




The Windsor-Essex Parkway Project Geotechnical Investigation and Design Report Permanent Cuts - Phase I (Station 10+070L to Station 10+900T)

Geocres No. 40J3-13

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1 Introduction

1.1 Preface

The Windsor Essex Parkway (the Parkway, or the WEP) was conceived to strengthen transportation and trade links between Canada and the United States, reduce road congestion, and foster economic growth. The Parkway will connect Highway 401 to a new Canadian inspection plaza and a new international crossing over the Detroit River to Interstate 75 in Michigan, USA. It will be a six-lane highway, 11 km long with 15 bridges, 11 tunnels and a four-lane service road that will provide full access to schools, neighbourhoods, natural areas, and shopping. Other components of the project include community and environmental features, such as: 300+ acres of green space, 20 km of recreational trails, extensive landscaping throughout the corridor, as well as noise and environmental mitigation measures. The environmental mitigation measures were based upon Permit AY-D-001-09 which was approved in February 2010.

The Parkway's strategic international importance, urban location, and unique ecological context necessitate strong design and planning principles to guide infrastructure development. The Parkway is to be a state-of-the-art facility within a contextually sensitive landscape setting that has ecological integrity, builds physical and cultural connections, and establishes a sustainable network of amenities that can be enjoyed by present and future generations.

The plans for the Parkway strive to build and strengthen linkages within and between both human and ecological communities. Over time, restored green space will evolve into a tall grass prairie and oak savannah landscape that will, through ecological succession, allow the roadway to become a 'Parkway in a Prairie'. All of the green space areas of the Parkway, (whether associated with the Roadway, the Stormwater Management Areas, the Ecological Landscape areas, or the Screening), are ecologically based areas that in their totality will represent an extensive habitat network consisting of existing, new and rehabilitated terrestrial and aquatic communities.

Natural and cultural history are proposed to be celebrated in the artful design of three Gateways, and eleven Land Bridges that support the existing municipal road system and the inter-connected multi-use pathway system. The Gateways are conceived as bold and commanding landscapes that draw on sculpted landform, strong patterning, and public art to create strong visual elements for the driving experience within themes of 'Arrival, Settlement, and Flow'.

The Land Bridges draw on natural and cultural influences to create distinct and memorable places that serve as markers, urban respite areas, and focal points to the overall green space system. Other opportunities for artistic expression include the streetscapes and urban amenity areas, trail bridges; tunnel abutments, and noise walls. These structural elements offer opportunities for simple expression of the surrounding natural environment, area history and the 'prairie' landscape in particular, through color, form, materials, and the integration of public art.

The lasting legacy of the Windsor Essex Parkway project will not only be its significant contribution as an international trade and transportation route, but rather include the establishment of a contiguous and sustainable green space system that contributes to the quality of life in the community and supports the re-establishment of an ecologically rich Carolinian landscape.

On December 17, 2010 Infrastructure Ontario and MTO announced that the Windsor Essex Mobility Group (WEMG) reached financial close and signed a fixed-price contract with the Province to design, build, finance and maintain the Windsor-Essex Parkway. To build the initial works, WEMG has formed a Design-Build Joint Venture – Parkway Infrastructure Constructors. This team includes Dragados Canada, Inc., Acciona Infrastructure Canada Inc., and Fluor Canada Ltd. This combination brings a wide range of local and international experience to the project.

1.2 Report Introduction

The 11.2 km long proposed WEP will run generally east-west and connect the existing Highway 401 in Tecumseh to the proposed new international crossing bridge across Detroit River (near Zug Island). It will run successively along segments of Highway 3 and Huron Church Road and then adjacent to the E.C. Row Expressway to its intersection with Ojibway Parkway. It will be constructed mostly within a cut section until the intersection of Huron Church Road and E.C. Row Expressway, beyond which it will be mostly on embankments. The proposed WEP includes 15 bridges (Bridges B-1 to B-15), 11 tunnels (numbered T-1 to T-11), 9 trail bridges, approximately 5.5 km length of retaining walls, 2 submerged culverts, and other structures.

The design for Highway 401 – Phase I requires permanent cuts along the alignment shown in Drawings 285380-04-090-WIP1-0060 to 0069¹. This report presents the geotechnical design of the permanent cuts for the depressed portion of Highway 401 – Phase I, located between Sta. 10+070L (LaSalle) and Sta. 10+900T (Tecumseh) along the proposed Highway 401 in the LaSalle and Tecumseh sectors of the proposed Windsor-Essex Parkway (WEP) project. The report includes the results of geotechnical investigation carried out to support the design and other relevant background information. It also addresses review comments from MTO.

This report addresses only the permanent cuts sections that are not associated with the retaining walls (e.g. HRW, MSEW, MSHP and SRW) proposed for this project. The geotechnical design of the retaining walls (along with associated permanent cuts for depressed portion of Highway 401) has been addressed in separate reports.

The design presented in this report was generally advanced from the preliminary geotechnical design developed for the WEMG (Windsor-Essex Mobility Group) proposal in June 2010 (ref. R-43)². The geotechnical design has been developed through interactive collaboration of the geotechnical, structural, other design disciplines as well as the Parkway Infrastructure Constructors (PIC).

¹ All Drawings are included at the end of the text of this report.

² References are listed in Section 9.

The report is organized in two parts. Part 1 is the Factual Information and is presented in Sections 1 to 4. Part 2 presents the geotechnical design and recommendations in Sections 5 and 6. Other information is presented in Sections 7 to 9.

The design complies with the requirements of the execution version of the Project Agreement (PA) Schedule 15-2 Part 2, Article 5.

2 Background Information

2.1 Geological Setting

The WEP project site is located within the Essex Clay Plain (a part of the St. Clair Clay Plain physiographic region described in references R-16, R-18, R-19 and R-26). The Essex Clay Plain was deposited during the retreat of the late Pleistocene Era ice sheets, when a series of glacial lakes inundated the area. The ice sheets generally deposited materials with a glacial till like gradation in the Windsor area. Depending on the locations of the glacial ice sheets and depths of water in the ice-contact glacial lakes, the materials may have been directly deposited at the contact between the ice sheet and bedrock or, as the lake levels rose and the ice sheets retreated and floated, the soil and rock debris within and at the base of ice may have been deposited through the lake water (i.e., lacustrine environment). It is considered that unlike typical till deposits (that have undergone consolidation and densification under the weight of the ice sheet), the majority of the “glacial till” soils in the Windsor and Detroit area were deposited through water and have a soft to firm consistency below a surficial crust layer that has become stiff to hard due to weathering and desiccation. Geologically, the deposit in the project area is considered to be slightly over-consolidated, having experienced no major overburden stresses in excess of the existing stresses.

The overburden in the St. Clair Clay Plain has variously been described as a clayey silt till, silty clay till and glaciolacustrine clay. Hudec (ref. R-26) summarized the overburden geology in Windsor as consisting of the following successive strata: desiccated lacustrine clay, normally consolidated lacustrine clay, silty Tavistock till, glaciolacustrine clay and coarse Catfish Creek till. A distinct change in overburden deposits occurs in the east-west direction along a boundary located generally along the Huron-Church Road. Whereas, the eastern part of Windsor is underlain by firm to stiff glaciolacustrine silts and clays with upper deposits of stiff sandy to silty weathered clay and hard to stiff lacustrine clay-silt crust, the western part of Windsor is characterized by a thin surficial granular deposit underlain by thin crust layer, in turn, underlain by soft to firm glaciolacustrine silts and clays.

At the WEP project area, the glacial till like deposit is typically 20 to 35 m thick and consists primarily of silty clay and clayey silt gradation with a random distribution of coarser particles. Random and apparently discontinuous seams / lenses of silt, sand and or gravel are present at various depths within the mass of the silty clay deposit. A firm to hard surficial crust layer has formed due to desiccation. Up to 2 m thick surficial layers of lacustrine silty clay or silt and sand are also encountered in the western sector of the project. A 1 m to 6 m thick very dense or hard basal glacial till or dense silty sand may be found directly overlying the bedrock surface. The bedrock at the project area comprises the Devonian Dundee Formation of the Hamilton group of formation and the underlying Devonian Lucas Formation of the Detroit River group of formation.

The Windsor area, referred to as the Essex Domain (with respect to bedrock geology), is located in the Grenville Front Tectonic Zone (GFTZ) (ref. R-26). The bedrock geology within the Essex Domain was formed as part of the midcontinent rift south-eastern extension. The midcontinent rift south-eastern extension is composed of Paleozoic cover rocks which form the bedrock foundation of the Essex Domain. The bedrock was deposited in the Paleozoic Era during the Middle Devonian period. Within the Essex

Domain the following strata were deposited the Hamilton Group, Dundee Formation, and Detroit River Group Onondaga Formation all consisting of Limestone, Dolostone, and Shale.

2.2 Site Seismic Background

Windsor-Tecumseh area is described in Canadian Highway Bridge Design Code (CHBDC, ref. R-9) by a seismic hazard associated to a Velocity Zone $Z_v = 0$ and Acceleration seismic zone $Z_a = 0$. Zonal Velocity ratio, V , and Zonal Acceleration ratio, A , are both 0.

In accordance with the CHBDC, the soil profile at the site of the project generally meets the description for Soil Profile Type III (soft clay and silts greater than 12 m in depth). A limited number of cross-hole tests was completed during the background investigation program (ref. R-21) at locations distributed strategically along is the project alignment between Howard Avenue (east end) and Matchette Road (west end). The measured velocities of the shear waves were consistently over 200 m/s, with the bulk of results ranging between 200 and 300 m/s.

2.3 Site Conditions

The depressed Highway 401 – Phase I is situated in the LaSalle and Tecumseh segment of the Parkway (i.e., the east segment of the WEP. The construction for this phase of the depressed Highway 401 will be carried under WEP Phase I development and will be used to carry Highway 401. Several tunnels and bridges will be constructed along and over the depressed Highway 401, respectively.

The topography of the lands immediately adjacent the proposed depressed Highway 401 is gently variable with elevation ranging from approximately 181.5³ to 187. It is understood that some local residential dwellings will be demolished and the local access roadway will be reconfigured to accommodate the depressed Highway 401. Adjacent land use is typically both residential and commercial.

2.4 Frost Depth

In accordance with MTO–SDO-90-01 Pavement Design and Rehabilitation Manual (ref. R-38) and OPSD 3090.101 the frost depth below the ground surface in Windsor area is estimated to 1.0 m⁴. This estimate is considered applicable for natural soils and / or conventional pavement materials where the ground surface is usually cleaned from the snow cover.

In the case of rip rap, or otherwise coarse rockfill cover, the insulation effects of such materials are considered to be approximately one half of the insulation offered by soil deposits /cover, and the depth of frost penetration will have to be increased accordingly.

³ Elevations are in metres and are referred to geodetic datum.

⁴ Ontario Provisional Standard Drawing is included at the end of the report text.

3 Geotechnical Investigations

3.1 Scope and Procedures of Geotechnical Investigations

Geotechnical investigations involving a number of boreholes, cone penetration tests (CPT) and Nilcon vane tests had been carried out in 2007-09 by Golder Associates (ref. R-16 to R-23) to develop the conceptual design and serve as part of background information for development of the WEP proposal designs. Additional geotechnical investigation has been carried out to supplement the available subsurface soil data, as required to support the detailed design development of the WEP embankment and structures.

For subsurface conditions description, the Phase I area of the WEP has been divided into ten (10) segments, represented by Soil Profiles #9 to #18⁵, along the alignment of the Highway 401:

- Soil Profile #9 (Table A.1) Sta. 14+700W to Sta. 10+400L
- Soil Profile #10 (Table A.2) Sta. 10+400L to Sta. 11+000L
- Soil Profile #11 (Table A.3) Sta. 10+900L to Sta. 11+500L
- Soil Profile #12 (Table A.4) Sta. 11+500W to Sta. 12+000L
- Soil Profile #13 (Table A.5) Sta. 12+000L to Sta. 12+800L
- Soil Profile #14 (Table A.6) Sta. 12+800L to Sta. 13+400L
- Soil Profile #15 (Table A.7) Sta. 13+400L to Sta. 10+100T
- Soil Profile #16 (Table A.8) Sta. 10+100T to Sta. 10+700T
- Soil Profile #17 (Table A.9) Sta. 10+700T to Sta. 11+400T
- Soil Profile #18 (Table A.10) Sta. 11+500T to Sta. 12+300T

The list of the test holes put down along the Phase I of the WEP during both the previous and the current geotechnical investigations are provided in Tables A.1 to A.10 in Appendix A for each segment.

Drawings 285380-04-090-WIP1-0060 to 0069 show the locations of the test holes and an interpreted soil stratigraphic profile along the WEP centreline of Phase I.

3.2 Additional Investigation

As indicated in Tables A.1 to A.10, the additional investigation program along the proposed location of permanent cuts - Phase I of Highway 401 comprised a total of 134 boreholes, 39 cone penetration tests, 18 Nilcon vane profiles (adjacent to boreholes), 11 flat plate dilatometer tests and 12 test pits.

⁵ The WEP has been divided into a number of 500 to 800 m long segments in consideration of the variation in soil conditions and Parkway components. The soil properties (such as, undrained shear strength, stress history, natural moisture content, consistency limits and compression index) with depth for these segments have been compiled on a number of "Soil Profiles". Soil Profiles #9 to #18 illustrate the soil properties for the Parkway Phase I.

3.2.1 Fieldwork

The investigation fieldwork along permanent cuts Phase I was carried out between April 19, 2011 and September 1, 2011, and comprised the following exploratory works:

- Boreholes (including sampling, testing and conventional vane tests);
- Nilcon Vane Tests;
- Cone Penetration Tests (CPT);
- Thin-Blade Dilatometer Tests (DMT); and
- Test Pits.

The boreholes were advanced using track-mounted CME55 auger rigs owned and operated by Marathon Drilling Co. Ltd. under a contract to AMICO and under technical supervision by AMEC engineers and technicians. Boreholes were generally advanced using 215 mm OD hollow stem augers, followed by wash boring with NW casing.

Soil sampling was carried out using 50 mm diameter split spoon samplers or thin-walled Shelby tubes (70 mm diameter by 600 mm long). Soil sampling was carried out generally at 0.75 m depth interval in the top 7 to 8 m and at 1.5 m depth intervals thereafter. All samples were identified by an experienced technologist, placed in airtight containers in the field and transported to AMEC's Tecumseh (Windsor) laboratories for further examination and testing⁶. Rock coring of the bedrock was completed using NQ or HQ sized core barrels with a length of 1.5 m.

Standard Penetration Tests (SPT, ASTM D1586) were carried out in conjunction with split spoon sampling. Field vane tests (using conventional vanes) were carried out in between sampling at selected depths.

The Nilcon vane tests listed in Tables A.1 to A.10 in Appendix A were carried typically adjacent the boreholes. Nilcon vane blade was pushed into the ground from the bottom of shallow pre-augered holes through surficial soils using the hydraulic ram of the drill rig. The Nilcon vane test was conducted in accordance with ASTM D2573-01.

Tables A.11 to A.20 in Appendix A summarize the depths of overburden penetration and rock coring as well as the list of instruments at each borehole location and the accompanying Nilcon vane tests.

Rock cores were examined and photographed in the field. For each core run, rock core recovery and rock quality designation (RQD) were determined. The recovery and RQD values are given on the borehole logs.

The boreholes were decommissioned using a bentonite-cement grout following completion of sampling, testing and instrument installation.

⁶ Advanced laboratory tests (consolidation, consolidated/unconsolidated undrained triaxial tests) were carried out in AMEC's Scarborough laboratory.

The CPT cone was pushed at a constant rate into the ground using the hydraulic ram system of the drill rig. The tests were conducted following the provisions of ASTM D 5778. All CPTs were advanced to refusal. Pore pressure dissipation tests were carried out at selected depths.

Similarly, the DMT probe was pushed into the ground in increments of 200 mm using the hydraulic ram of the drill rig. The test was conducted following the provisions of ASTM D 6635.

The locations of boreholes, Nilcon tests, CPTs and test pits executed during the previous pre-bid and additional investigations as also the inferred soil profile along the WEP alignment are shown on Drawings 285380-04-090-WIP1-0060 to 0069. Borehole, Nilcon Vane, CPT and DMT logs from the additional investigation are included in Appendix A. Test pit logs from the additional investigations are included in Appendix C. Relevant Borehole and CPT logs from the previous investigations are included in Appendix D.

3.2.2 Laboratory Testing

All recovered soil samples and rock cores were examined in the field and the laboratory. Natural moisture content tests were carried out on most of the recovered samples; grain size distribution and Atterberg limit tests were carried out on selected representative samples. Following these soil classification tests, representative soil samples were selected for advanced tests (e.g., triaxial compression tests, direct shear tests and one-dimensional consolidation tests.)

Compression strength tests were carried out on selected representative rock core samples.

The results of laboratory soil classification tests (e.g. natural moisture contents and Atterberg limits) are indicated on borehole logs. The results of grain size distribution, Atterberg limits, triaxial, direct shear and oedometer tests carried out on the samples obtained from the Phase I area of the WEP during the additional geotechnical investigation in 2011 are included in Appendix B.

3.2.3 Instrumentation

Geotechnical instruments (vibrating wire piezometers – VWP, spider magnets heave/settlement gauges – MHSG and inclinometer casings – IN) were installed at selected locations on completion of boreholes to monitor pore water pressure and deformation behaviour of the soil strata during and after construction. A brief description of the instruments follows.

Vibrating Wire Piezometers: The VWP transducers (RST Model VW2100, 0.35 MPa for shallow to mid-depth and 0.7 MPa for deep installations) were installed to measure pore water pressures in soil strata at the selected depths and their electrical wires extended to the monitoring station at the ground surface. The borehole was filled with a bentonite-cement mixture designed to match, as near as practical, the permeability and strength-deformation characteristics of the native soils.

Magnetic Settlement/Heave Gauges: Spider magnets (RST, Model SSMM100 mechanical release spider target for 25 mm pipe) were installed in boreholes at select locations and depths to permit future measurement of heave and settlement. Each magnetic torus was placed around a 25 mm diameter pipe, which was extended to above the ground surface. The spider legs grip into the surrounding soil, which

enables the magnetic torus to move up or down on the pipe as the soil settles or heaves. The locations of the magnetic torus are determined by lowering a magnetic probe inside the pipe.

Inclinometers: A total 11 inclinometer casings were installed in the area of Phase I. The purpose of this device is to measure the lateral ground movement at the installed location. The bottom end of the casing was anchored approximately 0.6 to 1.5 m into bedrock, and the annular space around the casing was filled with bentonite-cement grout. The inclinometer comprised 70 mm diameter RST “Snap Seal Inclinometer Casing”, and the probe is IC32005 MEMS digital inclinometer system (0.5 m long).

Proper future decommissioning of the instrumentation holes is responsibility of WEMG/PIC.

3.3 Data Interpretation – General Discussion

The results of field and laboratory tests carried out over the entire length of the WEP Project during the pre-bid and additional investigations were interpreted to deduce the shear strength (undrained and drained), deformability and permeability properties of the silty clay strata. Whereas some properties (e.g., undrained shear strength profiles) were based on data relating to the Parkway segment under design consideration, other properties (e.g., drained shear strength, compressibility, etc.) were interpreted to develop relationships with some index properties (e.g., natural moisture content or plasticity index) for the entire project site and the soil parameters were obtained from these relationships.

Field Vane Test Data Correction: The chart (Figure 3.1⁷) developed initially by Bjerrum (1972) and updated subsequently by Ladd et al (1977) based on circular arc failure analyses of embankment failures suggest correction by multiplying the field vane data by 1.05 to 1.10 for soils with plasticity index (PI) of about 15. However, based on re-evaluation of the Bjerrum chart by Aas et al. (1986), the Canadian Foundations Engineering Manual suggests that the vane test data for clays with PI<20 should not be corrected (ref. R-1 and R-43, and Figure 3.2). Therefore, the field vane test data (from conventional and Nilcon vane tests) at this site were not corrected for PI.

Strength Profiles from Cone Penetration Tests: The undrained shear strength of the silty clay/clayey silt deposit was estimated using the CPT tip resistance, Q_t , as follows:

$$S_{u\text{CPT}} = \frac{Q_t - \sigma_{vo}}{N_{kt}}$$

Where:

$S_{u\text{CPT}}$ is the undrained shear strength estimated from the CPT test;

Q_t is the corrected total cone tip resistance;

⁷ All figures are included at the end of the report text.

σ_{vo} is the total vertical stress at the corresponding depth of measurement of the Q_t value; and

N_{kt} is an empirical factor that varies, depending on soil type and test arrangement, typically between 8 and 20.

The CPT based S_u profiles were developed to achieve a general agreement with the nearby Nilcon vane test profiles. In this regard, the N_{kt} factor values used to calibrate the CPT strength profiles varied slightly for different segments of the WEP and the soil strata. Thus, N_{kt} factor of 14 was used to estimate the undrained shear strength of the clay crust and transition layers. The N_{kt} factors used for the underlying grey silty clay to clayey silt stratum and the lower clayey silt stratum were 15-16⁸, and 12-13⁹, respectively. Figures 3.3 to 3.12 present the undrained shear strength profiles for WEP segment (Phase I) between Sta. 14+700W and Sta. 12+300T, and illustrate a generally good agreement between the estimated undrained shear strength profile using the CPT data and the measured shear strength profile from Nilcon vane tests. In CPTs indicating pore pressures higher than cone tip resistance, the undrained shear strength was estimated from the excess pore pressures (using the N_u method).

Pre-Consolidation Pressures from Cone Penetration Tests: The approach used for estimating the pre-consolidation pressures from the estimated S_u profiles follows the Stress History and Normalized Soil Engineering Properties (SHANSEP) method developed at MIT (Ladd and Foott, 1974, ref. R-31). The following relationship was used to compute the pre-consolidation pressures:

$$OCR = \frac{\sigma'_p}{\sigma'_{vo}} = \left[\frac{S_u / \sigma'_{vo}}{S} \right]^{1/m}$$

Where:

S_u is the undrained shear strength;

σ'_{vo} is the vertical effective stress;

σ'_p is the pre-consolidation pressure (also referred as maximum past pressure);

S is the normalized strength ratio, S_u/σ'_v , of normally consolidated soil;

OCR is the overconsolidation ratio; and

m is an empirically determined exponent, typically varying between 0.7 and 1.0.

⁸ N_{kt} values for upper silty clay 15 (for 9+700W to 13+500W), 16 (for 13+500W to 13+400L) and 15 (for 13+400L to 10+700T)

⁹ N_{kt} values for lower clayey silt 13 (for 9+700W to 13+500W), 12 (for 13+500W to 13+400L) and 13 (for 13+400L to 10+700T)

Based on plasticity index of the clayey silt to silty clay deposit, values of $S = 0.18$ and $m = 0.95$ were chosen to estimate the maximum past pressures from the inferred undrained shear strength profile. The maximum past pressure, σ'_p can then be estimated as:

$$\sigma'_p = \sigma'_{vo} \times \left[\frac{S_{u\text{CPT}}}{\sigma'_{vo}} \right]^{1.05}$$

Flat Blade Dilatometer (DMT) Test Data: DMT tests were conducted following the ASTM D6635-01 (2007) method. The soil properties from the results of these tests were developed in general using the guidelines layout in ISSMGE, 2001 (ref. R-27), except that the undrained shear strength values for the clay deposits were estimated using the relationship $S_u = S \sigma'_{vo} (0.5 K_d)^{1.25}$, where $S = 0.18$ and K_d is the horizontal stress index represented by:

$$K_d = (p_0 - u_0) / \sigma'_{vo}$$

Where:

p_0 is the corrected instrument lateral pressure reading at zero membrane deformation (null method)

u_0 is the pore water pressure in the soil prior to the blade insertion

The constant 0.18 for S_u/σ'_{vo} for OCR=1 is based on average plasticity index of the silty clay to clayey silt stratum and the Chandler 1988 relationship (ref. R-11).

The undrained shear strength (S_u), pre-consolidation (maximum past) pressure (σ'_p), natural water content (w_N) and compression index (C_c) profiles based on field and laboratory testing from boreholes, CPTs and DMT carried out in Phase I segment are presented on Figures 3.3 to 3.12. Also included on this figure are $0.18 \times \sigma'_{vo}$ curve (representing OCR=1) and simplified soil stratigraphic deposits to facilitate correlation of soil properties to the individual soil units.

Stress-Strain and Effective Shear Strength Properties of the Silty Clay Strata: The stress-strain properties and the effective shear strength properties of the silty clay deposit were based on test results from the pre-bid geotechnical investigations (ref. R-16, R-17, R-18 and R-19) and the one-dimensional consolidation tests, triaxial shear tests and direct shear tests performed during the additional geotechnical investigation described in Section 3.1. These interpreted trends are supported by published correlations in the literature (Kulhawy and Mayne, 1990, ref. R-30, Leroueil et al., 2001, ref. R-34 and Terzaghi et al., ref. R-42).

The stress-strain relationships are correlated to natural water content (w_N , expressed as percent) as illustrated in Figures 4.1 and 4.2 and summarized as follows:

$$C_c = 0.0086w_N - 0.0086$$

$$C_r = 0.11C_c$$

$$C_s = 0.25C_c$$

$$C_\alpha = 0.028C_c$$

The modulus of elasticity has been correlated with the undrained shear strength of the material, published information (ref. R-42) and local experience (ref. R-19) as follows:

$$E_u = 300 S_u \quad \text{for undrained condition}$$

$$E' = 0.9E_u \quad \text{for drained condition}$$

In the case of the clay crust, E_u was estimated 35 MPa based on general experience with settlements for shallow foundations in the area.

The effective shear strength properties applicable to the silty clay to clayey silt stratum were determined from triaxial and direct shear tests performed during the pre-bid and additional geotechnical investigations and supported by published PI versus ϕ' relationships (ref. R-34 and R-42). These strength parameters are summarized as follows (Figures 4.3 and 4.4):

| | |
|---|-------------------------|
| Apparent cohesion, c' | 0 kPa |
| Angle of internal friction, ϕ | 30° |
| Friction angle at critical state ¹⁰ , Φ_c , | 25° - 26° |

The hydraulic conductivity of the silty clay to clayey silt stratum was interpreted from pore pressure dissipation tests carried out in the CPT probes as well as the laboratory oedometer tests. The hydraulic conductivity values obtained from previous (2007-09) and additional (2011) investigations are plotted on Figure 4.5.

¹⁰ Based on triaxial tests (ref. R-18).

4 Subsurface Conditions

Overburden: As indicated earlier, the subsurface conditions in Phase I area of the WEP are divided into ten (10) segments (Soil Profiles #9 to #18) along the alignment of the Highway 401. Soil property profiles are provided in the Figures 3.3 to 3.12.

The general soil stratigraphy at the borehole locations consists of the following successive strata: topsoil, surficial layers of occasional fills and upper granular deposit, an extensive cohesive clayey silt to silty clay deposit, and lower granular deposit, overlying limestone bedrock.

As described in Sections 4.1 to 4.10, the clayey silt to silty clay stratum may be subdivided into 5 successive layers as follows: brown desiccated stiff to very stiff clay crust, transition zone, upper grey silty clay to clayey silt deposit (referred in hereafter as “upper silty clay”), mid grey silty clay (referred in hereafter as “mid silty clay”) and then a generally coarser lower grey clayey silt to silty clay (referred in hereafter as “lower clayey silt”) deposit. Lenses of up to 2 m thick of non-cohesive silty sand to sandy silt were encountered at a number of boreholes embedded within the upper silty clay stratum within the elevation range of 171 to 179.

Bedrock: Where rock coring was undertaken, a white to grey, limestone bedrock was encountered. The bedrock was generally fresh, medium strong, thinly laminated, fine grained, faintly to moderately porous and moderately fractured. The Rock Quality Designation (RQD) of the recovered rock cores varied on average between 50 to 100 per cent, indicating a fair to good quality. Based on this core logging the rock mass classification was estimated to range from 2.8 to 5 for the Q-System (Barton *et. al.*, 1974, ref. R-3) and 53 to 58 for the Rock Mass Rating (RMR) based on Bieniawski (1976, ref. R-5) and indicates that the rock mass can be considered as a fair quality rock mass based on the latter system.

The subsurface conditions encountered in the ten segments mentioned above (and Soil Profiles #9 to #18) are described hereafter in Sections 4.1 to 4.10.

4.1 Sta. 14+700W to Sta. 10+400L (Soil Profile #9)

The general soil stratigraphy at the borehole locations between Sta. 14+700W and Sta. 10+400L (Soil Profile #9) consists of the following successive strata: topsoil, surficial layers of occasional fills and upper granular deposit, an extensive cohesive clayey silt to silty clay deposit below about elevations ranging from 177.9 to 180.5, and lower granular deposit below about elevation 150.0, overlying limestone bedrock below about elevations ranging from 146.9 to 148.5. The thickness of the clayey silt to silty clay stratum at borehole locations varied between 28.7 and 30.3 m.

Bedrock was encountered at depths ranging from about 32.3 m to 34.7 m below the ground surface.

4.1.1 Topsoil, Surficial Fills and Upper Granular Deposit

Most of the boreholes, except as noted below, encountered surficial fills consisting of pavement materials, clayey topsoil and gravel to clayey silt. In some cases, the fills were underlain by a well-defined layer of former topsoil. The total thickness of the fills and underlying topsoil ranged from 0.2 to 3.0 m.

Brown to black topsoil was encountered at the ground surface in Test Holes BH T6-2, TB4-1, BH 13-RW, CPT-36RW, NIL 12-RW and BH 325. The thickness of the topsoil at these locations varied from 0.1 to 0.8 m, but is expected to vary in thickness through the project area.

A layer of upper granular deposit was encountered beneath the soils described above in Boreholes BH T6.3, BH PS3-1, CPT 34-RW, CPT 36-RW, CPT 38-RW, CPT 39-RW, NIL 12-RW, BH 127 and BH 325. The upper granular deposit consisted of sandy silt to sand and gravel. The thickness of the upper granular deposit varied from 0.1 to 1.1 m at the borehole locations.

4.1.2 Clayey Silt to Silty Clay Stratum

Cohesive silty clay material was encountered directly underlying the surficial topsoil or fill/granular deposit in all test holes. The encountered depth below existing ground surface was from 0.2 to 3.0 m. Based on the gradation, in-situ moisture content and strength characteristics, the stratum may be divided into 5 layers as follows: brown desiccated firm to hard clay crust, transition zone, upper grey silty clay deposit, mid grey silty clay and then a generally coarser lower grey clayey silt deposit. The properties of the clay stratum are listed later in Table 4-1 included at the end of Section 4.1.

The natural water content, Atterberg limits, compression index, and undrained shear strengths properties of the clay sub-strata for the Soil Profiles #9 are shown in Figure 3.3. As indicated previously, the undrained shear strength of clay has been estimated from CPT sounding, Nilcon vane and DMT measurement results for Soil Profile #9 segment along the proposed permanent cuts under Phase I, as shown in Figure 3.3.

The stress-strain, effective shear strength and hydraulic conductivity properties were described in Section 3.3. Table 4-1 summarizes the soil strength and compressibility properties for the various overburden layers at Soil Profile #9 area.

4.1.3 Lower Granular Deposit

Underlying the silty clay stratum at about elevations between 149.2 and 159.0 was a heterogeneous non-cohesive deposit with material gradation varying from silt and sand to sandy silt and gravel to cobbles and boulders, in some cases with layers of clayey silt to silty clay. Based on the Standard Penetration Test (SPT) “N” value ranging generally from 10 to greater than 100, this material is considered to be in a compact to very dense state of compactness, or stiff to hard state of consistency. This layer was approximately 2.0 to 7.3 m thick but will vary significantly throughout the project area.

4.1.4 Bedrock

Where rock coring was undertaken, a grey to brown, limestone bedrock was encountered. The bedrock was coarse to very fine grained, occasionally pitted, faintly to strongly porous and fractured. Bedrock was encountered at elevations ranging from 148.5 to 147.9 in the vicinity of Soil Profile #9. The Rock Quality Designation (RQD) of the recovered rock varied from 0 to 100 per cent, indicating a very poor to excellent quality. Rock core samples from BH 127 and BH 129 were tested and had unconfined compressive strengths of 83.7 and 79.5 MPa, respectively. The results of the compressive strength testing indicate that the upper portion of the limestone rock may be described as “strong” rock.

4.1.5 Groundwater Conditions

Shallow and deep standpipe and vibrating wire piezometers were installed in selected boreholes to measure the water levels within overburden and bedrock. The most recent readings at the time of issuance of this report are listed in Table 4-2. Prior readings are recorded on the borehole logs.

The piezometric water levels within the overburden and the lower granular/bedrock were observed between elevations 178.8 to 181.1, and 177.3 to 179.3, respectively (Table 4-2). The highest piezometric water levels within the overburden and the lower granular / bedrock were reported to be at about elevations 181.1 and 179.3, respectively. These observations suggest a downward gradient between the overburden and the bedrock. The piezometric water levels inferred from VWP's are inferred to have stabilized.

Perched groundwater is known to accumulate seasonally within the upper deposits of fill, topsoil and granular layers, and within the fissures in the silty clay crust. In adverse conditions, the perched groundwater levels can rise to near the ground surface.

In consideration of the above and the experience along the project alignment, occurrence of local artesian conditions in bedrock cannot be ruled out.

Table 4-1: Properties for Soil Profile #9 (Sta. 14+700W to 10+400L)

| Material Description | Elevation | Natural Water Content, w _N , % | Liquid Limit, w _L | Plastic Limit, w _P | Unit Weight, γ, kN/m³ | | Shear Strength | | | Design Undrained Modulus of Elasticity, E, kPa | Design Drained Poisson's Ratio* | Design Average Moisture Content used in Analyses, % | Design Compressibility Characteristics | | | | | Design Initial Void Ratio, e ₀ |
|-----------------------|-------------|---|------------------------------|-------------------------------|-----------------------|--------|---------------------------------|---------|------------------------------|--|---------------------------------|---|--|----------------|----------------|--|--------------------------------|---|
| | | | | | Measured | Design | Undrained, S _u , kPa | | Design Friction Angle, φ', ° | | | | C _c | C _r | C _α | Preconsolidation Pressure, P' _c , kPa | Over Consolidation Ratio (OCR) | |
| | | | | | | | Measured | Design | | | | | | | | | | |
| Upper Granular | 181.5 – 180 | - | - | - | - | 21 | - | - | 30 | 25,000 | 0.35 | - | - | - | - | - | - | |
| Clay Crust | 181.6 - 177 | 9.0 – 33.0 | 32.0 – 39.0 | 19.0 – 20.0 | - | 22 | - | 75 ** | 30 | 35,000 | 0.35 | 20 | 0.163 | 0.018 | 0.005 | 550 | >4 | 0.54 |
| Clay Transition | 177 - 175 | 18.0 – 28.0 | 29.0 – 36.0 | 16.0 – 18.0 | 20.2 | 22 | 44 - 186 | 75 - 60 | 30 | 20,000 | 0.35 | 21 | 0.172 | 0.019 | 0.005 | 550 - 350 | 2.5 | 0.57 |
| Upper Grey Silty Clay | 175 - 166 | 14.8 – 35.0 | 26.5 – 40.0 | 15.0 – 17.0 | 18.6 – 21.4 | 20.5 | 36 - 105 | 60 - 40 | 30 | 15,000 | 0.35 | 23 | 0.189 | 0.021 | 0.005 | 350 - 230 | 1.5 to 2 | 0.62 |
| Mid Grey Silty Clay | 166 - 163 | 14.8 – 25.4 | 25.0 – 34.9 | 12.0 – 18.6 | 21.4 | 20.5 | 37 - 93 | 40 - 45 | 30 | 12,500 | 0.35 | 21 | 0.172 | 0.019 | 0.005 | 230 - 260 | 1.2 | 0.57 |
| Lower Clayey Silt | 163 - 150 | 9.0 – 35.0 | 25.0 – 41.0 | 13.0 – 21.0 | 20.8 – 21.8 | 20.5 | 42 - 178 | 45 - 65 | 30 | 16,500 - 19,500 | 0.35 | 20 | 0.163 | 0.018 | 0.005 | 260 - 400 | 1.5 | 0.54 |
| Lower Granular | 150 – 148 | - | - | - | - | 22 | - | - | 30 | 40,000 | 0.35 | - | - | - | - | - | - | |

Note: Average ground water level at 179.0.
* Assumed values (ref. R-42).
** Undrained strength used in global stability analyses.

Table 4-2: Summary of Measured Water Levels in the Vicinity of Soil Profile #9 Area

| Borehole | Surface Elevation | Piezometer Type | Screen / Sensor Elevation | Strata Type at Screen / Sensor Depth | Measured Water level | |
|----------|-------------------|-----------------|---------------------------|--------------------------------------|----------------------|-----------|
| | | | | | Date | Elevation |
| BH T6-1 | 180.9 | S-Piez | 177.9 | Clayey Silt | Aug. 29, 2011 | 180.5 |
| | | VWP | 169.5 | Clayey Silt | Aug. 29, 2011 | 181.1 |
| | | VWP | 148.9 | Lower Granular | Aug. 29, 2011 | 178.8 |
| BH T6-2 | 180.9 | VWP | 169.5 | Clayey Silt | Aug. 29, 2011 | 180.6 |
| | | VWP | 162.6 | Clayey Silt | Aug. 29, 2011 | 180.4 |
| PS3-1 | 181.3 | VWP | 166.1 | Clayey Silt | - | - |
| | | VWP | 158.4 | Clayey Silt | - | - |
| | | VWP | 148.3 | Lower Granular | - | - |
| BH-127 | 181.3 | S-Piez | 145.2 | Limestone | Jan. 28, 2009 | 177.3 |
| BH-127A | 181.3 | S-Piez | 172.0 | Clayey Silt | Jan. 28, 2009 | 179.1 |
| BH-129 | 180.8 | S-Piez | 147.9 | Lower Granular | Jan. 28, 2009 | 177.5 |
| BH-129A | 180.8 | S-Piez | 171.7 | Clayey Silt | Jan. 28, 2009 | 178.8 |
| BH-323 | 181.3 | S-Piez | 143.0 | Limestone | Jan. 6, 2010 | 178.9 |
| BH-323 | 180.8 | S-Piez | 143.3 | Limestone | Jan. 6, 2010 | 179.3 |

Legend: S-Piez. Standpipe Piezometer
VWP Vibrating Wire Piezometer.

4.2 Sta. 10+400L to Sta. 11+000L (Soil Profile #10)

The general soil stratigraphy at the borehole locations between Sta. 10+400L and 11+000L (Soil Profile #10) consists of the following successive strata: topsoil, surficial layers of occasional fills and upper granular deposit, an extensive cohesive clayey silt to silty clay deposit below about elevations ranging from 179.1 to 183.3, and lower granular deposit below about elevation 150.0, overlying limestone bedrock below about elevations ranging from 146.6 to 149.7. The thickness of the clayey silt to silty clay stratum at borehole locations varied between 23.8 and 33.0 m.

Bedrock was encountered at depths ranging from about 32.0 m to 35.1 m below the ground surface.

4.2.1 Topsoil, Surficial Fills and Upper Granular Deposit

Many of the boreholes, including Boreholes B9-2, T7-1, TB5-1, DMT 5-RW, CPT 123, BH 126, BH 127, BH 319, BH 321 and CPT 322, encountered surficial fills consisting of pavement materials and/or clayey topsoil to clayey silt. In some cases, the fills were underlain by a well-defined layer of former topsoil. The total thickness of the fills and underlying topsoil ranged from 0.2 to 1.7 m.

Brown to black topsoil was encountered at the ground surface at the remaining boreholes. The thickness of the topsoil at these locations varied from 0.2 to 1.2 m, but is expected to vary in thickness through the project area.

A layer of upper granular deposit was encountered beneath the soils described above at all of the boreholes except for Boreholes B9-1, B9-2, CPT B9-1, T7-2, CMT T7-1, TB5-1, TB5-2, BH 122, CPT 123, BH 126, and CPT 322. The upper granular deposit consisted of sandy silt to sand and gravel. The thickness of the upper granular deposit varied from 0.2 to 2.0 m at the borehole locations.

4.2.2 Clayey Silt to Silty Clay Stratum

Cohesive clayey silt to silty clay material was encountered directly underlying the surficial topsoil or fill/granular deposit in all test holes. The encountered depth below existing ground surface was from 0.2 to 2.4 m. Based on the gradation, in-situ moisture content and strength characteristics, the stratum may be divided into 5 layers as follows: brown desiccated firm to hard clay crust, transition zone, upper grey silty clay deposit, mid grey silty clay and then a generally coarser lower grey clayey silt deposit. The properties of the clay stratum are listed later in Table 4-3 included at the end of Section 4.2.

The natural water content, Atterberg limits, compression index, and undrained shear strengths properties of the clay sub-strata for the Soil Profiles #10 are shown in Figure 3.4. The undrained shear strength of clay has been estimated from CPT sounding, Nilcon vane and DMT measurement results for Soil Profile #10 segment along the proposed permanent cuts under Phase I, as shown in Figure 3.4.

The stress-strain, effective shear strength and hydraulic conductivity properties were described in Section 3.3. Table 4-3 summarizes the soil strength and compressibility properties for the various overburden layers at Soil Profile #10 area.

4.2.3 Lower Granular Deposit

Underlying the silty clay stratum at about elevations between 150.4 and 161.0 was a heterogeneous non-cohesive deposit with material gradation varying from silt and sand to sandy silt and gravel to cobbles and boulders, in some cases with layers of clayey silt to silty clay. Based on the Standard Penetration Test (SPT) “N” value ranging generally from 10 to greater than 100, this material is considered to be in a compact to very dense state of compactness, or stiff to hard state of consistency. This layer was approximately 2.0 to 6.5 m thick but will vary significantly throughout the project area.

4.2.4 Bedrock

Where rock coring was undertaken, a grey to brown, limestone bedrock was encountered. The bedrock was coarse to very fine grained, occasionally pitted, faintly to strongly porous and fractured. Bedrock was encountered at elevations ranging from 146.6 to 149.7 in the vicinity of Soil Profile #10. The Rock Quality Designation (RQD) of the recovered rock varied from 0 to 100 per cent, indicating a very poor to excellent quality. A sample of the rock core obtained from Boreholes B9-3 and B10-1 were tested in compression to failure and had unconfined compressive strengths of 77.8 and 64.9 MPa, respectively. Rock core from Borehole BH 122 was tested and had an unconfined compressive strength of 14.2 MPa. The results of the compressive strength testing indicate that the upper portion of the limestone rock may be described as “weak to strong” rock.

4.2.5 Groundwater Conditions

Shallow and deep standpipe and vibrating wire piezometers were installed in selected boreholes to measure the water levels within overburden and bedrock. The most recent readings at the time of issuance of this report are listed in Table 4-4. Prior readings are recorded on the borehole logs.

The piezometric water levels within the overburden and the lower granular/bedrock were observed between elevations 178.9 to 181.9, and 177.2 to 178.3, respectively (Table 4-4). The highest piezometric water levels within the overburden and the lower granular/bedrock were reported to be at about elevations 181.9 and 178.3, respectively. These observations suggest a downward gradient between the overburden and the bedrock. The piezometric water levels inferred from VWP's are inferred to have stabilized.

Perched groundwater is known to accumulate seasonally within the upper deposits of fill, topsoil and granular layers, and within the fissures in the silty clay crust. In adverse conditions, the perched groundwater levels can rise to near the ground surface.

In consideration of the above and the experience along the project alignment, occurrence of local artesian conditions in bedrock cannot be ruled out.

Table 4-3: Properties for Soil Profile #10 (Sta. 10+400L to 11+000L)

| Material Description | Elevation | Natural Water Content, w _N , % | Liquid Limit, w _L | Plastic Limit, w _P | Unit Weight, γ, kN/m ³ | | Shear Strength | | | Design Undrained Modulus of Elasticity, E, kPa | Design Drained Poisson's Ratio* | Design Average Moisture Content used in Analyses, % | Design Compressibility Characteristics | | | | | Design Initial Void Ratio, e ₀ |
|-----------------------|---------------|---|------------------------------|-------------------------------|-----------------------------------|--------|---------------------------------|---------|------------------------------|--|---------------------------------|---|--|----------------|----------------|--|--------------------------------|---|
| | | | | | Measured | Design | Undrained, S _u , kPa | | Design Friction Angle, φ', ° | | | | C _c | C _r | C _α | Preconsolidation Pressure, P' _c , kPa | Over Consolidation Ratio (OCR) | |
| | | | | | | | Measured | Design | | | | | | | | | | |
| Upper Granular | 183.5 – 179.4 | - | - | - | - | 21 | - | - | 30 | 25,000 | 0.35 | - | - | - | - | - | - | |
| Clay Crust | 181.9 - 177 | 6.0 – 32.0 | 31.0 – 44.0 | 14.0 – 22.0 | - | 22 | - | 75 ** | 30 | 35,000 | 0.35 | 19 | 0.155 | 0.017 | 0.004 | 550 | >4 | 0.51 |
| Clay Transition | 177 - 175 | 15.0 – 26.0 | 30.0 – 34.0 | 15.0 – 17.0 | 20.7 – 20.8 | 22 | 38 - 186 | 75 - 65 | 30 | 21,000 | 0.35 | 20 | 0.163 | 0.018 | 0.005 | 550 - 350 | 2.5 | 0.54 |
| Upper Grey Silty Clay | 175 - 166 | 14.8 – 46.7 | 26.0 – 38.0 | 15.0 – 18.0 | 18.6 – 21.4 | 20.5 | 36 - 105 | 65 - 40 | 30 | 16,000 | 0.35 | 24 | 0.198 | 0.022 | 0.006 | 350 - 230 | 1.5 | 0.65 |
| Mid Grey Silty Clay | 166 - 163 | 14.9 – 28.5 | 26.0 – 31.1 | 13.9 – 15.0 | 21.9 | 20.5 | 37 - 107 | 40 - 50 | 30 | 13,500 | 0.35 | 17 | 0.138 | 0.015 | 0.004 | 230 - 260 | 1.2 | 0.46 |
| Lower Clayey Silt | 163 - 151 | 13.0 – 34.0 | 19.0 – 50.0 | 13.0 – 22.0 | 20.0 – 21.9 | 20.5 | 40 - 161 | 50 - 65 | 30 | 17,000 - 19,500 | 0.35 | 19 | 0.155 | 0.017 | 0.004 | 260 - 400 | 1.2 | 0.51 |
| Lower Granular | 151 – 148 | 12.6 – 29.4 | - | - | - | 22 | - | - | 30 | 40,000 | 0.35 | - | - | - | - | - | - | |

Note: Average ground water level at 179.0.
*Assumed values (ref. R-42).
** Undrained strength used in global stability analyses.

Table 4-4: Summary of Measured Water Levels in the Vicinity of Soil Profile #10 Area

| Borehole | Surface Elevation | Piezometer Type | Screen / Sensor Elevation | Strata Type at Screen / Sensor Depth | Measured Water level | |
|----------|-------------------|-----------------|---------------------------|--------------------------------------|----------------------|-----------|
| | | | | | Date | Elevation |
| BH B9-1 | 180.9 | VWP | 172.8 | Clayey Silt | Aug. 6, 2011 | 181.9 |
| | | VWP | 165.4 | Clayey Silt | Aug. 6, 2011 | 181.8 |
| BH B9-2 | 180.9 | VWP | 172.0 | Clayey Silt | Aug. 6, 2011 | 181.0 |
| | | VWP | 164.1 | Clayey Silt | Aug. 6, 2011 | 179.8 |
| | | VWP | 150.4 | Lower Granular | Aug. 6, 2011 | 177.6 |
| BH B9-3 | 183.5 | VWP | 168.3 | Clayey Silt | Aug. 29, 2011 | 180.3 |
| | | VWP | 158.3 | Clayey Silt | Aug. 29, 2011 | 178.9 |
| BH B10-1 | 182.6 | VWP | 173.6 | Clayey Silt | Aug. 29, 2011 | 181.0 |
| | | VWP | 162.0 | Clayey Silt | Aug. 29, 2011 | 180.4 |
| BH T7-1 | 181.5 | VWP | 172.4 | Clayey Silt | Aug. 6, 2011 | 180.5 |
| | | VWP | 161.7 | Clayey Silt | Aug. 6, 2011 | 180.4 |
| BH T7-2 | 181.2 | VWP | 171.9 | Clayey Silt | Aug. 6, 2011 | 179.7 |
| | | VWP | 161.9 | Clayey Silt | Aug. 6, 2011 | 181.0 |
| | | VWP | 148.9 | Lower Granular | Aug. 6, 2011 | 177.7 |
| PS3-1 | 181.3 | VWP | 166.1 | Clayey Silt | - | - |
| | | VWP | 158.4 | Clayey Silt | - | - |
| | | VWP | 148.3 | Lower Granular | - | - |
| BH-122 | 181.7 | S-Piez | 143.2 | Limestone | Jan. 28, 2009 | 177.2 |
| BH-122A | 181.7 | S-Piez | 172.5 | Clayey Silt | Jan. 28, 2009 | 180.2 |
| BH-127 | 181.3 | S-Piez | 146.7 | Limestone | Jan. 28, 2009 | 177.3 |
| BH-127A | 181.3 | S-Piez | 172.0 | Clayey Silt | Jan. 28, 2009 | 179.1 |
| BH-321 | 183.1 | S-Piez | 143.7 | Limestone | Jan. 6, 2010 | 178.3 |

Legend: S-Piez. Standpipe Piezometer
VWP Vibrating Wire Piezometer.

4.3 Sta. 10+900L to Sta. 11+500L (Soil Profile #11)

The general soil stratigraphy at the borehole locations between Sta. 10+900L and 11+500L (Soil Profile #11) consists of the following successive strata: topsoil, surficial layers of occasional fills and upper granular deposit, an extensive cohesive clayey silt to silty clay deposit below about elevations ranging from 180.4 to 183.9, and lower granular deposit below about elevation 151.0, overlying limestone bedrock below about elevations ranging from 149.1 to 150.4. The thickness of the clayey silt to silty clay stratum at borehole locations varied between 26.0 and 32.1 m.

Bedrock was encountered at depths ranging from about 32.1 to 33.2 m below the ground surface.

4.3.1 Topsoil, Surficial Fills and Upper Granular Deposit

All of the boreholes except for BH / CPT 40-RW and BH / CPT 319 encountered brown to black topsoil at the ground surface. The thickness of the topsoil at these locations varied from 0.2 to 0.6 m, but is expected to vary in thickness through the project area.

Test hole BH / CPT 40-RW was advanced through 0.3 m of surficial fill consisting of crushed limestone sand and gravel. Test hole BH / CPT 319 was advanced through 0.2 m of asphaltic pavement and granular base.

A layer of upper granular deposit was encountered beneath the soils described above at Test Holes BH B10-2, B10-6, B10-8 and BH / CPT 40-RW. The upper granular deposit consisted of fine sand to silty sand. The thickness of the upper granular deposit varied from 0.3 to 0.7 m at the borehole locations.

4.3.2 Clayey Silt to Silty Clay Stratum

Cohesive clayey silt to silty clay material was encountered directly underlying the surficial topsoil or fill/granular deposit in all test holes. The encountered depth below existing ground surface was from 0.2 to 0.9 m. Based on the gradation, in-situ moisture content and strength characteristics, the stratum may be divided into 5 layers as follows: brown desiccated firm to hard clay crust, transition zone, upper grey silty clay deposit, mid grey silty clay and then a generally coarser lower grey clayey silt deposit. The properties of the clay stratum are listed later in Table 4-5 included at the end of Section 4.3.

The natural water content, Atterberg limits, compression index, and undrained shear strengths properties of the clay sub-strata for the Soil Profiles #11 are shown in Figure 3.5. The undrained shear strength of clay has been estimated from CPT sounding, Nilcon vane and DMT measurement results for Soil Profile #11 segment along the proposed permanent cuts under Phase I, as shown in Figure 3.5.

The stress-strain, effective shear strength and hydraulic conductivity properties were described in Section 3.3. Table 4-5 summarizes the soil strength and compressibility properties for the various overburden layers at Soil Profile #11 area.

4.3.3 Lower Granular Deposit

Underlying the silty clay stratum at about elevations between 150.3 and 155.2 was a heterogeneous non-cohesive deposit with material gradation varying from silt and sand to sandy silt and gravel to cobbles and boulders, in some cases with layers of clayey silt to silty clay. Based on the Standard Penetration Test (SPT) “N” value ranging generally from 10 to greater than 100, this material is considered to be in a compact to very dense state of compactness, or stiff to hard state of consistency. This layer was approximately 1.1 to 5.8 m thick but will vary significantly throughout the project area.

4.3.4 Bedrock

Where rock coring was undertaken, a grey to brown, limestone bedrock was encountered. The bedrock was coarse to very fine grained, occasionally pitted, faintly to strongly porous and fractured. Bedrock was encountered at elevations ranging from 149.1 to 150.4 in the vicinity of Soil Profile #11. The Rock Quality Designation (RQD) of the recovered rock varied from 29 to 100 per cent, indicating a poor to

excellent quality. A sample of the rock core obtained from Borehole BH 119 was tested in compression to failure and had an unconfined compressive strength of 38.8 MPa. The results of the compressive strength testing indicate that the upper portion of the limestone rock may be described as “medium strong” rock.

4.3.5 Groundwater Conditions

Shallow and deep standpipe and vibrating wire piezometers were installed in selected boreholes to measure the water levels within overburden and bedrock. The most recent readings at the time of issuance of this report are listed in Table 4-3. Prior readings are recorded on the borehole logs.

The piezometric water levels within the overburden and the lower granular/bedrock were observed between elevations 178.1 to 181.1, and 176.5 to 178.2, respectively (Table 4-6). The highest piezometric water levels within the overburden and the lower granular/bedrock were reported to be at about elevations 181.1 and 177.2, respectively. These observations suggest a downward gradient between the overburden and the bedrock. The piezometric water levels inferred from VWP's are inferred to have stabilized.

Perched groundwater is known to accumulate seasonally within the upper deposits of fill, topsoil and granular layers, and within the fissures in the silty clay crust. In adverse conditions, the perched groundwater levels can rise to near the ground surface.

In consideration of the above and the experience along the project alignment, occurrence of local artesian conditions in bedrock cannot be ruled out.

Table 4-6: Summary of Measured Water Levels in the Vicinity of Soil Profile #11 Area

| Borehole | Surface Elevation | Piezometer Type | Screen / Sensor Elevation | Strata Type at Screen / Sensor Depth | Measured Water level | |
|--------------|-------------------|-----------------|---------------------------|--------------------------------------|----------------------|-----------|
| | | | | | Date | Elevation |
| BH B10-3 | 182.2 | VWP | 172.1 | Clayey Silt | July 23, 2011 | 179.1 |
| | | VWP | 162.1 | Clayey Silt | July 23, 2011 | 179.4 |
| | | VWP | 149.9 | Lower Granular | July 23, 2011 | 176.5 |
| BH B10-5 | 182.3 | S-Piez | 147.9 | Limestone | July 23, 2011 | 177.3 |
| | | VWP | 170.7 | Clayey Silt | July 23, 2011 | 180.1 |
| | | VWP | 162.1 | Clayey Silt | July 23, 2011 | 178.5 |
| BH B10-5-P32 | 182.3 | VWP | 150.3 | Lower Granular | July 23, 2011 | 177.0 |
| BH B10-7 | 182.2 | VWP | 173.8 | Clayey Silt | July 23, 2011 | 180.7 |
| | | VWP | 162.4 | Clayey Silt | July 23, 2011 | 178.1 |
| BH-119 | 182.5 | S-Piez | 150.8 | Lower Granular | Jan. 28, 2009 | 177.4 |
| BH-119A | 182.5 | S-Piez | 173.5 | Clayey Silt | Jan. 28, 2009 | 181.1 |
| BH-318 | 182.3 | S-Piez | 144.9 | Limestone | Jan. 6, 2010 | 178.2 |

Legend: S-Piez. Standpipe Piezometer
VWP Vibrating Wire Piezometer.

4.4 Sta. 11+500L to Sta. 12+300L (Soil Profile #12)

The general soil stratigraphy at the borehole locations between Sta. 11+500L and Sta. 12+300L (Soil Profile #12) consists of the following successive strata: topsoil, surficial layers of occasional fills, an extensive cohesive clayey silt to silty clay deposit below about elevations ranging from 182.4 to 184.6, and lower granular deposit below about elevation 151.0, overlying limestone bedrock below about elevations ranging from 150.0 to 151.7. The thickness of the clayey silt to silty clay stratum at borehole locations varied between 29.8 and 31.7 m.

Bedrock was encountered at depths ranging from about 32.0 to 33.1 m below the ground surface.

4.4.1 Topsoil and Surficial Fills and Upper Granular Deposit

All of the boreholes except for BH / CPT T8-1, BH T9-1, BH TB7-3, BH CV3-1, BH CV3-2, BH 14-RW, BH 15-RW, BH / CPT 117, and BH / CPT 118 encountered brown to black topsoil at the ground surface. The thickness of the topsoil at these locations varied from 0.1 to 1.4 m, but is expected to vary in thickness through the project area.

Boreholes BH / CPT T8-1, BH T9-1, BH TB7-3, BH CV3-1, BH CV3-2, BH 14-RW, BH 15-RW, BH / CPT 117, and BH / CPT 118 encountered surficial fills consisting of pavement materials and/or clayey topsoil to clayey silt. The total thickness of the fills ranged from 0.9 to 2.1 m.

Borehole BH / CPT T8-1 was terminated in sandy silt at a depth of 2.0 m, beyond which the CPT was advanced without sampling. Borehole BH HG-MW-3 encountered sand between depths of 1.5 and 2.4 m.

Although upper granular deposits were not encountered at the other borehole locations between Sta. 11+500L and Sta. 12+300L, such deposits are known to occur in random locations and thickness in the area.

4.4.2 Clayey Silt to Silty Clay Stratum

Cohesive clayey silt to silty clay material was encountered directly underlying the surficial topsoil or fill/granular deposit in all test holes. The encountered depth below existing ground surface was from 0.1 to 2.1 m. Based on the gradation, in-situ moisture content and strength characteristics, the stratum may be divided into 5 layers as follows: brown desiccated firm to hard clay crust, transition zone, upper grey silty clay deposit, mid grey silty clay and then a generally coarser lower grey clayey silt deposit. The properties of the clay stratum are listed later in Table 4-7 included at the end of Section 4.4.

The natural water content, Atterberg limits, compression index, and undrained shear strengths properties of the clay sub-strata for the Soil Profiles #12 are shown in Figure 3.6. The undrained shear strength of clay has been estimated from CPT sounding, Nilcon vane and DMT measurement results for Soil Profile #12 segment along the proposed permanent cuts under Phase I, as shown in Figure 3.6.

The stress-strain, effective shear strength and hydraulic conductivity properties were described in Section 3.3. Table 4-7 summarizes the soil strength and compressibility properties for the various overburden layers at Soil Profile #12 area.

4.4.3 Lower Granular Deposit

Underlying the silty clay stratum at about elevations between 152.0 and 156.2 was a heterogeneous non-cohesive deposit with material gradation varying from silt and sand to sandy silt and gravel to cobbles and boulders, in some cases with layers of clayey silt to silty clay. Based on the Standard Penetration Test (SPT) “N” value ranging generally from 10 to greater than 100, this material is considered to be in a compact to very dense state of compactness, or stiff to hard state of consistency. This layer was approximately 0.0 to 4.7 m thick but will vary significantly throughout the project area.

4.4.4 Bedrock

Where rock coring was undertaken, a grey to brown, limestone bedrock was encountered. The bedrock was coarse to very fine grained, occasionally pitted, faintly to strongly porous and fractured. Bedrock was encountered at elevations ranging from 150.0 to 151.7 in the vicinity of Soil Profile #12. The Rock Quality Designation (RQD) of the recovered rock varied from 25 to 100 per cent, indicating a poor to excellent quality. Samples of the rock core obtained from Borehole BH 115, BH 116 and BH 118 were tested in compression to failure and had unconfined compressive strengths of 26.5, 24.8, and 27.8 MPa. The results of the compressive strength testing indicate that the upper portion of the limestone rock may be described as “medium strong” rock.

4.4.5 Groundwater Conditions

Shallow and deep standpipe and vibrating wire piezometers were installed in selected boreholes to measure the water levels within overburden and bedrock. The most recent readings at the time of issuance of this report are listed in Table 4-8. Prior readings are recorded on the borehole logs.

The piezometric water levels within the overburden and the lower granular/bedrock were observed generally between elevations 179.9 to 182.7, and 177.4 to 178.2, respectively (Table 4-8). The highest piezometric water levels within the overburden and the lower granular/bedrock were reported to be at about elevations 184.0 and 178.2, respectively. These observations suggest a downward gradient between the overburden and the bedrock. The piezometric water levels inferred from VWP's are inferred to have stabilized.

Perched groundwater is known to accumulate seasonally within the upper deposits of fill, topsoil and granular layers, and within the fissures in the silty clay crust. In adverse conditions, the perched groundwater levels can rise to near the ground surface.

In consideration of the above and the experience along the project alignment, occurrence of local artesian conditions in bedrock cannot be ruled out.

Table 4-8: Summary of Measured Water Levels in the Vicinity of Soil Profile #12 Area

| Borehole | Surface Elevation | Piezometer Type | Screen / Sensor Elevation | Strata Type at Screen / Sensor Depth | Measured Water level | |
|----------|-------------------|-----------------|---------------------------|--------------------------------------|----------------------|-----------|
| | | | | | Date | Elevation |
| BH T8-1 | 182.8 | VWP | 177.2 | Clayey Silt | Aug. 29, 2011 | 181.2 |
| | | VWP | 162.2 | Clayey Silt | Aug. 29, 2011 | 179.9 |
| BH T9-1 | 184.0 | VWP | 174.9 | Clayey Silt | Aug. 29, 2011 | 184.0 |
| | | VWP | 151.4 | Limestone | Aug. 29, 2011 | 177.7 |
| HG-MW-3 | 182.9 | S-Piez | 179.9 | Sand layer in Clayey Silt stratum | Oct. 13, 2011 | 180.6 |
| BH 7 | 183.2 | S-Piez | 167.2 | Clayey Silt | Nov. 14, 2006 | 180.1 |
| | | S-Piez | 146.2 | Limestone | Nov. 14, 2006 | 177.6 |
| BH 115 | 183.8 | S-Piez | 146.2 | Limestone | Jan. 28, 2009 | 177.4 |
| BH 115A | 183.8 | S-Piez | 173.0 | Clayey Silt | Jan. 28, 2009 | 182.2 |
| BH 116 | 183.6 | S-Piez | 152.0 | Limestone | Jan. 28, 2009 | 177.5 |
| BH 116A | 183.6 | S-Piez | 174.5 | Clayey Silt | Jan. 28, 2009 | 182.7 |
| BH 118 | 182.7 | S-Piez | 146.6 | Limestone | Jan. 28, 2009 | 177.4 |
| BH 118A | 182.7 | S-Piez | 173.5 | Clayey Silt | Jan. 28, 2009 | 180.9 |
| BH 314 | 183.1 | S-Piez | 144.8 | Limestone | Jan. 6, 2010 | 178.2 |

Legend: S-Piez. Standpipe Piezometer
VWP Vibrating Wire Piezometer.

4.5 Sta. 12+000L to Sta. 12+800L (Soil Profile #13)

The general soil stratigraphy at the borehole locations between Sta. 12+000L and Sta. 12+800L (Soil Profile #13) consists of the following successive strata: topsoil, surficial layers of occasional fills and upper granular deposit, an extensive cohesive clayey silt to silty clay deposit below about elevations ranging from 183.0 to 184.8, and lower granular deposit below about elevations ranging from 152.0 to 159.3, overlying limestone bedrock below about elevations ranging from 151.5 to 153.2. The thickness of the clayey silt to silty clay deposit varies between about 24.2 m and 31.7 m at borehole locations.

Lenses of up to 2 m thick of non-cohesive sand to sandy silt were encountered at Borehole BH-115 embedded within the silty clay stratum within the elevation 174.8 to 171.9.

Bedrock was encountered at depths ranging from about 31.4 m to 32.5 m below the ground surface.

4.5.1 Pavement, Topsoil, Surficial Fills and Upper Granular Deposit

About 300 mm thick asphalt layer was encountered at the pavement surface in Borehole BH-T9-1. Pavement granular layer was encountered beneath this asphalt. The granular layer was about 0.7 m thick.

All boreholes, except for BH T9-1, BH T10-1, BH 15RW, BH TB7-3, BH CV3-1, BH CPT-T10-2 and BH CPT-111, encountered an up to 0.5 m thick layer of brown to black topsoil at the ground surface. The thickness of the topsoil is expected to vary in thickness through the project area.

Surficial fills were encountered and/or interpreted to exist at the ground surface in Test Holes BH T10-1, BH 15RW, BH TB7-3, BH CV3-1, BH CPT-T10-2, BH CPT-111 and BH CPT-312. The fills were variable and consisted of clayey topsoil and gravel to clayey silt. The fills ranged in thickness from 0.5 to 1.5 m at the borehole locations.

A layer of upper granular deposit was encountered beneath the topsoil in Borehole BH CPT T10-2. The upper granular deposit consisted of poorly graded sand. The thickness of the upper granular deposit measured about 0.3 m at the borehole location.

An asphalt concrete pavement layer of about 0.3 m thick was encountered at the ground surface in Borehole BH-T9-1 over 0.7 m of silty sand and gravel fill material.

4.5.2 Clayey Silt to Silty Clay Stratum

Cohesive clayey silt to silty clay material was encountered directly underlying the surficial topsoil or fill/granular deposit in all test holes. The encountered depth below existing ground surface was from 0.2 to 1.5 m corresponding to elevation 184.6 to 182.6. Based on the gradation, in-situ moisture content and strength characteristics, the stratum may be divided into 5 layers as follows: brown desiccated firm to hard clay crust, transition zone, upper grey silty clay deposit, mid grey silty clay and then a generally coarser lower grey clayey silt deposit. The properties of the clay stratum are listed later in Table 4-9 included at the end of Section 4.5.

The natural water content, Atterberg limits, compression index, and undrained shear strengths properties of the clay sub-strata for the Soil Profiles #13 are shown in Figure 3.7. The undrained shear strength of clay has been estimated from CPT sounding, Nilcon vane and DMT measurement results for Soil Profile #13 segment along the proposed permanent cuts under Phase I, as shown in Figure 3.7.

The stress-strain, effective shear strength and hydraulic conductivity properties were described in Section 3.3. Table 4-9 summarizes the soil strength and compressibility properties for the various overburden layers at Soil Profile #13 area.

4.5.3 Lower Granular Deposit

Underlying the silty clay stratum at about elevations between 152.0 and 156.2 was a heterogeneous non-cohesive deposit with material gradation varying from silt and sand to sandy silt and gravel to clayey silt. Based on the Standard Penetration Test (SPT) “N” value ranging generally from 10 to greater than 100, this material is considered to be in a compact to very dense state of compactness, or stiff to hard state of consistency. This layer was approximately 1.6 to 6.1 m thick but will vary significantly throughout the project area.

4.5.4 Bedrock

Where rock coring was undertaken, a grey to brown, limestone bedrock was encountered. The bedrock was coarse to very fine grained, occasionally pitted, faintly to strongly porous and fractured. Bedrock was encountered at elevations ranging from 146.2 to 153.2 along soil profile #13. The Rock Quality Designation (RQD) of the recovered rock varied from 0 to 100 per cent, indicating a very poor to excellent quality. A sample of the rock core obtained from the Borehole T10-2 was tested in compression

to failure. The sample had an unconfined compressive strength of 93.0 MPa. Rock core samples from Boreholes BH 112, BH 113, BH 115 and BH 116 were tested and had unconfined compressive strengths of 16.6 and 30.1 MPa. The results of the compressive strength testing indicate that the upper portion of the limestone rock may be described as “weak to strong” rock.

4.5.5 Groundwater Conditions

Shallow and deep standpipe and vibrating wire piezometers were installed in selected boreholes to measure the water levels within overburden and bedrock, respectively (Table 4-10).

The piezometric water levels within the overburden and the lower granular/bedrock were observed generally between elevations 177.4 to 184.1, and 175.9 to 178.5, respectively (Table 4-10). The highest piezometric water levels within the overburden and the bedrock were reported to be at about elevations 184.1 and 182.9, respectively. These observations suggest a downward gradient between the overburden and the bedrock. It is recognized that these piezometric water levels (particularly in the overburden) may not have fully stabilized.

Perched groundwater is known to accumulate seasonally within the upper deposits of fill, topsoil and granular layers, and within the fissures in the silty clay crust. In adverse conditions, the perched groundwater levels can rise to near the ground surface.

In consideration of the above and the experience along the project alignment, occurrence of local artesian conditions in bedrock cannot be ruled out.

Table 4-9: Properties for Soil Profile #13 (Sta. 12+000L to 12+800L)

| Material Description | Elevation | Natural Water Content, w _N , % | Liquid Limit, w _L | Plastic Limit, w _P | Unit Weight, γ, kN/m ³ | | Shear Strength | | | Design Undrained Modulus of Elasticity, E, kPa | Design Drained Poisson's Ratio* | Design Average Moisture Content used in Analyses, % | Design Compressibility Characteristics | | | | | Design Initial Void Ratio, e ₀ |
|-----------------------|---------------|---|------------------------------|-------------------------------|-----------------------------------|--------|---------------------------------|----------|------------------------------|--|---------------------------------|---|--|----------------|----------------|--|--------------------------------|---|
| | | | | | Measured | Design | Undrained, S _u , kPa | | Design Friction Angle, φ', ° | | | | C _c | C _r | C _a | Preconsolidation Pressure, P' _c , kPa | Over Consolidation Ratio (OCR) | |
| | | | | | | | Measured | Design | | | | | | | | | | |
| Upper Granular | 185.0 – 180.2 | - | - | - | - | 21 | - | - | 30 | 25,000 | 0.35 | - | - | - | - | - | - | - |
| Clay Crust | 185 - 177 | 10.0 – 23.0 | 19.0 – 26.0 | 12.0 – 15.0 | 22 | 22 | - | 75 ** | 30 | 35,000 | 0.35 | 14 | 0.112 | 0.012 | 0.003 | 600 | >4 | 0.38 |
| Clay Transition | 177 - 175 | 10.0 – 18.0 | 23.0 – 25.0 | 12.0 – 13.0 | 21.6 – 21.7 | 22 | 45 - 156 | 75 - 55 | 30 | 19,500 | 0.35 | 15 | 0.120 | 0.013 | 0.003 | 600 - 350 | 2.5 | 0.41 |
| Upper Grey Silty Clay | 175 - 166 | 11.0 – 38.0 | 14.0 – 41.0 | 12.0 – 20.0 | 20.9 – 21.5 | 20.5 | 43 - 94 | 55 - 50 | 30 | 16,000 | 0.35 | 20 | 0.163 | 0.018 | 0.005 | 350 - 280 | 1.5 | 0.54 |
| Mid Grey Silty Clay | 166 - 163 | 12.0 – 44.0 | 23.0 – 31.0 | 14.0 – 16.0 | 19.6 – 21.9 | 20.5 | 36 - 90 | 50 - 60 | 30 | 16,500 | 0.35 | 22 | 0.181 | 0.020 | 0.005 | 280 - 315 | 1.2 | 0.59 |
| Lower Clayey Silt | 163 - 155 | 9.9 – 27.1 | 25.0 – 41.0 | 13.0 – 17.0 | 21.8 | 20.5 | 59 - 196 | 60 - 100 | 30 | 19,500 | 0.35 | 19 | 0.155 | 0.017 | 0.004 | 315 - 500 | 1.5 | 0.51 |
| Lower Granular | 155 – 150 | 6.2 – 35.3 | - | - | - | 22 | - | - | 30 | 40,000 | 0.35 | - | - | - | - | - | - | - |

Note: Average ground water level at 183.0.
*Assumed values (ref. R-42).
** Undrained strength used in global stability analyses.

Table 4-10: Summary of Measured Water Levels in the Vicinity of Soil Profile #13 Area

| Borehole | Surface Elevation | Piezometer Type | Screen / Sensor Elevation | Strata Type at Screen / Sensor Depth | Measured Water level | |
|----------|-------------------|-----------------|---------------------------|--------------------------------------|----------------------|-----------|
| | | | | | Date | Elevation |
| BH T9-1 | 184.0 | VWP | 174.7 | Clayey Silt | August 6, 2011 | 183.9 |
| | | | | | August 29, 2011 | 184.0 |
| | | VWP | 151.3 | Limestone | August 6, 2011 | 177.5 |
| | | | | | August 29, 2011 | 177.7 |
| BH T10-1 | 184.9 | VWP | 174.8 | Clayey Silt | July 29, 2011 | 183.4 |
| | | VWP | 162.8 | Clayey Silt | July 29, 2011 | 182.4 |
| BH-T10-2 | 184.8 | VWP | 178.3 | Clayey Silt | May 24, 2011 | 184.1 |
| | | | | | June 4, 2011 | 183.9 |
| | | | | | June 25, 2011 | 183.3 |
| | | | | | July 23, 2011 | 182.6 |
| | | VWP | 166.2 | Clayey Silt | May 24, 2011 | 183.5 |
| | | | | | June 4, 2011 | 183.8 |
| | | | | | June 25, 2011 | 183.1 |
| | | | | | July 23, 2011 | 182.4 |
| | | VWP | 153.8 | Sandy Silt | May 24, 2011 | 178.5 |
| | | | | | June 4, 2011 | 178.5 |
| | | | | | June 25, 2011 | 177.7 |
| | | | | | July 23, 2011 | 177.0 |
| BH-112 | 184.6 | S-Piez | 146.4 | Limestone | February 12, 2008 | 178.3 |
| | | | | | March 20, 2008 | 178.4 |
| | | | | | July 24, 2008 | 177.9 |
| | | | | | September 19, 2008 | 176.3 |
| | | | | | November 14, 2008 | 177.5 |
| | | | | | January 28, 2009 | 177.7 |
| BH-112A | 184.6 | VWP | 175.4 | Clayey Silt | March 20, 2008 | 181.9 |
| | | | | | July 24, 2008 | 182.6 |
| | | | | | September 19, 2008 | 182.5 |
| | | | | | January 28, 2009 | 182.4 |
| BH-113 | 184.4 | S-Piez | 152.9 | Limestone | February 28, 2008 | 178.1 |
| | | | | | March 20, 2008 | 182.9 |
| | | | | | July 22, 2008 | 177.8 |
| | | | | | September 19, 2008 | 175.9 |
| | | | | | November 11, 2008 | 177.2 |
| | | | | | January 28, 2009 | 177.4 |
| BH-113A | 184.4 | VWP | 174.8 | Clayey Silt | March 20, 2008 | 182.4 |
| | | | | | July 22, 2008 | 182.6 |
| | | | | | September 19, 2008 | 182.4 |
| | | | | | January 28, 2009 | 182.5 |
| BH-115 | 183.8 | S-Piez | 146.2 | Limestone | February 21, 2008 | 178.0 |
| | | | | | March 20, 2008 | 178.1 |
| | | | | | July 24, 2008 | 177.7 |
| | | | | | September 19, 2008 | 176.0 |
| | | | | | November 14, 2008 | 177.3 |
| | | | | | January 28, 2009 | 177.4 |
| BH-115A | 183.8 | VWP | 172.9 | Clayey Silt | March 20, 2008 | 182.4 |

| Borehole | Surface Elevation | Piezometer Type | Screen / Sensor Elevation | Strata Type at Screen / Sensor Depth | Measured Water level | |
|----------|-------------------|-----------------|---------------------------|--------------------------------------|----------------------|-----------|
| | | | | | Date | Elevation |
| BH-116 | 183.6 | S-Piez | 151.9 | Clayey Silt | July 24, 2008 | 182.3 |
| | | | | | September 19, 2008 | 182.3 |
| | | | | | January 28, 2009 | 182.2 |
| | | | | | March 20, 2008 | 180.8 |
| | | | | | July 22, 2008 | 178.0 |
| | | | | | August 11, 2008 | 176.7 |
| | | | | | September 19, 2008 | 176.1 |
| | | | | | November 14, 2008 | 177.3 |
| | | | | | January 28, 2009 | 177.5 |
| | | | | | March 20, 2008 | 182.6 |
| BH-116A | 183.6 | VWP | 174.6 | Clayey Silt | July 22, 2008 | 182.8 |
| | | | | | August 11, 2008 | 182.6 |
| | | | | | September 19, 2008 | 182.5 |
| | | | | | January 28, 2009 | 182.7 |
| | | | | | March 20, 2008 | 182.6 |

Legend: S-Piez. Standpipe Piezometer
VWP Vibrating Wire Piezometer.

4.6 Sta. 12+800L to Sta. 13+400L (Soil Profile #14)

The general soil stratigraphy at the borehole locations between Sta. 12+800L and Sta. 13+400L (Soil profile #14) consists of the following successive strata: topsoil, surficial layers of occasional fills and upper granular deposit, an extensive cohesive clayey silt to silty clay deposit below about elevations ranging from 183.3 to 185.7, and lower granular deposit below about elevations ranging from 152.0 to 159.3, overlying limestone bedrock below about elevations ranging from 153.4 to 157.3. The thickness of the clayey silt to silty clay deposit varies between about 27.3 m and 33.1 m at borehole locations.

Bedrock was encountered at depths ranging from about 34.3 m to 38.3 m below the ground surface.

4.6.1 Pavement, Topsoil, Surficial Fills, Concrete and Upper Granular Deposit

About 200 mm thick asphalt layer was encountered at the pavement surface in Boreholes BH B11-1, BH B11-6, BH CPT-B11-1, and BH CPT 48-RW. Pavement granular layer was encountered beneath this asphalt. The granular layer ranged from 0.1 to 0.6 m thick.

A layer of concrete was encountered beneath the asphalt layer in Borehole BH CPT 48-RW. The thickness of the concrete measured about 0.1 m at the borehole location.

All boreholes, except for BH B11-1, BH B11-2, BH B11-3, BH B11-6, BH CPTB11-1, BH CPT49-RW, BH CPT49-RW and BH CPT-309, encountered an up to 0.9 m thick layer of brown to black topsoil at the ground surface. The thickness of the topsoil is expected to vary in thickness through the project area.

Surficial fills were encountered and/or interpreted to exist at the ground surface in Test Holes BH B11-2, BH B11-3, BH 49-RW, BH 50-RW and BH CPT-309. The fills were variable and consisted of silty sand and gravel to silty clay with organics. The fills ranged in thickness from 0.2 to 2.1m at the borehole locations.

A layer of upper granular deposit was encountered beneath the surficial fill in Borehole BH CPT 49-RW. The upper granular deposit consisted of poorly graded sand. The thickness of the upper granular deposit measured about 0.2 m at the borehole location.

4.6.2 Clayey Silt to Silty Clay Stratum

Cohesive clayey silt to silty clay material was encountered directly underlying the surficial topsoil or fill/granular deposit in all test holes. The encountered depth below existing ground surface was from 0.2 to 2.1 m corresponding to elevation 185.7 to 183.3. Based on the gradation, in-situ moisture content and strength characteristics, the stratum may be divided into 5 layers as follows: brown desiccated firm to hard clay crust, transition zone, upper grey silty clay deposit, mid grey silty clay and then a generally coarser lower grey clayey silt deposit. The properties of the clay stratum are listed later in Table 4-11 included at the end of Section 4.6.

The natural water content, Atterberg limits, compression index, and undrained shear strengths properties of the clay sub-strata for the Soil Profiles #14 are shown in Figure 3.8. The undrained shear strength of clay has been estimated from CPT sounding, Nilcon vane and DMT measurement results for Soil Profile #14 segment along the proposed permanent cuts under Phase I, as shown in Figure 3.8.

The stress-strain, effective shear strength and hydraulic conductivity properties were described in Section 3.3. Table 4-11 summarizes the soil strength and compressibility properties for the various overburden layers at Soil Profile #14 area.

4.6.3 Lower Granular Deposit

Underlying the silty clay stratum at about elevations between 153.4 and 157.3 was a heterogeneous non-cohesive deposit with material gradation varying from silty sand and sand to sandy silt and gravel to clayey silt. Based on the Standard Penetration Test (SPT) “N” value ranging generally from 25 to greater than 100, this material is considered to be in a compact to very dense state of compactness, or stiff to hard state of consistency. This layer was approximately 3.9 to 8.4 m thick but will vary significantly throughout the project area.

4.6.4 Bedrock

Where rock coring was undertaken, a grey to brown, limestone bedrock was encountered. The bedrock was coarse to very fine grained, occasionally pitted, faintly to strongly porous and fractured. Bedrock was encountered at elevations ranging from 146.7 to 150.6 along soil profile #13. The Rock Quality Designation (RQD) of the recovered rock varied from 0 to 100 per cent, indicating a very poor to excellent quality. A rock core sample from Borehole BH-109 was tested and had unconfined compressive strengths of 25.4 MPa. The results of the compressive strength testing indicate that the upper portion of the limestone rock may be described as “medium strong” rock.

4.6.5 Groundwater Conditions

Shallow and deep standpipe and vibrating wire piezometers were installed in selected boreholes to measure the water levels within overburden and bedrock, respectively (Table 4-12).

The piezometric water levels within the overburden and the lower granular/bedrock were observed generally between elevations 181.4 to 184.5, and 175.8 to 178.3, respectively (Table 4-12). The highest piezometric water levels within the overburden and the bedrock were reported to be at about elevations 185.6 and 178.3, respectively. These observations suggest a downward gradient between the overburden and the bedrock. It is recognized that these piezometric water levels (particularly in the overburden) may not have fully stabilized.

Perched groundwater is known to accumulate seasonally within the upper deposits of fill, topsoil and granular layers, and within the fissures in the silty clay crust. In adverse conditions, the perched groundwater levels can rise to near the ground surface.

In consideration of the above and the experience along the project alignment, occurrence of local artesian conditions in bedrock cannot be ruled out.

Table 4-11: Properties for Soil Profile #14 (Sta. 12+800L to 13+400L)

| Material Description | Elevation | Natural Water Content, w _N , % | Liquid Limit, w _L | Plastic Limit, w _P | Unit Weight, γ, kN/m ³ | | Shear Strength | | | Design Undrained Modulus of Elasticity, E, kPa | Design Drained Poisson's Ratio* | Design Average Moisture Content used in Analyses, % | Design Compressibility Characteristics | | | | | Design Initial Void Ratio, e ₀ |
|-----------------------|-------------|---|------------------------------|-------------------------------|-----------------------------------|--------|---------------------------------|----------|------------------------------|--|---------------------------------|---|--|----------------|----------------|--|--------------------------------|---|
| | | | | | Measured | Design | Undrained, S _u , kPa | | Design Friction Angle, φ', ° | | | | C _c | C _r | C _u | Preconsolidation Pressure, P' _c , kPa | Over Consolidation Ratio (OCR) | |
| | | | | | | | Measured | Design | | | | | | | | | | |
| Upper Granular | 185.8 – 185 | - | - | - | - | 21 | | - | 30 | 25,000 | 0.35 | - | - | - | - | - | - | |
| Clay Crust | 185 - 179 | 11.0 – 23.0 | 22.0 – 29.0 | 14.0 – 18.0 | 21.9 – 22.3 | 22 | 72 - 188 | 75 ** | 30 | 35,000 | 0.35 | 13 | 0.103 | 0.011 | 0.003 | 550 | >4 | 0.35 |
| Clay Transition | 179 - 175 | 14.0 – 17.0 | 22.0 – 24.0 | 13.0 – 15.0 | 21.4 – 22.0 | 22 | 45 - 124 | 75 - 55 | 30 | 19,500 | 0.35 | 17 | 0.138 | 0.015 | 0.004 | 550 - 340 | 2.5 | 0.46 |
| Upper Grey Silty Clay | 175 - 166 | 11.0 – 36.0 | 24.0 – 39.0 | 14.0 – 21.0 | 19.0 – 21.8 | 20.5 | 38 - 80 | 55 - 50 | 30 | 16,000 | 0.35 | 18 | 0.146 | 0.016 | 0.004 | 340 - 280 | 1.5 | 0.49 |
| Mid Grey Silty Clay | 166 - 163 | 8.0 – 35.0 | 21.0 – 33.0 | 12.0 – 19.0 | 19.8 – 22.4 | 20.5 | 43 - 95 | 50 - 55 | 30 | 16,000 | 0.35 | 20 | 0.163 | 0.018 | 0.005 | 280 - 315 | 1.2 | 0.54 |
| Lower Clayey Silt | 163 - 156 | 10.0 – 29.0 | 22.0 – 31.0 | 14.0 – 17.0 | 21.5 – 22.3 | 20.5 | 47 - 156 | 55 - 100 | 30 | 23,00 - 30,000 | 0.35 | 19 | 0.155 | 0.017 | 0.004 | 315 - 500 | 1.5 | 0.51 |
| Lower Granular | 156 – 150 | 5.2 – 25.5 | - | - | - | 22 | - | - | 30 | 40,000 | 0.35 | - | - | - | - | - | - | |

Note: Average ground water level at 183.5.
*Assumed values (ref. R-42).
** Undrained strength used in global stability analyses.

Table 4-12: Summary of Measured Water Levels in the Vicinity of Soil Profile #14 Area

| Borehole | Surface Elevation | Piezometer Type | Screen / Sensor Elevation | Strata Type at Screen / Sensor Depth | Measured Water level | |
|----------|-------------------|-----------------|---------------------------|--------------------------------------|----------------------|-----------|
| | | | | | Date | Elevation |
| BH B11-1 | 185.4 | VWP | 177 | Clayey Silt | May 12, 2011 | 185.1 |
| | | | | | July 24, 2011 | 183.7 |
| | | VWP | 167.8 | Clayey Silt | May 12, 2011 | 185.6 |
| | | | | | July 24, 2011 | 183.0 |
| BH B11-4 | 185.0 | VWP | 175.4 | Clayey Silt | May 24, 2011 | 183.4 |
| | | | | | June 25, 2011 | 183.0 |
| | | | | | July 10, 2011 | 182.5 |
| | | | | | July 24, 2011 | 182.1 |
| | | | | | August 18, 2011 | 182.4 |
| | | VWP | 167.1 | Clayey Silt | May 24, 2011 | 182.2 |
| | | | | | June 25, 2011 | 181.9 |
| | | | | | July 10, 2011 | 181.7 |
| | | | | | July 24, 2011 | 181.4 |
| | | | | | August 18, 2011 | 181.4 |
| | | VWP | 148.8 | Sand and Gravel | May 24, 2011 | 177.3 |
| | | | | | June 25, 2011 | 176.7 |
| | | | | | July 10, 2011 | 176.8 |
| | | | | | July 24, 2011 | 175.8 |
| | | | | | August 18, 2011 | 176.9 |
| BH B11-7 | 185.4 | VWP | 175.9 | Clayey Silt | May 24, 2011 | 184.5 |
| | | | | | June 4, 2011 | 184.6 |
| | | | | | June 25, 2011 | 184.4 |
| | | | | | July 10, 2011 | 184.3 |
| | | | | | July 24, 2011 | 183.9 |
| | | | | | August 29, 2011 | 184.1 |
| | | VWP | 166.8 | Clayey Silt | May 24, 2011 | 184.2 |
| | | | | | June 4, 2011 | 184.3 |
| | | | | | June 25, 2011 | 184.1 |
| | | | | | July 10, 2011 | 184.0 |
| | | | | | July 24, 2011 | 183.6 |
| | | | | | August 29, 2011 | 183.8 |
| BH-109 | 185.3 | S-Piez | 149.6 | Sand and Gravel | March 20, 2008 | 178.1 |
| | | | | | July 24, 2008 | 177.8 |
| | | | | | November 4, 2008 | 177.2 |
| | | | | | January 28, 2009 | 177.4 |
| BH-109A | 185.3 | VWP | 176.2 | Clayey Silt | March 20, 2008 | 183.4 |
| | | | | | July 24, 2008 | 183.4 |
| | | | | | January 28, 2009 | 183.5 |
| BH-311 | 184.9 | S-Piez | 145.9 | Limestone | January 6, 2010 | 178.1 |
| | | | | | February 24, 2010 | 178.3 |

Legend: S-Piez. Standpipe Piezometer
VWP Vibrating Wire Piezometer.

4.7 Sta. 13+400L to Sta. 10+100T (Soil Profile #15)

The general soil stratigraphy at the borehole locations between Sta. 13+400L and Sta. 10+100T (Soil Profile #15) consists of the following successive strata: surficial layers of occasional fills, topsoil, and upper granular deposits over an extensive clayey silt to silty clay deposit below about elevations 181.1 to 186.1, and a lower, predominantly granular deposit below about elevation 160.0, overlying limestone and dolostone bedrock below about elevations 154.3 to 156.3. The thickness of the clayey silt to silty clay deposit varies between about 21.9 and 31.5 m at borehole locations.

Lenses of up to 2 m thick of non-cohesive silty sand to sandy silt were encountered at a number of boreholes embedded within the silty clay stratum within the elevation 171 to 178.

Bedrock was encountered at depths ranging from about 30 m to 31 m below the ground surface.

4.7.1 Pavement, Topsoil, Surficial Fills and Upper Granular Deposit

About 200 mm thick asphalt layer was encountered at the pavement surface in Borehole B12-1. Pavement granular layer was encountered beneath this asphalt. The granular layer was about 1.9 m thick.

All boreholes, except for Boreholes BH NIL T11-1, BH B12-1, BH/CPT B12-1, BH 104 and BH 104A, BH CPT-106, BH 304 and BH CPT-306 encountered up to 0.3 m thick layer of brown to black topsoil. The thickness of the topsoil is expected to vary in thickness through the project area.

Surficial fills were encountered beneath the topsoil in Test Holes BH B12-2, B-12-3, DMT 6-RW, BH 16-RW, BH CPT 50-RW, BH CPT51-RW, BH 304, BH CPT-106, and BH CPT-306 and at the ground surface in BH/CPT B12-1. The fills were variable and consisted of silty clay to sand to silty sand and gravel. The fills ranged in thickness from 0.2 to 2.9 m at the borehole locations.

A layer of upper granular deposit was encountered at the ground surface or beneath the topsoil in Boreholes BH T11-2, BH NIL T11-2, BH-104, BH-104A, BH-105 and BH-105A. The upper granular deposit consisted of sandy silt to silty sand to sand and gravel. The thickness of the upper granular deposit varied from 0.2 to 4.8 m at the borehole locations.

4.7.2 Clayey Silt to Silty Clay Stratum

Cohesive clayey silt to silty clay material was encountered directly underlying the surficial topsoil or fill/granular deposit in all test holes except Test Hole BH NIL T11-1, where it was encountered at the ground surface. The encountered depth below existing ground surface was from 0.0 to 4.9 m corresponding to elevation 181.1 to 185.8. Based on the gradation, in-situ moisture content and strength characteristics, the stratum may be divided into 5 layers as follows: brown desiccated firm to hard clay crust, transition zone, upper grey silty clay deposit, mid grey silty clay and then a generally coarser lower grey clayey silt deposit. The properties of the clay stratum are listed later in Table 4-13 included at the end of Section 4.7.

The natural water content, Atterberg limits, compression index, and undrained shear strengths properties of the clay sub-strata for the Soil Profiles #15 are shown in Figure 3.9. The undrained shear strength of

clay has been estimated from CPT sounding, Nilcon vane and DMT measurement results for Soil Profile #15 segment along the proposed permanent cuts under Phase I, as shown in Figure 3.9.

The stress-strain, effective shear strength and hydraulic conductivity properties were described in Section 3.3. Table 4-13 summarizes the soil strength and compressibility properties for the various overburden layers at Soil Profile #15 area.

4.7.3 Lower Granular Deposit

Underlying the silty clay stratum at about elevations between 155.3 and 163.5 was a heterogeneous non-cohesive deposit with material gradation varying from silt and sand to sandy silt and gravel to clayey silt. Based on the Standard Penetration Test (SPT) “N” value ranging generally from 10 to greater than 100, this material is considered to be in a compact to very dense state of compactness, or stiff to hard state of consistency. This layer was approximately 1.0 to 8.4 m thick but will vary significantly throughout the project area.

4.7.4 Bedrock

Where rock coring was undertaken, a grey to brown, limestone bedrock was encountered. The bedrock was coarse to very fine grained, occasionally pitted, faintly to strongly porous and fractured. Bedrock was encountered at elevations ranging from 154.3 to 156.3 along Soil Profile #15. The Rock Quality Designation (RQD) of the recovered rock varied from 0 to 100 per cent, indicating a very poor to excellent quality.

Three samples of the rock core obtained from Boreholes B12-2 and T11-2 were tested in compression to failure to determine the compressive strength of the core samples. The samples had unconfined compressive strengths of 52.6, 60.1 and 86.1 MPa. Rock samples obtained from Boreholes 104, 105 and 107 had unconfined compressive strengths of 18.9, 19.5 and 44.1 MPa, respectively. The results of the compressive strength testing indicate that the upper portion of the light grey to grey limestone rock may be termed as “weak to strong” rock (ref. R-6).

4.7.5 Groundwater Conditions

Shallow and deep standpipe and vibrating wire piezometers were installed in selected boreholes to measure the water levels within overburden and bedrock, respectively (Table 4-14).

The piezometric water levels within the overburden and the lower granular/bedrock were observed between elevations 182.1 to 184.5, and 176.1 to 178.4, respectively (Table 4-14). The highest piezometric water levels within the overburden and the bedrock were reported to be at about elevations 184.5 and 178.4, respectively. These observations suggest a downward gradient between the overburden and the bedrock. It is recognized that these piezometric water levels (particularly in the overburden) may not have fully stabilized.

Perched groundwater is known to accumulate seasonally within the upper deposits of fill, topsoil and granular layers, and within the fissures in the silty clay crust. In adverse conditions, the perched groundwater levels can rise to near the ground surface.

In consideration of the above and the experience along the project alignment, occurrence of local artesian conditions in bedrock cannot be ruled out.

Table 4-13: Properties for Soil Profile #15 (Sta. 13+400L to 10+000T)

| Material Description | Elevation | Natural Water Content, w _N , % | Liquid Limit, w _L | Plastic Limit, w _P | Unit Weight, γ, kN/m ³ | | Shear Strength | | | Design Undrained Modulus of Elasticity, E, kPa | Design Drained Poisson's Ratio* | Design Average Moisture Content used in Analyses, % | Design Compressibility Characteristics | | | | | Design Initial Void Ratio, e ₀ |
|-----------------------|---------------|---|------------------------------|-------------------------------|-----------------------------------|--------|---------------------------------|----------|------------------------------|--|---------------------------------|---|--|----------------|----------------|--|--------------------------------|---|
| | | | | | Measured | Design | Undrained, S _u , kPa | | Design Friction Angle, φ', ° | | | | C _c | C _r | C _α | Preconsolidation Pressure, P' _c , kPa | Over Consolidation Ratio (OCR) | |
| | | | | | | | Measured | Design | | | | | | | | | | |
| Upper Granular | 186.2 – 180.9 | - | - | - | - | 21 | - | - | 30 | 25,000 | 0.35 | - | - | - | - | - | - | |
| Clay Crust | 185 - 181 | 9.0 – 45.0 | 25.0 – 37.0 | 11.0 – 16.0 | - | 22 | 75 - 196 | 75 ** | 30 | 35,000 | 0.35 | 13 | 0.103 | 0.011 | 0.003 | 600 | >4 | 0.35 |
| Clay Transition | 181 - 176 | 11.0 – 17.0 | 13.0 – 26.0 | 11.0 – 14.0 | 21.7 – 22.0 | 22 | 51 - 169 | 75 - 55 | 30 | 19,500 | 0.35 | 15 | 0.120 | 0.013 | 0.003 | 600 - 325 | 2.5 | 0.41 |
| Upper Grey Silty Clay | 176 - 167 | 13.0 – 32.0 | 15.0 – 35.0 | 11.0 – 19.0 | 18.8 – 21.5 | 20.5 | 47 - 151 | 55 | 30 | 15,000 | 0.35 | 20 | 0.163 | 0.018 | 0.005 | 325 - 300 | 1.5 | 0.54 |
| Mid Grey Silty Clay | 167 - 164 | 13.0 – 35.0 | 23.0 – 35.0 | 12.0 – 17.0 | 19.1 – 22.2 | 20.5 | 49 - 119 | 55 - 60 | 30 | 16,500 | 0.35 | 22 | 0.181 | 0.020 | 0.005 | 300 - 340 | 1.2 | 0.59 |
| Lower Clayey Silt | 164 - 160 | 9.0 – 36.0 | 27.0 – 38.0 | 13.0 – 17.0 | 21.7 | 20.5 | 51 - 191 | 60 - 100 | 30 | 24,000 - 30,000 | 0.35 | 17 | 0.138 | 0.015 | 0.004 | 340 - 550 | 1.5 | 0.46 |
| Lower Granular | 160 – 155 | 7.3 – 32.0 | - | - | - | 22 | - | - | 30 | 40,000 | 0.35 | - | - | - | - | - | - | - |

Note: Average ground water level at 185.0.
*Assumed values (ref. R-42).
** Undrained strength used in global stability analyses.

Table 4-14: Summary of Measured Water Levels in the Vicinity of Soil Profile #15 Area

| Borehole | Surface Elevation | Piezometer Type | Screen / Sensor Elevation | Strata Type at Screen / Sensor Depth | Measured Water level | |
|-----------|-------------------|-----------------|---------------------------|--------------------------------------|----------------------|-----------|
| | | | | | Date | Elevation |
| BH T11-2 | 186.0 | VWP | 178.4 | Clayey Silt | May 16, 2011 | 184.49 |
| | | | | | August 6, 2011 | 183.43 |
| | | VWP | 167.7 | Clayey Silt | May 24, 2011 | 184.12 |
| | | | | | August 6, 2011 | 182.40 |
| BH T11-2A | 186.0 | VWP | 155.5 | Limestone | May 16, 2011 | 177.24 |
| | | | | | August 6, 2011 | 176.08 |
| BH T11-3A | 186.0 | VWP | 178.4 | Clayey Silt | May 16, 2011 | 184.47 |
| | | | | | August 6, 2011 | 184.12 |
| | | VWP | 167.7 | Clayey Silt | May 16, 2011 | 184.04 |
| | | | | | August 6, 2011 | 183.51 |
| BH B12-2 | 186.40 | VWP | 167.3 | Clayey Silt | July 24, 2011 | 182.30 |
| | | | | | August 4, 2011 | 182.10 |
| | | | | | August 6, 2011 | 182.26 |
| | | | | | August 29, 2011 | 182.28 |
| | | VWP | 156.1 | Limestone | July 24, 2011 | 176.63 |
| | | | | | August 4, 2011 | 177.23 |
| | | | | | August 6, 2011 | 177.52 |
| | | | | | August 29, 2011 | 177.61 |
| BH B12-2A | 186.30 | VWP | 174.9 | Clayey Silt | July 24, 2011 | 183.35 |
| | | | | | August 4, 2011 | 183.13 |
| | | | | | August 6, 2011 | 183.26 |
| | | | | | August 29, 2011 | 183.26 |
| BH-104 | 186.15 | S-Piez | 151.5 | Limestone | April 4, 2008 | 177.92 |
| | | | | | September 19, 2008 | 176.09 |
| | | | | | November 14, 2008 | 177.25 |
| BH-104A | 186.15 | VWP | 177.3 | Silty Sand | April 4, 2008 | 183.01 |
| | | | | | September 19, 2008 | 183.76 |
| BH-105 | 186.2 | S-Piez | 156.0 | Silty Sand and Gravel | March 20, 2008 | 178.26 |
| | | | | | January 28, 2009 | 177.94 |
| BH-105A | 186.2 | VWP | 177.3 | Sandy Silt | March 20, 2008 | 184.72 |
| | | | | | January 28, 2009 | 183.69 |
| BH-107 | 185.9 | S-Piez | 151.5 | Limestone | November 14, 2008 | 177.30 |
| | | | | | January 28, 2009 | 177.48 |
| BH-301 | 186.25 | VWP | 150.3 | Limestone | January 6, 2010 | 177.92 |
| | | | | | February 24, 2010 | 178.15 |
| BH-305 | 185.9 | VWP | 150.0 | Limestone | January 6, 2010 | 178.14 |
| | | | | | February 24, 2010 | 178.39 |

Legend: S-Piez. Standpipe Piezometer
VWP Vibrating Wire Piezometer.

4.8 Sta. 10+100T to Sta. 10+700 (Soil Profile #16)

The general soil stratigraphy at the borehole locations between Sta. 10+100T and Sta. 10+700T (Soil Profile #16) consists of the following successive strata: topsoil, surficial layers of occasional fills and upper granular deposit, an extensive cohesive clayey silt to silty clay deposit below about elevations ranging from 184.8 to 187.4, and lower granular deposit below about elevation 160.0, overlying limestone bedrock below about elevations ranging from 154.1 to 155.7. The thickness of the clayey silt to silty clay deposit varies between about 22.3 m and 33.0 m at borehole locations.

Lenses of up to 2 m thick of non-cohesive silty sand to sandy silt were encountered at a number of boreholes embedded within the silty clay stratum within the elevation 171 to 179.

Bedrock was encountered at depths ranging from about 30.5 m to 33.3 m below the ground surface.

4.8.1 Topsoil, Surficial Fills and Upper Granular Deposit

All boreholes, except for BH PS7-1, BH 104, BH-1(40J2-40) and BH-2(40J2-40), encountered an up to 0.6 m thick layer of brown to black topsoil at the ground surface. The thickness of the topsoil is expected to vary in thickness through the project area.

Surficial fills were encountered and/or interpreted to exist at the ground surface in Test Holes BH PS7-1 and BH 1(Geocres No. 40J2-40). The fills were variable and consisted of clayey topsoil and sand and gravel to clayey silt. The fills ranged in thickness from 0.2 to 1.2 m at the borehole locations. Surficial fill layer was encountered beneath the topsoil in Borehole BH 102. The fill consisted of clayey silt with sand and topsoil. The thickness of the fill layer measured about 1 m at the borehole location.

A layer of upper granular deposit was encountered beneath the topsoil in Borehole BH 18-RW and at the ground surface in Borehole BH 104. The upper granular deposit consisted of sandy silt to silty sand. The thickness of the upper granular deposit varied from 0.7 to 1.4 m at the borehole locations.

4.8.2 Clayey Silt to Silty Clay Stratum

Cohesive clayey silt to silty clay material was encountered directly underlying the surficial topsoil or fill/granular deposit in all test holes except Borehole BH 2(Geocres No. 40J2-40), where it was encountered at the ground surface. The encountered depth below existing ground surface was from 0.0 to 1.4 m corresponding to elevation 184.8 to 186.6. Based on the gradation, in-situ moisture content and strength characteristics, the stratum may be divided into 5 layers as follows: brown desiccated firm to hard clay crust, transition zone, upper grey silty clay deposit, mid grey silty clay and then a generally coarser lower grey clayey silt deposit. The properties of the clay stratum are listed later in Table 4-15 included at the end of Section 4.8.

The natural water content, Atterberg limits, compression index, and undrained shear strengths properties of the clay sub-strata for the Soil Profiles #16 are shown in Figure 3.10. The undrained shear strength of clay has been estimated from CPT sounding, Nilcon vane and DMT measurement results for Soil Profile #16 segment along the proposed permanent cuts under Phase I, as shown in Figure 3.10.

The stress-strain, effective shear strength and hydraulic conductivity properties were described in Section 3.3. Table 4-15 summarizes the soil strength and compressibility properties for the various overburden layers at Soil Profile #16 area.

4.8.3 Lower Granular Deposit

Underlying the silty clay stratum at about elevations between 154.9 and 162.5 was a heterogeneous non-cohesive deposit with material gradation varying from silt and sand to sandy silt and gravel to clayey silt. Based on the Standard Penetration Test (SPT) “N” value ranging generally from 15 to greater than 100, this material is considered to be in a compact to very dense state of compactness, or stiff to hard state of consistency. This layer was approximately 0.1 to 6.8 m thick but will vary significantly throughout the project area.

4.8.4 Bedrock

Where rock coring was undertaken, a grey to brown, limestone bedrock was encountered. The bedrock was coarse to very fine grained, occasionally pitted, faintly to strongly porous and fractured. Bedrock was encountered at elevations ranging from 154.1 to 155.7 along soil profile #16. The Rock Quality Designation (RQD) of the recovered rock varied from 59 to 100 per cent, indicating a fair to excellent quality. Rock core samples from Boreholes BH 1, BH 101, BH 102 and BH 104 were tested and had unconfined compressive strengths of 49.2, 19.5, 43.1 and 19.0 MPa, respectively. The results of the compressive strength testing indicate that the upper portion of the limestone rock may be described as “weak to medium strong” rock.

4.8.5 Groundwater Conditions

Shallow and deep standpipes were installed in selected boreholes to measure the water levels within overburden and bedrock, respectively (Table 4-16).

The piezometric water levels within the overburden and the lower granular/bedrock were observed between elevations 183.5 to 186.3, and 175.9 to 178.2, respectively (Table 4-16). The highest piezometric water levels within the overburden and the bedrock were reported to be at about elevations 186.3 and 178.2, respectively. These observations suggest a downward gradient between the overburden and the bedrock. It is recognized that these piezometric water levels (particularly in the overburden) may not have fully stabilized.

Perched groundwater is known to accumulate seasonally within the upper deposits of fill, topsoil and granular layers, and within the fissures in the silty clay crust. In adverse conditions, the perched groundwater levels can rise to near the ground surface.

In consideration of the above and the experience along the project alignment, occurrence of local artesian conditions in bedrock cannot be ruled out.

Table 4-15: Properties for Soil Profile #16 (Sta. 10+000T to 10+700T)

| Material Description | Elevation | Natural Water Content, w _N , % | Liquid Limit, w _L | Plastic Limit, w _P | Unit Weight, γ, kN/m ³ | | Shear Strength | | | Design Undrained Modulus of Elasticity, E, kPa | Design Drained Poisson's Ratio* | Design Average Moisture Content used in Analyses, % | Design Compressibility Characteristics | | | | | Design Initial Void Ratio, e ₀ |
|-----------------------|---------------|---|------------------------------|-------------------------------|-----------------------------------|--------|---------------------------------|----------|------------------------------|--|---------------------------------|---|--|----------------|----------------|--|--------------------------------|---|
| | | | | | Measured | Design | Undrained, S _u , kPa | | Design Friction Angle, φ', ° | | | | C _c | C _r | C _α | Preconsolidation Pressure, P' _c , kPa | Over Consolidation Ratio (OCR) | |
| | | | | | | | Measured | Design | | | | | | | | | | |
| Upper Granular | 187.0 – 184.8 | - | - | - | - | 21 | - | - | 30 | 25,000 | 0.35 | - | - | - | - | - | - | |
| Clay Crust | 187 - 181 | 7.0 – 28.0 | 16.0 – 33.0 | 11.0 – 16.0 | - | 22 | 81 - 197 | 75 ** | 30 | 35,000 | 0.35 | 14 | 0.112 | 0.012 | 0.003 | 600 | >4 | 0.38 |
| Clay Transition | 181 - 177 | 9.0 – 18.0 | 13.0 – 25.0 | 11.0 – 14.0 | 21.1 – 21.7 | 22 | 57 - 128 | 75 - 65 | 30 | 21,000 | 0.35 | 17 | 0.138 | 0.015 | 0.004 | 600 - 380 | 2.5 | 0.46 |
| Upper Grey Silty Clay | 177 - 167 | 11.0 – 43.0 | 17.0 – 33.0 | 11.0 – 19.0 | 20.0 – 21.4 | 20.5 | 50 - 84 | 65 - 60 | 30 | 18,000 | 0.35 | 20 | 0.163 | 0.018 | 0.005 | 380 - 350 | 1.6 | 0.54 |
| Mid Grey Silty Clay | 167 - 164 | 14.0 – 35.0 | 28.0 – 43.0 | 13.0 – 15.0 | - | 20.5 | 58 - 90 | 60 - 65 | 30 | 18,000 | 0.35 | 28 | 0.232 | 0.026 | 0.007 | 350 - 390 | 1.3 | 0.76 |
| Lower Clayey Silt | 164 - 162 | 13.0 – 25.0 | 20.0 – 22.0 | 13.0 – 17.0 | - | 20.5 | 43 - 193 | 65 - 125 | 30 | 28,500 | 0.35 | 17 | 0.138 | 0.015 | 0.004 | 390 - 600 | 1.5 | 0.46 |
| Lower Granular | 162 – 154 | 7.1 – 35.8 | - | - | - | 22 | - | - | 30 | 40,000 | 0.35 | - | - | - | - | - | - | |

Note: Average ground water level at 185.0.
*Assumed values (ref. R-42).
** Undrained strength used in global stability analyses.

Table 4-16: Summary of Measured Water Levels in the Vicinity of Soil Profile #16 Area

| Borehole | Surface Elevation | Piezometer Type | Screen / Sensor Elevation | Strata Type at Screen / Sensor Depth | Measured Water level | |
|----------|-------------------|-----------------|---------------------------|--------------------------------------|----------------------|-----------|
| | | | | | Date | Elevation |
| BH 1 | 186.7 | VWP | 175.0 | Clayey Silt | November 14, 2006 | 184.4 |
| | | S-Piez | 150.0 | Limestone | November 14, 2006 | 177.4 |
| BH 101 | 187.4 | S-Piez | 150.3 | Limestone | March 20, 2008 | 178.2 |
| | | | | | July 22, 2008 | 177.7 |
| | | | | | September 19, 2008 | 176.0 |
| | | | | | November 14, 2008 | 177.3 |
| | | | | | January 28, 2009 | 177.4 |
| BH 101A | 187.4 | VWP | 178.3 | Clayey Silt | March 20, 2008 | 186.3 |
| | | | | | July 22, 2008 | 185.8 |
| | | | | | September 19, 2008 | 185.4 |
| | | | | | January 28, 2009 | 185.9 |
| BH-102 | 186.6 | S-Piez | 154.4 | Limestone | July 22, 2008 | 177.9 |
| | | | | | September 19, 2008 | 175.9 |
| | | | | | November 14, 2008 | 177.3 |
| | | | | | January 28, 2009 | 177.0 |
| BH-102A | 186.6 | VWP | 177.5 | Clayey Silt | July 22, 2008 | 185.0 |
| | | | | | September 19, 2008 | 184.4 |
| | | | | | January 28, 2009 | 184.6 |
| BH-201A | 187.7 | VWP | 178.5 | Clayey Silt | April 15, 2009 | 185.3 |
| BH-202 | 187.3 | S-Piez | 150.7 | Limestone | April 15, 2009 | 177.7 |
| BH-207 | 186.9 | S-Piez | 151.5 | Limestone | May 26, 2009 | 178.1 |
| BH-208A | 186.4 | VWP | 177.1 | Clayey Silt | May 26, 2009 | 183.5 |

Legend: S-Piez. Standpipe Piezometer
VWP Vibrating Wire Piezometer.

4.9 Sta. 10+700T to Sta. 11+400T (Soil Profile #17)

The area was investigated by advancing shallow boreholes only. The general soil stratigraphy at the borehole locations between Sta. 10+700T and Sta. 11+400T (Soil Profile #17) consists of the following successive strata: topsoil, surficial layers of occasional fills and an extensive cohesive clayey silt to silty clay deposit below about elevations ranging from 186.3 to 187.5. Drilling for boreholes did not penetrate through the lower granular deposit and bedrock at this area. However, based on the geotechnical investigation data from other sections of the WEP project, a lower granular deposit overlying limestone and dolostone bedrock is expected under the silty clay to clayey silt deposit. The thickness of the clayey silt to silty clay deposit based on the available nearby boreholes is about 25 m to 30 m.

Bedrock in the other sections of WEP project was encountered at depth approximately 30 m to 31 m below the ground surface.

4.9.1 Topsoil, Surficial Fills and Upper Granular Deposit

All boreholes, except for BH CV1-1 and BH-4(Geocres No. 40J2-40), encountered an up to 0.8 m thick layer of brown to black topsoil at the ground surface. The thickness of the topsoil is expected to vary in thickness through the project area.

Surficial fills were encountered and/or interpreted to exist at the ground surface in Boreholes BH CV1-1 and BH 4(Geocres No. 40J2-40). The fills were variable and consisted of clayey topsoil and clayey silt. The fills ranged in thickness from 0.3 to 0.8 m at the borehole locations.

A layer of upper silty sand was encountered beneath the topsoil in Borehole BH 18-RW and at the ground surface in Borehole BH 104. The upper granular deposit consisted of sandy silt to silty sand. The thickness of the upper granular deposit varied from 0.7 to 1.4 m at the borehole locations.

4.9.2 Clayey Silt to Silty Clay Stratum

Cohesive clayey silt to silty clay material was encountered directly underlying the surficial topsoil or fill/granular deposit in all test holes except Borehole BH 2(Geocres No. 40J2-40), where it was encountered at the ground surface. The encountered depth below existing ground surface was from 0.0 to 0.8 m corresponding to elevation 186.6 to 187.6. Based on the gradation, in-situ moisture content and strength characteristics, the stratum may be divided into 5 layers as follows: brown desiccated firm to hard clay crust, transition zone, upper grey silty clay deposit, mid grey silty clay and then a generally coarser lower grey clayey silt deposit. The properties of the clay stratum are listed later in Table 4-17 included at the end of Section 4.9.

The natural water content, Atterberg limits, compression index, and undrained shear strengths properties of the clay sub-strata for the Soil Profiles #17 are shown in Figure 3.11. The undrained shear strength of clay has been estimated from CPT sounding, Nilcon vane and DMT measurement results for Soil Profile #17 segment along the proposed permanent cuts under Phase I, as shown in Figure 3.11.

The stress-strain, effective shear strength and hydraulic conductivity properties were described in Section 3.3. Table 4-17 summarizes the soil strength and compressibility properties for the various overburden layers at Soil Profile #17 area.

4.9.3 Silty Sand

In Borehole BH24-RW, a silty sand lens was found between elevations 183.5 and 181.2 below the silty clay. Based on the Standard Penetration Test (SPT) “N” value ranging generally from 13 to 20, this material is considered to be in a compact state of compactness.

4.9.4 Groundwater Conditions

Observation Well HGMW-06 was installed adjacent to Borehole CV1-1. The groundwater level in the observation well was noted on July 29, 2011 at elevation 186.9 m. In addition, water level readings for Boreholes BH-2(Geocres No. 40J2-40), BH-3(Geocres No. 40J2-40) and BH-4(Geocres No. 40J2-40) after completion between June 8 and 18, 1993 ranged from 0.3 m to 9 m below the ground surface corresponding to elevation 177.6 to 187.5.

Perched groundwater is known to accumulate seasonally within the upper deposits of fill, topsoil and granular layers, and within the fissures in the silty clay crust. In adverse conditions, the perched groundwater levels can rise to near the ground surface.

4.10 Sta. 11+500T to Sta. 12+300T (Soil Profile #18)

The area was investigated by advancing shallow boreholes with the exception of 3 deep boreholes for the proposed Bridge B-15. The general soil stratigraphy at the borehole locations between Sta. 11+500T and Sta. 12+300T (Soil Profile #18) consists of topsoil, surficial layers of occasional fills overlying an extensive cohesive clayey silt to silty clay deposit below about elevations ranging from 187.8 to 190.1 and limestone bedrock below about elevation 151.0. The thickness of the clayey silt to silty clay deposit varies between about 38.2 m and 38.9 m at borehole locations. Boreholes B15-1 and B15-3 were located within the approachway embankment of the former Talbot Road bridge and encountered approximately 8.2 m of fill.

Lenses of up to 2 m thick of non-cohesive sand to silty sand were encountered at a number of boreholes embedded within the silty clay stratum within the elevation 168.2 to 160.6.

Bedrock was encountered at depths ranging from about 39.9 m to 46.7 m below the existing ground surface.

4.10.1 Pavement, Topsoil and Surficial Fills

About 175 to 200 mm thick asphalt layer was encountered at the pavement surface in Boreholes B15-1, B15-2 and B15-3.

All boreholes, except for B15-1, B15-2 and B15-3, encountered an up to 0.4 m thick layer of brown to black topsoil at the ground surface. The thickness of the topsoil is expected to vary in thickness through the project area.

The fill encountered at Borehole B15-1 and B15-3 locations consists of up to 3.1 m of sand and gravel to silty sand and gravel with SPT 'N' values in the range of 28 to 3 (decreasing with depth), indicative of a dense to loose state of compaction. The granular fill is underlain by heterogeneous silty clay and clayey topsoil fill with measured N-values in the range of 3 to 14 indicative of a generally firm to stiff consistency. The clayey fill extended to about 8.2 m depth at the borehole locations.

The fill encountered at Borehole B15-2 consisted of about 1 m of sand and crushed gravel with a measured N-value of 15. This fill is interpreted to be granular fill used for roadway construction and has a compact to dense state of compaction.

4.10.2 Clayey Silt to Silty Clay Stratum

Cohesive clayey silt to silty clay material was encountered directly underlying the surficial topsoil or fill in all Boreholes. The encountered depth below existing ground surface was from 0.1 to 8.2 m corresponding to elevation 188.3 to 189.9. Based on the gradation, in-situ moisture content and strength characteristics, the stratum may be divided into 5 layers as follows: brown desiccated firm to hard clay crust, transition zone, upper grey silty clay deposit, mid grey silty clay and then a generally coarser lower grey clayey silt deposit. The properties of the clay stratum are listed later in Table 4-18 included at the end of Section 4.10.

The natural water content, Atterberg limits, compression index, and undrained shear strengths properties of the clay sub-strata for the Soil Profiles #18 are shown in Figure 3.12. The undrained shear strength of clay has been estimated from CPT sounding, Nilcon vane and DMT measurement results for Soil Profile #18 segment along the proposed permanent cuts under Phase I, as shown in Figure 3.12.

The stress-strain, effective shear strength and hydraulic conductivity properties were described in Section 3.3. Table 4-18 summarizes the soil strength and compressibility properties for the various overburden layers at Soil Profile #18 area.

4.10.3 Bedrock

Where rock coring was undertaken, a light grey, limestone bedrock was encountered. The bedrock was fine grained and fairly to strongly porous. Bedrock was encountered at elevations ranging from 151.2 to 151.7. The Rock Quality Designation (RQD) of the recovered rock varied from 0 to 100 per cent, indicating a very poor to excellent quality. Rock core sample from Borehole B15-1 was tested and had unconfined compression strength of 95.1 MPa. The results of the compressive strength testing indicate that the upper portion of the limestone rock may be described as “strong” rock.

4.10.4 Groundwater Conditions

The piezometric water levels within the overburden were measured at about elevation 178 based on interpretation of the pore pressures measured during electronic cone penetration (CPT B15-1 and CPT B15-2). No perched water levels were recorded during drilling. Water pressures within the bedrock were not measured. Based on observations made in piezometers installed in the general area of the WEP project, the piezometer water levels in the shallow overburden and the bedrock are likely to be at elevations 178 to 182 and 177 to 181, respectively.

In consideration of the above and the experience along the project alignment, occurrence of local artesian conditions in bedrock cannot be ruled out.

Perched groundwater is known to accumulate seasonally within the upper deposits of fill and within the fissures in the silty clay crust. In adverse conditions, the perched groundwater levels can rise to near the original ground surface.

Table 4-18: Properties for Soil Profile #18 (Sta. 11+500T to 12+300T)

| Material Description | Elevation | Natural Water Content, w _N , % | Liquid Limit, w _L | Plastic Limit, w _P | Unit Weight, γ, kN/m ³ | | Shear Strength | | | Design Undrained Modulus of Elasticity, E, kPa | Design Drained Poisson's Ratio* | Design Average Moisture Content used in Analyses, % | Design Compressibility Characteristics | | | | | Design Initial Void Ratio, e ₀ |
|-----------------------|-----------|---|------------------------------|-------------------------------|-----------------------------------|--------|---------------------------------|---------|------------------------------|--|---------------------------------|---|--|----------------|----------------|--|--------------------------------|---|
| | | | | | Measured | Design | Undrained, S _u , kPa | | Design Friction Angle, φ', ° | | | | C _c | C _r | C _a | Preconsolidation Pressure, P' _c , kPa | Over Consolidation Ratio (OCR) | |
| | | | | | | | Measured | Design | | | | | | | | | | |
| Upper Granular | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| Clay Crust | 191 - 185 | 6.4 – 37.7 | 23.8 – 28.8 | 12.5 – 15.8 | 22.0 | 22 | - | 75 ** | 30 | 35,000 | 0.35 | 13 | 0.103 | 0.011 | 0.003 | 700 | >4 | 0.35 |
| Clay Transition | 185 - 178 | 11.1 – 17.9 | 24.2 – 27.0 | 13.5 – 15.0 | 21.2 – 21.4 | 22 | 54 - 187 | 75 | 30 | 22,500 | 0.35 | 16 | 0.129 | 0.014 | 0.004 | 700 - 400 | 2.5 | 0.43 |
| Upper Grey Silty Clay | 178 - 173 | 10.2 – 19.2 | 24.0 – 26.0 | 14.0 – 15.0 | 21.1 – 22.7 | 20.5 | 61 - 187 | 75 - 70 | 30 | 22,000 | 0.35 | 18 | 0.146 | 0.016 | 0.004 | 400 - 380 | 1.3 | 0.49 |
| Mid Grey Silty Clay | 173 - 163 | 10.3 – 38.8 | 18.0 | 13.0 | 20.2 – 21.3 | 20.5 | 65 - 197 | 70 - 85 | 30 | 23,000 | 0.35 | 24 | 0.198 | 0.022 | 0.006 | 380 - 475 | 1.2 | 0.65 |
| Lower Clayey Silt | 163 - 151 | 11.2 – 29.7 | - | - | - | 20.5 | - | 100 | 30 | 30,000 | 0.35 | 16 | 0.129 | 0.014 | 0.004 | 550 | 1.5 | 0.43 |
| Lower Granular | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |

Note: Average ground water level at 186.0.
*Assumed values (ref. R-42).
** Undrained strength used in global stability analyses.

4.11 Test Pits

4.11.1 Fieldwork

Test pits TP7, TP8, TP 10 to TP15, TP B13-1, TP B13-2, TP B14-1 and TP B14-2 were excavated for Phase I sector of the WEP project. The test pits were advanced under the supervision of a member of AMEC's engineering team, who observed and documented the subsurface conditions. Test pit logs from the additional investigation are included in Appendix C.

On August 2, 2011 Amico Infrastructure (Amico) excavated four geotechnical test pits adjacent to the two abutments of the early bridges B-13 and B-14 using a John Deere track 470G LC track mounted excavator. Test pits at the location of Bridge B-13 were located on the south and north sides of the abutment and were identified as TP B13-1 and TP B13-2, respectively. Test Pits numbered TP B14-1 and TP B14-2 were excavated on the south and north sides of abutment B14, respectively.

Between August 12 and September 1, 2011, Amico used a John Deere 470G LC track mounted excavator to excavate eight geotechnical test pits numbered TP 7 to TP 8, TP 10 to TP 15. The soil stratigraphy and subsurface conditions exposed in the test pits were identified and recorded by an AMEC technologist from our Windsor office. Soil samples were collected from each testpit at selected depths and retained in sealed plastic bags for further detailed examination and laboratory testing. Each test pit varied in lateral dimensions but was at least approximately 10 m wide and at least 23 m long with a final depth for each test pit of approximately 10 m below ground surface.

Amico also carried out the backfilling for this work. After each test pit was observed and documented, Amico backfilled each test pit with the excavated material generally without compaction. Each test pit is expected to be re-excavated during the reconstruction of the road, or should not be considered suitable to receive future structural loads.

4.11.2 Subsurface Conditions in Test Pits

The following summary is intended to assist designers of the project with an understanding of anticipated soil conditions at the locations of the explorations. It should be noted that the soil and groundwater conditions might vary between these exploration locations.

Topsoil: Surficial Topsoil was observed in Test Pits TP 7 and TP 10 to TP 15. The topsoil thickness varied between 0.15 and 0.50 m. The topsoil consisted of organic matter and sand and was generally dark brown to black. It should be noted that where topsoil exists across the roadway alignment, the thickness of the topsoil may vary from what was encountered at the test pit locations.

Gravel: A granular fill was encountered from the surface at Test Pits TP B13-1, TP B13-2, TP B14-1, TP B14-2 and TP 8. The granular fill at the four test pits associated with the bridge abutments consisted of a typical OPSS granular A or B type materials extending up to 3 m deep. While the granular fill encountered at TP 8 was a sand and gravel mix of 0.1 m thick.

Fill: Fill encountered in Test Pits TP 7, TP 11, and TP 15 generally appeared to consist of reworked clay and topsoil, as described in Test Pits TP 11 and TP 15; clay mixed with occasional organic matter. The fill layer ranged from 0.1 to 0.8 m thick.

Sand, Sandy Silt and Silty Sand: Cohesionless deposits of sand, sandy silt and silty sand were generally encountered below the surface topsoil or gravel and underlying fill materials in Test Pits TP 8 and TP 15. The cohesionless deposits were encountered to 2.1 m depth below ground surface in Test Pits TP 15. The moisture content of the samples of sand, sandy silt and silty sand varied between 12.6 and 33.2 percent by weight.

Silty Clay to Clayey Silt Deposit: Below the sand is a deposit of silty clay or clayey silt with some sand and gravel. Gravel content varies but can increase in frequency with depth. The upper surface of silty clay to clayey silt deposit exhibited weathered grey and brown mottling colour to a depth of approximately 1.9 m to 3.7 m below ground surface. The silty clay transitioned from brown to grey colour at a depth of approximately 3.1 m to 3.6 m below ground surface as observed in Test Pits TP 10 through TP 15. Moisture contents of samples taken within this silty clay to clayey silt measured 14.4 to 26.7 percent. In situ shear strength measurements of the silty clay or clayey silt taken by hand vane indicated a consistency of very stiff to hard changing to firm to stiff with increasing depth.

The soil descriptions are based on visual, tactile inspection and in situ shear strength readings of the excavated soils and observation of the test pit side walls. It should be noted that there may be variations between samples that have been visually classified and those where laboratory tests used to determine soil classification per ASTM D2487.

Groundwater: Test Pits TP 7, TP 10, TP 14, TP B13-1 and TP B14-1 encountered seepage generally near or above the sand/silt and clay interface, i.e., at about 0.9 to 3.0 m depth below existing ground surface. Groundwater conditions will vary depending on temperature, season, precipitation, and other conditions that may differ from those at the time of the explorations.

4.11.3 Laboratory Tests

Selected soil samples were collected at the test pits and tested in our laboratory to determine soil index properties and natural moisture contents. The testing included natural moisture content (ASTM D2216), Grain Size Analysis (ASTM D422 and ASTM D4221), Atterberg Limits (ASTM D4318), and Standard Proctor (ASTM D698). Results of the laboratory tests are attached in Appendix C.

4.12 Subsurface Gases

The groundwater in the project area, especially within the lower granular deposit and bedrock, is known to contain dissolved hydrogen sulphide (H_2S) and methane (CH_4) gases that are liberated from the water on exposure to atmospheric pressure.

The H_2S gas can frequently be detected by odour at approximate concentrations of 0.5 parts per million (ppm or mg/L) and can be corrosive at concentrations of about 2 ppm (mg/L) to 3 ppm (mg/L) in the groundwater. The presence of the gas was not noted by odour during the current drilling site. H_2S concentrations measured in groundwater samples taken from Boreholes BH-101, BH-102, BH-104, BH-

105, BH-107, BH-109, BH-112, BH-113, BH-115, BH-116, BH-118, BH-119, BH-122, BH-127 and BH-129 during background investigations ranged from less than 0.02 to 5.54 ppm (mg/L) (ref. R-17). Dissolved CH₄ concentrations in the groundwater taken from Boreholes BH-101, BH-102, BH-104, BH-105, BH-107, BH-109, BH-112, BH-113, BH-115, BH-116, BH-118, BH-119, BH-122, BH-127 and BH-129 ranged from less than 5 parts per billion (ppb) to 395 ppb (ref. R-17).

Although the presence of the H₂S and CH₄ gases was not confirmed at site during drilling for additional geotechnical investigation along Phase I, their presence cannot be ruled out. The presence of these gases has been addressed in the hydrogeological assessment report.

Pumping tests were conducted at three locations across the proposed parkway to determine concentration levels of hydrogen sulphide gas in the groundwater of the area. A summary of the results of these tests is provided in Table 4-19.

Table 4-19: Pumping Tests Data

| Test Number | Approximate Location | H ₂ S Gas Concentration (mg/L) |
|-------------|----------------------|---|
| TOW-1 | East of Tunnel T-10A | <0.2 |
| TOW-2 | North of Tunnel T-7 | 20.0 |
| TOW-3 | South of Tunnel T-4 | 7.0 |

Air quality and subgrade pore pressure monitoring should be carried out during construction. The equipment operating in confined spaces should be selected to safely operate in a potentially gaseous environment. Excavation lifts should be decided in consideration of the pore pressure monitoring data and the potential ground softening.

The understanding of the engineering behaviour (related to the impact on design and construction) of the gassy soils is rather limited. In the case of low permeability cohesive soils it is known that these soils may experience rapid drop in undrained shear strength during unloading. Due to the relatively high compressibility of the pore water fluid in gassy soils, the immediate pore water pressure response (ΔU) to total stress changes can be very low. This phenomena leads to reduction in effective stress and hence shear strength (ref. R-25 and R-41). It is, therefore, recommended that the design and construction methodologies should be developed in consideration of the potential presence of these gases (ref. R-14).

5 Development of Geotechnical Design

5.1 Permanent Cuts – Phase I Configuration

Highway 401 along the below-grade section of WEP under Phase I will be constructed between Stations 10+070L and 10+900T, and accommodate the below-grade traffic of Highway 401. The permanent cuts - Phase I section is about 4.35 km long and depth of excavation varies between about 1.0 and 10.5 m. The permanent slopes have an inclination no steeper than 1 vertical and 3 horizontal. A minimum 2 m berm is required by the Project Agreement when the permanent cut finished height is 8 m and above.

Six different types of permanent cut slope configurations, named Configurations 'A' to 'F' (illustrated on Figure E.1 in Appendix E) are identified along the depressed portion of the highway. This design report address only the Configuration 'A' where permanent cut slopes are not containing retaining walls. The retaining walls with associated permanent cut slopes have been addressed in separate reports.

5.2 Geotechnical Design Criteria and Considerations

The geotechnical design has been completed in compliance with the requirements of the execution version of the Project Agreement Schedule 15-2 Part 2, Article 5 (PA) for the Windsor-Essex Parkway Project. Representative cross-sectional profiles (with associated ground features, such as adjacent Highway 3, ramps, landscape etc.) for the permanent cut slopes from each applicable soil profile segment under Phase I that have been analysed for the report are shown in Figures 5.1 to 5.6. The cross-sectional profiles were selected from Highway 401 design cross-sectional profiles developed in July, 2012. The most referred to design criteria and considerations are:

- The slope stability analyses (limit equilibrium analyses) were carried out using the SLOPE/W software, Version 7.03, 2007. Morgenstern-Price method of slices with circular failure surfaces was used. The behaviour of the native silty clay stratum under the short-term and long-term steady state static loading conditions was simulated using the undrained and drained shear strength parameters, respectively. The slope stability analyses were carried out to simulate both circular and non-circular failure surfaces.
- The permanent cuts are to be designed for a minimum factor of safety of 1.3 for both the short-term (undrained) loading conditions and the long-term (drained) steady state loading conditions.
- The contractor shall ensure that the cut slopes are appropriately protected from any surficial erosion and accessible for regular maintenance. As per PA no signs of tension cracks, toe bulging, slumping or sloughing in the permanent cuts are permitted.
- For the short-term (e.g., during construction and at end of construction) undrained loading conditions, a live load of 12 kPa was assumed at the top of the slope. The ground elevation at the toe of the excavation was considered at the level of the pavement subgrade with no dead or live loads over the ground surface (passive zone). For calculation purposes, in general, a 2 m deep tension cracks filled with water were considered at the top of the slope assuming that the top ground has not been covered yet with topsoil and/or road backfill just before completion of the construction (undrained condition).

- For the long-term steady state loading conditions (drained conditions), a surcharge of 15 kPa was assumed over the subgrade under Highway 401 to simulate the weight of the pavement over the base of the excavation. The pore water pressures for the drained conditions were simulated using a phreatic surface following closely the ground surface and subdrainage features.
- The settlement, heave and pore water dissipation related to the loading stages were assessed using the SIGMA/W software, Version 5.20, 2007. The results from SIGMA analyses were cross checked at select locations using conventional uniaxial consolidation theory based analyses.
- SEEP/W, Version 2007 was used to estimate the seepage rates associated with the long-term drawdown of the piezometric water levels (groundwater) within the sections of the permanent cuts of the project under Phase I.
- To simulate groundwater recharge subsurface infiltration rates from precipitation and runoff of 2.0×10^{-5} to 4.0×10^{-5} m/days were accommodated by trial-and-error approach to ensure compatibility with the ground transmissivity (sustained groundwater level without excessive mounding).

Permanent cut construction is expected to involve the following design elements and construction stages. Although the retaining walls (e.g. HRW, MSEW, SRW and MSHP) are not addressed in this report, construction stages including retaining walls are shown in Figure F.1 in Appendix F and described in sequence below:

- The relocation of Highway 3 is assumed to be completed before any of the major excavation along the future Highway 401.
- MSEW/SRW (RSS vertical/steep sloped walls) at the top of the bank (Configurations B to E, Figure E.1) and associated permanent drainage works are assumed to be constructed before relocation of Highway 3 within partial excavations of sufficient depth and width to facilitate the construction of these structures (Stage I excavation, Figure F.1).
- MSHP (toe retaining walls) required in Configurations Type D and E are assumed to be installed at the toe of permanent cuts before completion of the entire excavation for Highway 401 to the design subgrade levels. Temporary local excavations of sufficient depth and width will be required to facilitate the construction of the MSHP and associated backfills and subdrainage system (granular backfill, or clay backfill in conjunction with drainage blanket).
- Final excavation to the design slopes of permanent cuts will be followed by the placement of slope protection (rip rap, landscaping, etc).
- Subgrade at the design elevation will be exposed and base will be prepared.
- The pavement of Highway 401 will be completed.

5.3 Design Soil Properties

As described in Sections 3 and 4, the design soil properties for the silty clay deposit were interpreted from the CPT, DMT and Nilcon vane test profiles and the laboratory test results. The undrained shear strength (S_u) and preconsolidation (maximum past) pressure (σ'_p) profiles were estimated from the CPTs based on

the calibration described in Section 3.2. The S_u and σ'_p profiles inferred from the CPTs, DMT and Nilcon tests advanced along the Phase I alignment (Soil Profiles #9 to #18) and the design values obtained from these profiles are shown in Figures 3.3 to 3.12, and summarized in Tables 4-1, 4-3, 4-5, 4-7, 4-9, 4-11, 4-13, 4-15, 4-17 and 4-18, respectively. However, local soil conditions were also applied in the analyses at some stations where warranted.

The design values of the coefficient of horizontal permeability (k_h) and the hydraulic conductivity anisotropy ratio (based on tests performed along the entire WEP project length) required for the analysis of stress and deformation response of the soils are provided in Table 5-1. The design permeability values are slightly (2 to 5 times) higher than the values interpreted from the field test results (Figure 4.5) and are considered to be within range of precision of the measurements.

Table 5-1: Summary of Interpreted Soil Permeability

| Clay Substratum | Horizontal Permeability, cm/s | Anisotropy ratio, k_h/k_v |
|-----------------------|-------------------------------|-----------------------------|
| Clay Crust | 6.8×10^{-7} | 1 |
| Clay Transition | 3.9×10^{-7} | 2 |
| Upper Grey Silty Clay | 1.1×10^{-7} | 2 |
| Mid Grey Silty Clay | 1.1×10^{-7} | 2 |
| Lower Silty Clay | 1.1×10^{-7} | 2 |

5.4 Results of Analyses

5.4.1 Global Stability

Global stability analyses were carried out to simulate significant loading conditions during construction to achieve the final cut of up to 10.5 m for the several design sections representing variable subsurface soil conditions and permanent cut depths. The analyses were carried out using Morgenstern-Price method and both circular and non-circular failure surfaces were tested. The short-term loading condition was based on undrained shear strength parameters, which relates to the end of construction. The long-term loading condition was based on drained soil properties and steady-state pore water pressure conditions. The long-term steady state position of the phreatic surface within the native soils was assumed at about depth of 1 to 2 m below the original ground surface and following closely the slope.

Table 5-2 summarizes the calculated minimum factors of safety (FS) for both the short-term loading conditions (e.g., staged construction and end of construction conditions) and the long-term steady state static loading conditions. The models for the global stability analyses showing critical failure surfaces are illustrated in the Figures G.1 to G.46 in Appendix G. The slope features indicated in Table 5-2 and on corresponding figures were considered for global stability calculations. Based on the results of the analyses, conclusions and geotechnical recommendations are provided later in Section 5.5. The PA requires that permanent cut slopes shall be designed with adequate minimum factor of safety no less than 1.3. The calculated factors of safety summarized in Table 5-2 adequately satisfy the PA requirements.

Table 5-2: Summary of Global Stability Analyses

| Station | Side | Soil Profile | Slope Type | Total Height (m) ⁽¹⁾ | FS for Loading Condition ♠ / Figure # | | | | Remarks & Features |
|------------|------|--------------|------------|---------------------------------|---------------------------------------|------------------|------------------|--------------------|--|
| | | | | | SC-U | SC-D | EOC-U | Long-term | |
| 10+300L | R | #9 | A | 8.0 | 1.5 (1.5) / G.1 | N/A | 1.5 (1.5) / G.2 | 1.3 (1.3) / G.3 | -2.5 m deep Relief Drain at slope & 4 m wide Rip Rap at toe |
| 10+425L | R | #10 | A | 7.5 | N/A | N/A | 1.6 (1.6) / G.4 | 1.4 (1.3) / G.5 | -2.5 m deep Relief Drain at slope & 4 m wide Rip Rap at toe |
| 10+725L | R | #10 | A | 10.0 | N/A | N/A | 1.3 (1.3) / G.6 | 1.4 (1.3) / G.7 | -2.5 m deep Relief Drain at slope & 5 m wide Rip Rap at toe |
| 10+750L | R | #10 | A | 8.5 | N/A | N/A | 1.4 (1.4) / G.8 | 1.4 (1.3) / G.9 | -2.5 m deep Relief Drain at slope & 4 m wide Rip Rap at toe |
| 10+755.24L | R | #10 | A | 8.5 | N/A | N/A | 1.5 (1.4) / G.10 | 1.4 / (1.3) / G.11 | -2.5 m deep Relief Drain at slope & 4 m wide Rip Rap at toe |
| 10+775L | R | #10 | A | 8.0 | N/A | N/A | 1.5 (1.4) / G.12 | 1.3 (1.3) / G.13 | -2.5 m deep Relief Drain at slope & 4 m wide Rip Rap at toe |
| 11+000L | R | #11 | A | 8.0 | N/A | N/A | 1.5 (1.4) / G.14 | 1.3 (1.3) / G.15 | -2 m deep Relief Drain at slope & 3.5 m wide Rip Rap at toe |
| 12+325L | L | #13 | A | 8.5 | N/A | 1.4 (1.3) / G.16 | 1.6 (1.5) / G.17 | 1.4 (1.3) / G.18 | -2.5 m deep Relief Drain & 5 m wide Rip Rap at toe |
| 12+475L | L | #13 | A | 9.0 | N/A | 1.4 (1.3) / G.19 | 1.6 (1.5) / G.20 | 1.4 (1.3) / G.21 | -2.5 m deep Relief Drain at slope & 5 m wide Rip Rap at toe |
| 12+850L | L | #14 | A | 8.5 | 1.6 (1.5) / G.22 | N/A | 1.6 (1.5) / G.23 | 1.4 (1.3) / G.24 | - 2.5 m deep Relief Drain at slope & 5 m wide Rip Rap at toe |
| 12+900L | R | #14 | A | 10.0 | 1.4 (1.4) / G.25 | N/A | 1.5 (1.5) / G.26 | 1.5 (1.4) / G.27 | - 2.5 m deep Relief Drain at slope & 5 m wide Rip Rap at toe |
| 13+075L | L | #14 | A | 7.5 | N/A | 1.4 (1.4) / G.28 | 2.0 (1.9) / G.29 | 1.4 (1.4) / G.30 | - 2.5 m deep Relief Drain at slope & 3.5 m wide Rip Rap at toe |
| 13+720L | R | #15 | A | 8.5 | N/A | N/A | 1.6 (1.5) / G.31 | 1.4 (1.4) / G.32 | -2.5 m deep Relief Drain at slope & 5 m wide Rip Rap at toe |
| 13+794.47L | L | #15 | A | 9.5 | N/A | N/A | 1.4 (1.4) / G.33 | 1.4 (1.3) / G.34 | -2.5 m deep Relief Drain at slope & 5 m wide Rip Rap at toe |
| 10+050T | L | #15 | A | 10.0 | N/A | N/A | 1.4 (1.4) / G.35 | 1.4 (1.3) / G.36 | - 2.5 m deep Relief Drain at slope & 5 m wide Rip Rap at toe |
| 10+125T | L | #16 | A | 9.5 | N/A | N/A | 1.6 (1.6) / G.37 | 1.4 (1.3) / G.38 | - 2.5 m deep Relief Drain at slope & 5 m wide Rip Rap at toe |
| 10+225T | L | #16 | A | 10.5 | N/A | N/A | 1.5 (1.4) / G.39 | 1.4 (1.4) / G.40 | - 2.5 m deep Relief Drain at slope & 5 m wide Rip Rap at toe |
| 10+400T | R | #16 | A | 9.0 | N/A | N/A | 1.7 (1.7) / G.41 | 1.4 (1.4) / G.42 | - 2.5 m deep Relief Drain at slope & 4 m wide Rip Rap at toe |
| 10+500T | R | #16 | A | 7.5 | N/A | N/A | 1.3 (1.3) / G.43 | 1.4 (1.4) / G.44 | - Soil Mound at 7 m offset is shown on the new plan. Proposed mound top elevation is 196 m. However, based on slope stability analyses, mound top elevation should be restricted to 194 m in order to get appropriate factor of safety - 2.5 m deep Relief Drain at slope & 4 m wide Rip Rap at toe |
| 10+700T | L | #17 | A | 5.5 | N/A | N/A | 2.5 (2.3) / G.45 | 1.4 (1.4) / G.46 | - 2.0 m deep Relief Drain at slope & 2.5 m wide Rip Rap at toe |

♠ Legend – Loading Condition: SC-U = Stage During Construction (Undrained Condition)

SC-D = Stage During Construction (Drained Condition)

EOC-U = End of Construction (Undrained Condition)

Notes:

1. Measured between the top of finished grade and subgrade below pavement structure.
2. FS values outside parentheses refer to circular failure surfaces and the values in parentheses refer to non-circular failure surface.
3. FS values rounded to one decimal.
4. N/A – Not Applicable.

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5.4.2 Ground Deformations and Timeline

The main driving factor causing ground movement (deformation) along Phase I is the permanent excavation to accommodate the proposed depressed portion of Highway 401. As indicated in Section 5.2, stress-deformation models (SIGMA/W) were developed to simulate the anticipated soil response due to the loading caused by various construction stages. This analysis is intrinsically theoretical and the obtained values should be considered indicative of the approximate magnitudes and trends of the ground response. A more accurate assessment requires field scale tests and response monitoring in order to calibrate the theoretical models.

It is understood that the intended construction staging is to complete first sections of realigned Highway 3. This would incorporate portions at grade, portions of low embankments (up to 3 m high) and portions of relatively shallow cuts (up to 3 m deep). Most of the major excavations for Highway 401 would be conducted afterwards. The process of ground movement caused by the excavation for the depressed Highway 401 is considered to manifest as follows:

- A set of immediate (instantaneous) deformations, described also as “short-term” deformations, would occur during the unloading of the overburden (removal of the soil). Due to low permeability of the silty clay deposit left in place, and the anticipated relatively rapid rate of excavation, the response of the soil is expected to be largely undrained during the short time assumed for the bulk of excavation (30 days). The unloading is expected to be accompanied by rapid changes (decrease) of the soil pore water pressures compared to the initial conditions.
- The soil deformation process would continue after the completion of the loading/unloading for periods of time until the changes of the pore water pressures generated during excavation evolve (dissipate) toward a new state of equilibrium in balance with the total applied load and final geometrical configuration. The dissipation time is determined by the permeability of the soils and by the size of the soil region impacted by the loading/unloading. The deformation magnitudes at the completion of the dissipation are described as “long-term” (LT) deformations.

For the purposes of the calculations, the actual field conditions were schematized as follows:

- Where applicable, ground loads (surcharges or shallow excavations) were applied to simulate the construction of the low embankments/shallow cuts for Highway 3. A short period of 15 days was considered for calculation purposes. Accordingly, no significant pore water pressure dissipation was expected to occur during this stage of construction. Some levels of moderate immediate settlements (or heave) are associated with this construction. Since this movement component occurs during construction, there should be no effects on the surface of the road as the movement is compensated during construction by levelling the surface.
- The major excavation for Highway 401 would also be carried out relatively rapidly (assumed 30 days for the completion of the bulk of the excavation) to near the level of the design subgrade. The process is accompanied by “immediate” components of settlements of the grounds surface, inward lateral movement (toward the excavation of the slopes) and soil mass around the excavation sides, and heave of the bottom of the excavation. Features located on the excavation sides would “feel” the effects of this movement. The “immediate” heave at the bottom of

excavation would have no effect on the future performance of the road since the grades will be corrected during excavation. The completion of the bulk of the excavation is a reference moment described as End of Excavation (EOE) and can be used to assess the potential effects on the features existing in the vicinity of the excavation.

- Construction of the pavement structure along Highway 401: This process would generate minor immediate ground settlements of the bearing surface with no effects on the future performance of the pavement box. This stage of the construction is described as End of Construction (EOC) and can be used as reference for the assessment of the potential effects of the long-term deformations after the completion of the construction
- Long-term Condition: Assuming that after EOC no other major loads are applied, the entire soil mass surrounding the project is subjected to a slow process of “adjustments” of the deformation field under a transient redistribution of the soil pore water pressures described as “dissipation” until a final steady-state pore water pressure is achieved in equilibrium with the load configuration at EOC. This final stage of deformation is described as long-term (LT) condition. All features supported by the soil mass would experience movements caused by the dissipation process.

The stress-deformation analyses were carried out using an effective stress-based model (illustrated in Figures H.1 to H.28 in Appendix H). For the stress-deformation analyses, the long-term steady state phreatic surface was assumed to correspond to the initial groundwater level and follow the excavation and subgrade surfaces. Elastic-plastic Mohr-Coulomb models were used for all soil layers except for the unweathered firm and stiff silty clay which was described by the Modified Cam-Clay model. Hydraulic conductivity properties described in Table 5-1 were assigned to the different soil layers.

The calculated ground deformations corresponding to various loading stages and locations during and after permanent cuts along the Phase I segments are summarized in the Table 5-3. The degrees of consolidation at the select years are also indicated. The deformation and timeline estimates in Table 5-3 are based on soil deformation and conductivity properties that vary significantly within the soil mass. Accordingly, the indicated values should be considered approximate, and large variations of the actual response should be anticipated. The calculated horizontal displacements at subgrade level at the top ground of Highway 3 at select stations are summarized in Table 5-4. These estimates should be verified and refined with respect to the actual performance monitoring in the field. Figures H.29 to H.44 show the cumulative settlement/heave, horizontal displacement profiles at select stations for the end of excavations, end of construction and the long-term loading conditions.

Table 5-3: Summary of Estimated Cumulative Ground Deformation (Heave/Settlement)

| Station | Ref. Figure No. | Estimated Maximum Subgrade Heave, mm | | | Estimated Top Ground Settlements/Heave (EOC/LT) at distances from top of slope, mm | | | | % Consolidation after completion of construction (EOC) after years | | | | | | Notes |
|---------|-----------------|--------------------------------------|----|-----|--|-----------------|-----------------|-----------------|--|----|-----|-----|-----|-----|---------|
| | | | | | | | | | 2 | 5 | 10 | 15 | 20 | 25 | |
| 10+425L | H.1 & H.2 | 50 | 45 | 90 | (-)20/ 5 | (-)25/ (-)15 | (-)20/ (-)10 | (-)15/ (-)10 | 46 | 63 | 87 | 100 | 100 | 100 | |
| 10+725L | H.3 & H.4 | 55 | 50 | 105 | (-)20/ (-)5 | (-)20/ (-)10 | (-)10/ (-)5 | (-)15/ (-)10 | 45 | 58 | 75 | 96 | 100 | 100 | (1) |
| 12+475L | H.5 & H.6 | 60 | 50 | 95 | (-)20/ 0 | (-)25/ (-)10 | (-)20/ (-)10 | (-)15/ (-)10 | 50 | 76 | 98 | 100 | 100 | 100 | |
| 12+900L | H.7 & H.8 | 60 | 55 | 80 | 15/ 30 | 20/ 35 | 20/ 35 | 15/ 25 | 67 | 75 | 92 | 100 | 100 | 100 | (2) (3) |
| 10+050T | H.9 & H.10 | 55 | 50 | 85 | (-)15/ 0 | (-)15/ (-)5 | (-)15/ (-)5 | (-)10/ (-)5 | 45 | 67 | 79 | 88 | 100 | 100 | |
| 10+225T | H.11 & H.12 | 60 | 55 | 80 | (-)30/ (-)25 | (-)40/ (-)35 | (-)40/ (-)40 | (-)30/ (-)30 | 58 | 85 | 100 | 100 | 100 | 100 | (4) |
| 10+500T | H.13 & H.14 | 55 | 55 | 75 | (-)5/ (-)5 | (-)40/ (-)50 | (-)50/ (-)65 | (-)45/ (-)65 | 62 | 81 | 100 | 100 | 100 | 100 | (5) |

(-) Indicates settlement
 EOE = End of Excavation
 EOC = End of Construction
 LT = Long-term Condition
 xx/yy = Settlement or Heave at end of construction/Settlement or Heave in long-term

Notes:

1. Includes the effects of Trail Road TR 35
2. Includes the effects of excavation for Highway 3
3. Reported distances are from the right edge of Highway 3 excavation
4. Reported distances are from the right edge of Highway 3 embankment
5. Includes the effect of soil mound.

Table 5-4: Estimated Cumulative Lateral Displacements at the Highway 3 Subgrade

| Station | Construction Stage | Estimated Lateral Displacement at Subgrade of Highway 3 at Distances from Road Edge, mm | | | |
|---------|--------------------|---|------|------|------|
| | | 0 m | 10 m | 20 m | 30 m |
| 12+900L | EOE | 25 | 20 | 15 | 15 |
| | LT | 15 | 15 | 10 | 10 |
| 10+225T | EOE | 40 | 35 | 30 | 25 |
| | LT | 25 | 25 | 20 | 15 |

Displacement towards Highway 401 excavations

EOE = End of Excavation

LT = Long-term Condition

5.4.3 Groundwater Seepage Summary

Seepage analyses were carried for selected representative slope sections (for half of excavation) using hydraulic conductivity properties given in Table 5-1. The analyses models and the obtained results are also presented in Figures I.1 to I.10 in Appendix I. The flow rates at subdrain level and bottom of excavation were calculated, and the results are summarized hereafter in Table 5-5.

Table 5-5: Seepage Rates Summary (For Half of Excavation)

| Station | Estimated Long-Term Seepage Rates (litre/day/m) ⁽¹⁾ | | | Remarks |
|---------|--|----------------------|-------|--|
| | Slope Subdrain | Bottom of Excavation | Total | |
| 10+300L | 3.7 | 0.5 | 4.2 | Assumes "Leaky" Pond 4 & Water Level at El.182, Figure I.1 |
| 10+425L | 0.8 | 0.5 | 1.3 | Figure I.2 |
| 10+725L | 0.9 | 0.5 | 1.4 | Figure I.3 |
| 10+775L | 1.0 | 0.7 | 1.7 | Figure I.4 |
| 11+000L | 1.0 | 0.7 | 1.7 | Figure I.5 |
| 12+475L | 1.2 | 0.7 | 1.9 | Figure I.6 |
| 12+900L | 0.9 | 0.4 | 1.3 | Figure I.7 |
| 13+720L | 1.0 | 0.9 | 1.9 | Figure I.8 |
| 10+050T | 1.1 | 1.0 | 2.1 | Figure I.9 |
| 10+225T | 1.1 | 0.8 | 1.9 | Figure I.10 |

⁽¹⁾ Seepage was estimated on half of the cross-section of permanent cuts.

As the seepage rates in Table 5-5 are for half of excavation, to approximate the seepage rates for the entire section of the permanent cut, the quantities in Table 5-5 may be multiplied by a factor of 2 considering the section is almost symmetry about the centre of the excavation. The above rates exclude additional seepage from runoff collected within the surface drainage system.

The above seepage estimates are based on conductivity properties that vary significantly within the soil mass. Accordingly, the posted values should be considered approximate and large variations of the actual response should be anticipated.

5.4.4 Basal Uplift

The factors of safety against basal hydrostatic uplift was calculated at selected stations based on the highest measured water level in the bedrock, anticipated deepest excavation depth, and the weight of the silty clay/clayey silt cover between the base of the excavation and the lower granular deposit. The input parameters used to determine the factor of safety against basal uplift instability at select stations and calculated factors of safety are summarized in Table 5-6.

Table 5-6: Summary of Input Parameters and Factor of Safety for Basal Uplift

| Station | Original Ground Surface Elevation | Depth of Excavation below Original Ground Surface, m | Highest Ground Water Elevation in Bedrock | Depth of Clay Cap on Top of Lower Granular, m | Factor of Safety |
|---------|-----------------------------------|--|---|---|------------------|
| 10+300L | 181.5 | 7.5 | 176.8 | 23.2 | 1.9 |
| 10+775L | 182.0 | 7.5 | 178.3 | 22.6 | 1.8 |
| 11+000L | 183.0 | 7.0 | 178.5 | 22.9 | 1.9 |
| 12+475L | 185.0 | 9.0 | 182.9 | 16.7 | 1.5 |
| 12+900L | 185.5 | 10.0 | 178.3 | 19.1 | 1.9 |
| 10+050T | 187.0 | 10.0 | 178.2 | 17.3 | 2.0 |
| 10+225T | 187.0 | 9.5 | 177.6 | 21.0 | 2.1 |
| 10+400T | 187.5 | 7.5 | 178.1 | 20.7 | 2.4 |

5.5 Conclusions and Geotechnical Recommendations

5.5.1 Excavations and Permanent Cut Slopes

The contractors are fully responsible for the design, construction methods and performance (stability, dewatering, sloughing prevention, soil gases mitigation, etc) of the temporary slopes. The contractor also must ensure that the temporary slopes meet the PA criteria and the needs to accommodate the construction of the retaining structures, permanent drainage and permanent cuts.

Excavations for permanent cuts are expected to encounter fills, topsoil, surficial granular soils and other materials (deleterious materials, rubble, etc), and will be extended into the firm to stiff clayey silt to silty clay deposit. All excavation works should be carried out in accordance with the guidelines outlined in Occupational Health and Safety Act (OHSA) and OPSS 902. The native soils may generally be classified as Type 3 soils, if appropriate dewatering has been carried out. The excavations may intersect water bearing backfill within trenches of active and/or abandoned utilities. In these cases Type 4 soil conditions may occur and should be addressed accordingly.

Temporary Groundwater control will be required based on timing of construction and prevailing weather conditions.

The permanent slopes should have an inclination no steeper than 3H:1V. A minimum 2 m berm is required by the Project Agreement when the permanent cut finished height is 8 m and above.

The recommendations provided herein are based on the assumptions that (a) the permanent cut slopes during construction are properly protected at all times against surface erosion due to runoff, desiccation,

freeze-thaw effects, gas release, etc., and (b) the duration of the slope exposure of the unprotected final slope grade during construction is in general limited to minimal.

To protect the slope subgrade integrity, the final excavation lift above the design subgrade should not be less than 150 mm and should be carried out only when the contractor is ready to prepare and cover the slope surface with the materials specified in the design the same day it is exposed and approved. No construction traffic should be permitted over subgrade without approved protective covers.

To protect the road subgrade integrity, the final excavation lift above the design elevation should not be less than 500 mm and should be carried out only when the contractor is ready to prepare and cover the pavement subgrade with the materials specified in the design the same day it is exposed and approved.

No construction traffic should be permitted over subgrade without approved protective covers.

The results of deformation analyses at select Stations are summarized in Table 5-3 in Section 5.4.2. These analysis results indicated the following ground movement trends:

- Subgrade heave under Highway 401 pavement of up to 55 mm can be expected after completion of construction. Most of the ground movement is expected to occur within 10 to 15 years after end of construction.
- Subgrade settlement and lateral movement of up to 40 mm was estimated under Highway 3 pavement during and shortly after the completion of the main excavation for Highway 401.
- Due to the relatively smooth changes in the geometry of the tunnel, the above settlement changes along Highway 401 are anticipated to be gradual in the longitudinal profile. Where construction staging requires localized, but still large excavations (e.g., to construct a particular tunnel, or bridge) the ends of the excavations should be tapered progressively, at 5H:1V, or flatter. In this way the risks of differential settlements can be reduced.
- Since the main source of larger ground movement is represented by the deep excavations for Highway 401, as much as possible, the construction of the deformation sensitive facilities in the vicinity should be scheduled after completion of majority of the excavation.
- The utilities within the zone of influence should be flexible and especially be equipped with flexible connections at manholes or vaults.
- The reported magnitudes of the soil movement are based on established theoretical methods using soil properties derived from conventional investigation procedures. The accuracy of such predictions is generally poor. The improvement of the prediction can be made only on the basis of large scale field tests and feed-back from instrumentation and monitoring of the soil mass during field construction.

The calculated long-term seepage flow rate was about 2.6 to 8.4 litre/day per meter length of the roadway, across the entire section of the cut. This is an approximate estimate for the long-term postconstruction conditions. Temporary seepage during construction could be significantly different. These estimates do not include flow from runoff, perched groundwater and any unexpected seeps from pockets of sand or utility trenches.

Care should be exercised during excavation to control the thickness of the excavation layers in consideration of likely presence of silt or fine sand seams. Smooth edge bucket is recommended when excavation approaches the design lines and grades.

Occasional seepage from intersected sand/silt interbeds is likely to occur. In such cases temporary protection against piping and surface erosion will be required (e.g., sand & gravel blankets, interceptor ditches, etc.).

The calculated factor of safety against basal uplift instability at the excavation bottom (due to hydrostatic pressure in the lower granular deposits) as listed in Table 5-6 varied between 1.5 and 2.4, which is considered acceptable. The water level in the piezometers installed in the boreholes should be measured on regular basis and based on the results obtain, the basal uplift hydrostatic pressure should be verified.

As mentioned earlier, lenses of sandy silt and silty sand were encountered in some boreholes embedded within the upper half of the silty clay stratum between elevations 171 and 179. Excavations intersecting these lenses, or approaching the top of the lenses could cause local seeps, washouts of fines, or heave of the silty clay cover.

In addition, as described in Section 4.12, presence of gassy soils near bedrock surface could potentially be encountered, and that could impact the pore water pressure and undrained shear strength condition of the lower part of the silty clay deposit. While no indications of gassy soils were recorded at this site during the background and additional investigations, it is recommended that in the case of excavations deeper than 5 m, careful monitoring of basal heave and pore water pressures below of the bottom of the excavations be carried out during construction.

The above conditions warrant the installation of an adequate number of additional heave gauges and low-displacement type piezometers prior to initiation of the major excavations. If significant heave and pore water pressures are indicated by the monitoring during the excavation progress, the excavation rates will have to be adjusted to allow sufficient time to dissipate the pore water pressures to safe levels. The excavation guidelines can be revised based on on-site experience.

5.5.2 Permanent Subdrainage System

Permanent subdrainage system will be required to control the phreatic surface position in the slope as it affects the stability behavior of the slope.

A permanent subdrainage system to control the groundwater seepage under slope of Type A was developed using conventional relief drain trenches and rip rap blankets at the higher slopes. The schematic layout is illustrated in Figure J.1 in Appendix J and the typical design dimensions for different slope heights are summarized in Table 5-7:

Table 5-7: Typical Subdrainage System for the Permanent Cuts Type A

| Slope Height above Top Edge of Pavement, m | Depth (d) of Relief Drain below the Top of the Slope Surface, m ⁽¹⁾ | Size of the Rip Rap over Geotextile Filter | |
|--|--|--|----------|
| | | Thickness, mm | Width, m |
| <3 | NR | NR | NR |
| ≤4 | 1.5 | NR | NR |
| ≤5 | 2.0 | 300 | 2.5 |
| ≤6 | 2.0 | 300 | 3.5 |
| ≤7 | 2.5 | 300 | 4.0 |
| ≤8 | 2.5 | 300 | 5.0 |
| ≤9 | 3.0 | 300 | 5.0 |

- (1) See Figure J.1 for further details
 (2) Subdrainage below the pavement subgrade is required in all cases
 (3) All Relief Drains are to be installed along the elevation line located at 3 m above the finished toe of slope (or, at 9 m horizontal distance uphill from the finished toe of the slope)
 (4) Surface runoff and perched groundwater at the table land are to be intercepted by swales or roadside subdrains/ditches and directed away from the slope surface.
 NR – Not required

Perched groundwater bearing layers consisting of lenses of variable fills and upper granular deposits were encountered. The thickness of these layers varied from 0 to 4 m and the distribution along the project alignment was random. Unless the top portion of the permanent cuts is developed with retaining structures and/or structures and pavements incorporating adequate subdrainage systems, slopes intersecting such perched groundwater bearing material would experience uncontrolled seepage with rates fluctuating seasonally causing ongoing erosion and slope sloughing. To prevent these, a clay cutoff system is recommended to be applied where required.

Two typical cutoff design details are provided in Figure J.2 for shallow fills and granular (total depth of less than 1.2 m), and in Figure J.3 deeper deposits (depths exceeding 1.2 m). The perforated pipe subdrain should discharge to catch basins, or ditches.

5.5.3 Construction Dewatering

The design of the dewatering system should comply with the Ontario Provincial Standard Specification (OPSS) 517 and 518 provisions.

Due to the relatively low permeability of the silty clay deposit, groundwater seepage is anticipated to be minor, which should be controllable by conventional temporary dewatering methods. However, runoff and seepage into the excavations from perched groundwater from the fill, old farm tiles and/or the utility trenches, and the upper granular layers should also be anticipated. In addition, random water bearing seams, pockets and lenses of fine sand may be intersected by the excavation slopes. In adverse conditions, the runoff and seepage from perched groundwater and sand/silt lenses can be significant and accompanied by piping and wash-outs of the fines causing sloughing of the slopes.

Accordingly, provision should be made to prevent runoff and piping erosion of the slope surfaces by blanketing of the slopes with filter fabric and free-draining granular material. The seepage flow should be directed to collection sumps by temporary drainage ditches properly sized, filtered and lined to accommodate the flow rates.

All surface water should be directed away from all open excavations.

6 Other Geotechnical Recommendations

6.1 General Construction Requirements

The anticipated construction conditions in this report are discussed only to the extent of their potential influence on the design of the Permanent Cuts - Phase I. References to construction methods are not intended to be the suggestions or directions on the construction methodologies. Contractors should be aware that the data presented in this report and their interpretations may not be sufficient to assess all factors that may affect the construction.

As mentioned earlier, the Contractors are fully responsible for the design, construction methods and performance (stability, deformability and deterioration) of the temporary slopes and temporary works. The following recommendations and comments are considered applicable:

- All excavation works should be carried out in accordance with the guidelines outlined in Occupational Health and Safety Act (OHSA) and OPSS 902. The dewatered native undisturbed soils may be classified as Type 3 soils. Undewatered fills, sand and silt layered would qualify as Type 4 soils.
- Where excavations below the original ground levels intersect water bearing backfill within trenches of active and/or abandoned utilities adequate plugging and decommissioning of such features daylighting within the slope face will be required. The silty clay soils at the project site are highly susceptible to rapid deterioration when exposed to elements, weathering and/ or subjected to direct construction traffic.
- Temporary slopes, permanent slopes, and subgrade areas must be appropriately protected at all times against surface erosion due to runoff, desiccation, freeze-thaw effects, etc.
- To protect the integrity of subgrade for foundations and pavements, the final excavation lift above the design elevation should not be less than 500 mm and should be carried out only when the contractor is ready to prepare and cover the subgrade with the materials specified in the design same day the final excavation is exposed and approved. No construction traffic should be permitted over subgrade without approved protective covers.
- The final excavation layer above the design subgrade should be carried out using buckets equipped with smooth lips. Once exposed, the subgrade must be immediately inspected. Upon approval, the subgrade should be immediately protected; depending on the type of construction, appropriate protection should be used.
- As indicated earlier, pore pressures, heave/settlement behaviour and presence of gassy soils below the excavation should be monitored diligently during excavation. If the presence of gassy soils is evidenced (for example, dissolved gas bubbles coming out of solution and softening of the excavation face), the excavation should be carried out in small (say 1 m) depth increments and sufficient time to dissipate the pore pressures should be allowed at each excavation stage.
- Regular monitoring and inspection of the condition of temporary slopes and excavation base for signs of instability, deterioration, sloughing, etc should be carried out by qualified personnel. Appropriate mitigation measures should be implemented.

- Excavations should be limited in size in the area and appropriate monitoring of the nearby residences should take place. Monitoring should consist of a precondition survey along with regular surveying conducted of the nearby utilities, residences, etc.
- The realigned drain (Wolfe, Cahill) surfaces should be covered with clay liner to control the long-term seepage from drain to the cuts through the upper granular layer and/or sand/silt seams embedded in clay layer.

6.2 Reuse of Clay

It is understood that the suitable clay to be collected during excavation will be reused as a backfill materials where approved. Ultimate suitability of the backfill materials will be determined during excavation based on their consistency condition, moisture content vis-a-vis the optimum water content.

The existing asphalt, fill and organic materials that will be excavated from the site as they are not considered suitable as structural backfill materials. In general, the mottled, brown and upper portion of the grey silty clay soils are expected to be acceptable for general backfill as (a) their water content is likely to be near or slightly dryer than optimum water content for compaction, and (b) they are likely to be workable with construction equipment. The lower portion of the grey silty clay with higher moisture content and softer consistency is not likely to be suitable for reuse as backfill material.

Based on the geotechnical investigations and subsequent laboratory tests, the natural water content of the native soils within the depth of the anticipated excavations varies from typically less than 16% to typically over 25%.

The native soil zones that are considered potentially suitable for use for construction were selected based on the general soil consistency inferred from the in-situ natural water content vis-à-vis the generalized values of the optimum water content. The categories of reusable soil zones have been identified as follows:

1. Soil “Suitable As-Is”: These soil zones are characterized generally by natural water content of 16% or less, which is likely to be near the optimum value. These soils are expected to be placed and compacted without much pre-processing/moisture reconditioning.
2. Soils likely to be rendered “Suitable with Reconditioning”: These soil zones are characterized generally by natural water content of about 17% to 20% (i.e., a few percent above the optimum value). Some of this material may be suitable for placement in “wet of optimum” condition, and some may require some processing (e.g., spreading or stockpiling in windrows) to facilitate water content reduction. This zone generally exists as a layer beneath or above the “Suitable As-Is” zone in Tecumseh and LaSalle sectors of the project.
3. “Unsuitable Soils”: Soil zones with natural water content in excess of 20% (likely to be more than 4% in excess of the natural water content) will present difficulties of placement and compaction in their as-is condition, and are generally considered to be unsuitable for reuse as construction material. Some of the “not excessively wet” material may still be modified if dry weather conditions prevails and handling areas are available. The upper fine sands are also considered unsuitable.

6.3 Instrumentation and Monitoring during Construction

As mentioned earlier in Section 5.4, a program of site instrumentation and monitoring of the temporary works during construction should be implemented by the Contractor in addition to the limited instrumentation already installed during the geotechnical investigation (Table 6-1).

Recommendations for additional instrumentations and monitoring programme as well as guidelines for interpretation, alert levels and contingencies are provided in a separate report (Document No. 285380-04-118-0001).

The Contractor is responsible for planning, installation and maintenance of instrumentation as well as the completion of monitoring of the response of the excavations (ground movement) during construction. Detailed plans and procedures should be submitted to HMQ for approval at least 3 month prior to commencement of the monitoring of the works.

Monitoring is required to check the safety of the work, assess the effects of construction on surrounding ground and existing facilities, evaluate design assumptions, and refine estimates of future performance.

Table 6-1: Geotechnical Instrumentations Installed during Additional Investigations for Phase I

| Station | Structure | Instrumentation | | |
|--------------------|----------------|-----------------|------------------------|--------------|
| | | Piezometers | Heave/Settlement Gauge | Inclinometer |
| 13+850L | Bridge B-12 | 3 | 2 | |
| 13+450L to 13+700L | Tunnel T-11 | 5 | 4 | 1 |
| 13+000L to 13+300L | Bridge B-11 | 7 | 2 | 2 |
| 12+500L to 12+650L | Tunnel T-10A/B | 5 | | |
| 12+150L to 12+300L | Tunnel T-9 | 2 | 2 | 1 |
| 11+600L to 11+750L | Tunnel T-8 | 2 | 2 | 1 |
| 11+000L to 11+250L | Bridge B-10 | 10 | 7 | 2 |
| 10+800L to 10+900L | Bridge B-9 | 7 | 2 | 2 |
| 10+450L to 10+700L | Tunnel T-7 | 5 | 4 | 1 |
| 10+050L to 10+200L | Tunnel T-6 | 4 | 2 | 1 |

Preconstruction Condition Survey: It is recommended that before engaging in any major construction works, a detailed condition survey be conducted on properties abutting the project area.

6.4 Construction Quality Control

To ensure that construction is carried out in a manner consistent with the intent of the recommendations set forth in this report, a construction quality control program, including geotechnical inspection, field and laboratory testing and instrument monitoring, should be developed and implemented throughout the construction phase. In addition, related laboratory testing should be carried out in conjunction with the fieldwork to monitor compliance with the various materials and project specifications.

7 Limitations of Report

The work performed in this report was carried out in accordance with the Standard Terms and Conditions made part of our contract. The conclusions and recommendations presented herein are based solely upon the scope of services and time and budgetary limitations described in our contract.

This report presents the subsurface soil and groundwater conditions inferred from geotechnical investigation and geotechnical design of the permanent cuts mentioned in the report. The report was prepared with the condition that the structural and other designs of the WEP will be in accordance with applicable standards and codes, regulations of authorities having jurisdiction, and good engineering practices. Further, the recommendations and opinions expressed in this report are only applicable to the proposed project as described within AMEC's report.

There should also be an ongoing liaison with AMEC during both the design and construction phases of the project to ensure that the recommendations in this report have been interpreted and implemented correctly. Also, if any further clarification and/or elaboration are needed concerning the geotechnical aspects of this project, AMEC should be contacted immediately.

The conclusions and recommendations given in this report are based on data presented in the pre-bid geotechnical investigation reports and information determined at the test hole locations during the additional investigation carried out for the geotechnical design work. The data obtained from the pre-bid investigations (carried out by others) was assumed to be valid and applicable.

The information contained herein in no way reflects on the environmental aspects of the project, unless otherwise stated.

The soil boundaries indicated have been inferred from non-continuous sampling, observations of drilling resistance, Nilcon vane, CPT and DMT probing. The boundaries typically represent a transition from one soil type to another and are not intended to define exact planes of geological change. Subsurface and groundwater conditions between and beyond the test holes may differ from those encountered at the test hole locations, and conditions may become apparent during construction, which could not be detected or anticipated at the time of the site investigation. Thus, unsuitable foundation soils may be encountered at the foundation grade requiring extra sub-excavations, subgrade improvement, and/or changes to the design. It is important that the AMEC geotechnical design engineer be involved during construction throughout the WEP project site to confirm that the subsurface conditions do not deviate materially from those encountered in test holes, and that any material deviations, if encountered, do not adversely affect the geotechnical design.

The stability analyses assumed a certain sequence of the construction; if different construction approaches are considered the geotechnical design will have to be reviewed. The calculated factors of safety assume strict adherence to the good construction practices with respect to the protection of the exposed slopes.

The design recommendations given in this report are applicable only to the project described in the text and then only if constructed substantially in accordance with the details stated in this report. Since all details of the design may not be known, it is recommended that AMEC be engaged during the final design and construction stages to verify that the design and construction are consistent with AMEC's recommendations.

The comments made in this report on potential construction problems and possible methods are intended only for the guidance of the structural and other designers and constructor. The number of test holes may not be sufficient to determine all the factors that may affect construction methods and costs. For example, the thickness of the surficial topsoil and the clay crust layer, the presence of artesian conditions and exsolved natural gases, and the strength of the silty clay stratum may vary markedly and unpredictably. The constructor should, therefore, make their own interpretation of the factual information presented and draw their own conclusions as to how the subsurface conditions may affect their work. The work presented in this report has been undertaken in accordance with normally accepted geotechnical engineering practices. No other warranty is expressed or implied.

The benchmark and elevations mentioned in this report were surveyed and provided by AMICO. They should not be used by any other party for any other purpose.

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. AMEC accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

8 Closure

The geotechnical report for Permanent Cuts - Phase I was prepared by Mr. Nazmur Rahman, P.Eng. and checked by Dr. Dan Dimitriu, P.Eng. (lead designer) . The project was executed under the technical direction of Dr. Narendra S. Verma, P.Eng. (technical director) who also provided the senior review of the report. This report was approved by Mr. Brian Lapos, P.Eng. Mr. Matt Oldewening, P.Eng. managed the geotechnical investigation and Mr. Brian Lapos, P.Eng. was the project manager.

The cooperation received from Ms. Biljana Rajlic, P.Eng. and Mr. Philip Murray, P.Eng. of Hatch Mott McDonald and Mr. Daniel Muñoz, P.Eng. of PIC during the design study is gratefully acknowledged.

Yours truly,
AMEC Environment & Infrastructure
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Drawings

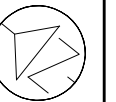
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Document: Geotechnical Investigation and Design Report –
Permanent Cuts - Phase I (Station 10+070L to Station 10+900T)
Doc No.: 285380-04-119-0029 (Geocres No. 40J3-13)

Date: August/2012
Rev: 0
Page No.: Drawings

METRIC



Windsor-Essex
Parkway Project
RFP No. 09-54-1007

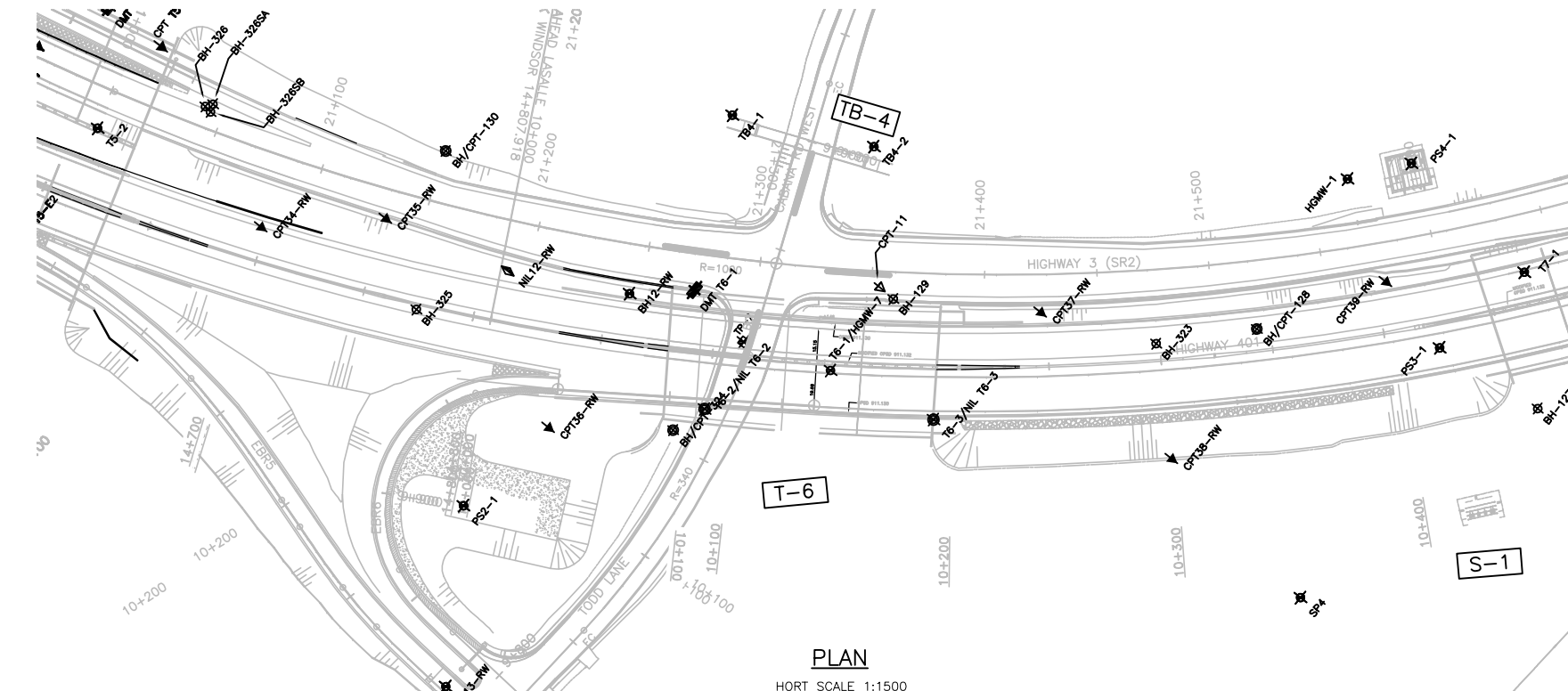
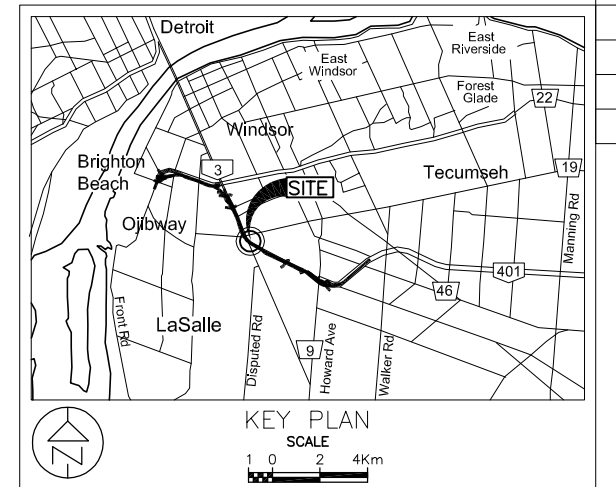


| REVISIONS | | | |
|-----------|-----|------|-------------------------|
| 15-AUG-12 | NR | 0 | ISSUED FOR CONSTRUCTION |
| DATE | BY | REV. | DESCRIPTION |
| DESIGN | NR | APR | NSV |
| DATE | NOV | 7/11 | |

LOCATION PLAN & INTERPRETED
STRATIGRAPHIC PROFILE
STA 14+700W TO STA 10+400L
(SOIL PROFILE 9)

SHEET
G0060

Phase 1
IFC



PLAN
HORIZONTAL SCALE 1:1500

LIST OF ABBREVIATIONS

- PH - SAMPLER ADVANCED BY HYDRAULIC PRESSURE
PM - SAMPLER ADVANCED BY MANUAL PRESSURE
WH - SAMPLER ADVANCED BY STATIC WEIGHT OF HAMMER
WR - SAMPLER ADVANCED BY WEIGHT OF SAMPLER RODS

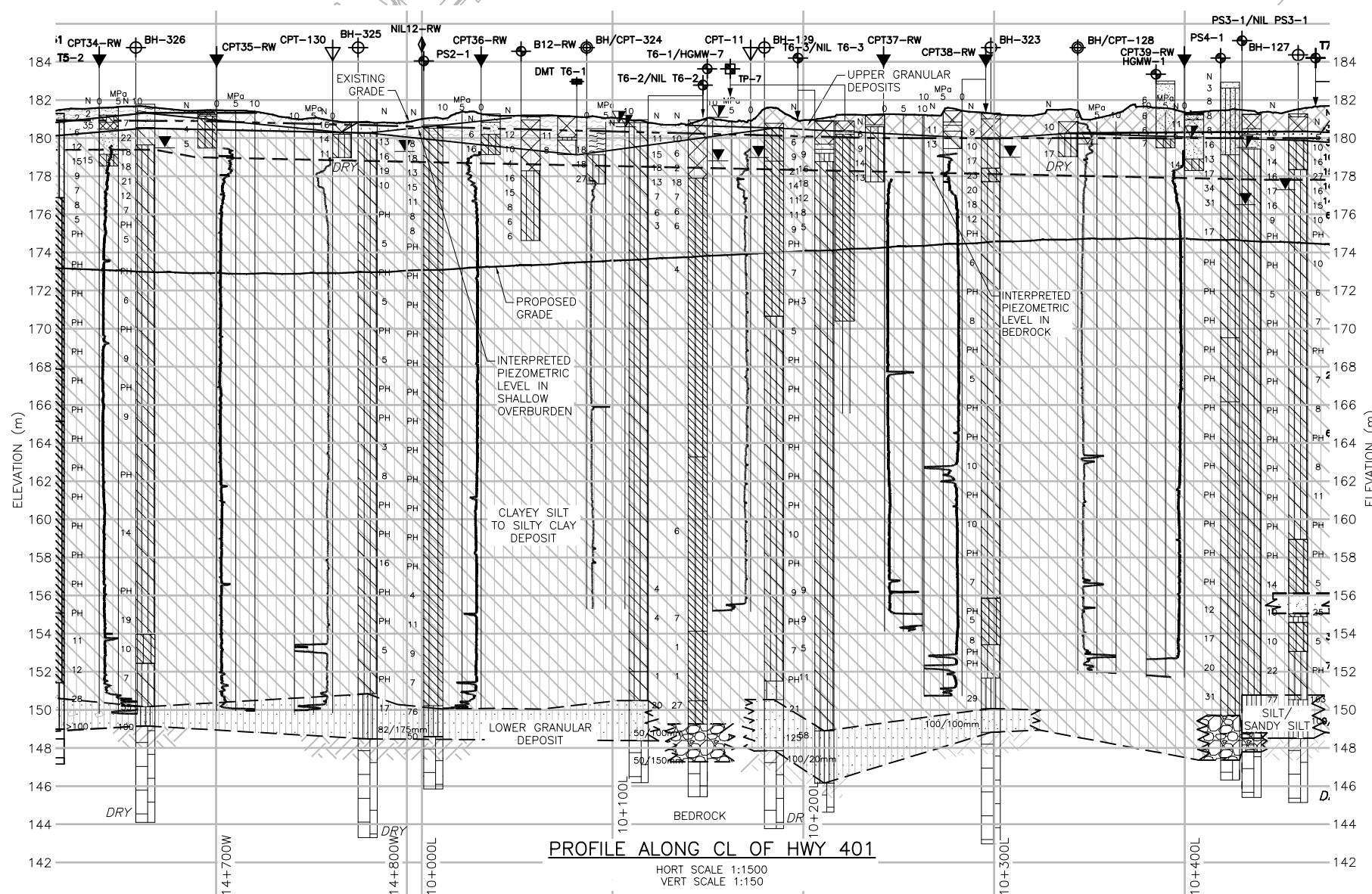
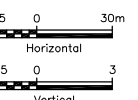
LEGEND

- BOREHOLE - CURRENT INVESTIGATION
BOREHOLE & NILCON VANE - CURRENT INVESTIGATION
NILCON VANE - CURRENT INVESTIGATION
CPT - CURRENT INVESTIGATION
DMT - CURRENT INVESTIGATION
SW/SP HOLE (HYDROGEOLOGY)
TEST PIT - CURRENT INVESTIGATION
BOREHOLE - PREVIOUS INVESTIGATIONS
BOREHOLE, CPT & NILCON VANE - PREVIOUS INVESTIGATIONS
CPT - PREVIOUS INVESTIGATIONS
- N SPT N-VALUE
WATER LEVEL DURING DRILLING
BOREHOLE DRY DURING DRILLING
WATER LEVEL (SHALLOW PIEZO)
WATER LEVEL (DEEP PIEZO)
PH - SAMPLE OBTAINED UNDER HYDRAULIC PRESSURE
MPa 10 5 0
CPT, qc
- TOPSOIL/ORGANICS
FILL
SAND
SILTY CLAY
SILTY SAND
COBBLES/BOULDERS
SILT
SANDY SILT
CLAYEY SILT
SAND AND GRAVEL
SILTY SAND AND GRAVEL
LIMESTONE /BEDROCK

NOTES

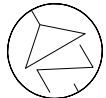
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GEOTECHNICAL DESIGN REPORT.
- THE INTERPRETED STRATIGRAPHY REPRESENTS SIMPLIFIED SUBSURFACE CONDITIONS. SEE BORING LOGS FOR DETAILED STRATIGRAPHY. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN DEFINED AT BOREHOLE LOCATIONS ONLY. CONDITIONS BETWEEN BOREHOLE LOCATIONS COULD DIFFER FROM ILLUSTRATED CONDITIONS.
- ELEVATIONS ARE REFERENCED TO GEODETIC DATUM. LOCATIONS ALONG THE PROPOSED WEP ARE REFERRING TO STATIONS IN WINDSOR (W) AND LASALLE (L) SECTORS.

SCALES



PROFILE ALONG CL OF HWY 401
HORIZONTAL SCALE 1:1500
VERTICAL SCALE 1:150

METRIC

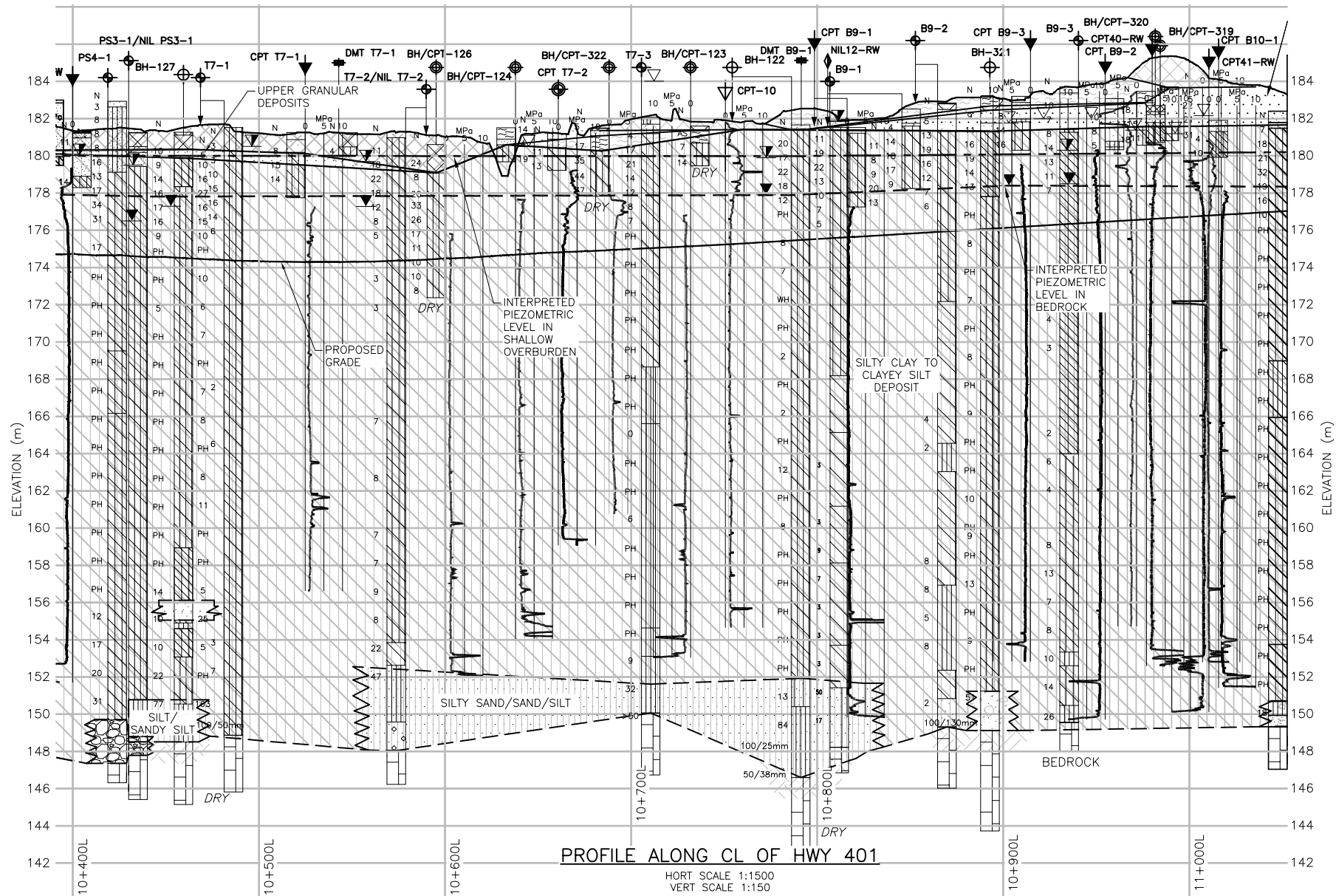
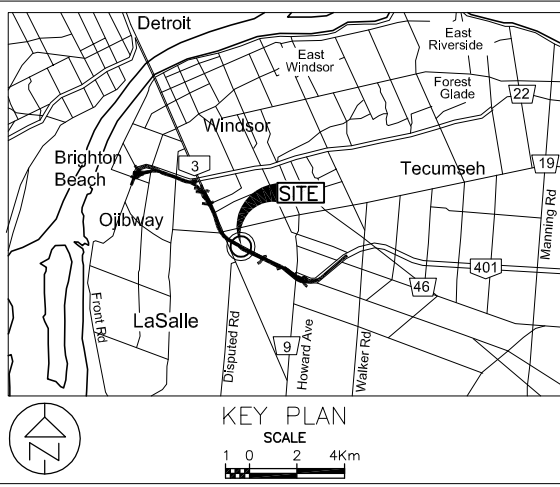
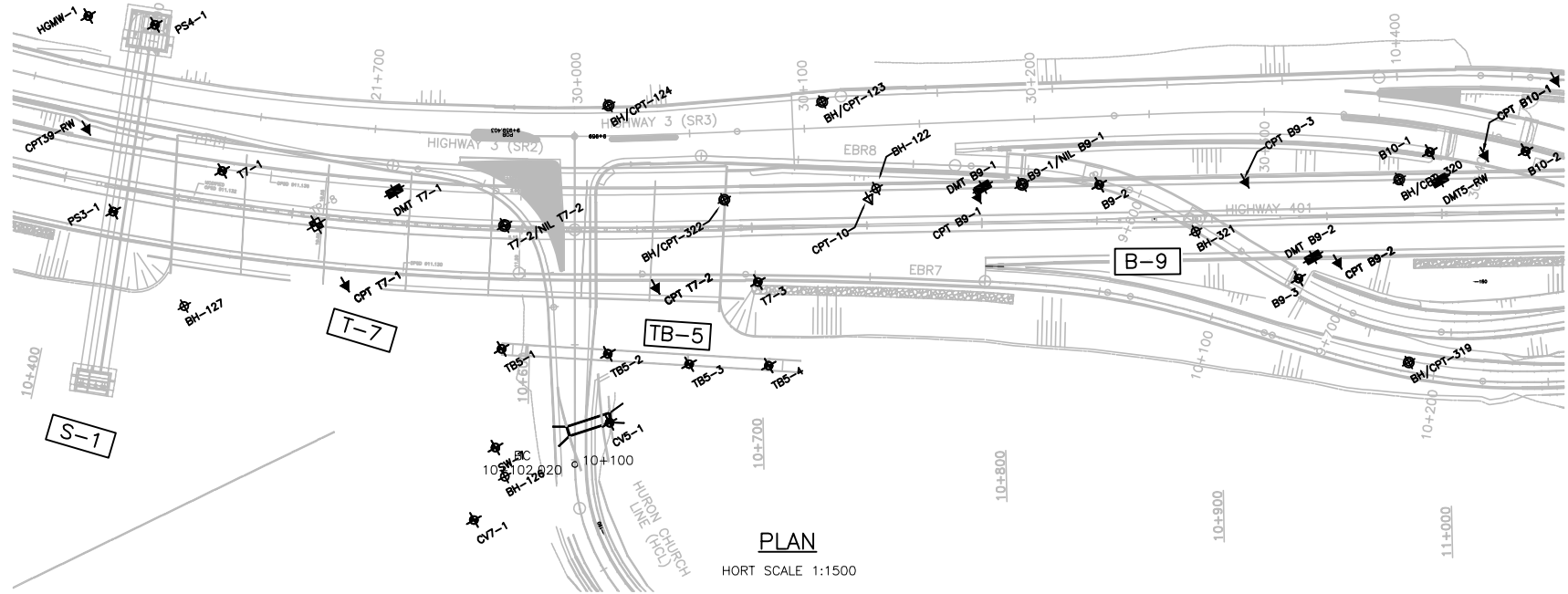


| REVISIONS | | | |
|-----------|----|------|-------------------------|
| 15-AUG-12 | NR | 0 | ISSUED FOR CONSTRUCTION |
| DATE | BY | REV. | DESCRIPTION |
| DESIGN | NR | APR | NSV |
| | | DATE | NOV 7/11 |

LOCATION PLAN & INTERPRETED
STRATIGRAPHIC PROFILE
STA 10+400L TO STA 11+000L
(SOIL PROFILE 10)

SHEET
G0061

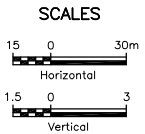
Phase 1
IFC



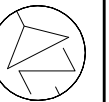
LEGEND

| | | | |
|--|---|--------|--|
| | BOREHOLE - CURRENT INVESTIGATION | N | SPT N-VALUE |
| | BOREHOLE & NILCON VANE - CURRENT INVESTIGATION | | WATER LEVEL DURING DRILLING |
| | NILCON VANE - CURRENT INVESTIGATION | | DRY BOREHOLE DRY DURING DRILLING |
| | CPT - CURRENT INVESTIGATION | | WATER LEVEL (SHALLOW PIEZO) |
| | DMT - CURRENT INVESTIGATION | | WATER LEVEL (DEEP PIEZO) |
| | SW/SP HOLE (HYDROGEOLOGY) | PH | SAMPLE OBTAINED UNDER HYDRAULIC PRESSURE |
| | TEST PIT - CURRENT INVESTIGATION | MPa | |
| | BOREHOLE - PREVIOUS INVESTIGATIONS | 10 5 0 | CPT, qc |
| | BOREHOLE, CPT & NILCON VANE - PREVIOUS INVESTIGATIONS | | |
| | CPT - PREVIOUS INVESTIGATIONS | | |
| | TOPSOIL/ORGANICS | | SILT |
| | FILL | | SANDY SILT |
| | SAND | | CLAYEY SILT |
| | SILTY CLAY | | SAND AND GRAVEL |
| | SILTY SAND | | SILTY SAND AND GRAVEL |
| | COBBLES/BOULDERS | | LIMESTONE /BEDROCK |

- NOTES**
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GEOTECHNICAL DESIGN REPORT.
 - THE INTERPRETED STRATIGRAPHY REPRESENTS SIMPLIFIED SUBSURFACE CONDITIONS. SEE BORING LOGS FOR DETAILED STRATIGRAPHY. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN DEFINED AT BOREHOLE LOCATIONS ONLY. CONDITIONS BETWEEN BOREHOLE LOCATIONS COULD DIFFER FROM ILLUSTRATED CONDITIONS.
 - ELEVATIONS ARE REFERENCED TO GEODETIC DATUM. LOCATIONS ALONG THE PROPOSED WEP ARE REFERRING TO STATIONS IN LASALLE (L) SECTOR.



METRIC

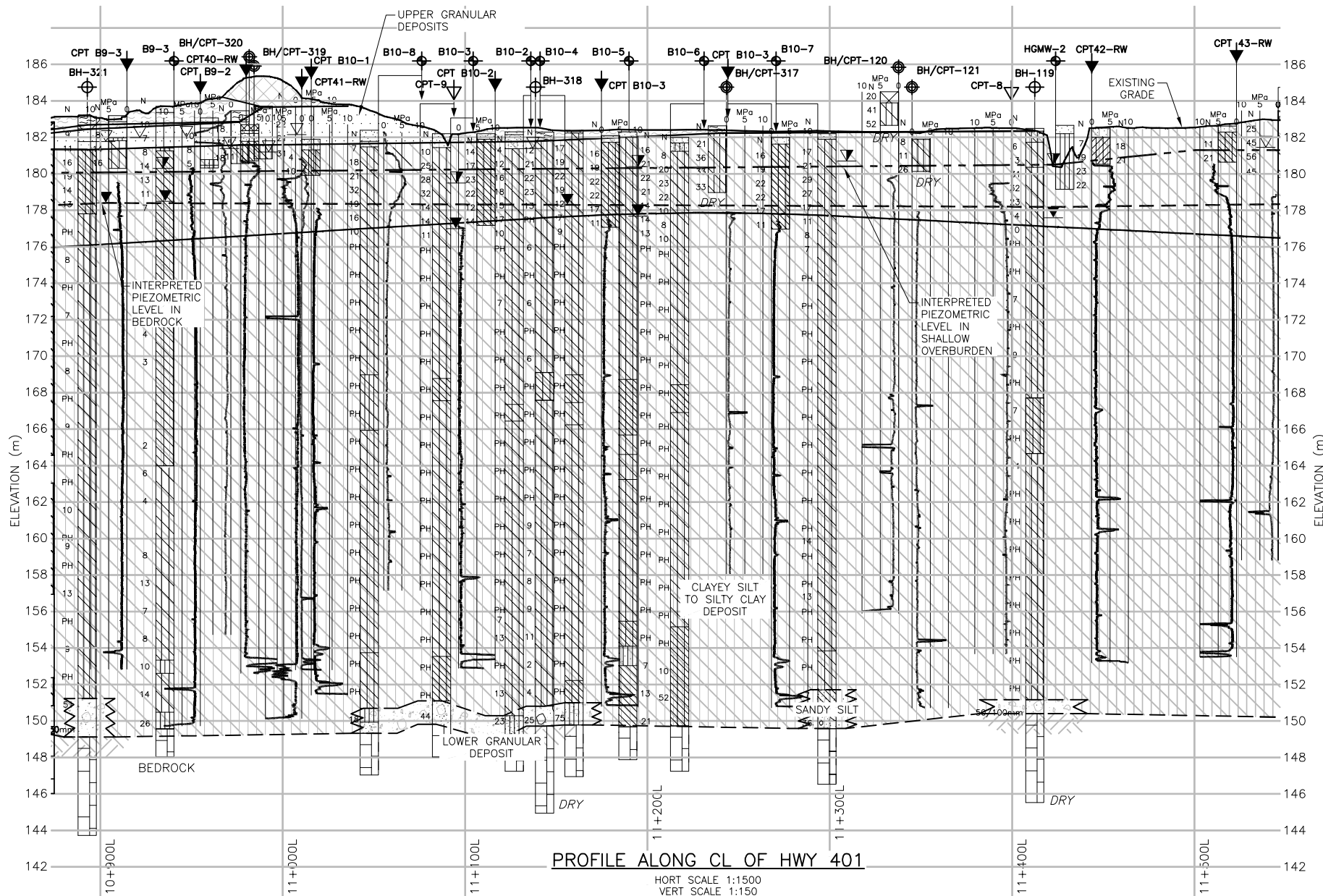
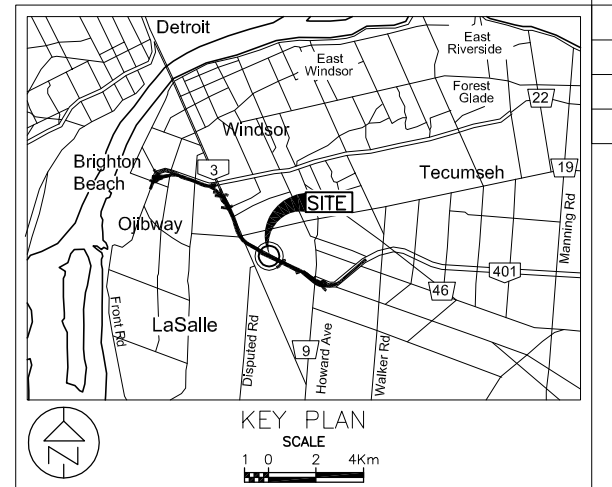
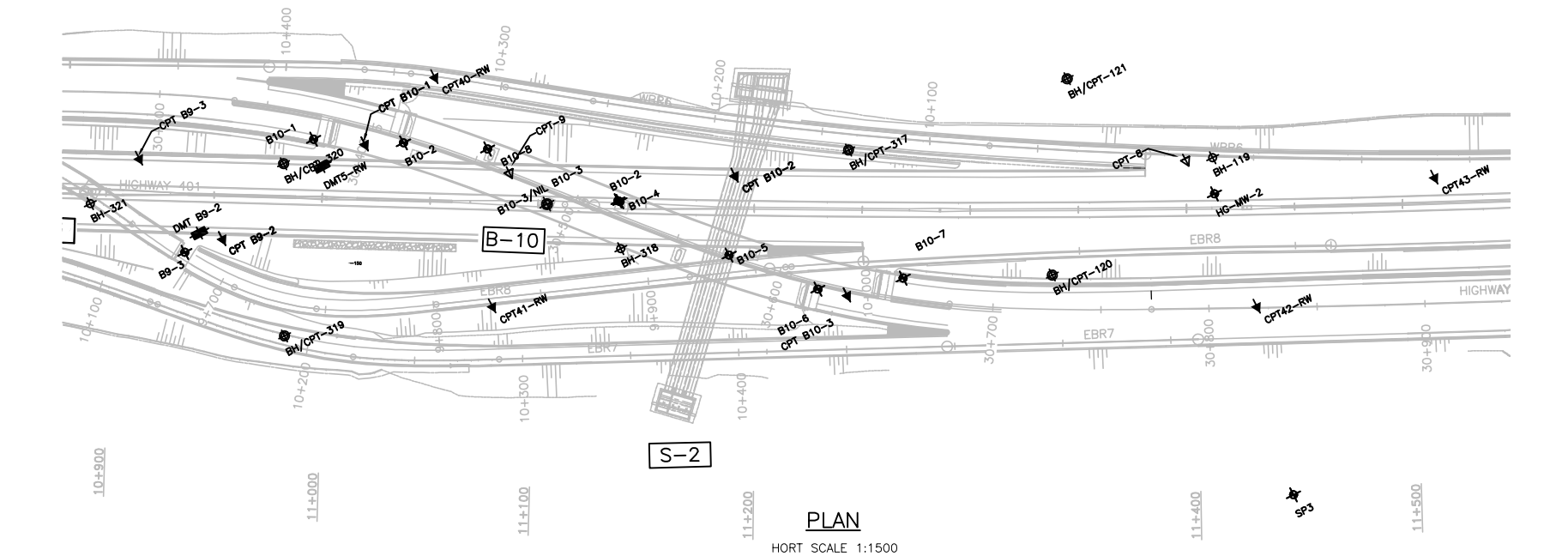


| REVISIONS | | | |
|-----------|-----|------|-------------------------|
| 15-AUG-12 | NR | 0 | ISSUED FOR CONSTRUCTION |
| DATE | BY | REV. | DESCRIPTION |
| DESIGN | NR | APR | NSV |
| DATE | NOV | 7/11 | |

LOCATION PLAN & INTERPRETED
STRATIGRAPHIC PROFILE
STA 10+900L TO STA 11+500L
(SOIL PROFILE 11)

SHEET
G0062

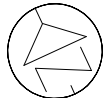
Phase 1
IFC



| LEGEND | |
|--------|---|
| | BOREHOLE - CURRENT INVESTIGATION |
| | BOREHOLE & NILCON VANE - CURRENT INVESTIGATION |
| | NILCON VANE - CURRENT INVESTIGATION |
| | CPT - CURRENT INVESTIGATION |
| | DMT - CURRENT INVESTIGATION |
| | SW/SP HOLE (HYDROGEOLOGY) |
| | TEST PIT - CURRENT INVESTIGATION |
| | BOREHOLE - PREVIOUS INVESTIGATIONS |
| | BOREHOLE, CPT & NILCON VANE - PREVIOUS INVESTIGATIONS |
| | CPT - PREVIOUS INVESTIGATIONS |
| | TOPSOIL/ ORGANICS |
| | FILL |
| | SAND |
| | SILTY CLAY |
| | SILTY SAND |
| | COBBLES/BOULDERS |
| | SILT |
| | SANDY SILT |
| | CLAYEY SILT |
| | SAND AND GRAVEL |
| | SILTY SAND AND GRAVEL |
| | LIMESTONE /BEDROCK |
| | WATER LEVEL DURING DRILLING |
| | DRY BOREHOLE DRY DURING DRILLING |
| | WATER LEVEL (SHALLOW PIEZO) |
| | WATER LEVEL (DEEP PIEZO) |
| | PH - SAMPLE OBTAINED UNDER HYDRAULIC PRESSURE |
| | MPa 10 5 0 |
| | CPT, qc |

- NOTES
- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GEOTECHNICAL DESIGN REPORT.
 - THE INTERPRETED STRATIGRAPHY REPRESENTS SIMPLIFIED SUBSURFACE CONDITIONS. SEE BORING LOGS FOR DETAILED STRATIGRAPHY. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN DEFINED AT BOREHOLE LOCATIONS ONLY. CONDITIONS BETWEEN BOREHOLE LOCATIONS COULD DIFFER FROM ILLUSTRATED CONDITIONS.
 - ELEVATIONS ARE REFERENCED TO GEODETIC DATUM. LOCATIONS ALONG THE PROPOSED WEP ARE REFERRING TO STATIONS IN LASALLE (L) SECTOR.
- SCALES
- Horizontal: 15 0 30m
- Vertical: 1.5 0 3

METRIC

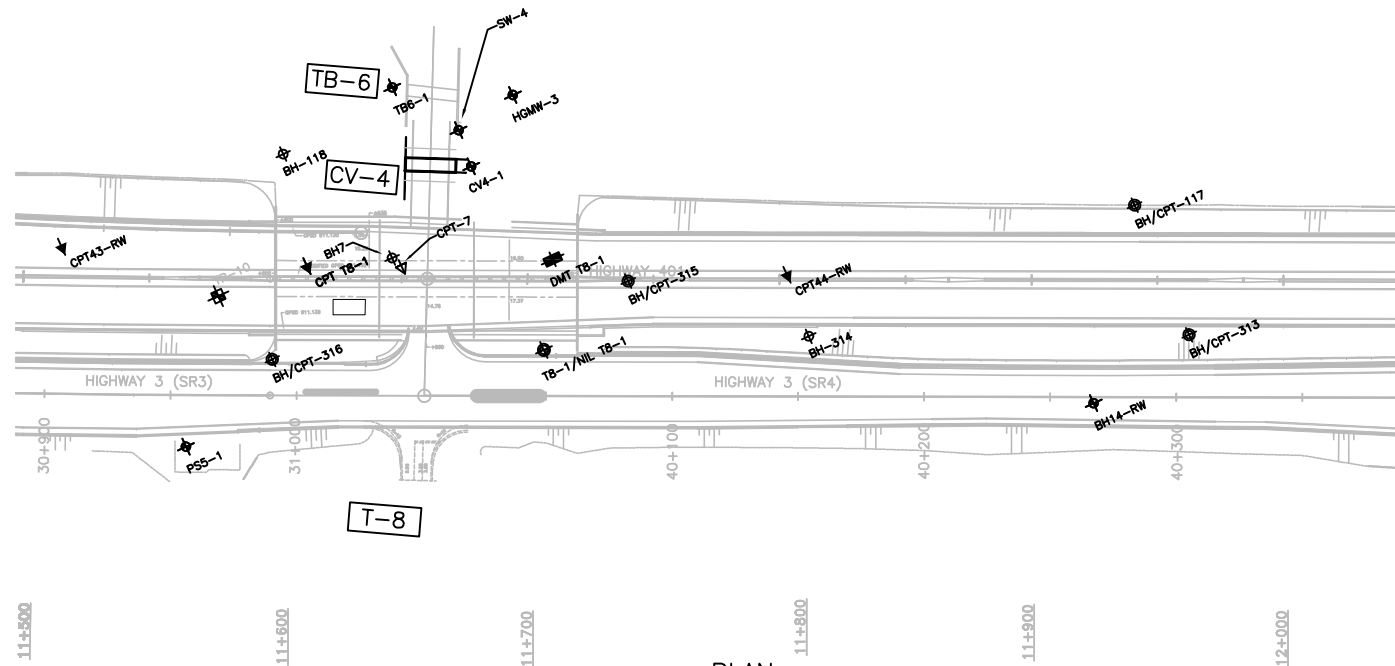


| REVISIONS | | | |
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| 15-AUG-12 | NR | 0 | ISSUED FOR CONSTRUCTION |
| DATE | BY | REV. | DESCRIPTION |
| DESIGN | NR | APR | NSV |
| DATE | NOV | 7/11 | |

LOCATION PLAN & INTERPRETED
STRATIGRAPHIC PROFILE
STA 11+500L TO STA 12+000L
(SOIL PROFILE 12)

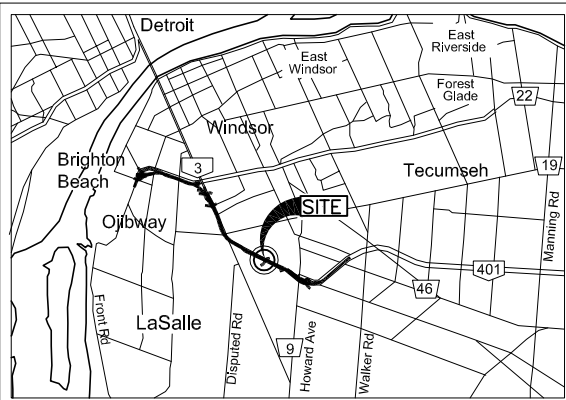
SHEET
G0063

Phase 1
IFC



PLAN

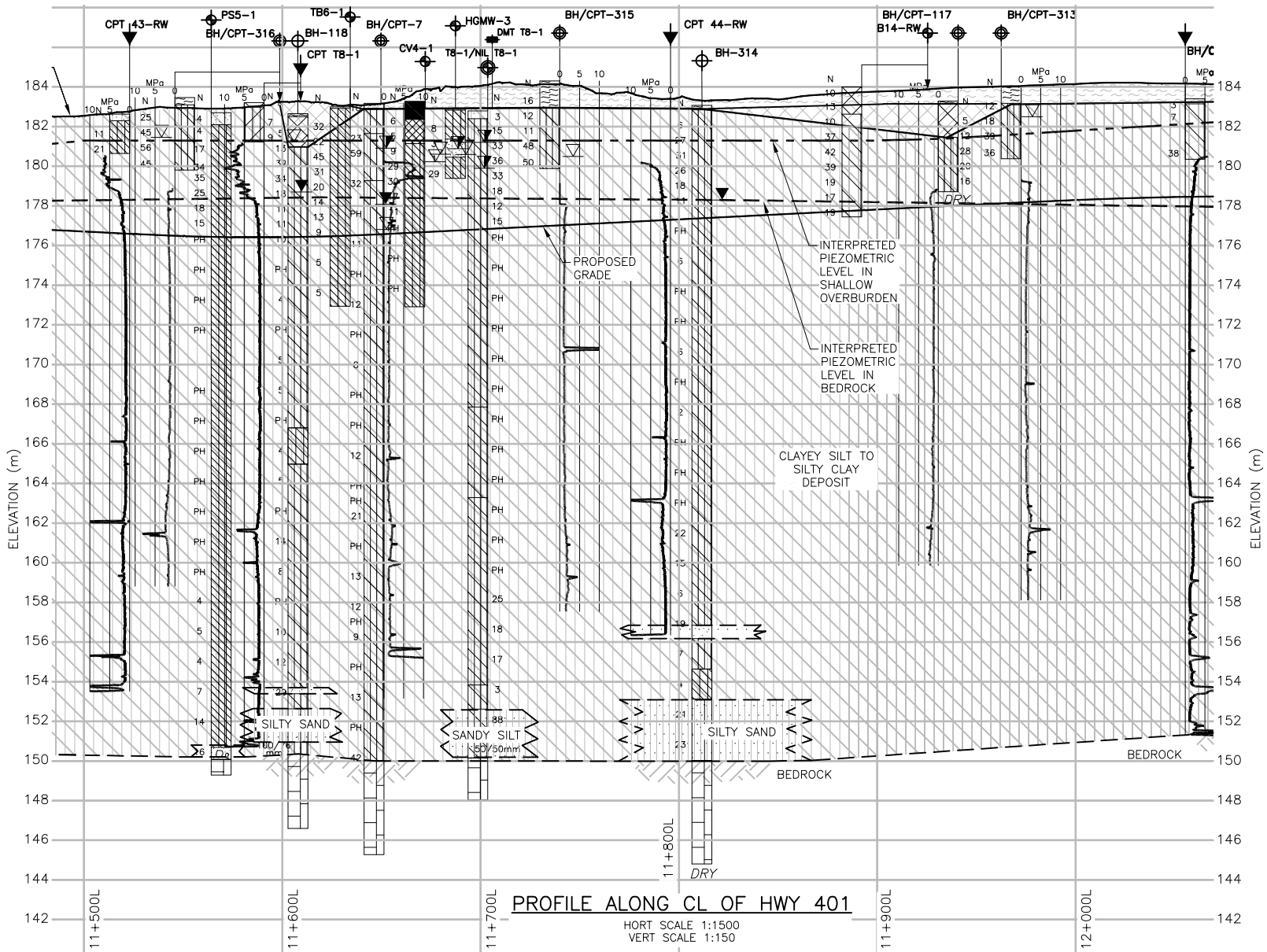
HORT SCALE 1:1500



KEY PLAN

SCALE

1 0 2 4Km



PROFILE ALONG CL OF HWY 401

HORT SCALE 1:1500
VERT SCALE 1:150

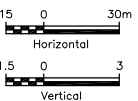
LEGEND

| | |
|---|---|
| BOREHOLE - CURRENT INVESTIGATION | N SPT N-VALUE |
| BOREHOLE & NILCON VANE - CURRENT INVESTIGATION | WATER LEVEL DURING DRILLING |
| NILCON VANE - CURRENT INVESTIGATION | DRY BOREHOLE DRY DURING DRILLING |
| CPT - CURRENT INVESTIGATION | WATER LEVEL (SHALLOW PIEZO) |
| DMT - CURRENT INVESTIGATION | WATER LEVEL (DEEP PIEZO) |
| SW/SP HOLE (HYDROGEOLOGY) | PH - SAMPLE OBTAINED UNDER HYDRAULIC PRESSURE |
| TEST PIT - CURRENT INVESTIGATION | |
| BOREHOLE - PREVIOUS INVESTIGATIONS | MPa 10 5 0 |
| BOREHOLE, CPT & NILCON VANE - PREVIOUS INVESTIGATIONS | CPT, qc |
| CPT - PREVIOUS INVESTIGATIONS | |
| TOPSOIL/ORGANICS | SILT |
| FILL | SANDY SILT |
| SAND | CLAYEY SILT |
| SILTY CLAY | SAND AND GRAVEL |
| SILTY SAND | SILTY SAND AND GRAVEL |
| COBBLES/BOULDERS | LIMESTONE /BEDROCK |
| | DOLOSTONE |

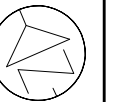
NOTES

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- THE INTERPRETED STRATIGRAPHY REPRESENTS SIMPLIFIED SUBSURFACE CONDITIONS. SEE BORING LOGS FOR DETAILED STRATIGRAPHY. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN DEFINED AT BOREHOLE LOCATIONS ONLY. CONDITIONS BETWEEN BOREHOLE LOCATIONS COULD DIFFER FROM ILLUSTRATED CONDITIONS.
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SCALES



METRIC

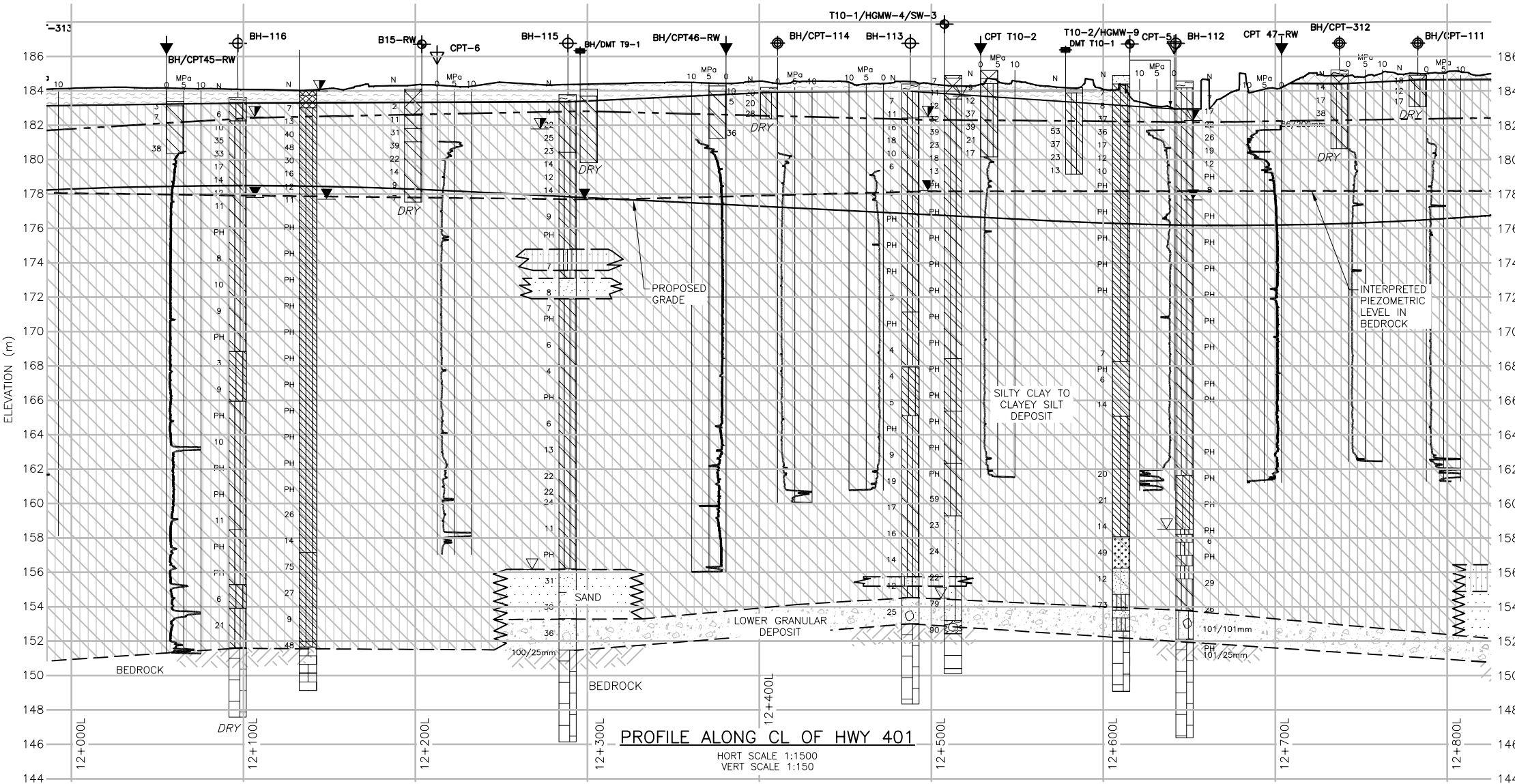
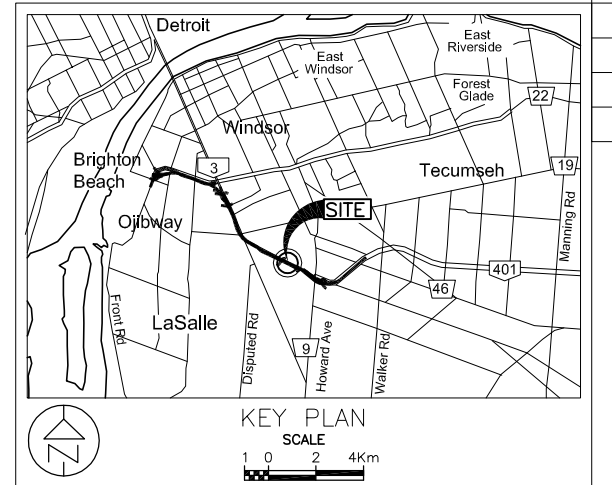
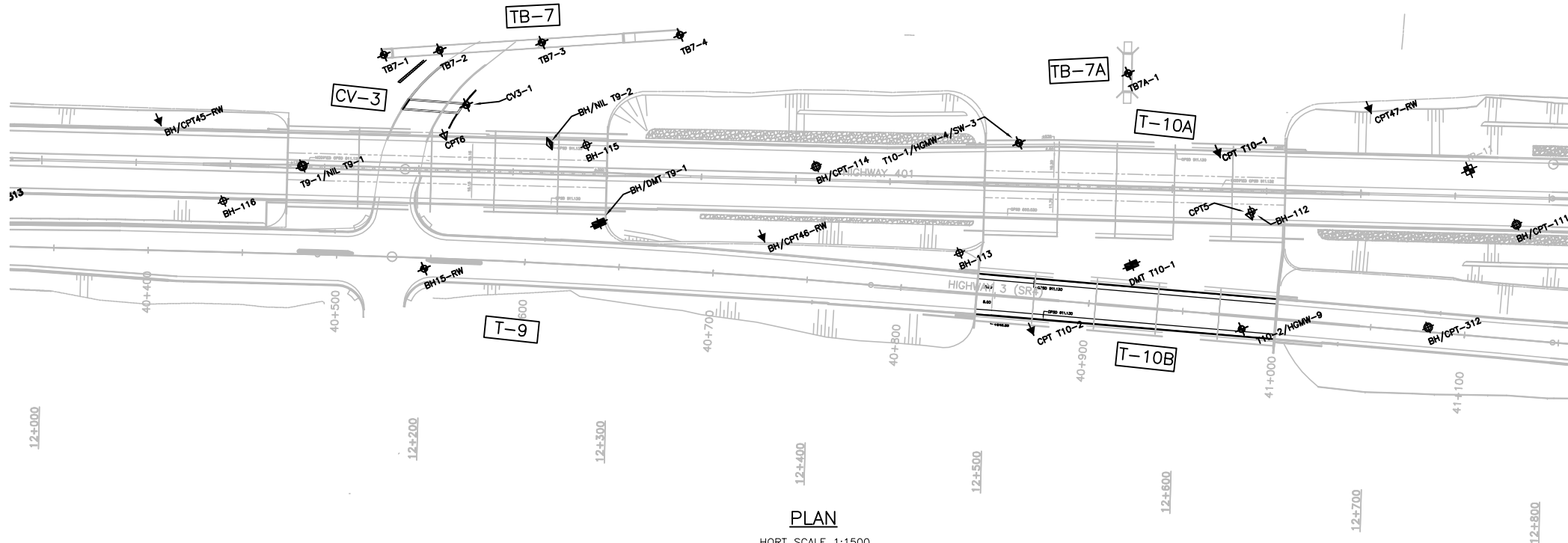


| REVISIONS | | | |
|-----------|-----|------|-------------------------|
| 15-AUG-12 | NR | 0 | ISSUED FOR CONSTRUCTION |
| DATE | BY | REV. | DESCRIPTION |
| DESIGN | NR | APR | NSV |
| DATE | NOV | 7/11 | |

LOCATION PLAN & INTERPRETED
STRATIGRAPHIC PROFILE
STA 12+000L TO STA 12+800L
(SOIL PROFILE 13)

SHEET
G0064

Phase 1
IFC



LEGEND

| | |
|--|---|
| BOREHOLE - CURRENT INVESTIGATION | SPT N-VALUE |
| BOREHOLE & NILCON VANE - CURRENT INVESTIGATION | WATER LEVEL DURING DRILLING |
| NILCON VANE - CURRENT INVESTIGATION | DRY BOREHOLE DRY DURING DRILLING |
| CPT - CURRENT INVESTIGATION | WATER LEVEL (SHALLOW PIEZO) |
| DMT - CURRENT INVESTIGATION | WATER LEVEL (DEEP PIEZO) |
| SW/SP HOLE (HYDROGEOLOGY) | PH - SAMPLE OBTAINED UNDER HYDRAULIC PRESSURE |
| TEST PIT - CURRENT INVESTIGATION | BOREHOLE - PREVIOUS INVESTIGATIONS |
| BOREHOLE & NILCON VANE - PREVIOUS INVESTIGATIONS | CPT, qc |
| CPT - PREVIOUS INVESTIGATIONS | |

| | |
|------------------|------------------------------|
| TOPSOIL/ORGANICS | SILT |
| FILL | SANDY SILT |
| SAND | CLAYEY SILT |
| SILTY CLAY | SAND AND GRAVEL |
| SILTY SAND | SILTY SAND AND GRAVEL |
| COBBLES/BOULDERS | LIMESTONE/DOLOSTONE /BEDROCK |

NOTES

- THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GEOTECHNICAL DESIGN REPORT.
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- ELEVATIONS ARE REFERENCED TO GEODETIC DATUM. LOCATIONS ALONG THE PROPOSED WEP ARE REFERRING TO STATIONS IN LASALLE (L) SECTOR.

SCALES

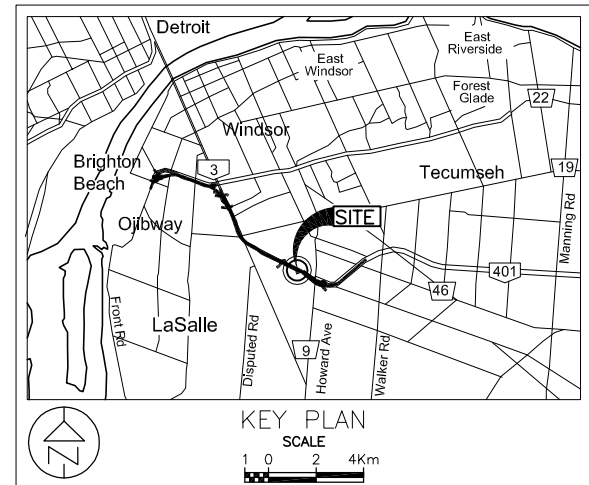
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Parkway Infrastructure Engineers | **amec** 
 **Hatch MacDon**

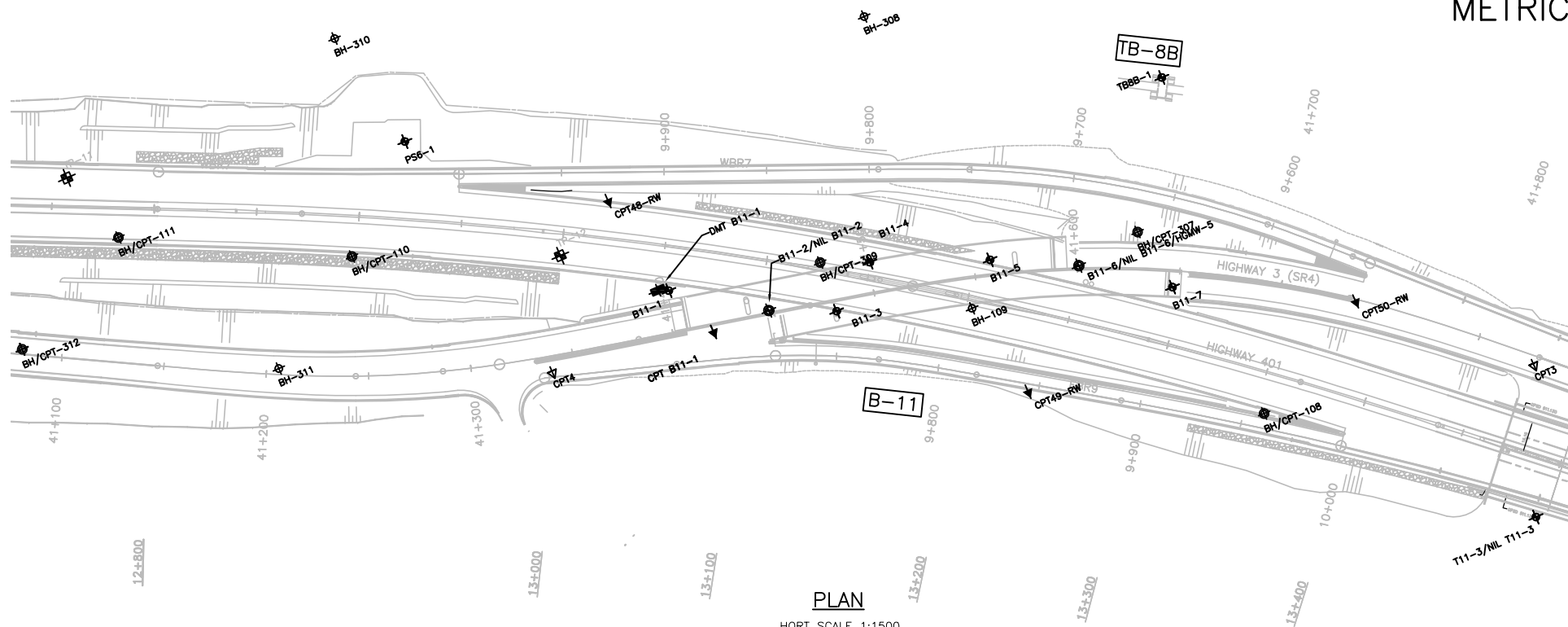
SHEET
G0065

| |
|---------|
| Phase 1 |
| IFC |

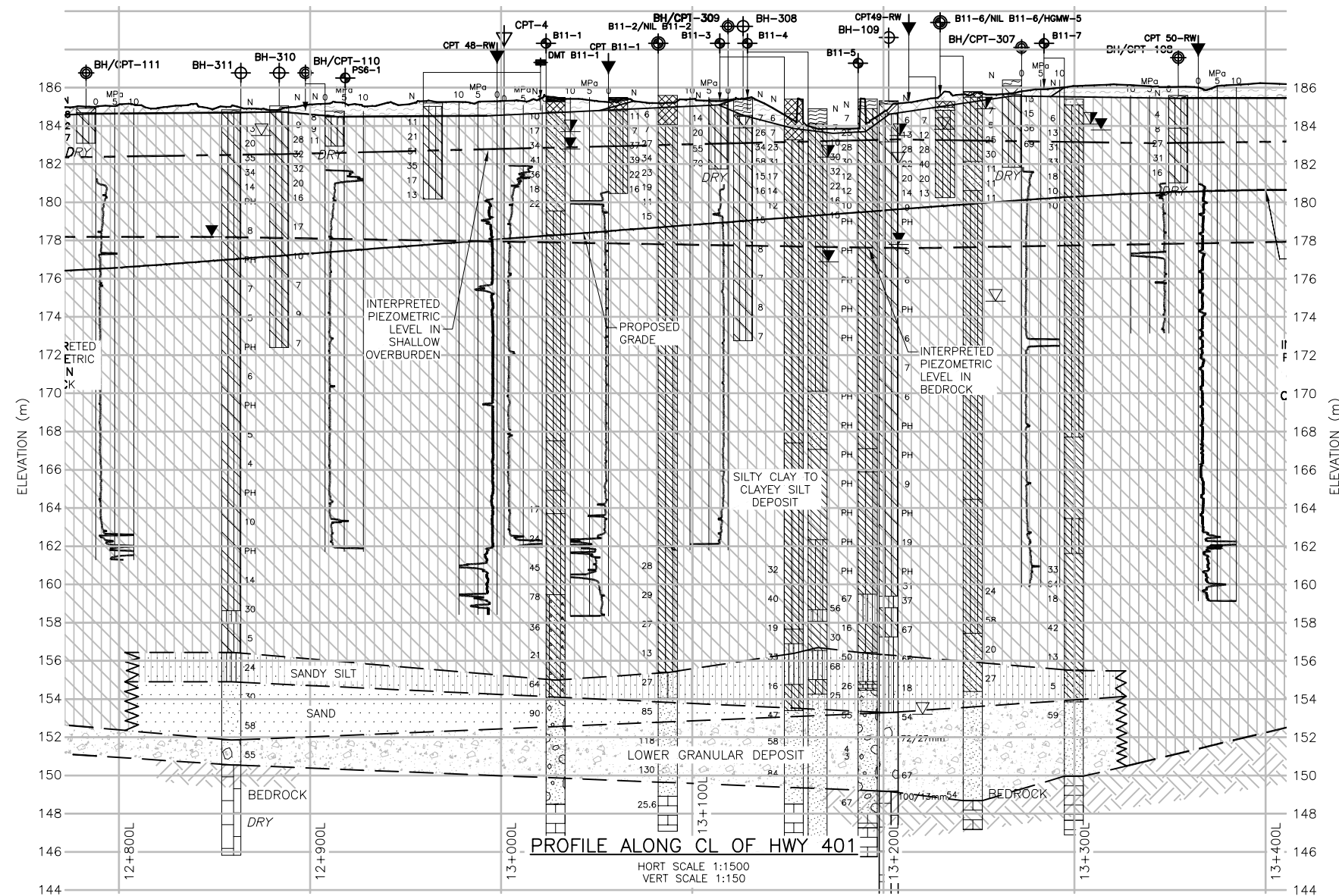


| | | | |
|--|--|--------|--|
| | BOREHOLE - CURRENT INVESTIGATION | N | SPT N-VALUE |
| | BOREHOLE & NILCON VANE - CURRENT INVESTIGATION | | WATER LEVEL DURING DRILLING |
| | NILCON VANE - CURRENT INVESTIGATION | DRY | BOREHOLE DRY DURING DRILLING |
| | CPT - CURRENT INVESTIGATION | | WATER LEVEL (SHALLOW PIEZO) |
| | DMT - CURRENT INVESTIGATION | | WATER LEVEL (DEEP PIEZO) |
| | SW/SP HOLE (HYDROGEOLOGY) | PH | SAMPLE OBTAINED UNDER HYDRAULIC PRESSURE |
| | TEST PIT - CURRENT INVESTIGATION | | |
| | BOREHOLE - PREVIOUS INVESTIGATIONS | MPa | |
| | BOREHOLE, CPT & NILCON VANE - PREVIOUS INVESTIGATIONS | 10 5 0 | CPT, qc |
| | CPT - PREVIOUS INVESTIGATIONS | | |
| | TOPSOIL/ ORGANICS | | SILT |
| | FILL | | SANDY SILT |
| | SAND | | CLAYEY SILT |
| | SILTY CLAY | | SAND AND GRAVEL |
| | SILTY SAND | | SILTY SAND AND GRAVEL |
| | COBBLES/BOULDERS | | LIMESTONE DOLOSTONE /BEDROCK |

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GEOTECHNICAL DESIGN REPORT.
2. THE INTERPRETED STRATIGRAPHY REPRESENTS SIMPLIFIED SUBSURFACE CONDITIONS. SEE BORING LOGS FOR DETAILED STRATIGRAPHY. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN DEFINED AT BOREHOLE LOCATIONS ONLY. CONDITIONS BETWEEN BOREHOLE LOCATIONS COULD DIFFER FROM ILLUSTRATED CONDITIONS.



HORT SCALE 1:1500



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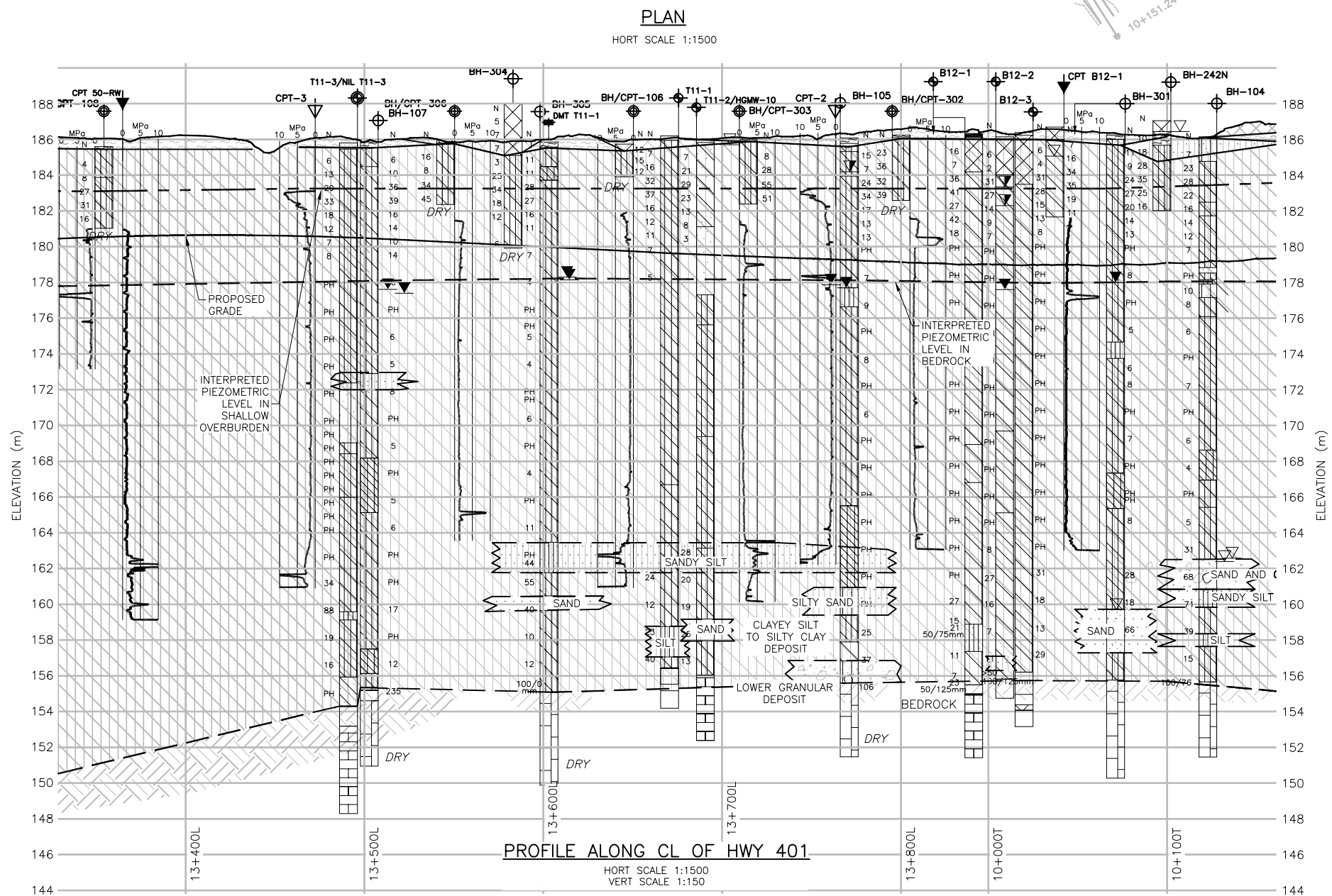
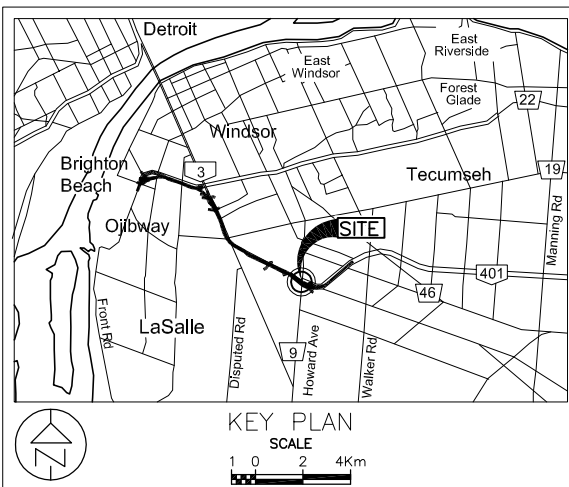


SHEET


























G0066

Phase 1

IFC



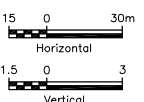
LEGEND

- | | | | |
|---|--|---|--|
|  | BOREHOLE – CURRENT INVESTIGATION | N | SPT N-VALUE |
|  | BOREHOLE & NILCON VANE – CURRENT INVESTIGATION |  | WATER LEVEL DURING DRILLING |
|  | NILCON VANE – CURRENT INVESTIGATION | <i>DRY</i> | BOREHOLE DRY DURING DRILLING |
|  | CPT – CURRENT INVESTIGATION |  | WATER LEVEL (SHALLOW PIEZO) |
|  | DMT – CURRENT INVESTIGATION |  | WATER LEVEL (DEEP PIEZO) |
|  | SW/SP HOLE (HYDROGEOLOGY) | PH – | SAMPLE OBTAINED UNDER HYDRAULIC PRESSURE |
|  | TEST PIT – CURRENT INVESTIGATION | | |
|  | BOREHOLE – PREVIOUS INVESTIGATIONS | MPa | |
|  | BOREHOLE, CPT & NILCON VANE – PREVIOUS INVESTIGATIONS | 10 5 0 | CPT, qc |
|  | CPT – PREVIOUS INVESTIGATIONS | | |
|  | TOPSOIL/ ORGANICS |  | SILT |
|  | FILL |  | SANDY SILT |
|  | SAND |  | CLAYEY SILT |
|  | SILTY CLAY |  | SAND AND GRAVEL |
|  | SILTY SAND |  | SILTY SAND AND GRAVEL |
|  | COBBLES/BOULDERS |  | LIMESTONE DOLOSTONE /BEDROCK |

NOTES

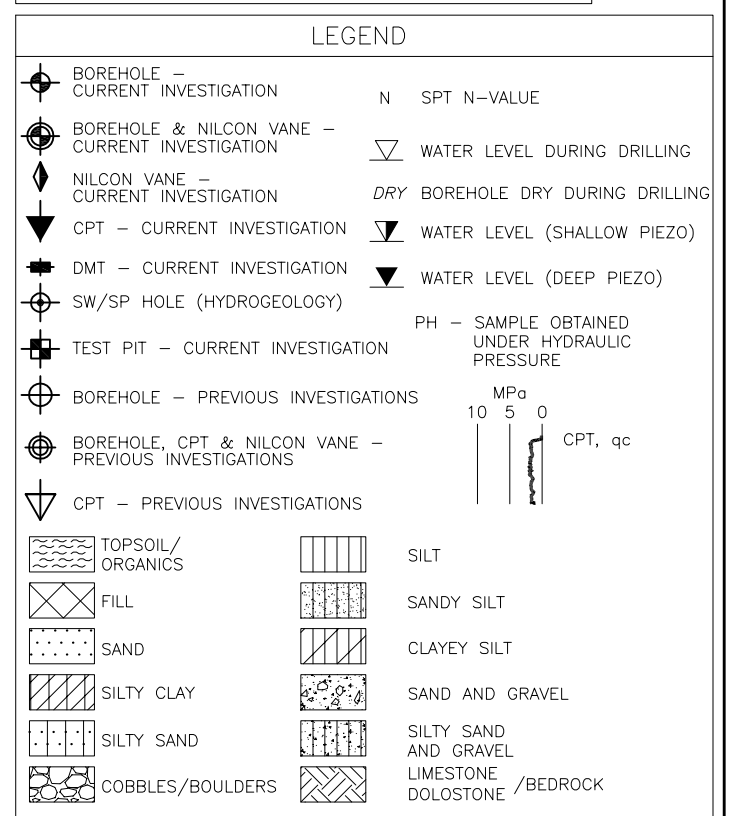
1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GEOTECHNICAL DESIGN REPORT.
2. THE INTERPRETED STRATIGRAPHY REPRESENTS SIMPLIFIED SUBSURFACE CONDITIONS. SEE BORING LOGS FOR DETAILED STRATIGRAPHY. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN DEFINED AT BOREHOLE LOCATIONS ONLY. CONDITIONS BETWEEN BOREHOLE LOCATIONS COULD DIFFER FROM ILLUSTRATED CONDITIONS.
3. ELEVATIONS ARE REFERENCED TO GEODETIC DATUM. LOCATIONS ALONG THE PROPOSED WEP ARE REFERRING TO STATIONS IN LASALLE (L) SECTOR.


SALES

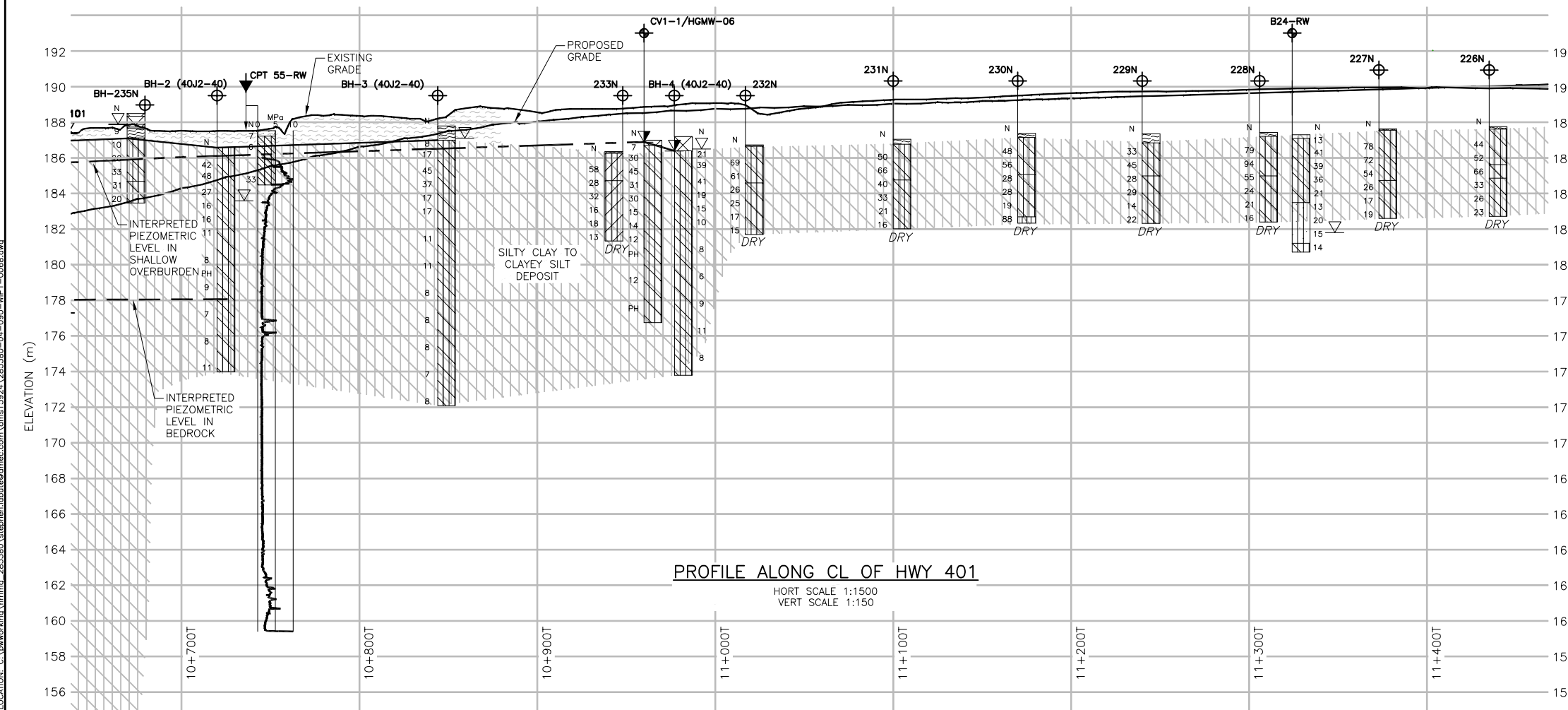
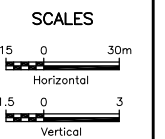


| | | |
|--|---|--|
| | LOCATION PLAN & INTERPRETED STRATIGRAPHIC PROFILE STA 10+700T TO STA 11+400T (SOIL PROFILE 17) | |
|--|---|--|

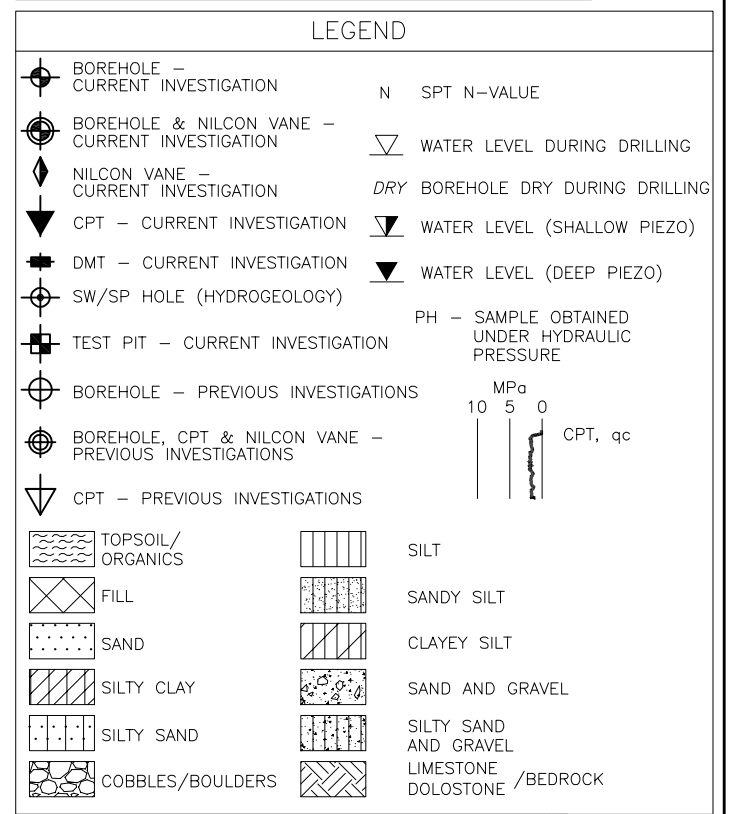
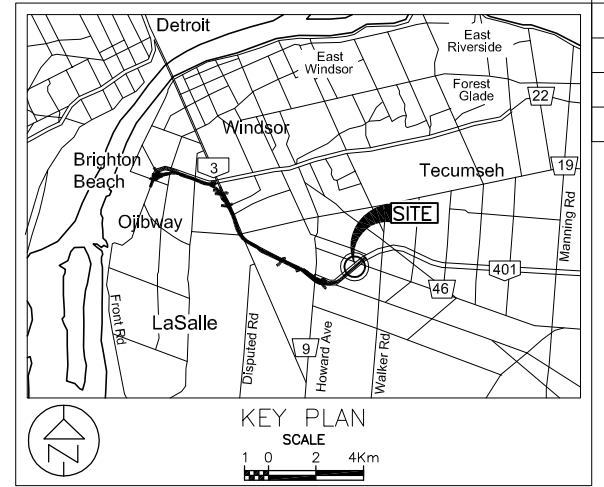
| |
|---------|
| Phase 1 |
| IFC |



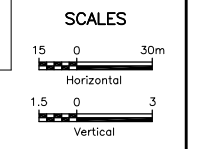
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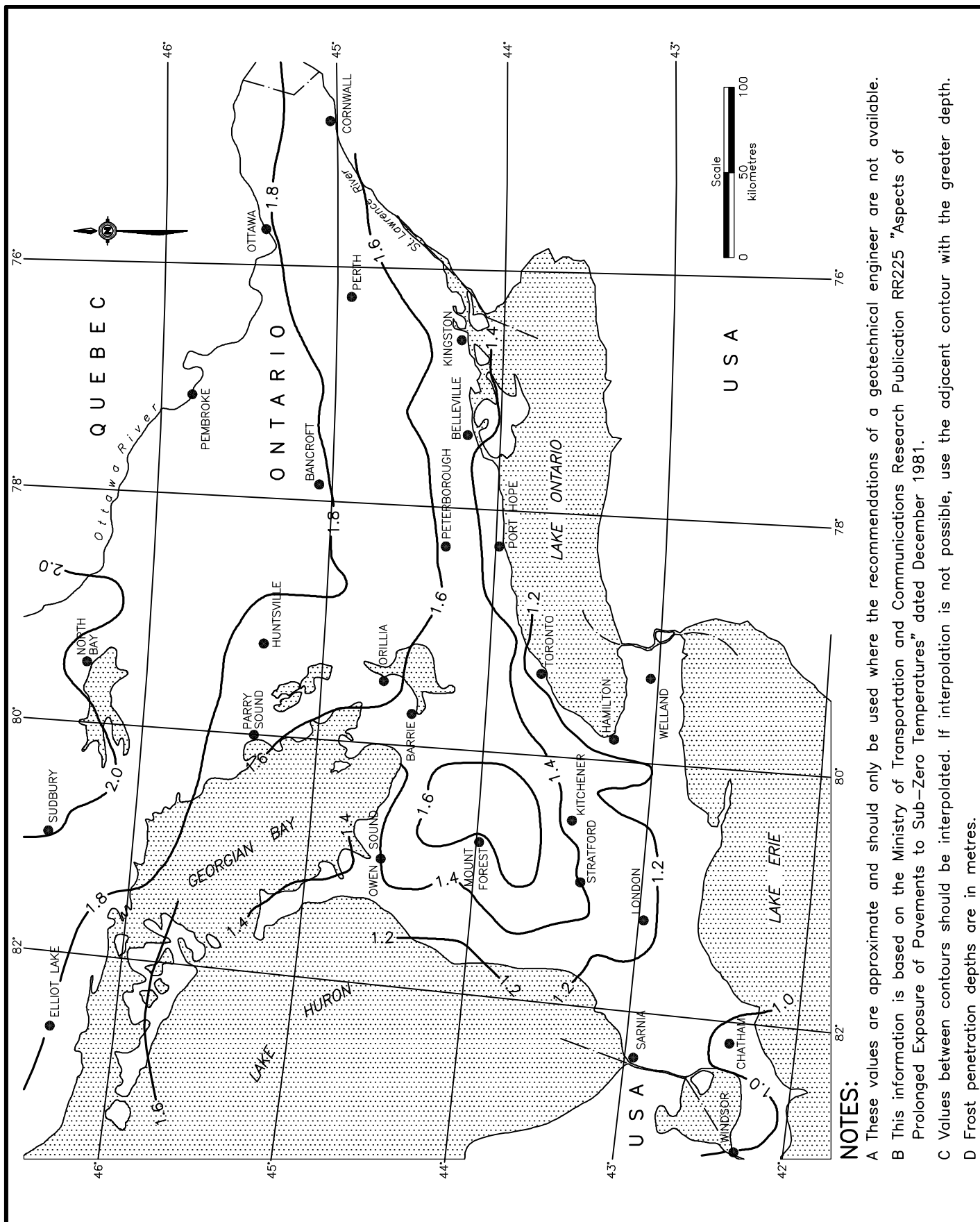
- SCALES**
- 15 0 30m



Applicable OPSDs

Project: Windsor-Essex Parkway
Document: Geotechnical Investigation and Design Report –
Permanent Cuts - Phase I (Station 10+070L to Station 10+900T)
Doc No.: 285380-04-119-0029 (Geocres No. 40J3-13)

Date: August/2012
Rev: 0
Page No.: Applicable OPSDs



NOTES:

- A These values are approximate and should only be used where the recommendations of a geotechnical engineer are not available.
- B This information is based on the Ministry of Transportation and Communications Research Publication RR225 "Aspects of Prolonged Exposure of Pavements to Sub-Zero Temperatures" dated December 1981.
- C Values between contours should be interpolated. If interpolation is not possible, use the adjacent contour with the greater depth.
- D Frost penetration depths are in metres.

ONTARIO PROVINCIAL STANDARD DRAWING

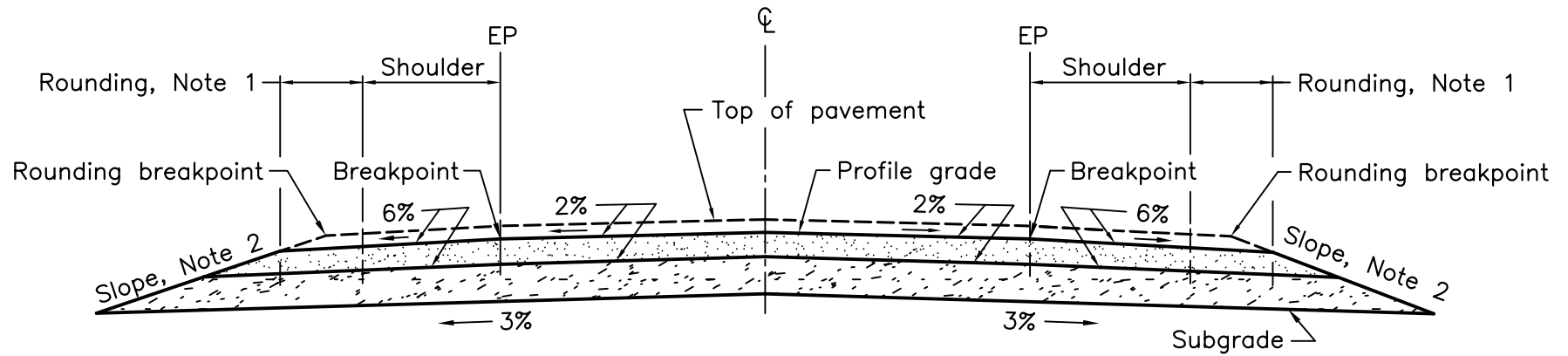
Nov 2010

Rev 1

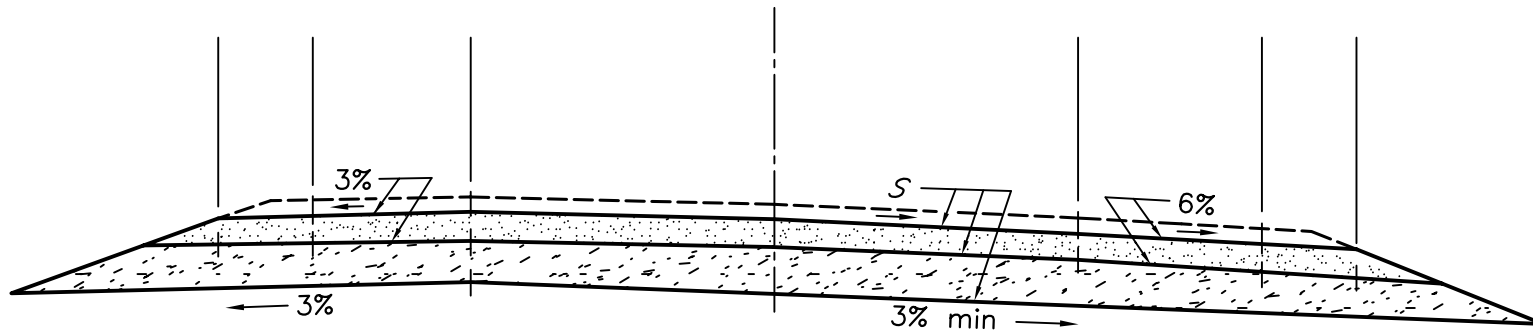
**FOUNDATION
FROST PENETRATION DEPTHS
FOR SOUTHERN ONTARIO**



OPSD 3090.101



TANGENT SECTION



SUPERELEVATED SECTION

LEGEND:



Granular base



Granular subbase

NOTES:

- 1 Rounding shall be 0.5m or greater when specified.
- 2 Slope shall be 3H:1V or flatter when specified.
- A All dimensions are in metres unless otherwise shown.

ONTARIO PROVINCIAL STANDARD DRAWING

GRANULAR COURSES

UNDIVIDED RURAL

Nov 2009

Rev 1



OPSD 206.010

Figures

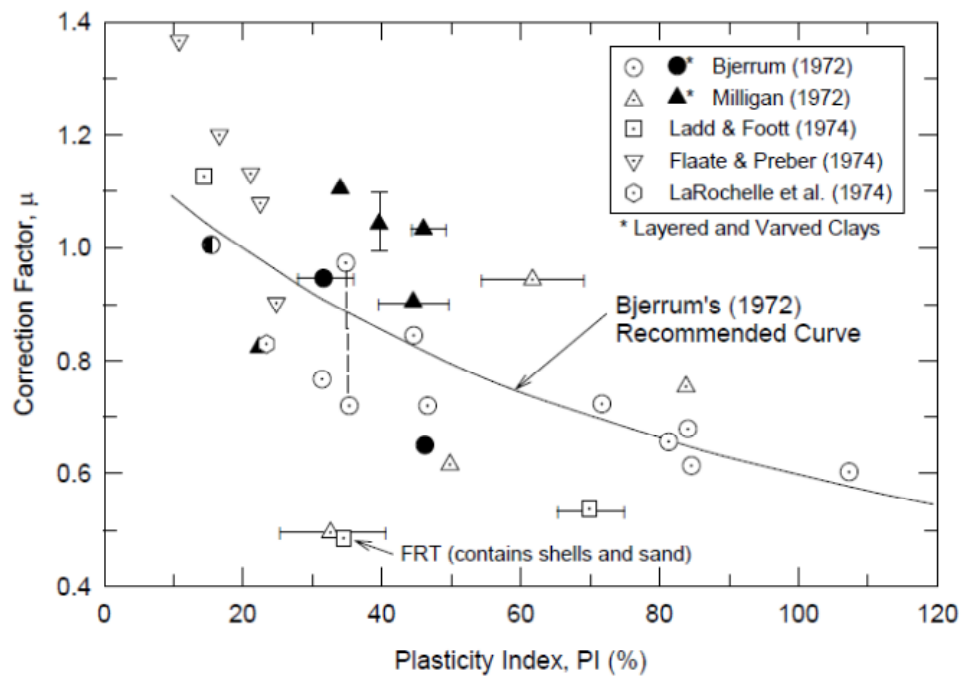


Figure 3.1: Field Vane Correction Factor vs. Plasticity Index Derived from Embankment Failures (Ladd & DeGroot, 2004)

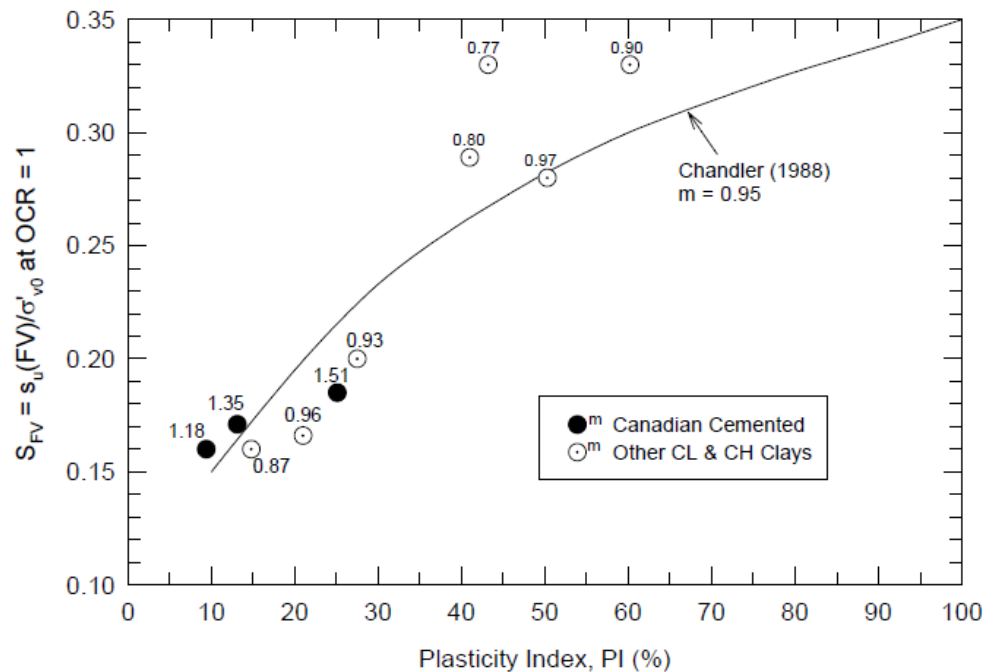
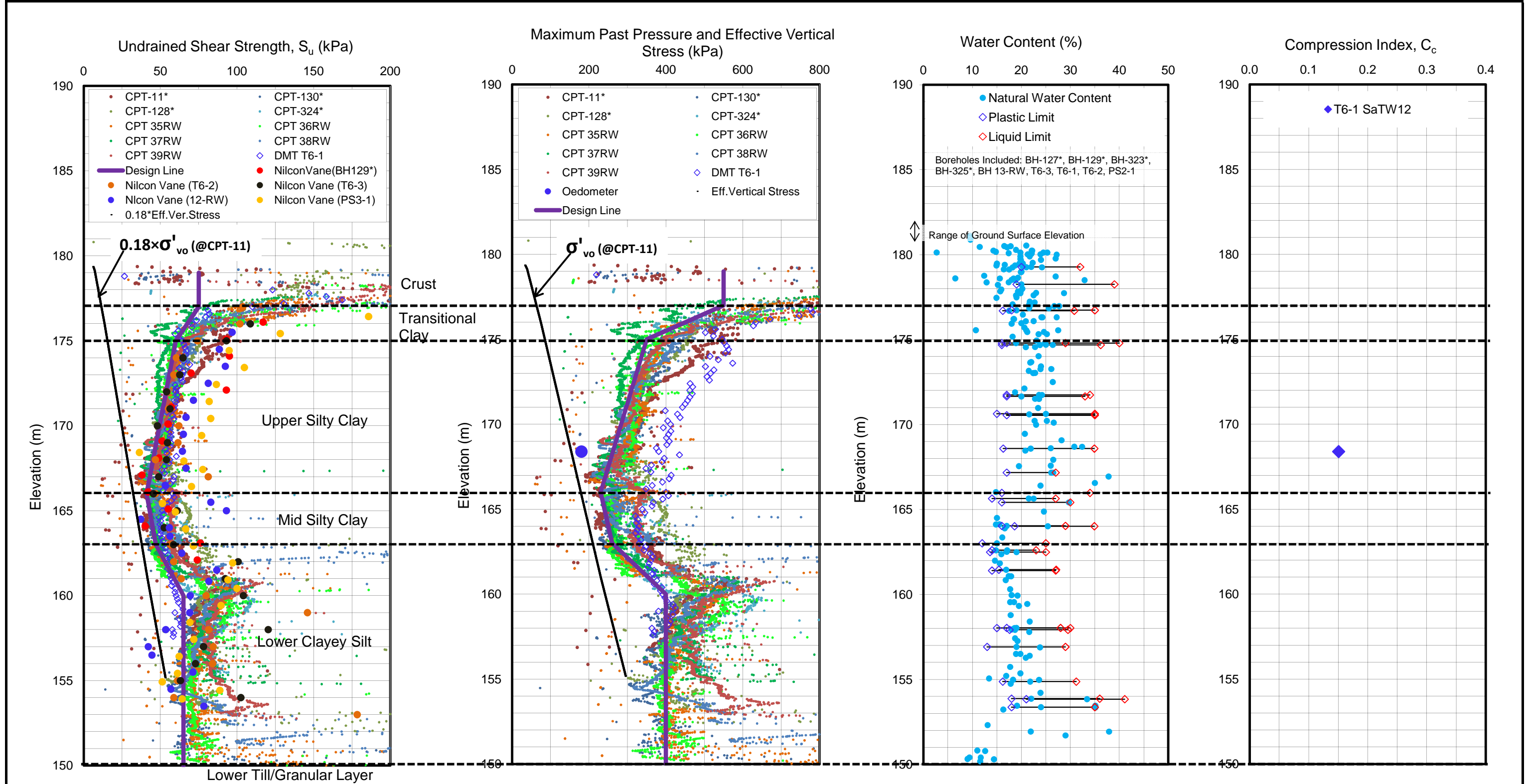



Figure 3.2: Field Vane Undrained Strength Ratio at OCR = 1 vs. Plasticity Index for Homogeneous Clays (Ladd & DeGroot, 2004)



Notes:
1. Shear strength profiles were estimated from CPT data using the equation $S_u = (q_t - \sigma_{vo}) / N_{KT}$. The cone factor N_{KT} was estimated by comparing the CPT profiles with a nearby Nilcon Vane profile.
2. Maximum past pressure profiles estimated using SHANSEP method. $OCR = [(S_u / \sigma'_v) / S]^{1/m}$
*From previous investigations (ref. R-16 to R-23).



Environment & Infrastructure

CLIENT :

PROJECT:
WINDSOR ESSEX PARKWAY

TITLE:
SOIL PROPERTIES PROFILES
STA.14+700W TO 10+400L (SOIL PROFILE #9)

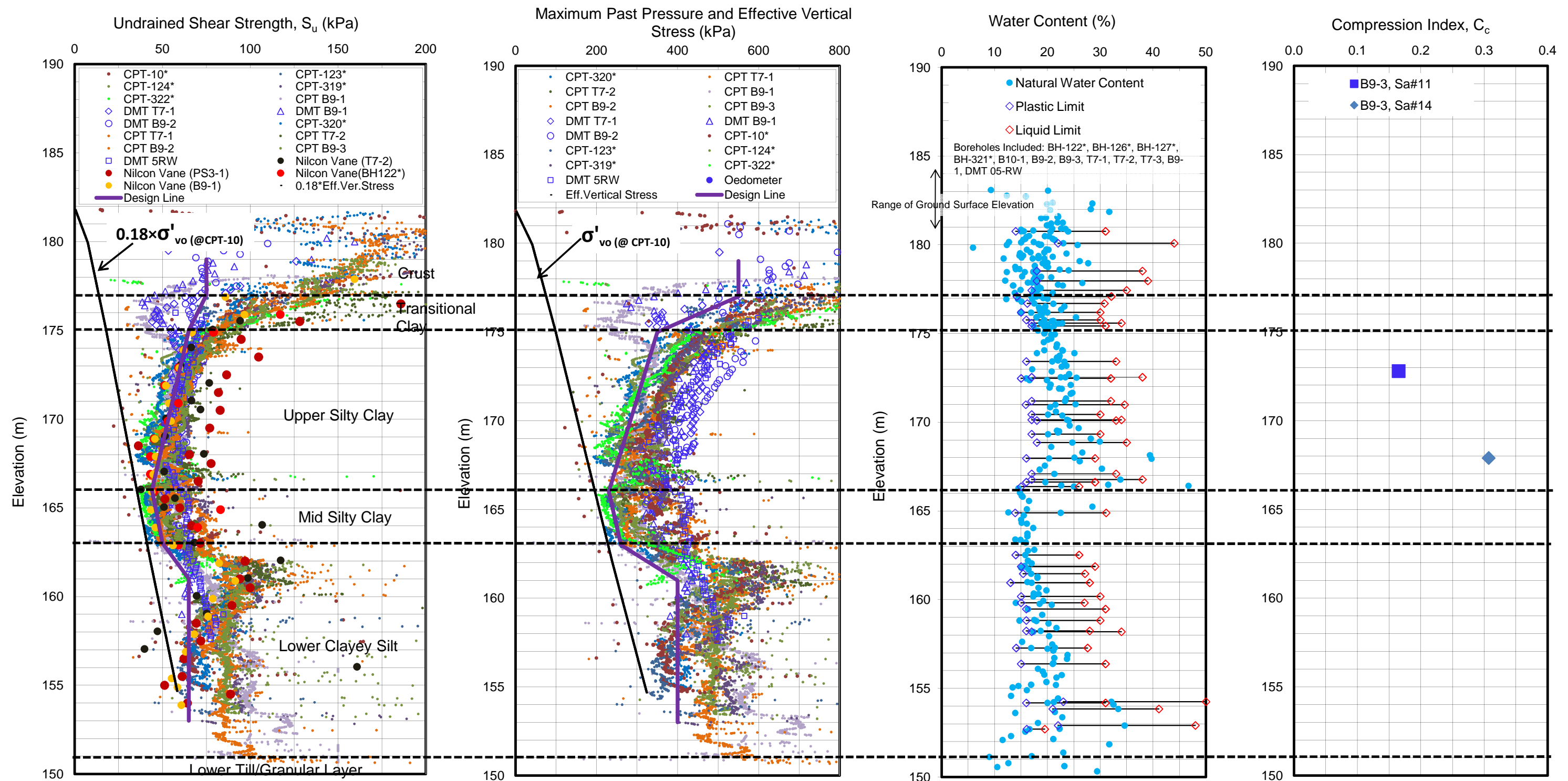
DATE:
Sep 2011

JOB NO.:
SW8801.1002

CAD FILE:

FIGURE NO.: 3.3

REV.



Notes:

1. Shear strength profiles were estimated from CPT data using the equation $S_u = (q_t - \sigma_{vo}) / N_{KT}$. The cone factor N_{KT} was estimated by comparing the CPT profiles with a nearby Nilcon Vane profile.

2. Maximum past pressure profiles estimated using SHANSEP method. $OCR = [(S_u / \sigma'_v) / S]^{1/m}$

*From previous investigations (ref. R-16 to R-23).



Environment & Infrastructure

CLIENT :

PROJECT:

WINDSOR ESSEX PARKWAY

TITLE:

**SOIL PROPERTIES PROFILES
STA.10+400L TO 11+000L (SOIL PROFILE#10)**

DATE:

Oct 2011

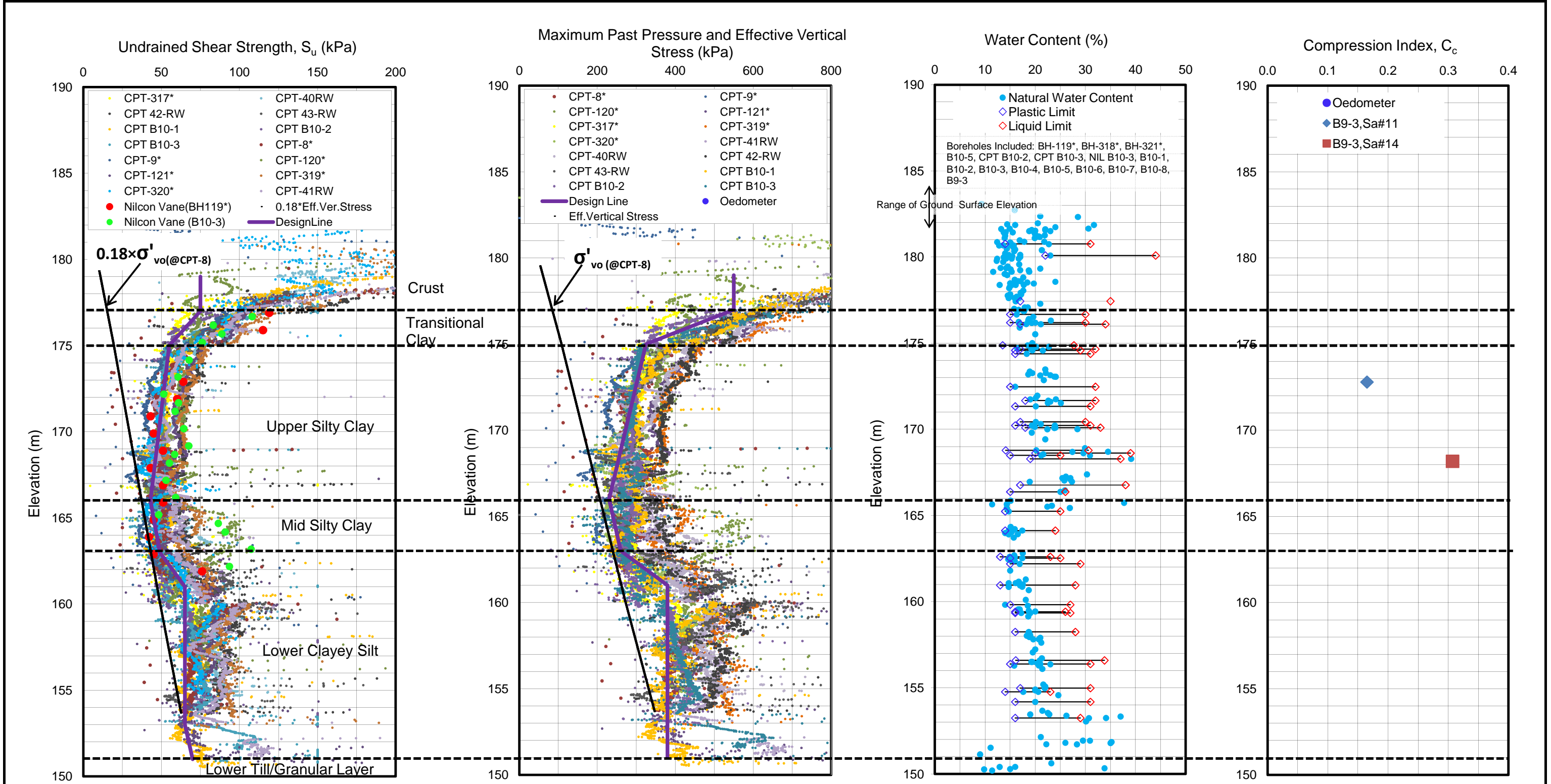
JOB NO.:

SW8801.1002


CAD FILE:

**FIGURE
NO.: 3.4**

REV.



Notes:
1. Shear strength profiles were estimated from CPT data using the equation $S_u = (q_t - \sigma_{vo}) / N_{KT}$. The cone factor N_{KT} was estimated by comparing the CPT profiles with a nearby Nilcon Vane profile.
2. Maximum past pressure profiles estimated using SHANSEP method. $OCR = [(S_u / \sigma'_v) / S]^{1/m}$
*From previous investigations (ref. R-16 to R-23).



Environment & Infrastructure

CLIENT :

PROJECT:
WINDSOR ESSEX PARKWAY

TITLE:
SOIL PROPERTIES PROFILES
STA.10+900L TO 11+500L (SOIL PROFILE #11)

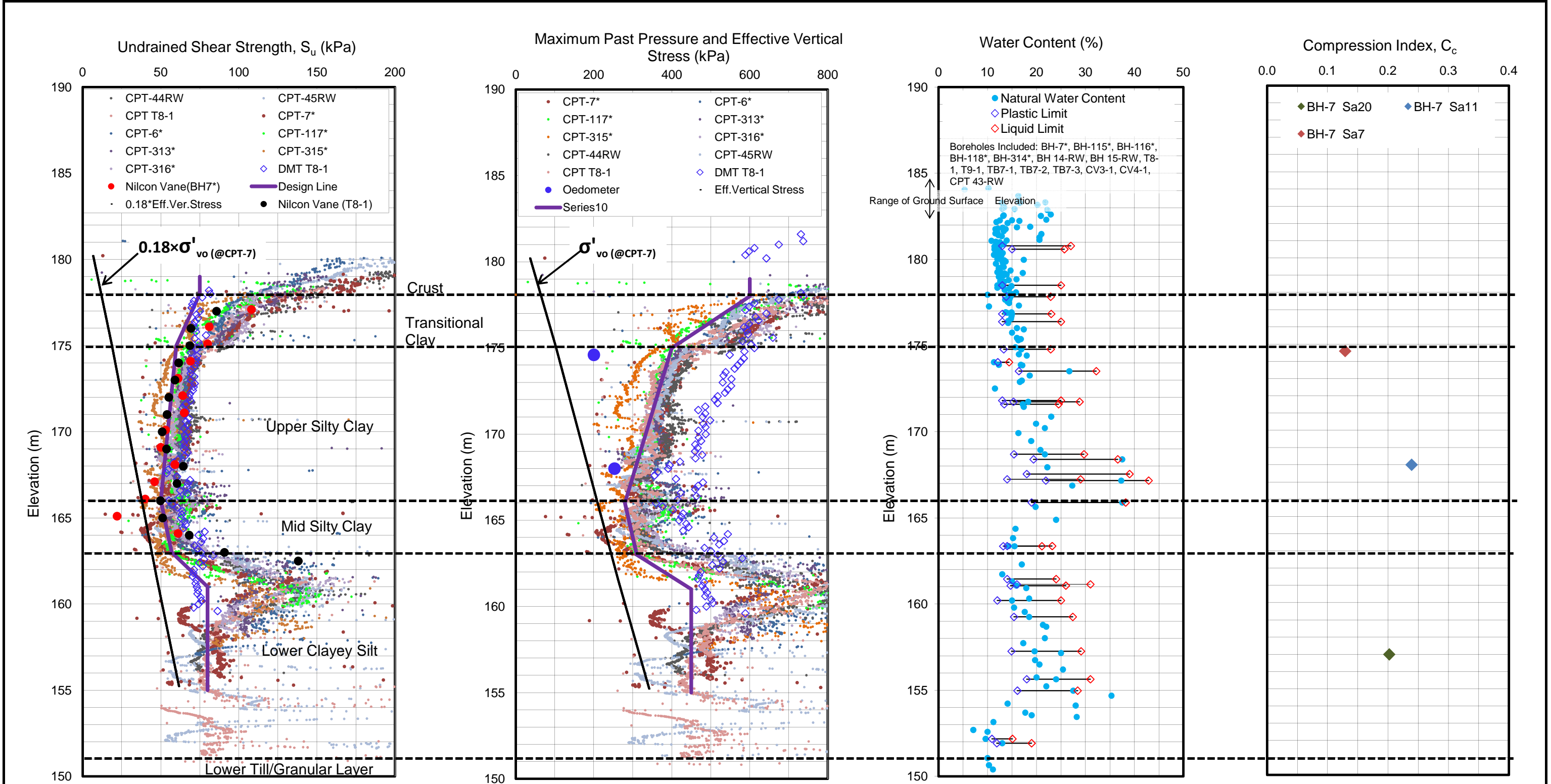
DATE:
Sep 2011

JOB NO.:
SW8801.1002

CAD FILE:

FIGURE NO.: 3.5

REV.




Notes:

1. Shear strength profiles were estimated from CPT data using the equation $S_u = (q_t - \sigma_{vo}) / N_{KT}$. The cone factor N_{KT} was estimated by comparing the CPT profiles with a nearby Nilcon Vane profile.

2. Maximum past pressure profiles estimated using SHANSEP method. $OCR = [(S_u / \sigma'_v) / S]^{1/m}$

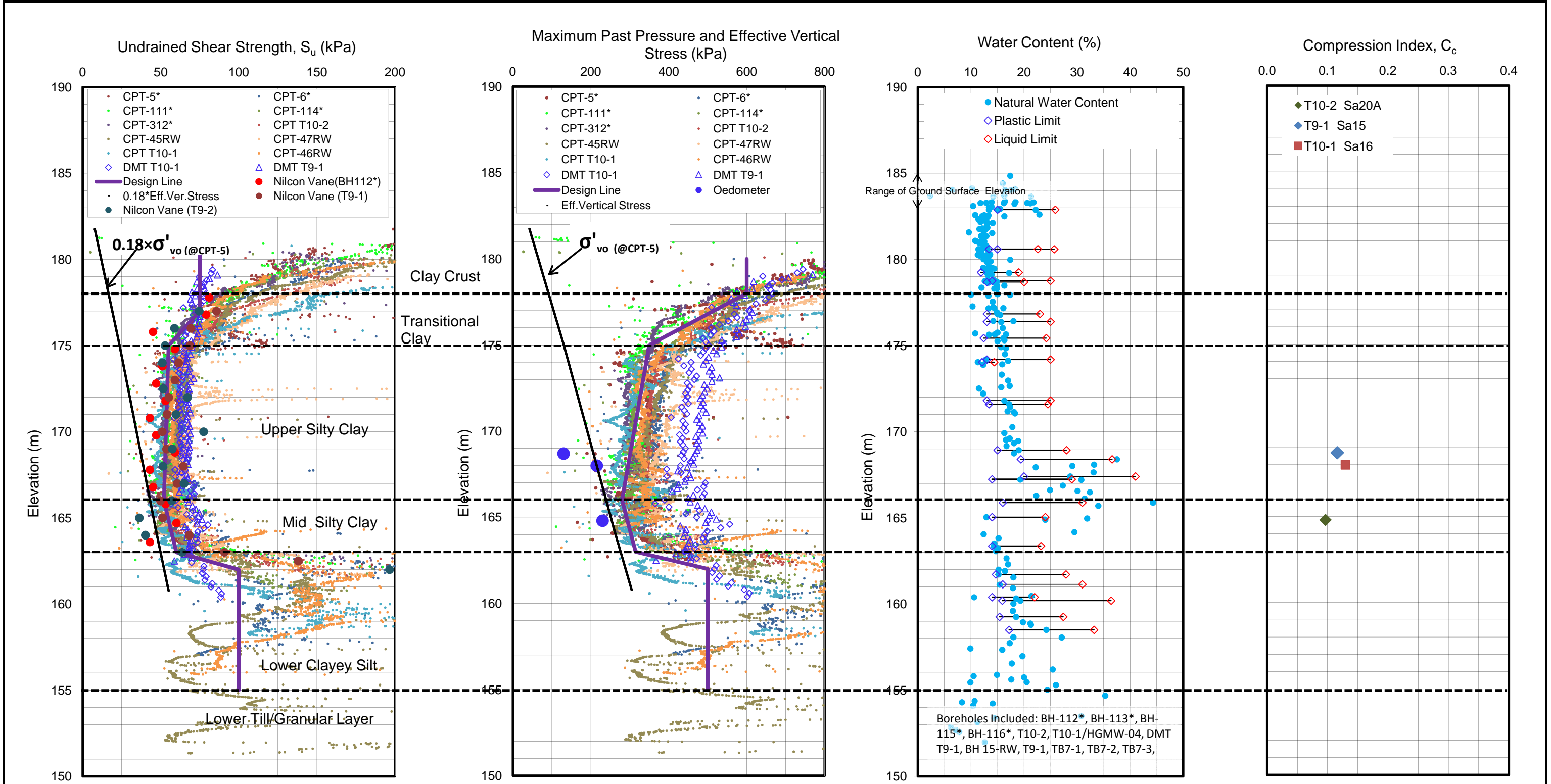
*From previous investigations (ref. R-16 to R-23).



Environment & Infrastructure

CLIENT :

| | | | | |
|---|----------------------|-----------|-----------------|------|
| PROJECT: WINDSOR ESSEX PARKWAY | | | | |
| TITLE: SOIL PROPERTIES PROFILES STA.11+500L TO 12+300L (SOIL PROFILE #12) | | | | |
| DATE: Sep 2011 | JOB NO.: SW8801.1002 | CAD FILE: | FIGURE NO.: 3.6 | REV. |




Notes:

1. Shear strength profiles were estimated from CPT data using the equation $S_u = (q_t - \sigma_{vo}) / N_{KT}$. The cone factor N_{KT} was estimated by comparing the CPT profiles with a nearby Nilcon Vane profile.

2. Maximum past pressure profiles estimated using SHANSEP method. $OCR = [(S_u / \sigma'_v) / S]^{1/m}$

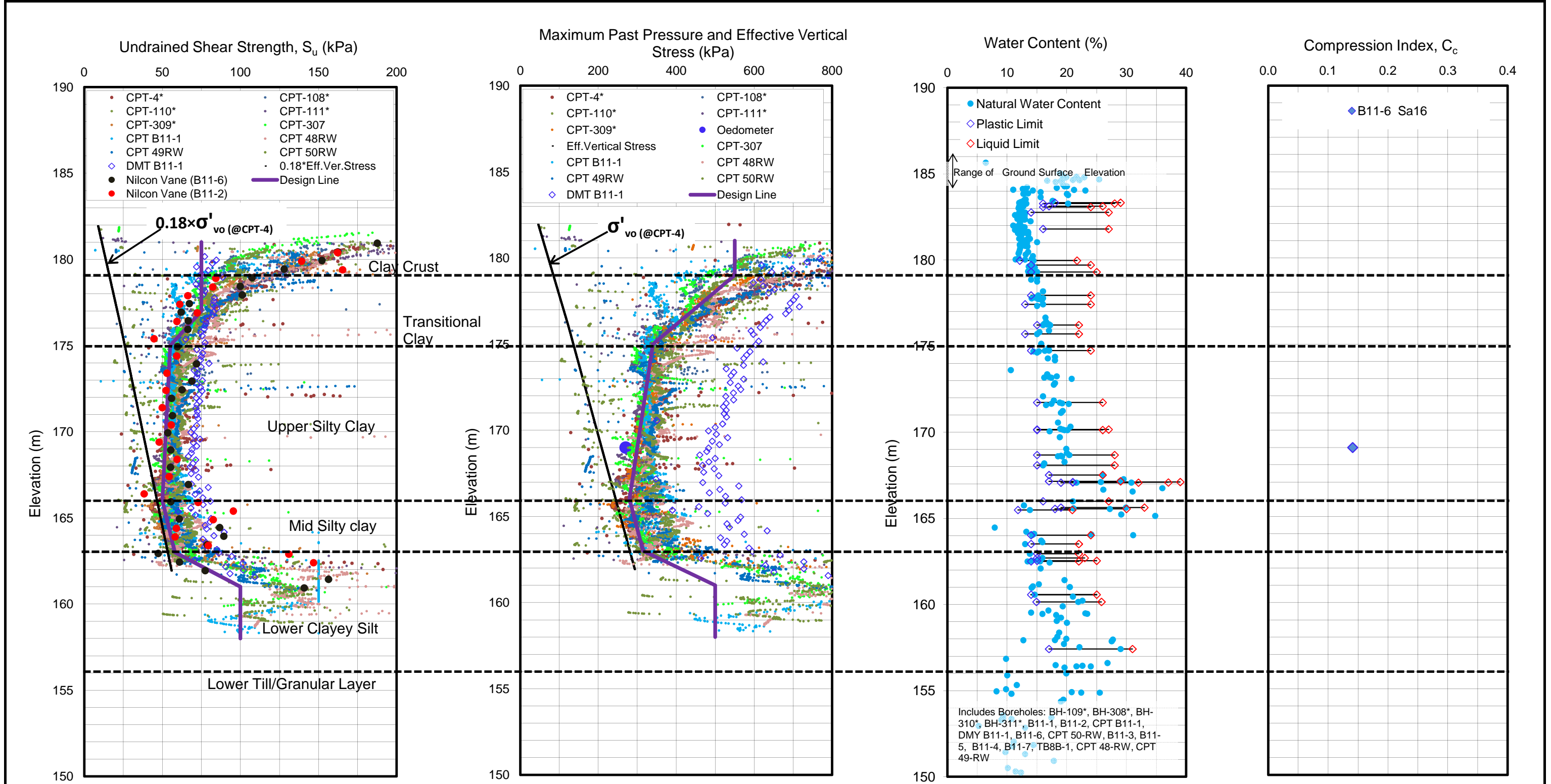
*From previous investigations (ref. R-16 to R-23).



Environment & Infrastructure

CLIENT :

| | |
|--|----------------------|
| PROJECT: WINDSOR ESSEX PARKWAY | |
| TITLE: SOIL PROPERTIES PROFILES STA.12+000L TO 12+800L (SOIL PROFILE #13) | |
| DATE: Sep 2011 | JOB NO.: SW8801.1002 |
| CAD FILE: | FIGURE NO.: 3.7 |
| REV. | |



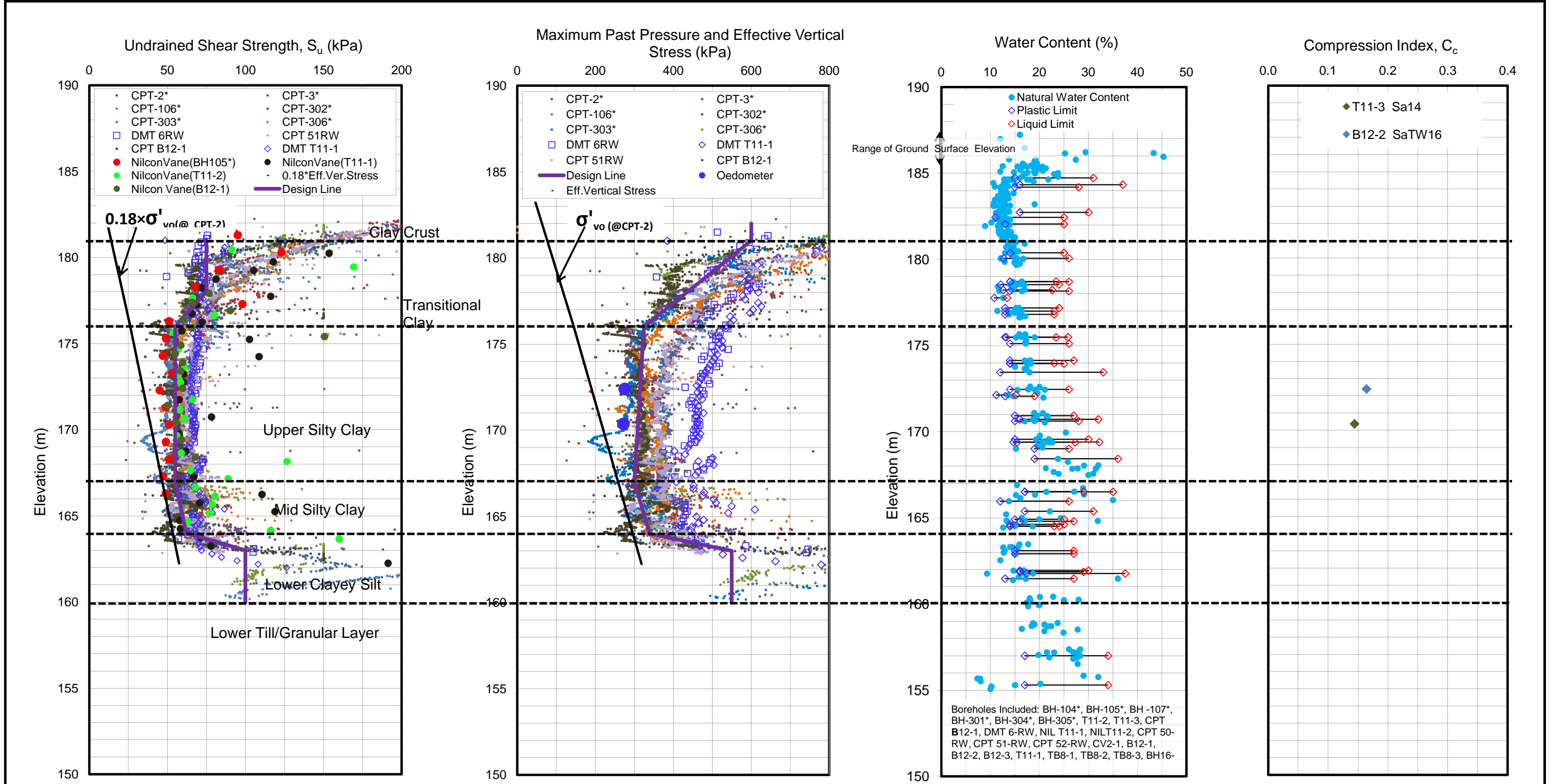
Notes:

1. Shear strength profiles were estimated from CPT data using the equation $S_u = (q_t - \sigma_{vo}) / N_{KT}$. The cone factor N_{KT} was estimated by comparing the CPT profiles with a nearby Nilcon Vane profile.

2. Maximum past pressure profiles estimated using SHANSEP method. $OCR = [(S_u / \sigma_v') / S]^{1/m}$

*From previous investigations (ref. R-16 to R-23).

| | | | | | |
|---------------------------------------|--|----------------|----------------------|-----------|-----------------|
| amtec Environment & Infrastructure | PROJECT: WINDSOR ESSEX PARKWAY | | | | |
| | TITLE: SOIL PROPERTIES PROFILES STA.12+800L TO 13+400L (SOIL PROFILE #14) | | | | |
| | CLIENT: | DATE: Sep 2011 | JOB NO.: SW8801.1002 | CAD FILE: | FIGURE NO.: 3.8 |
| | | | | | REV. |




Notes:

1. Shear strength profiles were estimated from CPT data using the equation $S_u = (q_t - \sigma_{vo}) / N_{KT}$. The cone factor N_{KT} was estimated by comparing the CPT profiles with a nearby Nilcon Vane profile.

2. Maximum past pressure profiles estimated using SHANSEP method. $OCR = [(S_u / \sigma'_v) / S]^{1/m}$

*From previous investigations (ref. R-16 to R-23).



Environment & Infrastructure

CLIENT :

PROJECT: **WINDSOR ESSEX PARKWAY**

TITLE: **SOIL PROPERTIES PROFILES
STA.13+400L TO 10+100T (SOIL PROFILE #15)**

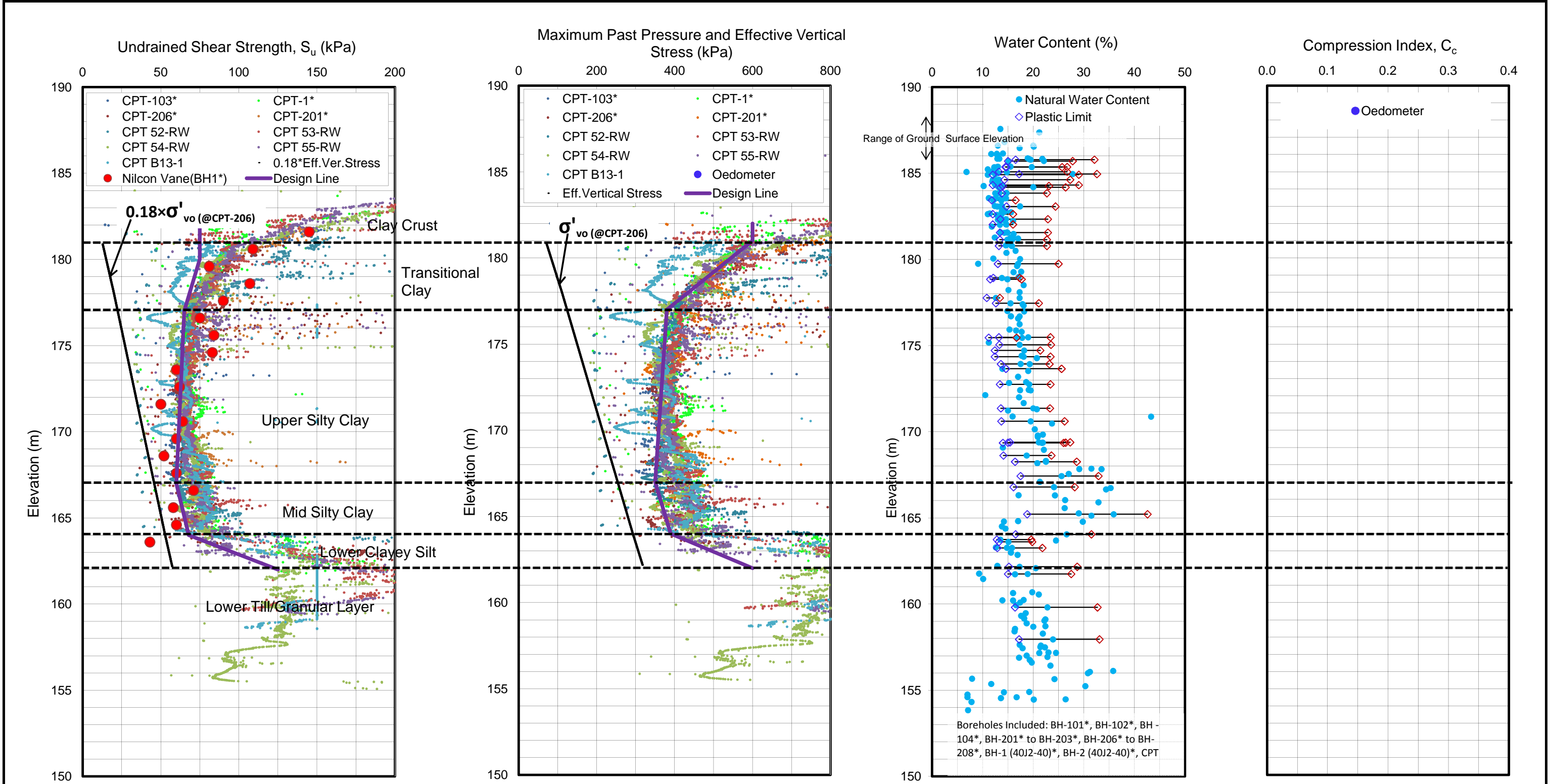
DATE: Sep 2011

JOB NO.: SW8801.1002

CAD FILE:

FIGURE NO.: 3.9

REV.




Notes:

1. Shear strength profiles were estimated from CPT data using the equation $S_u = (q_t - \sigma_{vo}) / N_{KT}$. The cone factor N_{KT} was estimated by comparing the CPT profiles with a nearby Nilcon Vane profile.

2. Maximum past pressure profiles estimated using SHANSEP method. $OCR = [(S_u / \sigma'_v) / S]^{1/m}$

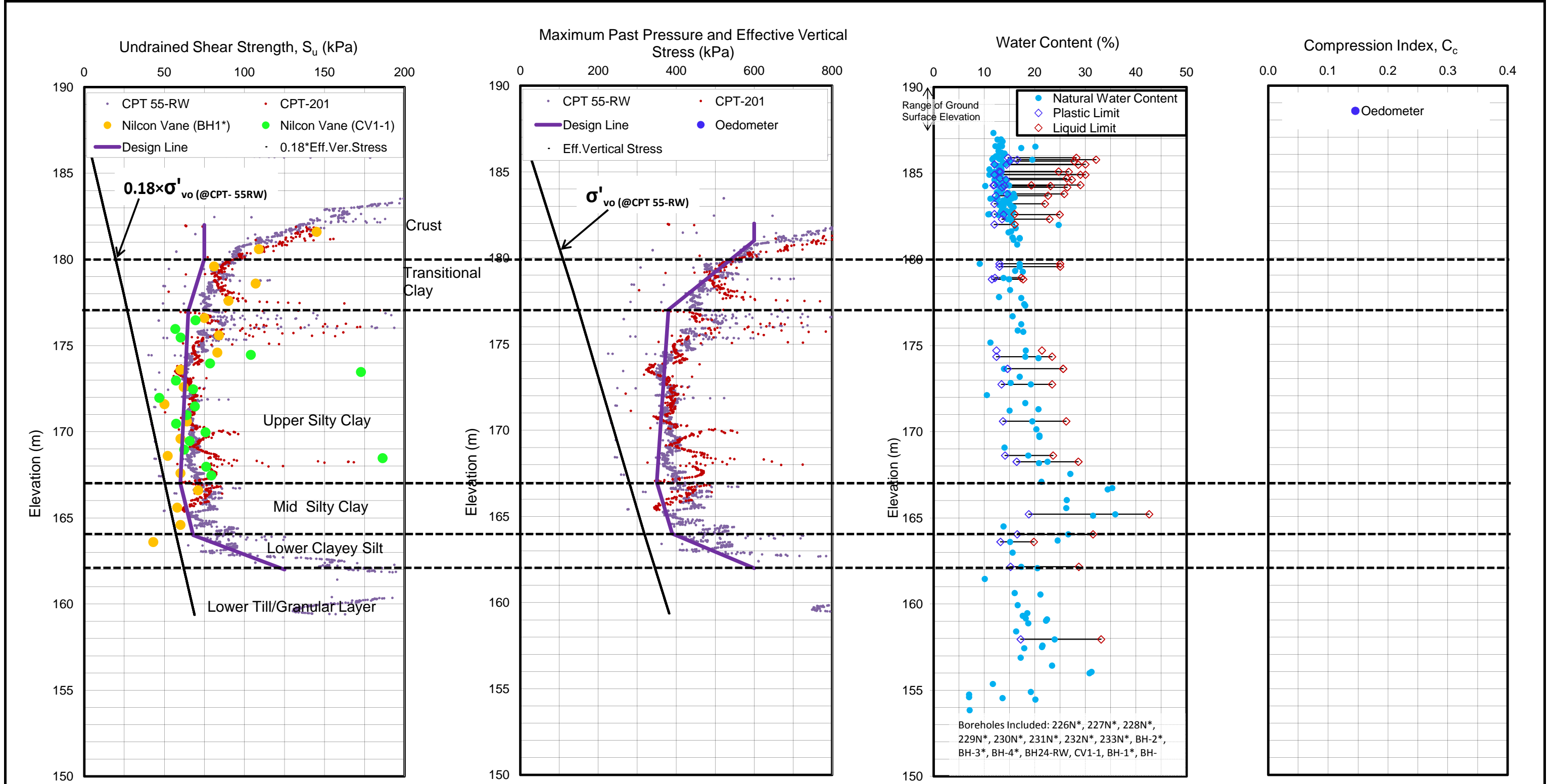
*From previous investigations (ref. R-16 to R-23).



Environment & Infrastructure

CLIENT :

| | |
|--|----------------------|
| PROJECT: WINDSOR ESSEX PARKWAY | |
| TITLE: SOIL PROPERTIES PROFILES STA.10+100T TO 10+700T (SOIL PROFILE #16) | |
| DATE: Aug 2011 | JOB NO.: SW8801.1002 |
| CAD FILE: | FIGURE NO.: 3.10 |
| REV. | |




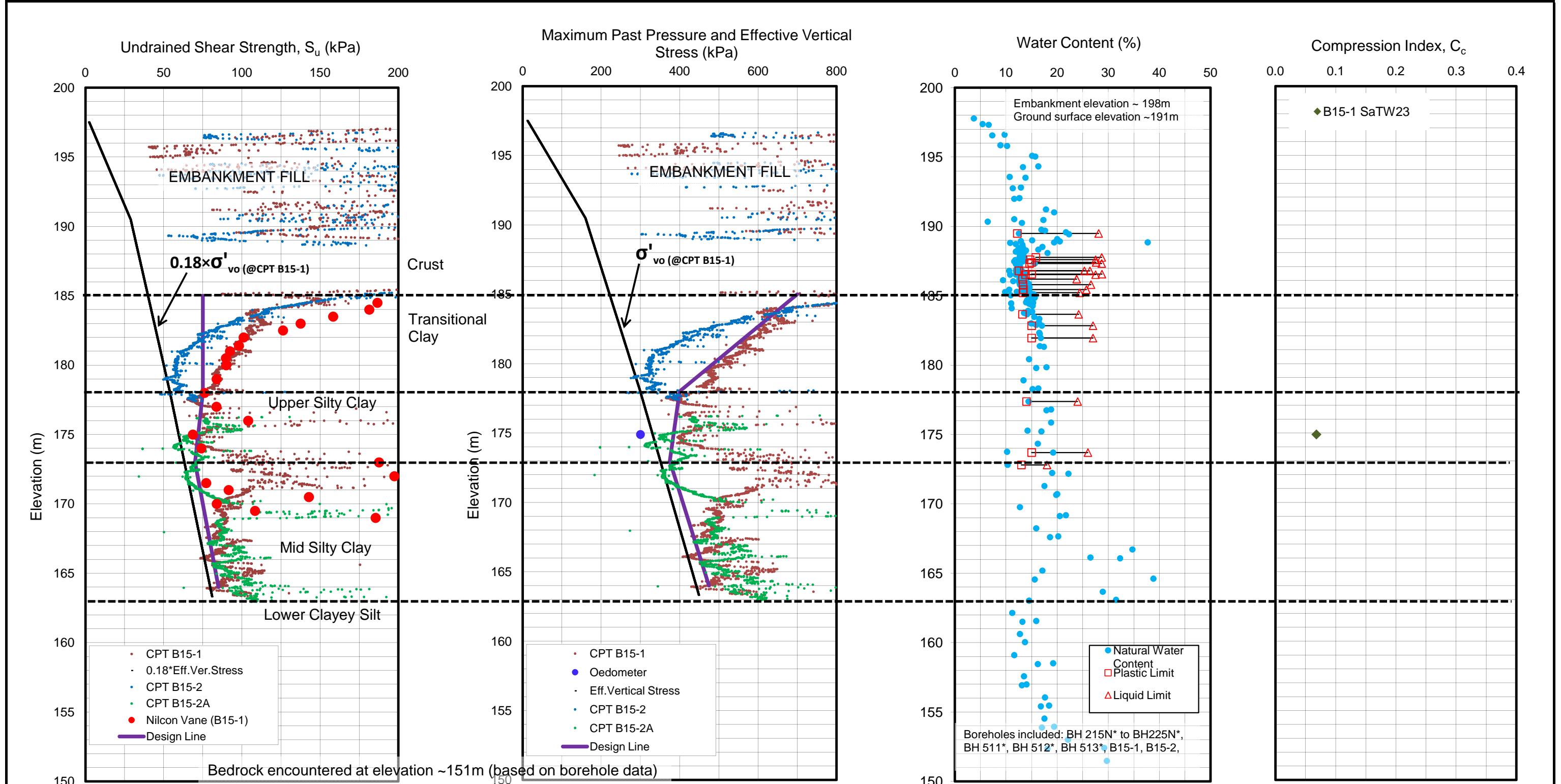
Notes:

1. Shear strength profiles were estimated from CPT data using the equation $S_u = (q_t - \sigma_{vo}) / N_{KT}$. The cone factor N_{KT} was estimated by comparing the CPT profiles with a nearby Nilcon Vane profile.

2. Maximum past pressure profiles estimated using SHANSEP method. $OCR = [(S_u/\sigma'_v)/S]^{1/m}$

*From previous investigations (ref. R-16 to R-23).


| | | | | | |
|---|--|----------------------|-----------|------------------|------|
|  Environment & Infrastructure | PROJECT: WINDSOR ESSEX PARKWAY | | | | |
| | TITLE: SOIL PROPERTIES PROFILES STA.10+500T TO 11+400T (SOIL PROFILE #17) | | | | |
| CLIENT : | DATE: Feb 2012 | JOB NO.: SW8801.1002 | CAD FILE: | FIGURE NO.: 3.11 | REV. |



Notes:

1. Shear strength profiles were estimated from CPT data using the equation $S_u = (q_t - \sigma_{VO}) / N_{KT}$. The cone factor N_{KT} was estimated by comparing the CPT profiles with a nearby Nilcon Vane profile.
2. Maximum past pressure profiles estimated using SHANSEP method. $OCR = [(S_u/\sigma'_v)/S]^{1/m}$
3. Water table is assumed at 0.5m below ground surface.
4. All CPTs and Nilcon Vane probings are located within station 12+100T TO 12+300T (around Bridge B-15) .
5. Index data data are from boreholes located within station 11+500T to 12+300T.

*From previous investigations (ref. R-16 to R-23).

| | | | | | |
|---|---|-------------------------|-----------|------------------|------|
|  Environment & Infrastructure | PROJECT: WINDSOR ESSEX PARKWAY | | | | |
| | TITLE: SOIL PROPERTIES PROFILES STA.11+500T TO 12+300T (SOIL PROFILE #18) | | | | |
| CLIENT : | DATE: Aug 2011 | JOB NO.: SW8801.1002 | CAD FILE: | FIGURE NO.: 3.12 | REV. |

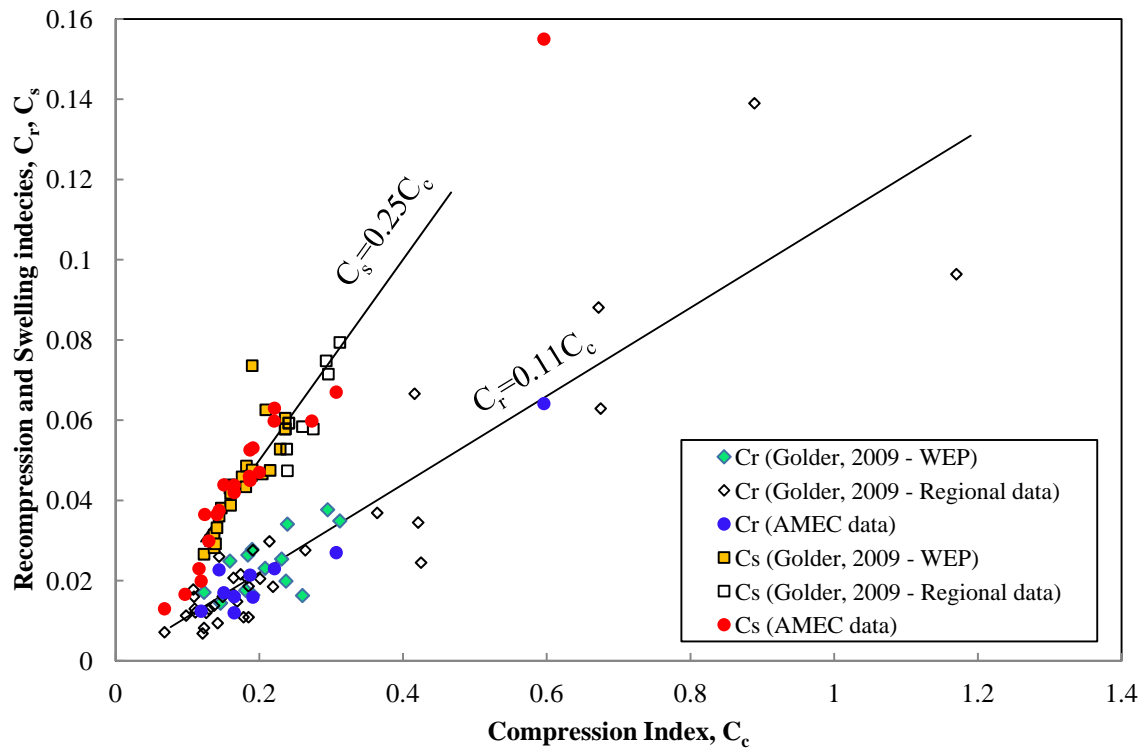
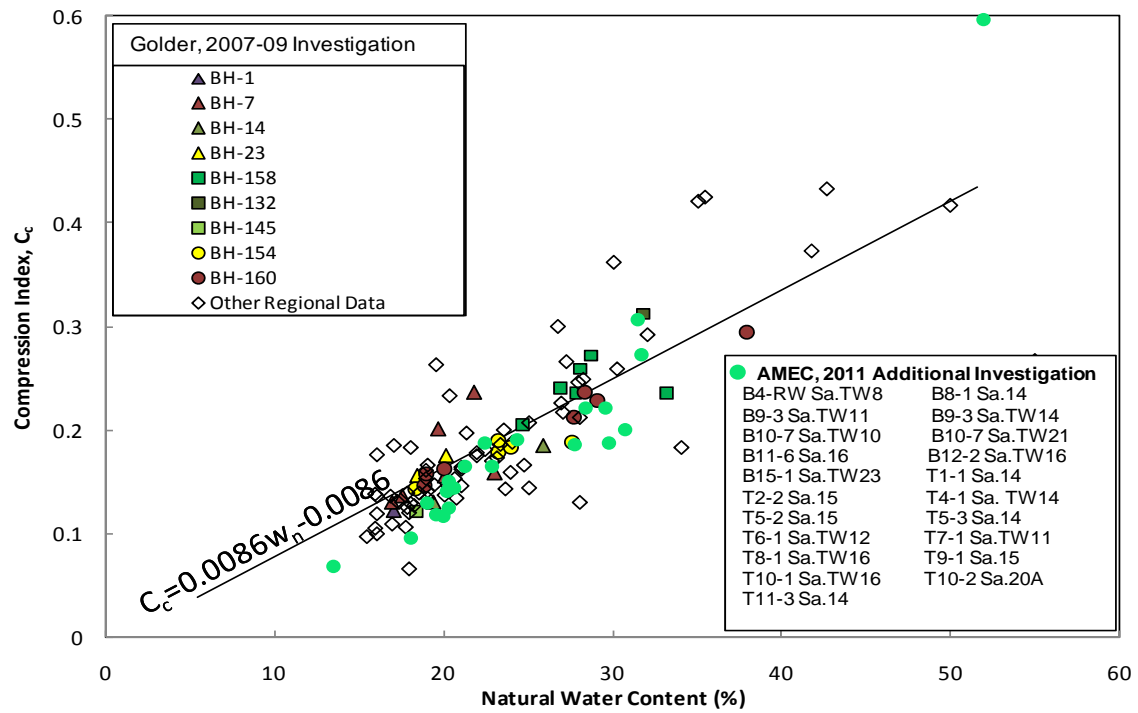


Figure 4.1: Compressibility Parameters at WEP

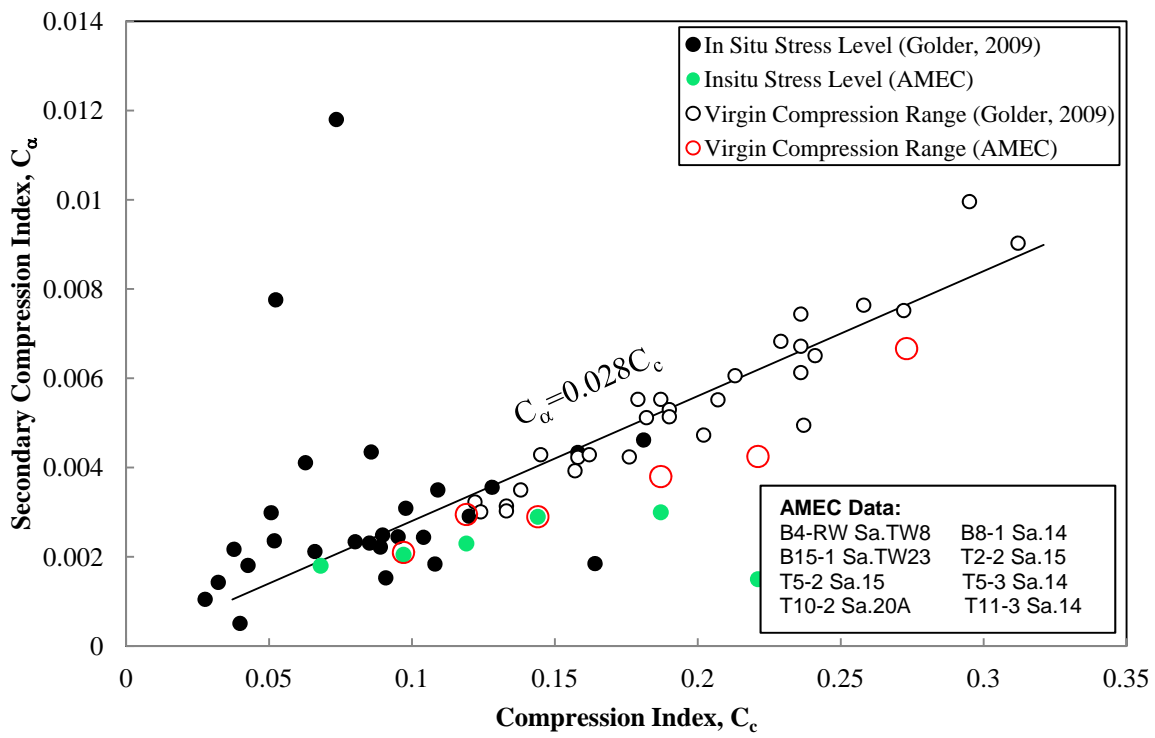


Figure 4.2: C_c versus C_α Relationship at WEP

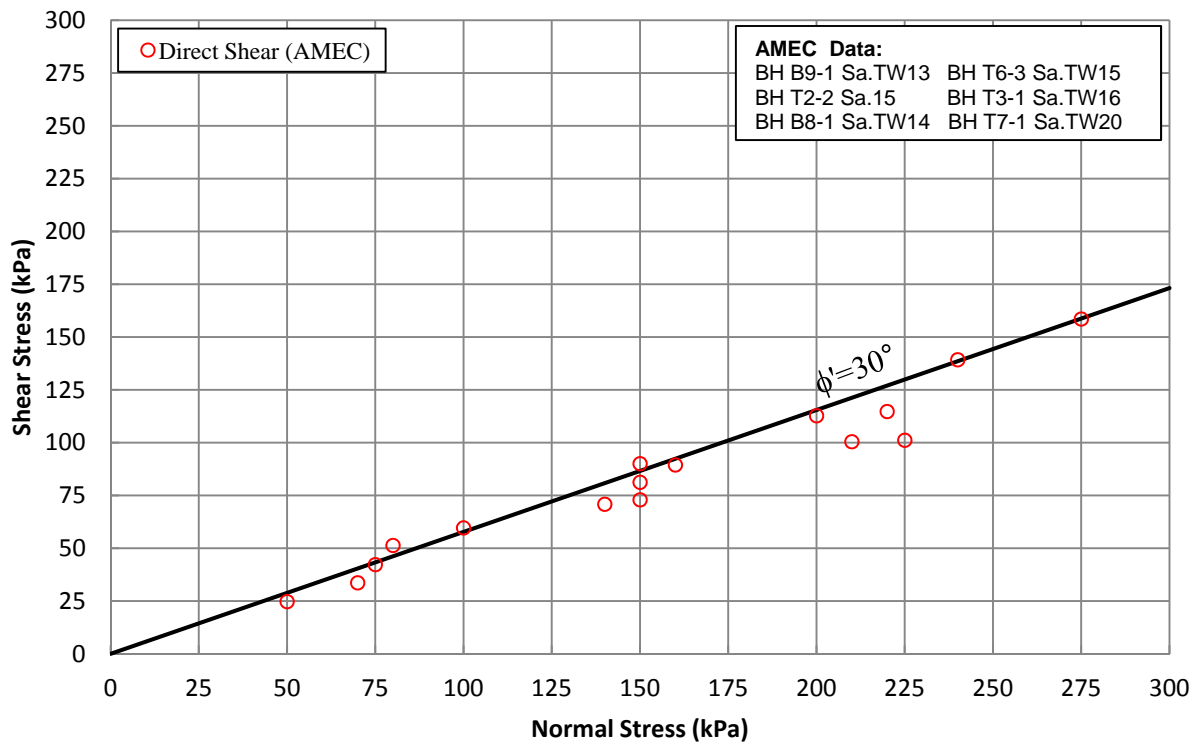
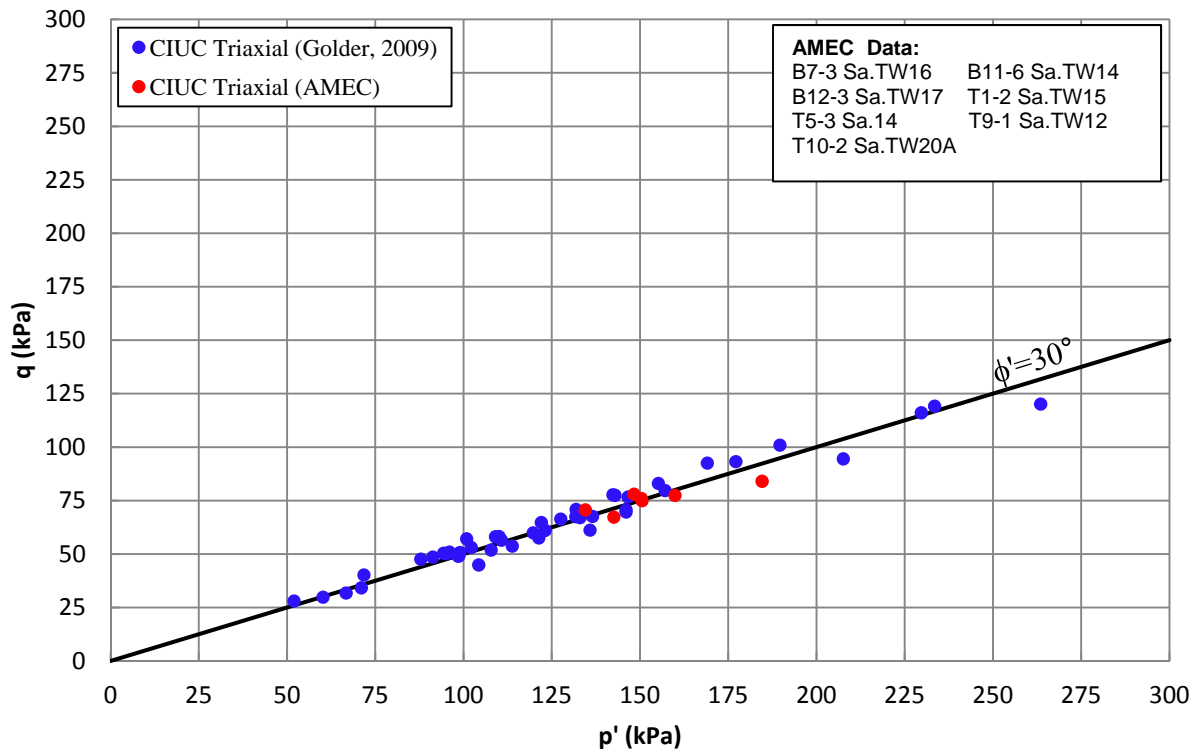


Figure 4.3: Effective Friction Angle (ϕ') for Silty Clay to Clayey Silt Stratum at WEP

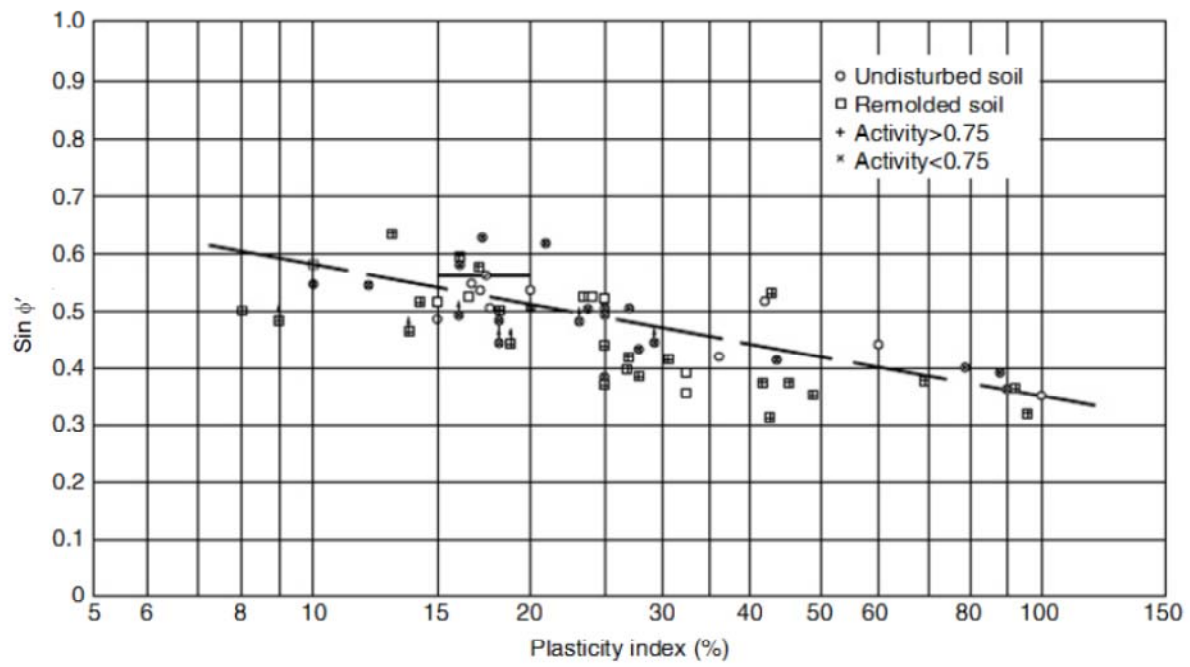


Figure 4.4: Relationship between $\sin \phi'$ and Plasticity Index for Normally Consolidated Soils
(Kenney, 1959)

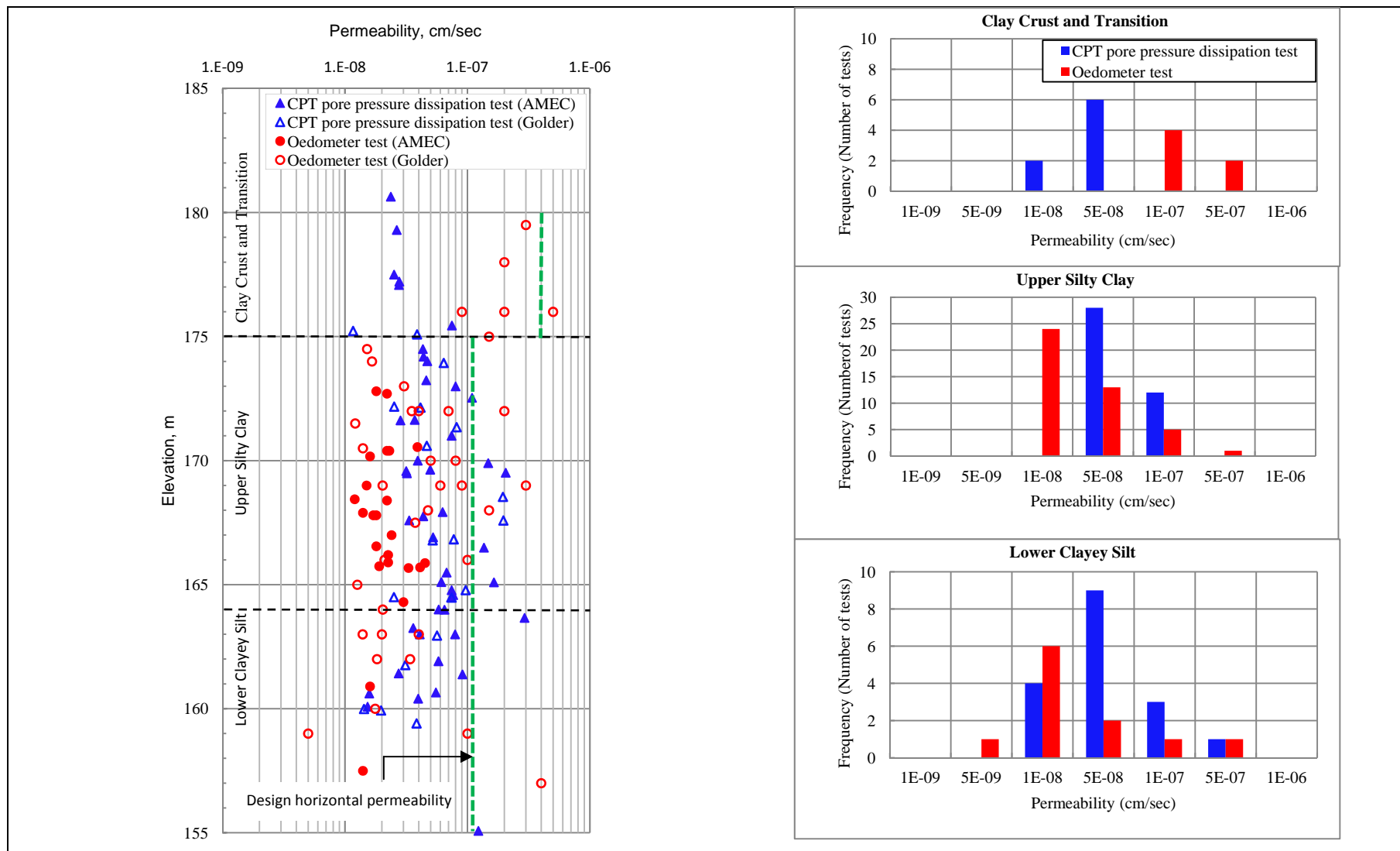
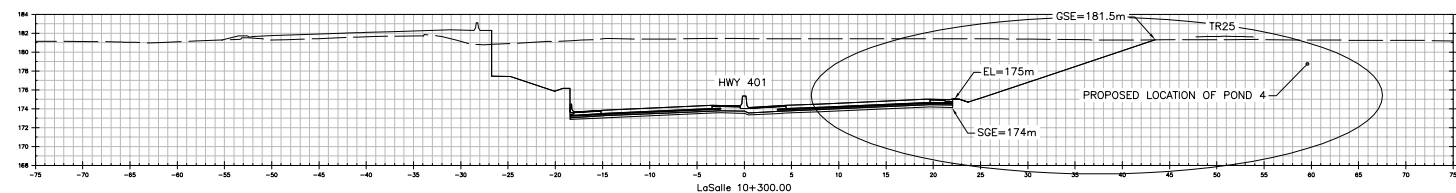
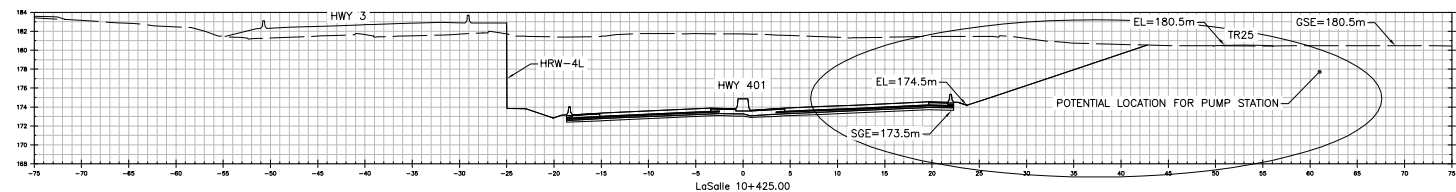
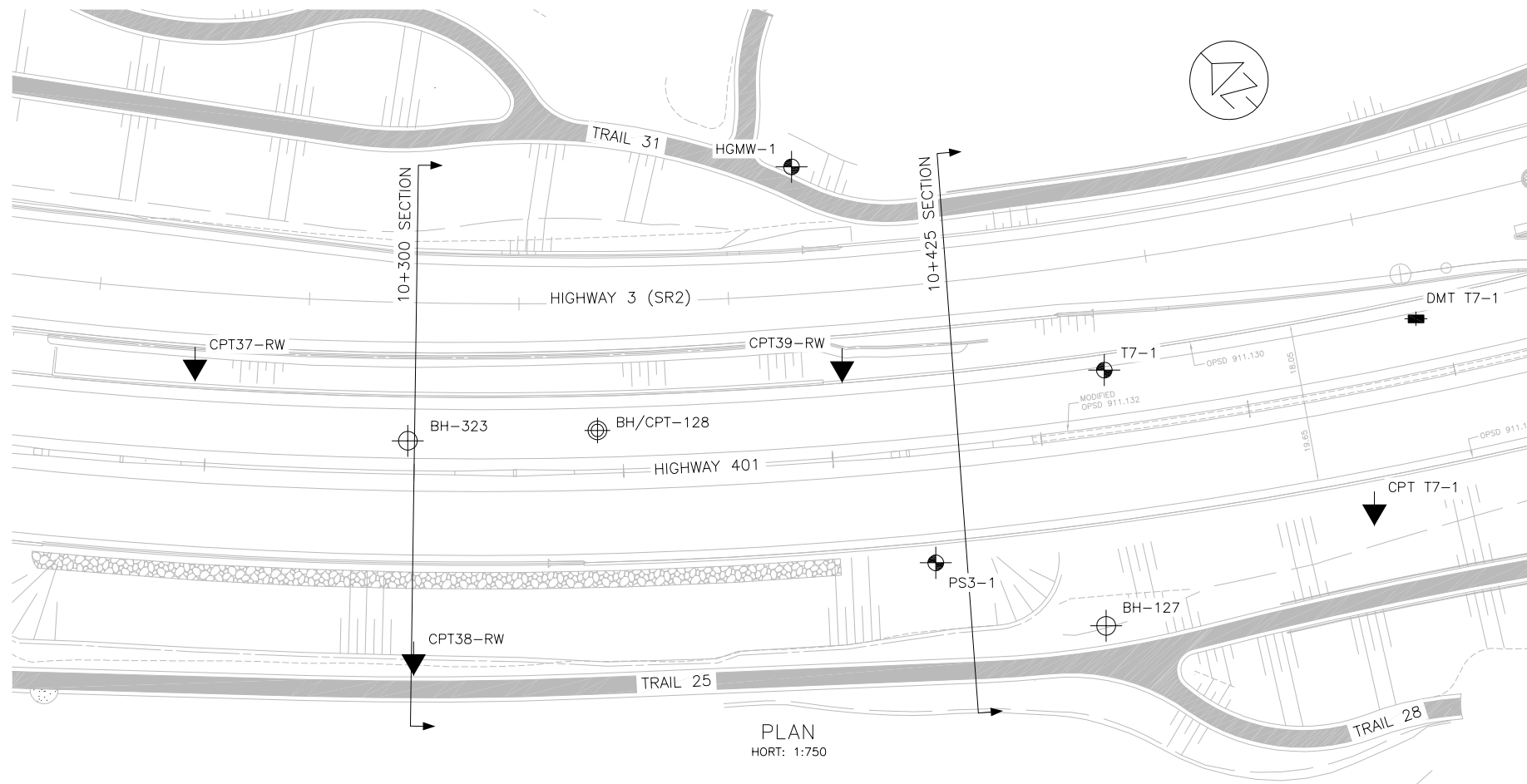
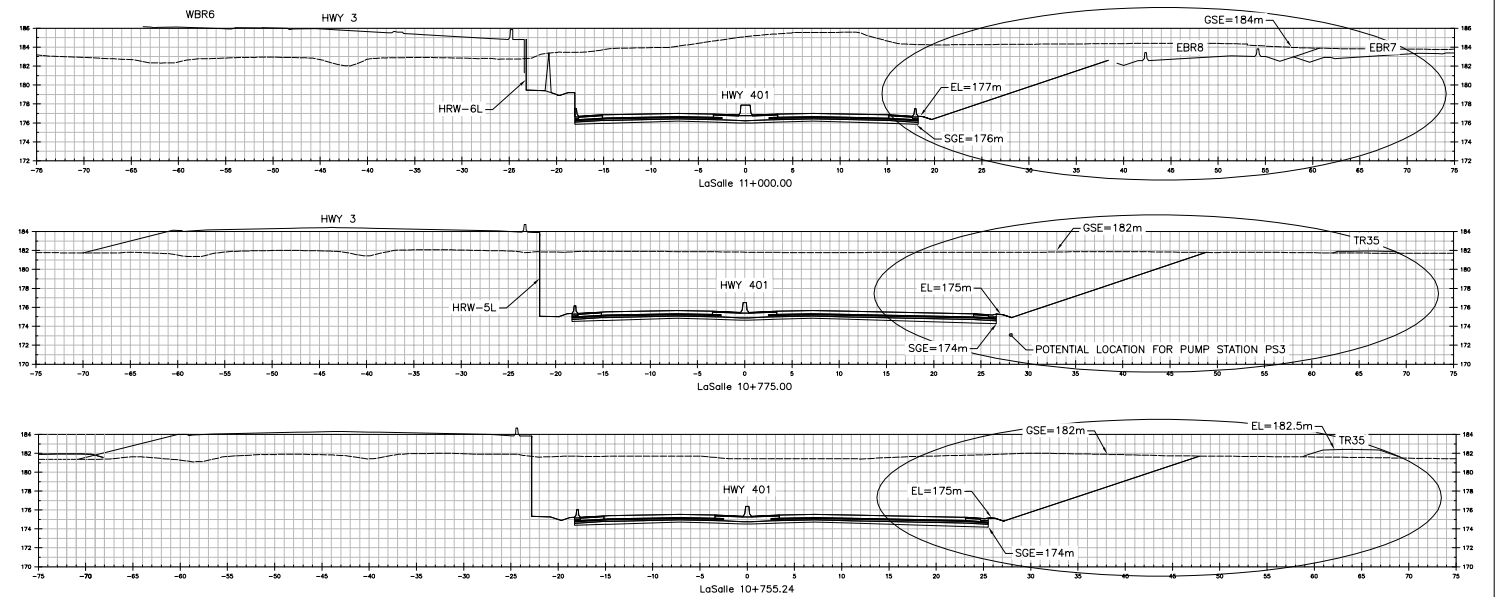
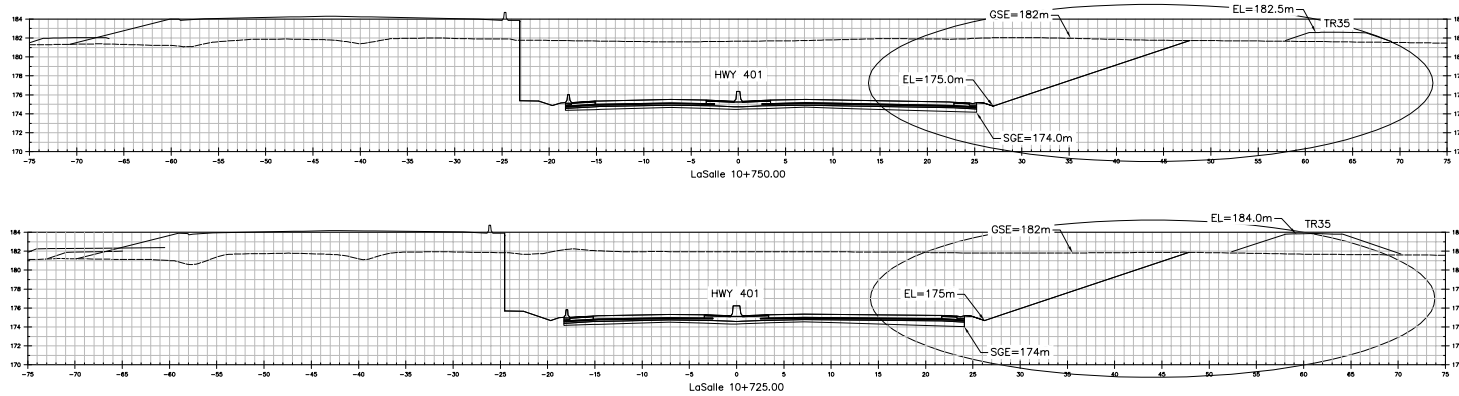
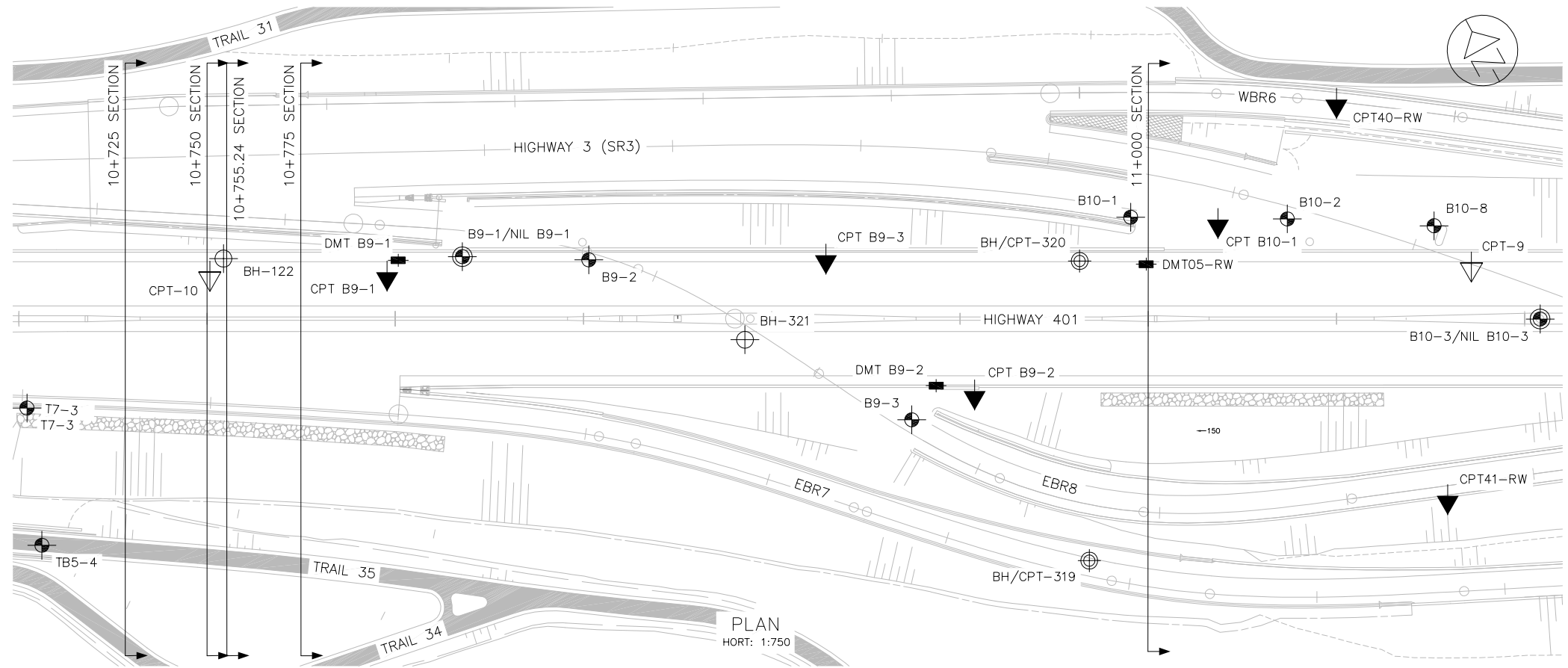


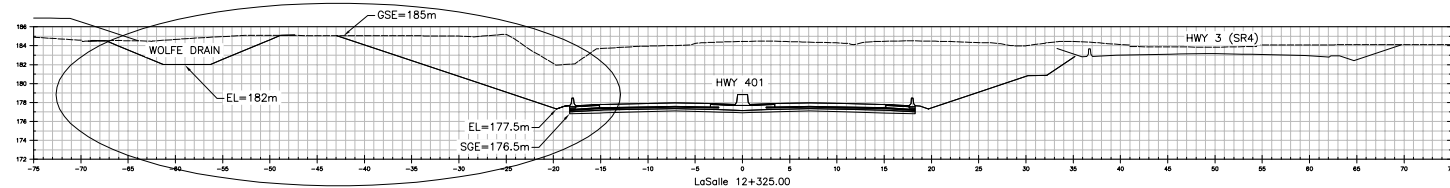
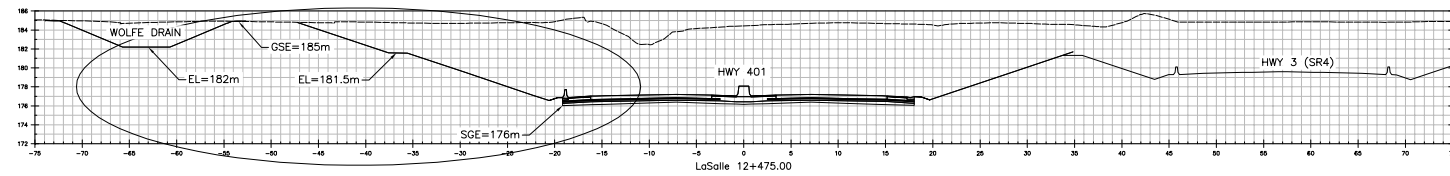
Figure 4.5: Inferred Clay Stratum Permeability from CPT Pore Pressure Dissipation and Oedometer Tests



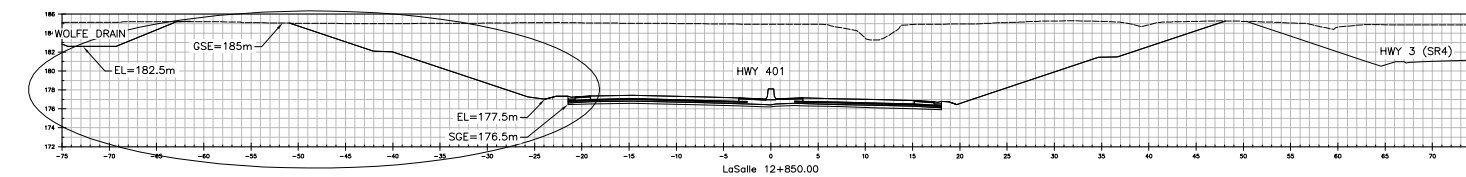
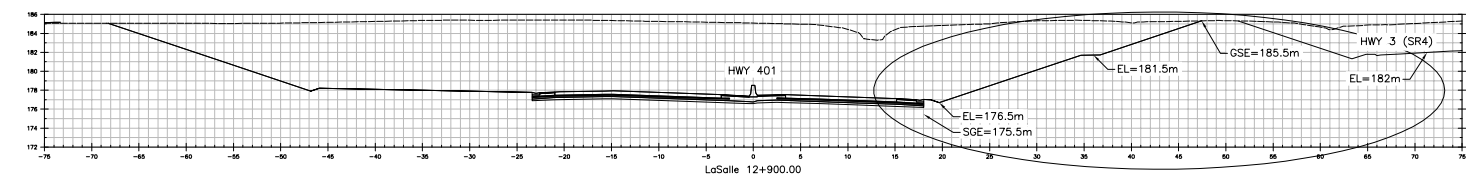
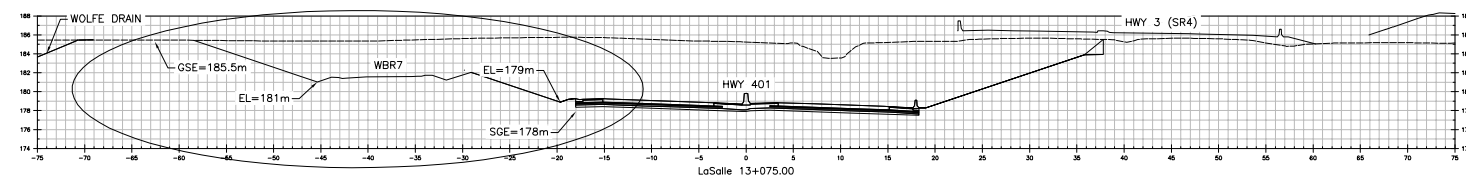
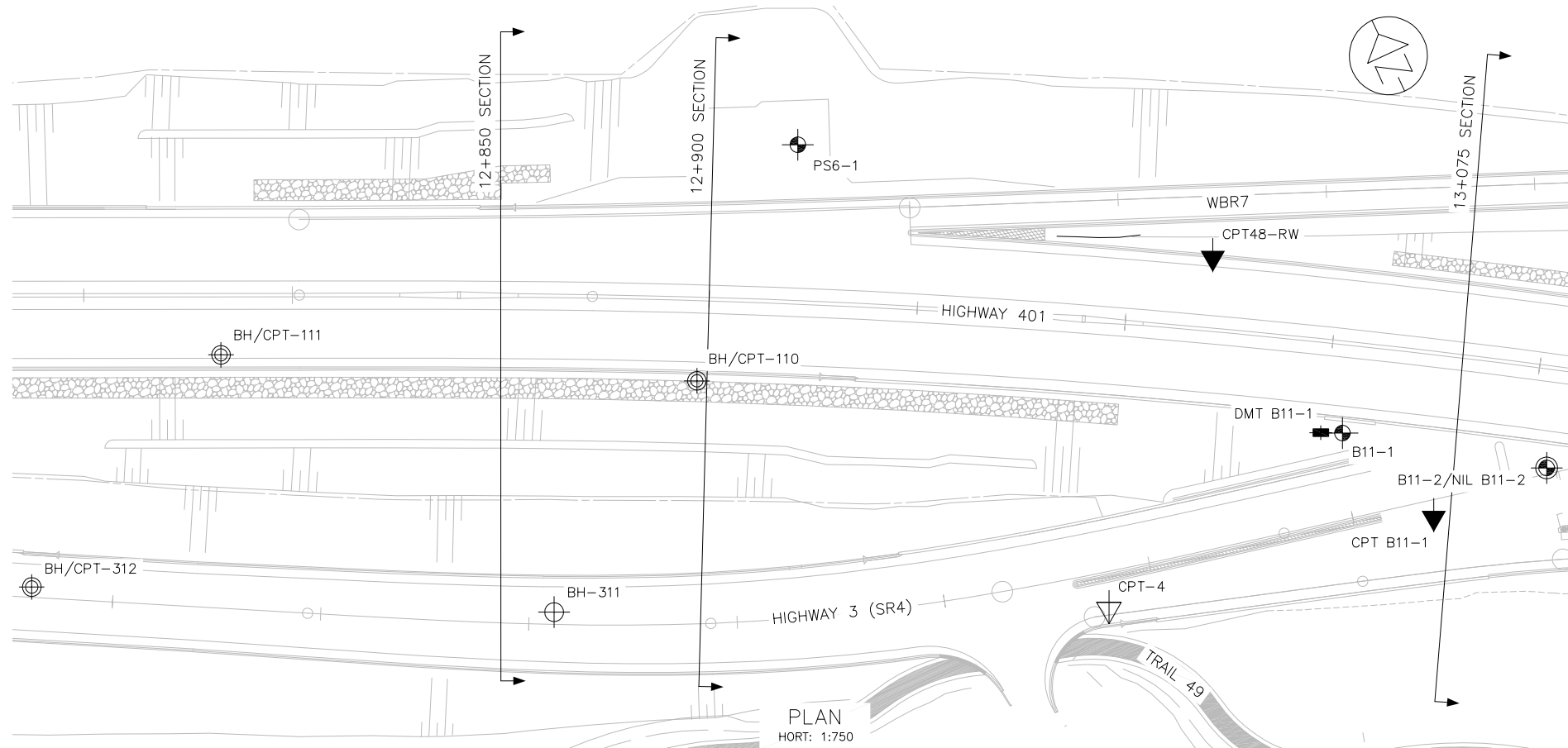
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VERT: 1:400



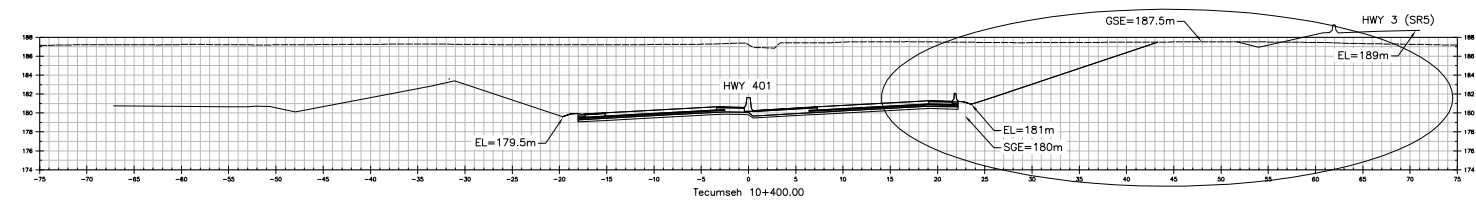
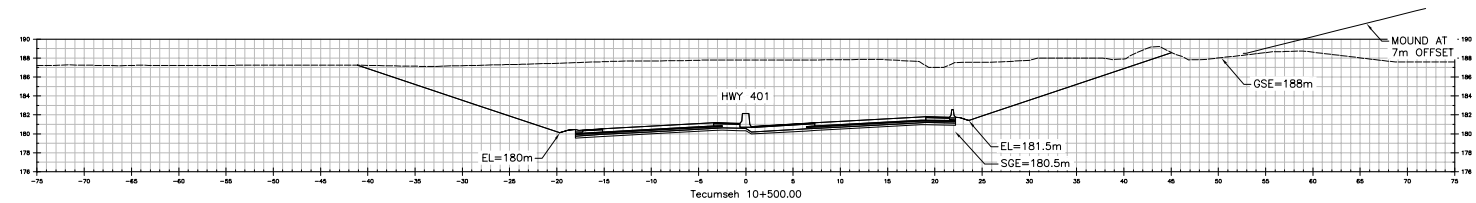
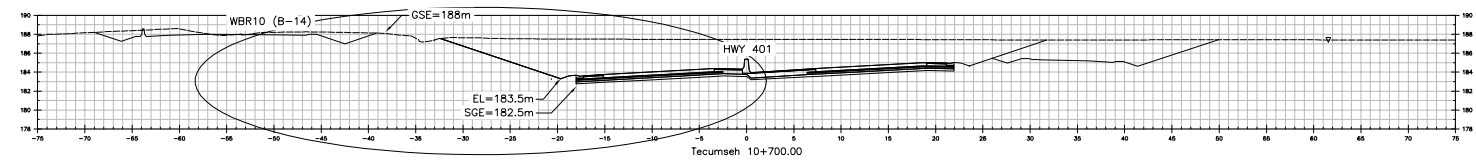
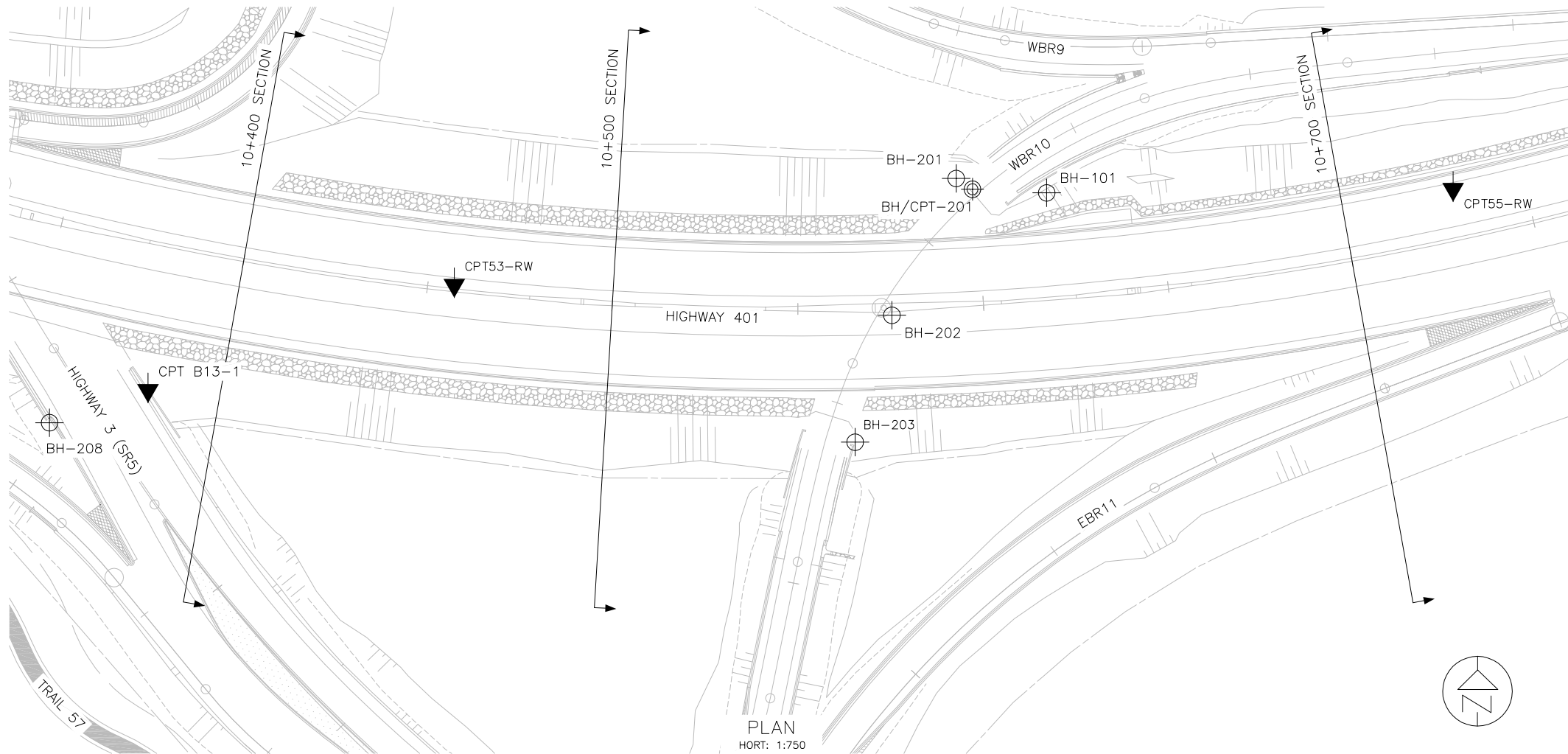
SECTIONS
HORT: 1:400
VERT: 1:400



SECTIONS
HORT: 1:400
VERT: 1:400



SECTIONS
HORT: 1:400
VERT: 1:400



SECTIONS
HORT: 1:400
VERT: 1:400

Appendix A Additional 2011 Geotechnical Investigations – Summary Tables, and Borehole, Nilcon Vane, CPT and DMT Logs

Summary Tables (Tables A.1 to A.20)

Table A.1: Test Holes from Sta. 14+700W to Sta. 10+400L (Soil Profile #9)

| Reference | Boreholes | Nilcon Vane Tests | CPT's | DMT's |
|--------------------|--------------|-------------------|-----------|----------|
| This Investigation | BH T6-1 | | | |
| | BH T6-2 | | | |
| | BH T6-3 | | | |
| | BH DMT T6-1 | | | DMT T6-1 |
| | BH TB 4-1 | | | |
| | BH TB 4-2 | | | |
| | BH PS3-1 | NIL PS3-1 | | |
| | BH 13-RW | | | |
| | BH CPT 34-RW | | CPT 34-RW | |
| | BH CPT 35-RW | | CPT 35-RW | |
| | BH CPT 36-RW | | CPT 36-RW | |
| | BH CPT 37-RW | | CPT 37-RW | |
| | BH CPT 38-RW | | CPT 38-RW | |
| | BH CPT 39-RW | | CPT 39-RW | |
| | BH NIL 12-RW | NIL 12-RW | | |
| Previous Studies | | | CPT-11 | |
| | BH 127 | | | |
| | BH / CPT-128 | | CPT-128 | |
| | BH 129 | NIL BH 129 | | |
| | BH / CPT-130 | | CPT-130 | |
| | BH 323 | | | |
| | BH / CPT-324 | | CPT-324 | |
| | BH 325 | | | |

Table A.2: Test Holes from Sta. 10+400L to Sta. 11+000L Soil Profile #10)

| Reference | Boreholes | Nilcon Vane Tests | CPT's | DMT's |
|--------------------|---------------|-------------------|----------|----------|
| This Investigation | BH B9-1 | NIL B9-1 | CPT B9-1 | DMT B9-1 |
| | BH B9-2 | | | |
| | BH B9-3 | | | |
| | BH / CPT B9-1 | | CPT B9-1 | |
| | BH / CPT B9-2 | | CPT B9-2 | |
| | BH / CPT B9-3 | | CPT B9-3 | |
| | BH B10-1 | | | |
| | BH T7-1 | | | |
| | BH T7-2 | NIL T7-2 | | |
| | BH T7-3 | | | |
| | BH / CPT T7-1 | | CPT T7-1 | |
| | BH / CPT T7-2 | | CPT T7-2 | |
| | BH / DMT T7-1 | | | DMT T7-1 |
| | BH TB 5-1 | | | |
| | BH TB 5-2 | | | |
| | BH TB 5-3 | | | |
| | BH TB 5-4 | | | |
| | BH PS3-1 | NIL PS3-1 | | |
| | BH DMT 5-RW | | | DMT 5-RW |
| Previous Studies | | | CPT-10 | |
| | BH 122 | NIL BH-122 | | |
| | BH / CPT 123 | | CPT 123 | |
| | BH / CPT 124 | | CPT 124 | |
| | BH 126 | | | |
| | BH 127 | | | |
| | BH / CPT 319 | | CPT 319 | |
| | BH / CPT 320 | | CPT 320 | |
| | BH 321 | | | |
| | BH / CPT 322 | | CPT 322 | |

Table A.3: Test Holes from Sta. 10+900L to Sta. 11+500L Soil Profile #11)

| Reference | Boreholes | Nilcon Vane Tests | CPT's | DMT's |
|--------------------|----------------|-------------------|-----------|-------|
| This Investigation | BH B10-2 | | | |
| | BH / NIL B10-3 | NIL B10-3 | | |
| | BH B10-4 | | | |
| | BH B10-5 | | | |
| | BH B10-6 | | | |
| | BH B10-7 | | | |
| | BH B10-8 | | | |
| | CPT / BH B10-2 | | CPT B10-2 | |
| | CPT / BH B10-3 | | CPT B10-3 | |
| | BH 13-RW | | | |
| | BH / CPT 40-RW | | CPT 40-RW | |
| | BH / CPT 41-RW | | CPT 41-RW | |
| | BH / CPT 42-RW | | CPT 42-RW | |
| Previous Studies | BH / NIL 119 | NIL 119 | | |
| | BH 119A | | | |
| | BH / CPT 120 | | CPT 120 | |
| | BH / CPT 121 | | CPT 121 | |
| | BH / CPT 317 | | CPT 317 | |
| | BH 318 | | | |
| | BH / CPT 319 | | CPT 319 | |
| | BH / CPT 320 | | CPT 320 | |

Table A.4: Test Holes from Sta. 11+500L to Sta. 12+300L (Soil Profile #12)

| Reference | Boreholes | Nilcon Vane Tests | CPT's | DMT's |
|--------------------|------------------|-------------------|-----------|----------|
| This Investigation | BH / NIL T8-1 | NIL T8-1 | | |
| | BH / CPT T8-1 | | CPT T8-1 | |
| | | | | DMT T8-1 |
| | BH / NIL T9-1 | NIL T9-1 | | |
| | BH / DMT T9-1 | | | DMT T9-1 |
| | BH / NIL T9-2 | NIL T9-2 | | |
| | BH TB6-1 | | | |
| | BH TB7-1 | | | |
| | BH TB7-2 | | | |
| | BH TB7-3 | | | |
| | BH TB7-4 | | | |
| | BH TB7A-1 | | | |
| | BH CV3-1 | | | |
| | BH CV4-1 | | | |
| | BH HG-MW-3 | | | |
| | BH 14-RW | | | |
| | BH 15-RW | | | |
| | BH / CPT 43-RW | | CPT 43-RW | |
| | BH / CPT 44-RW | | CPT 44-RW | |
| | BH / CPT 45-RW | | CPT 45-RW | |
| Previous Studies | | | CPT 6 | |
| | BH / NIL / CPT 7 | NIL 7 | CPT 7 | |
| | BH 115 | | | |
| | BH 115A | | | |
| | BH 116 | | | |
| | BH 116A | | | |
| | BH / CPT 117 | | CPT 117 | |
| | CH 118 | | | |
| | BH 118A | | | |
| | BH / CPT 313 | | CPT 313 | |
| | BH 314 | | | |
| | BH / CPT 315 | | CPT 315 | |
| | BH / CPT 316 | | CPT 316 | |

Table A.5: Test Holes from Sta. 12+000L to Sta. 12+800L (Soil Profile #13)

| Reference | Boreholes | Nilcon Vane Tests | CPT's | DMT's |
|--------------------|---------------|-------------------|-----------|-----------|
| This Investigation | BH-T9-1 | NIL T9-1 | | |
| | BH/NIL T9-2 | NIL T9-2 | | |
| | BH-T10-1 | | | |
| | BH-T10-2 | | | |
| | BH-DMT T9-1 | | | DMT T9-1 |
| | BH-DMT T10-1 | | | DMT T10-1 |
| | BH-15-RW | | | |
| | BH-TB7-1 | | | |
| | BH-TB7-2 | | | |
| | BH-TB7-3 | | | |
| | BH-TB7-4 | | | |
| | BH-TB7A-1 | | | |
| | BH-CV3-1 | | | |
| | BH-CPT T10-1 | | CPT-T10-1 | |
| | BH-CPT T10-2 | | CPT T10-2 | |
| | BH-CPT 45RW | | CPT-45RW | |
| | BH-CPT 46RW | | CPT-46-RW | |
| | BH-CPT 47RW | | CPT-47-RW | |
| Previous Studies | BH - 112/112A | NIL - BH-112 | | |
| | BH - 113/113A | | | |
| | BH - 115/115A | | | |
| | BH - 116/116A | | | |
| | BH/CPT- 111 | | CPT-111 | |
| | BH/CPT - 114 | | CPT-114 | |
| | BH/CPT- 312 | | CPT-312 | |
| | | | CPT-5 | |
| | | | CPT-6 | |

Table A.6: Test Holes from Sta. 12+800L to Sta. 13+400L (Soil Profile #14)

| Reference | Boreholes | Nilcon Vane Tests | CPT's | DMT's |
|--------------------|---------------|-------------------|-----------|-----------|
| This Investigation | BH-B11-1 | | | |
| | BH-B11-2 | NIL B11-2 | | |
| | BH-B11-3 | | | |
| | BH-B11-4 | | | |
| | BH-B11-5 | | | |
| | BH-B11-6 | NIL B11-6 | | |
| | BH-B11-7 | | | |
| | BH-DMT B11-1 | | | DMT B11-1 |
| | BH-PS6-1 | | | |
| | BH-TB8B-1 | | | |
| | BH-CPT B11-1 | | CPT-B11-1 | |
| | BH-CPT 48RW | | CPT-48RW | |
| | BH-CPT 49RW | | CPT-49-RW | |
| | BH-CPT 50RW | | CPT-50-RW | |
| Previous Studies | BH - 109/109A | | | |
| | BH - 308 | | | |
| | BH – 310 | | | |
| | BH – 311 | | | |
| | BH/CPT- 108 | | CPT-108 | |
| | BH/CPT - 110 | | CPT-110 | |
| | BH/CPT- 307 | | CPT-307 | |
| | BH/CPT-309 | | CPT-309 | |
| | | | CPT-4 | |

Table A.7: Test Holes from Sta. 13+400L to Sta. 10+100T (Soil Profile #15)

| Reference | Boreholes | Nilcon Vane Tests | CPT's | DMT's |
|--------------------|---------------|-------------------|-------------|-------------|
| This Investigation | BH - T11-1 | | | |
| | BH - T11-2 | | | |
| | BH - T11-3 | | | |
| | BH/NIL-T11-1 | NIL - T11-1 | | |
| | BH/NIL-T11-2 | NIL - T11-2 | | |
| | BH/NIL B12-1 | NIL - B12-1 | | |
| | BH-B12-2 | | | |
| | BH-B12-3 | | | |
| | BH - TB8-1 | | | |
| | BH - TB8-2 | | | |
| | BH - TB8-3 | | | |
| | BH - TB9-1 | | | |
| | BH - CV2-1 | | | |
| | BH - 16RW | | | |
| | BH/DMT 6-RW | | | DMT 6-RW |
| | | | | DMT - T11-1 |
| | BH/CP - B12-1 | | CPT - B12-1 | |
| | BH/CPT - 50RW | | CPT - 50RW | |
| | BH/CPT - 51RW | | CPT - 51RW | |
| | | | | |
| Previous Studies | BH - 104/104A | | | |
| | BH - 105/105A | NIL - BH-105 | | |
| | BH - 107/107A | | | |
| | BH - 301 | | | |
| | BH - 304 | | | |
| | BH - 305 | | | |
| | | | | |
| | BH/CPT - 106 | | CPT-106 | |
| | BH/CPT- 303 | | CPT-303 | |
| | BH/CPT- 306 | | CPT-306 | |
| | | | CPT-2 | |
| | | | CPT-3 | |
| | | | CPT-302 | |

Table A.8: Test Holes from Sta. 10+100T to Sta. 10+700T (Soil Profile #16)

| Reference | Boreholes | Nilcon Vane Tests | CPT's | DMT's |
|---------------------------------|----------------|-------------------|-----------|-------|
| Additional Investigation (2011) | PS7-1 | | | |
| | BH-17-RW | | | |
| | BH-18-RW | | | |
| | BH-19-RW | | | |
| | BH/CPT52-RW | | CPT52-RW | |
| | BH/CPT53-RW | | CPT53-RW | |
| | BH/CPT54-RW | | CPT54-RW | |
| | BH/CPT55-RW | | CPT55-RW | |
| | | | CPT B13-1 | |
| Previous Studies (2007-09) | BH - 1 | | | |
| | BH - 101/101A | | | |
| | BH - 102/102A | | | |
| | BH - 104/104A | | | |
| | BH -201/201A | | | |
| | BH -202 | | | |
| | BH -203 | | | |
| | BH -206 | | | |
| | BH -207 | | | |
| | BH -208/208A | | | |
| | BH /CPT-103 | | CPT103 | |
| | BH /CPT-201 | | CPT-201 | |
| | BH /CPT-206 | | CPT-206 | |
| | BH -1(40J2-40) | | | |
| | BH -1(40J2-40) | | | |
| | | | CPT-1 | |

Table A.9: Test Holes from Sta. 10+700T to Sta. 11+400T (Soil Profile #17)

| Reference | Boreholes | Nilcon Vane Tests | CPT's | DMT's |
|---------------------------------|----------------|-------------------|----------|-------|
| Additional Investigation (2011) | CV1-1 | NIL CV1-1 | | |
| | BH-24-RW | | | |
| | BH/CPT55-RW | | CPT55-RW | |
| Previous Studies (93-09) | BH -2(40J2-40) | | | |
| | BH -3(40J2-40) | | | |
| | BH -4(40J2-40) | | | |
| | BH-226N | | | |
| | BH-227N | | | |
| | BH-228N | | | |
| | BH-229N | | | |
| | BH-230N | | | |
| | BH-231N | | | |
| | BH-232N | | | |
| | BH-233N | | | |

Table A.10: Test Holes from Sta. 11+500T to Sta. 12+300T (Soil Profile #18)

| Reference | Boreholes | Nilcon Vane Tests | CPT's | DMT's |
|---------------------------------|--------------|-------------------|-----------|-------|
| Additional Investigation (2011) | BH/NIL B15-1 | NIL B15-1 | CPT B15-1 | |
| | BH-B15-2 | | CPT B15-2 | |
| | BH-B15-3 | | | |
| | BH-25-RW | | | |
| | BH-26-RW | | | |
| | BH-27-RW | | | |
| | BH-28-RW | | | |
| Previous Studies (2009) | BH – 216N | | | |
| | BH – 217N | | | |
| | BH – 218N | | | |
| | BH – 219N | | | |
| | BH – 220N | | | |
| | BH – 221N | | | |
| | BH – 222N | | | |
| | BH – 223N | | | |
| | BH – 224N | | | |
| | BH – 225N | | | |

**Table A.11: Overburden Thickness and Instrumentation in Boreholes
(Sta. 14+700W to 10+400L – Soil Profile #9)**

| Borehole | Location | Overburden Thickness, m | Test Name & Elevation | | | | | |
|------------------------|-----------------------|-------------------------|-----------------------|----------------|---------|---------------------|--------------|----|
| | | | Rock Coring | Nilcon Vane | S-Piez. | VWP | MHSG | IN |
| BH T6-1 (2011) | N4679627.0, E332067.4 | 33.7 | 147.2 to 145.4 | | 179.3 | 169.5, 148.9 | 169.6, 159.2 | |
| BH / NIL T6-2 (2011) | N4679659.9, E332018.8 | 32.6 | 148.3 to 146.1 | 176.9 to 152.9 | | 169.5, 162.6 | | |
| BH / NIL T6-3 (2011) | N4679577.5, E332079.1 | 34.7 | 146.9 to 145.3 | 176.6 to 154.6 | | | | |
| BH DMT T6-1 (2011) | N4679696.6, E332057.3 | 2.0 (BTEO) | | | | | | |
| TB 4-1 (2011) | N4679732.3, E332128.6 | 10.1 (BTEO) | | | | | | |
| TB 4-2 (2011) | N4679674.4, E332157.2 | 10.1 (BTEO) | | | | | | |
| BH PS3-1 (2011) | N4679421.9, E332245.3 | 33.5 | 147.8 to 145.5 | 176.3 to 153.8 | | 166.1, 158.4, 148.3 | 166.1, 158.4 | |
| BH 13-RW (2011) | N4679672.2, E331850.2 | 7.0 (BTEO) | | | | | | |
| BH / CPT 34-RW (2011) | N4679825.8, 331995.8 | 3.0 (BTEO) | | | | | | |
| BH / CPT 35-RW (2011) | N4679825.8, E331995.8 | 2.0 (BTEO) | | | | | | |
| BH / CPT 36-RW (2011) | N4679710.0, E331968.8 | 2.1 (BTEO) | | | | | | |
| BH / CPT 37-RW (2011) | N4679571.4, E332146.2 | N/A | | | | | | |
| BH / CPT 38-RW (2011) | N4679485.0, E332131.9 | 2.0 (BTEO) | | | | | | |
| BH / CPT 39-RW (2011) | N4679460.1, E332253.2 | 3.0 (BTEO) | | | | | | |
| BH / NIL 12-RW (2011) | N4679767.0, E332011.4 | 4.3 (BTEO) | | 176.2 to 154.2 | | | | |
| CPT-11 (Pre-bid) | N4679634, E332110 | N/A | | | | | | |
| BH 127 (Pre-bid) | N4679370.9, E332251.6 | 32.8 | 148.5 to 145.2 | | 145.2 | | | |
| BH 127A (Pre-bid) | N4679370.9, E332251.6 | 9.3 (BTEO) | | | 172.0 | | | |
| BH / CPT-128 (Pre-bid) | N4679491, E332201 | 1.8 (BTEO) | | | | | | |

| Borehole | Location | Overburden Thickness, m | Test Name & Elevation | | | | | |
|----------------------------|--------------------------|-------------------------------|-----------------------|----------------|-------------|-----|------|----|
| | | | Rock Coring | Nilcon Vane | S- Piez. | VWP | MHSG | IN |
| BH / NIL 129 (Pre-bid) | N4679625.1, E332109.7 | 32.9 | 147.9 to 143.8 | | 147.9 | | | |
| BH / NIL 129A (Pre-bid) | N4679625.1, E332109.7 | 9.6 (BTEO) | | | 172.1 | | | |
| BH / CPT-130 (Pre-bid) | N4679822, E332036 | 1.8 (BTEO) | | | | | | |
| BH 323 (Pre-bid) | N4679521.4, E332167.6 | 33.1 | 148.2 to 143.0 | | 143.0 | | | |
| BH / CPT-324 (Pre-bid) | N4679664.9, E332002.7 | 2.9 (BTEO) | | | | | | |
| BH 325 (Pre-bid) | N4679787.7, E331972.9 | 32.3 | 148.5 to 143.3 | | 143.3 | | | |

Legend: S-Piez. Standpipe piezometer
VWP Vibrating wire piezometer
MHSG Spider magnet heave/settlement gauge
IN Inclinator casing
BTEO Borehole Terminated Early in Overburden
N/A Not Available

**Table A.12: Overburden Thickness and Instrumentation in Boreholes
(Sta. 10+400L to 11+000L – Soil Profile #10)**

| Borehole | Location | Overburden Thickness, m | Test Name & Elevation | | | | | |
|----------------------|-----------------------|-------------------------|-----------------------|----------------|----------|---------------------|--------------|-------|
| | | | Rock Coring | Nilcon Vane | S- Piez. | VWP | MHSG | IN |
| BH B9-1 (2011) | N4679235.3, E332593.8 | 33.7 | 148.2 to 146.8 | 177.9 to 153.9 | | 172.8, 165.4 | | 146.8 |
| BH B9-2 (2011) | N4679218.5, E332622.8 | 34.0 | 148.4 to 145.6 | | | 172.0, 164.1, 150.4 | 171.7, 164.1 | |
| BH B9-3 (2011) | N4679140, E332677.6 | 34.1 | 149.4 to 147.8 | | | 168.3, 158.3 | | 147.8 |
| BH / CPT B9-1 (2011) | N4679241.3, E332574.3 | 4.3 (BTEO) | | | | | | |
| BH / CPT B9-2 (2011) | N4679138.6, E332696.0 | 2.7 (BTEO) | | | | | | |
| BH / CPT B9-3 (2011) | N4679189.2, E332678.6 | 2.9 (BTEO) | | | | | | |
| BH B10-1 (2011) | N4679159.2, E332754.5 | 33.2 | 149.4 to 140.3 | | | 173.6, 176.2 | 174.1, 168.0 | |
| BH T7-1 (2011) | N4679413.6, E332295.2 | 32.6 | 148.9 to 145.5 | 175.7 to 156.2 | | 172.4, 161.7 | 172.1, 161.7 | |
| BH T7-2 (2011) | N4679331.9, E332389.8 | 33.5 | 147.7 to 146.1 | | | 171.9, 161.1, 148.9 | | |
| BH T7-3 (2011) | N4679255.7, E332473.2 | 32.0 | 149.7 to 146.4 | | | | | |
| BH / CPT T7-1 (2011) | N4679345, E332316.9 | 1.2 (BTEO) | | | | | | |
| BH / CPT T7-2 (2011) | N4679276.9, E332433.5 | N/A | | | | | | |
| BH / DMT T7-1 (2011) | N4679368.7, E332355.7 | 1.2 (BTEO) | | | | | | |
| BH TB 5-1 (2011) | N4679286.0, E332362.0 | 10.1 (BTEO) | | | | | | |
| BH TB 5-2 (2011) | N4679261.2, E332400.9 | 10.1 (BTEO) | | | | | | |
| BH TB 5-3 (2011) | N4679239.6, E332429.4 | 10.1 (BTEO) | | | | | | |
| BH TB 5-4 (2011) | N4679221.9, E332459.0 | 10.1 (BTEO) | | | | | | |
| BH PS3-1 (2011) | N4679421.9, E332245.3 | 33.5 | 147.8 to 145.5 | 176.3 to 153.8 | | 166.1, 158.4, 148.3 | 166.1, 158.4 | |

| Borehole | Location | Overburden Thickness, m | Test Name & Elevation | | | | | |
|------------------------|-----------------------|-------------------------|-----------------------|---------------|--------------|-----|------|----|
| | | | Rock Coring | Nilcon Vane | S-Piez. | VWP | MHSG | IN |
| BH DMT 5-RW (2011) | N4679146.3, E332752.1 | 7.3 (BTEO) | | | | | | |
| CPT-10 (Pre-bid) | N4679264, E332533 | N/A | | | | | | |
| BH 122 (Pre-bid) | N4679265.4, E332537.9 | 35.1 | 146.6 to 141.3 | 175.9 – 162.9 | 143.2, 172.5 | | | |
| BH / CPT 123 (Pre-bid) | N4679309.7, E332536.3 | 2.1 (BTEO) | | | | | | |
| BH / CPT 124 (Pre-bid) | N4679354.6, E332455.0 | 1.8 (BTEO) | | | | | | |
| BH 126 (Pre-bid) | N4679237.2, E332335.5 | 8.2 (BTEO) | | | | | | |
| BH 127 (Pre-bid) | N4679370.9, E332251.6 | 32.8 | 148.5 to 145.2 | | 146.7, 172.0 | | | |
| BH / CPT 319 (Pre-bid) | N4679084.5, E332701.0 | 2.9 (BTEO) | | | | | | |
| BH / CPT 320 (Pre-bid) | N4679155.5, E332737.0 | 2.9 (BTEO) | | | | | | |
| BH 321 (Pre-bid) | N4679179.9, E332649.0 | 34.0 | 149.1 to 143.7 | | 143.7 | | | |
| BH / CPT 322 (Pre-bid) | N4679294.0, E332478.2 | 3.7 (BTEO) | | | | | | |

**Table A.13: Overburden Thickness and Instrumentation in Boreholes
(Sta. 10+900L to 11+500L – Soil Profile #11)**

| Borehole | Location | Overburden Thickness, m | Test Name & Elevation | | | | | |
|------------------------|------------------------|-------------------------|-----------------------|----------------|----------|---------------------|--------------|-------|
| | | | Rock Coring | Nilcon Vane | S- Piez. | VWP | MHSG | IN |
| BH B10-2 (2011) | N4679069.6, E332866.8 | 33.2 | 149.1 to 147.2 | | | | | |
| BH / NIL B10-3 (2011) | N4679083.2, E4679083.2 | 32.4 | 149.8 to 148.0 | 176.9 to 162.2 | | 172.1, 162.1, 149.9 | | |
| BH B10-4 (2011) | N4679068.8, E332867.5 | 32.7 | 149.7 to 147.0 | | | | | |
| BH B10-5 (2011) | N4679023.7, E332901.0 | 32.6 | 149.7 to 147.9 | | 147.9 | 170.7, 162.1 | | |
| BH B10-5-P32 (2011) | N4679021.0, E332901.4 | 32.3 | 150.0, 139.5 | | | 150.3 | | |
| BH B10-6 (2011) | N4678990.9, E332930.4 | 32.3 | 149.7 to 147.3 | | | | | |
| BH B10-7 (2011) | N4678977.5, E332967.8 | 32.6 | 149.6 to 146.5 | | | 173.8, 162.4 | 173.8, 162.4 | 146.5 |
| BH B10-8 (2011) | N4679118.4, E332824.1 | 33.1 | 149.3 to 147.0 | | | | | |
| CPT / BH B10-2 (2011) | N4679056.3, E332920.1 | 5.0 (BTEO) | | | | | | |
| CPT / BH B10-3 (2011) | N4678983.4, E332941.1 | 5.0 (BTEO) | | | | | | |
| BH 13-RW (2011) | N4679672.2, E331850.2 | 7.2 (BTEO) | | | | | | |
| BH / CPT 40-RW (2011) | N4679160.3, E332817.4 | 2.0 (BTEO) | | | | | | |
| BH / CPT 41-RW (2011) | N4679053.8, E332792.8 | 2.0 (BTEO) | | | | | | |
| BH / CPT 42-RW (2011) | N4678892.0, E333107.4 | 2.0 (BTEO) | | | | | | |
| BH / NIL 119 (Pre-bid) | N4678961.6, E333120.6 | 32.1 | 150.4 to 145.5 | 176.9 to 161.8 | 145.5 | | | |
| BH 119A (Pre-bid) | N4678961.6, E333120.6 | 9.0 (BTEO) | | | 173.5 | | | |
| BH / CPT 120 (Pre-bid) | N4678947.2, E333029.8 | 1.8 (BTEO) | | | | | | |
| BH / CPT 121 (Pre-bid) | N4679024.8, E333077.4 | 1.8 (BTEO) | | | | | | |
| BH / CPT 317 (Pre-bid) | N4679041.7, E332972.4 | 3.7 (BTEO) | | | | | | |

| Borehole | Location | Overburden Thickness, m | Test Name & Elevation | | | | | |
|---------------------------|--------------------------|-------------------------|-----------------------|-------------|---------|-----|------|----|
| | | | Rock Coring | Nilcon Vane | S-Piez. | VWP | MHSG | IN |
| BH 318 (Pre-bid) | N4679049.3, E332857.8 | 32.6 | 149.7 to 144.9 | | 144.9 | | | |
| BH / CPT 319 (Pre-bid) | N4679084.5, E332701.0 | 2.9 (BTEO) | | | | | | |
| BH / CPT 320 (Pre-bid) | N4679155.5, E332737.0 | 2.9 (BTEO) | | | | | | |

**Table A.14: Overburden Thickness and Instrumentation in Boreholes
(Sta. 11+500L to 12+000L – Soil Profile #12)**

| Borehole | Location | Overburden Thickness, m | Test Name & Elevation | | | | | |
|-----------------------|-----------------------|-------------------------|-----------------------|----------------|----------|--------------|--------------|-------|
| | | | Rock Coring | Nilcon Vane | S- Piez. | VWP | MHSG | IN |
| BH / NIL T8-1 (2011) | N4678789.7, E333364.5 | 29.8 | 150.2 to 148.1 | 175.8 to 161.8 | | 172.1, 162.2 | 171.3, 163.1 | 148.1 |
| BH / CPT T8-1 (2011) | N4678860.0, E333292.9 | 2.0 (BTEO) | | | | | | |
| DMT T8-1 (2011) | N4678820.9, E333382.7 | N/A | | | | | | |
| BH / NIL T9-1 (2011) | N4678634.8, E333768.4 | 32.3 | 151.7 to 149.1 | 177.0 to 162.5 | | 174.9, 151.4 | 174.9, 161.0 | 149.1 |
| BH / DMT T9-1 (2011) | N4678544.5, E333900.9 | 4.3 (BTEO) | | | | | | |
| BH / NIL T9-2 (2011) | N4678593.7, E333893.5 | 6.6 (BTEO) | | 177.0 to 162.0 | | | | |
| BH TB6-1 (2011) | N4678909.5, E333353.3 | 10.1 (BTEO) | | | | | | |
| BH TB7-1 (2011) | N4678671.8, E333831.4 | 10.1 (BTEO) | | | | | | |
| BH TB7-2 (2011) | N4678662.3, E333859.6 | 10.1 (BTEO) | | | | | | |
| BH TB7-3 (2011) | N4678644.6, E333911.0 | 10.1 (BTEO) | | | | | | |
| BH TB7-4 (2011) | N4678619.4, E333980.0 | 10.1 (BTEO) | | | | | | |
| BH TB7A-1 (2011) | N4678506.6, E334190.2 | 10.1 (BTEO) | | | | | | |
| BH CV3-1 (2011) | N4678630.0, E333861.1 | 9.8 (BTEO) | | | | | | |
| BH CV4-1 (2011) | N4678867.9, E333368.7 | 10.4 (BTEO) | | | | | | |
| BH HG-MW-3 (2011) | N4678886.8, E333395.5 | 3.5 (BTEO) | | | 179.5 | | | |
| BH 14-RW (2011) | N4678679.5, E333553.9 | 6.6 (BTEO) | | | | | | |
| BH 15-RW (2011) | N4678559.2, E333806.1 | 6.6 (BTEO) | | | | | | |
| BH / CPT 43-RW (2011) | N4678907.6, E333207.7 | 2.0 (BTEO) | | | | | | |
| BH / PT 44-RW (2011) | N4678777.5, E333464.6 | 3.0 (BTEO) | | | | | | |

| Borehole | Location | Overburden Thickness, m | Test Name & Elevation | | | | | |
|----------------------------|-----------------------|-------------------------|-----------------------|----------------|--------------|-----|------|----|
| | | | Rock Coring | Nilcon Vane | S-Piez. | VWP | MHSG | IN |
| BH / CPT 45-RW (2011) | N4678688.3, E333708.0 | 2.0 (BTEO) | | | | | | |
| CPT 6 (Pre-bid) | N4678621, E333844 | N/A | | | | | | |
| BH / NIL / CPT 7 (Pre-bid) | N4678848.0, E333325.0 | 33.2 | 150.0 to 145.3 | 177.1 to 164.1 | 167.2, 146.2 | | | |
| BH 115 (Pre-bid) | N4678585.3, E333911.1 | 32.3 | 151.5 to 146.2 | | 146.2 | | | |
| BH 115A (Pre-bid) | N4678585.3, E333911.1 | 19.8 (BTEO) | | | | | | |
| BH 116 (Pre-bid) | N4678634.3, E333722.5 | 32.0 | 151.7 to 147.6 | | 152.0 | | | |
| BH 116A (Pre-bid) | N4678634.3, E333722.5 | 9.1 (BTEO) | | | 174.5 | | | |
| BH / CPT 117 (Pre-bid) | N4678744.1, E333601.5 | 4.6 (BTEO) | | | | | | |
| BH 118 (Pre-bid) | N4678903.5, E333302.9 | 3.23 | 150.3 to 146.6 | | 146.6 | | | |
| BH 118A (Pre-bid) | N4678903.5, E333302.9 | 10.1 (BTEO) | | | 173.5 | | | |
| BH / CPT 313 (Pre-bid) | N4678688.4, E333599.7 | 3.7 (BTEO) | | | | | | |
| BH 314 (Pre-bid) | N4678750.8, E333462.3 | 33.1 | 150.0 to 144.8 | | 144.8 | | | |
| BH / CPT 315 (Pre-bid) | N4678800.6, E333406.3 | 4.4 (BTEO) | | | | | | |
| BH / CPT 316 (Pre-bid) | N4678831.3, E333265.0 | 3.7 (BTEO) | | | | | | |

**Table A.15: Overburden Thickness and Instrumentation in Boreholes
(Sta. 12+000L to Sta. 12+800L - Soil Profile #13)**

| Borehole | Location | Overburden Thickness, m | Test Name & Elevation | | | | | |
|---------------------|-----------------------|-------------------------|-----------------------|--------------|---------|---------------------|--------------|----|
| | | | Rock Coring | Nilcon Vane | S-Piez. | VWP | MHSG | IN |
| BH-T9-1 (2011) | N4678634.8, E333768.4 | 32.3 | 150.7 to 149.1 | 177, 162.5 | | 174.7, 151.3 | 174.9, 161.0 | |
| BH-T10-1 (2011) | N4678495.6, E334122.3 | 31.7 | 153.2 to 150.1 | | | 175.8, 163.3 | | |
| BH-T10-2 (2011) | N4678358.2, E334191.8 | 32.3 | 152.5 to 149 | | | 178.3, 166.2, 153.8 | | |
| BH-DMT T9-1 (2011) | N4678544.5, E333900.9 | 4.3(BTEO) | | | | | | |
| BH-DMT T10-1 (2011) | N4678412.4, E334151.5 | 5.0 (BTEO) | | | | | | |
| BH-15-RW (2011) | N4678559.2, E333806.1 | 6.6 (BTEO) | | | | | | |
| BH-TB7-1 (2011) | N4678671.8, E333831.4 | 10.1 (BTEO) | | | | | | |
| BH-TB7-2 (2011) | N4678662.3, E333859.6 | 10.1 (BTEO) | | | | | | |
| BH-TB7-3 (2011) | N4678644.6, E333911 | 10.1 (BTEO) | | | | | | |
| BH-TB7-4 (2011) | N4678619.4, E333980 | 10.1 (BTEO) | | | | | | |
| BH-TB7A-1 (2011) | N4678506.6, E334190.2 | 101 (BTEO) | | | | | | |
| BH-CV3-1 (2011) | N4678630, E333861.1 | 9.8 (BTEO) | | | | | | |
| BH-CPT T10-1 (2011) | N4678450.6, E334217.4 | 2.0 (BTEO) | | | | | | |
| BH-CPT T10-2 (2011) | N4678403.2, E334089.2 | 5.0 (BTEO) | | | | | | |
| BH-CPT 45RW (2011) | N4678688.3, E333708 | 3.0 (BTEO) | | | | | | |
| BH-CPT 46RW (2011) | N4678505, E333977.6 | 3.0 (BTEO) | | | | | | |
| BH-CPT 47RW (2011) | N4678440.3, E334300.2 | 2.0 (BTEO) | | | | | | |
| BH - 112 (Pre-Bid) | N4678413.3, E334221.3 | 32.5 | 152.1 to 146.4 | 177.8, 163.6 | 146.4 | | | |
| BH-112A | N4678413.3, | 9.1 (BTEO) | | | | 175.4 | | |

| Borehole | Location | Overburden Thickness, m | Test Name & Elevation | | | | | |
|---------------------------|--------------------------|-------------------------|-----------------------|-------------|---------|-------|------|----|
| | | | Rock Coring | Nilcon Vane | S-Piez. | VWP | MHSG | IN |
| (Pre-Bid) | E334221.3 | | | | | | | |
| BH – 113 (Pre-Bid) | N4678454.5, E334070.3 | 31.4 | 153.0 to 148.4 | | 152.9 | | | |
| BH-113A (Pre-Bid) | N4678454.5, E334070.3 | 9.6 (BTEO) | | | | 174.8 | | |
| BH – 115 (Pre-Bid) | N4678585.3, E333911.1 | 32.3 | 151.5 to 146.2 | | 146.2 | | | |
| BH-115A (Pre-Bid) | N4678585.3, E333911.1 | 19.8 (BTEO) | | | | 172.9 | | |
| BH – 116 (Pre-Bid) | N4678634.3, E33722.5 | 32.0 | 151.7 to 147.6 | | 151.9 | | | |
| BH116A (Pre-Bid) | N4678634.3, E33722.5 | 9.1 (BTEO) | | | | 174.6 | | |
| BH/CPT- 111 (Pre-Bid) | N4678351.4, E334347.6 | 1.8 (BTEO) | | | | | | |
| BH/CPT – 114 (Pre-Bid) | N4678526.7, E334018.6 | 1.8 | | | | | | |
| BH/CPT- 312 (Pre-Bid) | N4678319.9, E334283 | 4.6 | | | | | | |

**Table A.16: Overburden Thickness and Instrumentation in Boreholes
(Sta. 12+800L to Sta. 13+400L - Soil Profile #14)**

| Borehole | Location | Overburden Thickness, m | Test Name & Elevation | | | | | |
|---------------------|-----------------------|-------------------------|-----------------------|--------------|---------|---------------------|--------------|----|
| | | | Rock Coring | Nilcon Vane | S-Piez. | VWP | MHSG | IN |
| BH-B11-1 (2011) | N4678221.4, E334583.9 | 37.0 | 148.4 to 145.3 | | | 177.0, 167.8 | | SI |
| BH-B11-2 (2011) | N4678193.3, E334624.8 | 36.7 | 148.9 to 147.1 | 177.8, 163.6 | | | | |
| BH-B11-3 (2011) | N4678179.9, E334655.1 | 36.9 | 148.5 to 145.2 | | | | | |
| BH-B11-4 (2011) | N4678195.6, E334679.3 | 38.3 | 146.7 to 145.5 | | | 175.4, 167.1, 148.8 | 177.1, 166.7 | |
| BH-B11-5 (2011) | N4678173.2, E334733.7 | 37.4 | 148.0 to 145.8 | | | | | |
| BH-B11-6 (2011) | N4678153.5, E334772.4 | 37.1 | 148.7 to 147.2 | 180.9, 160.9 | | | | |
| BH-B11-7 (2011) | N4678125.8, E334810.2 | 35.4 | 150.0 to 146.9 | | | 175.9, 166.8 | | SI |
| BH-PS6-1 (2011) | N4678339.1, E334494.4 | 33.4 | | | | | | |
| BH-DMT B11-1 (2011) | N4678223.6, E334579.2 | 5.0 (BTEO) | | | | | | |
| BH-CPT B11-1 (2011) | N4678195.2, E334595.9 | 5.0 (BTEO) | | | | | | |
| BH-CPT 48-RW (2011) | N4678274.2, E334574.0 | 5.0 (BTEO) | | | | | | |
| BH-CPT 49-RW (2011) | N467807.8, E334725.3 | 5.0 (BTEO) | | | | | | |
| BH-CPT 50-RW (2011) | N4678085.0, E334889.4 | 5.0 (BTEO) | | | | | | |
| BH-TB8B-1 (2011) | N4678221.7, E334845.8 | 7.0 (BTEO) | | | | | | |
| BH - 109 (Pre-Bid) | N4678155.0, E334716.3 | 36.1 | 149.2 to 143.79 | | 149.6 | | | |
| BH-109A (Pre-Bid) | N4678155.0, E334716.3 | 9.8 (BTEO) | | | | 176.2 | | |
| BH - 308 (Pre-Bid) | N4678306.4, E334724.2 | 12.7 (BTEO) | | | | | | |
| BH-310 (Pre-Bid) | N4678398.7, E334482.8 | 12.7 (BTEO) | | | | | | |
| BH - 311 (Pre-Bid) | N4678261.8, E334394.2 | 34.3 | | | 145.9 | | | |

| Borehole | Location | Overburden Thickness, m | Test Name & Elevation | | | | | |
|--------------------------|--------------------------|-------------------------|-----------------------|-------------|---------|-----|------|----|
| | | | Rock Coring | Nilcon Vane | S-Piez. | VWP | MHSG | IN |
| BH/CPT 108 (Pre-Bid) | N4678051.6, E334826.8 | 4.6 (BTEO) | | | | | | |
| BH/CPT 110 (Pre-Bid) | N4678297.8, E334448.6 | 1.8 (BTEO) | | | | | | |
| BH/CPT 307 (Pre-Bid) | N4678157.2, E334805.1 | 4.6 (BTEO) | | | | | | |
| BH/CPT- 309 (Pre-Bid) | N4678204.8, E334657.1 | 3.7 (BTEO) | | | | | | |

**Table A.17: Overburden Thickness and Instrumentation in Boreholes
(Sta. 13+400L to Sta. 10+100T - Soil Profile #15)**

| Borehole | Location | Overburden Thickness, m | Test Name & Elevation | | | | | |
|----------------------|-------------------------|-------------------------|-----------------------|----------------|---------|--------------|--------------|-------|
| | | | Rock Coring | Nilcon Vane | S-Piez. | VWP | MHSG | IN |
| BH - T11-1 (2011) | N4677834.8, E335063.3 | 29.9 | 156.3 to 154.1 | | | | | |
| BH - T11-2 (2011) | N4677869.1, E335106.5 | 29.9 | 156.0 to 152.4 | | | 178.4, 167.7 | 177.9, 167.3 | |
| BH - T11-2A (2011) | N4677868.8, E335104.6 | 29.9 | N/A | | | 155.5 | | |
| BH - T11-3 (2011) | N4677952.8, E334928.6 | 31.5 | 154.3 to 148.3 | | | | 178.2, 167.2 | |
| BH - T11-3A (2011) | N4677951.9, E334926.0 | 18.3 (BTEO) | | | | 178.4, 167.7 | | |
| BH/NIL- T11-1 (2011) | N4677879.7, E335010.1 | 5.0 (BTEO) | | | | | | |
| BH/NIL- T11-2 (2011) | N4677870, E335107 | 5.0 (BTEO) | | 180.5 to 163.7 | | | | 155.4 |
| BH - B12-1 (2011) | N4677785.87, E335208.46 | 30.8 | 155.5 to 151.4 | 177.9 to 168.4 | | | | |
| BH - B12-2 (2011) | N4677743.4, E335208.9 | 30.1 | 156.3 to 154.7 | | | 167.3, 156.1 | 174.8, 167.3 | |
| BH - B12-2A (2011) | N4677739.14, E335208 | 11.4 (BTEO) | | | | 174.9 | | |
| BH - B12-3 (2011) | N4677709.64, E335206.52 | 30.2 | 156.0 to 152.9 | | | | | |
| BH - TB8-1 (2011) | N4678014.8, E335059.2 | 10.1 (BTEO) | | | | | | |
| BH - TB8-2 (2011) | N4677983.1, E335030.3 | 10.1 (BTEO) | | | | | | |
| BH - TB8-3 (2011) | N4677948, E334996.1 | 9.9 (BTEO) | | | | | | |
| BH - 16RW (2001) | N4677784.8, E335350.8 | 6.6 (BTEO) | | | | | | |
| BH/DMT - 6-RW (2011) | N4677767.57, E335236.78 | 5.0 (BTEO) | | | | | | |
| BH - TB9-1 (2011) | N4677654.25, E335225.50 | 6.6 (BTEO) | | | | | | |
| BH - CV2-1 (2001) | 4677918.5, E335208.6 | 10.2 (BTEO) | | | | | | |

| Borehole | Location | Overburden Thickness, m | Test Name & Elevation | | | | | |
|---------------------------|--------------------------|-------------------------------|-----------------------|----------------------|---------|-------|------|----|
| | | | Rock Coring | Nilcon Vane | S-Piez. | VWP | MHSG | IN |
| BH/CPT – 50RW (2011) | N4678085, E334889.4 | 5.0 (BTEO) | | | | | | |
| BH/CPT – 51RW | N4677746.8, E335290.7 | 5.0 (BTEO) | | | | | | |
| BH - 104 (Pre-Bid) | N4677630.3, E335263.1 | 30.5 | 155.7 to 151.5 | | 151.5 | | | |
| BH - 104A (Pre-Bid) | N4677630.3, E335263.1 | 10.1 (BTEO) | | | | 177.3 | | |
| BH - 105 (Pre-Bid) | N4677843.2, E335190.1 | 30.5 | 155.7 to 151.5 | 181.3 to 164.3 | 156.0 | | | |
| BH - 105A (Pre-Bid) | N4677843.2, E335190.1 | 9.1 (BTEO) | | | | 177.3 | | |
| BH - 107 (Pre-Bid) | N4677943.1, E334961.3 | 30.7 | 155.2 to 151.0 | | 151.5 | | | |
| BH - 107A (Pre-Bid) | N4677943.1, E334961.3 | 9.6 (BTEO) | | | | 176.8 | | |
| BH - 301 (Pre-Bid) | N4677712.2, E335231.1 | 30.4 | 155.8 to 150.3 | | | 150.3 | | |
| BH - 304 (Pre-Bid) | N4677998.2, E335082.8 | 8.1 (BTEO) | | | | | | |
| BH - 305 (Pre-Bid) | N4677923.8, E335038.1 | 30.8 | 155.1 to 150.0 | | | 150.0 | | |
| BH/CPT - 106 (Pre-Bid) | N4677846.1, E335039.9 | 1.8 (BTEO) | | | | | | |
| BH/CPT - 303 (Pre-Bid) | N4677840.3, E335113.1 | 3.7 (BTEO) | | | | | | |
| BH/CPT - 306 (Pre-Bid) | N4677911.6, E334964.7 | 3.7 (BTEO) | | | | | | |

**Table A.18: Overburden Thickness and Instrumentation in Boreholes
(Sta. 10+100T to Sta. 10+700T - Soil Profile #16)**

| Borehole | Location | Overburden Thickness, m | Test Name & Elevation | | | | | |
|---------------------|-----------------------|-------------------------|-----------------------|----------------|---------|-------|------|----|
| | | | Rock Coring | Nilcon Vane | S-Piez. | VWP | MHSG | IN |
| BH – PS-7 (2011) | N4677583.5, E335385.0 | 32.6 | 154.2 to 152.7 | | | | | |
| BH – 17-RW (2011) | N4677671.2, E335715.3 | 6.6 (BTEO) | | | | | | |
| BH – 18-RW (2011) | N4677390.7, E335692.7 | 6.6 (BTEO) | | | | | | |
| BH – 19-RW (2011) | N4677320.5, E335965.5 | 6.6 (BTEO) | | | | | | |
| BH/CPT 52-RW (2011) | N4677681.4, E335365.2 | 5.0 (BTEO) | | | | | | |
| BH/CPT 53-RW (2011) | N4677706.9, E335401.0 | 2.0 (BTEO) | | | | | | |
| BH/CPT 54-RW (2011) | N4677706.9, E335401.0 | 3.0 (BTEO) | | | | | | |
| BH/CPT 55-RW (2011) | N4677609.7, E335904.2 | 3.0 (BTEO) | | | | | | |
| BH-1 (Pre-Bid) | N4677738.0, E335500.0 | 32.5 | 154.2 to 148.8 | 181.6 to 163.6 | 150.1 | 175 | | |
| BH-101 (Pre-Bid) | N4677606.6, E335794.9 | 33.3 | 154.1 to 150.3 | | 150.3 | | | |
| BH-101A (Pre-Bid) | N4677606.6, E335794.9 | 9.1 (BTEO) | | | | 178.3 | | |
| BH-102 (Pre-Bid) | N4677631.8, E335512.7 | 32.0 | | | 154.4 | | | |
| BH-102A (Pre-Bid) | N4677631.8, E335512.7 | 9.1 (BTEO) | | | | 177.5 | | |
| BH-201 (Pre-Bid) | N4677610.4, E335770.5 | 32.9 | | | | | | |
| BH-201A (Pre-Bid) | N4677610.4, E335767.7 | 9.2 (BTEO) | | | | 178.5 | | |
| BH-202 (Pre-Bid) | N4677573.5, E335753.3 | 33.2 | | | 150.7 | | | |
| BH-203 (Pre-Bid) | N4677539.3, E335743.5 | 32.7 | | | | | | |
| BH-206 (Pre-Bid) | N4677645.8, E335462.4 | 32.3 | | | | | | |
| BH-207 (Pre-Bid) | N4677598.1, E335502.7 | 32.4 | | | 151.5 | | | |

| Borehole | Location | Overburden Thickness, m | Test Name & Elevation | | | | | |
|----------------------|-----------------------|-------------------------|-----------------------|-------------|---------|-------|------|----|
| | | | Rock Coring | Nilcon Vane | S-Piez. | VWP | MHSG | IN |
| BH-208 (Pre-Bid) | N4677543.9, E335528.5 | 9.8 | | | | 177.1 | | |
| BH-208A (Pre-Bid) | N4677543.9, E335526.5 | 32.3 | | | | | | |
| BH/CPT-103 (Pre-Bid) | N4677620.0, E335400.7 | 4.3 (BTEO) | | | | | | |
| BH-1(40J2-40) (1993) | N/A | 13.4 (BTEO) | | | | | | |
| BH-2(40J2-40) (1993) | N/A | 12.6 (BTEO) | | | | | | |

**Table A.19: Overburden Thickness and Instrumentation in Boreholes
(Sta. 10+700T to Sta. 11+400T - Soil Profile #17)**

| Borehole | Location | Overburden Thickness, m | Test Name & Elevation | | | | | |
|----------------------|-----------------------|-------------------------|-----------------------|--------------|---------|-----|------|----|
| | | | Rock Coring | Nilcon Vane | S-Piez. | VWP | MHSG | IN |
| BH – CV1-1 (2011) | N4677688.6, E336115.7 | 10.2 (BTEO) | | 178.5, 169.5 | | | | |
| BH – 24-RW (2011) | N4677912.6, E336374.9 | 6.6 (BTEO) | | | | | | |
| BH/CPT 55-RW (2011) | N4677609.7, E335904.2 | 3.0 (BTEO) | | | | | | |
| BH-226N (Pre-Bid) | N4677993.6, E336469.8 | 5.0 (BTEO) | | | | | | |
| BH-227N (Pre-Bid) | N4677951.7, E336423.8 | 5.0 (BTEO) | | | | | | |
| BH-228N (Pre-Bid) | N4677910.5, E336371.5 | 5.0 (BTEO) | | | | | | |
| BH-229N (Pre-Bid) | N4677866.4, E336321.6 | 5.0 (BTEO) | | | | | | |
| BH-230N (Pre-Bid) | N4677822.9, E336266.7 | 5.0 (BTEO) | | | | | | |
| BH-231N (Pre-Bid) | N4677775.6, E336213.6 | 5.0 (BTEO) | | | | | | |
| BH-232N (Pre-Bid) | N4677725.4, E336154.5 | 5.0 (BTEO) | | | | | | |
| BH-233N (Pre-Bid) | N4677688.5, E336099.5 | 5.0 (BTEO) | | | | | | |
| BH-2(40J2-40) (1993) | N/A | 12.6 (BTEO) | | | | | | |
| BH-3(40J2-40) (1993) | N/A | 15.7 (BTEO) | | | | | | |
| BH-4(40J2-40) (1993) | N/A | 13.4 (BTEO) | | | | | | |

**Table A.20: Overburden Thickness and Instrumentation in Boreholes
(Sta. 11+500T to Sta. 12+300T - Soil Profile #18)**

| Borehole | Location | Overburden Thickness, m | Test Name & Elevation | | | | | |
|---------------------|-----------------------|-------------------------|-----------------------|-------------|---------|-----|------|----|
| | | | Rock Coring | Nilcon Vane | S-Piez. | VWP | MHSG | IN |
| BH/NIL B15-1 (2011) | N4678489.2, E337046.3 | 46.4 | 151.7 to 150.1 | 185.5, 169 | | | | |
| BH-B15-2 (2011) | N4678473.5, E337073.8 | 39.9 | 151.2 to 149.0 | | | | | |
| BH-B15-3 (2011) | N4678467.7, E337107.6 | 46.7 | 151.4 to 149.9 | | | | | |
| BH-25-RW (2011) | N4677997.1, E336558.9 | 6.6 (BTEO) | | | | | | |
| BH-26-RW (2011) | N4678167.9, E336673.3 | 6.6 (BTEO) | | | | | | |
| BH-27-RW (2011) | N4678258.4, E336856.9 | 6.6 (BTEO) | | | | | | |
| BH-28-RW (2011) | N4678423.4, E336975.3 | 6.6 (BTEO) | | | | | | |
| BH – 215N (Pre-Bid) | N4678473.3, E337006.7 | 9.6 (BTEO) | | | | | | |
| BH – 216N (Pre-Bid) | N4678422.6, E336959.2 | 5.0 (BTEO) | | | | | | |
| BH – 217N (Pre-Bid) | N4678380.3, E336912.2 | 5.0 (BTEO) | | | | | | |
| BH – 218N (Pre-Bid) | N4678335.0, E336858.4 | 5.0 (BTEO) | | | | | | |
| BH – 219N (Pre-Bid) | N4678296.5, E336813.1 | 5.0 (BTEO) | | | | | | |
| BH – 220N (Pre-Bid) | N4678250.7, E336760.7 | 5.0 (BTEO) | | | | | | |
| BH – 221N (Pre-Bid) | N4678208.5, E336713.2 | 5.0 (BTEO) | | | | | | |
| BH – 222N (Pre-Bid) | N4678162.8, E336656.1 | 5.0 (BTEO) | | | | | | |
| BH – 223N (Pre-Bid) | N4678122.1, E336610.5 | 5.0 (BTEO) | | | | | | |
| BH – 224N (Pre-Bid) | N4678075.8, E336565.2 | 5.0 (BTEO) | | | | | | |
| BH – 225N (Pre-Bid) | N4678036.1, E336518.1 | 5.0 (BTEO) | | | | | | |

Borehole Logs (Soil Profiles #9 to #18)

Station 14+700W to Station 10+400L (Soil Profile #9)

RECORD OF BOREHOLE No T6-1/HG-MW-07

1 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679627.0, E332067.4 ORIGINATED BY DG
DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
DATUM Geodetic DATE Jul 14, 11 - Jul 15, 11 CHECKED BY MSO

| 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 (%) | | | | |
| 180.9 | Ground Surface | | | | | | | 20 40 60 80 100 | ○ UNCONFINED + FIELD VANE | ● POCKET PEN. × LAB VANE | W _P W W _L | | | | GR SA SI CL |
| 0.0 | FILL Sand and gravel, some silty clay clumps Brown | | 1 | SS | 10 | | 180 | | | | | | | | -Vibrating Wire Piezometers (VWP) installed in sampled borehole -Observation Well installed in adjacent boring at (coordinates) -Spider magnets (MG) installed in adjacent boring at (coordinates) |
| | | | 2 | SS | 6 | | 179 | | | | | | | | |
| | | | 3 | SS | 2 | | 178 | | | | | | | | |
| 177.9 | | | 4 | SS | 18 | | 177 | | | | | | | | |
| 3.0 | CLAYEY SILT Trace sand, trace fine-medium gravel Very stiff to very soft trace pink nodules Grey | | 5 | SS | 7 | | 176 | | | | | | | | 20.2 |
| | | | 6 | SS | 6 | | 175 | | | | | | | | |
| | | | 7 | SS | 6 | | 174 | | | | | | | | |
| | | | 8 | TW | PH | | 173 | | | | | | | | |
| | | | 9 | SS | 4 | | 172 | | | | | | | | 19.8 |
| | | | 10 | TW | PH | | 171 | | | | | | | | |
| | | | 11 | TW | PH | | 170 | | | | | | | | |
| | | | 12 | TW | PH | | 169 | | | | | | | | |
| | | | 13 | TW | PH | | 168 | | | | | | | | 19.6 |
| | | | | | | | 167 | | | | | | | | |
| | | | | | | | 166 | | | | | | | | |

Continued Next Page

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

2 OF 3

METRIC

| 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 C | | | |
|----------------|--|-------------|---------|------|------------|----------------------------|-----------------|---|--------------|---------------|------------------------------------|-------------------------------------|-----------------------------------|--|---|-------------------|--|--|
| ELEV. DEPTH | DESCRIPTION | STRAT. PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● POCKET PEN. | | | | | | × LAB VANE | | |
| | CLAYEY SILT Trace sand, trace fine-medium gravel Very stiff to very soft trace pink nodules Grey (continued) | | 14 | TW | PH | | 165 | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | | |
| | | | 15 | TW | PH | | 164 | | | | | | | | | | | |
| | | | | | | | 163 | | | | | | | | | | | |
| | | | 16 | TW | PH | | 162 | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | | |
| | | | 17 | TW | PH | | 161 | | | | | | | | | | | |
| | | | | | | | 160 | | | | | | | | | | | |
| | | | 18 | SS | 6 | | 159 | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | | |
| | | | 19 | TW | PH | | 158 | | | | | | | | | | | |
| | | | | | | | 157 | | | | | | | | | | | |
| | | | 20 | SS | 0 | | 156 | | | | | | | | | | | |
| | | | | | | | 155 | | | | | | | | | | | |
| | | | 21 | SS | 7 | | 154 | | | | | | | | | | | |
| | | | | | | | 153 | | | | | | | | | | | |
| | | | 22 | SS | 1 | | 152 | | | | | | | | | | | |
| | | | | | | | 151 | | | | | | | | | | | |

Continued Next Page

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No T6-2

1 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679626.8, E332066.1 ORIGINATED BY DG
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 18, 11 - Jul 19, 11 CHECKED BY MSO

| 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 | | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE | | | | | | | | | | ○ | | |
| | | | | | | | | ● POCKET PEN. × LAB VANE | | | | | | | | | | | | |
| 180.9 | Ground Surface | | | | | | | | | | | | | | | | | | | |
| 0.0 | 152mm TOPSOIL | | | | | | | | | | | | | | | | | | | |
| 0.2 | CLAYEY SILT Trace sand, trace fine-medium gravel, trace pink nodules Soft to very stiff Mottled brown and grey | | 1 | SS | 11 | | 180 | | | | | | | | | -Slope inclinometer casing installed in sampled borehole; Vibrating Wire Piezometers installed in adjacent boring at N4679627.0, E332068.1 Nilcon vane advanced adjacent to sampled borehole from 4 m to 28 m (El. 176.9 m to El. 152.9 m) -drove 50.8mm spoon to get sample for PIC -took 1.4 dioxane sample < | | | | |

Continued Next Page

+³, X³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No T6-2

3 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679626.8, E332066.1 ORIGINATED BY DG
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 18, 11 - Jul 19, 11 CHECKED BY MSO

| 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 | | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE | | | | | | | | | | ○ | | |
| | | | | | | | | ● POCKET PEN. × LAB VANE | | | | | | | | | | | | |
| | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | | | |
| 150.4 | | | | | | | | | | | | | | | | | | | | |
| 30.5 | SANDY SILT Trace fine-medium gravel, some clay Compact Grey Saturated | | 24 | SS | 20 | | | | | | | | | | | end of drilling July 18; continued July 19 | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| 148.3 | | | | | | | | | | | | | | | | | | | | |
| 32.6 | LIMESTONE Fine Grained, rubble, dense, grey -Rock/boulder fragments and pieces | | 25 | RC | | | | | | | | | | | | | | | | |
| 147.4 | | | | | | | | | | | | | | | | | | | | |
| 33.5 | LIMESTONE Fine Grained, laminated, porous, stylolites, grey | | 26 | RC | | | | | | | | | | | | RQD = 87% TCR = 100% SCR = 90% | | | | |
| 146.1 | | | | | | | | | | | | | | | | | | | | |
| 34.8 | END OF BOREHOLE No groundwater observed during drilling due to wash boring Water level measured in Piezometer VWP T6-2-P11 at elevation 180.8m on July 23, 2011 Water level measured in Piezometer VWP T6-2-P11 at elevation 180.5m on August 6, 2011 Water level measured in Piezometer VWP T6-2-P11 at elevation 180.6m on August 29, 2011 Water level measured in Piezometer VWP T6-2-P18 at elevation 180.6 on July 23, 2011 Water level measured in Piezometer VWP T6-2-P18 at elevation 180.3m on August 6, 2011 Water level measured in Piezometer VWP T6-2-P18 at elevation 180.4 on August 29, 2011 | | | | | | | | | | | | | | | | | | | |
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+ ³, × ³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No T6-3

1 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679577.5, E332079.1 ORIGINATED BY SD
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 14, 11 - Jul 19, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | PLASTIC LIMIT W _P | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|---|----|----|----|------------------------------------|-------------------------------------|-----------------------------------|-------------------------|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | |
| 181.6 | Ground Surface | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | |
| 0.0 | FILL Topsoil/sand/silt mixture, trace gravel and bricks, brown to black | | | | | | 181 | | | | | | | | | Nilcon vane advnced adjacent o sampled borehole from 5 m to 27 m depth (El. 176.6 m to El. 154.6 m) |
| 180.4 | | | 1 | SS | 7 | | | | | | | | | | | |
| 180.1 | CONCRETE | | | | | | 180 | | | | | | | | | |
| 1.5 | FINE SAND Trace gravel Brown | | 2 | SS | 6 | | | | | | | | | | | |
| 1.7 | CLAYEY SILT Some sand, trace gravel Soft to stiff Mottled brown and grey Trace pink nodules and moist to wet below approx. 4 m Brown | | | | | | 179 | | | | | | | | | |
| | | | 3 | SS | 16 | | | | | | | | | | | |
| | | | 4 | SS | 18 | | 178 | | | | | | | | | |
| | Grey | | 5 | SS | 12 | | 177 | | | | | | | | | |
| | | | 6 | SS | 8 | | 176 | | | | | | | | | |
| | | | 7 | SS | 5 | | 175 | | | | | | | | | |
| | | | 8 | TW | PH | | 174 | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | |
| | | | | VT | | | 172 | | | | | | | | | |
| | | | 9 | TW | PH | | 171 | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | |
| | -Sandy pocket | | 10 | SS | 3 | | 169 | | | | | | | | | |
| | | | | | | | 168 | | | | | | | | | |
| | | | | VT | | | 167 | | | | | | | | | |
| | | | 11 | TW | PH | | | | | | | | | | | |
| | | | 12 | TW | PH | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | |
| | | | 13 | TW | PH | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 168.6 | CLAYEY SILT Soft Trace black and pink inclusions, varved Grey | | | | | | | | | | | | | | | |
| 13.0 | | | | | | | | | | | | | | | | |

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No T6-3

2 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679577.5, E332079.1 ORIGINATED BY SD
DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
DATUM Geodetic DATE Jul 14, 11 - Jul 19, 11 CHECKED BY MSO

| 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 | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED ● POCKET PEN. | + FIELD VANE × LAB VANE | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | 20 40 60 80 100 | 20 40 60 80 100 | 10 20 30 | | | | | | | | | | |
| | CLAYEY SILT Soft Trace black and pink inclusions, varved Grey (continued) | | 14 | TW | PH | | 166 | | × | | | | | 18.6 | 1 14 44 41 | | | |
| | | | | VT | | | | | + | 3.6 | | | | | -end of augers at 15.2m -wash bore with NW casing | | | |
| | | | 15 | TW | PH | | 165 | | × | | | | | | 2 15 41 42 | | | |
| | | | | | | | 164 | | | | | | | | | | | |
| | CLAYEY SILT Some sand, trace gravel Soft to stiff Grey Moist to wet | | 16 | TW | PH | | 163 | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | | |
| | | | | | | | 162 | | | | | | | | | | | |
| | -Sand pocket, wet | | 17 | TW | PH | | 161 | | | × | | | | 21.8 | 3 25 47 25 | | | |
| | | | | | | | 160 | | | | | | | | | | | |
| | | | 18 | TW | PH | | 159 | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | | |
| | | | 19 | TW | PH | | 158 | | | × | | | | 21.1 | | | | |
| | | | | | | | 157 | | | | | | | | | | | |
| | | | 20 | SS | 9 | | 156 | | | | | | | | | | | |
| | | | | | | | 155 | | | | | | | | | | | |
| | -Some shale fragments | | 21 | SS | 9 | | 154 | | | | | | | | | | | |
| | | | | | | | 153 | | | | | | | | | | | |
| | | | 22 | SS | 5 | | 152 | | | | | | | | | | | |
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| | | | 23 | SS | 11 | | | | | | | | | | | | | |
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+ 3, X 3: Numbers refer to Sensitivity O 3% STRAIN AT FAILURE

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

METRIC

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No DMT T6-1

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679696.9, E332057.3 ORIGINATED BY LC
DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
DATUM Geodetic DATE Jul 14, 11 - Jul 14, 11 CHECKED BY MSO

| 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 | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● POCKET PEN. | | | | | | × LAB VANE | | |
| 181.2 | Ground Surface | | | | | | | | | | | | | | | | | |
| 0.0 | FILL Silty clay and topsoil Some sand, trace gravel | | | | | | | | | | | | | | | | | |
| 180.1 | | | 1A, B | SS | 11 | | | | | | | | | | | | | |
| 1.4 | ORGANIC CLAY Black | | | | | | | | | | | | | | | | | |
| 1.2 | SILTY CLAY Some sand, trace gravel Trace organic inclusion, weathered Mottled brown and grey | | 2 | SS | 8 | | | | | | | | | | | | | |
| 179.2 | END OF SAMPLED BOREHOLE Continued with DMT from 2.4 m to refusal at 23.4 m (El. 178.8 m to El. 157.8 m) | | | | | | | | | | | | | | | | | |
| 2.0 | Borehole dry on completion | | | | | | | | | | | | | | | | | |
| | | | | | | | 179 | | | | | | | | | | | |
| | | | | | | | 178 | | | | | | | | | | | |
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| | | | | | | | 171 | | | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | | | |
| | | | | | | | 169 | | | | | | | | | | | |
| | | | | | | | 168 | | | | | | | | | | | |
| | | | | | | | 167 | | | | | | | | | | | |

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

RECORD OF BOREHOLE No TB4-1

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679732.3, E332128.6 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 75 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 12, 11 - Jul 12, 11 CHECKED BY MSO

| 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 | | | | | | | | WATER CONTENT (%) | | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | | | | | | | | | | |
| | | | | | | | | ● POCKET PEN. | × LAB VANE | | | | | | | | | | |
| 180.7 | Ground Surface | | | | | | | | | | | | | | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | | | | |
| 180.3 | | | | | | | | | | | | | | | | | | | |
| 0.4 | CLAYEY SILT Some sand, trace gravel Firm to very stiff Mottled brown and grey | | 1 | SS | 10 | | | | | | | | | | | | | | |
| | -Some fissures, occasional silt seams Brown | | 2 | SS | 17 | | | | | | | | | | | | | | |
| | -Some sand pockets | | 3 | SS | 26 | | | | | | | | | | | | | | |
| | Grey | | 4 | SS | 15 | | | | | | | | | | | | | | |
| | | | 5 | SS | 9 | | | | | | | | | | | | | | |
| | | | 6 | SS | 7 | | | | | | | | | | | | | | |
| | | | 7 | SS | 5 | | | | | | | | | | | | | | |
| | | | 8 | SS | 5 | | | | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | | | |
| | | | 9 | SS | 3 | | | | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | | | |
| | | | 10 | SS | 1 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| 170.6 | END OF BOREHOLE | | | VT | | | | | | | | | | | | | | | |
| 10.1 | Borehole dry on completion | | | | | | | | | | | | | | | | | | |
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ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No TB4-2

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679674.4, E332157.2 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 75 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 7, 11 - Jul 7, 11 CHECKED BY MSO

| 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 | | | | | | | | | | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● POCKET PEN. | × LAB VANE | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | 20 | 40 | 60 | 80 | | | | | | 100 | 10 | 20 |
| 181.0 | Ground Surface | | | | | | | | | | | | | | | | | | |
| 0.0 | 25mm ASPHALT | | | | | | | | | | | | | | | | | | |
| 0.2 | FILL | | | | | | | | | | | | | | | | | | |
| 0.4 | Crushed Limestone | | | | | | | | | | | | | | | | | | |
| 0.5 | TOPSOIL | | | | | | | | | | | | | | | | | | |
| | CLAYEY SILT | | 1 | SS | 6 | | | | | | | | | ○ | | | | | |
| | Some sand, trace gravel | | | | | | | | | | | | | | | | | | |
| | Firm to stiff | | 2 | SS | 7 | | | | | | | | | ○ | | | | | |
| | Mottled brown and grey | | | | | | | | | | | | | | | | | | |
| | Trace to some pink nodules | | | | | | | | | | | | | | | | | | |
| | Brown | | 3 | SS | 16 | | | | | | | | | ○ | | | | | |
| | Grey | | 4A, B | SS | 12 | | | | | | | | | ○ | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | 5 | SS | 8 | | | | | | | | | ○ | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | 6 | SS | 7 | | | | | | | | | ○ | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | 7 | SS | 5 | | | | | | | | | ○ | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | 8 | SS | 6 | | | | | | | | | ○ | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | VT | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | 9 | SS | 4 | | | | | | | | | ○ | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | VT | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | 10 | SS | 4 | | | | | | | | | ○ | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | VT | | | | | | | | | | | | | | | | |
| 170.9 | END OF BOREHOLE | | | | | | | | | | | | | | | | | | |
| 10.1 | Borehole dry on completion | | | | | | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No PS3-1

1 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679421.9, E332245.3 ORIGINATED BY RL
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Aug 9, 11 - Aug 11, 11 CHECKED BY MSO

| 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 (%) | |
|---------------|--|------------|---------|------|------------|----------------------------|-----------------|---|----|-----|----|------------------------------------|-------------------------------------|-----------------------------------|--|---|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | WATER CONTENT (%) |
| 181.3 | Ground Surface | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | |
| 0.0 | ASPHALT | | | | | | 181 | | | | | | | | | | -Vibrating Wire Piezometers (VWP) and Spider Magents (MG) installed in borehole |
| | FILL Crushed limestone sand and gravel Grey | | | | | | | | | | | | | | | | |
| 180.5 | | | | | | | | | | | | | | | | | -Nilcon vane advanced adjacent to sampled borehole from 5 m to 27.5 m (El. 176.3 m to El. 153.8 m) |
| 0.8 180.2 | FILL Sand and gravel Brown | | 1 | SS | 10 | | | | | | | | | | | | |
| 1.1 | SAND Trace silt Loose Brown | | | | | | 180 | | | | | | | | | | |
| 179.5 | | | 2 | SS | 9 | | | | | | | | | | | | |
| 1.8 | CLAYEY SILT Trace sand Firm to very stiff Grey, trace pink nodules Wet | | | | | | 179 | | | | | | | | | | |
| | | | 3 | SS | 14 | | | | | | | | | | | | |
| | | | 4 | SS | 16 | | 178 | | | | | | | | | | |
| | | | 5 | SS | 17 | | | | | | | | | | | | |
| | | | 6 | SS | 16 | | 177 | | | | | | | | | | |
| | | | 7 | SS | 9 | | 176 | | | | | | | | | | |
| | | | 8 | TW | PH | | 175 | | | | | | | | | 21.4 | |
| | | | VT | | | | | | | | | | | | | | |
| | | | 9 | TW | PH | | 174 | | | 1.5 | | | | | | | |
| | | | | | | | 173 | | | | | | | | | | |
| | | | 10 | SS | 5 | | 172 | | | | | | | | | | |
| | | | VT | | | | | | | | | | | | | | |
| | | | 11 | TWtw | PH | | 171 | | | 1.9 | | | | | | | |
| | | | | | | | | | | | | | | | | 20.6 | |
| | | | | | | | 170 | | | | | | | | | | |
| | | | 12 | TW | PH | | 169 | | | | | | | | | | |
| | | | VT | | | | | | | | | | | | | | |
| | | | 13 | TW | PH | | 168 | | | 2.5 | | | | | | | |
| | | | | | | | | | | | | | | | | 21.4 | |
| | | | | | | | 167 | | | | | | | | | | |

Continued Next Page

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

METRIC

Continued Next Page

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No PS3-1

3 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679421.9, E332245.3 ORIGINATED BY RL
DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
DATUM Geodetic DATE Aug 9, 11 - Aug 11, 11 CHECKED BY MSO

| 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 | | | | | | |
| | | | | | | | | ● POCKET PEN. × LAB VANE | | | | | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | |
| | | | | | | | | | | PLASTIC LIMIT | NATURAL MOISTURE CONTENT | LIQUID LIMIT | | |
| | | | | | | | | | | W _p | W | W _L | | |
| | | | | | | | | | | WATER CONTENT (%) | | | | |
| | | | | | | | | | | 10 | 20 | 30 | | |
| 150.8 | | | | | | | 151 | | | | | | | |
| 30.5 | SILT Some clay, trace fine sand, some gravel, rock pieces Very dense Grey Wet | | 24 | SS | 77 | | 150 | | | | | | | |
| | | | | | | | 149 | | | | | | | |
| 148.8 | | | 25 | SS | | | 148 | | | | | | | |
| 32.5 | COBBLES AND BOULDERS | | 26 | RC | | | 147 | | | | | | | |
| 147.8 | | | | | | | 146 | | | | | | | |
| 33.5 | LIMESTONE Fine Grained, well crystallized, brown, vugs throughout filled with calcite mineralization | | 27 | RC | | | 145 | | | | | | | |
| | | | 28 | RC | | | 144 | | | | | | | |
| 145.9 | | | | | | | 143 | | | | | | | |
| 35.4 | LIMESTONE | | | | | | 142 | | | | | | | |
| 145.5 | Fine Grained, well crystallized, grey to white, black inclusions, dense | | | | | | 141 | | | | | | | |
| 35.8 | END OF BOREHOLE | | | | | | 140 | | | | | | | |
| | No groundwater observed during drilling due to wash boring | | | | | | 139 | | | | | | | |
| | Water level measured in Piezometer VWP PS3-1-P15 at elevation 179.5m on November 3, 2011 | | | | | | 138 | | | | | | | |
| | Water level measured in Piezometer VWP PS3-1-P15 at elevation 179.5m on November 11, 2011 | | | | | | 137 | | | | | | | |
| | Water level measured in Piezometer VWP PS3-1-P23 at elevation 176.8m on November 3, 2011 | | | | | | | | | | | | | |
| | Water level measured in Piezometer VWP PS3-1-P23 at elevation 176.7m on November 11, 2011 | | | | | | | | | | | | | |
| | Water level measured in Piezometer VWP PS3-1-P33 at elevation 176.8m on Nov 3, 2011 | | | | | | | | | | | | | |
| | Water level measured in Piezometer VWP PS3-1-P33 at elevation 176.8m on Nov. 11, 2011 | | | | | | | | | | | | | |

RQD = 0%
TCR = 20%
SCR = 1%
-VWP PS3-1-P33 installed at 32.9m below ground surface (El. 148.3 m)
RQD = 90%
TCR = 100%
SCR = 97%

RQD = 90%
TCR = 100%
SCR = 100%

RECORD OF BOREHOLE No BH13-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679672.2, E331850.2 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 75 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 7, 11 - Jul 7, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | | | |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|---|----|----|----|-----|------------------------------------|-------------------------------------|-----------------------------------|-------------------------|---|-------------------------------|----|----|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | | WATER CONTENT (%) | | | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE | | | | | | | | | | ● POCKET PEN. × LAB VANE | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| 180.8 | Ground Surface | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | GR | SA | SI | CL | | |
| 0.0 | TOPSOIL | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | | | | |
| 180.4 | | | | | | | | | | | | | | | | | | | | | | |
| 0.4 | CLAYEY SILT Some sand, trace gravel Trace organics to approx. 3 m Stiff to very stiff Mottled brown and grey Highly fissured Brown -Trace fissures Grey | | 1 | SS | 5 | | 180 | | | | | | | | | | | | | | | |
| | | | 2 | SS | 9 | | 179 | | | | | | | | | | | | | | | |
| | | | 3 | SS | 7 | | 178 | | | | | | | | | | | | | | | |
| | | | 4A, B | SS | 12 | | 177 | | | | | | | | | | | | | | | |
| | | | 5 | SS | 18 | | 176 | | | | | | | | | | | | | | | |
| | | | 6 | SS | 10 | | 175 | | | | | | | | | | | | | | | |
| | | | 7 | SS | 7 | | 174 | | | | | | | | | | | | | | | |
| | | | 8 | SS | 4 | | 173 | | | | | | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | | | | | | | |
| 173.8 | END OF BOREHOLE | | | VT | | | 171 | | | | | | | | | | | | | | | |
| 7.0 | Borehole dry on completion | | | | | | 170 | | | | | | | | | | | | | | | |
| | | | | | | | 169 | | | | | | | | | | | | | | | |
| | | | | | | | 168 | | | | | | | | | | | | | | | |
| | | | | | | | 167 | | | | | | | | | | | | | | | |
| | | | | | | | 166 | | | | | | | | | | | | | | | |

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

RECORD OF BOREHOLE No CPT34-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679865.7, E331958.2 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Aug 24, 11 - Aug 24, 11 CHECKED BY MSO

| 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 | | | | | | | | | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● POCKET PEN. × LAB VANE | | | | | | | | | | |
| | | | | | | | | 20 40 60 80 100 WATER CONTENT (%) | | | | | | | | | | |
| 181.3 | Ground Surface | | | | | | | | | | | | | | | | | |
| 0.0 | FILL | | 1 | SS | 2 | | 181 | | | | | | | | | | | |
| 180.9 | | | | | | | | | | | | | | | | | | |
| 0.4 | FILL | | | | | | | | | | | | | | | | | |
| 180.5 | Clayey silt, some clay, trace topsoil | | 2 | SS | 35 | | | | | | | | | | | | | |
| 0.8 | Brown | | | | | | | | | | | | | | | | | |
| 180.2 | FILL | | | | | | | | | | | | | | | | | |
| 1.1 | Crushed Limestone | | | | | | 180 | | | | | | | | | | | |
| | Grey | | | | | | | | | | | | | | | | | |
| | FINE SAND | | | | | | | | | | | | | | | | | |
| | Poorly graded, trace silt | | | | | | | | | | | | | | | | | |
| | Brown | | | | | | | | | | | | | | | | | |
| 178.9 | | | | | | | 179 | | | | | | | | | | | |
| 2.4 | CLAYEY SILT | | 3 | SS | 15 | | | | | | | | | | | | | |
| 178.3 | Some sand, trace gravel | | | | | | | | | | | | | | | | | |
| | Grey | | | | | | | | | | | | | | | | | |
| 3.0 | END OF SAMPLED BOREHOLE | | | | | | 178 | | | | | | | | | | | |
| | Continued with CPT to refusal | | | | | | | | | | | | | | | | | |
| | Borehole dry on completion | | | | | | | | | | | | | | | | | |
| | | | | | | | 177 | | | | | | | | | | | |
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| | | | | | | | 167 | | | | | | | | | | | |

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

RECORD OF BOREHOLE No CPT35-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679825.8, E331995.8 ORIGINATED BY TA
DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
DATUM Geodetic DATE Aug 24, 11 - Aug 24, 11 CHECKED BY MSO

| 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 | | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED | ● POCKET PEN. | + FIELD VANE | × LAB VANE | | | | | | | | | |
| 181.0 | Ground Surface | | | | | | | | | | | | | | | | | | | |
| 0.0 | FILL Topsoil | | | | | | | | | | | | | | | | | | | |
| 0.2 | FILL Crushed Limestone Grey | | 1 | SS | 4 | | | | | | | | | | | | | | | |
| 0.3 | FILL Sand and gravel Some silt (foundry sand), black | | | | | | | | | | | | | | | | | | | |
| | SILTY CLAY Some sand, trace gravel Mottled brown and grey | | 2 | SS | 5 | | | | | | | | | | | | | | | |
| 179.0 | END OF SAMPLED BOREHOLE Continue with CPT to refusal | | | | | | | | | | | | | | | | | | | |
| 2.0 | Borehole dry on completion | | | | | | | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No CPT36-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679710.0, E331968.8 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Aug 15, 11 - Aug 15, 11 CHECKED BY MSO

| 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 | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● POCKET PEN. | × LAB VANE | | | | | | | | |
| 180.5 | Ground Surface | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | | | | |
| 180.1 | | | | | | | | | | | | | | | | | | | |
| 0.4 | SILTY SAND Brown | | | | | | | | | | | | | | | | | | |
| 179.4 | | | 1A, B | SS | 6 | | | | | | | | | | | | | | |
| 1.1 | SILTY CLAY Some sand, trace gravel, trace fissures Mottled brown and grey Brown | | | | | | | | | | | | | | | | | | |
| 178.4 | | | 2 | SS | 16 | | | | | | | | | | | | | | |
| 2.1 | END OF SAMPLED BOREHOLE Continued with CPT to refusal Borehole dry on completion | | | | | | | | | | | | | | | | | | |
| | | | | | | | 178 | | | | | | | | | | | | |
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+ ³, × ³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No CPT37-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679571.4, E332146.2 ORIGINATED BY TA
DIST HWY WEP BOREHOLE TYPE CME 75 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
DATUM Geodetic DATE Jul 15, 11 - Jul 15, 11 CHECKED BY MSO

| 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 | | | | | | | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● POCKET PEN. × LAB VANE | | | | | | | | |
| 180.9 | Ground Surface | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | |
| 0.0 | FILL Crushed Limestone Grey | | | | | | | | | | | | | | | |
| 180.4 | TOPSOIL SILTY CLAY Some sand, trace gravel Mottled brown and grey | | 1 | SS | 6 | | | | | | | | | | | -faint hydrocarbon odour |
| 0.5 | | | | | | | | | | | | | | | | |
| 0.6 | Brown | | 2 | SS | 9 | | | | | | | | | | | |
| | | | 3 | SS | 14 | | | | | | | | | | | |
| | | | 4 | SS | 13 | | | | | | | | | | | |
| 177.4 | END OF SAMPLED BOREHOLE Continued with CPT from 3.3 m to refusal | | | | | | | | | | | | | | | |
| 3.5 | Borehole dry on completion | | | | | | | | | | | | | | | |
| | | | | | | | 177 | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | |
| | | | | | | | 175 | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No CPT38-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679485.0, E332131.9 ORIGINATED BY _____
 DIST _____ HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 27, 11 - Jul 27, 11 CHECKED BY MSO

| 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 | | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● POCKET PEN. × LAB VANE | | | | | | | | | | | | |
| 181.2 | Ground Surface | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | | |
| 0.0 | FILL Crushed Limestone Grey |  | | | | | 181 | | | | | | | | | | | | | |
| 180.6 | | | | | | | | | | | | | | | | | | | | |
| 0.6 | TOPSOIL |  | | | | | | | | | | | | | | | | | | |
| 0.8 | FINE SAND |  | | | | | | | | | | | | | | | | | | |
| 180.1 | Poorly graded Brown | | 1A, B | SS | 11 | | | | | | | | | | | | | | | |
| 1.1 | SILTY CLAY Some sand, trace gravel Mottled brown and grey Brown |  | | | | | 180 | | | | | | | | | | | | | |
| 179.2 | | | 2 | SS | 13 | | | | | | | | | | | | | | | |
| 2.0 | END OF SAMPLED BOREHOLE Continued with CPT to refusal Borehole dry on completion | | | | | | 179 | | | | | | | | | | | | | |
| | | | | | | | 178 | | | | | | | | | | | | | |
| | | | | | | | 177 | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No CPT39-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679460.1, E332253.2 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 28, 11 - Jul 28, 11 CHECKED BY MSO

| 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 | | | | | | | |
| | | | | | | | | ○ UNCONFINED | + | FIELD VANE | | | | | |
| | | | | | | | | ● POCKET PEN. | × | LAB VANE | | | | | |
| 181.4 | Ground Surface | | | | | | | | | | | | | | |
| 0.0 | ASPHALT | | | | | | | | | | | | | | |
| 0.1 | CONCRETE | | | | | | | | | | | | | | |
| 181.0 | FINE SAND | | | | | | | | | | | | | | |
| 0.4 | Poorly graded Brown | | 1 | SS | 11 | ▽ | 181 | | | | | | | | |
| | | | 2 | SS | 6 | | 180 | | | | | | | | |
| 179.9 | | | | | | | 179 | | | | | | | | |
| 1.5 | CLAYEY SILT | | | | | | | | | | | | | | |
| | Some sand, trace gravel Grey | | | | | | | | | | | | | | |
| 178.4 | | | 3 | SS | 14 | | | | | | | | | | |
| 3.0 | END OF SAMPLED BOREHOLE | | | | | | 178 | | | | | | | | |
| | Continued with CPT to refusal | | | | | | 177 | | | | | | | | |
| | | | | | | | 176 | | | | | | | | |
| | | | | | | | 175 | | | | | | | | |
| | | | | | | | 174 | | | | | | | | |
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| | | | | | | | 167 | | | | | | | | |

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

RECORD OF BOREHOLE No NIL12-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679767.0, E332011.4 ORIGINATED BY TR
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Aug 24, 11 - Aug 24, 11 CHECKED BY MSO

| 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 | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED ● POCKET PEN. | + FIELD VANE × LAB VANE | | | | | | | | | |
| 181.2 | Ground Surface | | | | | | | | | | | | | | | | | |
| 0.0 | TOPSOIL Sandy Black | | | | | | | | | | | | | | | | | |
| 180.4 | SILTY SAND Trace rootlets Brown | | 1 | SS | 4 | | | | | | | | | | | | | |
| 0.8 | CLAYEY SILT Some sand, trace gravel, trace rootlets Mottled brown and grey | | 2 | SS | 14 | | | | | | | | | | | | | |
| 0.9 | | | | | | | | | | | | | | | | | | |
| | | | 3 | SS | 18 | | | | | | | | | | | | | |
| | | | 4 | SS | 17 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 5 | SS | 9 | | | | | | | | | | | | | |
| 176.9 | END OF SAMPLED BOREHOLE Continued with Nilcon Vane from 5.0 m to refusal Borehole dry on completion | | | | | | | | | | | | | | | | | |
| 4.3 | | | | | | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF NILCON VANE TEST NIL PS3-1

Project : Windsor-Essex Parkway

Test Date: 8/26/2011

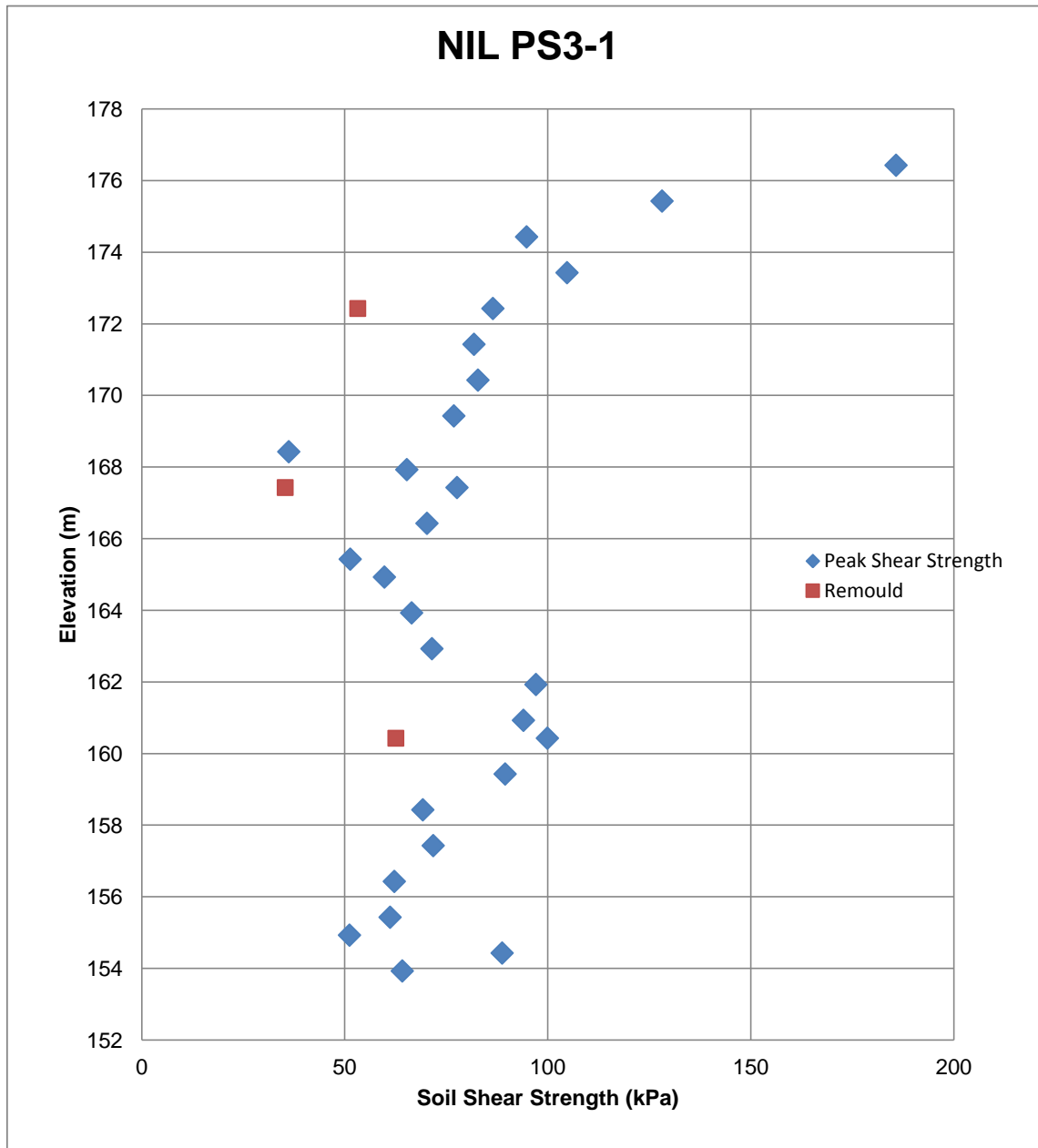
Sheet 1 of 1

Location: N4679419.4; E332251.2

Predrill Depth : 5.0 m

Datum Geodetic

Ground Surface Elevation: 181.4 m



Operator: SD

Checked: DD

RECORD OF NILCON VANE TEST NIL 12-RW

Project : Windsor-Essex Parkway

Test Date: 8/24/2011

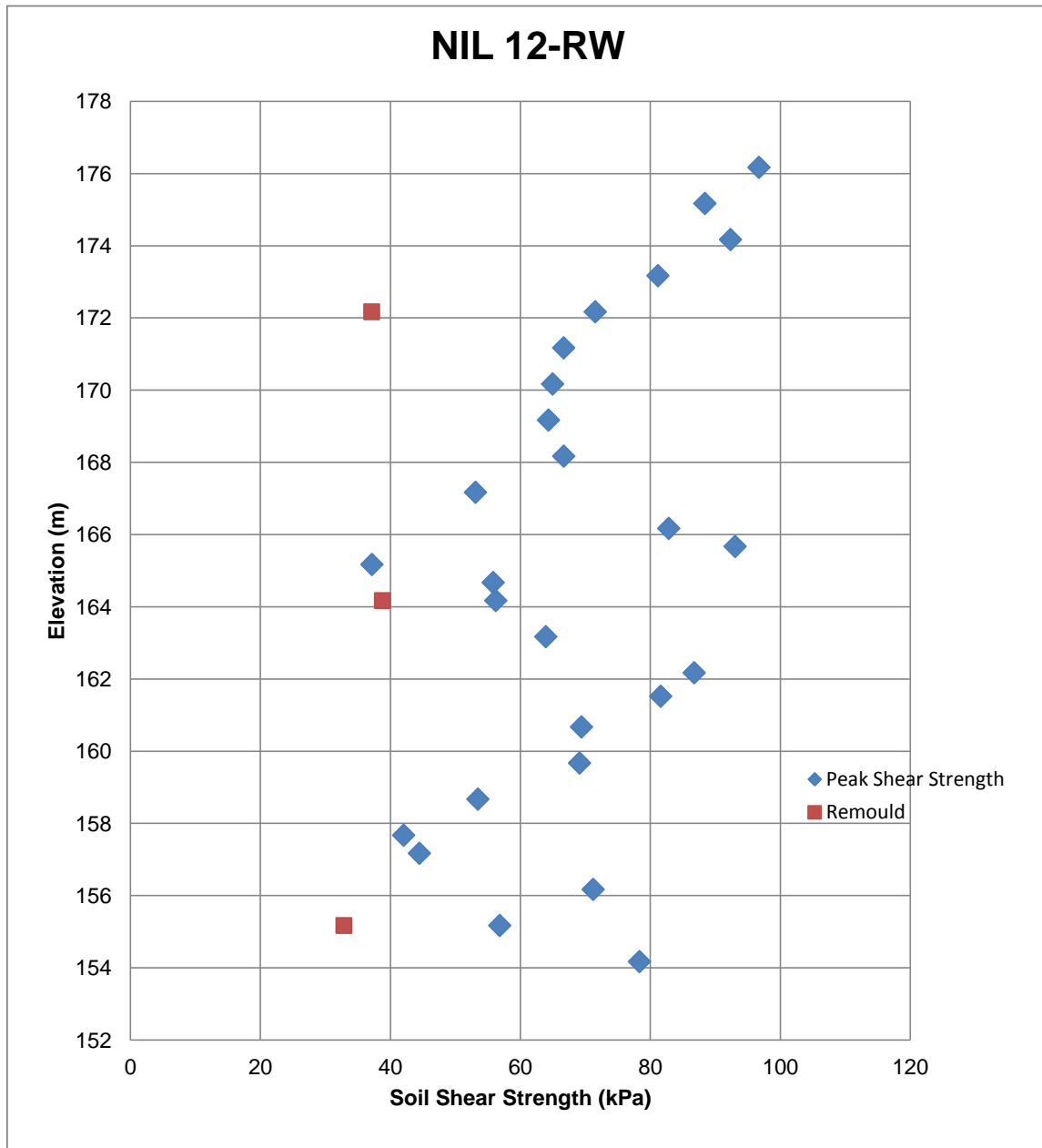
Sheet 1 of 1

Location: N4679767.0; E332011.4

Predrill Depth : 4.3 m

Datum Geodetic

Ground Surface Elevation: 181.2 m



Operator: TR

Checked: DD

RECORD OF CONE PENETRATION TEST CPT 34-RW

METRIC

PROJECT Windsor-Essex Parkway

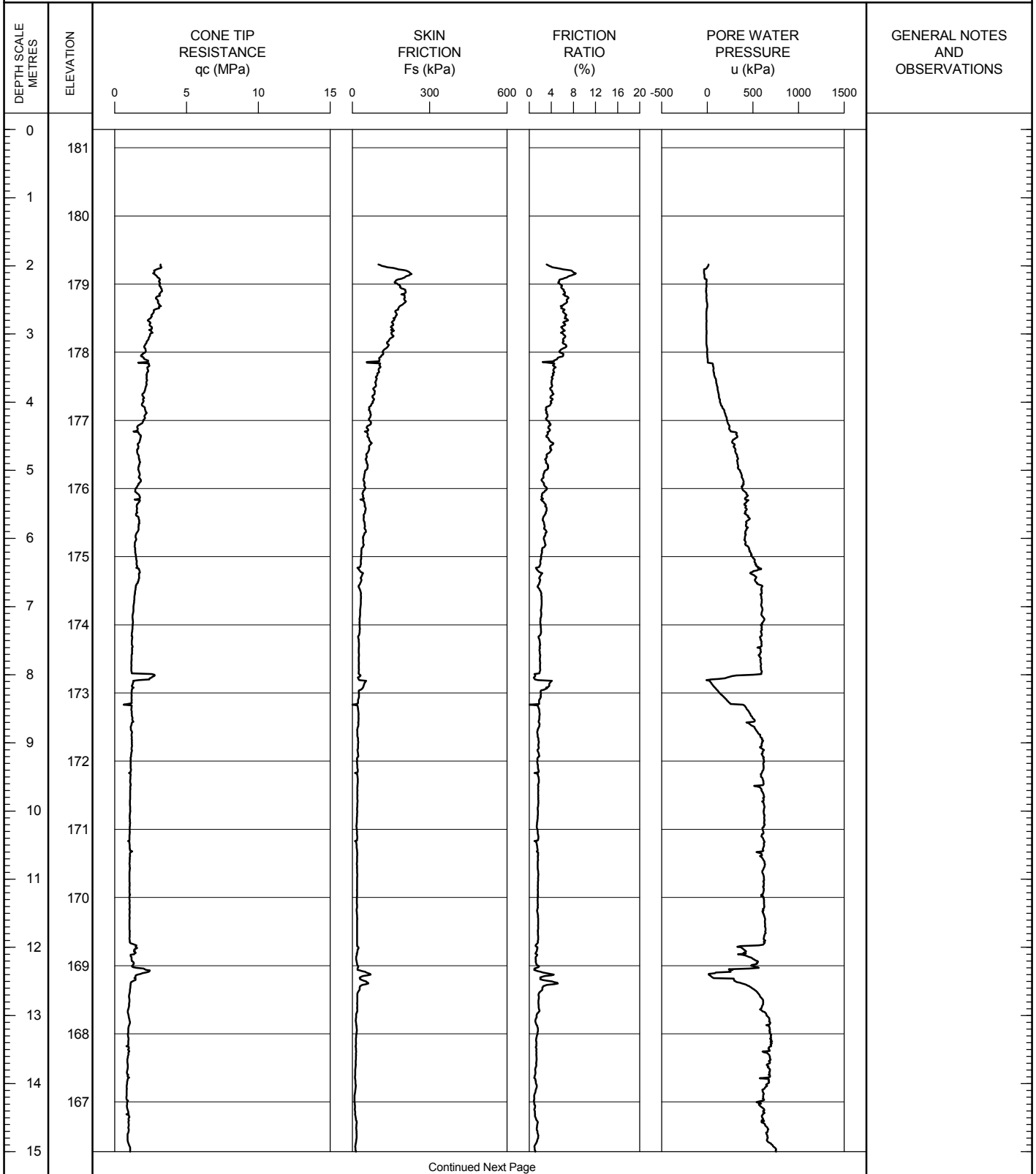
TEST DATE 8/23/2011 - 8/23/2011

SHEET 1 OF 3

LOCATION N4679865.7; E331958.2

DATUM Geodetic

GROUND SURFACE ELEVATION: 181.3 PREDRILL DEPTH: 1.98 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



WEF CPT LOG CPT-RW/GPJ ONTARIO MOT GDT 06/01/12

OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 34-RW

METRIC

PROJECT Windsor-Essex Parkway

TEST DATE 8/23/2011 - 8/23/2011

SHEET 2 OF 3

LOCATION N4679865.7; E331958.2

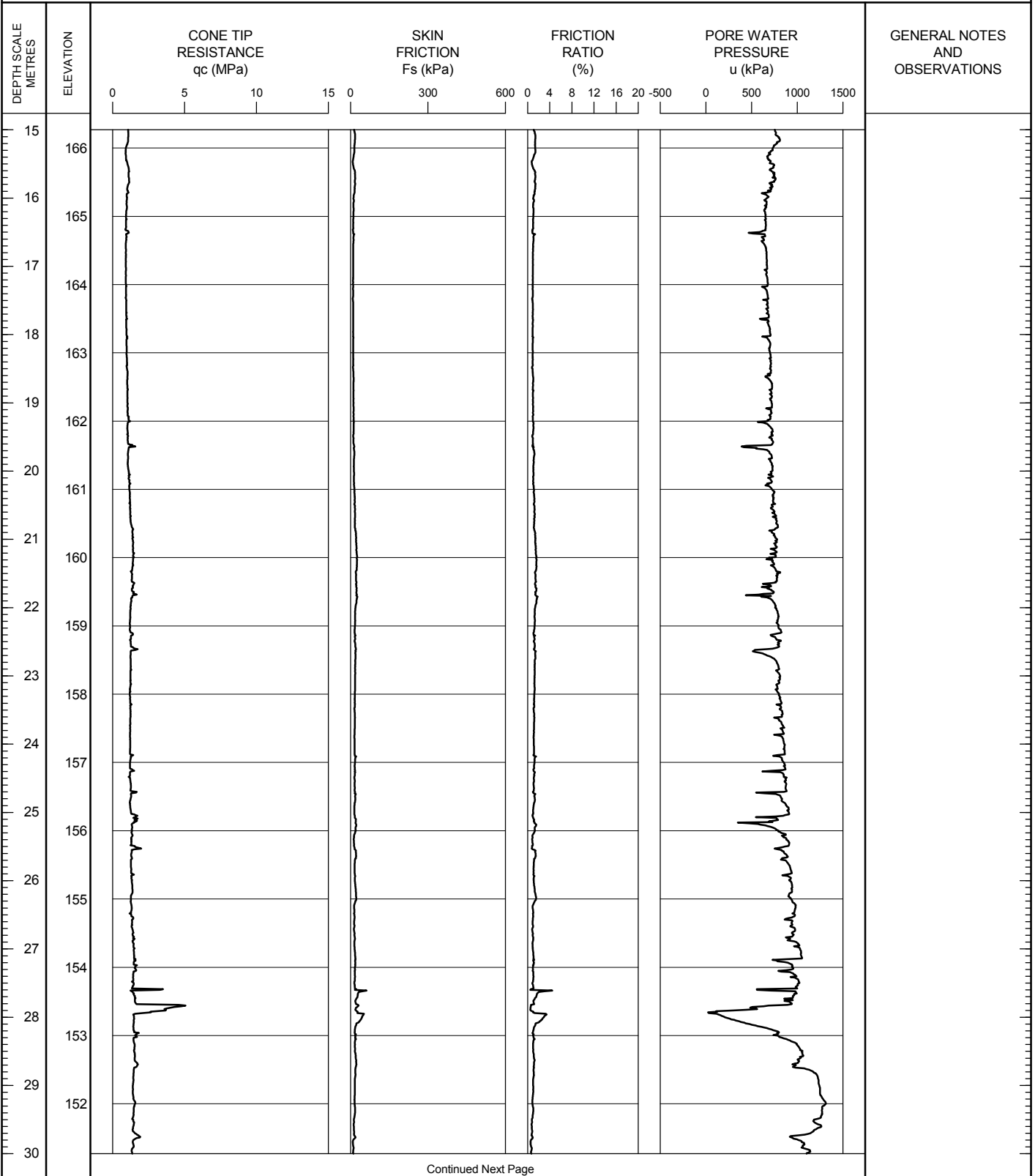
DATUM Geodetic

GROUND SURFACE ELEVATION: 181.3

PREDRILL DEPTH: 1.98

CORRECTION FACTOR A: 0.8

CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 34-RW

METRIC

PROJECT Windsor-Essex Parkway

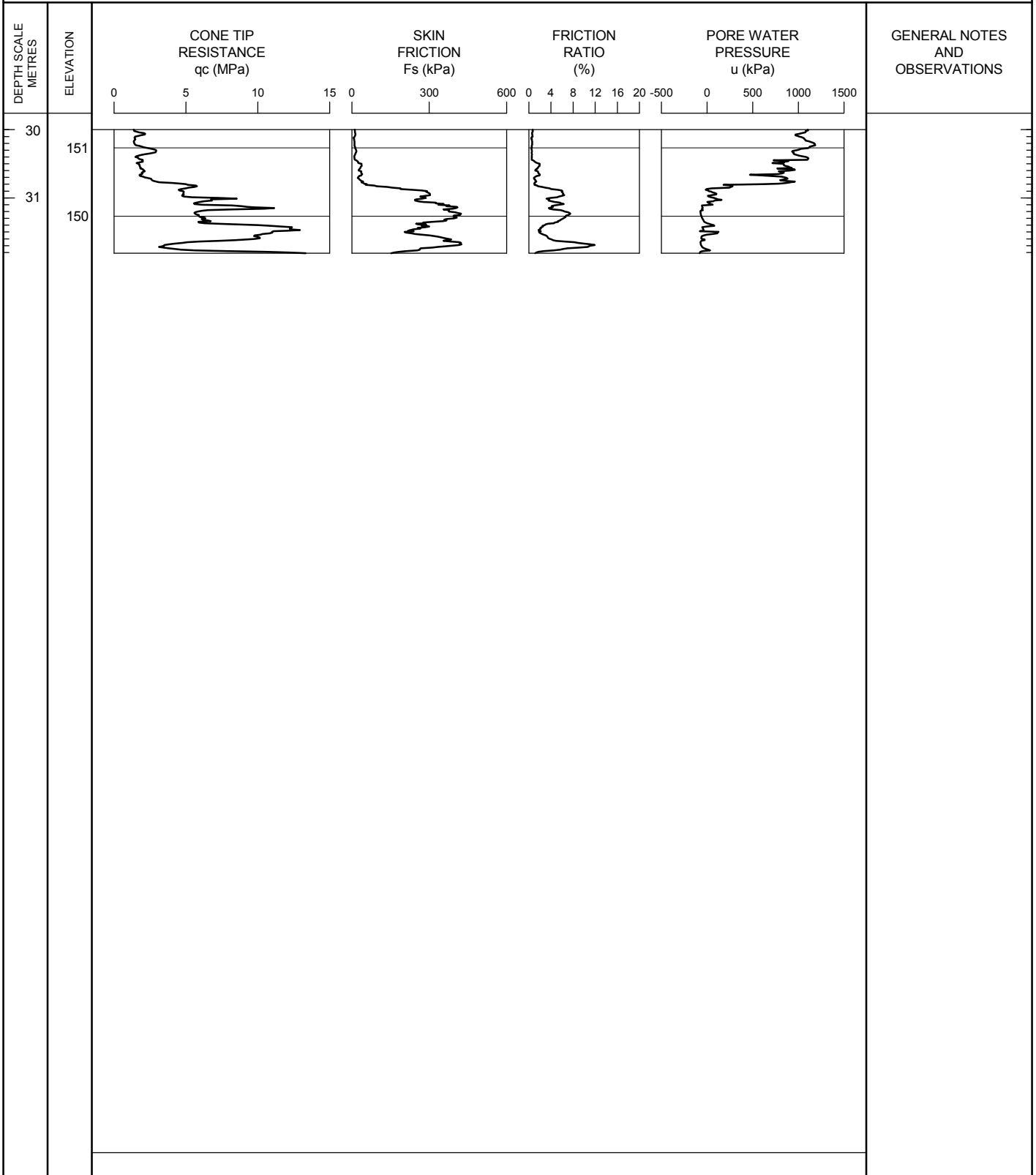
TEST DATE 8/23/2011 - 8/23/2011

SHEET 3 OF 3

LOCATION N4679865.7; E331958.2

DATUM Geodetic

GROUND SURFACE ELEVATION: 181.3 PREDRILL DEPTH: 1.98 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 35-RW

METRIC

PROJECT Windsor-Essex Parkway

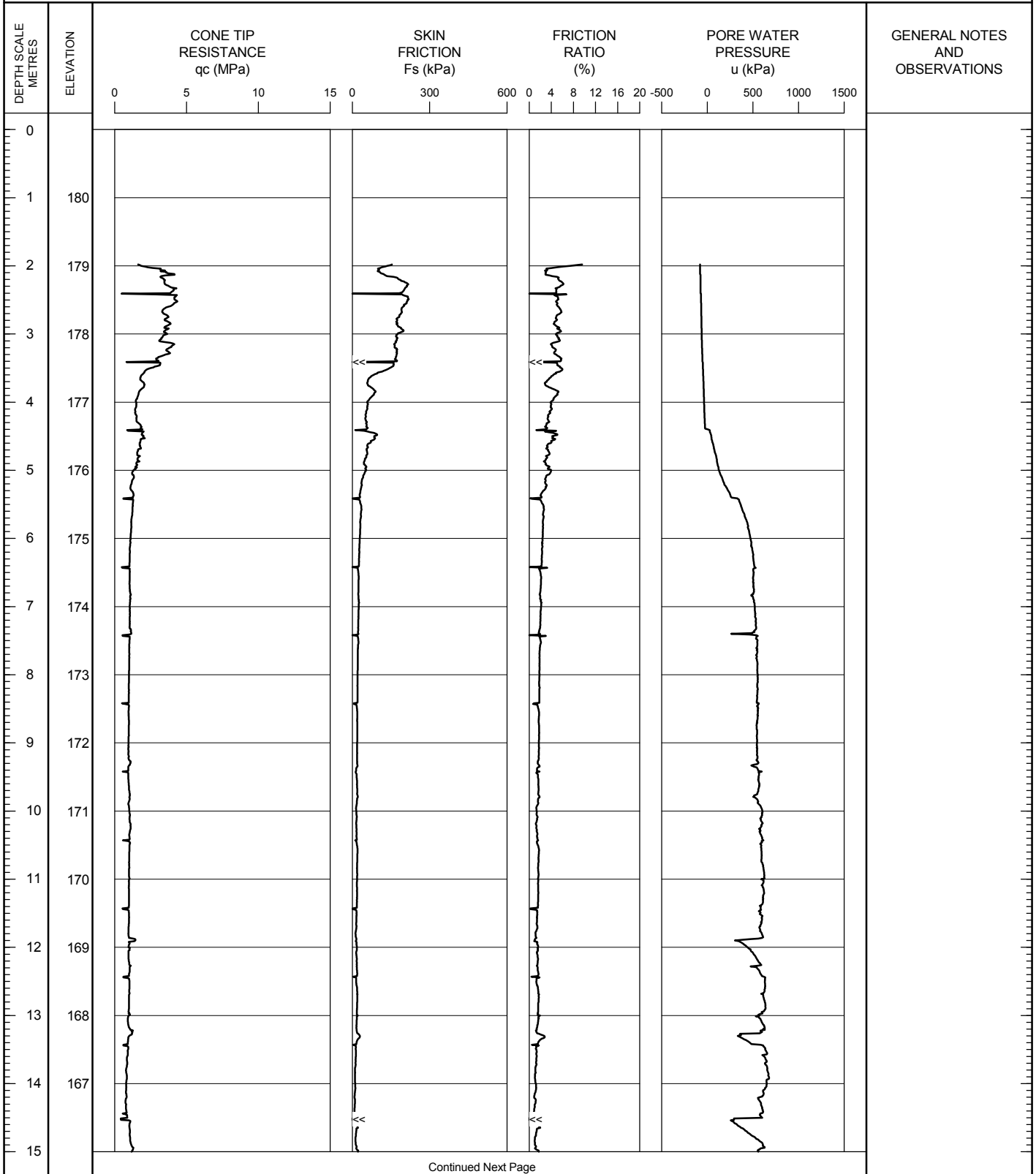
TEST DATE 8/24/2011 - 8/24/2011

SHEET 1 OF 3

LOCATION N4679825.8; E331995.8

DATUM Geodetic

GROUND SURFACE ELEVATION: 181.0 PREDRILL DEPTH: 1.98 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



WEP CPT LOG CPT-RW/GPJ ONTARIO MOT GDT 06/01/12

OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 35-RW

METRIC

PROJECT Windsor-Essex Parkway

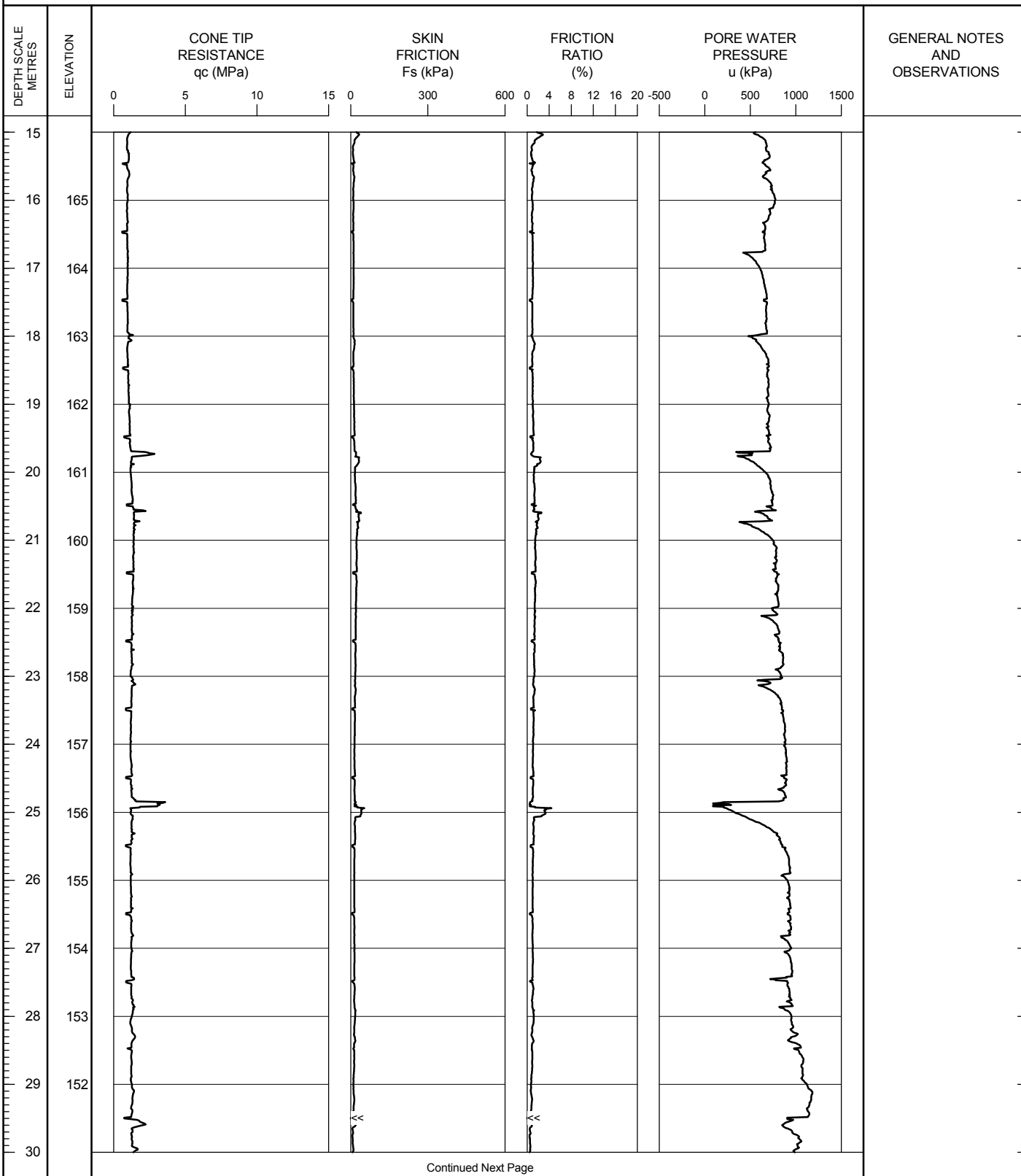
TEST DATE 8/24/2011 - 8/24/2011

SHEET 2 OF 3

LOCATION N4679825.8; E331995.8

DATUM Geodetic

GROUND SURFACE ELEVATION: 181.0 PREDRILL DEPTH: 1.98 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



WEF CPT LOG CPT-RW/GPJ ONTARIO MOT GDT 06/01/12

OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 35-RW

METRIC

PROJECT Windsor-Essex Parkway

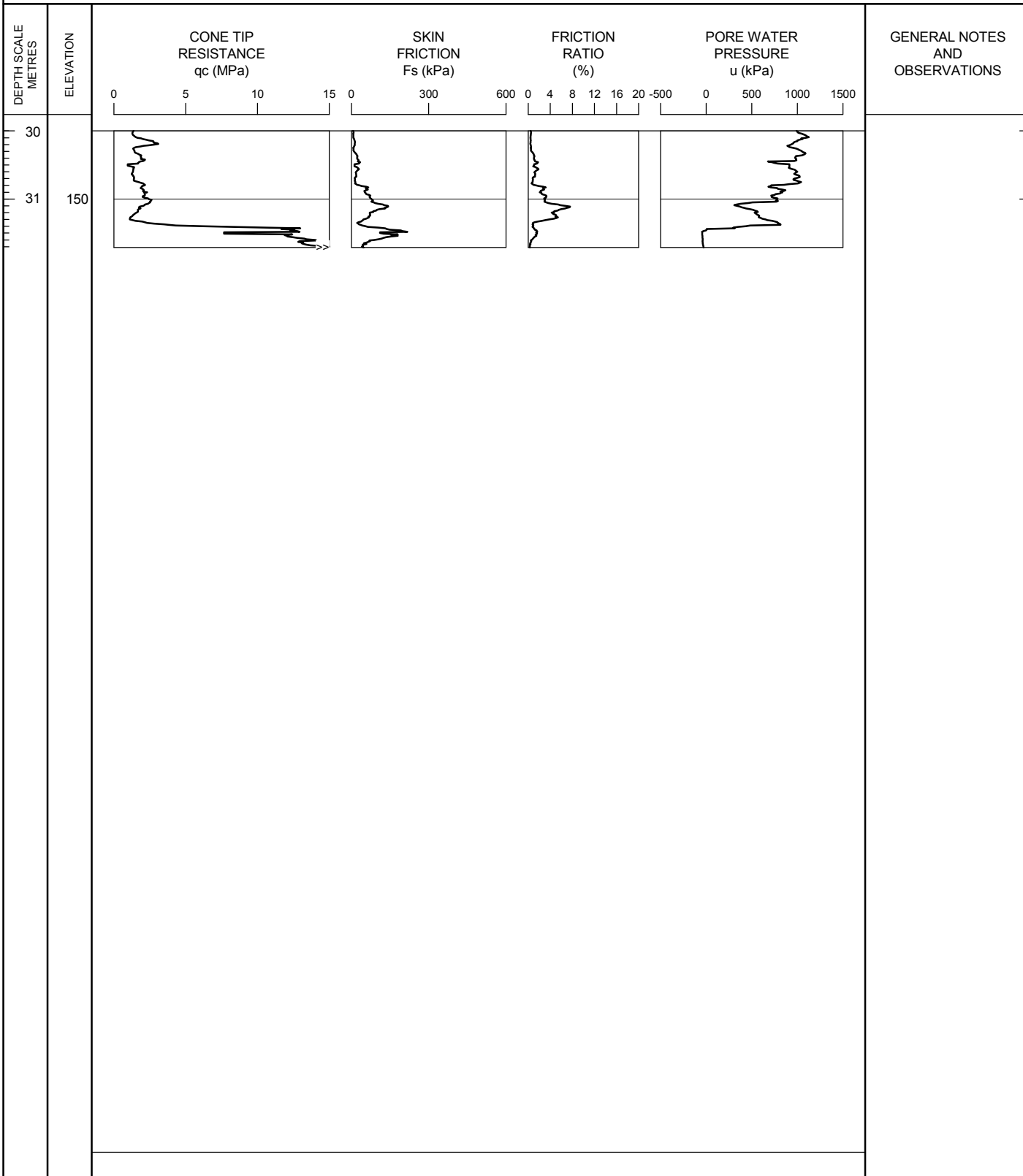
TEST DATE 8/24/2011 - 8/24/2011

SHEET 3 OF 3

LOCATION N4679825.8; E331995.8

DATUM Geodetic

GROUND SURFACE ELEVATION: 181.0 PREDRILL DEPTH: 1.98 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 36-RW

METRIC

PROJECT Windsor-Essex Parkway

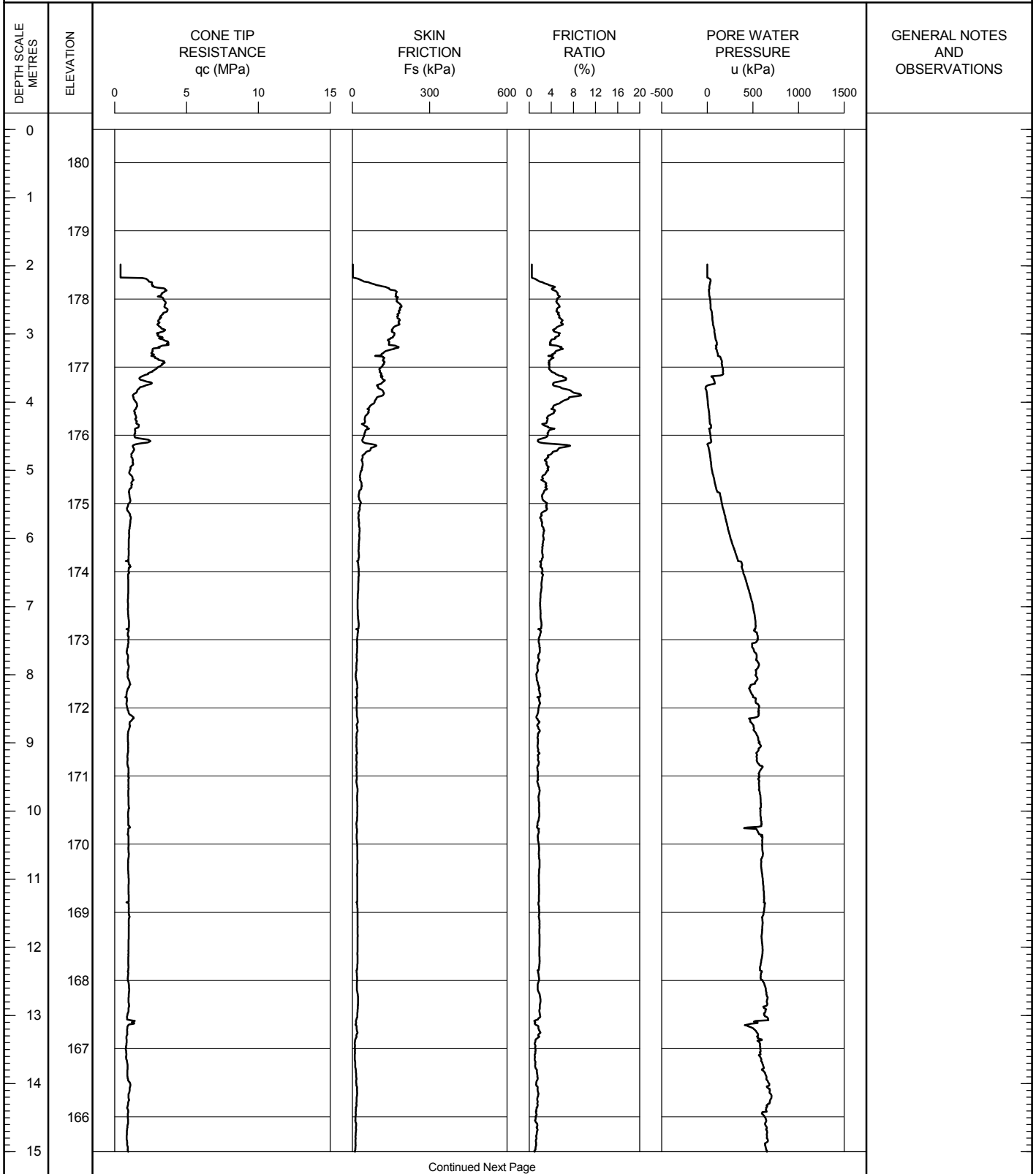
TEST DATE 8/15/2011 - 8/15/2011

SHEET 1 OF 3

LOCATION N4679710.0; E331968.8

DATUM Geodetic

GROUND SURFACE ELEVATION: 180.5 PREDRILL DEPTH: 2.17 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 36-RW

METRIC

PROJECT Windsor-Essex Parkway

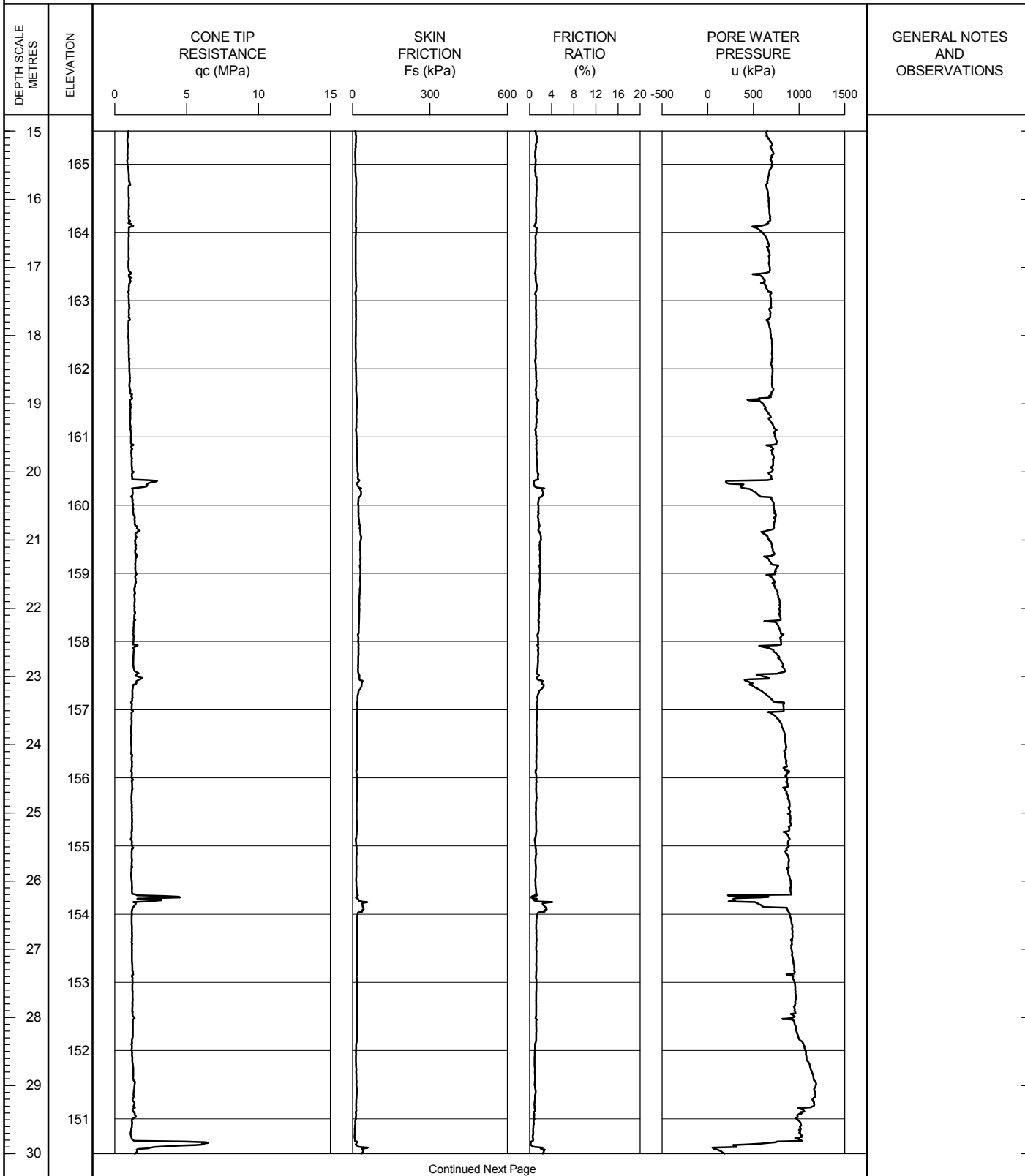
TEST DATE 8/15/2011 - 8/15/2011

SHEET 2 OF 3

LOCATION N4679710.0; E331968.8

DATUM Geodetic

GROUND SURFACE ELEVATION: 180.5 PREDRILL DEPTH: 2.17 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



WEF CPT LOG CPT-RW.GPJ ONTARIO MOT.GDT 06/01/12

OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 36-RW

METRIC

PROJECT Windsor-Essex Parkway

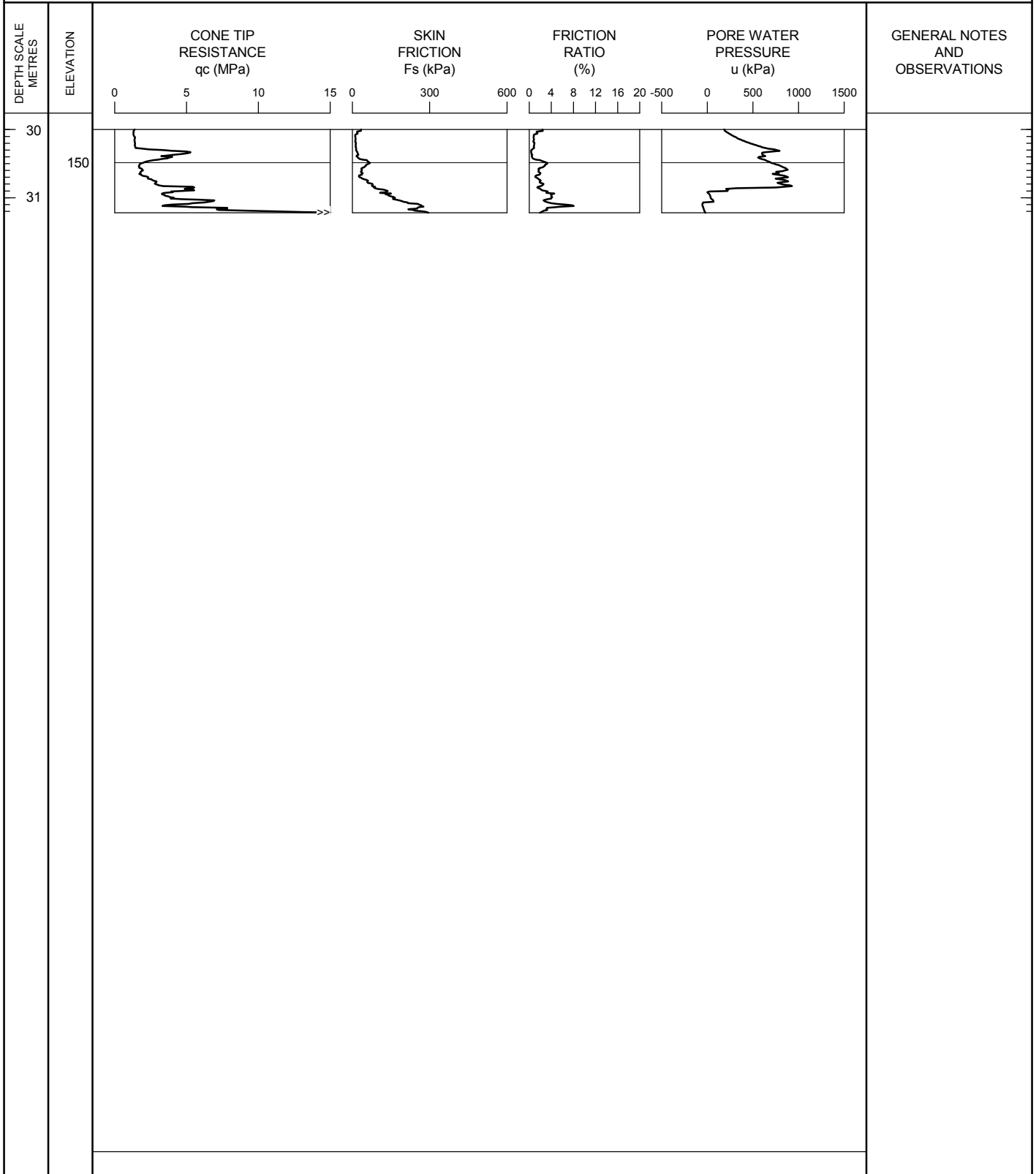
TEST DATE 8/15/2011 - 8/15/2011

SHEET 3 OF 3

LOCATION N4679710.0; E331968.8

DATUM Geodetic

GROUND SURFACE ELEVATION: 180.5 PREDRILL DEPTH: 2.17 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 37-RW

METRIC

PROJECT Windsor-Essex Parkway

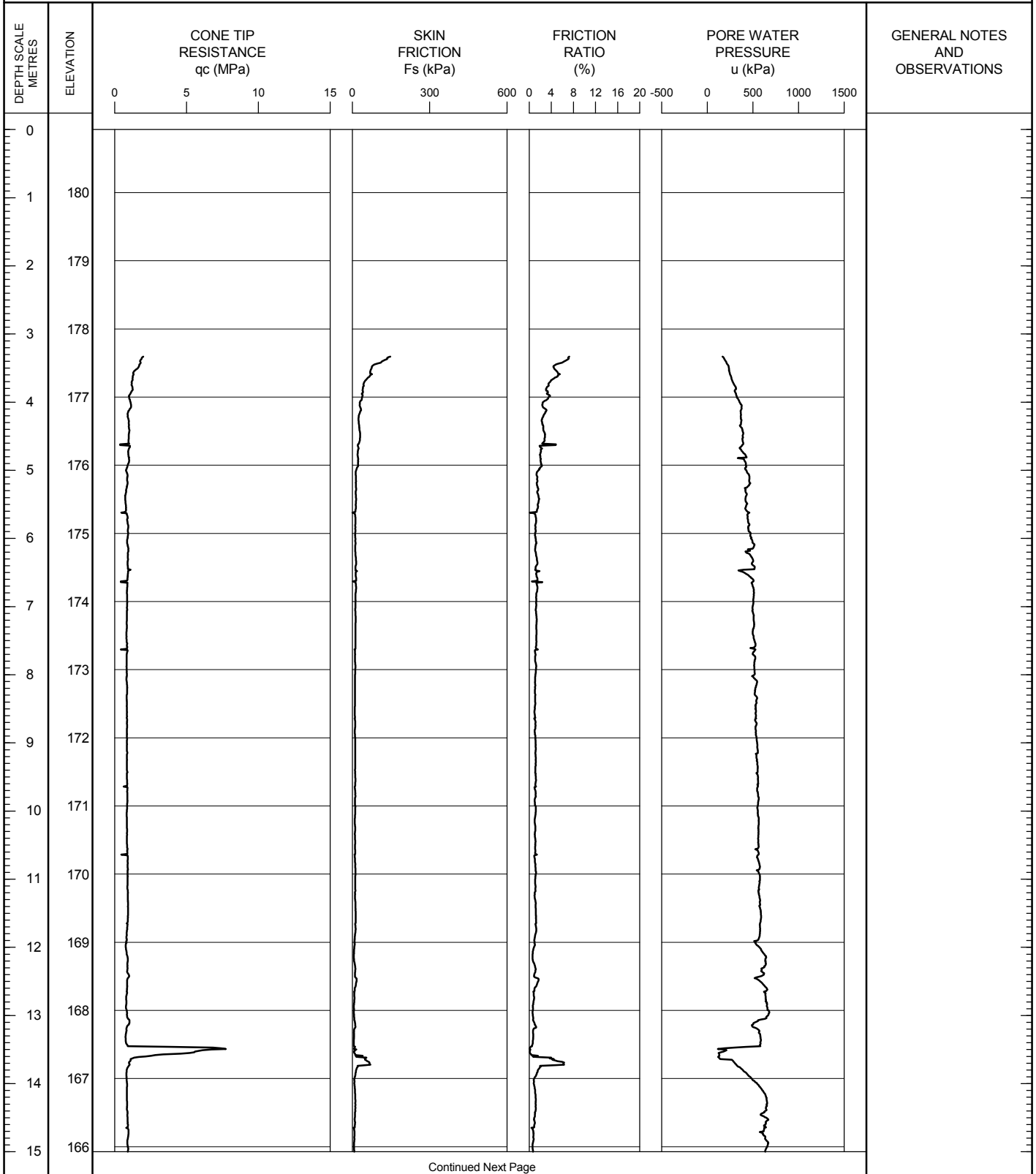
TEST DATE 7/27/2011 - 7/27/2011

SHEET 1 OF 2

LOCATION N4679571.4; E332146.2

DATUM Geodetic

GROUND SURFACE ELEVATION: 180.9 PREDRILL DEPTH: 2.98 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 37-RW

METRIC

PROJECT Windsor-Essex Parkway

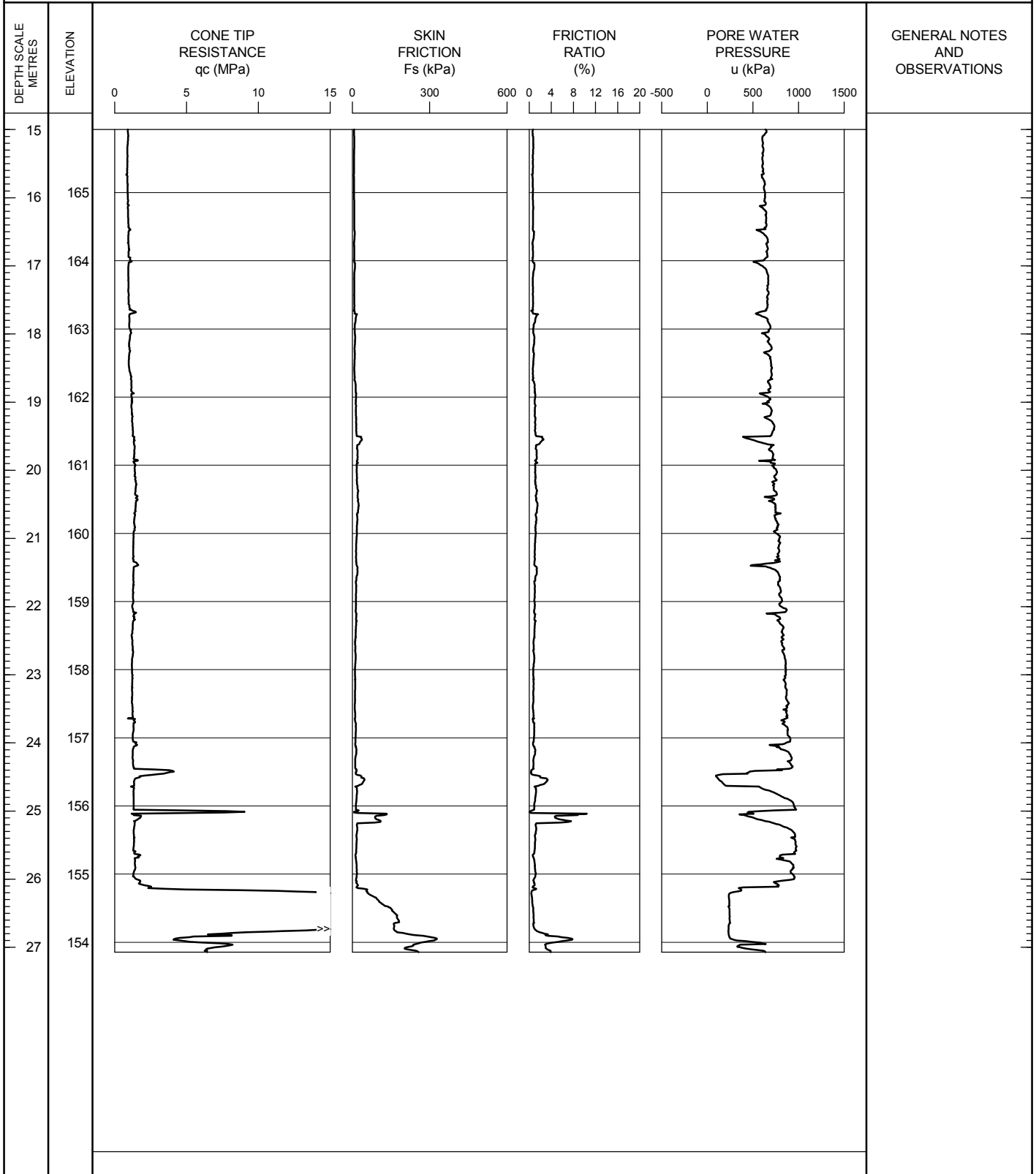
TEST DATE 7/27/2011 - 7/27/2011

SHEET 2 OF 2

LOCATION N4679571.4; E332146.2

DATUM Geodetic

GROUND SURFACE ELEVATION: 180.9 PREDRILL DEPTH: 2.98 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



WEP CPT LOG CPT-RW.GPJ ONTARIO MOT.GDT 06/01/12

OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 38-RW

METRIC

PROJECT Windsor-Essex Parkway

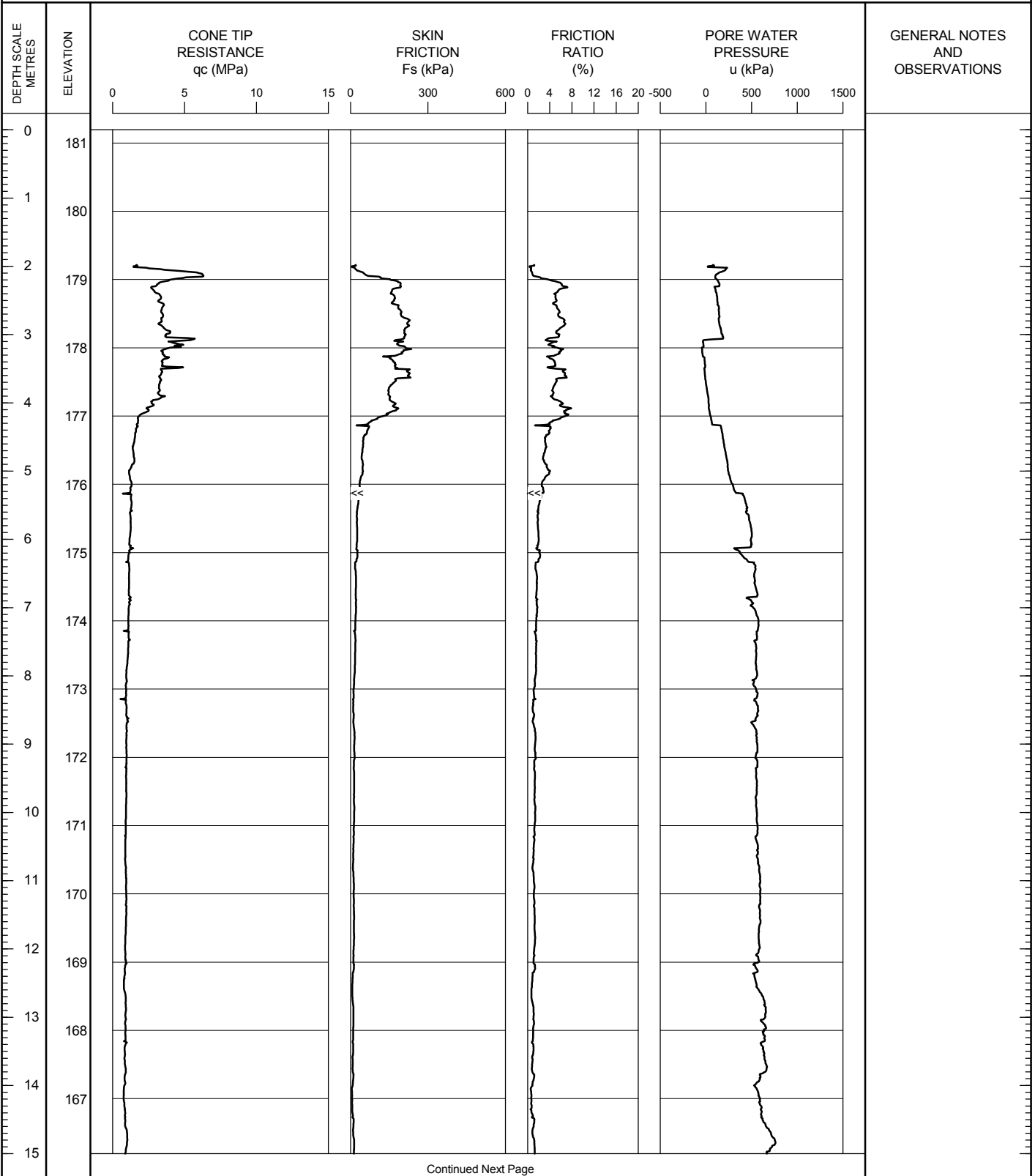
TEST DATE 7/27/2011 - 7/27/2011

SHEET 1 OF 3

LOCATION N4679485.0; E332131.9

DATUM Geodetic

GROUND SURFACE ELEVATION: 181.2 PREDRILL DEPTH: 1.88 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 38-RW

METRIC

PROJECT Windsor-Essex Parkway

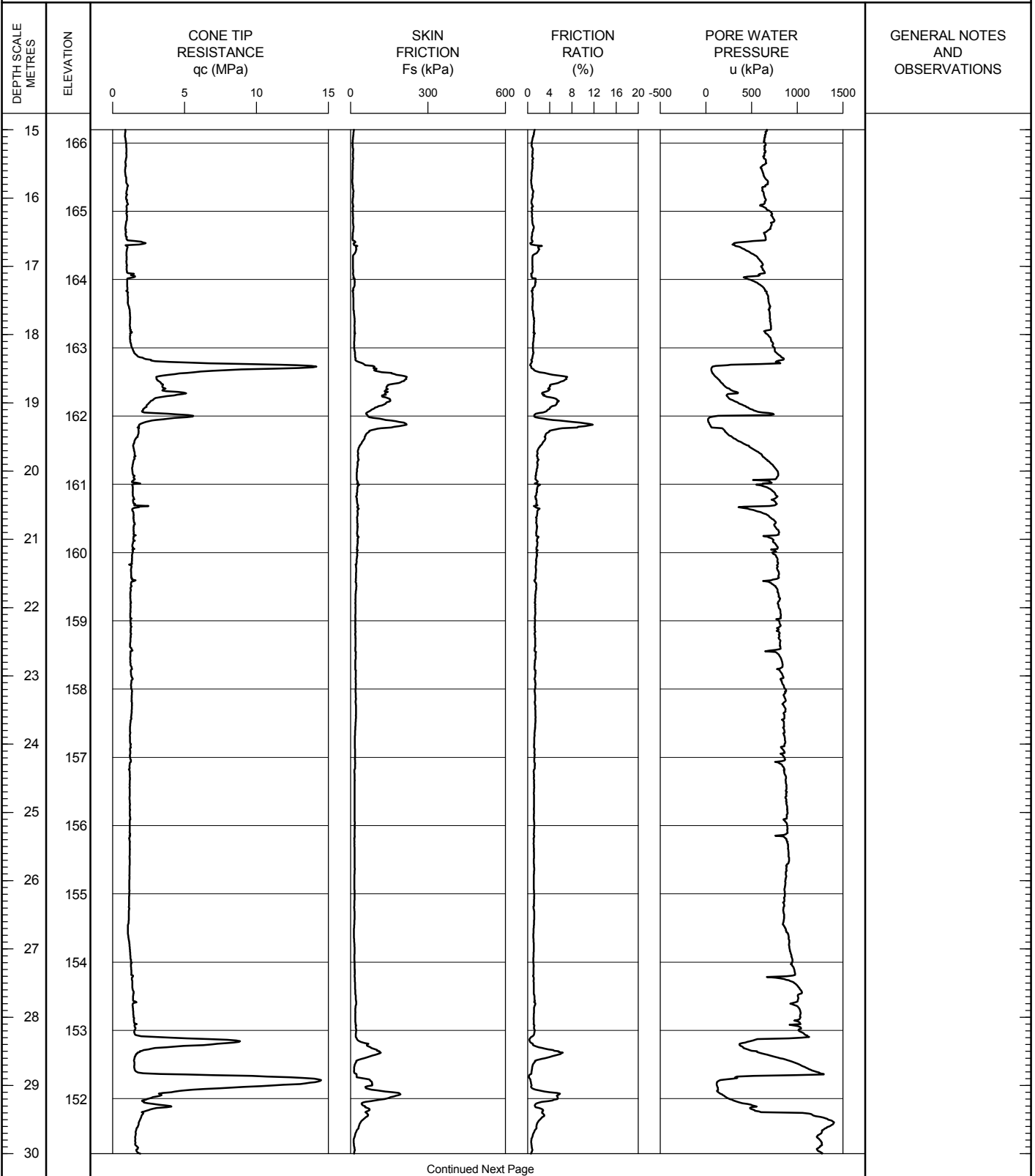
TEST DATE 7/27/2011 - 7/27/2011

SHEET 2 OF 3

LOCATION N4679485.0; E332131.9

DATUM Geodetic

GROUND SURFACE ELEVATION: 181.2 PREDRILL DEPTH: 1.88 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

METRIC

SHEET 3 OF 3

DATUM Geodetic

GROUND SURFACE ELEVATION: 181.2 PREDRILL DEPTH: 1.88 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0

RECORD OF CONE PENETRATION TEST CPT 39-RW

METRIC

PROJECT Windsor-Essex Parkway

TEST DATE 7/28/2011 - 7/28/2011

SHEET 1 OF 2

LOCATION N4679460.1; E332253.2

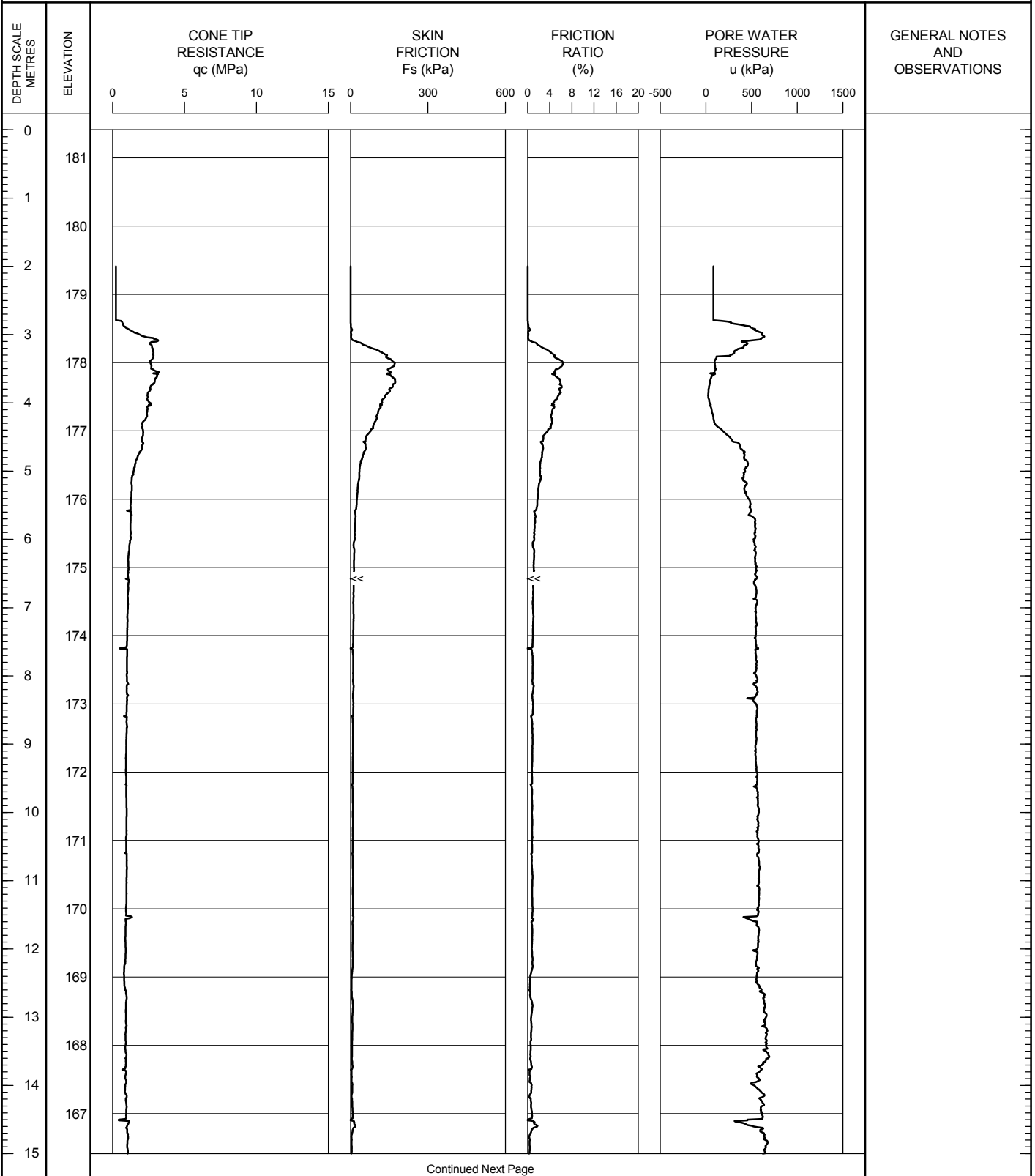
DATUM Geodetic

GROUND SURFACE ELEVATION: 181.4

PREDRILL DEPTH: 2

CORRECTION FACTOR A: 0.8

CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 39-RW

METRIC

PROJECT Windsor-Essex Parkway

TEST DATE 7/28/2011 - 7/28/2011

SHEET 2 OF 2

LOCATION N4679460.1; E332253.2

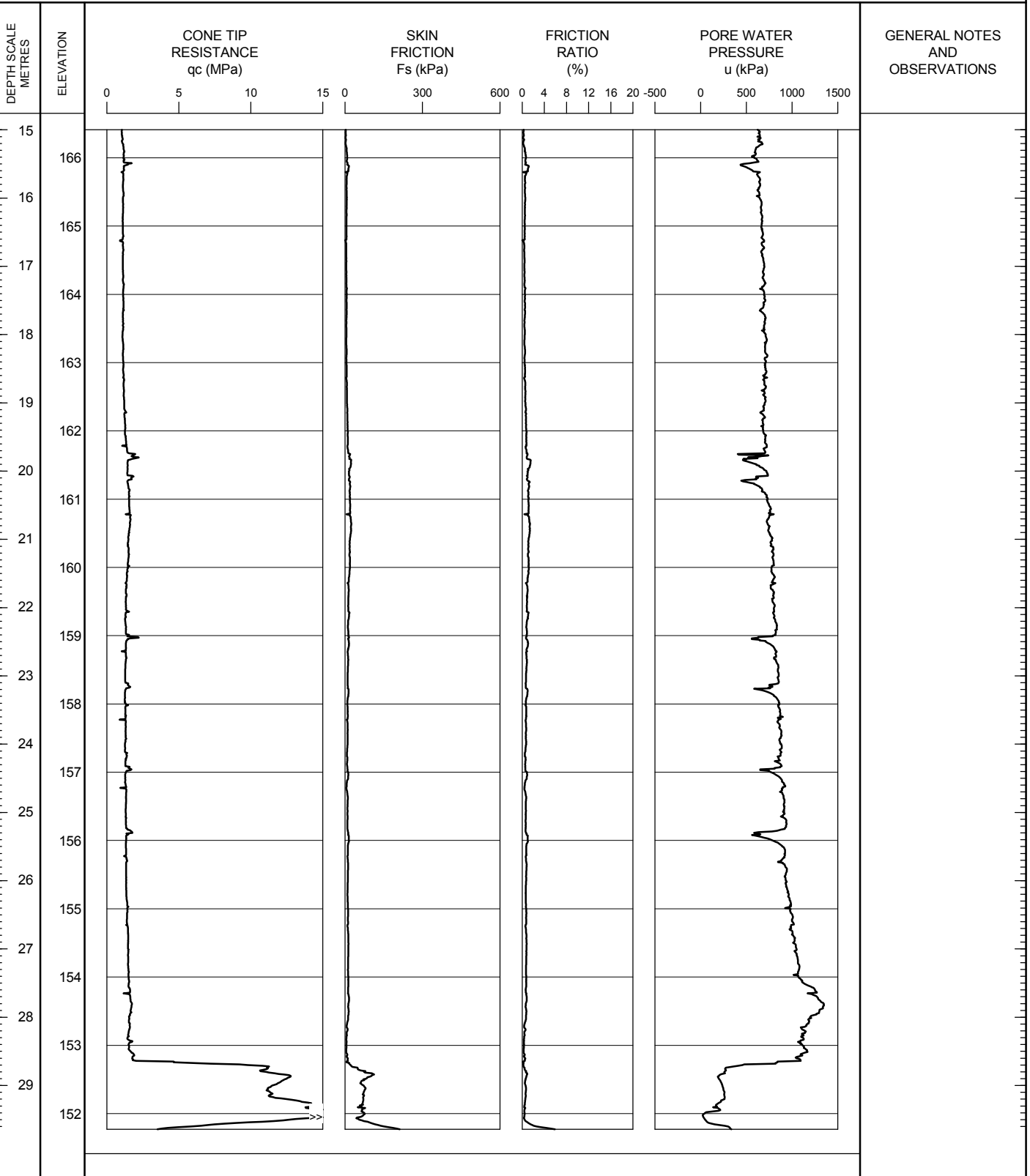
DATUM Geodetic

GROUND SURFACE ELEVATION: 181.4

PREDRILL DEPTH: 2

CORRECTION FACTOR A: 0.8

CORRECTION FACTOR B: 0



WEP CPT LOG CPT-RW/GPJ ONTARIO MOT GDT 06/01/12

OPERATOR: TA

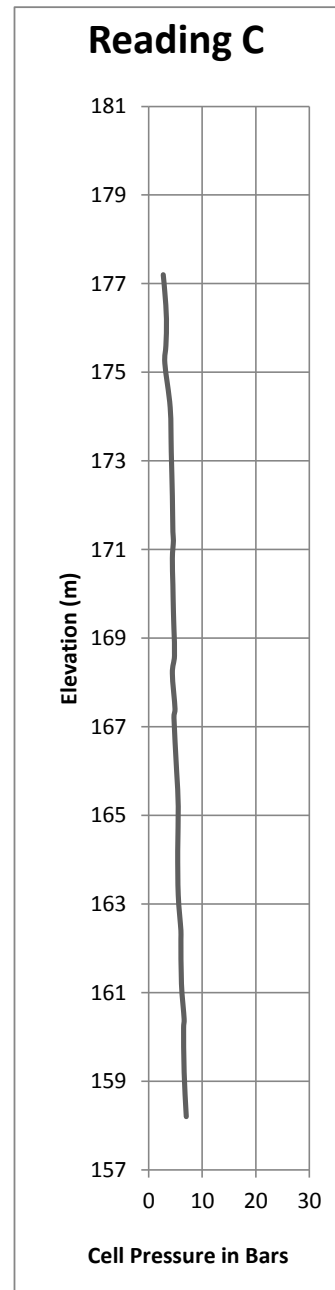
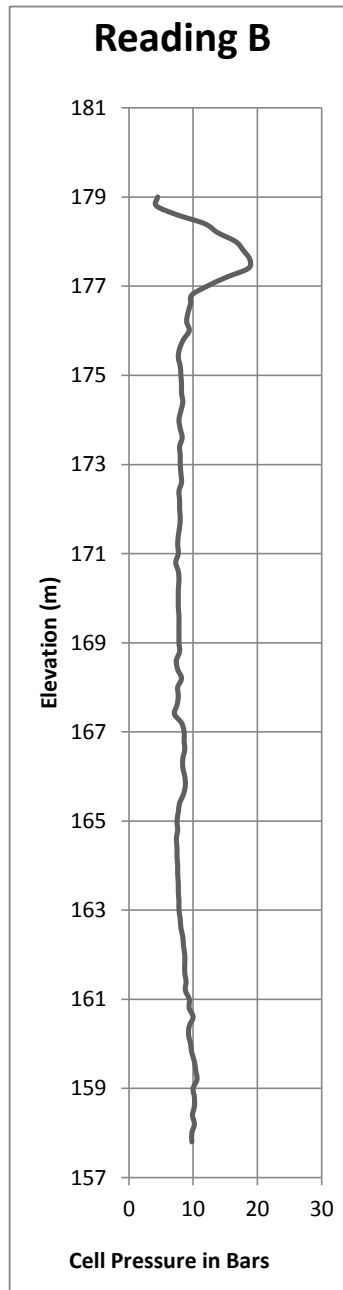
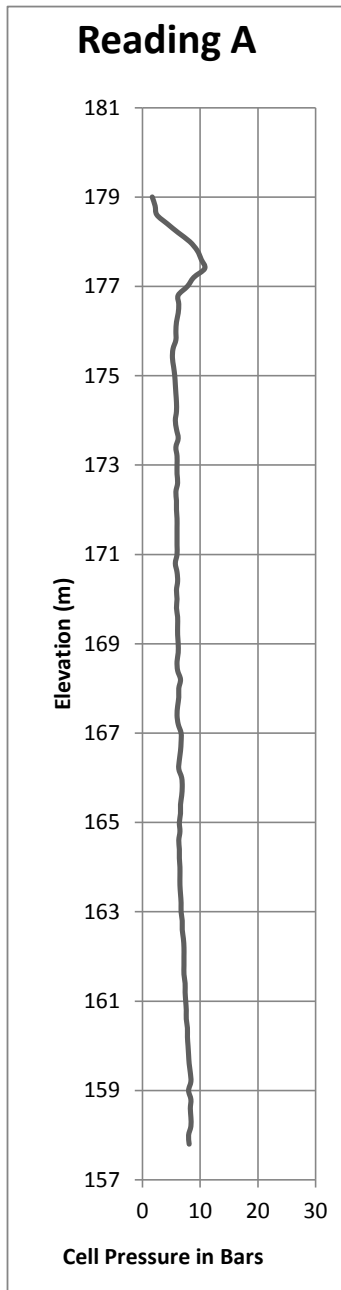
CHECKED: DD

RECORD OF DILATOMETER TEST DMT T6-1

Project : Windsor-Essex Parkway
Location: N 4679696.6; E 332057.3
Ground Surface Elevation : 181.2

Test Date: 7/14/2011
Predrill Depth : 2.0 m
Delta A: 0.18 Bar

Sheet 1 of 1
Datum Geodetic
Delta B: 0.22 Bar



Operator: LC
Checked: DD

Station 10+400L to Station 11+000L (Soil Profile #10)

METRIC

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No B9-1

3 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679235.3, E332593.8 ORIGINATED BY DG
DIST HWY WEP BOREHOLE TYPE CME 55 Track Mounted Drill - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
DATUM Geodetic DATE Jul 13, 11 - Jul 14, 11 CHECKED BY MSO

| 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 | | | | | | | | WATER CONTENT (%) |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | | | | | | | |
| | | | | | | | | ● POCKET PEN. | × LAB VANE | | | | | | | |
| | | | | | | 20 40 60 80 100 | | | | 10 20 30 | | | | | | |
| 151.4 | | | | | | | | | | | | | | | | |
| 30.5 | SANDY SILT Trace fine-medium gravel Compact to Very dense Grey | | 24 | SS | 50 | | 151 | | | | | | | | 0 26 64 10 | |
| | | | | | | | | | | | | | | | | |
| | Trace clay, trace fine-medium gravel | | 25 | SS | 17 | | 150 | | | | | | | | | |
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| | | | | | | | 149 | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 148.2 | -Rock fragments | | 26 | SS | | | | | | | | | | | -SPT refusal at 33.6m | |
| 33.7 | LIMESTONE Fine Grained | | | | | | 148 | | | | | | | | -end of drilling July 13 | |
| 147.7 | Non-calcareous inclusions, porous Grey | | | | | | | | | | | | | | | |
| 34.2 | LIMESTONE Medium to coarse grained, porous Laminated, stylolites present Fracture between 34.8m and 35.1m, running parallel to the core length | | 27 | RC | | | | | | | | | | | RQD = 86% TCR = 100% SCR = 98% | |
| 146.8 | | | | | | | 147 | | | | | | | | | |
| 35.1 | END OF BOREHOLE No groundwater observed during drilling due to wash boring Water Level measured in Piezometer VWP B9-1-P10 at elevation 181.6m on July 23, 2011 Water Level measured in Piezometer VWP B9-1-P10 at elevation 181.9 m on August 6, 2011 Water Level measured in Piezometer VWP B9-1-P17 at elevation 182.2m on July 23, 2011 Water Level measured in Piezometer VWP B9-1-P17 at elevation 181.8m on August 6, 2011 | | | | | | | | | | | | | | | |
| | | | | | | | 146 | | | | | | | | | |
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| | | | | | | | 137 | | | | | | | | | |

+³, X³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No B9-2

1 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679218.9, E332622.2 ORIGINATED BY DG
 DIST HWY WEP BOREHOLE TYPE Track Mounted Drill - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 10, 11 - Jul 12, 11 CHECKED BY MSO

| 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 (%) | | | | | | |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|---|----|--------------|-----|----|---------------------------|---------------------------------------|--------------------------|--|---|-------------------|--|--|--|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | | WATER CONTENT (%) | | | | | |
| | | | | | | | | ○ UNCONFINED | | + FIELD VANE | | | | | | | | | | | | | |
| | | | | | | | | ● POCKET PEN. | | X LAB VANE | | | | | | | | | | | | | |
| 182.4 | Ground Surface | | | | | | 20 | 40 | 60 | 80 | 100 | 10 | 20 | 30 | | GR SA SI CL | | | | | | | |
| 0.0 | 50mm ASPHALT | | | | | | | | | | | | | | | -Shallow Vibrating Wire Piezometer (VWP) installed in adjacent boring at N4679218.5, E3326228. Mid-Depth and bedrock VWP installed in sampled borehole. Spider Magnets (MG) installed in adjacent boring at N4679218.0, E332623.4 | | | | | | | |
| 182.0 | Over 350mm Crushed Limestone Sand and gravel | | | | | | | | | | | | | | | | | | | | | | |
| 0.4 | FILL | | | | | | | | | | | | | | | | | | | | | | |
| | Brown Fine Sand | | 1 | SS | 5 | | | | | | | | ○ | | | | | | | | | | |
| 181.3 | FILL | | | | | | | | | | | | | | | | | | | | | | |
| 1.1 | CLAYEY SILT | | | | | | | | | | | | | | | | | | | | | | |
| | Some sand, trace gravel | | 2 | SS | 13 | | | | | | | | ○ | | | | | | | | | | |
| | Soft to very stiff | | | | | | | | | | | | | | | | | | | | | | |
| | Mottled brown and grey | | | | | | | | | | | | | | | | | | | | | | |
| | Brown | | 3 | SS | 19 | | | | | | | | ○ | | | | | | | | | | |
| | Grey | | 4 | SS | 16 | | | | | | | | ○ | | | | | | | | | | |
| | -Some pink clay nodules | | 5 | SS | 12 | | | | | | | | ○ | | | | | | | | | | |
| | -Trace pink clay nodules | | 6 | SS | 7 | | | | | | | | ○ | | | | | | | | | | |
| | | | 7 | SS | 6 | | | | | | | | ○ | | | | | | | | | | |
| | | | 8 | SS | PH | | | | | | | | ○ | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | | | | | | | |
| | | | 9 | SS | PH | | | | | | | | ○ | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE


ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No B9-2

2 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679218.9, E332622.2 ORIGINATED BY DG
DIST HWY WEP BOREHOLE TYPE Track Mounted Drill - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
DATUM Geodetic DATE Jul 10, 11 - Jul 12, 11 CHECKED BY MSO

| 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 | | | | | | | | WATER CONTENT (%) |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | | | | | | | |
| | | | | | | | | ● POCKET PEN. | × LAB VANE | | | | | | | |
| | | | | | | | 20 40 60 80 100 | | | | 10 20 30 | | | | | |
| | CLAYEY SILT Some sand, trace gravel Soft to very stiff (continued) |  | 14 | TW | PH | | 167 | | | | | | | 19.5 | 1 17 44 38 | |
| | | | | | | | | | | | | | | | | |
| | | | | VT | | | 166 | | | | 1.7 | | | | | |
| | 15 | | SS | 4 | | 165 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | -Some sand, trace gravel | | 16 | SS | 2 | | 164 | | | | | | | | -installed MG and VWP B9-2-P18 at 18.29m below ground surface (EL. 164.1m) | |
| | | | | | | | | | | | | | | | | |
| | | | VT | | | 163 | | | | 1.4 | | | | | | |
| | -Trace fine-medium gravel, trace sand | | 17 | TW | PH | | 162 | | | | | | | 21.6 | 4 26 46 24 | |
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-installed MG and VWP B9-2-P18 at 18.29m below ground surface (EL. 164.1m)

-end of drilling July 11; continue July 12

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+³, X³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No B9-2

3 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679218.9, E332622.2 ORIGINATED BY DG
DIST HWY WEP BOREHOLE TYPE Track Mounted Drill - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
DATUM Geodetic DATE Jul 10, 11 - Jul 12, 11 CHECKED BY MSO

| 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 | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED | + | FIELD VANE | | | | | | | | |
| | | | | | | | | ● POCKET PEN. | × | LAB VANE | | | | | | | | |
| | | | | | | | 20 | 40 | 60 | 80 | 100 | 10 | 20 | 30 | | | | |
| 151.9 | | | | | | | | | | | | | | | | | | |
| 30.5 | SILTY CLAY Trace sand, fine gravel Very soft Grey | | 24 | SS | 0 | | | | | | | | ○ | | 0 5 50 45 | | | |
| 150.4 | | | | | | | | | | | | | | | -sampler advanced under weight of hammer and rods | | | |
| 32.0 | SILT Trace clay and fine sand Very loose Grey Moist-wet | | 25 | SS | 2 | | | | | | | | ○ | | 0 0 93 7 | | | |
| 148.9 | | | | | | | | | | | | | | | | | | |
| 33.5 | LIMESTONE COBBLES and BOULDERS (Inferred from sample fragments) Trace clay, trace fine gravel | | 26 | SS | 50/ 150mm | | | | | | | | | | -installed VWP B9-2-P32 at 32.00m below ground surface (EL. 150.4m) | | | |
| 148.4 | | | | | | | | | | | | | | | | | | |
| 34.0 | LIMESTONE Medium to coarse grained, laminated Fractured at locations between 34.35m and 36.39m Fracture is running parallel to the core length Brown | | 27 | RC | | | | | | | | | | | RQD = 31.8% TCR = 100% SCR = 33% | | | |
| | | | | | | | | | | | | | | | RQD = 17.4% TCR = 100% SCR = 33% | | | |
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| 146.0 | | | | | | | | | | | | | | | | | | |
| 36.4 | LIMESTONE Laminated, porous Grey | | | | | | | | | | | | | | | | | |
| 145.6 | | | | | | | | | | | | | | | | | | |
| 36.8 | END OF BOREHOLE No groundwater observed during drilling due to wash boring Water Level measured in Piezometer VWP B9-2-P11 at elevation 181.1m on July 23, 2011 Water Level measured in Piezometer VWP B9-2-P11 at elevation 181.0m on August 6, 2011 Water Level measured in Piezometer VWP B9-2-P19 at elevation 180.9m on July 23, 2011 Water Level measured in Piezometer VWP B9-2-P19 at elevation 179.8m on August 6, 2011 Water Level measured in Piezometer VWP B9-2-P32 at elevation 177.4m on July 23, 2011 Water Level measured in Piezometer VWP B9-2-P32 at elevation 177.6m on August 6, 2011 | | | | | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

METRIC

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METRIC

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No B9-3

3 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679140.0, E332677.6 ORIGINATED BY LC
DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
DATUM Geodetic DATE Jul 11, 11 - Jul 12, 11 CHECKED BY MSO

| 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 | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● POCKET PEN. | | | | | | × LAB VANE | | |
| | | | | | | | 20 40 60 80 100 | | | | 10 20 30 | | | | | | | |
| 153.1 | | | | | | | | | | | | | | | | | | |
| 30.4 | SILT Trace clay Compact Grey Moist to wet | | 24 | SS | 10 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 25 | SS | 14 | | | | | | | | | | | | | |
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| 150.3 | | | | | | | | | | | | | | | | | | |
| 33.2 | SANDY SILT Trace clay, trace gravel -Slightly cemented Compact Grey Moist to wet | | 26 | RC | 26 | | | | | | | | | | | | | |
| 149.4 | | | | | | | | | | | | | | | | | | |
| 34.4 | LIMESTONE Fine grained Partially crystallized, calcite crystallization is visible, vuggy at approx. 34.44m Grey | | 27 | RC | | | | | | | | | | | | | | |
| | Medium to coarse grained | | | | | | | | | | | | | | | | | |
| 147.8 | LIMESTONE Porous, laminated, fractured at approx. 35.63m | | | | | | | | | | | | | | | | | |
| 35.7 | END OF BOREHOLE No groundwater observed during drilling due to wash boring Water Level measured in Piezometer VWP B9-3-P15 at elevation 182.9m on July 23, 2011 Water Level measured in Piezometer VWP B9-3-P15 at elevation 180.3m on August 29, 2011 Water Level measured in Piezometer VWP B9-3-P25 at elevation 181.1m on July 23, 2011 Water Level measured in Piezometer VWP B9-3-P25 at elevation 178.9m on August 29, 2011 | | | | | | | | | | | | | | | | | |
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-no recovery

RQD = 72%
TCR = 100%
SCR = 73%
Rock Core UC = 77.8 MPa

RECORD OF BOREHOLE No CPT B9-1

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679241.3, E332574.3 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 25, 11 - Jul 25, 11 CHECKED BY MSO

| 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 | | | | | | | | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● POCKET PEN. × LAB VANE | | | | | | | | | |
| 182.4 | Ground Surface | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | | |
| 182.1 | CLAYEY SILT Some sand, trace gravel, trace organics in upper 1.0 m Mottled brown and grey | | 1 | SS | 11 | | | | | | | | | | | | |
| 0.3 | | | 2 | SS | 8 | | | | | | | | | | | | |
| | | | 3 | SS | 9 | | | | | | | | | | | | |
| | | | 4 | SS | 20 | | | | | | | | | | | | |
| | | | 5 | SS | 13 | | | | | | | | | | | | |
| 178.1 | END OF SAMPLED BOREHOLE Continued with CPT from 4.3 m to refusal at 31.7 m (El. 178.1 m to El. 150.7 m) | | | | | | | | | | | | | | | | |
| 4.3 | No groundwater observed on July 25, 2011 | | | | | | | | | | | | | | | | |
| | | | | | | | 178 | | | | | | | | | | |
| | | | | | | | 177 | | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | | |
| | | | | | | | 175 | | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | | |
| | | | | | | | 171 | | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | | |
| | | | | | | | 169 | | | | | | | | | | |
| | | | | | | | 168 | | | | | | | | | | |

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

RECORD OF BOREHOLE No CPT B9-2

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679138.6, E332696.0 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 25, 11 - Jul 25, 11 CHECKED BY MSO

| 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 | | | | | | | | | WATER CONTENT (%) | |
| | | | | | | | | ○ UNCONFINED | ○ FIELD VANE | ● POCKET PEN. | × LAB VANE | | | | | | | |
| 183.9 | Ground Surface | | | | | | | | | | | | | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | | | |
| 183.3 | FINE SAND | | | | | | 183 | | | | | | | | | | | |
| 0.6 | Poorly Graded, trace silt Brown | | 1 | SS | 10 | | | | | | | | | | | | | |
| | | | 2 | SS | 8 | | 182 | | | | | | | | | | | |
| 181.6 | SANDY SILT | | | | | | | | | | | | | | | | | |
| 2.3 | Brown | | 3 | SS | 5 | | | | | | | | | | | | | |
| 181.3 | CLAYEY SILT | | | | | | 181 | | | | | | | | | | | |
| 2.6 | Some sand Brown | | | | | | 180 | | | | | | | | | | | |
| 2.7 | END OF SAMPLED BOREHOLE | | | | | | 179 | | | | | | | | | | | |
| | Continued with CPT from 2.7 m to refusal at 33.5 m (El. 181.2 m to El. 150.4 m) | | | | | | 178 | | | | | | | | | | | |
| | Groundwater observed at 1.7 m (El. 182.2 m) on July 25, 2011 | | | | | | 177 | | | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | | | |
| | | | | | | | 175 | | | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | | | |
| | | | | | | | 171 | | | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | | | |
| | | | | | | | 169 | | | | | | | | | | | |

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

RECORD OF BOREHOLE No CPT B9-3

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679189.2, E332678.6 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 26, 11 - Jul 26, 11 CHECKED BY MSO

| 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 | | | | | | | | | WATER CONTENT (%) | |
| | | | | | | | | ○ UNCONFINED | ○ FIELD VANE | ○ | ○ | | | | | | ○ | ○ |
| | | | | | | | | ● POCKET PEN. | × LAB VANE | × | × | | | | | | × | × |
| 182.7 | Ground Surface | | | | | | | | | | | | | | | | | |
| 0.0 | | | | | | | | | | | | | | | | | | |
| 182.4 | TOPSOIL | | 1 | SS | 2 | ▽ | 182 | | | | | | | | | -sample from auger cuttings | | |
| 0.3 | FINE SAND Poorly Graded Trace silt Brown | | | | | | | | | | | | | | | | | |
| 181.5 | | | 2A, B | SS | 8 | | | | | | | | | | | | | |
| 1.2 | CLAYEY SILT Trace to some sand Grey with trace oxidation in fissures | | | | | | | | | | | | | | | | | |
| | | | 3 | SS | 14 | | 181 | | | | | | | | | -Groundwater on July 26, 2011 | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 4 | SS | 16 | | | | | | | | | | | | | |
| 179.8 | | | | | | | 180 | | | | | | | | | | | |
| 2.9 | END OF SAMPLED BOREHOLE Continued with CPT from 3.7 m to refusal at 30.4 m (El. 179.0 m to El. 152.3 m) Groundwater observed at 1.2 m (El. 181.5 m) on July 26, 2011 | | | | | | 179 | | | | | | | | | | | |
| | | | | | | | 178 | | | | | | | | | | | |
| | | | | | | | 177 | | | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | | | |
| | | | | | | | 175 | | | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | | | |
| | | | | | | | 171 | | | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | | | |
| | | | | | | | 169 | | | | | | | | | | | |
| | | | | | | | 168 | | | | | | | | | | | |

+ 3, X 3: Numbers refer to Sensitivity O 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No B10-1

1 OF 4

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4679159.2N, 332754.5E ORIGINATED BY LC
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 26, 11 - Jun 1, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|--|------------|---------|------|------------|----------------------------|--------------------|---|----------------------------|--|--|---|----------------|--|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | WATER CONTENT (%) | | | | |
| | | | | | | | | ○ UNCONFINED ● POCKET PEN. | + FIELD VANE × LAB VANE | | W _P | W | W _L | | |
| 182.6 | Ground Surface | | | | | | | | | | | | | | |
| 0.0 | SILTY SAND Fine Brown Saturated | | | | | | | | | | | | | | |
| 0.2 | CLAYEY SILT Some sand, trace gravel Soft to very stiff Grey Weathered, trace rootlets to approximately 1.5 m | | 1A, B | SS | 7 | | | | | | | | | | |
| | | | 2 | SS | 14 | | | | | | | | | | |
| | | | 3 | SS | 19 | | | | | | | | | | |
| | | | 4 | SS | 23 | | | | | | | | | | |
| | | | 5 | SS | 18 | | | | | | | | | | |
| | | | 6 | SS | 12 | | | | | | | | | | |
| | | | 7 | SS | 7 | | | | | | | | | | |
| | | | 8 | TW | PH | | | | | | | | | | |
| | | | 9 | TW | PH | | | | | | | | | | |
| | | | 10 | TW | PH | | | | | | | | | | |
| | | | VT | | | | | | | | | | | | |
| | | | 11 | TW | PH | | | | | | | | | | |
| | | | 12 | TW | | | | | | | | | | | |
| | | | VT | | | | | | | | | | | | |
| | | | 13 | TW | PH | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |

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+³, X³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No B10-1

2 OF 4

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4679159.2N, 332754.5E ORIGINATED BY LC
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 26, 11 - Jun 1, 11 CHECKED BY MSO

| 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 | | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● POCKET PEN. | × LAB VANE | | | | | | | | | |
| | CLAYEY SILT Some sand, trace gravel Soft to very stiff Grey (continued) -Sandy clay seams | | 14 | TW | PH | | | | | | | | | | | 19.5 | 14.57m below ground surface (El. 168.0 m) | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | | | | VT | | | | | | | | | | | | | | |
| | | | | | 15 | TW | PH | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | | | 16 | TW | PH | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | | | | VT | | | | | | | | | | | | | | |
| | | | | | 17 | TW | PH | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | | | 18 | TW | PH | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | | | | VT | | | | | | | | | | | | | | |
| | | | | | 19 | TW | PH | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | 20 | TW | PH | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | | | | |
| | | | 21 | TW | PH | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | 22 | TW | PH | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | 23 | TW | PH | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |

Continued Next Page

+³, X³: Numbers refer to Sensitivity O 3% STRAIN AT FAILURE

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

METRIC

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

RECORD OF BOREHOLE No B10-1

4 OF 4

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4679159.2N, 332754.5E ORIGINATED BY LC
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 26, 11 - Jun 1, 11 CHECKED BY MSO

| 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 | | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE | | | | | | | | | | | | |
| | | | | | | | | ● POCKET PEN. × LAB VANE | | | | | | | | | | | | |
| | Piezometer VWP B10-1-P9 at elevation 181.0m on July 23, 2011 Water Level measured in Piezometer VWP B10-1-P9 at elevation 181.0m on August 29, 2011 Water Level measured in Piezometer VWP B10-1-P21 at elevation 180.6m on June 4, 2011 Water Level measured in Piezometer VWP B10-1-P21 at elevation 180.7m on June 25, 2011 Water Level measured in Piezometer VWP B10-1-P21 at elevation 180.6m on July 10, 2011 Water Level measured in Piezometer VWP B10-1-P21 at elevation 180.4m on July 23, 2011 Water Level measured in Piezometer VWP B10-1-P21 at elevation 180.4m on August 29, 2011 | | | | | | 137 | | | | | | | | | | | | | |
| | | | | | | | 136 | | | | | | | | | | | | | |
| | | | | | | | 135 | | | | | | | | | | | | | |
| | | | | | | | 134 | | | | | | | | | | | | | |
| | | | | | | | 133 | | | | | | | | | | | | | |
| | | | | | | | 132 | | | | | | | | | | | | | |
| | | | | | | | 131 | | | | | | | | | | | | | |
| | | | | | | | 130 | | | | | | | | | | | | | |
| | | | | | | | 129 | | | | | | | | | | | | | |
| | | | | | | | 128 | | | | | | | | | | | | | |
| | | | | | | | 127 | | | | | | | | | | | | | |
| | | | | | | | 126 | | | | | | | | | | | | | |
| | | | | | | | 125 | | | | | | | | | | | | | |
| | | | | | | | 124 | | | | | | | | | | | | | |
| | | | | | | | 123 | | | | | | | | | | | | | |

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No T7-1

1 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4679413.6N, 332295.2E ORIGINATED BY DG
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 7, 11 - Jul 7, 11 CHECKED BY MSO

| 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 | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED ● POCKET PEN. | + FIELD VANE × LAB VANE | | | | | | | | | |
| | | | | | | | | 20 40 60 80 100 | 20 40 60 80 100 | | | | | | | | | |
| 181.5 | Ground Surface | | | | | | | | | | | | | | | | | |
| 0.0 | 50mm ASPHALT | | | | | | | | | | | | | | | | | |
| 0.2 | Over 200mm Crushed Limestone Sand and Gravel fill | | | | | | | | | | | | | | | | | |
| | FILL Silty Clay and Topsoil Green and black | | 1 | SS | 3 | | | | | | | | | | | | | |
| 180.0 | | | | | | | | | | | | | | | | | | |
| 1.5 | SAND Poorly Graded (Fine) Trace organics, saturated Green grey to brown | | 2 | SS | 3 | | | | | | | | | | | | | |
| 179.4 | | | | | | | | | | | | | | | | | | |
| 2.1 | CLAYEY SILT Some sand, trace gravel Very soft to very stiff Grey -Trace medium-coarse gravel Trace fine-medium gravel, pink clay nodules | | 3 | SS | 10 | | | | | | | | | | | | | |
| | | | 4 | SS | 15 | | | | | | | | | | | | | |
| | | | 5 | SS | 16 | | | | | | | | | | | | | |
| | -Trace fissures | | 6 | SS | 14 | | | | | | | | | | | | | |
| | -Trace pink clay nodules | | 7 | SS | 6 | | | | | | | | | | | | | |
| | Fine sand nodules Trace fine gravel, pink clay nodules | | 8 | TW | PH | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 9 | TW | PH | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 10 | TW | PH | | | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | | |
| | -Trace fine-coarse gravel | | 11 | TW | PH | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 12 | TW | PH | | | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | | |
| | -Trace fine-medium gravel | | 13 | SS | 2 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |

Continued Next Page

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No T7-1

2 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4679413.6N, 332295.2E ORIGINATED BY DG
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 7, 11 - Jul 7, 11 CHECKED BY MSO

| 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 W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● POCKET PEN. X LAB VANE | | WATER CONTENT (%) | | | | |
| | | | | | | | | 20 40 60 80 100 | | 10 20 30 | | | | |
| | CLAYEY SILT Some sand, trace gravel Very soft to very stiff Grey (continued) | | 14 | TW | PH | | 166 | | | | ○ | | | |
| | | | | VT | | | 165 | | + 1.3 | | ○ | | | |
| | -Trace sand and fine-coarse gravel | | 15 | SS | 6 | | 164 | | | | | | | |
| | | | 16 | TW | PH | | 163 | | X | | ○ | | | |
| | | | | VT | | | 162 | | + 1.3 | | ○ | | | |
| | -Trace fine-medium gravel | | 17 | TW | PH | | 161 | | | | | | | |
| | | | 18 | TW | PH | | 160 | | | | ○ | | | |
| | | | | VT | | | 159 | | >> 1.7 | | ○ | | | |
| | -Trace coarse sand | | 19 | SS | PH | | 158 | | | | | | | |
| | | | 20 | TW | PH | | 157 | | X | | ○ | | | |
| | | | | | | | 156 | | | | | | | |
| | -Trace fine-coarse sand Wet Silt seams | | 21 | SS | PH | | 155 | | | | ○ | | | |
| | | | 22 | SS | 3 | | 154 | | | | | ○ | | |
| | | | | | | | 153 | | | | ○ | | | |
| | Sandy -Red clay seams Wet | | 23 | SS | 7 | | 152 | | | | | | | |

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ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No T7-1

3 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4679413.6N, 332295.2E ORIGINATED BY DG
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 7, 11 - Jul 7, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---|--|------------|---------|------|--------------|-------------------------|-----------------|--|--|--|--|--|---------------------------------|-------------------------------|--------------------------------|------------------|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | |
| 151.3 30.2 | SAND And weathered LIMESTONE Cobbles and boulders (inferred) Very dense | | 24 | SS | 50/ 115mm | | 151 | | | | | | | | | | -no recovery, spoon bouncing continued to drill to 32m |
| | | | | | | | 150 | | | | | | | | | | |
| | | | 25 | SS | 50/ 150mm | | 149 | | | | | | | | | | RQD = 100% |
| 148.9 32.6 | LIMESTONE Medium to coarse grained Porous, vuggy, fractured at location between 33.07m and 33.22m Clacite crystallization is visible Brown | | 26 | RC | | | 148 | | | | | | | | | | |
| | | | | | | | 147 | | | | | | | | | | RQD = 100% |
| 146.7 34.8 146.4 35.1 146.0 35.5 35.7 | LIMESTONE Laminated, medium to fine grained, porous Pitted at location between 34.78m and 35.14m Brown to Grey LIMESTONE Fine Grained Vuggy, calcite crystals visible Grey LIMESTONE Fine Grained Laminated, porous and dense Grey END OF BOREHOLE No groundwater observed prior to starting wash boring below approx. 9.6 m on July 7, 2011 Water Level measured in Piezometer VWP T7-1-P9 at elevation 180.4m on July 24, 2011 Water Level measured in Piezometer VWP T7-1-P9 at elevation 180.5m on August 6, 2011 Water Level measured in Piezometer VWP T7-1-P20 at elevation 180.4m July 24, 2011 Water Level measured in Piezometer VWP T7-1-P20 at elevation 180.4m on August 6, 2011 | | 27 | RC | | | 146 | | | | | | | | | | |
| | | | | | | | 145 | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No T7-2

1 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679331.1, E332388.2 ORIGINATED BY SD
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 5, 11 - Jul 7, 11 CHECKED BY MSO

| 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 (%) |
|---------------|--------------------------------|------------|---------|------|------------|----------------------------|-----------------|---|--------------|----|------------------------------------|-------------------------------------|-----------------------------------|--|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | | | | | | |
| | | | | | | | | ● POCKET PEN. | × LAB VANE | | | | | | |
| | | | | | | | 20 | 40 | 60 | 80 | 100 | WATER CONTENT (%) | | | |
| 181.2 | Ground Surface | | | | | | | | | | | | | | |
| 0.0 | TOPSOIL | | | | | | 181 | | | | | | | | -Vibrating Wire Piezometers (VWP) installed in sampled borehole |
| 180.9 | Black | | | | | | | | | | | | | | |
| 0.3 | CLAYEY SILT | | | | | | | | | | | | | | -Nilcon vane advanced to sampled borehole from 5.5m to 25m (EL. 175.7m to EL. 156.2m) |
| | Some sand and gravel | | | | | | | | | | | | | | |
| | Soft to very stiff | | | | | | | | | | | | | | |
| | Mottled grey and brown to grey | | 1 | SS | 11 | | | | | | | | | | |
| | Moist | | | | | | | | | | | | | | |
| | | | 2 | SS | 18 | | | | | | | | | | |
| | Brown with Grey seams | | | | | | | | | | | | | | |
| | Brown | | 3 | SS | 22 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | -Becoming grey | | 4 | SS | 18 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | Grey | | 5 | SS | 12 | | | | | | | | | | |
| | | | 6 | SS | 8 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | Moist to wet | | 7 | SS | 5 | | | | | | | | | | |
| | | | 8 | TW | PH | | | | | | | | | | |
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| | | | | | | | | | | | | | | | |
| | Some sand, trace gravel | | 9 | SS | PH | | | | | | | | | | |
| | Moist to wet | | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

METRIC

[illegible]

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No T7-2

3 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679331.1, E332388.2 ORIGINATED BY SD
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 5, 11 - Jul 7, 11 CHECKED BY MSO

| 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 | | | | | | |
| | | | | | | | | ● POCKET PEN. X LAB VANE | | | | | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | |
| | | | | | | | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | | |
| | | | | | | | | | | WATER CONTENT (%) | | | | |
| | | | | | | | | | | 10 20 30 | | | | |
| 147.7 | Gravelly SAND Well-Graded Some silt Very dense Grey (continued) | | 24 | SS | | | 151 | | | | | | | |
| 33.5 | | | | | | | 150 | | | | | | | |
| | | | 25 | SS | | | 149 | | | | | | | |
| | -Cobbles | | 26 | RC | | | 148 | | | | | | | |
| | | | | | | | 147 | | | | | | | |
| 146.1 | Bedrock LIMESTONE -Not weathered | | 27 | RC | | | 146 | | | | | | | |
| 35.1 | END OF BOREHOLE | | | | | | 145 | | | | | | | |
| | No groundwater observed prior to starting wash boring below 15 m on July 6, 2011 | | | | | | 144 | | | | | | | |
| | Water Level measured in Piezometer VWP T7-2-P9 at elevation 179.5m on July 24, 2011 | | | | | | 143 | | | | | | | |
| | Water Level measured in Piezometer VWP T7-2-P9 at elevation 179.7m on August 6, 2011 | | | | | | 142 | | | | | | | |
| | Water Level measured in Piezometer VWP T7-2-P20 at elevation 180.3m on July 24, 2011 | | | | | | 141 | | | | | | | |
| | Water Level measured in Piezometer VWP T7-2-P20 at elevation 181.0m on August 6, 2011 | | | | | | 140 | | | | | | | |
| | Water Level measured in Piezometer VWP T7-2-P32 at elevation 177.3m on July 24, 2011 | | | | | | 139 | | | | | | | |
| | Water Level measured in Piezometer VWP T7-2-P32 at elevation 177.7m on August 6, 2011 | | | | | | 138 | | | | | | | |
| | | | | | | | 137 | | | | | | | |

-NW Casing refusal
-VWP #T7-2-P32 installed at 32.31m below ground surface (EL. 148.9m)
-continue with NQ Core, no bedrock
-only 15" recovery 1 solid piece, the rest possibly lost in BH
RQD = 25%

+³, X³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

METRIC

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No T7-3

2 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679255.7, E332473.2 ORIGINATED BY DG
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 9, 11 - Jul 10, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | |
|---------------|--|------------|---------|------|------------|----------------------------|-----------------|---|----------------------------|-------------------------|-------------------------|---|--|--|--|---|----|----|----|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | WATER CONTENT (%) | | | | GR | SA | SI | CL |
| | | | | | | | | ○ UNCONFINED ● POCKET PEN. | + FIELD VANE × LAB VANE | 20 40 60 80 100 | 20 40 60 80 100 | W _P W W _L | | | | | | | |
| | CLAYEY SILT Some fine sand, trace pink clay pockets, wet Grey <i>(continued)</i> | | 14 | TW | PH | | 166 | | | | | | | | | | | | |
| 165.2 | | | | VT | | | | | | | | | | | | | | | |
| 16.5 | SILTY CLAY/CLAYEY SILT Trace sand, fine-coarse gravel Very soft to very stiff Grey | | 15 | SS | 0 | | 165 | | | | | | | | | | | | |
| | | | | | | | 164 | | | | | | | | | | | | |
| | | | 16 | TW | PH | | 163 | | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | | | |
| | -Trace sand | | 17 | TW | PH | | 162 | | | | | | | | | | | | |
| | | | | | | | 161 | | | | | | | | | | | | |
| | | | 18 | SS | 6 | | 160 | | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | | | |
| | | | 19 | TW | PH | | 159 | | | | | | | | | | | | |
| | | | | | | | 158 | | | | | | | | | | | | |
| | | | 20 | TW | PH | | 157 | | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | | | |
| | | | 21 | TW | PH | | 156 | | | | | | | | | | | | |
| | | | | | | | 155 | | | | | | | | | | | | |
| 154.3 | | | | | | | | | | | | | | | | | | | |
| 27.4 | SILTY CLAY Firm Grey Wet | | 22 | TW | PH | | 154 | | | | | | | | | | | | |
| | | | | | | | 153 | | | | | | | | | | | | |
| 152.7 | SILT Trace fine sand and gravel Grey Saturated | | 23 | SS | 9 | | 152 | | | | | | | | | | | | |
| 29.0 | | | | | | | | | | | | | | | | | | | |

Continued Next Page

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

ONTARIO MOT. SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

METRIC

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

RECORD OF BOREHOLE No CPT T7-1

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4679346N, 332317E ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 11, 11 - Jul 11, 11 CHECKED BY MSO

| 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 | | | | | | | | |
| 181.2 | Ground Surface | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | |
| 180.8 | | | | | | | | | | | | | | | | |
| 0.4 | SAND Poorly graded Trace to some silt Brown | | 1A, B | SS | 8 | | | | | | | | | | | |
| 180.1 | | | | | | | | | | | | | | | | |
| 1.1 | SILTY CLAY Some sand, trace gravel Mottled brown and grey Brown -Trace fissures | | 2 | SS | 15 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | Grey -Trace oxidation | | 3 | SS | 14 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 177.7 | | | | | | | | | | | | | | | | |
| 3.5 | END OF BOREHOLE (continued with CPT to refusal) Borehole dry upon completion | | | | | | | | | | | | | | | |
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+ 3, × 3: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No CPT T7-2

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679276.9, E332433.5 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 23, 11 - Jul 23, 11 CHECKED BY MSO

| 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 | | | | | | | | | | WATER CONTENT (%) | |
| | | | | | | | | ○ UNCONFINED ● POCKET PEN. | + FIELD VANE × LAB VANE | | | | | | | | | | |
| 181.2 | Ground Surface | | | | | | | | | | | | | | | | | | |
| 0.0 180.9 | TOPSOIL | | | | | | | | | | | | | | | | | | |
| 0.3 | SAND | | | | | | | | | | | | | | | | | | |
| 180.4 | Poorly graded, trace silt Brown | | | | | | | | | | | | | | | | | | |
| 0.8 | SILTY CLAY | | 1 | SS | 11 | | | | | | | | | | | | | | |
| | Some sand, trace gravel Mottled brown-grey to brown | | | | | | | | | | | | | | | | | | |
| 179.2 | | | 2 | SS | 13 | | | | | | | | | | | | | | |
| 2.0 | END OF SAMPLED BOREHOLE Continued with CPT from 2.0 m to refusal at 22.1 m (El. 179.2 m to El. 157.1 m) Borehole dry upon completion | | | | | | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No DMT T7-1

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679368.7, E332355.7 ORIGINATED BY LC
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 15, 11 - Jul 15, 11 CHECKED BY MSO

| 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 | | | | | | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED ● POCKET PEN. | + FIELD VANE × LAB VANE | | | | | | | | | | | | | | | |
| 181.5 | Pavement Surface | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | | | | | | |
| 0.0 | 25mm Asphalt | | | | | | 181 | | | | | | | | | | | | | | | | | |
| 180.7 | 152mm Crushed Limestone, Silty | | | | | | | | | | | | | | | | | | | | | | | |
| 0.8 | 254mm Brown Silty Sand with gravel to 304mm Weathered Brown Sandy Clay with Topsoil FILL | | 1 | SS | 4 | | | | | | | | | ○ | | | | | | | | | | |
| 180.3 | SILTY CLAY Some sand, trace gravel Trace organics, weathered brown | | | | | | 180 | | | | | | | | | | | | | | | | | |
| 1.2 | END OF SAMPLED BOREHOLE Continued with DMT from 2.0 m to refusal at 16.8 m (El. 179.5 m o El. 164.7 m) Borehole dry upon completion | | | | | | 179 | | | | | | | | | | | | | | | | | |
| | | | | | | | 178 | | | | | | | | | | | | | | | | | |
| | | | | | | | 177 | | | | | | | | | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | | | | | | | | | |
| | | | | | | | 175 | | | | | | | | | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | | | | | | | | | |
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| | | | | | | | 171 | | | | | | | | | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | | | | | | | | | |
| | | | | | | | 169 | | | | | | | | | | | | | | | | | |
| | | | | | | | 168 | | | | | | | | | | | | | | | | | |
| | | | | | | | 167 | | | | | | | | | | | | | | | | | |

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

METRIC



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

RECORD OF BOREHOLE No TB5-2

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679261.2, E332400.9 ORIGINATED BY LC
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 10, 11 - Jul 10, 11 CHECKED BY MSO

| 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 | | | | | | | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● POCKET PEN. × LAB VANE | | | | | | | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | | | |
| 180.8 | Ground Surface | | | | | | | | | | | | | | | |
| 0.0 | TOPSOIL |  | | | | | | | | | | | | | | |
| 180.2 | CLAYEY SILT Some sand, trace gravel Firm to very stiff Mottled brown and grey Heavily weathered topsoil/roots in fissures in upper 1 m Trace pink nodules below approx. 7 m (El. 173.8 m) Brown -Trace roots, hairline sand/silt seams Grey Alternating layers of very stiff Brown-Grey Silty Clay and Sandy Clay -Hairline sand silt lenses -Vertical fissures |  | 1 | SS | 6 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | 2 | SS | 11 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | 3 | SS | 19 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | 4 | SS | 15 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | 5 | SS | 9 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | 6 | SS | 8 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | 7 | SS | 7 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | 8 | SS | 6 | | | | | | | | | | | |
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| | | | | VT | | | | | | | | | | | | |
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| | | | 9 | SS | 4 | | | | | | | | | | | |
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| | | | 10 | SS | 4 | | | | | | | | | | | |
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| | | | | VT | | | | | | | | | | | | |
| 170.7 | END OF BOREHOLE | | | | | | | | | | | | | | | |
| 10.1 | Borehole dry on completion | | | | | | | | | | | | | | | |
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ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No TB5-3

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679239.6, E332429.4 ORIGINATED BY LC
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 10, 11 - Jul 10, 11 CHECKED BY MSO

| 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 | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED ● POCKET PEN. | + FIELD VANE × LAB VANE | | | | | | | | | |
| 181.3 | Ground Surface | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | |
| 0.0 | TOPSOIL Sandy Black | | A | AS | | | 181 | | | | | | | | | | | |
| 180.9 | | | | | | | | | | | | | | | | | | |
| 0.4 | FINE SAND Trace to some silt Brown-yellow | | 1 | SS | 5 | | | | | | | | | | | | | |
| 179.8 | | | | | | | 180 | | | | | | | | | | | |
| 1.5 | CLAYEY SILT Some sand, trace gravel, fissured Firm to very stiff Brown to grey Trace pink nodules below approx. 5.5 m (El. 175.8 m) Fissured Hairline sand/silt lenses | | 2 | SS | 17 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 3 | SS | 18 | | 179 | | | | | | | | | | | |
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| | | | 4 | SS | 19 | | 178 | | | | | | | | | | | |
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| | | | 5 | SS | 11 | | 177 | | | | | | | | | | | |
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| | | | 6 | SS | 7 | | 176 | | | | | | | | | | | |
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| | | | 7 | SS | 6 | | 175 | | | | | | | | | | | |
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| | | | 8 | SS | 6 | | 174 | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | | |
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| | | | 9 | SS | 5 | | 173 | | | | | | | | | | | |
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| | | | 10 | SS | 4 | | 172 | | | | | | | | | | | |
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| | | | | VT | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 171.2 | END OF BOREHOLE | | | | | | 171 | | | | | | | | | | | |
| 10.1 | Borehole dry on completion | | | | | | | | | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | | | |
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| | | | | | | | 169 | | | | | | | | | | | |
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| | | | | | | | 168 | | | | | | | | | | | |
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| | | | | | | | 167 | | | | | | | | | | | |

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No TB5-4

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679221.9, E332459.0 ORIGINATED BY SD
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 10, 11 - Jul 10, 11 CHECKED BY MSO

| 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 | | | | | | | | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | | | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● POCKET PEN. × LAB VANE | | | | | | | | | |
| | | | | | | | 20 40 60 80 100 | | | | | WATER CONTENT (%) 10 20 30 | | | | | |
| 181.7 | Ground Surface | | | | | | | | | | | | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | | |
| 181.4 | some sand | | | | | | | | | | | | | | | | |
| 0.3 | Black | | | | | | | | | | | | | | | | |
| 181.1 | SAND | | | | | | | | | | | | | | | | |
| 0.6 | Some silt | | | | | | | | | | | | | | | | |
| | Brown | | 1 | SS | 6 | | 181 | | | | | | | ○ | | | |
| | CLAYEY SILT | | | | | | | | | | | | | | | | |
| | Some sand, trace gravel | | | | | | | | | | | | | ○ | | | |
| | Firm to very stiff | | 2 | SS | 15 | | 180 | | | | | | | | | | |
| | Mottled brown and grey | | | | | | | | | | | | | ○ | | | |
| | Brown | | | | | | | | | | | | | | | | |
| | -Fissured with sandy silt hairline lenses | | 3 | SS | 19 | | 179 | | | | | | | | | | |
| | | | | | | | | | | | | | | ○ | | | |
| | Grey | | 4 | SS | 15 | | 178 | | | | | | | | | | |
| | -Fissured | | | | | | | | | | | | | ○ | | | |
| | | | 5 | SS | 15 | | 177 | | | | | | | | | | |
| | | | | | | | | | | | | | | ○ | | | |
| | | | 6 | SS | 9 | | 176 | | | | | | | | | | |
| | | | | | | | | | | | | | | ○ | | | |
| | | | 7 | SS | 7 | | 175 | | | | | | | | | | |
| | | | | | | | | | | | | | | ○ | | | |
| | | | 8 | SS | 5 | | 174 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | |
| | | | 9 | SS | 5 | | 173 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | ○ | | | |
| | | | 10 | SS | 4 | | 172 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | |
| 171.6 | END OF BOREHOLE | | | | | | | | | | | | | | | | |
| 10.1 | Borehole dry on completion | | | | | | | | | | | | | | | | |
| | | | | | | | 171 | | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | | |
| | | | | | | | 169 | | | | | | | | | | |
| | | | | | | | 168 | | | | | | | | | | |
| | | | | | | | 167 | | | | | | | | | | |

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No PS3-1

1 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679421.9, E332245.3 ORIGINATED BY RL
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Aug 9, 11 - Aug 11, 11 CHECKED BY MSO

| 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 (%) |
|---------------|-----------------------------------|------------|---------|------|------------|----------------------------|-----------------|---|--------------|---------------|------------|------------------------------------|-------------------------------------|-----------------------------------|--|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● POCKET PEN. | × LAB VANE | | | | | |
| 181.3 | Ground Surface | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | |
| 0.0 | ASPHALT | | | | | | | | | | | | | | | |
| | FILL | | | | | | | | | | | | | | | |
| | Crushed limestone sand and gravel | | | | | | | | | | | | | | | |
| | Grey | | | | | | | | | | | | | | | |
| 180.5 | | | | | | | | | | | | | | | | |
| 0.8 | FILL | | | | | | | | | | | | | | | |
| 180.2 | Sand and gravel | | 1 | SS | 10 | | | | | | | | | | | |
| 1.1 | Brown | | | | | | | | | | | | | | | |
| | SAND | | | | | | | | | | | | | | | |
| | Trace silt | | | | | | | | | | | | | | | |
| 179.5 | Loose | | 2 | SS | 9 | | | | | | | | | | | |
| 1.8 | Brown | | | | | | | | | | | | | | | |
| | CLAYEY SILT | | | | | | | | | | | | | | | |
| | Trace sand | | | | | | | | | | | | | | | |
| | Firm to very stiff | | | | | | | | | | | | | | | |
| | Grey, trace pink nodules | | | | | | | | | | | | | | | |
| | Wet | | | | | | | | | | | | | | | |
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Continued Next Page

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

METRIC

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

RECORD OF BOREHOLE No DMT05-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679146.3, E332752.1 ORIGINATED BY LC
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 31, 11 - May 31, 11 CHECKED BY MSO

| 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 | | | | | | | | | | WATER CONTENT (%) | | | | |
| | | | | | | | | ○ UNCONFINED | + | FIELD VANE | × | LAB VANE | | | | | | | | | | |
| | | | | | | | | ● POCKET PEN. | | | | | | | | | | | | | | |
| 183.8 | Ground Surface | | | | | | | | | | | | | | | | | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | | | | | | | |
| 183.5 | | | | | | | | | | | | | | | | | | | | | | |
| 0.3 | FINE SAND Trace silt, trace rootlets Compact Reddish-brown | | 1 | SS | 11 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| | -Trace rootlets Wet to saturated | | 2 | SS | 13 | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| 181.5 | CLAYEY SILT Some sand, trace rootlets alternating layers of clayey silt and sandy silt to approx. 6.5 m (El. 177.3 m) Stiff to very stiff Grey -Silt and gravel inclusions | | 3 | SS | 21 | | | | | | | | | | | | | | | | | |
| 2.3 | | | | | | | | | | | | | | | | | | | | | | |
| | | | 4 | SS | 23 | | | | | | | | | | | | | | | | | |
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| | | | 5 | SS | 21 | | | | | | | | | | | | | | | | | |
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| | | | 6 | SS | 16 | | | | | | | | | | | | | | | | | |
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| | | | 7 | SS | 17 | | | | | | | | | | | | | | | | | |
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| | | | 8 | SS | 15 | | | | | | | | | | | | | | | | | |
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| | | | 9 | SS | 12 | | | | | | | | | | | | | | | | | |
| 176.5 | END OF SAMPLED BOREHOLE Continued with DMT from 7.8 m to refusal at 26.2 m (El. 176.0 m to El. 157.6 m) Groundwater observed at 1.6 m (El. 182.2 m) during drilling on May 31, 2011 | | | | | | | | | | | | | | | | | | | | | |
| 7.3 | | | | | | | | | | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF NILCON VANE TEST NIL B9-1

Project : Windsor-Essex Parkway

Test Date: 8/4/2011

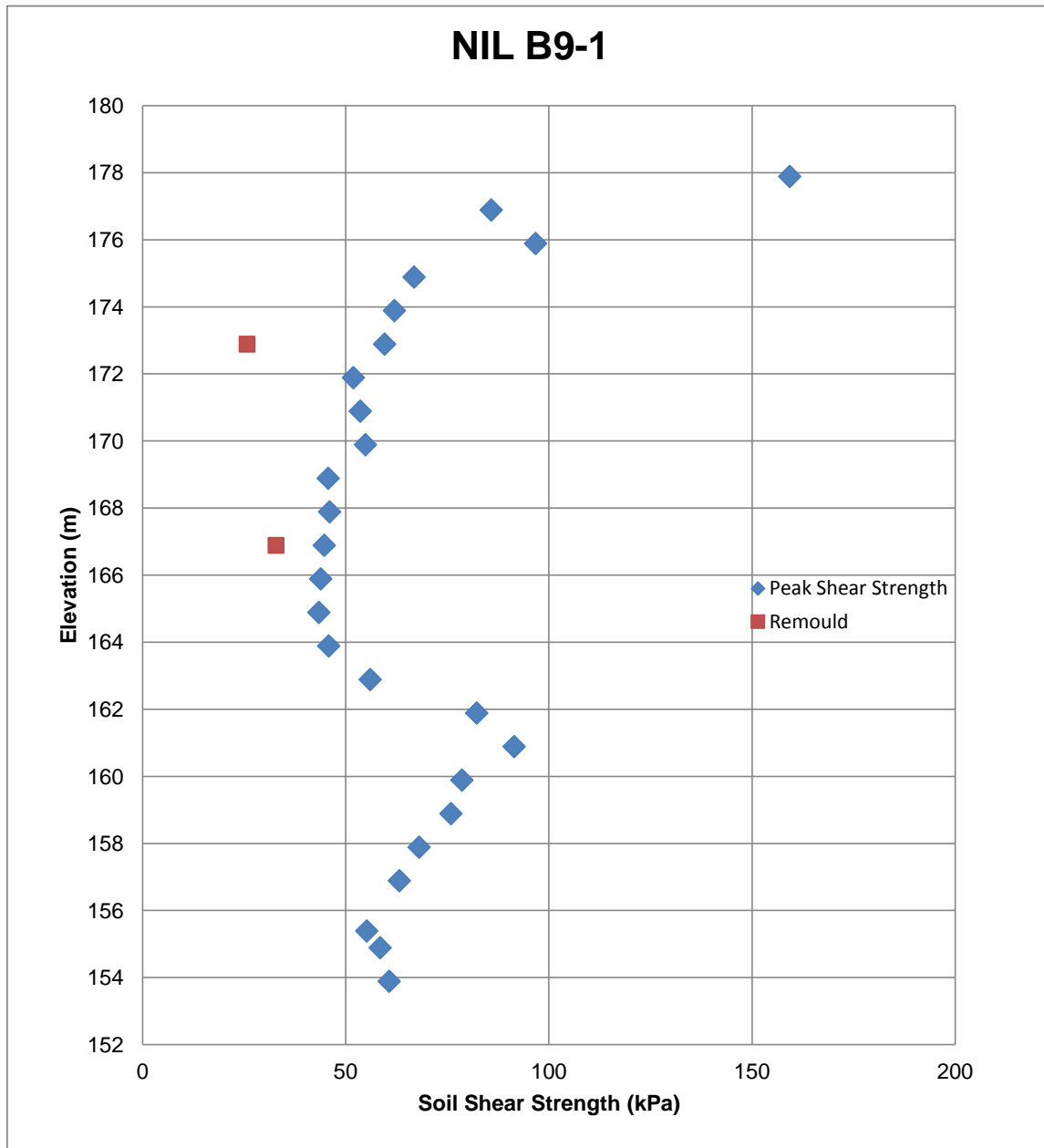
Sheet 1 of 1

Location: N4679233.0; E332592.6

Predrill Depth : 3.0 m

Datum Geodetic

Ground Surface Elevation: 181.9 m



Operator: SD

Checked: DD

RECORD OF NILCON VANE TEST NIL T7-2

Project : Windsor-Essex Parkway

Test Date: 7/8/2011

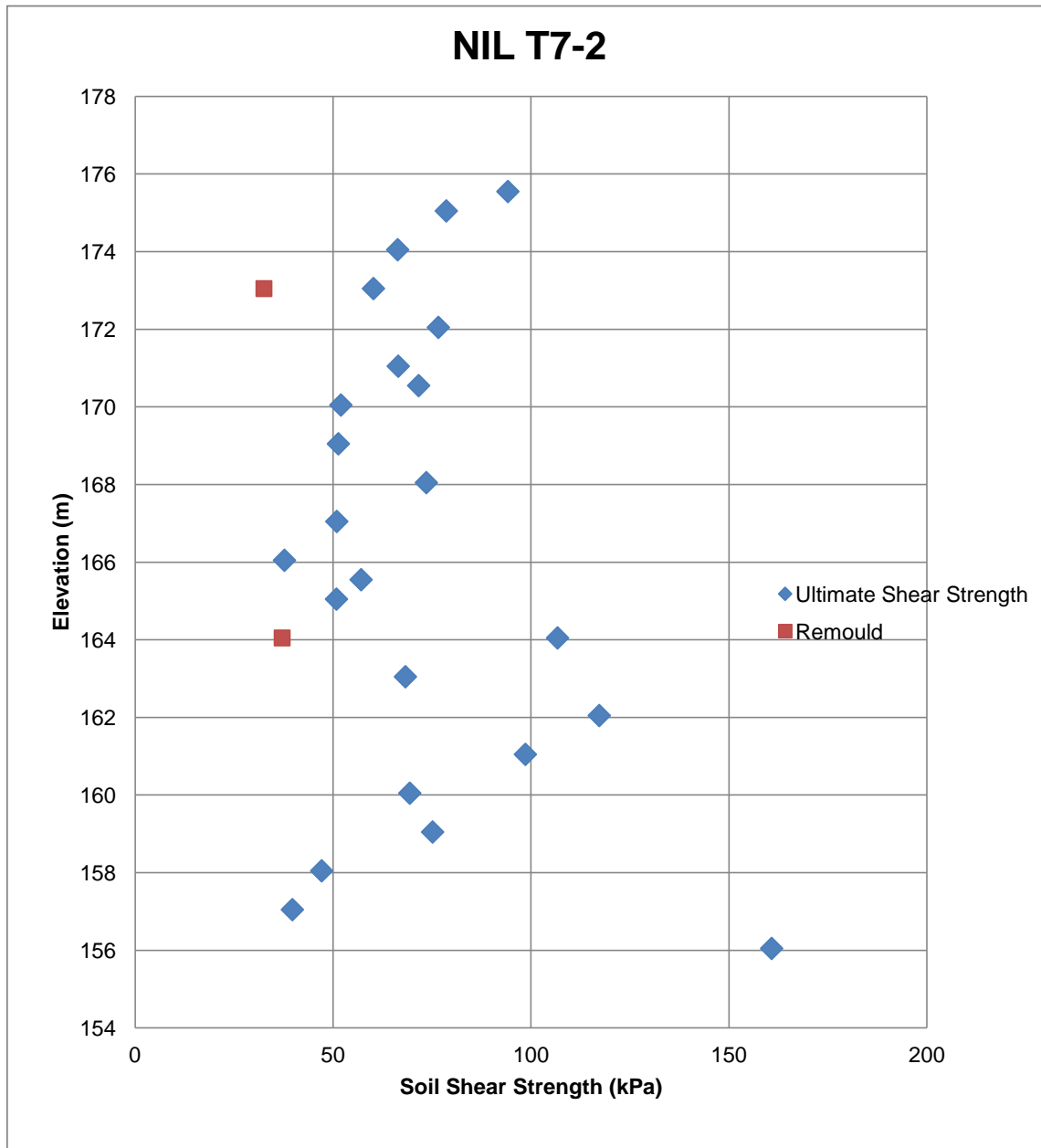
Sheet 1 of 1

Location: N4679332.1; E332390.8

Predrill Depth : 4.6 m

Datum Geodetic

Ground Surface Elevation: 181.0 m



Operator: SD

Checked: DD

RECORD OF NILCON VANE TEST NIL PS3-1

Project : Windsor-Essex Parkway

Test Date: 8/26/2011

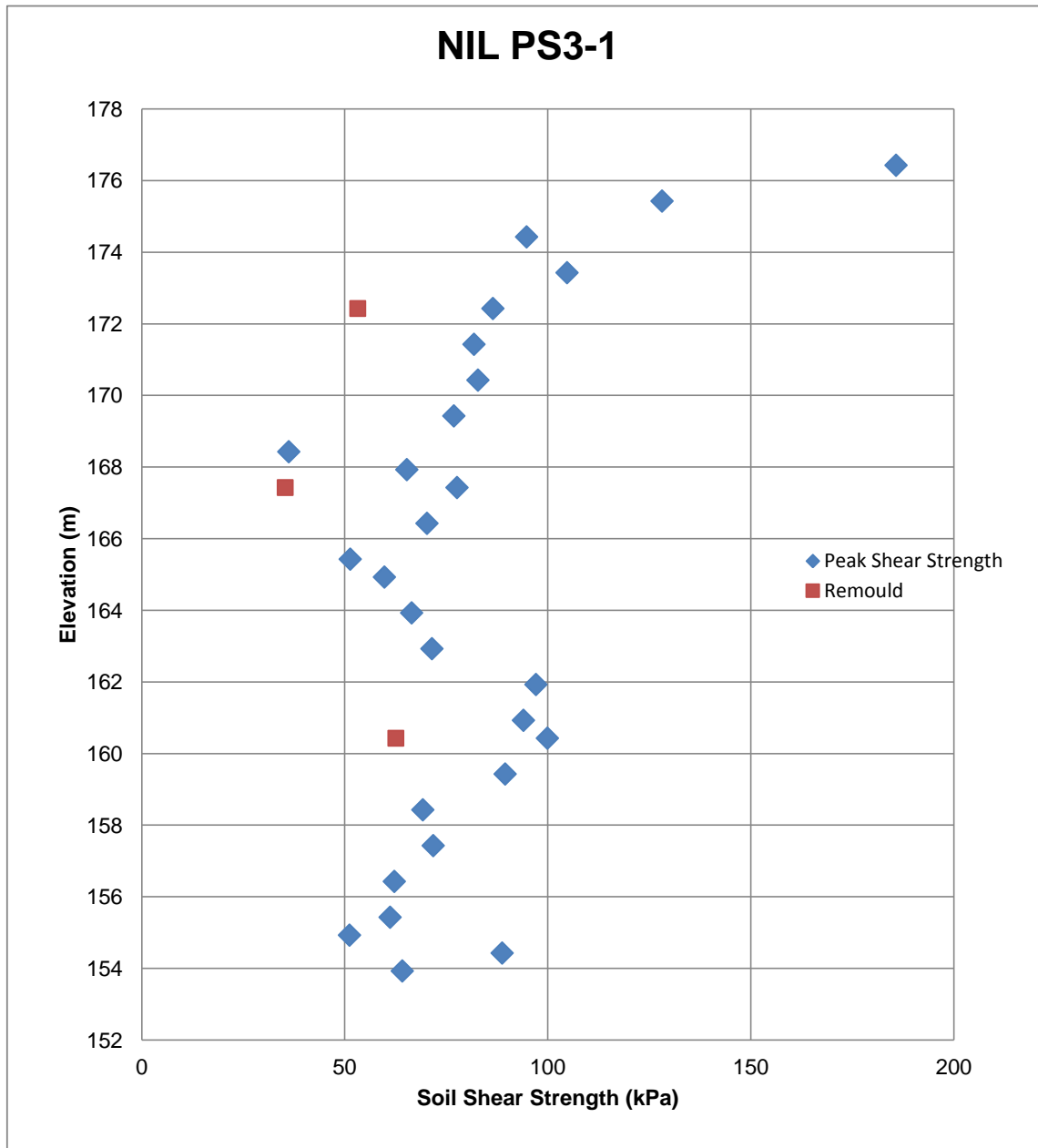
Sheet 1 of 1

Location: N4679419.4; E332251.2

Predrill Depth : 5.0 m

Datum Geodetic

Ground Surface Elevation: 181.4 m



Operator: SD

Checked: DD

RECORD OF CONE PENETRATION TEST CPT B9-1

METRIC

PROJECT Windsor-Essex Parkway

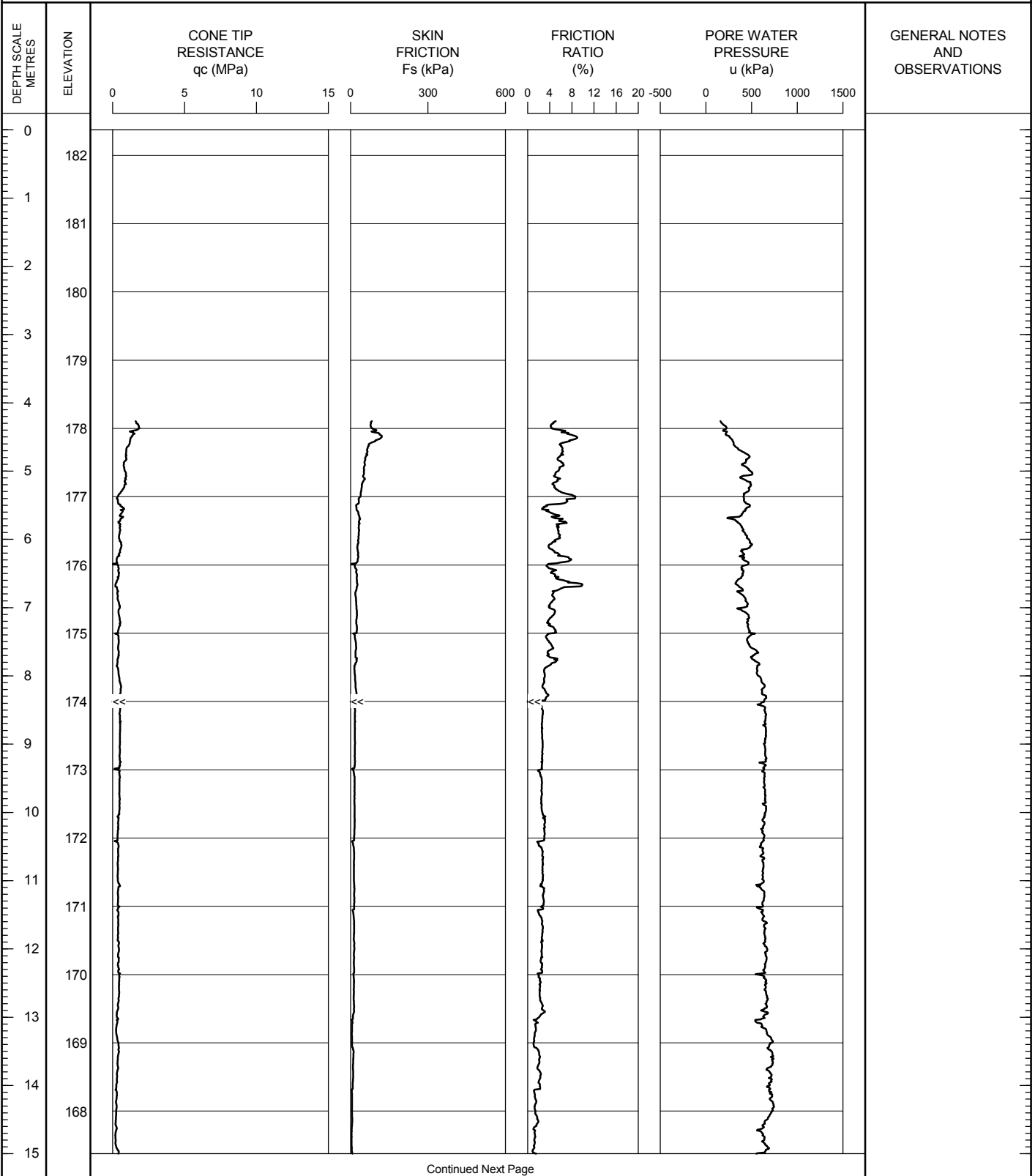
TEST DATE 7/25/2011 - 7/25/2011

SHEET 1 OF 3

LOCATION N4679241.3; E332574.3

DATUM Geodetic

GROUND SURFACE ELEVATION: 182.4 PREDRILL DEPTH: 3.8 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT B9-1

METRIC

PROJECT Windsor-Essex Parkway

TEST DATE 7/25/2011 - 7/25/2011

SHEET 2 OF 3

LOCATION N4679241.3; E332574.3

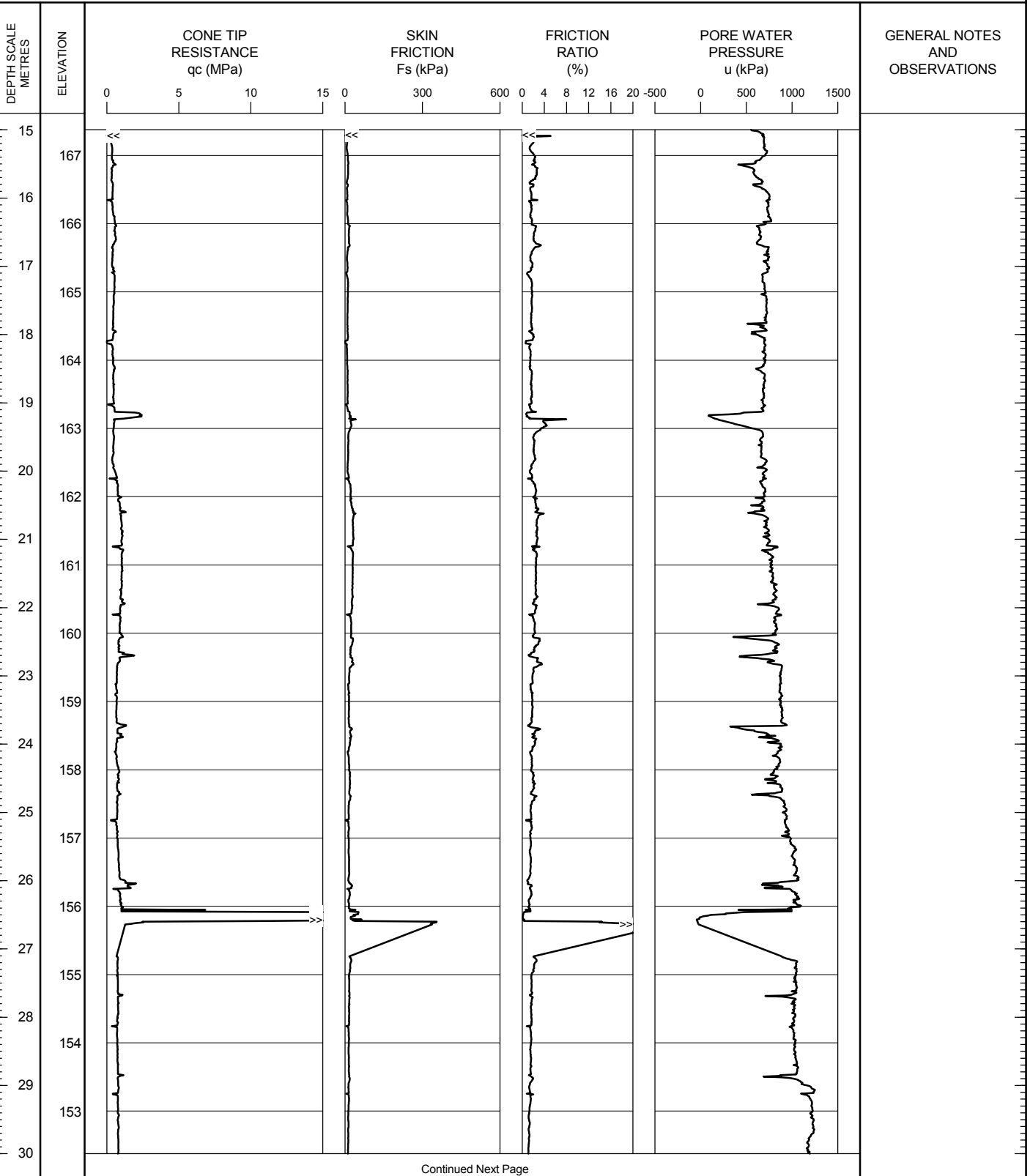
DATUM Geodetic

GROUND SURFACE ELEVATION: 182.4

PREDRILL DEPTH: 3.8

CORRECTION FACTOR A: 0.8

CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT B9-1

METRIC

PROJECT Windsor-Essex Parkway

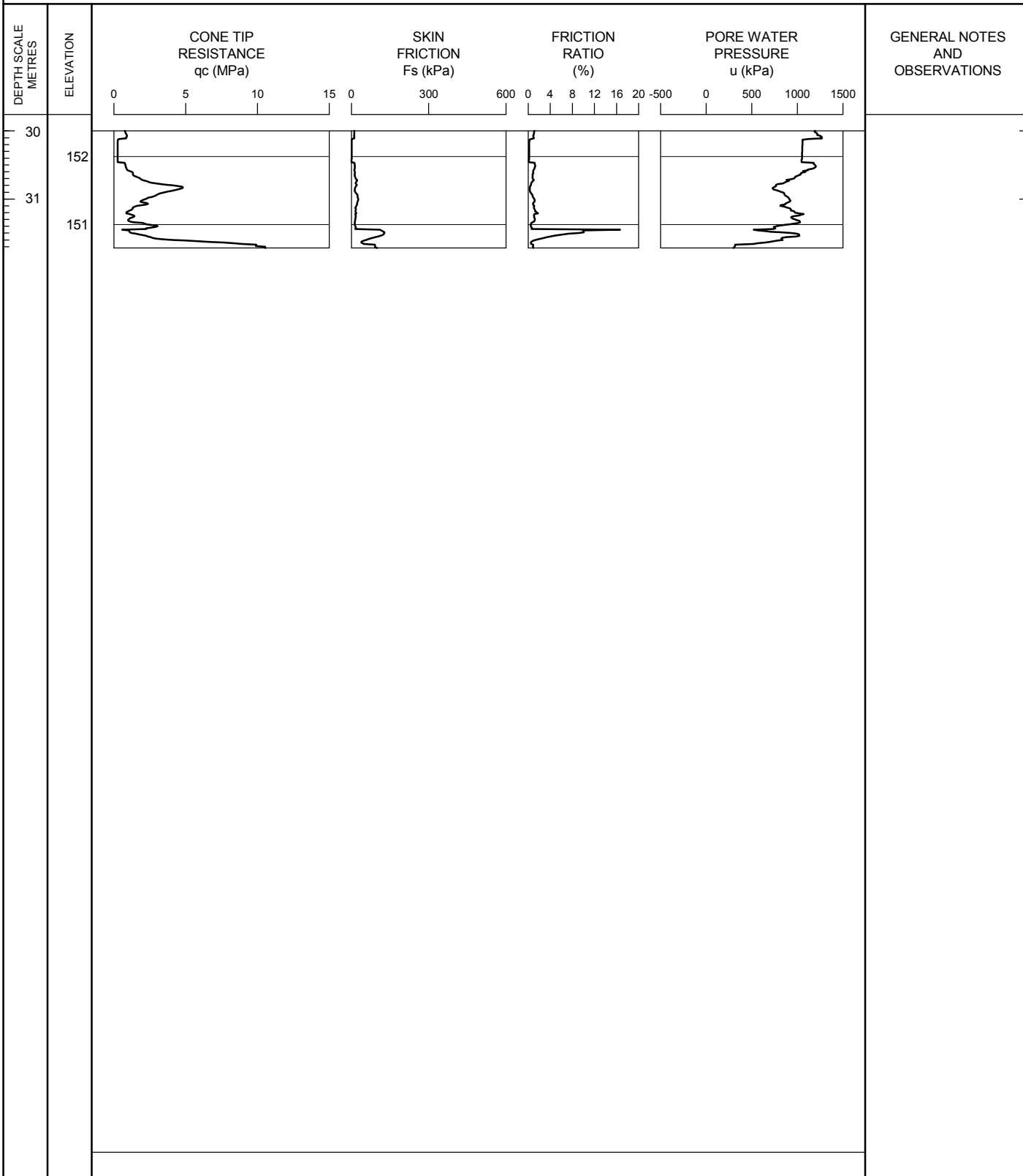
TEST DATE 7/25/2011 - 7/25/2011

SHEET 3 OF 3

LOCATION N4679241.3; E332574.3

DATUM Geodetic

GROUND SURFACE ELEVATION: 182.4 PREDRILL DEPTH: 3.8 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT B9-2

METRIC

PROJECT Windsor-Essex Parkway

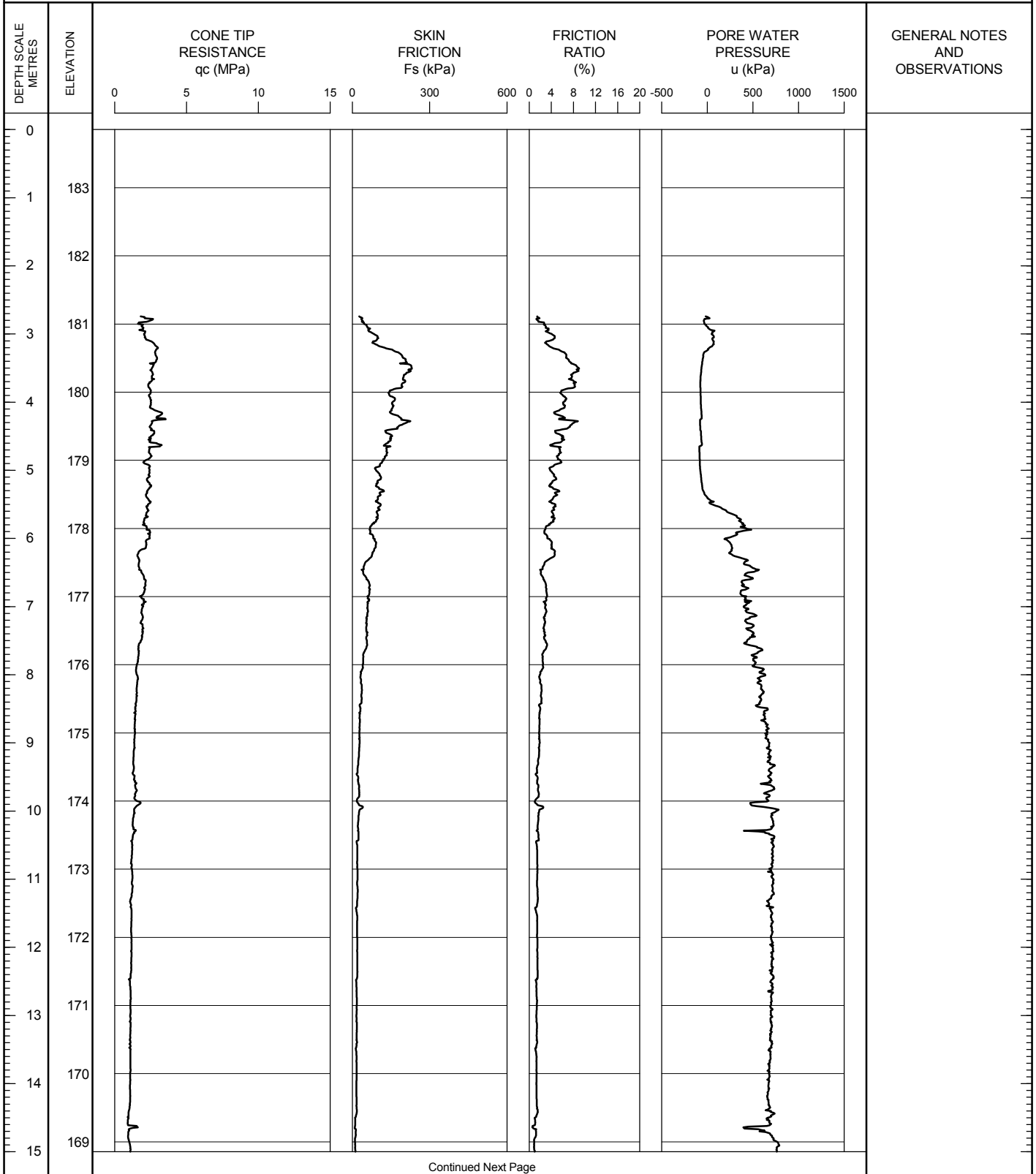
TEST DATE 7/25/2011 - 7/25/2011

SHEET 1 OF 3

LOCATION N4679138.6; E332696.0

DATUM Geodetic

GROUND SURFACE ELEVATION: 183.9 PREDRILL DEPTH: 2.4 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT B9-2

METRIC

PROJECT Windsor-Essex Parkway

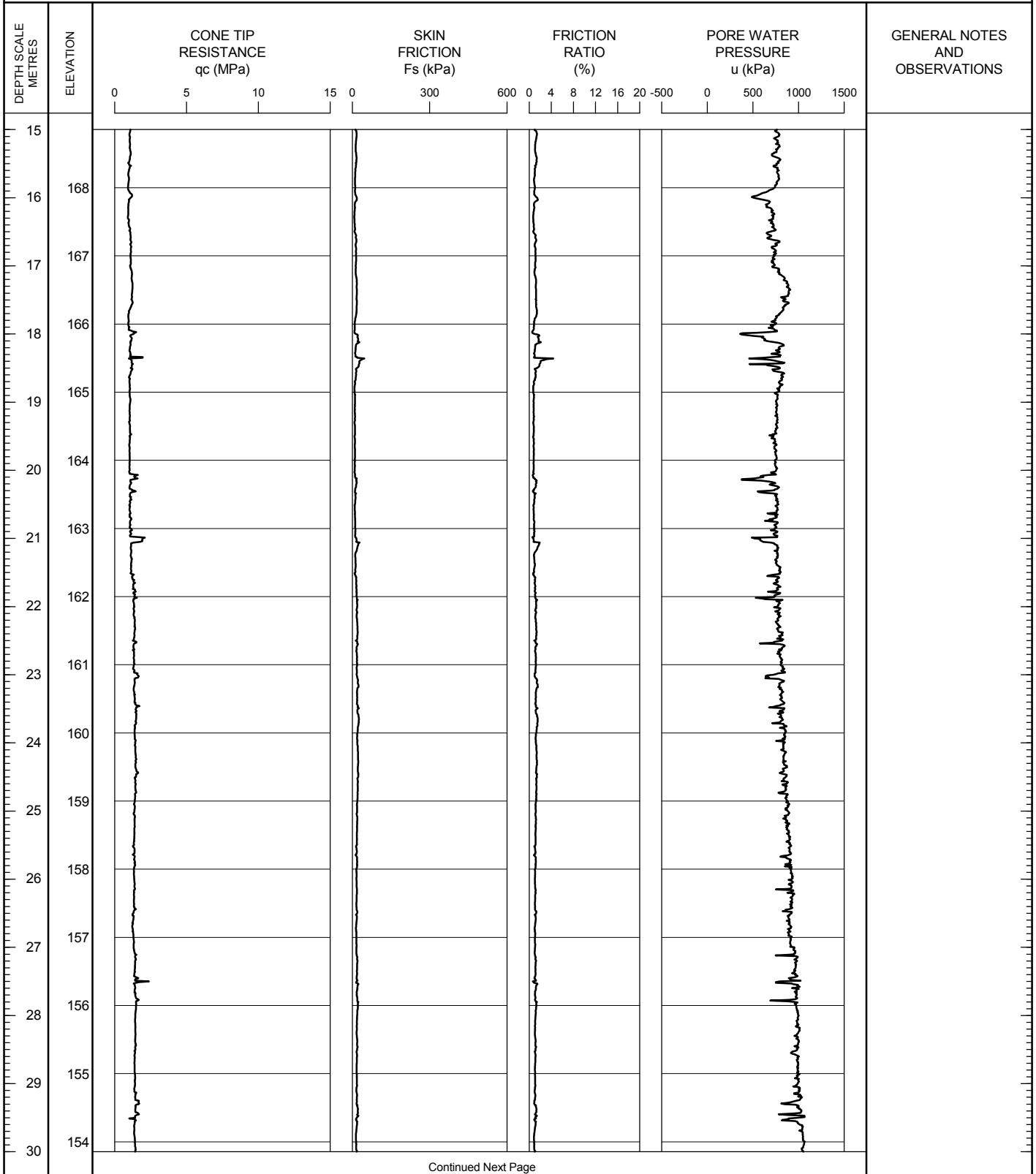
TEST DATE 7/25/2011 - 7/25/2011

SHEET 2 OF 3

LOCATION N4679138.6; E332696.0

DATUM Geodetic

GROUND SURFACE ELEVATION: 183.9 PREDRILL DEPTH: 2.4 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT B9-2

METRIC

PROJECT Windsor-Essex Parkway

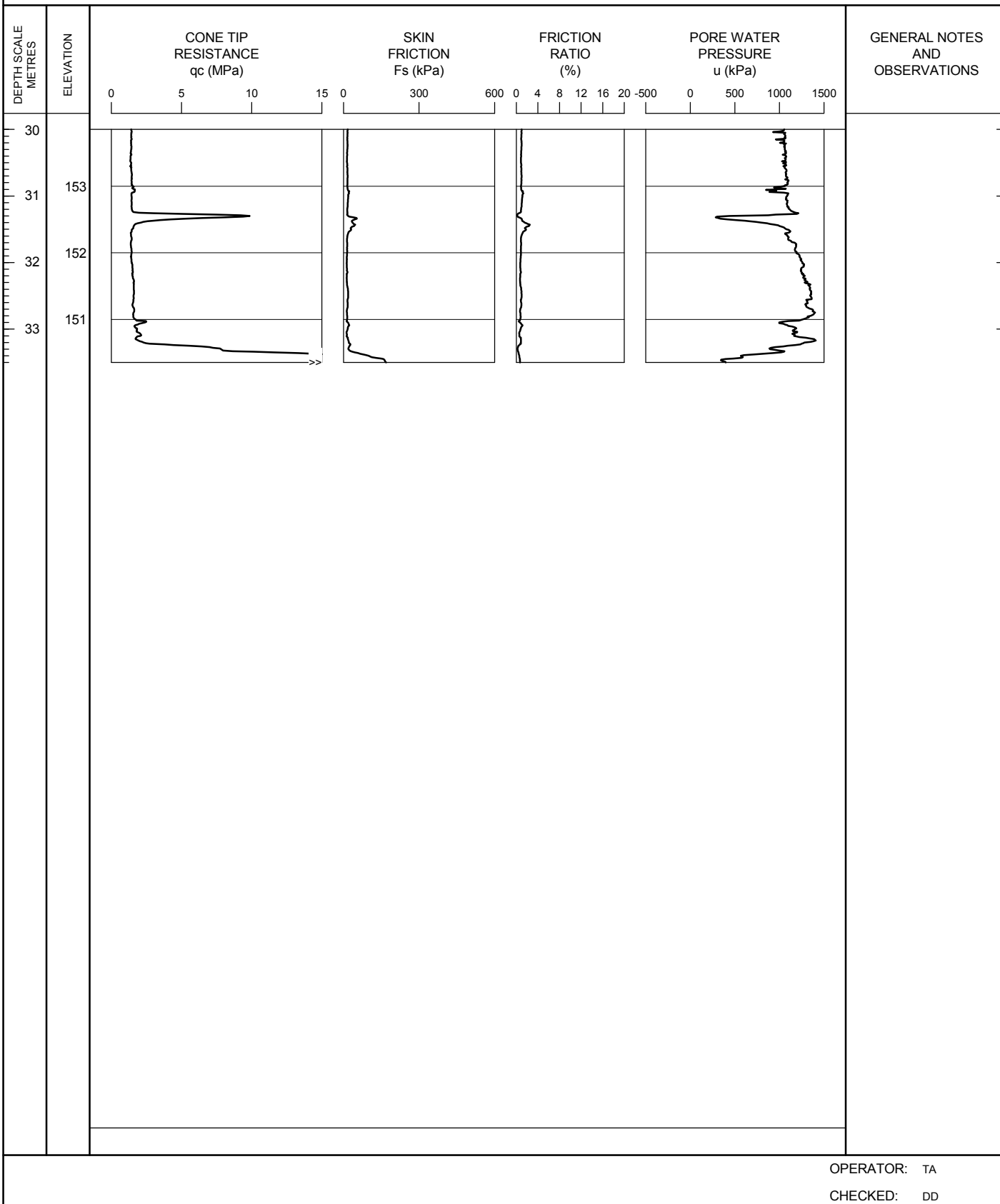
TEST DATE 7/25/2011 - 7/25/2011

SHEET 3 OF 3

LOCATION N4679138.6; E332696.0

DATUM Geodetic

GROUND SURFACE ELEVATION: 183.9 PREDRILL DEPTH: 2.4 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT B9-3

METRIC

PROJECT Windsor-Essex Parkway

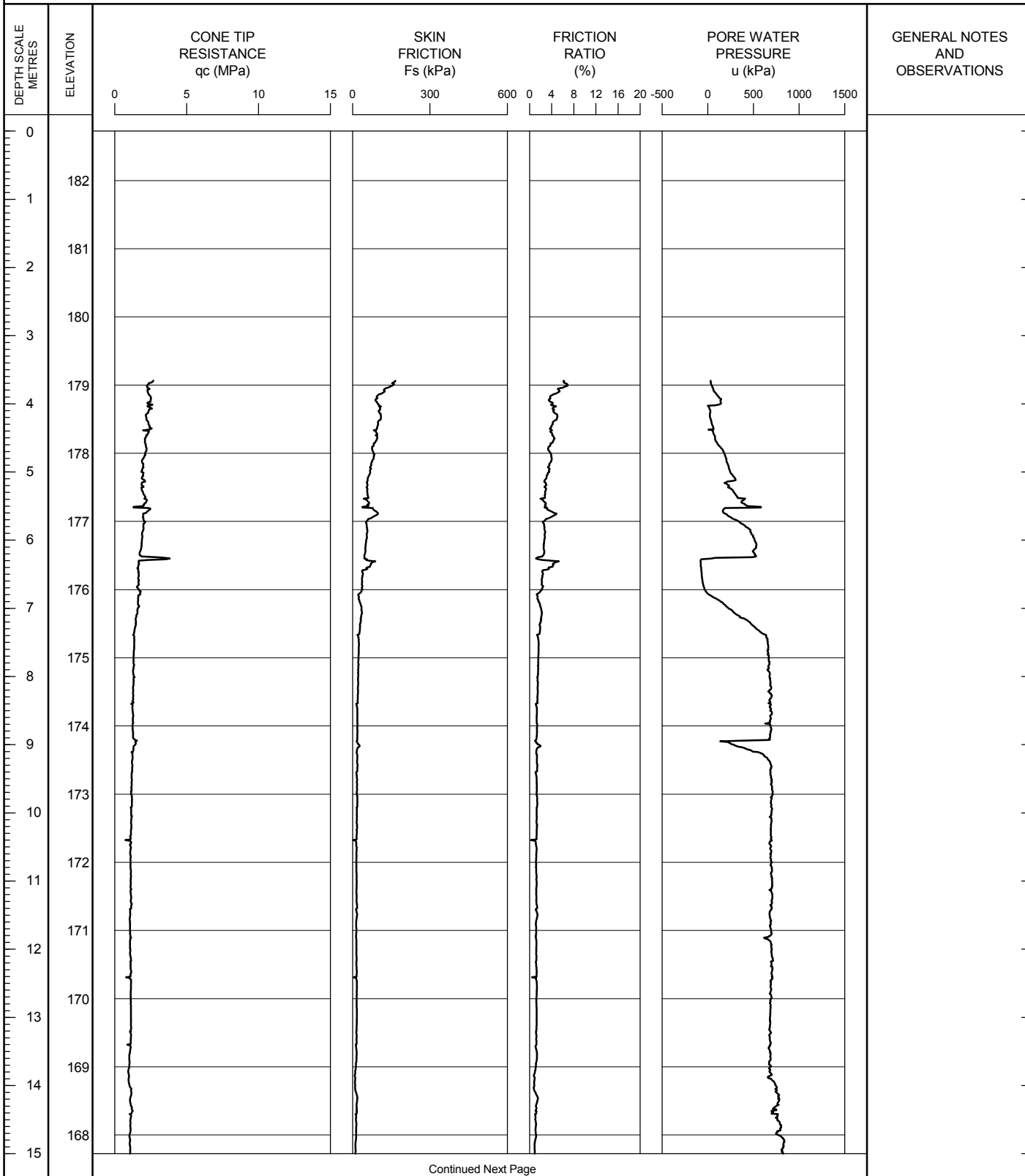
TEST DATE 7/26/2011 - 7/26/2011

SHEET 1 OF 3

LOCATION N4679189.2; E332678.6

DATUM Geodetic

GROUND SURFACE ELEVATION: 182.7 PREDRILL DEPTH: 2.49 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT B9-3

METRIC

PROJECT Windsor-Essex Parkway

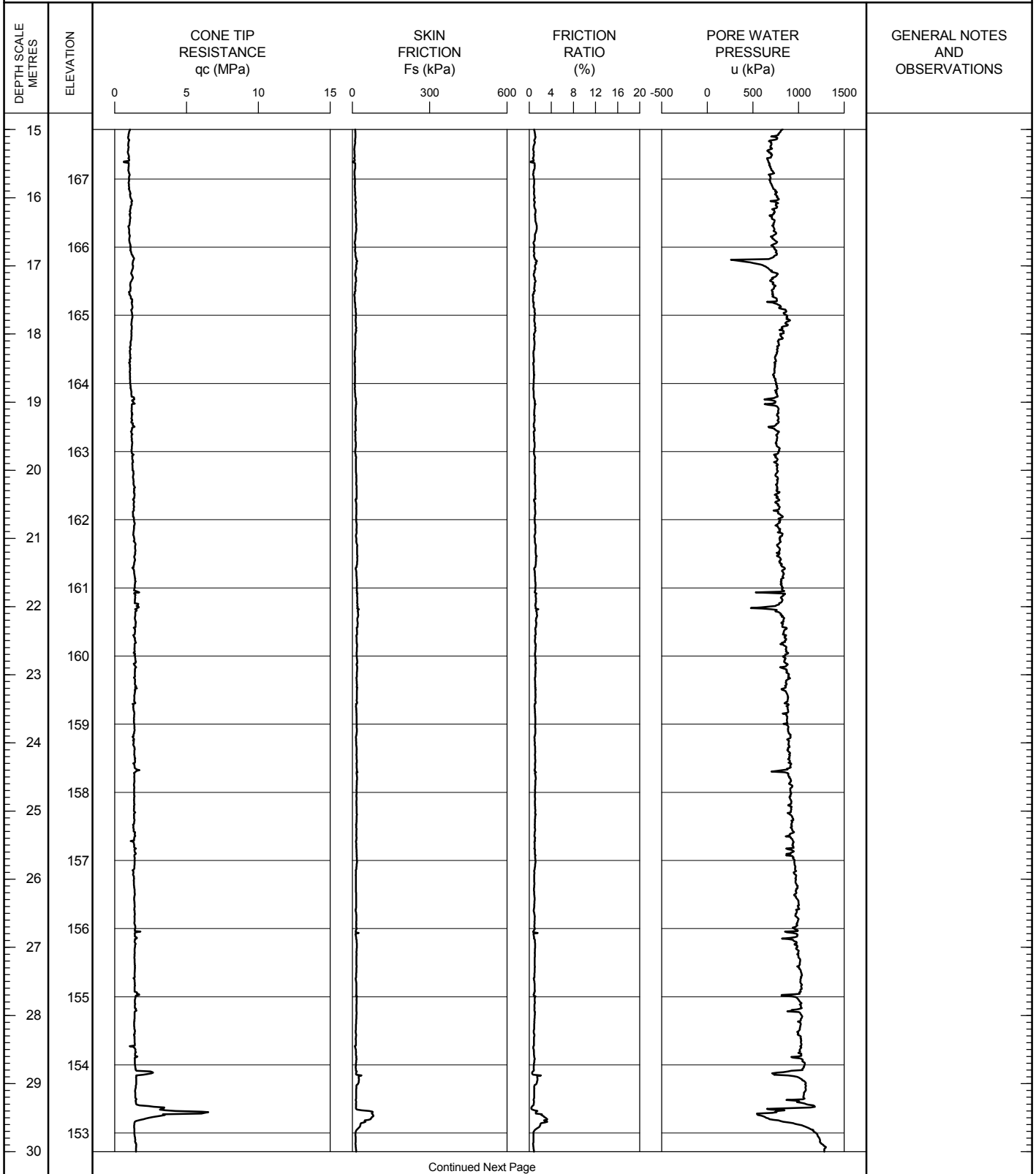
TEST DATE 7/26/2011 - 7/26/2011

SHEET 2 OF 3

LOCATION N4679189.2; E332678.6

DATUM Geodetic

GROUND SURFACE ELEVATION: 182.7 PREDRILL DEPTH: 2.49 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

METRIC

SHEET 3 OF 3

DATUM Geodetic

GROUND SURFACE ELEVATION: 182.7 PREDRILL DEPTH: 2.49 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0

RECORD OF CONE PENETRATION TEST CPT T7-1

METRIC

PROJECT Windsor-Essex Parkway

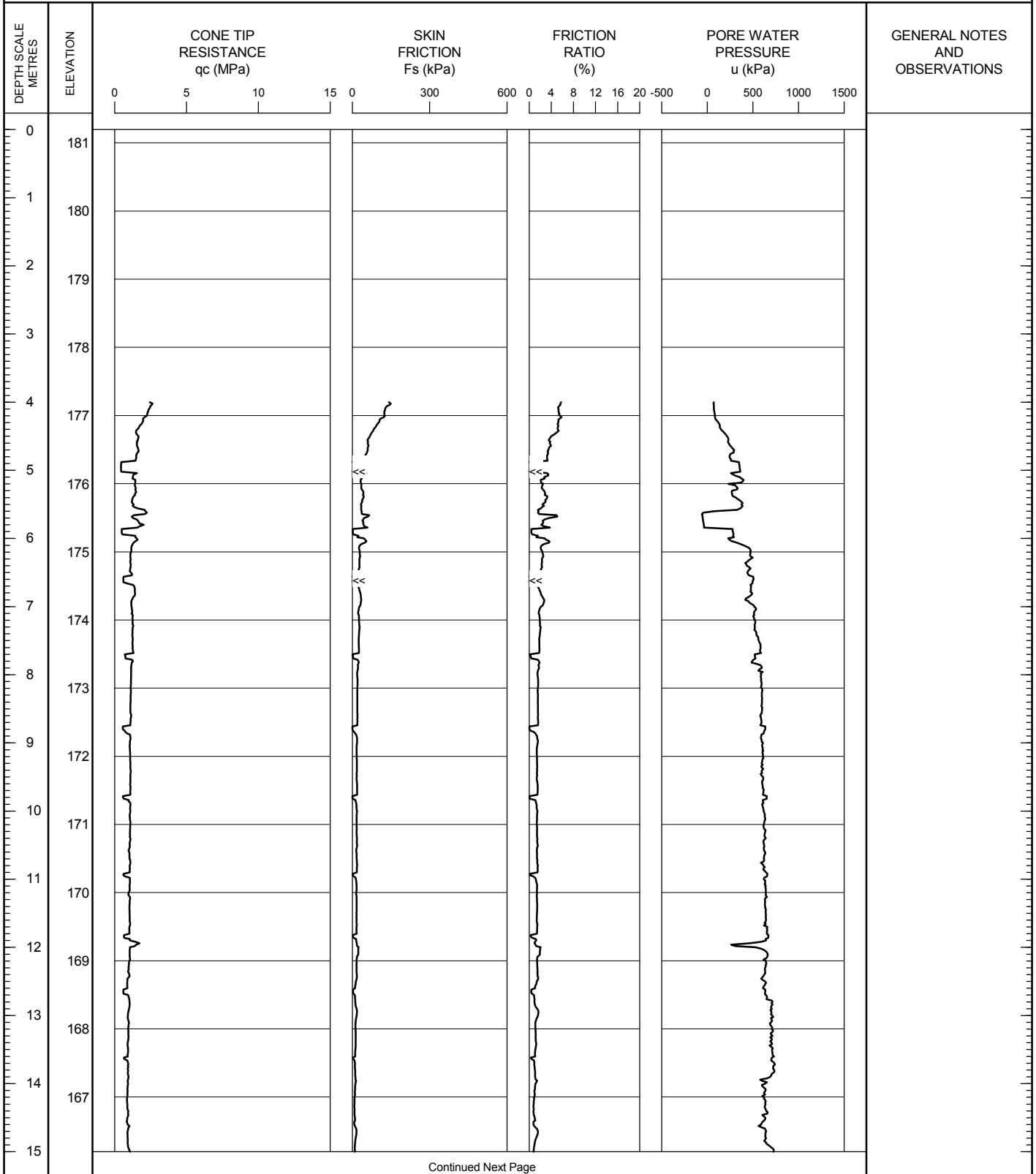
TEST DATE 7/22/2011 - 7/22/2011

SHEET 1 OF 2

LOCATION N4679345.0; E332316.9

DATUM Geodetic

GROUND SURFACE ELEVATION: 181.2 PREDRILL DEPTH: 3.37 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT T7-1

METRIC

PROJECT Windsor-Essex Parkway

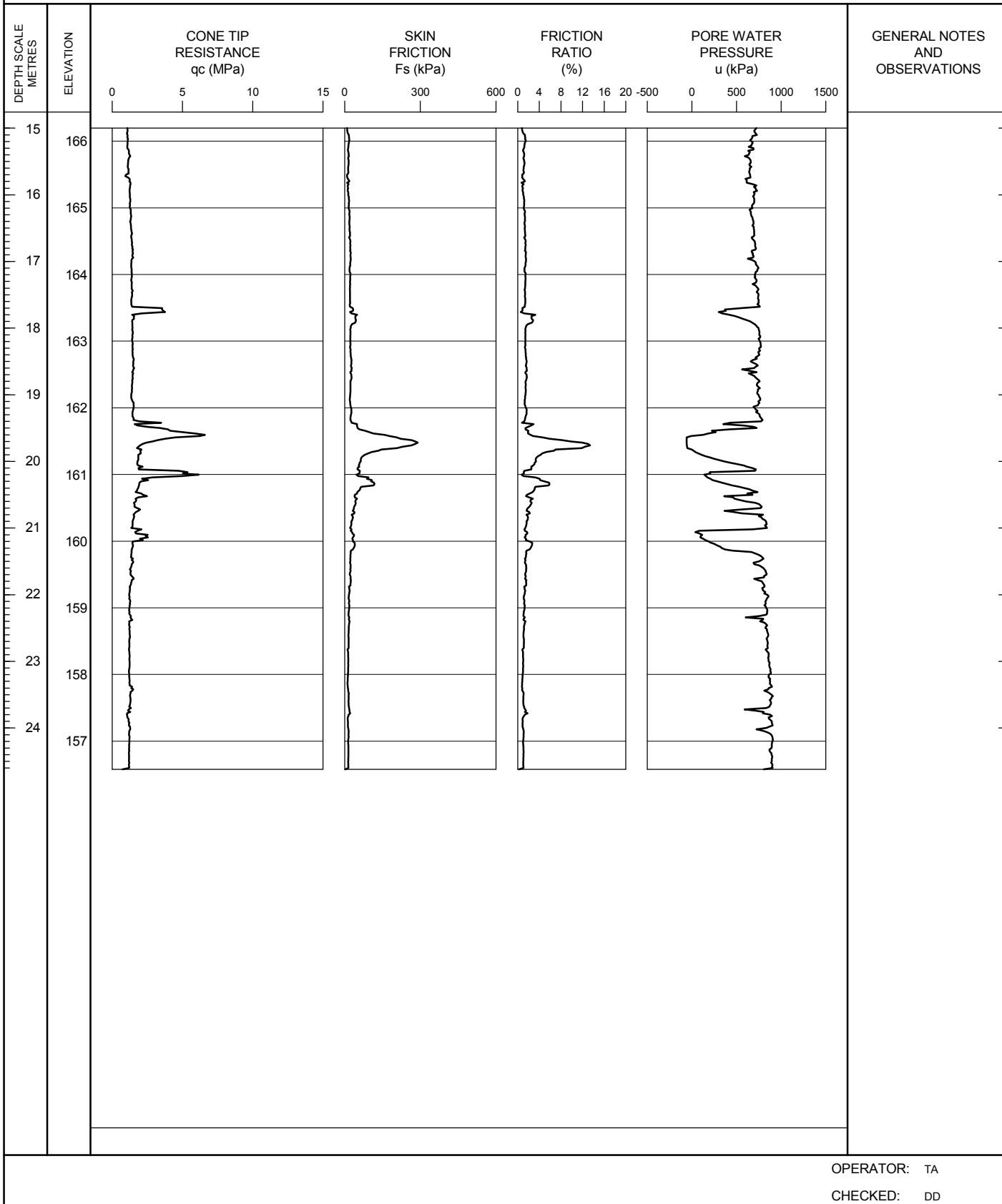
TEST DATE 7/22/2011 - 7/22/2011

SHEET 2 OF 2

LOCATION N4679345.0; E332316.9

DATUM Geodetic

GROUND SURFACE ELEVATION: 181.2 PREDRILL DEPTH: 3.37 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



RECORD OF CONE PENETRATION TEST CPT T7-2

METRIC

PROJECT Windsor-Essex Parkway

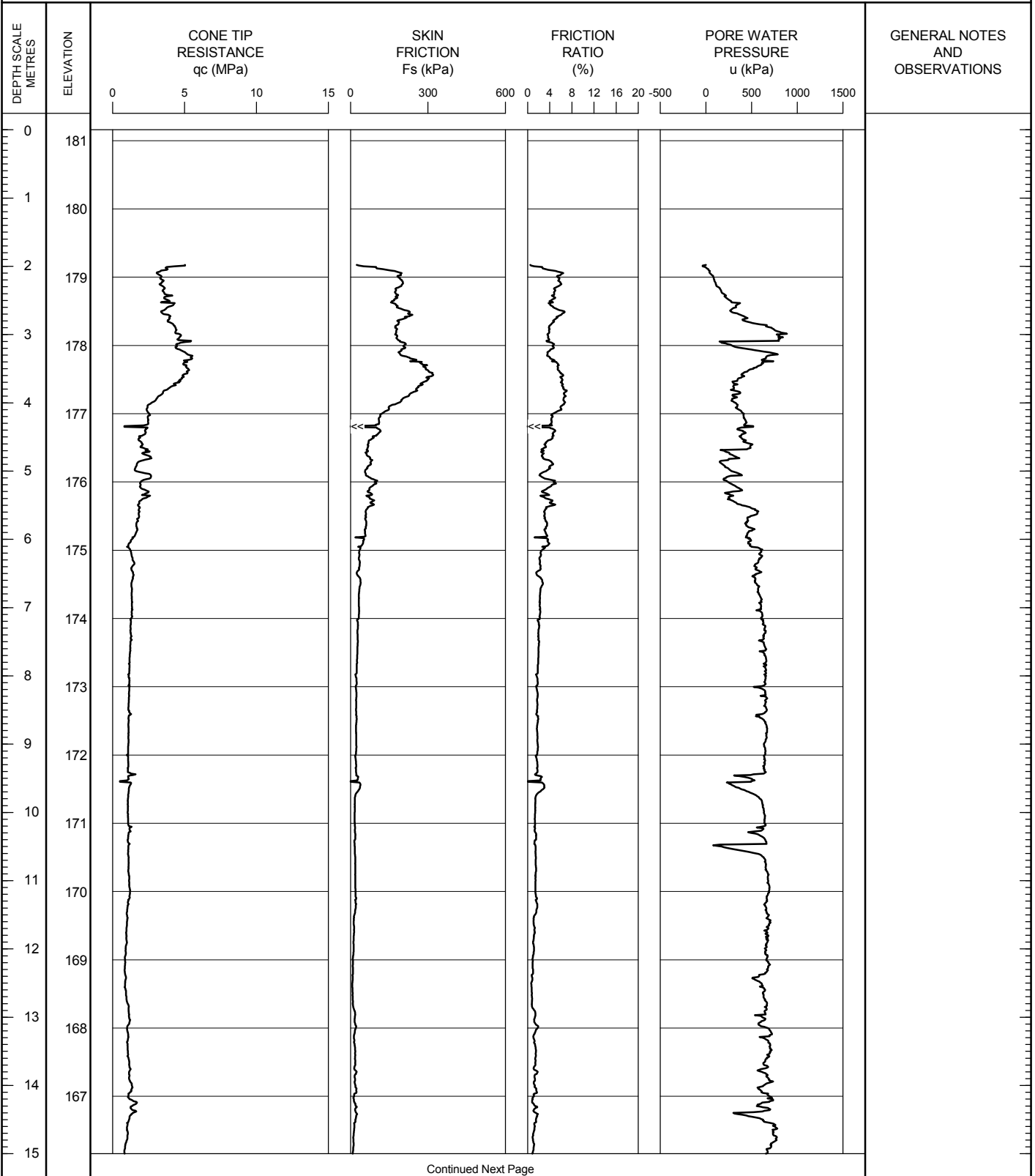
TEST DATE 7/23/2011 - 7/23/2011

SHEET 1 OF 2

LOCATION N4679276.9; E332433.5

DATUM Geodetic

GROUND SURFACE ELEVATION: 181.2 PREDRILL DEPTH: 1.98 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT T7-2

METRIC

PROJECT Windsor-Essex Parkway

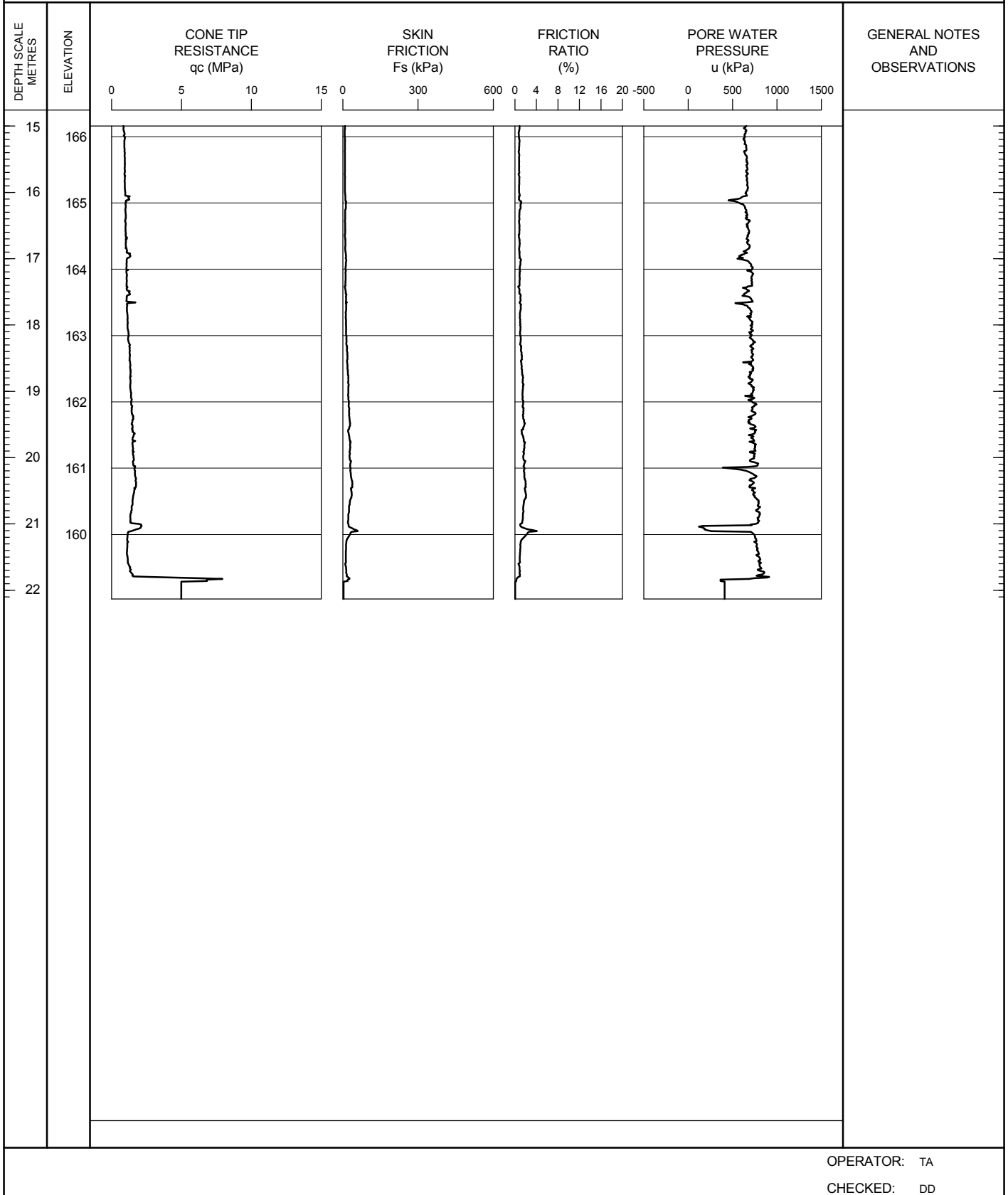
TEST DATE 7/23/2011 - 7/23/2011

SHEET 2 OF 2

LOCATION N4679276.9; E332433.5

DATUM Geodetic

GROUND SURFACE ELEVATION: 181.2 PREDRILL DEPTH: 1.98 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

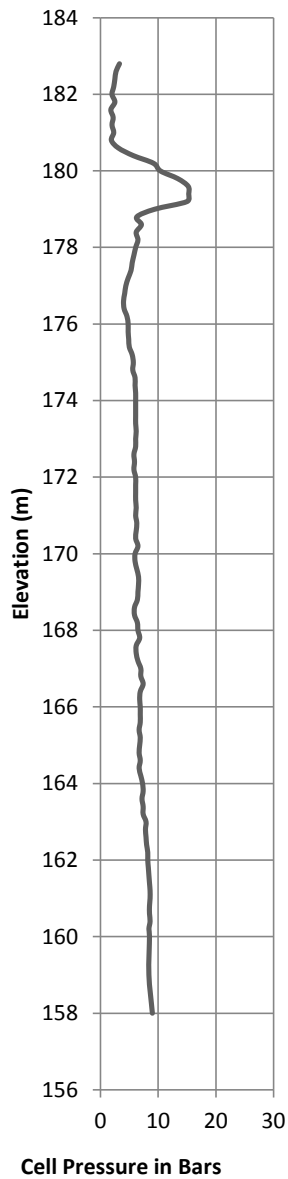
RECORD OF DILATOMETER TEST DMT B9-1

Project : Windsor-Essex Parkway
Location: N 4679242.7; E 332578.4
Ground Surface Elevation : 183.0

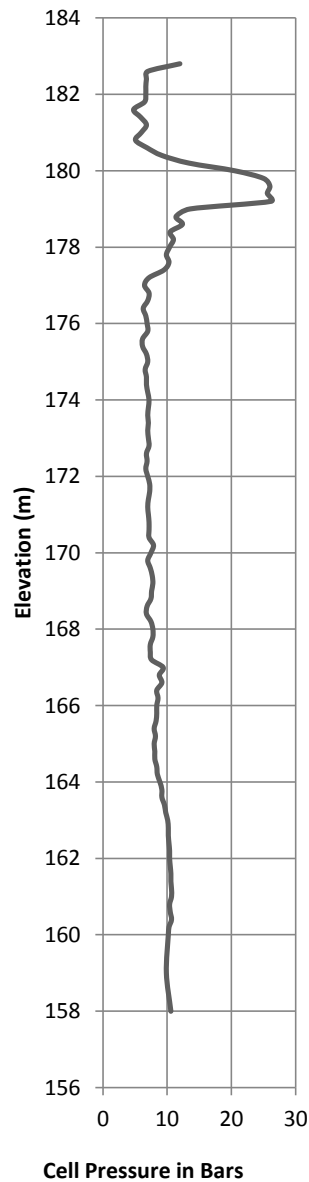
Test Date: 7/16/2011
Predrill Depth : 0.2 m
Delta A: 0.12 Bar

Sheet 1 of 1
Datum Geodetic
Delta B: 0.23 Bar

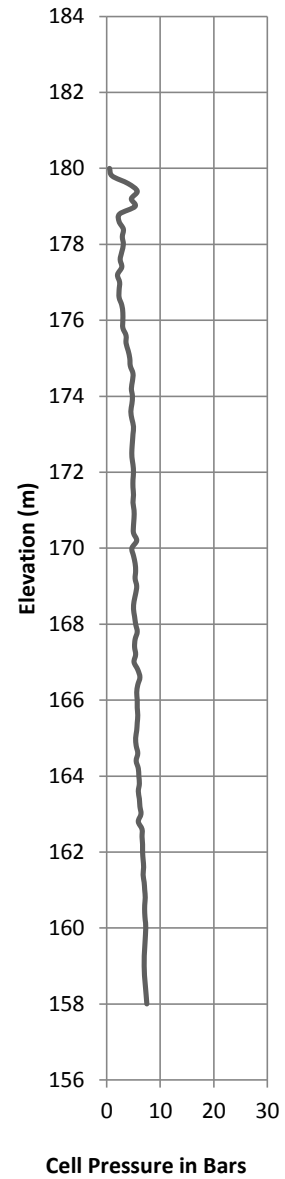
Reading A



Reading B



Reading C



Operator: LC

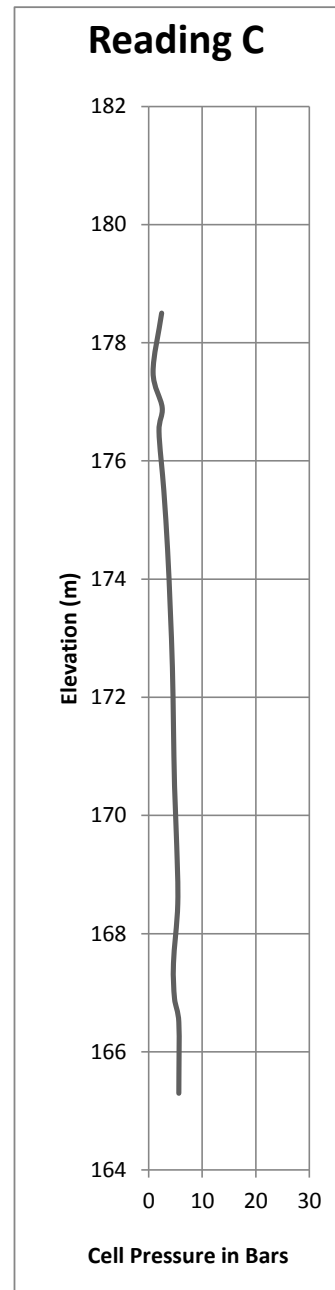
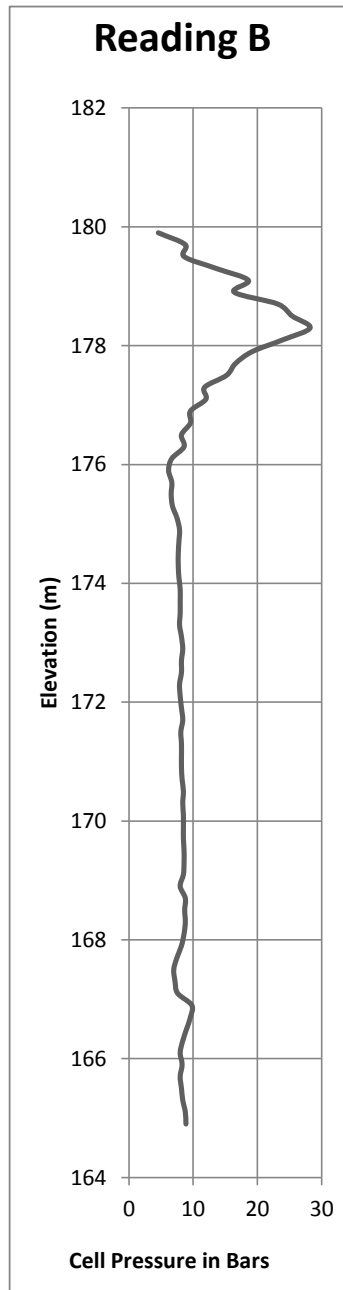
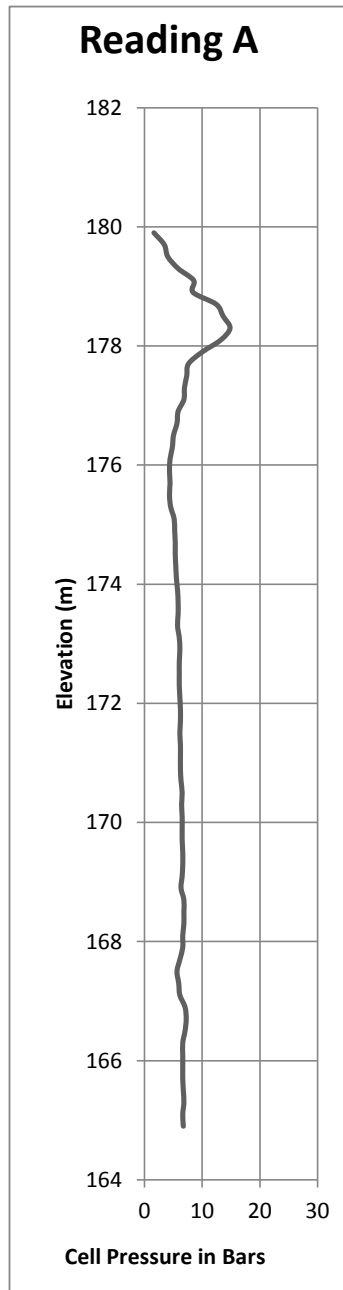
Checked: DD

RECORD OF DILATOMETER TEST DMT T7-1

Project : Windsor-Essex Parkway
Location: N 4679368.7; E 332355.7
Ground Surface Elevation : 181.5

Test Date: 7/15/2011
Predrill Depth : 1.5 m
Delta A: 0.14 Bar

Sheet 1 of 1
Datum Geodetic
Delta B: 0.22 Bar



Operator: LC

Checked: DD

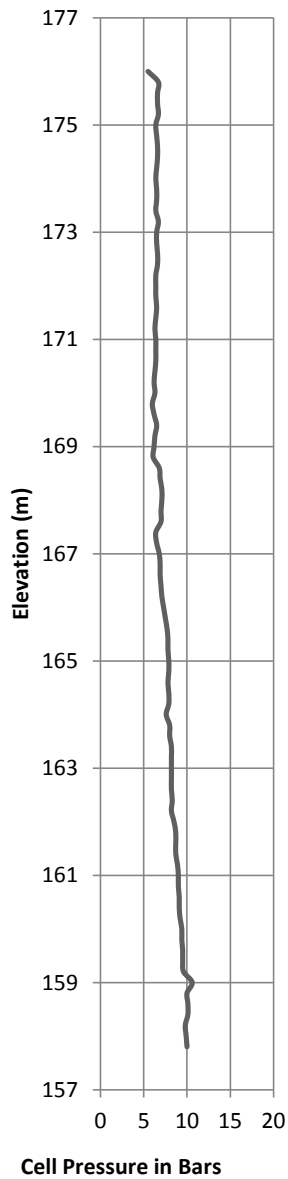
RECORD OF DILATOMETER TEST DMT05-RW

Project : Windsor-Essex Parkway
Location: N 4679146.3; E 332752.1
Ground Surface Elevation : 183.8

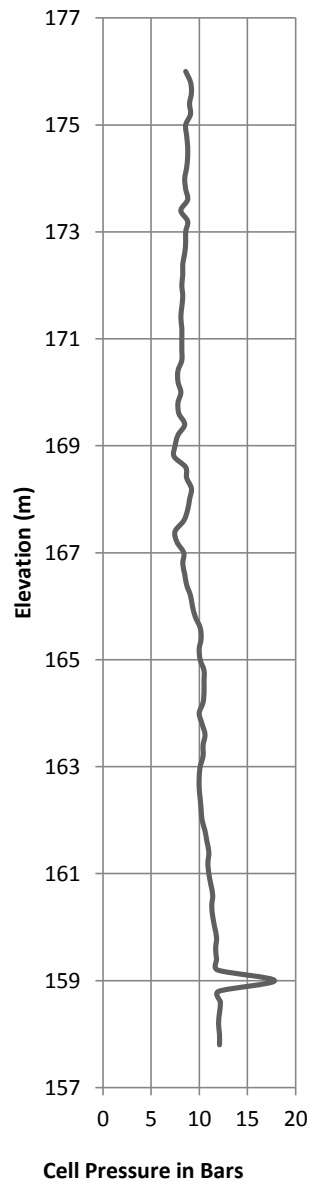
Test Date: 5/31/2011
Predrill Depth : 7.6 m
Delta A: 0.20 Bar

Sheet 1 of 1
Datum Geodetic
Delta B: 0.28 Bar

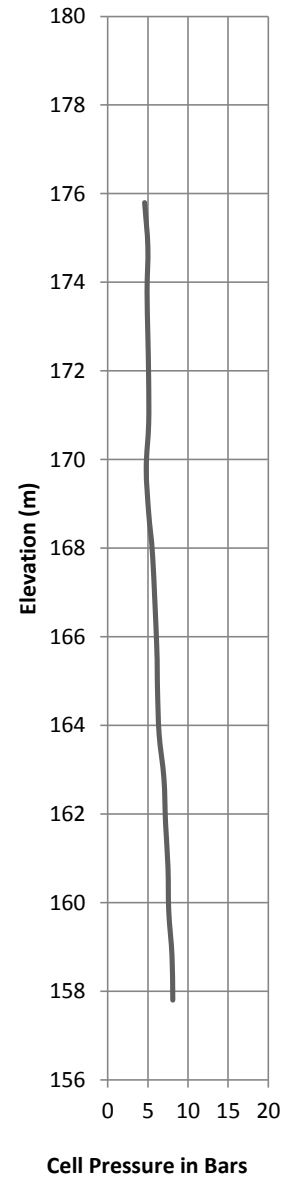
Reading A



Reading B



Reading C



Operator: LC

Checked: DD

Station 10+900L to Station 11+500L (Soil Profile #11)

METRIC

[illegible]

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

METRIC

Continued Next Page

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No B10-2

3 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679069.6, E332866.8 ORIGINATED BY SD
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 30, 11 - May 31, 11 CHECKED BY MSO

| 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 | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | 20 40 60 80 100 | 20 40 60 80 100 | 10 20 30 | | | | | | | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● POCKET PEN. × LAB VANE | | | | | | | | | | |
| | CLAYEY SILT Some sand, trace gravel Firm to very stiff (<i>continued</i>) -Trace sand | | 25 | SS | 13 | | 152 | | | | | | | | | | | |
| | | | | | | | | 151 | | | | | | | | | | |
| 150.3 32.0 | SILTY SAND Trace gravel, moist, slightly cemented Compact Grey | | 26 | SS | 23 | | 150 | | | | | | | | | | | |
| 149.1 33.2 | LIMESTONE Fine grained partially crystallized Stylolites present, laminated Grey | | | | | | 149 | | | | | | | | | | | |
| | | | 27 | RC | | | 148 | | | | | | | | | | | |
| 147.2 35.1 | END OF BOREHOLE No groundwater observed during drilling due to wash boring | | | | | | 147 | | | | | | | | | | | |
| | | | | | | | 146 | | | | | | | | | | | |
| | | | | | | | 145 | | | | | | | | | | | |
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| | | | | | | | 139 | | | | | | | | | | | |
| | | | | | | | 138 | | | | | | | | | | | |

-end of drilling
 May 30;
 continued May 31
 ROD=62%
 TCR = 92%
 SCR = 77%


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

RECORD OF BOREHOLE No B10-3

1 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679083.2, E332836.8 ORIGINATED BY LC
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jun 1, 11 - Jun 7, 11 CHECKED BY MSO

| 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 | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● POCKET PEN. | × LAB VANE | | | | | | | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | | | | 10 20 30 | | |
| 182.2 | Ground Surface | | | | | | | | | | | | | | | | | | |
| 0.0 | TOPSOIL Clayey |  | | | | | | | | | | | | | | -vibrating wire piezometers (VWP) installed in borehole -hand dug test hole for confirmation of topsoil thickness filled with groundwater at 0.45m below ground surface after 30 min. | | | |
| 181.4 | CLAYEY SILT Some sand, trace gravel Firm to hard Mottled brown and grey Trace pink nodules Trace organics Brown Grey -Thin silt lenses/inclusions | | 1 | SS | 10 | | | | | | | | | | | | | | |
| 0.8 | | | | | | | | | | | | | | | | | | | |
| | | | 2 | SS | 25 | | | | | | | | | | | | | | |
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| | | | 3 | SS | 28 | | | | | | | | | | | | | | |
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| | | | 4 | SS | 32 | | | | | | | | | | | | | | |
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| | | | 5 | SS | 14 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | 6 | SS | 14 | | | | | | | | | | | | -25mm diameter stone in tip of split spoon | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | 7 | SS | 11 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | 8 | TW | PH | | | | | × | | | | | | | 20.7 | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No B10-3

2 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679083.2, E332836.8 ORIGINATED BY LC
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jun 1, 11 - Jun 7, 11 CHECKED BY MSO

| 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 | | | | | | | WATER CONTENT (%) |
| | | | | | | | | ○ UNCONFINED ● POCKET PEN. | + FIELD VANE × LAB VANE | | | | | | |
| | CLAYEY SILT Some sand, trace gravel Firm Grey (continued) | | 14 | TW | PH | | | | | | | | 21.8 | -switch to wash boring with casing | |
| | | | | | VT | | | | | | | | | | |
| | | | 15 | TW | PH | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | 16 | TW | PH | | | | | | | | | 21.8 | |
| | | | | | | | | | | | | | | | |
| | | | | | VT | | | | | | | | | | |
| | | | 17 | TW | PH | | | | | | | | | | |
| | | | | | | | | | | | | | | | -VWP B10-3-P20 installed at 20.1m below ground surface (El. 162.1 m) |
| | | | | | | | | | | | | | | | |
| | | | 18 | TW | PH | | | | | | | | | 21.8 | -shelby tube damaged by inferred cobble |
| | | | | | | | | | | | | | | | |
| | | | | | VT | | | | | | | | | | |
| | | | 19 | TW | PH | | | | | | | | | | |
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ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

METRIC

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No B10-4

1 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4679068.8N, 332867.5E ORIGINATED BY DG
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jun 7, 11 - Jun 8, 11 CHECKED BY MSO

| 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 (%) | | | | | | |
|---------------|---|------------|---------|------|------------|----------------------------|--------------------|---|----------------------------|--|--|------------------------------------|-------------------------------------|-----------------------------------|--|---|--|--|----|----|----|----|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | WATER CONTENT (%) | | | GR | SA | SI | CL |
| | | | | | | | | ○ UNCONFINED ● POCKET PEN. | + FIELD VANE × LAB VANE | | | | | | | | | | | | | |
| 182.4 | Ground Surface | | | | | | | | | | | | | | | | | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | | | | | | | |
| 0.2 | CLAYEY SILT Some sand, trace gravel Firm to very stiff Mottled brown and grey | | | | | | | | | | | | | | | | | | | | | |
| | | | 1 | SS | 17 | | | | | | | | ○ | | | | | | | | | |
| | | | 2 | SS | 19 | | | | | | | | | ○ | | | | | | | | |
| | Brown | | 3 | SS | 22 | | | | | | | | ○ | | | | | | | | | |
| | | | 4 | SS | 19 | | | | | | | | ○ | | | | | | | | | |
| | Brown-grey | | 5 | SS | 12 | | | | | | | | ○ | | | | | | | | | |
| | | | 6 | SS | 7 | | | | | | | | ○ | | | | | | | | | |
| | Grey | | 7 | SS | 9 | | | | | | | | ○ | | | | | | | | | |
| | | | 8 | TW | PH | | | | | | | | | ○ | | | | | | | | |
| | | | 9 | TW | PH | | | | | | | | | ○ | | | | | | | | |
| | | | 10 | TW | PH | | | | | | | | | ○ | | | | | | | | |
| | | | VT | | | | | | | | | | | | | | | | | | | |
| | | | 11 | TW | PH | | | | | | | | | ○ | | | | | | | | |
| | | | VT | | | | | | | | | | | | | | | | | | | |
| | | | 12 | TW | PH | | | | | | | | | ○ | | | | | | | | |
| | | | 13 | TW | PH | | | | | | | | | ○ | | | | | | | | |
| | | | VT | | | | | | | | | | | | | | | | | | | |
| 169.0 | SILTY CLAY Grey, trace black silt and pink clay nodules Trace angular gravel | | | | | | | | | | | | | | | | | | | | | |
| 13.4 | | | | | | | | | | | | | | | | | | | | | | |
| 167.5 | | | VT | | | | | | | | | | | | | | | | | | | |
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ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No B10-4

2 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4679068.8N, 332867.5E ORIGINATED BY DG
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|---------------|--|------------|---------|------|------------|----------------------------|-----------------|---|----------------------------|--|------------------------------------|-------------------------------------|-----------------------------------|--|--|-------------------|------|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED ● POCKET PEN. | + FIELD VANE × LAB VANE | | | | | | | | | |
| 14.9 | CLAYEY SILT Some sand, trace gravel Soft to stiff, Grey (continued) | | 14 | TW | PH | | | | | | | | | 20.4 | -end of drilling June 7; continue June 8 | | | |
| | | | | | | | | | | | | | | | | | | |
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| | | | | | 15 | TW | PH | | | | | | | | | | | |
| | | | | | | VT | | | | | | | | | | | | |
| | | | | | 16 | TW | PH | | | | | | | | | | 21.9 | |
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| | | | | | 17 | TW | PH | | | | | | | | | | | |
| | | | | | | VT | | | | | | | | | | | | |
| | | | | | 18 | TW | PH | | | | | | | | | | 21.5 | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | 19 | TW | PH | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | 20 | TW | PH | | | | | | | | | | 21.0 | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | 21 | TW | PH | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | 22 | TW | PH | | | | | | | | | | 21.4 | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | 23 | TW | PH | | | | | | | | | | | |
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ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No B10-4

3 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4679068.8N, 332867.5E ORIGINATED BY DG
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
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|---------------|--|------------|---------|------|------------|----------------------------|-----------------|---|----|------------|------------------------------------|-------------------------------------|-----------------------------------|--|--|-------------------|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED | + | FIELD VANE | | | | | | | | |
| | | | | | | | | ● POCKET PEN. | × | LAB VANE | | | | | | | | |
| 152.2 | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | |
| 30.2 | SILTY CLAY Soft Grey | | 24 | TW | PH | | | | | | | | | ○ | | | | |
| 151.0 | | | | | | | | | | | | | | | | | | |
| 151.0 | FINE SANDY SILT Trace fine-med gravel Very dense Grey | | 25 | SS | 75 | | | | | | | | ○ | | | | | |
| 31.4 | | | | | | | | | | | | | | | | | | |
| 149.7 | | | 26 | RC | | | | | | | | | | | | | | |
| 32.7 | LIMESTONE Medium to fine grained Laminated, stylolites present White to grey | | 27 | RC | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 28 | RC | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 147.0 | END OF BOREHOLE No groundwater observed during drilling due to wash boring | | | | | | | | | | | | | | | | | |
| 35.4 | | | | | | | | | | | | | | | | | | |
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+ ³, × ³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No B10-5

2 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4679023.7N, 332901E ORIGINATED BY TP
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 13, 11 - May 14, 11 CHECKED BY MSO

| 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 | | | | | | | WATER CONTENT (%) |
| | | | | | | | | ○ UNCONFINED ● POCKET PEN. | + FIELD VANE × LAB VANE | | | | | | |
| | | | | | | | | 20 40 60 80 100 | 20 40 60 80 100 | 10 20 30 | | | | | |
| | SILTY CLAY Grey, some pink and black nodules, sandy clay lenses (continued) | | 14 | TW | PH | | 167 | | | | | | | | |
| | | | | VT | | | 166 | | | 1.88 | | | | | |
| 165.7 16.6 | CLAYEY SILT Some sand, trace gravel Firm to stiff Grey | | 15 | TW | PH | | 165 | | × | | | | 21.0 | -switched to wash bore with casing | |
| | | | 16 | SS | PH | | 164 | | | | | | | -no recovery with shelby tube; sample retrieved by pushing split spoon | |
| | | | | VT | | | 163 | | | 1.46 | | | | -end of drilling May 13; restarted May 14 | |
| | | | 17 | TW | PH | | 162 | | × | | | | 21.7 | 3 24 46 26 | |
| | | | 18 | TW | PH | | 161 | | | | | | | -VWP #P20 VWP installed at 20.2m below ground surface | |
| | | | | VT | | | 160 | | | 1.5 | | | | | |
| | | | 19 | TW | PH | | 159 | | × | | | | 21.7 | | |
| | | | 20 | SS | PH | | 158 | | | | | | | -no recovery with shelby tube; sample retrieved by pushing split spoon | |
| | | | 21 | SS | PH | | 156 | | | | | | | -no recovery with shelby tube; sample retrieved by pushing split spoon | |
| 155.5 26.8 | SILTY CLAY with FINE SAND Laminated Firm Grey | | 22 | TW | PH | | 155 | | | | | | | | |
| 154.1 28.2 | SILTY FINE SAND to SANDY SILT Some clay Compact Grey Saturated | | 23A, B | SS | 7 | | 154 | | | | | | | -harder drilling reported by driller | |
| 153.0 29.3 | SILTY CLAY Firm to stiff Grey | | | | | | 153 | | | | | | | | |

Continued Next Page

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

METRIC

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

1 OF 4

METRIC

Continued Next Page

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

RECORD OF BOREHOLE No B10-5-P32

2 OF 4

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679021, E332901.4 ORIGINATED BY LC
DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
DATUM Geodetic DATE May 16, 11 - May 17, 11 CHECKED BY MSO

| 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 | | | | | W _p | W | | |
| | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | |
| | Augered to 3.05m, then NW casing to bedrock. No sampling overburden vibrating wire piezometer (VWP) installed in borehole. (continued) | | | | | | 167 | | | | | | | | | |
| | | | | | | | 166 | | | | | | | | | |
| | | | | | | | 165 | | | | | | | | | |
| | | | | | | | 164 | | | | | | | | | |
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+ ³, × ³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

3 OF 4

METRIC

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT W _p W W _L | UNIT WEIGHT γ kN/m³ | 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 ● POCKET PEN. × LAB VANE | | | | |
| | Augured to 3.05m, then NW casing to bedrock. No sampling overburden vibrating wire piezometer (VWP) installed in borehole (<i>continued</i>) | | | | | | 152 | | | | | |
| | | | | | | | 151 | | | | | |
| 150.0 | | | | | | | 150 | | | | | -VWP B10-5-P32 installed at 32.0m below ground surface (El. 150.3 m) |
| 32.3 | Fractured LIMESTONE | | | | | | | | | | | RQD = 67% TCR = 100% SCR = 49% |
| 149.6 | LIMESTONE | | | | | | | | | | | |
| 32.7 | fine grained slightly porous laminated, semi-hard Light grey to white LIMESTONE | | 1 | RC | | | 149 | | | | | |
| 149.2 | | | | | | | | | | | | |
| 33.1 | medium grained, slightly porous, bedded, semi-hard, calcite crystals present Light grey LIMESTONE | | 2 | RC | | | 148 | | | | | RQD = 97% TCR = 100% SCR = 85% |
| 148.5 | fine grained slightly porous, stylolites, vuggy with calcite crystals, light blue-grey nodules Light grey LIMESTONE | | | | | | | | | | | |
| 33.8 | | | | | | | 147 | | | | | |
| | | | 3 | RC | | | | | | | | RQD = 100% TCR = 100% SCR = 100% |
| 146.4 | LIMESTONE | | | | | | 146 | | | | | |
| 35.9 | fine to medium grained laminated to bedded stylolites, some calcite filled vugs fossiliferous, vertical fracture between 36.35m to 36.96m with calcite crystals Brown | | 4 | RC | | | | | | | | RQD = 52% TCR = 100% SCR = 36% |
| | | | 5 | RC | | | 145 | | | | | |
| | | | | | | | | | | | | RQD = 100% TCR = 100% SCR = 90% |
| | | | 6 | RC | | | 144 | | | | | |
| | | | | | | | | | | | | RQD = 100% TCR = 100% SCR = 92% |
| 143.0 | LIMESTONE | | | | | | 143 | | | | | |
| 39.3 | fine grained, porous and pitted, very fossiliferous, vuggy Brown | | 8 | RC | | | | | | | | RQD = 100% TCR = 100% SCR = 100% |
| 141.8 | LIMESTONE | | | | | | 142 | | | | | |
| 40.5 | fine grained, bedded, extremely fossiliferous. Moderately porous Brown | | 7 | RC | | | | | | | | RQD = 98% TCR = 100% SCR = 83% |
| | | | | | | | 141 | | | | | |
| | | | 9 | RC | | | 140 | | | | | RQD = 100% TCR = 100% SCR = 92% |
| 139.8 | LIMESTONE | | | | | | | | | | | |
| 42.3 | fine grained, bedded, porous, semi-hard Brown | | | | | | | | | | | |
| 139.5 | | | | | | | | | | | | |
| 42.8 | END OF BOREHOLE | | | | | | 139 | | | | | |
| | | | | | | | | | | | | |
| | Water levels in Piezometer VWP B10-5-P32 measured at elevation 178.3m on June 4, 2011 Water levels in Piezometer VWP B10-5-P32 measured at elevation 177.5m on June 25, 2011 | | | | | | 138 | | | | | |

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

Continued Next Page

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

RECORD OF BOREHOLE No B10-6

1 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4678990.9N, 332930.4E ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 14, 11 - May 16, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|---|--------------|---------------|------------|------------------------------------|-------------------------------------|-----------------------------------|-------------------------|---|-------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | WATER CONTENT (%) |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● POCKET PEN. | × LAB VANE | | | | | | |
| | | | | | | | | | | | | | | | | | |
| 182.0 | Ground Surface | | | | | | | | | | | | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | | |
| 181.7 | 300mm thick, organic sandy silt, black | | | | | | | | | | | | | | | | |
| 0.3 | SILTY SAND | | | | | | | | | | | | | | | | |
| 181.2 | Orange-brown | | | | | | | | | | | | | | | | |
| 0.8 | CLAYEY SILT | | 1 | SS | 8 | | 181 | | | | | | | ○ | | | |
| | Some sand, trace gravel | | | | | | | | | | | | | | | | |
| | Stiff to very stiff | | 2 | SS | 20 | | 180 | | | | | | | ○ | | -bulk auger sample from 1.5m to 3.8m | |
| | Brown | | | | | | | | | | | | | | | | |
| | Some small pink clay nodules below 4.5m | | 3 | SS | 23 | | 179 | | | | | | | ○ | | -cobble/boulder encountered augers chattering | |
| | Grey | | 4 | SS | 22 | | | | | | | | | | | | |
| | -Layers of fine to medium sand, clayey sand in upper 2 m | | | | | | 178 | | | | | | | ○ | | | |
| | | | 5 | SS | 10 | | | | | | | | | | | | |
| | | | 6 | SS | 8 | | 177 | | | | | | | ○ | | | |
| | | | 7 | SS | 10 | | 176 | | | | | | | ○ | | | |
| | | | 8 | TW | PH | | 175 | | | | | | | | | | |
| | | | 9 | TW | PH | | 174 | | | | | | | ○ | | | |
| | | | | | | | 173 | | | | | | | | | | |
| | | | 10 | TW | PH | | 172 | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | |
| | | | 11 | TW | PH | | 171 | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | |
| | | | 12 | TW | PH | | 170 | | | | | | | | | | |
| | | | | | | | 169 | | | | | | | | | | |
| | Some fine sand seams at approx 12 m below ground surface (El. 170 m) | | | VT | | | | | | | | | | | | | |
| 168.4 | SILTY CLAY | | 13 | TW | PH | | 168 | | | | | | | | | | |
| 13.6 | Trace silt, trace gravel | | | | | | | | | | | | | | | | |
| | Grey, some pink and black clay nodules, | | | | | | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | |

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No B10-6

2 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4678990.9N, 332930.4E ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 14, 11 - May 16, 11 CHECKED BY MSO

| 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 | | | | | | | | WATER CONTENT (%) | | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | | | | | | | | | | |
| | | | | | | | | ● POCKET PEN. | × LAB VANE | | | | | | | | | | |
| 15.1 | CLAYEY SILT Some sand, trace gravel Grey | | | | | | | | | | | | | 21.3 | -end of drilling May 14; restarted May 16 -switched to wash boring | | | | |
| | | | 14 | TW | PH | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | | | |
| | | | 15 | TW | PH | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | 16 | TW | PH | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | 17 | TW | PH | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | 18 | TW | PH | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | 19 | TW | PH | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | 20 | SS | PH | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | 21 | TW | PH | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| 155.2 | SILTY CLAY with SILT/FINE SAND Laminated Firm Grey | | | | | | | | | | | | | 21.3 | -no recovery with shelby tube; sample retrieved by pushing split spoon | | | | |
| 26.8 | | | 22 | TW | PH | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | 23 | SS | 10 | | | | | | | | | | | | | | |
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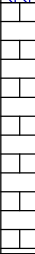
+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

-end of drilling
May 14; restarted
May 16
-switched to wash
boring

-no recovery with
shelby tube;
sample retrieved
by pushing split
spoon

METRIC

| SOIL PROFILE | | | | SAMPLES | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT LIMIT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI C |
|---------------|--|---|--------|---------|------------|----------------------------|-----------------|---|-----------------|--|--|--|---|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 40 60 80 100 | 20 40 60 80 100 | W _P W W _L | | | | |
| 149.7 32.3 | SILTY CLAY with SILT/FINE SAND Laminated Firm Grey (continued) |  | 24 | SS | 52 | | 151 | | | | | | | -cobbles encountered -chatter at ~31.4m from casing during advancement possible cobbles/boulder RQD = 91% TCR = 100% SCR = 95% |
| | | | | | 150 | | | | | | | | | |
| | | | | | 149 | | | | | | | | | |
| | | | | 148 | | | | | | | | | | |
| 147.3 34.7 | LIMESTONE Fine to Medium grained Grey Faintly laminated to bedded, stylolites, porous, semi-hard |  | 25 | RC | | | | | | | | | | RQD = 92% TCR = 97% SCR = 95% |
| | | | 26 | RC | | | | | | | | | | |
| | END OF BOREHOLE No groundwater observed during drilling due to wash boring | | | | | | 147 | | | | | | | |
| | | | | | | | 146 | | | | | | | |
| | | | | | | | 145 | | | | | | | |
| | | | | | | | 144 | | | | | | | |
| | | | | | | | 143 | | | | | | | |
| | | | | | | | 142 | | | | | | | |
| | | | | | | | 141 | | | | | | | |
| | | | | | | | 140 | | | | | | | |
| | | | | | | | 139 | | | | | | | |
| | | | | | | | 138 | | | | | | | |

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

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

RECORD OF BOREHOLE No B10-7

1 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4678978.0N, 332968.0E ORIGINATED BY SD
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 25, 11 - May 31, 11 CHECKED BY MSO

| 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 (%) |
|---------------|---------------------------------|------------|---------|------|------------|----------------------------|--------------------|---|----|--------------|-----|----|------------------------------------|-------------------------------------|-----------------------------------|--|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | |
| | | | | | | | | ○ UNCONFINED | | + FIELD VANE | | | | | | | |
| 182.2 | Ground Surface | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | | |
| 181.9 | Black | | | | | | | | | | | | | | | | |
| 0.3 | CLAYEY SILT | | | | | | | | | | | | | | | | |
| | Some sand, trace gravel | | 1 | SS | 17 | | | | | | | | ○ | | | | |
| | Soft to very stiff | | | | | | | | | | | | | | | | |
| | Brown | | 2 | SS | 21 | | | | | | | | ○ | | | | |
| | Some pink nodules below approx. | | | | | | | | | | | | | | | | |
| | 12m (El. 170 m) | | | | | | | | | | | | | | | | |
| | | | 3 | SS | 29 | | | | | | | | ○ | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | 4 | SS | 27 | | | | | | | | ○ | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | 5 | SS | 17 | | | | | | | | ○ | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | 6 | SS | 11 | | | | | | | | ○ | | | | |
| | | | | | | | | | | | | | | | | | |
| | Grey | | 7 | SS | 8 | | | | | | | | ○ | | | | |
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| | | | 8 | SS | 7 | | | | | | | | ○ | | | | |
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| | | | 9 | TW | PH | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No B10-7

2 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4678978.0N, 332968.0E ORIGINATED BY SD
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 25, 11 - May 31, 11 CHECKED BY MSO

| 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 | | | | | | | | WATER CONTENT (%) | | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | | | | | | | | | | |
| | | | | | | | | ● POCKET PEN. | × LAB VANE | | | | | | | | | | |
| | CLAYEY SILT Some sand, trace gravel Soft to very stiff (continued) | | 14 | TW | PH | | | | | | | | | | -end of augers; continued with N-casing | | | | |
| | | | | VT | | | | 1.5 | | | | | | | | | | | |
| | | | 15 | TW | PH | | × | | | | | | | 21.2 | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | 16 | TW | PH | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | 17 | TW | PH | | | | | | | | | 21.7 | -VWP B10-7-P21 & MG B10-7-SM21 installed at 19.8m below ground surface (El. 162.4 m) | | | | |
| | | | | | | | | | | | | | | | -end of drilling May 26; continue May 27 | | | | |
| | | | 18 | TW | PH | | | | | | | | | | | | | | |
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| | | | 19 | SS | 14 | | | | | | | | | | | | | | |
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| | | | 20 | TW | PH | | | | | | | | | | 2 22 42 34 | | | | |
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| | | | 21 | TW | PH | | | | | | | | | | 3 22 45 30 | | | | |
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| | | | 22 | SS | 13 | | | | | | | | | | | | | | |
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| | | | 23 | TW | PH | | | | | | | | | | 20.8 | | | | |
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| | | | 24 | TW | PH | | | | | | | | | | | | | | |
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| | | | 25 | TW | PH | | | | | | | | | | 18.5 | | | | |
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Continued Next Page

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

ONTARIO MOT - SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No B10-7

3 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4678978.0N, 332968.0E ORIGINATED BY SD
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 25, 11 - May 31, 11 CHECKED BY MSO

| 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 | | | | | W _p W W _L | | | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE | | | | | ○ | | | | |
| | | | | | | | | ● POCKET PEN. X LAB VANE | | | | | WATER CONTENT (%) | | | | |
| | | | | | | 20 | 40 | 60 | 80 | 100 | 10 | 20 | 30 | | | | |
| 151.7 | | | | | | | | | | | | | | | | | |
| 30.5 | | | 26 | SS | 7 | | | | | | | ○ | | | | | |
| 150.3 | | | | | | | | | | | | | | | | | |
| 31.9 | | | | | | | | | | | | ○ | | | | | |
| 150.3 | | | 27 | SS | 36 | | | | | | | | | | | | |
| 31.9 | | | | | | | | | | | | | | | | | |
| 149.6 | | | | | | | | | | | | | | | | | |
| 32.6 | | | 28 | RC | | | | | | | | | | | | | |
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| | | | 29 | RC | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| 146.5 | | | | | | | | | | | | | | | | | |
| 35.7 | | | | | | | | | | | | | | | | | |
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-end of drilling
May 27; continue
May 31
ROD = 35%
TCR = 60%
SCR = 46%

ROD = 88%
TCR = 99%
SCR = 93%

+³, X³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No B10-8

1 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4679118.4N, 332824.1E ORIGINATED BY SD
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jun 9, 11 - Jun 10, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _P | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|--|------------|---------|------|------------|----------------------------|-----------------|---|--|------------------------------------|-------------------------------------|-----------------------------------|---------------------|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | |
| 182.4 | Ground Surface | | | | | | | | | | | | | |
| 0.0 | TOPSOIL Black | | | | | | | | | | | | | |
| 181.8 | | | | | | | | | | | | | | |
| 0.8 | FINE SAND Some silt Red-brown | | | | | | | | | | | | | |
| 181.5 | | | 1 | SS | 7 | | | | | | | | | |
| 0.9 | CLAYEY SILT Some sand, trace gravel Soft to hard Mottled brown and grey | | 2 | SS | 18 | | | | | | | | | |
| | | | 3 | SS | 21 | | | | | | | | | |
| | | | 4 | SS | 32 | | | | | | | | | |
| | Grey | | 5 | SS | 19 | | | | | | | | | |
| | | | 6 | SS | 16 | | | | | | | | | |
| | | | 7 | SS | 10 | | | | | | | | | |
| | | | 8 | TW | PH | | | | | | | | | |
| | | | 9 | TW | PH | | | | | | | | | |
| | | | VT | | | | | | | | | | | |
| | | | 10 | TW | PH | | | | | | | | | |
| | | | 11 | TW | PH | | | | | | | | | |
| | | | VT | | | | | | | | | | | |
| | | | 12 | TW | PH | | | | | | | | | |
| | | | 13 | TW | PH | | | | | | | | | |
| | | | VT | | | | | | | | | | | |

Continued Next Page

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

METRIC

Continued Next Page

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

RECORD OF BOREHOLE No CPT B10-2

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679056.3, E332920.1 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 75 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 13, 11 - May 13, 11 CHECKED BY MSO

| 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 | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED ● POCKET PEN. | + FIELD VANE × LAB VANE | | | | | | | | | | |
| 182.2 | Ground Surface | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | |
| 0.0 | TOPSOIL | | | | | | 182 | | | | | | | | | | | | |
| 181.9 | 275mm thick, organic clay, black | | | | | | | | | | | | | | | | | | |
| 0.3 | CLAYEY SILT | | | | | | | | | | | | | | | | | | |
| | Some sand, trace gravel | | 1 | SS | 14 | | | | | | | | | | | | | | |
| | Stiff to very stiff | | | | | | 181 | | | | | | | | | | | | |
| | Mottled brown and grey | | 2 | SS | 17 | | | | | | | | | | | | | | |
| | Brown | | | | | | | | | | | | | | | | | | |
| | | | 3 | SS | 23 | | 180 | | | | | | | | | | | | |
| | | | 4 | SS | 22 | | 179 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | Grey | | 5 | SS | 12 | | 178 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | -Vertical silt seams | | 6 | SS | 14 | | | | | | | | | | | | | | |
| 177.2 | END OF SAMPLED BOREHOLE | | | | | | 177 | | | | | | | | | | | | |
| 5.0 | Continued with CPT from 5.0 m to refusal at 29.3 m (El. 177.2 m to El. 152.9 m) | | | | | | 176 | | | | | | | | | | | | |
| | | | | | | | 175 | | | | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | | | | |
| | | | | | | | 171 | | | | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | | | | |
| | | | | | | | 169 | | | | | | | | | | | | |
| | | | | | | | 168 | | | | | | | | | | | | |

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

RECORD OF BOREHOLE No CPT B10-3

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4678983.4N, 332941.1E ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 14, 11 - May 14, 11 CHECKED BY MSO

| 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 | | | | | | | | | |
| 182.1 | Ground Surface | | | | | | | <div><div></div><div>20 40 60 80 100</div></div> | | | | | | | | | |
| 0.0 | 300mm Black organic clay | | | | | | | <div><div>○ UNCONFINED</div><div>● POCKET PEN.</div><div>+ FIELD VANE</div><div>× LAB VANE</div></div> | | | | | | | | | |
| 181.7 | TOPSOIL | | | | | | | | | | | | | | | | |
| 0.4 | CLAYEY SILT Some sand, trace gravel Stiff to very stiff Mottled brown and grey Brown | | 1 | SS | 16 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | 2 | SS | 19 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | 3 | SS | 22 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | 4 | SS | 22 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | 5 | SS | 17 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | Grey | | 6 | SS | 11 | | | | | | | | | | | | |
| 177.1 | END OF SAMPLED BOREHOLE Continue with CPT from 4.6 m to refusal at 31.3 m (El. 177.5 m to El. 150.8 m) | | | | | | | | | | | | | | | | |
| 5.0 | Borehole dry upon completion | | | | | | | | | | | | | | | | |
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+ ³, × ³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No NIL B10-3

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679084.3, E332836.8 ORIGINATED BY SD
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jun 8, 11 - Jun 8, 11 CHECKED BY MSO

| 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 | | | | | | | | | WATER CONTENT (%) | | | | |
| | | | | | | | | ○ UNCONFINED | + | FIELD VANE | ● POCKET PEN. | | | | | | × | LAB VANE | | | |
| | | | | | | | | 20 | 40 | 60 | 80 | | | | | | 100 | 20 | 40 | 60 | 80 |
| 182.2 | Ground Surface | | | | | | | | | | | | | | | | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | | | | | | |
| 181.9 | Black | | | | | | | | | | | | | | | | | | | | |
| 0.3 | CLAYEY SILT | | | | | | | | | | | | | | | | | | | | |
| | Some sand, trace gravel | | 1 | SS | 17 | | | | | | | | | | | | | | | | |
| | Very stiff to hard | | | | | | | | | | | | | | | | | | | | |
| | Mottled brown and grey | | | | | | | | | | | | | | | | | | | | |
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| | Brown | | 2 | SS | 19 | | | | | | | | | | | | | | | | |
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| | | | 3 | SS | 36 | | | | | | | | | | | | | | | | |
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| | | | 4 | SS | 32 | | | | | | | | | | | | | | | | |
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| | | | 5 | SS | 16 | | | | | | | | | | | | | | | | |
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| | Grey | | 6 | SS | 15 | | | | | | | | | | | | | | | | |
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| 177.0 | END OF SAMPLED BOREHOLE | | | | | | | | | | | | | | | | | | | | |
| 5.2 | Continued with Nilcon Vane from 5.3 m to refusal at 20.0 m (El. 176.9 m to El. 162.2 m) | | | | | | | | | | | | | | | | | | | | |
| | Borehole dry on completion | | | | | | | | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No BH13-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679672.2, E331850.2 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 75 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 7, 11 - Jul 7, 11 CHECKED BY MSO

| 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 | | | | | | | | | WATER CONTENT (%) | | | | | |
| 180.8 | Ground Surface | | | | | | | ○ UNCONFINED | + | FIELD VANE | | | | | | | | | | | | |
| 0.0 | TOPSOIL | | | | | | | ● POCKET PEN. | × | LAB VANE | | | | | | | | | | | | |
| 180.4 | | | | | | | | | | | | | | | | | | | | | | |
| 0.4 | CLAYEY SILT Some sand, trace gravel Trace organics to approx. 3 m Stiff to very stiff Mottled brown and grey | | 1 | SS | 5 | | 180 | | | | | | | | | | | | | | | |
| | | | 2 | SS | 9 | | 179 | | | | | | | | | | | | | | | |
| | Highly fissured | | 3 | SS | 7 | | 178 | | | | | | | | | | | | | | | |
| | Brown -Trace fissures | | 4A, B | SS | 12 | | 177 | | | | | | | | | | | | | | | |
| | | | 5 | SS | 18 | | 176 | | | | | | | | | | | | | | | |
| | Grey | | 6 | SS | 10 | | 175 | | | | | | | | | | | | | | | |
| | | | 7 | SS | 7 | | 174 | | | | | | | | | | | | | | | |
| | | | 8 | SS | 4 | | 173 | | | | | | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | | | | | | | |
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| | | | | | | | 167 | | | | | | | | | | | | | | | |
| | | | | | | | 166 | | | | | | | | | | | | | | | |
| 173.8 | END OF BOREHOLE | | | | | | | | | | | | | | | | | | | | | |
| 7.0 | Borehole dry on completion | | | | | | | | | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

1 OF 1

METRIC



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

RECORD OF BOREHOLE No CPT41-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4679053.8, E332792.8 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 18, 11 - Jul 18, 11 CHECKED BY MSO

| 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 | | | | | | | | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● POCKET PEN. | × LAB VANE | WATER CONTENT (%) | | | | | |
| 181.9 | Ground Surface | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | |
| 0.0 | TOPSOIL |  | | | | | | | | | | | | | | | |
| 181.3 | CLAYEY SILT Some sand, trace gravel Mottled brown and grey |  | 1 | SS | 4 | | | | | | | | | | | | |
| 0.6 | | | | | | | | | | | | | | | | | |
| | | | 2 | SS | 10 | | | | | | | | | | | | |
| 179.9 | END OF SAMPLED BOREHOLE Continue with CPT from 1.9 m to refusal at 31.9 m (El. 180.0 m to El. 150.0 m) Borehole dry on completion | | | | | | | | | | | | | | | | |
| 2.0 | | | | | | | | | | | | | | | | | |
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+ ³, × ³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No CPT42-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678892, E333107 ORIGINATED BY TA
DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
DATUM Geodetic DATE Aug 3, 11 - Aug 3, 11 CHECKED BY MSO

| 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/m³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL | | | |
|---------------|--|------------|---------|------|------------|----------------------------|-----------------|---|----|----|-----|--|------------------------------------|-------------------------------------|-----------------------------------|--------------------------------------|--|-------------------|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| 182.4 | Ground Surface | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | | | | | |
| 181.9 | | | | | | | | | | | | | | | | | | | | |
| 0.5 | CLAYEY SILT Some sand, trace gravel Brown | | 1 | SS | 18 | | | | | | | | ○ | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | 2 | SS | 21 | | | | | | | | ○ | | | | | | | |
| 180.4 | END OF BOREHOLE Continued with CPT from 2.0 m to refusal at 29.4 m (El. 180.4 m to El. 153.0 m) Borehole dry on completion | | | | | | | | | | | | | | | | | | | |
| 2.0 | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | 180 | | | | | | | | | | | | | |
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| | | | | | | | 170 | | | | | | | | | | | | | |
| | | | | | | | 169 | | | | | | | | | | | | | |
| | | | | | | | 168 | | | | | | | | | | | | | |

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

RECORD OF NILCON VANE TEST NIL B10-3

Project : Windsor-Essex Parkway

Test Date: 6/8/2011

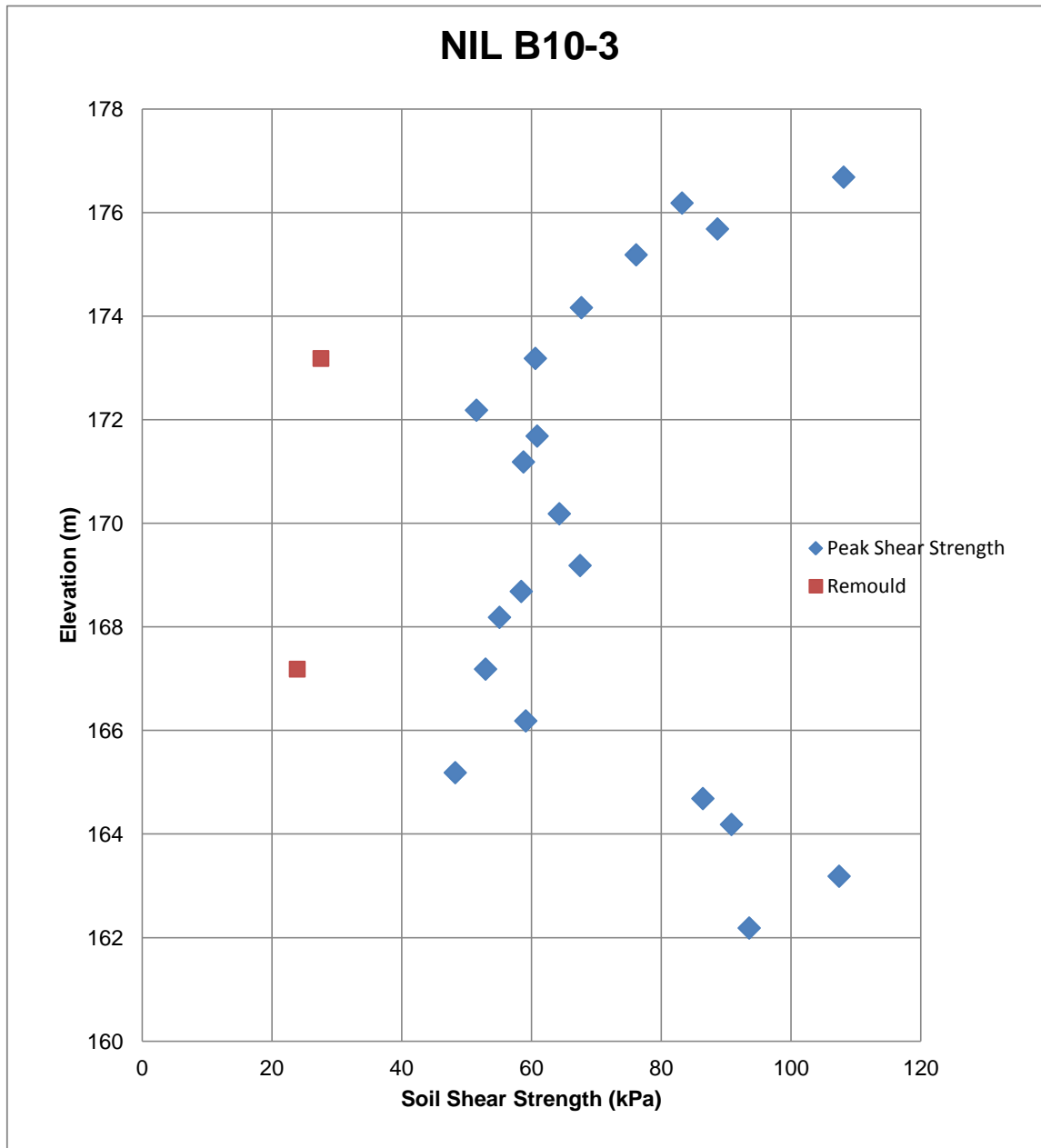
Sheet 1 of 1

Location: N4679084.3; E332841.7

Predrill Depth : 5.0 m

Datum Geodetic

Ground Surface Elevation: 182.2 m



Operator: SD

Checked: DD

RECORD OF CONE PENETRATION TEST CPT B10-2

METRIC

PROJECT Windsor-Essex Parkway

TEST DATE 5/13/2011 - 5/13/2011

SHEET 1 OF 2

LOCATION N4679056.3; E332920.1

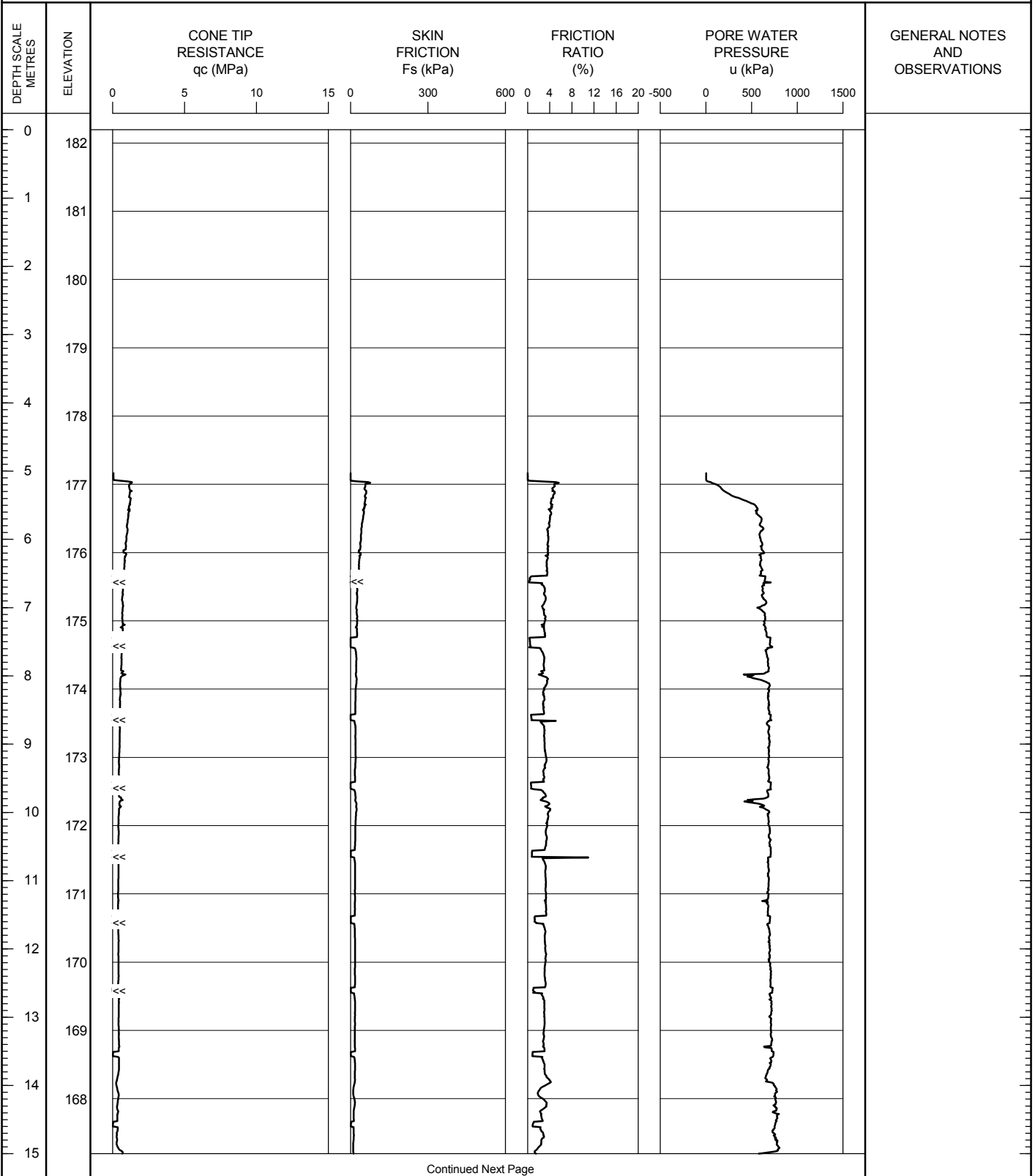
DATUM Geodetic

GROUND SURFACE ELEVATION: 182.2

PREDRILL DEPTH: 4.92

CORRECTION FACTOR A: 0.8

CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT B10-2

METRIC

PROJECT Windsor-Essex Parkway

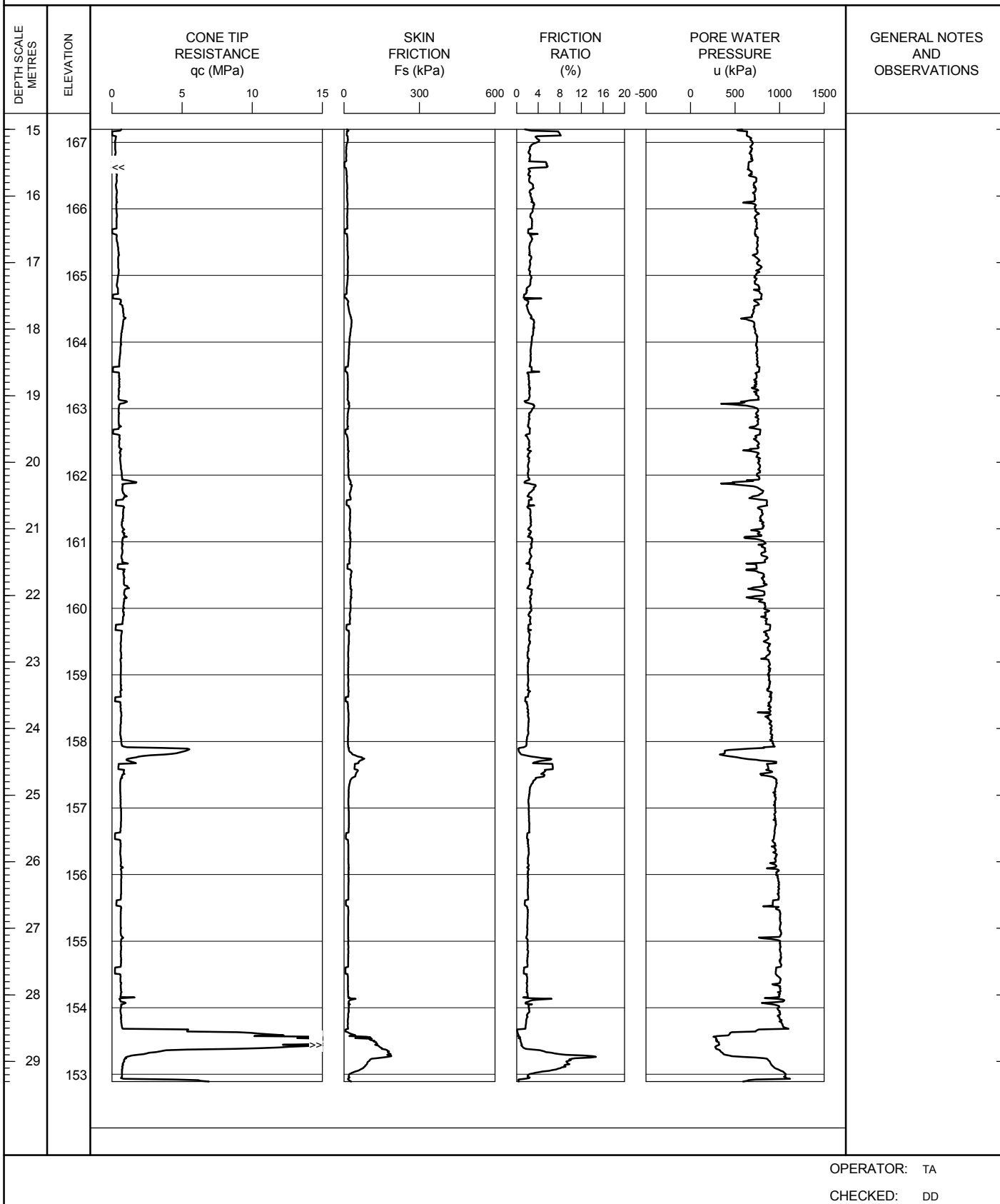
TEST DATE 5/13/2011 - 5/13/2011

SHEET 2 OF 2

LOCATION N4679056.3; E332920.1

DATUM Geodetic

GROUND SURFACE ELEVATION: 182.2 PREDRILL DEPTH: 4.92 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



RECORD OF CONE PENETRATION TEST CPT B10-3

METRIC

PROJECT Windsor-Essex Parkway

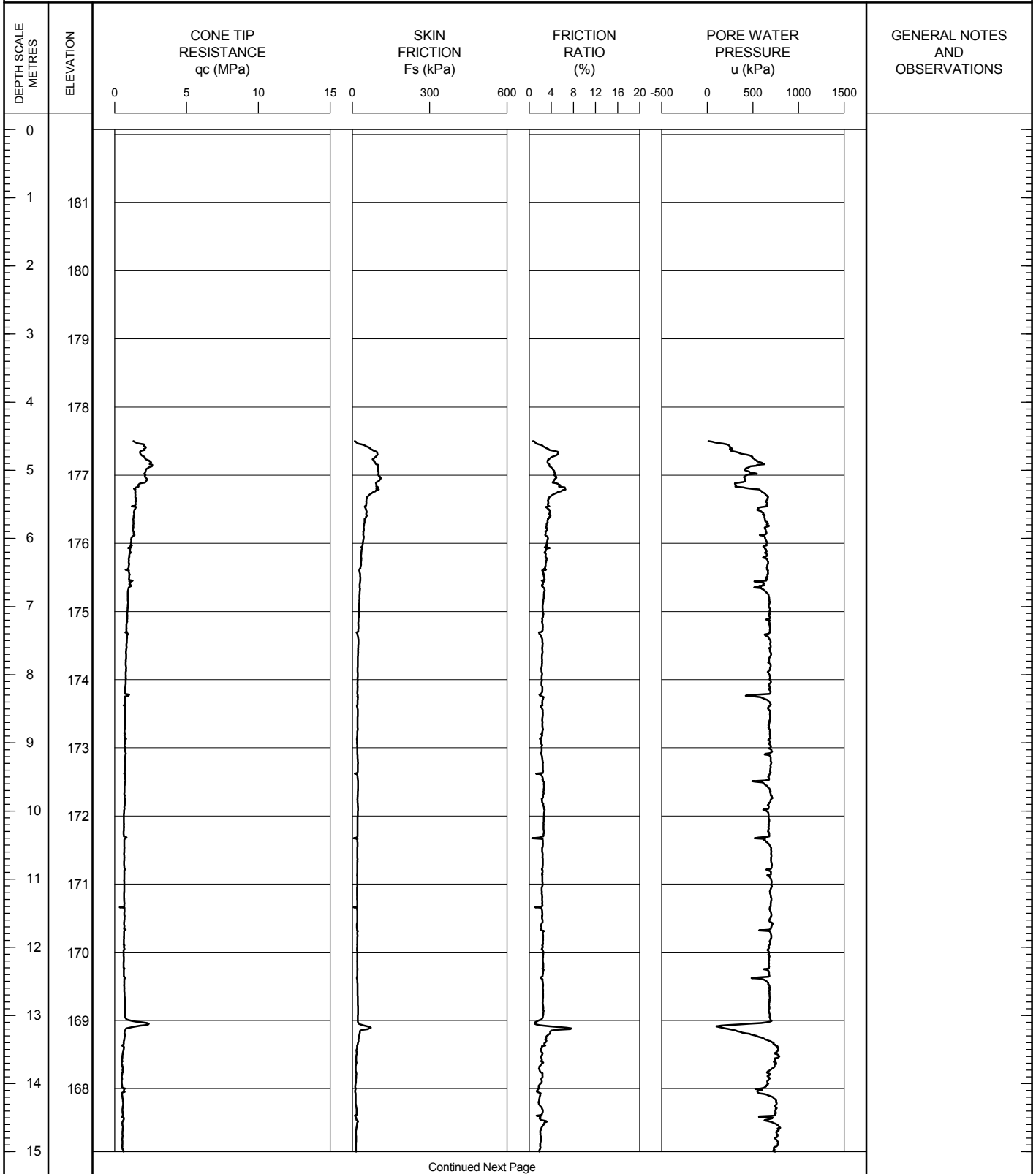
TEST DATE 5/13/2011 - 5/13/2011

SHEET 1 OF 3

LOCATION N4678983.4; E332941.1

DATUM Geodetic

GROUND SURFACE ELEVATION: 182.1 PREDRILL DEPTH: 4.48 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT B10-3

METRIC

PROJECT Windsor-Essex Parkway

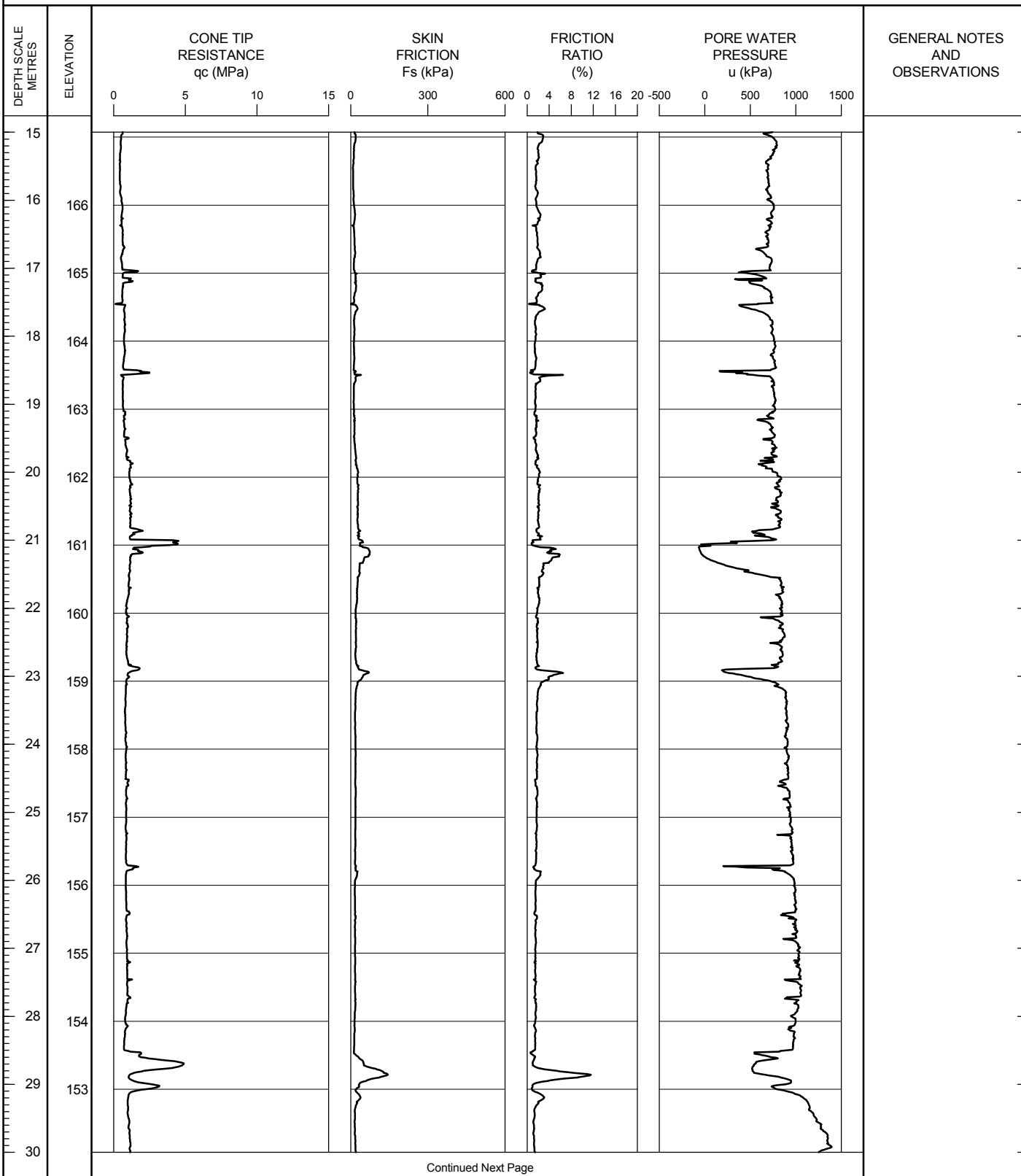
TEST DATE 5/13/2011 - 5/13/2011

SHEET 2 OF 3

LOCATION N4678983.4; E332941.1

DATUM Geodetic

GROUND SURFACE ELEVATION: 182.1 PREDRILL DEPTH: 4.48 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT B10-3

METRIC

PROJECT Windsor-Essex Parkway

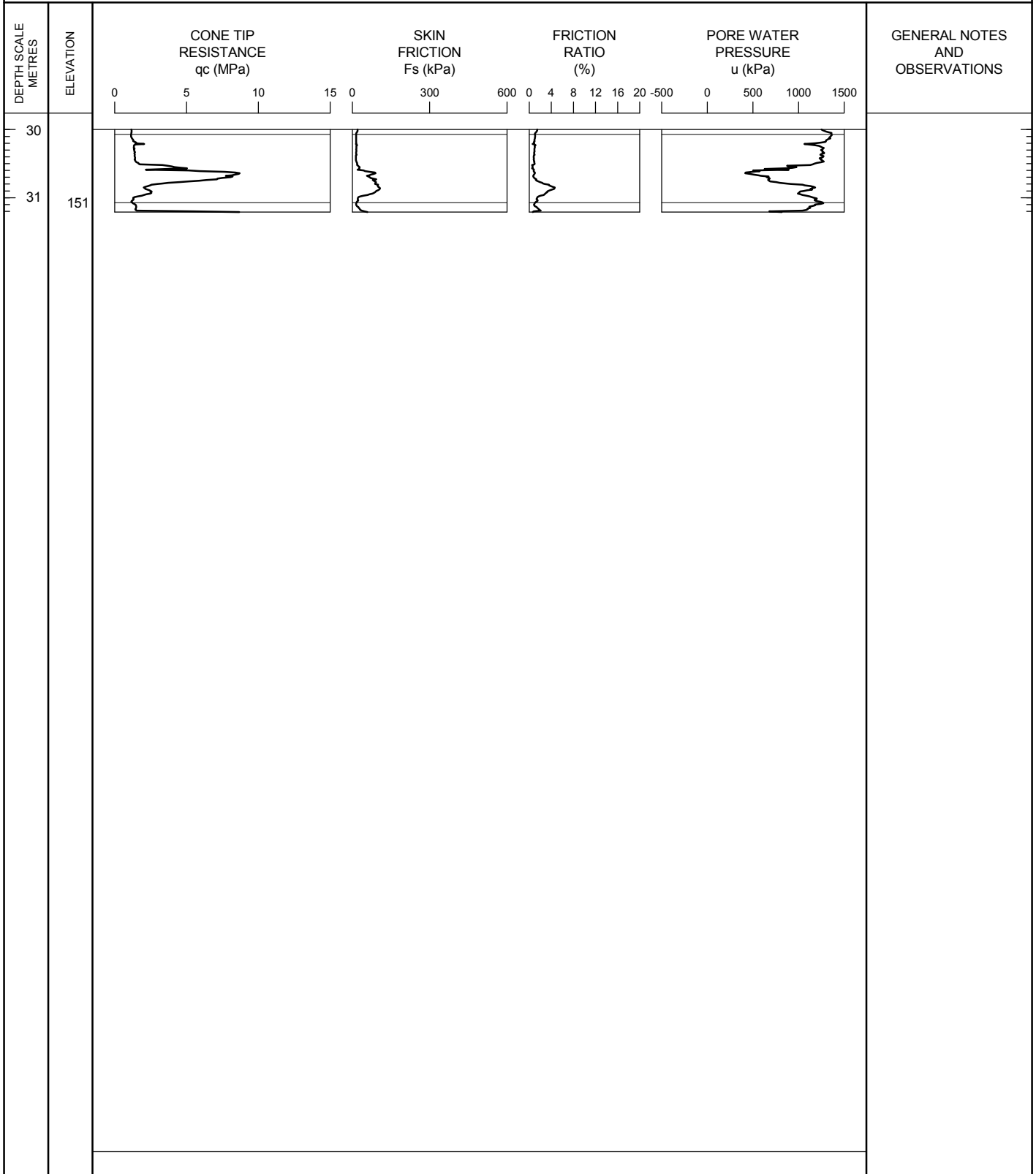
TEST DATE 5/13/2011 - 5/13/2011

SHEET 3 OF 3

LOCATION N4678983.4; E332941.1

DATUM Geodetic

GROUND SURFACE ELEVATION: 182.1 PREDRILL DEPTH: 4.48 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 40-RW

METRIC

PROJECT Windsor-Essex Parkway

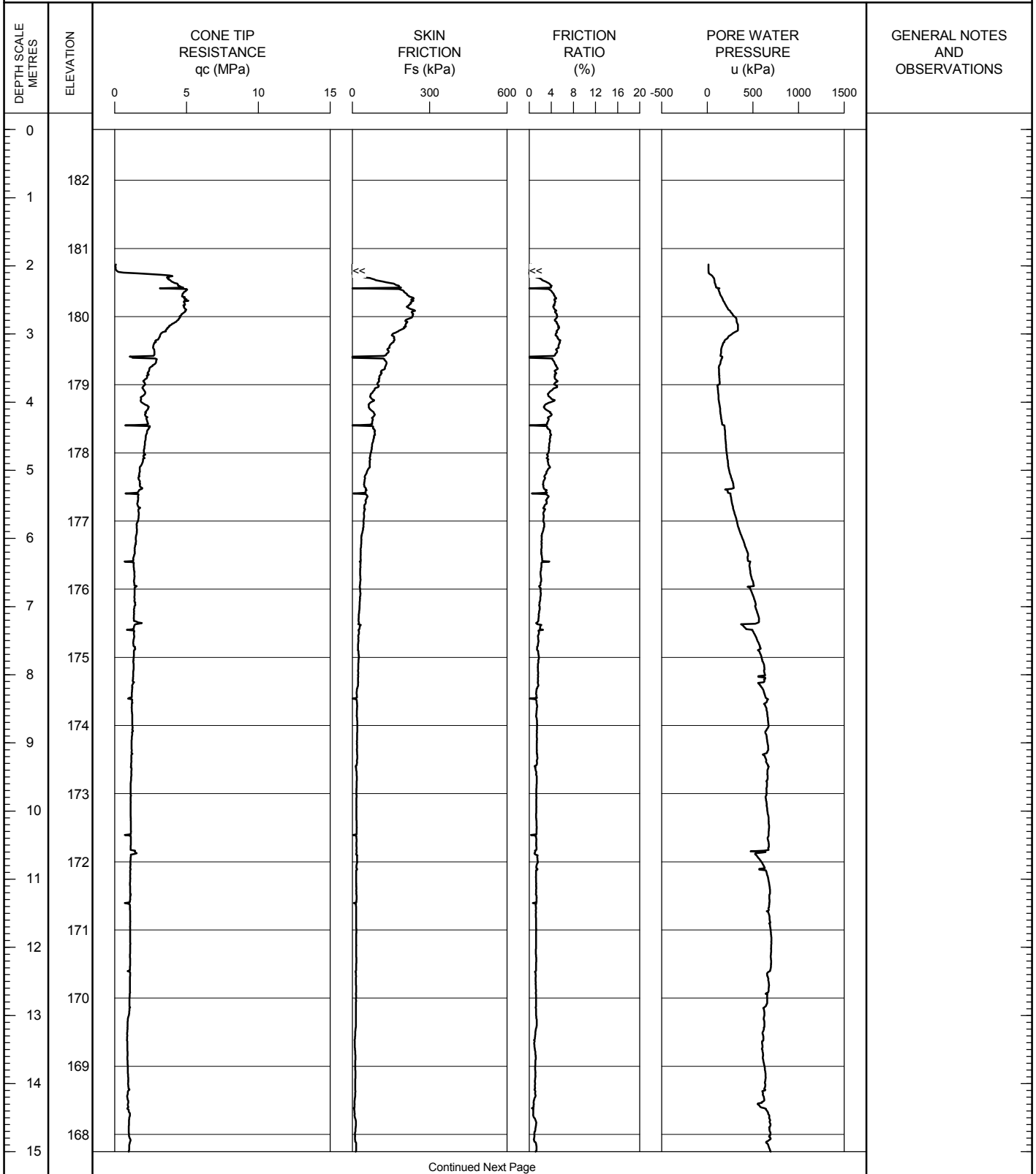
TEST DATE 8/9/2011 - 8/9/2011

SHEET 1 OF 3

LOCATION N4679160.3; E332817.4

DATUM Geodetic

GROUND SURFACE ELEVATION: 182.7 PREDRILL DEPTH: 1.98 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 40-RW

METRIC

PROJECT Windsor-Essex Parkway

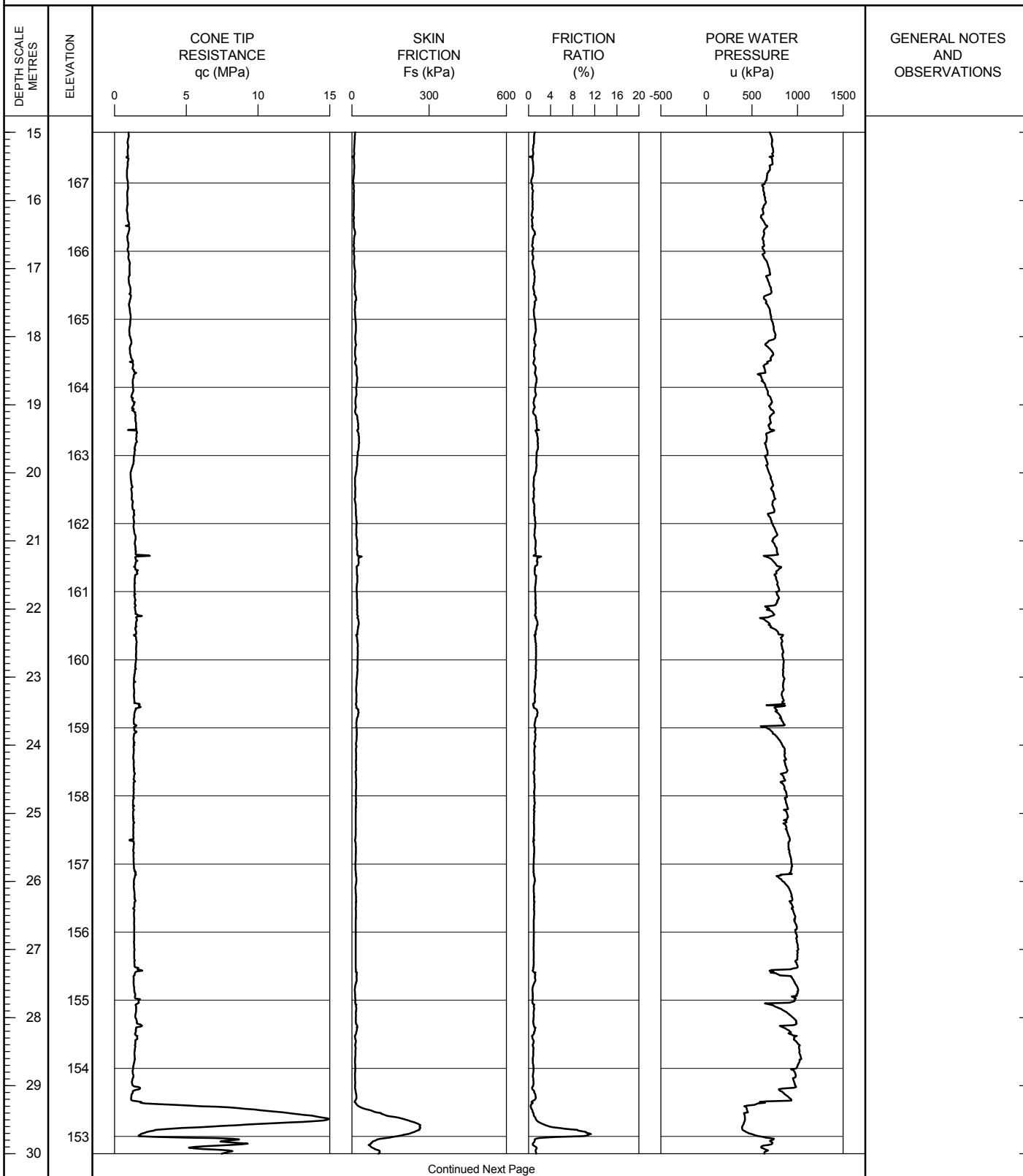
TEST DATE 8/9/2011 - 8/9/2011

SHEET 2 OF 3

LOCATION N4679160.3; E332817.4

DATUM Geodetic

GROUND SURFACE ELEVATION: 182.7 PREDRILL DEPTH: 1.98 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



WEP CPT LOG CPT-RW/GPJ ONTARIO MOT GDT 06/01/12

OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 40-RW

METRIC

PROJECT Windsor-Essex Parkway





TEST DATE 8/9/2011 - 8/9/2011

SHEET 3 OF 3

LOCATION N4679160.3; E332817.4

DATUM Geodetic

GROUND SURFACE ELEVATION: 182.7 PREDRILL DEPTH: 1.98 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0

| DEPTH SCALE METRES | ELEVATION | CONE TIP RESISTANCE qc (MPa) | SKIN FRICTION Fs (kPa) | FRICTION RATIO (%) | PORE WATER PRESSURE u (kPa) | GENERAL NOTES AND OBSERVATIONS |
|-----------------------|-----------|---|---|---|---|--------------------------------------|
| | | 0 5 10 15 | 0 300 600 | 0 4 8 12 16 20 | 0 500 1000 1500 | |
| 30 | |  |  |  |  | |

OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 41-RW

METRIC

PROJECT Windsor-Essex Parkway

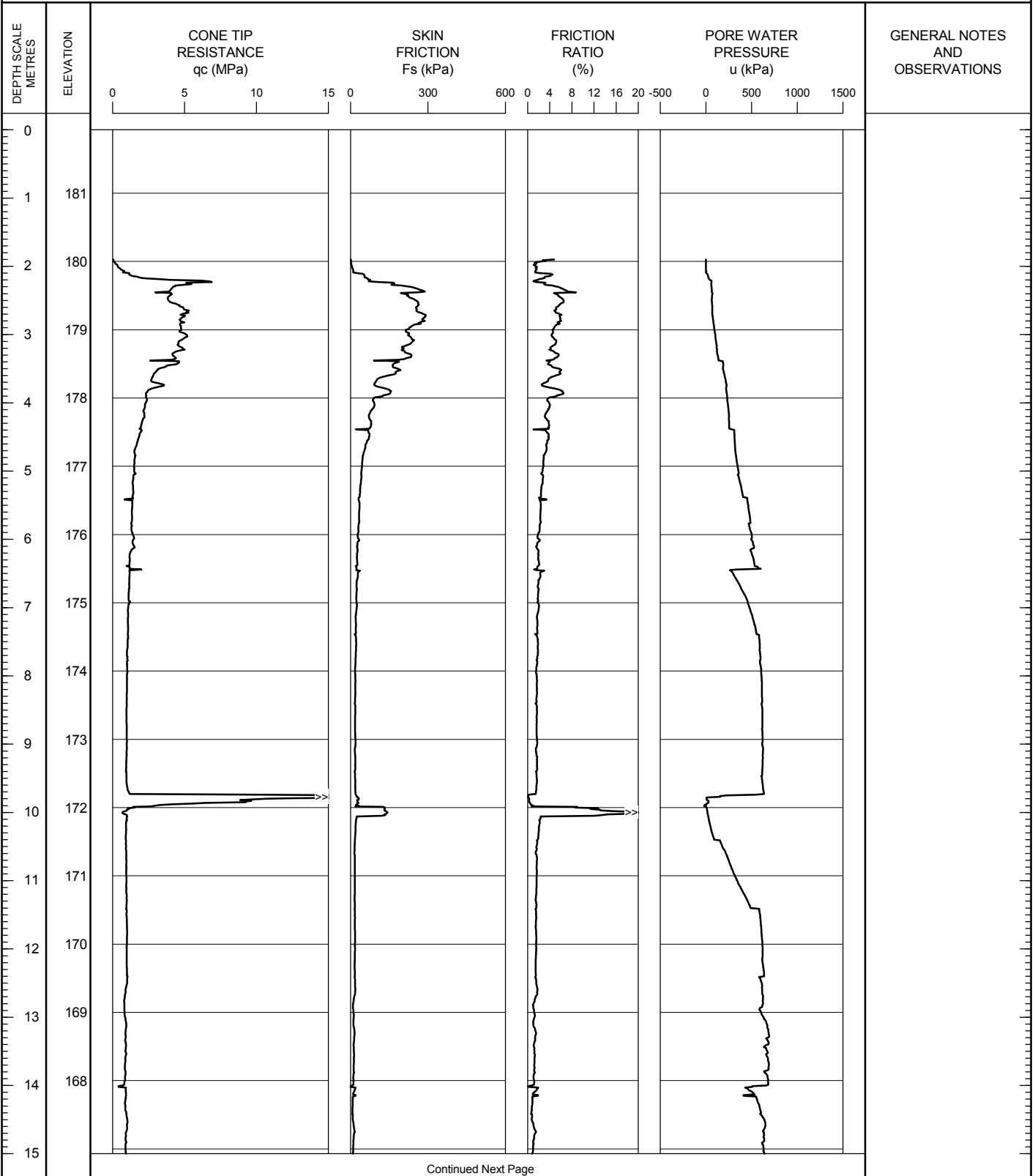
TEST DATE 7/28/2011 - 7/28/2011

SHEET 1 OF 3

LOCATION N4679053.8; E332792.8

DATUM Geodetic

GROUND SURFACE ELEVATION: 181.9 PREDRILL DEPTH: 1.59 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



WEP CPT LOG CPT-RW/GPJ ONTARIO MOT GDT 06/01/12

OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 41-RW

METRIC

PROJECT Windsor-Essex Parkway

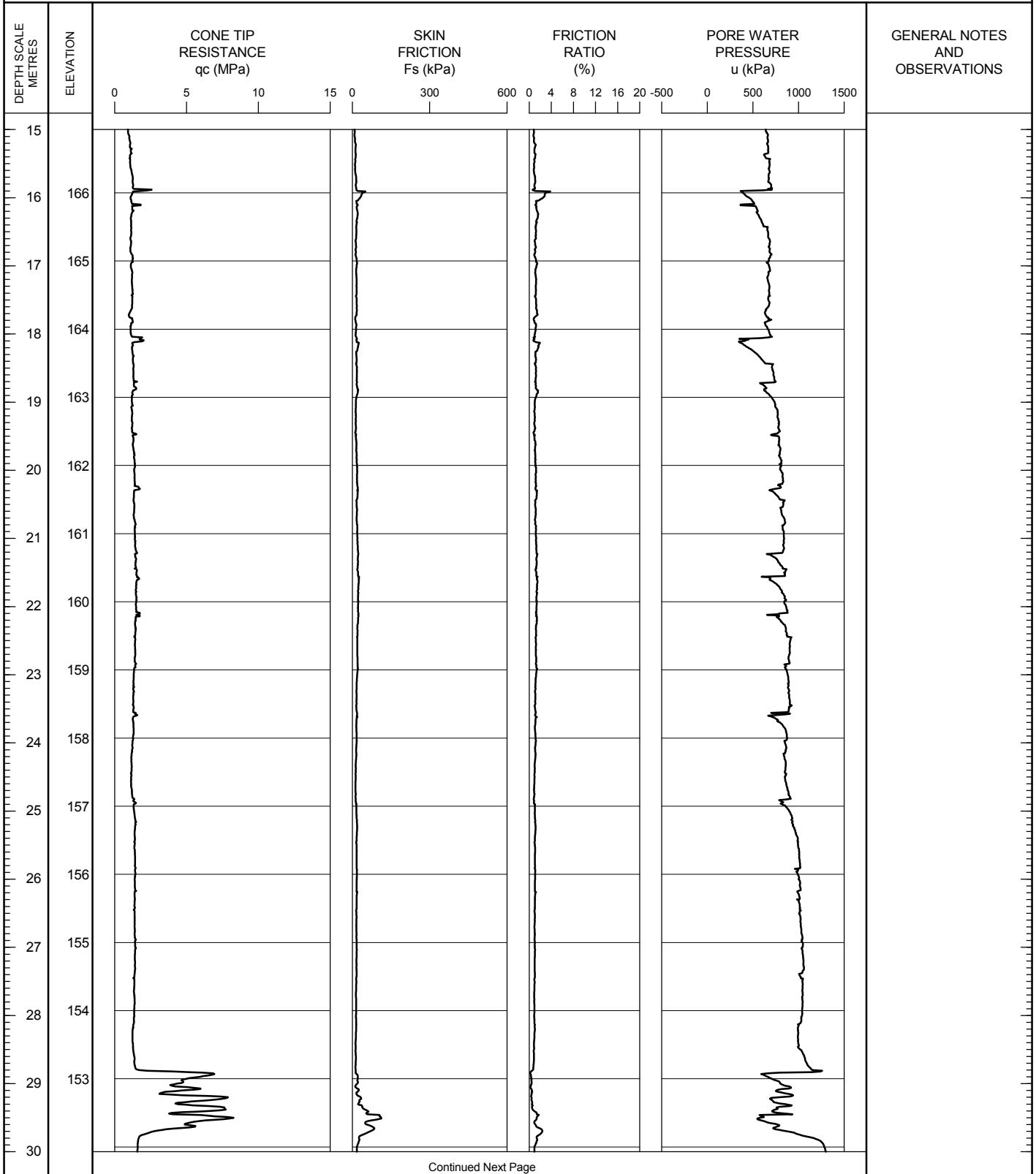
TEST DATE 7/28/2011 - 7/28/2011

SHEET 2 OF 3

LOCATION N4679053.8; E332792.8

DATUM Geodetic

GROUND SURFACE ELEVATION: 181.9 PREDRILL DEPTH: 1.59 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 41-RW

METRIC

PROJECT Windsor-Essex Parkway

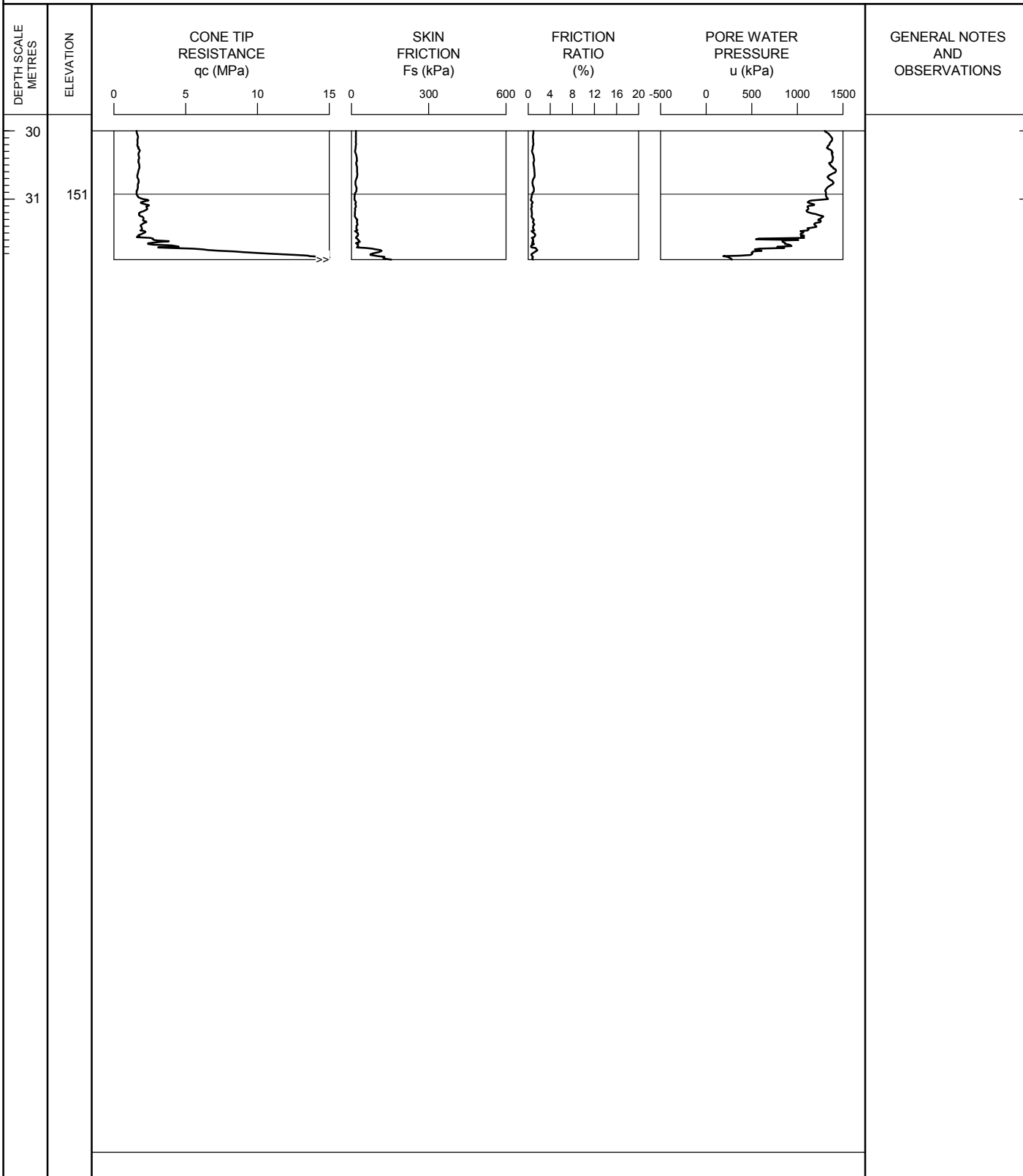
TEST DATE 7/28/2011 - 7/28/2011

SHEET 3 OF 3

LOCATION N4679053.8; E332792.8

DATUM Geodetic

GROUND SURFACE ELEVATION: 181.9 PREDRILL DEPTH: 1.59 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 42-RW

METRIC

PROJECT Windsor-Essex Parkway

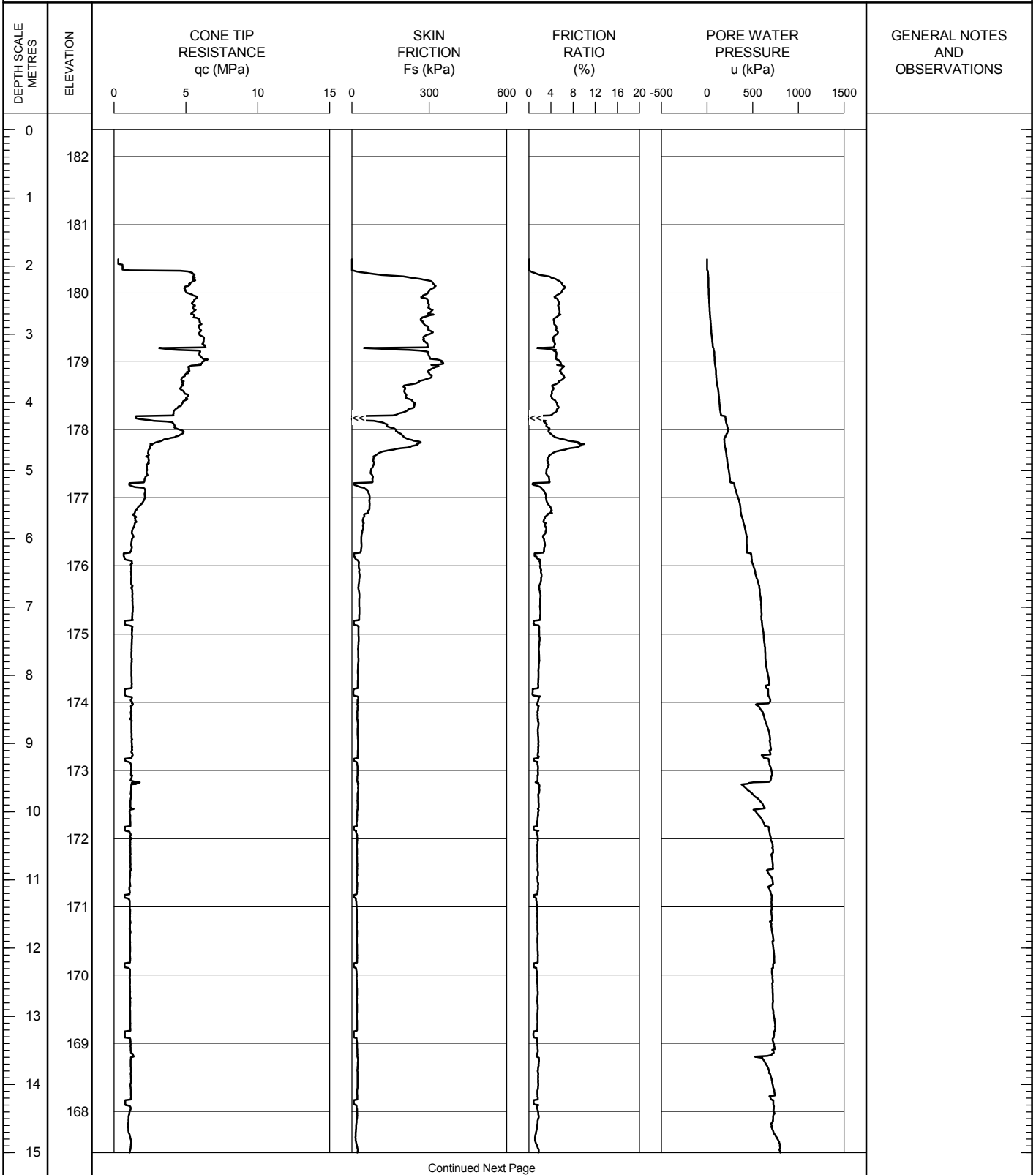
TEST DATE 7/3/2011 - 7/3/2011

SHEET 1 OF 2

LOCATION N4678892.0; E333107.4

DATUM Geodetic

GROUND SURFACE ELEVATION: 182.4 PREDRILL DEPTH: 1.97 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

WEP CPT LOG CPT-RW/GPJ ONTARIO MOT GDT 06/01/12

RECORD OF CONE PENETRATION TEST CPT 42-RW

METRIC

PROJECT Windsor-Essex Parkway

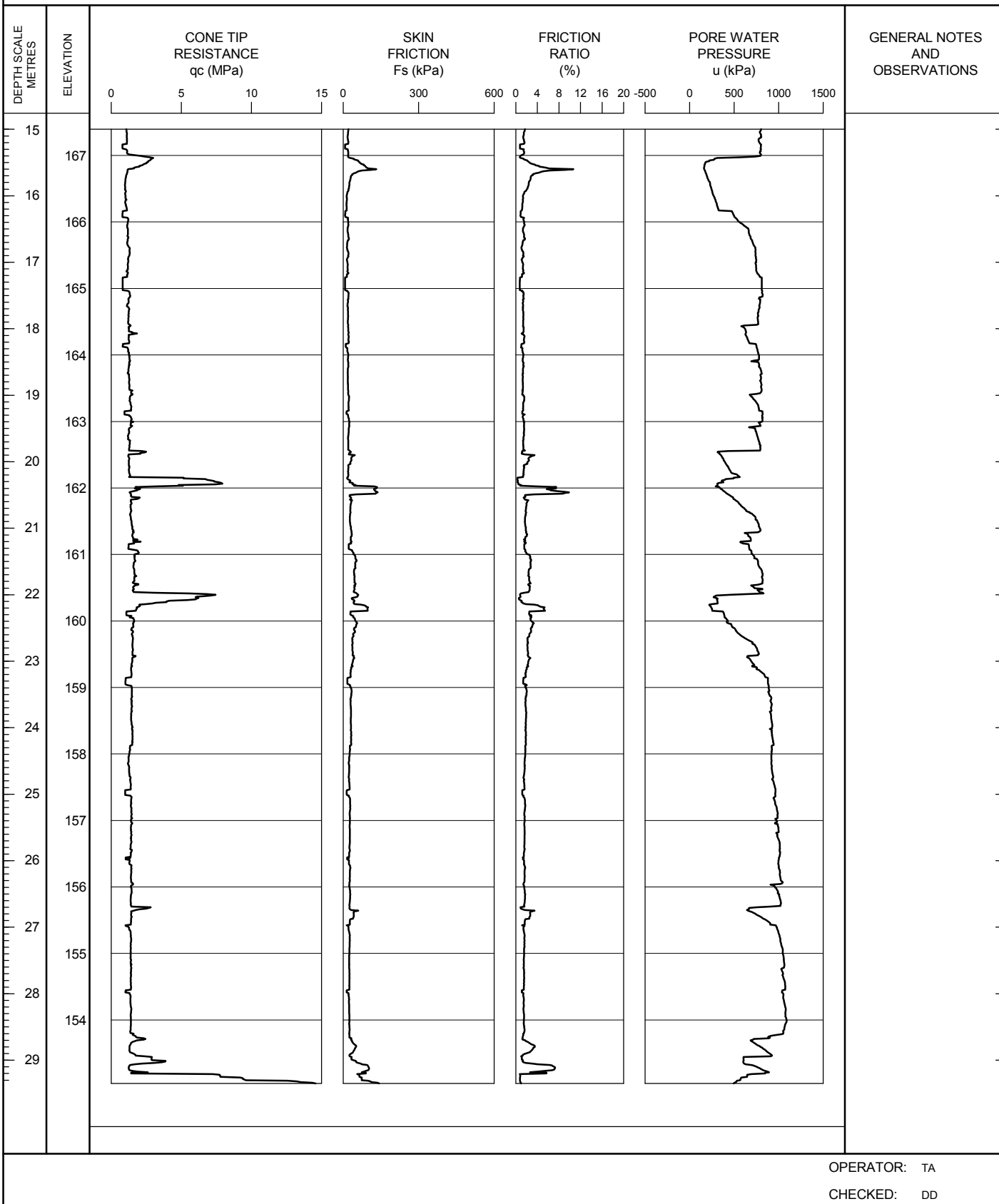
TEST DATE 7/3/2011 - 7/3/2011

SHEET 2 OF 2

LOCATION N4678892.0; E333107.4

DATUM Geodetic

GROUND SURFACE ELEVATION: 182.4 PREDRILL DEPTH: 1.97 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



WEF CPT LOG CPT-RW/GPJ ONTARIO MOT GDT 06/01/12

Station 11+500L to Station 12+300L (Soil Profile #12)

RECORD OF BOREHOLE No T8-1

1 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678789.7, E333364.5 ORIGINATED BY NB
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 19, 11 - Jul 20, 11 CHECKED BY MSO

| 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 | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● POCKET PEN. | × LAB VANE | | | | | | | | |
| | | | | | | | | 20 | 40 | 60 | 80 | | | | | | 100 | 10 | 20 |
| 182.8 | Ground Surface | | | | | | | | | | | | | | | | | | |
| 0.0 | 400mm | | | | | | | | | | | | | | | | | | |
| 182.4 | TOPSOIL | | 1 | SS | 3 | | | | | | | | | | | | | | |
| 0.4 | CLAYEY SILT Some sand, trace gravel Stiff to hard Brown-grey Trace rootlets in upper 2 m | | | | | | | | | | | | | | | | | | |
| | | | 2 | SS | 15 | | | | | | | | | | | | | | |
| | | | 3 | SS | 33 | | | | | | | | | | | | | | |
| | | | 4 | SS | 36 | | | | | | | | | | | | | | |
| | | | 5 | SS | 33 | | | | | | | | | | | | | | |
| | | | 6 | SS | 18 | | | | | | | | | | | | | | |
| | | | 7 | SS | 12 | | | | | | | | | | | | | | |
| | | | 8 | SS | 15 | | | | | | | | | | | | | | |
| | | | 9 | TW | PH | | | | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | | | |
| | | | 10 | TW | PH | | | | | | | | | | | | | | |
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Continued Next Page

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No T8-1

2 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678789.7, E333364.5 ORIGINATED BY NB
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 19, 11 - Jul 20, 11 CHECKED BY MSO

| 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 | | | | | | | WATER CONTENT (%) |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | | | | | | |
| | | | | | | | | ● POCKET PEN. | × LAB VANE | | | | | | |
| | | | | | | 20 40 60 80 100 | 20 40 60 80 100 | 10 20 30 | | | | | | | |
| 14.9 | SILTY CLAY Some silt nodules Firm to stiff Grey, some pink nodules <i>(continued)</i> | | 15 | TW | PH | | | | | | | | 20.4 | 1 19 35 45 | |
| | | | | | | | | | | | | | | | |
| | | | | | VT | | | | | | | | | | |
| | | | | 16 | TW | PH | | | | | | | | | |
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| | | | | 17 | TW | PH | | | | | | | | | |
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| | | | | | VT | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| 163.3 19.5 | CLAYEY SILT Some sand, trace gravel Very stiff Grey | | 18 | TW | PH | | | | | | | | 21.1 | -end of drilling July 19; continued July 20 -VWP T8-1-P21 installed at 20.6m below ground surface (El. 162.2 m) -MG T8-1-SM20 installed at 19.7 m below ground surface (El. 163.1 m) | |
| | | | | | | | | | | | | | | | |
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| | | | 19 | TW | PH | | | | | | | | 22.0 | 3 28 46 24 | |
| | | | | | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | |
| | | | 20 | TW | PH | | | | | | | | | -attempt at vane shear test exceeded max torque of apparatus | |
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| | | | 21 | SS | 25 | | | | | | | | | | |
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| | | | 22 | SS | 18 | | | | | | | | | | |
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| | | | 23 | SS | 17 | | | | | | | | | | |
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| 153.8 29.0 | SILTY CLAY Some silt seams Soft Grey Wet | | 24 | SS | 3 | | | | | | | | | | |
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Continued Next Page

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

ONTARIO MOT. SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No T8-1

3 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678789.7, E333364.5 ORIGINATED BY NB
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 19, 11 - Jul 20, 11 CHECKED BY MSO

| 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 | | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED ● POCKET PEN. | + FIELD VANE × LAB VANE | | | | | | | | | | | |
| 152.6 | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | | | |
| 30.2 | SANDY SILT With clayey silt layers, some gravel Very dense Grey | | 25 | SS | 88 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | -Some limestone fragments | | 26 | SS | 50/ 50mm | | | | | | | | | | | | | | | |
| 150.2 | | | | | | | | | | | | | | | | | | | | |
| 32.6 | LIMESTONE Fine grained, laminated, pitted Rubble between 33.0m and 33.2m White-Grey | | 27 | RC | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| 148.6 | LIMESTONE Fine grained, pitted, stylolitic contact with upper unit, porous Grey | | 28 | RC | | | | | | | | | | | | | | | | |
| 34.2 | | | | | | | | | | | | | | | | | | | | |
| 148.1 | | | | | | | | | | | | | | | | | | | | |
| 34.7 | END OF BOREHOLE | | | | | | | | | | | | | | | | | | | |
| | No groundwater observed during drilling from July 19 to July 20, 2011 due to wash boring | | | | | | | | | | | | | | | | | | | |
| | Water Level measured in Piezometer VWP T8-1-P11 at elevation 181.2m on August 29, 2011 | | | | | | | | | | | | | | | | | | | |
| | Water Level measured in Piezometer VWP T8-1-P21 at elevation 179.9m on August 29, 2011 | | | | | | | | | | | | | | | | | | | |
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+ 3, X 3: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No CPT T8-1

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678860.0, E333292.9 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Aug 4, 11 - Aug 4, 11 CHECKED BY MSO

| 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 | | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● POCKET PEN. × LAB VANE | | | | | | | | | | | | |
| 183.2 | Ground Surface | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | | | |
| 0.0 | FILL Crushed Limestone Grey | | | | | | | | | | | | | | | | | | | |
| 0.2 | | | | | | | | | | | | | | | | | | | | |
| 182.4 | FILL Clayey silt, some gravel Brown | | | | | | | | | | | | | | | | | | | |
| 0.8 | SANDY SILT Some clay, trace gravel Mottled brown and grey Brown | | 1 | SS | 7 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | 2 | SS | 9 | | | | | | | | | | | | | | | |
| 181.2 | END OF SAMPLED BOREHOLE Continued with CPT from 2 m to refusal at 32.4 m (El. 181.2 m to El. 150.8 m) Borehole dry on completion | | | | | | | | | | | | | | | | | | | |
| 2.0 | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | 181 | | | | | | | | | | | | | |
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| | | | | | | | 174 | | | | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | | | | | |
| | | | | | | | 171 | | | | | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | | | | | |
| | | | | | | | 169 | | | | | | | | | | | | | |

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

RECORD OF BOREHOLE No T9-1

1 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678634.9, E333766.7 ORIGINATED BY NB
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 15, 11 - Jul 16, 11 CHECKED BY MSO

| 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 | | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED ● POCKET PEN. | + | FIELD VANE X LAB VANE | | | | | | | | | | |
| 184.0 | Pavement Surface | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | | | |
| 0.0 | 280mm | | | | | | | | | | | | | | | | | | | |
| 183.7 | ASPHALT | | | | | | | | | | | | | | | | | | | |
| 0.3 | FILL | | 1 | SS | | | | | | | | | | | | | | | | |
| 183.0 | Crushed Limestone | | | | | | | | | | | | | | | | | | | |
| | Silty sand and gravel | | 2 | SS | 7 | | | | | | | | | | | | | | | |
| | Grey | | | | | | | | | | | | | | | | | | | |
| 1.0 | CLAYEY SILT | | | | | | | | | | | | | | | | | | | |
| | Some sand, trace gravel | | | | | | | | | | | | | | | | | | | |
| | Stiff to hard | | | | | | | | | | | | | | | | | | | |
| | Brown | | 3 | SS | 13 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | 4 | SS | 40 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | 5 | SS | 48 | | | | | | | | | | | | | | | |
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| | | | 6 | SS | 30 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | Grey | | 7 | SS | 16 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | 8 | SS | 12 | | | | | | | | | | | | | | | |
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| | | | 9 | SS | 11 | | | | | | | | | | | | | | | |
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| | | | | VT | | | | | | | | | | | | | | | | |
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| | | | 10 | TW | PH | | | | | | | | | | | | | | | |
| | Numerous Sand Layers between Elevations 176.4m and 167.2m | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
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| | | | 11 | TW | PH | | | | | | | | | | | | | | | |
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| | | | | VT | | | | | | | | | | | | | | | | |
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| | | | 12 | TW | PH | | | | | | | | | | | | | | | |
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| | | | 13 | TW | PH | | | | | | | | | | | | | | | |
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| | | | 14 | TW | PH | | | | | | | | | | | | | | | |
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Continued Next Page

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

-Switched to wash boring at 14.6m below ground surface (El. 169.4m)

METRIC

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

METRIC



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

RECORD OF BOREHOLE No DMT T9-1

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678544.5, E333900.9 ORIGINATED BY LC
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 19, 11 - Jul 19, 11 CHECKED BY MSO

| 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 | | | | | | | | | WATER CONTENT (%) | | | |
| | | | | | | | | ○ UNCONFINED | + | FIELD VANE | | | | | | | | | | |
| | | | | | | | | ● POCKET PEN. | × | LAB VANE | | | | | | | | | | |
| 184.1 | Ground Surface | | | | | | | | | | | | | | | | | | | |
| 0.0 | Clayey TOPSOIL |  | | | | | | | | | | | | | | | | | | |
| 183.7 | | | | | | | | | | | | | | | | | | | | |
| 0.4 | CLAYEY SILT Some sand, trace gravel Stiff to hard Mottled brown and grey |  | 1 | AS | | | | | | | | | | | | | | | | |
| | -Weathered fissures -Some sand, trace gravel with topsoil/organics in fissures | | 2 | SS | | | | | | | | | | | | | | | | |
| | Brown fissures | | 3 | SS | | | | | | | | | | | | | | | | |
| | Oxidized | | 4 | SS | | | | | | | | | | | | | | | | |
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| | Silty fissures Grey | | 5 | SS | | | | | | | | | | | | | | | | |
| 179.8 | END OF SAMPLED BOREHOLE DMT advanced from 0.2 m to refusal at 21.6 m (El. 183.9 m to El. 162.5 m) | | | | | | | | | | | | | | | | | | | |
| 4.3 | Borehole dry on completion | | | | | | | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No NIL T9-2

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678636.5, E333765.3 ORIGINATED BY SD
DIST HWY WEP BOREHOLE TYPE CME 850 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
DATUM Geodetic DATE Aug 15, 11 - Aug 15, 11 CHECKED BY MSO

| 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 | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE | | | | | | | | | | | |
| | | | | | | | | ● POCKET PEN. × LAB VANE | | | | | | | | | | | |
| 184.0 | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | | | | |
| 0.2 | CLAYEY SILT Some sand, trace gravel Stiff to very stiff Mottled brown and grey | |  | | | | | | | | | | | | | | | | |
| | | 1 | | SS | 10 | 183 | | | | | | | | | | | | | |
| | | 2 | | SS | 26 | 182 | | | | | | | | | | | | | |
| | Brown | 3 | | SS | 24 | 181 | | | | | | | | | | | | | |
| | | 4 | | SS | 21 | 180 | | | | | | | | | | | | | |
| | | 5 | | SS | 12 | 179 | | | | | | | | | | | | | |
| | | 6 | | SS | 10 | 178 | | | | | | | | | | | | | |
| | Grey | 7 | | SS | 8 | | | | | | | | | | | | | | |
| 177.4 | END OF BOREHOLE Continued with Nilcon vane from 7.0 m to refusal at 22.0 m (El. 177.0 to El. 162.0 m) | | 8 | SS | 5 | | | | | | | | | | | | | | |
| 6.6 | Borehole dry on completion | | | | | | | | | | | | | | | | | | |
| | | | | | | | 177 | | | | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | | | | |
| | | | | | | | 175 | | | | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | | | | |
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| | | | | | | | 172 | | | | | | | | | | | | |
| | | | | | | | 171 | | | | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | | | | |

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

RECORD OF BOREHOLE No TB6-1

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678909.5, E333353.3 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 75 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 9, 11 - Jul 9, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|---|------------|---------|------|------------|-------------------------|-----------------|--|----|------------|----|-----|---------------------------------|-------------------------------|--------------------------------|------------------|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | |
| 183.0 | Ground Surface | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | |
| 0.0 | TOPSOIL | | | | | | | ○ UNCONFINED | + | FIELD VANE | | | | | | | |
| | CLAYEY SILT | | | | | | | ● POCKET PEN. | × | LAB VANE | | | | | | | |
| | Some sand, trace gravel | | | | | | | WATER CONTENT (%) | | | | | | | | | |
| | Stiff to hard | | | | | | | 20 | 40 | 60 | 80 | 100 | 10 | 20 | 30 | | |
| | Mottled brown and grey | | | | | | | | | | | | | | | | |
| | Sandy, dry | | 1 | SS | 32 | | 182 | | | | | | | ○ | | | -hit a stone which may have skewed blow counts |
| | -Trace fissures | | 2 | SS | 22 | | 181 | | | | | | | ○ | | | |
| | -Trace inferred cobbles, trace fissures | | 3 | SS | 45 | | 180 | | | | | | | ○ | | | -sample very disturbed due to inferred cobbles |
| | | | 4 | SS | 31 | | 179 | | | | | | | ○ | | | |
| | | | 5 | SS | 20 | | 178 | | | | | | | ○ | | | |
| | | | 6 | SS | 14 | | 177 | | | | | | | ○ | | | |
| | | | 7 | SS | 13 | | 176 | | | | | | | ○ | | | |
| | | | 8 | SS | 9 | | 175 | | | | | | | ○ | | | |
| | | | 9 | SS | 5 | | 174 | | | | | | | ○ | | | |
| | | | VT | | | | 173 | | | | | | | ○ | | | |
| | | | 10 | SS | 5 | | 172 | | | | | | | ○ | | | |
| | | | VT | | | | 171 | | | | | | | ○ | | | |
| | | | VT | | | | 170 | | | | | | | ○ | | | |
| | | | VT | | | | 169 | | | | | | | ○ | | | |
| 172.9 | END OF BOREHOLE | | | | | | | | | | | | | | | | -corrosivity sample |
| 10.1 | Borehole dry on completion | | | | | | | | | | | | | | | | |

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No TB7-1

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678671.8, E333831.4 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 75 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 9, 11 - Jul 10, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|---|--------------|---------------|------------|------------------------------------|-------------------------------------|-----------------------------------|-------------------------|---|-------------------|---|----------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● POCKET PEN. | × LAB VANE | | | | | | W _p | W | W _L |
| 184.0 | Ground Surface | | | | | | | | | | | | | | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | | | | |
| 183.5 | CLAYEY SILT Some sand, trace gravel, trace cobbles Firm to hard Mottled brown and Grey Brown -Trace fissures Grey | | 1 | SS | 7 | ▽ | 183 | | | | | | | | | | | | |
| | | | | | | | | 182 | | | | | | | | | | | |
| | | | | | | | | 181 | | | | | | | | | | | |
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| | | | | | | | | 175 | | | | | | | | | | | |
| | | | | | | | | 174 | | | | | | | | | | | |
| 173.9 | END OF BOREHOLE | | | | | | | | | | | | | | | | | | |
| 10.1 | Groundwater encountered at elevation 181.0m during drilling on July 10, 2011 | | | | | | | | | | | | | | | | | | |
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ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No TB7-2

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678662.3, E333859.6 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 75 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 10, 11 - Jul 10, 11 CHECKED BY MSO

| 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 | | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● POCKET PEN. | × LAB VANE | | | | | | | | | |
| 184.1 | Ground Surface | | | | | | | | | | | | | | | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | | | | | |
| 183.8 | CLAYEY SILT | | | | | | | | | | | | | | | | | | | |
| 0.3 | Some sand, trace gravel | | 1 | SS | 12 | | | | | | | | | | | | | | | |
| | Firm to hard | | | | | | | | | | | | | | | | | | | |
| | Mottled brown and grey | | 2 | SS | 25 | | | | | | | | | | | | | | | |
| | Trace fissures | | | | | | | | | | | | | | | | | | | |
| | Brown | | 3 | SS | 37 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | Trace to some oxidized fissures | | 4 | SS | 28 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | Grey | | 5 | SS | 15 | | | | | | | | | | | | | | | |
| | | | 6 | SS | 10 | | | | | | | | | | | | | | | |
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| | | | 7 | SS | 9 | | | | | | | | | | | | | | | |
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| | | | 8 | SS | 9 | | | | | | | | | | | | | | | |
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| | | | 9 | SS | 5 | | | | | | | | | | | | | | | |
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| | | | | VT | | | | | | | | | | | | | | | | |
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| | | | 10 | SS | 5 | | | | | | | | | | | | | | | |
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| | | | | VT | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| 174.0 | END OF BOREHOLE | | | | | | | | | | | | | | | | | | | |
| 10.1 | Borehole dry on completion | | | | | | | | | | | | | | | | | | | |
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ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No TB7-3

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678644.6, E333911.0 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 75 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 12, 11 - Jul 12, 11 CHECKED BY MSO

| 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 | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED ● POCKET PEN. | + FIELD VANE × LAB VANE | | | | | | | | | |
| 184.9 | Fill Surface | | | | | | | | | | | | | | | | | |
| 0.0 | FILL | | | | | | | | | | | | | | | | | |
| 0.2 | Topsoil | | | | | | | | | | | | | | | | | |
| | FILL | | | | | | | | | | | | | | | | | |
| | Silty clay and topsoil | | | | | | | | | | | | | | | | | |
| | Brown | | | | | | | | | | | | | | | | | |
| 183.8 | | | 1 | SS | 6 | | | | | | | | | | | | | |
| 1.1 | CLAYEY SILT | | | | | | | | | | | | | | | | | |
| | Firm to hard | | | | | | | | | | | | | | | | | |
| | Mottled brown and grey | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | Brown | | | | | | | | | | | | | | | | | |
| | Moist to wet | | 3A, B | SS | 6 | | | | | | | | | | | | | |
| | Trace fissures | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 4 | SS | 25 | | | | | | | | | | | | | |
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| | | | 5 | SS | 37 | | | | | | | | | | | | | |
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| | Grey | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 6 | SS | 20 | | | | | | | | | | | | | |
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| | | | 7 | SS | 10 | | | | | | | | | | | | | |
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| | | | 8 | SS | 9 | | | | | | | | | | | | | |
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| | | | 9 | SS | 9 | | | | | | | | | | | | | |
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| | | | 10 | SS | 5 | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No TB7-4

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678619.4, E333980.0 ORIGINATED BY SD
 DIST HWY WEP BOREHOLE TYPE CME 75 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 15, 11 - Jul 15, 11 CHECKED BY MSO

| 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 | | | | | | | | | WATER CONTENT (%) | | | | | |
| 184.8 | Ground Surface | | | | | | | ○ UNCONFINED | + | FIELD VANE | | | | | | | | | | | | |
| 0.0 | TOPSOIL | | | | | | | ● POCKET PEN. | × | LAB VANE | | | | | | | | | | | | |
| 0.2 | CLAYEY SILT Some sand, trace gravel Firm to hard Brown | | 1 | SS | 6 | 184 | | | | | | | | | | | | | | | | |
| | | | 2 | SS | 12 | 183 | | | | | | | | | | | | | | | | |
| | Silt pockets | | 3 | SS | 20 | 182 | | | | | | | | | | | | | | | | |
| | Brown to grey | | 4 | SS | 34 | 181 | | | | | | | | | | | | | | | | |
| | | | 5 | SS | 25 | 180 | | | | | | | | | | | | | | | | |
| | Grey | | 6 | SS | 12 | 179 | | | | | | | | | | | | | | | | |
| | | | 7 | SS | 10 | 178 | | | | | | | | | | | | | | | | |
| | | | 8 | SS | 10 | 177 | | | | | | | | | | | | | | | | |
| | Moist to wet | | 9 | SS | 5 | 176 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| | Wet | 10 | SS | 3 | 175 | | | | | | | | | | | -corrosivity sample | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| 174.7 | END OF BOREHOLE | | | VT | | | | | | | | | | | | | | | | | | |
| 10.1 | Borehole dry on completion | | | | | | | | | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No TB7A-1

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678506.6, E334190.2 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 75 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 14, 11 - Jul 14, 11 CHECKED BY MSO

| 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 | | | | | | | | | | | | | |
| 184.8 | Ground Surface | | | | | | | ○ UNCONFINED + FIELD VANE | 20 | 40 | 60 | | | | | | 80 | 100 | ○ POCKET PEN. × LAB VANE | WATER CONTENT (%) | |
| 0.0 | TOPSOIL | | | | | | | | 20 | 40 | 60 | | | | | | 80 | 100 | | 10 | 20 |
| 184.2 | CLAYEY SILT Some sand, trace gravel Firm to hard Mottled brown and grey Brown - Trace fissures Grey | | 1 | SS | 8 | | 184 | | | | | | | ○ | | | | | | | |
| 0.6 | | | 2 | SS | 14 | | 183 | | | | | | | ○ | | | | | | | |
| | | | 3 | SS | 26 | | 182 | | | | | | | ○ | | | | | | | |
| | | | 4 | SS | 35 | | 181 | | | | | | | ○ | | | | | | | |
| | | | 5 | SS | 18 | | 180 | | | | | | | ○ | | | | | | | |
| | | | 6 | SS | 12 | | 179 | | | | | | | ○ | | | | | | | |
| | | | 7 | SS | 9 | | 178 | | | | | | | ○ | | | | | | | |
| | | | 8 | SS | 7 | | 177 | | | | | | | ○ | | | | | | | |
| | | | VT | | | | 176 | | | | | | | | | | | | | | |
| | | | 9 | SS | 6 | | 175 | | | | | | | | ○ | | | | | | |
| 174.7 | END OF BOREHOLE | | VT | | | | 174 | | | | | | | | | | | | | | |
| 10.1 | Borehole dry on completion | | | | | | 173 | | | | | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | | | | | | |
| | | | | | | | 171 | | | | | | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | | | | | | |

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No CV3-1

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678630.0, E333861.1 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 75 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 12, 11 - Jul 12, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|--|------------|---------|------|------------|-------------------------|-----------------|--|----|----|----|-----|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | |
| 184.5 | Ground Surface | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | |
| 0.0 | FILL Silty clay Some sand, trace gravel Trace to some topsoil Brown | | | | | | 184 | | | | | | | o | | | |
| 183.6 | CLAYEY SILT Some sand, trace gravel Stiff to hard Mottled brown and grey | | 1 | SS | 10 | | 183 | | | | | | | o | | | |
| 0.9 | | | 2 | SS | 9 | | 182 | | | | | | | o | | | |
| | Trace fissures, trace silt seams Brown | | 3 | SS | 29 | | 181 | | | | | | | o | | | |
| | | | 4 | SS | 40 | | 180 | | | | | | | o | | | |
| | | | 5 | SS | 27 | | 179 | | | | | | | o | | | |
| | Grey | | 6 | SS | 10 | | 178 | | | | | | | o | | | |
| | | | 7 | SS | 7 | | 177 | | | | | | | o | | | |
| | | | 8 | TW | PH | | 176 | | | | | | | o | | | |
| | Numerous Sand Layers at Elevation 176.9 m | | 9 | TW | PH | | 175 | | | | | | | o | | | |
| | | | 10 | TW | PH | | 174 | | | | | | | | | | |
| 174.7 | END OF BOREHOLE Borehole dry on completion | | | | | | 173 | | | | | | | | | | |
| 9.8 | | | | | | | 172 | | | | | | | | | | |
| | | | | | | | 171 | | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | | |

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No CV4-1

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678867.9, E333368.7 ORIGINATED BY DG
 DIST HWY WEP BOREHOLE TYPE CME 850 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Aug 27, 11 - Aug 27, 11 CHECKED BY MSO

| 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 | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED ● POCKET PEN. | + FIELD VANE × LAB VANE | | | | | | | | | | |
| 183.3 | Ground Surface | | | | | | | | | | | | | | | | | | |
| 0.0 | 75mm ASPHALT Over FILL, sand and gravel | | | | | | | | | | | | | | | | | | |
| 182.4 | | | 1 | SS | 6 | | | | | | | | | | | | | | |
| 0.9 | FILL Silty Clay/Clayey Silt Some topsoil, trace fine gravel, trace sand, brown | | 2 | SS | 5 | | | | | | | | | | | | | | |
| 181.2 | | | | | | | | | | | | | | | | | | | |
| 2.1 | CLAYEY SILT Some sand, trace fine-coarse gravel Stiff to hard Mottled brown-grey | | 3 | SS | 9 | | | | | | | | | | | | | | |
| | | | 4 | SS | 29 | | | | | | | | | | | | | | |
| | | | 5 | SS | 30 | | | | | | | | | | | | | | |
| | Grey | | 6 | SS | 17 | | | | | | | | | | | | | | |
| | | | 7 | SS | 11 | | | | | | | | | | | | | | |
| | | | 8 | TW | PH | | | | | | | | | | | | | | |
| | | | VT | | | | | | | | | | | | | | | | |
| | | | 9 | TW | PH | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | 10 | TW | PH | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | VT | | | | | | | | | | | | | | | | |
| 172.9 | | | | | | | | | | | | | | | | | | | |
| 10.4 | END OF BOREHOLE (no refusal) | | | | | | | | | | | | | | | | | | |
| | Groundwater observed at 3.0 m (El. 180.3 m) during drilling on Aug. 27, 2011 | | | | | | | | | | | | | | | | | | |

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No HG-MW-3

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678886.8, E333395.5 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 75 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 9, 11 - Jul 9, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|---|------------|---------|------|------------|-------------------------|-----------------|--|----|------------|----|-----|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | |
| 182.9 | Ground Surface | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | |
| 0.0 | TOPSOIL | | | | | | | ○ UNCONFINED | + | FIELD VANE | | | | | | | |
| | CLAYEY SILT | | | | | | | ● POCKET PEN. | × | LAB VANE | | | | | | | |
| | Some sand, trace gravel, trace organics | | | | | | | | | | | | | | | | |
| | Brown | | | | | | | | | | | | | | | | |
| 181.4 | | | 1 | SS | 8 | | 182 | | | | | | | | | | |
| 1.5 | SAND | | | | | | | | | | | | | | | | |
| | Poorly-Graded, trace gravel, trace silt | | 2 | SS | 3 | | 181 | | | | | | | | | | |
| | Brown | | | | | | | | | | | | | | | | |
| 180.5 | | | | | | | | | | | | | | | | | |
| 2.4 | CLAYEY SILT | | 3A, B | SS | 1 | | 180 | | | | | | | | | | |
| | Some sand, trace gravel | | | | | | | | | | | | | | | | |
| | Trace fissures | | | | | | | | | | | | | | | | |
| | Brown | | | | | | | | | | | | | | | | |
| 179.4 | | | 4 | SS | 29 | | | | | | | | | | | | |
| 3.5 | END OF BOREHOLE | | | | | | | | | | | | | | | | |
| | Water levels in observation well measured at elevation 180.9m on July 29, 2011 | | | | | | 179 | | | | | | | | | | |
| | Water levels in observation well measured at elevation 180.6m on October 13, 2011 | | | | | | 178 | | | | | | | | | | |
| | | | | | | | 177 | | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | | |
| | | | | | | | 175 | | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | | |
| | | | | | | | 171 | | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | | |
| | | | | | | | 169 | | | | | | | | | | |
| | | | | | | | 168 | | | | | | | | | | |



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

RECORD OF BOREHOLE No BH14-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678679.5, E333553.9 ORIGINATED BY NB
DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
DATUM Geodetic DATE Jul 19, 11 - Jul 19, 11 CHECKED BY MSO

| 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 | | | | | | | | | | | | | WATER CONTENT (%) | | | | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | | | | | | | | | | | | | | | | | |
| | | | | | | | | ● POCKET PEN. | × LAB VANE | | | | | | | | | | | | | | | | | |
| 184.0 | Fill Surface | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | | | | | | | | |
| 0.0 | FILL Silty Clay Some sand and gravel, trace construction debris, brown-grey |  | 1 | SS | 10 | | 183 | | | | | | | | | | | | | | | | | | | |
| | | | 2 | SS | 13 | | | | | | | | | | | | | | | | | | | | | |
| 182.6 | CLAYEY SILT Trace sand, trace organics in upper 1.0 m Stiff to hard Brown-grey Brown Grey |  | | | | | 182 | | | | | | | | | | | | | | | | | | | |
| 1.4 | | | 3 | SS | 10 | | | | | | | | | | | | | | | | | | | | | |
| | | | 4 | SS | 37 | | | | | | | | | | | | | | | | | | | | | |
| | | | 5 | SS | 42 | | | | 181 | | | | | | | | | | | | | | | | | |
| | | | 6 | SS | 39 | | | | | | | | | | | | | | | | | | | | | |
| | | | 7 | SS | 19 | | | | 180 | | | | | | | | | | | | | | | | | |
| | | | 8 | SS | 17 | | | | | | | | | | | | | | | | | | | | | |
| | | | 9 | SS | 19 | | | | 179 | | | | | | | | | | | | | | | | | |
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| | | | | | | | 178 | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 177.4 | END OF BOREHOLE | | | | | | 177 | | | | | | | | | | | | | | | | | | | |
| 6.6 | Borehole dry on completion | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | 176 | | | | | | | | | | | | | | | | | | |
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| | | | | | | | | 175 | | | | | | | | | | | | | | | | | | |
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| | | | | | | | | 174 | | | | | | | | | | | | | | | | | | |
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| | | | | | | | 173 | | | | | | | | | | | | | | | | | | | |
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| | | | | | | | 172 | | | | | | | | | | | | | | | | | | | |
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| | | | | | | | 171 | | | | | | | | | | | | | | | | | | | |
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| | | | | | | | 170 | | | | | | | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No BH15-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678559.2, E333806.1 ORIGINATED BY LC
 DIST HWY WEP BOREHOLE TYPE CME 75 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 15, 11 - Jul 15, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|---|------------|---------|------|------------|-------------------------|-----------------|--|----|----|----|-----|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | |
| 184.1 | Fill Surface | | | | | | 184 | 20 | 40 | 60 | 80 | 100 | | | | | |
| 0.0 | FILL Silty Topsoil to Mixed Clay/Silt/Sand/Roots/concrete | | | | | | | | | | | | | | | | |
| | FILL Soft Clay/Topsoil | | 1 | SS | 2 | | 183 | | | | | | | | | | |
| 182.6 | | | | | | | | | | | | | | | | | |
| 1.5 | SILTY CLAY Weathered, fissures Some sand, trace gravel | | 2 | SS | 11 | | 182 | | | | | | | | | | |
| 181.8 | Stiff Brown | | | | | | | | | | | | | | | | |
| 2.3 | CLAYEY SILT Hard to firm Brown | | 3 | SS | 31 | | | | | | | | | | | | |
| | Some sand, trace gravel Moist Fissured occasionally | | 4 | SS | 39 | | 181 | | | | | | | | | | |
| | Grey | | 5 | SS | 22 | | 180 | | | | | | | | | | |
| | | | 6 | SS | 14 | | | | | | | | | | | | |
| | | | | | | | 179 | | | | | | | | | | |
| | | | 7 | SS | 9 | | | | | | | | | | | | |
| | | | | | | | 178 | | | | | | | | | | |
| 177.5 | END OF BOREHOLE Borehole dry on completion | | 8 | SS | 7 | | | | | | | | | | | | |
| 6.6 | | | | | | | 177 | | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | | |
| | | | | | | | 175 | | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | | |
| | | | | | | | 171 | | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | | |

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

RECORD OF BOREHOLE No CPT43-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678907.6, E333207.7 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Aug 3, 11 - Aug 3, 11 CHECKED BY MSO

| 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 | | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● POCKET PEN. × LAB VANE | | | | | | | | | | | | |
| 182.6 | Ground Surface | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | | | | | |
| 182.3 | | | | | | | | | | | | | | | | | | | | |
| 0.3 | CLAYEY SILT Some sand, trace gravel Trace fissures Mottled brown and grey | | 1 | SS | 11 | | 182 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | Brown | | 2 | SS | 21 | | 181 | | | | | | | | | | | | | |
| 180.6 | END OF SAMPLED BOREHOLE Continued with CPT from 2.0 m to refusal at 29.1 m (El. 180.6 m to El. 153.5 m) | | | | | | 180 | | | | | | | | | | | | | |
| 2.0 | Borehole dry on completion | | | | | | | | | | | | | | | | | | | |
| | | | | | | | 179 | | | | | | | | | | | | | |
| | | | | | | | 178 | | | | | | | | | | | | | |
| | | | | | | | 177 | | | | | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | | | | | |
| | | | | | | | 175 | | | | | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | | | | | |
| | | | | | | | 171 | | | | | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | | | | | |
| | | | | | | | 169 | | | | | | | | | | | | | |
| | | | | | | | 168 | | | | | | | | | | | | | |

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

RECORD OF BOREHOLE No CPT44-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678777, E333464 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Aug 4, 11 - Aug 4, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | PLASTIC LIMIT w _p | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|---|----|----|------------------------------------|-------------------------------------|-----------------------------------|-------------------------|---|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | |
| | | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | |
| | | | | | | | | ○ UNCONFINED | | + | FIELD VANE | | | | | |
| | | | | | | | | ● POCKET PEN. | | × | LAB VANE | | | | | |
| | | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | |
| | | | | | | | | WATER CONTENT (%) | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 183.1 | Ground Surface | | | | | | | | | | | | | | | |
| 0.0 | TOPSOIL | | | | | | 183 | | | | | | | | | |
| | CLAYEY SILT | | 1 | SS | 4 | | | | | | | | | | | |
| | Some sand, occasional sand pockets | | 2 | SS | 14 | | 182 | | | | | | | | | |
| | Trace fissures | | | | | | | | | | | | | | | |
| | Mottled brown and grey | | | | | | | | | | | | | | | |
| | | | | | | | 181 | | | | | | | | | |
| | Brown | | | | | | | | | | | | | | | |
| 180.1 | | | 3 | SS | 31 | | | | | | | | | | | |
| 3.0 | END OF SAMPLED BOREHOLE | | | | | | 180 | | | | | | | | | |
| | Continued with CPT from 3.3 m to refusal at 27.2 m (El. 179.8 m to El. 155.9 m) | | | | | | | | | | | | | | | |
| | Borehole dry on completion | | | | | | 179 | | | | | | | | | |
| | | | | | | | 178 | | | | | | | | | |
| | | | | | | | 177 | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | |
| | | | | | | | 175 | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | |
| | | | | | | | 171 | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | |
| | | | | | | | 169 | | | | | | | | | |

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

RECORD OF BOREHOLE No CPT45-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678688.3, E333708.0 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Aug 9, 11 - Aug 9, 11 CHECKED BY MSO

| 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 | | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● POCKET PEN. × LAB VANE | | | | | | | | | | | | |
| 183.4 | Ground Surface | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | | | | | |
| 183.1 | CLAYEY SILT | | 1 | SS | 3 | | 183 | | | | | | | | | | | | | |
| 0.3 | Some sand, trace gravel, trace fissures | | 2 | SS | 7 | | | | | | | | | | | | | | | |
| | Firm to hard | | | | | | 182 | | | | | | | | | | | | | |
| | Mottled brown and grey | | | | | | | | | | | | | | | | | | | |
| | | | | | | | 181 | | | | | | | | | | | | | |
| | Brown | | 3 | SS | 38 | | | | | | | | | | | | | | | |
| 180.4 | END OF SAMPLED BOREHOLE | | | | | | 180 | | | | | | | | | | | | | |
| 3.0 | Continued with CPT from 3.5 m to refusal at 32.8 m (El. 179.9 m to El. 150.6 m) | | | | | | | | | | | | | | | | | | | |
| | Borehole dry on completion | | | | | | 179 | | | | | | | | | | | | | |
| | | | | | | | 178 | | | | | | | | | | | | | |
| | | | | | | | 177 | | | | | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | | | | | |
| | | | | | | | 175 | | | | | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | | | | | |
| | | | | | | | 171 | | | | | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | | | | | |
| | | | | | | | 169 | | | | | | | | | | | | | |

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

RECORD OF NILCON VANE TEST NIL T8-1

Project : Windsor-Essex Parkway

Test Date: 8/17/2011

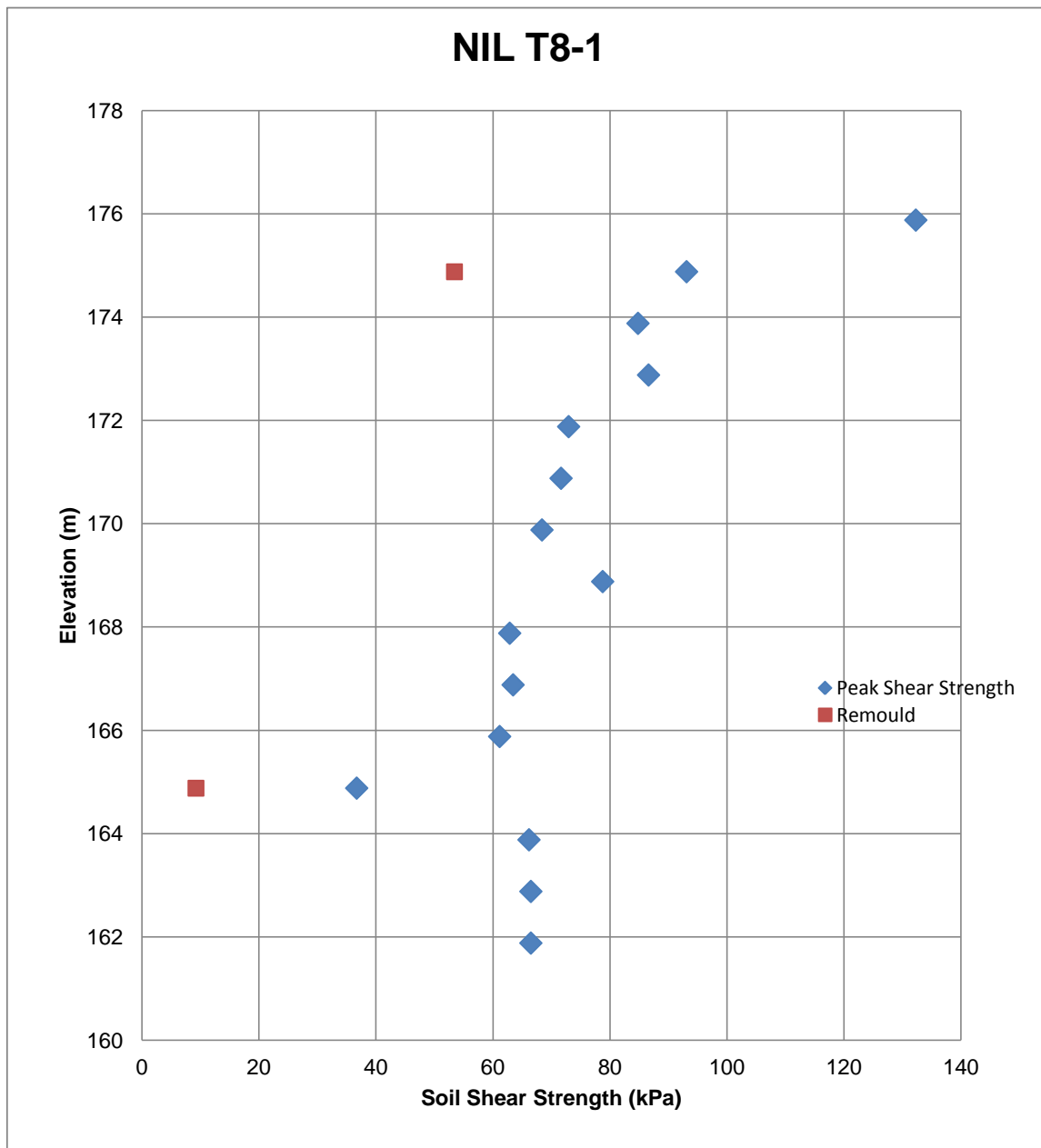
Sheet 1 of 1

Location: N4678784.8; E333381.3

Predrill Depth : 6.1 m

Datum Geodetic

Ground Surface Elevation: 182.9 m



Operator: SD

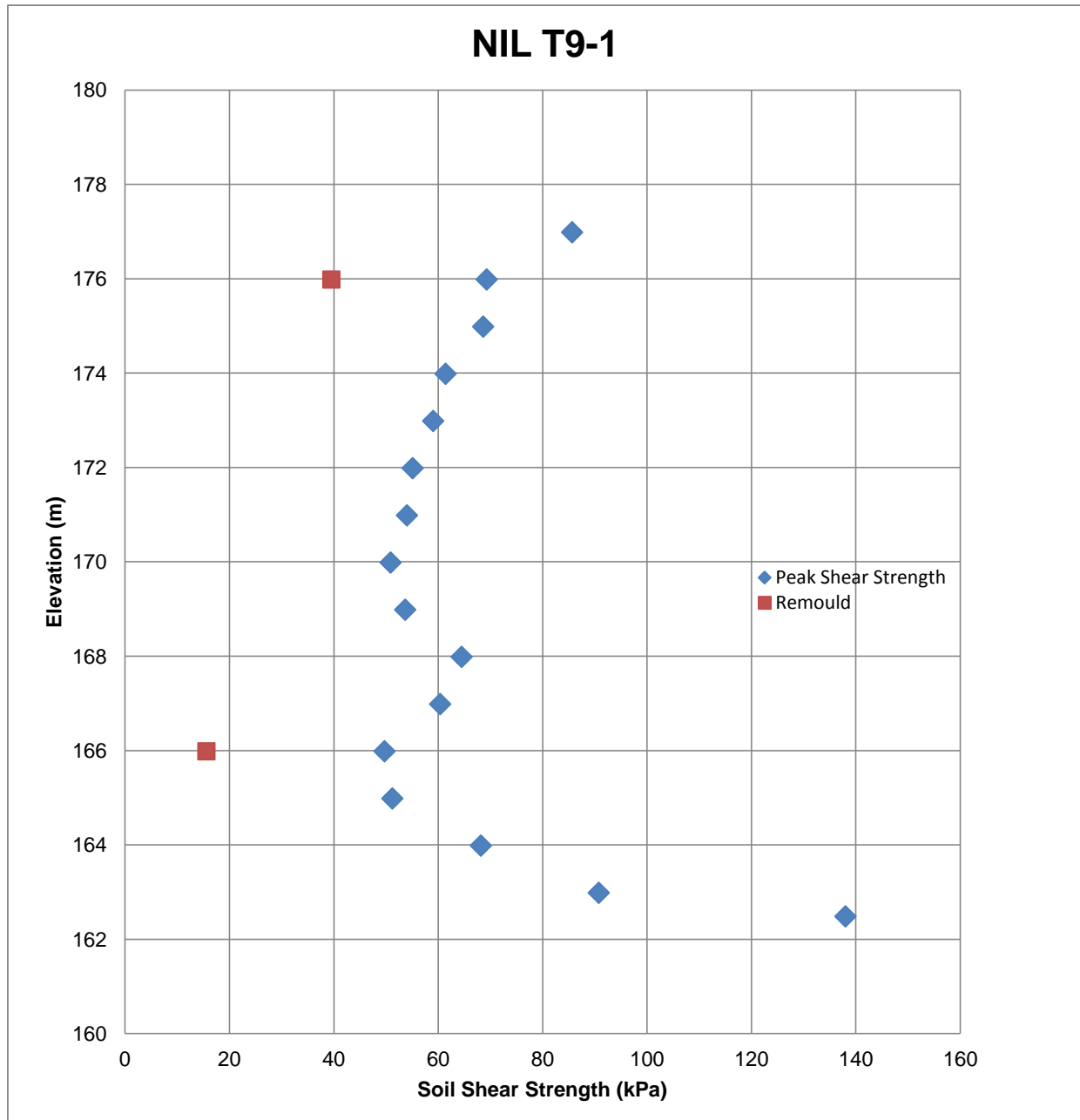
Checked: DD

RECORD OF NILCON VANE TEST NIL T9-1

Project : Windsor-Essex Parkway
 Location: N4678636.5; E333765.3
 Ground Surface Elevation: 184.0 m

Test Date: 8/16/2001
 Predrill Depth : 6.1 m

Sheet 1 of 1
 Datum Geodetic



Operator: SD

Checked: DD

RECORD OF NILCON VANE TEST NIL T9-2

Project : Windsor-Essex Parkway

Test Date: 8/15/2001

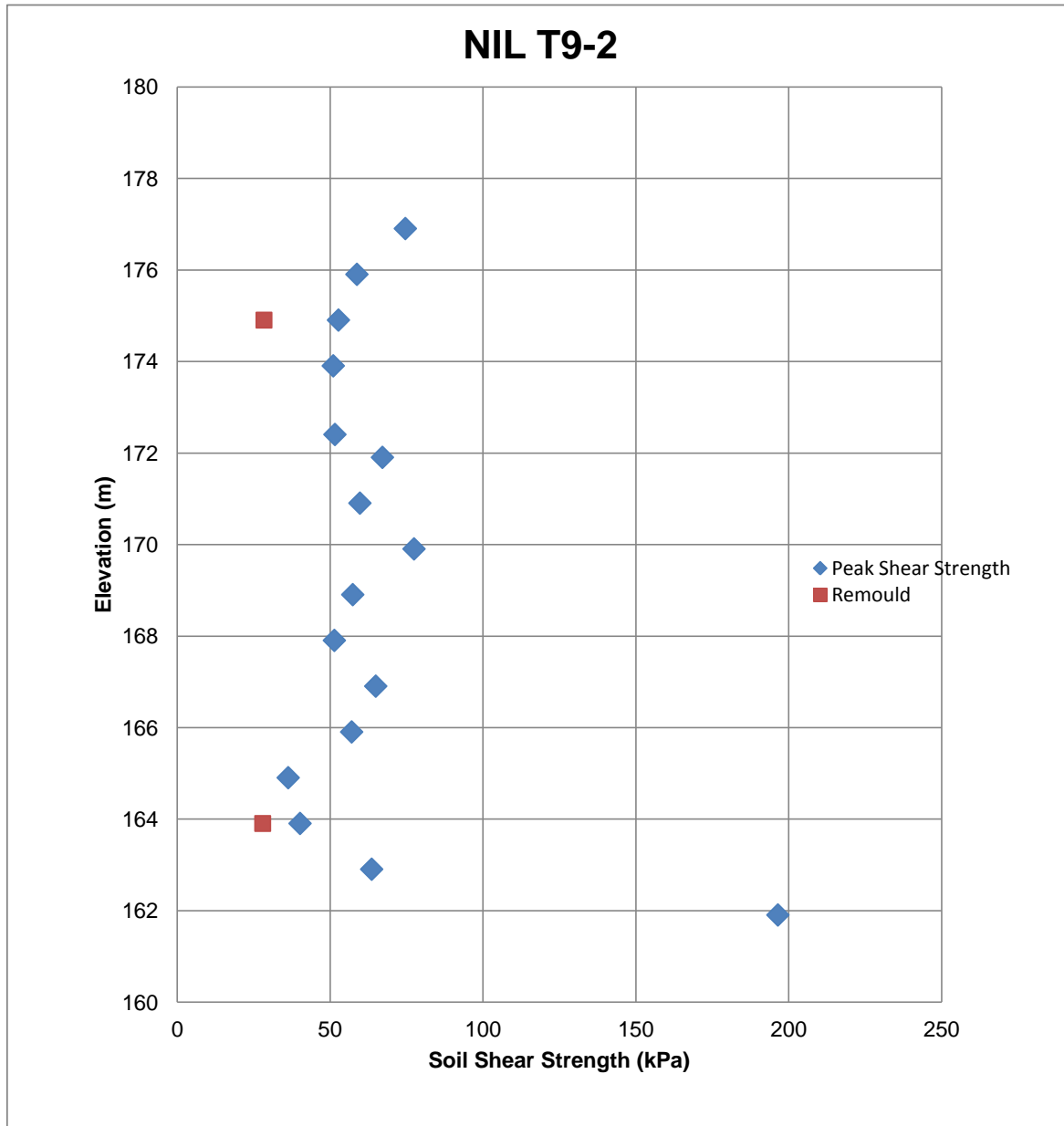
Sheet 1 of 1

Location: N4678593.7; E333893.5

Predrill Depth : 6.6 m

Datum Geodetic

Ground Surface Elevation: 183.9 m



Operator: SD

Checked: DD

RECORD OF CONE PENETRATION TEST CPT T8-1

METRIC

PROJECT Windsor-Essex Parkway

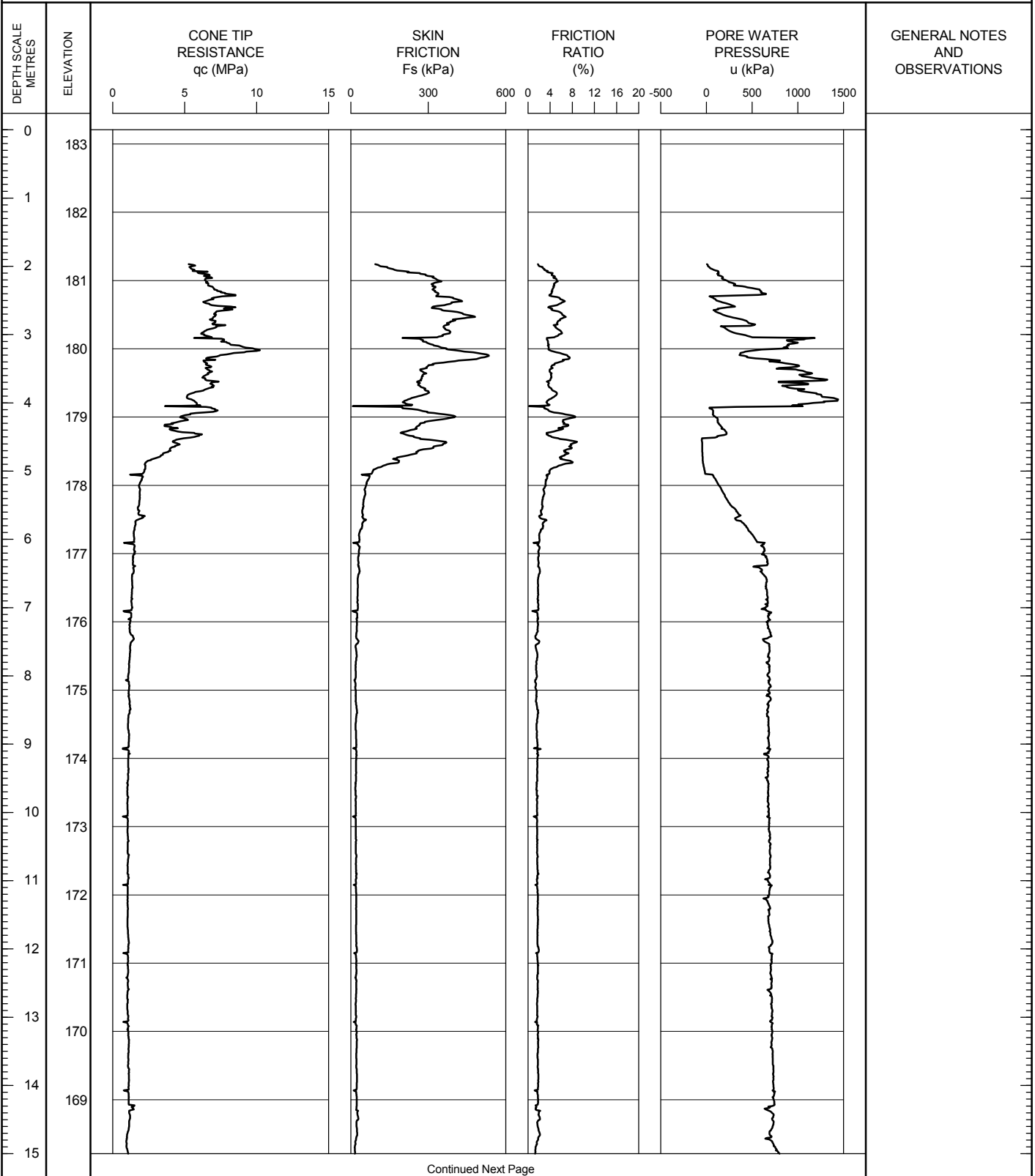
TEST DATE 8/4/2011 - 8/4/2011

SHEET 1 OF 3

LOCATION N4678860.0; E333292.9

DATUM Geodetic

GROUND SURFACE ELEVATION: 183.2 PREDRILL DEPTH: 1.82 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



WEP CPT LOG CPT T8-1.GPJ ONTARIO.MOT.GDT 22/12/11

OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT T8-1

METRIC

PROJECT Windsor-Essex Parkway

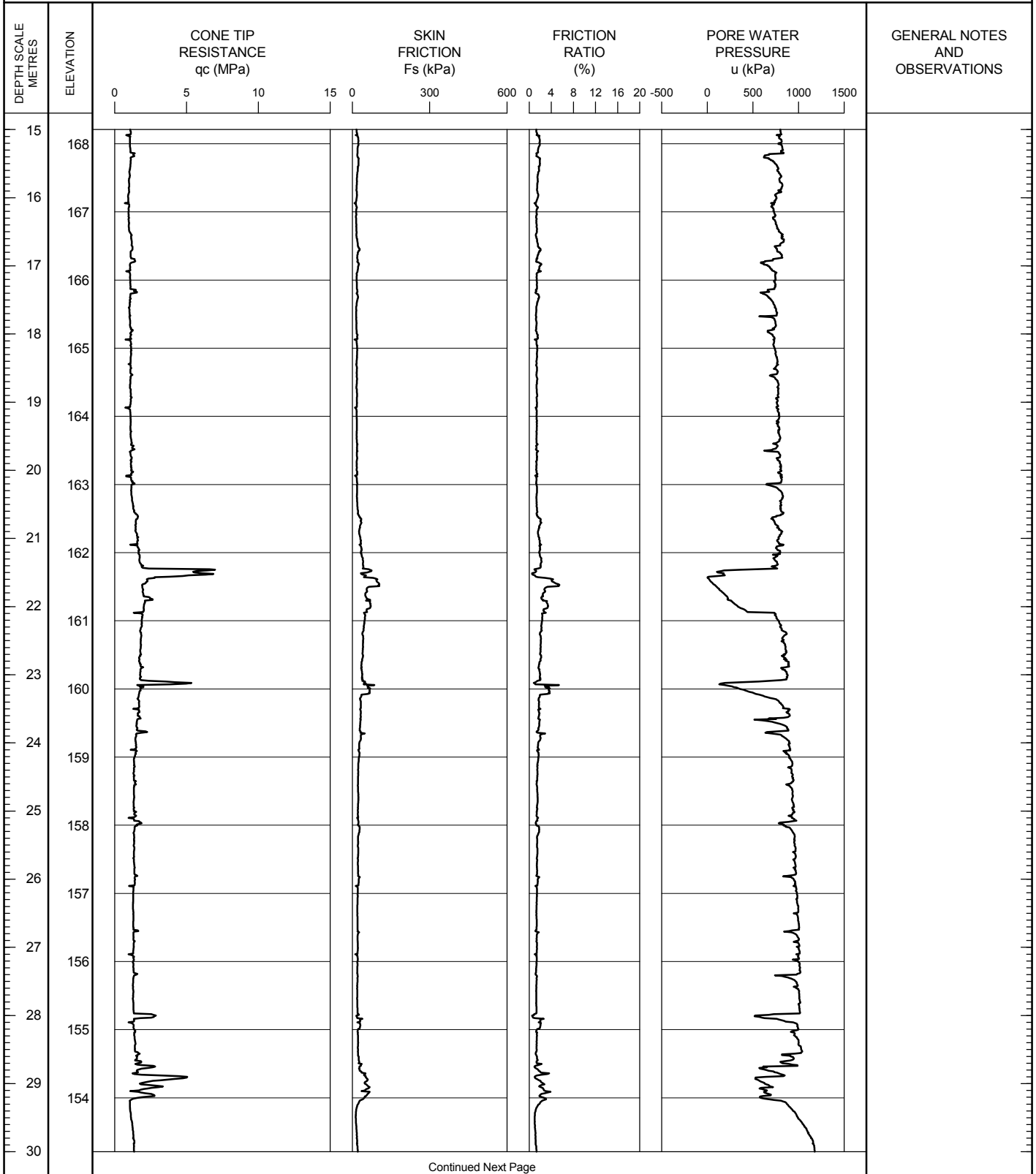
TEST DATE 8/4/2011 - 8/4/2011

SHEET 2 OF 3

LOCATION N4678860.0; E333292.9

DATUM Geodetic

GROUND SURFACE ELEVATION: 183.2 PREDRILL DEPTH: 1.82 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT T8-1

METRIC

PROJECT Windsor-Essex Parkway

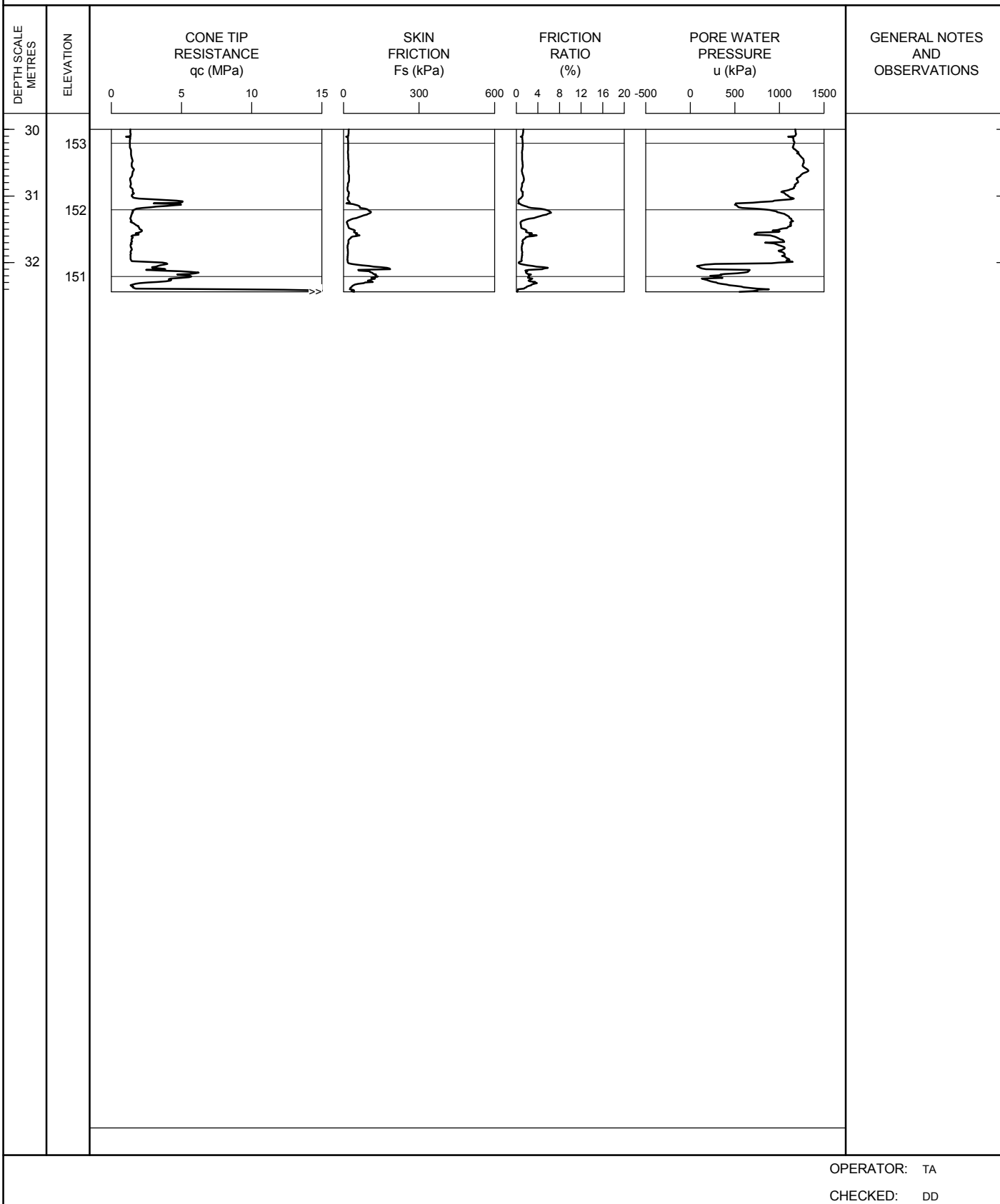
TEST DATE 8/4/2011 - 8/4/2011

SHEET 3 OF 3

LOCATION N4678860.0; E333292.9

DATUM Geodetic

GROUND SURFACE ELEVATION: 183.2 PREDRILL DEPTH: 1.82 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 43-RW

METRIC

PROJECT Windsor-Essex Parkway

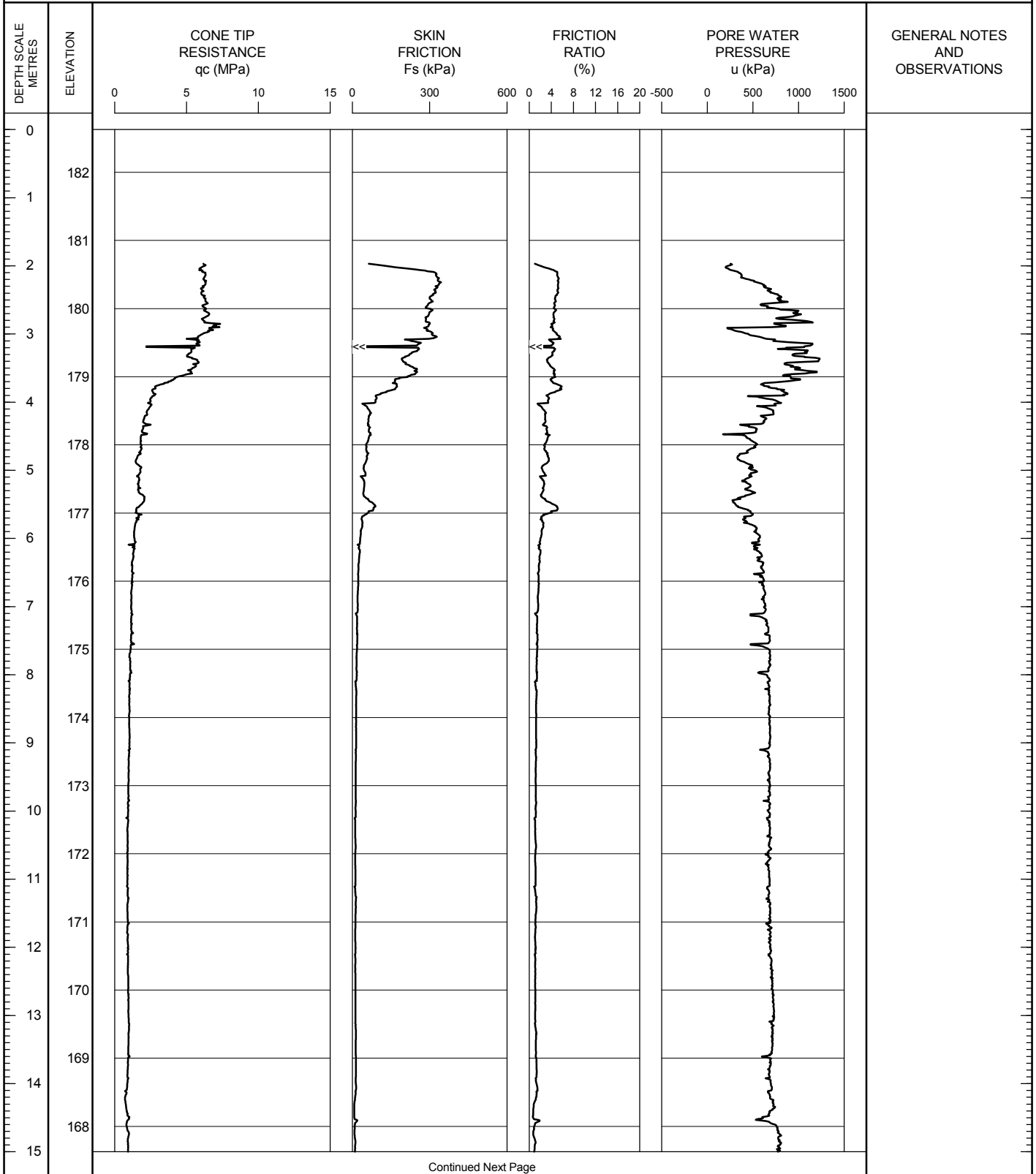
TEST DATE 8/3/2011 - 8/3/2011

SHEET 1 OF 2

LOCATION N4678907.6; E333207.7

DATUM Geodetic

GROUND SURFACE ELEVATION: 182.6 PREDRILL DEPTH: 1.97 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 43-RW

METRIC

PROJECT Windsor-Essex Parkway

TEST DATE 8/3/2011 - 8/3/2011

SHEET 2 OF 2

LOCATION N4678907.6; E333207.7

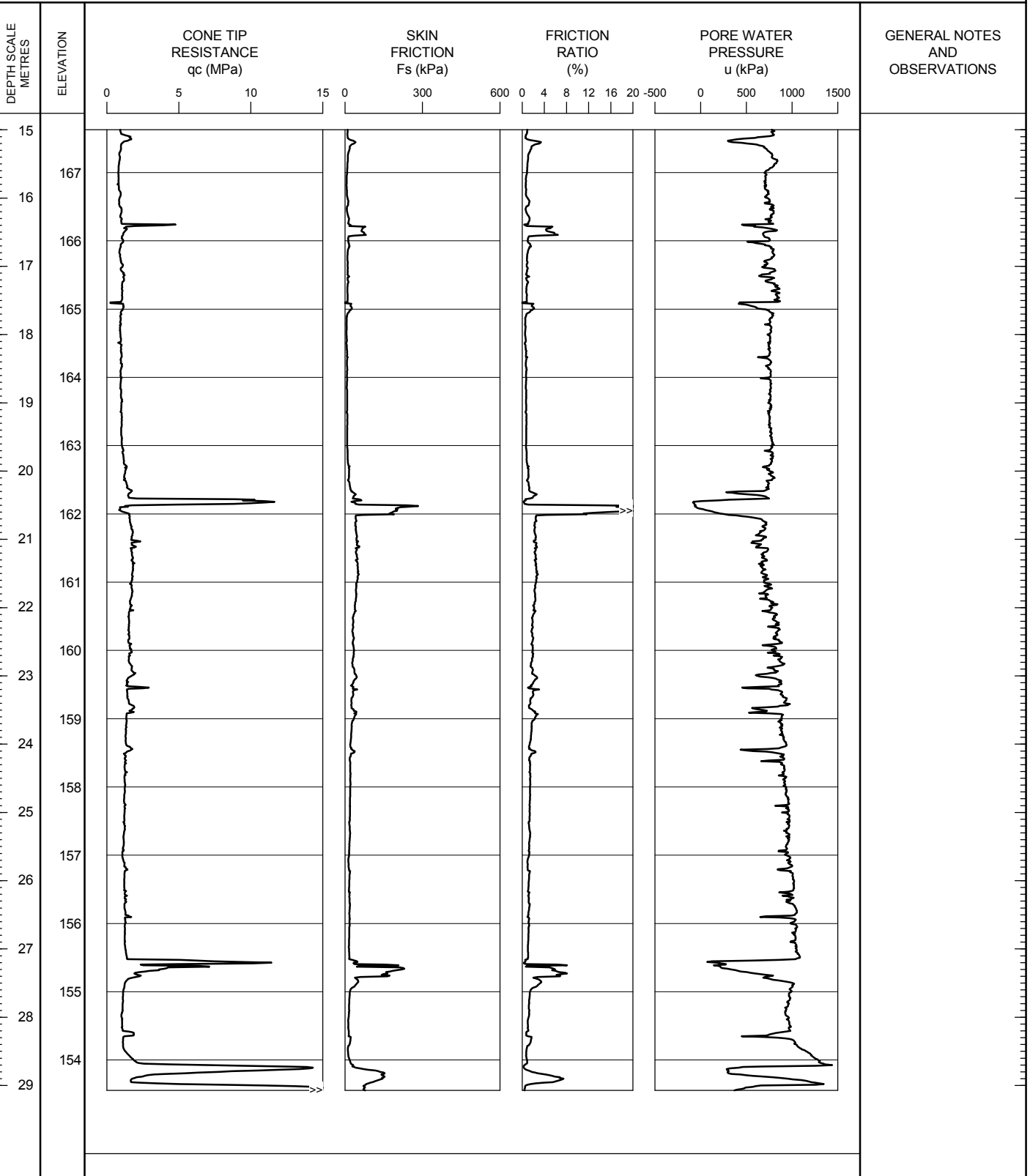
DATUM Geodetic

GROUND SURFACE ELEVATION: 182.6

PREDRILL DEPTH: 1.97

CORRECTION FACTOR A: 0.8

CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 44-RW

METRIC

PROJECT Windsor-Essex Parkway

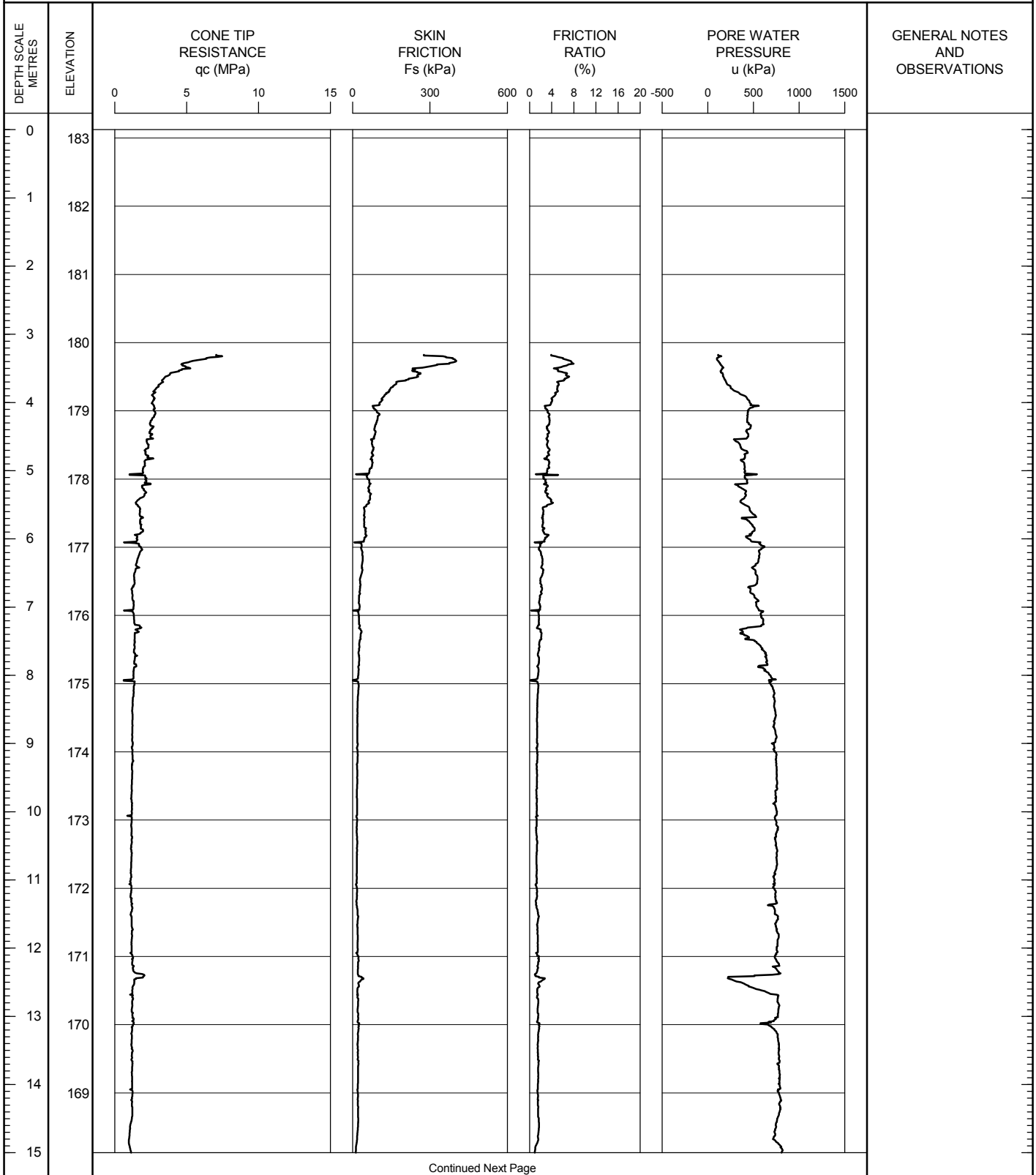
TEST DATE 8/4/2011 - 8/4/2011

SHEET 1 OF 2

LOCATION N4678777.5; E333464.6

DATUM Geodetic

GROUND SURFACE ELEVATION: 183.1 PREDRILL DEPTH: 3 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

WEP CPT LOG CPT-RW/GPJ ONTARIO MOT.GDT 06/01/12

RECORD OF CONE PENETRATION TEST CPT 44-RW

METRIC

PROJECT Windsor-Essex Parkway

TEST DATE 8/4/2011 - 8/4/2011

SHEET 2 OF 2

LOCATION N4678777.5; E333464.6

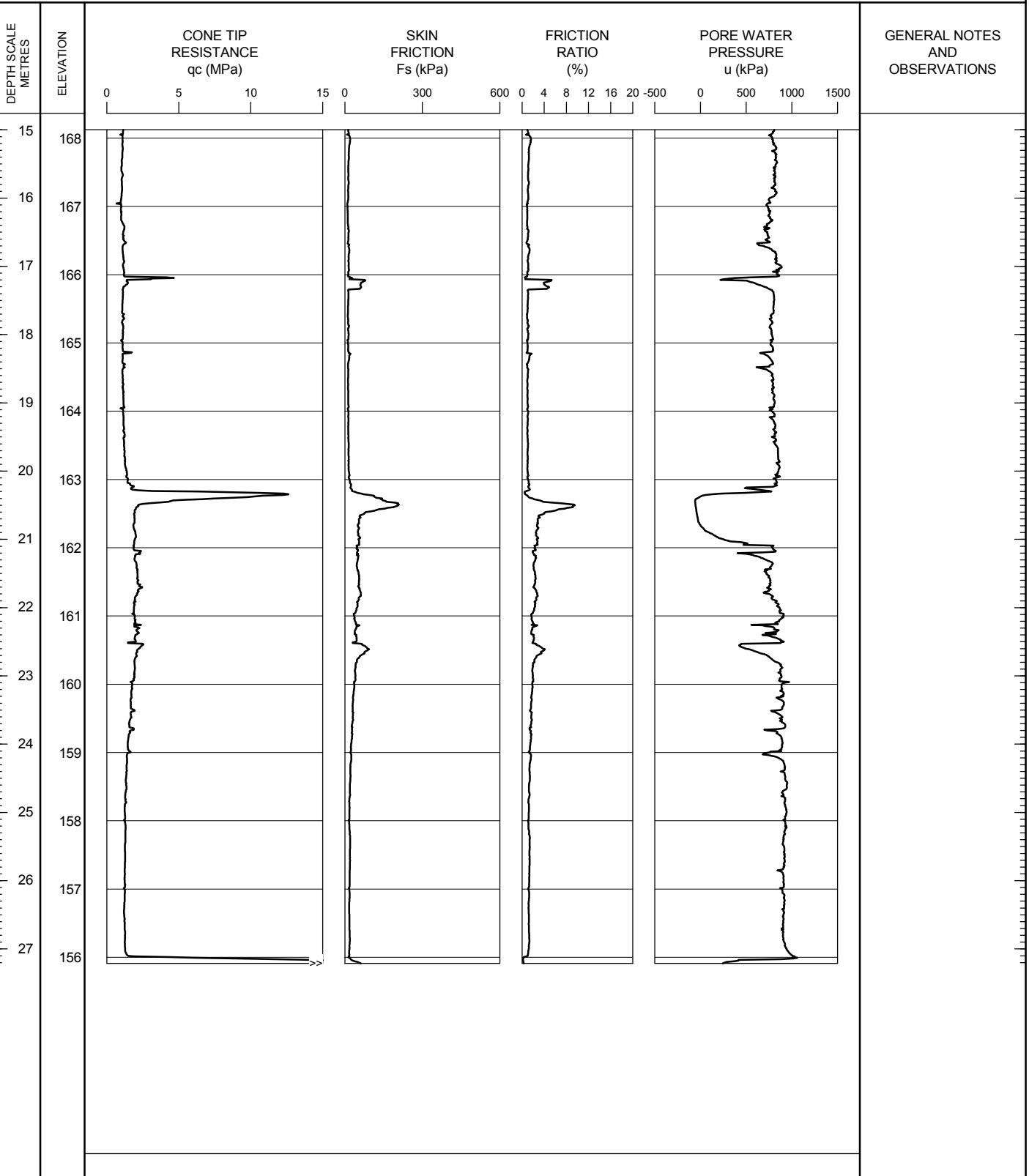
DATUM Geodetic

GROUND SURFACE ELEVATION: 183.1

PREDRILL DEPTH: 3

CORRECTION FACTOR A: 0.8

CORRECTION FACTOR B: 0



WEF CPT LOG CPT-RW.GPJ ONTARIO MOT.GDT 06/01/12

OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 45-RW

METRIC

PROJECT Windsor-Essex Parkway

TEST DATE 8/9/2011 - 8/9/2011

SHEET 1 OF 3

LOCATION N4678688.3; E333708.0

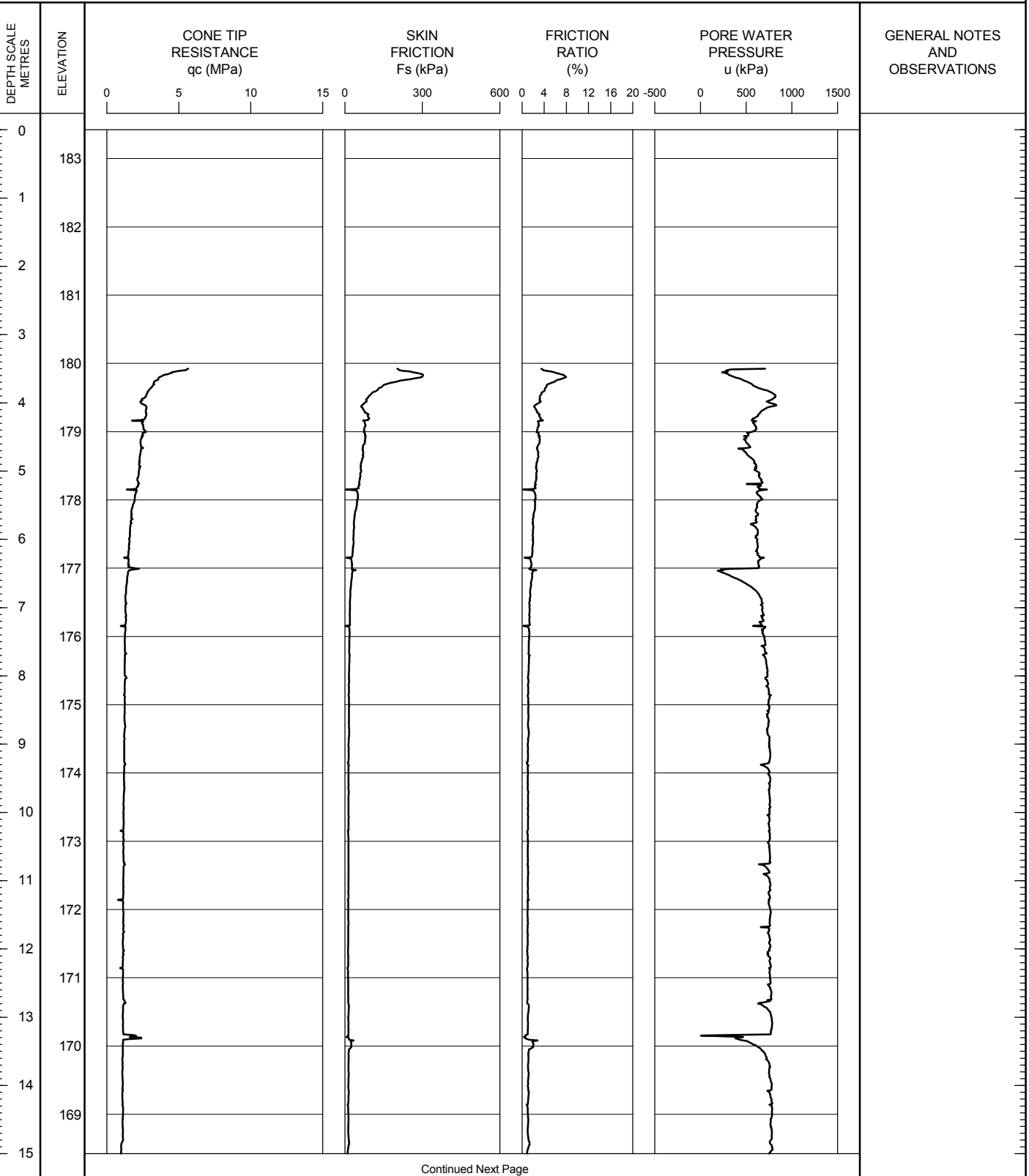
DATUM Geodetic

GROUND SURFACE ELEVATION: 183.4

PREDRILL DEPTH: 3

CORRECTION FACTOR A: 0.8

CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 45-RW

METRIC

PROJECT Windsor-Essex Parkway

TEST DATE 8/9/2011 - 8/9/2011

SHEET 2 OF 3

LOCATION N4678688.3; E333708.0

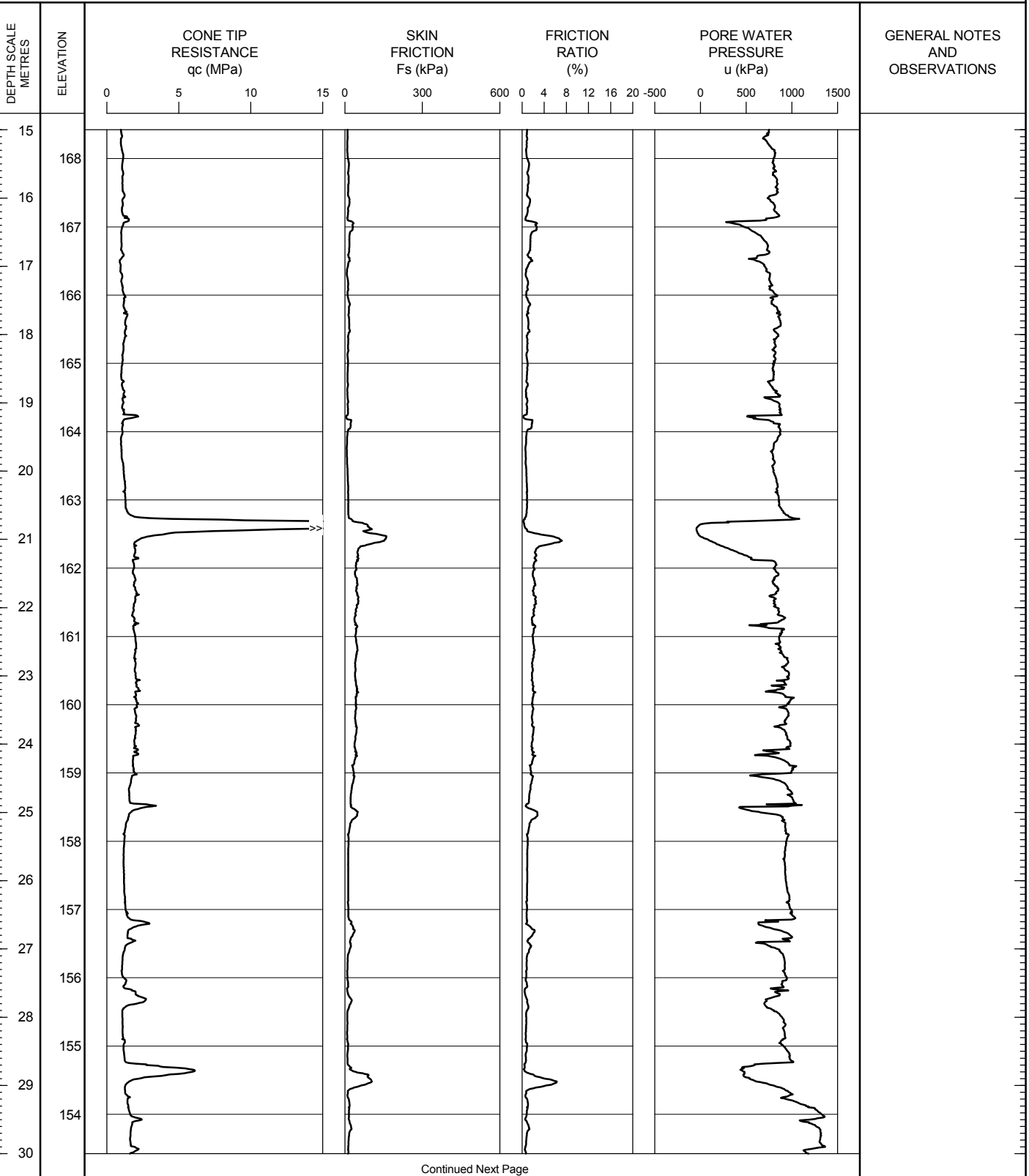
DATUM Geodetic

GROUND SURFACE ELEVATION: 183.4

PREDRILL DEPTH: 3

CORRECTION FACTOR A: 0.8

CORRECTION FACTOR B: 0



WEF CPT LOG CPT-RW/GPJ ONTARIO MOT GDT 06/01/12

OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 45-RW

METRIC

PROJECT Windsor-Essex Parkway

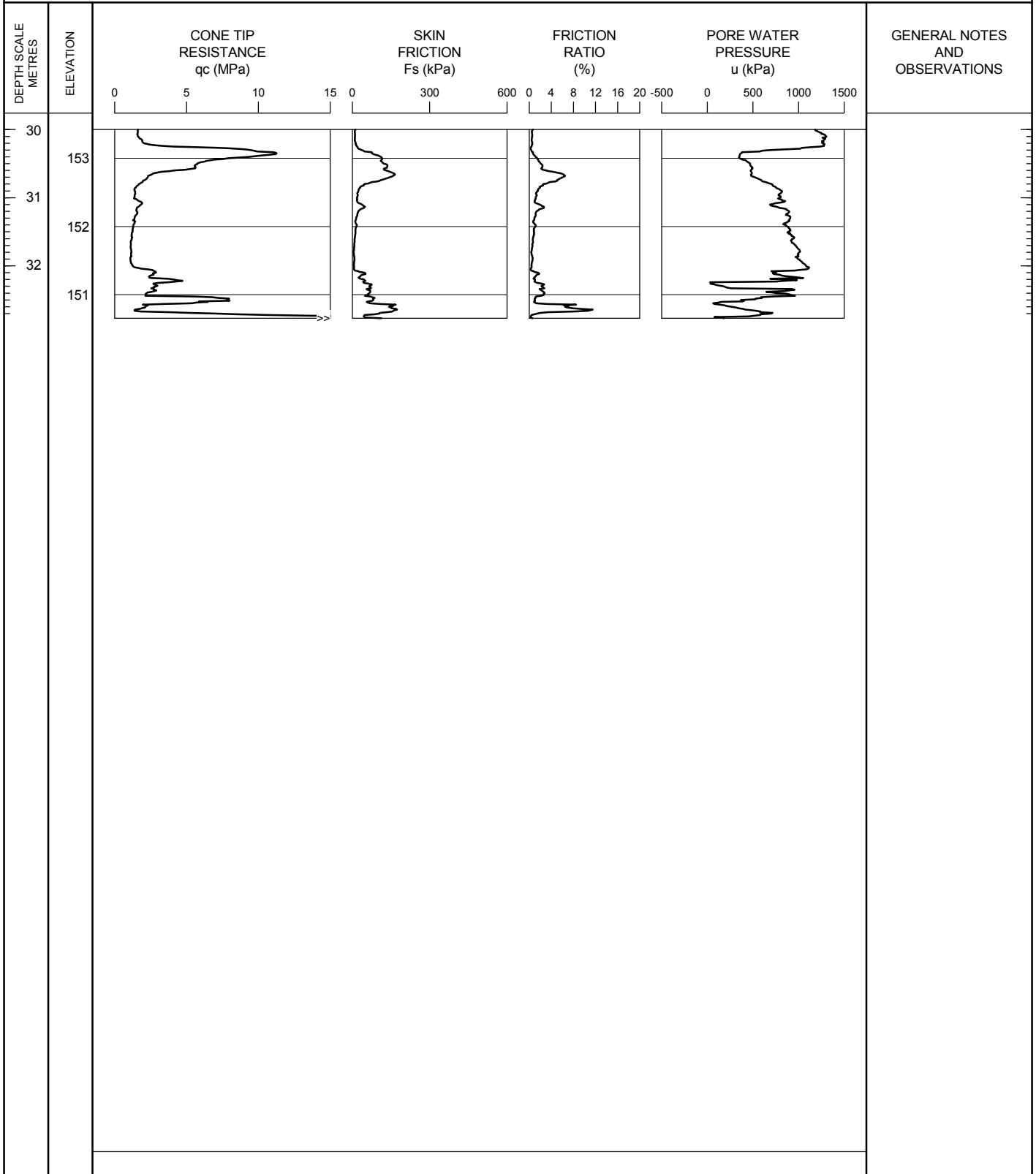
TEST DATE 8/9/2011 - 8/9/2011

SHEET 3 OF 3

LOCATION N4678688.3; E333708.0

DATUM Geodetic

GROUND SURFACE ELEVATION: 183.4 PREDRILL DEPTH: 3 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

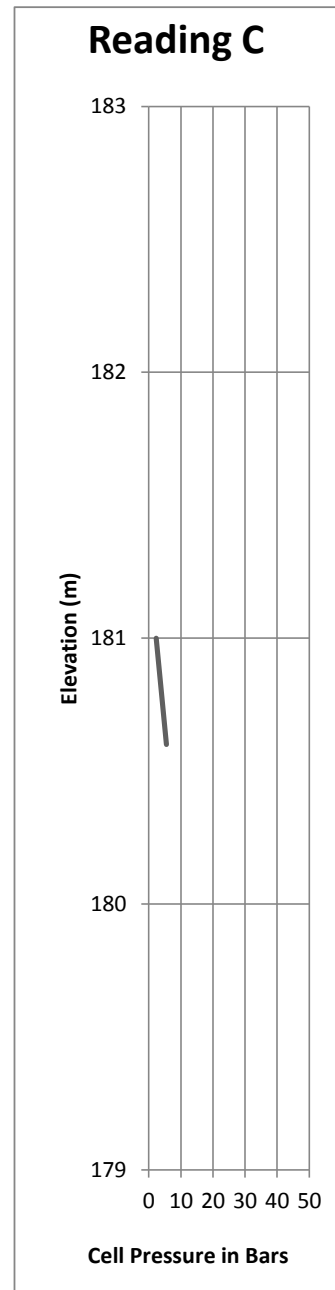
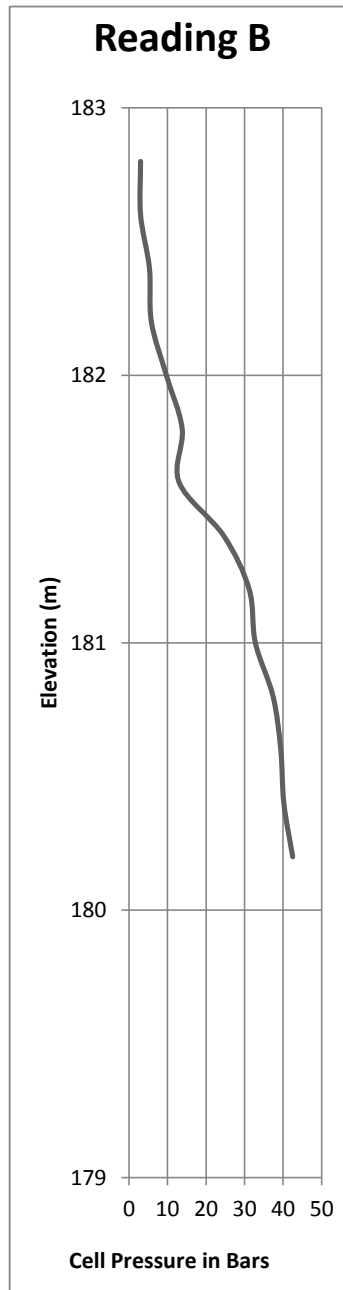
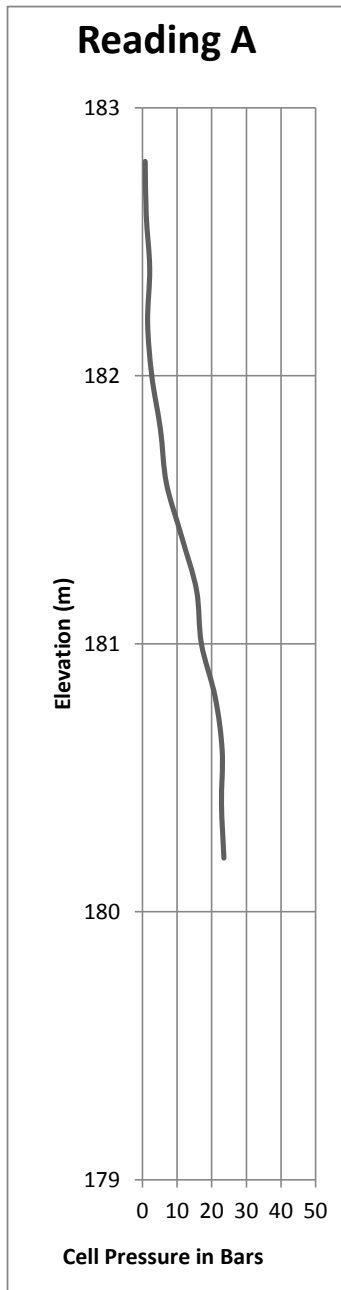
CHECKED: DD

RECORD OF DILATOMETER TEST DMT T8-1-SHALLOW

Project : Windsor-Essex Parkway
Location: N 4678820.9; E 333382.7
Ground Surface Elevation : 183.0

Test Date: 7/18/2011
Predrill Depth : 0.2 m
Delta A: 0.14 Bar

Sheet 1 of 1
Datum Geodetic
Delta B: 0.18 Bar



Note: DMT refusal at elevation 180.2m. Redrilled to elevation 178.4m.
Continued with DMT to elevation 159.6m

Operator: LC
Checked: DD

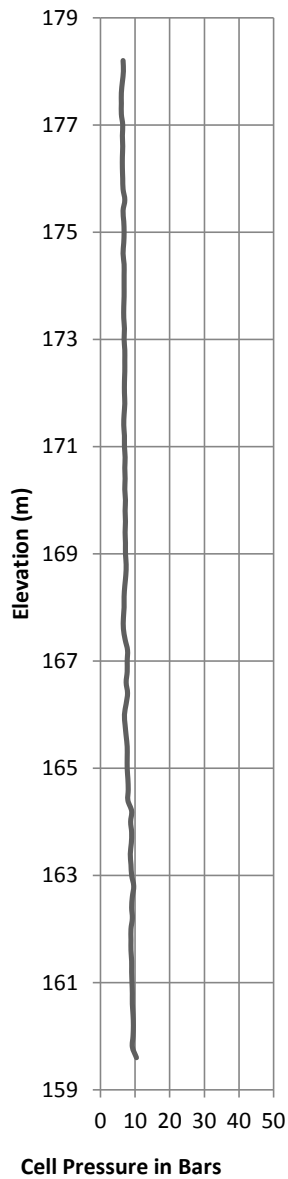
RECORD OF DILATOMETER TEST DMT T8-1-DEEP

Project : Windsor-Essex Parkway
Location: N 4678820.9; E 333382.7
Ground Surface Elevation : 183.0

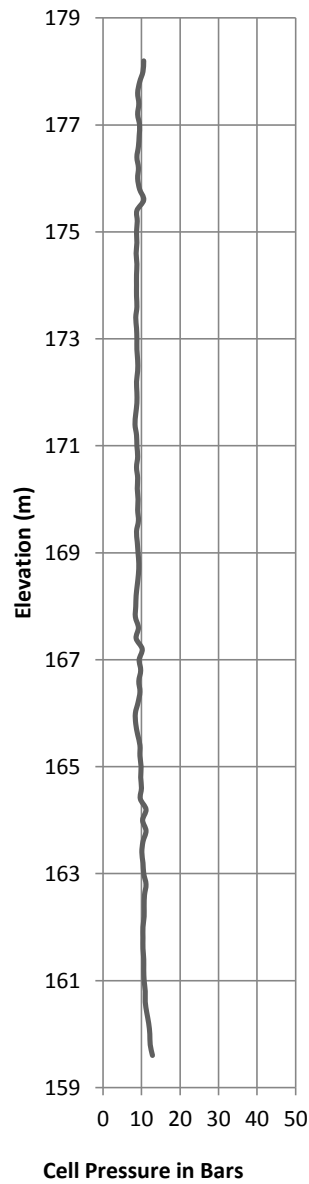
Test Date: 7/18/2011
Predrill Depth : 4.6 m
Delta A: 0.14 Bar

Sheet 1 of 1
Datum Geodetic
Delta B: 0.18 Bar

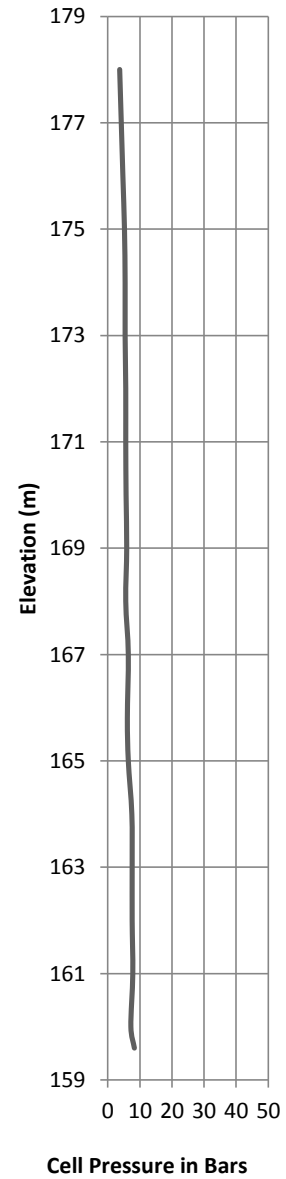
Reading A



Reading B



Reading C



Operator: LC

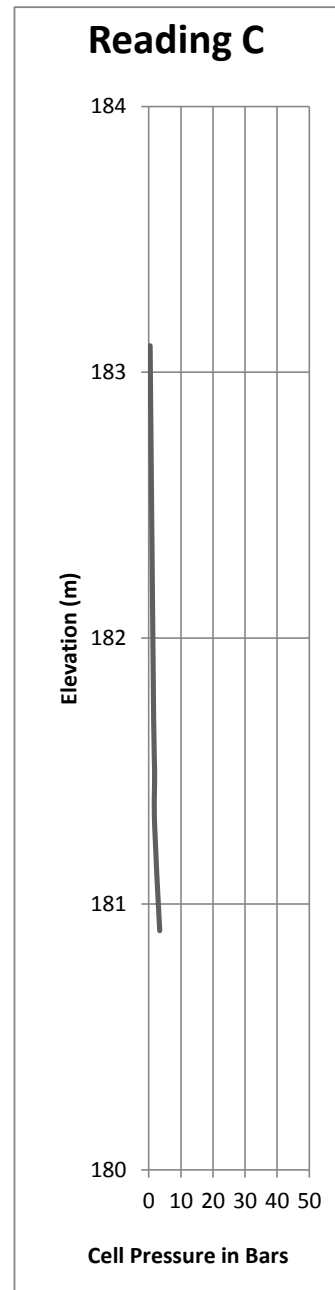
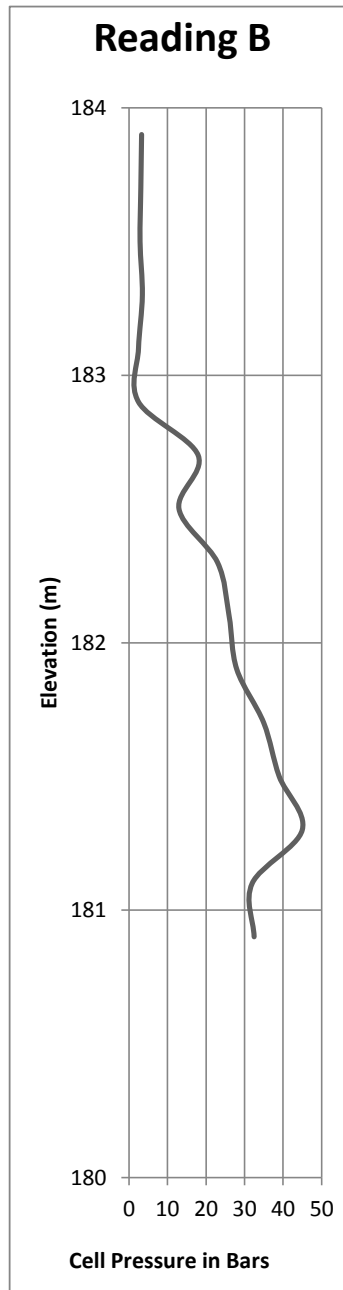
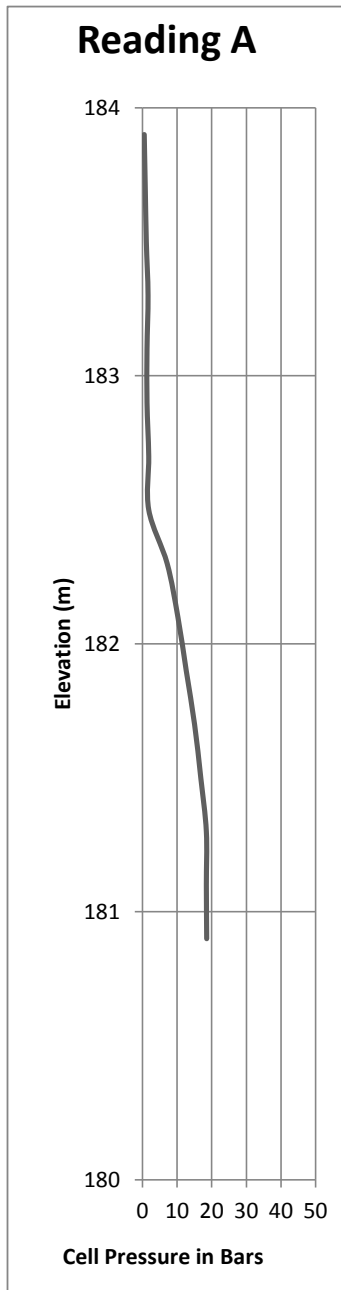
Checked: DD

RECORD OF DILATOMETER TEST DMT T9-1-SHALLOW

Project : Windsor-Essex Parkway
 Location: N 4678544.5; E 333900.9
 Ground Surface Elevation : 184.1

Test Date: 7/19/2011
 Predrill Depth : 0.2 m
 Delta A: 0.14 Bar

Sheet 1 of 1
 Datum Geodetic
 Delta B: 0.22 Bar



Note: DMT refusal at elevation 180.9m .Redrill to elevation 179.5m
 Resumed DMT to elevation 162.5m

Operator: LC
 Checked: DD

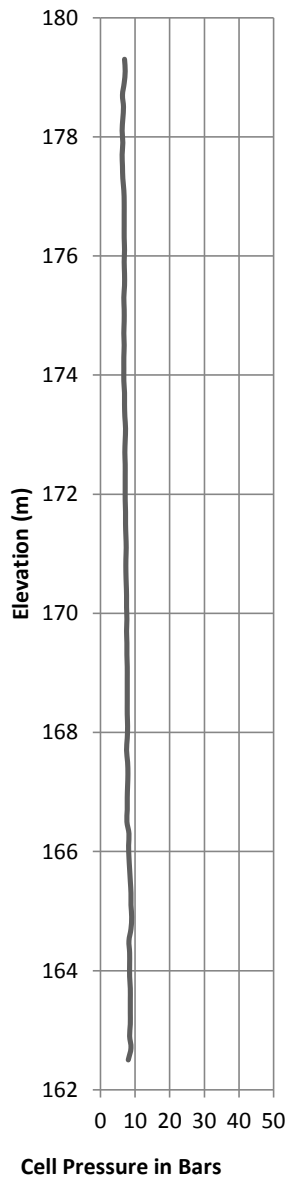
RECORD OF DILATOMETER TEST DMT T9-1-DEEP

Project : Windsor-Essex Parkway
Location: N 4678544.5; E 333900.9
Ground Surface Elevation : 184.1

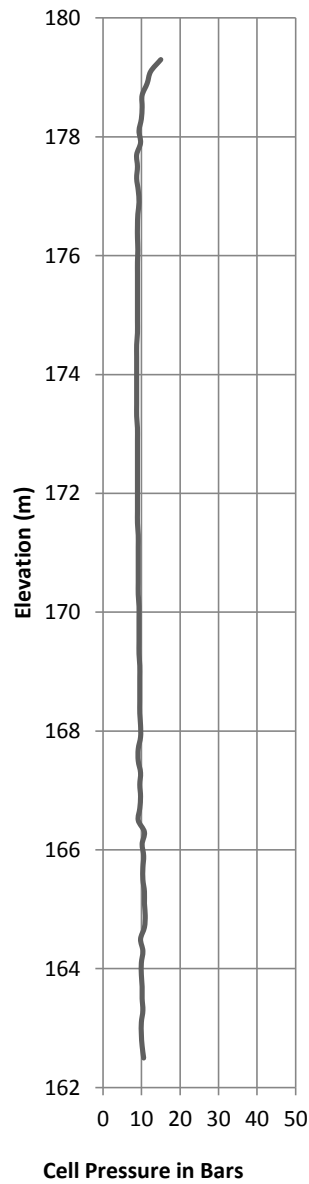
Test Date: 7/19/2011
Predrill Depth : 4.6 m
Delta A: 0.10 Bar

Sheet 1 of 1
Datum Geodetic
Delta B: 0.37 Bar

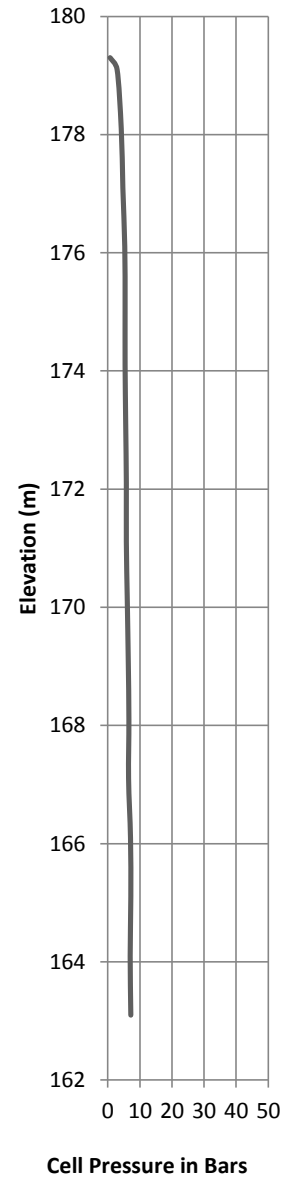
Reading A



Reading B



Reading C



Operator: LC

Checked: DD

Station 12+000L to Station 12+800L (Soil Profile #13)

METRIC

Continued Next Page

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

METRIC



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

RECORD OF BOREHOLE No DMT T9-1

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678544.5, E333900.9 ORIGINATED BY LC
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 19, 11 - Jul 19, 11 CHECKED BY MSO

| 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 | | | | | | | | | WATER CONTENT (%) | | | |
| | | | | | | | | ○ UNCONFINED | + | FIELD VANE | | | | | | | | | | |
| | | | | | | | | ● POCKET PEN. | × | LAB VANE | | | | | | | | | | |
| 184.1 | Ground Surface | | | | | | | | | | | | | | | | | | | |
| 0.0 | Clayey TOPSOIL |  | | | | | | | | | | | | | | | | | | |
| 183.7 | | | | | | | | | | | | | | | | | | | | |
| 0.4 | CLAYEY SILT Some sand, trace gravel Stiff to hard Mottled brown and grey |  | 1 | AS | | | | | | | | | | | | | | | | |
| | -Weathered fissures -Some sand, trace gravel with topsoil/organics in fissures | | 2 | SS | | | | | | | | | | | | | | | | |
| | Brown fissures | | 3 | SS | | | | | | | | | | | | | | | | |
| | Oxidized | | 4 | SS | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | Silty fissures Grey | | 5 | SS | | | | | | | | | | | | | | | | |
| 179.8 | END OF SAMPLED BOREHOLE DMT advanced from 0.2 m to refusal at 21.6 m (El. 183.9 m to El. 162.5 m) | | | | | | | | | | | | | | | | | | | |
| 4.3 | Borehole dry on completion | | | | | | | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No NIL T9-2

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678636.5, E333765.3 ORIGINATED BY SD
DIST HWY WEP BOREHOLE TYPE CME 850 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
DATUM Geodetic DATE Aug 15, 11 - Aug 15, 11 CHECKED BY MSO

| 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 ○ UNCONFINED + FIELD VANE ● POCKET PEN. × LAB VANE | | | | | | | | | WATER CONTENT (%) |
| 184.0 | | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | | |
| 0.2 | CLAYEY SILT Some sand, trace gravel Stiff to very stiff Mottled brown and grey |  | | | | | | | | | | | | | | | |
| | | | 1 | SS | 10 | | 183 | | | | | | | | | | |
| | Brown | | | | | | | | | | | | | | | | |
| | | | 2 | SS | 26 | | 182 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | 3 | SS | 24 | | 181 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | 4 | SS | 21 | | 180 | | | | | | | | | | |
| | Grey | | | | | | | | | | | | | | | | |
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+ ³, × ³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No T10-1/HGMW-04 1 OF 3 METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678495.6, E334122.3 ORIGINATED BY NB
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 13, 11 - Jul 15, 11 CHECKED BY MSO

| 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 | | | | | | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | | | | | | |
| | | | | | | | | ● POCKET PEN. | × LAB VANE | | | | | | |
| 184.9 | Fill Surface | | | | | | | | | | | | | | |
| 0.0 | | | | | | | | | | | | | | | |
| 0.2 | <div><div>FILL</div><div>150mm Topsoil</div><div>FILL</div><div>Silty Clay and Topsoil</div><div>Brown-Grey</div></div> | | 1 | SS | 7 | | | | | | | | | | |
| | | | 2 | SS | 11 | | | | | | | | | | |
| 183.5 | | | | | | | | | | | | | | | |
| 1.4 | <div>CLAYEY SILT</div> <div>Sandy to some sand, trace gravel</div> <div>Stiff</div> | | 3 | SS | 12 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | Brown | | 4 | SS | 32 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | 5 | SS | 39 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | 6 | SS | 23 | | | | | | | | | | |
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| | | | 7 | SS | 18 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | 8 | SS | 13 | | | | | | | | | | |
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| | | | 9 | TW | PH | | | | × | | | | | | |
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| | | | 10 | TW | PH | | | | | | | | | | |
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| | | | 11 | TW | PH | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | |
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| | | | 12 | TW | PH | | | | × | | | | | | |
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| | | | 13 | TW | PH | | | | | | | | | | |
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| | | | 14 | TW | PH | | | | | | | | | | |
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+³, X³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

2 OF 3

METRIC

Continued Next Page

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

3 OF 3

METRIC[illegible]

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

1 OF 3

METRIC

[illegible]

Continued Next Page

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

METRIC

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|-------|--------------------|----------|-----------------------|--|-------------|
| W.P. | RFP No. 09-54-1007 | LOCATION | 4678358.2N, 334191.8E | ORIGINATED BY | TA |
| DIST | HWY | WEP | BOREHOLE TYPE | CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers | COMPILED BY |
| | | | | | SS |
| DATUM | Geodetic | DATE | May 2, 11 - May 4, 11 | CHECKED BY | MSO |

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

3 OF 3

METRIC

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



ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No CPT T10-1

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678450.6, E334217.4 ORIGINATED BY TA
DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
DATUM Geodetic DATE Aug 9, 11 - Aug 9, 11 CHECKED BY MSO

| 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 | | | | | | | | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● POCKET PEN. × LAB VANE | | | | | | | | | |
| 184.9 | Ground Surface | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | |
| 0.0 | TOPSOIL |  | | | | | | | | | | | | | | | |
| 184.4 | CLAYEY SILT Some sand, trace gravel Stiff Mottled brown and grey |  | | | | | | | | | | | | | | | |
| 0.5 | | | 1 | SS | 10 | 184 | | | | | | | | ○ | | | |
| | | | | | | | | | | | | | | | ○ | | |
| 182.9 | END OF SAMPLED BOREHOLE (Continued with CPT to refusal) | | 2 | SS | 10 | 183 | | | | | | | | | | | |
| 2.0 | Borehole dry on completion | | | | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No CPT T10-2

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N46783403.2, E334089.2 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 2, 11 - May 2, 11 CHECKED BY MSO

| 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 | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED | | + FIELD VANE | | | | | | | | | |
| | | | | | | | | ● POCKET PEN. | | × LAB VANE | | | | | | | | | |
| 185.2 | Fill Surface | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | | |
| 0.0 | FILL 75mm rounded gravel over 400mm silty clay | | | | | | | | | | | | | | | | | | |
| 184.7 | | | | | | | | | | | | | | | | | | | |
| 0.5 | SAND Poorly graded Black | | | | | | | | | | | | | | | | | | |
| 184.2 | | | | | | | | | | | | | | | | | | | |
| 0.8 | SANDY SILT Some clay, trace gravel Stiff to hard Mottled brown and grey Dry to wet -Disturbed soil to approx. 1.2m Brown | | 1 | SS | 9 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | 2 | SS | 12 | | | | | | | | | | | | | | |
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| | | | 3 | SS | 37 | | | | | | | | | | | | | | |
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| | | | 4 | SS | 39 | | | | | | | | | | | | | | |
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| | | | 5 | SS | 21 | | | | | | | | | | | | | | |
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| | | | 6 | SS | 17 | | | | | | | | | | | | | | |
| 180.2 | END OF SAMPLED BOREHOLE (continued with CPT to refusal) Borehole dry on completion | | | | | | | | | | | | | | | | | | |
| 5.0 | | | | | | | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No DMT T10-1

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678412.4, E334151.5 ORIGINATED BY LC
DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
DATUM Geodetic DATE Jul 21, 11 - Jul 21, 11 CHECKED BY MSO

| 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 | | | | | | | |
| 184.6 | Ground Surface | | | | | | | 20 | 40 | 60 | 80 | 100 | | | |
| 0.0 | TOPSOIL | | | | | | | ○ UNCONFINED | + | FIELD VANE | | | | | |
| 184.3 | Clayey, with roots | | | | | | | ● POCKET PEN. | × | LAB VANE | | | | | |
| 0.3 | To weathered brown-grey silty clay | | | | | | | WATER CONTENT (%) | | | | | | | |
| | Some sand, trace gravel | | | | | | | 20 | 40 | 60 | 80 | 100 | 10 | 20 | 30 |
| | SILTY CLAY | | | | | | | | | | | | | | |
| | Some sand, trace gravel | | | | | | | | | | | | | | |
| | Dry | | | | | | | | | | | | | | |
| | -Brown fissures | | | | | | | | | | | | | | |
| | Stiff to hard | | 1 | AS | | | 184 | | | | | | | | |
| | Mottled brown and grey | | 2 | SS | 53 | | 183 | | | | | | | | |
| | | | 3 | SS | 37 | | 182 | | | | | | | | |
| | | | 4 | SS | 23 | | 181 | | | | | | | | |
| | | | 5 | SS | 13 | | 180 | | | | | | | | |
| 179.6 | END OF SAMPLED BOREHOLE | | | | | | 179 | | | | | | | | |
| 5.0 | (continued with DMT to refusal) | | | | | | 178 | | | | | | | | |
| | Borehole dry on completion | | | | | | 177 | | | | | | | | |
| | | | | | | | 176 | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No BH15-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678559.2, E333806.1 ORIGINATED BY LC
 DIST HWY WEP BOREHOLE TYPE CME 75 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 15, 11 - Jul 15, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|---|------------|---------|------|------------|-------------------------|-----------------|--|----|----|----|-----|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | |
| 184.1 | Fill Surface | | | | | | 184 | 20 | 40 | 60 | 80 | 100 | | | | | |
| 0.0 | FILL Silty Topsoil to Mixed Clay/Silt/Sand/Roots/concrete | | | | | | | | | | | | | | | | |
| | FILL Soft Clay/Topsoil | | 1 | SS | 2 | | 183 | | | | | | | | | | |
| 182.6 | | | | | | | | | | | | | | | | | |
| 1.5 | SILTY CLAY Weathered, fissures Some sand, trace gravel | | 2 | SS | 11 | | 182 | | | | | | | | | | |
| 181.8 | Stiff Brown | | | | | | | | | | | | | | | | |
| 2.3 | CLAYEY SILT Hard to firm Brown | | 3 | SS | 31 | | | | | | | | | | | | |
| | Some sand, trace gravel Moist Fissured occasionally | | 4 | SS | 39 | | 181 | | | | | | | | | | |
| | Grey | | 5 | SS | 22 | | 180 | | | | | | | | | | |
| | | | 6 | SS | 14 | | | | | | | | | | | | |
| | | | | | | | 179 | | | | | | | | | | |
| | | | 7 | SS | 9 | | | | | | | | | | | | |
| | | | | | | | 178 | | | | | | | | | | |
| 177.5 | END OF BOREHOLE Borehole dry on completion | | 8 | SS | 7 | | | | | | | | | | | | |
| 6.6 | | | | | | | 177 | | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | | |
| | | | | | | | 175 | | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | | |
| | | | | | | | 171 | | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | | |

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

RECORD OF BOREHOLE No CV3-1

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678630.0, E333861.1 ORIGINATED BY TA
DIST HWY WEP BOREHOLE TYPE CME 75 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
DATUM Geodetic DATE Jul 12, 11 - Jul 12, 11 CHECKED BY MSO

| 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 | | | | | | | | |
| | | | | | | | | ○ UNCONFINED | + | FIELD VANE | | | | | | |
| | | | | | | | | ● POCKET PEN. | × | LAB VANE | | | | | | |
| 184.5 | Ground Surface | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | |
| 0.0 | FILL Silty clay Some sand, trace gravel Trace to some topsoil Brown | | | | | | | | | | | | | | | |
| 183.6 | CLAYEY SILT Some sand, trace gravel Stiff to hard Mottled brown and grey | | 1 | SS | 10 | | | | | | | | ○ | | | |
| 0.9 | | | 2 | SS | 9 | | | | | | | | ○ | | | |
| | | | | | | | | | | | | | ○ | | | |
| | Trace fissures, trace silt seams Brown | | 3 | SS | 29 | | | | | | | | ○ | | | |
| | | | 4 | SS | 40 | | | | | | | | ○ | | | |
| | | | 5 | SS | 27 | | | | | | | | ○ | | | |
| | | | | | | | | | | | | | ○ | | | |
| | Grey | | 6 | SS | 10 | | | | | | | | ○ | | | |
| | | | 7 | SS | 7 | | | | | | | | ○ | | | |
| | | | 8 | TW | PH | | | | | | | | ○ | | | |
| | | | | | | | | | | | | | | | | |
| | Numerous Sand Layers at Elevation 176.9 m | | 9 | TW | PH | | | | | × | | | ○ | | | 1 32 42 25 |
| | | | | | | | | | | | | | | | | |
| | | | 10 | TW | PH | | | | | | | | ○ | | | |
| 174.7 | END OF BOREHOLE Borehole dry on completion | | | | | | | | | | | | | | | |
| 9.8 | | | | | | | | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | |
| | | | | | | | 171 | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | |

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




ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No TB7-1

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678671.8, E333831.4 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 75 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 9, 11 - Jul 10, 11 CHECKED BY MSO

| 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 | | | | | | | | | |
| | | | | | | | | ○ UNCONFINED | + | FIELD VANE | × | | | | | | LAB VANE |
| 184.0 | Ground Surface | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | |
| 0.0 | TOPSOIL |  | | | | | | | | | | | | | | | |
| 183.5 | CLAYEY SILT Some sand, trace gravel, trace cobbles Firm to hard Mottled brown and Grey Brown -Trace fissures Grey |  | 1 | SS | 7 |  | 183 | | | | | | | | | | |
| | | | | | | | | 182 | | | | | | | | | |
| | | | | | | | | 181 | | | | | | | | | |
| | | | | | | | | 180 | | | | | | | | | |
| | | | | | | | | 179 | | | | | | | | | |
| | | | | | | | | 178 | | | | | | | | | |
| | | | | | | | | 177 | | | | | | | | | |
| | | | | | | | | 176 | | | | | | | | | |
| | | | | | | | | 175 | | | | | | | | | |
| | | | | | | | | 174 | | | | | | | | | |
| 173.9 | END OF BOREHOLE | | | VT | | | 174 | | | | | | | | | | |
| 10.1 | Groundwater encountered at elevation 181.0m during drilling on July 10, 2011 | | | | | | 173 | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | | |
| | | | | | | | 171 | | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | | |

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No TB7-2

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678662.3, E333859.6 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 75 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 10, 11 - Jul 10, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|---------------------------------|------------|---------|------|------------|-------------------------|-----------------|--|----|----|----|-----|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | |
| 184.1 | Ground Surface | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | |
| 0.0 | TOPSOIL | | | | | | 184 | | | | | | | | | | |
| 183.8 | CLAYEY SILT | | | | | | | | | | | | | | | | |
| 0.3 | Some sand, trace gravel | | 1 | SS | 12 | | 183 | | | | | | | | | | |
| | Firm to hard | | | | | | | | | | | | | | | | |
| | Mottled brown and grey | | 2 | SS | 25 | | 182 | | | | | | | | | | |
| | Trace fissures | | | | | | | | | | | | | | | | |
| | Brown | | 3 | SS | 37 | | 181 | | | | | | | | | | |
| | Trace to some oxidized fissures | | 4 | SS | 28 | | | | | | | | | | | | |
| | Grey | | 5 | SS | 15 | | 180 | | | | | | | | | | |
| | | | 6 | SS | 10 | | 179 | | | | | | | | | | |
| | | | 7 | SS | 9 | | 178 | | | | | | | | | | |
| | | | 8 | SS | 9 | | 177 | | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | | |
| | | | 9 | SS | 5 | | 175 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | |
| | | | 10 | SS | 5 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | |
| 174.0 | END OF BOREHOLE | | | | | | 174 | | | | | | | | | | |
| 10.1 | Borehole dry on completion | | | | | | 173 | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | | |
| | | | | | | | 171 | | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | | |

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No TB7-3

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678644.6, E333911.0 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 75 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 12, 11 - Jul 12, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|----------------------------|------------|---------|------|------------|-------------------------|-----------------|--|----|------------|----|-----|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | WATER CONTENT (%) | | | | |
| 184.9 | Fill Surface | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | |
| 0.0 | FILL | | | | | | | ○ UNCONFINED | + | FIELD VANE | | | | | | | |
| 0.2 | Topsoil | | | | | | | ● POCKET PEN. | × | LAB VANE | | | | | | | |
| | FILL | | | | | | | | | | | | | | | | |
| | Silty clay and topsoil | | | | | | | | | | | | | | | | |
| | Brown | | 1 | SS | 6 | | 184 | | | | | | | | | | |
| 183.8 | | | | | | | | | | | | | | | | | |
| 1.1 | CLAYEY SILT | | 2 | SS | 7 | | 183 | | | | | | | | | | |
| | Firm to hard | | | | | | | | | | | | | | | | |
| | Mottled brown and grey | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | Brown | | 3A, B | SS | 6 | | 182 | | | | | | | | | | |
| | Moist to wet | | | | | | | | | | | | | | | | |
| | Trace fissures | | 4 | SS | 25 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | 5 | SS | 37 | | 181 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | Grey | | 6 | SS | 20 | | 180 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | 7 | SS | 10 | | 179 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | 8 | SS | 9 | | | | | | | | | | | | |
| | | | | | | | 178 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | 9 | SS | 9 | | 177 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | | |
| | | | 10 | SS | 5 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| 174.8 | END OF BOREHOLE | | VT | | | | 175 | | | | | | | | | | |
| 10.1 | Borehole dry on completion | | | | | | | | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | 171 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | | |

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No TB7-4

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678619.4, E333980.0 ORIGINATED BY SD
 DIST HWY WEP BOREHOLE TYPE CME 75 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 15, 11 - Jul 15, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|----------------------------|------------|---------|------|------------|-------------------------|-----------------|--|----|------------|----|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | WATER CONTENT (%) | | | | |
| 184.8 | Ground Surface | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | |
| 0.0 | TOPSOIL | | | | | | | ○ UNCONFINED | + | FIELD VANE | | | | | | |
| 0.2 | CLAYEY SILT | | | | | | | ● POCKET PEN. | × | LAB VANE | | | | | | |
| | Some sand, trace gravel | | | | | | | 20 | 40 | 60 | 80 | 100 | 10 | 20 | 30 | |
| | Firm to hard | | 1 | SS | 6 | | 184 | | | | | | ○ | | | |
| | Brown | | | | | | | | | | | | | | | |
| | | | 2 | SS | 12 | | 183 | | | | | | ○ | | | |
| | | | | | | | | | | | | | | | | |
| | Silt pockets | | 3 | SS | 20 | | 182 | | | | | | ○ | | | |
| | | | | | | | | | | | | | | | | |
| | Brown to grey | | 4 | SS | 34 | | 181 | | | | | | ○ | | | |
| | | | | | | | | | | | | | | | | |
| | | | 5 | SS | 25 | | 180 | | | | | | ○ | | | |
| | | | | | | | | | | | | | | | | |
| | Grey | | 6 | SS | 12 | | 179 | | | | | | ○ | | | |
| | | | | | | | | | | | | | | | | |
| | | | 7 | SS | 10 | | 178 | | | | | | ○ | | | |
| | | | | | | | | | | | | | | | | |
| | | | 8 | SS | 10 | | 177 | | | | | | ○ | | | |
| | | | | | | | | | | | | | | | | |
| | Moist to wet | | 9 | SS | 5 | | 176 | | | | | | ○ | | | |
| | | | | | | | | | | | | | | | | |
| | | | 10 | SS | 3 | | 175 | | | | | | ○ | | | |
| | Wet | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 174.7 | END OF BOREHOLE | | VT | | | | 175 | | | | | | | | | |
| 10.1 | Borehole dry on completion | | | | | | | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | |
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| | | | | | | | 172 | | | | | | | | | |
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| | | | | | | | 171 | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | |

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No TB7A-1

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678506.6, E334190.2 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 75 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 14, 11 - Jul 14, 11 CHECKED BY MSO

| 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 | | | | | | | | | | | | | | | | | | | |
| 184.8 | Ground Surface | | | | | | | ○ UNCONFINED | ○ POCKET PEN. | ○ FIELD VANE | ○ LAB VANE | | | | | | WATER CONTENT (%) | | | | | | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 184.2 | CLAYEY SILT Some sand, trace gravel Firm to hard Mottled brown and grey Brown - Trace fissures Grey | | 1 | SS | 8 | | | | | | | | | | | | | | | | | | | | | | |
| 0.6 | | | | 2 | SS | | | | | | | | | | | | 14 | 183 | | | | | | | | | |
| | | | | 3 | SS | | | | | | | | | | | | 26 | 182 | | | | | | | | | |
| | | | | 4 | SS | | | | | | | | | | | | 35 | 181 | | | | | | | | | |
| | | | | 5 | SS | | | | | | | | | | | | 18 | 180 | | | | | | | | | |
| | | | | 6 | SS | | | | | | | | | | | | 12 | 179 | | | | | | | | | |
| | | | | 7 | SS | | | | | | | | | | | | 9 | 178 | | | | | | | | | |
| | | | | 8 | SS | | | | | | | | | | | | 7 | 177 | | | | | | | | | |
| | | | | | VT | | | | | | | | | | | | | 176 | | | | | | | | | |
| | | | | 9 | SS | | | | | | | | | | | | 6 | 175 | | | | | | | | | |
| 174.7 | END OF BOREHOLE | | | VT | | | | | | | | | | | | | | | | | | | | | | | |
| 10.1 | Borehole dry on completion | | | | | | | | | | | | | | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 30/04/12

RECORD OF BOREHOLE No CPT45-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678688.3, E333708.0 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Aug 9, 11 - Aug 9, 11 CHECKED BY MSO

| 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 | | | | | | | | | WATER CONTENT (%) | | | | | | | | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● POCKET PEN. | × LAB VANE | | | | | | | | | | | | | | | |
| 183.4 | Ground Surface | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | | | | | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | | | | | | | | | | | |
| 183.1 | CLAYEY SILT | | 1 | SS | 3 | | 183 | | | | | | | | | | | | | | | | | | | |
| 0.3 | Some sand, trace gravel, trace fissures | | 2 | SS | 7 | | | | | | | | | | | | | | | | | | | | | |
| | Firm to hard | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Mottled brown and grey | | | | | | 182 | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Brown | | | | | | 181 | | | | | | | | | | | | | | | | | | | |
| 180.4 | | | 3 | SS | 38 | | | | | | | | | | | | | | | | | | | | | |
| 3.0 | END OF SAMPLED BOREHOLE | | | | | | 180 | | | | | | | | | | | | | | | | | | | |
| | Continued with CPT from 3.5 m to refusal at 32.8 m (El. 179.9 m to El. 150.6 m) | | | | | | 179 | | | | | | | | | | | | | | | | | | | |
| | Borehole dry on completion | | | | | | 178 | | | | | | | | | | | | | | | | | | | |
| | | | | | | | 177 | | | | | | | | | | | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | | | | | | | | | | | |
| | | | | | | | 175 | | | | | | | | | | | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | | | | | | | | | | | |
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| | | | | | | | 171 | | | | | | | | | | | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | | | | | | | | | | | |
| | | | | | | | 169 | | | | | | | | | | | | | | | | | | | |

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

RECORD OF BOREHOLE No CPT46-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678505.0, E333977.6 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Aug 5, 11 - Aug 5, 11 CHECKED BY MSO

| 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 | | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● POCKET PEN. × LAB VANE | | | | | | | | | | | | |
| 184.3 | Ground Surface | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | | | |
| 0.0 | TOPSOIL | | 1 | SS | 10 | | | | | | | | | | | | | | | |
| 184.0 | CLAYEY SILT Some sand, trace gravel Firm to hard Mottled brown and grey | | 2 | SS | 5 | | | | | | | | | | | | | | | |
| 0.3 | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | Brown Trace fissures | | 3 | SS | 36 | | | | | | | | | | | | | | | |
| 181.3 | END OF SAMPLED BOREHOLE (continued with CPT to refusal) | | | | | | | | | | | | | | | | | | | |
| 3.0 | Borehole dry on completion | | | | | | | | | | | | | | | | | | | |
| | | | | | | | 181 | | | | | | | | | | | | | |
| | | | | | | | 180 | | | | | | | | | | | | | |
| | | | | | | | 179 | | | | | | | | | | | | | |
| | | | | | | | 178 | | | | | | | | | | | | | |
| | | | | | | | 177 | | | | | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | | | | | |
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| | | | | | | | 172 | | | | | | | | | | | | | |
| | | | | | | | 171 | | | | | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | | | | | |



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

RECORD OF BOREHOLE No CPT47-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678440.3, E334300.2 ORIGINATED BY TA
DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
DATUM Geodetic DATE Aug 10, 11 - Aug 10, 11 CHECKED BY MSO

| 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 | | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED ● POCKET PEN. | + FIELD VANE × LAB VANE | 20 | 40 | 60 | | | | | | 80 | 100 | 10 |
| 185.4 | Ground Surface | | | | | | | | | | | | | | | | | | | |
| 0.0 | TOPSOIL |  | | | | | 185 | | | | | | | | | | | | | |
| 184.9 | CLAYEY SILT Some sand, trace gravel Firm to stiff Mottled brown and grey Dry Brown -Trace fissures |  | 1 | SS | 6 | | 184 | | | | | | | | | | | | | |
| 0.5 | | | | | | | | | | | | | | | | | | | | |
| 183.4 | | | 2 | SS | 15 | | | | | | | | | | | | | | | |
| 2.0 | END OF SAMPLED BOREHOLE (continued with CPT to refusal) Borehole dry on completion | | | | | | 183 | | | | | | | | | | | | | |
| | | | | | | | 182 | | | | | | | | | | | | | |
| | | | | | | | 181 | | | | | | | | | | | | | |
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| | | | | | | | 171 | | | | | | | | | | | | | |

RECORD OF NILCON VANE TEST NIL T9-1

Project : Windsor-Essex Parkway

Test Date: 8/16/2001

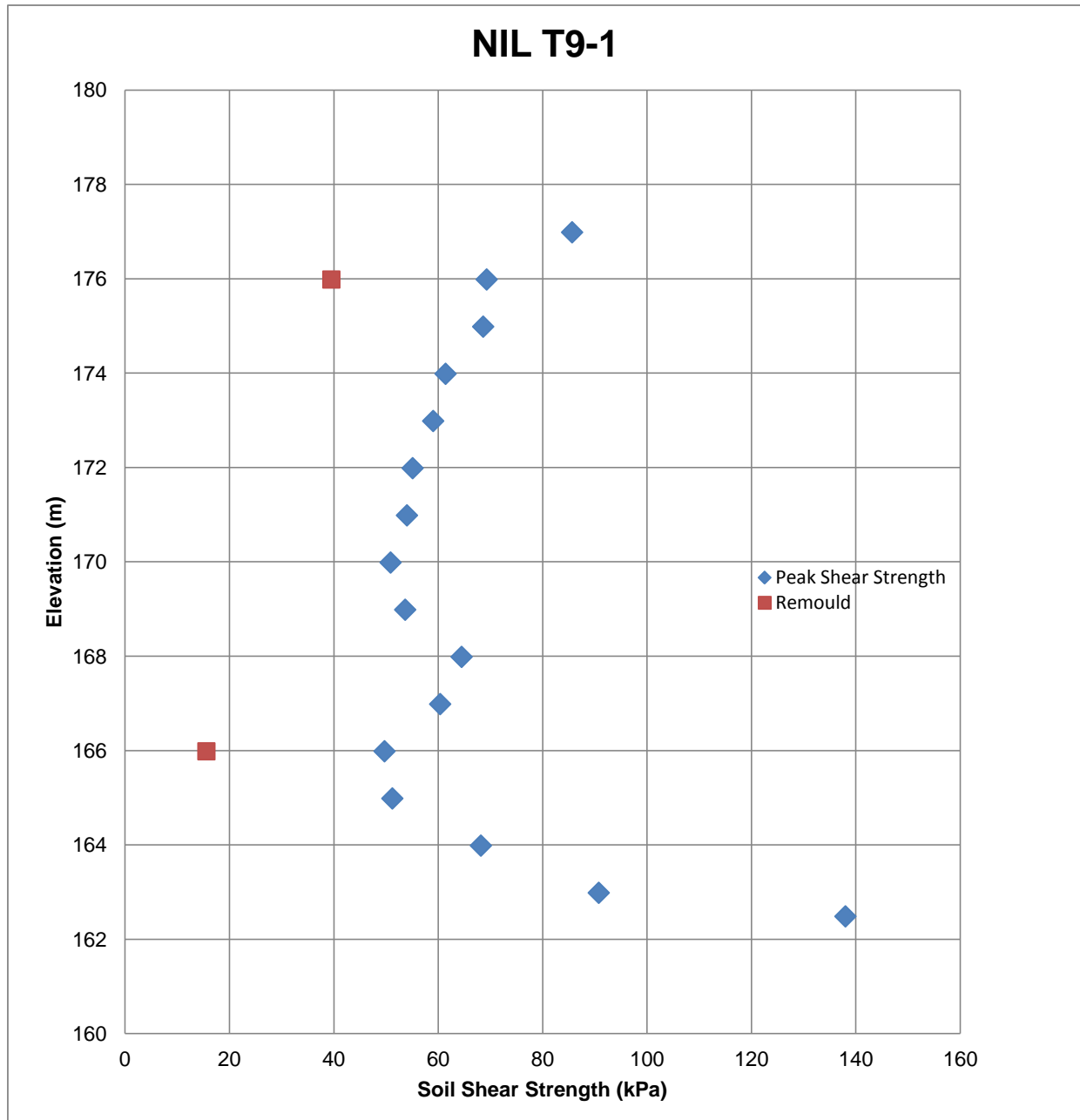
Sheet 1 of 1

Location: N4678636.5; E333765.3

Predrill Depth : 6.1 m

Datum Geodetic

Ground Surface Elevation: 184.0 m



Operator: SD

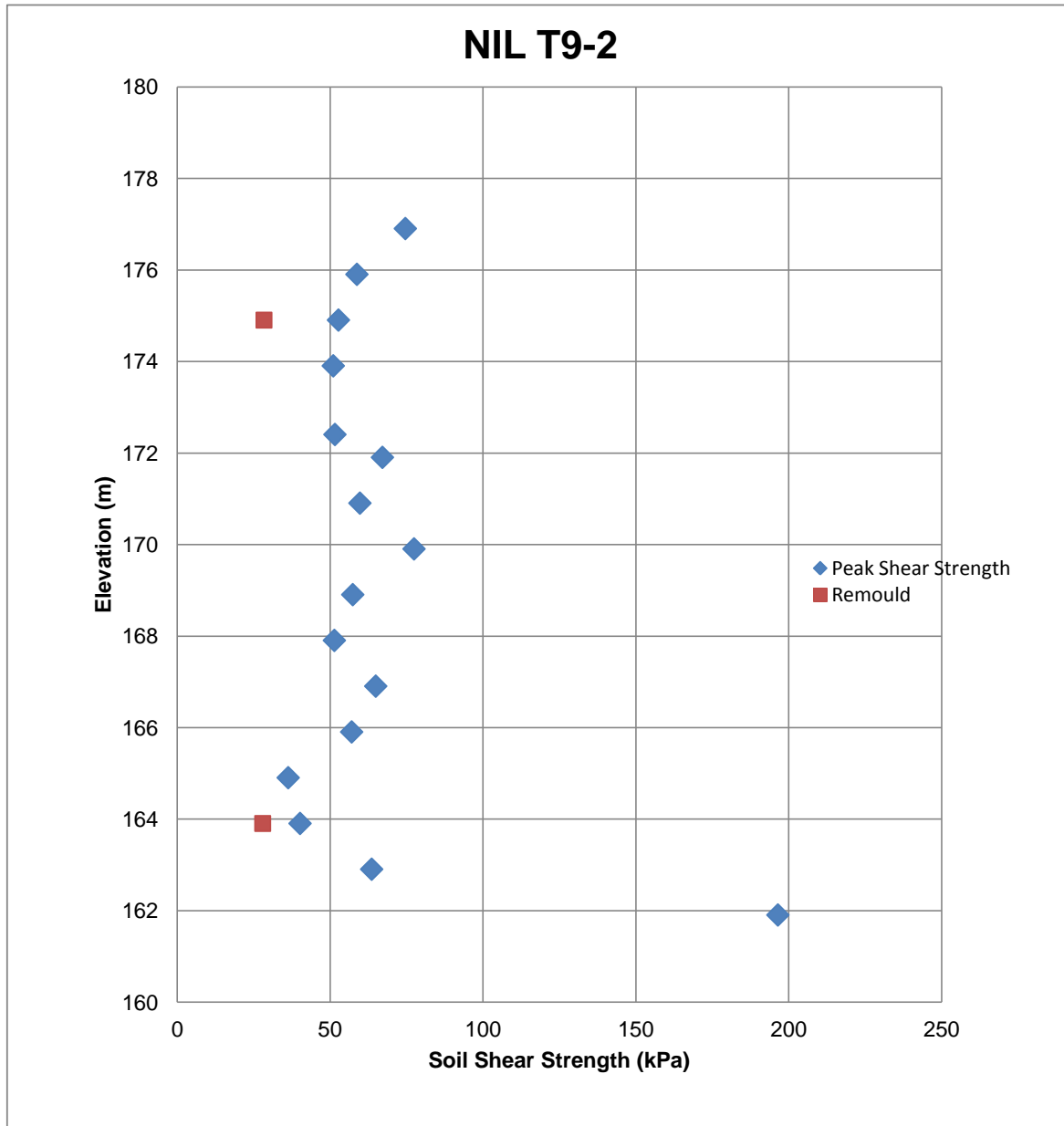
Checked: DD

RECORD OF NILCON VANE TEST NIL T9-2

Project : Windsor-Essex Parkway
 Location: N4678593.7; E333893.5
 Ground Surface Elevation: 183.9 m

Test Date: 8/15/2001
 Predrill Depth : 6.6 m

Sheet 1 of 1
 Datum Geodetic



Operator: SD

Checked: DD

RECORD OF CONE PENETRATION TEST CPT T10-1

METRIC

PROJECT Windsor-Essex Parkway

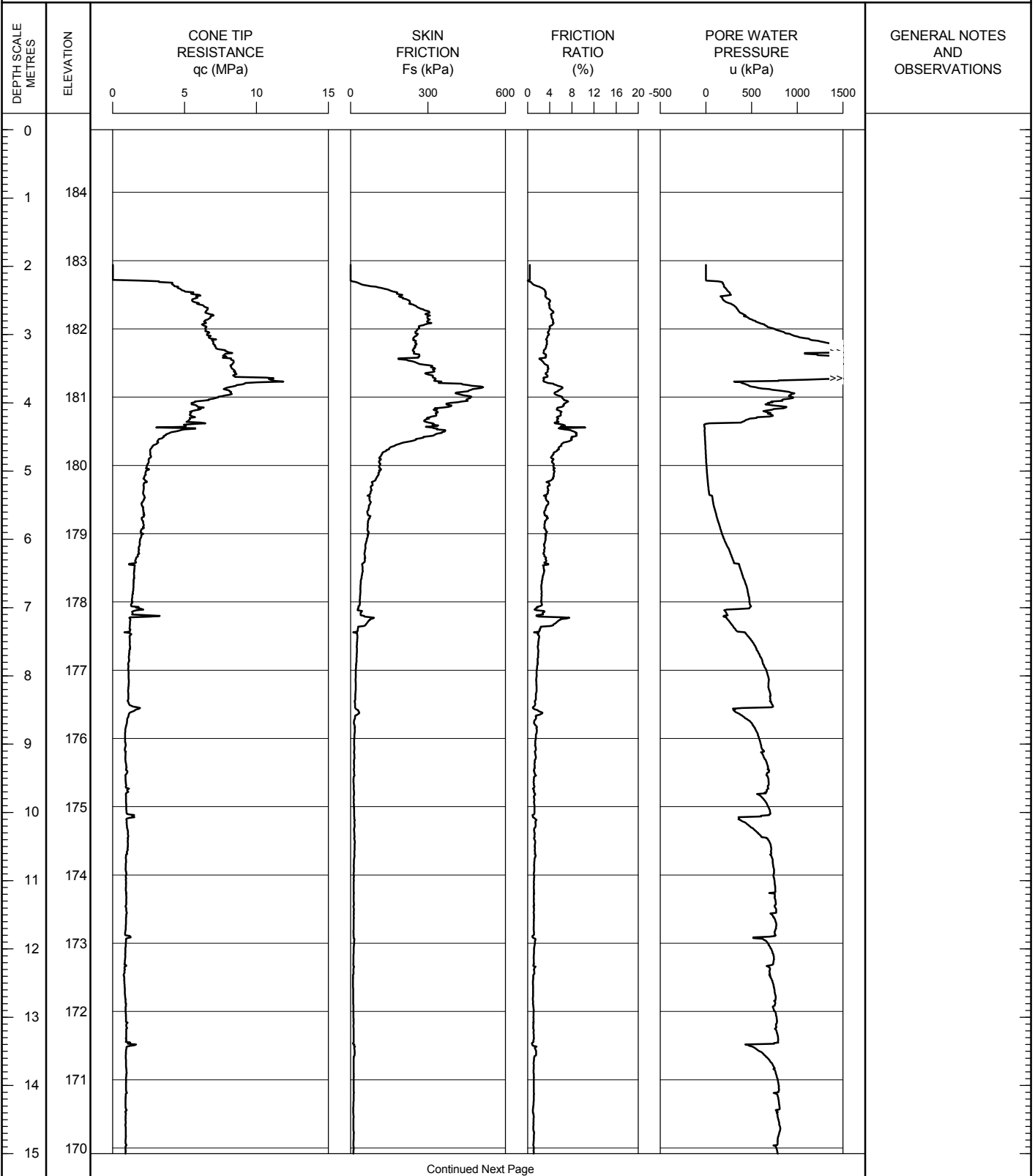
TEST DATE 8/9/2011 - 8/9/2011

SHEET 1 OF 2

LOCATION N4678450.6; E334217.4

DATUM Geodetic

GROUND SURFACE ELEVATION: 184.9 PREDRILL DEPTH: 1.98 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT T10-1

METRIC

PROJECT Windsor-Essex Parkway

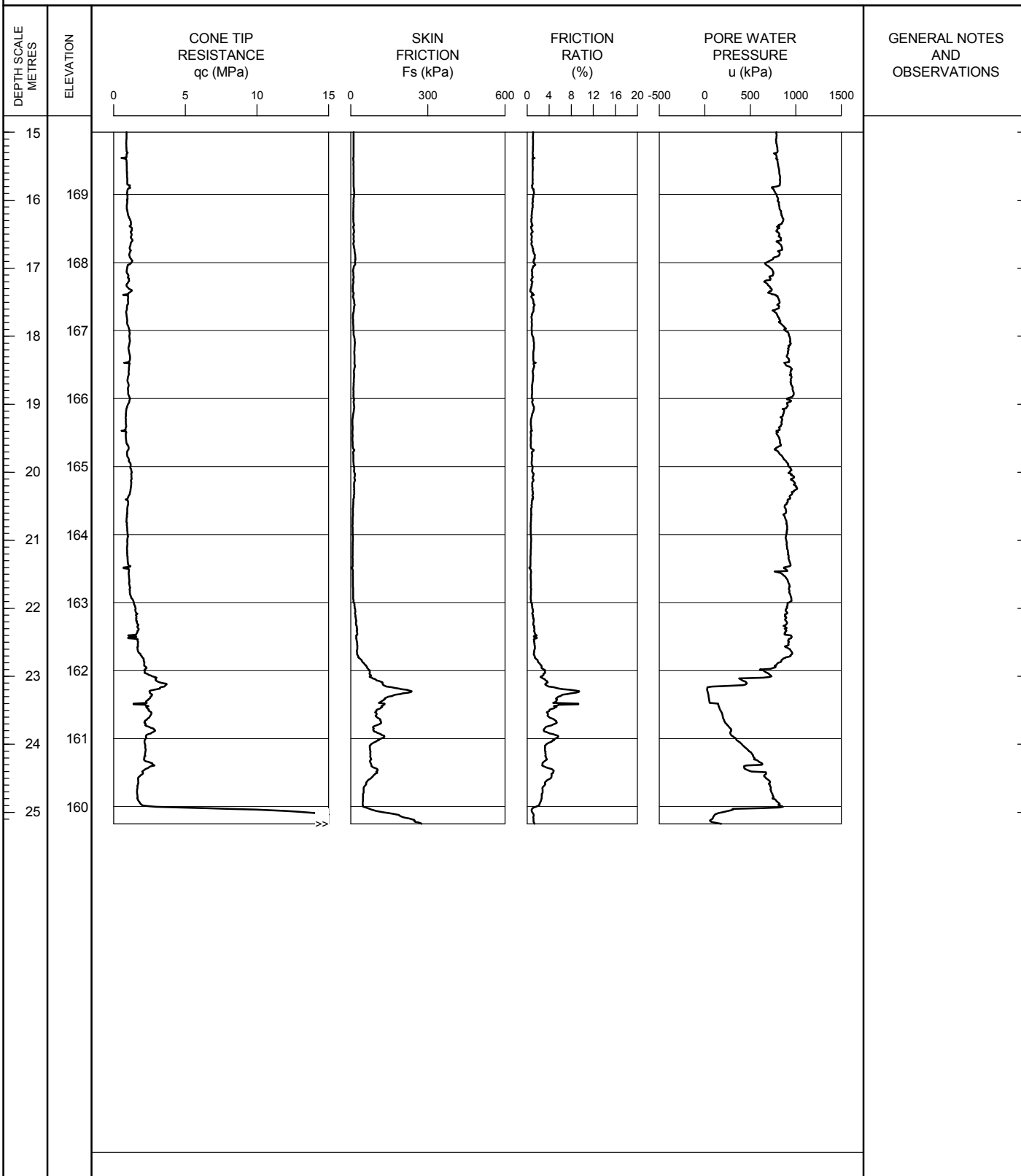
TEST DATE 8/9/2011 - 8/9/2011

SHEET 2 OF 2

LOCATION N4678450.6; E334217.4

DATUM Geodetic

GROUND SURFACE ELEVATION: 184.9 PREDRILL DEPTH: 1.98 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



WEP CPT LOG CPT T10-1.GPJ ONTARIO MOT.GDT 02/12/11

OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT T10-2

METRIC

PROJECT Windsor-Essex Parkway

TEST DATE 02/05/2011 - 02/05/2011

SHEET 1 OF 2

LOCATION 4678403.2N; 334089.2E

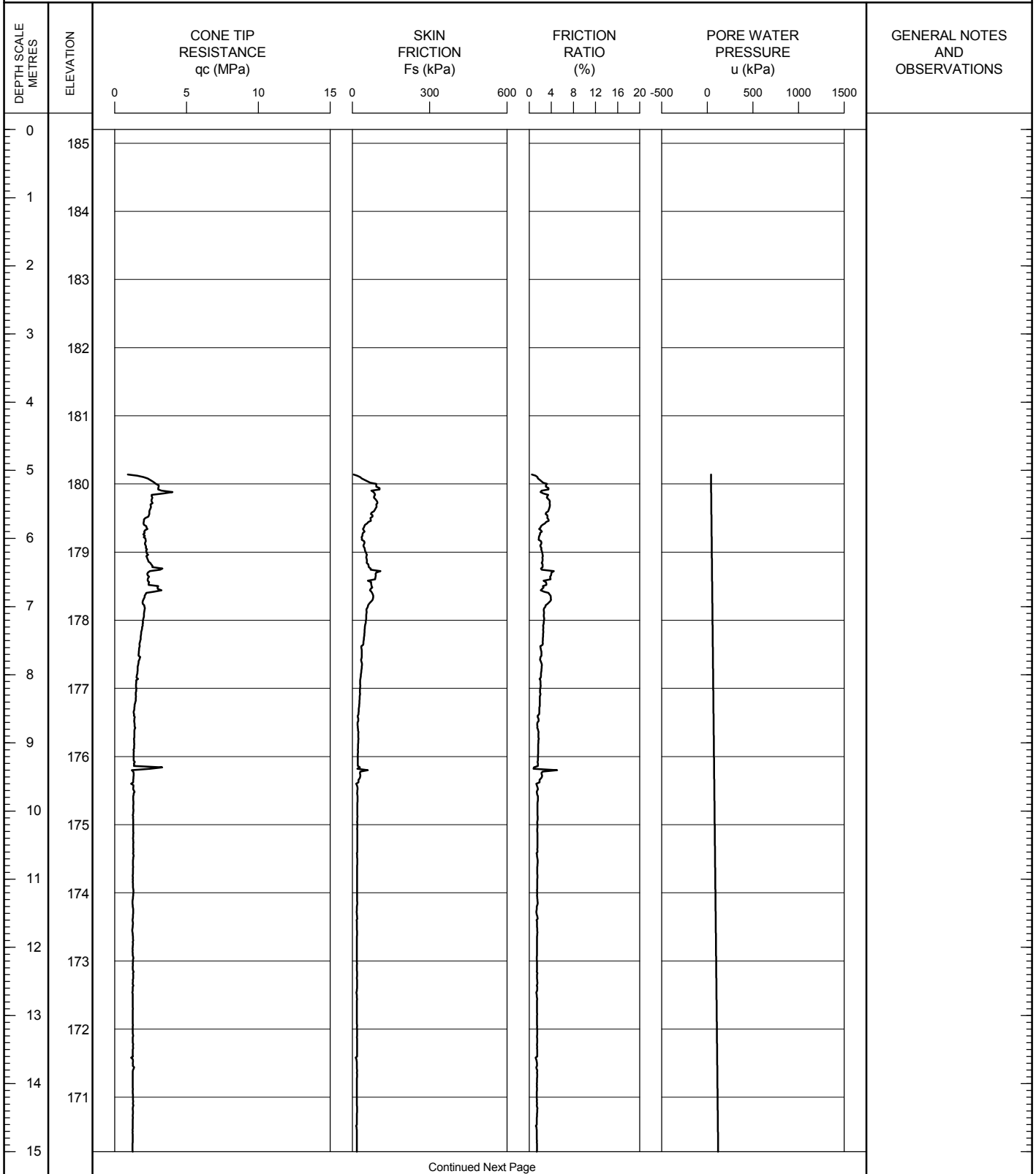
DATUM Geodetic

GROUND SURFACE ELEVATION: 185.2

PREDRILL DEPTH: 5

CORRECTION FACTOR A: 0.8

CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: MSO

RECORD OF CONE PENETRATION TEST CPT T10-2

METRIC

PROJECT Windsor-Essex Parkway

TEST DATE 02/05/2011 - 02/05/2011

SHEET 2 OF 2

LOCATION 4678403.2N; 334089.2E

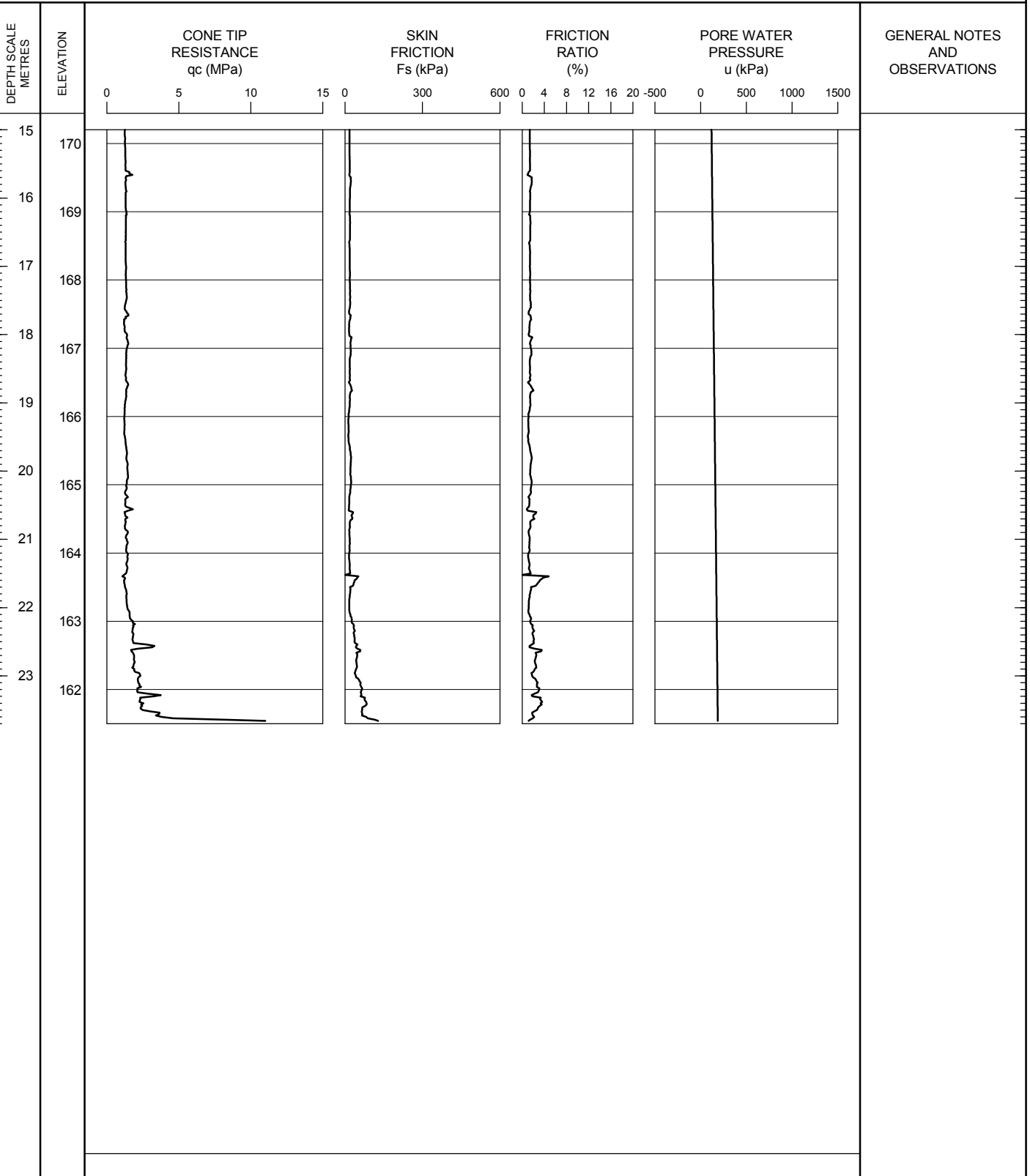
DATUM Geodetic

GROUND SURFACE ELEVATION: 185.2

PREDRILL DEPTH: 5

CORRECTION FACTOR A: 0.8

CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: MSO

RECORD OF CONE PENETRATION TEST CPT 45-RW

METRIC

PROJECT Windsor-Essex Parkway

TEST DATE 8/9/2011 - 8/9/2011

SHEET 1 OF 3

LOCATION N4678688.3; E333708.0

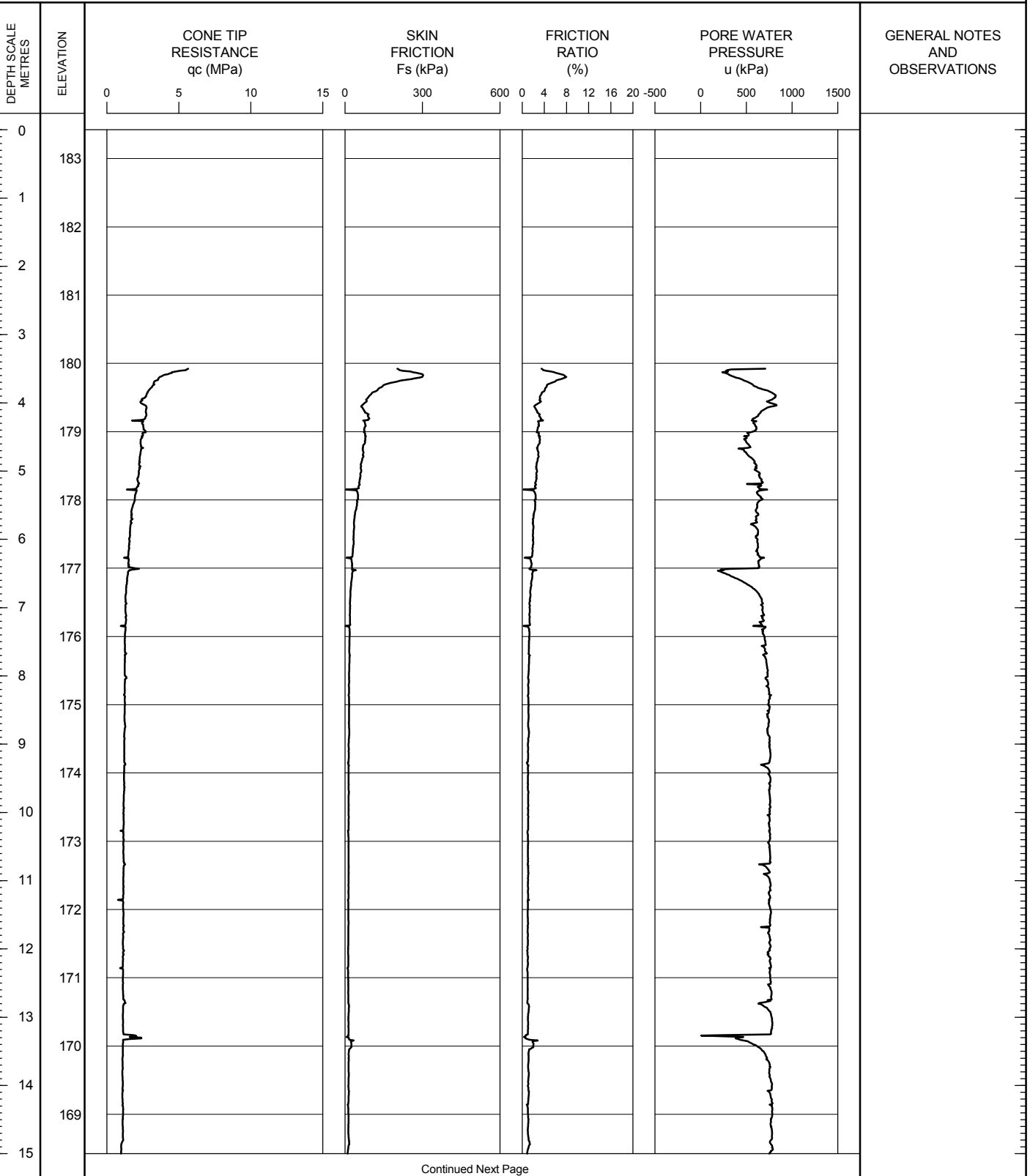
DATUM Geodetic

GROUND SURFACE ELEVATION: 183.4

PREDRILL DEPTH: 3

CORRECTION FACTOR A: 0.8

CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 45-RW

METRIC

PROJECT Windsor-Essex Parkway

TEST DATE 8/9/2011 - 8/9/2011

SHEET 2 OF 3

LOCATION N4678688.3; E333708.0

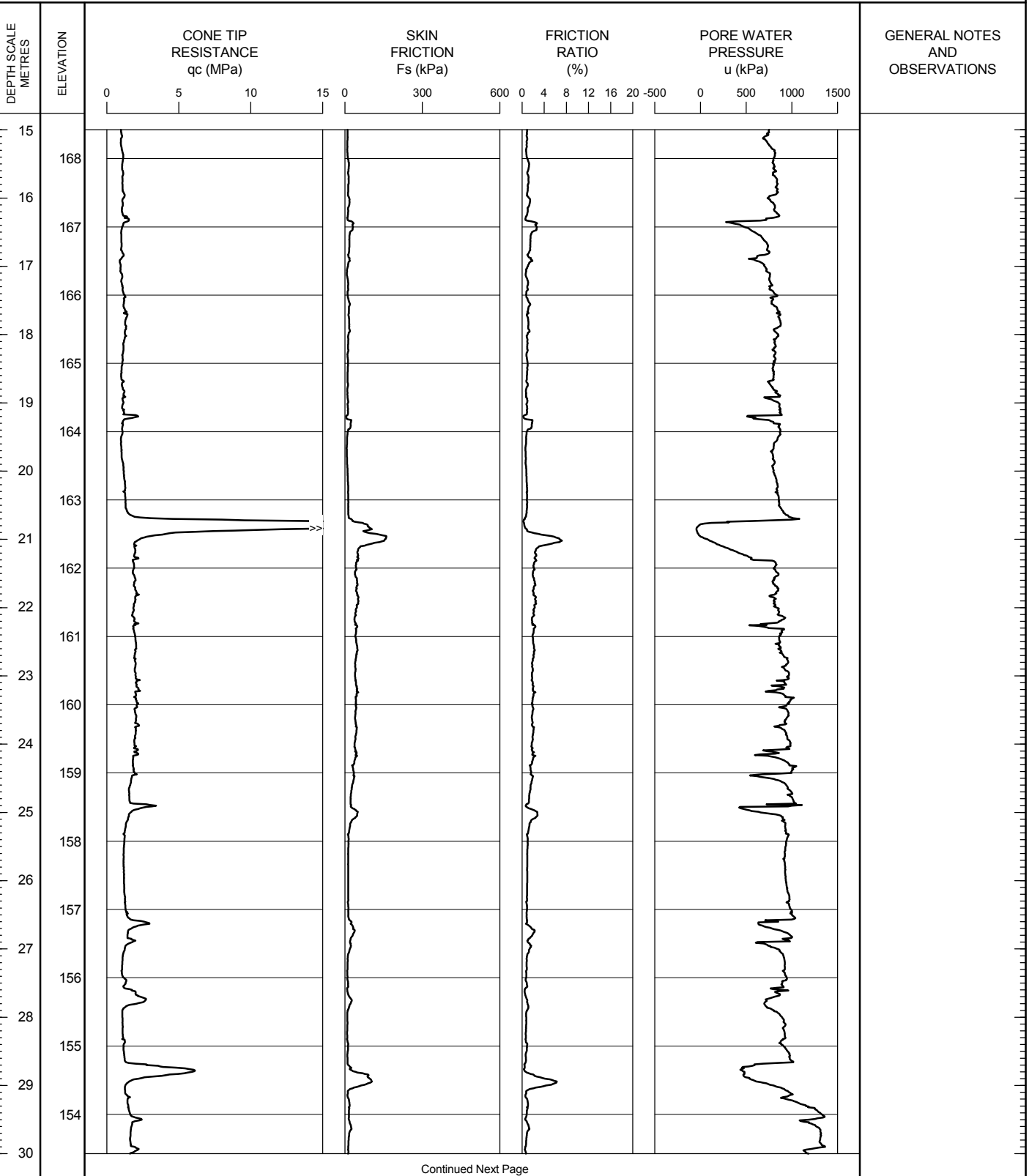
DATUM Geodetic

GROUND SURFACE ELEVATION: 183.4

PREDRILL DEPTH: 3

CORRECTION FACTOR A: 0.8

CORRECTION FACTOR B: 0



WEF CPT LOG CPT-RW/GPJ ONTARIO MOT GDT 06/01/12

OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 45-RW

METRIC

PROJECT Windsor-Essex Parkway

TEST DATE 8/9/2011 - 8/9/2011

SHEET 3 OF 3

LOCATION N4678688.3; E333708.0

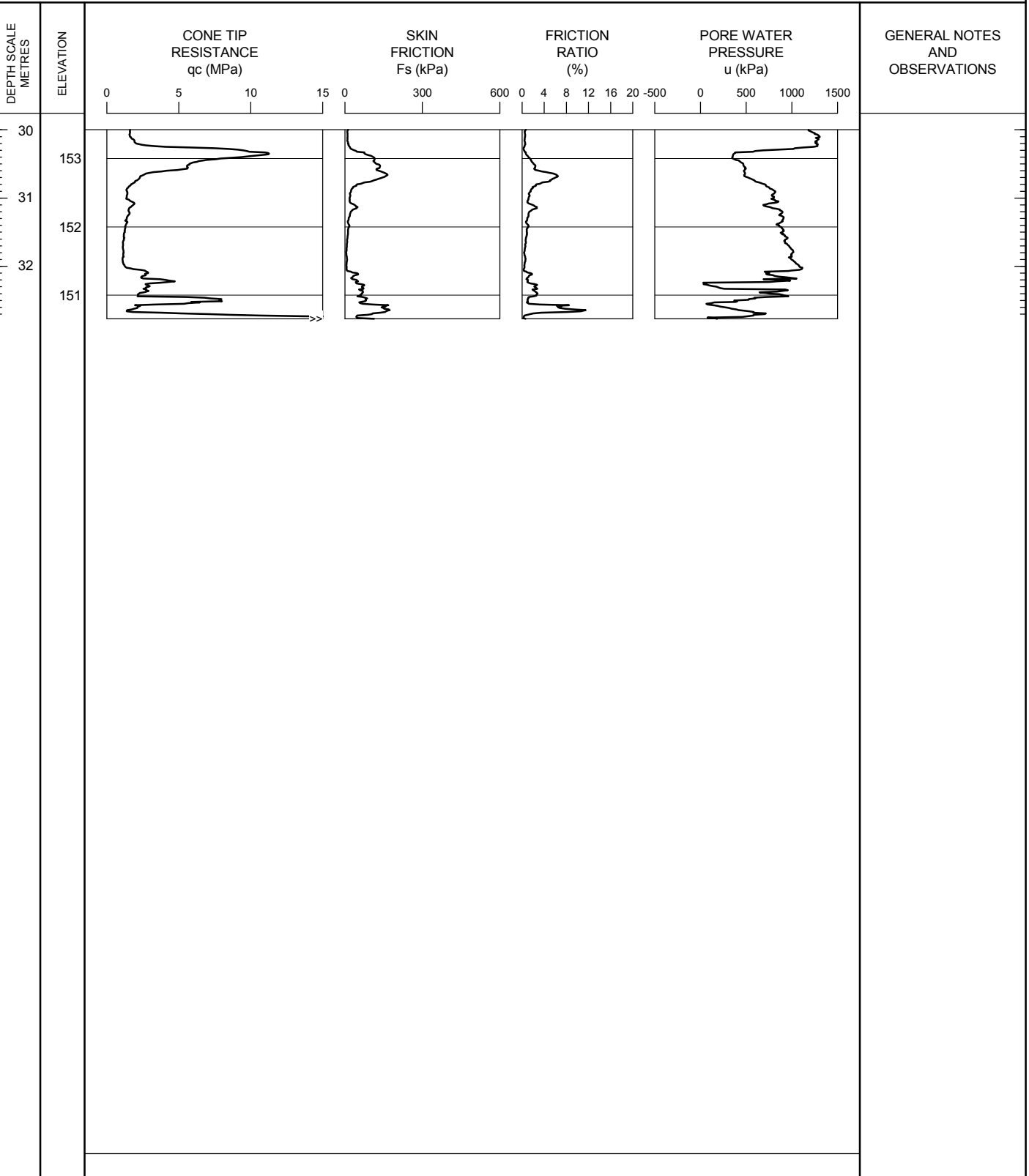
DATUM Geodetic

GROUND SURFACE ELEVATION: 183.4

PREDRILL DEPTH: 3

CORRECTION FACTOR A: 0.8

CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 46-RW

METRIC

PROJECT Windsor-Essex Parkway

TEST DATE 8/5/2011 - 8/5/2011

SHEET 1 OF 2

LOCATION N4678505.0; E333977.6

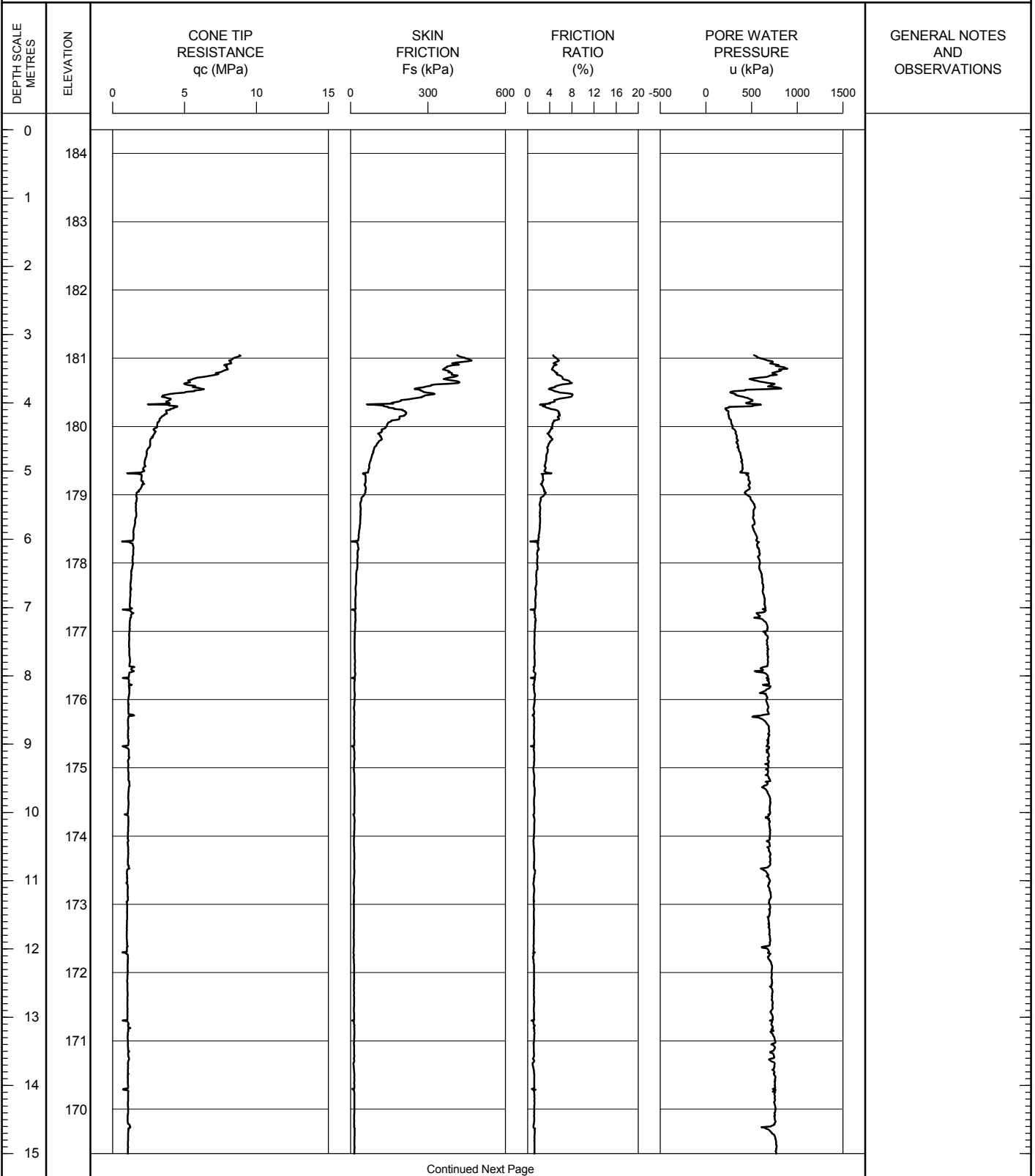
DATUM Geodetic

GROUND SURFACE ELEVATION: 184.3

PREDRILL DEPTH: 3

CORRECTION FACTOR A: 0.8

CORRECTION FACTOR B: 0



WEF CPT LOG CPT-RW/GPJ ONTARIO MOT GDT 06/01/12

OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 46-RW

METRIC

PROJECT Windsor-Essex Parkway

TEST DATE 8/5/2011 - 8/5/2011

SHEET 2 OF 2

LOCATION N4678505.0; E333977.6

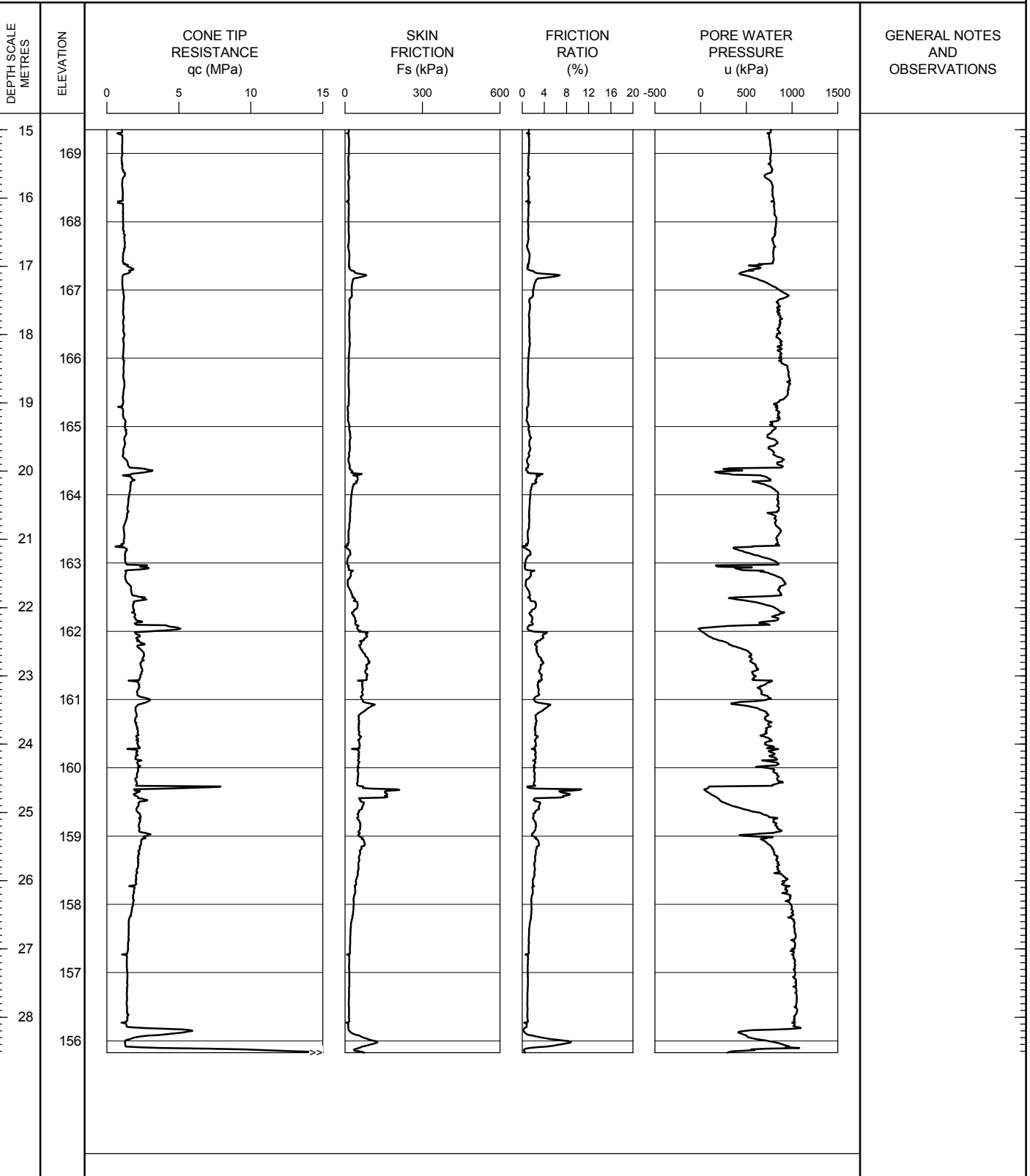
DATUM Geodetic

GROUND SURFACE ELEVATION: 184.3

PREDRILL DEPTH: 3

CORRECTION FACTOR A: 0.8

CORRECTION FACTOR B: 0



WEF CPT LOG CPT-RW.GPJ ONTARIO MOT.GDT 06/01/12

OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 47-RW

METRIC

PROJECT Windsor-Essex Parkway

TEST DATE 8/10/2011 - 8/10/2011

SHEET 1 OF 2

LOCATION N4678440.3; E334300.2

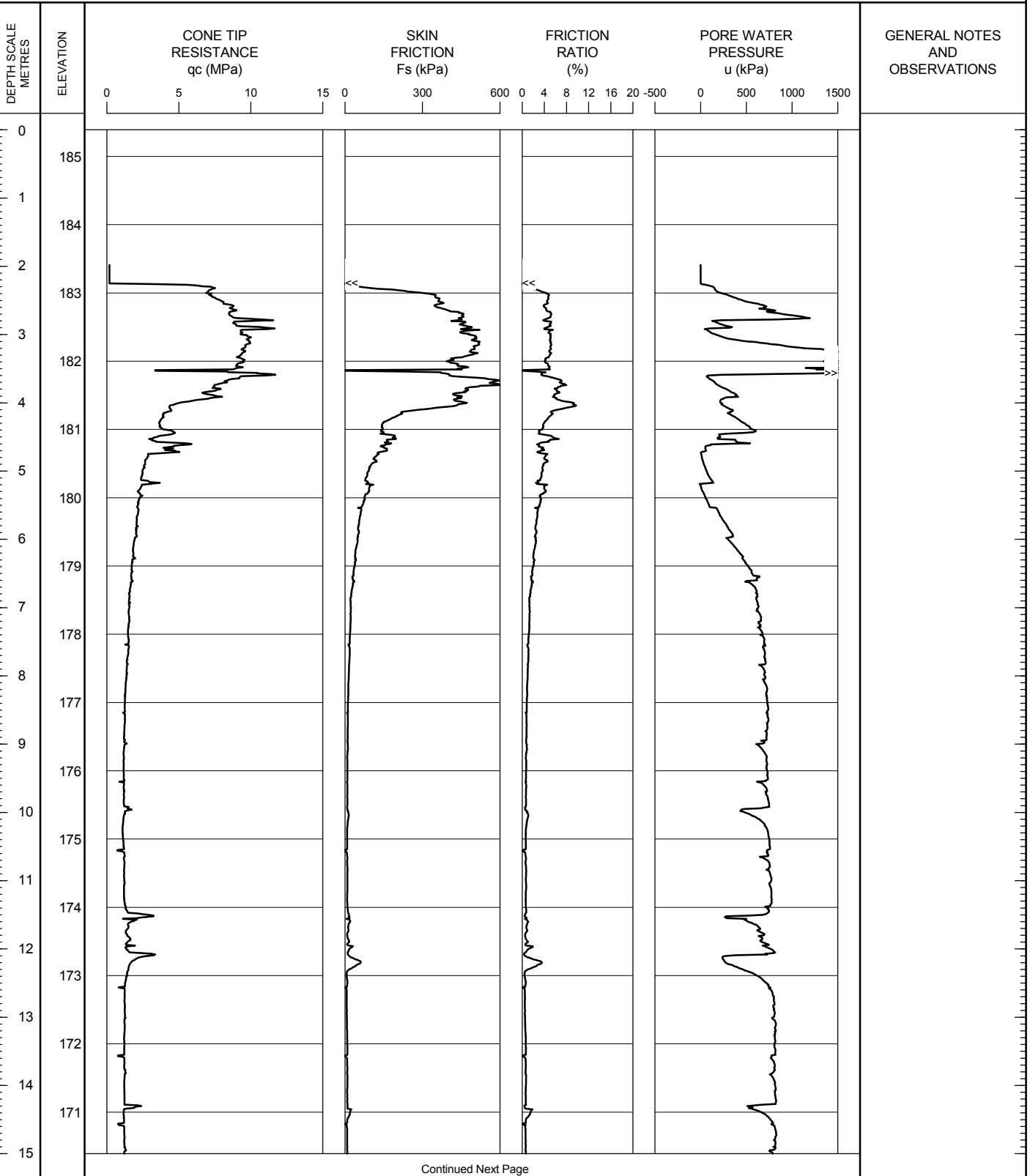
DATUM Geodetic

GROUND SURFACE ELEVATION: 185.4

PREDRILL DEPTH: 1.98

CORRECTION FACTOR A: 0.8

CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 47-RW

METRIC

PROJECT Windsor-Essex Parkway

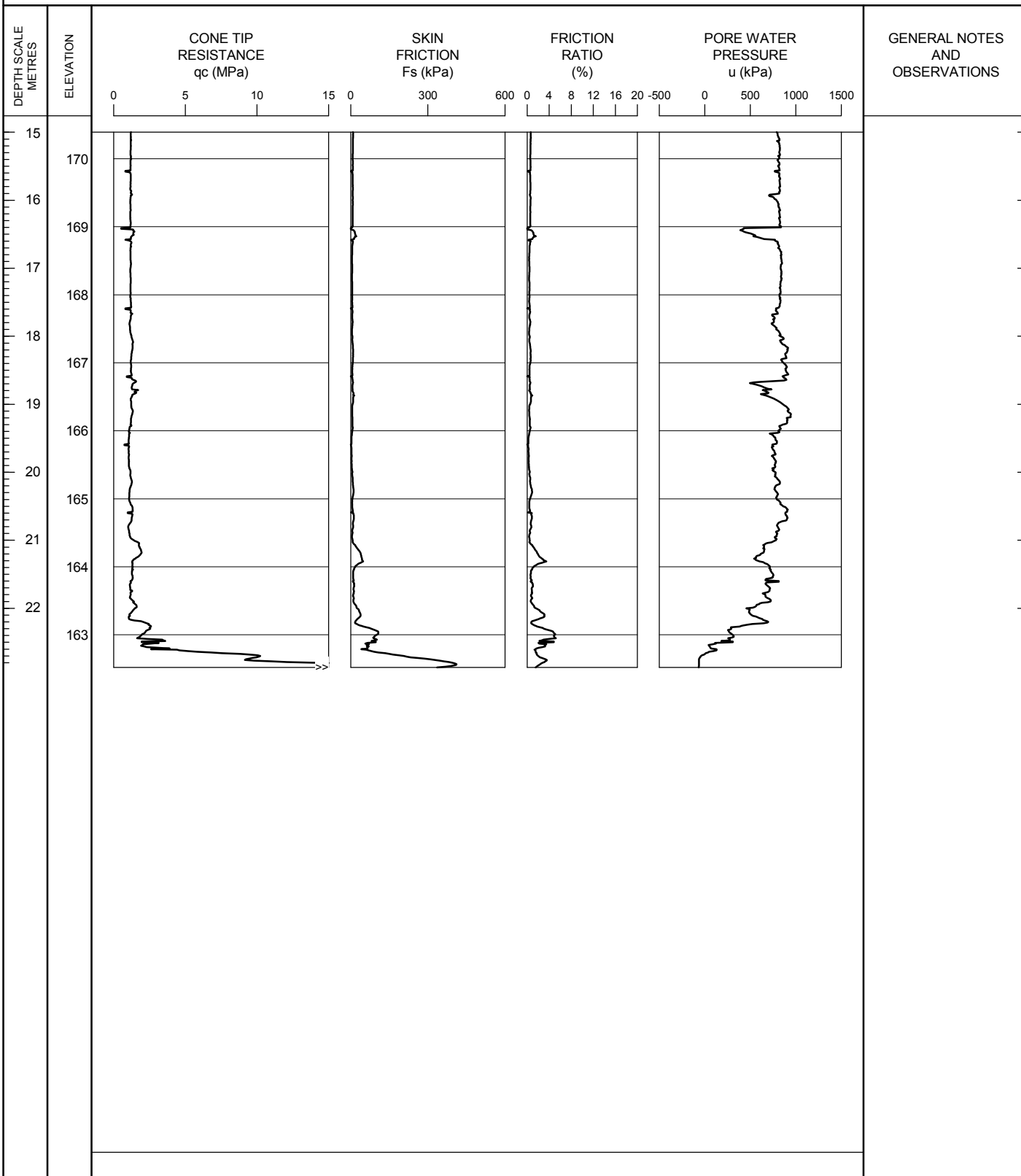
TEST DATE 8/10/2011 - 8/10/2011

SHEET 2 OF 2

LOCATION N4678440.3; E334300.2

DATUM Geodetic

GROUND SURFACE ELEVATION: 185.4 PREDRILL DEPTH: 1.98 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



WEP CPT LOG CPT 47-RW.GPJ ONTARIO MOT.GDT 02/12/11

OPERATOR: TA

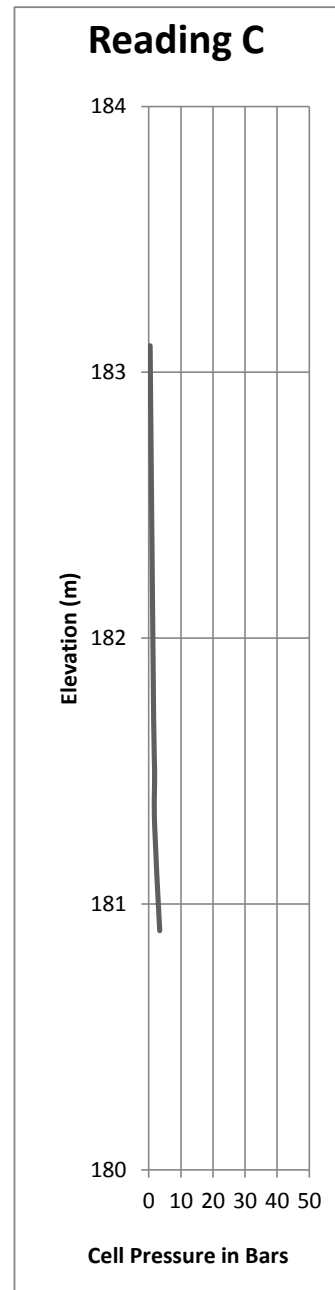
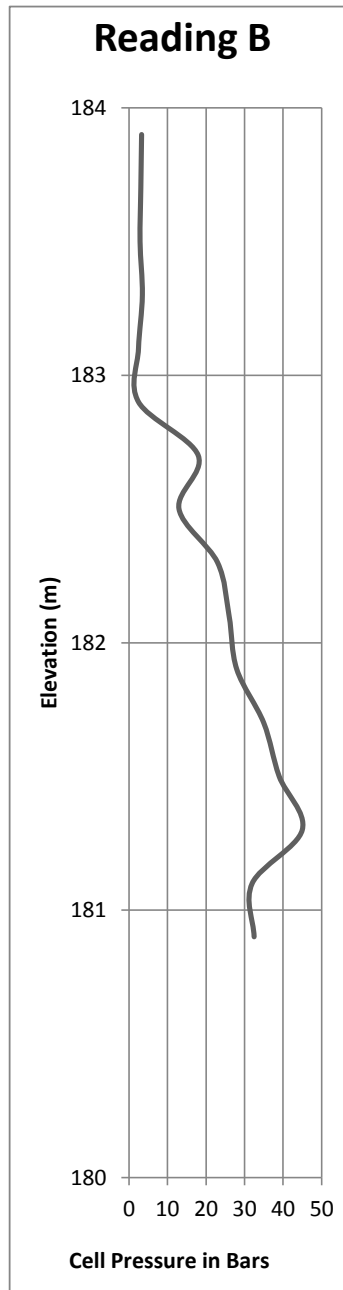
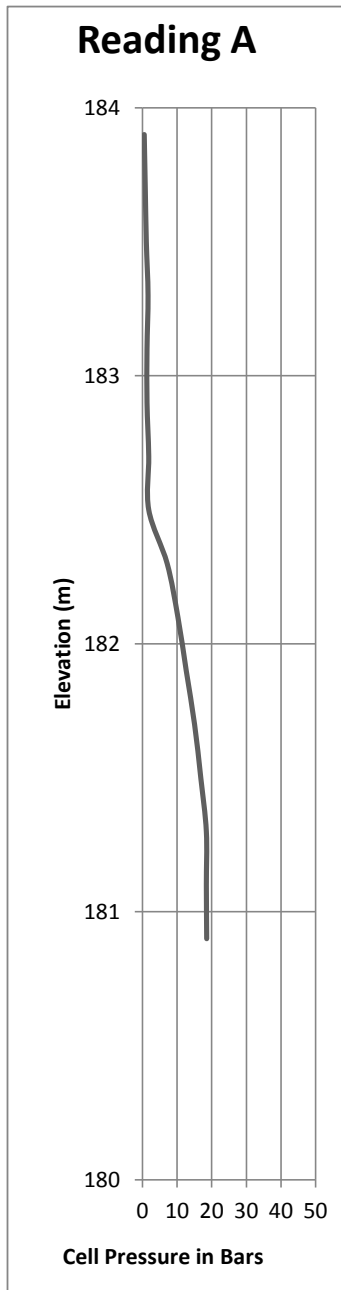
CHECKED: DD

RECORD OF DILATOMETER TEST DMT T9-1-SHALLOW

Project : Windsor-Essex Parkway
 Location: N 4678544.5; E 333900.9
 Ground Surface Elevation : 184.1

Test Date: 7/19/2011
 Predrill Depth : 0.2 m
 Delta A: 0.14 Bar

Sheet 1 of 1
 Datum Geodetic
 Delta B: 0.22 Bar



Note: DMT refusal at elevation 180.9m .Redrill to elevation 179.5m
 Resumed DMT to elevation 162.5m

Operator: LC

Checked: DD

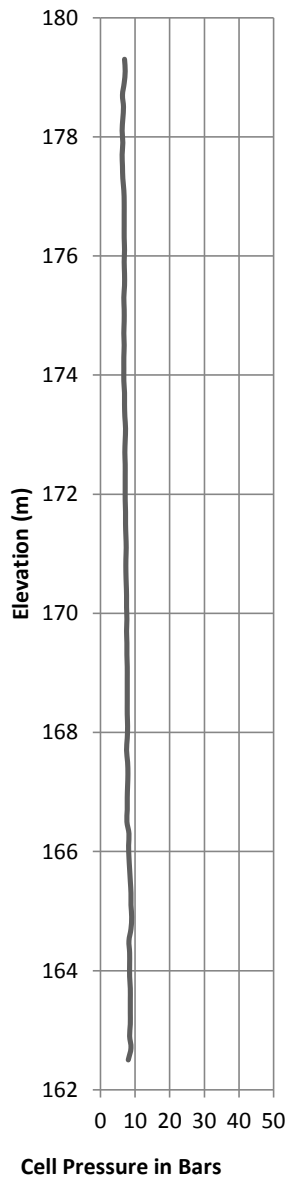
RECORD OF DILATOMETER TEST DMT T9-1-DEEP

Project : Windsor-Essex Parkway
Location: N 4678544.5; E 333900.9
Ground Surface Elevation : 184.1

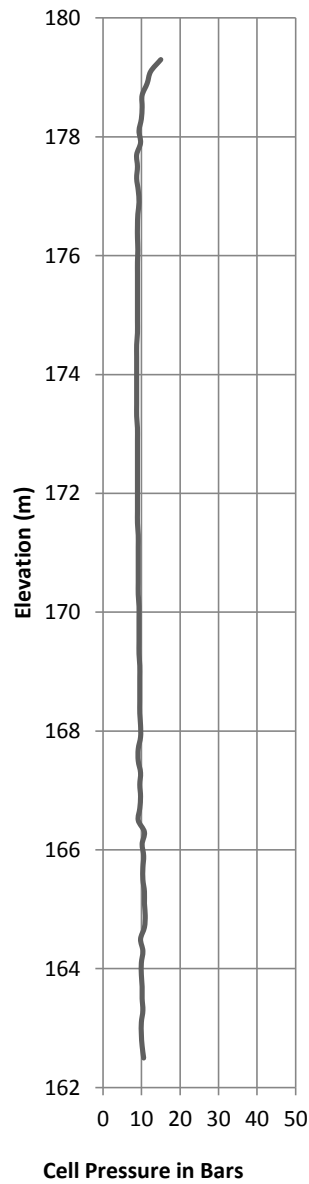
Test Date: 7/19/2011
Predrill Depth : 4.6 m
Delta A: 0.10 Bar

Sheet 1 of 1
Datum Geodetic
Delta B: 0.37 Bar

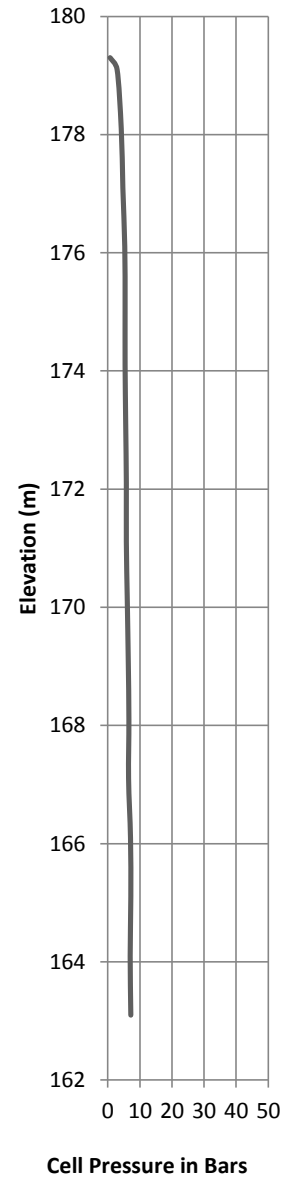
Reading A



Reading B



Reading C



Operator: LC

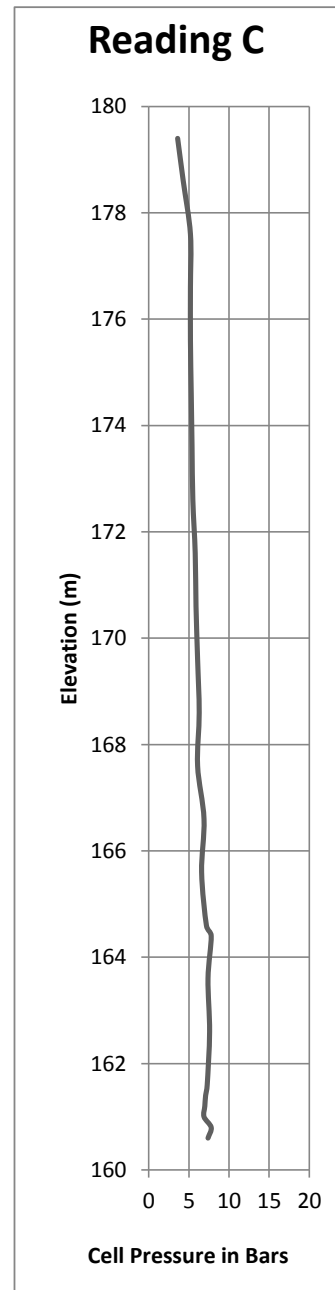
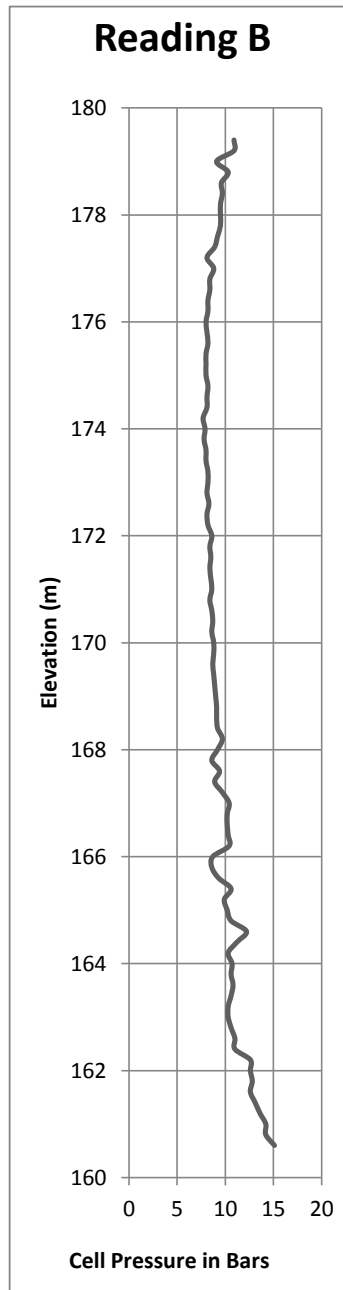
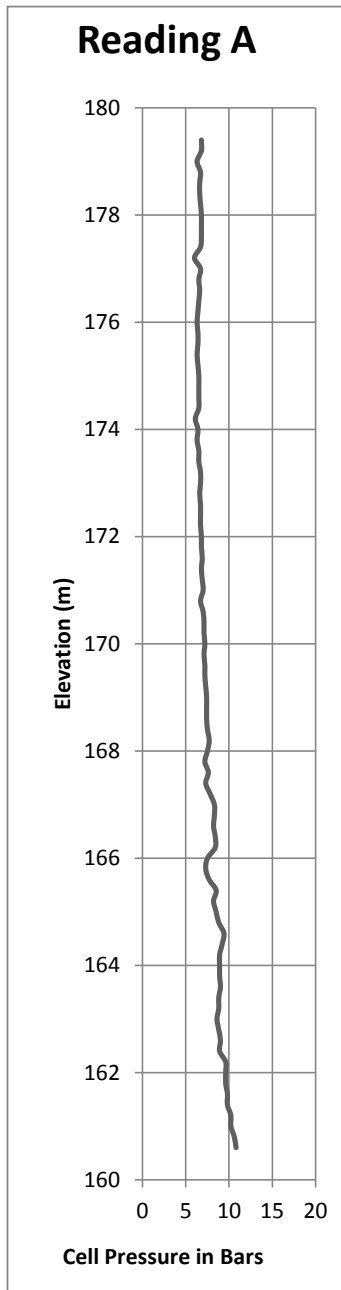
Checked: DD

RECORD OF DILATOMETER TEST DMT T10-1

Project : Windsor-Essex Parkway
Location: N 4678412.4; E 334151.5
Ground Surface Elevation : 184.6

Test Date: 7/21/2011
Predrill Depth : 5.0 m
Delta A: 0.10 Bar

Sheet 1 of 1
Datum Geodetic
Delta B: 0.33 Bar



Operator: LC
Checked: DD

Station 12+800L to Station 13+400L (Soil Profile #14)

RECORD OF BOREHOLE No B11-1

1 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678221.4, E334583.9 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 4, 11 - May 7, 11 CHECKED BY MSO

| 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 (%) |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|---|----------------------------|--|--|------------------------------------|-------------------------------------|-----------------------------------|--|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | |
| | | | | | | | | ○ UNCONFINED ● POCKET PEN. | + FIELD VANE × LAB VANE | | | | | | | |
| 185.4 | Ground Surface | | | | | | | | | | | | | | | |
| 185.2 | 225mm ASPHALT | | | | | | | | | | | | | | | |
| 0.2 | FILL | | | | | | | | | | | | | | | |
| 184.6 | Crushed limestone sand and gravel Grey | | | | | | | | | | | | | | | |
| 0.8 | CLAYEY SILT Some clay, trace gravel Stiff to hard Mottled brown and grey | | 1 | SS | 10 | | | | | | | | | | | |
| | | | 2 | SS | 17 | | | | | | | | | | | |
| | | | 3 | SS | 34 | | | | | | | | | | | |
| | | | 4 | SS | 41 | | | | | | | | | | | |
| | | | 5 | SS | 36 | | | | | | | | | | | |
| | | | 6 | SS | 18 | | | | | | | | | | | |
| | | | 7 | SS | 22 | | | | | | | | | | | |
| 179.5 | | | 8 | TW | PH | | | | | | | | | | | |
| 5.9 | CLAYEY SILT Some sand, trace gravel Stiff Grey | | 9 | TW | PH | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | |
| | | | 10 | TW | PH | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | |
| | | | 11 | TW | PH | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | |
| | | | 12 | TW | PH | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | |
| | | | 13 | TW | PH | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | |

Continued Next Page

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 01/05/12

METRIC

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

METRIC

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

RECORD OF BOREHOLE No B11-2

1 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4678193.3N, 334624.8 ORIGINATED BY LC
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Apr 30, 11 - May 3, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|--|------------|---------|------|------------|-------------------------|-----------------|--|----|----|----|-----|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | |
| 185.6 | Ground Surface | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | |
| 0.0 | FILL Crushed Limestone Silty sand and Gravel | | | | | | 185 | | | | | | | | | | |
| 185.0 | FILL Weathered silty clay mixed with topsoil | | 1 | SS | 6 | | | | | | | | | | | | |
| 0.6 | | | | | | | | | | | | | | | | | |
| 184.1 | CLAYEY SILT Some sand, trace gravel Mottled brown and grey Stiff -Sandy fissures to approx. 3m Brown Hard | | 2 | SS | 7 | | 184 | | | | | | | | | | |
| 1.5 | | | | | | | | | | | | | | | | | |
| | | | 3A,B | SS | 27 | | 183 | | | | | | | | | | 2 21 49 29 |
| | | | 4 | SS | 34 | | | | | | | | | | | | |
| | | | | | | | 182 | | | | | | | | | | |
| | | | 5 | SS | 23 | | | | | | | | | | | | |
| | | | | | | | 181 | | | | | | | | | | |
| | | | 6 | SS | 19 | | | | | | | | | | | | |
| | | | | | | | 180 | | | | | | | | | | |
| | | | 7 | SS | 11 | | | | | | | | | | | | |
| | | | | | | | 179 | | | | | | | | | | |
| | | | 8 | SS | 15 | | | | | | | | | | | | |
| | | | | | | | 178 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | 9 | TW | PH | | | | | | | | | | | | |
| | | | | | | | 177 | | | | | | | | | | |
| | | | 10 | TW | PH | | | | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | 11 | TW | PH | | | | | | | | | | | | |
| | | | | | | | 175 | | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | | |
| | | | 12 | TW | PH | | | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | | |
| | | | 13 | TW | PH | | | | | | | | | | | | |
| | | | | | | | 171 | | | | | | | | | | |

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ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 01/05/12

METRIC

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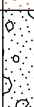

+ 3, × 3: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No B11-2

3 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4678193.3N, 334624.8 ORIGINATED BY LC
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Apr 30, 11 - May 3, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|---|---|---------|------|------------|-------------------------|-----------------|--|----|------------|----|-----|---------------------------------|-------------------------------|--------------------------------|------------------|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | |
| | | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | |
| | | | | | | | | ○ UNCONFINED | + | FIELD VANE | | | | | | | |
| | | | | | | | | ● POCKET PEN. | × | LAB VANE | | | | | | | |
| | | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | |
| | | | | | | | | | | | | | | | | | |
| 155.4 30.2 | FINE SAND With clay layers, some gravel Compact Grey |  | 24 | SS | 27 | | 155 | | | | | | | | | | -end of drilling May 2; continued May 3 |
| 154.1 31.5 | SAND and GRAVEL Limestone and shale fragments, inferred cobbles, boulders Very dense Grey |  | 25 | SS | 85 | | 154 | | | | | | | | | | -flushed out casing and drove split spoon but had no penetration; attempted coring but had no recovery; NQ barrel getting jammed in casing; flushed out casing again but getting no return water and pump pressure spiking; remove core barrel and wash casing down to 36.67m; collected wash samples |
| | | | | | | | 153 | | | | | | | | | | |
| | | | 26 | SS | 118 | | 152 | | | | | | | | | | |
| | | | | | | | 151 | | | | | | | | | | |
| | | | 27 | SS | 130 | | 150 | | | | | | | | | | |
| | | | 28 | RC | | | | | | | | | | | | | |
| | | | | | | | 149 | | | | | | | | | | |
| 148.9 36.7 | LIMESTONE Fine grained, cherty Highly fractured, numerous stylolites, faintly laminated to bedded, light blue-grey inclusion Light grey |  | 29 | RC | | | 148 | | | | | | | | | | RQD = 17% TCR = 100% SCR = 58% RQD = 100% TCR = 100% SCR = 100% |
| | | | 30 | RC | | | | | | | | | | | | | |
| 147.1 38.5 | END OF BOREHOLE No groundwater observed during drilling due to wash boring | | | | | | 147 | | | | | | | | | | |
| | | | | | | | 146 | | | | | | | | | | |
| | | | | | | | 145 | | | | | | | | | | |
| | | | | | | | 144 | | | | | | | | | | |
| | | | | | | | 143 | | | | | | | | | | |
| | | | | | | | 142 | | | | | | | | | | |
| | | | | | | | 141 | | | | | | | | | | |

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

RECORD OF BOREHOLE No B11-3

1 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4678179.9N, 334655.1E ORIGINATED BY TP
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 7, 11 - May 9, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|---|------------|---------|------|------------|-------------------------|-----------------|--|--------------|--------------|---------------|---|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | |
| 185.4 | Ground Surface | | | | | | | 20 40 60 80 100 | ○ UNCONFINED | + FIELD VANE | ● POCKET PEN. | × | LAB VANE | WATER CONTENT (%) | | | GR SA SI CL |
| 0.0 | FILL Crushed limestone silty sand and gravel Grey | | | | | | 185 | | | | | | | | | | |
| 184.6 | FILL Silty Clay with organics Grey-brown | | 1A, B | SS | 6 | | 184 | | | | | | | | | | |
| 0.8 | | | 2A, B | SS | 7 | | | | | | | | | | | | |
| 183.3 | CLAYEY SILT Some sand, trace gravel Very stiff Orange-Brown Hard Numerous Sand Layers At Elevation 182.4m | | 3 | SS | 23 | | 183 | | | | | | | | | | |
| 2.1 | | | 4 | SS | 31 | | 182 | | | | | | | | | | 2 33 37 28 |
| | | | 5A, B | SS | 17 | | | | | | | | | | | | |
| | Very stiff | | 6 | SS | 14 | | 181 | | | | | | | | | | |
| | Grey | | 7 | SS | 12 | | 180 | | | | | | | | | | |
| | Stiff | | 8 | TW | PH | | 179 | | | | | | | | | 21.9 | |
| | | | 9 | TW | PH | | 178 | | | | | | | | | | |
| | | | 10 | TW | PH | | 176 | | | | | | | | | 21.5 | |
| | | | VT | | | | 175 | | | | | | | | | | |
| | | | 11 | TW | PH | | 174 | | | | | | | | | | |
| | | | VT | | | | 173 | | | | | | | | | 21.4 | |
| | | | 12 | TW | PH | | 172 | | | | | | | | | | |
| | | | VT | | | | 171 | | | | | | | | | | |
| | | | 13 | TW | PH | | | | | | | | | | | | |
| | | | VT | | | | | | | | | | | | | | |

Continued Next Page

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

RECORD OF BOREHOLE No B11-3

3 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4678179.9N, 334655.1E ORIGINATED BY TP
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 7, 11 - May 9, 11 CHECKED BY MSO

| 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 | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● POCKET PEN. | | | | | | × LAB VANE | | |
| | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | |
| 154.8 | | | | | | | 155 | | | | | | | | | | | |
| 30.6 | SILTY CLAY Medium Plasticity Some silt, trace gravel Very stiff Grey | | 24 | A,B,C SS | 16 | | 154 | | | | | | | | | | | |
| 153.4 | | | | | | | 153 | | | | | | | | | | | |
| 32.0 | SAND and GRAVEL and inferred cobbles and boulders Dense to very dense Grey and Black | | 25 | SS | 47 | | 152 | | | | | | | | | | | |
| | | | 26 | SS | 58 | | 151 | | | | | | | | | | | |
| | | | | | | | 150 | | | | | | | | | | | |
| | | | 27 | SS | 84 | | 149 | | | | | | | | | | | |
| | | | | | | | 148 | | | | | | | | | | | |
| | | | 28 | Grab Sample | | | 147 | | | | | | | | | | | |
| | | | 29 | Grab Sample | | | 146 | | | | | | | | | | | |
| 148.5 | Limestone and granite gravel (up to 75mm diameter) sampled | | | | | | 145 | | | | | | | | | | | |
| 36.9 | LIMESTONE Fine grained, cherty, vuggy with calcite, chalcopryrite and celestite crystals present stylolites throughout, moderately porous, semi-hard trace fossils. Light Blue-grey inclusions Light grey | | 30 | RC | | | 144 | | | | | | | | | | | |
| | | | | | | | 143 | | | | | | | | | | | |
| | | | 31 | RC | | | 142 | | | | | | | | | | | |
| | | | | | | | 141 | | | | | | | | | | | |
| 145.2 | END OF BOREHOLE | | | | | | 140 | | | | | | | | | | | |
| 40.2 | No groundwater observed during drilling due to wash boring | | | | | | 139 | | | | | | | | | | | |

17 26 57

RQD = 0%
TCR = 57%
SCR = 0%

-end of drilling
May 9; finish May 10
RQD = 80%
TCR = 100%
SCR = 80%

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ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 01/05/12

RECORD OF BOREHOLE No B11-4

1 OF 4

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4678195.6N, 334679.3E ORIGINATED BY TP
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Auger COMPILED BY SS
 DATUM Geodetic DATE May 10, 11 - May 11, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _P | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | |
|---------------|---|--|---------|------|------------|----------------------------|--------------------|---|--------------|---------------|------------|--|------------------------------------|-------------------------------------|-----------------------------------|-------------------------|--|-------------------|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● POCKET PEN. | × LAB VANE | | | | | | | | | |
| 185.0 | Ground Surface | | | | | | | | | | | | | | | | | | | |
| 0.0 | TOPSOIL Organic Clay Black |  | | | | | | | | | | | | | | | -Deep Vibrating Wire Piezometer (VWP) installed in sampled borehole. Shallow and mid-depth VWP installed in adjacent boring at N 4678197.3, E334679.6; Shallow Spider Magnet (MG) installed in adjacent boring at N4678199, E334679.1; Mid-depth MG installed in adjacent boring at N4678199.8, E334678.1 | | | |
| 184.2 | CLAYEY SILT Some sand, trace gravel Stiff Mottled brown-orange Brown Hard Very stiff Stiff Numerous Sand Layers at Elevation 178.9m |  | 1 | SS | 7 | | | | | | | | | | | | | | | |
| 0.8 | | | 2 | SS | 10 | | | | | | | | | | | | | | | |
| | | | 3 | SS | 30 | | | | | | | | | | | | | | | |
| | | | 4 | SS | 32 | | | | | | | | | | | | | | | |
| | | | 5 | SS | 22 | | | | | | | | | | | | | | | |
| | | | 6 | SS | 16 | | | | | | | | | | | | | | | |
| | | | 7 | SS | 15 | | | | | | | | | | | | | | | |
| | | | 8 | TW | PH | | | | | | | | | | | | | | | |
| | | | 9 | TW | PH | | | | | | | | | | | | | | | |
| | | | 10 | TW | PH | | | | | | | | | | | | | | | |
| | | | | HV | | | | | | | | | | | | | | | | |
| | | | 11 | TW | PH | | | | | | | | | | | | | | | |
| | | HV | | | | | | | | | | | | | | | | | | |
| | 12 | TW | PH | | | | | | | | | | | | | | | | | |
| | | HV | | | | | | | | | | | | | | | | | | |
| | 13 | TW | PH | | | | | | | | | | | | | | | | | |
| 170.2 | | | | | | | | | | | | | | | | | | | | |
| 14.8 | | | | | | | | | | | | | | | | | | | | |

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 01/05/12

METRIC

Continued Next Page

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

RECORD OF BOREHOLE No B11-4

3 OF 4

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4678195.6N, 334679.3E ORIGINATED BY TP
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Auger COMPILED BY SS
 DATUM Geodetic DATE May 10, 11 - May 11, 11 CHECKED BY MSO

| 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 | | | | | | | | WATER CONTENT (%) | | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | | | | | | | | | | |
| | | | | | | | | ● POCKET PEN. | × LAB VANE | | | | | | | | | | |
| 29.9 | SILTY CLAY Very stiff (continued) | | | | | | | | | | | | | | | | | | |
| 154.4 | | | 24A, B | SS | 25 | | | | | | | | | | | | | | |
| 30.6 | SAND and GRAVEL Some shale and limestone fragments, inferred cobbles and boulders Very dense Grey to Black | | | | | | | | | | | | | | | | | | |
| | | | 25 | SS | 52/ 150mm | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | 26 | SS | 116/ 150mm | | | | | | | | | | | | | | |
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+ 3, × 3: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 01/05/12

METRIC

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

METRIC

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 01/05/12

RECORD OF BOREHOLE No B11-5

3 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4678173.2N, 334733.7E ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 25, 11 - May 30, 11 CHECKED BY MSO

| 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 | | | | | | | | | |
| | | | | | | | | ○ UNCONFINED | | + FIELD VANE | | | | | | | |
| | | | | | | | | ● POCKET PEN. | | × LAB VANE | | | | | | | |
| | | | | | | | WATER CONTENT (%) | | | | | | | | | | |
| | | | | | | | 20 40 60 80 100 | | | | | 10 20 30 | | | | | |
| 154.9 | | | | | | | 155 | | | | | | | | | | |
| 154.8 | | | | | | | | | | | | | | | | | |
| 154.6 | | | | | | | | | | | | | | | | | |
| 154.5 | | | | | | | | | | | | | | | | | |
| 154.4 | | | | | | | | | | | | | | | | | |
| 30.9 | | | | | | | | | | | | | | | | | |
| | SILTY CLAY Some sand, trace gravel Very stiff Grey | | 24 | SS | 26 | | | | | | | | | | | | |
| | SILTY SAND Trace gravel Grey | | | | | | | | | | | | | | | | |
| | SILTY CLAY Trace sand, trace gravel Grey | | 25 | SS | 55 | | | | | | | | | | | | |
| | SAND and GRAVEL Inferred cobbles and boulders; unknown fine sand/silt/clay content Grey and black | | | | | | | | | | | | | | | | |
| | | | 26 | RC | | | | | | | | | | | | | |
| | | | 27 | SS | 4 | | | | | | | | | | | | |
| | | | 28 | SS | 3 | | | | | | | | | | | | |
| | -Cobble and rock fragments | | 29 | RC | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | | | 30 | SS | 67 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| 148.0 | | | | | | | | | | | | | | | | | |
| 37.4 | LIMESTONE Laminated, stylolites present, fine grained, pitted between 37.98m and 38.10m | | 31 | RC | | | | | | | | | | | | | |
| 147.3 | White to grey | | | | | | | | | | | | | | | | |
| 38.1 | LIMESTONE -Fractures are visible between 38.6 and 38.7m Grey to brown | | 32 | RC | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| 145.8 | | | | | | | | | | | | | | | | | |
| 39.6 | END OF BOREHOLE No groundwater observed during drilling due to wash boring | | | | | | | | | | | | | | | | |
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-potential boulder encountered at 32.7m by casing; advanced NQ core barrel; no recovery
 -N-Values probably low due to disturbance by coring; no recovery
 -split spoon refusal on potential cobble/boulder; advanced NQ core barrel and retrieved cobble rock fragments, then continued was boring to 36.58m

-end of drilling May 29; continue May 30
 ROD = 38%
 TCR = 95%
 SCR = 57%

RQD = 86%
 TCR = 98%
 SCR = 88%

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 01/05/12

1 OF 3

METRIC

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT w | LQUID LIMIT W _L | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|----------------|--|-------------|---------|------|------------|-------------------------|-----------------|---|---------------------------------|-------------------------------|-------------------------------|--|---------------------------------------|
| ELEV. DEPTH | DESCRIPTION | STRAT. PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | WATER CONTENT (%) | | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● POCKET PEN. × LAB VANE | | | | | |
| 185.8 | Ground Surface | | | | | | | | | | | | |
| 180.9 | 25mm ASPHALT | | 1 | AS | | | | | ○ | | | | |
| 185.5 | FILL | | | | | | | | | | | | |
| 0.3 | Brown sand and gravel | | | | | | | | | | | | |
| | SILT CLAY | | 2 | SS | 7 | | | | | ○ | | | |
| | Some sand, trace gravel | | | | | | | | | | | | |
| | Firm | | 3 | SS | 6 | | | | | ○ | | | |
| | Mottled brown and grey | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | Brown | | | | | | | | | ○ | | | |
| | Very stiff | | 4 | SS | 25 | | | | | | | | |
| | -Frequent oxidized fractures | | | | | | | | | | | | |
| | Hard | | 5 | SS | 30 | | | | | ○ | | | |
| 182.1 | | | | | | | | | | | | | |
| 3.7 | SILT CLAY | | | | | | | | | | | | |
| | Some sand, some gravel, fine sand inclusions | | 6 | SS | 11 | | | | | ○ | | | |
| | Stiff | | | | | | | | | | | | |
| | Grey | | 7 | SS | 11 | | | | | ○ | | | |
| 180.6 | | | | | | | | | | | | | |
| 5.2 | CLAYEY SILT | | | | | | | | | | | | |
| | Some sand, trace gravel | | 8 | SS | 11 | | | | | ○ | | | |
| | Stiff | | | | | | | | | | | | |
| | Grey | | | | | | | | | | | | |
| | Numerous Sand Layers At Elevation 179.7m | | 9 | TW | PH | | | × | | + | | 21.9 | 3 33 39 25 |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | Firm | | 10 | TW | PH | | | | | ○ | | | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | 11 | TW | PH | | | | | ○ | | 21.6 | |
| | | | | | | | | | | | | | |
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| | | | | VT | | | | | | | | | |
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| | | | 12 | SS | PH | | | | | ○ | | | |
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| | | | | | | | | | | | | | |
| | | | 13 | TW | PH | | | | | ○ | | 21.7 | |
| | | | | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | | | | VT | | | | | | | | | |
| | | | | | | | | | | | | | |
| | Silt and fine sand seams | | 14 | TW | PH | | | | | ○</ | | | |

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ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 01/05/12

2 OF 3

METRIC

DATUM Geodetic

Continued Next Page

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

3 OF 3

METRIC

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 01/05/12

RECORD OF BOREHOLE No B11-7

1 OF 4

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4678125.8N, 334810.2E ORIGINATED BY NB
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 9, 11 - May 11, 11 CHECKED BY MSO

| 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 | | | | | | | | WATER CONTENT (%) | | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | | | | | | | | | | |
| | | | | | | | | ● POCKET PEN. | × LAB VANE | | | | | | | | | | |
| 185.4 | Ground Surface | | | | | | | | | | | | | | | | | | |
| 0.0 | | | | | | | | | | | | | | | | | | | |
| 185.1 | 300mm Black TOPSOIL | | | | | | | | | | | | | | | | | | |
| 0.3 | Organic Clay | | | | | | | | | | | | | | | | | | |
| | CLAYEY SILT | | | | | | | | | | | | | | | | | | |
| | Some sand, trace gravel | | 1 | SS | 6 | | | | | | | | ○ | | | | | | |
| | Firm | | | | | | | | | | | | | | | | | | |
| | Mottled brown and grey | | | | | | | | | | | | | | | | | | |
| | Brown | | 2 | SS | 13 | | | | | | | | ○ | | | | | | |
| | Stiff | | | | | | | | | | | | | | | | | | |
| | Hard | | 3 | SS | 31 | | | | | | | | ○ | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | 4 | SS | 33 | | | | | | | | ○ | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | Grey | | 5 | SS | 18 | | | | | | | | ○ | | | | | | |
| | Very stiff | | | | | | | | | | | | | | | | | | |
| | | | 6 | SS | 10 | | | | | | | | ○ | | | | | | |
| | Stiff | | | | | | | | | | | | | | | | | | |
| | | | 7 | SS | 10 | | | | | | | | ○ | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | 8 | TW | PH | | | | | × | | | ○ | | 22.3 | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | 9 | TW | PH | | | | | | | | ○ | | | | | | |
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| | Numerous Sand Layers At Elevation 176.3m | | 10 | TW | PH | | | | | × | | | ○ | | 21.6 | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | | | |
| | | | 11 | TW | PH | | | | | | | | ○ | | | | | | |
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| | | | 12 | TW | PH | | | | | | | | ○ | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | | | |
| | | | 13 | TW | PH | | | | | | | | ○ | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No B11-7

2 OF 4

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4678125.8N, 334810.2E ORIGINATED BY NB
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 9, 11 - May 11, 11 CHECKED BY MSO

| 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 | | | | | | | WATER CONTENT (%) | |
| | | | | | | | | ○ UNCONFINED ● POCKET PEN. | + FIELD VANE × LAB VANE | | | | | | | |
| | | | | | | | 20 40 60 80 100 | 20 40 60 80 100 | 10 20 30 | | | | | | | |
| 167.7 17.7 | CLAYEY SILT Some sand, trace gravel (continued) | | 14 | TW | PH | | 170 | | | | | | 20.8 | 2 28 40 30 | | |
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| | | | | 15 | SS | PH | | 169 | | | | | | | | |
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| 164.7 20.7 | SILTY CLAY Trace pink clay nodules Stiff Grey | | 16 | TW | PH | | 167 | | | | | | 19.5 | 1 9 38 52 | | |
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| 161.6 23.8 | CLAYEY SILT Some sand, trace gravel Very stiff Grey | | 17 | TW | PH | | 166 | | | | | | | | | |
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| | | | | 18 | SS | PH | | 165 | | | | | | | | |
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| | CLAYEY SILT Stiff to hard Grey | | 19 | TW | PH | | 164 | | | | | | | | | |
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| | | | | 20 | SS | 33 | | 163 | | | | | | | | |
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| | Very dense, grey SILTY SAND encountered at elevation 160.3 m | | 21A,B | SS | 64 | | 162 | | | | | | | | | |
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| | Dense, grey SILTY SAND encountered at elevation 158 m | | 22 | SS | 18 | | 161 | | | | | | | | | |
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| | | | 23 | SS | 42 | | 160 | | | | | | | | | |
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Continued Next Page

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 01/05/12

METRIC

Continued Next Page

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

4 OF 4

METRIC

| ELEV. DEPTH | 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 (%) | |
|----------------|--------------|-------------|---------|------|------------|----------------------------|-----------------|---|--------------|--|---|---|--|
| | DESCRIPTION | STRAT. PLOT | NUMBER | TYPE | "N" VALUES | | | | | | | | W _p W W _L ————— WATER CONTENT (%) |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | | | | |
| | | | | | | | | ● POCKET PEN. | × | LAB VANE | | | |
| | | | | | | | | 20 40 60 80 100 | | | 10 20 30 | | GR SA SI CL |

[illegible]

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 01/05/12

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

RECORD OF BOREHOLE No CPT B11-1

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678195.2, E334595.9 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 4, 11 - May 4, 11 CHECKED BY MSO

| 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 | | | | | | | |
| | | | | | | | | ○ UNCONFINED | ○ FIELD VANE | | | | | | |
| | | | | | | | | ● POCKET PEN. | × LAB VANE | | | | | | |
| 185.4 | Ground Surface | | | | | | | | | | | | | | |
| 186.0 | 150mm ASPHALT | | | | | | | | | | | | | | |
| 184.7 | FILL Crushed Limestone sand and gravel Grey | | | | | | | | | | | | | | |
| 0.7 | CLAYEY SILT Some sand, trace gravel -Horizontal and vertical fractures/fissures from 2m to 4m Stiff to hard Mottled brown | | 1 | SS | 11 | | | | | | | | | | |
| | Brown | | 2 | SS | 7 | | | | | | | | | | |
| | | | 3 | SS | 37 | | | | | | | | | | |
| | | | 4 | SS | 39 | | | | | | | | | | |
| | | | 5 | SS | 22 | | | | | | | | | | |
| | Grey | | 6 | SS | 16 | | | | | | | | | | |
| 180.4 | END OF SAMPLED BOREHOLE (Continued with CPT to refusal) | | | | | | | | | | | | | | |
| 5.0 | Borehole dry on completion | | | | | | | | | | | | | | |
| | | | | | | | 180 | | | | | | | | |
| | | | | | | | 179 | | | | | | | | |
| | | | | | | | 178 | | | | | | | | |
| | | | | | | | 177 | | | | | | | | |
| | | | | | | | 176 | | | | | | | | |
| | | | | | | | 175 | | | | | | | | |
| | | | | | | | 174 | | | | | | | | |
| | | | | | | | 173 | | | | | | | | |
| | | | | | | | 172 | | | | | | | | |
| | | | | | | | 171 | | | | | | | | |

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

RECORD OF BOREHOLE No DMT B11-1

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678223.6, E334579.2 ORIGINATED BY LC
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Apr 29, 11 - Apr 29, 11 CHECKED BY MSO

| 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 | | | | | | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | | | | | | |
| 185.1 | Ground Surface | | | | | | | | | | | | | | |
| 184.9 | 175mm Black organic Clay | | | | | | | | | | | | | | |
| 0.2 | TOPSOIL | | | | | | | | | | | | | | |
| | CLAYEY SILT | | | | | | | | | | | | | | |
| | Some sand, trace gravel | | 1 | SS | 11 | | | | | | | | | | |
| | Stiff to hard | | | | | | | | | | | | | | |
| | Mottled brown and grey | | | | | | | | | | | | | | |
| | -Thin sand partings to 2.0m | | 2 | SS | 21 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | 3 | SS | 51 | | | | | | | | | | |
| | Brown | | | | | | | | | | | | | | |
| | Grey | | 4 | SS | 35 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | 5 | SS | 17 | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | 6 | SS | 13 | | | | | | | | | | |
| 180.1 | END OF SAMPLED BOREHOLE | | | | | | | | | | | | | | |
| 5.0 | (continued with DMT to refusal) | | | | | | | | | | | | | | |
| | Borehole dry on completion | | | | | | | | | | | | | | |
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+ ³, × ³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No PS6-1

1 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678339.1, E334494.4 ORIGINATED BY SM
 DIST HWY WEP BOREHOLE TYPE Track Mounted Drill - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Aug 25, 11 - Aug 28, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _P | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|--|------------|---------|------|------------|-------------------------|-----------------|--|----|----|----|-----|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | |
| 185.3 | Ground Surface | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | | |
| 185.0 | CLAYEY SILT Some sand, trace gravel Stiff to hard Mottled brown and grey changing to grey below approx 4m (EL. 181.3m) | | 1 | SS | 9 | | | | | | | | | | | | |
| 0.3 | | | | 2 | SS | 14 | | | | | | | | | | | |
| | | | | 3 | SS | 28 | | | | | | | | | | | |
| | | | | 4 | SS | 33 | | | | | | | | | | | |
| | | | | 5 | SS | 16 | | | | | | | | | | | |
| 180.7 | SANDY SILT Trace clay, trace gravel Grey | | 6 | SS | 14 | | | | | | | | | | | | |
| 4.6 | CLAYEY SILT Some sand, trace gravel Soft to very stiff Grey Trace pink nodules -Pink nodules | | 7 | SS | 8 | | | | | | | | | | | | |
| 180.0 | | | | 8 | TW | PH | | | | | | | | | | | |
| 5.3 | | | | | VT | | | | | | | | | | | | |
| | | | | 9 | TW | PH | | | | | | | | | | | |
| | | | | 10 | TW | PH | | | | | | | | | | | |
| | | | | | VT | | | | | | | | | | | | |
| | | | | 11 | TW | PH | | | | | | | | | | | |
| | | | | | VT | | | | | | | | | | | | |
| | | | | 12 | TW | PH | | | | | | | | | | | |
| | | | | | VT | | | | | | | | | | | | |
| | | 13 | TW | PH | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 01/05/12

METRIC

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 01/05/12

RECORD OF BOREHOLE No TB8B-1

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678221.7, E334845.8 ORIGINATED BY LC
DIST HWY WEP BOREHOLE TYPE CME 75 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
DATUM Geodetic DATE Jul 15, 11 - Jul 15, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _P | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | |
|---------------|------------------------------------|------------|---------|------|------------|----------------------------|-----------------|---|--------------|---------------|------------|--|------------------------------------|-------------------------------------|-----------------------------------|---------------------|---|-------------------|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● POCKET PEN. | × LAB VANE | | | | | | | | | |
| 185.7 | Ground Surface | | | | | | | | | | | | | | | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | | | | | |
| 185.3 | Silty | | | | | | | | | | | | | | | | | | | |
| 0.4 | SILTY CLAY | | | | | | | | | | | | | | | | | | | |
| | Weathered, some sand, trace gravel | | | | | | | | | | | | | | | | | | | |
| | -Trace topsoil in fissures | | 1 | SS | 6 | | | | | | | | | | | | | | | |
| | Firm | | | | | | | | | | | | | | | | | | | |
| 184.2 | | | | | | | | | | | | | | | | | | | | |
| 1.5 | CLAYEY SILT | | | | | | | | | | | | | | | | | | | |
| | -Oxidation in fissures, | | 2 | SS | 20 | | | | | | | | | | | | | | | |
| | Very stiff to stiff | | | | | | | | | | | | | | | | | | | |
| | Brown | | | | | | | | | | | | | | | | | | | |
| | | | 3 | SS | 25 | | | | | | | | | | | | | | | |
| | Grey | | | | | | | | | | | | | | | | | | | |
| | | | 4 | SS | 26 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | -Trace gravel | | 5 | SS | 15 | | | | | | | | | | | | | | | |
| | -Fissured | | | | | | | | | | | | | | | | | | | |
| | | | 6 | SS | 12 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | 7 | SS | 10 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | 8 | SS | 10 | | | | | | | | | | | | | | | |
| | -Sandy silt lenses | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| 178.7 | | | | | | | | | | | | | | | | | | | | |
| 7.0 | END OF BOREHOLE | | | VT | | | | | | | | | | | | | | | | |
| | Borehole dry on completion | | | | | | | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No CPT48-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678274.2, E334574.0 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 31, 11 - May 31, 11 CHECKED BY MSO

| 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 | | | | | | | | WATER CONTENT (%) |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | | | | | | | |
| | | | | | | | | ● POCKET PEN. | × LAB VANE | | | | | | | |
| 185.6 | Ground Surface | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | |
| 185.3 | 125mm ASPHALT | | | | | | | | | | | | | | | |
| | FILL Crushed Limestone Brown and grey | | 1 | SS | 5 | | | | | | | | | | | |
| | 100mm CONCRETE | | | | | | | | | | | | | | | |
| | CLAYEY SILT Some sand, trace gravel Mottled brown and grey Brown Trace vertical silt lenses (till) | | 2 | SS | 24 | | | | | | | | | | | |
| | -Trace fissures | | 3 | SS | 29 | | | | | | | | | | | |
| | | | 4 | SS | 35 | | | | | | | | | | | |
| | Grey | | 5 | SS | 20 | | | | | | | | | | | |
| | | | 6 | 6 | 11 | | | | | | | | | | | |
| 180.6 | END OF SAMPLED BOREHOLE (continued with CPT to refusal) | | | | | | | | | | | | | | | |
| 5.0 | Borehole dry on completion | | | | | | | | | | | | | | | |
| | | | | | | | 180 | | | | | | | | | |
| | | | | | | | 179 | | | | | | | | | |
| | | | | | | | 178 | | | | | | | | | |
| | | | | | | | 177 | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | |
| | | | | | | | 175 | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | |
| | | | | | | | 171 | | | | | | | | | |

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

RECORD OF BOREHOLE No CPT50-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678085.0, E334889.4 ORIGINATED BY TA
DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
DATUM Geodetic DATE May 27, 11 - May 27, 11 CHECKED BY MSO

| 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 | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | | | | | | | | | |
| | | | | | | | | ● POCKET PEN. | × LAB VANE | | | | | | | | | |
| 185.8 | Ground Surface | | | | | ▽ | 185 | | | | | | | | | | | |
| 186.0 | 150mm FILL | | | | | | 184 | | | | | | | | | | | |
| 0.2 | Limestone gravel | | | | | | | | | | | | | | | | | |
| 185.3 | Grey | | | | | | | | | | | | | | | | | |
| 0.5 | TOPSOIL | | 1 | SS | 6 | | | | | | | | | | | | | |
| | Black clayey | | | | | | | | | | | | | | | | | |
| | CLAYEY SILT | | 2A,B | SS | 14 | | | | | | | | | | | | | |
| | Some sand, trace gravel | | | | | | | | | | | | | | | | | |
| | Firm to hard | | | | | | | | | | | | | | | | | |
| | -Extensive fissures to 2.0m | | | | | | | | | | | | | | | | | |
| | Brown | | 3 | SS | 33 | | 183 | | | | | | | | | | | |
| | Grey | | 4A,B | SS | 32 | | 182 | | | | | | | | | | | |
| | | | 5 | SS | 14 | | 181 | | | | | | | | | | | |
| | -Trace pink clay nodules | | 6 | SS | 11 | | | | | | | | | | | | | |
| 180.8 | END OF SAMPLED BOREHOLE | | | | | | 180 | | | | | | | | | | | |
| 5.0 | (Continued with CPT to refusal) | | | | | | 179 | | | | | | | | | | | |
| | | | | | | | 178 | | | | | | | | | | | |
| | | | | | | | 177 | | | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | | | |
| | | | | | | | 175 | | | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | | | |
| | | | | | | | 171 | | | | | | | | | | | |

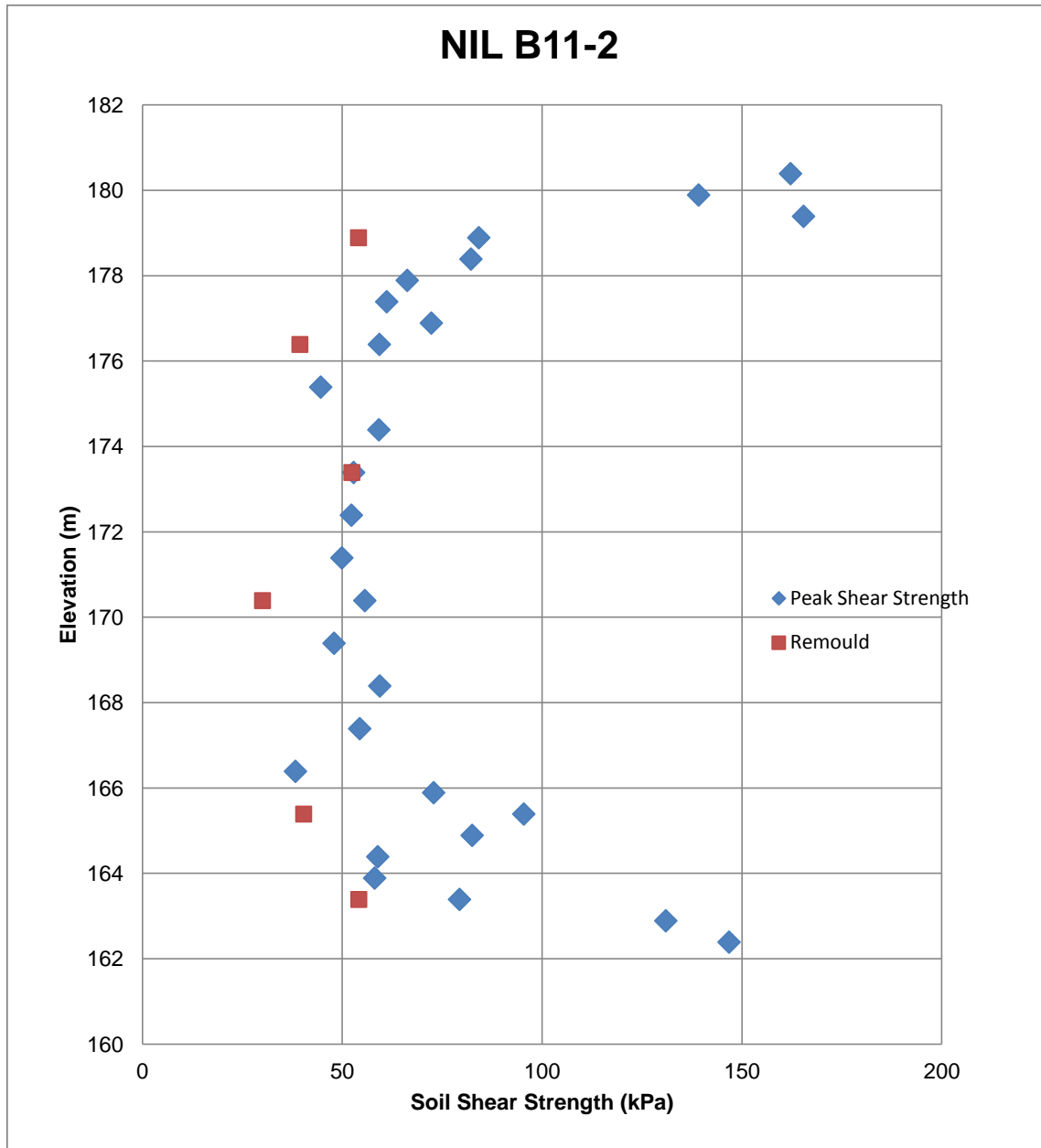
+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF NILCON VANE TEST NIL B11-2

Project : Windsor-Essex Parkway
 Location: N4678200.03; E334623.6
 Ground Surface Elevation: 185.4 m

Test Date: 5/31/2011
 Predrill Depth : 5.0 m

Sheet 1 of 1
 Datum Geodetic



Operator: NB

Checked: DD

RECORD OF NILCON VANE TEST NIL B11-6

Project : Windsor-Essex Parkway

Test Date: 5/17/2011

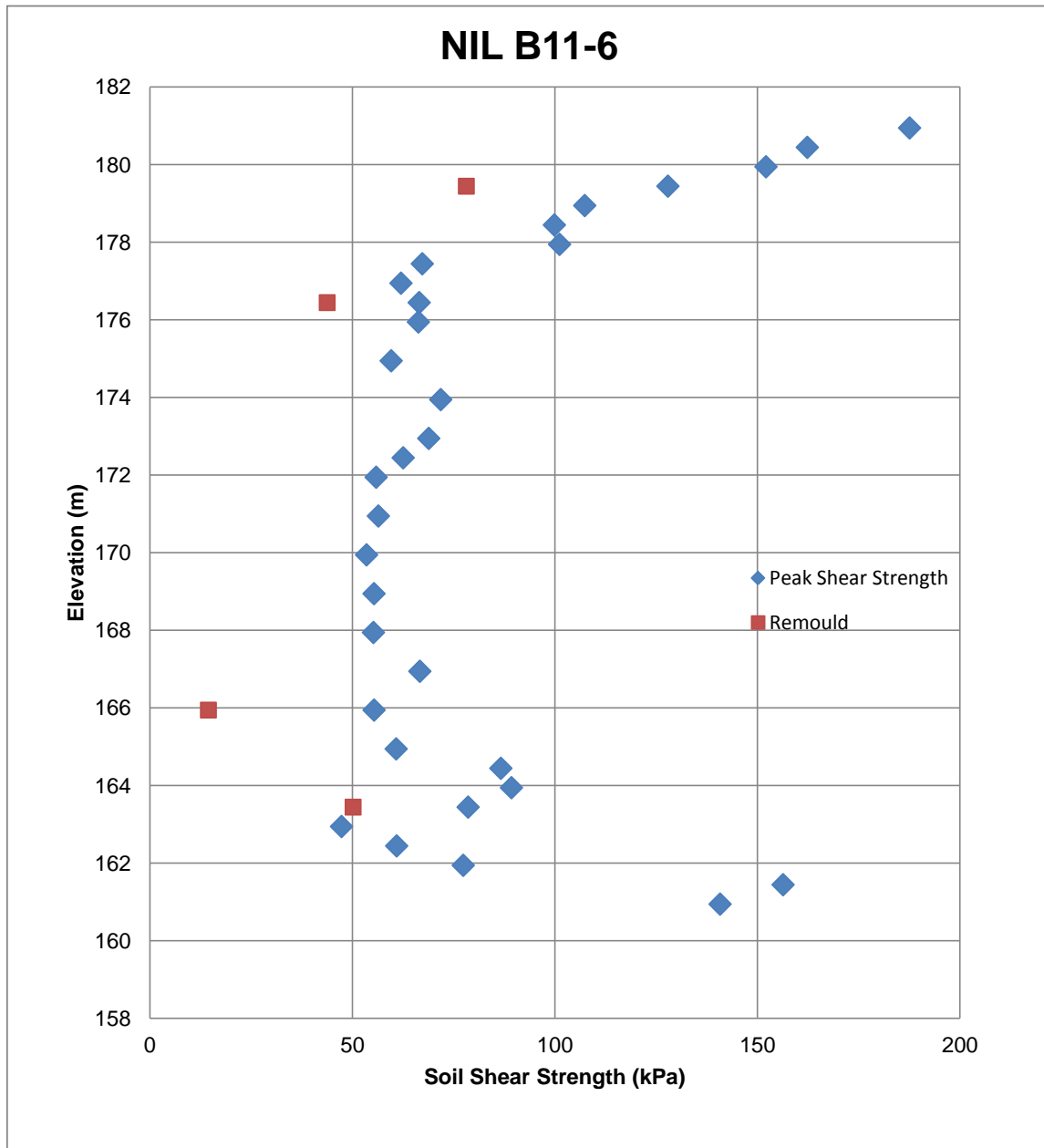
Sheet 1 of 1

Location: N4678156.4; E334772.5

Predrill Depth : 5.0 m

Datum Geodetic

Ground Surface Elevation: 185.9 m



Operator: NB

Checked: DD

RECORD OF CONE PENETRATION TEST CPT B11-1

METRIC

PROJECT Windsor-Essex Parkway

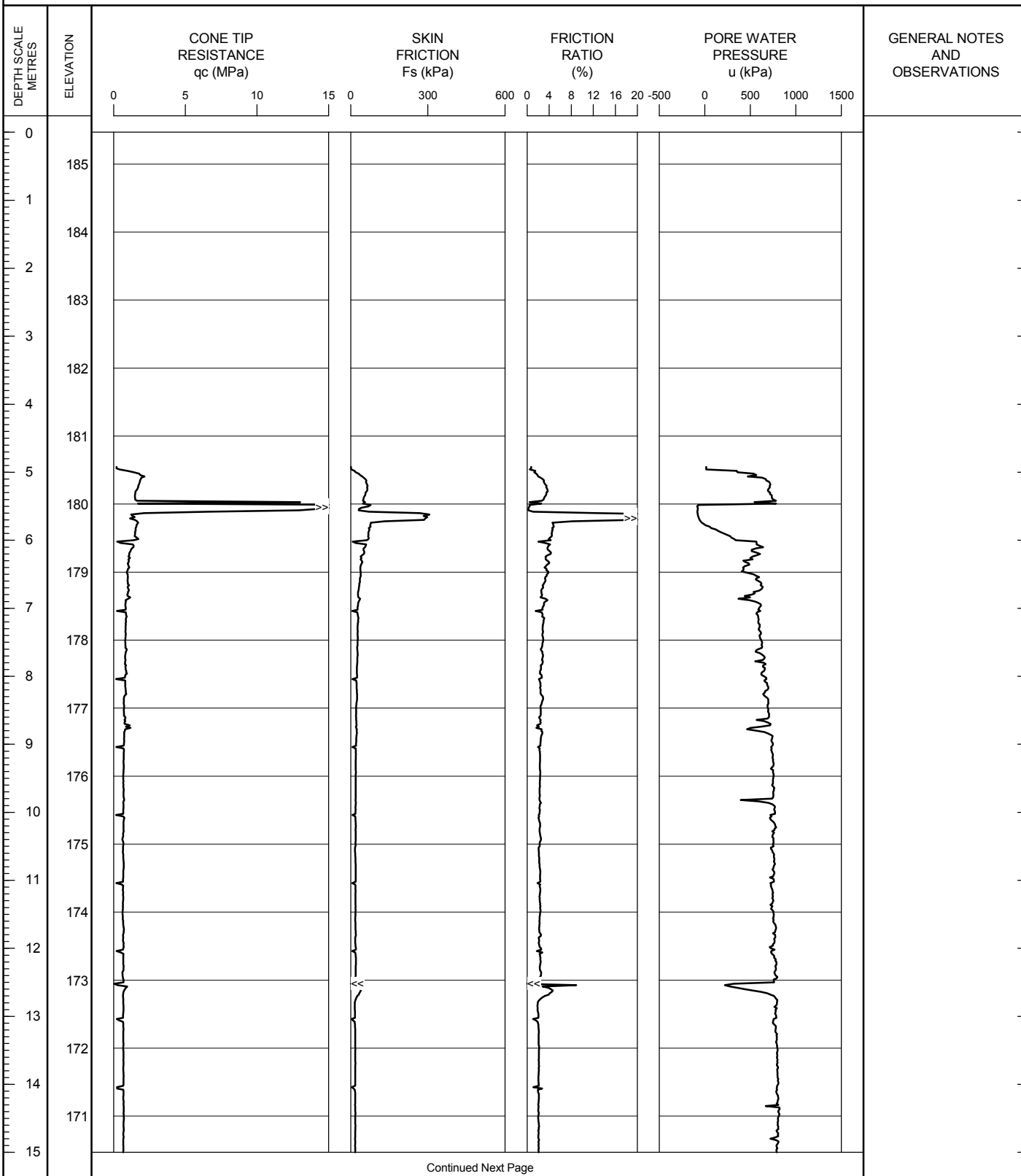
TEST DATE 5/4/2011 - 5/4/2011

SHEET 1 OF 2

LOCATION N4678195.2; 334595.9

DATUM Geodetic

GROUND SURFACE ELEVATION: 185.5 PREDRILL DEPTH: 4.9 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



Continued Next Page

OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT B11-1

METRIC

PROJECT Windsor-Essex Parkway

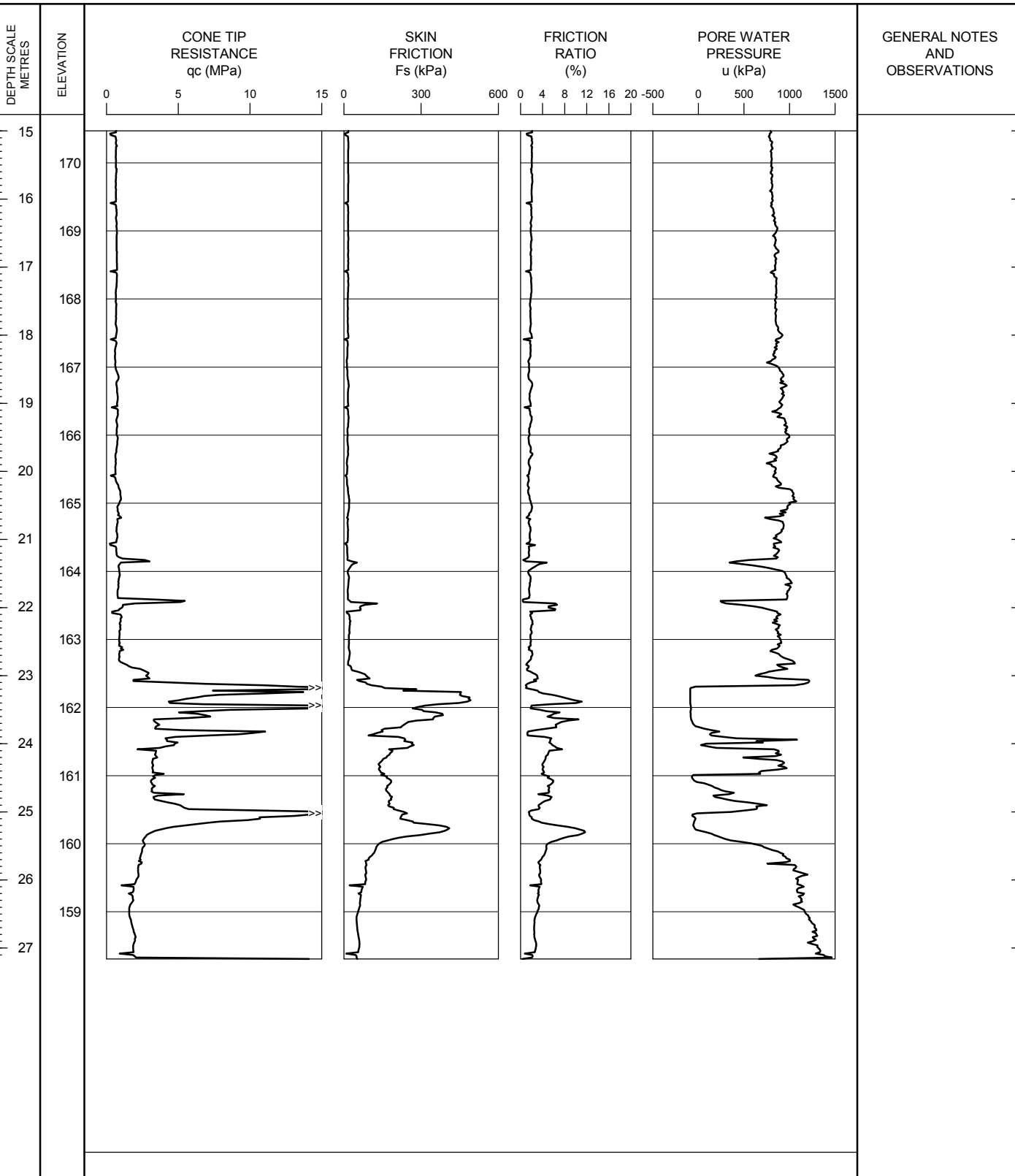
TEST DATE 5/4/2011 - 5/4/2011

SHEET 2 OF 2

LOCATION N4678195.2; 334595.9

DATUM Geodetic

GROUND SURFACE ELEVATION: 185.5 PREDRILL DEPTH: 4.9 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 48-RW

METRIC

PROJECT Windsor-Essex Parkway

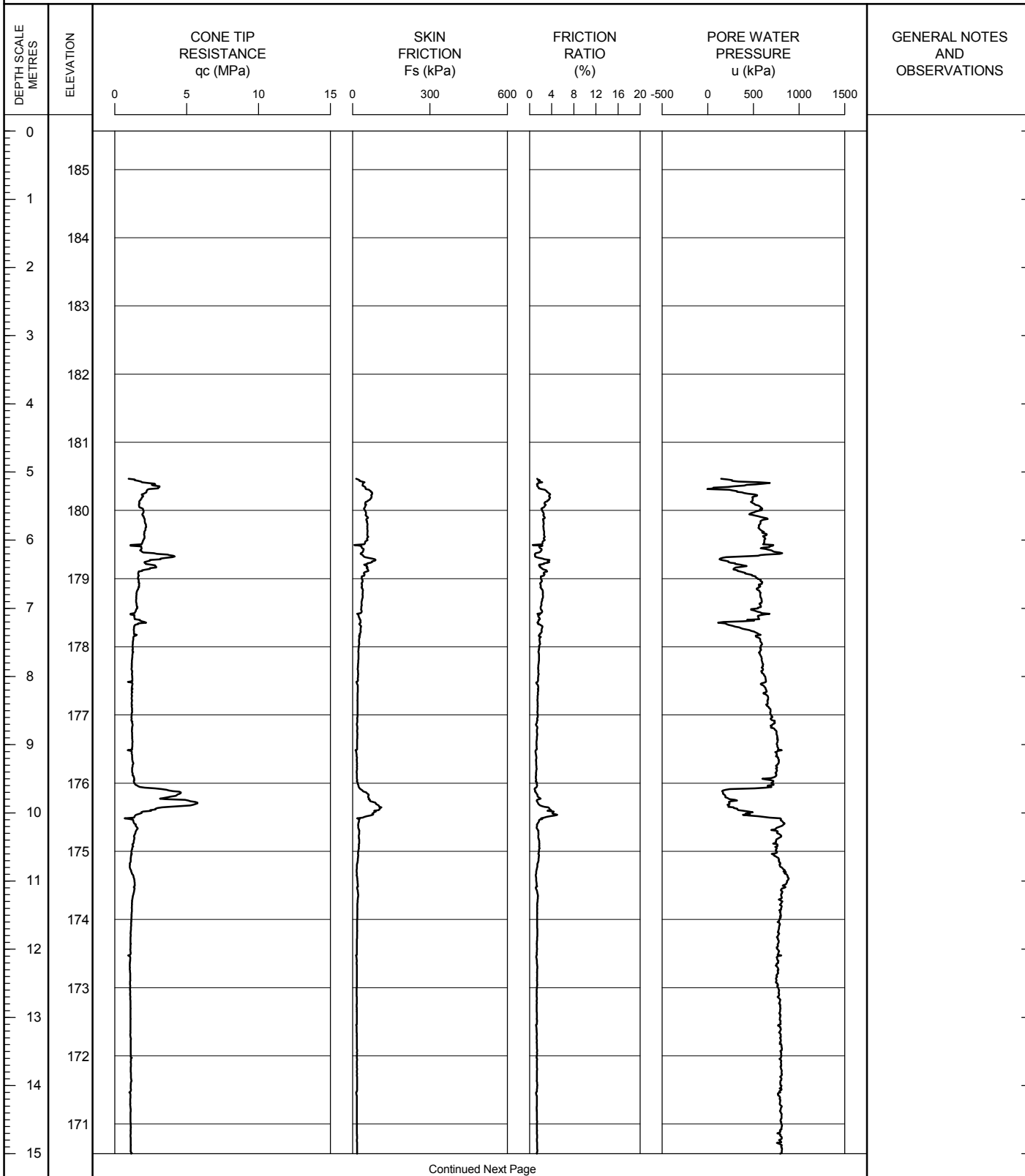
TEST DATE 5/31/2011 - 5/31/2011

SHEET 1 OF 2

LOCATION N4678274.2; E334574.0

DATUM Geodetic

GROUND SURFACE ELEVATION: 185.6 PREDRILL DEPTH: 5.04 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



Continued Next Page

OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 48-RW

METRIC

PROJECT Windsor-Essex Parkway

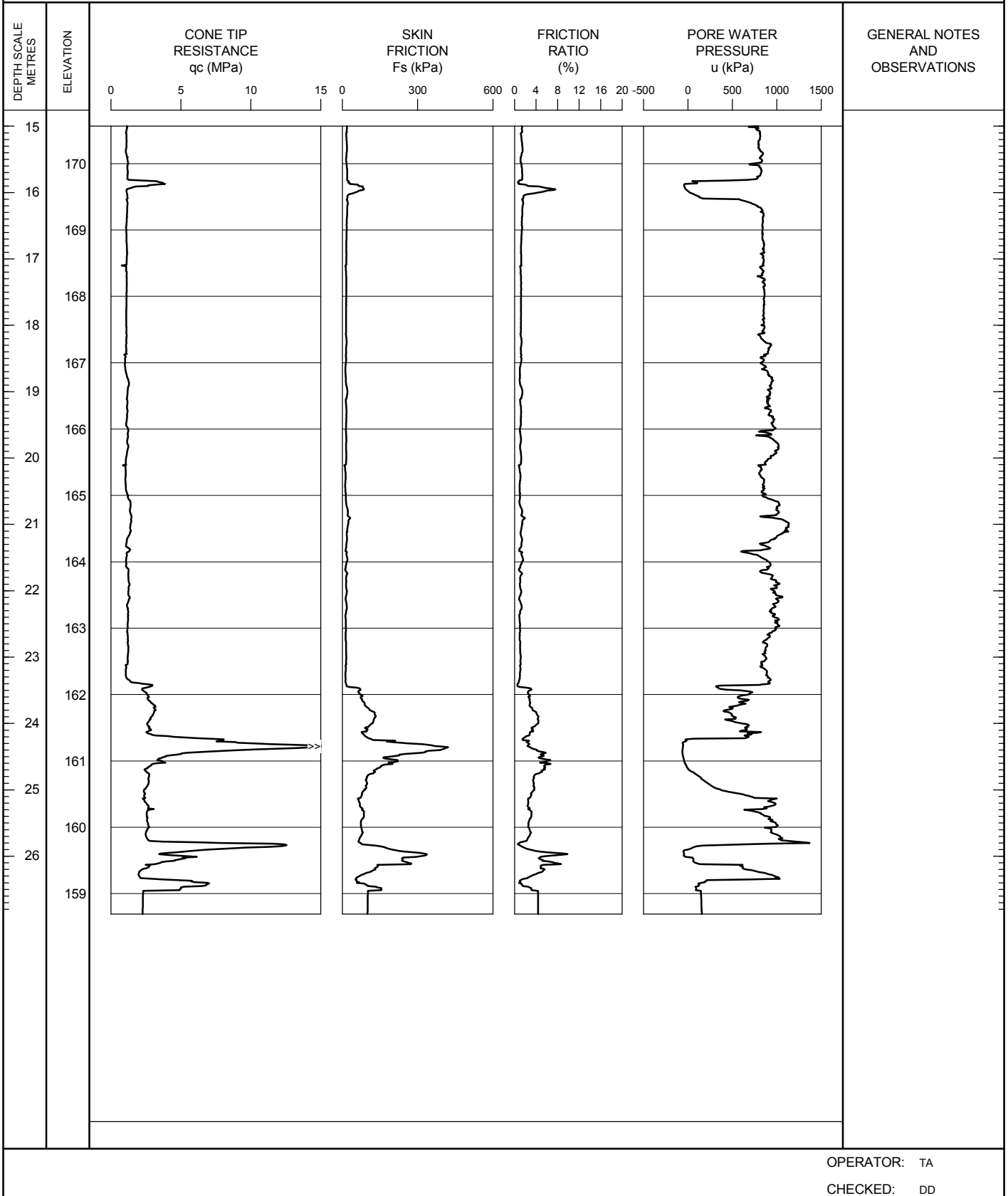
TEST DATE 5/31/2011 - 5/31/2011

SHEET 2 OF 2

LOCATION N4678274.2; E334574.0

DATUM Geodetic

GROUND SURFACE ELEVATION: 185.6 PREDRILL DEPTH: 5.04 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



RECORD OF CONE PENETRATION TEST CPT 49-RW

METRIC

PROJECT Windsor-Essex Parkway

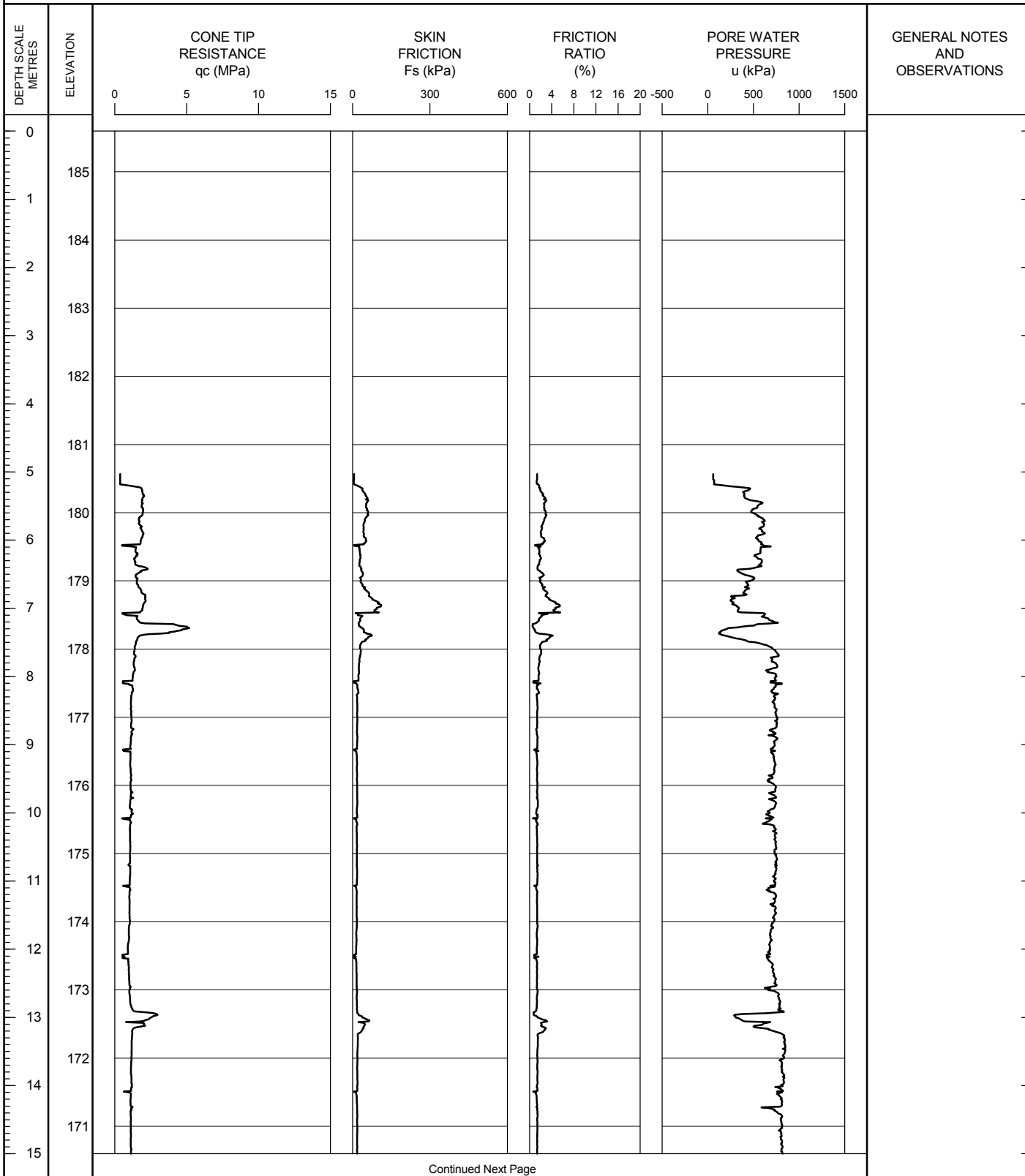
TEST DATE 5/30/2011 - 5/30/2011

SHEET 1 OF 2

LOCATION N4678107.8; E334725.3

DATUM Geodetic

GROUND SURFACE ELEVATION: 185.6 PREDRILL DEPTH: 5 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



WEP CPT LOG CPT-RW/GPJ ONTARIO MOT GDT 06/01/12

OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 49-RW

METRIC

PROJECT Windsor-Essex Parkway

TEST DATE 5/30/2011 - 5/30/2011

SHEET 2 OF 2

LOCATION N4678107.8; E334725.3

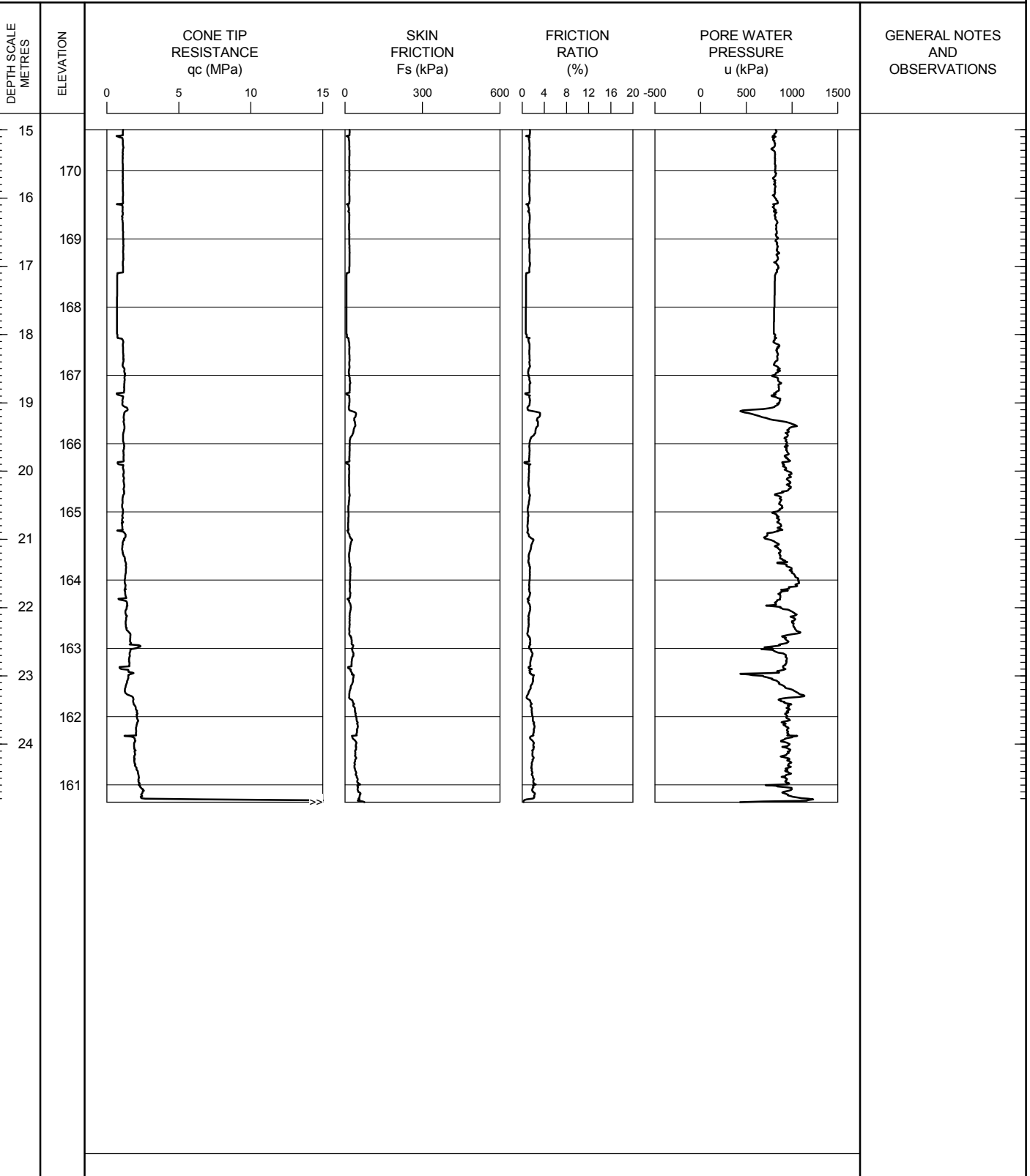
DATUM Geodetic

GROUND SURFACE ELEVATION: 185.6

PREDRILL DEPTH: 5

CORRECTION FACTOR A: 0.8

CORRECTION FACTOR B: 0



WEP CPT LOG CPT-RW.GPJ ONTARIO MOT.GDT 06/01/12

OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 50-RW

METRIC

PROJECT Windsor-Essex Parkway

TEST DATE 5/27/2011 - 5/27/2011

SHEET 1 OF 2

LOCATION N4678085.0; E334889.4

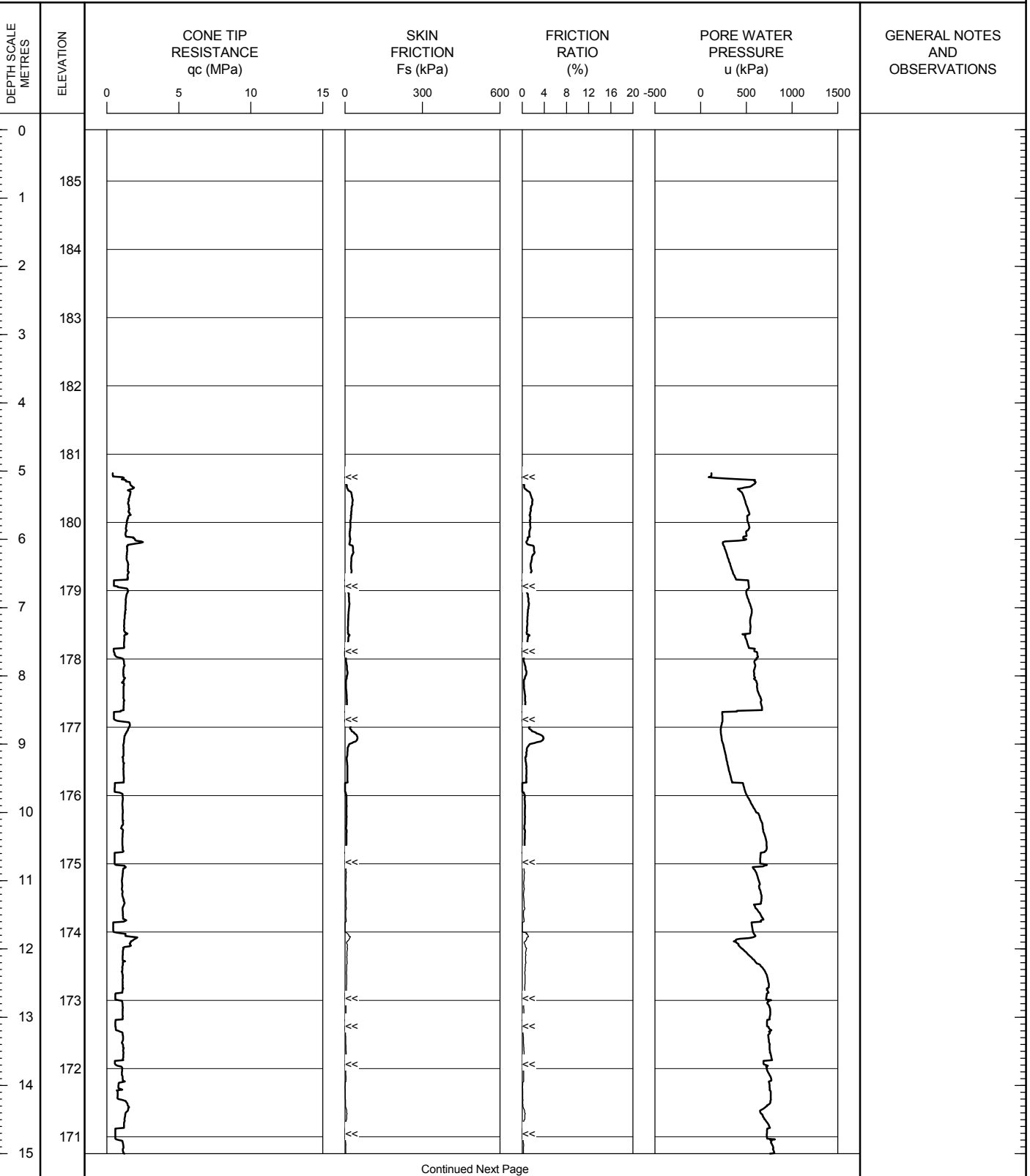
DATUM Geodetic

GROUND SURFACE ELEVATION: 185.8

PREDRILL DEPTH: 5

CORRECTION FACTOR A: 0.8

CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 50-RW

METRIC

PROJECT Windsor-Essex Parkway

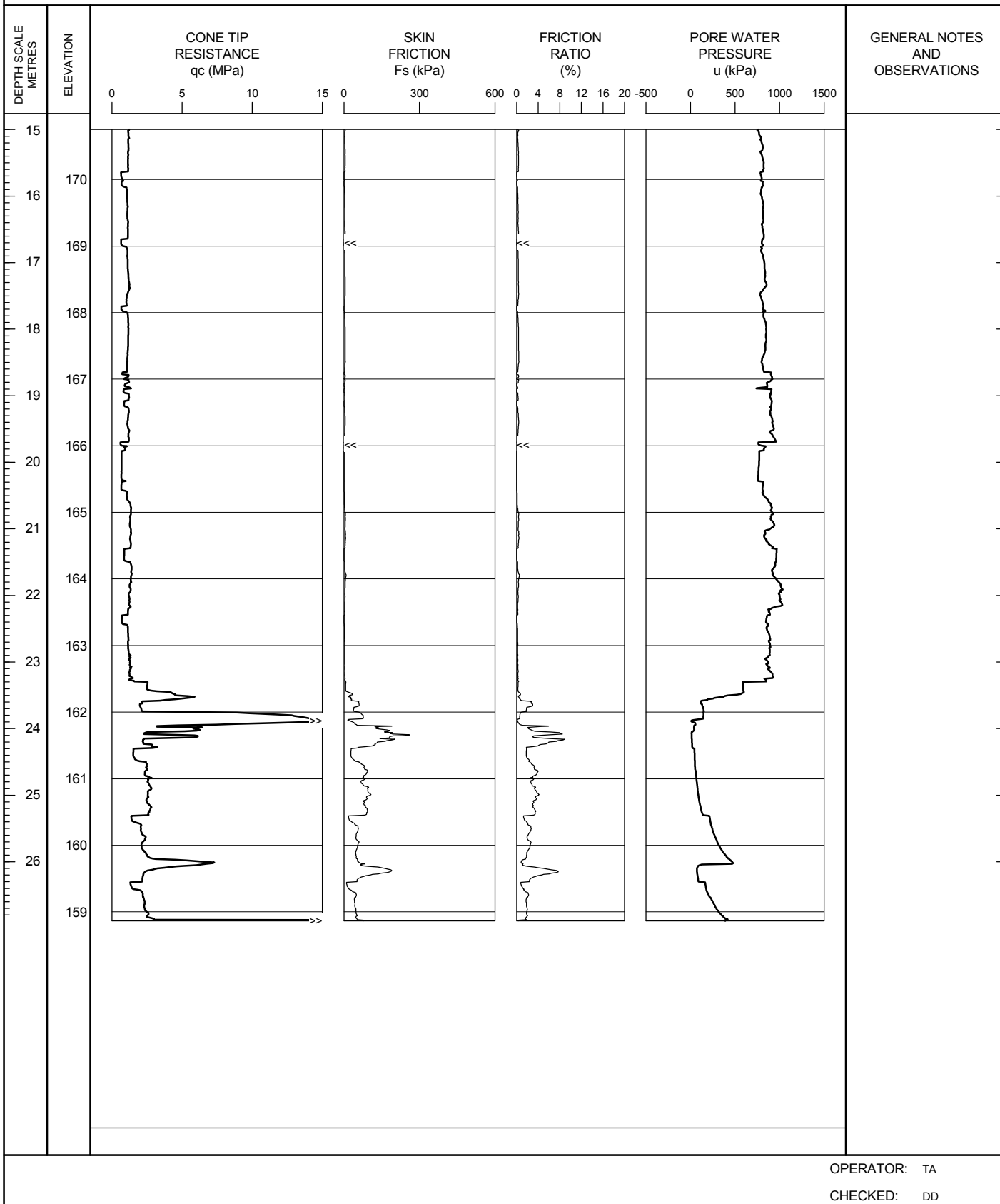
TEST DATE 5/27/2011 - 5/27/2011

SHEET 2 OF 2

LOCATION N4678085.0; E334889.4

DATUM Geodetic

GROUND SURFACE ELEVATION: 185.8 PREDRILL DEPTH: 5 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



WEP CPT LOG CPT-RW.GPJ ONTARIO MOT.GDT 06/01/12

OPERATOR: TA

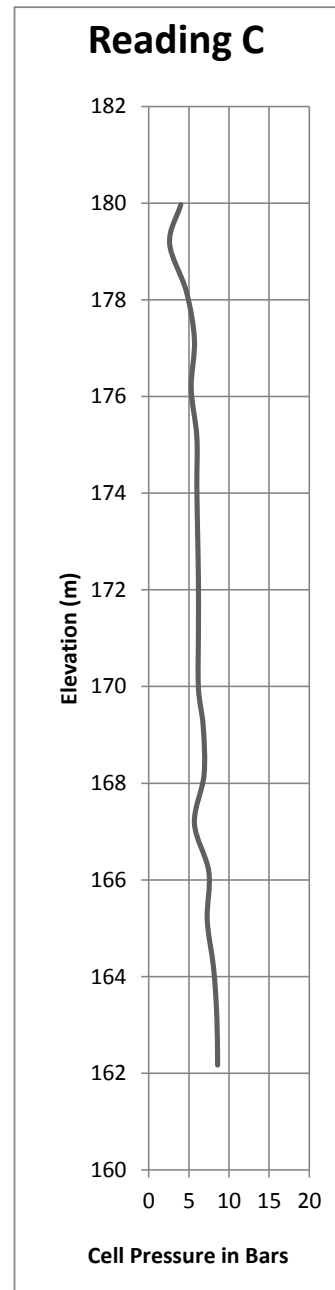
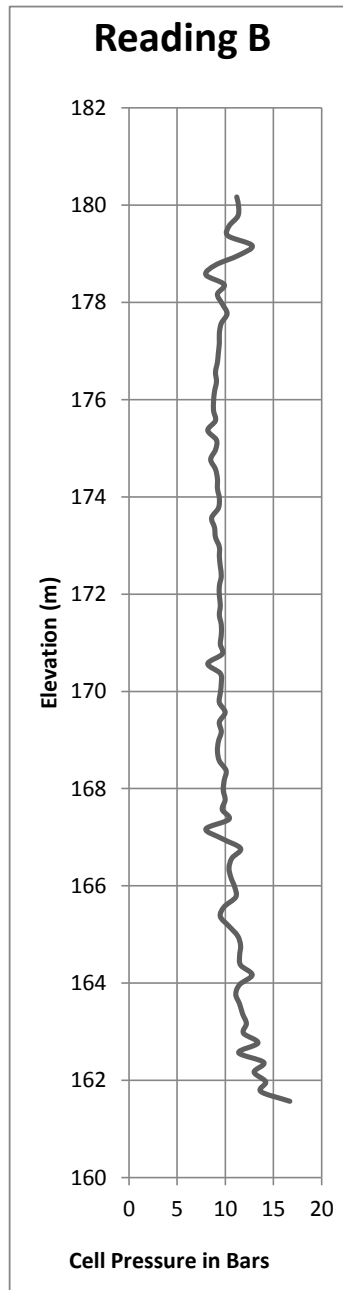
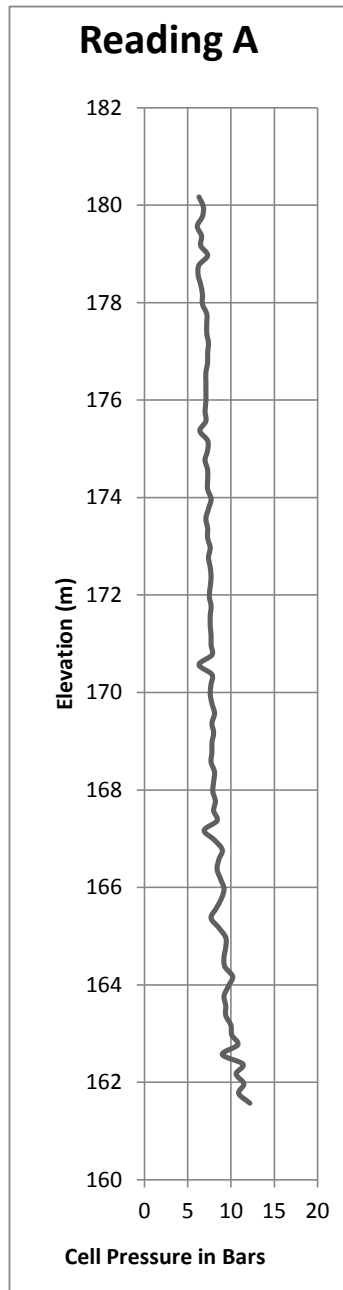
CHECKED: DD

RECORD OF DILATOMETER TEST DMT B11-1

Project : Windsor-Essex Parkway
Location: N 4678223.6; E 334579.2
Ground Surface Elevation : 185.2

Test Date: 4/29/2011
Predrill Depth : 5 m
Delta A: 0.18 Bar

Sheet 1 of 1
Datum Geodetic
Delta B: 0.33 Bar



Operator: LC
Checked: DD

Station 13+400L to Station 10+100T (Soil Profile #15)

RECORD OF BOREHOLE No T11-1

3 OF 3


METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677834.8, E335063.3 ORIGINATED BY SD
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jun 4, 11 - Jun 5, 11 CHECKED BY MSO

| 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 | | | | | | | | | WATER CONTENT (%) | | | |
| | | | | | | | | ○ UNCONFINED | + | FIELD VANE | | | | | | | | | | |
| | | | | | | | | ● POCKET PEN. | × | LAB VANE | | | | | | | | | | |
| | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | | | |
| 29.9 | LIMESTONE Coarse to fine grained, laminated Grey to Brown (<i>continued</i>) clay seam at about elevation 155.27m | | 24 | RC | | | | | | | | | | | | | SCR = 100% | | | |
| | | | | | | | | | | | | | | | | | | | | |
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| 154.1 | END OF BOREHOLE Borehole dry during drilling between June 4 and 5, 2011 | | 25 | RC | | | | | | | | | | | | | RQD = 78% TCR = 97% SCR = 85% | | | |
| 32.0 | | | | | | | | | | | | | | | | | | | | |
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ONTARIO MOT TUNNEL T11 BOREHOLES-MODIFIED.GPJ ONTARIO MOT.GDT 01/05/12

METRIC

| 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 | | |  | W _p | W | W _L | | |
| | | | | | | | | SHEAR STRENGTH kPa | WATER CONTENT (%) | | | | |
| 186.0 | Ground Surface | | | | | | ○ UNCONFINED + FIELD VANE ● POCKET PEN. × LAB VANE | <div style="text-align: center;"> 20 40 60 80 100 </div> | <div style="text-align: center;"> 10 20 30 45.3 </div> | | | | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | 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 | | | | | | | | WATER CONTENT (%) | | | |
| | | | | | | | ○ UNCONFINED | + FIELD VANE | | | | | | | | | | |
| | | | | | | | ● POCKET PEN. | × LAB VANE | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 186.0 | Ground Surface | | | | | | | | | | | | | | | | | |
| 0.0 | 175 mm TOPSOIL | | 1 | TP | | | | | | | | | | | | | | |
| 0.2 | Black organic sandy clay | | 2 | TP | | | | | | | | | | | | | | |
| | SANDY SILT | | | | | | | | | | | | | | | | | |
| | With silty clay layers, trace rootlets | | | | | | | | | | | | | | | | | |
| | Loose | | 1 | SS | 7 | | | | | | | | | | | | | |
| | Mottled brown and grey | | | | | | | | | | | | | | | | | |
| 184.4 | | | | | | | | | | | | | | | | | | |
| 1.5 | SANDY SILT | | 2 | SS | 21 | | | | | | | | | | | | | |
| | With silty clay layers, trace rootlets | | | | | | | | | | | | | | | | | |
| | Compact | | | | | | | | | | | | | | | | | |
| | Brown | | 3 | SS | 29 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | oxidized fissures at about elevation 183.06 m | | 4 | SS | 23 | | | | | | | | | | | | | |
| 182.2 | | | | | | | | | | | | | | | | | | |
| 3.8 | SANDY SILT | | 5 | SS | 13 | | | | | | | | | | | | | |
| | With silty clay layers, trace rootlets | | | | | | | | | | | | | | | | | |
| | Compact | | | | | | | | | | | | | | | | | |
| | Grey | | | | | | | | | | | | | | | | | |
| | horizontal silt fissure at about elevation 181.39 m | | 6 | SS | 8 | | | | | | | | | | | | | |
| 181.1 | | | | | | | | | | | | | | | | | | |
| 4.9 | CLAYEY SILT | | | | | | | | | | | | | | | | | |
| | Some sand, trace gravel | | | | | | | | | | | | | | | | | |
| | Stiff | | 7 | SS | 3 | | | | | | | | | | | | | |
| | Grey | | | | | | | | | | | | | | | | | |
| | | | 8 | TW | PH | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | HV | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 9A,9B | TW | PH | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | HV | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | Numerous Sand Layers At Elevation 176.51m | | 10 | TW | PH | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | HV | | | | | | | | | | | | | | |
| 175.6 | | | | | | | | | | | | | | | | | | |
| 10.4 | SILTY CLAY TO CLAYEY SILT | | | | | | | | | | | | | | | | | |
| | Some sand, trace gravel | | | | | | | | | | | | | | | | | |
| | Stiff | | 11 | TW | PH | | | | | | | | | | | | | |
| | Grey | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | HV | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 12 | TW | PH | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | HV | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | trace pink clay nodules at about elevation 173.31 m | | 13 | TW | PH | | | | | | | | | | | | | |
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| | | | | HV | | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○^{3%} STRAIN AT FAILURE

ONTARIO MOT TUNNEL T11 BOREHOLES-MODIFIED.GPJ ONTARIO MOT GDT 01/05/12

METRIC

ONTARIO MOT TUNNEL T11 BOREHOLES-MODIFIED.GPJ ONTARIO MOT GDT 01/05/12

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

RECORD OF BOREHOLE No T11-2

3 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677869.1, E335106.5 ORIGINATED BY TP
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Apr 29, 11 - May 6, 11 CHECKED BY MSO

| 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 | | | | | | | | WATER CONTENT (%) | | | | | | |
| | | | | | | | | ○ UNCONFINED | | + FIELD VANE | | | | | | | | | | | | |
| | | | | | | | | ● POCKET PEN. | | × LAB VANE | | | | | | | | | | | | |
| | | | | | | | 20 40 60 80 100 | | | | | | | | | | | | | | | |
| 29.9 | LIMESTONE Faintly laminated to bedded, fine grained, stylolitic; porous, pitted between elevations 154.23m and 153.86m and elevations 152.74m and 152.33m Light grey (continued) | | 28 | RC | | | | | | | | | | | RQD = 21% TCR = 92% SCR = 31% | | | | | | | |
| | | | 29 | RC | | | | | | | | | | | RQD = 97% TCR = 100% SCR = 97% | | | | | | | |
| | | | 30 | RC | | | | | | | | | | | RQD = 85% TCR = 100% SCR = 87% | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | |
| 152.4 | | | | | | | | | | | | | | | | | | | | | | |
| 33.6 | END OF BOREHOLE No groundwater observed during drilling between April 29 and May 6, 2011 due to wash boring Water level measured in Piezometer T11-2-P8 at elevation 184.49 m on May 16, 2011 Water level measured in Piezometer T11-2-P8 at elevation 184.31 m on May 24, 2011 Water level measured in Piezometer T11-2-P8 at elevation 184.12 m on June 25, 2011 Water level measured in Piezometer T11-2-P8 at elevation 183.87 m on July 10, 2011 Water level measured in Piezometer T11-2-P8 at elevation 183.26 m on July 24, 2011 Water level measured in Piezometer T11-2-P8 at elevation 183.84 m on July 29, 2011 Water level measured in Piezometer T11-2-P8 at elevation 183.43 m on August 6, 2011 Water level measured in Piezometer T11-2-P18 at elevation 183.23 m on May 12, 2011 Water level measured in Piezometer T11-2-P18 at elevation 183.35 m on May 16, 2011 Water level measured in Piezometer T11-2-P18 at elevation 184.12 m on May 24, 2011 Water level measured in Piezometer T11-2-P18 at elevation 182.94 m on June 25, 2011 Water level measured in Piezometer T11-2-P18 at elevation 182.76 m on July 10, 2011 Water level measured in Piezometer T11-2-P18 at elevation 182.4 m on July 24, 2011 Water level measured in Piezometer T11-2-P18 at elevation 182.64 m on July 29, 2011 Water level measured in Piezometer T11-2-P18 at elevation 182.40 m on August 6, 2011 | | | | | | 152 | | | | | | | | | | | | | | | |
| | | | | | | | 151 | | | | | | | | | | | | | | | |
| | | | | | | | 150 | | | | | | | | | | | | | | | |
| | | | | | | | 149 | | | | | | | | | | | | | | | |
| | | | | | | | 148 | | | | | | | | | | | | | | | |
| | | | | | | | 147 | | | | | | | | | | | | | | | |
| | | | | | | | 146 | | | | | | | | | | | | | | | |
| | | | | | | | 145 | | | | | | | | | | | | | | | |
| | | | | | | | 144 | | | | | | | | | | | | | | | |
| | | | | | | | 143 | | | | | | | | | | | | | | | |
| | | | | | | | 142 | | | | | | | | | | | | | | | |

ONTARIO MOT TUNNEL T11 BOREHOLES-MODIFIED.GPJ ONTARIO MOT.GDT 01/05/12

METRIC

Continued Next Page

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

RECORD OF BOREHOLE No T11-2A

2 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677868.8, E335104.6 ORIGINATED BY NB
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Apr 29, 11 - May 6, 11 CHECKED BY MSO

| 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 | 20 40 60 80 100 | 20 40 60 80 100 | W _p | W | | |
| | Borehole drilled without sampling (continued) | | | | | | | | | | | | |
| 170 | | | | | | | | | | | | | |
| 169 | | | | | | | | | | | | | |
| 168 | | | | | | | | | | | | | |
| 167 | | | | | | | | | | | | | |
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| 164 | | | | | | | | | | | | | |
| 163 | | | | | | | | | | | | | |
| 162 | | | | | | | | | | | | | |
| 161 | | | | | | | | | | | | | |
| 160 | | | | | | | | | | | | | |
| 159 | | | | | | | | | | | | | |
| 158 | | | | | | | | | | | | | |
| 157 | | | | | | | | | | | | | |

Continued Next Page

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

ONTARIO MOT TUNNEL T11 BOREHOLES-MODIFIED.GPJ ONTARIO MOT.GDT 01/05/12

RECORD OF BOREHOLE No T11-2A

3 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677868.8, E335104.6 ORIGINATED BY NB
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Apr 29, 11 - May 6, 11 CHECKED BY MSO

| 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 (%) | | | | | | |
|---------------|--|------------|---------|------|------------|----------------------------|-----------------|---|----|----|----|-----|-------------------------------|---|------------------------------|---|---|----|--|----|----|----|----|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | WATER CONTENT (%) | | | GR | SA | SI | CL |
| | | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | 20 | 40 | 60 | | | | |
| 155.5 | Borehole drilled without sampling (continued) | | | | | | | | | | | | | | | | | | | | | | |
| 30.5 | END OF BOREHOLE | | | | | | | | | | | | | | | | | | VWP T11-2-P30 installed at elevavtion 155.48m | | | | |
| | Water level measured in Piezometer T11-2-P30 at elevation 177.19 m on May 12, 2011 | | | | | | | 155 | | | | | | | | | | | | | | | |
| | Water level measured in Piezometer T11-2-P30 at elevation 177.24 m on May 16, 2011 | | | | | | | | | | | | | | | | | | | | | | |
| | Water level measured in Piezometer T11-2-P30 at elevation 177.01 m on May 24, 2011 | | | | | | | 154 | | | | | | | | | | | | | | | |
| | Water level measured in Piezometer T11-2-P30 at elevation 176.44 m on June 25, 2011 | | | | | | | | | | | | | | | | | | | | | | |
| | Water level measured in Piezometer T11-2-P30 at elevation 176.55 m on July 10, 2011 | | | | | | | 153 | | | | | | | | | | | | | | | |
| | Water level measured in Piezometer T11-2-P30 at elevation 175.61 m on July 24, 2011 | | | | | | | | | | | | | | | | | | | | | | |
| | Water level measured in Piezometer T11-2-P30 at elevation 176.08 m on July 29, 2011 | | | | | | | 152 | | | | | | | | | | | | | | | |
| | Water level measured in Piezometer T11-2-P30 at elevation 176.08 m on August 6, 2011 | | | | | | | 151 | | | | | | | | | | | | | | | |
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ONTARIO MOT TUNNEL T11 BOREHOLES-MODIFIED.GPJ ONTARIO MOT.GDT 01/05/12

METRIC

ONTARIO MOT TUNNEL T11 BOREHOLES-MODIFIED.GPJ ONTARIO MOT.GDT 01/05/12

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

RECORD OF BOREHOLE No T11-3

2 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677952.8, E334928.6 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Apr 19, 11 - Apr 21, 11 CHECKED BY MSO

| 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 | | | | | | | WATER CONTENT (%) |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | | | | | | |
| | | | | | | | | ● POCKET PEN. | × LAB VANE | | | | | | |
| 170.5 | | | | | | | | | | | | | | | |
| 15.2 | CLAYEY SILT Some sand, trace gravel Stiff Grey Occasional Sand Layers Between Elevations 168.73m and 165.68m | | 14 | TW | PH | | 170 | | | | | | | Oedometer 1 26 42 31 | |
| | | | 15 | TW | PH | | 169 | | | | | | | | |
| | | | 16 | TW | PH | | 168 | | | | | | | 2 26 36 35 | |
| | | | 17 | TW | PH | | 167 | | | | | | | | |
| | | | 18 | TW | PH | | 166 | | | | | | | T11-3-SM25 installed at N4677953.6, E334927.3 at elevation 167.17m | |
| | | | 19 | TW | PH | | 165 | | | | | | | | |
| | | | 20 | TW | PH | | 164 | | | | | | | continued by wash boring with casing below elevation 164.44m | |
| | | | 21 | TW | PH | | 163 | | | | | | | | |
| | | | 22 | TW | PH | | 162 | | | | | | | | |
| | | | 23 | TW | PH | | 161 | | | | | | | 4 18 47 29 | |
| | | | 24 | SS | 34 | | 160 | | | | | | | unable to push shelby tube at elevation 161.39m | |
| 159.6 | | | | 25AB | SS | 88 | | 159 | | | | | | | |
| 26.2 | SANDY SILT Dense Grey CLAYEY SILT Some sand, trace gravel Very Stiff Grey | | | | | | 158 | | | | | | | | |
| 159.1 | | | | | | | 157 | | | | | | | | |
| 26.7 | | | 26 | SS | 19 | | 156 | | | | | | | | |
| | | | 27 | SS | 16 | | | | | | | | | | |

Continued Next Page

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

ONTARIO MOT TUNNEL T11 BOREHOLES-MODIFIED.GPJ ONTARIO MOT.GDT 01/05/12

METRIC

| SOIL PROFILE | | | | SAMPLES | |
|---------------|--|------------|--------|---------|------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES |
| 154.3 31.5 | CLAYEY SILT Some sand, trace gravel Very Stiff Grey (<i>continued</i>) trace pink nodules, possible sand, seams, trace shale fragments at about elevation 155.30 m | [Pattern] | 28 | TW | PH |
| 153.2 32.6 | LIMESTONE Fine grained, stylolitic, dark grey inclusions, vuggy between elevations 153.68 m and 153.37 m, faintly porous, laminated, fractured Light grey | [Pattern] | 29 | NQ | |
| 152.2 33.6 | LIMESTONE Fine grained, porous, fractured Light brown | [Pattern] | 30 | NQ | |
| 151.5 34.3 | LIMESTONE Fine grained, highly laminated, thick sandstone seam between elevations 152.19 m to 152.15 m Light brown | [Pattern] | 31 | NQ | |
| | LIMESTONE Fine grained, porous, vuggy with calcite crystals between elevations 149.05 m and 148.75 m, fossiliferous, stylolitic Brown | [Pattern] | 32 | NQ | |
| | | [Pattern] | 33 | NQ | |
| 148.3 37.5 | END OF BOREHOLE No groundwater observed during drilling between April 19 and 21, 2011 due to wash boring | | | | |

ONTARIO MOT TUNNEL T11 BOREHOLES-MODIFIED.GPJ ONTARIO MOT.GDT 01/05/12

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

METRIC

VWP T11-3-P8
installed at
elevation
178.36m

2 OF 2

METRIC

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC NATURAL LIQUID LIMIT MOISTURE 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 | | WATER CONTENT (%) | | | | |
| | | | | | | | | 20 40 60 80 100 | POCKET PEN. X LAB VANE | W _p W W _L | | | | |
| | Borehole drilled without sampling (continued) | | | | | | 170 | | | | | | | |
| | | | | | | | 169 | | | | | | | |
| 167.7 | | | | | | | 168 | | | | | | | |
| 18.3 | END OF BOREHOLE | | | | | | | | | | | | | VWP T11-3-P18 installed at elevation 167.69m |
| | Water level measured in shallow piezometer at elevation 184.16 m on May 12, 2011 | | | | | | 167 | | | | | | | |
| | Water level measured in Piezometer VWP T11-3-P8 at elevation 184.47 m on May 16, 2011 | | | | | | 166 | | | | | | | |
| | Water level measured in Piezometer VWP T11-3-P8 at elevation 184.10 m on May 24, 2011 | | | | | | 165 | | | | | | | |
| | Water level measured in Piezometer VWP T11-3-P8 at elevation 184.18 m on June 4, 2011 | | | | | | 164 | | | | | | | |
| | Water level measured in Piezometer VWP T11-3-P8 at elevation 184.21 m on June 25, 2011 | | | | | | 163 | | | | | | | |
| | Water level measured in Piezometer VWP T11-3-P8 at elevation 184.06 m on July 10, 2011 | | | | | | 162 | | | | | | | |
| | Water level measured in Piezometer VWP T11-3-P8 at elevation 183.98 m on July 24, 2011 | | | | | | 161 | | | | | | | |
| | Water level measured in Piezometer VWP T11-3-P8 at elevation 184.12 m on August 6, 2011 | | | | | | 160 | | | | | | | |
| | Water level measured in Piezometer VWP T11-3-P18 at elevation 183.79 m on May 12, 2011 | | | | | | 159 | | | | | | | |
| | Water level measured in Piezometer VWP T11-3-P18 at elevation 184.04 m on May 16, 2011 | | | | | | 158 | | | | | | | |
| | Water level measured in Piezometer VWP T11-3-P18 at elevation 183.63 m on May 24, 2011 | | | | | | 157 | | | | | | | |
| | Water level measured in Piezometer VWP T11-3-P18 at elevation 183.73 m on June 4, 2011 | | | | | | | | | | | | | |
| | Water level measured in Piezometer VWP T11-3-P18 at elevation 183.71 m on June 25, 2011 | | | | | | | | | | | | | |
| | Water level measured in Piezometer VWP T11-3-P18 at elevation 183.55 m on July 10, 2011 | | | | | | | | | | | | | |
| | Water level measured in Piezometer VWP T11-3-P18 at elevation 183.44 m on July 24, 2011 | | | | | | | | | | | | | |
| | Water level measured in Piezometer VWP T11-3-P18 at elevation 183.51 m on August 6, 2011 | | | | | | | | | | | | | |

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

RECORD OF BOREHOLE No NIL T11-1

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677879.7, E335010.1 ORIGINATED BY NB
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 7, 11 - May 7, 11 CHECKED BY MSO

| 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 | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| 185.8 | Ground Surface | | | | | | | | | | | | | | | | | | |
| 0.0 | SILTY CLAY TO CLAYEY SILT Some sand, trace gravel Stiff Mottled brown and grey | | 1 | SS | 8 | | | | | | | | | | | ground surface in vicinity of borehole stripped of topsoil | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | 2 | SS | 8 | | | | | | | | | | | | | | |
| | trace organic matters (rootlets) at about elevation 184.07 m | | | | | | | | | | | | | | | | | | |
| 183.5 | | | | | | | | | | | | | | | | | | | |
| 2.3 | SILTY CLAY TO CLAYEY SILT Some sand, trace gravel Hard Brown | | 3 | SS | 35 | | | | | | | | | | | | | | |
| 182.6 | | | | | | | | | | | | | | | | | | | |
| 3.2 | SILTY CLAY TO CLAYEY SILT Some sand, trace gravel Hard to stiff Grey prominent oxidized vertical and horizontal fissures at elevation 182.25 m | | 4 | SS | 34 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | 5 | SS | 19 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| 180.7 | | | 6 | SS | 11 | | | | | | | | | | | | | | |
| 5.0 | END OF BOREHOLE Continued with Nilcon Vane Borehole dry during drilling on May 7, 2011 | | | | | | | | | | | | | | | | | | |
| | | | | | | | 180 | | | | | | | | | | | | |
| | | | | | | | 179 | | | | | | | | | | | | |
| | | | | | | | 178 | | | | | | | | | | | | |
| | | | | | | | 177 | | | | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | | | | |
| | | | | | | | 175 | | | | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | | | | |
| | | | | | | | 171 | | | | | | | | | | | | |

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

ONTARIO MOT TUNNEL T11 BOREHOLES-MODIFIED.GPJ ONTARIO MOT.GDT 01/05/12

RECORD OF BOREHOLE No NIL T11-2

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677870, E335107 ORIGINATED BY NB
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 5, 11 - May 5, 11 CHECKED BY MSO

| 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 (%) |
|---------------|--|------------|---------|------|------------|----------------------------|-----------------|---|----|----|----|-----|------------------------------------|-------------------------------------|-----------------------------------|---|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | |
| 186.0 | Ground Surface | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | |
| 0.0 | TOPSOIL Organic clay Black | | | | | | | | | | | | | | | | |
| 0.2 | SANDY SILT Some clay, trace gravel Loose to compact Mottled brown and grey | | 1 | SS | 7 | | 185 | | | | | | | | | | |
| | vertical fissures with rootlets at about elevation 184.25 m | | 2 | SS | 21 | | 184 | | | | | | | | | | |
| 183.7 | SANDY SILT Some clay, trace gravel Dense Brown | | 3 | SS | 32 | | 183 | | | | | | | | | | |
| 182.9 | SANDY SILT Some clay, trace gravel Dense to compact Grey | | 4 | SS | 31 | | 182 | | | | | | | | | | |
| | | | 5 | SS | 16 | | | | | | | | | | | | |
| | | | 6 | SS | 12 | | 181 | | | | | | | | | | |
| 180.9 | END OF BOREHOLE Continued with Nilcon Vane Borehole dry during drilling on May 5, 2011 | | | | | | 180 | | | | | | | | | | |
| 5.0 | | | | | | | 179 | | | | | | | | | | |
| | | | | | | | 178 | | | | | | | | | | |
| | | | | | | | 177 | | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | | |
| | | | | | | | 175 | | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | | |

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

ONTARIO MOT TUNNEL T11 BOREHOLES-MODIFIED.GPJ ONTARIO MOT.GDT 01/05/12

RECORD OF BOREHOLE No TB 8-1

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678014.8, E335059.2 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 75 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 13, 11 - Jul 13, 11 CHECKED BY MSO

| 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 | | | | | | | | WATER CONTENT (%) |
| | | | | | | | | ○ UNCONFINED ● POCKET PEN. | + FIELD VANE × LAB VANE | | | | | | | |
| 186.2 | Ground Surface | | | | | | | | | | | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | |
| 0.2 | SILTY CLAY TO CLAYEY SILT Some sand, trace gravel Firm Mottled brown and grey | | 1 | SS | 7 | | | | | | | | | | | |
| | | | 2 | SS | 6 | | | | | | | | | | | |
| 184.0 | | | | | | | | | | | | | | | | |
| 2.1 | SILTY CLAY TO CLAYEY SILT Some sand, trace gravel Very stiff to hard Brown Trace fissures at about elevations 183.74m | | 3 | SS | 28 | | | | | | | | | | | |
| | | | 4 | SS | 35 | | | | | | | | | | | |
| 182.5 | | | | | | | | | | | | | | | | |
| 3.7 | SILTY CLAY TO CLAYEY SILT Some sand, trace gravel Stiff Grey Trace to some oxidation at about elevation 182.21m Trace oxidation at about elevation 181.68m | | 5 | SS | 16 | | | | | | | | | | | |
| | | | 6 | SS | 8 | | | | | | | | | | | |
| | | | 7 | SS | 9 | | | | | | | | | | | |
| | | | 8 | SS | 7 | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | |
| | | | 9 | SS | 5 | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | |
| | | | 10 | SS | 1 | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | |
| 176.1 | | | | | | | | | | | | | | | | |
| 10.1 | END OF BOREHOLE Borehole dry during drilling on July 13, 2011 | | | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ONTARIO MOT TUNNEL T11 BOREHOLES-MODIFIED.GPJ ONTARIO MOT.GDT 01/05/12

RECORD OF BOREHOLE No TB 8-2

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677983.1, E335030.3 ORIGINATED BY TA
DIST HWY WEP BOREHOLE TYPE CME 75 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
DATUM Geodetic DATE Jul 12, 11 - Jul 12, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL | | |
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| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | WATER CONTENT (%) | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● POCKET PEN. | × LAB VANE | | | | | | | |
| | | | | | | | | 20 | 40 | 60 | 80 | | | | | | 100 | 10 |
| 186.1 | Ground Surface | | | | | | | | | | | | | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | | | |
| 0.2 | Brown SILTY CLAY TO CLAYEY SILT Some sand trace gravel, trace to some topsoil Firm Mottled brown and grey | | 1 | SS | 5 | | | | | | | | ○ | | | | | |
| 184.2 | | | 2A, B | SS | 5 | | | | | | | | ○ | | | | | |
| 1.8 | SILTY CLAY TO CLAYEY SILT Some sand trace gravel Hard Brown Some fissures at about elevation 183.71m | | 3 | SS | 35 | | | | | | | | ○ | | | | | |
| | | | 4 | SS | 38 | | | | | | | | ○ | | | | | |
| 182.4 | | | | | | | | | | | | | ○ | | | | | |
| 3.7 | SILTY CLAY TO CLAYEY SILT Some sand trace gravel Very stiff to stiff Grey Some oxidation at about elevation 181.96m Trace oxidation at about elevation 181.43m | | 5 | SS | 21 | | | | | | | | ○ | | | | | |
| | | | 6 | SS | 14 | | | | | | | | ○ | | | | | |
| | | | 7 | SS | 9 | | | | | | | | ○ | | | | | |
| | | | 8 | SS | 6 | | | | | | | | ○ | | | | | |
| | | | VT | | | | | | | | | | ○ | | | | | |
| | | | 9 | SS | 5 | | | | | | | | ○ | | | | | |
| | | | | | | | | | | | | | ○ | | | | | |
| | | | 10 | SS | 3 | | | | | | | | ○ | | | | | |
| | | | VT | | | | | | | | | | ○ | | | | | |
| 176.0 | END OF BOREHOLE | | | | | | | | | | | | ○ | | | | | |
| 10.1 | Borehole dry during drilling on July 12, 2011 | | | | | | | | | | | | ○ | | | | | |
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ONTARIO MOT TUNNEL T11 BOREHOLES-MODIFIED.GPJ ONTARIO MOT.GDT 01/05/12

RECORD OF BOREHOLE No B12-1

1 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677785.87, E335208.46 ORIGINATED BY NB
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 9, 11 - Jul 10, 11 CHECKED BY MSO

| 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 | | W _P | W | W _L | | WATER CONTENT (%) | GR | SA | SI | CL |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● POCKET PEN. × LAB VANE | | | | | | | | | | |
| 186.3 | Ground Surface | | | | | | | | | | | | | | | | | |
| 0.0 | 200mm ASPHALT | | | | | | | | | | | | | | | | | |
| 0.2 | FILL Sand and Gravel to compact fine sand Moist | | 1 | SS | 16 | | | | | | | | | | | | | |
| | | | 2 | SS | 7 | | | | | | | | | | | | | |
| 184.2 | | | | | | | | | | | | | | | | | | |
| 2.1 | CLAYEY SILT Some sand, trace gravel Stiff to hard Brown and grey Moist | | 3 | SS | 36 | | | | | | | | | | | | | |
| | Occasional sand layers between about elevations 178.4m and 176.8m -Oxidized -Extensive oxidized fissures | | 4 | SS | 41 | | | | | | | | | | | | | |
| | | | 5 | SS | 27 | | | | | | | | | | | | | |
| | | | 6 | SS | 42 | | | | | | | | | | | | | |
| | | | 7 | SS | 18 | | | | | | | | | | | | | |
| | | | 8 | TW | PH | | | | | | | | | | | | | |
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| | | | 9 | TW | PH | | | | | | | | | | | | | |
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| | | | 10 | TW | PH | | | | | | | | | | | | | |
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| | | | 11 | TW | PH | | | | | | | | | | | | | |
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| | | | 12 | TW | PH | | | | | | | | | | | | | |
| | | | | VT | | | | | | | | | | | | | | |
| | | | 13 | TW | PH | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ONTARIO MOT B12 BOREHOLE LOGS - SEP 19, 2011.GPJ ONTARIO MOT.GDT 01/05/12

RECORD OF BOREHOLE No B12-1

2 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677785.87, E335208.46 ORIGINATED BY NB
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 9, 11 - Jul 10, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL | | | |
|---------------|--|------------|---------|------|------------------|----------------------------|-----------------|---|----|----|---|----|-----|---|--|----------------|---|----------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | WATER CONTENT (%) | | | | | | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● POCKET PEN. × LAB VANE | 20 | 40 | 60 | 80 | 100 | | | W _P | W | W _L |
| | CLAYEY SILT Some sand, trace gravel (<i>continued</i>) | | 14 | SS | PH | | | | | | | | | | | | | |
| | | | | | VT | | | | | | | | | | | | | |
| | | | | 15 | TW | PH | | | | | | | | | | | | |
| 169.0 | CLAYEY SILT Some sand trace gravel, trace black Clay/Silt nodules Stiff Grey Moist | | | | | | | | | | | | | | | | | |
| 166.8 | | | 16 | TW | PH | | | | | | | | | | | | | |
| 166.8 | | | | VT | | | | | | | | | | | | | | |
| 19.5 | SILTY CLAY Some sand, trace gravel Stiff to very stiff Grey Moist | | 17 | TW | PH | | | | | | | | | | | | | |
| | | | | 18 | SS | PH | | | | | | | | | | | | |
| | | | | | VT | | | | | | | | | | | | | |
| | | | | 19 | TW | PH | | | | | | | | | | | | |
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| | | | | 20 | TW | PH | | | | | | | | | | | | |
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| | | | | 21 | SS | 27 | | | | | | | | | | | | |
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| 158.9 | SANDY SILT/SILTY SAND Some clay, trace to some gravel Very dense Grey Moist | | 22 | SS | 5,21,50/ 75mm | | | | | | | | | | | | | |
| 157.4 | CLAYEY SILT TO SILTY CLAY Some sand, trace gravel Stiff Grey Moist | | 23 | SS | 11 | | | | | | | | | | | | | |

Continued Next Page

+³, X³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ONTARIO MOT B12 BOREHOLE LOGS - SEP 19, 2011.GPJ ONTARIO MOT.GDT 01/05/12

METRIC

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

RECORD OF BOREHOLE No B12-2

1 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677743.4, E335208.9 ORIGINATED BY BS
 DIST HWY WEP BOREHOLE TYPE CME 850 - 150mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jun 28, 11 - Jun 29, 11 CHECKED BY MSO

| 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 | | | | | | | | WATER CONTENT (%) | | | | |
| 186.4 | Ground Surface | | | | | | | ○ UNCONFINED | + FIELD VANE | ● POCKET PEN. | | | | | | × | LAB VANE | | | |
| 0.0 186.0 | Topsoil | | | | | | | | | | | | | | | | | | | |
| 0.3 | FILL Silty clay, some topsoil Loose to compact Brown Moist | | 1 | SS | 6 | | | | | | | | | | | | | | | |
| | | | 2 | SS | 2 | | | | | | | | | | | | | | | |
| 184.2 | CLAYEY SILT some sand , trace gravel Hard to stiff Brown Moist occasional sand layers at about elevation 178.4m | | 3 | SS | 31 | | | | | | | | | | | | | | | |
| 2.1 | | | 4 | SS | 27 | | | | | | | | | | | | | | | |
| | | | 5 | SS | 14 | | | | | | | | | | | | | | | |
| | | | 6 | SS | 9 | | | | | | | | | | | | | | | |
| | | | 7 | SS | 7 | | | | | | | | | | | | | | | |
| | | | 8 | TW | PH | | | | | | | | | | | | | | | |
| | | | 9 | TW | PH | | | | | | | | | | | | | | | |
| | | | 10 | TW | PH | | | | | | | | | | | | | | | |
| | | | VT | | | | | | | | | | | | | | | | | |
| | | | 11 | TW | PH | | | | | | | | | | | | | | | |
| | | | 12 | TW | PH | | | | | | | | | | | | | | | |
| | | | VT | | | | | | | | | | | | | | | | | |
| | | | 13 | TW | PH | | | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ONTARIO MOT B12 BOREHOLE LOGS - SEP 19, 2011.GPJ ONTARIO MOT.GDT 01/05/12

METRIC

Continued Next Page

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

METRIC

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

RECORD OF BOREHOLE No B12-2A

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677739.1, E335208 ORIGINATED BY BS
 DIST HWY WEP BOREHOLE TYPE CME 850 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jun 28, 11 - Jun 29, 11 CHECKED BY MSO

| SOIL PROFILE | | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | |
|---------------|-----------------------------------|------------|--------|---------|------------|--------------------|----------------------------|-----------------|---|--------------|-------------------|--|--|------------------------------------|-------------------------------------|-----------------------------------|-------------------------|---|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | SHEAR STRENGTH kPa | | | | | WATER CONTENT (%) | | | | | | | | | |
| | | | | | | ○ UNCONFINED | | | ○ POCKET PEN. | + FIELD VANE | × LAB VANE | | | | | | | | | |
| 186.3 | Ground Surface | | | | | | | | | | | | | | | | GR SA SI CL | | | |
| 0.0 | Borehole drilled without sampling | | | | | | | | | | | | | | | | | | | |
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ONTARIO MOT B12 BOREHOLE LOGS - SEP 19, 2011.GPJ ONTARIO MOT.GDT 01/05/12

RECORD OF BOREHOLE No B12-3

1 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677709.64, E335206.52 ORIGINATED BY BS
 DIST HWY WEP BOREHOLE TYPE CME 850 - 150mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jun 27, 11 - Jun 28, 11 CHECKED BY MSO

| 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 | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED ● POCKET PEN. | + FIELD VANE × LAB VANE | | | | | | | | | |
| 186.2 | Ground Surface | | | | | | | | | | | | | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | | | |
| 0.2 | FILL Silty Clay, trace topsoil Loose Brown Moist | | 1 | SS | 6 | | | | | | | | | | | | | |
| | | | 2 | SS | 4 | | | | | | | | | | | | | |
| 183.9 | CLAYEY SILT Some sand, trace gravel Some oxidized fissures Hard to Stiff Brown Moist | | 3 | SS | 31 | | | | | | | | | | | | | |
| 2.3 | | | 4 | SS | 28 | | | | | | | | | | | | | |
| | Occasional sand layers between elevations 178.3m and 172.3m | | 5 | SS | 15 | | | | | | | | | | | | | |
| | | | 6 | SS | 13 | | | | | | | | | | | | | |
| | | | 7 | SS | 8 | | | | | | | | | | | | | |
| | | | 8 | TW | PH | | | | | | | | | | | | | |
| | | | VT | | | | | | | | | | | | | | | |
| | | | 9 | TW | PH | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 10 | TW | PH | | | | | | | | | | | | | |
| | | | VT | | | | | | | | | | | | | | | |
| | | | 11 | SS | PH | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 12 | TW | PH | | | | | | | | | | | | | |
| | | | VT | | | | | | | | | | | | | | | |
| | | | 13 | TW | PH | | | | | | | | | | | | | |
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Continued Next Page

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

ONTARIO MOT B12 BOREHOLE LOGS - SEP 19, 2011.GPJ ONTARIO MOT.GDT 01/05/12

METRIC

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

ONTARIO MOT B12 BOREHOLE LOGS - SEP 19, 2011.GPJ ONTARIO MOT.GDT 01/05/12

RECORD OF BOREHOLE No B12-3

3 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677709.64, E335206.52 ORIGINATED BY BS
 DIST HWY WEP BOREHOLE TYPE CME 850 - 150mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jun 27, 11 - Jun 28, 11 CHECKED BY MSO

| 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 | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | | 10 20 30 | | |
| | | | | | | | | | | | | | | | | | |
| 156.0 | | | | | | | 156 | | | | | | | | RQD = 67% TCR = 100% SCR = 67% | | |
| 30.2 | LIMESTONE Styolitic, pitted, fine grained, fractured | | 24 | RC | | | 155 | | | | | | | | | | |
| 154.2 | | | | | | | 154 | | | | | | | | | | |
| 153.9 | LIMESTONE Grey to light grey | | | | | | | | | | | | | | RQD = 95% TCR = 100% SCR = 98% | | |
| 32.3 | LIMESTONE Styolitic, pitted, fine grained | | 25 | RC | | | | | | | | | | | | | |
| 152.9 | | | | | | | 153 | | | | | | | | | | |
| 33.2 | END OF BOREHOLE No groundwater observed during drilling between June 27 and 28, 2011 due to wash boring | | | | | | | | | | | | | | | | |
| | | | | | | | 152 | | | | | | | | | | |
| | | | | | | | 151 | | | | | | | | | | |
| | | | | | | | 150 | | | | | | | | | | |
| | | | | | | | 149 | | | | | | | | | | |
| | | | | | | | 148 | | | | | | | | | | |
| | | | | | | | 147 | | | | | | | | | | |
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| | | | | | | | 144 | | | | | | | | | | |
| | | | | | | | 143 | | | | | | | | | | |
| | | | | | | | 142 | | | | | | | | | | |

ONTARIO MOT B12 BOREHOLE LOGS - SEP 19, 2011.GPJ ONTARIO MOT.GDT 01/05/12

RECORD OF BOREHOLE No CPT B12-1

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677699.2, E335217.28 ORIGINATED BY TA
DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
DATUM Geodetic DATE May 18, 11 - May 18, 11 CHECKED BY MSO

| 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 | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED ● POCKET PEN. | + FIELD VANE × LAB VANE | | | | | | | | | |
| 186.1 | Ground Surface | | | | | ▽ | 186 | | | | | | | | | | | |
| 0.0 | FILL Crushed limestone, silty sand and gravel Grey | | | | | | 185 | | | | | | | | | | | |
| 185.5 | FILL Poorly graded compact sand Brown Moist | | 1 | SS | 7 | | | | | | | | | | | | | |
| 0.7 | SILTY CLAY TO CLAYEY SILT Some sand, trace gravel Very stiff | | 2 | SS | 16 | | | | | | | | | | | | | |
| 184.3 | SILTY CLAY TO CLAYEY SILT Some sand, trace gravel Very stiff to hard Brown Moist | | 3 | SS | 34 | | | | | | | | | | | | | |
| 1.8 | | | 4 | SS | 35 | | | | | | | | | | | | | |
| | | | 5 | SS | 19 | | 182 | | | | | | | | | | | |
| 181.9 | SILTY CLAY TO CLAYEY SILT Some sand, trace gravel Stiff Grey Moist | | 6 | SS | 11 | | | | | | | | | | | | | |
| 4.3 | | | | | | | | | | | | | | | | | | |
| 181.1 | END OF BOREHOLE Continued with CPT | | | | | | 181 | | | | | | | | | | | |
| 5.0 | Groundwater was encountered at about elevation 185.07m during drilling on May 18, 2011 | | | | | | 180 | | | | | | | | | | | |
| | | | | | | | 179 | | | | | | | | | | | |
| | | | | | | | 178 | | | | | | | | | | | |
| | | | | | | | 177 | | | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | | | |
| | | | | | | | 175 | | | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | | | |

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

RECORD OF BOREHOLE No DMT 6-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677767.57, E335236.78 ORIGINATED BY LC
 DIST HWY WEP BOREHOLE TYPE Track Mounted Drill - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 18, 11 - May 18, 11 CHECKED BY MSO

| 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 | | | | | | | | | | | | |
| | | | | | | | | ○ UNCONFINED | ○ POCKET PEN. | + | × | | | | | | FIELD VANE | LAB VANE | WATER CONTENT (%) | |
| | | | | | | | | 20 40 60 80 100 | 20 40 60 80 100 | 10 20 30 | | | | | | | | | | |
| 186.9 | Ground Surface | | | | | | | | | | | | | | | | | | | |
| 0.0 | Topsoil | | | | | | | | | | | | | | | | | | | |
| 0.2 | FILL Sand Brown | | | | | | | | | | | | | | | | | | | |
| 186.2 | FILL | | | | | | | | | | | | | | | | | | | |
| 0.8 | Silty topsoil, brick pieces, some clay Compact Black | | 1 | SS | 11 | | 186 | | | | | | | | | | | | | |
| 185.4 | Silty topsoil, brick pieces, some clay Compact Black | | | | | | | | | | | | | | | | | | | |
| 1.5 | SILTY CLAY TO CLAYEY SILT Some sand, trace gravel Stiff Mottled brown and grey Moist | | 2 | SS | 8 | | 185 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | 3A,B | SS | 9 | | | | | | | | | | | | | | | |
| 184.0 | SILTY CLAY TO CLAYEY SILT Some sand, trace gravel Very stiff Brown Moist fissured at about elevation 182.90 m | | | | | | 184 | | | | | | | | | | | | | |
| 2.9 | SILTY CLAY TO CLAYEY SILT Some sand, trace gravel Very stiff Brown Moist fissured at about elevation 182.90 m | | 4 | SS | 28 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | 5 | SS | 28 | | 183 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| 182.3 | SILTY CLAY TO CLAYEY SILT Some sand, trace gravel Stiff Grey Moist | | | | | | | | | | | | | | | | | | | |
| 4.6 | SILTY CLAY TO CLAYEY SILT Some sand, trace gravel Stiff Grey Moist | | 6 | SS | 12 | | 182 | | | | | | | | | | | | | |
| 181.9 | SILTY CLAY TO CLAYEY SILT Some sand, trace gravel Stiff Grey Moist | | | | | | | | | | | | | | | | | | | |
| 5.0 | END OF BOREHOLE Continued with DMT | | | | | | | | | | | | | | | | | | | |
| | Borehole dry during drilling on May 18, 2011 | | | | | | 181 | | | | | | | | | | | | | |
| | | | | | | | 180 | | | | | | | | | | | | | |
| | | | | | | | 179 | | | | | | | | | | | | | |
| | | | | | | | 178 | | | | | | | | | | | | | |
| | | | | | | | 177 | | | | | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | | | | | |
| | | | | | | | 175 | | | | | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | | | | | |

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

ONTARIO MOT B12 BOREHOLE LOGS - SEP 19, 2011.GPJ ONTARIO MOT.GDT 01/05/12

RECORD OF BOREHOLE No TB 9-1

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677654.25, E335225.5 ORIGINATED BY SM
 DIST HWY WEP BOREHOLE TYPE Track Mounted Drill - 200mm Dia. Continuous Flight Solid Stem Auger COMPILED BY SS
 DATUM Geodetic DATE Jul 6, 11 - Jul 6, 11 CHECKED BY MSO

| 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 | | | | | | | | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● POCKET PEN. × LAB VANE | | | | | | | | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | | | | |
| 185.9 | Ground Surface | | | | | | | | | | | | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | | |
| 185.6 | | | | | | | | | | | | | | | | | |
| 0.3 | SILTY CLAY TO CLAYEY SILT some sand, trace gravel Firm to hard Mottled Brown and grey Moist Sand pockets | | 1 | SS | 6 | | 185 | | | | | | | | | | |
| | | | 2 | SS | 22 | | 184 | | | | | | | | | | |
| | | | 3 | SS | 32 | | 183 | | | | | | | | | | |
| | -oxidized, fractured | | 4 | SS | 27 | | 182 | | | | | | | | | | |
| | | | 5 | SS | 14 | | 181 | | | | | | | | | | |
| | | | 6 | SS | | | 180 | | | | | | | | | | |
| | | | 7 | SS | 8 | | | | | | | | | | | | |
| | -pink nodules | | 8 | SS | 7 | | | | | | | | | | | | |
| 179.4 | END OF BOREHOLE Borehole dry during drilling on June 6, 2011 | | | | | | 179 | | | | | | | | | | |
| 6.6 | | | | | | | 178 | | | | | | | | | | |
| | | | | | | | 177 | | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | | |
| | | | | | | | 175 | | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | | |
| | | | | | | | 171 | | | | | | | | | | |

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

ONTARIO MOT B12 BOREHOLE LOGS - SEP 19, 2011.GPJ ONTARIO MOT.GDT 01/05/12

RECORD OF BOREHOLE No CV2-1

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4677918.502N, 335208.644E ORIGINATED BY DG
 DIST HWY WEP BOREHOLE TYPE Track Mounted Drill - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 25, 11 - May 25, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|---|---------------|--------------|------------|------------------------------------|-------------------------------------|-----------------------------------|-------------------------|---|-------------------|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED | ● POCKET PEN. | + FIELD VANE | × LAB VANE | | | | | | | | |
| 186.2 | Ground Surface | | | | | | | | | | | | | | | | | | |
| 0.0 | TOPSOIL | | 1 | SS | 7 | | 186 | | | | | | | | | | | | |
| 0.2 | 200mm, clayey Dark Brown | | | | | | | | | | | | | | | | | | |
| | CLAYEY SILT | | 2 | SS | 5 | | 185 | | | | | | | | | | | | |
| | Some sand, trace gravel Firm to very stiff Mottled brown and grey | | | | | | | | | | | | | | | | | | |
| | Brown | | 3 | SS | 13 | | 184 | | | | | | | | | | | | |
| | | | 4 | SS | 28 | | 183 | | | | | | | | | | | | |
| | | | 5 | SS | 29 | | 182 | | | | | | | | | | | | |
| 182.5 | CLAYEY SILT | | 6 | SS | 14 | | 181 | | | | | | | | | | | | |
| 3.7 | Trace gravel Stiff Grey | | | | | | 180 | | | | | | | | | | | | |
| 181.7 | CLAYEY SILT | | 7 | SS | 14 | | 179 | | | | | | | | | | | | |
| 4.4 | Some sand, trace gravel Stiff Grey | | 8 | SS | 11 | | 178 | | | | | | | | | | | | |
| | | | 9 | TW | PH | | 177 | | | | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | | | | |
| | | | | VT | | | 175 | | | | | | | | | | | | |
| 178.7 | CLAYEY SILT | | 10 | SS | 11 | | 174 | | | | | | | | | | | | |
| 7.5 | Some sand and gravel Stiff Grey | | | | | | 173 | | | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | | | | |
| 177.3 | CLAYEY SILT | | 11 | TW | PH | | | | | | | | | | | | | | |
| 8.8 | Trace sand, trace gravel Stiff Grey | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| 175.9 | END OF BOREHOLE | | | | | | | | | | | | | | | | | | |
| 10.2 | Borehole open and dry at completion | | | | | | | | | | | | | | | | | | |

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 01/05/12

RECORD OF BOREHOLE No BH16-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677784.4, E335350.8 ORIGINATED BY NB
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 12, 11 - Jul 12, 11 CHECKED BY MSO

| 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 | | | | | | | | | WATER CONTENT (%) | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● POCKET PEN. | × LAB VANE | | | | | | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | | | | 10 20 30 | |
| 187.0 | Fill Surface | | | | | | | | | | | | | | | | | |
| 0.0 | 300mm Topsoil | | | | | | | | | | | | | | | | | |
| 186.7 | FILL | | 1 | SS | 6 | | | | | | | | | | | | | |
| 0.3 | FILL | | | | | | | | | | | | | | | | | |
| | Clayey Silt | | | | | | | | | | | | | | | | | |
| | -Some sand, trace gravel | | 2 | SS | 7 | | | | | | | | | | | | | |
| | Trace organics | | | | | | | | | | | | | | | | | |
| | Brown-Grey | | | | | | | | | | | | | | | | | |
| 185.5 | CLAYEY SILT | | | | | | | | | | | | | | | | | |
| 1.5 | Some sand, trace gravel | | 3 | SS | 11 | | | | | | | | | | | | | |
| | Stiff to hard | | | | | | | | | | | | | | | | | |
| | Brown-Grey | | | | | | | | | | | | | | | | | |
| | Brown | | 4 | SS | 36 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 5 | SS | 43 | | | | | | | | | | | | | |
| | -Oxidized fissures | | | | | | | | | | | | | | | | | |
| | Grey | | 6 | SS | 41 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 7 | SS | 23 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | Trace silt seams | | 8 | SS | 13 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 9 | SS | 14 | | | | | | | | | | | | | |
| 180.4 | END OF BOREHOLE | | | | | | | | | | | | | | | | | |
| 6.6 | Borehole dry on completion | | | | | | | | | | | | | | | | | |
| | | | | | | | 180 | | | | | | | | | | | |
| | | | | | | | 179 | | | | | | | | | | | |
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| | | | | | | | 174 | | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | | | |

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

METRIC

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

RECORD OF BOREHOLE No CPT51-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677746.8, E335290.7 ORIGINATED BY TA
DIST HWY WEP BOREHOLE TYPE CME 850 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
DATUM Geodetic DATE May 17, 11 - May 17, 11 CHECKED BY MSO

| 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 | | | | | | | | | WATER CONTENT (%) | | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● POCKET PEN. | × LAB VANE | | | | | | | | | |
| 186.9 | Ground Surface | | | | | | | | | | | | | | | | | | | |
| 0.0 | <div><div></div><div>FILL 125mm Clayey Topsoil</div></div> | <div></div> | | | | | | | | | | | | | | | | | | |
| 185.7 | <div><div></div><div>FILL Brown Silty Clay, mixed with some topsoil</div></div> | <div></div> | 1 | SS | 8 | | | | | | | | | | | | | | | |
| 1.2 | <div><div></div><div>CLAYEY SILT Some sand, trace gravel Firm to hard Mottled brown-grey</div></div> | <div></div> | 2 | SS | 7 | | | | | | | | | | | | | | | |
| | | <div></div> | 3A,B | SS | 17 | | | | | | | | | | | | | | | |
| | Brown | <div></div> | 4 | SS | 33 | | | | | | | | | | | | | | | |
| | Grey -Oxidized fissures | <div></div> | 5 | SS | 21 | | | | | | | | | | | | | | | |
| 181.9 | | <div></div> | 6 | SS | 11 | | | | | | | | | | | | | | | |
| 5.0 | END OF SAMPLED BOREHOLE (continued with CPT to refusal) | | | | | | | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF NILCON VANE TEST NIL T11-1

Project : Windsor-Essex Parkway

Test Date: 5/7/2011

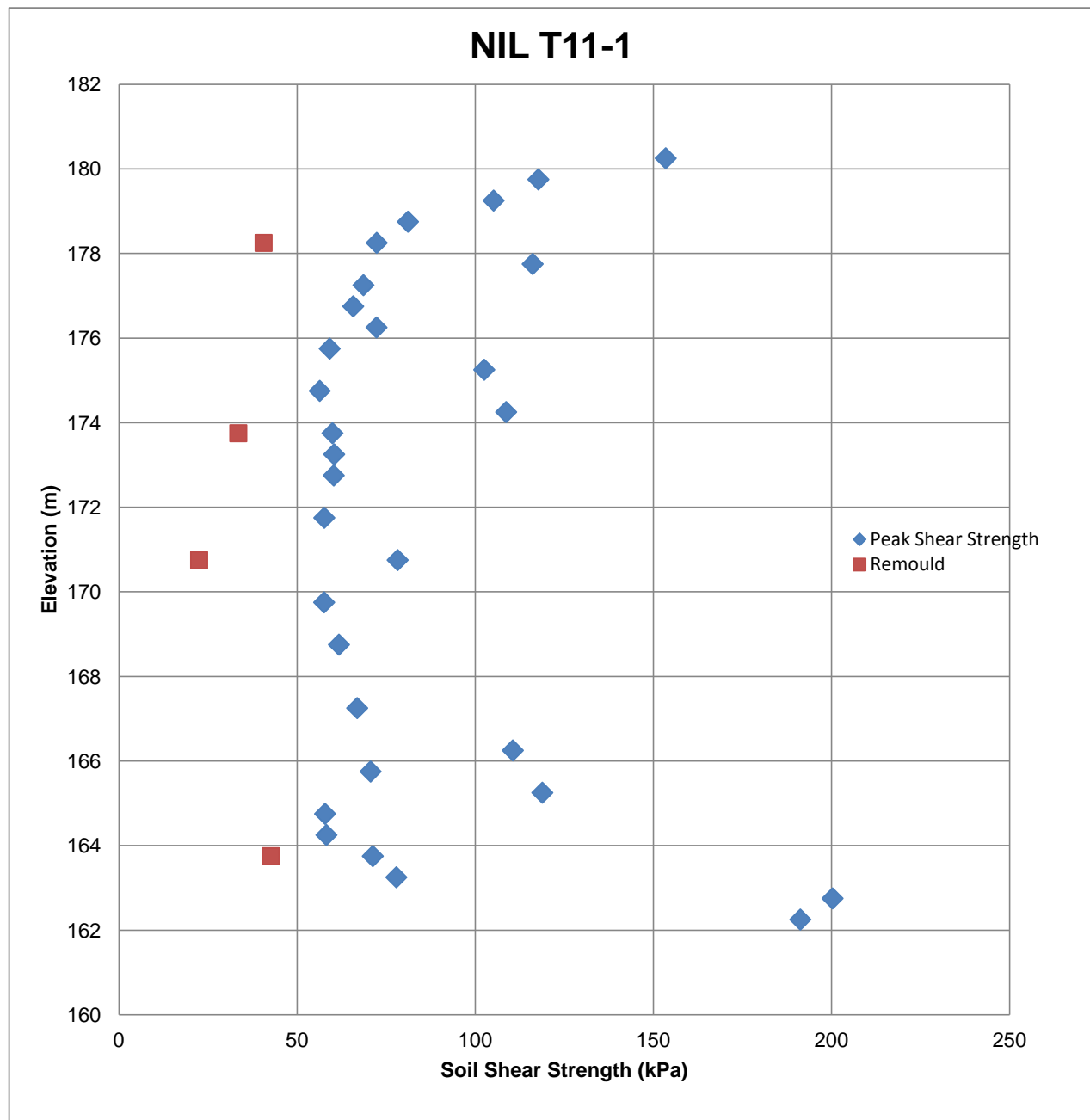
Sheet 1 of 1

Location: N4677879.7; E335010.1

Predrill Depth : 5 m

Datum Geodetic

Ground Surface Elevation: 185.8 m



Operator: NB

Checked: DD

RECORD OF NILCON VANE TEST NIL T11-2

Project : Windsor-Essex Parkway

Test Date: 5/5/2011

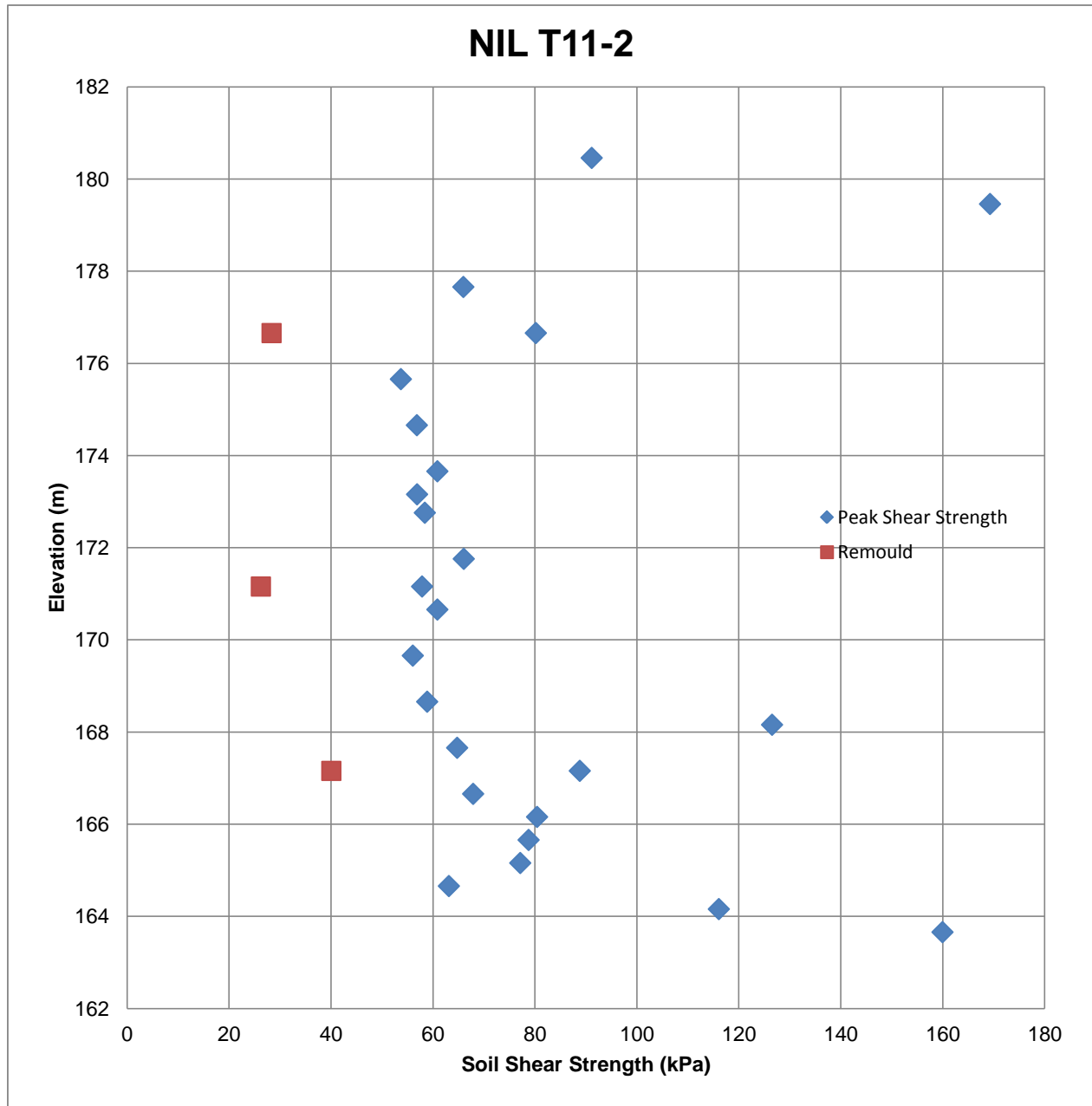
Sheet 1 of 1

Location: N4677870; E335107

Predrill Depth : 5 m

Datum Geodetic

Ground Surface Elevation: 186.0 m



Operator: NB

Checked: DD

RECORD OF NILCON VANE TEST NIL B12-1

Project : Windsor-Essex Parkway

Test Date: 7/11/2011

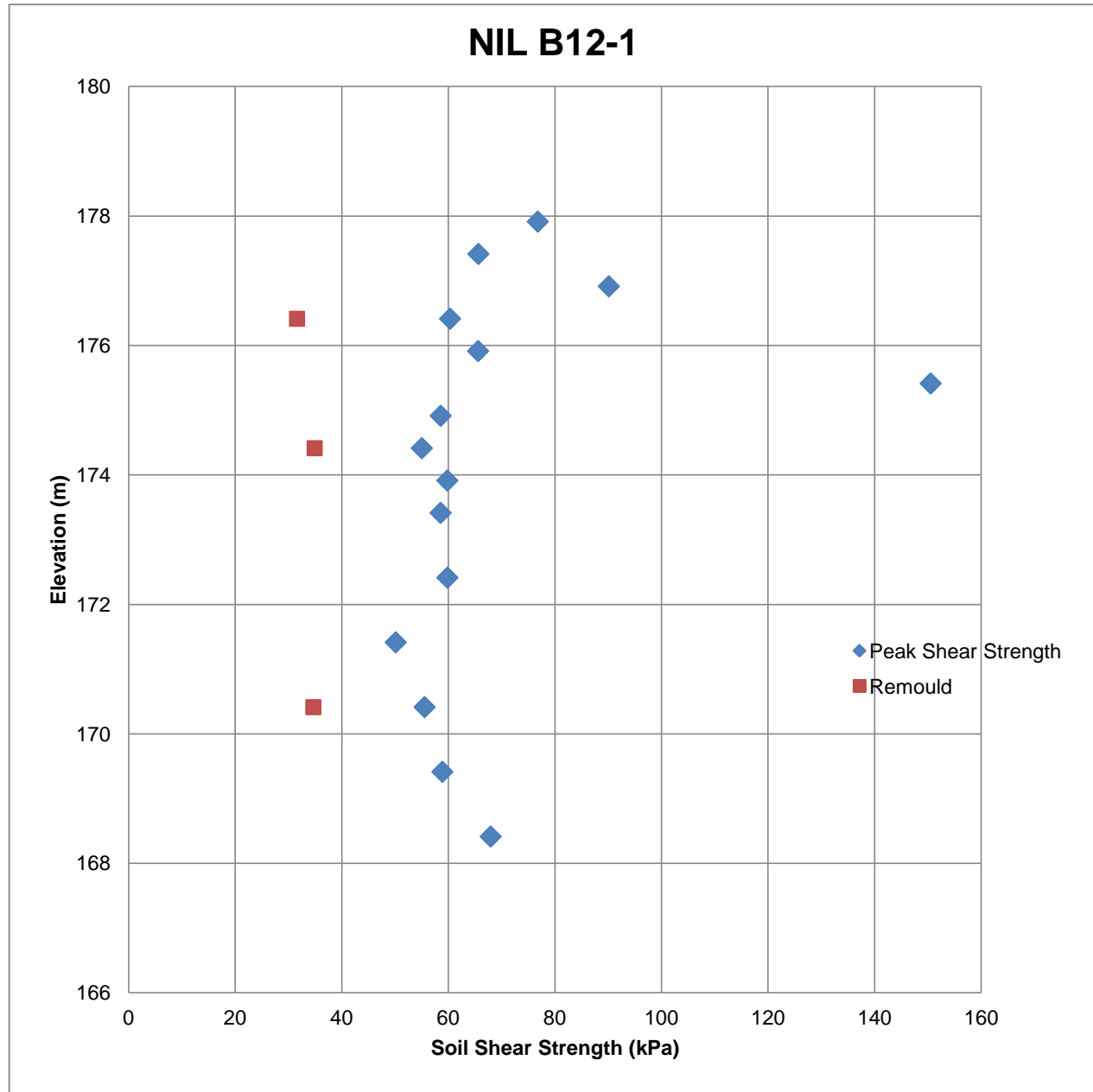
Sheet 1 of 1

Location: N4677785.3; E335209.1

Predrill Depth : 8.5 m

Datum Geodetic

Ground Surface Elevation: 186.4 m



Operator: NB

Checked: DD

RECORD OF CONE PENETRATION TEST CPT B12-1

METRIC

PROJECT Windsor-Essex Parkway

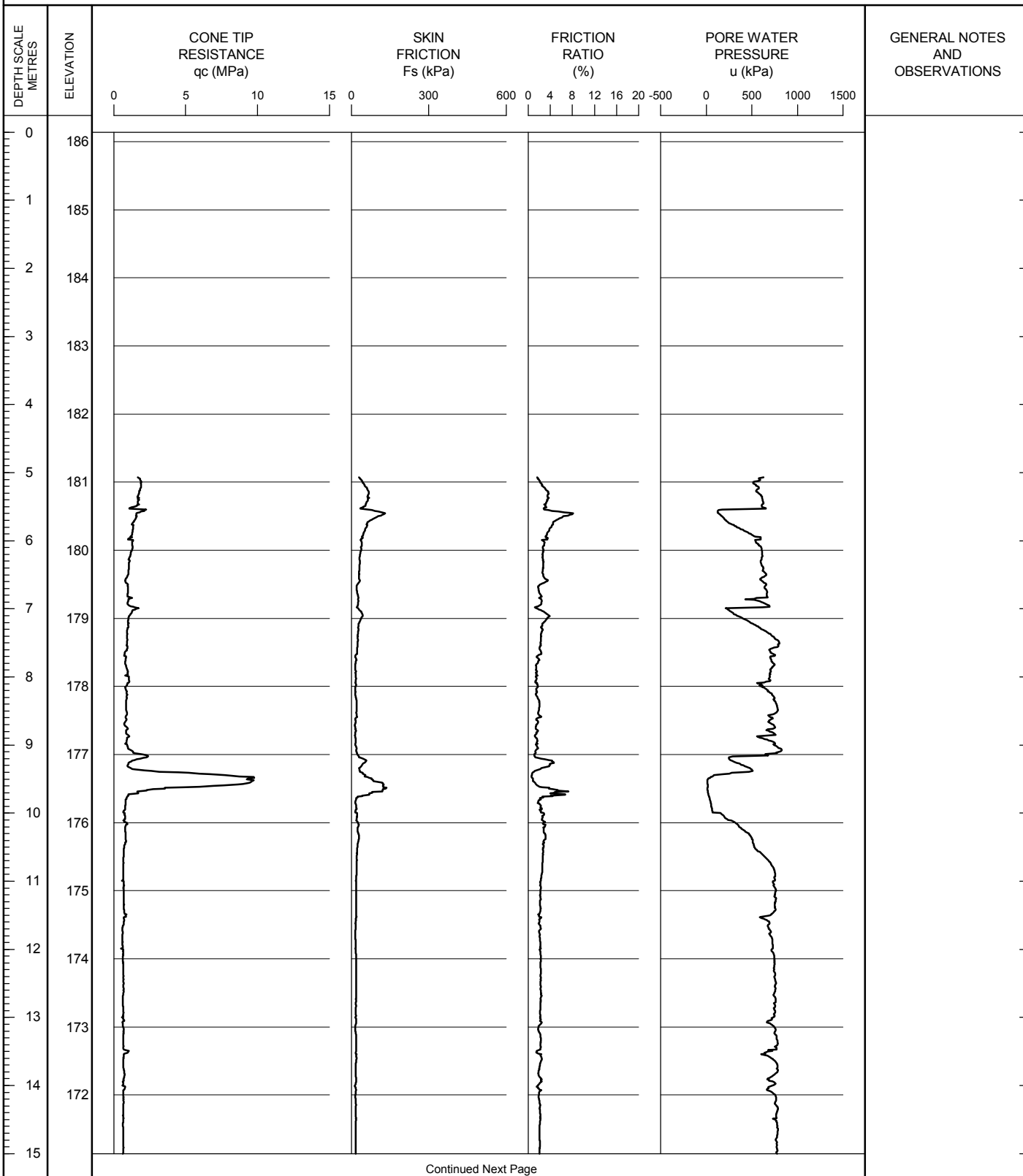
TEST DATE 5/18/2011 - 5/19/2011

SHEET 1 OF 2

LOCATION N4677699.2; E335217.28

DATUM Geodetic

GROUND SURFACE ELEVATION: 186.1 PREDRILL DEPTH: 5 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



WEP CPT LOG CPT B12-1.GPJ ONTARIO MOT.GDT 04/08/11

OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT B12-1

METRIC

PROJECT Windsor-Essex Parkway

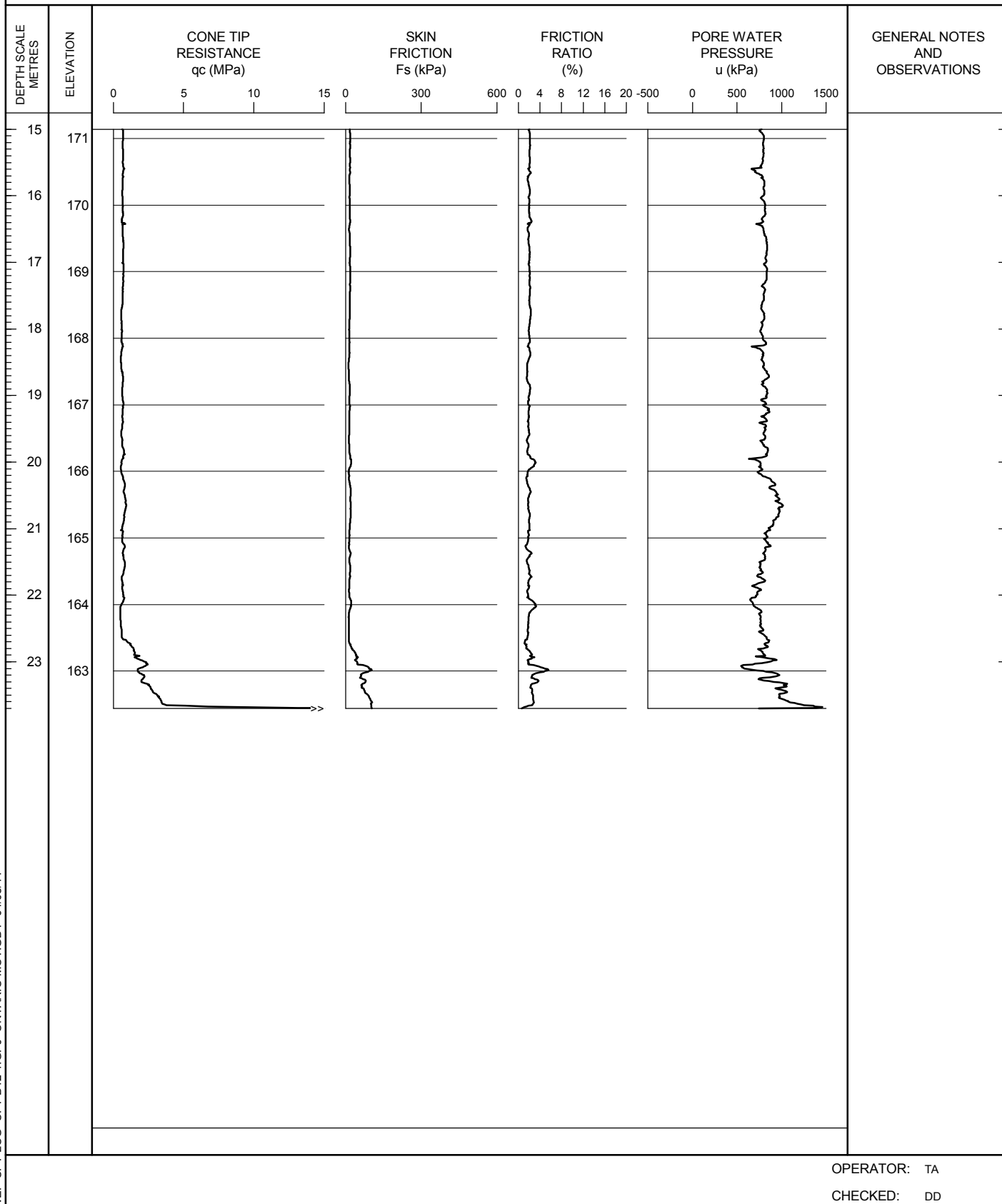
TEST DATE 5/18/2011 - 5/19/2011

SHEET 2 OF 2

LOCATION N4677699.2; E335217.28

DATUM Geodetic

GROUND SURFACE ELEVATION: 186.1 PREDRILL DEPTH: 5 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 50-RW

METRIC

PROJECT Windsor-Essex Parkway

TEST DATE 5/27/2011 - 5/27/2011

SHEET 1 OF 2

LOCATION N4678085.0; E334889.4

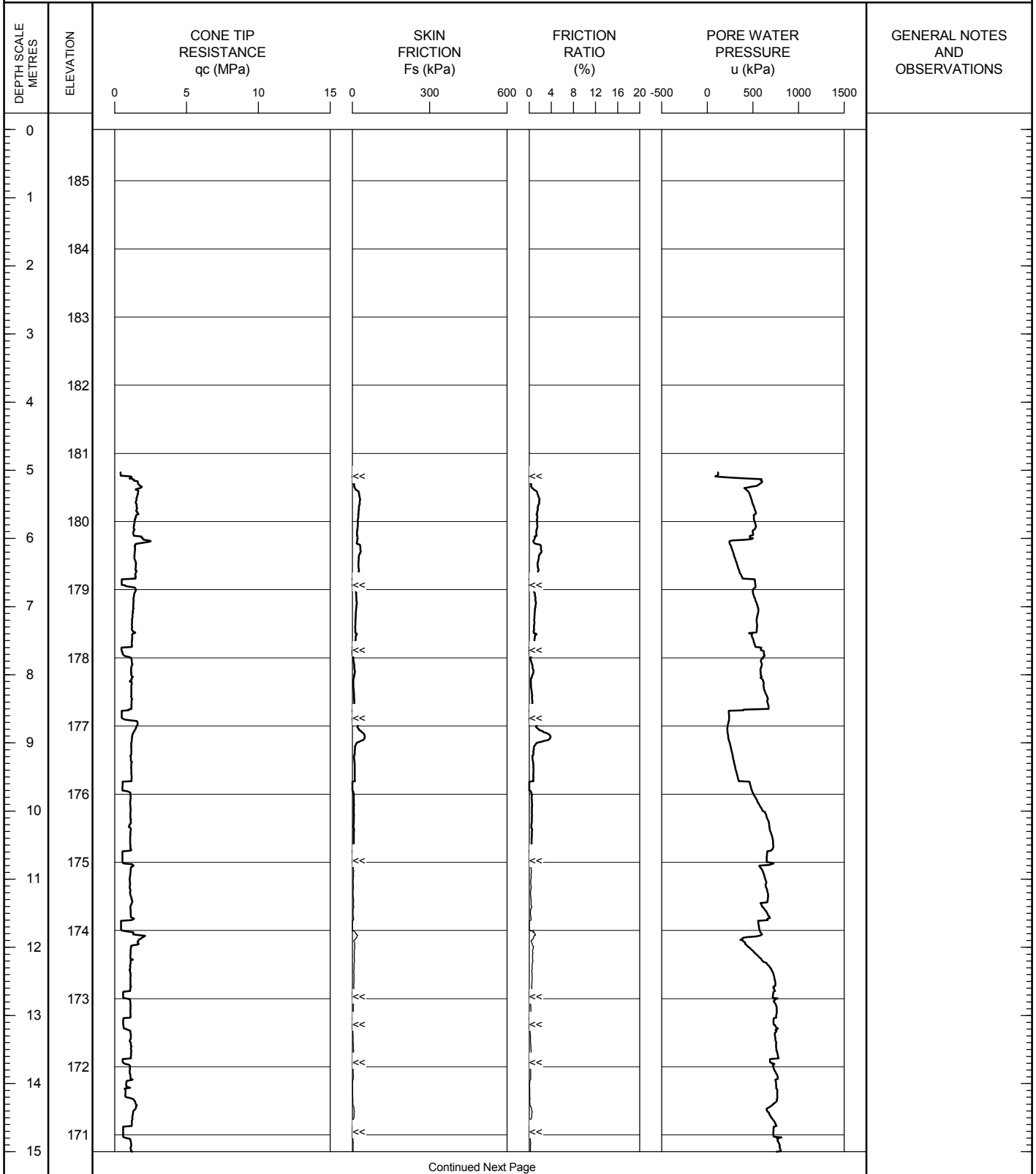
DATUM Geodetic

GROUND SURFACE ELEVATION: 185.8

PREDRILL DEPTH: 5

CORRECTION FACTOR A: 0.8

CORRECTION FACTOR B: 0



WEP CPT LOG CPT-RW.GPJ ONTARIO MOT.GDT 06/01/12

OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 50-RW

METRIC

PROJECT Windsor-Essex Parkway

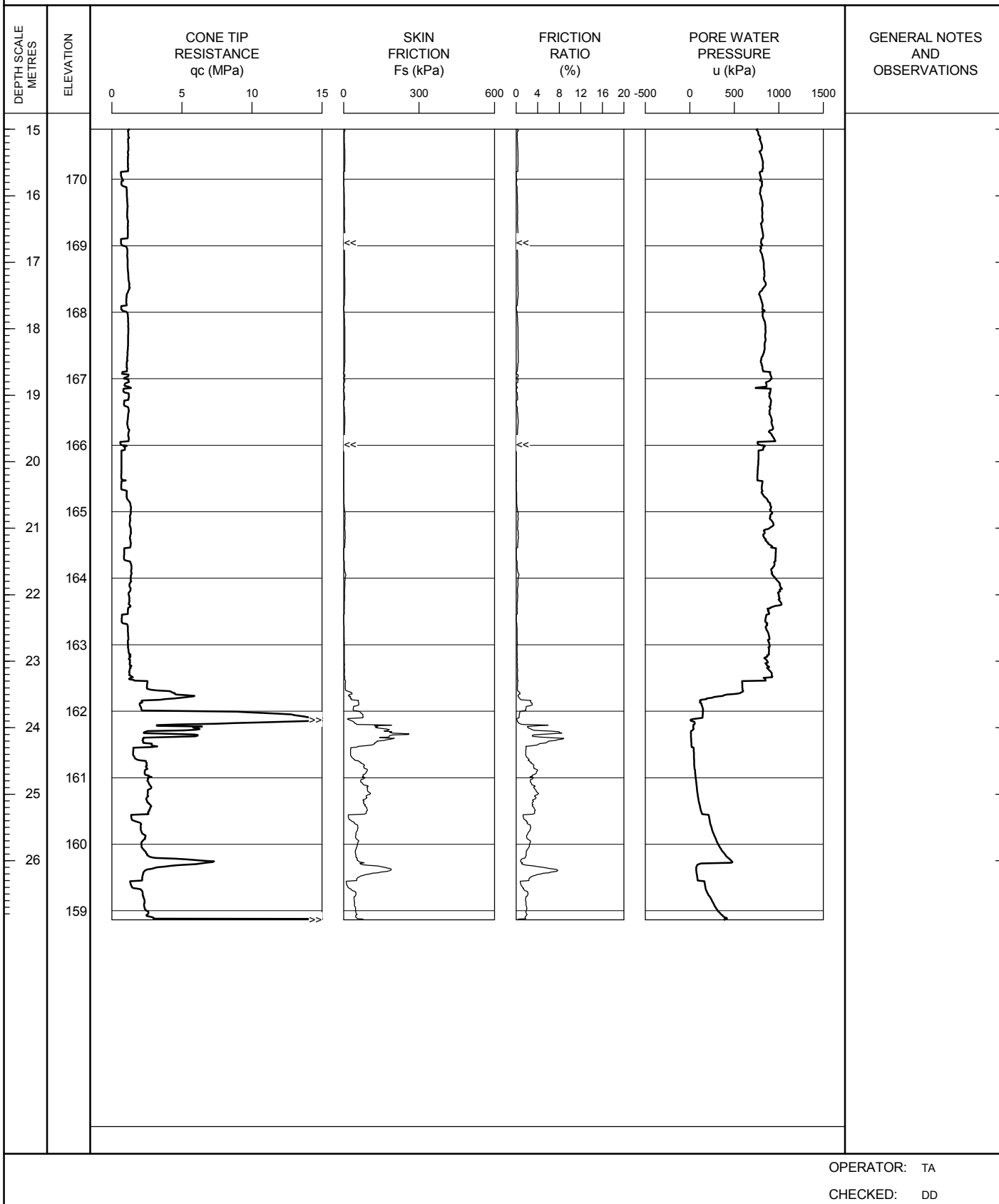
TEST DATE 5/27/2011 - 5/27/2011

SHEET 2 OF 2

LOCATION N4678085.0; E334889.4

DATUM Geodetic

GROUND SURFACE ELEVATION: 185.8 PREDRILL DEPTH: 5 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



WEP CPT LOG CPT-RW.GPJ ONTARIO MOT.GDT 06/01/12

OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 51-RW

METRIC

PROJECT Windsor-Essex Parkway

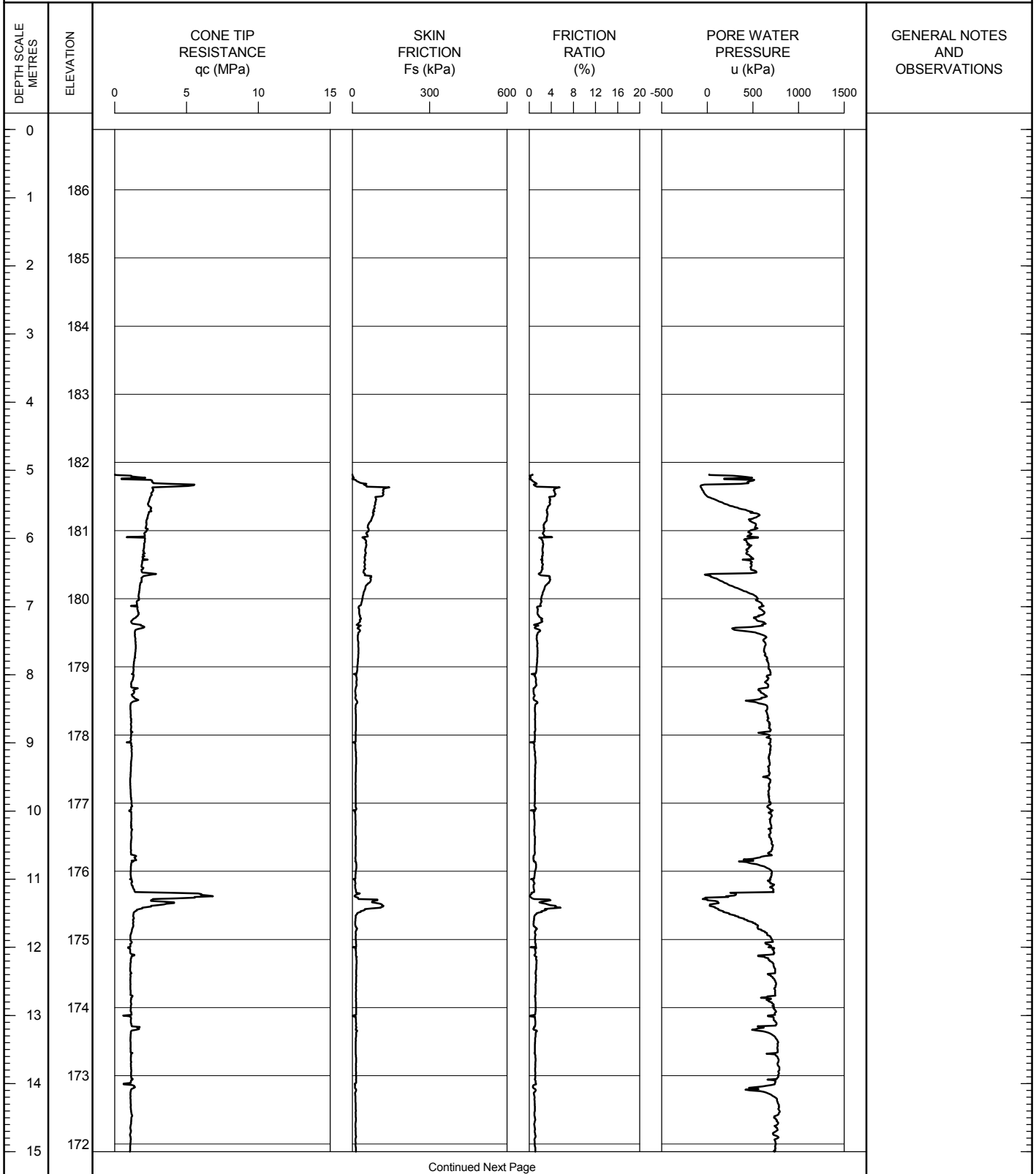
TEST DATE 5/18/2011 - 5/18/2011

SHEET 1 OF 2

LOCATION N4677746.8; E335290.7

DATUM Geodetic

GROUND SURFACE ELEVATION: 186.9 PREDRILL DEPTH: 5 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



Continued Next Page

OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 51-RW

METRIC

PROJECT Windsor-Essex Parkway

TEST DATE 5/18/2011 - 5/18/2011

SHEET 2 OF 2

LOCATION N4677746.8; E335290.7

DATUM Geodetic

GROUND SURFACE ELEVATION: 186.9 PREDRILL DEPTH: 5 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0

| DEPTH SCALE METRES | ELEVATION | CONE TIP RESISTANCE qc (MPa) | SKIN FRICTION Fs (kPa) | FRICTION RATIO (%) | PORE WATER PRESSURE u (kPa) | GENERAL NOTES AND OBSERVATIONS |
|-----------------------|-----------|------------------------------------|------------------------------|--------------------------|-----------------------------------|--------------------------------------|
| | | 0 5 10 15 | 0 300 600 | 0 4 8 12 16 20 | -500 0 500 1000 1500 | |
| 15 | | | | | | |
| 16 | 171 | | | | | |
| 17 | 170 | | | | | |
| 18 | 169 | | | | | |
| 19 | 168 | | | | | |
| 20 | 167 | | | | | |
| 21 | 166 | | | | | |
| 22 | 165 | | | | | |
| 23 | 164 | | | | | |
| 24 | 163 | | | | | |

OPERATOR: TA

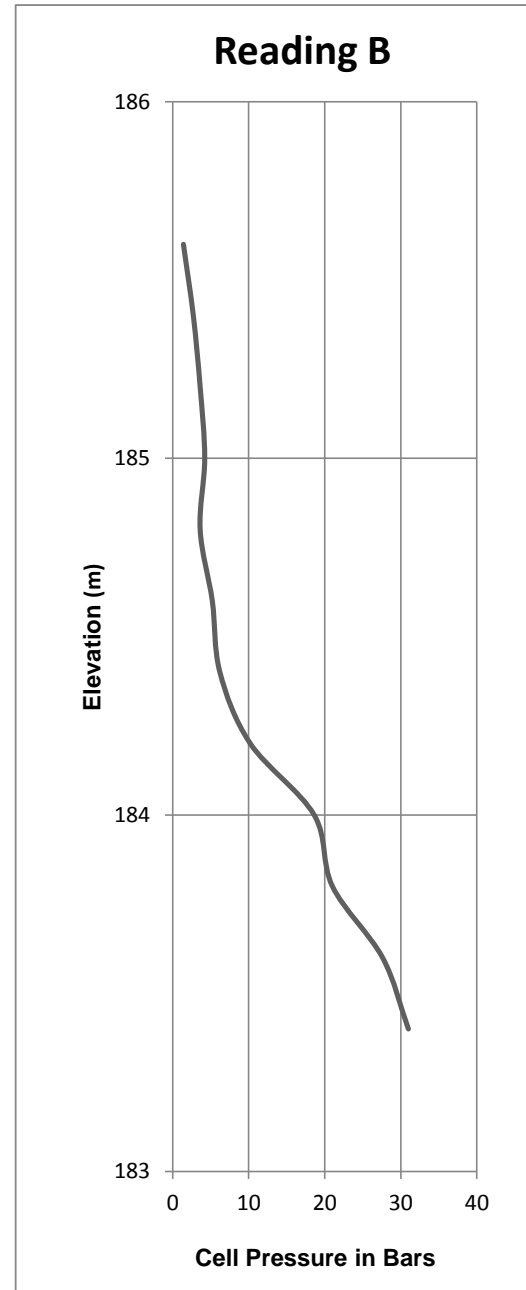
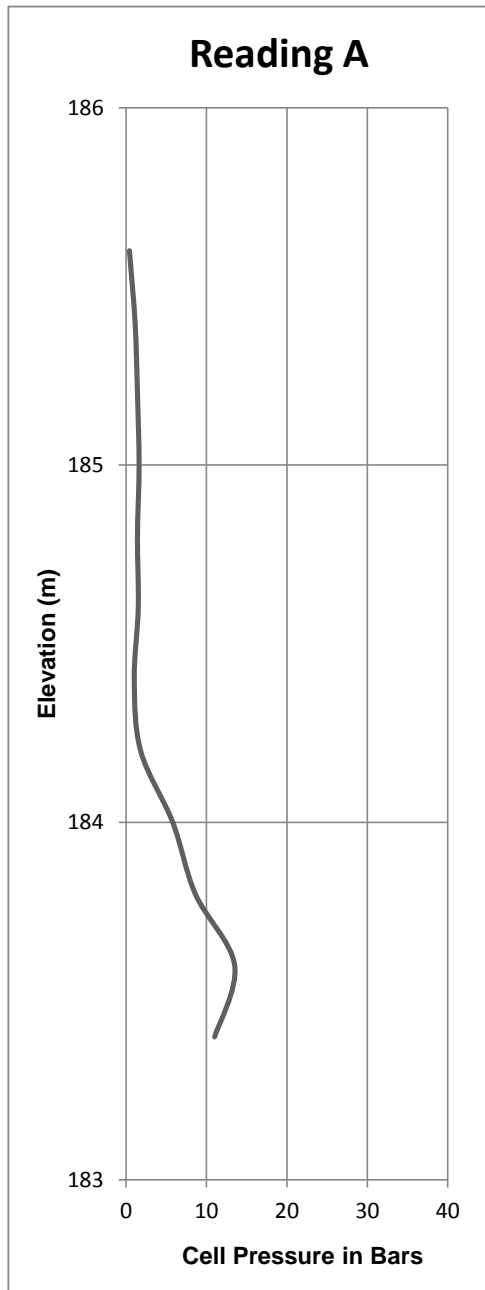
CHECKED: DD

RECORD OF DILATOMETER TEST DMT T11-1 Shallow

Project : Windsor-Essex Parkway
Location: N4677882.6; E335010.7
Ground Surface Elevation : 185.8

Test Date: 4/27/2001
Predrill Depth : 0.2 m
Delta A: 0.19 Bar

Sheet 1 of 1
Datum Geodetic
Delta B: 0.37 Bar



Note DMT refusal at elevation 183.2m. Redrilled to elevation 181.2m.
Resumed DMT at elevation 181.0 m.

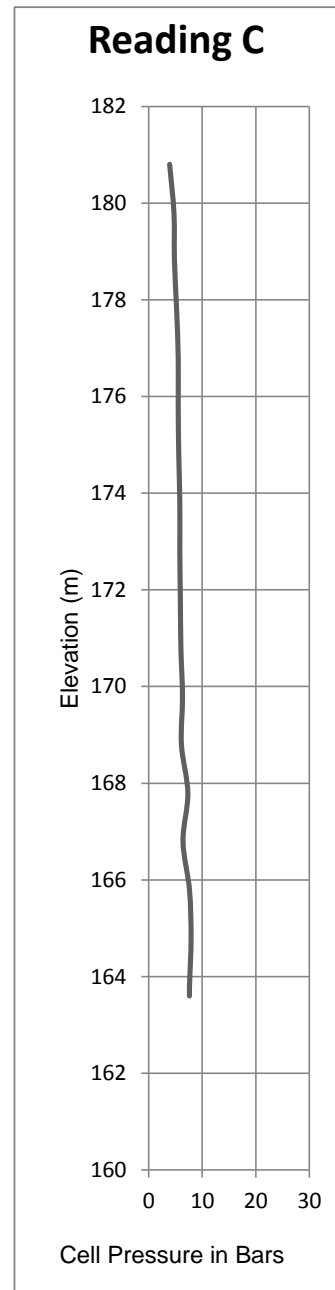
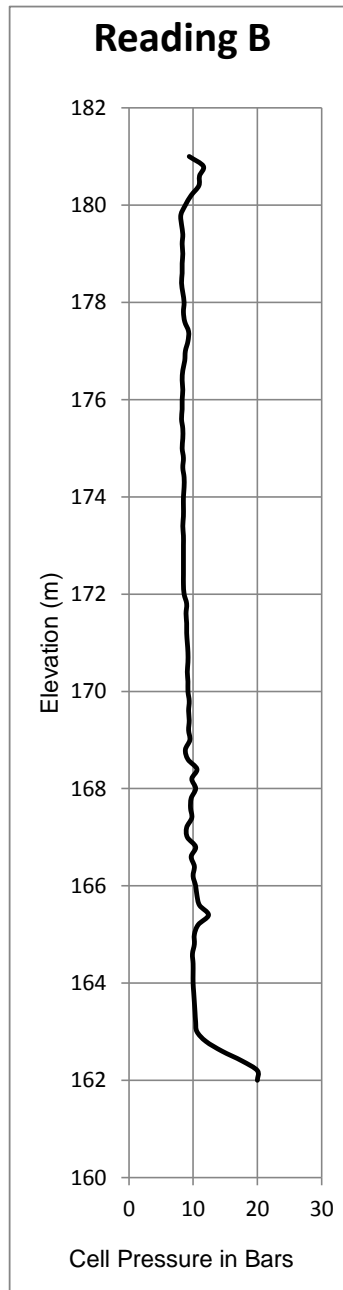
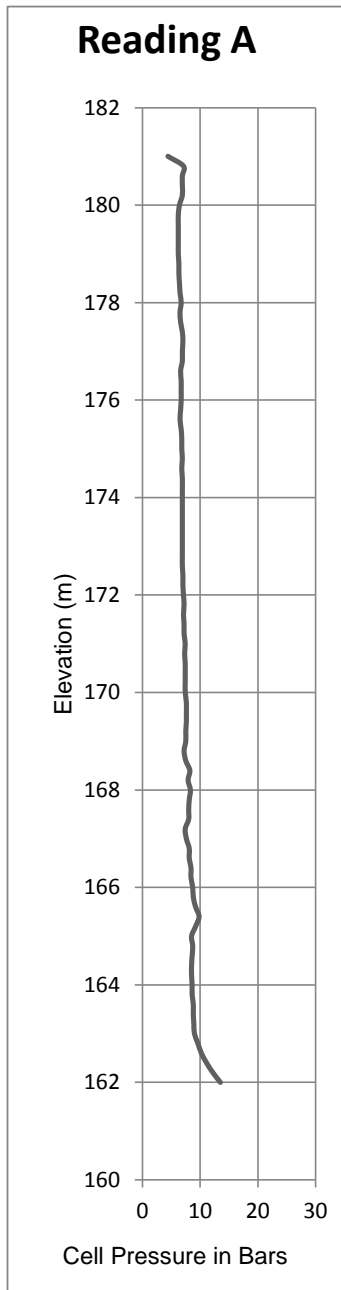
Operator: LC
Checked: DD

RECORD OF DILATOMETER TEST DMT T11-1 Deep

Project : Windsor-Essex Parkway
Location: N4677882.6; E335010.7
Ground Surface Elevation : 185.8

Test Date: 4/27/2001
Predrill Depth : 4.6 m
Delta A: 0.19 Bar

Sheet 1 of 1
Datum Geodetic
Delta B: 0.37 Bar



Note: DMT resumed at elevation 181.0 m

Operator: LC

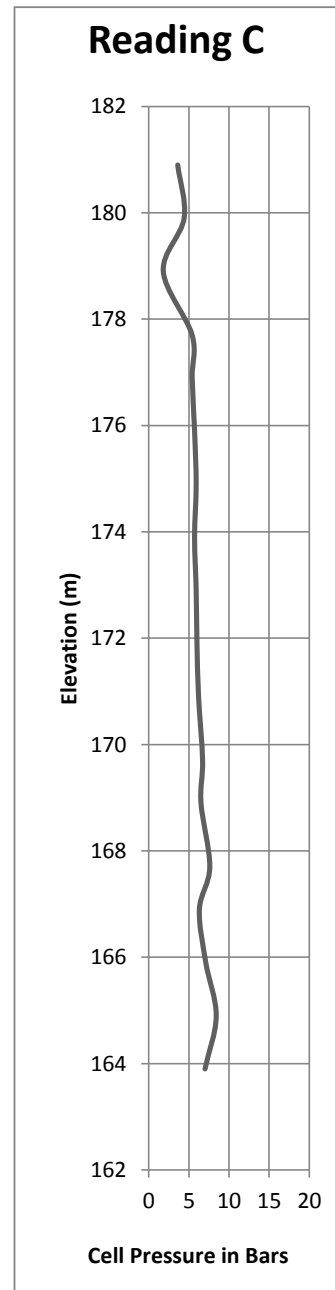
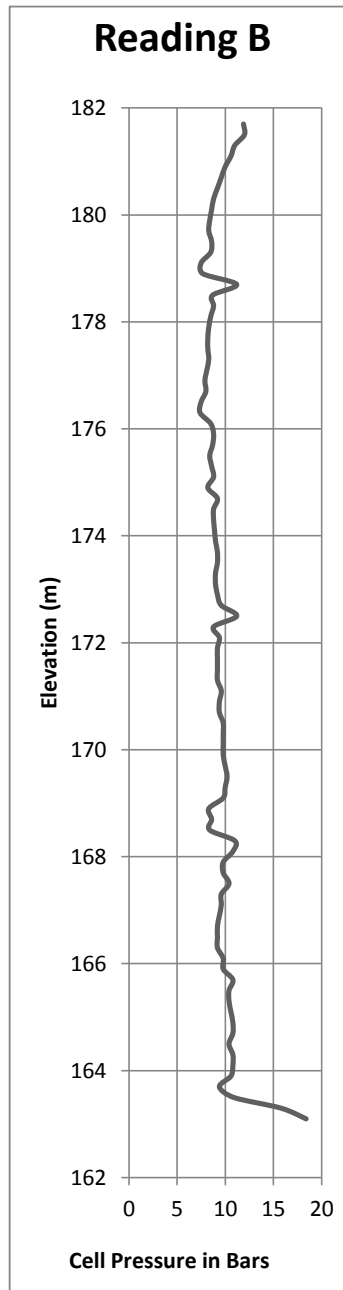
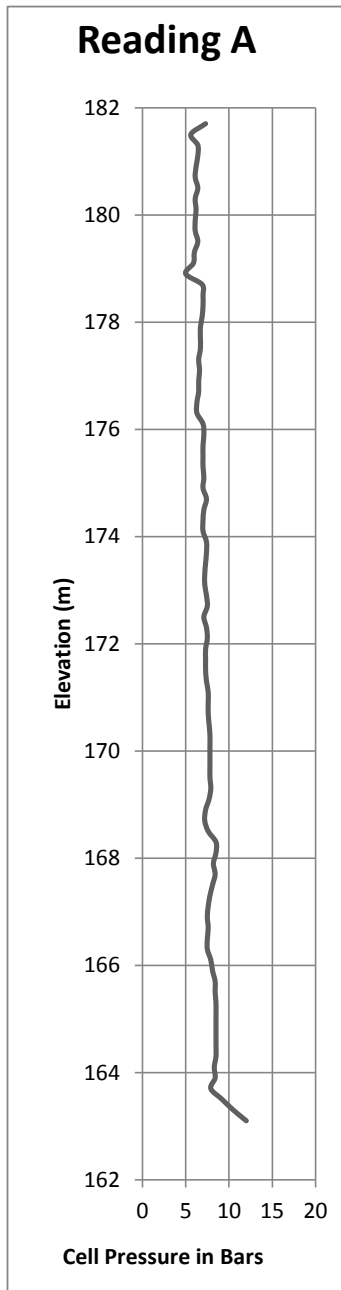
Checked: DD

RECORD OF DILATOMETER TEST DMT06-RW

Project : Windsor-Essex Parkway
Location: N 4677767.6; E 335236.8
Ground Surface Elevation : 186.9

Test Date: 5/18/2011
Predrill Depth : 5.0 m
Delta A: 0.20 Bar

Sheet 1 of 1
Datum Geodetic
Delta B: 0.29 Bar



Operator: LC
Checked: DD

Station 10+100T to Station 10+700T (Soil Profile #16)

RECORD OF BOREHOLE No PS7-1

1 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677583.5, E335385.0 ORIGINATED BY NB
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Aug 17, 11 - Aug 17, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | PLASTIC LIMIT | NATURAL MOISTURE CONTENT | LIQUID LIMIT | UNIT WEIGHT γ kN/m³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|--|------------|---------|------|------------|-------------------------|-----------------|--|--|--|--|----------------|--------------------------|----------------|-----------------------------------|---------------------------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | W _p | W | W _L | | |
| 186.8 | Fill Surface | | | | | | | | | | | | | | GR SA SI CL | |
| 0.0 | FILL | | 1 | SS | 14 | | | | | | | | | | | |
| 0.2 | Topsoil | | | | | | | | | | | | | | | |
| 0.3 | FILL | | 2 | SS | 10 | | | | | | | | | | | |
| | Sand and Gravel | | | | | | | | | | | | | | | |
| | Grey | | | | | | | | | | | | | | | |
| | CLAYEY SILT | | 3 | SS | 6 | | | | | | | | | | | |
| | Some sand, trace gravel , thin sand seams between approx 24m and 25m (EL. 163m and EL. 162m) | | | | | | | | | | | | | | | |
| | Firm to very stiff | | | | | | | | | | | | | | | |
| | Brown changing to grey below approx. 4.6m (EL. 182.2m) | | | | | | | | | | | | | | | |
| | | | 4 | SS | 17 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | 5 | SS | 32 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | 6 | SS | 30 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | 7 | SS | 13 | | | | | | | | | | | | |
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| | | 8 | SA | 9 | | | | | | | | | | | | |
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| | | 9 | TW | PH | | | | | | | | | | | | |
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| | | VT | | | | | | | | | | | | | | |
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| | | 10 | TW | PH | | | | | | | | | | | | |
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| | | 11 | TW | PH | | | | | | | | | | | | |
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| | | VT | | | | | | | | | | | | | | |
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| | | 12 | TW | PH | | | | | | | | | | | | |
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| | | 13 | SS | PH | | | | | | | | | | | | |
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| | | VT | | | | | | | | | | | | | | |
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| | | 14 | SS | PH | | | | | | | | | | | | |
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Continued Next Page

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

METRIC

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 01/05/12

RECORD OF BOREHOLE No PS7-1

3 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677583.5, E335385.0 ORIGINATED BY NB
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Aug 17, 11 - Aug 17, 11 CHECKED BY MSO

| 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 | | | | | | | | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | | | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE | | | | | | | | | |
| | | | | | | | | ● POCKET PEN. × LAB VANE | | | | | | | | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| 156.3 | | | | | | | | | | | | | | | | | |
| 30.5 | | | | | | | | | | | | | | | | | |
| 156.0 | FINE SAND | | 25 | SS | 9 | | 156 | | | | | | | | | | |
| 30.8 | Poorly graded Grey | | | | | | | | | | | | | | | | |
| | CLAYEY SILT | | | | | | | | | | | | | | | | |
| | Grey | | | | | | | | | | | | | | | | |
| 154.8 | | | | | | | 155 | | | | | | | | | | |
| 32.0 | BOULDERS AND COBBLES | | 26 | SS | 27 | | | | | | | | | | | | |
| 154.2 | | | | | | | | | | | | | | | | | |
| 32.6 | LIMESTONE | | 27 | RC | | | 154 | | | | | | | | | | |
| | Laminated, having bands of coarse grains and fine grains, dense stylolites present. White to light grey | | | | | | | | | | | | | | | | |
| 152.7 | | | | | | | 153 | | | | | | | | | | |
| 34.1 | END OF BOREHOLE | | | | | | | | | | | | | | | | |
| | No groundwater observed during drilling due to wash boring | | | | | | 152 | | | | | | | | | | |
| | Observation well plugged at approx 6m below ground surface (noted on Nov 11, 2011) | | | | | | | | | | | | | | | | |
| | Water levels measured in Piezometer PS7-1-P18 at elevation 185.0m on November 3, 2011 | | | | | | 151 | | | | | | | | | | |
| | Water levels measured in Piezometer PS7-1-P18 at elevation 184.9m on November 11, 2011 | | | | | | | | | | | | | | | | |
| | Water levels measured in Piezometer PS7-1-P24 at elevation 181.5m on November 3, 2011 | | | | | | 150 | | | | | | | | | | |
| | Water levels measured in Piezometer PS7-1-P24 at elevation 181.5m on November 11, 2011 | | | | | | | | | | | | | | | | |
| | Water levels measured in Piezometer PS7-1-P32 at elevation 177.9m on November 3, 2011 | | | | | | 149 | | | | | | | | | | |
| | Water levels measured in Piezometer PS7-1-P32 at elevation 177.9m Nov 11, 2011 | | | | | | | | | | | | | | | | |
| | | | | | | | 148 | | | | | | | | | | |
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| | | | | | | | 142 | | | | | | | | | | |

-VWP PS7-1-P32 installed at 32.0m below ground surface (EL. 154.8m)

RQD = 97%
TCR = 97%
SCR = 100%

RECORD OF BOREHOLE No BH17-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677671.2, E335715.3 ORIGINATED BY NB
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 13, 11 - Jul 13, 11 CHECKED BY MSO

| 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 | | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED | ○ POCKET PEN. | + FIELD VANE | × LAB VANE | | | | | | | | | |
| | | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | 10 | 20 | 30 |
| 187.7 | Ground Surface | | | | | | | | | | | | | | | | | | | |
| 0.0 | 400mm TOPSOIL | | 1 | SS | 5 | | | | | | | | | | | | | | | |
| 187.3 | | | | | | | | | | | | | | | | | | | | |
| 0.4 | CLAYEY SILT Trace rootlets, white precipitates in fissures Very stiff to hard Brown Moist Some sand, trace gravel Moist to damp | | | | | | | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No BH18-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677390.7, E335692.7 ORIGINATED BY NB
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 13, 11 - Jul 13, 11 CHECKED BY MSO

| 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 | | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | | | | | 10 20 30 | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● POCKET PEN. × LAB VANE | | | | | | | | | | | | |
| 187.6 | Ground Surface | | | | | | | | | | | | | | | | | | | |
| 0.0 | 100mm TOPSOIL | | 1 | SS | 7 | | 187 | | | | | | | | | | | | | |
| 186.8 | CLAYEY SILT Trace gravel Brown-grey | | 2 | SS | 20 | | | | | | | | | | | | | | | |
| 0.8 | SILTY CLAY Some sand, trace gravel Stiff to hard Brown Moist | | 3 | SS | 33 | | 186 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | Hard -Oxidized | | 4 | SS | 43 | | 185 | | | | | | | | | | | | | |
| | | | 5 | SS | 39 | | | | | | | | | | | | | | | |
| | | | | | | | 184 | | | | | | | | | | | | | |
| | | | 6 | SS | 20 | | | | | | | | | | | | | | | |
| | | | | | | | 183 | | | | | | | | | | | | | |
| | | | 7 | SS | 14 | | | | | | | | | | | | | | | |
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| | | | 8 | SS | 12 | | 182 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | 9 | SS | 12 | | | | | | | | | | | | | | | |
| 181.0 | END OF BOREHOLE | | | | | | 181 | | | | | | | | | | | | | |
| 6.6 | Borehole dry on completion | | | | | | 180 | | | | | | | | | | | | | |
| | | | | | | | 179 | | | | | | | | | | | | | |
| | | | | | | | 178 | | | | | | | | | | | | | |
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| | | | | | | | 174 | | | | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | | | | | |

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 01/05/12

RECORD OF BOREHOLE No BH19-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677320.5, E335965.5 ORIGINATED BY NB
DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
DATUM Geodetic DATE Jul 12, 11 - Jul 12, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | PLASTIC LIMIT W _P | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | |
|---------------|--|------------|---------|------|------------|----------------------------|-----------------|---|--------------|-------------------|------------------------------------|-------------------------------------|-----------------------------------|-------------------------|---|-------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | | | | | | | |
| 187.4 | Ground Surface | | | | | | ● POCKET PEN. | × LAB VANE | | WATER CONTENT (%) | | | | | | |
| 0.0 | 200mm TOPSOIL | | | | | | 20 | 40 | 60 | 80 | 100 | 10 | 20 | 30 | kN/m ³ | GR SA SI CL |
| 0.2 | SILTY CLAY Some sand, trace gravel Trace organics Stiff to hard Grey-brown | | 1 | SS | 11 | | | | | | | | | | | |
| | | | 2 | SS | 9 | | | | | | | | | | | |
| | Brown | | 3 | SS | 25 | | | | | | | | | | | |
| | | | 4 | SS | 36 | | | | | | | | | | | |
| | -Oxidation in fissures | | 5 | SS | 36 | | | | | | | | | | | |
| | Grey | | 6 | SS | 21 | | | | | | | | | | | |
| | -Inferred cobbles | | 7 | SS | 36 | | | | | | | | | | | |
| | | | 8 | SS | 17 | | | | | | | | | | | |
| | -Sandy, trace pink nodules | | 9 | SS | 18 | | | | | | | | | | | |
| 180.8 | END OF BOREHOLE | | | | | | | | | | | | | | | |
| 6.6 | Borehole dry on completion | | | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 01/05/12

RECORD OF BOREHOLE No CPT52-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677681.4, E335365.2 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 850 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 17, 11 - May 17, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | PLASTIC NATURAL LIQUID LIMIT MOISTURE 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 | | | | WATER CONTENT (%) | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| 186.6 | Ground Surface | | | | | | | | | | | | | | | | | | |
| 0.0 | 275mm Clayey TOPSOIL | | | | | | | | | | | | | | | | | | |
| 186.3 | SILTY CLAY Some sand, trace gravel | | | | | | | | | | | | | | | | | | |
| 0.3 | | | | | | | | | | | | | | | | | | | |
| | Firm to hard | | 1 | SS | 5 | | 186 | | | | | | | | | | | | |
| | Brown | | 2 | SS | 11 | | 185 | | | | | | | | | | | | |
| | | | 3 | SS | 30 | | 184 | | | | | | | | | | | | |
| | | | 4 | SS | 27 | | 183 | | | | | | | | | | | | |
| | Grey | | 5 | SS | 23 | | 182 | | | | | | | | | | | | |
| | | | 6 | SS | 15 | | | | | | | | | | | | | | |
| 181.6 | END OF SAMPLED BOREHOLE (continued with CPT to refusal) | | | | | | | | | | | | | | | | | | |
| 5.0 | | | | | | | | | | | | | | | | | | | |
| | | | | | | | 181 | | | | | | | | | | | | |
| | | | | | | | 180 | | | | | | | | | | | | |
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| | | | | | | | 174 | | | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | | | | |

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

RECORD OF BOREHOLE No CPT53-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677706.9, E335401.0 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE Track Mounted Drill - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Aug 6, 11 - Aug 6, 11 CHECKED BY MSO


| 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 | | | | | | | | | | | | | | | |
| 185.2 | Ground Surface | | | | | | | ○ UNCONFINED | + | FIELD VANE | | | | | | | | | | | | | |
| 0.0 184.9 | TOPSOIL | | | | | | | ● POCKET PEN. | × | LAB VANE | | | | | | | | | | | | | |
| 0.3 | CLAYEY SILT Some sand, trace gravel Mottled brown and grey Very stiff Brown Trace fissures | | 1 | SS | 21 | | | | | | | | | | | | | | | | | | |
| 183.2 | | | 2 | SS | 22 | | | | | | | | | | | | | | | | | | |
| 2.0 | END OF SAMPLED BOREHOLE (Continued with CPT to refusal) Borehole dry on completion | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | 183 | | | | | | | | | | | | | | | | |
| | | | | | | | 182 | | | | | | | | | | | | | | | | |
| | | | | | | | 181 | | | | | | | | | | | | | | | | |
| | | | | | | | 180 | | | | | | | | | | | | | | | | |
| | | | | | | | 179 | | | | | | | | | | | | | | | | |
| | | | | | | | 178 | | | | | | | | | | | | | | | | |
| | | | | | | | 177 | | | | | | | | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | | | | | | | | |
| | | | | | | | 175 | | | | | | | | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | | | | | | | | |
| | | | | | | | 171 | | | | | | | | | | | | | | | | |

RECORD OF BOREHOLE No CPT54-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677706.9, E335401.0 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Aug 8, 11 - Aug 8, 11 CHECKED BY MSO

| 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 | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| 185.2 | Ground Surface | | | | | | | | | | | | | | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | | | | |
| 184.9 | CLAYEY SILT Some sand, trace gravel Stiff to hard Mottled brown and grey |  | 1 | SS | 5 | | 185 | | | | | | | | | | | | |
| 0.3 | | | 2 | SS | 8 | | 184 | | | | | | | | | | | | |
| | | | | | | | 183 | | | | | | | | | | | | |
| | | | 3 | SS | 35 | | | | | | | | | | | | | | |
| 182.2 | Brown Trace fissures | | | | | | | | | | | | | | | | | | |
| 3.0 | END OF SAMPLED BOREHOLE (Continued with CPT to refusal) Borehole dry on completion | | | | | | 182 | | | | | | | | | | | | |
| | | | | | | | 181 | | | | | | | | | | | | |
| | | | | | | | 180 | | | | | | | | | | | | |
| | | | | | | | 179 | | | | | | | | | | | | |
| | | | | | | | 178 | | | | | | | | | | | | |
| | | | | | | | 177 | | | | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | | | | |
| | | | | | | | 175 | | | | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | | | | | | |
| | | | | | | | 171 | | | | | | | | | | | | |

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

RECORD OF BOREHOLE No CPT55-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677609.7, E335904.2 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Aug 6, 11 - Aug 6, 11 CHECKED BY MSO

| 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 | | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● POCKET PEN. × LAB VANE | | | | | | | | | | | | |
| 187.5 | Ground Surface | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | | |
| 0.0 | TOPSOIL | | 1 | SS | 7 | | 187 | | | | | | | | | | | | | |
| 187.2 | CLAYEY SILT Some sand, trace gravel Firm to hard Mottled brown and grey | | 2 | SS | 6 | | 186 | | | | | | | | | | | | | |
| 0.3 | | | | | | | 185 | | | | | | | | | | | | | |
| 184.5 | | Brown -Trace fissures | | 3 | SS | 33 | | | | | | | | | | | | | | |
| 3.0 | END OF SAMPLED BOREHOLE (continued with CPT to refusal) Borehole dry on completion | | | | | | 184 | | | | | | | | | | | | | |
| | | | | | | | 183 | | | | | | | | | | | | | |
| | | | | | | | 182 | | | | | | | | | | | | | |
| | | | | | | | 181 | | | | | | | | | | | | | |
| | | | | | | | 180 | | | | | | | | | | | | | |
| | | | | | | | 179 | | | | | | | | | | | | | |
| | | | | | | | 178 | | | | | | | | | | | | | |
| | | | | | | | 177 | | | | | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | | | | | |
| | | | | | | | 175 | | | | | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | | | | | |

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 01/05/12

RECORD OF CONE PENETRATION TEST CPT B13-1

METRIC

PROJECT Windsor-Essex Parkway

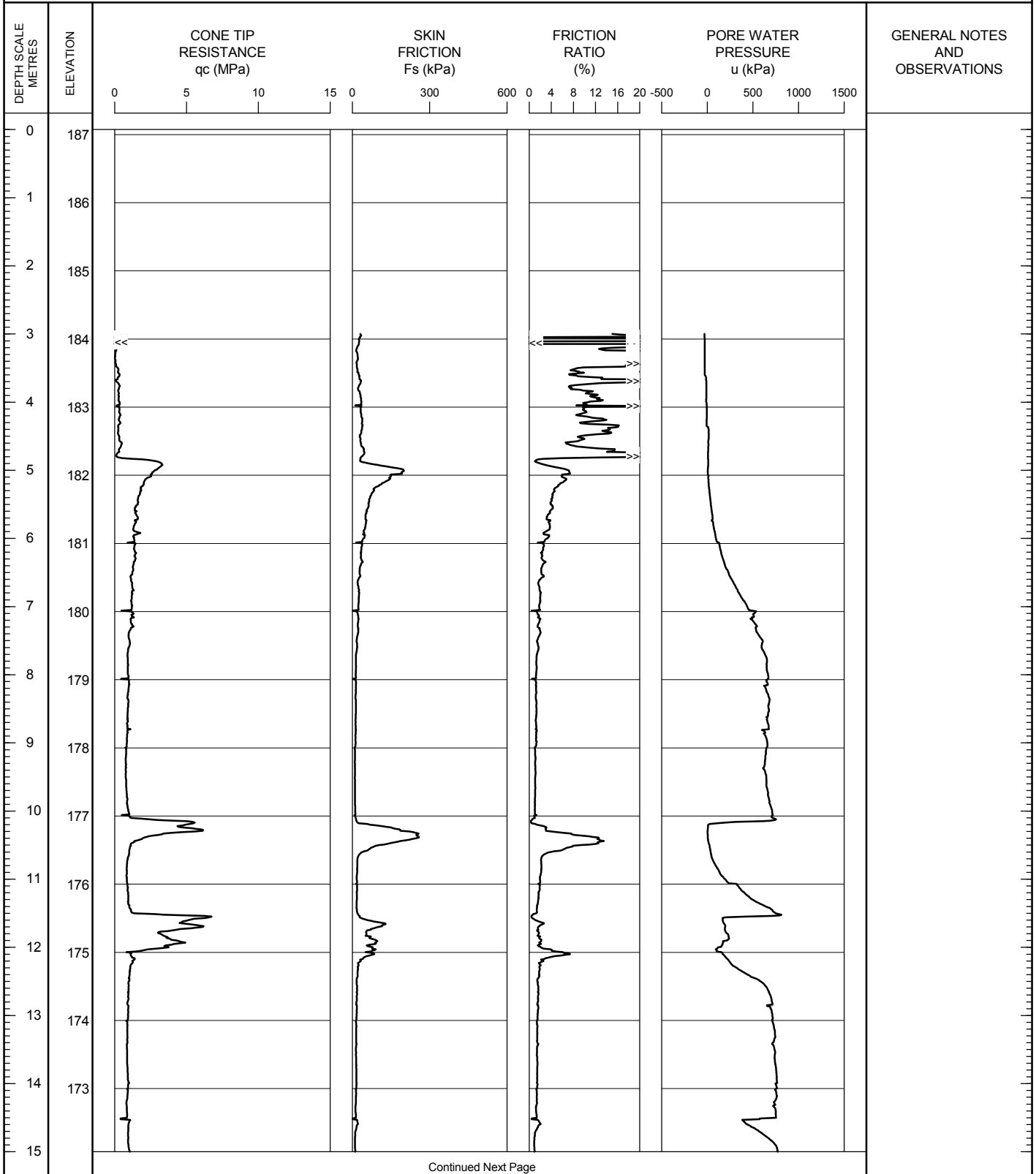
TEST DATE 8/5/2011 - 8/5/2011

SHEET 1 OF 2

LOCATION N4677554.4; E335553.0

DATUM Geodetic

GROUND SURFACE ELEVATION: 187.1 PREDRILL DEPTH: 3 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT B13-1

METRIC

PROJECT Windsor-Essex Parkway

TEST DATE 8/5/2011 - 8/5/2011

SHEET 2 OF 2

LOCATION N4677554.4; E335553.0

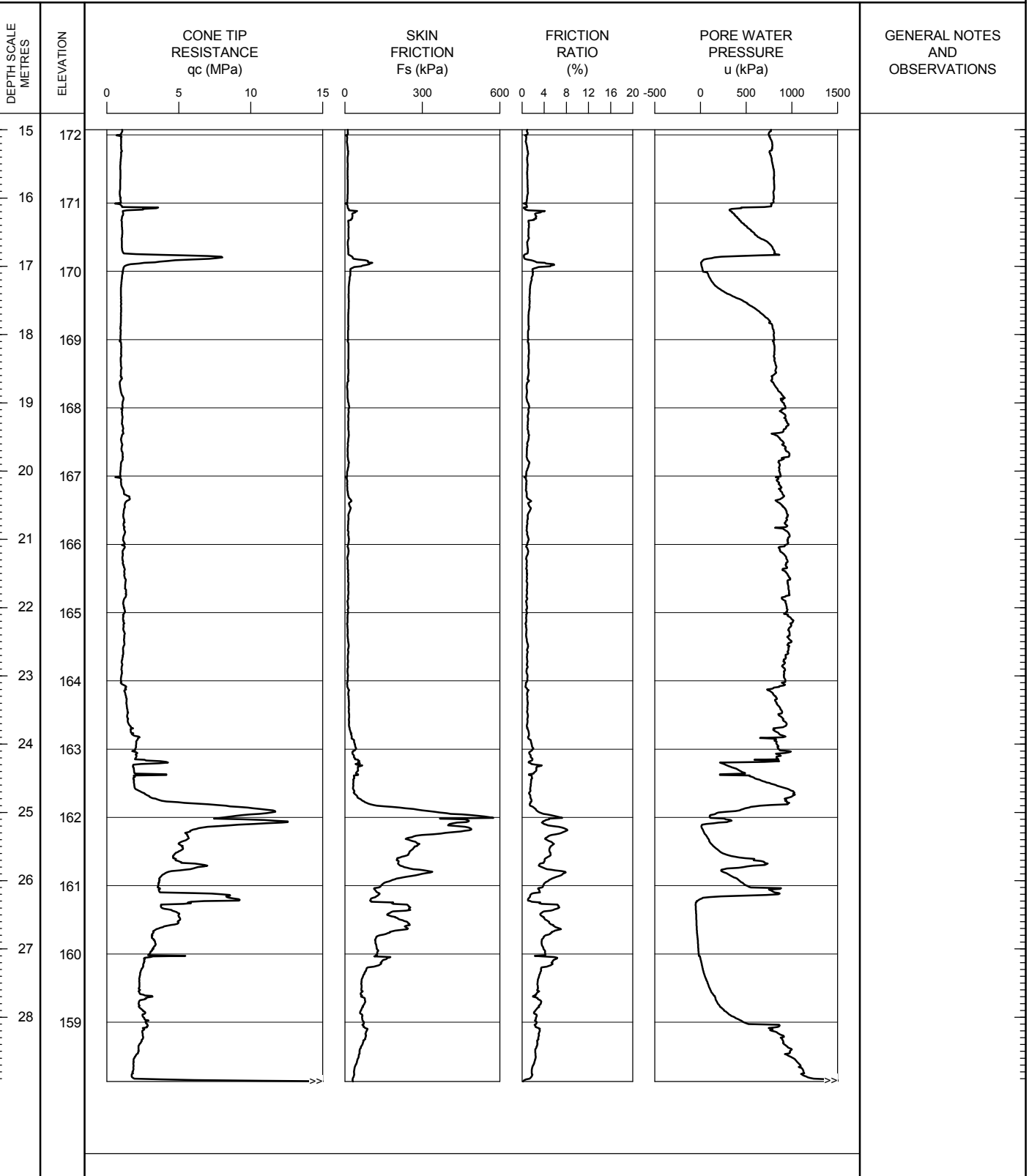
DATUM Geodetic

GROUND SURFACE ELEVATION: 187.1

PREDRILL DEPTH: 3

CORRECTION FACTOR A: 0.8

CORRECTION FACTOR B: 0



WEF CPT LOG CPT B13-13.GPJ ONTARIO.MOT.GDT 22/12/11

OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 52-RW

METRIC

PROJECT Windsor-Essex Parkway

TEST DATE 5/17/2011 - 5/17/2011

SHEET 1 OF 2

LOCATION N4677681.4; E335365.2

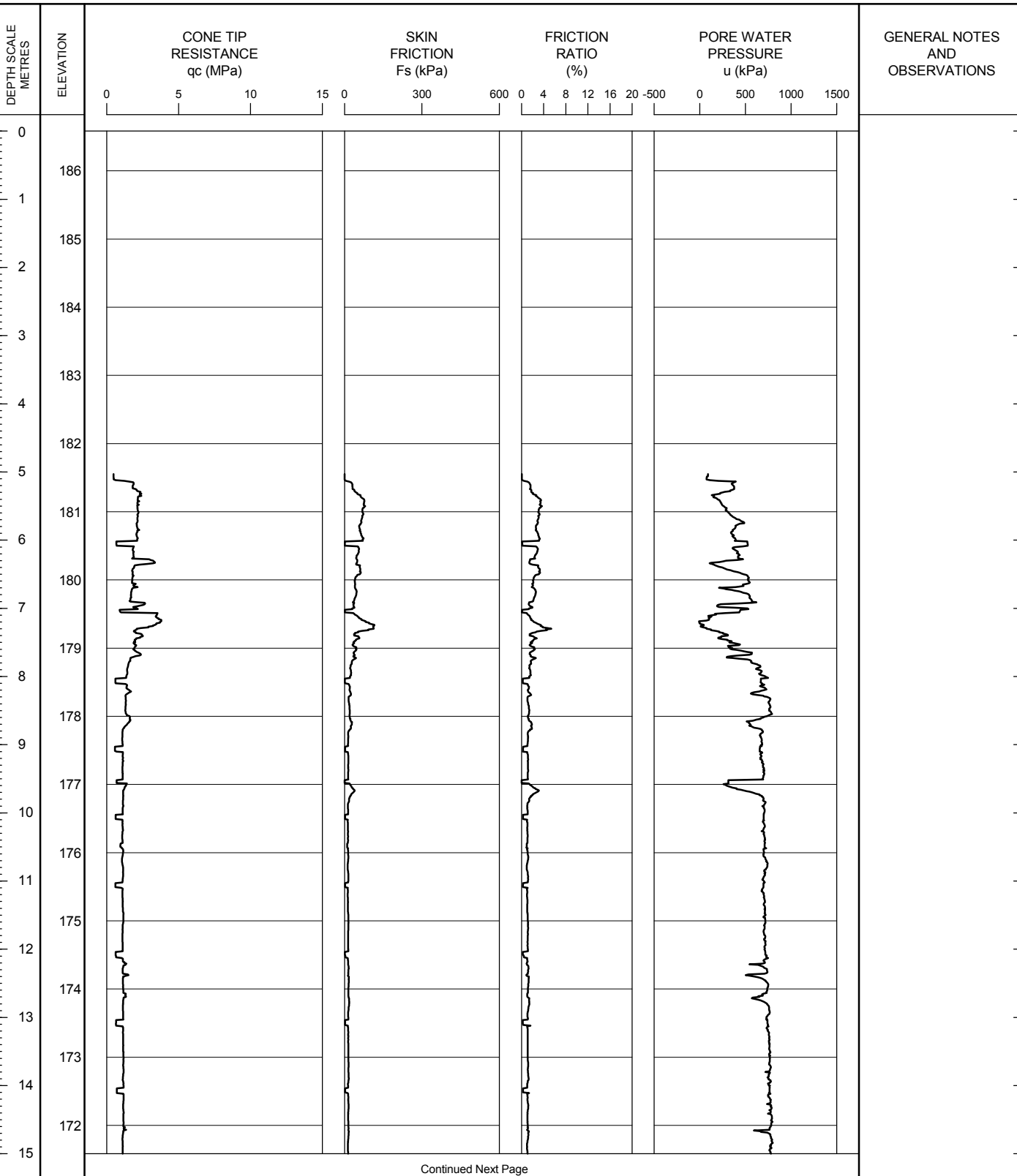
DATUM Geodetic

GROUND SURFACE ELEVATION: 186.6

PREDRILL DEPTH: 5

CORRECTION FACTOR A: 0.8

CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 52-RW

METRIC

PROJECT Windsor-Essex Parkway

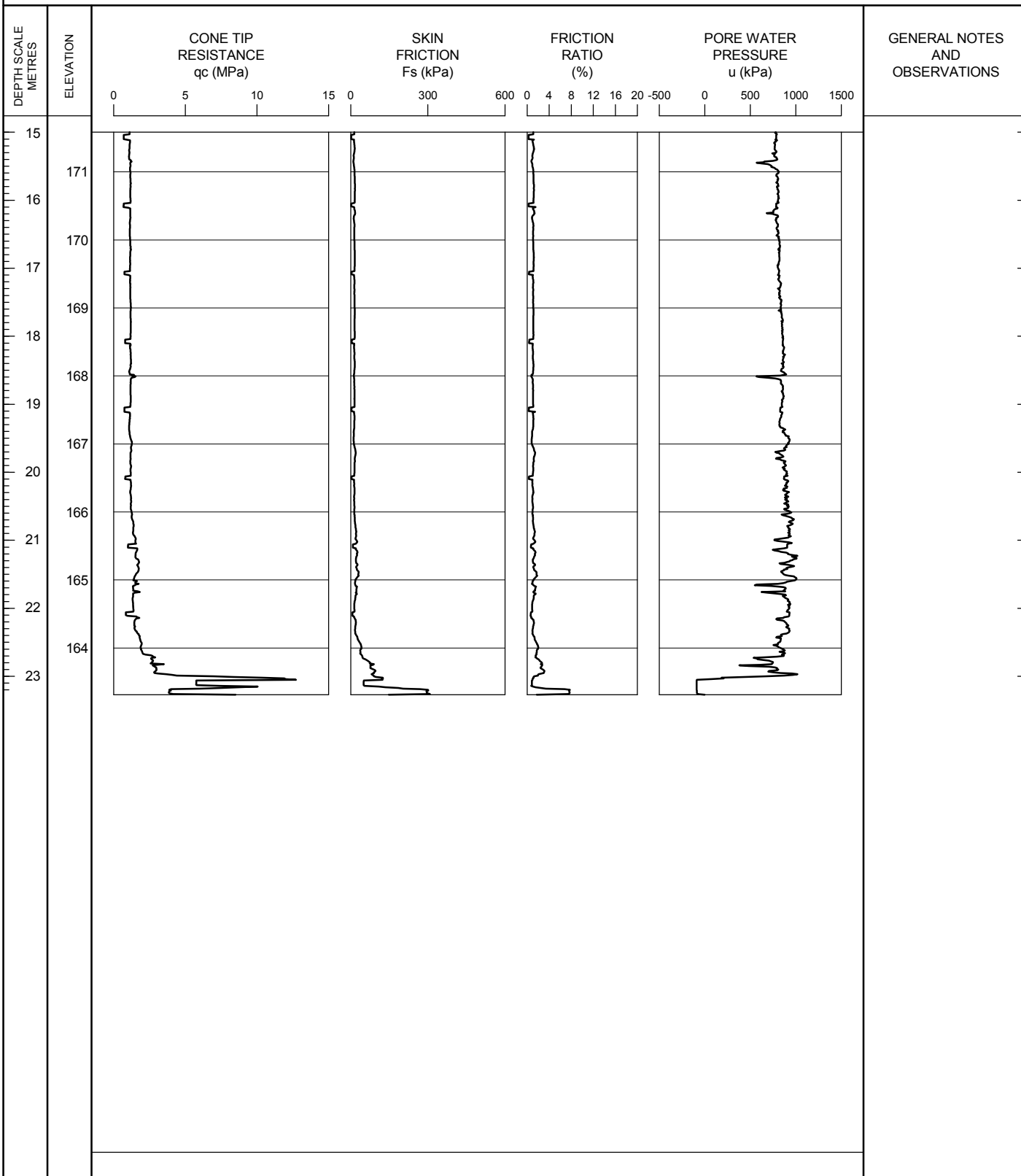
TEST DATE 5/17/2011 - 5/17/2011

SHEET 2 OF 2

LOCATION N4677681.4; E335365.2

DATUM Geodetic

GROUND SURFACE ELEVATION: 186.6 PREDRILL DEPTH: 5 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



WEP CPT LOG CPT-RW.GPJ ONTARIO MOT.GDT 06/01/12

OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 53-RW

METRIC

PROJECT Windsor-Essex Parkway

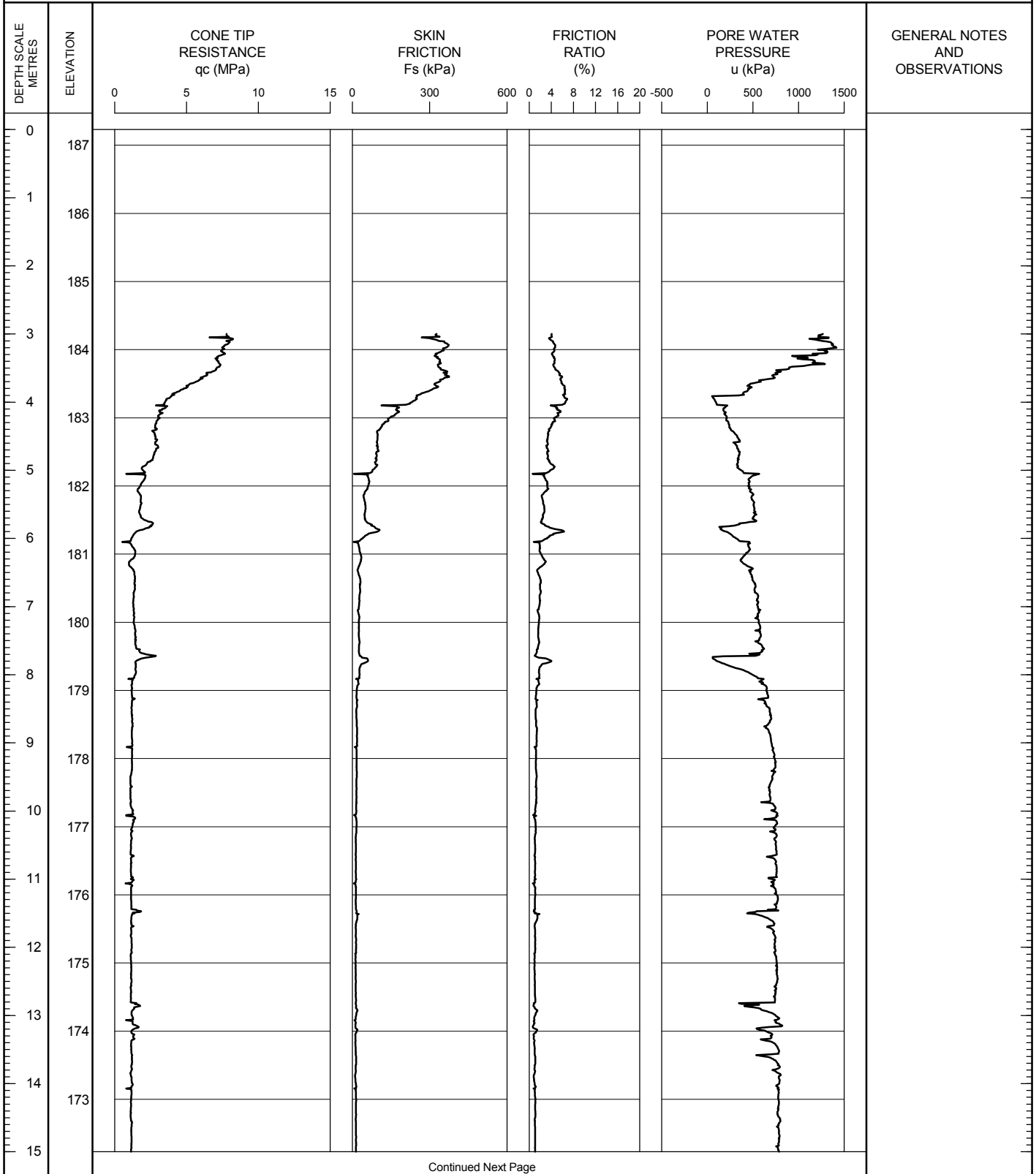
TEST DATE 8/6/2011 - 8/6/2011

SHEET 1 OF 2

LOCATION N4677582.9; E335635.4

DATUM Geodetic

GROUND SURFACE ELEVATION: 187.2 PREDRILL DEPTH: 1.98 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 53-RW

METRIC

PROJECT Windsor-Essex Parkway

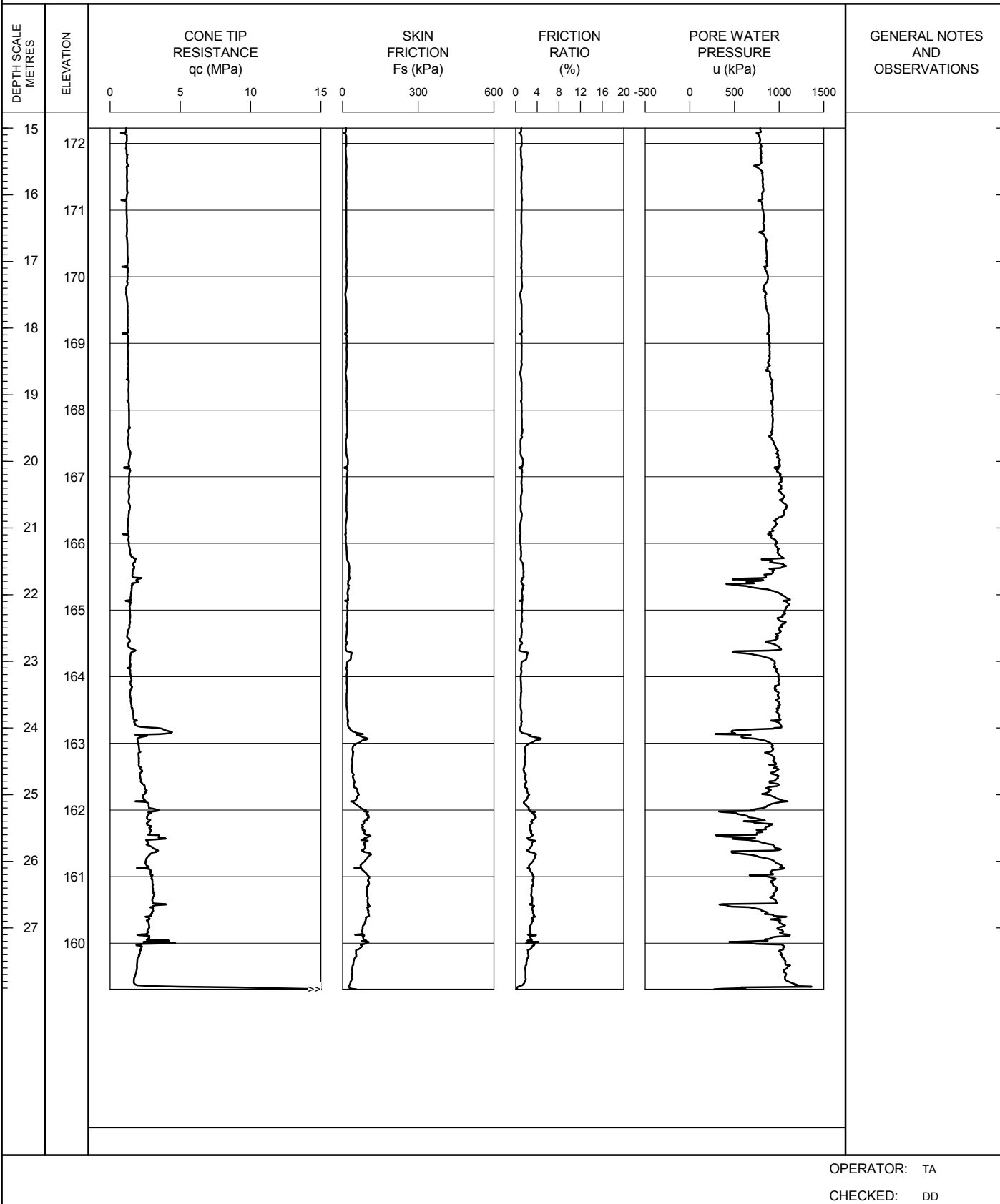
TEST DATE 8/6/2011 - 8/6/2011

SHEET 2 OF 2

LOCATION N4677582.9; E335635.4

DATUM Geodetic

GROUND SURFACE ELEVATION: 187.2 PREDRILL DEPTH: 1.98 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



RECORD OF CONE PENETRATION TEST CPT 54-RW

METRIC

PROJECT Windsor-Essex Parkway

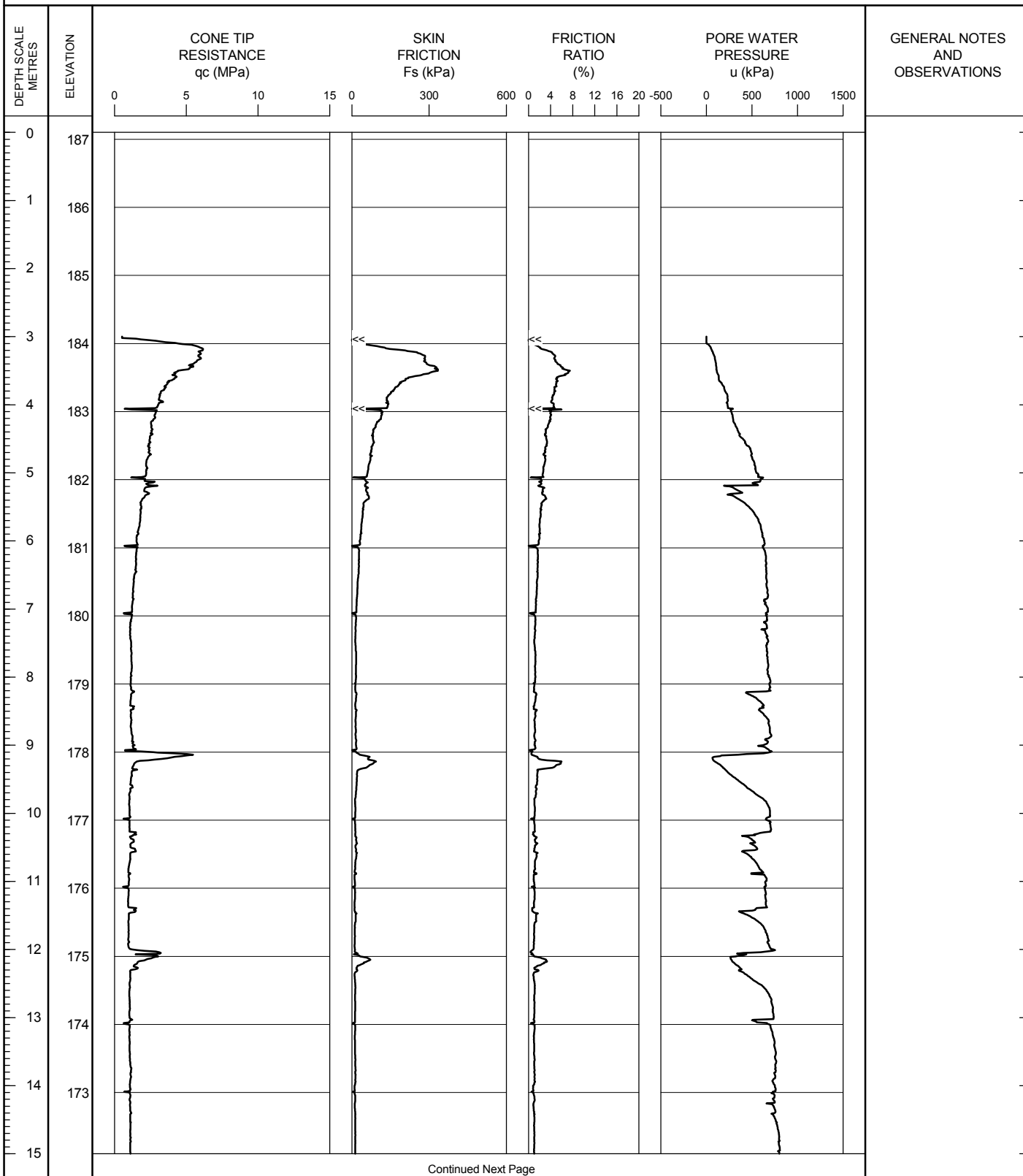
TEST DATE 8/8/2011 - 8/8/2011

SHEET 1 OF 3

LOCATION N4677677.2; E335602.3

DATUM Geodetic

GROUND SURFACE ELEVATION: 187.1 PREDRILL DEPTH: 3 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 54-RW

METRIC

PROJECT Windsor-Essex Parkway

TEST DATE 8/8/2011 - 8/8/2011

SHEET 2 OF 3

LOCATION N4677677.2; E335602.3

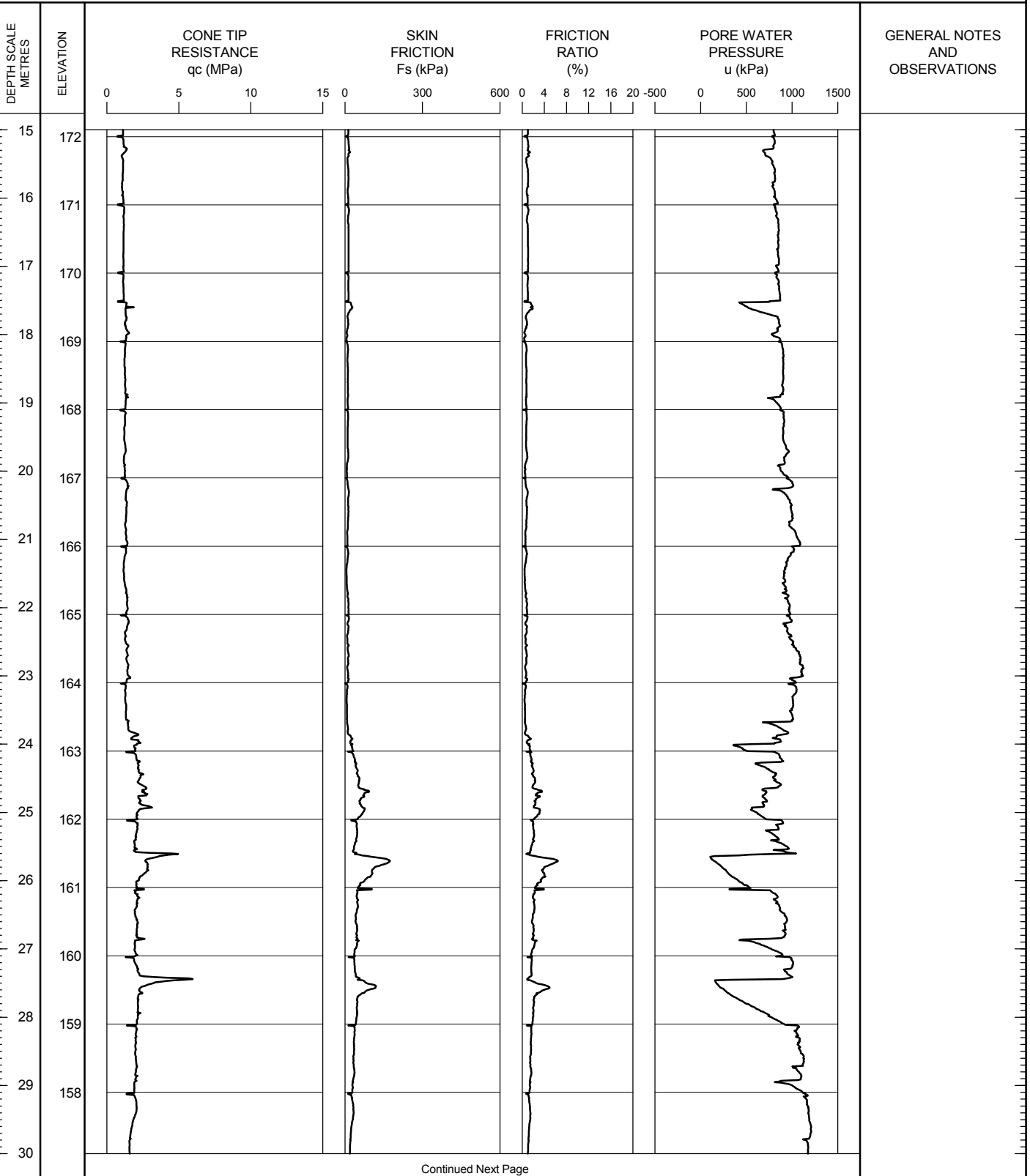
DATUM Geodetic

GROUND SURFACE ELEVATION: 187.1

PREDRILL DEPTH: 3

CORRECTION FACTOR A: 0.8

CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 54-RW

METRIC

PROJECT Windsor-Essex Parkway

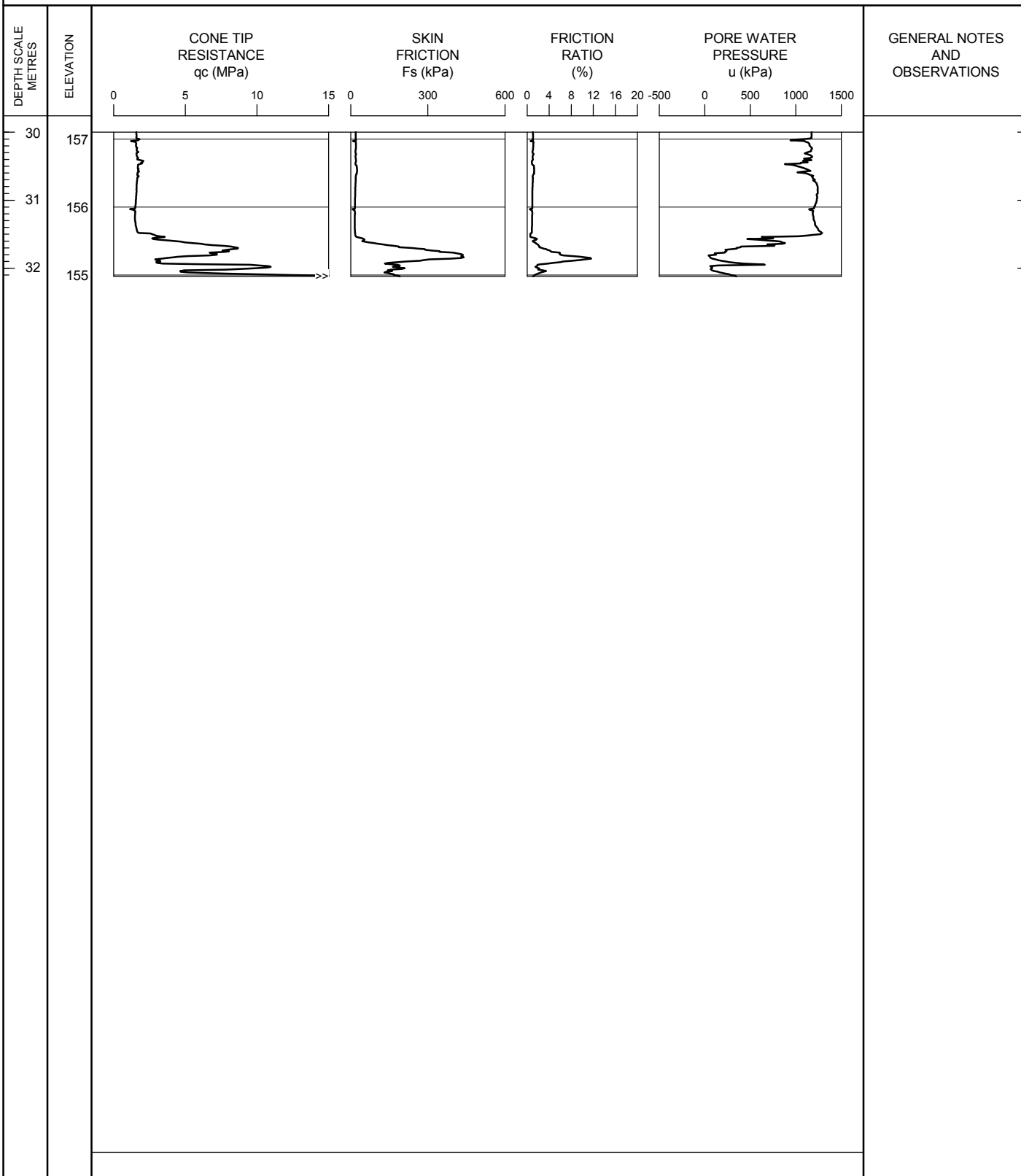
TEST DATE 8/8/2011 - 8/8/2011

SHEET 3 OF 3

LOCATION N4677677.2; E335602.3

DATUM Geodetic

GROUND SURFACE ELEVATION: 187.1 PREDRILL DEPTH: 3 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 55-RW

METRIC

PROJECT Windsor-Essex Parkway

TEST DATE 8/6/2011 - 8/6/2011

SHEET 1 OF 2

LOCATION N4677609.7; E335904.2

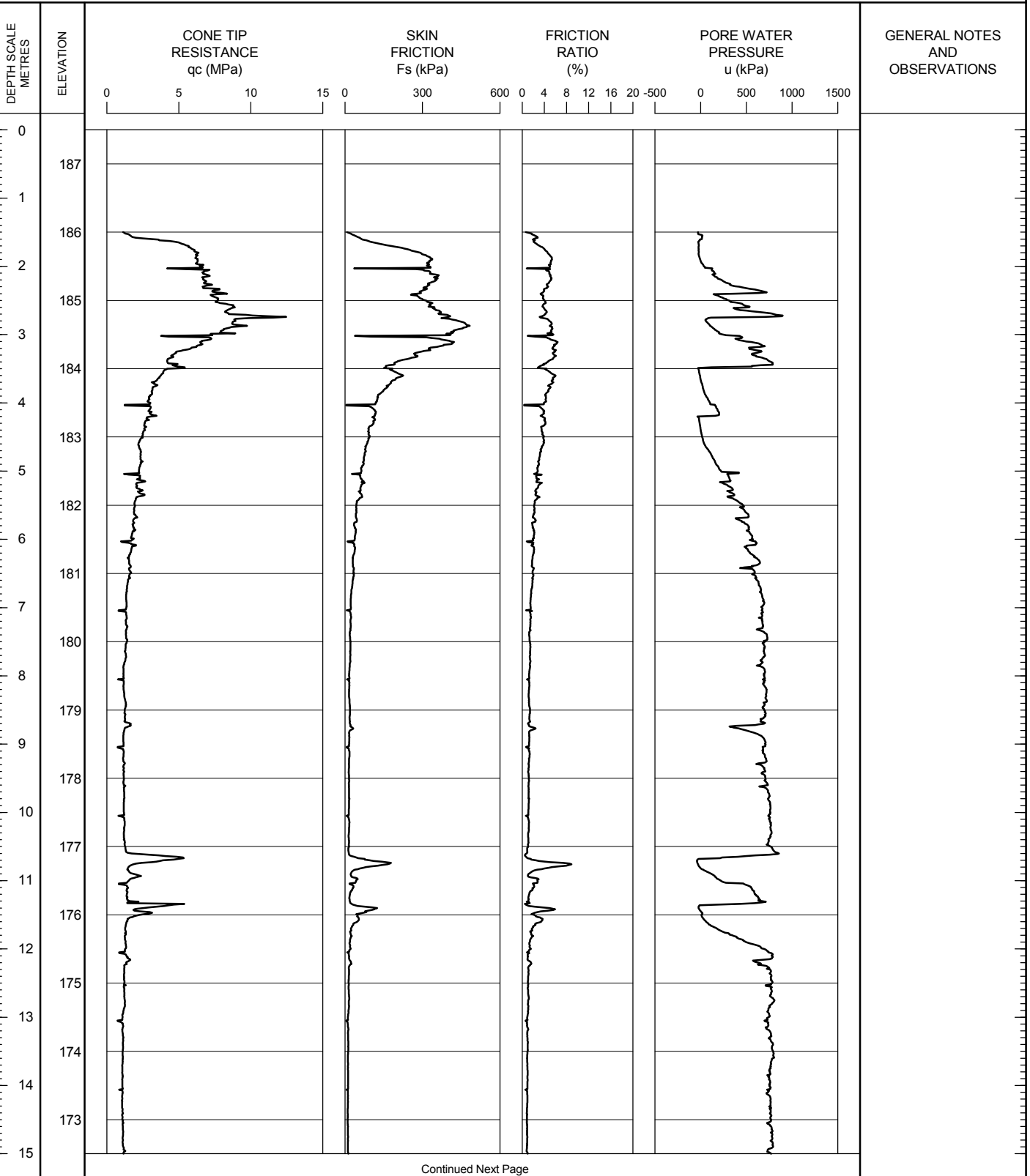
DATUM Geodetic

GROUND SURFACE ELEVATION: 187.5

PREDRILL DEPTH: 3

CORRECTION FACTOR A: 0.8

CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 55-RW

METRIC

PROJECT Windsor-Essex Parkway

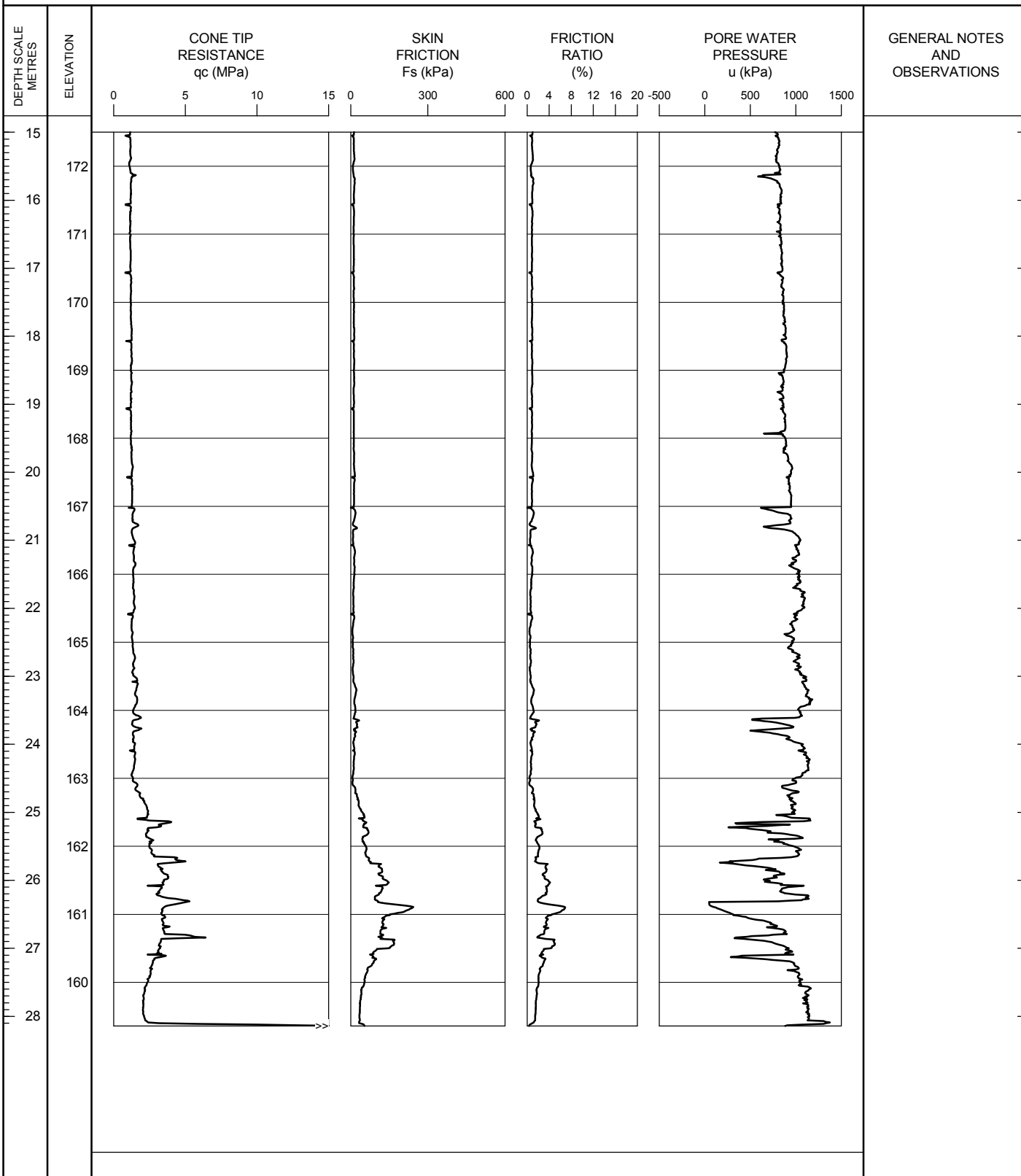
TEST DATE 8/6/2011 - 8/6/2011

SHEET 2 OF 2

LOCATION N4677609.7; E335904.2

DATUM Geodetic

GROUND SURFACE ELEVATION: 187.5 PREDRILL DEPTH: 3 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



WEF CPT LOG CPT-RW.GPJ ONTARIO MOT.GDT 06/01/12

OPERATOR: TA

CHECKED: DD

Station 10+700T to Station 11+400T (Soil Profile #17)

1 OF 1

METRIC

[illegible]

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 01/05/12






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

RECORD OF BOREHOLE No BH24-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677912.6, E336374.9 ORIGINATED BY NB
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 7, 11 - Jul 7, 11 CHECKED BY MSO

| 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 | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED ● POCKET PEN. | + FIELD VANE × LAB VANE | | | | | | | | | |
| 187.3 | Ground Surface | | | | | | | | | | | | | | | | | |
| 0.0 | 200mm TOPSOIL | | | | | | | | | | | | | | | | | |
| 0.2 | CLAYEY SILT Some sand, trace gravel Trace rootlets, white precipitates in fissures Hard to very stiff Brown and grey Brown |  | 1 | SS | 13 |  | 187 | | | | | | | | | -corrosivity sample | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 2 | SS | 41 | | 186 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 3 | SS | 39 | | 185 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | 4 | SS | 36 | 184 | | | | | | | | | | | | | | |
| | Grey | | | | | | | | | | | | | | | | | |
| | 5 | SS | 21 | 183 | | | | | | | | | | | | | | |
| 183.5 | SILTY SAND Some clay Compact Grey |  | 6 | SS | 13 | | | | | | | | | | | | | |
| 3.8 | | | | | | | | | | | | | | | | | | |
| | | | 7 | SS | 20 | 182 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | 8 | SS | 15 | 181 | | | | | | | | | | | | | | |
| 181.2 | SILTY CLAY Some sand, trace gravel Stiff Grey |  | 9 | SS | 14 | | | | | | | | | | | | | |
| 6.1 | | | | | | | | | | | | | | | | | | |
| 180.7 | END OF BOREHOLE Groundwater encountered at about elevation 181.8m during drilling on July 7, 2011 |  | | | | | | | | | | | | | | | | |
| 6.6 | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | | |

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

RECORD OF BOREHOLE No CPT55-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677609.7, E335904.2 ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Aug 6, 11 - Aug 6, 11 CHECKED BY MSO

| 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 | | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● POCKET PEN. | × LAB VANE | | | | | | | | | |
| 187.5 | Ground Surface | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | | | |
| 0.0 | TOPSOIL | | 1 | SS | 7 | | | | | | | | | | | | | | | |
| 187.2 | CLAYEY SILT Some sand, trace gravel Firm to hard Mottled brown and grey | | 2 | SS | 6 | | | | | | | | | | | | | | | |
| 0.3 | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | Brown -Trace fissures | | 3 | SS | 33 | | | | | | | | | | | | | | | |
| 184.5 | END OF SAMPLED BOREHOLE (continued with CPT to refusal) Borehole dry on completion | | | | | | | | | | | | | | | | | | | |
| 3.0 | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | 184 | | | | | | | | | | | | | |
| | | | | | | | 183 | | | | | | | | | | | | | |
| | | | | | | | 182 | | | | | | | | | | | | | |
| | | | | | | | 181 | | | | | | | | | | | | | |
| | | | | | | | 180 | | | | | | | | | | | | | |
| | | | | | | | 179 | | | | | | | | | | | | | |
| | | | | | | | 178 | | | | | | | | | | | | | |
| | | | | | | | 177 | | | | | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | | | | | |
| | | | | | | | 175 | | | | | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | | | | | | |

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 01/05/12

RECORD OF NILCON VANE TEST NIL CV1-1

Project : Windsor-Essex Parkway

Test Date: 7/7/2011

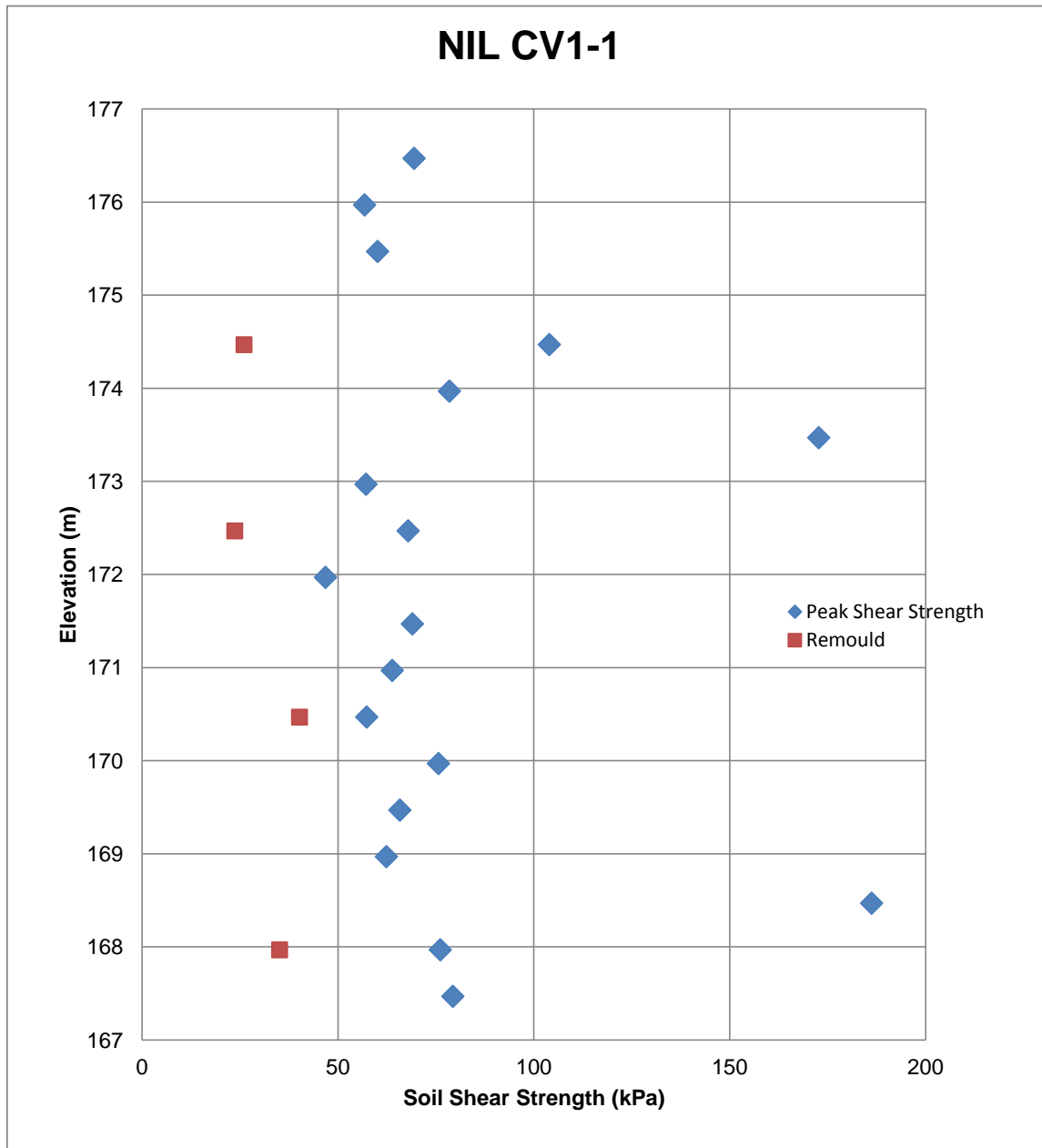
Sheet 1 of 1

Location: N4677688.6; E336115.7

Predrill Depth : 10.5 m

Datum Geodetic

Ground Surface Elevation: 187.0 m



Operator: NB

Checked: DD

RECORD OF CONE PENETRATION TEST CPT 55-RW

METRIC

PROJECT Windsor-Essex Parkway

TEST DATE 8/6/2011 - 8/6/2011

SHEET 1 OF 2

LOCATION N4677609.7; E335904.2

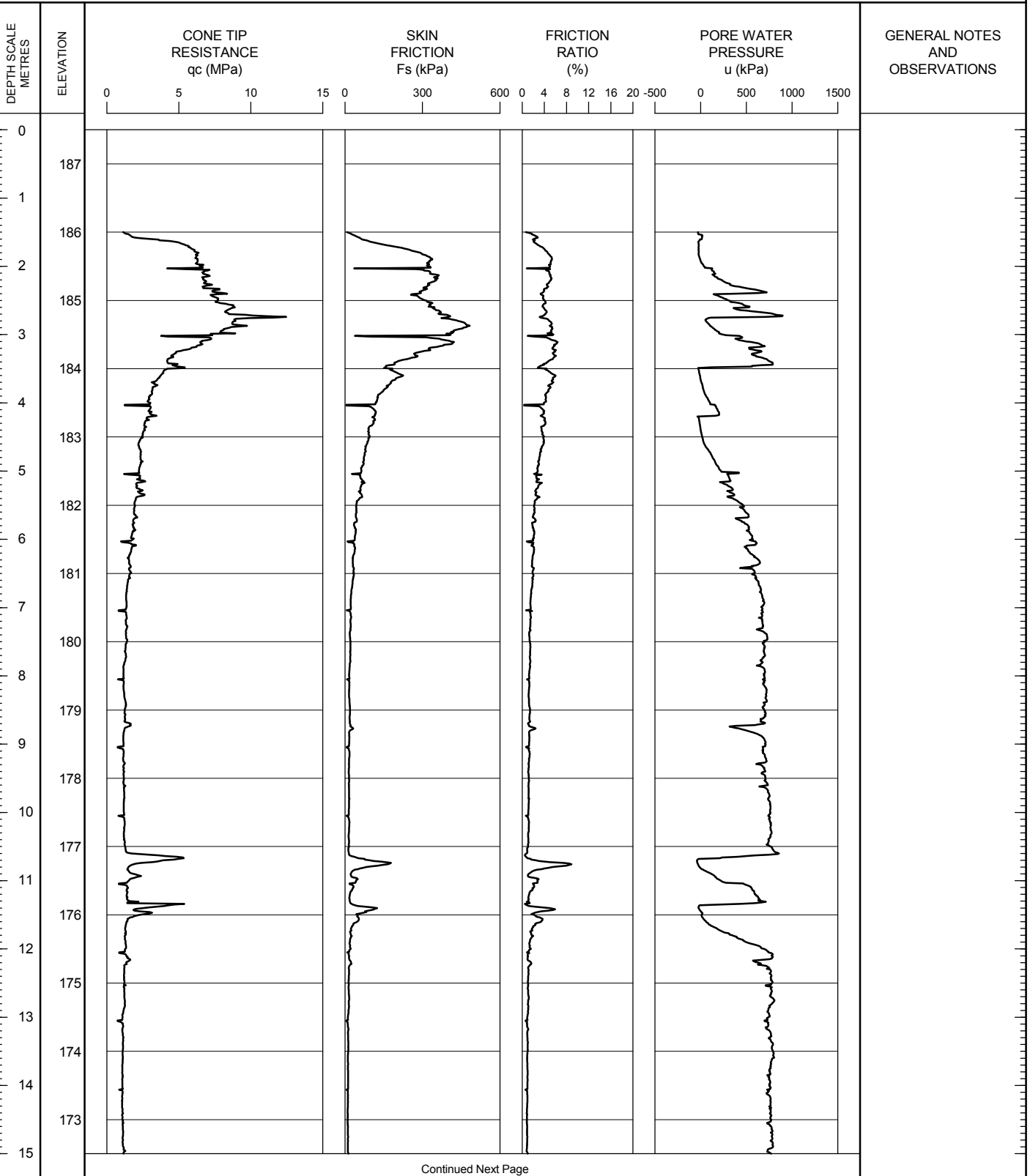
DATUM Geodetic

GROUND SURFACE ELEVATION: 187.5

PREDRILL DEPTH: 3

CORRECTION FACTOR A: 0.8

CORRECTION FACTOR B: 0



OPERATOR: TA

CHECKED: DD

RECORD OF CONE PENETRATION TEST CPT 55-RW

METRIC

PROJECT Windsor-Essex Parkway

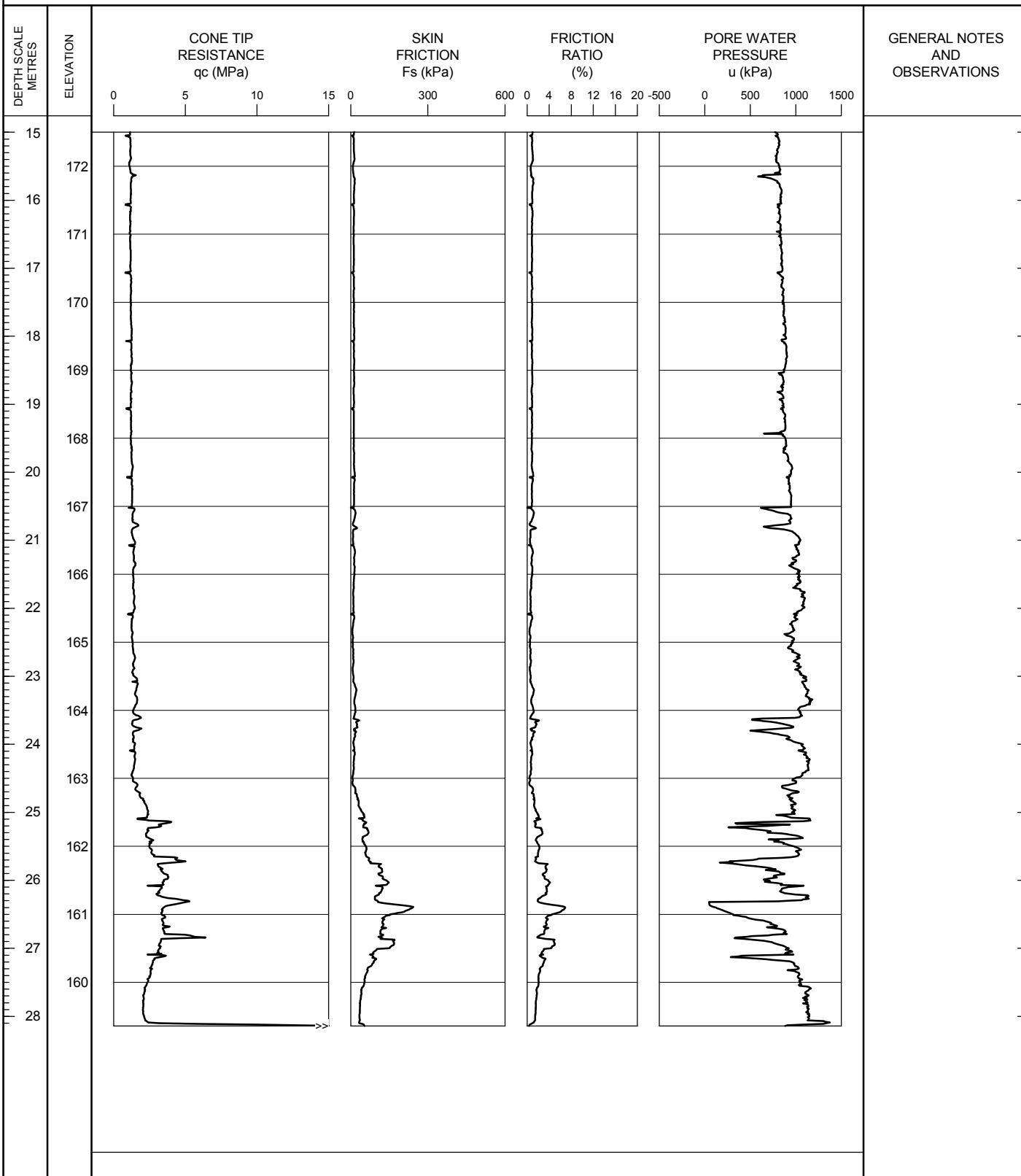
TEST DATE 8/6/2011 - 8/6/2011

SHEET 2 OF 2

LOCATION N4677609.7; E335904.2

DATUM Geodetic

GROUND SURFACE ELEVATION: 187.5 PREDRILL DEPTH: 3 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



WEF CPT LOG CPT-RW.GPJ ONTARIO MOT.GDT 06/01/12

OPERATOR: TA

CHECKED: DD

Station 11+500T to Station 12+300T (Soil Profile #18)

METRIC

Continued Next Page


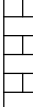


+³, ×³: Numbers refer to Sensitivity ○^{3%} STRAIN AT FAILURE

RECORD OF BOREHOLE No B15-1

4 OF 4

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4678489N, 337046E ORIGINATED BY DG
 DIST HWY WEP BOREHOLE TYPE Track Mounted Drill - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE May 25, 11 - May 30, 11 CHECKED BY MSO

| 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 | | | | | | | | | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | | | | | | | | | |
| | | | | | | | | ● POCKET PEN. | × LAB VANE | | | | | | | | | |
| 153.0 43.1 | SILTY CLAY Stiff Grey |  | | | | | | | | | | | | | | | | |
| 151.7 46.4 | | | 38 | SS | 12 | | | | | | | | | | | | | |
| 151.7 46.4 | LIMESTONE Fine-grained, fractured throughout, laminated Grey to brown |  | | | | | | | | | | | | | | | | |
| | | | 39 | RC | | | | | | | | | | | | | | |
| 150.1 48.0 | END OF BOREHOLE |  | | | | | | | | | | | | | | | | |
| 150.1 48.0 | No groundwater observed during drilling due to wash boring |  | | | | | | | | | | | | | | | | |
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+ ³, × ³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No B15-2

1 OF 3

METRIC

W.P. RFP No. 09-54-1007 LOCATION 4678473N, 337073E ORIGINATED BY TA
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jun 1, 11 - Jun 3, 11 CHECKED BY MSO

| 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 | | | | | | | | |
| 191.1 | Highway Median Surface | | | | | | 191 | | | | | | | | | |
| 0.0 | 175mm ASPHALT | | | | | | | | | | | | | | | |
| 0.2 | FILL Sand and Crushed Gravel | | | | | | | | | | | | | | | |
| 190.1 | | | 1A, B | SS | 15 | | 190 | | | | | | | | | |
| 1.0 | CLAYEY SILT/SILTY CLAY Trace gravel Firm Mottled brown and grey Fractures Brown with grey-lined fractures Very stiff Brown Hard -Oxidized vertical fractures Very stiff Grey Stiff | | | | | | 189 | | | | | | | | | |
| | | | 2 | SS | 7 | | | | | | | | | | | |
| | | | 3 | SS | 29 | | 188 | | | | | | | | | |
| | | | 4 | SS | 32 | | | | | | | | | | | |
| | | | 5 | SS | 37 | | 187 | | | | | | | | | |
| | | | 6 | SS | 24 | | 186 | | | | | | | | | |
| | | | 7 | SS | 9 | | 185 | | | | | | | | | |
| | | | 8 | TW | PH | | | | | | | | | | | |
| | | | | VT | | | 184 | | | | | | | | | |
| | | | 9 | TW | PH | | 183 | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | 182 | | | | | | | | | |
| | Numerous Sand Layers Between Elevations 182m and 177.4m | | 10 | TW | PH | | | | | | | | | | | |
| | | | | VT | | | 181 | | | | | | | | | |
| | | | 11 | SS | PH | | 180 | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | 12 | TW | PH | | 179 | | | | | | | | | |
| | | | | VT | | | 178 | | | | | | | | | |
| | | | 13 | TW | PH | | 177 | | | | | | | | | |

Continued Next Page

+³, X³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 01/05/12

METRIC

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 01/05/12

METRIC

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

RECORD OF BOREHOLE No B15-3

2 OF 4

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678467.7, E337107.6 ORIGINATED BY NB
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jun 3, 11 - Jun 5, 11 CHECKED BY MSO

| 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 (%) | | | | | | | | |
|---------------|--|------------|---------|------|------------|----------------------------|-----------------|---|--------------|---------------|------------|------------------------------------|-------------------------------------|-----------------------------------|--|---|----|----|---|----|----|----|----|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | WATER CONTENT (%) | | | | GR | SA | SI | CL | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● POCKET PEN. | × LAB VANE | | | | | 10 | 20 | 30 | -started wash boring with casing -no recovery with shelby tube (damaged); retrieved sample by pushing split spoon | | | | | -no recovery with shelby tube; retrieved sample by pushing split spoon |
| | | | | | | | | 20 | 40 | 60 | 80 | | | | | 100 | | | | | | | | |
| | CLAYEY SILT Trace gravel (continued) Numerous Sand Layers Between Elevations 182.9m and 173.7m | | 20 | TW | PH | | | | | | | | | 21.2 | 3 | 30 | 37 | 30 | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 21 | SS | PH | | | | | | | | | | | | | | | | | | | |
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| | | | 22 | SS | PH | | | | | | | | | | | | | | | | | | | |
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| | | | | VT | | | | | | | | | | | | | | | | | | | | |
| | -Seams of silt/sand | | 23 | TW | PH | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | |
| | Fine sand | | 24 | TW | PH | | | | | | | | | | | | | | | | | | | |
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| | | | | VT | | | | | | | | | | | | | | | | | | | | |
| | | | 25 | SS | 13 | | | | | | | | | | | | | | | | | | | |
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| | | | 26 | TW | PH | | | | | | | | | | | | | | | | | | | |
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| | | | | VT | | | | | | | | | | | | | | | | | | | | |
| | | | 27 | SS | 1 | | | | | | | | | | | | | | | | | | | |
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| | | | 28 | TW | PH | | | | | | | | | | | | | | | | | | | |
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| | | | | VT | | | | | | | | | | | | | | | | | | | | |
| | | | 29 | SS | 2 | | | | | | | | | | | | | | | | | | | |
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| 168.2 | | | | | | | | | | | | | | | | | | | | | | | | |

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

ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 01/05/12

METRIC

Continued Next Page

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

RECORD OF BOREHOLE No B15-3

4 OF 4

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678467.7, E337107.6 ORIGINATED BY NB
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jun 3, 11 - Jun 5, 11 CHECKED BY MSO

| 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 | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED | + | FIELD VANE | | | | | | | | |
| | | | | | | | | ● POCKET PEN. | × | LAB VANE | | | | | | | | |
| | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | |
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RQD = 100%
TCR = 100%
SCR = 96%

RECORD OF BOREHOLE No BH25-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4677997.1, E336558.9 ORIGINATED BY NB
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 6, 11 - Jul 6, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT γ kN/m³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|--|------------|---------|------|------------|----------------------------|--------------------|---|----------------------------|---|---|----------------|--------------------------------------|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | w _p | w | w _L | | |
| | | | | | | | | ○ UNCONFINED ● POCKET PEN. | + FIELD VANE × LAB VANE | | | | | |
| 188.3 | Ground Surface | | | | | | | 20 40 60 80 100 | | | | | | GR SA SI CL |
| 0.0 | 280mm TOPSOIL | | 1 | SS | 10 | | 188 | | | | | | | |
| 188.0 | SILTY CLAY Organics, trace rootlets Some sand, trace gravel Hard to very stiff Brown -Oxidized fissures Grey | | 2 | SS | 36 | | 187 | | | | | | | |
| 0.3 | | | 3 | SS | 38 | | 186 | | | | | | | |
| | | | 4 | SS | 59 | | 185 | | | | | | | |
| | | | 5 | SS | 22 | | 184 | | | | | | | |
| | | | 6 | SS | 20 | | 183 | | | | | | | |
| | | | 7 | SS | 16 | | 182 | | | | | | | |
| | | | 8 | SS | 17 | | | | | | | | | |
| | | | 9 | SS | 16 | | | | | | | | | |
| | | | | | | | | | | | | | | |
| 181.7 | END OF BOREHOLE | | | | | | | | | | | | | |
| 6.6 | Borehole dry on completion | | | | | | | | | | | | | |
| | | | | | | | 181 | | | | | | | |
| | | | | | | | 180 | | | | | | | |
| | | | | | | | 179 | | | | | | | |
| | | | | | | | 178 | | | | | | | |
| | | | | | | | 177 | | | | | | | |
| | | | | | | | 176 | | | | | | | |
| | | | | | | | 175 | | | | | | | |
| | | | | | | | 174 | | | | | | | |

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


ONTARIO MOT SW8801.1004.101.GPJ ONTARIO MOT.GDT 01/05/12

RECORD OF BOREHOLE No BH26-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678167.9, E336673.3 ORIGINATED BY NB
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 6, 11 - Jul 6, 11 CHECKED BY MSO

| 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 (%) | | | | | | |
|---------------|--|--|---------|------|------------|----------------------------|-----------------|---|--------------|---------------|--|---|---------------------------------------|--|---|--|--|--|--|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | WATER CONTENT (%) | | | | | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● POCKET PEN. | | | | | × LAB VANE | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| 188.4 | Ground Surface | | | | | | | | | | | | | | | | | | | | |
| 0.0 | TOPSOIL | | | | | | | | | | | | | | | | | | | | |
| 0.2 | CLAYEY SILT |  | 1 | SS | 8 | | 188 | | | | | | | | | | | | | | |
| | Some sand, trace gravel | | | | | | | | | | | | | | | | | | | | |
| | Hard to stiff | | 2 | SS | 40 | | | | | | | | | | | | | | | | |
| | Brown | | | | | | | | | | | | | | | | | | | | |
| | Oxidized vertical and horizontal fractures | | 3 | SS | 45 | | | 187 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | Grey | | 4 | SS | 28 | | | 186 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | | 5 | SS | 18 | | | 185 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | 6 | SS | 22 | | | | | | | | | | | | | | | | | |
| | Sandy below approx. 4m | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | 7 | SS | 17 | | 184 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| | | 8 | SS | 11 | | 183 | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | | | | | | |
| | | 9 | SS | 11 | | 182 | | | | | | | | | | | | | | | |
| 181.8 | END OF BOREHOLE | | | | | | | | | | | | | | | | | | | | |
| 6.6 | Borehole dry on completion | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | 181 | | | | | | | | | | | | | | |
| | | | | | | | 180 | | | | | | | | | | | | | | |
| | | | | | | | 179 | | | | | | | | | | | | | | |
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| | | | | | | | 177 | | | | | | | | | | | | | | |
| | | | | | | | 176 | | | | | | | | | | | | | | |
| | | | | | | | 175 | | | | | | | | | | | | | | |
| | | | | | | | 174 | | | | | | | | | | | | | | |

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

RECORD OF BOREHOLE No BH27-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678258.4, E336856.9 ORIGINATED BY NB
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 6, 11 - Jul 6, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|---|----|----|-----|--|------------------------------------|-------------------------------------|-----------------------------------|-------------------------|---|-------------------|----|----|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE | | | | | | | | | | | | |
| | | | | | | | | ● POCKET PEN. × LAB VANE | | | | | | | | | | | | |
| 189.4 | Ground Surface | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | GR | SA | SI | CL |
| 0.0 | 400mm TOPSOIL | | 1 | SS | 5 | | | | | | | | | | | | | | | |
| 189.0 | | | | | | | | | | | | | | | | | | | | |
| 0.4 | CLAYEY SILT Some sand, trace gravel, rootlets Very stiff to hard Brown | | 2 | SS | 23 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | 3 | SS | 50 | | | | | | | | | | | | | | | |
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| | -Oxidized | | 4 | SS | 57 | | | | | | | | | | | | | | | |
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| | Grey Oxidized fissures | | 5 | SS | 30 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | -Some sand to sandy -Trace gravel | | 6 | SS | 25 | | | | | | | | | | | | | | | |
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| | | | 7 | SS | 20 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | 8 | SS | 25 | | | | | | | | | | | | | | | |
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| | | | 9 | SS | 16 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| 182.8 | END OF BOREHOLE | | | | | | | | | | | | | | | | | | | |
| 6.6 | Borehole dry on completion | | | | | | | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No BH28-RW

1 OF 1

METRIC

W.P. RFP No. 09-54-1007 LOCATION N4678423.4, E336975.3 ORIGINATED BY NB
 DIST HWY WEP BOREHOLE TYPE CME 55 - 200mm Dia. Continuous Flight Hollow Stem Augers COMPILED BY SS
 DATUM Geodetic DATE Jul 6, 11 - Jul 6, 11 CHECKED BY MSO

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT γ kN/m³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | | | | | |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|---|-------------------------------|-------------------|---|-----|----------------|-----------------------------------|---|----|----|----|--|--|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | w _p | w | w _L | | GR | SA | SI | CL | | | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE | ● POCKET PEN. × LAB VANE | WATER CONTENT (%) | | | | | | | | | | | | |
| 189.4 | Ground Surface | | | | | | | 20 | 40 | 60 | 80 | 100 | | 10 | 20 | 30 | | | | | | |
| 0.0 | 350 mm TOPSOIL | | 1 | SS | 5 | | | | | | | | | ○ | | | | | | | | |
| 189.0 | CLAYEY SILT Trace gravel Brown and grey Hard to stiff Brown Grey | | | | | | | | | | | | | ○ | | | | | | | | |
| 0.4 | | | | 2 | SS | 31 | | | | | | | | | ○ | | | | | | | |
| | | | | | 3 | SS | 41 | | | | | | | | ○ | | | | | | | |
| | | | | | 4 | SS | 26 | | | | | | | | ○ | | | | | | | |
| | | | | | 5 | SS | 23 | | | | | | | | ○ | | | | | | | |
| | | | | | 6 | SS | 13 | | | | | | | | ○ | | | | | | | |
| | | | | | 7 | SS | 14 | | | | | | | | ○ | | | | | | | |
| | | | | | 8 | SS | 11 | | | | | | | | ○ | | | | | | | |
| | | | | | 9 | SS | 12 | | | | | | | | ○ | | | | | | | |
| 182.8 | END OF BOREHOLE | | | | | | | | | | | | | | | | | | | | | |
| 6.6 | Borehole dry on completion | | | | | | | | | | | | | | | | | | | | | |
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+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF NILCON VANE TEST NIL B15-1

Project : Windsor-Essex Parkway

Test Date: 6/2/2011

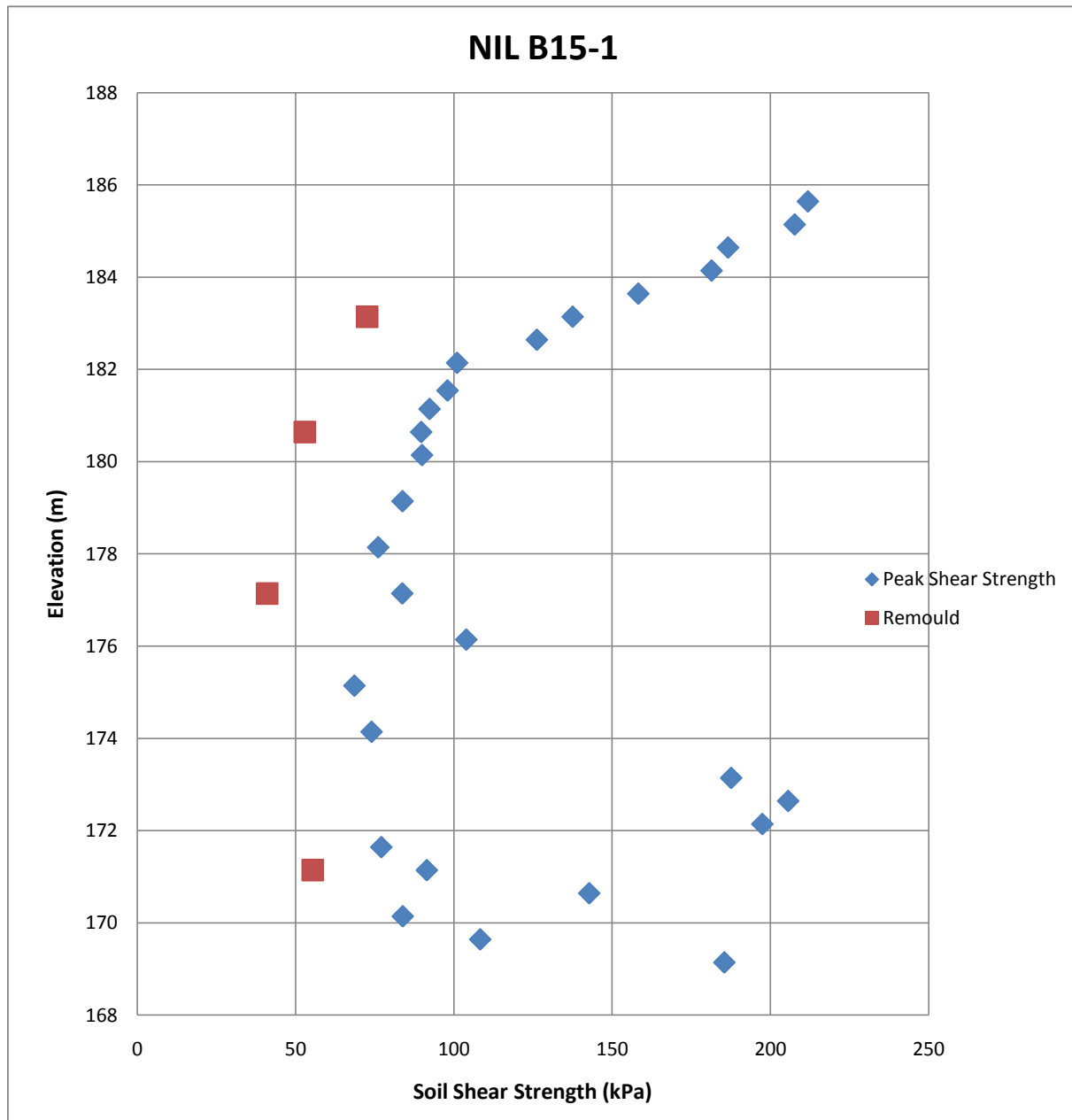
Sheet 1 of 1

Location: N4678489.2; E337046.3

Predrill Depth : 12.5 m

Datum Geodetic

Ground Surface Elevation: 198.1 m



Operator: NB

Checked: DD

RECORD OF CONE PENETRATION TEST CPT B15-1

METRIC

PROJECT Windsor-Essex Parkway

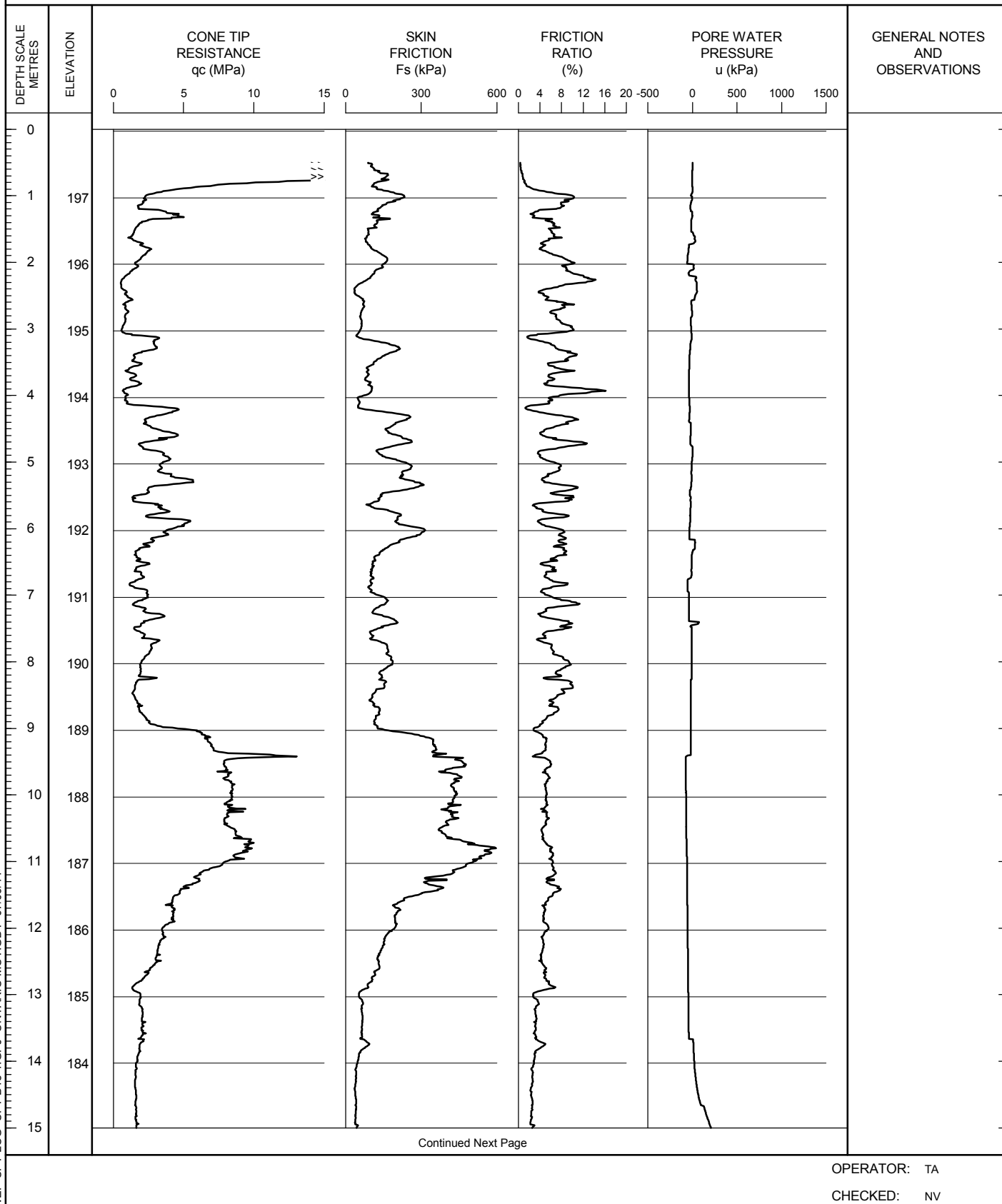
TEST DATE 5/31/2011 - 5/31/2011

SHEET 1 OF 3

LOCATION N4678491.3; E337040.8

DATUM Geodetic

GROUND SURFACE ELEVATION: 198.0 PREDRILL DEPTH: 0.35 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



RECORD OF CONE PENETRATION TEST CPT B15-1

METRIC

PROJECT Windsor-Essex Parkway

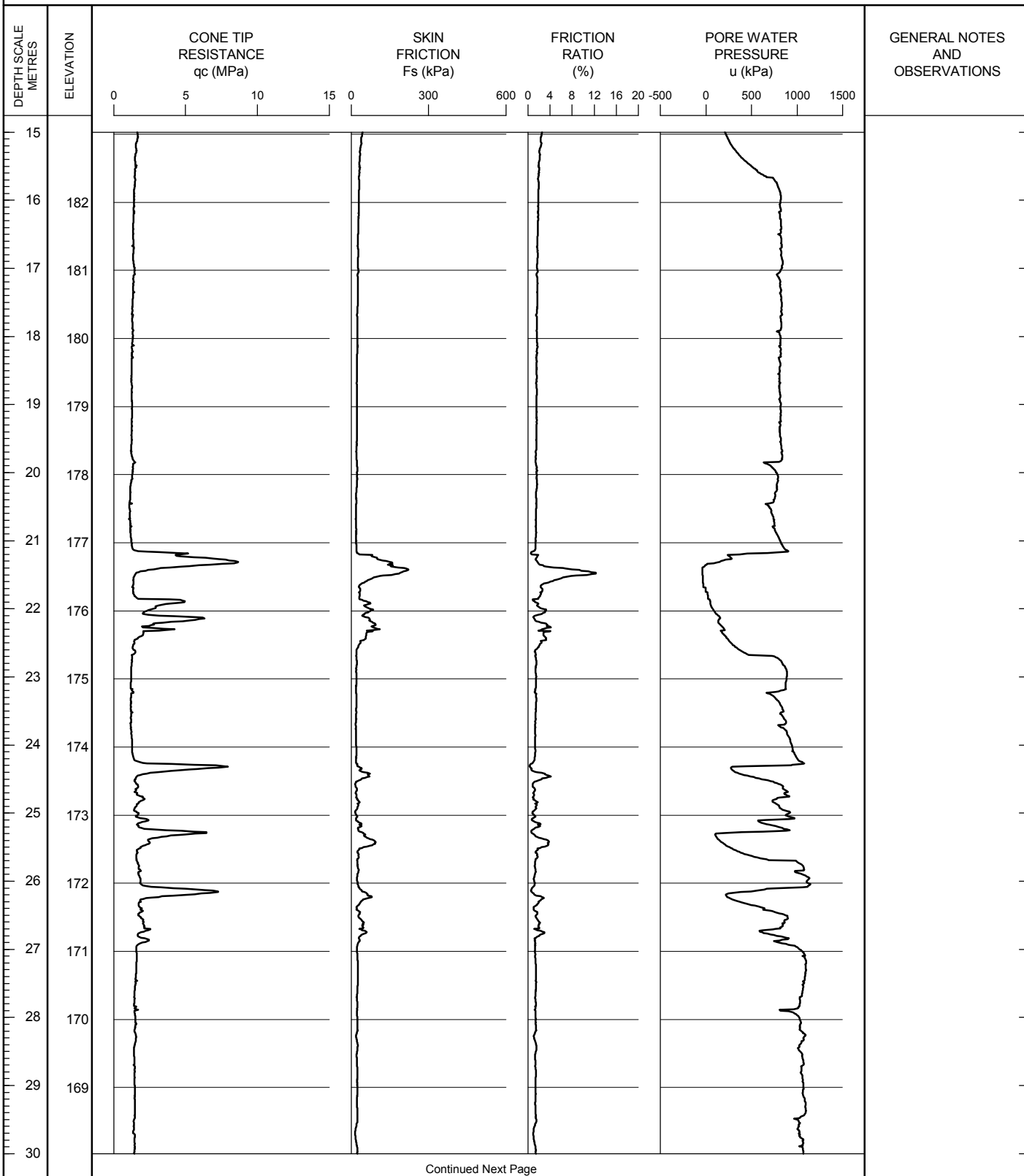
TEST DATE 5/31/2011 - 5/31/2011

SHEET 2 OF 3

LOCATION N4678491.3; E337040.8

DATUM Geodetic

GROUND SURFACE ELEVATION: 198.0 PREDRILL DEPTH: 0.35 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



WEPCPT LOG CPT B15-1.GPJ ONTARIO MOT.GDT 07/09/11

OPERATOR: TA

CHECKED: NV

RECORD OF CONE PENETRATION TEST CPT B15-1

METRIC

PROJECT Windsor-Essex Parkway

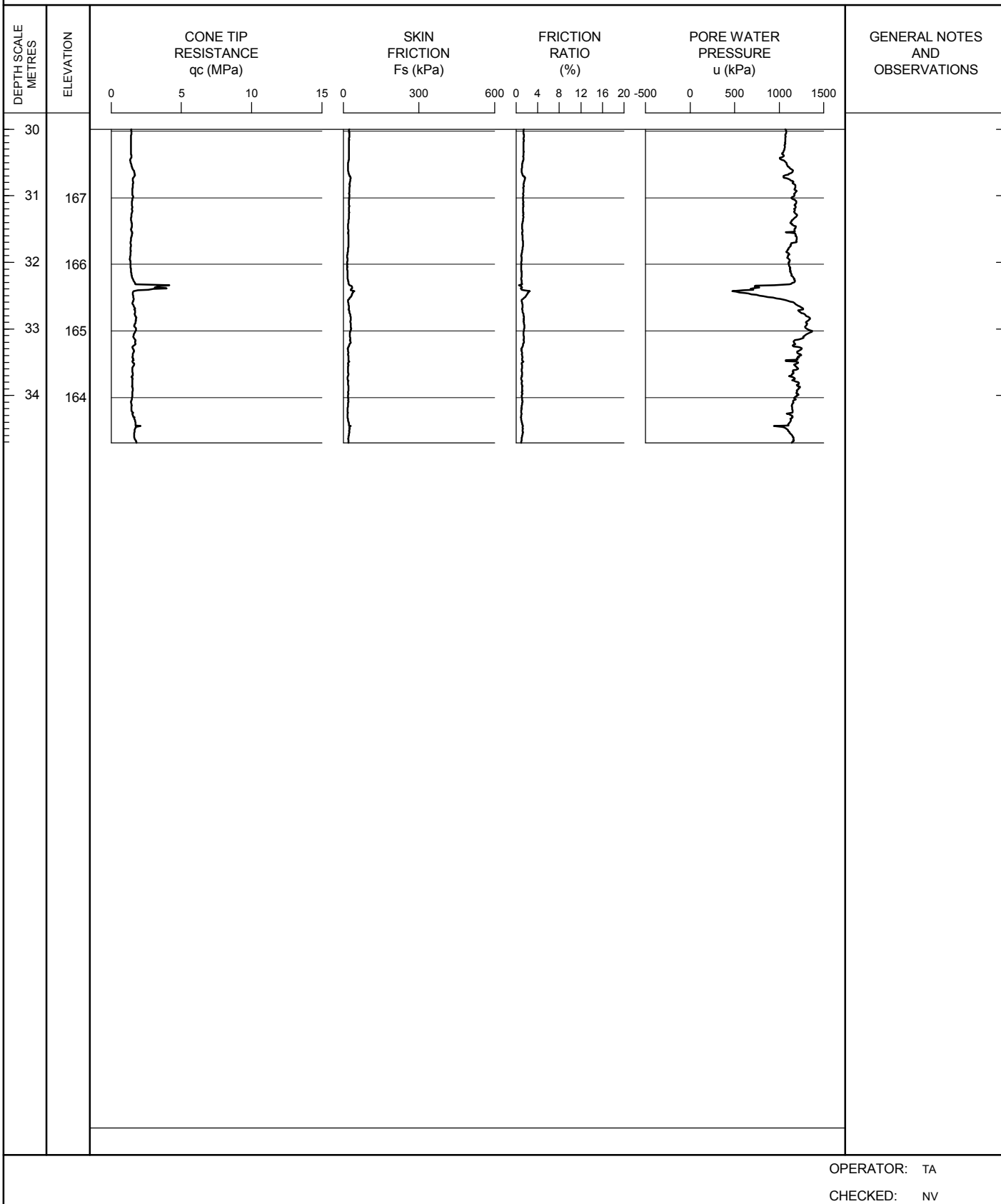
TEST DATE 5/31/2011 - 5/31/2011

SHEET 3 OF 3

LOCATION N4678491.3; E337040.8

DATUM Geodetic

GROUND SURFACE ELEVATION: 198.0 PREDRILL DEPTH: 0.35 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



RECORD OF CONE PENETRATION TEST CPT B15-2

METRIC

PROJECT Windsor-Essex Parkway

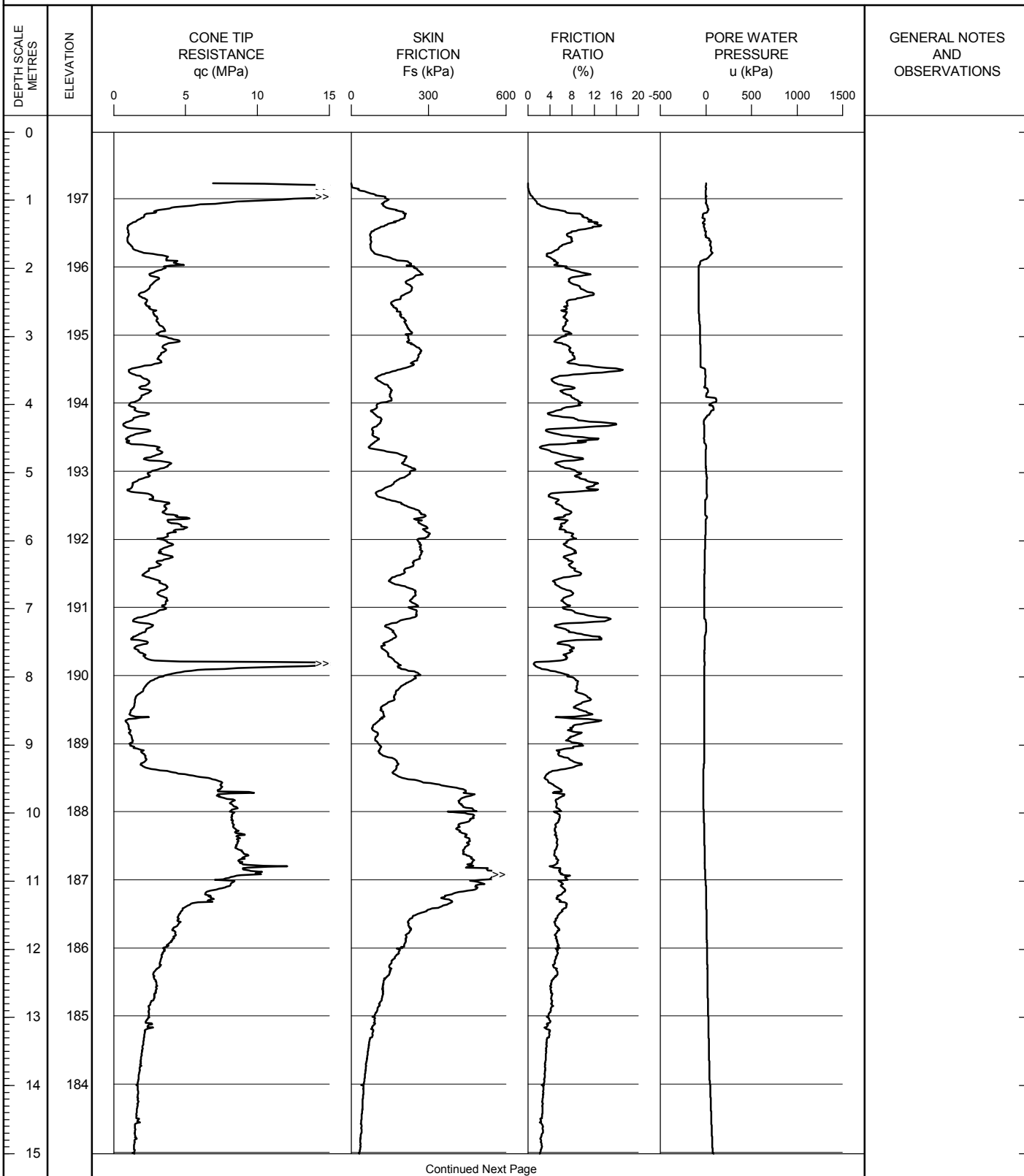
TEST DATE 6/1/2011 - 6/1/2011

SHEET 1 OF 2

LOCATION N4678460.3; E337116.3

DATUM Geodetic

GROUND SURFACE ELEVATION: 198.0 PREDRILL DEPTH: 0.74 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



WEP CPT LOG CPT B15-2.GPJ ONTARIO MOT.GDT 07/09/11

OPERATOR: TA

CHECKED: NV

RECORD OF CONE PENETRATION TEST CPT B15-2

METRIC

PROJECT Windsor-Essex Parkway

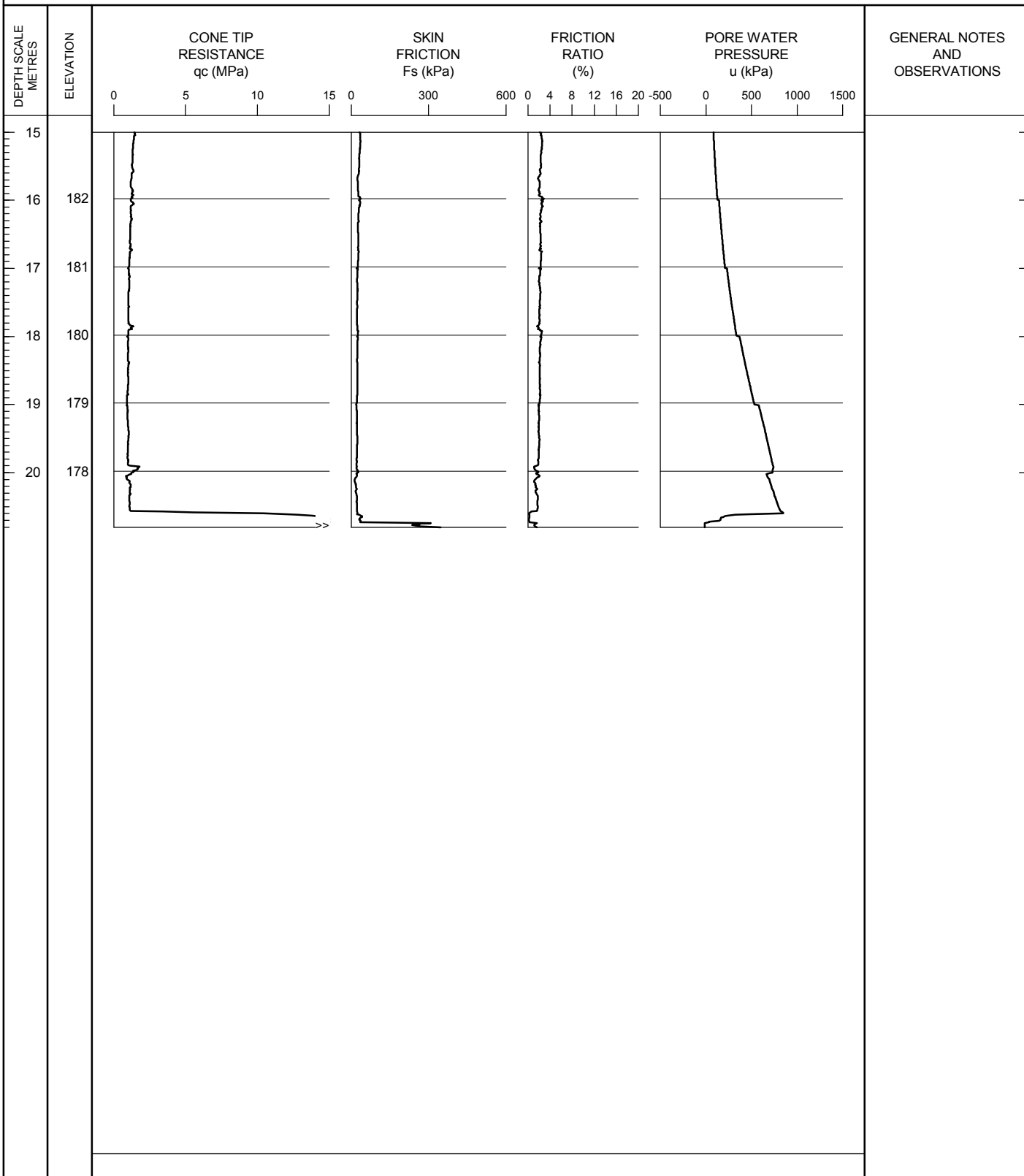
TEST DATE 6/1/2011 - 6/1/2011

SHEET 2 OF 2

LOCATION N4678460.3; E337116.3

DATUM Geodetic

GROUND SURFACE ELEVATION: 198.0 PREDRILL DEPTH: 0.74 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



WEP CPT LOG CPT B15-2.GPJ ONTARIO MOT.GDT 07/09/11

OPERATOR: TA

CHECKED: NV

RECORD OF CONE PENETRATION TEST CPT B15-2A

METRIC

PROJECT Windsor-Essex Parkway

TEST DATE 6/1/2011 - 6/1/2011

SHEET 1 OF 3

LOCATION N4678460.3; E337116.3

DATUM Geodetic

GROUND SURFACE ELEVATION: 198.0 PREDRILL DEPTH: 0.74 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0

| DEPTH SCALE METRES | ELEVATION | CONE TIP RESISTANCE qc (MPa) | SKIN FRICTION Fs (kPa) | FRICTION RATIO (%) | PORE WATER PRESSURE u (kPa) | GENERAL NOTES AND OBSERVATIONS |
|-----------------------|-----------|------------------------------------|------------------------------|--------------------------|-----------------------------------|--------------------------------------|
| | | 0 5 10 15 | 0 300 600 | 0 4 8 12 16 20 -500 | 0 500 1000 1500 | |
| 0 | | | | | | See CPT B15-2 |
| 1 | 197 | | | | | |
| 2 | 196 | | | | | |
| 3 | 195 | | | | | |
| 4 | 194 | | | | | |
| 5 | 193 | | | | | |
| 6 | 192 | | | | | |
| 7 | 191 | | | | | |
| 8 | 190 | | | | | |
| 9 | 189 | | | | | |
| 10 | 188 | | | | | |
| 11 | 187 | | | | | |
| 12 | 186 | | | | | |
| 13 | 185 | | | | | |
| 14 | 184 | | | | | |
| 15 | | | | | | |

Continued Next Page

OPERATOR: TA

CHECKED: NV

RECORD OF CONE PENETRATION TEST CPT B15-2A

METRIC

PROJECT Windsor-Essex Parkway

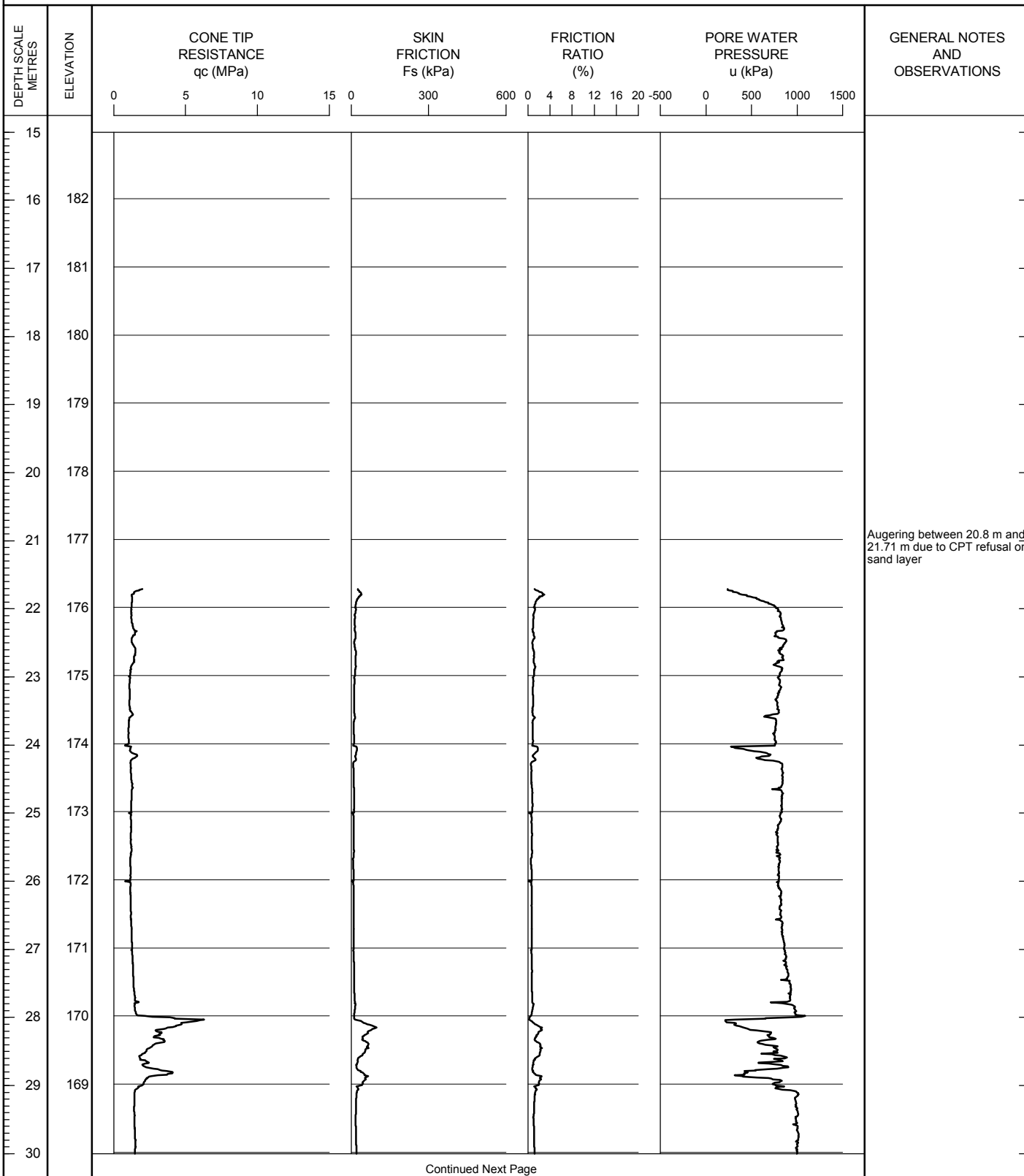
TEST DATE 6/1/2011 - 6/1/2011

SHEET 2 OF 3

LOCATION N4678460.3; E337116.3

DATUM Geodetic

GROUND SURFACE ELEVATION: 198.0 PREDRILL DEPTH: 0.74 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



Continued Next Page

OPERATOR: TA

CHECKED: NV

RECORD OF CONE PENETRATION TEST CPT B15-2A

METRIC

PROJECT Windsor-Essex Parkway

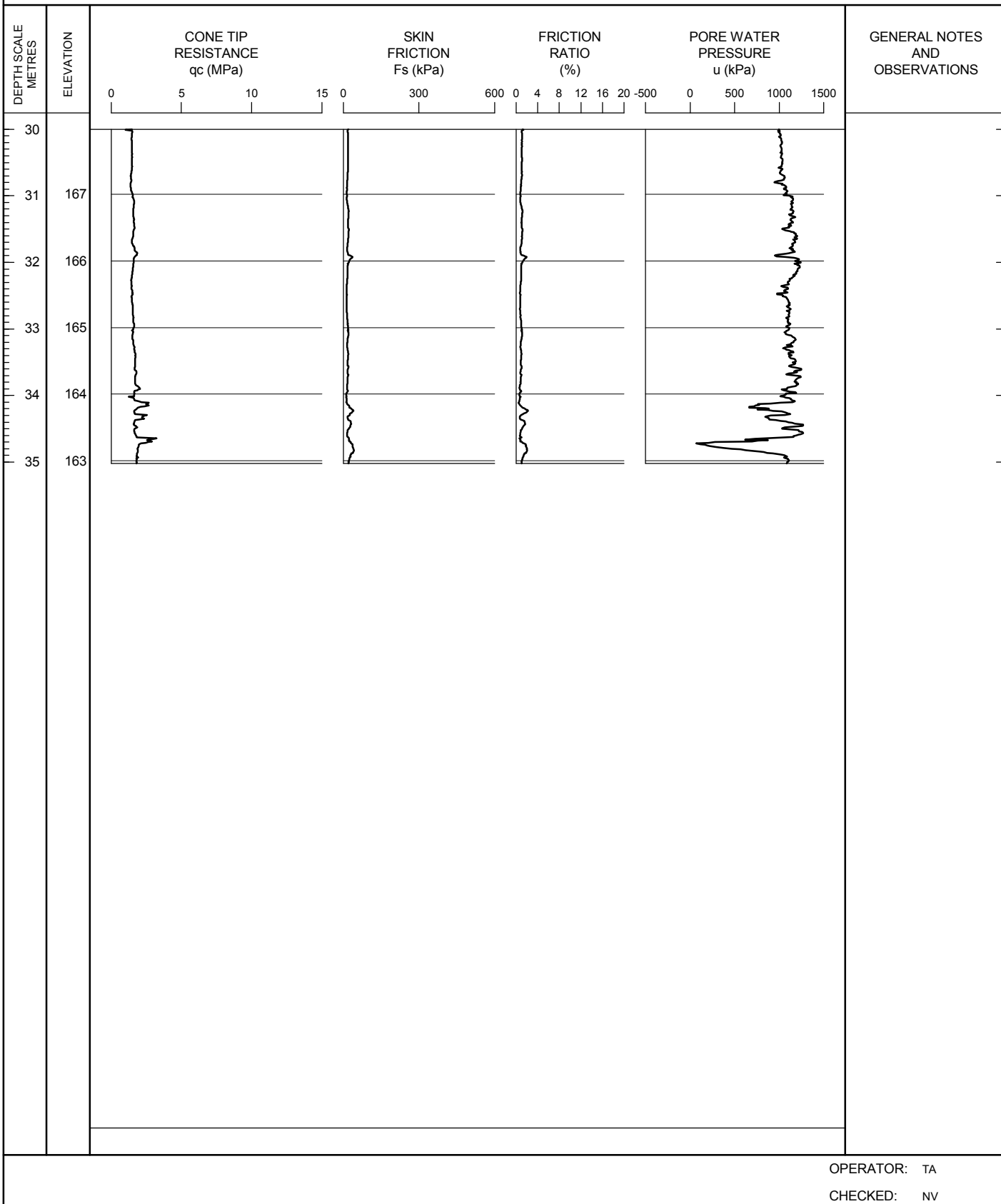
TEST DATE 6/1/2011 - 6/1/2011

SHEET 3 OF 3

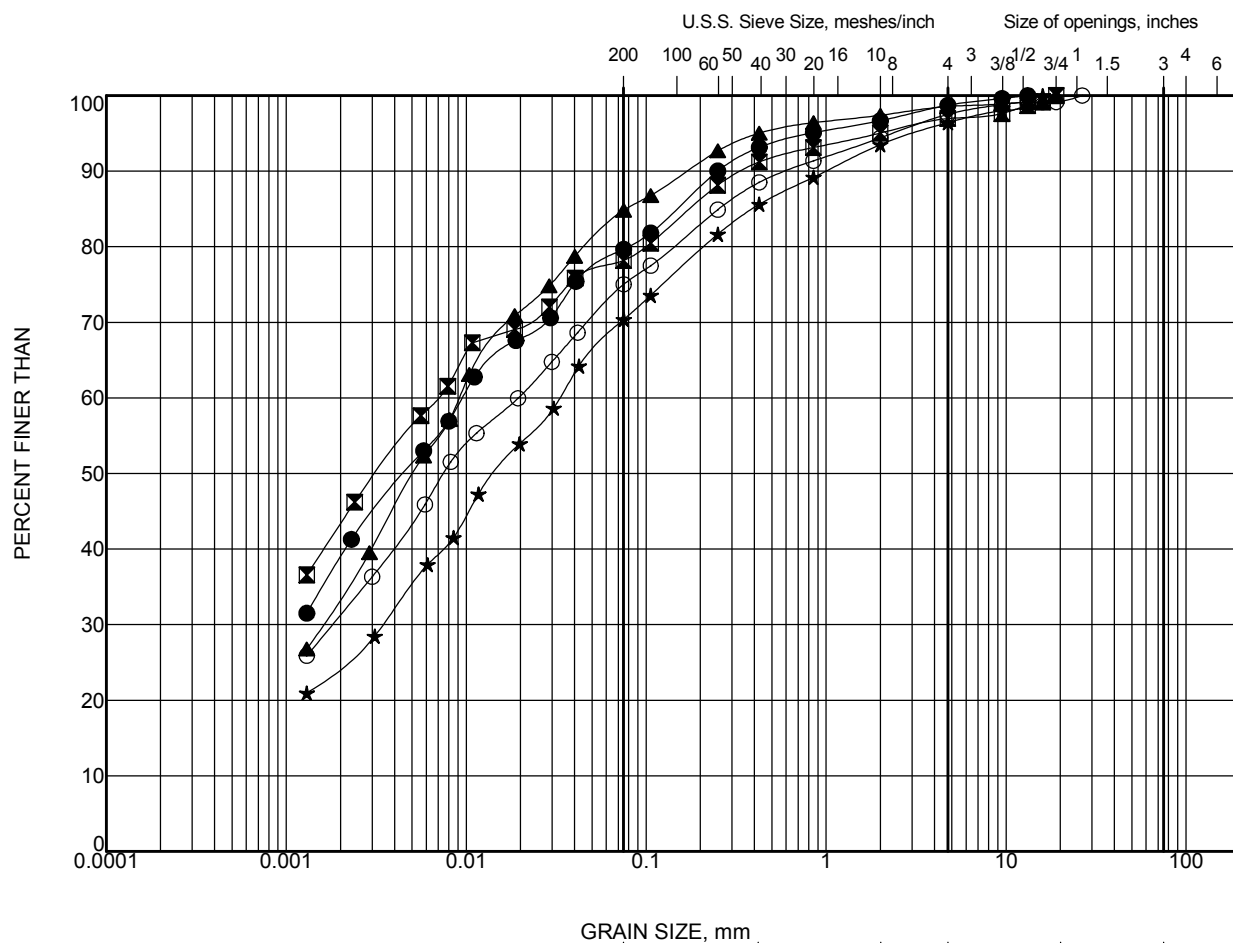
LOCATION N4678460.3; E337116.3

DATUM Geodetic

GROUND SURFACE ELEVATION: 198.0 PREDRILL DEPTH: 0.74 CORRECTION FACTOR A: 0.8 CORRECTION FACTOR B: 0



Appendix B Additional 2011 Geotechnical Investigations – Laboratory Test Results

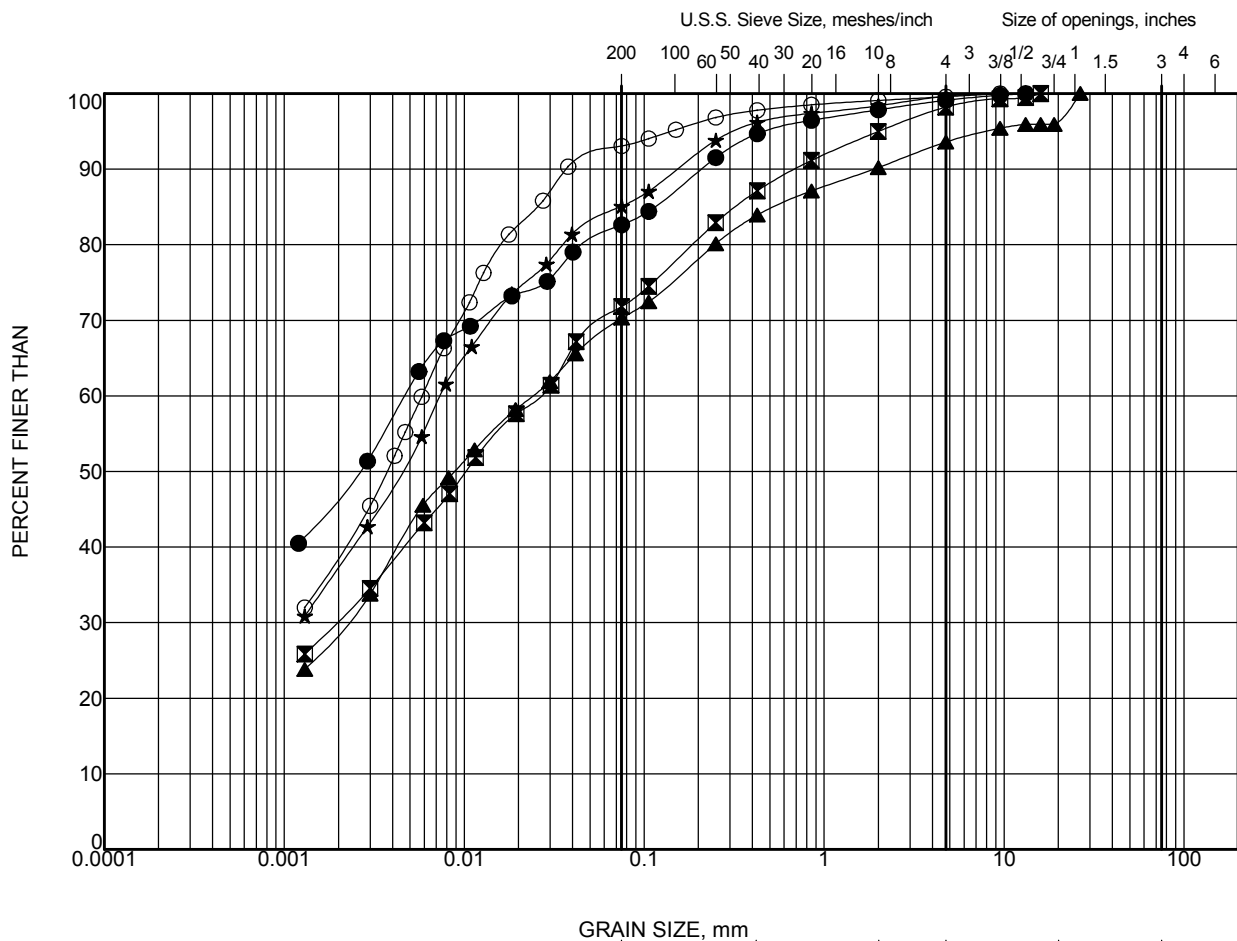


| | | | | | | |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|---------------|--------|-----------|
| ● | T6-1/HG-MW-07 | 8 | 6.1 |
| ■ | T6-1/HG-MW-07 | 10 | 9.1 |
| ▲ | T6-1/HG-MW-07 | 13 | 13.7 |
| ★ | T6-1/HG-MW-07 | 16 | 18.3 |
| ○ | T6-1/HG-MW-07 | 19 | 22.9 |

| | | | | | |
|---------|--|--|-----|-------------------|------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | | | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | | | |
| | | PROJECT No. SW8801.1004.101 | | FILE No. | |
| | | DRAWN | EA | SCALE | REV. |
| | | CHECK | MSO | FIGURE B.1 | |

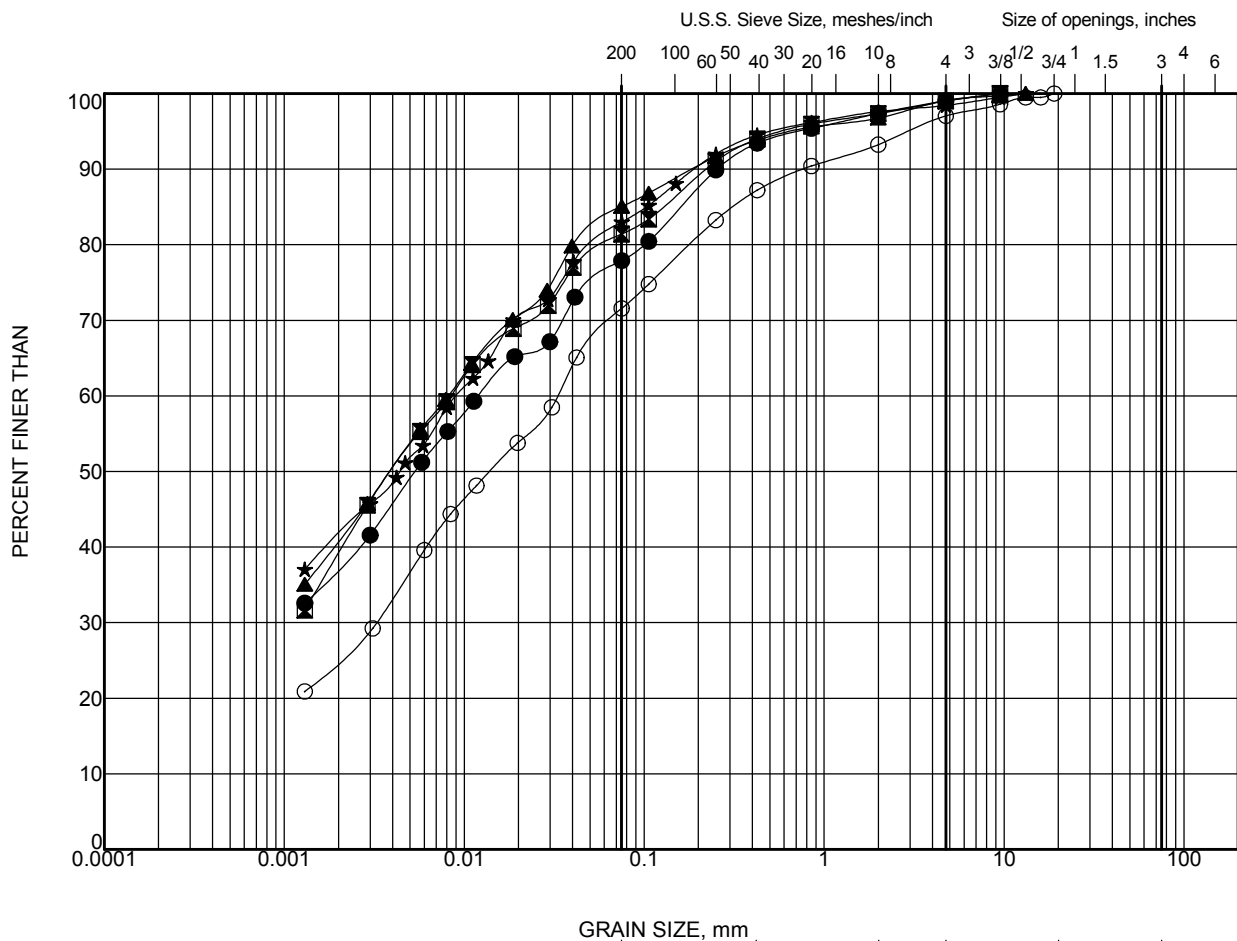


| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | T6-2 | 8 | 6.1 |
| ■ | T6-2 | 14 | 15.2 |
| ▲ | T6-2 | 19 | 22.9 |
| ★ | T6-3 | 11 | 10.7 |
| ○ | T6-3 | 12 | 12.2 |

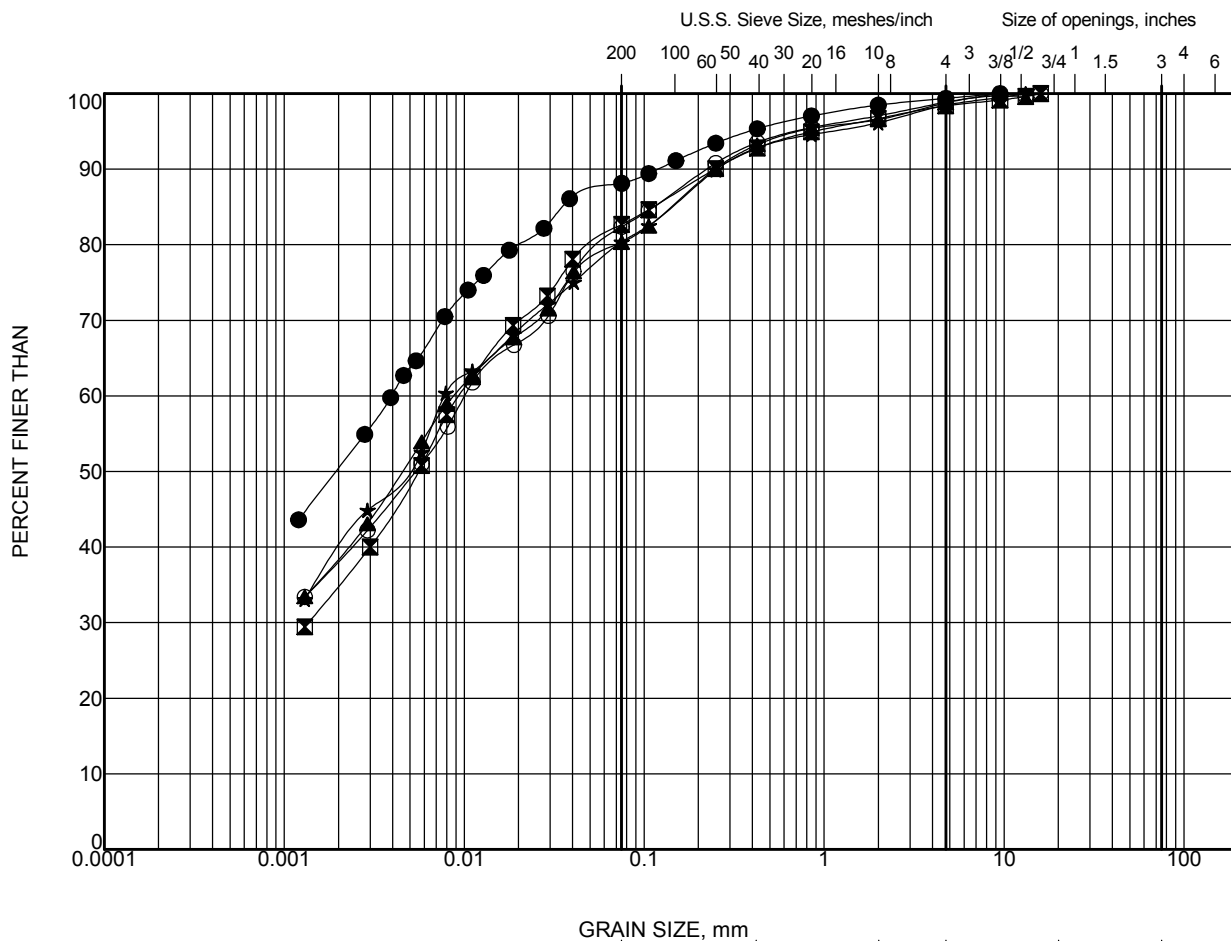
| | | | |
|---------|-----|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | | PROJECT No. SW8801.1004.101 | FILE No. |
| DRAWN | EA | | SCALE |
| CHECK | MSO | | REV. |
| | | FIGURE B.2 | |



LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | B9-1 | 8 | 6.1 |
| ■ | B9-1 | 11 | 10.7 |
| ▲ | T6-3 | 14 | 15.2 |
| ★ | T6-3 | 15 | 16.8 |
| ○ | T6-3 | 17 | 19.8 |

| | | | |
|----------|--|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | | PROJECT No. SW8801.1004.101 | FILE No. |
| DRAWN EA | | CHECK MSO | SCALE |
| | | | REV. |
| | | FIGURE B.3 | |

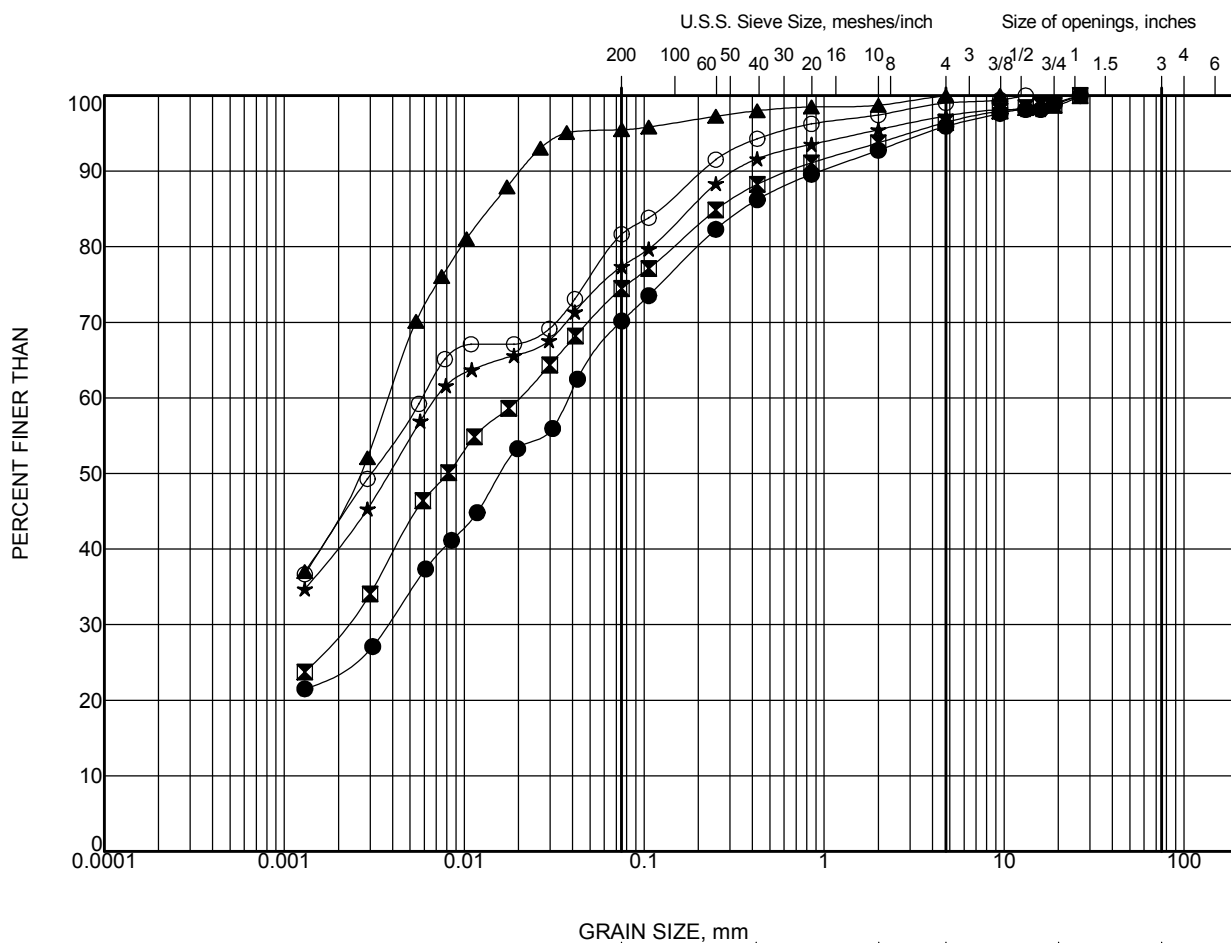


| | | | | | | |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | B9-1 | 13 | 13.7 |
| ■ | B9-1 | 14 | 15.2 |
| ▲ | B9-2 | 6 | 4.6 |
| ★ | B9-2 | 12 | 12.2 |
| ○ | B9-2 | 14 | 15.2 |

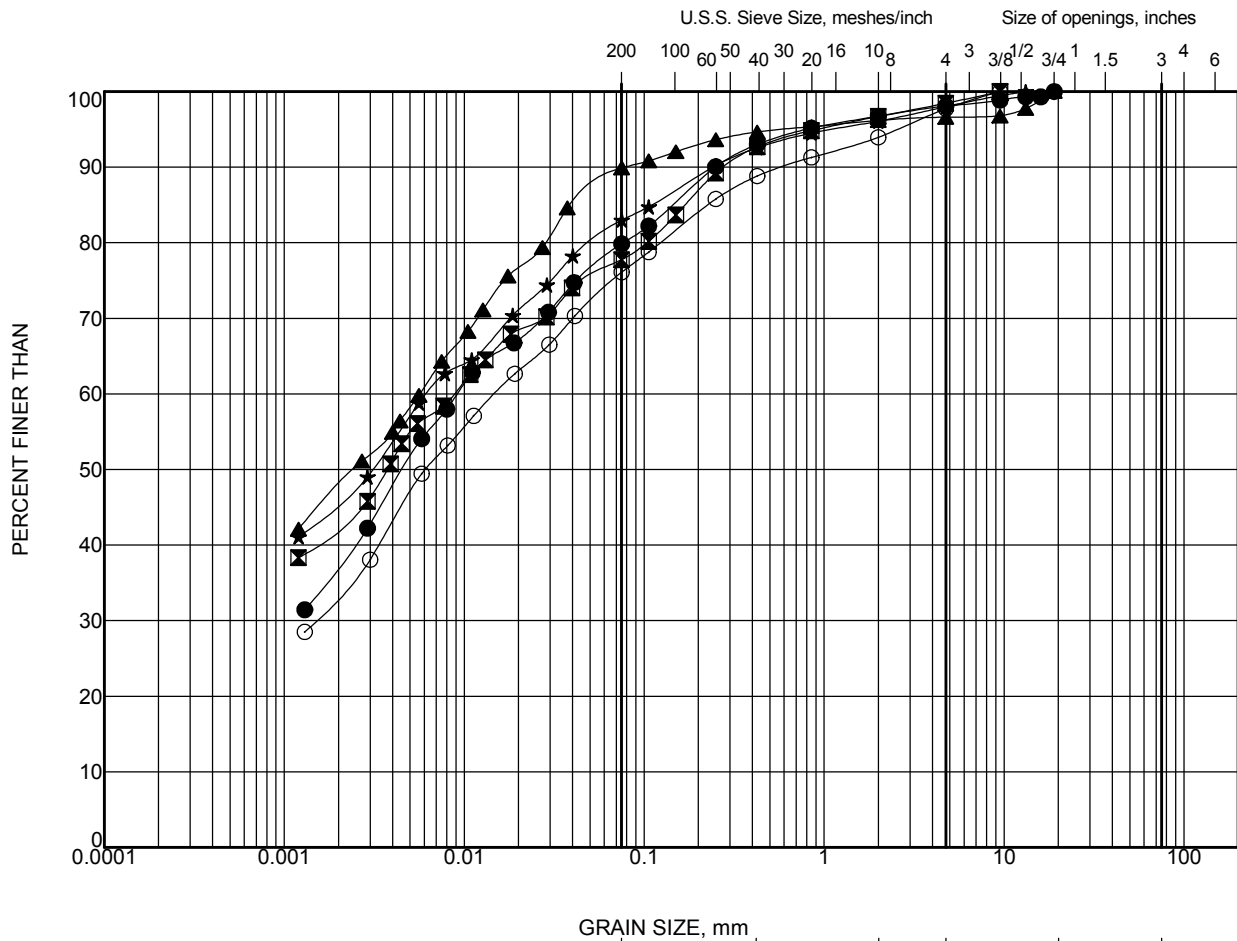
| | | | |
|-------------------|-----------------------------|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE B.4 | | | |



LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | B9-2 | 17 | 19.8 |
| ▣ | B9-2 | 19 | 22.9 |
| ▲ | B9-2 | 24 | 30.5 |
| ★ | B9-3 | 8 | 6.1 |
| ○ | B9-3 | 10 | 9.1 |

| | | | |
|---|-----------------------------|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| <div> <div> Parkway Infrastructure Engineers </div> <div> amec Hatch Mott MacDonald </div> </div> | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE B.5 | | | |

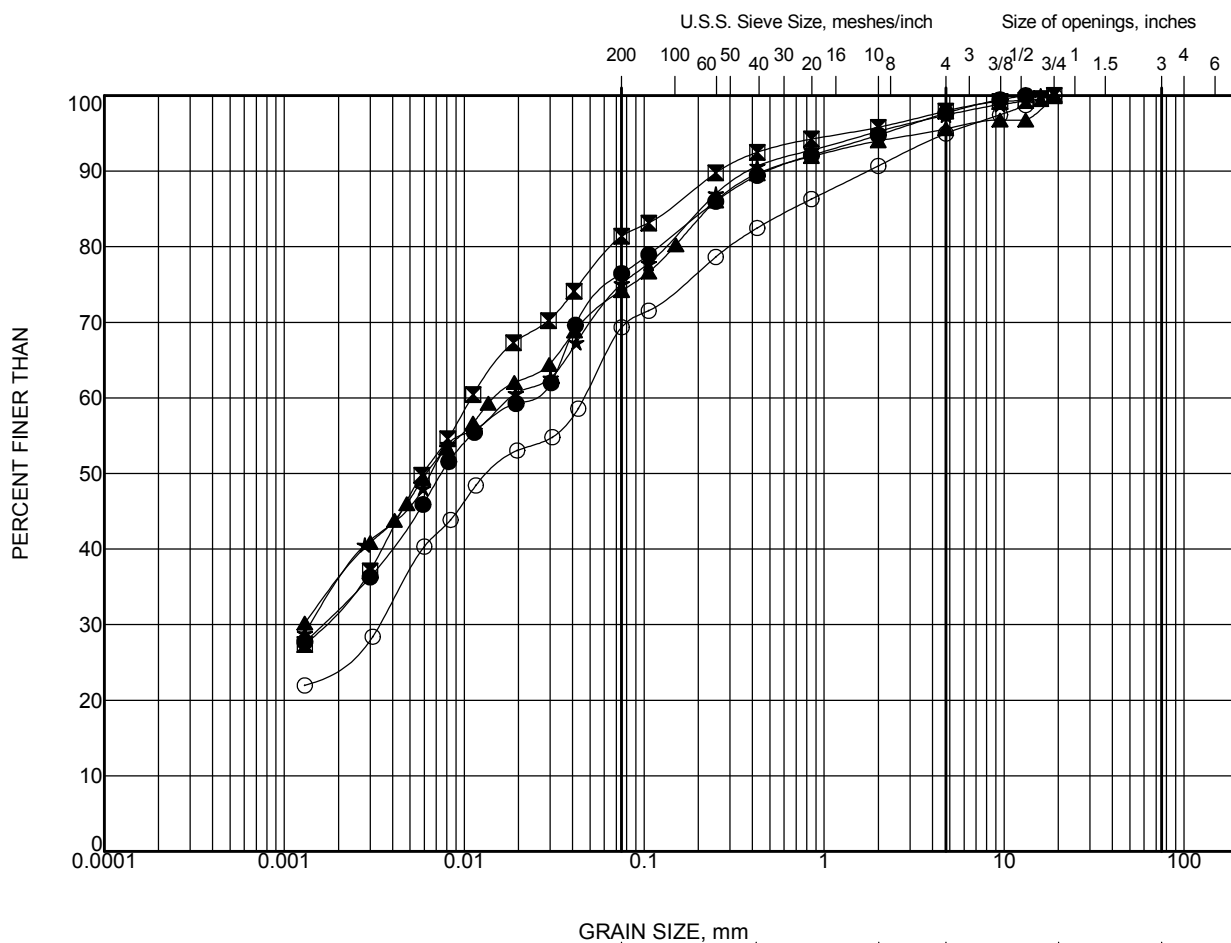


| | | | | | | |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | B10-1 | 12 | 12.2 |
| ■ | B9-3 | 11 | 10.7 |
| ▲ | B9-3 | 14 | 15.2 |
| ★ | B9-3 | 15 | 16.8 |
| ○ | B9-3 | 22 | 27.4 |

| | | | |
|-------------------|-----------------------------|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE B.6 | | | |

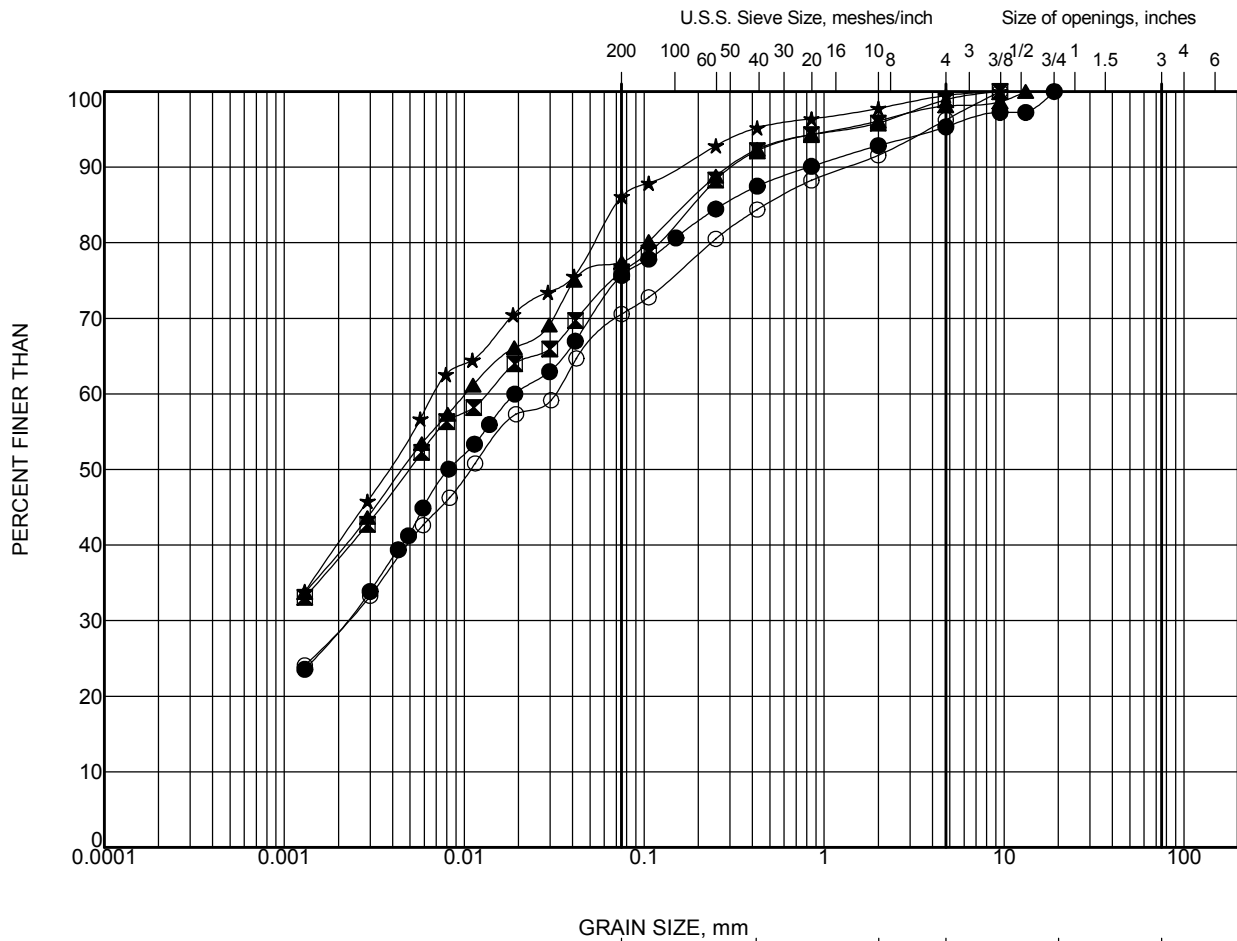


| | | | | | | |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | B10-1 | 20 | 24.4 |
| ■ | T7-1 | 8 | 6.1 |
| ▲ | T7-1 | 11 | 10.7 |
| ★ | T7-1 | 12 | 12.2 |
| ○ | T7-1 | 18 | 21.3 |

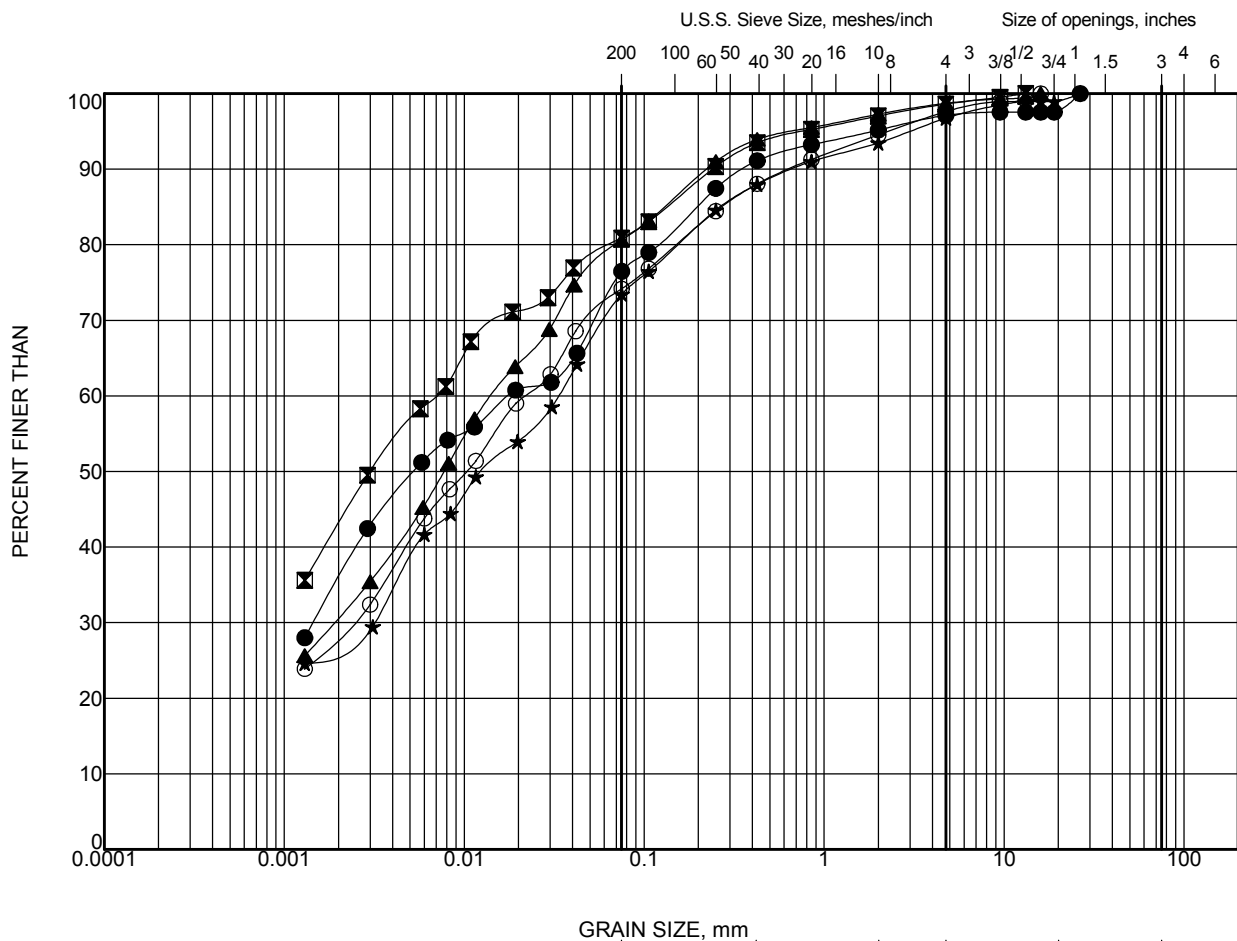
| | | | |
|-------------------|-------------|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. | SW8801.1004.101 | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE B.7 | | | |



LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | T7-1 | 20 | 24.4 |
| ■ | T7-2 | 5 | 3.8 |
| ▲ | T7-2 | 10 | 9.1 |
| ★ | T7-2 | 12 | 12.2 |
| ○ | T7-2 | 18 | 21.3 |

| | | | |
|---------|-----------------------------|----------------------------------|-------------------|
| PROJECT | | Windsor Essex Parkway (WEP) | |
| | | Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION | |
| | | SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| | | | FIGURE B.8 |

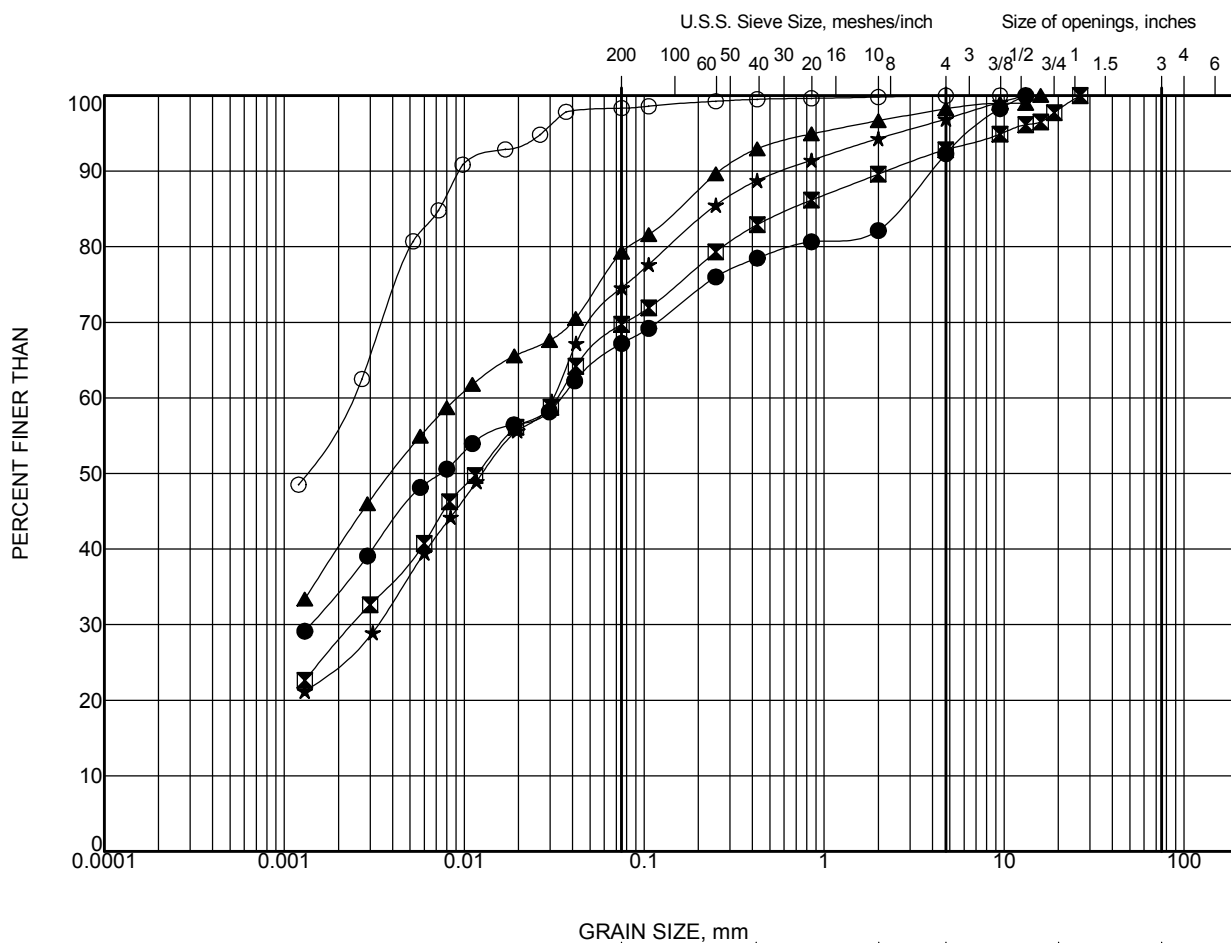


| | | | | | | |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | T7-3 | 8 | 6.1 |
| ⊠ | T7-3 | 10 | 9.1 |
| ▲ | T7-3 | 13 | 13.7 |
| ★ | T7-3 | 17 | 19.8 |
| ○ | T7-3 | 19 | 22.9 |

| | | | |
|-------------------|-----------------------------|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE B.9 | | | |

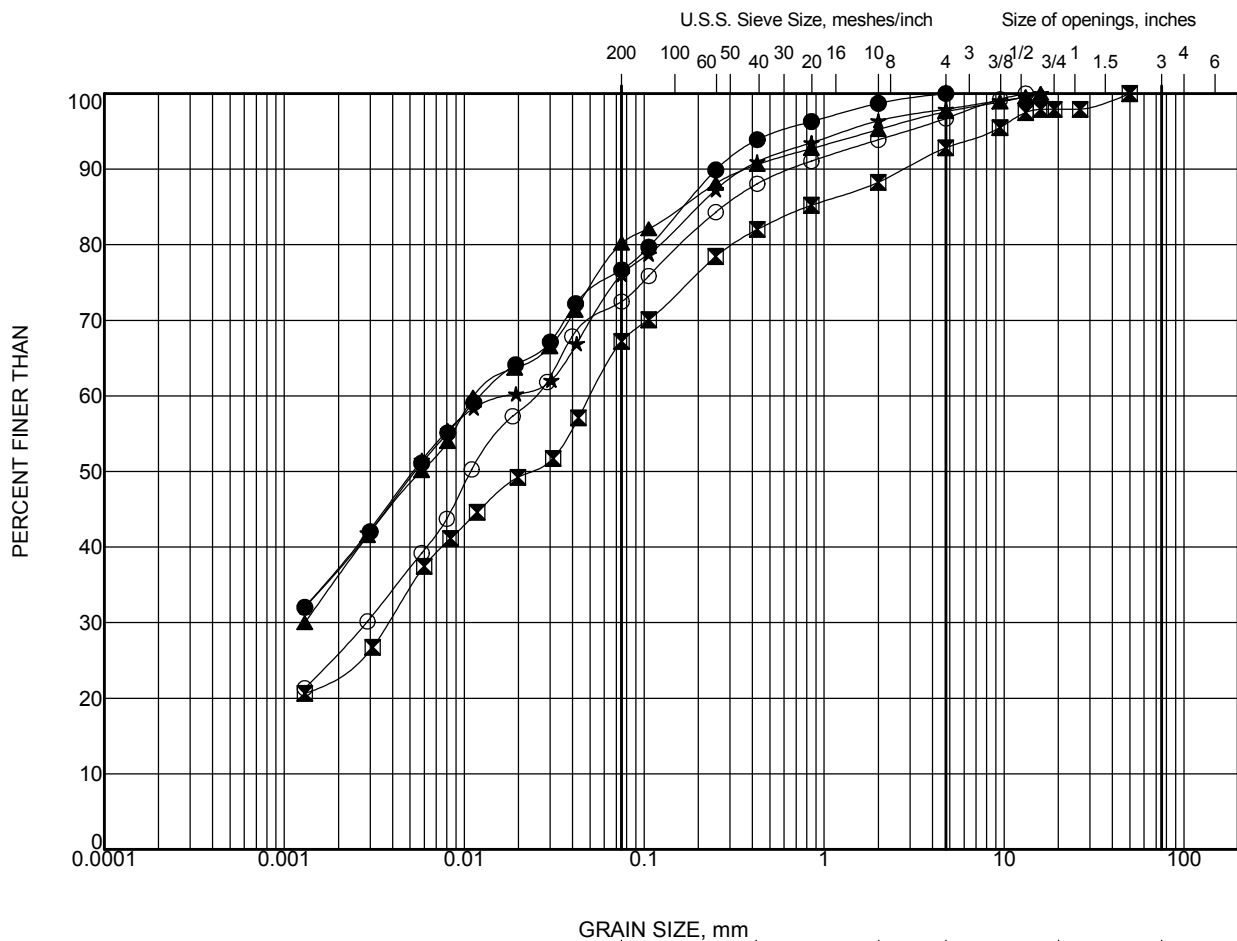


| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | B10-2 | 9 | 7.6 |
| ■ | B10-2 | 19 | 22.9 |
| ▲ | B10-3 | 8 | 6.1 |
| ★ | B10-3 | 22 | 27.4 |
| ○ | T7-3 | 22 | 27.4 |

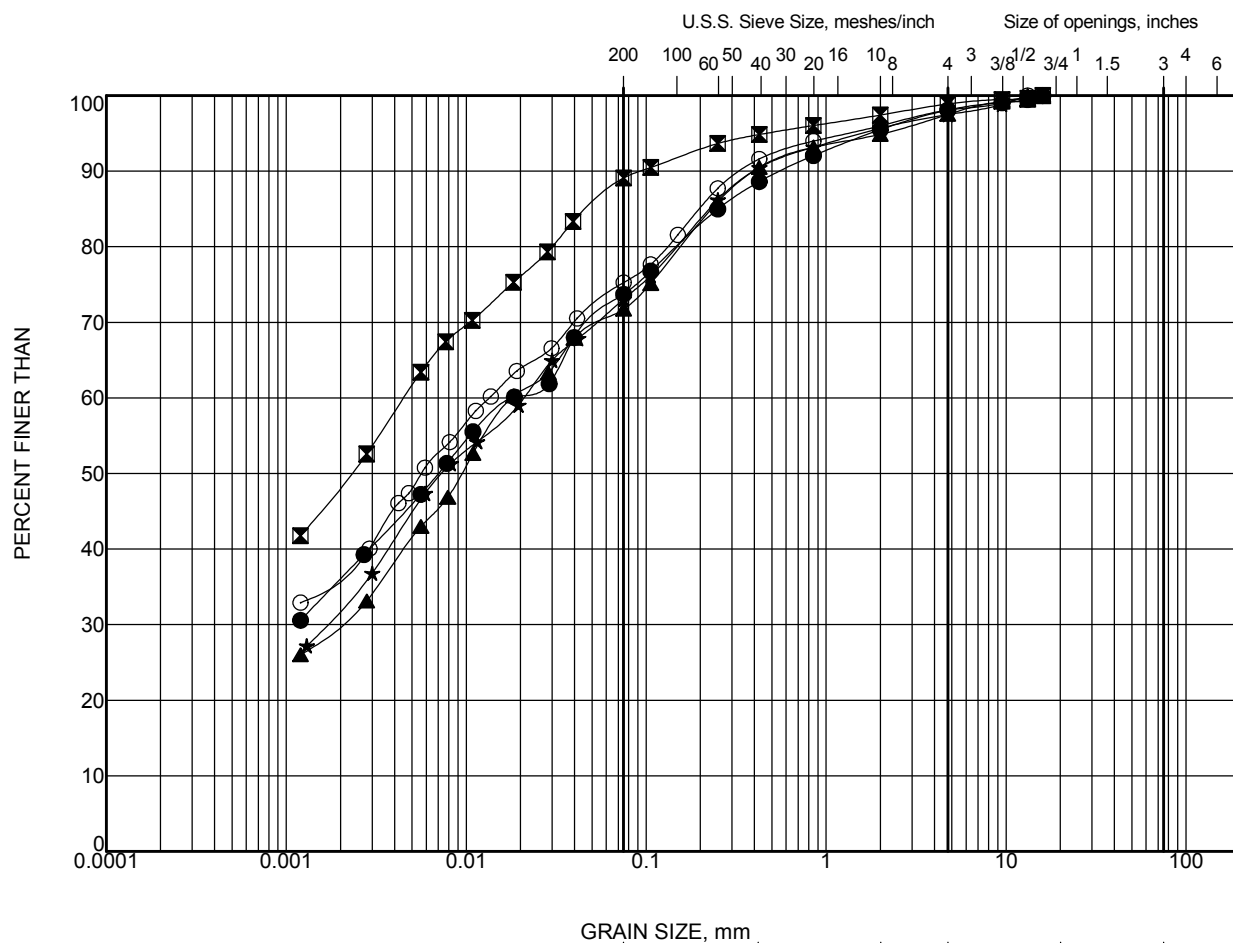
| | | | |
|---------|-----------------------------|--|------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | FILE No. | |
| | DRAWN EA | SCALE | REV. |
| | CHECK MSO | FIGURE B.10 | |



LEGEND:




| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | B10-4 | 8 | 6.1 |
| ■ | B10-4 | 16 | 18.3 |
| ▲ | B10-4 | 22 | 27.4 |
| ★ | B10-5 | 11 | 10.7 |
| ○ | B10-5 | 17 | 19.8 |

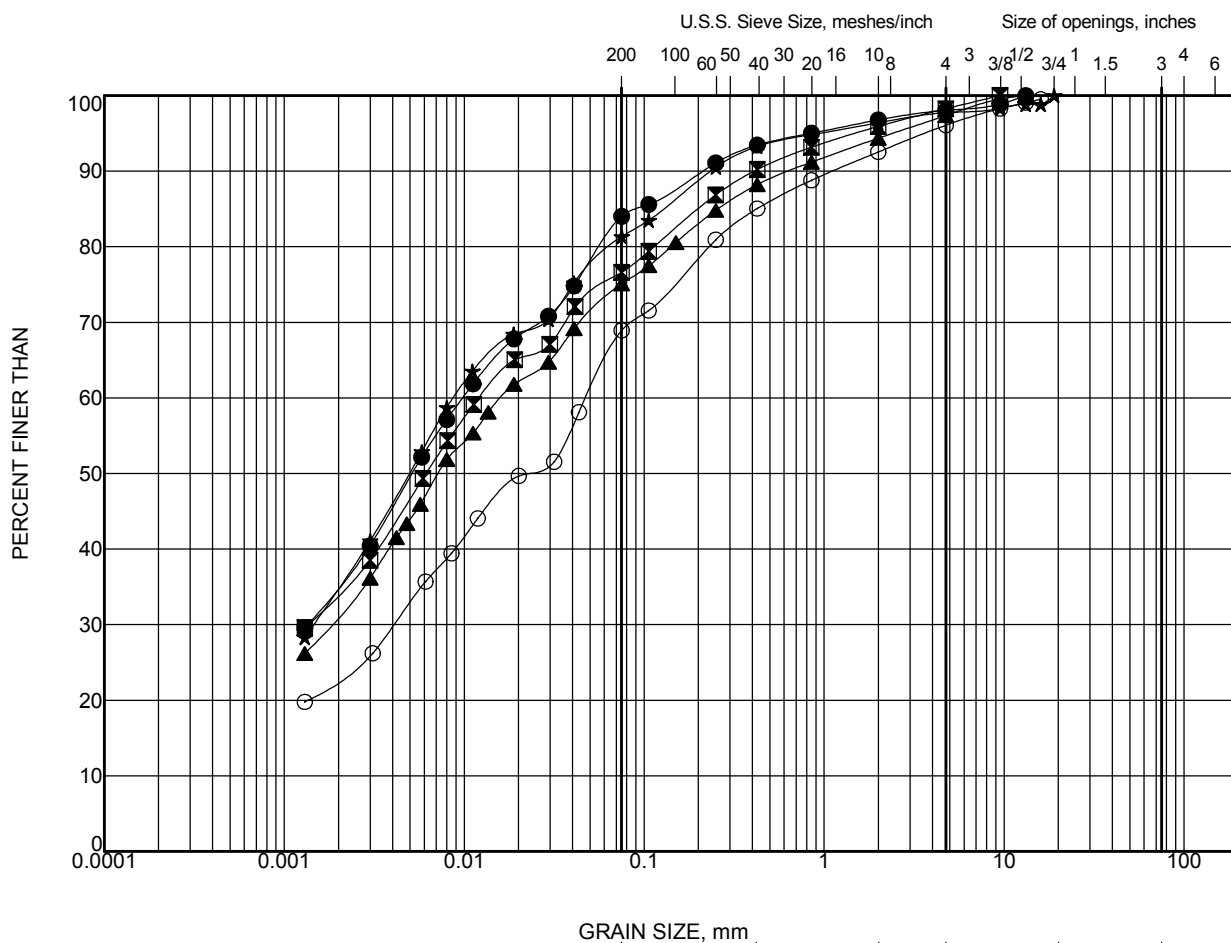
| | | | |
|--------------------|-----------------------------|----------------------------------|----------|
| PROJECT | | Windsor Essex Parkway (WEP) | |
| | | Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION | |
| | | SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE B.11 | | | |



LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | B10-6 | 9 | 7.6 |
| ■ | B10-6 | 13 | 13.7 |
| ▲ | B10-6 | 17 | 19.8 |
| ★ | B10-7 | 9 | 7.6 |
| ○ | B10-7 | 10 | 9.1 |

| | | | |
|--|-----|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
|    | | PROJECT No. SW8801.1004.101 | FILE No. |
| DRAWN | EA | | SCALE |
| CHECK | MSO | | REV. |
| | | FIGURE B.12 | |

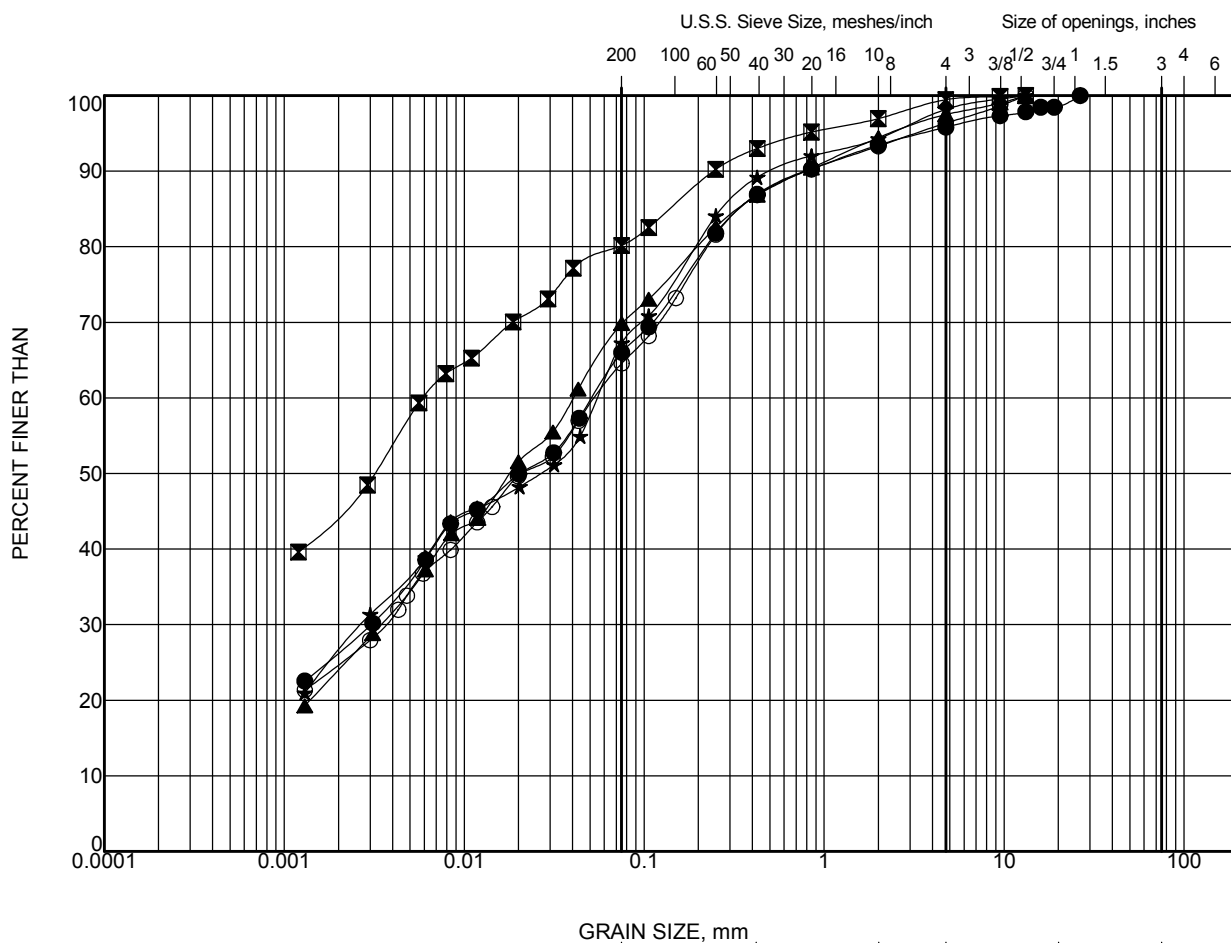


| | | | | | | |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | B10-7 | 13 | 13.7 |
| ■ | B10-7 | 20 | 22.9 |
| ▲ | B10-7 | 21 | 24.4 |
| ★ | B10-8 | 12 | 12.2 |
| ○ | B10-8 | 17 | 19.8 |

| | | | |
|--------------------|-----------------------------|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE B.13 | | | |

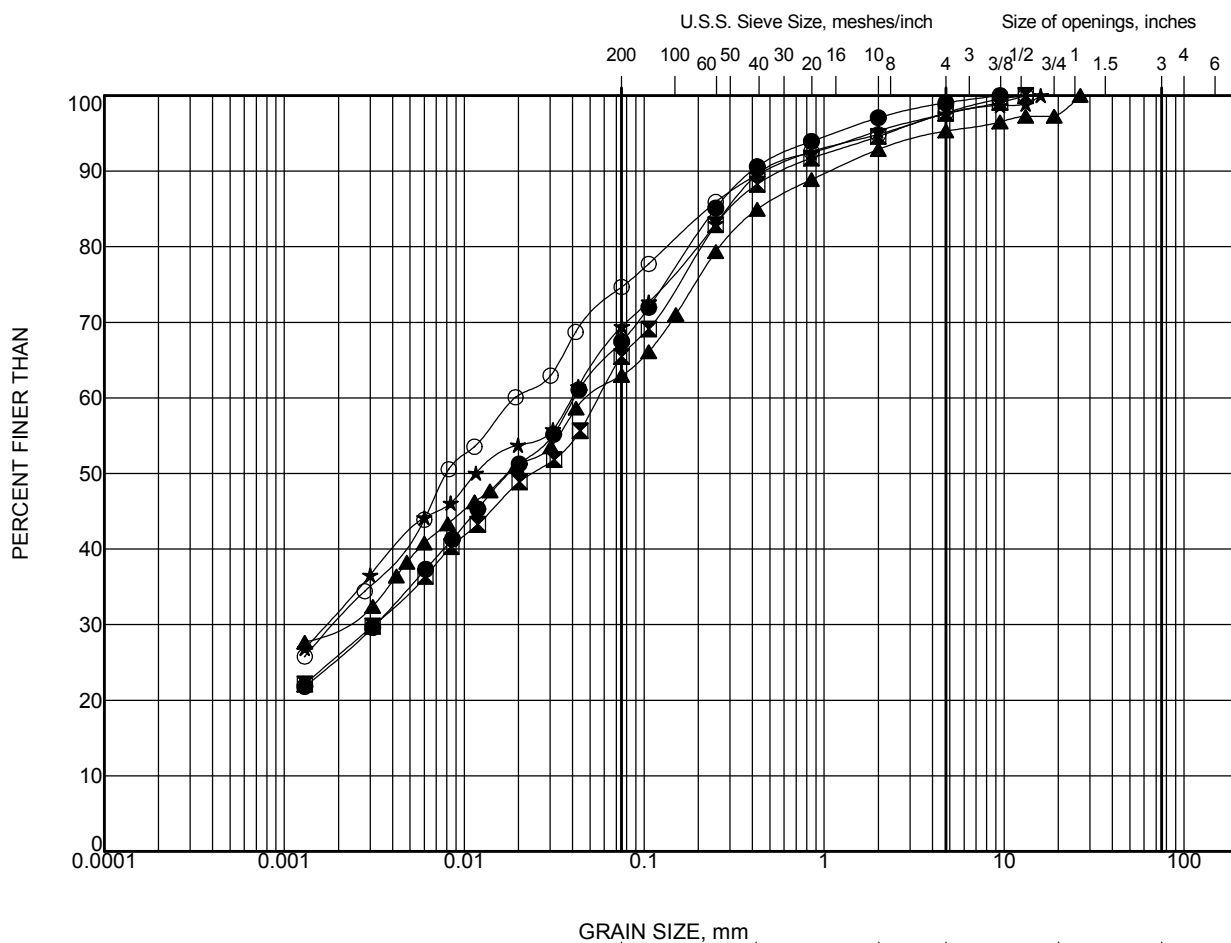


| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | T8-1 | 11 | 9.1 |
| ■ | T8-1 | 15 | 15.2 |
| ▲ | T8-1 | 19 | 21.3 |
| ★ | T9-1 | 10 | 7.6 |
| ○ | T9-1 | 12 | 10.7 |

| | | | |
|--------------------|-----------------------------|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE B.14 | | | |

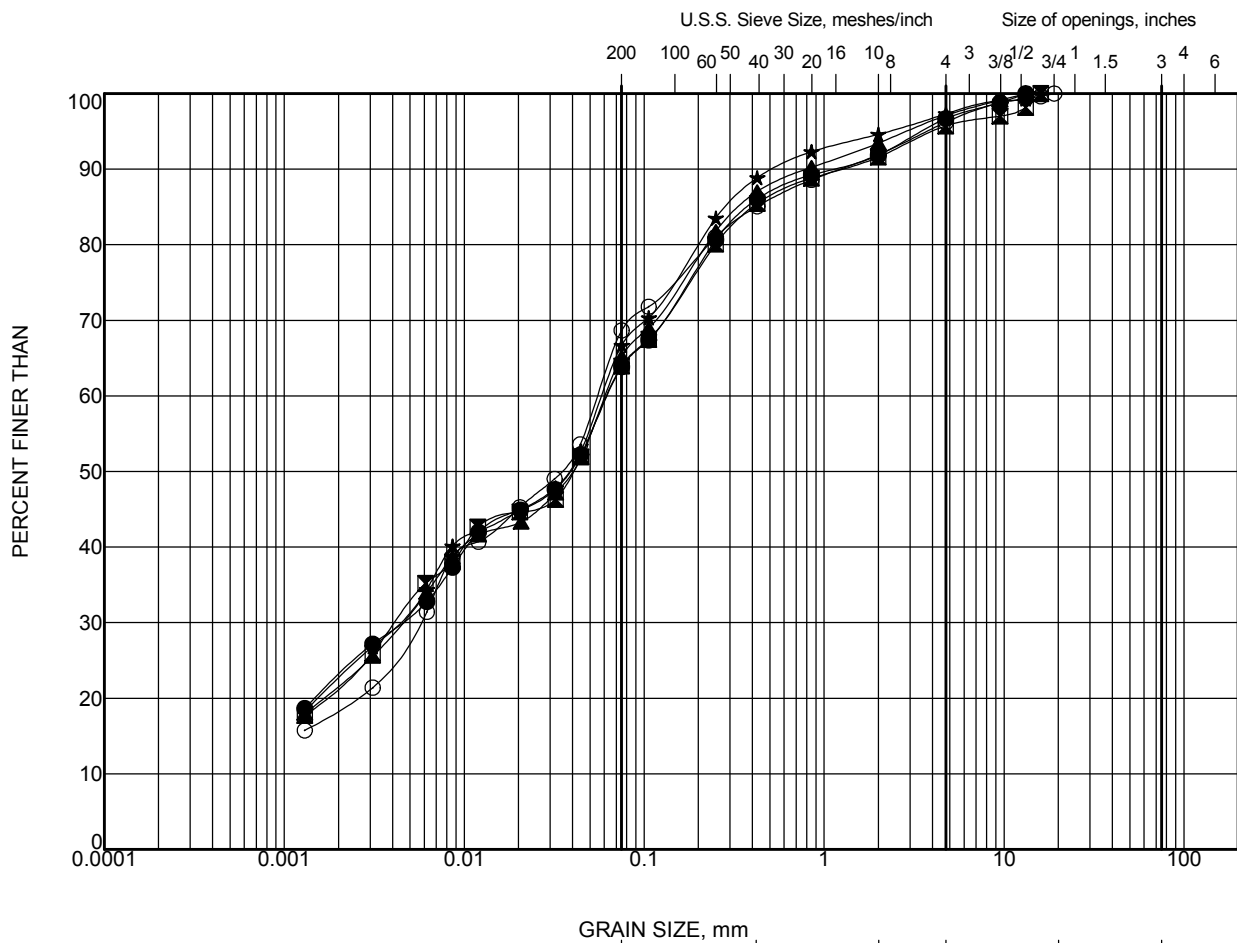


| | | | | | | |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | CV3-1 | 9 | 7.6 |
| ■ | T9-1 | 13 | 12.2 |
| ▲ | T9-1 | 15 | 15.2 |
| ★ | T9-1 | 16 | 16.8 |
| ○ | T9-1 | 20 | 22.9 |

| | | | |
|---------|-----------------------------|--|------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | FILE No. | |
| | DRAWN EA | SCALE | REV. |
| | CHECK MSO | FIGURE B.15 | |

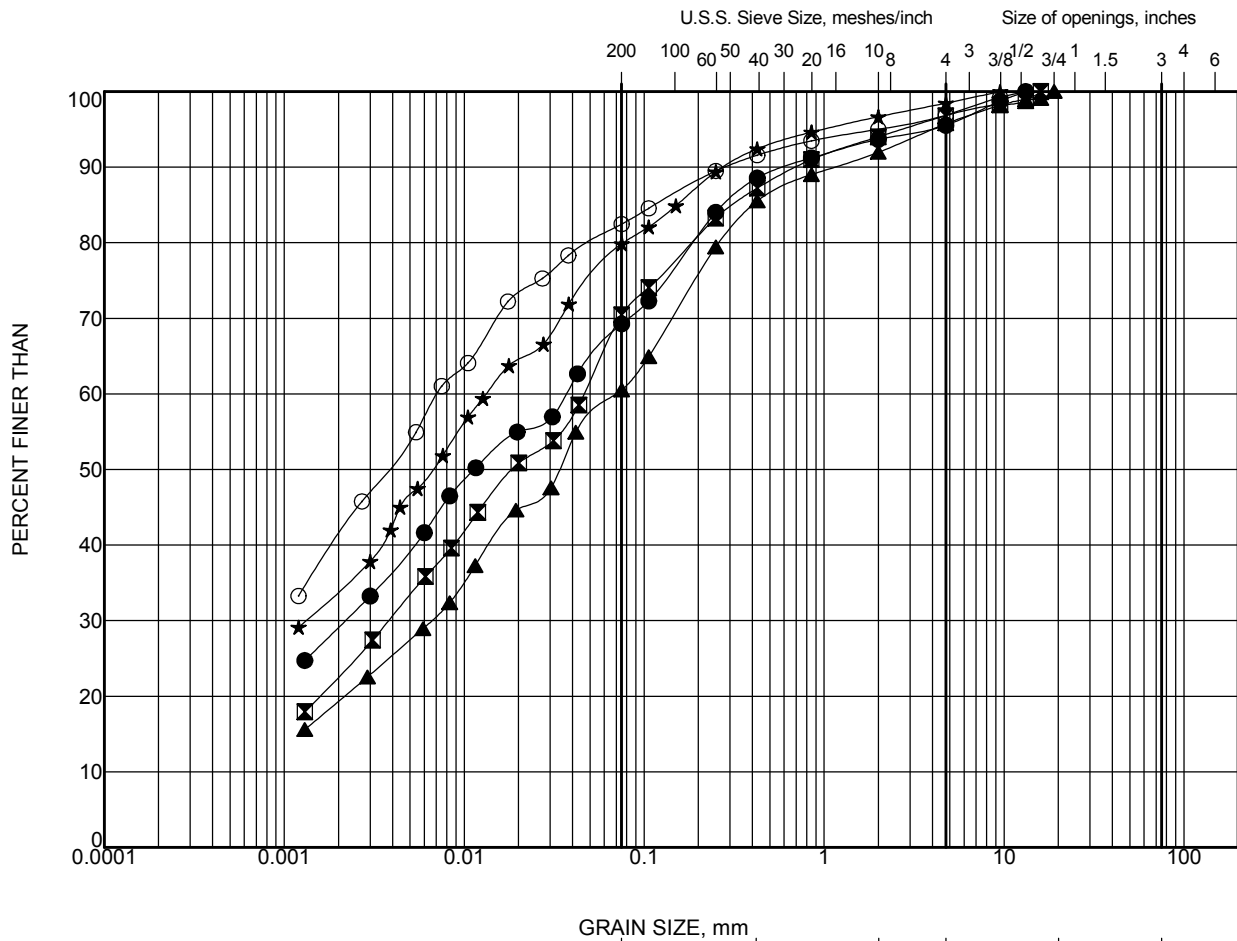


| | | | | | | |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|---------------|--------|-----------|
| ● | T10-1/HGMW-04 | 5 | 3 |
| ■ | T10-1/HGMW-04 | 7 | 4.6 |
| ▲ | T10-1/HGMW-04 | 9 | 6.1 |
| ★ | T10-1/HGMW-04 | 12 | 10.7 |
| ○ | T10-1/HGMW-04 | 18 | 19.8 |

| | | | |
|--------------------|-----------------------------|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE B.16 | | | |

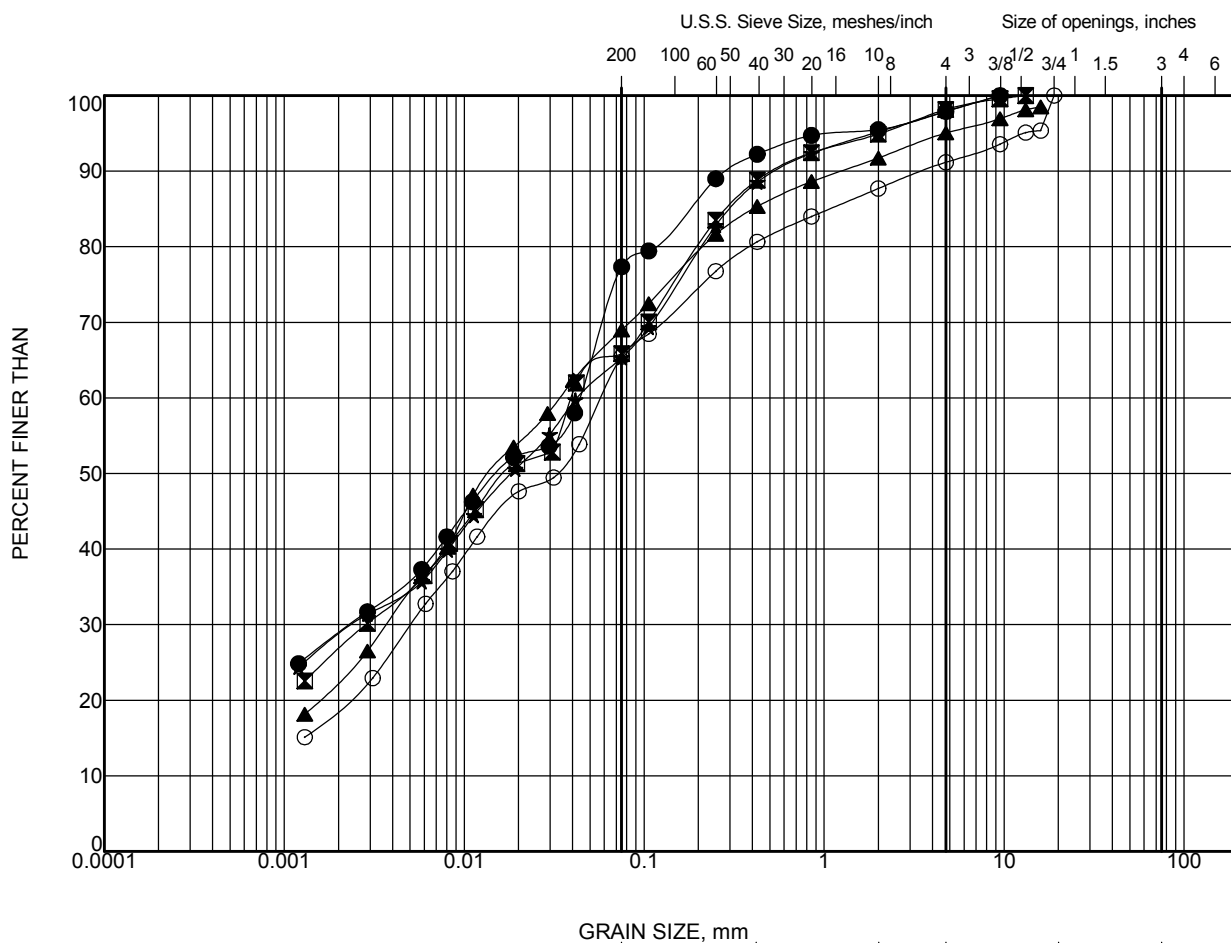


| | | | | | | |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|---------------|--------|-----------|
| ● | B11-1 | 13 | 13.7 |
| ■ | B11-1 | 18 | 21.3 |
| ▲ | T10-2/HGMW-09 | 8 | 6.1 |
| ★ | T10-2/HGMW-09 | 20.1 | 19.8 |
| ○ | T10-2/HGMW-09 | 24 | 25.9 |

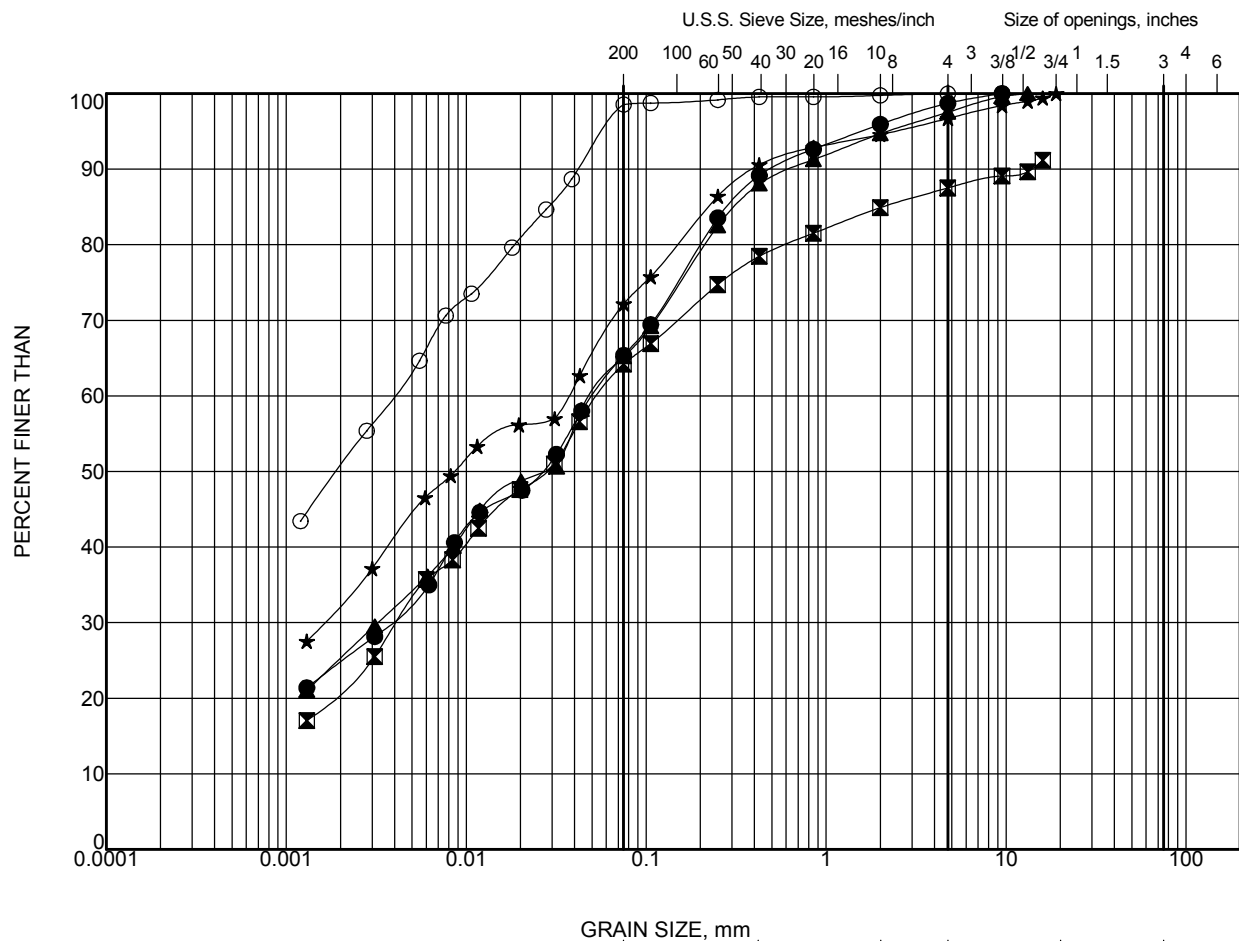
| | | | |
|--------------------|-----------------------------|----------------------------------|----------|
| PROJECT | | Windsor Essex Parkway (WEP) | |
| | | Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION | |
| | | SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE B.17 | | | |



LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | B11-2 | 3 | 2.3 |
| ■ | B11-2 | 9 | 7.6 |
| ▲ | B11-2 | 19 | 22.9 |
| ★ | B11-3 | 4 | 3 |
| ○ | B11-3 | 19 | 22.9 |

| | | | |
|--------------------|-------------|----------------------------------|----------|
| PROJECT | | Windsor Essex Parkway (WEP) | |
| | | Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION | |
| | | SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. | SW8801.1004.101 | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE B.18 | | | |

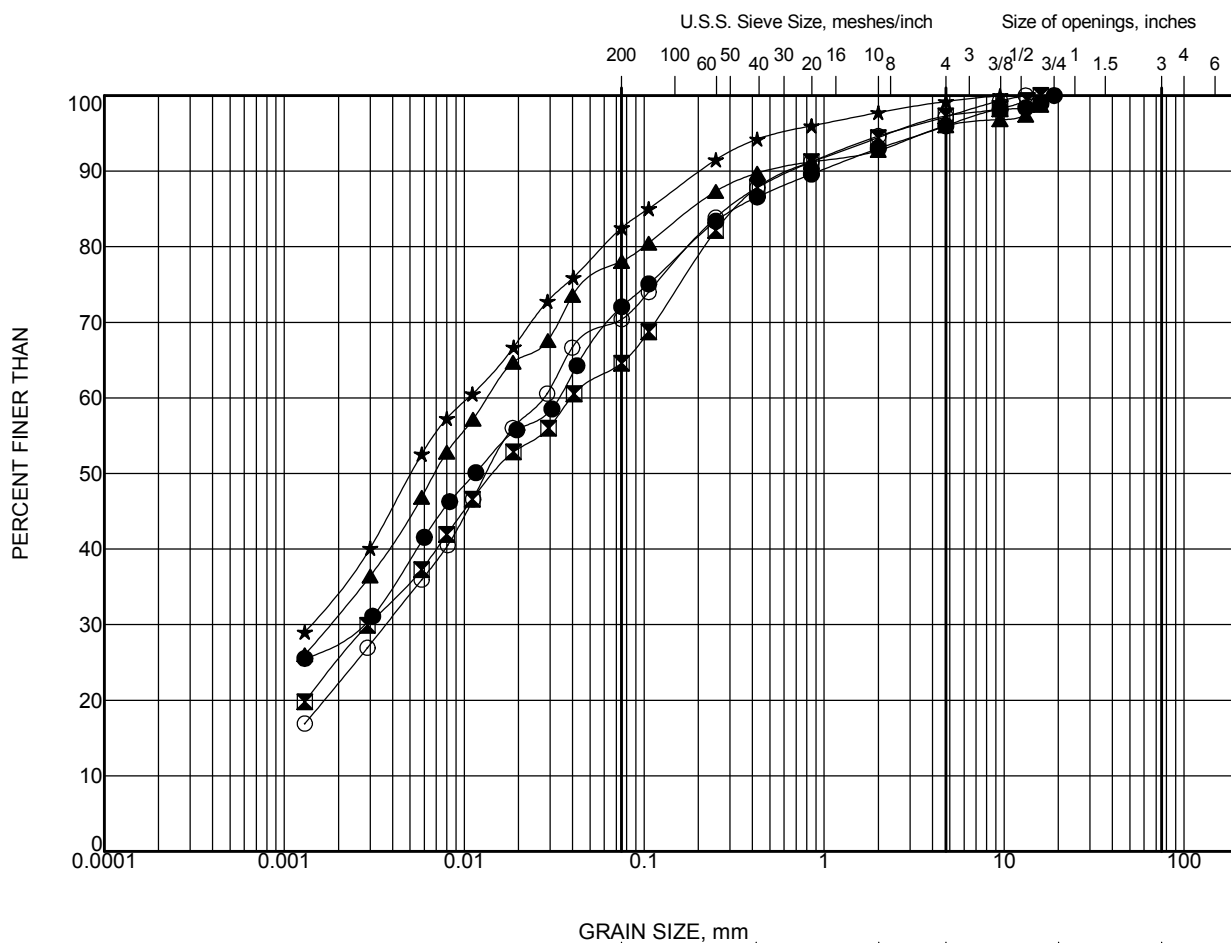


| | | | | | | |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | B11-4 | 8 | 6.1 |
| ■ | B11-4 | 20 | 24.4 |
| ▲ | B11-5 | 8 | 6.1 |
| ★ | B11-5 | 14 | 15.2 |
| ○ | B11-5 | 16 | 18.3 |

| | | | |
|--------------------|-----------------------------|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE B.19 | | | |

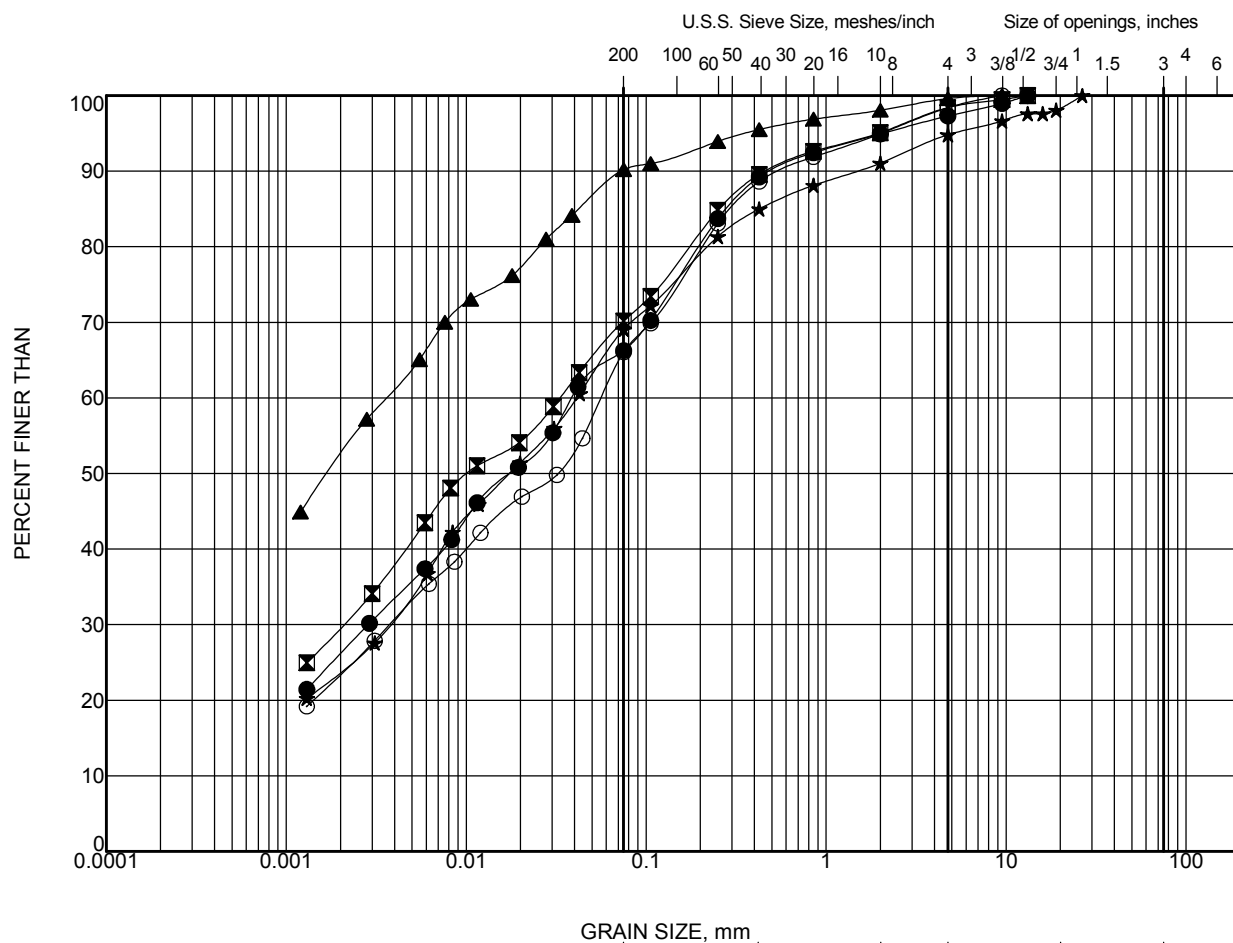


| | | | | | | |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|---------------|--------|-----------|
| ● | B11-5 | 19 | 22.9 |
| ■ | B11-6/HGMW-05 | 9 | 6.1 |
| ▲ | B11-6/HGMW-05 | 18 | 18.3 |
| ★ | B11-6/HGMW-05 | 20 | 19.8 |
| ○ | B11-6/HGMW-05 | 24 | 22.9 |

| | | | |
|--------------------|-----------------------------|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE B.20 | | | |

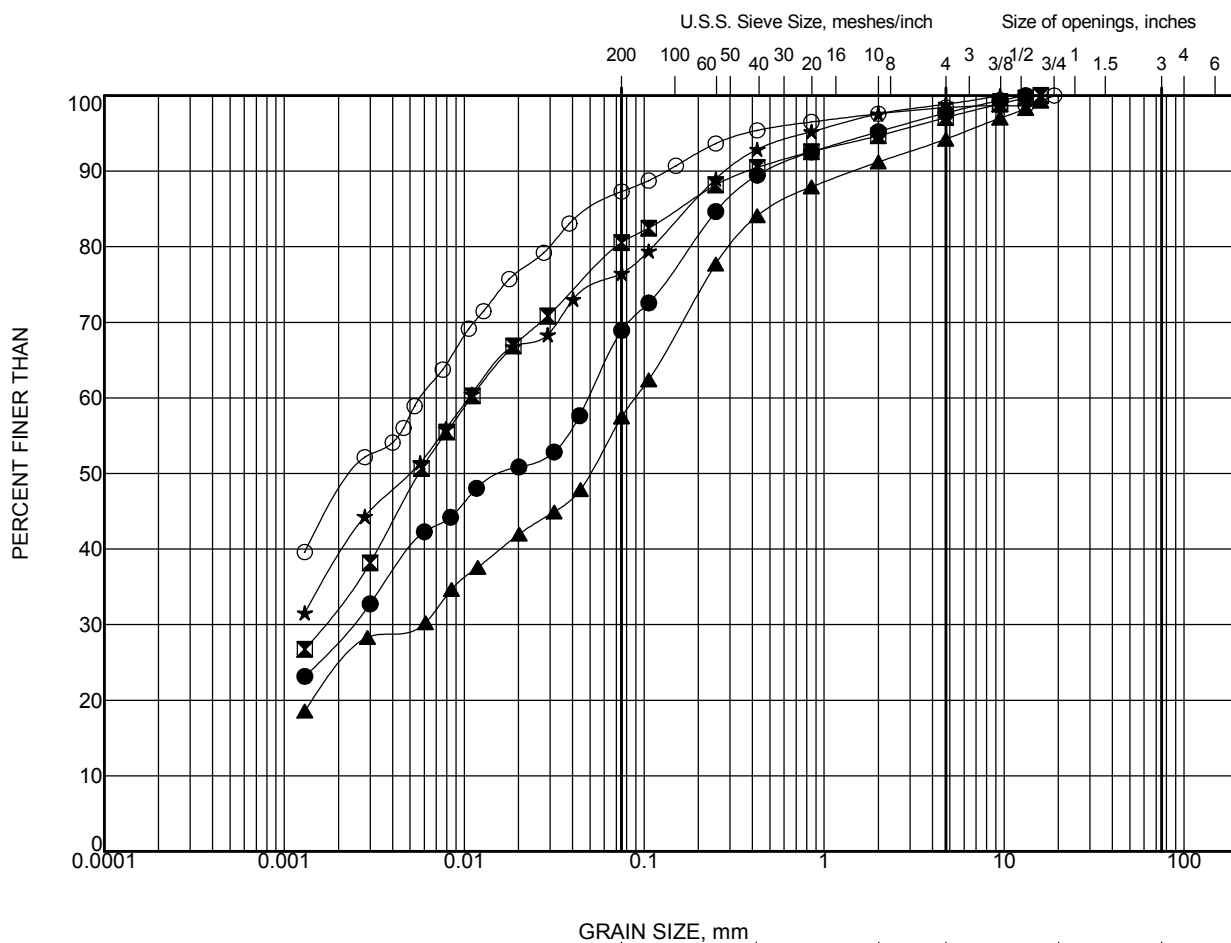


| | | | | | | |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | B11-7 | 10 | 9.1 |
| ■ | B11-7 | 14 | 15.2 |
| ▲ | B11-7 | 16 | 18.3 |
| ★ | B11-7 | 19 | 22.9 |
| ○ | T11-1 | 10 | 9.1 |

| | | | |
|--------------------|-----------------------------|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE B.21 | | | |

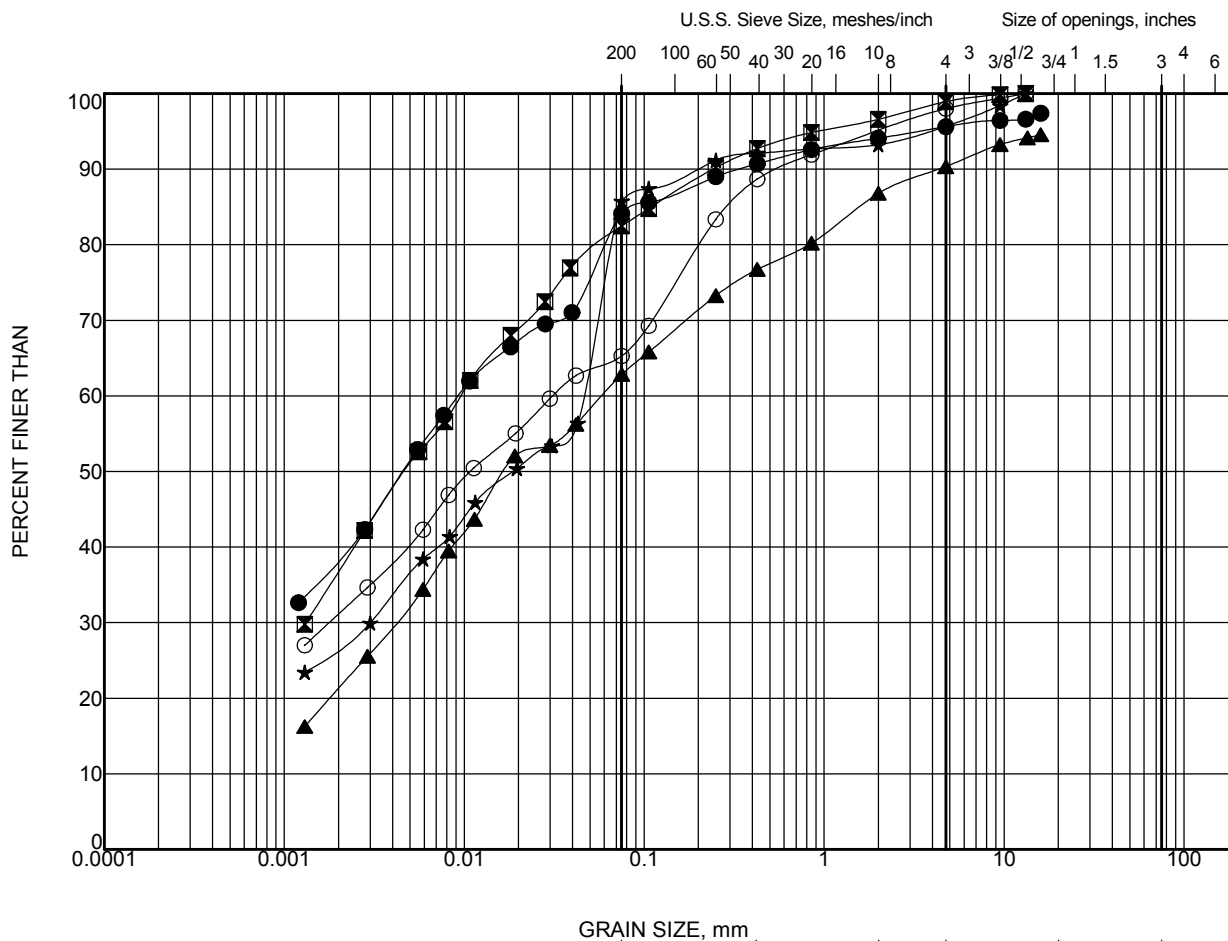


| | | | | | | |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|---------------|--------|-----------|
| ● | T11-1 | 12 | 12.2 |
| ■ | T11-1 | 18 | 21.3 |
| ▲ | T11-2/HGMW-10 | 10 | 9.1 |
| ★ | T11-2/HGMW-10 | 14 | 15.2 |
| ○ | T11-2/HGMW-10 | 16 | 16.8 |

| | | | |
|--------------------|-----------------------------|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE B.22 | | | |

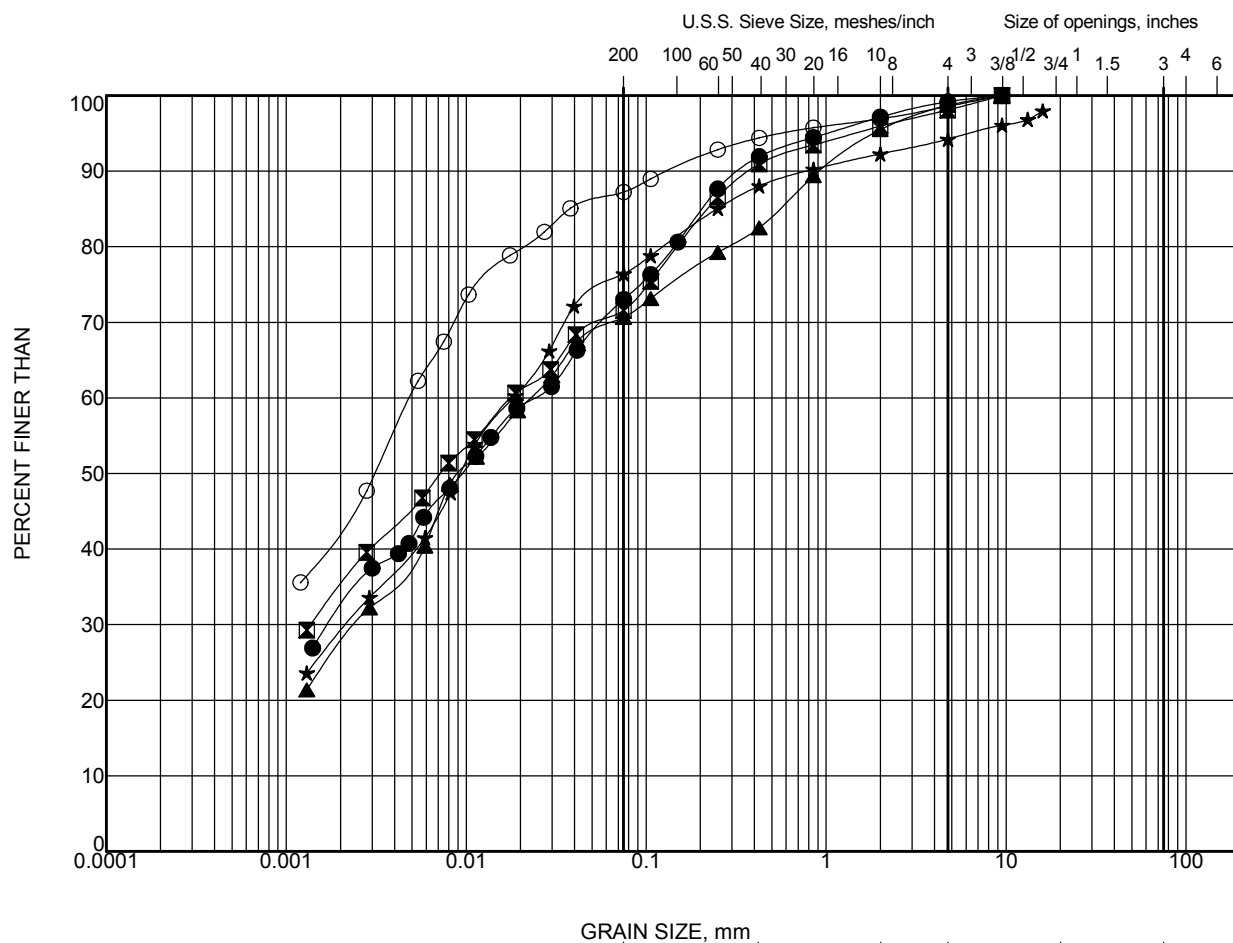


| | | | | | | |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|---------------|--------|-----------|
| ● | T11-2/HGMW-10 | 17 | 17.5 |
| ■ | T11-2/HGMW-10 | 21 | 20.6 |
| ▲ | T11-2/HGMW-10 | 22 | 21.3 |
| ★ | T11-3 | 9 | 7.6 |
| ○ | T11-3 | 11 | 10.7 |

| | | | |
|--------------------|-----------------------------|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE B.23 | | | |

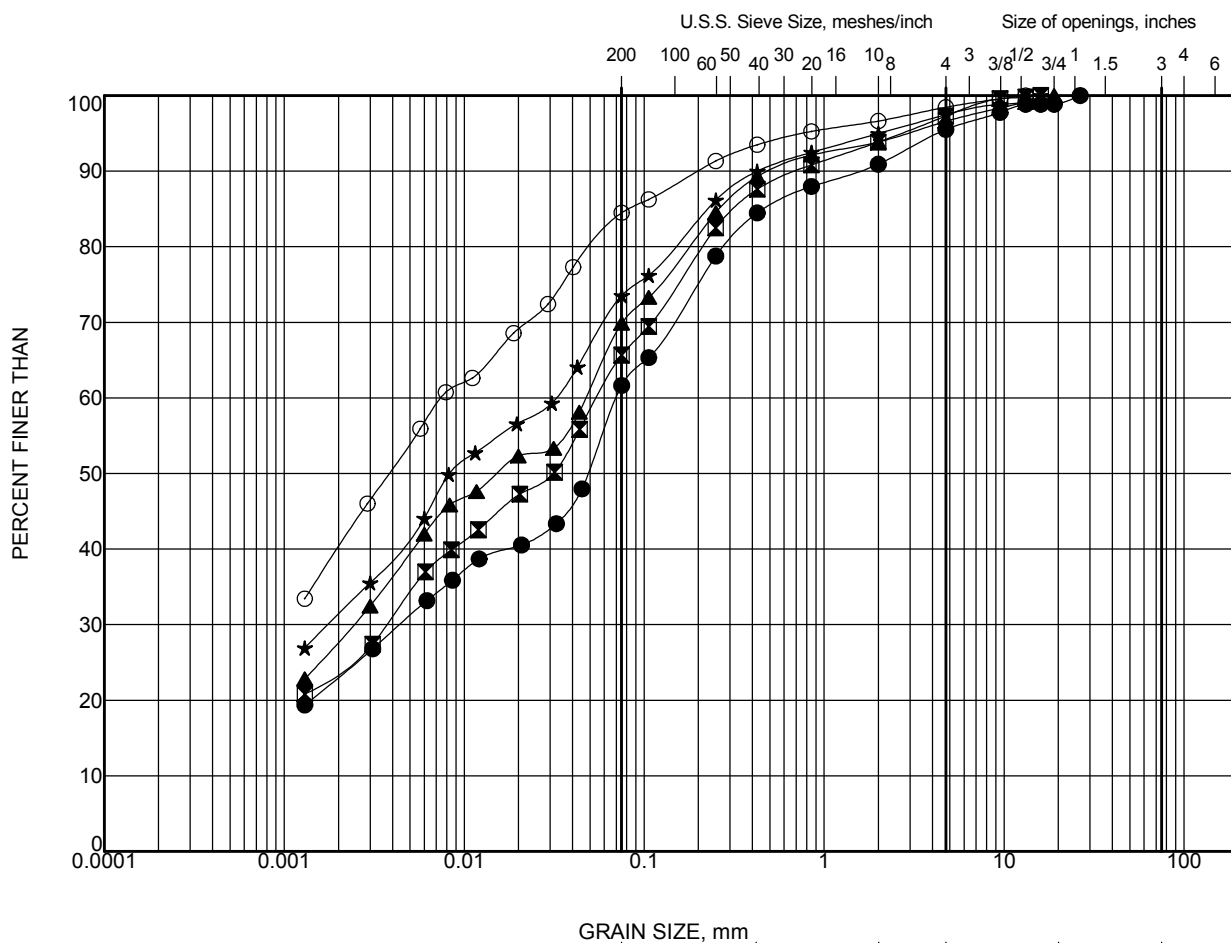


| | | | | | | |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | T11-3 | 14 | 15.2 |
| ■ | T11-3 | 16 | 16.8 |
| ▲ | T11-3 | 20 | 19.8 |
| ★ | T11-3 | 23 | 22.9 |
| ○ | T11-3 | 28 | 30.5 |

| | | | |
|--------------------|-----------------------------|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE B.24 | | | |

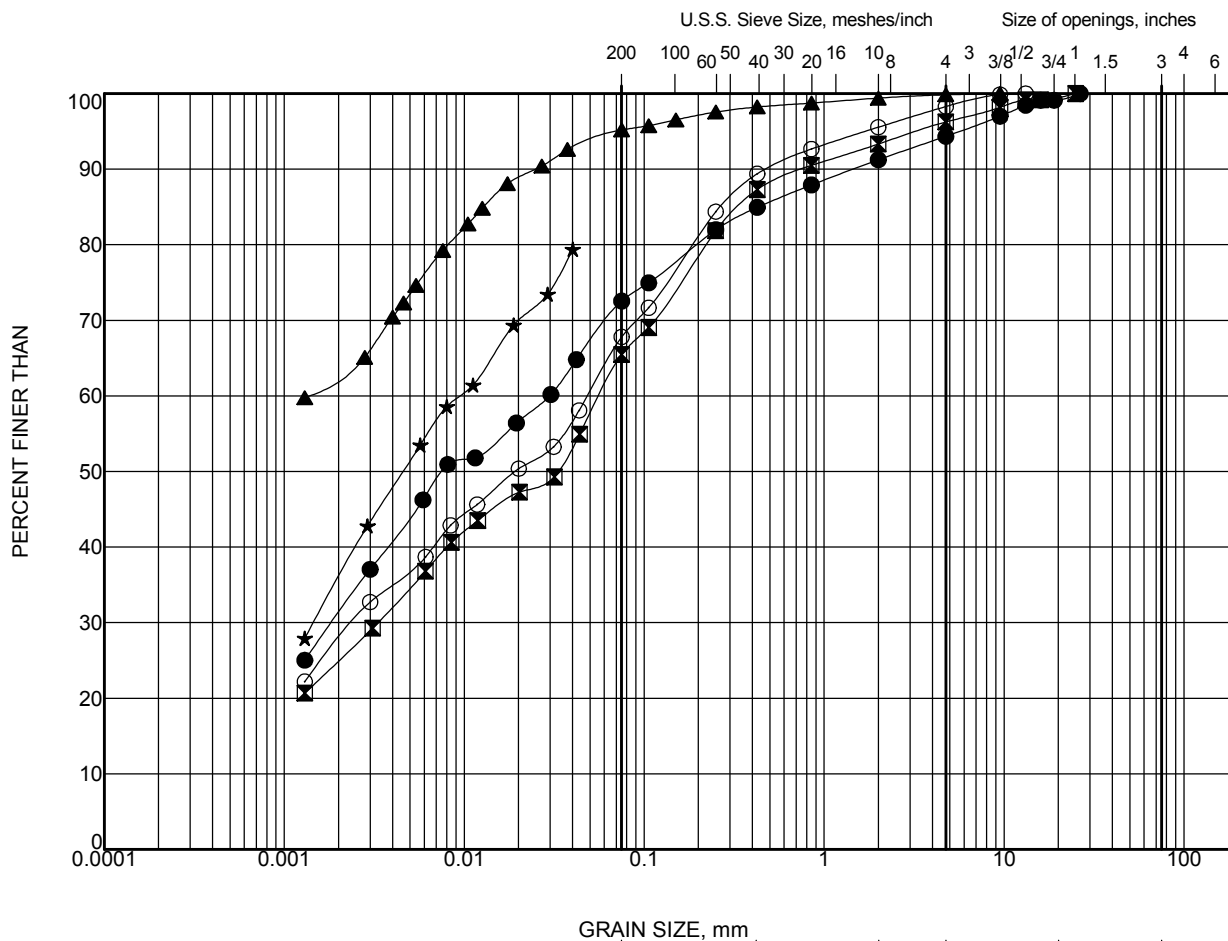


| | | | | | | |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | B12-1 | 9 | 7.6 |
| ■ | B12-1 | 10 | 9.1 |
| ▲ | B12-1 | 12 | 12.2 |
| ★ | B12-1 | 15 | 16.8 |
| ○ | B12-1 | 17 | 19.8 |

| | | | |
|--------------------|-----------------------------|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE B.25 | | | |

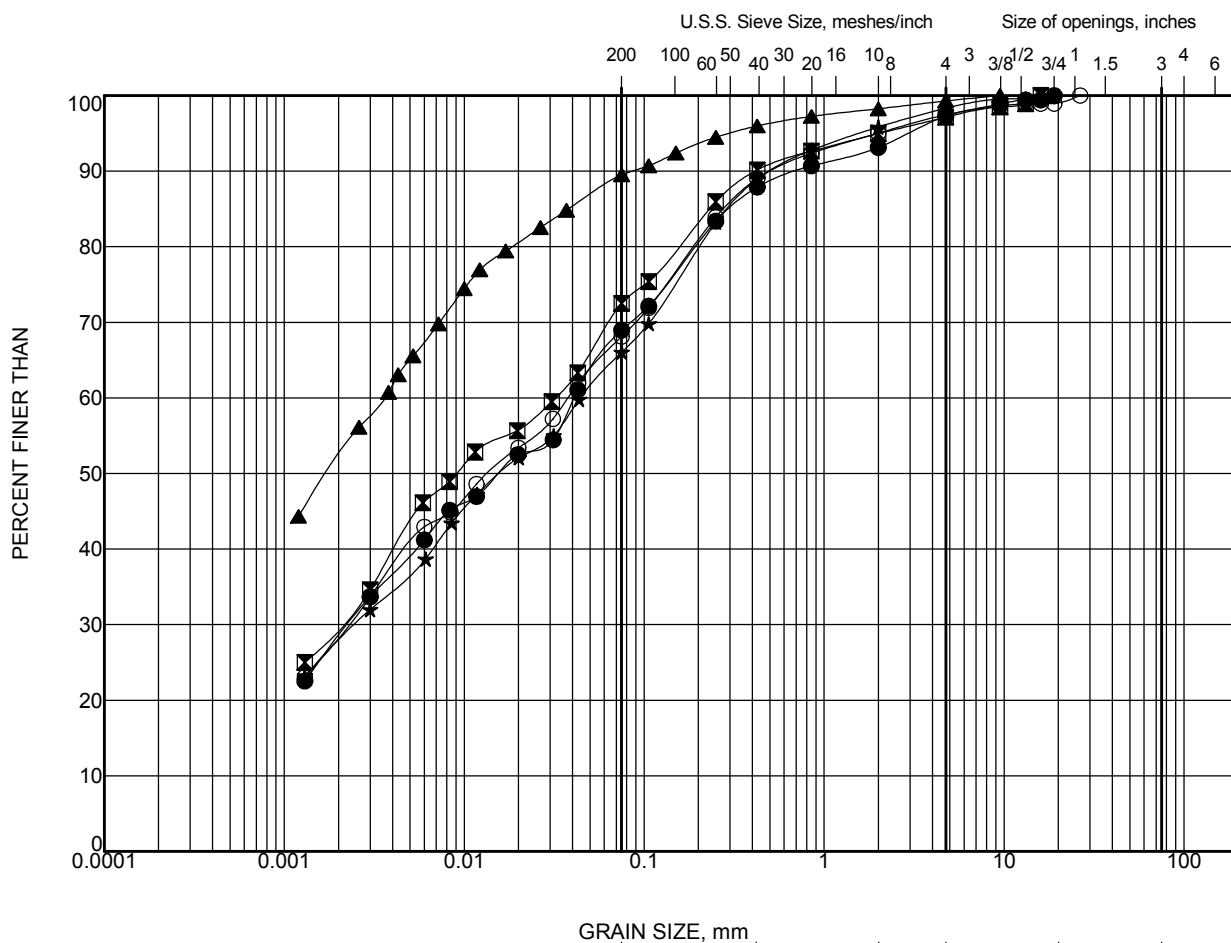


| | | | | | | |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | B12-1 | 20 | 24.4 |
| ■ | B12-2 | 9 | 7.6 |
| ▲ | B12-2 | 16 | 18.3 |
| ★ | B12-2 | 17 | 19.8 |
| ○ | B12-3 | 12 | 12.2 |

| | | | |
|--------------------|-----------------------------|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE B.26 | | | |

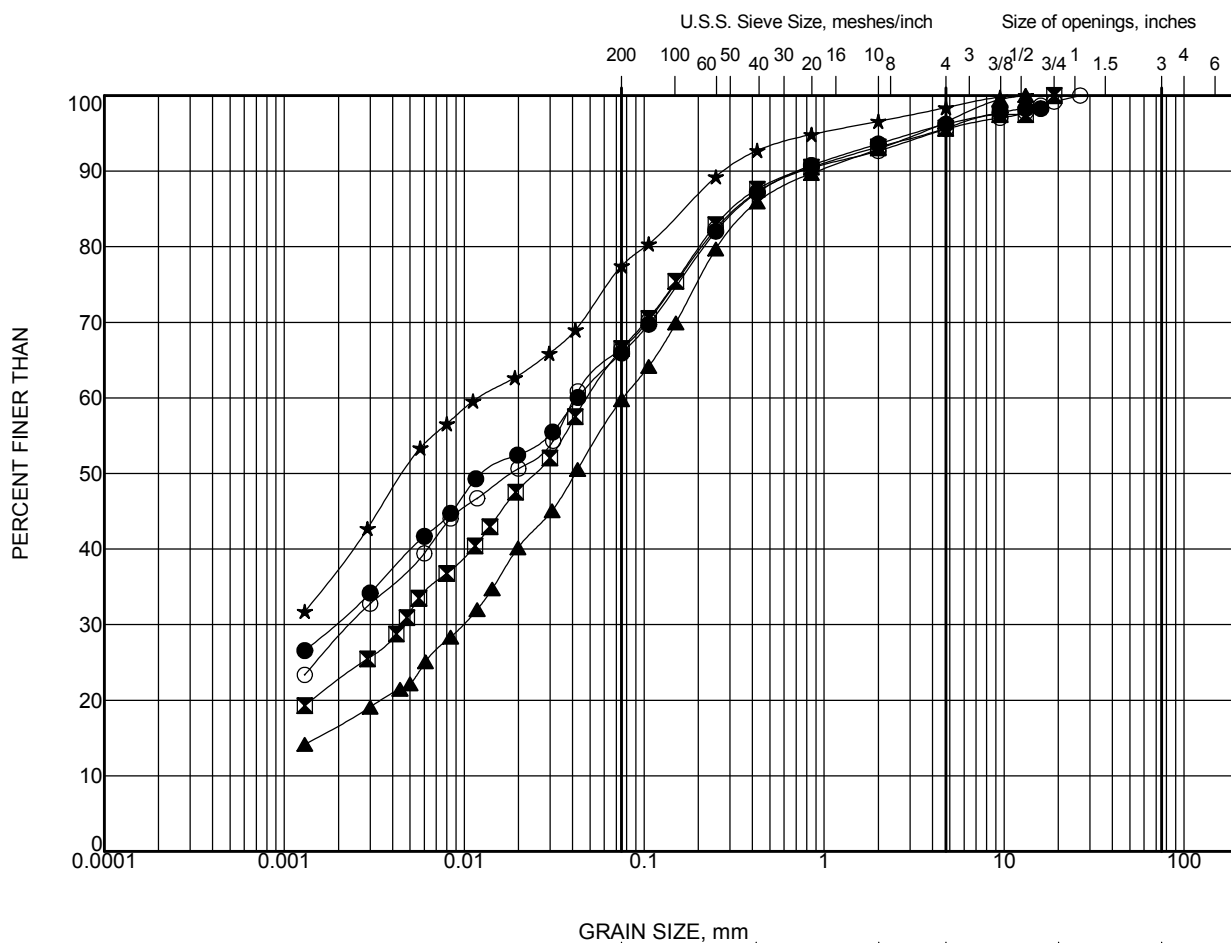


| | | | | | | |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | B12-3 | 13 | 13.7 |
| ■ | B12-3 | 14 | 15.2 |
| ▲ | B12-3 | 17 | 19.8 |
| ★ | PS7-1 | 12 | 10.7 |
| ○ | PS7-1 | 15 | 15.2 |

| | | | |
|--------------------|-------------|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. | SW8801.1004.101 | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE B.27 | | | |

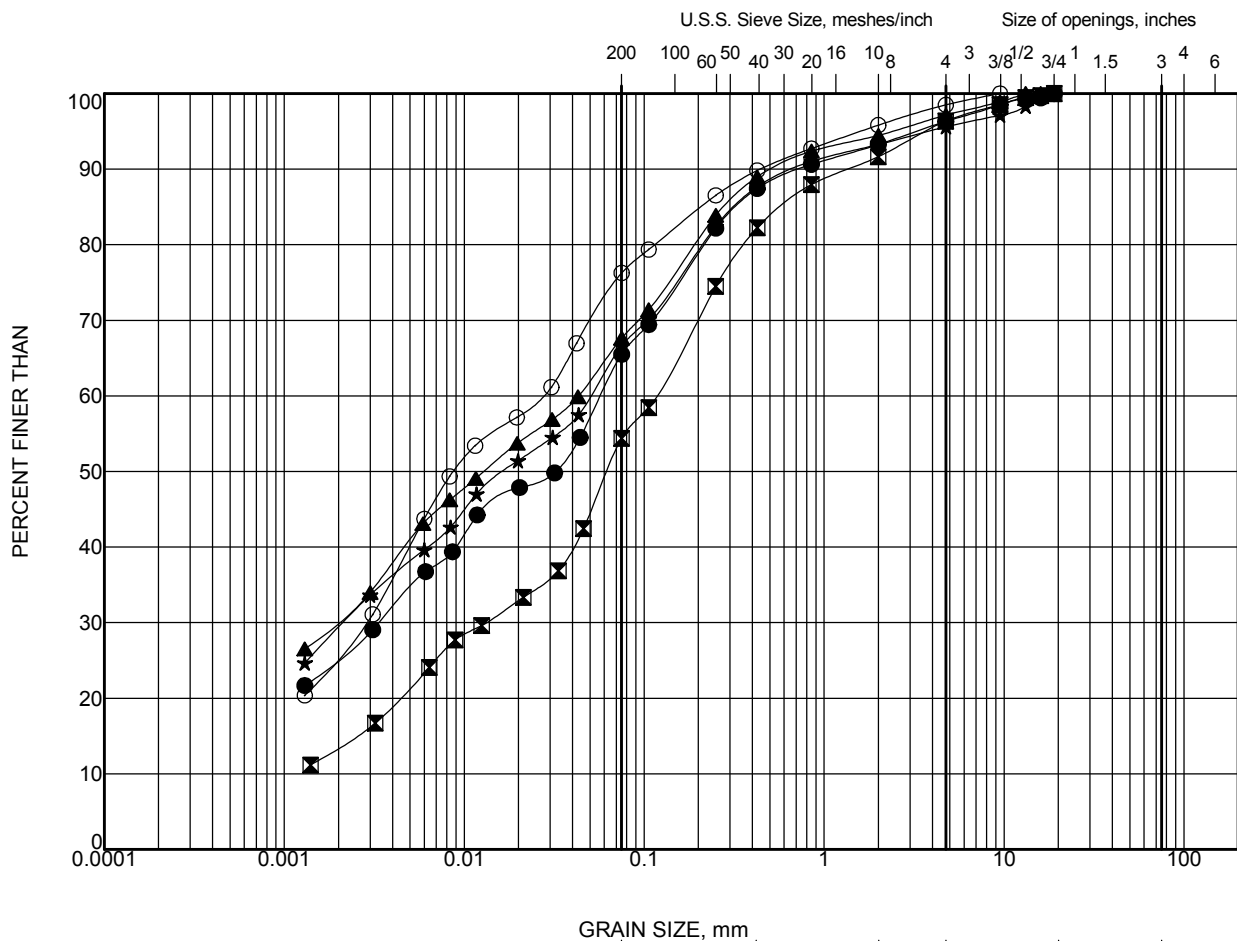


| | | | | | | |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | B15-1 | 20 | 18.3 |
| ■ | B15-1 | 23.1 | 23.2 |
| ▲ | B15-1 | 23.2 | 23.5 |
| ★ | B15-1 | 27 | 29 |
| ○ | B15-2 | 10 | 9.1 |

| | | | |
|--------------------|-----------------------------|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE B.28 | | | |

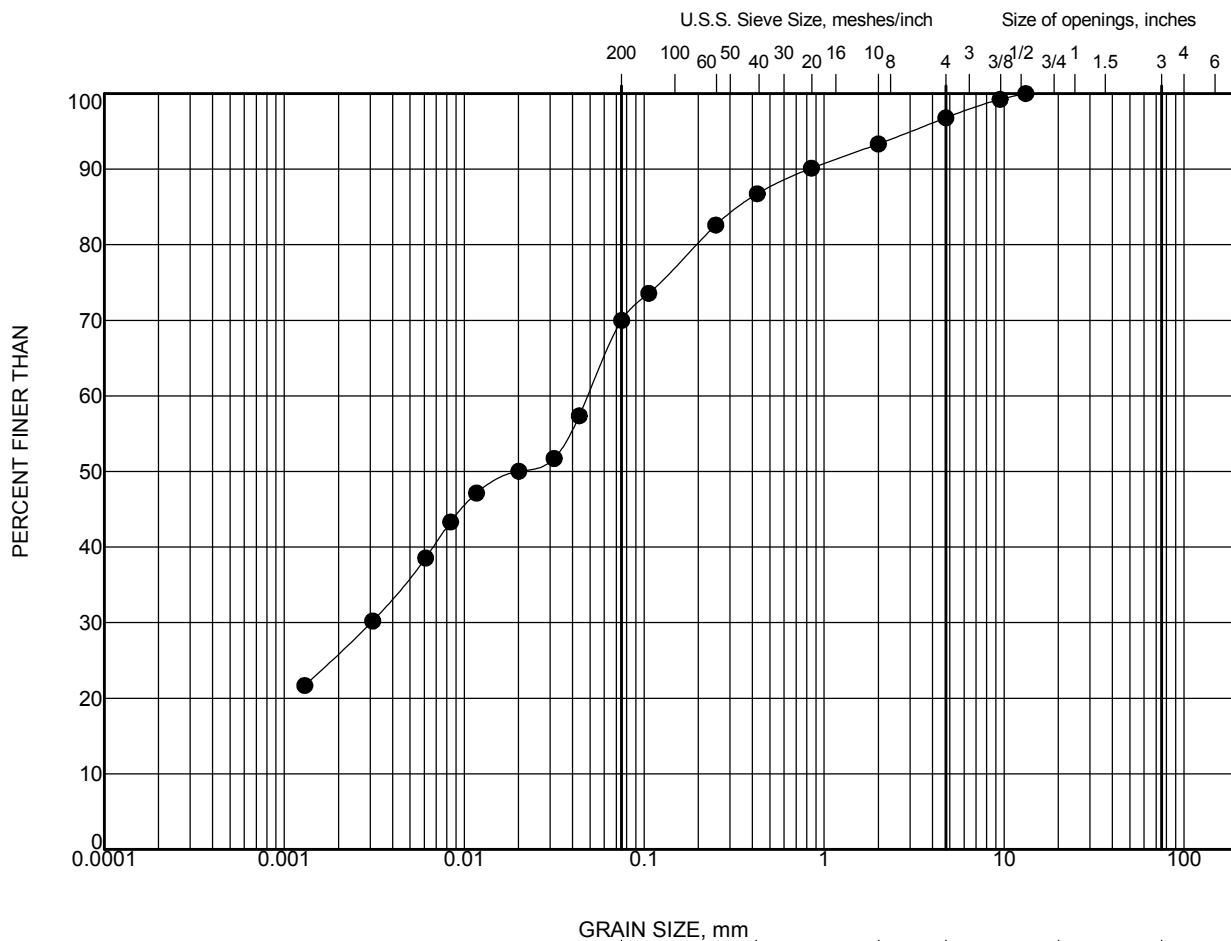


| | | | | | | |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | B15-2 | 13 | 13.7 |
| ■ | B15-2 | 16 | 18.3 |
| ▲ | B15-3 | 20 | 15.2 |
| ★ | B15-3 | 26 | 24.4 |
| ○ | B15-3 | 33 | 35.1 |

| | | | |
|--------------------|-----------------------------|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE B.29 | | | |

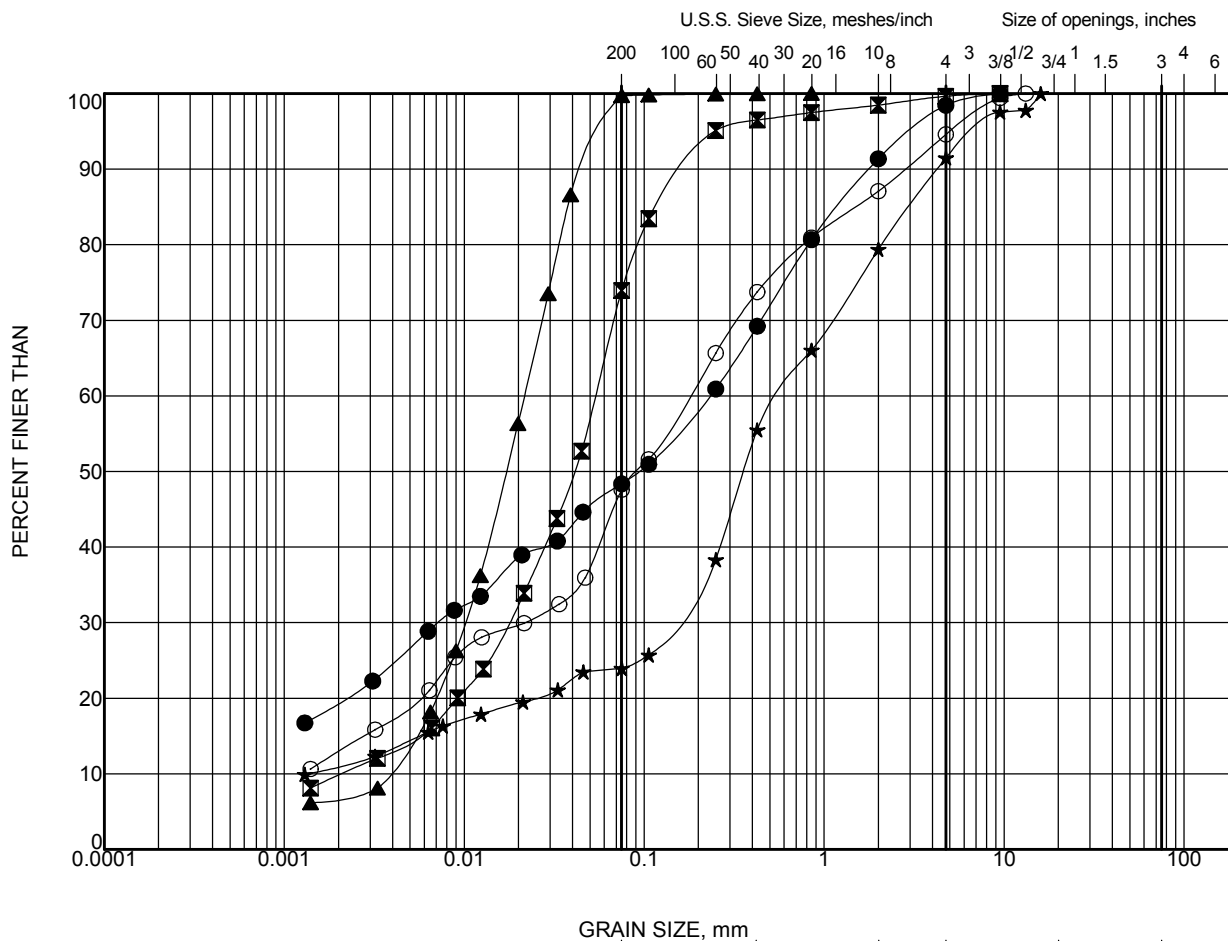


| GRAIN SIZE, mm | | | | | | |
|----------------|-----------|--------|--------|-------------|--------|-------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | B15-3 | 39 | 44.2 |

| | | | |
|--------------------|-----------------------------|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE B.30 | | | |

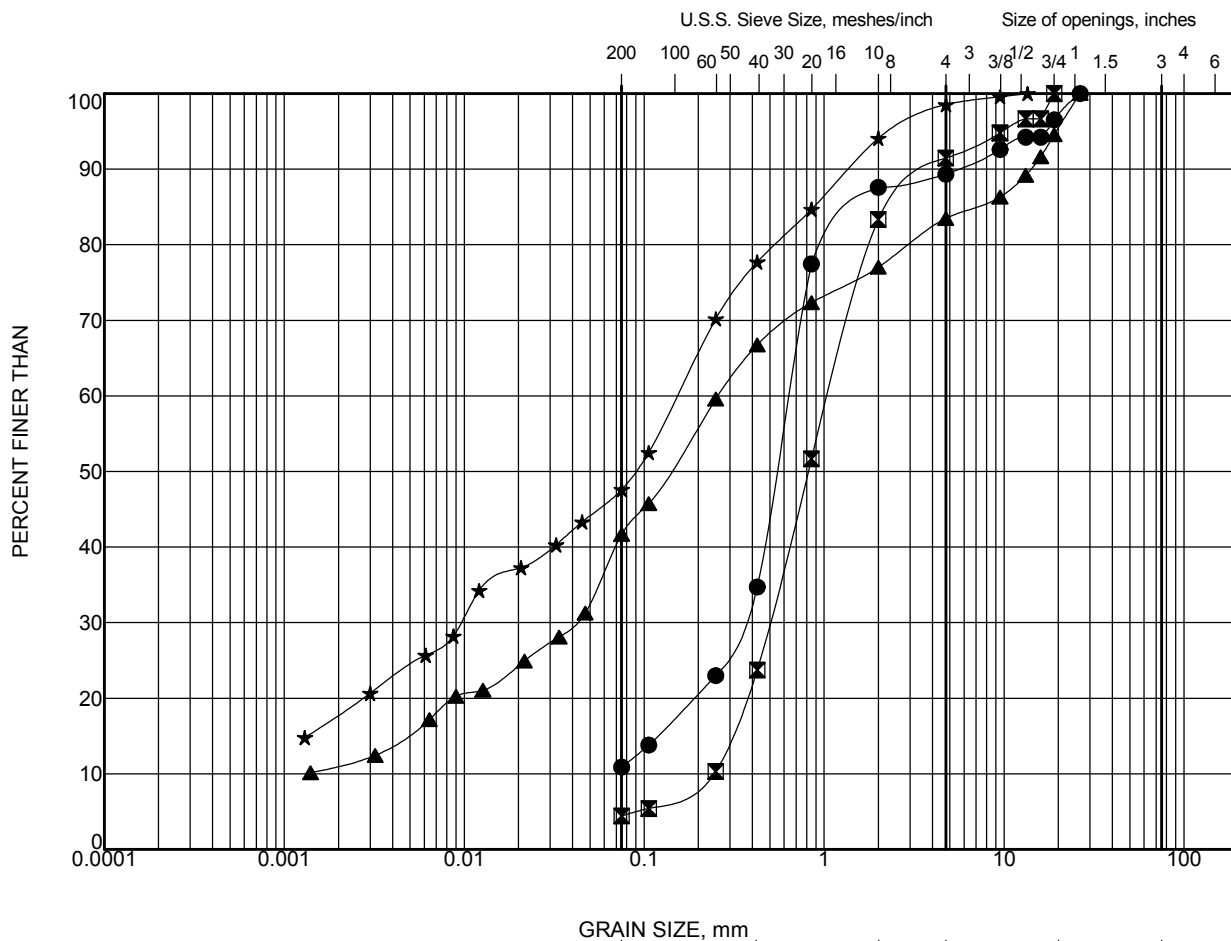


| | | | | | | |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|---------------|--------|-----------|
| ● | B9-1 | 18 | 21.3 |
| ■ | B9-1 | 24 | 30.5 |
| ▲ | B9-2 | 25 | 32 |
| ★ | HG-MW-3 | 2 | 1.5 |
| ○ | T10-1/HGMW-04 | 23 | 27.4 |

| | | | |
|--------------------|-----------------------------|-------------------------------------|----------|
| PROJECT | | Windsor Essex Parkway (WEP) | |
| | | Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION | |
| | | SILTY SAND/SANDY SILT/GRAVEL | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE B.31 | | | |



LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|---------------|--------|-----------|
| ● | B11-1 | 25 | 32 |
| ■ | B11-3 | 27 | 35.1 |
| ▲ | T10-1/HGMW-04 | 24 | 29 |
| ★ | T11-3 | 13 | 13.7 |

PROJECT

Windsor Essex Parkway (WEP)
Windsor, Ontario

TITLE

GRAIN SIZE DISTRIBUTION SILTY SAND/SANDY SILT/GRAVEL

Parkway Infrastructure Engineers **amec**
Hatch Mott MacDonald

PROJECT No. SW8801.1004.101

FILE No.

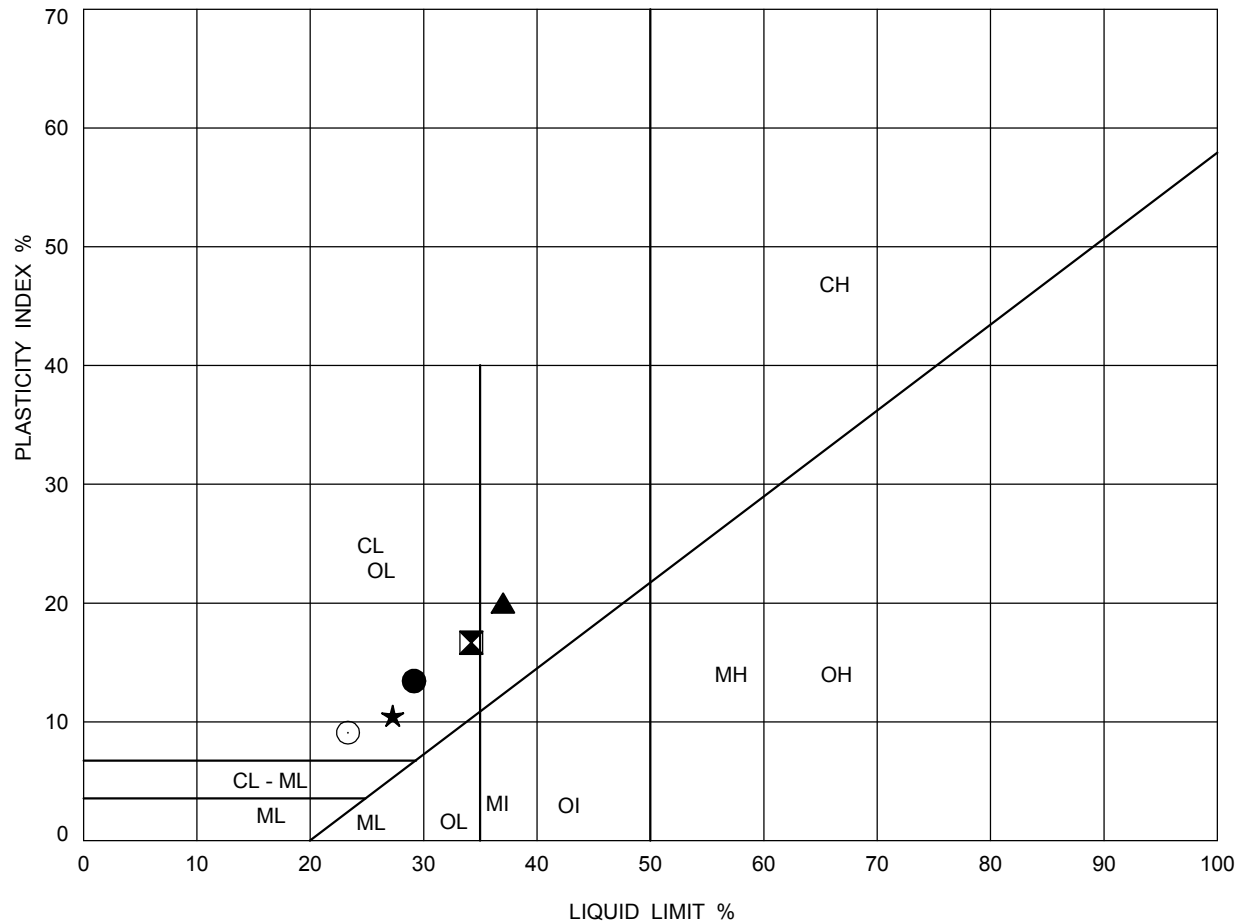
DRAWN EA

SCALE

REV.

CHECK MSO

FIGURE B.32






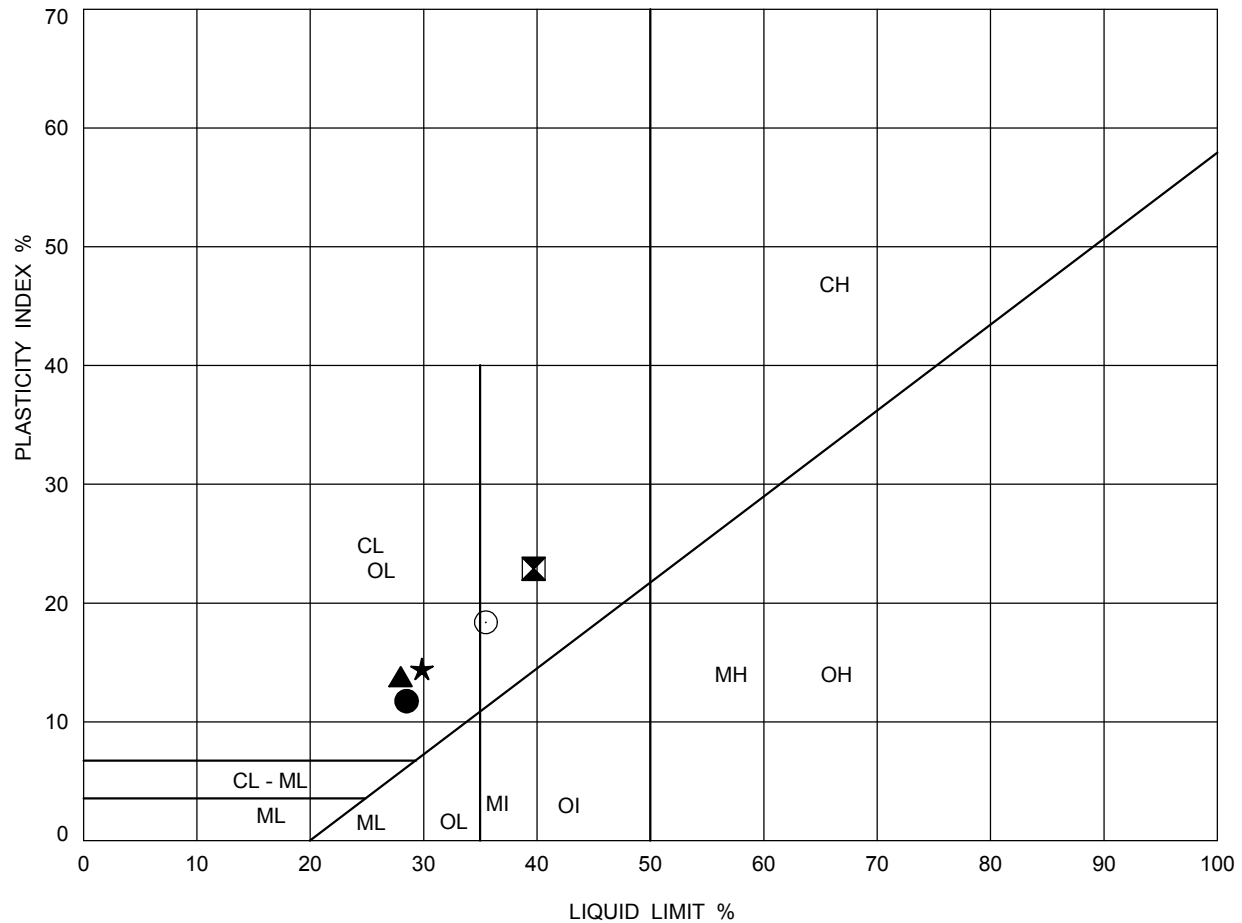
SOIL TYPE
 C = Clay
 M = Silt
 O = Organic

PLASTICITY
 L = Low
 I = Intermediate
 H = High

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|---------------|--------|-----------|-------|-------|----|
| ● | T6-1/HG-MW-07 | 8 | 6.1 | 29 | 16 | 13 |
| ⊠ | T6-1/HG-MW-07 | 10 | 9.1 | 34 | 18 | 16 |
| ▲ | T6-1/HG-MW-07 | 12 | 12.2 | 37 | 17 | 20 |
| ★ | T6-1/HG-MW-07 | 13 | 13.7 | 27 | 17 | 10 |
| ○ | T6-1/HG-MW-07 | 16 | 18.3 | 23 | 14 | 9 |

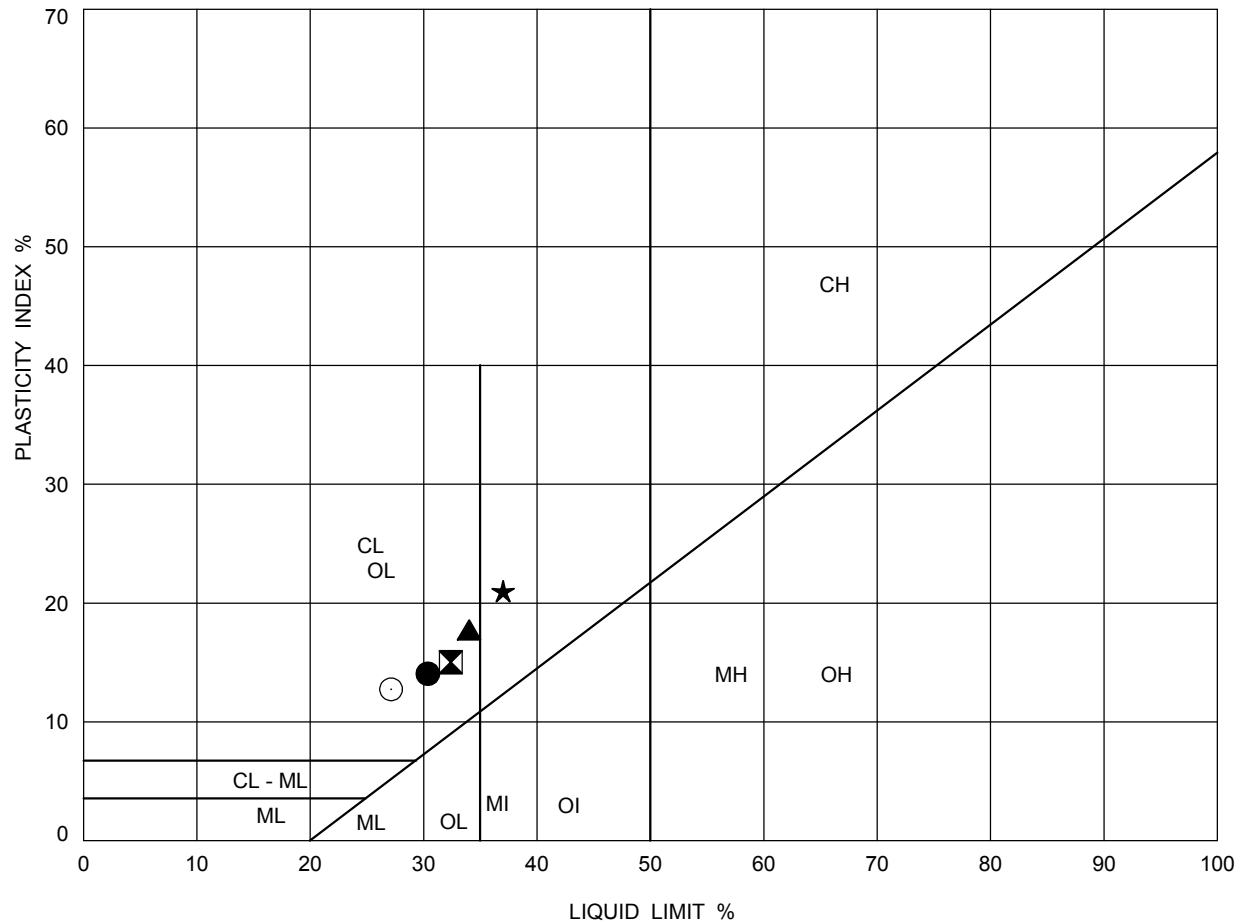
| | | | |
|--|--|--|--|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
| PROJECT No. SW8801.1004.101 | | FILE No. | |
| DRAWN EAA | | SCALE | |
| CHECK MSO | | REV. | |
|   | |  | |
| | | FIGURE B.33 | |



LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|---------------|--------|-----------|-------|-------|----|
| ● | T6-1/HG-MW-07 | 19 | 22.9 | 28 | 17 | 11 |
| ⊠ | T6-2 | 8 | 6.1 | 40 | 17 | 23 |
| ▲ | T6-2 | 14 | 15.2 | 28 | 14 | 14 |
| ★ | T6-2 | 19 | 22.9 | 30 | 15 | 15 |
| ○ | T6-3 | 11 | 10.7 | 35 | 17 | 18 |

| | | | |
|-----------------------------|-----|---|------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
| PROJECT No. SW8801.1004.101 | | FILE No. | |
| DRAWN | EAA | SCALE | REV. |
| CHECK | MSO | FIGURE B.34 | |






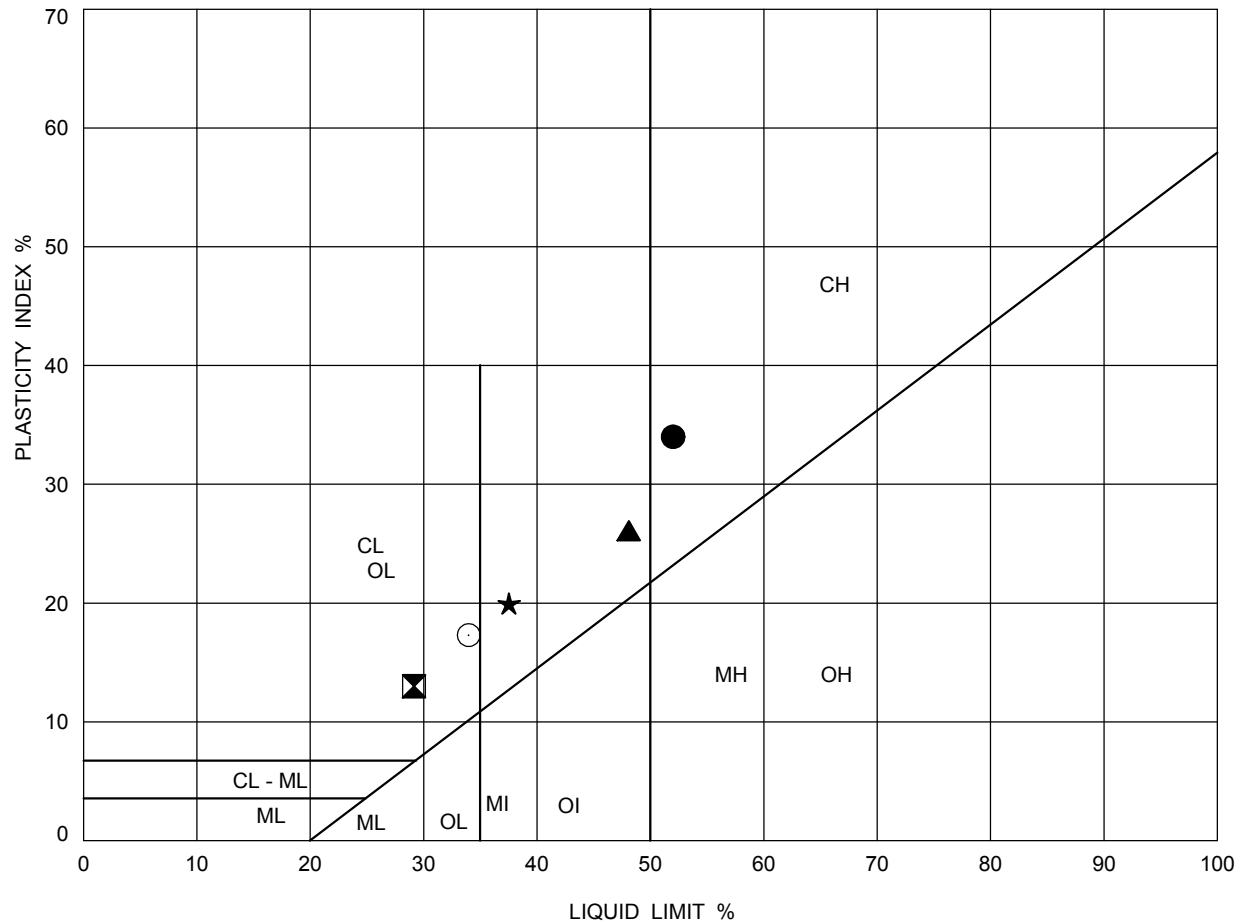
SOIL TYPE
 C = Clay
 M = Silt
 O = Organic

PLASTICITY
 L = Low
 I = Intermediate
 H = High

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | B9-1 | 8 | 6.1 | 30 | 16 | 14 |
| ⊠ | B9-1 | 11 | 10.7 | 32 | 17 | 15 |
| ▲ | T6-3 | 14 | 15.2 | 34 | 16 | 18 |
| ★ | T6-3 | 15 | 16.8 | 37 | 16 | 21 |
| ○ | T6-3 | 17 | 19.8 | 27 | 14 | 13 |

| | | | |
|---|--|---|--|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
| PROJECT No. SW8801.1004.101 | | FILE No. | |
| DRAWN EAA | | SCALE | |
| CHECK MSO | | REV. | |
|    | | FIGURE B.35 | |



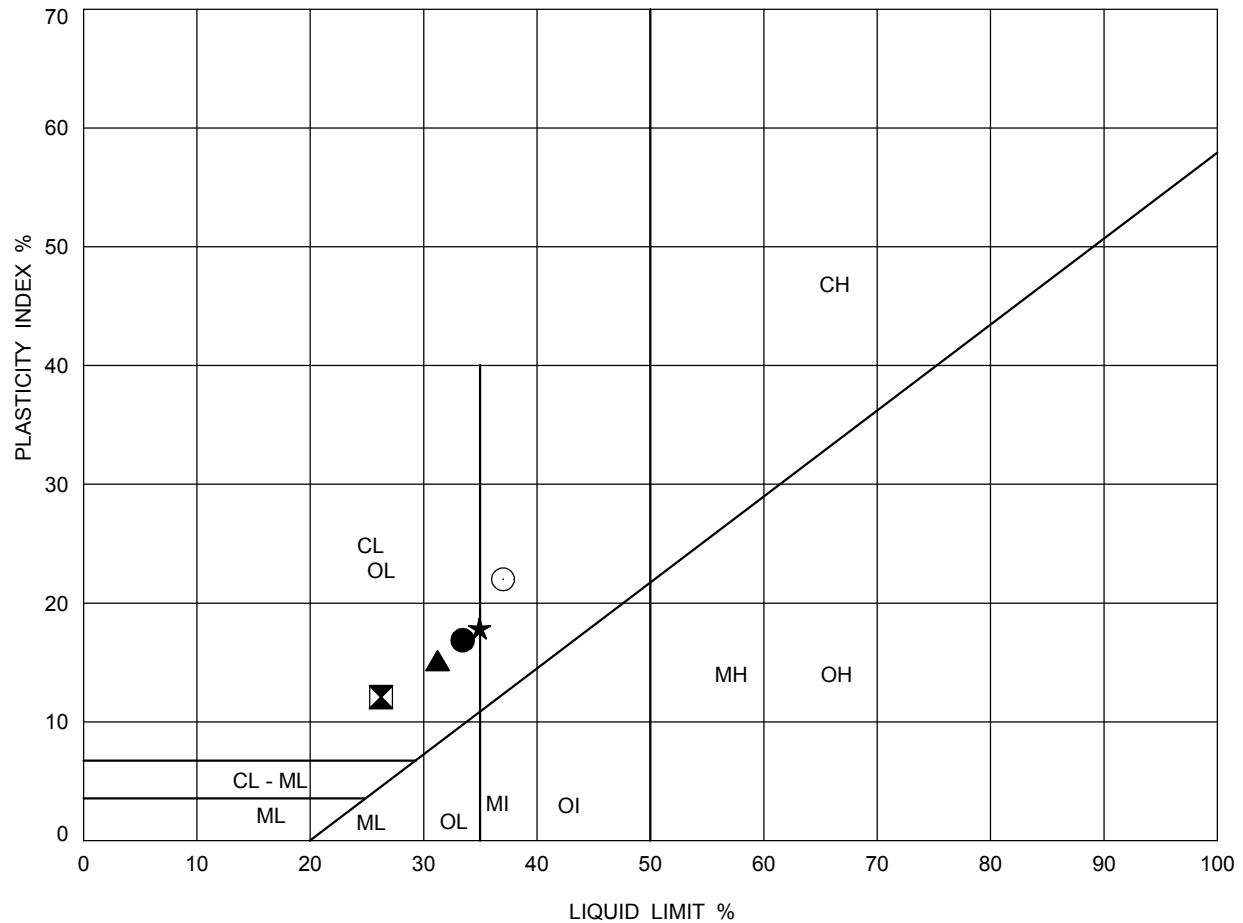
SOIL TYPE
 C = Clay
 M = Silt
 O = Organic

PLASTICITY
 L = Low
 I = Intermediate
 H = High

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | B9-1 | 13 | 13.7 | 52 | 18 | 34 |
| ⊠ | B9-1 | 14 | 15.2 | 29 | 16 | 13 |
| ▲ | B9-1 | 23 | 29 | 48 | 22 | 26 |
| ★ | B9-2 | 5 | 3.8 | 38 | 18 | 20 |
| ○ | B9-2 | 12 | 12.2 | 34 | 17 | 17 |

| | | | |
|-----------------------------|-----|---|------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
| PROJECT No. SW8801.1004.101 | | FILE No. | |
| DRAWN | EAA | SCALE | REV. |
| CHECK | MSO | FIGURE B.36 | |



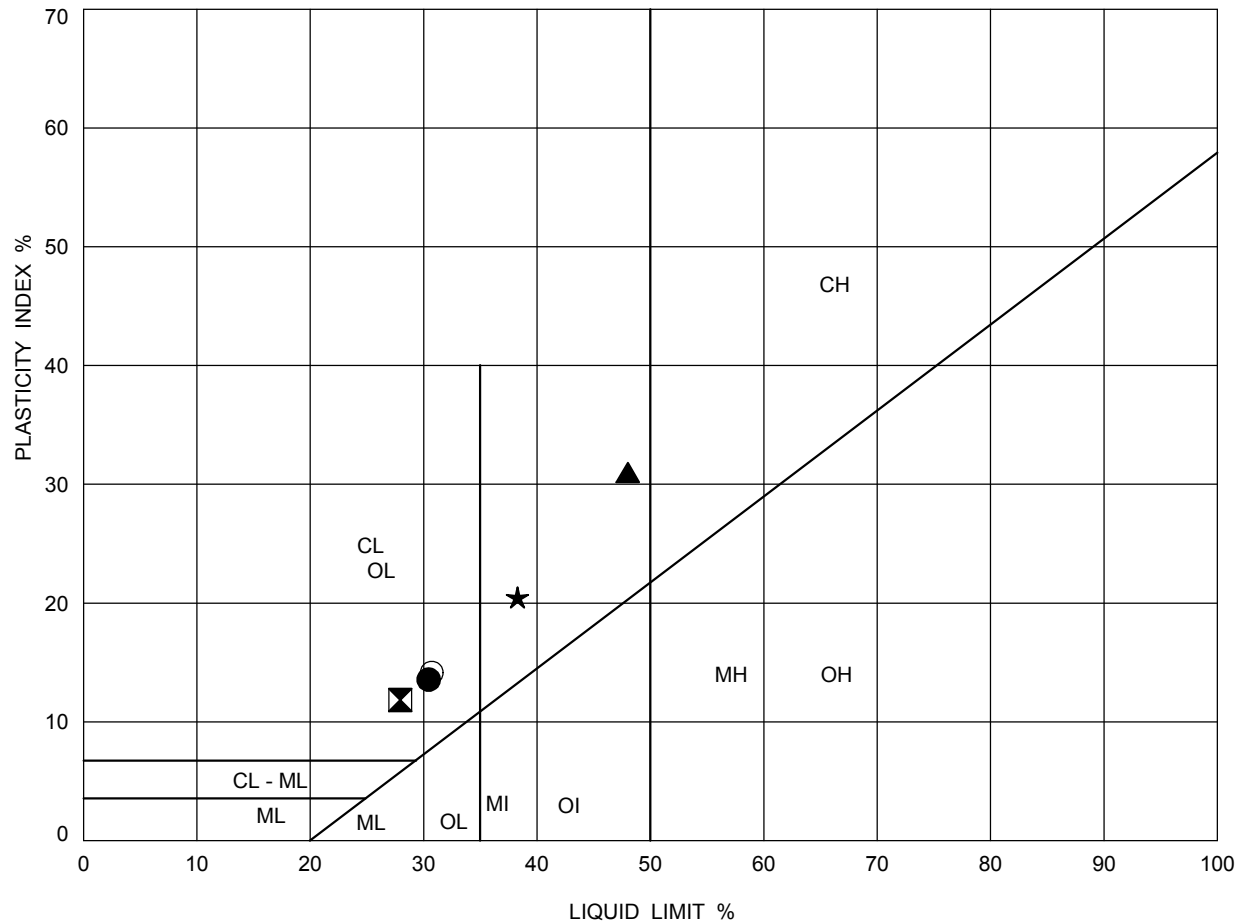
SOIL TYPE
 C = Clay
 M = Silt
 O = Organic

PLASTICITY
 L = Low
 I = Intermediate
 H = High

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | B9-2 | 14 | 15.2 | 33 | 17 | 16 |
| ⊠ | B9-2 | 17 | 19.8 | 26 | 14 | 12 |
| ▲ | B9-2 | 19 | 22.9 | 31 | 16 | 15 |
| ★ | B9-3 | 8 | 6.1 | 35 | 17 | 18 |
| ○ | B9-3 | 11 | 10.7 | 37 | 15 | 22 |

| | | | |
|-----------------------------|-----|---|------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
| PROJECT No. SW8801.1004.101 | | FILE No. | |
| DRAWN | EAA | SCALE | REV. |
| CHECK | MSO | FIGURE B.37 | |





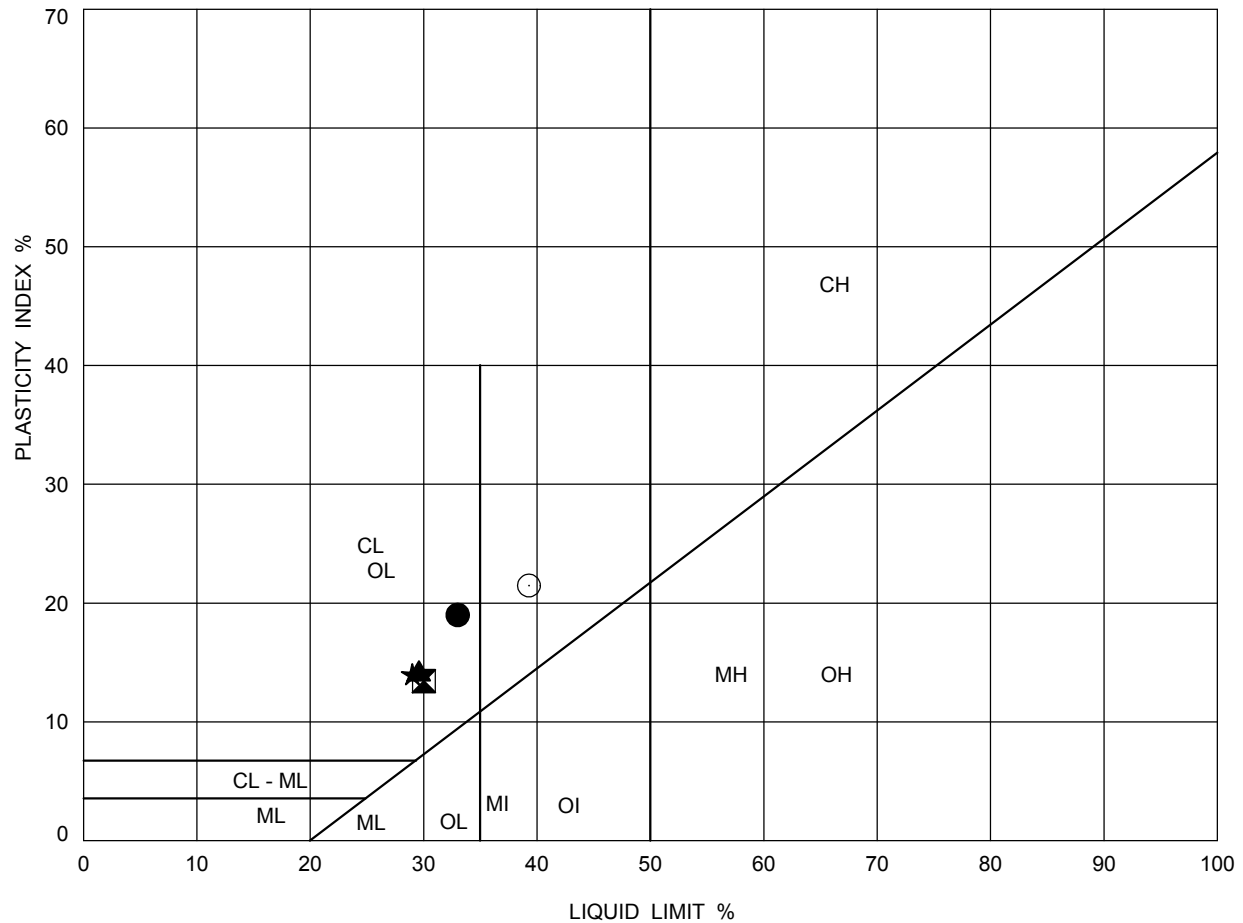
SOIL TYPE
 C = Clay
 M = Silt
 O = Organic

PLASTICITY
 L = Low
 I = Intermediate
 H = High

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | B10-1 | 12 | 12.2 | 30 | 17 | 13 |
| ⊠ | B10-1 | 20 | 24.4 | 28 | 16 | 12 |
| ▲ | B9-3 | 14 | 15.2 | 48 | 17 | 31 |
| ★ | B9-3 | 15 | 16.8 | 38 | 18 | 20 |
| ○ | T7-1 | 8 | 6.1 | 31 | 17 | 14 |

| | | | |
|--|-----|---|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
|   | | PROJECT No. SW8801.1004.101 | FILE No. |
| DRAWN | EAA | SCALE | REV. |
| CHECK | MSO | FIGURE B.38 | |



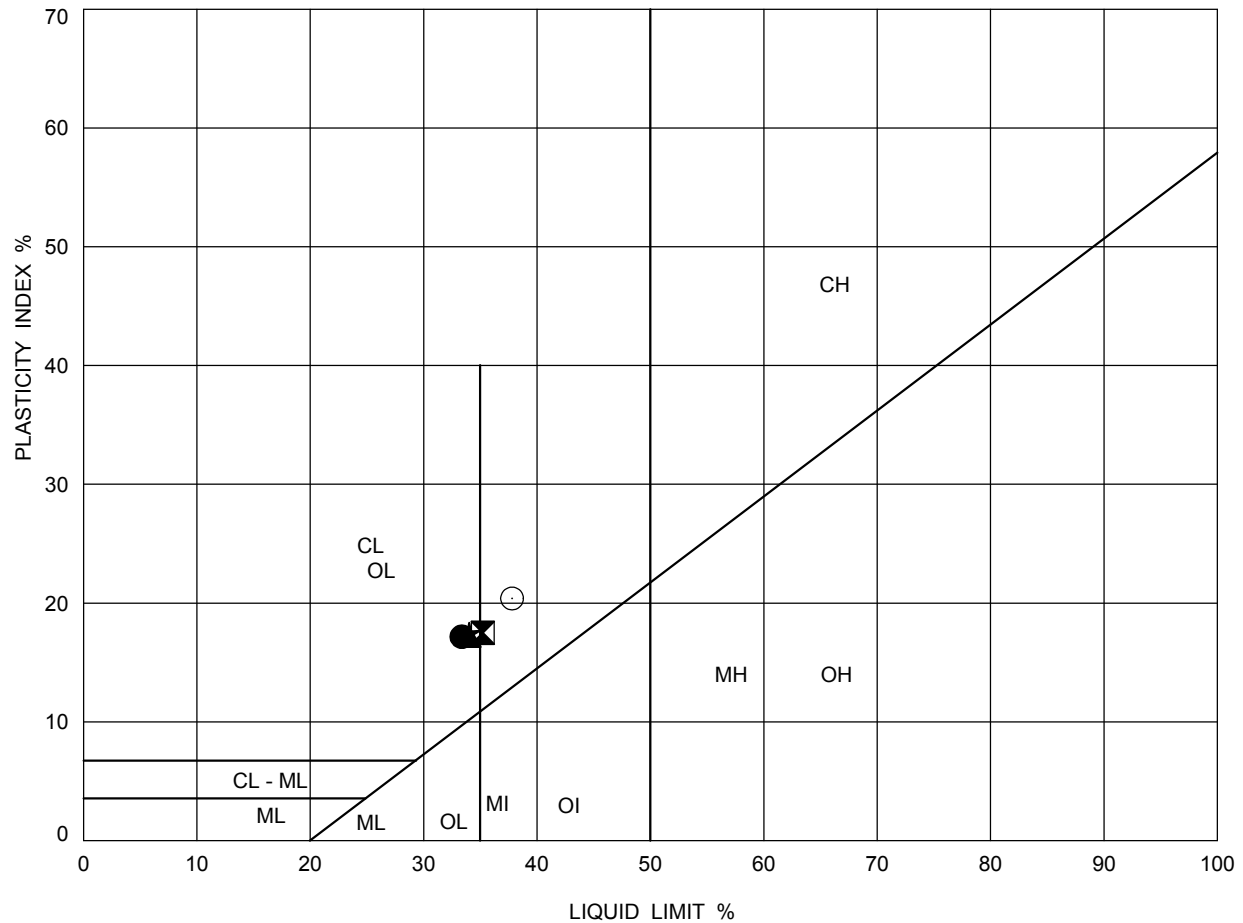
SOIL TYPE
 C = Clay
 M = Silt
 O = Organic

PLASTICITY
 L = Low
 I = Intermediate
 H = High

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | T7-1 | 11 | 10.7 | 33 | 14 | 19 |
| ⊠ | T7-1 | 12 | 12.2 | 30 | 17 | 13 |
| ▲ | T7-1 | 18 | 21.3 | 30 | 15 | 15 |
| ★ | T7-1 | 20 | 24.4 | 29 | 15 | 14 |
| ○ | T7-2 | 4 | 3 | 39 | 18 | 21 |

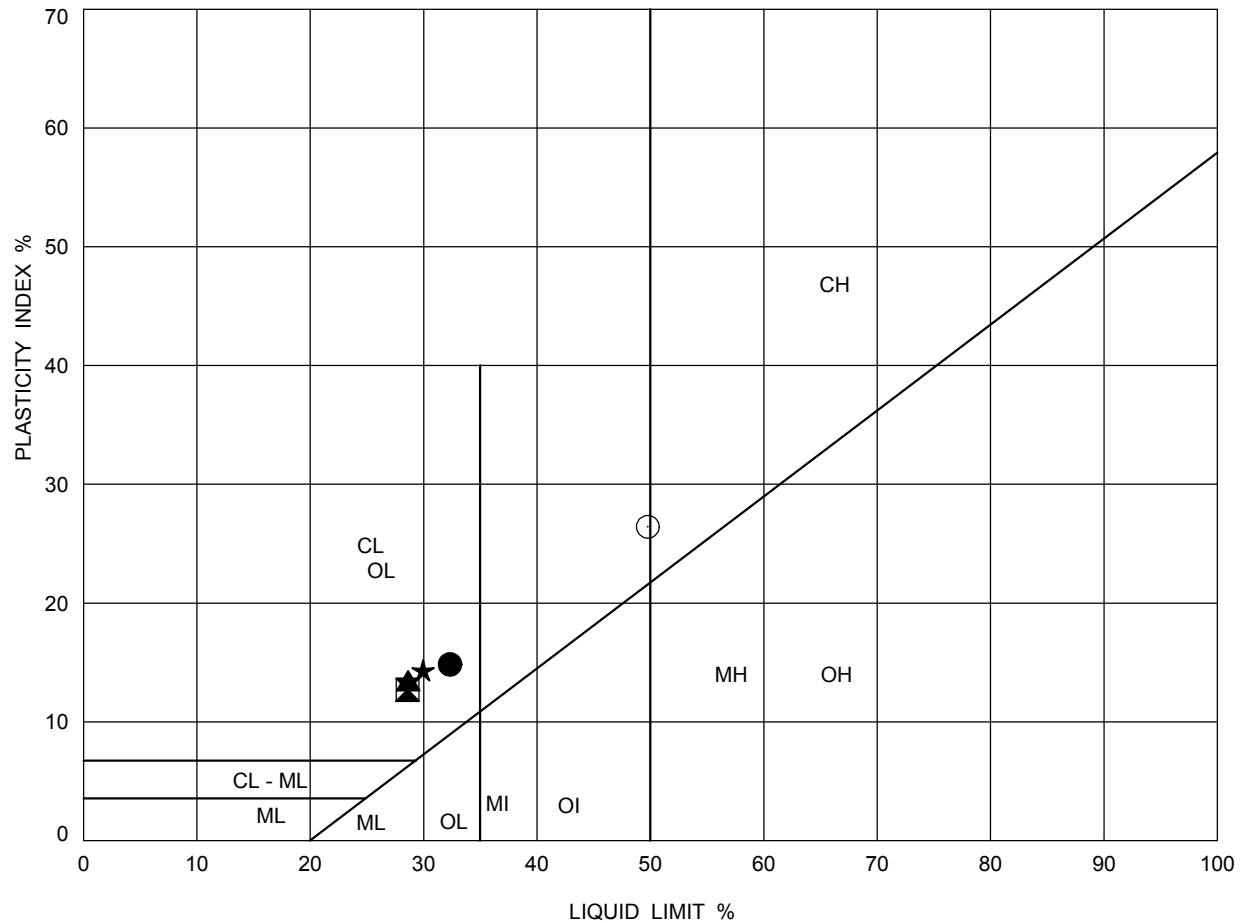
| | | | |
|-----------------------------|-----|---|------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
| PROJECT No. SW8801.1004.101 | | FILE No. | |
| DRAWN | EAA | SCALE | REV. |
| CHECK | MSO | FIGURE B.39 | |



LEGEND:



| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | T7-2 | 9 | 7.6 | 33 | 16 | 17 |
| ⊠ | T7-2 | 12 | 12.2 | 35 | 18 | 17 |
| ▲ | T7-2 | 19 | 22.9 | 34 | 17 | 17 |
| ★ | T7-3 | 8 | 6.1 | 34 | 17 | 17 |
| ○ | T7-3 | 10 | 9.1 | 38 | 17 | 21 |

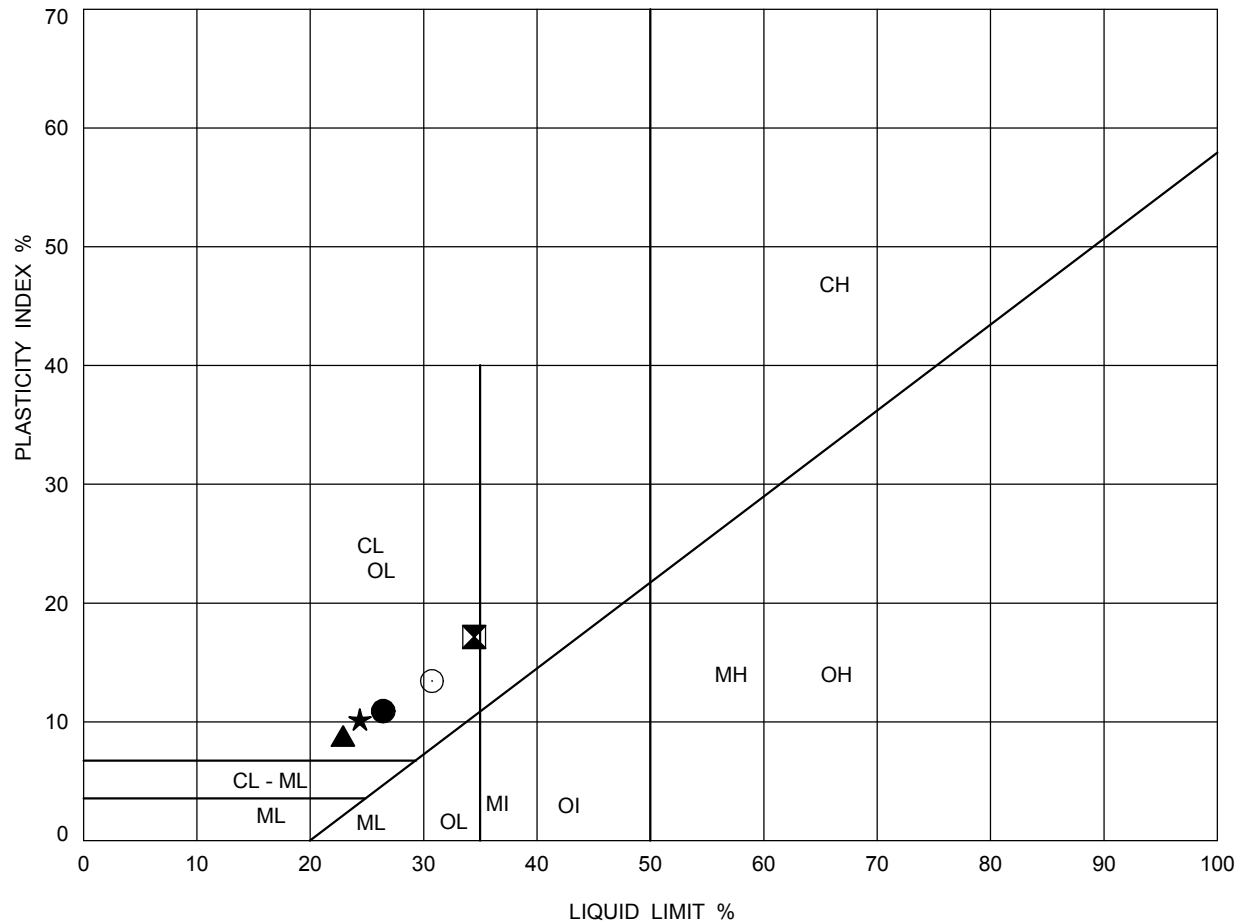
| | | | |
|-----------------------------|-----|---|------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
| PROJECT No. SW8801.1004.101 | | FILE No. | |
| DRAWN | EAA | SCALE | REV. |
| CHECK | MSO | FIGURE B.40 | |



LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | B10-2 | 9 | 7.6 | 32 | 17 | 15 |
| ⊠ | T7-3 | 13 | 13.7 | 29 | 16 | 13 |
| ▲ | T7-3 | 17 | 19.8 | 29 | 15 | 14 |
| ★ | T7-3 | 19 | 22.9 | 30 | 16 | 14 |
| ○ | T7-3 | 22 | 27.4 | 50 | 23 | 27 |

| | | | |
|--|-----|---|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
|   | | PROJECT No. SW8801.1004.101 | FILE No. |
| DRAWN | EAA | SCALE | REV. |
| CHECK | MSO | FIGURE B.41 | |



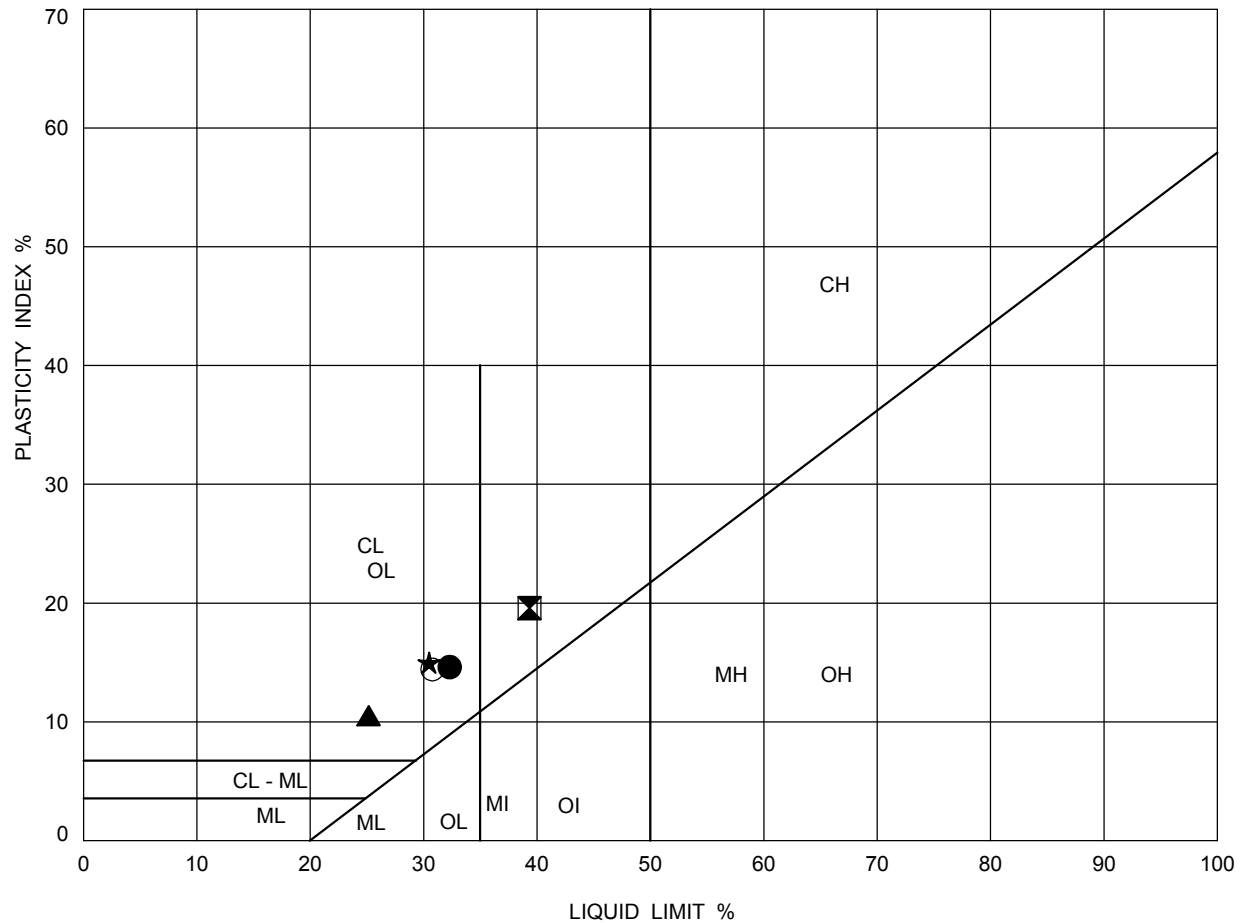
SOIL TYPE
 C = Clay
 M = Silt
 O = Organic

PLASTICITY
 L = Low
 I = Intermediate
 H = High

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | B10-2 | 19 | 22.9 | 26 | 16 | 10 |
| ⊠ | B10-3 | 8 | 6.1 | 34 | 17 | 17 |
| ▲ | B10-3 | 22 | 27.4 | 23 | 14 | 9 |
| ★ | B10-4 | 16 | 18.3 | 24 | 14 | 10 |
| ○ | B10-4 | 22 | 27.4 | 31 | 17 | 14 |

| | | | |
|-----------------------------|-----|---|------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
| PROJECT No. SW8801.1004.101 | | FILE No. | |
| DRAWN | EAA | SCALE | REV. |
| CHECK | MSO | FIGURE B.42 | |





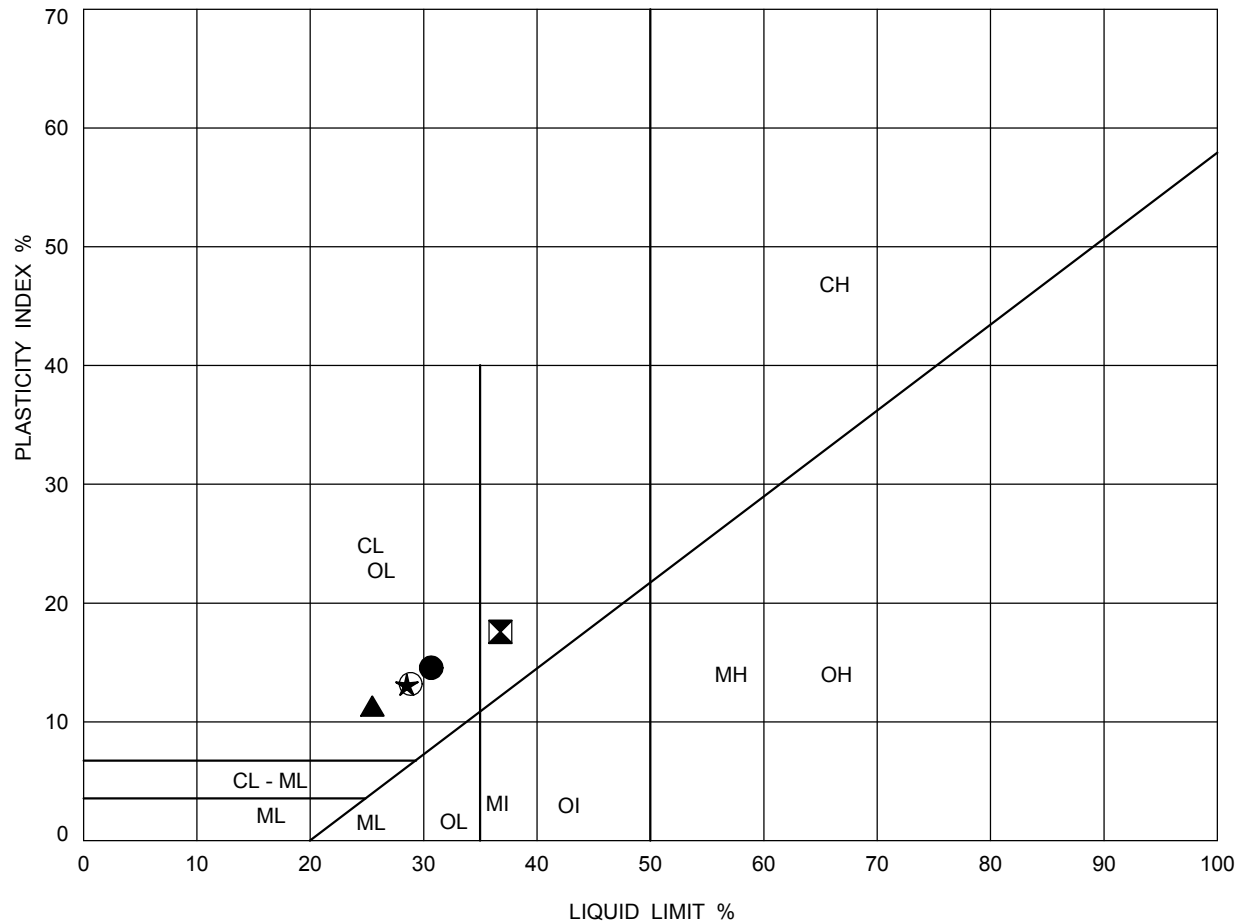
SOIL TYPE
 C = Clay
 M = Silt
 O = Organic

PLASTICITY
 L = Low
 I = Intermediate
 H = High

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | B10-5 | 11 | 10.7 | 32 | 18 | 14 |
| ⊠ | B10-5 | 13 | 13.7 | 39 | 20 | 19 |
| ▲ | B10-5 | 17 | 19.8 | 25 | 15 | 10 |
| ★ | B10-6 | 7 | 5.3 | 30 | 15 | 15 |
| ○ | B10-6 | 9 | 7.6 | 31 | 16 | 15 |

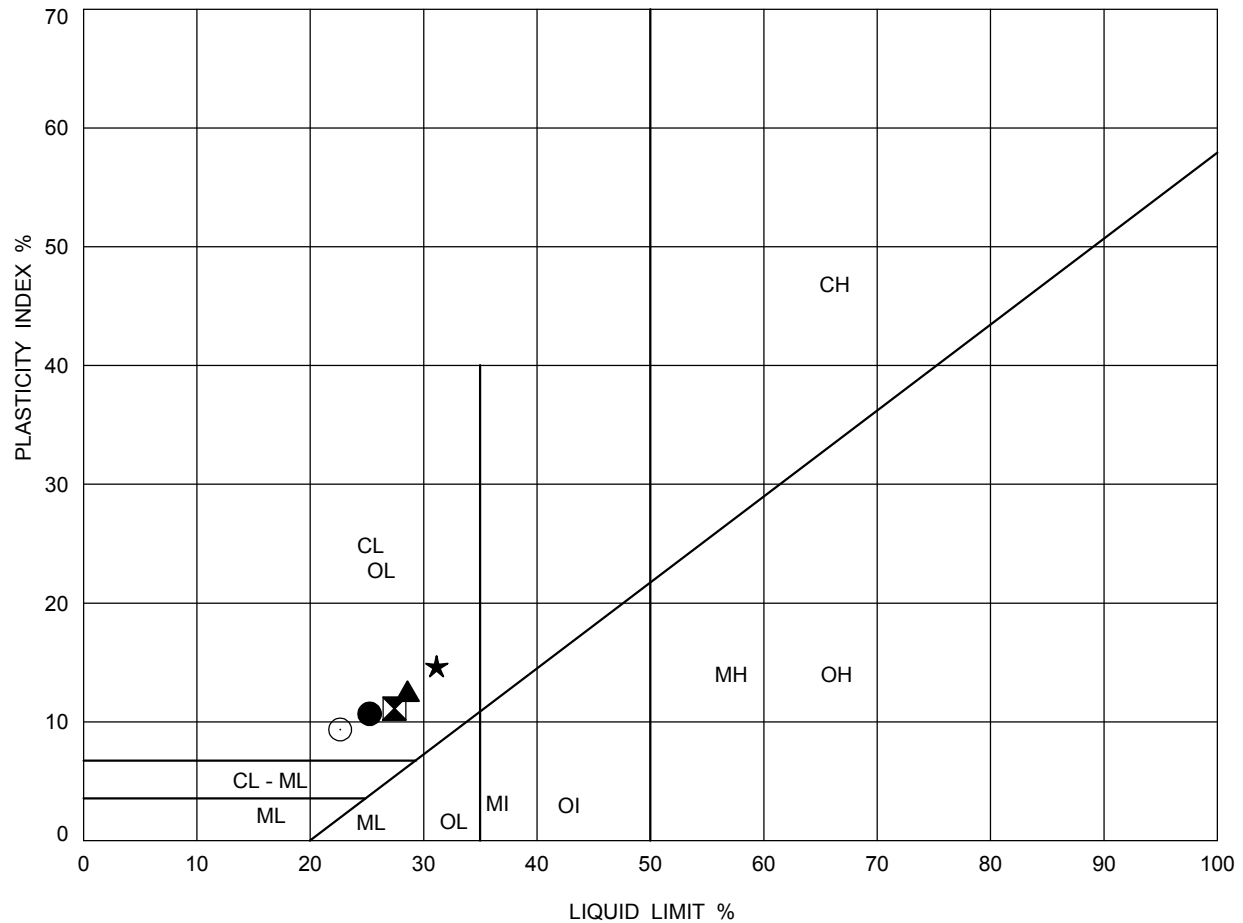
| | | | |
|--|-----|---|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
|   | | PROJECT No. SW8801.1004.101 | FILE No. |
| DRAWN | EAA | SCALE | REV. |
| CHECK | MSO | FIGURE B.43 | |



LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | B10-6 | 11 | 10.7 | 31 | 16 | 15 |
| ⊠ | B10-6 | 13 | 13.7 | 37 | 19 | 18 |
| ▲ | B10-6 | 15 | 16.8 | 25 | 14 | 11 |
| ★ | B10-6 | 17 | 19.8 | 29 | 15 | 14 |
| ○ | B10-7 | 9 | 7.6 | 29 | 16 | 13 |

| | | | |
|-----------------------------|-----|---|------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
| PROJECT No. SW8801.1004.101 | | FILE No. | |
| DRAWN | EAA | SCALE | REV. |
| CHECK | MSO | FIGURE B.44 | |





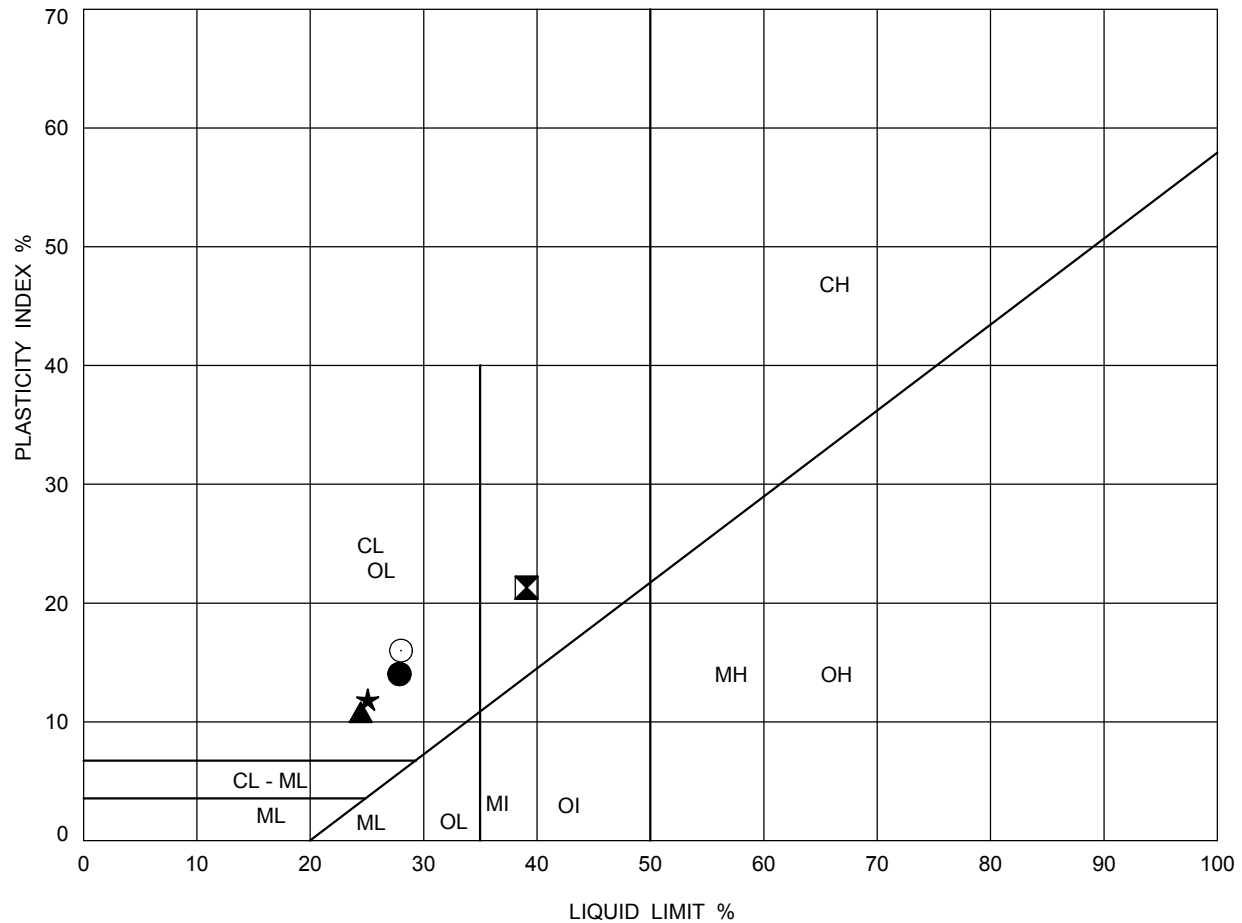
SOIL TYPE
 C = Clay
 M = Silt
 O = Organic

PLASTICITY
 L = Low
 I = Intermediate
 H = High

LEGEND:



| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | B10-7 | 13 | 13.7 | 25 | 15 | 10 |
| ⊠ | B10-7 | 20 | 22.9 | 27 | 16 | 11 |
| ▲ | B10-7 | 25 | 29 | 29 | 16 | 13 |
| ★ | B10-8 | 12 | 12.2 | 31 | 16 | 15 |
| ○ | B10-8 | 17 | 19.8 | 23 | 13 | 10 |

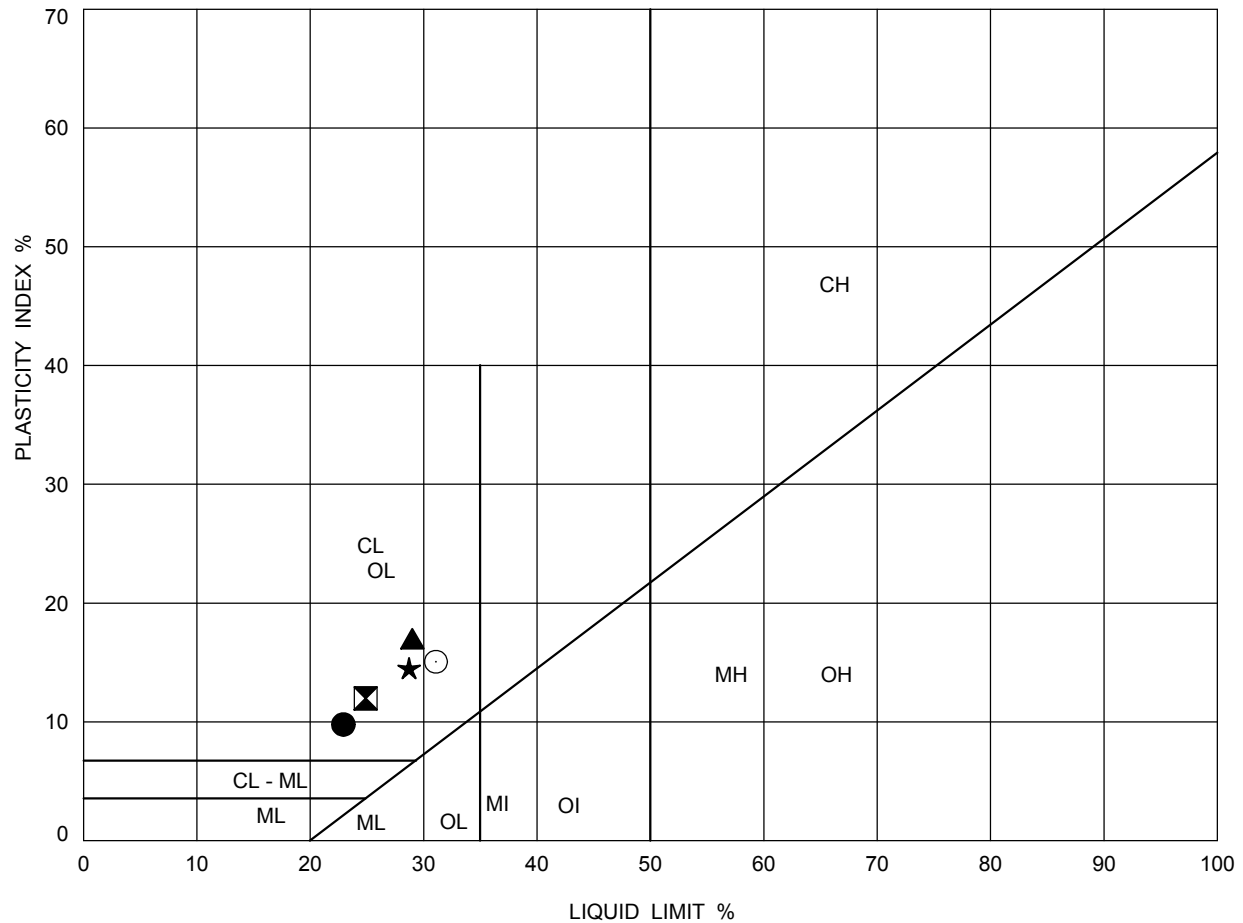
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|--|-----|---|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
|   | | PROJECT No. SW8801.1004.101 | FILE No. |
| DRAWN | EAA | | SCALE |
| CHECK | MSO | | REV. |
| | | FIGURE B.45 | |



LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | T8-1 | 11 | 9.1 | 28 | 14 | 14 |
| ⊠ | T8-1 | 15 | 15.2 | 39 | 18 | 21 |
| ▲ | T8-1 | 19 | 21.3 | 24 | 14 | 10 |
| ★ | T9-1 | 10 | 7.6 | 25 | 13 | 12 |
| ○ | T9-1 | 12 | 10.7 | 28 | 12 | 16 |

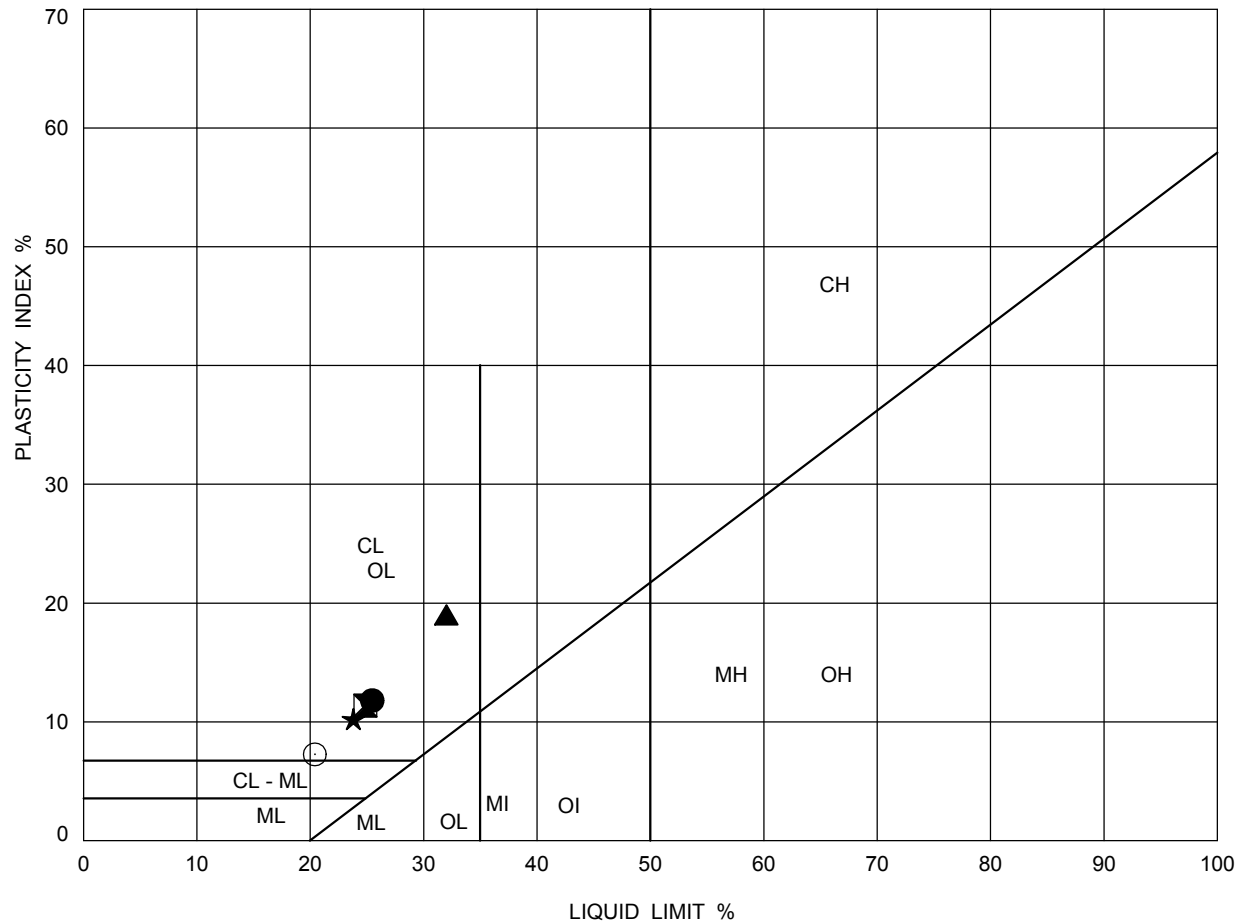
| | | | |
|--|-----|---|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
|   | | PROJECT No. SW8801.1004.101 | FILE No. |
| DRAWN | EAA | | SCALE |
| CHECK | MSO | | REV. |
| | | FIGURE B.46 | |



LEGEND:



| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | CV3-1 | 9 | 7.6 | 23 | 13 | 10 |
| ⊠ | T9-1 | 13 | 12.2 | 25 | 13 | 12 |
| ▲ | T9-1 | 15 | 15.2 | 29 | 12 | 17 |
| ★ | T9-1 | 16 | 16.8 | 29 | 14 | 15 |
| ○ | T9-1 | 20 | 22.9 | 31 | 16 | 15 |

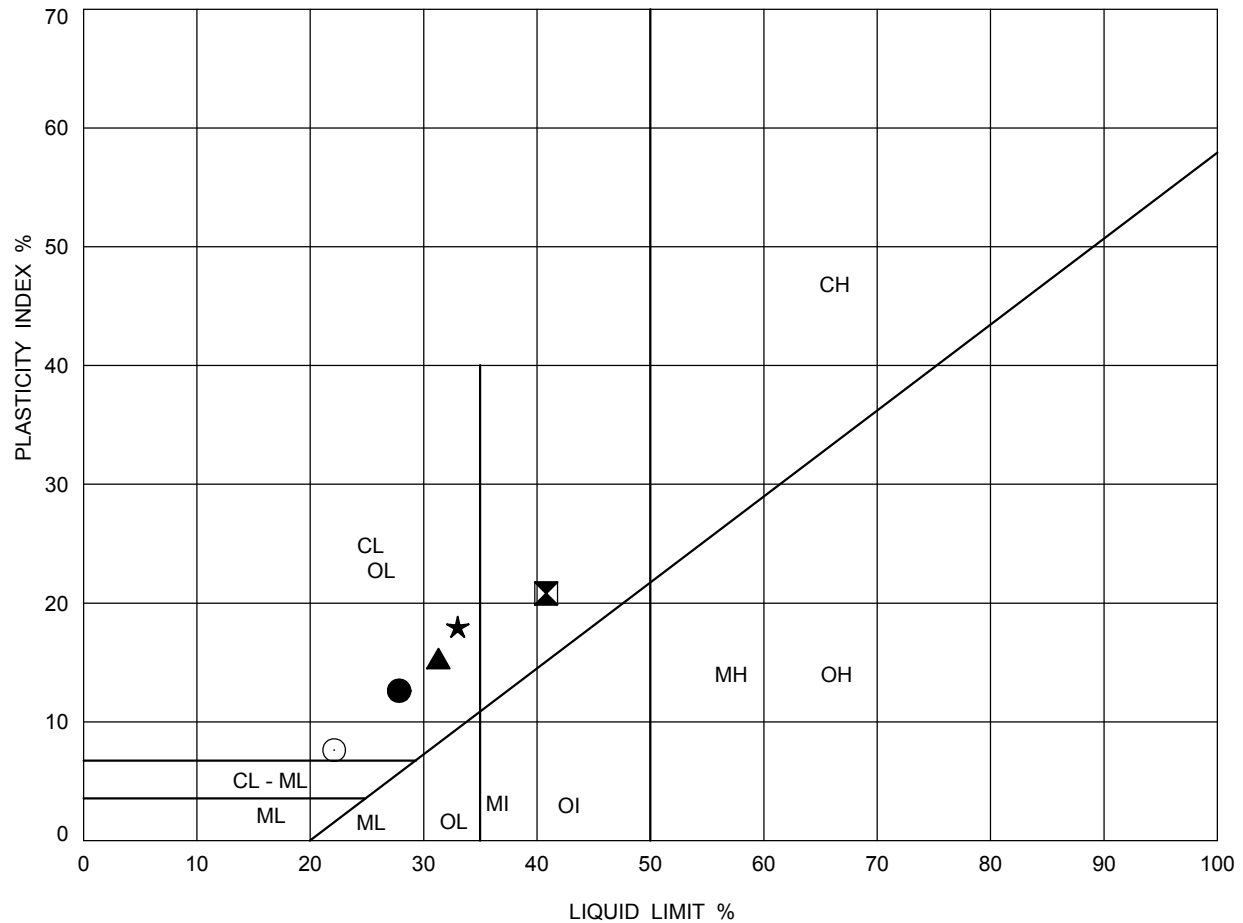
| | | | |
|---------|-----|---|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
| | | PROJECT No. SW8801.1004.101 | FILE No. |
| DRAWN | EAA | SCALE | |
| CHECK | MSO | REV. | |
| | | FIGURE B.47 | |



LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|---------------|--------|-----------|-------|-------|----|
| ● | T10-1/HGMW-04 | 9 | 6.1 | 25 | 14 | 11 |
| ⊠ | T10-1/HGMW-04 | 12 | 10.7 | 25 | 13 | 12 |
| ▲ | T10-1/HGMW-04 | 16 | | 32 | 13 | 19 |
| ★ | T10-1/HGMW-04 | 18 | 19.8 | 24 | 14 | 10 |
| ○ | T10-2/HGMW-09 | 8 | 6.1 | 20 | 13 | 7 |

| | | | |
|--|-----|---|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
|   | | PROJECT No. SW8801.1004.101 | FILE No. |
| DRAWN | EAA | SCALE | |
| CHECK | MSO | REV. | |
| | | FIGURE B.48 | |



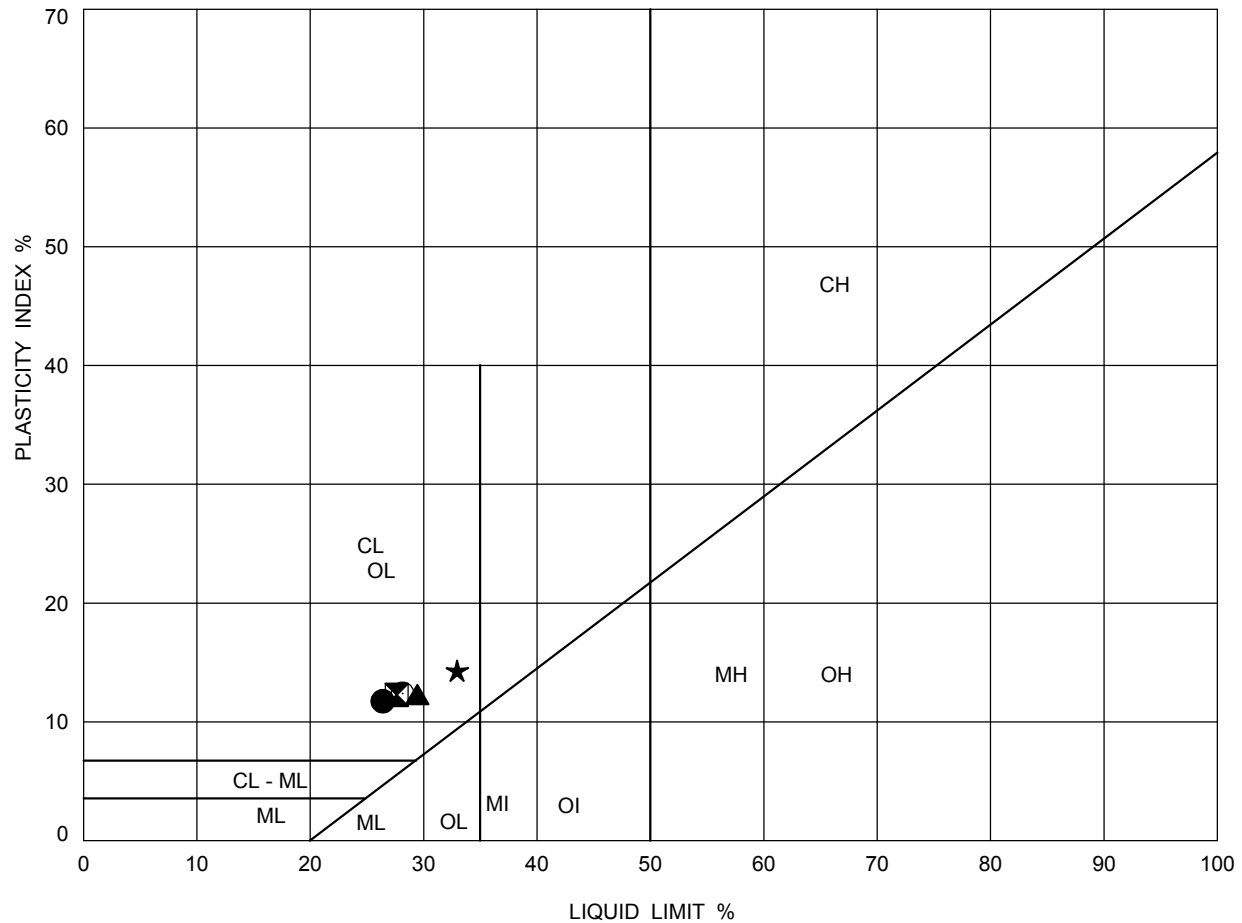
SOIL TYPE
 C = Clay
 M = Silt
 O = Organic

PLASTICITY
 L = Low
 I = Intermediate
 H = High

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|---------------|--------|-----------|-------|-------|----|
| ● | T10-2/HGMW-09 | 15 | 15.8 | 28 | 15 | 13 |
| ⊠ | T10-2/HGMW-09 | 17 | 17.4 | 41 | 20 | 21 |
| ▲ | T10-2/HGMW-09 | 19 | 18.9 | 31 | 16 | 15 |
| ★ | T10-2/HGMW-09 | 20 | | 33 | 15 | 18 |
| ○ | T10-2/HGMW-09 | 23 | 24.4 | 22 | 14 | 8 |

| | | | |
|-----------------------------|-----|---|------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
| PROJECT No. SW8801.1004.101 | | FILE No. | |
| DRAWN | EAA | SCALE | REV. |
| CHECK | MSO | FIGURE B.49 | |



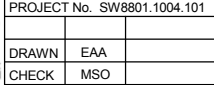


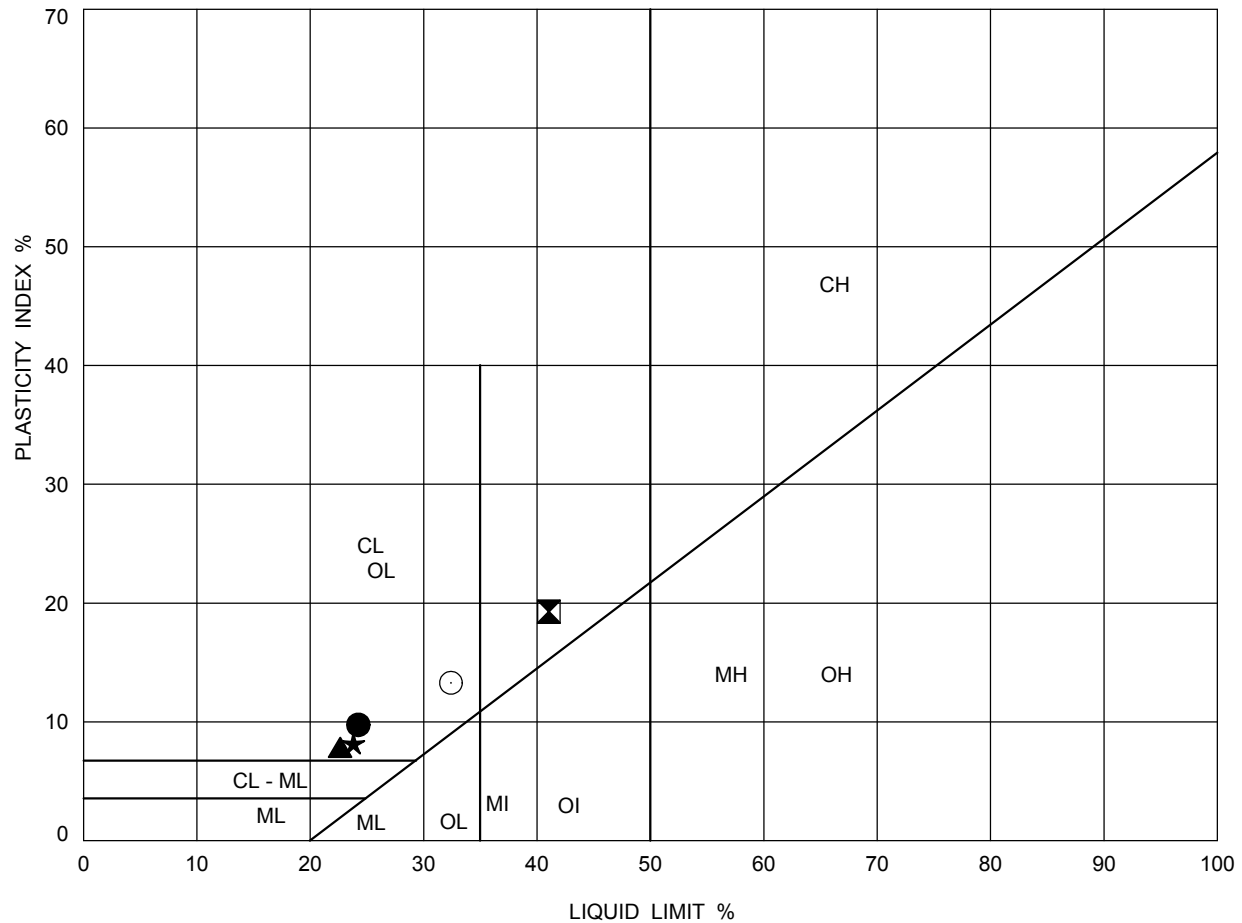
SOIL TYPE
 C = Clay
 M = Silt
 O = Organic

PLASTICITY
 L = Low
 I = Intermediate
 H = High

LEGEND:



| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | B11-1 | 13 | 13.7 | 26 | 15 | 11 |
| ⊠ | B11-1 | 15 | 16.8 | 28 | 15 | 13 |
| ▲ | B11-1 | 16 | 18.3 | 29 | 17 | 12 |
| ★ | B11-1 | 17 | 19.8 | 33 | 19 | 14 |
| ○ | B11-2 | 3 | 2.3 | 28 | 16 | 12 |

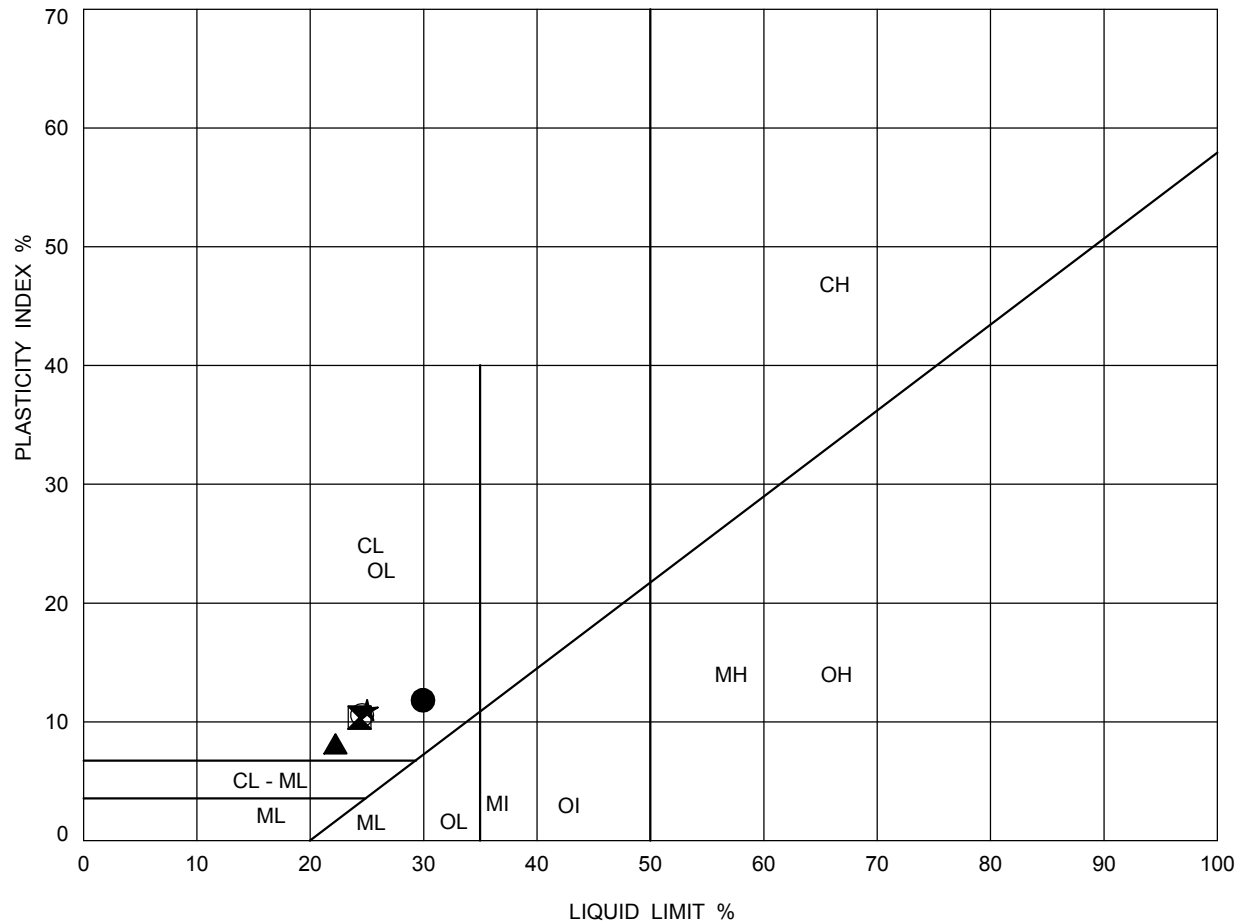
| | | | |
|--|--|---|--|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
| PROJECT No. SW8801.1004.101 | | FILE No. | |
| DRAWN EAA | | SCALE | |
| CHECK MSO | | REV. | |
|   | |  | |
| | | FIGURE B.50 | |



LEGEND:



| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | B11-2 | 9 | 7.6 | 24 | 14 | 10 |
| ⊠ | B11-2 | 16 | 18.3 | 41 | 22 | 19 |
| ▲ | B11-2 | 19 | 22.9 | 23 | 15 | 8 |
| ★ | B11-3 | 3 | 2.3 | 24 | 16 | 8 |
| ○ | B11-3 | 16 | 18.3 | 32 | 19 | 13 |

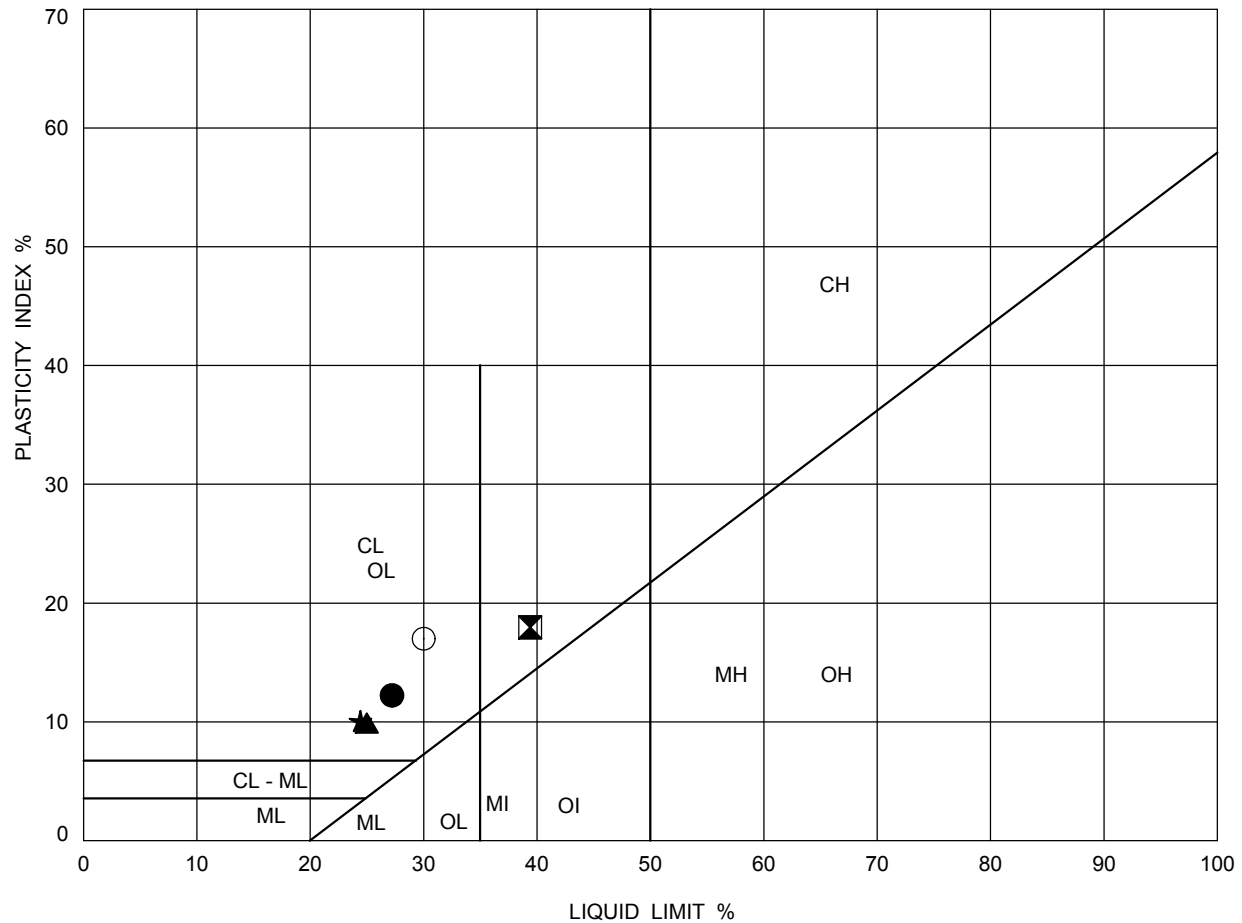
| | | | |
|--|-----|---|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
|   | | PROJECT No. SW8801.1004.101 | FILE No. |
| DRAWN | EA | | SCALE |
| CHECK | MSO | | REV. |
| | | FIGURE B.51 | |



LEGEND:




| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | B11-3 | 17 | 19.8 | 30 | 18 | 12 |
| ⊠ | B11-3 | 18 | 21.3 | 24 | 14 | 10 |
| ▲ | B11-3 | 19 | 22.9 | 22 | 14 | 8 |
| ★ | B11-4 | 20 | 24.4 | 25 | 14 | 11 |
| ○ | B11-5 | 8 | 6.1 | 25 | 14 | 11 |

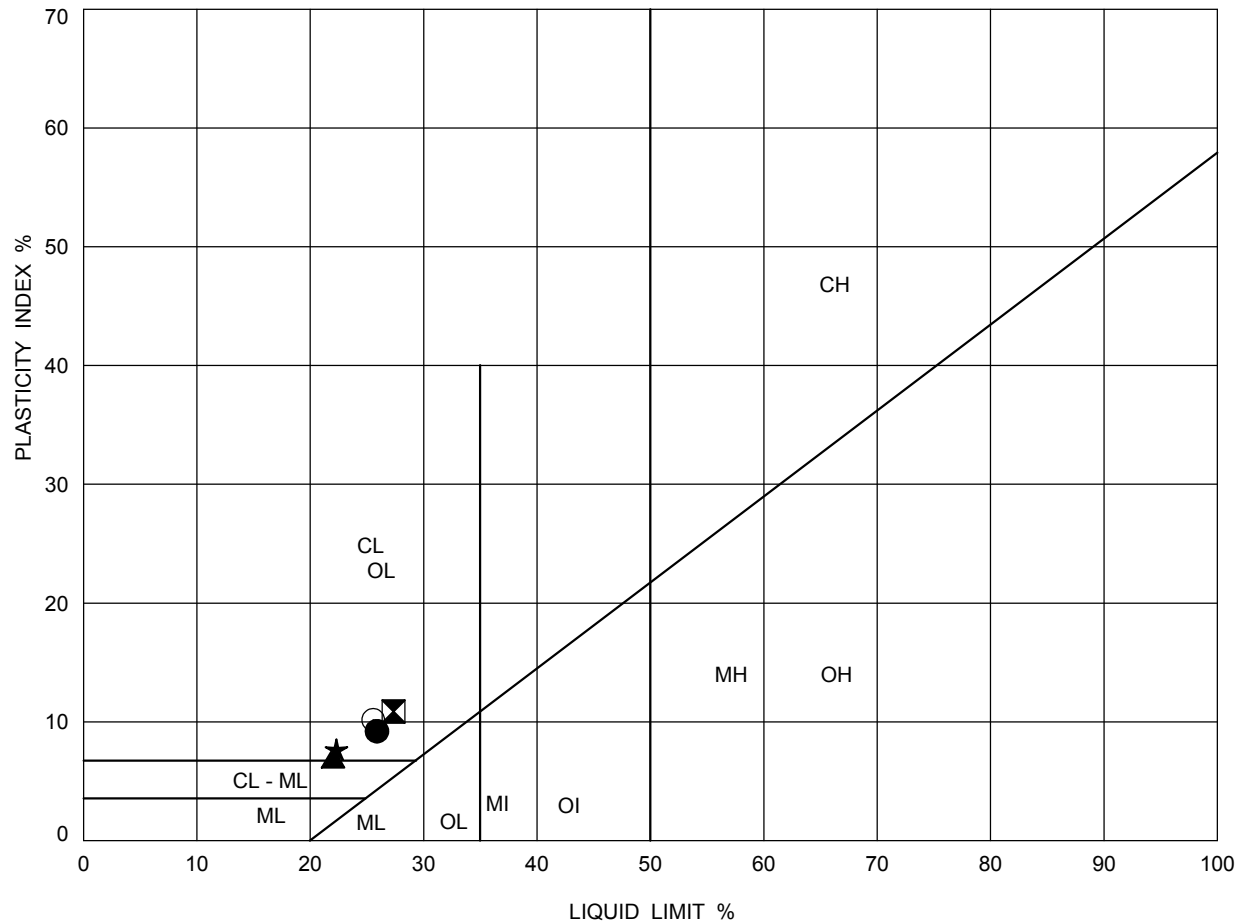
| | | | |
|--|-----|---|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
|   | | PROJECT No. SW8801.1004.101 | FILE No. |
| DRAWN | EA | | SCALE |
| CHECK | MSO | | REV. |
| | | FIGURE B.52 | |



LEGEND:



| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|---------------|--------|-----------|-------|-------|----|
| ● | B11-5 | 14 | 15.2 | 27 | 15 | 12 |
| ⊠ | B11-5 | 16 | 18.3 | 39 | 21 | 18 |
| ▲ | B11-5 | 19 | 22.9 | 25 | 15 | 10 |
| ★ | B11-6/HGMW-05 | 9 | 6.1 | 24 | 14 | 10 |
| ○ | B11-6/HGMW-05 | 16 | 16.8 | 30 | 13 | 17 |

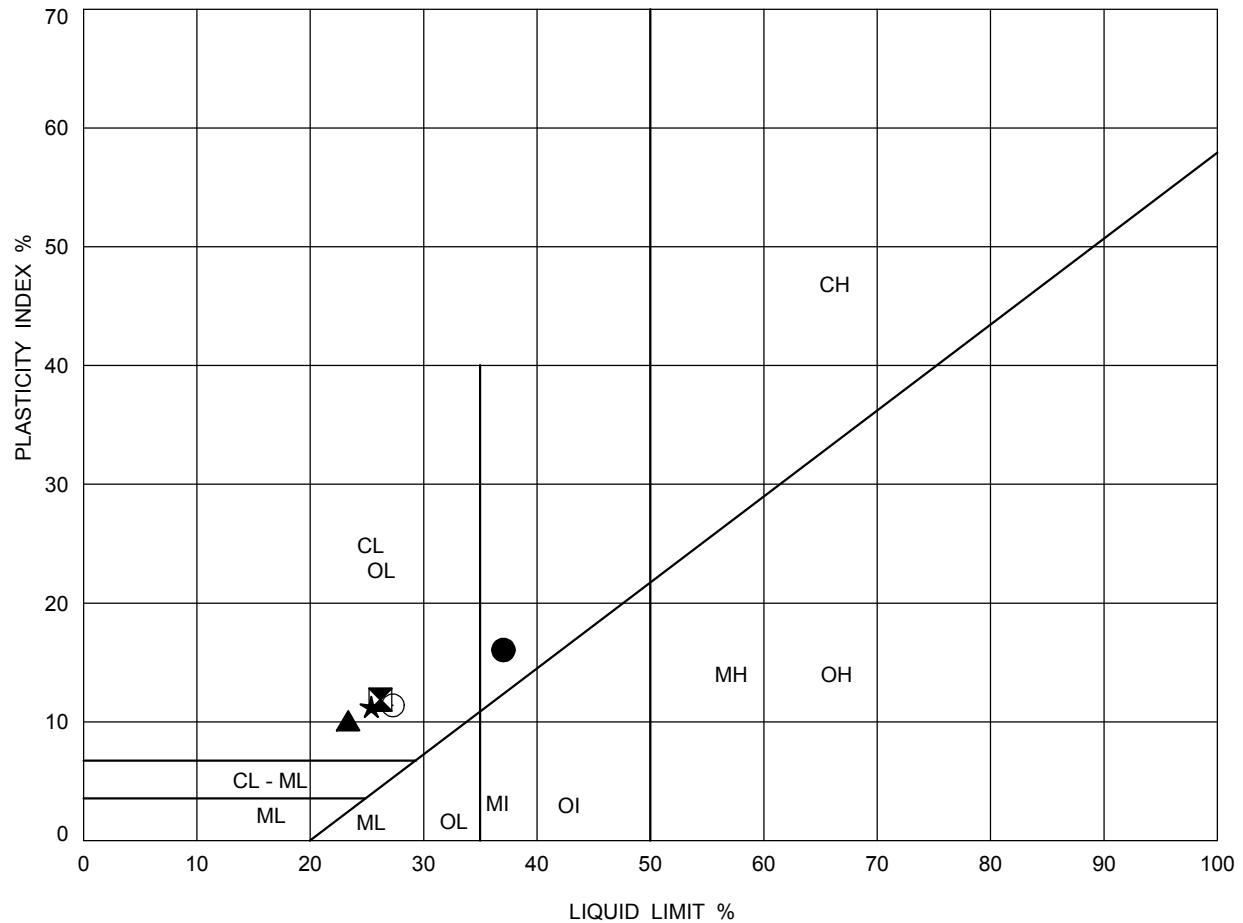
| | | | |
|---|--|---|--|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
| PROJECT No. SW8801.1004.101 | | FILE No. | |
| DRAWN EA | | SCALE | |
| CHECK MSO | | REV. | |
|    | | FIGURE B.53 | |



LEGEND:



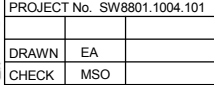
| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|---------------|--------|-----------|-------|-------|----|
| ● | B11-6/HGMW-05 | 18 | 18.3 | 26 | 17 | 9 |
| ⊠ | B11-6/HGMW-05 | 20 | 19.8 | 27 | 16 | 11 |
| ▲ | B11-6/HGMW-05 | 24 | 22.9 | 22 | 15 | 7 |
| ★ | B11-7 | 10 | 9.1 | 22 | 15 | 7 |
| ○ | B11-7 | 14 | 15.2 | 26 | 15 | 11 |

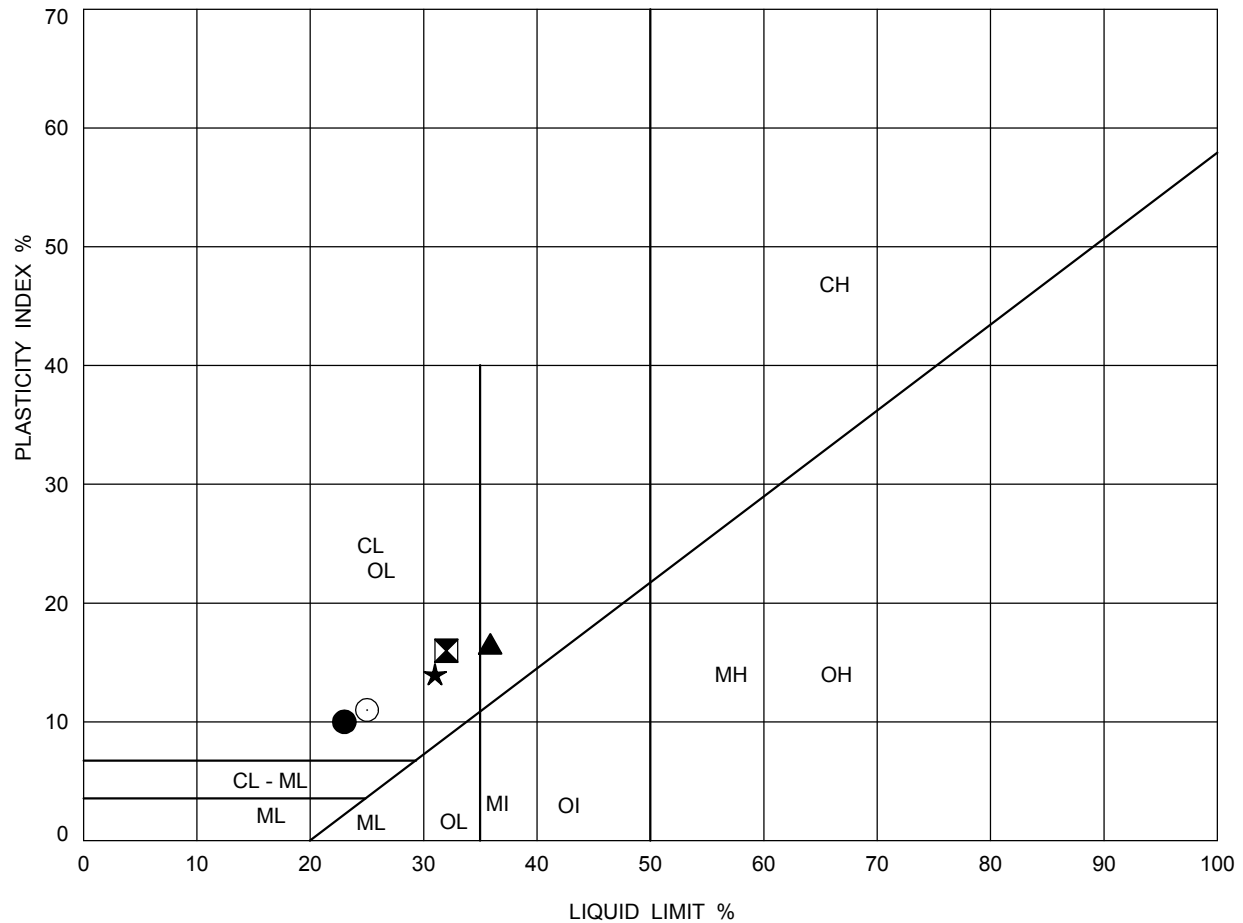
| | | | |
|--|-----|---|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
|   | | PROJECT No. SW8801.1004.101 | FILE No. |
| DRAWN | EA | | SCALE |
| CHECK | MSO | | REV. |
| | | FIGURE B.54 | |



LEGEND:



| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | B11-7 | 16 | 18.3 | 37 | 21 | 16 |
| ⊠ | B11-7 | 19 | 22.9 | 26 | 14 | 12 |
| ▲ | T11-1 | 10 | 9.1 | 23 | 13 | 10 |
| ★ | T11-1 | 12 | 12.2 | 25 | 14 | 11 |
| ○ | T11-1 | 18 | 21.3 | 27 | 16 | 11 |

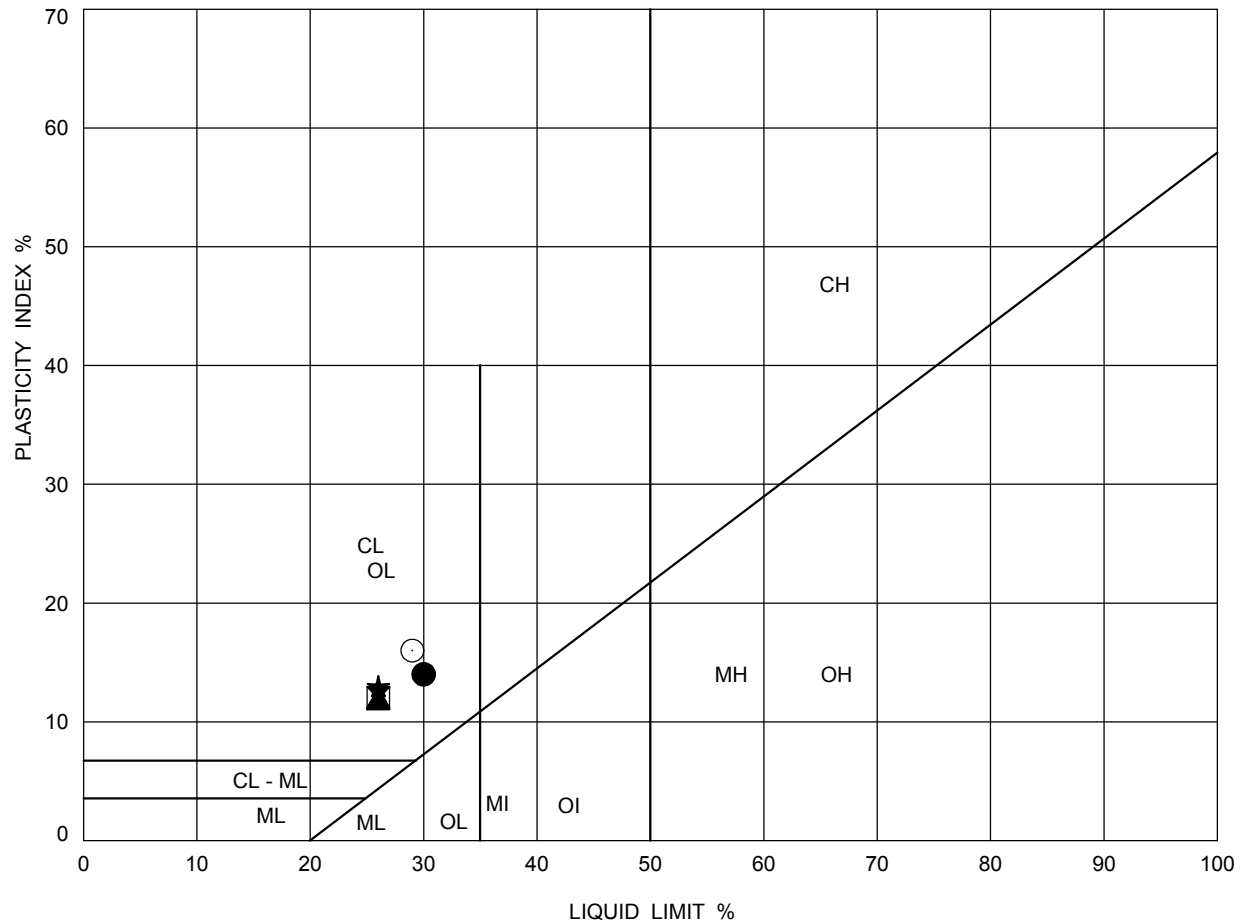
| | | | |
|--|--|---|--|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
| PROJECT No. SW8801.1004.101 | | FILE No. | |
| DRAWN EA | | SCALE | |
| CHECK MSO | | REV. | |
|    | | FIGURE B.55 | |



LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|---------------|--------|-----------|-------|-------|----|
| ● | T11-2/HGMW-10 | 10 | 9.1 | 23 | 13 | 10 |
| ⊠ | T11-2/HGMW-10 | 14 | 15.2 | 32 | 16 | 16 |
| ▲ | T11-2/HGMW-10 | 17 | 17.5 | 36 | 19 | 17 |
| ★ | T11-2/HGMW-10 | 21 | 20.6 | 31 | 17 | 14 |
| ○ | T11-2/HGMW-10 | 22 | 21.3 | 25 | 14 | 11 |

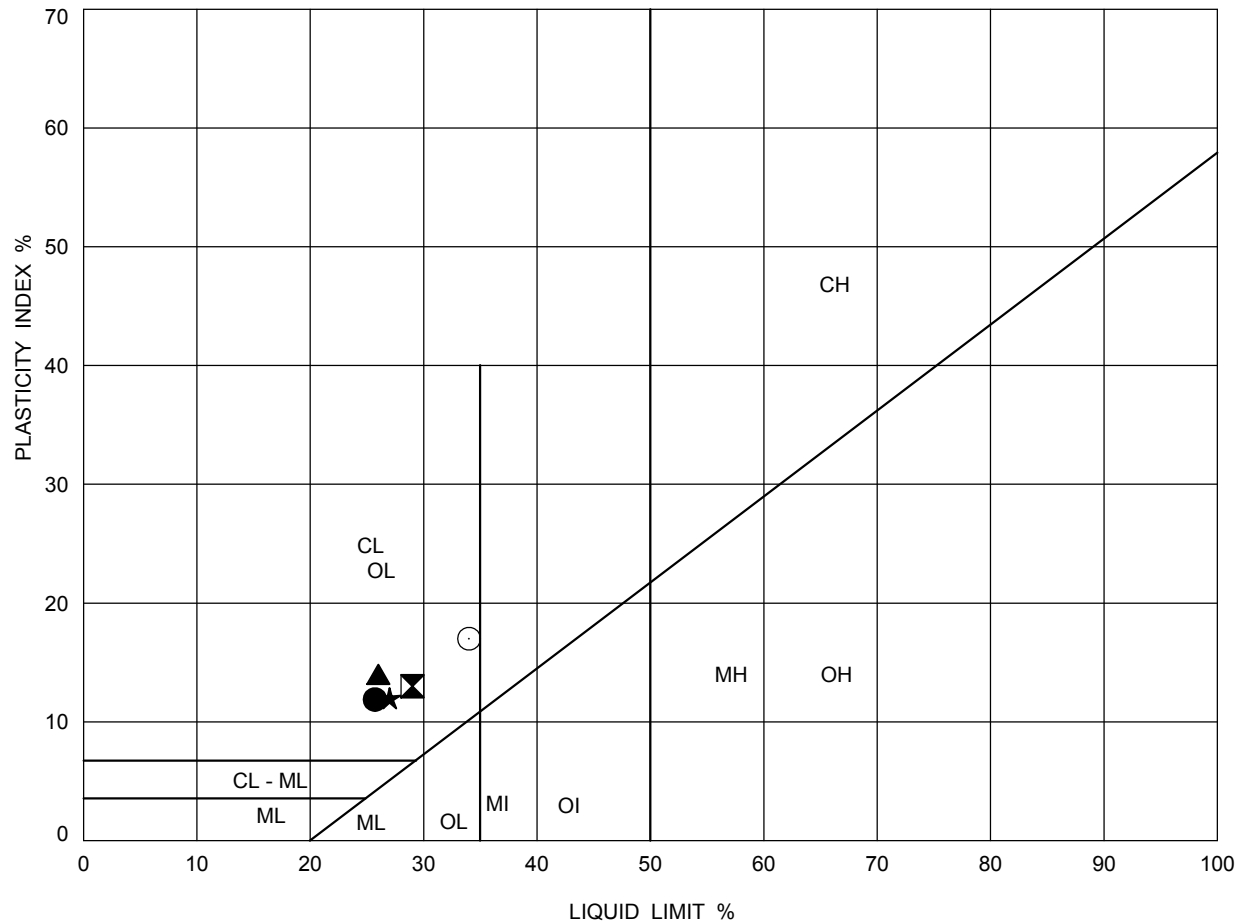
| | | | |
|--|-----|---|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
|   | | PROJECT No. SW8801.1004.101 | FILE No. |
| DRAWN | EA | SCALE | REV. |
| CHECK | MSO | FIGURE B.56 | |



LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | T11-3 | 3 | | 30 | 16 | 14 |
| ⊠ | T11-3 | 9 | 7.6 | 26 | 14 | 12 |
| ▲ | T11-3 | 11 | 10.7 | 26 | 14 | 12 |
| ★ | T11-3 | 12 | 12.2 | 26 | 13 | 13 |
| ○ | T11-3 | 14 | 15.2 | 29 | 13 | 16 |

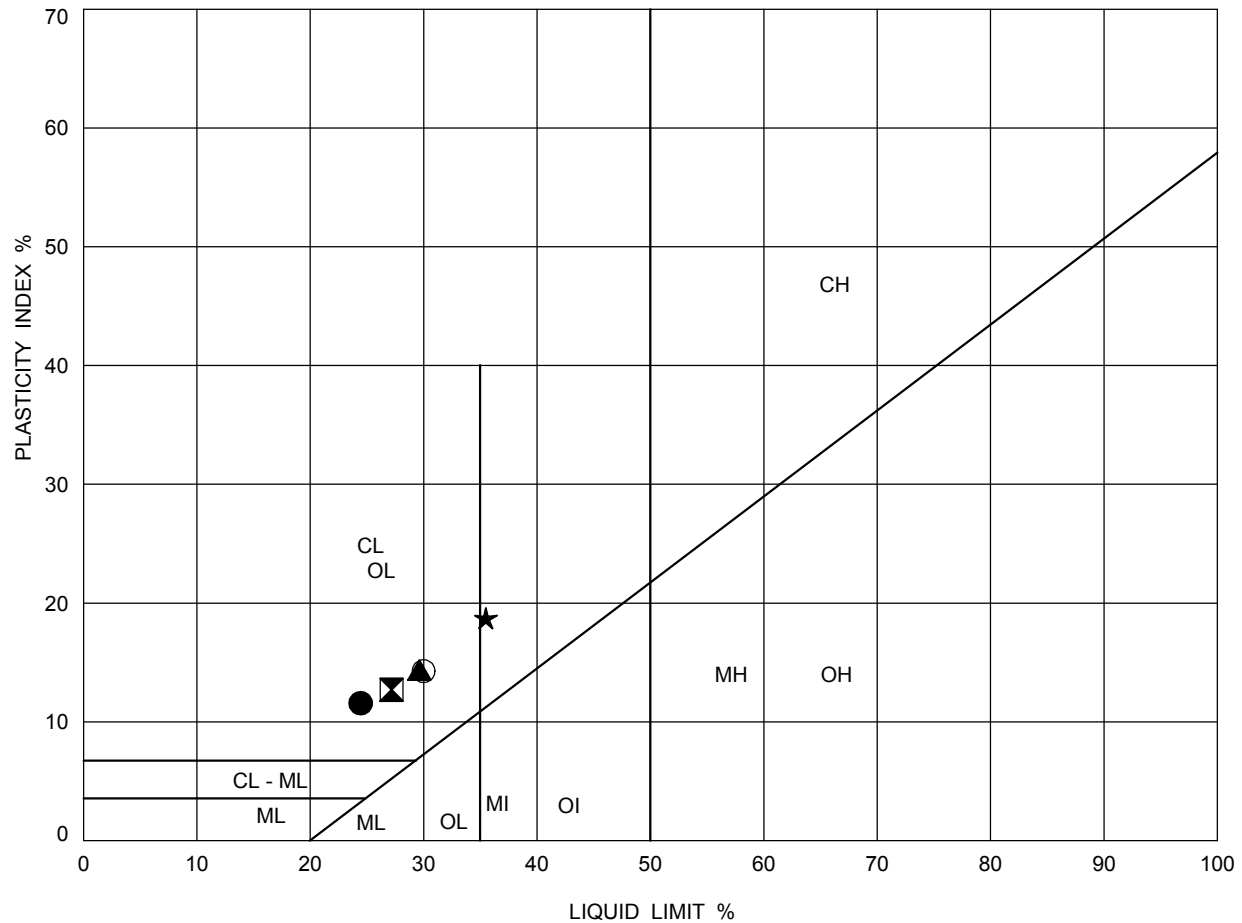
| | | | |
|-----------------------------|-----|---|------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
| PROJECT No. SW8801.1004.101 | | FILE No. | |
| DRAWN | EA | SCALE | REV. |
| CHECK | MSO | FIGURE B.57 | |



LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | B12-1 | 9 | 7.6 | 26 | 14 | 12 |
| ⊠ | T11-3 | 16 | 16.8 | 29 | 16 | 13 |
| ▲ | T11-3 | 20 | 19.8 | 26 | 12 | 14 |
| ★ | T11-3 | 23 | 22.9 | 27 | 15 | 12 |
| ○ | T11-3 | 28 | 30.5 | 34 | 17 | 17 |

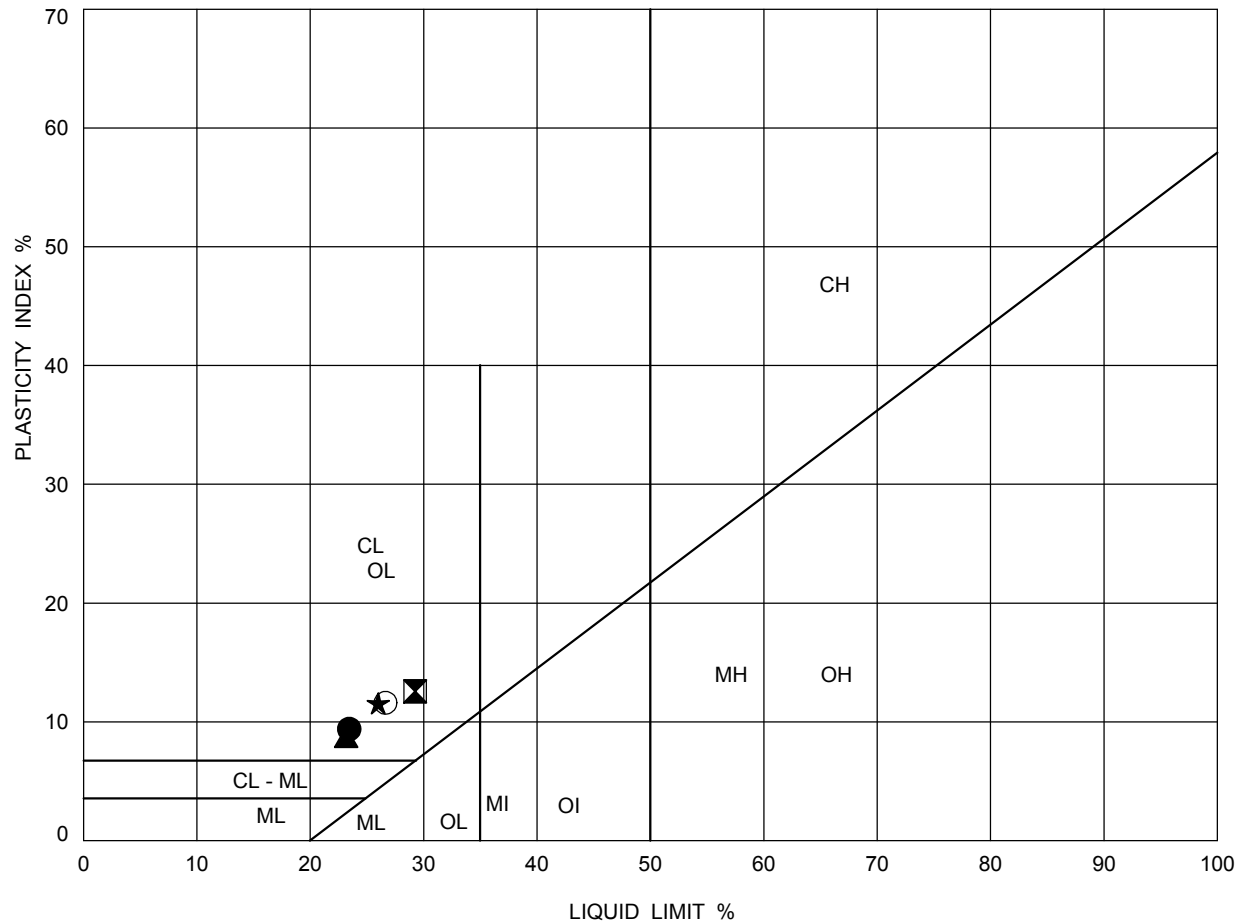
| | | | |
|-----------------------------|-----|---|------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
| PROJECT No. SW8801.1004.101 | | FILE No. | |
| DRAWN | EA | SCALE | REV. |
| CHECK | MSO | FIGURE B.58 | |



LEGEND:




| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | B12-1 | 10 | 9.1 | 24 | 13 | 11 |
| ⊠ | B12-1 | 12 | 12.2 | 27 | 14 | 13 |
| ▲ | B12-1 | 15 | 16.8 | 30 | 15 | 15 |
| ★ | B12-1 | 17 | 19.8 | 35 | 17 | 18 |
| ○ | B12-1 | 20 | 24.4 | 30 | 16 | 14 |

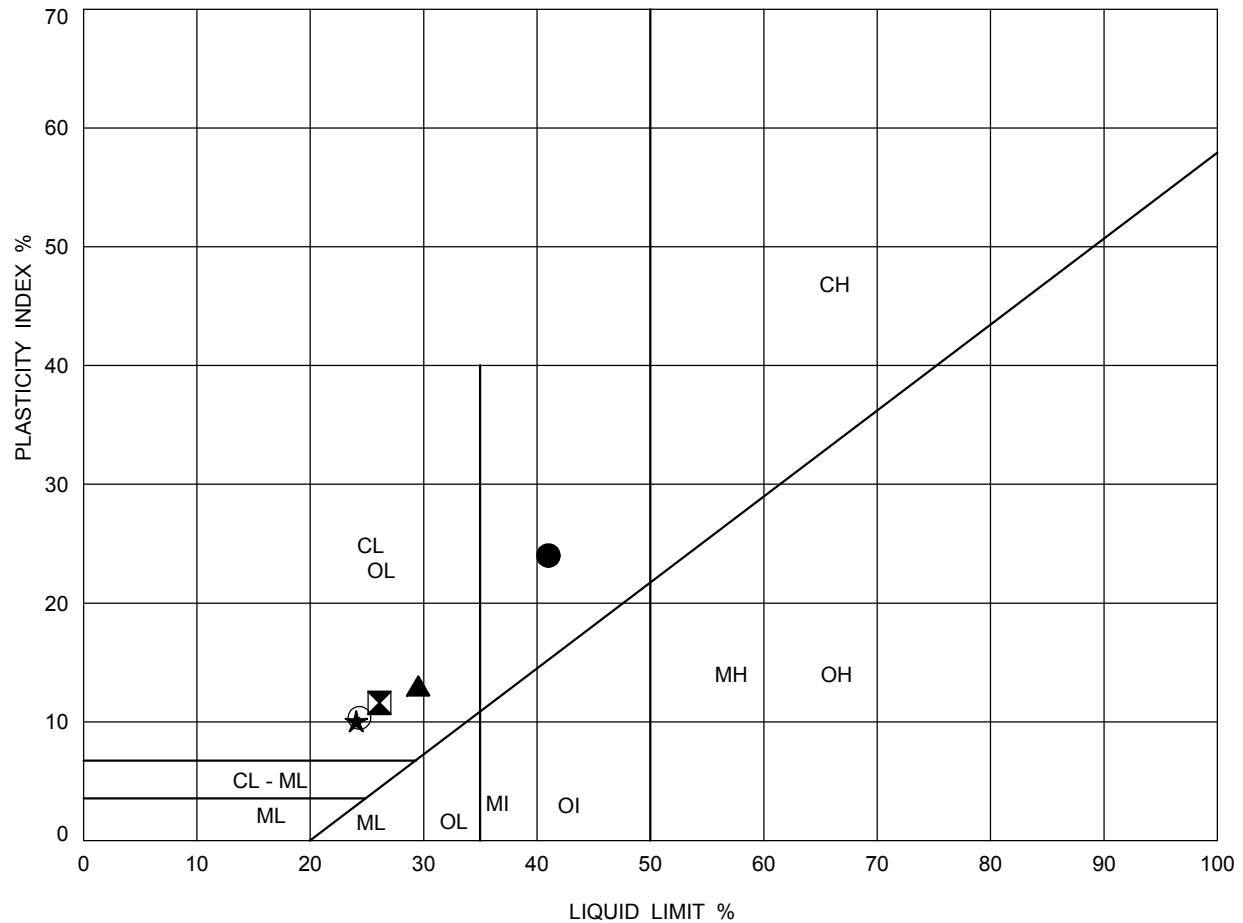
| | | | |
|-----------------------------|-----|---|------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
| PROJECT No. SW8801.1004.101 | | FILE No. | |
| DRAWN | EA | SCALE | REV. |
| CHECK | MSO | FIGURE B.59 | |



LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | B12-2 | 9 | 7.6 | 23 | 14 | 9 |
| ⊠ | B12-2 | 17 | 19.8 | 29 | 17 | 12 |
| ▲ | B12-3 | 12 | 12.2 | 23 | 14 | 9 |
| ★ | B12-3 | 13 | 13.7 | 26 | 14 | 12 |
| ○ | B12-3 | 14 | 15.2 | 27 | 15 | 12 |

| | | | |
|---|--|---|--|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
| PROJECT No. SW8801.1004.101 | | FILE No. | |
| DRAWN EA | | SCALE | |
| CHECK MSO | | REV. | |
|    | | FIGURE B.60 | |



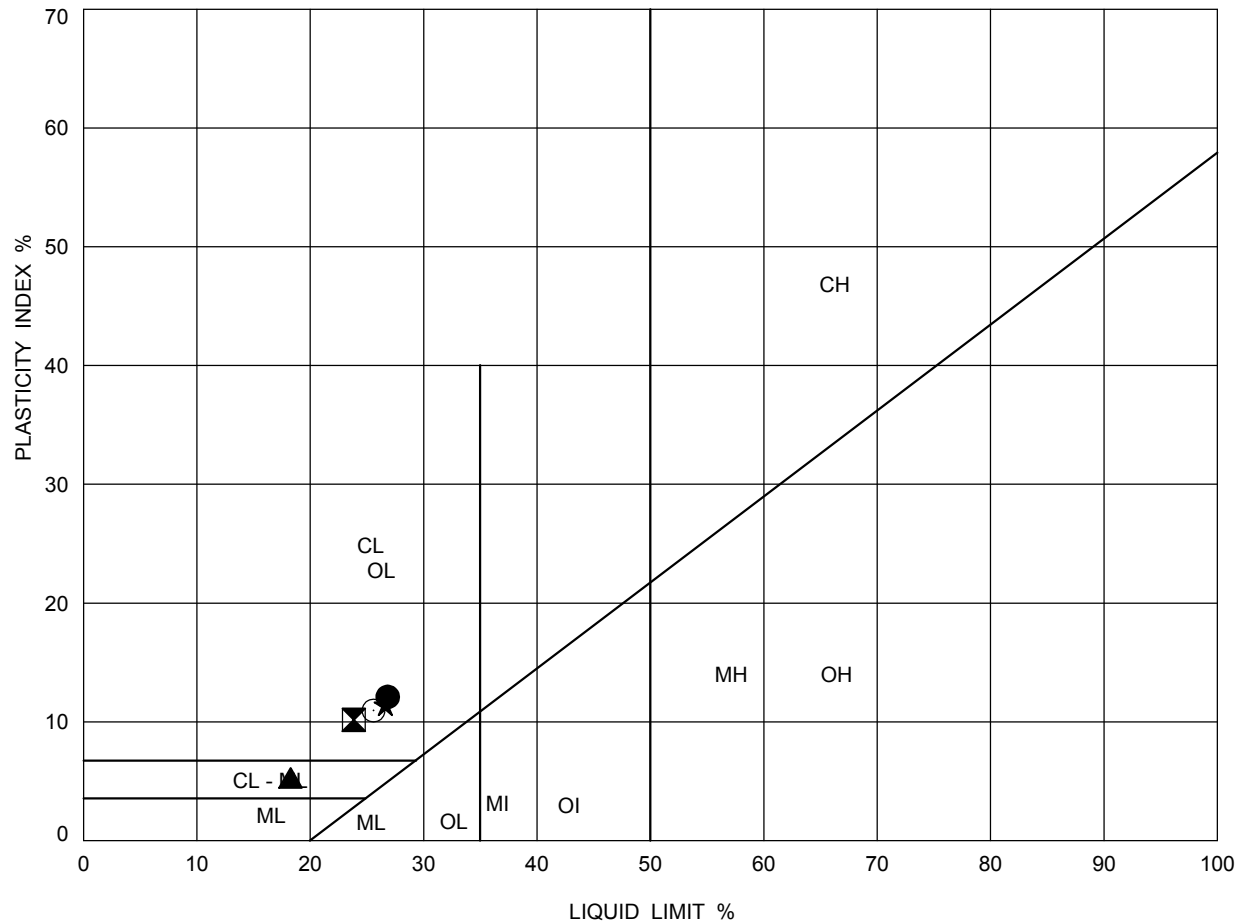
SOIL TYPE
 C = Clay
 M = Silt
 O = Organic

PLASTICITY
 L = Low
 I = Intermediate
 H = High

LEGEND:



| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | B12-3 | 17 | 19.8 | 41 | 17 | 24 |
| ⊠ | B15-1 | 20 | 18.3 | 26 | 15 | 12 |
| ▲ | B15-1 | 27 | 29 | 30 | 16 | 14 |
| ★ | PS7-1 | 12 | 10.7 | 24 | 14 | 10 |
| ○ | PS7-1 | 15 | 15.2 | 24 | 14 | 10 |

| | | | |
|-----------------------------|-----|---|------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
| PROJECT No. SW8801.1004.101 | | FILE No. | |
| DRAWN | EA | SCALE | REV. |
| CHECK | MSO | FIGURE B.61 | |



LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | B15-2 | 10 | 9.1 | 27 | 15 | 12 |
| ⊠ | B15-2 | 13 | 13.7 | 24 | 14 | 10 |
| ▲ | B15-2 | 16 | 18.3 | 18 | 13 | 5 |
| ★ | B15-3 | 20 | 15.2 | 27 | 15 | 12 |
| ○ | B15-3 | 26 | 24.4 | 26 | 15 | 11 |

| | | | |
|--|-----|---|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
|   | | PROJECT No. SW8801.1004.101 | FILE No. |
| DRAWN | EA | SCALE | REV. |
| CHECK | MSO | FIGURE B.62 | |

ONE DIMENSIONAL CONSOLIDATION TEST (ASTM D 2435)

Project: **WEP**
 Client: **Hatch Mott MacDonald**
 Date: **14-Nov-11**

Job No.: **SW8801.1004.101**

Sample ID: **T6-1_TW12**

Depth(m): **12.2**

Test Data

| | | | | | |
|---|---|--------------------|--------|--|--------|
| Ring # : | A | Ring Height (in) = | 0.758 | Wt of dry filter paper (g) | 0.8 |
| Wet soil + Ring Wt (g) | | | 205.34 | Wt of ring (g) | 76.58 |
| Wet soil + Wet Paper + Ring (g) | | | 204.00 | Wet Paper (g) | 2.28 |
| Dry Soil + Dry Paper + Ring (g) | | | 184.44 | Ring Dia (in) | 2.498 |
| Initial moisture Content (%) | | | 20.27 | Final moisture Content (%) | 16.89 |
| Area of Ring (in ²) | | | 4.90 | Initial Volume (in ³) | 3.7149 |
| Initial Bulk Density (kg/m ³) | | | 2115 | Initial Dry Density (kg/m ³) | 1759 |
| Specific Gravity of Soil | | | 2.73 | Equiv. Thick. of solids (mm) | 12.389 |
| Final Bulk Density (kg/m ³) | | | 2186 | Final Dry Density (kg/m ³) | 1870 |
| Initial gauge reading for Load 1 | | | 0.2558 | Gauge reading for last Loading | 0.2106 |
| Initial Voids Ratio | | | 0.554 | Final Void Ratio | 0.461 |
| Initial Degree of Saturation (%) | | | 100 | Final Degree of Saturation (%) | 100 |

| Trial # | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|--------------------------------------|--------|--------|--------|--------|--------|--------|--------|
| Load (kPa) | 4.75 | 7.0 | 10.5 | 15.75 | 23.75 | 35.5 | 53.5 |
| Load (tsf) | 0.0494 | 0.0728 | 0.109 | 0.164 | 0.247 | 0.369 | 0.556 |
| Gauge Reading (in) | 0.2558 | 0.2554 | 0.2548 | 0.2517 | 0.2496 | 0.2468 | 0.2434 |
| (H-Hs) mm | 6.864 | 6.854 | 6.838 | 6.760 | 6.706 | 6.636 | 6.549 |
| Voids ratio | 0.554 | 0.553 | 0.552 | 0.546 | 0.541 | 0.536 | 0.529 |
| t ₉₀ (min) | | | 5.71 | 6.76 | 11.56 | 9.00 | 7.56 |
| C _v (m ² /day) | | | 0.020 | 0.017 | 0.010 | 0.012 | 0.015 |
| k' (MPa) | | | 4.209 | 1.299 | 2.872 | 3.201 | 3.919 |
| M _v (mm ² / N) | | | 0.2376 | 0.7700 | 0.3482 | 0.3124 | 0.2551 |

| Trial # | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|--------------------------------------|--------|--------|--------|--------|--------|--------|--------|
| Load (kPa) | 80.0 | 120.0 | 80.0 | 53.5 | 80.0 | 120.0 | 180.0 |
| Load (tsf) | 0.832 | 1.248 | 0.832 | 0.556 | 0.832 | 1.248 | 1.872 |
| Gauge Reading (in) | 0.2393 | 0.2347 | 0.2352 | 0.2357 | 0.2352 | 0.2340 | 0.2282 |
| (H-Hs) mm | 6.445 | 6.328 | 6.341 | 6.353 | 6.341 | 6.310 | 6.163 |
| Voids ratio | 0.520 | 0.511 | 0.512 | 0.513 | 0.512 | 0.509 | 0.497 |
| t ₉₀ (min) | 7.02 | 6.76 | | | | | 6.25 |
| C _v (m ² /day) | 0.016 | 0.016 | | | | | 0.017 |
| k' (MPa) | 4.819 | 6.448 | | | | | 7.616 |
| M _v (mm ² / N) | 0.2075 | 0.1551 | | | | | 0.1313 |



Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATION TEST
TUNNEL T-6 (T6-1-SA12)**

Date

Aug 2012

JOB NO

SW8801.1004.101

FIGURE NO.
B.63-A

REV

| | | | | | | | |
|--------------------------|---------|--------|--------|--------|--------|--------|--------|
| Trial # | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| Load (kPa) | 270.0 | 405.0 | 607.5 | 910.0 | 1375.0 | 685.0 | 340.0 |
| Load (tsf) | 2.808 | 4.212 | 6.318 | 9.464 | 14.300 | 7.124 | 3.536 |
| Gauge Reading (in) | 0.21968 | 0.2094 | 0.1986 | 0.1863 | 0.1733 | 0.1751 | 0.1775 |
| (H-Hs) mm | 5.946 | 5.686 | 5.410 | 5.099 | 4.769 | 4.814 | 4.874 |
| Voids ratio | 0.480 | 0.459 | 0.437 | 0.412 | 0.385 | 0.389 | 0.393 |
| t90 (min) | 7.02 | 6.25 | 6.25 | 6.25 | 6.25 | | |
| Cv (m ² /day) | 0.015 | 0.016 | 0.016 | 0.015 | 0.015 | | |
| k' (MPa) | 7.715 | 9.508 | 13.245 | 17.304 | 24.665 | | |
| Mv (mm ² / N) | 0.1296 | 0.1052 | 0.0755 | 0.0578 | 0.0405 | | |

| | | | | | | | |
|--------------------------|--------|--------|--------|--------|--------|--------|--|
| Trial # | 22 | 23 | 24 | 25 | 26 | 27 | |
| Load (kPa) | 170.0 | 85.0 | 42.5 | 21.5 | 10.75 | 5.25 | |
| Load (tsf) | 1.768 | 0.884 | 0.442 | 0.224 | 0.112 | 0.055 | |
| Gauge Reading (in) | 0.1818 | 0.1870 | 0.1922 | 0.1986 | 0.2050 | 0.2106 | |
| (H-Hs) mm | 4.983 | 5.116 | 5.248 | 5.411 | 5.574 | 5.715 | |
| Voids ratio | 0.402 | 0.413 | 0.424 | 0.437 | 0.450 | 0.461 | |
| t90 (min) | | | | | | | |
| Cv (m ² /day) | | | | | | | |
| k' (MPa) | | | | | | | |
| Mv (mm ² / N) | | | | | | | |



Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATION TEST
TUNNEL T-6 (T6-1-SA12)**

Date

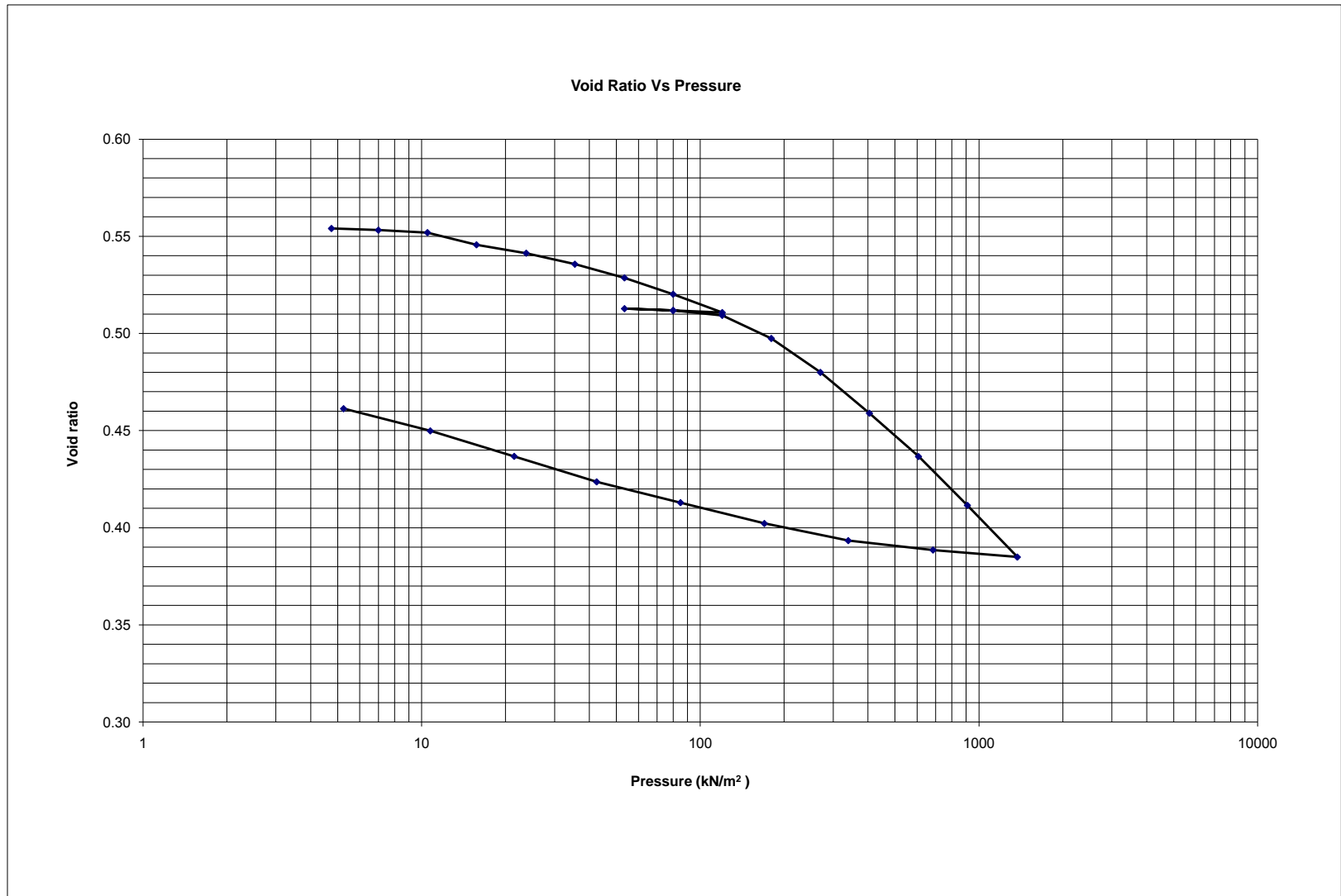
Aug 2012

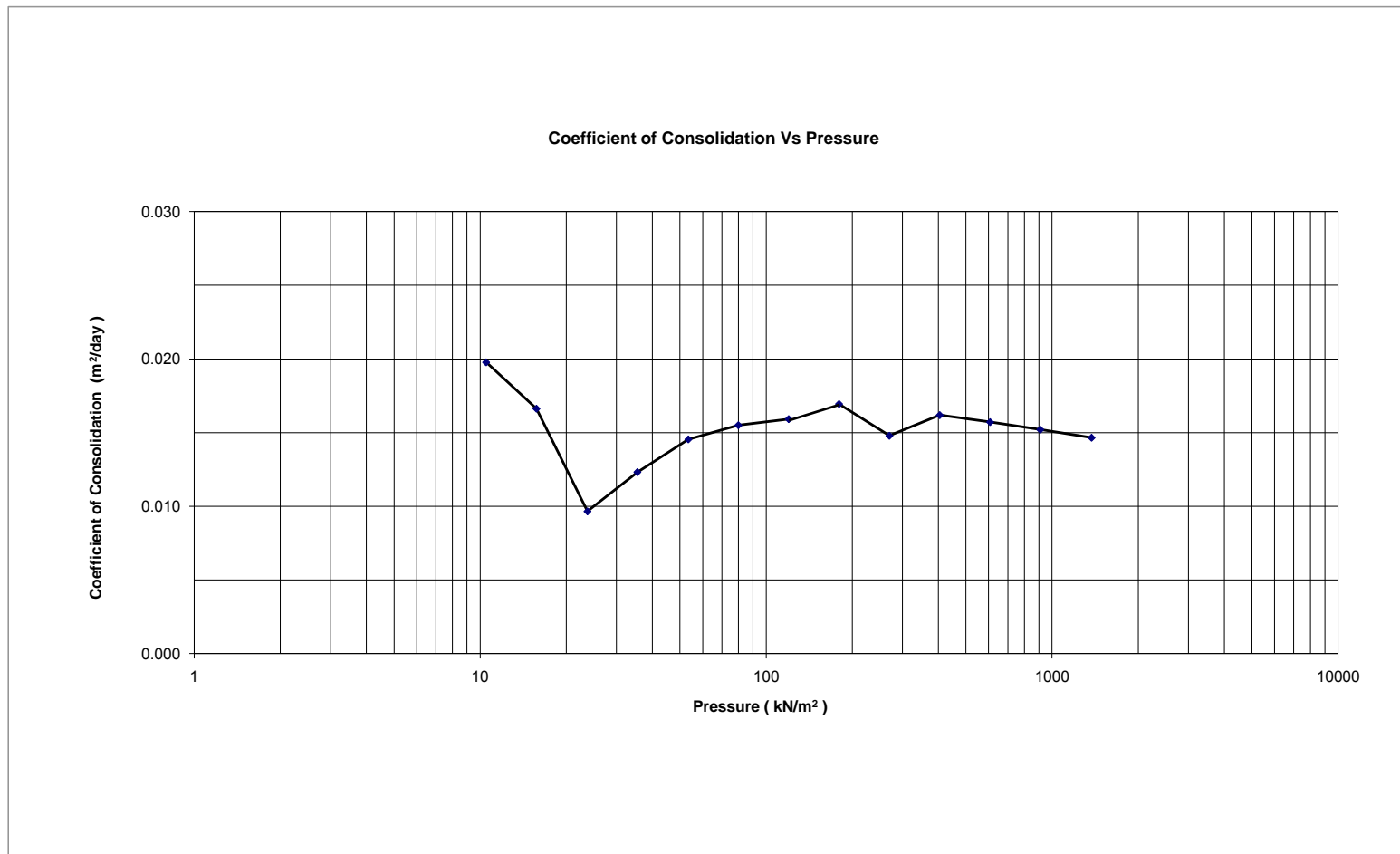
JOB NO

SW8801.1004.101

FIGURE NO.
B.63-B

REV





Strain Energy Data

| Presssure (kN/m ²) | c _v (m ² /day) | Void ratio |
|-----------------------------------|---|------------|
| 4.75 | | 0.554 |
| 7.0 | | 0.553 |
| 10.5 | 0.020 | 0.552 |
| 15.8 | 0.017 | 0.546 |
| 23.75 | 0.010 | 0.541 |
| 35.5 | 0.012 | 0.536 |
| 53.5 | 0.015 | 0.529 |
| 80.0 | 0.016 | 0.520 |
| 120.0 | 0.016 | 0.511 |
| 80.0 | | 0.512 |
| 53.5 | | 0.513 |
| 80.0 | | 0.512 |
| 120.0 | | 0.509 |
| 180.0 | 0.0169 | 0.497 |
| 270.0 | 0.0148 | 0.480 |
| 405.0 | 0.0162 | 0.459 |
| 607.5 | 0.0157 | 0.437 |
| 910.0 | 0.0152 | 0.412 |
| 1375.0 | 0.0147 | 0.385 |
| 685.0 | | 0.389 |
| 340.0 | | 0.393 |
| 170.0 | | 0.402 |
| 85.0 | | 0.413 |
| 42.5 | | 0.424 |
| 21.5 | | 0.437 |
| 10.75 | | 0.450 |
| 5.25 | | 0.461 |

| Presssure (kN/m ²) | Height mm | Total Work (kJ/m ³) |
|-----------------------------------|--------------|------------------------------------|
| 4.75 | 19.253 | 0.000 |
| 7.0 | 19.243 | 0.003 |
| 10.5 | 19.227 | 0.010 |
| 15.75 | 19.149 | 0.064 |
| 23.75 | 19.096 | 0.119 |
| 35.5 | 19.026 | 0.227 |
| 53.5 | 18.938 | 0.432 |
| 80.0 | 18.834 | 0.799 |
| 120.0 | 18.717 | 1.419 |
| 80.0 | 18.731 | 1.347 |
| 53.5 | 18.742 | 1.306 |
| 80.0 | 18.730 | 1.349 |
| 120.0 | 18.699 | 1.513 |
| 180.0 | 18.552 | 2.695 |
| 270.0 | 18.188 | 7.106 |
| 405.0 | 17.928 | 11.937 |
| 607.5 | 17.652 | 19.741 |
| 910.0 | 17.341 | 33.115 |
| 1375.0 | 17.011 | 54.837 |
| 685.0 | 17.056 | 52.100 |
| 340.0 | 17.116 | 50.306 |
| 170.0 | 17.225 | 48.679 |
| 85.0 | 17.358 | 47.696 |
| 42.5 | 17.490 | 47.209 |
| 21.5 | 17.653 | 46.911 |
| 10.75 | 17.816 | 46.763 |
| 5.25 | 17.957 | 46.699 |



Project

WINDSOR ESSEX PARKWAY

TITLE

CONSOLIDATION TEST
TUNNEL T-6 (T6-1-SA12)

Date

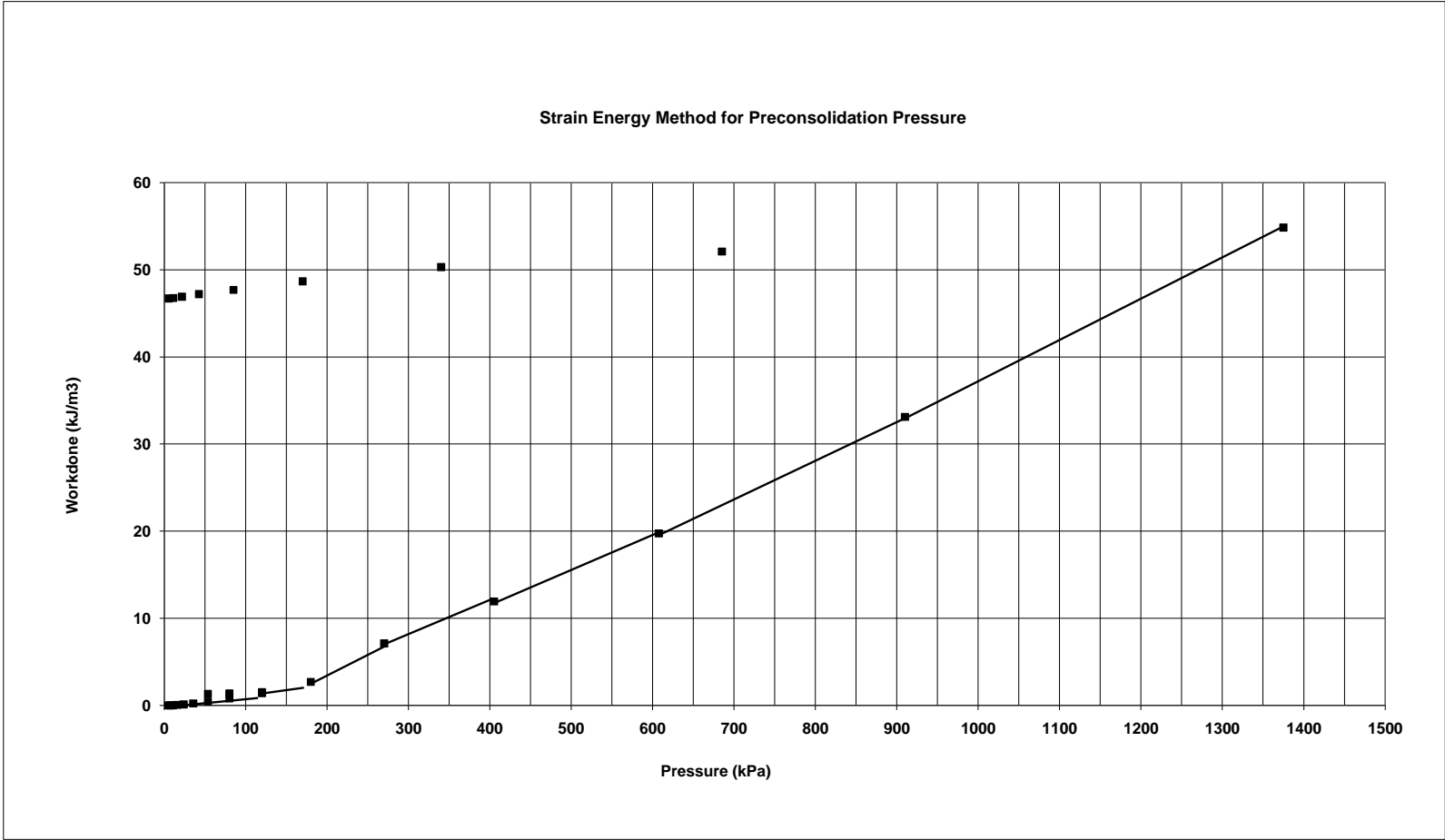
Aug 2012

JOB NO

SW8801.1004.101

FIGURE NO.
B.63-E

REV



ONE DIMENSIONAL CONSOLIDATION TEST (ASTM D 2435)

Project: **WEP**
Client: **Hatch Mott MacDonald**
Date: **21-Oct-11**

Job N **SW8801.1004.101**

Sample ID: **B9-3_TW11**

Depth(m): **10.7**

Test Data

| | | | | | |
|---|----------|--------------------|---------------|--|---------------|
| Ring # : | B | Ring Height (in) = | 0.756 | Wt of dry filter paper (g) | 0.69 |
| Wet soil + Ring Wt (g) | | | 202.20 | Wt of ring (g) | 76.54 |
| Wet soil + Wet Paper + Ring (g) | | | 201.33 | Wet Paper (g) | 2.13 |
| Dry Soil + Dry Paper + Ring (g) | | | 179.48 | Ring Dia (in) | 2.498 |
| Initial moisture Content (%) | | | 22.89 | Final moisture Content (%) | 19.96 |
| Area of Ring (in ²) | | | 4.90 | Initial Volume (in ³) | 3.7051 |
| Initial Bulk Density (kg/m ³) | | | 2070 | Initial Dry Density (kg/m ³) | 1684 |
| Specific Gravity of Soil | | | 2.74 | Equiv. Thick. of solids (mm) | 11.811 |
| Final Bulk Density (kg/m ³) | | | 2126 | Final Dry Density (kg/m ³) | 1730 |
| Initial gauge reading for Load 1 | | | 0.2570 | Gauge reading for last Loading | 0.2195 |
| Initial Voids Ratio | | | 0.626 | Final Void Ratio | 0.545 |
| Initial Degree of Saturation (%) | | | 100 | Final Degree of Saturation (%) | 100 |

| | | | | | | | |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|
| Trial # | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Load (kPa) | 4.0 | 6.0 | 10.0 | 15.0 | 22.5 | 35.0 | 50.0 |
| Load (tsf) | 0.0416 | 0.0624 | 0.104 | 0.156 | 0.234 | 0.364 | 0.520 |
| Gauge Reading (in) | 0.2568 | 0.2567 | 0.2559 | 0.2542 | 0.2520 | 0.2486 | 0.2457 |
| (H-Hs) mm | 7.387 | 7.384 | 7.363 | 7.320 | 7.264 | 7.179 | 7.105 |
| Voids ratio | 0.625 | 0.625 | 0.623 | 0.620 | 0.615 | 0.608 | 0.602 |
| t90 (min) | | | 4.41 | 8.41 | 12.60 | 13.69 | 16.00 |
| Cv (m ² /day) | | | 0.025 | 0.013 | 0.009 | 0.008 | 0.007 |
| k' (MPa) | | | 3.642 | 2.260 | 2.568 | 2.777 | 3.867 |
| Mv (mm ² / N) | | | 0.2746 | 0.4425 | 0.3894 | 0.3601 | 0.2586 |

| | | | | | | | |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|
| Trial # | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Load (kPa) | 75 | 110.0 | 75.0 | 50.0 | 75.0 | 110.0 | 165.0 |
| Load (tsf) | 0.78 | 1.144 | 0.780 | 0.520 | 0.780 | 1.144 | 1.716 |
| Gauge Reading (in) | 0.2416 | 0.2368 | 0.2375 | 0.2382 | 0.2376 | 0.2365 | 0.2306 |
| (H-Hs) mm | 7.000 | 6.878 | 6.896 | 6.913 | 6.898 | 6.869 | 6.721 |
| Voids ratio | 0.593 | 0.582 | 0.584 | 0.585 | 0.584 | 0.582 | 0.569 |
| t90 (min) | 8.12 | 6.25 | | | | | 10.24 |
| Cv (m ² /day) | 0.013 | 0.017 | | | | | 0.010 |
| k' (MPa) | 4.519 | 5.400 | | | | | 6.938 |
| Mv (mm ² / N) | 0.2213 | 0.1852 | | | | | 0.1441 |



Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATION TEST
BRIDGE B-9 (B9-3-SA11)**

Date

Aug 2012

JOB NO

SW8801.1004.101

FIGURE NO.
B.64-A

REV

| Trial # | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|
| Load (kPa) | 250.0 | 370.0 | 560.0 | 835.0 | 1250.0 | 625.0 | 315.0 |
| Load (tsf) | 2.6 | 3.848 | 5.824 | 8.684 | 13.000 | 6.500 | 3.276 |
| Gauge Reading (in) | 0.2214 | 0.2129 | 0.2009 | 0.1883 | 0.1746 | 0.1772 | 0.1814 |
| (H-Hs) mm | 6.487 | 6.271 | 5.966 | 5.646 | 5.298 | 5.364 | 5.471 |
| Voids ratio | 0.549 | 0.531 | 0.505 | 0.478 | 0.449 | 0.454 | 0.463 |
| t90 (min) | 6.25 | 7.84 | 6.25 | 8.41 | 7.56 | | |
| Cv (m ² /day) | 0.011 | 0.013 | 0.016 | 0.011 | 0.012 | | |
| k' (MPa) | 0.295 | 10.146 | 11.290 | 15.276 | 20.820 | | |
| Mv (mm ² / N) | 3.3871 | 0.0986 | 0.0886 | 0.0655 | 0.0480 | | |

| Trial # | 22 | 23 | 24 | 25 | 26 | 27 | |
|--------------------------|---------|--------|--------|--------|--------|--------|--|
| Load (kPa) | 155 | 75.0 | 40.0 | 20.0 | 10.0 | 5.0 | |
| Load (tsf) | 1.612 | 0.780 | 0.416 | 0.208 | 0.104 | 0.052 | |
| Gauge Reading (in) | 0.18694 | 0.1941 | 0.1983 | 0.2053 | 0.2120 | 0.2195 | |
| (H-Hs) mm | 5.612 | 5.794 | 5.900 | 6.078 | 6.248 | 6.439 | |
| Voids ratio | 0.475 | 0.491 | 0.500 | 0.515 | 0.529 | 0.545 | |
| t90 (min) | | | | | | | |
| Cv (m ² /day) | | | | | | | |
| k' (MPa) | | | | | | | |
| Mv (mm ² / N) | | | | | | | |



Project

WINDSOR ESSEX PARKWAY

TITLE

CONSOLIDATION TEST
BRIDGE B-9 (B9-3-SA11)

Date

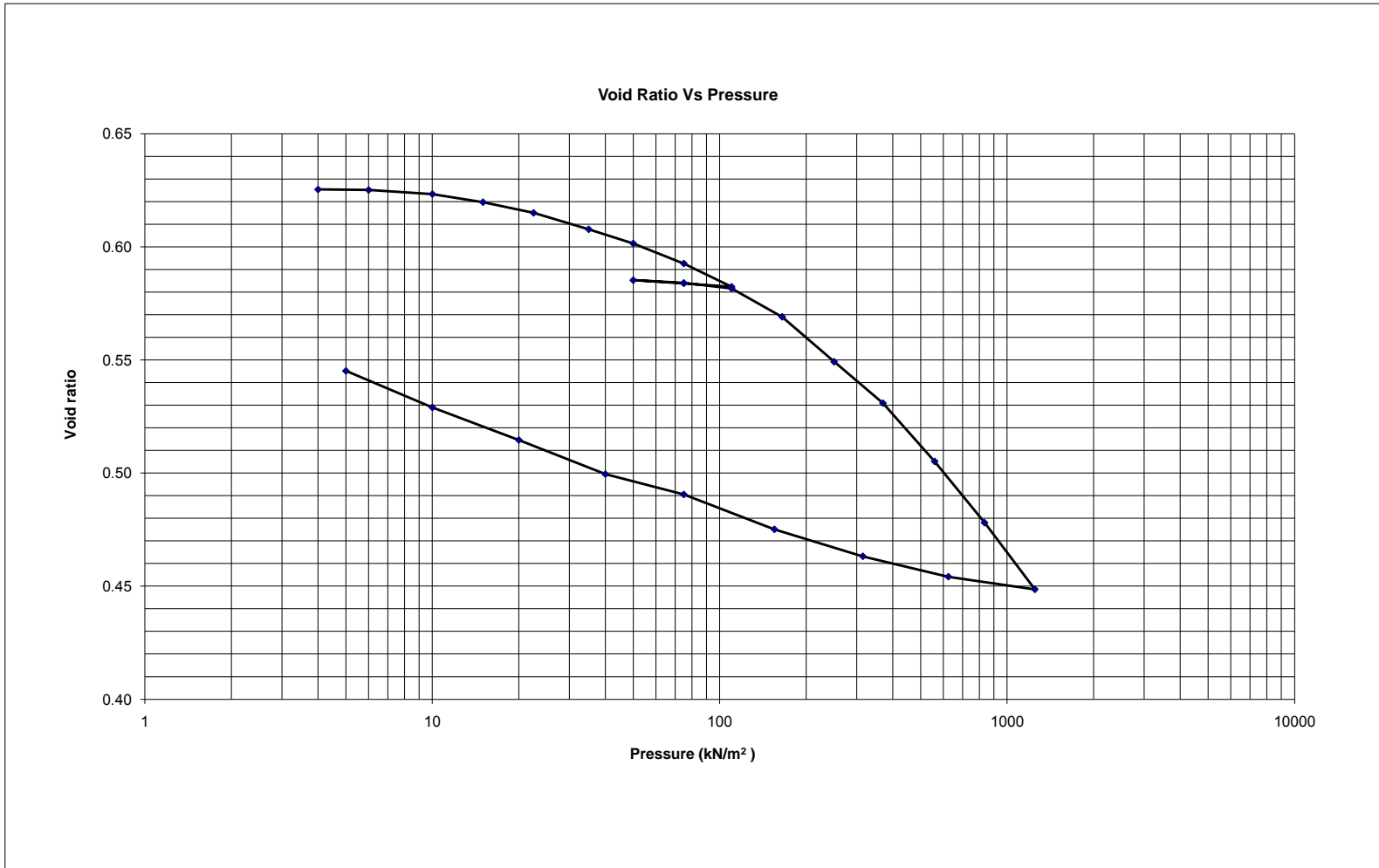
Aug 2012

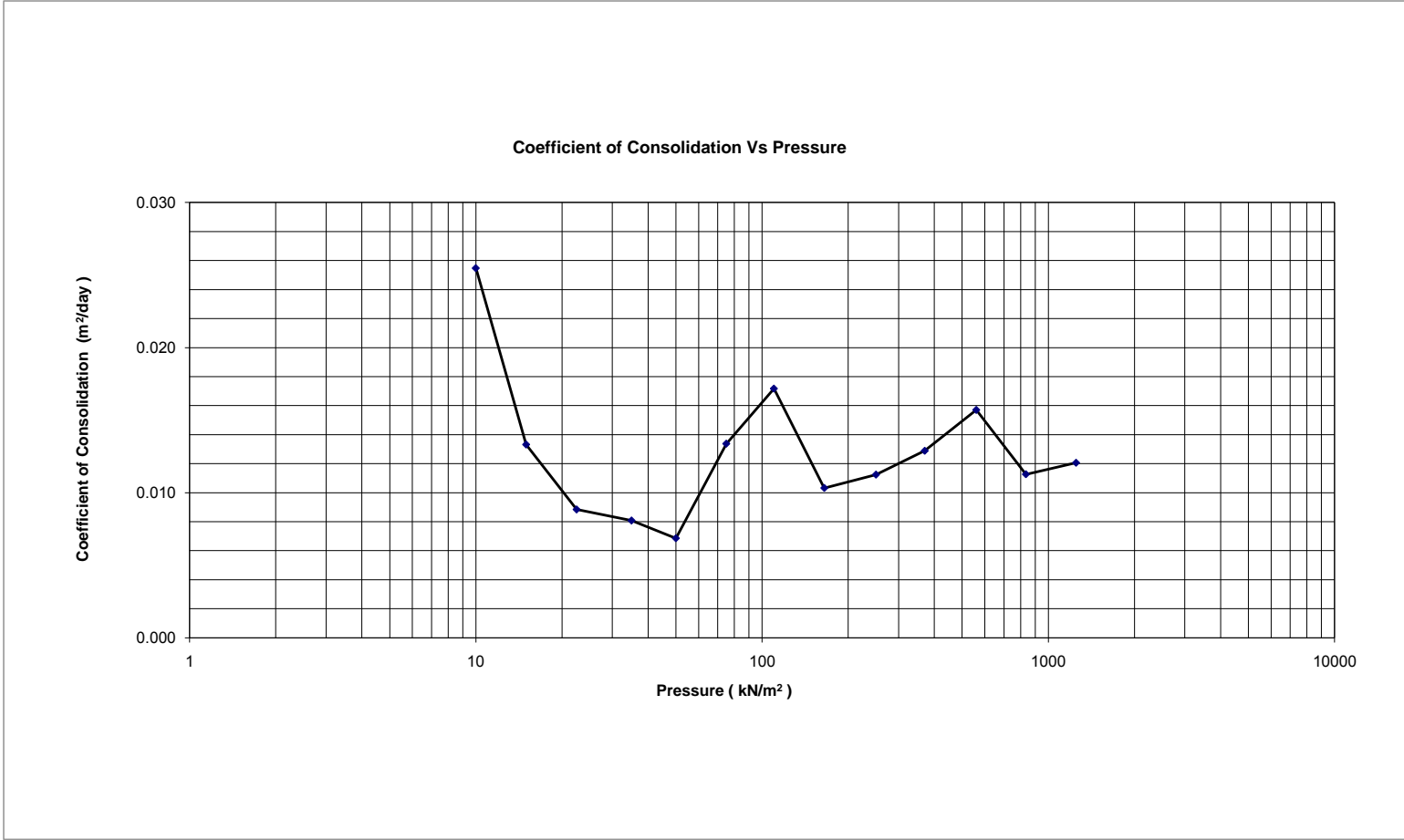
JOB NO

SW8801.1004.101

FIGURE NO.
B.64-B

REV





Strain Energy Data

| Presssure (kN/m ²) | c _v (m ² /day) | Void ratio |
|-----------------------------------|---|------------|
| 4.0 | | 0.625 |
| 6.0 | | 0.625 |
| 10.0 | 0.025 | 0.623 |
| 15.0 | 0.013 | 0.620 |
| 22.5 | 0.009 | 0.615 |
| 35.0 | 0.008 | 0.608 |
| 50.0 | 0.007 | 0.602 |
| 75.0 | 0.013 | 0.593 |
| 110.0 | 0.017 | 0.582 |
| 75.0 | | 0.584 |
| 50.0 | | 0.585 |
| 75.0 | | 0.584 |
| 110.0 | | 0.582 |
| 165.0 | 0.010 | 0.569 |
| 250.0 | 0.011 | 0.549 |
| 370.0 | 0.013 | 0.531 |
| 560.0 | 0.016 | 0.505 |
| 835.0 | 0.011 | 0.478 |
| 1250.0 | 0.012 | 0.449 |
| 625.0 | | 0.454 |
| 315.0 | | 0.463 |
| 155.0 | | 0.475 |
| 75.0 | | 0.491 |
| 40.0 | | 0.500 |
| 20.0 | | 0.515 |
| 10.0 | | 0.529 |
| 5.0 | | 0.545 |

| Presssure (KN/m ²) | Height mm | Total Work (KJ/m ³) |
|-----------------------------------|--------------|------------------------------------|
| 4.0 | 19.202 | 0.000 |
| 6.0 | 19.199 | 0.001 |
| 10.0 | 19.178 | 0.010 |
| 15.0 | 19.136 | 0.037 |
| 22.5 | 19.080 | 0.092 |
| 35.0 | 18.994 | 0.221 |
| 50.0 | 18.920 | 0.386 |
| 75.0 | 18.816 | 0.732 |
| 110.0 | 18.694 | 1.331 |
| 75.0 | 18.712 | 1.242 |
| 50.0 | 18.728 | 1.187 |
| 75.0 | 18.714 | 1.235 |
| 110.0 | 18.685 | 1.378 |
| 165.0 | 18.537 | 2.468 |
| 250.0 | 18.303 | 5.089 |
| 370.0 | 18.086 | 8.755 |
| 560.0 | 17.782 | 16.578 |
| 835.0 | 17.462 | 29.132 |
| 1250.0 | 17.114 | 49.907 |
| 625.0 | 17.180 | 46.289 |
| 315.0 | 17.286 | 43.377 |
| 155.0 | 17.427 | 41.461 |
| 75.0 | 17.609 | 40.261 |
| 40.0 | 17.715 | 39.914 |
| 20.0 | 17.894 | 39.612 |
| 10.0 | 18.064 | 39.470 |
| 5.0 | 18.255 | 39.390 |



Project

WINDSOR ESSEX PARKWAY

TITLE

CONSOLIDATION TEST
BRIDGE B-9 (B9-3-SA11)

Date

Aug 2012

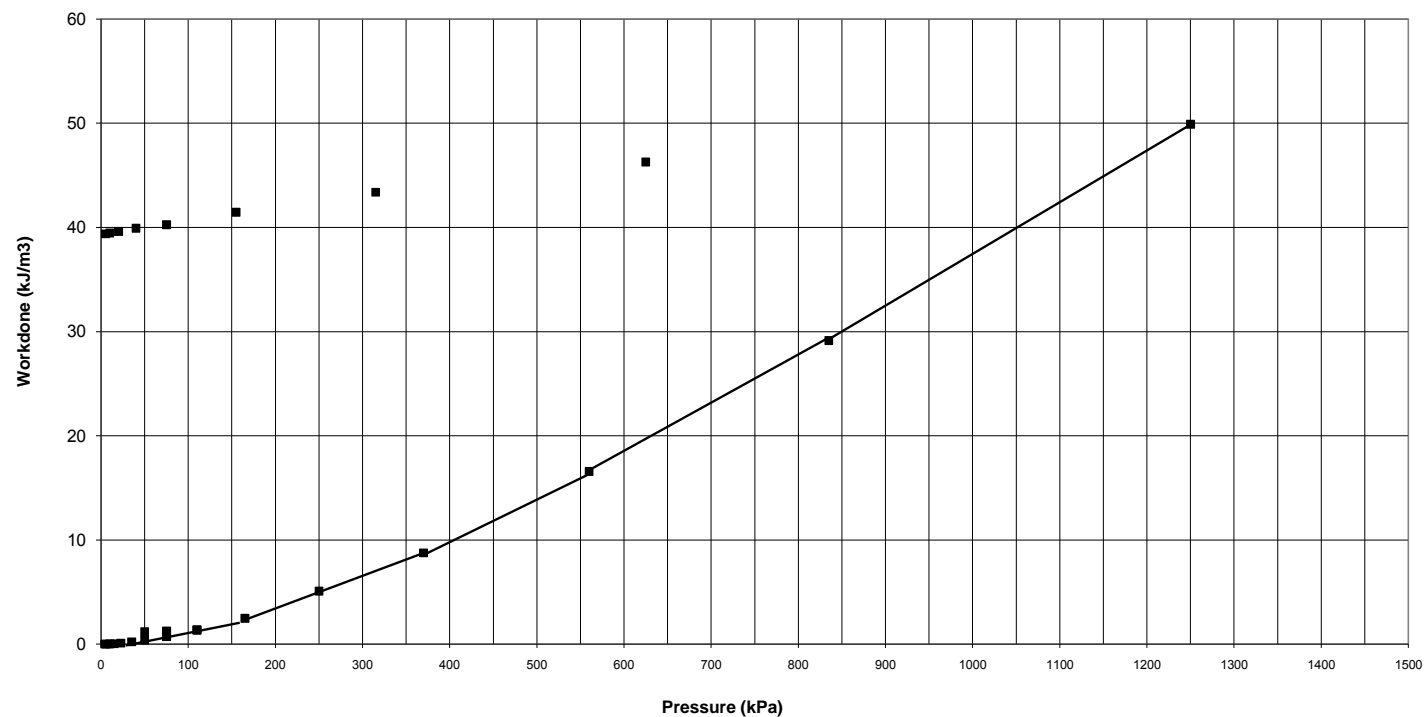
JOB NO

SW8801.1004.101

FIGURE NO.
B.64-E

REV

Strain Energy Method for Preconsolidation Pressure



ONE DIMENSIONAL CONSOLIDATION TEST (ASTM D 2435)

Project: **WEP**
Client: **Hatch Mott MacDonald**
Date: **28-Oct-11**

Job N **SW8801.1004.101**

Sample ID: **B9-3_TW14**

Depth(m): **15.3 to 15.9**

Test Data

| | | | | | |
|---|---|--------------------|--------|--|--------|
| Ring # : | B | Ring Height (in) = | 0.755 | Wt of dry filter paper (g) | 0.64 |
| Wet soil + Ring Wt (g) | | | 195.14 | Wt of ring (g) | 76.53 |
| Wet soil + Wet Paper + Ring (g) | | | 193.02 | Wet Paper (g) | 1.93 |
| Dry Soil + Dry Paper + Ring (g) | | | 167.40 | Ring Dia (in) | 2.498 |
| Initial moisture Content (%) | | | 31.45 | Final moisture Content (%) | 26.96 |
| Area of Ring (in ²) | | | 4.90 | Initial Volume (in ³) | 3.7002 |
| Initial Bulk Density (kg/m ³) | | | 1956 | Initial Dry Density (kg/m ³) | 1488 |
| Specific Gravity of Soil | | | 2.79 | Equiv. Thick. of solids (mm) | 10.228 |
| Final Bulk Density (kg/m ³) | | | 2025 | Final Dry Density (kg/m ³) | 1595 |
| Initial gauge reading for Load 1 | | | 0.2568 | Gauge reading for last Loading | 0.2063 |
| Initial Voids Ratio | | | 0.875 | Final Void Ratio | 0.750 |
| Initial Degree of Saturation (%) | | | 100 | Final Degree of Saturation (%) | 100 |

| | | | | | | | |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|
| Trial # | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Load (kPa) | 6.0 | 9.0 | 13.0 | 20.0 | 30.0 | 45.0 | 65.0 |
| Load (tsf) | 0.0624 | 0.0936 | 0.135 | 0.208 | 0.312 | 0.468 | 0.676 |
| Gauge Reading (in) | 0.2565 | 0.2561 | 0.2558 | 0.2542 | 0.2526 | 0.2493 | 0.2460 |
| (H-Hs) mm | 8.941 | 8.931 | 8.923 | 8.881 | 8.842 | 8.758 | 8.675 |
| Voids ratio | 0.874 | 0.873 | 0.872 | 0.868 | 0.864 | 0.856 | 0.848 |
| t90 (min) | | | 4.41 | 8.41 | 12.60 | 13.69 | 8.70 |
| Cv (m ² /day) | | | 0.025 | 0.013 | 0.009 | 0.008 | 0.013 |
| k' (MPa) | | | 10.057 | 3.199 | 4.823 | 3.433 | 4.530 |
| Mv (mm ² / N) | | | 0.0994 | 0.3126 | 0.2074 | 0.2912 | 0.2207 |

| | | | | | | | |
|--------------------------|---------|--------|--------|--------|--------|--------|--------|
| Trial # | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Load (kPa) | 100 | 150.0 | 100.0 | 65.0 | 45.0 | 65.0 | 100.0 |
| Load (tsf) | 1.04 | 1.560 | 1.040 | 0.676 | 0.468 | 0.676 | 1.040 |
| Gauge Reading (in) | 0.24161 | 0.2363 | 0.2376 | 0.2395 | 0.2417 | 0.2409 | 0.2387 |
| (H-Hs) mm | 8.563 | 8.429 | 8.462 | 8.510 | 8.565 | 8.545 | 8.489 |
| Voids ratio | 0.837 | 0.824 | 0.827 | 0.832 | 0.837 | 0.835 | 0.830 |
| t90 (min) | 8.12 | 12.25 | | | | | |
| Cv (m ² /day) | 0.013 | 0.009 | | | | | |
| k' (MPa) | 5.920 | 7.006 | | | | | |
| Mv (mm ² / N) | 0.1689 | 0.1427 | | | | | |



Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATION TEST
BRIDGE B-9 (B9-3-SA14)**

Date

Aug 2012

JOB NO

SW8801.1004.101

FIGURE NO.
B.65-A

REV

| | | | | | | | |
|--------------------------|---------|--------|--------|--------|--------|--------|--------|
| Trial # | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| Load (kPa) | 150.0 | 225.0 | 335.0 | 505.0 | 760.0 | 1140.0 | 1710.0 |
| Load (tsf) | 1.56 | 2.340 | 3.484 | 5.252 | 7.904 | 11.856 | 17.784 |
| Gauge Reading (in) | 0.23571 | 0.2295 | 0.2195 | 0.2021 | 0.1793 | 0.1566 | 0.1350 |
| (H-Hs) mm | 8.413 | 8.256 | 8.002 | 7.559 | 6.981 | 6.404 | 5.854 |
| Voids ratio | 0.823 | 0.807 | 0.782 | 0.739 | 0.682 | 0.626 | 0.572 |
| t90 (min) | | 12.25 | 9.00 | 10.24 | 12.25 | 9.92 | 8.70 |
| Cv (m ² /day) | | 0.009 | 0.011 | 0.010 | 0.008 | 0.009 | 0.009 |
| k' (MPa) | | 8.878 | 8.021 | 6.988 | 7.849 | 11.332 | 17.240 |
| Mv (mm ² / N) | | 0.1126 | 0.1247 | 0.1431 | 0.1274 | 0.0882 | 0.0580 |

| | | | | | | | |
|--------------------------|-------|--------|--------|--------|--------|--------|--------|
| Trial # | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| Load (kPa) | 855.0 | 425.0 | 215 | 105.0 | 55.0 | 25.0 | 13.5 |
| Load (tsf) | 8.892 | 4.420 | 2.236 | 1.092 | 0.572 | 0.260 | 0.140 |
| Gauge Reading (in) | 0.139 | 0.1459 | 0.1549 | 0.1634 | 0.1711 | 0.1850 | 0.1927 |
| (H-Hs) mm | 5.957 | 6.132 | 6.360 | 6.577 | 6.772 | 7.125 | 7.321 |
| Voids ratio | 0.582 | 0.599 | 0.622 | 0.643 | 0.662 | 0.697 | 0.716 |
| t90 (min) | | | | | | | |
| Cv (m ² /day) | | | | | | | |
| k' (MPa) | | | | | | | |
| Mv (mm ² / N) | | | | | | | |

| | |
|--------------------------|--------|
| Trial # | 29 |
| Load (kPa) | 6.5 |
| Load (tsf) | 0.068 |
| Gauge Reading (in) | 0.2063 |
| (H-Hs) mm | 7.666 |
| Voids ratio | 0.750 |
| t90 (min) | |
| Cv (m ² /day) | |
| k' (MPa) | |
| Mv (mm ² / N) | |



Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATION TEST
BRIDGE B-9 (B9-3-SA14)**

Date

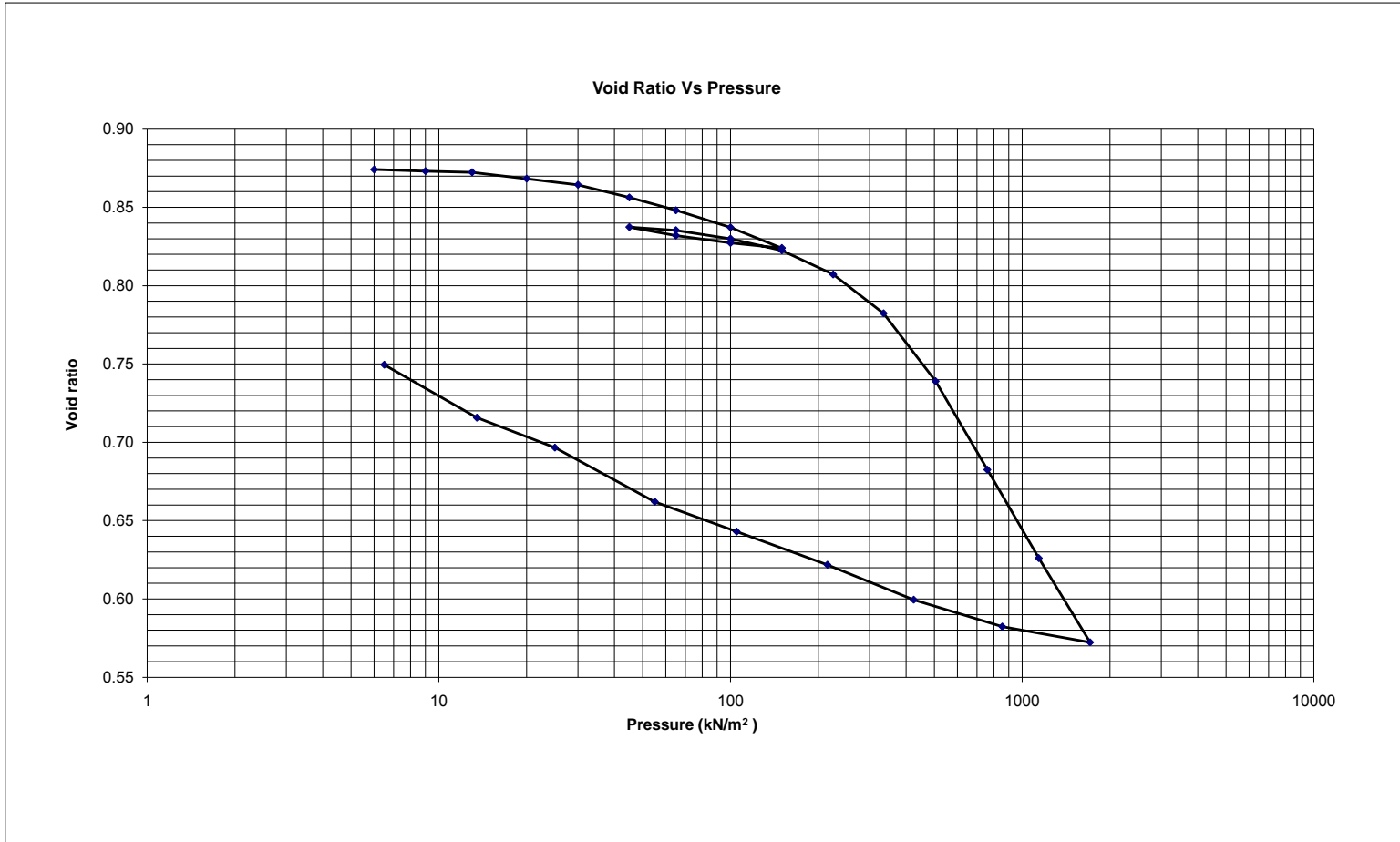
Aug 2012

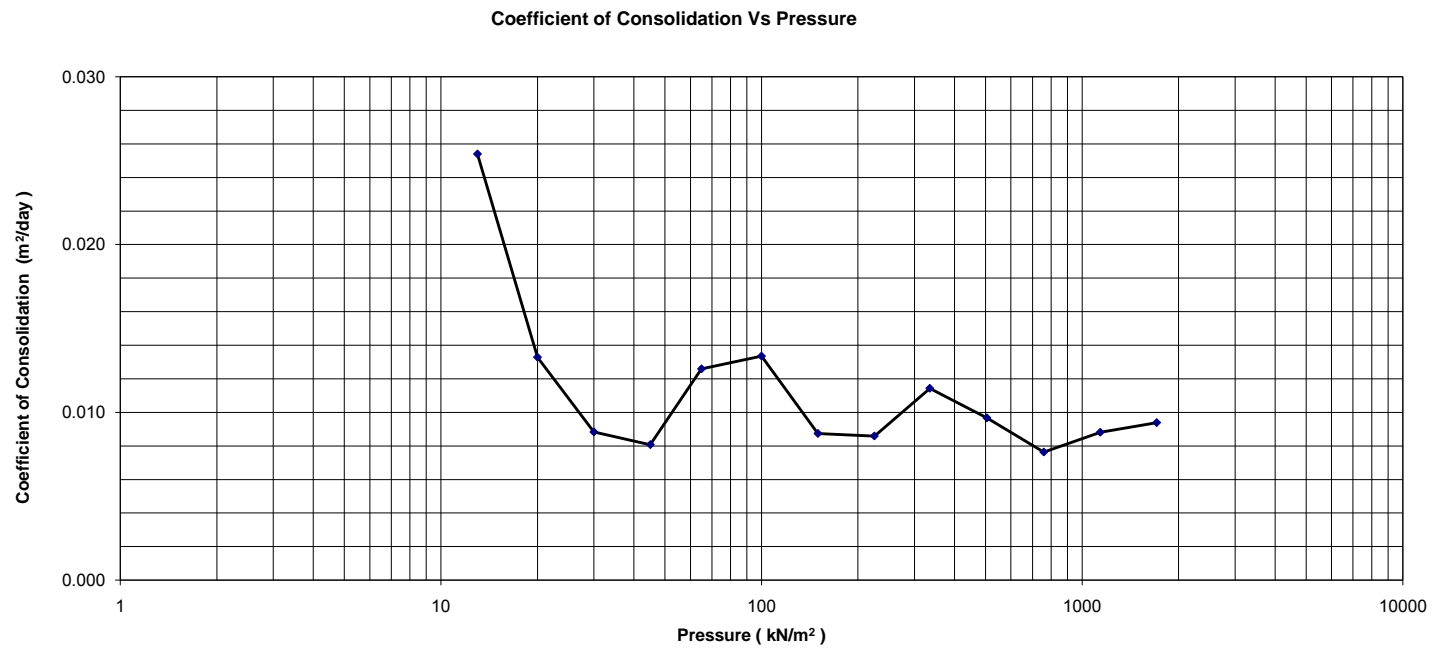
JOB NO

SW8801.1004.101

FIGURE NO.
B.65-B

REV





Strain Energy Data

| Presssure (kN/m ²) | c _v (m ² /day) | Void ratio |
|-----------------------------------|---|------------|
| 6.0 | | 0.874 |
| 9.0 | | 0.873 |
| 13.0 | 0.025 | 0.872 |
| 20.0 | 0.013 | 0.868 |
| 30.0 | 0.009 | 0.864 |
| 45.0 | 0.008 | 0.856 |
| 65.0 | 0.013 | 0.848 |
| 100.0 | 0.013 | 0.837 |
| 150.0 | 0.009 | 0.824 |
| 100.0 | | 0.827 |
| 65.0 | | 0.832 |
| 45.0 | | 0.837 |
| 65.0 | | 0.835 |
| 100.0 | | 0.830 |
| 150.0 | | 0.823 |
| 225.0 | 0.009 | 0.807 |
| 335.0 | 0.011 | 0.782 |
| 505.0 | 0.010 | 0.739 |
| 760.0 | 0.008 | 0.682 |
| 1140.0 | 0.009 | 0.626 |
| 1710.0 | 0.009 | 0.572 |
| 855.0 | | 0.582 |
| 425.0 | | 0.599 |
| 215.0 | | 0.622 |
| 105.0 | | 0.643 |
| 55.0 | | 0.662 |
| 25.0 | | 0.697 |
| 13.5 | | 0.716 |
| 6.5 | | 0.750 |

| Presssure (KN/m ²) | Height mm | Total Work (KJ/m ³) |
|-----------------------------------|--------------|------------------------------------|
| 6.0 | 19.177 | 0.000 |
| 9.0 | 19.167 | 0.004 |
| 13.0 | 19.159 | 0.008 |
| 20.0 | 19.117 | 0.044 |
| 30.0 | 19.078 | 0.096 |
| 45.0 | 18.994 | 0.260 |
| 65.0 | 18.911 | 0.503 |
| 100.0 | 18.799 | 0.990 |
| 150.0 | 18.665 | 1.882 |
| 100.0 | 18.697 | 1.663 |
| 65.0 | 18.746 | 1.449 |
| 45.0 | 18.801 | 1.286 |
| 65.0 | 18.781 | 1.346 |
| 100.0 | 18.725 | 1.590 |
| 150.0 | 18.649 | 2.100 |
| 225.0 | 18.491 | 3.683 |
| 335.0 | 18.238 | 7.522 |
| 505.0 | 17.794 | 17.735 |
| 760.0 | 17.217 | 38.274 |
| 1140.0 | 16.640 | 70.117 |
| 1710.0 | 16.090 | 117.211 |
| 855.0 | 16.193 | 109.012 |
| 425.0 | 16.368 | 102.085 |
| 215.0 | 16.596 | 97.615 |
| 105.0 | 16.813 | 95.531 |
| 55.0 | 17.008 | 94.602 |
| 25.0 | 17.361 | 93.772 |
| 13.5 | 17.556 | 93.555 |
| 6.5 | 17.902 | 93.358 |

Project

WINDSOR ESSEX PARKWAY

TITLE

CONSOLIDATION TEST
BRIDGE B-9 (B9-3-SA14)

Date

Aug 2012

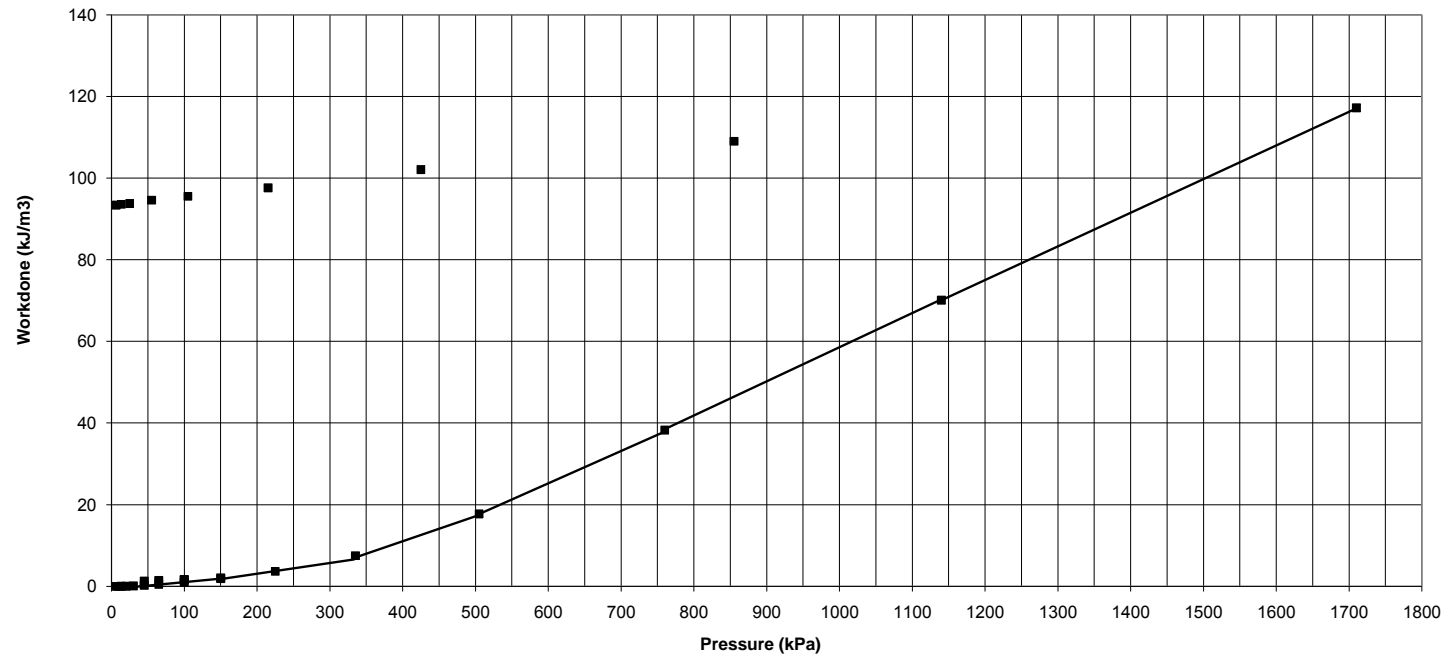
JOB NO

SW8801.1004.101

FIGURE NO.
B.65-E

REV

Strain Energy Method for Preconsolidation Pressure



ONE DIMENSIONAL CONSOLIDATION TEST (ASTM D 2435)

Project: **WEP**
Client: **Hatch Mott MacDonald**
Date: **23-Dec-11**

Job N **SW8801.1004.101**

Sample ID: **T7-1_TW11**

Depth(m):

Test Data

| | | | | | |
|---|---|--------------------|--------|--|--------|
| Ring # : | B | Ring Height (in) = | 0.752 | Wt of dry filter paper (g) | 0.77 |
| Wet soil + Ring Wt (g) | | | 201.84 | Wt of ring (g) | 76.53 |
| Wet soil + Wet Paper + Ring (g) | | | 200.93 | Wet Paper (g) | 2.00 |
| Dry Soil + Dry Paper + Ring (g) | | | 179.68 | Ring Dia (in) | 2.498 |
| Initial moisture Content (%) | | | 22.40 | Final moisture Content (%) | 19.55 |
| Area of Ring (in ²) | | | 4.90 | Initial Volume (in ³) | 3.6855 |
| Initial Bulk Density (kg/m ³) | | | 2075 | Initial Dry Density (kg/m ³) | 1695 |
| Specific Gravity of Soil | | | 2.75 | Equiv. Thick. of solids (mm) | 11.770 |
| Final Bulk Density (kg/m ³) | | | 2139 | Final Dry Density (kg/m ³) | 1789 |
| Initial gauge reading for Load 1 | | | 0.2520 | Gauge reading for last Loading | 0.2126 |
| Initial Voids Ratio | | | 0.623 | Final Void Ratio | 0.538 |
| Initial Degree of Saturation (%) | | | 99 | Final Degree of Saturation (%) | 100 |

| | | | | | | | |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|
| Trial # | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Load (kPa) | 6.0 | 9.0 | 13.0 | 20.0 | 30.0 | 45.0 | 65.0 |
| Load (tsf) | 0.0624 | 0.0936 | 0.135 | 0.208 | 0.312 | 0.468 | 0.676 |
| Gauge Reading (in) | 0.2520 | 0.2515 | 0.2512 | 0.2500 | 0.2481 | 0.2457 | 0.2430 |
| (H-Hs) mm | 7.331 | 7.320 | 7.311 | 7.281 | 7.232 | 7.173 | 7.102 |
| Voids ratio | 0.623 | 0.622 | 0.621 | 0.619 | 0.614 | 0.609 | 0.603 |
| t90 (min) | | | 2.25 | 3.06 | 3.24 | 3.61 | 3.61 |
| Cv (m ² /day) | | | 0.049 | 0.036 | 0.034 | 0.030 | 0.030 |
| k' (MPa) | | | 8.842 | 4.382 | 3.886 | 4.837 | 5.385 |
| Mv (mm ² / N) | | | 0.1131 | 0.2282 | 0.2573 | 0.2067 | 0.1857 |

| | | | | | | | |
|--------------------------|---------|--------|--------|--------|--------|--------|--------|
| Trial # | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Load (kPa) | 100 | 150.0 | 100.0 | 65.0 | 45.0 | 65.0 | 100.0 |
| Load (tsf) | 1.04 | 1.560 | 1.040 | 0.676 | 0.468 | 0.676 | 1.040 |
| Gauge Reading (in) | 0.23865 | 0.2336 | 0.2344 | 0.2358 | 0.2372 | 0.2366 | 0.2351 |
| (H-Hs) mm | 6.993 | 6.865 | 6.886 | 6.920 | 6.956 | 6.939 | 6.901 |
| Voids ratio | 0.594 | 0.583 | 0.585 | 0.588 | 0.591 | 0.590 | 0.586 |
| t90 (min) | 4.00 | 3.24 | | | | | |
| Cv (m ² /day) | 0.027 | 0.033 | | | | | |
| k' (MPa) | 6.034 | 7.314 | | | | | |
| Mv (mm ² / N) | 0.1657 | 0.1367 | | | | | |



Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATION TEST
TUNNEL T-7 (T7-1-SA11)**

Date

Aug 2012

JOB NO

SW8801.1004.101

FIGURE NO.
B.66-A

REV

| | | | | | | | |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|
| Trial # | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| Load (kPa) | 150.0 | 225.0 | 335.0 | 505.0 | 760.0 | 1140.0 | 1710.0 |
| Load (tsf) | 1.56 | 2.340 | 3.484 | 5.252 | 7.904 | 11.856 | 17.784 |
| Gauge Reading (in) | 0.2324 | 0.2268 | 0.2183 | 0.2069 | 0.1933 | 0.1789 | 0.1637 |
| (H-Hs) mm | 6.834 | 6.692 | 6.476 | 6.185 | 5.840 | 5.476 | 5.089 |
| Voids ratio | 0.581 | 0.569 | 0.550 | 0.525 | 0.496 | 0.465 | 0.432 |
| t90 (min) | | 3.24 | 4.00 | 4.00 | 7.02 | 5.76 | 3.61 |
| Cv (m ² /day) | | 0.032 | 0.026 | 0.025 | 0.014 | 0.016 | 0.025 |
| k' (MPa) | | 9.810 | 9.406 | 10.665 | 13.254 | 18.385 | 25.428 |
| Mv (mm ² / N) | | 0.1019 | 0.1063 | 0.0938 | 0.0754 | 0.0544 | 0.0393 |

| | | | | | | | |
|--------------------------|---------|--------|---------|--------|--------|--------|--------|
| Trial # | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| Load (kPa) | 855.0 | 425.0 | 215 | 105.0 | 55.0 | 25.0 | 13.5 |
| Load (tsf) | 8.892 | 4.420 | 2.236 | 1.092 | 0.572 | 0.260 | 0.140 |
| Gauge Reading (in) | 0.16621 | 0.1697 | 0.17481 | 0.1815 | 0.1885 | 0.1968 | 0.2049 |
| (H-Hs) mm | 5.153 | 5.242 | 5.371 | 5.540 | 5.719 | 5.930 | 6.134 |
| Voids ratio | 0.438 | 0.445 | 0.456 | 0.471 | 0.486 | 0.504 | 0.521 |
| t90 (min) | | | | | | | |
| Cv (m ² /day) | | | | | | | |
| k' (MPa) | | | | | | | |
| Mv (mm ² / N) | | | | | | | |

| | |
|--------------------------|--------|
| Trial # | 29 |
| Load (kPa) | 6.5 |
| Load (tsf) | 0.068 |
| Gauge Reading (in) | 0.2126 |
| (H-Hs) mm | 6.331 |
| Voids ratio | 0.538 |
| t90 (min) | |
| Cv (m ² /day) | |
| k' (MPa) | |
| Mv (mm ² / N) | |



Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATION TEST
TUNNEL T-7 (T7-1-SA11)**

Date

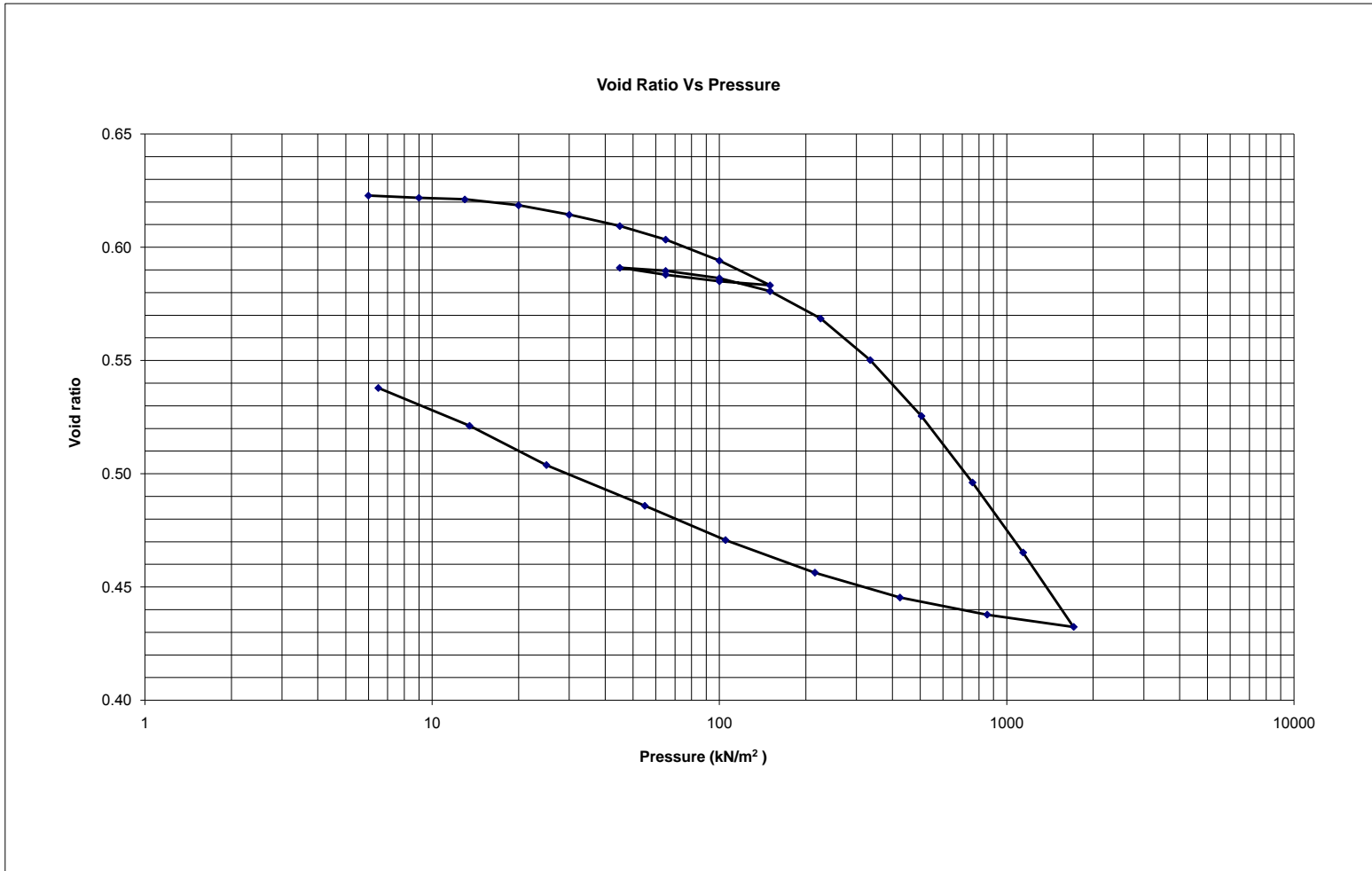
Aug 2012

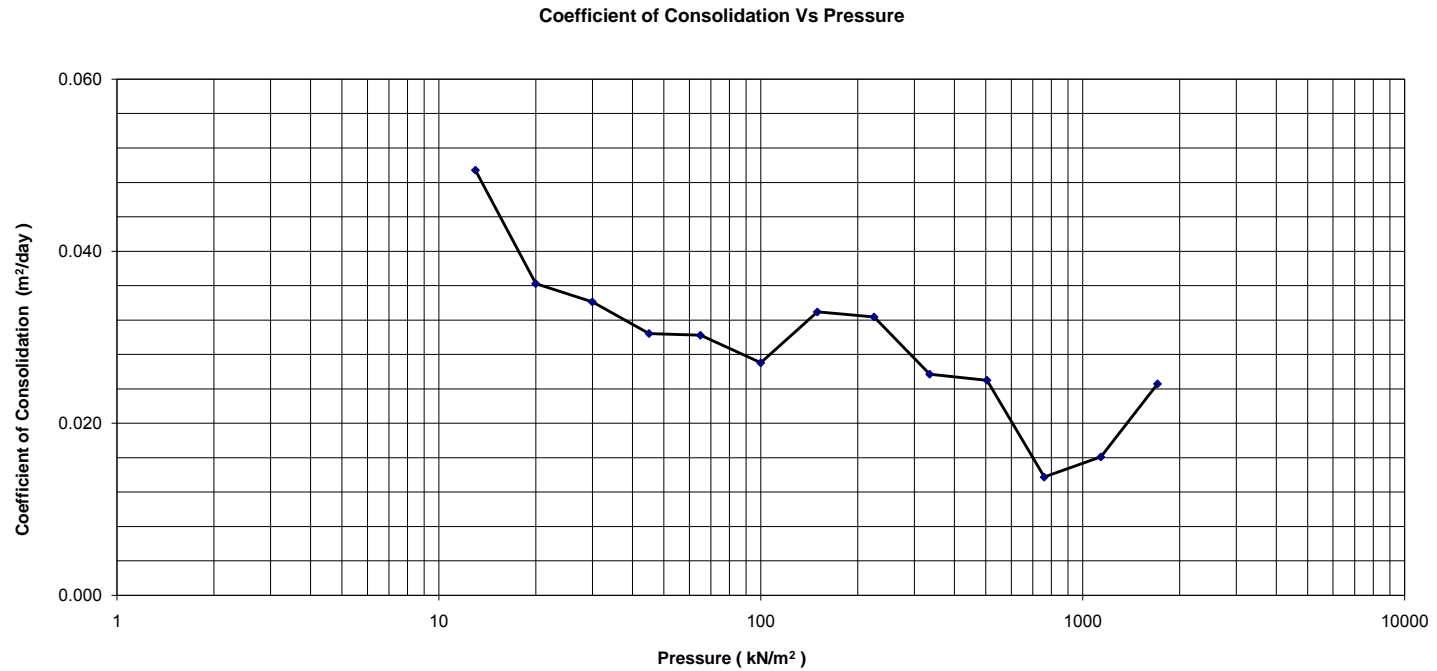
JOB NO

SW8801.1004.101

**FIGURE NO.
B.66-B**

REV



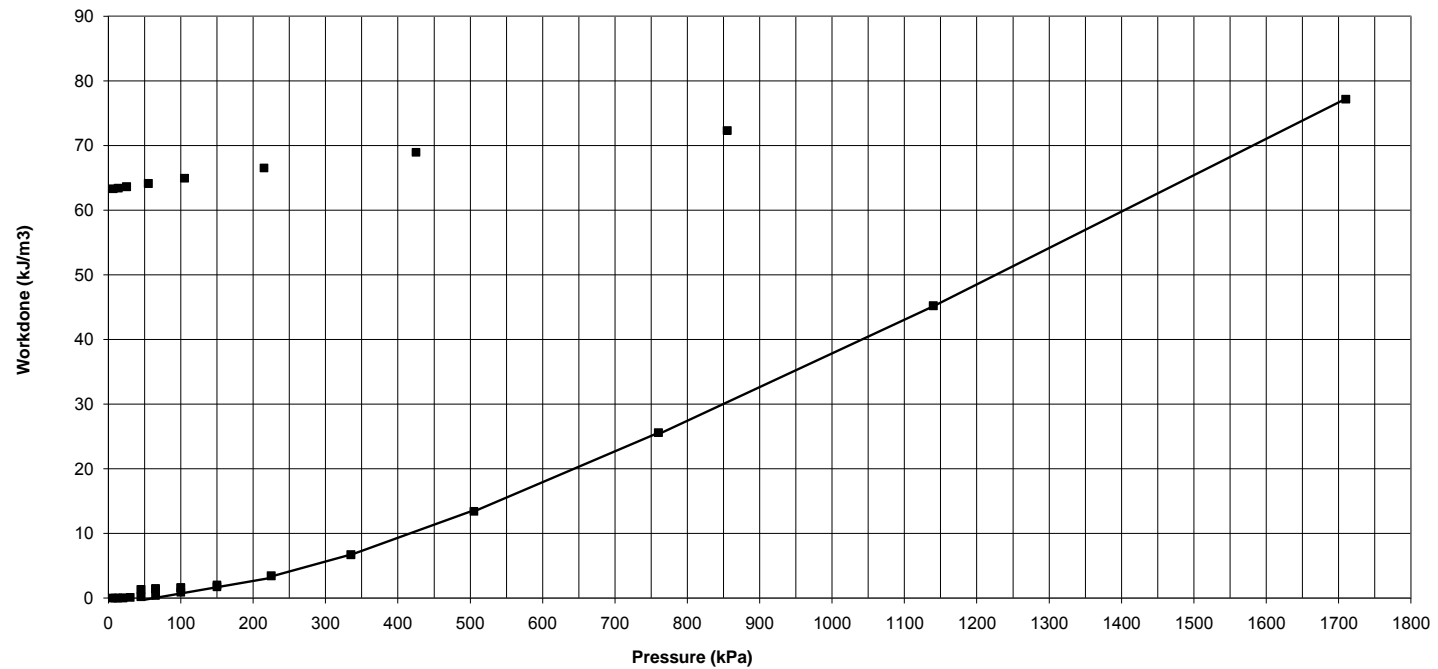


Strain Energy Data

| Presssure kN/m ² | cv m ² /day | Void ratio |
|--------------------------------|---------------------------|------------|
| 6.0 | | 0.623 |
| 9.0 | | 0.622 |
| 13.0 | 0.049 | 0.621 |
| 20.0 | 0.036 | 0.619 |
| 30.0 | 0.034 | 0.614 |
| 45.0 | 0.030 | 0.609 |
| 65.0 | 0.030 | 0.603 |
| 100.0 | 0.027 | 0.594 |
| 150.0 | 0.033 | 0.583 |
| 100.0 | | 0.585 |
| 65.0 | | 0.588 |
| 45.0 | | 0.591 |
| 65.0 | | 0.590 |
| 100.0 | | 0.586 |
| 150.0 | | 0.581 |
| 225.0 | 0.032 | 0.569 |
| 335.0 | 0.026 | 0.550 |
| 505.0 | 0.025 | 0.525 |
| 760.0 | 0.014 | 0.496 |
| 1140.0 | 0.016 | 0.465 |
| 1710.0 | 0.025 | 0.432 |
| 855.0 | | 0.438 |
| 425.0 | | 0.445 |
| 215.0 | | 0.456 |
| 105.0 | | 0.471 |
| 55.0 | | 0.486 |
| 25.0 | | 0.504 |
| 13.5 | | 0.521 |
| 6.5 | | 0.538 |

| Presssure kN/m ² | Height mm | Total Work kJ/m ³ |
|--------------------------------|--------------|---------------------------------|
| 6.0 | 19.101 | 0.000 |
| 9.0 | 19.089 | 0.004 |
| 13.0 | 19.081 | 0.009 |
| 20.0 | 19.050 | 0.036 |
| 30.0 | 19.001 | 0.100 |
| 45.0 | 18.942 | 0.216 |
| 65.0 | 18.872 | 0.421 |
| 100.0 | 18.762 | 0.899 |
| 150.0 | 18.634 | 1.754 |
| 100.0 | 18.655 | 1.612 |
| 65.0 | 18.690 | 1.460 |
| 45.0 | 18.725 | 1.355 |
| 65.0 | 18.709 | 1.403 |
| 100.0 | 18.671 | 1.571 |
| 150.0 | 18.604 | 2.021 |
| 225.0 | 18.461 | 3.455 |
| 335.0 | 18.246 | 6.730 |
| 505.0 | 17.955 | 13.424 |
| 760.0 | 17.609 | 25.593 |
| 1140.0 | 17.245 | 45.230 |
| 1710.0 | 16.859 | 77.174 |
| 855.0 | 16.922 | 72.324 |
| 425.0 | 17.011 | 68.962 |
| 215.0 | 17.141 | 66.525 |
| 105.0 | 17.310 | 64.946 |
| 55.0 | 17.488 | 64.123 |
| 25.0 | 17.700 | 63.638 |
| 13.5 | 17.904 | 63.417 |
| 6.5 | 18.101 | 63.307 |

Strain Energy Method for Preconsolidation Pressure



ONE DIMENSIONAL CONSOLIDATION TEST (ASTM D 2435)

Project: **WEP**
 Client: **Hatch Mott MacDonald**
 Date: **22-Nov-11**

Job N **SW8801.1004.101**

Sample ID: **B10-7_TW10**

Depth(m): **9.2 to 9.8**

Test Data

| | | | | | |
|---|---|--------------------|--------|--|--------|
| Ring # : | B | Ring Height (in) = | 0.752 | Wt of dry filter paper (g) | 0.73 |
| Wet soil + Ring Wt (g) | | | 203.68 | Wt of ring (g) | 76.52 |
| Wet soil + Wet Paper + Ring (g) | | | 201.60 | Wet Paper (g) | 2.00 |
| Dry Soil + Dry Paper + Ring (g) | | | 182.13 | Ring Dia (in) | 2.498 |
| Initial moisture Content (%) | | | 21.24 | Final moisture Content (%) | 17.35 |
| Area of Ring (in ²) | | | 4.90 | Initial Volume (in ³) | 3.6855 |
| Initial Bulk Density (kg/m ³) | | | 2106 | Initial Dry Density (kg/m ³) | 1737 |
| Specific Gravity of Soil | | | 2.75 | Equiv. Thick. of solids (mm) | 12.062 |
| Final Bulk Density (kg/m ³) | | | 2187 | Final Dry Density (kg/m ³) | 1863 |
| Initial gauge reading for Load 1 | | | 0.2572 | Gauge reading for last Loading | 0.2061 |
| Initial Voids Ratio | | | 0.584 | Final Void Ratio | 0.476 |
| Initial Degree of Saturation (%) | | | 100 | Final Degree of Saturation (%) | 100 |

| | | | | | | | |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|
| Trial # | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Load (kPa) | 6.0 | 9.0 | 13.0 | 20.0 | 30.0 | 45.0 | 65.0 |
| Load (tsf) | 0.0624 | 0.0936 | 0.135 | 0.208 | 0.312 | 0.468 | 0.676 |
| Gauge Reading (in) | 0.2571 | 0.2559 | 0.2551 | 0.2529 | 0.2500 | 0.2466 | 0.2431 |
| (H-Hs) mm | 7.037 | 7.005 | 6.986 | 6.930 | 6.855 | 6.768 | 6.681 |
| Voids ratio | 0.583 | 0.581 | 0.579 | 0.575 | 0.568 | 0.561 | 0.554 |
| t90 (min) | | | 4.41 | 2.56 | 4.41 | 5.52 | 6.76 |
| Cv (m ² /day) | | | 0.025 | 0.043 | 0.025 | 0.020 | 0.016 |
| k' (MPa) | | | 3.900 | 2.386 | 2.526 | 3.286 | 4.323 |
| Mv (mm ² / N) | | | 0.2564 | 0.4191 | 0.3959 | 0.3044 | 0.2313 |

| | | | | | | | |
|--------------------------|---------|--------|--------|--------|--------|--------|--------|
| Trial # | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Load (kPa) | 100 | 150.0 | 100.0 | 65.0 | 45.0 | 65.0 | 100.0 |
| Load (tsf) | 1.04 | 1.560 | 1.040 | 0.676 | 0.468 | 0.676 | 1.040 |
| Gauge Reading (in) | 0.23791 | 0.2312 | 0.2319 | 0.2328 | 0.2341 | 0.2335 | 0.2322 |
| (H-Hs) mm | 6.549 | 6.377 | 6.396 | 6.418 | 6.452 | 6.437 | 6.403 |
| Voids ratio | 0.543 | 0.529 | 0.530 | 0.532 | 0.535 | 0.534 | 0.531 |
| t90 (min) | 5.52 | 8.41 | | | | | |
| Cv (m ² /day) | 0.019 | 0.012 | | | | | |
| k' (MPa) | 4.957 | 5.419 | | | | | |
| Mv (mm ² / N) | 0.2017 | 0.1845 | | | | | |



Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATION TEST
BRIDGE B-10 (B10-7-SA10)**

Date

Aug 2012

JOB NO

SW8801.1004.101

FIGURE NO.
B.67-A

REV

| | | | | | | | |
|--------------------------|---------|--------|--------|--------|--------|--------|--------|
| Trial # | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| Load (kPa) | 150.0 | 225.0 | 335.0 | 505.0 | 760.0 | 1140.0 | 1710.0 |
| Load (tsf) | 1.56 | 2.340 | 3.484 | 5.252 | 7.904 | 11.856 | 17.784 |
| Gauge Reading (in) | 0.23011 | 0.2233 | 0.2143 | 0.2031 | 0.1905 | 0.1776 | 0.1639 |
| (H-Hs) mm | 6.351 | 6.177 | 5.950 | 5.665 | 5.344 | 5.018 | 4.669 |
| Voids ratio | 0.527 | 0.512 | 0.493 | 0.470 | 0.443 | 0.416 | 0.387 |
| t90 (min) | | 8.41 | 9.00 | 9.61 | 8.41 | 7.84 | 6.76 |
| Cv (m ² /day) | | 0.012 | 0.011 | 0.010 | 0.011 | 0.012 | 0.013 |
| k' (MPa) | | 7.925 | 8.855 | 10.754 | 14.080 | 20.281 | 27.896 |
| Mv (mm ² / N) | | 0.1262 | 0.1129 | 0.0930 | 0.0710 | 0.0493 | 0.0358 |

| | | | | | | | |
|--------------------------|---------|--------|---------|--------|--------|--------|--------|
| Trial # | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| Load (kPa) | 855.0 | 425.0 | 215 | 105.0 | 55.0 | 25.0 | 13.5 |
| Load (tsf) | 8.892 | 4.420 | 2.236 | 1.092 | 0.572 | 0.260 | 0.140 |
| Gauge Reading (in) | 0.16615 | 0.1692 | 0.17389 | 0.1803 | 0.1863 | 0.1935 | 0.2007 |
| (H-Hs) mm | 4.726 | 4.804 | 4.923 | 5.085 | 5.238 | 5.420 | 5.605 |
| Voids ratio | 0.392 | 0.398 | 0.408 | 0.422 | 0.434 | 0.449 | 0.465 |
| t90 (min) | | | | | | | |
| Cv (m ² /day) | | | | | | | |
| k' (MPa) | | | | | | | |
| Mv (mm ² / N) | | | | | | | |

| | |
|--------------------------|--------|
| Trial # | 29 |
| Load (kPa) | 6.5 |
| Load (tsf) | 0.068 |
| Gauge Reading (in) | 0.2061 |
| (H-Hs) mm | 5.741 |
| Voids ratio | 0.476 |
| t90 (min) | |
| Cv (m ² /day) | |
| k' (MPa) | |
| Mv (mm ² / N) | |



Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATION TEST
BRIDGE B-10 (B10-7-SA10)**

Date

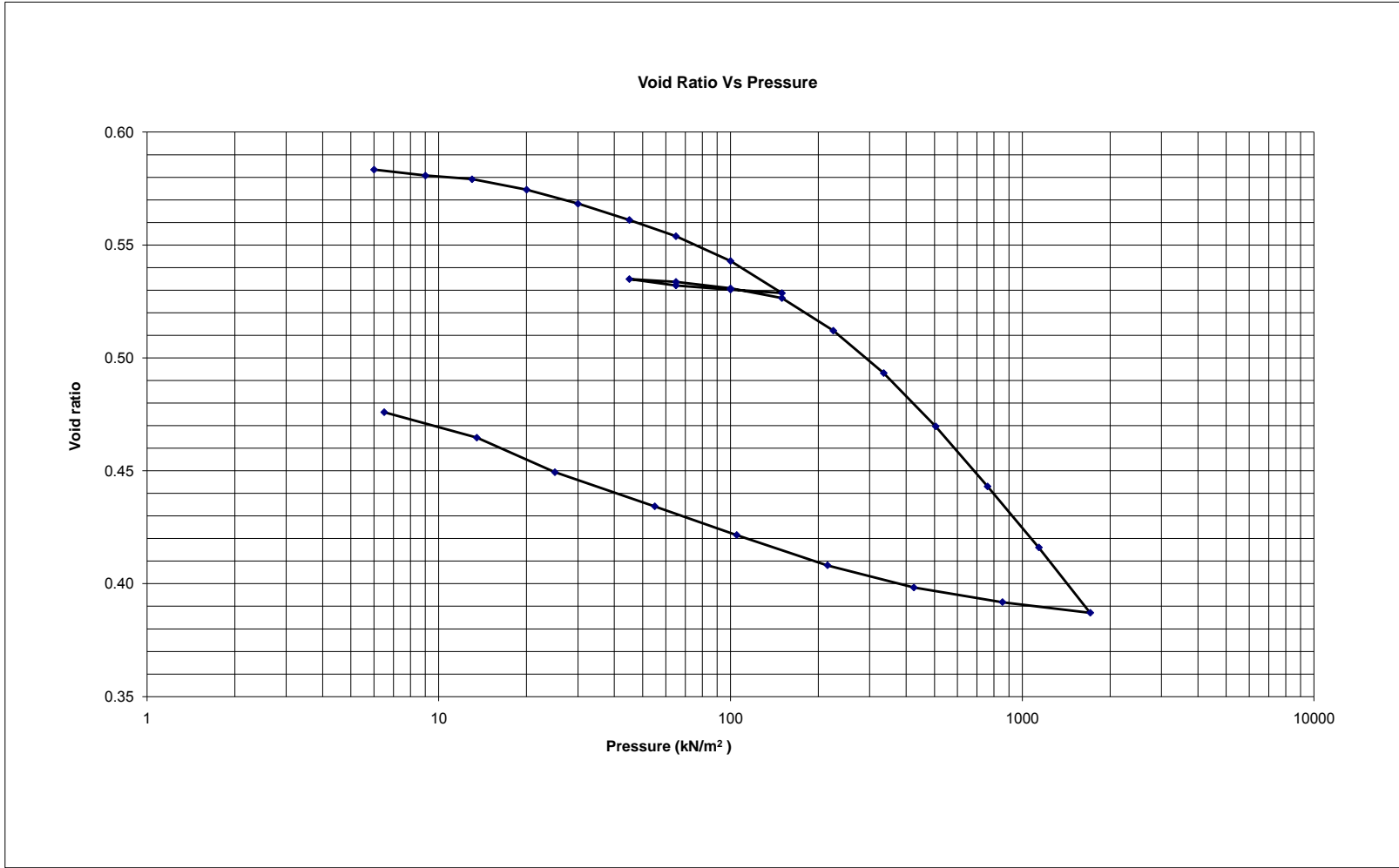
Aug 2012

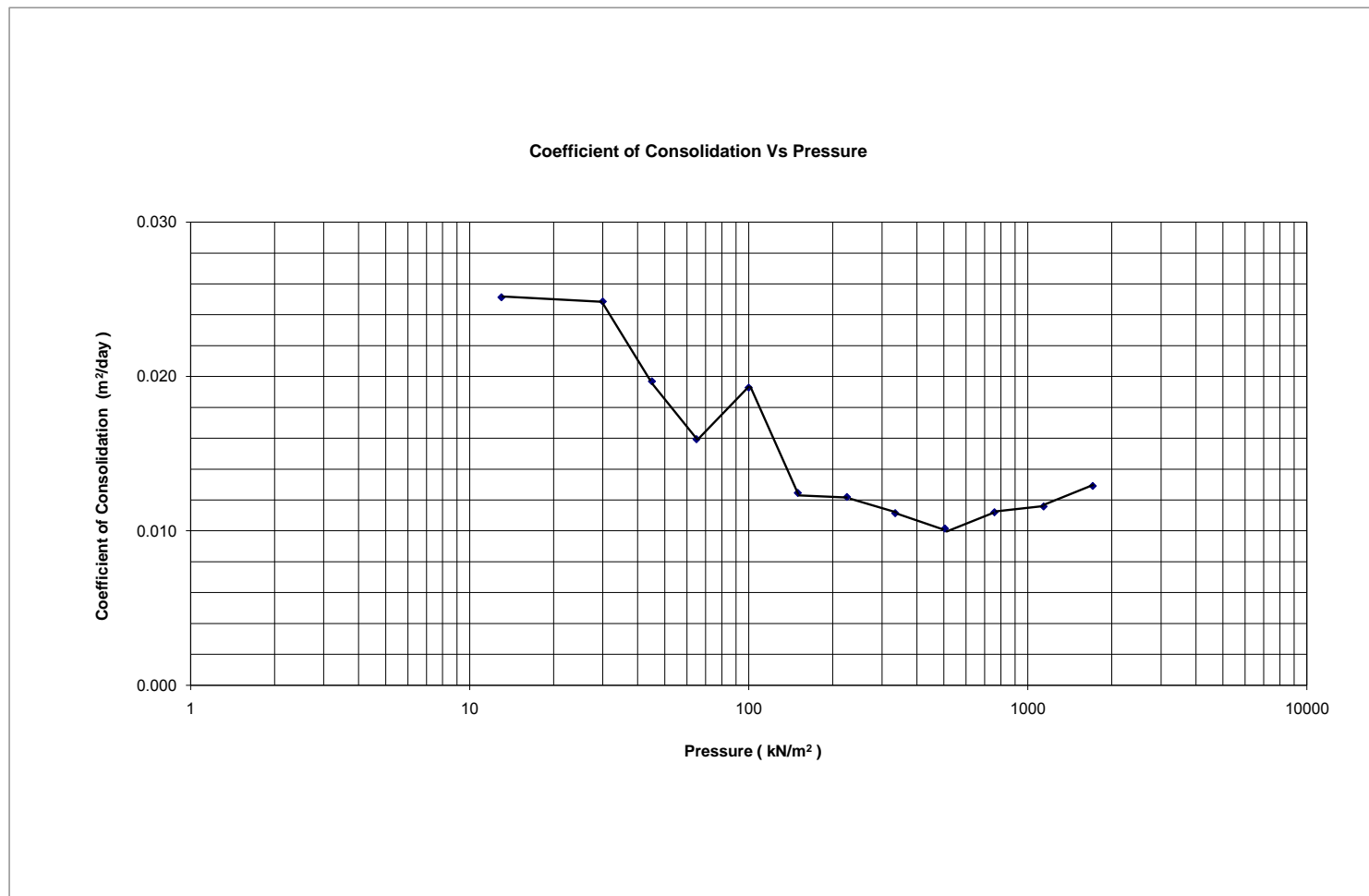
JOB NO

SW8801.1004.101

**FIGURE NO.
B.67-B**

REV





Strain Energy Data

| Presssure kN/m ² | C _v m ² /day | Void ratio |
|--------------------------------|---------------------------------------|------------|
| 6.0 | | 0.583 |
| 9.0 | | 0.581 |
| 13.0 | 0.025 | 0.579 |
| 20.0 | 0.043 | 0.575 |
| 30.0 | 0.025 | 0.568 |
| 45.0 | 0.020 | 0.561 |
| 65.0 | 0.016 | 0.554 |
| 100.0 | 0.019 | 0.543 |
| 150.0 | 0.012 | 0.529 |
| 100.0 | | 0.530 |
| 65.0 | | 0.532 |
| 45.0 | | 0.535 |
| 65.0 | | 0.534 |
| 100.0 | | 0.531 |
| 150.0 | | 0.527 |
| 225.0 | 0.012 | 0.512 |
| 335.0 | 0.011 | 0.493 |
| 505.0 | 0.010 | 0.470 |
| 760.0 | 0.011 | 0.443 |
| 1140.0 | 0.012 | 0.416 |
| 1710.0 | 0.013 | 0.387 |
| 855.0 | | 0.392 |
| 425.0 | | 0.398 |
| 215.0 | | 0.408 |
| 105.0 | | 0.422 |
| 55.0 | | 0.434 |
| 25.0 | | 0.449 |
| 13.5 | | 0.465 |
| 6.5 | | 0.476 |

| Presssure kN/m ² | Height mm | Total Work kJ/m ³ |
|--------------------------------|--------------|---------------------------------|
| 6.0 | 19.101 | 0.000 |
| 9.0 | 19.069 | 0.012 |
| 13.0 | 19.049 | 0.024 |
| 20.0 | 18.994 | 0.072 |
| 30.0 | 18.918 | 0.171 |
| 45.0 | 18.832 | 0.342 |
| 65.0 | 18.745 | 0.597 |
| 100.0 | 18.613 | 1.179 |
| 150.0 | 18.441 | 2.332 |
| 100.0 | 18.460 | 2.203 |
| 65.0 | 18.482 | 2.104 |
| 45.0 | 18.516 | 2.003 |
| 65.0 | 18.501 | 2.048 |
| 100.0 | 18.466 | 2.203 |
| 150.0 | 18.414 | 2.554 |
| 225.0 | 18.240 | 4.328 |
| 335.0 | 18.014 | 7.806 |
| 505.0 | 17.729 | 14.444 |
| 760.0 | 17.408 | 25.899 |
| 1140.0 | 17.082 | 43.697 |
| 1710.0 | 16.733 | 72.811 |
| 855.0 | 16.790 | 68.430 |
| 425.0 | 16.868 | 65.468 |
| 215.0 | 16.987 | 63.213 |
| 105.0 | 17.148 | 61.689 |
| 55.0 | 17.302 | 60.973 |
| 25.0 | 17.484 | 60.552 |
| 13.5 | 17.668 | 60.349 |
| 6.5 | 17.805 | 60.271 |



Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATION TEST
BRIDGE B-10 (B10-7-SA10)**

Date

Aug 2012

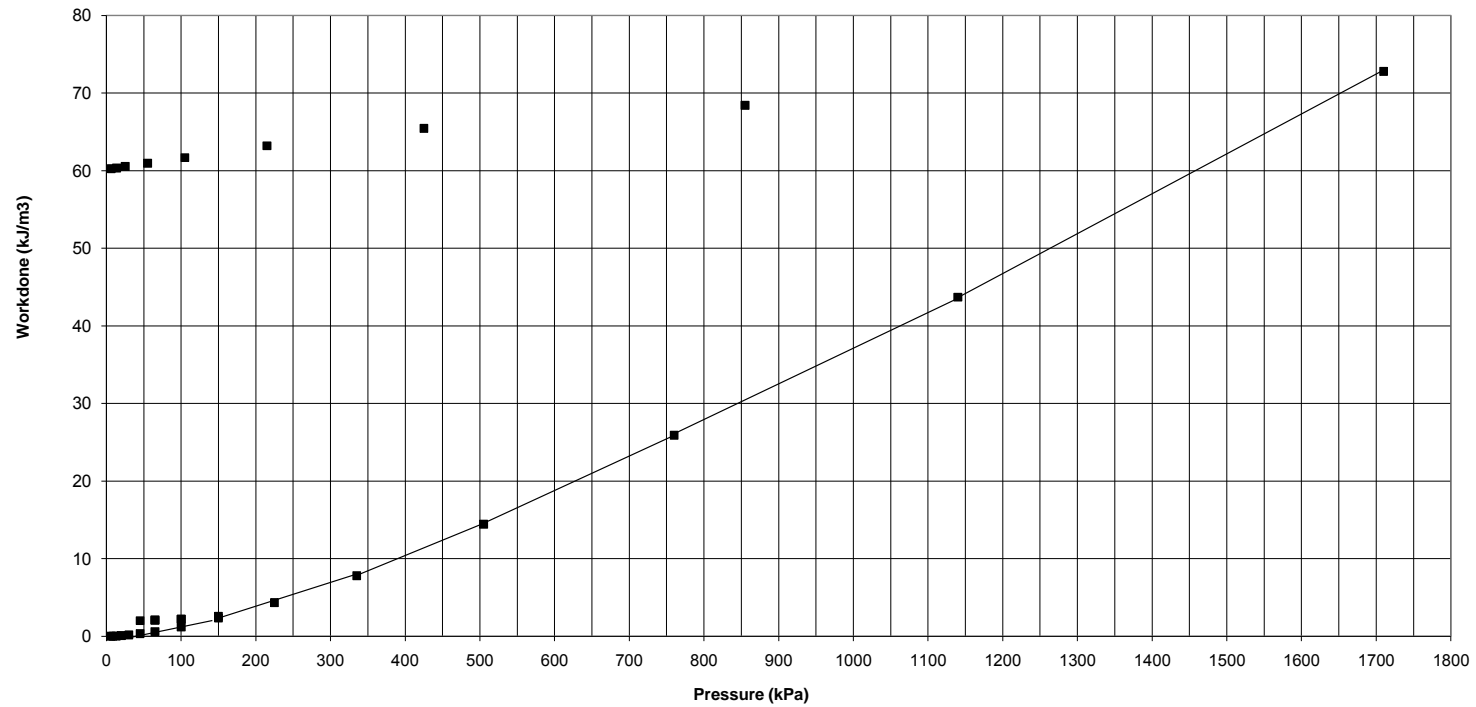
JOB NO

SW8801.1004.101

FIGURE NO.
B.67-E

REV

Strain Energy Method for Preconsolidation Pressure



ONE DIMENSIONAL CONSOLIDATION TEST (ASTM D 2435)

Project: **WEP**
 Client: **Hatch Mott MacDonald**
 Date: **16-Nov-11**

Job No.: **SW8801.1004.101**

Sample ID: **B10-7_TW21**

Depth(m): **24.4 to 25.0**

Test Data

| | | | | | |
|---|---|--------------------|--------|--|--------|
| Ring # : | B | Ring Height (in) = | 0.755 | Wt of dry filter paper (g) | 0.79 |
| Wet soil + Ring Wt (g) | | | 205.67 | Wt of ring (g) | 76.52 |
| Wet soil + Wet Paper + Ring (g) | | | 204.18 | Wet Paper (g) | 2.62 |
| Dry Soil + Dry Paper + Ring (g) | | | 184.65 | Ring Dia (in) | 2.498 |
| Initial moisture Content (%) | | | 20.32 | Final moisture Content (%) | 16.49 |
| Area of Ring (in ²) | | | 4.90 | Initial Volume (in ³) | 3.7002 |
| Initial Bulk Density (kg/m ³) | | | 2130 | Initial Dry Density (kg/m ³) | 1770 |
| Specific Gravity of Soil | | | 2.76 | Equiv. Thick. of solids (mm) | 12.291 |
| Final Bulk Density (kg/m ³) | | | 2210 | Final Dry Density (kg/m ³) | 1897 |
| Initial gauge reading for Load 1 | | | 0.2612 | Gauge reading for last Loading | 0.2107 |
| Initial Voids Ratio | | | 0.560 | Final Void Ratio | 0.456 |
| Initial Degree of Saturation (%) | | | 100 | Final Degree of Saturation (%) | 100 |

| Trial # | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|--------------------------|--------|--------|--------|--------|--------|---------|--------|
| Load (kPa) | 3.5 | 5.0 | 8.0 | 12.0 | 17.5 | 26.5 | 40.0 |
| Load (tsf) | 0.0364 | 0.052 | 0.083 | 0.125 | 0.182 | 0.276 | 0.416 |
| Gauge Reading (in) | 0.2612 | 0.2598 | 0.2590 | 0.2569 | 0.2544 | 0.25088 | 0.2473 |
| (H-Hs) mm | 6.884 | 6.851 | 6.829 | 6.775 | 6.714 | 6.624 | 6.533 |
| Voids ratio | 0.560 | 0.557 | 0.556 | 0.551 | 0.546 | 0.539 | 0.531 |
| t90 (min) | | | 19.36 | 26.52 | 20.25 | 16.81 | 16.00 |
| Cv (m ² /day) | | | 0.006 | 0.004 | 0.005 | 0.007 | 0.007 |
| k' (MPa) | | | 2.599 | 1.434 | 1.699 | 1.902 | 2.808 |
| Mv (mm ² / N) | | | 0.3848 | 0.6974 | 0.5886 | 0.5257 | 0.3561 |

| Trial # | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|
| Load (kPa) | 60 | 90.0 | 135.0 | 200.0 | 300.0 | 200.0 | 135.0 |
| Load (tsf) | 0.624 | 0.936 | 1.404 | 2.080 | 3.120 | 2.080 | 1.404 |
| Gauge Reading (in) | 0.2429 | 0.2379 | 0.2313 | 0.2240 | 0.2152 | 0.2160 | 0.2166 |
| (H-Hs) mm | 6.421 | 6.294 | 6.126 | 5.941 | 5.717 | 5.736 | 5.753 |
| Voids ratio | 0.522 | 0.512 | 0.498 | 0.483 | 0.465 | 0.467 | 0.468 |
| t90 (min) | 16.81 | 14.06 | 11.22 | 11.22 | 11.90 | | |
| Cv (m ² /day) | 0.006 | 0.008 | 0.009 | 0.009 | 0.008 | | |
| k' (MPa) | 3.369 | 4.420 | 4.989 | 6.456 | 8.157 | | |
| Mv (mm ² / N) | 0.2969 | 0.2262 | 0.2004 | 0.1549 | 0.1226 | | |

| Trial # | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|
| Load (kPa) | 90.0 | 60.0 | 40.0 | 60.0 | 90.0 | 135.0 | 200.0 |
| Load (tsf) | 0.936 | 0.624 | 0.416 | 0.624 | 0.936 | 1.404 | 2.080 |
| Gauge Reading (in) | 0.2182 | 0.2197 | 0.2216 | 0.2210 | 0.2199 | 0.2184 | 0.2164 |
| (H-Hs) mm | 5.794 | 5.830 | 5.880 | 5.865 | 5.837 | 5.798 | 5.747 |
| Voids ratio | 0.471 | 0.474 | 0.478 | 0.477 | 0.475 | 0.472 | 0.468 |
| t90 (min) | | | | | | | |
| Cv (m ² /day) | | | | | | | |
| k' (MPa) | | | | | | | |
| Mv (mm ² / N) | | | | | | | |



Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATION TEST
BRIDGE B-10 (B10-7-SA21)**

Date

Aug 2012

JOB NO

SW8801.1004.101

FIGURE NO.
B.68-A

REV

| Trial # | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
|--------------------------|---------|--------|---------|--------|--------|--------|--------|
| Load (kPa) | 300.0 | 450.0 | 675 | 1015.0 | 1525.0 | 760.0 | 380.0 |
| Load (tsf) | 3.12 | 4.680 | 7.02 | 10.556 | 15.860 | 7.904 | 3.952 |
| Gauge Reading (in) | 0.21275 | 0.2057 | 0.19615 | 0.1856 | 0.1749 | 0.1768 | 0.1792 |
| (H-Hs) mm | 5.655 | 5.476 | 5.233 | 4.966 | 4.694 | 4.741 | 4.802 |
| Voids ratio | 0.460 | 0.446 | 0.426 | 0.404 | 0.382 | 0.386 | 0.391 |
| t90 (min) | | 6.50 | 6.76 | 5.76 | 5.52 | | |
| Cv (m ² /day) | | 0.015 | 0.014 | 0.016 | 0.016 | | |
| k' (MPa) | | 14.883 | 16.255 | 21.916 | 31.873 | | |
| Mv (mm ² / N) | | 0.0665 | 0.0607 | 0.0449 | 0.0309 | | |

| Trial # | 29 | 30 | 31 | 32 | 33 | 34 | |
|--------------------------|--------|--------|--------|--------|--------|--------|--|
| Load (kPa) | 190.0 | 95.0 | 47.5 | 23.5 | 12.0 | 6.0 | |
| Load (tsf) | 1.976 | 0.988 | 0.494 | 0.244 | 0.125 | 0.062 | |
| Gauge Reading (in) | 0.1833 | 0.1882 | 0.1927 | 0.1992 | 0.2057 | 0.2107 | |
| (H-Hs) mm | 4.907 | 5.032 | 5.146 | 5.310 | 5.475 | 5.603 | |
| Voids ratio | 0.399 | 0.409 | 0.419 | 0.432 | 0.445 | 0.456 | |
| t90 (min) | | | | | | | |
| Cv (m ² /day) | | | | | | | |
| k' (MPa) | | | | | | | |
| Mv (mm ² / N) | | | | | | | |



Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATION TEST
BRIDGE B-10 (B10-7-SA21)**

Date

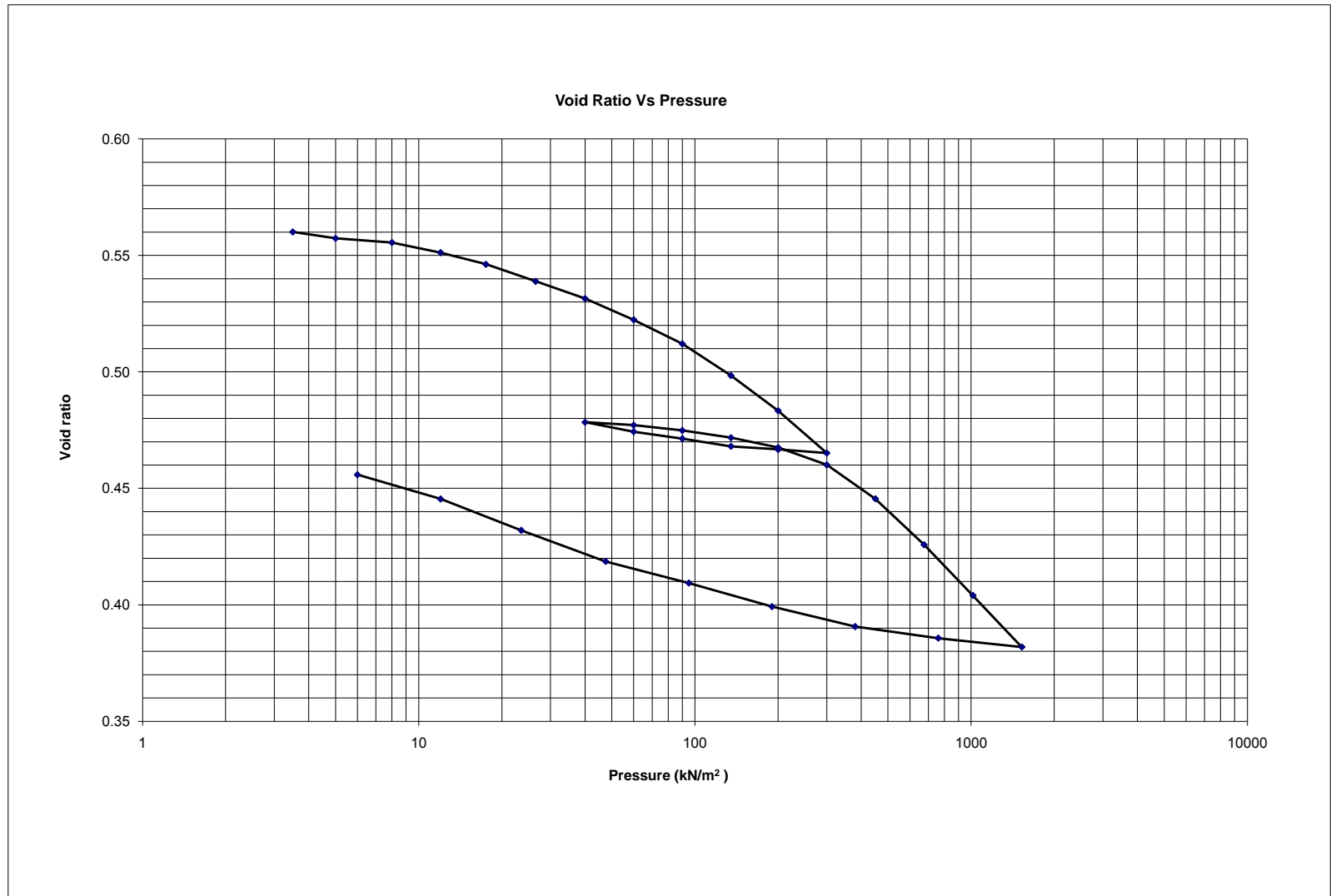
Aug 2012

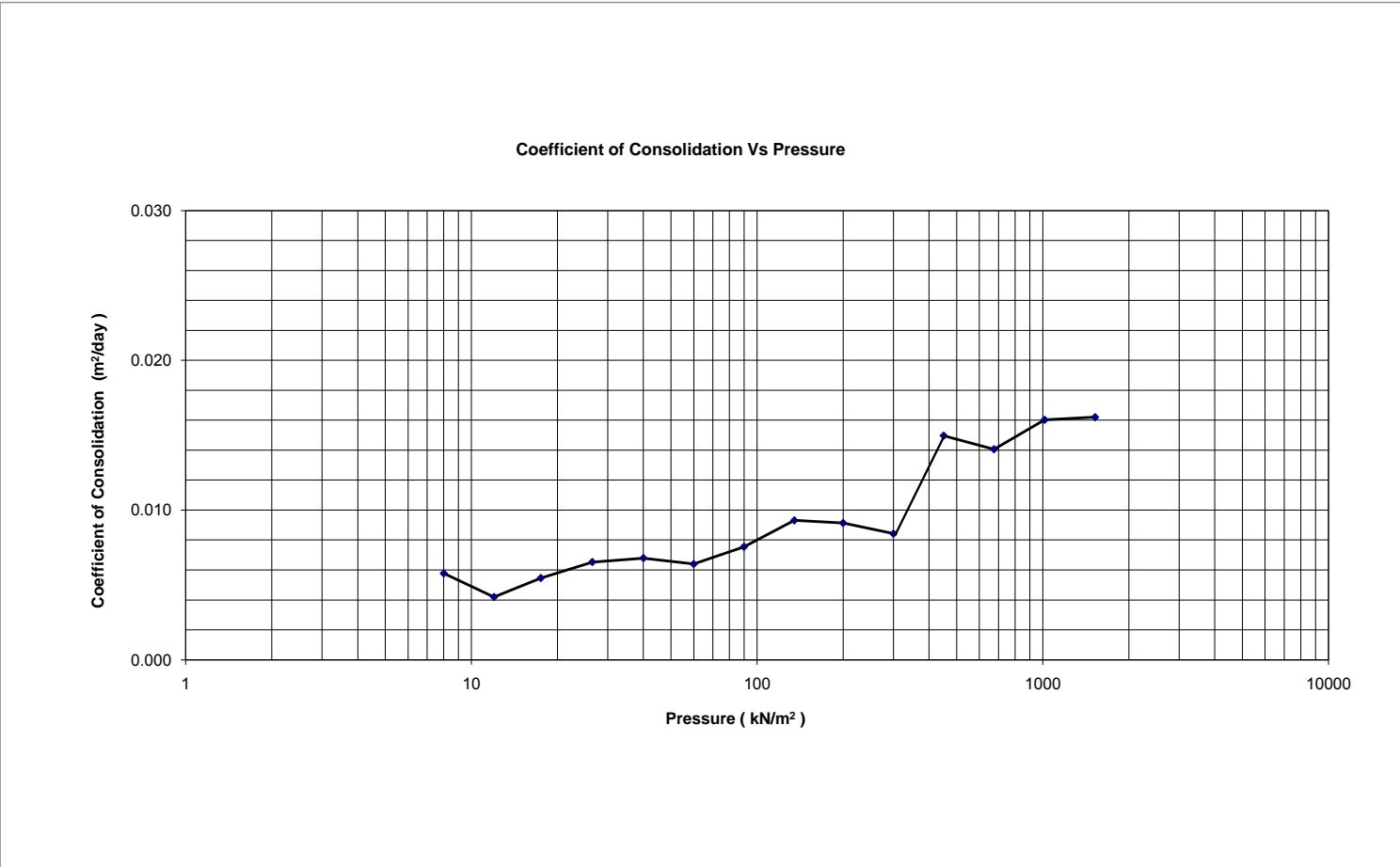
JOB NO

SW8801.1004.101

FIGURE NO.
B.68-B

REV

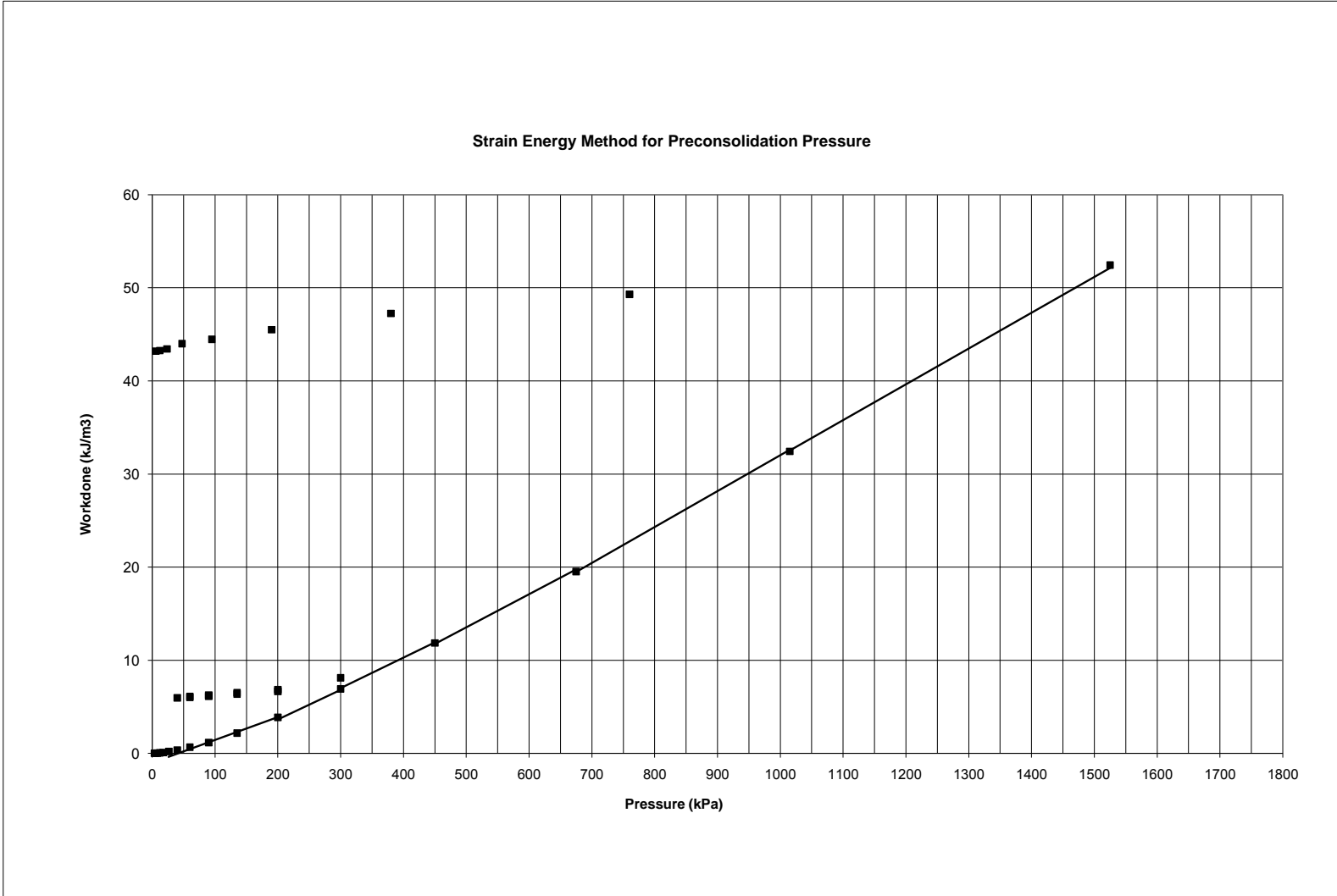




Strain Energy Data

| Pressure (kN/m ²) | C _v (m ² /day) | Void ratio |
|----------------------------------|---|------------|
| 3.5 | | 0.560 |
| 5.0 | | 0.557 |
| 8.0 | 0.006 | 0.556 |
| 12.0 | 0.004 | 0.551 |
| 17.5 | 0.005 | 0.546 |
| 26.5 | 0.007 | 0.539 |
| 40.0 | 0.007 | 0.531 |
| 60.0 | 0.006 | 0.522 |
| 90.0 | 0.008 | 0.512 |
| 135.0 | 0.009 | 0.498 |
| 200.0 | 0.009 | 0.483 |
| 300.0 | 0.008 | 0.465 |
| 200.0 | | 0.467 |
| 135.0 | | 0.468 |
| 90.0 | | 0.471 |
| 60.0 | | 0.474 |
| 40.0 | | 0.478 |
| 60.0 | | 0.477 |
| 90.0 | | 0.475 |
| 135.0 | | 0.472 |
| 200.0 | | 0.468 |
| 300.0 | | 0.460 |
| 450.0 | 0.015 | 0.446 |
| 675.0 | 0.014 | 0.426 |
| 1015.0 | 0.016 | 0.404 |
| 1525.0 | 0.016 | 0.382 |
| 760.0 | | 0.386 |
| 380.0 | | 0.391 |
| 190.0 | | 0.399 |
| 95.0 | | 0.409 |
| 47.5 | | 0.419 |
| 23.5 | | 0.432 |
| 12.0 | | 0.445 |
| 6.0 | | 0.456 |

| Pressure (KN/m ²) | Height mm | Total Work (KJ/m ³) |
|----------------------------------|--------------|------------------------------------|
| 3.5 | 19.177 | 0.000 |
| 5.0 | 19.143 | 0.007 |
| 8.0 | 19.121 | 0.015 |
| 12.0 | 19.068 | 0.043 |
| 17.5 | 19.006 | 0.091 |
| 26.5 | 18.916 | 0.195 |
| 40.0 | 18.825 | 0.355 |
| 60.0 | 18.713 | 0.651 |
| 90.0 | 18.586 | 1.160 |
| 135.0 | 18.419 | 2.175 |
| 200.0 | 18.233 | 3.861 |
| 300.0 | 18.010 | 6.926 |
| 200.0 | 18.029 | 6.662 |
| 135.0 | 18.045 | 6.508 |
| 90.0 | 18.086 | 6.255 |
| 60.0 | 18.123 | 6.102 |
| 40.0 | 18.172 | 5.965 |
| 60.0 | 18.157 | 6.007 |
| 90.0 | 18.129 | 6.123 |
| 135.0 | 18.091 | 6.361 |
| 200.0 | 18.039 | 6.841 |
| 300.0 | 17.948 | 8.108 |
| 450.0 | 17.769 | 11.849 |
| 675.0 | 17.526 | 19.528 |
| 1015.0 | 17.258 | 32.436 |
| 1525.0 | 16.987 | 52.436 |
| 760.0 | 17.033 | 49.292 |
| 380.0 | 17.094 | 47.252 |
| 190.0 | 17.200 | 45.495 |
| 95.0 | 17.324 | 44.464 |
| 47.5 | 17.438 | 43.995 |
| 23.5 | 17.716 | 43.428 |
| 12.0 | 17.881 | 43.263 |
| 6.0 | 18.010 | 43.198 |



ONE DIMENSIONAL CONSOLIDATION TEST (ASTM D 2435)

Project: **WEP**
Client: **Hatch Mott MacDonald**
Date: **05-Jan-12**

Job No.: **SW8801.1004.101**

Sample ID: **T8-1_TW16**

Depth(m): **16.8 to 17.4**

Test Data

| | | | | | |
|---|---|--------------------|--------|--|--------|
| Ring # : | A | Ring Height (in) = | 0.755 | Wt of dry filter paper (g) | 0.69 |
| Wet soil + Ring Wt (g) | | | 192.35 | Wt of ring (g) | 76.58 |
| Wet soil + Wet Paper + Ring (g) | | | 191.27 | Wet Paper (g) | 1.91 |
| Dry Soil + Dry Paper + Ring (g) | | | 167.40 | Ring Dia (in) | 2.498 |
| Initial moisture Content (%) | | | 28.45 | Final moisture Content (%) | 25.13 |
| Area of Ring (in ²) | | | 4.90 | Initial Volume (in ³) | 3.7002 |
| Initial Bulk Density (kg/m ³) | | | 1909 | Initial Dry Density (kg/m ³) | 1486 |
| Specific Gravity of Soil | | | 2.74 | Equiv. Thick. of solids (mm) | 10.396 |
| Final Bulk Density (kg/m ³) | | | 2031 | Final Dry Density (kg/m ³) | 1623 |
| Initial gauge reading for Load 1 | | | 0.2553 | Gauge reading for last Loading | 0.1918 |
| Initial Voids Ratio | | | 0.845 | Final Void Ratio | 0.690 |
| Initial Degree of Saturation (%) | | | 92 | Final Degree of Saturation (%) | 100 |

| | | | | | | | |
|--------------------------|--------|--------|--------|--------|--------|---------|--------|
| Trial # | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Load (kPa) | 3.5 | 5.0 | 8.0 | 12.0 | 17.5 | 26.5 | 40.0 |
| Load (tsf) | 0.0364 | 0.052 | 0.083 | 0.125 | 0.182 | 0.276 | 0.416 |
| Gauge Reading (in) | 0.2553 | 0.2553 | 0.2550 | 0.2538 | 0.2522 | 0.24975 | 0.2469 |
| (H-Hs) mm | 8.781 | 8.781 | 8.772 | 8.743 | 8.701 | 8.640 | 8.567 |
| Voids ratio | 0.845 | 0.845 | 0.844 | 0.841 | 0.837 | 0.831 | 0.824 |
| t90 (min) | | | 0.25 | 2.56 | 4.41 | 3.61 | 4.00 |
| Cv (m ² /day) | | | 0.449 | 0.044 | 0.025 | 0.031 | 0.028 |
| k' (MPa) | | | 6.471 | 2.625 | 2.512 | 2.819 | 3.489 |
| Mv (mm ² / N) | | | 0.1545 | 0.3810 | 0.3981 | 0.3547 | 0.2866 |

| | | | | | | | |
|--------------------------|---------|--------|--------|--------|--------|--------|--------|
| Trial # | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Load (kPa) | 60 | 90.0 | 135.0 | 200.0 | 300.0 | 200.0 | 135.0 |
| Load (tsf) | 0.624 | 0.936 | 1.404 | 2.080 | 3.120 | 2.080 | 1.404 |
| Gauge Reading (in) | 0.24285 | 0.2378 | 0.2309 | 0.2213 | 0.2085 | 0.2095 | 0.2105 |
| (H-Hs) mm | 8.465 | 8.337 | 8.160 | 7.918 | 7.592 | 7.618 | 7.643 |
| Voids ratio | 0.814 | 0.802 | 0.785 | 0.762 | 0.730 | 0.733 | 0.735 |
| t90 (min) | 2.56 | 2.25 | 2.56 | 2.40 | 2.56 | | |
| Cv (m ² /day) | 0.043 | 0.048 | 0.041 | 0.043 | 0.039 | | |
| k' (MPa) | 3.733 | 4.411 | 4.775 | 4.972 | 5.633 | | |
| Mv (mm ² / N) | 0.2679 | 0.2267 | 0.2094 | 0.2011 | 0.1775 | | |

| | | | | | | | |
|--------------------------|---------|--------|--------|--------|--------|--------|--------|
| Trial # | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| Load (kPa) | 90.0 | 60.0 | 40.0 | 60.0 | 90.0 | 135.0 | 200.0 |
| Load (tsf) | 0.936 | 0.624 | 0.416 | 0.624 | 0.936 | 1.404 | 2.080 |
| Gauge Reading (in) | 0.21247 | 0.2148 | 0.2177 | 0.2164 | 0.2144 | 0.2121 | 0.2094 |
| (H-Hs) mm | 7.693 | 7.752 | 7.826 | 7.794 | 7.741 | 7.684 | 7.616 |
| Voids ratio | 0.740 | 0.746 | 0.753 | 0.750 | 0.745 | 0.739 | 0.733 |
| t90 (min) | | | | 2.25 | 1.00 | 1.44 | 1.21 |
| Cv (m ² /day) | | | | 0.045 | 0.101 | 0.070 | 0.082 |
| k' (MPa) | | | | 11.209 | 10.379 | 14.281 | 17.264 |
| Mv (mm ² / N) | | | | 0.0892 | 0.0964 | 0.0700 | 0.0579 |



Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATION TEST
TUNNEL T-8 (T8-1-SA16)**

Date

Aug 2012

JOB NO

SW8801.1004.101

FIGURE NO.
B.69-A

REV

| Trial # | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
|--------------------------|---------|--------|---------|--------|--------|--------|--------|
| Load (kPa) | 300.0 | 450.0 | 675 | 1015.0 | 1525.0 | 760.0 | 380.0 |
| Load (tsf) | 3.12 | 4.680 | 7.02 | 10.556 | 15.860 | 7.904 | 3.952 |
| Gauge Reading (in) | 0.20385 | 0.1909 | 0.17465 | 0.1580 | 0.1421 | 0.1450 | 0.1491 |
| (H-Hs) mm | 7.474 | 7.144 | 6.733 | 6.308 | 5.905 | 5.980 | 6.084 |
| Voids ratio | 0.719 | 0.687 | 0.648 | 0.607 | 0.568 | 0.575 | 0.585 |
| t90 (min) | 1.44 | 2.56 | 3.24 | 2.56 | 1.96 | | |
| Cv (m ² /day) | 0.045 | 0.037 | 0.028 | 0.034 | 0.042 | | |
| k' (MPa) | 12.731 | 7.968 | 9.366 | 13.389 | 20.624 | | |
| Mv (mm ² / N) | 0.0785 | 0.1232 | 0.1043 | 0.0728 | 0.0473 | | |

| Trial # | 29 | 30 | 31 | 32 | 33 | 34 | |
|--------------------------|--------|--------|--------|--------|--------|--------|--|
| Load (kPa) | 190.0 | 95.0 | 47.5 | 23.5 | 12.0 | 6.0 | |
| Load (tsf) | 1.976 | 0.988 | 0.494 | 0.244 | 0.125 | 0.062 | |
| Gauge Reading (in) | 0.1547 | 0.1617 | 0.1692 | 0.1771 | 0.1862 | 0.1918 | |
| (H-Hs) mm | 6.226 | 6.404 | 6.594 | 6.794 | 7.026 | 7.169 | |
| Voids ratio | 0.599 | 0.616 | 0.634 | 0.653 | 0.676 | 0.690 | |
| t90 (min) | | | | | | | |
| Cv (m ² /day) | | | | | | | |
| k' (MPa) | | | | | | | |
| Mv (mm ² / N) | | | | | | | |



Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATION TEST
TUNNEL T-8 (T8-1-SA16)**

Date

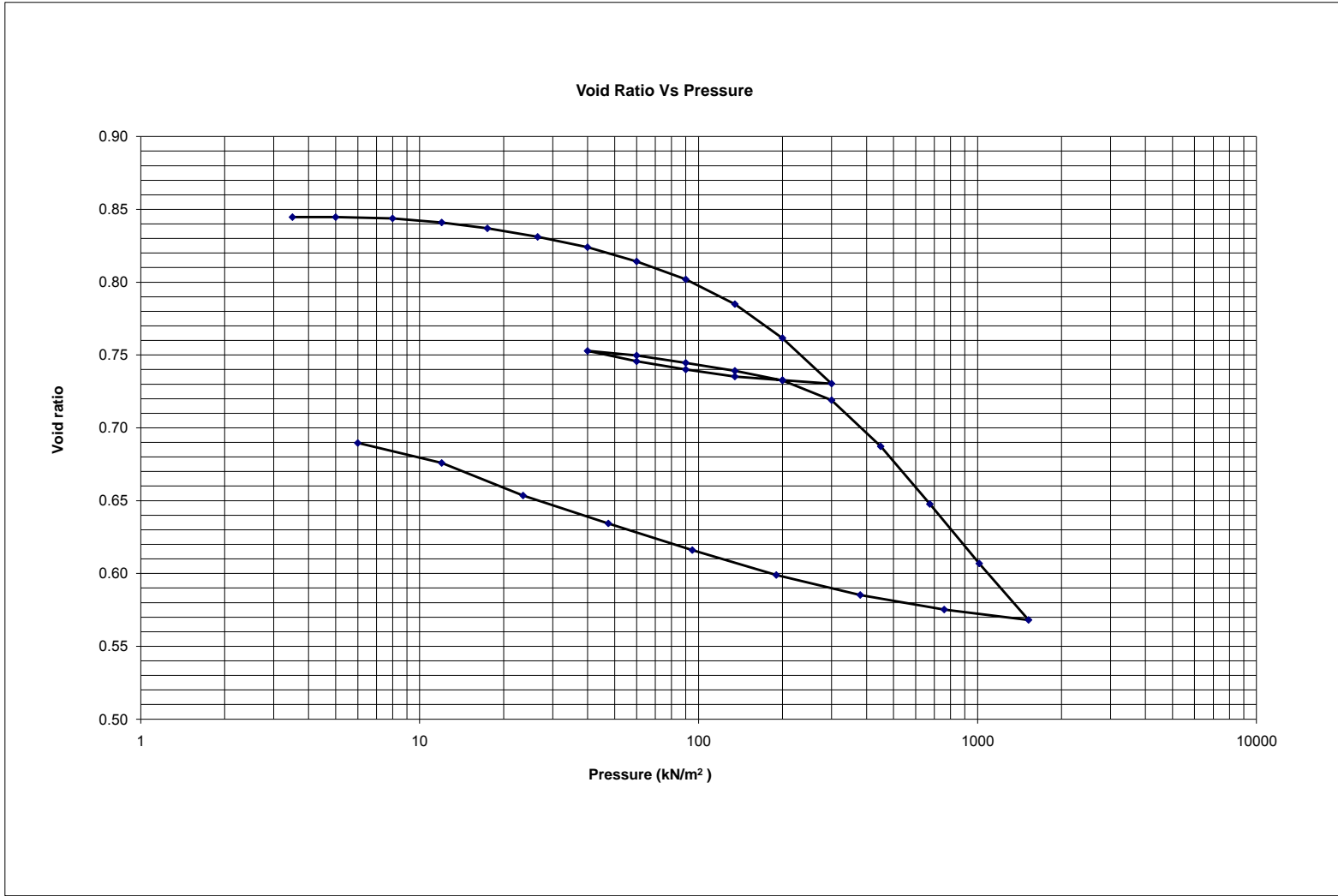
Aug 2012

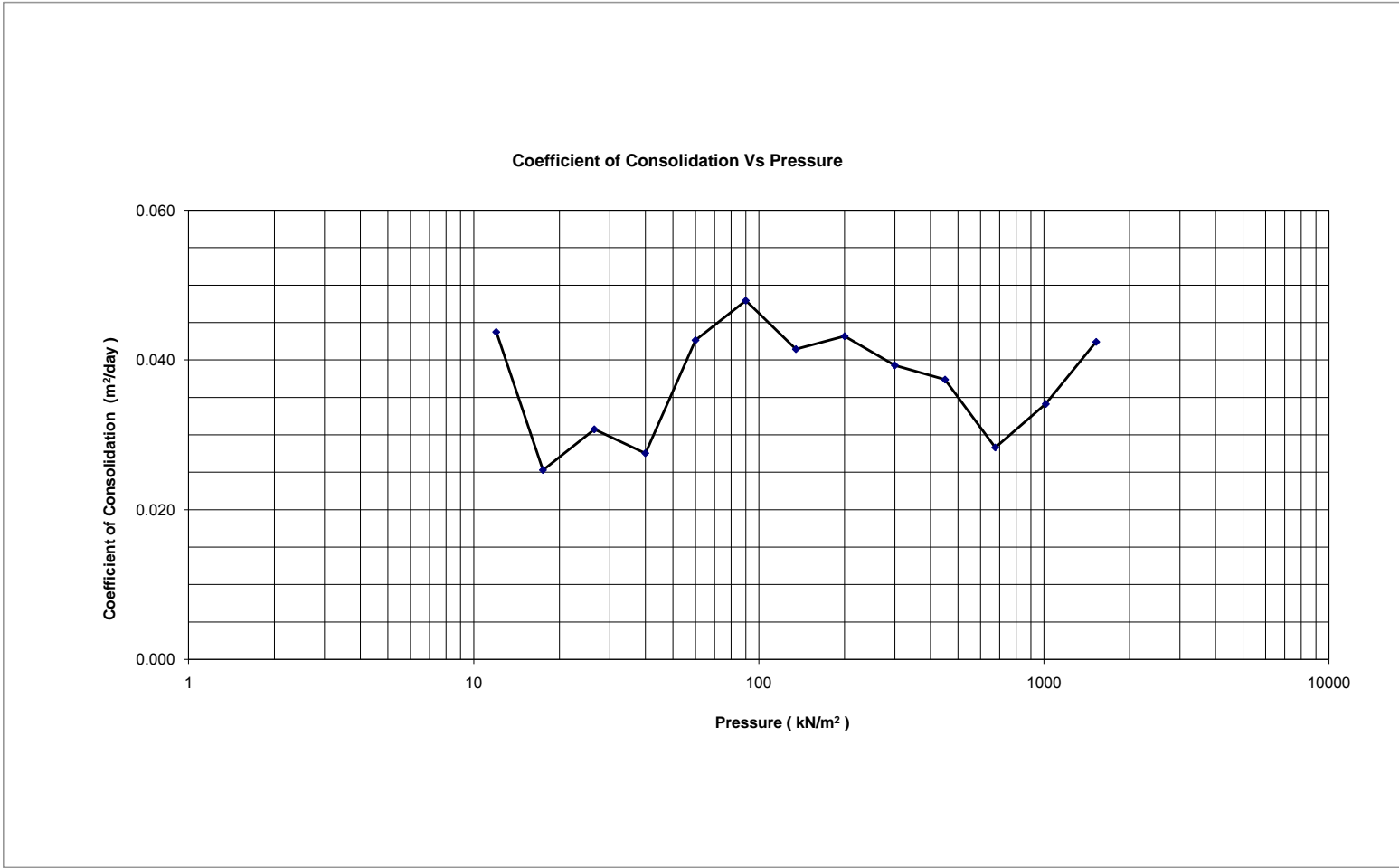
JOB NO

SW8801.1004.101

FIGURE NO.
B.69-B

REV





Strain Energy Data

| Presssure (kN/m ²) | c _v (m ² /day) | Void ratio | Presssure (kN/m ²) | Height mm | Total Work (KJ/m ³) |
|-----------------------------------|---|------------|-----------------------------------|--------------|------------------------------------|
| 3.5 | | 0.845 | 3.5 | 19.177 | 0.000 |
| 5.0 | | 0.845 | 5.0 | 19.177 | 0.000 |
| 8.0 | | 0.844 | 8.0 | 19.168 | 0.003 |
| 12.0 | 0.044 | 0.841 | 12.0 | 19.139 | 0.018 |
| 17.5 | 0.025 | 0.837 | 17.5 | 19.097 | 0.051 |
| 26.5 | 0.031 | 0.831 | 26.5 | 19.036 | 0.121 |
| 40.0 | 0.028 | 0.824 | 40.0 | 18.962 | 0.249 |
| 60.0 | 0.043 | 0.814 | 60.0 | 18.861 | 0.517 |
| 90.0 | 0.048 | 0.802 | 90.0 | 18.733 | 1.027 |
| 135.0 | 0.041 | 0.785 | 135.0 | 18.556 | 2.088 |
| 200.0 | 0.043 | 0.762 | 200.0 | 18.313 | 4.277 |
| 300.0 | 0.039 | 0.730 | 300.0 | 17.988 | 8.715 |
| 200.0 | | 0.733 | 200.0 | 18.014 | 8.362 |
| 135.0 | | 0.735 | 135.0 | 18.039 | 8.126 |
| 90.0 | | 0.740 | 90.0 | 18.089 | 7.814 |
| 60.0 | | 0.746 | 60.0 | 18.148 | 7.572 |
| 40.0 | | 0.753 | 40.0 | 18.222 | 7.367 |
| 60.0 | | 0.750 | 60.0 | 18.189 | 7.456 |
| 90.0 | | 0.745 | 90.0 | 18.137 | 7.673 |
| 135.0 | | 0.739 | 135.0 | 18.080 | 8.027 |
| 200.0 | | 0.733 | 200.0 | 18.012 | 8.658 |
| 300.0 | | 0.719 | 300.0 | 17.870 | 10.622 |
| 450.0 | 0.037 | 0.687 | 450.0 | 17.540 | 17.551 |
| 675.0 | 0.028 | 0.648 | 675.0 | 17.128 | 30.747 |
| 1015.0 | 0.034 | 0.607 | 1015.0 | 16.704 | 51.673 |
| 1525.0 | 0.042 | 0.568 | 1525.0 | 16.301 | 82.320 |
| 760.0 | | 0.575 | 760.0 | 16.375 | 77.122 |
| 380.0 | | 0.585 | 380.0 | 16.480 | 73.497 |
| 190.0 | | 0.599 | 190.0 | 16.622 | 71.037 |
| 95.0 | | 0.616 | 95.0 | 16.800 | 69.513 |
| 47.5 | | 0.634 | 47.5 | 16.990 | 68.705 |
| 23.5 | | 0.653 | 23.5 | 17.380 | 67.890 |
| 12.0 | | 0.676 | 12.0 | 17.612 | 67.653 |
| 6.0 | | 0.690 | 6.0 | 17.755 | 67.580 |



Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATION TEST
TUNNEL T-8 (T8-1-SA16)**

Date

Aug 2012

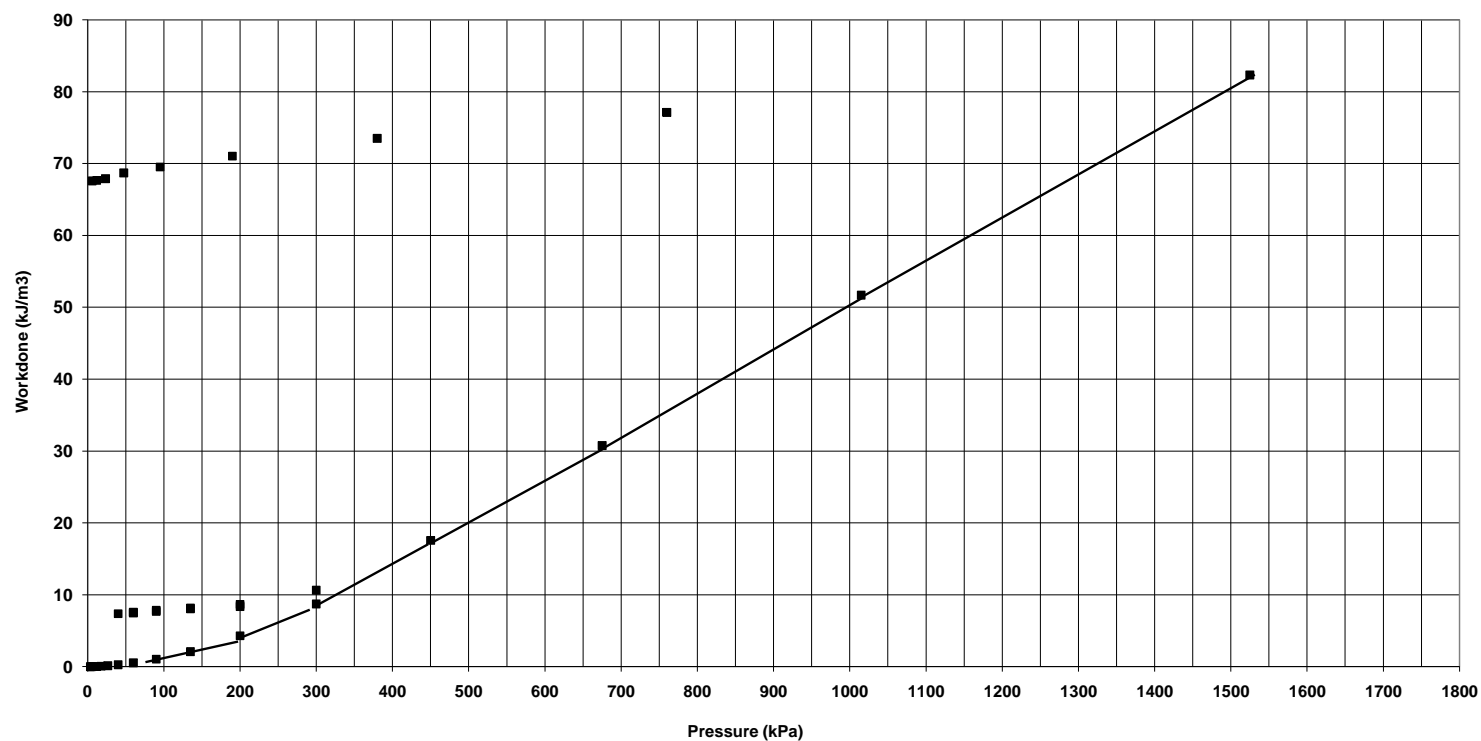
JOB NO

SW8801.1004.101

FIGURE NO.
B.69-E

REV

Strain Energy Method for Preconsolidation Pressure



ONE DIMENSIONAL CONSOLIDATION TEST (ASTM D 2435)

Project: **WEP**
 Client: **Hatch Mott MacDonald**
 Date: **21-Oct-11**

Job No.: **SW8801.1004.101**
 Sample ID: **T9-1_Sa15**
 Depth(m): **15.25 to 15.86**

Test Data

| | | | | | |
|---|---|--------------------|--------|--|--------|
| Ring # : | A | Ring Height (in) = | 0.758 | Wt of dry filter paper (g) | 0.67 |
| Wet soil + Ring Wt (g) | | | 205.82 | Wt of ring (g) | 76.59 |
| Wet soil + Wet Paper + Ring (g) | | | 201.90 | Wet Paper (g) | 2.00 |
| Dry Soil + Dry Paper + Ring (g) | | | 184.96 | Ring Dia (in) | 2.498 |
| Initial moisture Content (%) | | | 19.99 | Final moisture Content (%) | 14.49 |
| Area of Ring (in ²) | | | 4.90 | Initial Volume (in ³) | 3.7149 |
| Initial Bulk Density (kg/m ³) | | | 2123 | Initial Dry Density (kg/m ³) | 1769 |
| Specific Gravity of Soil | | | 2.74 | Equiv. Thick. of solids (mm) | 12.441 |
| Final Bulk Density (kg/m ³) | | | 2245 | Final Dry Density (kg/m ³) | 1871 |
| Initial gauge reading for Load 1 | | | 0.2566 | Gauge reading for last Loading | 0.1824 |
| Initial Voids Ratio | | | 0.548 | Final Void Ratio | 0.396 |
| Initial Degree of Saturation (%) | | | 100 | Final Degree of Saturation (%) | 100 |

| | | | | | | | |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|
| Trial # | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Load (kPa) | 5.0 | 7.5 | 11.5 | 17.0 | 25.0 | 37.5 | 55.0 |
| Load (tsf) | 0.052 | 0.078 | 0.120 | 0.177 | 0.260 | 0.390 | 0.572 |
| Gauge Reading (in) | 0.2533 | 0.2511 | 0.2484 | 0.2446 | 0.2418 | 0.2359 | 0.2295 |
| (H-Hs) mm | 6.730 | 6.672 | 6.604 | 6.508 | 6.437 | 6.287 | 6.124 |
| Voids ratio | 0.541 | 0.536 | 0.531 | 0.523 | 0.517 | 0.505 | 0.492 |
| t90 (min) | | 60.06 | 51.84 | 46.24 | 59.29 | 36.00 | 30.25 |
| Cv (m ² /day) | | 0.002 | 0.002 | 0.002 | 0.002 | 0.003 | 0.004 |
| k' (MPa) | | 0.824 | 1.136 | 1.085 | 2.131 | 1.580 | 2.010 |
| Mv (mm ² / N) | | 1.2137 | 0.8805 | 0.9215 | 0.4692 | 0.6329 | 0.4976 |

| | | | | | | | |
|--------------------------|---------|--------|--------|--------|--------|--------|--------|
| Trial # | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Load (kPa) | 85.0 | 130.0 | 195.0 | 130.0 | 85.0 | 55.0 | 37.5 |
| Load (tsf) | 0.884 | 1.352 | 2.028 | 1.352 | 0.884 | 0.572 | 0.390 |
| Gauge Reading (in) | 0.22115 | 0.2122 | 0.2031 | 0.2035 | 0.2045 | 0.2055 | 0.2069 |
| (H-Hs) mm | 5.912 | 5.684 | 5.454 | 5.465 | 5.490 | 5.515 | 5.550 |
| Voids ratio | 0.475 | 0.457 | 0.438 | 0.439 | 0.441 | 0.443 | 0.446 |
| t90 (min) | 26.52 | 18.49 | 16.40 | | | | |
| Cv (m ² /day) | 0.004 | 0.005 | 0.006 | | | | |
| k' (MPa) | 2.626 | 3.613 | 5.136 | | | | |
| Mv (mm ² / N) | 0.3808 | 0.2768 | 0.1947 | | | | |

| | | | | | | | |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|
| Trial # | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| Load (kPa) | 25.0 | 17.0 | 11.5 | 7.5 | 11.5 | 17.0 | 25.0 |
| Load (tsf) | 0.26 | 0.177 | 0.120 | 0.078 | 0.120 | 0.177 | 0.260 |
| Gauge Reading (in) | 0.2072 | 0.2085 | 0.2097 | 0.2113 | 0.2111 | 0.2107 | 0.2098 |
| (H-Hs) mm | 5.558 | 5.590 | 5.621 | 5.661 | 5.657 | 5.647 | 5.624 |
| Voids ratio | 0.447 | 0.449 | 0.452 | 0.455 | 0.455 | 0.454 | 0.452 |
| t90 (min) | | | | | | | |
| Cv (m ² /day) | | | | | | | |
| k' (MPa) | | | | | | | |
| Mv (mm ² / N) | | | | | | | |



Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATION TEST
TUNNEL T-9 (T9-1-SA15)**

Date

Aug 2012

JOB NO

SW8801.1004.101

FIGURE NO.
B.70-A

REV

| | | | | | | | |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|
| Trial # | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| Load (kPa) | 37.5 | 55.0 | 85.0 | 130.0 | 195.0 | 290.0 | 440.0 |
| Load (tsf) | 0.390 | 0.572 | 0.884 | 1.352 | 2.028 | 3.016 | 4.576 |
| Gauge Reading (in) | 0.2088 | 0.2074 | 0.2058 | 0.2042 | 0.2007 | 0.1937 | 0.1841 |
| (H-Hs) mm | 5.597 | 5.563 | 5.522 | 5.482 | 5.393 | 5.214 | 4.971 |
| Voids ratio | 0.450 | 0.447 | 0.444 | 0.441 | 0.433 | 0.419 | 0.400 |
| t90 (min) | | | | | | 9.30 | 9.30 |
| Cv (m ² /day) | | | | | | 0.010 | 0.010 |
| k' (MPa) | | | | | | 9.461 | 10.917 |
| Mv (mm ² / N) | | | | | | 0.1057 | 0.0916 |

| | | | | | | | |
|--------------------------|--------|--------|---------|--------|--------|--------|--------|
| Trial # | 29 | 30 | 31 | 32 | 33 | 34 | 35 |
| Load (kPa) | 660.0 | 990.0 | 1500 | 750.0 | 370.0 | 185.0 | 90.0 |
| Load (tsf) | 6.864 | 10.296 | 15.6 | 7.800 | 3.848 | 1.924 | 0.936 |
| Gauge Reading (in) | 0.1747 | 0.1652 | 0.15485 | 0.1560 | 0.1571 | 0.1606 | 0.1648 |
| (H-Hs) mm | 4.732 | 4.491 | 4.228 | 4.257 | 4.285 | 4.374 | 4.481 |
| Voids ratio | 0.380 | 0.361 | 0.340 | 0.342 | 0.344 | 0.352 | 0.360 |
| t90 (min) | 8.70 | 6.25 | 4.84 | | | | |
| Cv (m ² /day) | 0.010 | 0.014 | 0.018 | | | | |
| k' (MPa) | 16.044 | 23.486 | 32.847 | | | | |
| Mv (mm ² / N) | 0.0623 | 0.0426 | 0.0304 | | | | |

| | | | | | | | |
|--------------------------|--------|--------|--------|--------|--|--|--|
| Trial # | 36 | 37 | 38 | 39 | | | |
| Load (kPa) | 45.0 | 22.5 | 11.5 | 5.5 | | | |
| Load (tsf) | 0.468 | 0.234 | 0.1196 | 0.0572 | | | |
| Gauge Reading (in) | 0.1679 | 0.1728 | 0.1778 | 0.1824 | | | |
| (H-Hs) mm | 4.560 | 4.684 | 4.811 | 4.928 | | | |
| Voids ratio | 0.367 | 0.376 | 0.387 | 0.396 | | | |
| t90 (min) | | | | | | | |
| Cv (m ² /day) | | | | | | | |
| k' (MPa) | | | | | | | |
| Mv (mm ² / N) | | | | | | | |



Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATION TEST
TUNNEL T-9 (T9-1-SA15)**

Date

Aug 2012

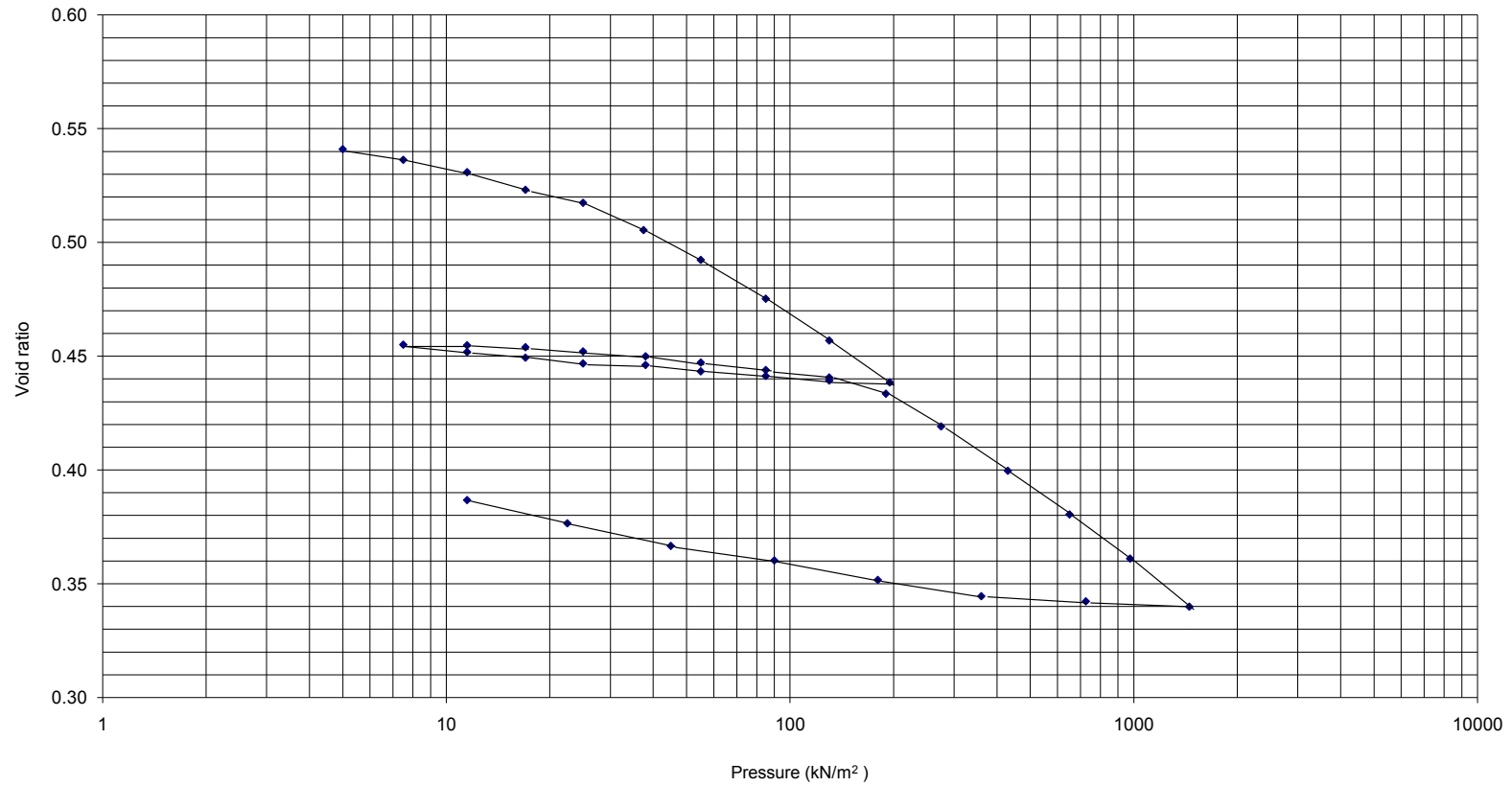
JOB NO

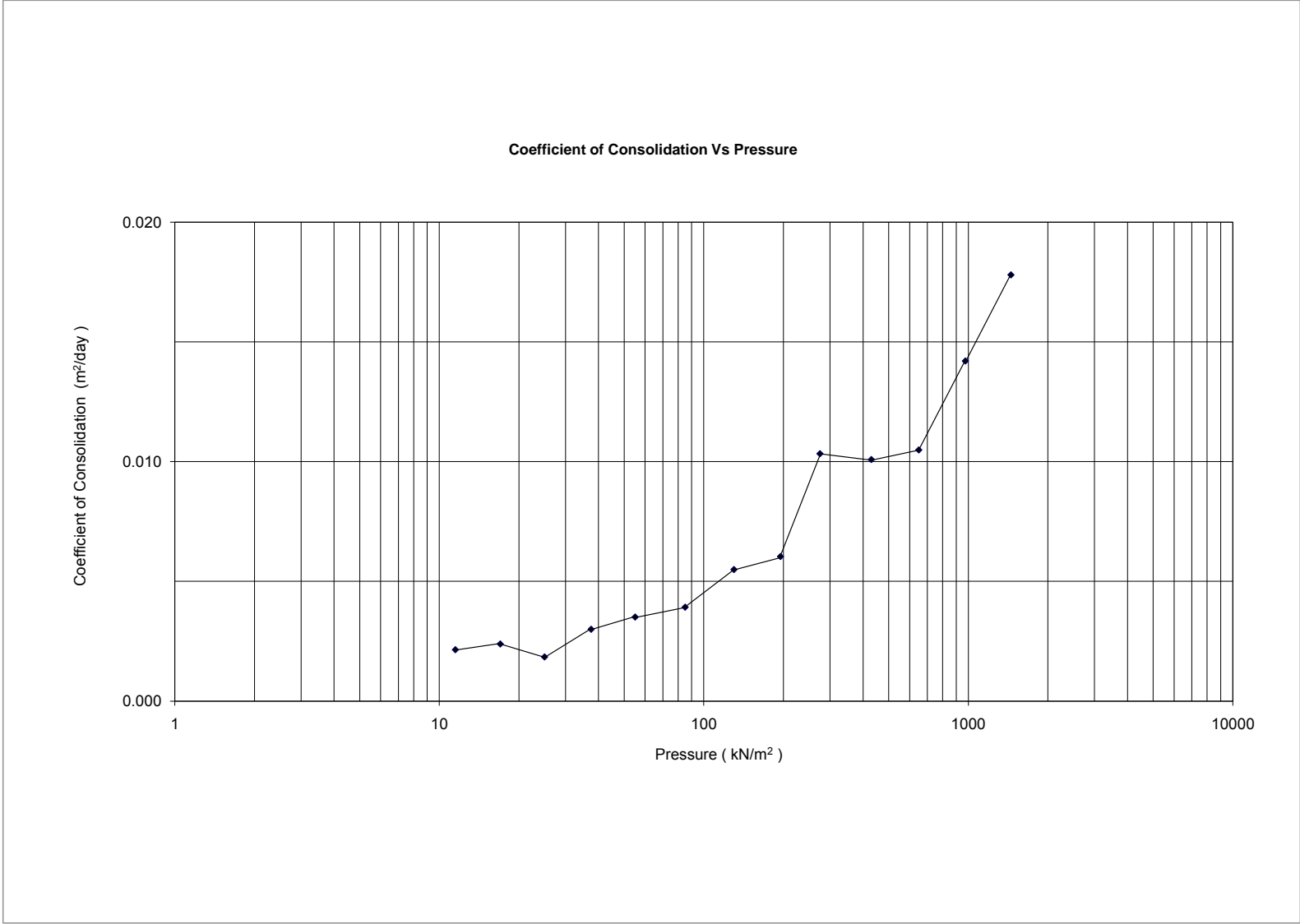
SW8801.1004.101

FIGURE NO.
B.70-B

REV

Void Ratio Vs Pressure





Strain Energy Data

| Presssure (kN/m ²) | c _v (m ² /day) | Void ratio |
|-----------------------------------|---|------------|
| 5.0 | | 0.541 |
| 7.5 | | 0.536 |
| 11.5 | 0.002 | 0.531 |
| 17.0 | 0.002 | 0.523 |
| 25.0 | 0.002 | 0.517 |
| 37.5 | 0.003 | 0.505 |
| 55.0 | 0.004 | 0.492 |
| 85.0 | 0.004 | 0.475 |
| 130.0 | 0.005 | 0.457 |
| 195.0 | 0.006 | 0.438 |
| 130.0 | | 0.439 |
| 85.0 | | 0.441 |
| 55.0 | | 0.443 |
| 38.0 | | 0.446 |
| 25.0 | | 0.447 |
| 17.0 | | 0.449 |
| 11.5 | | 0.452 |
| 7.5 | | 0.455 |
| 11.5 | | 0.455 |
| 17.0 | | 0.454 |
| 25.0 | | 0.452 |
| 38.0 | | 0.450 |
| 55.0 | | 0.447 |
| 85.0 | | 0.444 |
| 130.0 | | 0.441 |
| 190.0 | | 0.433 |
| 275.0 | 0.010 | 0.419 |
| 430.0 | 0.010 | 0.400 |
| 650.0 | 0.010 | 0.380 |
| 975.0 | 0.014 | 0.361 |
| 1450.0 | 0.018 | 0.340 |
| 725.0 | | 0.342 |
| 360.0 | | 0.344 |
| 180.0 | | 0.352 |
| 90.0 | | 0.360 |
| 45.0 | | 0.367 |
| 22.5 | | 0.376 |
| 11.5 | | 0.387 |
| 5.5 | | 0.396 |

| Presssure (kN/m ²) | Height mm | Total Work (kJ/m ³) |
|-----------------------------------|--------------|------------------------------------|
| 5.0 | 19.253 | 0.000 |
| 7.5 | 19.195 | 0.019 |
| 11.5 | 19.128 | 0.052 |
| 17.0 | 19.031 | 0.124 |
| 25.0 | 18.960 | 0.203 |
| 37.5 | 18.811 | 0.449 |
| 55.0 | 18.648 | 0.850 |
| 85.0 | 18.436 | 1.646 |
| 130.0 | 18.207 | 2.979 |
| 195.0 | 17.978 | 5.026 |
| 130.0 | 17.988 | 4.932 |
| 85.0 | 18.013 | 4.783 |
| 55.0 | 18.038 | 4.684 |
| 38.0 | 18.073 | 4.595 |
| 25.0 | 18.116 | 4.520 |
| 17.0 | 18.148 | 4.483 |
| 11.5 | 18.179 | 4.458 |
| 7.5 | 18.219 | 4.437 |
| 11.5 | 18.216 | 4.439 |
| 17.0 | 18.205 | 4.448 |
| 25.0 | 18.182 | 4.474 |
| 38.0 | 18.155 | 4.520 |
| 55.0 | 18.121 | 4.608 |
| 85.0 | 18.080 | 4.765 |
| 130.0 | 18.040 | 5.007 |
| 190.0 | 17.951 | 5.795 |
| 275.0 | 17.772 | 8.114 |
| 430.0 | 17.529 | 12.926 |
| 650.0 | 17.291 | 20.281 |
| 975.0 | 17.049 | 31.620 |
| 1450.0 | 16.786 | 50.316 |
| 725.0 | 16.816 | 48.424 |
| 360.0 | 16.844 | 47.522 |
| 180.0 | 16.932 | 46.097 |
| 90.0 | 17.039 | 45.247 |
| 45.0 | 17.119 | 44.932 |
| 22.5 | 17.242 | 44.688 |
| 11.5 | 17.369 | 44.563 |
| 5.5 | 17.486 | 44.506 |



Project

WINDSOR ESSEX PARKWAY

TITLE

CONSOLIDATION TEST
TUNNEL T-9 (T9-1-SA15)

Date

Aug 2011

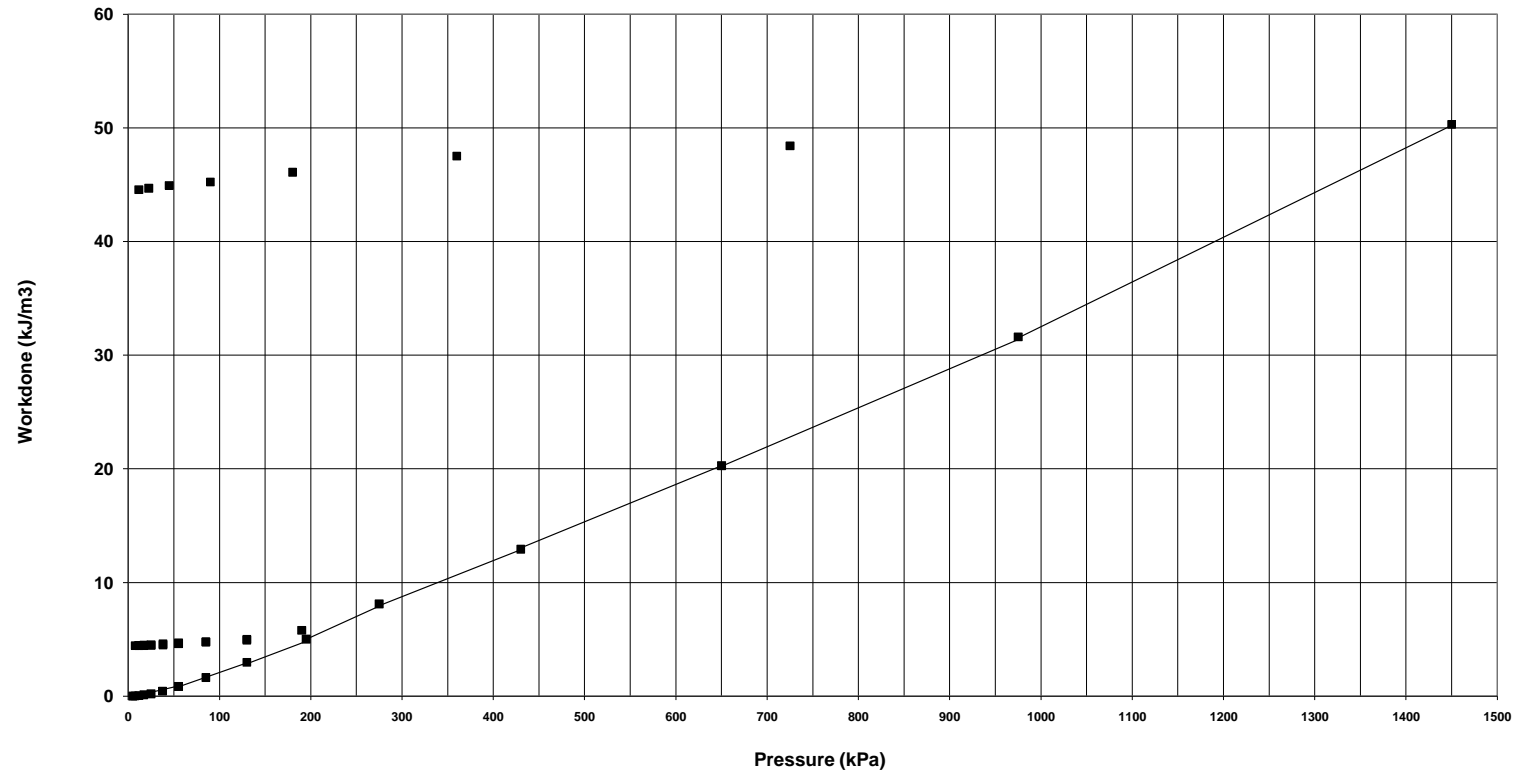
JOB NO

SW8801.1004.101

FIGURE NO.
B.70-E

REV

Strain Energy Method for Preconsolidation Pressure



ONE DIMENSIONAL CONSOLIDATION TEST (ASTM D 2435)

Project: **WEP**
 Client: **Hatch Mott MacDonald**
 Date: **12-Jul-11**

Job No.: **SW8801.1004.101**

Sample ID: **T10-2_Sa20A** Depth(m): **19.8 to 20.4**

Test Data

| | | | | | |
|---|---|--------------------|--------|--|--------|
| Ring # : | A | Ring Height (in) = | 0.755 | Wt of dry filter paper (g) | 0.69 |
| Wet soil + Ring Wt (g) | | | 208.30 | Wt of ring (g) | 76.58 |
| Wet soil + Wet Paper + Ring (g) | | | 204.96 | Wet Paper (g) | 2.15 |
| Dry Soil + Dry Paper + Ring (g) | | | 188.87 | Ring Dia (in) | 2.498 |
| Initial moisture Content (%) | | | 18.03 | Final moisture Content (%) | 13.11 |
| Area of Ring (in ²) | | | 4.90 | Initial Volume (in ³) | 3.7002 |
| Initial Bulk Density (kg/m ³) | | | 2172 | Initial Dry Density (kg/m ³) | 1841 |
| Specific Gravity of Soil | | | 2.75 | Equiv. Thick. of solids (mm) | 12.844 |
| Final Bulk Density (kg/m ³) | | | 2230 | Final Dry Density (kg/m ³) | 1889 |
| Initial gauge reading for Load 1 | | | 0.2506 | Gauge reading for last Loading | 0.1829 |
| Initial Voids Ratio | | | 0.493 | Final Void Ratio | 0.359 |
| Initial Degree of Saturation (%) | | | 100 | Final Degree of Saturation (%) | 100 |

| | | | | | | | |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|
| Trial # | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Load (kPa) | 4.0 | 5.5 | 8.5 | 13.0 | 20.0 | 30.0 | 45.0 |
| Load (tsf) | 0.0416 | 0.0572 | 0.088 | 0.135 | 0.208 | 0.312 | 0.468 |
| Gauge Reading (in) | 0.2475 | 0.2471 | 0.2450 | 0.2418 | 0.2380 | 0.2333 | 0.2276 |
| (H-Hs) mm | 6.254 | 6.244 | 6.191 | 6.110 | 6.013 | 5.893 | 5.749 |
| Voids ratio | 0.487 | 0.486 | 0.482 | 0.476 | 0.468 | 0.459 | 0.448 |
| t90 (min) | | | 47.61 | 44.89 | 36.00 | 21.16 | 20.25 |
| Cv (m ² /day) | | | 0.002 | 0.002 | 0.003 | 0.005 | 0.005 |
| k' (MPa) | | | 1.089 | 1.047 | 1.371 | 1.580 | 1.941 |
| Mv (mm ² / N) | | | 0.9182 | 0.9548 | 0.7294 | 0.6331 | 0.5151 |

| | | | | | | | |
|--------------------------|---------|--------|--------|--------|--------|--------|--------|
| Trial # | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Load (kPa) | 65 | 100.0 | 150.0 | 220.0 | 150.0 | 100.0 | 65.0 |
| Load (tsf) | 0.676 | 1.040 | 1.560 | 2.288 | 1.560 | 1.040 | 0.676 |
| Gauge Reading (in) | 0.22462 | 0.2175 | 0.2108 | 0.2043 | 0.2045 | 0.2050 | 0.2055 |
| (H-Hs) mm | 5.673 | 5.492 | 5.322 | 5.157 | 5.162 | 5.175 | 5.188 |
| Voids ratio | 0.442 | 0.428 | 0.414 | 0.401 | 0.402 | 0.403 | 0.404 |
| t90 (min) | 19.36 | 12.25 | 12.25 | 7.29 | | | |
| Cv (m ² /day) | 0.005 | 0.008 | 0.008 | 0.014 | | | |
| k' (MPa) | 4.913 | 3.584 | 5.379 | 7.714 | | | |
| Mv (mm ² / N) | 0.2036 | 0.2790 | 0.1859 | 0.1296 | | | |

| | | | | | | | |
|--------------------------|---------|--------|--------|--------|--------|--------|--------|
| Trial # | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| Load (kPa) | 45.0 | 30.0 | 20.0 | 13.0 | 20.0 | 30.0 | 45.0 |
| Load (tsf) | 0.468 | 0.312 | 0.208 | 0.135 | 0.208 | 0.312 | 0.468 |
| Gauge Reading (in) | 0.20621 | 0.2069 | 0.2078 | 0.2088 | 0.2088 | 0.2085 | 0.2078 |
| (H-Hs) mm | 5.205 | 5.222 | 5.246 | 5.271 | 5.271 | 5.264 | 5.246 |
| Voids ratio | 0.405 | 0.407 | 0.408 | 0.410 | 0.410 | 0.410 | 0.408 |
| t90 (min) | | | | | | | |
| Cv (m ² /day) | | | | | | | |
| k' (MPa) | | | | | | | |
| Mv (mm ² / N) | | | | | | | |



Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATION TEST
TUNNEL T-10 (T10-2-SA20A)**

Date

Aug 2012

JOB NO

SW8801.1004.101

FIGURE NO.
B.71-A

REV

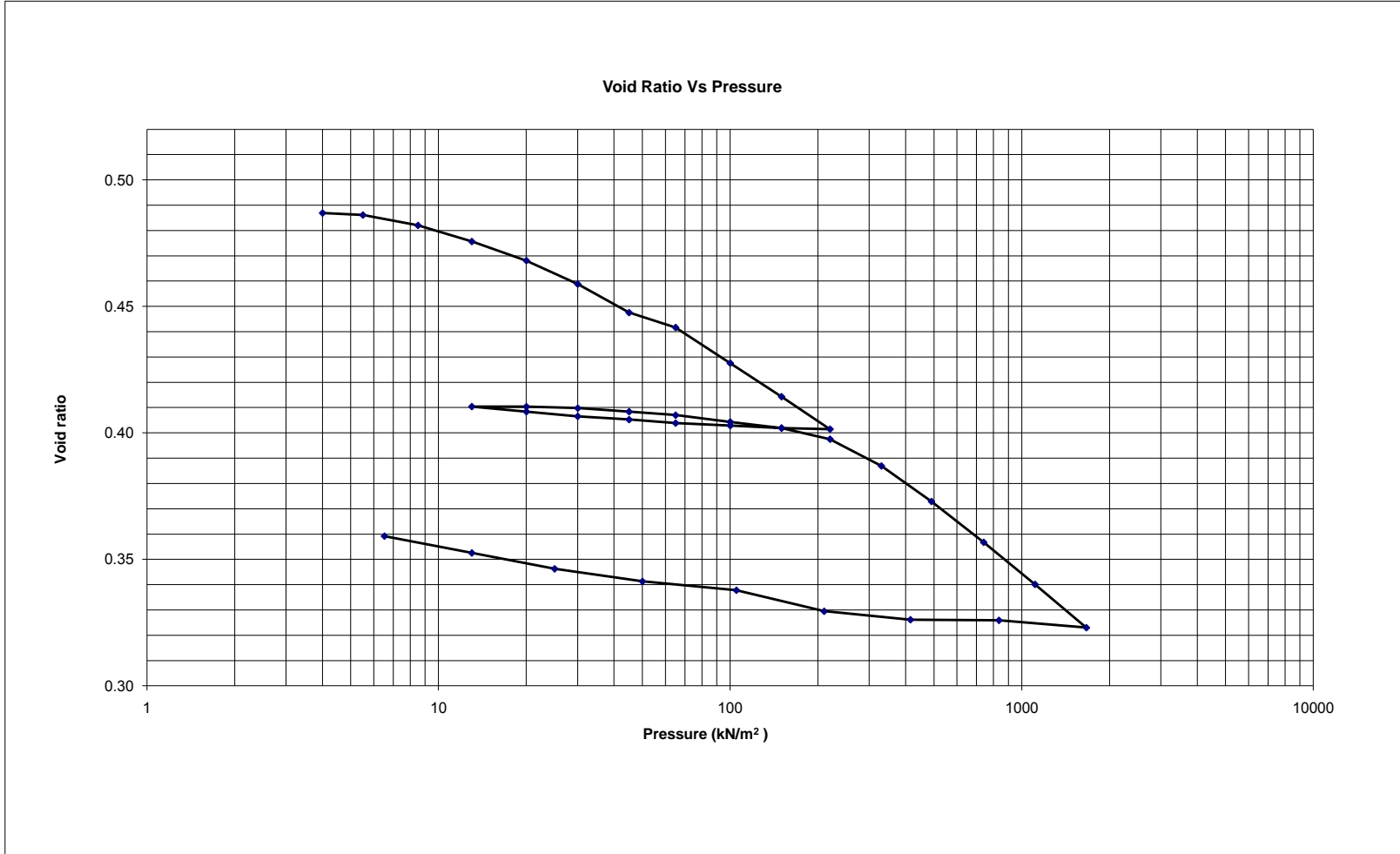
| | | | | | | | |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|
| Trial # | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| Load (kPa) | 65 | 100.0 | 150.0 | 220.0 | 330.0 | 490.0 | 740.0 |
| Load (tsf) | 0.676 | 1.040 | 1.560 | 2.288 | 3.432 | 5.096 | 7.696 |
| Gauge Reading (in) | 0.2071 | 0.2058 | 0.2045 | 0.2023 | 0.1970 | 0.1899 | 0.1817 |
| (H-Hs) mm | 5.228 | 5.194 | 5.163 | 5.106 | 4.970 | 4.790 | 4.582 |
| Voids ratio | 0.407 | 0.404 | 0.402 | 0.398 | 0.387 | 0.373 | 0.357 |
| t90 (min) | | | | | 4.84 | 4.62 | 4.41 |
| Cv (m ² /day) | | | | | 0.020 | 0.021 | 0.021 |
| k' (MPa) | | | | | 14.530 | 15.805 | 21.244 |
| Mv (mm ² / N) | | | | | 0.0688 | 0.0633 | 0.0471 |

| | | | | | | | |
|--------------------------|---------|--------|--------|--------|--------|--------|--------|
| Trial # | 29 | 30 | 31 | 32 | 33 | 34 | 35 |
| Load (kPa) | 1110 | 1665.0 | 835.0 | 415.0 | 210.0 | 105.0 | 50.0 |
| Load (tsf) | 11.544 | 17.316 | 8.684 | 4.316 | 2.184 | 1.092 | 0.520 |
| Gauge Reading (in) | 0.17328 | 0.1646 | 0.1661 | 0.1662 | 0.1679 | 0.1721 | 0.1739 |
| (H-Hs) mm | 4.369 | 4.149 | 4.186 | 4.189 | 4.232 | 4.339 | 4.384 |
| Voids ratio | 0.340 | 0.323 | 0.326 | 0.326 | 0.330 | 0.338 | 0.341 |
| t90 (min) | 4.00 | 2.89 | | | | | |
| Cv (m ² /day) | 0.023 | 0.031 | | | | | |
| k' (MPa) | 30.220 | 43.431 | | | | | |
| Mv (mm ² / N) | 0.0331 | 0.0230 | | | | | |

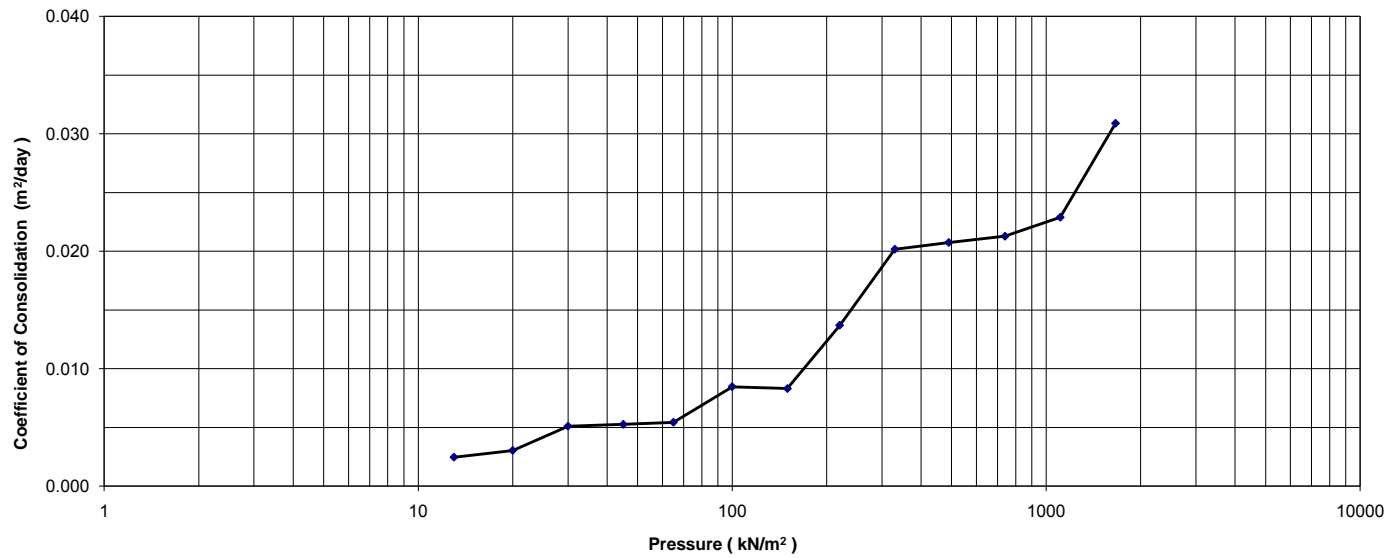
| | | | | | | | |
|--------------------------|--------|--------|--------|--|--|--|--|
| Trial # | 36 | 37 | 38 | | | | |
| Load (kPa) | 25 | 13.0 | 6.5 | | | | |
| Load (tsf) | 0.26 | 0.135 | 0.068 | | | | |
| Gauge Reading (in) | 0.1764 | 0.1796 | 0.1829 | | | | |
| (H-Hs) mm | 4.448 | 4.528 | 4.614 | | | | |
| Voids ratio | 0.346 | 0.353 | 0.359 | | | | |
| t90 (min) | | | | | | | |
| Cv (m ² /day) | | | | | | | |
| k' (MPa) | | | | | | | |
| Mv (mm ² / N) | | | | | | | |



| | | | |
|--|---------------------------|----------------------|-----|
| Project WINDSOR ESSEX PARKWAY | | | |
| TITLE CONSOLIDATION TEST TUNNEL T-10 (T10-2-SA20A) | | | |
| Date Aug 2012 | JOB NO SW8801.1004.101 | FIGURE NO. B.71-B | REV |



Coefficient of Consolidation Vs Pressure

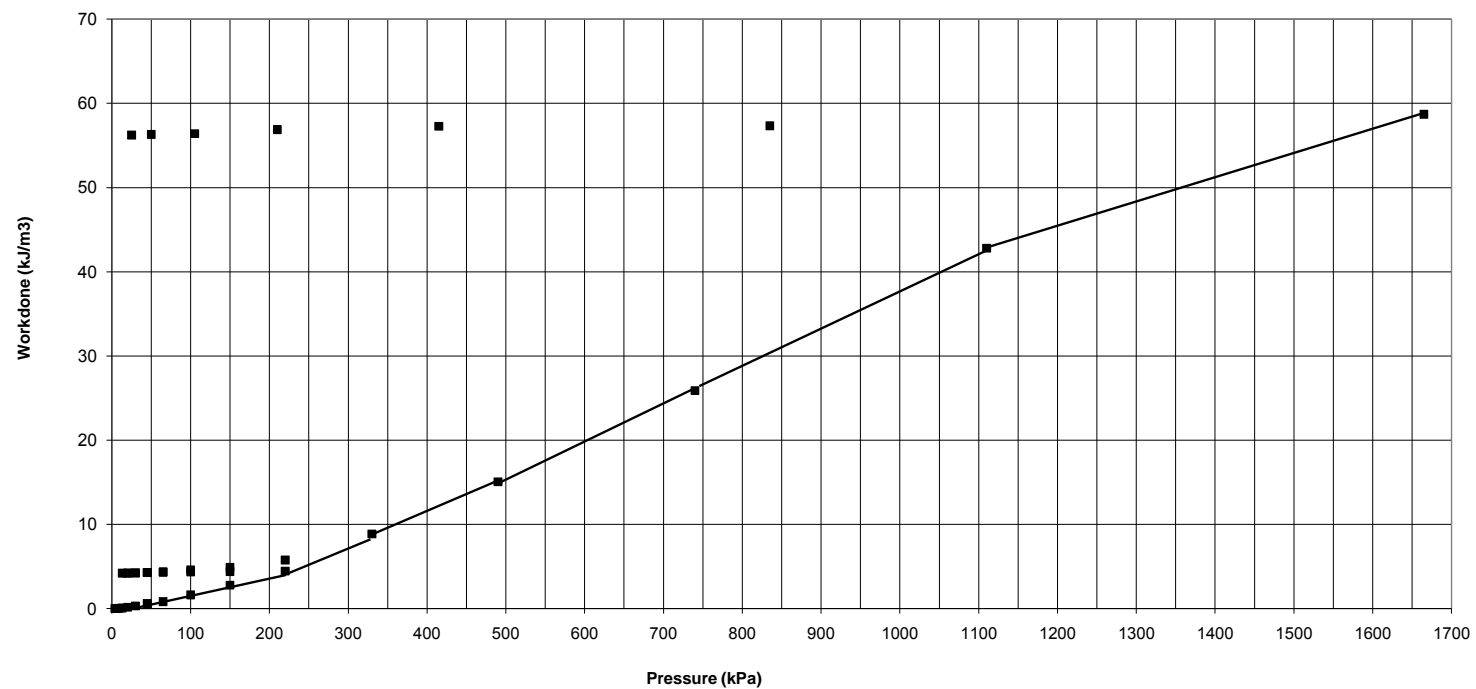


Strain Energy Data

| Presssure (kN/m ²) | c _v (m ² /day) | Void ratio |
|-----------------------------------|---|------------|
| 4.0 | | 0.487 |
| 5.5 | | 0.486 |
| 8.5 | | 0.482 |
| 13.0 | 0.002 | 0.476 |
| 20.0 | 0.003 | 0.468 |
| 30.0 | 0.005 | 0.459 |
| 45.0 | 0.005 | 0.448 |
| 65.0 | 0.005 | 0.442 |
| 100.0 | 0.008 | 0.428 |
| 150.0 | 0.008 | 0.414 |
| 220.0 | 0.014 | 0.401 |
| 150.0 | | 0.402 |
| 100.0 | | 0.403 |
| 65.0 | | 0.404 |
| 45.0 | | 0.405 |
| 30.0 | | 0.407 |
| 20.0 | | 0.408 |
| 13.0 | | 0.410 |
| 20.0 | | 0.410 |
| 30.0 | | 0.410 |
| 45.0 | | 0.408 |
| 65.0 | | 0.407 |
| 100.0 | | 0.404 |
| 150.0 | | 0.402 |
| 220.0 | | 0.398 |
| 330.0 | 0.020 | 0.387 |
| 490.0 | 0.021 | 0.373 |
| 740.0 | 0.021 | 0.357 |
| 1110.0 | 0.023 | 0.340 |
| 1665.0 | 0.031 | 0.323 |
| 835.0 | | 0.326 |
| 415.0 | | 0.326 |
| 210.0 | | 0.330 |
| 105.0 | | 0.338 |
| 50.0 | | 0.341 |
| 25.0 | | 0.346 |
| 13.0 | | 0.353 |
| 6.5 | | 0.359 |

| Presssure (kN/m ²) | Height mm | Total Work (kJ/m ³) |
|-----------------------------------|--------------|------------------------------------|
| 4.0 | 19.177 | 0.000 |
| 5.5 | 19.167 | 0.003 |
| 8.5 | 19.114 | 0.022 |
| 13.0 | 19.032 | 0.068 |
| 20.0 | 18.936 | 0.152 |
| 30.0 | 18.816 | 0.309 |
| 45.0 | 18.672 | 0.598 |
| 65.0 | 18.596 | 0.821 |
| 100.0 | 18.415 | 1.623 |
| 150.0 | 18.245 | 2.780 |
| 220.0 | 18.080 | 4.451 |
| 150.0 | 18.085 | 4.404 |
| 100.0 | 18.098 | 4.346 |
| 65.0 | 18.110 | 4.308 |
| 45.0 | 18.128 | 4.271 |
| 30.0 | 18.145 | 4.248 |
| 20.0 | 18.169 | 4.226 |
| 13.0 | 18.194 | 4.203 |
| 20.0 | 18.194 | 4.203 |
| 30.0 | 18.186 | 4.219 |
| 45.0 | 18.169 | 4.273 |
| 65.0 | 18.151 | 4.354 |
| 100.0 | 18.117 | 4.590 |
| 150.0 | 18.086 | 4.906 |
| 220.0 | 18.029 | 5.767 |
| 330.0 | 17.893 | 8.858 |
| 490.0 | 17.713 | 15.056 |
| 740.0 | 17.505 | 25.893 |
| 1110.0 | 17.292 | 42.805 |
| 1665.0 | 17.072 | 58.706 |
| 835.0 | 17.109 | 57.348 |
| 415.0 | 17.112 | 57.288 |
| 210.0 | 17.155 | 56.893 |
| 105.0 | 17.262 | 56.411 |
| 50.0 | 17.307 | 56.313 |
| 25.0 | 17.371 | 56.243 |
| 13.0 | 17.451 | 56.198 |
| 6.5 | 17.537 | 56.182 |

Strain Energy Method for Preconsolidation Pressure



ONE DIMENSIONAL CONSOLIDATION TEST (ASTM D 2435)

Project: **WEP**
 Client: **Hatch Mott MacDonald**
 Date: **15-Aug-11**

Job No.: **SW8801.1004.101**
 Sample ID: **B11-6_Sa16**
 Depth(m): **16.8**

Test Data

| | | | | | |
|---|---|--------------------|--------|--|--------|
| Ring # : | A | Ring Height (in) = | 0.760 | Wt of dry filter paper (g) | 0.69 |
| Wet soil + Ring Wt (g) | | | 205.50 | Wt of ring (g) | 76.59 |
| Wet soil + Wet Paper + Ring (g) | | | 203.68 | Wet Paper (g) | 1.98 |
| Dry Soil + Dry Paper + Ring (g) | | | 184.48 | Ring Dia (in) | 2.498 |
| Initial moisture Content (%) | | | 20.25 | Final moisture Content (%) | 16.71 |
| Area of Ring (in ²) | | | 4.90 | Initial Volume (in ³) | 3.7247 |
| Initial Bulk Density (kg/m ³) | | | 2112 | Initial Dry Density (kg/m ³) | 1756 |
| Specific Gravity of Soil | | | 2.72 | Equiv. Thick. of solids (mm) | 12.465 |
| Final Bulk Density (kg/m ³) | | | 2185 | Final Dry Density (kg/m ³) | 1817 |
| Initial gauge reading for Load 1 | | | 0.2493 | Gauge reading for last Loading | 0.2022 |
| Initial Voids Ratio | | | 0.549 | Final Void Ratio | 0.453 |
| Initial Degree of Saturation (%) | | | 100 | Final Degree of Saturation (%) | 100 |

| | | | | | | | |
|--------------------------|--------|--------|--------|--------|--------|---------|--------|
| Trial # | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Load (kPa) | 3.5 | 5.5 | 8.0 | 12.5 | 18.5 | 27.5 | 42.5 |
| Load (tsf) | 0.0364 | 0.0572 | 0.083 | 0.130 | 0.192 | 0.286 | 0.442 |
| Gauge Reading (in) | 0.2493 | 0.2490 | 0.2482 | 0.2466 | 0.2438 | 0.24098 | 0.2374 |
| (H-Hs) mm | 6.839 | 6.830 | 6.811 | 6.771 | 6.700 | 6.628 | 6.538 |
| Voids ratio | 0.549 | 0.548 | 0.546 | 0.543 | 0.537 | 0.532 | 0.525 |
| t90 (min) | | | | 12.25 | 12.25 | 12.25 | 14.06 |
| Cv (m ² /day) | | | | 0.009 | 0.009 | 0.009 | 0.008 |
| k' (MPa) | | | | 2.134 | 1.623 | 2.408 | 3.185 |
| Mv (mm ² / N) | | | | 0.4685 | 0.6162 | 0.4153 | 0.3140 |

| | | | | | | | |
|--------------------------|---------|--------|--------|--------|--------|--------|--------|
| Trial # | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Load (kPa) | 62.5 | 95.0 | 140.0 | 210.0 | 140.0 | 95.0 | 62.5 |
| Load (tsf) | 0.65 | 0.988 | 1.456 | 2.184 | 1.456 | 0.988 | 0.650 |
| Gauge Reading (in) | 0.23369 | 0.2292 | 0.2238 | 0.2170 | 0.2176 | 0.2180 | 0.2192 |
| (H-Hs) mm | 6.443 | 6.327 | 6.192 | 6.018 | 6.034 | 6.043 | 6.074 |
| Voids ratio | 0.517 | 0.508 | 0.497 | 0.483 | 0.484 | 0.485 | 0.487 |
| t90 (min) | 13.32 | 11.22 | 10.89 | 9.30 | | | |
| Cv (m ² /day) | 0.008 | 0.010 | 0.010 | 0.011 | | | |
| k' (MPa) | 3.990 | 5.329 | 6.258 | 7.473 | | | |
| Mv (mm ² / N) | 0.2506 | 0.1877 | 0.1598 | 0.1338 | | | |

| | | | | | | | |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|
| Trial # | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| Load (kPa) | 42.5 | 27.5 | 18.5 | 12.5 | 8.0 | 12.5 | 18.5 |
| Load (tsf) | 0.442 | 0.286 | 0.192 | 0.130 | 0.083 | 0.130 | 0.192 |
| Gauge Reading (in) | 0.2207 | 0.2225 | 0.2245 | 0.2265 | 0.2287 | 0.2283 | 0.2273 |
| (H-Hs) mm | 6.113 | 6.159 | 6.208 | 6.260 | 6.315 | 6.306 | 6.281 |
| Voids ratio | 0.490 | 0.494 | 0.498 | 0.502 | 0.507 | 0.506 | 0.504 |
| t90 (min) | | | | | | | |
| Cv (m ² /day) | | | | | | | |
| k' (MPa) | | | | | | | |
| Mv (mm ² / N) | | | | | | | |



Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATION TEST
BRIDGE B-11 (B11-6-SA16)**

Date

Aug 2012

JOB NO

SW8801.1004.101

FIGURE NO.
B.72-A

REV

| | | | | | | | |
|--------------------------|-------|--------|--------|--------|--------|--------|--------|
| Trial # | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| Load (kPa) | 27.5 | 42.5 | 62.5 | 95.0 | 140.0 | 210.0 | 315.0 |
| Load (tsf) | 0.286 | 0.442 | 0.650 | 0.988 | 1.456 | 2.184 | 3.276 |
| Gauge Reading (in) | 0.226 | 0.2241 | 0.2222 | 0.2202 | 0.2180 | 0.2147 | 0.2083 |
| (H-Hs) mm | 6.247 | 6.199 | 6.151 | 6.099 | 6.044 | 5.960 | 5.798 |
| Void ratio | 0.501 | 0.497 | 0.493 | 0.489 | 0.485 | 0.478 | 0.465 |
| t90 (min) | | | | | | | 7.56 |
| Cv (m ² /day) | | | | | | | 0.014 |
| k' (MPa) | | | | | | | 11.938 |
| Mv (mm ² / N) | | | | | | | 0.0838 |

| | | | | | | | |
|--------------------------|---------|--------|--------|--------|--------|--------|--------|
| Trial # | 29 | 30 | 31 | 32 | 33 | 34 | 35 |
| Load (kPa) | 475 | 710.0 | 1060.0 | 1595.0 | 800.0 | 400.0 | 200.0 |
| Load (tsf) | 4.94 | 7.384 | 11.024 | 16.588 | 8.320 | 4.160 | 2.080 |
| Gauge Reading (in) | 0.19953 | 0.1888 | 0.1773 | 0.1651 | 0.1669 | 0.1691 | 0.1732 |
| (H-Hs) mm | 5.575 | 5.303 | 5.011 | 4.699 | 4.745 | 4.802 | 4.905 |
| Void ratio | 0.447 | 0.425 | 0.402 | 0.377 | 0.381 | 0.385 | 0.394 |
| t90 (min) | 7.02 | 6.76 | 6.25 | 5.29 | | | |
| Cv (m ² /day) | 0.014 | 0.014 | 0.015 | 0.017 | | | |
| k' (MPa) | 13.117 | 15.555 | 21.326 | 29.999 | | | |
| Mv (mm ² / N) | 0.0762 | 0.0643 | 0.0469 | 0.0333 | | | |

| | | | | | | | |
|--------------------------|--------|--------|--------|--------|--------|--|--|
| Trial # | 36 | 37 | 38 | 39 | 40 | | |
| Load (kPa) | 100 | 50.0 | 25.0 | 12.5 | 6.5 | | |
| Load (tsf) | 1.04 | 0.520 | 0.260 | 0.130 | 0.068 | | |
| Gauge Reading (in) | 0.1784 | 0.1837 | 0.1888 | 0.1953 | 0.2022 | | |
| (H-Hs) mm | 5.037 | 5.173 | 5.303 | 5.466 | 5.642 | | |
| Void ratio | 0.404 | 0.415 | 0.425 | 0.439 | 0.453 | | |
| t90 (min) | | | | | | | |
| Cv (m ² /day) | | | | | | | |
| k' (MPa) | | | | | | | |
| Mv (mm ² / N) | | | | | | | |



Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATION TEST
BRIDGE B-11 (B11-6-SA16)**

Date

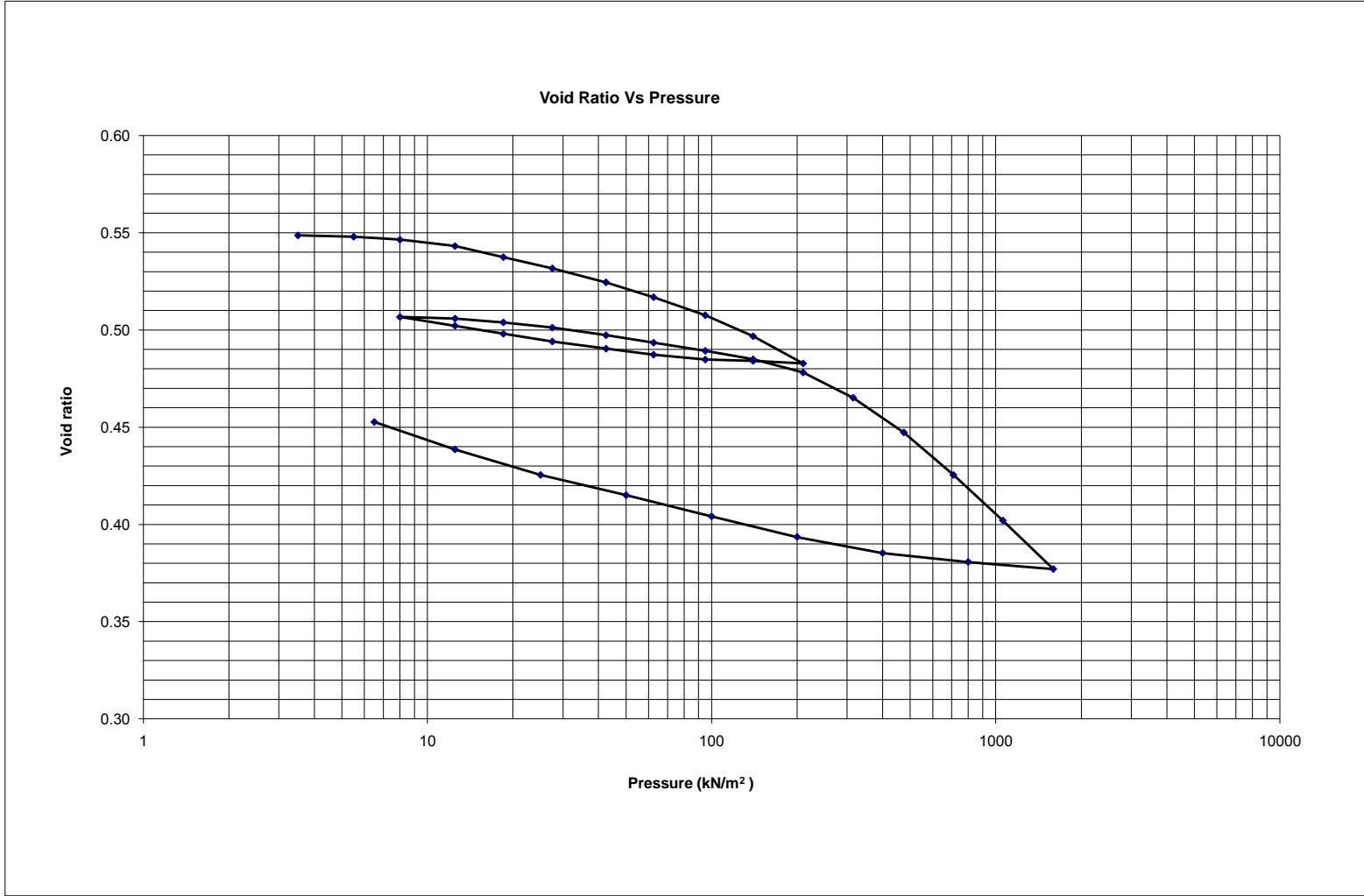
Aug 2012

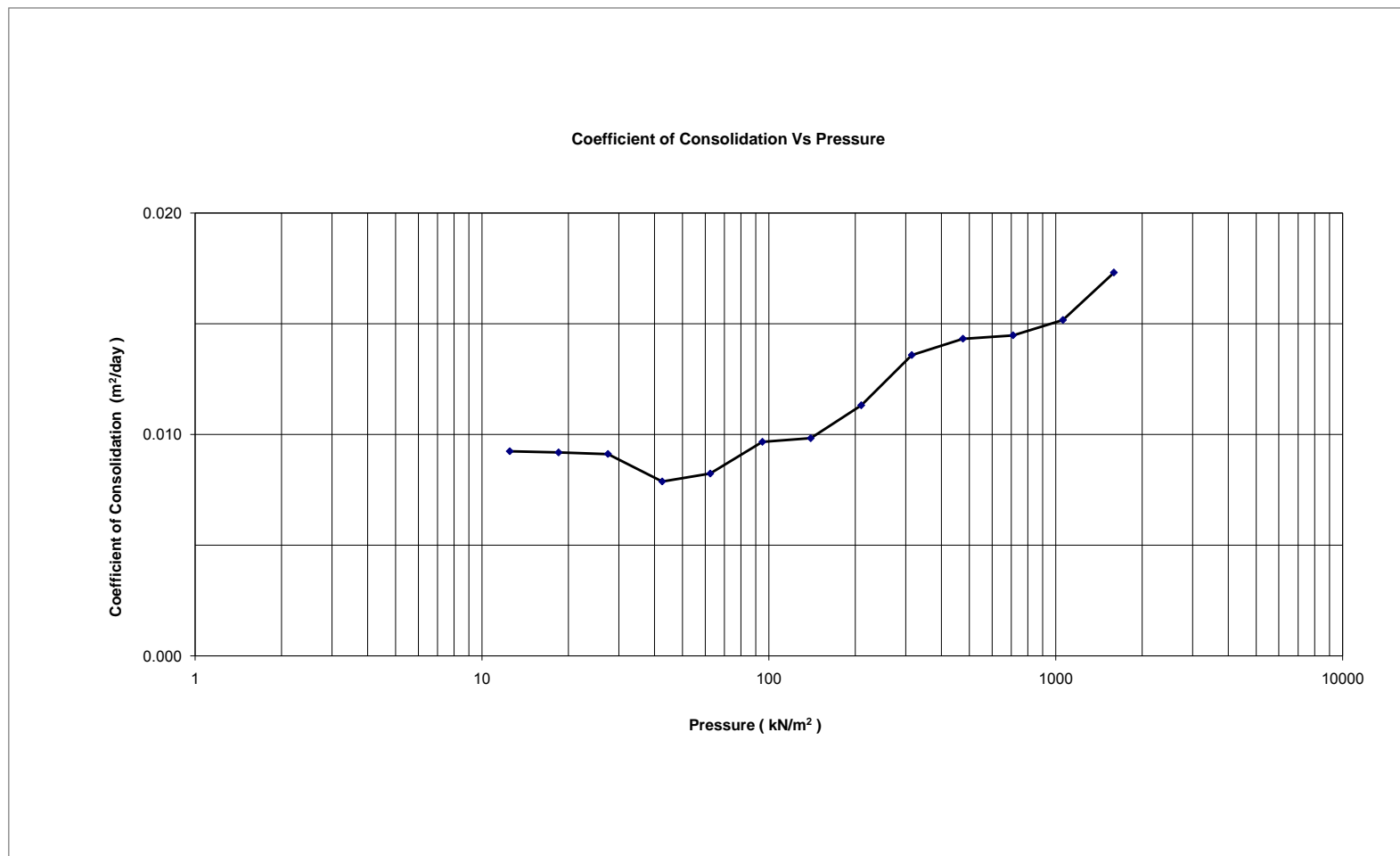
JOB NO

SW8801.1004.101

FIGURE NO.
B.72-B

REV





Strain Energy Data

| Presssure (kN/m ²) | c _v (m ² /day) | Void ratio | Presssure (KN/m ²) | Height mm | Total Work (KJ/m ³) |
|-----------------------------------|---|------------|-----------------------------------|--------------|------------------------------------|
| 3.5 | | 0.549 | 3.5 | 19.304 | 0.000 |
| 5.5 | | 0.548 | 5.5 | 19.295 | 0.002 |
| 8.0 | | 0.546 | 8.0 | 19.276 | 0.009 |
| 12.5 | 0.009 | 0.543 | 12.5 | 19.235 | 0.030 |
| 18.5 | 0.009 | 0.537 | 18.5 | 19.164 | 0.088 |
| 27.5 | 0.009 | 0.532 | 27.5 | 19.093 | 0.174 |
| 42.5 | 0.008 | 0.525 | 42.5 | 19.003 | 0.338 |
| 62.5 | 0.008 | 0.517 | 62.5 | 18.908 | 0.602 |
| 95.0 | 0.010 | 0.508 | 95.0 | 18.792 | 1.082 |
| 140.0 | 0.010 | 0.497 | 140.0 | 18.657 | 1.927 |
| 210.0 | 0.011 | 0.483 | 210.0 | 18.482 | 3.566 |
| 140.0 | | 0.484 | 140.0 | 18.499 | 3.430 |
| 95.0 | | 0.485 | 95.0 | 18.508 | 3.392 |
| 62.5 | | 0.487 | 62.5 | 18.539 | 3.304 |
| 42.5 | | 0.490 | 42.5 | 18.578 | 3.231 |
| 27.5 | | 0.494 | 27.5 | 18.623 | 3.174 |
| 18.5 | | 0.498 | 18.5 | 18.673 | 3.133 |
| 12.5 | | 0.502 | 12.5 | 18.724 | 3.104 |
| 8.0 | | 0.507 | 8.0 | 18.780 | 3.074 |
| 12.5 | | 0.506 | 12.5 | 18.771 | 3.082 |
| 18.5 | | 0.504 | 18.5 | 18.746 | 3.112 |
| 27.5 | | 0.501 | 27.5 | 18.712 | 3.175 |
| 42.5 | | 0.497 | 42.5 | 18.664 | 3.311 |
| 62.5 | | 0.493 | 62.5 | 18.616 | 3.514 |
| 95.0 | | 0.489 | 95.0 | 18.564 | 3.842 |
| 140.0 | | 0.485 | 140.0 | 18.509 | 4.357 |
| 210.0 | | 0.478 | 210.0 | 18.425 | 5.553 |
| 315.0 | 0.014 | 0.465 | 315.0 | 18.263 | 9.027 |
| 475.0 | 0.014 | 0.447 | 475.0 | 18.040 | 16.254 |
| 710.0 | 0.014 | 0.425 | 710.0 | 17.767 | 29.625 |
| 1060.0 | 0.015 | 0.402 | 1060.0 | 17.476 | 51.411 |
| 1595.0 | 0.017 | 0.377 | 1595.0 | 17.164 | 72.767 |
| 800.0 | | 0.381 | 800.0 | 17.210 | 71.169 |
| 400.0 | | 0.385 | 400.0 | 17.267 | 70.173 |
| 200.0 | | 0.394 | 200.0 | 17.370 | 69.279 |
| 100.0 | | 0.404 | 100.0 | 17.502 | 68.709 |
| 50.0 | | 0.415 | 50.0 | 17.638 | 68.418 |
| 25.0 | | 0.425 | 25.0 | 17.767 | 68.280 |
| 12.5 | | 0.439 | 12.5 | 17.931 | 68.192 |
| 6.5 | | 0.453 | 6.5 | 18.107 | 68.161 |

Project

WINDSOR ESSEX PARKWAY

TITLE

CONSOLIDATION TEST
BRIDGE B-11 (B11-6-SA16)

Date

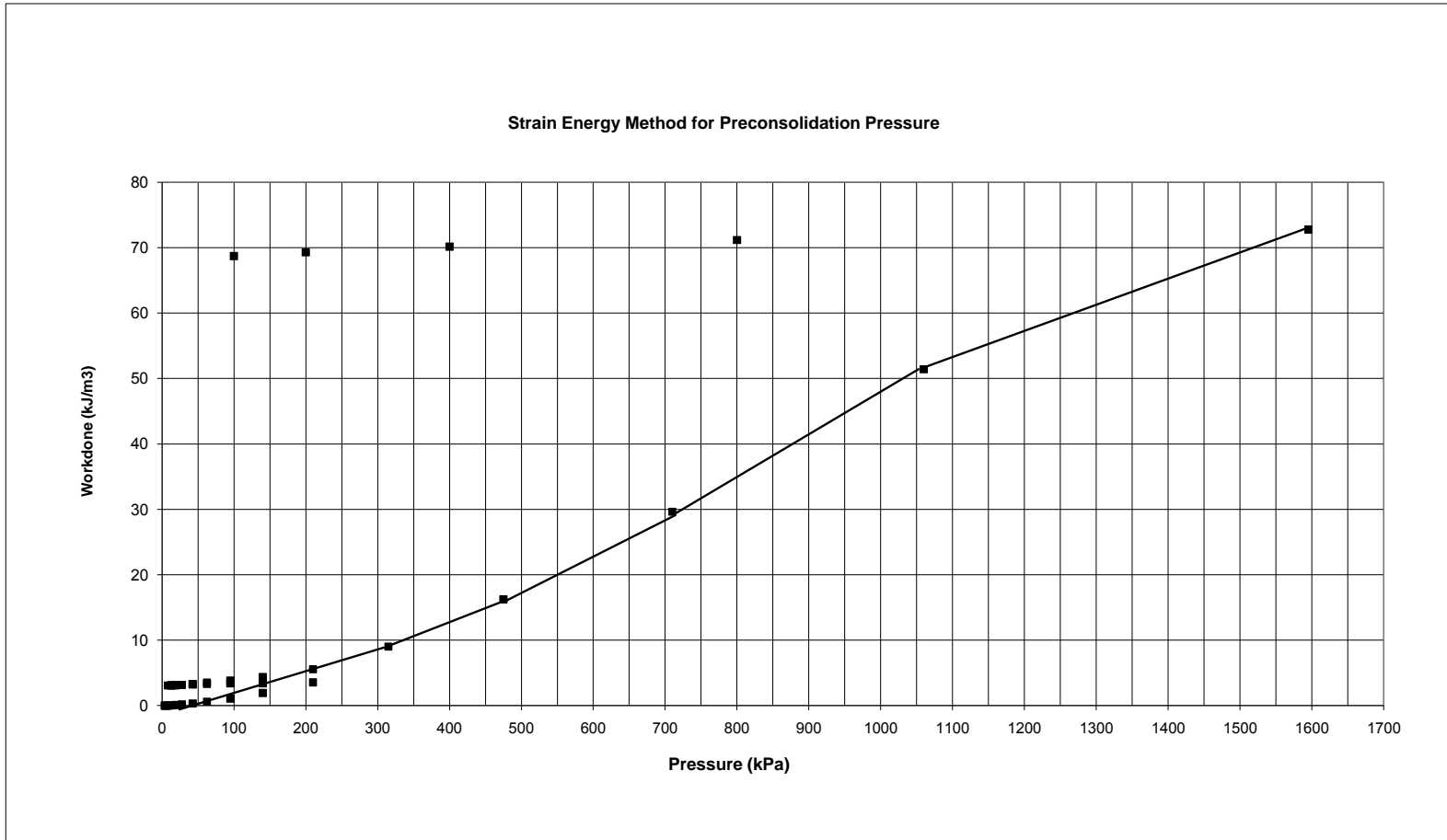
Aug 2012

JOB NO

SW8801.1004.101

FIGURE NO.
B.72-E

REV



ONE DIMENSIONAL CONSOLIDATION TEST (ASTM D 2435)

Project: **WEP**
 Client: **Hatch Mott MacDonald**
 Date: **20-May-11**

Job No.: **SW8801.1004.101**
 Sample ID: **T11-3_Sa14**
 Depth(m): **15.25 to 16.00**

Test Data

| | | | | | |
|---|---|--------------------|--------|--|--------|
| Ring # : | A | Ring Height (in) = | 0.762 | Wt of dry filter paper (g) | 0.69 |
| Wet soil + Ring Wt (g) | | | 205.51 | Wt of ring (g) | 76.58 |
| Wet soil + Wet Paper + Ring (g) | | | 203.03 | Wet Paper (g) | 1.81 |
| Dry Soil + Dry Paper + Ring (g) | | | 184.11 | Ring Dia (in) | 2.500 |
| Initial moisture Content (%) | | | 20.68 | Final moisture Content (%) | 16.66 |
| Area of Ring (in ²) | | | 4.91 | Initial Volume (in ³) | 3.7405 |
| Initial Bulk Density (kg/m ³) | | | 2103 | Initial Dry Density (kg/m ³) | 1743 |
| Specific Gravity of Soil | | | 2.72 | Equiv. Thick. of solids (mm) | 12.403 |
| Final Bulk Density (kg/m ³) | | | 2537 | Final Dry Density (kg/m ³) | 2102 |
| Initial gauge reading for Load 1 | | | 0.2578 | Gauge reading for last Loading | 0.2048 |
| Initial Voids Ratio | | | 0.560 | Final Void Ratio | 0.452 |
| Initial Degree of Saturation (%) | | | 100 | Final Degree of Saturation (%) | 100 |

| Trial # | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|
| Load (kPa) | 4.0 | 6.0 | 9.0 | 13.5 | 20.0 | 30.0 | 45.0 |
| Load (tsf) | 0.0416 | 0.0624 | 0.094 | 0.140 | 0.208 | 0.312 | 0.468 |
| Gauge Reading (in) | 0.2536 | 0.2532 | 0.2520 | 0.2497 | 0.2477 | 0.2448 | 0.2418 |
| (H-Hs) mm | 6.846 | 6.834 | 6.804 | 6.746 | 6.696 | 6.620 | 6.545 |
| Voids ratio | 0.552 | 0.551 | 0.549 | 0.544 | 0.540 | 0.534 | 0.528 |
| t90 (min) | | 1.96 | 12.25 | 7.84 | 9.00 | 19.36 | 15.60 |
| Cv (m ² /day) | | 0.058 | 0.009 | 0.014 | 0.012 | 0.006 | 0.007 |
| k' (MPa) | | 3.158 | 1.976 | 1.480 | 2.475 | 2.532 | 3.808 |
| Mv (mm ² / N) | | 0.3167 | 0.5062 | 0.6759 | 0.4041 | 0.3950 | 0.2626 |

| Trial # | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|
| Load (kPa) | 70 | 105.0 | 155.0 | 230.0 | 155.0 | 105.0 | 70.0 |
| Load (tsf) | 0.728 | 1.092 | 1.612 | 2.392 | 1.612 | 1.092 | 0.728 |
| Gauge Reading (in) | 0.2374 | 0.2326 | 0.2277 | 0.2212 | 0.2219 | 0.2225 | 0.2238 |
| (H-Hs) mm | 6.434 | 6.312 | 6.186 | 6.022 | 6.040 | 6.056 | 6.087 |
| Voids ratio | 0.519 | 0.509 | 0.499 | 0.486 | 0.487 | 0.488 | 0.491 |
| t90 (min) | 12.96 | 10.24 | 10.56 | 8.70 | | | |
| Cv (m ² /day) | 0.008 | 0.011 | 0.010 | 0.012 | | | |
| k' (MPa) | 4.239 | 5.407 | 7.442 | 8.510 | | | |
| Mv (mm ² / N) | 0.2359 | 0.1849 | 0.1344 | 0.1175 | | | |

| Trial # | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|
| Load (kPa) | 45.0 | 30.0 | 20.0 | 13.5 | 9.0 | 13.5 | 20.0 |
| Load (tsf) | 0.468 | 0.312 | 0.208 | 0.140 | 0.094 | 0.140 | 0.208 |
| Gauge Reading (in) | 0.2257 | 0.2272 | 0.2290 | 0.2308 | 0.2329 | 0.2324 | 0.2315 |
| (H-Hs) mm | 6.136 | 6.174 | 6.221 | 6.266 | 6.318 | 6.306 | 6.284 |
| Voids ratio | 0.495 | 0.498 | 0.502 | 0.505 | 0.509 | 0.508 | 0.507 |
| t90 (min) | | | | | | | |
| Cv (m ² /day) | | | | | | | |
| k' (MPa) | | | | | | | |
| Mv (mm ² / N) | | | | | | | |



Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATION TEST
TUNNEL T-11 (T11-3-SA14)**

Date

Aug 2012

JOB NO

SW8801.1004.101

FIGURE NO.
B.73-A

REV

| | | | | | | | |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|
| Trial # | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| Load (kPa) | 30 | 45.0 | 70.0 | 105.0 | 155.0 | 230.0 | 345.0 |
| Load (tsf) | 0.312 | 0.468 | 0.728 | 1.092 | 1.612 | 2.392 | 3.588 |
| Gauge Reading (in) | 0.2302 | 0.2286 | 0.2265 | 0.2245 | 0.2224 | 0.2188 | 0.2123 |
| (H-Hs) mm | 6.251 | 6.209 | 6.157 | 6.105 | 6.051 | 5.961 | 5.796 |
| Voids ratio | 0.504 | 0.501 | 0.496 | 0.492 | 0.488 | 0.481 | 0.467 |
| t90 (min) | | | | | | | 6.25 |
| Cv (m ² /day) | | | | | | | 0.016 |
| k' (MPa) | | | | | | | 12.792 |
| Mv (mm ² / N) | | | | | | | 0.0782 |

| | | | | | | | |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|
| Trial # | 29 | 30 | 31 | 32 | 33 | 34 | 35 |
| Load (kPa) | 525 | 775.0 | 1175.0 | 1750.0 | 875.0 | 440.0 | 220.0 |
| Load (tsf) | 5.46 | 8.060 | 12.220 | 18.200 | 9.100 | 4.576 | 2.288 |
| Gauge Reading (in) | 0.2025 | 0.1916 | 0.1789 | 0.1664 | 0.1682 | 0.1706 | 0.1748 |
| (H-Hs) mm | 5.547 | 5.269 | 4.948 | 4.629 | 4.676 | 4.737 | 4.844 |
| Voids ratio | 0.447 | 0.425 | 0.399 | 0.373 | 0.377 | 0.382 | 0.391 |
| t90 (min) | 8.70 | 8.70 | 6.25 | 5.76 | | | |
| Cv (m ² /day) | 0.011 | 0.011 | 0.015 | 0.016 | | | |
| k' (MPa) | 13.160 | 16.135 | 22.000 | 31.297 | | | |
| Mv (mm ² / N) | 0.0760 | 0.0620 | 0.0455 | 0.0320 | | | |

| | | | | | | | |
|--------------------------|--------|--------|--------|--------|--------|--|--|
| Trial # | 36 | 37 | 38 | 39 | 40 | | |
| Load (kPa) | 110 | 55.0 | 27.5 | 14.0 | 7.00 | | |
| Load (tsf) | 1.144 | 0.572 | 0.286 | 0.146 | 0.073 | | |
| Gauge Reading (in) | 0.1809 | 0.1863 | 0.1926 | 0.1978 | 0.2048 | | |
| (H-Hs) mm | 4.997 | 5.134 | 5.296 | 5.428 | 5.606 | | |
| Voids ratio | 0.403 | 0.414 | 0.427 | 0.438 | 0.452 | | |
| t90 (min) | | | | | | | |
| Cv (m ² /day) | | | | | | | |
| k' (MPa) | | | | | | | |
| Mv (mm ² / N) | | | | | | | |



Project

WINDSOR ESSEX PARKWAY

TITLE

CONSOLIDATION TEST
TUNNEL T-11 (T11-3-SA14)

Date

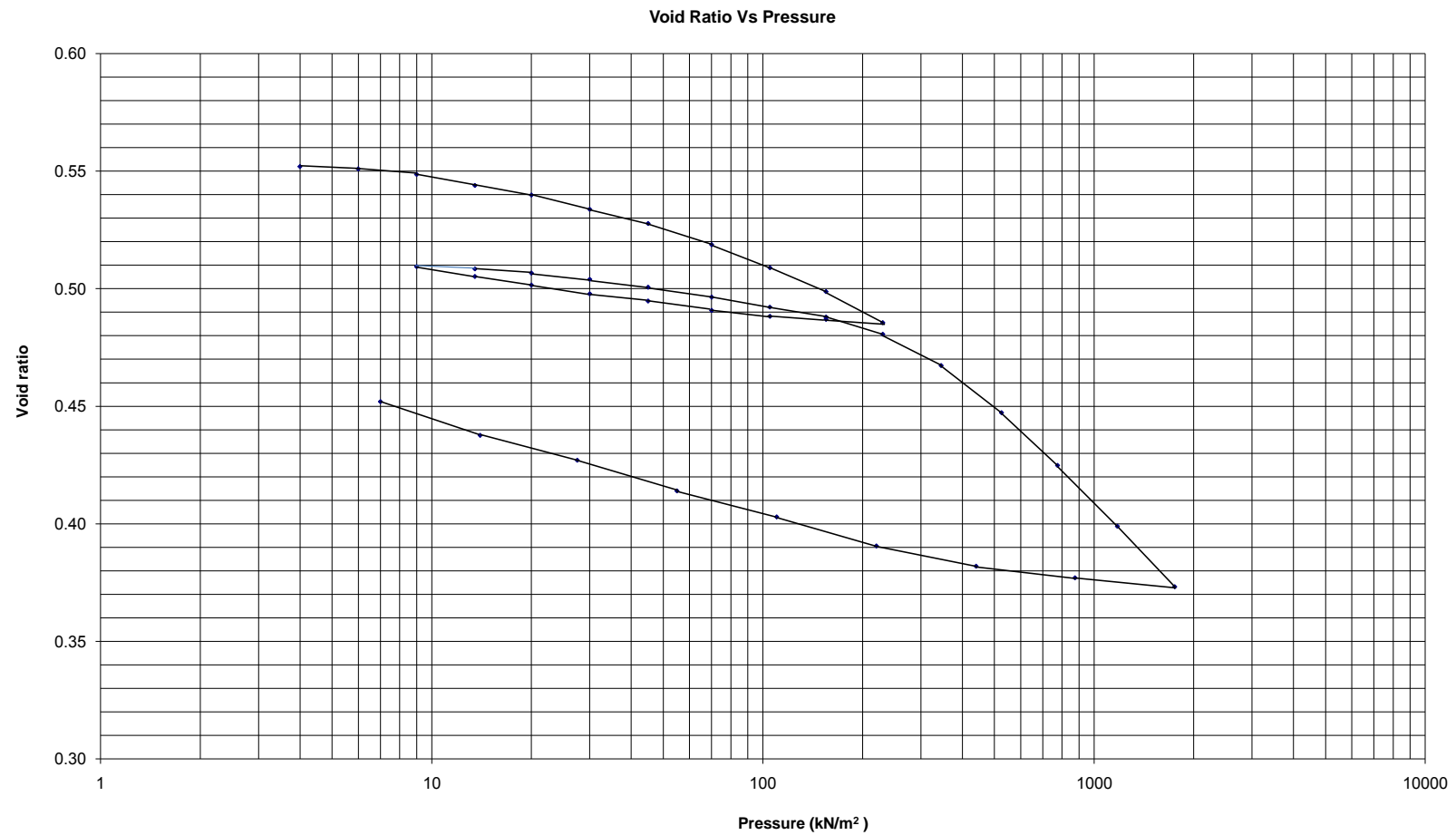
Aug 2012

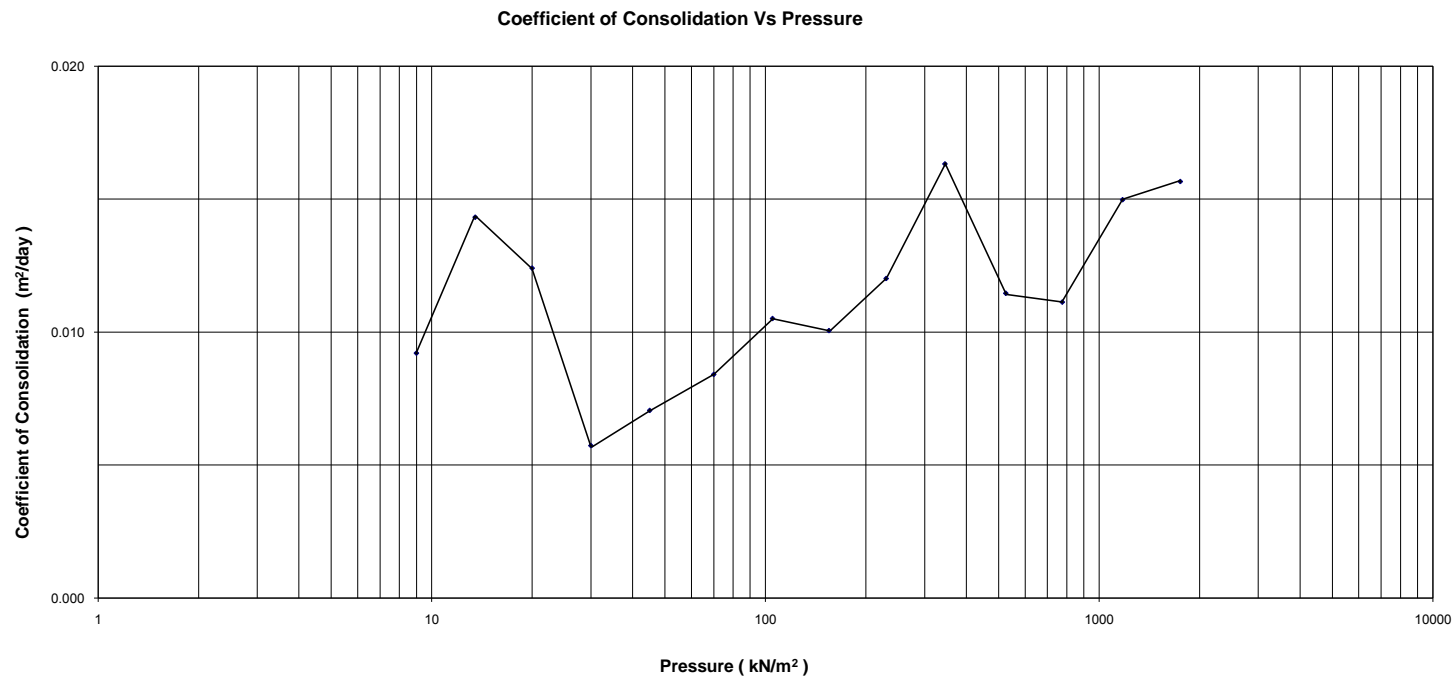
JOB NO

SW8801.1004.101

FIGURE NO.
B.73-B

REV





Strain Energy Data

| Presssure Kn/m ² | C _v m ² /day | Void ratio |
|--------------------------------|---------------------------------------|------------|
| 4.0 | | 0.552 |
| 6.0 | | 0.551 |
| 9.0 | 0.009 | 0.549 |
| 13.5 | 0.014 | 0.544 |
| 20.0 | 0.012 | 0.540 |
| 30.0 | 0.006 | 0.534 |
| 45.0 | 0.007 | 0.528 |
| 70.0 | 0.008 | 0.519 |
| 105.0 | 0.011 | 0.509 |
| 155.0 | 0.010 | 0.499 |
| 230.0 | 0.012 | 0.486 |
| 155.0 | | 0.487 |
| 105.0 | | 0.488 |
| 70.0 | | 0.491 |
| 45.0 | | 0.495 |
| 30.0 | | 0.498 |
| 20.0 | | 0.502 |
| 13.5 | | 0.505 |
| 9.0 | | 0.509 |
| 13.5 | | 0.508 |
| 20.0 | | 0.507 |
| 30.0 | | 0.504 |
| 45.0 | | 0.501 |
| 70.0 | | 0.496 |
| 105.0 | | 0.492 |
| 155.0 | | 0.488 |
| 230.0 | | 0.481 |
| 345.0 | 0.016 | 0.467 |
| 525.0 | 0.011 | 0.447 |
| 775.0 | 0.011 | 0.425 |
| 1175.0 | 0.015 | 0.399 |
| 1750.0 | 0.016 | 0.373 |
| 875.0 | | 0.377 |
| 440.0 | | 0.382 |
| 220.0 | | 0.391 |
| 110.0 | | 0.403 |
| 55.0 | | 0.414 |
| 27.5 | | 0.427 |
| 14.0 | | 0.438 |
| 7.0 | | 0.452 |

| Presssure kN/m ² | Height mm | Total Work kJ/m ³ |
|--------------------------------|--------------|---------------------------------|
| 4.0 | 19.355 | 0.000 |
| 6.0 | 19.343 | 0.003 |
| 9.0 | 19.313 | 0.014 |
| 13.5 | 19.255 | 0.049 |
| 20.0 | 19.205 | 0.092 |
| 30.0 | 19.129 | 0.190 |
| 45.0 | 19.054 | 0.337 |
| 70.0 | 18.943 | 0.675 |
| 105.0 | 18.821 | 1.238 |
| 155.0 | 18.695 | 2.106 |
| 230.0 | 18.531 | 3.793 |
| 155.0 | 18.549 | 3.632 |
| 105.0 | 18.565 | 3.558 |
| 70.0 | 18.596 | 3.461 |
| 45.0 | 18.645 | 3.362 |
| 30.0 | 18.683 | 3.311 |
| 20.0 | 18.729 | 3.269 |
| 13.5 | 18.775 | 3.242 |
| 9.0 | 18.827 | 3.211 |
| 13.5 | 18.815 | 3.222 |
| 20.0 | 18.793 | 3.251 |
| 30.0 | 18.760 | 3.317 |
| 45.0 | 18.718 | 3.445 |
| 70.0 | 18.666 | 3.689 |
| 105.0 | 18.614 | 4.052 |
| 155.0 | 18.560 | 4.603 |
| 230.0 | 18.470 | 6.000 |
| 345.0 | 18.305 | 9.889 |
| 525.0 | 18.056 | 18.728 |
| 775.0 | 17.778 | 33.746 |
| 1175.0 | 17.457 | 60.179 |
| 1750.0 | 17.138 | 84.146 |
| 875.0 | 17.185 | 82.343 |
| 440.0 | 17.246 | 81.167 |
| 220.0 | 17.353 | 80.144 |
| 110.0 | 17.506 | 79.416 |
| 55.0 | 17.643 | 79.093 |
| 27.5 | 17.805 | 78.903 |
| 14.0 | 18.099 | 78.730 |
| 7.0 | 18.570 | 78.639 |

Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATION TEST
TUNNEL T-11 (T11-3-SA14)**

Date

Aug 2012

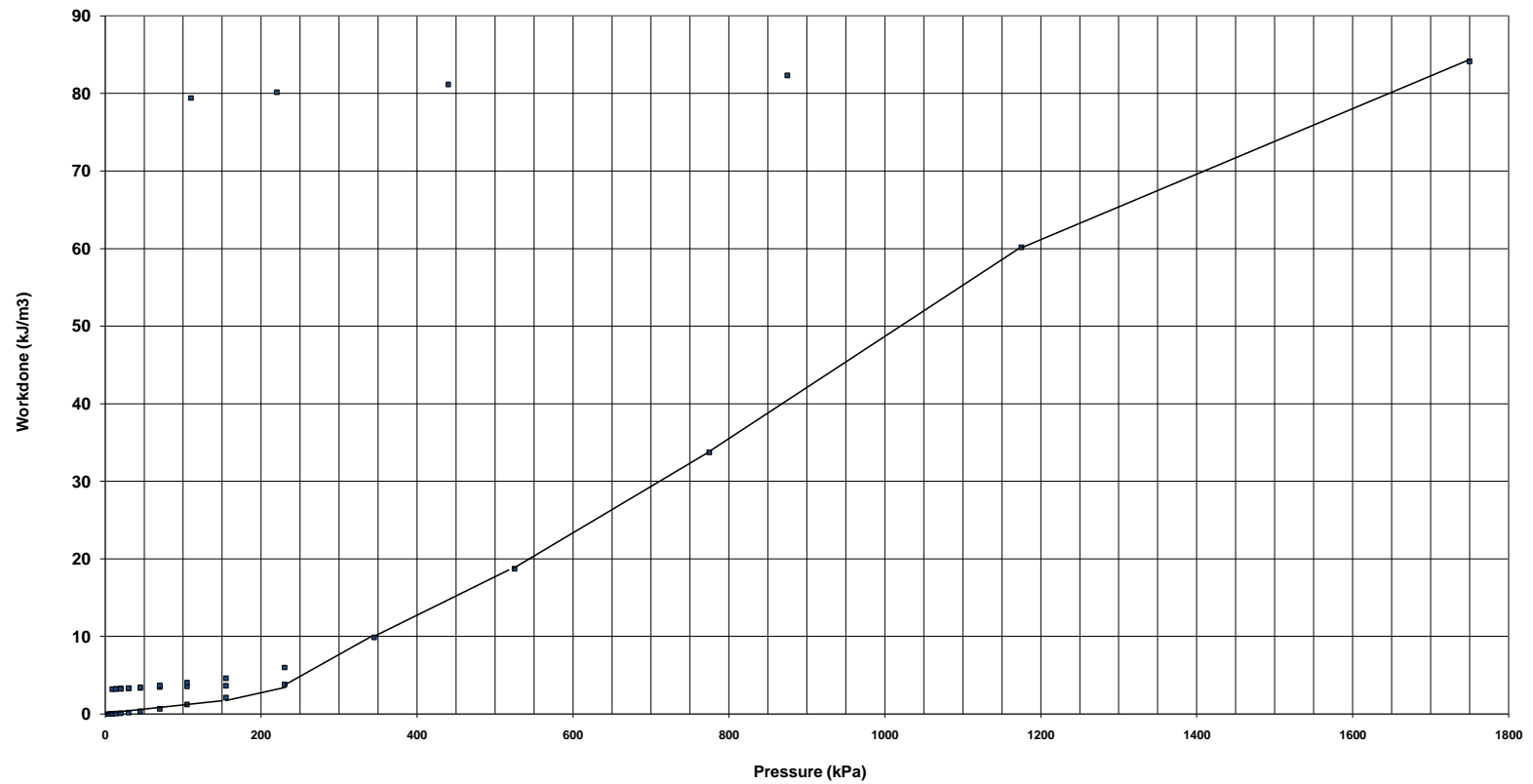
JOB NO

SW8801.1004.101

FIGURE NO.
B.73-E

REV

Strain Energy Method for Preconsolidation Pressure



ONE DIMENSIONAL CONSOLIDATION TEST (ASTM D 2435)

Project: **WEP**
Client: **Hatch Mott MacDonald**
Date: **19-Jul-11**

Job No.: **SW8801.1004.101**

Sample ID: **B12-2_TW16**

Depth(m): **18.3 to 18.9**

Test Data

| | | | | | |
|---|---|--------------------|--------|--|--------|
| Ring # : | A | Ring Height (in) = | 0.758 | Wt of dry filter paper (g) | 0.68 |
| Wet soil + Ring Wt (g) | | | 197.75 | Wt of ring (g) | 76.59 |
| Wet soil + Wet Paper + Ring (g) | | | 195.05 | Wet Paper (g) | 1.94 |
| Dry Soil + Dry Paper + Ring (g) | | | 172.12 | Ring Dia (in) | 2.498 |
| Initial moisture Content (%) | | | 27.74 | Final moisture Content (%) | 22.85 |
| Area of Ring (in ²) | | | 4.90 | Initial Volume (in ³) | 3.7149 |
| Initial Bulk Density (kg/m ³) | | | 1990 | Initial Dry Density (kg/m ³) | 1558 |
| Specific Gravity of Soil | | | 2.74 | Equiv. Thick. of solids (mm) | 10.948 |
| Final Bulk Density (kg/m ³) | | | 2066 | Final Dry Density (kg/m ³) | 1618 |
| Initial gauge reading for Load 1 | | | 0.2500 | Gauge reading for last Loading | 0.1942 |
| Initial Voids Ratio | | | 0.759 | Final Void Ratio | 0.629 |
| Initial Degree of Saturation (%) | | | 100 | Final Degree of Saturation (%) | 100 |

| | | | | | | | |
|--------------------------|--------|--------|--------|--------|--------|---------|--------|
| Trial # | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Load (kPa) | 5.0 | 7.0 | 10.5 | 16.0 | 24.0 | 36.0 | 55.0 |
| Load (tsf) | 0.052 | 0.0728 | 0.109 | 0.166 | 0.250 | 0.374 | 0.572 |
| Gauge Reading (in) | 0.2492 | 0.2487 | 0.2461 | 0.2435 | 0.2400 | 0.23565 | 0.2307 |
| (H-Hs) mm | 8.283 | 8.271 | 8.206 | 8.139 | 8.051 | 7.940 | 7.813 |
| Voids ratio | 0.757 | 0.756 | 0.750 | 0.743 | 0.735 | 0.725 | 0.714 |
| t90 (min) | | 12.96 | 12.96 | 20.70 | 11.56 | 10.24 | 9.61 |
| Cv (m ² /day) | | 0.009 | 0.009 | 0.005 | 0.010 | 0.011 | 0.011 |
| k' (MPa) | | 3.222 | 1.027 | 1.565 | 1.742 | 2.063 | 2.826 |
| Mv (mm ² / N) | | 0.3104 | 0.9742 | 0.6389 | 0.5739 | 0.4846 | 0.3539 |

| | | | | | | | |
|--------------------------|---------|--------|--------|--------|--------|--------|--------|
| Trial # | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Load (kPa) | 80.0 | 125.0 | 185.0 | 275.0 | 185.0 | 125.0 | 80.0 |
| Load (tsf) | 0.832 | 1.300 | 1.924 | 2.860 | 1.924 | 1.300 | 0.832 |
| Gauge Reading (in) | 0.22553 | 0.2177 | 0.2103 | 0.2013 | 0.2021 | 0.2027 | 0.2045 |
| (H-Hs) mm | 7.683 | 7.485 | 7.297 | 7.068 | 7.089 | 7.104 | 7.148 |
| Voids ratio | 0.702 | 0.684 | 0.666 | 0.646 | 0.647 | 0.649 | 0.653 |
| t90 (min) | 9.00 | 6.50 | 6.25 | 5.06 | | | |
| Cv (m ² /day) | 0.012 | 0.016 | 0.016 | 0.020 | | | |
| k' (MPa) | 3.607 | 4.216 | 5.884 | 7.199 | | | |
| Mv (mm ² / N) | 0.2773 | 0.2372 | 0.1700 | 0.1389 | | | |

| | | | | | | | |
|--------------------------|---------|--------|--------|--------|--------|--------|--------|
| Trial # | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| Load (kPa) | 55.0 | 36.0 | 24.0 | 16.0 | 10.5 | 7.0 | 10.5 |
| Load (tsf) | 0.572 | 0.374 | 0.250 | 0.166 | 0.109 | 0.073 | 0.109 |
| Gauge Reading (in) | 0.20618 | 0.2082 | 0.2108 | 0.2133 | 0.2159 | 0.2185 | 0.2182 |
| (H-Hs) mm | 7.192 | 7.244 | 7.310 | 7.372 | 7.439 | 7.505 | 7.496 |
| Voids ratio | 0.657 | 0.662 | 0.668 | 0.673 | 0.679 | 0.685 | 0.685 |
| t90 (min) | | | | | | | |
| Cv (m ² /day) | | | | | | | |
| k' (MPa) | | | | | | | |
| Mv (mm ² / N) | | | | | | | |



Project

WINDSOR ESSEX PARKWAY

TITLE

CONSOLIDATION TEST
SOIL SAMPLE ID: B12-2_TW16
BRIDGE B-12

Date

Aug 2012

JOB NO

SW8801.1004.101

FIGURE NO
B.74-A

REV

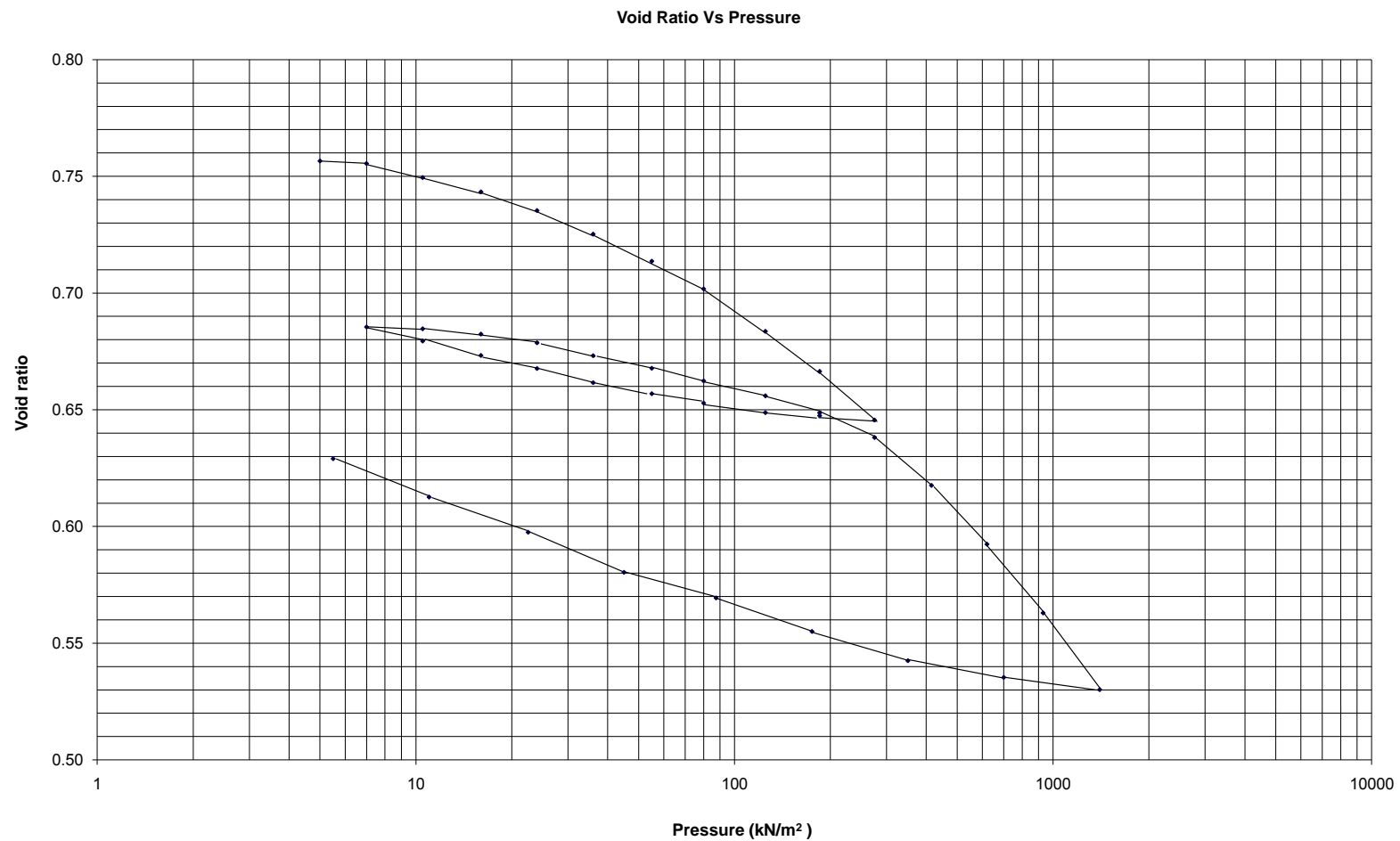
| | | | | | | | |
|--------------------------|---------|--------|--------|--------|--------|--------|--------|
| Trial # | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| Load (kPa) | 16.0 | 24.0 | 36.0 | 55.0 | 80.0 | 125.0 | 185.0 |
| Load (tsf) | 0.1664 | 0.250 | 0.374 | 0.572 | 0.832 | 1.300 | 1.924 |
| Gauge Reading (in) | 0.21719 | 0.2156 | 0.2132 | 0.2109 | 0.2086 | 0.2058 | 0.2027 |
| (H-Hs) mm | 7.472 | 7.431 | 7.370 | 7.311 | 7.252 | 7.182 | 7.102 |
| Voids ratio | 0.682 | 0.679 | 0.673 | 0.668 | 0.662 | 0.656 | 0.649 |
| t90 (min) | | | | | | | |
| Cv (m ² /day) | | | | | | | |
| k' (MPa) | | | | | | | |
| Mv (mm ² / N) | | | | | | | |

| | | | | | | | |
|--------------------------|--------|--------|--------|--------|--------|--------|--------|
| Trial # | 29 | 30 | 31 | 32 | 33 | 34 | 35 |
| Load (kPa) | 275.0 | 415.0 | 620.0 | 930.0 | 1400.0 | 700.0 | 350.0 |
| Load (tsf) | 2.86 | 4.316 | 6.448 | 9.672 | 14.560 | 7.280 | 3.640 |
| Gauge Reading (in) | 0.1981 | 0.1893 | 0.1784 | 0.1657 | 0.1516 | 0.1538 | 0.1569 |
| (H-Hs) mm | 6.987 | 6.762 | 6.486 | 6.164 | 5.804 | 5.861 | 5.940 |
| Voids ratio | 0.638 | 0.618 | 0.592 | 0.563 | 0.530 | 0.535 | 0.543 |
| t90 (min) | | 3.80 | 3.80 | 3.24 | 2.56 | | |
| Cv (m ² /day) | | 0.026 | 0.025 | 0.028 | 0.034 | | |
| k' (MPa) | | 11.170 | 13.174 | 16.755 | 22.377 | | |
| Mv (mm ² / N) | | 0.0895 | 0.0759 | 0.0597 | 0.0447 | | |

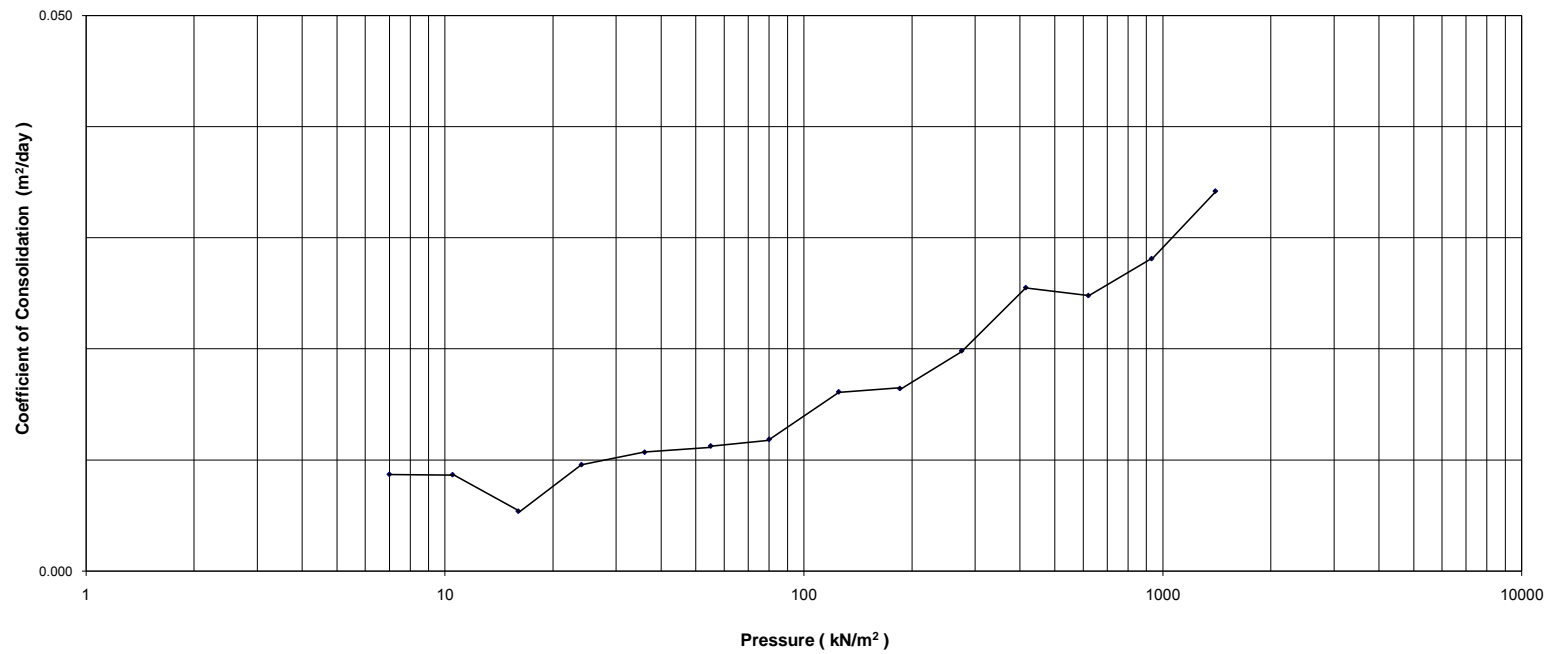
| | | | | | | | |
|--------------------------|--------|--------|--------|--------|--------|--------|--|
| Trial # | 36 | 37 | 38 | 39 | 40 | 41 | |
| Load (kPa) | 175.0 | 87.5 | 45.0 | 22.5 | 11.0 | 5.5 | |
| Load (tsf) | 1.82 | 0.91 | 0.468 | 0.234 | 0.1144 | 0.0572 | |
| Gauge Reading (in) | 0.1623 | 0.1685 | 0.1732 | 0.1806 | 0.1871 | 0.1942 | |
| (H-Hs) mm | 6.077 | 6.234 | 6.354 | 6.542 | 6.707 | 6.887 | |
| Voids ratio | 0.555 | 0.569 | 0.580 | 0.598 | 0.613 | 0.629 | |
| t90 (min) | | | | | | | |
| Cv (m ² /day) | | | | | | | |
| k' (MPa) | | | | | | | |
| Mv (mm ² / N) | | | | | | | |



| | | | |
|--|---------------------------|---------------------|-----|
| Project WINDSOR ESSEX PARKWAY | | | |
| TITLE CONSOLIDATION TEST SOIL SAMPLE ID: B12-2_TW16 BRIDGE B-12 | | | |
| Date Aug 2012 | JOB NO SW8801.1004.101 | FIGURE NO B.74-B | REV |



Coefficient of Consolidation Vs Pressure



Strain Energy Data

| Presssure (kN/m ²) | c _v (m ² /day) | Void ratio |
|-----------------------------------|---|------------|
| 5.0 | | 0.757 |
| 7.0 | 0.009 | 0.756 |
| 10.5 | 0.009 | 0.750 |
| 16.0 | 0.005 | 0.743 |
| 24.0 | 0.010 | 0.735 |
| 36.0 | 0.011 | 0.725 |
| 55.0 | 0.011 | 0.714 |
| 80.0 | 0.012 | 0.702 |
| 125.0 | 0.016 | 0.684 |
| 185.0 | 0.016 | 0.666 |
| 275.0 | 0.020 | 0.646 |
| 185.0 | | 0.647 |
| 125.0 | | 0.649 |
| 80.0 | | 0.653 |
| 55.0 | | 0.657 |
| 36.0 | | 0.662 |
| 24.0 | | 0.668 |
| 16.0 | | 0.673 |
| 10.5 | | 0.679 |
| 7.0 | | 0.685 |
| 10.5 | | 0.685 |
| 16.0 | | 0.682 |
| 24.0 | | 0.679 |
| 36.0 | | 0.673 |
| 55.0 | | 0.668 |
| 80.0 | | 0.662 |
| 125.0 | | 0.656 |
| 185.0 | | 0.649 |
| 275.0 | | 0.638 |
| 415.0 | 0.026 | 0.618 |
| 620.0 | 0.025 | 0.592 |
| 930.0 | 0.028 | 0.563 |
| 1400.0 | 0.034 | 0.530 |
| 700.0 | | 0.535 |
| 350.0 | | 0.543 |
| 175.0 | | 0.555 |
| 87.5 | | 0.569 |
| 45.0 | | 0.580 |
| 22.5 | | 0.598 |
| 11.0 | | 0.613 |
| 5.5 | | 0.629 |

| Presssure (kN/m ²) | Height mm | Total Work (kJ/m ³) |
|-----------------------------------|--------------|------------------------------------|
| 5.0 | 19.253 | 0.000 |
| 7.0 | 19.241 | 0.004 |
| 10.5 | 19.176 | 0.034 |
| 16.0 | 19.108 | 0.080 |
| 24.0 | 19.021 | 0.172 |
| 36.0 | 18.910 | 0.346 |
| 55.0 | 18.783 | 0.652 |
| 80.0 | 18.653 | 1.119 |
| 125.0 | 18.454 | 2.212 |
| 185.0 | 18.266 | 3.790 |
| 275.0 | 18.038 | 6.662 |
| 185.0 | 18.059 | 6.403 |
| 125.0 | 18.073 | 6.277 |
| 80.0 | 18.118 | 6.025 |
| 55.0 | 18.206 | 5.696 |
| 36.0 | 18.258 | 5.566 |
| 24.0 | 18.324 | 5.457 |
| 16.0 | 18.386 | 5.390 |
| 10.5 | 18.453 | 5.342 |
| 7.0 | 18.519 | 5.310 |
| 10.5 | 18.511 | 5.314 |
| 16.0 | 18.486 | 5.332 |
| 24.0 | 18.445 | 5.376 |
| 36.0 | 18.385 | 5.475 |
| 55.0 | 18.326 | 5.620 |
| 80.0 | 18.266 | 5.838 |
| 125.0 | 18.197 | 6.230 |
| 185.0 | 18.117 | 6.912 |
| 275.0 | 18.001 | 8.379 |
| 415.0 | 17.776 | 12.687 |
| 620.0 | 17.501 | 20.710 |
| 930.0 | 17.178 | 34.996 |
| 1400.0 | 16.819 | 59.370 |
| 700.0 | 16.876 | 55.802 |
| 350.0 | 16.954 | 53.369 |
| 175.0 | 17.091 | 51.245 |
| 87.5 | 17.249 | 50.036 |
| 45.0 | 17.369 | 49.575 |
| 22.5 | 17.556 | 49.210 |
| 11.0 | 17.722 | 49.052 |
| 5.5 | 17.901 | 48.969 |

Project

WINDSOR ESSEX PARKWAY

TITLE

CONSOLIDATION TEST
 SOIL SAMPLE ID: B12-2_TW16
 BRIDGE B-12

Date

Aug 2012

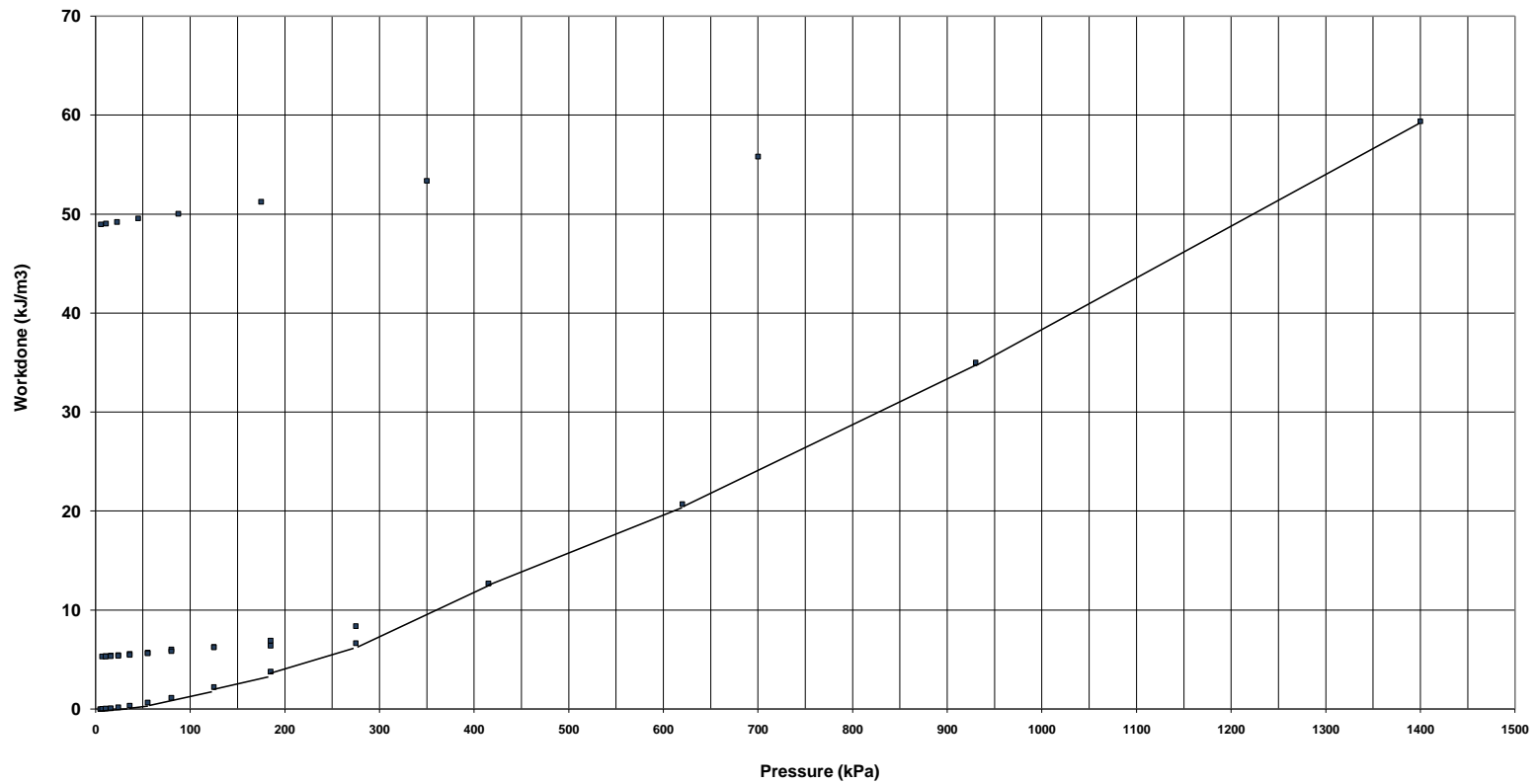
JOB NO

SW8801.1004.101

FIGURE NO
B.74-E

REV

Strain Energy Method for Preconsolidation Pressure



ONE DIMENSIONAL CONSOLIDATION TEST (ASTM D 2435)

Project: **WEP**
 Client: **Hatch Mott MacDonald**
 Date: **21-Jun-11**

Job No.: **SW8801.1004.101**
 Sample ID: **B15-1_TW23**
 Depth(m): **22.9 to 23.5**

Test Data

| | | | | | |
|---|---|--------------------|--------|--|--------|
| Ring # : | B | Ring Height (in) = | 0.750 | Wt of dry filter paper (g) | 0.7 |
| Wet soil + Ring Wt (g) | | | 212.98 | Wt of ring (g) | 76.52 |
| Wet soil + Wet Paper + Ring (g) | | | 210.45 | Wet Paper (g) | 2.07 |
| Dry Soil + Dry Paper + Ring (g) | | | 197.47 | Ring Dia (in) | 2.498 |
| Initial moisture Content (%) | | | 13.48 | Final moisture Content (%) | 9.65 |
| Area of Ring (in ²) | | | 4.90 | Initial Volume (in ³) | 3.6757 |
| Initial Bulk Density (kg/m ³) | | | 2266 | Initial Dry Density (kg/m ³) | 1996 |
| Specific Gravity of Soil | | | 2.74 | Equiv. Thick. of solids (mm) | 13.860 |
| Final Bulk Density (kg/m ³) | | | 2380 | Final Dry Density (kg/m ³) | 2097 |
| Initial gauge reading for Load 1 | | | 0.2578 | Gauge reading for last Loading | 0.1976 |
| Initial Voids Ratio | | | 0.374 | Final Void Ratio | 0.264 |
| Initial Degree of Saturation (%) | | | 99 | Final Degree of Saturation (%) | 100 |

| | | | | | | | |
|--------------------------|--------|--------|--------|--------|--------|---------|--------|
| Trial # | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| Load (kPa) | 5.0 | 7.5 | 11.5 | 16.0 | 25.0 | 37.0 | 55.0 |
| Load (tsf) | 0.052 | 0.078 | 0.120 | 0.166 | 0.260 | 0.385 | 0.572 |
| Gauge Reading (in) | 0.2550 | 0.2539 | 0.2517 | 0.2494 | 0.2466 | 0.24347 | 0.2400 |
| (H-Hs) mm | 5.118 | 5.091 | 5.035 | 4.976 | 4.904 | 4.826 | 4.739 |
| Voids ratio | 0.369 | 0.367 | 0.363 | 0.359 | 0.354 | 0.348 | 0.342 |
| t90 (min) | | 13.69 | 27.04 | 26.52 | 12.96 | 9.00 | 9.00 |
| Cv (m ² /day) | | 0.008 | 0.004 | 0.004 | 0.008 | 0.012 | 0.012 |
| k' (MPa) | | 1.779 | 1.344 | 1.455 | 2.358 | 2.878 | 3.849 |
| Mv (mm ² / N) | | 0.5621 | 0.7439 | 0.6871 | 0.4240 | 0.3474 | 0.2598 |

| | | | | | | | |
|--------------------------|---------|--------|--------|--------|--------|--------|--------|
| Trial # | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
| Load (kPa) | 85.0 | 125.0 | 185.0 | 280.0 | 185.0 | 125.0 | 85.0 |
| Load (tsf) | 0.884 | 1.300 | 1.924 | 2.912 | 1.924 | 1.300 | 0.884 |
| Gauge Reading (in) | 0.23567 | 0.2314 | 0.2265 | 0.2209 | 0.2210 | 0.2210 | 0.2213 |
| (H-Hs) mm | 4.628 | 4.519 | 4.394 | 4.253 | 4.256 | 4.254 | 4.262 |
| Voids ratio | 0.334 | 0.326 | 0.317 | 0.307 | 0.307 | 0.307 | 0.307 |
| t90 (min) | 4.84 | 4.41 | 3.80 | 2.56 | | | |
| Cv (m ² /day) | 0.022 | 0.024 | 0.027 | 0.039 | | | |
| k' (MPa) | 5.038 | 6.787 | 8.806 | 12.301 | | | |
| Mv (mm ² / N) | 0.1985 | 0.1473 | 0.1136 | 0.0813 | | | |

| | | | | | | | |
|--------------------------|---------|--------|--------|--------|--------|--------|--------|
| Trial # | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
| Load (kPa) | 55.0 | 37.0 | 25.0 | 16.0 | 11.0 | 7.5 | 11.0 |
| Load (tsf) | 0.572 | 0.385 | 0.260 | 0.166 | 0.114 | 0.078 | 0.114 |
| Gauge Reading (in) | 0.22178 | 0.2224 | 0.2229 | 0.2235 | 0.2242 | 0.2249 | 0.2248 |
| (H-Hs) mm | 4.275 | 4.290 | 4.304 | 4.320 | 4.337 | 4.354 | 4.352 |
| Voids ratio | 0.308 | 0.310 | 0.311 | 0.312 | 0.313 | 0.314 | 0.314 |
| t90 (min) | | | | | | | |
| Cv (m ² /day) | | | | | | | |
| k' (MPa) | | | | | | | |
| Mv (mm ² / N) | | | | | | | |



Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATION TEST
BRIDGE B-15 (B15-1-SA23)**

Date

Aug 2012

JOB NO

SW8801.1004.101

FIGURE NO.
B.75-A

REV

| | | | | | | | |
|--------------------------|---------|--------|--------|--------|--------|--------|--------|
| Trial # | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
| Load (kPa) | 16.0 | 25.0 | 37.0 | 55.0 | 85.0 | 125.0 | 185.0 |
| Load (tsf) | 0.1664 | 0.260 | 0.385 | 0.572 | 0.884 | 1.300 | 1.924 |
| Gauge Reading (in) | 0.22456 | 0.2241 | 0.2237 | 0.2231 | 0.2225 | 0.2218 | 0.2210 |
| (H-Hs) mm | 4.346 | 4.335 | 4.323 | 4.309 | 4.293 | 4.276 | 4.254 |
| Voids ratio | 0.314 | 0.313 | 0.312 | 0.311 | 0.310 | 0.308 | 0.307 |
| t90 (min) | | | | | | | |
| Cv (m ² /day) | | | | | | | |
| k' (MPa) | | | | | | | |
| Mv (mm ² / N) | | | | | | | |

| | | | | | | | |
|--------------------------|---------|--------|--------|--------|--------|--------|--------|
| Trial # | 29 | 30 | 31 | 32 | 33 | 34 | 35 |
| Load (kPa) | 280.0 | 420.0 | 630.0 | 945.0 | 1415.0 | 710.0 | 350.0 |
| Load (tsf) | 2.912 | 4.368 | 6.552 | 9.828 | 14.716 | 7.384 | 3.640 |
| Gauge Reading (in) | 0.21902 | 0.2145 | 0.2084 | 0.2018 | 0.1951 | 0.1958 | 0.1964 |
| (H-Hs) mm | 4.205 | 4.091 | 3.935 | 3.768 | 3.596 | 3.616 | 3.630 |
| Voids ratio | 0.303 | 0.295 | 0.284 | 0.272 | 0.259 | 0.261 | 0.262 |
| t90 (min) | | 3.06 | 2.40 | 2.56 | 2.10 | | |
| Cv (m ² /day) | | 0.032 | 0.041 | 0.037 | 0.045 | | |
| k' (MPa) | | 22.078 | 24.290 | 33.438 | 48.323 | | |
| Mv (mm ² / N) | | 0.0453 | 0.0412 | 0.0299 | 0.0207 | | |

| | | | | | | | |
|--------------------------|--------|--------|--------|--------|--------|--------|--|
| Trial # | 36 | 37 | 38 | 39 | 40 | 41 | |
| Load (kPa) | 175.0 | 90.0 | 45.0 | 22.0 | 11.0 | 5.5 | |
| Load (tsf) | 1.82 | 0.936 | 0.468 | 0.2288 | 0.1144 | 0.0572 | |
| Gauge Reading (in) | 0.1976 | 0.1989 | 0.2002 | 0.2022 | 0.2041 | 0.2063 | |
| (H-Hs) mm | 3.661 | 3.694 | 3.728 | 3.777 | 3.826 | 3.881 | |
| Voids ratio | 0.264 | 0.267 | 0.269 | 0.273 | 0.276 | 0.280 | |
| t90 (min) | | | | | | | |
| Cv (m ² /day) | | | | | | | |
| k' (MPa) | | | | | | | |
| Mv (mm ² / N) | | | | | | | |



Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATION TEST
BRIDGE B-15 (B15-1-SA23)**

Date

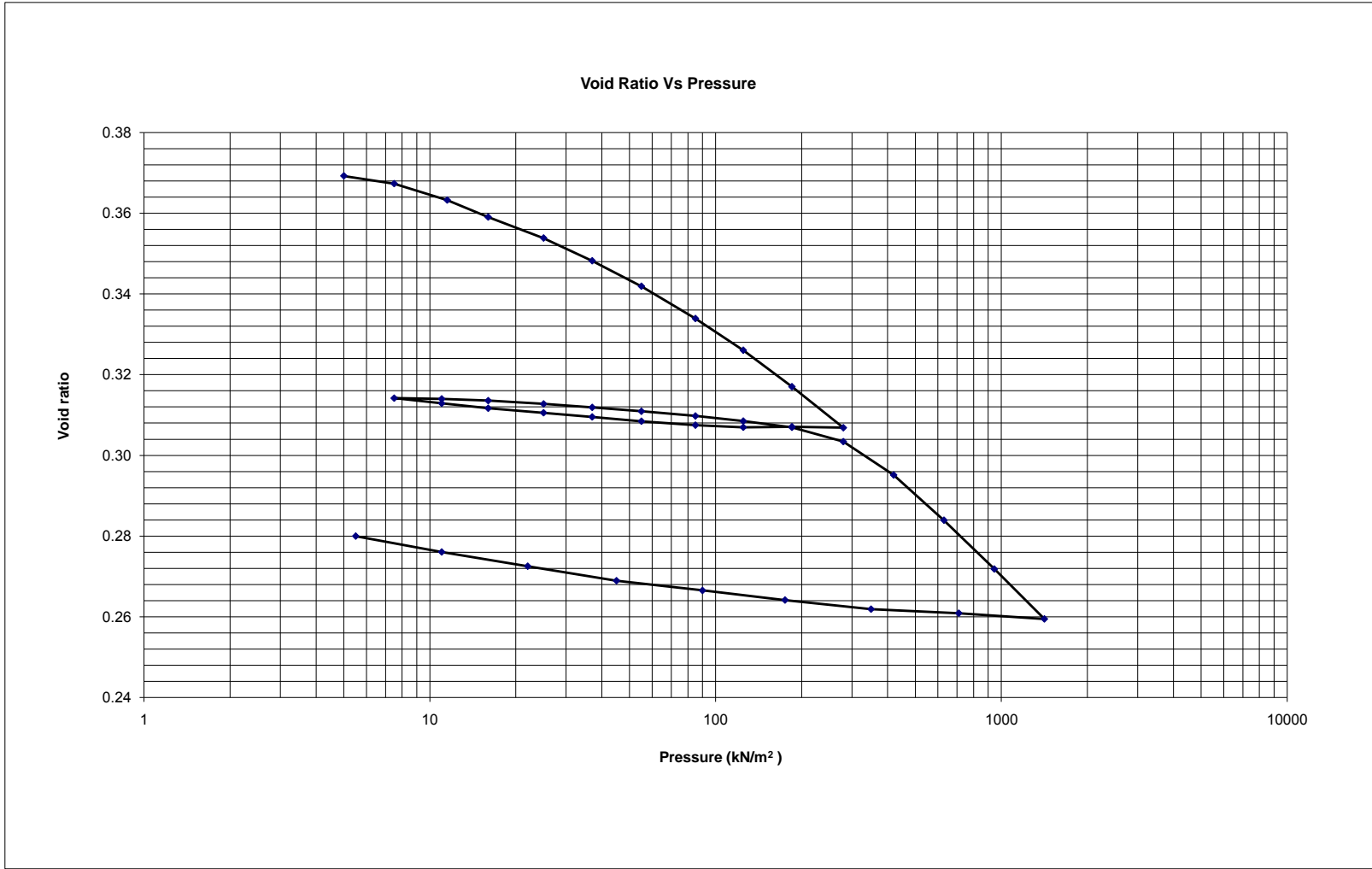
Aug 2012

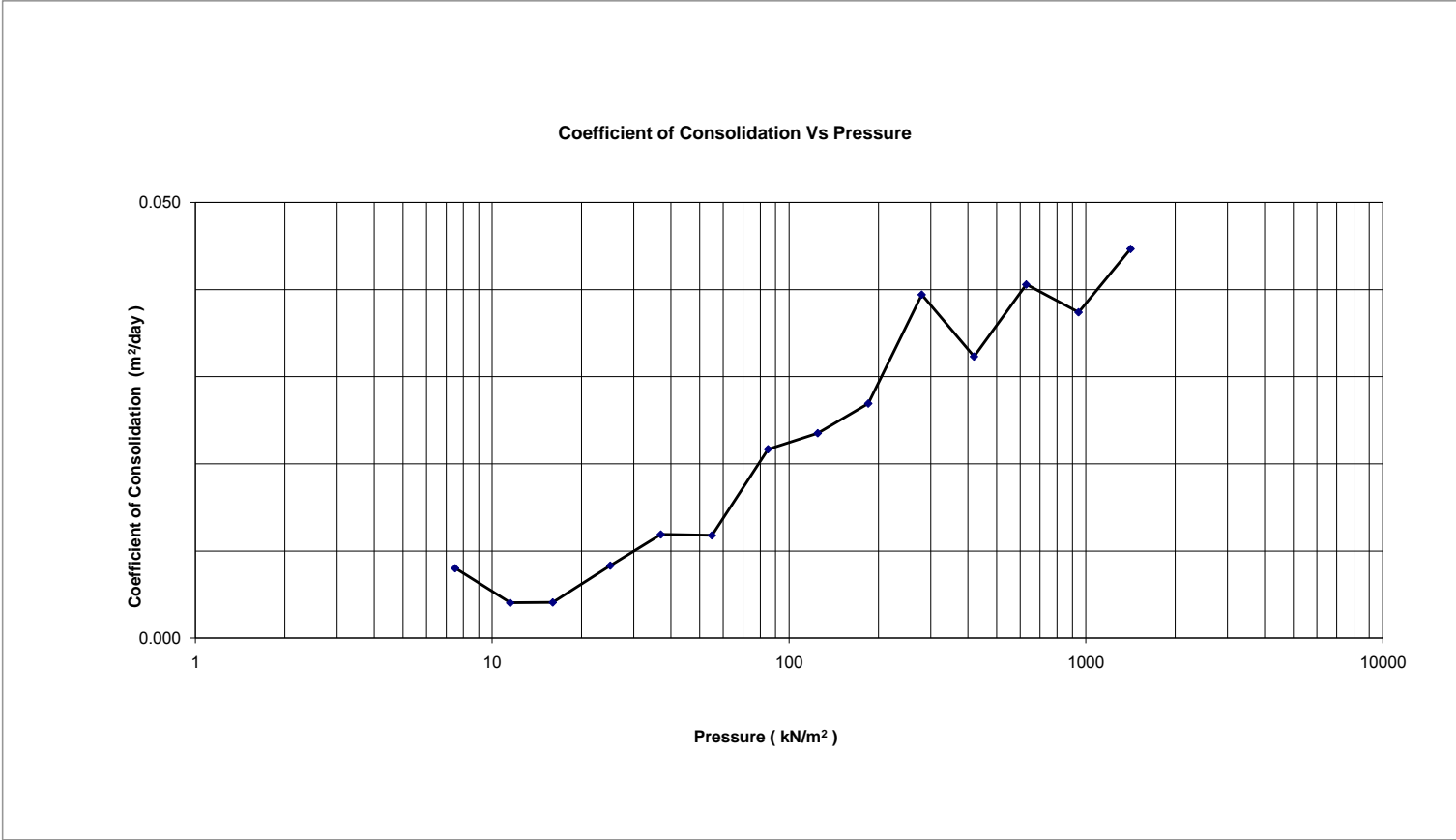
JOB NO

SW8801.1004.101

FIGURE NO.
B.75-B

REV





Strain Energy Data

| Presssure (kN/m ²) | c _v (m ² /day) | Void ratio | Presssure (kN/m ²) | Height mm | Total Work (KJ/m ³) |
|-----------------------------------|---|------------|-----------------------------------|--------------|------------------------------------|
| 5.0 | | 0.369 | 5.0 | 19.050 | 0.000 |
| 7.5 | 0.008 | 0.367 | 7.5 | 19.023 | 0.009 |
| 11.5 | 0.004 | 0.363 | 11.5 | 18.967 | 0.037 |
| 16.0 | 0.004 | 0.359 | 16.0 | 18.909 | 0.079 |
| 25.0 | 0.008 | 0.354 | 25.0 | 18.837 | 0.157 |
| 37.0 | 0.012 | 0.348 | 37.0 | 18.758 | 0.286 |
| 55.0 | 0.012 | 0.342 | 55.0 | 18.671 | 0.500 |
| 85.0 | 0.022 | 0.334 | 85.0 | 18.560 | 0.915 |
| 125.0 | 0.024 | 0.326 | 125.0 | 18.451 | 1.532 |
| 185.0 | 0.027 | 0.317 | 185.0 | 18.326 | 2.584 |
| 280.0 | 0.039 | 0.307 | 280.0 | 18.185 | 4.372 |
| 185.0 | | 0.307 | 185.0 | 18.188 | 4.330 |
| 125.0 | | 0.307 | 125.0 | 18.187 | 4.345 |
| 85.0 | | 0.307 | 85.0 | 18.194 | 4.303 |
| 55.0 | | 0.308 | 55.0 | 18.215 | 4.223 |
| 37.0 | | 0.310 | 37.0 | 18.230 | 4.185 |
| 25.0 | | 0.311 | 25.0 | 18.244 | 4.161 |
| 16.0 | | 0.312 | 16.0 | 18.259 | 4.144 |
| 11.0 | | 0.313 | 11.0 | 18.276 | 4.131 |
| 7.5 | | 0.314 | 7.5 | 18.294 | 4.122 |
| 11.0 | | 0.314 | 11.0 | 18.292 | 4.123 |
| 16.0 | | 0.314 | 16.0 | 18.285 | 4.128 |
| 25.0 | | 0.313 | 25.0 | 18.274 | 4.140 |
| 37.0 | | 0.312 | 37.0 | 18.262 | 4.161 |
| 55.0 | | 0.311 | 55.0 | 18.249 | 4.195 |
| 85.0 | | 0.310 | 85.0 | 18.233 | 4.256 |
| 125.0 | | 0.308 | 125.0 | 18.215 | 4.357 |
| 185.0 | | 0.307 | 185.0 | 18.194 | 4.541 |
| 280.0 | | 0.303 | 280.0 | 18.145 | 5.167 |
| 420.0 | 0.032 | 0.295 | 420.0 | 18.030 | 7.377 |
| 630.0 | 0.041 | 0.284 | 630.0 | 17.875 | 11.896 |
| 945.0 | 0.037 | 0.272 | 945.0 | 17.707 | 19.281 |
| 1415.0 | 0.045 | 0.259 | 1415.0 | 17.536 | 30.706 |
| 710.0 | | 0.261 | 710.0 | 17.556 | 29.506 |
| 350.0 | | 0.262 | 350.0 | 17.569 | 29.092 |
| 175.0 | | 0.264 | 175.0 | 17.601 | 28.625 |
| 90.0 | | 0.267 | 90.0 | 17.634 | 28.377 |
| 45.0 | | 0.269 | 45.0 | 17.667 | 28.248 |
| 22.0 | | 0.273 | 22.0 | 17.717 | 28.154 |
| 11.0 | | 0.276 | 11.0 | 17.766 | 28.108 |
| 5.5 | | 0.280 | 5.5 | 17.820 | 28.083 |

Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATION TEST
BRIDGE B-15 (B15-1-SA23)**

Date

Aug 2012

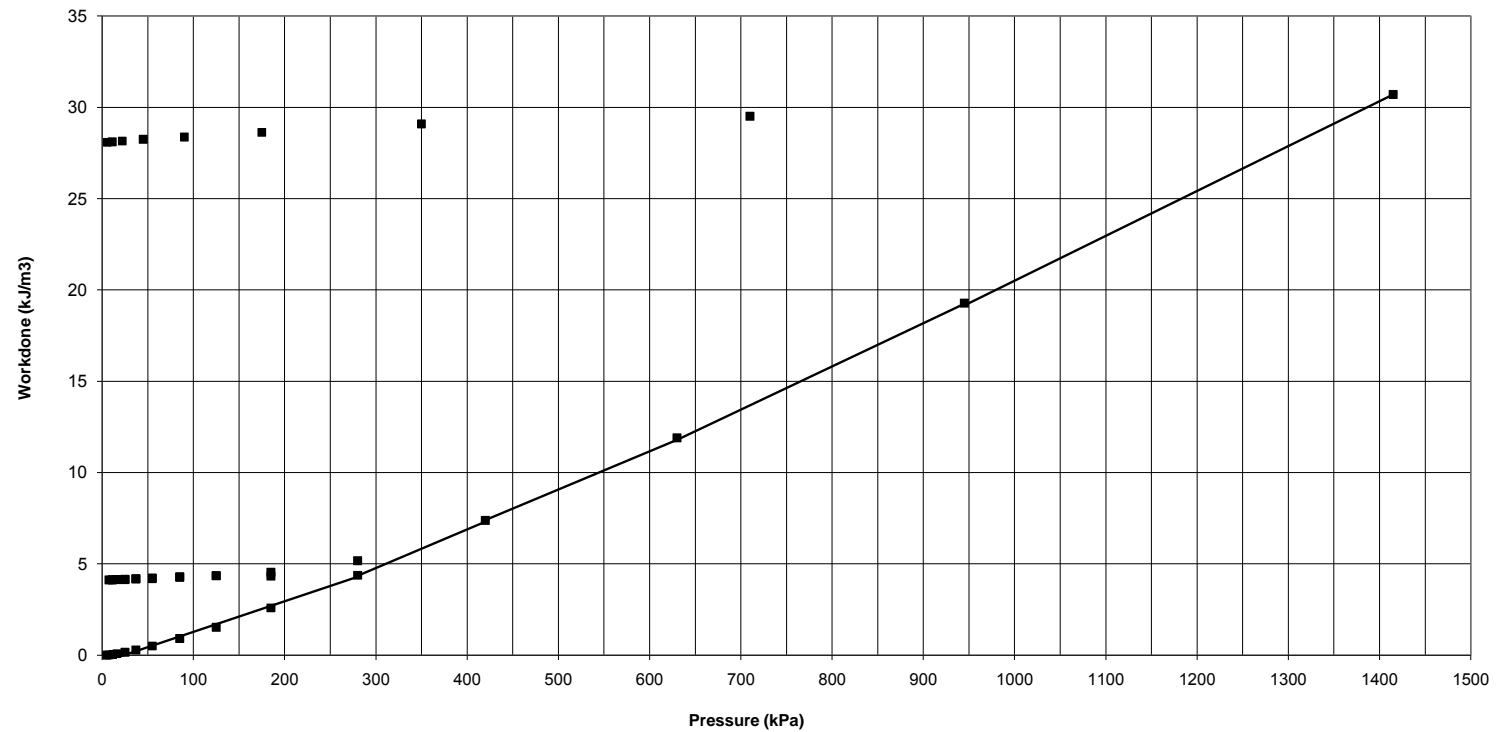
JOB NO

SW8801.1004.101

FIGURE NO.
B.75-E

REV

Strain Energy Method for Preconsolidation Pressure



DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS (ASTM D 3080)

Page 1 of 5

Project:- WEP
Client:- Hatch Mott MacDonald
Sample ID.: T6-3_TW15
Lab No.: AdS090_2011

Job#: SW8801.1004.101
Date: 14 November 2011
Tested By: CZ/SB
Checked By: SB

| Specimen ID | 1 | 2 | 3 |
|------------------------------------|-----------|-----------|-----------|
| Date of Test | 15-Nov-11 | 16-Nov-11 | 17-Nov-11 |
| Normal Stress (kPa) | 80 | 160 | 240 |
| Rate of displacement (mm/min) | 0.05 | 0.06 | 0.06 |
| Initial thickness of specimen (mm) | 24.10 | 24.10 | 24.10 |
| Initial diameter of specimen (mm) | 63.30 | 63.30 | 63.30 |
| Initial moisture content (%) | 16.0 | 15.2 | 15.2 |
| Density (kN/m ³) | 8.4 | 7.9 | 8.1 |
| Final moisture (%) | 15.3 | 15.3 | 13.1 |

| Specimen ID | Normal Stress | Peak Shear Stress | Residual Shear Stress |
|-------------|---------------|-------------------|-----------------------|
| | kPa | kPa | kPa |
| 1 | 80.0 | 51.4 | 49.8 |
| 2 | 160.0 | 89.5 | 86.6 |
| 3 | 240.0 | 139.3 | 137.0 |

Note: Test specimens were inundated with water.



Project

WINDSOR ESSEX PARKWAY

TITLE

DIRECT SHEAR TEST
TUNNEL T-6 (T6-3-SA15)

Date

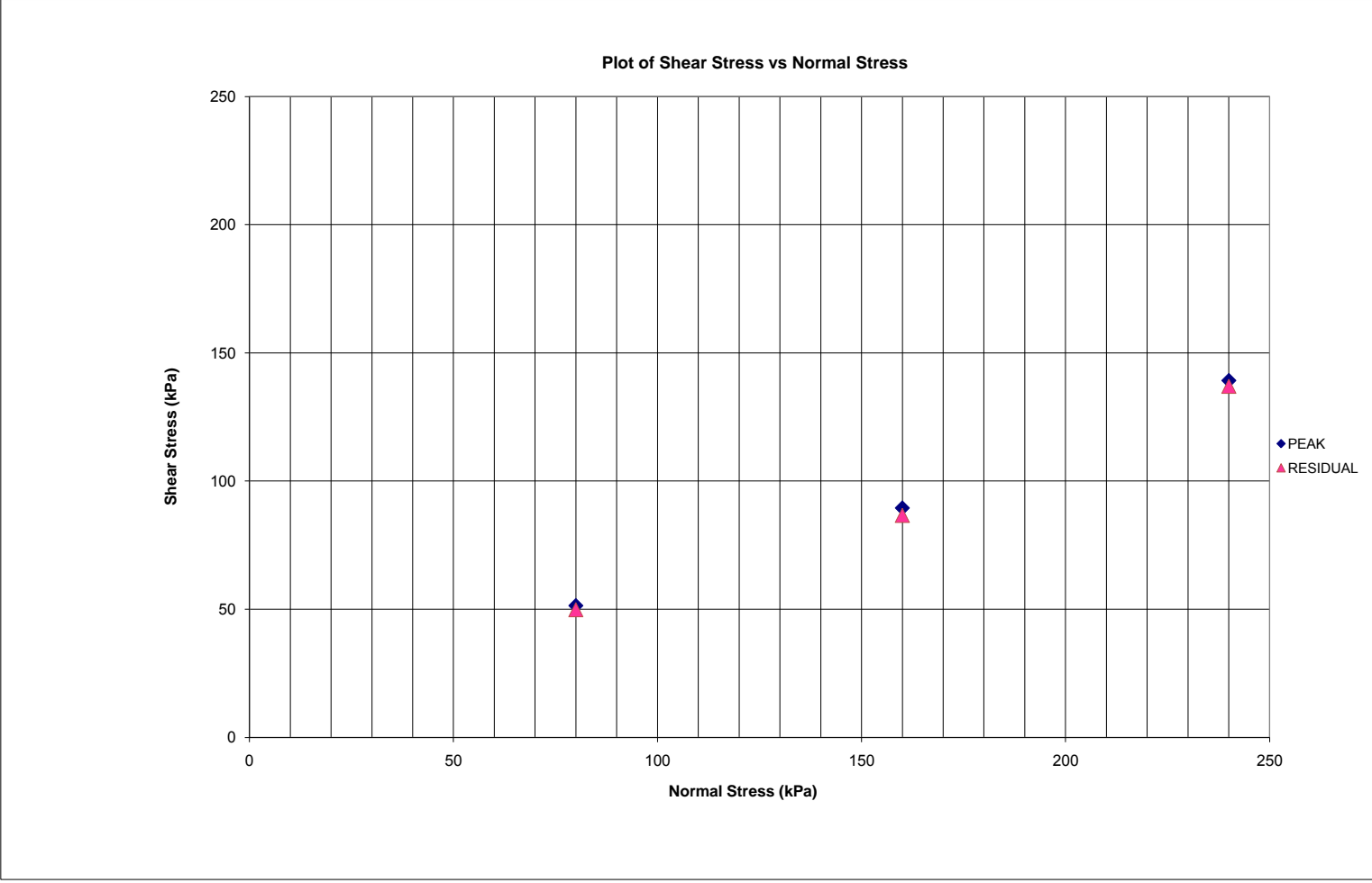
Aug 2012

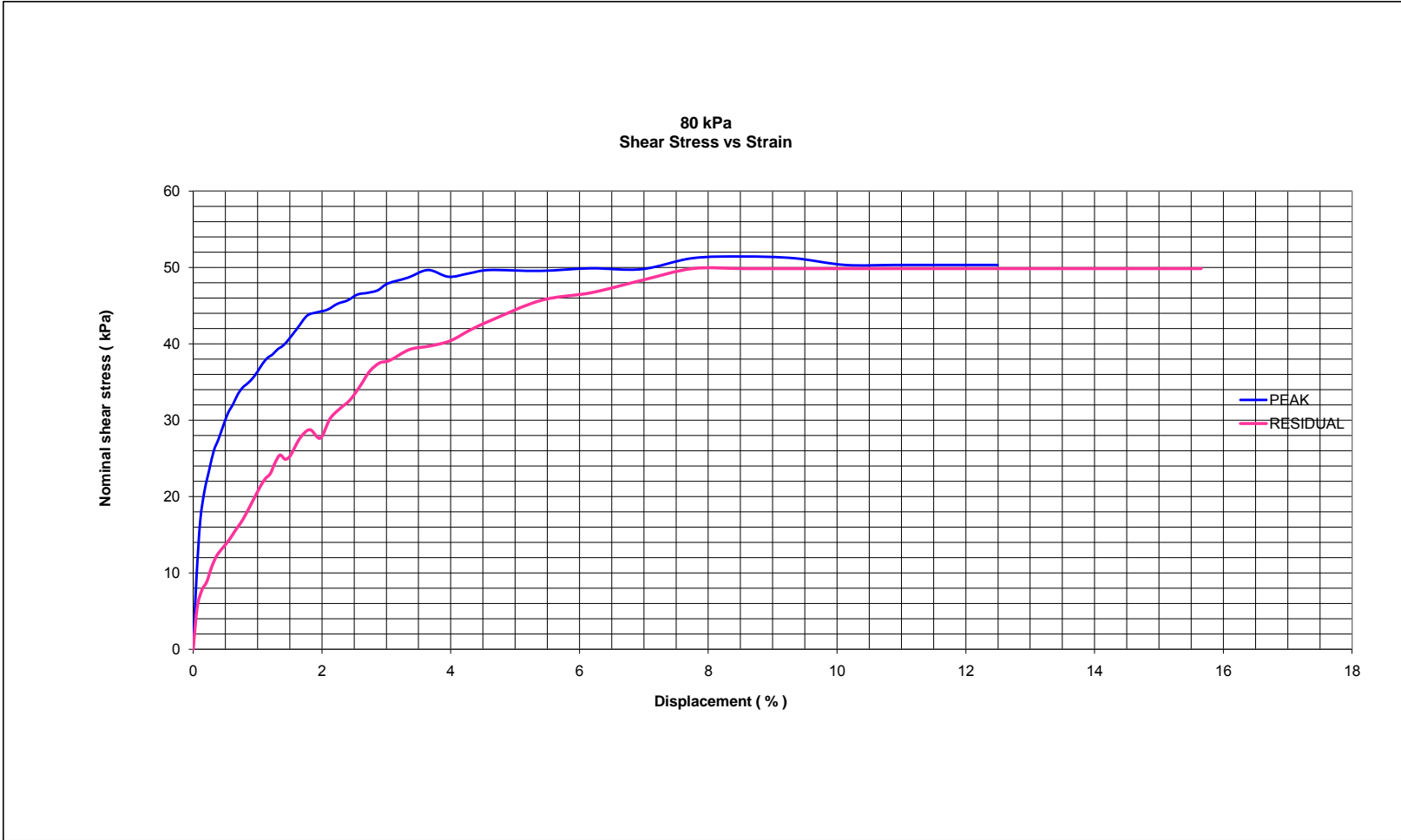
JOB NO

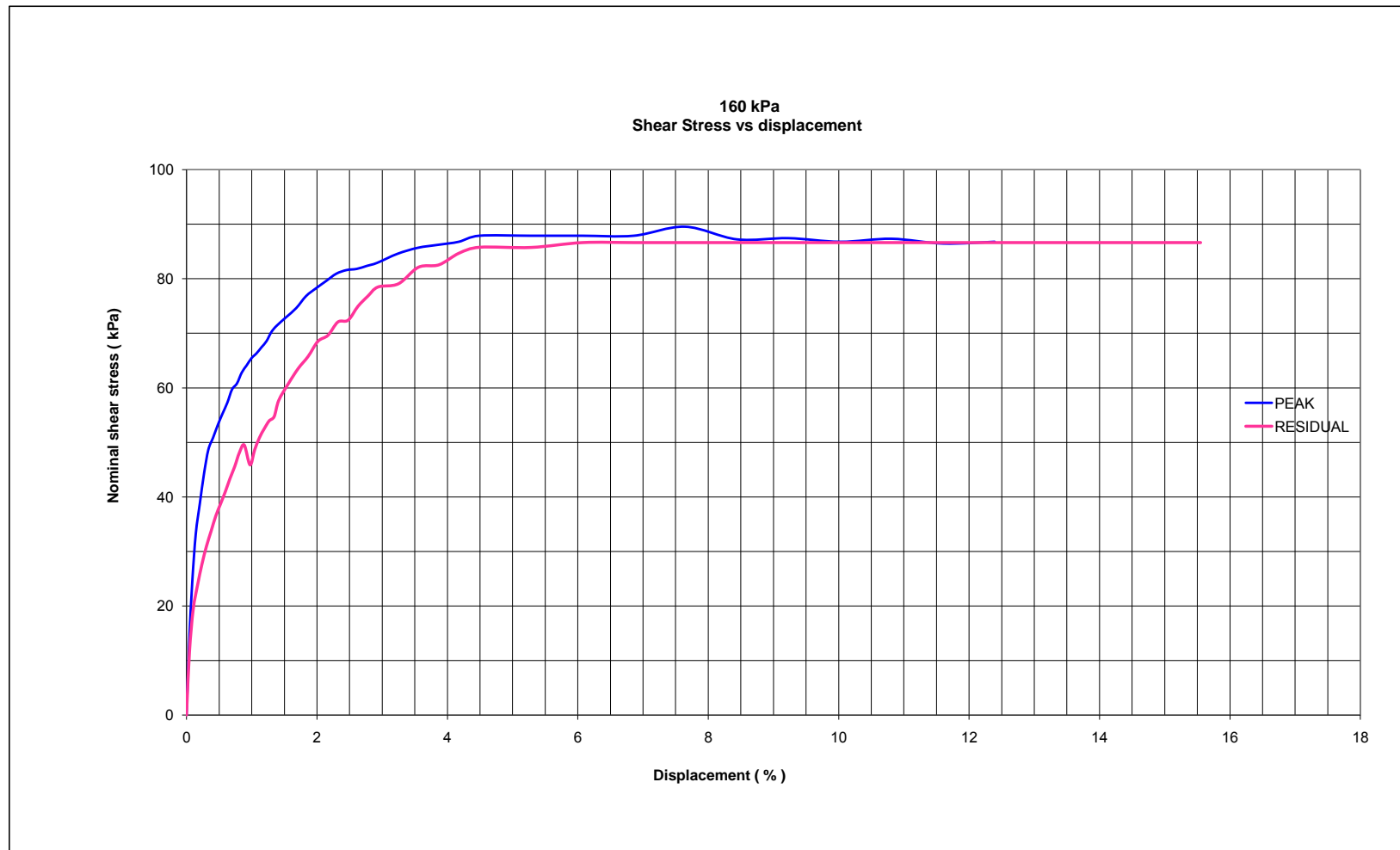
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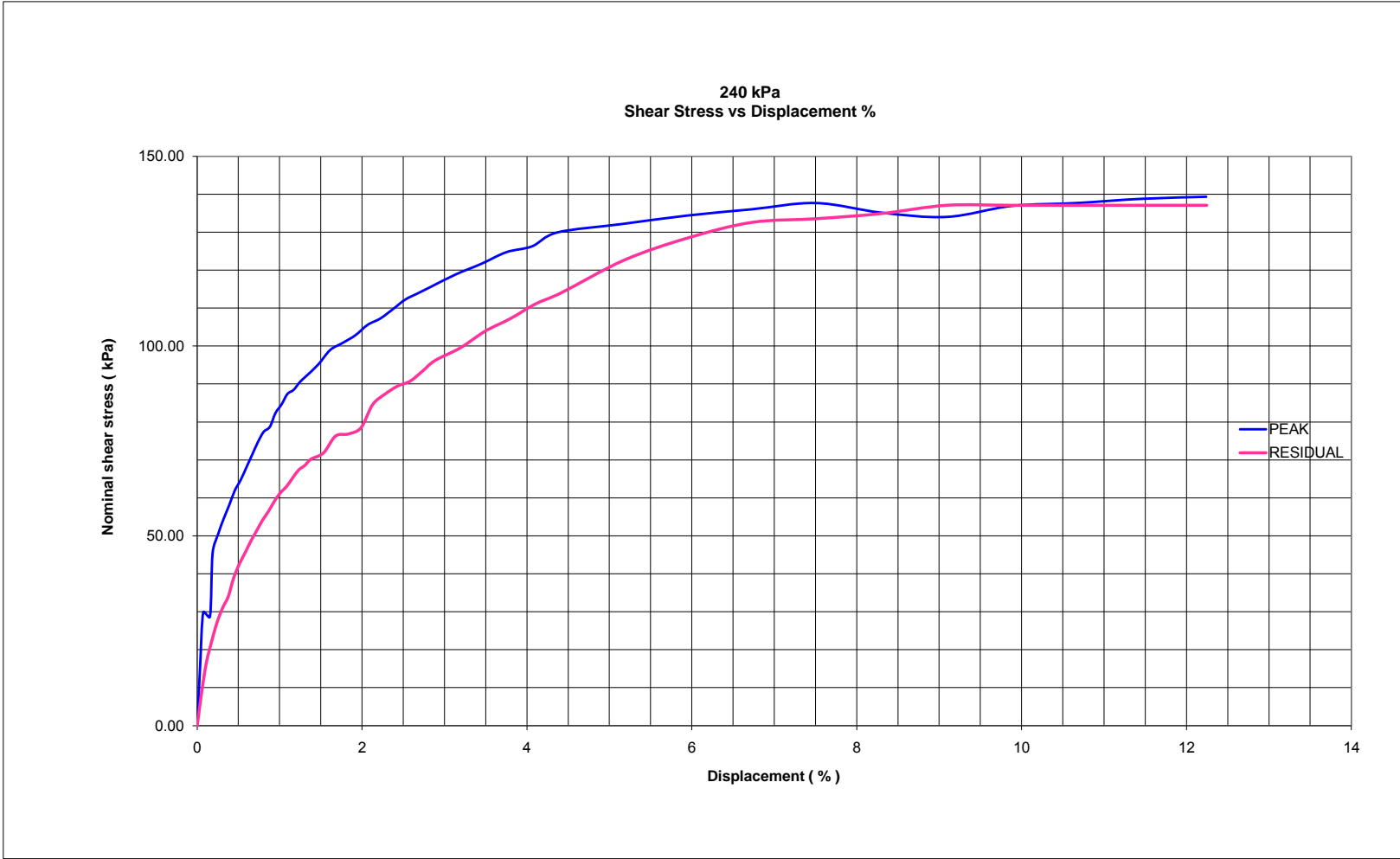
FIGURE NO.
B.76-A

REV









DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS (ASTM D 3080)

Page 1 of 5

Project:- **WEP**
 Client:- **Hatch Mott MacDonald**
 Sample ID.: **B9-1_TW13**
 Lab No.: **AdS077_2011**

Job#: **SW8801.1004.101**
 Date: **19 October 2011**
 Tested By: **CZ/SB**
 Checked By: **SB**

| Specimen ID | 1 | 2 | 3 |
|------------------------------------|-----------|-----------|-----------|
| Date of Test | 19-Oct-11 | 20-Oct-11 | 21-Oct-11 |
| Normal Stress (kPa) | 70 | 140 | 210 |
| Rate of displacement (mm/min) | 0.02 | 0.02 | 0.03 |
| Initial thickness of specimen (mm) | 24.10 | 24.10 | 24.10 |
| Initial diameter of specimen (mm) | 63.30 | 63.30 | 63.30 |
| Initial moisture content (%) | 42.1 | 33.2 | 36.7 |
| Density (kN/m ³) | 18.4 | 19.3 | 18.8 |
| Final moisture (%) | 38.3 | 27.2 | 29.2 |

| Specimen ID | Normal Stress | Peak Shear Stress | Residual Shear Stress |
|-------------|---------------|-------------------|-----------------------|
| | kPa | kPa | kPa |
| 1 | 70.0 | 33.7 | 27.1 |
| 2 | 140.0 | 70.9 | 53.9 |
| 3 | 210.0 | 100.5 | 96.3 |

Note: Test specimens were inundated with water.



Project

WINDSOR ESSEX PARKWAY

TITLE

DIRECT SHEAR TEST
BRIDGE B9 (B9-1-SA13)

Date

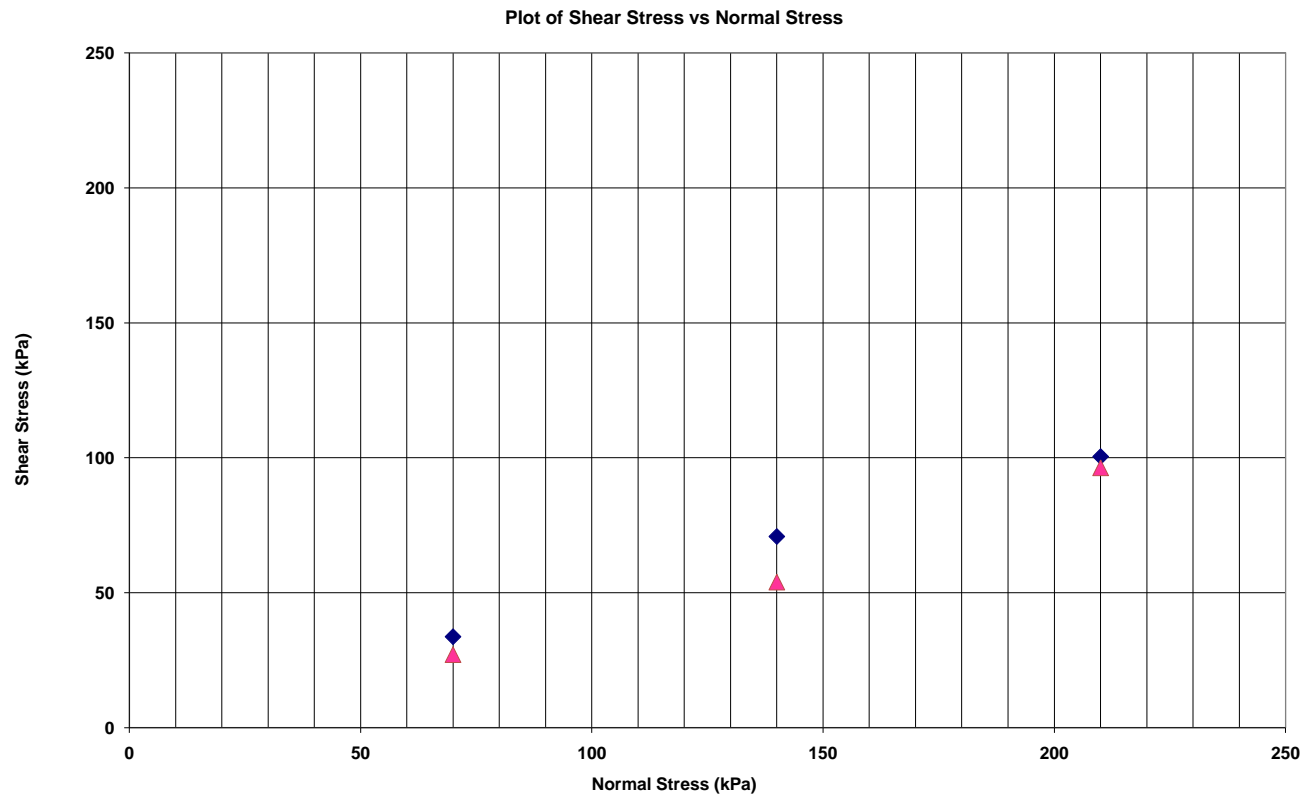
Aug 2012

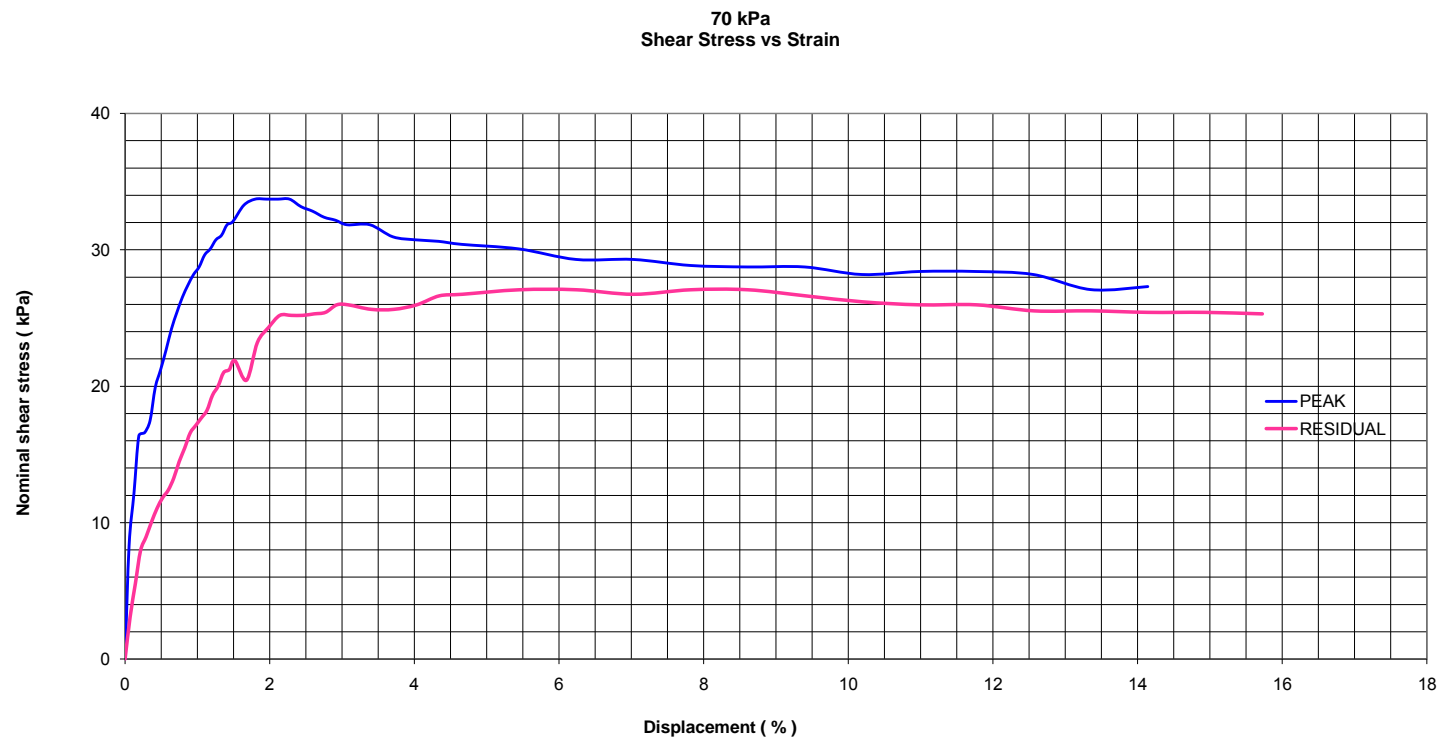
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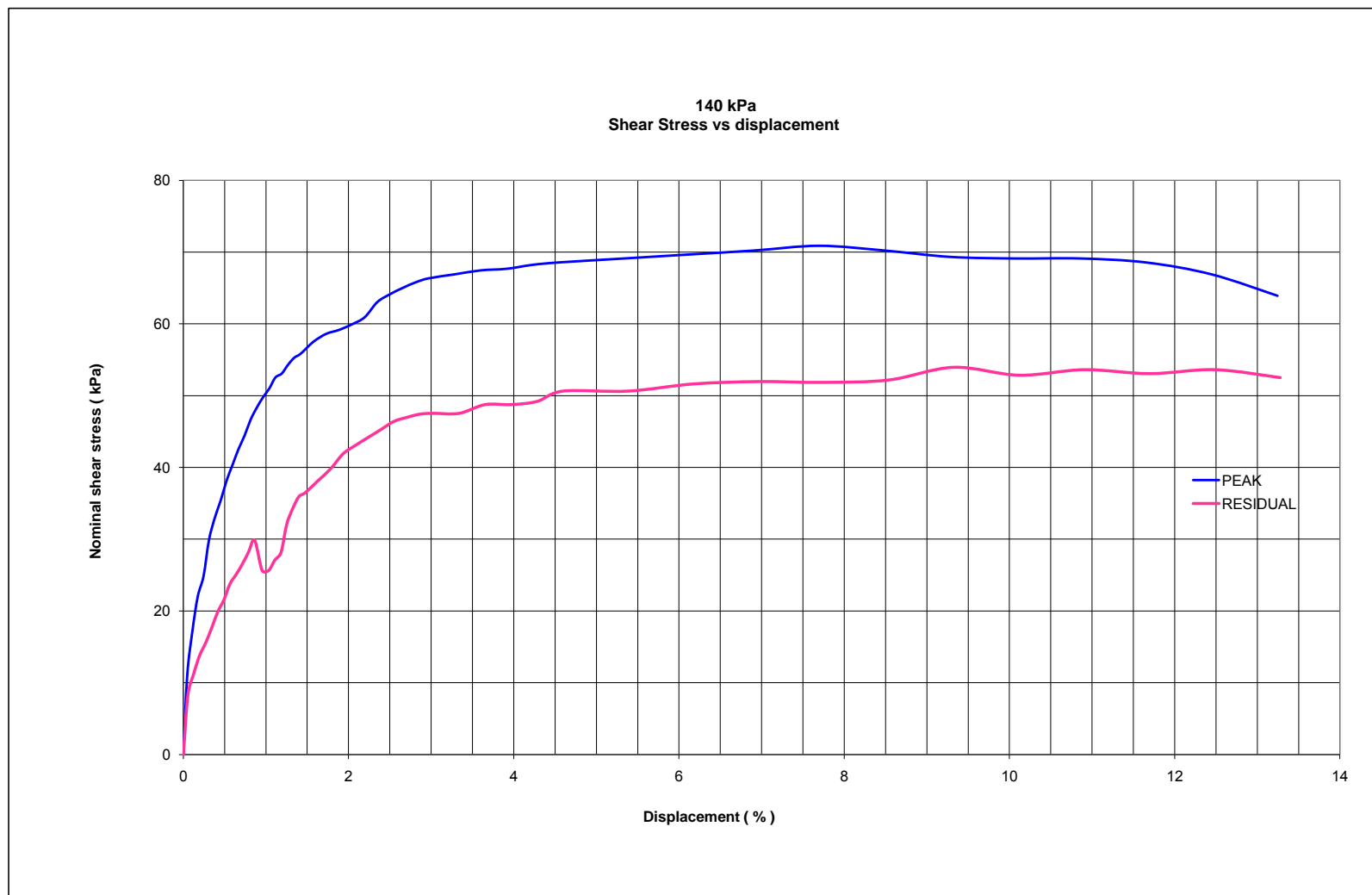
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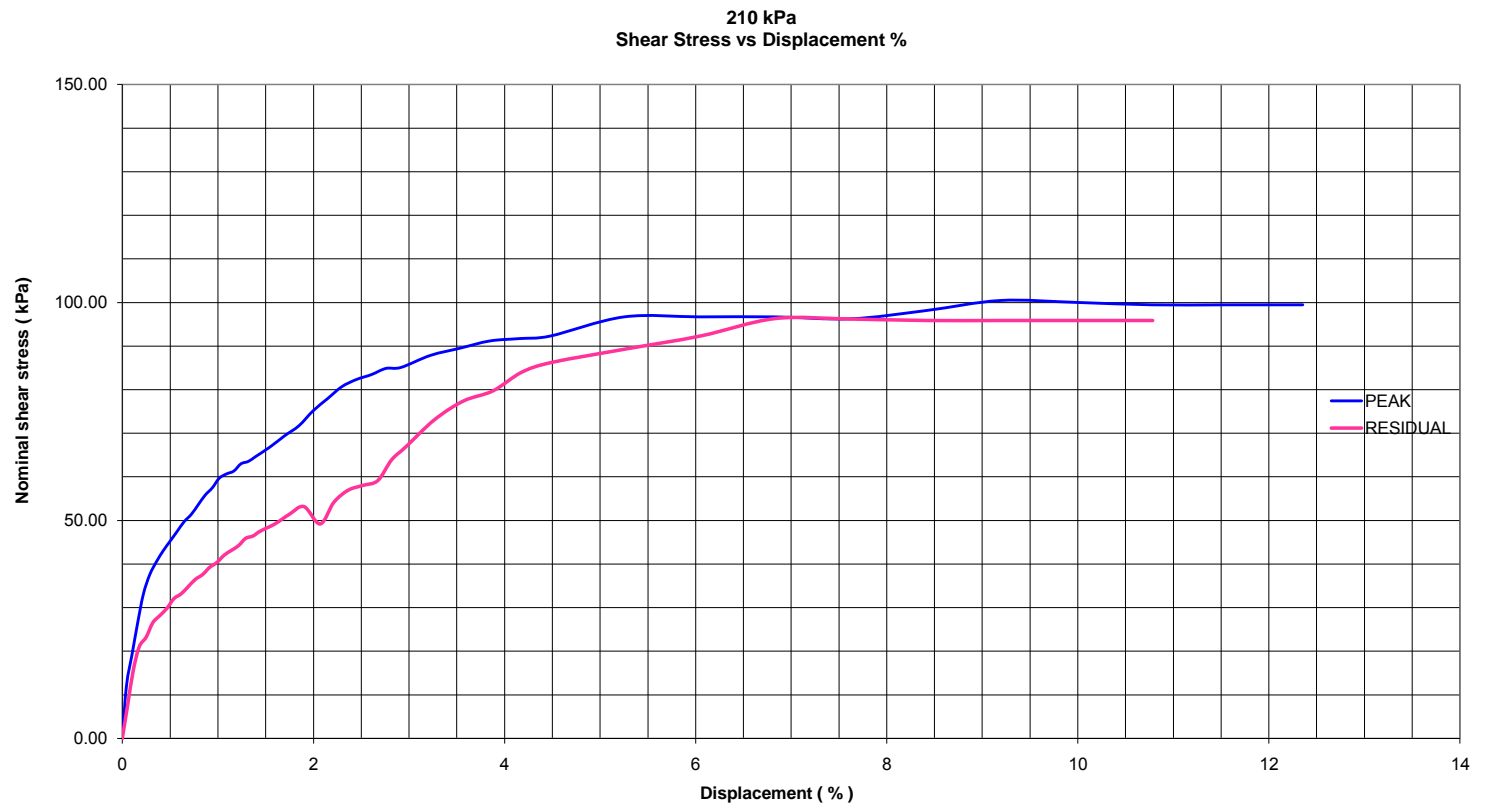
FIGURE NO.
B.77-A

REV









DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS (ASTM D 3080)

Page 1 of 5

Project:- WEP
 Client:- Hatch Mott MacDonald
 Sample ID.: T7-1_TW20
 Lab No.: AdS092_2011

Job#: SW8801.1004.101
 Date: 01 December 2011
 Tested By: CZ/SB
 Checked By: SB

| Specimen ID | 1 | 2 | 3 |
|---|-----------|-----------|-----------|
| Date of Test | 01-Dec-11 | 03-Dec-11 | 05-Dec-11 |
| Normal Stress (kPa) | 150 | 275 | 350 |
| Rate of displacement (mm/min) | 0.04 | 0.013 | 0.012 |
| Initial thickness of specimen (mm) | 24.10 | 24.10 | 24.10 |
| Initial diameter of specimen (mm) | 63.30 | 63.30 | 63.30 |
| Initial moisture content (%) | 20.6 | 19.5 | 20.2 |
| Initial Bulk Density (kN/m ³) | 20.2 | 20.6 | 20.4 |
| Final moisture (%) | 19.9 | 17.4 | 16.8 |

| Specimen ID | Normal Stress | Peak Shear Stress | Residual Shear Stress |
|-------------|---------------|-------------------|-----------------------|
| | kPa | kPa | kPa |
| 1 | 150.0 | 81.3 | 79.4 |
| 2 | 275.0 | 158.6 | 154.2 |
| 3 | 350.0 | 186.6 | 184.6 |

Note: Test specimens were inundated with water.



Project

WINDSOR ESSEX PARKWAY

TITLE

DIRECT SHEAR TEST
TUNNEL T-7 (T7-1-SA20)

Date

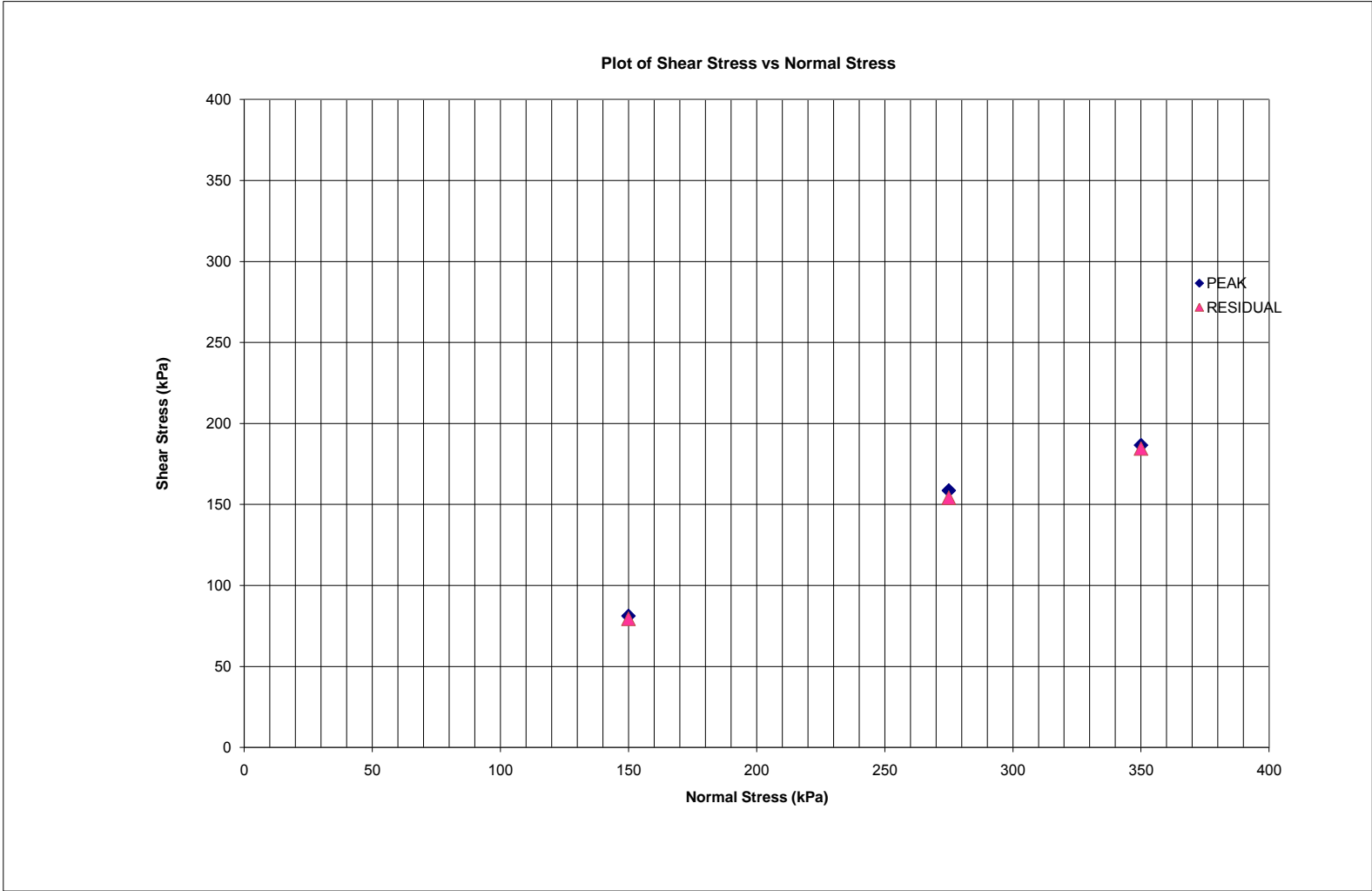
Aug 2012

JOB NO

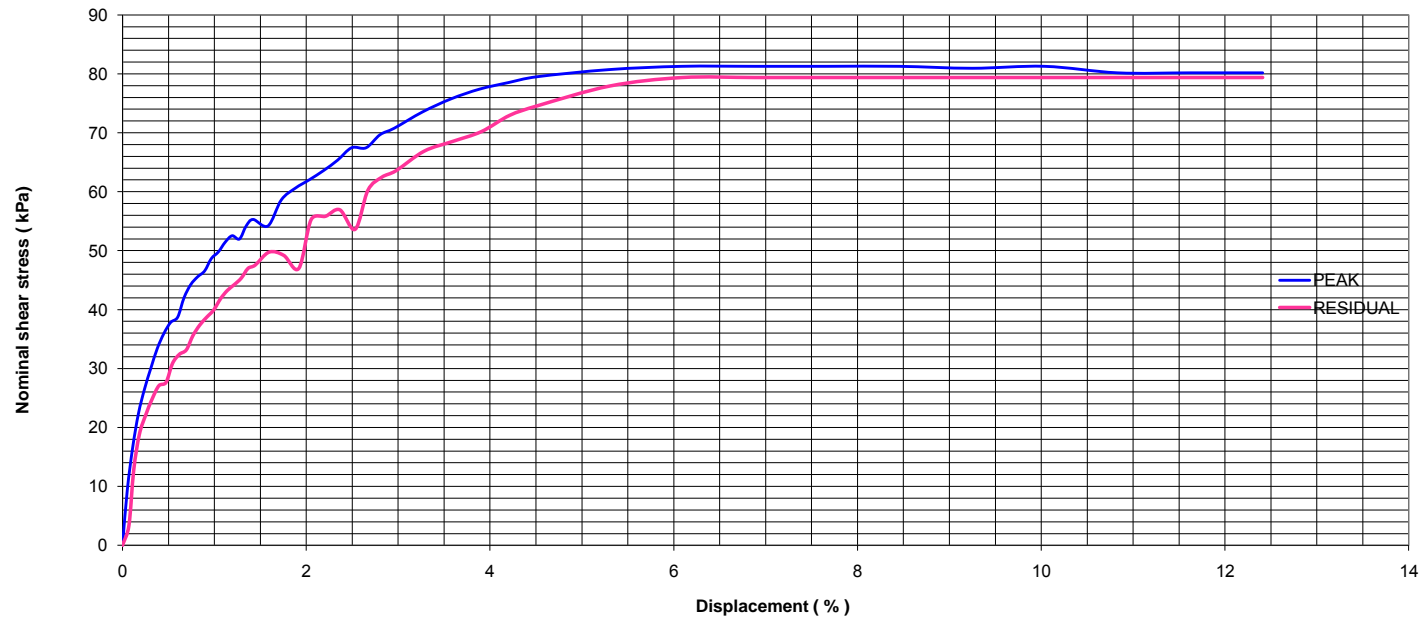
SW8801.1004.101

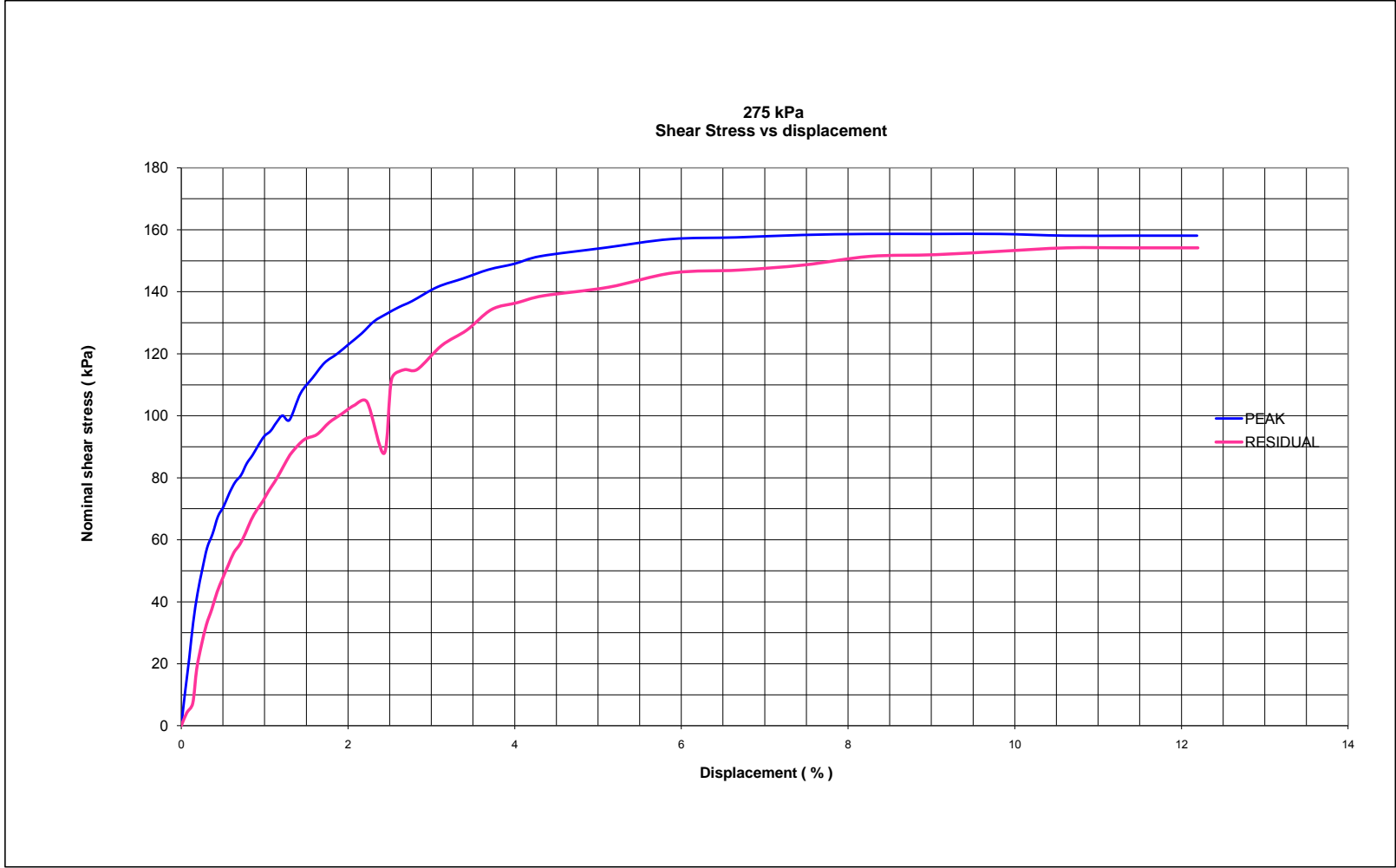
FIGURE NO.
B.78-A

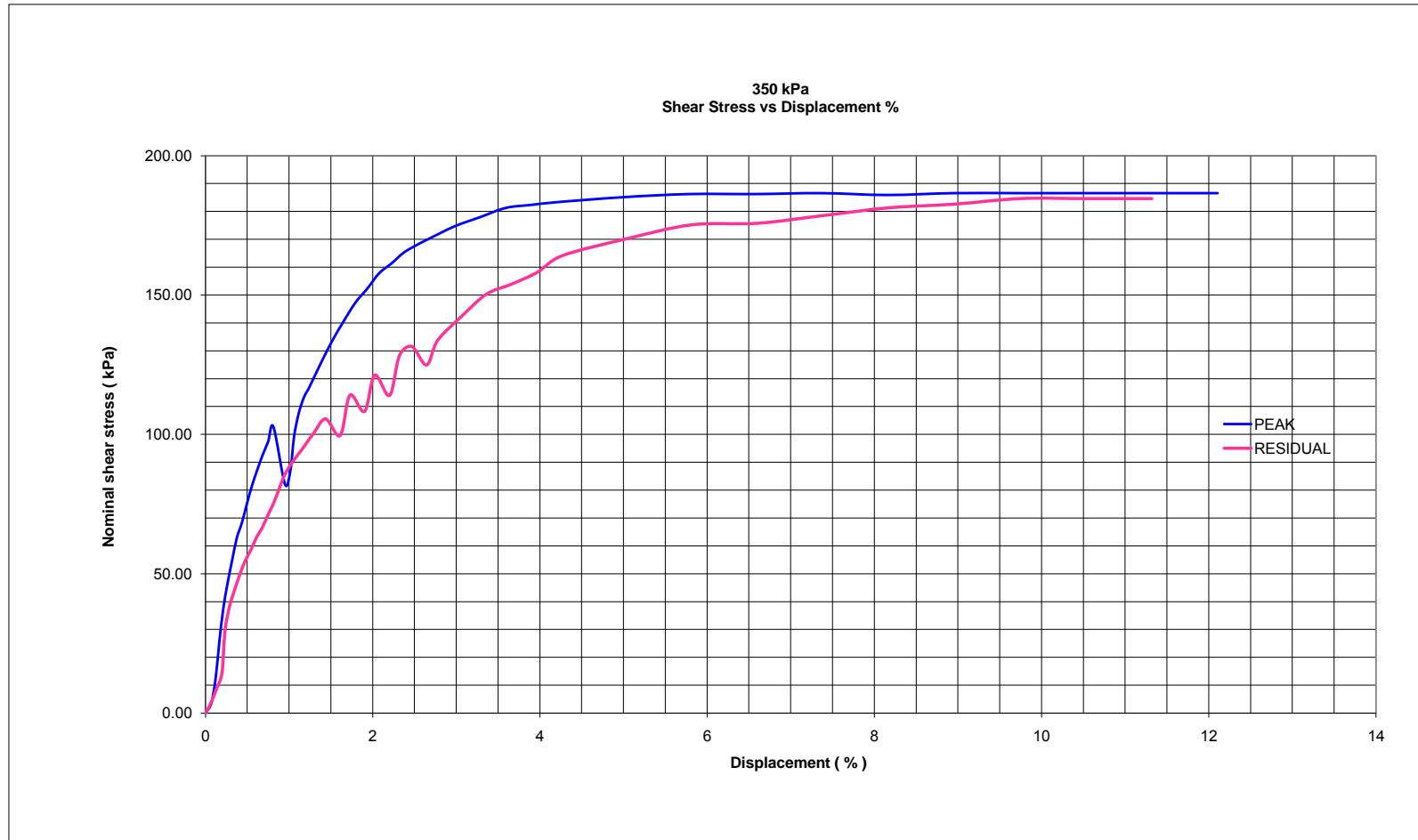
REV



150 kPa
Shear Stress vs Strain







DIRECT SHEAR TEST OF SOILS UNDER CONSOLIDATED DRAINED CONDITIONS (ASTM D 3080)

Page 1 of 5

Project:- **WEP**
Client:- **Hatch Mott MacDonald**
Sample ID.: **T10-1_Sa16**
Lab No.: **AdS056_2011**

Job#: **SW8801.1004.101**
Date: **24 August 2011**
Tested By: **FC/SB**
Checked By: **SB**

| Specimen ID | 1 | 2 | 3 |
|------------------------------------|-----------|-----------|-----------|
| Date of Test | 15-Aug-11 | 18-Aug-11 | 23-Aug-11 |
| Normal Stress (kPa) | 60 | 110 | 210 |
| Rate of displacement (mm/min) | 0.02 | 0.02 | 0.03 |
| Initial thickness of specimen (mm) | 24.10 | 24.10 | 24.10 |
| Initial diameter of specimen (mm) | 63.30 | 63.30 | 63.30 |
| Initial moisture content (%) | 18.9 | 19.6 | 18.7 |
| Density (kN/m ³) | 20.8 | 20.7 | 21.1 |
| Final moisture (%) | 19.4 | 18.4 | 16.8 |

| Specimen ID | Normal Stress | Peak Shear Stress | Residual Shear Stress |
|-------------|---------------|-------------------|-----------------------|
| | kPa | kPa | kPa |
| 1 | 60.0 | 25.6 | 30.4 |
| 2 | 110.0 | 39.6 | 54.4 |
| 3 | 210.0 | 89.5 | 107.0 |

Note: Test specimens were inundated with water.



Project

WINDSOR ESSEX PARKWAY

TITLE

DIRECT SHEAR TEST
TUNNEL T-10 (T10-1-SA16)

Date

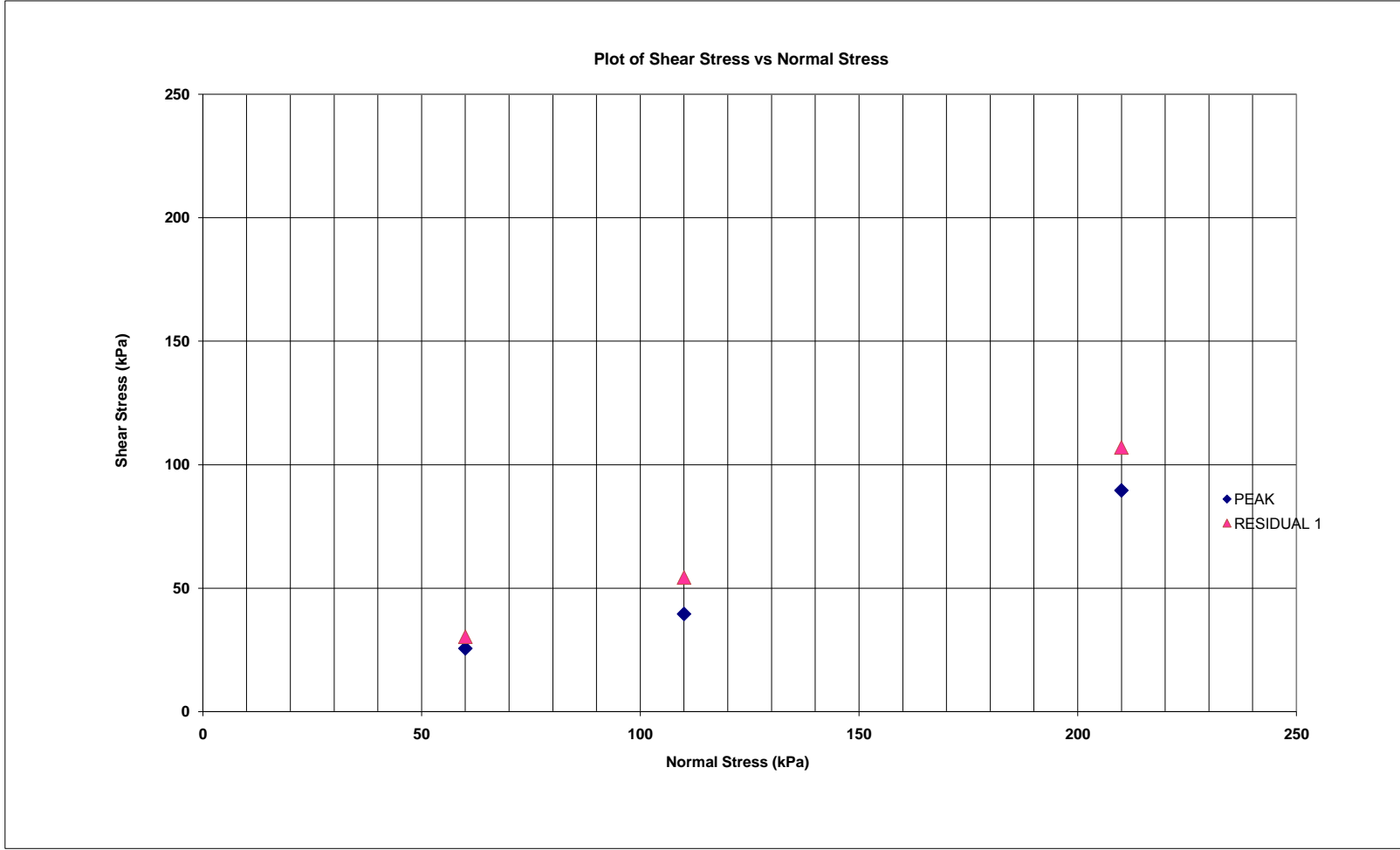
Aug 2012

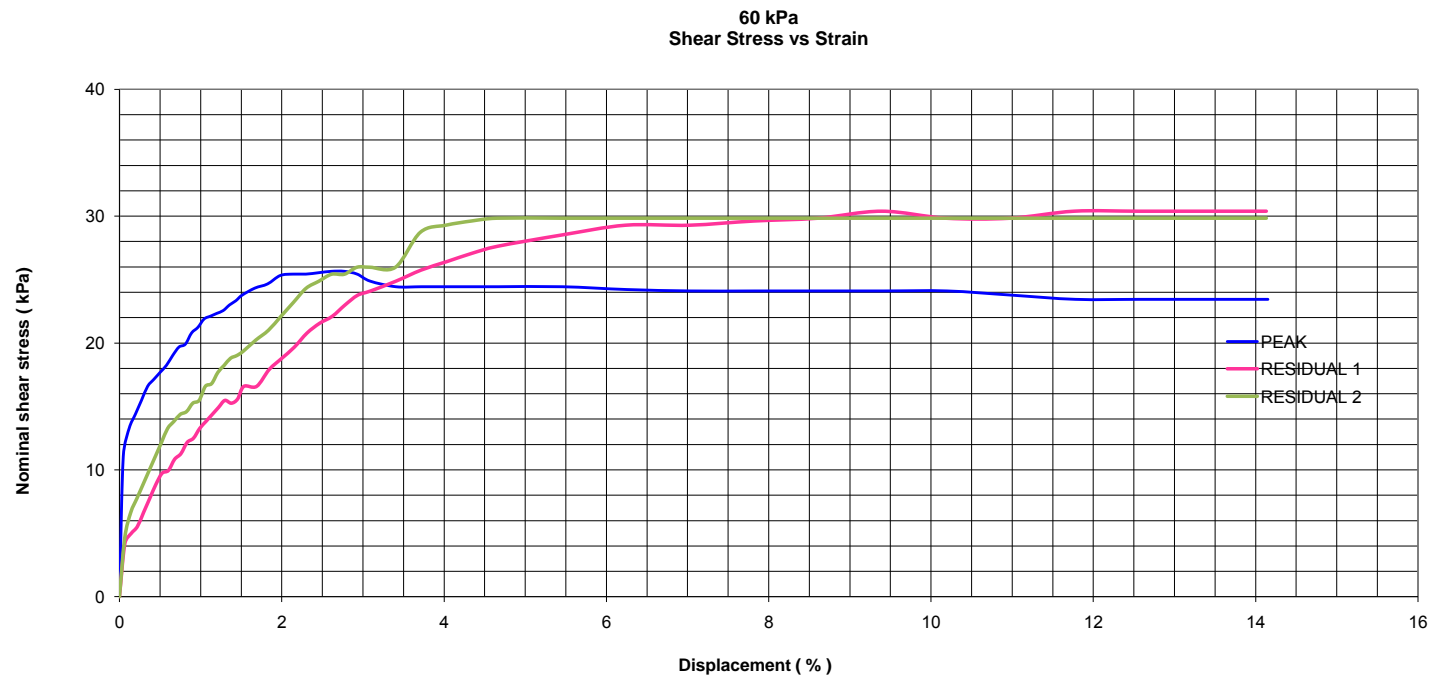
JOB NO

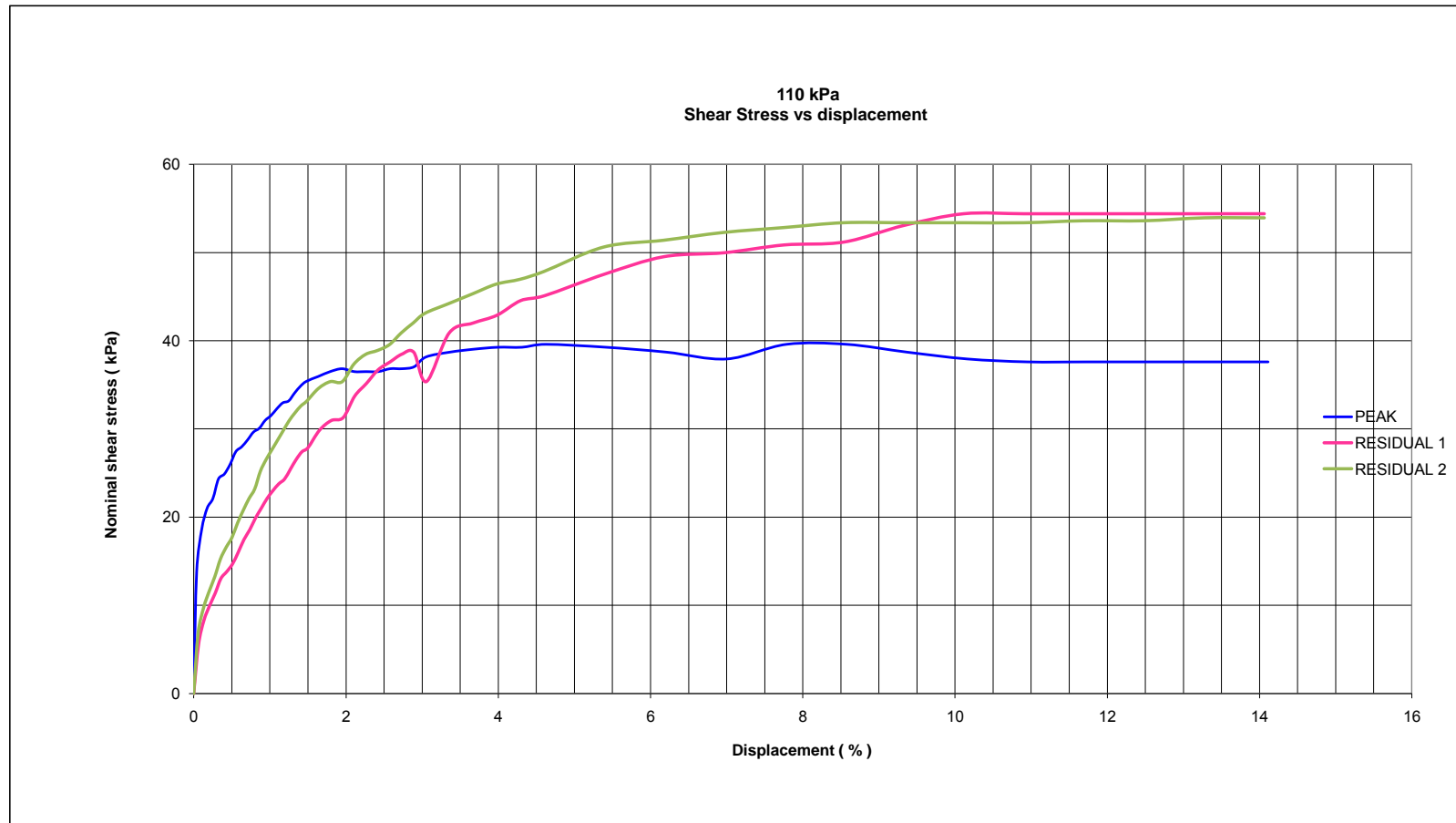
SW8801.1004.101

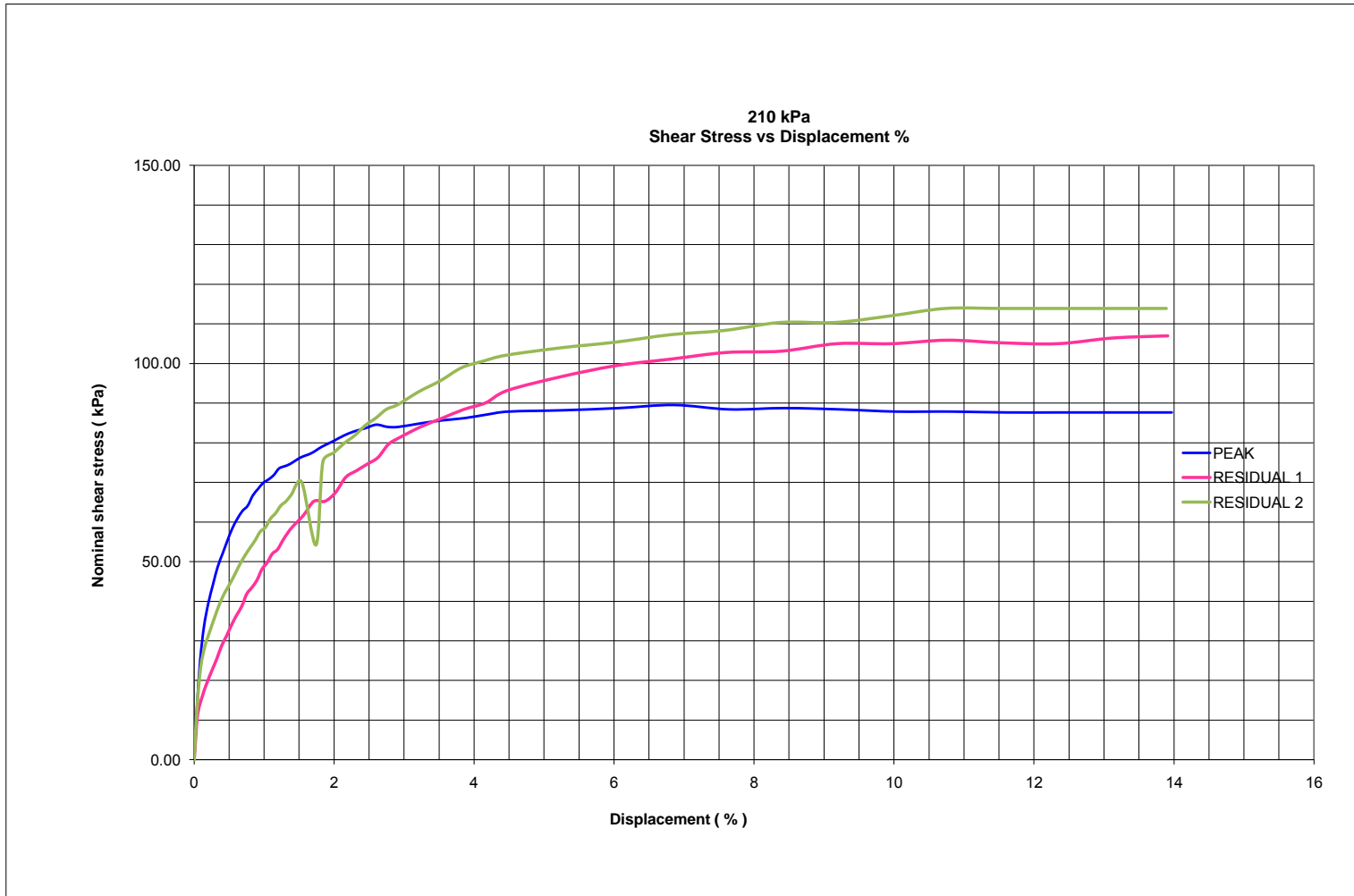
FIGURE NO.
B.79-A

REV









**CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST
FOR COHESIVE SOILS (ASTM D-4767)**

Project: WEP
Client: Hatch Mott MacDonald
Location: Windsor, ON.

Sample ID: T9-1_TW12

Project No.: SW8801.1004.101
Date: 01-Nov-11
Depth(m): 10.7 to 11.3

Sample Description: Sandy Silty Clay trace gravel

| Sample Parameters | | | | |
|---|-------------------|------------|------------|------------|
| Initial | | Specimen 1 | Specimen 2 | Specimen 3 |
| Diameter | cm | 7.256 | | |
| Height | cm | 14.625 | | |
| Volume | cm ³ | 604.756 | | |
| Wet Mass | g | 1322.80 | | |
| Dry Density | kg/m ³ | 1874 | | |
| Water Content | % | 16.7 | | |
| Specific Gravity | Actual | 2.740 | | |
| Void Ratio | | 0.46 | | |
| Degree of Saturation | | 99.1 | | |
| Before Shear (after consolidation) | | | | |
| Volume | cm ³ | 589.656 | | |
| B - Value | | 0.98 | | |
| After Shear | | | | |
| Wet Mass | g | 1316.64 | | |
| Dry Density | kg/m ³ | 1920 | | |
| Water Content | % | 16.3 | | |
| Void Ratio | | 0.43 | | |
| Degree of Saturation | | 100.0 | | |
| Stress - Strain | | | | |
| Cell Pressure | kPa | 420.00 | | |
| Back Pressure | kPa | 300.00 | | |
| Consolidation Stress | kPa | 120.00 | | |
| Rate of Strain | mm/min | 0.0200 | | |
| Vertical Strain at Failure | % | 9.22 | | |
| Deviator Stress at Failure | kPa | 156.00 | | |
| Pore Pressure at Failure | kPa | 49.70 | | |
| Total Stress | | | | |
| Minor Principal Stress, σ_3 | kPa | 120.00 | | |
| Major Principal Stress, σ_1 | kPa | 276.00 | | |
| Radius, $(\sigma_1 - \sigma_3)/2$ | kPa | 78.00 | | |
| Intersection Point, $(\sigma_1 + \sigma_3)/2$ | kPa | 198.00 | | |
| Effective Stress | | | | |
| Minor Principal Stress, σ_3' | kPa | 70.30 | | |
| Major Principal Stress, σ_1' | kPa | 226.30 | | |
| Radius, $(\sigma_1' - \sigma_3')/2$ | kPa | 78.00 | | |
| Intersection Point, $(\sigma_1' + \sigma_3')/2$ | kPa | 148.30 | | |



Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST
TUNNEL T-9 (T9-1-TW12)**

Date

Aug 2012

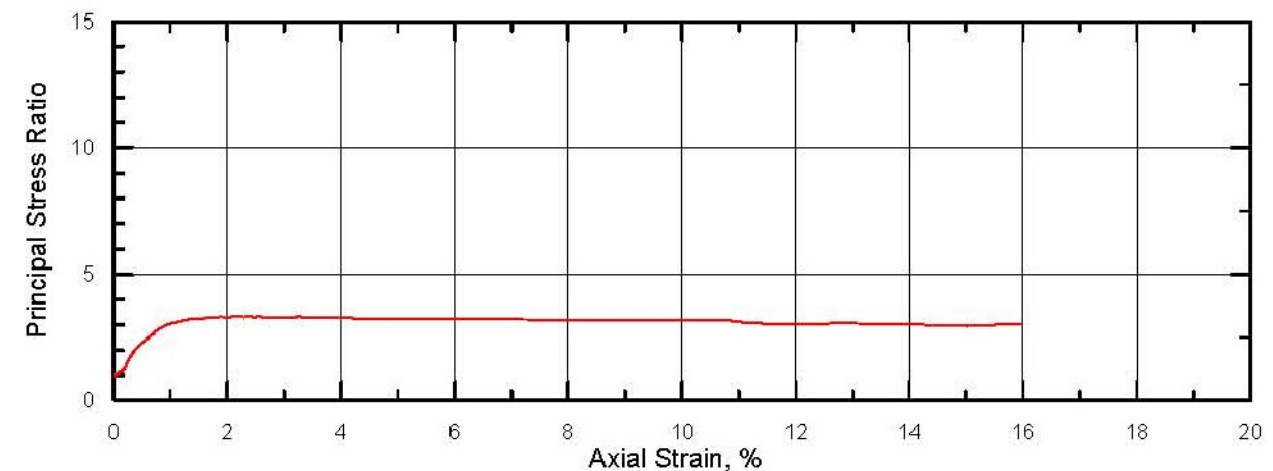
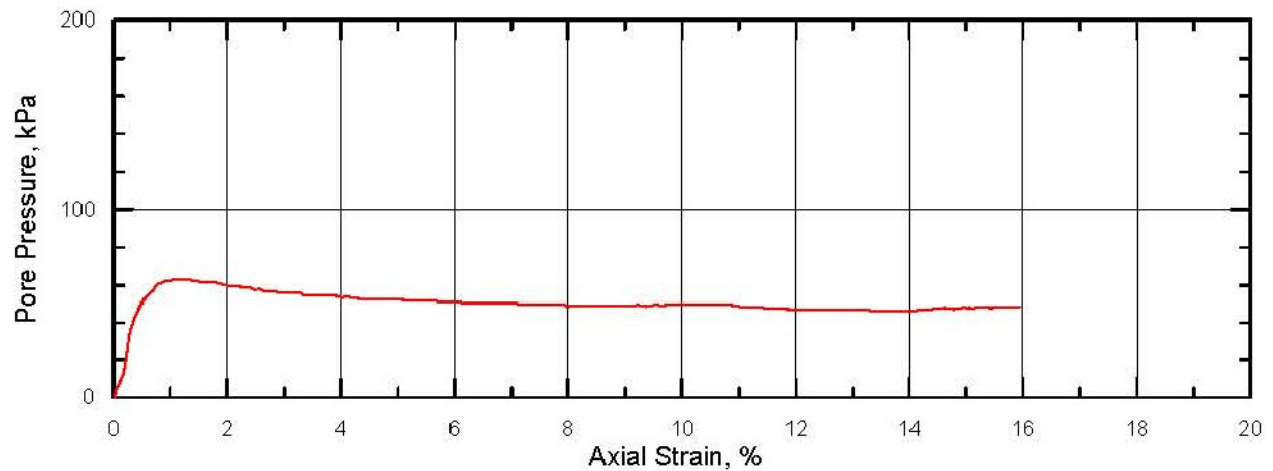
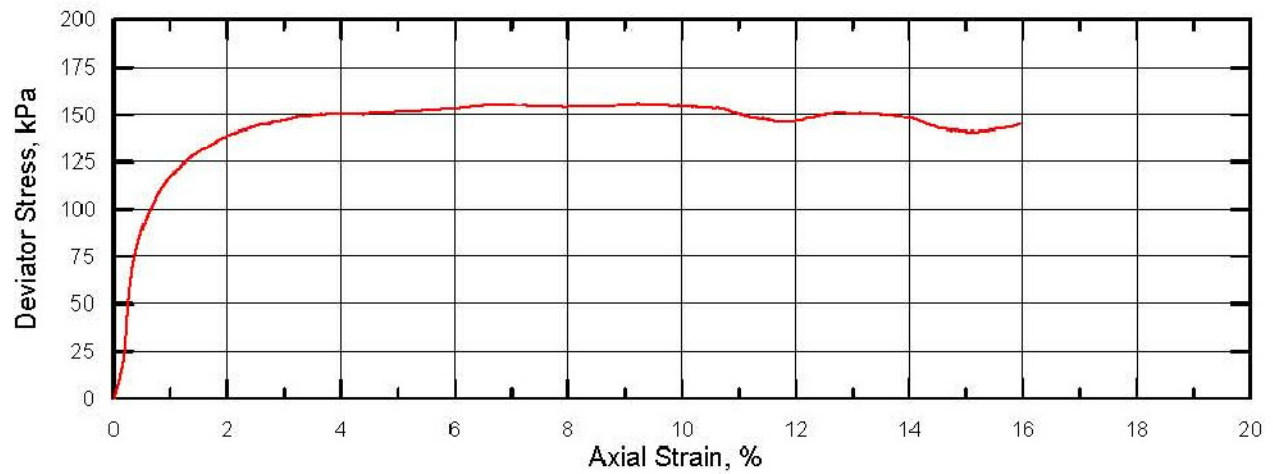
JOB NO

SW8801.1004.101

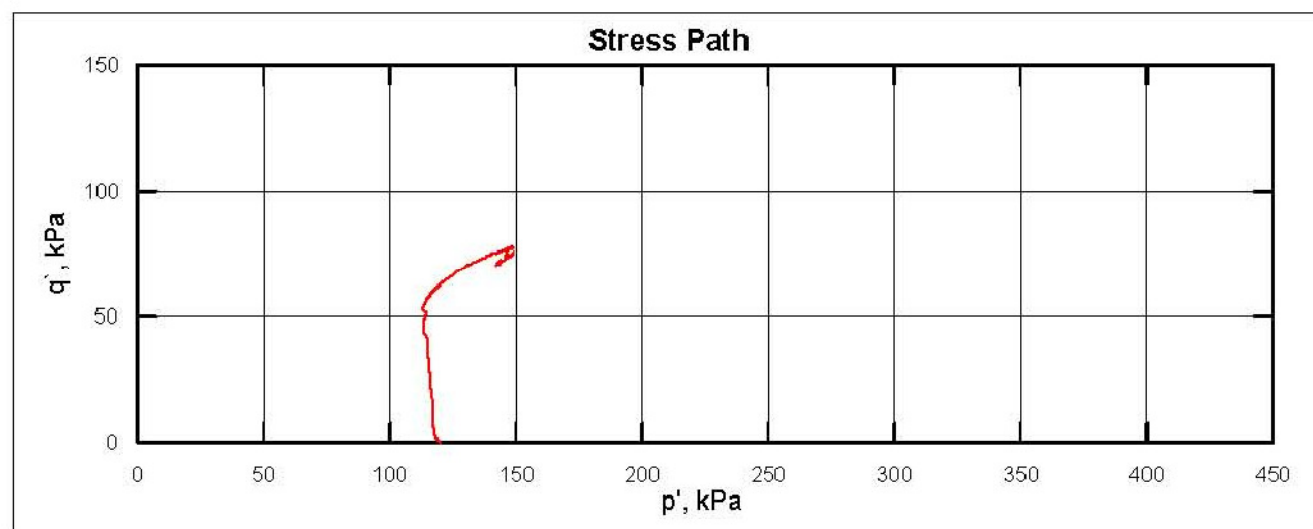
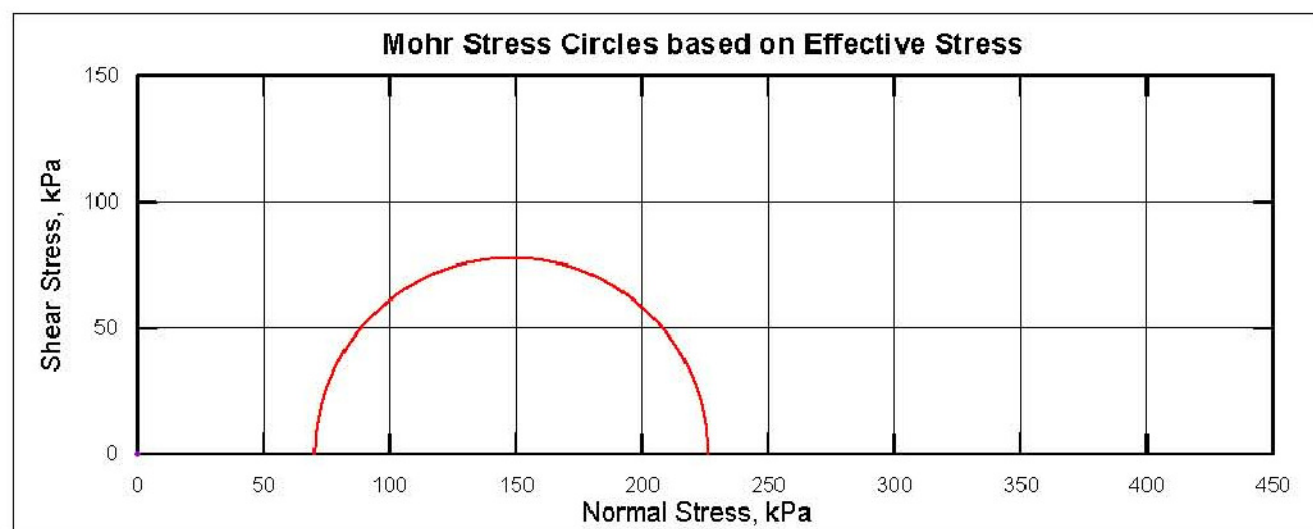
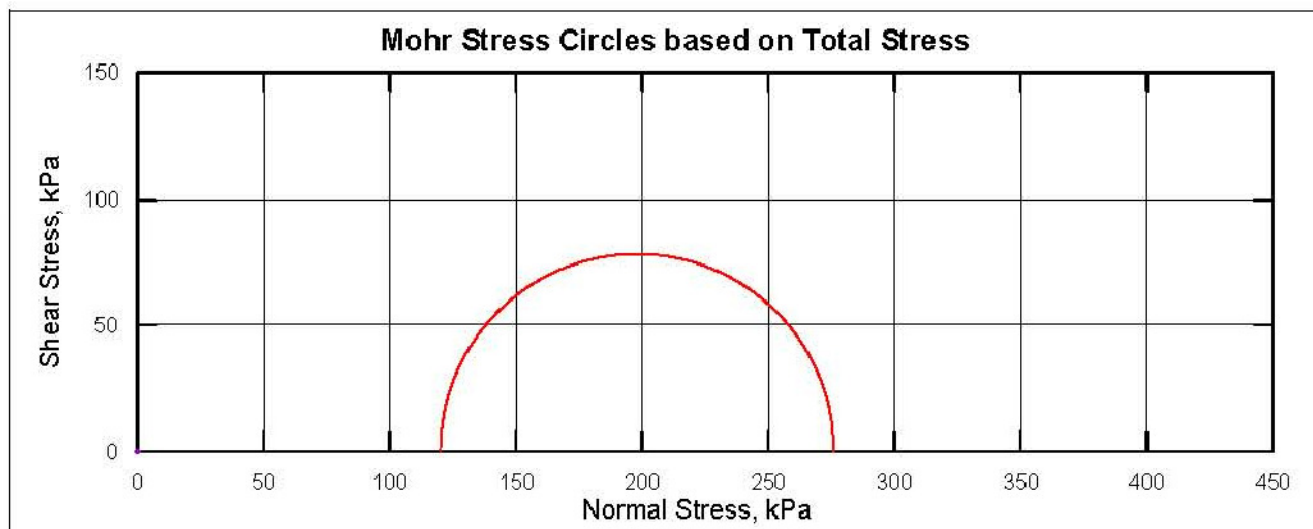
FIGURE NO.

B.80-A

REV



— 120 kPa



— 120 kPa

Note:
Failure based on maximum deviator stress

**CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST
FOR COHESIVE SOILS (ASTM D-4767)**

Project: WEP
Client: Hatch Mott MacDonald
Location: Windsor, ON.

Sample ID: T10-2_TW20A

Project No.: SW8801.1004.101
Date: 18-Jul-11
Depth(m): 19.8 to 20.4

Sample Description: Clayey Silt/Silty Clay, some sand, trace gravel

| | | Sample Parameters | | |
|---|-------------------|-------------------|------------|------------|
| Initial | | Specimen 1 | Specimen 2 | Specimen 3 |
| Diameter | cm | 7.040 | | |
| Height | cm | 14.070 | | |
| Volume | cm ³ | 547.683 | | |
| Wet Mass | g | 1076.40 | | |
| Dry Density | kg/m ³ | 1622 | | |
| Water Content | % | 21.2 | | |
| Specific Gravity | Actual | 2.748 | | |
| Void Ratio | | 0.69 | | |
| Degree of Saturation | | 83.9 | | |
| Before Shear (after consolidation) | | | | |
| Volume | cm ³ | 508.393 | | |
| B - Value | | 0.99 | | |
| After Shear | | | | |
| Wet Mass | g | 1039.18 | | |
| Dry Density | kg/m ³ | 1678 | | |
| Water Content | % | 21.8 | | |
| Void Ratio | | 0.64 | | |
| Degree of Saturation | | 94.0 | | |
| Stress - Strain | | | | |
| Cell Pressure | kPa | 304.00 | | |
| Back Pressure | kPa | 150.00 | | |
| Consolidation Stress | kPa | 154.00 | | |
| Rate of Strain | mm/min | 0.0140 | | |
| Vertical Strain at Failure | % | 8.39 | | |
| Deviator Stress at Failure | kPa | 168.16 | | |
| Pore Pressure at Failure | kPa | 53.50 | | |
| Total Stress | | | | |
| Minor Principal Stress, σ_3 | kPa | 154.00 | | |
| Major Principal Stress, σ_1 | kPa | 322.16 | | |
| Radius, $(\sigma_1 - \sigma_3)/2$ | kPa | 84.08 | | |
| Intersection Point, $(\sigma_1 + \sigma_3)/2$ | kPa | 238.08 | | |
| Effective Stress | | | | |
| Minor Principal Stress, σ_3' | kPa | 100.50 | | |
| Major Principal Stress, σ_1' | kPa | 268.66 | | |
| Radius, $(\sigma_1' - \sigma_3')/2$ | kPa | 84.08 | | |
| Intersection Point, $(\sigma_1' + \sigma_3')/2$ | kPa | 184.58 | | |



Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST
TUNNEL T-10 (T10-2-SA20A)**

Date

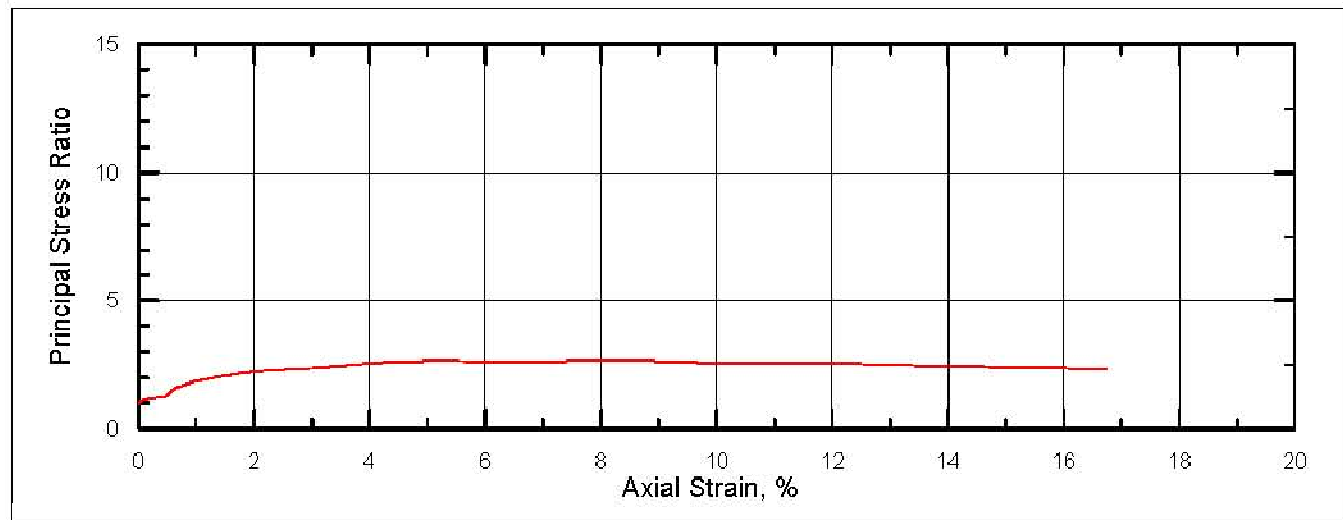
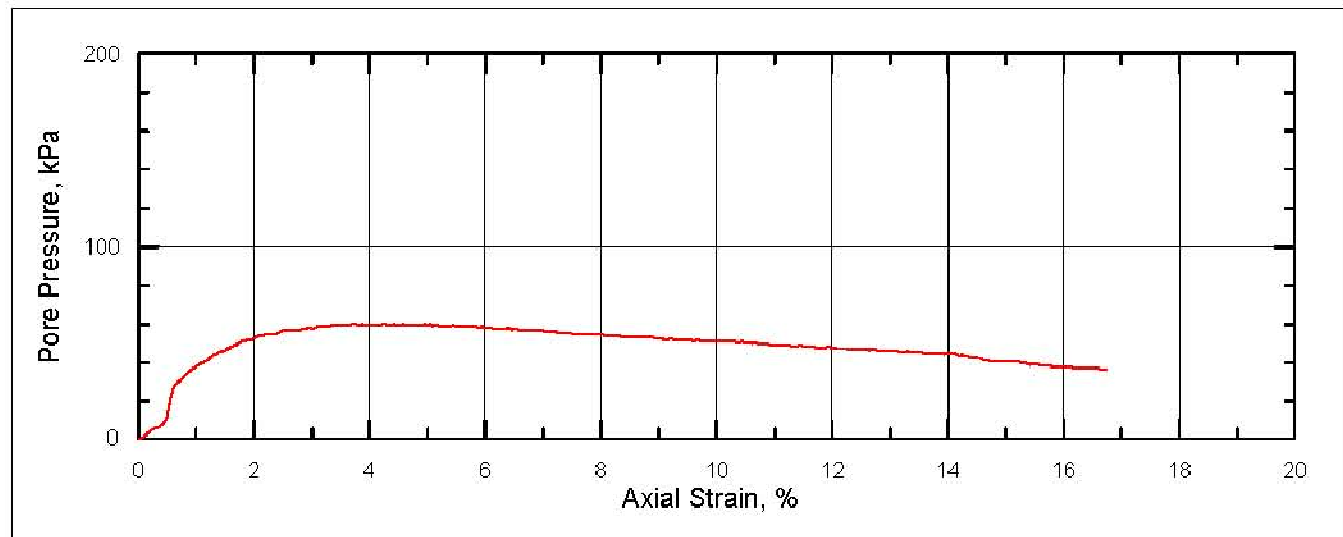
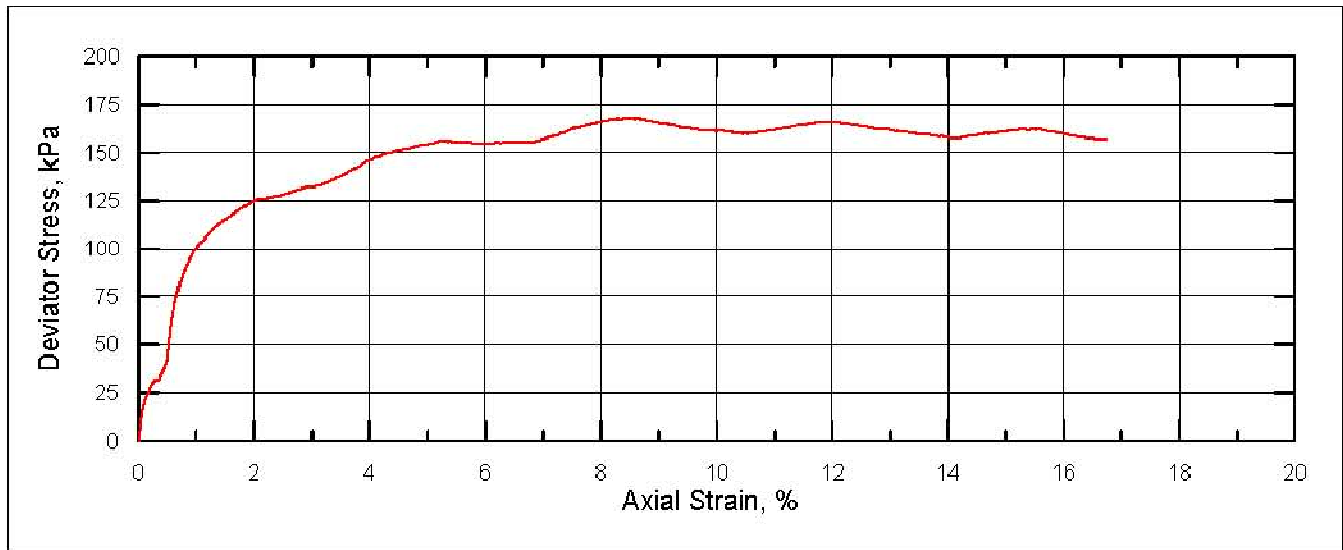
Aug 2012

JOB NO

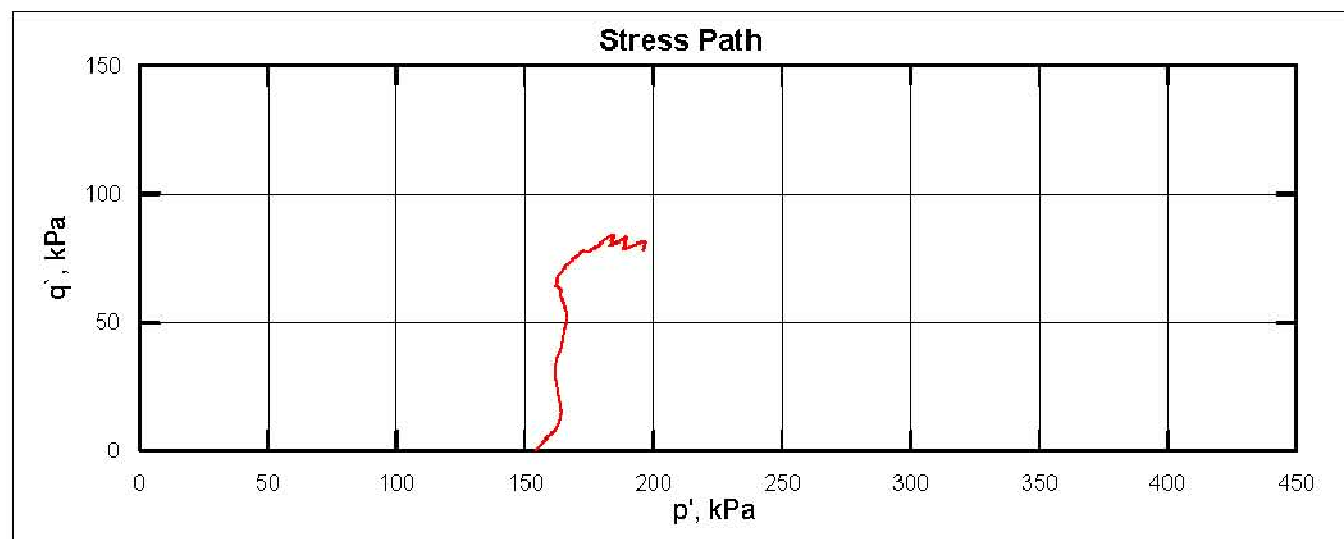
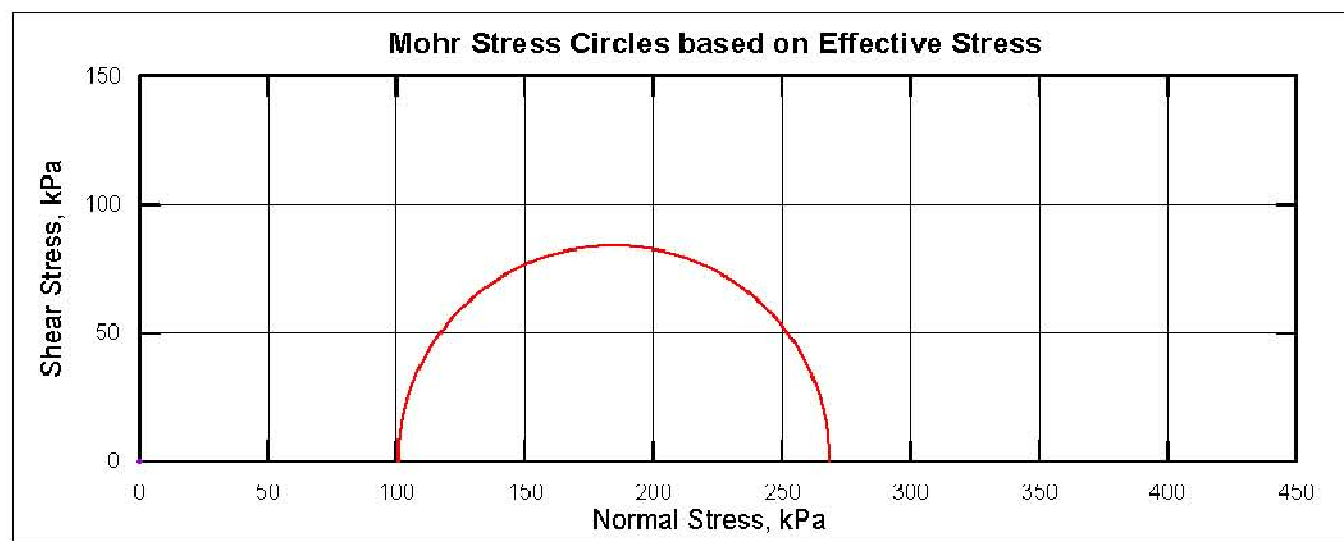
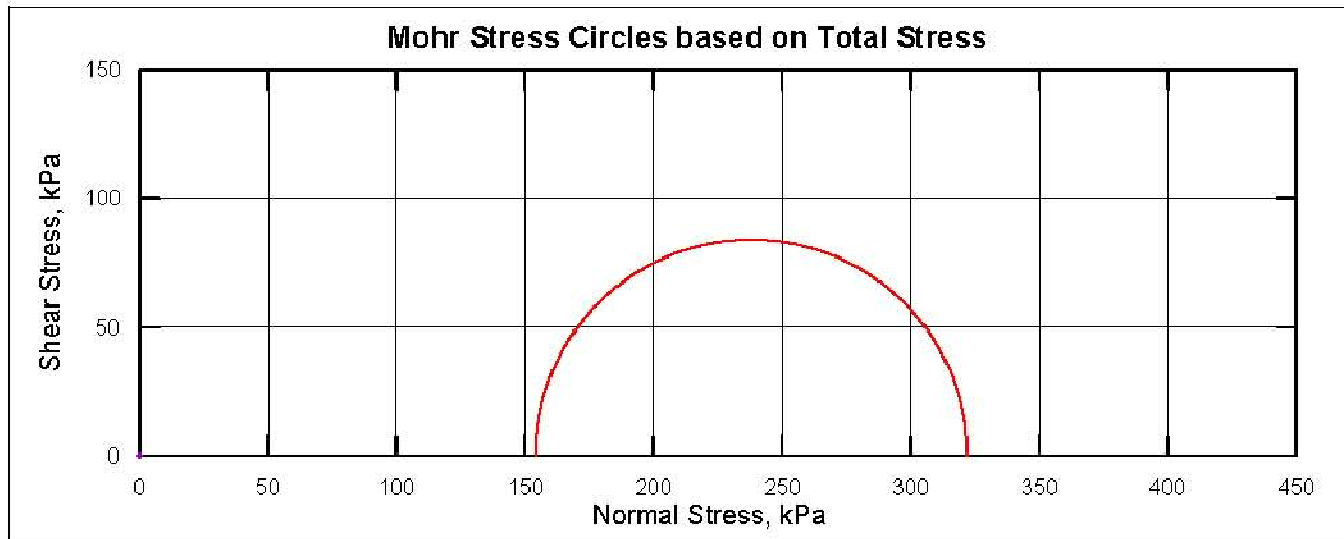
SW8801.1004.101

**FIGURE NO.
B.81-A**

REV



— 150 kPa



— 150 kPa

**CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST
FOR COHESIVE SOILS (ASTM D-4767)**

Project: WEP
Client: Hatch Mott MacDonald
Location: Windsor, ON.

Sample ID: B11-6_TW14

Project No.: SW8801.1004.101
Date: 24-Aug-11
Depth(m): 13.7

Sample Description: Sandy Silty Clay trace gravel

| | | Sample Parameters | | |
|---|-------------------|-------------------|------------|------------|
| Initial | | Specimen 1 | Specimen 2 | Specimen 3 |
| Diameter | cm | 6.940 | | |
| Height | cm | 14.088 | | |
| Volume | cm ³ | 532.915 | | |
| Wet Mass | g | 1177.70 | | |
| Dry Density | kg/m ³ | 1927 | | |
| Water Content | % | 14.7 | | |
| Specific Gravity | Actual | 2.700 | | |
| Void Ratio | | 0.40 | | |
| Degree of Saturation | | 98.8 | | |
| Before Shear (after consolidation) | | | | |
| Volume | cm ³ | 518.115 | | |
| B - Value | | 1.00 | | |
| After Shear | | | | |
| Wet Mass | g | 1167.83 | | |
| Dry Density | kg/m ³ | 1985 | | |
| Water Content | % | 13.5 | | |
| Void Ratio | | 0.36 | | |
| Degree of Saturation | | 100.0 | | |
| Stress - Strain | | | | |
| Cell Pressure | kPa | 235.00 | | |
| Back Pressure | kPa | 190.00 | | |
| Consolidation Stress | kPa | 45.00 | | |
| Rate of Strain | mm/min | 0.0500 | | |
| Vertical Strain at Failure | % | 6.18 | | |
| Deviator Stress at Failure | kPa | 152.09 | | |
| Pore Pressure at Failure | kPa | -29.30 | | |
| Total Stress | | | | |
| Minor Principal Stress, σ_3 | kPa | 45.00 | | |
| Major Principal Stress, σ_1 | kPa | 197.09 | | |
| Radius, $(\sigma_1 - \sigma_3)/2$ | kPa | 76.04 | | |
| Intersection Point, $(\sigma_1 + \sigma_3)/2$ | kPa | 121.04 | | |
| Effective Stress | | | | |
| Minor Principal Stress, σ_3' | kPa | 74.30 | | |
| Major Principal Stress, σ_1' | kPa | 226.39 | | |
| Radius, $(\sigma_1' - \sigma_3')/2$ | kPa | 76.04 | | |
| Intersection Point, $(\sigma_1' + \sigma_3')/2$ | kPa | 150.34 | | |



Project

WINDSOR ESSEX PARKWAY

TITLE

**CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST
BRIDGE B-11 (B11-6-SA14)**

Date

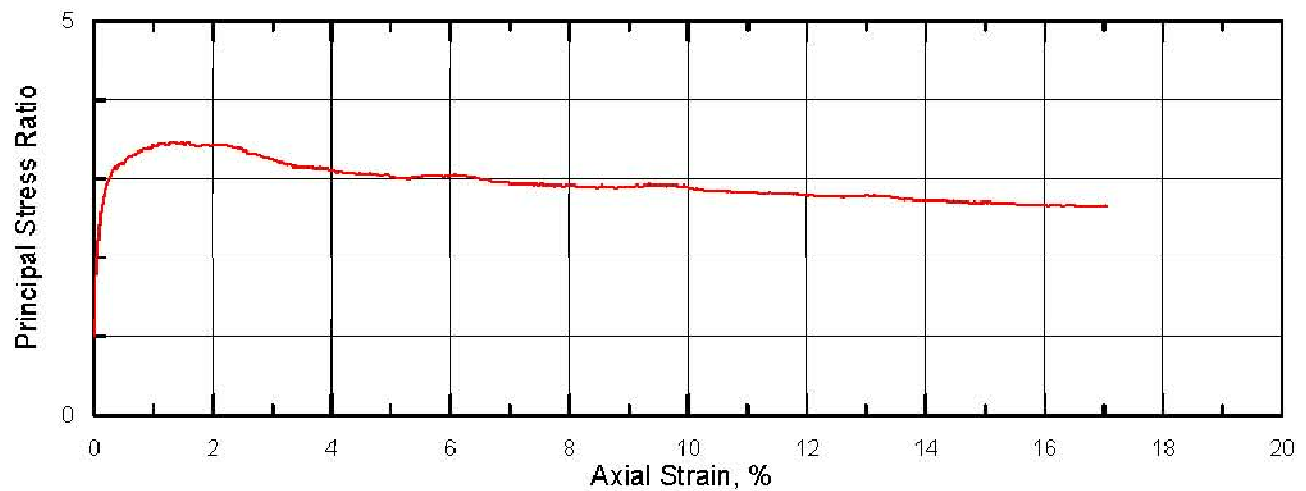
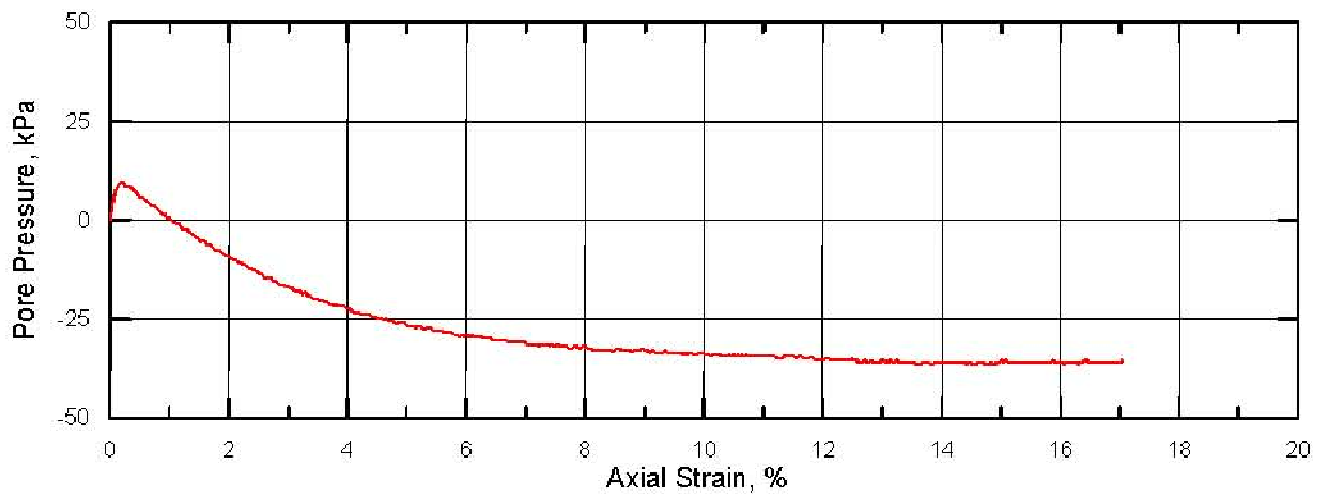
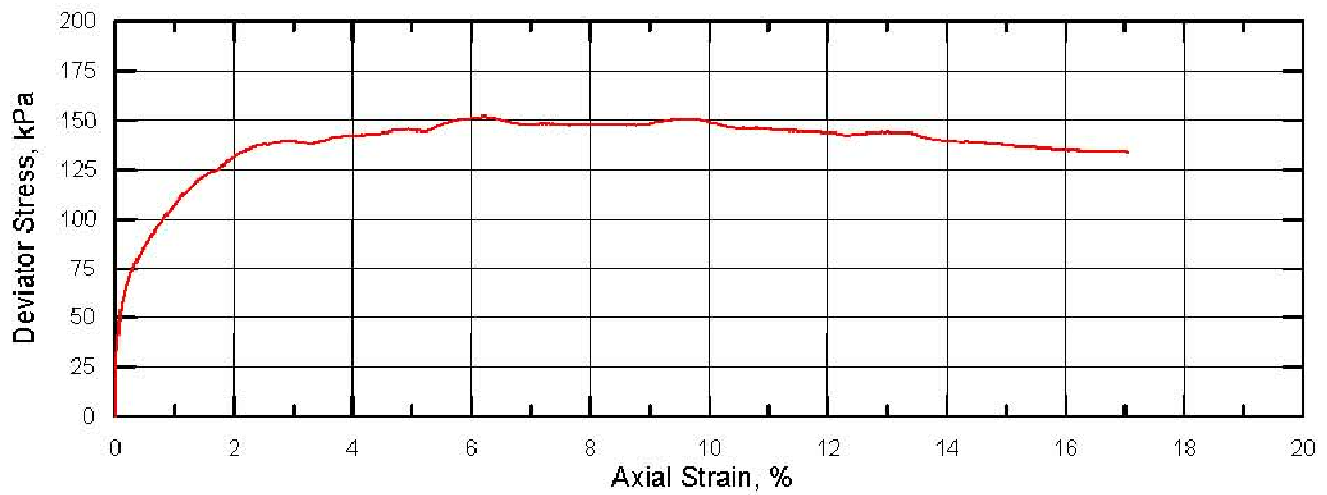
Aug 2012

JOB NO

SW8801.1004.101

**FIGURE NO.
B.82-A**

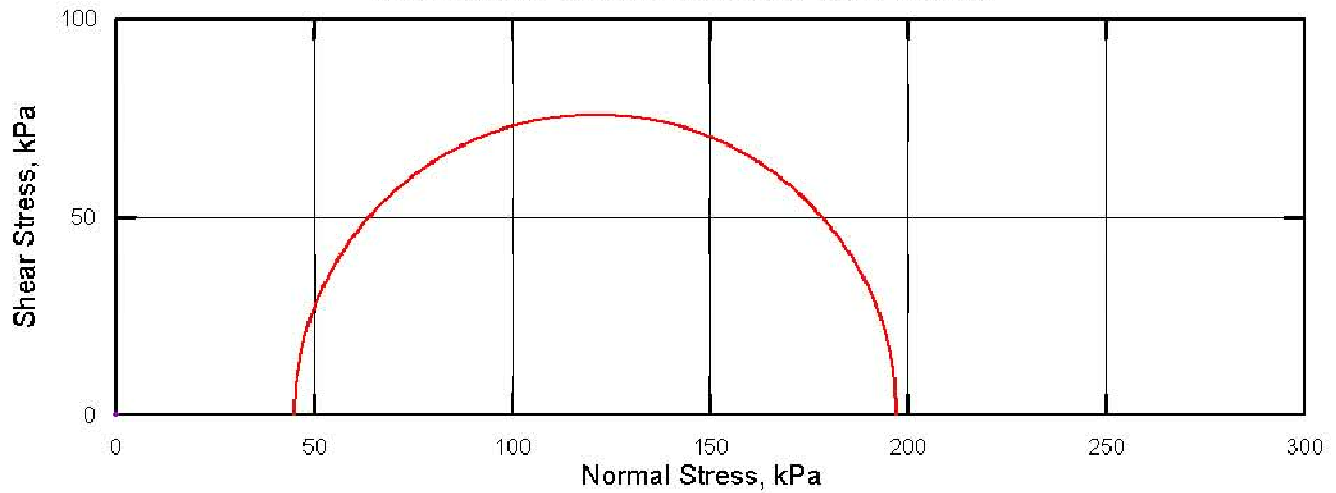
REV



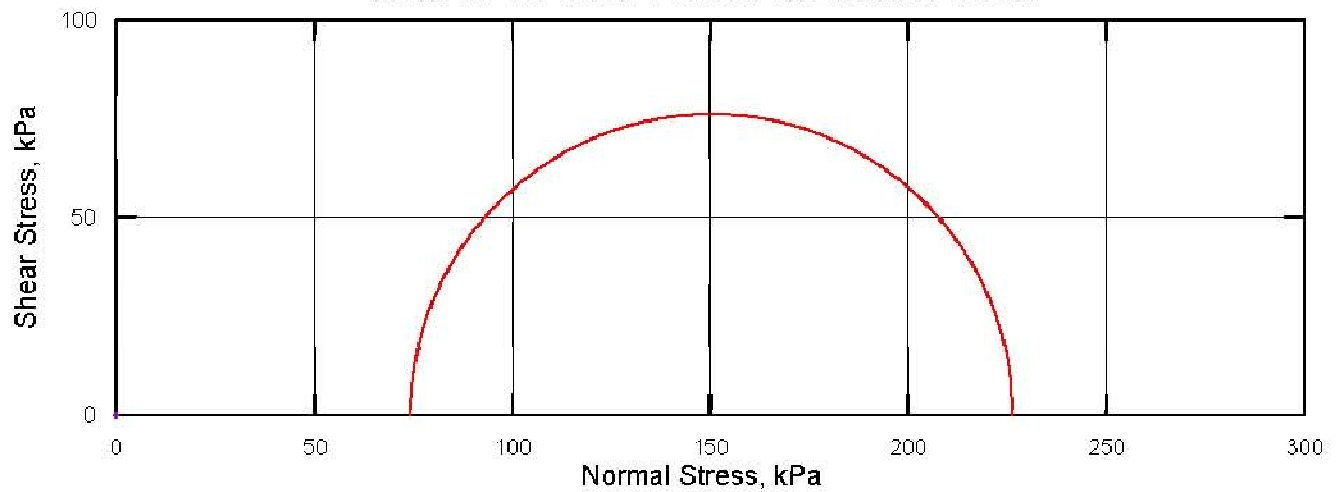
— 45 kPa

NOTE:
Multi specimen - single stage

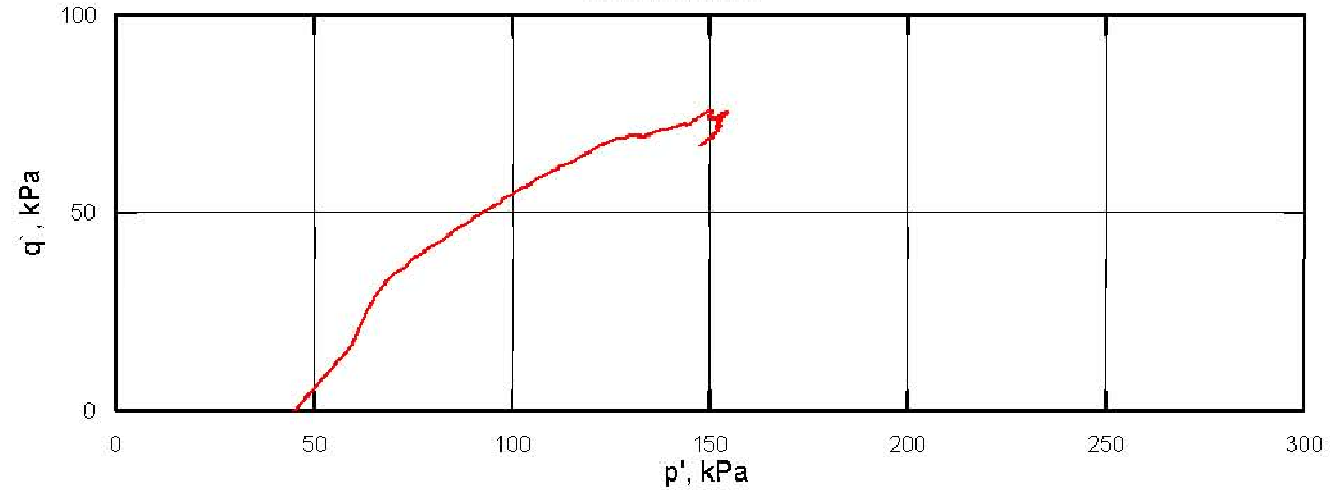
Mohr Stress Circles based on Total Stress



Mohr Stress Circles based on Effective Stress



Stress Path



— 45 kPa

NOTE:
Multi specimen - single stage

**UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST
ON COHESIVE SOILS (ASTM D-2850)**

Project: WEP
Client: Hatch Mott MacDonald
Location: Windsor, ON.

Sample ID: T11-2_Sa16

Project No. SW8801
Date: 20-May-11
Depth(m): 16.7 to 17.3

Sample Description: Silty Clay trace sand and gravel

| Sample Parameters | | | | |
|---|-------------------|------------|------------|------------|
| Initial | | Specimen 1 | Specimen 2 | Specimen 3 |
| Diameter | cm | 6.970 | | |
| Height | cm | 14.110 | | |
| Volume | cm ³ | 538.372 | | |
| Wet Mass | g | 1108.10 | | |
| Dry Density | kg/m ³ | 1641 | | |
| Water Content | % | 25.4 | | |
| Specific Gravity | Assumed | 2.720 | | |
| Void Ratio | | 0.66 | | |
| Degree of Saturation | | 105.1 | | |
| Before Shear (after consolidation) | | | | |
| Volume | cm ³ | 538.372 | | |
| B - Value | | 0.98 | | |
| After Shear | | | | |
| Wet Mass | g | 1108.10 | | |
| Dry Density | kg/m ³ | 1645 | | |
| Water Content | % | 25.1 | | |
| Void Ratio | | 0.65 | | |
| Degree of Saturation | | 100.0 | | |
| Stress - Strain | | | | |
| Cell Pressure | kPa | 465.00 | | |
| Back Pressure | kPa | 190.00 | | |
| Consolidation Stress | kPa | 275.00 | | |
| Rate of Strain | mm/min | 0.2000 | | |
| Vertical Strain at Failure | % | 14.89 | | |
| Deviator Stress at Failure | kPa | 59.14 | | |
| Pore Pressure at Failure | kPa | 250.40 | | |
| Total Stress | | | | |
| Minor Principal Stress, σ_3 | kPa | 275.00 | | |
| Major Principal Stress, σ_1 | kPa | 334.14 | | |
| Radius, $(\sigma_1 - \sigma_3)/2$ | kPa | 29.57 | | |
| Intersection Point, $(\sigma_1 + \sigma_3)/2$ | kPa | 304.57 | | |
| Effective Stress | | | | |
| Minor Principal Stress, σ_3' | kPa | 24.60 | | |
| Major Principal Stress, σ_1' | kPa | 83.74 | | |
| Radius, $(\sigma_1' - \sigma_3')/2$ | kPa | 29.57 | | |
| Intersection Point, $(\sigma_1' + \sigma_3')/2$ | kPa | 54.17 | | |



Project

WINDSOR ESSEX PARKWAY

TITLE

UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST
TUNNEL T-11 (T11-2-SA16)

Date

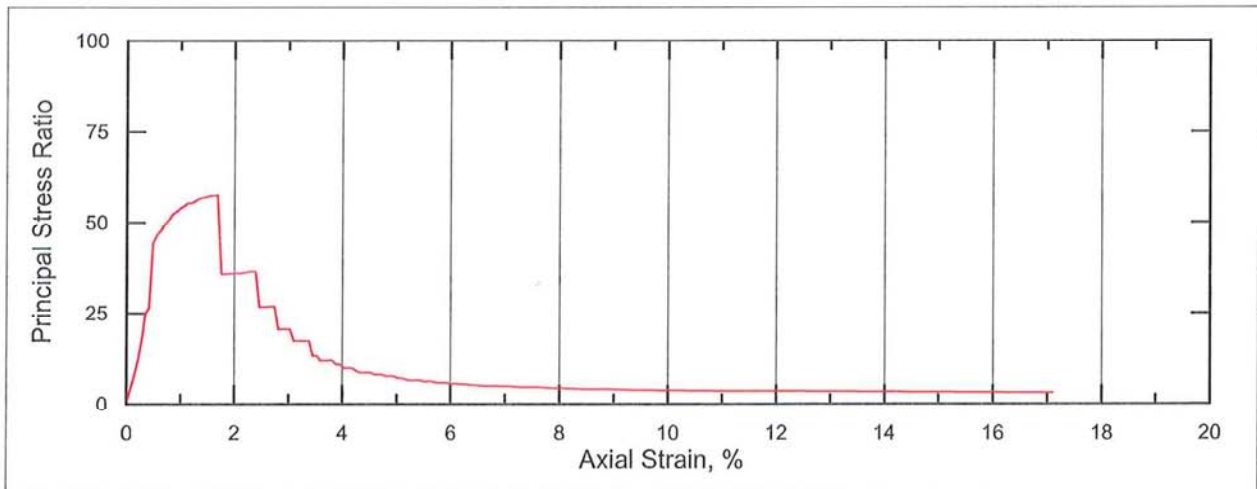
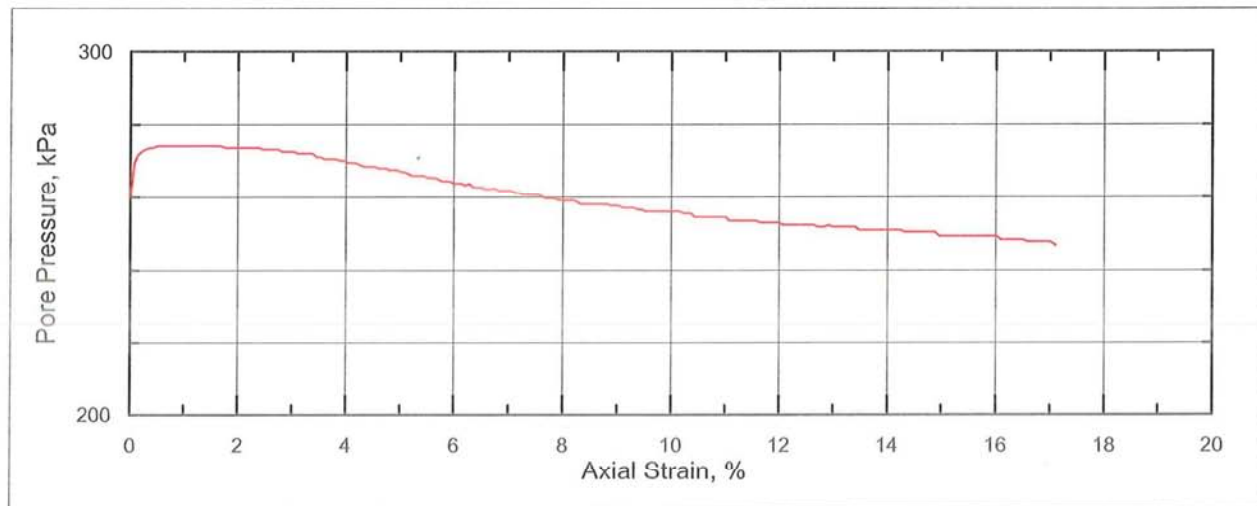
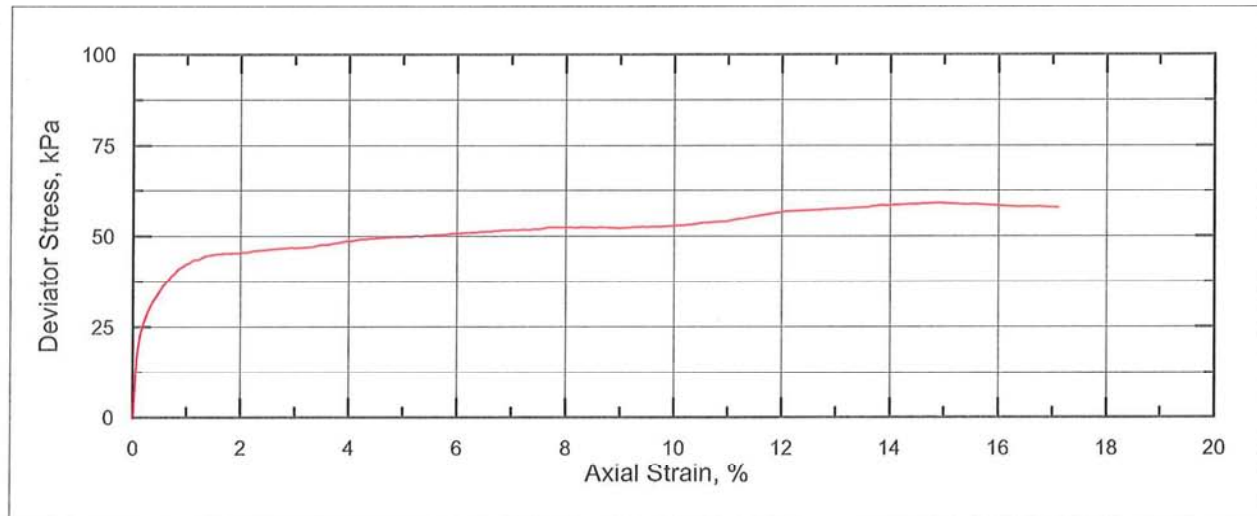
Aug 2012

JOB NO

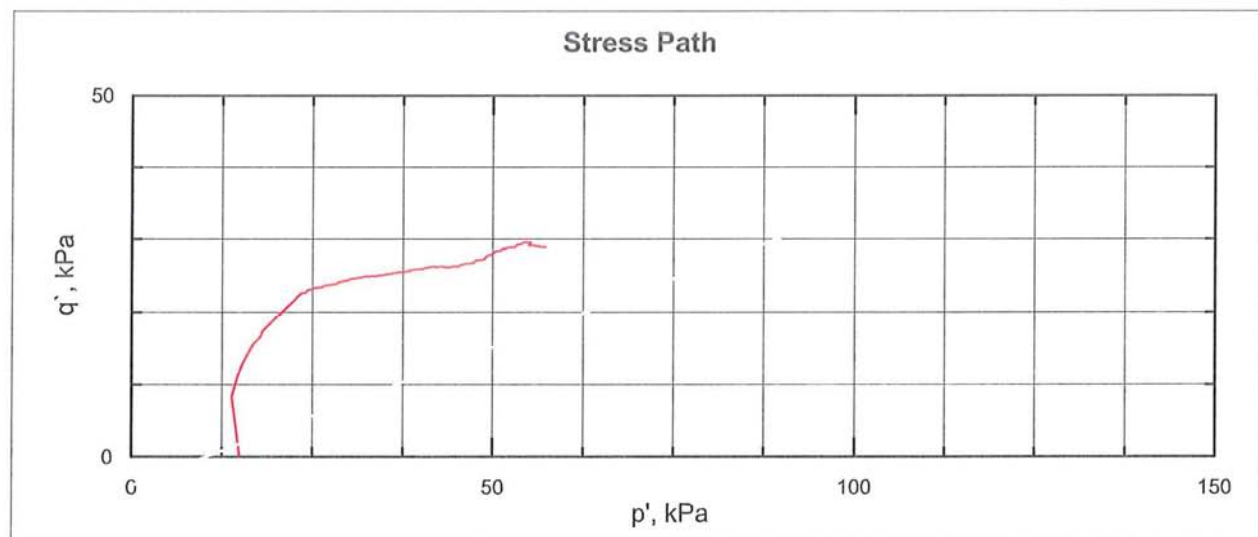
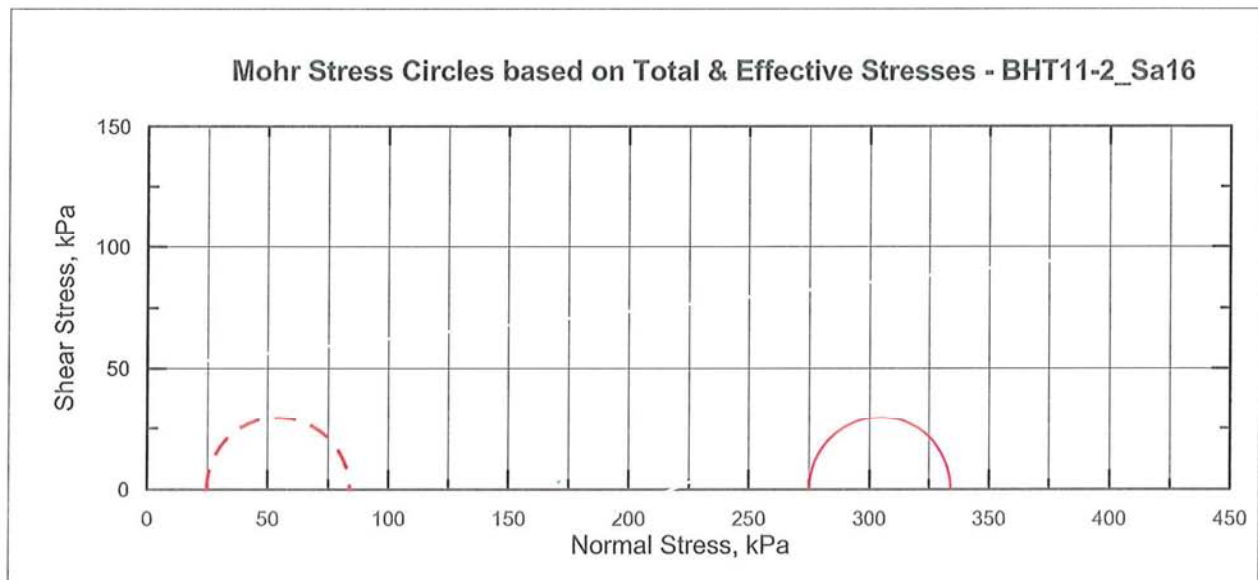
SW8801.1004.101

FIGURE NO.
B.83-A

REV



— BH T11-2_Sa16 (275 kPa)



— BHT11-2_Sa16 (275 kPa)

NOTE:
Failure based on maximum deviator stress

**UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST
ON COHESIVE SOILS (ASTM D-2850)**

Project: WEP
Client: Hatch Mott MacDonald
Location: Windsor, ON.

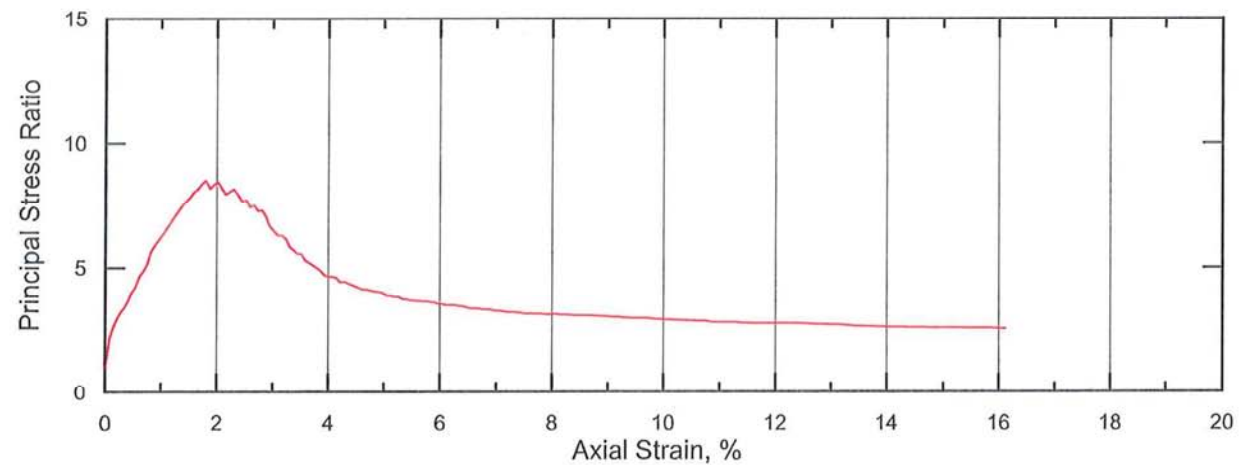
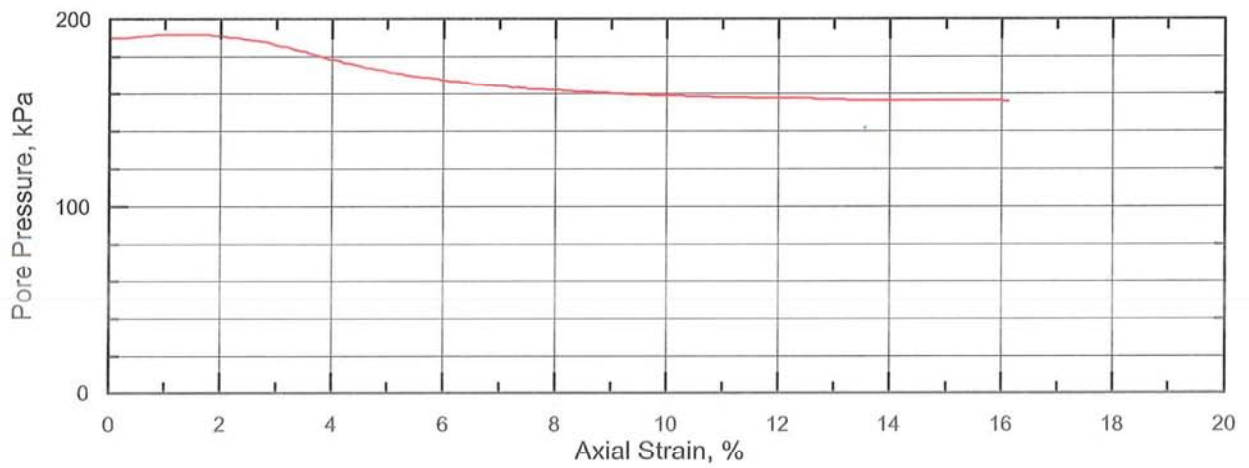
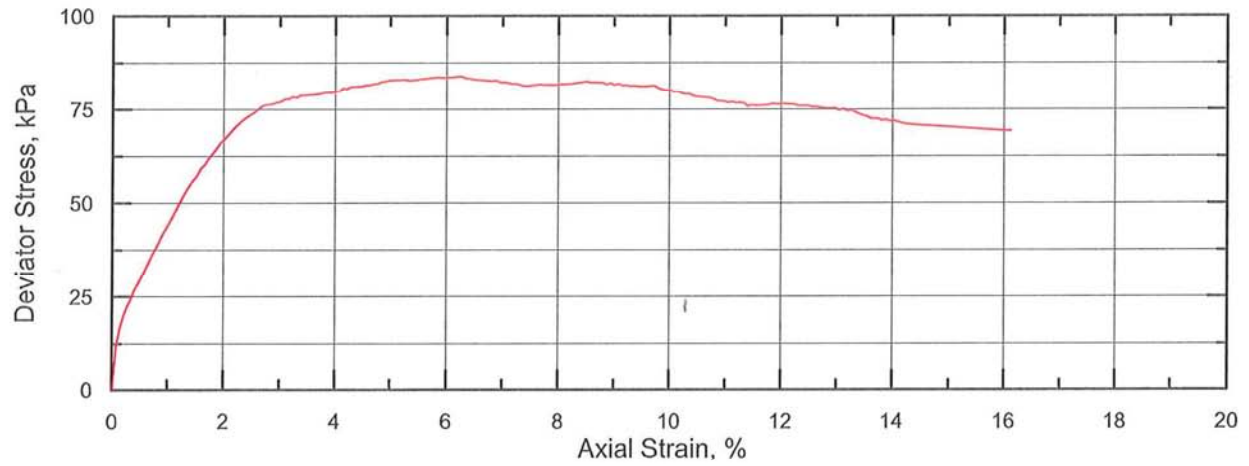
Project No.: SW8801
Date: 23-May-11
Depth(m): 12.2 to 12.8
Sample ID: T11-3_Sa12

Sample Description: Silty Clay trace sand and gravel

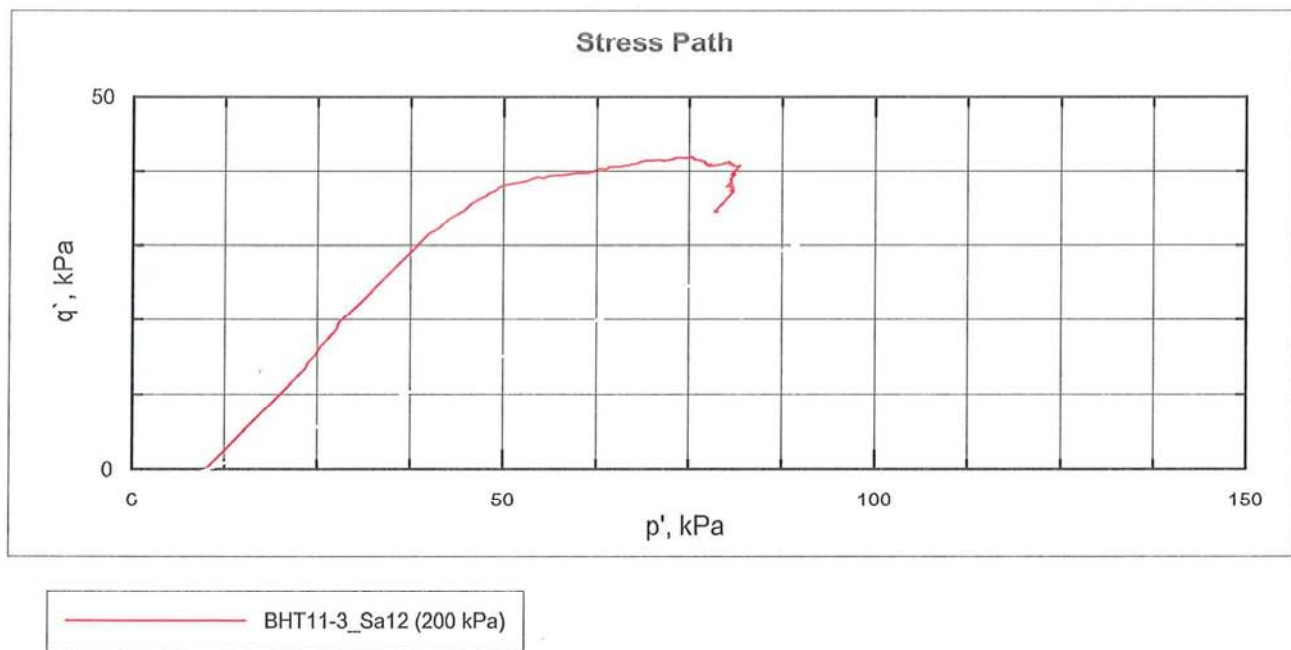
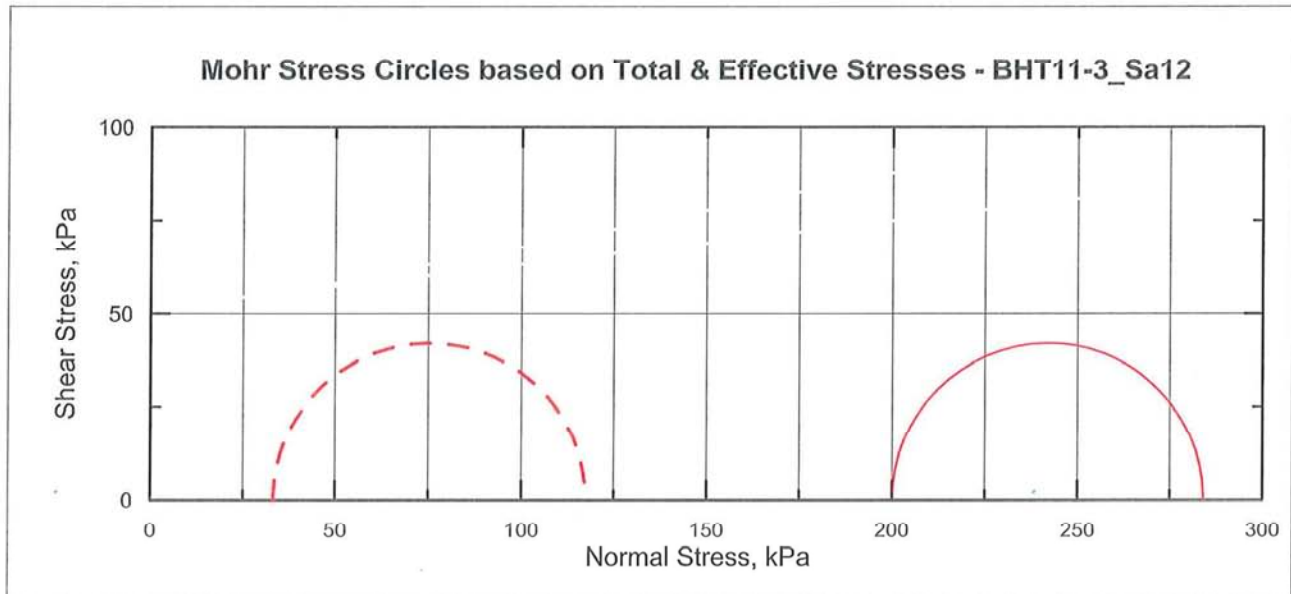
| Sample Parameters | | | | |
|---|-------------------|------------|------------|------------|
| Initial | | Specimen 1 | Specimen 2 | Specimen 3 |
| Diameter | cm | 6.989 | | |
| Height | cm | 14.105 | | |
| Volume | cm ³ | 541.119 | | |
| Wet Mass | g | 1166.35 | | |
| Dry Density | kg/m ³ | 1820 | | |
| Water Content | % | 18.4 | | |
| Specific Gravity | Assumed | 2.720 | | |
| Void Ratio | | 0.49 | | |
| Degree of Saturation | | 101.3 | | |
| Before Shear (after consolidation) | | | | |
| Volume | cm ³ | 541.119 | | |
| B - Value | | N/A | | |
| After Shear | | | | |
| Wet Mass | g | 1194.00 | | |
| Dry Density | kg/m ³ | 1857 | | |
| Water Content | % | 18.8 | | |
| Void Ratio | | 0.46 | | |
| Degree of Saturation | | 100.0 | | |
| Stress - Strain | | | | |
| Cell Pressure | kPa | 440.00 | | |
| Back Pressure | kPa | 240.00 | | |
| Consolidation Stress | kPa | 200.00 | | |
| Rate of Strain | mm/min | 0.1000 | | |
| Vertical Strain at Failure | % | 6.27 | | |
| Deviator Stress at Failure | kPa | 83.99 | | |
| Pore Pressure at Failure | kPa | 166.70 | | |
| Total Stress | | | | |
| Minor Principal Stress, σ_3 | kPa | 200.00 | | |
| Major Principal Stress, σ_1 | kPa | 283.99 | | |
| Radius, $(\sigma_1 - \sigma_3)/2$ | kPa | 41.99 | | |
| Intersection Point, $(\sigma_1 + \sigma_3)/2$ | kPa | 241.99 | | |
| Effective Stress | | | | |
| Minor Principal Stress, σ_3' | kPa | 33.30 | | |
| Major Principal Stress, σ_1' | kPa | 117.29 | | |
| Radius, $(\sigma_1' - \sigma_3')/2$ | kPa | 41.99 | | |
| Intersection Point, $(\sigma_1' + \sigma_3')/2$ | kPa | 75.29 | | |



| | | | |
|---|---------------------------|----------------------|-----|
| Project WINDSOR ESSEX PARKWAY | | | |
| TITLE UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST TUNNEL T-11 (T11-3-SA12) | | | |
| Date Aug 2012 | JOB NO SW8801.1004.101 | FIGURE NO. B.84-A | REV |



— BH T11-3_Sa12 (200 kPa)



NOTE:
Failure based on maximum deviator stress

**CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST
FOR COHESIVE SOILS (ASTM D-4767)**

Project: **WEP**
Client: **Hatch Mott MacDonald**
Location: **Windsor, ON.**

Project No.: **SW8801.1004.101**
Date: **25-Jul-11**
Depth(m): **19.8 to 20.4**
Sample ID: **B12-3_TW17**

Sample Description: **Clayey Silt/Silty Clay, some sand, trace gravel**

| Sample Parameters | | | | |
|---|-------------------|------------|------------|------------|
| Initial | | Specimen 1 | Specimen 2 | Specimen 3 |
| Diameter | cm | 6.946 | | |
| Height | cm | 14.187 | | |
| Volume | cm ³ | 537.589 | | |
| Wet Mass | g | 936.10 | | |
| Dry Density | kg/m ³ | 1304 | | |
| Water Content | % | 33.5 | | |
| Specific Gravity | Actual | 2.740 | | |
| Void Ratio | | 1.10 | | |
| Degree of Saturation | | 83.4 | | |
| Before Shear (after consolidation) | | | | |
| Volume | cm ³ | 515.169 | | |
| B - Value | | 0.99 | | |
| After Shear | | | | |
| Wet Mass | g | 923.81 | | |
| Dry Density | kg/m ³ | 1253 | | |
| Water Content | % | 43.1 | | |
| Void Ratio | | 1.19 | | |
| Degree of Saturation | | 99.5 | | |
| Stress - Strain | | | | |
| Cell Pressure | kPa | 305.00 | | |
| Back Pressure | kPa | 180.00 | | |
| Consolidation Stress | kPa | 125.00 | | |
| Rate of Strain | mm/min | 0.0150 | | |
| Vertical Strain at Failure | % | 1.53 | | |
| Deviator Stress at Failure | kPa | 141.38 | | |
| Pore Pressure at Failure | kPa | 61.20 | | |
| Total Stress | | | | |
| Minor Principal Stress, σ_3 | kPa | 125.00 | | |
| Major Principal Stress, σ_1 | kPa | 266.38 | | |
| Radius, $(\sigma_1 - \sigma_3)/2$ | kPa | 70.69 | | |
| Intersection Point, $(\sigma_1 + \sigma_3)/2$ | kPa | 195.69 | | |
| Effective Stress | | | | |
| Minor Principal Stress, σ_3' | kPa | 63.80 | | |
| Major Principal Stress, σ_1' | kPa | 205.18 | | |
| Radius, $(\sigma_1' - \sigma_3')/2$ | kPa | 70.69 | | |
| Intersection Point, $(\sigma_1' + \sigma_3')/2$ | kPa | 134.49 | | |



Project

WINDSOR ESSEX PARKWAY

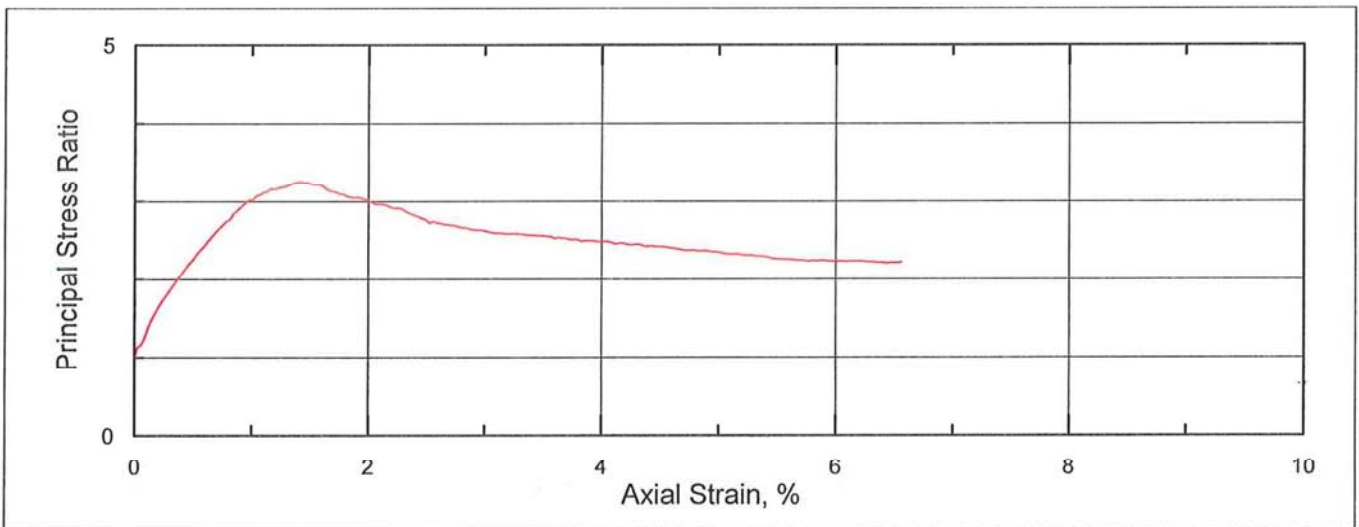
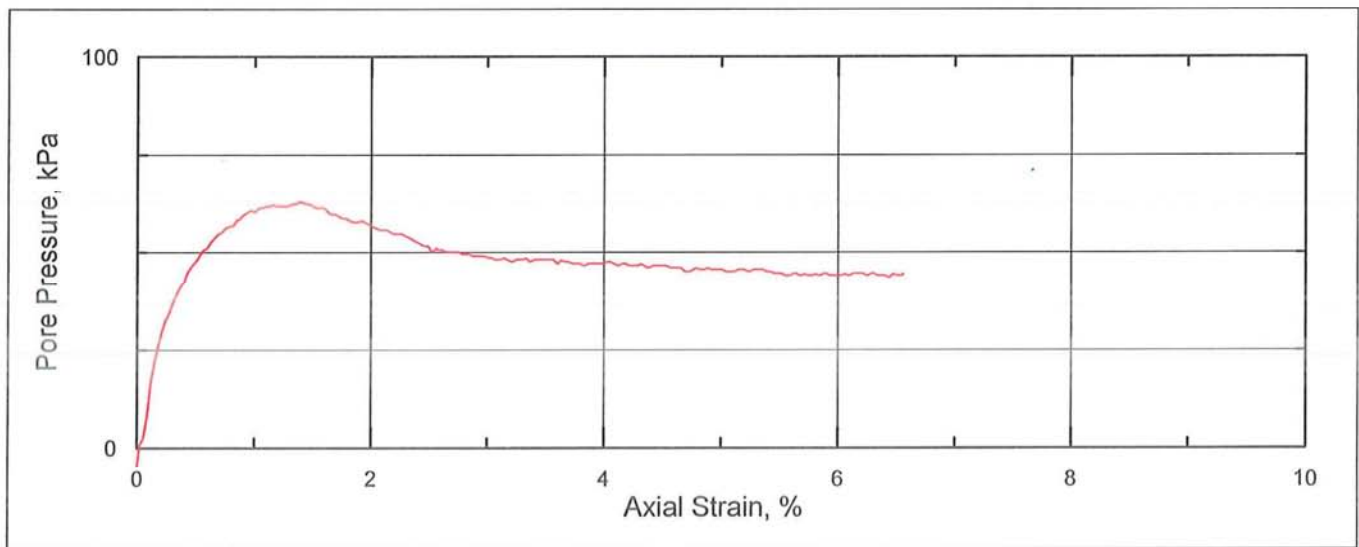
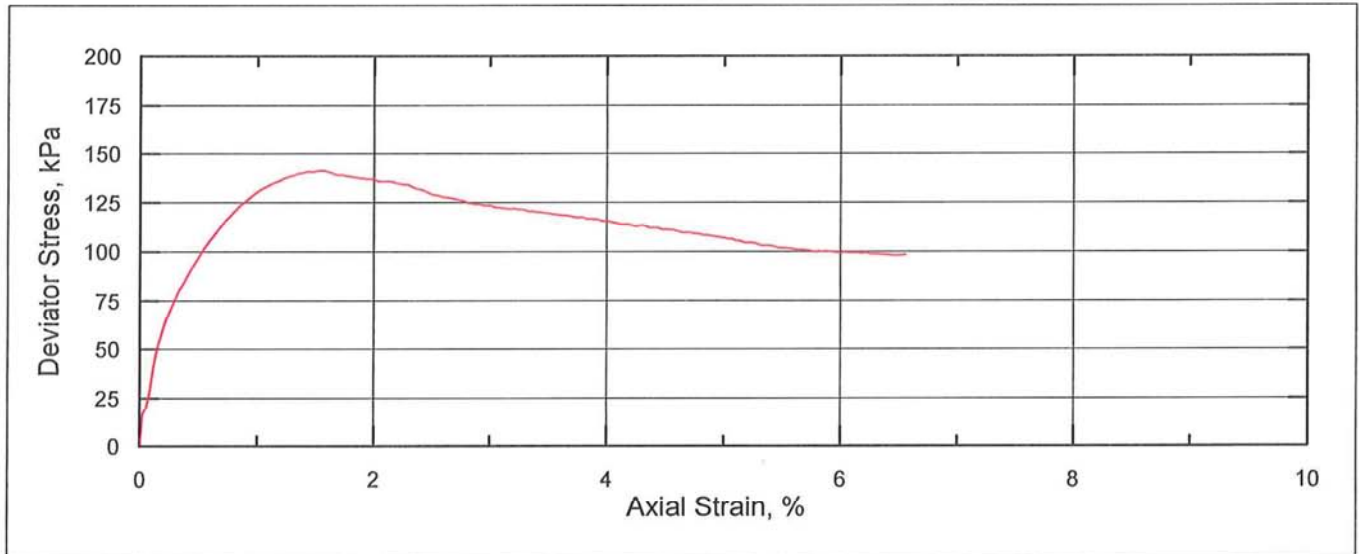
TITLE **CONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION TEST
SOIL SAMPLE ID: B12-3_TW17
BRIDGE B-12**

Date
Aug 2012

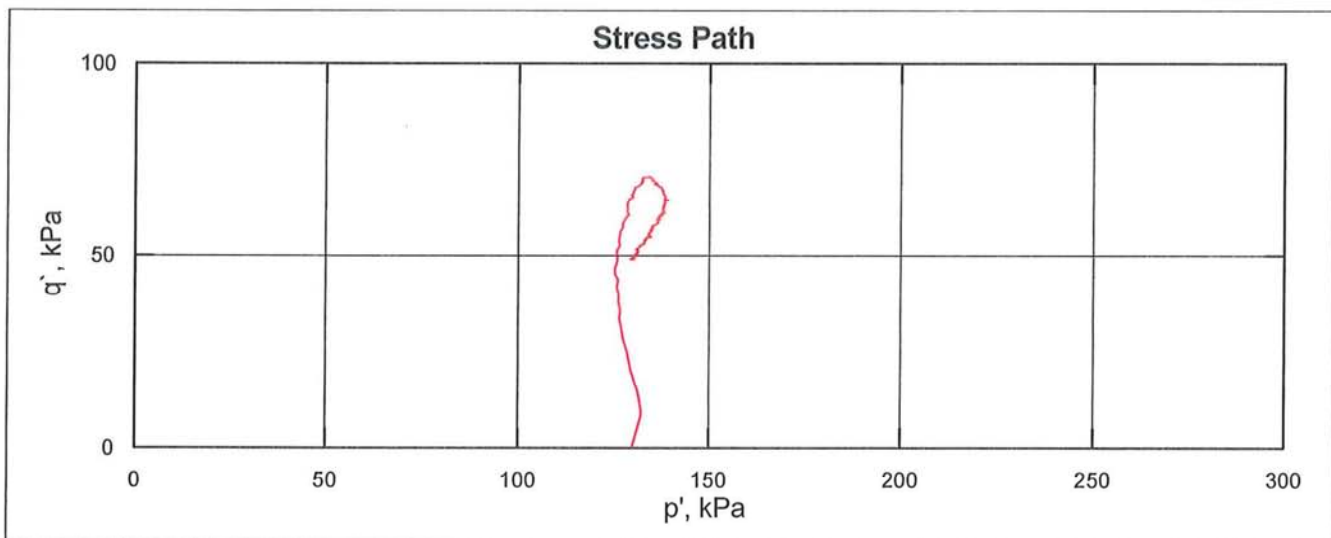
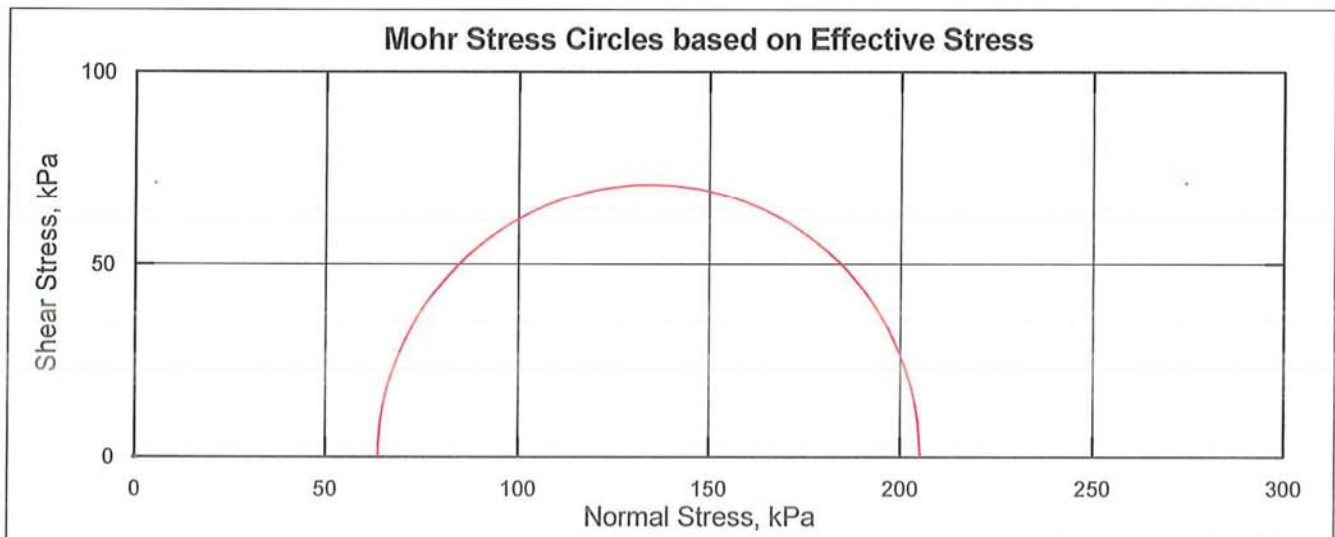
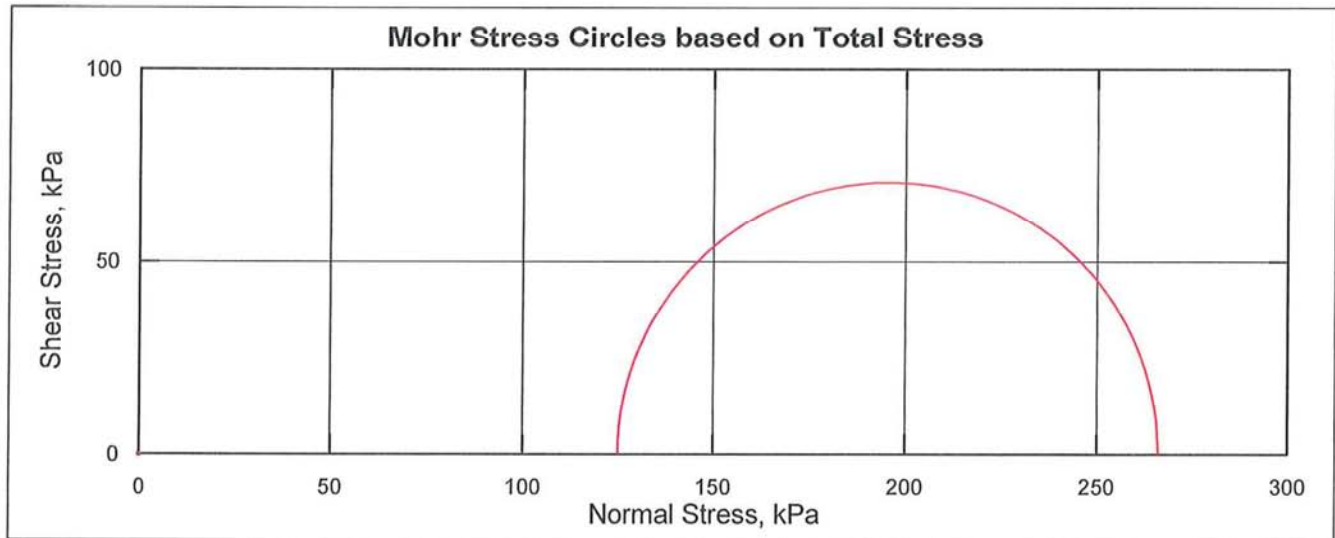
JOB NO
SW8801.1004.101

FIGURE NO
B.85-A

REV



— 125 kPa



— 125 kPa

Appendix C Additional 2011 Geotechnical Investigations – Test Pit Logs and Laboratory Test Results of Test Pit Soils


Project: Windsor-Essex Parkway
Document: Geotechnical Investigation and Design Report –
Permanent Cuts - Phase I (Station 10+070L to Station 10+900T)
Doc No.: 285380-04-119-0029 (Geocres No. 40J3-13)

Date: August/2012
Rev: 0
Page No.: Appendix C

TEST PIT STRATIGRAPHY LOG



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| | | | | | | | | |
|--|-------|-----------|--|--|---|--|--|------|
| Project Name: Geotechnical Test Pit | | | Contractor: Amico Infrastructure | | Test Pit Designation: TP 7 | | | |
| Project No.: SW8801.1004.301 | | | | | | | | |
| Client: Parkway Infrastructure Engineers | | | Surface Elevation: ~ 180.9 m | | Date Completed: 08-15-11 | | | |
| Location: Windsor, ON | | | Test Pit Method: J Deere 470G LC | | Supervisor: A Cevizli | | | |
| Depth (m) | | | Soil Symbol, Primary Component, Secondary Component, Relative Density/Consistency, Grain Size/Plasticity, Gradation/Structure, Colour, Moisture Content, Supplementary Descriptors | | Location: Easting 0332053, Northing 4679665 | | | |
| | | | | | Photo: Looking North | | | |
| From | At | To | Sample No. | |  | | | |
| 0 | 1.0.5 | 0.4 - 0.5 | | | | | Surface: grass | |
| | | | | | | | FILL clayey and TOPSOIL | |
| 0.4 - 0.5 | | 0.6 | | | | | TOPSOIL - sandy, some roots, dark brown to black, oxidized (extended to 0.9 m on north side) | |
| | | | | | | | 0.6 | 1.0 |
| 1.0 | | 3.4 | | | | | | |
| | | | | | | | 3.4 | 10.5 |
| 7-1.5 | | | | | | | | |
| 7-2.5 | | | | | | | | |
| 7-4.2 | | | | | | | | |
| 7-10.5 | | | | | | | | |
| End of Test Pit at ~ 170.9 m | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |
| bgs- below ground surface | | | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

NOTES:

| |
|--|
| Seepage depth: Moderate seepage on South Wall @ 1 m bgs |
| Sidewall Stability: Stable |
| Organic depth-thickness: 0.6 m of topsoil (mixed with backfill) |
| Surface water run into excavation: No |
| Ranges of Hand Vanes: @ 3m - >260 kPa; @4.2m - 220 kPa; @7m - 80 kPa; @8m - 62-76 kPa; @8.5m - 60-70 kPa; @10.5m - 44-56 kPa |


Completed By: P Neumann

Date: 9-20-2011

TEST PIT STRATIGRAPHY LOG



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| | | | | | | |
|--|----|------|--|--|--|---|
| Project Name: Geotechnical Test Pit | | | Contractor: Amico Infrastructure | | Test Pit Designation: TP 8 | |
| Project No.: SW8801.1004.301 | | | | | | |
| Client: Parkway Infrastructure Engineers | | | Surface Elevation: ~ 181.5 m | | Date Completed: 08-12-11 | |
| Location: Windsor, ON | | | Test Pit Method: J Deere 470G LC | | Supervisor: A Cevizli | |
| Depth (m) | | | Soil Symbol, Primary Component, Secondary Component, Relative Density/Consistency, Grain Size/Plasticity, Gradation/Structure, Colour, Moisture Content, Supplementary Descriptors | | Sample No. | Location: Easting 0332319, Northing 4679373 |
| From | At | To | | | | Photo: Looking East |
| 0 | 10 | 0.1 | Surface: sand and gravel | | 8-1.3 8-2.1 8-3.0 8-4.2 8-10 |  |
| | | | SAND and GRAVEL | | | |
| 0.1 | | 0.25 | TOPSOIL - sandy, dark brown | | | |
| 0.25 | | 1 | SAND - fine, compact, brown | | | |
| 1 | | 1.5 | CLAYEY SILT - mottled brown and grey [1.3 m 14.9% MC] | | | |
| 1.5 | | 2.3 | SILTY CLAY - with embedded sand and gravel, mottled brown and grey [2.1 m 20.0% MC] | | | |
| 2.3 | | 10 | SILTY CLAY - with embedded sand and gravel, grey [3.0 m 14.7% MC] [4.2 m 17.9% MC] [10 m 20.6% MC] | | | |
| End of Test Pit at ~ 171.5 m | | | | | | |
| bgs- below ground surface | | | | | | |
| | | | | | | |

NOTES:

| |
|---|
| Seepage depth: None observed |
| Sidewall Stability: Stable |
| Organic depth-thickness: 0.25 m of topsoil |
| Surface water run into excavation: No |
| Range of Hand Vanes: @ 3m ->260 kPa; @4.2m - 200-240 kPa; @8m - 140-160 kPa; @9m - 80-100 kPa; @10m - 60-78 kPa |


Completed By: P Neumann

Date: 9-20-2011

TEST PIT STRATIGRAPHY LOG



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| | | | | | | | |
|--|-----------|---|--|--------|--|---|--------|
| Project Name: Geotechnical Test Pit | | | Contractor: Amico Infrastructure | | Test Pit Designation: TP10 | | |
| Project No.: SW8801.1004.301 | | | | | | | |
| Client: Parkway Infrastructure Engineers | | | Surface Elevation: ~ 183.2 m | | Date Completed: 08-24-11 | | |
| Location: Windsor, ON | | | Test Pit Method: J Deere 470G LC | | Supervisor: A Cevizli | | |
| Depth (m) | | | Soil Symbol, Primary Component, Secondary Component, Relative Density/Consistency, Grain Size/Plasticity, Gradation/Structure, Colour, Moisture Content, Supplementary Descriptors | | Sample No. | Location: Easting 0333256, Northing 4678863 | |
| | | | | | | Photo: Looking West | |
| From | At | To | | |  | | |
| 0 | 0.3 - 0.4 | 0.3 - 0.4 | Surface: grass | | | 10-1.15 | |
| | | | TOPSOIL - sandy, some roots, dark brown to black | | | | |
| 1 | | SILTY CLAY - with organics, grey and brown | | 10-2.0 | | | |
| | | SANDY CLAY - mottled brown and grey [1.15 m 14.1% MC] | | | | | 10-2.8 |
| 1.7 | | SILTY CLAY - with embedded sand and gravel, mottled brown and grey [2.0 m 13.1% MC] [2.8 m 12.5% MC] [4.1 m 15.2% MC] | | 10-4.1 | | | |
| | | SILTY CLAY - with embedded sand and gravel, brown | | | | | 10-10 |
| 2.8 | | SILTY CLAY - with embedded sand and gravel, grey [4.1 m 15.2% MC] [10 m 19.0% MC] | | | | | |
| | | End of Test Pit at ~173.2 m | | | | | |
| 3.4 | | bgs- below ground surface | | | | | |
| | | | | | | | |


NOTES:

| |
|---|
| Seepage depth: 7 m West Wall @ 0.9 m bgs |
| Sidewall Stability: Stable |
| Organic depth-thickness: 0.3 m of topsoil |
| Surface water run into excavation: No |
| Range of Hand Vane: @ 3m - >260 kPa; @4.2m - >260 kPa; @5.5m - 130-160 kPa; @7m - 80 kPa; @8m - 50-60 kPa; 9m - 48-58 kPa |

Completed By: P Neumann

Date: 9-20-2011

amec

| | | | | | | | |
|--|----|-----|--|-------------------------------------|------------|--|--|
| Project Name: Geotechnical Test Pit | | | | Contractor: Amico Infrastructure | | Test Pit Designation: TP11 | |
| Project No.: SW8801.1004.301 | | | | | | | |
| Client: Parkway Infrastructure Engineers | | | | Surface Elevation: ~ 184.8 m | | Date Completed: 08-31-11 | |
| Location: Windsor, ON | | | | Test Pit Method: J Deere 470G LC | | Supervisor: A Cevizli | |
| Depth (m) | | | Soil Symbol, Primary Component, Secondary Component, Relative Density/Consistency, Grain Size/Plasticity, Gradation/Structure, Colour, Moisture Content, Supplementary Descriptors | | Sample No. | Location: Easting 0334336, Northing 4678388 | |
| From | At | To | | | | Photo: Looking West | |
| 0 | 10 | 0.2 | Surface: grass | | 11-1.8 |  | |
| | | | TOPSOIL - sandy, some roots, dark brown to black | | | | |
| | | | BACKFILL - clayey with organics and embedded sand and gravel | | | | |
| | | | CLAYEY SILT - mottled brown and grey | | | | |
| | | | SILTY CLAY - with embedded sand and gravel, mottled brown and grey [1.8 m 20.9 % MC] [2.0 m 14.3 % MC] | | | | |
| | | | SILTY CLAY - with embedded sand and gravel, brown [2.8 m 13.7 % MC] | | | | |
| | | | SILTY CLAY - with embedded sand and gravel, grey [4.5 m 13.0 % MC] [10.0 m 15.1 % MC] | | | | |
| | | | End of Test Pit at ~174.8 m | | | | |
| | | | | | | | |
| | | | bgs- below ground surface | | | | |
| | | | | | | | |

| |
|---|
| Seepage depth: None observed; Encountered copper water line which allowed water into excavation at 1.7 m on north side. |
| Sidewall Stability: Stable |
| Organic depth-thickness: 0.2 m of topsoil |
| Surface water run into excavation: No |
| Ave. Hand Vanes: @ 3m - >260 kPa; @4.5m - 210 kPa; @6m - 170 kPa; @7.25m - 90 kPa; @9m - 62 kPa; @9.5m - 62 kPa |
| |

Date: 9-20-2011

TEST PIT STRATIGRAPHY LOG



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| | | | | | | |
|--|----|-----|--|--|---|--|
| Project Name: Geotechnical Test Pit | | | Contractor: Amico Infrastructure | | Test Pit Designation: TP12 | |
| Project No.: SW8801.1004.301 | | | | | | |
| Client: Parkway Infrastructure Engineers | | | Surface Elevation: ~ 185.6 m | | Date Completed: 09-01-11 | |
| Location: Windsor, ON | | | Test Pit Method: J Deere 470G LC | | Supervisor: A Cevizli | |
| Depth (m) | | | Soil Symbol, Primary Component, Secondary Component, Relative Density/Consistency, Grain Size/Plasticity, Gradation/Structure, Colour, Moisture Content, Supplementary Descriptors | | Location: Easting 0334542, Northing 4678258 | |
| | | | Sample No. | | Photo: Looking South | |
| From | At | To | | | | |
| 0 | | 0.5 | Surface: grass | | | |
| | | | | | | |
| | | | TOPSOIL - sandy, some roots, dark brown to black | | | |
| 0.5 | | 1.2 | CLAYEY SILT - with organics, mottled brown and grey [1.1 m 14.4% MC] | | | |
| 1.2 | | 2.2 | SILTY CLAY - mottled brown and grey [1.5 m 20.4% MC] [2.1 m 13.2% MC] | | | |
| | | | 12-1.1 | | | |
| | | | 12-1.5 | | | |
| | | | 12-2.1 | | | |
| 2.2 | | 3.5 | SILTY CLAY - brown | | | |
| 3.5 | | 10 | SILTY CLAY - with embedded sand and gravel, grey [4.5 m 13.1% MC] [9.5 m 15.5% MC] | | | |
| | | | 12-4.5 | | | |
| | | | 12-9.5 | | | |
| | 10 | | End of Test Pit at ~175.6 m | | | |
| | | | | | | |
| | | | bgs- below ground surface | | | |
| | | | | | | |
| | | | | | | |


NOTES:

| |
|---|
| Seepage depth: None observed |
| Sidewall Stability: Stable |
| Organic depth-thickness: 0.5 m of topsoil |
| Surface water run into excavation: No |
| Range of Hand Vanes: @ 3m >260kPa; @4.5m - 180->260kPa; @6.5m - 102-112kPa; @8m - 80-100kPa; @9m - 64-80kPa; @9.5m - 52-80kPa |

Completed By: P Neumann

Date: 9-20-2011

amec

| | | | | | | |
|---|----|------|--|--|---|--|
| Project Name: Geotechnical Test Pit | | | Contractor: Amico Infrastructure | | Test Pit Designation: TP13 | |
| Project No.: SW8801.1004.301 | | | | | | |
| Client: Parkway Infrastructure Engineers | | | Surface Elevation: ~ 185.8 m | | Date Completed: 08-17-11 | |
| Location: Windsor, ON | | | Test Pit Method: J Deere 470G LC | | Supervisor: A Cevizli | |
| Depth (m) | | | Soil Symbol, Primary Component, Secondary Component, Relative Density/Consistency, Grain Size/Plasticity, Gradation/Structure, Colour, Moisture Content, Supplementary Descriptors | | Sample No. | |
| | | | | | | |
| | | | | | Photo: Looking North | |
| From | At | To | | |  | |
| 0 0.15 0.9 1.6 1.9 3.3 | 10 | 0.15 | Surface: grass | | | |
| | | | TOPSOIL - silty clay with organics, brown and grey | | | |
| | | | SILTY CLAY with organics, brown and grey [0.6 m 15.7% MC] | | | |
| | | | CLAYEY SILT - mottled brown and grey [1.2 m 20.3% MC] | | | |
| | | | SILTY CLAY - mottled brown and grey [1.8 m 13.9% MC] | | | |
| | | | SILTY CLAY - brown [2.9 m 13.1% MC] | | | |
| | | | SILTY CLAY - with embedded sand and gravel, grey [4.2 m 13.0% MC] [10 m 15.8% MC] | | | |
| | | | End of Test Pit at ~ 175.8 m | | | |
| | | | bgs- below ground surface | | | |
| | | | | | | |


| |
|--|
| Seepage depth: None observed |
| Sidewall Stability: Stable |
| Organic depth-thickness: 0.15 m of topsoil |
| Surface water run into excavation: No |
| Range of Hand Vanes: @ 3m - >260kPa; @4.2m - 240->260kPa; @5.5m - 140-200kPa; @6.8 - 128-148kPa; @8m - 80-120kPa; @9.2m - 58-78kPa; @ 10m - 50-60kPa |

Date: 9-20-2011

TEST PIT STRATIGRAPHY LOG



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| | | | | | | | | | |
|--|------|-----------|--|--|---|--|---|--|-----------------|
| Project Name: Geotechnical Test Pit | | | Contractor: Amico Infrastructure | | Test Pit Designation: TP14 | | | | |
| Project No.: SW8801.1004.301 | | | | | | | | | |
| Client: Parkway Infrastructure Engineers | | | Surface Elevation: ~ 186.6m | | Date Completed: 08-16-11 | | | | |
| Location: Windsor, ON | | | Test Pit Method: J Deere 470G LC | | Supervisor: A Cevizli | | | | |
| Depth (m) | | | Soil Symbol, Primary Component, Secondary Component, Relative Density/Consistency, Grain Size/Plasticity, Gradation/Structure, Colour, Moisture Content, Supplementary Descriptors | | Sample No. | | Location: Easting 0335292, Northing 4677678 | | |
| | | | | | | | Photo: Looking East | | |
| From | At | To | | |  | | | | |
| 0 | 10.0 | 0.3 | Surface: grass | | | | | | 14-0.9 |
| | | | TOPSOIL - sandy, some roots, dark brown to black | | | | | | |
| 0.3 | | 1.5 - 1.6 | CLAYEY SILT - mottled brown and grey [0.9 m 19.5% MC] | | | | | | 14-1.7 |
| | | | SILTY CLAY - mottled brown and grey [1.7 m 14.6% MC] | | | | | | |
| 1.5 - 1.6 | | 2.2 | SILTY CLAY - brown [2.5 m 12.3% MC] | | | | | | 14-2.5 |
| | | | SILTY CLAY - with embedded sand and gravel, grey [4.2 m 12.8% MC] [10 m 9.8% MC] | | | | | | |
| 2.2 | | 3.1 | End of Test Pit at ~176.6 m | | | | | | 14-4.2 14-10 |
| | | | | | | | | | |
| 3.1 | | | bgs- below ground surface | | | | | | |
| | | | | | | | | | |

NOTES:

| |
|---|
| Seepage depth: seepage at the silt/clay interface @1.2m to 1.6m bgs |
| Sidewall Stability: Stable |
| Organic depth-thickness: 0.3 m of topsoil |
| Surface water run into excavation: No |
| Range of Hand Vanes: @ 3m - >260kPa; @ 4.2m - 200-220kPa; @ 6.0m - 100-120kPa; @ 7.5m - 60-80kPa; @ 9m - 40-60kPa; @ 10m - 56-72kPa |

Completed By: P Neumann

Date: 9-20-2011

TEST PIT STRATIGRAPHY LOG



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| | | | | | | |
|--|------|-----|--|--|---|--|
| Project Name: Geotechnical Test Pit | | | Contractor: Amico Infrastructure | | Test Pit Designation: TP15 | |
| Project No.: SW8801.1004.301 | | | | | | |
| Client: Parkway Infrastructure Engineers | | | Surface Elevation: ~ 187.7 m | | Date Completed: 8-23-11 | |
| Location: Windsor, ON | | | Test Pit Method: J Deere 470G LC | | Supervisor: A Cevizli | |
| Depth (m) | | | Soil Symbol, Primary Component, Secondary Component, Relative Density/Consistency, Grain Size/Plasticity, Gradation/Structure, Colour, Moisture Content, Supplementary Descriptors | | Location: Easting 0335576, Northing 4677604 | |
| | | | Sample No. | | Photo: Looking East | |
| From | At | To | | | | |
| 0 | | 0.2 | Surface: grass | | | |
| | | | | | | |
| 0.2 | | 1 | TOPSOIL - sandy, some roots, dark brown to black | | | |
| | | | | | | |
| 1 | | 1.6 | BACKFILL - with organics | | | |
| | | | | | | |
| 1.6 | | 2.1 | SANDY SILT - ground and grey | | | |
| | | | | | | |
| 2.1 | | 3.5 | SILTY SAND - brown and grey | | | |
| | | | | | | |
| 2.1 | | 3.5 | SILTY CLAY - with embedded sand and gravel, brown | | | |
| | | | | | | |
| 3.5 | 10.0 | | SILTY CLAY - with embedded sand and gravel, grey | | | |
| | | | | | | |
| | 10.0 | | End of Test Pit at ~ 177.7 m | | | |
| | | | | | | |
| | | | bgs- below ground surface | | | |
| | | | | | | |
| | | | | | | |

NOTES:

| |
|--|
| Seepage depth: None observed |
| Sidewall Stability: Stable |
| Peat depth-thickness: not encountered |
| Organic depth-thickness: 0.2 m of topsoil |
| |
| Ave. Hand Vanes: @ 3m - >260 kPa; @4.2m - >260 kPa; @5.75m - 160-200 kPa; @7.5m - 120 kPa; @8.75 - 90 kPa; @10m - 90 kPa |
| |

Completed By: P Neumann

Date: 9-16-2011

TEST PIT STRATIGRAPHY LOG



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| | | | | | | |
|--|----|-----|--|--|---------------------------------------|--|
| Project Name: Geotechnical Test Pit | | | Contractor: Amico Infrastructure | | Test Pit Designation: TP B13-1 | |
| Project No.: SW8801.1004.301 | | | | | | |
| Client: Parkway Infrastructure Engineers | | | Surface Elevation: ~ N/A m | | Date Completed: 08-02-11 | |
| Location: Windsor, ON | | | Test Pit Method: J Deere 470G LC | | Supervisor: M Oldewening | |
| Depth (m) | | | Soil Symbol, Primary Component, Secondary Component, Relative Density/Consistency, Grain Size/Plasticity, Gradation/Structure, Colour, Moisture Content, Supplementary Descriptors | | Sample No. | |
| | | | | | Location: Easting N/A, Northing N/A | |
| | | | | | Photo: Looking North | |
| From | At | To | | | | |
| 0 | | 2.4 | Surface: Granular 'A' | | | |
| | | | GRANULAR 'B' Type II (north side of TP) | | | |
| | | | Granular over Topsoil Fill (centre of of TP) | | | |
| | | | FILL - mottled Silty Clay brown and grey, some Topsoil, trace building materials (centre of TP) | | | |
| | | | SILTY CLAY - fissured, fractured, mottled (south side of TP) | | | |
| 0.8 | | 1.1 | | | | |
| 1.1 | | 4.1 | | | | |
| 1.1 | | 2.3 | | | | |
| 2.3 | | 3.6 | | | | |
| 4.1 | | | End of Test Pit at ~ N/A m | | | |
| | | | | | | |
| | | | | | | |
| | | | bgs- below ground surface | | | |
| | | | | | | |

NOTES:

| |
|---|
| Seepage depth: 2.4 m bgs @ north side of TP |
| Sidewall Stability: Considered unstable |
| Organic depth-thickness: not encountered |
| Surface water run into excavation: No |
| Ave. Hand Vanes: Excavation considered unsafe for sampling or testing |
| Depth of TP varies |

Completed By: P Neumann

Date: 9-20-2011

TEST PIT STRATIGRAPHY LOG



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| | | | | | | |
|---|----|---|--|--|---------------------------------------|--|
| Project Name: Geotechnical Test Pit | | | Contractor: Amico Infrastructure | | Test Pit Designation: TP B13-2 | |
| Project No.: SW8801.1004.301 | | | | | | |
| Client: Parkway Infrastructure Engineers | | | Surface Elevation: ~ N/A m | | Date Completed: 08-02-11 | |
| Location: Windsor, ON | | | Test Pit Method: J Deere 470G LC | | Supervisor: M Oldewening | |
| Depth (m) | | | Soil Symbol, Primary Component, Secondary Component, Relative Density/Consistency, Grain Size/Plasticity, Gradation/Structure, Colour, Moisture Content, Supplementary Descriptors | | Sample No. | |
| | | | | | | |
| From | At | To | Photo: Looking North | | | |
| 0 0.3 1.5 3.9 5.8 | | 0.3 1.5 7.9 5.8 9.1 | Surface: grass | | | |
| | | | Granular 'A' | | | |
| | | | Granular 'B' Type II | | | |
| | | | FILL - Silty Clay, trace Topsoil, brown and grey, moist | | | |
| | | | SILTY CLAY - brown (at north side of TP) | | | |
| | | | SILTY CLAY - grey (at north side of TP) | | | |
| | | | | | | |
| | | | End of Test Pit at ~ N/A m | | | |
| | | | | | | |
| | | | bgs- below ground surface | | | |

NOTES:

| |
|---|
| Seepage depth: None observed |
| Sidewall Stability: Excavation considered unsafe for sampling or testing. |
| Organic depth-thickness: not encountered |
| Surface water run into excavation: No |
| Ave. Hand Vanes: Excavation considered unsafe for sampling or testing. |
| |

Completed By: P Neumann

Date: 9-20-2011

TEST PIT STRATIGRAPHY LOG



Page 1 of 1

| | | | | | | |
|--|-----|-----|--|--|---------------------------------------|--|
| Project Name: Geotechnical Test Pit | | | Contractor: Amico Infrastructure | | Test Pit Designation: TP B14-1 | |
| Project No.: SW8801.1004.301 | | | | | | |
| Client: Parkway Infrastructure Engineers | | | Surface Elevation: ~ N/A m | | Date Completed: 08-02-11 | |
| Location: Windsor, ON | | | Test Pit Method: J Deer 470G LC | | Supervisor: M Oldewening | |
| Depth (m) | | | Soil Symbol, Primary Component, Secondary Component, Relative Density/Consistency, Grain Size/Plasticity, Gradation/Structure, Colour, Moisture Content, Supplementary Descriptors | | Sample No. | |
| | | | | | | |
| | | | | | Photo: Looking North | |
| From | At | To | | | | |
| 0 | | 3 | Surface: Granular 'B' Type II | | | |
| | | | Granular 'B' Type II (north side) | | | |
| | | | FILL placed as temporary dam (north side) | | | |
| | | | FILL - Silty Clay, trace Topsoil, brown (south side) | | | |
| | | | FILL - Silty Clay mixed, grey and brown (south side) | | | |
| 3 | | 5.5 | SILTY CLAY - brown (south side) | | | |
| 0.6 | | 3.0 | End of Test Pit at ~ N/A m | | | |
| 3.0 | | 4.5 | bgs- below ground surface | | | |
| 4.5 | | 5.5 | | | | |
| | 5.5 | | | | | |

NOTES:

| |
|--|
| Seepage depth: @ 3m bgs, @ 4.5 m bgs, @ 5.2 m bgs |
| Sidewall Stability: Excavation considered unsafe for sampling or testing |
| Organic depth-thickness: not encountered |
| Surface water run into excavation: No |
| Ave. Hand Vanes: Excavation considered unsafe for sampling or testing |
| Test Pit excavated on a slope. |

Completed By: P Neumann

Date: 9-20-2011

TEST PIT STRATIGRAPHY LOG



Page 1 of 1

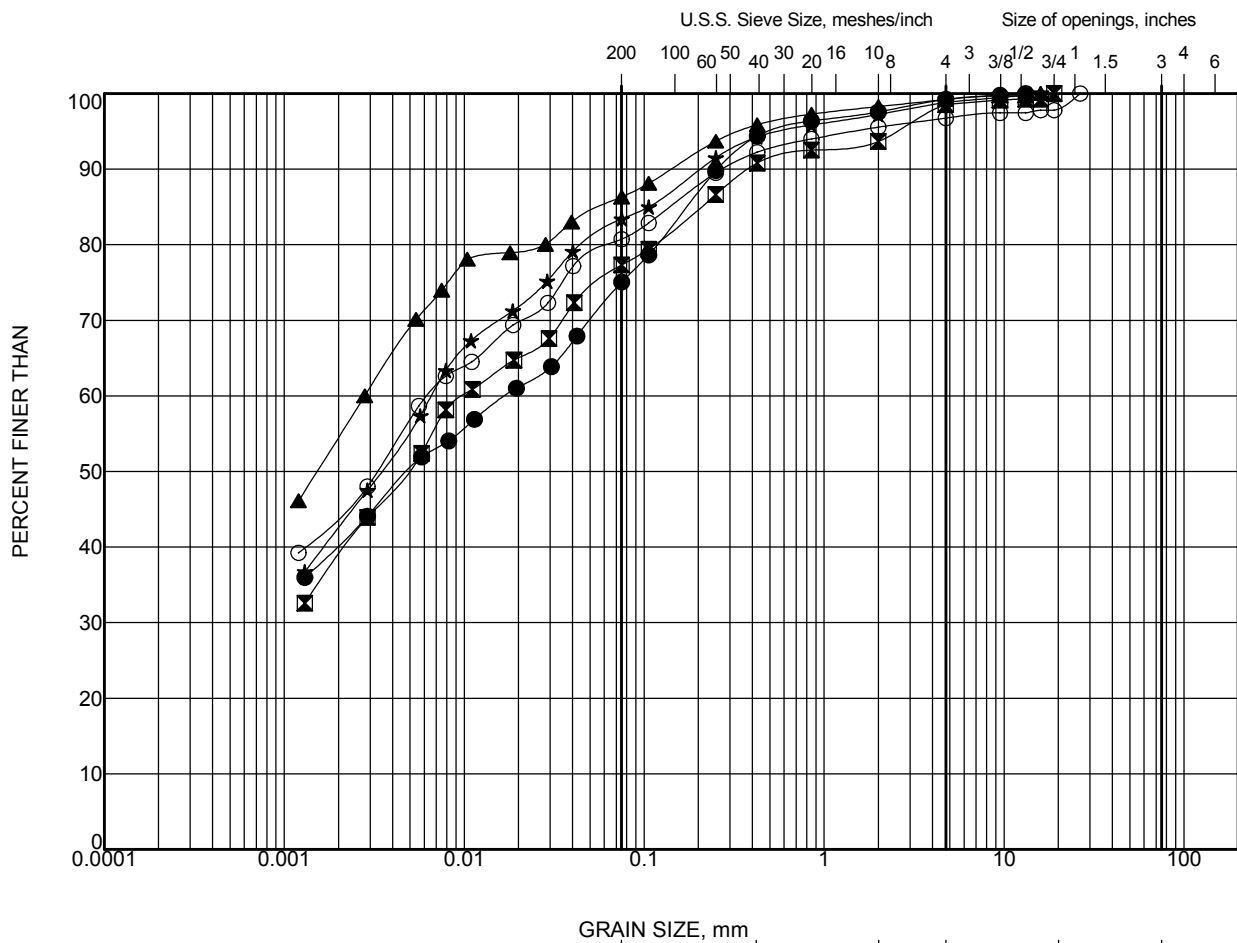
| | | | | | | |
|--|----|-----|--|--|---------------------------------------|--|
| Project Name: Geotechnical Test Pit | | | Contractor: Amico Infrastructure | | Test Pit Designation: TP B14-2 | |
| Project No.: SW8801.1004.301 | | | | | | |
| Client: Parkway Infrastructure Engineers | | | Surface Elevation: ~ N/A m | | Date Completed: 08-02-11 | |
| Location: Windsor, ON | | | Test Pit Method: J Deere 470G LC | | Supervisor: AC | |
| Depth (m) | | | Soil Symbol, Primary Component, Secondary Component, Relative Density/Consistency, Grain Size/Plasticity, Gradation/Structure, Colour, Moisture Content, Supplementary Descriptors | | Location: Easting N/A, Northing N/A | |
| | | | Sample No. | | Photo: Looking North | |
| From | At | To | | | | |
| 0 | | 5.8 | Surface: Granular 'B' | | | |
| | | | | | | |
| | | | FILL - Silty Clay, trace Topsoil, trace building materials, brown | | | |
| | | | SILTY CLAY - mottled brown (south side) | | | |
| | | | CLAY - brown (south side) | | | |
| 2.7 | | 3.7 | SILTY CLAY - grey (south side) | | | |
| 3.7 | | 4.6 | | | | |
| 4.6 | | 5.8 | | | | |
| | | | End of Test Pit at ~N/A m | | | |
| | | | bgs- below ground surface | | | |
| | | | | | | |
| | | | | | | |

NOTES:

| |
|--|
| Seepage depth: None observed |
| Sidewall Stability: Excavation considered unsafe for sampling or testing |
| Organic depth-thickness: not encountered |
| Surface water run into excavation: No |
| Ave. Hand Vanes: Excavation considered unsafe for sampling or testing |
| |

Completed By: P Neumann

Date: 9-20-2011

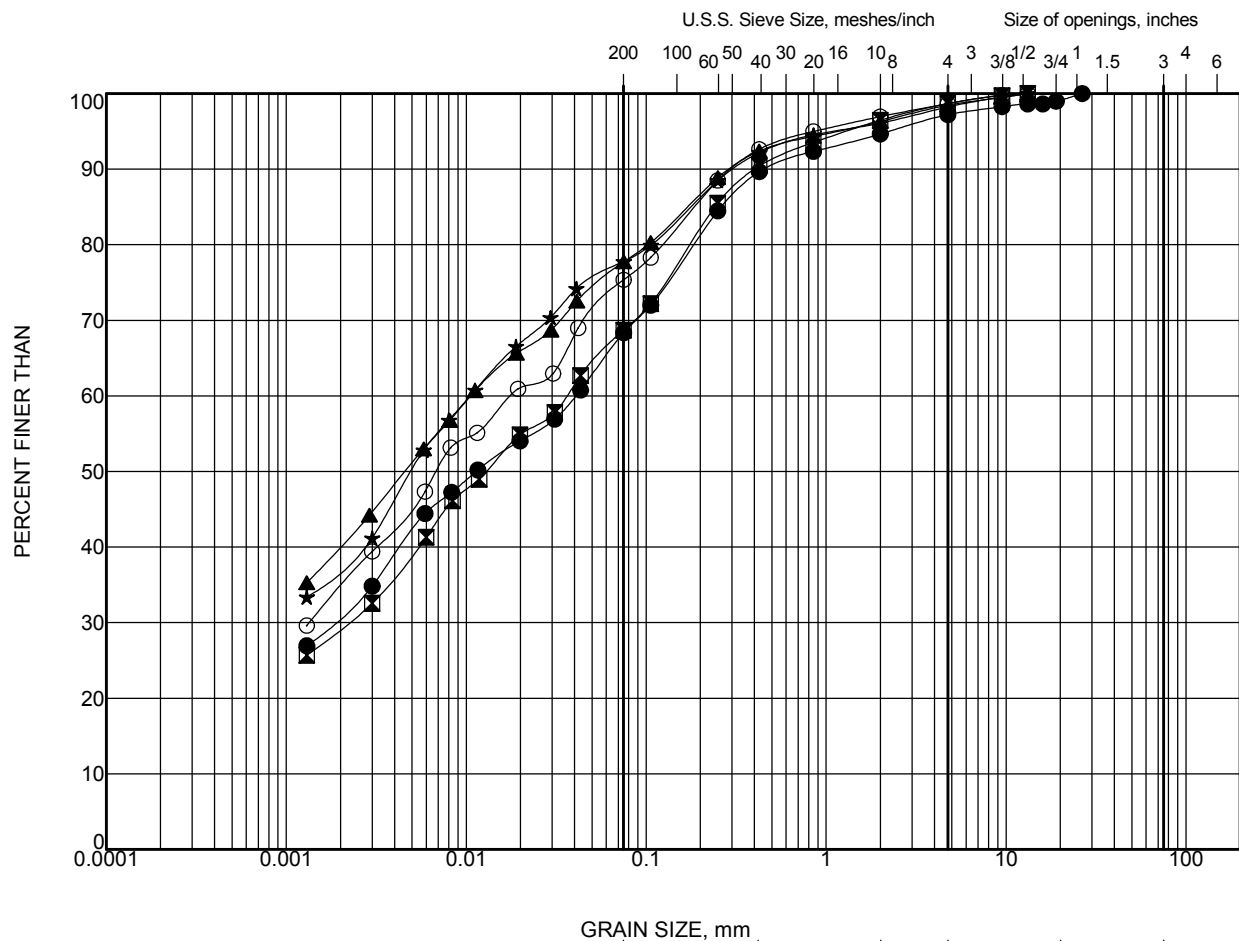


| GRAIN SIZE, mm | | | | | | |
|----------------|-----------|--------|--------|-------------|--------|----------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | TP7 | 1 | 1.5 |
| ⊠ | TP7 | 2 | 2.5 |
| ▲ | TP7 | 3 | 4.2 |
| ★ | TP7 | 4 | 10.5 |
| ○ | TP8 | 2 | 2.1 |

| | | | |
|-------------------|-----------------------------|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE C.1 | | | |

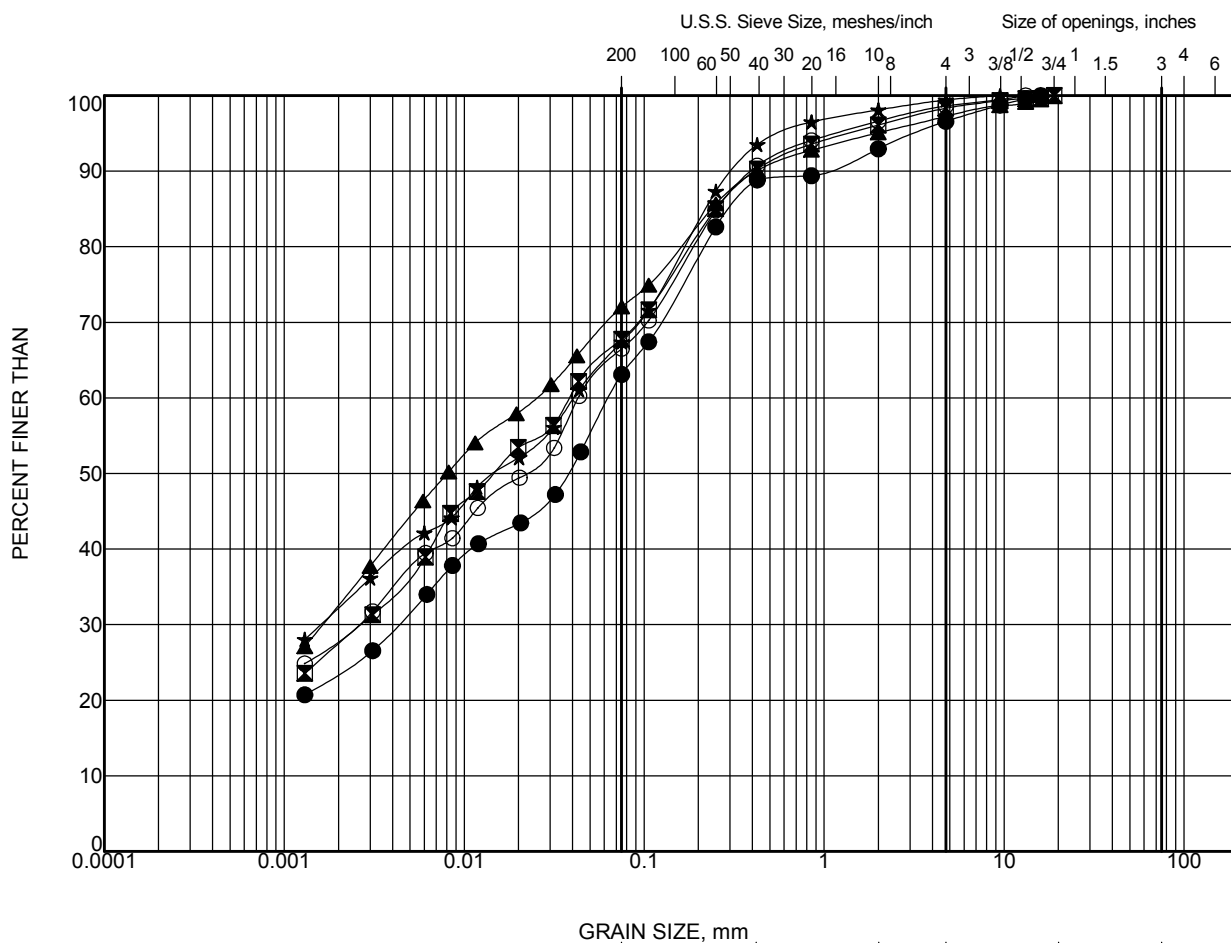


| CLAY AND SILT | SAND SIZE | | | GRAVEL SIZE | | Cobble Size |
|---------------|-----------|--------|--------|-------------|--------|-------------|
| | fine | medium | coarse | fine | coarse | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | TP10 | 1 | 1.2 |
| ■ | TP10 | 2 | 2 |
| ▲ | TP8 | 3 | 3 |
| ★ | TP8 | 4 | 4.2 |
| ○ | TP8 | 5 | 10 |

| | | | |
|-------------------|-------------|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. | SW8801.1004.101 | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE C.2 | | | |

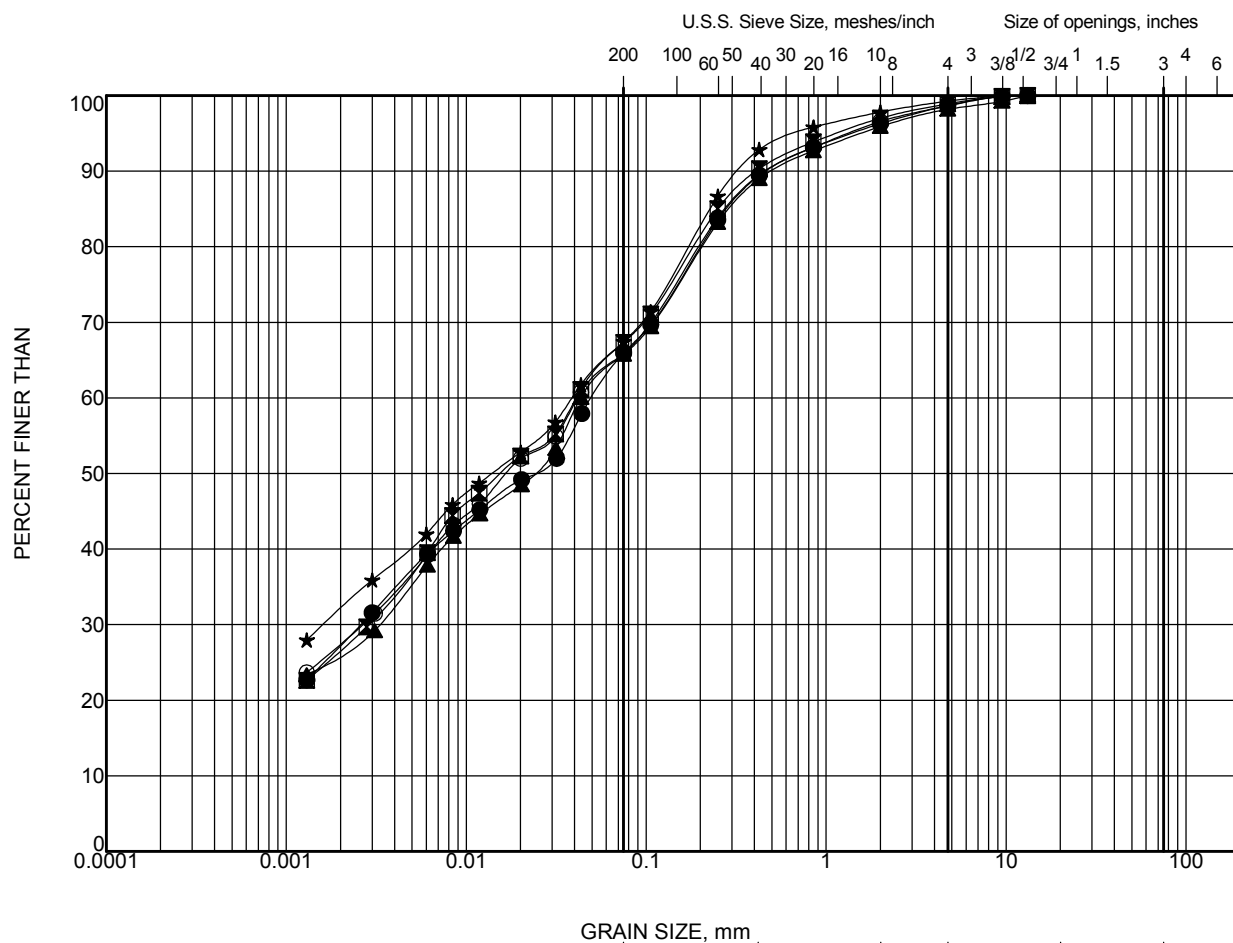


| | | | | | | |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | TP10 | 3 | 2.8 |
| ⊠ | TP10 | 4 | 4.1 |
| ▲ | TP10 | 5 | 10 |
| ★ | TP11 | 1 | 1.8 |
| ○ | TP11 | 2 | 2 |

| | | | |
|-------------------|-----------------------------|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE C.3 | | | |

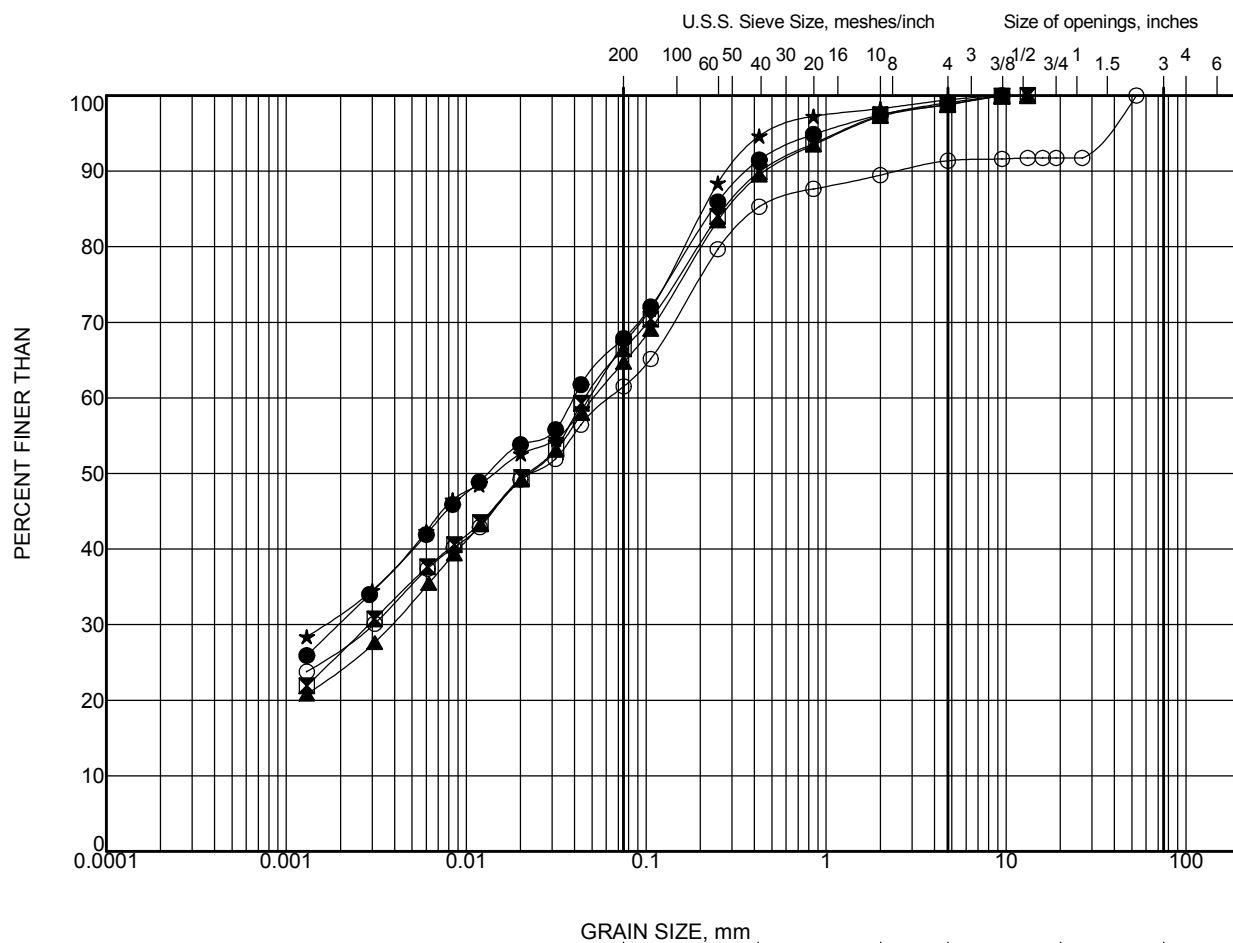


| | | | | | | |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | TP11 | 3 | 2.8 |
| ■ | TP11 | 4 | 4.5 |
| ▲ | TP11 | 5 | 10 |
| ★ | TP12 | 1 | 1.1 |
| ○ | TP12 | 2 | 1.5 |

| | | | |
|-------------------|-----------------------------|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE C.4 | | | |

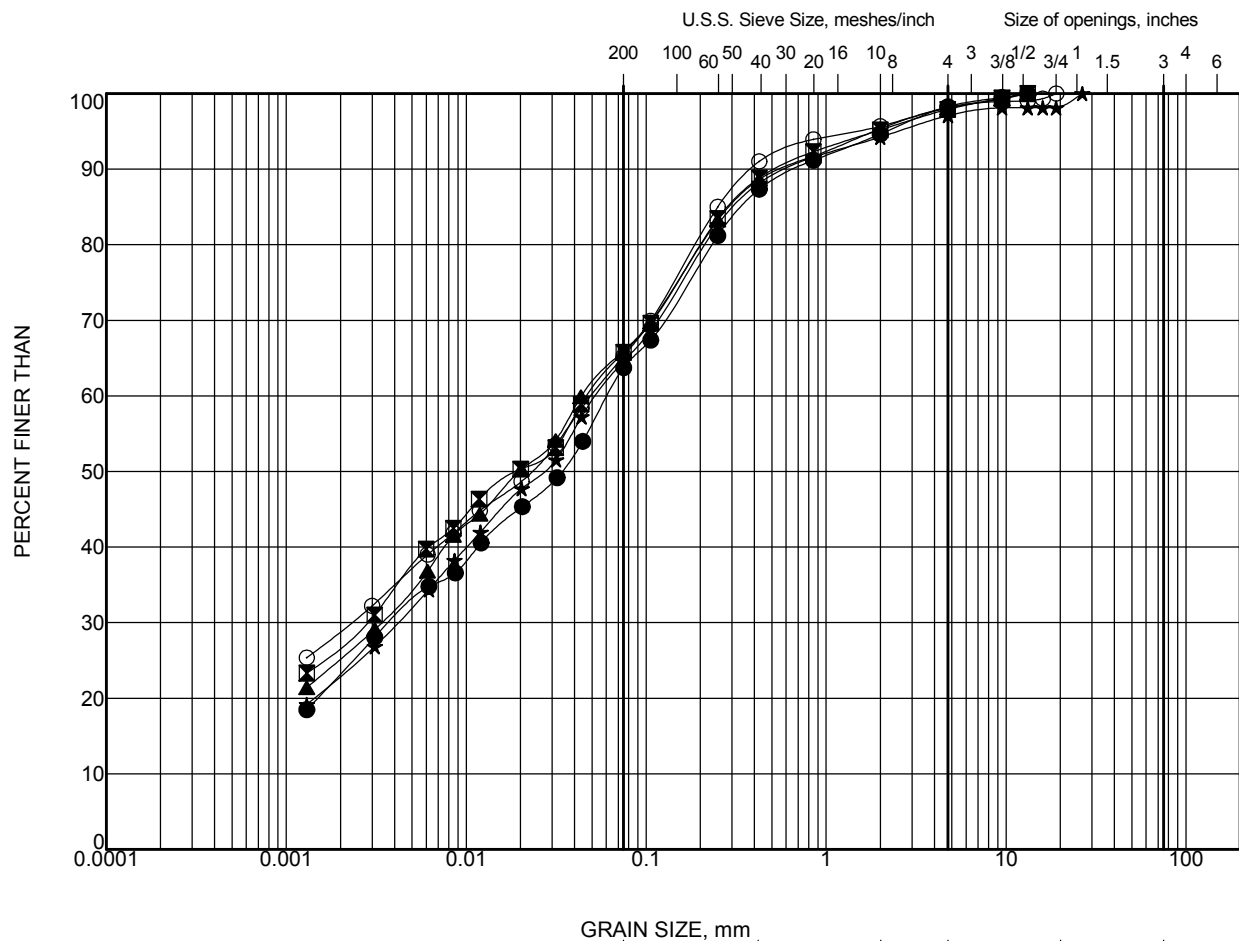


| | | | | | | |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | TP12 | 3 | 2.1 |
| ■ | TP12 | 4 | 4.5 |
| ▲ | TP12 | 5 | 9.5 |
| ★ | TP13 | 1 | 0.6 |
| ○ | TP13 | 2 | 1.2 |

| | | | |
|-------------------|-----------------------------|----------------------------------|----------|
| PROJECT | | Windsor Essex Parkway (WEP) | |
| | | Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION | |
| | | SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE C.5 | | | |

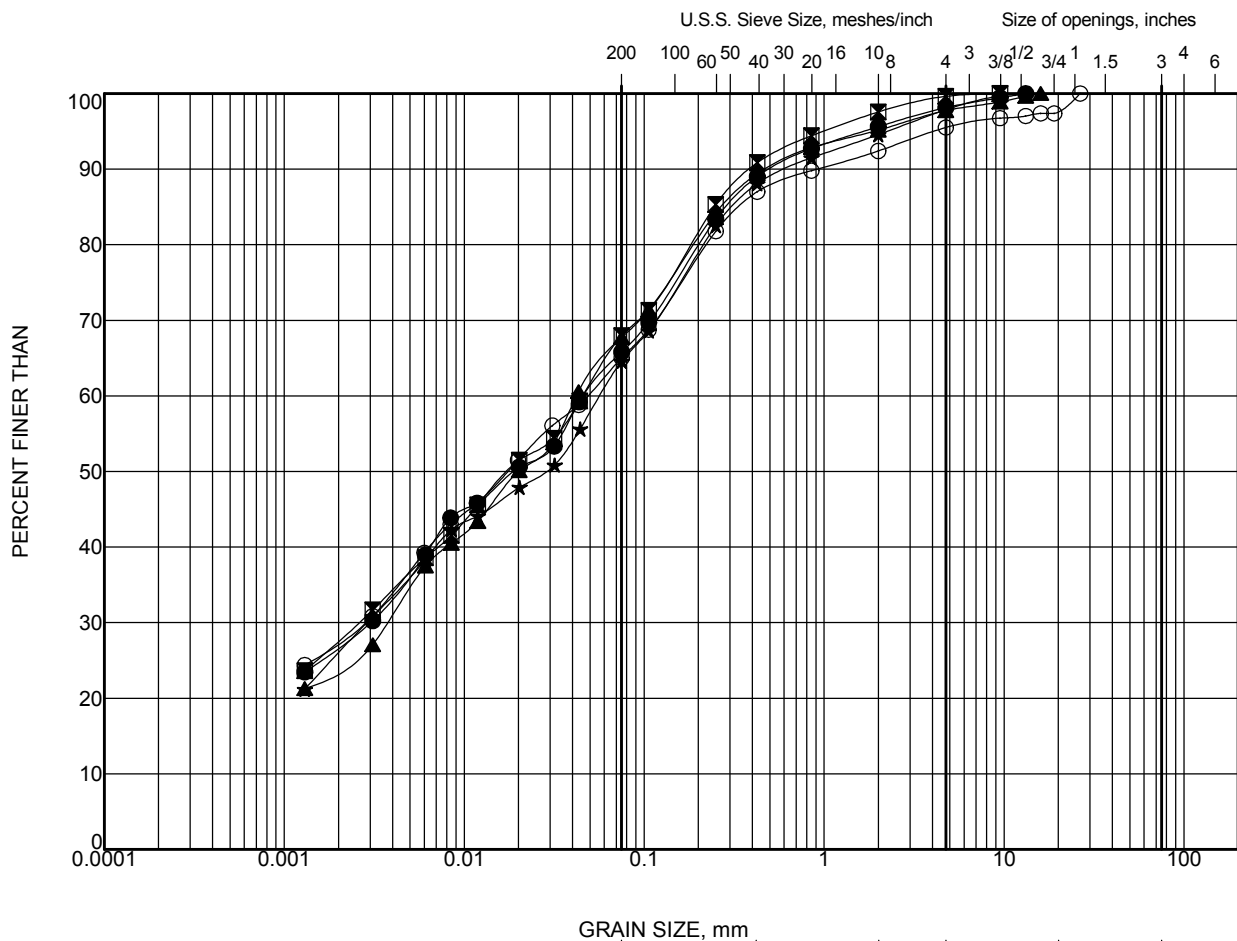


| | | | | | | |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | TP13 | 3 | 1.8 |
| ■ | TP13 | 4 | 2.9 |
| ▲ | TP13 | 5 | 4.2 |
| ★ | TP13 | 6 | 10 |
| ○ | TP14 | 1 | 0.9 |

| | | | |
|---------|-----------------------------|----------------------------------|-------------------|
| PROJECT | | Windsor Essex Parkway (WEP) | |
| | | Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION | |
| | | SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| | | | FIGURE C.6 |

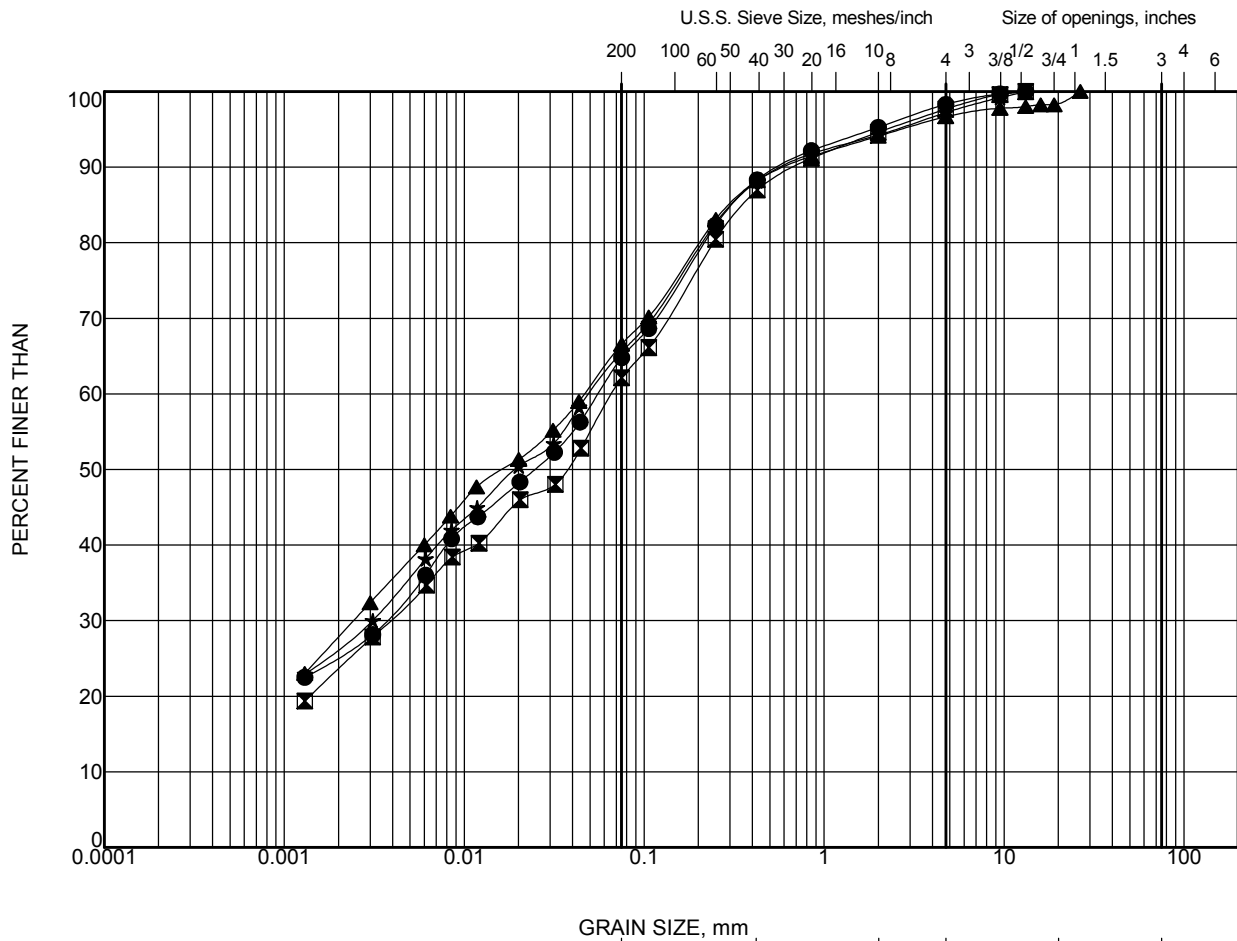


| | | | | | | |
|---------------|-----------|--------|--------|-------------|--------|----------------|
| CLAY AND SILT | fine | medium | coarse | fine | coarse | Cobble Size |
| | SAND SIZE | | | GRAVEL SIZE | | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | TP14 | 2 | 1.7 |
| ■ | TP14 | 3 | 2.5 |
| ▲ | TP14 | 4 | 4.2 |
| ★ | TP14 | 5 | 10 |
| ○ | TP15 | 2 | 1.5 |

| | | | |
|-------------------|-----------------------------|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE C.7 | | | |

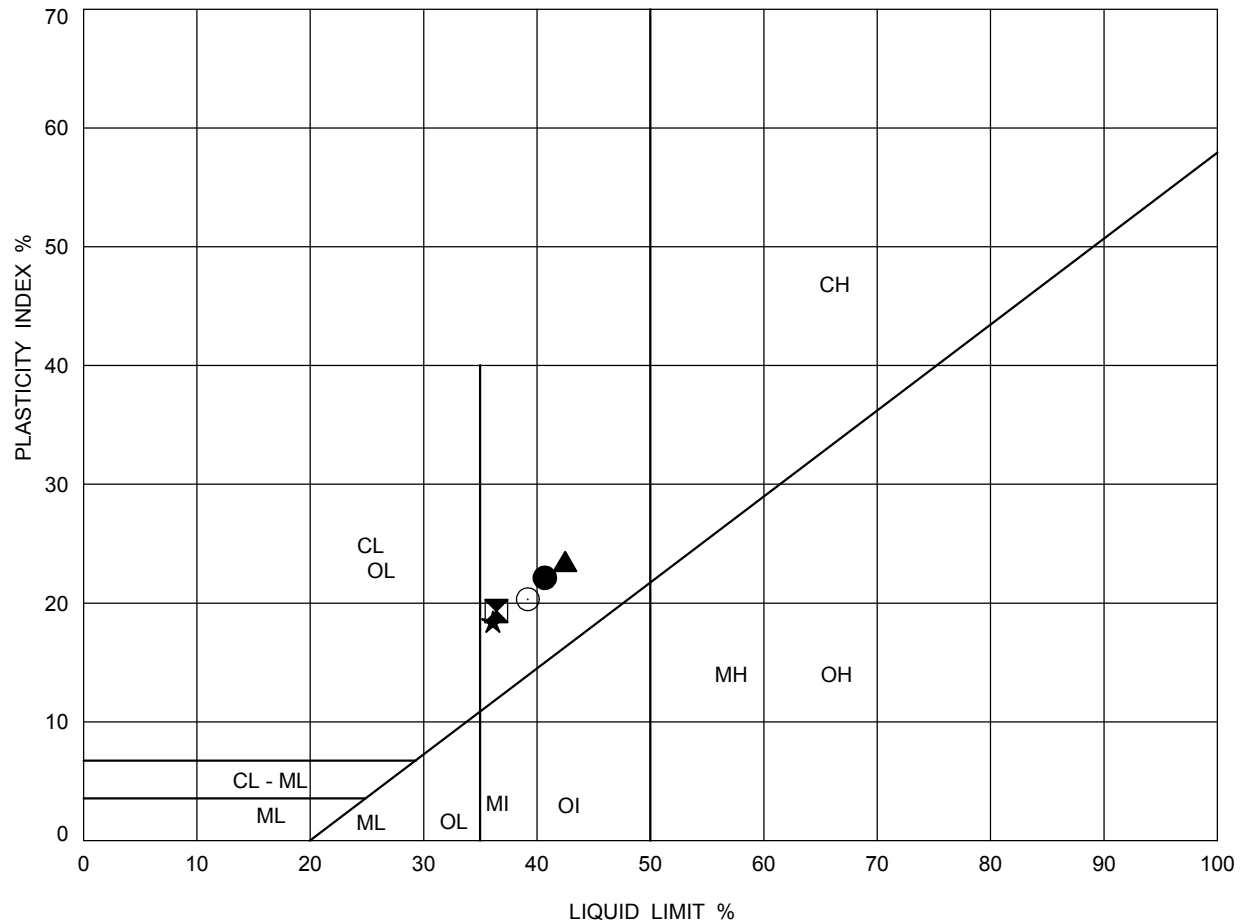


| CLAY AND SILT | SAND SIZE | | | GRAVEL SIZE | | Cobble Size |
|---------------|-----------|--------|--------|-------------|--------|-------------|
| | fine | medium | coarse | fine | coarse | |

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) |
|--------|----------|--------|-----------|
| ● | TP15 | 3 | 1.8 |
| ◻ | TP15 | 4 | 2.5 |
| ▲ | TP15 | 5 | 4.2 |
| ★ | TP15 | 6 | 10 |

| | | | |
|-------------------|-----------------------------|--|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | GRAIN SIZE DISTRIBUTION SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| FIGURE C.8 | | | |



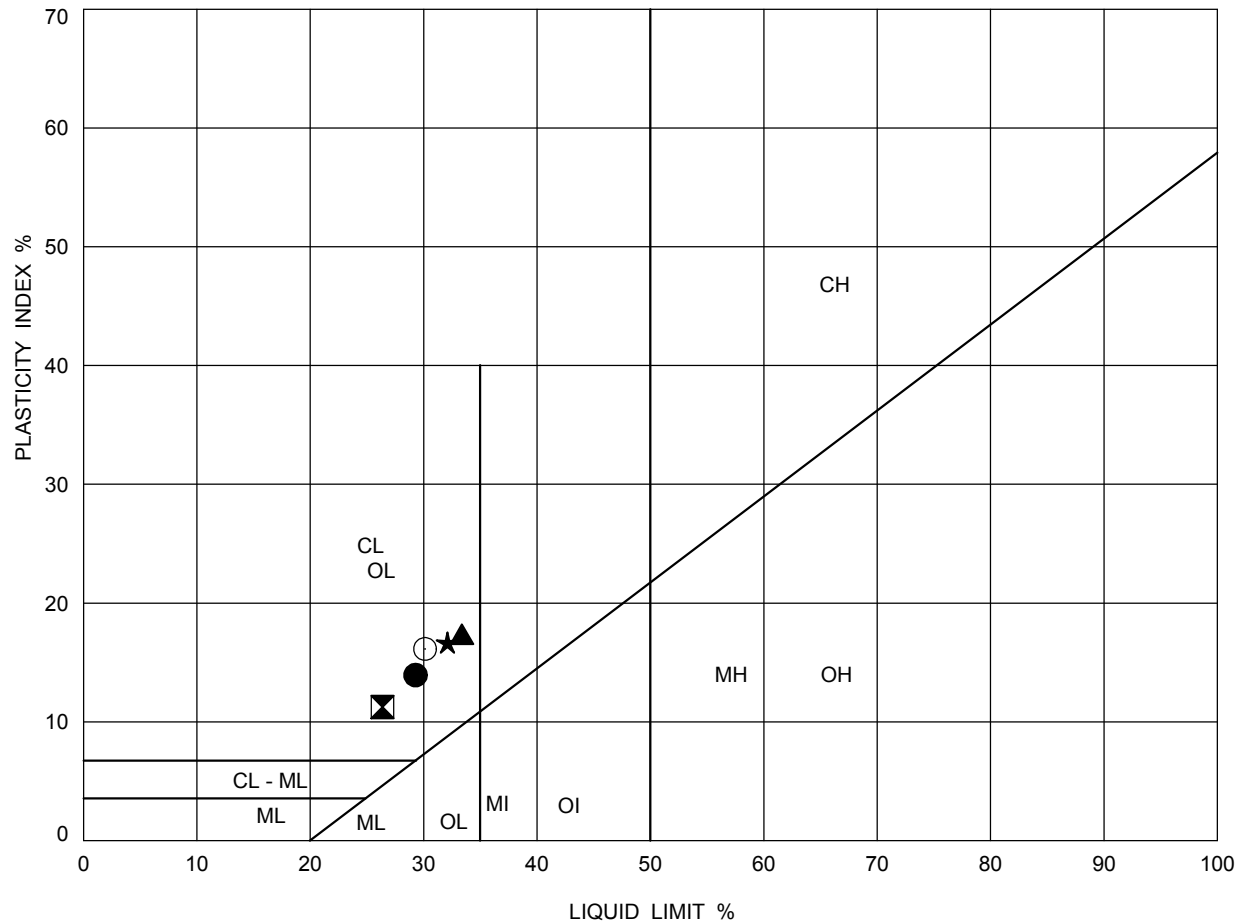
SOIL TYPE
 C = Clay
 M = Silt
 O = Organic

PLASTICITY
 L = Low
 I = Intermediate
 H = High

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | TP7 | 1 | 1.5 | 41 | 19 | 22 |
| ⊠ | TP7 | 2 | 2.5 | 36 | 17 | 19 |
| ▲ | TP7 | 3 | 4.2 | 42 | 19 | 23 |
| ★ | TP7 | 4 | 10.5 | 36 | 18 | 18 |
| ○ | TP8 | 2 | 2.1 | 39 | 19 | 20 |

| | | | |
|-----------------------------|-----|---|------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
| PROJECT No. SW8801.1004.101 | | FILE No. | |
| DRAWN | EA | SCALE | REV. |
| CHECK | MSO | FIGURE C.9 | |



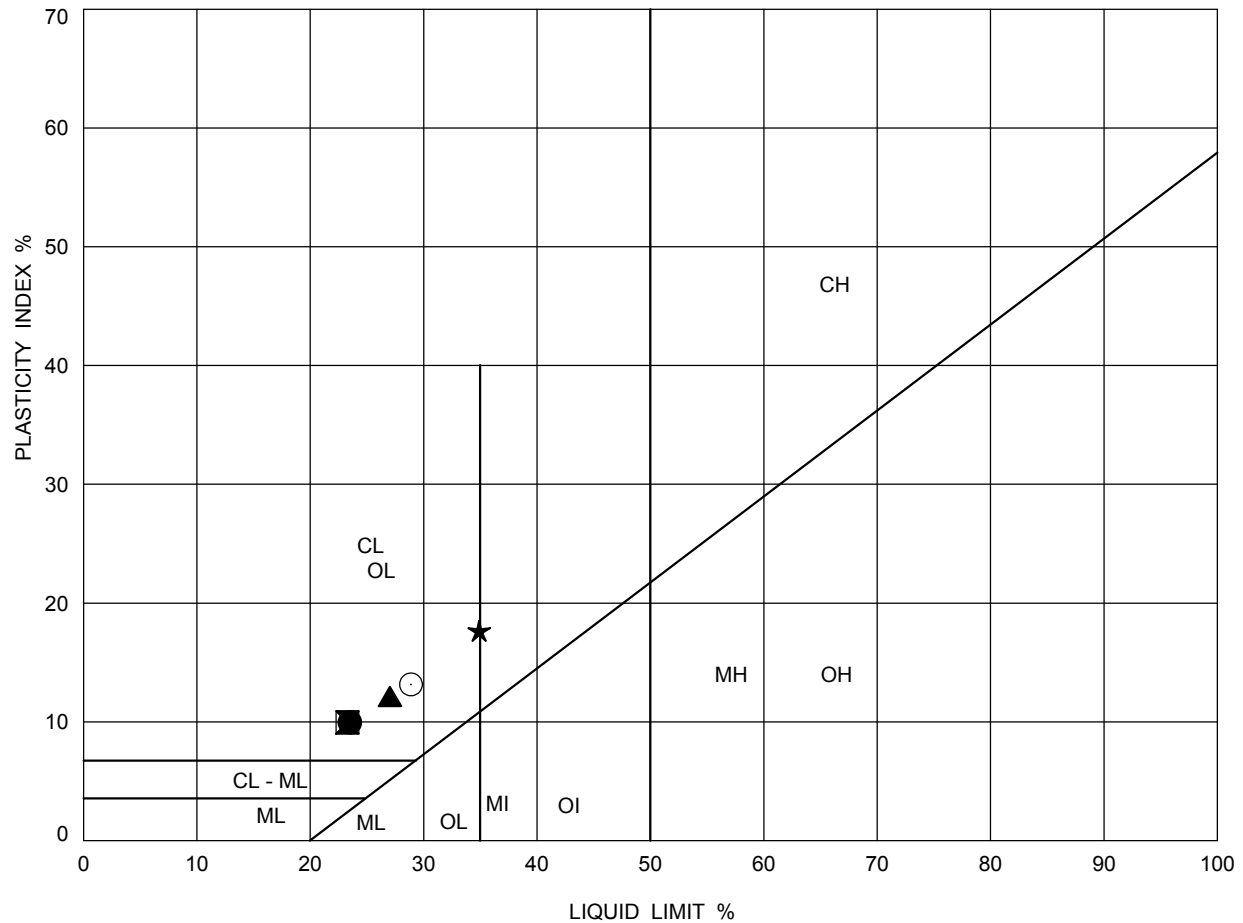
SOIL TYPE
 C = Clay
 M = Silt
 O = Organic

PLASTICITY
 L = Low
 I = Intermediate
 H = High

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | TP10 | 1 | 1.2 | 29 | 15 | 14 |
| ⊠ | TP10 | 2 | 2 | 26 | 15 | 11 |
| ▲ | TP8 | 3 | 3 | 33 | 16 | 17 |
| ★ | TP8 | 4 | 4.2 | 32 | 15 | 17 |
| ○ | TP8 | 5 | 10 | 30 | 14 | 16 |

| | | | |
|-----------------------------|-----|---|------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
| PROJECT No. SW8801.1004.101 | | FILE No. | |
| DRAWN | EA | SCALE | REV. |
| CHECK | MSO | FIGURE C.10 | |





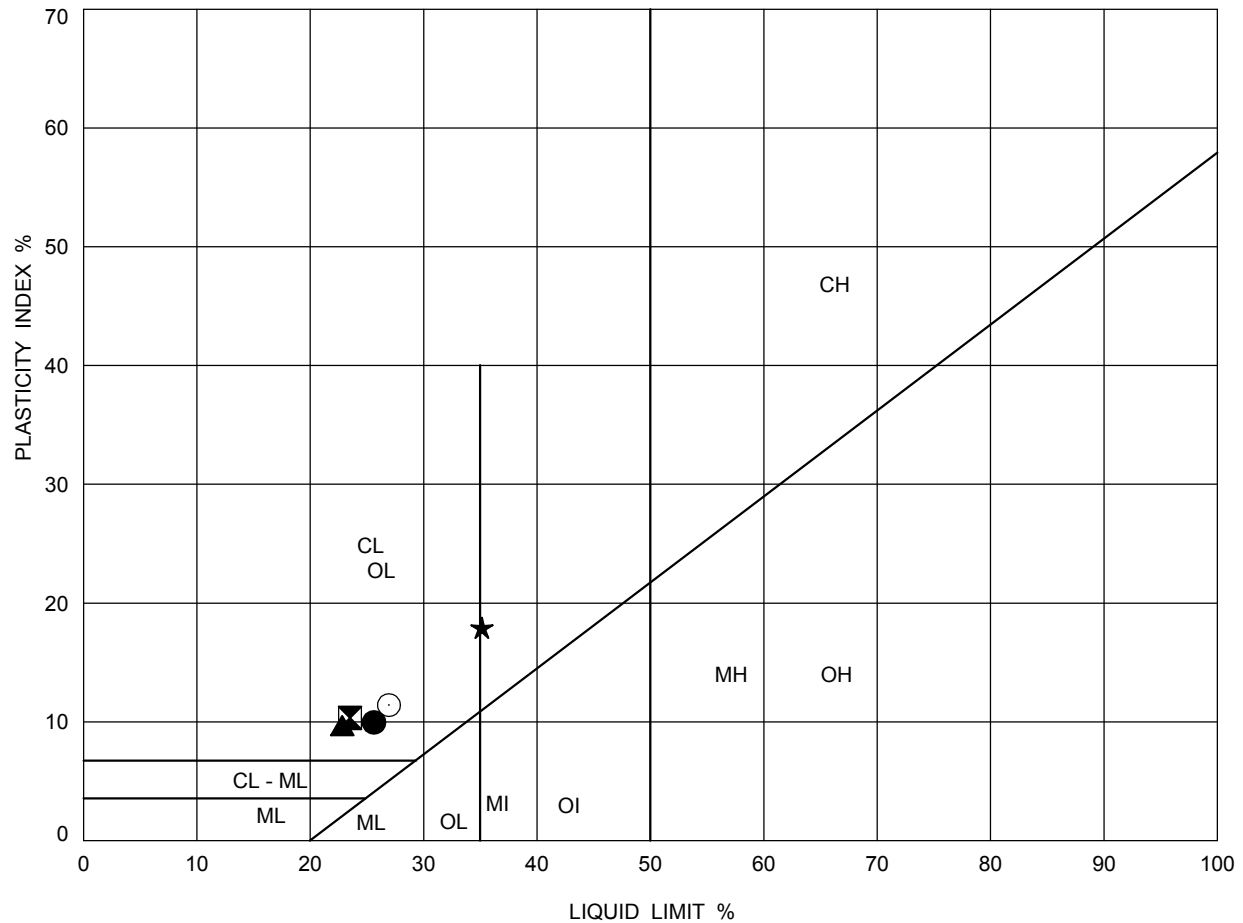
SOIL TYPE
 C = Clay
 M = Silt
 O = Organic

PLASTICITY
 L = Low
 I = Intermediate
 H = High

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | TP10 | 3 | 2.8 | 23 | 14 | 9 |
| ⊠ | TP10 | 4 | 4.1 | 23 | 13 | 10 |
| ▲ | TP10 | 5 | 10 | 27 | 15 | 12 |
| ★ | TP11 | 1 | 1.8 | 35 | 17 | 18 |
| ○ | TP11 | 2 | 2 | 29 | 16 | 13 |

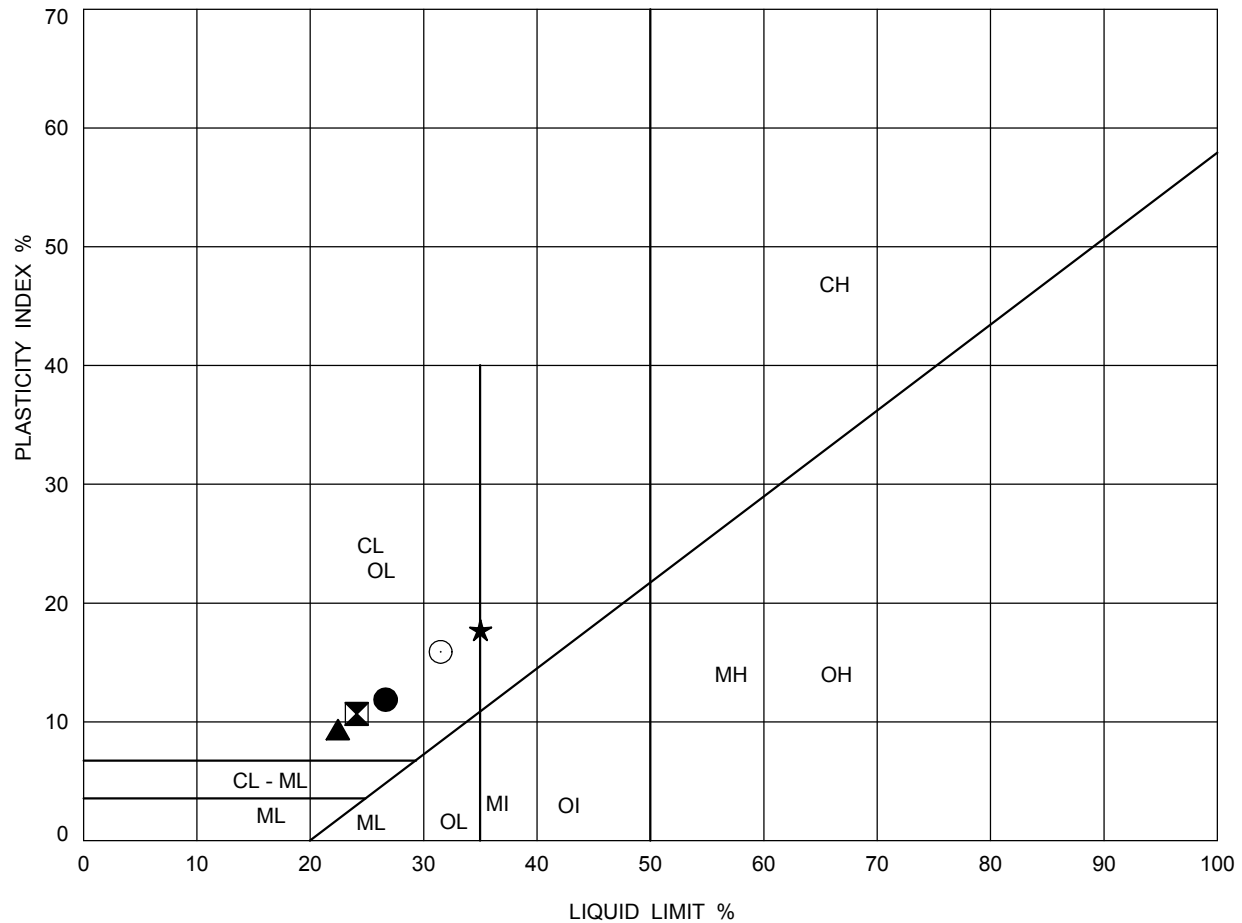
| | | | |
|--|-----|---|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
|   | | PROJECT No. SW8801.1004.101 | FILE No. |
| DRAWN | EA | SCALE | REV. |
| CHECK | MSO | FIGURE C.11 | |



LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | TP11 | 3 | 2.8 | 26 | 16 | 10 |
| ⊠ | TP11 | 4 | 4.5 | 24 | 13 | 11 |
| ▲ | TP11 | 5 | 10 | 23 | 13 | 10 |
| ★ | TP12 | 1 | 1.1 | 35 | 17 | 18 |
| ○ | TP12 | 2 | 1.5 | 27 | 16 | 11 |

| | | | |
|---------|-----------------------------|---|-------------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
| | PROJECT No. SW8801.1004.101 | | FILE No. |
| | DRAWN | EA | SCALE |
| | CHECK | MSO | REV. |
| | | | FIGURE C.12 |





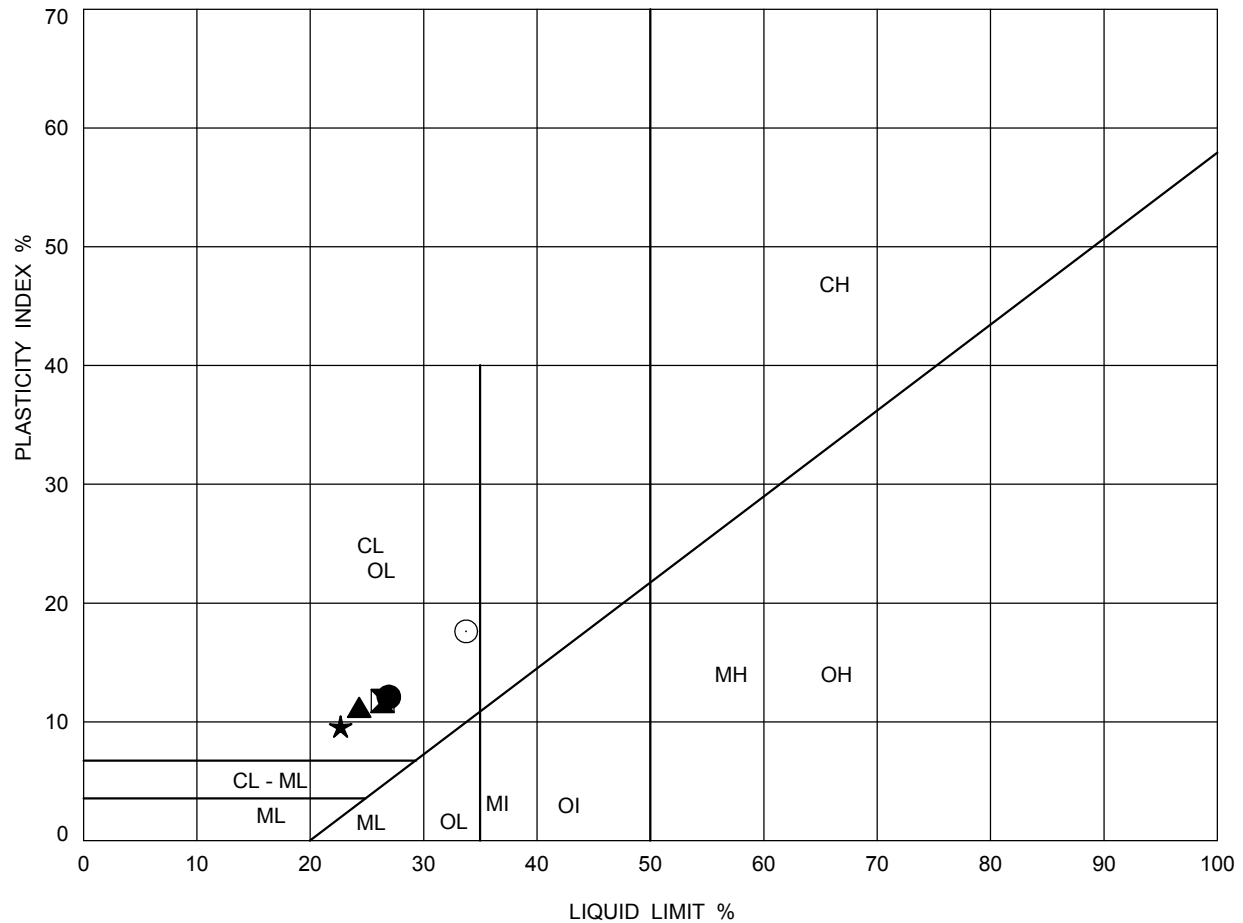
SOIL TYPE
 C = Clay
 M = Silt
 O = Organic

PLASTICITY
 L = Low
 I = Intermediate
 H = High

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | TP12 | 3 | 2.1 | 27 | 15 | 12 |
| ⊠ | TP12 | 4 | 4.5 | 24 | 13 | 11 |
| ▲ | TP12 | 5 | 9.5 | 22 | 13 | 9 |
| ★ | TP13 | 1 | 0.6 | 35 | 17 | 18 |
| ○ | TP13 | 2 | 1.2 | 31 | 16 | 15 |

| | | | |
|--|-----|---|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
|   | | PROJECT No. SW8801.1004.101 | FILE No. |
| DRAWN | EA | SCALE | REV. |
| CHECK | MSO | FIGURE C.13 | |





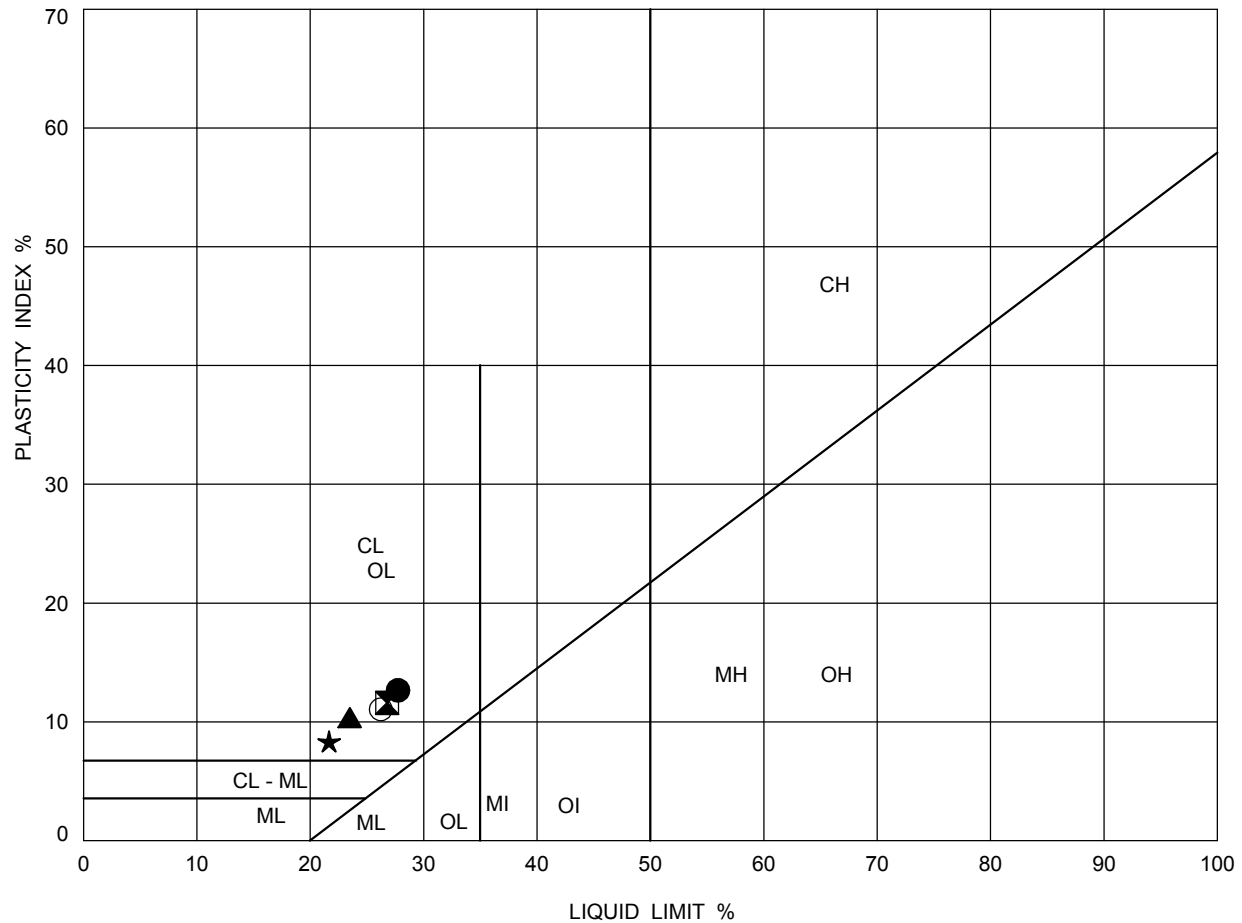
SOIL TYPE
 C = Clay
 M = Silt
 O = Organic

PLASTICITY
 L = Low
 I = Intermediate
 H = High

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | TP13 | 3 | 1.8 | 27 | 15 | 12 |
| ⊠ | TP13 | 4 | 2.9 | 26 | 15 | 11 |
| ▲ | TP13 | 5 | 4.2 | 24 | 13 | 11 |
| ★ | TP13 | 6 | 10 | 23 | 13 | 10 |
| ⊙ | TP14 | 1 | 0.9 | 34 | 16 | 18 |

| | | | |
|--|-----|---|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
|   | | PROJECT No. SW8801.1004.101 | FILE No. |
| DRAWN | EA | SCALE | REV. |
| CHECK | MSO | FIGURE C.14 | |





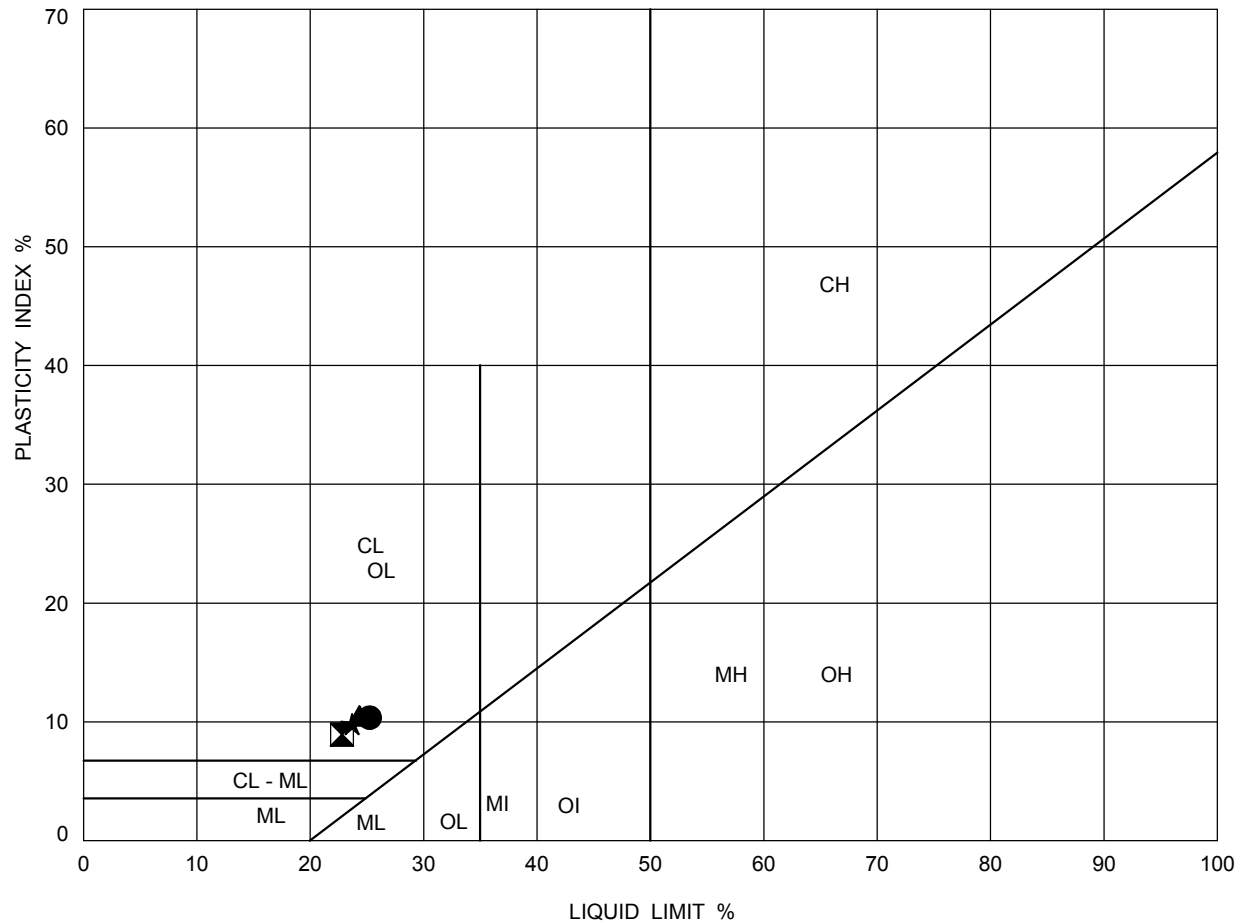
SOIL TYPE
 C = Clay
 M = Silt
 O = Organic

PLASTICITY
 L = Low
 I = Intermediate
 H = High

LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | TP14 | 2 | 1.7 | 28 | 15 | 13 |
| ⊠ | TP14 | 3 | 2.5 | 27 | 15 | 12 |
| ▲ | TP14 | 4 | 4.2 | 23 | 13 | 10 |
| ★ | TP14 | 5 | 10 | 22 | 13 | 9 |
| ○ | TP15 | 2 | 1.5 | 26 | 15 | 11 |

| | | | |
|--|-----|---|----------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
|   | | PROJECT No. SW8801.1004.101 | FILE No. |
| DRAWN | EA | | SCALE |
| CHECK | MSO | | REV. |
| | | FIGURE C.15 | |



LEGEND:

| SYMBOL | BOREHOLE | SAMPLE | DEPTH (m) | LL(%) | PL(%) | PI |
|--------|----------|--------|-----------|-------|-------|----|
| ● | TP15 | 3 | 1.8 | 25 | 15 | 10 |
| ⊠ | TP15 | 4 | 2.5 | 23 | 14 | 9 |
| ▲ | TP15 | 5 | 4.2 | 24 | 14 | 10 |
| ★ | TP15 | 6 | 10 | 24 | 14 | 10 |

| | | | |
|-----------------------------|-----|---|------|
| PROJECT | | Windsor Essex Parkway (WEP) Windsor, Ontario | |
| TITLE | | PLASTICITY CHART SILTY CLAY TO CLAYEY SILT | |
| PROJECT No. SW8801.1004.101 | | FILE No. | |
| DRAWN | EA | SCALE | REV. |
| CHECK | MSO | FIGURE C.16 | |

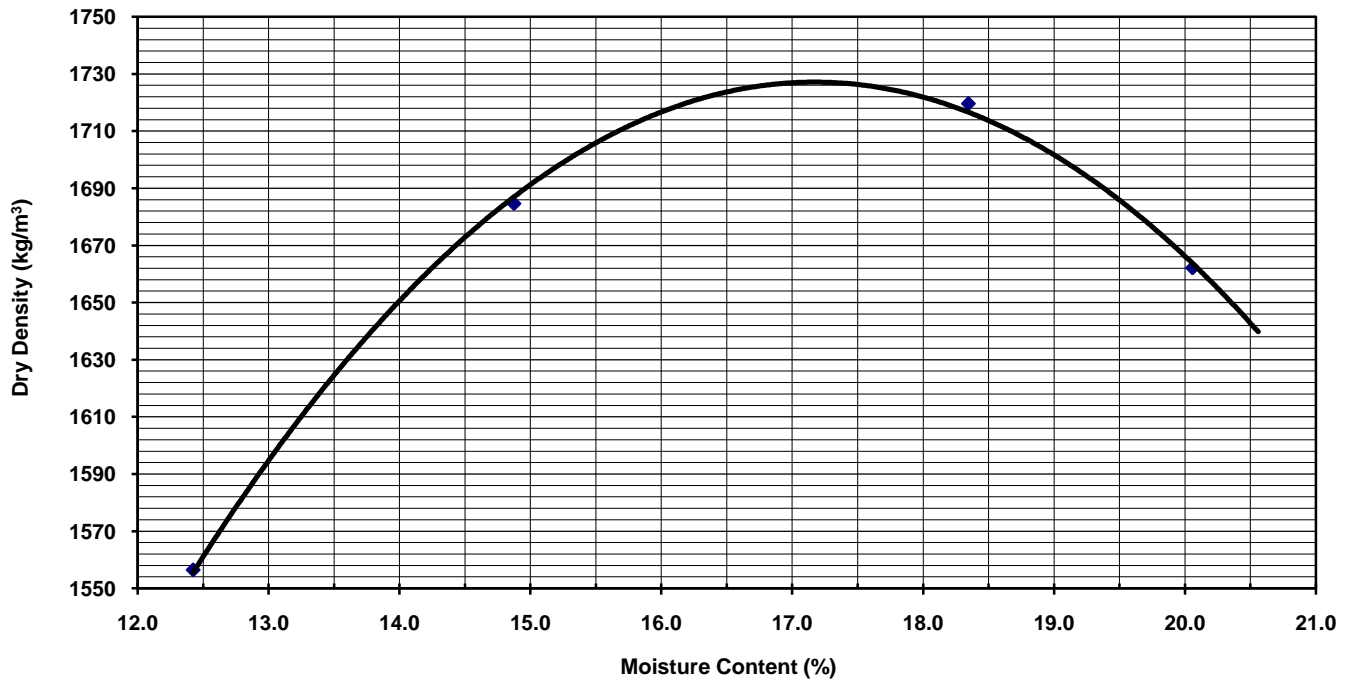
STANDARD PROCTOR DENSITY CURVE LS 706

| | | | | | |
|-------------------|--------------------------------|---------------|-----------|----------------|-----------|
| Project No.: | SW8801.1004.101 | Date Sampled: | 15-Aug-11 | Sampled by: | Adem |
| Client Name: | HMM | | | Received by: | Max |
| Project Name: | Windsor Essex Parkway | | | Tested by: | Max |
| Soil Description: | Brown/Grey Mottled Clayey Silt | | | Date Received: | 15-Aug-11 |
| Sample Location: | TP7 @ 1.5m | | | Date Tested: | 17-Aug-11 |
| Report Date: | 07-Aug-12 | | | Log No.: | 0 |

| | | |
|--|---------------------|--|
| | Test Results | |
|--|---------------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 1727 kg/m ³ | 107.8 pcf |
| Optimum Moisture Content | 17.2 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|---|---|---|
| Dry Density (kg / m3) | 1556 | 1685 | 1720 | 1662 | | | |
| Moisture Content (%) | 12.4 | 14.9 | 18.3 | 20.1 | | | |



| | | | | | |
|----------|--|-----------------|--------------------------------|-----------------|--|
| PROJECT | | | WINDSOR ESSEX PARKWAY | | |
| TITLE | | | STANDARD PROCTOR DENSITY CURVE | | |
| DATE | | JOB NO | | FIGURE NO. C.17 | |
| Aug 2012 | | SW8801.1004.101 | | | |

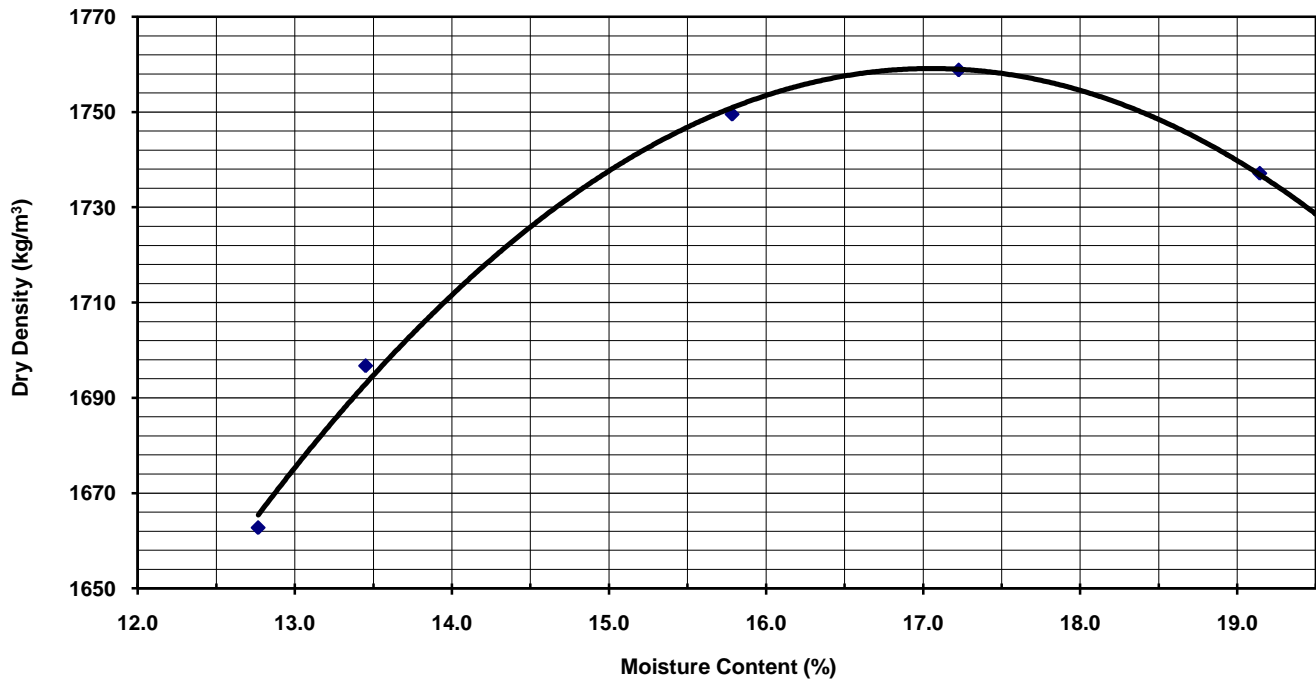
STANDARD PROCTOR DENSITY CURVE LS 706

| | | | | | |
|-------------------|-------------------------------|---------------|-----------|----------------|-----------|
| Project No.: | SW8801.1004.101 | Date Sampled: | 15-Aug-11 | Sampled by: | Adem |
| Client Name: | HMM | | | Received by: | Max |
| Project Name: | Windsor Essex Parkway | | | Tested by: | Max |
| Soil Description: | Brown-Grey Mottled Silty Clay | | | Date Received: | 15-Aug-11 |
| Sample Location: | TP7 @ 2.5m | | | Date Tested: | 29-Aug-11 |
| Report Date: | 07-Aug-12 | | | Log No.: | 0 |

| | | |
|--|---------------------|--|
| | Test Results | |
|--|---------------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 1758 kg/m ³ | 109.7 pcf |
| Optimum Moisture Content | 17.0 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|------|---|---|
| Dry Density (kg / m3) | 1663 | 1697 | 1750 | 1759 | 1737 | | |
| Moisture Content (%) | 12.8 | 13.5 | 15.8 | 17.2 | 19.1 | | |



STANDARD PROCTOR DENSITY CURVE LS 706

Project No.: SW8801.1004.101
Client Name: HMM
Project Name: Windsor Essex Parkway
Soil Description: Grey Silty Clay
Sample Location: TP7 @ 4.2m
Report Date: 07-Aug-12

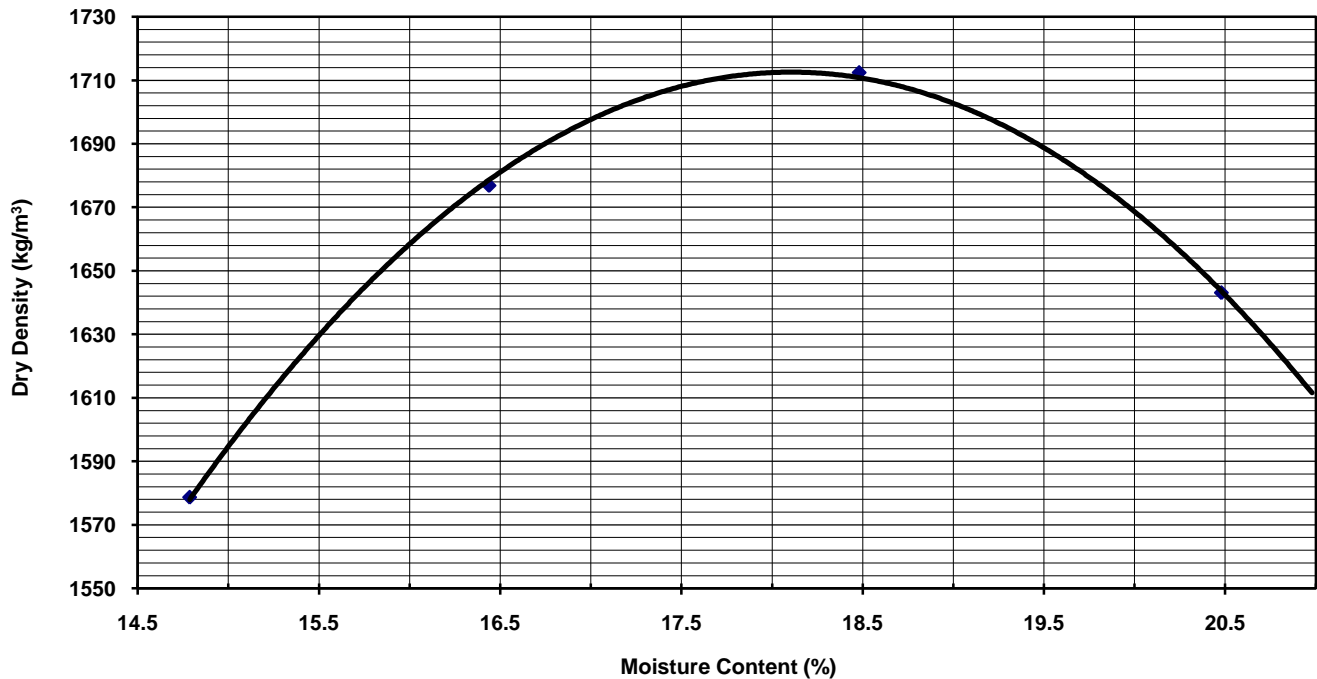
Date Sampled: 15-Aug-11

Sampled by: Adem
Received by: Max
Tested by: Max
Date Received: 15-Aug-11
Date Tested: 29-Aug-11
Log No.: 0

Test Results

Maximum Dry Density 1712 kg/m³ 106.9 pcf
 Optimum Moisture Content 17.6 %

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|---|---|---|
| Dry Density (kg / m3) | 1579 | 1677 | 1712 | 1643 | | | |
| Moisture Content (%) | 14.8 | 16.4 | 18.5 | 20.5 | | | |



PROJECT

WINDSOR ESSEX PARKWAY

TITLE

STANDARD PROCTOR DENSITY CURVE

DATE

Aug 2012

JOB NO

SW8801.1004.101

FIGURE NO. C.19

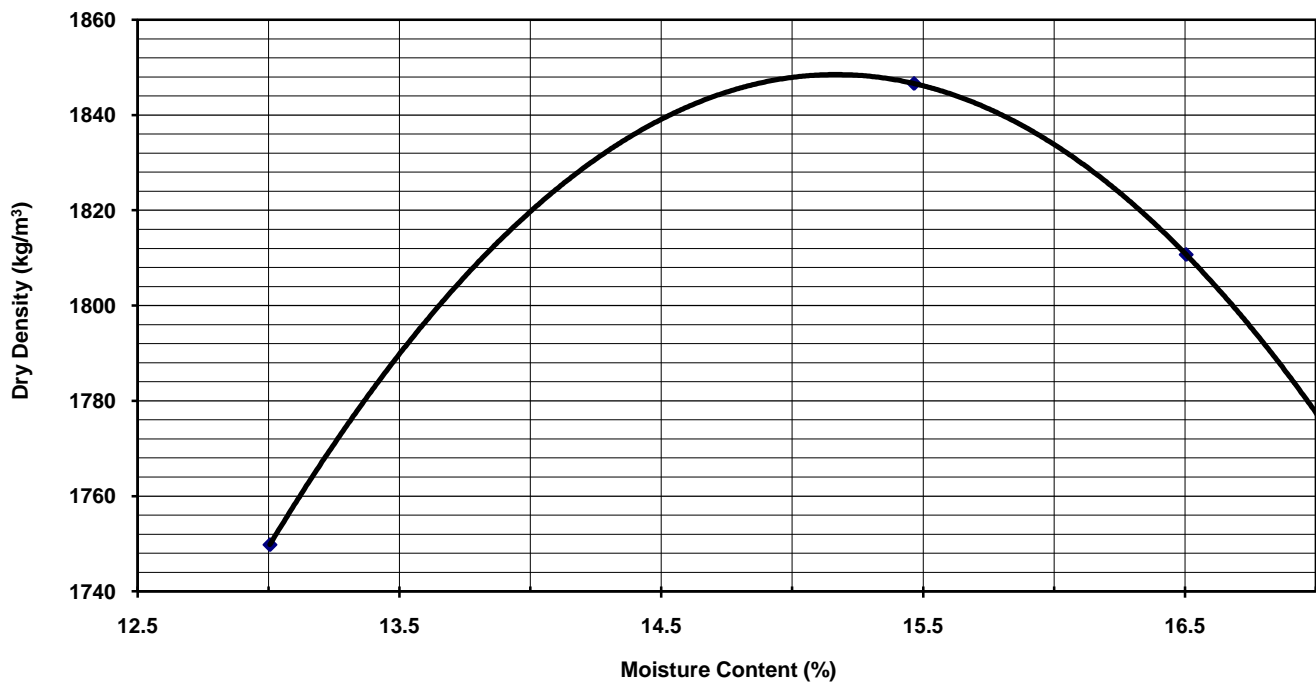
STANDARD PROCTOR DENSITY CURVE LS 706

| | | | | |
|-------------------|-----------------------|---------------|-----------|--------------------------|
| Project No.: | SW8801.1004.101 | Date Sampled: | 15-Aug-11 | Sampled by: Adem |
| Client Name: | HMM | | | Received by: Max |
| Project Name: | Windsor Essex Parkway | | | Tested by: Max |
| Soil Description: | Grey Silty Clay | | | Date Received: 15-Aug-11 |
| Sample Location: | TP7 @ 10.5m | | | Date Tested: 29-Aug-11 |
| Report Date: | 07-Aug-12 | | | Log No.: 0 |

| | | |
|--|---------------------|--|
| | Test Results | |
|--|---------------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 1848 kg/m ³ | 115.4 pcf |
| Optimum Moisture Content | 14.2 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|---|---|---|---|
| Dry Density (kg / m3) | 1750 | 1847 | 1811 | | | | |
| Moisture Content (%) | 13.0 | 15.5 | 16.5 | | | | |



STANDARD PROCTOR DENSITY CURVE LS 706

Project No.: SW8801.1004.101
Client Name: HMM
Project Name: Windsor Essex Parkway
Soil Description: Fine Brown Sand
Sample Location: TP8 @ 1.3m
Report Date: 07-Aug-12

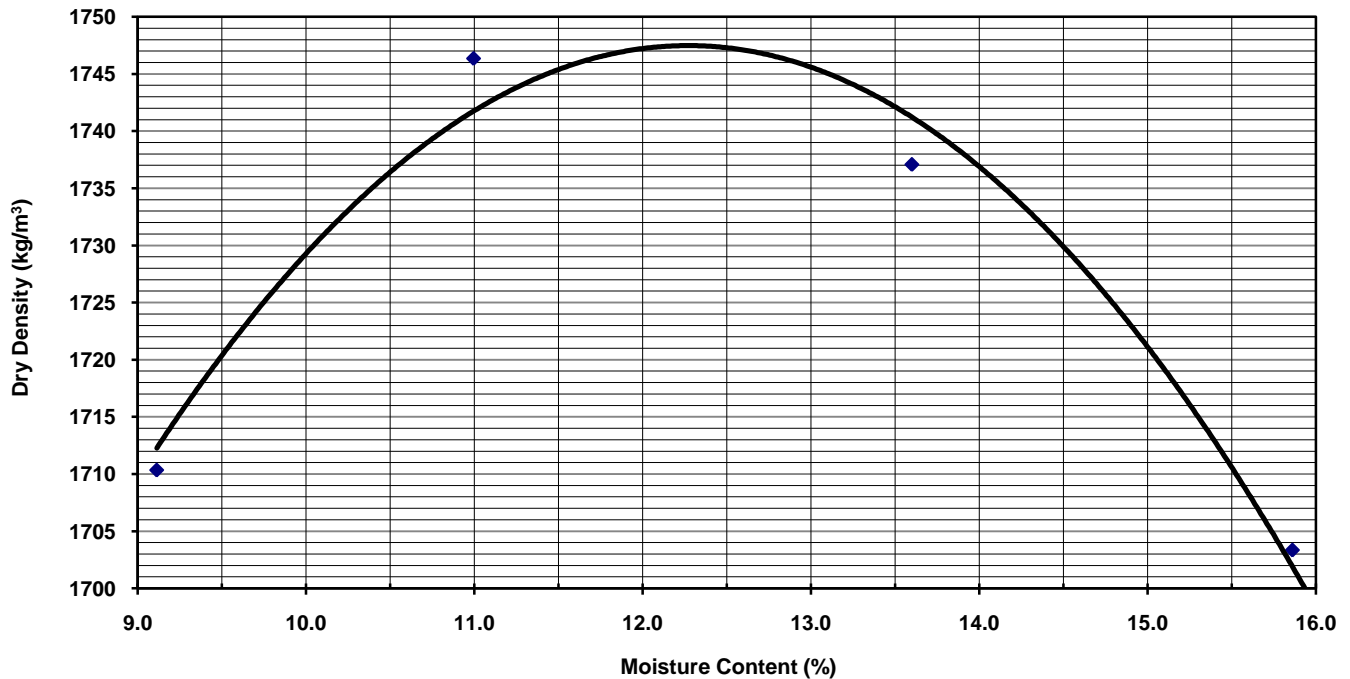
Date Sampled: 12-Aug-11

Sampled by: Adem
Received by: Max
Tested by: Max
Date Received: 12-Aug-11
Date Tested: 22-Aug-11
Log No.: 0

Test Results

Maximum Dry Density 1747 kg/m³ 109.1 pcf
 Optimum Moisture Content 12.3 %

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|---|---|---|
| Dry Density (kg / m3) | 1710 | 1746 | 1737 | 1703 | | | |
| Moisture Content (%) | 9.1 | 11.0 | 13.6 | 15.9 | | | |



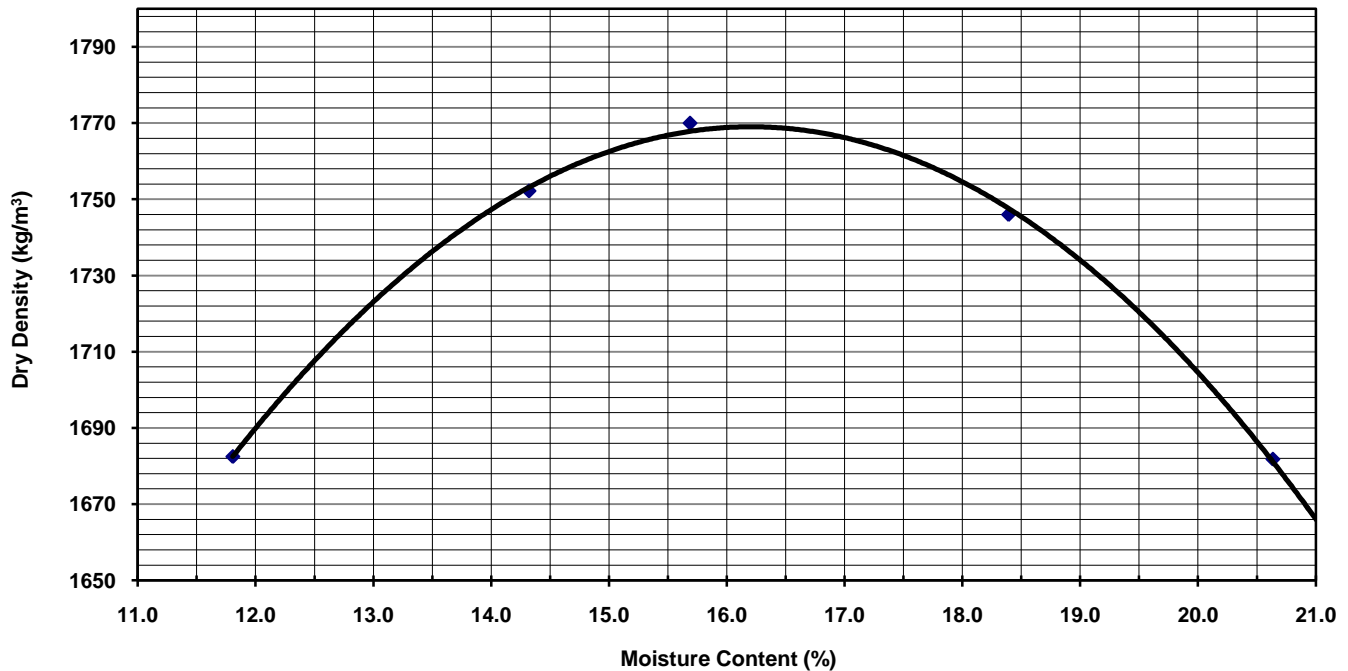
STANDARD PROCTOR DENSITY CURVE LS 706

| | | | | | |
|-------------------|-------------------------------|---------------|-----------|----------------|-----------|
| Project No.: | SW8801.1004.101 | Date Sampled: | 12-Aug-11 | Sampled by: | Adem |
| Client Name: | HMM | | | Received by: | Max |
| Project Name: | Windsor Essex Parkway | | | Tested by: | Max |
| Soil Description: | Brown/Grey Mottled Silty Clay | | | Date Received: | 12-Aug-11 |
| Sample Location: | TP8 @ 2.1m | | | Date Tested: | 22-Aug-11 |
| Report Date: | 07-Aug-12 | | | Log No.: | 0 |

| | | |
|--|---------------------|--|
| | Test Results | |
|--|---------------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 1770 kg/m ³ | 110.5 pcf |
| Optimum Moisture Content | 16.2 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|------|---|---|
| Dry Density (kg / m3) | 1682 | 1752 | 1770 | 1746 | 1682 | | |
| Moisture Content (%) | 11.8 | 14.3 | 15.7 | 18.4 | 20.6 | | |



| | | | | | |
|---------|--|-----------------|--------------------------------|-----------------|--|
| PROJECT | | | WINDSOR ESSEX PARKWAY | | |
| TITLE | | | STANDARD PROCTOR DENSITY CURVE | | |
| DATE | | JOB NO | | FIGURE NO. C.22 | |
| Aug2012 | | SW8801.1004.101 | | | |

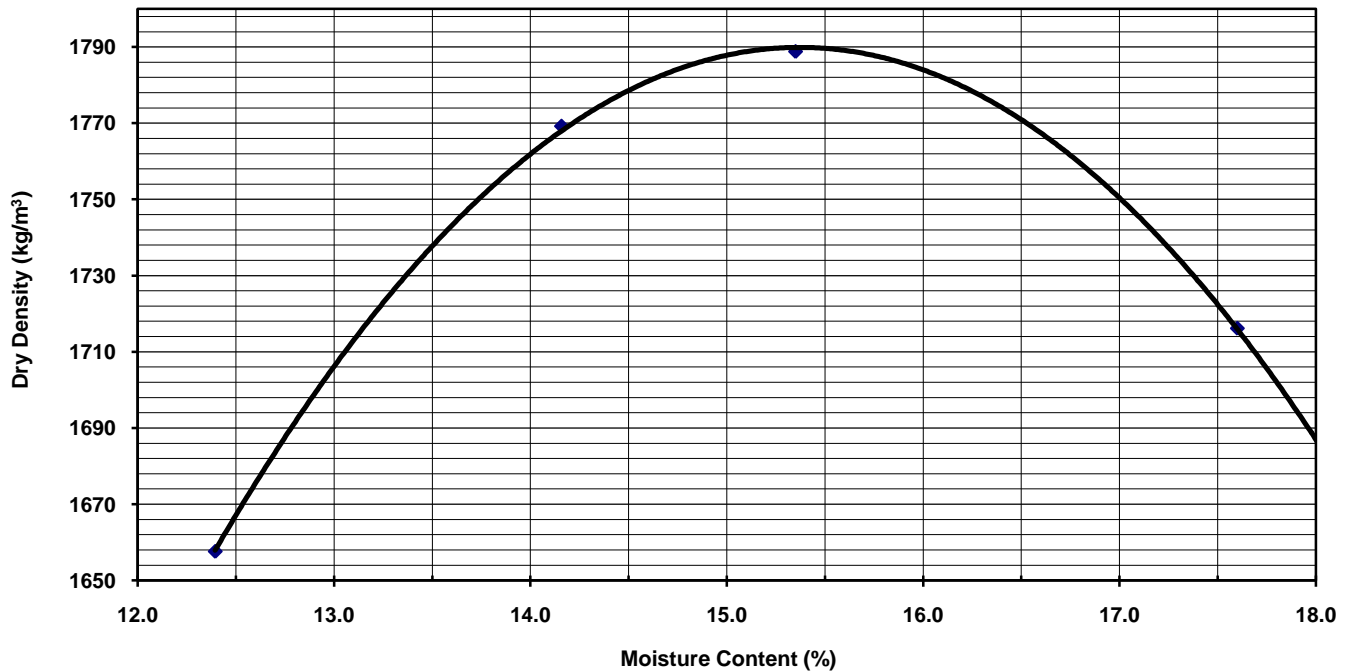
STANDARD PROCTOR DENSITY CURVE LS 706

| | | | | |
|-------------------|-----------------------|---------------|-----------|--------------------------|
| Project No.: | SW8801.1004.101 | Date Sampled: | 12-Aug-11 | Sampled by: Adem |
| Client Name: | HMM | | | Received by: Max |
| Project Name: | Windsor Essex Parkway | | | Tested by: Max |
| Soil Description: | Grey Silty Clay | | | Date Received: 12-Aug-11 |
| Sample Location: | TP8 @ 3m | | | Date Tested: 19-Aug-11 |
| Report Date: | 07-Aug-12 | | | Log No.: 0 |

| | | |
|--|---------------------|--|
| | Test Results | |
|--|---------------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 1789 kg/m ³ | 111.7 pcf |
| Optimum Moisture Content | 15.4 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|---|---|---|
| Dry Density (kg / m3) | 1658 | 1769 | 1789 | 1716 | | | |
| Moisture Content (%) | 12.4 | 14.2 | 15.4 | 17.6 | | | |



| | | |
|--------------------------------|-----------------|-----------------|
| PROJECT | | |
| WINDSOR ESSEX PARKWAY | | |
| TITLE | | |
| STANDARD PROCTOR DENSITY CURVE | | |
| DATE | JOB NO | FIGURE NO. C.23 |
| Aug2012 | SW8801.1004.101 | |

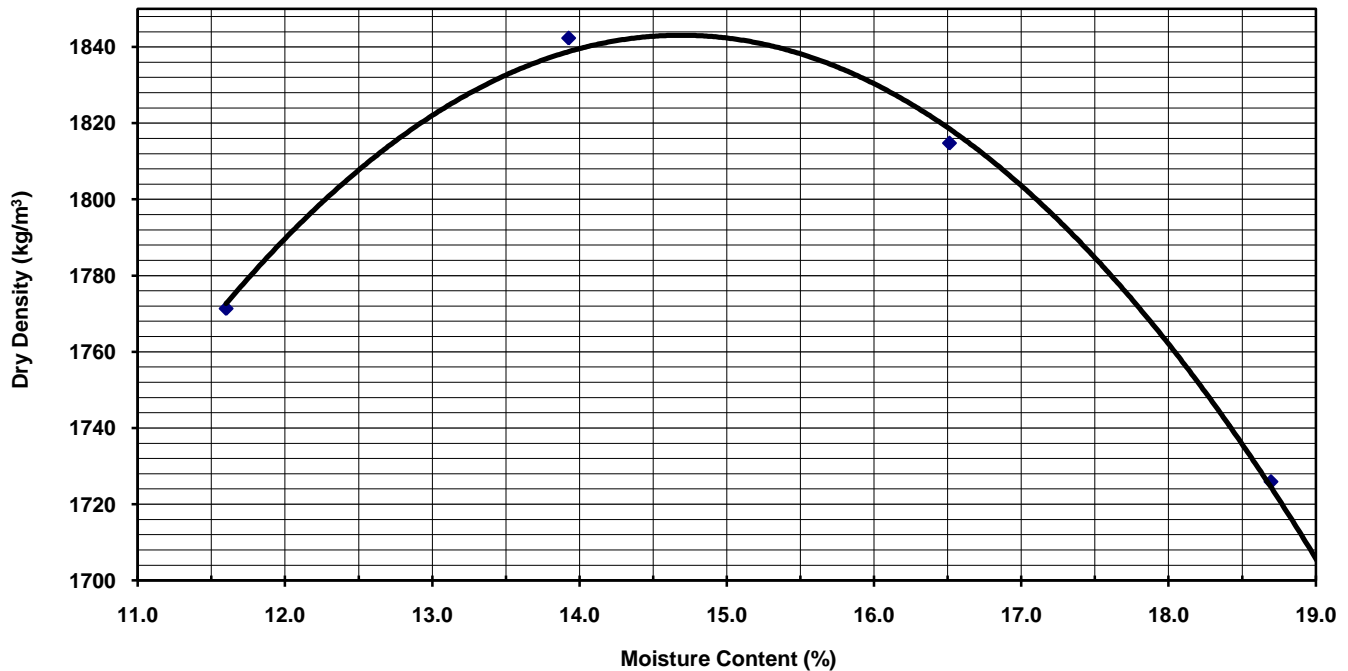
STANDARD PROCTOR DENSITY CURVE LS 706

| | | | | |
|-------------------|-----------------------|---------------|-----------|--------------------------|
| Project No.: | SW8801.1004.101 | Date Sampled: | 12-Aug-11 | Sampled by: Adem |
| Client Name: | HMM | | | Received by: Max |
| Project Name: | Windsor Essex Parkway | | | Tested by: Max |
| Soil Description: | Grey silty clay | | | Date Received: 12-Aug-11 |
| Sample Location: | TP8 @ 4.2m | | | Date Tested: 19-Aug-11 |
| Report Date: | 07-Aug-12 | | | Log No.: 0 |

| | | |
|--|---------------------|--|
| | Test Results | |
|--|---------------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 1844 kg/m ³ | 115.1 pcf |
| Optimum Moisture Content | 14.7 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|---|---|---|
| Dry Density (kg / m3) | 1771 | 1842 | 1815 | 1726 | | | |
| Moisture Content (%) | 11.6 | 13.9 | 16.5 | 18.7 | | | |



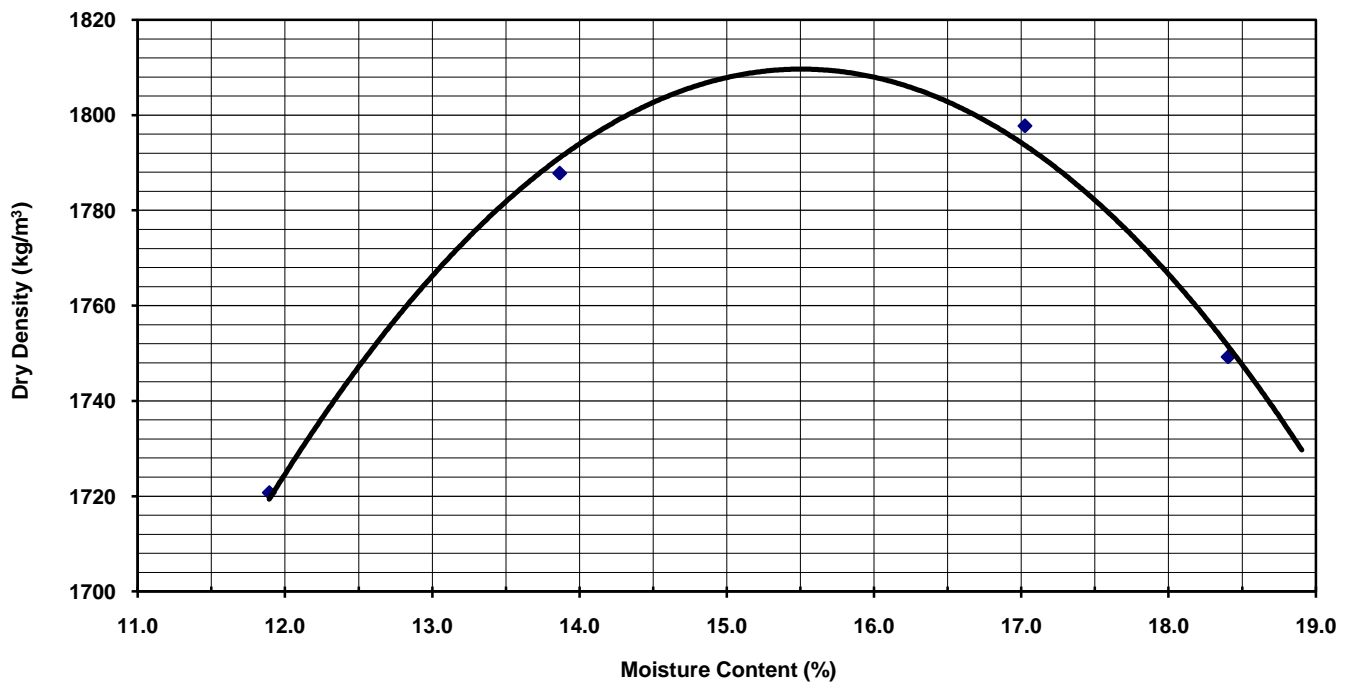
STANDARD PROCTOR DENSITY CURVE LS 706

| | | | | |
|-------------------|-----------------------|---------------|-----------|--------------------------|
| Project No.: | SW8801.1004.101 | Date Sampled: | 12-Aug-11 | Sampled by: Adem |
| Client Name: | HMM | | | Received by: Max |
| Project Name: | Windsor Essex Parkway | | | Tested by: Max |
| Soil Description: | Grey silty clay | | | Date Received: 12-Aug-11 |
| Sample Location: | TP8 @ 10m | | | Date Tested: 19-Aug-11 |
| Report Date: | 07-Aug-12 | | | Log No.: 0 |

| | | |
|--|---------------------|--|
| | Test Results | |
|--|---------------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 1811 kg/m ³ | 113.1 pcf |
| Optimum Moisture Content | 15.5 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|---|---|---|
| Dry Density (kg / m3) | 1721 | 1788 | 1798 | 1749 | | | |
| Moisture Content (%) | 11.9 | 13.9 | 17.0 | 18.4 | | | |



| | | |
|--------------------------------|-----------------|-----------------|
| PROJECT | | |
| WINDSOR ESSEX PARKWAY | | |
| TITLE | | |
| STANDARD PROCTOR DENSITY CURVE | | |
| DATE | JOB NO | FIGURE NO. C.25 |
| Aug 2012 | SW8801.1004.101 | |

STANDARD PROCTOR DENSITY CURVE LS 706

Project No.: SW8801.1004.101
Client Name: HMM
Project Name: Windsor Essex Parkway
Soil Description: Brown/Grey Mottled Sandy Clay
Sample Location: TP10 @ 1.15m
Report Date: 07-Aug-12

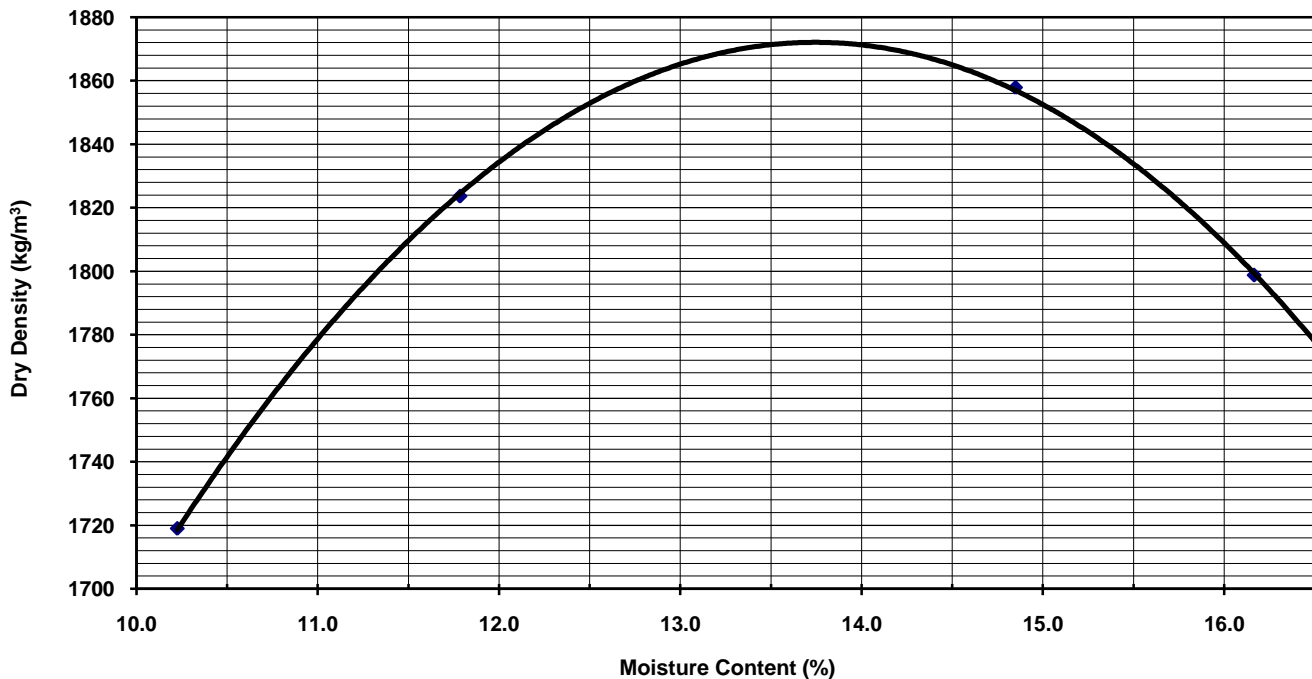
Date Sampled: 24-Aug-11

Sampled by: Adem
Received by: Max
Tested by: Max
Date Received: 24-Aug-11
Date Tested: 30-Aug-11
Log No.: 0

| | | |
|--|---------------------|--|
| | Test Results | |
|--|---------------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 1872 kg/m ³ | 116.9 pcf |
| Optimum Moisture Content | 13.7 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|---|---|---|
| Dry Density (kg / m3) | 1719 | 1824 | 1858 | 1799 | | | |
| Moisture Content (%) | 10.2 | 11.8 | 14.8 | 16.2 | | | |



PROJECT WINDSOR ESSEX PARKWAY

TITLE STANDARD PROCTOR DENSITY CURVE

DATE
Aug 2012

JOB NO
SW8801.1004.101

FIGURE NO. C.26

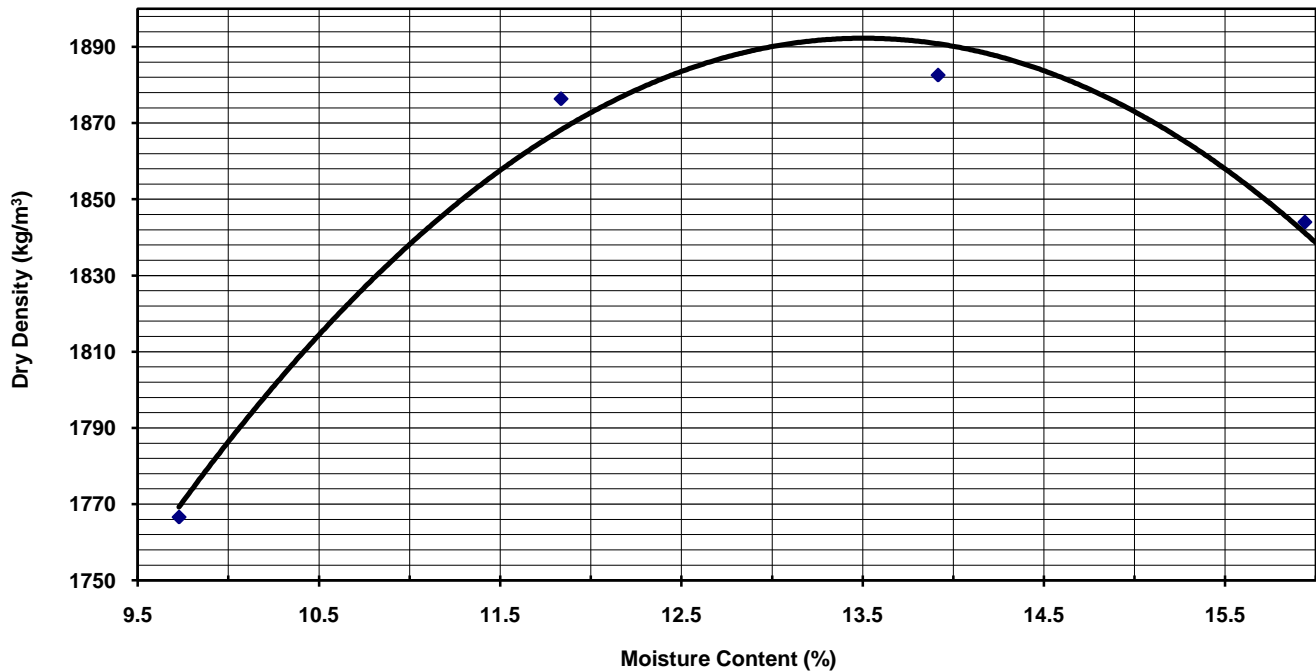
STANDARD PROCTOR DENSITY CURVE LS 706

| | | | | |
|--------------------------|-------------------------------|----------------------|-----------|---------------------------------|
| Project No.: | SW8801.1004.101 | Date Sampled: | 24-Aug-11 | Sampled by: Adem |
| Client Name: | HMM | | | Received by: Max |
| Project Name: | Windsor Essex Parkway | | | Tested by: Max |
| Soil Description: | Brown/Grey Mottled Silty Clay | | | Date Received: 24-Aug-11 |
| Sample Location: | TP10 @ 2.0m | | | Date Tested: 30-Aug-11 |
| Report Date: | 07-Aug-12 | | | Log No.: 0 |

| | | |
|--|---------------------|--|
| | Test Results | |
|--|---------------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 1893 kg/m ³ | 118.2 pcf |
| Optimum Moisture Content | 13.5 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|---|---|---|
| Dry Density (kg / m3) | 1767 | 1876 | 1883 | 1844 | | | |
| Moisture Content (%) | 9.7 | 11.8 | 13.9 | 15.9 | | | |



| | | | |
|----------|-----------------|-----------------|--------------------------------|
| PROJECT | | | WINDSOR ESSEX PARKWAY |
| TITLE | | | STANDARD PROCTOR DENSITY CURVE |
| DATE | JOB NO | FIGURE NO. C.27 | |
| Aug 2012 | SW8801.1004.101 | | |

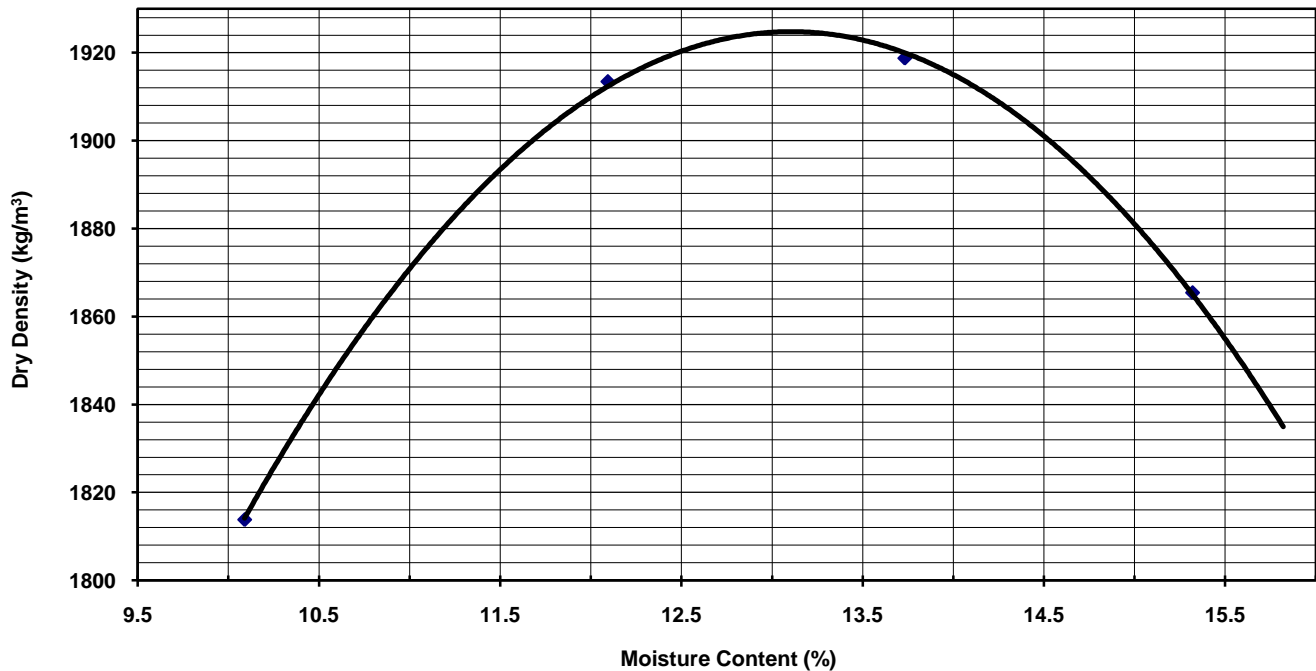
STANDARD PROCTOR DENSITY CURVE LS 706

| | | | | |
|--------------------------|-----------------------|----------------------|-----------|---------------------------------|
| Project No.: | SW8801.1004.101 | Date Sampled: | 24-Aug-11 | Sampled by: Adem |
| Client Name: | HMM | | | Received by: Max |
| Project Name: | Windsor Essex Parkway | | | Tested by: Max |
| Soil Description: | Brown Silty Clay | | | Date Received: 24-Aug-11 |
| Sample Location: | TP10 @ 2.8m | | | Date Tested: 30-Aug-11 |
| Report Date: | 07-Aug-12 | | | Log No.: 0 |

| | | |
|--|---------------------|--|
| | Test Results | |
|--|---------------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 1924 kg/m ³ | 120.1 pcf |
| Optimum Moisture Content | 12.6 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|---|---|---|
| Dry Density (kg / m3) | 1814 | 1913 | 1919 | 1865 | | | |
| Moisture Content (%) | 10.1 | 12.1 | 13.7 | 15.3 | | | |



| | | | |
|----------|-----------------|-----------------|--------------------------------|
| PROJECT | | | WINDSOR ESSEX PARKWAY |
| TITLE | | | STANDARD PROCTOR DENSITY CURVE |
| DATE | JOB NO | FIGURE NO. C.28 | |
| Aug 2012 | SW8801.1004.101 | | |

STANDARD PROCTOR DENSITY CURVE LS 706

Project No.: SW8801.1004.101
Client Name: HMM
Project Name: Windsor Essex Parkway
Soil Description: Grey Silty Clay
Sample Location: TP10 @ 4.1m
Report Date: 07-Aug-12

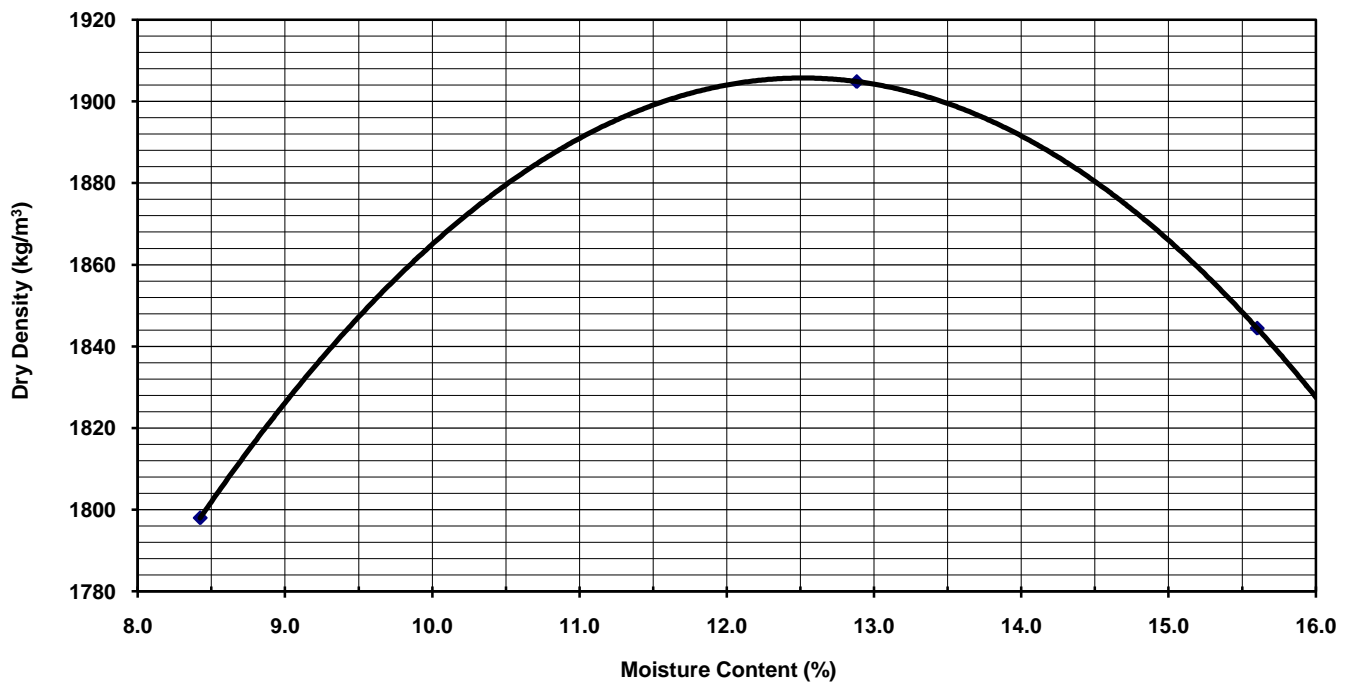
Date Sampled: 24-Aug-11

Sampled by: Adem
Received by: Max
Tested by: Max
Date Received: 24-Aug-11
Date Tested: 30-Aug-11
Log No.: 0

Test Results

Maximum Dry Density 1907 kg/m³ 119.0 pcf
 Optimum Moisture Content 12.5 %

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|---|---|---|---|
| Dry Density (kg / m3) | 1798 | 1905 | 1844 | | | | |
| Moisture Content (%) | 8.4 | 12.9 | 15.6 | | | | |



PROJECT WINDSOR ESSEX PARKWAY

TITLE STANDARD PROCTOR DENSITY CURVE

DATE
Aug 2012

JOB NO
SW8801.1004.101

FIGURE NO. C.29

STANDARD PROCTOR DENSITY CURVE LS 706

Project No.: SW8801.1004.101
Client Name: HMM
Project Name: Windsor Essex Parkway
Soil Description: Grey Silty Clay
Sample Location: TP10 @ 10m
Report Date: 07-Aug-12

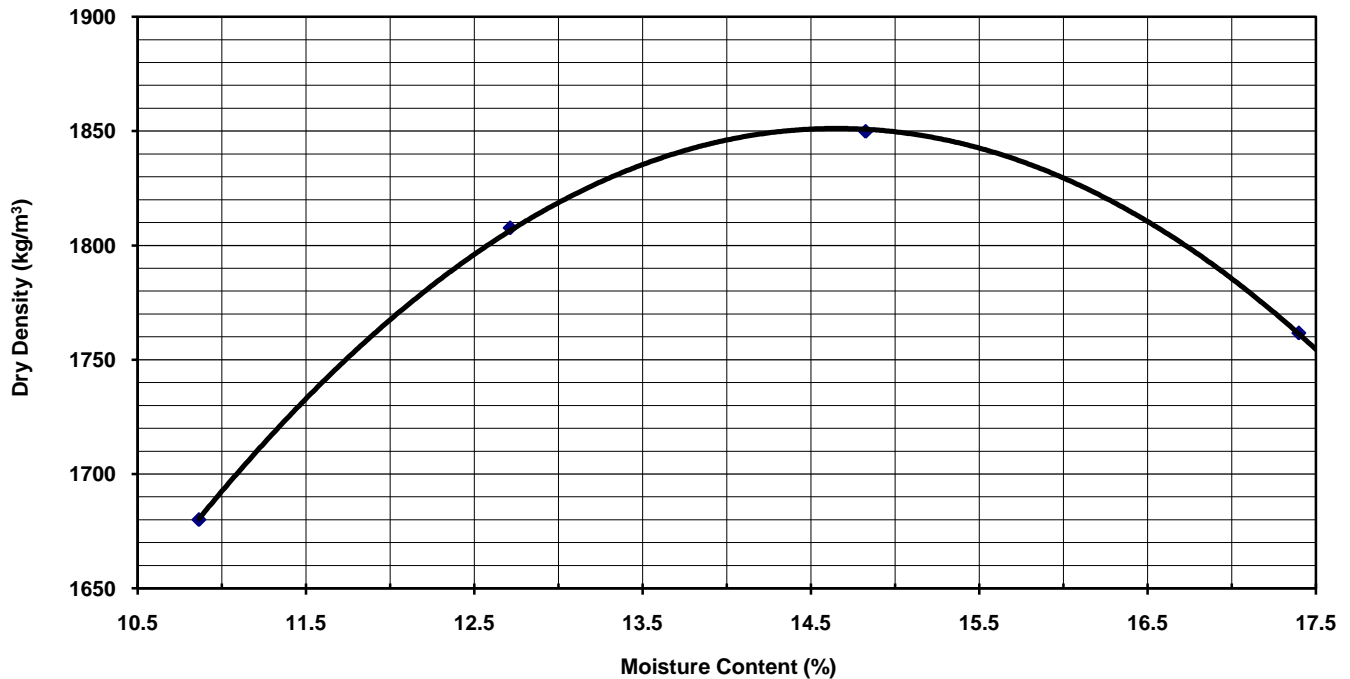
Date Sampled: 24-Aug-11

Sampled by: Adem
Received by: Max
Tested by: Max
Date Received: 24-Aug-11
Date Tested: 31-Aug-11
Log No.: 0

Test Results

Maximum Dry Density 1850 kg/m³ 115.5 pcf
 Optimum Moisture Content 14.7 %

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|---|---|---|
| Dry Density (kg / m3) | 1680 | 1808 | 1850 | 1762 | | | |
| Moisture Content (%) | 10.9 | 12.7 | 14.8 | 17.4 | | | |



PROJECT **WINDSOR ESSEX PARKWAY**

TITLE STANDARD PROCTOR DENSITY CURVE

DATE
Aug 2012

JOB NO
SW8801.1004.101

FIGURE NO. C.30

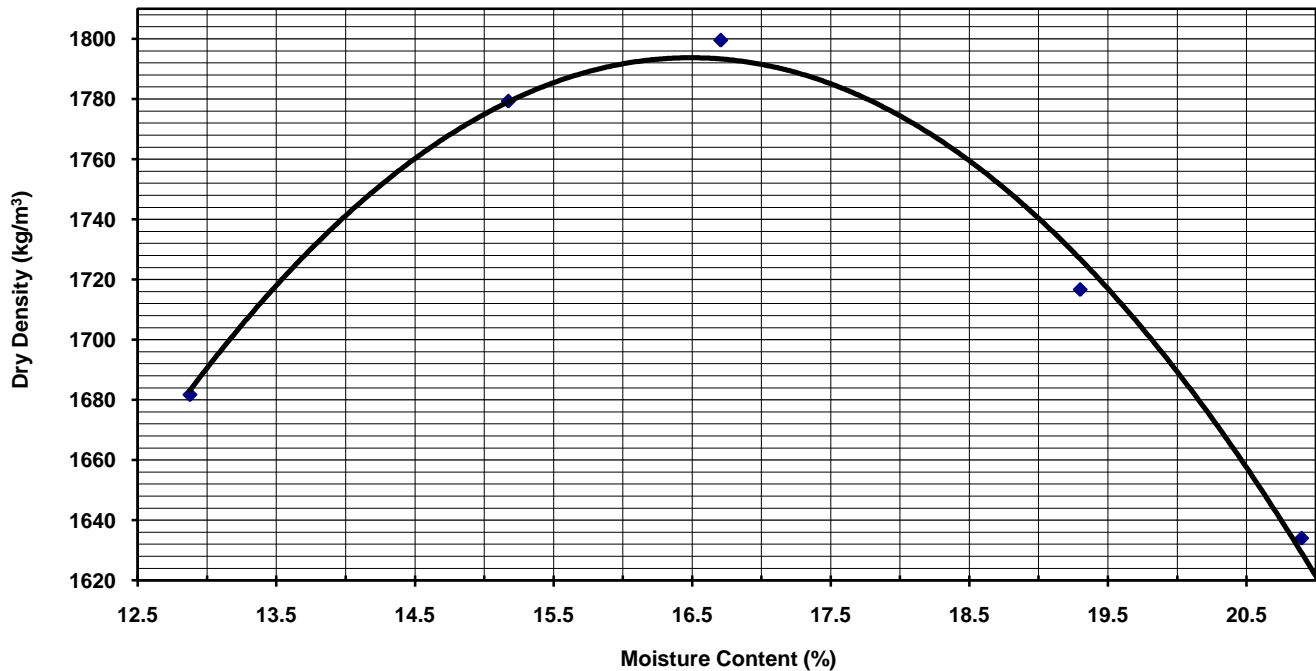
STANDARD PROCTOR DENSITY CURVE LS 706

| | | | | |
|-------------------|-----------------------|---------------|-----------|--------------------------|
| Project No.: | SW8801.1004.101 | Date Sampled: | 31-Aug-11 | Sampled by: Adem |
| Client Name: | HMM | | | Received by: Owen |
| Project Name: | Windsor Essex Parkway | | | Tested by: Owen |
| Soil Description: | Mottled Silty Clay | | | Date Received: 31-Aug-11 |
| Sample Location: | TP11 @ 1.8m | | | Date Tested: 09-Sep-11 |
| Report Date: | 07-Aug-12 | | | Log No.: 0 |

| | | |
|--|--------------|--|
| | Test Results | |
|--|--------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 1795 kg/m ³ | 112.1 pcf |
| Optimum Moisture Content | 16.5 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|------|---|---|
| Dry Density (kg / m3) | 1682 | 1779 | 1800 | 1717 | 1634 | | |
| Moisture Content (%) | 12.9 | 15.2 | 16.7 | 19.3 | 20.9 | | |



| | | |
|--------------------------------|-----------------|-----------------|
| PROJECT | | |
| WINDSOR ESSEX PARKWAY | | |
| TITLE | | |
| STANDARD PROCTOR DENSITY CURVE | | |
| DATE | JOB NO | FIGURE NO. C.31 |
| Aug 2012 | SW8801.1004.101 | |

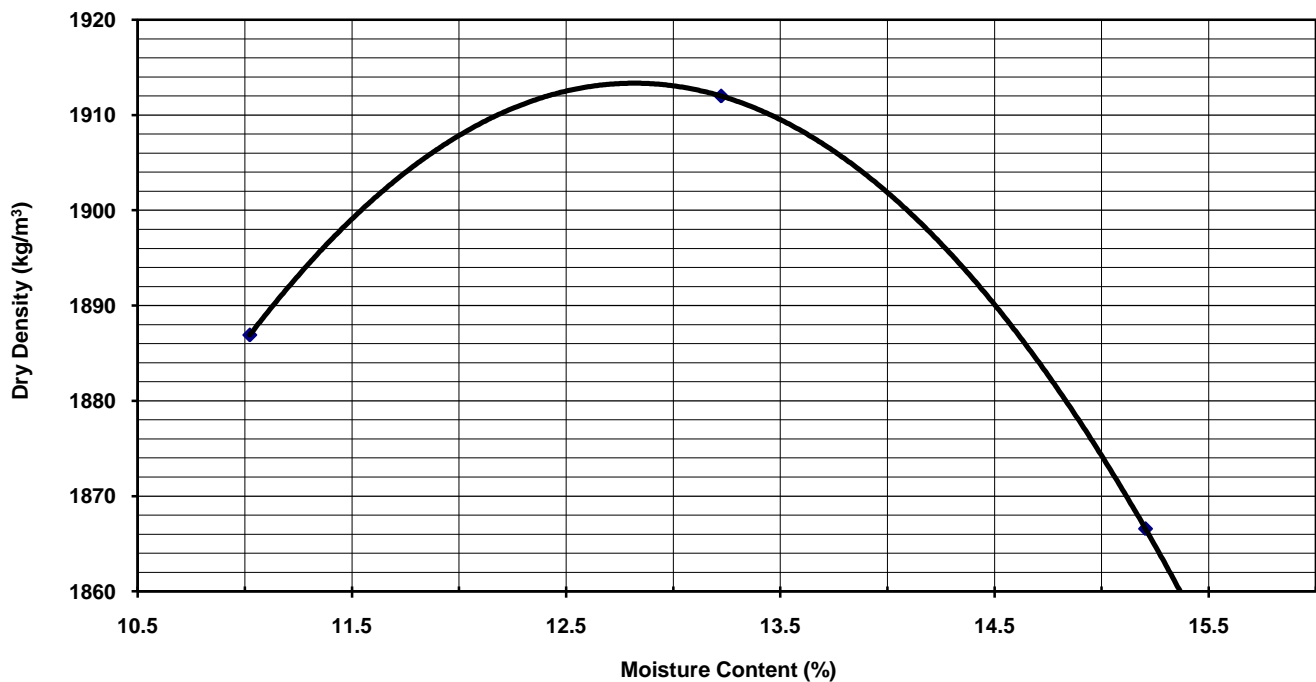
STANDARD PROCTOR DENSITY CURVE LS 706

| | | | | |
|--------------------------|-------------------------------|----------------------|-----------|---------------------------------|
| Project No.: | SW8801.1004.101 | Date Sampled: | 31-Aug-11 | Sampled by: Adem |
| Client Name: | HMM | | | Received by: Owen |
| Project Name: | Windsor Essex Parkway | | | Tested by: Owen |
| Soil Description: | Brown Grey Mottled Silty Clay | | | Date Received: 31-Aug-11 |
| Sample Location: | TP11 @ 2.0m | | | Date Tested: 09-Sep-11 |
| Report Date: | 07-Aug-12 | | | Log No.: 0 |

| | | |
|--|---------------------|--|
| | Test Results | |
|--|---------------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 1914 kg/m ³ | 119.5 pcf |
| Optimum Moisture Content | 12.8 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|---|---|---|---|
| Dry Density (kg / m3) | 1887 | 1912 | 1867 | | | | |
| Moisture Content (%) | 11.0 | 13.2 | 15.2 | | | | |



STANDARD PROCTOR DENSITY CURVE LS 706

Project No.: SW8801.1004.101
Client Name: HMM
Project Name: Windsor Essex Parkway
Soil Description: Brown Silty Clay
Sample Location: TP11 @ 2.8m
Report Date: 07-Aug-12

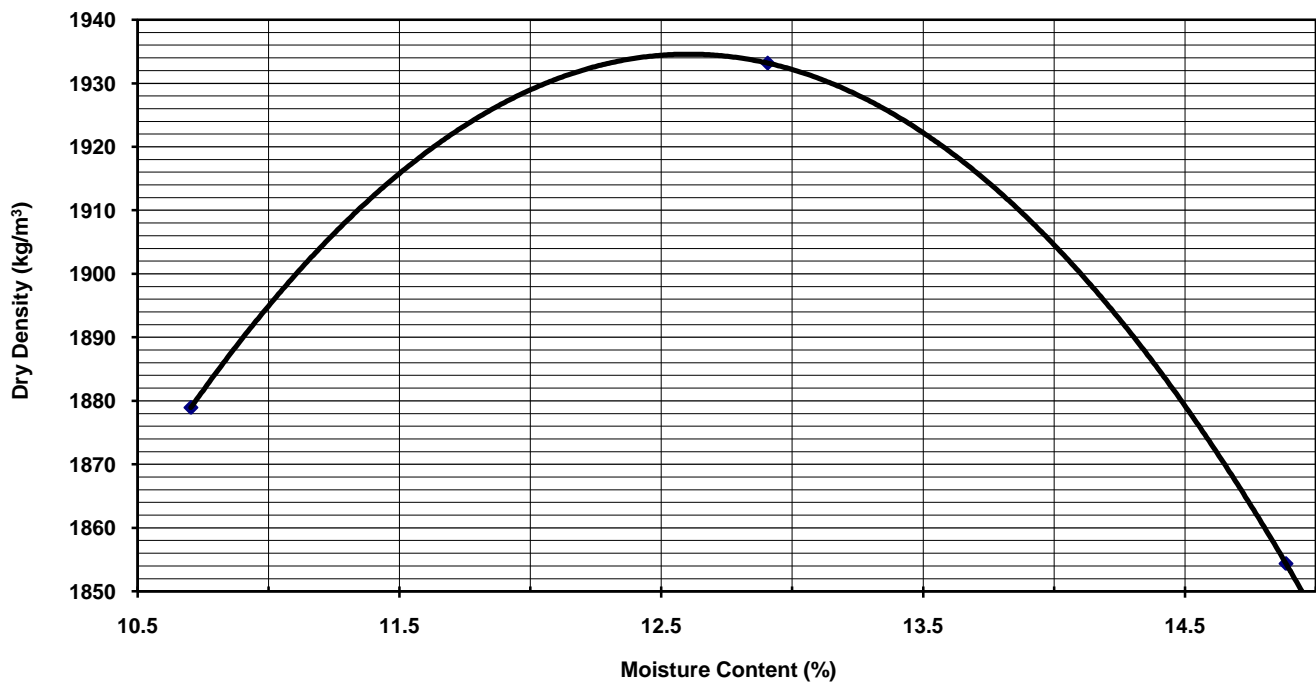
Date Sampled: 31-Aug-11

Sampled by: Adem
Received by: Owen
Tested by: Owen
Date Received: 31-Aug-11
Date Tested: 09-Sep-11
Log No.: 0

| | | |
|--|---------------------|--|
| | Test Results | |
|--|---------------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 1935 kg/m ³ | 120.8 pcf |
| Optimum Moisture Content | 12.6 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|---|---|---|---|
| Dry Density (kg / m3) | 1879 | 1933 | 1854 | | | | |
| Moisture Content (%) | 10.7 | 12.9 | 14.9 | | | | |



STANDARD PROCTOR DENSITY CURVE LS 706

Project No.: SW8801.1004.101
Client Name: HMM
Project Name: Windsor Essex Parkway
Soil Description: Brown Silty Clay
Sample Location: TP11 @ 4.5m
Report Date: 07-Aug-12

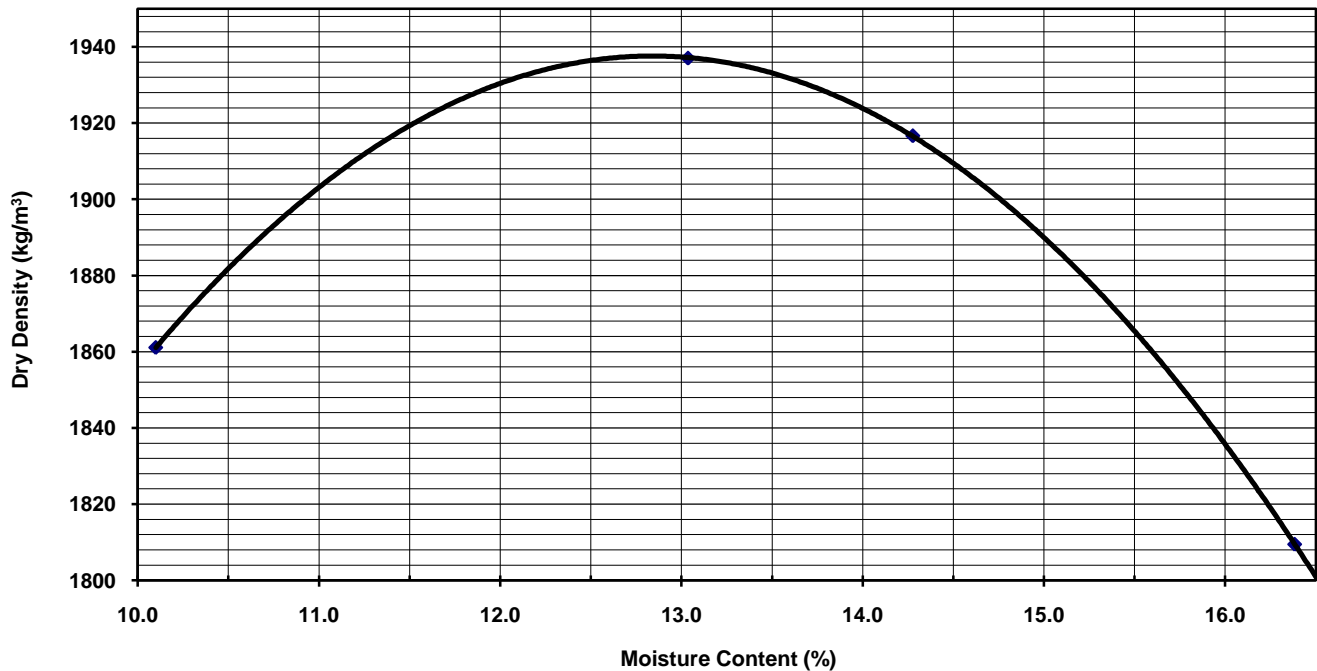
Date Sampled: 31-Aug-11

Sampled by: Adem
Received by: Owen
Tested by: Owen
Date Received: 31-Aug-11
Date Tested: 09-Sep-11
Log No.: 0

Test Results

Maximum Dry Density 1937 kg/m³ 120.9 pcf
 Optimum Moisture Content 12.8 %

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|---|---|---|
| Dry Density (kg / m3) | 1861 | 1937 | 1917 | 1809 | | | |
| Moisture Content (%) | 10.1 | 13.0 | 14.3 | 16.4 | | | |



PROJECT **WINDSOR ESSEX PARKWAY**

TITLE STANDARD PROCTOR DENSITY CURVE

DATE
Aug 2012

JOB NO
SW8801.1004.101

FIGURE NO. C.34

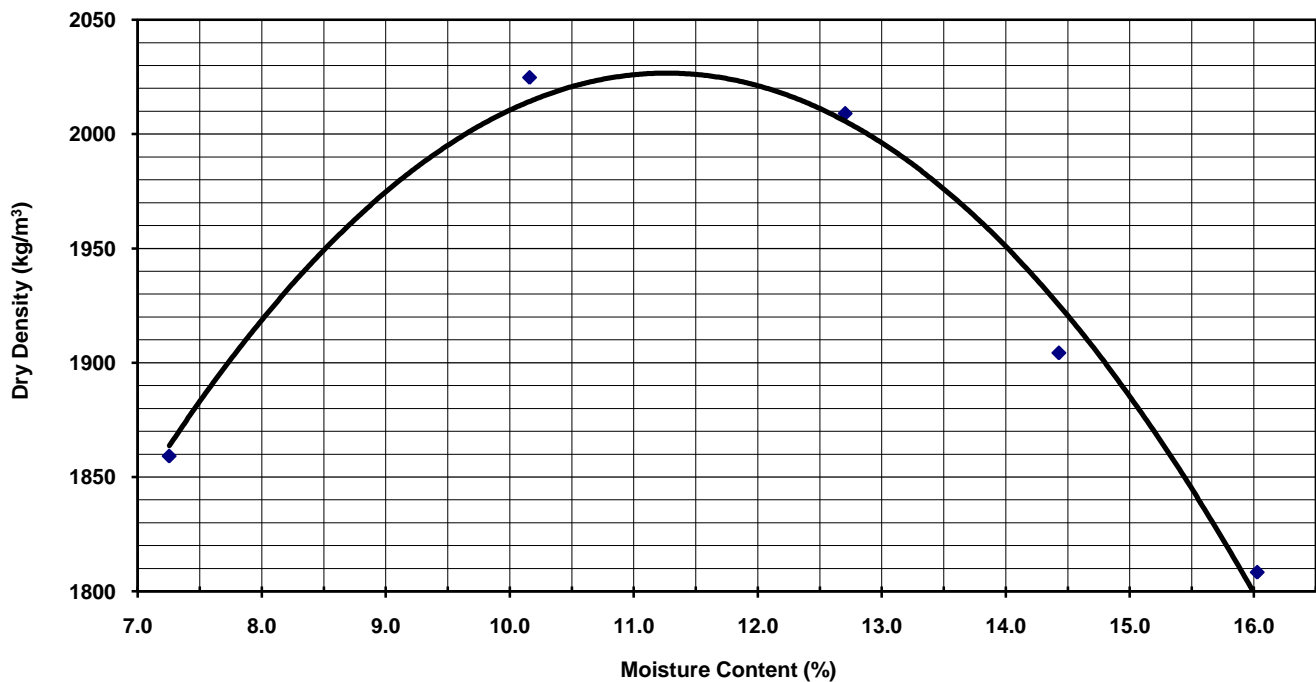
STANDARD PROCTOR DENSITY CURVE LS 706

| | | | | |
|-------------------|-----------------------|---------------|-----------|--------------------------|
| Project No.: | SW8801.1004.101 | Date Sampled: | 31-Aug-11 | Sampled by: Adem |
| Client Name: | HMM | | | Received by: Owen |
| Project Name: | Windsor Essex Parkway | | | Tested by: Owen |
| Soil Description: | Grey Silty Clay | | | Date Received: 31-Aug-11 |
| Sample Location: | TP11 @ 10m | | | Date Tested: 09-Sep-11 |
| Report Date: | 07-Aug-12 | | | Log No.: 0 |

| | | |
|--|---------------------|--|
| | Test Results | |
|--|---------------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 2026 kg/m ³ | 126.5 pcf |
| Optimum Moisture Content | 11.3 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|------|---|---|
| Dry Density (kg / m3) | 1859 | 2025 | 2009 | 1904 | 1808 | | |
| Moisture Content (%) | 7.3 | 10.2 | 12.7 | 14.4 | 16.0 | | |



| | | | | | |
|----------|--|-----------------|--------------------------------|-----------------|--|
| PROJECT | | | WINDSOR ESSEX PARKWAY | | |
| TITLE | | | STANDARD PROCTOR DENSITY CURVE | | |
| DATE | | JOB NO | | FIGURE NO. C.35 | |
| Aug 2012 | | SW8801.1004.101 | | | |

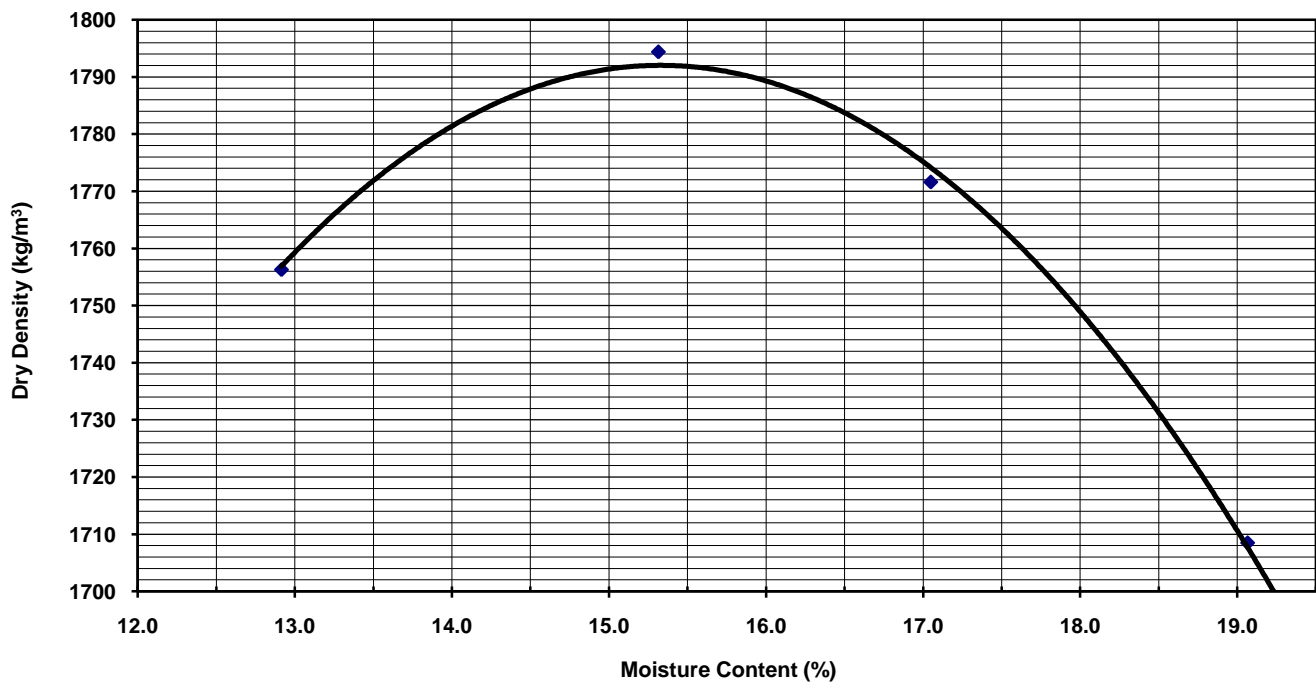
STANDARD PROCTOR DENSITY CURVE LS 706

| | | | | |
|-------------------|-------------------------------|---------------|-----------|--------------------------|
| Project No.: | SW8801.1004.101 | Date Sampled: | 01-Sep-11 | Sampled by: Adem |
| Client Name: | HMM | | | Received by: Owen |
| Project Name: | Windsor Essex Parkway | | | Tested by: Owen |
| Soil Description: | Brown Grey Mottled silty clay | | | Date Received: 01-Sep-11 |
| Sample Location: | TP12 @ 1.1m | | | Date Tested: 13-Sep-11 |
| Report Date: | 07-Aug-12 | | | Log No.: 0 |

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| | Test Results | |
|--|---------------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 1791 kg/m ³ | 111.8 pcf |
| Optimum Moisture Content | 15.3 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|---|---|---|
| Dry Density (kg / m3) | 1756 | 1794 | 1772 | 1708 | | | |
| Moisture Content (%) | 12.9 | 15.3 | 17.0 | 19.1 | | | |



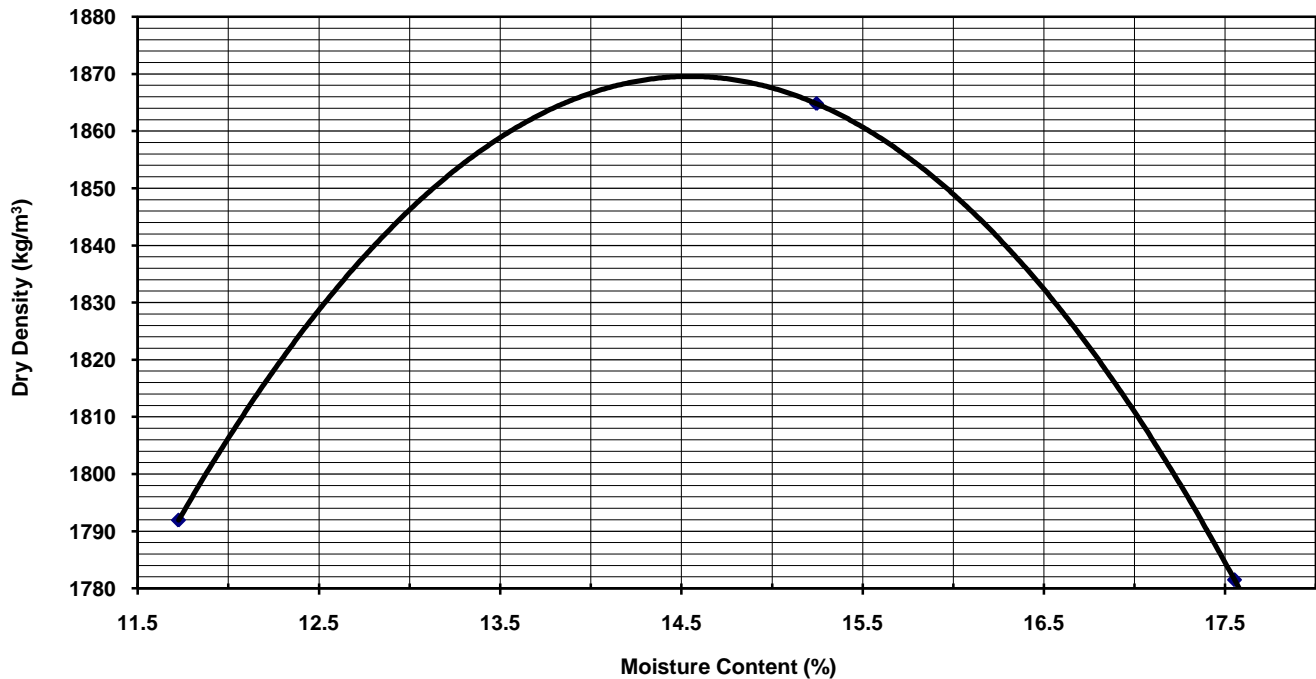
STANDARD PROCTOR DENSITY CURVE LS 706

| | | | | | |
|-------------------|-------------------------------|---------------|-----------|----------------|-----------|
| Project No.: | SW8801.1004.101 | Date Sampled: | 01-Sep-11 | Sampled by: | Adem |
| Client Name: | HMM | | | Received by: | Owen |
| Project Name: | Windsor Essex Parkway | | | Tested by: | Owen |
| Soil Description: | Brown Grey Mottled silty clay | | | Date Received: | 01-Sep-11 |
| Sample Location: | TP12 @ 1.5m | | | Date Tested: | 13-Sep-11 |
| Report Date: | 07-Aug-12 | | | Log No.: | 0 |

| | | |
|--|---------------------|--|
| | Test Results | |
|--|---------------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 1870 kg/m ³ | 116.7 pcf |
| Optimum Moisture Content | 14.6 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|---|---|---|---|
| Dry Density (kg / m3) | 1792 | 1865 | 1781 | | | | |
| Moisture Content (%) | 11.7 | 15.2 | 17.6 | | | | |



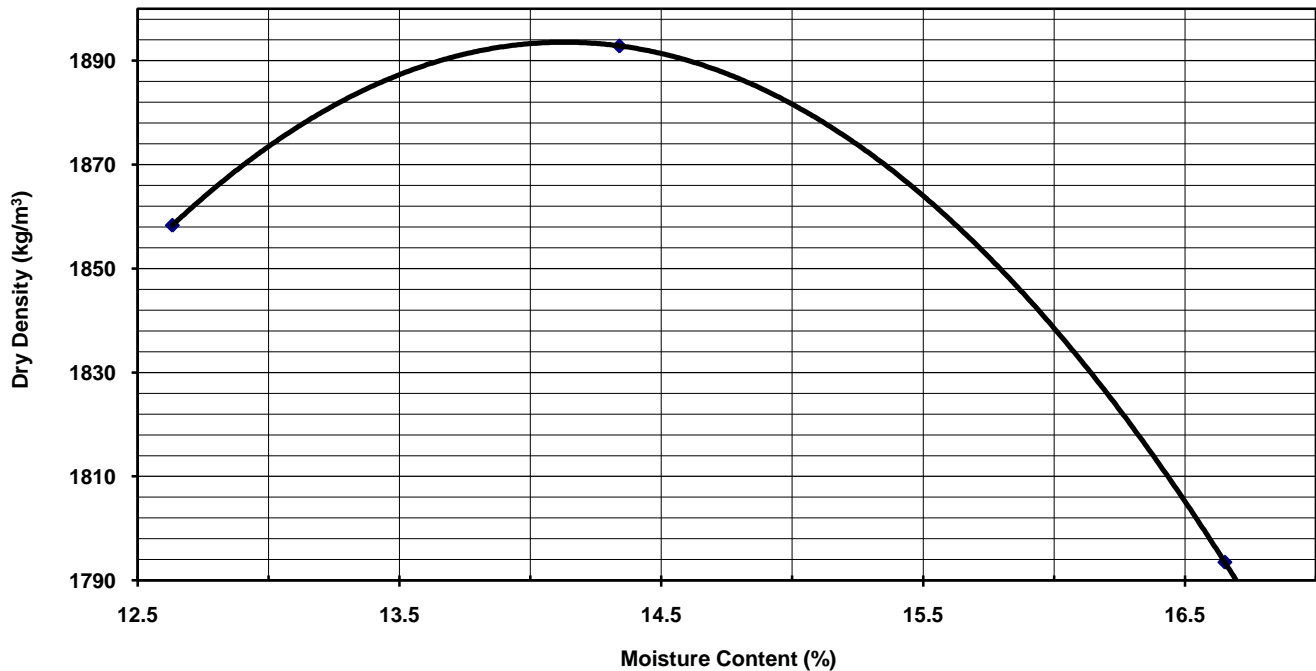
STANDARD PROCTOR DENSITY CURVE LS 706

| | | | | |
|--------------------------|-----------------------|----------------------|-----------|---------------------------------|
| Project No.: | SW8801.1004.101 | Date Sampled: | 01-Sep-11 | Sampled by: Adem |
| Client Name: | HMM | | | Received by: owen |
| Project Name: | Windsor Essex Parkway | | | Tested by: owen |
| Soil Description: | Brown Silty Clay | | | Date Received: 01-Sep-11 |
| Sample Location: | TP12 @ 2.1m | | | Date Tested: 13-Sep-11 |
| Report Date: | 07-Aug-12 | | | Log No.: 0 |

| | | |
|--|---------------------|--|
| | Test Results | |
|--|---------------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 1893 kg/m ³ | 118.2 pcf |
| Optimum Moisture Content | 13.7 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|---|---|---|---|
| Dry Density (kg / m3) | 1858 | 1893 | 1793 | | | | |
| Moisture Content (%) | 12.6 | 14.3 | 16.7 | | | | |



STANDARD PROCTOR DENSITY CURVE LS 706

Project No.: SW8801.1004.101
Client Name: HMM
Project Name: Windsor Essex Parkway
Soil Description: Grey silty clay
Sample Location: TP12 @ 4.5m
Report Date: 07-Aug-12

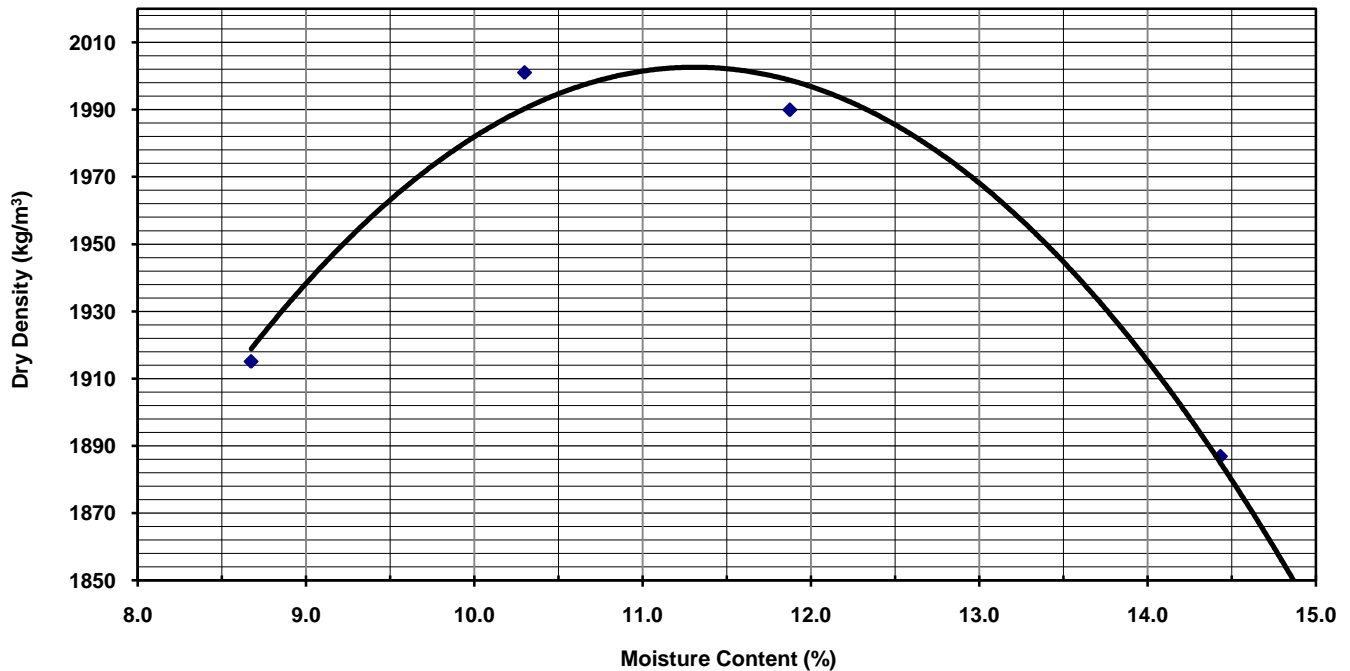
Date Sampled: 01-Sep-11

Sampled by: Adem
Received by: Owen
Tested by: Owen
Date Received: 01-Sep-11
Date Tested: 13-Sep-11
Log No.: 0

Test Results

Maximum Dry Density 2002 kg/m³ 125.0 pcf
 Optimum Moisture Content 11.3 %

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|---|---|---|
| Dry Density (kg / m3) | 1915 | 2001 | 1990 | 1887 | | | |
| Moisture Content (%) | 8.7 | 10.3 | 11.9 | 14.4 | | | |



PROJECT WINDSOR ESSEX PARKWAY

TITLE STANDARD PROCTOR DENSITY CURVE

DATE
 Aug 2012

JOB NO
 SW8801.1004.101

FIGURE NO. C.39

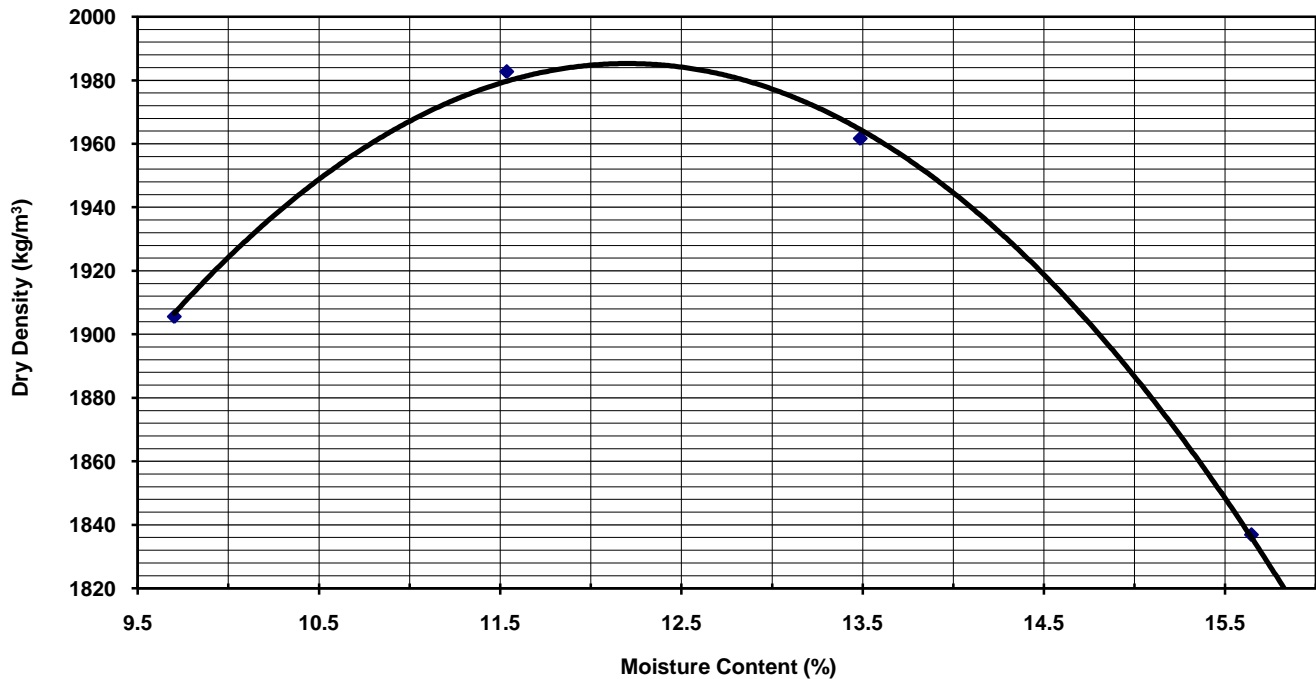
STANDARD PROCTOR DENSITY CURVE LS 706

| | | | | |
|--------------------------|-----------------------|----------------------|-----------|---------------------------------|
| Project No.: | SW8801.1004.101 | Date Sampled: | 01-Sep-11 | Sampled by: Adem |
| Client Name: | HMM | | | Received by: owen |
| Project Name: | Windsor Essex Parkway | | | Tested by: owen |
| Soil Description: | Grey Silty Clay | | | Date Received: 01-Sep-11 |
| Sample Location: | TP12 @ 9.5m | | | Date Tested: 13-Sep-11 |
| Report Date: | 07-Aug-12 | | | Log No.: 0 |

| | | |
|--|---------------------|--|
| | Test Results | |
|--|---------------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 1987 kg/m ³ | 124.0 pcf |
| Optimum Moisture Content | 11.7 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|---|---|---|
| Dry Density (kg / m3) | 1906 | 1983 | 1962 | 1837 | | | |
| Moisture Content (%) | 9.7 | 11.5 | 13.5 | 15.6 | | | |



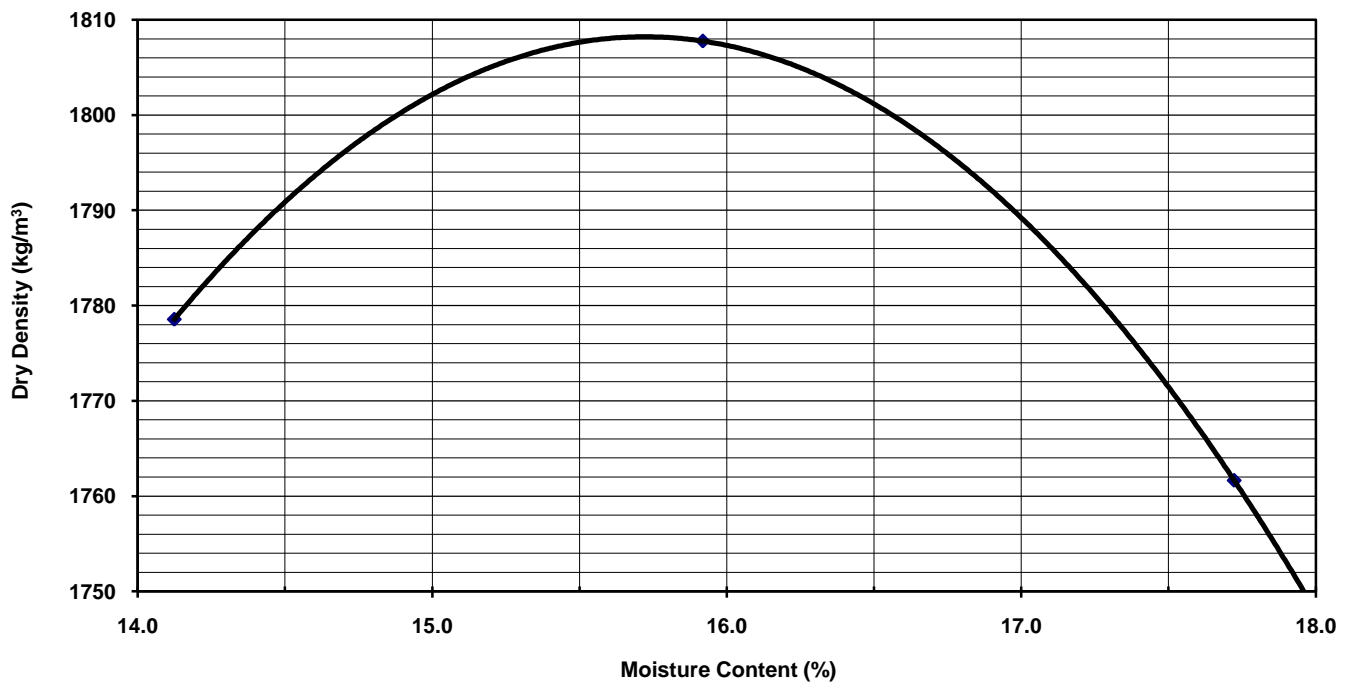
STANDARD PROCTOR DENSITY CURVE LS 706

| | | | | | |
|-------------------|-----------------------|---------------|-----------|----------------|-----------|
| Project No.: | SW8801.1004.101 | Date Sampled: | 17-Aug-11 | Sampled by: | Adem |
| Client Name: | HMM | | | Received by: | O.E. |
| Project Name: | Windsor Essex Parkway | | | Tested by: | O.E. |
| Soil Description: | Brown Grey Silty Clay | | | Date Received: | 17-Aug-11 |
| Sample Location: | TP13 @ 0.6m | | | Date Tested: | 24-Aug-11 |
| Report Date: | 07-Aug-12 | | | Log No.: | 0 |

| | | |
|--|---------------------|--|
| | Test Results | |
|--|---------------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 1808 kg/m ³ | 112.9 pcf |
| Optimum Moisture Content | 15.7 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|---|---|---|---|
| Dry Density (kg / m3) | 1779 | 1808 | 1762 | | | | |
| Moisture Content (%) | 14.1 | 15.9 | 17.7 | | | | |



| | | | | | |
|----------|--|-----------------|--------------------------------|-----------------|--|
| PROJECT | | | WINDSOR ESSEX PARKWAY | | |
| TITLE | | | STANDARD PROCTOR DENSITY CURVE | | |
| DATE | | JOB NO | | FIGURE NO. C.41 | |
| Aug 2012 | | SW8801.1004.101 | | | |

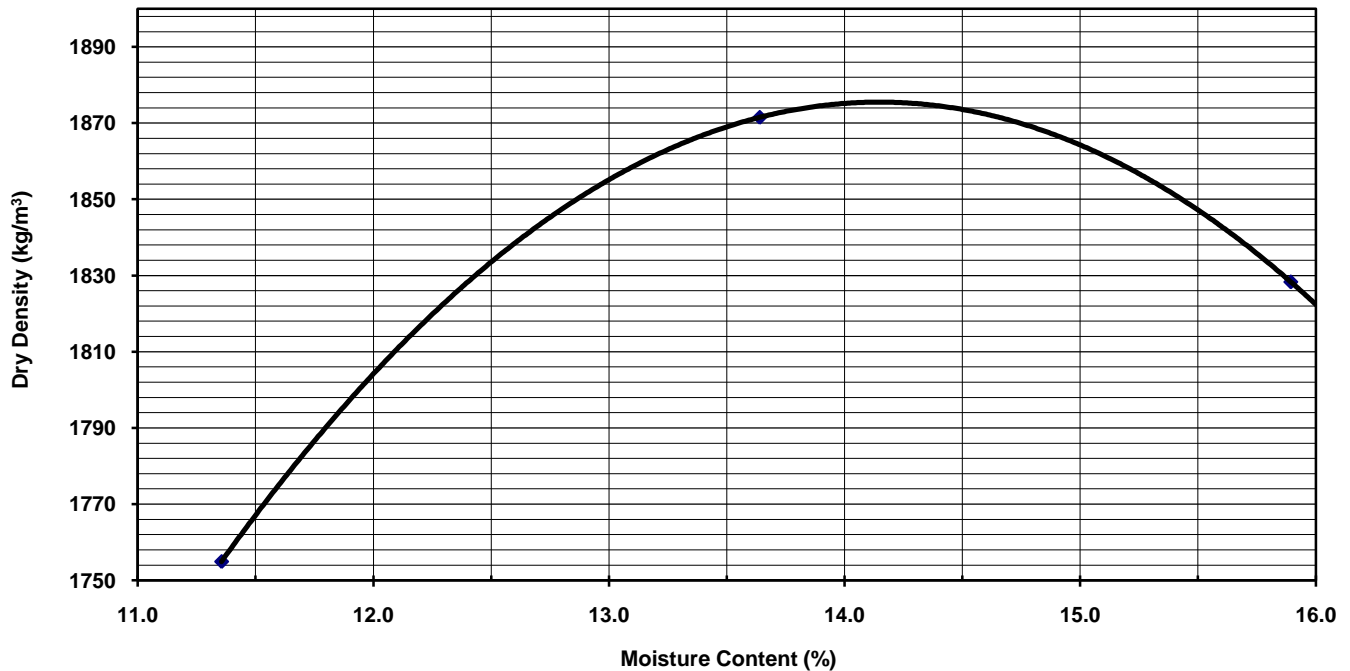
STANDARD PROCTOR DENSITY CURVE LS 706

| | | | | |
|--------------------------|---------------------------|----------------------|-----------|---------------------------------|
| Project No.: | SW8801.1004.101 | Date Sampled: | 17-Aug-11 | Sampled by: Adem |
| Client Name: | HMM | | | Received by: Max |
| Project Name: | Windsor Essex Parkway | | | Tested by: Max |
| Soil Description: | Brown and Grey Silty Clay | | | Date Received: 17-Aug-11 |
| Sample Location: | TP13 @ 1.2m | | | Date Tested: 30-Aug-11 |
| Report Date: | 07-Aug-12 | | | Log No.: 0 |

| | | |
|--|---------------------|--|
| | Test Results | |
|--|---------------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 1876 kg/m ³ | 117.1 pcf |
| Optimum Moisture Content | 14.2 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|---|---|---|---|
| Dry Density (kg / m3) | 1755 | 1872 | 1828 | | | | |
| Moisture Content (%) | 11.4 | 13.6 | 15.9 | | | | |



| | | |
|--------------------------------|-----------------|-------------------|
| PROJECT | | |
| WINDSOR ESSEX PARKWAY | | |
| TITLE | | |
| STANDARD PROCTOR DENSITY CURVE | | |
| DATE | JOB NO | FIGURE NO. |
| Aug 2012 | SW8801.1004.101 | C.42 |

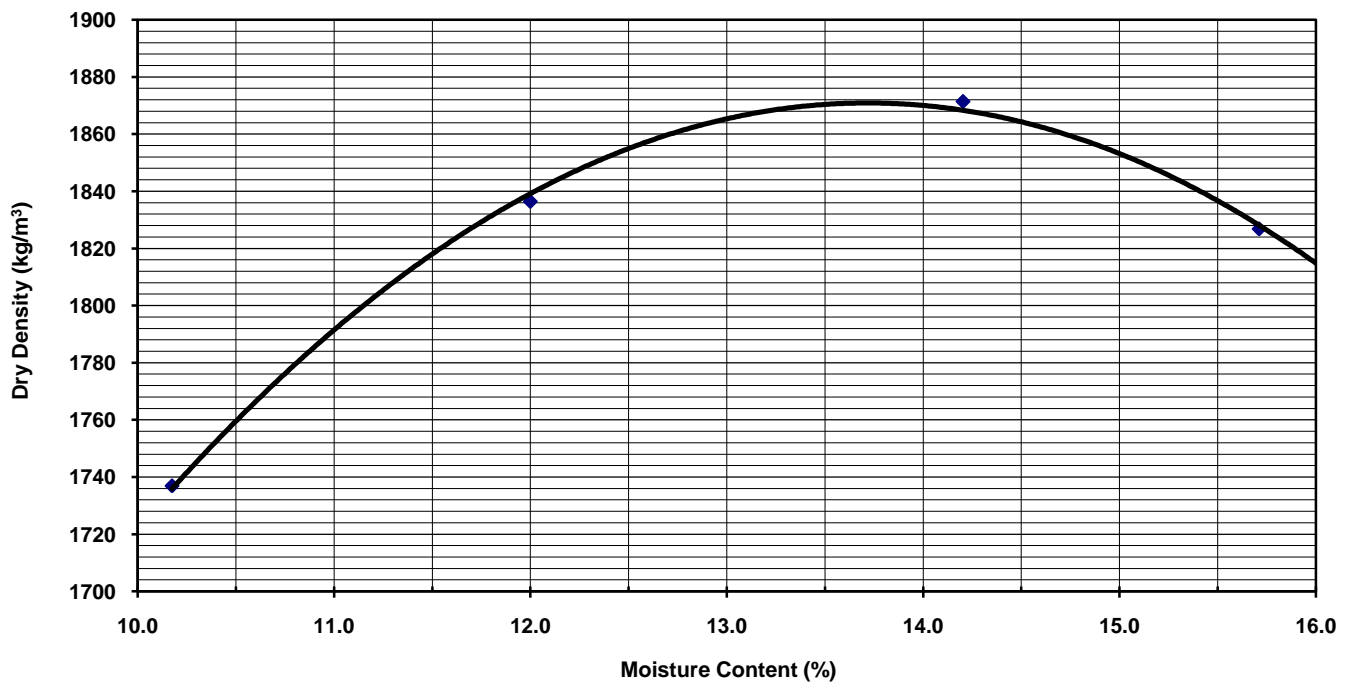
STANDARD PROCTOR DENSITY CURVE LS 706

| | | | | | |
|-------------------|---------------------------|---------------|-----------|----------------|-----------|
| Project No.: | SW8801.1004.101 | Date Sampled: | 17-Aug-11 | Sampled by: | Adem |
| Client Name: | HMM | | | Received by: | Max |
| Project Name: | Windsor Essex Parkway | | | Tested by: | Max |
| Soil Description: | Brown and Grey Silty Clay | | | Date Received: | 17-Aug-11 |
| Sample Location: | TP13 @ 1.8m | | | Date Tested: | 24-Aug-11 |
| Report Date: | 07-Aug-12 | | | Log No.: | 0 |

| | | |
|--|---------------------|--|
| | Test Results | |
|--|---------------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 1871 kg/m ³ | 116.8 pcf |
| Optimum Moisture Content | 13.7 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|---|---|---|
| Dry Density (kg / m3) | 1737 | 1836 | 1871 | 1827 | | | |
| Moisture Content (%) | 10.2 | 12.0 | 14.2 | 15.7 | | | |



STANDARD PROCTOR DENSITY CURVE LS 706

Project No.: SW8801.1004.101
Client Name: HMM
Project Name: Windsor Essex Parkway
Soil Description: Brown Silty Clay
Sample Location: TP13 @ 2.9m
Report Date: 07-Aug-12

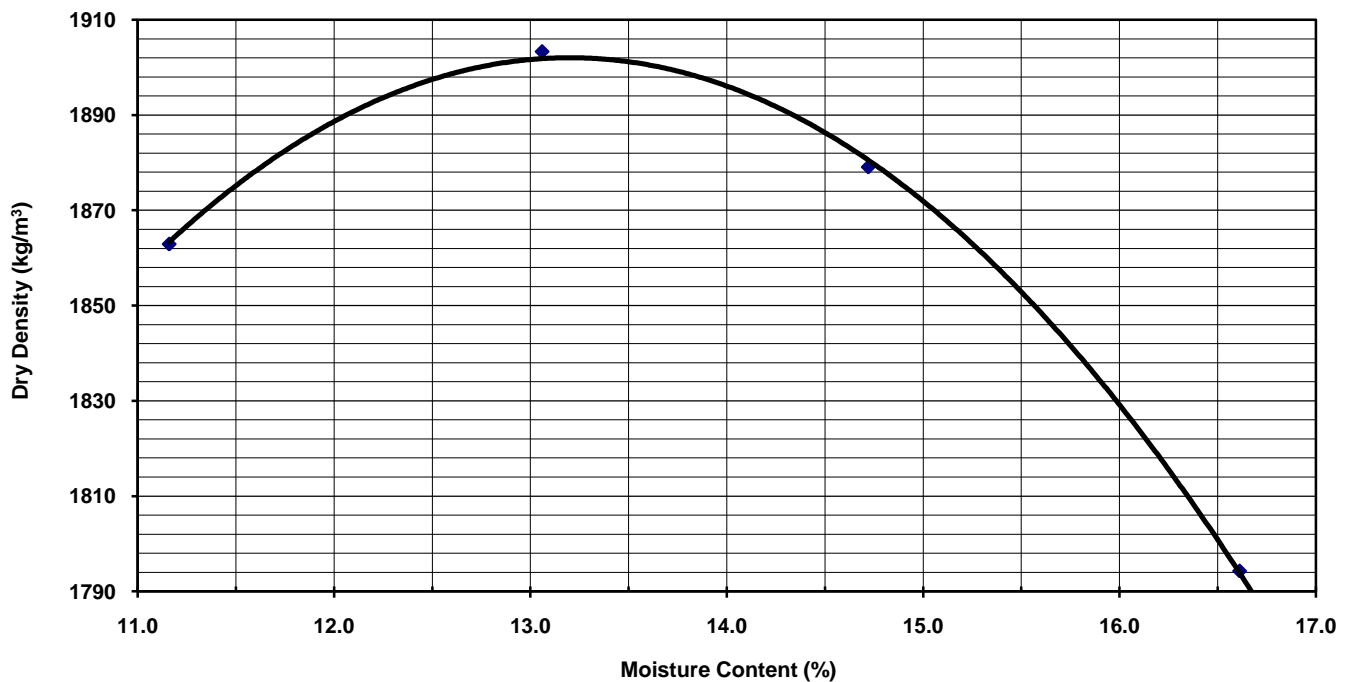
Date Sampled: 17-Aug-11

Sampled by: Adem
Received by: Max
Tested by: Max
Date Received: 17-Aug-11
Date Tested: 30-Aug-11
Log No.: 0

Test Results

Maximum Dry Density 1902 kg/m³ 118.7 pcf
 Optimum Moisture Content 13.2 %

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|---|---|---|
| Dry Density (kg / m3) | 1863 | 1903 | 1879 | 1794 | | | |
| Moisture Content (%) | 11.2 | 13.1 | 14.7 | 16.6 | | | |



PROJECT WINDSOR ESSEX PARKWAY

TITLE STANDARD PROCTOR DENSITY CURVE

DATE
Aug 2012

JOB NO
SW8801.1004.101

FIGURE NO. C.44

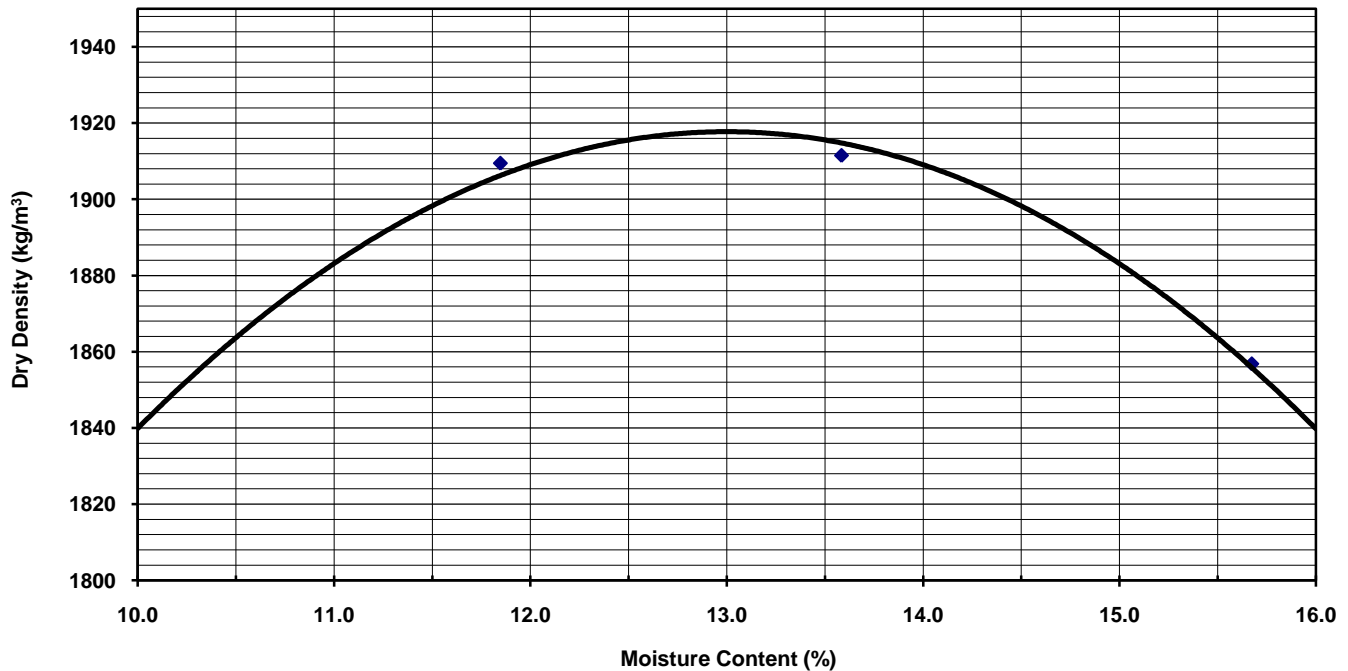
STANDARD PROCTOR DENSITY CURVE LS 706

| | | | | |
|-------------------|-----------------------|---------------|-----------|--------------------------|
| Project No.: | SW8801.1004.101 | Date Sampled: | 17-Aug-11 | Sampled by: Adem |
| Client Name: | HMM | | | Received by: Max |
| Project Name: | Windsor Essex Parkway | | | Tested by: Max |
| Soil Description: | Grey Silty Clay | | | Date Received: 17-Aug-11 |
| Sample Location: | TP13 @ 4.2m | | | Date Tested: 30-Aug-11 |
| Report Date: | 07-Aug-12 | | | Log No.: 0 |

| | | |
|--|---------------------|--|
| | Test Results | |
|--|---------------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 1918 kg/m ³ | 119.7 pcf |
| Optimum Moisture Content | 13.0 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|---|---|---|
| Dry Density (kg / m3) | 1827 | 1909 | 1912 | 1857 | | | |
| Moisture Content (%) | 9.8 | 11.8 | 13.6 | 15.7 | | | |



| | | | |
|----------|-----------------|-----------------|--------------------------------|
| PROJECT | | | WINDSOR ESSEX PARKWAY |
| TITLE | | | STANDARD PROCTOR DENSITY CURVE |
| DATE | JOB NO | FIGURE NO. C.45 | |
| Aug 2012 | SW8801.1004.101 | | |

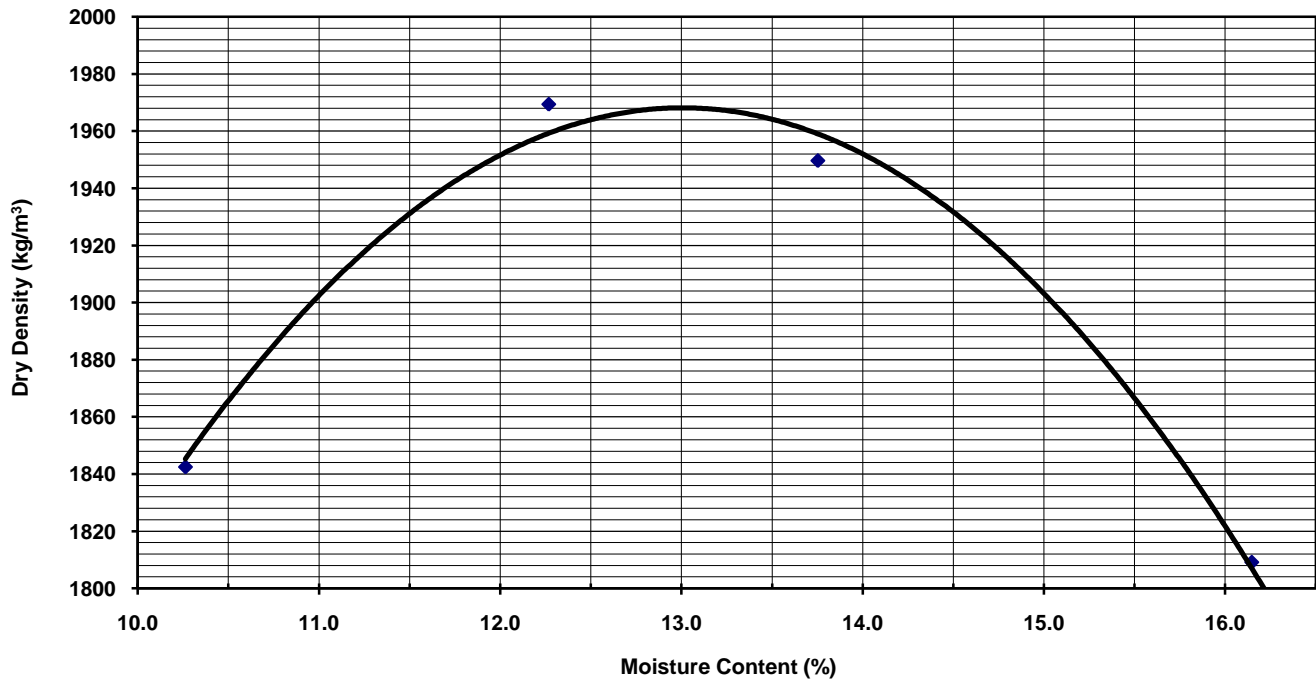
STANDARD PROCTOR DENSITY CURVE LS 706

| | | | | |
|-------------------|-----------------------|---------------|-----------|--------------------------|
| Project No.: | SW8801.1004.101 | Date Sampled: | 17-Aug-11 | Sampled by: Adem |
| Client Name: | HMM | | | Received by: Max |
| Project Name: | Windsor Essex Parkway | | | Tested by: Max |
| Soil Description: | Grey Silty Clay | | | Date Received: 17-Aug-11 |
| Sample Location: | TP13 @ 10m | | | Date Tested: 24-Aug-11 |
| Report Date: | 07-Aug-12 | | | Log No.: 0 |

| | | |
|--|---------------------|--|
| | Test Results | |
|--|---------------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 1967 kg/m ³ | 122.8 pcf |
| Optimum Moisture Content | 13.0 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|---|---|---|
| Dry Density (kg / m3) | 1842 | 1969 | 1950 | 1809 | | | |
| Moisture Content (%) | 10.3 | 12.3 | 13.8 | 16.1 | | | |



| | | | |
|----------|-----------------|-----------------|--------------------------------|
| PROJECT | | | WINDSOR ESSEX PARKWAY |
| TITLE | | | STANDARD PROCTOR DENSITY CURVE |
| DATE | JOB NO | FIGURE NO. C.46 | |
| Aug 2012 | SW8801.1004.101 | | |

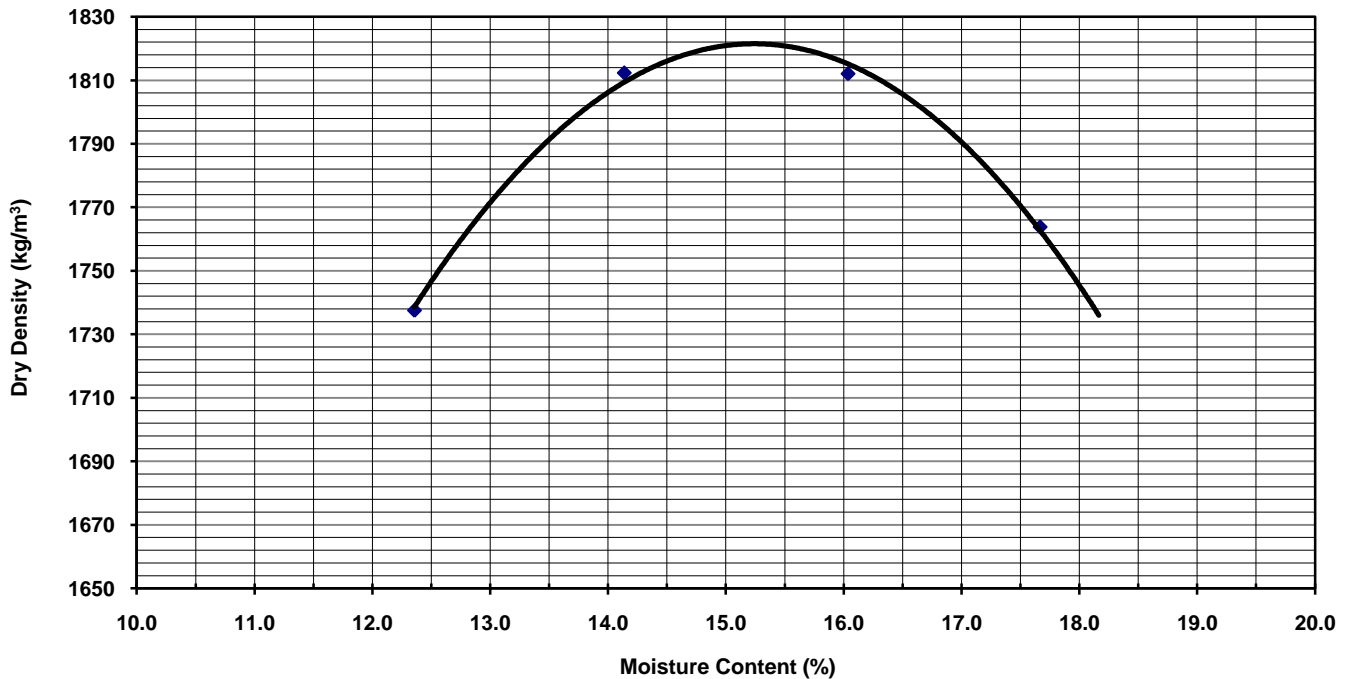
STANDARD PROCTOR DENSITY CURVE LS 706

| | | | | |
|-------------------|-------------------------------|---------------|-----------|--------------------------|
| Project No.: | SW8801.1004.101 | Date Sampled: | 16-Aug-11 | Sampled by: Adem |
| Client Name: | HMM | | | Received by: Max |
| Project Name: | Windsor Essex Parkway | | | Tested by: Max |
| Soil Description: | Grey-Brown Mottled Silty Clay | | | Date Received: 16-Aug-11 |
| Sample Location: | TP14 @ 0.9m | | | Date Tested: 22-Aug-11 |
| Report Date: | 07-Aug-12 | | | Log No.: 0 |

| | | |
|--|---------------------|--|
| | Test Results | |
|--|---------------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 1824 kg/m ³ | 113.9 pcf |
| Optimum Moisture Content | 15.3 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|---|---|---|
| Dry Density (kg / m3) | 1738 | 1812 | 1812 | 1764 | | | |
| Moisture Content (%) | 12.4 | 14.1 | 16.0 | 17.7 | | | |



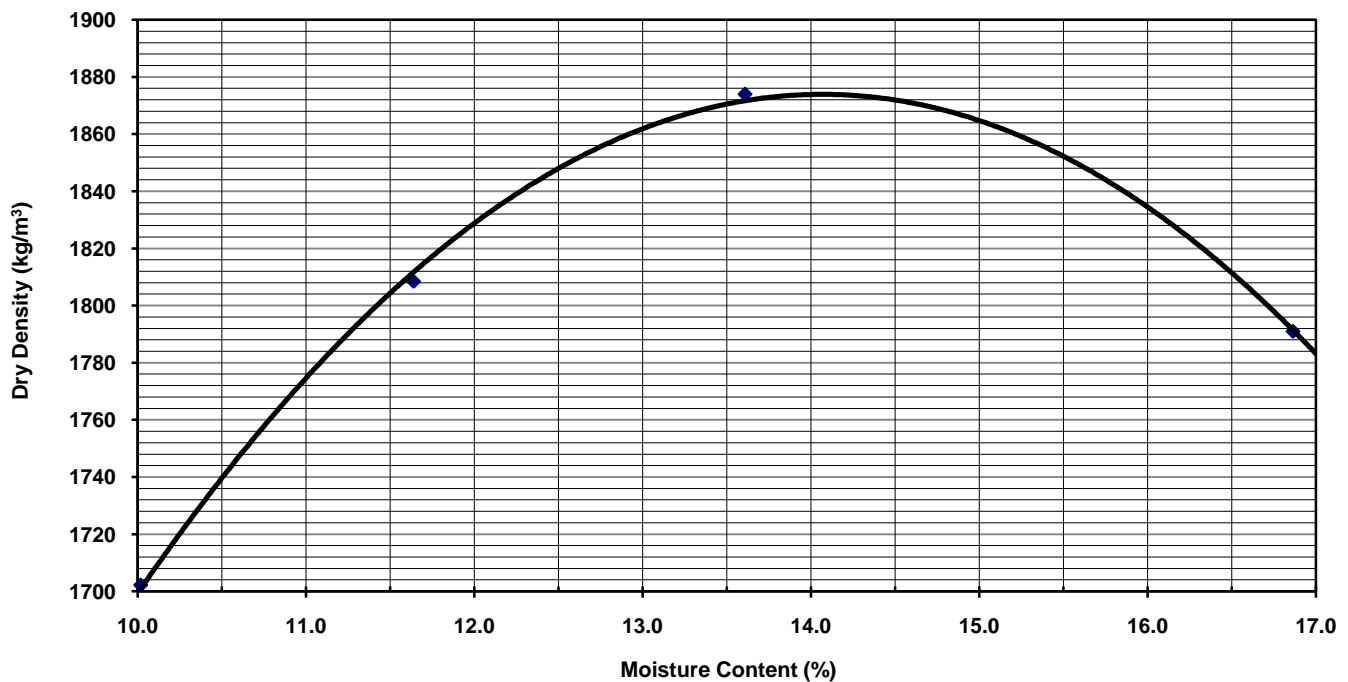
STANDARD PROCTOR DENSITY CURVE LS 706

| | | | | |
|--------------------------|-------------------------------|----------------------|-----------|---------------------------------|
| Project No.: | SW8801.1004.101 | Date Sampled: | 16-Aug-11 | Sampled by: Adem |
| Client Name: | HMM | | | Received by: Max |
| Project Name: | Windsor Essex Parkway | | | Tested by: Max |
| Soil Description: | Grey-Brown Mottled Silty Clay | | | Date Received: 16-Aug-11 |
| Sample Location: | TP14 @ 1.7m | | | Date Tested: 22-Aug-11 |
| Report Date: | 07-Aug-12 | | | Log No.: 0 |

| | | |
|--|---------------------|--|
| | Test Results | |
|--|---------------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 1873 kg/m ³ | 116.9 pcf |
| Optimum Moisture Content | 14.2 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|---|---|---|
| Dry Density (kg / m3) | 1702 | 1808 | 1874 | 1791 | | | |
| Moisture Content (%) | 10.0 | 11.6 | 13.6 | 16.9 | | | |



| | | | |
|----------|-----------------|-----------------|--------------------------------|
| PROJECT | | | WINDSOR ESSEX PARKWAY |
| TITLE | | | STANDARD PROCTOR DENSITY CURVE |
| DATE | JOB NO | FIGURE NO. C.48 | |
| Aug 2012 | SW8801.1004.101 | | |

STANDARD PROCTOR DENSITY CURVE LS 706

Project No.: SW8801.1004.101
Client Name: HMM
Project Name: Windsor Essex Parkway
Soil Description: Brown Silty Clay
Sample Location: TP14 @ 2.5m
Report Date: 07-Aug-12

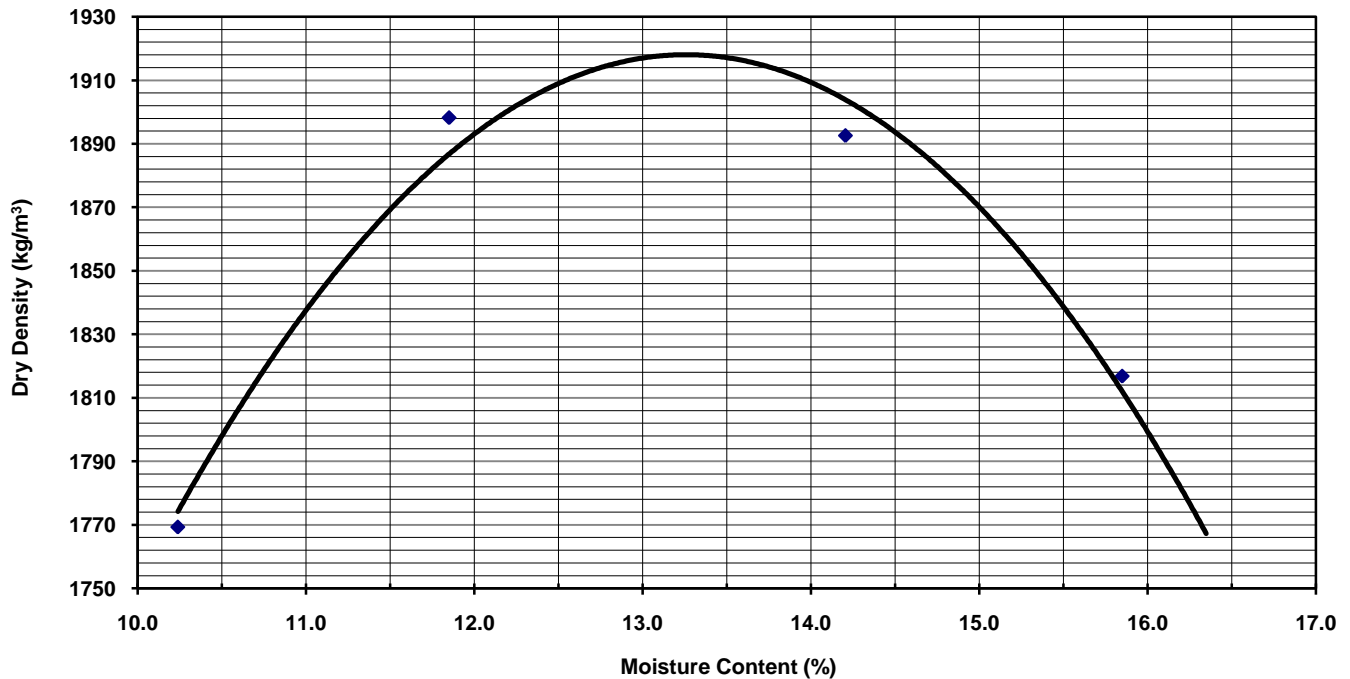
Date Sampled: 16-Aug-11

Sampled by: Adem
Received by: Max
Tested by: Max
Date Received: 16-Aug-11
Date Tested: 23-Aug-11
Log No.: 0

Test Results

Maximum Dry Density 1928 kg/m³ 120.4 pcf
 Optimum Moisture Content 13.3 %

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|---|---|---|
| Dry Density (kg / m3) | 1769 | 1898 | 1893 | 1817 | | | |
| Moisture Content (%) | 10.2 | 11.9 | 14.2 | 15.8 | | | |



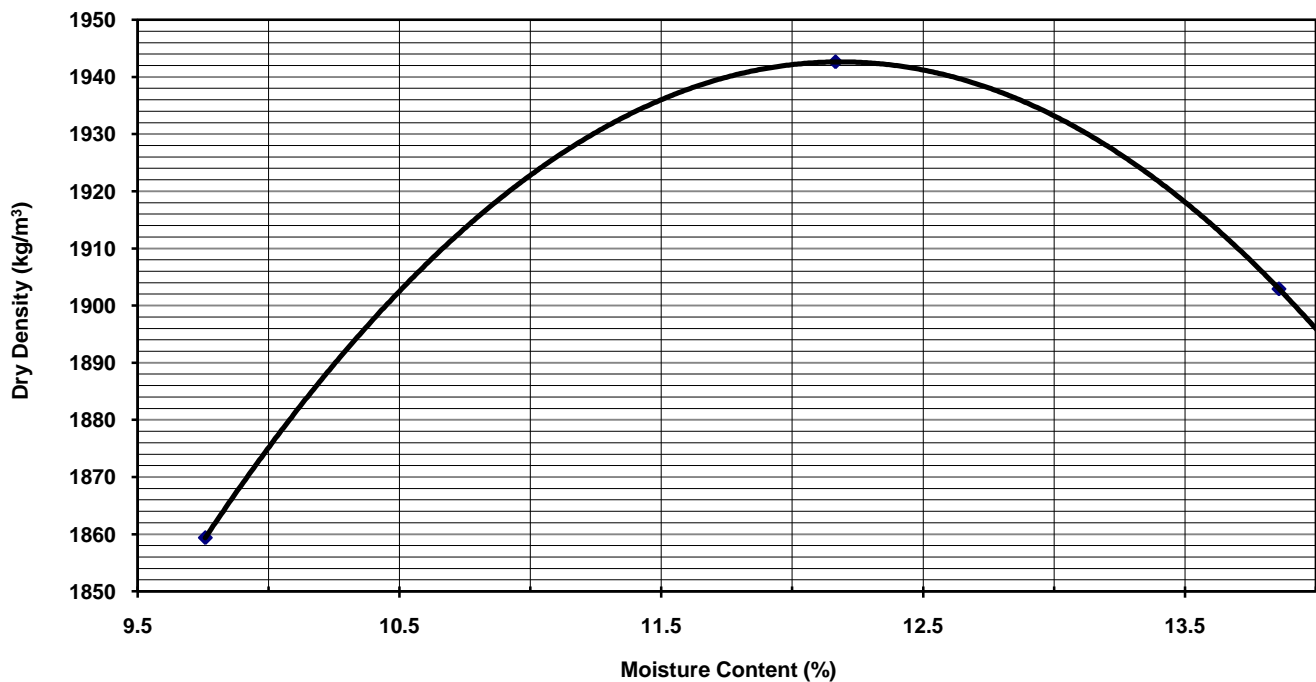
STANDARD PROCTOR DENSITY CURVE LS 706

| | | | | |
|-------------------|-----------------------|---------------|-----------|--------------------------|
| Project No.: | SW8801.1004.101 | Date Sampled: | 16-Aug-11 | Sampled by: Adem |
| Client Name: | HMM | | | Received by: Max |
| Project Name: | Windsor Essex Parkway | | | Tested by: Max |
| Soil Description: | Grey Silty Clay | | | Date Received: 16-Aug-11 |
| Sample Location: | TP14 @ 4.2m | | | Date Tested: 29-Aug-11 |
| Report Date: | 07-Aug-12 | | | Log No.: 0 |

| | | |
|--|---------------------|--|
| | Test Results | |
|--|---------------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 1943 kg/m ³ | 121.3 pcf |
| Optimum Moisture Content | 12.2 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|---|---|---|---|
| Dry Density (kg / m3) | 1859 | 1943 | 1903 | | | | |
| Moisture Content (%) | 9.8 | 12.2 | 13.9 | | | | |



| | | | |
|----------|-----------------|-----------------|--------------------------------|
| PROJECT | | | WINDSOR ESSEX PARKWAY |
| TITLE | | | STANDARD PROCTOR DENSITY CURVE |
| DATE | JOB NO | FIGURE NO. C.50 | |
| Aug 2012 | SW8801.1004.101 | | |

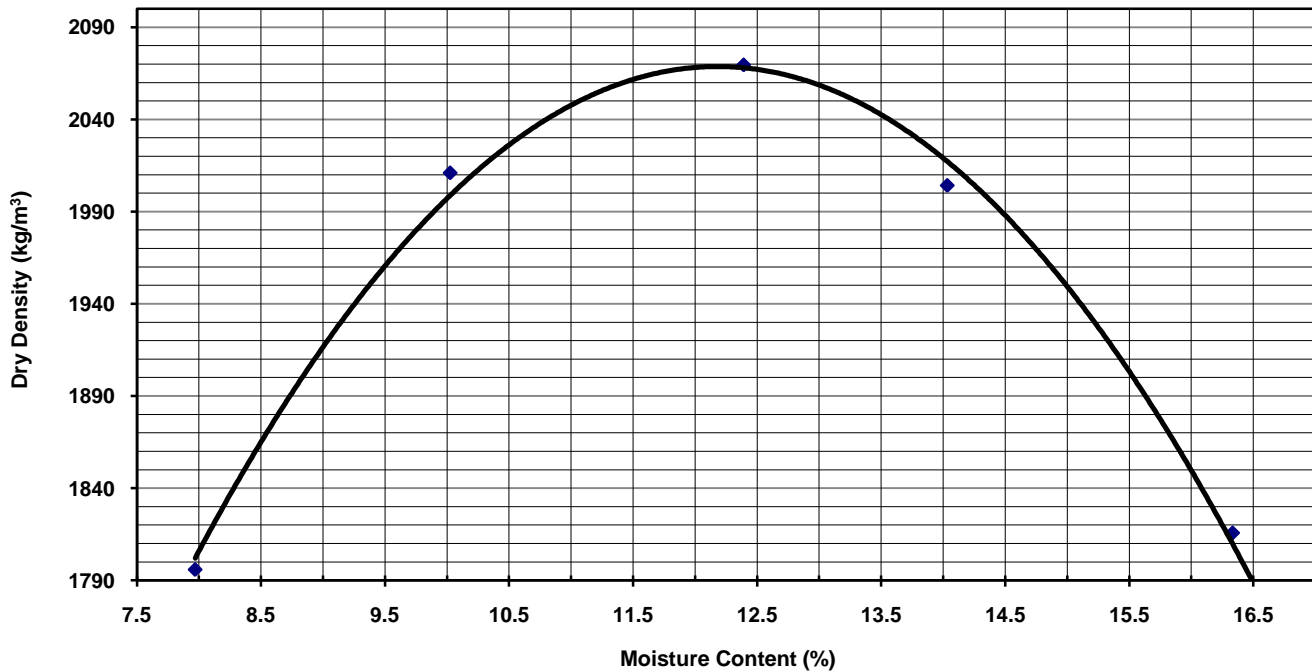
STANDARD PROCTOR DENSITY CURVE LS 706

| | | | | |
|-------------------|-----------------------|---------------|-----------|--------------------------|
| Project No.: | SW8801.1004.101 | Date Sampled: | 16-Aug-11 | Sampled by: Adem |
| Client Name: | HMM | | | Received by: O.E. |
| Project Name: | Windsor Essex Parkway | | | Tested by: O.E. |
| Soil Description: | Grey Silty Clay | | | Date Received: 16-Aug-11 |
| Sample Location: | TP14 @ 10m | | | Date Tested: 25-Aug-11 |
| Report Date: | 07-Aug-12 | | | Log No.: 0 |

| | | |
|--|---------------------|--|
| | Test Results | |
|--|---------------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 2070 kg/m ³ | 129.2 pcf |
| Optimum Moisture Content | 11.8 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|------|---|---|
| Dry Density (kg / m3) | 1796 | 2011 | 2070 | 2004 | 1816 | | |
| Moisture Content (%) | 8.0 | 10.0 | 12.4 | 14.0 | 16.3 | | |



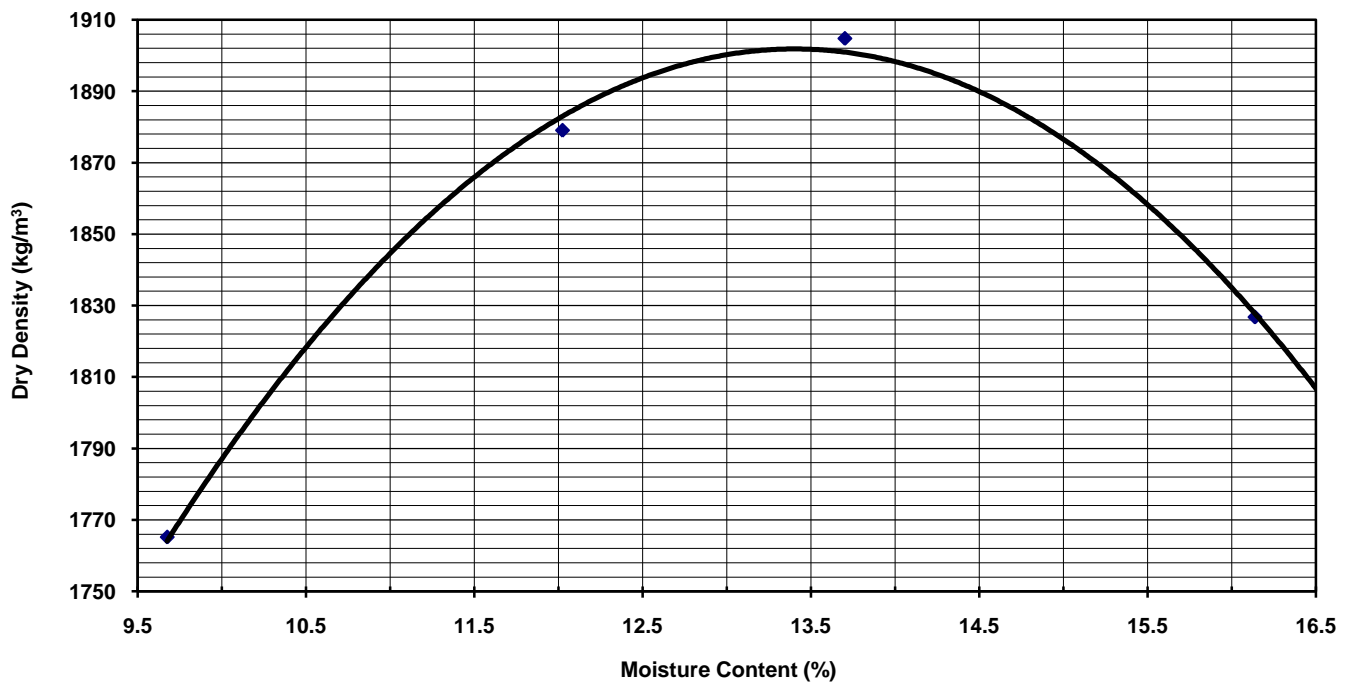
STANDARD PROCTOR DENSITY CURVE LS 706

| | | | | |
|-------------------|-------------------------------|---------------|-----------|--------------------------|
| Project No.: | SW8801.1004.101 | Date Sampled: | 23-Aug-11 | Sampled by: Adem |
| Client Name: | HMM | | | Received by: Max |
| Project Name: | Windsor Essex Parkway | | | Tested by: Max |
| Soil Description: | Brown/Grey Mottled Sandy Silt | | | Date Received: 23-Aug-11 |
| Sample Location: | TP15 @ 1.5m | | | Date Tested: 30-Aug-11 |
| Report Date: | 07-Aug-12 | | | Log No.: 0 |

| | | |
|--|--------------|--|
| | Test Results | |
|--|--------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 1904 kg/m ³ | 118.9 pcf |
| Optimum Moisture Content | 13.4 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|---|---|---|
| Dry Density (kg / m3) | 1765 | 1879 | 1905 | 1827 | | | |
| Moisture Content (%) | 9.7 | 12.0 | 13.7 | 16.1 | | | |



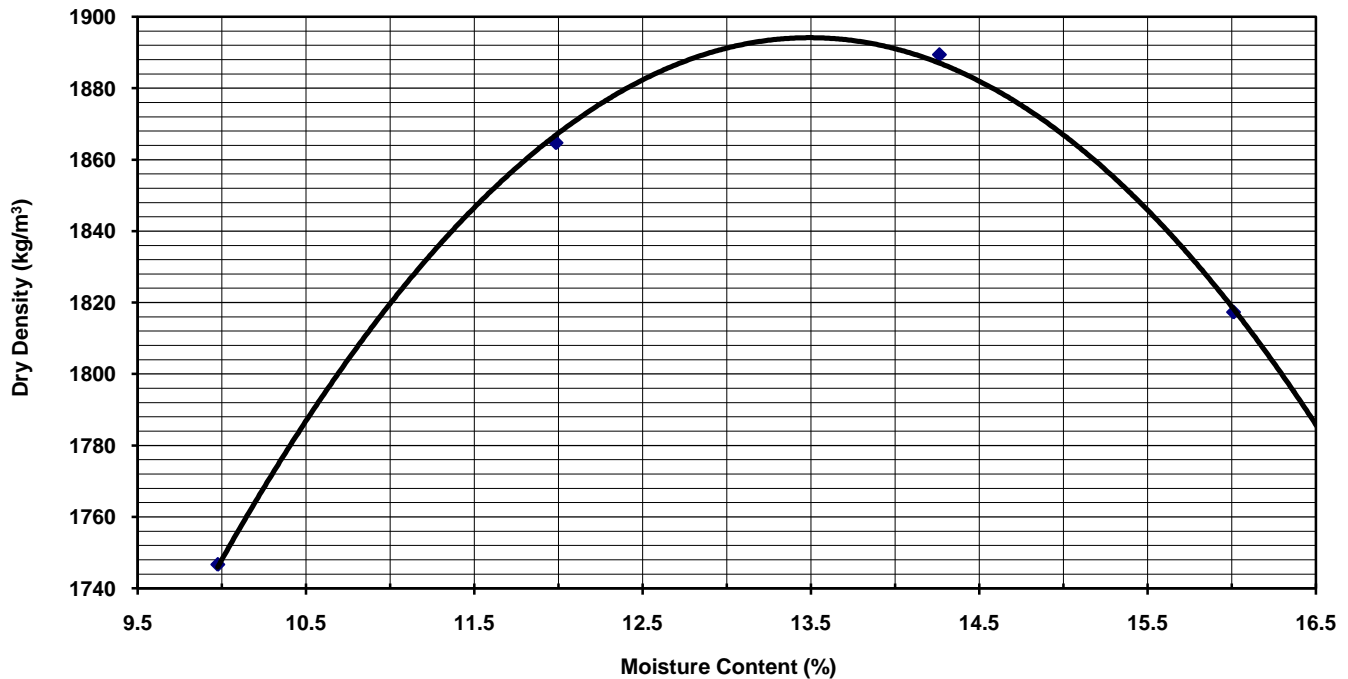
STANDARD PROCTOR DENSITY CURVE LS 706

| | | | | |
|-------------------|-------------------------------|---------------|-----------|--------------------------|
| Project No.: | SW8801.1004.101 | Date Sampled: | 23-Aug-11 | Sampled by: Adem |
| Client Name: | HMM | | | Received by: Max |
| Project Name: | Windsor Essex Parkway | | | Tested by: Max |
| Soil Description: | Brown/Grey Mottled Silty Clay | | | Date Received: 23-Aug-11 |
| Sample Location: | TP15 @ 1.8m | | | Date Tested: 26-Aug-11 |
| Report Date: | 07-Aug-12 | | | Log No.: 0 |

| | | |
|--|---------------------|--|
| | Test Results | |
|--|---------------------|--|

| | | |
|--------------------------|------------------------|-----------|
| Maximum Dry Density | 1894 kg/m ³ | 118.2 pcf |
| Optimum Moisture Content | 13.5 % | |

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|---|---|---|
| Dry Density (kg / m3) | 1747 | 1865 | 1889 | 1817 | | | |
| Moisture Content (%) | 10.0 | 12.0 | 14.3 | 16.0 | | | |



STANDARD PROCTOR DENSITY CURVE LS 706

Project No.: SW8801.1004.101
Client Name: HMM
Project Name: Windsor Essex Parkway
Soil Description: Brown Silty Clay
Sample Location: TP15 @ 2.5m
Report Date: 07-Aug-12

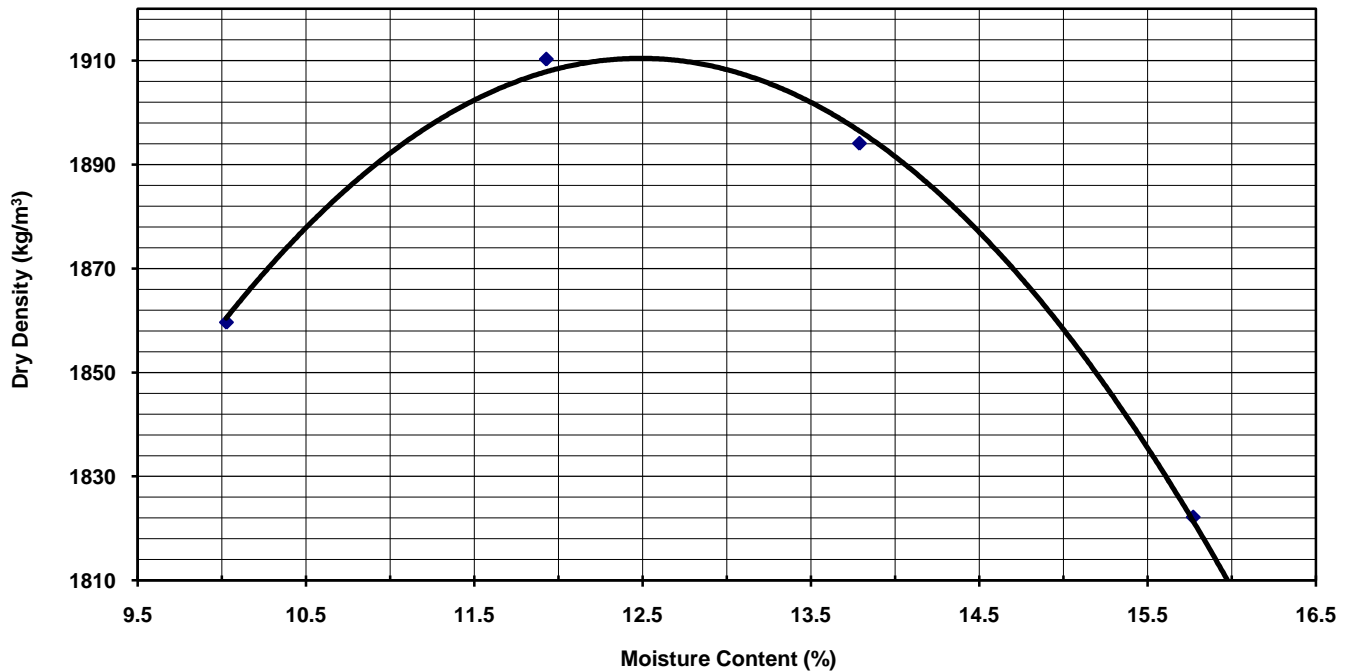
Date Sampled: 23-Aug-11

Sampled by: Adem
Received by: Max
Tested by: Max
Date Received: 23-Aug-11
Date Tested: 30-Aug-11
Log No.: 0

Test Results

Maximum Dry Density 1910 kg/m³ 119.2 pcf
 Optimum Moisture Content 12.5 %

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|---|---|---|
| Dry Density (kg / m3) | 1860 | 1910 | 1894 | 1822 | | | |
| Moisture Content (%) | 10.0 | 11.9 | 13.8 | 15.8 | | | |



PROJECT

WINDSOR ESSEX PARKWAY

TITLE

STANDARD PROCTOR DENSITY CURVE

DATE

Aug2012

JOB NO

SW8801.1004.101

FIGURE NO. C.54

STANDARD PROCTOR DENSITY CURVE LS 706

Project No.: SW8801.1004.101
Client Name: HMM
Project Name: Windsor Essex Parkway
Soil Description: Grey Silty Clay
Sample Location: TP15 @ 4.2m
Report Date: 07-Aug-12

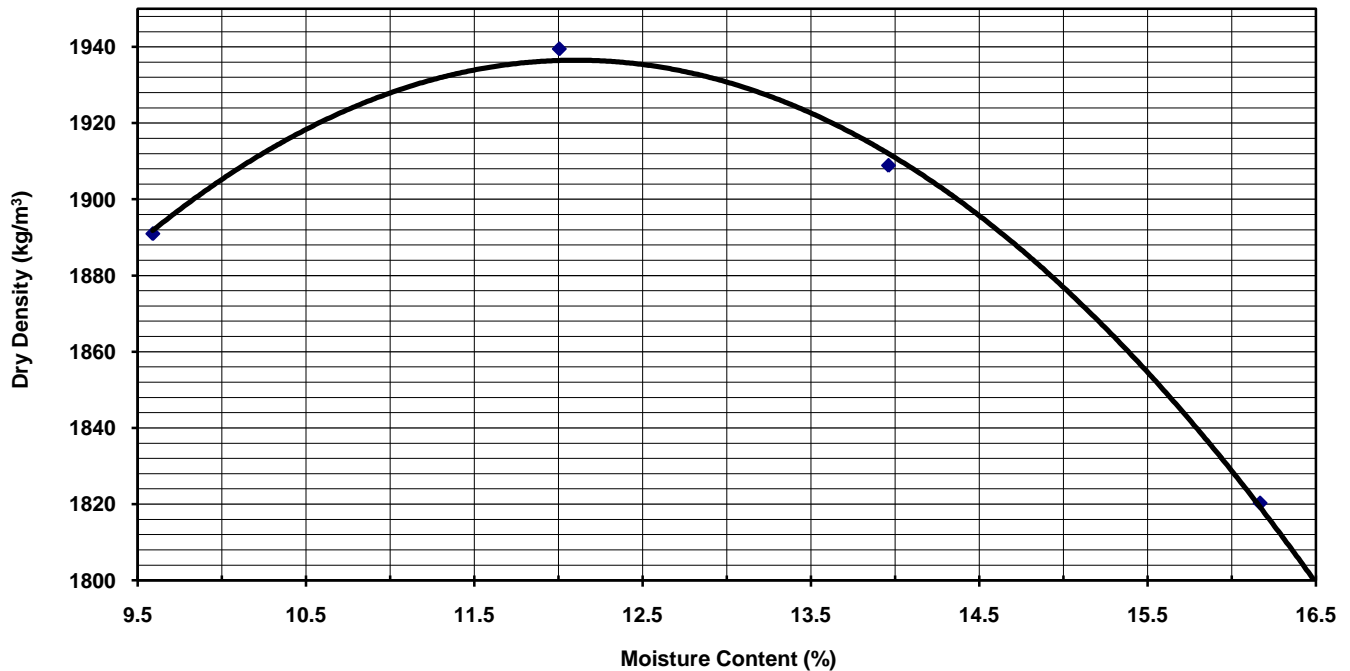
Date Sampled: 23-Aug-11

Sampled by: Adem
Received by: Max
Tested by: Max
Date Received: 23-Aug-11
Date Tested: 25-Aug-11
Log No.: 0

Test Results

Maximum Dry Density 1935 kg/m³ 120.8 pcf
 Optimum Moisture Content 12.0 %

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|---|---|---|
| Dry Density (kg / m3) | 1891 | 1939 | 1909 | 1820 | | | |
| Moisture Content (%) | 9.6 | 12.0 | 14.0 | 16.2 | | | |



PROJECT

WINDSOR ESSEX PARKWAY

TITLE

STANDARD PROCTOR DENSITY CURVE

DATE

Aug 2012

JOB NO

SW8801.1004.101

FIGURE NO. C.55

STANDARD PROCTOR DENSITY CURVE LS 706

Project No.: SW8801.1004.101
Client Name: HMM
Project Name: Windsor Essex Parkway
Soil Description: Grey Silty Clay
Sample Location: TP15 @ 10m
Report Date: 07-Aug-12

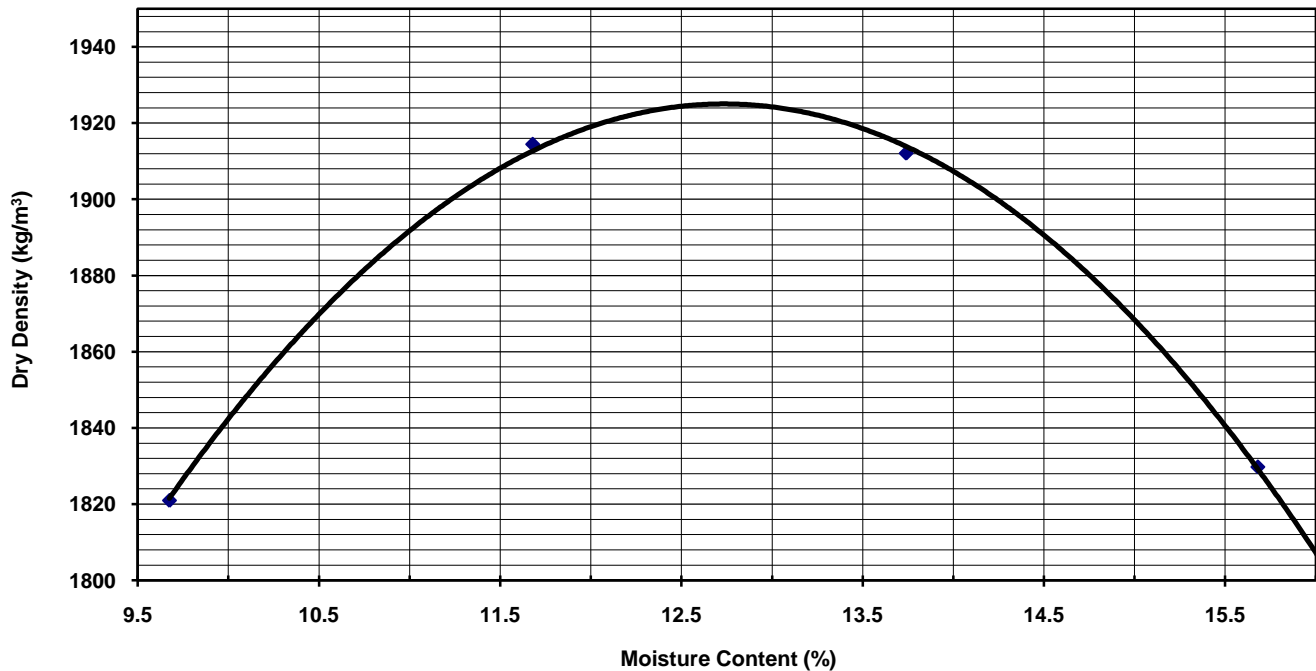
Date Sampled: 23-Aug-11

Sampled by: Adem
Received by: Max
Tested by: Max
Date Received: 23-Aug-11
Date Tested: 30-Aug-11
Log No.: 0

Test Results

Maximum Dry Density 1925 kg/m³ 120.2 pcf
 Optimum Moisture Content 12.7 %

| Trial Number | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|-----------------------|------|------|------|------|---|---|---|
| Dry Density (kg / m3) | 1821 | 1914 | 1912 | 1830 | | | |
| Moisture Content (%) | 9.7 | 11.7 | 13.7 | 15.7 | | | |



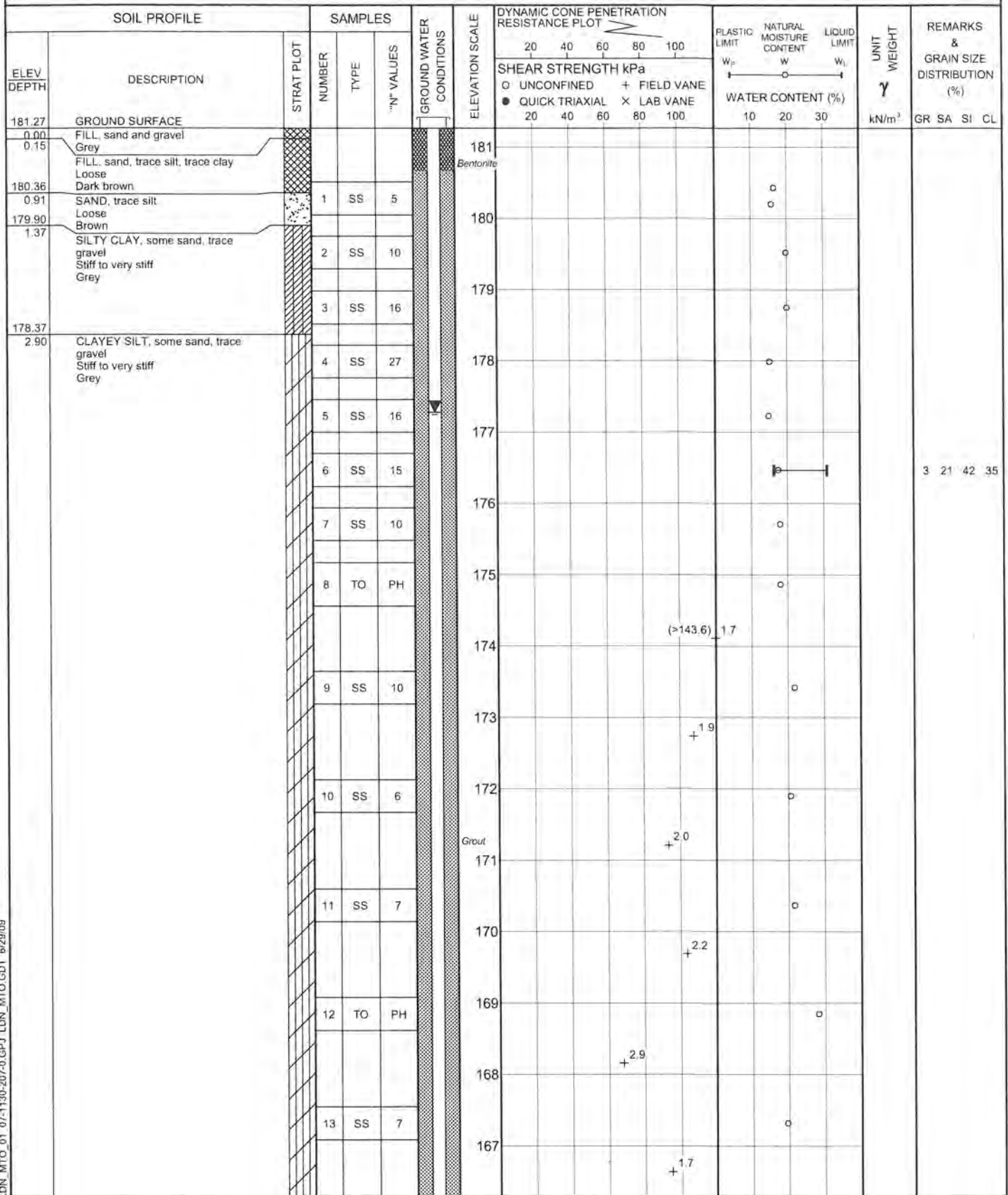
Appendix D Previous Investigations – Borehole and CPT Logs

Project: Windsor-Essex Parkway
Document: Geotechnical Investigation and Design Report –
Permanent Cuts - Phase I (Station 10+070L to Station 10+900T)
Doc No.: 285380-04-119-0029 (Geocres No. 40J3-13)

Date: August/2012
Rev: 0
Page No.: Appendix D

Station 14+700W to Station 10+400L (Soil Profile #9)

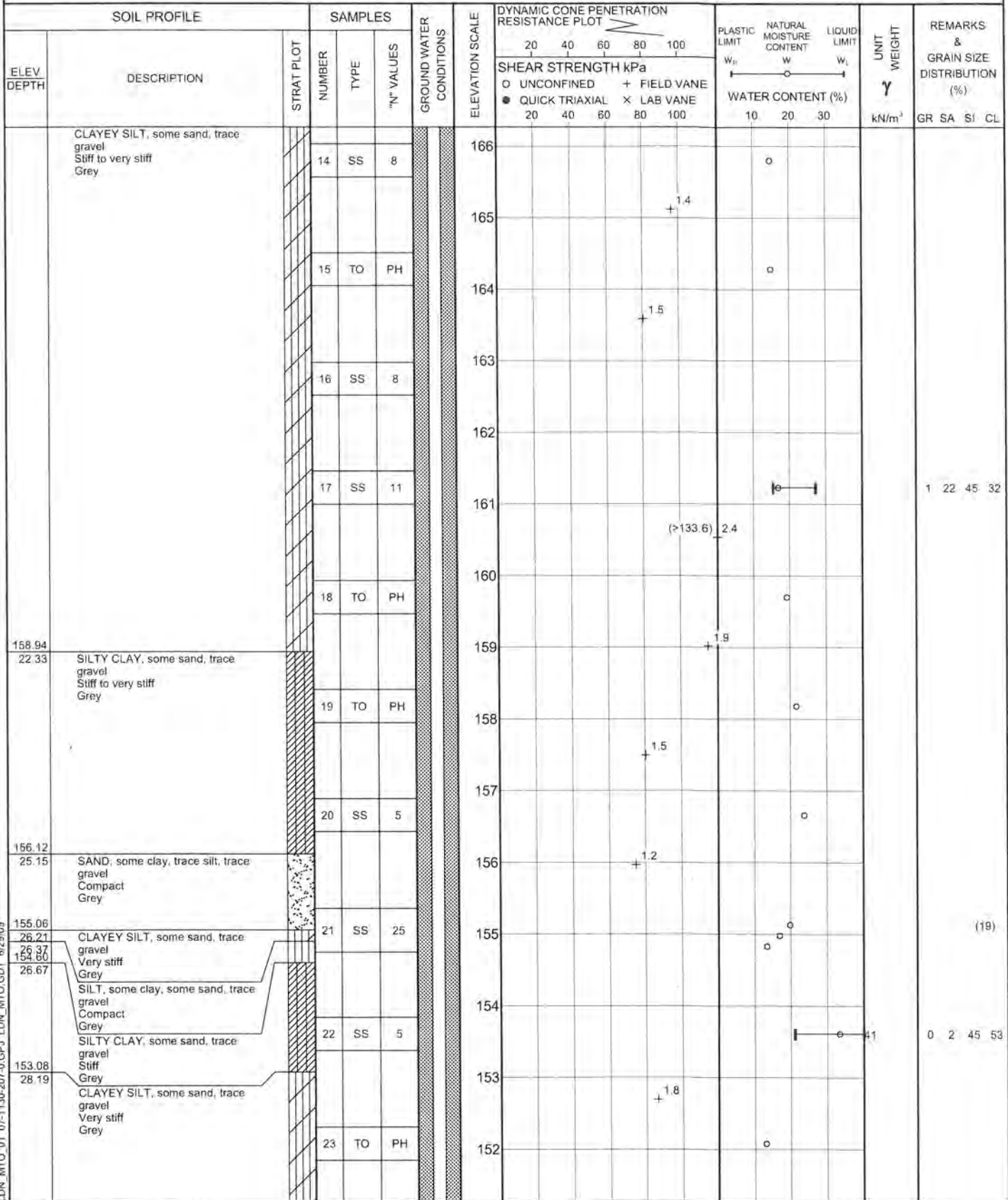
PROJECT 07-1130-207-0 **RECORD OF BOREHOLE No 127** 1 OF 4 **METRIC**
W.P. LOCATION N 4679370.9, E 332251.6 ORIGINATED BY SM
DIST WEST HWY 401/3 BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC COMPILED BY BRS
DATUM GEODETIC DATE March 11, 2008 - March 13, 2008 CHECKED BY *SLF*



Continued Next Page

+ 3, X 3. Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

| | | | | | |
|-----------------------|---------------|---|--|-----------------------|---------------|
| PROJECT 07-1130-207-0 | | RECORD OF BOREHOLE No 127 | | 2 OF 4 | METRIC |
| W.P. | LOCATION | N 4679370.9, E 332251.6 | | ORIGINATED BY SM | |
| DIST WEST HWY 401/3 | BOREHOLE TYPE | POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC | | COMPILED BY BRS | |
| DATUM GEODETIC | DATE | March 11, 2008 - March 13, 2008 | | CHECKED BY <i>SJB</i> | |



LDN_MTO_01 07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

Continued Next Page

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

| PROJECT 07-1130-207-0 | | RECORD OF BOREHOLE No 127 | | 3 OF 4 | | METRIC | | | | | | |
|---|--|---|---------|-----------------------|-------------------------|-----------------|--|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|
| W.P. _____ | | LOCATION N 4679370.9 E 332251.6 | | ORIGINATED BY SM | | | | | | | | |
| DIST WEST HWY 401/3 | | BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC | | COMPILED BY BRS | | | | | | | | |
| DATUM GEODETIC | | DATE March 11, 2008 - March 13, 2008 | | CHECKED BY <i>SJB</i> | | | | | | | | |
| SOIL PROFILE | | | SAMPLES | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _l | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
| ELEV. DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | | | | | | | | |
| 150.54 | CLAYEY SILT, some sand, trace gravel Very stiff Grey | | 24 | SS | 163 | | | | | | | (39) |
| 30.73 | SANDY SILT, trace clay, trace gravel, with cobbles Very dense Grey | | 25 | SS | 100/50mm | | | | | | | |
| 148.47 | DOLOSTONE/LIMESTONE, fresh, medium strong, thinly laminated, fine grained, faintly porous Brown to grey (FOR DETAILED DESCRIPTIONS REFER TO RECORD OF DRILLHOLE) | | 26 | NQ RC | | | | | | | | |
| 32.80 | | | 27 | NQ RC | | | | | | | | |
| 145.16 | | | 28 | NQ RC | | | | | | | | UC |
| 36.11 | END OF BOREHOLE | | | | | | | | | | | |
| <p>Borehole dry during drilling between March 11 and 13, 2008.</p> <p>Water level measured in deep piezometer at elev. 177.74m on March 20, 2008.</p> <p>Water level measured in deep piezometer at elev. 178.27m on July 22, 2008.</p> <p>Water level measured in deep piezometer at elev. 178.12m on August 11, 2008.</p> <p>Water level measured in deep piezometer at elev. 177.87m on September 19, 2008.</p> <p>Water level measured in deep piezometer at elev. 177.74m on November 11, 2008.</p> <p>Water level measured in deep piezometer at elev. 177.28m on January 28, 2009.</p> | | | | | | | | | | | | |

LDN_MTO_01_07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

PROJECT: 07-1130-207-0

RECORD OF DRILLHOLE: 127

SHEET 4 OF 4

LOCATION: N 4679370.9 ; E 332251.6

DRILLING DATE: March 11, 2008 - March 13, 2008

DATUM: GEODETIC

INCLINATION: -90° AZIMUTH: —

DRILL RIG: MUD ROTARY WITH HQ TRICONE, NQRC

DRILLING CONTRACTOR: AARDVARK DRILLING INC

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. | RUN No. | PENETRATION RATE (mm/min) | COLOUR % RETURN | FLUSH | ELEVATION | JN - Joint FLT - Fault SHR - Shear VN - Vein CJ - Conjugate BD - Bedding FO - Foliation CO - Contact OR - Orthogonal CL - Cleavage PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular PO - Polished K - Slickensided SM - Smooth Ro - Rough Br - Broken Rock NOTE: For additional abbreviations refer to list of abbreviations & symbols | | | | | | | | | | DIAMETRAL POINT LOAD INDEX (MPa) | NOTES WATER LEVELS INSTRUMENTATION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------|-----------------|-------------|--------------|-----------------|---------|------------------------------|--------------------|-------|-----------|--|--|-------------|---------------------------|--------------------|--|--|-----------------------|---------------------------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | DEPTH (m) | | | | | | RECOVERY | | R Q D. % | FRACT INDEX PER 0.3 | DISCONTINUITY DATA | | HYDRAULIC CONDUCTIVITY k. cm/sec | DIP w/11 CORE AXIS | TYPE AND SURFACE DESCRIPTION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | TOTAL CORE % | | | | | | SOLID CORE % | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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RECORD OF BOREHOLE No 129

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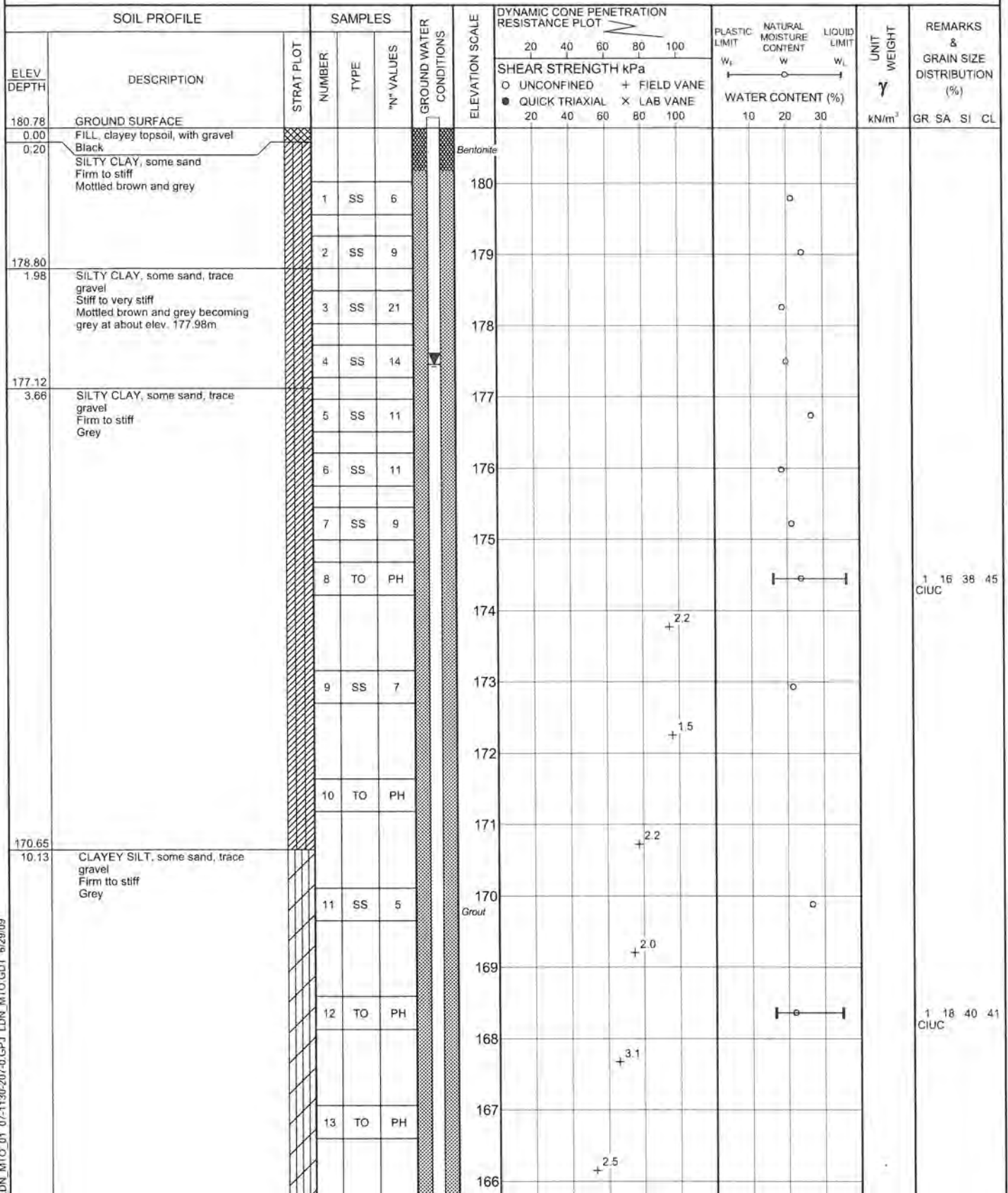
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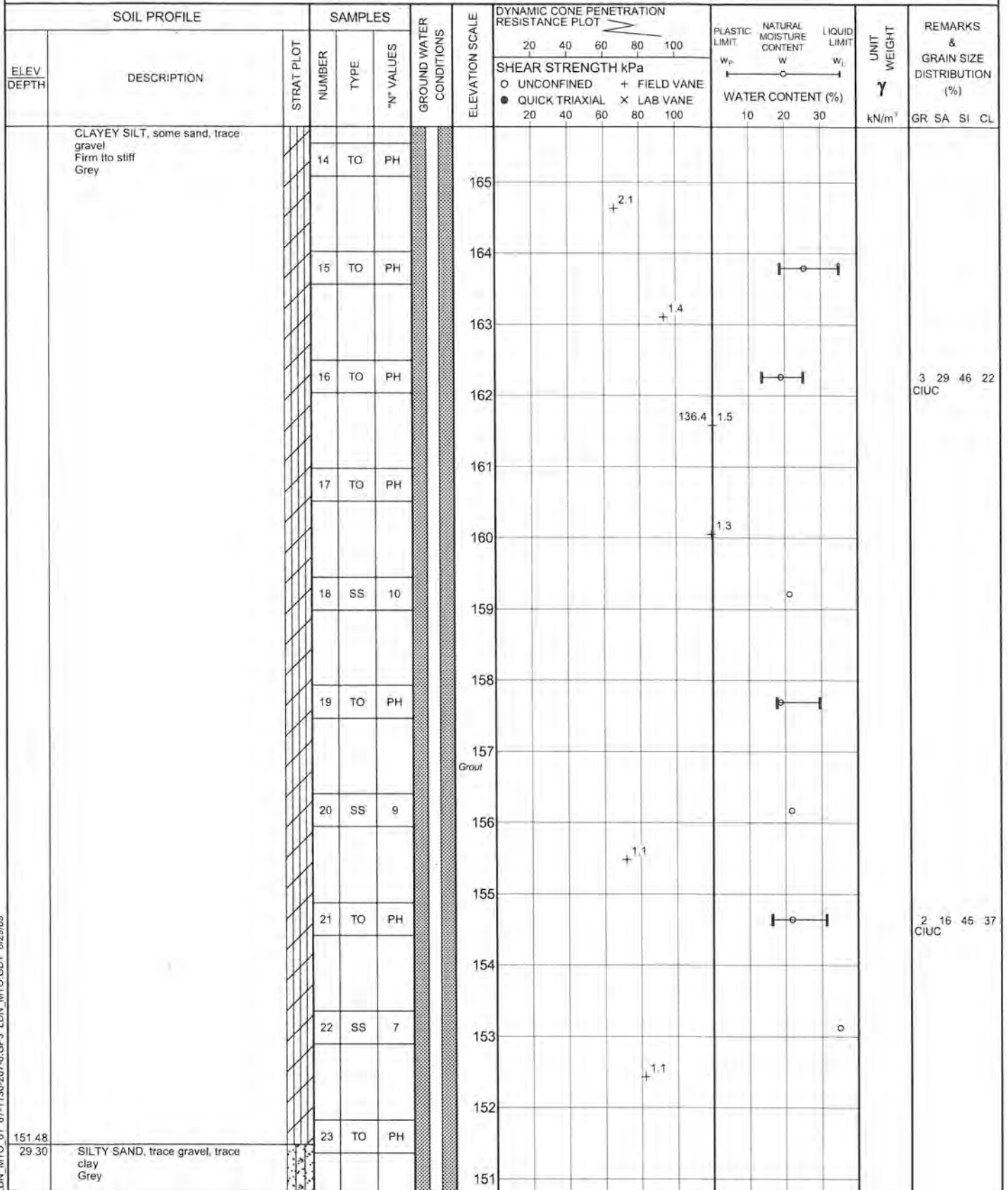
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COMPILED BY BRS

DATUM GEODETIC

DATE March 4, 2008 - March 10, 2008

CHECKED BY *SSB*



Continued Next Page

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

LDN MTO_01 07-1130-207-0.GPJ LDN_MTO.GDT 6/23/09

RECORD OF BOREHOLE No 129

3 OF 4

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4679625.1 : E 332109.7

ORIGINATED BY LZ/CC/MA/SM

DIST WEST HWY 401/3

BOREHOLE TYPE

POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

COMPILED BY BRS

DATUM GEODETIC

DATE

March 4, 2008 - March 10, 2008

CHECKED BY **SJB**

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|--------------|--|-------------|---------|-------|------------|-------------------------|------------------------|--|--|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|
| ELEV. DEPTH | DESCRIPTION | STRAT. PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE | | | | | | |
| | | | | | | | | ● QUICK TRIAXIAL x LAB VANE | | | | | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | |
| | | | | | | | | | | 10 20 30 | | | | |
| 150.55 | | | | | | | | | | | | | | |
| 30.23 | SAND AND GRAVEL, medium to coarse, trace silt Compact to very dense Grey | | 24 | SS | 21 | | 150 | | | | | | | |
| | | | | | | | Bentonite | | | | | | | |
| | | | | | | | 149 | | | | | | | |
| | | | 25 | SS | 125 | | Screen | | | | | | | |
| | | | | | | | 148 | | | | | | | |
| 147.88 | DOLOSTONE/LIMESTONE, fresh, medium strong, thinly laminated, very fine grained, faintly porous Grey to brown | | 26 | SS | 100 | | Bedrock soil interface | | | | | | | |
| 32.90 | (FOR DETAILED DESCRIPTIONS REFER TO RECORD OF DRILLHOLE) | | 27 | NQ RC | 120mm | | 147 | 0 | | | | | | |
| | | | 28 | NQ RC | | | 146 | 94 | | | | | | |
| | | | 29 | NQ RC | | | 145 | 33 | | | | | | |
| | | | 30 | NQ RC | | | 144 | 174 | | | | | | |
| 143.78 | END OF BOREHOLE | | | | | | | | | | | | | |
| 37.00 | Borehole dry during drilling between March 4 and 10, 2008. Water level measured in deep piezometer at elev. 178.50m on July 22, 2008. Water level measured in deep piezometer at elev. 177.88m on August 11, 2008. Water level measured in deep piezometer at elev. 177.48m on September 19, 2008. Water level measured in deep piezometer at elev. 177.57m on November 11, 2008. Water level measured in deep piezometer at elev. 177.46m on January 28, 2009. | | | | | | | | | | | | | |

LDN_MTO_01 07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

PROJECT: 07-1130-207-0
LOCATION: N 4679625.1 E 332109.7
INCLINATION: -90° AZIMUTH: —

RECORD OF DRILLHOLE: 129

SHEET 4 OF 4
DATUM: GEODETIC

DRILLING DATE: March 4, 2008 - March 10, 2008
DRILL RIG: MUD ROTARY WITH HQ TRICONE, NQRC
DRILLING CONTRACTOR: AARDVARK DRILLING INC.

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. | | RUN No. | PENETRATION RATE (m/min) | COLOUR FLUSH | % RETURN | ELEVATION | JN - Joint FLT - Fault SHR - Shear VN - Vein CJ - Conguate BD - Bedding FO - Foliation CO - Contact OR - Orthogonal CL - Cleavage PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular PO - Polished K - Slickensided SM - Smooth Ro - Rough Br - Broken Rock <small>NOTE: For additional abbreviations refer to list of abbreviations & symbols.</small> | | | | | | | | | | DIAMETRAL POINT LOAD INDEX (MPa) | NOTES WATER LEVELS INSTRUMENTATION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | DEPTH (m) | | | | | | | RECOVERY | | R Q D % | FRACT INDEX PER 0.3 | DISCONTINUITY DATA | | HYDRAULIC CONDUCTIVITY k, cm/sec | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | TOTAL CORE % | SOLID CORE % | | | DIP w.r.t. CORE AXIS | TYPE AND SURFACE DESCRIPTION | | 10 ⁻¹ | 10 ⁻² | 10 ⁻³ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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DEPTH SCALE
1:75



LOGGED: SG
CHECKED: *SG*

RECORD OF BOREHOLE No 129A

1 OF 1

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4679625.1, E 332109.7

ORIGINATED BY SM

DIST

WEST

HWY 401/3

BOREHOLE TYPE

POWER AUGER, HOLLOW STEM

COMPILED BY BRS

DATUM GEODETIC

DATE

March 4, 2008

CHECKED BY **SSB**

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|--|------------|---------|------|------------|----------------------------|-----------------|---|--|------------------------------------|-------------------------------------|-----------------------------------|---------------------|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | |
| 180.78 | SOIL CONDITIONS INFERRED FROM BOREHOLE No. 129 GROUND SURFACE | | | | | | | 20 40 60 80 100 | | | | | | |
| 0.00 | FILL, clayey topsoil, with gravel | | | | | | | 0 UNCONFINED + FIELD VANE | | | | | | |
| 0.20 | Black | | | | | | | ● QUICK TRIAXIAL × LAB VANE | | | | | | |
| | SILTY CLAY, some sand | | | | | | | 20 40 60 80 100 | | | | | | |
| | Firm to stiff | | | | | | | | | | | | | |
| | Mottled brown and grey | | | | | | | | | | | | | |
| 178.50 | SILTY CLAY, some sand, trace gravel | | | | | | | | | | | | | |
| 1.98 | Stiff to very stiff | | | | | | | | | | | | | |
| | Mottled brown and grey to grey at about elev. 177.98m | | | | | | | | | | | | | |
| 177.12 | SILTY CLAY, some sand, trace gravel | | | | | | | | | | | | | |
| 3.66 | Firm to stiff | | | | | | | | | | | | | |
| | Grey | | | | | | | | | | | | | |
| 171.18 | END OF BOREHOLE | | | | | | | | | | | | | |
| 9.60 | Water level measured in shallow piezometer at elev. 178.95m on July 22, 2008.3 | | | | | | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 178.93m on August 11, 2008. | | | | | | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 178.95m on September 19, 2008. | | | | | | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 178.84m on January 28, 2009. | | | | | | | | | | | | | |

LDN MTO 01 07-1130-207-0.GPJ LDN MTO GDT 6/29/09

| | | | | | |
|-----------------------------------|--|--|--|-------------------------|--|
| PROJECT <u>07-1130-207-0</u> | | RECORD OF BOREHOLE No CPT-128 | | 1 OF 1 METRIC | |
| W.P. _____ | | LOCATION <u>N 4679490 6 :E 332200.8</u> | | ORIGINATED BY <u>CC</u> | |
| DIST <u>WEST</u> HWY <u>401/3</u> | | BOREHOLE TYPE <u>POWER AUGER, SOLID STEM</u> | | COMPILED BY <u>SJL</u> | |
| DATUM <u>GEODETIC</u> | | DATE <u>September 5, 2008</u> | | CHECKED BY <u>SJB</u> | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 | 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 | | | | | | | | |
| 180.87 | GROUND SURFACE | | | | | | | | | | | | |
| 0.00 | FILL, silty sand, trace gravel, trace organics with clayey silt Compact Brown | | 1 | SS | 10 | | | | | | | | |
| 180.26 | CLAYEY SILT, trace sand, trace gravel Firm to very stiff Mottled brown and grey | | 2 | SS | 7 | | | | | | | | |
| 0.61 | | | 3 | SS | 17 | | | | | | | | |
| 179.04 | END OF BOREHOLE | | | | | | | | | | | | |
| 1.83 | Water level in borehole at about elev. 179.7m during drilling on September 5, 2008. | | | | | | | | | | | | |

LDN-MTO-01 07-1130-207-0.GPJ LDN-MTO-GDT 8/29/09

PROJECT 07-1130-207-0 RECORD OF BOREHOLE No CPT-130 1 OF 1 METRIC

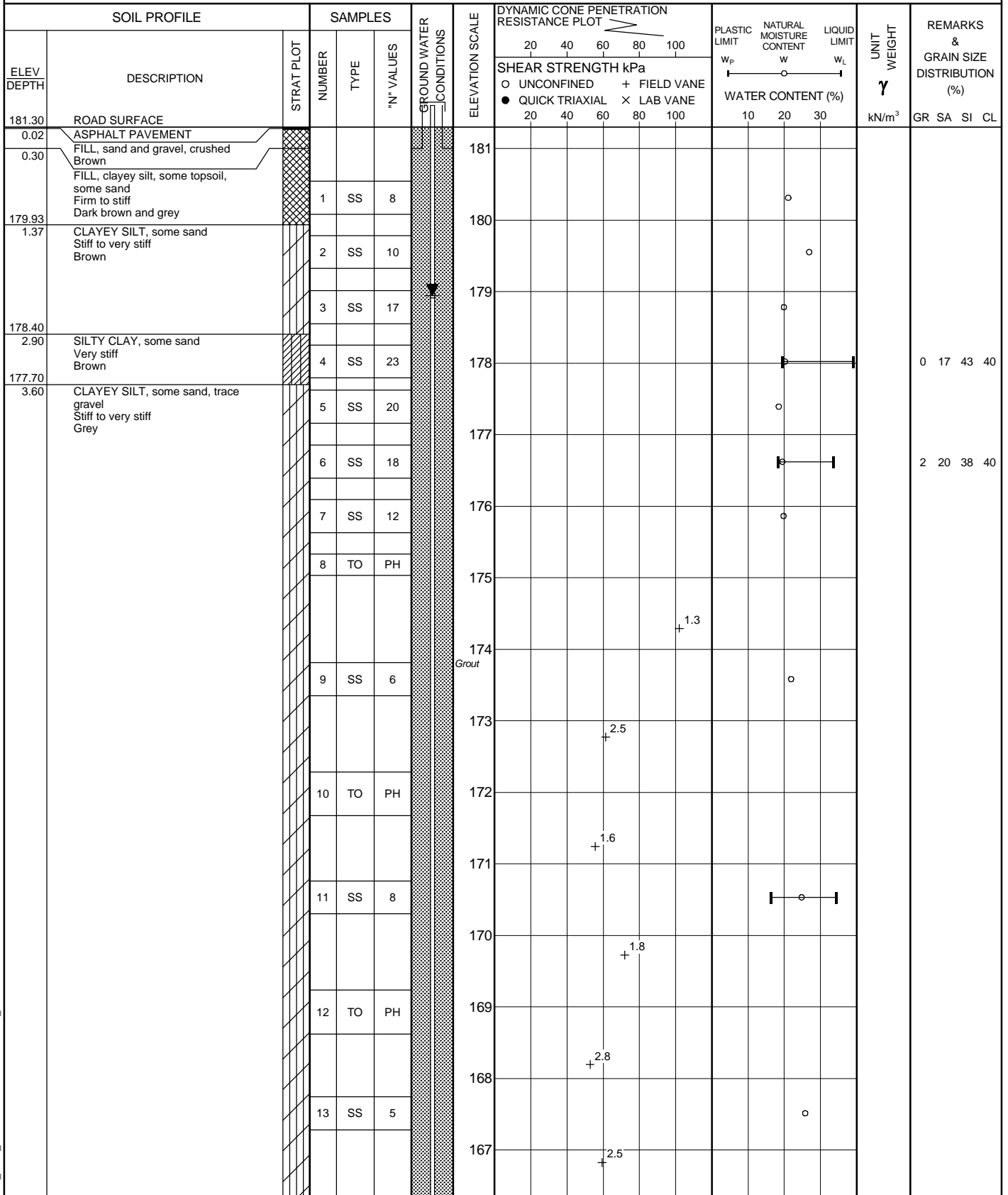
W.P. LOCATION N 4679821.8 :E 332036.1 ORIGINATED BY CC

DIST WEST HWY 401/3 BOREHOLE TYPE POWER AUGER, SOLID STEM COMPILED BY SJL

DATUM GEODETIC DATE September 4, 2008 CHECKED BY SJB

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT w _p | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|--|------------|---------|------|------------|-------------------------|-----------------|--|-----------------|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 40 60 80 100 | 20 40 60 80 100 | | | | | |
| 180.82 | GROUND SURFACE | | | | | | | | | | | | | |
| 0.00 | FILL, crushed sand and gravel, trace silt | | 1 | SS | 16 | | | | | | | | | |
| 180.29 | Compact Brown | | | | | | | | | | | | | |
| 0.61 | FILL, sand with slag | | 2 | SS | 14 | | 180 | | | | | | | |
| | Compact Black | | | | | | | | | | | | | |
| | CLAYEY SILT, trace sand, trace gravel | | 3 | SS | 11 | | | | | | | | | |
| 178.99 | Stiff | | | | | | 179 | | | | | | | |
| 1.83 | Mottled brown and grey | | | | | | | | | | | | | |
| | END OF BOREHOLE | | | | | | | | | | | | | |
| | Borehole dry during drilling on September 4, 2008. | | | | | | | | | | | | | |

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|-------------------------------------|--|--|--|----------------------------|---------------|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No 323 | | 1 OF 4 | METRIC |
| W.P. _____ | | LOCATION <u>N 4679521.4 ; E 332167.6</u> | | ORIGINATED BY <u>MK/MR</u> | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | | COMPILED BY <u>LMK/DMB</u> | |
| DATUM <u>GEODETIC</u> | | DATE <u>December 15, 2009 - December 17, 2009</u> | | CHECKED BY _____ | |

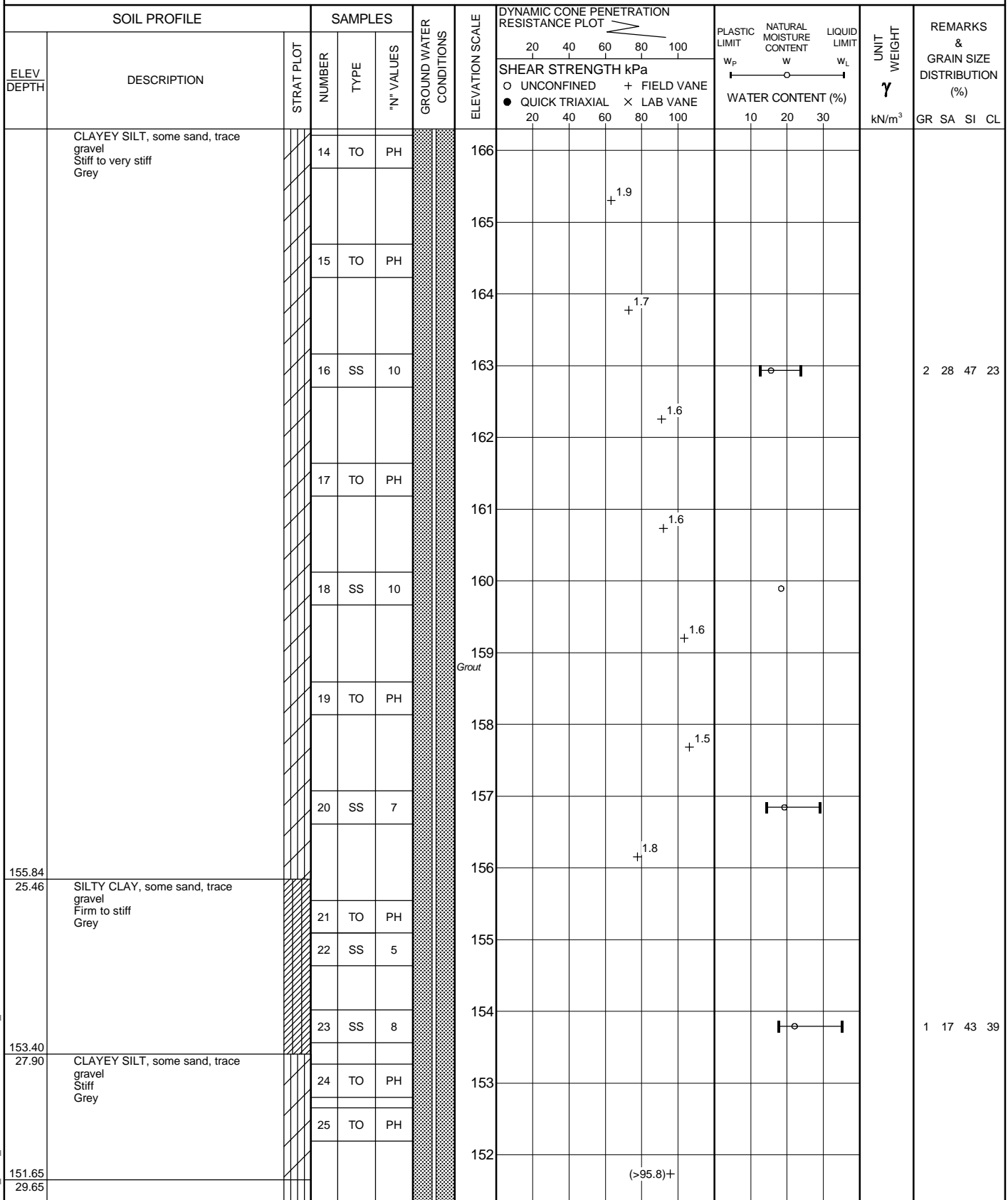


LDN_MTO_06 09-1132-0080.GPJ LDN_MTO.GDT 11/03/10

Continued Next Page

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

| | | | | | | | |
|-------------------------------------|--|--|--|----------------------------|--|---------------|--|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No 323 | | 2 OF 4 | | METRIC | |
| W.P. _____ | | LOCATION <u>N 4679521.4 ; E 332167.6</u> | | ORIGINATED BY <u>MK/MR</u> | | | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | | COMPILED BY <u>LMK/DMB</u> | | | |
| DATUM <u>GEODETIC</u> | | DATE <u>December 15, 2009 - December 17, 2009</u> | | CHECKED BY _____ | | | |



LDN_MTO_06 09-1132-0080.GPJ LDN_MTO.GDT 11/03/10

Continued Next Page

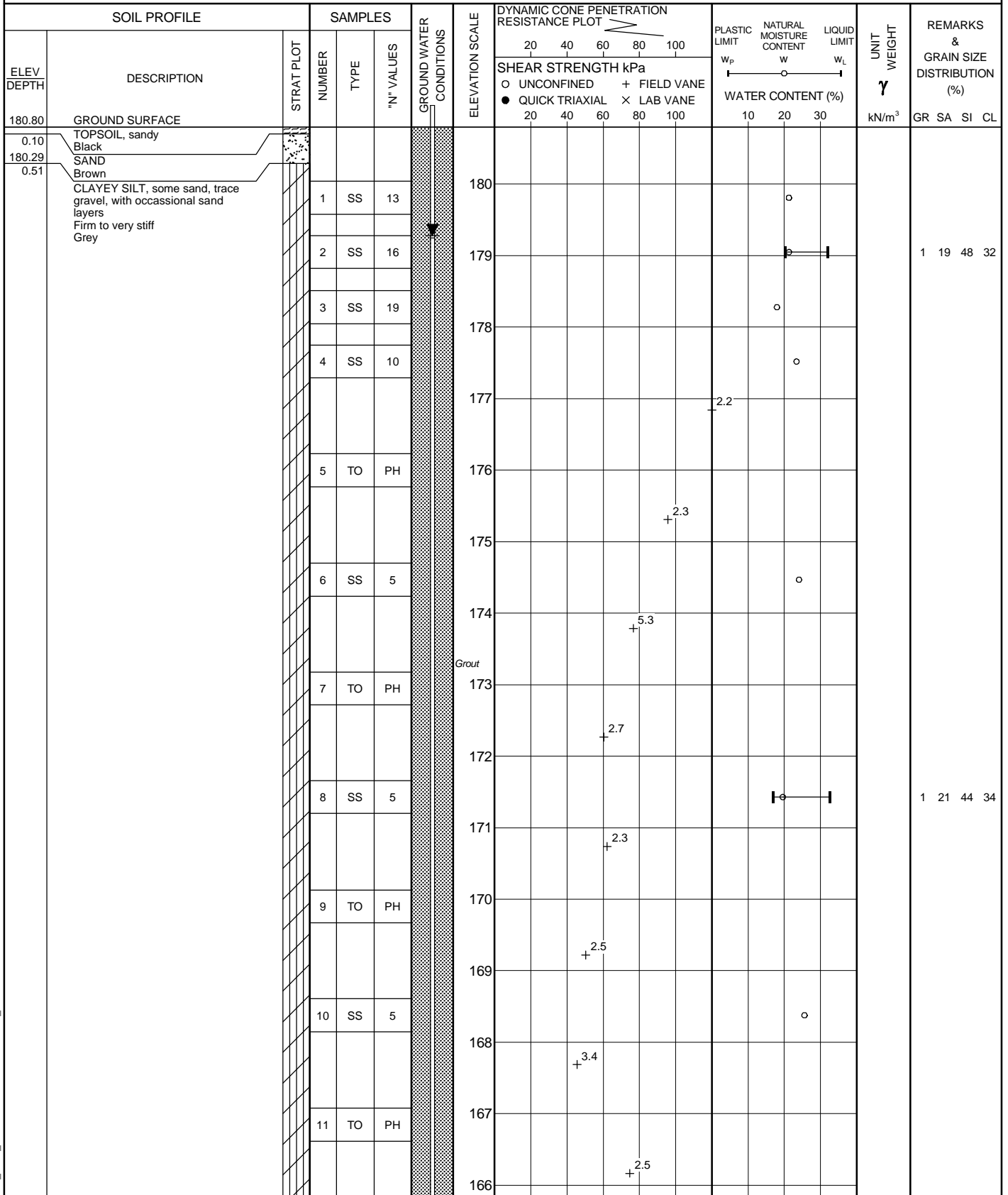
+³, ×³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

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|-------------------------------------|--|--|--|----------------------------|---------------|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No 323 | | 3 OF 4 | METRIC |
| W.P. _____ | | LOCATION <u>N 4679521.4 ; E 332167.6</u> | | ORIGINATED BY <u>MK/MR</u> | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | | COMPILED BY <u>LMK/DMB</u> | |
| DATUM <u>GEODETIC</u> | | DATE <u>December 15, 2009 - December 17, 2009</u> | | CHECKED BY _____ | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | |
|---------------|-------------|------------|---------|------|------------|----------------------------|-----------------|---|----|----|----|-----|---|---|----------------|---|---|----|----|----|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | WATER CONTENT (%) | | | | GR | SA | SI | CL |
| | | | | | | | | 20 | 40 | 60 | 80 | 100 | W _p | W | W _L | | | | | |
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LDN_MTO_06 09-1132-0080.GPJ LDN_MTO.GDT 11/03/10

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| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No 325 | | 1 OF 4 | | METRIC | |
| W.P. _____ | | LOCATION <u>N 4679787.7 ; E 331972.9</u> | | ORIGINATED BY <u>SM</u> | | | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | | COMPILED BY <u>LMK/DMB</u> | | | |
| DATUM <u>GEODETIC</u> | | DATE <u>December 16, 2009 - December 17, 2009</u> | | CHECKED BY _____ | | | |

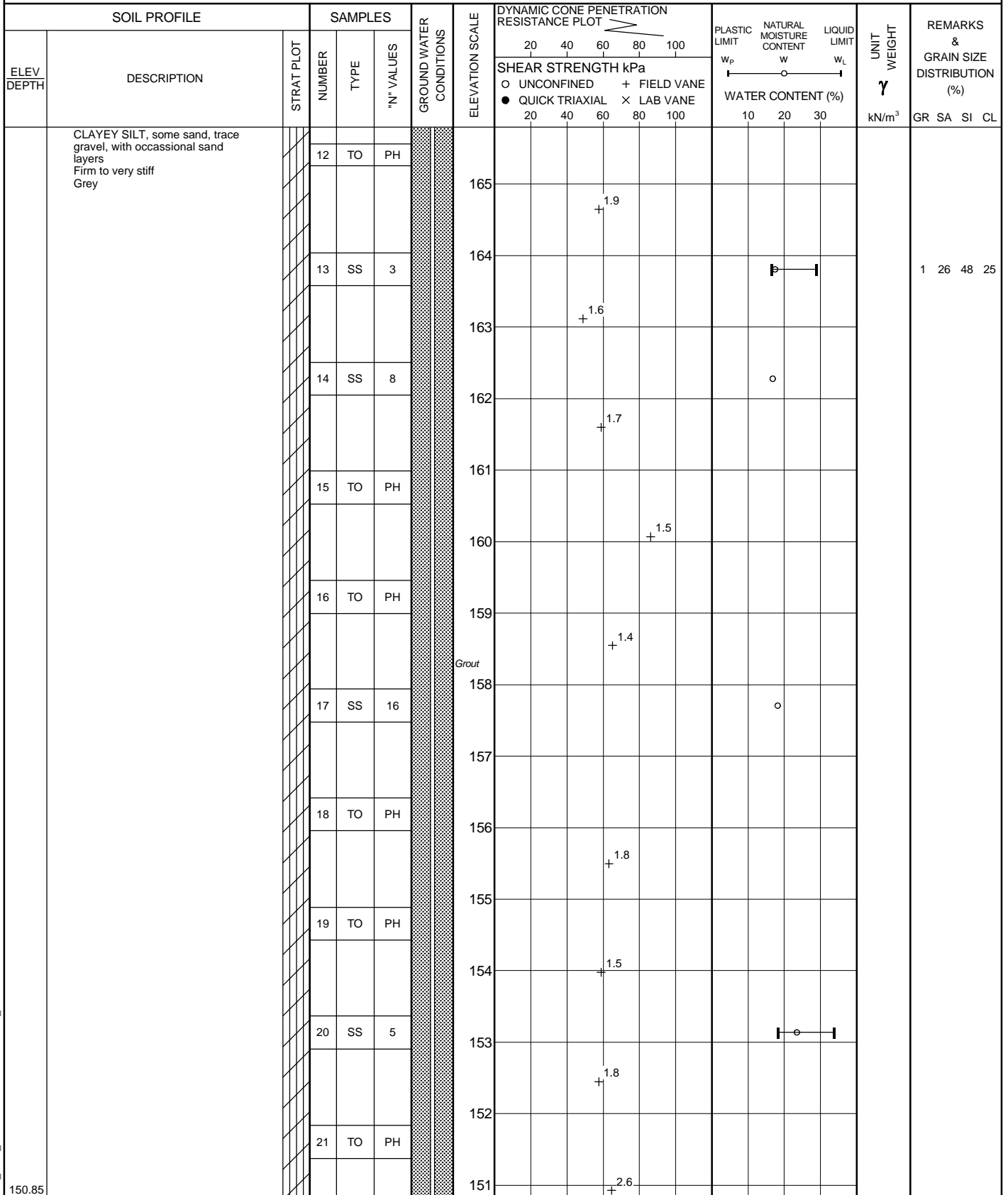


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+ 3, X 3: Numbers refer to Sensitivity O 3% STRAIN AT FAILURE

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| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No 325 | | 2 OF 4 | METRIC |
| W.P. _____ | | LOCATION <u>N 4679787.7 ; E 331972.9</u> | | ORIGINATED BY <u>SM</u> | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | | COMPILED BY <u>LMK/DMB</u> | |
| DATUM <u>GEODETIC</u> | | DATE <u>December 16, 2009 - December 17, 2009</u> | | CHECKED BY _____ | |



LDN_MTO_06 09-1132-0080.GPJ LDN_MTO.GDT 11/03/10

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| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No 325 | | 3 OF 4 | | METRIC | |
| W.P. _____ | | LOCATION <u>N 4679787.7 ; E 331972.9</u> | | ORIGINATED BY <u>SM</u> | | | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | | COMPILED BY <u>LMK/DMB</u> | | | |
| DATUM <u>GEODETIC</u> | | DATE <u>December 16, 2009 - December 17, 2009</u> | | CHECKED BY _____ | | | |

| 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 | | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | | | | | ○ UNCONFINED | | | | | | + FIELD VANE | ● QUICK TRIAXIAL | × LAB VANE |
| 29.95 | SANDY SILT, some clay, trace to some gravel Compact to very dense Grey | | | | | | | | | | | | | | | | | | | |
| | | | 22 | SS | 17 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| 148.48 | | | 23 | SS | 82/ 175mm | | | | | | | | | | | | | | | |
| 32.32 | LIMESTONE, fresh, medium strong, weakly laminated to laminated, very fine to fine grained, faintly porous Light grey to brown (FOR DETAILED DESCRIPTIONS REFER TO RECORD OF DRILLHOLE) | | 24 | NQ RC | - | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | 25 | NQ RC | - | | | | | | | | | | | | | | | |
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| | | | 26 | NQ RC | - | | | | | | | | | | | | | | | |
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| | | | 27 | NQ RC | - | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| 143.31 | | | | | | | | | | | | | | | | | | | | |
| 37.49 | END OF BOREHOLE | | | | | | | | | | | | | | | | | | | |
| | Borehole dry during drilling between December 14 and 17, 2009. | | | | | | | | | | | | | | | | | | | |
| | Water level measured at elev. 179.35 on February 24, 2010. | | | | | | | | | | | | | | | | | | | |
| | Water level measured at elev. 179.28 on January 6, 2010. | | | | | | | | | | | | | | | | | | | |

PROJECT: 09-1132-0080

RECORD OF DRILLHOLE: 325

SHEET 4 OF 4

LOCATION: N 4679787.7 ;E 331972.9

DRILLING DATE: December 16, 2009 - December 17, 2009

DATUM: GEODETIC

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: MUD ROTARY WITH HQ TRICONE, NQRC

DRILLING CONTRACTOR: AARDVARK

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. | RUN No. | PENETRATION RATE (m/min) | COLOUR % RETURN | FLUSH | ELEVATION | JN - Joint FLT - Fault SHR - Shear VN - Vein CJ - Conjugate BD - Bedding FO - Foliation CO - Contact OR - Orthogonal CL - Cleavage PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular PO - Polished K - Slickensided SM - Smooth Ro - Rough Br - Broken Rock NOTE: For additional abbreviations refer to list of abbreviations & symbols. | | | | | | | | | | HYDRAULIC CONDUCTIVITY k, cm/sec | | | DIAMETRAL POINT LOAD INDEX (MPa) | | NOTES WATER LEVELS INSTRUMENTATION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | DEPTH (m) | | | | | | RECOVERY | | R.Q.D. % | FRACT. INDEX PER 0.3 | DISCONTINUITY DATA | | TYPE AND SURFACE DESCRIPTION | 10 ⁻⁸ | 10 ⁻⁶ | 10 ⁻⁴ | 2 | 4 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | TOTAL CORE % | SOLID CORE % | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

DEPTH SCALE

1 : 75



LOGGED: SG

CHECKED:

LDN_ROCK_03 09-1132-0080-ROCK.GPJ GLDR LDN.GDT 11/03/10 DATA INPUT: LMK

| | | | | | | | |
|-------------------------------------|--|--|--|-------------------------|--|---------------|--|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No CPT-324 | | 1 OF 1 | | METRIC | |
| W.P. _____ | | LOCATION <u>N 4679664.9 ; E 332002.7</u> | | ORIGINATED BY <u>TA</u> | | | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, SOLID STEM</u> | | COMPILED BY <u>DMB</u> | | | |
| DATUM <u>GEODETIC</u> | | DATE <u>January 25, 2010</u> | | CHECKED BY _____ | | | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT γ kN/m³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|--|----|----|----|-----|---|----|----------------|--------------------------------------|---|----|----|----|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | w _p | w | w _L | | GR | SA | SI | CL |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE | | | | | | | | | | | | |
| 180.85 | GROUND SURFACE | | | | | | | 20 | 40 | 60 | 80 | 100 | | 10 | 20 | 30 | | | | |
| 0.00 | TOPSOIL, clayey Very stiff Black | | 1 | SS | 18 | | 180 | | | | | | | | | | | | | |
| 179.48 | CLAYEY SILT, some sand, trace gravel, with occasional silt partings Very stiff Brown | | 2 | SS | 18 | | 179 | | | | | | | ○ | | | | | | |
| 1.37 | | | | | | | | | | | | | | | | | | | | |
| | | | 3 | SS | 27 | | 178 | | | | | | | | ○ | | | | | |
| 177.95 | END OF BOREHOLE | | | | | | | | | | | | | | | | | | | |
| 2.90 | Borehole dry during drilling on January 25, 2010. | | | | | | | | | | | | | | | | | | | |

LDN_MTO_06 09-1132-0080.GPJ LDN_MTO.GDT 11/03/10

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-11

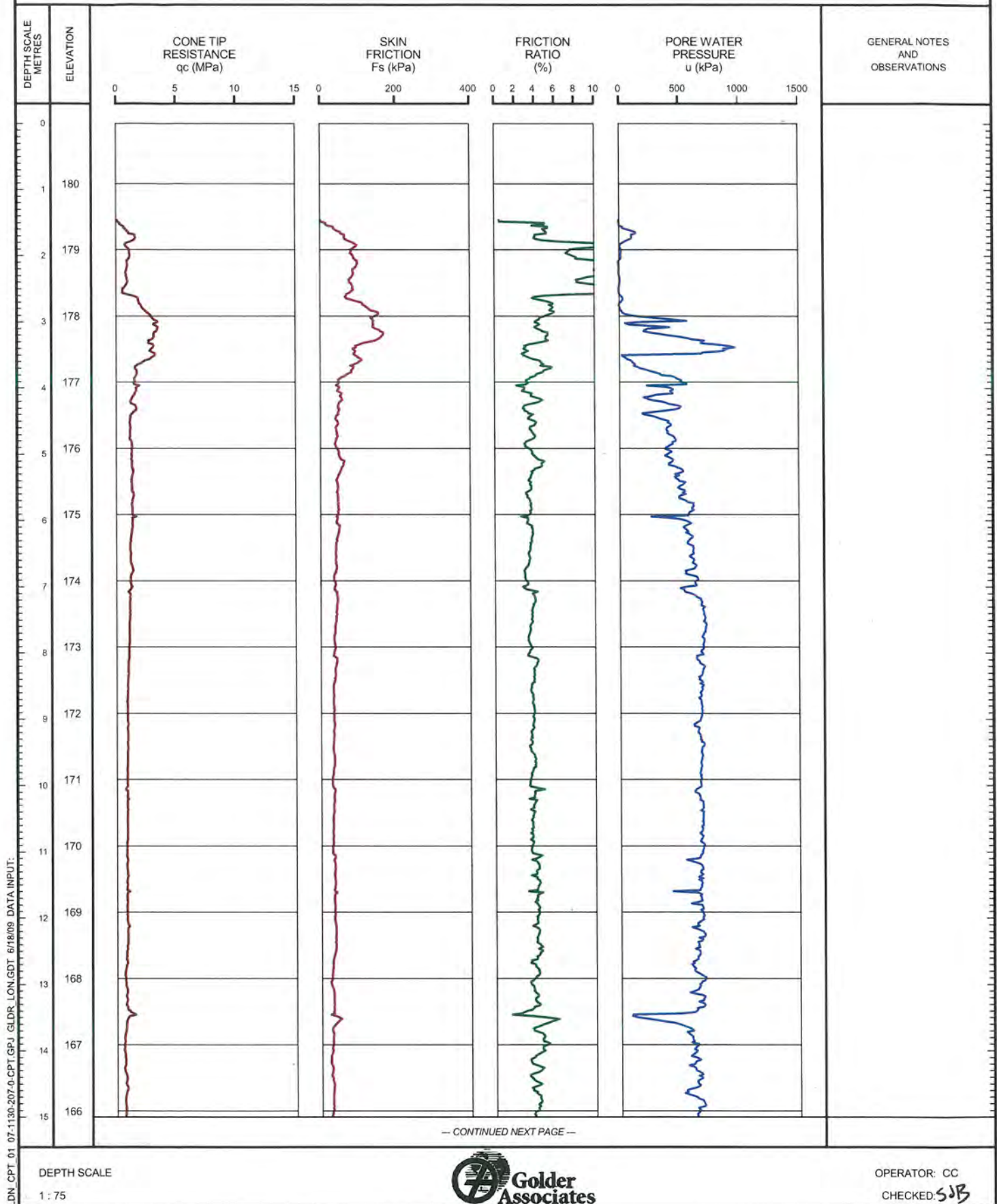
SHEET 1 OF 2

LOCATION: N 4679634.0 ; E 332110.0

TEST DATE: November 10, 2006

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 1.46m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-11

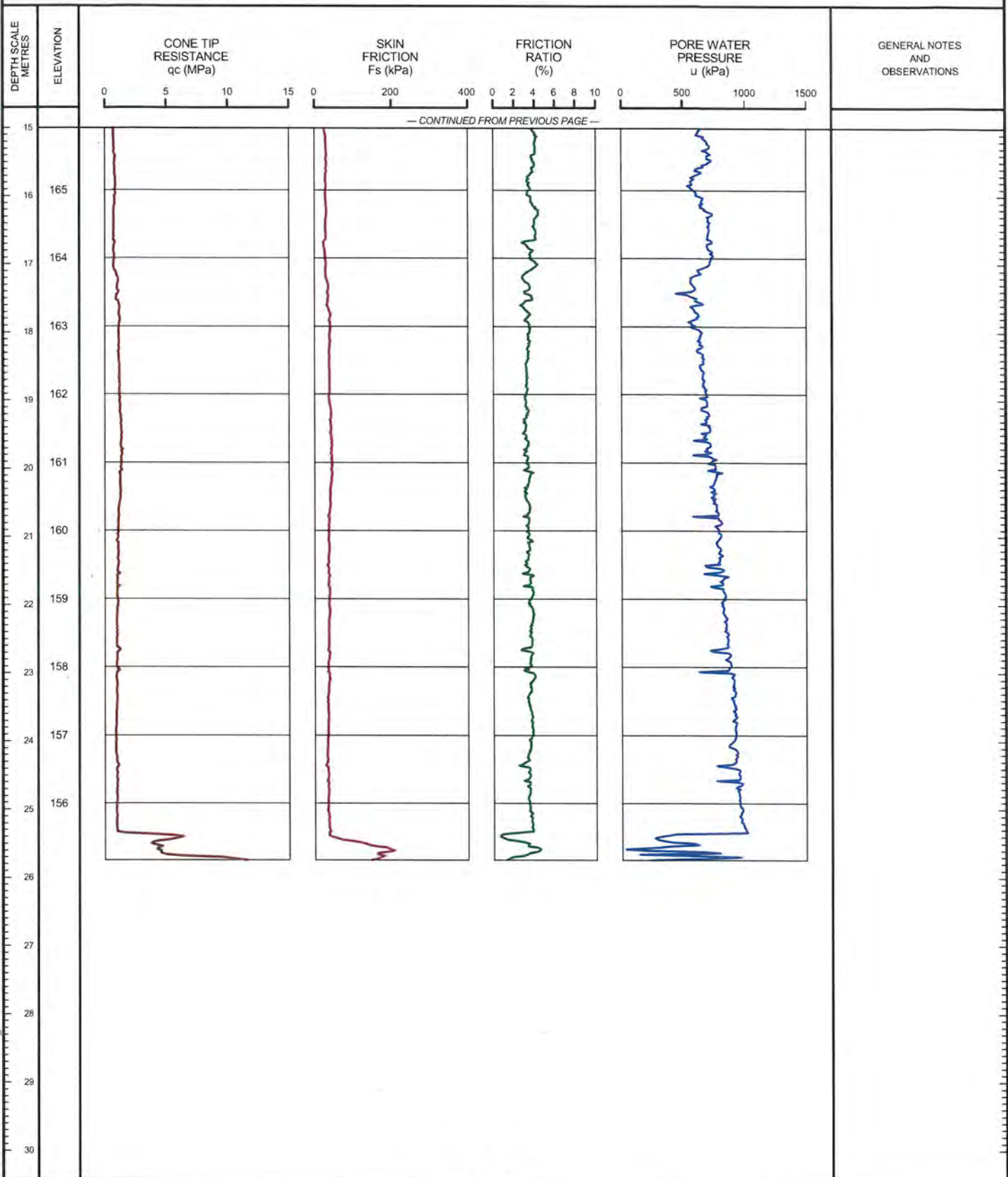
SHEET 2 OF 2

LOCATION: N 4679634.0 :E 332110.0

TEST DATE: November 10, 2006

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 1.46m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE

1 : 75



OPERATOR: CC

CHECKED: *SSB*

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-128

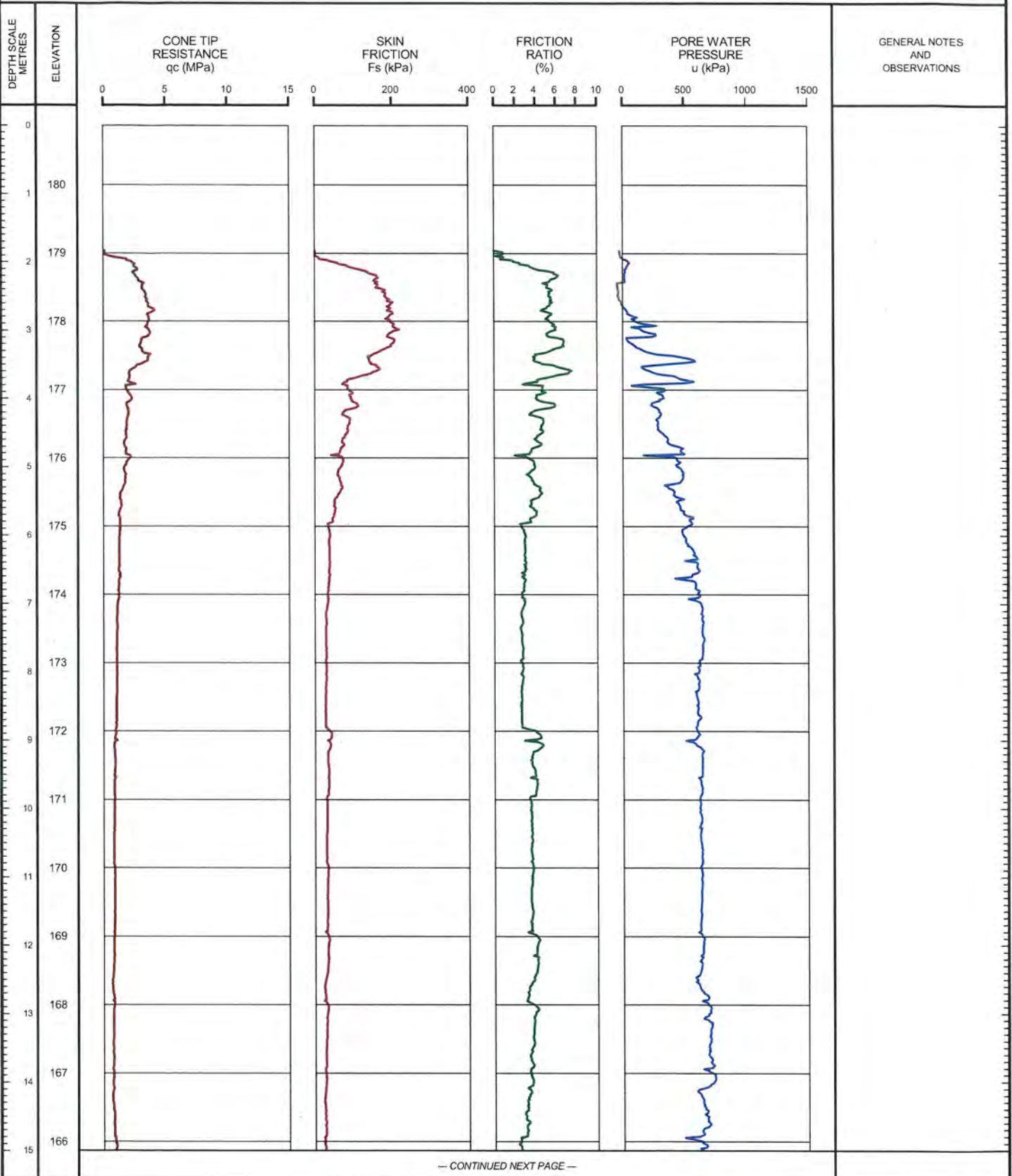
SHEET 1 OF 3

LOCATION: N 4679490.6 E 332200.8

TEST DATE: September 5, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 1.83m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LDN CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE

1 : 75



OPERATOR: CC

CHECKED: SJB

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-128

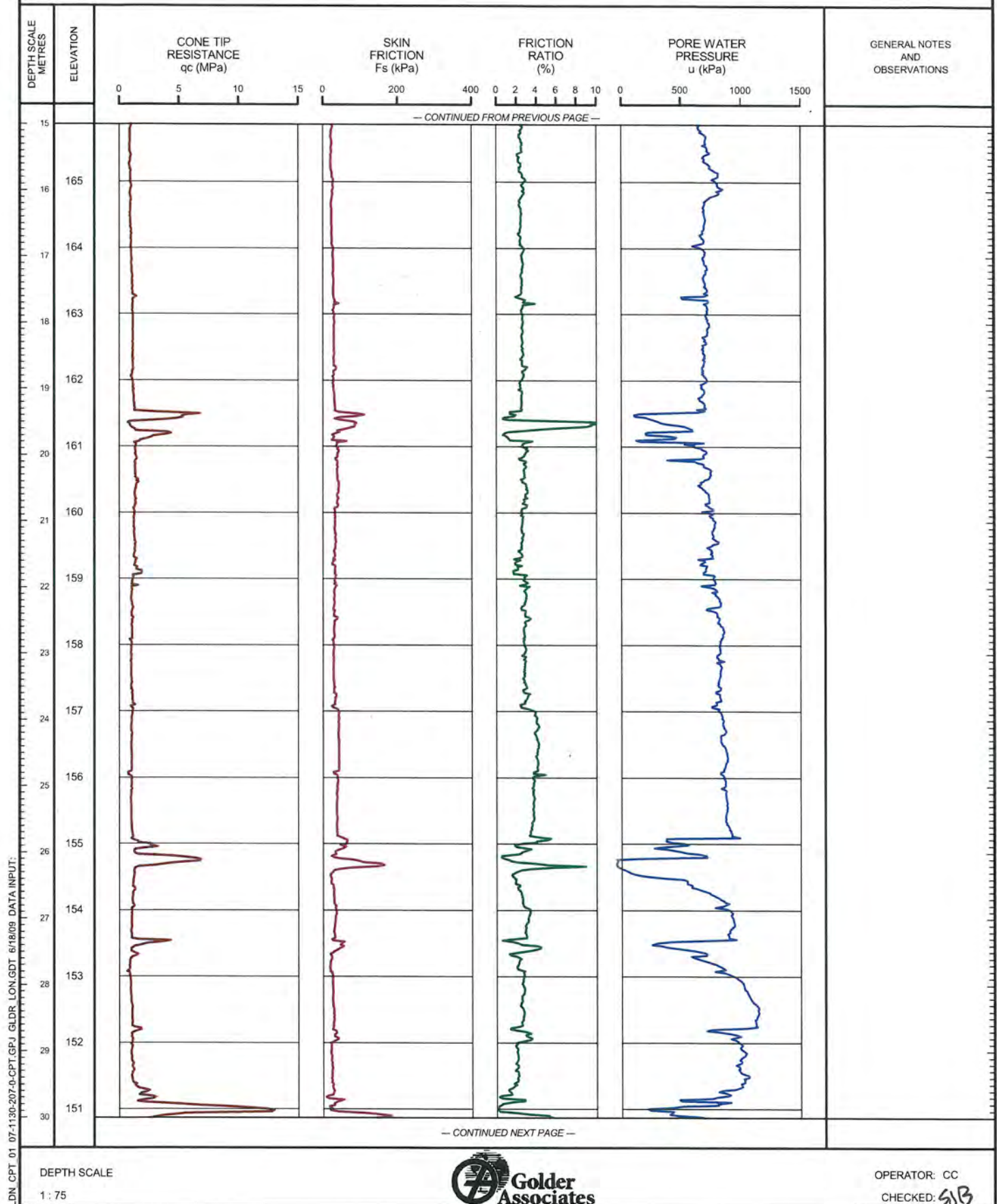
SHEET 2 OF 3

LOCATION: N 4679490.6 ; E 332200.8

TEST DATE: September 5, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 1.83m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-128

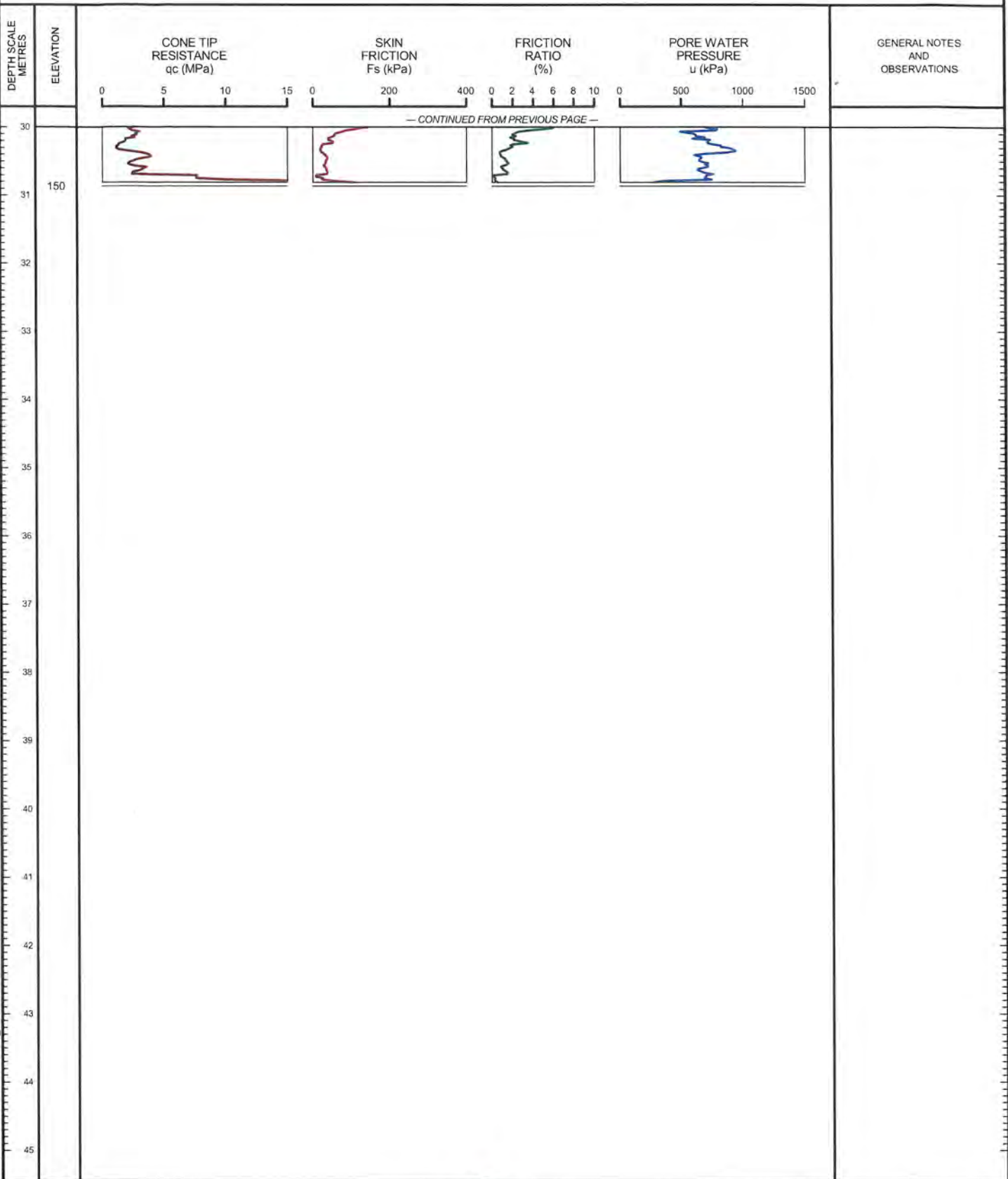
SHEET 3 OF 3

LOCATION: N 4679490.6 E 332200.8

TEST DATE: September 5, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 1.83m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LDN CPT_01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE

1 : 75



OPERATOR: CC

CHECKED: SSB

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-130

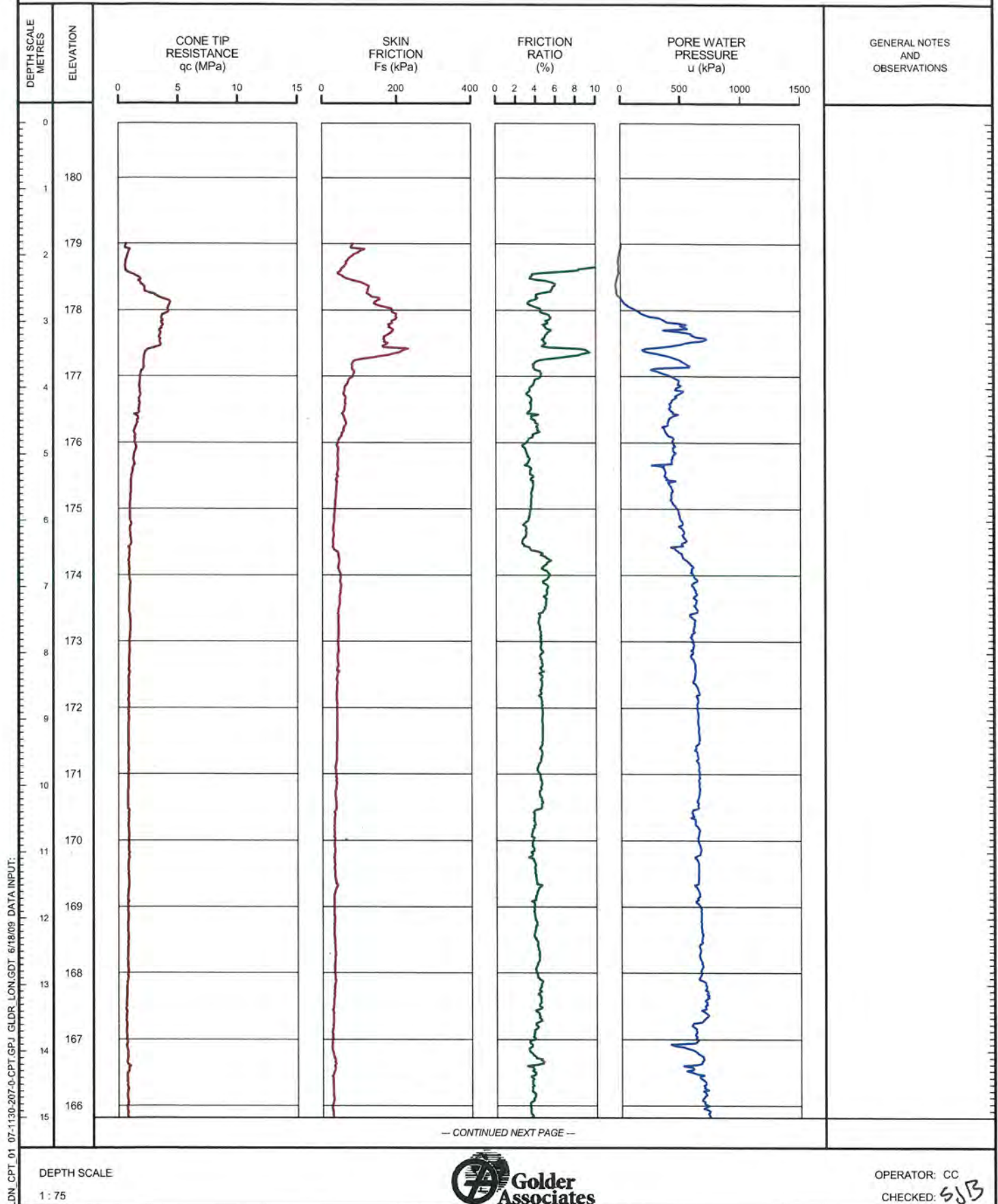
SHEET 1 OF 3

LOCATION: N 4679821.8 :E 332036.1

TEST DATE: September 4, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 1.83m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-130

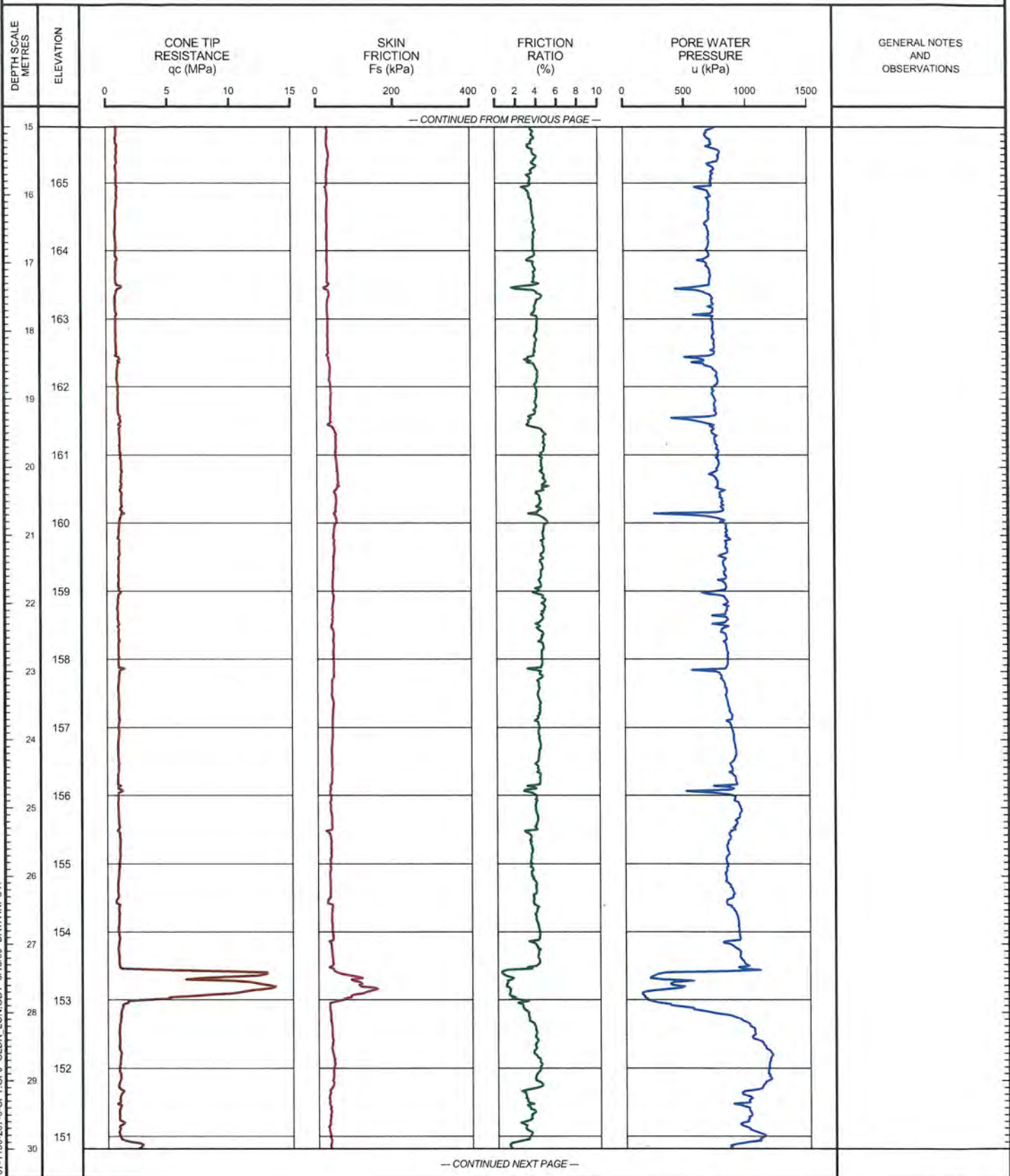
SHEET 2 OF 3

LOCATION: N 4679821.8 ; E 332036.1

TEST DATE: September 4, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 1.83m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE

1 : 75



OPERATOR: CC

CHECKED: SJB

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-130

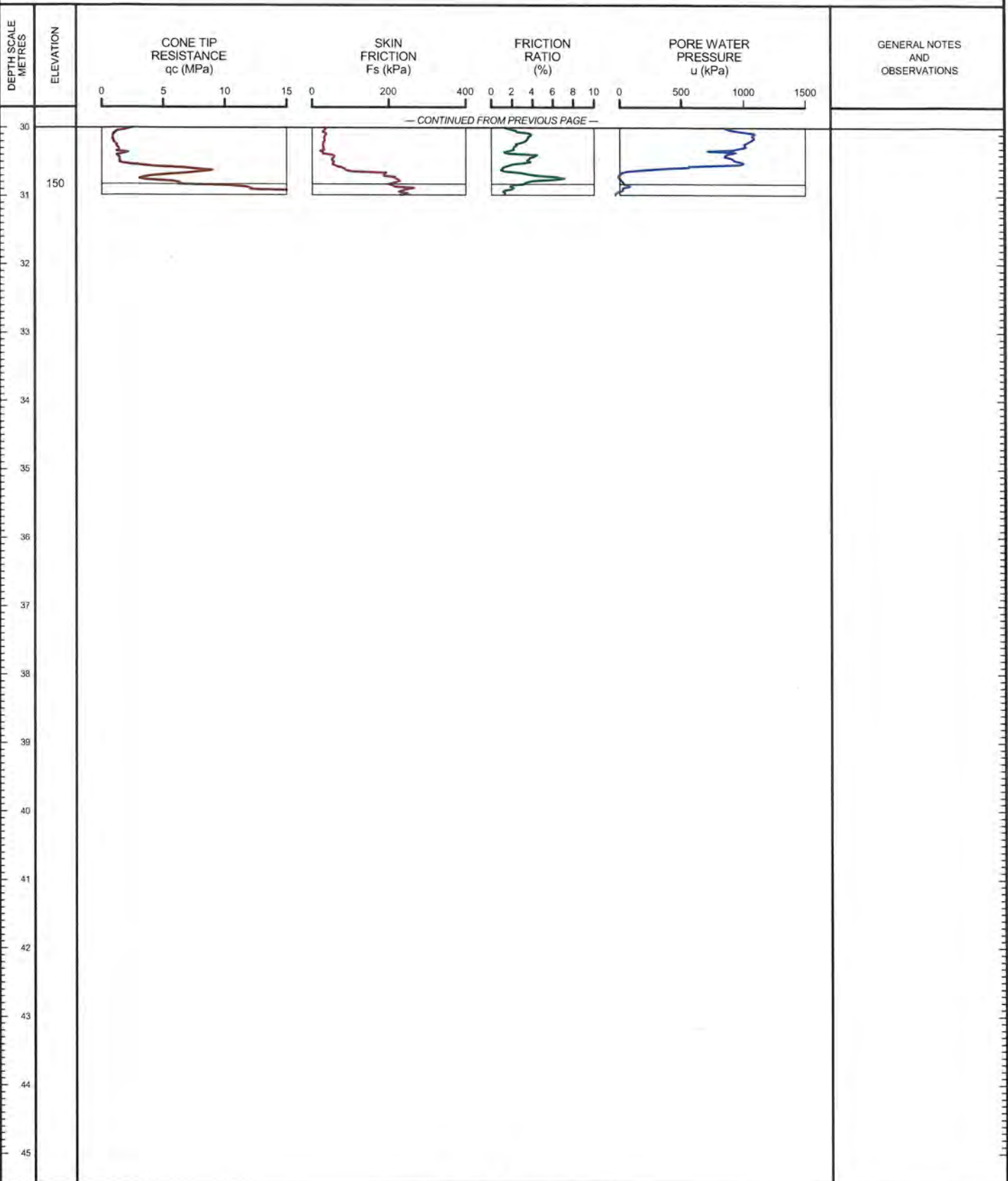
SHEET 3 OF 3

LOCATION: N 4679821.8 :E 332036.1

TEST DATE: September 4, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 1.83m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN_CPT_01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE

1 : 75



OPERATOR: CC

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-324

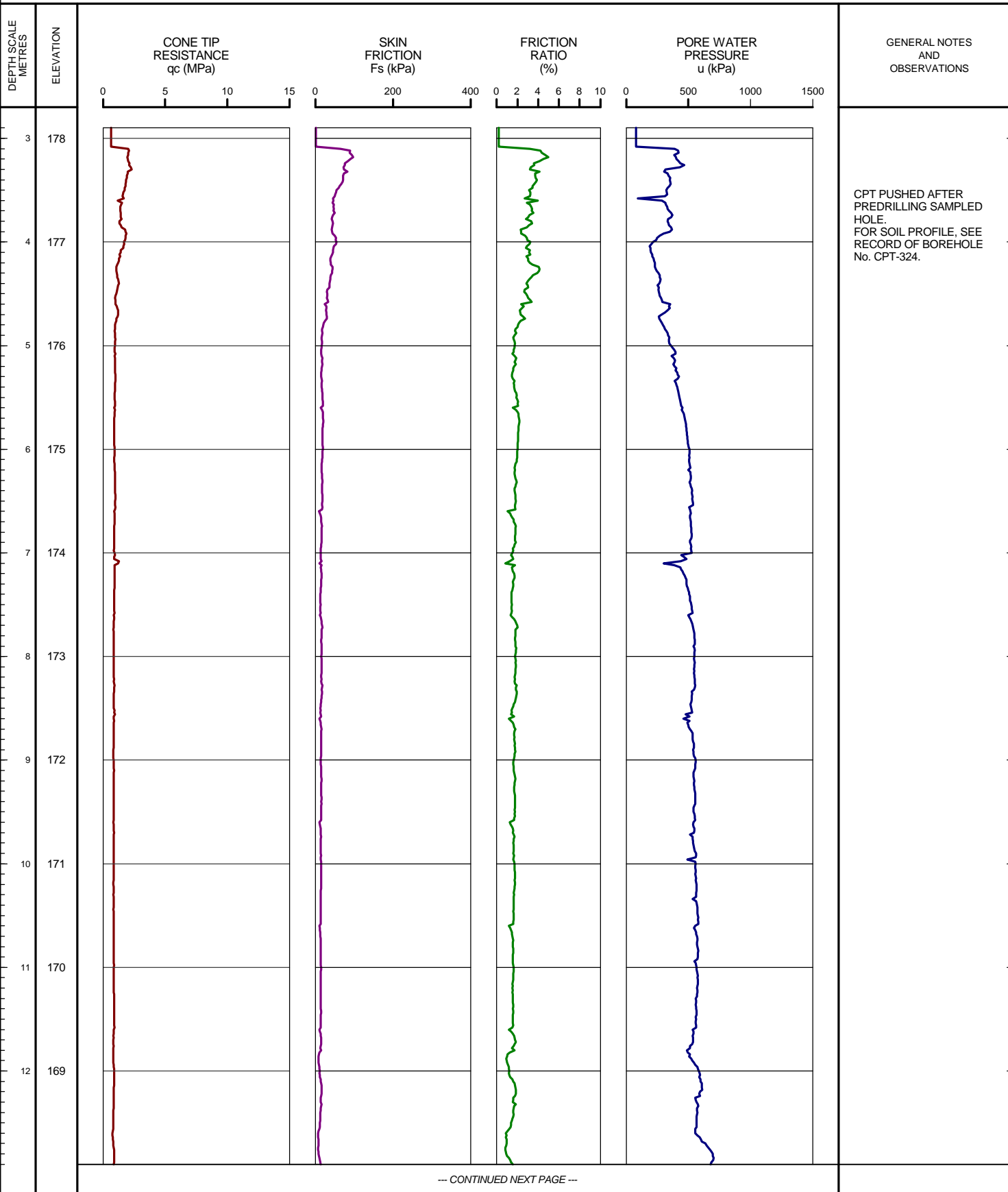
SHEET 1 OF 3

LOCATION: N 4679664.9 ;E 332002.7

TEST DATE: January 25, 2010

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 180.85m PREDRILL DEPTH: 2.90m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LDN_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-324

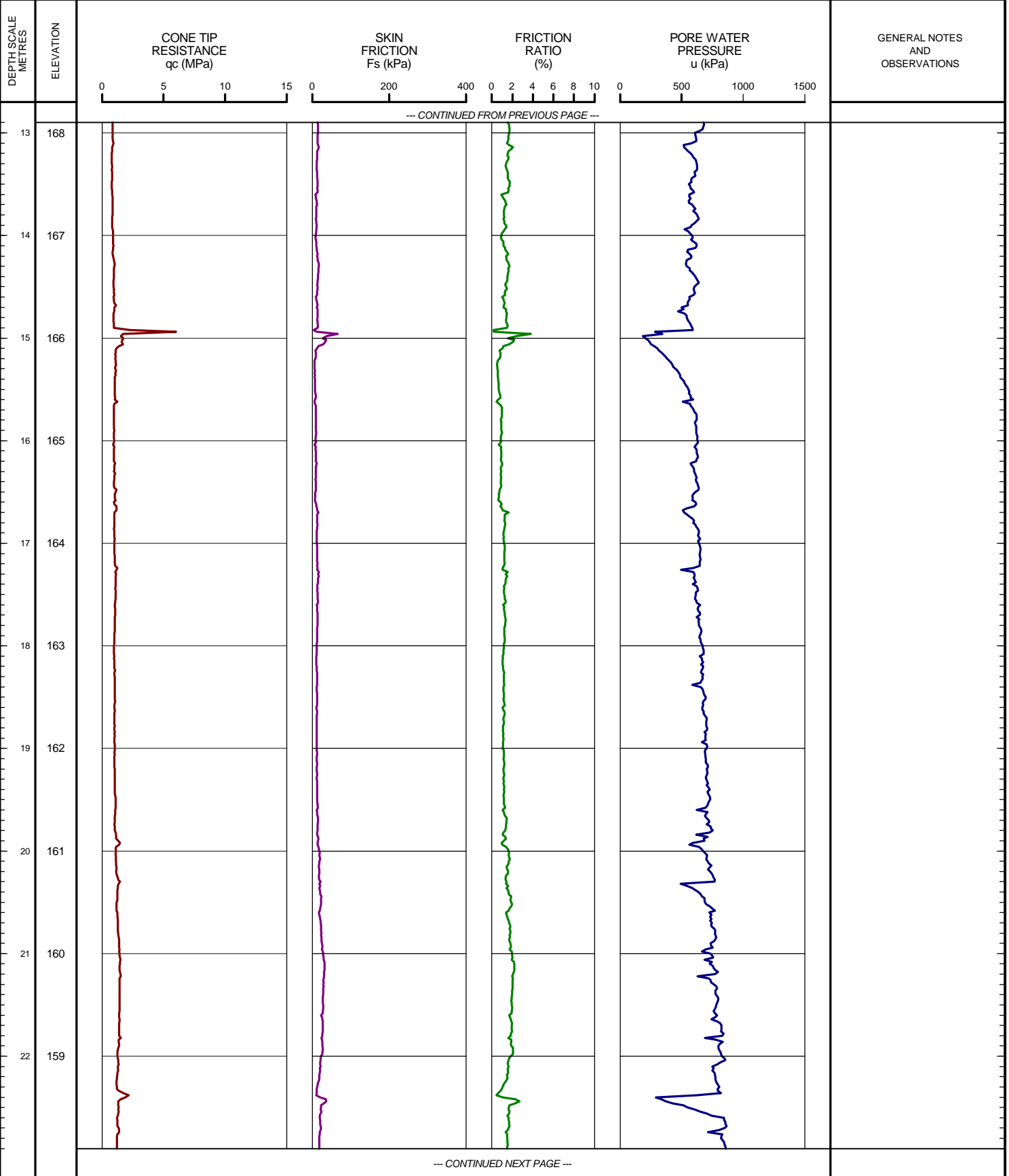
SHEET 2 OF 3

LOCATION: N 4679664.9 ;E 332002.7

TEST DATE: January 25, 2010

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 180.85m PREDRILL DEPTH: 2.90m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LON_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-324

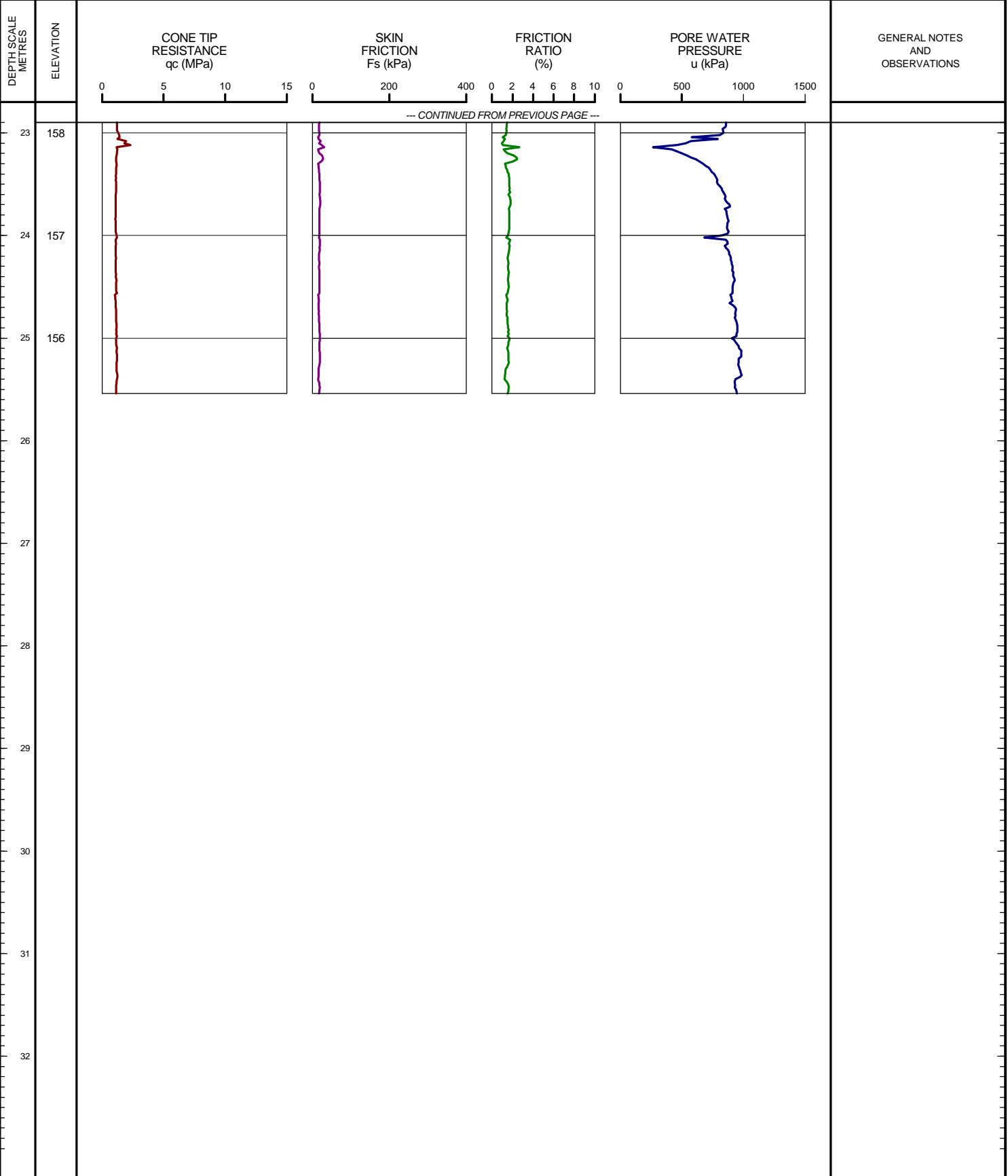
SHEET 3 OF 3

LOCATION: N 4679664.9 ;E 332002.7

TEST DATE: January 25, 2010

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 180.85m PREDRILL DEPTH: 2.90m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

LDN_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

Station 10+400L to Station 11+000L (Soil Profile #10)

RECORD OF BOREHOLE No 122

1 OF 4

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4679265.4 :E 332537.9

ORIGINATED BY SM

DIST WEST HWY 401/3

BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

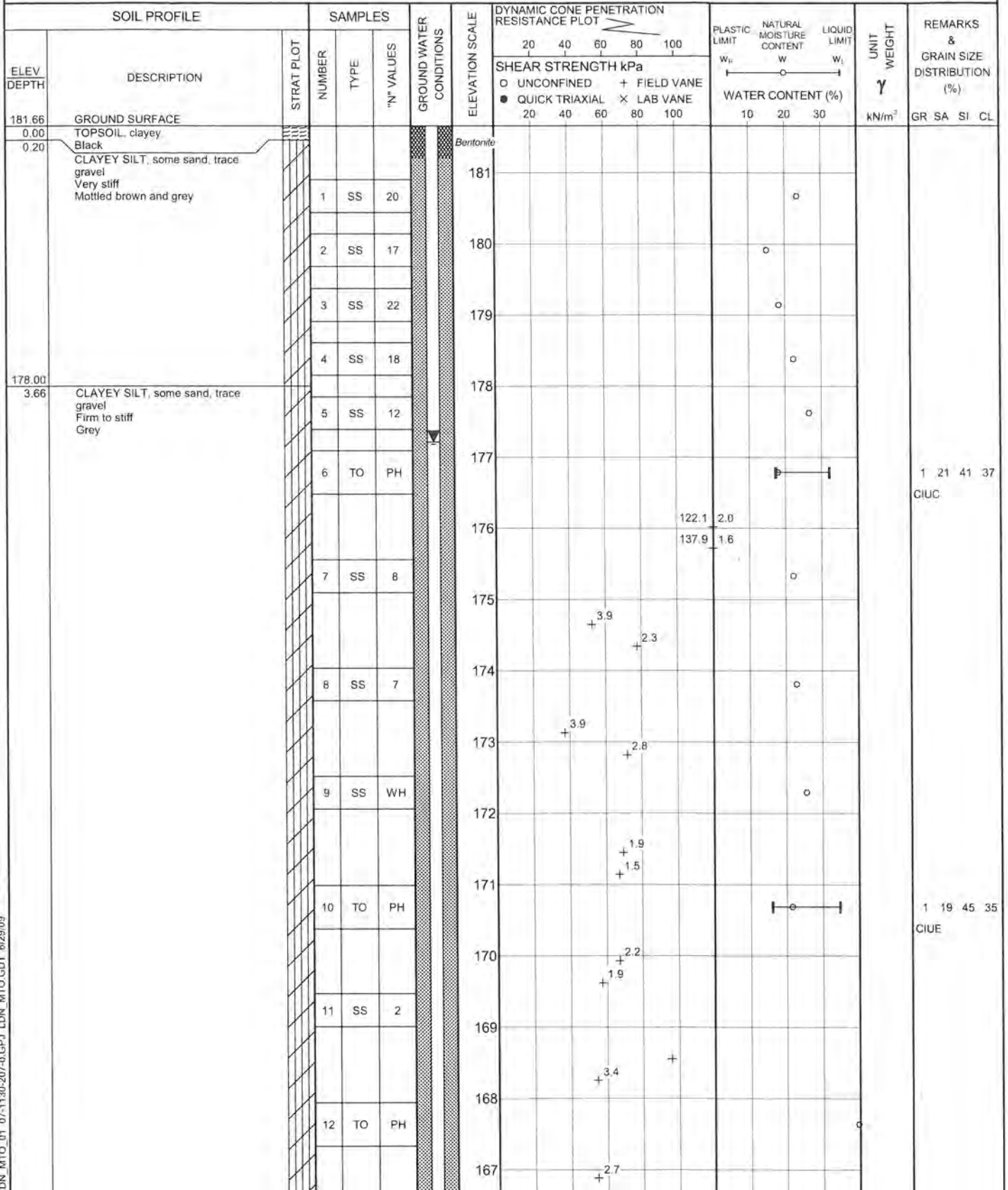
COMPILED BY BRS

DATUM GEODETIC

DATE

January 24, 2008 - January 29, 2008

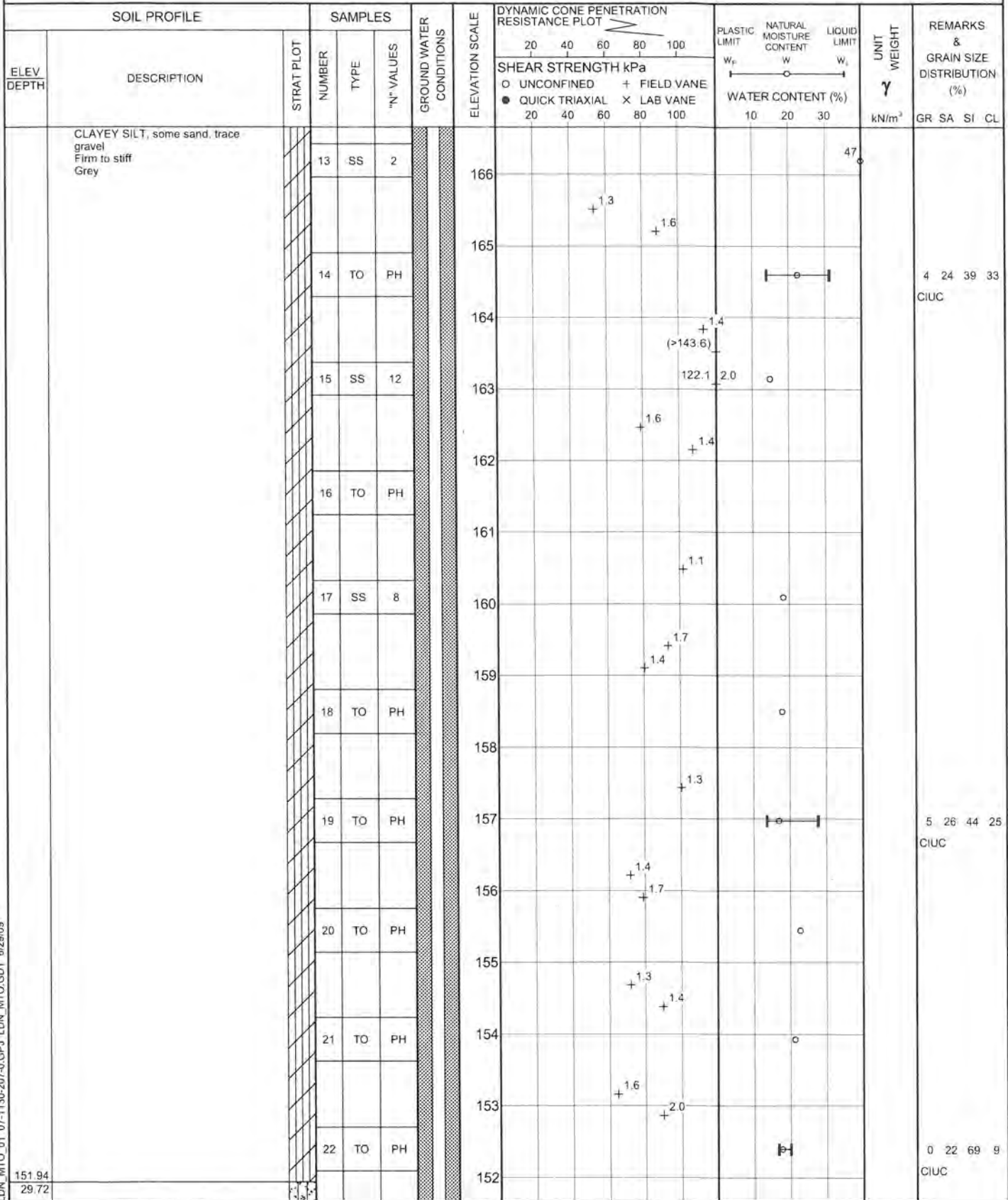
CHECKED BY *SSS*



Continued Next Page

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

| | | | | | |
|-----------------------------------|--|--|--|-------------------------|---------------|
| PROJECT <u>07-1130-207-0</u> | | RECORD OF BOREHOLE No 122 | | 2 OF 4 | METRIC |
| W.P. _____ | | LOCATION <u>N 4679265.4 : E 332537.9</u> | | ORIGINATED BY <u>SM</u> | |
| DIST <u>WEST</u> HWY <u>401/3</u> | | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | | COMPILED BY <u>BRS</u> | |
| DATUM <u>GEODETIC</u> | | DATE <u>January 24, 2008 - January 29, 2008</u> | | CHECKED BY <u>SJB</u> | |



LDN MTO_01 07-1130-207-0.GPJ LDN MTO.GDT 6/29/09

Continued Next Page

+ 3, X 3, Numbers refer to Sensitivity O 3% STRAIN AT FAILURE

| | | | | | |
|-----------------------|--|---|--|-----------------------|---------------|
| PROJECT 07-1130-207-0 | | RECORD OF BOREHOLE No 122 | | 3 OF 4 | METRIC |
| W.P. _____ | | LOCATION N 4679265.4 : E 332537.9 | | ORIGINATED BY SM | |
| DIST WEST HWY 401/3 | | BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC | | COMPILED BY BRS | |
| DATUM GEODETIC | | DATE January 24, 2008 - January 29, 2008 | | CHECKED BY <i>SJS</i> | |

| 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 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL X LAB VANE | WATER CONTENT (%) | | | | | |
| 150.42 | SILTY SAND, fine to medium, trace clay Compact Grey | | 23 | SS | 13 | | | | | | | | | (29) |
| 31.24 | SANDY SILT, trace clay, with clayey silt intrusions Very dense Grey | | 24 | SS | 84 | | | | | | | | | |
| 146.61 | LIMESTONE, fresh, medium strong, thinly laminated to laminated, very fine to fine grained, faintly to strongly porous Brown to grey (FOR DETAILED DESCRIPTIONS REFER TO RECORD OF DRILLHOLE) | | 25 | SS | 100/ 2.5mm | | | | | | | | | |
| 35.05 | | | 26 | SS | 50/ 3.8mm | | | | | | | | | |
| | | | 27 | NQ RC | | | | | | | | | | |
| | | | 28 | NQ RC | | | | | | | | | | |
| | | | 29 | NQ RC | | | | | | | | | | |
| | | | 30 | NQ RC | | | | | | | | | | |
| 141.33 | END OF BOREHOLE | | | | | | | | | | | | | |
| 40.33 | <p>Borehole dry during drilling between January 24 and 29, 2008.</p> <p>Water level measured in deep piezometer at elev. 178.01m on July 22, 2008</p> <p>Water level measured in deep piezometer at elev. 178.26m on August 11, 2008.</p> <p>Water level measured in deep piezometer at elev. 178.26m on September 19, 2008.</p> <p>Water level measured in deep piezometer at elev. 177.54m on November 11, 2008.</p> <p>Water level measured in deep piezometer at elev. 177.21m on January 28, 2009.</p> | | | | | | | | | | | | | |

LDN MTO_01 07-1130-207-0.GPJ LDN MTO GDT 8/29/09

PROJECT: 07-1130-207-0

RECORD OF DRILLHOLE: 122

SHEET 4 OF 4

LOCATION: N 4679265.4 E 332537.9

DRILLING DATE: January 24, 2008 - January 29, 2008

DATUM: GEODETIC

INCLINATION: -90° AZIMUTH: —

DRILL RIG: MUD ROTARY WITH HQ TRICONE, NQRC

DRILLING CONTRACTOR: AARDVARK DRILLING INC

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. | RUN No. | PENETRATION RATE (mm/min) | COLOUR % RETURN | FLUSH | ELEVATION | JN - Joint FLT - Fault SHR - Shear VN - Vein CJ - Conjugate BD - Bedding FO - Foliation CO - Contact OR - Orthogonal CL - Cleavage PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular PO - Polished K - Slickensided SM - Smooth Ro - Rough Br - Broken Rock NOTE: For additional abbreviations refer to list of abbreviations & symbols. | | | | | | | | | | DIAMETRAL LOAD INDEX (MPa) | NOTES WATER LEVELS INSTRUMENTATION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | TOTAL CORE % | SOLID CORE % | | | DIP w.r.t CORE AXIS | TYPE AND SURFACE DESCRIPTION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | 80 60 40 20 | 80 60 40 20 | 5 10 15 20 | 0 30 60 90 | 10° 15° 20° 30° 45° 60° 75° 90° | 10° 15° 20° 30° 45° 60° 75° 90° | 10° 15° 20° 30° 45° 60° 75° 90° | 10° 15° 20° 30° 45° 60° 75° 90° | | | 10° 15° 20° 30° 45° 60° 75° 90° | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ROCK SURFACE | 146.61 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | </ |

LDN ROCK 03 07-1130-207-0-ROCK GP, GLDR LDN GDT 5/29/09 DATA INPUT: WDF

DEPTH SCALE

1:75



LOGGED: SG

CHECKED: SJB

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4679265.4 E 332537.9

ORIGINATED BY SM

DIST

WEST

HWY 401/3

BOREHOLE TYPE

POWER AUGER, HOLLOW STEM

COMPILED BY BRS

DATUM GEODETIC

DATE _____

January 24, 2008

CHECKED BY **SSB**

[illegible]

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

RECORD OF BOREHOLE No 126

1 OF 1

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4679237.2 :E 332335.5

ORIGINATED BY DM

DIST WEST HWY 401/3

BOREHOLE TYPE POWER AUGER, HOLLOW STEM

COMPILED BY BRS

DATUM GEODETIC

DATE

March 26, 2008

CHECKED BY *SSB*

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | |
|---------------|---|------------|---------|------|------------|----------------------------|--------------------|---|--|------------------------------------|-------------------------------------|-----------------------------------|---------------------|---|-------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | WATER CONTENT (%) |
| | | | | | | | | ○ UNCONFINED + FIELD VANE | | | | | | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | | |
| | | | | | | | | ● QUICK TRIAXIAL × LAB VANE | | | | | | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | | |
| 180.61 | GROUND SURFACE | | | | | | | | | | | | | | |
| 0.00 | FILL, sand and gravel, trace silt Compact Brown | | 1 | SS | 24 | | 180 | | | | | | | | |
| 179.09 | | | | | | | | | | | | | | | |
| 1.52 | CLAYEY SILT, some sand, trace gravel Stiff to hard Brown, becoming grey at about elev. 177.0m | | 2 | SS | 8 | | 179 | | | | | | | | |
| | | | 3 | SS | 20 | | 178 | | | | | | | | |
| | | | 4 | SS | 33 | | 177 | | | | | | | | |
| | | | 5 | SS | 26 | | 176 | | | | | | | | |
| | | | 6 | SS | 17 | | 175 | | | | | | | | |
| | | | 7 | SS | 11 | | 174 | | | | | | | | |
| | | | 8 | SS | 10 | | 173 | | | | | | | | |
| | | | 9 | SS | 10 | | | | | | | | | | |
| | | | 10 | SS | 8 | | | | | | | | | | |
| 172.38 | END OF BOREHOLE | | | | | | | | | | | | | | |
| 8.23 | Borehole dry during drilling on March 26, 2008. | | | | | | | | | | | | | | |

DN_MTO_01 07-11-30-207-0.GPJ LUN_MTO.GDT 6/23/09

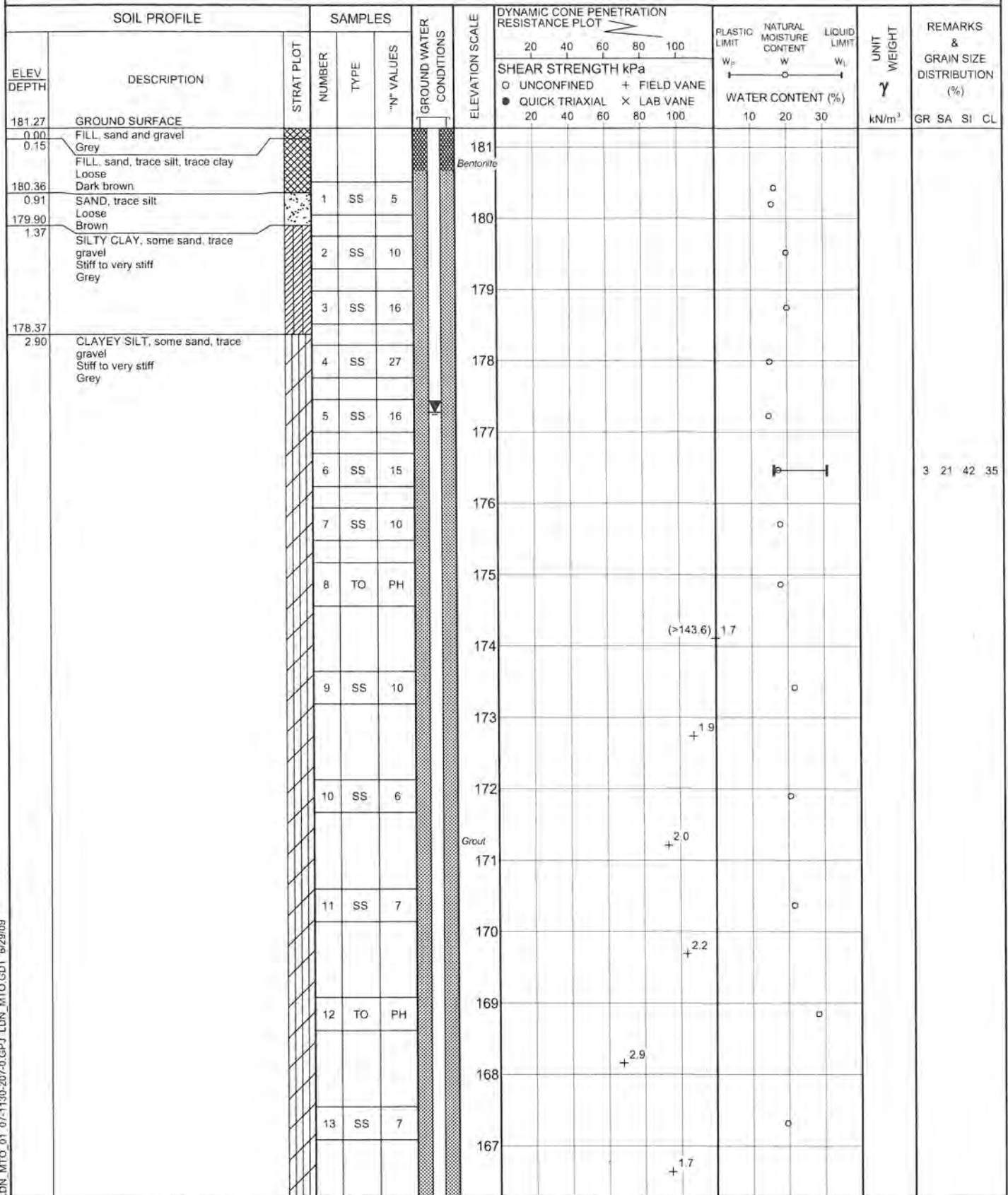
LDN_MTO_01 07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

PROJECT 07-1130-207-0 **RECORD OF BOREHOLE No 127** 1 OF 4 **METRIC**

W.P. LOCATION N 4679370.9, E 332251.6 ORIGINATED BY SM

DIST WEST HWY 401/3 BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC COMPILED BY BRS

DATUM GEODETIC DATE March 11, 2008 - March 13, 2008 CHECKED BY *SLF*

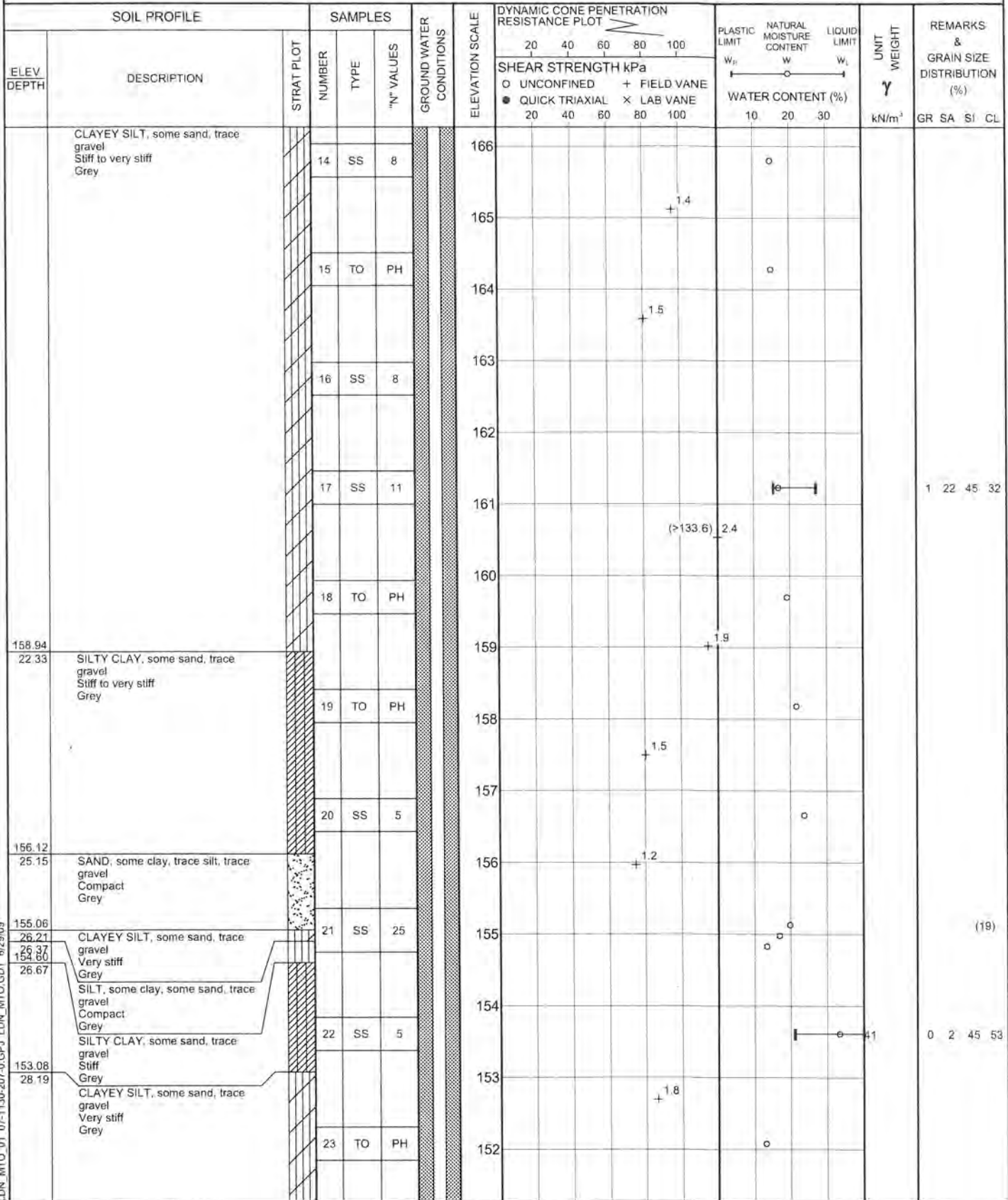


LDN_MTO_01_07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

Continued Next Page

+ 3, X 3. Numbers refer to Sensitivity O 3% STRAIN AT FAILURE

| | | | | | |
|-----------------------|---------------|---|--|-----------------------|---------------|
| PROJECT 07-1130-207-0 | | RECORD OF BOREHOLE No 127 | | 2 OF 4 | METRIC |
| W.P. | LOCATION | N 4679370.9, E 332251.6 | | ORIGINATED BY SM | |
| DIST WEST HWY 401/3 | BOREHOLE TYPE | POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC | | COMPILED BY BRS | |
| DATUM GEODETIC | DATE | March 11, 2008 - March 13, 2008 | | CHECKED BY <i>SJB</i> | |



LDN_MTO_01 07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

Continued Next Page

+ 3, x 3. Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

PROJECT: 07-1130-207-0

RECORD OF DRILLHOLE: 127

SHEET 4 OF 4

LOCATION: N 4679370.9 ; E 332251.6

DRILLING DATE: March 11, 2008 - March 13, 2008

DATUM: GEODETIC

INCLINATION: -90° AZIMUTH: —

DRILL RIG: MUD ROTARY WITH HQ TRICONE, NQRC

DRILLING CONTRACTOR: AARDVARK DRILLING INC

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. | RUN No. | PENETRATION RATE (mm/min) | FLUSH | COLOUR % RETURN | ELEVATION | JN - Joint FLT - Fault SHR - Shear VN - Vein CJ - Conjugate BD - Bedding FO - Foliation CO - Contact OR - Orthogonal CL - Cleavage PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular PO - Polished K - Slickensided SM - Smooth Ro - Rough Br - Broken Rock NOTE: For additional abbreviations refer to list of abbreviations & symbols | | | | | | | | | | DIAMETRAL POINT LOAD INDEX (MPa) | NOTES WATER LEVELS INSTRUMENTATION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | TOTAL CORE % | SOLID CORE % | R Q D. % | | DIP w/1:1 CORE AXIS | TYPE AND SURFACE DESCRIPTION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | 10 10 ⁻⁶ | 10 10 ⁻⁵ | 10 10 ⁻⁴ | | | | 10 10 ⁻³ | 10 10 ⁻² | 10 10 ⁻¹ | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ROCK SURFACE | | 148.47 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | </ |

LDN-ROCK-03 07-1130-207-0-ROCK-GPJ GLDR LDN-GDT 6/29/09 DATA INPUT: WDF

DEPTH SCALE

1:75



LOGGED: SG

CHECKED: SJB

| | | | | | | | |
|-----------------------------------|--|--|--|-------------------------|--|---------------|--|
| PROJECT <u>07-1130-207-0</u> | | RECORD OF BOREHOLE No CPT-123 | | 1 OF 1 | | METRIC | |
| W.P. _____ | | LOCATION <u>N 4679309.7 :E 332536.3</u> | | ORIGINATED BY <u>CC</u> | | | |
| DIST <u>WEST</u> HWY <u>401/3</u> | | BOREHOLE TYPE <u>POWER AUGER, SOLID STEM</u> | | COMPILED BY <u>SJL</u> | | | |
| DATUM <u>GEODETIC</u> | | DATE <u>September 10, 2008</u> | | CHECKED BY <u>SJB</u> | | | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT w _p | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|---|----|------------------------------------|-------------------------------------|-----------------------------------|---------------------|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 | 40 | | | | | |
| 181.60 | GROUND SURFACE | | | | | | | | | | | | | |
| 0.00 | FILL, crushed gravel and recycled aggregate | | | | | | | | | | | | | |
| 0.28 | Grey and black TOPSOIL, clayey | | 1 | AS | | | | | | | | | | |
| 180.69 | Black | | | | | | | | | | | | | |
| 0.91 | CLAYEY SILT, trace sand, trace gravel | | 2 | SS | 7 | | | | | | | | | |
| | Firm to stiff | | | | | | | | | | | | | |
| | Mottled brown and grey | | 3 | SS | 14 | | | | | | | | | |
| 179.47 | | | | | | | | | | | | | | |
| 2.13 | END OF BOREHOLE | | | | | | | | | | | | | |
| | Borehole dry during drilling on September 10, 2008. | | | | | | | | | | | | | |

LDN MTO_01 07-1130-207-0.GPJ LDN MTO.GDT 6/29/09

| | | | | | |
|-----------------------------------|--|--|--|-------------------------|---------------|
| PROJECT <u>07-1130-207-0</u> | | RECORD OF BOREHOLE No CPT-124 | | 1 OF 1 | METRIC |
| W.P. _____ | | LOCATION <u>N 4679354.6 :E 332455.0</u> | | ORIGINATED BY <u>CC</u> | |
| DIST <u>WEST</u> HWY <u>401/3</u> | | BOREHOLE TYPE <u>POWER AUGER, SOLID STEM</u> | | COMPILED BY <u>LMK</u> | |
| DATUM <u>GEODETIC</u> | | DATE <u>September 11, 2008</u> | | CHECKED BY <u>SJB</u> | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT w _p — w — 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 | | | | | | |
| 181.51 | GROUND SURFACE | | | | | | | | | | |
| 0.00 | TOPSOIL, silty, some sand, trace clay, trace organics, trace gravel | | 1 | SS | 14 | | 181 | | | | |
| 180.90 | Compact Brown | | | | | | | | | | |
| 0.61 | SAND, fine to medium, some silt | | 2 | SS | 4 | | | | | | |
| 0.91 | Loose Brown | | | | | | | | | | |
| | CLAYEY SILT, trace sand, trace gravel | | 3 | SS | 19 | | 180 | | | | |
| 179.68 | Firm to very stiff | | | | | | | | | | |
| 1.83 | Mottled brown and grey | | | | | | | | | | |
| | END OF BOREHOLE | | | | | | | | | | |
| | Water level in borehole at about elev. 180.5m during drilling on September 11, 2008. | | | | | | | | | | |

LDN_MTO_01 07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

| | | | | | | | | | |
|---------|--|------------------|--|---------------------------|--|---|--|---------------|--|
| PROJECT | | 09-1132-0080 | | RECORD OF BOREHOLE No 321 | | 1 OF 4 | | METRIC | |
| W.P. | | | | LOCATION | | N 4679179.9 ; E 332649.0 | | ORIGINATED BY | |
| DIST | | WEST HWY 401 / 3 | | BOREHOLE TYPE | | POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC | | COMPILED BY | |
| DATUM | | GEODETIC | | DATE | | December 9, 2010 - December 14, 2010 | | CHECKED BY | |

[illegible]

Continued Next Page

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

DN_MTO_06 09-1132-0080.GPJ LDN_MTO.GDT 11/03/10

| | | | | | | | |
|-------------------------------------|--|--|--|----------------------------|--|---------------|--|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No 321 | | 2 OF 4 | | METRIC | |
| W.P. _____ | | LOCATION <u>N 4679179.9 ; E 332649.0</u> | | ORIGINATED BY <u>MR</u> | | | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | | COMPILED BY <u>LMK/DMB</u> | | | |
| DATUM <u>GEODETIC</u> | | DATE <u>December 9, 2010 - December 14, 2010</u> | | CHECKED BY _____ | | | |

| 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 | | W _p | W | W _L | | |
| | | | | | | | | ○ UNCONFINED ● QUICK TRIAXIAL | + FIELD VANE × LAB VANE | | | | | |
| | CLAYEY SILT, some sand, trace to some gravel Stiff to very stiff Grey | | 13 | TO | PH | | 168 | | | | | | | |
| | | | | | | | 167 | | | | | | | |
| | | | 14 | SS | 9 | | 166 | | | | | | | 1 21 49 29 |
| | | | | | | | 165 | | | | | | | |
| | | | 15 | TO | PH | | 164 | | | | | | | |
| | | | | | | | 163 | | | | | | | |
| | | | 16 | TO | PH | | 162 | | | | | | | |
| | | | | | | | 161 | | | | | | | |
| | | | 17 | SS | 10 | | 160 | | | | | | | 11 24 40 25 |
| | | | | | | | 159 | | | | | | | |
| | | | 18 | TO | PH | | 158 | | | | | | | |
| | | | 19 | SS | 9 | | 157 | | | | | | | |
| | | | | | | | 156 | | | | | | | |
| | | | 20 | TO | PH | | 155 | | | | | | | |
| | | | | | | | 154 | | | | | | | |
| | | | 21 | SS | 13 | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 22 | TO | PH | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 23 | SS | 9 | | | | | | | | | |
| | | | | | | | | | | | | | | |

LDN_MTO_06 09-1132-0080.GPJ LDN_MTO.GDT 11/03/10

Continued Next Page

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

| | | | | | |
|-------------------------------------|--|--|--|-------------------------------|---------------|
| PROJECT 09-1132-0080 | | RECORD OF BOREHOLE No 321 | | 3 OF 4 | METRIC |
| W.P. _____ | | LOCATION N 4679179.9 ; E 332649.0 | | ORIGINATED BY MR _____ | |
| DIST WEST HWY 401 / 3 | | BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC | | COMPILED BY LMK/DMB | |
| DATUM GEODETIC | | DATE December 9, 2010 - December 14, 2010 | | CHECKED BY _____ | |

| 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 | | | | | | 20 | 40 | 60 | 80 |
| | CLAYEY SILT, some sand, trace to some gravel Stiff to very stiff Grey | | 24 | TO | PH | | | | | | | | | | | | | | | | |
| 151.24 | | | | | | | | | | | | | | | | | | | | | |
| 31.90 | SAND AND GRAVEL, trace silt Very dense Grey | | 25 | SS | 51 | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | |
| 149.12 | | | 26 | SS | 100/ 130mm | | | | | | | | | | | | | | | | |
| 34.02 | LIMESTONE, fresh, medium strong, weakly laminated, very fine grained, faintly porous Light grey to brown (FOR DETAILED DESCRIPTIONS REFER TO RECORD OF DRILLHOLE) | | 27 | NQ RC | - | | | | | | | | | | | | | | | | |
| | | | | 28 | NQ RC | - | | | | | | | | | | | | | | | |
| | | | | 29 | NQ RC | - | | | | | | | | | | | | | | | |
| | | | | 30 | NQ RC | - | | | | | | | | | | | | | | | |
| 143.73 | | | | | | | | | | | | | | | | | | | | | |
| 39.41 | END OF BOREHOLE | | | | | | | | | | | | | | | | | | | | |
| | Groundwater encountered at about elev. 181.7m and at about elev. 151.7m during drilling between December 9 and 14, 2009. Water level measured at elev. 178.52 on February 24, 2010. Water level measured at elev. 178.26 on January 6, 2010. | | | | | | | | | | | | | | | | | | | | |

PROJECT: 09-1132-0080

RECORD OF DRILLHOLE: 321

SHEET 4 OF 4

LOCATION: N 4679179.9 ;E 332649.0

DRILLING DATE: December 9, 2010 - December 14, 2010

DATUM: GEODETIC

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: MUD ROTARY WITH HQ TRICONE, NQRC

DRILLING CONTRACTOR: LANTECH

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. | RUN No. | PENETRATION RATE (mm/min) | FLUSH | COLOUR % RETURN | ELEVATION | JN - Joint FLT - Fault SHR - Shear VN - Vein CJ - Conjugate BD - Bedding FO - Foliation CO - Contact OR - Orthogonal CL - Cleavage PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular PO - Polished K - Slickensided SM - Smooth Ro - Rough Br - Broken Rock NOTE: For additional abbreviations refer to list of abbreviations & symbols. | | | | | | | | | | HYDRAULIC CONDUCTIVITY k, cm/sec | | | DIAMETRAL POINT LOAD INDEX (MPa) | | NOTES WATER LEVELS INSTRUMENTATION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | TOTAL CORE % | SOLID CORE % | | | DIP w.r.t. CORE AXIS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | 80 60 40 20 | 80 60 40 20 | 5 10 15 20 | 0 30 60 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | ROCK SURFACE | | 149.12 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

DEPTH SCALE

1 : 75



LOGGED: SG

CHECKED:

LDN_ROCK_03 09-1132-0080-ROCK.GPJ GLDR_LDN.GDT 11/03/10 DATA INPUT: LMK

| | | | | | | | |
|-------------------------------------|--|--|--|-------------------------|--|---------------|--|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No CPT-319 | | 1 OF 1 | | METRIC | |
| W.P. _____ | | LOCATION <u>N 4679084.5 ; E 332701.0</u> | | ORIGINATED BY <u>TA</u> | | | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, SOLID STEM</u> | | COMPILED BY <u>DMB</u> | | | |
| DATUM <u>GEODETIC</u> | | DATE <u>December 21, 2009</u> | | CHECKED BY _____ | | | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | | |
|---------------|---|------------|---------|------|------------|-----------------------------|-----------------|---|--|--|--|--|---|---|----------------|---|---|--|--|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | W _p | W | W _L | | WATER CONTENT (%) | | | | |
| | | | | | | | | 20 40 60 80 100 | | | | | 20 40 60 80 100 | | | | | | | | |
| | | | | | | ○ UNCONFINED + FIELD VANE | | | | | | | | | | | | | | | |
| | | | | | | ● QUICK TRIAXIAL × LAB VANE | | | | | | | | | | | | | | | |
| 183.71 | ROAD SURFACE | | | | | ▽ | 183 | | | | | | | | | | | | | | |
| 0.05 | ASPHALT PAVEMENT | | | | | | | | | | | | | | | | | | | | |
| 0.20 | FILL, limestone gravel, crushed Grey | | | | | | | | | | | | | | | | | | | | |
| | SAND, fine, some silt Compact Brown | | 1 | SS | 22 | | | | | | | | | | | | | | | | |
| | | | 2 | SS | 21 | | | | | | | | | | | | | | | | |
| 181.58 | | | | | | 182 | | | | | | | | | | | | | | | |
| 2.13 | CLAYEY SILT, some sand, trace gravel Hard Grey | | 3 | SS | 31 | | | | | | | | | | | | | | | | |
| 180.81 | | | | | | 181 | | | | | | | | | | | | | | | |
| 2.90 | END OF BOREHOLE | | | | | | | | | | | | | | | | | | | | |
| | Groundwater encountered at about elev. 182.2m during drilling on December 21, 2009. | | | | | | | | | | | | | | | | | | | | |

| | | | | | | | |
|-------------------------------------|--|--|--|-------------------------|--|---------------|--|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No CPT-320 | | 1 OF 1 | | METRIC | |
| W.P. _____ | | LOCATION <u>N 4679155.5 ; E 332737.0</u> | | ORIGINATED BY <u>TA</u> | | | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, SOLID STEM</u> | | COMPILED BY <u>DMB</u> | | | |
| DATUM <u>GEODETIC</u> | | DATE <u>December 21, 2009</u> | | CHECKED BY _____ | | | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT NATURAL MOISTURE LIQUID CONTENT | | | UNIT WEIGHT γ kN/m³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|---|----|----|----|----|---|----------------|---|--------------------------------------|---|----|----|----|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | WATER CONTENT (%) | | | | GR | SA | SI | CL |
| | | | | | | | | ○ UNCONFINED + FIELD VANE | 20 | 40 | 60 | 80 | 100 | w _p | w | | w _L | | | |
| 183.50 | GROUND SURFACE | | | | | | | | | | | | | | | | | | | |
| 0.00 | TOPSOIL, sandy, some rootlets Black | | | | | | | | | | | | | | | | | | | |
| 182.89 | | | | | | | | | | | | | | | | | | | | |
| 0.61 | SAND, fine, some silt Compact to dense Brown | | 1 | SS | 18 | | | | | | | | ○ | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| 181.62 | | | 2 | SS | 31 | | | | | | | | | | | | | | | |
| 1.88 | CLAYEY SILT, some sand, trace gravel Very stiff to hard Grey | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| 180.60 | | | 3 | SS | 18 | | | | | | | | ○ | | | | | | | |
| 2.90 | END OF BOREHOLE | | | | | | | | | | | | | | | | | | | |
| | Groundwater encountered at about elev. 182.0m during drilling on December 21, 2009. | | | | | | | | | | | | | | | | | | | |

| | | | | | | | |
|-------------------------------------|--|--|--|-------------------------|--|---------------|--|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No CPT-322 | | 1 OF 1 | | METRIC | |
| W.P. _____ | | LOCATION <u>N 4679294.0 ; E 332478.2</u> | | ORIGINATED BY <u>TA</u> | | | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, SOLID STEM</u> | | COMPILED BY <u>DMB</u> | | | |
| DATUM <u>GEODETIC</u> | | DATE <u>January 7, 2010</u> | | CHECKED BY _____ | | | |

| 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 | | w _p | w | w _L | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE | | | | | | |
| 181.50 | ROAD SURFACE | | | | | | | 20 40 60 80 100 | | | | | | |
| 0.05 | ASPHALT PAVEMENT | | | | | | | | | | | | | |
| 181.04 | FILL, limestone gravel, crushed | | | | | | | | | | | | | |
| 0.46 | Grey TOPSOIL, clayey Very stiff Black | | 1 | SS | 17 | | | | | | | | | |
| 180.28 | CLAYEY SILT, some sand, trace gravel, with occasional fissures, silt partings and seams Hard Brown becoming grey below about elev. 177.5m | | 2 | SS | 35 | | | | | | | | | |
| 1.22 | | | | | | | | | | | | | | |
| | | | 3 | SS | 44 | | | | | | | | | |
| | | | 4 | SS | 37 | | | | | | | | | |
| 177.84 | END OF BOREHOLE | | | | | | | | | | | | | |
| 3.66 | Borehole dry during drilling on January 7, 2010. | | | | | | | | | | | | | |

LDN_MTO_06 09-1132-0080.GPJ LDN_MTO.GDT 11/03/10

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-10

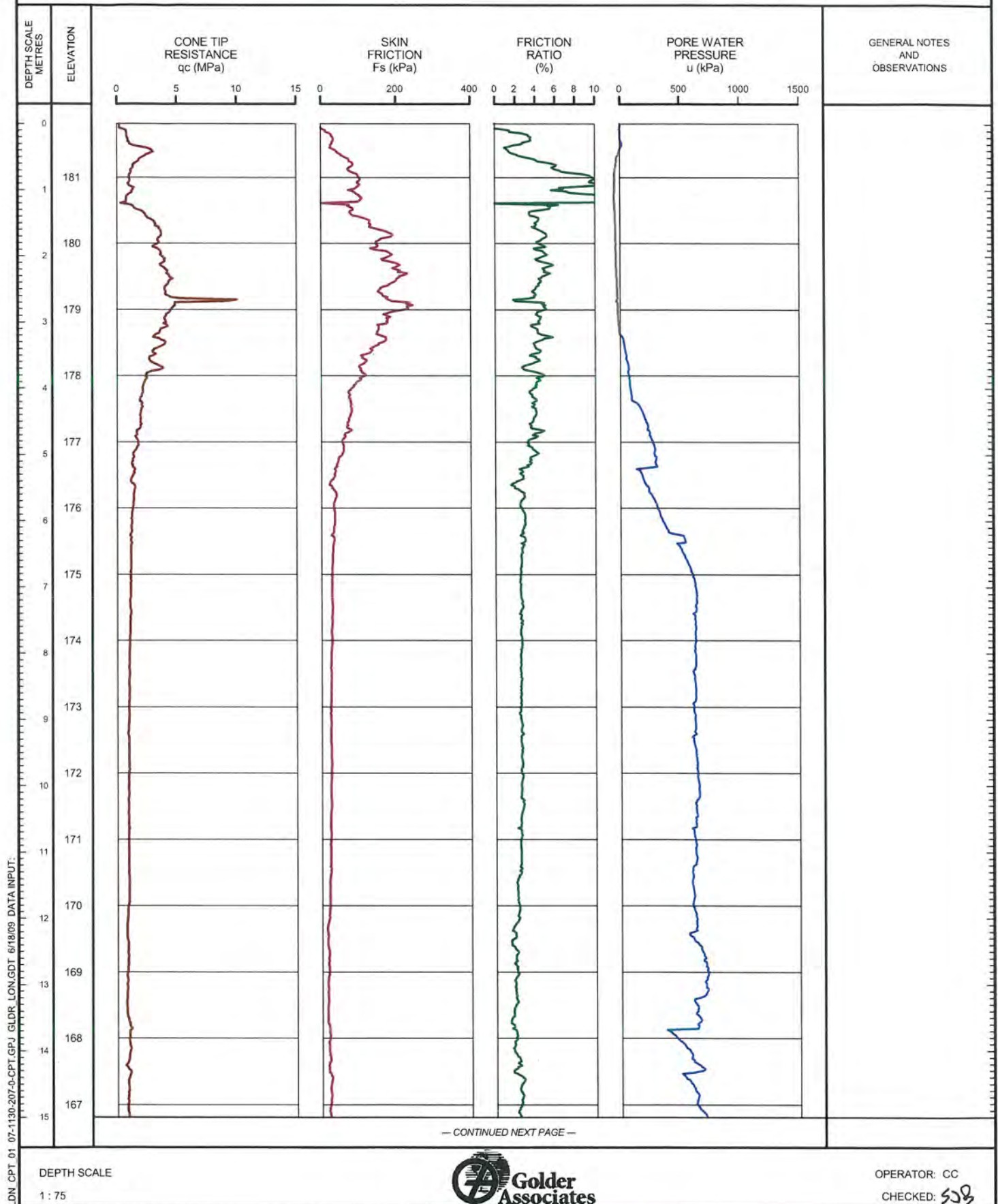
SHEET 1 OF 2

LOCATION: N 4679264.0 ; E 332533.0

TEST DATE: November 10, 2006

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 0.00m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-10

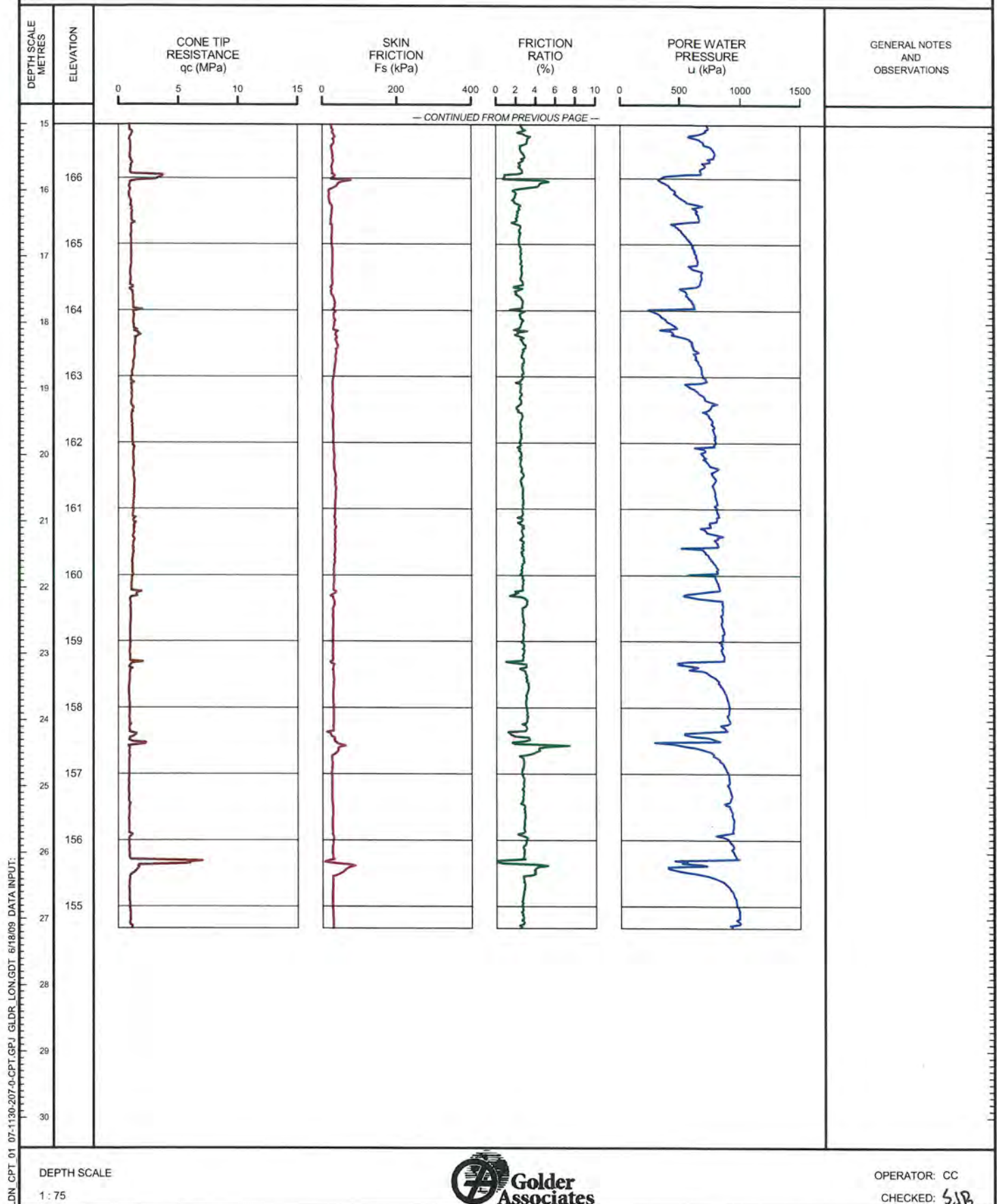
SHEET 2 OF 2

LOCATION: N 4679264.0 :E 332533.0

TEST DATE: November 10, 2006

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 0.00m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-123

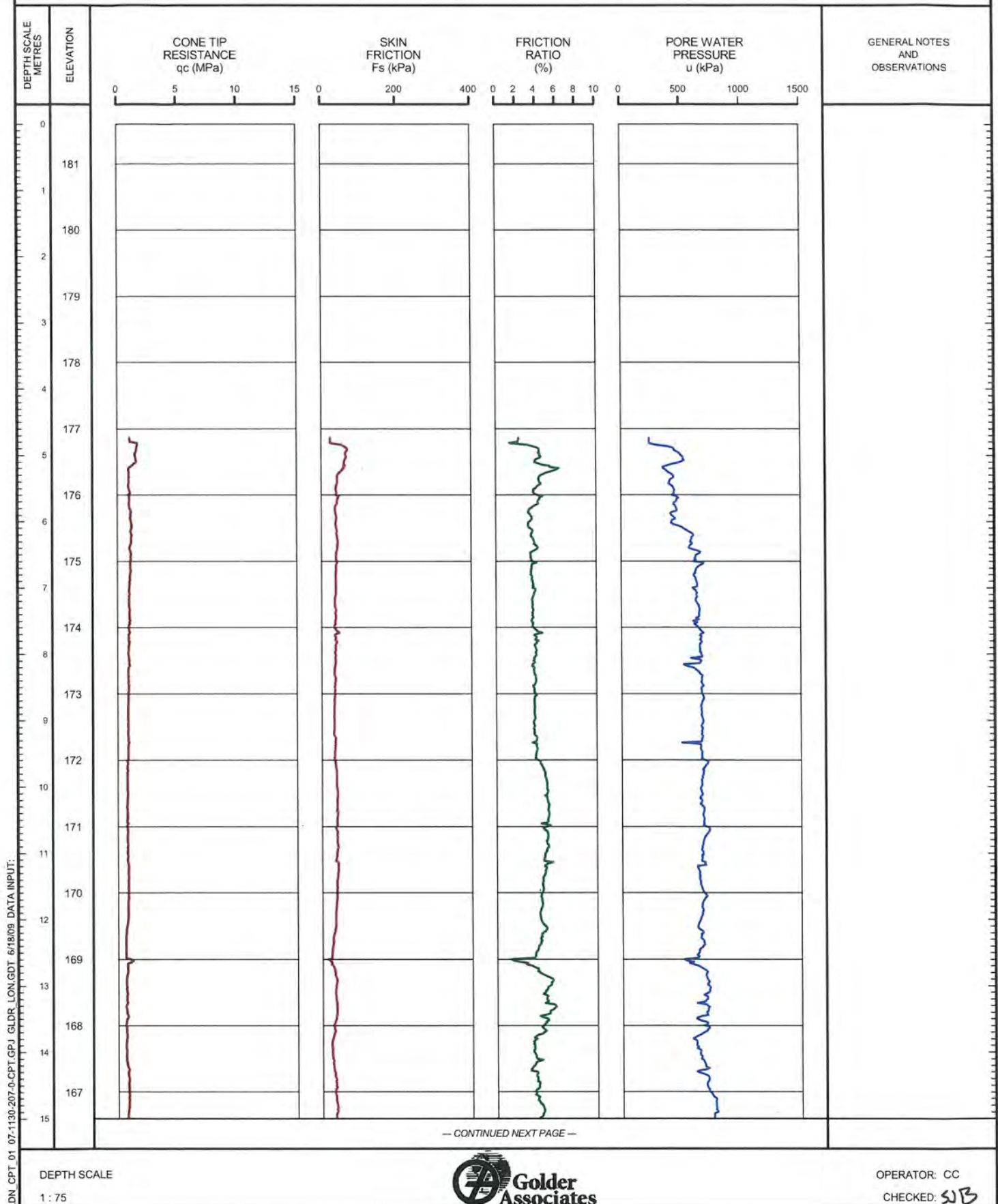
SHEET 1 OF 2

LOCATION: N 4679309.7 ; E 332536.3

TEST DATE: September 29, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 4.75m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LDN CPT_01_07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-123

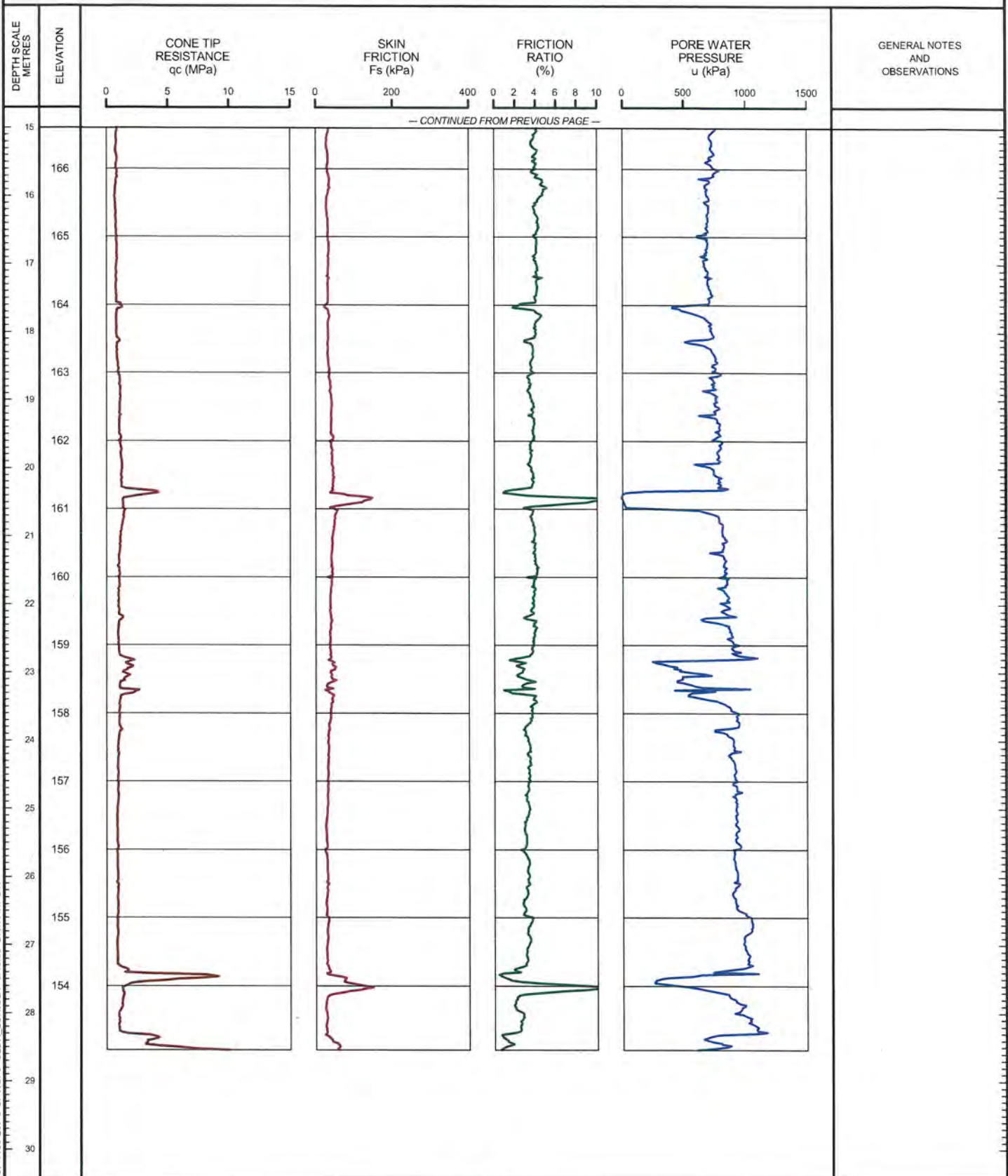
SHEET 2 OF 2

LOCATION: N 4679309.7 ; E 332536.3

TEST DATE: September 29, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 4.75m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LDN CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE
1 : 75OPERATOR: CC
CHECKED: *SSB*

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-124

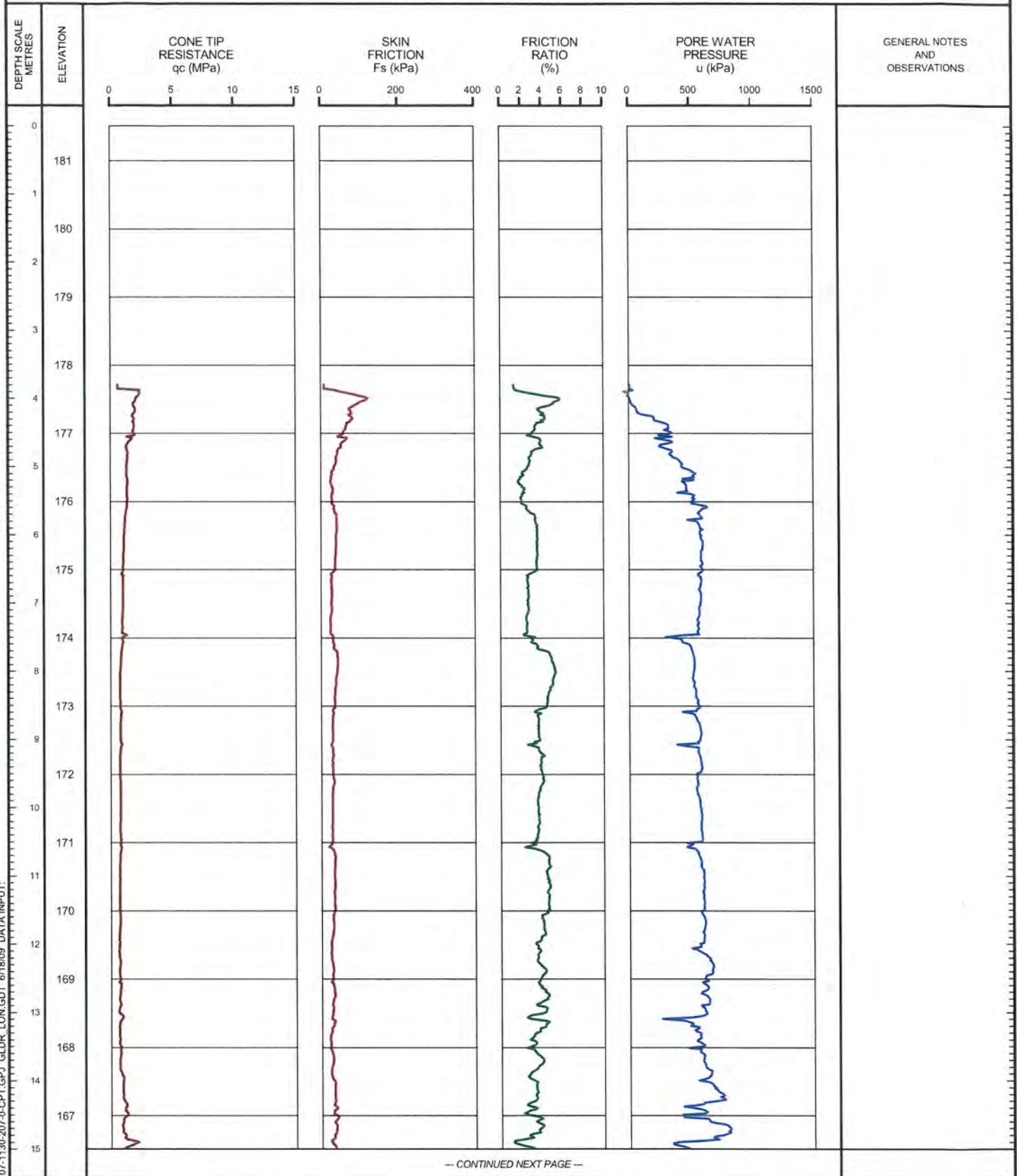
SHEET 1 OF 2

LOCATION: N 4679354.6 :E 332455.0

TEST DATE: September 29, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 3.81m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LDN CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE

1 : 75



OPERATOR: CC

CHECKED: *SB*

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-124

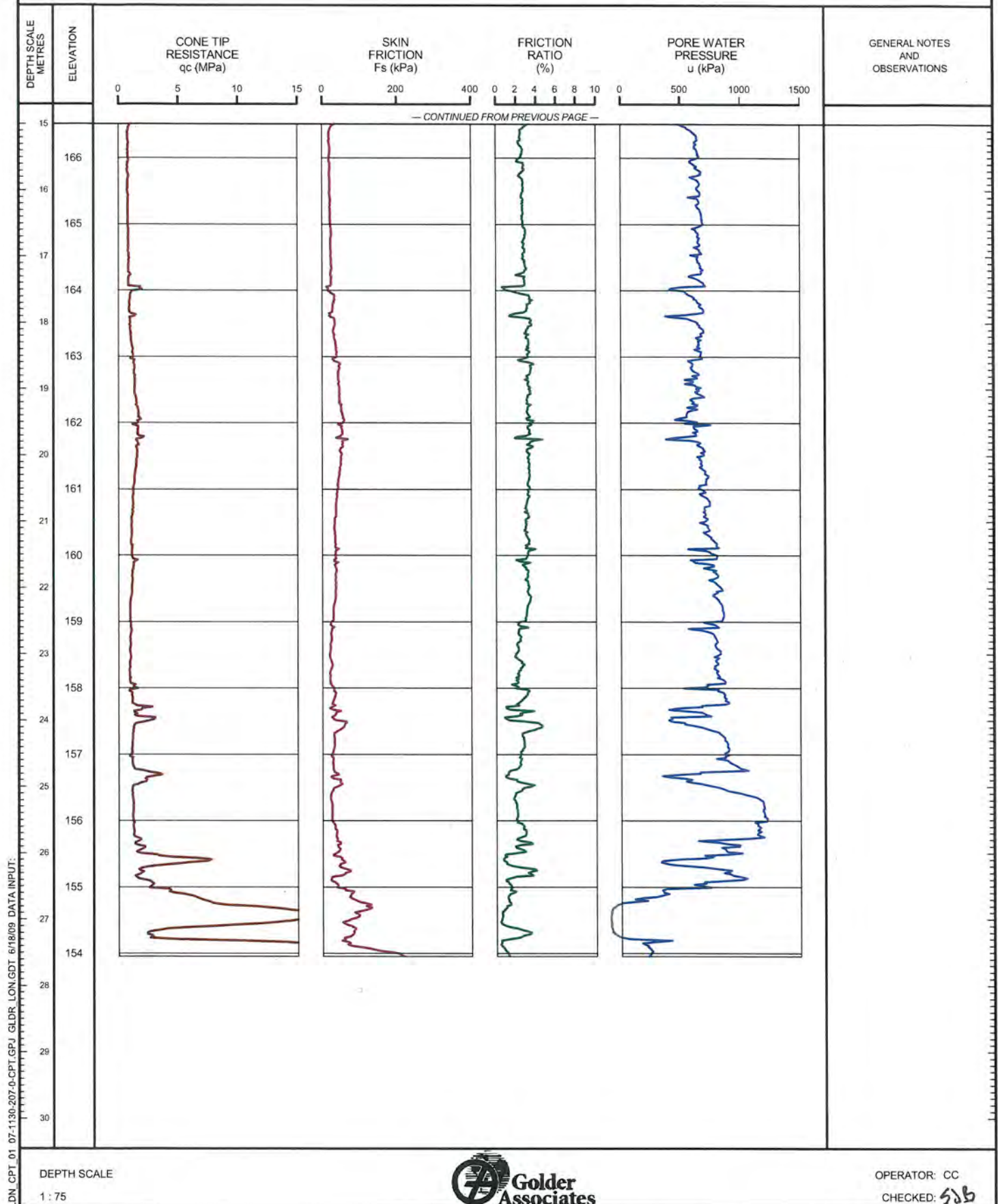
SHEET 2 OF 2

LOCATION: N 4679354.6 :E 332455.0

TEST DATE: September 29, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 3.81m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-319

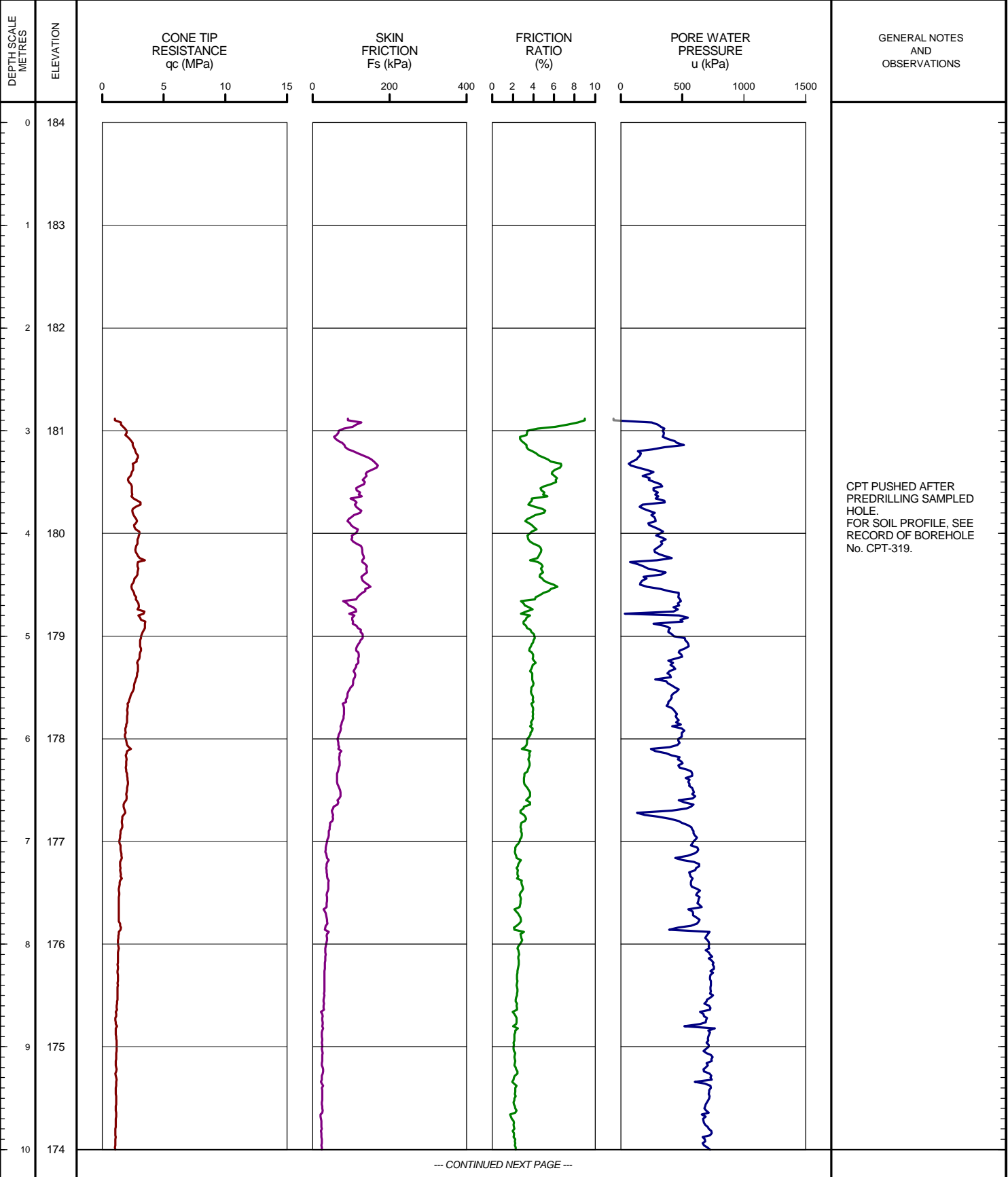
SHEET 1 OF 4

LOCATION: N 4679084.5 ;E 332701.0

TEST DATE: December 22, 2009

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 183.71m PREDRILL DEPTH: m CORRECTION FACTOR A: CORRECTION FACTOR B:



CPT PUSHED AFTER
PREDRILLING SAMPLED
HOLE.
FOR SOIL PROFILE, SEE
RECORD OF BOREHOLE
No. CPT-319.

LDN_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-319

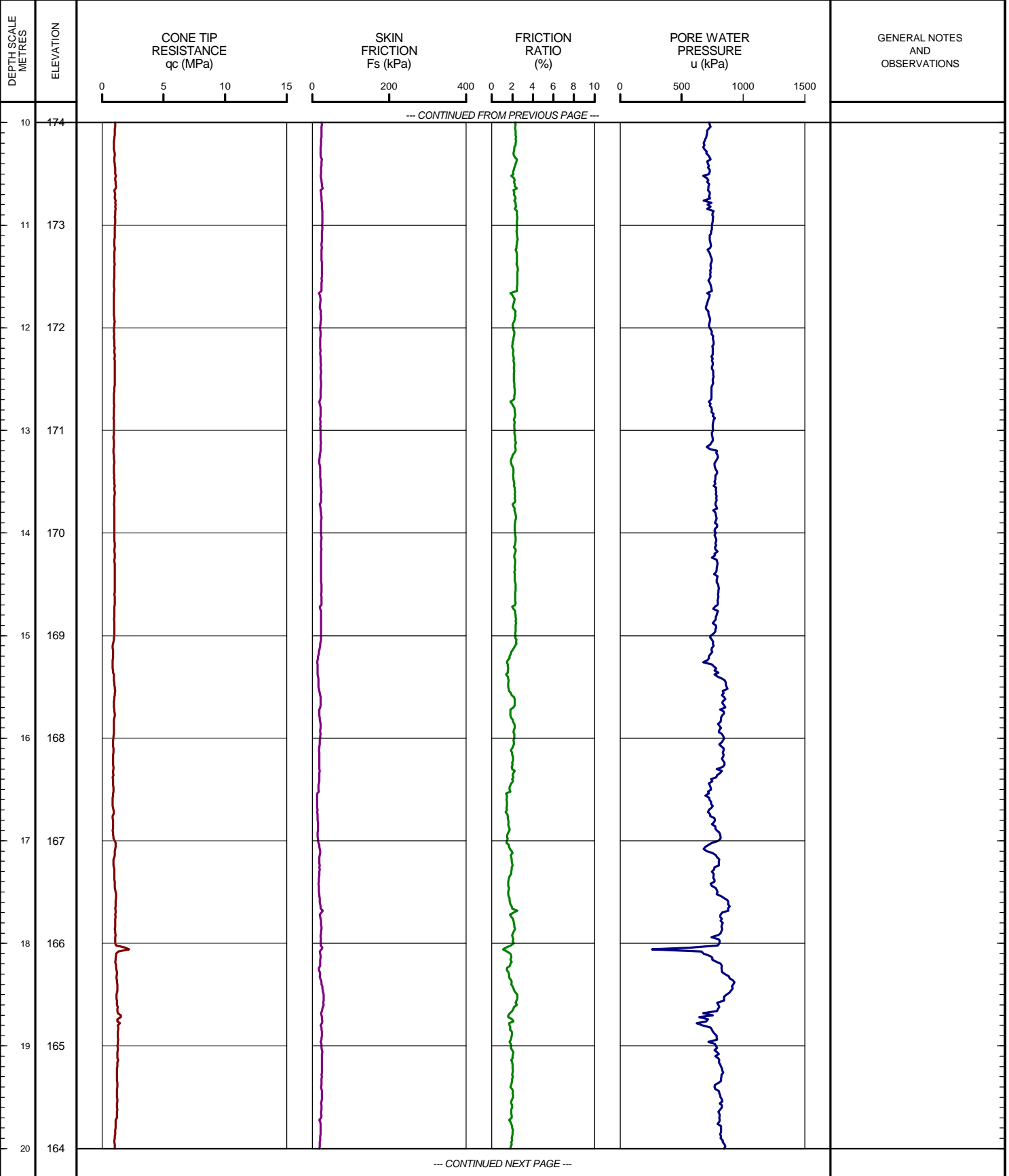
SHEET 2 OF 4

LOCATION: N 4679084.5 ;E 332701.0

TEST DATE: December 22, 2009

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 183.71m PREDRILL DEPTH: m CORRECTION FACTOR A: CORRECTION FACTOR B:



LDN_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

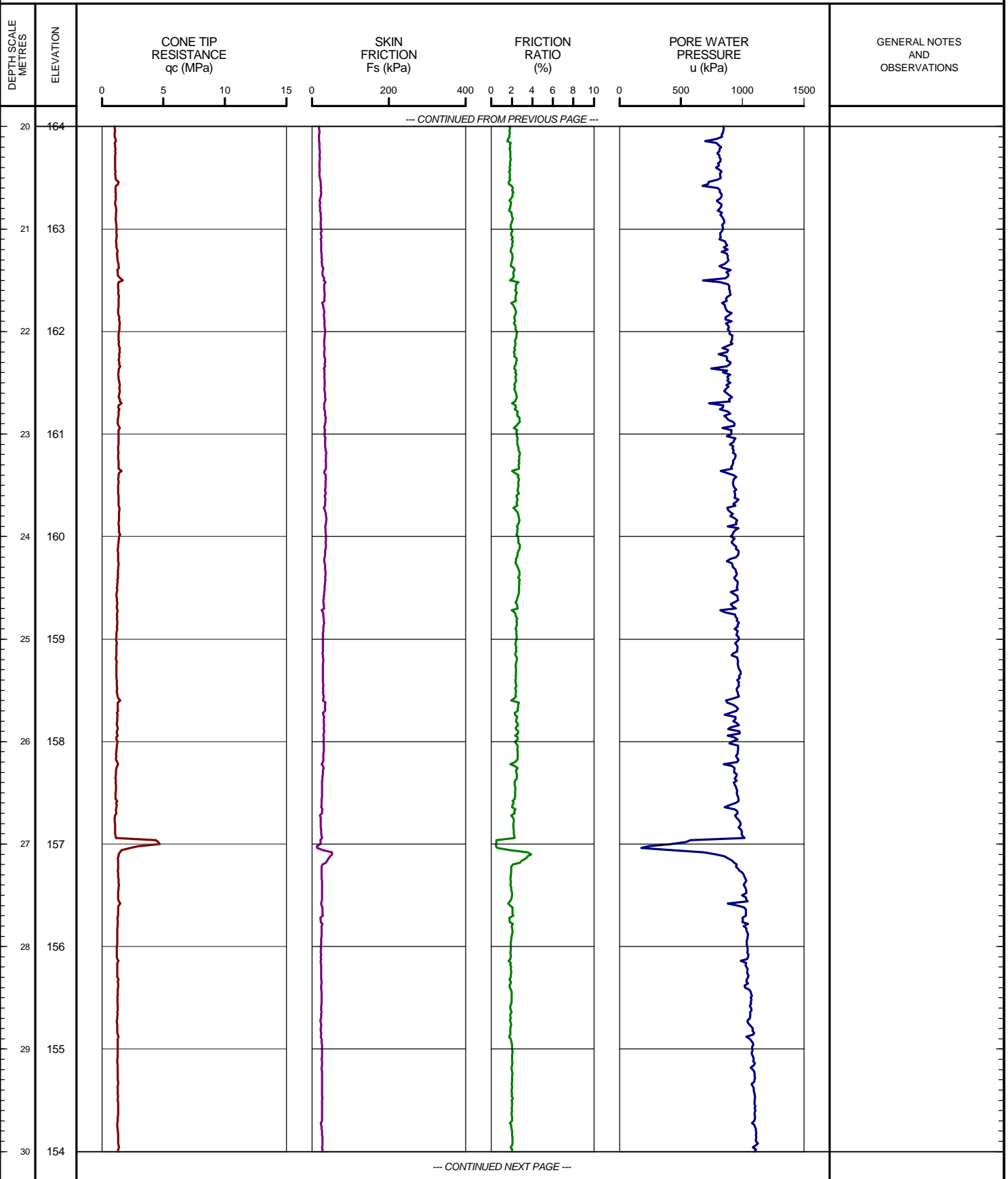
PROJECT: 09-1132-0080
LOCATION: N 4679084.5 ;E 332701.0

RECORD OF CONE PENETRATION TEST CPT-319

TEST DATE: December 22, 2009

SHEET 3 OF 4
DATUM: GEODETIC

GROUND SURFACE ELEVATION: 183.71m PREDRILL DEPTH: m CORRECTION FACTOR A: CORRECTION FACTOR B:



LON_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE
1 : 50



OPERATOR: TA
CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-319

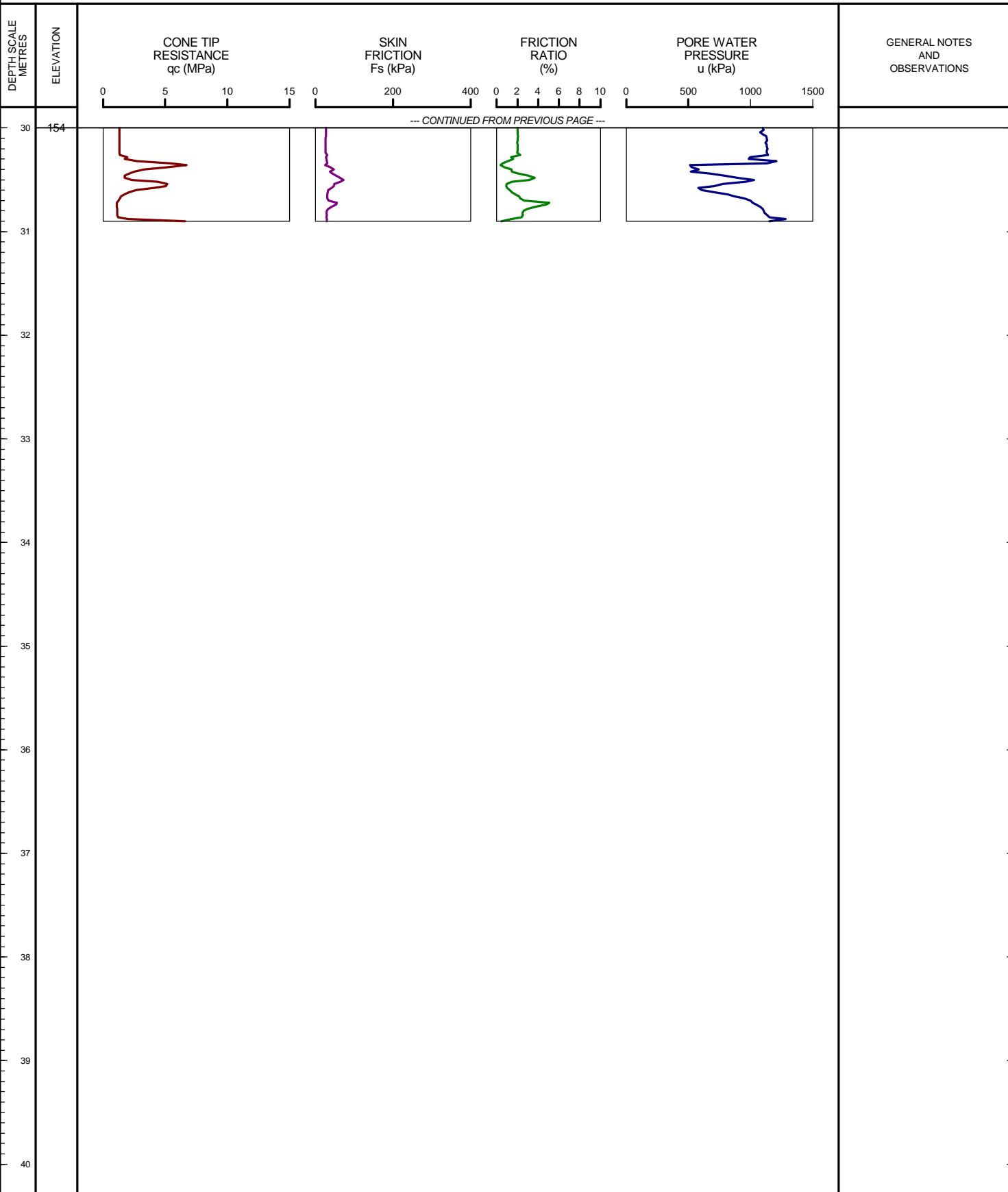
SHEET 4 OF 4

LOCATION: N 4679084.5 ;E 332701.0

TEST DATE: December 22, 2009

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 183.71m PREDRILL DEPTH: m CORRECTION FACTOR A: CORRECTION FACTOR B:



DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

LDN_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-320

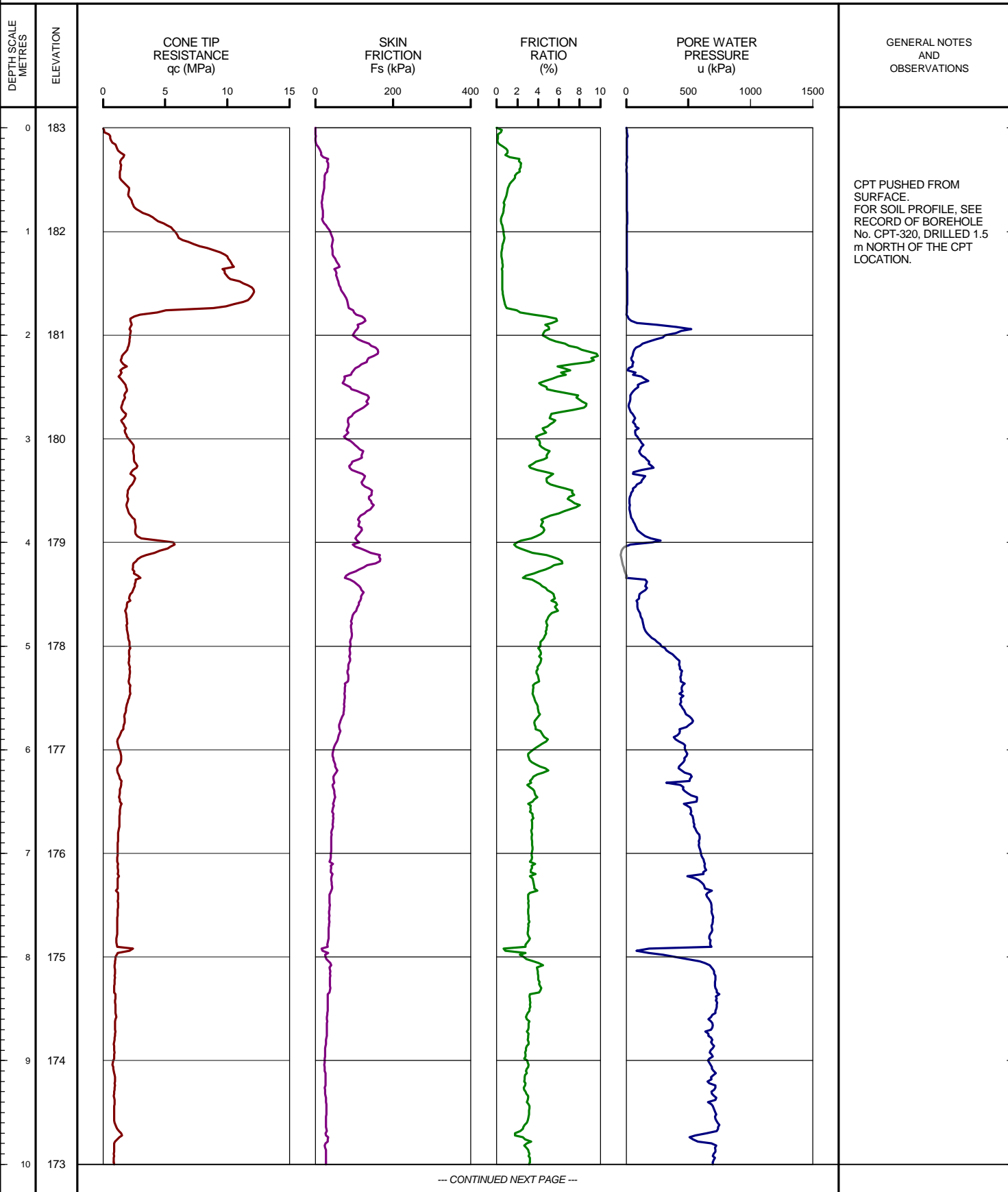
SHEET 1 OF 3

LOCATION: N 4679155.5 ;E 332737.0

TEST DATE: December 22, 2009

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 183.50m PREDRILL DEPTH: 0.00m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LON_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-320

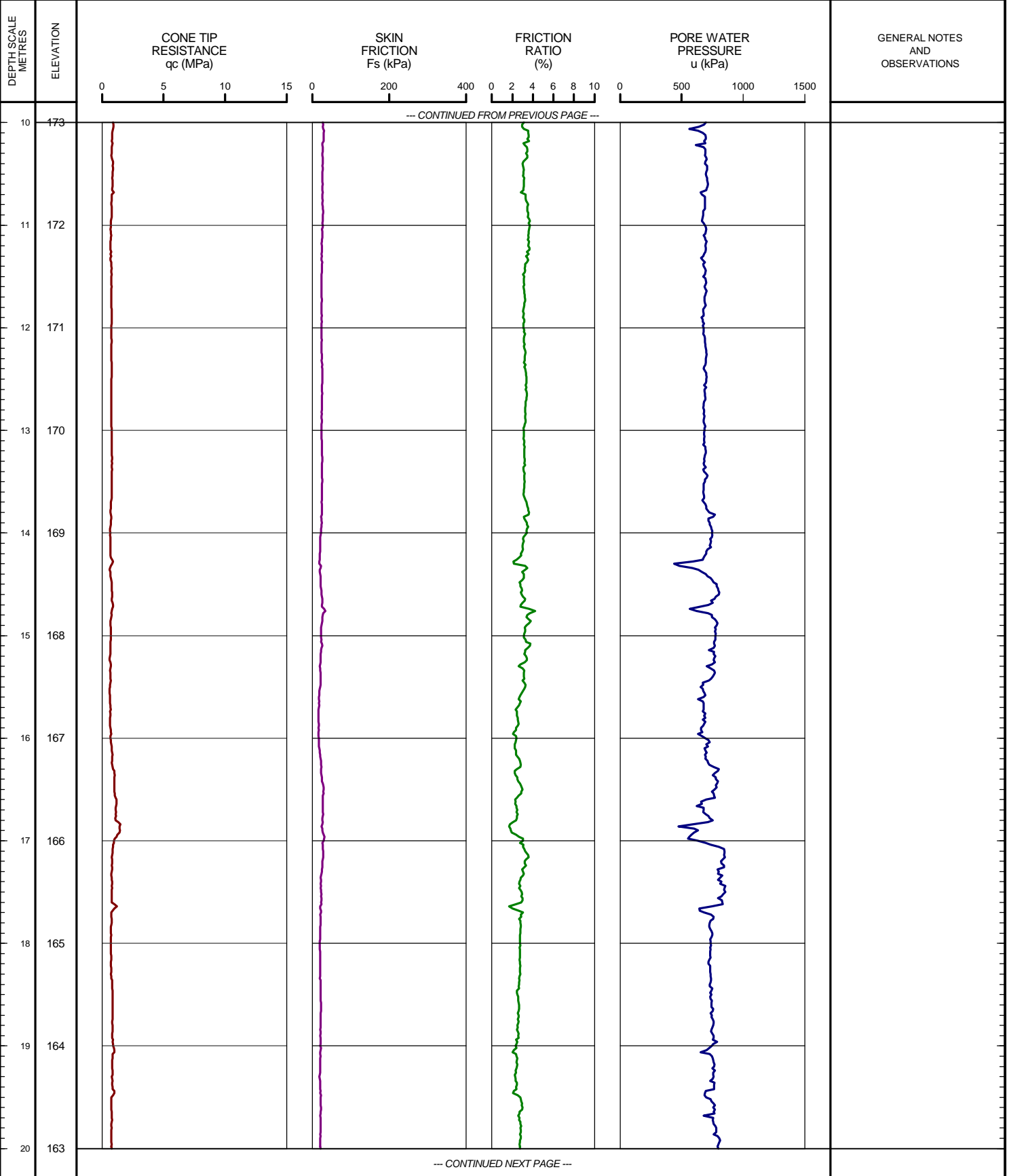
SHEET 2 OF 3

LOCATION: N 4679155.5 ;E 332737.0

TEST DATE: December 22, 2009

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 183.50m PREDRILL DEPTH: 0.00m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LON_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-320

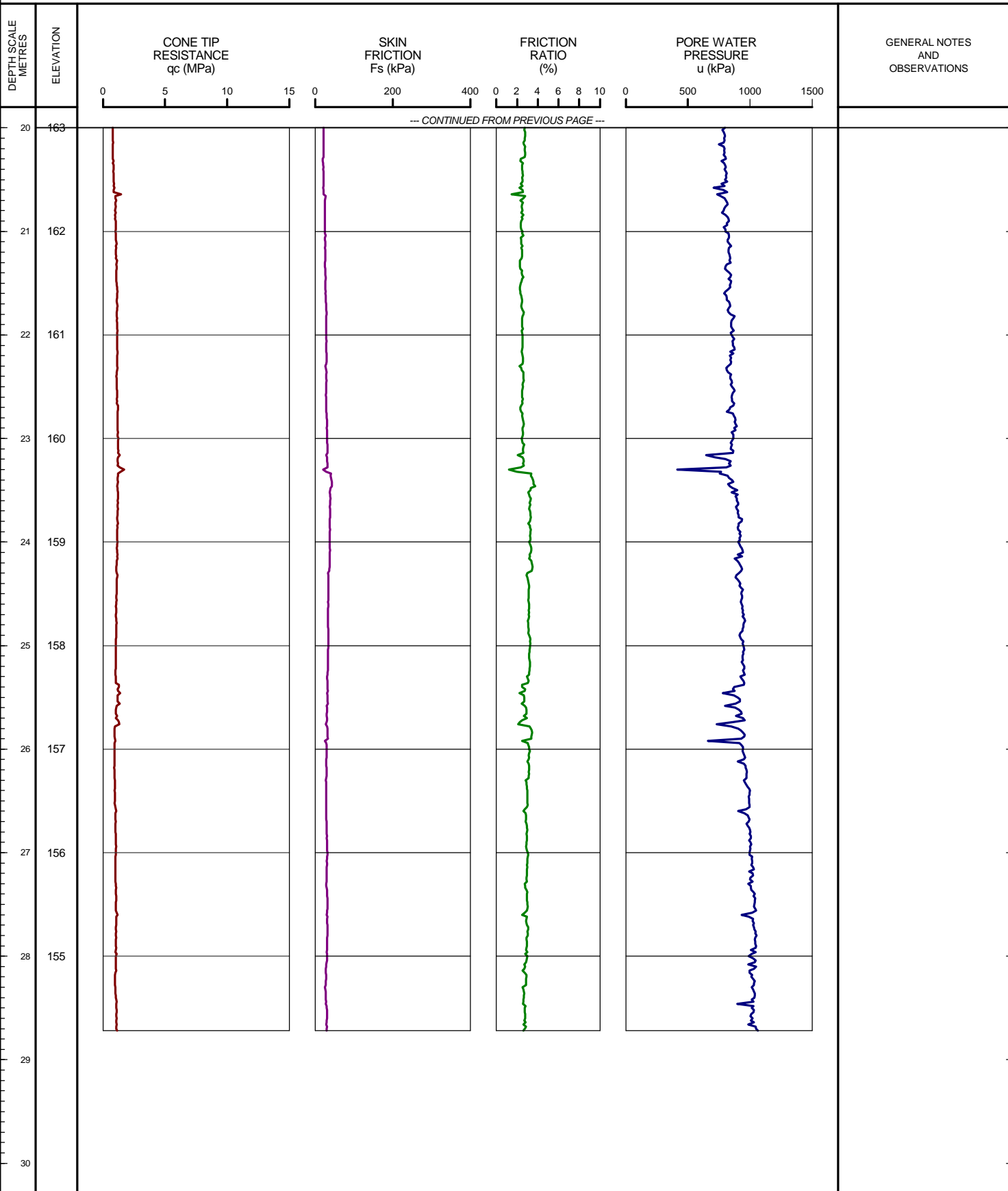
SHEET 3 OF 3

LOCATION: N 4679155.5 ;E 332737.0

TEST DATE: December 22, 2009

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 183.50m PREDRILL DEPTH: 0.00m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LON_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-322

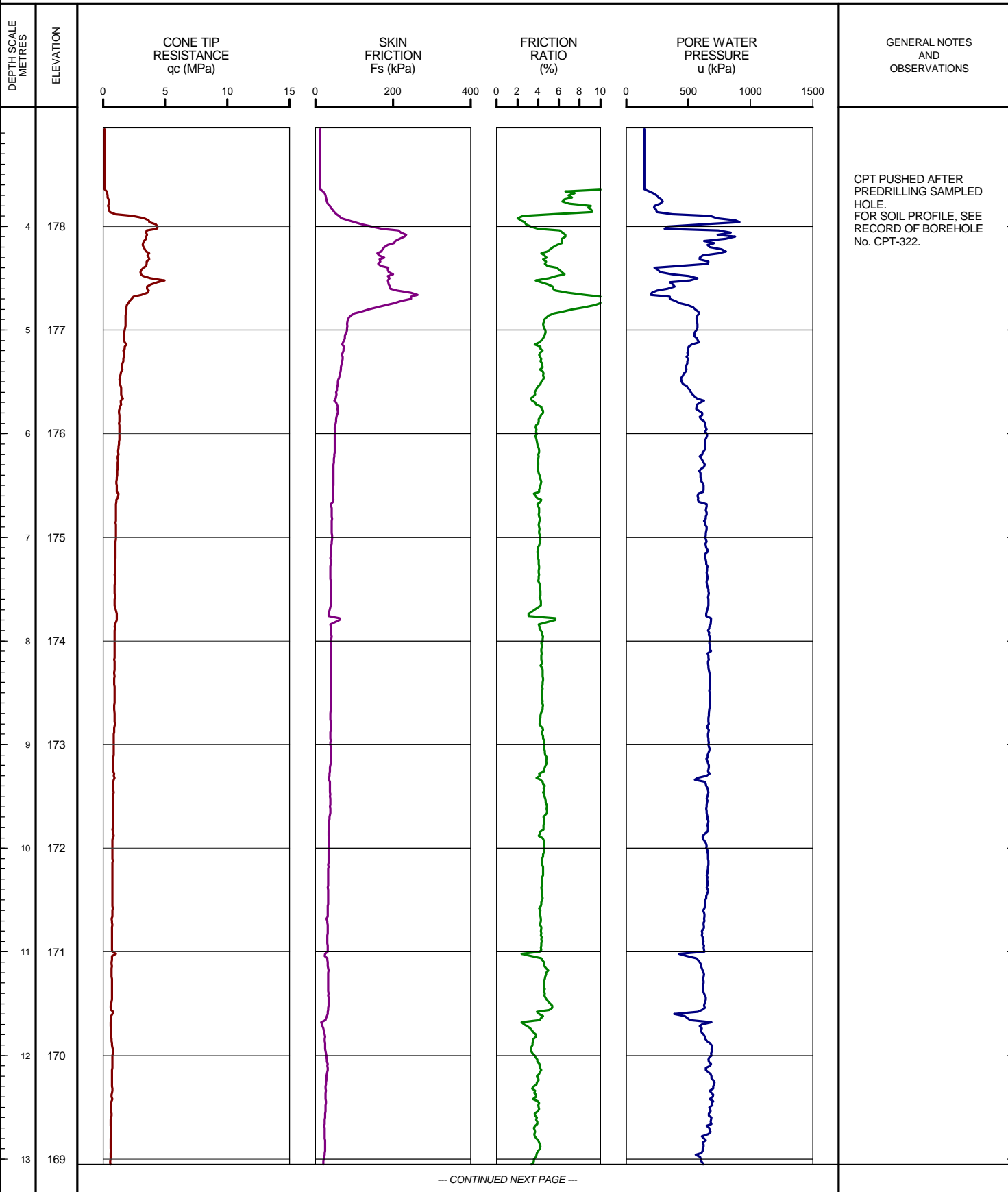
SHEET 1 OF 2

LOCATION: N 4679294.0 ;E 332478.2

TEST DATE: January 8, 2010

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 181.50m PREDRILL DEPTH: 3.05m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-322

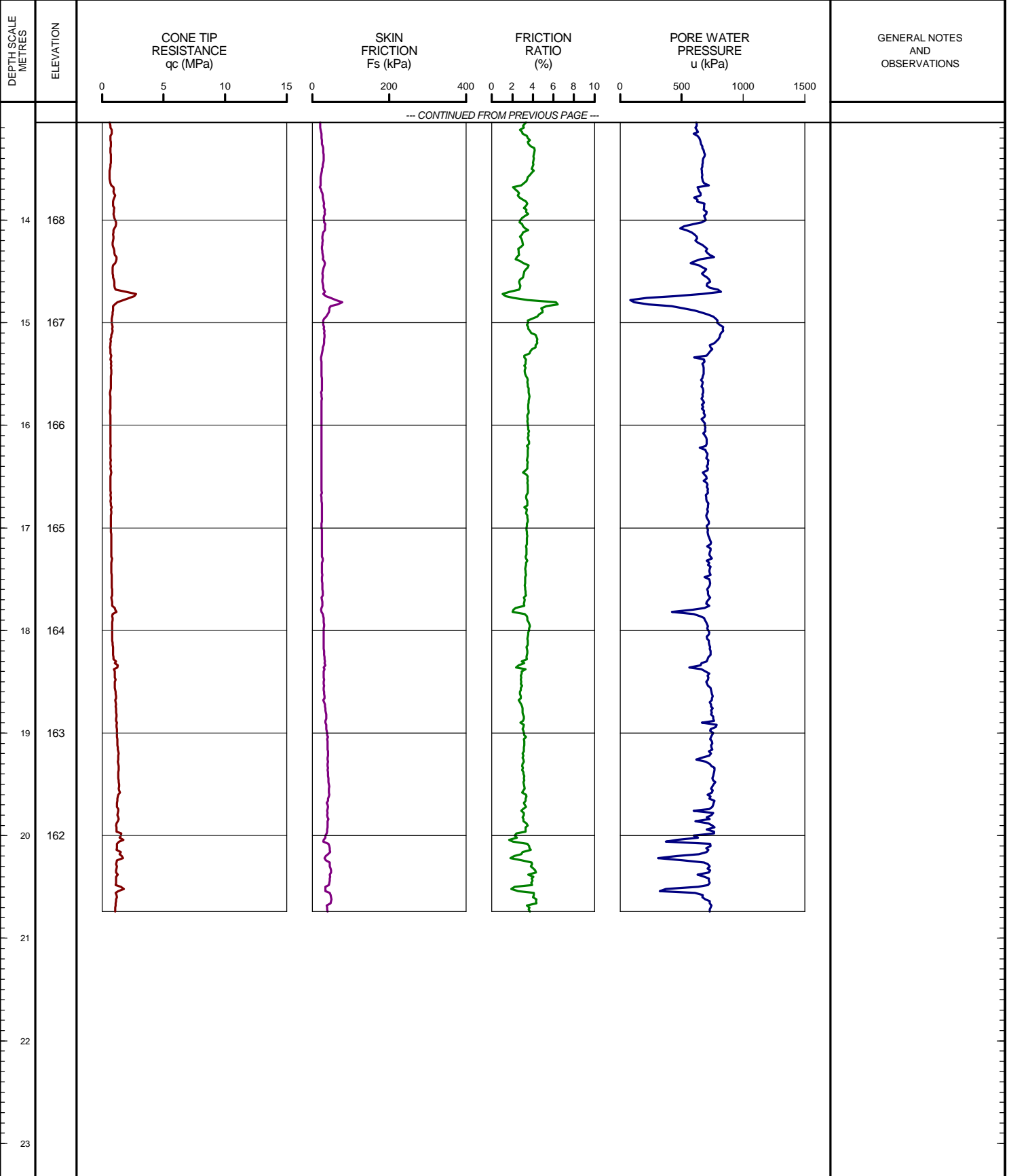
SHEET 2 OF 2

LOCATION: N 4679294.0 ;E 332478.2

TEST DATE: January 8, 2010

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 181.50m PREDRILL DEPTH: 3.05m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LON_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

Station 10+900L to Station 11+500L (Soil Profile #11)

RECORD OF BOREHOLE No 119

1 OF 4

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4678961.6 ; E 333120.6

ORIGINATED BY SM

DIST WEST HWY 401/3

BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

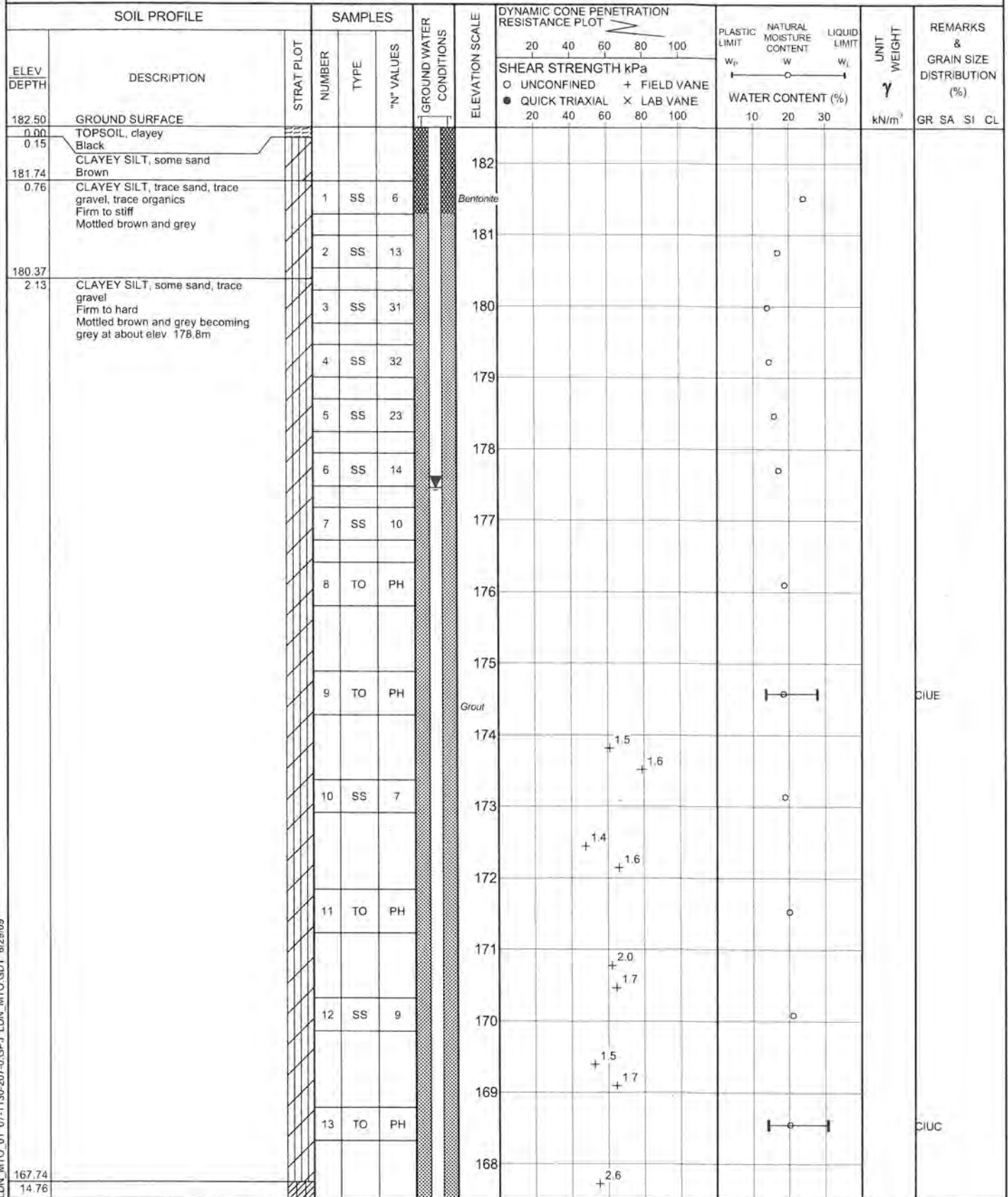
COMPILED BY BRS

DATUM GEODETIC

DATE

February 12, 2008 - February 20, 2008

CHECKED BY SJS

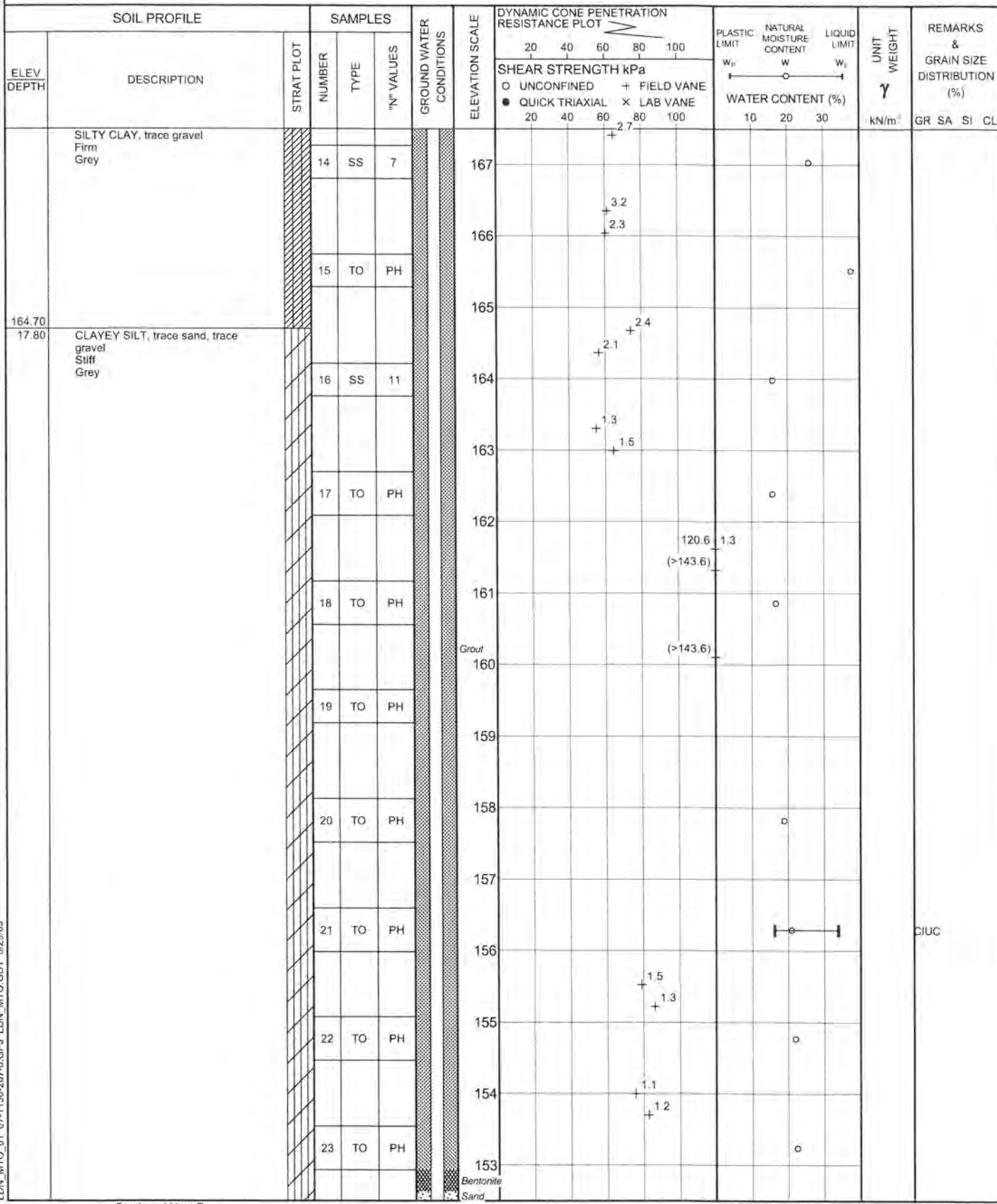


LDN_MTO_01_07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

Continued Next Page

+ 3, X 3 Numbers refer to Sensitivity O 3% STRAIN AT FAILURE

| | | | | | |
|-----------------------------------|--|--|--|-------------------------|---------------|
| PROJECT <u>07-1130-207-0</u> | | RECORD OF BOREHOLE No 119 | | 2 OF 4 | METRIC |
| W.P. _____ | | LOCATION <u>N 4678961.6 : E 333120.6</u> | | ORIGINATED BY <u>SM</u> | |
| DIST <u>WEST</u> HWY <u>401/3</u> | | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | | COMPILED BY <u>BRS</u> | |
| DATUM <u>GEODETIC</u> | | DATE <u>February 12, 2008 - February 20, 2008</u> | | CHECKED BY <u>SJB</u> | |



LDN_MTO_01_07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

Continued Next Page

+ 3 x 3 Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No 119

3 OF 4

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4678961.6 : E 333120.6

ORIGINATED BY SM

DIST

WEST

HWY 401/3

BOREHOLE TYPE

POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

COMPILED BY BRS

DATUM GEODETIC

DATE

February 12, 2008 - February 20, 2008

CHECKED BY *SSB*

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | PLASTIC LIMIT W _P | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|---|------------|---------|-------|------------|-------------------------|-----------------|--|-----------------|-----------------|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 40 60 80 100 | 20 40 60 80 100 | 20 40 60 80 100 | | | | | |
| 151.18 | CLAYEY SILT, trace sand, trace gravel Stiff Grey | | 24 | TO | PH | | 152 | | | | | | | | |
| 31.32 | SAND AND GRAVEL (Possible glacial till or weathered rock) | | 25 | SS | 50/0mm | | 151 | | | | | | | | |
| 150.40 | LIMESTONE, fresh, medium strong, thinly laminated to laminated, very fine to fine grained, faintly porous to porous, light grey (FOR DETAILED DESCRIPTIONS REFER TO RECORD OF DRILLHOLE) | | 26 | NQ RC | | | 150 | 48 | 44 | 44 | | | | | |
| 32.10 | | | 27 | NQ RC | | | 149 | 95 | 91 | 89 | | | | | |
| | | | 28 | NQ RC | | | 147 | 100 | 100 | 100 | | | | | |
| | | | 29 | NQ RC | | | 146 | 67 | 53 | 55 | | | | | |
| 145.54 | END OF BOREHOLE | | | | | | | | | | | | | | |
| 36.96 | Borehole dry during drilling on February 19, 2008. Water level measured in deep piezometer at elev. 178.18m on March 20, 2008. Water level measured in deep piezometer at elev. 177.78m on July 22, 2008. Water level measured in deep piezometer at elev. 178.85m on August 11, 2008. Water level measured in deep piezometer at elev. 176.03m on September 19, 2008. Water level measured in deep piezometer at elev. 177.16m on November 11, 2008. Water level measured in deep piezometer at elev. 177.45m on January 28, 2009. | | | | | | | | | | | | | | |

+ 3, X 3

Numbers refer to Sensitivity

○ 3% STRAIN AT FAILURE

PROJECT: 07-1130-207-0

RECORD OF DRILLHOLE: 119

SHEET 4 OF 4

LOCATION: N 4678961.6 :E 333120.6

DRILLING DATE: February 12, 2008 - February 19, 2008

DATUM: GEODETIC

INCLINATION: -90° AZIMUTH: --

DRILL RIG: MUD ROTARY WITH HQ TRICONE, NQRC

DRILLING CONTRACTOR: AARDVARK DRILLING INC

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. | | RUN No. | PENETRATION RATE (m/min) | COLOUR % RETURN | FLUSH | ELEVATION | RECOVERY | | | | R.Q.D. % | FRACT INDEX PER 0.3 | DISCONTINUITY DATA | | | | HYDRAULIC CONDUCTIVITY k. cm/sec. | DIAMETRAL INDEX (MPa) | NOTES WATER LEVELS INSTRUMENTATION |
|-----------------------|----------------------------|---|--------------|-----------------|------------|---------|-----------------------------|--------------------|-------|-----------|-----------------|-----------------|---------------------------------|------------------------|-------------|---------------------------|------------------------|------------------------|------------------------|--|---|--------------------------|--|
| | | | | DEPTH (m) | CORRECTION | | | | | | TOTAL CORE % | SOLID CORE % | TYPE AND SURFACE DESCRIPTION | DIP w.r.t CORE AXIS | | | DIP w.r.t CORE AXIS | DIP w.r.t CORE AXIS | DIP w.r.t CORE AXIS | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | |
| | | ROCK SURFACE | | 150.40 | | | | | | | | | | | | | | | | | | | |
| | MUD ROTARY NO ROCK CORE | LIMESTONE, fresh, medium strong, laminated, fine grained, faintly porous, light grey-brown | | 32.10 | | | | | | 150 | | | | | | | | | | | | | |
| 33 | | | | 149.37 | | | | | | | | | | | | | | | | | | | |
| | | LIMESTONE, fresh, medium strong, thinly laminated, fine grained, porous, light grey-tan | | 33.13 | | | | | | 149 | | | | | | | | | | | | | |
| 34 | | | | 148.30 | | | | | | | | | | | | | | | | | | | |
| | | LIMESTONE, fresh, medium strong, laminated, very fine grained, faintly porous, light grey | | 34.20 148.03 | | | | | | 148 | | | | | | | | | | | | | |
| | | LIMESTONE, fresh, medium strong, thinly laminated, fine grained, faintly porous, light grey-brown, fossiliferous, porous zones from 35.36m to 35.51m and 35.81m to 36.03m | | 34.47 | | | | | | 147 | | | | | | | | | | | | | |
| 35 | | | | | | | | | | | | | | | | | | | | | | | |
| | | LIMESTONE, fresh, medium strong, thinly laminated, fine grained to very fine grained, faintly porous, light grey, porous zone 36.52m to 36.67m | | 146.47 36.03 | | | | | | 146 | | | | | | | | | | | | | |
| 36 | | | | | | | | | | | | | | | | | | | | | | | |
| | | END OF DRILLHOLE | | 145.54 36.96 | | | | | | | | | | | | | | | | | | | |
| 37 | | | | | | | | | | | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | | | | | | | | | | | |
| 39 | | | | | | | | | | | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | | | | | | | | | | | |
| 41 | | | | | | | | | | | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | | | | | | | | | | | |
| 43 | | | | | | | | | | | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | | | | | | | | | | | |
| 45 | | | | | | | | | | | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | | | | | | | | | | | |
| 47 | | | | | | | | | | | | | | | | | | | | | | | |

DEPTH SCALE

1:75



LOGGED: SG

CHECKED: SJB

LDN ROCK 03 07-1130-207-0-ROCK.GPJ GLDR LDN.GDT 6/29/09 DATA INPUT: WDF

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4678961.6 E 333120.6

ORIGINATED BY SM

DIST

WEST

HWY 401/3

BOREHOLE TYPE

POWER AUGER, HOLLOW STEM

COMPILED BY BRS

DATUM GEODETIC

DATE _____

February 20, 2008

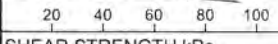
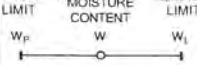



CHECKED BY SSB

[illegible]

DN MTO 01 07-1130-207-0.GPJ LDN MTO.GDT 5/29/09

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

| | | | | | |
|-----------------------------------|--|--|--|-------------------------|---------------|
| PROJECT <u>07-1130-207-0</u> | | RECORD OF BOREHOLE No CPT-120 | | 1 OF 1 | METRIC |
| W.P. _____ | | LOCATION <u>N 4678947.2 :E 333029.8</u> | | ORIGINATED BY <u>CC</u> | |
| DIST <u>WEST</u> HWY <u>401/3</u> | | BOREHOLE TYPE <u>POWER AUGER, SOLID STEM</u> | | COMPILED BY <u>SJL</u> | |
| DATUM <u>GEODETIC</u> | | DATE <u>September 8, 2008</u> | | CHECKED BY <u>SJB</u> | |

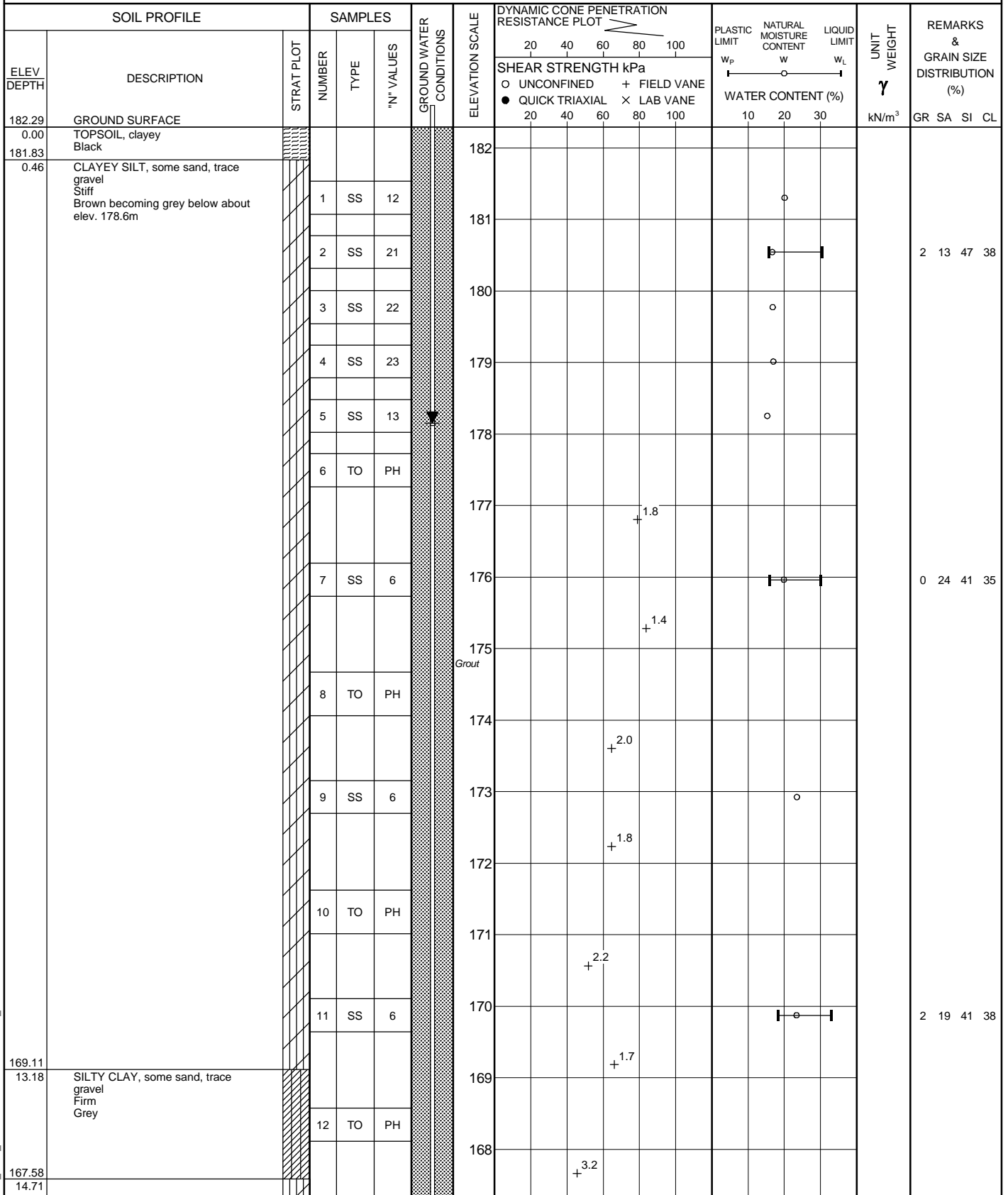
| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT  SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL X LAB VANE | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT  | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
|--------------|---|---|---------|------|------------|-------------------------|-----------------|--|--|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | | | | |
| 184.49 | GROUND SURFACE | | | | | | | | | | |
| 0.00 | FILL, clayey topsoil, with clayey silt pockets Very stiff Brown |  | 1 | SS | 20 | | 184 | | | | |
| 183.90 | CLAYEY SILT, trace to some sand, trace gravel Hard Mottled brown and grey |  | 2 | SS | 41 | | | | | | |
| 182.66 | |  | 3 | SS | 52 | | 183 | | | | |
| 1.83 | END OF BOREHOLE Borehole dry during drilling on September 8, 2008. | | | | | | | | | | |

| | | | | | |
|-----------------------------------|--|--|--|-------------------------|---------------|
| PROJECT <u>07-1130-207-0</u> | | RECORD OF BOREHOLE No CPT-121 | | 1 OF 1 | METRIC |
| W.P. _____ | | LOCATION <u>N 4679024.8 :E 333077.4</u> | | ORIGINATED BY <u>CC</u> | |
| DIST <u>WEST</u> HWY <u>401/3</u> | | BOREHOLE TYPE <u>POWER AUGER, SOLID STEM</u> | | COMPILED BY <u>SJL</u> | |
| DATUM <u>GEODETIC</u> | | DATE <u>September 10, 2008</u> | | CHECKED BY <u>SJB</u> | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 | 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 | | | | | | | | |
| 181.97 | GROUND SURFACE | | | | | | | | | | | | |
| 0.08 | TOPSOIL, clayey Very soft Brown CLAYEY SILT, trace to some sand, trace gravel Stiff to very stiff Mottled brown and grey becoming grey at about elev. 180.8m | | 1 | SS | 8 | | | | | | | | |
| | | | 2 | SS | 11 | | | | | | | | |
| 180.14 | | | 3 | SS | 26 | | | | | | | | |
| 1.83 | END OF BOREHOLE Borehole dry during drilling on September 10, 2008. | | | | | | | | | | | | |

LDN MTO-01 07-1130-207-0 GPJ LDN MTO GDT 6/29/09

| | | | | | |
|-------------------------------------|--|--|--|----------------------------|---------------|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No 318 | | 1 OF 4 | METRIC |
| W.P. _____ | | LOCATION <u>N 4679049.3 ; E 332857.8</u> | | ORIGINATED BY <u>SM</u> | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | | COMPILED BY <u>LMK/DMB</u> | |
| DATUM <u>GEODETIC</u> | | DATE <u>December 10, 2009 - December 14, 2009</u> | | CHECKED BY _____ | |

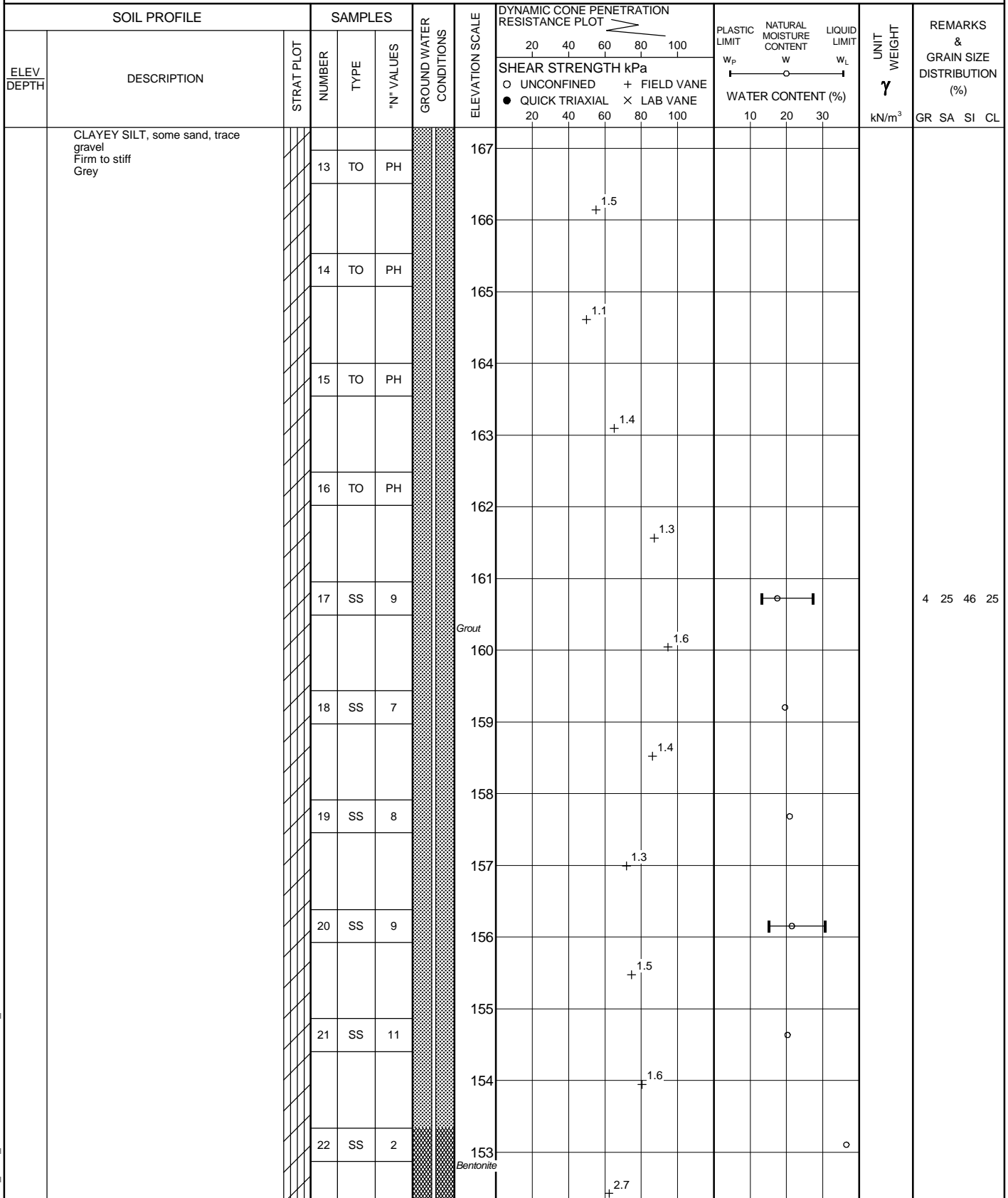


LDN_MTO_06 09-1132-0080 GPJ LDN_MTO.GDT 11/03/10

Continued Next Page

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

| | | | | | | | |
|-------------------------------------|--|--|--|----------------------------|--|---------------|--|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No 318 | | 2 OF 4 | | METRIC | |
| W.P. _____ | | LOCATION <u>N 4679049.3 ; E 332857.8</u> | | ORIGINATED BY <u>SM</u> | | | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | | COMPILED BY <u>LMK/DMB</u> | | | |
| DATUM <u>GEODETIC</u> | | DATE <u>December 10, 2009 - December 14, 2009</u> | | CHECKED BY _____ | | | |



LDN_MTO_06 09-1132-0080.GPJ LDN_MTO.GDT 11/03/10

Continued Next Page

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

| | | | | | |
|-------------------------------------|--|--|--|----------------------------|---------------|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No 318 | | 3 OF 4 | METRIC |
| W.P. _____ | | LOCATION <u>N 4679049.3 ; E 332857.8</u> | | ORIGINATED BY <u>SM</u> | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | | COMPILED BY <u>LMK/DMB</u> | |
| DATUM <u>GEODETIC</u> | | DATE <u>December 10, 2009 - December 14, 2009</u> | | CHECKED BY _____ | |

| 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 | | | | | |
| | | | | | | | | | | | | | | | | |
| 150.81 | CLAYEY SILT, some sand, trace gravel Firm to stiff Grey | | 23 | SS | 4 | | | | | | | | | | | |
| 31.48 | SAND AND GRAVEL, some silt, trace clay Compact Grey | | 24 | SS | 25 | | | | | | | | | | | |
| 149.72 | LIMESTONE, fresh, medium strong, weakly laminated, fine grained, faintly porous Light grey to brown (FOR DETAILED DESCRIPTIONS REFER TO RECORD OF DRILLHOLE) | | 25 | NQ RC | - | | | | | | | | | | | |
| 32.57 | | | 26 | NQ RC | - | | | | | | | | | | | |
| | | | 27 | NQ RC | - | | | | | | | | | | | |
| | | | 28 | NQ RC | - | | | | | | | | | | | |
| 144.93 | END OF BOREHOLE | | | | | | | | | | | | | | | |
| 37.36 | Borehole dry during drilling between December 10 and 14, 2009. Water level measured at elev. 178.35 on February 24, 2010. Water level measured at elev. 178.15 on January 6, 2010. | | | | | | | | | | | | | | | |

PROJECT: 09-1132-0080

RECORD OF DRILLHOLE: 318

SHEET 4 OF 4

LOCATION: N 4679049.3 ;E 332857.8

DRILLING DATE: December 10, 2009 - December 15, 2009

DATUM: GEODETIC

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: MUD ROTARY WITH HQ TRICONE, NQRC

DRILLING CONTRACTOR: AARDVARK

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. | RUN No. | PENETRATION RATE (m/min) | COLOUR % RETURN | FLUSH | ELEVATION | JN - Joint FLT - Fault SHR - Shear VN - Vein CJ - Conjugate BD - Bedding FO - Foliation CO - Contact OR - Orthogonal CL - Cleavage PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular PO - Polished K - Slickensided SM - Smooth Ro - Rough Br - Broken Rock NOTE: For additional abbreviations refer to list of abbreviations & symbols. | | | | | | | | | | | | | | | | RECOVERY | | | | FRACT. INDEX PER 0.3 | DISCONTINUITY DATA | | | | HYDRAULIC CONDUCTIVITY k, cm/sec | | | DIAMETRAL POINT LOAD INDEX (MPa) | | NOTES WATER LEVELS INSTRUMENTATION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | DEPTH (m) | | | | | | TOTAL CORE % | SOLID CORE % | R.Q.D. % | DIP W.R.T. CORE AXIS | | TYPE AND SURFACE DESCRIPTION | | | | 2 | 4 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | 80 60 40 20 | 80 60 40 20 | 80 60 40 20 | 5 10 15 20 | 0 30 60 90 | | 10 ⁻⁶ | 10 ⁻⁴ | 10 ⁻² | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | </ |

DEPTH SCALE

1 : 75



LOGGED: SG

CHECKED:

LDN_ROCK_03 09-1132-0080-ROCK.GPJ GLDR LDN.GDT 12/03/10 DATA INPUT: LMK

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-120

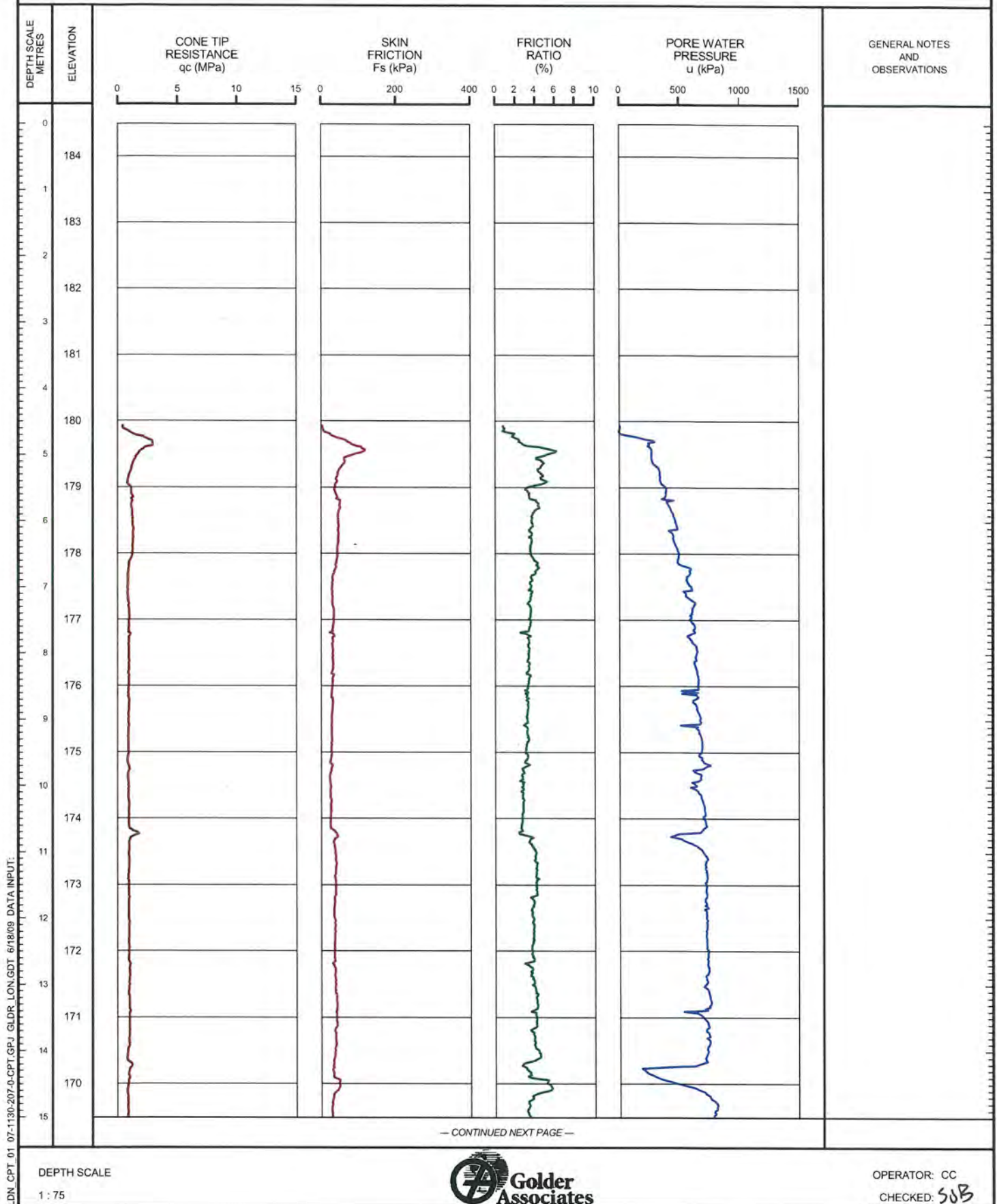
SHEET 1 OF 2

LOCATION: N 4678947.2 :E 333029.8

TEST DATE: September 8, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 4.57m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-120

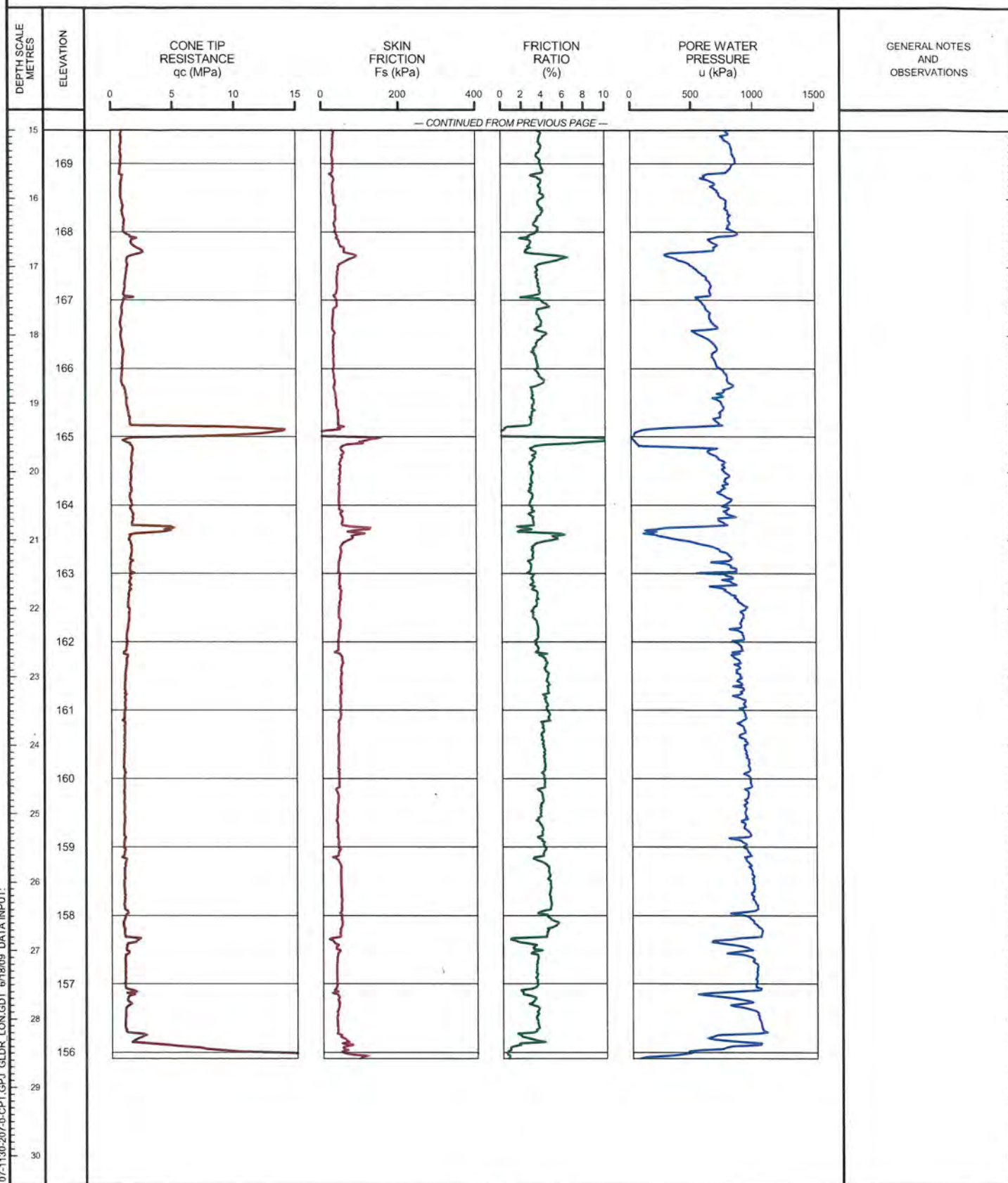
SHEET 2 OF 2

LOCATION: N 4678947.2 E 333029.8

TEST DATE: September 8, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 4.57m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LON CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE

1 : 75



OPERATOR: CC

CHECKED: *SJB*

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-121

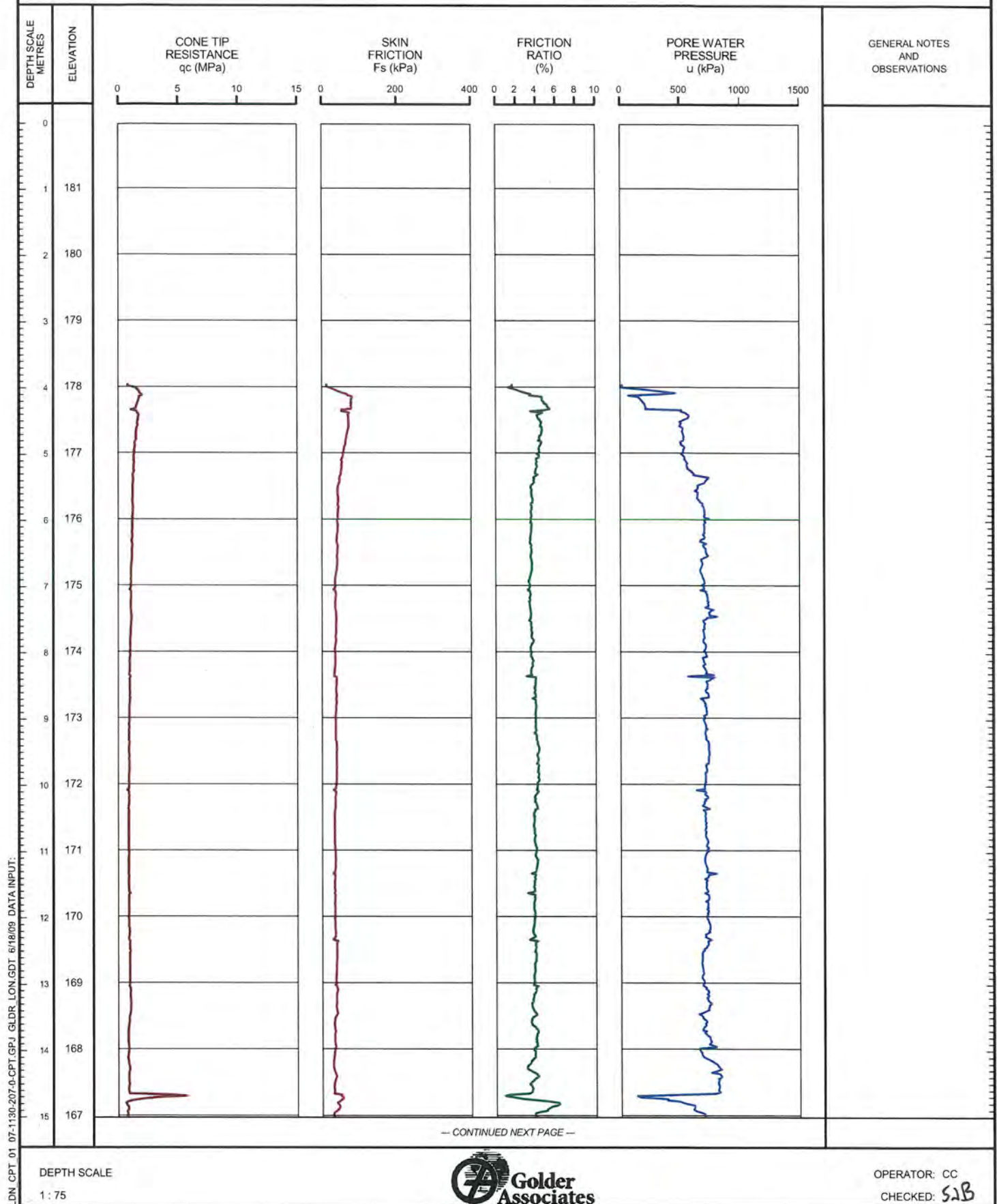
SHEET 1 OF 3

LOCATION: N 4679024.8 :E 333077.4

TEST DATE: September 10, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 3.96m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-121

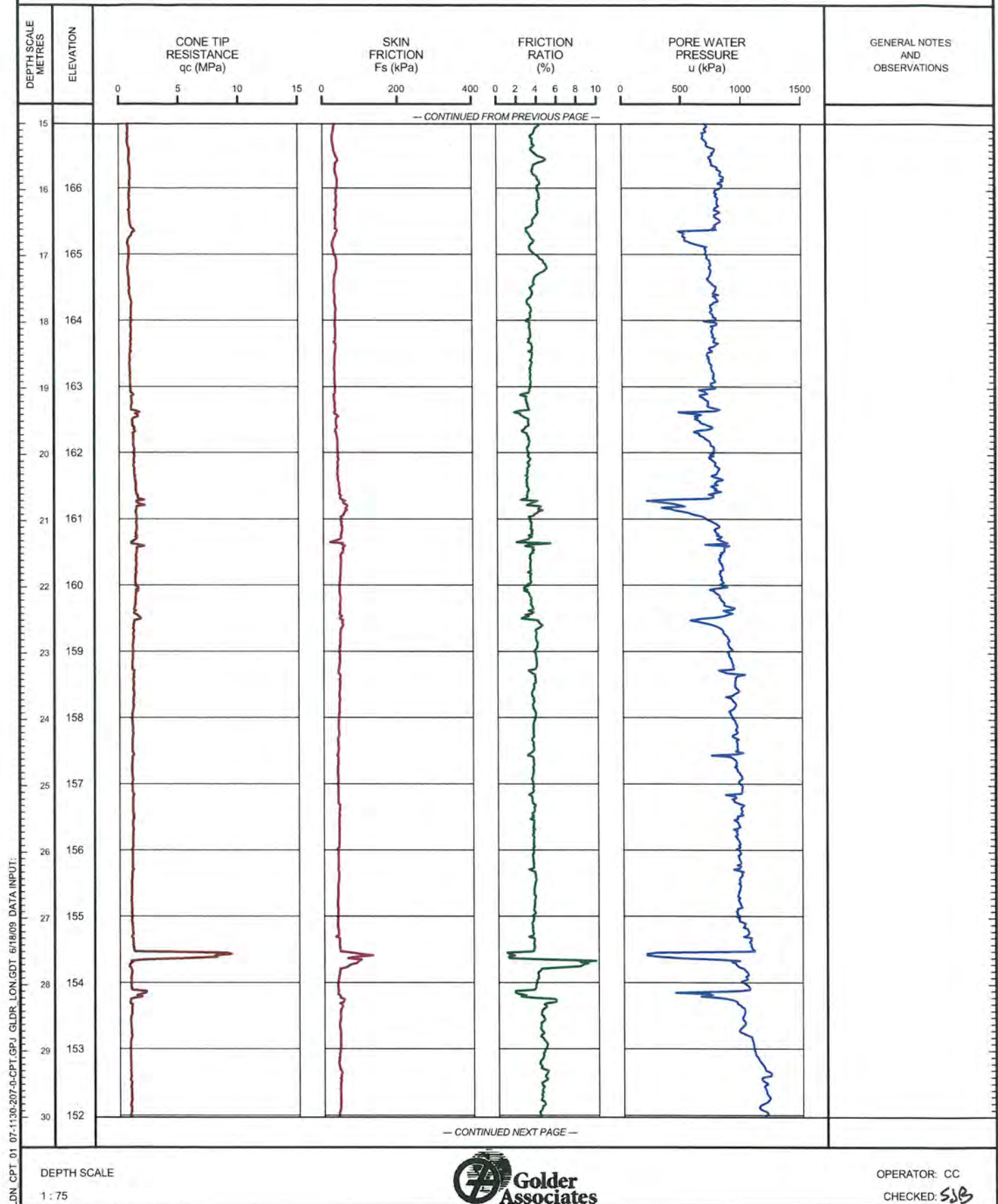
SHEET 2 OF 3

LOCATION: N 4679024.8 :E 333077.4

TEST DATE: September 10, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 3.96m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LON CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-121

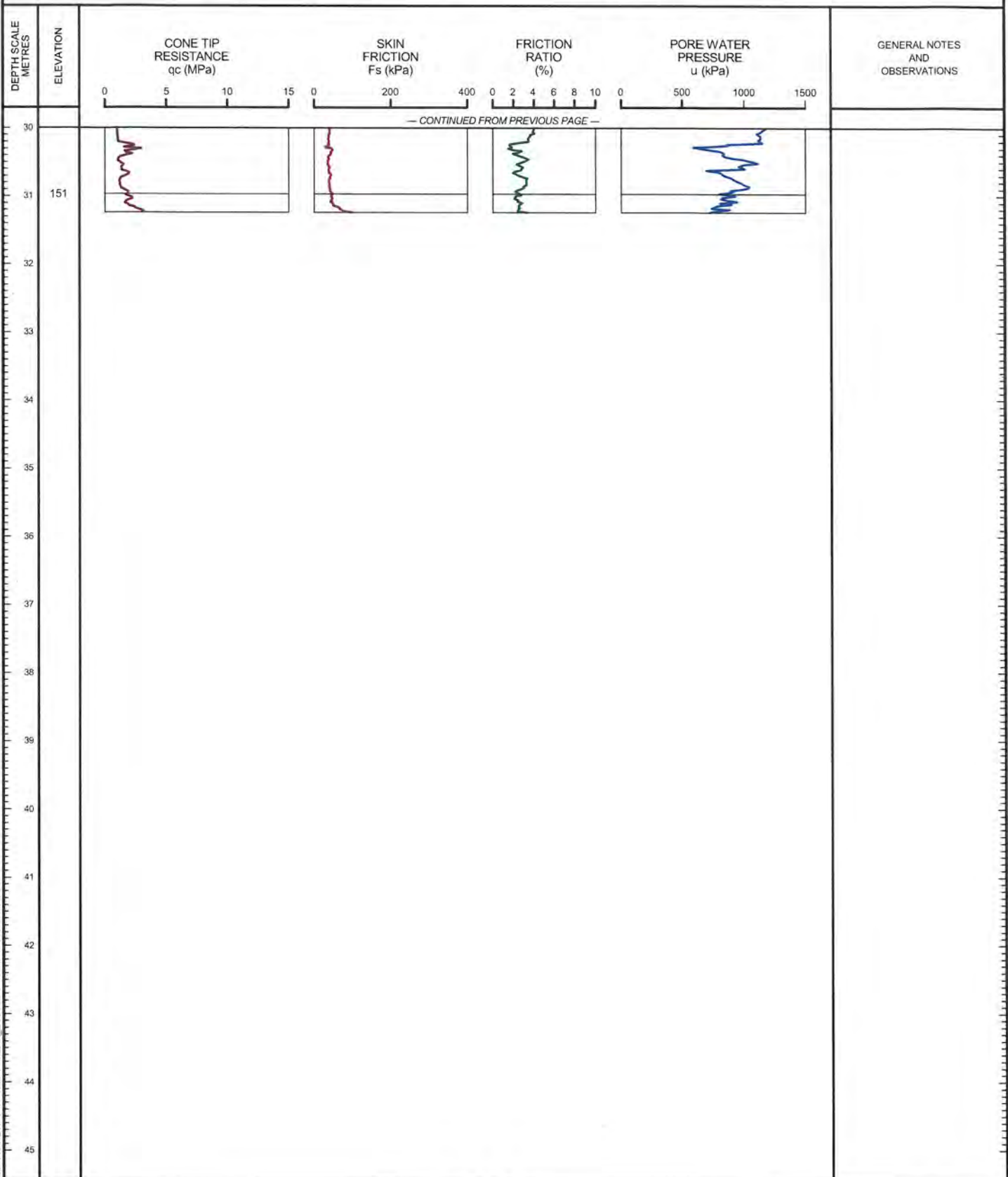
SHEET 3 OF 3

LOCATION: N 4679024.8 :E 333077.4

TEST DATE: September 10, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 3.96m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE

1 : 75



OPERATOR: CC

CHECKED: SJB

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-317

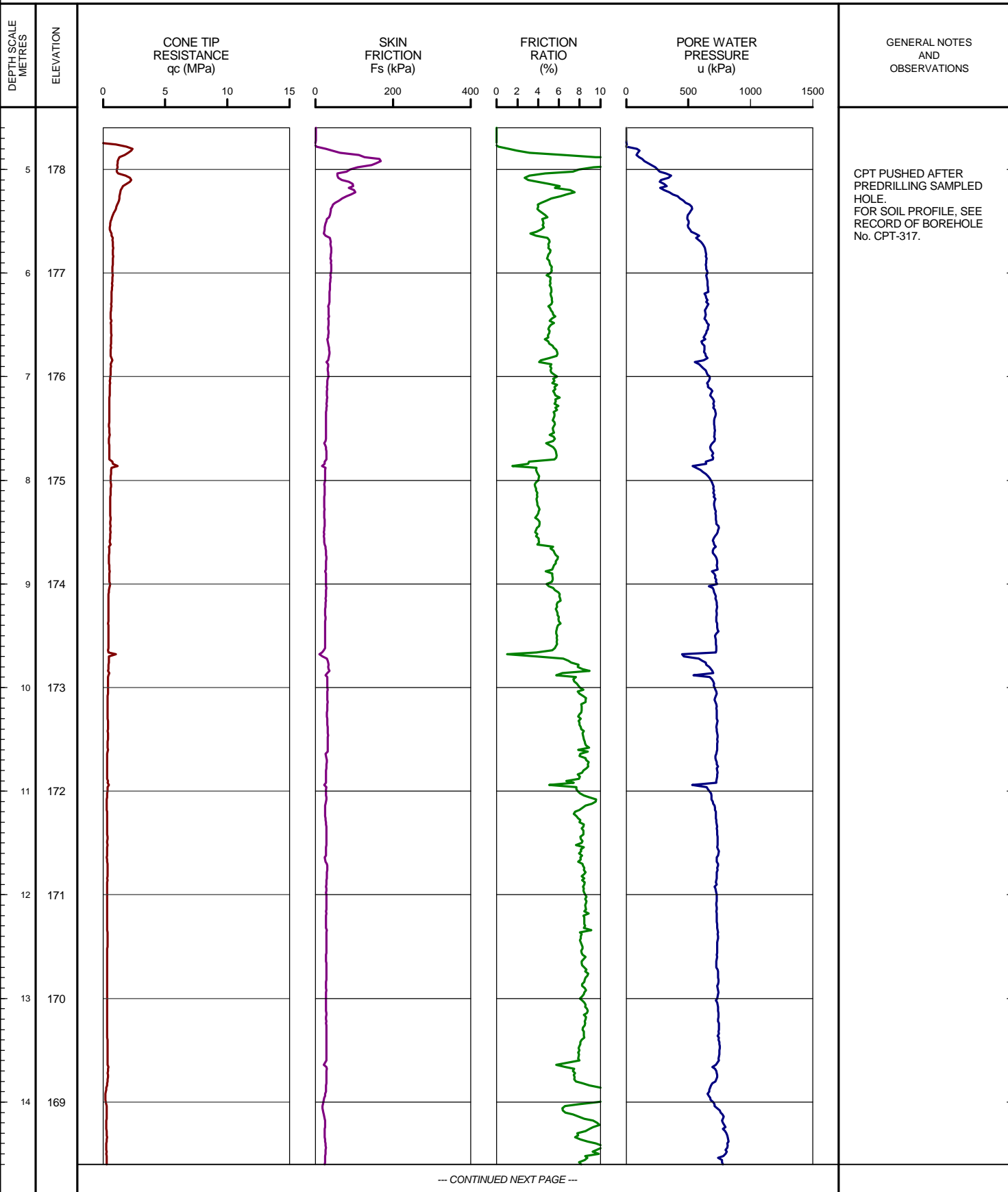
SHEET 1 OF 2

LOCATION: N 4679041.7 ;E 332972.4

TEST DATE: January 26, 2010

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 182.64m PREDRILL DEPTH: 4.60m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LDN_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

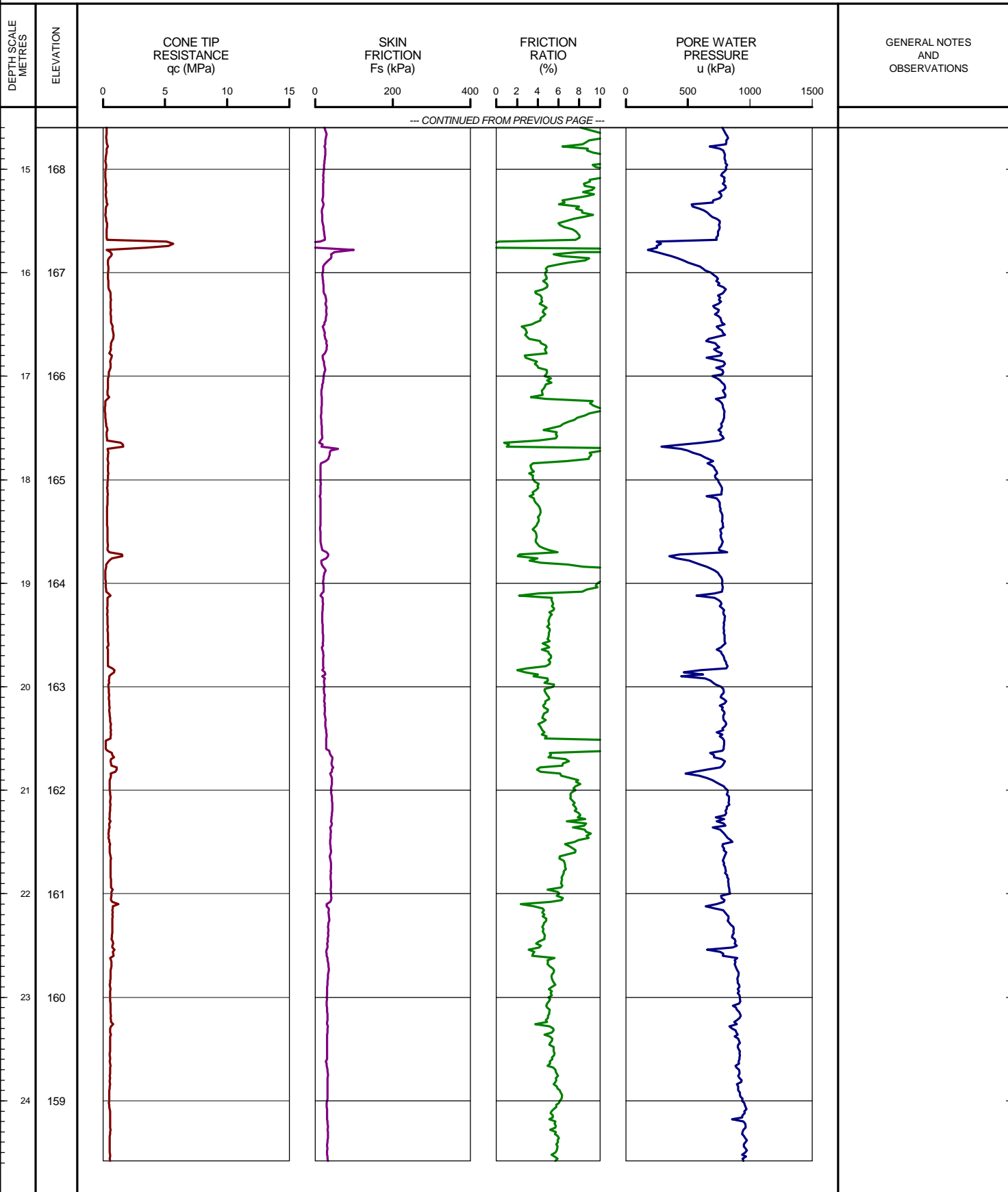
PROJECT: 09-1132-0080
LOCATION: N 4679041.7 ;E 332972.4

RECORD OF CONE PENETRATION TEST CPT-317

TEST DATE: January 26, 2010

SHEET 2 OF 2
DATUM: GEODETIC

GROUND SURFACE ELEVATION: 182.64m PREDRILL DEPTH: 4.60m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LON_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE
1 : 50



OPERATOR: TA
CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-319

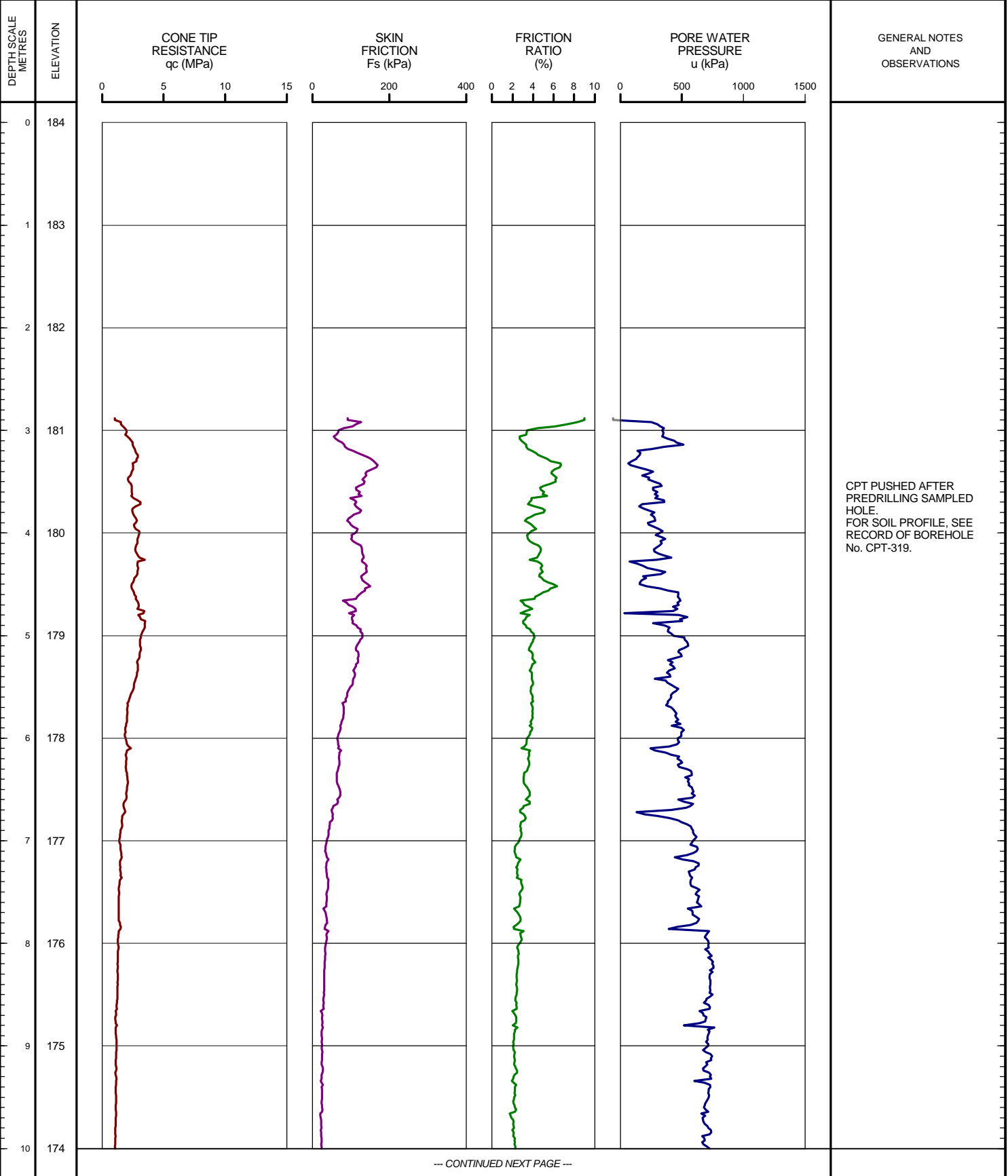
SHEET 1 OF 4

LOCATION: N 4679084.5 ;E 332701.0

TEST DATE: December 22, 2009

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 183.71m PREDRILL DEPTH: m CORRECTION FACTOR A: CORRECTION FACTOR B:



CPT PUSHED AFTER
PREDRILLING SAMPLED
HOLE.
FOR SOIL PROFILE, SEE
RECORD OF BOREHOLE
No. CPT-319.

LDN_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-319

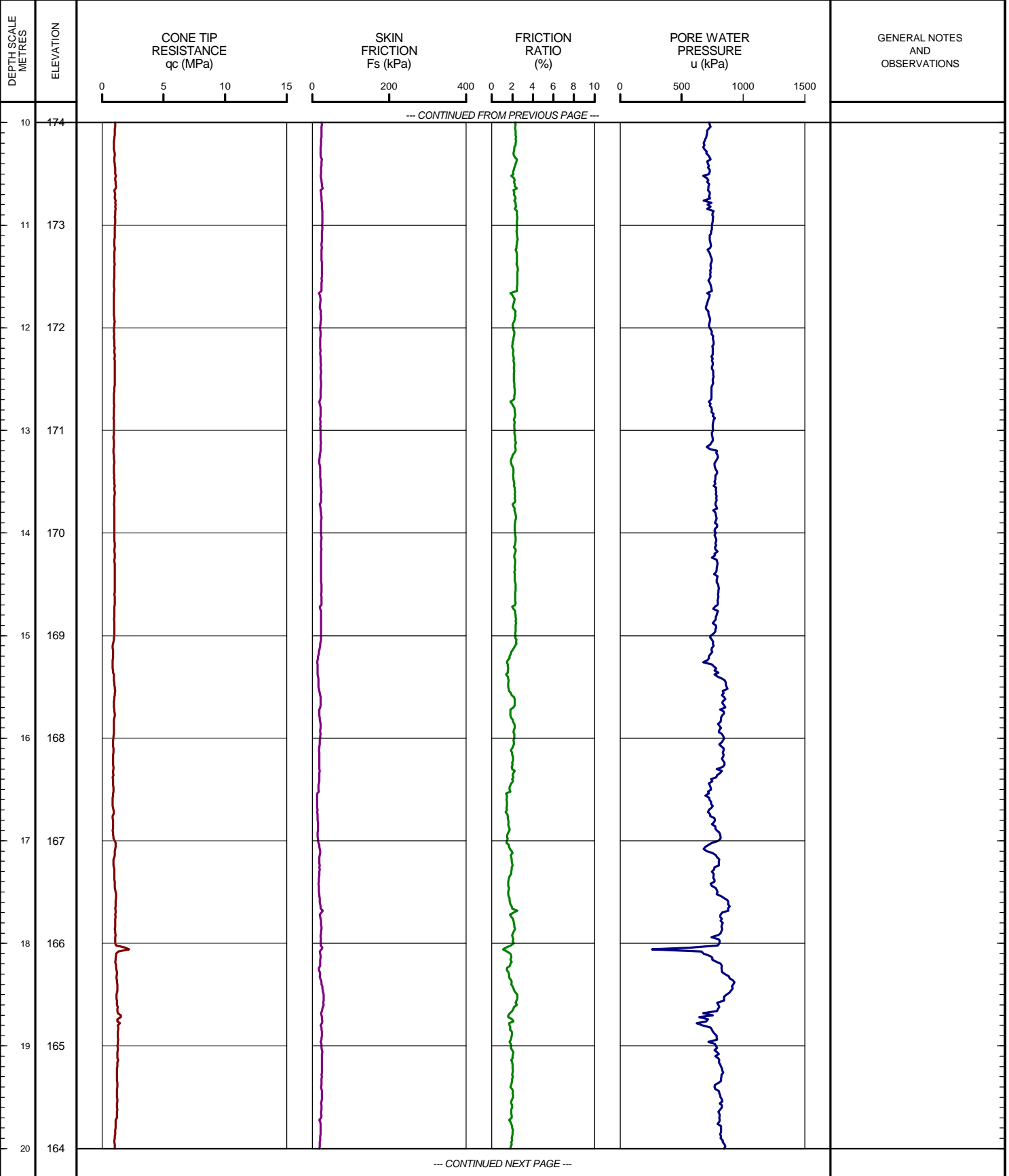
SHEET 2 OF 4

LOCATION: N 4679084.5 ;E 332701.0

TEST DATE: December 22, 2009

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 183.71m PREDRILL DEPTH: m CORRECTION FACTOR A: CORRECTION FACTOR B:



LON_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-319

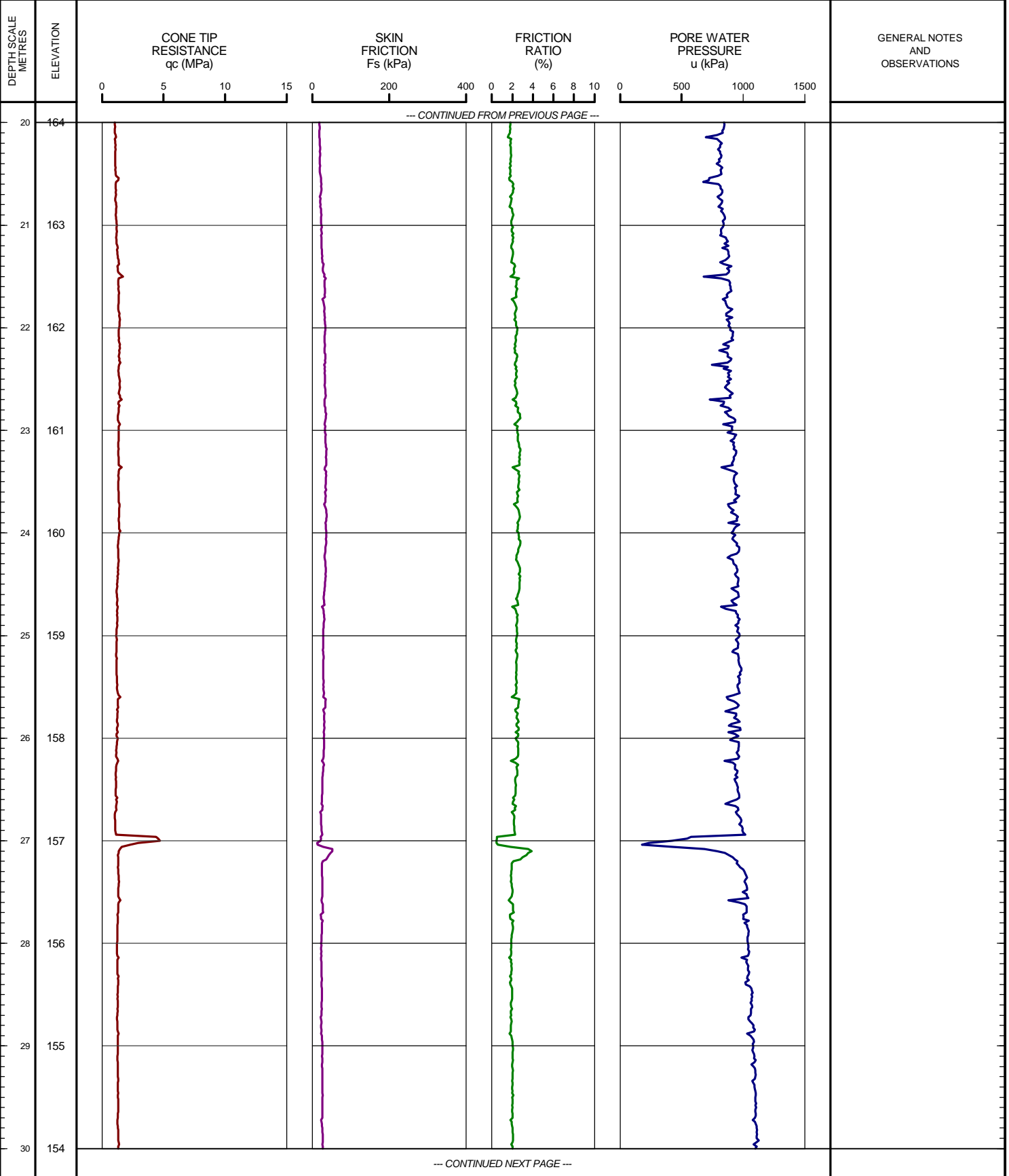
SHEET 3 OF 4

LOCATION: N 4679084.5 ;E 332701.0

TEST DATE: December 22, 2009

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 183.71m PREDRILL DEPTH: m CORRECTION FACTOR A: CORRECTION FACTOR B:



LON_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-319

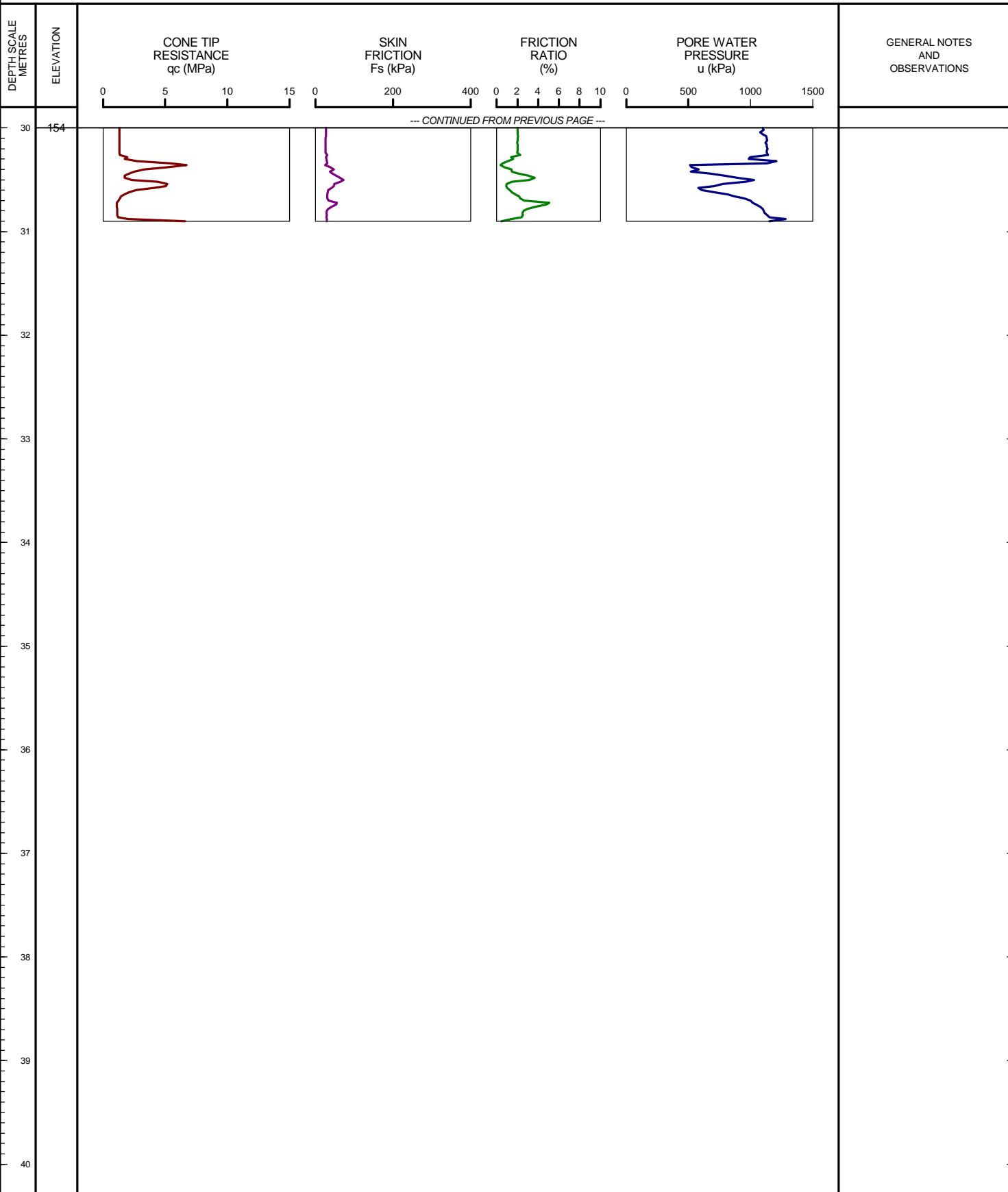
SHEET 4 OF 4

LOCATION: N 4679084.5 ;E 332701.0

TEST DATE: December 22, 2009

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 183.71m PREDRILL DEPTH: m CORRECTION FACTOR A: CORRECTION FACTOR B:



LDN_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-320

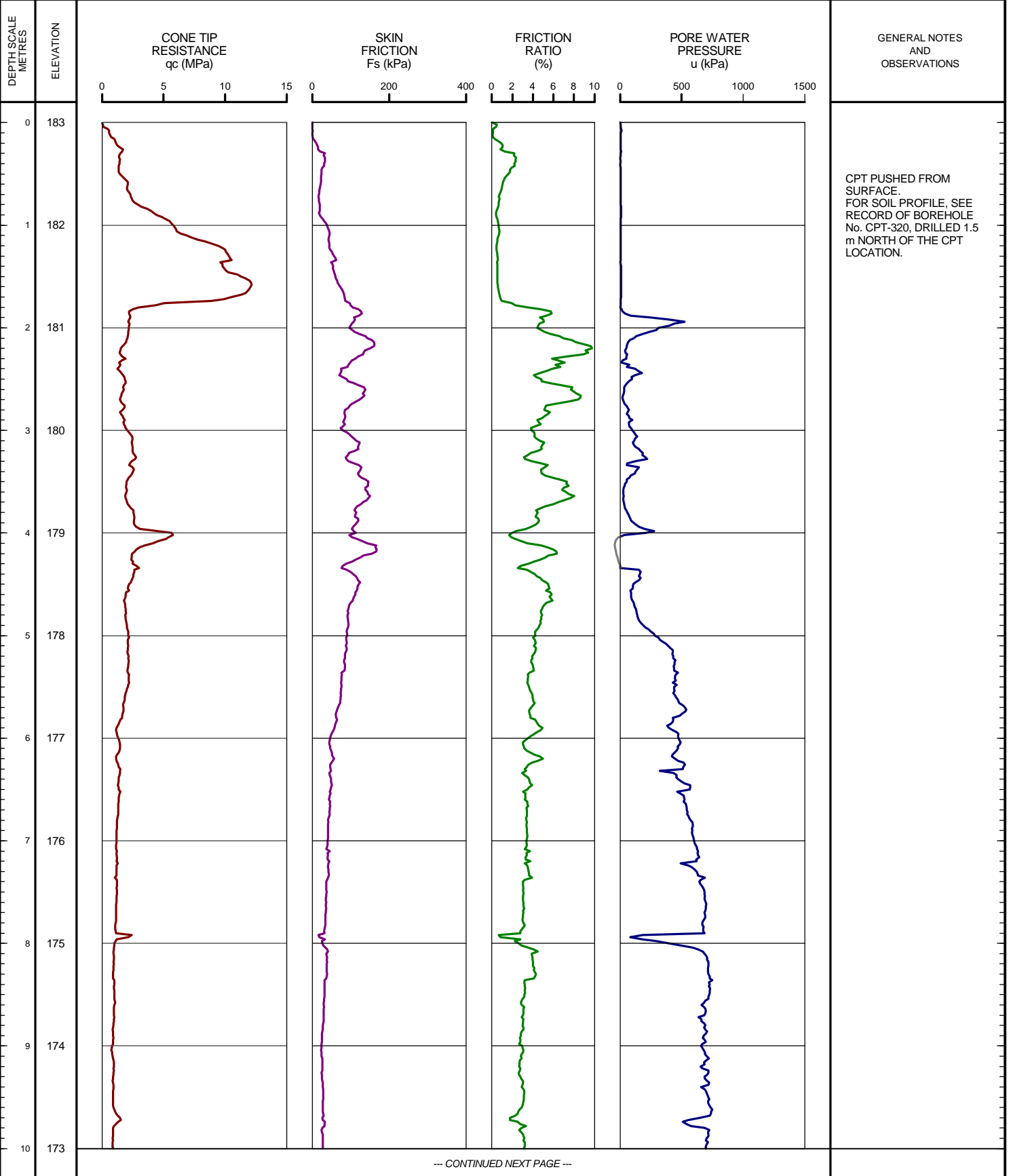
SHEET 1 OF 3

LOCATION: N 4679155.5 ;E 332737.0

TEST DATE: December 22, 2009

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 183.50m PREDRILL DEPTH: 0.00m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LON_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-320

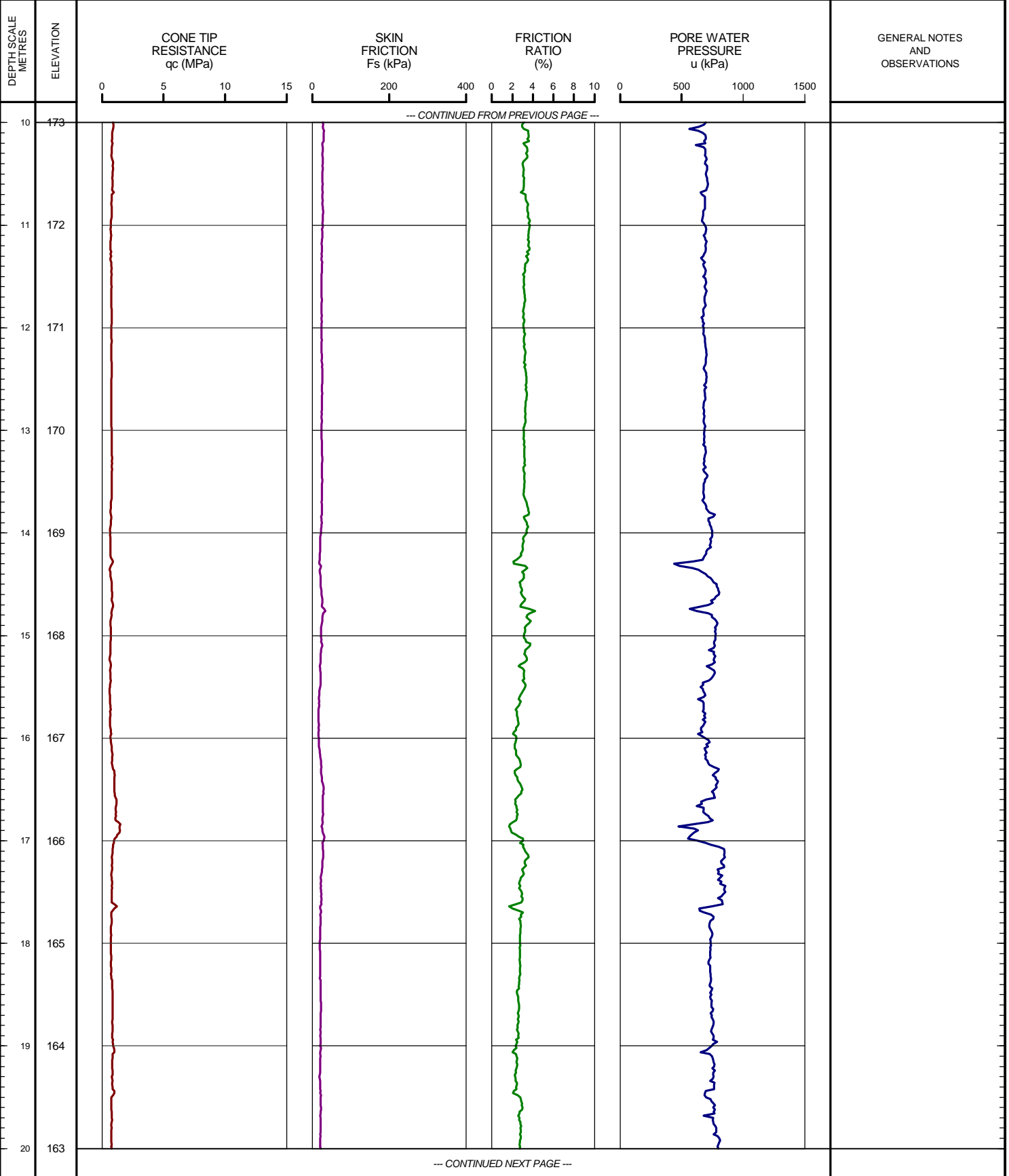
SHEET 2 OF 3

LOCATION: N 4679155.5 ;E 332737.0

TEST DATE: December 22, 2009

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 183.50m PREDRILL DEPTH: 0.00m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LON_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-320

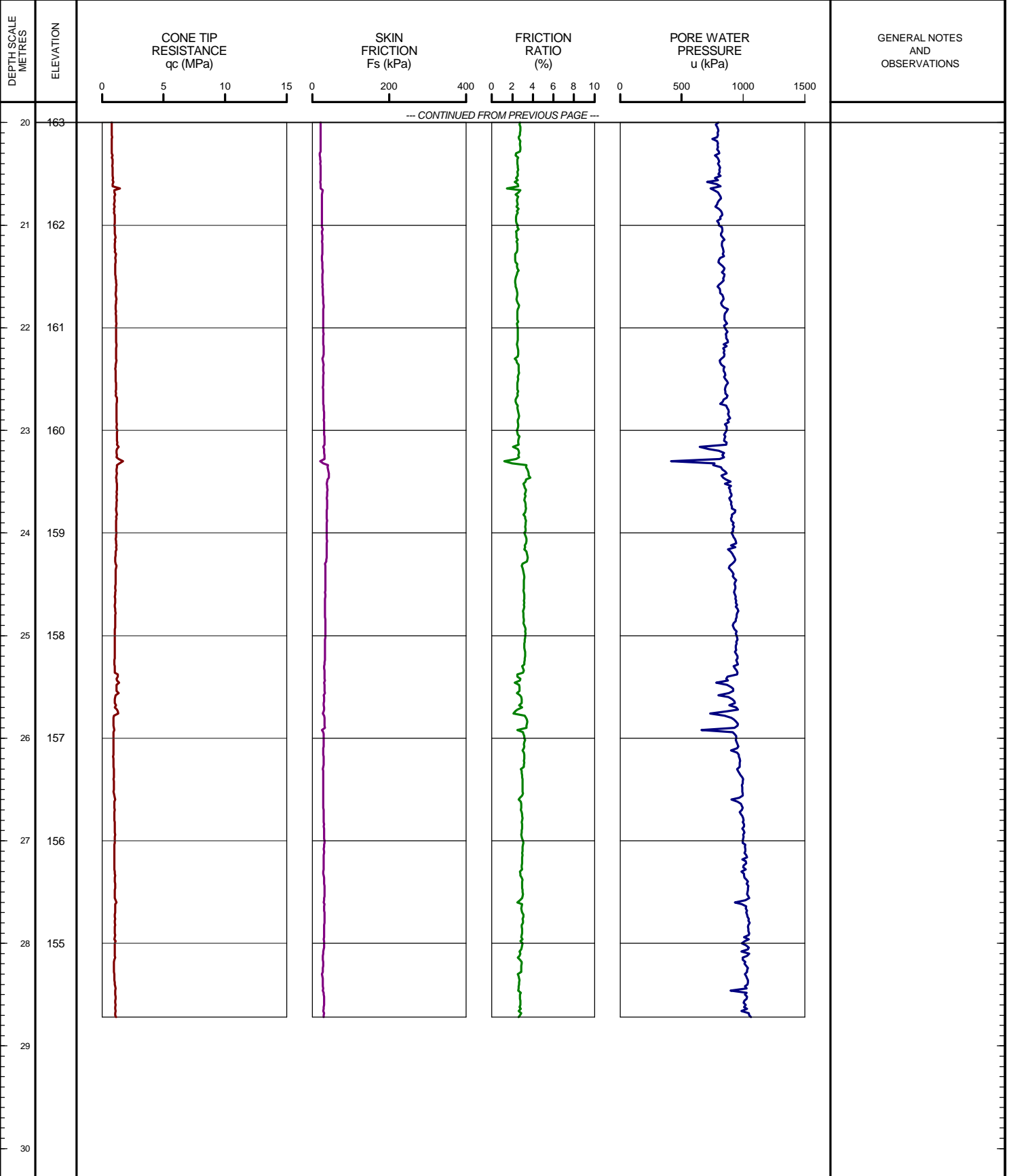
SHEET 3 OF 3

LOCATION: N 4679155.5 ;E 332737.0

TEST DATE: December 22, 2009

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 183.50m PREDRILL DEPTH: 0.00m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LON_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

Station 11+500L to Station 12+300L (Soil Profile #12)

RECORD OF BOREHOLE No 7

1 OF 4

METRIC

PROJECT 04-1111-060

W.P.

LOCATION

N 4678848.0 :E 333325.0

ORIGINATED BY C.C.

DIST WEST HWY 401 / 3

BOREHOLE TYPE POWER AUGER, HOLLOW STEM

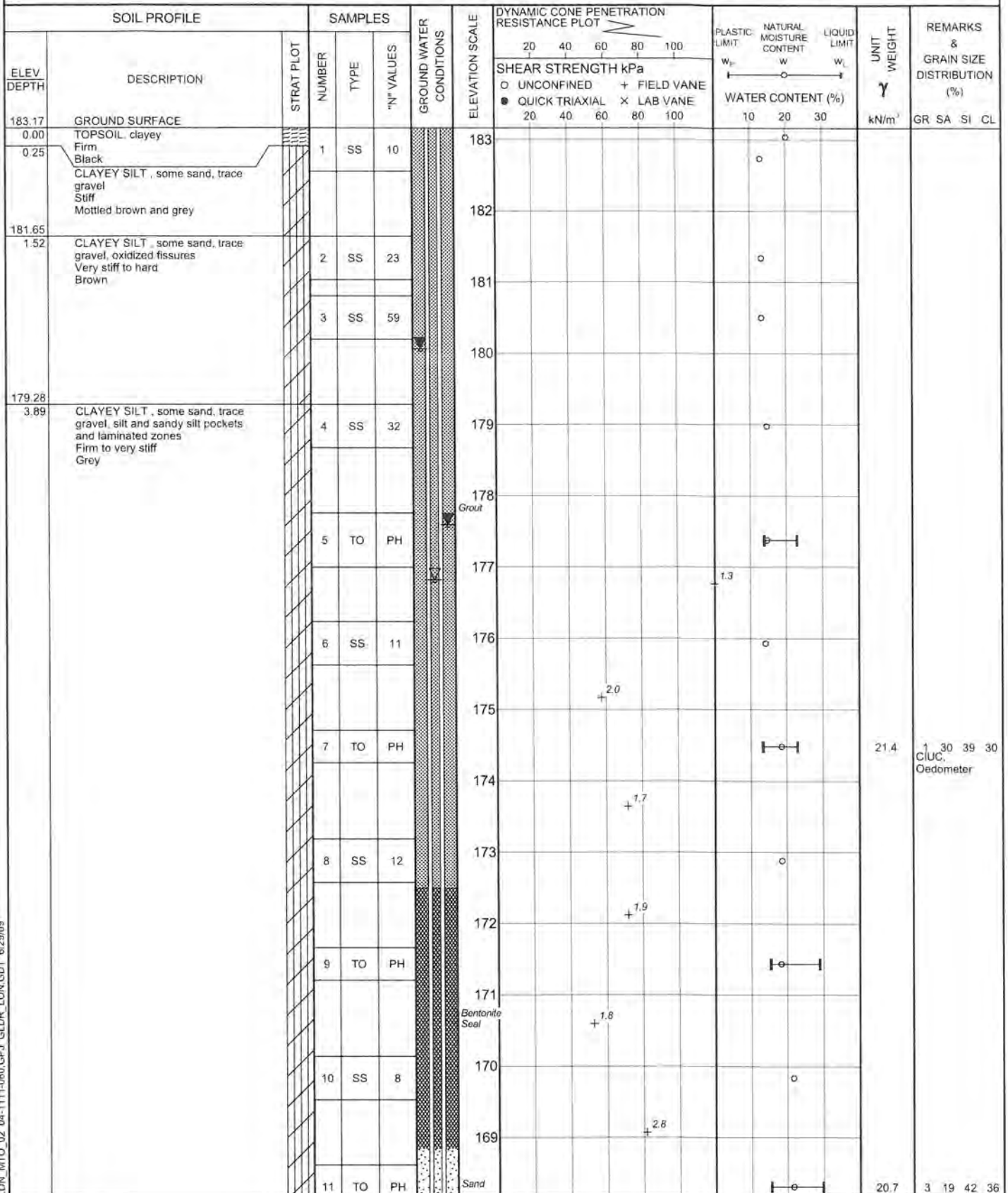
COMPILED BY T.M.

DATUM Geodetic

DATE

November 10, 2006 - November 16, 2006

CHECKED BY *SB*



Continued Next Page

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

LON_MTO_02 04-1111-060.GPJ GLDR_LON.GDT 6/29/09

| | | | | | |
|---------------------|---------------|---------------------------------------|--|-----------------------|---------------|
| PROJECT 04-1111-060 | | RECORD OF BOREHOLE No 7 | | 2 OF 4 | METRIC |
| W.P. | LOCATION | N 4678848.0 : E 333325.0 | | ORIGINATED BY C.C. | |
| DIST WEST HWY 401/3 | BOREHOLE TYPE | POWER AUGER/HOLLOW STEM | | COMPILED BY T.M. | |
| DATUM Geodetic | DATE | November 10, 2006 - November 16, 2006 | | CHECKED BY SJS | |

| 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 | | | | | | | WATER CONTENT (%) |
| | | | | | | | | ○ UNCONFINED ● QUICK TRIAXIAL | + FIELD VANE × LAB VANE | | | | | | |
| | CLAYEY SILT , some sand, trace gravel, silt and sandy silt pockets and laminated zones Firm to very stiff Grey | | | | | | 168 | | | | | | | CIUC, Oedometer | |
| | | | | | | | | 167 | | | | | | | |
| | | | | 12 | TO | PH | | | | | | | | | |
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| | | | | 13 | SS | 12 | | | | | | | | | |
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| | | | | 14 | TO | PH | | | | | | | | | |
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| | | | | 15 | TO | PH | | | | | | | | | |
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| | | | | | | | | | | | | | | | |
| | | | | 16 | SS | 21 | | | | | | | | | |
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| | | | | 17 | SS | PH | | | | | | | | | |
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| | | | 18 | SS | 13 | | | | | | | | | | |
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| | | | 19 | SS | 12 | | | | | | | | | | |
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| | | | 20 | TO | PH | | | | | | | | | | |
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| | | | 21 | SS | 9 | | | | | | | | | | |
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| | | | 22 | SS | PH | | | | | | | | | | |
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LDN_MTO_02 04-1111-060.GPJ GLDR LON.GDT 6/29/03

Continued Next Page

+³ X³: Numbers refer to Sensitivity O³% STRAIN AT FAILURE

RECORD OF BOREHOLE No 7

3 OF 4

METRIC

PROJECT 04-1111-060

W.P.

LOCATION

N 4678848.0 ; E 333325.0

ORIGINATED BY C.C.

DIST WEST HWY 401 / 3

BOREHOLE TYPE POWER AUGER, HOLLOW STEM

COMPILED BY T.M.


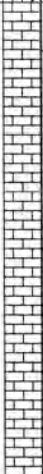
DATUM Geodetic

DATE

November 10, 2006 - November 16, 2006

CHECKED BY **SB**

| 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 | | | | | | | WATER CONTENT (%) |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | | | | | | |
| | | | | | | | | ● QUICK TRIAXIAL | × LAB VANE | | | | | | |
| | | | | | | 20 40 60 80 100 | 20 40 60 80 100 | 10 20 30 | | | | | | | |

| | | | | | | | | | | | | | | |
|--------|---|--|----|-------|----|--|-----|--|--|--|--|--|--|--|
| | CLAYEY SILT , some sand, trace gravel, silt and sandy silt pockets and laminated zones Firm to very stiff Grey |  | 23 | SS | 13 | | 153 | | | | | | | |
| | | | | | | | 152 | | | | | | | |
| | | | 24 | SS | PH | | | | | | | | | |
| | | | | | | | 151 | | | | | | | |
| 150.02 | | | 25 | SS | 42 | | | | | | | | | |
| 33.15 | LIMESTONE, fresh, medium strong, laminated, very fine grained, moderately porous, light grey (FOR DETAILED DESCRIPTIONS REFER TO RECORD OF DRILLHOLE) |  | 26 | NQ RC | | | 150 | | | | | | | |
| | | | 27 | NQ RC | | | 149 | | | | | | | |
| | | | 28 | NQ RC | | | 148 | | | | | | | |
| | | | 29 | NQ RC | | | 146 | | | | | | | |
| 145.28 | END OF BOREHOLE | | | | | | | | | | | | | |
| 37.89 | Water level in borehole at about elevation 176.82m on October 16, 2006 Lower piezometer 32mm PVC screen and riser pipe. Second (Upper) piezometer 13mm porous tip and CPVC riser pipe. Water level in Upper Piezometer at about elevation 180.06m on November 14, 2006. Water level in Lower Piezometer at about elevation 177.59m on November 14, 2006. | | | | | | | | | | | | | |

LDN_MTD_02_04-1111-060.GPJ GLDR_LON.GDT 6/30/09

| | | | | | |
|-----------------------|---------------|---|--|-----------------------|---------------|
| PROJECT 07-1130-207-0 | | RECORD OF BOREHOLE No 115 | | 1 OF 4 | METRIC |
| W.P. | LOCATION | N 4678585.3 E 333911.1 | | ORIGINATED BY MA | |
| DIST WEST HWY 401/3 | BOREHOLE TYPE | POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC | | COMPILED BY BRS | |
| DATUM GEODETIC | DATE | February 15, 2008 - February 21, 2008 | | CHECKED BY <i>SJB</i> | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | | |
|---------------|--|------------|---------|------|------------|----------------------------|-----------------|---|--------------|------------------------------------|-------------------------------------|-----------------------------------|---------------------|---|-------------------|------------------|------------|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | WATER CONTENT (%) | | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | | | | | | | ● QUICK TRIAXIAL | x LAB VANE | |
| 183.79 | GROUND SURFACE | | | | | | 20 | 40 | 60 | 80 | 100 | 10 | 20 | 30 | GR SA SI CL | | | |
| 0.00 | TOPSOIL, silty Brown | | | | | | | | | | | | | | | | | |
| 183.36 | | | | | | | | | | | | | | | | | | |
| 0.43 | CLAYEY SILT, some sand, trace gravel Soft to very stiff Brown | | 1 | SS | 4 | | | | | | | | | | | | | |
| | | | 2 | SS | 22 | | | | | | | | | | | | | |
| | | | 3 | SS | 25 | | | | | | | | | | | | | |
| | | | 4 | SS | 23 | | | | | | | | | | | | | |
| 180.44 | | | | | | | | | | | | | | | | | | |
| 3.35 | CLAYEY SILT, some sand, trace gravel Stiff Grey | | 5 | SS | 14 | | | | | | | | | | | | | |
| | | | 6 | SS | 12 | | | | | | | | | | | | | |
| | | | 7 | SS | 14 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 8 | SS | 9 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 9 | TO | PH | | | | | | | | | | | | | |
| 174.80 | | | | | | | | | | | | | | | | | | |
| 8.99 | SANDY SILT, some clay, trace gravel Loose Grey | | | | | | | | | | | | | | | | | |
| | | | 10 | SS | 7 | | | | | | | | | | | | | |
| 173.58 | | | | | | | | | | | | | | | | | | |
| 10.21 | CLAYEY SILT, some sand, trace gravel Firm Grey | | | | | | | | | | | | | | | | | |
| 173.12 | | | | | | | | | | | | | | | | | | |
| 10.67 | SAND, trace gravel, trace silt Loose Grey | | 11 | SS | 8 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 171.90 | | | | | | | | | | | | | | | | | | |
| 11.89 | CLAYEY SILT, some sand, trace gravel Soft to very stiff Grey | | 12 | SS | 7 | | | | | | | | | | | | | |
| | | | 13 | TO | PH | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 14 | SS | 6 | | | | | | | | | | | | | |
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LDN_MTO_01 07-1130-207-0.GPJ LDN_MTO.GDT 8/29/09

Continued Next Page

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

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4678585.3 E 333911.1

ORIGINATED BY MA

DIST WEST HWY 401/3

BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

COMPILED BY BRS

DATUM GEODETIC

DATE February 15, 2008 - February 21, 2008

CHECKED BY **SLB**

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | 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 | | | | | WATER CONTENT (%) W _p W W _L |
| | | | | | | | ○ UNCONFINED | + FIELD VANE | × LAB VANE | | | |
| | CLAYEY SILT, some sand, trace gravel Soft to very stiff Grey | | | | | | | | | | | |
| | | | 15 | SS | 4 | | | | | | | |
| | | | 16 | TO | PH | | | | | | | |
| | | | 17 | SS | 6 | | | | | | | |
| | | | 18 | SS | 13 | | | | | | | |
| | | | 19 | SS | 22 | | | | | | | |
| | | | 20 | SS | 22 | | | | | | | |
| | | | 21 | SS | 24 | | | | | | | |
| | | | 22 | SS | 11 | | | | | | | |
| | | | 23 | TO | PH | | | | | | | |
| 156.21 27.58 | SAND, trace sand, trace gravel, trace clay Dense Grey | | 24 | SS | 31 | | | | | | | |
| 154.83 28.96 | SAND, trace gravel Compact to dense Grey | | 25 | SS | 30 | | | | | | | |

Continued Next Page

 $+3, \times 3.$

Numbers refer to
Sensitivity

○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No 115

3 OF 4

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4678585.3 : E 333911.1

ORIGINATED BY MA

DIST WEST HWY 401/3

BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

COMPILED BY BRS

DATUM GEODETIC

DATE

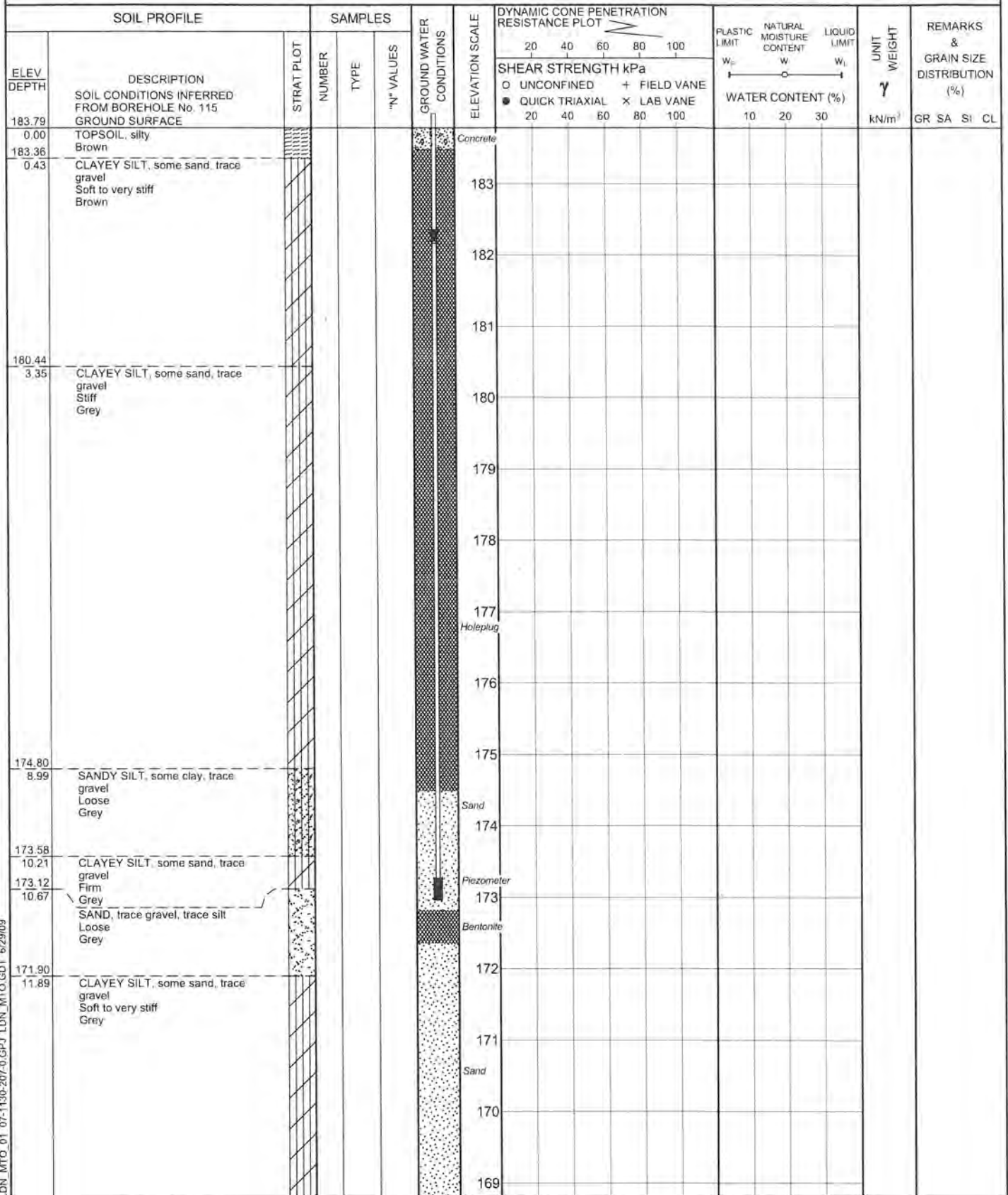
February 15, 2008 - February 21, 2008

CHECKED BY **SJB**

| 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 | | | | | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE | | | | | | |
| | | | | | | | 20 40 60 80 100 | | | | | | | |
| | | | | | | | 20 40 60 80 100 | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | |
| 153.31 | | | | | | | | | | | | | | |
| 30.48 | SAND AND GRAVEL, trace silt Dense Grey | | 26 | SS | 36 | | 153 | | | | | | | 25 66 6 3 |
| | | | | | | | 152 | | | | | | | |
| 151.48 | | | | | | | | | | | | | | |
| 32.31 | LIMESTONE, fresh, medium strong, laminated, fine grained Light grey (FOR DETAILED DESCRIPTIONS REFER TO RECORD OF DRILLHOLE) | | 27 | SS | 100/ 25mm | | 151 | | | | | | | |
| | | | | | | | 150 | | | | | | | |
| | | | 28 | NQ RC | | | 149 | | | | | | | |
| | | | 29 | NQ RC | | | 148 | | | | | | | |
| | | | 30 | NQ RC | | | 147 | | | | | | | |
| 146.15 | | | | | | | | | | | | | | UC |
| 37.64 | END OF BOREHOLE Water level in borehole at about elev. 156.19m during drilling on February 21, 2008. Water level measured in deep piezometer at elev. 178.00m on February 21, 2008. Water level measured in deep piezometer at elev. 178.10m on March 20, 2008. Water level measured in deep piezometer at elev. 177.69m on July 24, 2008. Water level measured in deep piezometer at elev. 175.99m on September 19, 2008. Water level measured in deep piezometer at elev. 177.25m on November 14, 2008. Water level measured in deep piezometer at elev. 177.35m on January 28, 2009. | | | | | | | | | | | | | |

LDN_MTO_01 07-1130-207-0.GPJ LDN_MTO.GDT 8/29/09

| | | | | | |
|-----------------------------------|--|--|--|-------------------------|---------------|
| PROJECT <u>07-1130-207-0</u> | | RECORD OF BOREHOLE No 115A | | 1 OF 2 | METRIC |
| W.P. _____ | | LOCATION <u>N 4678585.3 ; E 333911.1</u> | | ORIGINATED BY <u>MA</u> | |
| DIST <u>WEST</u> HWY <u>401/3</u> | | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | | COMPILED BY <u>BRS</u> | |
| DATUM <u>GEODETIC</u> | | DATE <u>February 20, 2008 - February 21, 2008</u> | | CHECKED BY <u>SJB</u> | |





LDN_MTO_01 07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

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

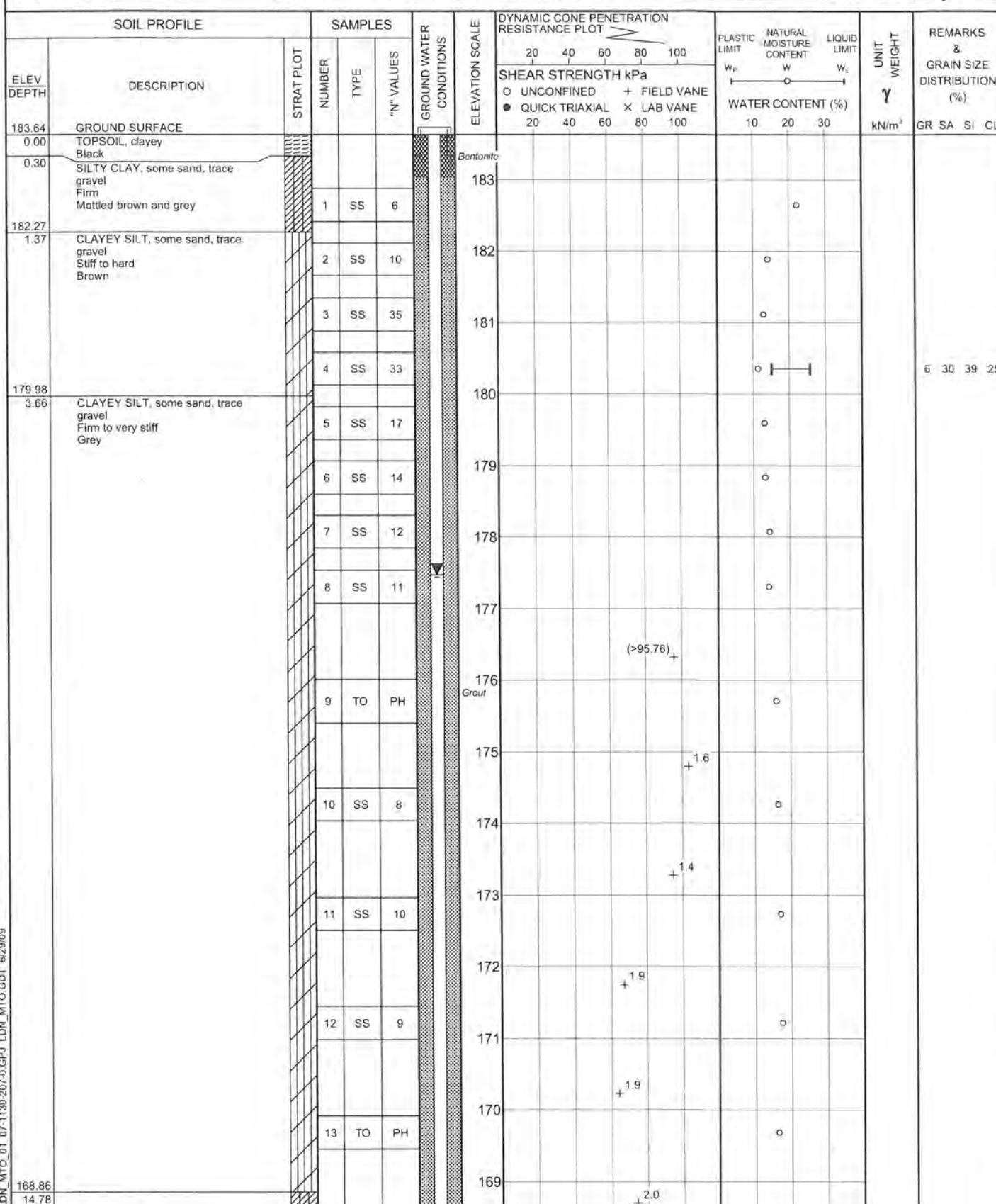
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|-----------------------------------|--|--|--|-------------------------|--|---------------|--|
| PROJECT <u>07-1130-207-0</u> | | RECORD OF BOREHOLE No 115A | | 2 OF 2 | | METRIC | |
| W.P. _____ | | LOCATION <u>N 4678585.3 E 333911.1</u> | | ORIGINATED BY <u>MA</u> | | | |
| DIST <u>WEST</u> HWY <u>401/3</u> | | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | | COMPILED BY <u>BRS</u> | | | |
| DATUM <u>GEODETIC</u> | | DATE <u>February 20, 2008 - February 21, 2008</u> | | CHECKED BY <u>SJB</u> | | | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC NATURAL LIQUID LIMIT MOISTURE LIMIT | | | 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 | 20 40 60 80 100 | W _p W W _L | | | | |
| | CLAYEY SILT, some sand, trace gravel Soft to very stiff Grey |  | | | |  | | | | | | | | |
| | | | | | | | 168 | | | | | | | |
| | | | | | | | 167 | | | | | | | |
| | | | | | | Sand | 166 | | | | | | | |
| | | | | | | | 165 | | | | | | | |
| 163.98 | | | | | | | 164 | | | | | | | |
| 19.81 | END OF BOREHOLE | | | | | | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 182.36m on March 20, 2008. | | | | | | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 182.34m on July 24, 2008. | | | | | | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 182.26m on September 19, 2008. | | | | | | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 182.20m on January 28, 2009. | | | | | | | | | | | | | |

DN_MTO_01 07-1130-207-0.GPJ LDN_MTO.LDT 8/29/09

LDN_MTO_01 07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

| | | | | | |
|-----------------------|---------------|---|--|----------------------|---------------|
| PROJECT 07-1130-207-0 | | RECORD OF BOREHOLE No 116 | | 1 OF 4 | METRIC |
| W.P. | LOCATION | N 4678634.3 :E 333722.5 | | ORIGINATED BY SM | |
| DIST WEST HWY 401/3 | BOREHOLE TYPE | POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC | | COMPILED BY BRS | |
| DATUM GEODETIC | DATE | February 20, 2008 - February 25, 2008 | | CHECKED BY SB | |



LDN_MTO_01_07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

Continued Next Page

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

RECORD OF BOREHOLE No 116

2 OF 4

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4678634.3 E 333722.5

ORIGINATED BY SM

DIST WEST HWY 401/3

BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

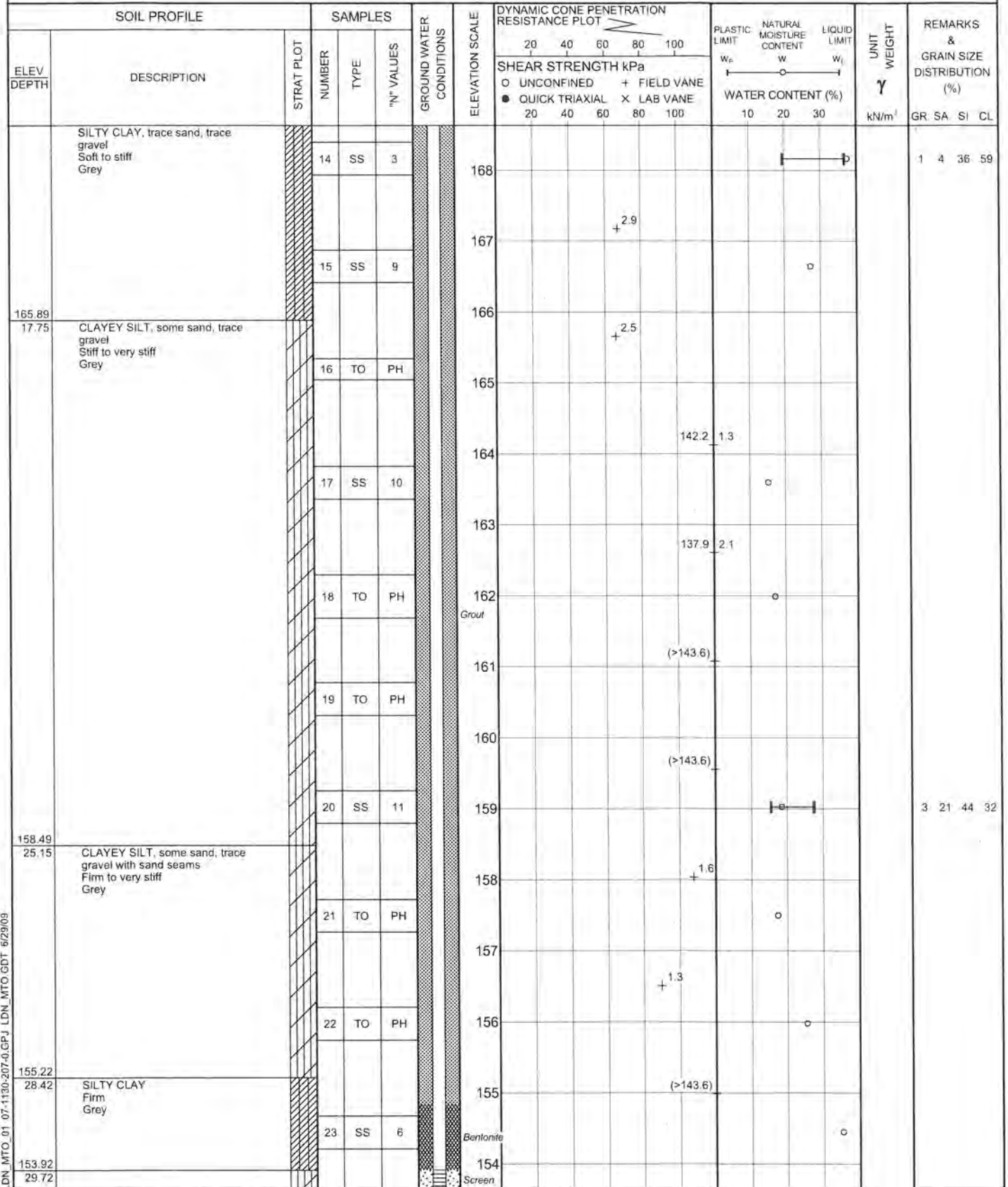
COMPILED BY BRS

DATUM GEODETIC

DATE

February 20, 2008 - February 25, 2008

CHECKED BY **SJB**



Continued Next Page

+ 3, X 3 Numbers refer to Sensitivity O 3% STRAIN AT FAILURE

LDN MTO.01 07-1130-207-0.GPJ LDN MTO.GDT 6/29/09

| | | | | | |
|-----------------------|--|---|--|-----------------------|---------------|
| PROJECT 07-1130-207-0 | | RECORD OF BOREHOLE No 116 | | 3 OF 4 | METRIC |
| W.P. _____ | | LOCATION N 4678634.3 E 333722.5 | | ORIGINATED BY SM | |
| DIST WEST HWY 401/3 | | BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC | | COMPILED BY BRS | |
| DATUM GEODETIC | | DATE February 20, 2008 - February 25, 2008 | | CHECKED BY <i>SYB</i> | |

| 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 | | | | | | | WATER CONTENT (%) | | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE | | | | | | | | | | |

| | | | | | | | | | | | | | | |
|--------|---|--|----|-------|----|--|-----|----|----|----|--|--|--|------|
| | CLAYEY SILT, some sand, some gravel, with cobbles and boulders Very stiff Brown | | 24 | SS | 21 | | 153 | | | | | | | (49) |
| | | | | | | | 152 | | | | | | | |
| 151.66 | | | | | | | | | | | | | | |
| 31.98 | LIMESTONE AND DOLOSTONE, fresh, medium strong, laminated, fine grained, faintly porous Light brown to grey (FOR DETAILED DESCRIPTIONS REFER TO RECORD OF DRILLHOLE) | | 25 | NQ RC | | | 151 | 53 | 33 | 33 | | | | |
| | | | 26 | NQ RC | | | 150 | 80 | 72 | 69 | | | | |
| | | | 27 | NQ RC | | | 149 | | | | | | | |
| 147.58 | | | | | | | 148 | 57 | 56 | 89 | | | | |
| 36.06 | END OF BOREHOLE | | | | | | | | | | | | | |
| | Borehole dry during drilling between February 20 and 25, 2008. | | | | | | | | | | | | | |
| | Water level measured in deep piezometer at elev. 180.79m on March 20, 2008. | | | | | | | | | | | | | |
| | Water level measured in deep piezometer at elev. 177.95m on July 22, 2008. | | | | | | | | | | | | | |
| | Water level measured in deep piezometer at elev. 176.69m on August 11, 2008. | | | | | | | | | | | | | |
| | Water level measured in deep piezometer at elev. 176.09m on September 19, 2008. | | | | | | | | | | | | | |
| | Water level measured in deep piezometer at elev. 177.26m on November 11, 2008. | | | | | | | | | | | | | |
| | Water level measured in deep piezometer at elev. 177.48m on January 28, 2009. | | | | | | | | | | | | | |

LDN_MTO_01 07-1130-207-0-GPJ LDN_MTO.GDT 6/29/09

RECORD OF BOREHOLE No 116A

1 OF 1

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4678634.3 E 333722.5

ORIGINATED BY SM

DIST

WEST

HWY 401/3

BOREHOLE TYPE

POWER AUGER, SOLID STEM

COMPILED BY BRS

DATUM GEODETIC

DATE

February 25, 2008

CHECKED BY SJB

| 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 | | | | | | | WATER CONTENT (%) |
| | | | | | | | | ○ UNCONFINED ● QUICK TRIAXIAL | + FIELD VANE × LAB VANE | | | | | | |
| 183.64 | GROUND SURFACE | | | | | | 20 40 60 80 100 | 20 40 60 80 100 | 10 20 30 | | | | | | |
| 0.00 | TOPSOIL, clayey Black | | | | | | | | | | | | | | |
| 0.30 | SILTY CLAY, some sand, trace gravel Firm Mottled brown and grey | | | | | | | | | | | | | | |
| 182.27 | CLAYEY SILT, some sand, trace gravel Stiff to hard Brown | | | | | | | | | | | | | | |
| 1.37 | | | | | | | | | | | | | | | |
| 179.98 | CLAYEY SILT, some sand, trace gravel Firm to very stiff Grey | | | | | | | | | | | | | | |
| 3.66 | | | | | | | | | | | | | | | |
| 174.50 | END OF BOREHOLE | | | | | | | | | | | | | | |
| 9.14 | Water level measured in shallow piezometer at elev. 182.55m on March 20, 2008. | | | | | | | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 182.80m on July 22, 2008. | | | | | | | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 182.59m on August 11, 2008. | | | | | | | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 182.57m on September 19, 2008. | | | | | | | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 182.72m on January 28, 2009. | | | | | | | | | | | | | | |

LDN_MTO 01 07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

RECORD OF BOREHOLE No 118

1 OF 4

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4678903 5 :E 333302.9

ORIGINATED BY MA

DIST WEST HWY 401/3

BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

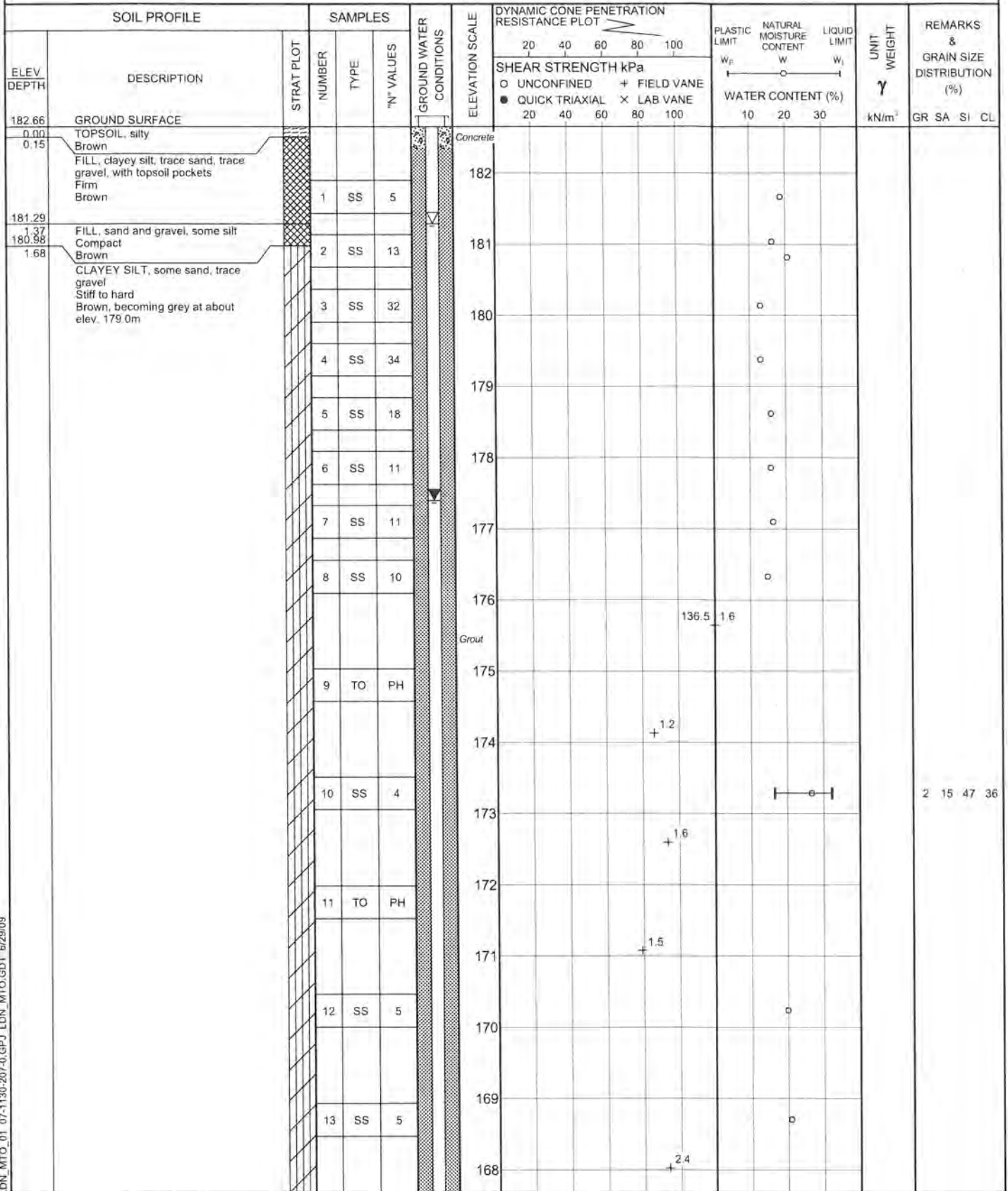
COMPILED BY BRS

DATUM GEODETIC

DATE

February 28, 2008 - March 4, 2008

CHECKED BY SSB

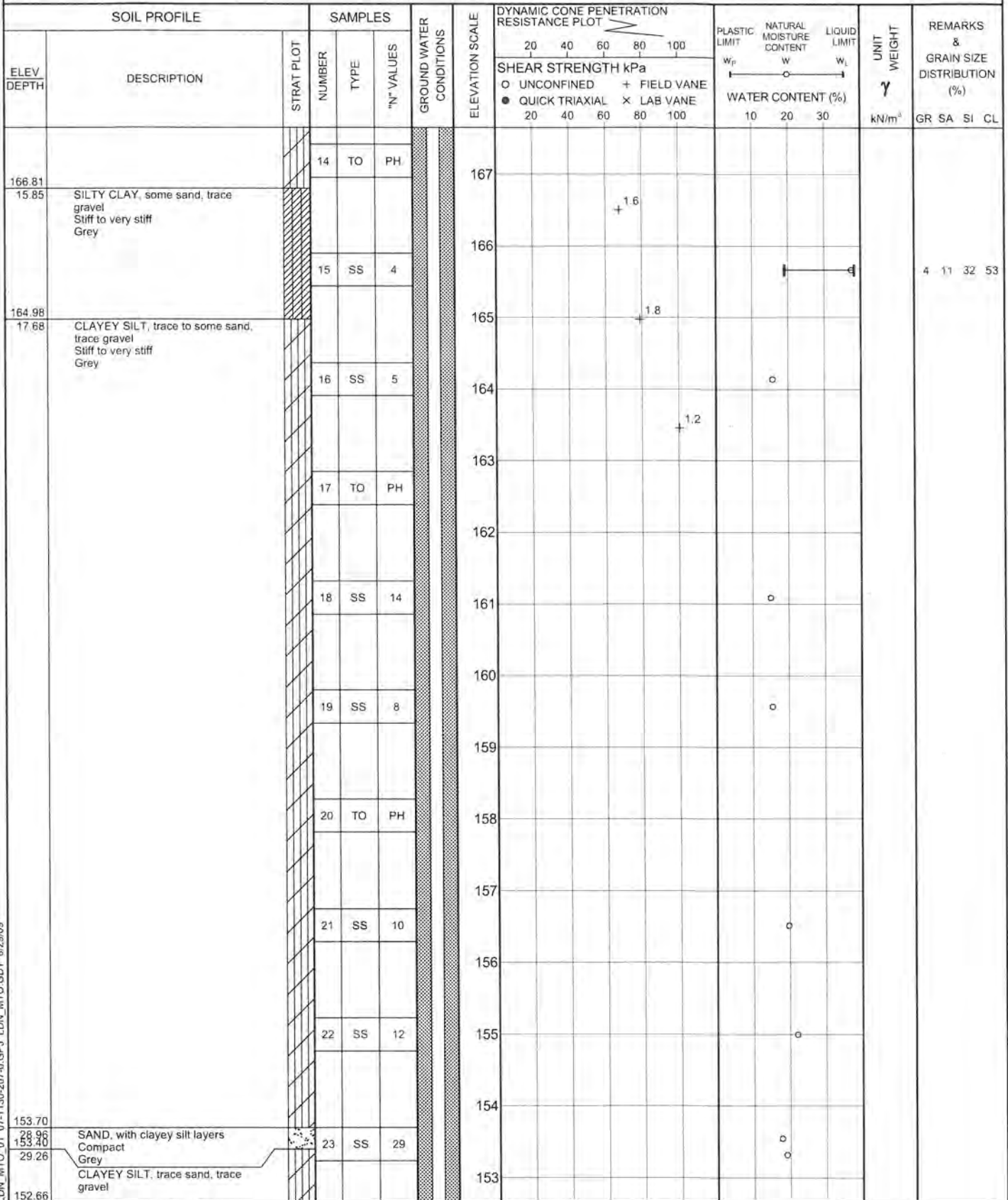


Continued Next Page

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

LDN_MTO_01 07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

| | | | | | |
|-----------------------------------|--|--|--|-------------------------|---------------|
| PROJECT <u>07-1130-207-0</u> | | RECORD OF BOREHOLE No 118 | | 2 OF 4 | METRIC |
| W.P. _____ | | LOCATION <u>N 4678903.5 :E 333302.9</u> | | ORIGINATED BY <u>MA</u> | |
| DIST <u>WEST</u> HWY <u>401/3</u> | | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | | COMPILED BY <u>BRS</u> | |
| DATUM <u>GEODETIC</u> | | DATE <u>February 28, 2008 - March 4, 2008</u> | | CHECKED BY <u>SJB</u> | |



Continued Next Page

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

LDN MTO_01 07-1130-207-0.GPJ LDN_MTO_GDT 6/29/09

RECORD OF BOREHOLE No 118

3 OF 4

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4678903.5 :E 333302.9

ORIGINATED BY MA

DIST WEST HWY 401/3

BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

COMPILED BY BRS

DATUM GEODETIC

DATE

February 28, 2008 - March 4, 2008

CHECKED BY SJS

| 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 | | | | | | | | WATER CONTENT (%) | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● QUICK TRIAXIAL | | | | | | | × LAB VANE |
| | | | | | | | | | | | | | | | | | |
| 30.02 | Very stiff Grey SILTY SAND, trace clay, trace gravel Compact Grey | | 24 | SS | 19 | | | | | | | | | 4 48 39 9 | | | |
| 150.96 | | | | | | | | | | | | | | | | | |
| 31.70 | SILTY SAND AND GRAVEL, trace clay Dense Grey | | 25 | SS | 100/ 76mm | | | | | | | | | | | | |
| 150.32 | | | | | | | | | | | | | | | | | |
| 32.34 | LIMESTONE, fresh, medium strong, thinly laminated, fine grained, moderately porous Whitish grey (FOR DETAILED DESCRIPTIONS REFER TO RECORD OF DRILLHOLE) | | 26 | NQ RC | | | | | | | | | | | UC | | |
| | | | 27 | NQ RC | | | | | | | | | | | | | |
| | | | 28 | NQ RC | | | | | | | | | | | | | |
| 146.61 | | | | | | | | | | | | | | | | | |
| 36.05 | END OF BOREHOLE | | | | | | | | | | | | | | | | |
| | Water levels in borehole at about elev. 181.29m, 153.70m and 150.96m during drilling between February 28 and March 4, 2008. | | | | | | | | | | | | | | | | |
| | Water level measured in deep piezometer at elev. 176.77m on March 4, 2008. | | | | | | | | | | | | | | | | |
| | Water level measured in deep piezometer at elev. 177.30m on March 20, 2008. | | | | | | | | | | | | | | | | |
| | Water level measured in deep piezometer at elev. 177.78m on July 24, 2008. | | | | | | | | | | | | | | | | |
| | Water level measured in deep piezometer at elev. 177.32m on September 19, 2008. | | | | | | | | | | | | | | | | |
| | Water level measured in deep piezometer at elev. 177.28m on November 14, 2008. | | | | | | | | | | | | | | | | |
| | Water level measured in deep piezometer at elev. 177.40m on January 28, 2009. | | | | | | | | | | | | | | | | |

+ 3 X 3

Numbers refer to Sensitivity

○ 3% STRAIN AT FAILURE

PROJECT: 07-1130-207-0

RECORD OF DRILLHOLE: 118

SHEET 4 OF 4

LOCATION: N 4678903.5 ;E 333302.9

DRILLING DATE: February 28, 2008 - March 4, 2008

DATUM: GEODETIC

INCLINATION: -90° AZIMUTH: —

DRILL RIG: MUD ROTARY WITH HQ TRICONE, NQRC

DRILLING CONTRACTOR: AARDVARK DRILLING INC

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. DEPTH (m) | RUN No. | PENETRATION RATE (m/min) | COLOUR FLUSH % RETURN | ELEVATION | JN - Joint FLT - Fault SHR - Shear VN - Vein CJ - Conjugate BD - Bedding FO - Foliation CO - Contact OR - Orthogonal CL - Cleavage PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular PO - Polished K - Slickensided SM - Smooth Ro - Rough Br - Broken Rock NOTE: For additional abbreviations refer to list of abbreviations & symbols | | | | | | | | | | DIAMETRAL POINT LOAD INDEX (MPa) | NOTES WATER LEVELS INSTRUMENTATION | |
|-----------------------|----------------------------|---|---|--------------------------|--------------------------|-----------------------------|-----------------------------|-----------|--|-----------------|---------------------------|---------------------------------|------------|--|------------------|------------------|------------------|--|--|--|--|
| | | | | | | | | | RECOVERY | | FRACT INDEX PER 0.3 | DISCONTINUITY DATA | | HYDRAULIC CONDUCTIVITY k, cm/sec | | | | | | | |
| | | | | | | | | | TOTAL CORE % | SOLID CORE % | | TYPE AND SURFACE DESCRIPTION | | | | | | | | | |
| | | | | | | | | | 80 60 40 20 | 80 60 40 20 | | 80 60 40 20 | 40 20 10 5 | DIP w.r.t. CORE AXIS | 10 ⁻⁸ | 10 ⁻⁶ | 10 ⁻⁴ | | | | |
| | | ROCK SURFACE | | 150.32 | | | | | | | | | | | | | | | | | |
| | MUD ROTARY NO ROCK CORE | LIMESTONE, fresh, medium strong, thinly laminated, fine grained, faintly porous, whitish grey | | 32.34 | 1 | | | 150 | | | | | | | | | | | | | |
| 33 | | | | 149.56 | | | | | | | | | | | | | | | | | |
| | | LIMESTONE, fresh, medium strong, thinly laminated, fine grained, faintly porous, grey | | 33.10 149.22 33.44 | | | | 149 | | | | | | | | | | | | | |
| 34 | | | LIMESTONE, fresh, medium strong, thinly laminated, fine to very fine grained, pitted, whitish grey | | 147.97 | 2 | | | | | | | | | | | | | | | |
| | | | | | 34.69 147.61 35.05 | | | 148 | | | | | | | | | | | | | |
| 35 | | | LIMESTONE, fresh, medium strong, thinly laminated, very fine grained, moderately porous, light grey | | | | | | | | | | | | | | | | | | |
| | | | LIMESTONE, fresh, medium strong, thinly laminated, fine grained, pitted to vuggy, light brown to grey | | | 3 | | | 147 | | | | | | | | | | | | |
| 36 | | | | | 146.60 36.06 | | | | | | | | | | | | | | | | |
| | | | END OF DRILLHOLE | | | | | | | | | | | | | | | | | | |
| 37 | | | | | | | | | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | | | | | | | | | |
| 39 | | | | | | | | | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | | | | | | | | | |
| 41 | | | | | | | | | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | | | | | | | | | |
| 43 | | | | | | | | | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | | | | | | | | | |
| 45 | | | | | | | | | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | | | | | | | | | |
| 47 | | | | | | | | | | | | | | | | | | | | | |

LDN ROCK 03 07-1130-207-0-ROCK GPJ GLDR LDN GDT 6/29/09 DATA INPUT WDF

DEPTH SCALE

1:75



LOGGED: SG

CHECKED: SSB



+ 3, X 3. Numbers refer to Sensitivity

PROJECT 07-1130-207-0 **RECORD OF BOREHOLE No CPT-117** 1 OF 1 **METRIC**
W.P. _____ LOCATION N 4678744.1 :E 333601.5 ORIGINATED BY MA
DIST WEST HWY 401/3 BOREHOLE TYPE POWER AUGER, SOLID STEM COMPILED BY BRS
DATUM GEODETIC DATE March 27, 2008 CHECKED BY SSB

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _P | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|--|------------|---------|------|------------|-------------------------|-----------------|--|--|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | |
| 183.29 | GROUND SURFACE | | | | | | | 20 40 60 80 100 | | | | | | |
| 0.00 | TOPSOIL, silty Brown | | | | | | | ○ UNCONFINED + FIELD VANE | | | | | | |
| 0.15 | FILL, clayey silt, some sand, trace gravel Firm to stiff Brown | | 1 | SS | 5 | | 183 | ● QUICK TRIAXIAL x LAB VANE | | | | | | |
| | | | | | | | 182 | | | | | | | |
| 181.46 | | | 2 | SS | 12 | | | | | | | | | |
| 1.83 | CLAYEY SILT, some sand, trace gravel Stiff to very stiff Brown becoming grey at about elev. 179.9m | | | | | | 181 | | | | | | | |
| | | | 3 | SS | 28 | | | | | | | | | |
| | | | | | | | 180 | | | | | | | |
| | | | 4 | SS | 20 | | | | | | | | | |
| | | | | | | | 179 | | | | | | | |
| | | | 5 | SS | 16 | | | | | | | | | |
| 178.72 | END OF BOREHOLE | | | | | | | | | | | | | |
| 4.57 | Borehole dry during drilling on March 27, 2008. | | | | | | | | | | | | | |

LDN_MTO_01 07-1130-207-0.GPJ LDN_MTO_GDT 5/29/09

| | | | | | |
|-----------------------------------|--|--------------------------------------|-------------------------|--------|---------------|
| PROJECT <u>07-1130-207-0</u> | | RECORD OF BOREHOLE No CPT-120 | | 1 OF 1 | METRIC |
| W.P. _____ | LOCATION <u>N 4678947.2 :E 333029.8</u> | | ORIGINATED BY <u>CC</u> | | |
| DIST <u>WEST</u> HWY <u>401/3</u> | BOREHOLE TYPE <u>POWER AUGER, SOLID STEM</u> | | COMPILED BY <u>SJL</u> | | |
| DATUM <u>GEODETIC</u> | DATE <u>September 8, 2008</u> | | CHECKED BY <u>SJB</u> | | |

| 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 | | | | | | | WATER CONTENT (%) | | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | | | | | |
| 184.49 | GROUND SURFACE | | | | | | | | | | | | | | | | | |
| 0.00 | FILL, clayey topsoil, with clayey silt pockets Very stiff Brown |  | 1 | SS | 20 | | | | | | | | | | | | | |
| 183.90 | CLAYEY SILT, trace to some sand, trace gravel Hard Mottled brown and grey |  | 2 | SS | 41 | | | | | | | | | | | | | |
| 0.59 | | | 3 | SS | 52 | | | | | | | | | | | | | |
| 182.66 | | | | | | | | | | | | | | | | | | |
| 1.83 | END OF BOREHOLE Borehole dry during drilling on September 8, 2008. | | | | | | | | | | | | | | | | | |

| | | | | | |
|-------------------------------------|--|--|--|----------------------------|---------------|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No 314 | | 1 OF 4 | METRIC |
| W.P. _____ | | LOCATION <u>N 4678750.8 ; E 333462.3</u> | | ORIGINATED BY <u>SM</u> | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | | COMPILED BY <u>LMK/DMB</u> | |
| DATUM <u>GEODETIC</u> | | DATE <u>December 7, 2009 - December 9, 2009</u> | | CHECKED BY _____ | |

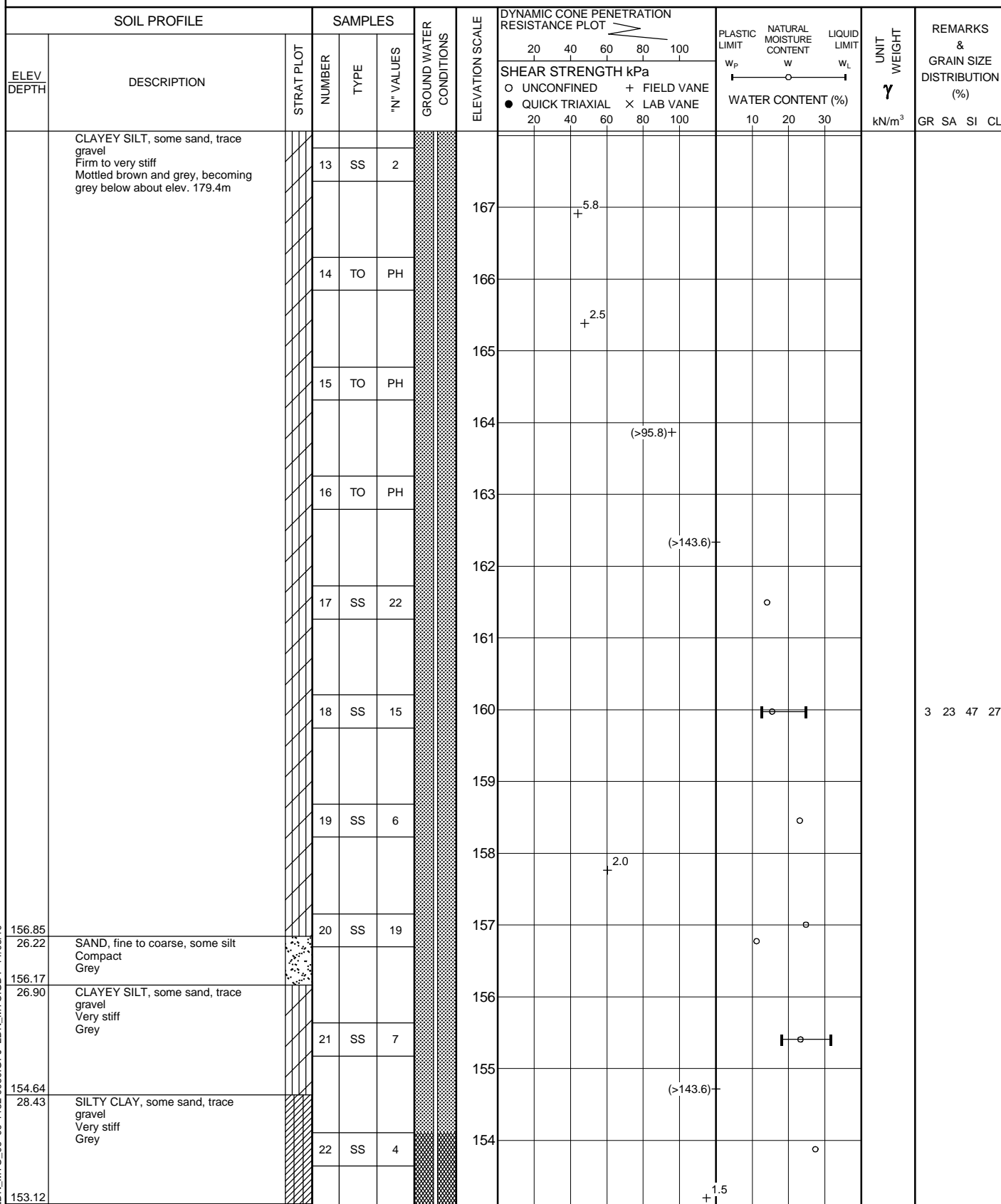
| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT NATURAL LIQUID LIMIT LIMIT MOISTURE CONTENT CONTENT CONTENT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
|---------------|--|------------|---------|------|------------|----------------------------|--------------------|---|----------------------------|---|--|--|---|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | WATER CONTENT (%) | | | | |
| | | | | | | | | ○ UNCONFINED ● QUICK TRIAXIAL | + FIELD VANE × LAB VANE | | | | | |
| 183.07 | GROUND SURFACE | | | | | | | | | | | | | |
| 0.00 | TOPSOIL, clayey Black | | | | | | | | | | | | | |
| 0.23 | CLAYEY SILT, some sand, trace gravel Firm to very stiff Mottled brown and grey, becoming grey below about elev. 179.4m | | | | | | | | | | | | | |
| | | | 1 | SS | 6 | | | | | | | | | |
| | | | 2 | SS | 27 | | | | | | | | | |
| | | | 3 | SS | 31 | | | | | | | | | |
| | | | 4 | SS | 26 | | | | | | | | | |
| | | | 5 | SS | 18 | | | | | | | | | |
| | | | 6 | SS | 11 | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 7 | TO | PH | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 8 | SS | 6 | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 9 | TO | PH | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 10 | TO | PH | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 11 | SS | 6 | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 12 | TO | PH | | | | | | | | | |
| | | | | | | | | | | | | | | |

LDN_MTO_06 09-1132-0080.GPJ LDN_MTO.GDT 11/03/10

Continued Next Page

+³, X³: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

| | | | | | |
|-------------------------------------|--|----------------------------------|--|--------|---------------|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No 314 | | 2 OF 4 | METRIC |
| W.P. _____ | LOCATION <u>N 4678750.8 ;E 333462.3</u> | ORIGINATED BY <u>SM</u> | | | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | COMPILED BY <u>LMK/DMB</u> | | | |
| DATUM <u>GEODETIC</u> | DATE <u>December 7, 2009 - December 9, 2009</u> | CHECKED BY _____ | | | |



Continued Next Page

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

| | | | | | |
|-------------------------------------|--|--|--|----------------------------|---------------|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No 314 | | 3 OF 4 | METRIC |
| W.P. _____ | | LOCATION <u>N 4678750.8 ; E 333462.3</u> | | ORIGINATED BY <u>SM</u> | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | | COMPILED BY <u>LMK/DMB</u> | |
| DATUM <u>GEODETIC</u> | | DATE <u>December 7, 2009 - December 9, 2009</u> | | CHECKED BY _____ | |

| 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 | | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED | | + FIELD VANE | | | | | | | | ● QUICK TRIAXIAL | | |
| | | | | | | 20 | 40 | 60 | 80 | 100 | 20 | 40 | 60 | 80 | 100 | 10 | 20 | 30 | | |
| 29.95 | SILTY SAND, some gravel, trace clay Compact Grey | | | | | | | | | | | | | | | | | | | |
| | | | 23 | SS | 21 | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | |
| | | | 24 | SS | 23 | | | | | | | | | | | | | | | |
| 150.02 | LIMESTONE, fresh, medium strong, weakly laminated, fine grained, faintly porous Light brown to grey (FOR DETAILED DESCRIPTIONS REFER TO RECORD OF DRILLHOLE) | | | | | | | | | | | | | | | | | | | |
| 33.05 | | | 25 | NQ RC | - | | | | | | | | | | | | | | | |
| | | | 26 | NQ RC | - | | | | | | | | | | | | | | | |
| | | | 27 | NQ RC | - | | | | | | | | | | | | | | | |
| | | | 28 | NQ RC | - | | | | | | | | | | | | | | | |
| 144.82 | END OF BOREHOLE | | | | | | | | | | | | | | | | | | | |
| 38.25 | Borehole dry during drilling between December 7 and 9, 2009. Water level measured at elev. 178.35 on February 24, 2010. Water level measured at elev. 178.17 on January 6, 2010. | | | | | | | | | | | | | | | | | | | |

PROJECT: 09-1132-0080

RECORD OF DRILLHOLE: 314

SHEET 4 OF 4

LOCATION: N 4678750.8 ;E 333462.3

DRILLING DATE: December 7, 2009 - December 9, 2009

DATUM: GEODETIC

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: MUD ROTARY WITH HQ TRICONE, NQRC

DRILLING CONTRACTOR: AARDVARK

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. | RUN No. | PENETRATION RATE (m/min) | FLUSH | COLOUR % RETURN | ELEVATION | JN - Joint FLT - Fault SHR - Shear VN - Vein CJ - Conjugate | BD - Bedding FO - Foliation CO - Contact OR - Orthogonal CL - Cleavage | PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular | PO - Polished K - Slickensided SM - Smooth Ro - Rough | Br - Broken Rock | DISCONTINUITY DATA | HYDRAULIC CONDUCTIVITY k, cm/sec | DIAMETRAL POINT LOAD INDEX (MPa) | NOTES WATER LEVELS INSTRUMENTATION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------|-----------------|-------------|--------------|--------------|---------|-----------------------------|-------|--------------------|-----------|---|--|---|--|---------------------------------|--------------------|--|--|--|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| | | | | DEPTH (m) | | | | | | RECOVERY | | R.Q.D. % | FRACT. INDEX PER 0.3 | TYPE AND SURFACE DESCRIPTION | | | | | 10 ⁻⁸ 10 ⁻⁶ 10 ⁻⁴ 10 ⁻² | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | TOTAL CORE % | SOLID CORE % | | | DIP W.R.T. CORE AXIS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

DEPTH SCALE

1 : 75



LOGGED: SG

CHECKED:



LDN_ROCK_03 09-1132-0080-ROCK.GPJ GLDR LDN.GDT 11/03/10 DATA INPUT: LMK

| | | | | | | | |
|-------------------------------------|--|--|--|-------------------------|--|---------------|--|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No CPT-313 | | 1 OF 1 | | METRIC | |
| W.P. _____ | | LOCATION <u>N 4678688.4 ;E 333599.7</u> | | ORIGINATED BY <u>TA</u> | | | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, SOLID STEM</u> | | COMPILED BY <u>DMB</u> | | | |
| DATUM <u>GEODETIC</u> | | DATE <u>January 21, 2010</u> | | CHECKED BY _____ | | | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|---|----|----|----|-----|--|---|----------------|---|---|----|----|----|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | WATER CONTENT (%) | | | | GR | SA | SI | CL |
| | | | | | | | | 20 | 40 | 60 | 80 | 100 | W _p | W | W _L | | | | | |
| 184.04 | GROUND SURFACE | | | | | | | | | | | | | | | | | | | |
| 0.00 | TOPSOIL, clayey Stiff Black | | | | | ▽ | | | | | | | | | | | | | | |
| 183.18 | CLAYEY SILT, some sand, trace gravel, with occasional fissures, silt partings and seams Stiff to hard Brown | | 1 | SS | 12 | | 183 | | | | | | | | | | | | | |
| 0.86 | | | 2 | SS | 18 | | 182 | | | | | | | o | | | | | | |
| | | | 3 | SS | 39 | | | | | | | | | | | | | | | |
| | | | 4 | SS | 36 | | 181 | | | | | | | | o | | | | | |
| 180.38 | END OF BOREHOLE | | | | | | | | | | | | | | | | | | | |
| 3.66 | Groundwater encountered at about elev. 182.5m during drilling on January 21, 2010. | | | | | | | | | | | | | | | | | | | |

LDN_MTO_06 09-1132-0080.GPJ LDN_MTO.GDT 11/03/10

| | | | | | | | |
|-------------------------------------|--|--|--|-------------------------|--|---------------|--|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No CPT-315 | | 1 OF 1 | | METRIC | |
| W.P. _____ | | LOCATION <u>N 4678800.6 ; E 333406.3</u> | | ORIGINATED BY <u>TA</u> | | | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, SOLID STEM</u> | | COMPILED BY <u>DMB</u> | | | |
| DATUM <u>GEODETIC</u> | | DATE <u>January 21, 2010</u> | | CHECKED BY _____ | | | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT NATURAL LIQUID | | | UNIT WEIGHT γ kN/m³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | |
|---------------|--|---|-----------------|------|--|----------------------------|-----------------|---|--|-------------------|--|--|------------------------------------|---|----------------|--------------------------------------|---|----|----|----|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | W _p | W | W _L | | GR | SA | SI | CL |
| | | | | | ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE | | | | | WATER CONTENT (%) | | | | | | | | | | |
| 184.31 | GROUND SURFACE | | | | | ▽ | 184 | | | | | | | | | | | | | |
| 0.00 | TOPSOIL, clayey Very stiff Black |  | 1 | SS | 16 | | 183 | | | | | | | | | | | | | |
| 182.94 | CLAYEY SILT, some sand, trace gravel, with occasional fissures and silt partings Stiff to hard Brown |  | 2 | SS | 12 | | 182 | | | | | | | | | | | | | |
| 1.37 | | | 3 | SS | 11 | | 181 | | | | | | | | | | | | | |
| | | | 4 | SS | 48 | | 180 | | | | | | | | | | | | | |
| | | | 5 | SS | 50 | | | | | | | | | | | | | | | |
| 179.89 | | | END OF BOREHOLE | | | | | | | | | | | | | | | | | |
| 4.42 | Groundwater encountered at about elev. 180.5m during drilling on January 21, 2010. | | | | | | | | | | | | | | | | | | | |

| | | | | | | | |
|-------------------------------------|--|--|--|-------------------------|--|---------------|--|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No CPT-316 | | 1 OF 1 | | METRIC | |
| W.P. _____ | | LOCATION <u>N 4678831.3 ; E 333265.0</u> | | ORIGINATED BY <u>TA</u> | | | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, SOLID STEM</u> | | COMPILED BY <u>DMB</u> | | | |
| DATUM <u>GEODETIC</u> | | DATE <u>January 21, 2010</u> | | CHECKED BY _____ | | | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT γ kN/m³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | |
|---------------|--|------------|---------|------|------------|----------------------------|-----------------|---|----|----|----|-----|---|---|----------------|--------------------------------------|---|----|----|----|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | WATER CONTENT (%) | | | | GR | SA | SI | CL |
| | | | | | | | | 20 | 40 | 60 | 80 | 100 | W _P | W | W _L | | | | | |
| 182.99 | GROUND SURFACE | | | | | | 182 | | | | | | | | | | | | | |
| 0.00 | TOPSOIL, clayey Black | | | | | | | 181 | | | | | | | | | | | | |
| 182.63 | CLAYEY SILT, some sand, trace gravel, with occasional fissures, silt partings and seams Very stiff to hard Brown | | 1 | SS | 25 | | | | | | | | | | | | | | | |
| 0.36 | | | 2 | SS | 45 | | | | | | | | | | | | | | | |
| | | | 3 | SS | 56 | | | | | | | | | | | | | | | |
| | | | 4 | SS | 45 | | | | | | | | | | | | | | | |
| 179.33 | END OF BOREHOLE | | | | | | | | | | | | | | | | | | | |
| 3.66 | Groundwater encountered at about elev. 181.5m during drilling on January 21, 2010. | | | | | | | | | | | | | | | | | | | |

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-6

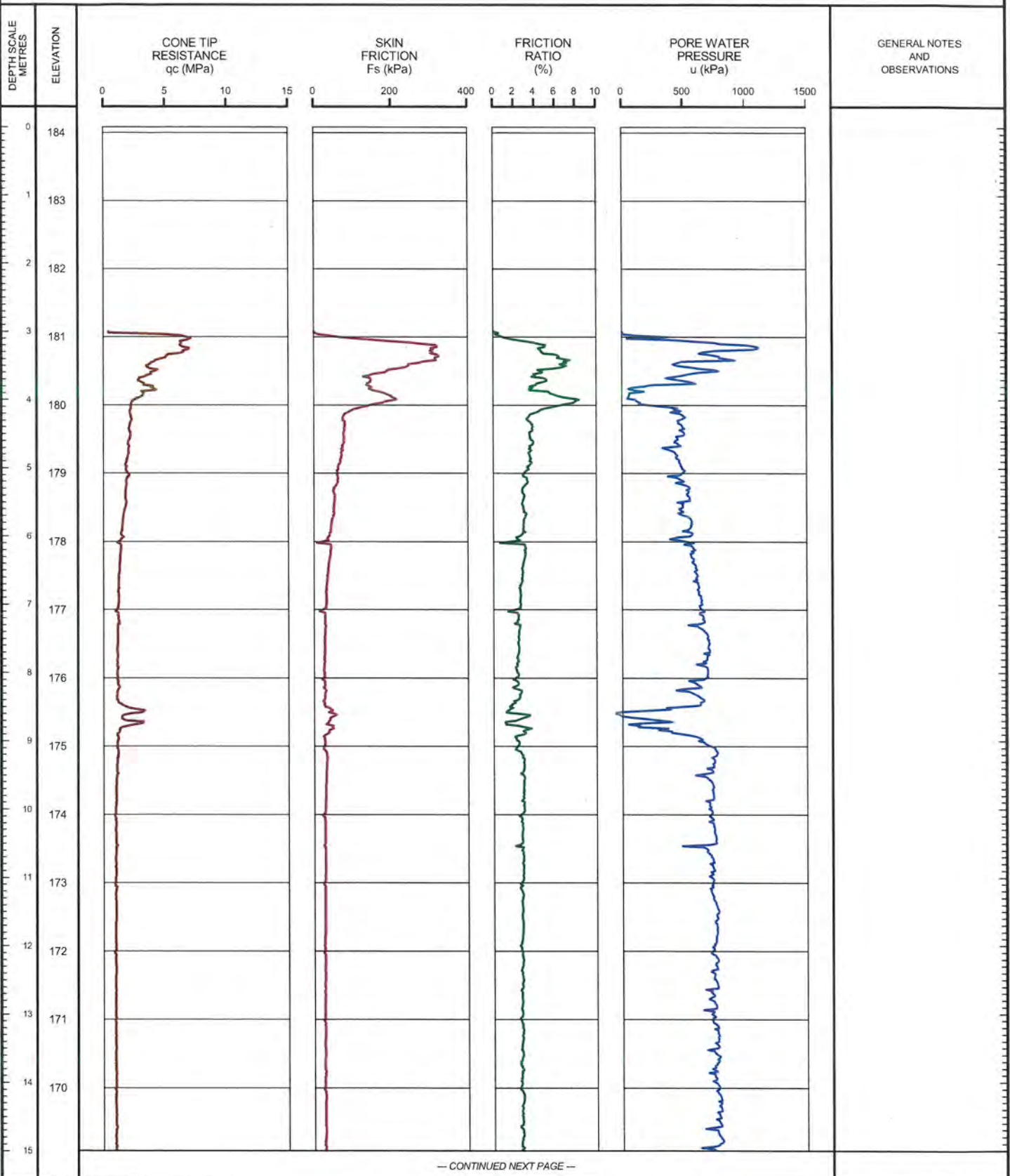
SHEET 1 OF 2

LOCATION: N 4678621.0 ; E 333844.0

TEST DATE: November 13, 2006

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 3.00m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE

1 : 75



OPERATOR: CC

CHECKED: *536*

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-6

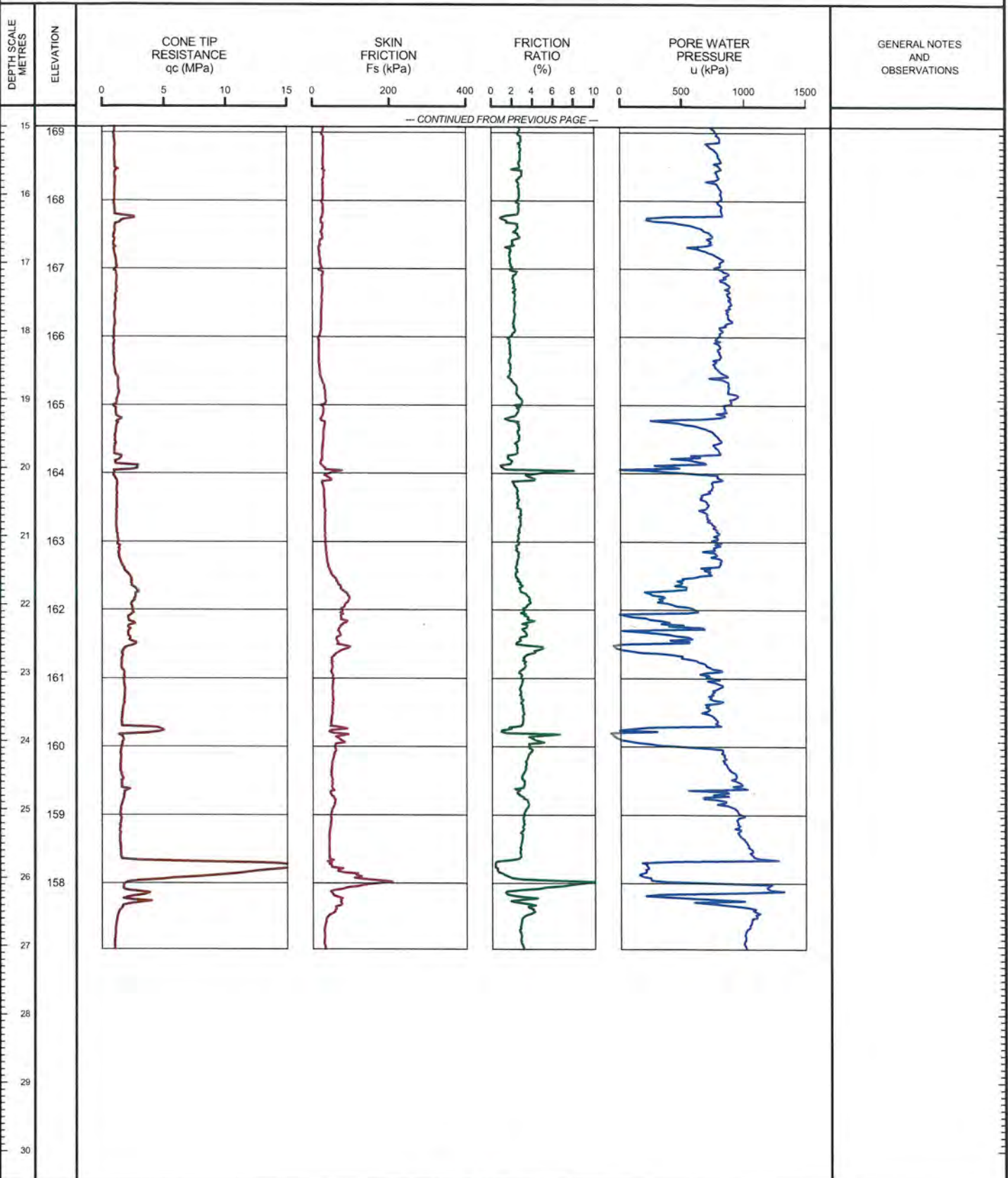
SHEET 2 OF 2

LOCATION: N 4678621.0; E 333844.0

TEST DATE: November 13, 2006

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 3.00m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE

1 : 75



OPERATOR: CC

CHECKED: *SVB*

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-7

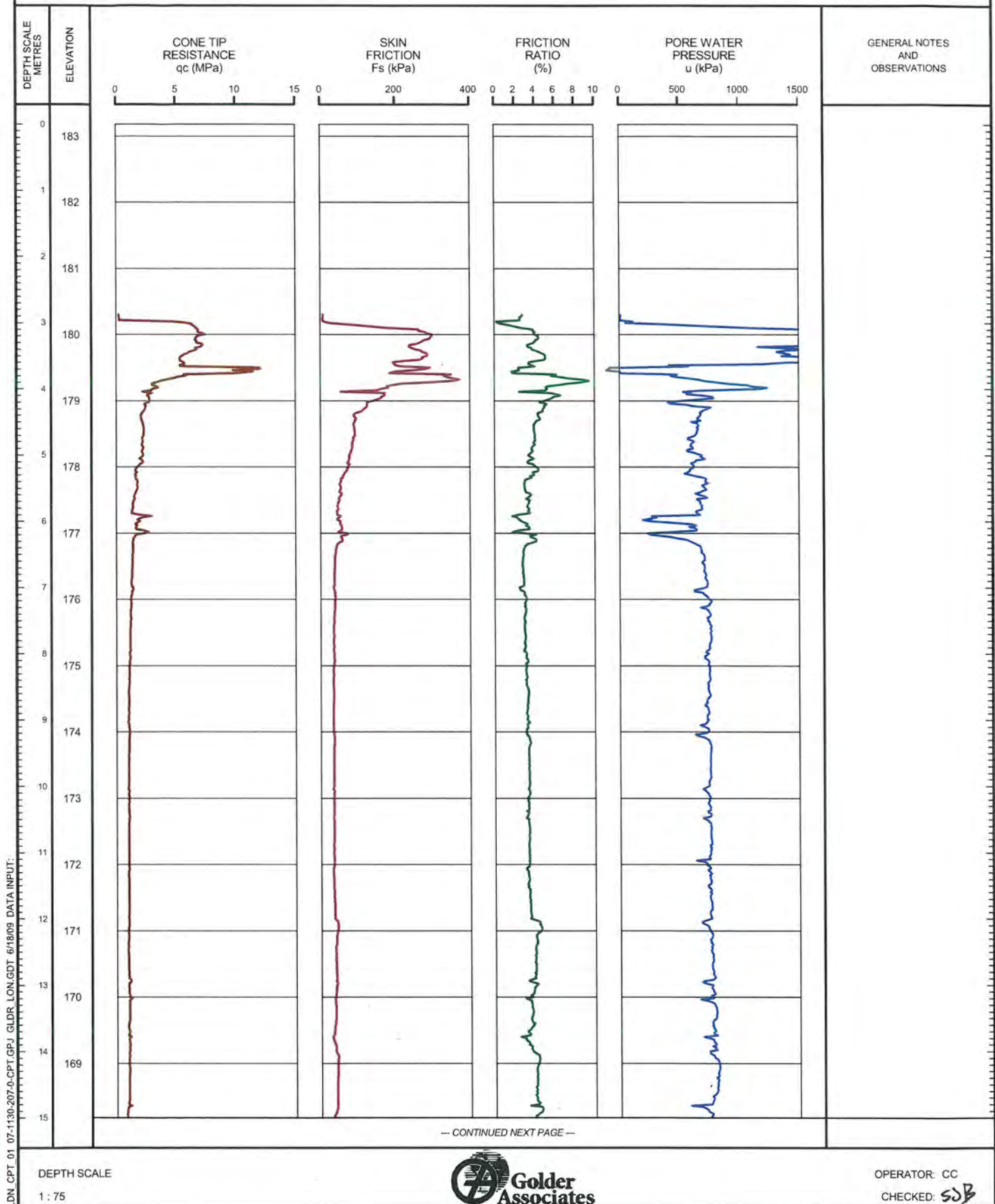
SHEET 1 OF 2

LOCATION: N 4678844.0 ;E 333327.0

TEST DATE: November 12, 2006

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 2.90m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-7

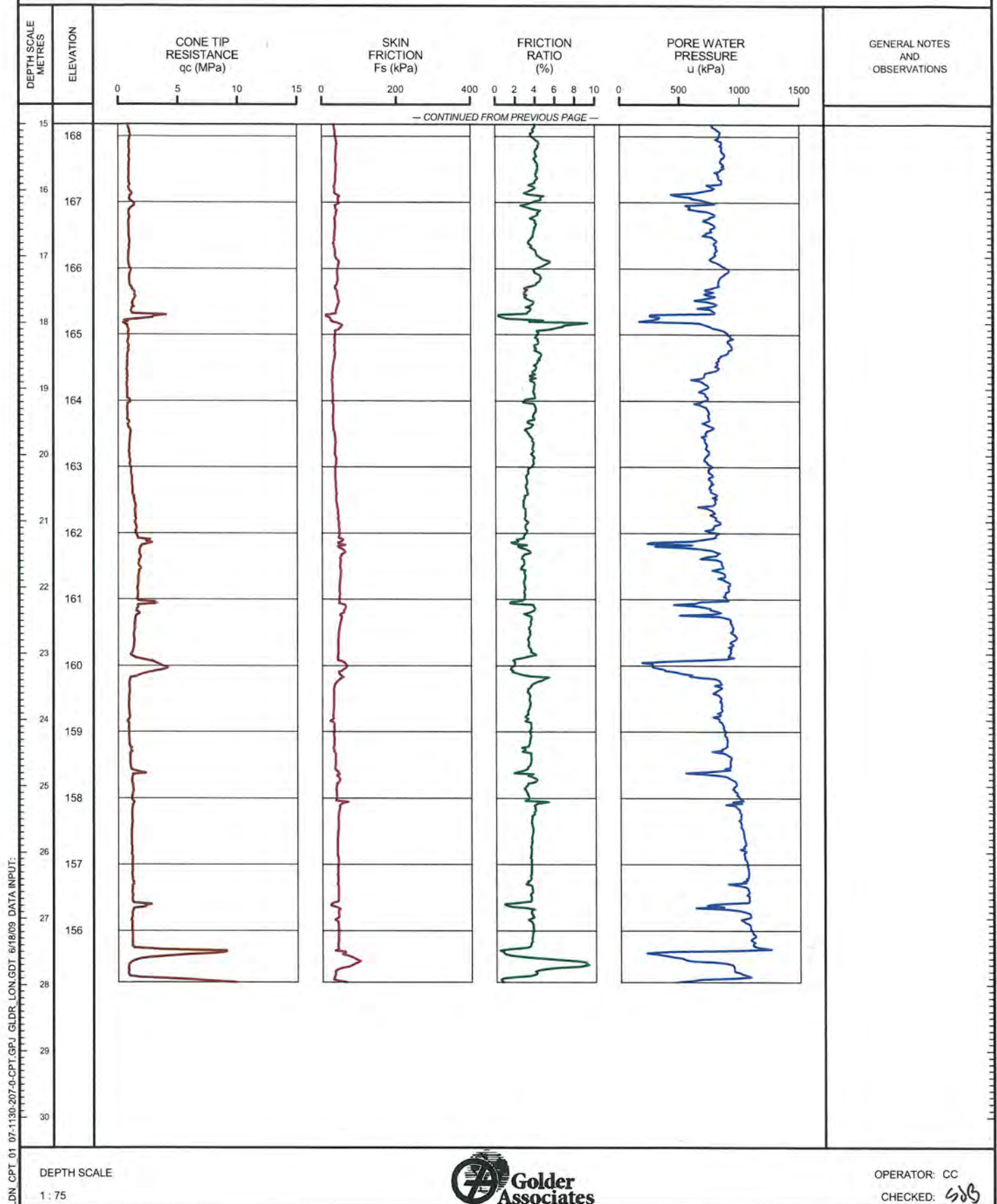
SHEET 2 OF 2

LOCATION: N 4678844.0 :E 333327.0

TEST DATE: November 12, 2006

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 2.90m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LDN CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-117

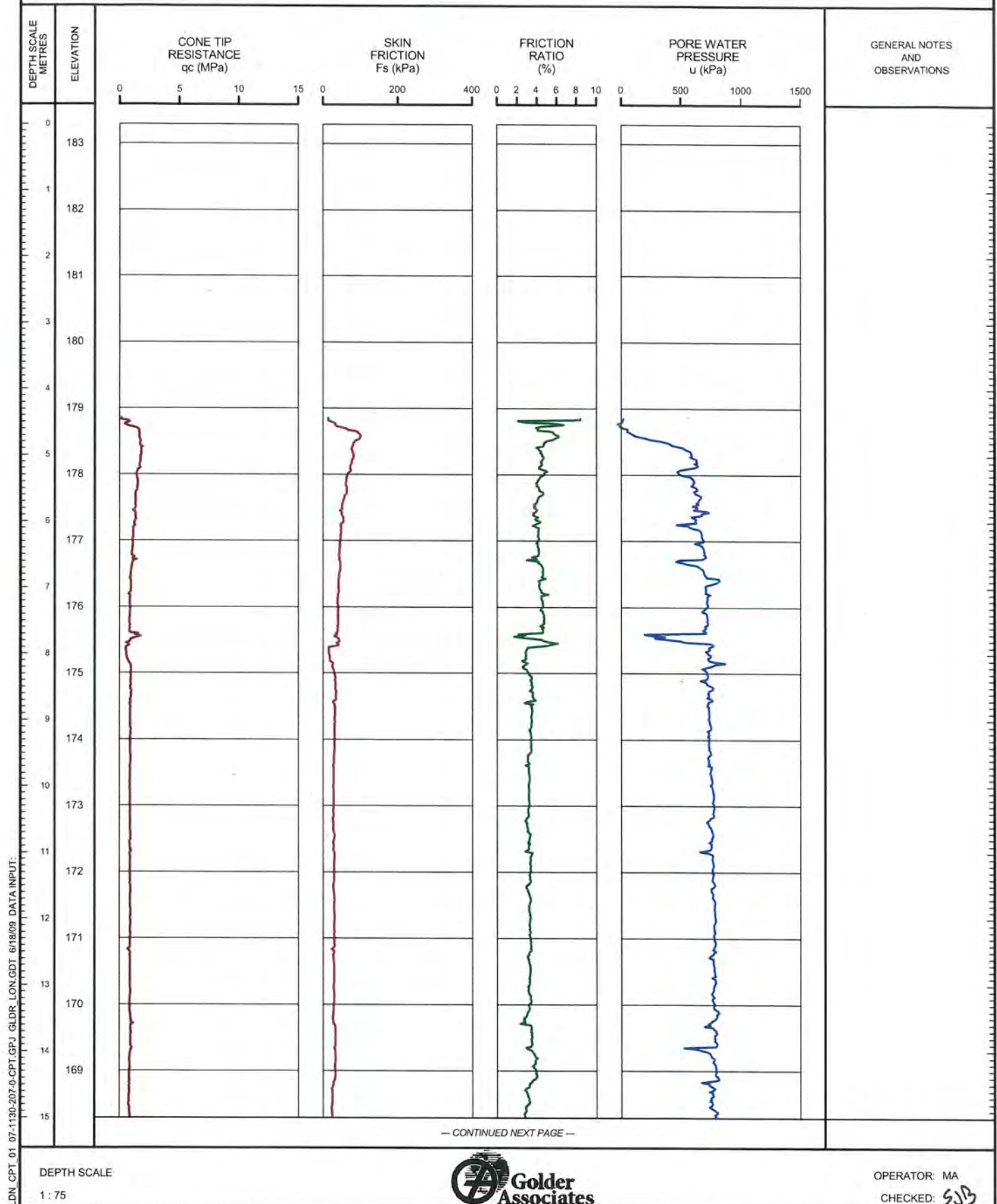
SHEET 1 OF 2

LOCATION: N 4678744.1 ; E 333601.5

TEST DATE: March 27, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 4.45m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LON CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/19/09 DATA INPUT:

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-117

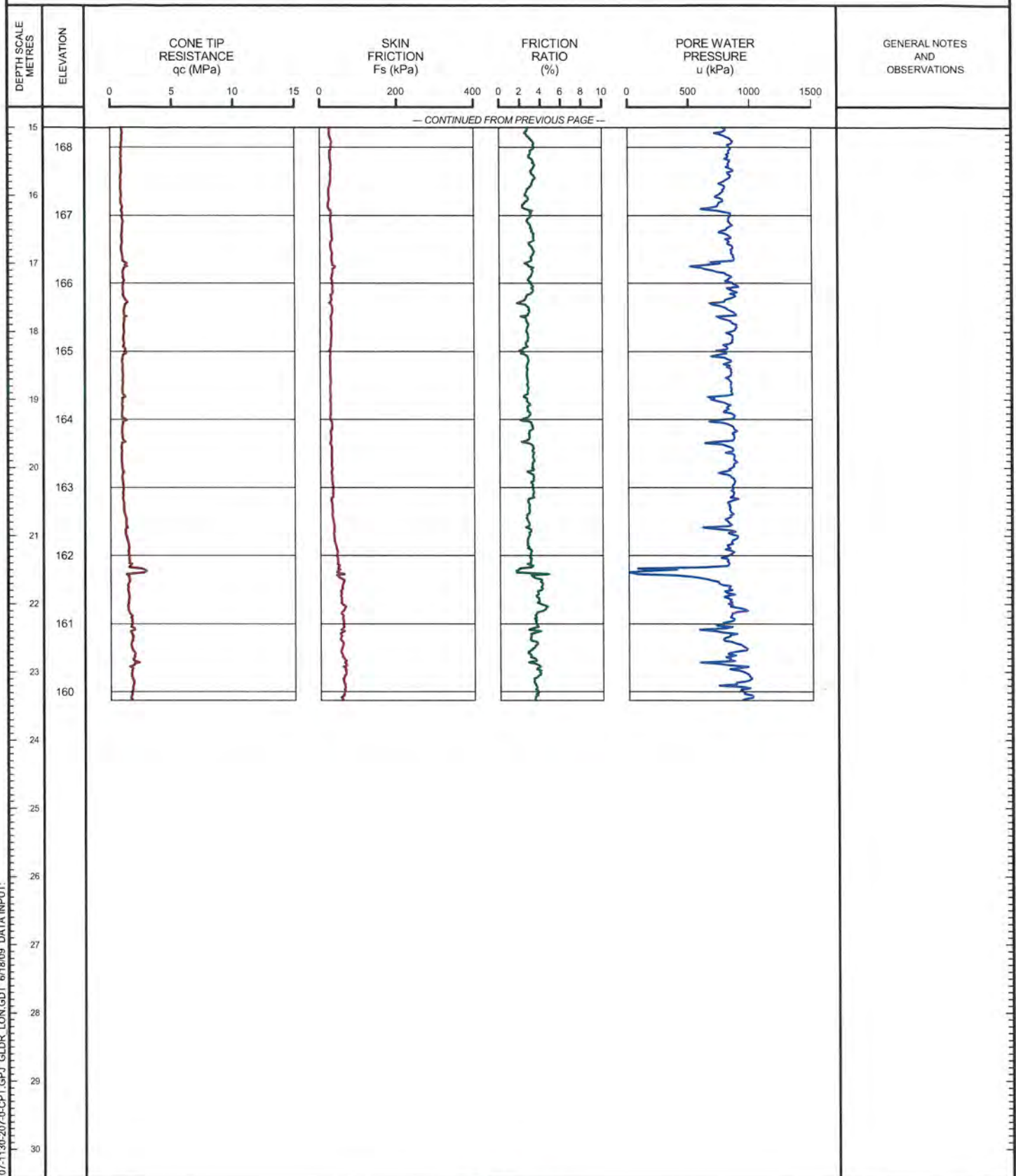
SHEET 2 OF 2

LOCATION: N 4678744.1 ; E 333601.5

TEST DATE: March 27, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 4.45m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LDN CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE

1 : 75



OPERATOR: MA

CHECKED: *SJB*

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-313

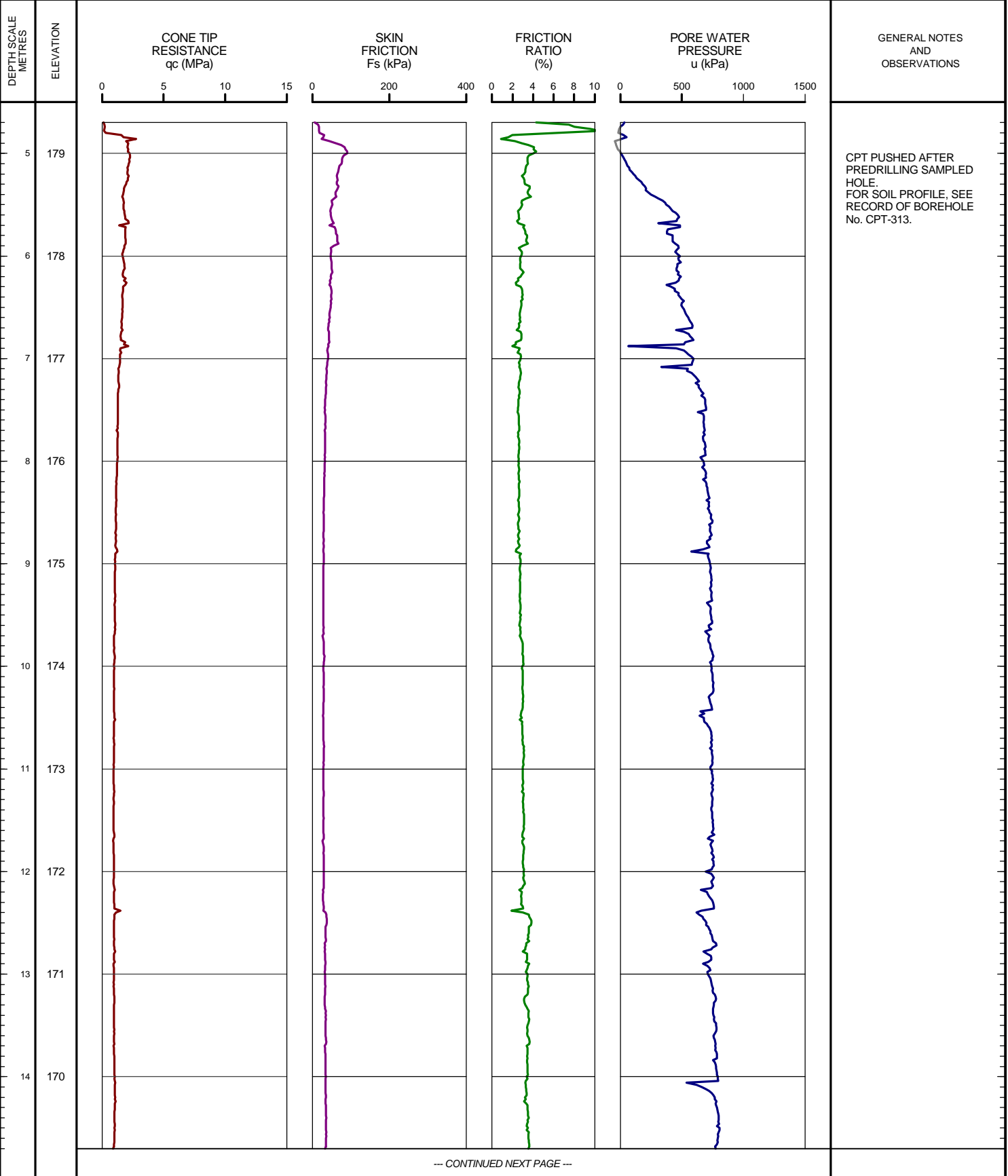
SHEET 1 OF 3

LOCATION: N 4678688.4 ;E 333599.7

TEST DATE: January 22, 2010

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 184.04m PREDRILL DEPTH: 4.70m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LON_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-313

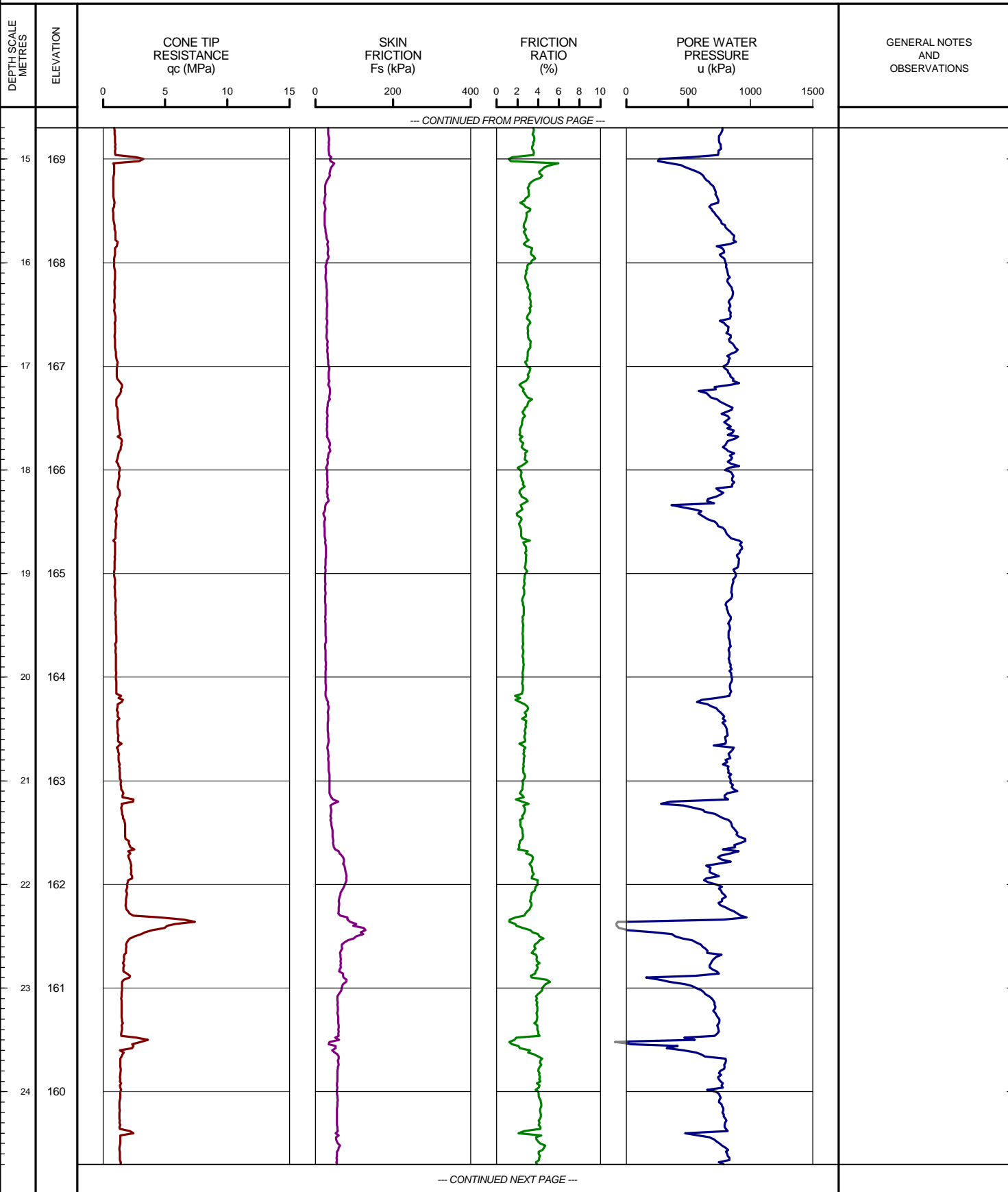
SHEET 2 OF 3

LOCATION: N 4678688.4 ;E 333599.7

TEST DATE: January 22, 2010

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 184.04m PREDRILL DEPTH: 4.70m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LON_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-313

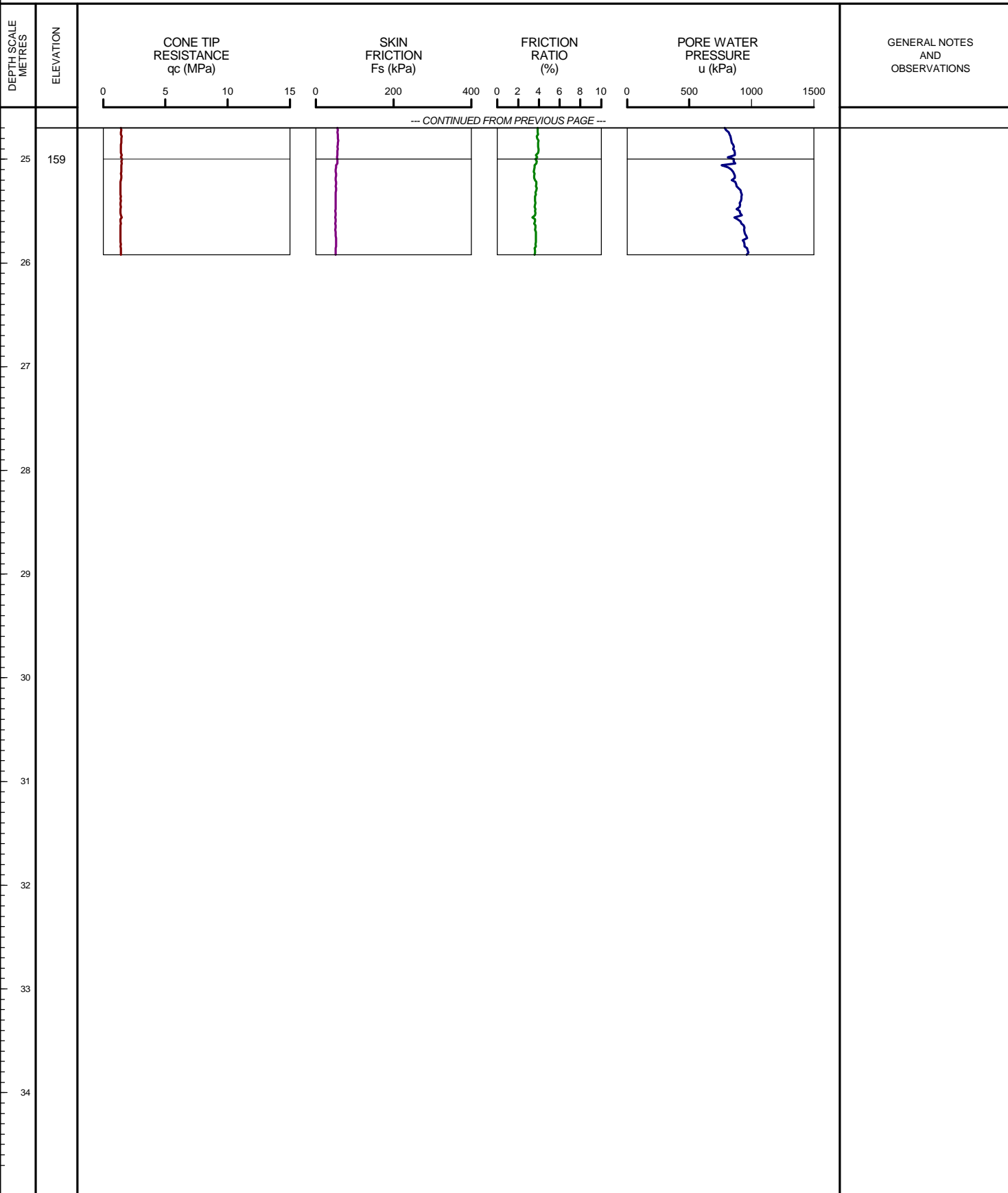
SHEET 3 OF 3

LOCATION: N 4678688.4 ;E 333599.7

TEST DATE: January 22, 2010

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 184.04m PREDRILL DEPTH: 4.70m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-315

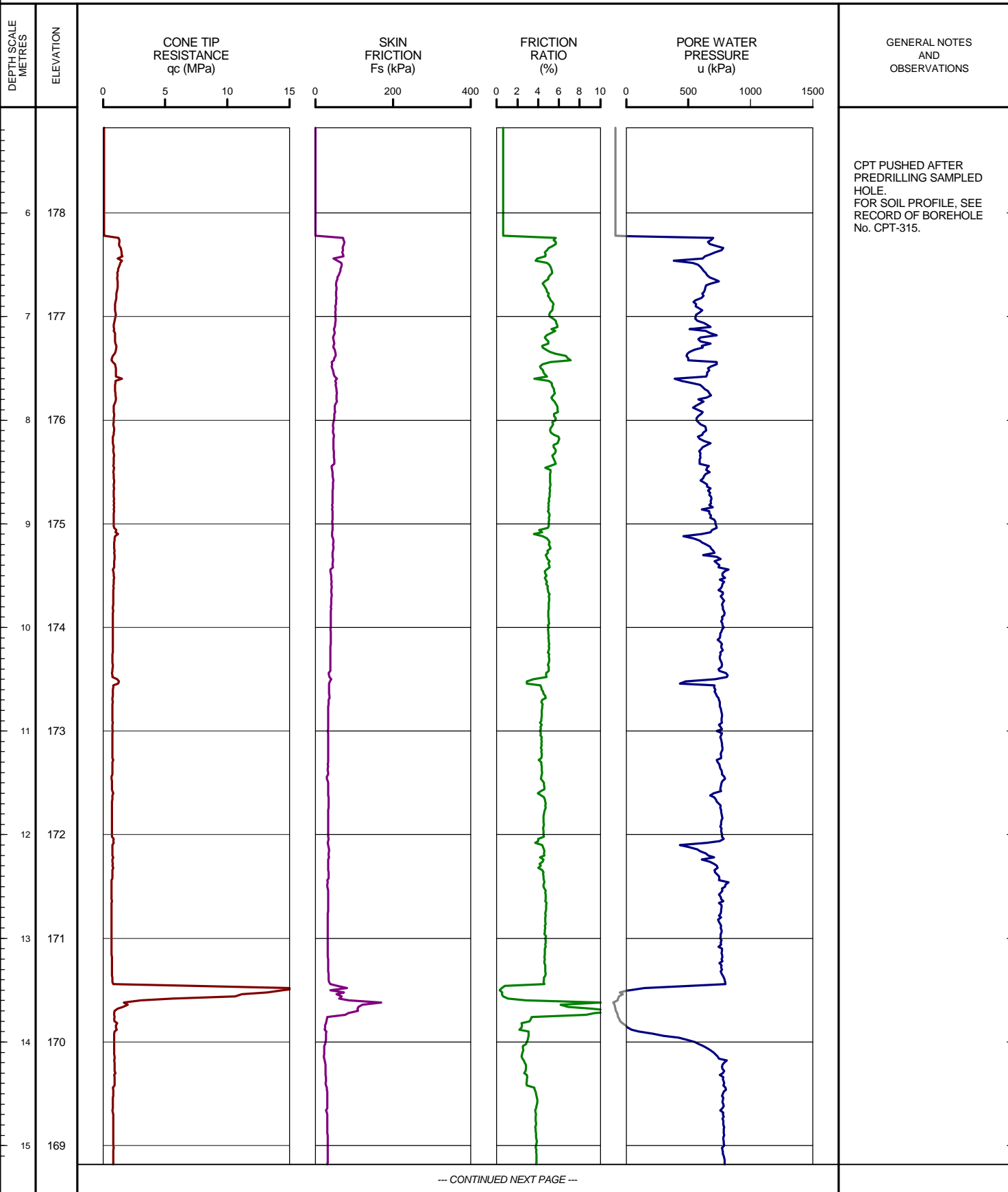
SHEET 1 OF 3

LOCATION: N 4678800.6 ;E 333406.3

TEST DATE: January 22, 2010

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 184.31m PREDRILL DEPTH: 5.18m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LDN_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-315

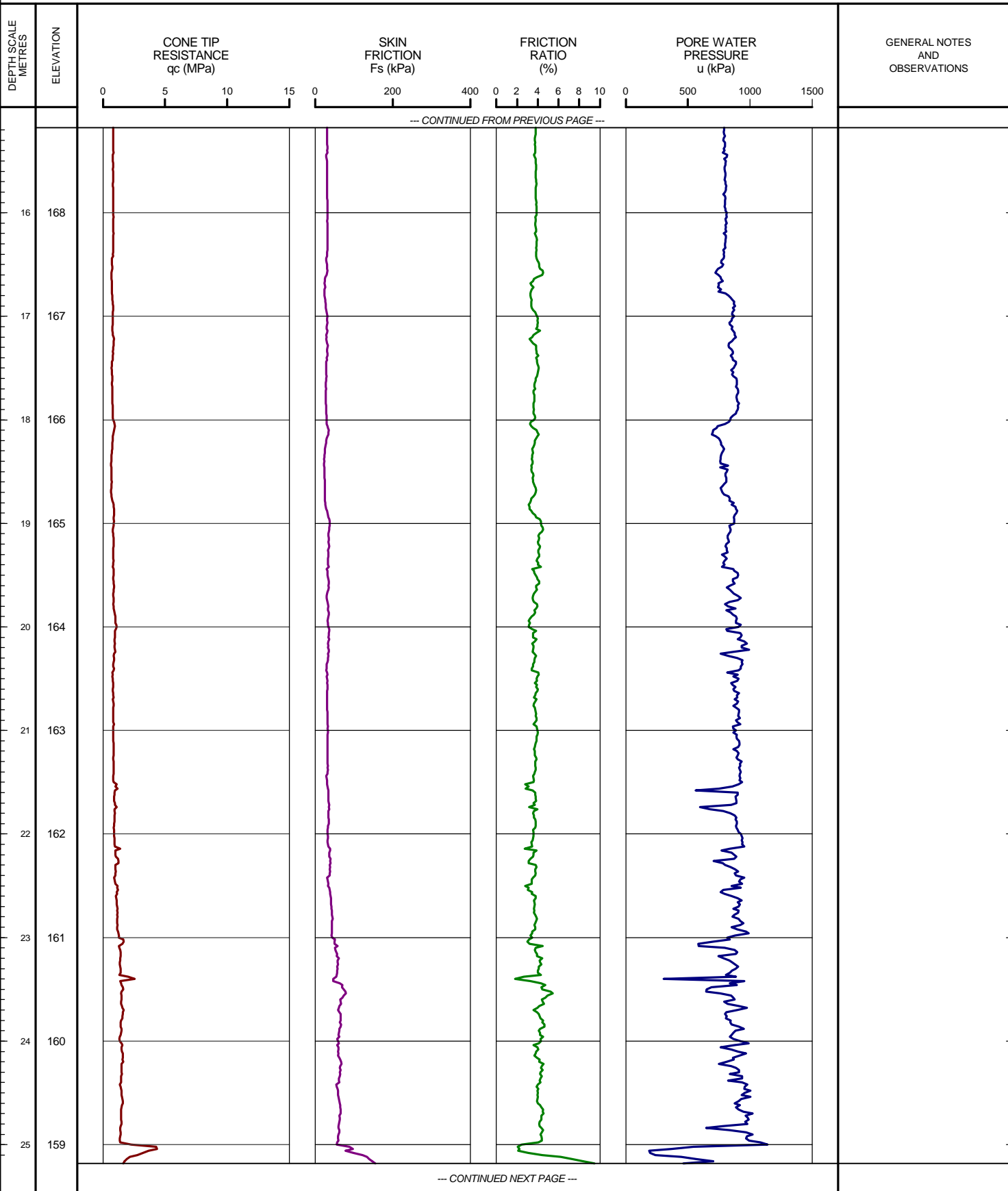
SHEET 2 OF 3

LOCATION: N 4678800.6 ;E 333406.3

TEST DATE: January 22, 2010

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 184.31m PREDRILL DEPTH: 5.18m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LON_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-315

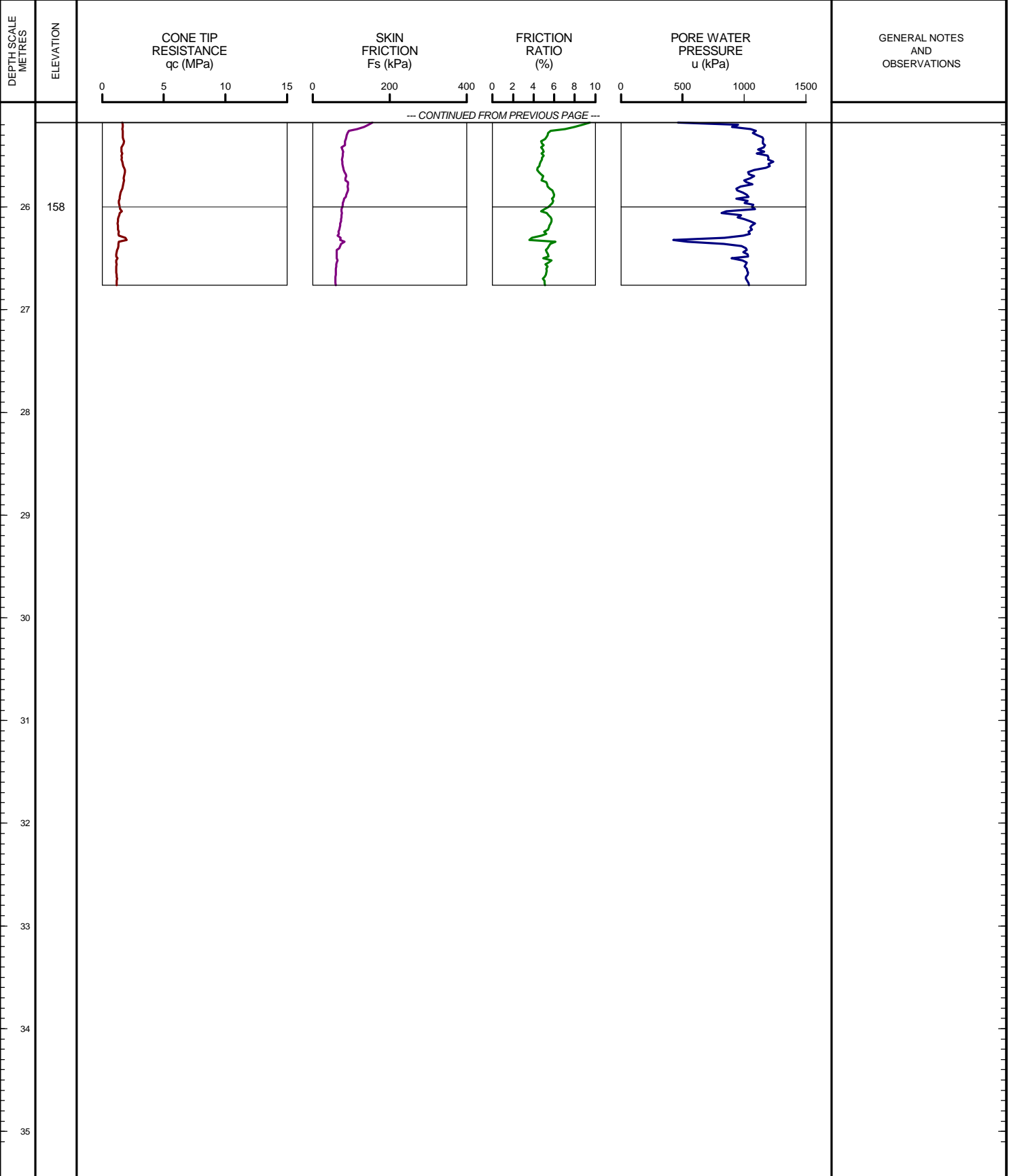
SHEET 3 OF 3

LOCATION: N 4678800.6 ;E 333406.3

TEST DATE: January 22, 2010

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 184.31m PREDRILL DEPTH: 5.18m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LDN_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-316

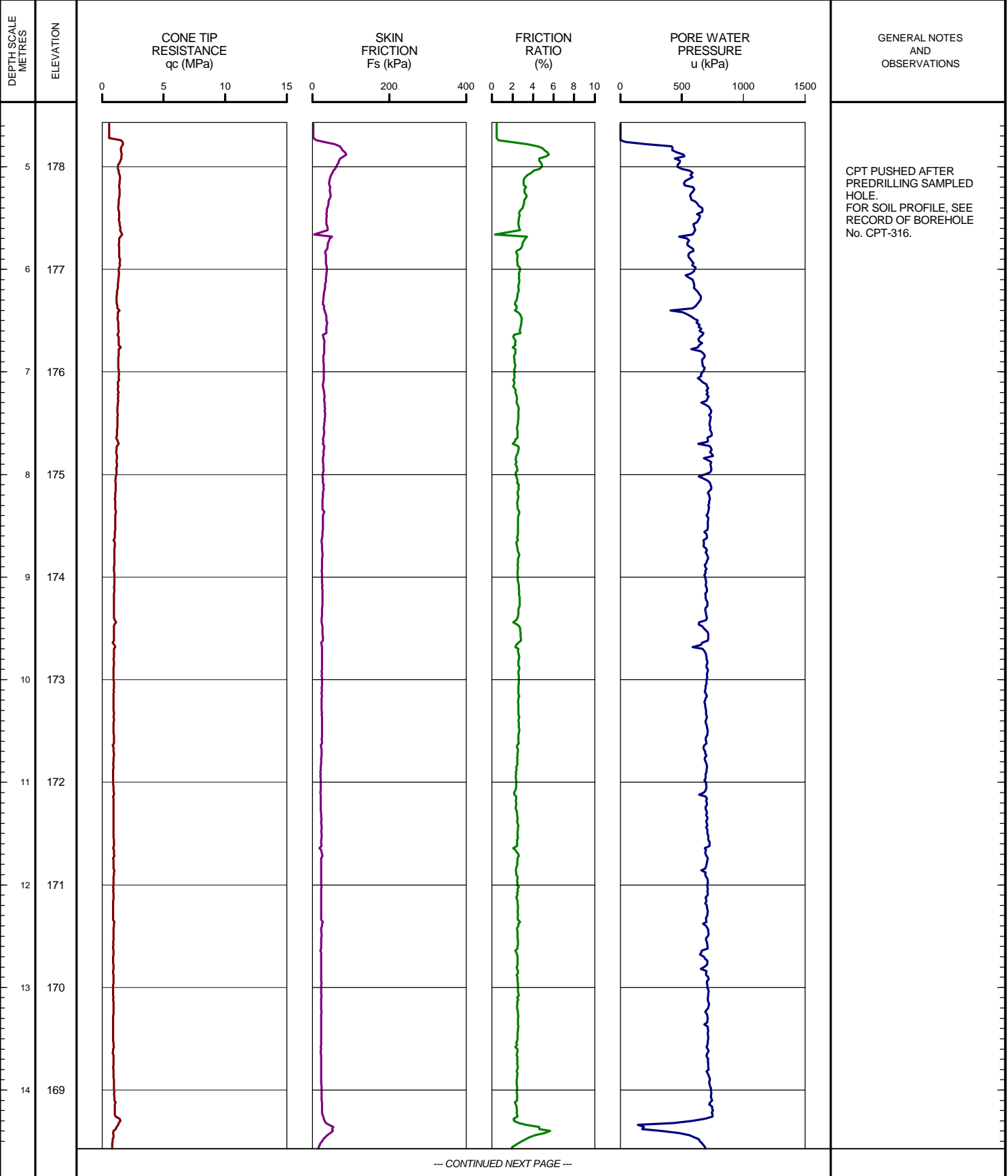
SHEET 1 OF 3

LOCATION: N 4678831.3 ;E 333265.0

TEST DATE: January 21, 2010

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 182.99m PREDRILL DEPTH: 4.57m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-316

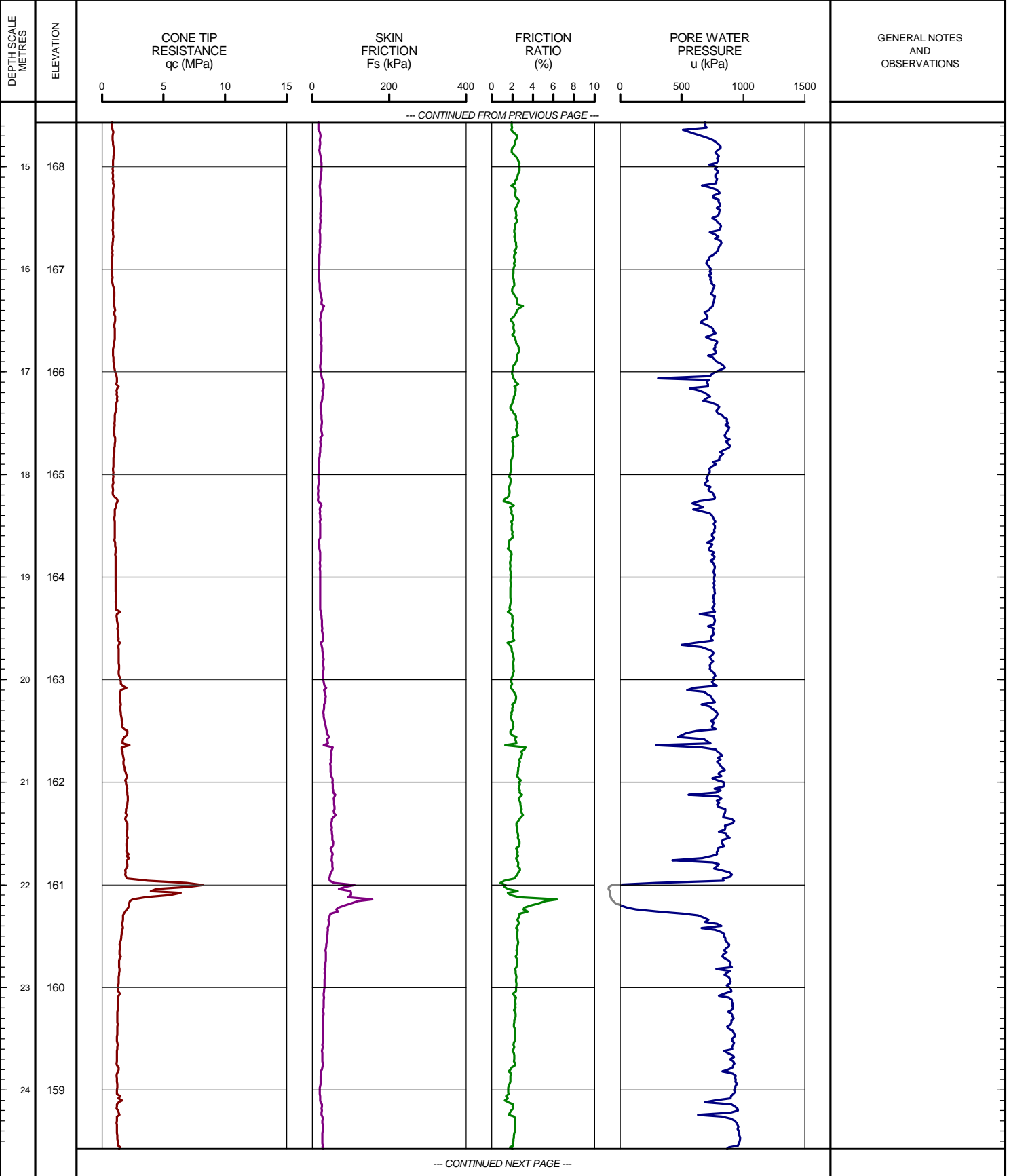
SHEET 2 OF 3

LOCATION: N 4678831.3 ;E 333265.0

TEST DATE: January 21, 2010

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 182.99m PREDRILL DEPTH: 4.57m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-316

SHEET 3 OF 3

LOCATION: N 4678831.3 ;E 333265.0

TEST DATE: January 21, 2010

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 182.99m PREDRILL DEPTH: 4.57m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013

| DEPTH SCALE METRES | ELEVATION | CONE TIP RESISTANCE qc (MPa) | SKIN FRICTION Fs (kPa) | FRICTION RATIO (%) | PORE WATER PRESSURE u (kPa) | GENERAL NOTES AND OBSERVATIONS |
|-----------------------|-----------|--------------------------------------|------------------------------|--------------------------|-----------------------------------|--------------------------------------|
| | | 0 5 10 15 | 0 200 400 | 0 2 4 6 8 10 | 0 500 1000 1500 | |
| | | --- CONTINUED FROM PREVIOUS PAGE --- | | | | |
| 25 | | | | | | |
| 26 | | | | | | |
| 27 | | | | | | |
| 28 | | | | | | |
| 29 | | | | | | |
| 30 | | | | | | |
| 31 | | | | | | |
| 32 | | | | | | |
| 33 | | | | | | |
| 34 | | | | | | |

DEPTH SCALE

1 : 50



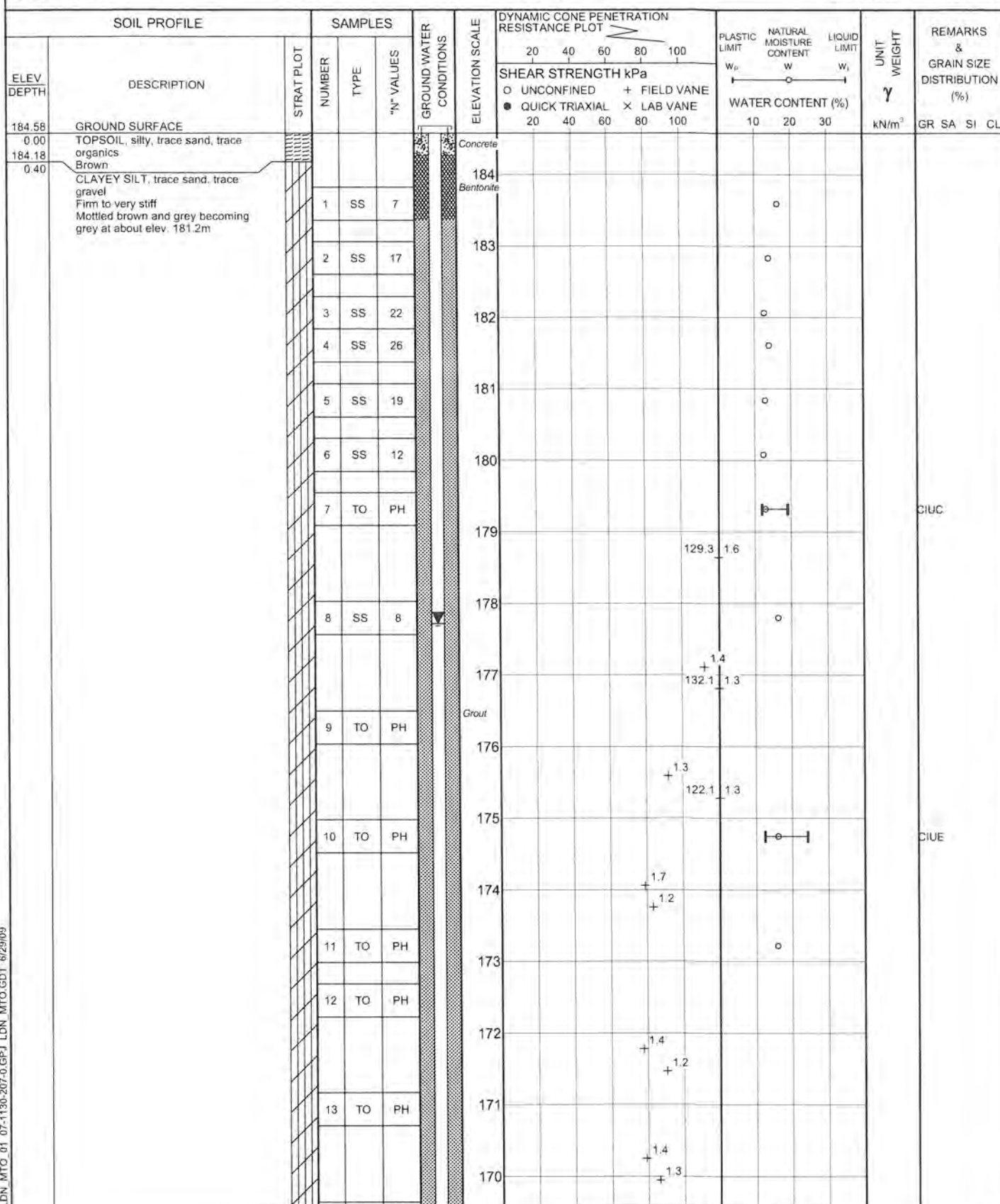
OPERATOR: TA

CHECKED:

LDN_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

Station 12+000L to Station 12+800L (Soil Profile #13)

| | | | | | |
|------------------------------|--|--|--|------------------------------|---------------|
| PROJECT 07-1130-207-0 | | RECORD OF BOREHOLE No 112 | | 1 OF 4 | METRIC |
| W.P. _____ | | LOCATION N 4678413.3 :E 334221.3 | | ORIGINATED BY SM | |
| DIST WEST HWY 401/3 | | BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC | | COMPILED BY BRS | |
| DATUM GEODETIC | | DATE January 29, 2008 - February 12, 2008 | | CHECKED BY <i>SJB</i> | |



LDN_MTO_01_07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

Continued Next Page

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

| | | | | | |
|-----------------------|---------------|---|--|-----------------------|---------------|
| PROJECT 07-1130-207-0 | | RECORD OF BOREHOLE No 112 | | 3 OF 4 | METRIC |
| W.P. | LOCATION | N 4678413.3 : E 334221.3 | | ORIGINATED BY SM | |
| DIST WEST HWY 401/3 | BOREHOLE TYPE | POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC | | COMPILED BY BRS | |
| DATUM GEODETIC | DATE | January 29, 2008 - February 12, 2008 | | CHECKED BY <i>SSB</i> | |

| 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 | | | | | | | | WATER CONTENT (%) |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | × LAB VANE | | | | | | |
| | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | |
| 153.80 | CLAYEY SILT, some sand, trace gravel Very stiff Grey | | 24 | SS | 28 | | | | | | | | | | (54) | |
| 30.78 | SILTY SAND AND GRAVEL, with cobbles and boulders Very dense Grey | | 25 | SS | 101/ 101mm | | | | | | | | | | | |
| | | | 26 | TO | PH | | | | | | | | | | | |
| 152.12 | LIMESTONE, fresh, medium strong, thinly laminated to laminated, very fine to medium grained, faintly to moderately porous Light greyish brown | | 27 | SS | 101/ 25mm | | | | | | | | | | | |
| 32.46 | (FOR DETAILED DESCRIPTIONS REFER TO RECORD OF DRILLHOLE) | | 28 | NQ RC | | | | | | | | | | | UC | |
| | | | 29 | NQ RC | | | | | | | | | | | | |
| | | | 30 | NQ RC | | | | | | | | | | | | |
| | | | 31 | NQ RC | | | | | | | | | | | | |
| 146.39 | END OF BOREHOLE | | | | | | | | | | | | | | | |
| 38.19 | Water level in borehole at about elev. 158.52m during drilling on February 5, 2008. Water level measured in deep piezometer at elev. 178.28m on February 12, 2008. Water level measured in deep piezometer at elev. 178.38m on March 20, 2008. Water level measured in deep piezometer at elev. 177.93m on July 24, 2008. Water level measured in deep piezometer at elev. 176.25m on September 19, 2008. Water level measured in deep piezometer at elev. 177.54m on November 14, 2008. Water level measured in deep piezometer at elev. 177.72m on January 28, 2009. | | | | | | | | | | | | | | | |

LDN_MTO_01_07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

PROJECT: 07-1130-207-0

RECORD OF DRILLHOLE: 112

SHEET 4 OF 4

LOCATION: N 4678413.3 ; E 334221.3

DRILLING DATE: January 29, 2008 - February 12, 2008

DATUM: GEODETIC

INCLINATION: -90° AZIMUTH: —

DRILL RIG: MUD ROTARY WITH HQ TRICONE, NQRC

DRILLING CONTRACTOR: AARDVARK DRILLING INC

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. DEPTH (m) | RUN No. | PENETRATION RATE (m/min) | COLOUR % RETURN | ELEVATION | JN - Joint FLT - Fault SHR - Shear VN - Vein CJ - Conjugate | BD - Bedding FO - Foliation CO - Contact OR - Orthogonal CL - Cleavage | PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular | PO - Polished K - Stickensided SM - Smooth Ro - Rough | Br - Broken Rock NOTE: For occasional abbreviations refer to list of abbreviations & symbols | HYDRAULIC CONDUCTIVITY k, cm/sec | DIAMETRAL POWER LOG INDEX (MPa) | NOTES WATER LEVELS INSTRUMENTATION |
|-----------------------|----------------------------|---|--------------|---------------------------|---------|-----------------------------|--------------------|-----------|---|--|---|--|--|--|---------------------------------------|--|
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | ROCK SURFACE | | 152.12 32.46 | | | | 152 | | | | | | | | |
| 33 | MUD ROTARY NQ ROCK CORE | LIMESTONE, fresh, medium strong, thinly laminated, very fine grained, faintly porous, light grey | | 150.75 33.83 | 1 | | | 151 | | | | | | | | |
| 34 | | LIMESTONE, fresh, medium strong, laminated, fine grained, vuggy to faintly porous with depth, light greyish brown, fossils present | | | | | | 150 | | | | | | | | |
| 35 | | LIMESTONE, fresh, medium strong, thinly laminated, very fine grained, faintly porous, light grey | | 149.28 35.30 | 2 | | | 149 | | | | | | | | |
| 36 | | LIMESTONE, fresh, medium strong, thinly laminated, fine grained, faintly porous, light greyish brown | | 148.34 36.24 | 3 | | | 148 | | | | | | | | |
| 37 | | LIMESTONE, fresh, medium strong, laminated, medium grained, moderately porous, light greyish brown | | 147.18 37.40 | 4 | | | 147 | | | | | | | | |
| 38 | | LIMESTONE, fresh, medium strong, laminated, fine grained, faintly porous, very light greyish brown | | 146.66 37.92 146.39 | | | | | | | | | | | | |
| 39 | | END OF DRILLHOLE | | 38.19 | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | | | | |
| 41 | | | | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | | | | |
| 43 | | | | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | | | | |
| 45 | | | | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | | | | |
| 47 | | | | | | | | | | | | | | | | |

DEPTH SCALE

1:75



LOGGED: SG

CHECKED: SJB

RECORD OF BOREHOLE No 113

1 OF 4

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4678454.5 : E 334070.3

ORIGINATED BY DJM/MA

DIST WEST HWY 401/3

BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

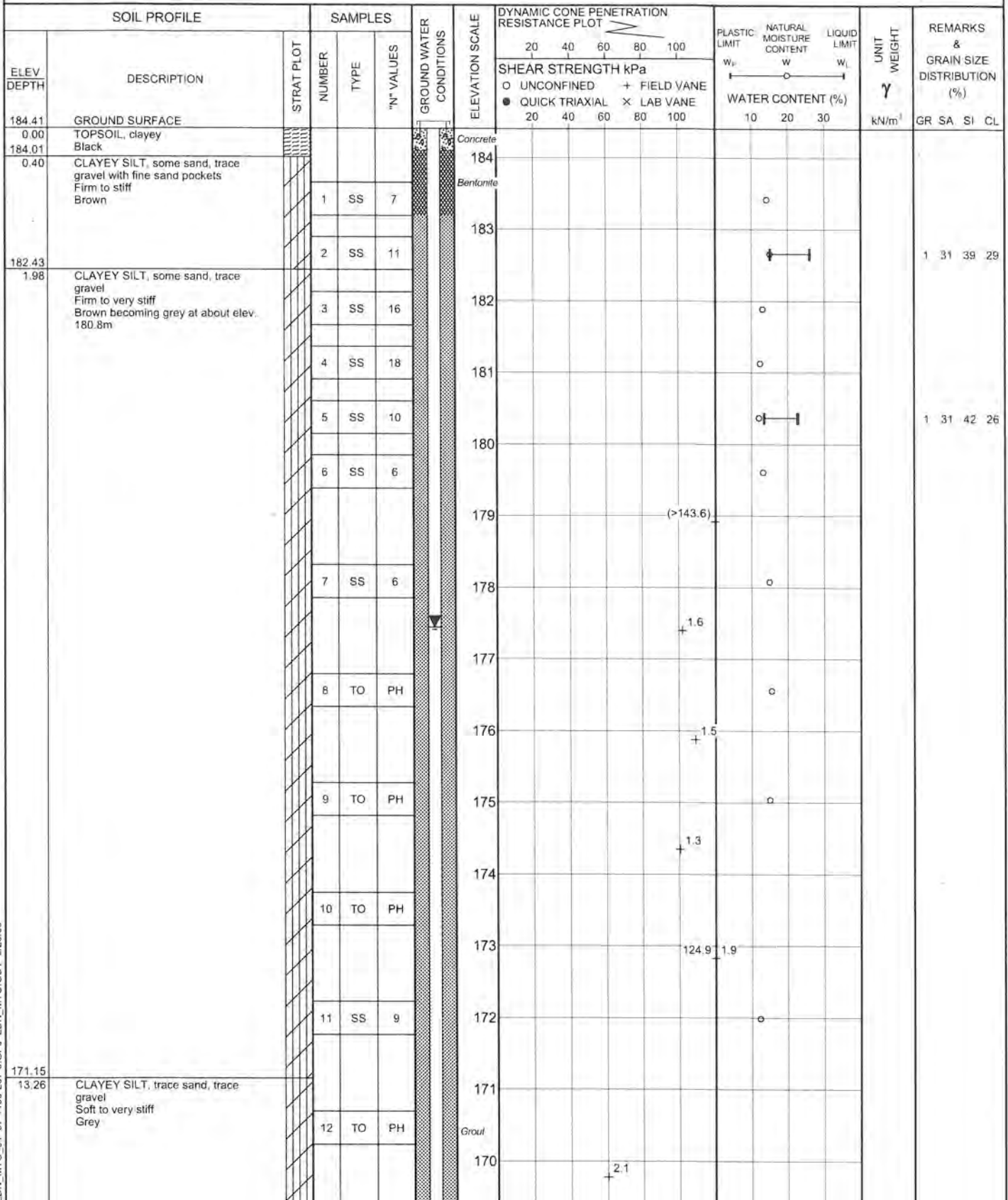
COMPILED BY BRS

DATUM GEODETIC

DATE

February 22, 2008 - February 28, 2008

CHECKED BY *SB*



Continued Next Page

+ 3, x 3. Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

LDN_MTO_01_07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

| | | | | | |
|------------------------------|--|--|--|-----------------------------|---------------|
| PROJECT 07-1130-207-0 | | RECORD OF BOREHOLE No 113 | | 2 OF 4 | METRIC |
| W.P. _____ | | LOCATION N 4678454.5 ; E 334070.3 | | ORIGINATED BY DJM/MA | |
| DIST WEST HWY 401/3 | | BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC | | COMPILED BY BRS | |
| DATUM GEODETIC | | DATE February 22, 2008 - February 28, 2008 | | CHECKED BY <i>SB</i> | |

| 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 | | | | | | | WATER CONTENT (%) |
| | | | | | | | | ○ UNCONFINED 20 40 60 80 100 | + FIELD VANE 20 40 60 80 100 | | | | | | |
| | CLAYEY SILT, trace sand, trace gravel Soft to very stiff Grey | | 13 | SS | 4 | | | | | | | | | | |
| 167.95 16.46 | SILTY CLAY, trace sand Soft to stiff Grey | | 14 | SS | 4 | | | 1.8 | | | | | | | |
| | | | 15 | SS | 5 | | | 2.7 | | | | | | | |
| 165.13 19.28 | CLAYEY SILT, trace sand, trace gravel Stiff to very stiff Grey | | 16 | TO | PH | | | 2.6 | | | | | | | |
| | | | 17 | SS | 9 | | | 1.9 | | | | | | | |
| | | | 18 | SS | 19 | | | | | | | | | | |
| | | | 19 | SS | 17 | | | | | | | | | | |
| | | | 20 | SS | 16 | | | | | | | | | | |
| | | | 21 | SS | 14 | | | | | | | | | | |
| 155.76 28.65 | SILTY SAND, trace gravel, trace clay Compact Grey | | 22 | SS | 12 | | | | | | | | | | |
| 155.21 29.20 | CLAYEY SILT, with silt lenses. Stiff Grey | | | | | | | | | | | | | | |
| 154.54 | | | | | | | | | | | | | | | |

LDN MTO 01 07-1130-207-0.GPJ LDN MTO GDT 6/29/09

Continued Next Page

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

RECORD OF BOREHOLE No 113

3 OF 4

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4678454.5 : E 334070.3

ORIGINATED BY DJM/MA

DIST

WEST

HWY 401/3

BOREHOLE TYPE

POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

COMPILED BY BRS

DATUM GEODETIC

DATE

February 22, 2008 - February 28, 2008

CHECKED BY *SJB*

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | PLASTIC LIMIT NATURAL MOISTURE LIQUID LIMIT CONTENT 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 (%) | | | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | | | |
| 29.87 | SAND AND GRAVEL, trace silt Compact Grey | | 23 | SS | 25 | | 154 | | | | | | | | | |
| | | | | | | | Screen | | | | | | | | | |
| 153.01 | | | 24 | NQ RC | | | 153 | 33 | 0 | 0 | | | | | | |
| 31.40 | LIMESTONE, fresh, medium strong, thinly laminated to laminated, very fine to fine grained, faintly porous to porous Light grey to brown (FOR DETAILED DESCRIPTIONS REFER TO RECORD OF DRILLHOLE) | | 25 | NQ RC | | | Bentonite | 27 | 10 | 0 | | | | | | |
| | | | 26 | NQ RC | | | 152 | 73 | 38 | 12 | | | | | | |
| | | | 27 | NQ RC | | | 151 | T.C.R (%) 0 | S.C.R. (%) 0 | R.Q.D. (%) 0 | | | | | | |
| | | | | | | | Sand | | | | | | | | | |
| | | | 28 | NQ RC | | | 150 | | | | | | | | | |
| | | | | | | | 149 | 94 | 92 | 78 | | | | | UC | |
| 148.36 | | | | | | | | | | | | | | | | |
| 36.05 | END OF BOREHOLE | | | | | | | | | | | | | | | |
| | Water level in borehole at about elev. 154.54m during drilling between February 22 and 28, 2008 | | | | | | | | | | | | | | | |
| | Water level measured in deep piezometer at elev. 178.13m on February 28, 2008. | | | | | | | | | | | | | | | |
| | Water level measured in deep piezometer at elev. 182.91m on March 20, 2008. | | | | | | | | | | | | | | | |
| | Water level measured in deep piezometer at elev. 177.75m on July 22, 2008. | | | | | | | | | | | | | | | |
| | Water level measured in deep piezometer at elev. 175.87m on September 19, 2008. | | | | | | | | | | | | | | | |
| | Water level measured in deep piezometer at elev. 177.18m on November 11, 2008. | | | | | | | | | | | | | | | |
| | Water level measured in deep piezometer at elev. 177.44m on January 28, 2009. | | | | | | | | | | | | | | | |

LDN_MTO_01_07-1130-207-0.GPJ LDN_MTO.GDT 5/29/09

PROJECT: 07-1130-207-0

RECORD OF DRILLHOLE: 113

SHEET 4 OF 4

LOCATION: N 4678454.5 E 334070.3


DRILLING DATE: February 22, 2008 - February 28, 2008

DATUM: GEODETIC

INCLINATION: -90° AZIMUTH: —

DRILL RIG: MUD ROTARY WITH HQ TRICONE, NQRC

DRILLING CONTRACTOR: AARDVARK DRILLING INC

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. | | PENETRATION RATE (m/min) | COLOUR % RETURN | ELEVATION | JN - Joint FLT - Fault SHR - Shear VN - Vein C.J. - Conjugate BD - Bedding FO - Foliation CO - Contact OR - Orthogonal CL - Cleavage PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular PO - Polished K - Slickensided SM - Smooth Ro - Rough Br - Broken Rock NOTE: For additional abbreviations refer to list of abbreviations A symbols | | | | | | | | | | DIAMETRAL POINT LOAD INDEX (MPa) | NOTES WATER LEVELS INSTRUMENTATION |
|-----------------------|----------------------------|--|---|--------------|---------|-----------------------------|--------------------|-----------|--|-----------------|------------|---------------------------|------------------------|---------------------------------|--|----------------|--------------|--------------|--|--|
| | | | | DEPTH (m) | RUN No. | | | | RECOVERY | | R Q D % | FRACT INDEX PER 0.3 | DISCONTINUITY DATA | | HYDRAULIC CONDUCTIVITY k, cm/sec | | | | | |
| | | | | | | | | | TOTAL CORE % | SOLID CORE % | | | DIP w.r.t CORE AXIS | TYPE AND SURFACE DESCRIPTION | | | | | | |
| | | | | | | | | | | | | | | | | 40 60 80 100 | 40 60 80 100 | 40 60 80 100 | | |
| | | ROCK SURFACE | | 153.01 | | | | 153 | | | | | | | | | | | | |
| 32 | MUD ROTARY NO ROCK CORE | LIMESTONE, fresh, medium strong, thinly laminated, fine grained, faintly porous, light grey No recovery from 32.00m to 32.31m |  | 31.40 | 1 | | | | | | | | | | Broken Core | | | | | |
| | | | | 2 | | | | | | | | | | | | | | | | |
| | | | | | 3 | | | | | | | | | | | Broken Core | | | | |
| 33 | | LIMESTONE, fresh, medium strong, thinly laminated, fine grained to very fine grained, porous, light grey | | 151.40 | | | | | | | | | | | | JN, UN, Ro, Cl | | | | |
| | | | | 33.01 | | | | | | | | | | | | | | | | |
| | | LIMESTONE, fresh, medium strong, laminated, fine grained, faintly porous, grey - brown | | 150.70 | | | | | | | | | | Broken Core | | | | | | |
| 34 | | | | 33.71 | 4 | | | | | | | | | Broken Core | | | | | | |
| | | | | | | | | 150 | | | | | | | | | | | | |
| | | LIMESTONE, fresh, medium strong, thinly laminated, fine grained, porous, light grey | | 149.60 | | | | | | | | | | | BD, UN, SM, Cl | | | | | |
| 35 | | | | 34.81 | | | | | | | | | | | JN, UN, SM, Cl | | | | | |
| | | | | 149.18 | | | | | | | | | | | | | | | | |
| | | LIMESTONE, fresh, medium strong, thinly laminated, fine grained, faintly porous, light grey to brown | | 35.23 | 5 | | | | | | | | | | JN, PL, Ro, Si | | | | | |
| 36 | | END OF DRILLHOLE | | 148.35 | | | | | | | | | | | | | | | | |
| | | | | 36.06 | | | | | | | | | | | | | | | | |
| 37 | | | | | | | | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | | | | | | | | |
| 39 | | | | | | | | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | | | | | | | | |
| 41 | | | | | | | | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | | | | | | | | |
| 43 | | | | | | | | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | | | | | | | | |
| 45 | | | | | | | | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | | | | | | | | |

DEPTH SCALE

1 : 75



LOGGED: SG

CHECKED: SJB

| | | | | | |
|-----------------------|---|----------------------------------|--|--------|---------------|
| PROJECT 07-1130-207-0 | | RECORD OF BOREHOLE No 115 | | 1 OF 4 | METRIC |
| W.P. _____ | LOCATION N 4678585.3 E 333911.1 | ORIGINATED BY MA | | | |
| DIST WEST HWY 401/3 | BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC | COMPILED BY BRS | | | |
| DATUM GEODETIC | DATE February 15, 2008 - February 21, 2008 | CHECKED BY <i>SJB</i> | | | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _P | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | | | |
|---------------|--|------------|---------|------|------------|-------------------------|-----------------|--|----|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|----|----|-----|----|----|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 | 40 | | | | | | 60 | 80 | 100 | 20 | 40 |
| 183.79 | GROUND SURFACE | | | | | | | | | | | | | | | | | | |
| 0.00 | TOPSOIL, silty Brown | | | | | | Concrete | | | | | | | | | | | | |
| 183.36 | | | | | | | Bentonite | | | | | | | | | | | | |
| 0.43 | CLAYEY SILT, some sand, trace gravel Soft to very stiff Brown | | 1 | SS | 4 | | 183 | | | | | | | | | | | | |
| | | | 2 | SS | 22 | | 182 | | | | | | | | | | | | |
| | | | 3 | SS | 25 | | 181 | | | | | | | | | | | | |
| | | | 4 | SS | 23 | | 180 | | | | | | | | | | | | |
| 180.44 | | | | | | | | | | | | | | | | | | | |
| 3.35 | CLAYEY SILT, some sand, trace gravel Stiff Grey | | 5 | SS | 14 | | 180 | | | | | | | | | | | | |
| | | | 6 | SS | 12 | | 179 | | | | | | | | | | | | |
| | | | 7 | SS | 14 | | 178 | | | | | | | | | | | | |
| | | | | | | | 177 | | | | | | | | | | | | |
| | | | 8 | SS | 9 | | 176 | | | | | | | | | | | | |
| | | | | | | | Grout | | | | | | | | | | | | |
| | | | 9 | TO | PH | | 175 | | | | | | | | | | | | |
| 174.80 | | | | | | | | | | | | | | | | | | | |
| 8.99 | SANDY SILT, some clay, trace gravel Loose Grey | | | | | | 174 | | | | | | | | | | | | |
| | | | 10 | SS | 7 | | 173 | | | | | | | | | | | | |
| 173.58 | | | | | | | | | | | | | | | | | | | |
| 10.21 | CLAYEY SILT, some sand, trace gravel Firm Grey | | | | | | 173 | | | | | | | | | | | | |
| 173.12 | | | | | | | | | | | | | | | | | | | |
| 10.67 | SAND, trace gravel, trace silt Loose Grey | | | | | | 172 | | | | | | | | | | | | |
| | | | 11 | SS | 8 | | 171 | | | | | | | | | | | | |
| 171.90 | | | | | | | | | | | | | | | | | | | |
| 11.89 | CLAYEY SILT, some sand, trace gravel Soft to very stiff Grey | | 12 | SS | 7 | | 170 | | | | | | | | | | | | |
| | | | 13 | TO | PH | | 169 | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | 14 | SS | 6 | | | | | | | | | | | | | | |

LDN_MTO_01 07-1130-207-0.GPJ LDN_MTO.GDT 8/29/09

Continued Next Page

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

RECORD OF BOREHOLE No 115

2 OF 4

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4678585.3 :E 333911.1

ORIGINATED BY MA

DIST WEST HWY 401/3

BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

COMPILED BY BRS

DATUM GEODETIC

DATE

February 15, 2008 - February 21, 2008

CHECKED BY **SB**

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT w | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|-----------------|--|-------------|---------|------|------------|-------------------------|-----------------|--|-----------------|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|
| ELEV. DEPTH | DESCRIPTION | STRAT. PLOT | NUMBER | TYPE | "N" VALUES | | | 20 40 60 80 100 | 20 40 60 80 100 | | | | | |
| | CLAYEY SILT, some sand, trace gravel Soft to very stiff Grey | | | | | | | | | | | | | |
| | | | 15 | SS | 4 | | 168 | | 1.5 | | | | | |
| | | | | | | | 167 | | 2.0 | | | | | |
| | | | 16 | TO | PH | | 166 | | | | | | | |
| | | | | | | | 165 | | 1.5 | | | | | |
| | | | 17 | SS | 6 | | 164 | | | | | | | |
| | | | | | | | 163 | | | | | | | 4 25 47 24 |
| | | | 18 | SS | 13 | | 162 | | | | | | | |
| | | | | | | | 161 | | | | | | | |
| | | | 19 | SS | 22 | | 160 | | | | | | | |
| | | | | | | | 159 | | | | | | | |
| | | | 20 | SS | 22 | | 158 | | | | | | | |
| | | | | | | | 157 | | | | | | | |
| | | | 21 | SS | 24 | | 156 | | | | | | | |
| | | | | | | | 155 | | | | | | | |
| | | | 22 | SS | 11 | | 154 | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 23 | TO | PH | | | | | | | | | |
| | | | | | | | | | | | | | | |
| 156.21 27.58 | SAND, trace sand, trace gravel, trace clay Dense Grey | | 24 | SS | 31 | | | | | | | | | 1 86 8 5 |
| 154.83 28.96 | SAND, trace gravel Compact to dense Grey | | | | | | | | | | | | | |
| | | | 25 | SS | 30 | | | | | | | | | |

Continued Next Page

+ 3, x 3

Numbers refer to Sensitivity

○ 3% STRAIN AT FAILURE

LDN MTO 01 07-1130-207-0.GPJ LDN MTO.GDT 6/29/09

PROJECT: 07-1130-207-0

RECORD OF DRILLHOLE: 115

SHEET 4 OF 4

LOCATION: N 4678585.3 ; E 333911.1


DRILLING DATE: February 15, 2008 - February 21, 2008

DATUM: GEODETIC

INCLINATION: -90° AZIMUTH: —

DRILL RIG: MUD ROTARY WITH HQ TRICONE, NQRC

DRILLING CONTRACTOR: AARDVARK DRILLING INC

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. | | RUN No. | PENETRATION RATE (m/min) | COLOUR (m/min) | FLUSH % RETURN | ELEVATION | JN - Joint FLT - Fault SHR - Shear VN - Vein CJ - Conjugate BD - Bedding FO - Foliation CO - Contact OR - Orthogonal CL - Cleavage PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular PO - Polished K - Slickensided SM - Smooth Ro - Rough Br - Broken Rock NOTE: For additional abbreviations refer to list of abbreviations & symbols | | | | | | | | | | DIAMETER POINT LOAD INDEX (MPa) | NOTES WATER LEVELS INSTRUMENTATION | | |
|-----------------------|----------------------------|---|---|------------------|----------|-----------------|-----------------------------|-------------------|-------------------|-----------|---|---------------------------|---------------------------------|----|--|------------------|------------------|------------------|------------------|---|---------------------------------------|--|--|--|
| | | | | DEPTH (m) | RECOVERY | | | | | | R.Q.D. % | FRACT INDEX PER 0.3 | DISCONTINUITY DATA | | HYDRAULIC CONDUCTIVITY k, cm/sec | | | | | | | | | |
| | | | | | | | | | | | | | TYPE AND SURFACE DESCRIPTION | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | TOTAL CORE % | SOLID CORE % | | | | | | | |
| 80 | 60 | 40 | 20 | 80 | 60 | 40 | 20 | 5 | 10 | 15 | 20 | 0 | 30 | 60 | 90 | 10 ⁻⁶ | 10 ⁻⁵ | 10 ⁻⁴ | 10 ⁻³ | 2 | 4 | 6 | | |
| | | ROCK SURFACE | | 151.48 32.31 | | | | | | | | | | | | | | | | | | | | |
| 33 | MUD ROTARY NO ROCK CORE | LIMESTONE, fresh, medium strong, thinly laminated, fine grained, faintly porous to porous, light brown to grey, fossiliferous |  | 149.99 33.80 | 1 | | | | | 151 | | | | | | | | | | | | | | |
| 34 | | LIMESTONE, fresh, medium strong, thinly laminated, medium grain, faintly porous to porous, light grey | | 149.53 34.26 | | | | | | | 150 | | | | | | | | | | | | | |
| 35 | | LIMESTONE, fresh, medium strong, laminated, fine grained, porous to vuggy, light grey | | 148.80 34.99 | 2 | | | | | | 149 | | | | | | | | | | | | | |
| 36 | | LIMESTONE, fresh, medium strong, laminated, fine grained, faintly porous, brown - grey | | 148.19 35.60 | | | | | | | | 148 | | | | | | | | | | | | |
| 37 | | LIMESTONE, fresh, medium strong, laminated, porous, light brown and grey | | 147.06 36.73 | 3 | | | | | | 147 | | | | | | | | | | | | | |
| | | LIMESTONE, fresh, medium strong, laminated, porous, light grey to white | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | 146.15 37.64 | | | | | | | | | | | | | | | | | | |
| 38 | | | | END OF DRILLHOLE | | | | | | | | | | | | | | | | | | | | |
| 39 | | | | | | | | | | | | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | | | | | | | | | | | | |
| 41 | | | | | | | | | | | | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | | | | | | | | | | | | |
| 43 | | | | | | | | | | | | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | | | | | | | | | | | | |
| 45 | | | | | | | | | | | | | | | | | | | | | | | | |
| 46 | | | | | | | | | | | | | | | | | | | | | | | | |
| 47 | | | | | | | | | | | | | | | | | | | | | | | | |

DEPTH SCALE

1 : 75



LOGGED: SG

CHECKED: SUB

RECORD OF BOREHOLE No 115A

1 OF 2

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4678585.3 ; E 333911.1

ORIGINATED BY MA

DIST WEST HWY 401/3

BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

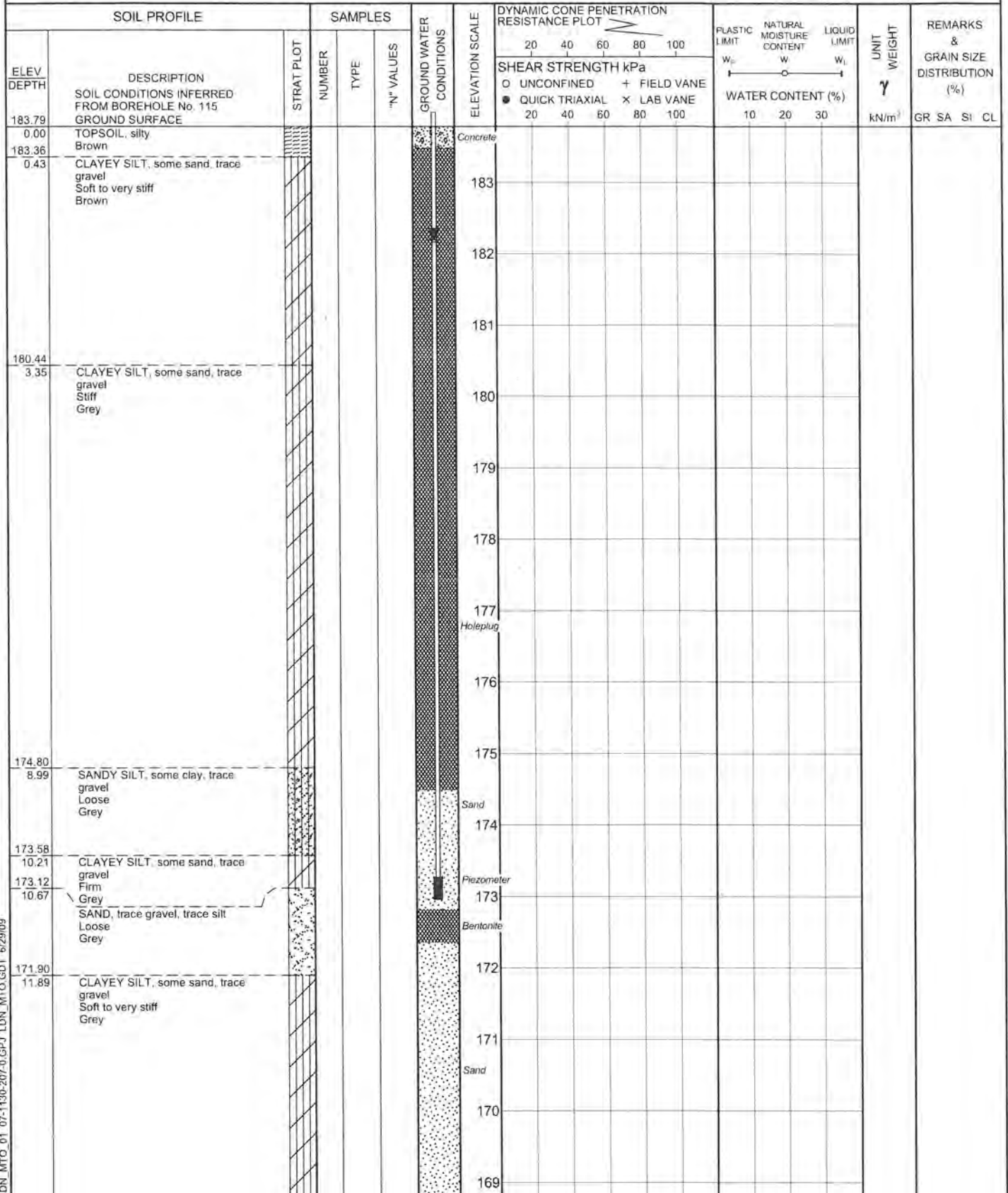
COMPILED BY BRS

DATUM GEODETIC

DATE

February 20, 2008 - February 21, 2008

CHECKED BY SJB



Continued Next Page

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

| | | | | | |
|-----------------------------------|--|--|--|-------------------------|---------------|
| PROJECT <u>07-1130-207-0</u> | | RECORD OF BOREHOLE No 115A | | 2 OF 2 | METRIC |
| W.P. _____ | | LOCATION <u>N 4678585.3 E 333911.1</u> | | ORIGINATED BY <u>MA</u> | |
| DIST <u>WEST</u> HWY <u>401/3</u> | | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | | COMPILED BY <u>BRS</u> | |
| DATUM <u>GEODETIC</u> | | DATE <u>February 20, 2008 - February 21, 2008</u> | | CHECKED BY <u>SJB</u> | |

| 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 | | | | | | |
| | CLAYEY SILT, some sand, trace gravel Soft to very stiff Grey | | | | | | | 20 40 60 80 100 O UNCONFINED + FIELD VANE ● QUICK TRIAXIAL X LAB VANE | | | | | | |
| | | | | | | | 168 | | | | | | | |
| | | | | | | | 167 | | | | | | | |
| | | | | | | | 166 | | | | | | | |
| | | | | | | | 165 | | | | | | | |
| 163.98 | END OF BOREHOLE | | | | | | 164 | | | | | | | |
| 19.81 | Water level measured in shallow piezometer at elev. 182.36m on March 20, 2008. Water level measured in shallow piezometer at elev. 182.34m on July 24, 2008. Water level measured in shallow piezometer at elev. 182.26m on September 19, 2008. Water level measured in shallow piezometer at elev. 182.20m on January 28, 2009. | | | | | | | | | | | | | |

LDN_MTO_01 07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4678634.3 ; E 333722.5

ORIGINATED BY SM

DIST

WEST

HWY 401/3

BOREHOLE TYPE

POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

COMPILED BY BRS

DATUM GEODETIC

DATE _____

February 20, 2008 - February 25, 2008

CHECKED BY **SJB**

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | DYNAMIC CONE PENETRATION RESISTANCE PLOT | PLASTIC LIMIT W _P | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ kN/m³ | 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 | | | | | |
| | | | | | | | 10 20 30 | | | | | |
| | | | | | | | WATER CONTENT (%) | | | | | |
| 183.64 | GROUND SURFACE | | | | | | | | | | | |
| 0.00 | TOPSOIL, clayey Black | | | | | | | | | | | |
| 0.30 | SILT CLAY, some sand, trace gravel Firm Mottled brown and grey | | 1 | SS | 6 | | | | | | | |
| 182.27 | | | | | | | | | | | | |
| 1.37 | CLAYEY SILT, some sand, trace gravel Stiff to hard Brown | | 2 | SS | 10 | | | | | | | |
| | | | 3 | SS | 35 | | | | | | | |
| | | | 4 | SS | 33 | | | | | | | |
| 179.98 | | | | | | | | | | | | |
| 3.66 | CLAYEY SILT, some sand, trace gravel Firm to very stiff Grey | | 5 | SS | 17 | | | | | | | |
| | | | 6 | SS | 14 | | | | | | | |
| | | | 7 | SS | 12 | | | | | | | |
| | | | 8 | SS | 11 | | | | | | | |
| | | | | | | | | | | | | |
| | | | | | | | (>95.76) + | | | | | |
| | | | 9 | TO | PH | | | | | | | |
| | | | | | | | | | | | | |
| | | | 10 | SS | 8 | | + 1.6 | | | | | |
| | | | | | | | | | | | | |
| | | | 11 | SS | 10 | | + 1.4 | | | | | |
| | | | | | | | | | | | | |
| | | | 12 | SS | 9 | | + 1.9 | | | | | |
| | | | | | | | | | | | | |
| | | | 13 | TO | PH | | + 1.9 | | | | | |
| | | | | | | | | | | | | |
| 168.86 | | | | | | | | | | | | |
| 14.78 | | | | | | | + 2.0 | | | | | |

DN_MTO_01 07-1130-207-0.GPJ LON_MTO.GDT 6/29/09

Continued Next Page

+3, X3: Numbers refer to Sensitivity O 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No 116

2 OF 4

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4678634.3 E 333722.5

ORIGINATED BY SM

DIST WEST HWY 401/3

BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

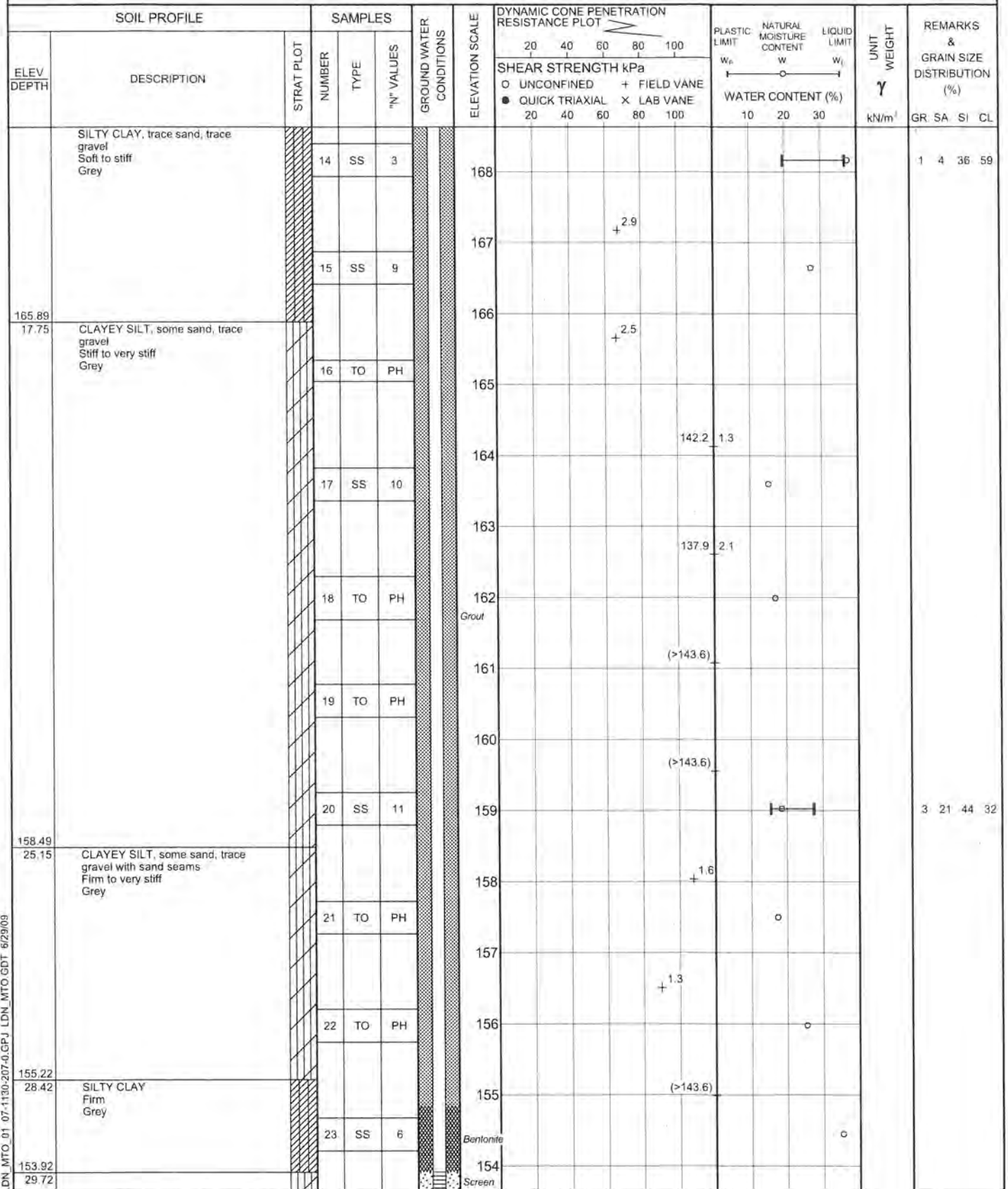
COMPILED BY BRS

DATUM GEODETIC

DATE

February 20, 2008 - February 25, 2008

CHECKED BY **SJB**



Continued Next Page

+ 3, X 3

Numbers refer to Sensitivity

○ 3% STRAIN AT FAILURE

PROJECT 07-1130-207-0 **RECORD OF BOREHOLE No 116** 3 OF 4 **METRIC**
W.P. LOCATION N 4678634.3 E 333722.5 ORIGINATED BY SM
DIST WEST HWY 401/3 BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC COMPILED BY BRS
DATUM GEODETIC DATE February 20, 2008 - February 25, 2008 CHECKED BY *SYB*

| 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 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE | | | | | | | | |
| | | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | |
| | | | | | | | | (>143.6) | | | | | | | | |
| | CLAYEY SILT, some sand, some gravel, with cobbles and boulders Very stiff Brown | | 24 | SS | 21 | | 153 | | | | | | | | | (49) |
| | | | | | | | 152 | | | | | | | | | |
| 151.66 | | | | | | | | | | | | | | | | |
| 31.98 | LIMESTONE AND DOLOSTONE, fresh, medium strong, laminated, fine grained, faintly porous Light brown to grey (FOR DETAILED DESCRIPTIONS REFER TO RECORD OF DRILLHOLE) | | 25 | NQ RC | | | 151 | 53 | 33 | 33 | | | | | | |
| | | | 26 | NQ RC | | | 150 | 80 | 72 | 69 | | | | | | |
| | | | 27 | NQ RC | | | 149 | | | | | | | | | |
| | | | | | | | 148 | | | | | | | | | |
| 147.58 | | | | | | | | | | | | | | | | |
| 36.06 | END OF BOREHOLE | | | | | | | | | | | | | | | |
| | Borehole dry during drilling between February 20 and 25, 2008. | | | | | | | | | | | | | | | |
| | Water level measured in deep piezometer at elev. 180.79m on March 20, 2008. | | | | | | | | | | | | | | | |
| | Water level measured in deep piezometer at elev. 177.95m on July 22, 2008. | | | | | | | | | | | | | | | |
| | Water level measured in deep piezometer at elev. 176.69m on August 11, 2008. | | | | | | | | | | | | | | | |
| | Water level measured in deep piezometer at elev. 176.09m on September 19, 2008. | | | | | | | | | | | | | | | |
| | Water level measured in deep piezometer at elev. 177.26m on November 11, 2008. | | | | | | | | | | | | | | | |
| | Water level measured in deep piezometer at elev. 177.48m on January 28, 2009. | | | | | | | | | | | | | | | |

LDN_MTO_01 07-1130-207-0-GPJ LDN_MTO.GDT 6/29/09

RECORD OF BOREHOLE No 116A

1 OF 1

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4678634.3 E 333722.5

ORIGINATED BY SM

DIST

WEST

HWY 401/3

BOREHOLE TYPE

POWER AUGER, SOLID STEM

COMPILED BY BRS

DATUM GEODETIC

DATE

February 25, 2008

CHECKED BY SJB

| 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 | | | | | | | WATER CONTENT (%) |
| | | | | | | | | ○ UNCONFINED ● QUICK TRIAXIAL | + FIELD VANE × LAB VANE | | | | | | |
| 183.64 | GROUND SURFACE | | | | | | 20 40 60 80 100 | | 10 20 30 | | | | | | |
| 0.00 | TOPSOIL, clayey Black | | | | | | | | | | | | | | |
| 0.30 | SILTY CLAY, some sand, trace gravel Firm Mottled brown and grey | | | | | | | | | | | | | | |
| 182.27 | | | | | | | | | | | | | | | |
| 1.37 | CLAYEY SILT, some sand, trace gravel Stiff to hard Brown | | | | | | | | | | | | | | |
| 179.98 | | | | | | | | | | | | | | | |
| 3.66 | CLAYEY SILT, some sand, trace gravel Firm to very stiff Grey | | | | | | | | | | | | | | |
| 174.50 | | | | | | | | | | | | | | | |
| 9.14 | END OF BOREHOLE | | | | | | | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 182.55m on March 20, 2008. | | | | | | | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 182.80m on July 22, 2008. | | | | | | | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 182.59m on August 11, 2008. | | | | | | | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 182.57m on September 19, 2008. | | | | | | | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 182.72m on January 28, 2009. | | | | | | | | | | | | | | |

LDN_MTO 01 07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

| | | | | | |
|-----------------------|--|---------------------------------------|--|-----------------------|--|
| PROJECT 07-1130-207-0 | | RECORD OF BOREHOLE No CPT-111 | | 1 OF 1 METRIC | |
| W.P. _____ | | LOCATION N 4678351.4 :E 334347.6 | | ORIGINATED BY CC | |
| DIST WEST HWY 401/3 | | BOREHOLE TYPE POWER AUGER, SOLID STEM | | COMPILED BY SJL | |
| DATUM GEODETIC | | DATE September 8, 2008 | | CHECKED BY <i>SJS</i> | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 | 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 | | | | | | | | |
| 184.92 | GROUND SURFACE | | | | | | | | | | | | |
| 0.00 | FILL, silty topsoil with crushed gravel and organics | | 1 | SS | 18 | | | | | | | | |
| 0.23 | Very stiff Brown | | 2 | SS | 12 | | | | | | | | |
| | CLAYEY SILT, trace to some sand, trace gravel | | 3 | SS | 17 | | | | | | | | |
| 183.09 | Stiff to very stiff | | | | | | | | | | | | |
| | Mottled brown and grey becoming brown at about elev. 183.7m | | | | | | | | | | | | |
| 1.83 | END OF BOREHOLE | | | | | | | | | | | | |
| | Borehole dry during drilling on September 8, 2008. | | | | | | | | | | | | |

| | | | | | |
|-----------------------------------|--|--|--|-------------------------|---------------|
| PROJECT <u>07-1130-207-0</u> | | RECORD OF BOREHOLE No CPT-114 | | 1 OF 1 | METRIC |
| W.P. _____ | | LOCATION <u>N 4678526.7 :E 334018.6</u> | | ORIGINATED BY <u>CC</u> | |
| DIST <u>WEST</u> HWY <u>401/3</u> | | BOREHOLE TYPE <u>POWER AUGER, SOLID STEM</u> | | COMPILED BY <u>SJL</u> | |
| DATUM <u>GEODETIC</u> | | DATE <u>September 10, 2008</u> | | CHECKED BY <u>SJB</u> | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
|---------------|--|------------|---------|------|------------|-------------------------|-----------------|---|---------------------------------|-------------------------------|--------------------------------|------------------|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | | | | | | |
| 184.21 | GROUND SURFACE | | | | | | | | | | | | |
| 0.00 | TOPSOIL, silty, trace to some sand Compact Black | | 1 | SS | 20 | | 184 | | | | | | |
| 0.28 | CLAYEY SILT, trace to some sand, trace gravel Very stiff Mottled brown and grey becoming brown at about elev. 183.0m | | 2 | SS | 20 | | 183 | | | | | | |
| 182.38 | | | 3 | SS | 28 | | | | | | | | |
| 1.83 | END OF BOREHOLE Borehole dry during drilling on September 10, 2008. | | | | | | | | | | | | |

LDN MTO_01 07-1130-207-0.GPJ LDN MTO.GDT 6/29/09

| | | | | | | | |
|-------------------------------------|--|--|--|-------------------------|--|---------------|--|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No CPT-312 | | 1 OF 1 | | METRIC | |
| W.P. _____ | | LOCATION <u>N 4678319.9; E 334283.0</u> | | ORIGINATED BY <u>TA</u> | | | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, SOLID STEM</u> | | COMPILED BY <u>DMB</u> | | | |
| DATUM <u>GEODETIC</u> | | DATE <u>January 15, 2010</u> | | CHECKED BY _____ | | | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT γ kN/m³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
|---------------|---|------------|---------|------|--------------|----------------------------|-----------------|--|----|----|-----|--|---|---|--|--------------------------------------|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | *N VALUES | | | SHEAR STRENGTH kPa | | | | | WATER CONTENT (%) | | | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE | | | | | w _p w w _L | | | | |
| 185.22 | GROUND SURFACE | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | |
| 0.00 | TOPSOIL, clayey Black | | | | | | | | | | | | | | | | |
| 0.23 | FILL, clayey silt, some sand, trace gravel, trace organics | | | | | | | | | | | | | | | | |
| 184.46 | Brown and grey | | | | | | | | | | | | | | | | |
| 0.76 | CLAYEY SILT, some sand, trace gravel, with cobbles and occasional silt partings Stiff to hard Brown | | 1 | SS | 14 | | | | | | | | | ○ | | | |
| | | | 2 | SS | 17 | | | | | | | | | | | | |
| | | | 3 | SS | 38 | | | | | | | | | ○ | | | |
| | | | 4 | SS | 66/ 200mm | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| 180.65 | | | | | | | | | | | | | | | | | |
| 4.57 | END OF BOREHOLE | | | | | | | | | | | | | | | | |
| | Borehole dry during drilling on January 15, 2010. | | | | | | | | | | | | | | | | |

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-5

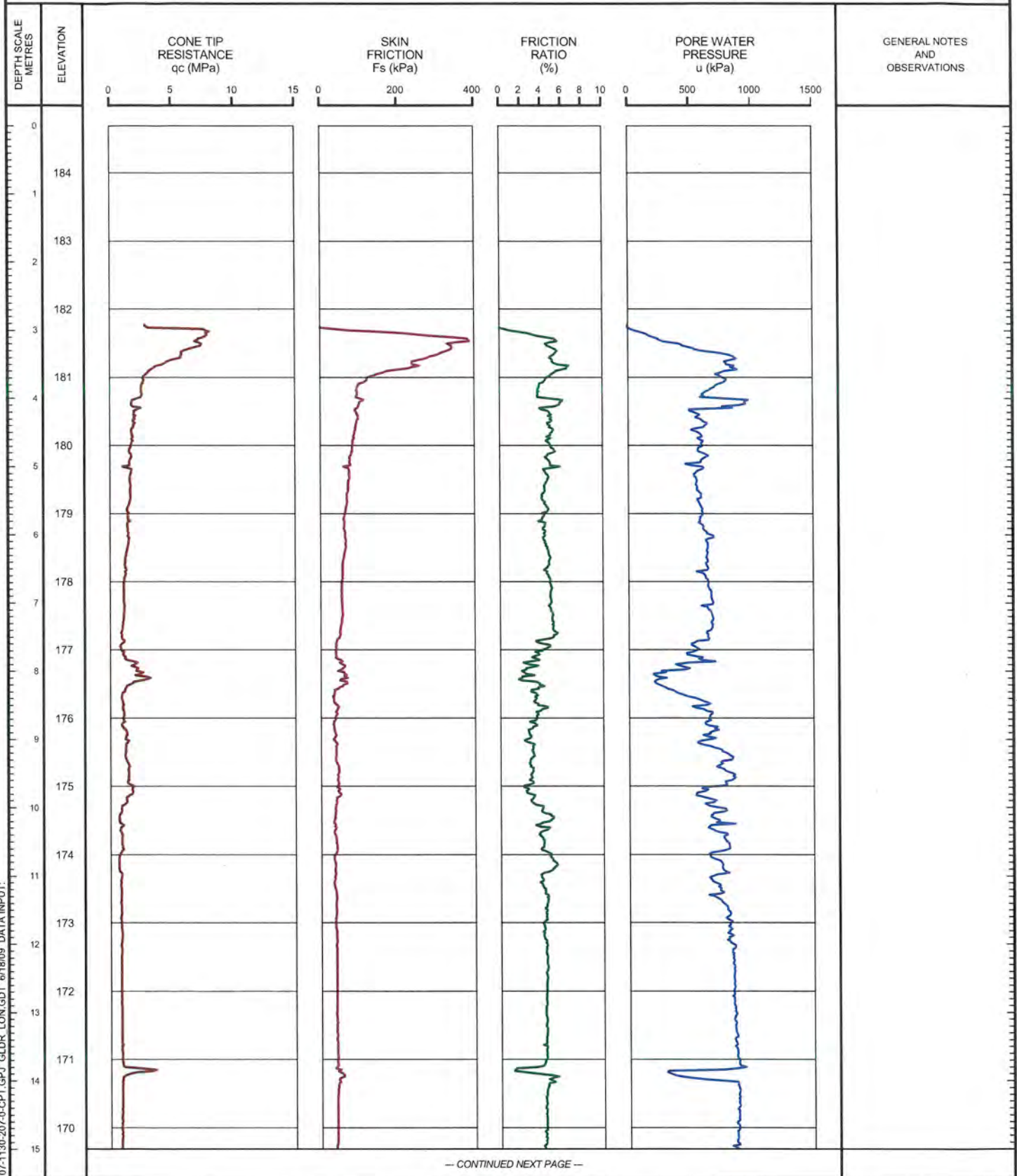
SHEET 1 OF 2

LOCATION: N 4678413.0 ; E 334220.0

TEST DATE: November 13, 2006

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 2.94m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LON CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE

1 : 75



OPERATOR: CC

CHECKED: *SB*

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-5

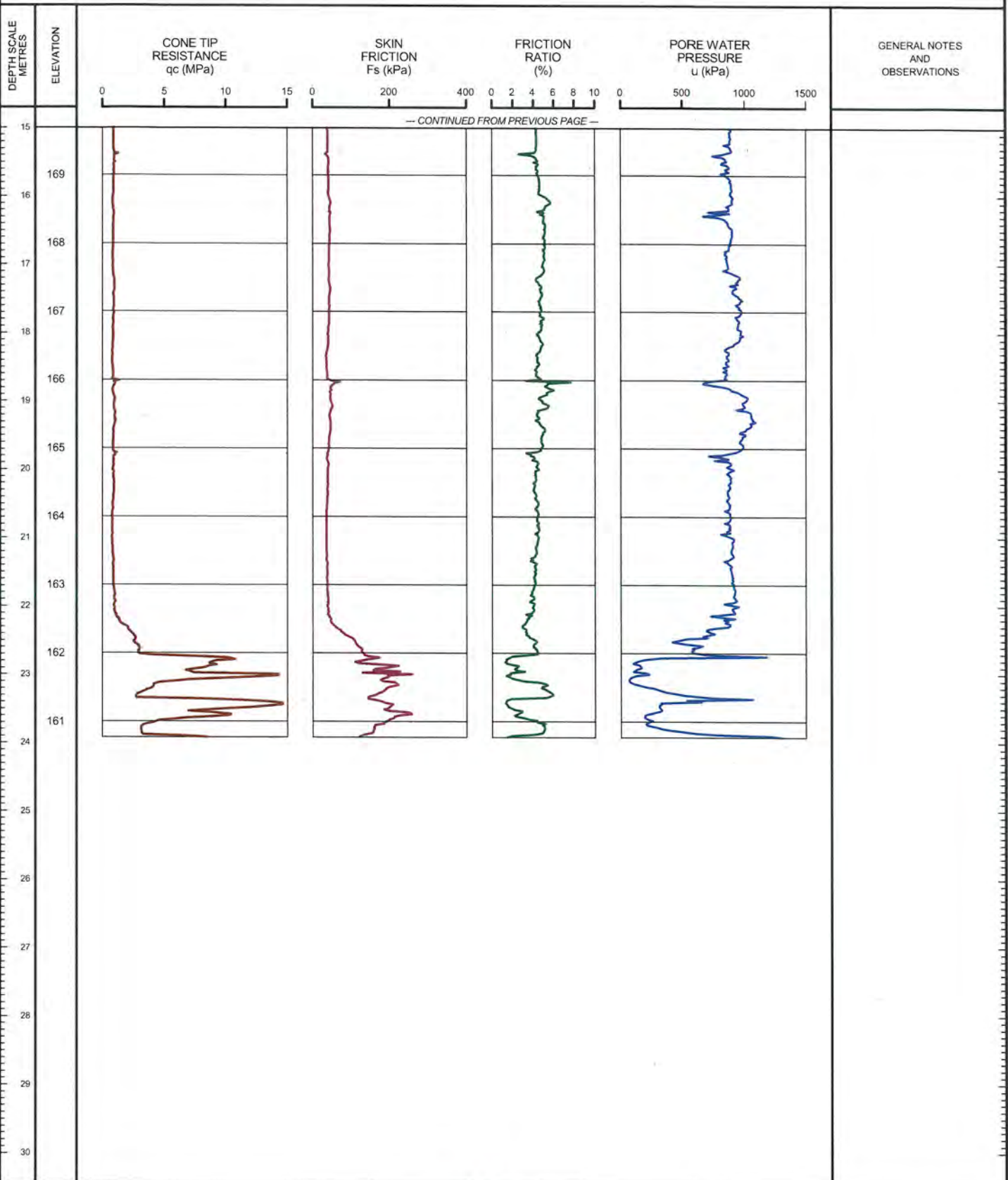
SHEET 2 OF 2

LOCATION: N 4678413.0, E 334220.0

TEST DATE: November 13, 2006

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 2.94m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LDN_CPT_01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/19/09 DATA INPUT:

DEPTH SCALE

1 : 75



OPERATOR: CC

CHECKED: *SSS*

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-6

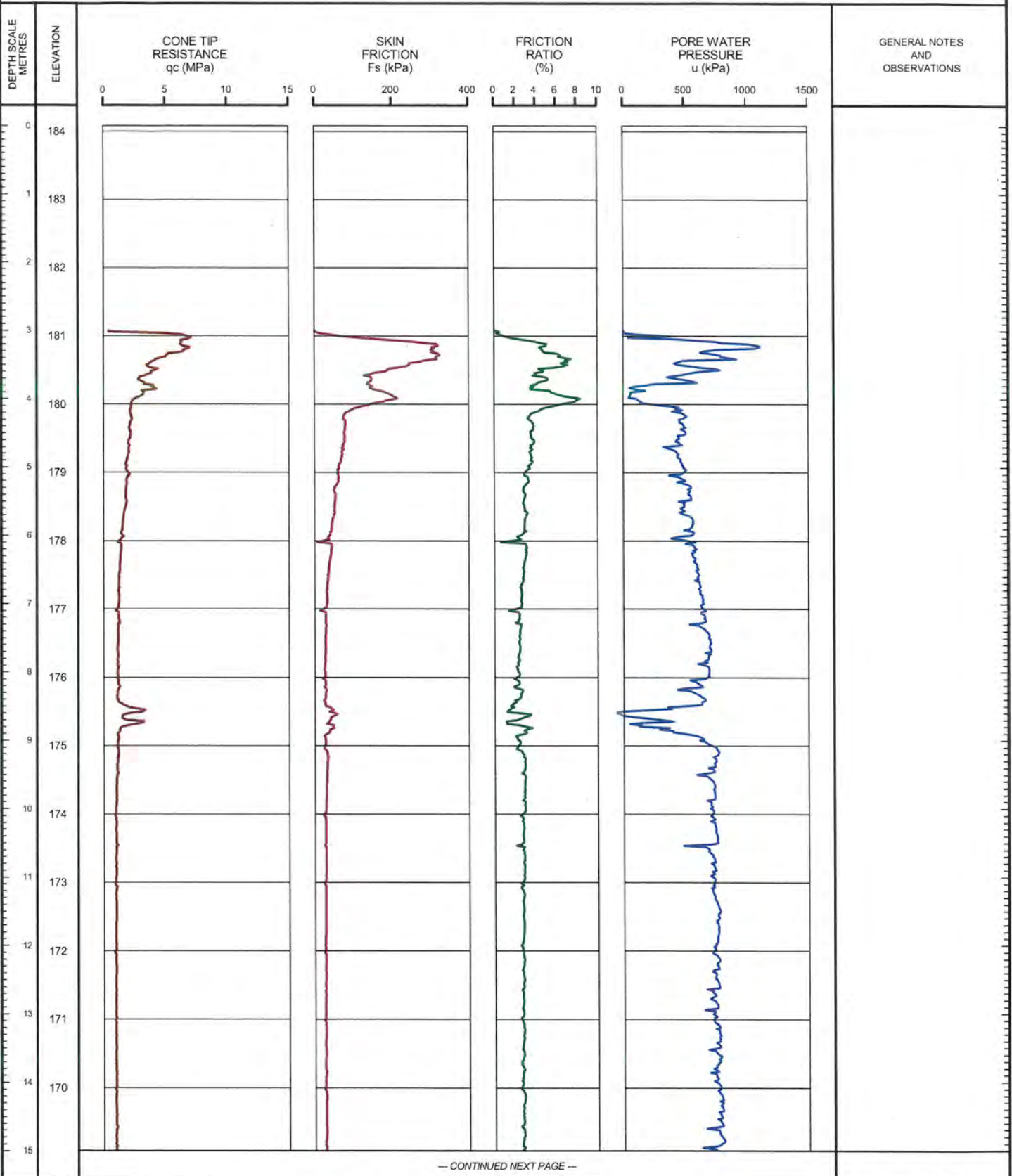
SHEET 1 OF 2

LOCATION: N 4678621.0 ; E 333844.0

TEST DATE: November 13, 2006

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 3.00m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE

1 : 75

OPERATOR: CC
CHECKED: *536*

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-6

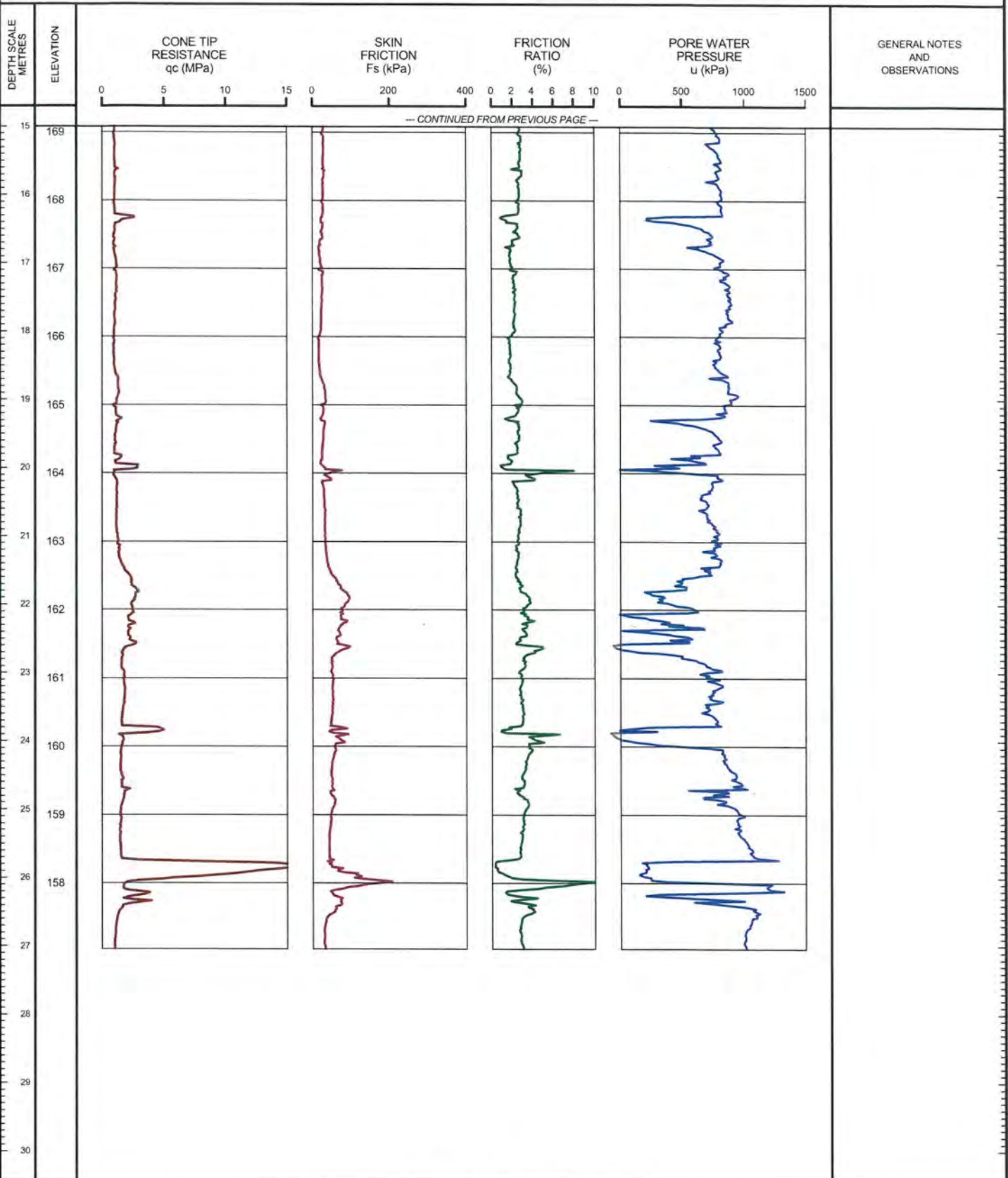
SHEET 2 OF 2

LOCATION: N 4678621.0; E 333844.0

TEST DATE: November 13, 2006

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 3.00m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE

1 : 75



OPERATOR: CC

CHECKED: *SVB*

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-111

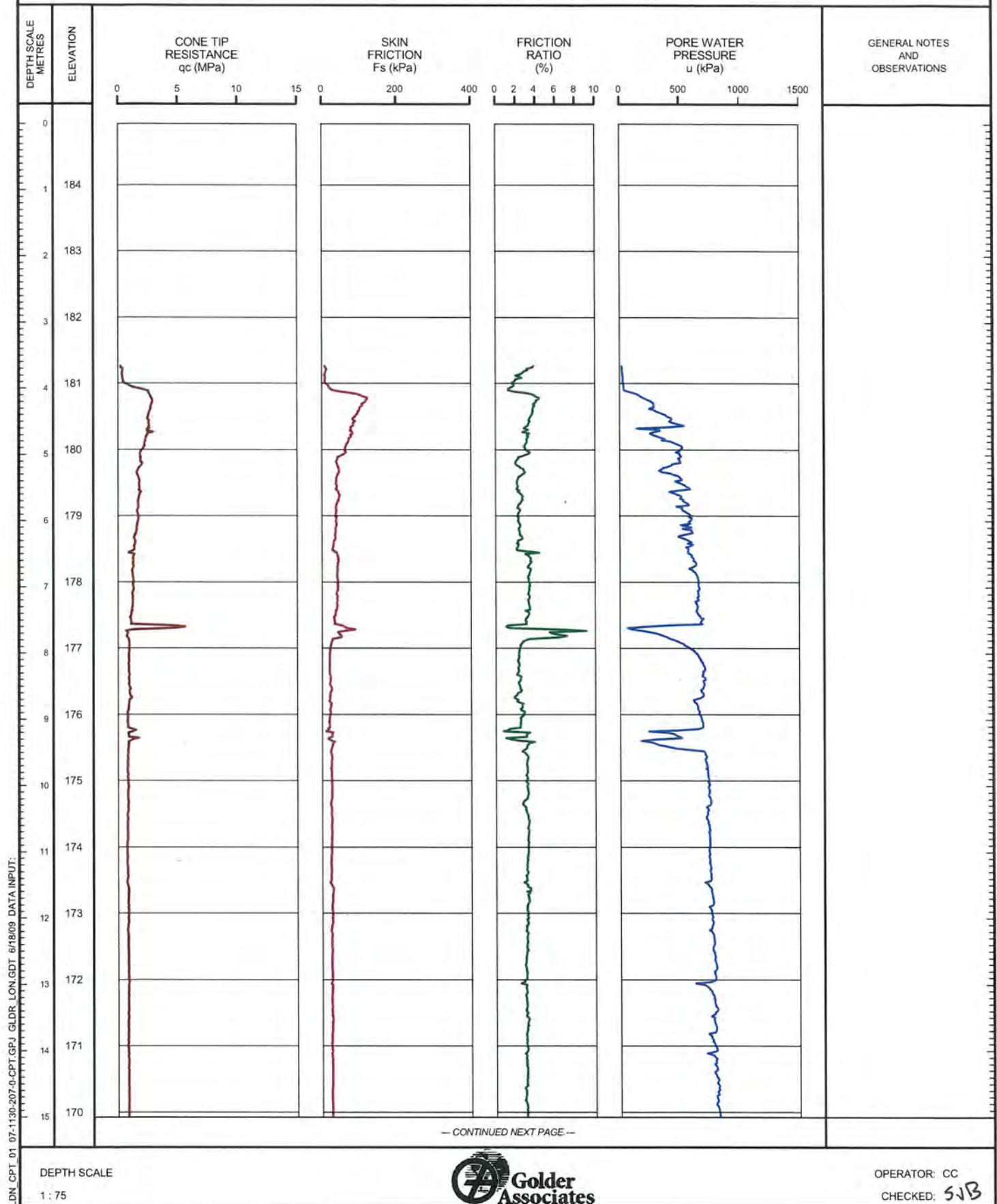
SHEET 1 OF 2

LOCATION: N 4678351.4 :E 334347.6

TEST DATE: September 9, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 3.66m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-111

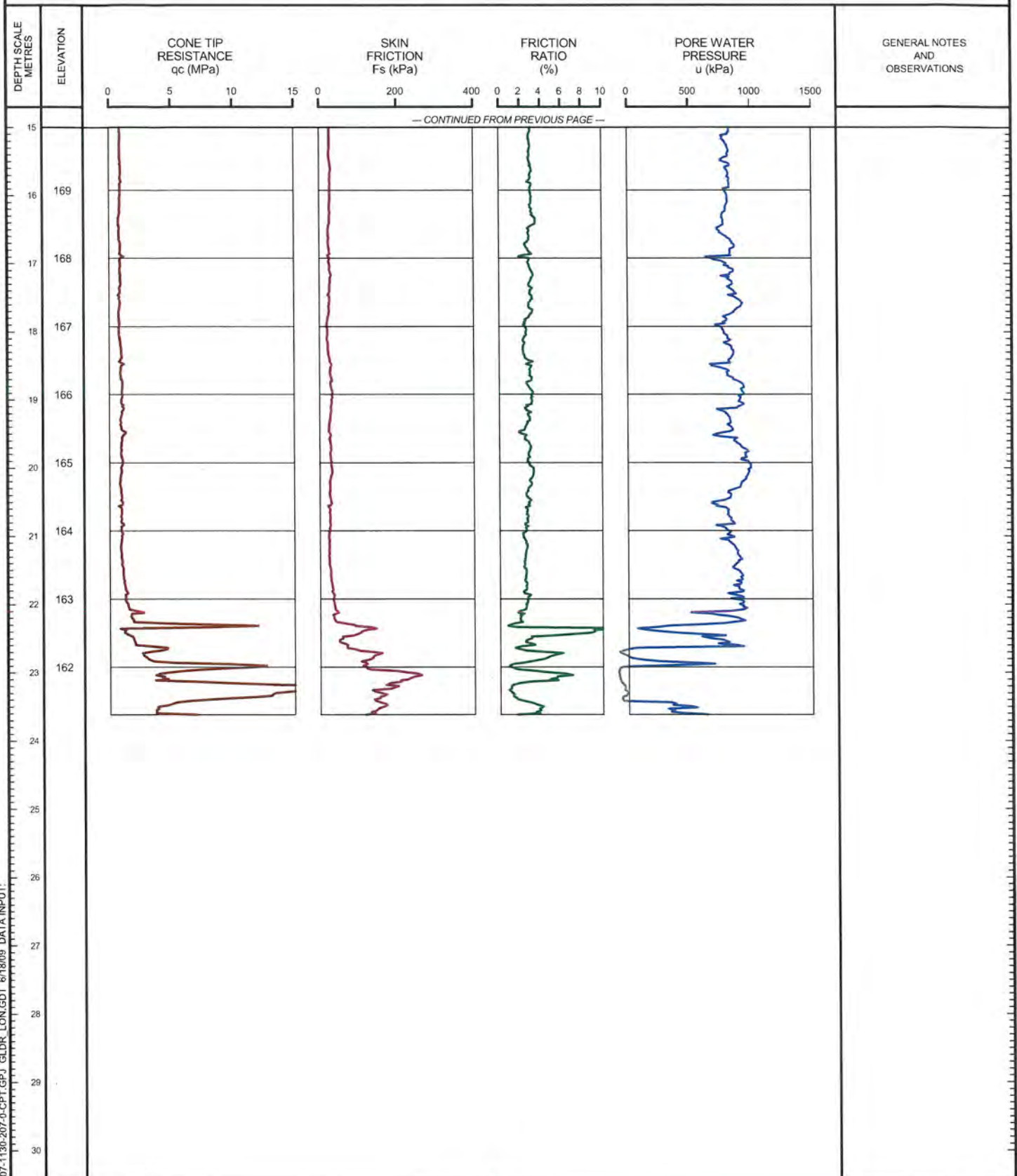
SHEET 2 OF 2

LOCATION: N 4678351.4 ; E 334347.6

TEST DATE: September 9, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 3.66m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE

1 : 75



OPERATOR: CC

CHECKED: *JSB*

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-114

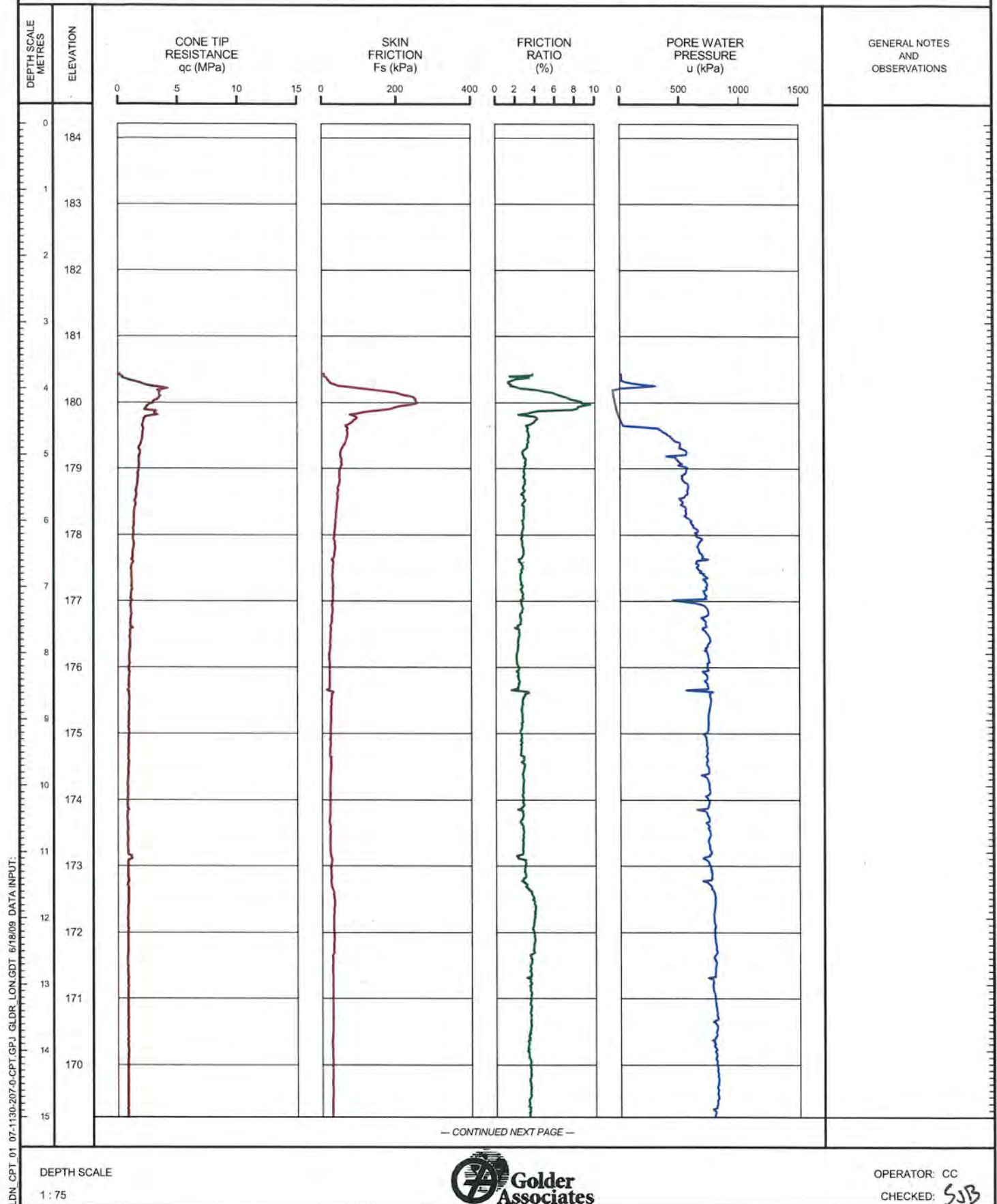
SHEET 1 OF 2

LOCATION: N 4678526.7 ,E 334018.6

TEST DATE: September 10, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 3.80m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-114

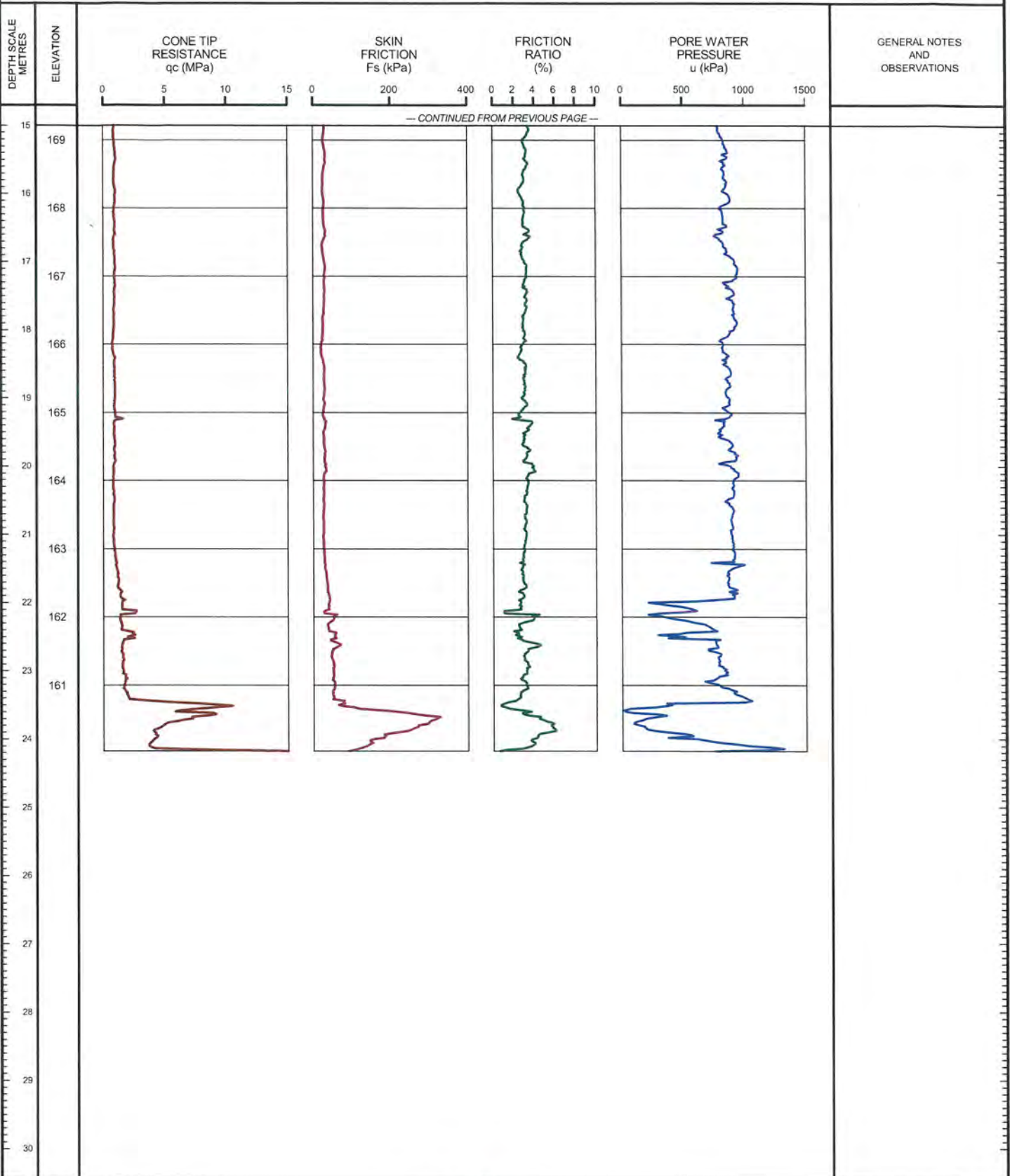
SHEET 2 OF 2

LOCATION: N 4678526.7 ;E 334018.6

TEST DATE: September 10, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 3.80m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LDN CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE

1 : 75



OPERATOR: CC

CHECKED: *SJB*

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-312

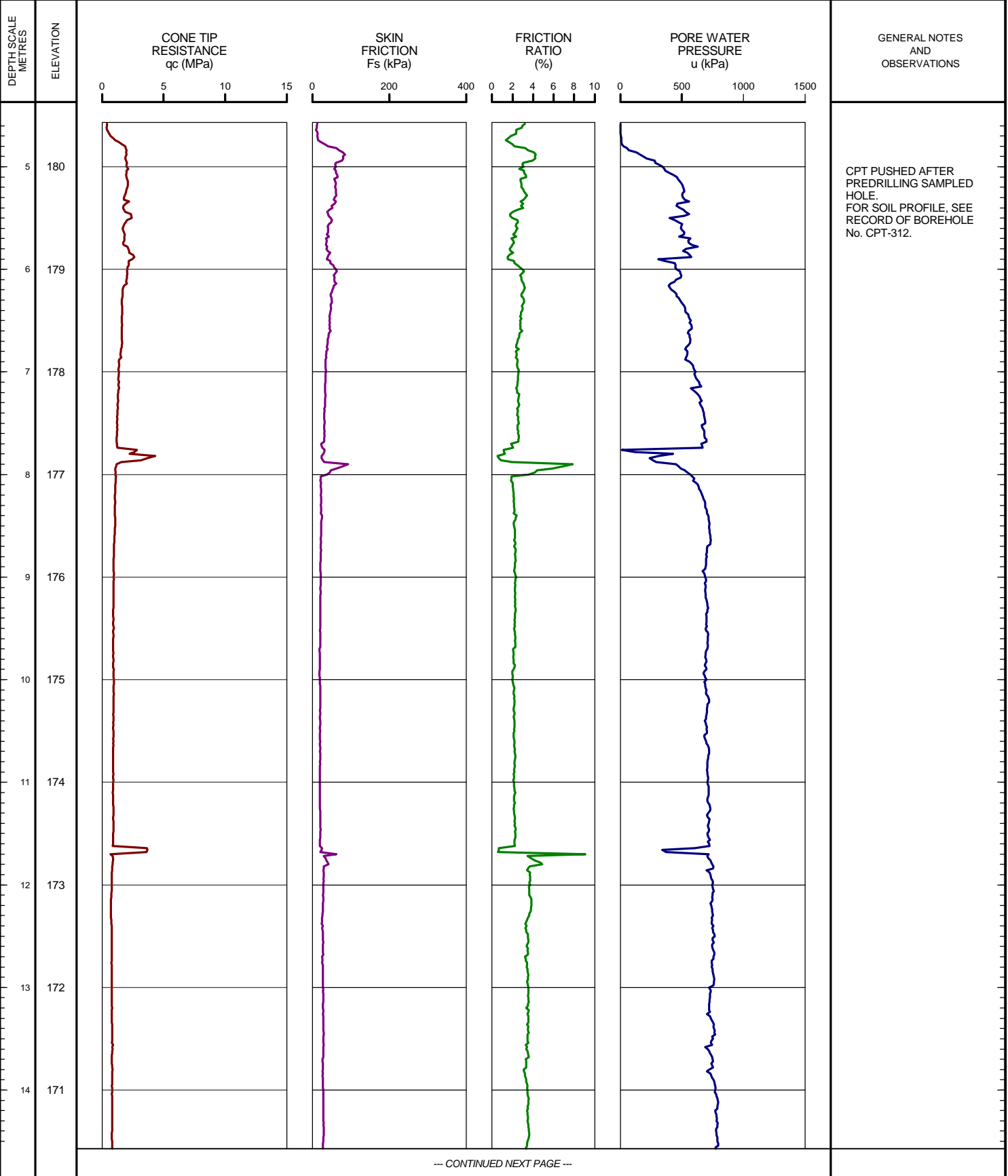
SHEET 1 OF 2

LOCATION: N 4678319.9 ;E 334283.0

TEST DATE: January 15, 2010

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 185.22m PREDRILL DEPTH: 4.57m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-312

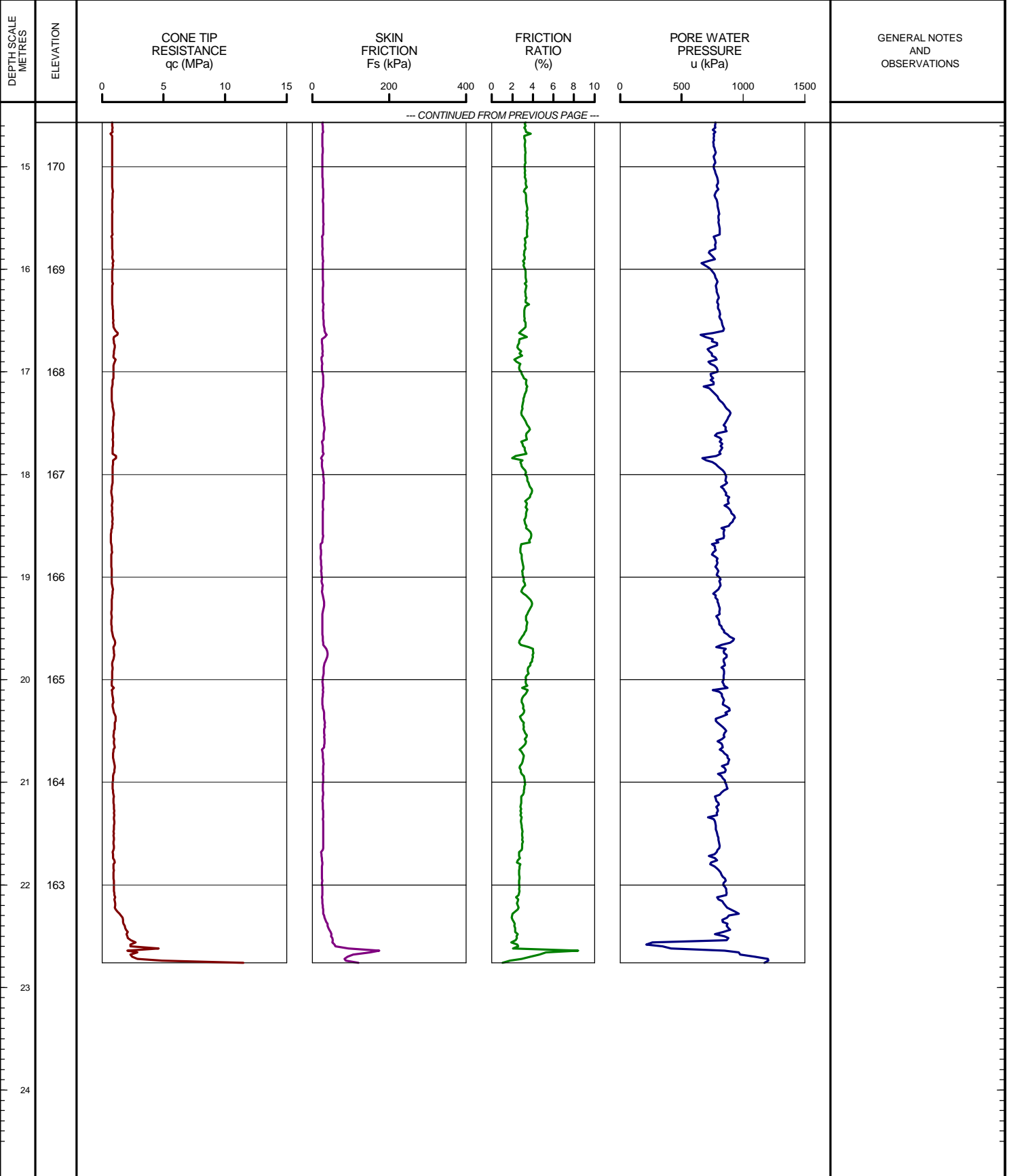
SHEET 2 OF 2

LOCATION: N 4678319.9 ;E 334283.0

TEST DATE: January 15, 2010

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 185.22m PREDRILL DEPTH: 4.57m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LON_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

Station 12+800L to Station 13+400L (Soil Profile #14)

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4678155.0 ; E 334716.3

ORIGINATED BY MA

DIST WEST HWY 401/3

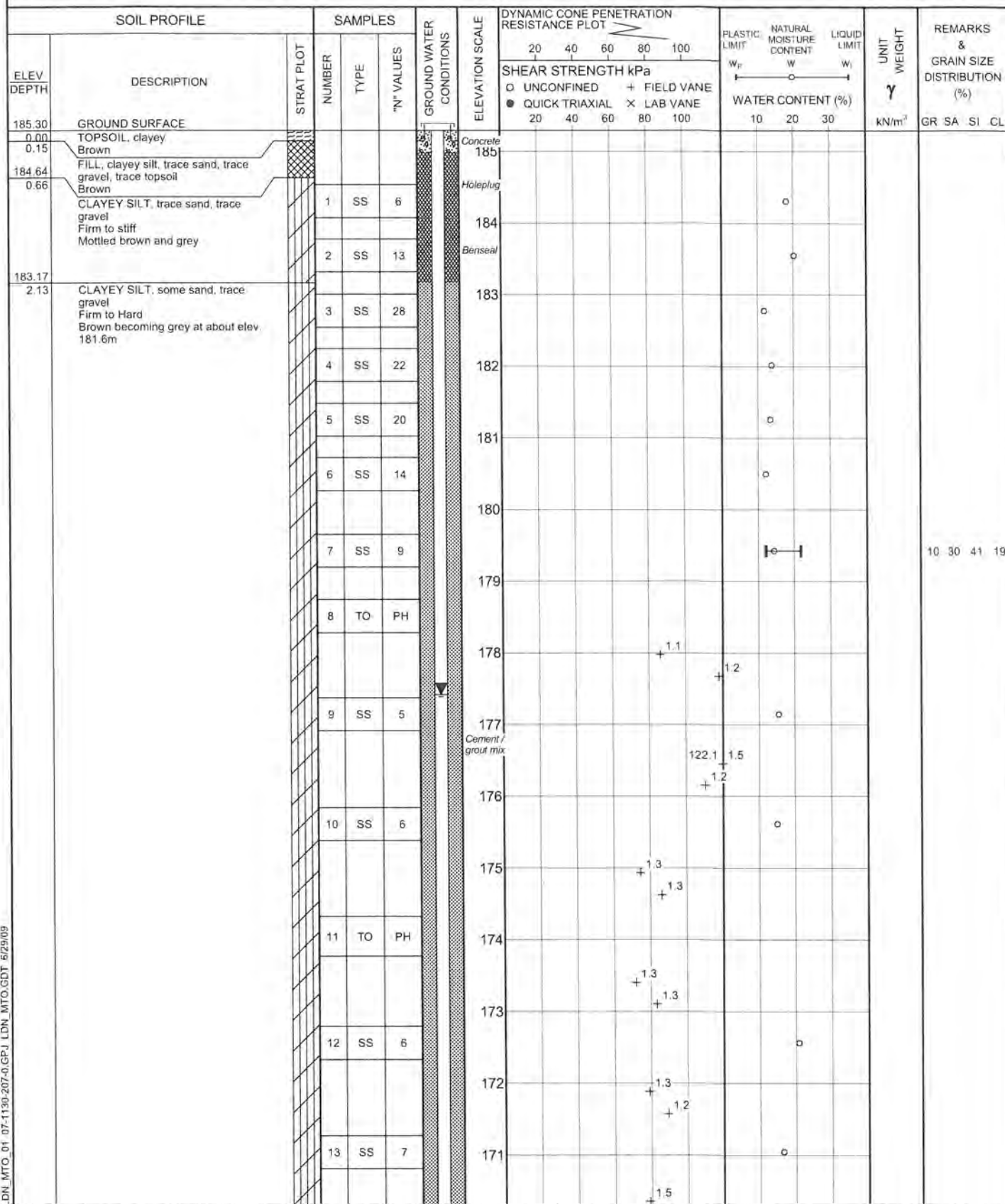
BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

COMPILED BY LMK

DATUM GEODETIC

DATE January 17, 2008 - January 29, 2008

CHECKED BY SJR



Continued Next Page

+3, X3: Numbers refer to Sensitivity O 3% STRAIN AT FAILURE

DN MTO 01 07-1130-207-0.GPJ LDN MTO.GDT 5/29/09

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4678155.0 :E 334716.3

ORIGINATED BY MA

DIST WEST HWY 401/3

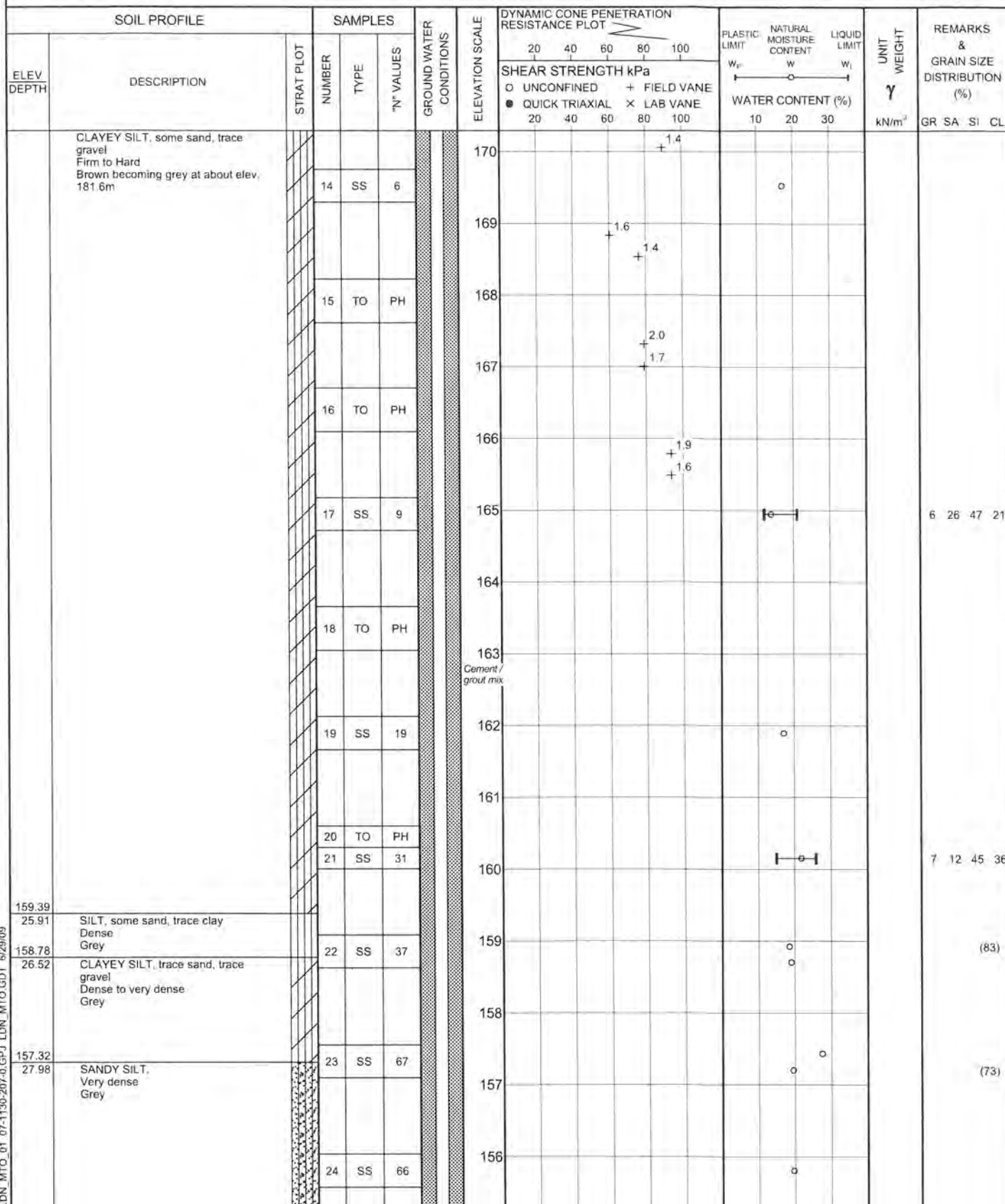
BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

COMPILED BY LMK

DATUM GEODETIC

DATE January 17, 2008 - January 29, 2008

CHECKED BY: SJB



Continued Next Page

 $+^3, \times^3,$

Numbers refer to Sensitivity

○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No 109

3 OF 4

METRIC

PROJECT 07-1130-207-0

W.P. _____

LOCATION N 4678155.0 :E 334716.3

ORIGINATED BY MA

DIST WEST HWY 401/3

BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

COMPILED BY LMK

DATUM GEODETIC

DATE January 17, 2008 - January 29, 2008

CHECKED BY *SJB*

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---|--|-----------------|---|------|--------------|-------------------------|-----------------|--|-----------------|-----------------|-----------------|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|
| 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 80 100 | 20 40 60 80 100 | 10 20 30 | | | | |
| 155.12 30.18 | SANDY SILT, some clay, trace gravel Compact Grey | | 25 | SS | 18 | | 155 | | | | | | | | | (49) |
| | | | | | | | 154 | | | | | | | | | |
| 153.30 32.00 | | | SAND AND GRAVEL, trace silt Very dense Grey | 26 | SS | | 54 | 153 | | | | | | | | |
| | | | | | 152 | | | | | | | | | | | |
| | | 27 | | SS | 72/ 127mm | 151 | | | | | | | | | | |
| | | 28 | | SS | 67 | 150 | | | | | | | | | | |
| 149.18 36.12 | LIMESTONE, fresh, medium strong, fine grained, moderately porous Light grey (FOR DETAILED DESCRIPTIONS REFER TO RECORD OF DRILLHOLE) | 29 | | SS | 100/ 13mm | 149 | | | | | | | | | UC | |
| | | 30 | NQ RC | | 148 | | 90 | 69 | 10 | | | | | | | |
| | | 31 | NQ RC | | 147 | | | | | | | | | | | |
| | | 32 | NQ RC | | 146 | | 100 | 98 | 73 | | | | | | | |
| | | 33 | NQ RC | | 145 | | | | | | | | | | | |
| | | | | | 144 | | | | | | | | | | | |
| 143.79 41.51 | | END OF BOREHOLE | | | | | | | | | | | | | | |
| Water levels in borehole at about elev. 159.39m, 157.32m and 153.30m during drilling between January 18 and 28, 2008. Water level measured in deep piezometer at elev. 178.11m on March 20, 2008. Water level measured in deep piezometer at elev. 177.75m on July 24, 2008. Water level measured in deep piezometer at elev. 177.20m on November 14, 2008. Water level measured in deep piezometer at elev. 177.42m on January 28, 2009. | | | | | | | | | | | | | | | | |

LDN_MTO_01 07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

PROJECT: 07-1130-207-0
LOCATION: N 4678155.0 E 334716.3
INCLINATION: -90° AZIMUTH: --

RECORD OF DRILLHOLE: 109

SHEET 4 OF 4
DATUM: GEODETIC

DRILLING DATE: January 17, 2008 - January 29, 2008
DRILL RIG: MUD ROTARY WITH HQ TRICONE, NQRC
DRILLING CONTRACTOR: AARDVARK DRILLING INC

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. | | RUN No | PENETRATION RATE (mm/min) | COLOUR % RETURN | FLUSH | ELEVATION | JN - Joint FLT - Fault SHR - Shear VN - Vein CJ - Conjugate | | | | | | | | | | | | BD - Bedding FO - Foliation CO - Contact OR - Orthogonal CL - Cleavage | | | | | | | | | | | | PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular | | | | | | | | | | | | PO - Polished K - Slickensided SM - Smooth Ro - Rough | | | | | | | | | | | | Br - Broken Rock NOTE: For additional abbreviations refer to list of abbreviations & symbols | HYDRAULIC CONDUCTIVITY k, cm/sec | | | | DIAMETER POINT LOAD INDEX (MPa) | | NOTES WATER LEVELS INSTRUMENTATION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | DEPTH (m) | ELEVATION | | | | | | RECOVERY | | R.Q.D. % | FRACT INDEX PER 0.3 | DISCONTINUITY DATA | | DIP to 2.2 CORE AXIS | TYPE AND SURFACE DESCRIPTION | | | | | 2 | 4 | 6 | 8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | TOTAL CORE % | SOLID CORE % | | | DIP W 1.2 CORE AXIS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | 60 | | | | | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | | 60 | 40 | 20 | 60 | 40 | 20 | | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 | 40 | 20 | 60 |

BD, PL, SM CI
JN, UN, Ro CI
BD, PL, Ro CI
JN, UN, Ro CI
BD, PL, Ro CI
BD, PL, Ro CI



LDN ROCK 03 07-1130-207-0-ROCK.GPJ GLDR LDN CDT 8/29/09 DATA INPUT WDF

DEPTH SCALE
1:75



LOGGED: SG
CHECKED: SJB

| | | | | | |
|-----------------------------|--|--|--|---------------------|---------------|
| PROJECT 09-1132-0080 | | RECORD OF BOREHOLE No 308 | | 1 OF 1 | METRIC |
| W.P. _____ | | LOCATION N 4678306.4 ; E 334724.2 | | ORIGINATED BY TA | |
| DIST WEST HWY 401 / 3 | | BOREHOLE TYPE POWER AUGER, HOLLOW STEM | | COMPILED BY WDF/DMB | |
| DATUM GEODETIC | | DATE January 14, 2010 | | CHECKED BY _____ | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT γ kN/m³ | 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 | W _p W W _L | | | | | | |
| | | | | | | ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE | | | | | | | | | |
| 185.41 | GROUND SURFACE | | | | | ▽ | 185 | | | | | | | | |
| 0.00 | TOPSOIL, clayey Firm Black |  | | | | | 184 | | | | | | | | |
| 184.55 | CLAYEY SILT, some sand, trace gravel, with occasional silt partings Firm to stiff Brown becoming grey below about elev. 181.8m |  | 1 | SS | 7 | | 183 | | | | | | | | |
| 0.86 | | | | | | | | 182 | | | | | | | |
| | | | | | | | | 181 | | | | | | | |
| | | | | | | | | 180 | | | | | | | |
| | | | | | | | | 179 | | | | | | | |
| | | | | | | | | 178 | | | | | | | |
| | | | | | | | | 177 | | | | | | | |
| | | | | | | | | 176 | | | | | | | |
| | | | | | | | | 175 | | | | | | | |
| | | | | | | | | 174 | | | | | | | |
| | | | | | 173 | | | | | | | | | | |
| | | | 7 | SS | 7 | | | | | | | | | | |
| 172.76 | END OF BOREHOLE | | | | | | | | | | | | | | |
| 12.65 | Groundwater encountered at about elev. 183.9m during drilling on January 14, 2010. | | | | | | | | | | | | | | |

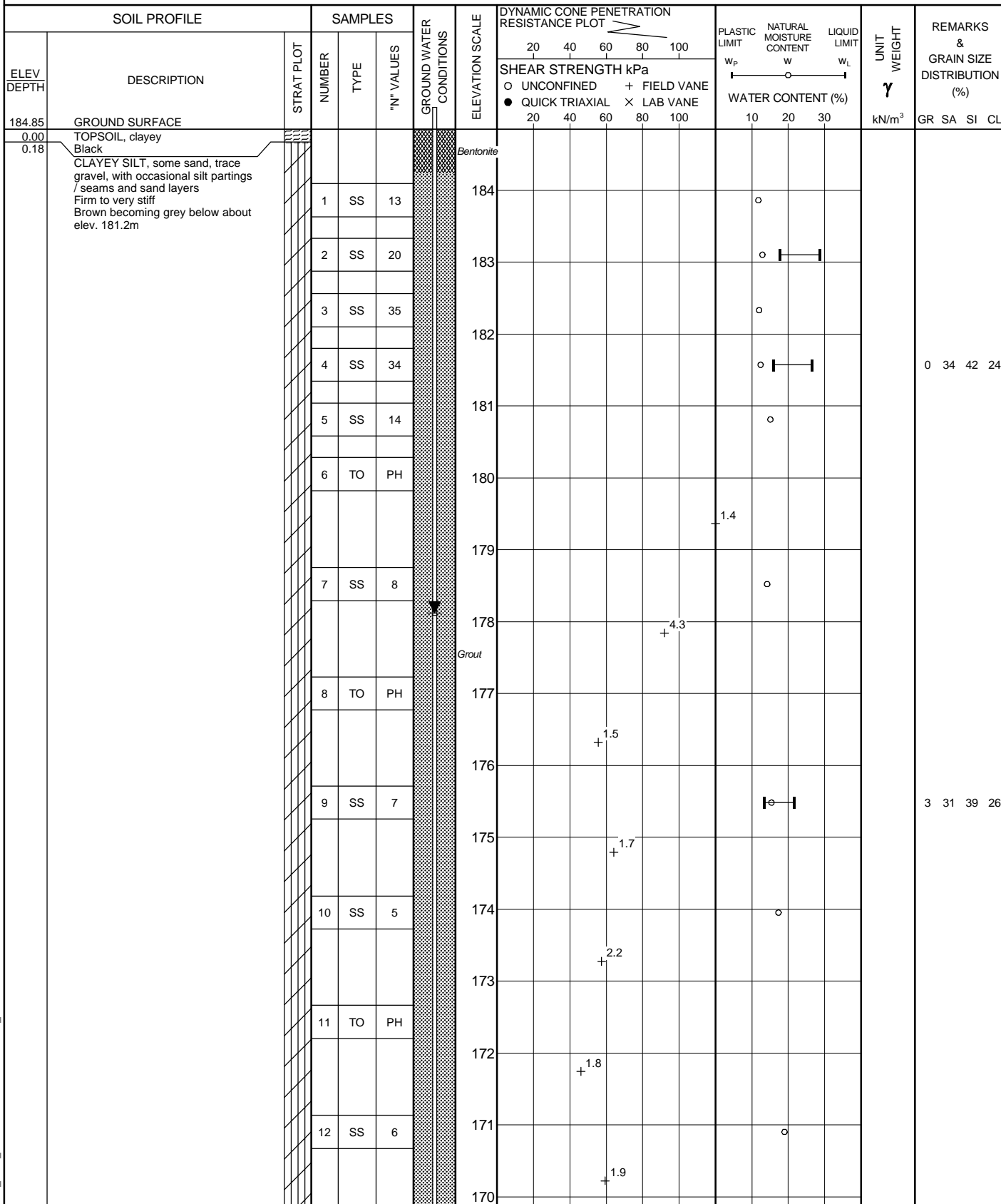
LDN_MTO_06 09-1132-0080.GPJ LDN_MTO.GDT 11/03/10

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| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No 310 | | 1 OF 1 | METRIC |
| W.P. _____ | | LOCATION <u>N 4678398.7 ; E 334482.8</u> | | ORIGINATED BY <u>TA</u> | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, HOLLOW STEM</u> | | COMPILED BY <u>WDF/DMB</u> | |
| DATUM <u>GEODETIC</u> | | DATE <u>January 14, 2010</u> | | CHECKED BY _____ | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | PLASTIC NATURAL LIQUID LIMIT MOISTURE CONTENT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|--|------------|---------|------|------------|----------------------------|--------------------|--|----|----|-----|--|---|----------------|---|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | w _p | w | w _L | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE | | | | | | | | |
| 185.05 | GROUND SURFACE | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | |
| 0.00 | TOPSOIL, clayey Black | | | | | | | | | | | | | | | |
| 0.30 | CLAYEY SILT, some sand, trace gravel, with occasional silt partings Firm to stiff Brown becoming grey below about elev. 181.4m | | | | | | | | | | | | | | | |
| | | | 1 | SS | 9 | | | | | | | | | | | |
| | | | 2 | SS | 28 | | | | | | | | | | | |
| | | | 3 | SS | 32 | | | | | | | | | | | |
| | | | 4 | SS | 32 | | | | | | | | | | | |
| | | | 5 | SS | 20 | | | | | | | | | | | |
| | | | 6 | SS | 16 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | 7 | SS | 17 | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | | 8 | SS | 10 | | | | | | | | | | | |
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| | | | 9 | SS | 7 | | | | | | | | | | | |
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| | | | 10 | SS | 9 | | | | | | | | | | | |
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| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No 311 | | 1 OF 4 | METRIC |
| W.P. _____ | | LOCATION <u>N 4678261.8 ;E 334394.2</u> | | ORIGINATED BY <u>SM</u> | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | | COMPILED BY <u>LMK/DMB</u> | |
| DATUM <u>GEODETIC</u> | | DATE <u>December 3, 2009 - December 4, 2009</u> | | CHECKED BY _____ | |



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

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|-------------------------------------|--|--|--|----------------------------|---------------|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No 311 | | 2 OF 4 | METRIC |
| W.P. _____ | | LOCATION <u>N 4678261.8 ; E 334394.2</u> | | ORIGINATED BY <u>SM</u> | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | | COMPILED BY <u>LMK/DMB</u> | |
| DATUM <u>GEODETIC</u> | | DATE <u>December 3, 2009 - December 4, 2009</u> | | CHECKED BY _____ | |

| 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 | | | | | | |
| | | | | | | | | ○ UNCONFINED ● QUICK TRIAXIAL | + FIELD VANE × LAB VANE | | | | | |
| | CLAYEY SILT, some sand, trace gravel, with occasional silt partings / seams and sand layers Firm to very stiff Brown becoming grey below about elev. 181.2m | | 13 | TO | PH | | | | | | | | | |
| | | | 14 | SS | 5 | | | | | | | | | |
| | | | 15 | SS | 4 | | | | | | | | | |
| | | | 16 | TO | PH | | | | | | | | | |
| | | | 17 | SS | 10 | | | | | | | | | |
| | | | 18 | TO | PH | | | | | | | | | |
| | | | 19 | SS | 14 | | | | | | | | | |
| | | | 20 | SS | 30 | | | | | | | | | |
| 158.63 | SANDY SILT, trace clay Dense Grey | | 21 | SS | 5 | | | | | | | | | |
| 157.95 | CLAYEY SILT, some sand, trace gravel Stiff Grey | | 22 | SS | 24 | | | | | | | | | |
| 156.42 | SANDY SILT, some clay, trace gravel Compact Grey | | | | | | | | | | | | | |
| 154.90 | | | | | | | | | | | | | | |

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

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| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No 311 | | 3 OF 4 | | METRIC | |
| W.P. _____ | | LOCATION <u>N 4678261.8 ; E 334394.2</u> | | ORIGINATED BY <u>SM</u> | | | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | | COMPILED BY <u>LMK/DMB</u> | | | |
| DATUM <u>GEODETIC</u> | | DATE <u>December 3, 2009 - December 4, 2009</u> | | CHECKED BY _____ | | | |

| 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 | | | | | | | | | WATER CONTENT (%) | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | ● QUICK TRIAXIAL | × LAB VANE | | | | | | | | |
| 29.95 | SAND, fine to coarse, some silt, trace gravel Dense to very dense Grey | | | | | | | | | | | | | | | 7 80 7 6 | | | |
| | | | 23 | SS | 30 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | 24 | SS | 58 | | | | | | | | | | | | | | |
| 151.85 | | | | | | | | | | | | | | | | | | | |
| 33.00 | SAND AND GRAVEL, trace silt Very dense Grey | | | | | | | | | | | | | | | | | | |
| | | | 25 | SS | 55 | | | | | | | | | | | | | | |
| 150.56 | | | | | | | | | | | | | | | | | | | |
| 34.29 | LIMESTONE, fresh, medium strong, weakly laminated to laminated, very fine grained, faintly porous Light grey to brown (FOR DETAILED DESCRIPTIONS REFER TO RECORD OF DRILLHOLE) | | 26 | NQ RC | - | | | | | | | | | | | | | | |
| | | | 27 | NQ RC | - | | | | | | | | | | | | | | |
| | | | 28 | NQ RC | - | | | | | | | | | | | | | | |
| | | | 29 | NQ RC | - | | | | | | | | | | | | | | |
| | | | 30 | NQ RC | - | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| 145.86 | END OF BOREHOLE | | | | | | | | | | | | | | | | | | |
| 38.99 | Borehole dry during drilling on December 3 and 4, 2009. Water level measured at elev. 178.32 on February 24, 2010. Water level measured at elev. 178.12 on January 6, 2010. | | | | | | | | | | | | | | | | | | |

LDN_MTO_06 09-1132-0080.GPJ LDN_MTO.GDT 11/03/10

PROJECT: 09-1132-0080

RECORD OF DRILLHOLE: 311

SHEET 4 OF 4

LOCATION: N 4678261.8 ;E 334394.2

DRILLING DATE: December 1, 2009 - December 4, 2009

DATUM: GEODETIC

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: MUD ROTARY WITH HQ TRICONE, NQRC

DRILLING CONTRACTOR: AARDVARK

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. | | RUN No. | PENETRATION RATE (m/min) | COLOUR % RETURN | FLUSH | ELEVATION | JN - Joint FLT - Fault SHR - Shear VN - Vein CJ - Conjugate BD - Bedding FO - Foliation CO - Contact OR - Orthogonal CL - Cleavage PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular PO - Polished K - Slickensided SM - Smooth Ro - Rough Br - Broken Rock NOTE: For additional abbreviations refer to list of abbreviations & symbols. | | | | | | | | | | HYDRAULIC CONDUCTIVITY k, cm/sec | | | DIAMETRAL POINT LOAD INDEX (MPa) | | NOTES WATER LEVELS INSTRUMENTATION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | | TOTAL CORE % | | | | | | | | SOLID CORE % | DIP W.R.T. CORE AXIS | | TYPE AND SURFACE DESCRIPTION | 10 ⁻⁶ | 10 ⁻⁴ | | | | 10 ⁻² | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | 80 | 60 | 40 | | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | 80 | 60 | 40 | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ROCK SURFACE | | 150.56 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

DEPTH SCALE

1 : 75



LOGGED: SG

CHECKED:

LDN_ROCK_03 09-1132-0080-ROCK.GPJ GLDR LDN.GDT 11/03/10 DATA INPUT: LMK

| | | | | | |
|-----------------------------------|--|--|--|-------------------------|--|
| PROJECT <u>07-1130-207-0</u> | | RECORD OF BOREHOLE No CPT-108 | | 1 OF 1 METRIC | |
| W.P. _____ | | LOCATION <u>N 4678051.6 :E 334826.8</u> | | ORIGINATED BY <u>MA</u> | |
| DIST <u>WEST</u> HWY <u>401/3</u> | | BOREHOLE TYPE <u>POWER AUGER, SOLID STEM</u> | | COMPILED BY <u>BRS</u> | |
| DATUM <u>GEODETIC</u> | | DATE <u>March 31, 2008</u> | | CHECKED BY <u>SJB</u> | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE | PLASTIC LIMIT W_p NATURAL MOISTURE CONTENT W LIQUID LIMIT W_L WATER CONTENT (%) | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
|--------------|---|------------|---------|------|------------|-------------------------|-----------------|--|--|---|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | | | | |
| 185.60 | GROUND SURFACE | | | | | | | | | | |
| 0.00 | TOPSOIL, silty Brown | | | | | | | | | | |
| 0.15 | CLAYEY SILT, some sand, trace gravel, with silty sand partings Soft to hard Mottled brown and grey, becoming grey at about elev. 182.7m | | 1 | SS | 4 | | 185 | | | | |
| | | | 2 | SS | 8 | | 184 | | | | |
| | | | 3 | SS | 27 | | 183 | | | | |
| | | | 4 | SS | 31 | | 182 | | | | |
| | | | 5 | SS | 16 | | | | | | |
| 181.03 | END OF BOREHOLE | | | | | | | | | | |
| 4.57 | Borehole dry during drilling on March 31, 2008. | | | | | | | | | | |

LDN_MTO_01 07-1130-207-0.GPJ LDN_MTO.GDT 5/29/09

| | | | | | |
|-----------------------------------|--|--|--|-------------------------|---------------|
| PROJECT <u>07-1130-207-0</u> | | RECORD OF BOREHOLE No CPT-110 | | 1 OF 1 | METRIC |
| W.P. _____ | | LOCATION <u>N 4678297 8 :E 334448.6</u> | | ORIGINATED BY <u>CC</u> | |
| DIST <u>WEST</u> HWY <u>401/3</u> | | BOREHOLE TYPE <u>POWER AUGER, SOLID STEM</u> | | COMPILED BY <u>SJL</u> | |
| DATUM <u>GEODETIC</u> | | DATE <u>September 8, 2008</u> | | CHECKED BY <u>SJB</u> | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT 20 40 60 80 100 | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT w _p — w — 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 | | | | | | |
| 184.82 | GROUND SURFACE | | | | | | | | | | |
| 0.00 | TOPSOIL, clayey Stiff Brown | | 1 | SS | 8 | | | | | | |
| 0.30 | CLAYEY SILT, trace to some sand, trace gravel Stiff Mottled brown and grey | | 2 | SS | 9 | | | | | | |
| | | | 3 | SS | 11 | | | | | | |
| 182.99 | | | | | | | | | | | |
| 1.83 | END OF BOREHOLE Borehole dry during drilling on September 8, 2008. | | | | | | | | | | |

LDN_MTO_01 07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

| | | | | | | | |
|-------------------------------------|--|--|--|-------------------------|--|---------------|--|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No CPT-307 | | 1 OF 1 | | METRIC | |
| W.P. _____ | | LOCATION <u>N 4678157.2; E 334805.1</u> | | ORIGINATED BY <u>TA</u> | | | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, SOLID STEM</u> | | COMPILED BY <u>DMB</u> | | | |
| DATUM <u>GEODETIC</u> | | DATE <u>January 13, 2010</u> | | CHECKED BY _____ | | | |

| 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 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE | | | | | | |
| 186.43 | GROUND SURFACE | | | | | | | | | | | | | |
| 0.00 | TOPSOIL, clayey Black | | | | | | | | | | | | | |
| 0.30 | FILL, clayey silt, some sand, trace gravel, trace topsoil | | | | | | | | | | | | | |
| 185.67 | Brown | | | | | | | | | | | | | |
| 0.76 | CLAYEY SILT, some sand, trace gravel, with occasional silt partings Stiff to hard Brown | | 1 | SS | 13 | | | | | | | ○ | | |
| | | | 2 | SS | 15 | | | | | | | | | |
| | | | 3 | SS | 36 | | | | | | | | | |
| | | | 4 | SS | 69 | | | | | | | ○ | | |
| 181.86 | END OF BOREHOLE | | | | | | | | | | | | | |
| 4.57 | Borehole dry during drilling on January 13, 2010. | | | | | | | | | | | | | |

| | | | | | | | |
|-------------------------------------|--|--|--|-------------------------|--|---------------|--|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No CPT-309 | | 1 OF 1 | | METRIC | |
| W.P. _____ | | LOCATION <u>N 4678204.8 ; E 334657.1</u> | | ORIGINATED BY <u>TA</u> | | | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, SOLID STEM</u> | | COMPILED BY <u>DMB</u> | | | |
| DATUM <u>GEODETIC</u> | | DATE <u>December 22, 2009</u> | | CHECKED BY _____ | | | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|--|--|--|--|--|---|----------------|---|---|----|----|----|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE | | | | W _p | W | W _L | | GR | SA | SI | CL |
| 185.31 | GROUND SURFACE | | | | | | | | | | | | | | | | | | |
| 0.00 | FILL, limestone gravel, crushed | | | | | | | | | | | | | | | | | | |
| 0.13 | Grey | | | | | | | | | | | | | | | | | | |
| 0.30 | FILL, sand and gravel | | | | | | | | | | | | | | | | | | |
| | Brown | | | | | | | | | | | | | | | | | | |
| | CLAYEY SILT, some sand, trace gravel, with occasional fissures, silt partings and seams | | 1 | SS | 14 | | | | | | | | | | | | | | |
| | Stiff to hard | | | | | | | | | | | | | | | | | | |
| | Brown | | 2 | SS | 20 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | 3 | SS | 55 | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | |
| | | | 4 | SS | 70 | | | | | | | | | | | | | | |
| 181.65 | END OF BOREHOLE | | | | | | | | | | | | | | | | | | |
| 3.66 | Borehole dry during drilling on December 22, 2009. | | | | | | | | | | | | | | | | | | |

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-4

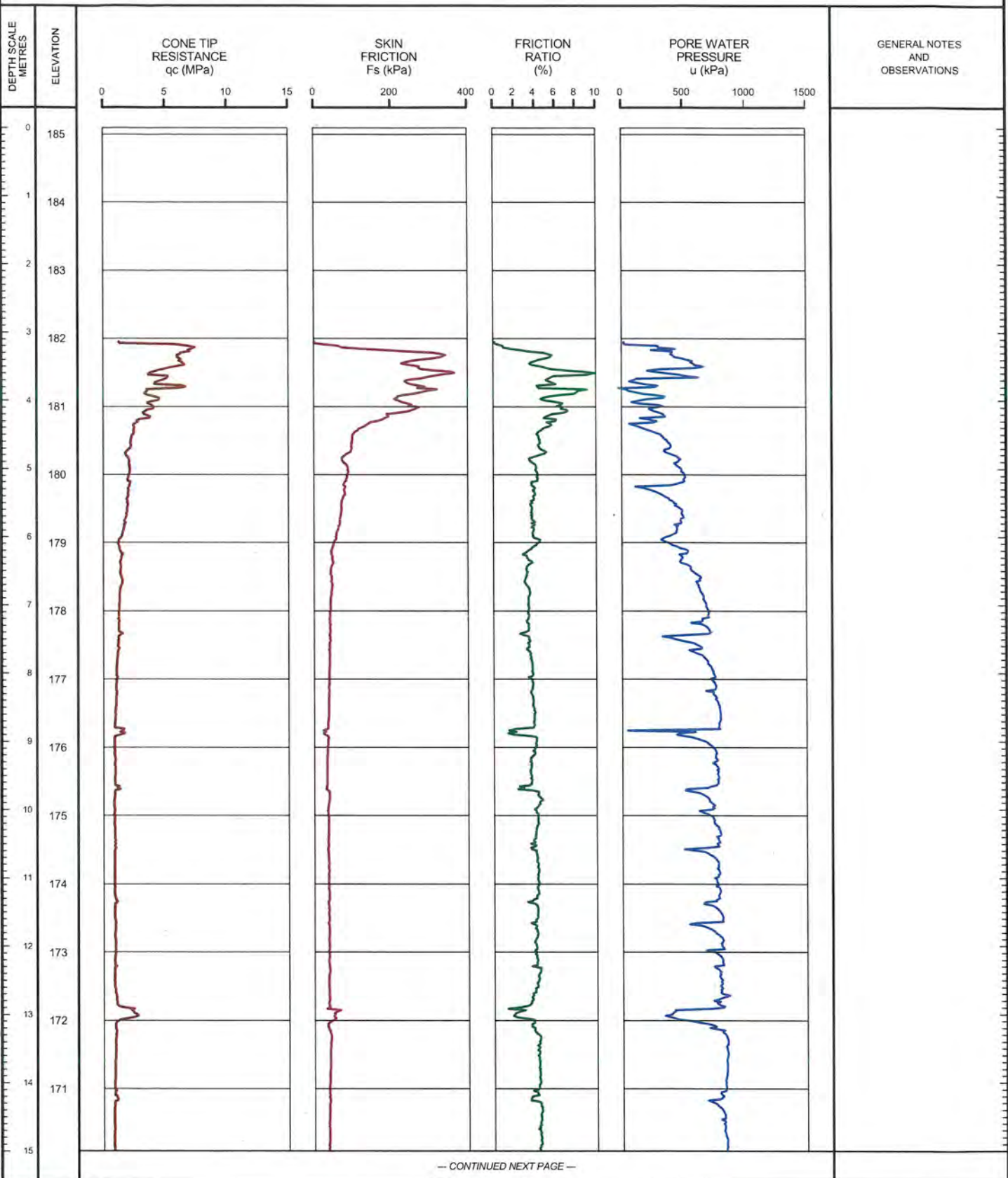
SHEET 1 OF 2

LOCATION: N 4678208.0 E 334516.0

TEST DATE: November 14, 2006

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 3.14m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE

1:75



OPERATOR: CC

CHECKED: *SB*

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-4

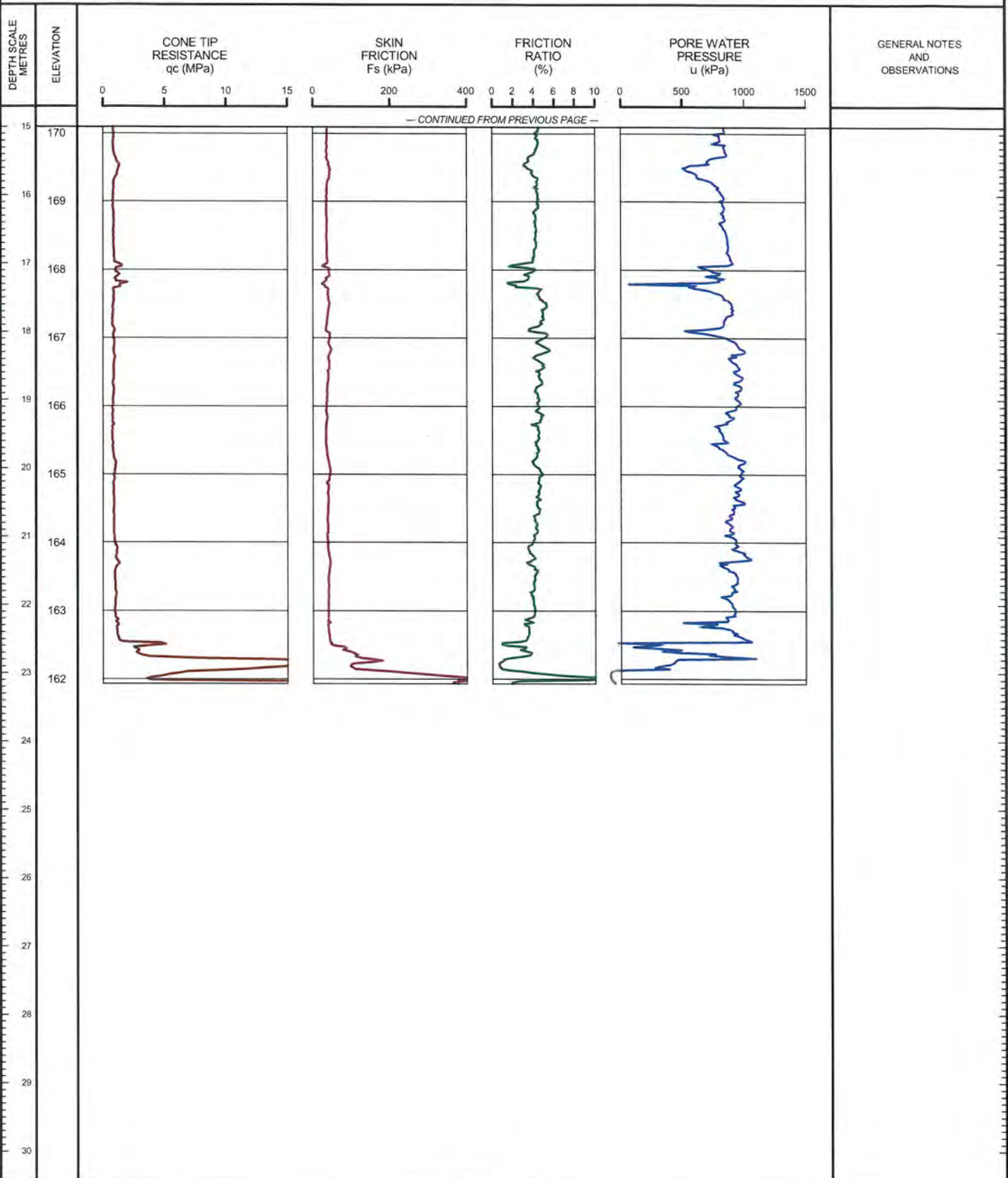
SHEET 2 OF 2

LOCATION: N 4678208.0 E 334516.0

TEST DATE: November 14, 2006

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 3.14m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE

1 : 75



OPERATOR: CC

CHECKED: SJB

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-108

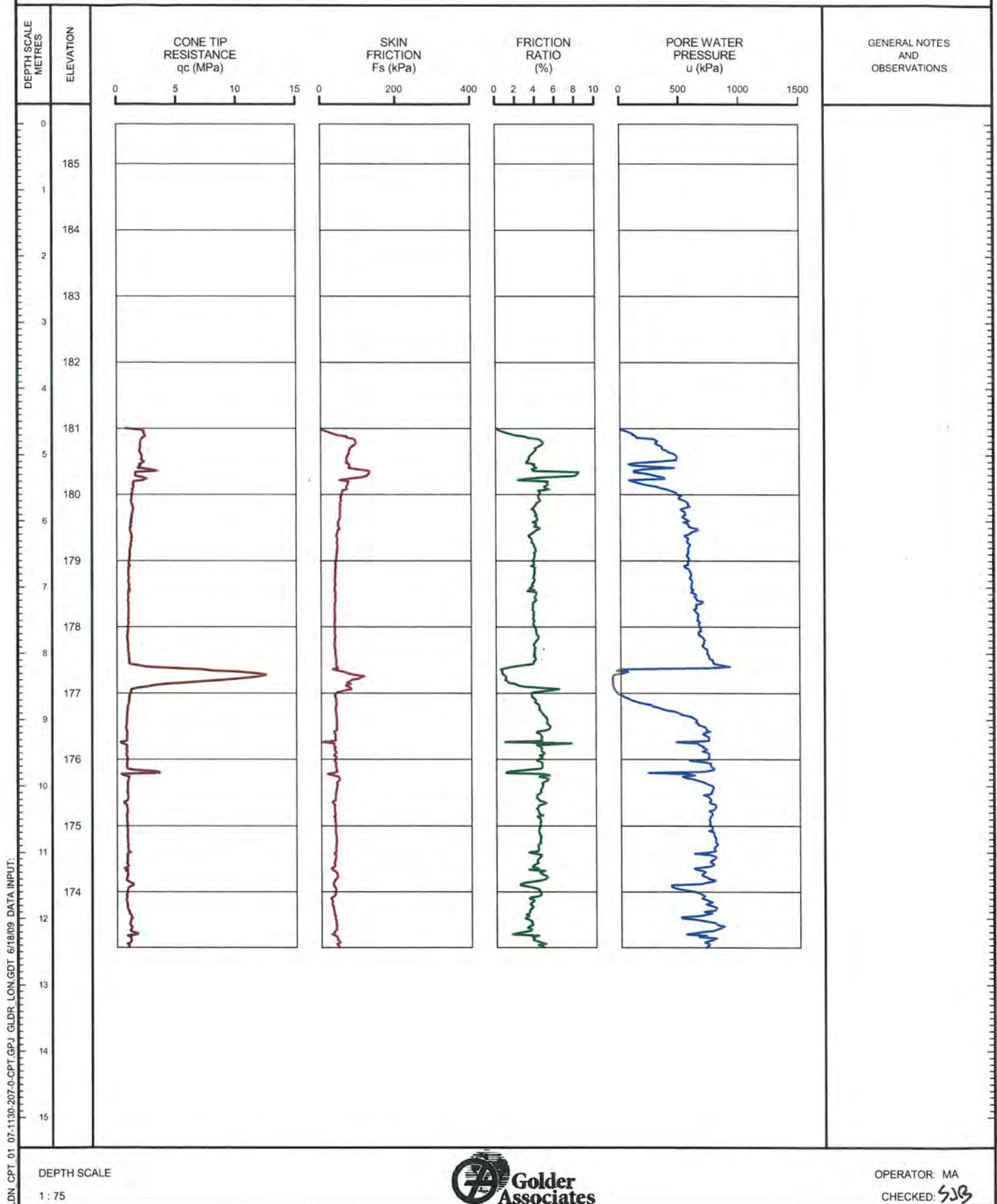
SHEET 1 OF 1

LOCATION: N 4678051.6 ; E 334826.8

TEST DATE: March 31, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 4.60m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LON CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-110

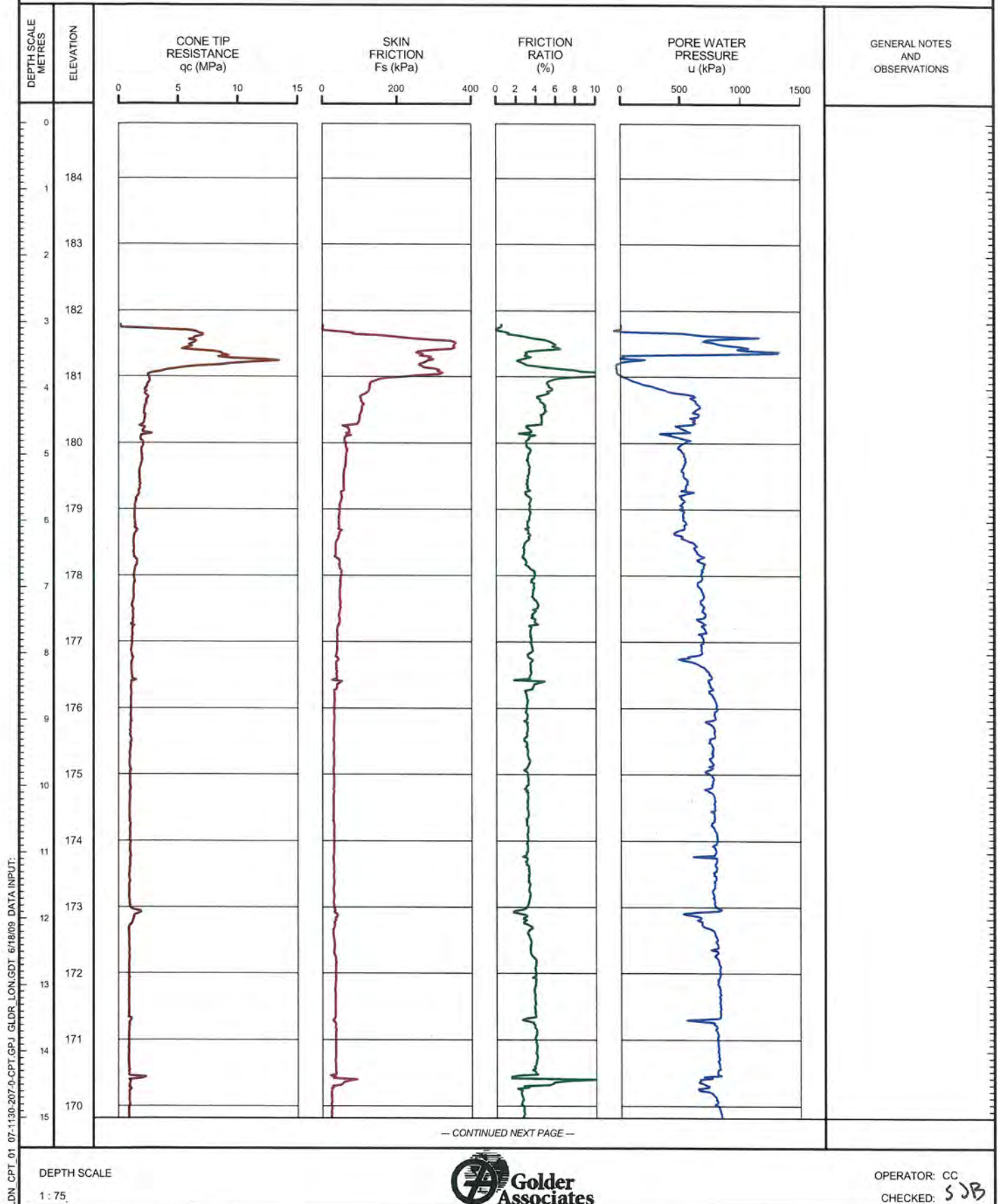
SHEET 1 OF 2

LOCATION: N 4678297.8, E 334448.6

TEST DATE: September 9, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 3.05m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-110

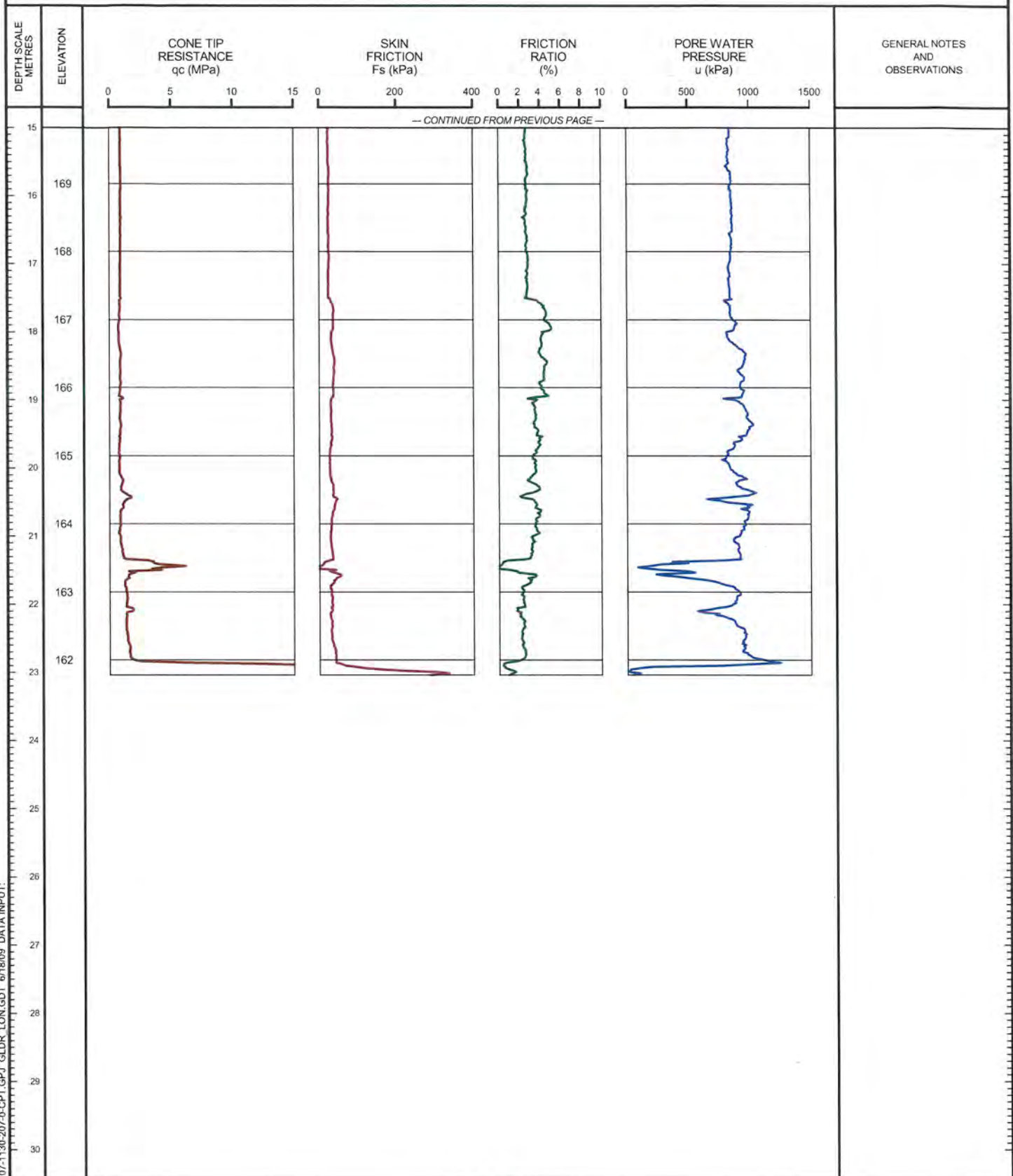
SHEET 2 OF 2

LOCATION: N 4678297.8 :E 334448.6

TEST DATE: September 9, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 3.05m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LDN CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE

1 : 75



OPERATOR: CC

CHECKED: SJB

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-307

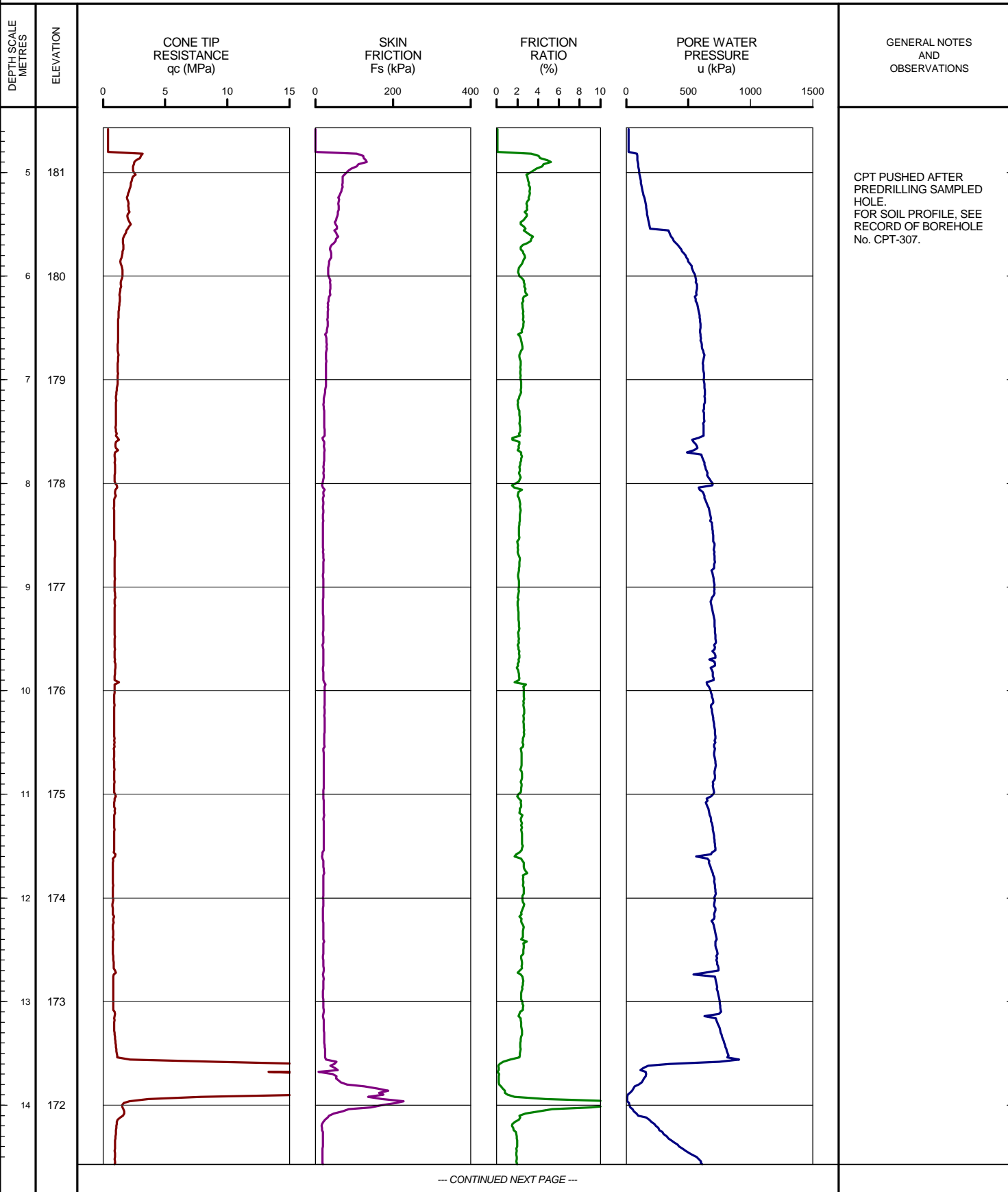
SHEET 1 OF 3

LOCATION: N 4678157.2 ;E 334805.1

TEST DATE: January 13, 2010

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 186.43m PREDRILL DEPTH: 4.57m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LDN_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-307

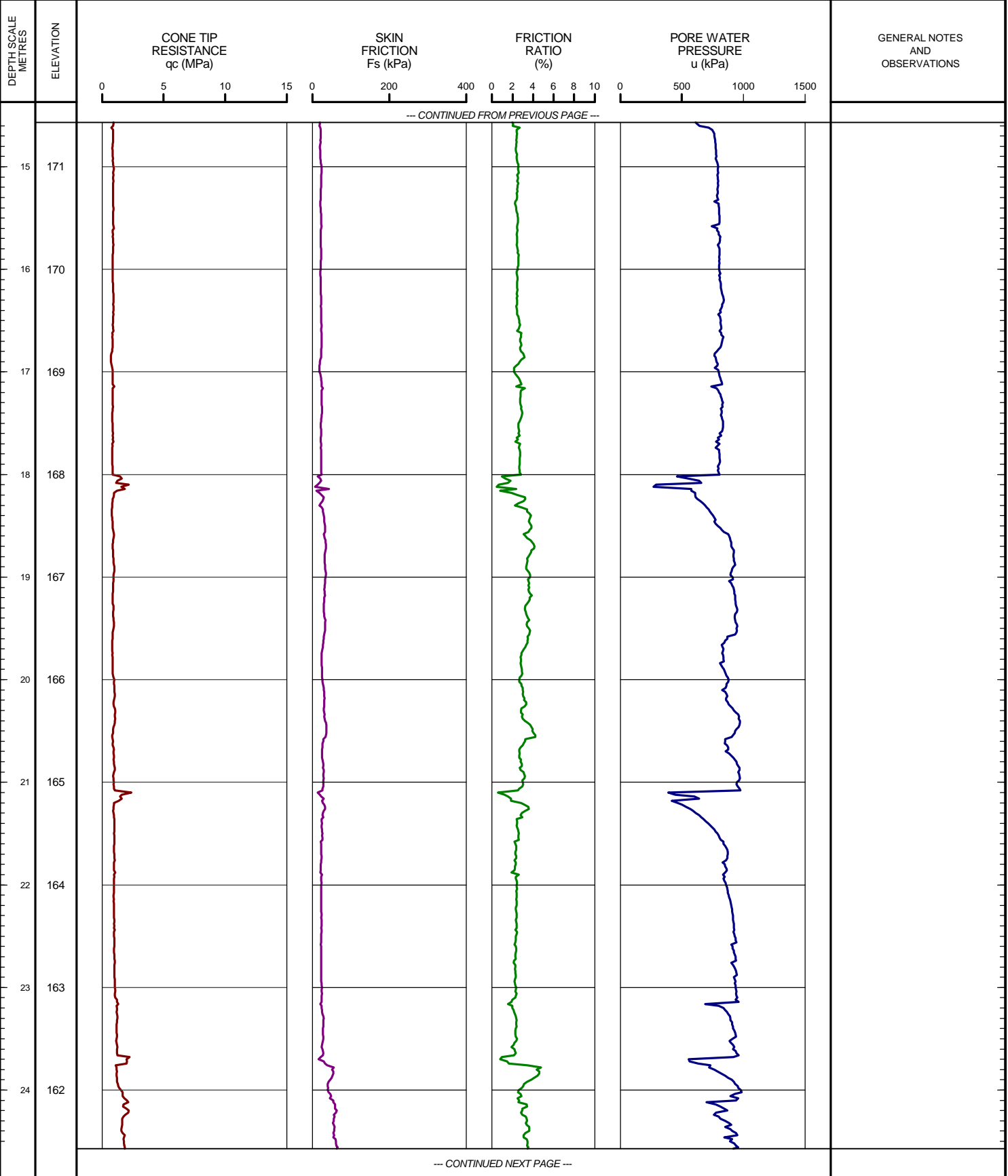
SHEET 2 OF 3

LOCATION: N 4678157.2 ;E 334805.1

TEST DATE: January 13, 2010

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 186.43m PREDRILL DEPTH: 4.57m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LDN_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-307

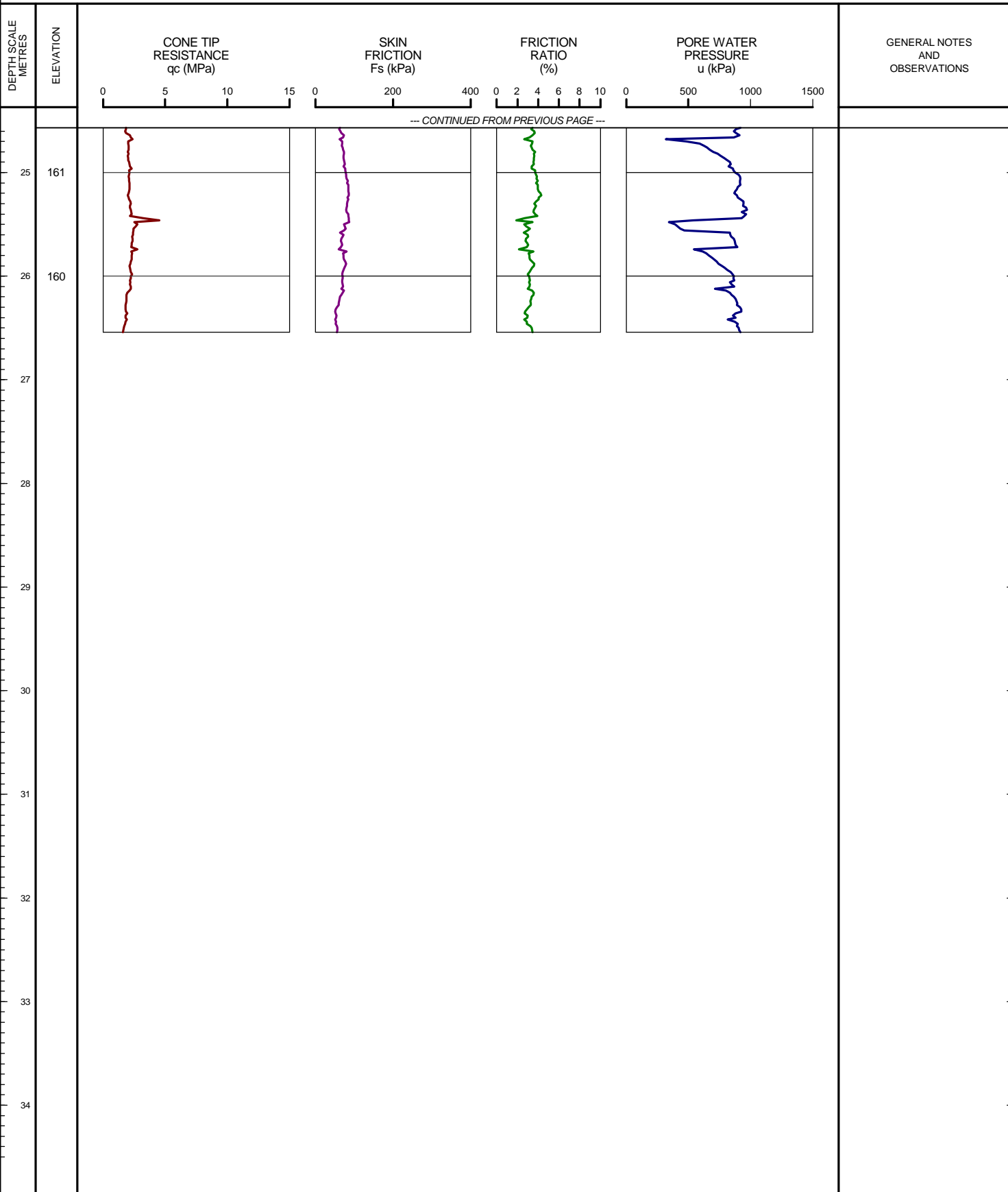
SHEET 3 OF 3

LOCATION: N 4678157.2 ;E 334805.1

TEST DATE: January 13, 2010

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 186.43m PREDRILL DEPTH: 4.57m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

LDN_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-309

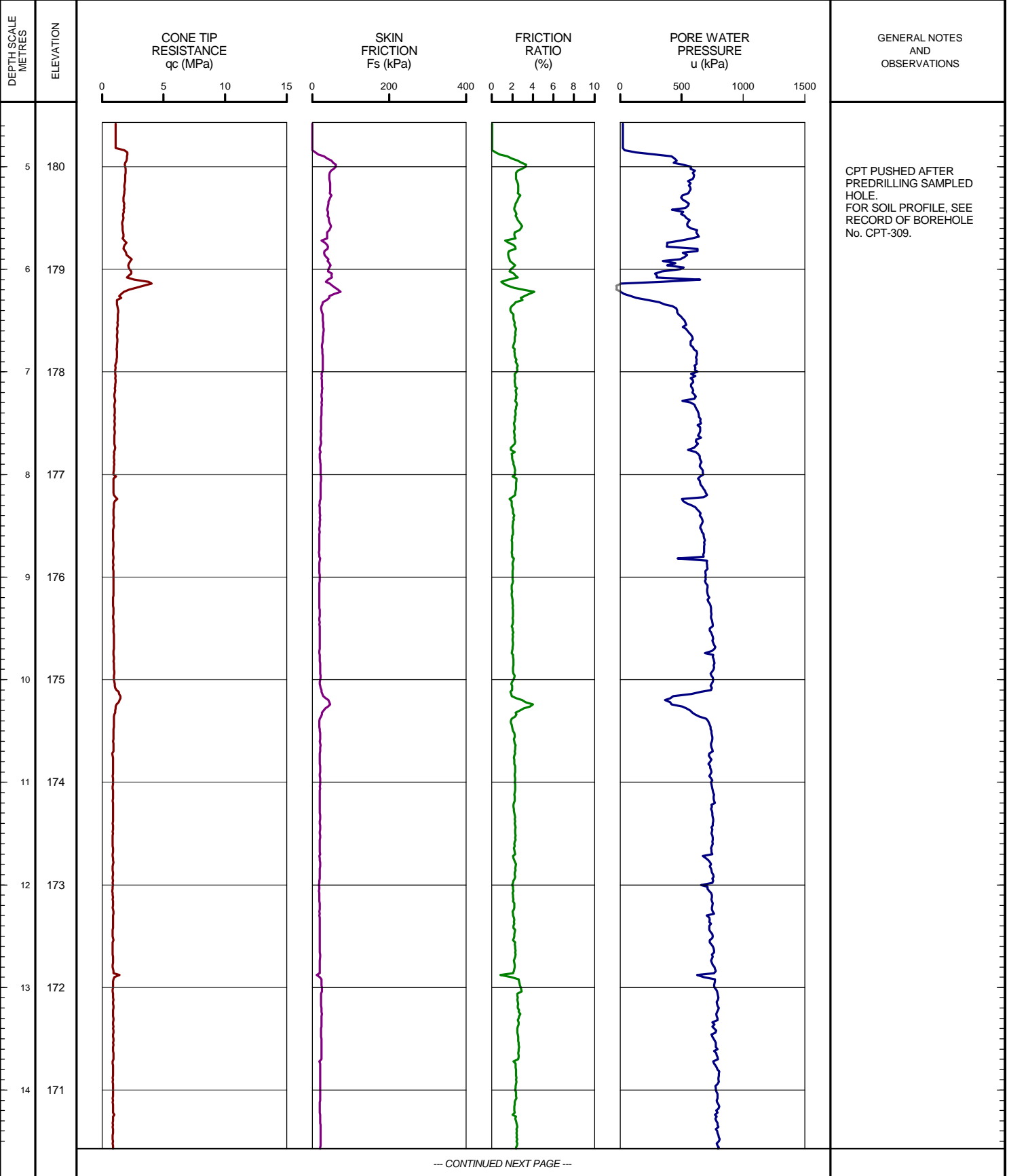
SHEET 1 OF 2

LOCATION: N 4678204.8 ;E 334657.1

TEST DATE: December 25, 2009

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 185.31m PREDRILL DEPTH: 4.57m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-309

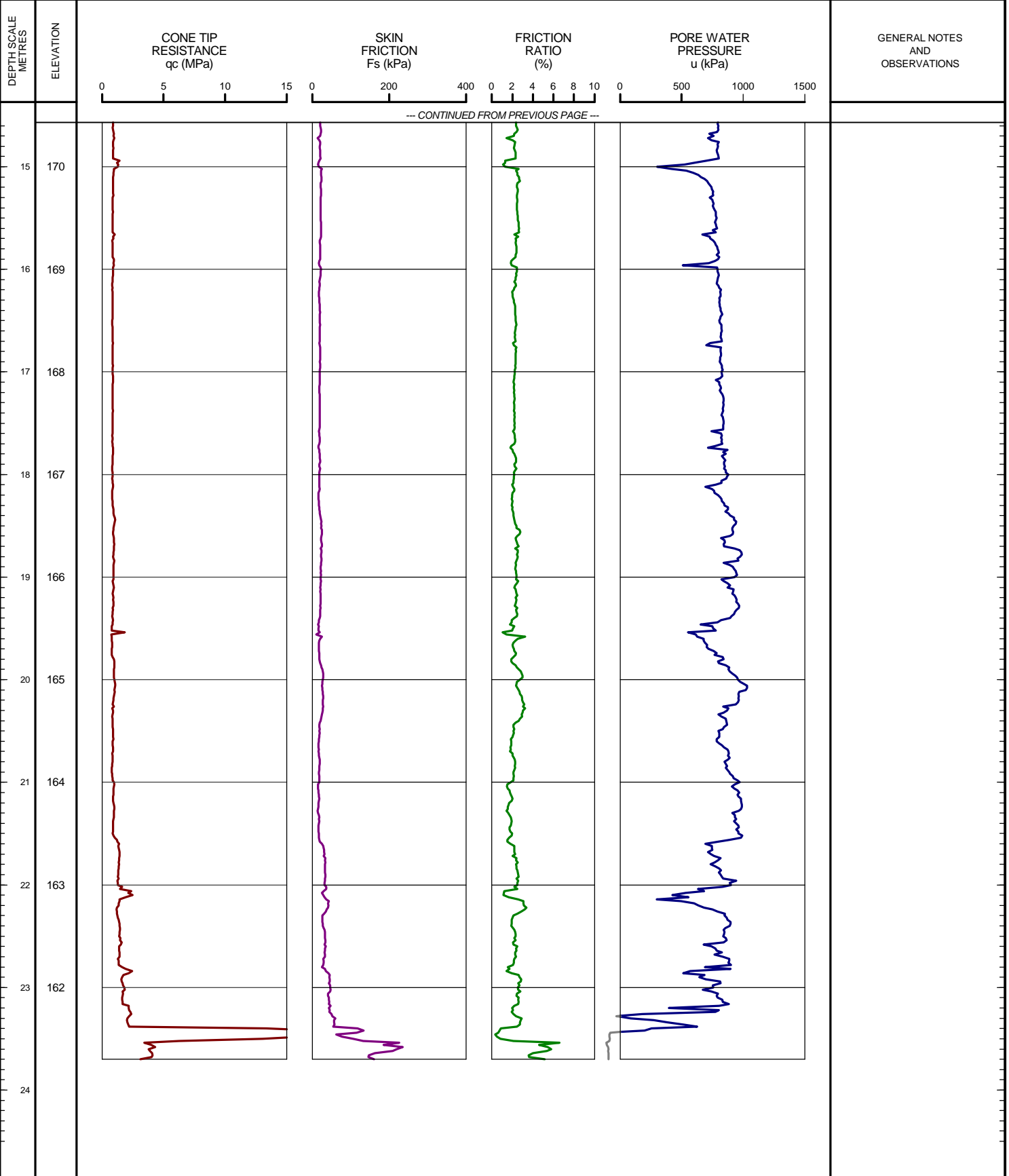
SHEET 2 OF 2

LOCATION: N 4678204.8 ;E 334657.1

TEST DATE: December 25, 2009

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 185.31m PREDRILL DEPTH: 4.57m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LON_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

Station 13+400L to Station 10+100T (Soil Profile #15)

RECORD OF BOREHOLE No 104

1 OF 4

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4677630.3 ; E 335263.1

ORIGINATED BY MA

DIST WEST HWY 401/3

BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

COMPILED BY BRS

DATUM GEODETIC

DATE

April 1, 2008 - April 2, 2008

CHECKED BY SJS

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|--------------|---|------------|---------|------|------------|-------------------------|-----------------|--|-----------------|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 40 60 80 100 | 20 40 60 80 100 | | | | | |
| 186.15 | GROUND SURFACE | | | | | | | | | | | | | |
| 0.00 | SILTY SAND, some clay, trace gravel, Loose Mottled brown and grey | | 1 | SS | 7 | | Concrete | | | | | | | |
| 184.78 | | | | | | | Bentonite | | | | | | | |
| 1.37 | CLAYEY SILT, some sand, trace gravel Very stiff Brown becoming grey at about elev. 183.1m | | 2 | SS | 23 | | | | | | | | | |
| | | | 3 | SS | 28 | | | | | | | | | |
| | | | 4 | SS | 22 | | | | | | | | | |
| 182.49 | | | | | | | | | | | | | | |
| 3.66 | CLAYEY SILT, some sand, trace gravel, with sandy silt layers Very stiff Grey | | 5 | SS | 16 | | | | | | | | | |
| 181.73 | | | | | | | | | | | | | | |
| 4.42 | CLAYEY SILT, some sand, trace gravel Very stiff Grey | | 6 | SS | 14 | | | | | | | | | |
| | | | 7 | SS | 12 | | | | | | | | | |
| | | | 8 | SS | 7 | | | | | | | | | |
| 178.85 | | | | | | | | | | | | | | |
| 7.35 | SAND AND GRAVEL, some silt, some clay Grey | | 9 | TO | PH | | | | | | | | | |
| 178.17 | CLAYEY SILT, some sand, trace gravel Grey | | | | | | | | | | | | | |
| 7.98 | | | | | | | | | | | | | | |
| 8.23 | SANDY SILT, trace gravel Grey | | 10 | SS | 10 | | | | | | | | | |
| 177.16 | SILTY SAND, trace gravel, trace clay, with clayey silt layers Loose to compact Grey | | 11 | SS | 8 | | Grout | | | | | | | 4 46 37 13 |
| 8.99 | | | | | | | | | | | | | | |
| 176.09 | CLAYEY SILT, some sand, trace gravel, with silt and sand partings Firm Grey | | | | | | | | | | | | | |
| 10.06 | CLAYEY SILT, some sand, trace gravel Stiff Grey | | 12 | SS | 6 | | | | | | | | | 2 27 43 28 |
| | | | | | | | | | | | | | | |
| | | | 13 | TO | PH | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 14 | SS | 7 | | | | | | | | | |
| | | | | | | | | | | | | | | |
| 171.21 | | | | | | | | | | | | | | |

Continued Next Page

+ 3, x 3, Numbers refer to Sensitivity O 3% STRAIN AT FAILURE

LDN_MTO_01 07-1130-207-0.GPJ LDN_MTO.GDT 5/29/09

RECORD OF BOREHOLE No 104

2 OF 4

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4677630.3 E 335263.1

ORIGINATED BY MA

DIST WEST HWY 401/3

BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

COMPILED BY BRS

DATUM GEODETIC

DATE

April 1, 2008 - April 2, 2008

CHECKED BY SJB

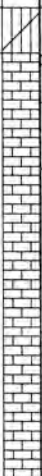
| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|--|------------|---------|------|------------|-------------------------|-----------------|--|-----------------|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 40 60 80 100 | 20 40 60 80 100 | | | | | |
| 14.94 | CLAYEY SILT, some sand, trace gravel, with sand partings Stiff Grey | | 15 | TO | PH | | 171 | | | | | | | |
| | | | | | | | 170 | | 1.7 | | | | | |
| | | | 16 | SS | 6 | | 169 | | | | | | | 1 23 41 35 |
| 168.62 | SILTY CLAY, trace sand, trace gravel Stiff Grey | | | | | | 168 | | 1.5 | | | | | |
| 17.53 | | | 17 | SS | 4 | | 167 | | | | | | | |
| 166.95 | CLAYEY SILT, trace sand, trace gravel, with silt partings Stiff Grey | | | | | | 166 | | 2.3 | | | | | |
| 19.20 | | | 18 | TO | PH | | 165 | | 1.8 | | | | | |
| 165.42 | CLAYEY SILT, trace sand, trace gravel Stiff to hard Grey | | | | | | 164 | | 1.2 | | | | | |
| 20.73 | | | 19 | SS | 5 | | 163 | | | | | | | |
| | | | 20 | SS | 31 | | 162 | | | | | | | |
| 162.53 | SAND AND GRAVEL, trace silt Very dense Grey | | | | | | 161 | | | | | | | |
| 23.62 | | | 21 | SS | 68 | | 160 | | | | | | | 8 74 (18) |
| 160.85 | SANDY SILT Very dense Grey | | | | | | 159 | | | | | | | |
| 25.30 | | | 22 | SS | 71 | | 158 | | | | | | | (66) |
| 159.85 | CLAYEY SILT, trace sand, trace gravel Hard Grey | | | | | | 157 | | | | | | | |
| 26.30 | | | 23 | SS | 39 | | | | | | | | | (92) |
| 158.35 | SILT, trace sand Dense Grey | | | | | | | | | | | | | |
| 27.80 | | | 24 | SS | 15 | | | | | | | | | |
| 157.65 | CLAYEY SILT, trace sand, trace gravel, with sandy silt partings Stiff to very stiff Grey | | | | | | | | | | | | | |
| 28.50 | | | | | | | | | | | | | | |

Continued Next Page

+ 3, X 3, Numbers refer to Sensitivity O 3% STRAIN AT FAILURE

LDN_MTO_01_07-1130-207-0.GPJ LDN_MTO.GDT 5/29/09

| | | | | | |
|-----------------------------------|--|----------------------------------|--|--------|---------------|
| PROJECT <u>07-1130-207-0</u> | | RECORD OF BOREHOLE No 104 | | 3 OF 4 | METRIC |
| W.P. _____ | LOCATION <u>N 4677630.3 ; E 335263.1</u> | ORIGINATED BY <u>MA</u> | | | |
| DIST <u>WEST</u> HWY <u>401/3</u> | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | COMPILED BY <u>BRS</u> | | | |
| DATUM <u>GEODETIC</u> | DATE <u>April 1, 2008 - April 2, 2008</u> | CHECKED BY <u>SJB</u> | | | |

| 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 | | | | | | | | WATER CONTENT (%) |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | × LAB VANE | | | | | | |
| | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | |
| 155.70 | LIMESTONE, fresh, medium strong, thinly laminated, fine grained, faintly porous Light grey (FOR DETAILED DESCRIPTIONS REFER TO RECORD OF DRILLHOLE) |  | 25 | SS | 100/76mm | | | | | | | | | | | |
| 30.45 | | | 26 | HQ RC | | | | | | | | | | | | |
| | | | 27 | HQ RC | | | | | | | | | | | | |
| | | | 28 | HQ RC | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| 151.45 | END OF BOREHOLE | | | | | | | | | | | | | | | |
| 34.70 | Water level in borehole at about elev. 162.4m during drilling on April 1 and 2, 2008. Water level measured in deep piezometer at elev. 177.92m on April 4, 2008. Water level measured in deep piezometer at elev. 176.09m on September 19, 2008. Water level measured in deep piezometer at elev. 177.25 on November 14, 2008. | | | | | | | | | | | | | | | |

LDN_MTO_01_07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

PROJECT: 07-1130-207-0

RECORD OF DRILLHOLE: 104

SHEET 4 OF 4

LOCATION: N 4677630.3 ; E 335263.1

DRILLING DATE: April 1, 2008 - April 2, 2008

DATUM: GEODETIC

INCLINATION: -90° AZIMUTH: —

DRILL RIG: MUD ROTARY WITH HQ TRICONE, NQRC

DRILLING CONTRACTOR: AARDVARK DRILLING INC

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. | | RUN No. | PENETRATION RATE (mm/min) | COLOUR FLUSH % RETURN | ELEVATION | RECOVERY | | | | R.Q.D. % | FRACT INDEX PER 0.3 | DISCONTINUITY DATA | | | | HYDRAULIC CONDUCTIVITY k, cm/sec. | DIAMETRAL POINT LOAD INDEX (MPa) | | | | NOTES WATER LEVELS INSTRUMENTATION |
|-----------------------|----------------------------|--|--------------|------------------------------------|-----------------|---------|------------------------------|-----------------------------|-----------|-----------------|-------------------------|---------------------------------|-----|-------------|---------------------------|--------------------|-----|-----|--|---|--|--|--|--|--|
| | | | | DEPTH (m) | TOTAL CORE % | | | | | SOLID CORE % | DIP w.r.t. CORE AXIS | TYPE AND SURFACE DESCRIPTION | 10° | | | 10° | 10° | 10° | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ROCK SURFACE | | 155.70 | | | | | | | | | | | | | | | | | | | | | |
| | | | | 30.45 | | | | | | | | | | | | | | | | | | | | | |
| 31 | MUD ROTARY NO ROCK CORE | LIMESTONE, fresh, medium strong, thinly laminated to laminated, fine grained, faintly porous, light brown to tan | | | 1 | | | | 155 | | | | | | | | | | | | | | | | |
| 32 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 33 | | LIMESTONE, fresh, medium strong, laminated to bedded, very fine grained to fine grained, moderately porous with occasional pits, light grey and grey | | 153.51 32.64 153.11 33.04 | | | | | | | | | | | | | | | | | | | | | |
| 34 | | LIMESTONE, fresh, medium strong, thinly laminated, fine to medium grained, moderately porous, grey | | 152.32 33.83 | 3 | | | | | | | | | | | | | | | | | | | | |
| 35 | | LIMESTONE, fresh, medium strong, thinly laminated, stylolitic, fine grained, faintly porous, grey | | 151.45 | | | | | | | | | | | | | | | | | | | | | |
| | | END OF DRILLHOLE | | 34.70 | | | | | | | | | | | | | | | | | | | | | |
| 36 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 37 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 39 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 41 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 43 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 45 | | | | | | | | | | | | | | | | | | | | | | | | | |

DEPTH SCALE

1:75



LOGGED: SG

CHECKED: SJS

RECORD OF BOREHOLE No 104A

1 OF 1

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4677630.3 : E 335263.1

ORIGINATED BY MA

DIST

WEST

HWY 401/3

BOREHOLE TYPE

POWER AUGER, SOLID STEM

COMPILED BY BRS

DATUM GEODETIC

DATE

April 1, 2008

CHECKED BY **SJS**

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | PLASTIC LIMIT w _p | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|---|------------|---------|------|------------|-------------------------|-----------------|--|-----------------|-----------------|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|
| ELEV. / DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 40 60 80 100 | 20 40 60 80 100 | 20 40 60 80 100 | | | | | |
| 186.15 | SOIL CONDITIONS INFERRED FROM BOREHOLE No. 104 GROUND SURFACE | | | | | | | | | | | | | | |
| 0.00 | SILTY SAND, some clay, trace gravel, Loose. Mottled brown and grey | | | | | | Concrete | | | | | | | | |
| 184.78 | | | | | | | | | | | | | | | |
| 1.37 | CLAYEY SILT, some sand, trace gravel Very stiff Brown becoming grey at about elev. 183.1m | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| 182.49 | | | | | | | | | | | | | | | |
| 3.66 | CLAYEY SILT, some sand, trace gravel, with sandy silt layers Very stiff Grey | | | | | | Bentonite | | | | | | | | |
| 181.73 | | | | | | | | | | | | | | | |
| 4.42 | CLAYEY SILT, some sand, trace gravel Very stiff Grey | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| 178.85 | | | | | | | | | | | | | | | |
| 7.35 | SAND AND GRAVEL, some silt, some clay Grey | | | | | | | | | | | | | | |
| 178.17 | | | | | | | | | | | | | | | |
| 7.98 | CLAYEY SILT, some sand, trace gravel Grey | | | | | | Sand | | | | | | | | |
| 8.23 | SANDY SILT, trace gravel Grey | | | | | | | | | | | | | | |
| 177.16 | | | | | | | | | | | | | | | |
| 8.99 | SILTY SAND, trace gravel, trace clay, with clayey silt layers Loose to compact Grey | | | | | | Piezometer | | | | | | | | |
| | | | | | | | | | | | | | | | |
| 176.09 | | | | | | | | | | | | | | | |
| 10.06 | CLAYEY SILT, some sand, trace gravel, with silt and sand partings Firm Grey | | | | | | | | | | | | | | |
| | END OF BOREHOLE | | | | | | | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 183.01m on April 4, 2008. | | | | | | | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 183.76m on September 19, 2008. | | | | | | | | | | | | | | |

LDN_MTO_01_07-1130-207-0.GPJ LDN_MTO.GDT 8/29/09

RECORD OF BOREHOLE No 105

1 OF 4

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4677843.2; E 335190.1

ORIGINATED BY SM

DIST

WEST

HWY 401/3

BOREHOLE TYPE

POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

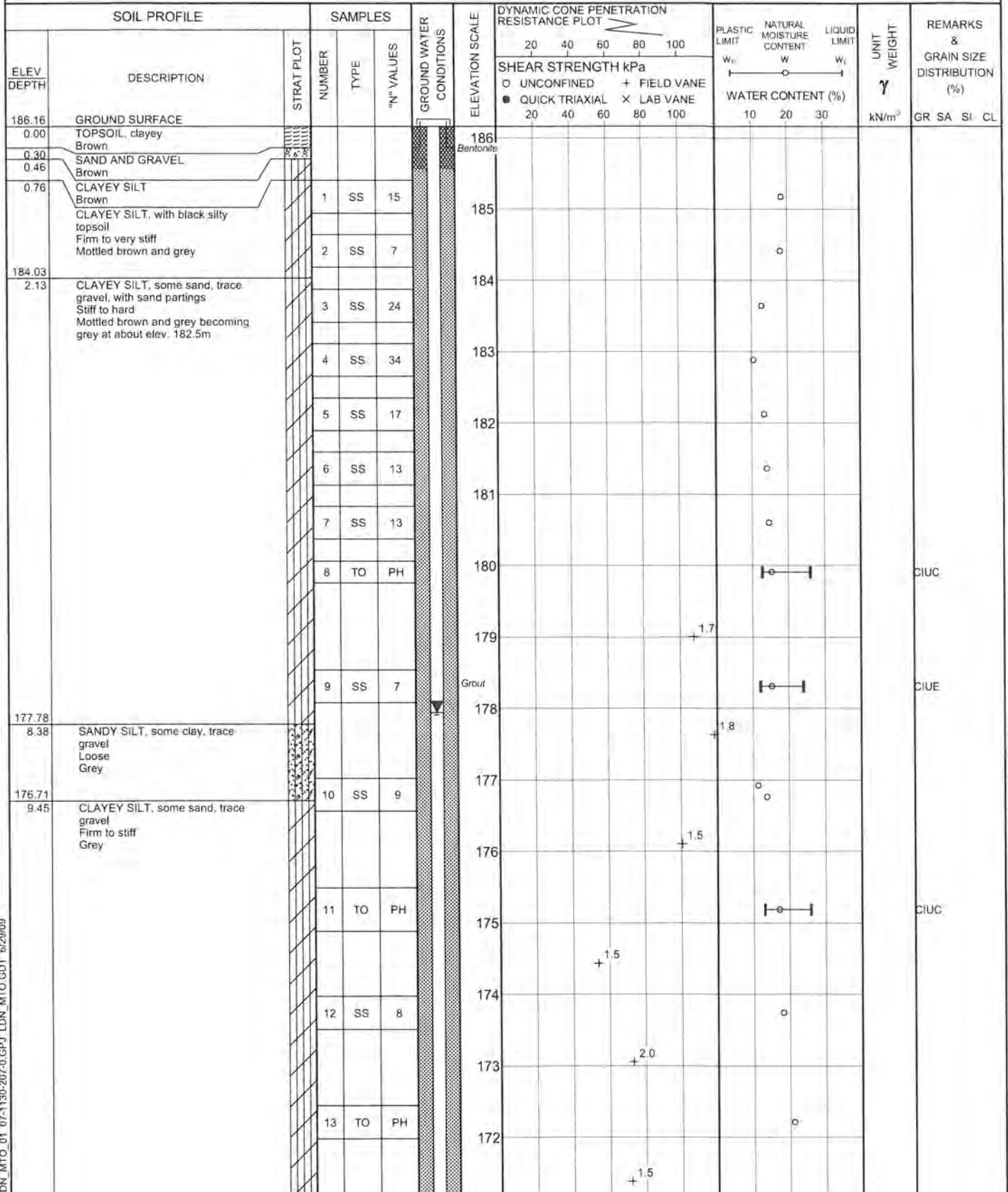
COMPILED BY BRS

DATUM GEODETIC

DATE

February 26, 2008 - February 28, 2008

CHECKED BY *SB*



Continued Next Page

RECORD OF BOREHOLE No 105

2 OF 4

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4677843.2 :E 335190.1

ORIGINATED BY SM

DIST WEST HWY 401/3

BOREHOLE TYPE

POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

COMPILED BY BRS

DATUM GEODETIC

DATE

February 26, 2008 - February 28, 2008

CHECKED BY SJS

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|---|-----------------|---------------------------------|-------------------------------------|--------------------------------|------------------|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 40 60 80 100 | 20 40 60 80 100 | | | | | |
| | CLAYEY SILT, some sand, trace gravel Firm to stiff Grey | | 14 | SS | 6 | | 171 | | | | | | | |
| | | | | | | | 170 | 1.6 | | | | | | |
| | | | 15 | TO | PH | | 169 | | | | | | | CIUC |
| | | | | | | | 168 | 1.9 | | | | | | |
| | | | 16 | TO | PH | | 167 | | | | | | | |
| | | | | | | | 166 | 1.2 | | | | | | |
| 165.59 | | | 17 | TO | PH | | 165 | | | | | | | |
| 20.57 | SILTY CLAY, some sand, trace gravel Very stiff Grey | | 18 | TO | PH | | 164 | 1.4 | | | | | | |
| | | | | | | | 163 | | | | | | | |
| | | | 19 | TO | PH | | 162 | | | | | | | |
| | | | | | | | 161 | 125.7 | 1.3 | | | | | |
| | | | 20 | TO | PH | | 160 | | | | | | | CIUC |
| 161.01 | | | | | | | 159 | | | | | | | |
| 25.15 | SILTY FINE SAND, trace clay Grey | | 21 | TO | PH | | 158 | | | | | | | |
| | | | | | | | 157 | | | | | | | |
| 159.49 | | | 22 | SS | 25 | | 156 | | | | | | | |
| 26.67 | CLAYEY SILT, some sand Very stiff Grey | | | | | | 155 | | | | | | | |
| | | | | | | | 154 | | | | | | | |
| 157.97 | | | | | | | 153 | | | | | | | |
| 28.19 | SILTY CLAY, some sand, trace gravel Hard Grey | | | | | | 152 | | | | | | | |
| | | | | | | | 151 | | | | | | | |
| 156.90 | | | 23 | SS | 37 | | 150 | | | | | | | |
| 29.26 | SILTY SAND AND GRAVEL, trace clay Dense Grey | | | | | | 149 | | | | | | | |

Continued Next Page

+ 3 x 3 Numbers refer to Sensitivity O 3% STRAIN AT FAILURE

LDN_MTO_01 07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

| | | | | | |
|-----------------------|--|---|--|-----------------------|---------------|
| PROJECT 07-1130-207-0 | | RECORD OF BOREHOLE No 105 | | 3 OF 4 | METRIC |
| W.P. _____ | | LOCATION N 4677843.2 :E 335190.1 | | ORIGINATED BY SM | |
| DIST WEST HWY 401/3 | | BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC | | COMPILED BY BRS | |
| DATUM GEODETIC | | DATE February 26, 2008 - February 28, 2008 | | CHECKED BY SJB | |

| 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 | | | | | | | WATER CONTENT (%) |
| | | | | | | | | ○ UNCONFINED ● QUICK TRIAXIAL | + FIELD VANE x LAB VANE | | | | | | |
| | | | | | | | 20 40 60 80 100 | | 10 20 30 | | | | | | |
| 155.68 | | | | | | | Screen | | | | | | | | |
| 30.48 | LIMESTONE, fresh, medium strong, thinly laminated to laminated, very fine to fine grained, faintly to strongly porous Light grey to tan (FOR DETAILED DESCRIPTIONS REFER TO RECORD OF DRILLHOLE) | | 24 | SS | 106 | | Bentonite | | | | | | | | |
| | | | 25 | NQ RC | | | 155 | 43 18 0 | | | | | | | |
| | | | 26 | NQ RC | | | 154 | 92 88 67 | | | | | | UC | |
| | | | 27 | NQ RC | | | 153 | 98 88 56 | | | | | | | |
| 151.54 | | | | | | | 152 | | | | | | | | |
| 34.62 | END OF BOREHOLE Borehole dry during drilling on February 27, 2008 Water level measured in deep piezometer at elev. 178.26m on March 20, 2008 Water level measured in deep piezometer at elev. 177.93m on July 22, 2008 Water level measured in deep piezometer at elev. 175.77m on August 11, 2008 Water level measured in deep piezometer at elev. 176.84m on September 19, 2008 Water level measured in deep piezometer at elev. 177.35m on November 14, 2008 Water level measured in deep piezometer at elev. 177.94m on January 28, 2009 | | | | | | | | | | | | | | |

LDN_MTO_01_07-1130-207-0.GPJ LDN_MTO.GOT 6/29/09

PROJECT: 07-1130-207-0

RECORD OF DRILLHOLE: 105

SHEET 4 OF 4

LOCATION: N 4677843.2 :E 335190.1

DRILLING DATE: February 26, 2008 - February 28, 2008

DATUM: GEODETIC

INCLINATION: -90° AZIMUTH: —

DRILL RIG: MUD ROTARY WITH HQ TRICONE, NQRC

DRILLING CONTRACTOR: AARDVARK DRILLING INC

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. DEPTH (m) | RUN No | PENETRATION RATE (mm/min) | COLOUR % RETURN | ELEVATION | JN - Joint FLT - Fault SHR - Shear VN - Vein CJ - Conjugate | BD - Bedding FO - Foliation CO - Contact OR - Orthogonal CL - Cleavage | PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular | PO - Polished K - Slickensided SM - Smooth Ro - Rough | Br - Broken Rock NOTE: For additional abbreviations refer to list of abbreviations & symbols | HYDRAULIC CONDUCTIVITY k, cm/sec | DIAMETRAL INDEX (MPI) | NOTES WATER LEVELS INSTRUMENTATION |
|-----------------------|----------------------------|--|--------------|-----------------------|--------|------------------------------|--------------------|-----------|---|--|---|--|--|--|--------------------------|--|
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
| | | ROCK SURFACE | | 155.88 30.48 | | | | | | | | | | | | |
| 31 | MUD ROTARY NO ROCK CORE | LIMESTONE, fresh, medium strong, thinly laminated, fine to very fine grained, faintly porous, light grey to tan | | 154.59 31.57 | 1 | | | 155 | | | | | | | | |
| 32 | | | | | | | | | | | | | | | | |
| 33 | | LIMESTONE, fresh, medium strong, laminated, very fine grained, strongly porous to pitted, whitish grey | | 153.06 33.10 | 2 | | | 154 | | | | | | | | |
| 34 | | LIMESTONE, fresh, medium strong, laminated, fine grained, porous with localized pitting, light grey, occasional fossils | | | 3 | | | 153 | | | | | | | | |
| 35 | | END OF DRILLHOLE | | 151.54 34.62 | | | | 152 | | | | | | | | |
| 36 | | | | | | | | | | | | | | | | |
| 37 | | | | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | | | | |
| 39 | | | | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | | | | |
| 41 | | | | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | | | | |
| 43 | | | | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | | | | |
| 45 | | | | | | | | | | | | | | | | |

LDN ROCK 03 07-1130-207-0-ROCK.GPJ GLDR LDN GDT 6/29/09 DATA INPUT: WDF

DEPTH SCALE

1:75



LOGGED: SG

CHECKED: *SB*

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4677843.2 ; E 335190.1

ORIGINATED BY SM

DIST

WEST

HWY 401/3

BOREHOLE TYPE

POWER AUGER, HOLLOW STEM

COMPILED BY BRS

DATUM GEODETIC

DATE _____

February 28, 2008

CHECKED BY

| 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 | | | | | | | WATER CONTENT (%) |
| | | | | | | | | ○ UNCONFINED ● QUICK TRIAXIAL | + FIELD VANE × LAB VANE | | | | | | |
| 186.16 | GROUND SURFACE | | | | | | | 20 40 60 80 100 | 10 20 30 | | | | | | |
| 0.00 | TOPSOIL, clayey Brown | | | | | | 186 | | | | | | | | |
| 0.30 | SAND AND GRAVEL Brown | | | | | | 185 | | | | | | | | |
| 0.46 | CLAYEY SILT Brown | | | | | | 184 | | | | | | | | |
| 0.76 | CLAYEY SILT, with black silty topsoil Firm to very stiff Mottled brown and grey | | | | | | 183 | | | | | | | | |
| 184.03 | | | | | | | 182 | | | | | | | | |
| 2.13 | CLAYEY SILT, some sand, trace gravel, with sand partings Stiff to hard Mottled brown and grey becoming grey at about elev. 182.5m | | | | | | 181 | | | | | | | | |
| | | | | | | | 180 | | | | | | | | |
| | | | | | | | 179 | | | | | | | | |
| | | | | | | | 178 | | | | | | | | |
| 177.78 | | | | | | | 177 | | | | | | | | |
| 8.38 | SANDY SILT, some clay, trace gravel Loose Grey | | | | | | 176 | | | | | | | | |
| 177.02 | | | | | | | 175 | | | | | | | | |
| 9.14 | END OF BOREHOLE | | | | | | 174 | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 184.72m on March 20, 2008. | | | | | | 173 | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 184.36m on July 22, 2008. | | | | | | 172 | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 184.12m on August 11, 2008. | | | | | | 171 | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 184.05m on September 19, 2008. | | | | | | 170 | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 183.69m on January 28, 2009. | | | | | | 169 | | | | | | | | |

DN MTO 01 07-1130-207-0.GPJ LDN MTO.GDT 6/29/09

+3, X3: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No 107

1 OF 4

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4677973.1 : E 334961.3

ORIGINATED BY MA

DIST WEST

HWY 401/3

BOREHOLE TYPE

POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

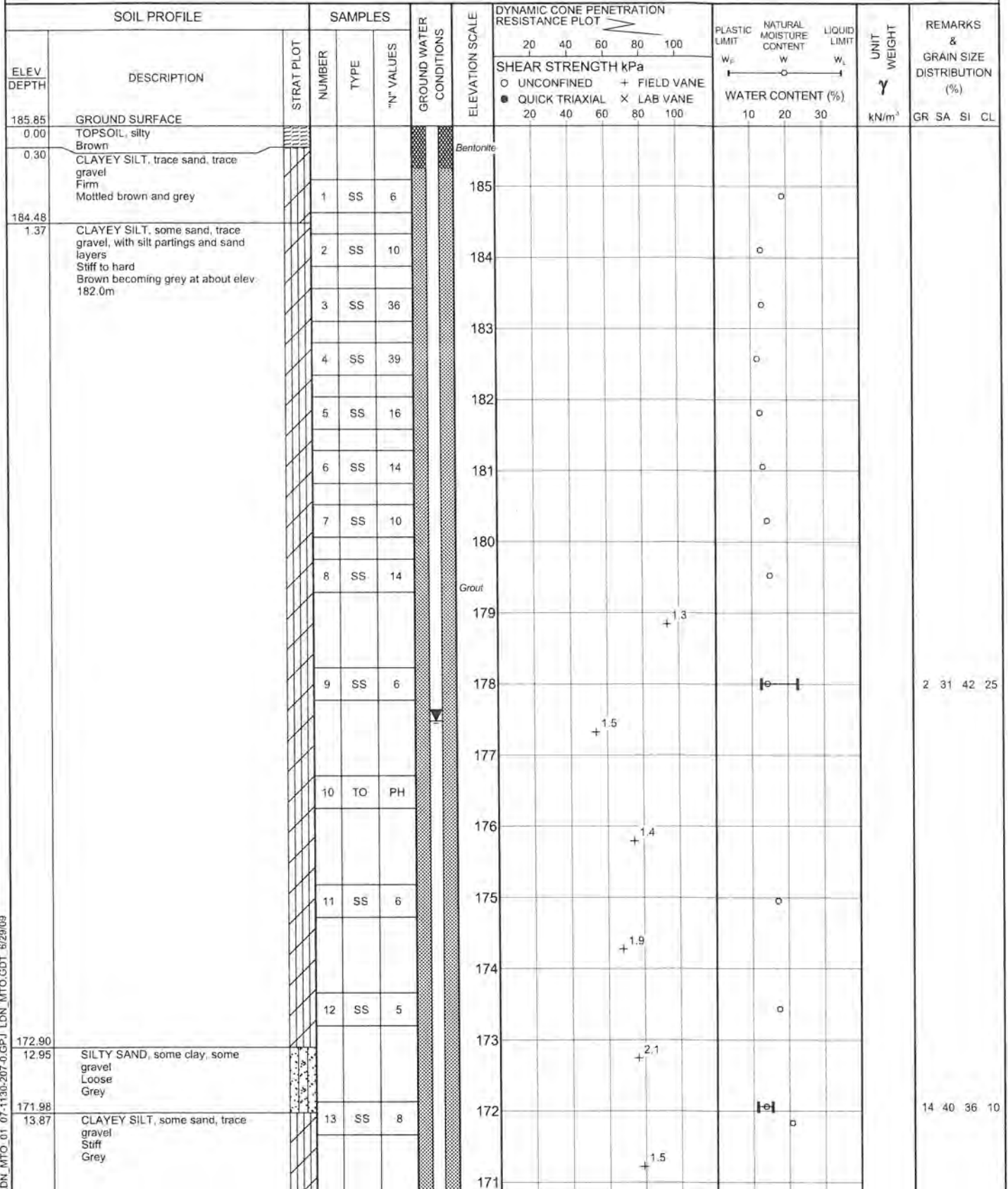
COMPILED BY BRS

DATUM GEODETIC

DATE

March 14, 2008 - March 19, 2008

CHECKED BY *SSB*

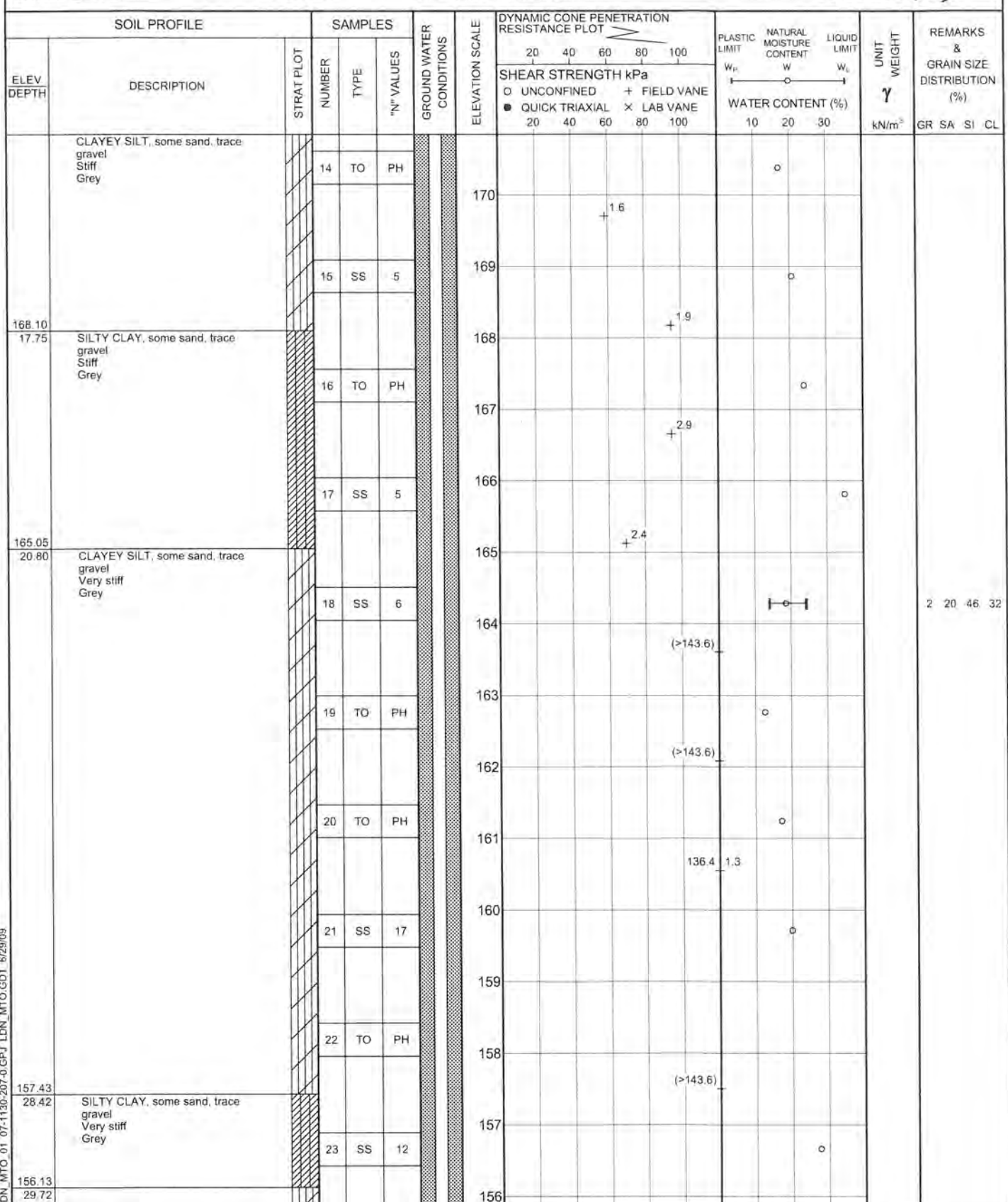


Continued Next Page

+ 3, x 3; Numbers refer to Sensitivity
○ 3% STRAIN AT FAILURE

LDN_MTO_01 07-1130-207-0.GPJ LDN_MTO.GDT 8/29/09

| | | | | | |
|-----------------------|---------------|---|--|-----------------------|---------------|
| PROJECT 07-1130-207-0 | | RECORD OF BOREHOLE No 107 | | 2 OF 4 | METRIC |
| W.P. | LOCATION | N 4677973.1 ; E 334961.3 | | ORIGINATED BY MA | |
| DIST WEST HWY 401/3 | BOREHOLE TYPE | POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC | | COMPILED BY BRS | |
| DATUM GEODETIC | DATE | March 14, 2008 - March 19, 2008 | | CHECKED BY <i>SJB</i> | |



LDN_MTO_01_07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

Continued Next Page

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

RECORD OF BOREHOLE No 107

3 OF 4

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4677973.1 E 334961.3

ORIGINATED BY MA

DIST WEST HWY 401/3

BOREHOLE TYPE

POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

COMPILED BY BRS

DATUM GEODETIC

DATE

March 14, 2008 - March 19, 2008

CHECKED BY *SLB*

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|--------------|--|------------|---------|-------|------------|-------------------------|-----------------|--|-----------------------------|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|
| ELEV. DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | |
| | | | | | | | | 20 40 60 80 100 | 20 40 60 80 100 | 10 20 30 | | | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE | ○ UNCONFINED + FIELD VANE | | | | | |
| | | | | | | | | ● QUICK TRIAXIAL × LAB VANE | ● QUICK TRIAXIAL × LAB VANE | | | | | |
| | | | | | | | | 20 40 60 80 100 | 20 40 60 80 100 | 10 20 30 | | | | |
| 155.25 | CLAYEY SILT, some sand, trace gravel Very stiff Grey | | 24 | SS | 235 | | 155 | | | | | | | |
| 30.68 | SILTY SAND, trace clay, trace gravel | | | | | | | | | | | | | |
| 154.61 | LIMESTONE, weathered Tan and grey | | 25 | NQ RC | | | | | | | | | | |
| 31.24 | LIMESTONE, fresh, medium strong, thinly laminated, fine to medium grained, faintly porous Brown and grey | | 26 | NQ RC | | | | | | | | | | |
| | (FOR DETAILED DESCRIPTIONS REFER TO RECORD OF DRILLHOLE) | | | | | | | | | | | | | |
| | | | 27 | NQ RC | | | 153 | | | | | | | |
| | | | 28 | NQ RC | | | | | | | | | | |
| | | | 29 | NQ RC | | | | | | | | | | |
| | | | 30 | NQ RC | | | | | | | | | | |
| | | | 31 | NQ RC | | | | | | | | | | |
| 150.95 | END OF BOREHOLE | | | | | | 151 | | | | | | | |
| 34.90 | Borehole dry during drilling between March 14 and 19, 2008. | | | | | | | | | | | | | |
| | Water level measured in deep piezometer at elev. 177.30m on November 14, 2008. | | | | | | | | | | | | | |
| | Water level measured in deep piezometer at elev. 177.48m on January 28, 2009. | | | | | | | | | | | | | |

LDN_MTO_01_07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

PROJECT: 07-1130-207-0

RECORD OF DRILLHOLE: 107

SHEET 4 OF 4

LOCATION: N 4677973.1;E 334961.3

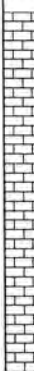
DRILLING DATE: March 14, 2008 - March 19, 2008

DATUM: GEODETIC

INCLINATION: -90° AZIMUTH: —

DRILL RIG: MUD ROTARY WITH HQ TRICONE, NQRC

DRILLING CONTRACTOR: AARDVARK DRILLING INC

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. | RUN No. | PENETRATION RATE (mm/min) | COLOUR % RETURN | ELEVATION | JN - Joint FLT - Fault SHR - Shear VN - Vein CJ - Conjugate BD - Bedding FO - Foliation CO - Contact OR - Orthogonal CL - Cleavage PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular PO - Polished K - Slickensided SM - Smooth Ro - Rough Br - Broken Rock NOTE: For additional abbreviations refer to list of abbreviations & symbols | | | | | | | | | | DIAMETRAL INDEX (MPa) | NOTES WATER LEVELS INSTRUMENTATION |
|-----------------------|----------------------------|---|---|-----------------|---------|------------------------------|--------------------|-----------|---|-----------------|-----------------|----------------------------|------------------------|---------------------------------|--|------------------|------------------|------------------|--------------------------|--|
| | | | | DEPTH (m) | | | | | FLUSH | RECOVERY | R.Q.D. % | FRACT. INDEX PER 0.3 | DISCONTINUITY DATA | | HYDRAULIC CONDUCTIVITY k, cm/sec | | | | | |
| | | | | | | | | | | TOTAL CORE % | SOLID CORE % | | DIP w / l CORE AXIS | TYPE AND SURFACE DESCRIPTION | 10 ⁻¹ | 10 ⁻² | 10 ⁻³ | 10 ⁻⁴ | | |
| | | | | | | | | | | 80 60 40 20 | 80 60 40 20 | 80 60 40 20 | 5 10 15 20 | 0 30 60 90 | | | | | | |
| 31 | MUD ROTARY NO ROCK CORE | ROCK SURFACE | | 155.17 30.68 | | | | 155 | | | | | | | | | | | | |
| | | Core retriever malfunctioning - most of core broken LIMESTONE, fresh, medium strong, thinly laminated to laminated, fine to medium grained, faintly porous, brown and grey |  | 1 | | | | | | | | | | | | | | | | |
| 32 | | | | 2 | | | | | | | | | | | | | | | | |
| 33 | | | | 3 | | | | | | | | | | | | | | | | |
| | | | | 4 | | | | | | | | | | | | | | | | |
| 34 | | | | 5 | | | | | | | | | | | | | | | | |
| | | | | 6 | | | | | | | | | | | | | | | | |
| 35 | | END OF DRILLHOLE | | 150.95 34.90 | 7 | | | 151 | | | | | | | | | | | | |
| 36 | | | | | | | | | | | | | | | | | | | | |
| 37 | | | | | | | | | | | | | | | | | | | | |
| 38 | | | | | | | | | | | | | | | | | | | | |
| 39 | | | | | | | | | | | | | | | | | | | | |
| 40 | | | | | | | | | | | | | | | | | | | | |
| 41 | | | | | | | | | | | | | | | | | | | | |
| 42 | | | | | | | | | | | | | | | | | | | | |
| 43 | | | | | | | | | | | | | | | | | | | | |
| 44 | | | | | | | | | | | | | | | | | | | | |
| 45 | | | | | | | | | | | | | | | | | | | | |

LDN ROCK 03 07-1130-207-0-ROCK.GPJ GLDR LDN GDT 6/29/09 DATA INPUT: WDF

DEPTH SCALE

1:75



LOGGED: SG

CHECKED: SSB

RECORD OF BOREHOLE No 107A

1 OF 1

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4677973.1 E 334961.3

ORIGINATED BY MA

DIST WEST HWY 401/3

BOREHOLE TYPE POWER AUGER, SOLID STEM

COMPILED BY BRS

DATUM GEODETTIC

DATE

March 14, 2008

CHECKED BY *SB*

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT w _p | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|--|------------|---------|------|------------|----------------------------|-------------------|---|-----------------|---------------------------------|----------------------------------|--------------------------------|------------------|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 40 60 80 100 | 20 40 60 80 100 | | | | | |
| 185.85 | SOIL CONDITIONS INFERRED FROM BOREHOLE No. 107 GROUND SURFACE | | | | | | | | | | | | | |
| 0.00 | TOPSOIL, silty Brown | | | | | | Concrete | | | | | | | |
| 0.30 | CLAYEY SILT, trace sand, trace gravel Firm Mottled brown and grey | | | | | | 185 | | | | | | | |
| 184.48 | | | | | | | 184 | | | | | | | |
| 1.37 | CLAYEY SILT, some sand, trace gravel, with silt partings and sand layers Stiff to hard Brown becoming grey at about elev 182.0m | | | | | | 183 | | | | | | | |
| | | | | | | | 182 | | | | | | | |
| | | | | | | | 181 | | | | | | | |
| | | | | | | | 180 | | | | | | | |
| | | | | | | | 179 Bentonite | | | | | | | |
| | | | | | | | 178 Sand | | | | | | | |
| | | | | | | | 177 Piezometer | | | | | | | |
| 176.25 | | | | | | | | | | | | | | |
| 9.60 | END OF BOREHOLE | | | | | | | | | | | | | |

LDN_MTO_01 07-1130-207-0.GPJ LDN_MTO.GDT 5/29/09

| | | | | | |
|-------------------------------------|--|----------------------------------|--|--------|---------------|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No 301 | | 1 OF 4 | METRIC |
| W.P. _____ | LOCATION <u>N 4677712.2 ;E 335231.1</u> | ORIGINATED BY <u>MR</u> | | | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | COMPILED BY <u>LMK/DMB</u> | | | |
| DATUM <u>GEODETIC</u> | DATE <u>December 2, 2009 - December 3, 2009</u> | CHECKED BY _____ | | | |

[illegible]

Continued Next Page

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

DN_MTO_06 09-1132-0080.GPJ LDN_MTO.GDT 15/03/10

| | | | | | | | |
|-------------------------------------|--|--|--|----------------------------|--|---------------|--|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No 301 | | 2 OF 4 | | METRIC | |
| W.P. _____ | | LOCATION <u>N 4677712.2; E 335231.1</u> | | ORIGINATED BY <u>MR</u> | | | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | | COMPILED BY <u>LMK/DMB</u> | | | |
| DATUM <u>GEODETIC</u> | | DATE <u>December 2, 2009 - December 3, 2009</u> | | CHECKED BY _____ | | | |

| 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 | | | | | | |
| | | | | | | | | ○ UNCONFINED ● QUICK TRIAXIAL | + FIELD VANE × LAB VANE | | | | | |
| | | | | | | | 20 40 60 80 100 | | | | | | | |
| | | | | | | | 20 40 60 80 100 | | | | | | | |
| | | | | | | | | | | | | | | |
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LDN_MTO_06 09-1132-0080.GPJ LDN_MTO.GDT 11/03/10

Continued Next Page

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

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|-------------------------------------|--|--|--|----------------------------|---------------|
| PROJECT 09-1132-0080 | | RECORD OF BOREHOLE No 301 | | 3 OF 4 | METRIC |
| W.P. _____ | | LOCATION N 4677712.2; E 335231.1 | | ORIGINATED BY MR | |
| DIST WEST HWY 401 / 3 | | BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC | | COMPILED BY LMK/DMB | |
| DATUM GEODETIC | | DATE December 2, 2009 - December 3, 2009 | | CHECKED BY _____ | |

| 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 |
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| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 | 40 | 60 | 80 | 100 | W _P | W | | |
| 155.83 30.42 | LIMESTONE, fresh, medium strong, laminated, very fine to fine grained, faintly porous Light grey to brown (FOR DETAILED DESCRIPTIONS REFER TO RECORD OF DRILLHOLE) | | 26 | SS | 100/25mm | | | | | | | | | | | |
| | | | 27 | NQ RC | - | | 71 | 0 | 0 | | | | | | | |
| | | | 28 | NQ RC | - | | 98 | 48 | 45 | | | | | | | |
| | | | 29 | NQ RC | - | | 77 | 60 | 50 | | | | | | | |
| | | | 30 | NQ RC | - | | 100 | 82 | 65 | | | | | | | |
| | | | 31 | NQ RC | - | | 100 | 73 | 67 | | | | | | | |
| 150.28 35.97 | END OF BOREHOLE Groundwater encountered at about elev. 159.7m during drilling on December 2 and 3, 2009. Water level measured at elev. 178.15m on February 24, 2010. Water level measured at elev. 177.92m on January 6, 2010. Borehole sealed with cement-bentonite grout. | | | | | | | | | | | | | | | |

PROJECT: 09-1132-0080

RECORD OF DRILLHOLE: 301

SHEET 4 OF 4

LOCATION: N 4677712.2 ;E 335231.1

DRILLING DATE: December 2, 2009 - December 3, 2009

DATUM: GEODETIC

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: MUD ROTARY WITH HQ TRICONE, NQRC

DRILLING CONTRACTOR: LANTECH

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. | RUN No. | PENETRATION RATE (m/min) | FLUSH | COLOUR % RETURN | ELEVATION | JN - Joint FLT - Fault SHR - Shear VN - Vein CJ - Conjugate BD - Bedding FO - Foliation CO - Contact OR - Orthogonal CL - Cleavage PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular PO - Polished K - Slickensided SM - Smooth Ro - Rough Br - Broken Rock NOTE: For additional abbreviations refer to list of abbreviations & symbols. | | | | | | | | | | | | | | | HYDRAULIC CONDUCTIVITY k, cm/sec | | | DIAMETRAL POINT LOAD INDEX (MPa) | | NOTES WATER LEVELS INSTRUMENTATION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | DEPTH (m) | | | | | | RECOVERY | | R.Q.D. % | FRACT. INDEX PER 0.3 | DISCONTINUITY DATA | | | | | 10 ⁻⁸ | 10 ⁻⁶ | 10 ⁻⁴ | 10 ⁻² | 2 | 4 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | TOTAL CORE % | SOLID CORE % | | | DIP W.R.T. CORE AXIS | TYPE AND SURFACE DESCRIPTION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | 80 60 40 20 | 80 60 40 20 | 80 60 40 20 | 5 10 15 20 | 0 30 60 90 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 31 | MUD ROTARY NQ ROCK CORE | ROCK SURFACE | | 155.83 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

DEPTH SCALE

1 : 75













LOGGED: SG

CHECKED:

LDN_ROCK_03 09-1132-0080-ROCK.GPJ GLDR LDN.GDT 11/03/10 DATA INPUT: LMK

| | | | | | |
|-------------------------------------|--|---|--|----------------------------|---------------|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No 304 | | 1 OF 1 | METRIC |
| W.P. _____ | | LOCATION <u>N 4677998.2 ; E 335082.8</u> | | ORIGINATED BY <u>SM</u> | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, HOLLOW STEM</u> | | COMPILED BY <u>LMK/DMB</u> | |
| DATUM <u>GEODETIC</u> | | DATE <u>November 27, 2009</u> | | CHECKED BY _____ | |

| 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 | | | | | w _p | w | w _L | | | | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE | | | | | | | | | | | | |
| 188.00 | GROUND SURFACE | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | | |
| 0.00 | FILL, clayey silt, some sand, trace gravel, trace bricks, with topsoil pockets Firm Brown |  | | | | | 187 | | | | | | | | ○ | | | | | |
| | |  | 1 | SS | 5 | | | | | | | | | | | ○ | | | | |
| | |  | 2 | SS | 7 | | 186 | | | | | | | | | ○ | | | | |
| | |  | 3 | SS | 7 | | | | | | | | | | | ○ | | | | |
| 185.10 | | | | | | | 185 | | | | | | | | | | ○ | | | |
| 2.90 | CLAYEY SILT, some sand, trace gravel, with occasional silt partings Very stiff Brown becoming grey below about elev. 182.8m |  | 4 | SS | 3 | | | | | | | | | | | | ○ | | | |
| | |  | 5 | SS | 25 | | 184 | | | | | | | | ○ | | | | | |
| | |  | 6 | SS | 34 | | 183 | | | | | | | | ○ | | | | | |
| | |  | 7 | SS | 18 | | 182 | | | | | | | | ○ | | | | | |
| | |  | 8 | SS | 12 | | 181 | | | | | | | | ○ | | | | | |
| | |  | | | | | | | | | | | | | | | | | | |
| 179.92 | | | 9 | SS | 6 | | 180 | | | | | | | | ○ | | | | | |
| 8.08 | END OF BOREHOLE Borehole dry during drilling on November 27, 2009. | | | | | | | | | | | | | | | | | | | |

| | | | | | |
|-------------------------------------|--|----------------------------------|--|--------|---------------|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No 305 | | 1 OF 4 | METRIC |
| W.P. _____ | LOCATION <u>N 4677923.8 ;E 335038.1</u> | ORIGINATED BY <u>SM</u> | | | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | COMPILED BY <u>LMK/DMB</u> | | | |
| DATUM <u>GEODETIC</u> | DATE <u>November 30, 2009 - December 1, 2009</u> | CHECKED BY _____ | | | |

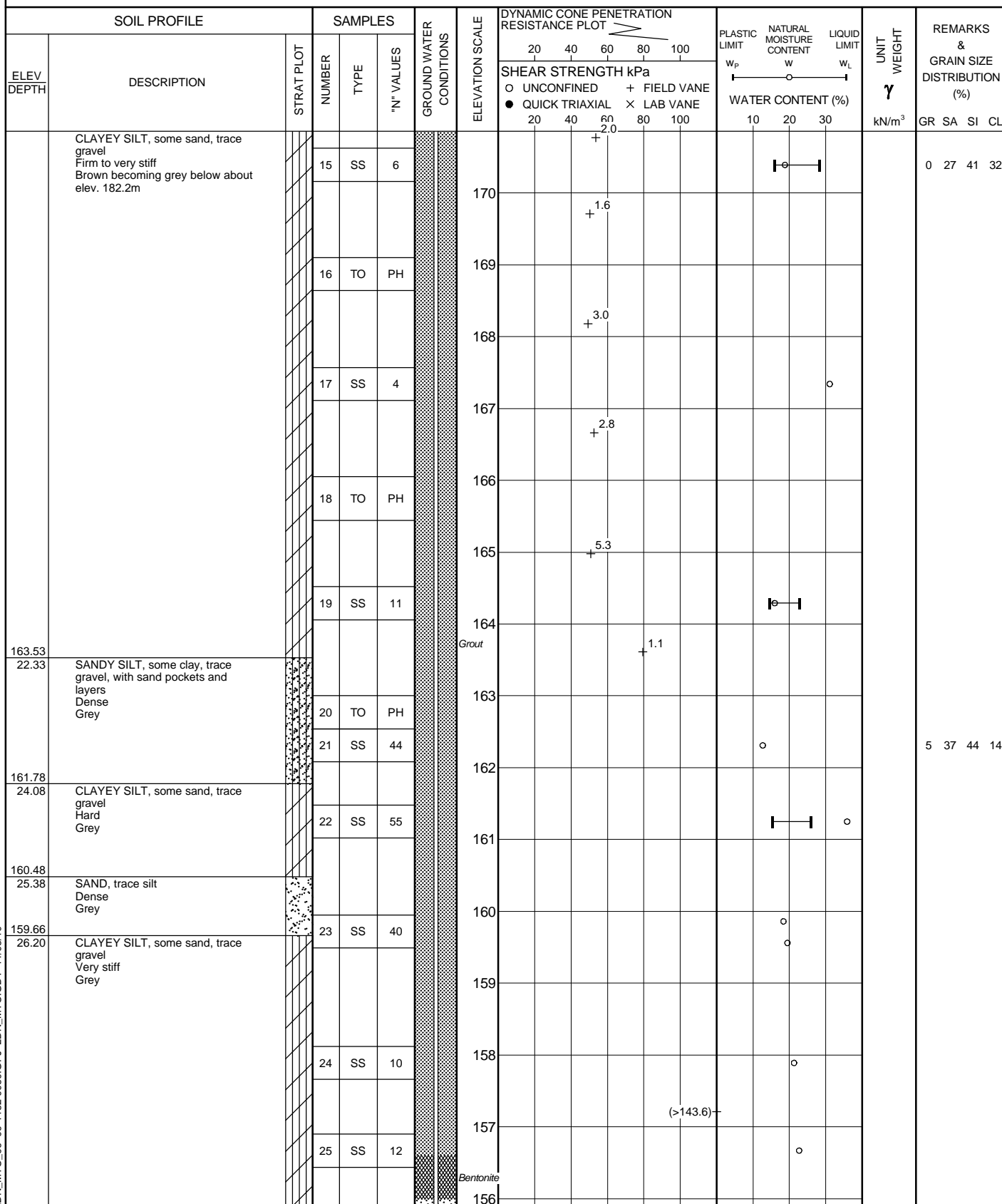
[illegible]

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

LDN_MTO_06 09-1132-0080.GPJ LDN_MTO.GDT 11/03/10

| | | | | | |
|-------------------------------------|--|----------------------------------|--|--------|---------------|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No 305 | | 2 OF 4 | METRIC |
| W.P. _____ | LOCATION <u>N 4677923.8 ;E 335038.1</u> | ORIGINATED BY <u>SM</u> | | | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | COMPILED BY <u>LMK/DMB</u> | | | |
| DATUM <u>GEODETIC</u> | DATE <u>November 30, 2009 - December 1, 2009</u> | CHECKED BY _____ | | | |



Continued Next Page

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

DN_MTO_06 09-1132-0080.GPJ LDN_MTO.GDT 11/03/10

| | | | | | | | |
|-------------------------------------|--|--|--|----------------------------|--|---------------|--|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No 305 | | 3 OF 4 | | METRIC | |
| W.P. _____ | | LOCATION <u>N 4677923.8 ; E 335038.1</u> | | ORIGINATED BY <u>SM</u> | | | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | | COMPILED BY <u>LMK/DMB</u> | | | |
| DATUM <u>GEODETIC</u> | | DATE <u>November 30, 2009 - December 1, 2009</u> | | CHECKED BY _____ | | | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT NATURAL LIMIT MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT γ kN/m³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
|---------------|--|------------|---------|----------|-------------|----------------------------|-----------------|---|-------------------------|-----------------------------------|-------------------|--|---|--|--|--------------------------------------|--|
| 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 (%) | | | | | | |
| 155.09 | CLAYEY SILT, some sand, trace gravel Very stiff Grey | | 26 | SS | 100/ 0mm | | | | | | | | | | | | |
| 30.77 | LIMESTONE, fresh, medium strong, weakly laminated, very fine grained, faintly porous Light brown to grey (FOR DETAILED DESCRIPTIONS REFER TO RECORD OF DRILLHOLE) | | 27 | NQ RC | - | | 100 | 38 | 17 | | | | | | | | |
| | | | 28 | NQ RC | - | | 98 | 74 | 64 | | | | | | | | |
| | | | 29 | NQ RC | - | | 98 | 79 | 75 | | | | | | | | |
| | | | 30 | NQ RC | - | | 100 | 71 | 83 | | | | | | | | |
| 149.99 | END OF BOREHOLE | | | | | | | | | | | | | | | | |
| 35.87 | Borehole dry during drilling on November 30, 2009 to December 1, 2009. Water level measured at elev. 178.39 on February 24, 2010. Water level measured at elev. 178.14 on January 6, 2010. | | | | | | | | | | | | | | | | |

PROJECT: 09-1132-0080

RECORD OF DRILLHOLE: 305

SHEET 4 OF 4

LOCATION: N 4677923.8 ;E 335038.1

DRILLING DATE: November 30, 2009 - December 1, 2009

DATUM: GEODETIC

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: MUD ROTARY WITH HQ TRICONE, NQRC

DRILLING CONTRACTOR: AARDVARK

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. | | RUN No. | PENETRATION RATE (mm/min) | COLOUR FLUSH % RETURN | ELEVATION | JN - Joint FLT - Fault SHR- Shear VN - Vein CJ - Conjugate BD- Bedding FO- Foliation CO- Contact OR- Orthogonal CL - Cleavage PL - Planar CU- Curved UN- Undulating ST - Stepped IR - Irregular PO- Polished K - Slickensided SM- Smooth Ro - Rough Br - Broken Rock NOTE: For additional abbreviations refer to list of abbreviations & symbols. | | | | | | | | | | HYDRAULIC CONDUCTIVITY k, cm/sec | | | DIAMETRAL POINT LOAD INDEX (MPa) | | NOTES WATER LEVELS INSTRUMENTATION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | DEPTH (m) | RECOVERY | | | | | R.Q.D. % | FRACT. INDEX PER 0.3 | DISCONTINUITY DATA | | TYPE AND SURFACE DESCRIPTION | 10 ⁻⁶ | 10 ⁻⁵ | 10 ⁻⁴ | 10 ⁻³ | 2 | 4 | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | TOTAL CORE % | SOLID CORE % | | | | | | | | | DIP w.r.t. CORE AXIS | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | 80 | 60 | | 40 | 20 | 5 | 10 | 15 | 20 | 0 | 30 | 60 | 90 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 31 | MUD ROTARY NO ROCK CORE | ROCK SURFACE | | 155.10 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | </ |

DEPTH SCALE

1 : 75

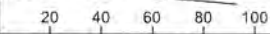



LOGGED: SG

CHECKED:

LDN_ROCK_03 09-1132-0080-ROCK.GPJ GLDR_LDN.GDT 11/03/10 DATA INPUT: LMK

| | | | | | |
|-----------------------------------|--|--|--|-------------------------|---------------|
| PROJECT <u>07-1130-207-0</u> | | RECORD OF BOREHOLE No CPT-106 | | 1 OF 1 | METRIC |
| W.P. _____ | | LOCATION <u>N 4677846.1 :E 335039.9</u> | | ORIGINATED BY <u>CC</u> | |
| DIST <u>WEST</u> HWY <u>401/3</u> | | BOREHOLE TYPE <u>POWER AUGER, SOLID STEM</u> | | COMPILED BY <u>SJL</u> | |
| DATUM <u>GEODETIC</u> | | DATE <u>September 8, 2008</u> | | CHECKED BY <u>SJB</u> | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT <div style="text-align: center;">  </div> | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL |
|---------------|---|---|---------|------|------------|-------------------------|-----------------|---|---------------------------------|-------------------------------|--------------------------------|------------------|--|
| ELEV. / DEPTH | DESCRIPTION | STRAT. PLOT | NUMBER | TYPE | "N" VALUES | | | | | | | | |
| 185.72 | GROUND SURFACE | | | | | | | | | | | | |
| 0.00 | FILL, clayey topsoil with crushed gravel |  | 1 | SS | 12 | | | | | | | | |
| 185.36 | Stiff Brown | | 2 | SS | 15 | | | | | | | | |
| 0.36 | CLAYEY SILT, trace to some sand, trace gravel | | 3 | SS | 12 | | | | | | | | |
| 183.89 | Mottled brown and grey becoming brown at about elev. 184.5m | | | | | | 185 | | | | | | |
| 184.5 | | | | | | | 184 | | | | | | |
| 1.83 | END OF BOREHOLE | | | | | | | | | | | | |
| | Borehole dry during drilling on September 8, 2008. | | | | | | | | | | | | |

LDN_MTO_01 07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

| | | | | | | | |
|-------------------------------------|--|--|--|-------------------------|--|---------------|--|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No CPT-303 | | 1 OF 1 | | METRIC | |
| W.P. _____ | | LOCATION <u>N 4677840.3 ; E 335113.1</u> | | ORIGINATED BY <u>TA</u> | | | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, SOLID STEM</u> | | COMPILED BY <u>DMB</u> | | | |
| DATUM <u>GEODETIC</u> | | DATE <u>January 11, 2010</u> | | CHECKED BY _____ | | | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT γ kN/m³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL | | | | |
|---------------|--|------------|---------|------|------------|----------------------------|-----------------|--|----|----|----|-----|---|---|--|--------------------------------------|--|--|--|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | WATER CONTENT (%) | | | | | | | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE | | | | | w _p w w _L | | | | | | | | |
| 186.02 | GROUND SURFACE | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | | | |
| 0.10 | TOPSOIL, clayey Black CLAYEY SILT, some sand, trace gravel, with occasional silt partings and seams Firm to hard Brown becoming grey below about elev. 183.1m | | | | | ▽ | | | | | | | | | | | | | | | |
| | | | 1 | SS | 8 | | 185 | | | | | | | | | | | | | | |
| | | | 2 | SS | 28 | | 184 | | | | | | | ○ | | | | | | | |
| | | | 3 | SS | 55 | | | | | | | | | | | | | | | | |
| | | | | | | | 183 | | | | | | | | | | | | | | |
| | | | 4 | SS | 51 | | | | | | | | | ○ | | | | | | | |
| 182.36 | END OF BOREHOLE | | | | | | | | | | | | | | | | | | | | |
| 3.66 | Groundwater encountered at about elev. 185.7m during drilling on January 11, 2010. | | | | | | | | | | | | | | | | | | | | |

| | | | | | | | |
|-------------------------------------|--|--|--|-------------------------|--|---------------|--|
| PROJECT <u>09-1132-0080</u> | | RECORD OF BOREHOLE No CPT-306 | | 1 OF 1 | | METRIC | |
| W.P. _____ | | LOCATION <u>N 4677911.6 ; E 334964.7</u> | | ORIGINATED BY <u>TA</u> | | | |
| DIST <u>WEST</u> HWY <u>401 / 3</u> | | BOREHOLE TYPE <u>POWER AUGER, SOLID STEM</u> | | COMPILED BY <u>DMB</u> | | | |
| DATUM <u>GEODETIC</u> | | DATE <u>January 8, 2010</u> | | CHECKED BY _____ | | | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | | UNIT WEIGHT γ kN/m³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | |
|---------------|--|------------|---------|------|------------|----------------------------|-----------------|---|----|----|----|-----|---|---|----------------|--------------------------------------|---|----|----|----|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | w _p | w | w _L | | GR | SA | SI | CL |
| | | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | | |
| 186.02 | GROUND SURFACE | | | | | | | | | | | | | | | | | | | |
| 0.00 | FILL, limestone gravel, crushed Grey | | | | | | | | | | | | | | | | | | | |
| 0.22 | CLAYEY SILT, some sand, trace gravel, with occasional silt partings and seams Firm to hard Brown | | 1 | SS | 16 | | | | | | | | | | | | | | | |
| | | | 2 | SS | 8 | | | | | | | | | | | | | | | |
| | | | 3 | SS | 34 | | | | | | | | | | | | | | | |
| | | | 4 | SS | 45 | | | | | | | | | | | | | | | |
| 182.36 | END OF BOREHOLE | | | | | | | | | | | | | | | | | | | |
| 3.66 | Borehole dry during drilling on January 8, 2010. | | | | | | | | | | | | | | | | | | | |

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-2

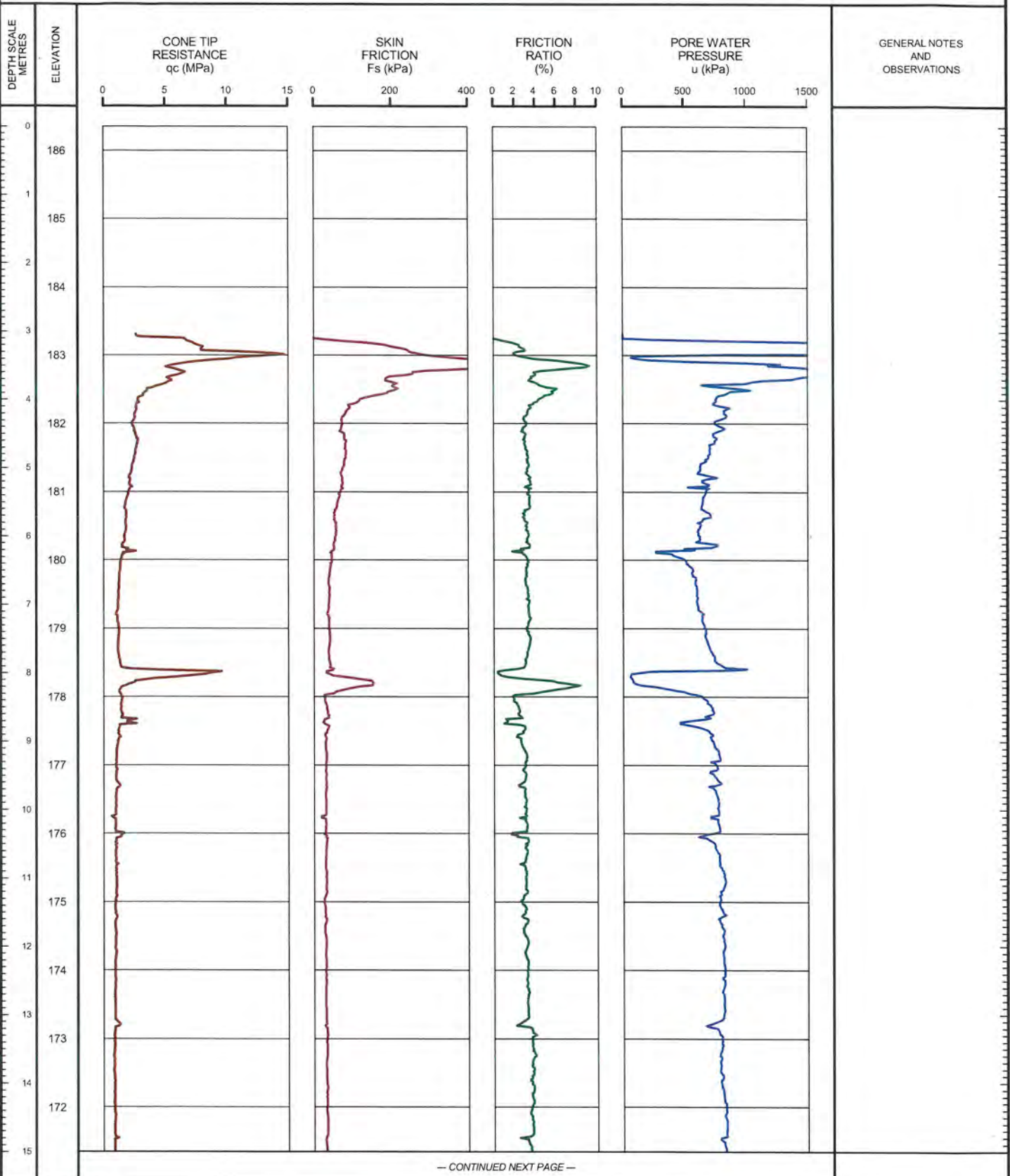
SHEET 1 OF 2

LOCATION: N 4677841.0, E 335185.0

TEST DATE: November 12, 2006

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 3.05m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE

1 : 75



OPERATOR: CC

CHECKED: SJB

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-2

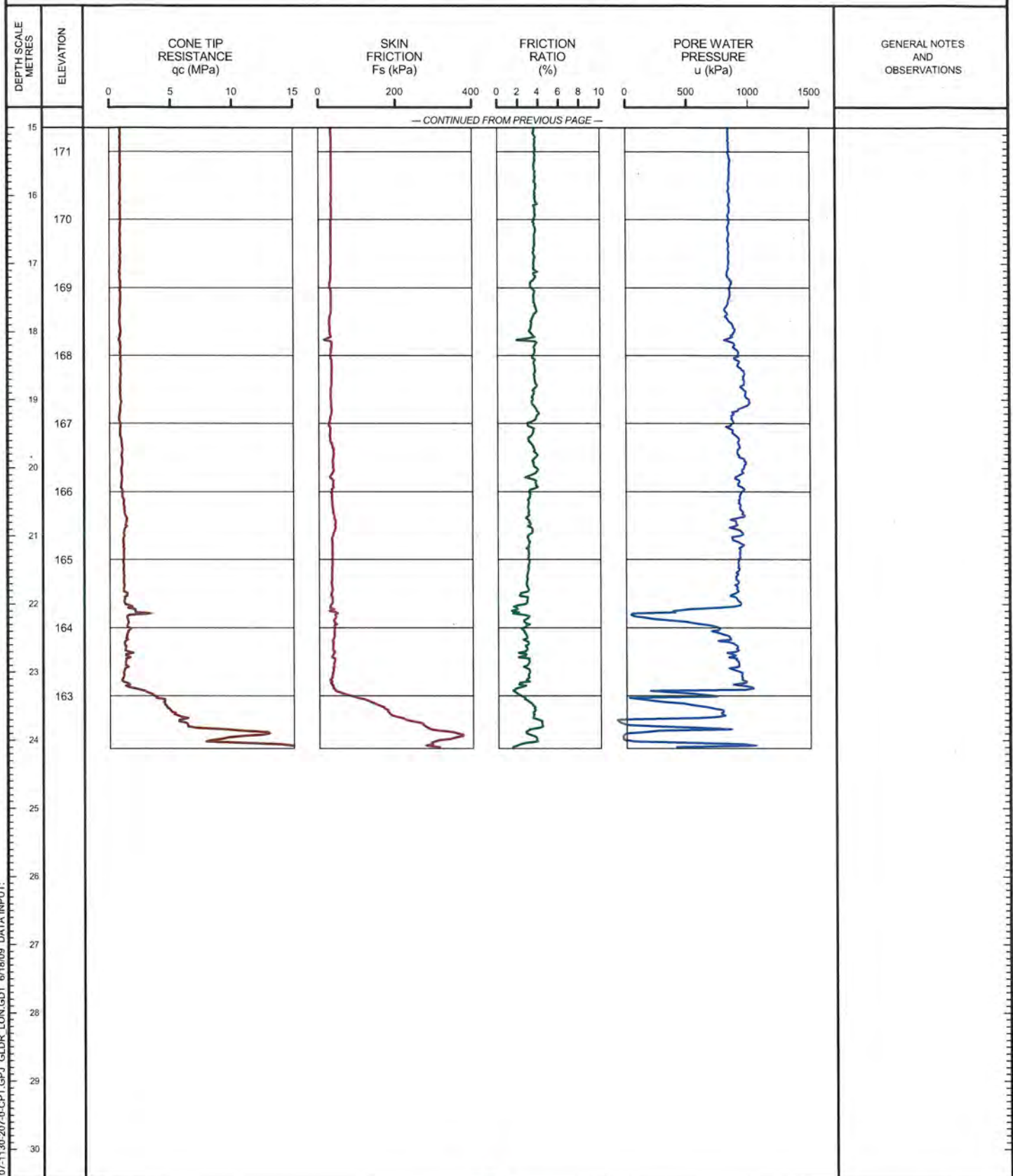
SHEET 2 OF 2

LOCATION: N 4677841.0 :E 335185.0

TEST DATE: November 12, 2006

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 3.05m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE

1 : 75



OPERATOR: CC

CHECKED: SJB

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-3

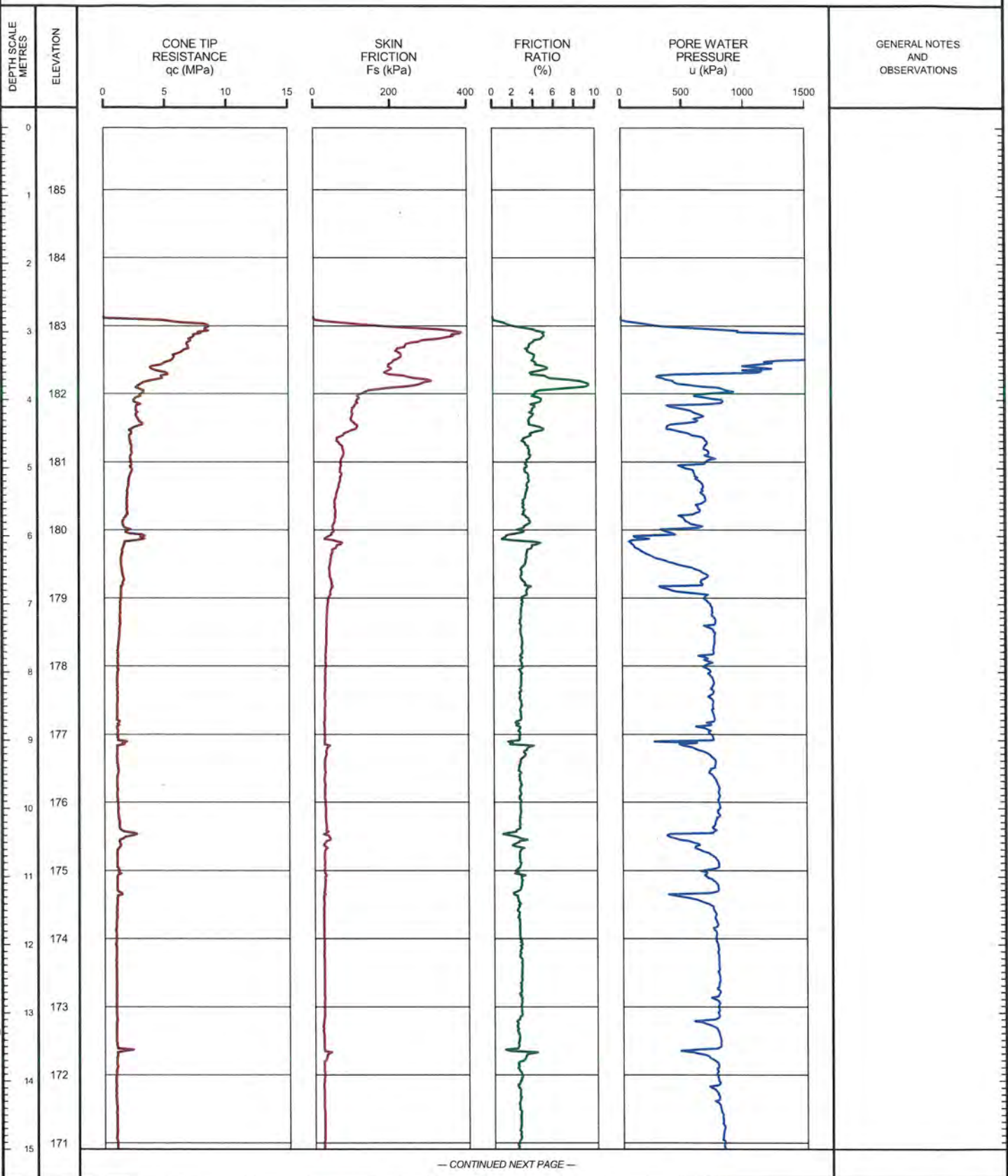
SHEET 1 OF 2

LOCATION: N 4678022.0 E 334957.0

TEST DATE: November 13, 2006

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 2.80m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE

1 : 75

OPERATOR: CC
CHECKED: SSB

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-3

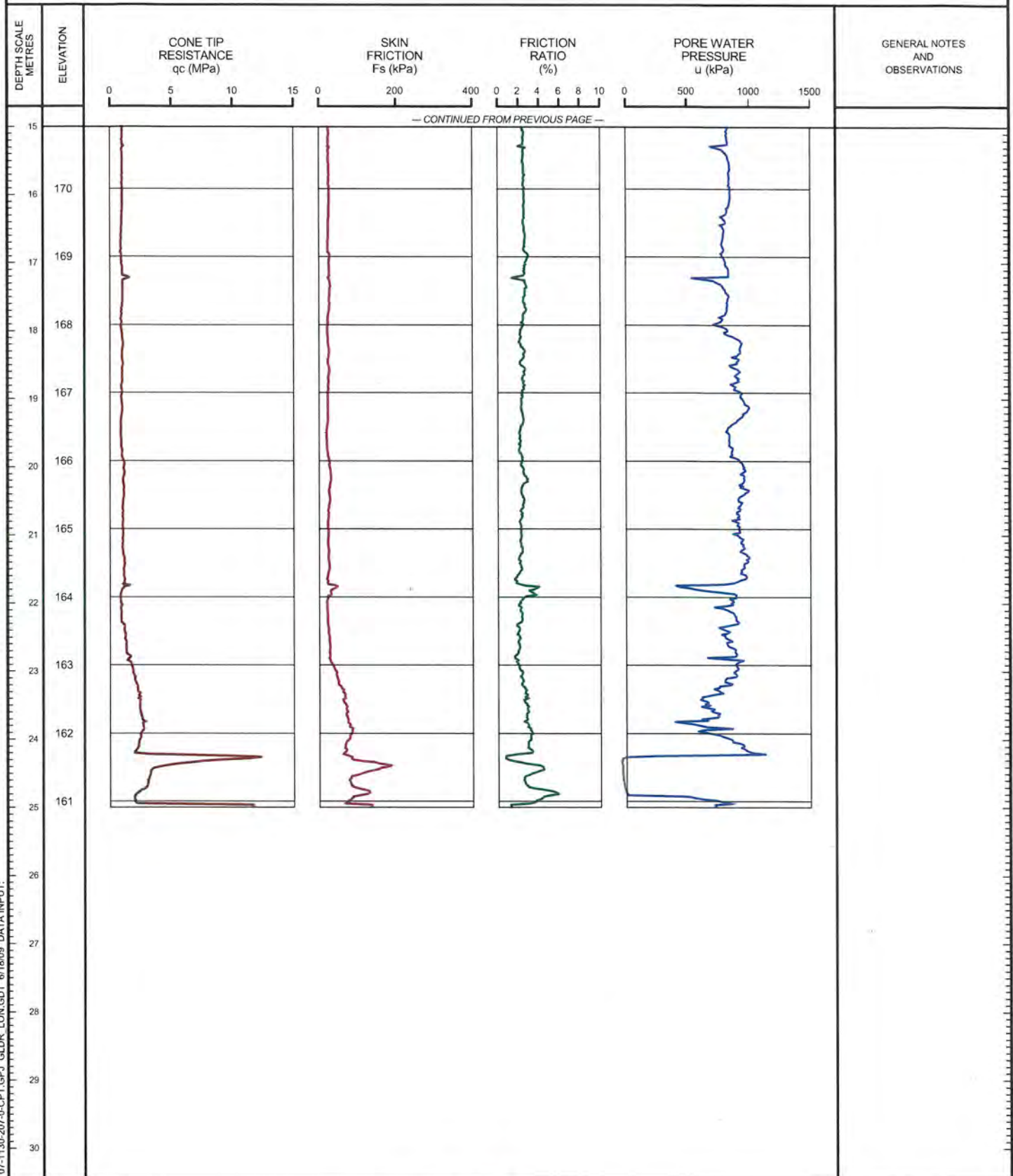
SHEET 2 OF 2

LOCATION: N 4678022.0 ; E 334957.0

TEST DATE: November 13, 2006

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 2.80m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN_CPT_01 07-1130-207-0-CPT.GPJ GILDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE

1 : 75



OPERATOR: CC

CHECKED: *SSB*

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-106

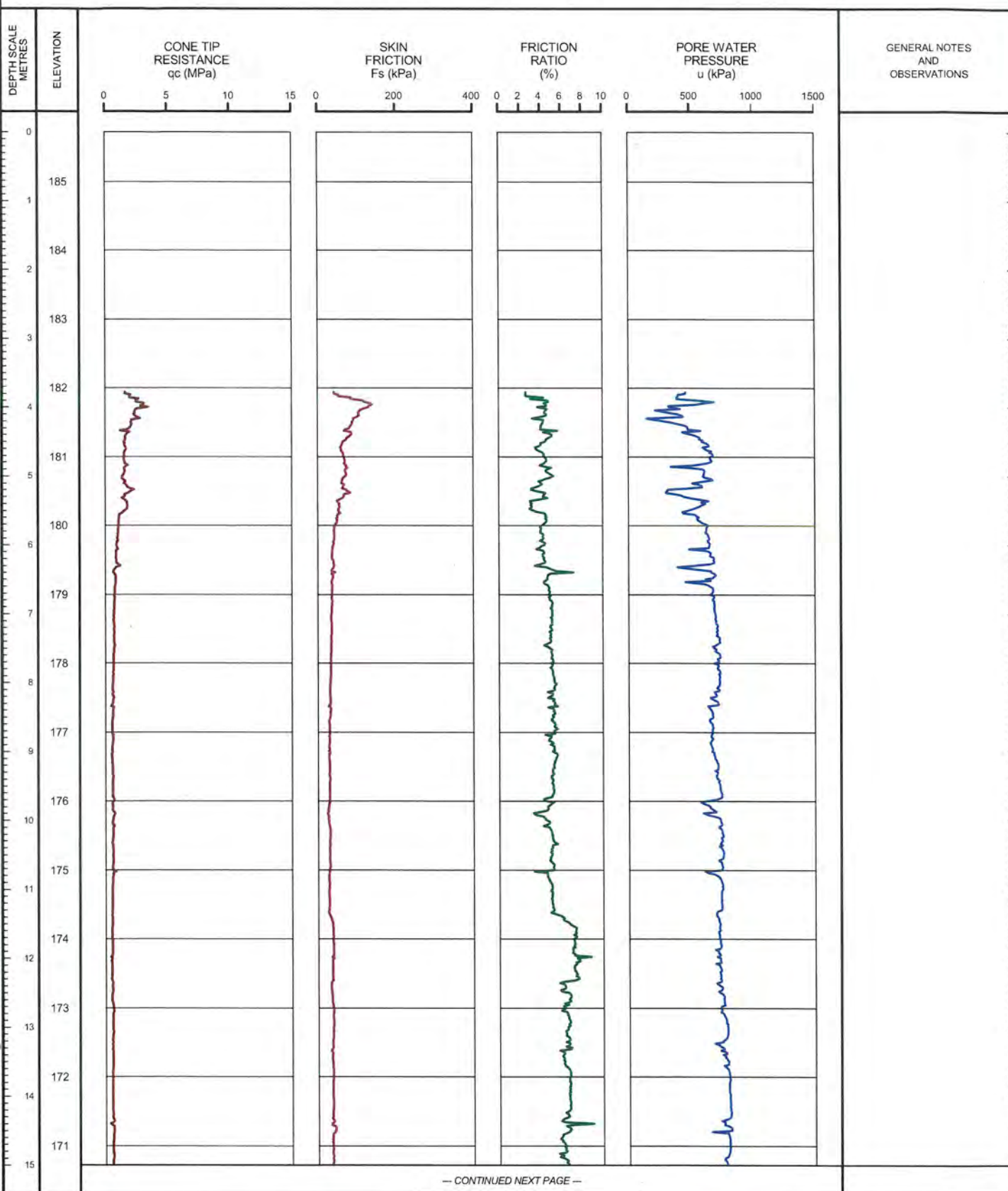
SHEET 1 OF 2

LOCATION: N 4677846.1 E 335039.9

TEST DATE: September 9, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 3.80m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE

1 : 75



OPERATOR: CC

CHECKED: SJB

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-106

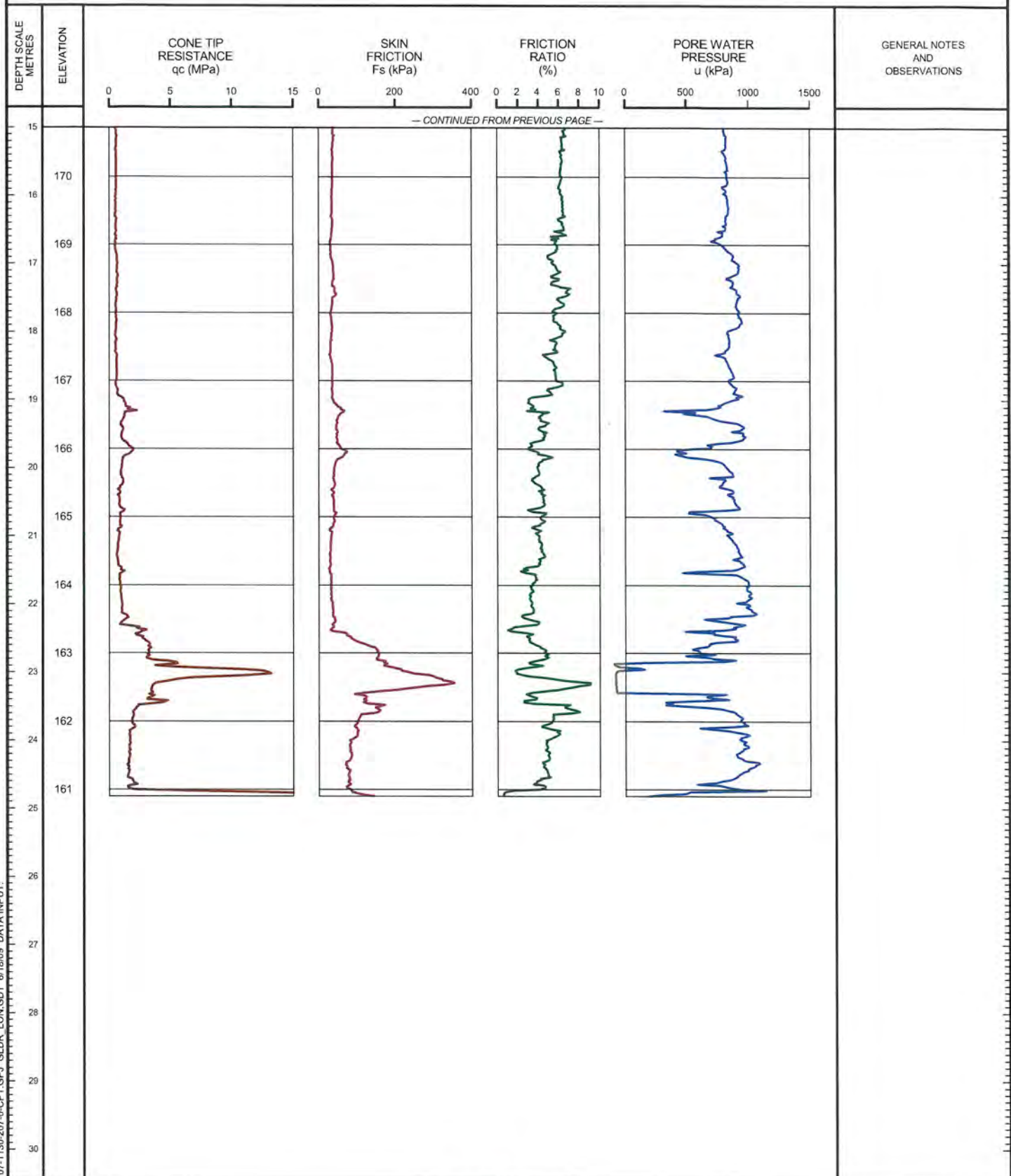
SHEET 2 OF 2

LOCATION: N 4677846.1 :E 335039.9

TEST DATE: September 9, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 3.80m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/19/09 DATA INPUT:

DEPTH SCALE

1 : 75



OPERATOR: CC

CHECKED: SDB

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-302

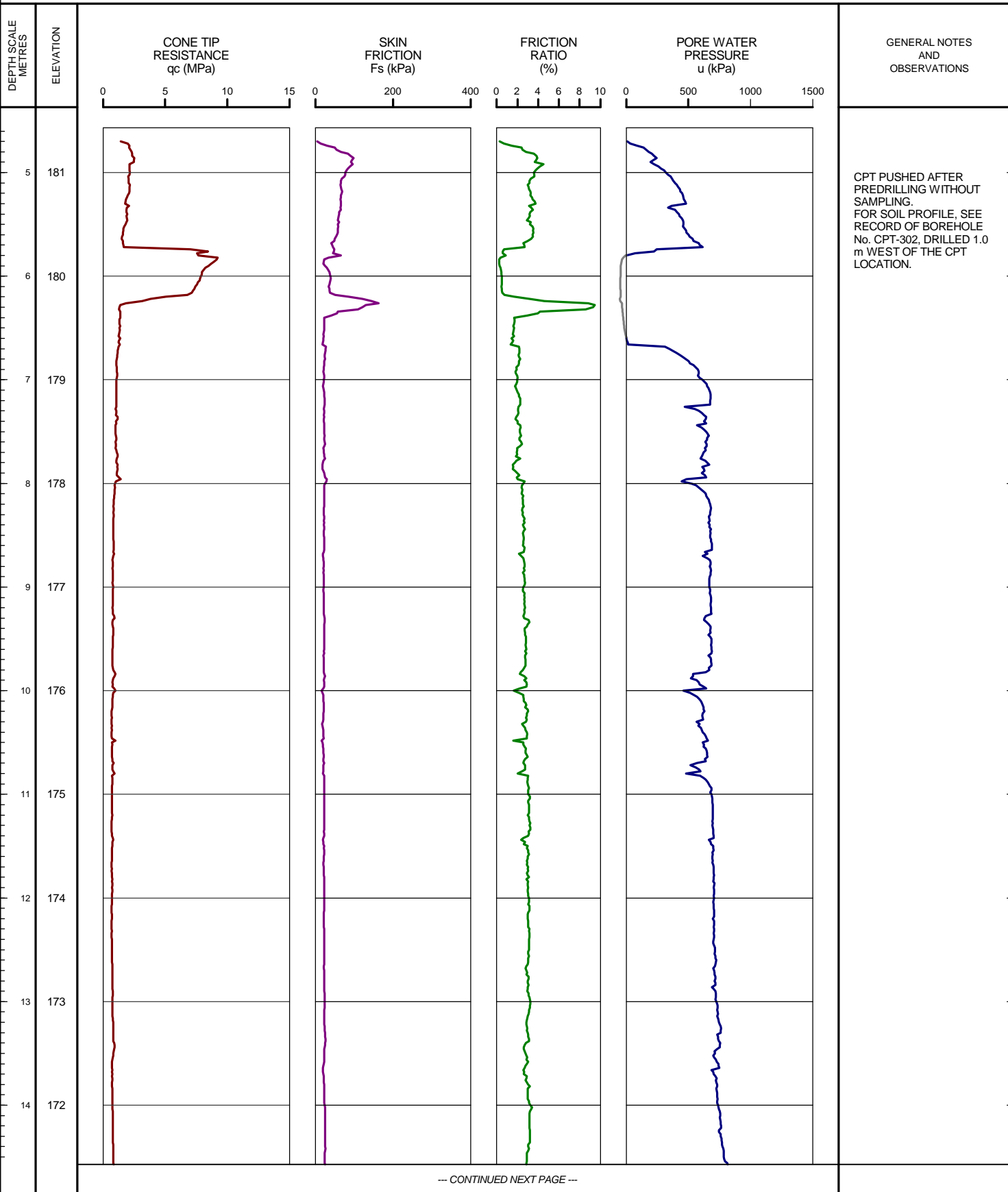
SHEET 1 OF 2

LOCATION: N 4677756.9 ;E 335154.9

TEST DATE: January 13, 2010

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 186.26m PREDRILL DEPTH: 4.57m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-302

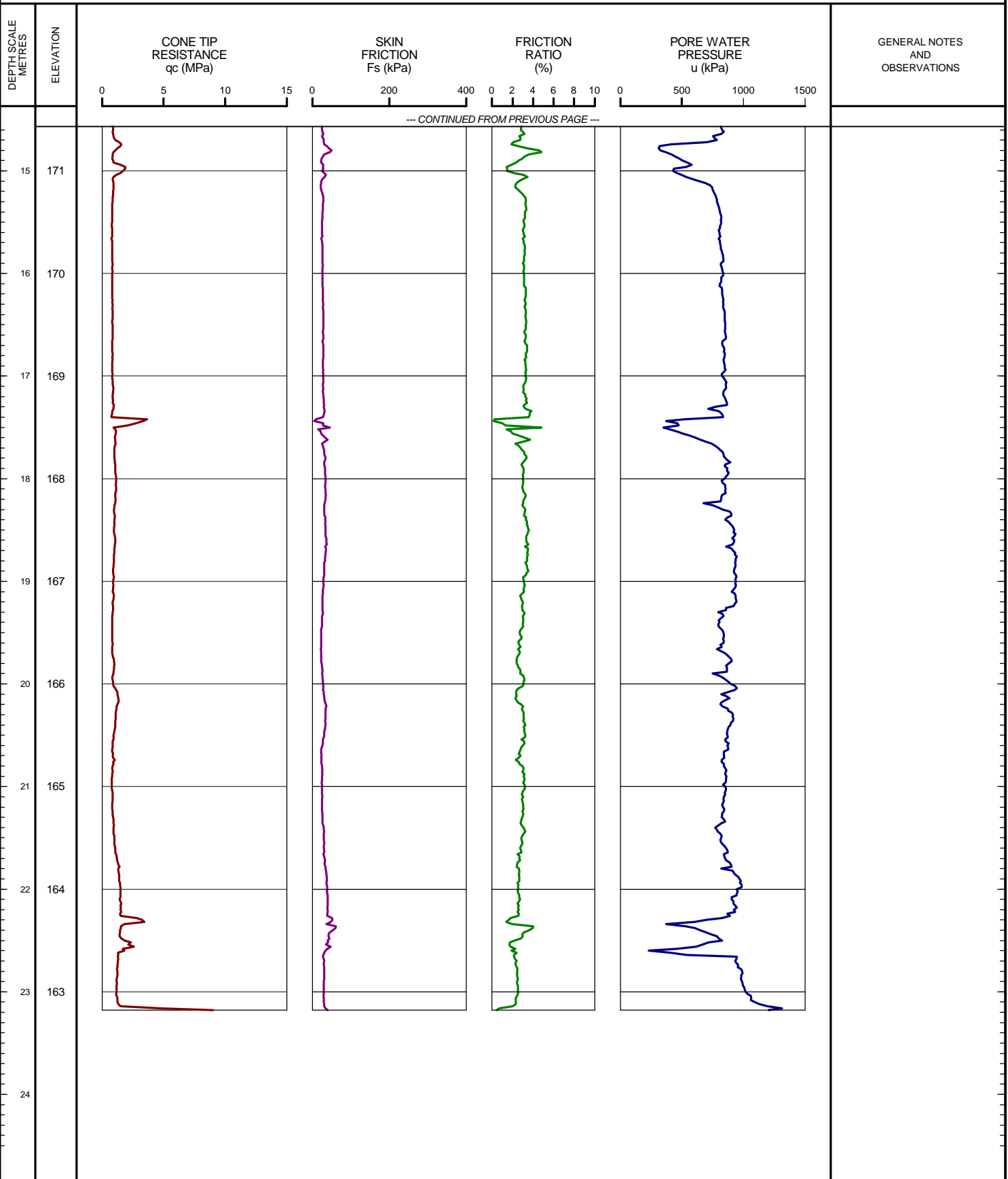
SHEET 2 OF 2

LOCATION: N 4677756.9 ;E 335154.9

TEST DATE: January 13, 2010

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 186.26m PREDRILL DEPTH: 4.57m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LON_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-303

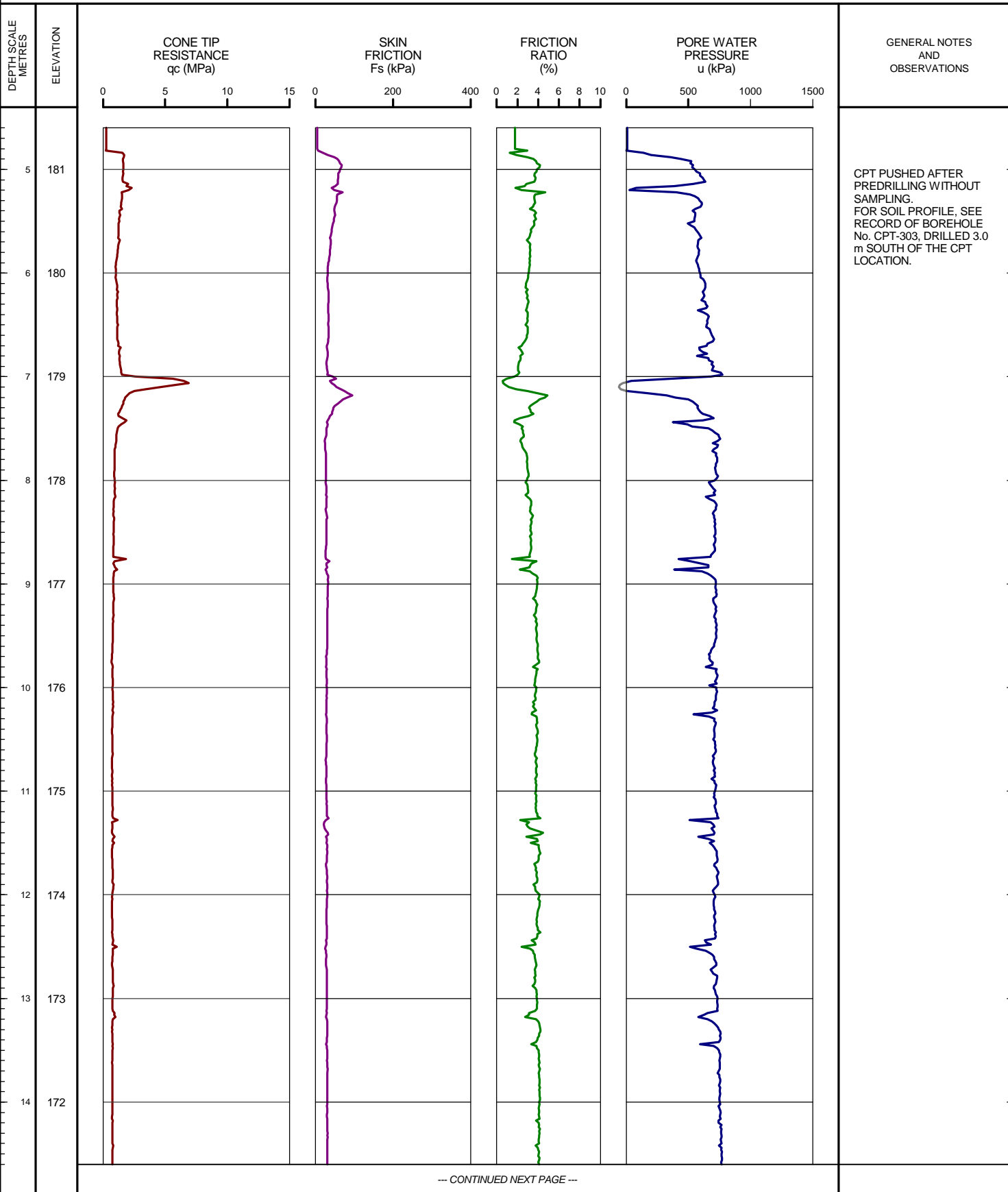
SHEET 1 OF 3

LOCATION: N 4677840.3 ;E 335113.1

TEST DATE: January 25, 2010

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 186.02m PREDRILL DEPTH: 4.60m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-303

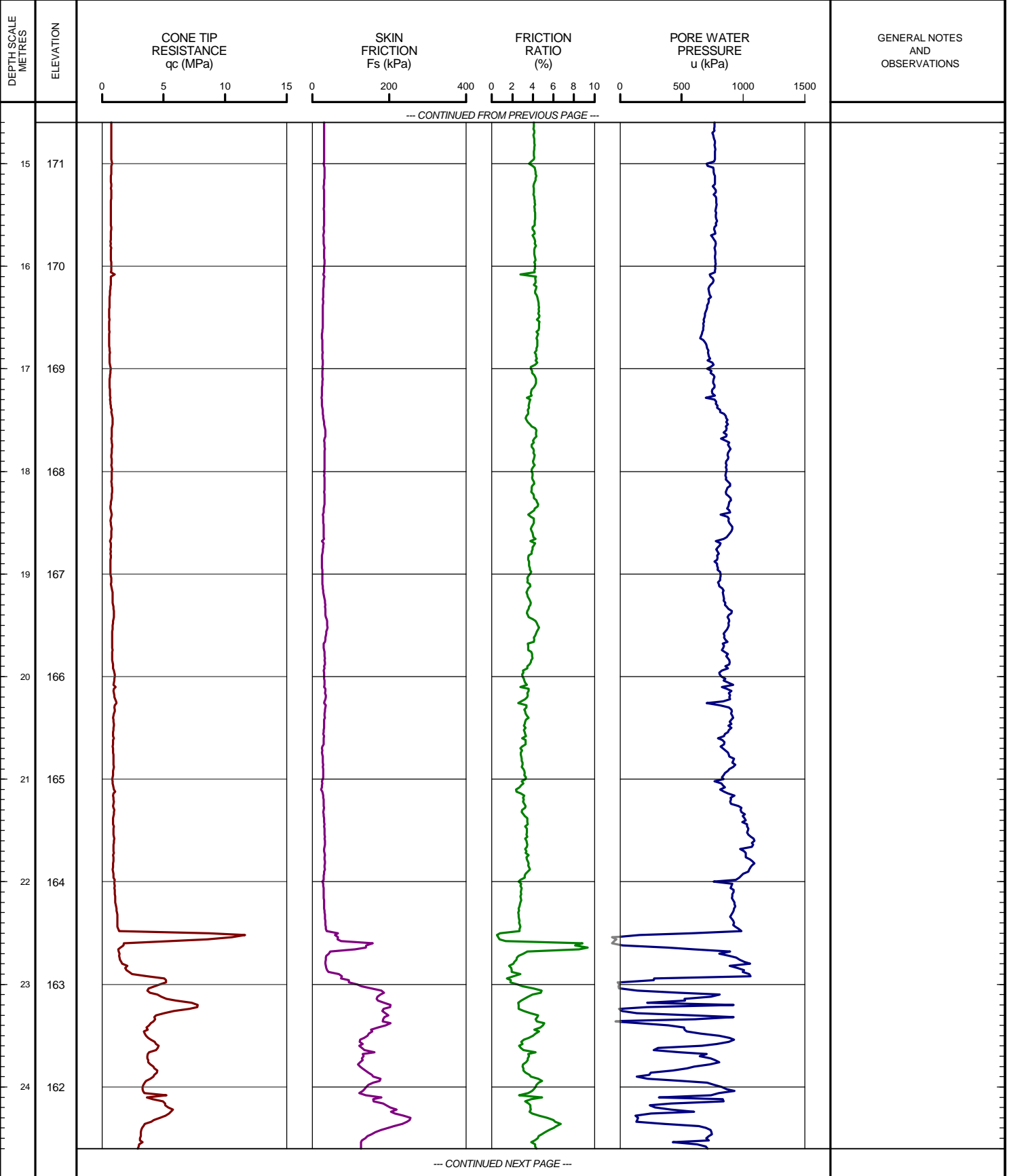
SHEET 2 OF 3

LOCATION: N 4677840.3 ;E 335113.1

TEST DATE: January 25, 2010

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 186.02m PREDRILL DEPTH: 4.60m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



LDN_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-303

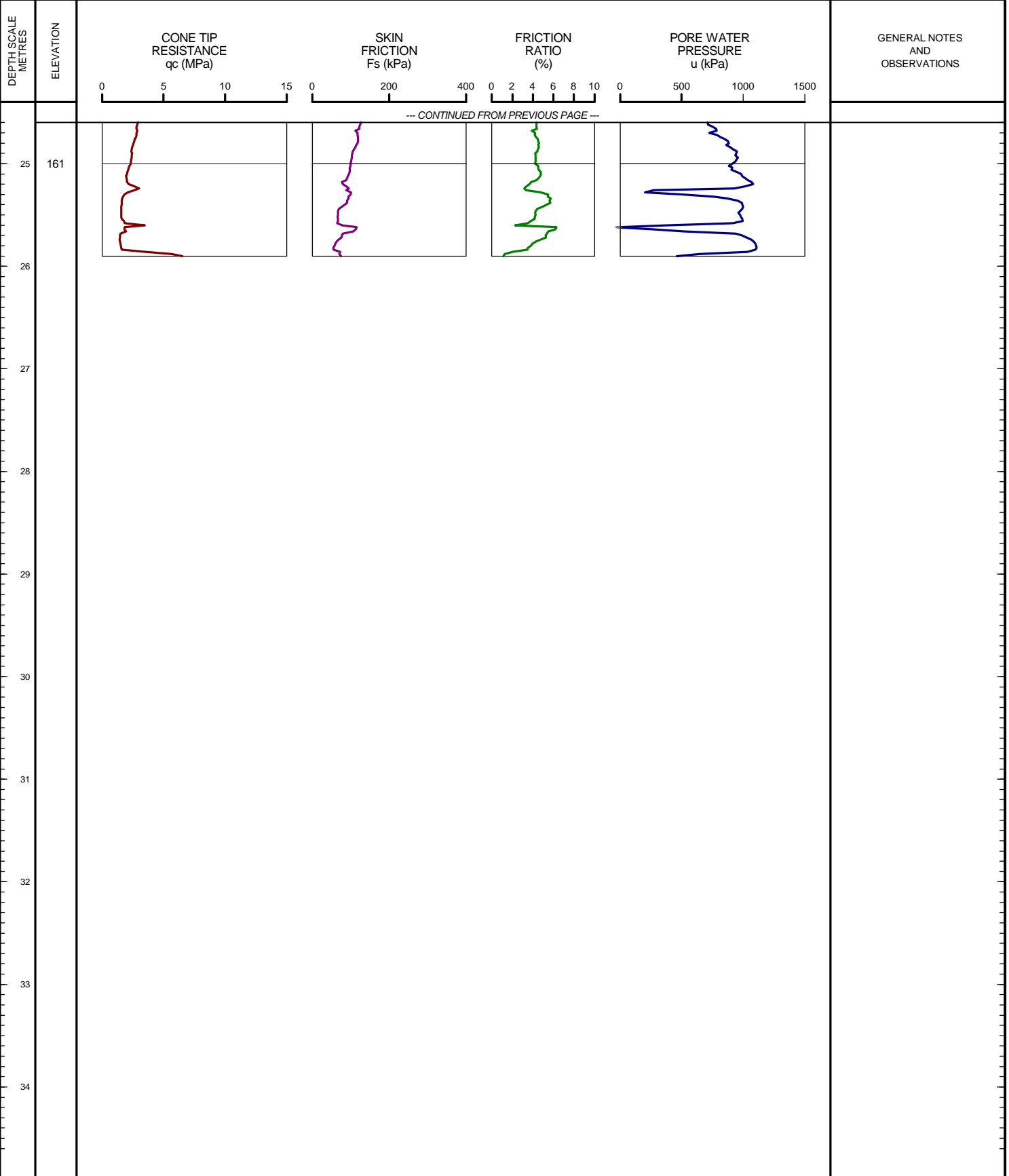
SHEET 3 OF 3

LOCATION: N 4677840.3 ;E 335113.1

TEST DATE: January 25, 2010

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 186.02m PREDRILL DEPTH: 4.60m CORRECTION FACTOR A: 0.6 CORRECTION FACTOR B: 0.013



DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

LON_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-306

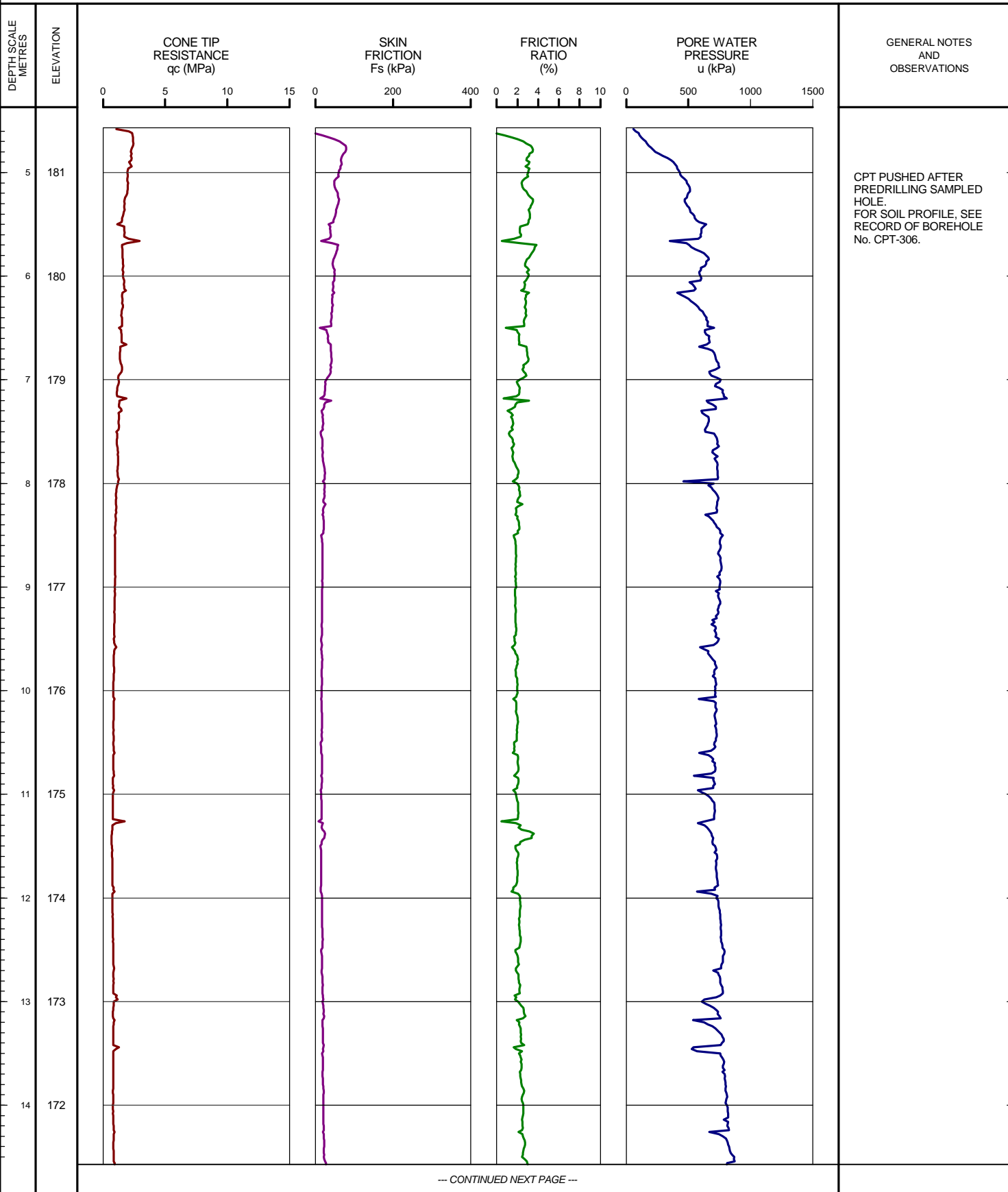
SHEET 1 OF 2

LOCATION: N 4677911.6 ;E 334964.7

TEST DATE: January 11, 2010

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 186.02m PREDRILL DEPTH: 4.57m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LDN_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

1 : 50



OPERATOR: TA

CHECKED:

PROJECT: 09-1132-0080

RECORD OF CONE PENETRATION TEST CPT-306

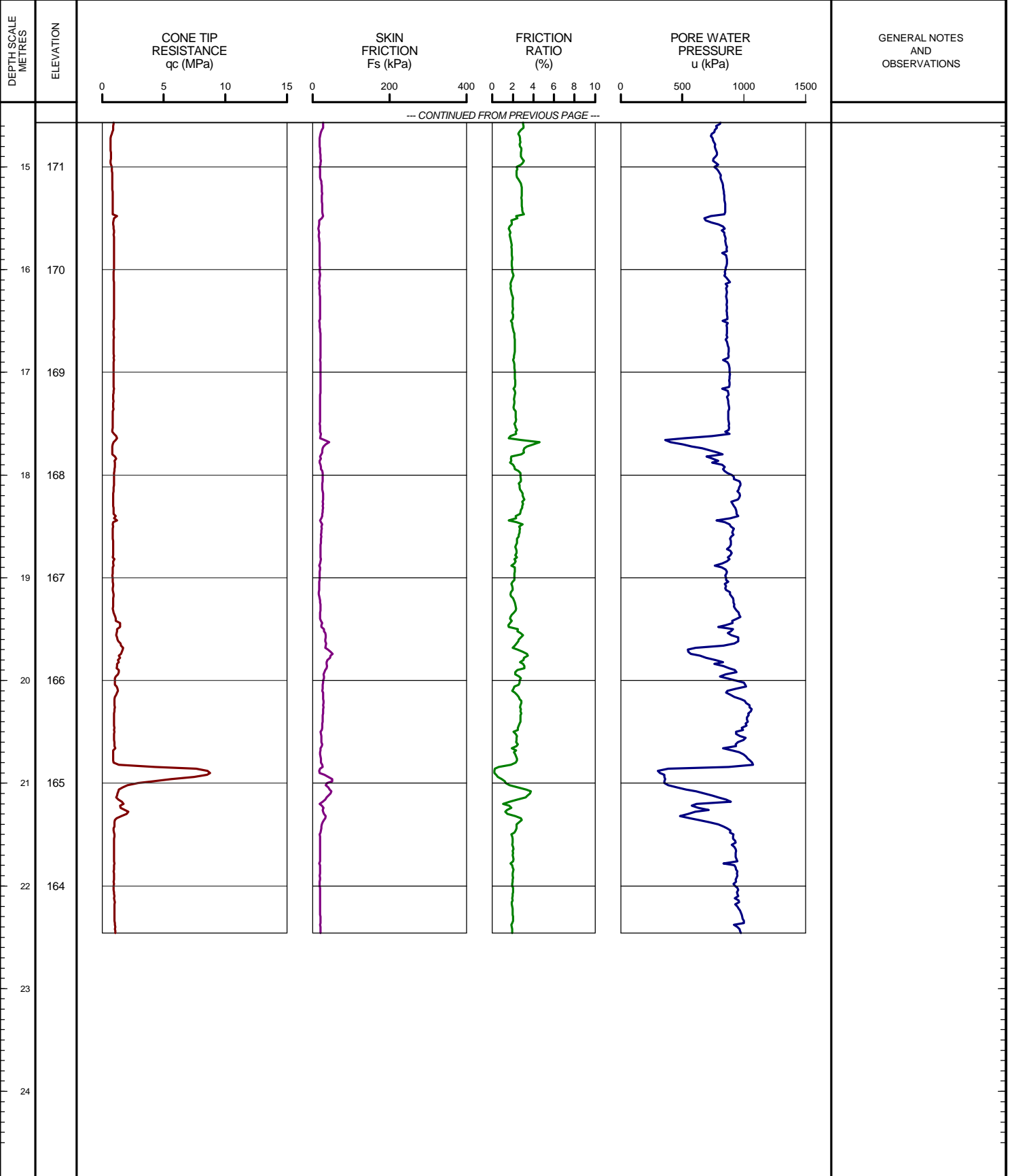
SHEET 2 OF 2

LOCATION: N 4677911.6 ;E 334964.7

TEST DATE: January 11, 2010

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 186.02m PREDRILL DEPTH: 4.57m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LDN_CPT_01 09-1132-0080-CPT.GPJ GLDR_LON.GDT 02/23/10 DATA INPUT:

DEPTH SCALE

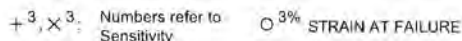
1 : 50



OPERATOR: TA

CHECKED:

Station 10+100T to Station 10+700T (Soil Profile #16)



| | | | | | |
|------------------------------|--|---|--|---------------------------|---------------|
| PROJECT 04-1111-060 | | RECORD OF BOREHOLE No 1 | | 3 OF 4 | METRIC |
| W.P. _____ | | LOCATION N 4677738.0 ; E 335500.0 | | ORIGINATED BY C.C. | |
| DIST WEST HWY 401 / 3 | | BOREHOLE TYPE POWER AUGER, HOLLOW STEM | | COMPILED BY T.M. | |
| DATUM Geodetic | | DATE November 2, 2006 - November 5, 2006 | | CHECKED BY | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT <div style="display: flex; justify-content: space-around; font-size: small;"> 20 40 60 80 100 </div> | PLASTIC LIMIT w _p | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|-----------------|--|------------|---------|------|------------|-------------------------|-----------------|---|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | | | | | | |
| | CLAYEY SILT, some sand, trace gravel, fine to medium silty sand layers Stiff to hard Grey | | 22 | TO | PH | | | | | | | | |
| | | | 23 | TO | PH | | 156 | | | | | | |
| | | | 24 | SS | PH | | 155 | | | | | | |
| 154.24 | | | | | | | | | | | | | |
| 32.46 153.93 | LIMESTONE, white to light grey | | 25 | SS | 50 | | 154 | | | | | | |
| 32.77 | LIMESTONE, fresh, medium strong, laminated, very fine grained, moderately porous, white to light grey (FOR DETAILED DESCRIPTIONS REFER TO RECORD OF DRILLHOLE) | | 26 | NQ | RC | | 153 | | | | | | |
| | | | 27 | NQ | RC | | 152 | | | | | | |
| | | | 28 | NQ | RC | | 151 | | | | | | |
| | | | 29 | NQ | RC | | 150 | | | | | | |
| 148.78 37.92 | END OF BOREHOLE Water level encountered in borehole at about elevation 176.65m during drilling and on completion of drilling October 2, 2006 Lower piezometer 32mm PVC screen and riser pipe. Second (Upper) piezometer installed in immediately adjacent unsampled borehole, 13mm porous tip and CPVC riser pipe. Water level in Upper Piezometer at about elevation 184.41m on November 14, 2006. Water level in Lower Piezometer at about elevation 177.37m on November 14, 2006. | | | | | | 149 | | | | | | |

LDN_MTO_02 04-1111-060.GPJ GLDR_LON.GDT 6/30/09

PROJECT: 04-1111-060

RECORD OF DRILLHOLE: 1

SHEET 4 OF 4

LOCATION: N 4677738.0 E 335500.0

DRILLING DATE: November 2, 2006 - November 5, 2006

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: —

DRILL RIG:

DRILLING CONTRACTOR:

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. DEPTH (m) | RUN No. | PENETRATION RATE (m/min) | COLOUR % RETURN | FLUSH | ELEVATION | JN - Joint FLT - Fault SHR- Shear VN - Vein CJ - Conjugate BD- Bedding FO- Foliation CO- Contact OR- Orthogonal CL - Cleavage PL - Planar CU- Curved UN- Undulating ST - Stepped IR - Irregular PO- Polished K - Slickensided SM- Smooth Ro - Rough Br - Broken Rock NOTE: For additional abbreviations refer to list of abbreviations & symbols | | | | | | | | | | NOTES WATER LEVELS INSTRUMENTATION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | TOTAL CORE % | SOLID CORE % | | | DIP w.r.t. CORE AXIS | TYPE AND SURFACE DESCRIPTION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | ROCK SURFACE | | 154.24 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | </ |

DEPTH SCALE

1:75



LOGGED: C.C.

CHECKED: SJB

RECORD OF BOREHOLE No 101

1 OF 4

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4677606.6 E 335794.9

ORIGINATED BY SM

DIST WEST HWY 401/3

BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

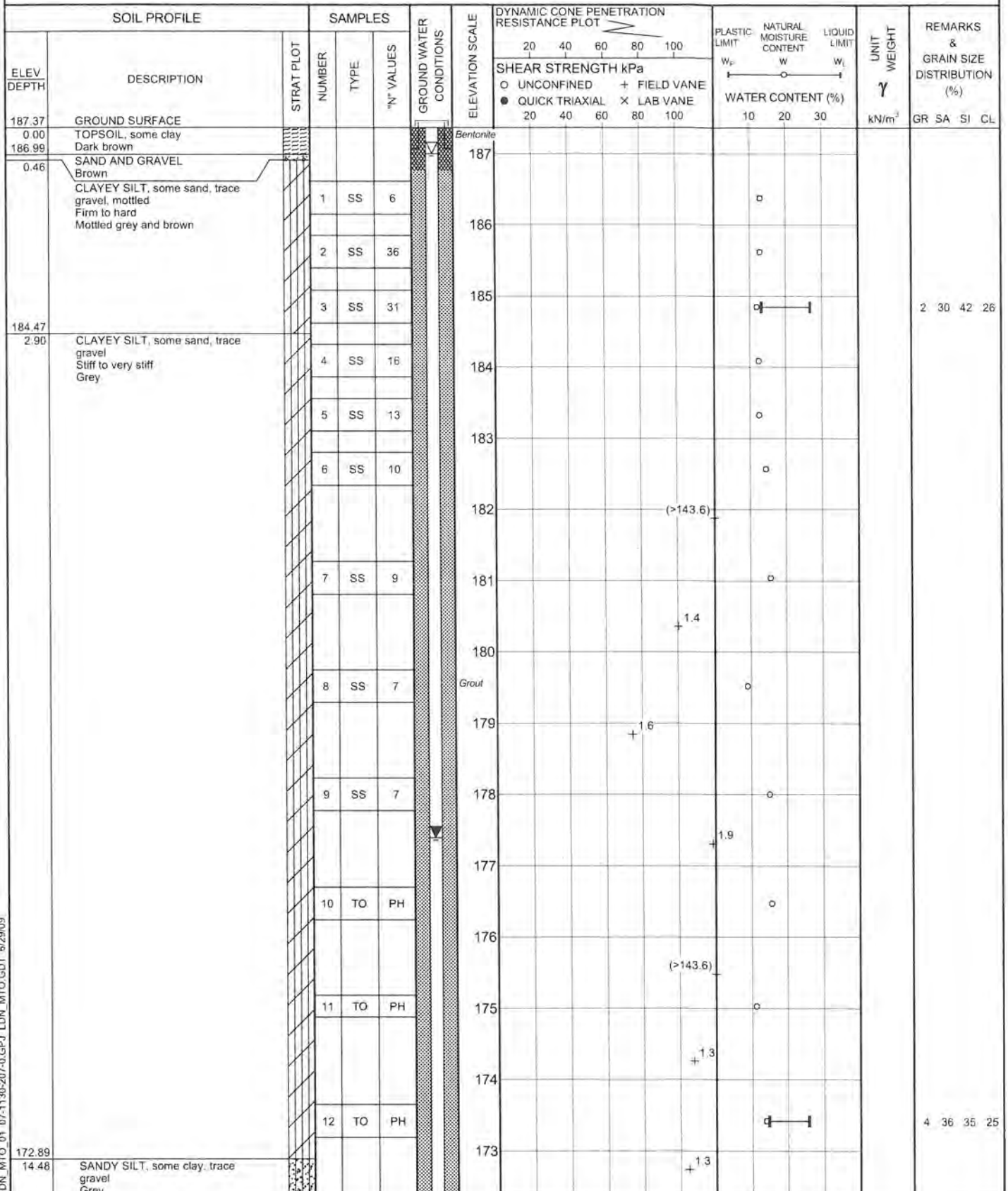
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DATUM GEODETIC

DATE

February 29, 2008 - March 5, 2008

CHECKED BY *SSB*

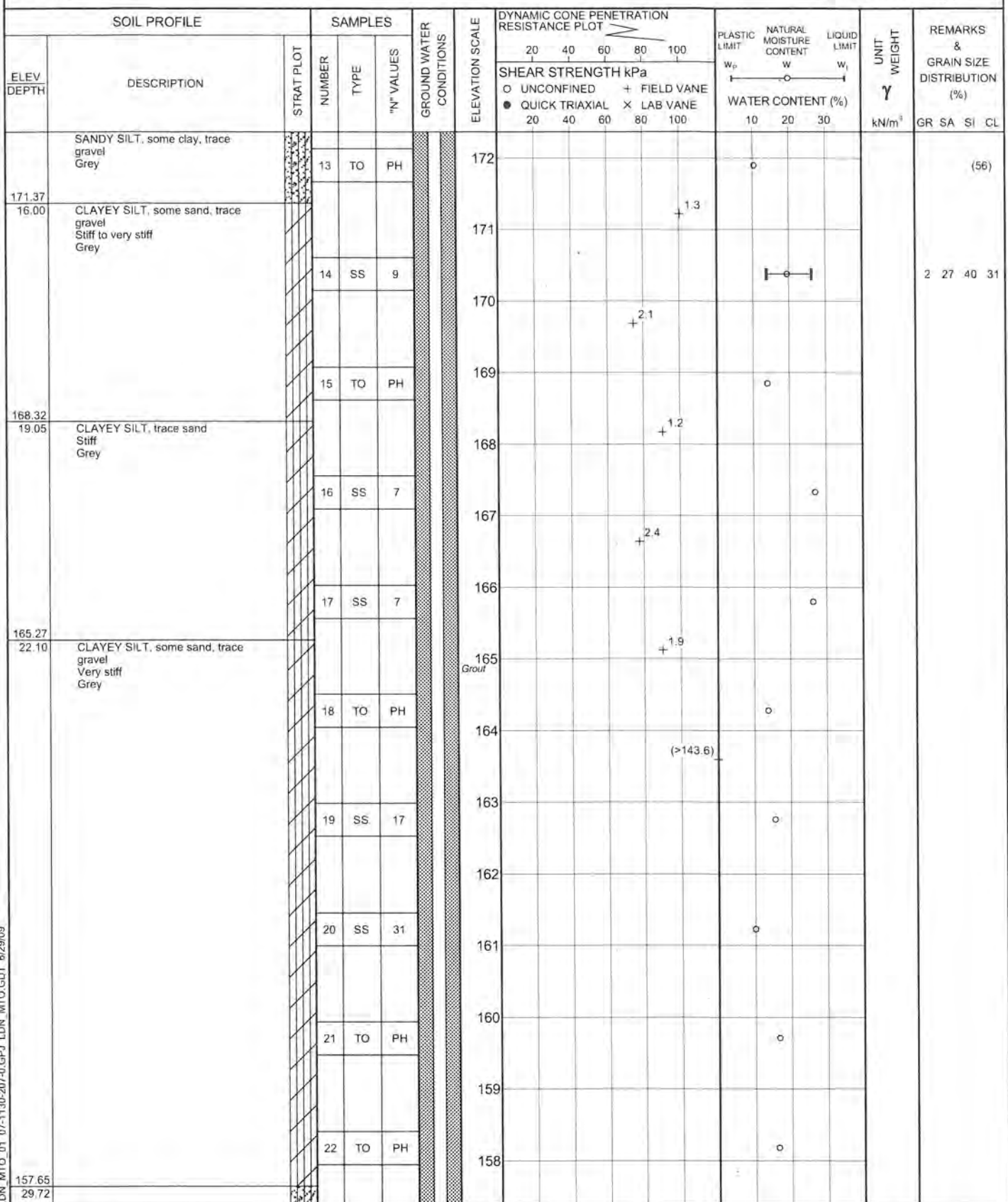


LDN MTO 01 07-1130-207-0.GPJ LDN MTO.GDT 6/29/09

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+ 3, X 3. Numbers refer to Sensitivity O 3% STRAIN AT FAILURE

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| PROJECT 07-1130-207-0 | | RECORD OF BOREHOLE No 101 | | 2 OF 4 | METRIC |
| W.P. _____ | | LOCATION N 4677606.6 :E 335794.9 | | ORIGINATED BY SM | |
| DIST WEST HWY 401/3 | | BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC | | COMPILED BY BRS | |
| DATUM GEODETIC | | DATE February 29, 2008 - March 5, 2008 | | CHECKED BY <i>JB</i> | |



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

PROJECT: 07-1130-207-0

RECORD OF DRILLHOLE: 101

SHEET 4 OF 4

LOCATION: N 4677606.6 :E 335794.9

DRILLING DATE: February 29, 2008 - March 5, 2008

DATUM: GEODETIC

INCLINATION: -90° AZIMUTH: —

DRILL RIG: MUD ROTARY WITH HQ TRICONE, NQRC

DRILLING CONTRACTOR: AARDVARK DRILLING INC

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. | | RUN No. | PENETRATION RATE (m/min) | COLOUR % RETURN | FLUSH | ELEVATION | JN - Joint FLT - Fault SHR - Shear VN - Vein CJ - Congregate BD - Bedding FO - Foliation CO - Contact OR - Orthogonal CL - Cleavage PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular PO - Polished K - Slickensided SM - Smooth Ro - Rough Br - Broken Rock NOTE: For additional abbreviations refer to list of abbreviations & symbols. | | | | | | | | | | NOTES WATER LEVELS INSTRUMENTATION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | | TOTAL CORE % | | | | | | | | SOLID CORE % | DIP w.r.t. CORE AXIS | TYPE AND SURFACE DESCRIPTION | | R1 | R2 | R3 | W1 | W2 | W3 | W4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | ROCK SURFACE | | 154.05 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

DEPTH SCALE

1:75



LOGGED: SG

CHECKED: *SG*

RECORD OF BOREHOLE No 101A

1 OF 1

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4677606.6 E 335794.9

ORIGINATED BY SM

DIST WEST HWY 401/3

BOREHOLE TYPE POWER AUGER, HOLLOW STEM

COMPILED BY BRS

DATUM GEODETIC

DATE

March 5, 2008

CHECKED BY S.B.

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT w _p | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|--|------------|---------|------|------------|----------------------------|-----------------|---|-----------------|------------------------------------|-------------------------------------|-----------------------------------|---------------------|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 40 60 80 100 | 20 40 60 80 100 | | | | | |
| 187.37 | SOIL CONDITIONS INFERRED FROM BOREHOLE No. 101 GROUND SURFACE | | | | | | | | | | | | | |
| 0.00 | TOPSOIL, some clay Dark brown | | | | | | | | | | | | | |
| 186.99 | SAND AND GRAVEL Brown | | | | | | | | | | | | | |
| 0.46 | CLAYEY SILT, some sand, trace gravel, mottled Firm to hard Mottled grey and brown | | | | | | | | | | | | | |
| 184.47 | CLAYEY SILT, some sand, trace gravel Stiff to very stiff Grey | | | | | | | | | | | | | |
| 2.90 | | | | | | | | | | | | | | |
| 183 | | | | | | | | | | | | | | |
| 182 | | | | | | | | | | | | | | |
| 181 | | | | | | | | | | | | | | |
| 180 | | | | | | | | | | | | | | |
| 179 | | | | | | | | | | | | | | |
| 178.23 | END OF BOREHOLE | | | | | | | | | | | | | |
| 9.14 | Water level measured in shallow piezometer at elev. 186.30m on March 20, 2008. | | | | | | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 185.77m on July 22, 2008. | | | | | | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 185.41m on September 19, 2008. | | | | | | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 185.86m on January 28, 2009. | | | | | | | | | | | | | |

LDN MTO 01 07-1130-207-0.GPJ LDN MTO.GDT 6/29/09

RECORD OF BOREHOLE No 102

1 OF 4

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4677631.8 :E 335512.7

ORIGINATED BY SM

DIST WEST HWY 401/3

BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

COMPILED BY BRS

DATUM GEODETIC

DATE

March 25, 2008 - March 28, 2008

CHECKED BY *SB*

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|--|------------|---------|------|------------|-------------------------|-----------------|--|-----------------|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 40 60 80 100 | 20 40 60 80 100 | | | | | |
| 186.60 | GROUND SURFACE | | | | | | | | | | | | | |
| 0.00 | TOPSOIL, clayey | | | | | | | | | | | | | |
| 186.25 | Brown | | | | | | | | | | | | | |
| 0.35 | FILL, clayey silt, some sand, trace topsoil, trace gravel Firm to stiff Mottled brown and grey | | 1 | SS | 8 | | 186 | | | | | | | |
| 185.23 | | | | | | | | | | | | | | |
| 1.37 | CLAYEY SILT, some sand, trace gravel, with silt seams Hard Brown | | 2 | SS | 39 | | 185 | | | | | | | |
| | | | 3 | SS | 38 | | 184 | | | | | | | |
| | | | 4 | SS | 41 | | 183 | | | | | | | |
| 182.94 | | | | | | | | | | | | | | |
| 3.66 | CLAYEY SILT, some sand, trace gravel Stiff to very stiff Grey | | 5 | SS | 25 | | 182 | | | | | | | |
| | | | 6 | SS | 25 | | 181 | | | | | | | |
| | | | 7 | SS | 15 | | 180 | | | | | | | |
| | | | 8 | SS | 11 | | 179 | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 9 | SS | 14 | | 178 | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 10 | SS | 23 | | 177 | | | | | | | |
| | | | 11 | TO | PH | | 176 | | | | | | | |
| | | | 12 | TO | PH | | 175 | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 13 | SS | 9 | | 174 | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 14 | TO | PH | | 173 | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | | | | | 172 | | | | | | | |

Continued Next Page

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

LDN_MTO_01_07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

| | | | | | |
|-----------------------|---|----------------------------------|--|-----------------------|---------------|
| PROJECT 07-1130-207-0 | | RECORD OF BOREHOLE No 102 | | 2 OF 4 | METRIC |
| W.P. _____ | LOCATION N 4677631.8 E 335512.7 | | | ORIGINATED BY SM | |
| DIST WEST HWY 401/3 | BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRIGONE, NQRC | | | COMPILED BY BRS | |
| DATUM GEODETIC | DATE March 25, 2008 - March 28, 2008 | | | CHECKED BY <i>SJB</i> | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT <div style="display: flex; justify-content: space-around; font-size: small;"> 20 40 60 80 100 </div> | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|-----------------|---|------------|---------|------|------------|-------------------------|-----------------|---|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | | | | | | |
| | CLAYEY SILT, some sand, trace gravel Stiff to very stiff Grey | | 15 | SS | 10 | | 171 | | | | | | 0 24 43 33 |
| | | | 16 | TO | PH | | 170 | | | | | | |
| | | | 17 | TO | PH | | 169 | | | | | | |
| | | | 18 | TO | PH | | 168 | | | | | | |
| | | | 19 | TO | PH | | 167 | | | | | | |
| | | | 20 | SS | 19 | | 166 | | | | | | |
| | | | 21 | TO | PH | | 165 | | | | | | |
| | | | 22 | SS | 21 | | 164 | | | | | | |
| | | | 23 | SS | 85 | | 163 | | | | | | |
| | | | 24 | SS | 60 | | 162 | | | | | | |
| | | | | | | | 161 | | | | | | |
| | | | | | | | 160 | | | | | | |
| | | | | | | | 159 | | | | | | |
| | | | | | | | 158 | | | | | | |
| | | | | | | | 157 | | | | | | |
| 159.93 26.67 | SANDY SILT, trace clay Very dense Grey | | | | | | | | | | | | |
| 157.41 29.19 | CLAYEY SILT, some sand, trace gravel Hard Grey | | | | | | | | | | | | |
| 156.88 29.72 | | | | | | | | | | | | | |

LDN_MTO_01 07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

Continued Next Page

+ 3, x 3. Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

RECORD OF BOREHOLE No 102

3 OF 4

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4677631.8 :E 335512.7

ORIGINATED BY SM

DIST WEST HWY 401/3

BOREHOLE TYPE

POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

COMPILED BY BRS

DATUM GEODETIC

DATE

March 25, 2008 - March 28, 2008

CHECKED BY *SLB*

| 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 (%) | | | | |
| | | | | | | | | 20 40 60 80 100 | ○ UNCONFINED + FIELD VANE | | | | | |
| | | | | | | | | 20 40 60 80 100 | ● QUICK TRIAXIAL x LAB VANE | | | | | |
| | | | | | | | | | | | | 10 20 30 | | |
| 155.40 | SILTY CLAY, some sand, trace gravel Very stiff Grey | | 25 | TO | PH | | Bentonite | 156 | | | | | | |
| 31.20 | CLAYEY SILT, some sand, trace gravel Very stiff Grey | | | | | | Screen | 155 | | | | | | |
| 154.58 | | | 26 | SS | | 110/ 13mm | Bentonite | 154 | | | | | | |
| 32.02 | LIMESTONE, fresh, medium strong, thinly laminated, fine grained, faintly porous Brown to grey (FOR DETAILED DESCRIPTIONS REFER TO RECORD OF DRILLHOLE) | | 27 | NQ RC | | | | 153 | 100 | 67 | 59 | | | |
| | | | 28 | NQ RC | | | | 152 | 99 | 97 | 92 | | | |
| | | | 29 | NQ RC | | | Sand | 151 | 100 | 100 | 97 | | | |
| 150.28 | END OF BOREHOLE | | | | | | | | | | | | | |
| 36.32 | Borehole dry during drilling between March 25 and 28, 2008. Water level measured in deep piezometer at elev. 177.91m on July 22, 2008. Water level measured in deep piezometer at elev. 175.88m on September 19, 2008. Water level measured in deep piezometer at elev. 177.26m on November 14, 2008. Water level measured in deep piezometer at elev. 177.00m on January 28, 2009. | | | | | | | | | | | | | |

LDN_MTO_01_07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

PROJECT: 07-1130-207-0

RECORD OF DRILLHOLE: 102

SHEET 4 OF 4

LOCATION: N 4677631.8 :E 335512.7


DRILLING DATE: March 25, 2008 - March 28, 2008

DATUM: GEODETIC

INCLINATION: -90° AZIMUTH: —

DRILL RIG: MUD ROTARY WITH HQ TRICONE, NQRC

DRILLING CONTRACTOR: AARDVARK DRILLING INC

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. | | RUN No. | PENETRATION RATE (m/min) | COLOUR (m/min) | FLUSH % RETURN | ELEVATION | RECOVERY | | | | R.Q.D. % | FRACT INDEX PER 0.3 | DISCONTINUITY DATA | | | | HYDRAULIC CONDUCTIVITY k, cm/sec | DIAMETRAL PORT LOAD INDEX (MPa) | NOTES WATER LEVELS INSTRUMENTATION | | |
|--|----------------------------|---|---|-----------------|-----------|---------|-----------------------------|-------------------|-------------------|-----------|-----------------|-----------------|----------------------|---------------------------------|-------------|---------------------------|--------------------|------------------|-----------------|-----------------|--|---------------------------------------|--|--|--|
| | | | | DEPTH (m) | ELEVATION | | | | | | TOTAL CORE % | SOLID CORE % | DIP w/1 CORE AXIS | TYPE AND SURFACE DESCRIPTION | | | 10 ⁻² | 10 ⁻¹ | 10 ⁰ | 10 ¹ | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ROCK SURFACE | | 154.58 32.02 | | | | | | | | | | | | | | | | | | | | | |
| 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 | MUD ROTARY NO ROCK CORE | LIMESTONE, fresh, medium, strong, thinly laminated, medium grained, faintly porous, light grey |  | 153.56 33.04 | 1 | | | | | 154 | | | | | | | | | | | | | | | |
| | | LIMESTONE, fresh, medium, strong, thinly laminated, stylolitic, very fine grained, faintly porous, light grey | | 153.01 33.59 | | | | | | | | | | | | | | | | | | | | | |
| | | LIMESTONE, fresh, medium strong, thinly laminated, very fine grained to fine grained, faintly porous, tan | | 152.19 34.41 | 2 | | | | | | | | | | | | | | | | | | | | |
| | | LIMESTONE, fresh, medium strong, thinly laminated, coarse grained with fine grained matrix, moderately porous, light brown to grey, oolitic, fossiliferous | | 151.85 34.75 | | | | | | | | | | | | | | | | | | | | | |
| | | LIMESTONE, fresh, medium strong, thinly laminated, stylolitic, very fine grained, faintly porous with moderately porous zones, grey | | 151.03 35.57 | 3 | | | | | | | | | | | | | | | | | | | | |
| | | LIMESTONE, fresh, medium, strong, thinly laminated, very fine grained to fine grained, faintly porous, brown | | 150.76 35.84 | | | | | | | | | | | | | | | | | | | | | |
| | | LIMESTONE, fresh, medium strong, laminated, fine grained, moderately porous, brown to grey, fossiliferous | | 150.28 36.32 | | | | | | | | | | | | | | | | | | | | | |
| | | LIMESTONE, fresh, medium strong, laminated, fine to medium grained, moderately porous with occasional pits, grey | | | | | | | | | | | | | | | | | | | | | | | |
| | | END OF DRILLHOLE | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | |

DEPTH SCALE

1:75



LOGGED: SG

CHECKED: SJB

RECORD OF BOREHOLE No 104

1 OF 4

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4677630.3 ; E 335263.1

ORIGINATED BY MA

DIST WEST HWY 401/3

BOREHOLE TYPE POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

COMPILED BY BRS

DATUM GEODETIC

DATE

April 1, 2008 - April 2, 2008

CHECKED BY SJS

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|--------------|---|------------|---------|------|------------|-------------------------|-----------------|--|-----------------|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 40 60 80 100 | 20 40 60 80 100 | | | | | |
| 186.15 | GROUND SURFACE | | | | | | | | | | | | | |
| 0.00 | SILTY SAND, some clay, trace gravel, Loose Mottled brown and grey | | 1 | SS | 7 | | Concrete | | | | | | | |
| 184.78 | | | | | | | Bentonite | | | | | | | |
| 1.37 | CLAYEY SILT, some sand, trace gravel Very stiff Brown becoming grey at about elev. 183.1m | | 2 | SS | 23 | | | | | | | | | |
| | | | 3 | SS | 28 | | | | | | | | | |
| | | | 4 | SS | 22 | | | | | | | | | |
| 182.49 | | | | | | | | | | | | | | |
| 3.66 | CLAYEY SILT, some sand, trace gravel, with sandy silt layers Very stiff Grey | | 5 | SS | 16 | | | | | | | | | |
| 181.73 | | | | | | | | | | | | | | |
| 4.42 | CLAYEY SILT, some sand, trace gravel Very stiff Grey | | 6 | SS | 14 | | | | | | | | | |
| | | | 7 | SS | 12 | | | | | | | | | |
| | | | 8 | SS | 7 | | | | | | | | | |
| 178.85 | | | | | | | | | | | | | | |
| 7.35 | SAND AND GRAVEL, some silt, some clay Grey | | 9 | TO | PH | | | | | | | | | |
| 178.17 | CLAYEY SILT, some sand, trace gravel Grey | | | | | | | | | | | | | |
| 7.98 | | | | | | | | | | | | | | |
| 8.23 | SANDY SILT, trace gravel Grey | | 10 | SS | 10 | | | | | | | | | |
| 177.16 | SILTY SAND, trace gravel, trace clay, with clayey silt layers Loose to compact Grey | | 11 | SS | 8 | | Grout | | | | | | | 4 46 37 13 |
| 8.99 | | | | | | | | | | | | | | |
| 176.09 | CLAYEY SILT, some sand, trace gravel, with silt and sand partings Firm Grey | | | | | | | | | | | | | |
| 10.06 | CLAYEY SILT, some sand, trace gravel Stiff Grey | | 12 | SS | 6 | | | | | | | | | 2 27 43 28 |
| | | | | | | | | | | | | | | |
| | | | 13 | TO | PH | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 14 | SS | 7 | | | | | | | | | |
| | | | | | | | | | | | | | | |
| 171.21 | | | | | | | | | | | | | | |

Continued Next Page

+ 3, x 3, Numbers refer to Sensitivity O 3% STRAIN AT FAILURE

LDN_MTO_01 07-1130-207-0.GPJ LDN_MTO.GDT 5/29/09

RECORD OF BOREHOLE No 104

2 OF 4

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4677630.3 E 335263.1

ORIGINATED BY MA

DIST

WEST

HWY 401/3

BOREHOLE TYPE

POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC

COMPILED BY BRS

DATUM GEODETIC

DATE

April 1, 2008 - April 2, 2008

CHECKED BY SJB

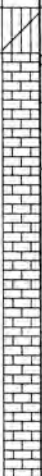
| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|--|------------|---------|------|------------|-------------------------|-----------------|--|-----------------|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 40 60 80 100 | 20 40 60 80 100 | | | | | |
| 14.94 | CLAYEY SILT, some sand, trace gravel, with sand partings Stiff Grey | | 15 | TO | PH | | 171 | | | | | | | |
| | | | | | | | 170 | | 1.7 | | | | | |
| | | | 16 | SS | 6 | | 169 | | | | | | | 1 23 41 35 |
| 168.62 | SILTY CLAY, trace sand, trace gravel Stiff Grey | | | | | | 168 | | 1.5 | | | | | |
| 17.53 | | | 17 | SS | 4 | | 167 | | | | | | | |
| 166.95 | CLAYEY SILT, trace sand, trace gravel, with silt partings Stiff Grey | | | | | | 166 | | 2.3 | | | | | |
| 19.20 | | | 18 | TO | PH | | 165 | | 1.8 | | | | | |
| 165.42 | CLAYEY SILT, trace sand, trace gravel Stiff to hard Grey | | | | | | 164 | | 1.2 | | | | | |
| 20.73 | | | 19 | SS | 5 | | 163 | | | | | | | |
| | | | 20 | SS | 31 | | 162 | | | | | | | |
| 162.53 | SAND AND GRAVEL, trace silt Very dense Grey | | | | | | 161 | | | | | | | |
| 23.62 | | | 21 | SS | 68 | | 160 | | | | | | | 8 74 (18) |
| 160.85 | SANDY SILT Very dense Grey | | | | | | 159 | | | | | | | |
| 25.30 | | | 22 | SS | 71 | | 158 | | | | | | | (66) |
| 159.85 | CLAYEY SILT, trace sand, trace gravel Hard Grey | | | | | | 157 | | | | | | | |
| 26.30 | | | 23 | SS | 39 | | | | | | | | | (92) |
| 158.35 | SILT, trace sand Dense Grey | | | | | | | | | | | | | |
| 27.80 | | | 24 | SS | 15 | | | | | | | | | |
| 157.65 | CLAYEY SILT, trace sand, trace gravel, with sandy silt partings Stiff to very stiff Grey | | | | | | | | | | | | | |
| 28.50 | | | | | | | | | | | | | | |

Continued Next Page

+ 3, X 3, Numbers refer to Sensitivity O 3% STRAIN AT FAILURE

LDN_MTO_01_07-1130-207-0.GPJ LDN_MTO.GDT 5/29/09

| | | | | | |
|-----------------------------------|--|----------------------------------|--|--------|---------------|
| PROJECT <u>07-1130-207-0</u> | | RECORD OF BOREHOLE No 104 | | 3 OF 4 | METRIC |
| W.P. _____ | LOCATION <u>N 4677630.3 ; E 335263.1</u> | ORIGINATED BY <u>MA</u> | | | |
| DIST <u>WEST</u> HWY <u>401/3</u> | BOREHOLE TYPE <u>POWER AUGER, MUD ROTARY WITH HQ TRICONE, NQRC</u> | COMPILED BY <u>BRS</u> | | | |
| DATUM <u>GEODETIC</u> | DATE <u>April 1, 2008 - April 2, 2008</u> | CHECKED BY <u>SJB</u> | | | |

| 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 | | | | | | | | WATER CONTENT (%) |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | × LAB VANE | | | | | | |
| | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | |
| 155.70 | LIMESTONE, fresh, medium strong, thinly laminated, fine grained, faintly porous Light grey (FOR DETAILED DESCRIPTIONS REFER TO RECORD OF DRILLHOLE) |  | 25 | SS | 100/76mm | | | | | | | | | | | |
| 30.45 | | | 26 | HQ RC | | | | | | | | | | | | |
| | | | 27 | HQ RC | | | | | | | | | | | | |
| | | | 28 | HQ RC | | | | | | | | | | | | |
| 151.45 | END OF BOREHOLE | | | | | | | | | | | | | | | |
| 34.70 | Water level in borehole at about elev. 162.4m during drilling on April 1 and 2, 2008. Water level measured in deep piezometer at elev. 177.92m on April 4, 2008. Water level measured in deep piezometer at elev. 176.09m on September 19, 2008. Water level measured in deep piezometer at elev. 177.25 on November 14, 2008. | | | | | | | | | | | | | | | |

LDN_MTO_01_07-1130-207-0.GPJ LDN_MTO.GDT 6/29/09

PROJECT: 07-1130-207-0

RECORD OF DRILLHOLE: 104

SHEET 4 OF 4

LOCATION: N 4677630.3 ; E 335263.1

DRILLING DATE: April 1, 2008 - April 2, 2008

DATUM: GEODETIC

INCLINATION: -90° AZIMUTH: —

DRILL RIG: MUD ROTARY WITH HQ TRICONE, NQRC

DRILLING CONTRACTOR: AARDVARK DRILLING INC

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. | | RUN No. | PENETRATION RATE (mm/min) | COLOUR FLUSH % RETURN | ELEVATION | JN - Joint FLT - Fault SHR - Shear VN - Vein CJ - Conjugate | | | | BD - Bedding FO - Foliation CO - Contact OR - Orthogonal CL - Cleavage | | | | PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular | | | | PO - Polished K - Slickensided SM - Smooth Ro - Rough | | | | Br - Broken Rock | NOTE: For additional abbreviations refer to list of abbreviations & symbols | DISCONTINUITY DATA | | | | | | HYDRAULIC CONDUCTIVITY k, cm/sec | DIAMETRAL POINT LOAD INDEX (MPa) | | | | | | NOTES WATER LEVELS INSTRUMENTATION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------|-----------------|-------------|--------------|--------------|-----------------|---------|------------------------------|-----------------------------|-----------|---|---------------------------|------------------------|---|--|----|----|----|---|----|----|------------------|--|------------------|------------------|------------------|------------------|--|--------------------|------------------|------------------|------------------|-------------------|-------------------|--|--|-------------------|-------------------|-------------------|-------------------|-------------------|--|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|--------------------|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| | | | | DEPTH (m) | RECOVERY | | | | | R.Q.D. % | FRACT INDEX PER 0.3 | DIP w.r.t CORE AXIS | | TYPE AND SURFACE DESCRIPTION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | TOTAL CORE % | | | | | | | SOLID CORE % | 0 | | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | 60 | 90 | 10 | 15 | 20 | 10 ⁻¹ | 10 ⁻² | 10 ⁻³ | 10 ⁻⁴ | 10 ⁻⁵ | | | 10 ⁻⁶ | 10 ⁻⁷ | 10 ⁻⁸ | 10 ⁻⁹ | 10 ⁻¹⁰ | 10 ⁻¹¹ | | 10 ⁻¹² | 10 ⁻¹³ | 10 ⁻¹⁴ | 10 ⁻¹⁵ | 10 ⁻¹⁶ | 10 ⁻¹⁷ | | 10 ⁻¹⁸ | 10 ⁻¹⁹ | 10 ⁻²⁰ | 10 ⁻²¹ | 10 ⁻²² | 10 ⁻²³ | 10 ⁻²⁴ | 10 ⁻²⁵ | 10 ⁻²⁶ | 10 ⁻²⁷ | 10 ⁻²⁸ | 10 ⁻²⁹ | 10 ⁻³⁰ | 10 ⁻³¹ | 10 ⁻³² | 10 ⁻³³ | 10 ⁻³⁴ | 10 ⁻³⁵ | 10 ⁻³⁶ | 10 ⁻³⁷ | 10 ⁻³⁸ | 10 ⁻³⁹ | 10 ⁻⁴⁰ | 10 ⁻⁴¹ | 10 ⁻⁴² | 10 ⁻⁴³ | 10 ⁻⁴⁴ | 10 ⁻⁴⁵ | 10 ⁻⁴⁶ | 10 ⁻⁴⁷ | 10 ⁻⁴⁸ | 10 ⁻⁴⁹ | 10 ⁻⁵⁰ | 10 ⁻⁵¹ | 10 ⁻⁵² | 10 ⁻⁵³ | 10 ⁻⁵⁴ | 10 ⁻⁵⁵ | 10 ⁻⁵⁶ | 10 ⁻⁵⁷ | 10 ⁻⁵⁸ | 10 ⁻⁵⁹ | 10 ⁻⁶⁰ | 10 ⁻⁶¹ | 10 ⁻⁶² | 10 ⁻⁶³ | 10 ⁻⁶⁴ | 10 ⁻⁶⁵ | 10 ⁻⁶⁶ | 10 ⁻⁶⁷ | 10 ⁻⁶⁸ | 10 ⁻⁶⁹ | 10 ⁻⁷⁰ | 10 ⁻⁷¹ | 10 ⁻⁷² | 10 ⁻⁷³ | 10 ⁻⁷⁴ | 10 ⁻⁷⁵ | 10 ⁻⁷⁶ | 10 ⁻⁷⁷ | 10 ⁻⁷⁸ | 10 ⁻⁷⁹ | 10 ⁻⁸⁰ | 10 ⁻⁸¹ | 10 ⁻⁸² | 10 ⁻⁸³ | 10 ⁻⁸⁴ | 10 ⁻⁸⁵ | 10 ⁻⁸⁶ | 10 ⁻⁸⁷ | 10 ⁻⁸⁸ | 10 ⁻⁸⁹ | 10 ⁻⁹⁰ | 10 ⁻⁹¹ | 10 ⁻⁹² | 10 ⁻⁹³ | 10 ⁻⁹⁴ | 10 ⁻⁹⁵ | 10 ⁻⁹⁶ | 10 ⁻⁹⁷ | 10 ⁻⁹⁸ | 10 ⁻⁹⁹ | 10 ⁻¹⁰⁰ | 10 ⁻¹⁰¹ | 10 ⁻¹⁰² | 10 ⁻¹⁰³ | 10 ⁻¹⁰⁴ | 10 ⁻¹⁰⁵ | 10 ⁻¹⁰⁶ | 10 ⁻¹⁰⁷ | 10 ⁻¹⁰⁸ | 10 ⁻¹⁰⁹ | 10 ⁻¹¹⁰ | 10 ⁻¹¹¹ | 10 ⁻¹¹² | 10 ⁻¹¹³ | 10 ⁻¹¹⁴ | 10 ⁻¹¹⁵ | 10 ⁻¹¹⁶ | 10 ⁻¹¹⁷ | 10 ⁻¹¹⁸ | 10 ⁻¹¹⁹ | 10 ⁻¹²⁰ | 10 ⁻¹²¹ | 10 ⁻¹²² | 10 ⁻¹²³ | 10 ⁻¹²⁴ | 10 ⁻¹²⁵ | 10 ⁻¹²⁶ | 10 ⁻¹²⁷ | 10 ⁻¹²⁸ | 10 ⁻¹²⁹ | 10 ⁻¹³⁰ | 10 ⁻¹³¹ | 10 ⁻¹³² | 10 ⁻¹³³ | 10 ⁻¹³⁴ | 10 ⁻¹³⁵ | 10 ⁻¹³⁶ | 10 ⁻¹³⁷ | 10 ⁻¹³⁸ | 10 ⁻¹³⁹ | 10 ⁻¹⁴⁰ | 10 ⁻¹⁴¹ | 10 ⁻¹⁴² | 10 ⁻¹⁴³ | 10 ⁻¹⁴⁴ | 10 ⁻¹⁴⁵ | 10 ⁻¹⁴⁶ | 10 ⁻¹⁴⁷ | 10 ⁻¹⁴⁸ | 10 ⁻¹⁴⁹ | 10 ⁻¹⁵⁰ | 10 ⁻¹⁵¹ | 10 ⁻¹⁵² | 10 ⁻¹⁵³ | 10 ⁻¹⁵⁴ | 10 ⁻¹⁵⁵ | 10 ⁻¹⁵⁶ | 10 ⁻¹⁵⁷ | 10 ⁻¹⁵⁸ | 10 ⁻¹⁵⁹ | 10 ⁻¹⁶⁰ | 10 ⁻¹⁶¹ | 10 ⁻¹⁶² | 10 ⁻¹⁶³ | 10 ⁻¹⁶⁴ | 10 ⁻¹⁶⁵ | 10 ⁻¹⁶⁶ | 10 ⁻¹⁶⁷ | 10 ⁻¹⁶⁸ | 10 ⁻¹⁶⁹ | 10 ⁻¹⁷⁰ | 10 ⁻¹⁷¹ | 10 ⁻¹⁷² | 10 ⁻¹⁷³ | 10 ⁻¹⁷⁴ | 10 ⁻¹⁷⁵ | 10 ⁻¹⁷⁶ | 10 ⁻¹⁷⁷ | 10 ⁻¹⁷⁸ | 10 ⁻¹⁷⁹ | 10 ⁻¹⁸⁰ | 10 ⁻¹⁸¹ | 10 ⁻¹⁸² | 10 ⁻¹⁸³ | 10 ⁻¹⁸⁴ | 10 ⁻¹⁸⁵ | 10 ⁻¹⁸⁶ | 10 ⁻¹⁸⁷ | 10 ⁻¹⁸⁸ | 10 ⁻¹⁸⁹ | 10 ⁻¹⁹⁰ | 10 ⁻¹⁹¹ | 10 ⁻¹⁹² | 10 ⁻¹⁹³ | 10 ⁻¹⁹⁴ | 10 ⁻¹⁹⁵ | 10 ⁻¹⁹⁶ | 10 ⁻¹⁹⁷ | 10 ⁻¹⁹⁸ | 10 ⁻¹⁹⁹ | 10 ⁻²⁰⁰ | 10 ⁻²⁰¹ | 10 ⁻²⁰² | 10 ⁻²⁰³ | 10 ⁻²⁰⁴ | 10 ⁻²⁰⁵ | 10 ⁻²⁰⁶ | 10 ⁻²⁰⁷ | 10 ⁻²⁰⁸ | 10 ⁻²⁰⁹ | 10 ⁻²¹⁰ | 10 ⁻²¹¹ | 10 ⁻²¹² | 10 ⁻²¹³ | 10 ⁻²¹⁴ | 10 ⁻²¹⁵ | 10 ⁻²¹⁶ | 10 ⁻²¹⁷ | 10 ⁻²¹⁸ | 10 ⁻²¹⁹ | 10 ⁻²²⁰ | 10 ⁻²²¹ | 10 ⁻²²² | 10 ⁻²²³ | 10 ⁻²²⁴ | 10 ⁻²²⁵ | 10 ⁻²²⁶ | 10 ⁻²²⁷ | 10 ⁻²²⁸ | 10 ⁻²²⁹ | 10 ⁻²³⁰ | 10 ⁻²³¹ | 10 ⁻²³² | 10 ⁻²³³ | 10 ⁻²³⁴ | 10 ⁻²³⁵ | 10 ⁻²³⁶ | 10 ⁻²³⁷ | 10 ⁻²³⁸ | 10 ⁻²³⁹ | 10 ⁻²⁴⁰ | 10 ⁻²⁴¹ | 10 ⁻²⁴² | 10 ⁻²⁴³ | 10 ⁻²⁴⁴ | 10 ⁻²⁴⁵ | 10 ⁻²⁴⁶ | 10 ⁻²⁴⁷ | 10 ⁻²⁴⁸ | 10 ⁻²⁴⁹ | 10 ⁻²⁵⁰ | 10 ⁻²⁵¹ | 10 ⁻²⁵² | 10 ⁻²⁵³ | 10 ⁻²⁵⁴ | 10 ⁻²⁵⁵ | 10 ⁻²⁵⁶ | 10 ⁻²⁵⁷ | 10 ⁻²⁵⁸ | 10 ⁻²⁵⁹ | 10 ⁻²⁶⁰ | 10 ⁻²⁶¹ | 10 ⁻²⁶² | 10 ⁻²⁶³ | 10 ⁻²⁶⁴ | 10 ⁻²⁶⁵ | 10 ⁻²⁶⁶ | 10 ⁻²⁶⁷ | 10 ⁻²⁶⁸ | 10 ⁻²⁶⁹ | 10 ⁻²⁷⁰ | 10 ⁻²⁷¹ | 10 ⁻²⁷² | 10 ⁻²⁷³ | 10 ⁻²⁷⁴ | 10 ⁻²⁷⁵ | 10 ⁻²⁷⁶ | 10 ⁻²⁷⁷ | 10 ⁻²⁷⁸ | 10 ⁻²⁷⁹ | 10 ⁻²⁸⁰ | 10 ⁻²⁸¹ | 10 ⁻²⁸² | 10 ⁻²⁸³ | 10 ⁻²⁸⁴ | 10 ⁻²⁸⁵ | 10 ⁻²⁸⁶ | 10 ⁻²⁸⁷ | 10 ⁻²⁸⁸ | 10 ⁻²⁸⁹ | 10 ⁻²⁹⁰ | 10 ⁻²⁹¹ | 10 ⁻²⁹² | 10 ⁻²⁹³ | 10 ⁻²⁹⁴ | 10 ⁻²⁹⁵ | 10 ⁻²⁹⁶ | 10 ⁻²⁹⁷ | 10 ⁻²⁹⁸ | 10 ⁻²⁹⁹ | 10 ⁻³⁰⁰ | 10 ⁻³⁰¹ | 10 ⁻³⁰² | 10 ⁻³⁰³ | 10 ⁻³⁰⁴ | 10 ⁻³⁰⁵ | 10 ⁻³⁰⁶ | 10 ⁻³⁰⁷ | 10 ⁻³⁰⁸ | 10 ⁻³⁰⁹ | 10 ⁻³¹⁰ | 10 ⁻³¹¹ | 10 ⁻³¹² | 10 ⁻³¹³ | 10 ⁻³¹⁴ | 10 ⁻³¹⁵ | 10 ⁻³¹⁶ | 10 ⁻³¹⁷ | 10 ⁻³¹⁸ | 10 ⁻³¹⁹ | 10 ⁻³²⁰ | 10 ⁻³²¹ | 10 ⁻³²² | 10 ⁻³²³ | 10 ⁻³²⁴ | 10 ⁻³²⁵ | 10 ⁻³²⁶ | 10 ⁻³²⁷ | 10 ⁻³²⁸ | 10 ⁻³²⁹ | 10 ⁻³³⁰ | 10 ⁻³³¹ | 10 ⁻³³² | 10 ⁻³³³ | 10 ⁻³³⁴ | 10 ⁻³³⁵ | 10 ⁻³³⁶ | 10 ⁻³³⁷ | 10 ⁻³³⁸ | 10 ⁻³³⁹ | 10 ⁻³⁴⁰ | 10 ⁻³⁴¹ | 10 ⁻³⁴² | 10 ⁻³⁴³ | 10 ⁻³⁴⁴ | 10 ⁻³⁴⁵ | 10 ⁻³⁴⁶ | 10 ⁻³⁴⁷ | 10 ⁻³⁴⁸ | 10 ⁻³⁴⁹ | 10 ⁻³⁵⁰ | 10 ⁻³⁵¹ | 10 ⁻³⁵² | 10 ⁻³⁵³ | 10 ⁻³⁵⁴ | 10 ⁻³⁵⁵ | 10 ⁻³⁵⁶ | 10 ⁻³⁵⁷ | 10 ⁻³⁵⁸ | 10 ⁻³⁵⁹ | 10 ⁻³⁶⁰ | 10 ⁻³⁶¹ | 10 ⁻³⁶² | 10 ⁻³⁶³ | 10 ⁻³⁶⁴ | 10 ⁻³⁶⁵ | 10 ⁻³⁶⁶ | 10 ⁻³⁶⁷ | 10 ⁻³⁶⁸ | 10 ⁻³⁶⁹ | 10 ⁻³⁷⁰ | 10 ⁻³⁷¹ | 10 ⁻³⁷² | 10 ⁻³⁷³ | 10 ⁻³⁷⁴ | 10 ⁻³⁷⁵ | 10 ⁻³⁷⁶ | 10 ⁻³⁷⁷ | 10 ⁻³⁷⁸ | 10 ⁻³⁷⁹ | 10 ⁻³⁸⁰ | 10 ⁻³⁸¹ | 10 ⁻³⁸² | 10 ⁻³⁸³ | 10 ⁻³⁸⁴ | 10 ⁻³⁸⁵ | 10 ⁻³⁸⁶ | 10 ⁻³⁸⁷ | 10 ⁻³⁸⁸ | 10 ⁻³⁸⁹ | 10 ⁻³⁹⁰ | 10 ⁻³⁹¹ | 10 ⁻³⁹² | 10 ⁻³⁹³ | 10 ⁻³⁹⁴ | 10 ⁻³⁹⁵ | 10 ⁻³⁹⁶ | 10 ⁻³⁹⁷ | 10 ⁻³⁹⁸ | 10 ⁻³⁹⁹ | 10 ⁻⁴⁰⁰ | 10 ⁻⁴⁰¹ | 10 ⁻⁴⁰² | 10 ⁻⁴⁰³ | 10 ⁻⁴⁰⁴ | 10 ⁻⁴⁰⁵ | 10 ⁻⁴⁰⁶ | 10 ⁻⁴⁰⁷ | 10 ⁻⁴⁰⁸ | 10 ⁻⁴⁰⁹ | 10 ⁻⁴¹⁰ | 10 ⁻⁴¹¹ | 10 ⁻⁴¹² | 10 ⁻⁴¹³ | 10 ⁻⁴¹⁴ | 10 ⁻⁴¹⁵ | 10 ⁻⁴¹⁶ | 10 ⁻⁴¹⁷ | 10 ⁻⁴¹⁸ | 10 ⁻⁴¹⁹ | 10 ⁻⁴²⁰ | 10 ⁻⁴²¹ | 10 ⁻⁴²² | 10 ⁻⁴²³ | 10 ⁻⁴²⁴ | 10 ⁻⁴²⁵ | 10 ⁻⁴²⁶ | 10 ⁻⁴²⁷ | 10 ⁻⁴²⁸ | 10 ⁻⁴²⁹ | 10 ⁻⁴³⁰ | 10 ⁻⁴³¹ | 10 ⁻⁴³² | 10 ⁻⁴³³ | 10 ⁻⁴³⁴ | 10 ⁻⁴³⁵ | 10 ⁻⁴³⁶ | 10 ⁻⁴³⁷ | 10 ⁻⁴³⁸ | 10 ⁻⁴³⁹ | 10 ⁻⁴⁴⁰ | 10 ⁻⁴⁴¹ | 10 ⁻⁴⁴² | 10 ⁻⁴⁴³ | 10 ⁻⁴⁴⁴ | 10 ⁻⁴⁴⁵ | 10 ⁻⁴⁴⁶ | 10 ⁻⁴⁴⁷ | 10 ⁻⁴⁴⁸ | 10 ⁻⁴⁴⁹ | 10 ⁻⁴⁵⁰ | 10 ⁻⁴⁵¹ | 10 ⁻⁴⁵² | 10 ⁻⁴⁵³ | 10 ⁻⁴⁵⁴ | 10 ⁻⁴⁵⁵ | 10 ⁻⁴⁵⁶ | 10 ⁻⁴⁵⁷ | 10 ⁻⁴⁵⁸ | 10 ⁻⁴⁵⁹ | 10 ⁻⁴⁶⁰ | 10 ⁻⁴⁶¹ | 10 ⁻⁴⁶² | 10 ⁻⁴⁶³ | 10 ⁻⁴⁶⁴ | 10 ⁻⁴⁶⁵ | 10 ⁻⁴⁶⁶ | 10 ⁻⁴⁶⁷ | 10 ⁻⁴⁶⁸ | 10 ⁻⁴⁶⁹ | 10 ⁻⁴⁷⁰ | 10 ⁻⁴⁷¹ | 10 ⁻⁴⁷² | 10 ⁻⁴⁷³ | 10 ⁻⁴⁷⁴ | 10 ⁻⁴⁷⁵ | 10 ⁻⁴⁷⁶ | 10 ⁻⁴⁷⁷ | 10 ⁻⁴⁷⁸ | 10 ⁻⁴⁷⁹ | 10 ⁻⁴⁸⁰ | 10 ⁻⁴⁸¹ | 10 ⁻⁴⁸² | 10 ⁻⁴⁸³ | 10 ⁻⁴⁸⁴ | 10 ⁻⁴⁸⁵ | 10 ⁻⁴⁸⁶ | 10 ⁻⁴⁸⁷ | 10 ⁻⁴⁸⁸ | 10 ⁻⁴⁸⁹ | 10 ⁻⁴⁹⁰ | 10 ⁻⁴⁹¹ | 10 ⁻⁴⁹² | 10 ⁻⁴⁹³ | 10 ⁻⁴⁹⁴ | 10 ⁻⁴⁹⁵ | 10 ⁻⁴⁹⁶ | 10 ⁻⁴⁹⁷ | 10 ⁻⁴⁹⁸ | 10 ⁻⁴⁹⁹ | 10 ⁻⁵⁰⁰ | 10 ⁻⁵⁰¹ | 10 ⁻⁵⁰² | 10 ⁻⁵⁰³ | 10 ⁻⁵⁰⁴ | 10 ⁻⁵⁰⁵ | 10 ⁻⁵⁰⁶ | 10 ⁻⁵⁰⁷ | 10 ⁻⁵⁰⁸ | 10 ⁻⁵⁰⁹ | 10 ⁻⁵¹⁰ | 10 ⁻⁵¹¹ | 10 ⁻⁵¹² | 10 ⁻⁵¹³ | 10 ⁻⁵¹⁴ | 10 ⁻⁵¹⁵ | 10 ⁻⁵¹⁶ | 10 ⁻⁵¹⁷ | 10 ⁻⁵¹⁸ | 10 ⁻⁵¹⁹ | 10 ⁻⁵²⁰ | 10 ⁻⁵²¹ | 10 ⁻⁵²² | 10 ⁻⁵²³ | 10 ⁻⁵²⁴ | 10 ⁻⁵²⁵ | 10 ⁻⁵²⁶ | 10 ⁻⁵²⁷ | 10 ⁻⁵²⁸ | 10 ⁻⁵²⁹ | 10 ⁻⁵³⁰ | 10 ⁻⁵³¹ | 10 ⁻⁵³² | 10 ⁻⁵³³ | 10 ⁻⁵³⁴ | 10 ⁻⁵³⁵ | 10 ⁻⁵³⁶ | 10 ⁻⁵³⁷ | 10 ⁻⁵³⁸ | 10 ⁻⁵³⁹ | 10 ⁻⁵⁴⁰ | 10 ⁻⁵⁴¹ | 10 ⁻⁵⁴² | 10 ⁻⁵⁴³ | 10 ⁻⁵⁴⁴ | 10 ⁻⁵⁴⁵ | 10 ⁻⁵⁴⁶ | 10 ⁻⁵⁴⁷ | 10 ⁻⁵⁴⁸ | 10 ⁻⁵⁴⁹ | 10 ⁻⁵⁵⁰ | 10 ⁻⁵⁵¹ | 10 ⁻⁵⁵² | 10 ⁻⁵⁵³ | 10 ⁻⁵⁵⁴ | 10 ⁻⁵⁵⁵ | 10 ⁻⁵⁵⁶ | 10 ⁻⁵⁵⁷ | 10 ⁻⁵⁵⁸ | 10 ⁻⁵⁵⁹ | 10 ⁻⁵⁶⁰ | 10 ⁻⁵⁶¹ | 10 ⁻⁵⁶² | 10 ⁻⁵⁶³ | 10 ⁻⁵⁶⁴ | 10 ⁻⁵⁶⁵ | 10 ⁻⁵⁶⁶ | 10 ⁻⁵⁶⁷ | 10 ⁻⁵⁶⁸ | 10 ⁻⁵⁶⁹ | 10 ⁻⁵⁷⁰ | 10 ⁻⁵⁷¹ | 10 ⁻⁵⁷² | 10 ⁻⁵⁷³ | 10 ⁻⁵⁷⁴ | 10 ⁻⁵⁷⁵ | 10 ⁻⁵⁷⁶ | 10 ⁻⁵⁷⁷ | 10 ⁻⁵⁷⁸ | 10 ⁻⁵⁷⁹ | 10 ⁻⁵⁸⁰ | 10 ⁻⁵⁸¹ | 10 ⁻⁵⁸² | 10 ⁻⁵⁸³ | 10 ⁻⁵⁸⁴ | 10 ⁻⁵⁸⁵ | 10 ⁻⁵⁸⁶ | 10 ⁻⁵⁸⁷ | 10 ⁻⁵⁸⁸ | 10 ⁻⁵⁸⁹ | 10 ⁻⁵⁹⁰ | 10 ⁻⁵⁹¹ | 10 ⁻⁵⁹² | 10 ⁻⁵⁹³ | 10 ⁻⁵⁹⁴ | 10 ⁻⁵⁹⁵ | 10 ⁻⁵⁹⁶ | 10 ⁻⁵⁹⁷ | 10 ⁻⁵⁹⁸ | 10 ⁻⁵⁹⁹ | 10 ⁻⁶⁰⁰ | 10 ⁻⁶⁰¹ | 10 ⁻⁶⁰² | 10 ⁻⁶⁰³ | 10 ⁻⁶⁰⁴ | 10 ⁻⁶⁰⁵ | 10 ⁻⁶⁰⁶ | 10 ⁻⁶⁰⁷ | 10 ⁻⁶⁰⁸ | 10 ⁻⁶⁰⁹ | 10 ⁻⁶¹⁰ | 10 ⁻⁶¹¹ | 10 ⁻⁶¹² | 10 ⁻⁶¹³ | 10 ⁻⁶¹⁴ | 10 ⁻⁶¹⁵ | 10 ⁻⁶¹⁶ | 10 ⁻⁶¹⁷ | 10 ⁻⁶¹⁸ | 10 ⁻⁶¹⁹ | 10 ⁻⁶²⁰ | 10 ⁻⁶²¹ | 10 ⁻⁶²² | 10 ⁻⁶²³ | 10 ⁻⁶²⁴ | 10 ⁻⁶²⁵ | 10 ⁻⁶²⁶ | 10 ⁻⁶²⁷ | 10 ⁻⁶²⁸ | 10 ⁻⁶²⁹ | 10 ⁻⁶³⁰ | 10 ⁻⁶³¹ | 10 ⁻⁶³² | 10 ⁻⁶³³ | 10 ⁻⁶³⁴ | 10 ⁻⁶³⁵ | 10 ⁻⁶³⁶ | 10 ⁻⁶³⁷ | 10 ⁻⁶³⁸ | 10 ⁻⁶³⁹ | 10 ⁻⁶⁴⁰ | 10 ⁻⁶⁴¹ | 10 ⁻⁶⁴² | 10 ⁻⁶⁴³ | 10 ⁻⁶⁴⁴ | 10 ⁻⁶⁴⁵ | 10 ⁻⁶⁴⁶ | 10 ⁻⁶⁴⁷ | 10 ⁻⁶⁴⁸ | 10 ⁻⁶⁴⁹ | 10 ⁻⁶⁵⁰ | 10 ⁻⁶⁵¹ | 10 ⁻⁶⁵² | 10 ⁻⁶⁵³ | 10 ⁻⁶⁵⁴ | 10 ⁻⁶⁵⁵ | 10 ⁻⁶⁵⁶ | 10 ⁻⁶⁵⁷ | 10 ⁻⁶⁵⁸ | 10 ⁻⁶⁵⁹ | 10 ⁻⁶⁶⁰ | 10 ⁻⁶⁶¹ | 10 ⁻⁶⁶² | 10 ⁻⁶⁶³ | 10 ⁻⁶⁶⁴ | 10 ⁻⁶⁶⁵ | 10 ⁻⁶⁶⁶ | 10 ⁻⁶⁶⁷ | 10 ⁻⁶⁶⁸ | 10 ⁻⁶⁶⁹ | 10 ⁻⁶⁷⁰ | 10 ⁻⁶⁷¹ | 10 ⁻⁶⁷² | 10 ⁻⁶⁷³ | 10 ⁻⁶⁷⁴ | 10 ⁻⁶⁷⁵ | 10 ⁻⁶⁷⁶ | 10 ⁻⁶⁷⁷ | 10 ⁻⁶⁷⁸ | 10 ⁻⁶⁷⁹ | 10 ⁻⁶⁸⁰ | 10 ⁻⁶⁸¹ | 10 ⁻⁶⁸² | 10 ⁻⁶⁸³ | 10 ⁻⁶⁸⁴ | 10 ⁻⁶⁸⁵ | 10 ⁻⁶⁸⁶ | 10 ⁻⁶⁸⁷ | 10 ⁻⁶⁸⁸ | 10 ⁻⁶⁸⁹ | 10 ⁻⁶⁹⁰ | 10 ⁻⁶⁹¹ | 10 ⁻⁶⁹² | 10 ⁻⁶⁹³ | 10 ⁻⁶⁹⁴ | 10 ⁻⁶⁹⁵ | 10 ⁻⁶⁹⁶ | 10 ⁻⁶⁹⁷ | 10 ⁻⁶⁹⁸ | 10 ⁻⁶⁹⁹ | 10 ⁻⁷⁰⁰ | 10 ⁻⁷⁰¹ | 10 ⁻⁷⁰² | 10 ⁻⁷⁰³ | 10 ⁻⁷⁰⁴ | 10 ⁻⁷⁰⁵ | 10 ⁻⁷⁰⁶ | 10 ⁻⁷⁰⁷ | 10 ⁻⁷⁰⁸ | 10 ⁻⁷⁰⁹ | 10 ⁻⁷¹⁰ | 10 ⁻⁷¹¹ | 10 ⁻⁷¹² | 10 ⁻⁷¹³ | 10 ⁻⁷¹⁴ | 10 ⁻⁷¹⁵ | 10 ⁻⁷¹⁶ | 10 ⁻⁷¹⁷ | 10 ⁻⁷¹⁸ | 10 ⁻⁷¹⁹ | 10 ⁻⁷²⁰ | 10 ⁻⁷²¹ | 10 ⁻⁷²² | 10 ⁻⁷²³ | 10 ⁻⁷²⁴ | 10 ⁻⁷²⁵ | 10 ⁻⁷²⁶ | 10 ⁻⁷²⁷ | 10 ⁻⁷²⁸ | 10 ⁻⁷²⁹ | 10 ⁻⁷³⁰ | 10 ⁻⁷³¹ | 10 ⁻⁷³² | 10 ⁻⁷³³ | 10 ⁻⁷³⁴ | 10 ⁻⁷³⁵ | 10 ⁻⁷³⁶ | 10 ⁻⁷³⁷ | 10 ⁻⁷³⁸ | 10 ⁻⁷³⁹ | 10 ⁻⁷⁴⁰ | 10 ⁻⁷⁴¹ | 10 ⁻⁷⁴² | 10 ⁻⁷⁴³ | 10 ⁻⁷⁴⁴ | 10 ⁻⁷⁴⁵ | 10 ⁻⁷⁴⁶ | 10 ⁻⁷⁴⁷ | 10 ⁻⁷⁴⁸ | 10 ⁻⁷⁴⁹ | 10 ⁻⁷⁵⁰ | 10 ⁻⁷⁵¹ | 10 ⁻⁷⁵² | 10 ⁻⁷⁵³ | 10 ⁻⁷⁵⁴ | 10 ⁻⁷⁵⁵ | 10 ⁻⁷⁵⁶ | 10 ⁻⁷⁵⁷ | 10 ⁻⁷⁵⁸ | 10 ⁻⁷⁵⁹ | 10 ⁻⁷⁶⁰ | 10 ⁻⁷⁶¹ | 10 ⁻⁷⁶² | 10 ⁻⁷⁶³ | 10 ⁻⁷⁶⁴ | 10 ⁻⁷⁶⁵ | 10 ⁻⁷⁶⁶ | 10 ⁻⁷⁶⁷ | 10 ⁻⁷⁶⁸ | 10 ⁻⁷⁶⁹ | 10 ⁻⁷⁷⁰ | 10 ⁻⁷⁷¹ | 10 ⁻⁷⁷² | 10 ⁻⁷⁷³ | 10 ⁻⁷⁷⁴ | 10 ⁻⁷⁷⁵ |

RECORD OF BOREHOLE No 104A

1 OF 1

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4677630.3 : E 335263.1

ORIGINATED BY MA

DIST

WEST

HWY 401/3

BOREHOLE TYPE

POWER AUGER, SOLID STEM

COMPILED BY BRS

DATUM GEODETIC

DATE

April 1, 2008

CHECKED BY **SJS**

| 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 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE | | | | | | | |
| 186.15 | SOIL CONDITIONS INFERRED FROM BOREHOLE No. 104 GROUND SURFACE | | | | | | | 20 40 60 80 100 | | | | | | | |
| 0.00 | SILTY SAND, some clay, trace gravel, Loose Mottled brown and grey | | | | | | Concrete | | | | | | | | |
| 184.78 | | | | | | | | | | | | | | | |
| 1.37 | CLAYEY SILT, some sand, trace gravel Very stiff Brown becoming grey at about elev. 183.1m | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| 182.49 | | | | | | | | | | | | | | | |
| 3.66 | CLAYEY SILT, some sand, trace gravel, with sandy silt layers Very stiff Grey | | | | | | Bentonite | | | | | | | | |
| 181.73 | | | | | | | | | | | | | | | |
| 4.42 | CLAYEY SILT, some sand, trace gravel Very stiff Grey | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| 178.85 | | | | | | | | | | | | | | | |
| 7.35 | SAND AND GRAVEL, some silt, some clay Grey | | | | | | | | | | | | | | |
| 178.17 | | | | | | | | | | | | | | | |
| 7.98 | CLAYEY SILT, some sand, trace gravel Grey | | | | | | Sand | | | | | | | | |
| 8.23 | SANDY SILT, trace gravel Grey | | | | | | | | | | | | | | |
| 177.16 | | | | | | | | | | | | | | | |
| 8.99 | SILTY SAND, trace gravel, trace clay, with clayey silt layers Loose to compact Grey | | | | | | Piezometer | | | | | | | | |
| 176.09 | | | | | | | | | | | | | | | |
| 10.06 | CLAYEY SILT, some sand, trace gravel, with silt and sand partings Firm Grey | | | | | | | | | | | | | | |
| | END OF BOREHOLE | | | | | | | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 183.01m on April 4, 2008. | | | | | | | | | | | | | | |
| | Water level measured in shallow piezometer at elev. 183.76m on September 19, 2008. | | | | | | | | | | | | | | |

LDN_MTO_01 07-1130-207-0.GPJ LDN_MTO.GDT 8/29/09

| | | | | | |
|-----------------------------------|--|----------------------------------|--|--------|---------------|
| PROJECT <u>09-1132-0003</u> | | RECORD OF BOREHOLE No 201 | | 1 OF 3 | METRIC |
| W.P. <u>3118-08-01</u> | LOCATION <u>N 4677610.4 :E 335770.5</u> | ORIGINATED BY <u>NG</u> | | | |
| DIST <u>WEST</u> HWY <u>WEP/3</u> | BOREHOLE TYPE <u>POWER AUGER, HOLLOW STEM, WASH BORING WITH HQ</u> | COMPILED BY <u>LMK/DMB</u> | | | |
| DATUM <u>GEODETIC</u> | DATE <u>February 12, 2009 - February 13, 2009</u> | CHECKED BY <u>SJB</u> | | | |

| 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 | | | | | | | WATER CONTENT (%) | | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | | | | | | | ● QUICK TRIAXIAL | × LAB VANE | |
| 187.67 | GROUND SURFACE | | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | |
| 0.00 | TOPSOIL, clayey | | | | | | | | | | | | | | | | | |
| 187.34 | Black | | | | | | | | | | | | | | | | | |
| 0.33 | CLAYEY SILT, some sand, trace gravel, with oxidized fissures Very stiff to hard Mottled brown and grey | | 1 | SS | 26 | | | | | | | | | | | | | |
| | | | 2 | SS | 34 | | | | | | | | | | | | | |
| | | | 3 | SS | 44 | | | | | | | | | | | | | |
| 184.77 | CLAYEY SILT, some sand, trace gravel, with occasional sand pockets Stiff to hard Grey | | 4 | SS | 39 | | | | | | | | | 2 30 43 25 | | | | |
| 2.90 | | | 5 | SS | 23 | | | | | | | | | | | | | |
| | | | 6 | TO | PH | | | | | | | | | | | | | |
| | | | 7 | SS | 31 | | | | | | | | | 0 29 45 26 | | | | |
| | | | 8 | SS | 20 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 9 | SS | 10 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 10 | TO | PH | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 11 | SS | 13 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 12 | SS | 13 | | | | | | | | | 2 30 40 28 | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 13 | SS | PH | | | | | | | | | ZERO RECOVERY IN SHELBY TUBE PUSHED | | | | |

LDN_MTO_01 09-1132-0003.GPJ LDN_MTO.GDT 5/29/09

Continued Next Page

+ 3 x 3 Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

METRIC

PROJECT 09-1132-0003

W.P. 3118-08-01

LOCATION N 4677610.4 ;E 335770.5

ORIGINATED BY NG

DIST WEST HWY WEP/3

BOREHOLE TYPE POWER AUGER, HOLLOW STEM, WASH BORING WITH HO

COMPILED BY LMK/DMB

DATUM GEODETIC

DATE February 12, 2009 - February 13, 2009

CHECKED BY SJB

[illegible]

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+3, X3: Numbers refer to Sensitivity O 3% STRAIN AT FAILURE

| | | | | | |
|----------------------|---|----------------------------------|--|-----------------------|---------------|
| PROJECT 09-1132-0003 | | RECORD OF BOREHOLE No 201 | | 3 OF 3 | METRIC |
| W.P. 3118-08-01 | LOCATION N 4677610.4 ; E 335770.5 | | | ORIGINATED BY NG | |
| DIST WEST HWY WEP/3 | BOREHOLE TYPE POWER AUGER, HOLLOW STEM, WASH BORING WITH HQ | | | COMPILED BY LMK/DMB | |
| DATUM GEODETIC | DATE February 12, 2009 - February 13, 2009 | | | CHECKED BY SSB | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | |
|---------------|---|------------|---------|------|---------------|----------------------------|-----------------|---|----------------------------|------------------------------------|-------------------------------------|-----------------------------------|---------------------|---|-------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | WATER CONTENT (%) |
| | | | | | | | | ○ UNCONFINED ● QUICK TRIAXIAL | + FIELD VANE × LAB VANE | | | | | | |
| | | | | | | | 20 40 60 80 100 | 20 40 60 80 100 | 10 20 30 | | | | | | |
| | CLAYEY SILT, some sand, trace gravel Very stiff Grey | | 24 | SS | 20 | | | | | | | | | | |
| 155.67 | | | | | | | | | | | | | | | |
| 32.00 | CLAYEY SILT, some sand, trace gravel with sand pockets Hard Grey | | | | | | | | | | | | | | |
| 154.95 | | | | | | | | | | | | | | | |
| 32.72 | SAND AND GRAVEL, trace silt Very dense Grey | | 25 | SS | 116/ 250mm | | | | | | | | | | |
| 32.87 | | | | | | | | | | | | | | | |
| 153.99 | LIMESTONE (inferred) Grey | | | | | | | | | | | | | | |
| 33.68 | END OF BOREHOLE | | | | | | | | | | | | | | |
| | Groundwater encountered at about elev. 180.3m during drilling on February 12, 2009. | | | | | | | | | | | | | | |

LDN_MTO_01_09-1132-0003.GPJ LDN_MTO.GDT 6/29/09

RECORD OF BOREHOLE No 202

1 OF 4

METRIC

PROJECT 09-1132-0003

W.P. 3118-08-01

LOCATION N 4677573.5 ; E 335753.3

ORIGINATED BY NG

DIST WEST HWY WEP/3

BOREHOLE TYPE POWER AUGER, HOLLOW STEM, WASH BORING WITH HQ, NQRC

COMPILED BY LMK/DMB

DATUM GEODETIC

DATE February 18, 2009

CHECKED BY *SJB*

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|--|------------|---------|------|------------|----------------------------|-----------------|---|--|------------------------------------|-------------------------------------|-----------------------------------|---------------------|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | |
| 187.31 | GROUND SURFACE | | | | | | | 20 40 60 80 100 | | | | | | |
| 0.00 | TOPSOIL, clayey | | 1 | SS | 10 | | 187 | ○ UNCONFINED + FIELD VANE | | | | | | |
| 0.18 | Stiff Black CLAYEY SILT, some sand, trace gravel Stiff to very stiff Mottled brown and grey | | 2 | SS | 10 | | 186 | ● QUICK TRIAXIAL × LAB VANE | | | | | | |
| | | | 3 | SS | 22 | | | | | | | | | 3 27 39 31 |
| 185.18 | | | | | | | 185 | | | | | | | |
| 2.13 | CLAYEY SILT, some sand, trace gravel, with oxidized fissures Very stiff to hard Brown | | 4 | SS | 66 | | 184 | | | | | | | 7 28 43 22 |
| | | | 5 | SS | 62 | | 183 | | | | | | | |
| | | | 6 | SS | 20 | | 182 | | | | | | | |
| 182.43 | | | 7 | TO | PH | | 181 | | | | | | | |
| 4.88 | CLAYEY SILT, some sand, trace gravel Firm to hard Grey | | 8 | SS | 21 | | 180 | | | | | | | |
| | | | 9 | SS | 34 | | 179 | | | | | | | |
| | | | | | | | 178 | | | | | | | 1 31 44 24 |
| | | | 10 | SS | 9 | | 177 | | | | | | | |
| | | | | | | | 176 | | | | | | | |
| | | | 11 | SS | 8 | | 175 | | | | | | | |
| | | | | | | | 174 | | | | | | | 7 33 35 25 |
| | | | 12 | TO | PH | | 173 | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 13 | SS | 20 | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 14 | SS | 13 | | | | | | | | | |

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

LDN_MTO_01 09-1132-0003.GPJ LDN_MTO.GDT 6/29/09

METRIC

PROJECT 09-1132-0003

W.P. 3118-08-01

LOCATION N 4677573.5 :E 335753.3

ORIGINATED BY NG

DIST WEST HWY WEP/3

BOREHOLE TYPE POWER AUGER, HOLLOW STEM, WASH BORING WITH HQ, NQRC

COMPILED BY LMK/DMB

DATUM GEODETIC

DATE February 18, 2009

CHECKED BY SSB

| 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 (%) |
|--------------|---|------------|---------|------|------------|----------------------------|-----------------|--|--|------------------------|---------------------------------|-----------------------|--|---------------------------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | |
| | | | | | | | | ○ UNCONFINED + FIELD VANE | | | | | | |
| | | | | | | | | ● QUICK TRIAXIAL × LAB VANE | | | | | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | |
| | | | | | | | | WATER CONTENT (%) | | | | | | |
| | CLAYEY SILT, some sand, trace gravel Firm to hard Grey | | | | | | 172 | | | | | | | |
| | | | 15 | TO | PH | | 171 | | | | | | | |
| | | | | | | | 170 | | | | | | | |
| | | | 16 | SS | 19 | | 169 | | | | | | | |
| | | | | | | | 168 | | | | | | | 1 23 44 32 |
| 167.11 | | | | | | | 167 | | | | | | | |
| 20.20 | SILT CLAY, some sand, trace gravel Stiff to very stiff Grey | | 18 | SS | 18 | | 166 | | | | | | | |
| | | | | | | | Grout 165 | | | | | | | |
| | | | 19 | SS | 13 | | 164 | | | | | | | |
| 164.06 | | | | | | | 163 | | | | | | | |
| 23.25 | CLAYEY SILT, some sand, trace gravel Very stiff to hard Grey | | 20 | SS | 18 | | 162 | | | | | | | 3 22 45 30 |
| | | | | | | | 161 | | | | | | | |
| | | | 21 | SS | 21 | | 160 | | | | | | | |
| | | | | | | | 159 | | | | | | | |
| | | | 22 | SS | 36 | | 158 | | | | | | | |
| 157.97 | | | | | | | Holeplug | | | | | | | |
| 29.34 | | | | | | | | | | | | | | |

DN_MTO_01 09-1132-0003.GPJ LBN MTO.GDT 6/29/09

Continued Next Page

+3, X3: Numbers refer to Sensitivity O 3% STRAIN AT FAILURE

METRIC

PROJECT 09-1132-0003

W.P. 3118-08-01

LOCATION N 4677573.5 ; E 335753.3

ORIGINATED BY NG

DIST WEST HWY WEP/3

BOREHOLE TYPE POWER AUGER, HOLLOW STEM, WASH BORING WITH HQ, NQRC

COMPILED BY LMK/DMB

DATUM GEODETTIC

DATE February 18, 2009

CHECKED BY **SJB**

[illegible]

DN MTO 01 09-1132-0003,GPJ LDN MTO.GDT 6/29/09

+3, X3: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

PROJECT: 09-1132-0003

RECORD OF DRILLHOLE: 202

SHEET 4 OF 4

LOCATION: N 4677573.5;E 335753.3

DRILLING DATE: February 18, 2009

DATUM: GEODETIC

INCLINATION: -90° AZIMUTH: —

DRILL RIG: POWER AUGER, HOLLOW STEM, WASH BORING WITH HQ, NQRC

DRILLING CONTRACTOR: LANTECH

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. | RUN No. | PENETRATION RATE (mm/min) | FLUSH | COLOUR % RETURN | ELEVATION | JN - Joint FLT - Fault SHR - Shear VN - Vein CJ - Congregate BD - Bedding FO - Foliation CO - Contact OR - Orthogonal CL - Cleavage PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular PO - Polished K - Slickensided SM - Smooth Ro - Rough Br - Broken Rock NOTE: For additional abbreviations refer to list of abbreviations & symbols | | | | | | | | | | HYDRAULIC CONDUCTIVITY k, cm/sec | DIAMETER mm INDEX (MPa) | NOTES WATER LEVELS INSTRUMENTATION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
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| | | | | DEPTH (m) | | | | | | RECOVERY | | R.Q.D. % | FRACT INDEX PER 0.3 | DISCONTINUITY DATA | | DIP w.r.t. CORE AXIS | TYPE AND SURFACE DESCRIPTION | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

DEPTH SCALE

1:75



LOGGED: SG

CHECKED: SJB

RECORD OF BOREHOLE No 203

1 OF 3

METRIC

PROJECT 09-1132-0003

W.P. 3118-08-01

LOCATION N 4677539.3 E 335743.5

ORIGINATED BY NG

DIST WEST HWY WEP/3

BOREHOLE TYPE POWER AUGER, HOLLOW STEM, WASH BORING WITH HQ

COMPILED BY LMK/DMB

DATUM GEODETTIC

DATE February 25, 2009 - February 26, 2009

CHECKED BY *SWB*

| 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 | | | | | | | WATER CONTENT (%) |
| | | | | | | | | ○ UNCONFINED ● QUICK TRIAXIAL | + FIELD VANE x LAB VANE | | | | | | |
| 187.23 | GROUND SURFACE | | | | | | | 20 40 60 80 100 | | | | | | | |
| 0.00 | TOPSOIL, clayey Black | | 1 | AS | | | 187 | | | | | | | | |
| 186.62 | | | | | | | | | | | | | | | |
| 0.61 | CLAYEY SILT, some sand, trace gravel Very stiff Mottled brown and grey | | 2 | SS | 15 | | 186 | | | | ○ | | | | |
| | | | 3 | SS | 28 | | | | | | ○ | — | | 2 29 39 30 | |
| 185.10 | | | | | | | | | | | | | | | |
| 2.13 | CLAYEY SILT, some sand, trace gravel Very stiff to hard Brown | | 4 | SS | 60 | | 185 | | | | ○ | | | | |
| | | | 5 | SS | 60 | | 184 | | | | ○ | — | | 3 29 37 31 | |
| | | | 6 | SS | 24 | | | | | | ○ | | | | |
| 182.81 | | | | | | | 183 | | | | ○ | | | | |
| 4.42 | CLAYEY SILT, some sand, trace gravel Very stiff Grey | | 7 | TO | PH | | 182 | | | | ○ | | | | |
| | | | 8 | SS | 16 | | | | | | | | | | |
| | | | 9 | SS | 21 | | 181 | | | | ○ | | | | |
| | | | | | | | | | | | | | | | |
| 179.76 | | | | | | | 180 | | | | | | | | |
| 7.47 | SILTY SAND, some clay, trace gravel Compact Grey | | 10 | SS | 20 | | 179 | | | | — | — | | 4 41 39 16 | |
| | | | | | | | | | | | | | | | |
| 178.09 | | | | | | | 178 | | | | | | | | |
| 9.14 | CLAYEY SILT, some sand, trace gravel Stiff to very stiff Grey | | 11 | SS | PH | | 177 | | | | ○ | | | ZERO RECOVERY IN SHELBY TUBE, PUSHED SPLIT-SPOON SAMPLER. | |
| | | | | | | | | | | | | | | | |
| | | | 12 | TO | PH | | 176 | | | | ○ | | | | |
| | | | | | | | | | | | | | | | |
| | | | 13 | SS | 11 | | 175 | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | 174 | | | | ○ | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | |
| | | | | | | | 173 | | | | | | | | |
| | | | 14 | SS | 8 | | | | | | | | | 2 28 40 30 | |

Continued Next Page

+ 3, x 3. Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

LDN_MTO_01_09-1132-0003.GPJ LDN_MTO.GDT 6/29/09

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| PROJECT 09-1132-0003 | | RECORD OF BOREHOLE No 203 | | 2 OF 3 | METRIC |
| W.P. 3118-08-01 | LOCATION N 4677539.3 E 335743.5 | ORIGINATED BY NG | | | |
| DIST WEST HWY WEP/3 | BOREHOLE TYPE POWER AUGER, HOLLOW STEM, WASH BORING WITH HQ | COMPILED BY LMK/DMB | | | |
| DATUM GEODETIC | DATE February 25, 2009 - February 26, 2009 | CHECKED BY <i>SSS</i> | | | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | | |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|---|--------------|------------------------------------|-------------------------------------|-----------------------------------|---------------------|---|-------------------|-------------------|-------------|----|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | WATER CONTENT (%) | | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | | | | | | | ● QUICK TRIAXIAL | × LAB VANE | 20 |
| | | | | | | | | 20 | 40 | 60 | 80 | 100 | 10 | 20 | 30 | kN/m ³ | GR SA SI CL | |
| | CLAYEY SILT, some sand, trace gravel Stiff to very stiff Grey | | | | | | 172 | | | | | | | | | | | |
| | | | 15 | TO | PH | | 171 | | | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | | | |
| | | | 16 | SS | 11 | | 169 | | | | | | | | | | | |
| | | | | | | | 168 | | | | | | | | | | | |
| | | | 17 | SS | 17 | | 167 | | | | | | | | | | | |
| 167.34 | | | | | | | 166 | | | | | | | | | | | |
| 19.89 | SILTY CLAY, some sand, trace gravel Stiff to very stiff Grey | | 18 | SS | 14 | | 165 | | | | | | | | | | | |
| | | | | | | | 164 | | | | | | | | | | | |
| | | | 19 | SS | 22 | | 163 | | | | | | | | | | | |
| 164.29 | | | | | | | 162 | | | | | | | | | | | |
| 22.94 | CLAYEY SILT, some sand, trace gravel Very stiff Grey | | 20 | SS | 22 | | 161 | | | | | | | | | | | |
| | | | | | | | 160 | | | | | | | | | | | |
| 162.85 | | | | | | | 159 | | | | | | | | | | | |
| 24.38 | SANDY SILT, trace clay Dense Grey | | 21 | SS | 45 | | 158 | | | | | | | | | | | |
| | | | | | | | 157 | | | | | | | | | | | |
| 161.32 | CLAYEY SILT, some sand, trace gravel Hard Grey | | 22 | SS | 34 | | 156 | | | | | | | | | | | |
| | | | | | | | 155 | | | | | | | | | | | |
| 159.06 | | | | | | | 154 | | | | | | | | | | | |
| 28.17 | SANDY SILT, trace clay, with gravel layers Very dense Grey | | 23 | SS | 129 | | 153 | | | | | | | | | | | |
| | | | | | | | 152 | | | | | | | | | | | |
| 158.27 | SILTY CLAY, some sand, trace gravel Stiff to very stiff Grey | | 24 | SS | 21 | | 151 | | | | | | | | | | | |
| 28.96 | | | | | | | 150 | | | | | | | | | | | |

LDN_MTO_01_09-1132-0003.GPJ LDN_MTO.GDT 6/29/09

Continued Next Page

+ 3, X 3. Numbers refer to Sensitivity O 3% STRAIN AT FAILURE

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| PROJECT 09-1132-0003 | | RECORD OF BOREHOLE No 203 | | 3 OF 3 | METRIC |
| W.P. 3118-08-01 | LOCATION N 4677539.3 :E 335743.5 | ORIGINATED BY NG | | | |
| DIST WEST HWY WEP/3 | BOREHOLE TYPE POWER AUGER, HOLLOW STEM, WASH BORING WITH HQ | COMPILED BY LMK/DMB | | | |
| DATUM GEODETIC | DATE February 25, 2009 - February 26, 2009 | CHECKED BY <i>SJB</i> | | | |

| 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 | | | | | | | | WATER CONTENT (%) | | |
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LDN_MTO_01_09-1132-0003.GPJ LDN_MTO.GDT 6/29/09

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| PROJECT 09-1132-0003 | | RECORD OF BOREHOLE No 206 | | 1 OF 3 | METRIC |
| W.P. 3117-08-01 | LOCATION N 4677645.8 E 335462.4 | | | ORIGINATED BY NG | |
| DIST WEST HWY WEP/3 | BOREHOLE TYPE POWER AUGER, HOLLOW STEM, WASH BORING WITH HQ | | | COMPILED BY LMK/DMB | |
| DATUM GEODETIC | DATE February 9, 2009 - February 10, 2009 | | | CHECKED BY <i>CSB</i> | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT w _p | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|---|--------------|------------------------------------|-------------------------------------|-----------------------------------|---------------------|---|-------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | WATER CONTENT (%) |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | | | | | | |
| | | | | | | | | ● QUICK TRIAXIAL | × LAB VANE | | | | | | |
| 186.48 | GROUND SURFACE | | | | | | | | | | | | | | |
| 0.00 | TOPSOIL | | | | | | | | | | | | | | |
| 0.20 | Firm Black | | 1 | SS | 7 | | | | | | | | | | |
| 185.87 | CLAYEY SILT, some sand, trace gravel | | | | | | | | | | | | | | |
| 0.61 | Firm | | 2 | SS | 11 | | | | | | | | | | |
| 185.41 | Mottled brown and grey | | | | | | | | | | | | | | |
| 1.07 | SAND, fine, trace silt Compact Grey | | 3 | SS | 6 | | | | | | | | | 2 23 45 30 | |
| 184.35 | CLAYEY SILT, some sand, trace gravel, with oxidized fissures | | | | | | | | | | | | | | |
| 2.13 | Firm to stiff | | | | | | | | | | | | | | |
| | Mottled brown and grey | | 4 | SS | 28 | | | | | | | | | | |
| | CLAYEY SILT, some sand, trace gravel, with oxidized fissures | | | | | | | | | | | | | | |
| | Very stiff to hard Brown | | 5 | SS | 44 | | | | | | | | | 5 43 40 12 | |
| | | | 6 | SS | 35 | | | | | | | | | | |
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LDN MTO 01 09-1132-0003.GPJ LDN MTO.GDT 5/29/09

Continued Next Page

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

| | | | | | |
|----------------------|---|----------------------------------|--|--------|---------------|
| PROJECT 09-1132-0003 | | RECORD OF BOREHOLE No 206 | | 2 OF 3 | METRIC |
| W.P. 3117-08-01 | LOCATION N 4677645.8 ; E 335462.4 | ORIGINATED BY NG | | | |
| DIST WEST HWY WEP/3 | BOREHOLE TYPE POWER AUGER, HOLLOW STEM, WASH BORING WITH HQ | COMPILED BY LMK/DMB | | | |
| DATUM GEODETIC | DATE February 9, 2009 - February 10, 2009 | CHECKED BY SDB | | | |

| 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 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL x LAB VANE | WATER CONTENT (%) | | | | | |
| | CLAYEY SILT, some sand, trace gravel Firm to hard Grey | | | | | | 171 | | | | | | | |
| | | | 16 | SS | 14 | | 170 | | | | | | | |
| | | | | | | | 169 | | | | | | | |
| | | | 17 | SS | 8 | | 168 | 3.8 | | | | | | |
| | | | | | | | 167 | | | | | | | 1 13 40 46 |
| | | | 18 | SS | 7 | | 166 | 1.3 | | | | | | |
| | | | | | | | 165 | | | | | | | |
| | | | 19 | SS | 8 | | 164 | 1.8 | | | | | | |
| | | | | | | | 163 | | | | | | | |
| | | | 20 | SS | 13 | | 162 | | | | | | | |
| | | | | | | | 161 | | | | | | | |
| | | | 21 | SS | 20 | | 160 | | | | | | | |
| | | | | | | | 159 | | | | | | | 1 14 49 36 |
| | | | 22 | SS | 76 | | 158 | | | | | | | |
| | | | | | | | 157 | | | | | | | |
| | | | 23 | SS | 13 | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 24 | SS | 14 | | | | | | | | | |
| | | | | | | | | | | | | | | |



LDN_MTO_01 09-1132-0003.GPJ LDN_MTO.GDT 6/29/09

156.46

Continued Next Page

+ 3, x 3. Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

| | | | | | |
|----------------------|---|----------------------------------|--|--------|---------------|
| PROJECT 09-1132-0003 | | RECORD OF BOREHOLE No 206 | | 3 OF 3 | METRIC |
| W.P. 3117-08-01 | LOCATION N 4677645.8 ; E 335462.4 | ORIGINATED BY NG | | | |
| DIST WEST HWY WEP/3 | BOREHOLE TYPE POWER AUGER, HOLLOW STEM, WASH BORING WITH HQ | COMPILED BY LMK/DMB | | | |
| DATUM GEODETIC | DATE February 9, 2009 - February 10, 2009 | CHECKED BY <i>SJS</i> | | | |

| 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 (%) |
|--------------|--|---|---------|------|------------|-------------------------|-----------------|--|--|------------------------|---------------------------------|-----------------------|--|---------------------------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | |
| 30.02 | SILTY SAND, some clay, trace gravel, with silt pockets Very dense Grey |  | 25 | SS | 72 | | | | | | | | | GR SA SI CL 5 47 32 16 |
| 155.70 | | | | | | | | | | | | | | |
| 30.78 | CLAYEY SILT, some sand, trace gravel, with sandy silt pockets Very stiff to hard Grey | | 26 | SS | 29 | | | | | | | | | |
| 154.20 | | | 27 | SS | 80/280mm | | | | | | | | | |
| 32.28 | LIMESTONE (inferred) Grey |  | | | | | | | | | | | | |
| 153.51 | | | | | | | | | | | | | | |
| 32.97 | END OF BOREHOLE Groundwater encountered at about elev. 173.9m during drilling on February 10, 2009. | | | | | | | | | | | | | |

LDN_MTO_01_09-1132-0003.GPJ LDN_MTO.GDT 6/29/09

RECORD OF BOREHOLE No 207

1 OF 4

METRIC

PROJECT 09-1132-0003

W.P. 3117-08-01

LOCATION N 4677598.1 : E 335502.7

ORIGINATED BY NG

DIST WEST HWY WEP/3

BOREHOLE TYPE POWER AUGER, HOLLOW STEM, WASH BORING WITH HQ, NQRC

COMPILED BY LMK/DMB

DATUM GEODETIC

DATE February 27, 2009 - March 2, 2009

CHECKED BY SJS

| SOIL PROFILE | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _P | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) |
|---------------|---|------------|--------|------|----------------------------|-----------------|--|--------------------|------------------------------------|-------------------------------------|-----------------------------------|---------------------|---|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | | | "N" VALUES | SHEAR STRENGTH kPa | | | | | |
| 186.89 | GROUND SURFACE | | | | | | 20 40 60 80 100 | 20 40 60 80 100 | 10 20 30 | | | | GR SA SI CL |
| 0.00 | TOPSOIL, clayey Black | | | | | | ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE | | | | | | |
| 186.38 | | | | | | | | | | | | | |
| 0.51 | CLAYEY SILT, some sand, trace gravel Hard Mottled brown and grey | | 1 | SS | 39 | 186 | | | | ○ | | | |
| | | | 2 | SS | 57 | 185 | | | | ○ | | | 2 30 37 31 |
| 184.76 | | | | | | | | | | | | | |
| 2.13 | CLAYEY SILT, some sand, trace gravel Hard Brown | | 3 | SS | 47 | 184 | | | | ○ | | | |
| | | | 4 | SS | 61 | 183 | | | | ○ | | | 3 31 39 27 |
| | | | 5 | SS | 52 | 182 | | | | ○ | | | |
| 182.01 | | | 6 | TO | PH | 181 | | | | ○ | | | |
| 4.88 | CLAYEY SILT, some sand, trace gravel Stiff to hard Grey | | 7 | SS | 37 | 180 | | | | ○ | | | 3 30 41 26 |
| | | | 8 | SS | 15 | 179 | | | | ○ | | | |
| | | | | | | 178 | | | | | | | |
| | | | | | | 177 | | | | ○ | | | |
| | | | | | | 176 | | | | | | | |
| | | | 11 | SS | 13 | 175 | | | | ○ | | | 3 35 39 23 |
| | | | | | | 174 | | | | ○ | | | |
| | | | | | | 173 | | | | | | | |
| | | | 13 | TO | PH | 172 | | | | ○ | | | |

Continued Next Page

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

LDN_MTO_01_09-1132-0003.GPJ LDN_MTO_GDT 6/29/09

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|-----------------------------|--|----------------------------------|--|--------|---------------|
| PROJECT 09-1132-0003 | | RECORD OF BOREHOLE No 207 | | 2 OF 4 | METRIC |
| W.P. 3117-08-01 | LOCATION N 4677598.1 E 335502.7 | ORIGINATED BY NG | | | |
| DIST WEST HWY WEP/3 | BOREHOLE TYPE POWER AUGER, HOLLOW STEM, WASH BORING WITH HQ, NQRC | COMPILED BY LMK/DMB | | | |
| DATUM GEODETIC | DATE February 27, 2009 - March 2, 2009 | CHECKED BY | | | |

| 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 | | | | | | WATER CONTENT (%) | | | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | | | | | |
| | CLAYEY SILT, some sand, trace gravel Stiff to hard Grey | | | | | | | | | | | | | | | | | |
| | | | 14 | SS | 13 | | 171 | | | | | | | | | | | |
| | | | | | | | 170 | | | | | | | | | | | |
| | | | 15 | SS | 13 | | 169 | | | | | | 2 21 43 34 | | | | | |
| | | | 16 | SS | 10 | | 168 | | | | | | | | | | | |
| | | | | | | | 167 | | | | | | | | | | | |
| | | | 17 | SS | 13 | | 166 | | | | | | | | | | | |
| | | | | | | | 165 | | | | | | | | | | | |
| | | | 18 | SS | 20 | | 164 | | | | | | | | | | | |
| | | | | | | | 163 | | | | | | | | | | | |
| | | | 19 | SS | 38 | | 162 | | | | | | | | | | | |
| | | | 20 | SS | 23 | | 161 | | | | | | 5 22 43 3 | | | | | |
| | | | 21 | SS | 21 | | 160 | | | | | | | | | | | |
| | | | | | | | 159 | | | | | | | | | | | |
| | | | 22 | SS | 34 | | 158 | | | | | | | | | | | |
| | | | 23 | SS | 15 | | 157 | | | | | | | | | | | |

Continued Next Page

+ 3, x 3. Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE

LDN_MTO_01 09-1132-0003.GPJ LDN_MTO.GDT 6/29/09

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|-----------------------------------|--|----------------------------------|--|--------|---------------|
| PROJECT <u>09-1132-0003</u> | | RECORD OF BOREHOLE No 207 | | 3 OF 4 | METRIC |
| W.P. <u>3117-08-01</u> | LOCATION <u>N 4677598.1 :E 335502.7</u> | ORIGINATED BY <u>NG</u> | | | |
| DIST <u>WEST</u> HWY <u>WEP/3</u> | BOREHOLE TYPE <u>POWER AUGER, HOLLOW STEM, WASH BORING WITH HQ, NQRC</u> | COMPILED BY <u>LMK/DMB</u> | | | |
| DATUM <u>GEODETIC</u> | DATE <u>February 27, 2009 - March 2, 2009</u> | CHECKED BY <u>SJB</u> | | | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | |
|---------------|---|------------|---------|-------|------------|----------------------------|-----------------|---|----|----|------------------------------------|-------------------------------------|-----------------------------------|---------------------|---|----|-----|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | 'N' VALUES | | | 20 | 40 | 60 | | | | | | 80 | 100 |
| | | | | | | | | SHEAR STRENGTH kPa | | | | | | | | | |
| | | | | | | | | | | | | | | | | | |
| | CLAYEY SILT, some sand, trace gravel Stiff to hard Grey | | 24 | SS | 100 | | | | | | | | | | | | |
| 154.53 | | | 25 | SS | 100/50mm | | | | | | | | | | | | |
| 32.36 | LIMESTONE, fresh, medium strong, thinly laminated, very fine to coarse grained, faintly porous Light tan to grey (FOR DETAILED DESCRIPTIONS REFER TO RECORD OF DRILL HOLE) | | 26 | NQ RC | | | | | | | | | | | | | |
| | | | 27 | NQ RC | | | | | | | | | | | | | |
| 151.53 | | | | | | | | | | | | | | | | | |
| 35.36 | END OF BOREHOLE Groundwater encountered at about elev. 176.1m during drilling on February 27, 2009. Water level measured in deep piezometer at elev. 178.05m on May 26, 2009. | | | | | | | | | | | | | | | | |

LDN_MTO_01 09-1132-0003.GPJ LDN_MTO_GDT 5/29/09

PROJECT: 09-1132-0003

RECORD OF DRILLHOLE: 207

SHEET 4 OF 4

LOCATION: N 4677598.1 E 335502.7

DRILLING DATE: February 27, 2009 - March 2, 2009

DATUM: GEODETIC

INCLINATION: -90°

AZIMUTH: —

DRILL RIG: POWER AUGER, HOLLOW STEM, WASH BORING WITH HQ, NQRC

DRILLING CONTRACTOR: LANTECH

| DEPTH SCALE METRES | DRILLING RECORD | DESCRIPTION | SYMBOLIC LOG | ELEV. | RUN No. | PENETRATION RATE (min/m) | COLOUR % RETURN | FLUSH | ELEVATION | JN - Joint FLT - Fault SHR - Shear VN - Vein CJ - Congregate BD - Bedding FO - Foliation CO - Contact OR - Orthogonal CL - Cleavage PL - Planar CU - Curved UN - Undulating ST - Stepped IR - Irregular PO - Polished K - Slickensided SM - Smooth Ro - Rough Br - Broken Rock NOTE: For additional abbreviations refer to list of abbreviations & symbols | | | | | | | | | | DIAMETRAL INDEX (MPa) | NOTES WATER LEVELS INSTRUMENTATION | | |
|-----------------------|-----------------|---|--------------|--------------------------------------|---------|-----------------------------|--------------------|-------|-----------|--|----------------------|----------------------|-------------|----------------------------|----------------------------------|----------------------|--|---------------------|--|--------------------------|--|-------------|--|
| | | | | DEPTH (m) | | | | | | RECOVERY | | | R.Q.D. % | FRACT. INDEX PER 0.3 | DISCONTINUITY DATA | | HYDRAULIC CONDUCTIVITY k, cm/sec | | | | | | |
| | | | | | | | | | | TOTAL CORE % | SOLID CORE % | DIP w/1 CORE AXIS | | | TYPE AND SURFACE DESCRIPTION | | | | | | | | |
| | | | | | | | | | | 80 60 40 20 | 80 60 40 20 | | | | | 80 60 40 20 | 5 10 15 20 | 0 30 60 90 | 10 ⁻¹ 10 ⁻² 10 ⁻³ 10 ⁻⁴ | | | 2 1 0 | |
| | | ROCK SURFACE | | 154.53 | | | | | | | | | | | | | | | | | | | |
| | | LIMESTONE, fresh, medium strong, weakly laminated, medium grained, faintly porous, light to tan grey Broken core from about elev. 154.6m to about elev. 154.3m | | 154.36 154.26 | | | | | 154 | | | | | | JN, CU, SM, CI JN, PL, Ro, CI | | | | | | | | |
| | | LIMESTONE, fresh, medium strong, weakly laminated, very fine grained, faintly porous, grey with dark grey inclusions, stylolitic | | 153.61 153.28 153.21 153.68 | 1 | | | | 153 | | | | | | | | | | | | | | |
| | | LIMESTONE, fresh, medium strong, weakly laminated, very fine to coarse grained, faintly porous, light grey, fossiliferous, stylolitic | | 152.20 152.69 | 2 | | | | 152 | | | | | | JN, PL, SM, CI | | | | | | | | |
| | | LIMESTONE, fresh, medium strong, thinly laminated, fine to coarse grained, faintly porous with porous zones, light tan, fossiliferous | | 151.53 151.36 | | | | | | | | | | | | | | | | | | | |
| | | LIMESTONE, fresh, medium strong, thinly laminated, fine to coarse grained, faintly porous, light grey, stylolitic | | | | | | | | | | | | | | | | | | | | | |
| | | LIMESTONE, fresh, medium strong, thinly laminated, fine grained, faintly porous, light tan, stylolitic | | | | | | | | | | | | | | | | | | | | | |
| | | END OF DRILLHOLE | | | | | | | | | | | | | | | | | | | | | |

LDN, ROCK 03 09-1132-0003-ROCK.GPJ GLDR LDN.GDT 6/29/09 DATA INPUT: LMK

DEPTH SCALE

1:75



LOGGED: SG

CHECKED: SJB

METRIC

PROJECT 09-1132-0003

W.P. 3117-08-01

LOCATION N 4677543.9 E 335526.5

ORIGINATED BY NG

DIST WEST HWY WEP/3

BOREHOLE TYPE POWER AUGER, HOLLOW STEM, WASH BORING WITH HQ

COMPILED BY LMK/DMB

DATUM GEODETIC

DATE March 4, 2009 - March 5, 2009

CHECKED BY SJB

[illegible]

Continued Next Page

 $+^3 \times^3$

Numbers refer to
Sensitivity

○ 3% STRAIN AT FAILURE

| | | | | | |
|----------------------|---|----------------------------------|--|-----------------------|---------------|
| PROJECT 09-1132-0003 | | RECORD OF BOREHOLE No 208 | | 2 OF 3 | METRIC |
| W.P. 3117-08-01 | LOCATION N 4677543.9; E 335526.5 | | | ORIGINATED BY NG | |
| DIST WEST HWY WEP/3 | BOREHOLE TYPE POWER AUGER, HOLLOW STEM, WASH BORING WITH HQ | | | COMPILED BY LMK/DMB | |
| DATUM GEODETIC | DATE March 4, 2009 - March 5, 2009 | | | CHECKED BY <i>SJB</i> | |

| 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 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE | | | | | | |
| | CLAYEY SILT, some sand, trace gravel Stiff to hard Grey | | 15 | TO | PH | | | | | | | | | |
| | | | 16 | SS | 10 | | | | | | | | | 1 24 43 32 |
| 168.51 | | | | | | | | | | | | | | |
| 18.37 | SILTY CLAY, some sand, trace gravel Stiff Grey | | 17 | SS | 10 | | | | | | | | | |
| | | | 18 | SS | 10 | | | | | | | | | |
| | | | | | | | | | | | | | | |
| 165.46 | | | | | | | | | | | | | | |
| 21.42 | CLAYEY SILT, some sand, trace gravel Very stiff to hard Grey | | 19 | SS | 19 | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 20 | SS | 35 | | | | | | | | | 2 24 47 27 |
| | | | | | | | | | | | | | | |
| | | | 21 | SS | 57 | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 22 | SS | 25 | | | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 23 | SS | 20 | | | | | | | | | |
| | | | | | | | | | | | | | | |
| 157.11 | | | | | | | | | | | | | | |
| 29.77 | SANDY SILT, trace clay | | 24 | SS | 41 | | | | | | | | | 0 45 50 5 |

LDN_MTO_01 09-1132-0003.GPJ LDN_MTO.GDT 6/25/09

Continued Next Page

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

| | | | | | |
|----------------------|---|-----------------------------------|--|--------|---------------|
| PROJECT 09-1132-0003 | | RECORD OF BOREHOLE No 208A | | 1 OF 1 | METRIC |
| W.P. 3117-08-01 | LOCATION N 4677543.9 E 335528.5 | ORIGINATED BY NG | | | |
| DIST WEST HWY WEP/3 | BOREHOLE TYPE POWER AUGER, HOLLOW STEM, WASH BORING WITH HQ | COMPILED BY DMB | | | |
| DATUM GEODETIC | DATE March 5, 2009 | CHECKED BY SJB | | | |

| 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 (SOIL CONDITIONS INFERRED FROM BOREHOLE No. 208) | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL × LAB VANE | | | | | | |
| 186.88 | GROUND SURFACE | | | | | | | 20 40 60 80 100 | 10 20 30 | | | | | |
| 0.00 | TOPSOIL, clayey Black | | | | | | Holeplug | | | | | | | |
| 186.42 | | | | | | | | | | | | | | |
| 0.46 | CLAYEY SILT, some sand, trace gravel Hard Brown | | | | | | | | | | | | | |
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LDN_MTO_01 09-1132-0003.GPJ LDN_MTO_GDT 6/29/09

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

RECORD OF BOREHOLE No CPT-103

1 OF 1

METRIC

PROJECT 07-1130-207-0

W.P.

LOCATION

N 4677620.0 :E 335400.7

ORIGINATED BY MA

DIST

WEST

HWY 401/3

BOREHOLE TYPE

POWER AUGER, SOLID STEM

COMPILED BY

BRS

DATUM GEODETIC

DATE

March 31, 2008

CHECKED BY

SJB

| 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 | | |
| 186.30 | GROUND SURFACE | | | | | | | | | | | | | |
| 0.09 | TOPSOIL, silty Brown CLAYEY SILT, some sand, trace gravel Firm to hard Mottled brown and grey, becoming grey at about elev. 183.0m | | 1 | SS | 7 | | 186 | | | | | | | |
| | | | 2 | SS | 26 | | 185 | | | | | | | |
| | | | 3 | SS | 35 | | 184 | | | | | | | |
| | | | 4 | SS | 29 | | 183 | | | | | | | |
| | | | 5 | SS | 15 | | | | | | | | | |
| 182.03 | END OF BOREHOLE | | | | | | | | | | | | | |
| 4.27 | Borehole dry during drilling on March 31, 2008. | | | | | | | | | | | | | |

RECORD OF BOREHOLE No 1

1 OF 1

METRIC

W.P. 143-91-00 LOCATION Sta. 10+539.7 O/S 28.6m Lt (from Centreline of Hwy. 3) ORIGINATED BY E.M.
 DIST 1 HWY 401 and 3 BOREHOLE TYPE Hollow Stem Auger and Vane Tests COMPILED BY D.S.
 DATUM Geodetic DATE June 9, 1993 CHECKED BY T.K.

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | | | | PLASTIC LIMIT NATURAL MOISTURE CONTENT | | | 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 | W _P | W | W _L | | | | | | | | | | | | | | | |
| 187.2 | Ground Surface | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.0 | Clayey Silt Fill --- Granular Base | | 1 | SS | 8 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 186.0 | Stiff | | 2 | SS | 37 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1.2 | Very Stiff to Hard | | 3 | SS | 64 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ----- Brown | | 4 | SS | 31 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ----- Grey | | 5 | SS | 19 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 6 | SS | 15 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Clayey Silt with Sand and trace of Gravel occasional Sand Layers (Glacial Till) | | 7 | SS | 10 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 8 | SS | 6 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Firm to Very Stiff | | 9 | SS | 10 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 10 | SS | 7 | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 11 | SS | 8 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 173.8 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 13.4 | End of Borehole | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | * <table border="1"> <thead> <tr> <th>Date</th> <th>Water Level</th> </tr> </thead> <tbody> <tr> <td>June 9</td> <td>12.1m Dry</td> </tr> <tr> <td>June 11</td> <td>6.9m</td> </tr> <tr> <td>June 15</td> <td>1.2m</td> </tr> <tr> <td>June 16</td> <td>1.0m</td> </tr> <tr> <td>June 17</td> <td>1.0m</td> </tr> <tr> <td>June 18</td> <td>1.0m</td> </tr> </tbody> </table> | Date | Water Level | June 9 | 12.1m Dry | June 11 | 6.9m | June 15 | 1.2m | June 16 | 1.0m | June 17 | 1.0m | June 18 | 1.0m | | | | | | | | | | | | | | | |
| Date | Water Level | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 9 | 12.1m Dry | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 11 | 6.9m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 15 | 1.2m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 16 | 1.0m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 17 | 1.0m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 18 | 1.0m | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

RECORD OF BOREHOLE No 2

1 OF 1

METRIC

W.P. 143-91-00 LOCATION Sta. 10+684.6 O/S 29.0m Lt (from Centreline of Hwy. 3) ORIGINATED BY E.M.
 DIST 1 HWY 401 and 3 BOREHOLE TYPE Hollow Stem Auger and Cone Test COMPILED BY D.S.
 DATUM Geodetic DATE June 8, 1993 CHECKED BY T.K.

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _P | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | | | | | | | | | | | |
|--------------|--|------------|-------------|--------|------------|-------------------------|-----------------|--|------|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|------|----|-----|----|----|----|--|--|--|--|--|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | 'N' VALUES | | | 20 | 40 | | | | | | 60 | 80 | 100 | 20 | 40 | 60 | | | | | | | |
| 186.6 | Ground Surface | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.0 | Very Stiff to Hard | | 1 | SS | 42 | | 186 | | | | | | | | | | | | | | | | | | | | |
| | | | 2 | SS | 48 | | 184 | | | | | | | | | | | | | | | | | | | | |
| | | | 3 | SS | 27 | | 182 | | | | | | | | | | | | | | | | | | | | |
| | | | 4 | SS | 16 | | 180 | | | | | | | | | | | | | | | | | | | | |
| | | | 5 | SS | 16 | | 178 | | | | | | | | | | | | | | | | | | | | |
| | | | 6 | SS | 11 | | 176 | | | | | | | | | | | | | | | | | | | | |
| | | | 7 | SS | 8 | | | | | | | | | | | | | | | | | | | | | | |
| | | | 8 | TW | PH | | | | | | | | | | | | | | | | | | | | | | |
| | | | 9 | SS | 9 | | | | | | | | | | | | | | | | | | | | | | |
| | | | 10 | SS | 7 | | | | | | | | | | | | | | | | | | | | | | |
| | | | 11 | SS | 8 | | | | | | | | | | | | | | | | | | | | | | |
| 174.0 | | | 12 | SS | 11 | | | | | | | | | | | | | | | | | | | | | | |
| 12.6 | End of Borehole | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <p>* </p> <table border="1"> <thead> <tr> <th>Date</th> <th>Water Level</th> </tr> </thead> <tbody> <tr> <td>June 8</td> <td>10.7m Dry</td> </tr> <tr> <td>June 9</td> <td>9.0m</td> </tr> <tr> <td>June 11</td> <td>8.4m</td> </tr> <tr> <td>June 15</td> <td>5.2m</td> </tr> <tr> <td>June 17</td> <td>3.3m</td> </tr> <tr> <td>June 18</td> <td>3.0m</td> </tr> </tbody> </table> | Date | Water Level | June 8 | 10.7m Dry | June 9 | 9.0m | June 11 | 8.4m | June 15 | 5.2m | June 17 | 3.3m | June 18 | 3.0m | | | | | | | | | | | | |
| Date | Water Level | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 8 | 10.7m Dry | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 9 | 9.0m | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 11 | 8.4m | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 15 | 5.2m | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 17 | 3.3m | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 18 | 3.0m | | | | | | | | | | | | | | | | | | | | | | | | | | |

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-1

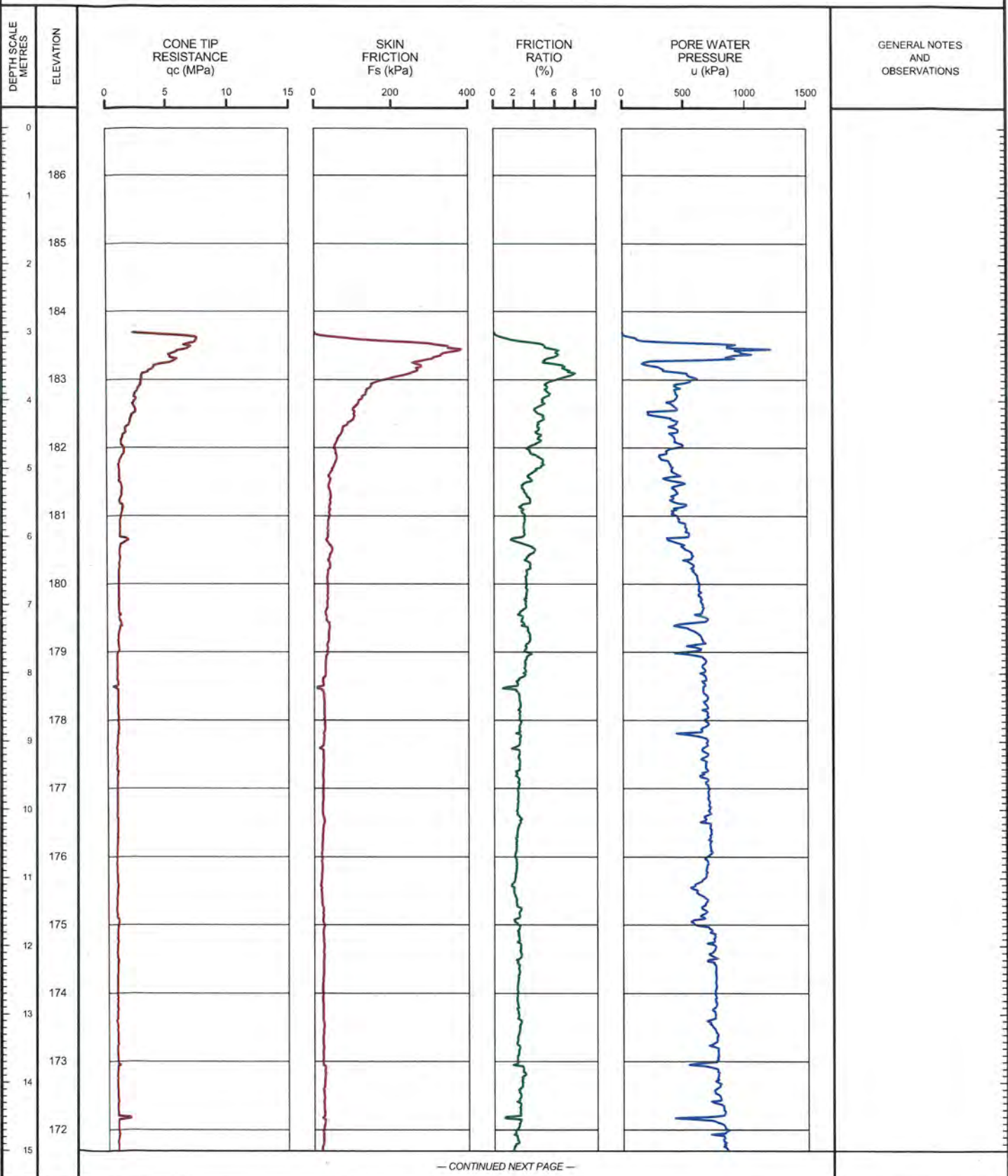
SHEET 1 OF 2

LOCATION: N 4677739.0 ; E 335502.0

TEST DATE: November 6, 2006

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 3.00m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LDN CPT_01 07-1130-207-0-CPT.GPJ GLDR LONGDT 6/18/09 DATA INPUT:

DEPTH SCALE

1 : 75

OPERATOR: CC
CHECKED: SJB

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-1

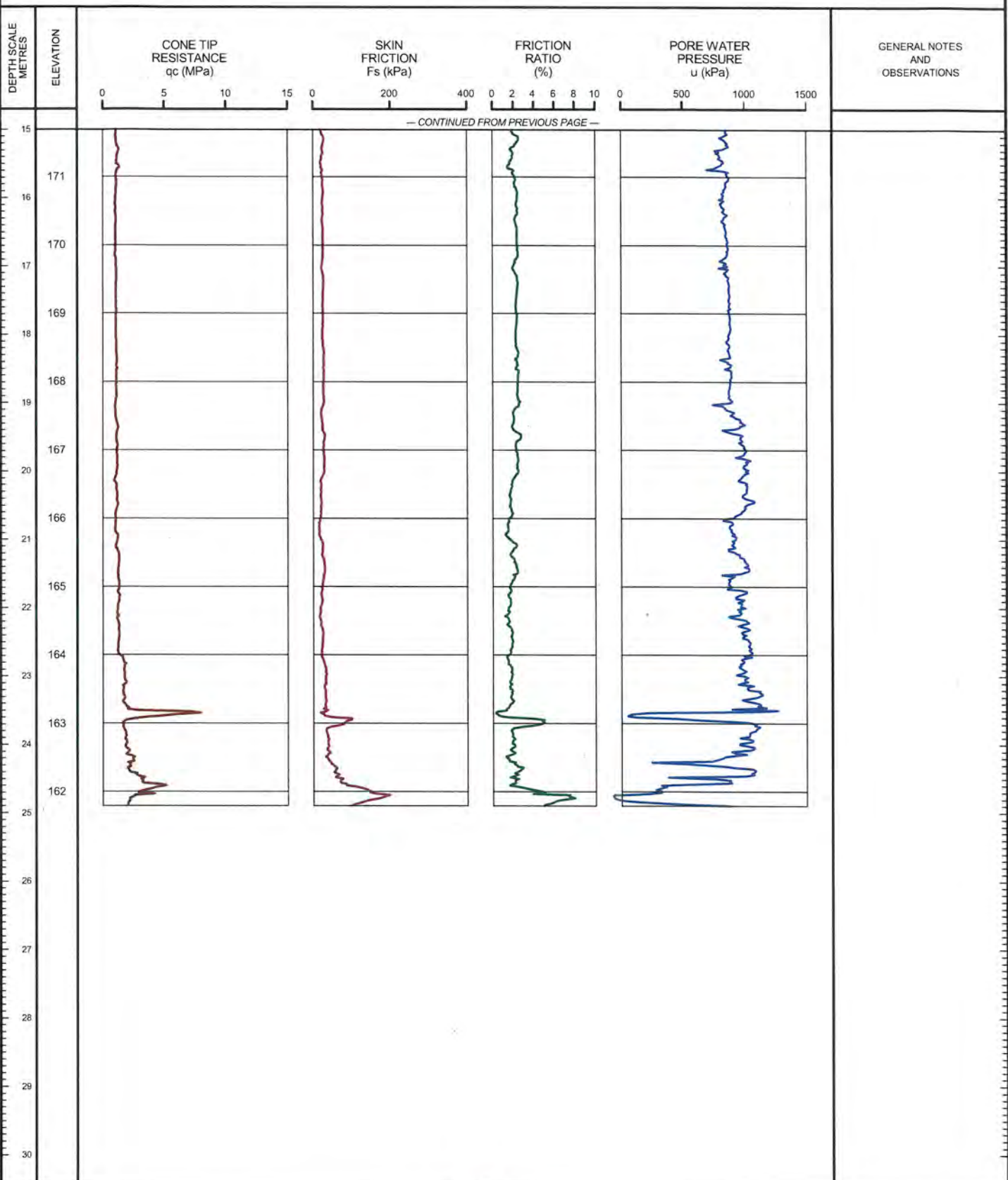
SHEET 2 OF 2

LOCATION: N 4677739.0 E 335502.0

TEST DATE: November 6, 2006

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 3.00m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LDN CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE

1 : 75



OPERATOR: CC

CHECKED: *SSB*

PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-103

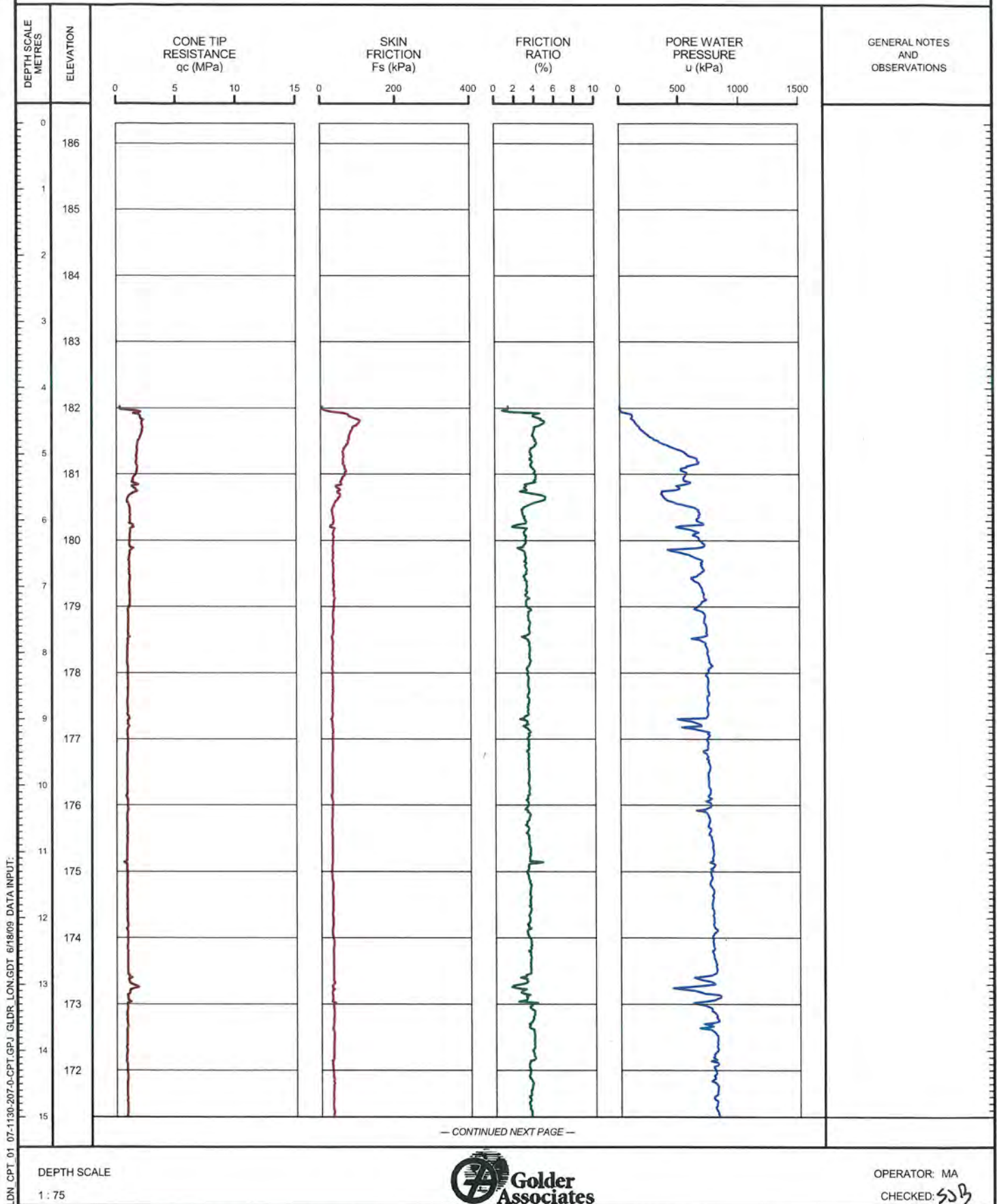
SHEET 1 OF 2

LOCATION: N 4677620.0 :E 335400.7

TEST DATE: March 31, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 4.30m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



PROJECT: 07-1130-207-0

RECORD OF CONE PENETRATION TEST CPT-103

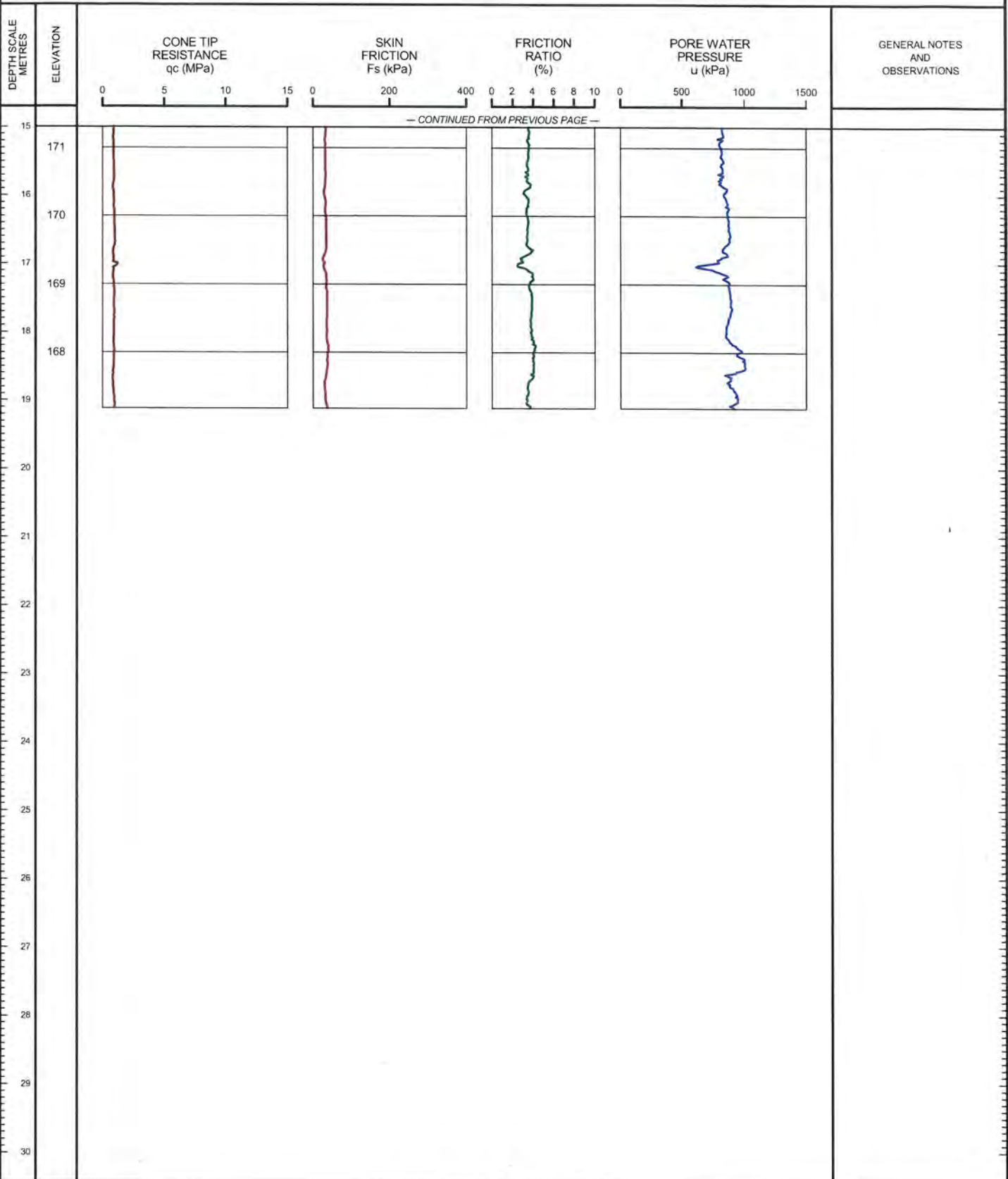
SHEET 2 OF 2

LOCATION: N 4677620.0 ; E 335400.7

TEST DATE: March 31, 2008

DATUM: GEODETIC

GROUND SURFACE ELEVATION: PREDRILL DEPTH: 4.30m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LDN CPT 01 07-1130-207-0-CPT.GPJ GLDR LON.GDT 6/19/09 DATA INPUT:

DEPTH SCALE

1 : 75



OPERATOR: MA

CHECKED: *GSB*

PROJECT: 09-1132-0003

RECORD OF CONE PENETRATION TEST CPT-201

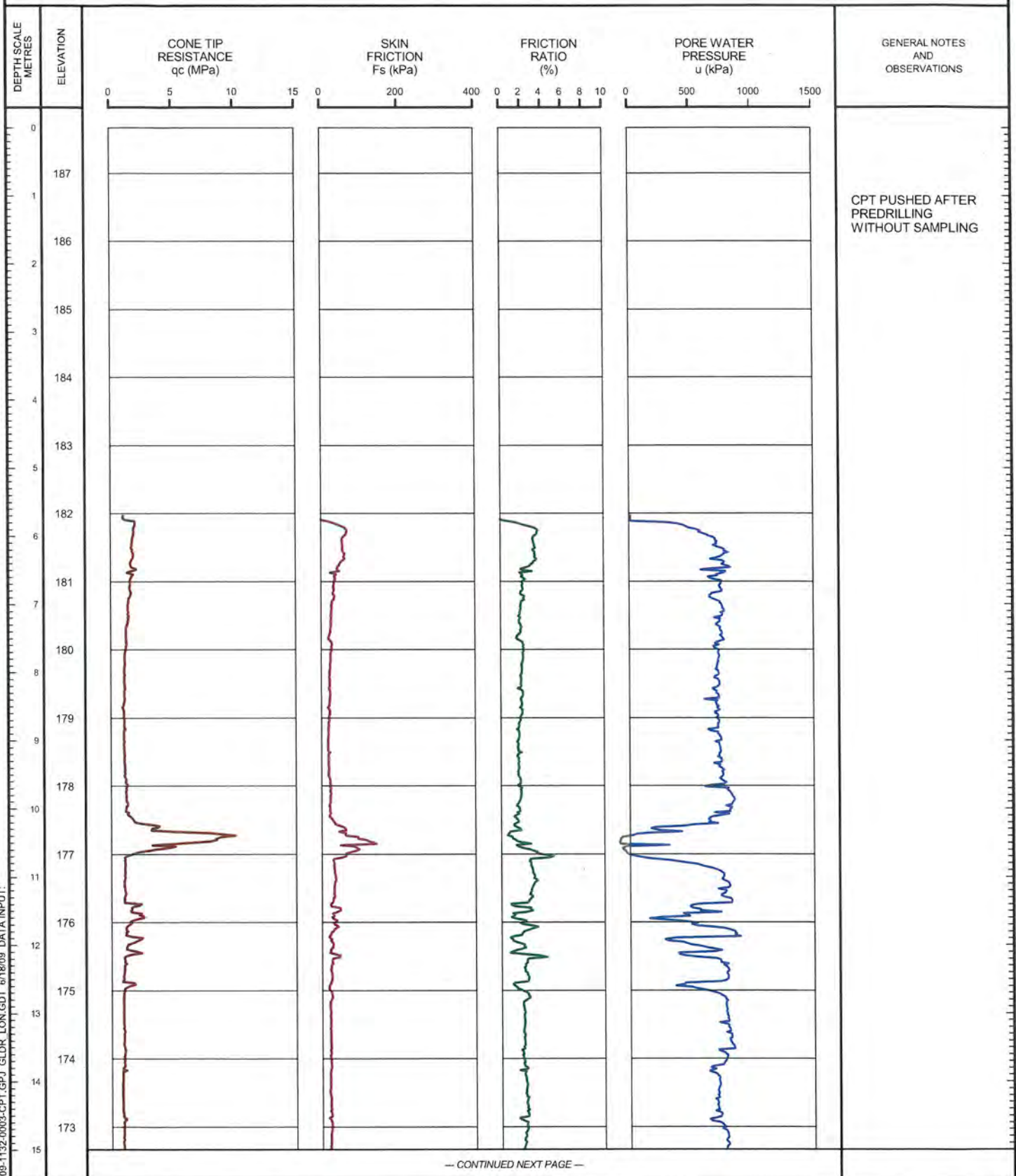
SHEET 1 OF 2

LOCATION: N 4677608.0 :E 335775.0

TEST DATE: February 24, 2009

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 187.67m PREDRILL DEPTH: 5.70m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



DEPTH SCALE

1 : 75



OPERATOR: NG

CHECKED: SSB

PROJECT: 09-1132-0003

RECORD OF CONE PENETRATION TEST CPT-201

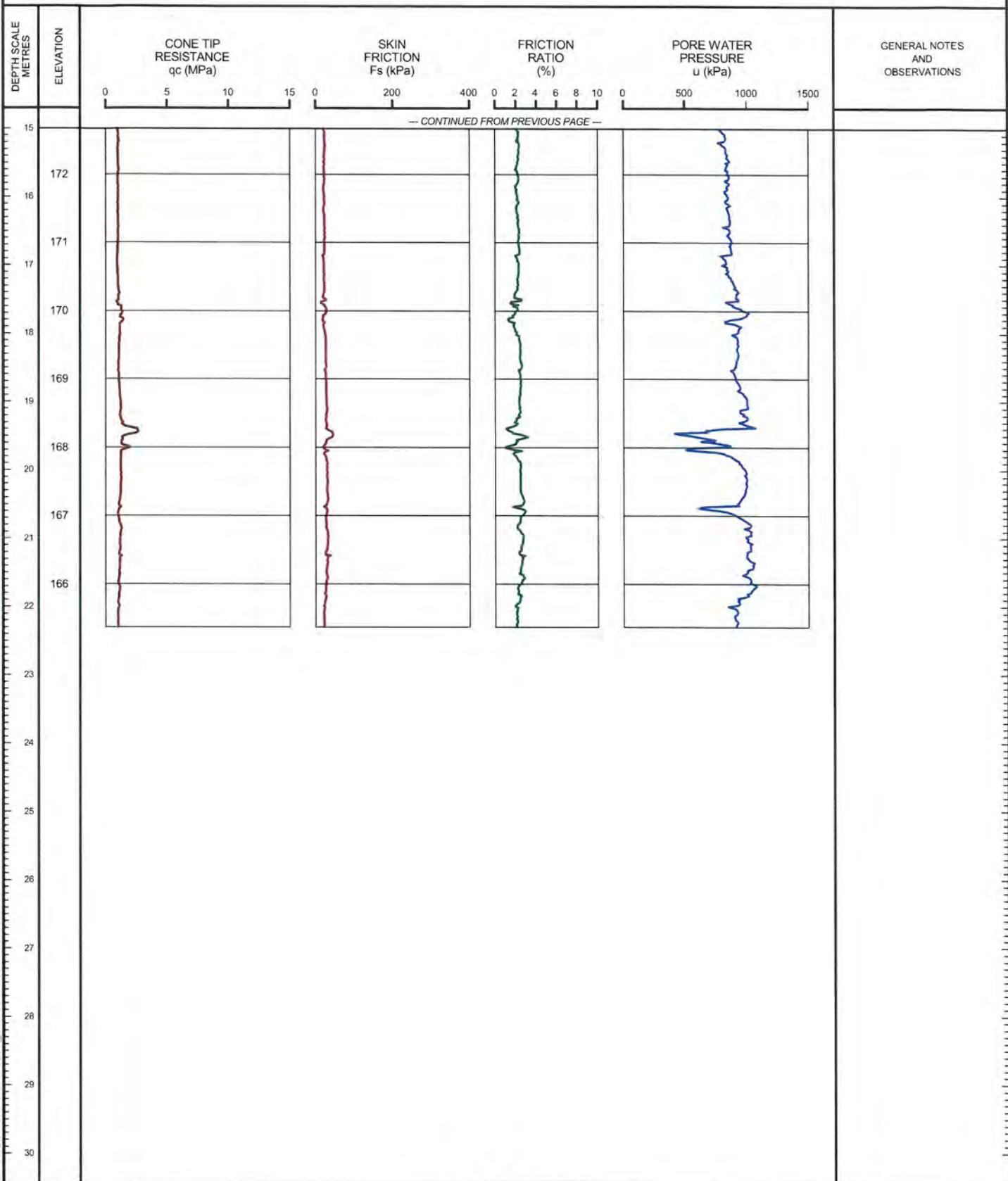
SHEET 2 OF 2

LOCATION: N 4677608.0 :E 335775.0

TEST DATE: February 24, 2009

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 172.67m PREDRILL DEPTH: 5.70m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LDN CPT 01 09-1132-0003-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE

1 : 75



OPERATOR: NG

CHECKED: *SSB*

PROJECT: 09-1132-0003

RECORD OF CONE PENETRATION TEST CPT-206

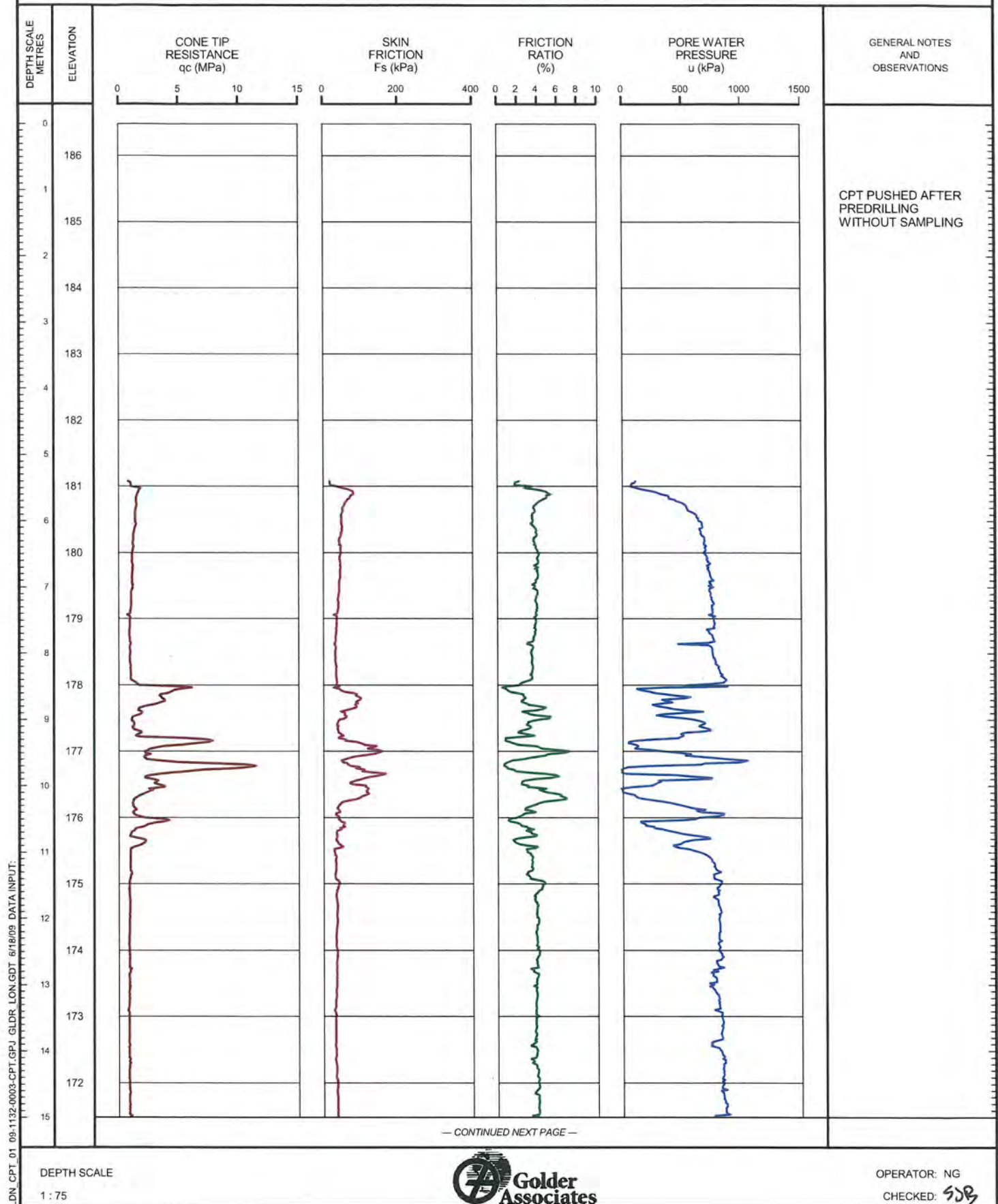
SHEET 1 OF 2

LOCATION: N 4677643.0 ; E 335466.0

TEST DATE: February 24, 2009

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 186.48m PREDRILL DEPTH: 5.40m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LON_CPT_01 09-1132-0003-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

PROJECT: 09-1132-0003

RECORD OF CONE PENETRATION TEST CPT-206

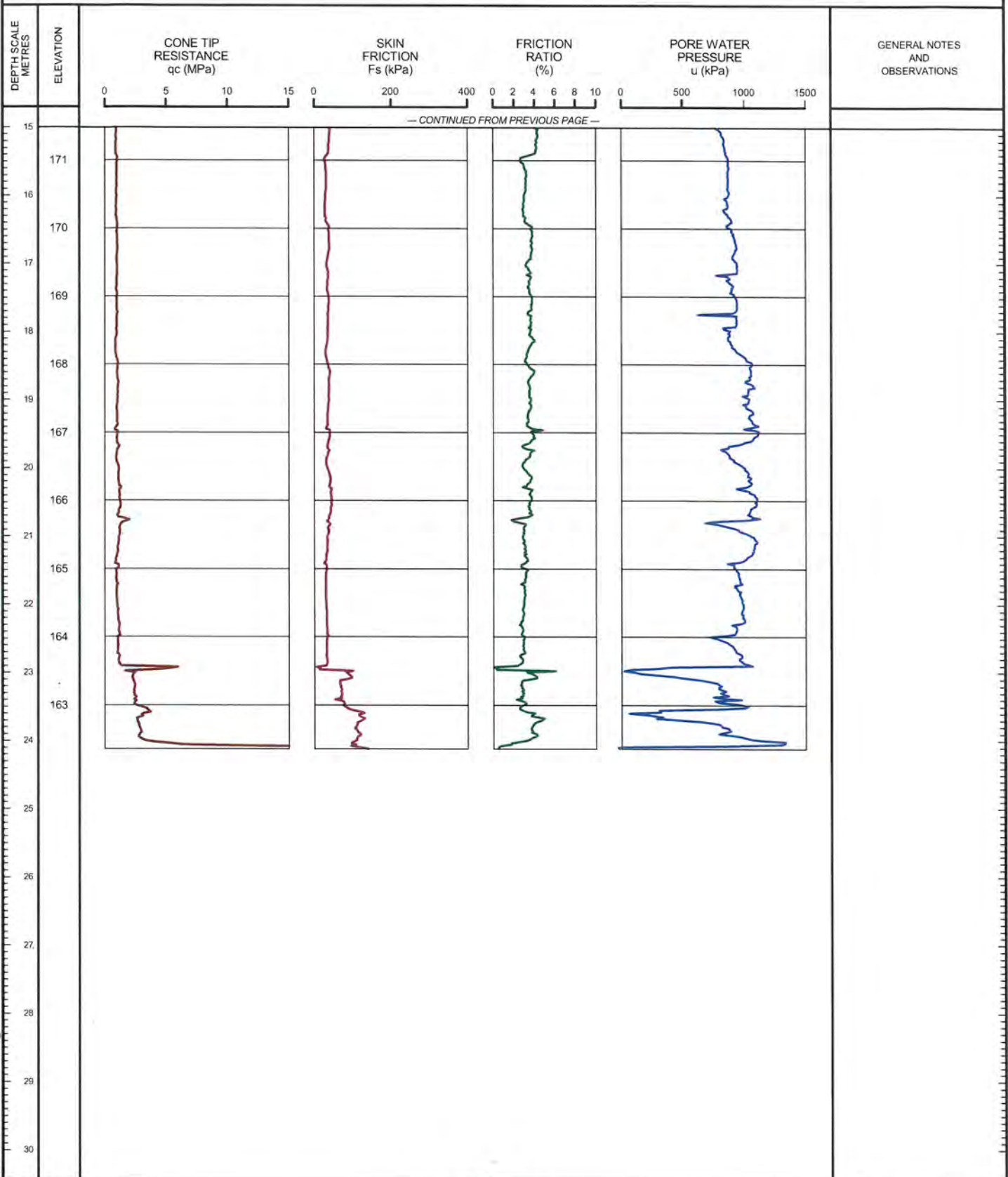
SHEET 2 OF 2

LOCATION: N 4677643.0 ; E 335466.0

TEST DATE: February 24, 2009

DATUM: GEODETIC

GROUND SURFACE ELEVATION: 171.48m PREDRILL DEPTH: 5.40m CORRECTION FACTOR A: 0.584 CORRECTION FACTOR B: 0.012



LDN_CPT_01 09-1132-0003-CPT.GPJ GLDR LON.GDT 6/18/09 DATA INPUT:

DEPTH SCALE

1 : 75



OPERATOR: NG

CHECKED: *SB*

Station 10+700T to Station 11+400T (Soil Profile #17)

| | | | | | |
|----------------------|--|---------------------------------------|--|----------------------|--|
| PROJECT 09-1132-0003 | | RECORD OF BOREHOLE No 226N | | 1 OF 1 METRIC | |
| W.P. _____ | | LOCATION N 4677993.6 :E 336469.8 | | ORIGINATED BY NG | |
| DIST WEST HWY WEP/3 | | BOREHOLE TYPE POWER AUGER, SOLID STEM | | COMPILED BY LMK | |
| DATUM GEODETIC | | DATE March 10, 2009 | | CHECKED BY <i>SB</i> | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT w _p | NATURAL MOISTURE CONTENT w | LIQUID LIMIT w _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | |
|---------------|---|------------|---------|------|------------|----------------------------|-----------------|---|----------------------------|------------------------------------|-------------------------------------|-----------------------------------|---------------------|---|-------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | WATER CONTENT (%) |
| | | | | | | | | ○ UNCONFINED ● QUICK TRIAXIAL | + FIELD VANE × LAB VANE | | | | | | |
| 187.72 | GROUND SURFACE | | | | | | | | | | | | | | |
| 0.00 | TOPSOIL, clayey Brown | | | | | | | | | | | | | | |
| 0.13 | CLAYEY SILT, some sand, trace gravel, with oxidized fissures Hard Brown | | 1 | SS | 44 | | 187 | | | | ○ | | | | |
| | | | 2 | SS | 52 | | 186 | | | | ○ | | | | |
| 185.59 | | | | | | | | | | | | | | | |
| 2.13 | CLAYEY SILT, some sand, trace gravel, with oxidized fissures Hard Mottled brown and grey | | 3 | SS | 66 | | 185 | | | | ○ | | | | |
| 184.82 | | | | | | | | | | | | | | | |
| 2.90 | CLAYEY SILT, some sand, trace gravel Very stiff to hard Grey | | 4 | SS | 33 | | 184 | | | | ○ | | | | |
| | | | 5 | SS | 26 | | | | | | ○ | | | | |
| | | | 6 | SS | 23 | | 183 | | | | ○ | | | | |
| 182.69 | END OF BOREHOLE | | | | | | | | | | | | | | |
| 5.03 | Borehole dry during drilling on March 10, 2009. | | | | | | | | | | | | | | |

LDN_MTO_01 09-1132-0003.GPJ LDN_MTO.GDT 6/29/09

| | | | | | |
|-----------------------------------|--|--|--|-------------------------|---------------|
| PROJECT <u>09-1132-0003</u> | | RECORD OF BOREHOLE No 227N | | 1 OF 1 | METRIC |
| W.P. _____ | | LOCATION <u>N 4677951.7 :E 336423.8</u> | | ORIGINATED BY <u>NG</u> | |
| DIST <u>WEST</u> HWY <u>WEP/3</u> | | BOREHOLE TYPE <u>POWER AUGER, SOLID STEM</u> | | COMPILED BY <u>LMK</u> | |
| DATUM <u>GEODETIC</u> | | DATE <u>March 10, 2009</u> | | CHECKED BY <u>SJB</u> | |

| 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 | 20 40 60 80 100 | | | | | |
| 187.61 | GROUND SURFACE | | | | | | | | | | | | | |
| 0.08 | TOPSOIL, clayey Black | | | | | | | | | | | | | |
| | CLAYEY SILT, some sand, trace gravel, with oxidized fissures Hard Brown | | 1 | SS | 78 | | | | | | | | | |
| | | | 2 | SS | 72 | | | | | | | | | |
| | | | 3 | SS | 54 | | | | | | | | | |
| 184.71 | | | | | | | | | | | | | | |
| 2.90 | CLAYEY SILT, some sand, trace gravel Very stiff Grey | | 4 | SS | 26 | | | | | | | | | |
| | | | 5 | SS | 17 | | | | | | | | | |
| | | | 6 | SS | 19 | | | | | | | | | |
| 182.58 | | | | | | | | | | | | | | |
| 5.03 | END OF BOREOLE | | | | | | | | | | | | | |
| | Borehole dry during drilling on March 10, 2009. | | | | | | | | | | | | | |

LDN_MTO_01 09-1132-0003.GPJ LDN_MTO.GDT 6/29/09

| | | | | | |
|----------------------|--|---------------------------------------|--|----------------------|---------------|
| PROJECT 09-1132-0003 | | RECORD OF BOREHOLE No 228N | | 1 OF 1 | METRIC |
| W.P. _____ | | LOCATION N 4677910.5 ; E 336371.5 | | ORIGINATED BY NG | |
| DIST WEST HWY WEP/3 | | BOREHOLE TYPE POWER AUGER, SOLID STEM | | COMPILED BY LMK | |
| DATUM GEODETIC | | DATE March 9, 2009 | | CHECKED BY <i>SB</i> | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | |
|---------------|--|------------|---------|------|------------|----------------------------|-----------------|---|----------------------------|------------------------------------|-------------------------------------|-----------------------------------|---------------------|---|-------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | WATER CONTENT (%) |
| | | | | | | | | ○ UNCONFINED ● QUICK TRIAXIAL | + FIELD VANE × LAB VANE | | | | | | |
| 187.41 | GROUND SURFACE | | | | | | | | | | | | | | |
| 0.00 | TOPSOIL, clayey | | | | | | | | | | | | | | |
| 0.20 | Black CLAYEY SILT, some sand, trace gravel, with oxidized fissures Hard Brown | | 1 | SS | 79 | | | | | | | | | | |
| | | | 2 | SS | 94 | | | | | | | | | | |
| 185.00 | | | | | | | | | | | | | | | |
| 2.41 | CLAYEY SILT, some sand, trace gravel, with oxidized fissures to 2.9m depth Very stiff to hard Grey | | 3 | SS | 55 | | | | | | | | | | |
| | | | 4 | SS | 24 | | | | | | | | | | |
| | | | 5 | SS | 21 | | | | | | | | | | |
| | | | 6 | SS | 16 | | | | | | | | | | |
| 182.38 | END OF BOREHOLE | | | | | | | | | | | | | | |
| 5.03 | Borehole dry during drilling on March 9, 2009 | | | | | | | | | | | | | | |

LDN_MTO_01_09-1132-0003.GPJ LDN_MTO_GDT 5/29/09

| | | | | | |
|----------------------|--|---------------------------------------|--|----------------------|---------------|
| PROJECT 09-1132-0003 | | RECORD OF BOREHOLE No 229N | | 1 OF 1 | METRIC |
| W.P. _____ | | LOCATION N 4677866.4 :E 336321.6 | | ORIGINATED BY NG | |
| DIST WEST HWY WEP/3 | | BOREHOLE TYPE POWER AUGER, SOLID STEM | | COMPILED BY LMK | |
| DATUM GEODETIC | | DATE March 9, 2009 | | CHECKED BY <i>SB</i> | |

| 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 | | | | | |
| 187.34 | GROUND SURFACE | | | | | | | | | | | | | |
| 0.00 | TOPSOIL, clayey Black | | | | | | | | | | | | | |
| 186.83 | | | | | | | 187 | | | | | | | |
| 0.51 | CLAYEY SILT, some sand, trace gravel, with oxidized fissures Hard Brown | | 1 | SS | 33 | | | | | | | | | |
| | | | 2 | SS | 45 | | 186 | | | | | | | |
| 184.98 | | | | | | | | | | | | | | |
| 2.36 | CLAYEY SILT, some sand, trace gravel, with oxidized fissures to 2.9m depth Stiff to very stiff Grey | | 3 | SS | 28 | | 185 | | | | | | | |
| | | | 4 | SS | 29 | | | | | | | | | |
| | | | 5 | SS | 14 | | 184 | | | | | | | 5 27 42 36 |
| | | | 6 | SS | 22 | | 183 | | | | | | | |
| 182.31 | END OF BOREHOLE | | | | | | | | | | | | | |
| 5.03 | Borehole dry during drilling on March 9, 2009. | | | | | | | | | | | | | |

LDN_MTO_01_09-1132-0003.GPJ LDN_MTO.GDT 6/29/09

| | | | | | |
|----------------------|--|---------------------------------------|--|-----------------------|---------------|
| PROJECT 09-1132-0003 | | RECORD OF BOREHOLE No 230N | | 1 OF 1 | METRIC |
| W.P. _____ | | LOCATION N 4677822.9 ; E 336266.7 | | ORIGINATED BY NG | |
| DIST WEST HWY WEP/3 | | BOREHOLE TYPE POWER AUGER, SOLID STEM | | COMPILED BY LMK | |
| DATUM GEODETIC | | DATE March 9, 2009 | | CHECKED BY <i>SSB</i> | |

| 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 | | | 20 40 60 80 100 | 20 40 60 80 100 | W _p W W _L | WATER CONTENT (%) | 10 20 30 | | |
| 187.37 | GROUND SURFACE | | | | | | | | | | | | | |
| 0.00 | TOPSOIL, clayey Black | | | | | | | | | | | | | |
| 0.23 | CLAYEY SILT, some sand, trace gravel, with oxidized fissures Hard Brown | | 1 | SS | 48 | | | | | | ○ | | | |
| | | | 2 | SS | 56 | | | | | | ○ | | | |
| 185.08 | | | | | | | | | | | | | | |
| 2.29 | CLAYEY SILT, some sand, trace gravel, with oxidized fissures to 2.9m depth Very stiff Grey | | 3 | SS | 28 | | | | | | ■ | ■ | | 3 27 45 25 |
| | | | 4 | SS | 28 | | | | | | ○ | | | |
| | | | 5 | SS | 19 | | | | | | ○ | | | |
| 182.70 | | | | | | | | | | | | | | |
| 4.67 | SANDY SILT, trace clay, trace gravel, with sand pockets Very dense Grey | | 6 | SS | 88 | | | | | | ○ | | | 6 50 37 7 |
| 182.34 | | | | | | | | | | | | | | |
| 5.03 | END OF BOREHOLE | | | | | | | | | | | | | |
| | Borehole dry during drilling on March 9, 2009. | | | | | | | | | | | | | |

LDN_MTO_01 09-1132-0003.GPJ LDN_MTO.GDT 6/29/09

| | | | | | |
|----------------------|---------------|-----------------------------------|--|-----------------------|---------------|
| PROJECT 09-1132-0003 | | RECORD OF BOREHOLE No 231N | | 1 OF 1 | METRIC |
| W.P. | LOCATION | N 4677775.6, E 336213.6 | | ORIGINATED BY NG | |
| DIST WEST HWY WEP/3 | BOREHOLE TYPE | POWER AUGER, SOLID STEM | | COMPILED BY LMK | |
| DATUM GEODETIC | DATE | March 9, 2009 | | CHECKED BY <i>SJS</i> | |

| 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 | | | | | | | WATER CONTENT (%) | | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | | | | | |
| 187.06 | GROUND SURFACE | | | | | | | | | | | | | | | | | |
| 0.00 | TOPSOIL, clayey Brown | | | | | | | | | | | | | | | | | |
| 0.28 | CLAYEY SILT, some sand, trace gravel, with oxidized fissures Hard Brown | | 1 | SS | 50 | | | | | | | | | | | | | |
| | | | 2 | SS | 66 | | | | | | | | | | | | | |
| 184.77 | | | | | | | | | | | | | | | | | | |
| 2.29 | CLAYEY SILT, some sand, trace gravel Very stiff to hard Grey | | 3 | SS | 40 | | | | | | | | | | | | | |
| | | | 4 | SS | 33 | | | | | | | | | | | | | |
| | | | 5 | SS | 21 | | | | | | | | | | | | | |
| | | | 6 | SS | 16 | | | | | | | | | | | | | |
| 182.03 | | | | | | | | | | | | | | | | | | |
| 5.03 | END OF BOREHOLE Borehole dry during drilling on March 9, 2009. | | | | | | | | | | | | | | | | | |

LDN_MTO_01 09-1132-0003.GPJ LDN_MTO.GDT 6/29/09

RECORD OF BOREHOLE No 232N

1 OF 1

METRIC

PROJECT 09-1132-0003

W.P.

LOCATION

N 4677725.4 E 336154.5

ORIGINATED BY NG

DIST WEST HWY WEP/3

BOREHOLE TYPE POWER AUGER, SOLID STEM

COMPILED BY LMK

DATUM GEODETIC

DATE

March 9, 2009

CHECKED BY *SSB*

| 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 | | |
| 186.75 | GROUND SURFACE | | | | | | | | | | | | | |
| 0.08 | TOPSOIL, clayey Brown CLAYEY SILT, some sand, trace gravel, with oxidized fissures Hard Mottled brown and grey | | 1 | SS | 69 | | 186 | | | | | | | |
| | | | 2 | SS | 61 | | 185 | | | | | | | |
| 184.62 | CLAYEY SILT, some sand, trace gravel Very stiff Grey | | 3 | SS | 26 | | 184 | | | | | | | |
| 2.13 | | | 4 | SS | 25 | | 183 | | | | | | | |
| | | | 5 | SS | 17 | | 182 | | | | | | | |
| | | | 6 | SS | 15 | | | | | | | | | |
| 181.72 | END OF BOREHOLE | | | | | | | | | | | | | |
| 5.03 | Borehole dry during drilling on March 9, 2009. | | | | | | | | | | | | | |

LDN_MTO_01 09-1132-0003.GPJ LDN_MTO.GDT 6/29/09

RECORD OF BOREHOLE No 233N

1 OF 1

METRIC

PROJECT 09-1132-0003

W.P.

LOCATION

N 4677688.5 :E 336099.5

ORIGINATED BY NG

DIST WEST HWY WEP/3

BOREHOLE TYPE POWER AUGER, SOLID STEM

COMPILED BY LMK

DATUM GEODETIC

DATE

March 9, 2009

CHECKED BY *SJB*

| 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 | | |
| 186.39 | GROUND SURFACE | | | | | | | | | | | | | |
| 0.10 | TOPSOIL, clayey Brown | | | | | | 186 | | | | | | | |
| | CLAYEY SILT, some sand, trace gravel, with oxidized fissures | | 1 | SS | 58 | | | | | | | | | |
| | Hard Brown | | | | | | 185 | | | | | | | |
| 184.76 | | | | | | | | | | | | | | |
| 1.63 | CLAYEY SILT, some sand, trace gravel | | 2 | SS | 28 | | | | | | | | | |
| | Very stiff to hard Grey | | | | | | | | | | | | | |
| | | | 3 | SS | 32 | | 184 | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 4 | SS | 16 | | 183 | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 5 | SS | 18 | | 182 | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 6 | SS | 13 | | | | | | | | | |
| 181.36 | | | | | | | | | | | | | | |
| 5.03 | END OF BOREHOLE | | | | | | | | | | | | | |
| | Borehole dry during drilling on March 9, 2009. | | | | | | | | | | | | | |

LDN_MTO_01 09-1132-0003.GPJ LDN_MTO.GDT 6/29/09

RECORD OF BOREHOLE No 2

1 OF 1

METRIC

W.P. 143-91-00 LOCATION Sta. 10+684.6 O/S 29.0m Lt (from Centreline of Hwy. 3) ORIGINATED BY E.M.
 DIST 1 HWY 401 and 3 BOREHOLE TYPE Hollow Stem Auger and Cone Test COMPILED BY D.S.
 DATUM Geodetic DATE June 8, 1993 CHECKED BY T.K.

| 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 | 20 | 40 | 60 | | | | | | | | |
| 186.6 | Ground Surface | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.0 | Very Stiff to Hard | | 1 | SS | 42 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 2 | SS | 48 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 3 | SS | 27 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 4 | SS | 16 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 5 | SS | 16 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 6 | SS | 11 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 7 | SS | 8 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 8 | TW | PH | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 9 | SS | 9 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 10 | SS | 7 | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 11 | SS | 8 | | | | | | | | | | | | | | | | | | | | | | | |
| 174.0 | | | 12 | SS | 11 | | | | | | | | | | | | | | | | | | | | | | | |
| 12.6 | End of Borehole | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <p>*</p> <table border="1"> <thead> <tr> <th>Date</th> <th>Water Level</th> </tr> </thead> <tbody> <tr> <td>June 8</td> <td>10.7m Dry</td> </tr> <tr> <td>June 9</td> <td>9.0m</td> </tr> <tr> <td>June 11</td> <td>8.4m</td> </tr> <tr> <td>June 15</td> <td>5.2m</td> </tr> <tr> <td>June 17</td> <td>3.3m</td> </tr> <tr> <td>June 18</td> <td>3.0m</td> </tr> </tbody> </table> | Date | Water Level | June 8 | 10.7m Dry | June 9 | 9.0m | June 11 | 8.4m | June 15 | 5.2m | June 17 | 3.3m | June 18 | 3.0m | | | | | | | | | | | | | |
| Date | Water Level | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 8 | 10.7m Dry | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 9 | 9.0m | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 11 | 8.4m | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 15 | 5.2m | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 17 | 3.3m | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 18 | 3.0m | | | | | | | | | | | | | | | | | | | | | | | | | | | |

1 OF 1

METRIC

+3, x5: Numbers refer to Sensitivity

RECORD OF BOREHOLE No 4

1 OF 1

METRIC

W.P. 143-91-00 LOCATION Sta. 10+293.3 O/S 22.9m Rt (from Centreline of Hwy. 401) ORIGINATED BY E.M.
 DIST 1 HWY 401 and 3 BOREHOLE TYPE Hollow Stem Auger and Vane Tests COMPILED BY D.S.
 DATUM Geodetic DATE June 9, 1993 CHECKED BY T.K.

| 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 | 20 40 60 80 100 | 20 40 60 | | | | | | | | | | | | | | | | | | | |
| 187.2 | Ground Surface | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.0 186.4 | Clayey Silt Fill | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.8 | Very Stiff to Hard Brown ----- Grey Clayey Silt with Sand and trace of Gravel occasional Sand Layers (Glacial Till) Stiff to Very Stiff Fine Sand Layer ===== Medium Sand Layer ===== | | 1 | SS | 21 | | 186 | | | | | | | | | | | | | | | | | | | | | | |
| | | | 2 | SS | 39 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 3 | SS | 41 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 4 | SS | 19 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 5 | SS | 15 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 6 | SS | 10 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 7 | SS | 8 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 8 | SS | 6 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 9 | SS | 9 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 10 | SS | 11 | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | 11 | SS | 8 | | | | | | | | | | | | | | | | | | | | | | | | |
| 173.8 | | | | | | | 174 | | | | | | | | | | | | | | | | | | | | | | |
| 13.4 | End of Borehole | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <div>★<table><tr><th>Date</th><th>Water Level</th></tr><tr><td>June 9</td><td>6.5m Dry</td></tr><tr><td>June 11</td><td>5.6m</td></tr><tr><td>June 15</td><td>0.5m</td></tr><tr><td>June 16</td><td>0.7m</td></tr><tr><td>June 17</td><td>0.7m</td></tr><tr><td>June 18</td><td>0.7m</td></tr></table></div> | | | | | | | | | | | | | | | Date | Water Level | June 9 | 6.5m Dry | June 11 | 5.6m | June 15 | 0.5m | June 16 | 0.7m | June 17 | 0.7m | June 18 | 0.7m |
| Date | Water Level | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 9 | 6.5m Dry | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 11 | 5.6m | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 15 | 0.5m | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 16 | 0.7m | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 17 | 0.7m | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 18 | 0.7m | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Date | Water Level |
|---------|-------------|
| June 9 | 6.5m Dry |
| June 11 | 5.6m |
| June 15 | 0.5m |
| June 16 | 0.7m |
| June 17 | 0.7m |
| June 18 | 0.7m |

Station 11+500T to Station 12+300T (Soil Profile #18)

| | | | | | |
|----------------------|--|---------------------------------------|--|----------------------|---------------|
| PROJECT 09-1132-0003 | | RECORD OF BOREHOLE No 226N | | 1 OF 1 | METRIC |
| W.P. _____ | | LOCATION N 4677993.6 :E 336469.8 | | ORIGINATED BY NG | |
| DIST WEST HWY WEP/3 | | BOREHOLE TYPE POWER AUGER, SOLID STEM | | COMPILED BY LMK | |
| DATUM GEODETIC | | DATE March 10, 2009 | | CHECKED BY <i>SB</i> | |

| 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 | | | | | | | WATER CONTENT (%) | | | |
| | | | | | | | | ○ UNCONFINED | + FIELD VANE | | | | | | | ● QUICK TRIAXIAL | × LAB VANE | |
| 187.72 | GROUND SURFACE | | | | | | 20 | 40 | 60 | 80 | 100 | | | | | | | |
| 0.00 | TOPSOIL, clayey | | | | | | | | | | | | | | | | | |
| 0.13 | Brown | | | | | | | | | | | | | | | | | |
| | CLAYEY SILT, some sand, trace gravel, with oxidized fissures | | | | | | | | | | | | | | | | | |
| | Hard | | 1 | SS | 44 | | | | | | | | | | | | | |
| | Brown | | | | | | | | | | | | | | | | | |
| | | | 2 | SS | 52 | | | | | | | | | | | | | |
| 185.59 | | | | | | | | | | | | | | | | | | |
| 2.13 | CLAYEY SILT, some sand, trace gravel, with oxidized fissures | | | | | | | | | | | | | | | | | |
| | Hard | | 3 | SS | 66 | | | | | | | | | | | | | |
| | Mottled brown and grey | | | | | | | | | | | | | | | | | |
| 184.82 | | | | | | | | | | | | | | | | | | |
| 2.90 | CLAYEY SILT, some sand, trace gravel | | | | | | | | | | | | | | | | | |
| | Very stiff to hard | | 4 | SS | 33 | | | | | | | | | | | | | |
| | Grey | | | | | | | | | | | | | | | | | |
| | | | 5 | SS | 26 | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| | | | 6 | SS | 23 | | | | | | | | | | | | | |
| 182.69 | | | | | | | | | | | | | | | | | | |
| 5.03 | END OF BOREHOLE | | | | | | | | | | | | | | | | | |
| | Borehole dry during drilling on March 10, 2009. | | | | | | | | | | | | | | | | | |

LDN_MTO_01 09-1132-0003.GPJ LDN_MTO.GDT 6/29/09

| | | | | | |
|----------------------|---------------|-----------------------------------|--|-----------------------|---------------|
| PROJECT 09-1132-0003 | | RECORD OF BOREHOLE No 227N | | 1 OF 1 | METRIC |
| W.P. | LOCATION | N 4677951.7 :E 336423.8 | | ORIGINATED BY NG | |
| DIST WEST HWY WEP/3 | BOREHOLE TYPE | POWER AUGER, SOLID STEM | | COMPILED BY LMK | |
| DATUM GEODETIC | DATE | March 10, 2009 | | CHECKED BY SLB | |

| 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 | | | | | | |
| 187.61 | GROUND SURFACE | | | | | | | | | | | | | |
| 0.08 | TOPSOIL, clayey Black | | | | | | | | | | | | | |
| | CLAYEY SILT, some sand, trace gravel, with oxidized fissures | | | | | | | | | | | | | |
| | Hard Brown | | | | | | | | | | | | | |
| | | | 1 | SS | 78 | | | | | | | | | |
| | | | 2 | SS | 72 | | | | | | | | | |
| | | | 3 | SS | 54 | | | | | | | | | |
| 184.71 | | | | | | | | | | | | | | |
| 2.90 | CLAYEY SILT, some sand, trace gravel | | | | | | | | | | | | | |
| | Very stiff Grey | | | | | | | | | | | | | |
| | | | 4 | SS | 26 | | | | | | | | | |
| | | | 5 | SS | 17 | | | | | | | | | |
| | | | 6 | SS | 19 | | | | | | | | | |
| 182.58 | | | | | | | | | | | | | | |
| 5.03 | END OF BOREOLE | | | | | | | | | | | | | |
| | Borehole dry during drilling on March 10, 2009. | | | | | | | | | | | | | |

LDN_MTO_01 09-1132-0003.GPJ LDN_MTO.GDT 6/29/09

| | | | | | |
|----------------------|--|---------------------------------------|--|----------------------|---------------|
| PROJECT 09-1132-0003 | | RECORD OF BOREHOLE No 228N | | 1 OF 1 | METRIC |
| W.P. _____ | | LOCATION N 4677910.5 ; E 336371.5 | | ORIGINATED BY NG | |
| DIST WEST HWY WEP/3 | | BOREHOLE TYPE POWER AUGER, SOLID STEM | | COMPILED BY LMK | |
| DATUM GEODETIC | | DATE March 9, 2009 | | CHECKED BY <i>SB</i> | |

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _p | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | |
|---------------|--|------------|---------|------|------------|----------------------------|-----------------|---|----------------------------|------------------------------------|-------------------------------------|-----------------------------------|---------------------|---|-------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | SHEAR STRENGTH kPa | | | | | | | WATER CONTENT (%) |
| | | | | | | | | ○ UNCONFINED ● QUICK TRIAXIAL | + FIELD VANE × LAB VANE | | | | | | |
| 187.41 | GROUND SURFACE | | | | | | | | | | | | | | |
| 0.00 | TOPSOIL, clayey | | | | | | | | | | | | | | |
| 0.20 | Black CLAYEY SILT, some sand, trace gravel, with oxidized fissures Hard Brown | | 1 | SS | 79 | | 187 | | | | | | | | |
| | | | 2 | SS | 94 | | 186 | | | | | | | 0 29 41 30 | |
| 185.00 | | | | | | | | | | | | | | | |
| 2.41 | CLAYEY SILT, some sand, trace gravel, with oxidized fissures to 2.9m depth Very stiff to hard Grey | | 3 | SS | 55 | | 185 | | | | | | | | |
| | | | 4 | SS | 24 | | 184 | | | | | | | | |
| | | | 5 | SS | 21 | | 183 | | | | | | | | |
| 182.38 | | | 6 | SS | 16 | | | | | | | | | | |
| 5.03 | END OF BOREHOLE | | | | | | | | | | | | | | |
| | Borehole dry during drilling on March 9, 2009 | | | | | | | | | | | | | | |

LDN_MTO_01_09-1132-0003.GPJ LDN_MTO_GDT 5/29/09

| | | | | | |
|----------------------|--|---------------------------------------|--|----------------------|--|
| PROJECT 09-1132-0003 | | RECORD OF BOREHOLE No 229N | | 1 OF 1 METRIC | |
| W.P. _____ | | LOCATION N 4677866.4 :E 336321.6 | | ORIGINATED BY NG | |
| DIST WEST HWY WEP/3 | | BOREHOLE TYPE POWER AUGER, SOLID STEM | | COMPILED BY LMK | |
| DATUM GEODETIC | | DATE March 9, 2009 | | CHECKED BY <i>SB</i> | |

| 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 |
| 187.34 | GROUND SURFACE | | | | | | | | | | | | | | | |
| 0.00 | TOPSOIL, clayey Black | | | | | | | | | | | | | | | |
| 186.83 | | | | | | | 187 | | | | | | | | | |
| 0.51 | CLAYEY SILT, some sand, trace gravel, with oxidized fissures Hard Brown | | 1 | SS | 33 | | | | | | | | | | | |
| | | | 2 | SS | 45 | | 186 | | | | | | | | | |
| 184.98 | | | | | | | | | | | | | | | | |
| 2.36 | CLAYEY SILT, some sand, trace gravel, with oxidized fissures to 2.9m depth Stiff to very stiff Grey | | 3 | SS | 28 | | 185 | | | | | | | | | |
| | | | 4 | SS | 29 | | 184 | | | | | | | | | 5 27 42 36 |
| | | | 5 | SS | 14 | | | | | | | | | | | |
| | | | 6 | SS | 22 | | 183 | | | | | | | | | |
| 182.31 | END OF BOREHOLE | | | | | | | | | | | | | | | |
| 5.03 | Borehole dry during drilling on March 9, 2009. | | | | | | | | | | | | | | | |

LDN_MTO_01_09-1132-0003.GPJ LDN_MTO.GDT 6/29/09

| | | | | | |
|----------------------|---------------|-----------------------------------|--|------------------|---------------|
| PROJECT 09-1132-0003 | | RECORD OF BOREHOLE No 230N | | 1 OF 1 | METRIC |
| W.P. | LOCATION | N 4677822.9 ; E 336266.7 | | ORIGINATED BY NG | |
| DIST WEST HWY WEP/3 | BOREHOLE TYPE | POWER AUGER, SOLID STEM | | COMPILED BY LMK | |
| DATUM GEODETIC | DATE | March 9, 2009 | | CHECKED BY SSB | |

| 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 | | | | | | | WATER CONTENT (%) | | | | | |
| | | | | | | | | ○ UNCONFINED | | | | | | | + FIELD VANE | | ● QUICK TRIAXIAL | | × LAB VANE | |
| 187.37 | GROUND SURFACE | | | | | 20 | 40 | 60 | 80 | 100 | 10 | 20 | 30 | | | | | | | |
| 0.00 | TOPSOIL, clayey Black | | | | | | | | | | | | | | | | | | | |
| 0.23 | CLAYEY SILT, some sand, trace gravel, with oxidized fissures Hard Brown | | 1 | SS | 48 | | | | | | | | | | | | | | | |
| | | | 2 | SS | 56 | | | | | | | | | | | | | | | |
| 185.08 | CLAYEY SILT, some sand, trace gravel, with oxidized fissures to 2.9m depth Very stiff Grey | | 3 | SS | 28 | | | | | | | | | | | | | | | |
| 2.29 | | | 4 | SS | 28 | | | | | | | | | | | | | | | |
| | | | 5 | SS | 19 | | | | | | | | | | | | | | | |
| 182.70 | SANDY SILT, trace clay, trace gravel, with sand pockets Very dense Grey | | 6 | SS | 88 | | | | | | | | | | | | | | | |
| 4.67 | | | | | | | | | | | | | | | | | | | | |
| 182.34 | END OF BOREHOLE | | | | | | | | | | | | | | | | | | | |
| 5.03 | Borehole dry during drilling on March 9, 2009. | | | | | | | | | | | | | | | | | | | |

LDN_MTO_01 09-1132-0003.GPJ LDN_MTO.GDT 6/29/09

| | | | | | |
|----------------------|--|---------------------------------------|--|-----------------------|--|
| PROJECT 09-1132-0003 | | RECORD OF BOREHOLE No 231N | | 1 OF 1 METRIC | |
| W.P. _____ | | LOCATION N 4677775.6, E 336213.6 | | ORIGINATED BY NG | |
| DIST WEST HWY WEP/3 | | BOREHOLE TYPE POWER AUGER, SOLID STEM | | COMPILED BY LMK | |
| DATUM GEODETIC | | DATE March 9, 2009 | | CHECKED BY <i>SJS</i> | |

| 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 | | | | | | | WATER CONTENT (%) | | | |
| | | | | | | | | 20 40 60 80 100 | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | |
| 187.06 | GROUND SURFACE | | | | | | | | | | | | | | | | | |
| 0.00 | TOPSOIL, clayey Brown | | | | | | | | | | | | | | | | | |
| 0.28 | CLAYEY SILT, some sand, trace gravel, with oxidized fissures Hard Brown | | 1 | SS | 50 | | | | | | | | | | | | | |
| | | | 2 | SS | 66 | | | | | | | | | | | | | |
| 184.77 | | | | | | | | | | | | | | | | | | |
| 2.29 | CLAYEY SILT, some sand, trace gravel Very stiff to hard Grey | | 3 | SS | 40 | | | | | | | | | | | | | |
| | | | 4 | SS | 33 | | | | | | | | | | | | | |
| | | | 5 | SS | 21 | | | | | | | | | | | | | |
| | | | 6 | SS | 16 | | | | | | | | | | | | | |
| 182.03 | | | | | | | | | | | | | | | | | | |
| 5.03 | END OF BOREHOLE Borehole dry during drilling on March 9, 2009. | | | | | | | | | | | | | | | | | |

LDN_MTO_01 09-1132-0003.GPJ LDN_MTO.GDT 6/29/09

RECORD OF BOREHOLE No 232N

1 OF 1

METRIC

PROJECT 09-1132-0003

W.P. _____

LOCATION N 4677725.4 E 336154.5

ORIGINATED BY NG

DIST WEST HWY WEP/3

BOREHOLE TYPE POWER AUGER, SOLID STEM

COMPILED BY LMK

DATUM GEODETIC

DATE March 9, 2009

CHECKED BY *SSB*

| 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 | | |
| 186.75 | GROUND SURFACE | | | | | | | | | | | | | |
| 0.08 | TOPSOIL, clayey Brown CLAYEY SILT, some sand, trace gravel, with oxidized fissures Hard Mottled brown and grey | | 1 | SS | 69 | | 186 | | | | | | | |
| | | | 2 | SS | 61 | | 185 | | | | | | | |
| 184.62 | CLAYEY SILT, some sand, trace gravel Very stiff Grey | | 3 | SS | 26 | | 184 | | | | | | | |
| 2.13 | | | 4 | SS | 25 | | 183 | | | | | | | |
| | | | 5 | SS | 17 | | 182 | | | | | | | |
| 181.72 | END OF BOREHOLE | | 6 | SS | 15 | | | | | | | | | |
| 5.03 | Borehole dry during drilling on March 9, 2009. | | | | | | | | | | | | | |

LDN_MTO_01 09-1132-0003.GPJ LDN_MTO.GDT 6/29/09

RECORD OF BOREHOLE No 233N

1 OF 1

METRIC

PROJECT 09-1132-0003

W.P.

LOCATION

N 4677688.5 :E 336099.5

ORIGINATED BY NG

DIST WEST HWY WEP/3

BOREHOLE TYPE POWER AUGER, SOLID STEM

COMPILED BY LMK

DATUM GEODETIC

DATE

March 9, 2009

CHECKED BY *SJB*

| 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 (%) |
|---------------|--|------------|---------|------|------------|-------------------------|-----------------|--|-----------------|---------------------------------|-------------------------------|--------------------------------|--|---------------------------------------|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | "N" VALUES | | | 20 40 60 80 100 | 20 40 60 80 100 | | | | | |
| 186.39 | GROUND SURFACE | | | | | | | | | | | | | |
| 0.10 | TOPSOIL, clayey Brown | | | | | | 186 | | | | | | | |
| | CLAYEY SILT, some sand, trace gravel, with oxidized fissures | | 1 | SS | 58 | | | | | | | | | |
| | Hard Brown | | | | | | 185 | | | | | | | |
| 184.76 | | | | | | | | | | | | | | |
| 1.63 | CLAYEY SILT, some sand, trace gravel | | 2 | SS | 28 | | | | | | | | | |
| | Very stiff to hard Grey | | | | | | | | | | | | | |
| | | | 3 | SS | 32 | | 184 | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 4 | SS | 16 | | 183 | | | | | | | |
| | | | | | | | | | | | | | | |
| | | | 5 | SS | 18 | | | | | | | | | |
| | | | | | | | 182 | | | | | | | |
| | | | 6 | SS | 13 | | | | | | | | | |
| 181.36 | END OF BOREHOLE | | | | | | | | | | | | | |
| 5.03 | Borehole dry during drilling on March 9, 2009. | | | | | | | | | | | | | |

LDN_MTO_01 09-1132-0003.GPJ LDN_MTO.GDT 6/29/09

RECORD OF BOREHOLE No 2

1 OF 1

METRIC

W.P. 143-91-00 LOCATION Sta. 10+684.6 O/S 29.0m Lt (from Centreline of Hwy. 3) ORIGINATED BY E.M.
 DIST 1 HWY 401 and 3 BOREHOLE TYPE Hollow Stem Auger and Cone Test COMPILED BY D.S.
 DATUM Geodetic DATE June 8, 1993 CHECKED BY T.K.

| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT W _P | NATURAL MOISTURE CONTENT W | LIQUID LIMIT W _L | UNIT WEIGHT γ | REMARKS & GRAIN SIZE DISTRIBUTION (%) | | | | | | | | | | | | | |
|--------------|---|------------|-------------|--------|------------|-------------------------|-----------------|--|------|---------------------------------|-------------------------------|--------------------------------|------------------|---------------------------------------|------|----|-----|----|----|----|--|--|--|--|--|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | 'N' VALUES | | | 20 | 40 | | | | | | 60 | 80 | 100 | 20 | 40 | 60 | | | | | | | |
| 186.6 | Ground Surface | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.0 | Very Stiff to Hard | | 1 | SS | 42 | | 186 | | | | | | | | | | | | | | | | | | | | |
| | | | 2 | SS | 48 | | 184 | | | | | | | | | | | | | | | | | | | | |
| | | | 3 | SS | 27 | | 182 | | | | | | | | | | | | | | | | | | | | |
| | | | 4 | SS | 16 | | 180 | | | | | | | | | | | | | | | | | | | | |
| | | | 5 | SS | 16 | | 178 | | | | | | | | | | | | | | | | | | | | |
| | | | 6 | SS | 11 | | 176 | | | | | | | | | | | | | | | | | | | | |
| | | | 7 | SS | 8 | | | | | | | | | | | | | | | | | | | | | | |
| | | | 8 | TW | PH | | | | | | | | | | | | | | | | | | | | | | |
| | | | 9 | SS | 9 | | | | | | | | | | | | | | | | | | | | | | |
| | | | 10 | SS | 7 | | | | | | | | | | | | | | | | | | | | | | |
| | | | 11 | SS | 8 | | | | | | | | | | | | | | | | | | | | | | |
| 174.0 | | | 12 | SS | 11 | | | | | | | | | | | | | | | | | | | | | | |
| 12.6 | End of Borehole | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | <p>*</p> <table border="1"> <thead> <tr> <th>Date</th> <th>Water Level</th> </tr> </thead> <tbody> <tr> <td>June 8</td> <td>10.7m Dry</td> </tr> <tr> <td>June 9</td> <td>9.0m</td> </tr> <tr> <td>June 11</td> <td>8.4m</td> </tr> <tr> <td>June 15</td> <td>5.2m</td> </tr> <tr> <td>June 17</td> <td>3.3m</td> </tr> <tr> <td>June 18</td> <td>3.0m</td> </tr> </tbody> </table> | Date | Water Level | June 8 | 10.7m Dry | June 9 | 9.0m | June 11 | 8.4m | June 15 | 5.2m | June 17 | 3.3m | June 18 | 3.0m | | | | | | | | | | | | |
| Date | Water Level | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 8 | 10.7m Dry | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 9 | 9.0m | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 11 | 8.4m | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 15 | 5.2m | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 17 | 3.3m | | | | | | | | | | | | | | | | | | | | | | | | | | |
| June 18 | 3.0m | | | | | | | | | | | | | | | | | | | | | | | | | | |

1 OF 1

METRIC

+3, x5: Numbers refer to Sensitivity

RECORD OF BOREHOLE No 4

1 OF 1

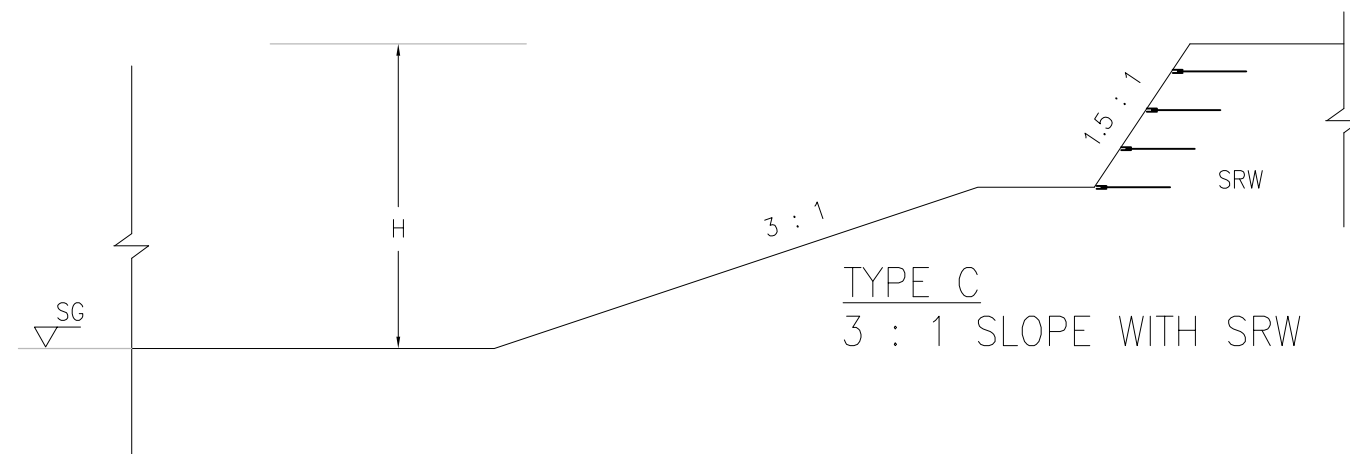
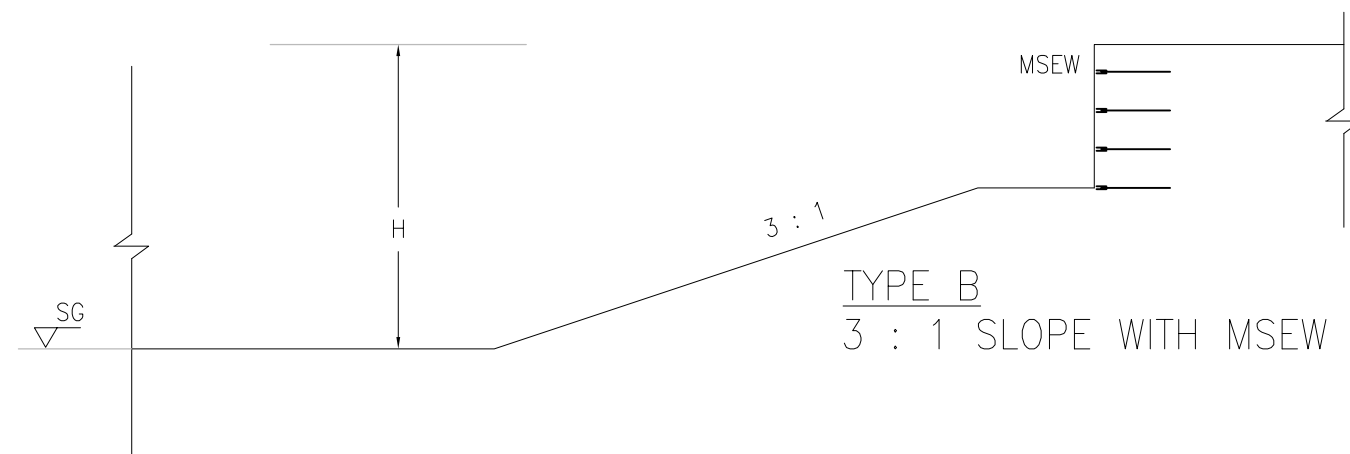
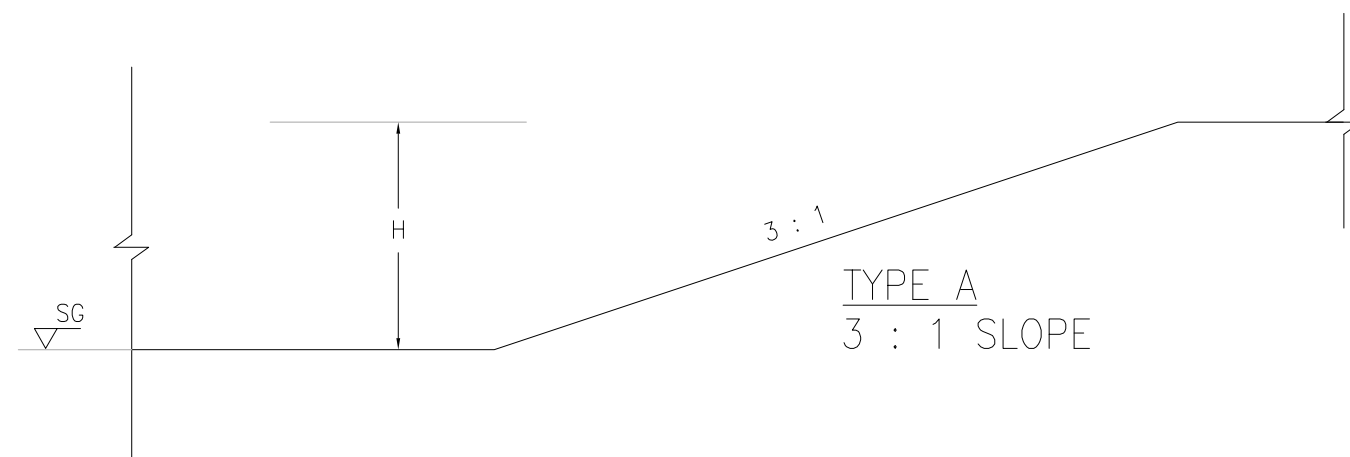
METRIC

W.P. 143-91-00 LOCATION Sta. 10+293.3 O/S 22.9m Rt (from Centreline of Hwy. 401) ORIGINATED BY E.M.
 DIST 1 HWY 401 and 3 BOREHOLE TYPE Hollow Stem Auger and Vane Tests COMPILED BY D.S.
 DATUM Geodetic DATE June 9, 1993 CHECKED BY T.K.

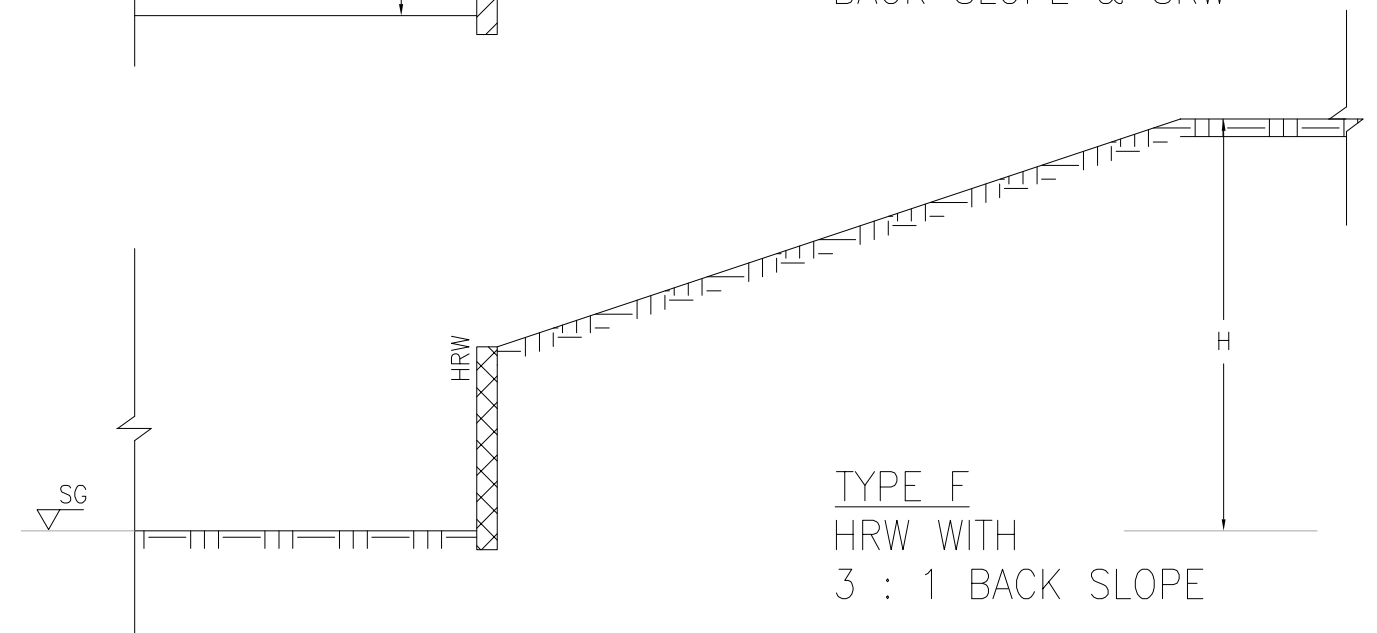
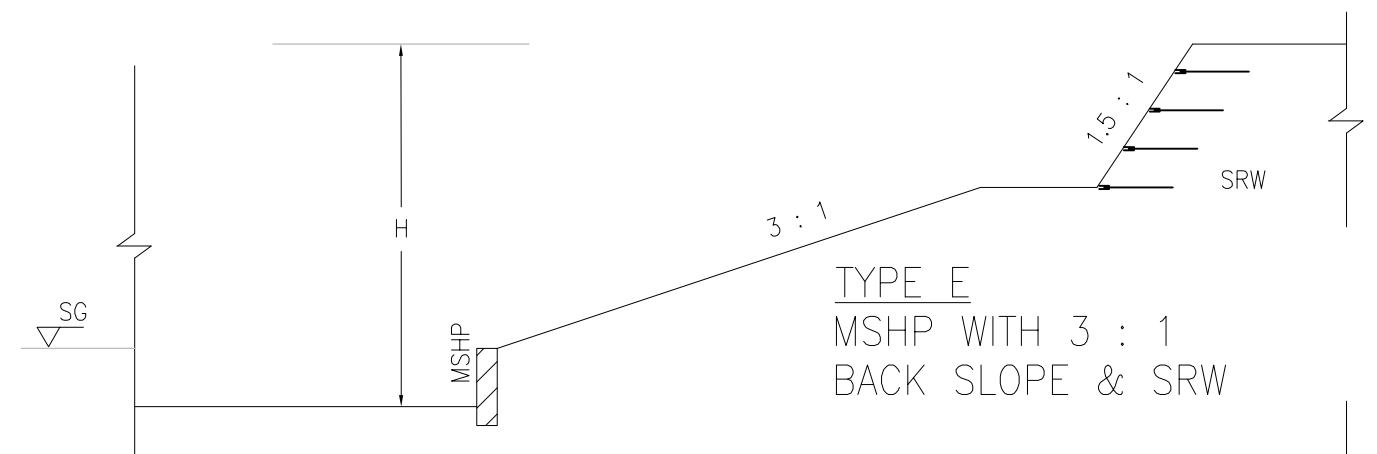
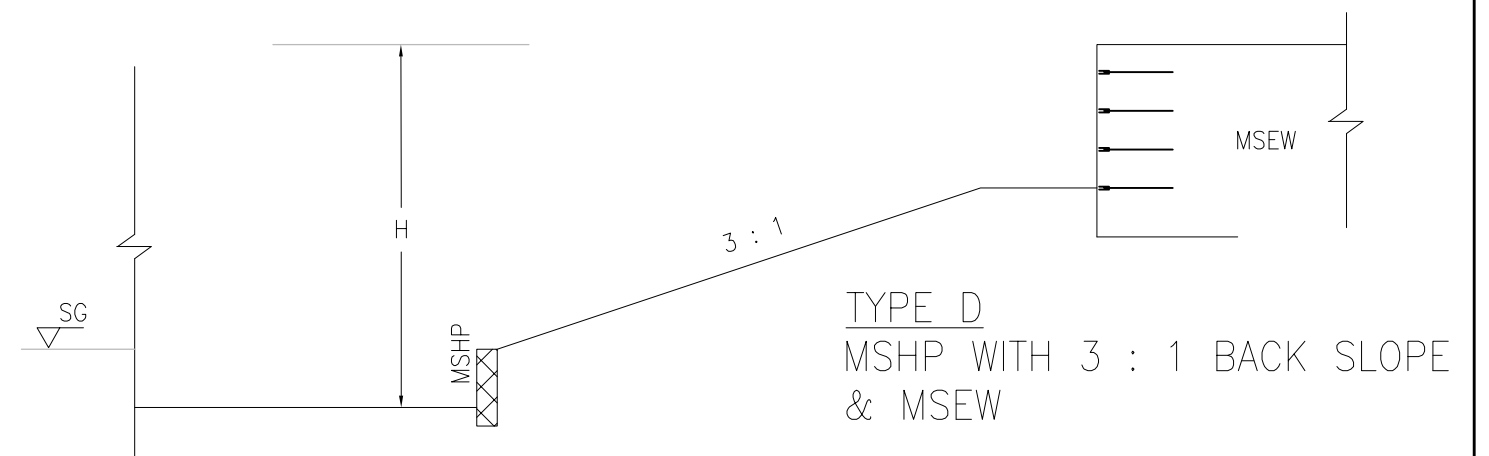
| SOIL PROFILE | | | SAMPLES | | | GROUND WATER CONDITIONS | ELEVATION SCALE | DYNAMIC CONE PENETRATION RESISTANCE PLOT | | PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT | | UNIT WEIGHT γ kN/m ³ | REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL | |
|---|---|------------|---------|------|------------|----------------------------|-----------------|---|-----------------|---|--|--|--|--|
| ELEV DEPTH | DESCRIPTION | STRAT PLOT | NUMBER | TYPE | 'N' VALUES | | | 20 40 60 80 100 | 20 40 60 80 100 | W _P W W _L | | | | |
| 187.2 | Ground Surface | | | | | | | | | | | | | |
| 0.0 186.4 | Clayey Silt Fill | | | | | | | | | | | | | |
| 0.8 | Very Stiff to Hard Brown ----- Grey Clayey Silt with Sand and trace of Gravel occasional Sand Layers (Glacial Till) Stiff to Very Stiff Fine Sand Layer ===== | | 1 | SS | 21 | | 186 | | | | | | | |
| | | | 2 | SS | 39 | | | | | | | | | |
| | | | 3 | SS | 41 | | | | | | | | | |
| | | | 4 | SS | 19 | | | | | | | | | |
| | | | 5 | SS | 15 | | | | | | | | | |
| | | | 6 | SS | 10 | | | | | | | | | |
| | | | 7 | SS | 8 | | | | | | | | | |
| | | | 8 | SS | 6 | | | | | | | | | |
| | | | 9 | SS | 9 | | | | | | | | | |
| | | | 10 | SS | 11 | | | | | | | | | |
| | | | 11 | SS | 8 | | | | | | | | | |
| 173.8 | | | | | | | | | | | | | | |
| 13.4 | End of Borehole | | | | | | | | | | | | | |
| <div><div>Date</div><div>Water Level</div><div>June 9</div><div>6.5m Dry</div><div>June 11</div><div>5.6m</div><div>June 15</div><div>0.5m</div><div>June 16</div><div>0.7m</div><div>June 17</div><div>0.7m</div><div>June 18</div><div>0.7m</div></div> | | | | | | | | | | | | | | |

| Date | Water Level |
|---------|-------------|
| June 9 | 6.5m Dry |
| June 11 | 5.6m |
| June 15 | 0.5m |
| June 16 | 0.7m |
| June 17 | 0.7m |
| June 18 | 0.7m |

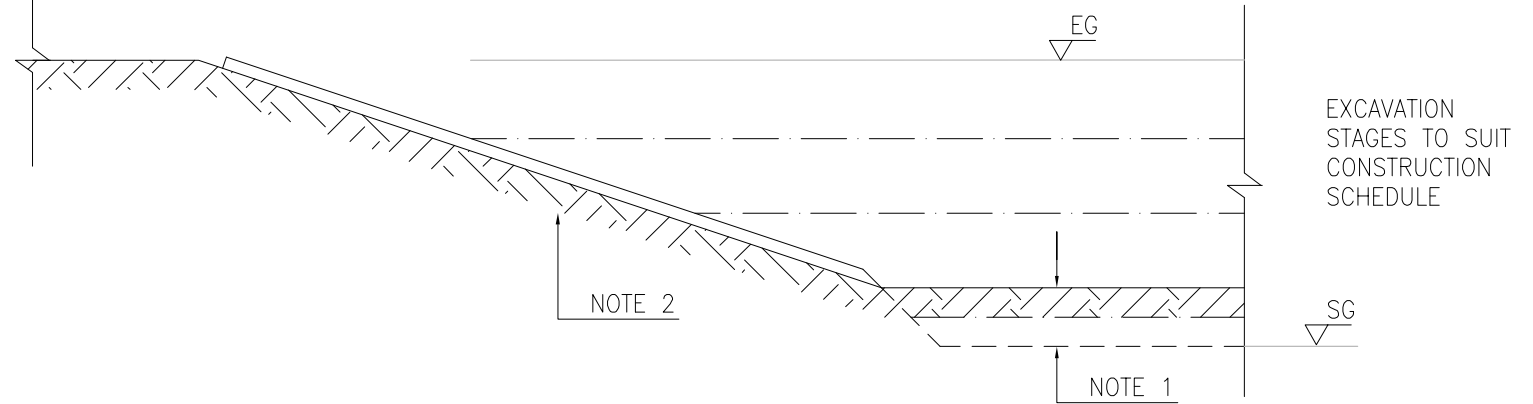
Appendix E Typical Slope Configurations



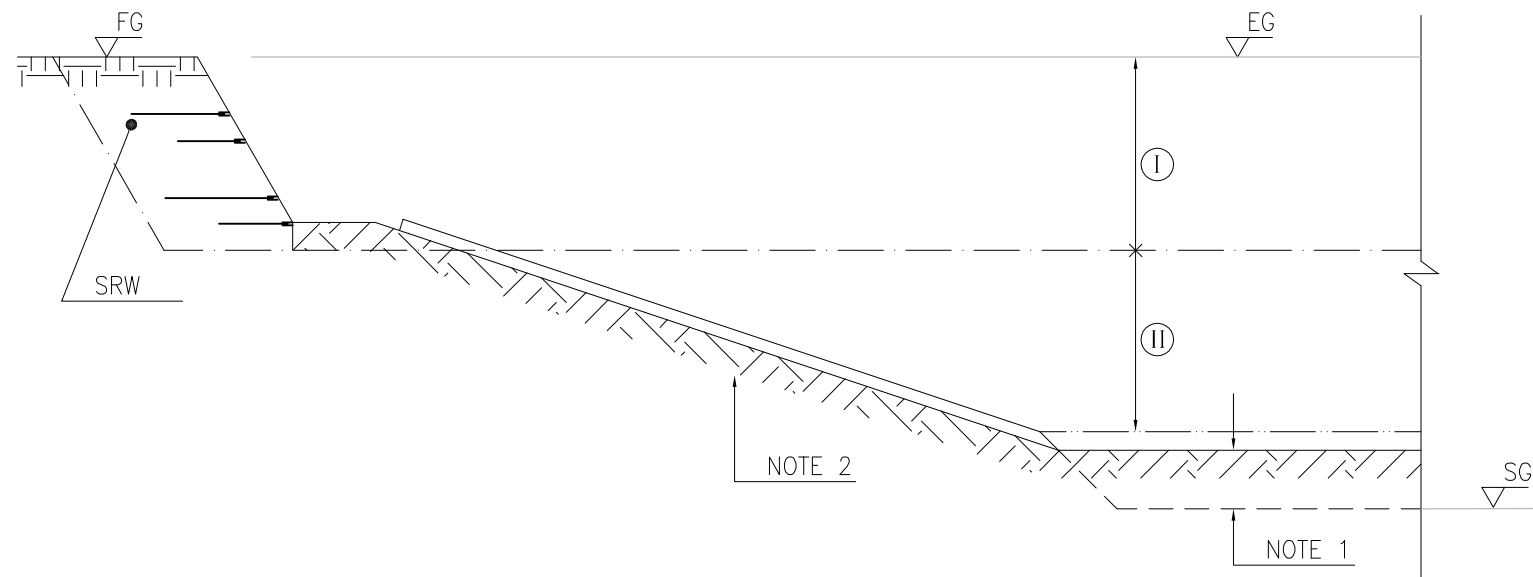
NOT TO SCALE



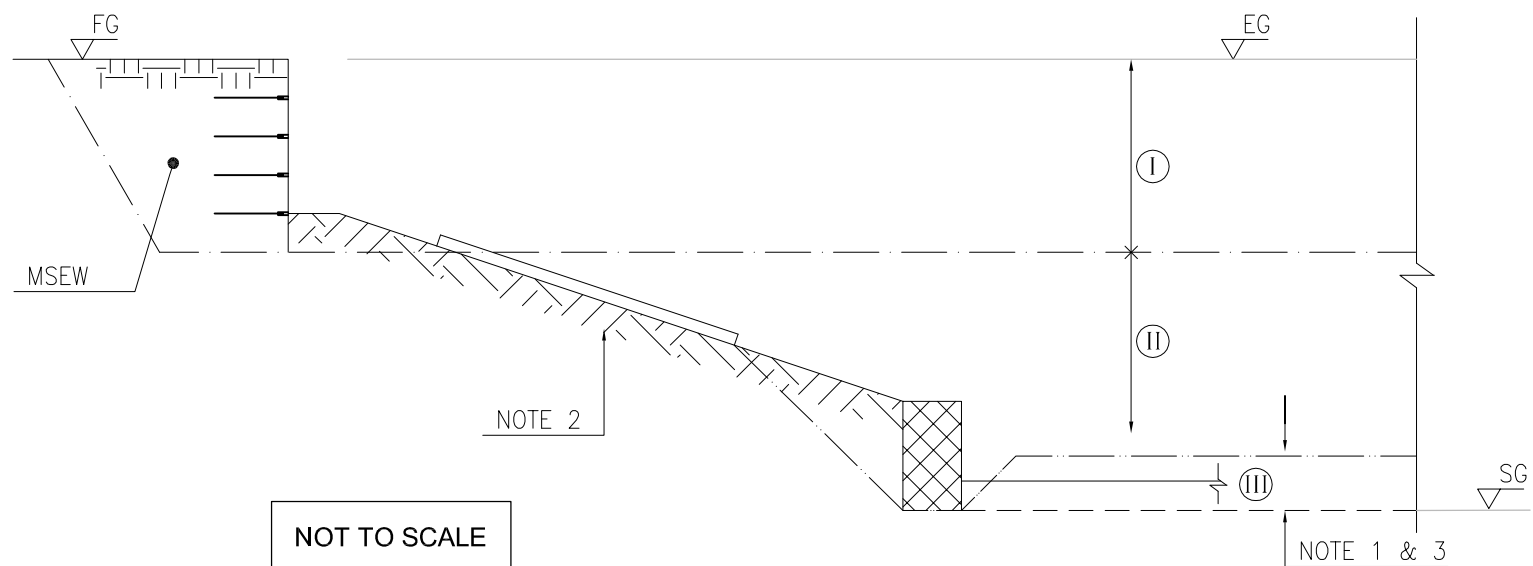
Appendix F Schematic Construction Staging



SLOPE TYPE A



SLOPE TYPE B & C



SLOPE TYPE D & E

NOT TO SCALE

LEGEND:

- EG – EXISTING GRADE
- FG – FINISHED GRADE
- SG – SUBGRADE
- ① EXCAVATION LIMIT STAGE
- ② EXCAVATION LIMIT STAGE
- ③ EXCAVATION LIMIT STAGE /SUBGRADE

NOTES:

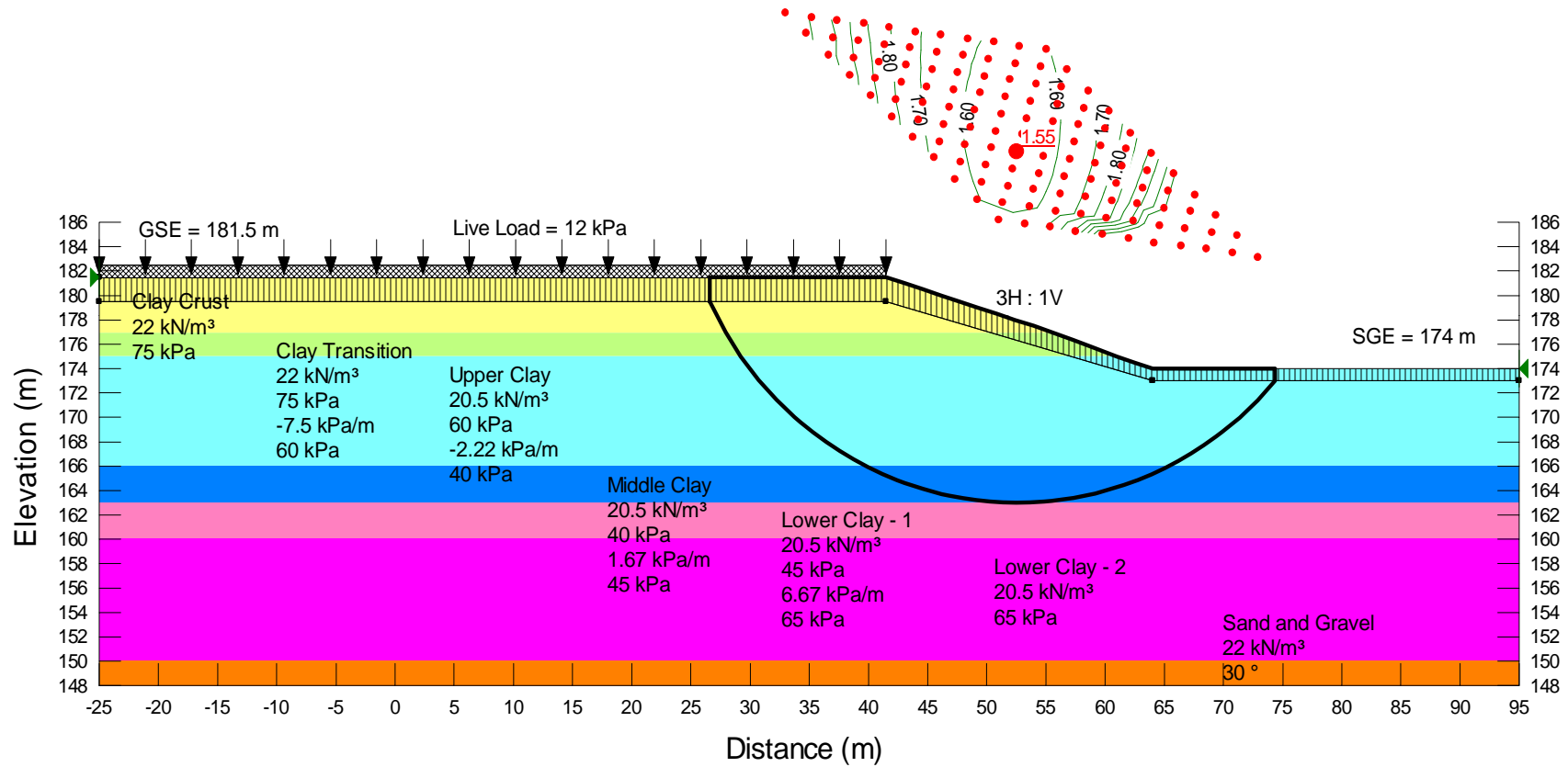
1. NOT LESS THAN 500mm TO BE REMOVED ONLY WHEN PAVEMENT CONSTRUCTION IS READY TO START.
2. MINIMUM OF 150mm OF UNEXCAVATED SOIL TO BE LEFT ABOVE FINISHED GRADE, OR EQUIVALENT SURFACE PROTECTION TO BE PROVIDED UNTIL LANDSCAPING IS READY TO BE APPLIED.
3. UNEXCAVATED TO MIN. 1.0m ABOVE SUBGRADE UNTIL COMPLETION OF TRW AND THE ASSOCIATED BACKFILL.

Appendix G Global Stability Analyses

Station 10+300L-7m H-Right Side-Short Term-Undrained.gsz

10/31/2011

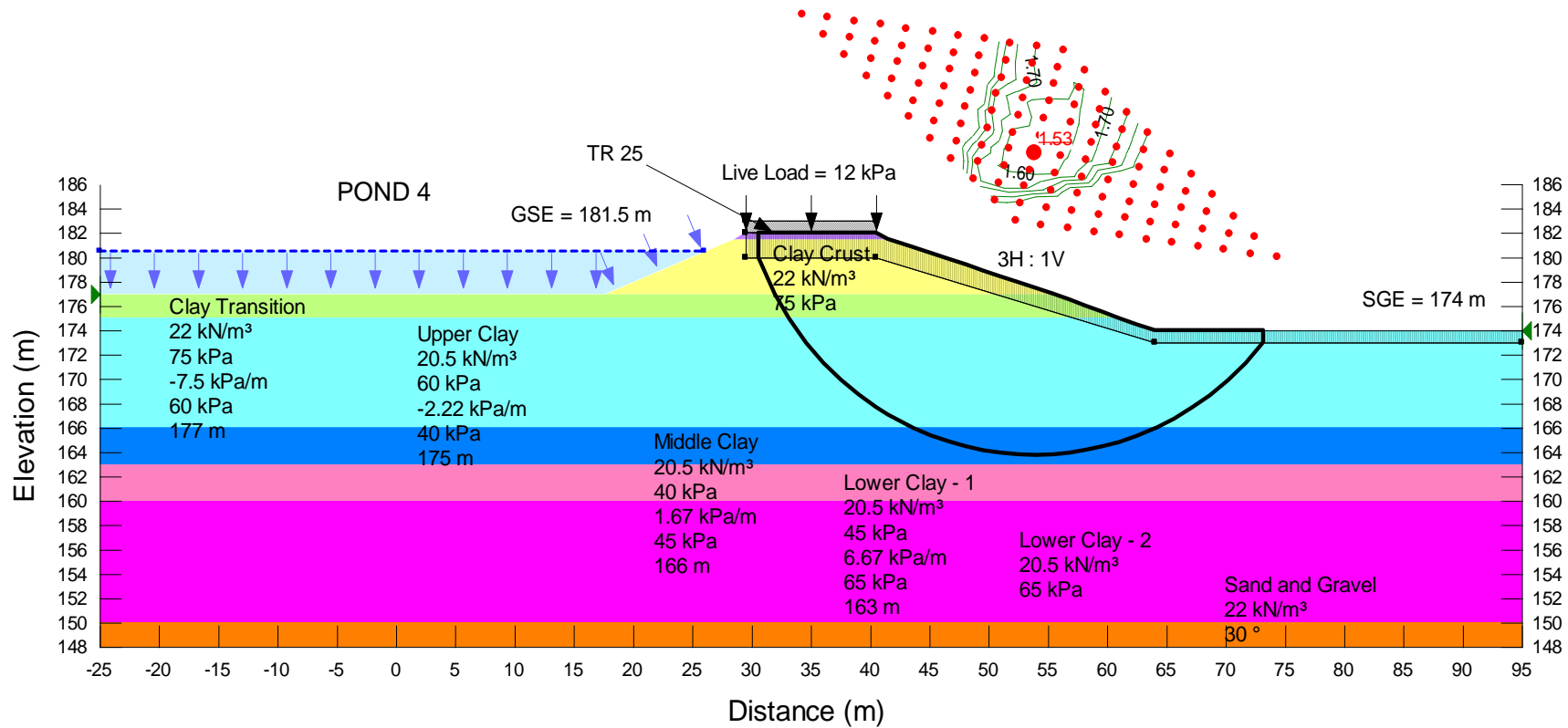
WEP SW8801.1002.101



Station 10+300L-7m H-Right Side-Undrained.gsz

10/31/2011

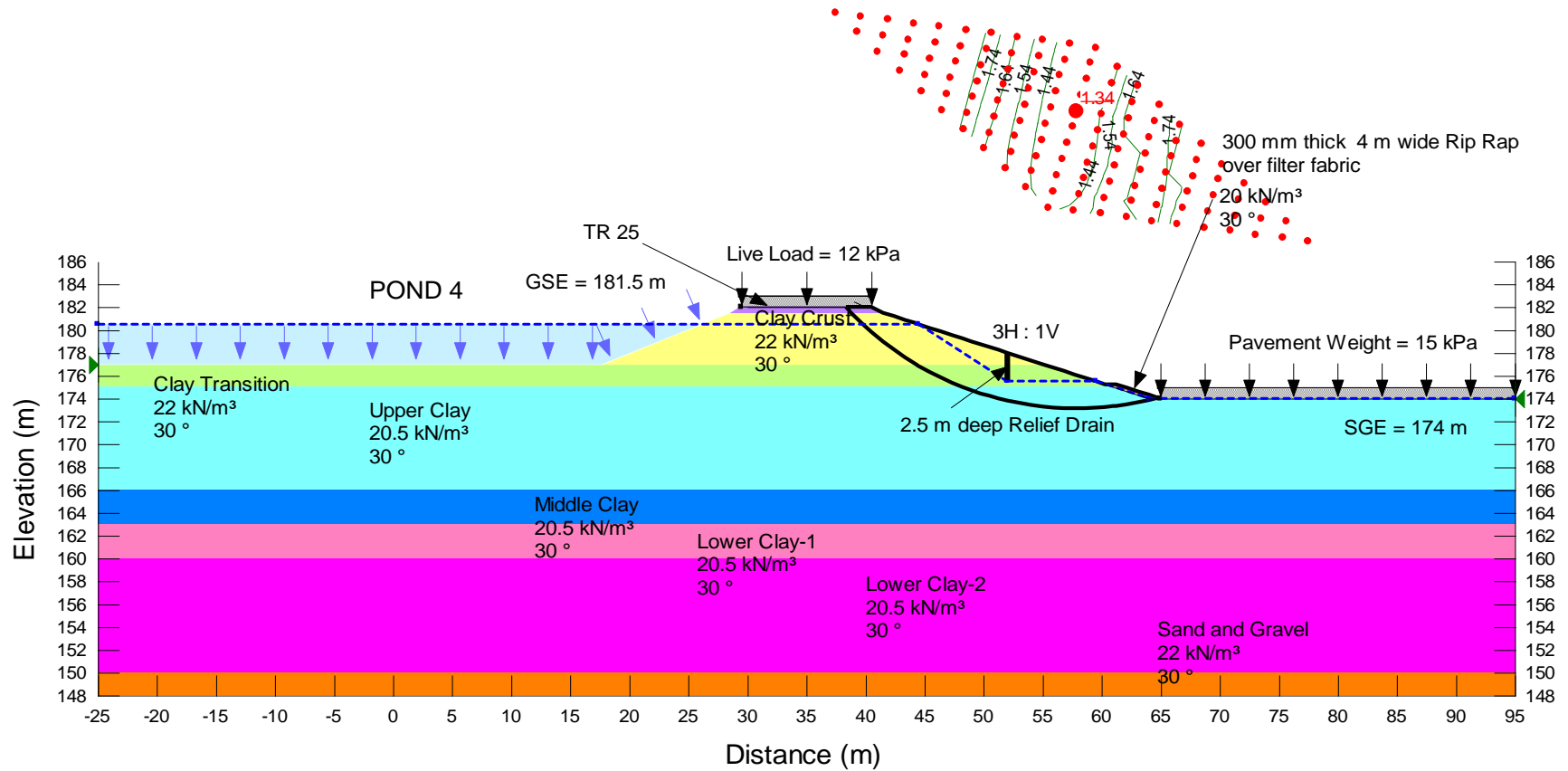
WEP SW8801.1002.101



Station 10+300L-7m H-Right Side-Drained.gsz

11/08/2011

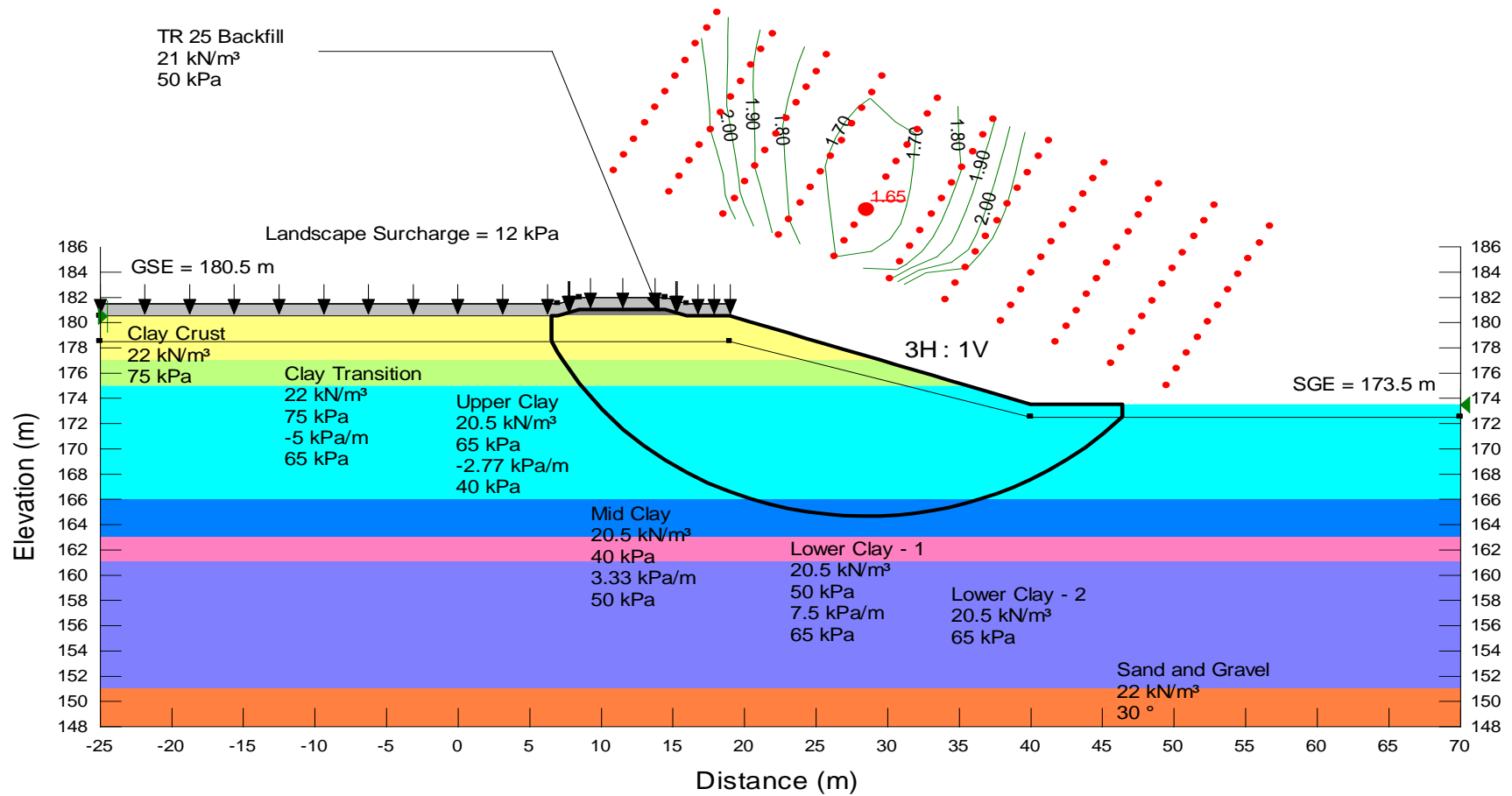
WEP SW8801.1002.101



Station 10+425L-6.5m H-Right Side-Undrained.gsz

10/31/2011

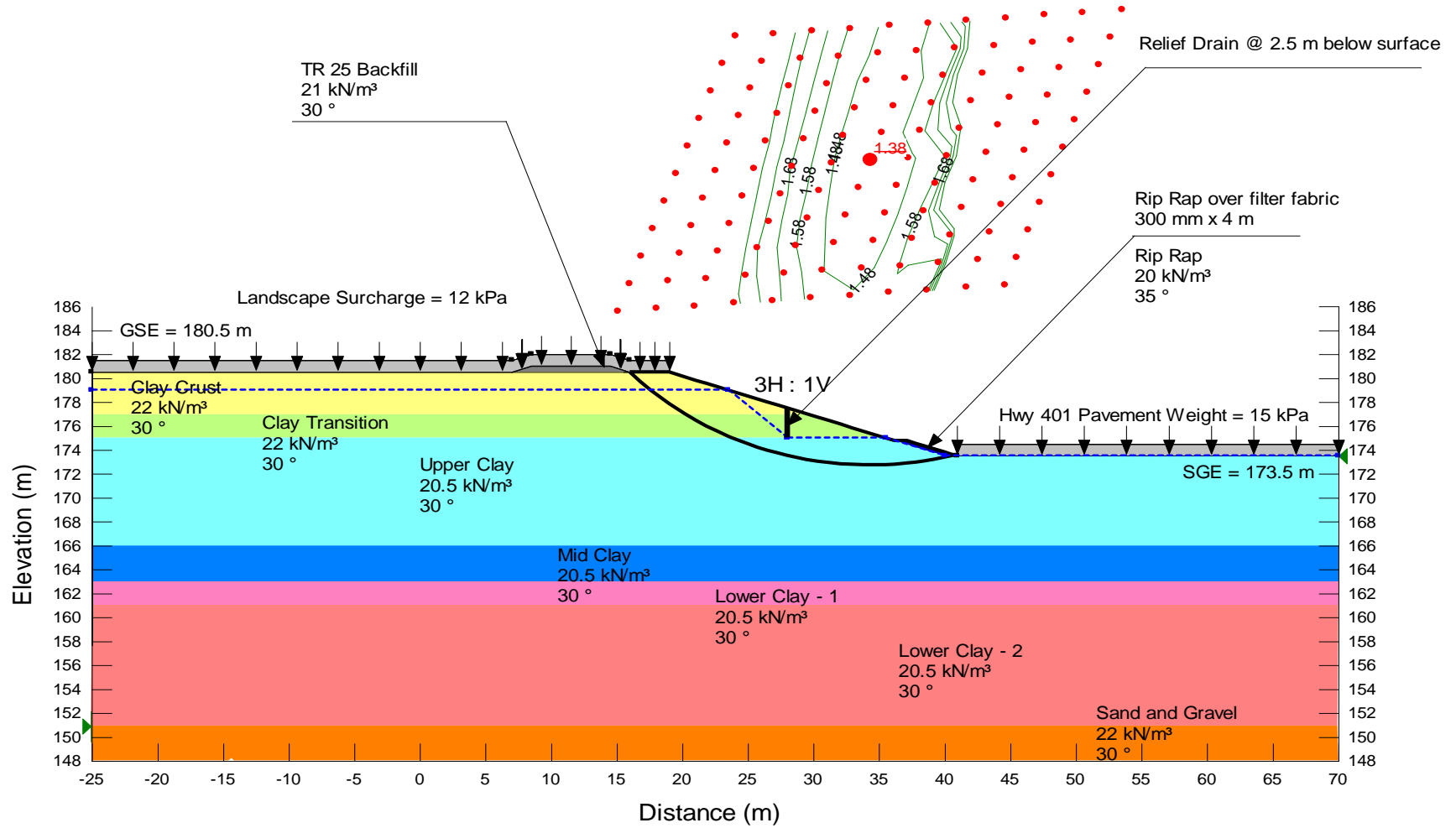
WEP SW8801.1002.101



Station 10+425L-6.5m H-Right Side-Drained.gsz

10/31/2011

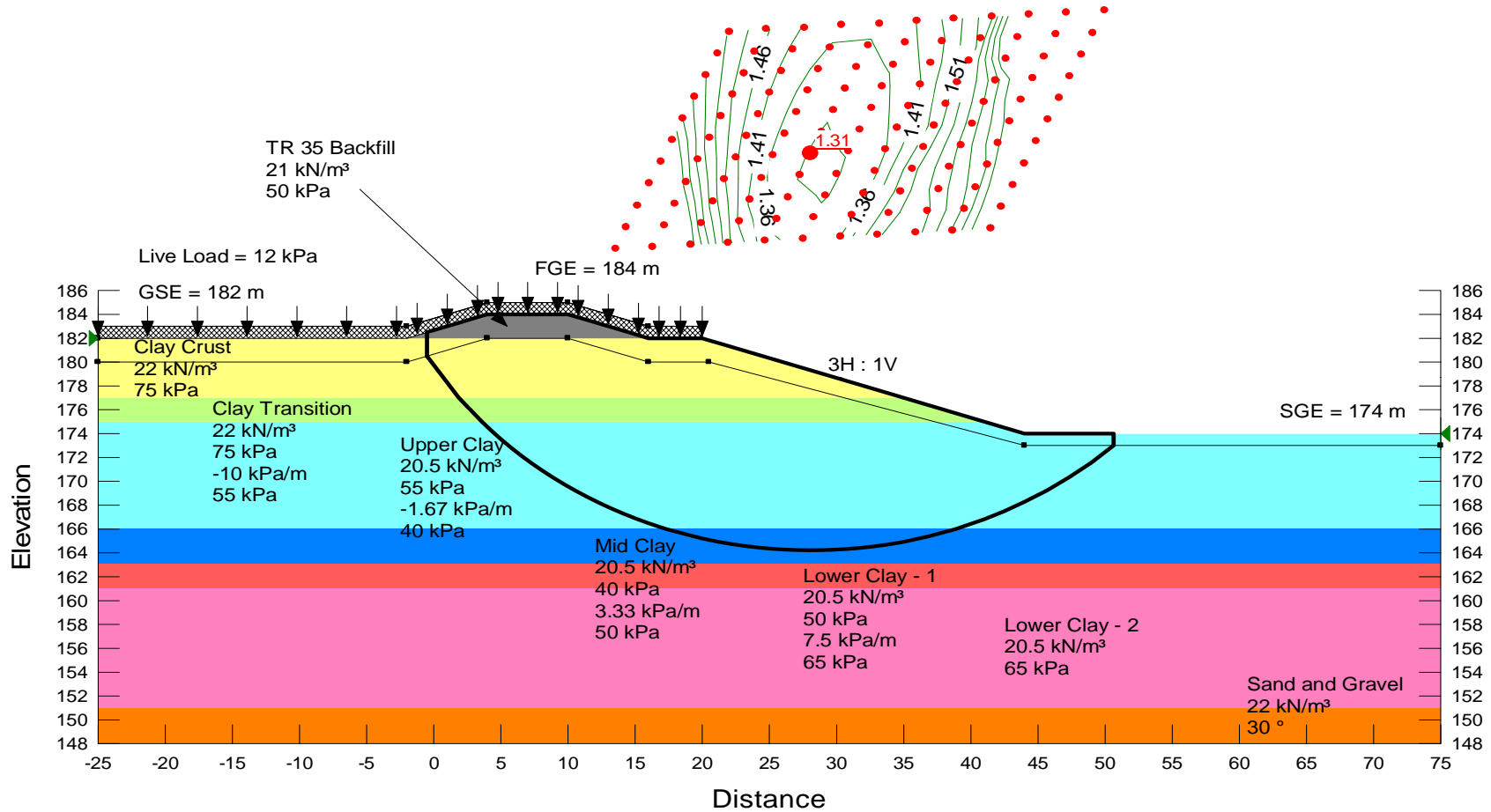
WEP SW8801.1002.101



Station 10+725L-9m H-Right Side-Undrained.gsz

08/07/2012

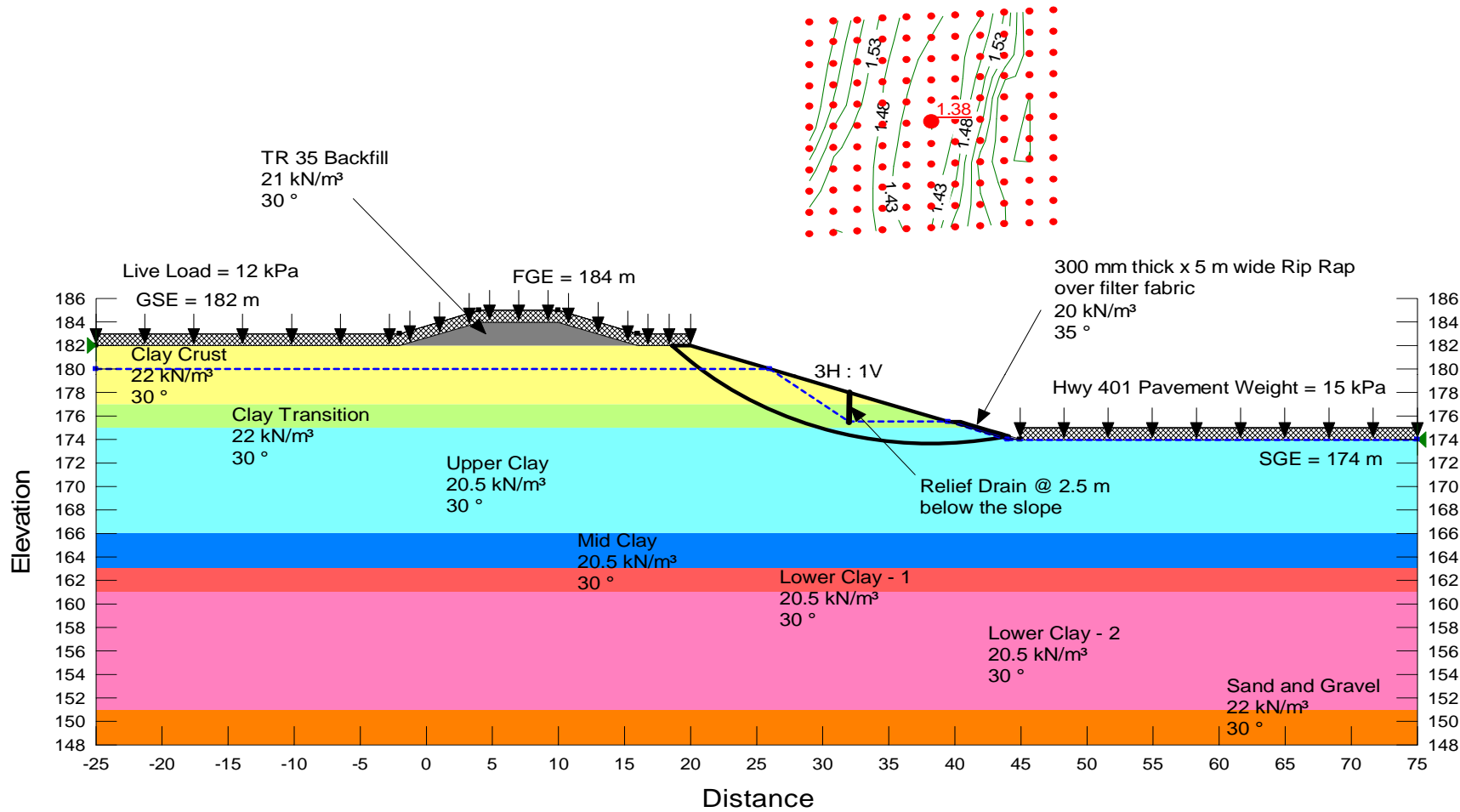
WEP SW8801.1002.101



Station 10+725L-9m H-Right Side-Drained.gsz

08/07/2012

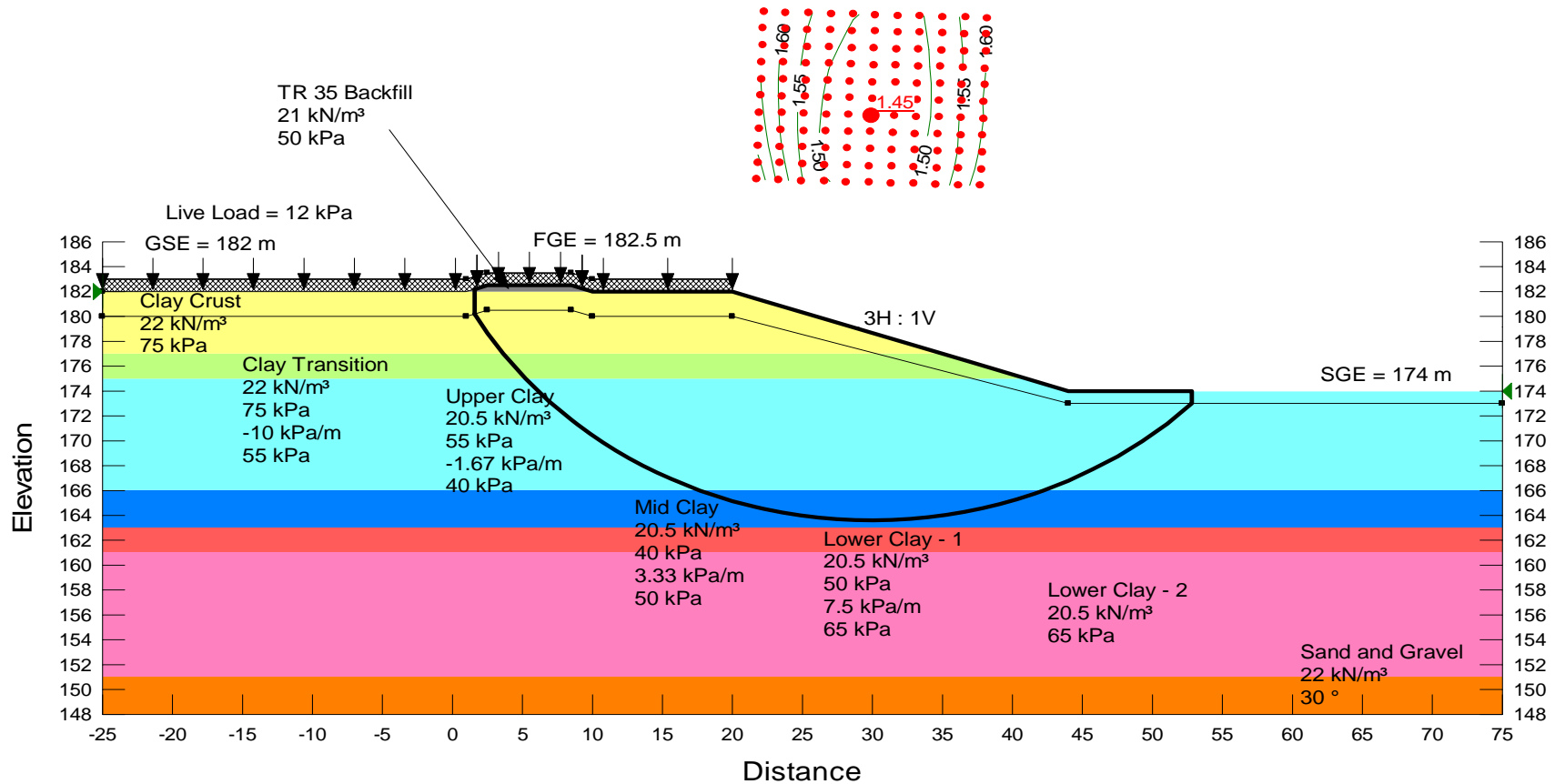
WEP SW8801.1002.101



Station 10+750L-7.5 m H-Right Side-Undrained.gsz

08/07/2012

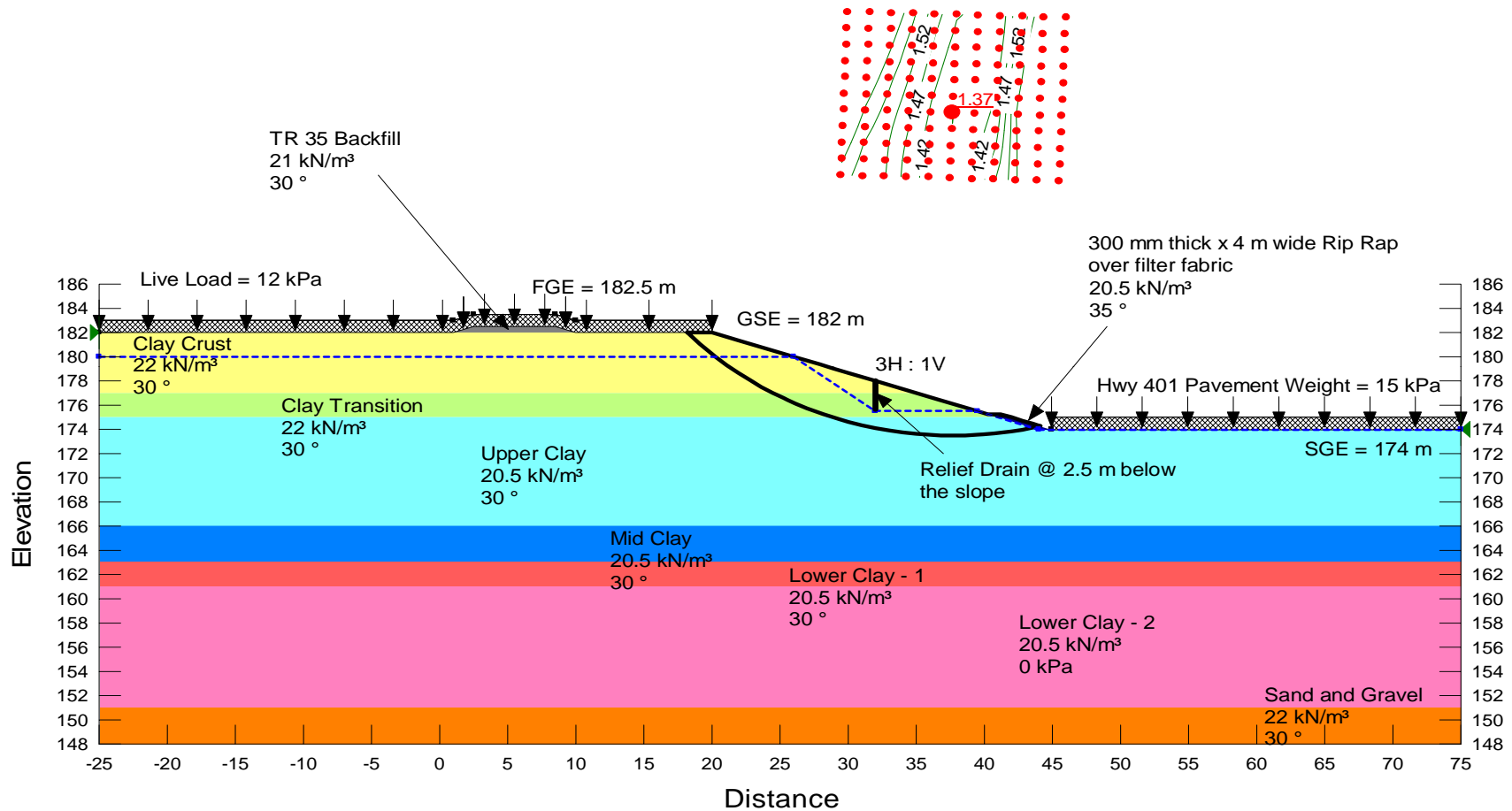
WEP SW8801.1002.101



Station 10+750L-7.5 m H-Right Side-Drained.gsz

08/07/2012

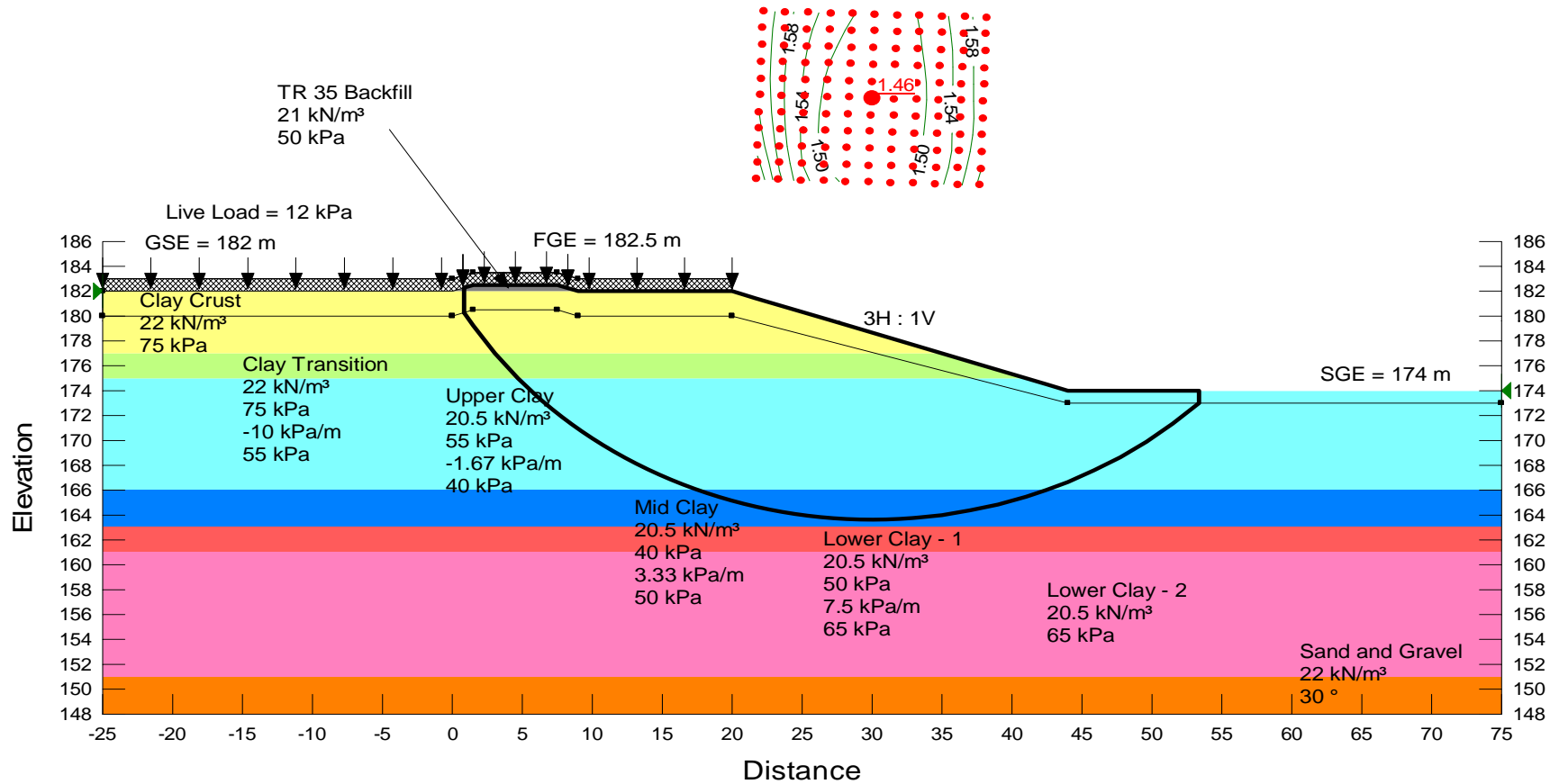
WEP SW8801.1002.101



Station 10+755.24L-7.5 m H-Right Side-Undrained.gsz

08/07/2012

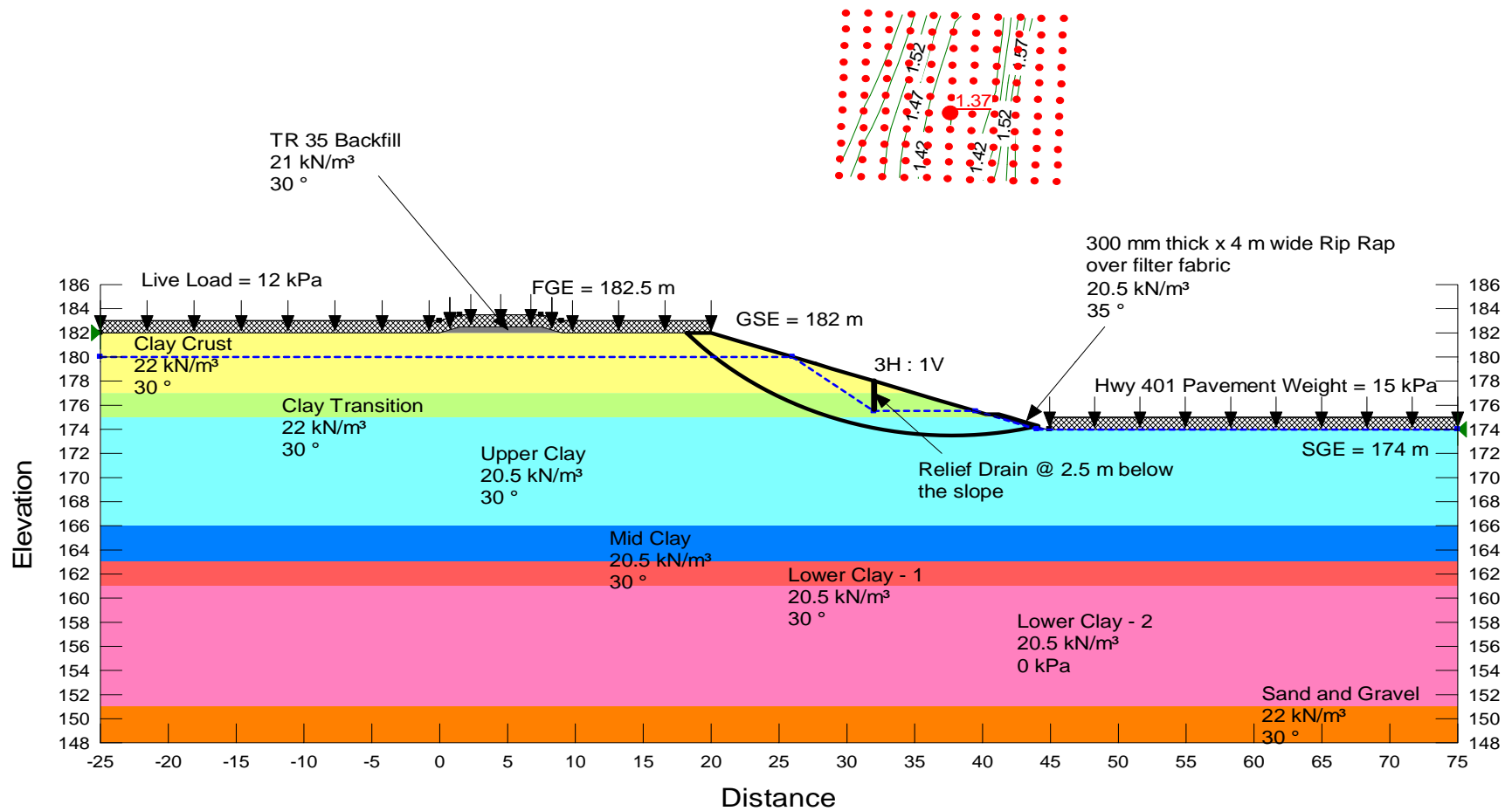
WEP SW8801.1002.101



Station 10+755.24L-7.5 m H-Right Side-Drained.gsz

08/07/2012

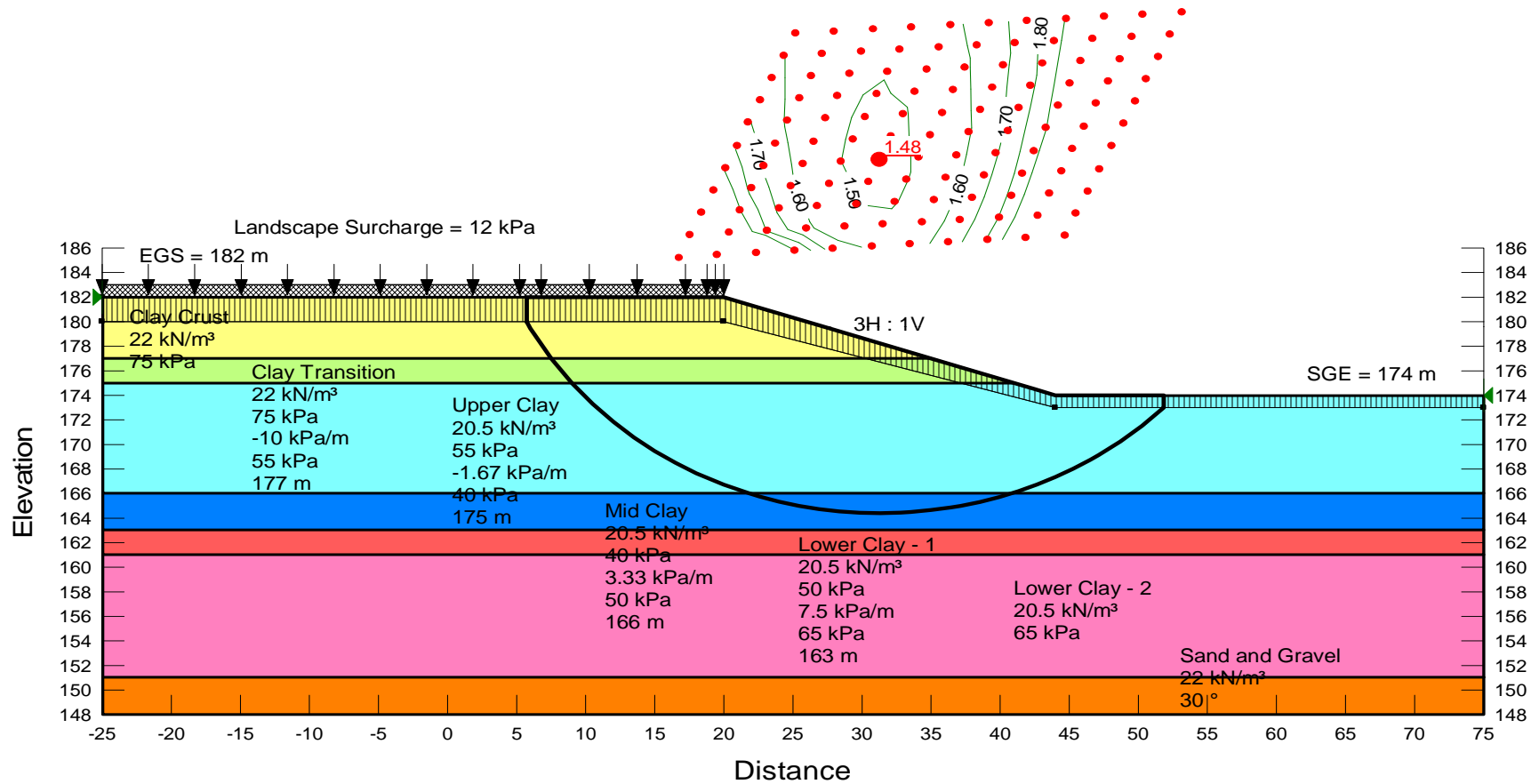
WEP SW8801.1002.101



Station 10+775L-7m H-Right Side-Undrained.gsz

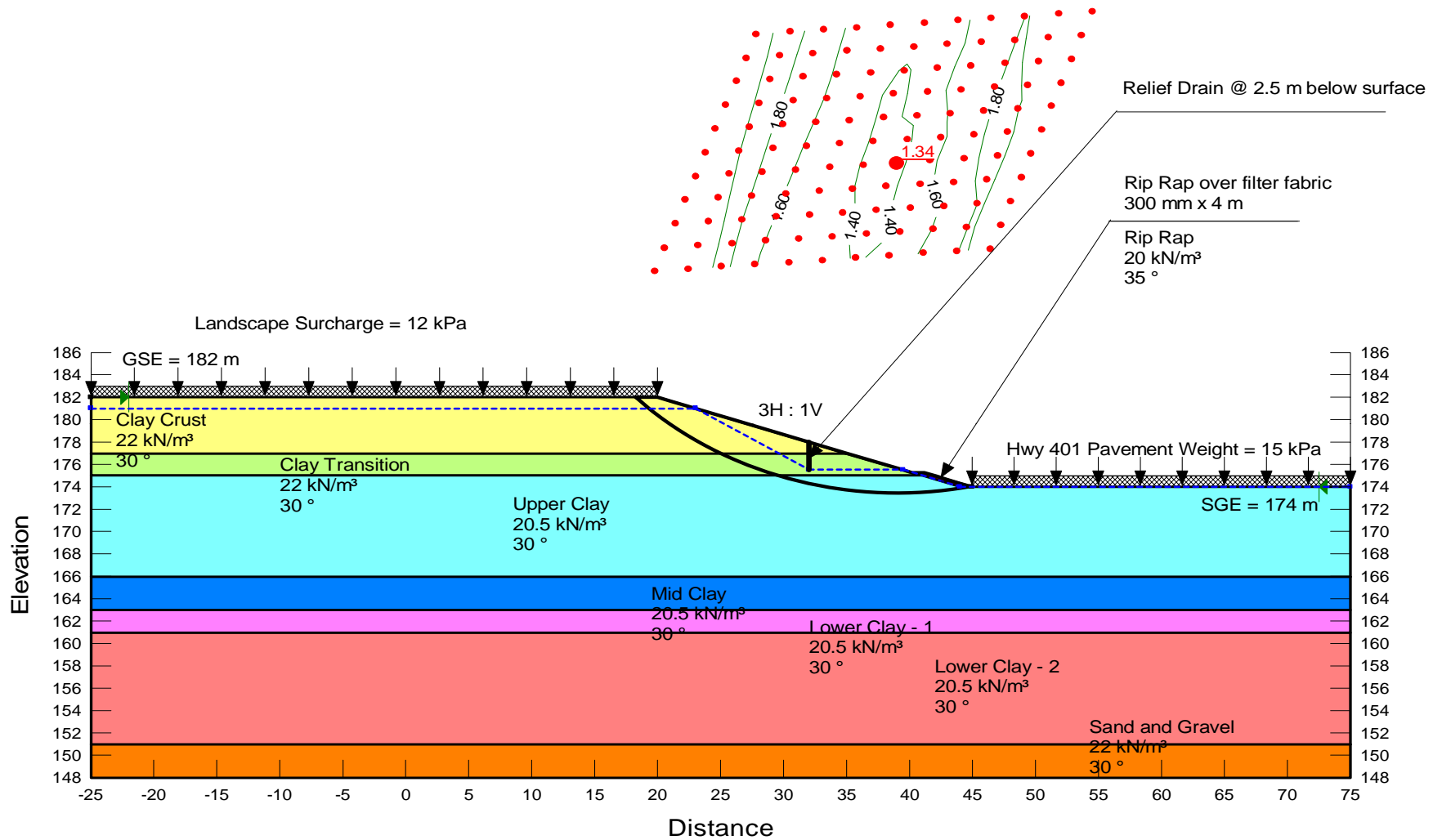
08/07/2012

WEP SW8801.1002.101



Station 10+775L-7m H-Right Side-Drained.gsz
08/07/2012

WEP SW8801.1002.101



WEP SW8801.1002.101

Geotechnical cross-section diagram showing a slope stability analysis. The diagram includes a failure surface (black line) and a potential failure surface (red dotted line). The failure surface is labeled "3H:1V". The potential failure surface is labeled "1.49". The diagram includes soil layers with properties:

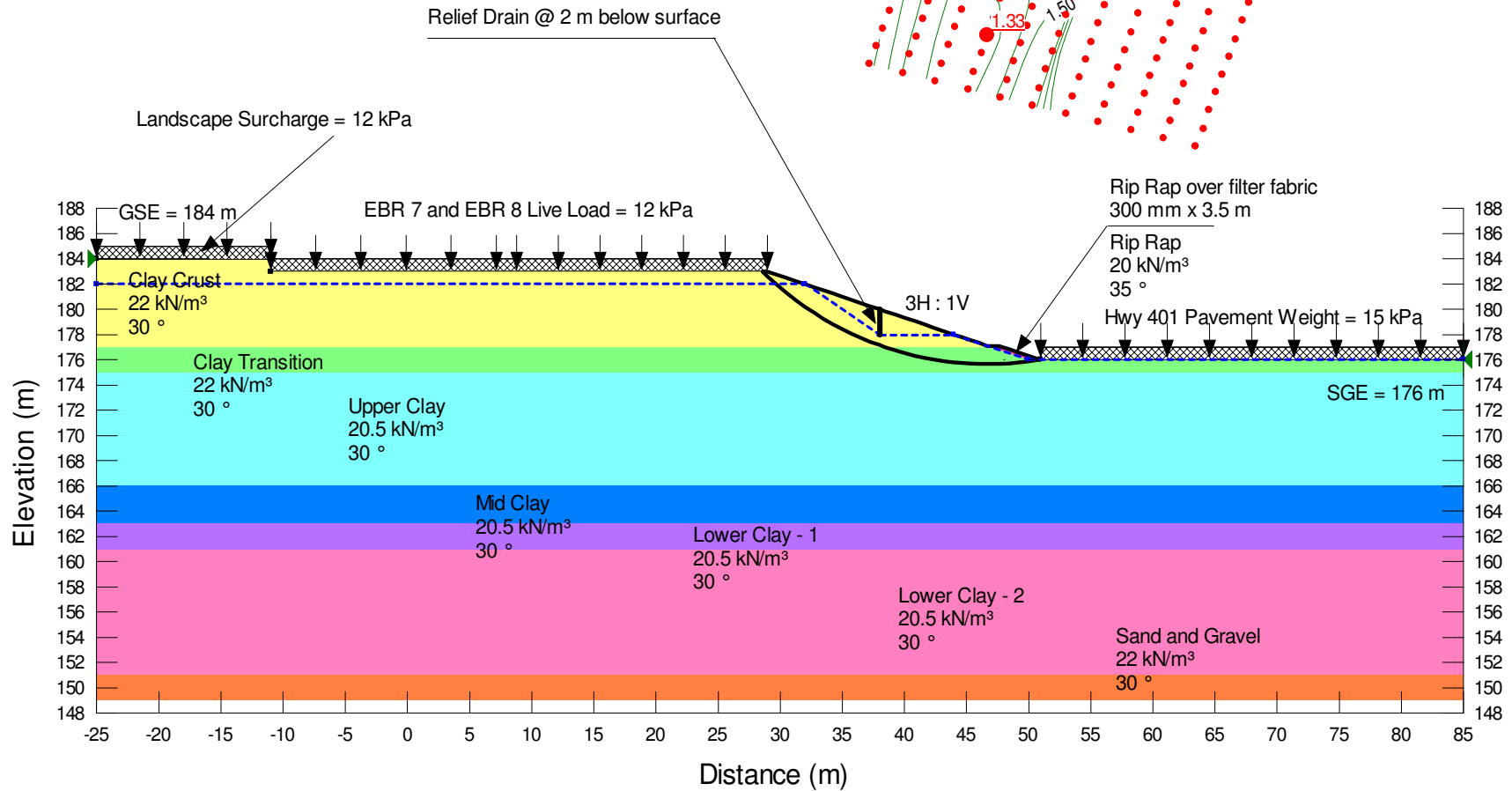
- Clay Crust: 22 kN/m³, 75 kPa
- Clay Transition: 22 kN/m³, 75 kPa, -10 kPa/m, 55 kPa
- Upper Clay: 20.5 kN/m³, 55 kPa, -1.67 kPa/m, 40 kPa
- Mid Clay: 20.5 kN/m³, 40 kPa, 3.33 kPa/m, 50 kPa
- Lower Clay - 1: 20.5 kN/m³, 50 kPa, 7.5 kPa/m, 65 kPa
- Lower Clay - 2: 20.5 kN/m³, 65 kPa
- Sand and Gravel: 22 kN/m³, 30°

The diagram also shows a landscape surcharge (EBR 7 and EBR 8 Live Load = 12 kPa) and a GSE = 184 m. The SGE = 176 m is indicated on the right. The x-axis is Distance (m) from -25 to 85, and the y-axis is Elevation (m) from 148 to 188.

Station 11+000L-Right Side-7m H-Drained.gsz

10/31/2011

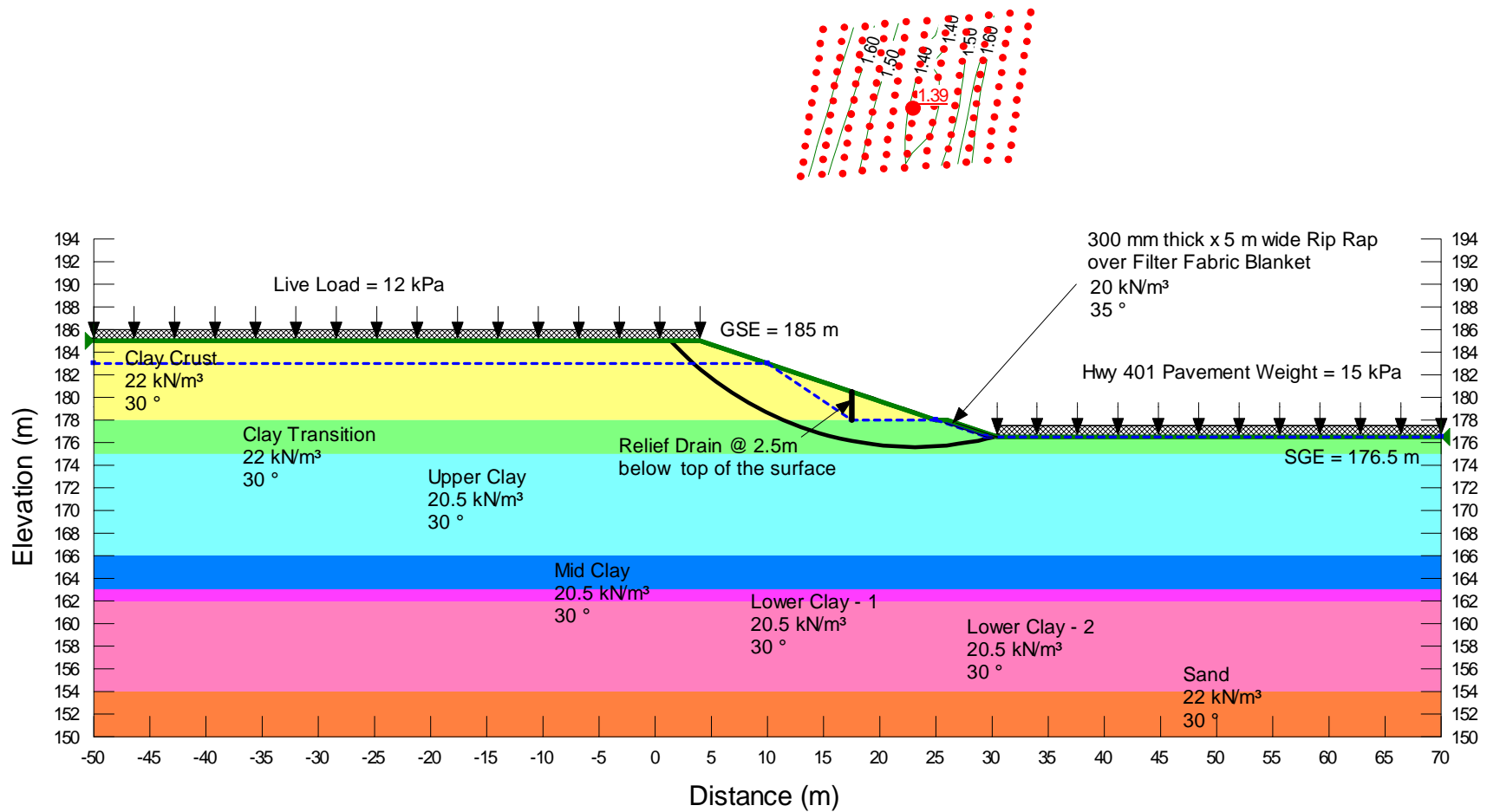
WEP SW8801.1002.101



Station 12+325 L-7.5m H-Left Side-End of Construction-Drained.gsz

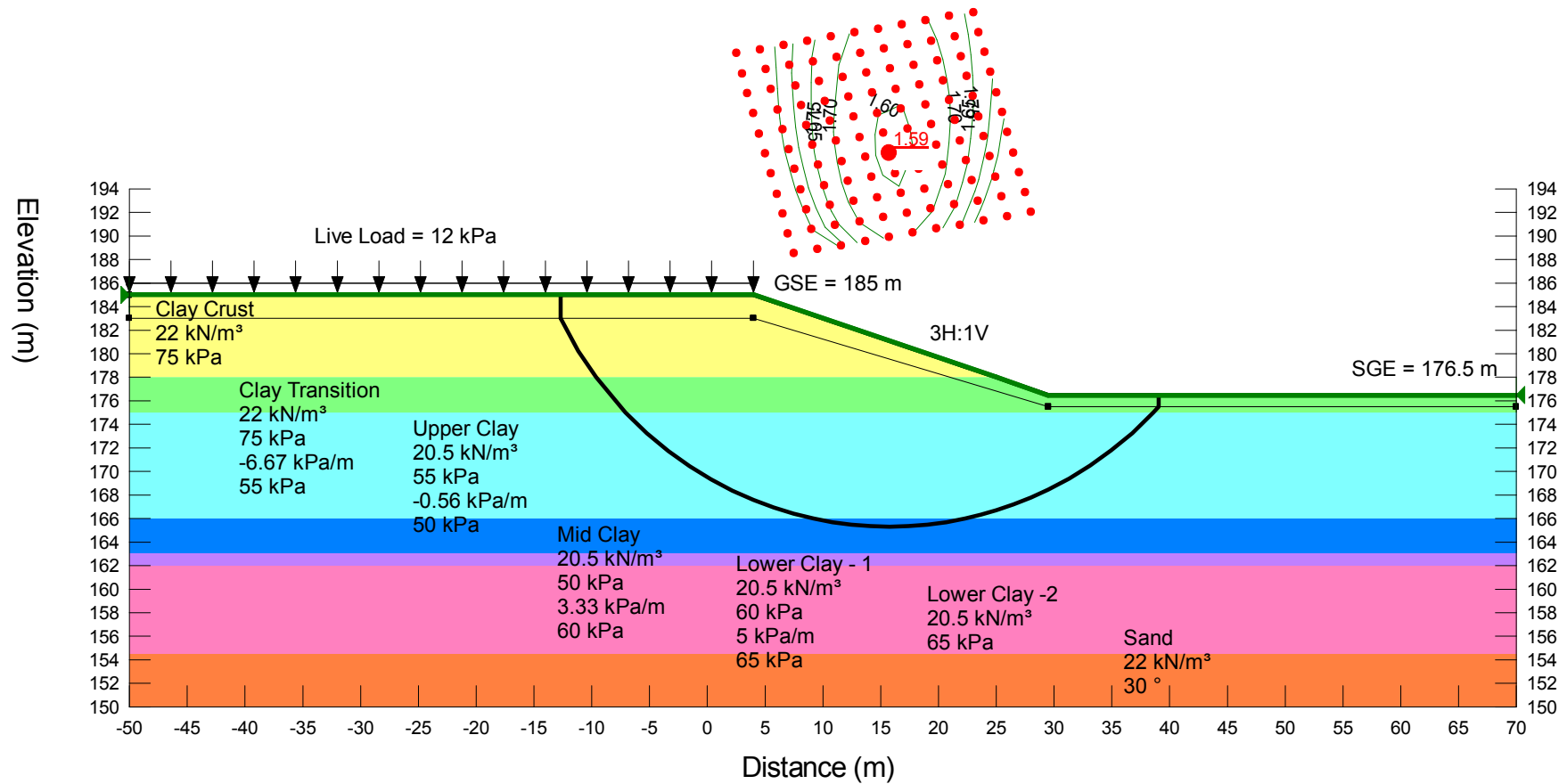
10/31/2011

WEP SW8801.1002.101



Station 12+325L-7.5m H-Left Side-Undrained.gsz
10/31/2011

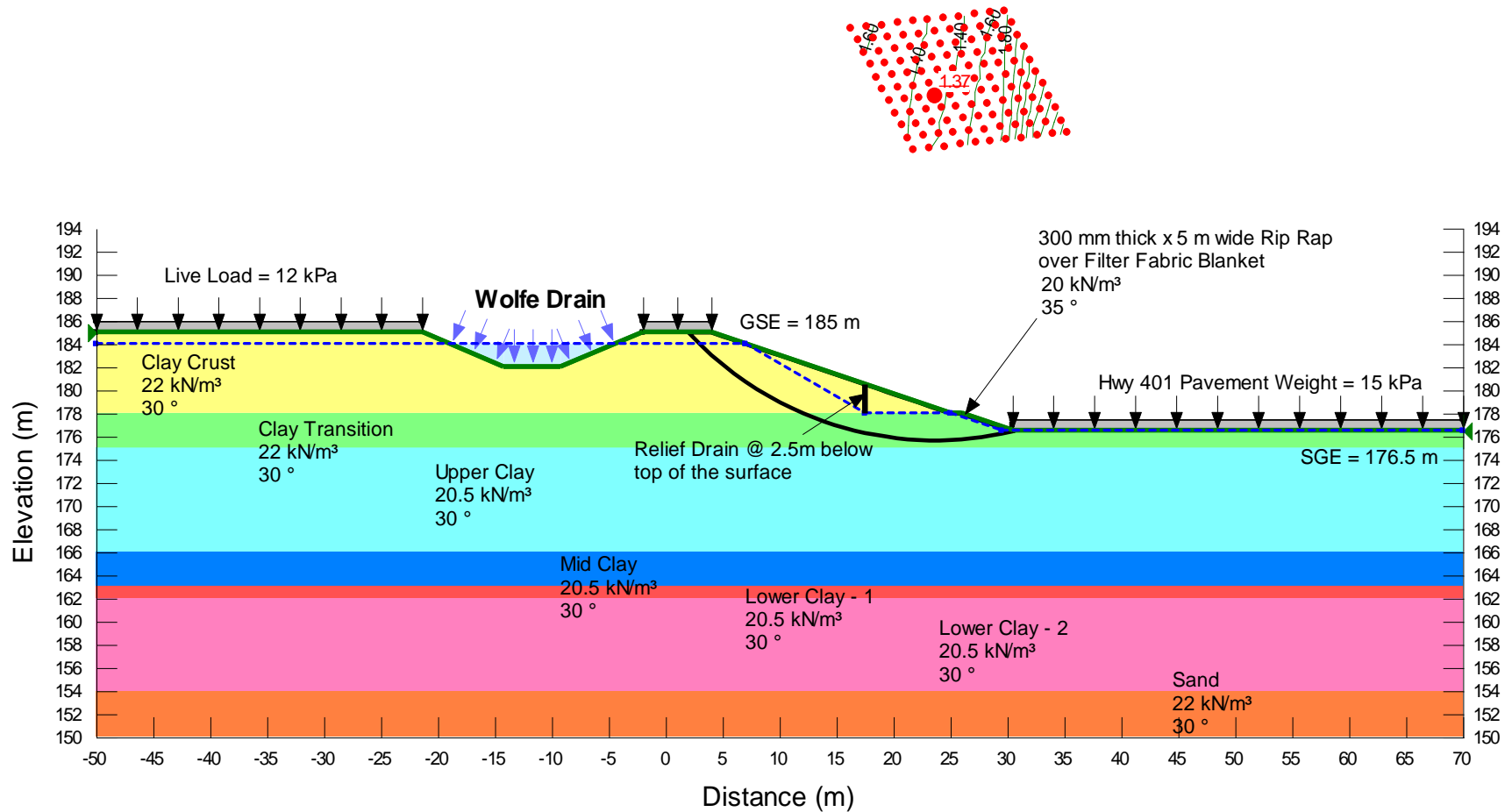
WEP SW8801.1002.101



Station 12+325 L-7.5m H -Left Side-Long Term-Drained.gsz

10/7/2011

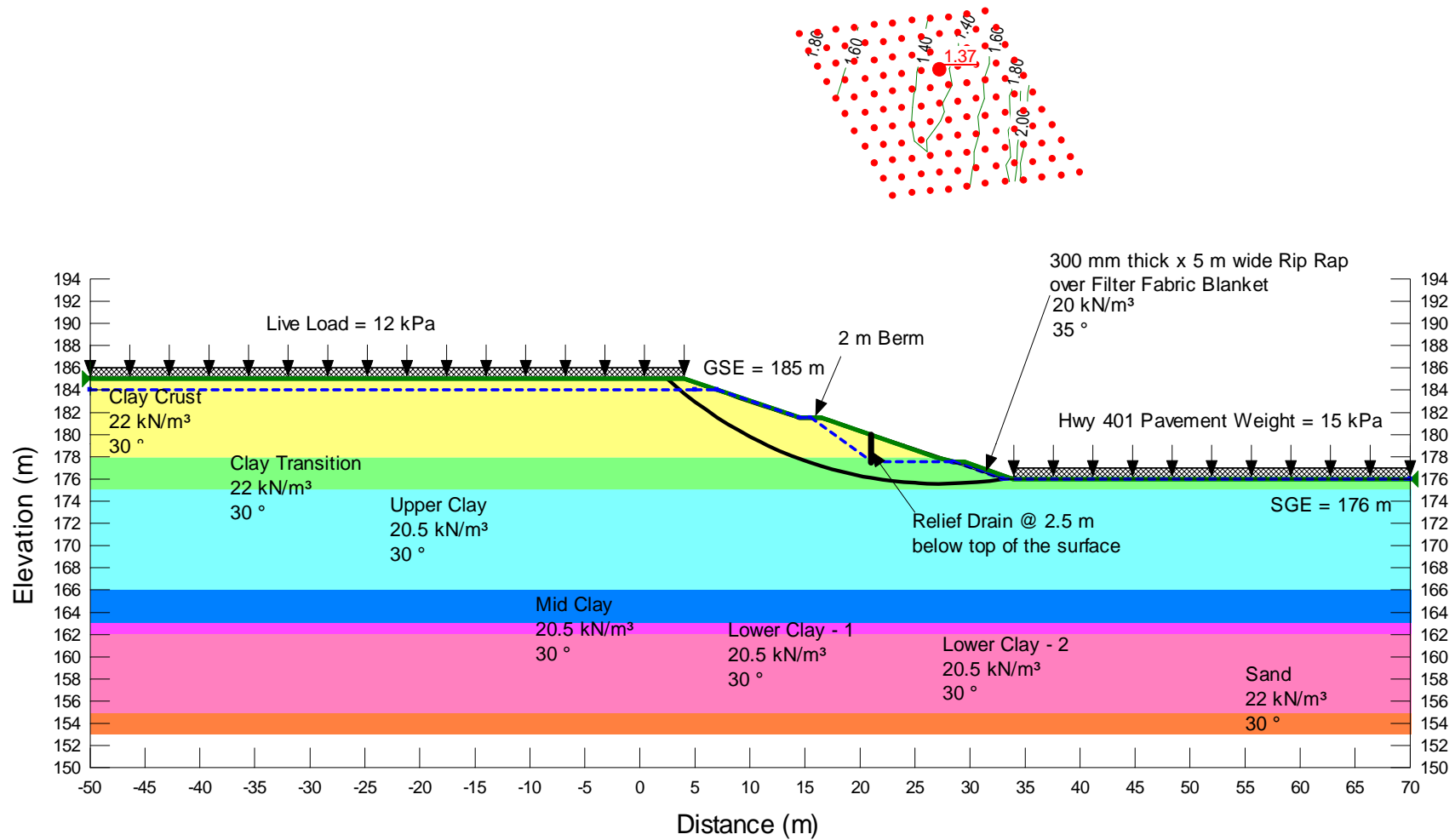
WEP SW8801.1002.101



Station 12+475 L-8m H-Left Side-End of Construction-Drained.gsz

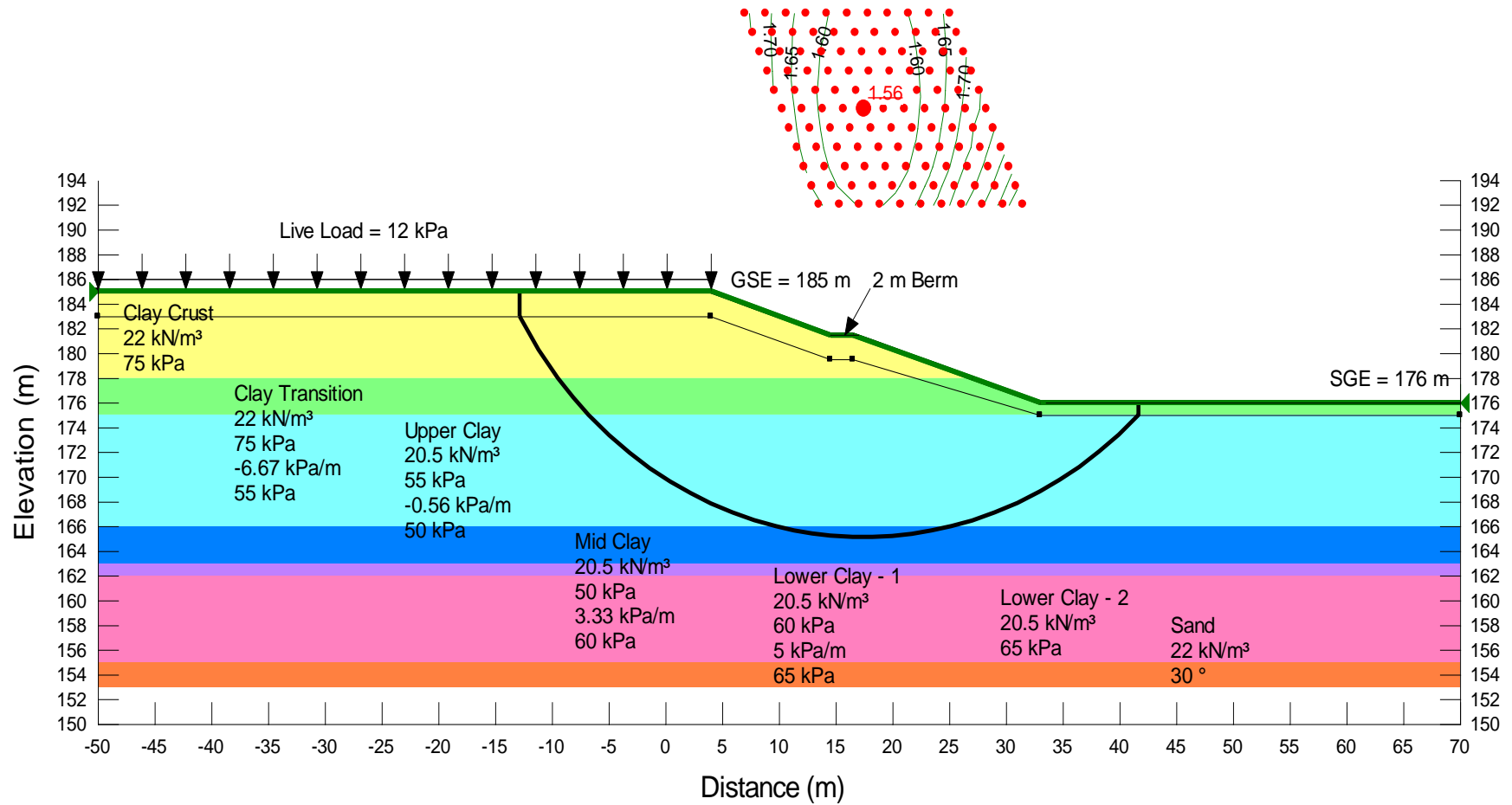
10/31/2011

WEP SW8801.1002.101



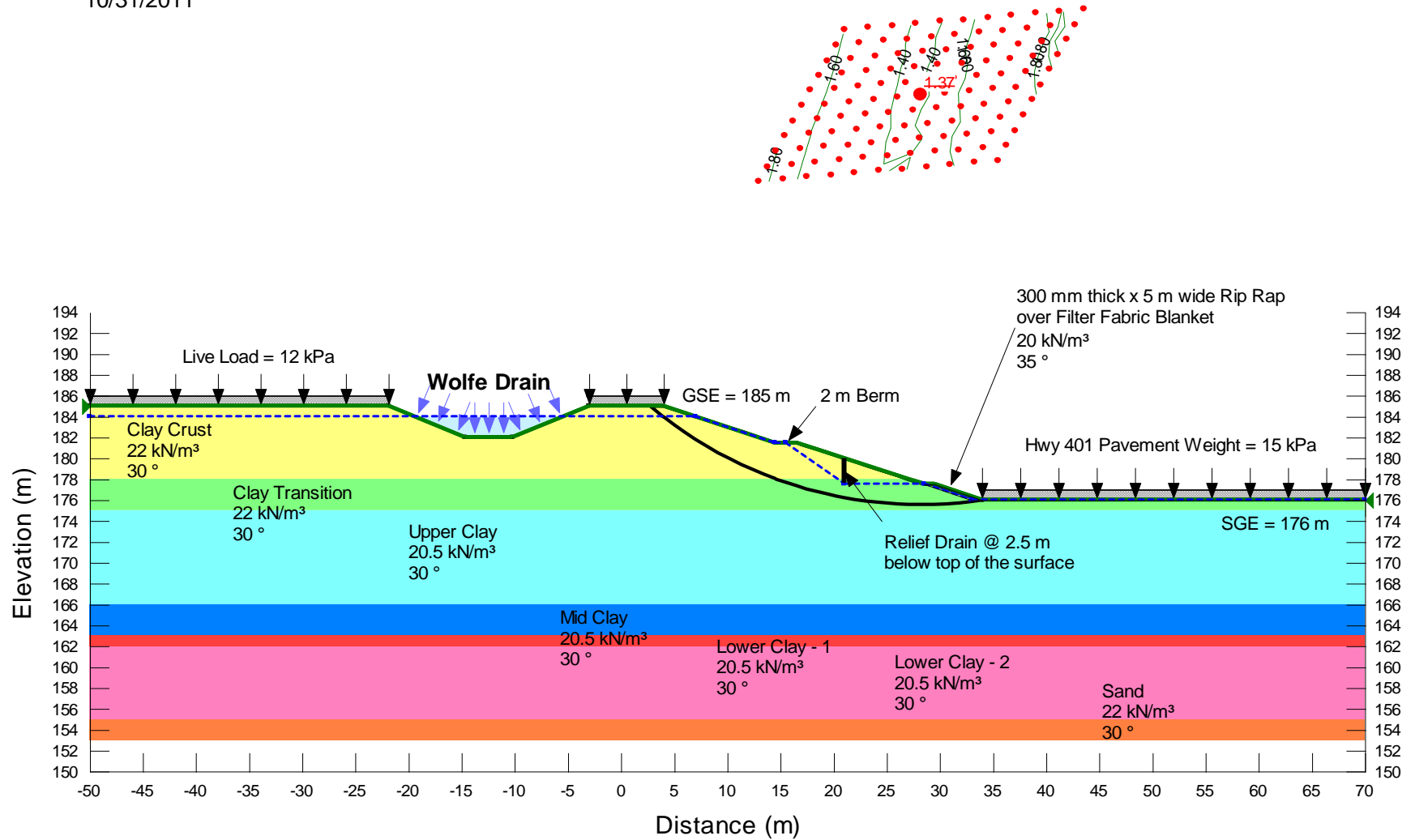
Station 12+475 L-8m H-Left Side-Undrained.gsz
10/31/2011

WEP SW8801.1002.101



Station 12+475 L-8m H-Left Side-Long Term-Drained.gsz
10/31/2011

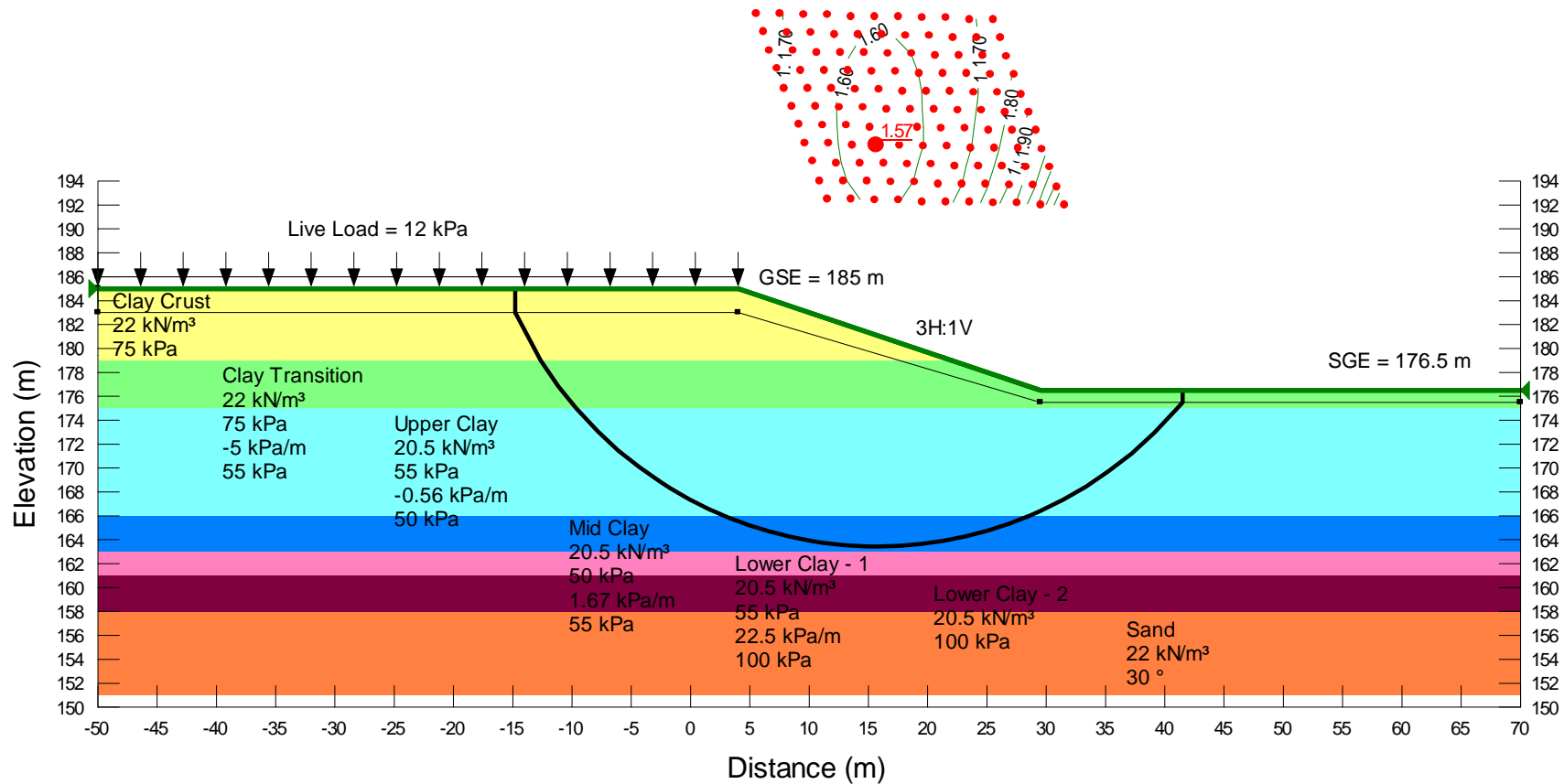
WEP SW8801.1002.101



Station 12+850 L-7.5m H-Left Side-Undrained.gsz

11/02/2011

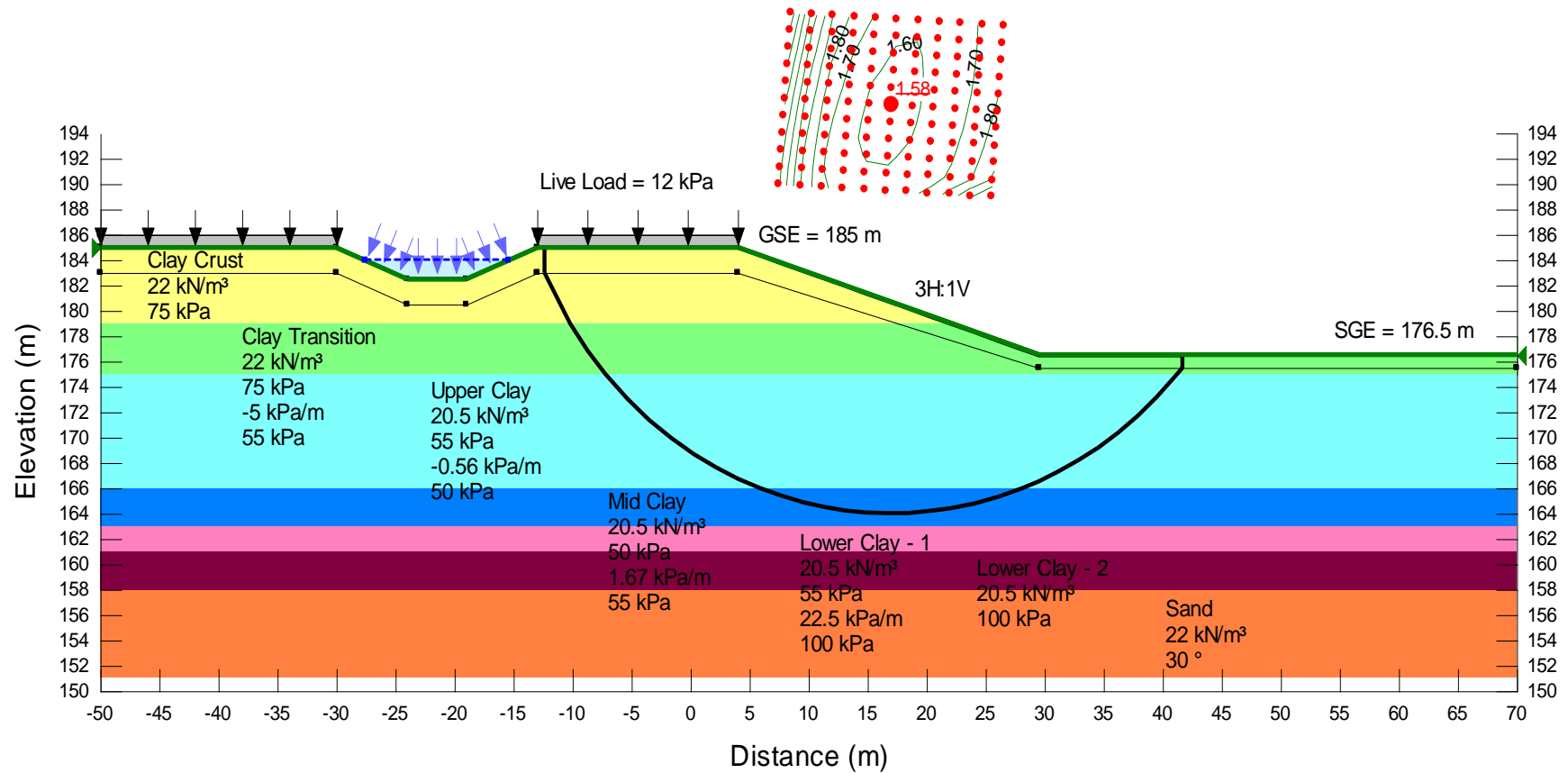
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Station 12+850 L-7.5m H-Left Side-Long Term-Undrained.gsz

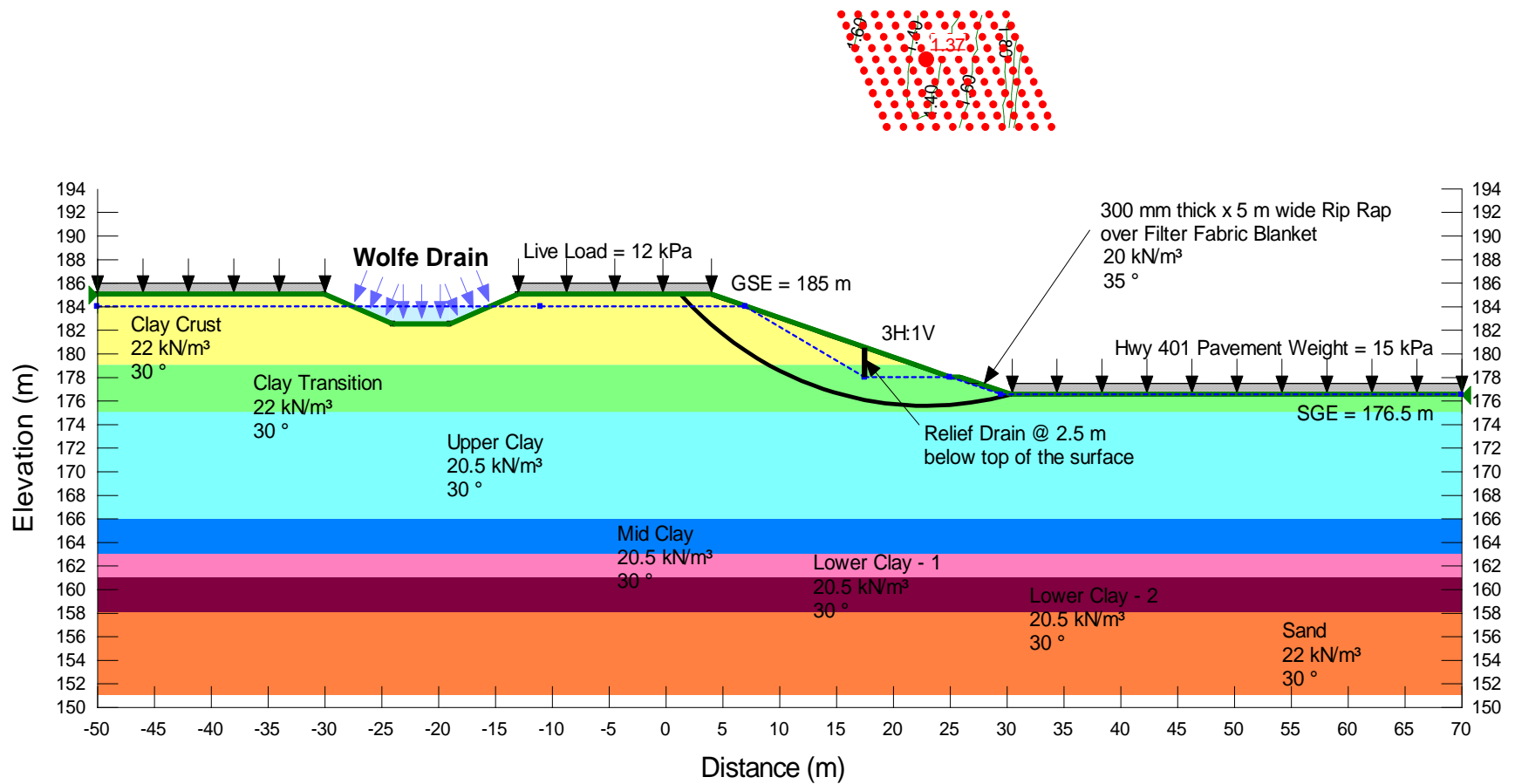
11/02/2011

WEP SW8801.1002.101



Station 12+850 L-7.5m H-Left Side-Long Term-Drained.gsz
10/12/2011

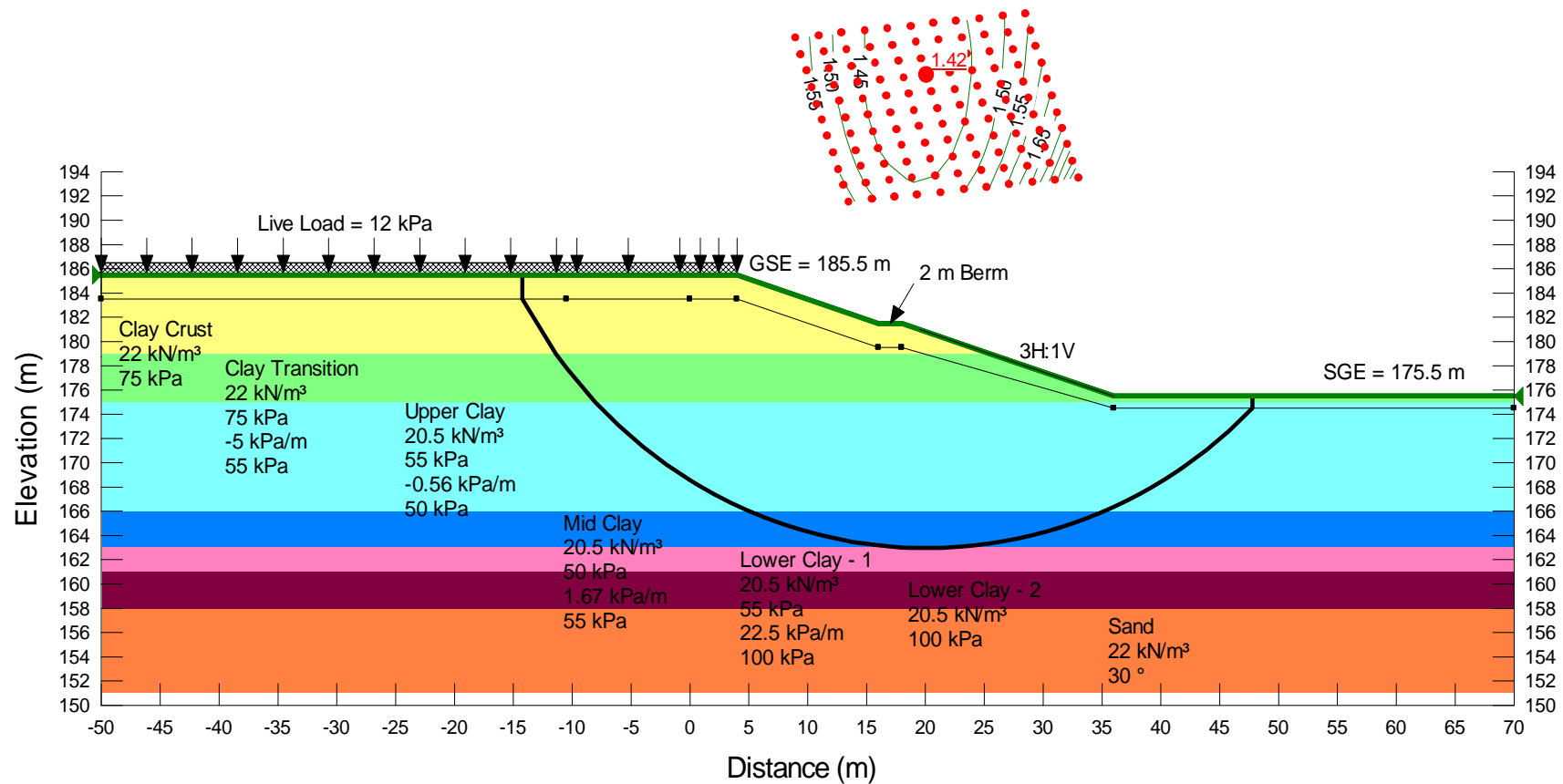
WEP SW8801.1002.101



Station 12+900L-9m H-Right Side-Short Term-Undrained.gsz

WEP SW8801.1002.101

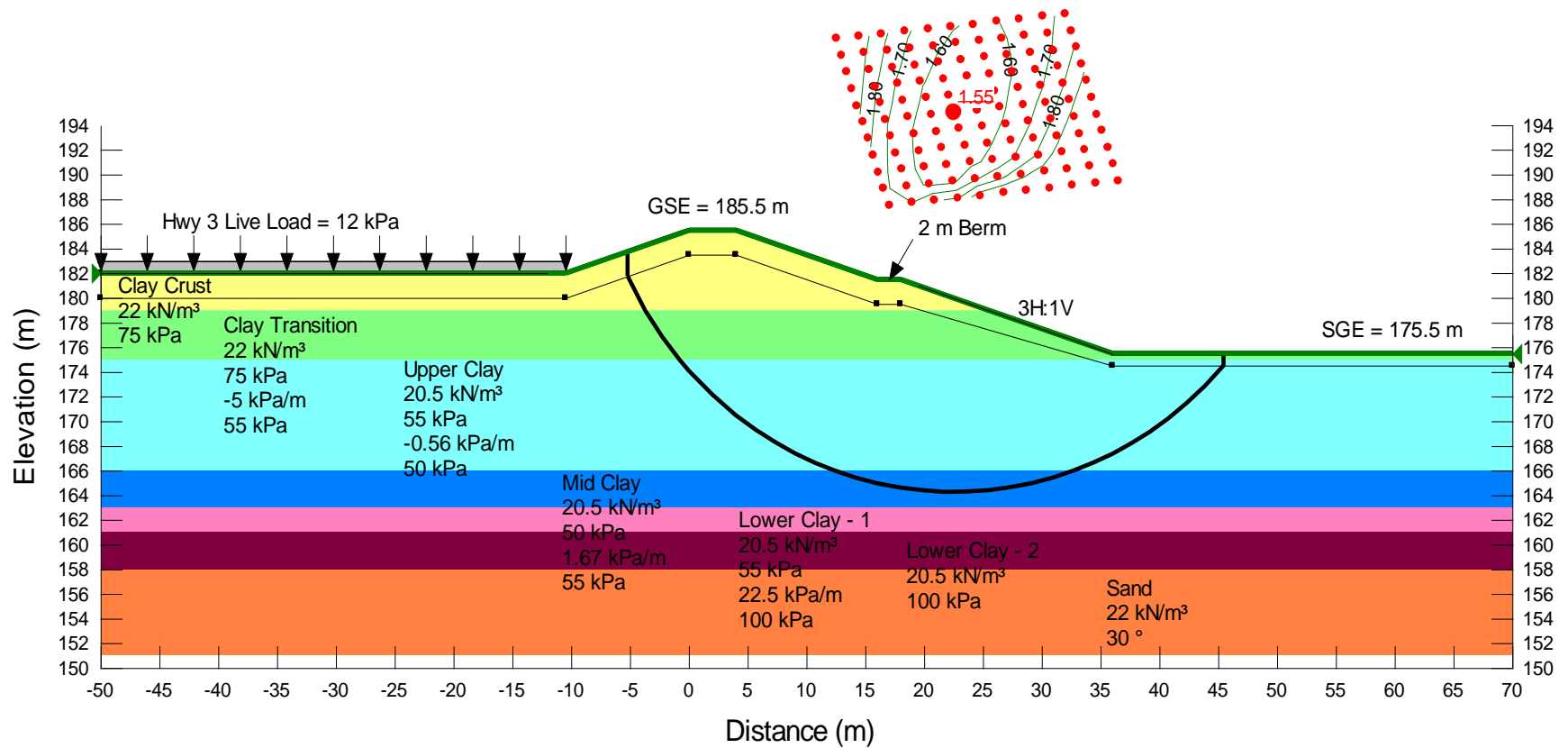
11/02/2011



Station 12+900L-9m H-Right Side-Undrained.gsz

11/02/2011

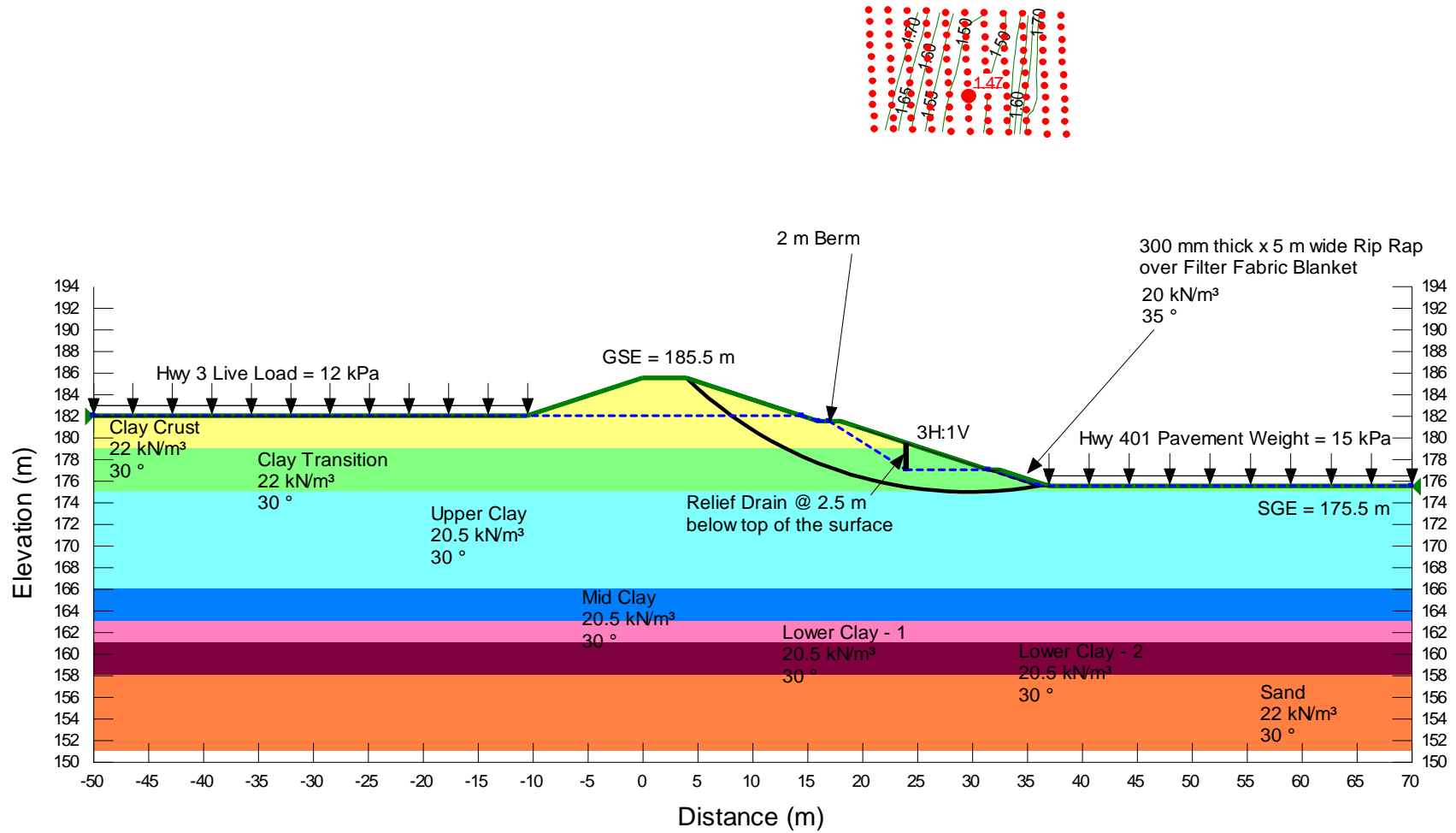
WEP SW8801.1002.101



Station 12+900L-9m H-Right Side-Drained.gsz

11/02/2011

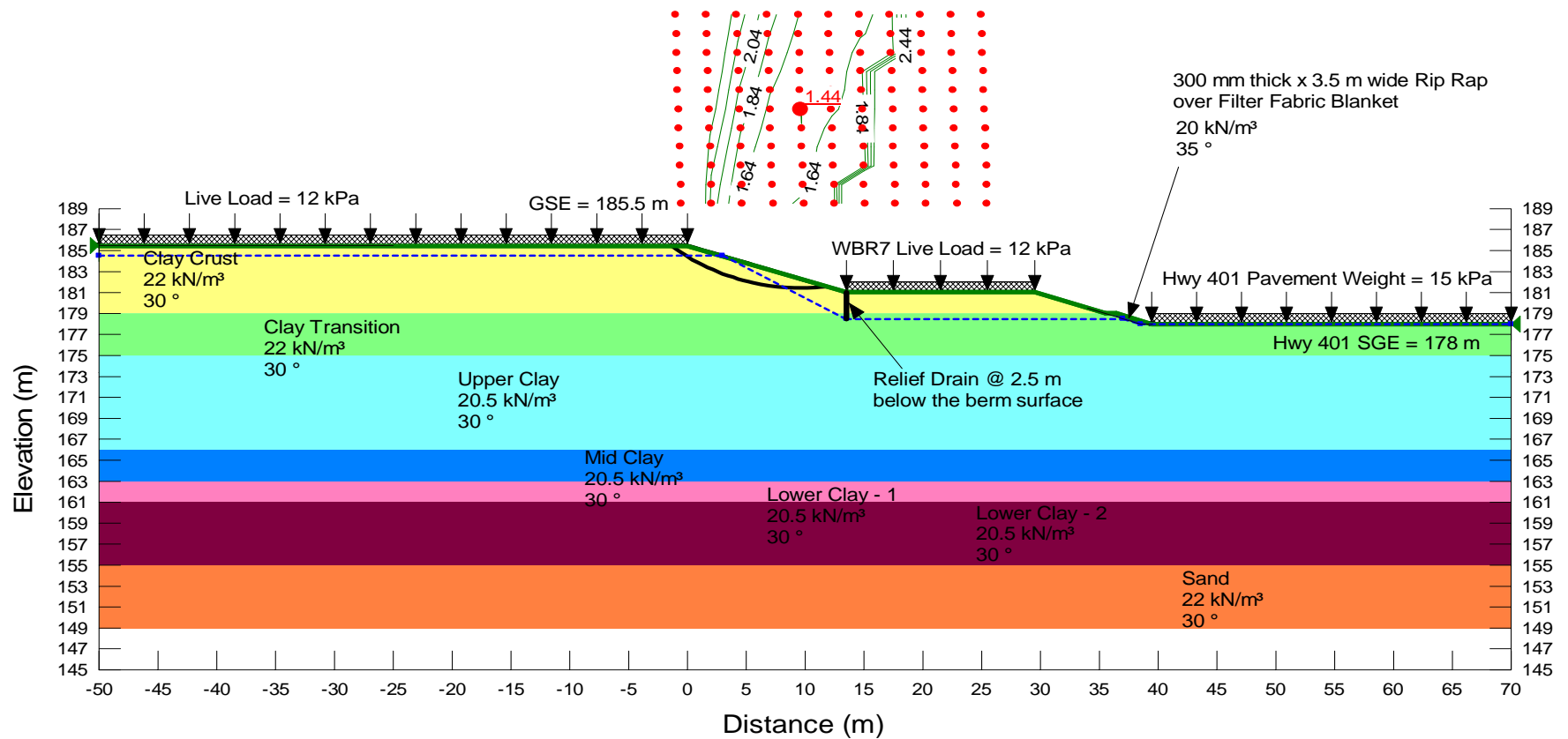
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Station 13+075L-6.5m H-Left Side-Short Term-Drained.gsz

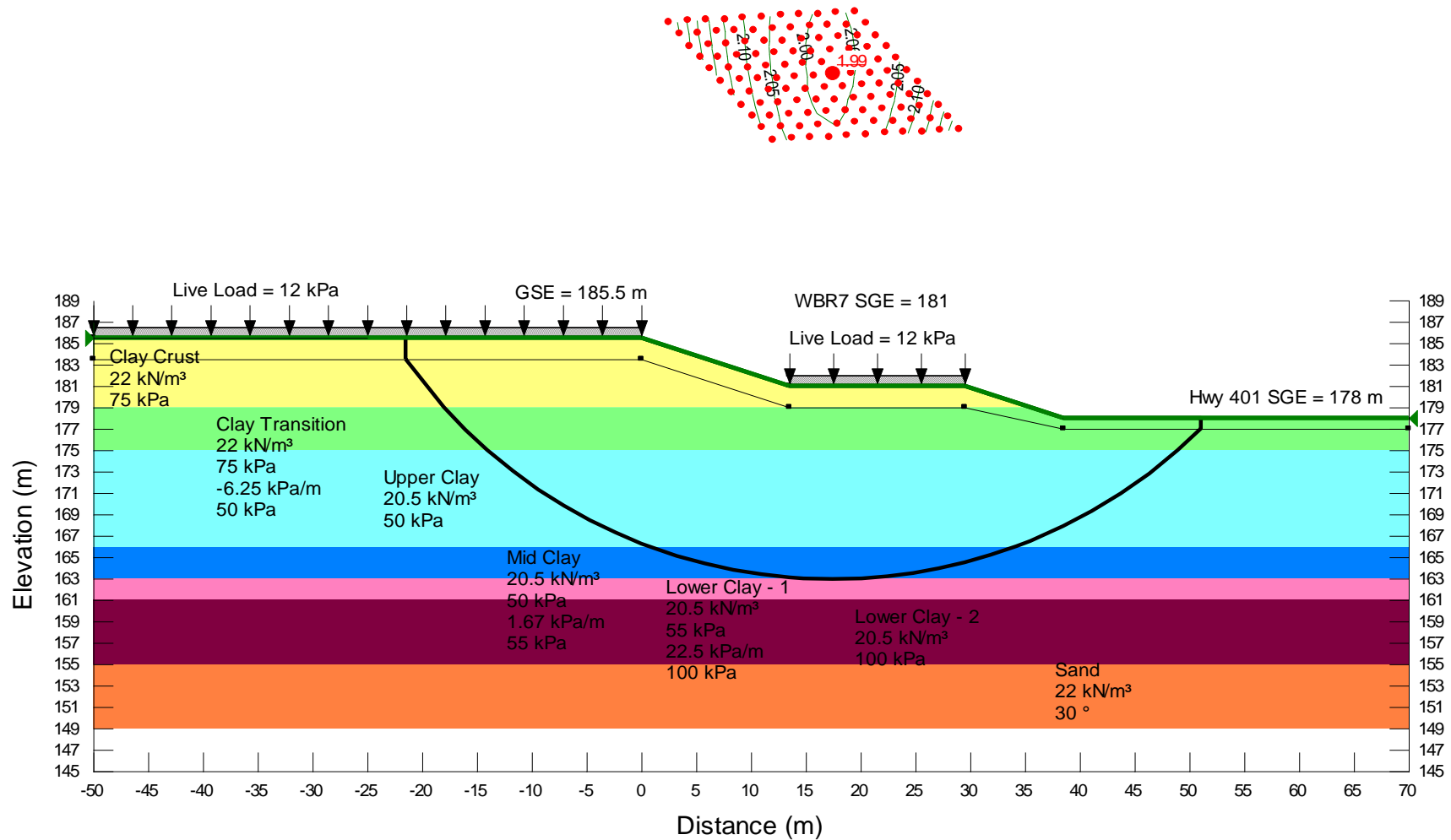
08/07/2012

WEP SW8801.1002.101



Station 13+075L-6.5m H-Left Side-Undrained.gsz
11/2/2011

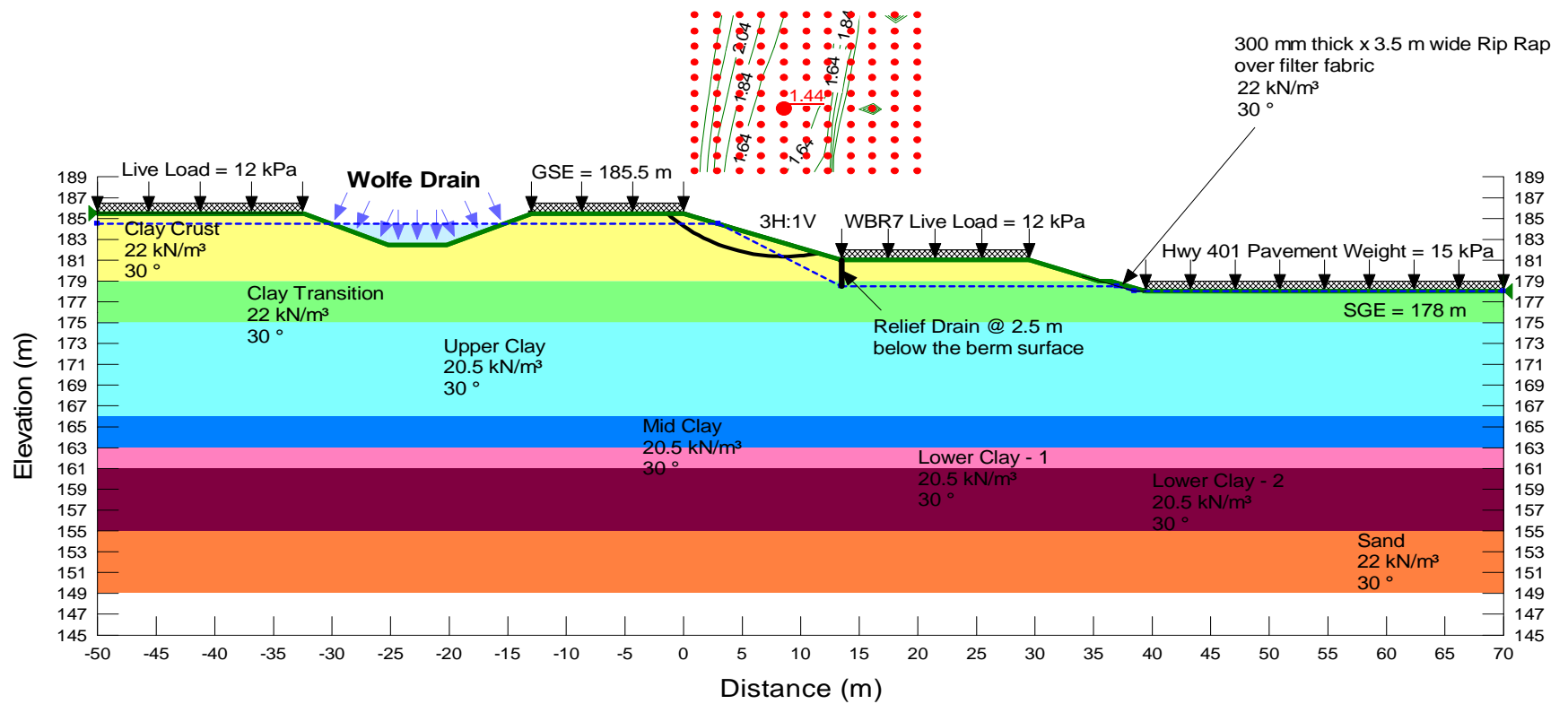
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Station 13+075L-6.5m H-Left Side-Drained.gsz

08/07/2012

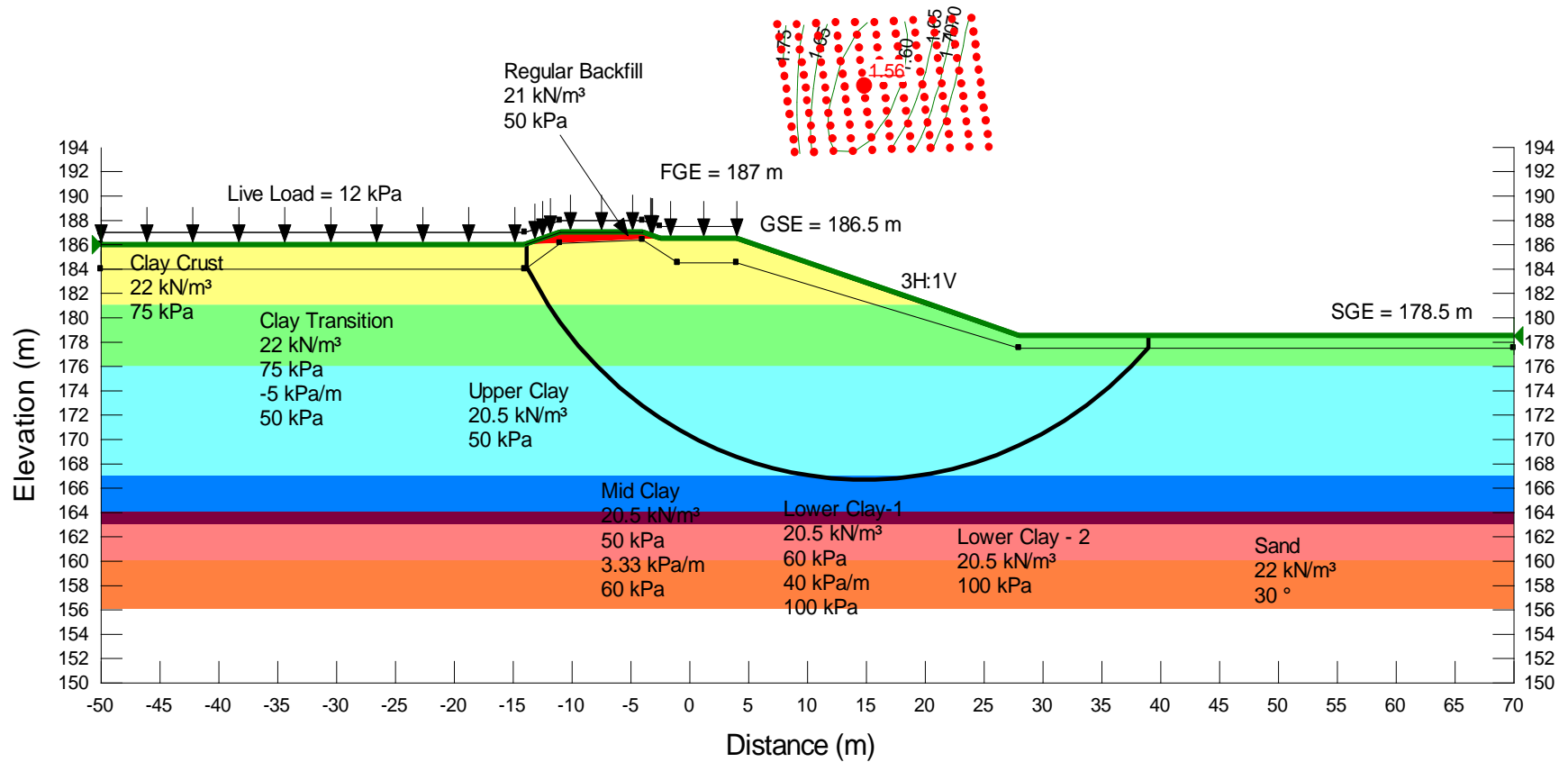
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Station 13+720L-7.5 m H-Right Side-Undrained.gsz

11/14/2011

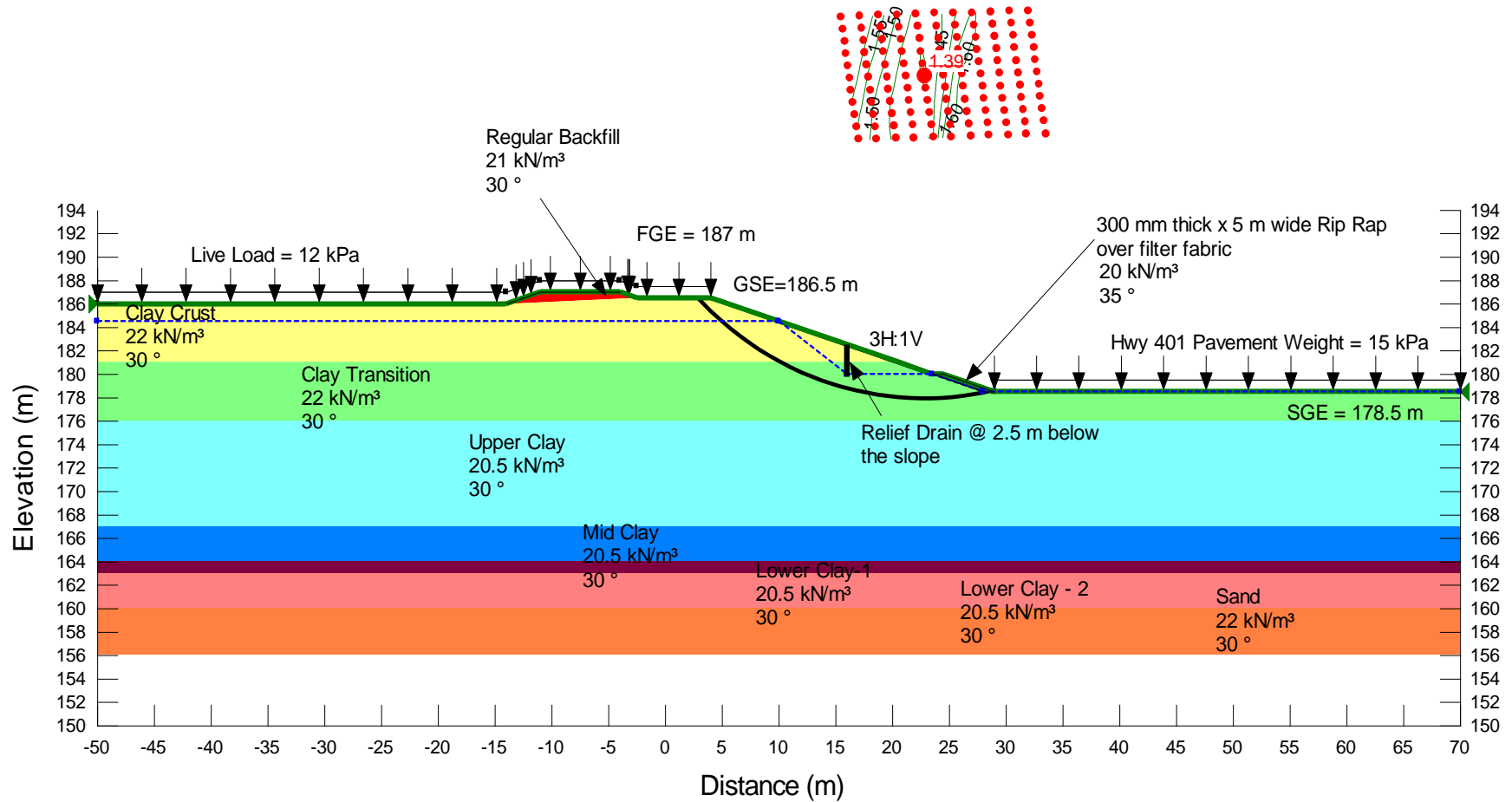
WEP SW8801.1002.101



Station 13+720L-7.5 m H-Right Side-Drained.gsz

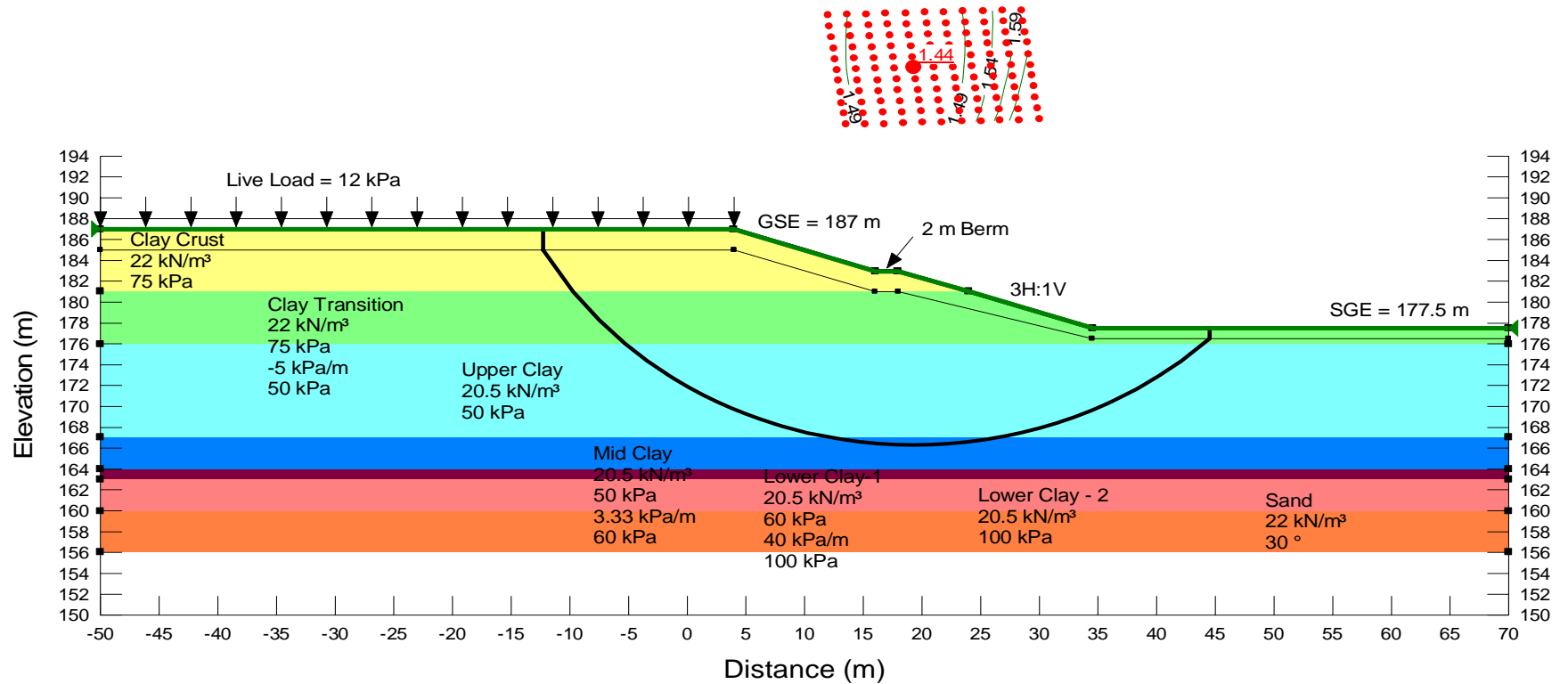
11/14/2011

WEP SW8801.1002.101



Station 13+794.47L-8.5 m H-Left Side-Undrained.gsz
08/07/2012

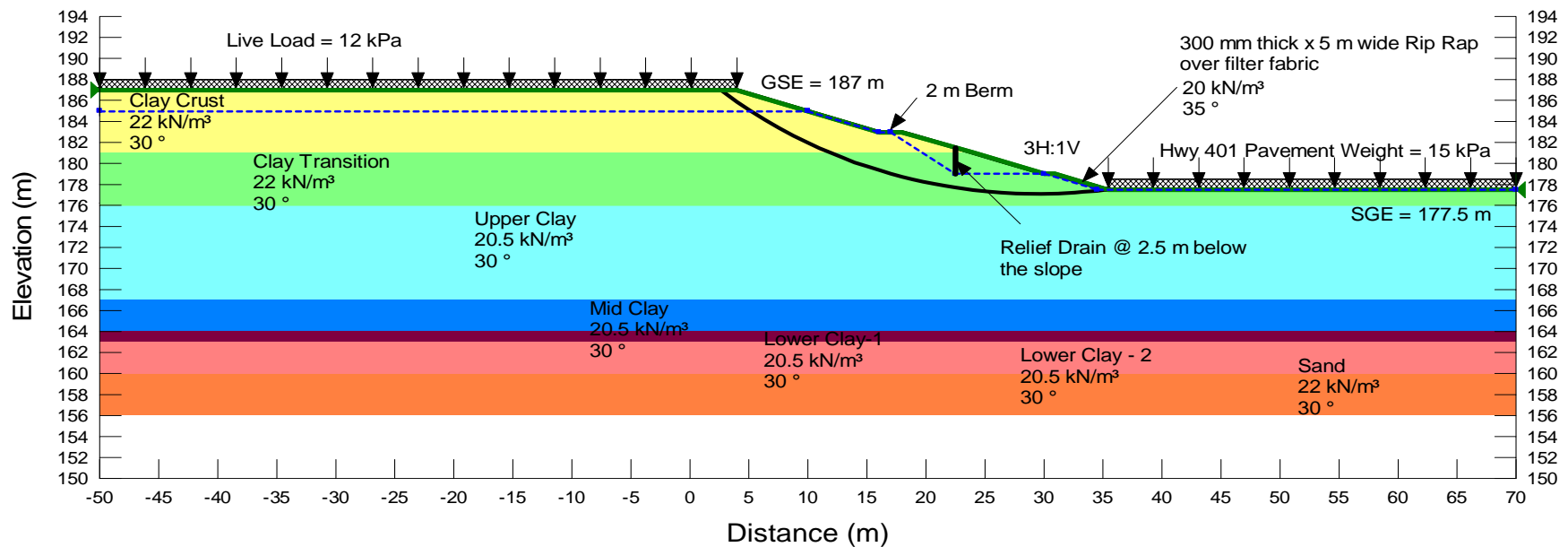
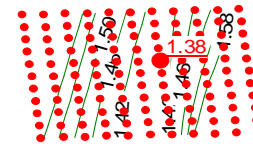
WEP SW8801.1002.101



Station 13+794.47L-8.5 m H-Left Side-Drained.gsz

08/07/2012

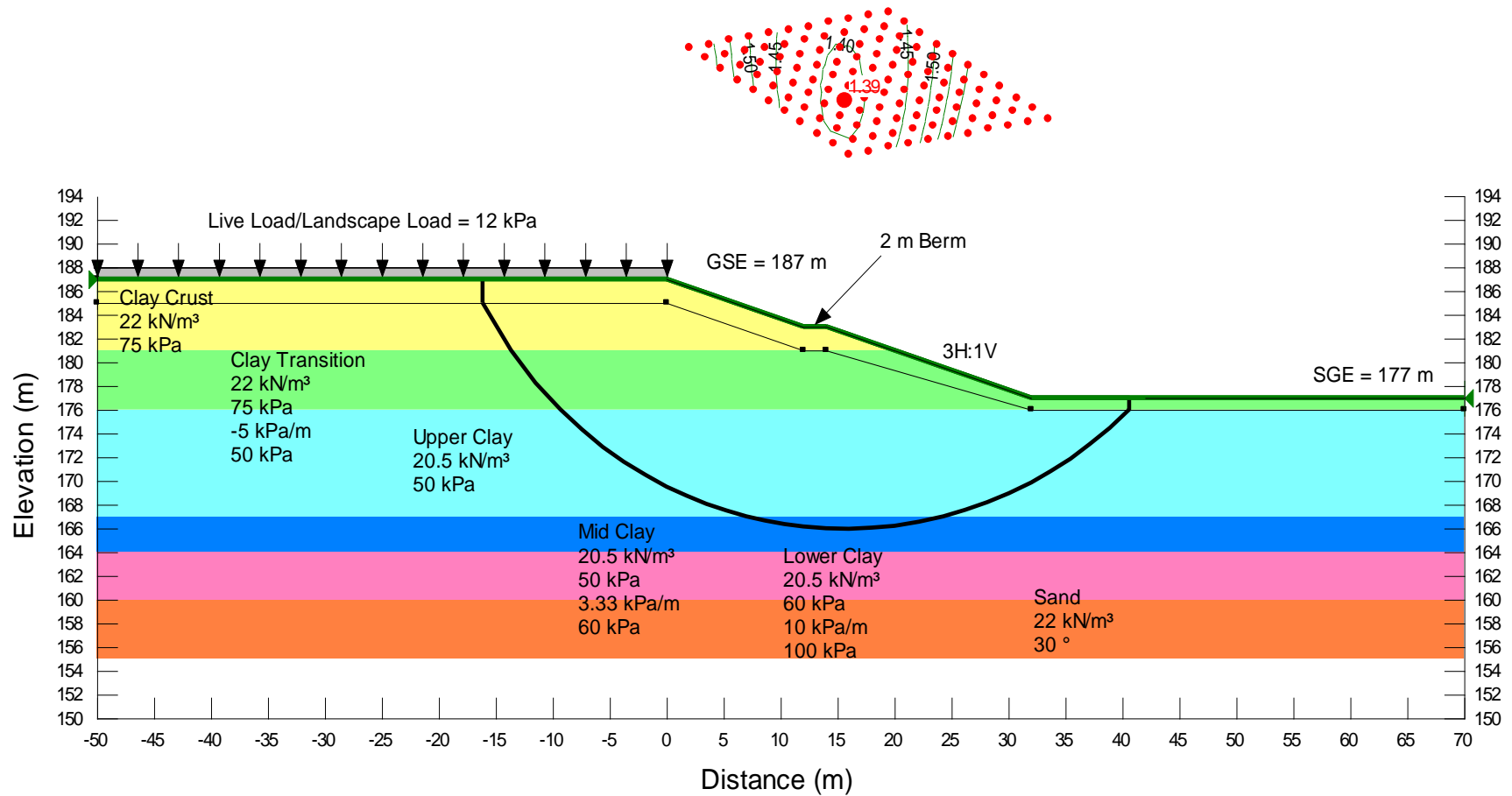
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Station 10+050T-9m H-Left Side-Undrained.gsz

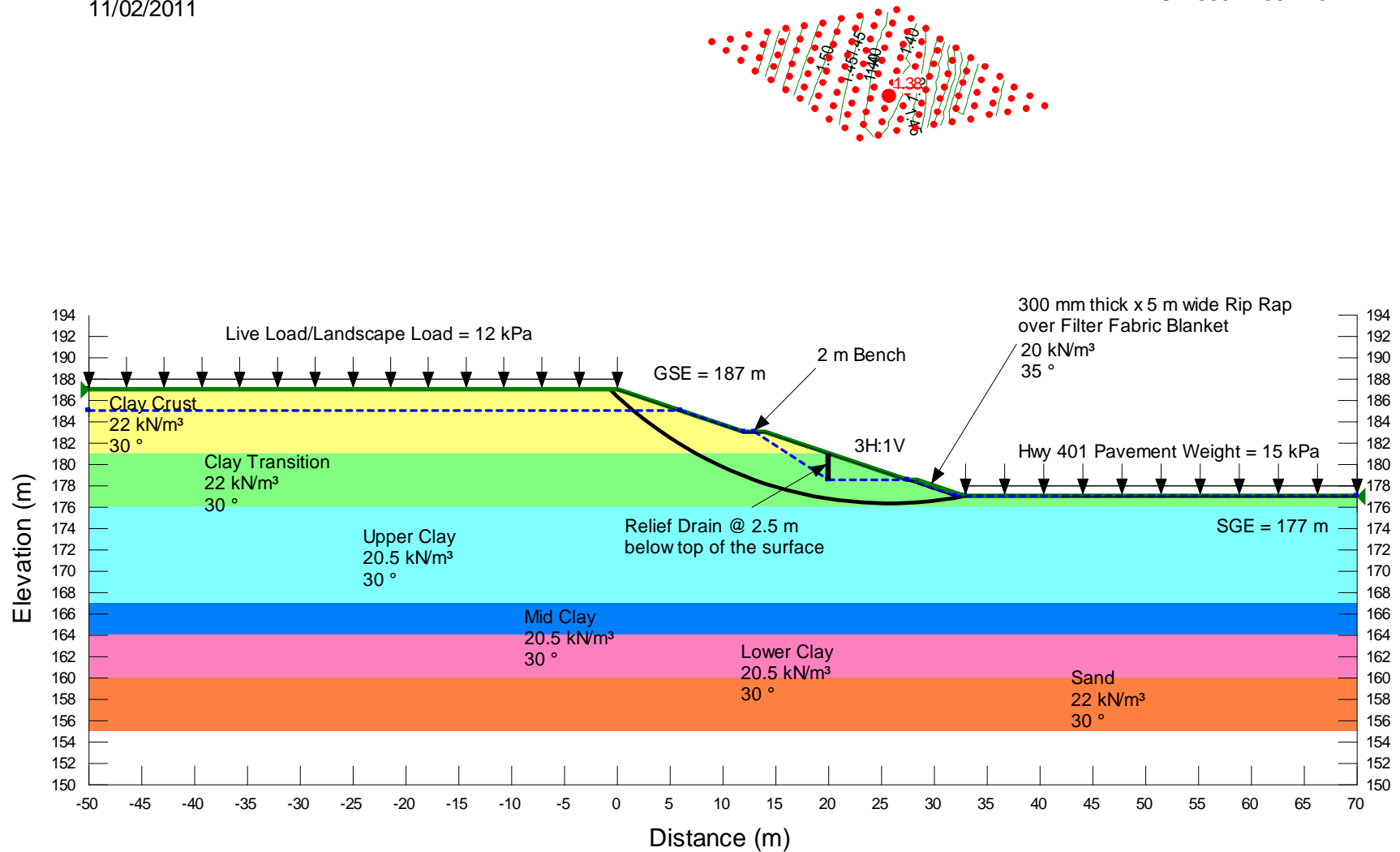
11/02/2011

WEP SW8801.1002.101



Station 10+050T-9m H-Left Side-Drained.gsz
11/02/2011

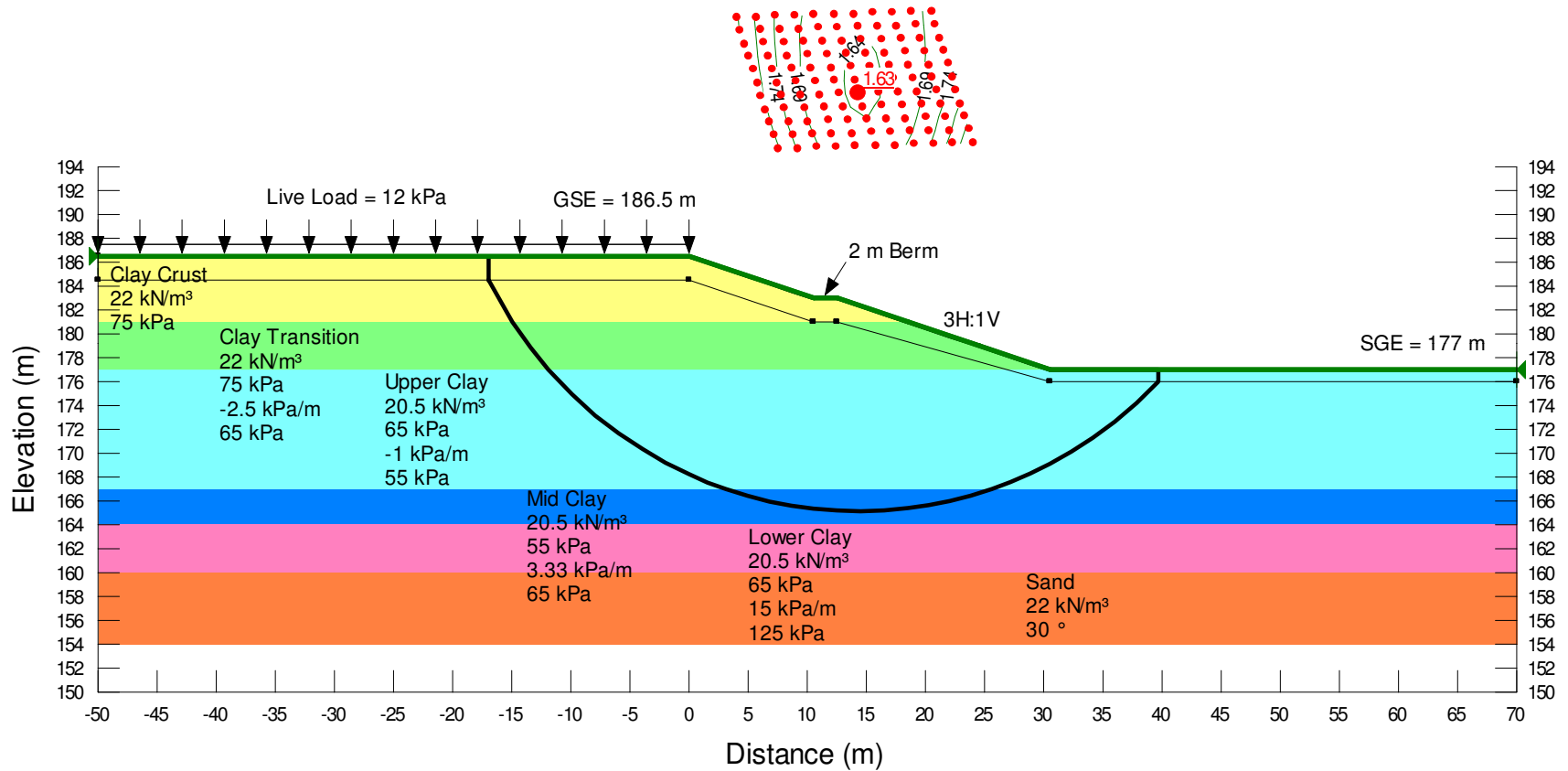
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Station 10+125T-8.5 m H-Left Side-Undrained.gsz

11/02/2011

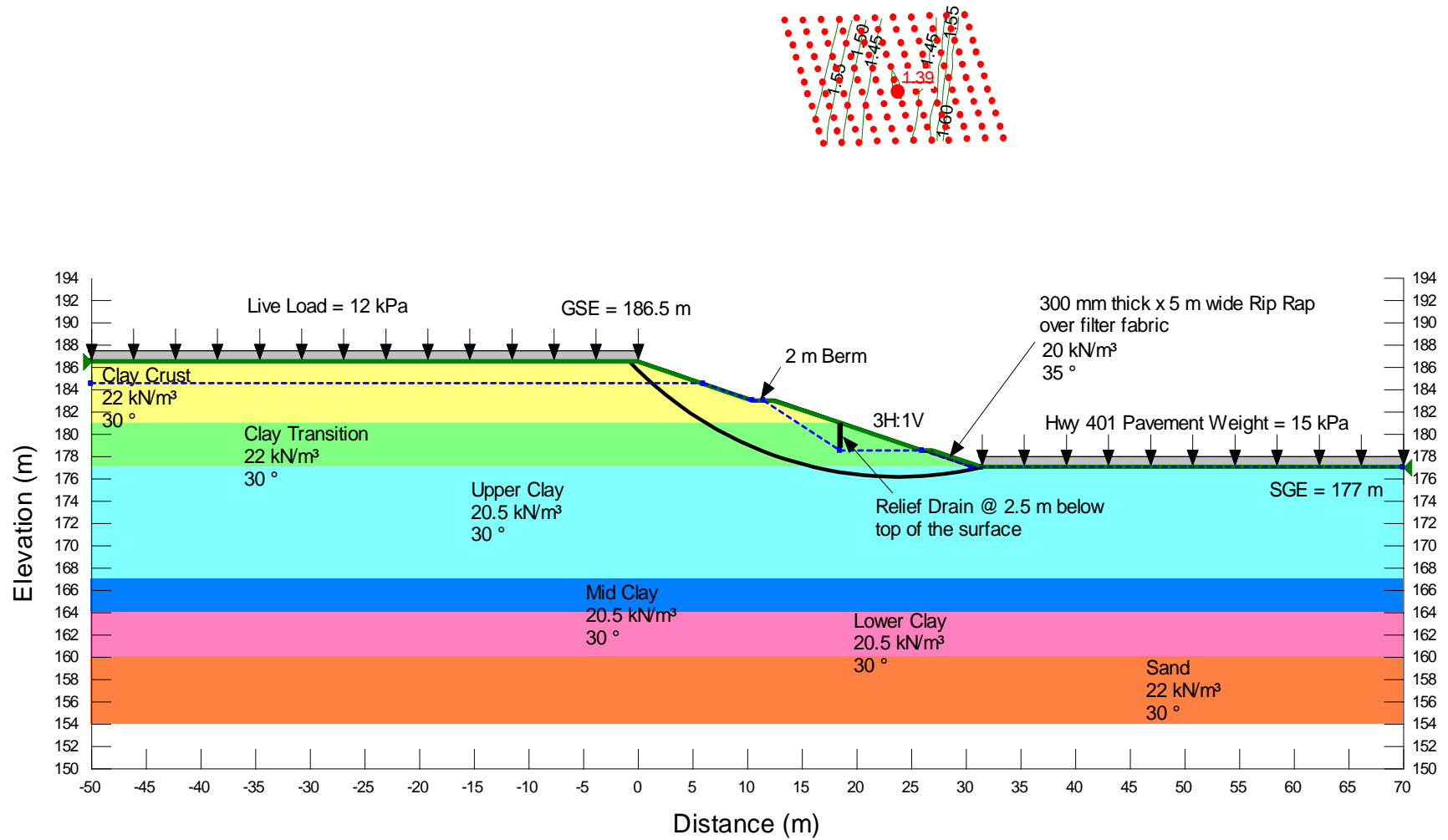
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Station 10+125T-8.5 m H-Left Side-Drained.gsz

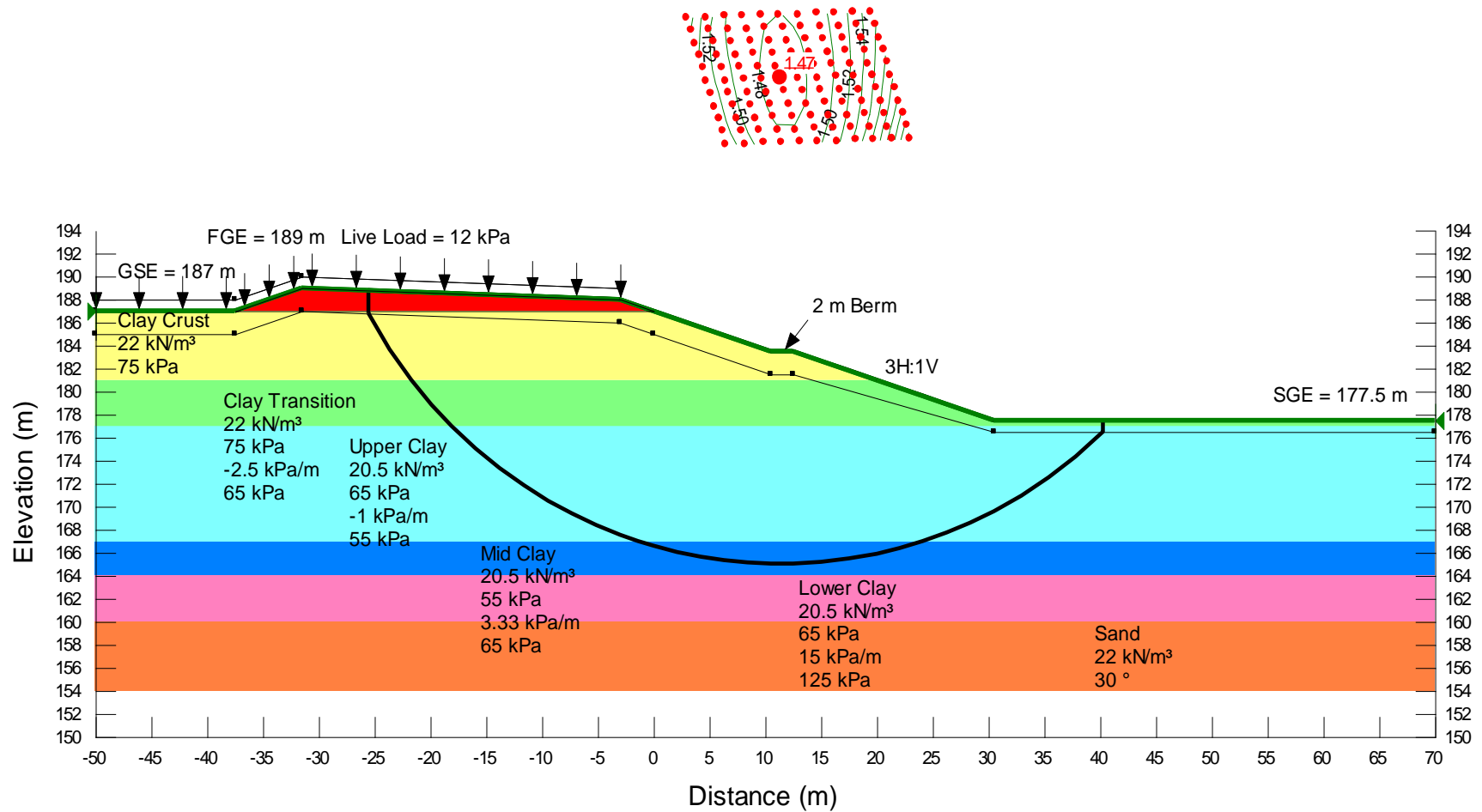
WEP SW8801.1002.101

11/02/2011



Station 10+225T-9.5 m H-Left Side-Undrained.gsz
11/03/2011

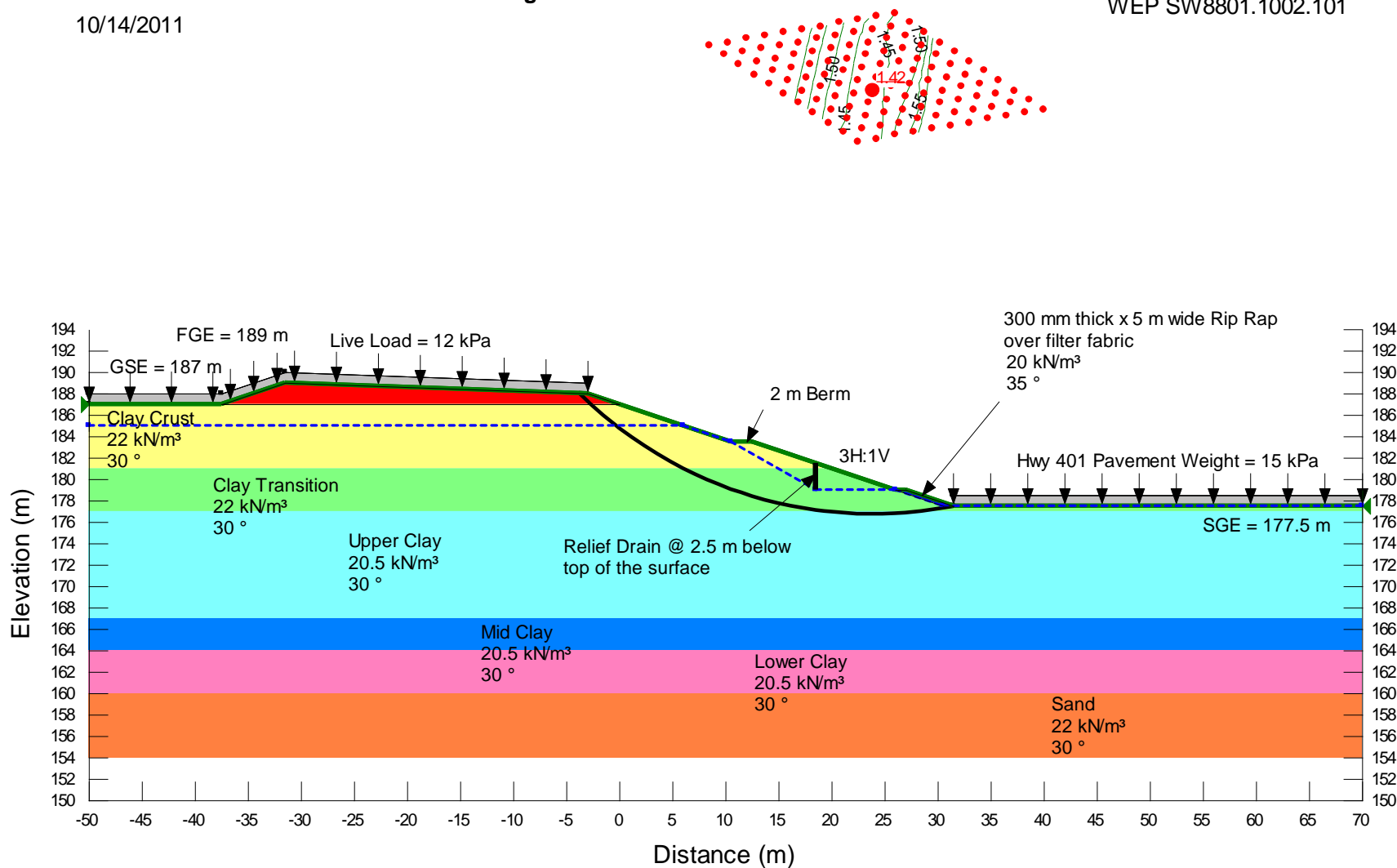
WEP SW8801.1002.101



Station 10+225T-9.5 m H-Left Side-Drained.gsz

10/14/2011

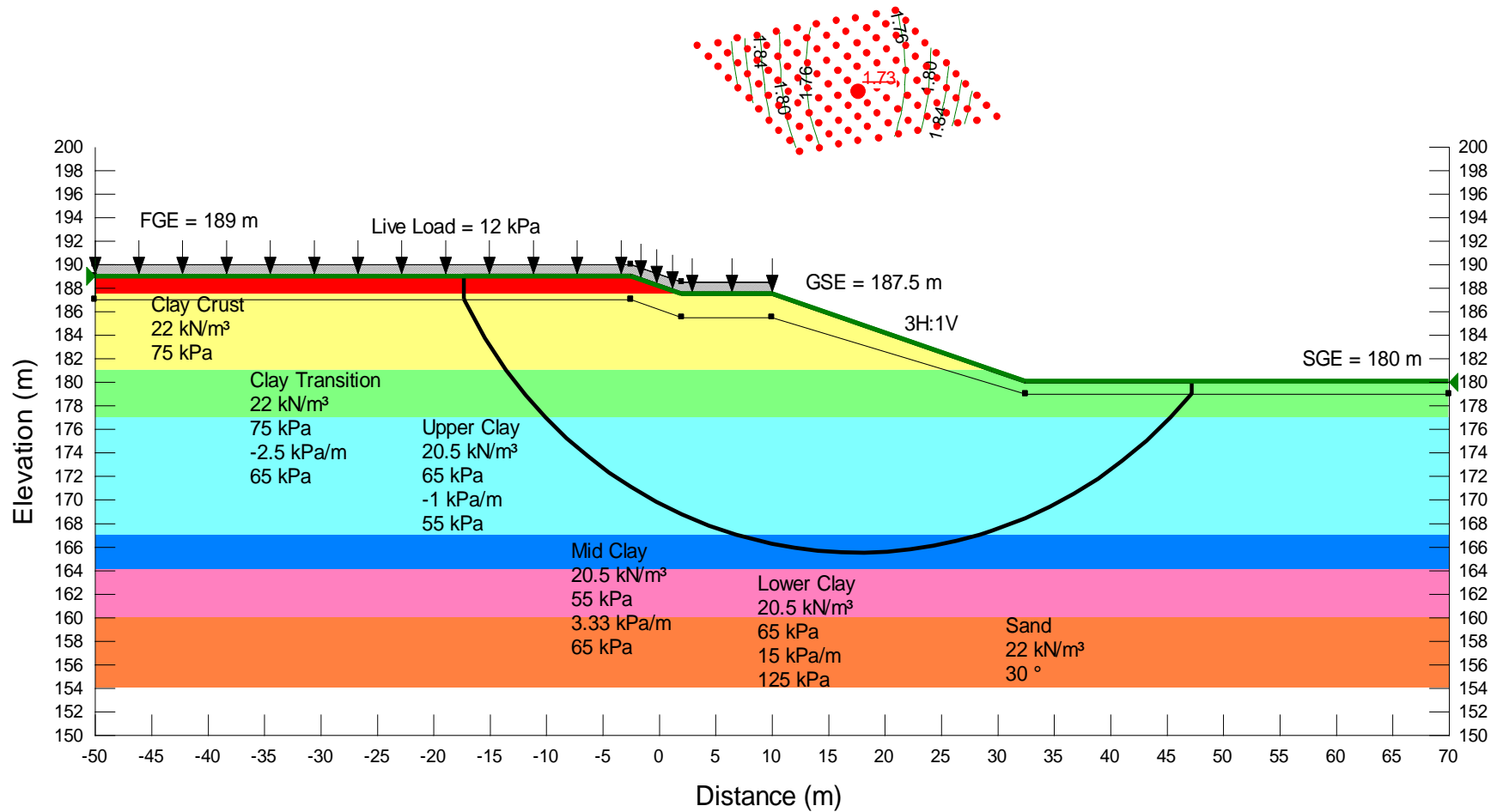
WEP SW8801.1002.101



Station 10+400T-8m H-Right Side-Undrained.gsz

11/03/2011

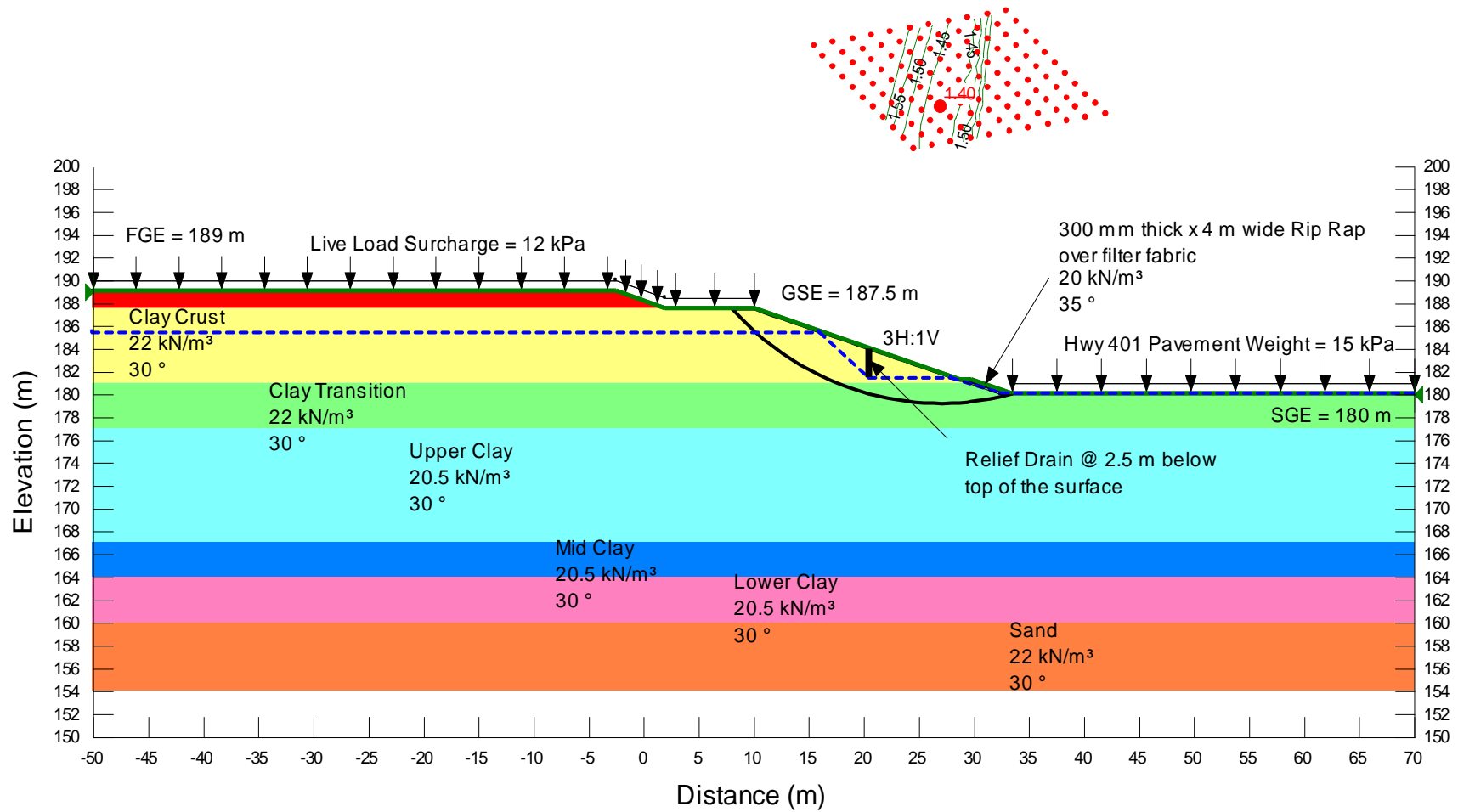
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Station 10+400T-8m H-Right Side-Drained.gsz

11/03/2011

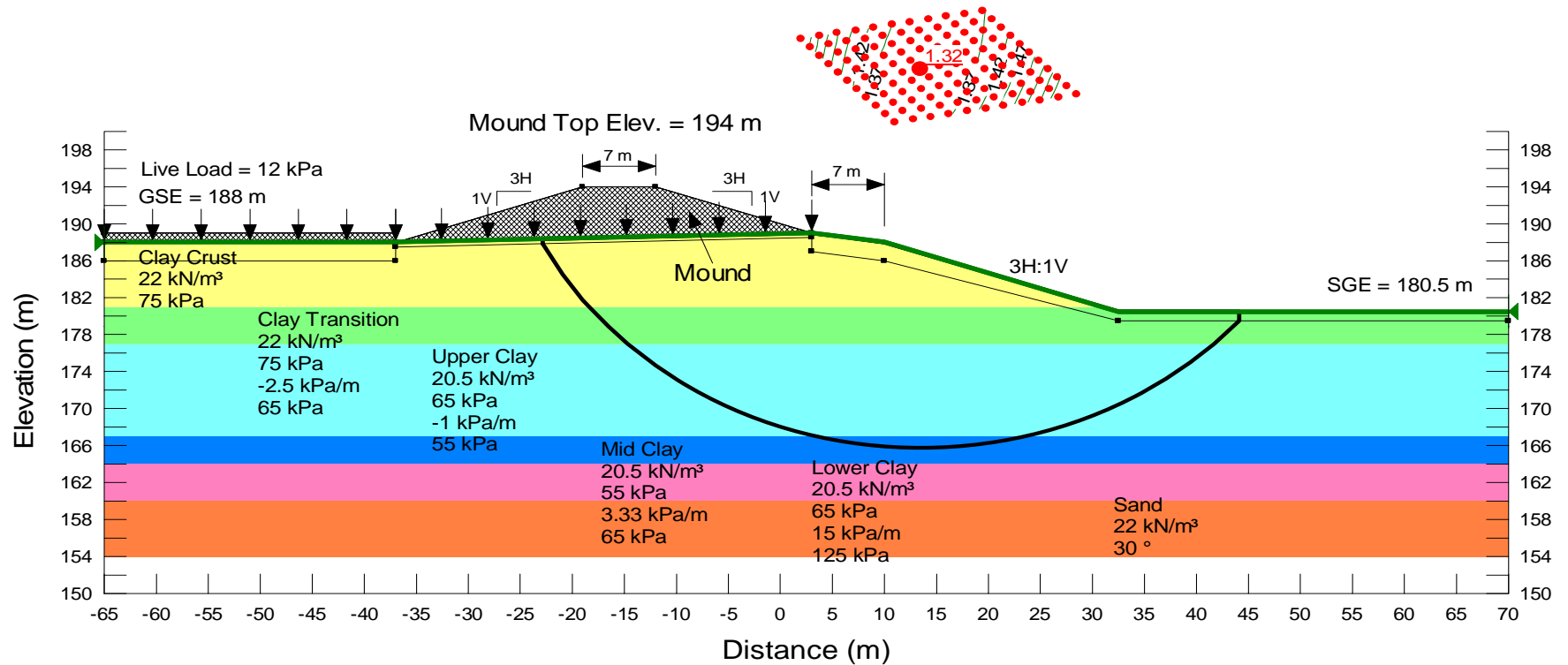
WEP SW8801.1002.101



Station 10+500T-6.5m H-Right Side-Mound El. 194m-Undrained.gsz

08/07/2012

WEP SW8801.1002.101



WEP SW8801.1002.101

The diagram illustrates the molecular structure of a polymer electrolyte. It features a network of red spheres, likely representing ions, interconnected by green lines representing polymer chains. Several specific distances are highlighted with labels: 1.02, 1.80, 1.42, 1.52, and 1.70. These labels are positioned near the green lines, indicating the lengths of various bonds or segments within the polymer structure.

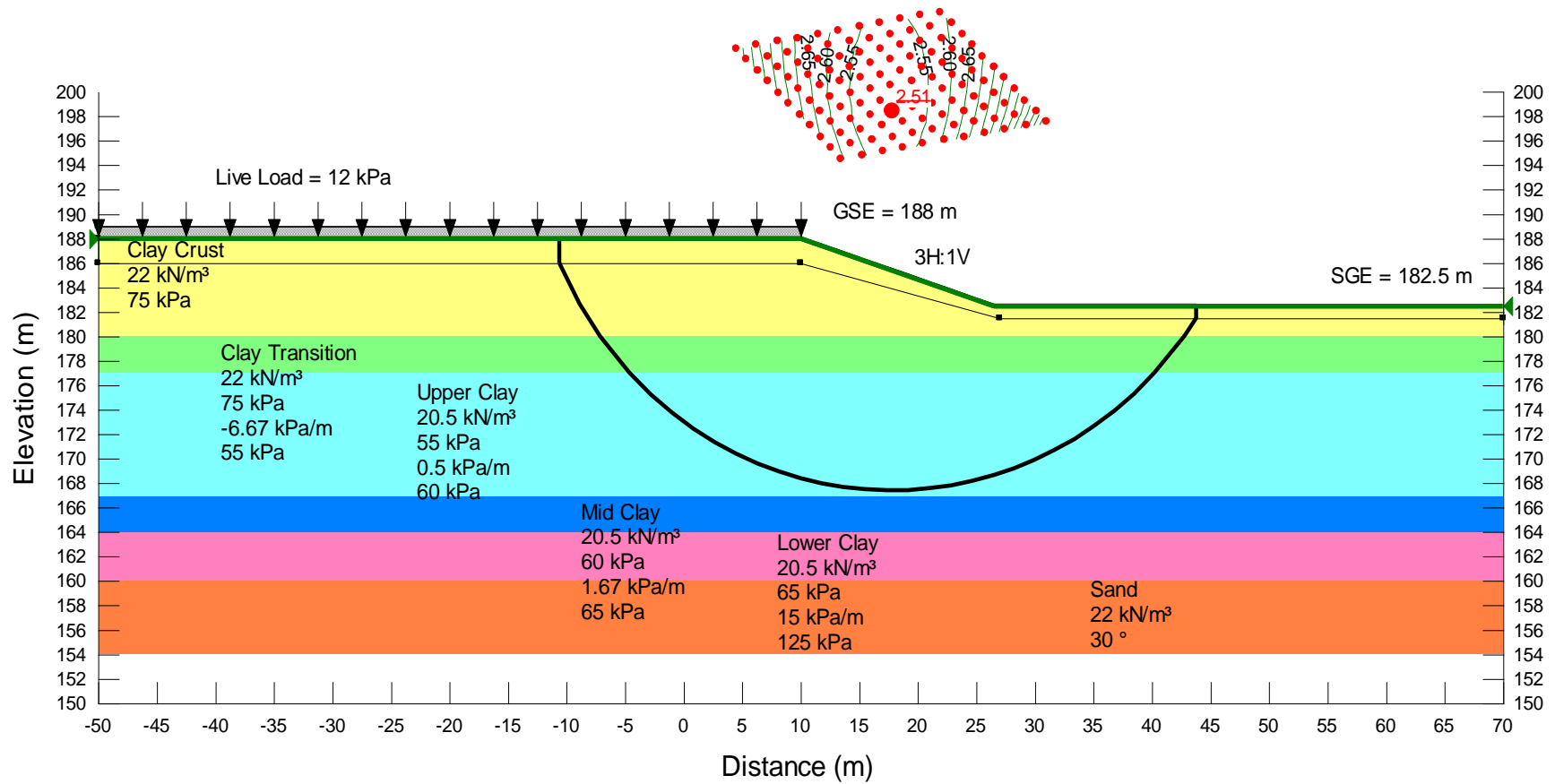


| | | | | |
|---|----------|-----------|---------------------|------|
| PROJECT: WINDSOR ESSEX PARKWAY | | | | |
| TITLE: Station 10+500 - Right Side - Long Term - Drained Conditions (Relief Drain and Rip Rap) Permanent Cuts - Phase I | | | | |
| DATE: Aug 2012 | JOB NO.: | CAD FILE: | FIGURE NO.: G.44 | REV. |

Station 10+700T-4.5 m H-Left Side-Undrained.gsz

11/03/2011

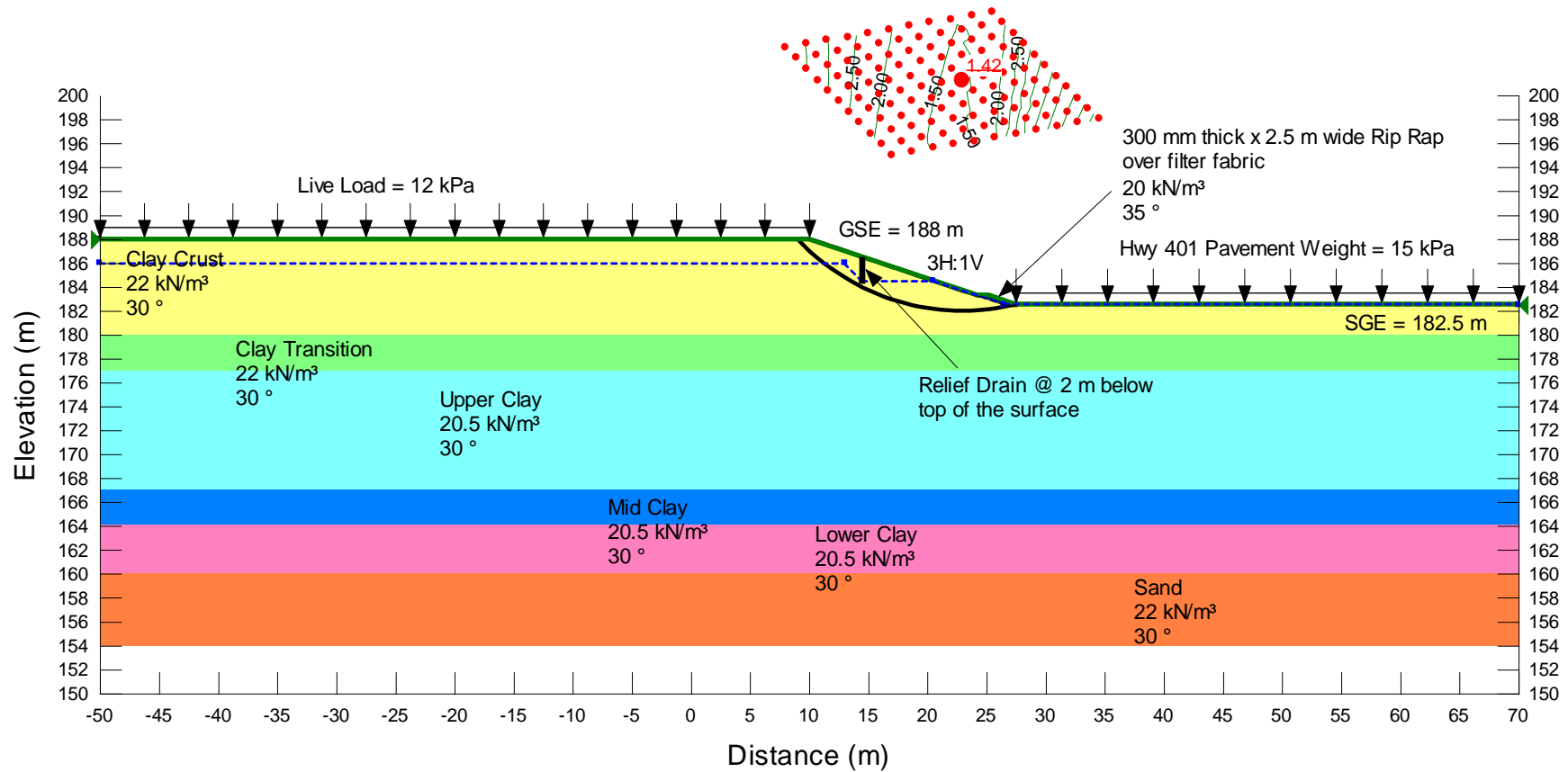
WEP SW8801.1002.101



Station 10+700T-4.5 m H-Left Side-Drained.gsz

11/03/2011

WEP SW8801.1002.101



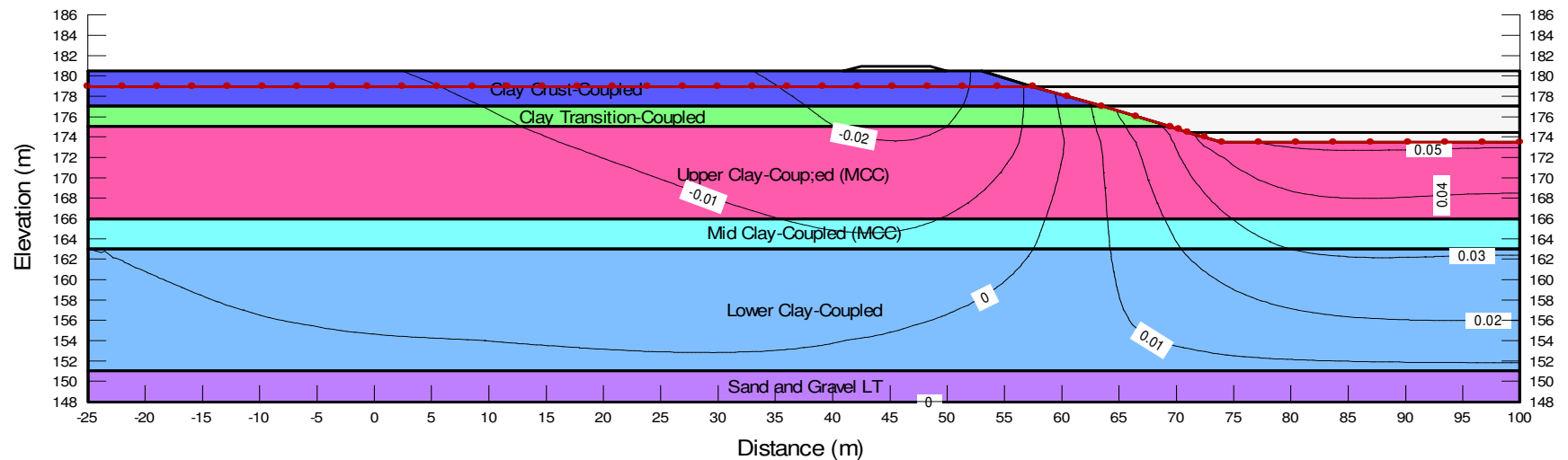
Appendix H Ground Deformation Analyses

Sta 10+425L - Right Side - 7.5 m H - Deformation.gsz

11/03/2011

WEP SW8801.1002.101

Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Clay Transition-Coupled Effective Young's Modulus (E'): 19000 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Upper Clay-Coupled (MCC) O.C. Ratio: 1.5 Poisson's Ratio: 0.35 Lambda: 0.086 Kappa: 0.0094 Initial Void Ratio: 0.65 Unit Weight: 20.5 kN/m³ Phi': 26 °
 Name: Mid Clay-Coupled (MCC) O.C. Ratio: 1.2 Poisson's Ratio: 0.35 Lambda: 0.06 Kappa: 0.0066 Initial Void Ratio: 0.46 Unit Weight: 20.5 kN/m³ Phi': 25 °
 Name: Lower Clay-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: Sand and Gravel LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 20.5 kN/m³



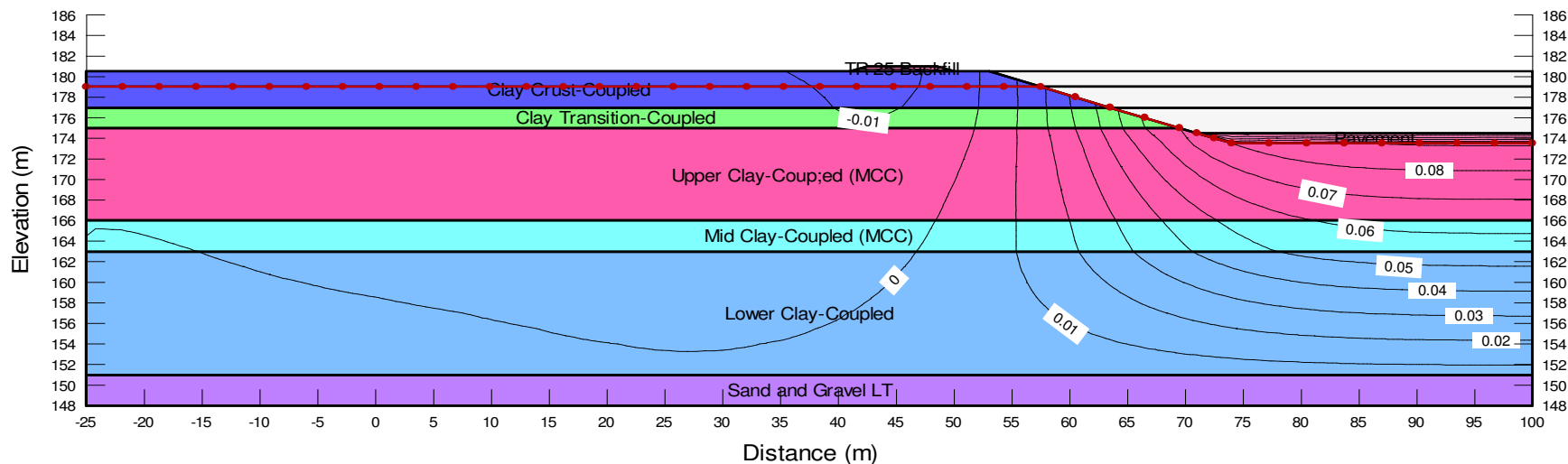
Legend:
 (-) Sign on Contourline = Settlement
 No Sign on Contourline = Heave

Sta 10+425L - Right Side - 7.5 m H - Deformation.gsz

11/03/2011

WEP SW8801.1002.101

Name: Pavement Young's Modulus (E): 54000 kPa Unit Weight: 15 kN/m³ Poisson's Ratio: 0.25
 Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Clay Transition-Coupled Effective Young's Modulus (E'): 19000 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Upper Clay-Coupled (MCC) O.C. Ratio: 1.5 Poisson's Ratio: 0.35 Lambda: 0.086 Kappa: 0.0094 Initial Void Ratio: 0.65 Unit Weight: 20.5 kN/m³ Phi': 26 °
 Name: Mid Clay-Coupled (MCC) O.C. Ratio: 1.2 Poisson's Ratio: 0.35 Lambda: 0.06 Kappa: 0.0066 Initial Void Ratio: 0.46 Unit Weight: 20.5 kN/m³ Phi': 25 °
 Name: Lower Clay-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: Sand and Gravel LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: TR 25 Backfill Young's Modulus (E): 22500 kPa Poisson's Ratio: 0.35 Cohesion: 50 kPa Phi: 0 ° Unit Weight: 21 kN/m³



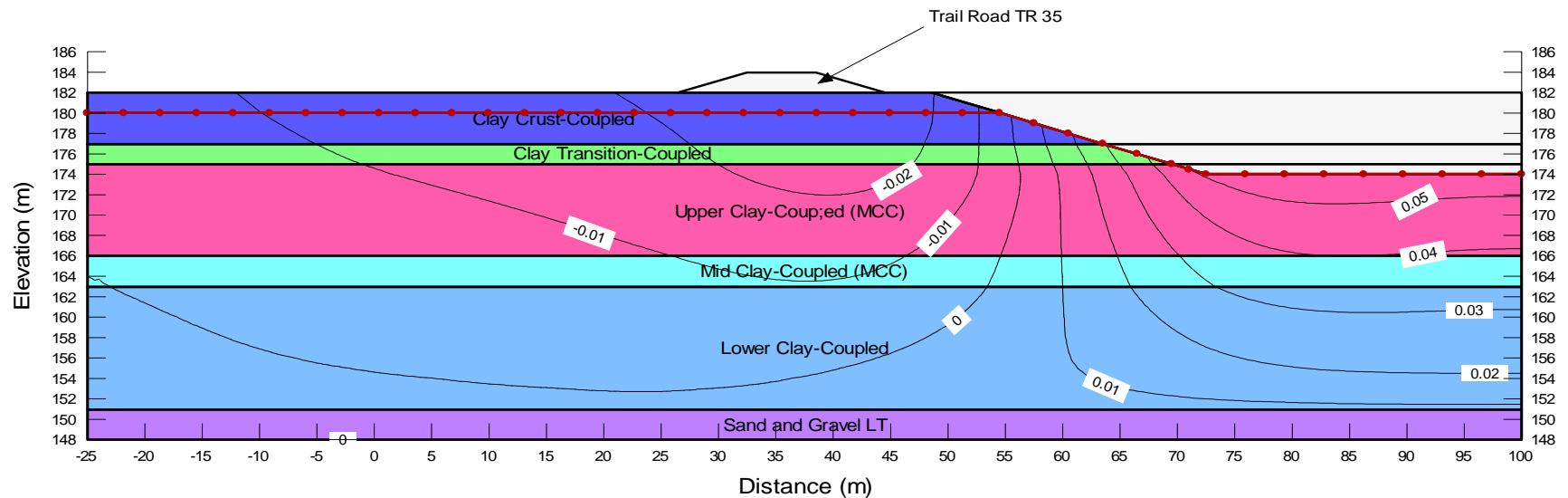
Legend:
 (-) Sign on Contourline = Settlement
 No Sign on Contourline = Heave

Sta 10+725L - Right Side - 9 m H - Deformation.gsz

08/07/2012

WEP SW8801.1002.101

Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Clay Transition-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Upper Clay-Coupled (MCC) O.C. Ratio: 1.5 Poisson's Ratio: 0.35 Lambda: 0.086 Kappa: 0.0094 Initial Void Ratio: 0.65 Unit Weight: 20.5 kN/m³ Phi': 26 °
 Name: Mid Clay-Coupled (MCC) O.C. Ratio: 1.2 Poisson's Ratio: 0.35 Lambda: 0.06 Kappa: 0.0066 Initial Void Ratio: 0.46 Unit Weight: 20.5 kN/m³ Phi': 25 °
 Name: Lower Clay-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: Sand and Gravel LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 20.5 kN/m³



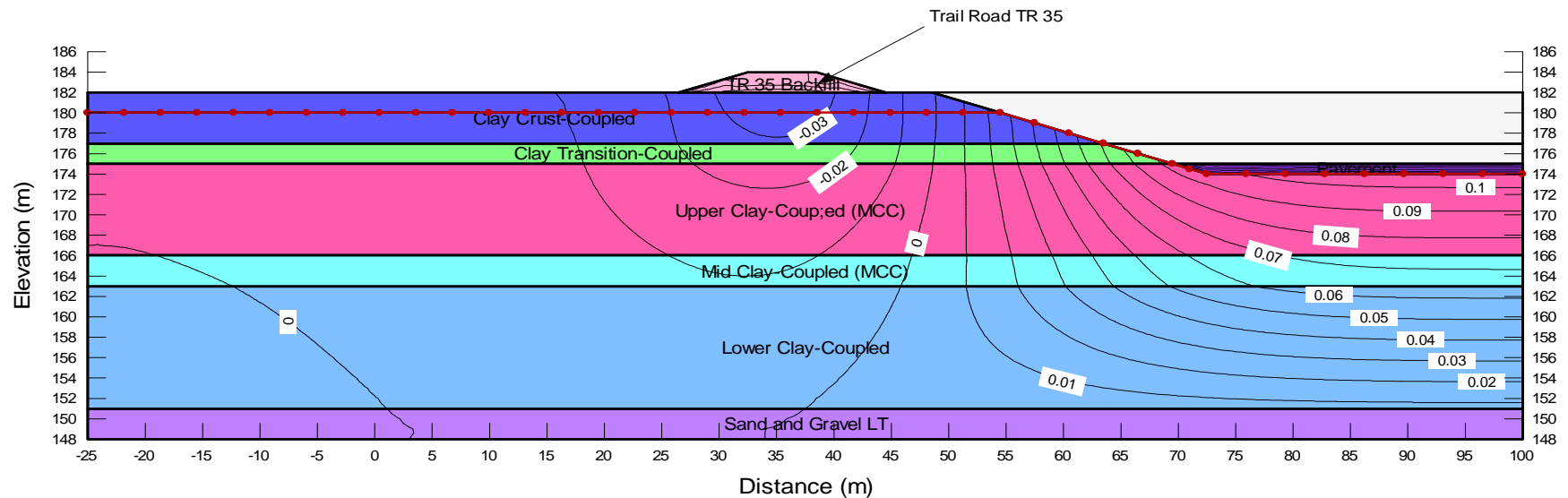
Legend:
 (-) Sign on Contourline = Settlement
 No Sign on Contourline = Heave

Sta 10+725L - Right Side - 9 m H - Deformation.gsz

08/07/2012

WEP SW8801.1002.101

Name: Pavement Young's Modulus (E): 54000 kPa Unit Weight: 15 kN/m³ Poisson's Ratio: 0.25
 Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Clay Transition-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Upper Clay-Coupled (MCC) O.C. Ratio: 1.5 Poisson's Ratio: 0.35 Lambda: 0.086 Kappa: 0.0094 Initial Void Ratio: 0.65 Unit Weight: 20.5 kN/m³ Phi': 26 °
 Name: Mid Clay-Coupled (MCC) O.C. Ratio: 1.2 Poisson's Ratio: 0.35 Lambda: 0.06 Kappa: 0.0066 Initial Void Ratio: 0.46 Unit Weight: 20.5 kN/m³ Phi': 25 °
 Name: Lower Clay-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: Sand and Gravel LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: TR 35 Backfill Young's Modulus (E): 22500 kPa Poisson's Ratio: 0.35 Cohesion: 50 kPa Phi: 0 ° Unit Weight: 21 kN/m³

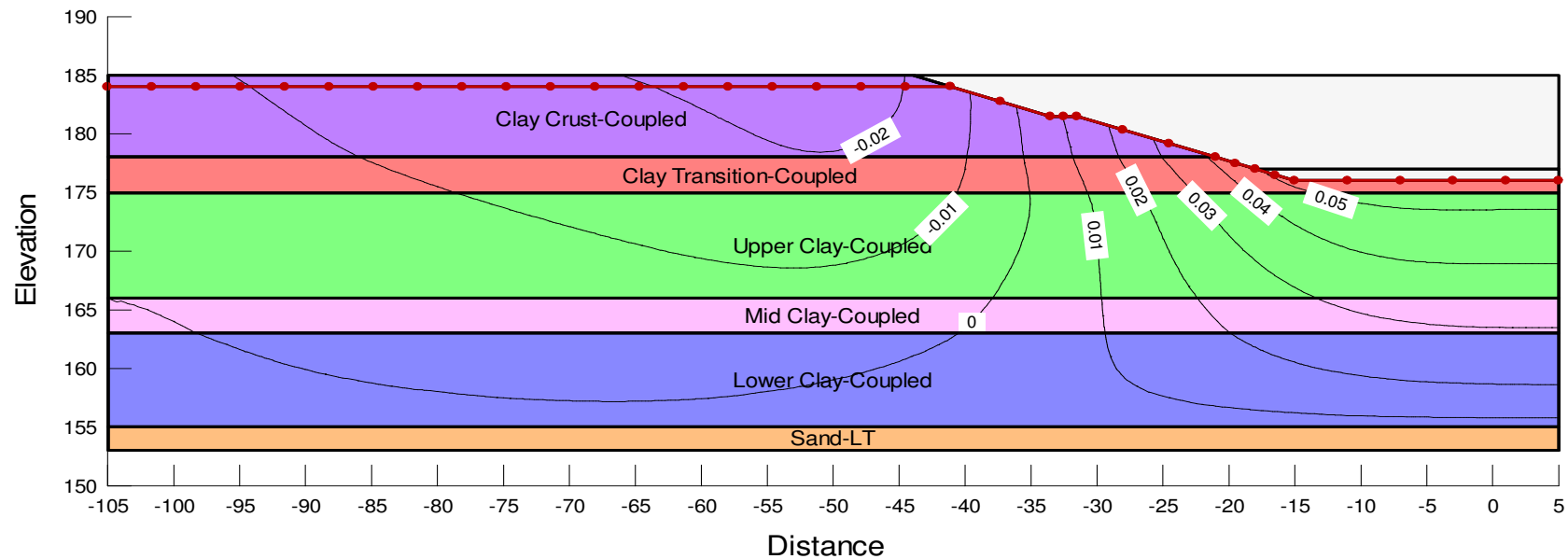


Legend:
 (-) Sign on Contourline = Settlement
 No Sign on Contourline = Heave

Sta. 12+475L Left Side - Deformation.gsz
11/10/2011

WEP SW8801.1002.101

Name: Upper Clay-Coupled O.C. Ratio: 1.5 Poisson's Ratio: 0.35 Lambda: 0.061 Kappa: 0.0078 Initial Void Ratio: 0.54 Unit Weight: 20.5 kN/m³ Phi': 25 °
Name: Mid Clay-Coupled O.C. Ratio: 1.2 Poisson's Ratio: 0.35 Lambda: 0.078 Kappa: 0.0086 Initial Void Ratio: 0.59 Unit Weight: 20.5 kN/m³ Phi': 26 °
Name: Lower Clay-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 20.5 kN/m³
Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
Name: Sand-LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
Name: Clay Transition-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³

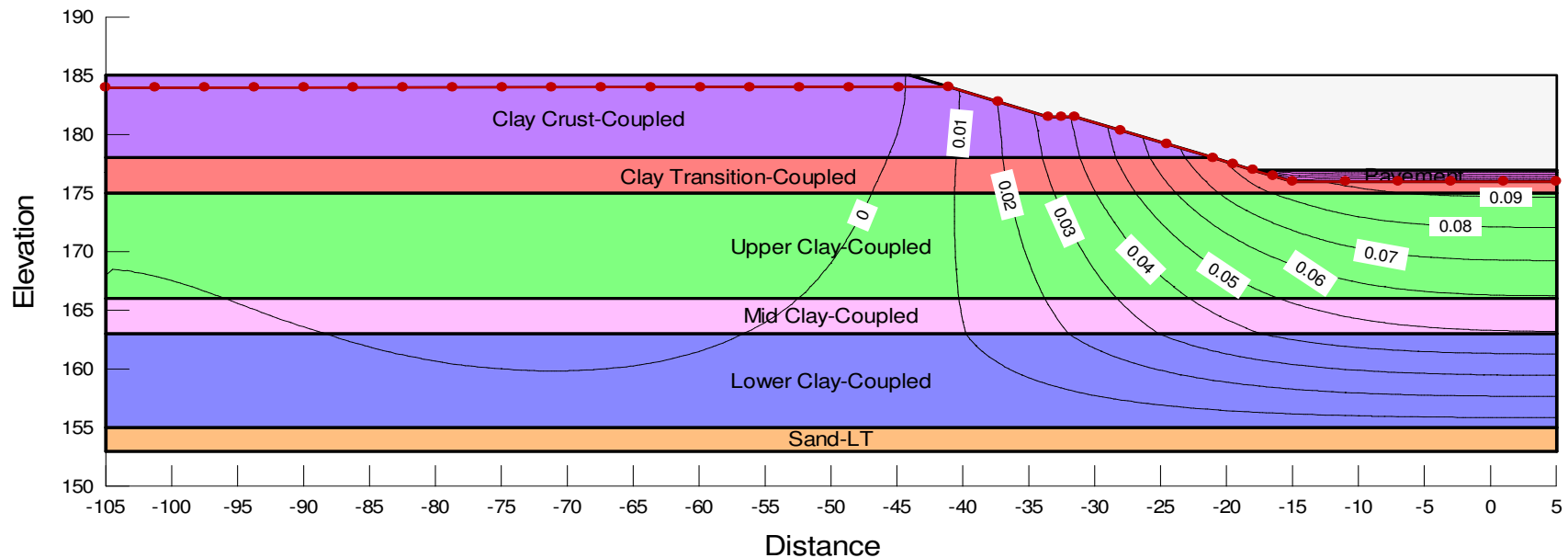


Legend:
(-) Sign on Contourline = Settlement
No Sign on Contourline = Heave

Sta. 12+475L Left Side - Deformation.gsz
11/10/2011

WEP SW8801.1002.101

Name: Upper Clay-Coupled O.C. Ratio: 1.5 Poisson's Ratio: 0.35 Lambda: 0.061 Kappa: 0.0078 Initial Void Ratio: 0.54 Unit Weight: 20.5 kN/m³ Phi': 25 °
 Name: Mid Clay-Coupled O.C. Ratio: 1.2 Poisson's Ratio: 0.35 Lambda: 0.078 Kappa: 0.0086 Initial Void Ratio: 0.59 Unit Weight: 20.5 kN/m³ Phi': 26 °
 Name: Lower Clay-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: Pavement Young's Modulus (E): 54000 kPa Unit Weight: 15 kN/m³ Poisson's Ratio: 0.25
 Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Sand-LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Clay Transition-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³



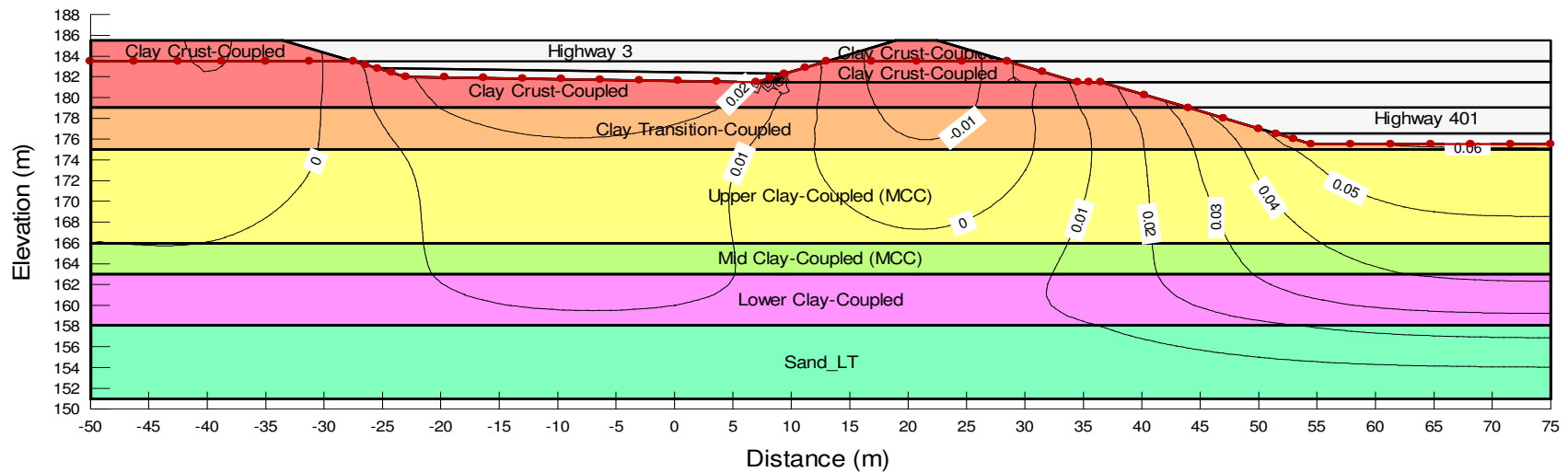
Legend:
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 No Sign on Contourline = Heave

Sta 12+900 L - Right Slope - 9.5m H - Deformation-Hwy 3.gsz

11/04/2011

SW8801.1002.101

Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Clay Transition-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Upper Clay-Coupled (MCC) O.C. Ratio: 1.5 Poisson's Ratio: 0.35 Lambda: 0.063 Kappa: 0.007 Initial Void Ratio: 0.49 Unit Weight: 20.5 kN/m³ Phi': 25 °
 Name: Mid Clay-Coupled (MCC) O.C. Ratio: 1.2 Poisson's Ratio: 0.35 Lambda: 0.071 Kappa: 0.0078 Initial Void Ratio: 0.54 Unit Weight: 20.5 kN/m³ Phi': 26 °
 Name: Lower Clay-Coupled Effective Young's Modulus (E'): 23500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: Sand_LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³



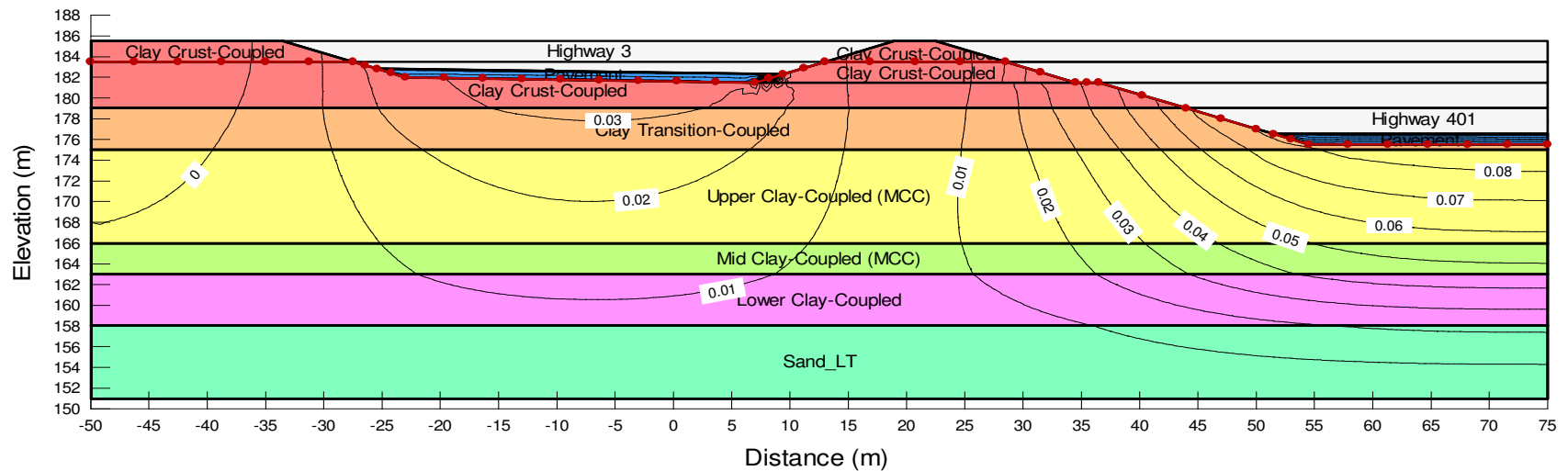
Legend:
 (-) Sign on Contourline = Settlement
 No Sign on Contourline = Heave

Sta 12+900 L - Right Slope - 9.5m H - Deformation-Hwy 3.gsz

11/04/2011

SW8801.1002.101

Name: Pavement Young's Modulus (E): 54000 kPa Unit Weight: 15 kN/m³ Poisson's Ratio: 0.25
 Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Clay Transition-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Upper Clay-Coupled (MCC) O.C. Ratio: 1.5 Poisson's Ratio: 0.35 Lambda: 0.063 Kappa: 0.007 Initial Void Ratio: 0.49 Unit Weight: 20.5 kN/m³ Phi': 25 °
 Name: Mid Clay-Coupled (MCC) O.C. Ratio: 1.2 Poisson's Ratio: 0.35 Lambda: 0.071 Kappa: 0.0078 Initial Void Ratio: 0.54 Unit Weight: 20.5 kN/m³ Phi': 26 °
 Name: Lower Clay-Coupled Effective Young's Modulus (E'): 23500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: Sand_LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³



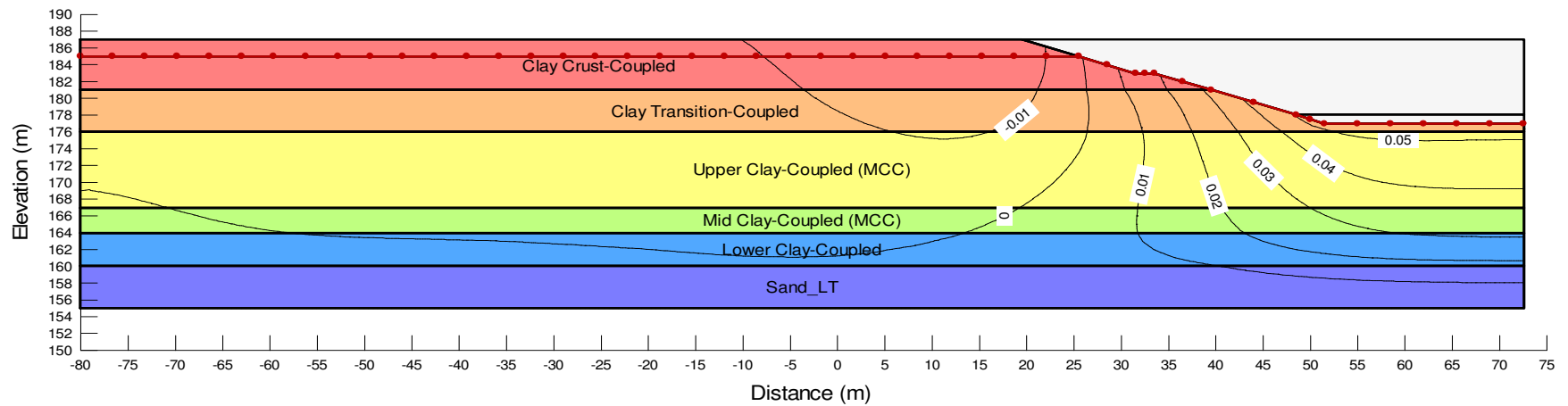
Legend:
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 No Sign on Contourline = Heave

Sta 10+050T - Left Slope - 9 m H-Deformation.gsz

11/04/2011

SW8801.1002.101

Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Clay Transition-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Upper Clay-Coupled (MCC) O.C. Ratio: 1.5 Poisson's Ratio: 0.35 Lambda: 0.071 Kappa: 0.0078 Unit Weight: 20.5 kN/m³ Phi': 25 °
 Name: Mid Clay-Coupled (MCC) O.C. Ratio: 1.2 Poisson's Ratio: 0.35 Lambda: 0.078 Kappa: 0.0086 Unit Weight: 20.5 kN/m³ Phi': 26 °
 Name: Lower Clay-Coupled Effective Young's Modulus (E'): 24500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: Sand_LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³



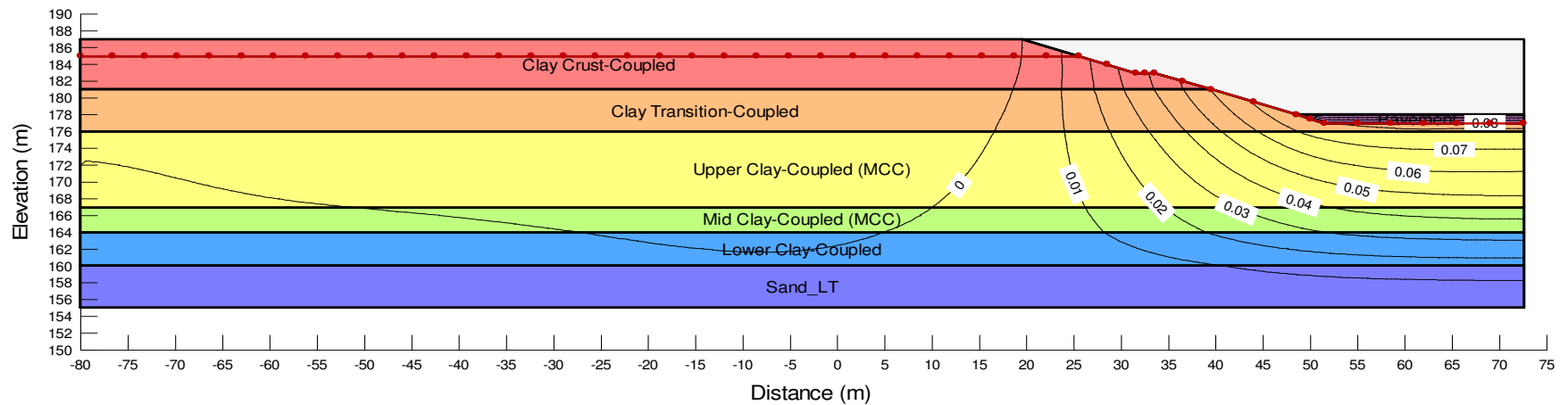
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Sta 10+050T - Left Slope - 9 m H-Deformation.gsz

11/04/2011

SW8801.1002.101

Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Clay Transition-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Upper Clay-Coupled (MCC) O.C. Ratio: 1.5 Poisson's Ratio: 0.35 Lambda: 0.071 Kappa: 0.0078 Unit Weight: 20.5 kN/m³ Phi': 25 °
 Name: Mid Clay-Coupled (MCC) O.C. Ratio: 1.2 Poisson's Ratio: 0.35 Lambda: 0.078 Kappa: 0.0086 Unit Weight: 20.5 kN/m³ Phi': 26 °
 Name: Lower Clay-Coupled Effective Young's Modulus (E'): 24500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: Sand_LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Pavement Young's Modulus (E): 54000 kPa Unit Weight: 15 kN/m³ Poisson's Ratio: 0.25



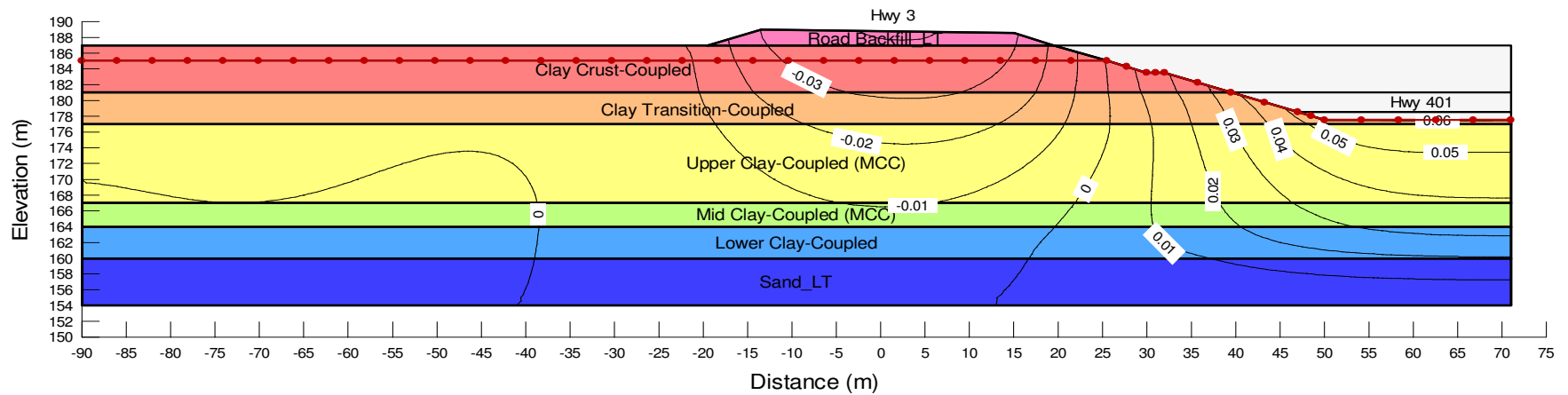
Legend:
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Sta 10+225T - Left Slope - 9.5 m H -Deformation.gsz

5/17/2011

SW8801.1002.101

Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Clay Transition-Coupled Effective Young's Modulus (E'): 19000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Upper Clay-Coupled (MCC) O.C. Ratio: 1.6 Poisson's Ratio: 0.35 Lambda: 0.071 Kappa: 0.0078 Initial Void Ratio: 0.54 Unit Weight: 20.5 kN/m³ Phi': 25 °
 Name: Mid Clay-Coupled (MCC) O.C. Ratio: 1.3 Poisson's Ratio: 0.35 Lambda: 0.101 Kappa: 0.0111 Initial Void Ratio: 0.76 Unit Weight: 20.5 kN/m³ Phi': 26 °
 Name: Lower Clay-Coupled Effective Young's Modulus (E'): 25500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: Sand_LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Road Backfill_LT Young's Modulus (E): 22500 kPa Unit Weight: 22 kN/m³ Poisson's Ratio: 0.35



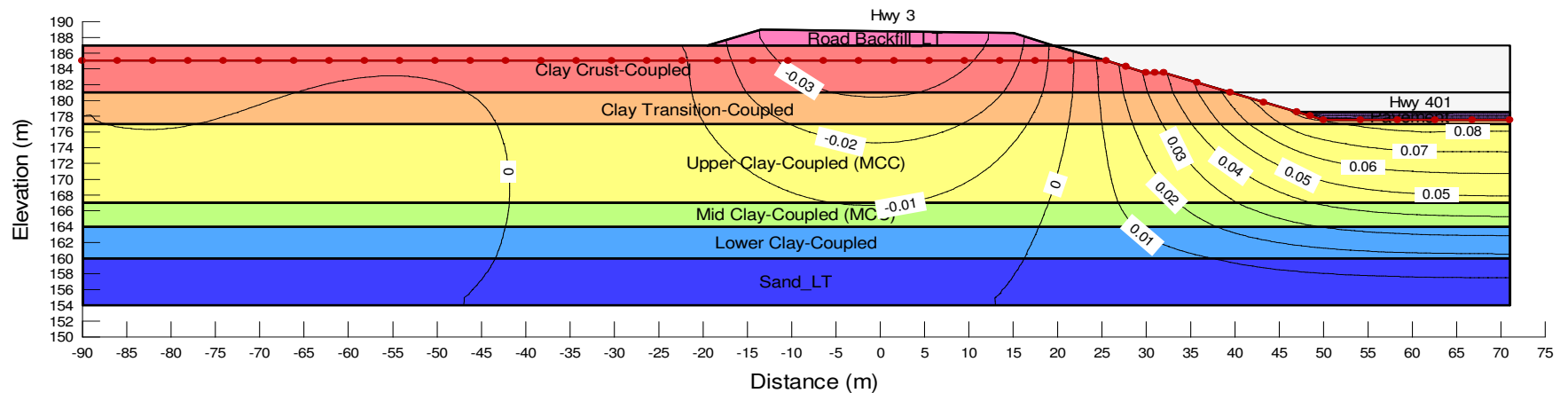
Legend:
 (-) Sign on Contourline = Settlement
 No Sign on Contourline = Heave

Sta 10+225T - Left Slope - 9.5 m H -Deformation.gsz

5/17/2011

SW8801.1002.101

Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Clay Transition-Coupled Effective Young's Modulus (E'): 19000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Upper Clay-Coupled (MCC) O.C. Ratio: 1.6 Poisson's Ratio: 0.35 Lambda: 0.071 Kappa: 0.0078 Initial Void Ratio: 0.54 Unit Weight: 20.5 kN/m³ Phi': 25 °
 Name: Mid Clay-Coupled (MCC) O.C. Ratio: 1.3 Poisson's Ratio: 0.35 Lambda: 0.101 Kappa: 0.0111 Initial Void Ratio: 0.76 Unit Weight: 20.5 kN/m³ Phi': 26 °
 Name: Lower Clay-Coupled Effective Young's Modulus (E'): 25500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: Sand_LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Pavement Young's Modulus (E): 54000 kPa Unit Weight: 15 kN/m³ Poisson's Ratio: 0.25
 Name: Road Backfill_LT Young's Modulus (E): 22500 kPa Unit Weight: 22 kN/m³ Poisson's Ratio: 0.35



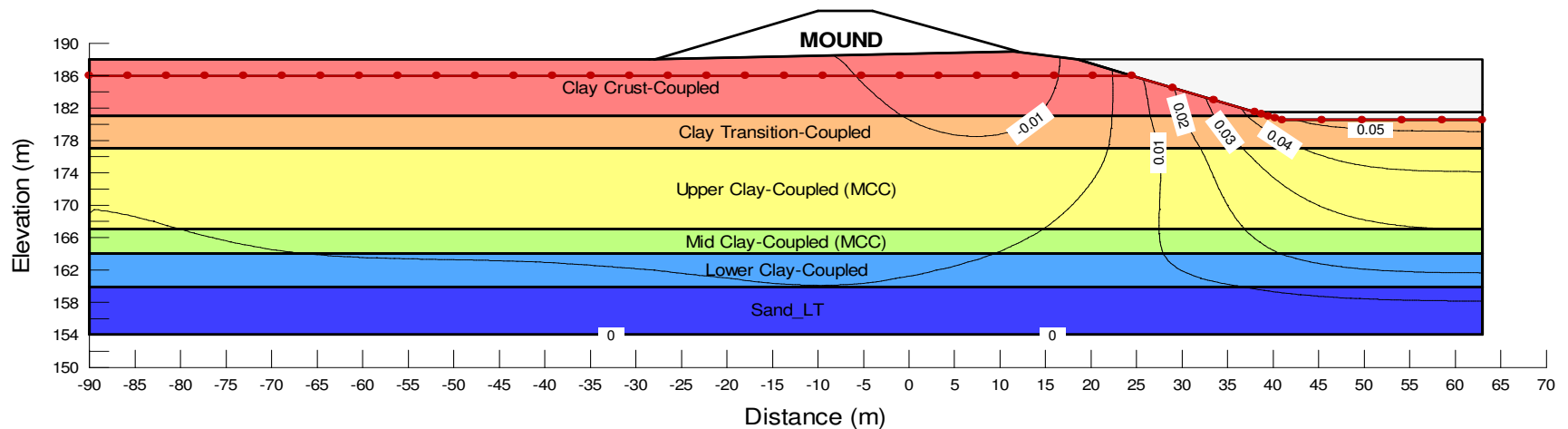
Legend:
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Sta 10+500T - Right Slope - 6.5 m H-Mound EI 194m-Deformation.gsz

11/04/2011

WEP SW8801.1002.101

Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Clay Transition-Coupled Effective Young's Modulus (E'): 19000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Upper Clay-Coupled (MCC) O.C. Ratio: 1.6 Poisson's Ratio: 0.35 Lambda: 0.071 Kappa: 0.0078 Initial Void Ratio: 0.54 Unit Weight: 20.5 kN/m³ Phi': 25 °
 Name: Mid Clay-Coupled (MCC) O.C. Ratio: 1.3 Poisson's Ratio: 0.35 Lambda: 0.101 Kappa: 0.0111 Initial Void Ratio: 0.76 Unit Weight: 20.5 kN/m³ Phi': 26 °
 Name: Lower Clay-Coupled Effective Young's Modulus (E'): 25500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: Sand_LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³



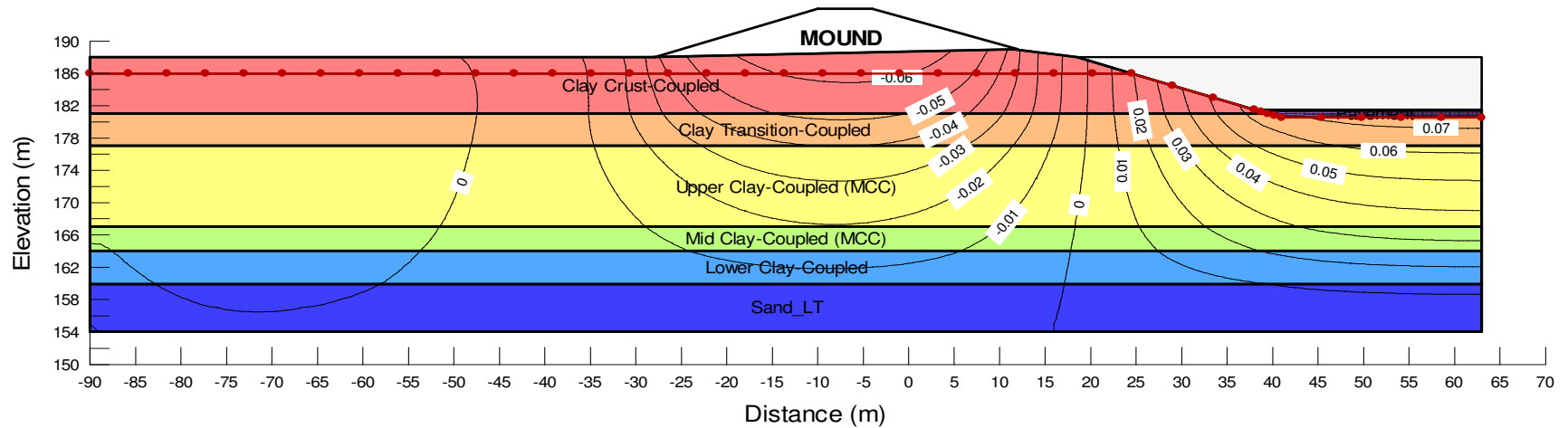
Legend:
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 No Sign on Contourline = Heave

Sta 10+500T - Right Slope - 6.5 m H -Mound EI 194m-Deformation.gsz

11/04/2011

WEP SW8801.1002.101

Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Clay Transition-Coupled Effective Young's Modulus (E'): 19000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Upper Clay-Coupled (MCC) O.C. Ratio: 1.6 Poisson's Ratio: 0.35 Lambda: 0.071 Kappa: 0.0078 Initial Void Ratio: 0.54 Unit Weight: 20.5 kN/m³ Phi': 25 °
 Name: Mid Clay-Coupled (MCC) O.C. Ratio: 1.3 Poisson's Ratio: 0.35 Lambda: 0.101 Kappa: 0.0111 Initial Void Ratio: 0.76 Unit Weight: 20.5 kN/m³ Phi': 26 °
 Name: Lower Clay-Coupled Effective Young's Modulus (E'): 25500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: Sand_LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Pavement Young's Modulus (E): 54000 kPa Unit Weight: 15 kN/m³ Poisson's Ratio: 0.25



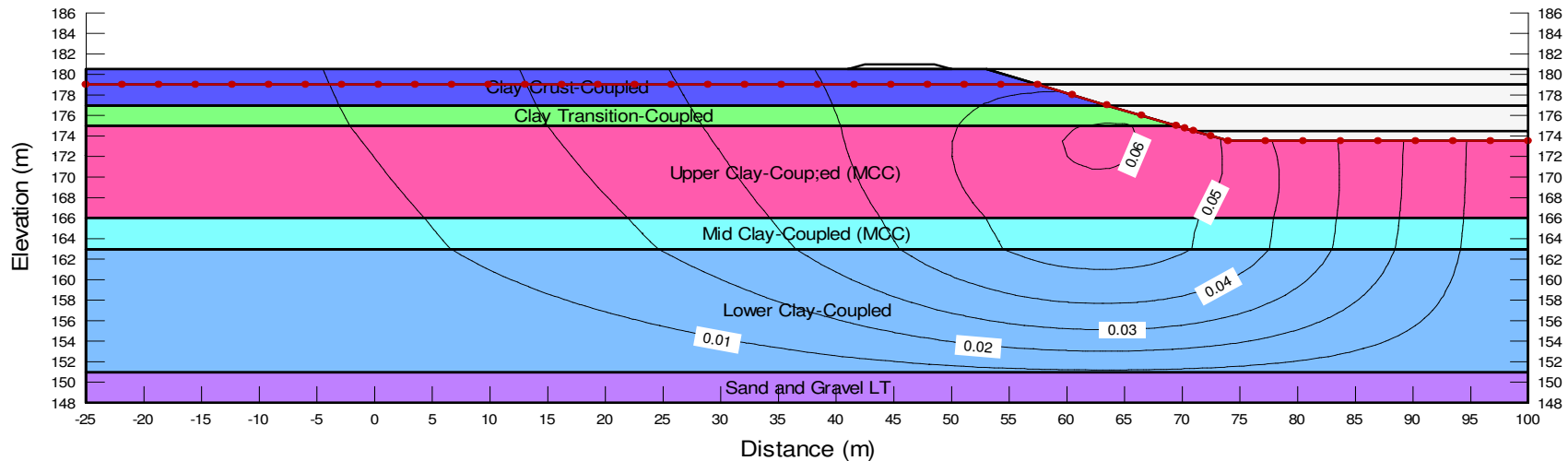
Legend:
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Sta 10+425L - Right Side - 7.5 m H - Deformation.gsz

WEP SW8801.1002.101

11/03/2011

Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Clay Transition-Coupled Effective Young's Modulus (E'): 19000 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Upper Clay-Coupled (MCC) O.C. Ratio: 1.5 Poisson's Ratio: 0.35 Lambda: 0.086 Kappa: 0.0094 Initial Void Ratio: 0.65 Unit Weight: 20.5 kN/m³ Phi': 26 °
 Name: Mid Clay-Coupled (MCC) O.C. Ratio: 1.2 Poisson's Ratio: 0.35 Lambda: 0.06 Kappa: 0.0066 Initial Void Ratio: 0.46 Unit Weight: 20.5 kN/m³ Phi': 25 °
 Name: Lower Clay-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: Sand and Gravel LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 20.5 kN/m³



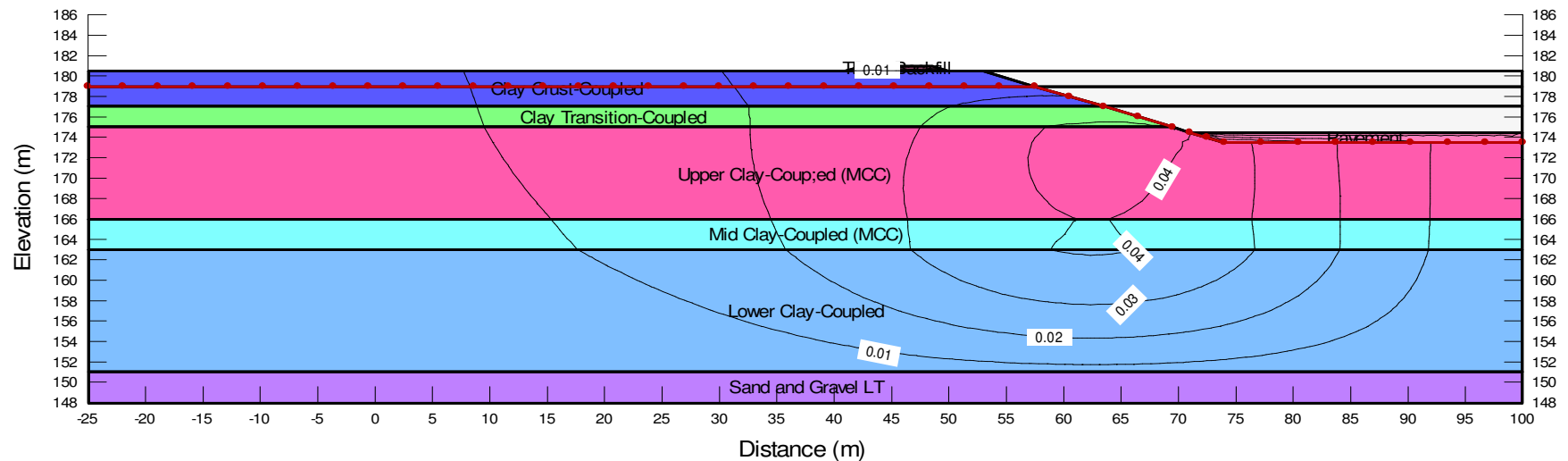
Legend:
 (-) Sign on Contourline = Horizontal Displacement opposite to Highway 401 Excavations
 No Sign on Contourline = Horizontal Displacement towards Highway 401 Excavations

Sta 10+425L - Right Side - 7.5 m H - Deformation.gsz

11/03/2011

WEP SW8801.1002.101

Name: Pavement Young's Modulus (E): 54000 kPa Unit Weight: 15 kN/m³ Poisson's Ratio: 0.25
 Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Cohesion: 0 kPa Phi: 30 ° Unit Weight: 22 kN/m³
 Name: Clay Transition-Coupled Effective Young's Modulus (E'): 19000 kPa Poisson's Ratio: 0.35 Cohesion: 0 kPa Phi: 30 ° Unit Weight: 22 kN/m³
 Name: Upper Clay-Coupled (MCC) O.C. Ratio: 1.5 Poisson's Ratio: 0.35 Lambda: 0.086 Kappa: 0.0094 Initial Void Ratio: 0.65 Unit Weight: 20.5 kN/m³ Phi: 26 °
 Name: Mid Clay-Coupled (MCC) O.C. Ratio: 1.2 Poisson's Ratio: 0.35 Lambda: 0.06 Kappa: 0.0066 Initial Void Ratio: 0.46 Unit Weight: 20.5 kN/m³ Phi: 25 °
 Name: Lower Clay-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Cohesion: 0 kPa Phi: 30 ° Unit Weight: 20.5 kN/m³
 Name: Sand and Gravel LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Cohesion: 0 kPa Phi: 30 ° Unit Weight: 20.5 kN/m³
 Name: TR 25 Backfill Young's Modulus (E): 22500 kPa Poisson's Ratio: 0.35 Cohesion: 50 kPa Phi: 0 ° Unit Weight: 21 kN/m³



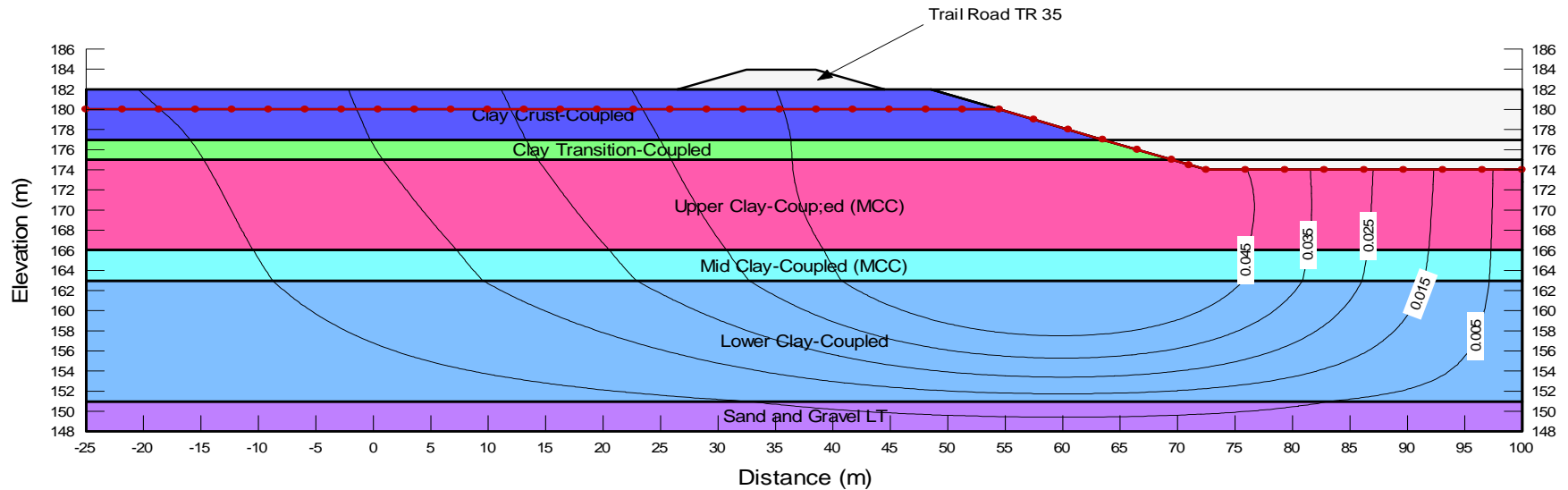
Legend:
 (-) Sign on Contourline = Horizontal Displacement opposite to Highway 401 Excavations
 No Sign on Contourline = Horizontal Displacement towards Highway 401 Excavations

Sta 10+725L - Right Side - 9 m H - Deformation.gsz

08/07/2012

WEP SW8801.1002.101

Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Clay Transition-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Upper Clay-Coupled (MCC) O.C. Ratio: 1.5 Poisson's Ratio: 0.35 Lambda: 0.086 Kappa: 0.0094 Initial Void Ratio: 0.65 Unit Weight: 20.5 kN/m³ Phi': 26 °
 Name: Mid Clay-Coupled (MCC) O.C. Ratio: 1.2 Poisson's Ratio: 0.35 Lambda: 0.06 Kappa: 0.0066 Initial Void Ratio: 0.46 Unit Weight: 20.5 kN/m³ Phi': 25 °
 Name: Lower Clay-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: Sand and Gravel LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 20.5 kN/m³



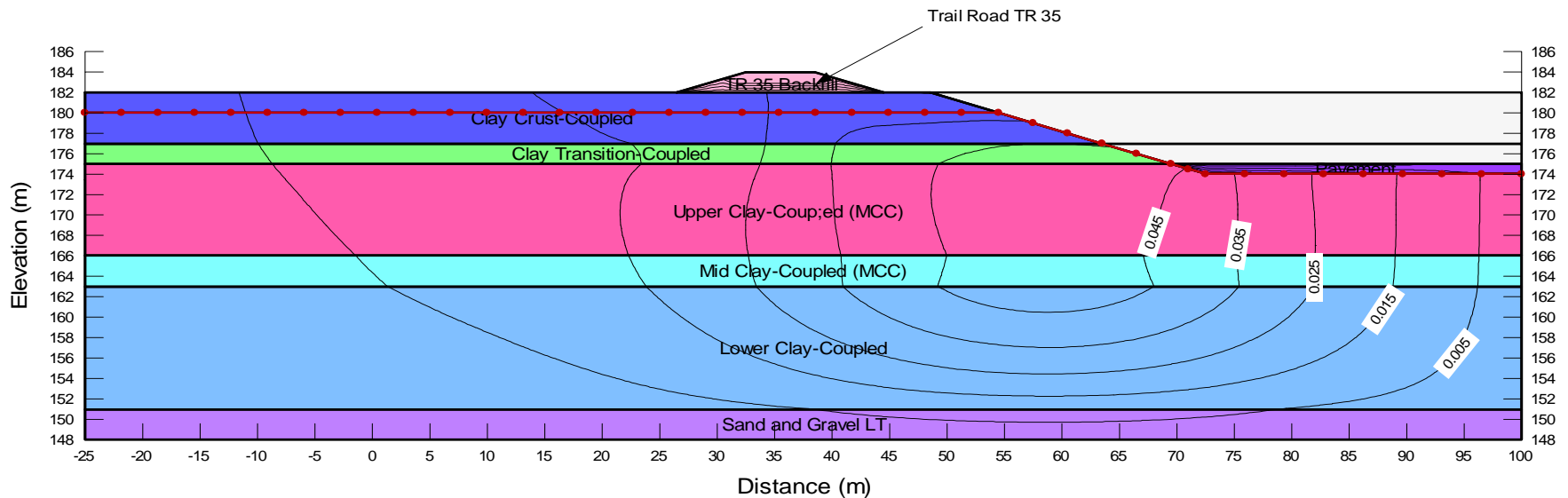
Legend:
 (-) Sign on Contourline = Horizontal Displacement opposite to Highway 401 Excavations
 No Sign on Contourline = Horizontal Displacement towards Highway 401 Excavations

Sta 10+725L - Right Side - 9 m H - Deformation.gsz

08/07/2012

WEP SW8801.1002.101

Name: Pavement Young's Modulus (E): 54000 kPa Unit Weight: 15 kN/m³ Poisson's Ratio: 0.25
 Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Clay Transition-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Upper Clay-Coupled (MCC) O.C. Ratio: 1.5 Poisson's Ratio: 0.35 Lambda: 0.086 Kappa: 0.0094 Initial Void Ratio: 0.65 Unit Weight: 20.5 kN/m³ Phi': 26 °
 Name: Mid Clay-Coupled (MCC) O.C. Ratio: 1.2 Poisson's Ratio: 0.35 Lambda: 0.06 Kappa: 0.0066 Initial Void Ratio: 0.46 Unit Weight: 20.5 kN/m³ Phi': 25 °
 Name: Lower Clay-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: Sand and Gravel LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Cohesion': 0 kPa Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: TR 35 Backfill Young's Modulus (E): 22500 kPa Poisson's Ratio: 0.35 Cohesion: 50 kPa Phi: 0 ° Unit Weight: 21 kN/m³

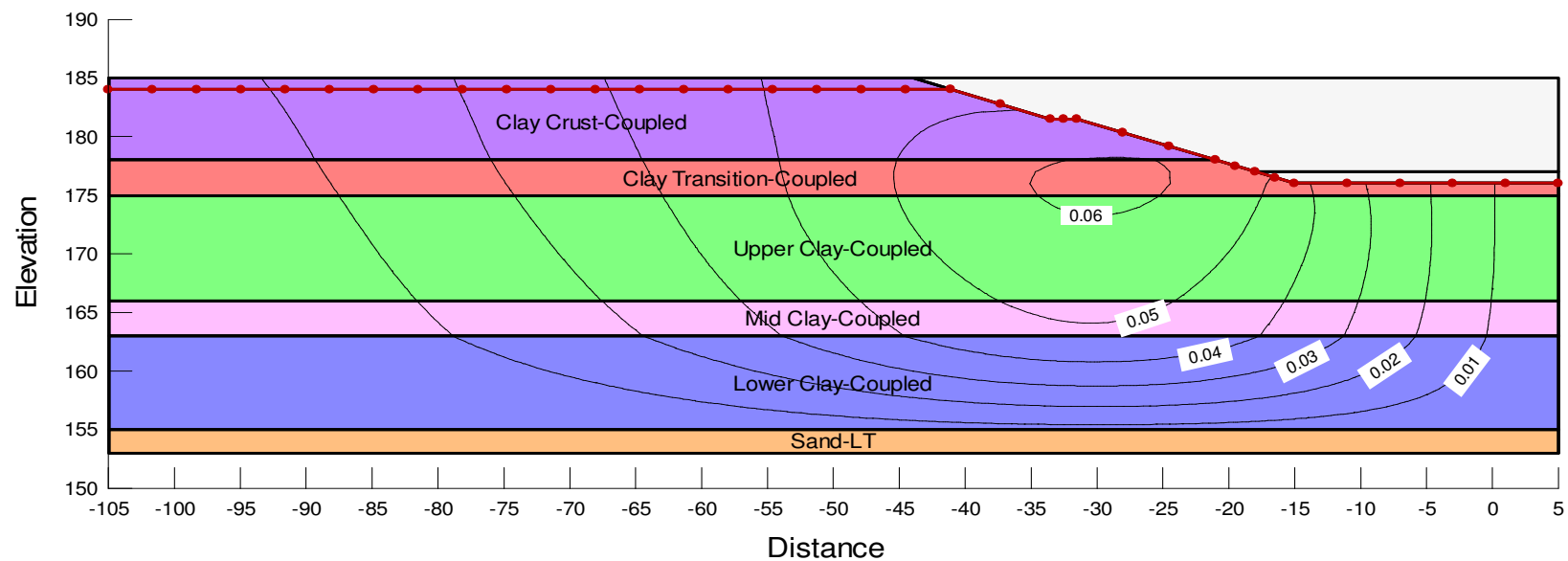


Legend:
 (-) Sign on Contourline = Horizontal Displacement opposite to Highway 401 Excavations
 No Sign on Contourline = Horizontal Displacement towards Highway 401 Excavations

Sta. 12+475L Left Side - Deformation.gsz
11/10/2011

WEP SW8801.1002.101

Name: Upper Clay-Coupled O.C. Ratio: 1.5 Poisson's Ratio: 0.35 Lambda: 0.061 Kappa: 0.0078 Initial Void Ratio: 0.54 Unit Weight: 20.5 kN/m³ Phi': 25 °
 Name: Mid Clay-Coupled O.C. Ratio: 1.2 Poisson's Ratio: 0.35 Lambda: 0.078 Kappa: 0.0086 Initial Void Ratio: 0.59 Unit Weight: 20.5 kN/m³ Phi': 26 °
 Name: Lower Clay-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Sand-LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Clay Transition-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³

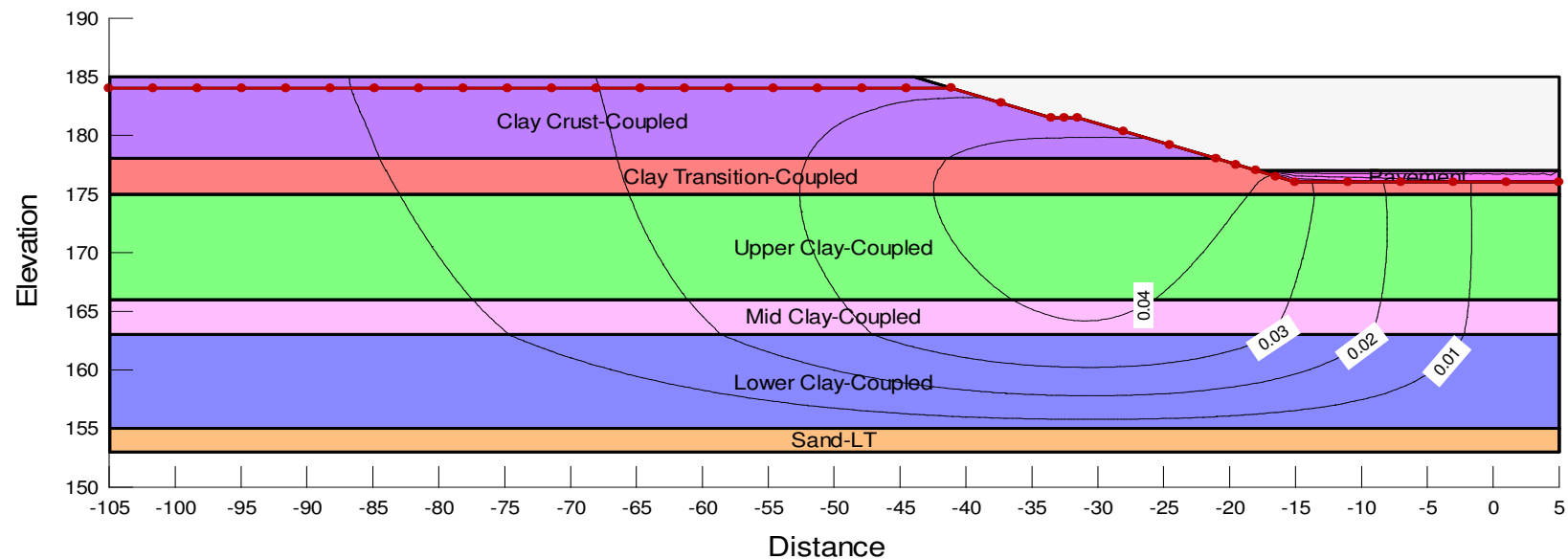


Legend:
 (-) Sign on Contourline = Horizontal Displacement opposite to Highway 401 Excavations
 No Sign on Contourline = Horizontal Displacement towards Highway 401 Excavations

Sta. 12+475L Left Side - Deformation.gsz
11/10/2011

WEP SW8801.1002.101

Name: Upper Clay-Coupled O.C. Ratio: 1.5 Poisson's Ratio: 0.35 Lambda: 0.061 Kappa: 0.0078 Initial Void Ratio: 0.54 Unit Weight: 20.5 kN/m³ Phi': 25 °
 Name: Mid Clay-Coupled O.C. Ratio: 1.2 Poisson's Ratio: 0.35 Lambda: 0.078 Kappa: 0.0086 Initial Void Ratio: 0.59 Unit Weight: 20.5 kN/m³ Phi': 26 °
 Name: Lower Clay-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: Pavement Young's Modulus (E): 54000 kPa Unit Weight: 15 kN/m³ Poisson's Ratio: 0.25
 Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Sand-LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Clay Transition-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³



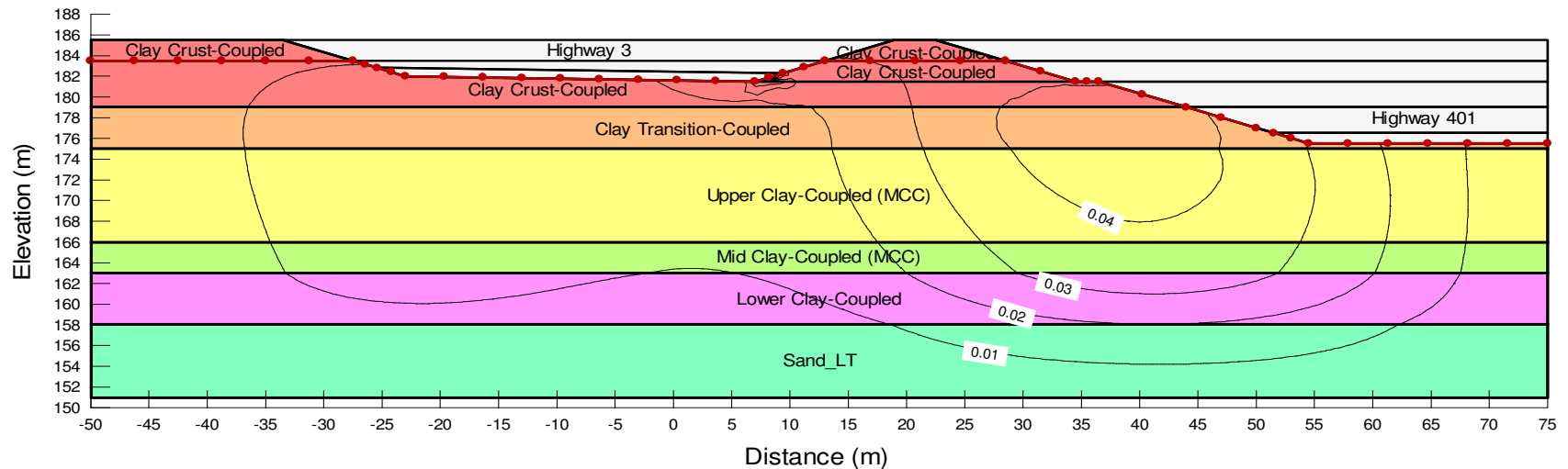
Legend:
 (-) Sign on Contourline = Horizontal Displacement opposite to Highway 401 Excavations
 No Sign on Contourline = Horizontal Displacement towards Highway 401 Excavations

Sta 12+900 L - Right Slope - 9.5m H - Deformation-Hwy 3.gsz

11/04/2011

SW8801.1002.101

Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Clay Transition-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Upper Clay-Coupled (MCC) O.C. Ratio: 1.5 Poisson's Ratio: 0.35 Lambda: 0.063 Kappa: 0.007 Initial Void Ratio: 0.49 Unit Weight: 20.5 kN/m³ Phi': 25 °
 Name: Mid Clay-Coupled (MCC) O.C. Ratio: 1.2 Poisson's Ratio: 0.35 Lambda: 0.071 Kappa: 0.0078 Initial Void Ratio: 0.54 Unit Weight: 20.5 kN/m³ Phi': 26 °
 Name: Lower Clay-Coupled Effective Young's Modulus (E'): 23500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: Sand_LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³



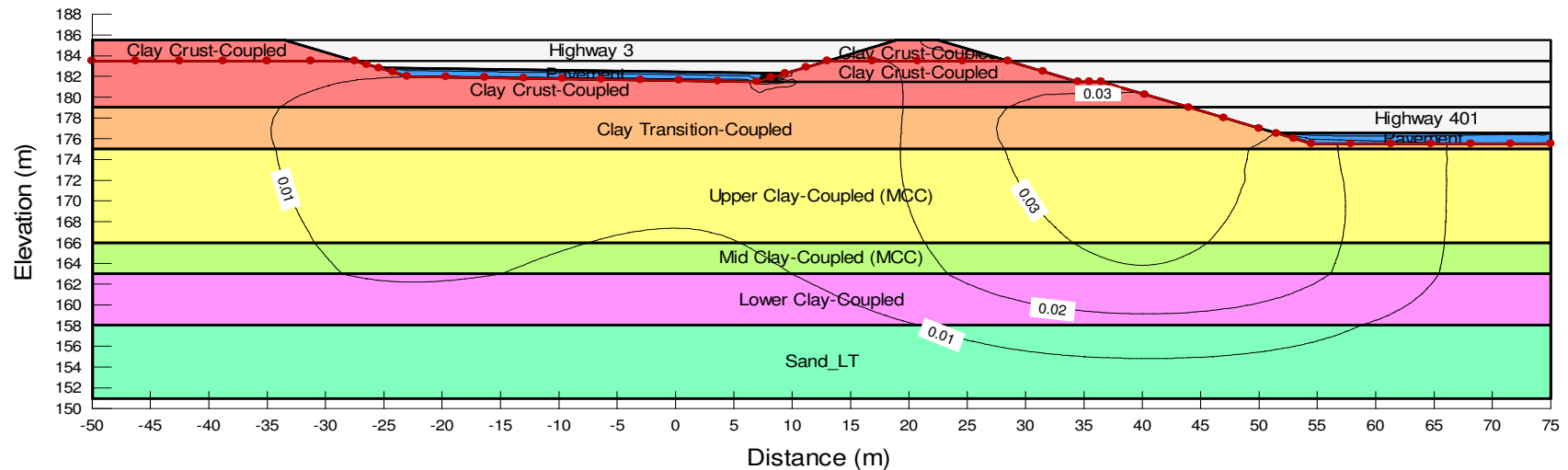
Legend:
 (-) Sign on Contourline = Horizontal Displacement opposite to Highway 401 Excavations
 No Sign on Contourline = Horizontal Displacement towards Highway 401 Excavations

Sta 12+900 L - Right Slope - 9.5m H - Deformation-Hwy 3.gsz

11/04/2011

SW8801.1002.101

Name: Pavement Young's Modulus (E): 54000 kPa Unit Weight: 15 kN/m³ Poisson's Ratio: 0.25
 Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Clay Transition-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Upper Clay-Coupled (MCC) O.C. Ratio: 1.5 Poisson's Ratio: 0.35 Lambda: 0.063 Kappa: 0.007 Initial Void Ratio: 0.49 Unit Weight: 20.5 kN/m³ Phi': 25 °
 Name: Mid Clay-Coupled (MCC) O.C. Ratio: 1.2 Poisson's Ratio: 0.35 Lambda: 0.071 Kappa: 0.0078 Initial Void Ratio: 0.54 Unit Weight: 20.5 kN/m³ Phi': 26 °
 Name: Lower Clay-Coupled Effective Young's Modulus (E'): 23500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: Sand_LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³

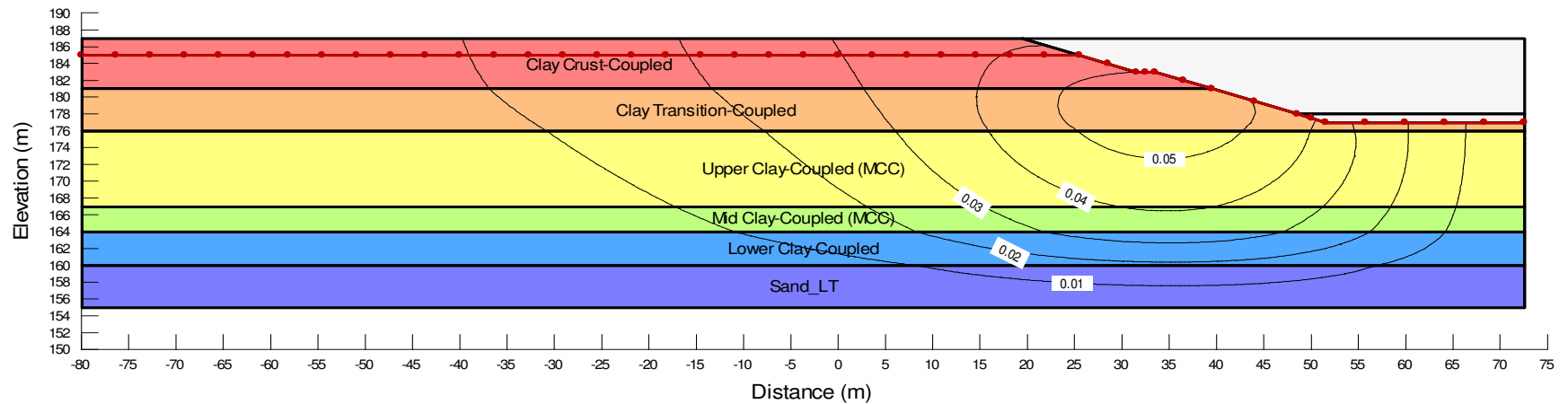


Legend:
 (-) Sign on Contourline = Horizontal Displacement opposite to Highway 401 Excavations
 No Sign on Contourline = Horizontal Displacement towards Highway 401 Excavations

Sta 10+050T - Left Slope - 9 m H-Deformation.gsz
11/04/2011

SW8801.1002.101

Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Φ' : 30 ° Unit Weight: 22 kN/m³
 Name: Clay Transition-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Φ' : 30 ° Unit Weight: 22 kN/m³
 Name: Upper Clay-Coupled (MCC) O.C. Ratio: 1.5 Poisson's Ratio: 0.35 Lambda: 0.071 Kappa: 0.0078 Unit Weight: 20.5 kN/m³ Φ' : 25 °
 Name: Mid Clay-Coupled (MCC) O.C. Ratio: 1.2 Poisson's Ratio: 0.35 Lambda: 0.078 Kappa: 0.0086 Unit Weight: 20.5 kN/m³ Φ' : 26 °
 Name: Lower Clay-Coupled Effective Young's Modulus (E'): 24500 kPa Poisson's Ratio: 0.35 Φ' : 30 ° Unit Weight: 20.5 kN/m³
 Name: Sand_LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Φ' : 30 ° Unit Weight: 22 kN/m³



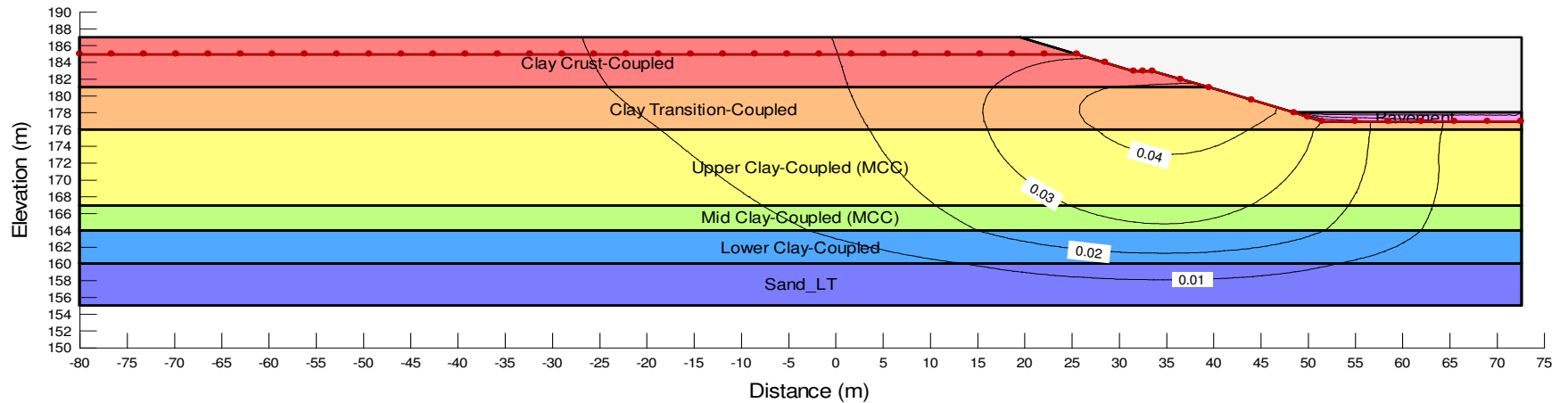
Legend:
 (-) Sign on Contourline = Horizontal Displacement opposite to Highway 401 Excavations
 No Sign on Contourline = Horizontal Displacement towards Highway 401 Excavations

Sta 10+050T - Left Slope - 9 m H-Deformation.gsz

11/04/2011

SW8801.1002.101

Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Clay Transition-Coupled Effective Young's Modulus (E'): 17500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Upper Clay-Coupled (MCC) O.C. Ratio: 1.5 Poisson's Ratio: 0.35 Lambda: 0.071 Kappa: 0.0078 Unit Weight: 20.5 kN/m³ Phi': 25 °
 Name: Mid Clay-Coupled (MCC) O.C. Ratio: 1.2 Poisson's Ratio: 0.35 Lambda: 0.078 Kappa: 0.0086 Unit Weight: 20.5 kN/m³ Phi': 26 °
 Name: Lower Clay-Coupled Effective Young's Modulus (E'): 24500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: Sand_LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Pavement Young's Modulus (E): 54000 kPa Unit Weight: 15 kN/m³ Poisson's Ratio: 0.25



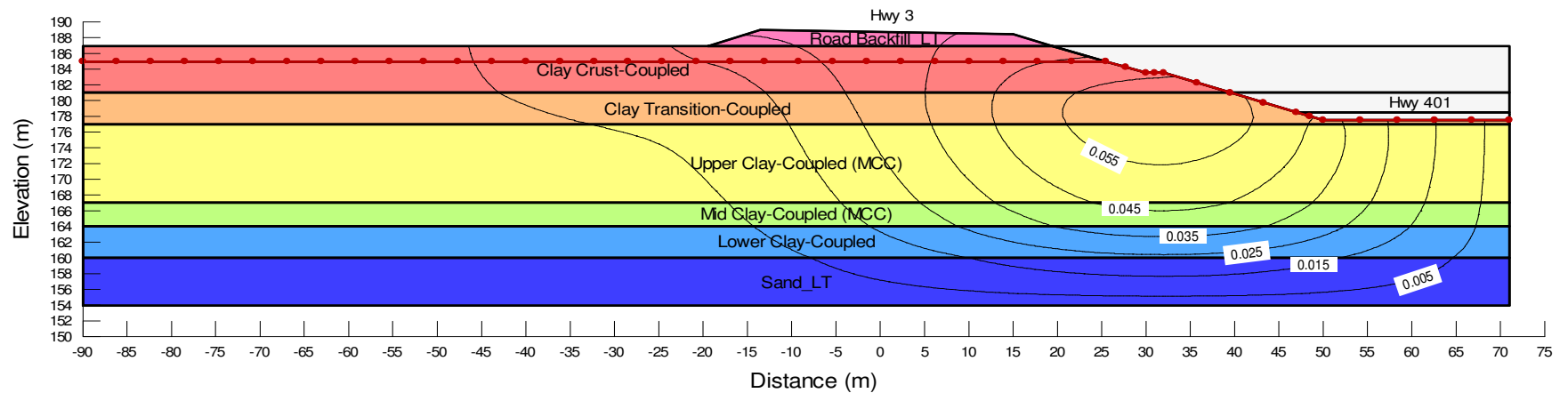
Legend:
 (-) Sign on Contourline = Horizontal Displacement opposite to Highway 401 Excavations
 No Sign on Contourline = Horizontal Displacement towards Highway 401 Excavations

Sta 10+225T - Left Slope - 9.5 m H -Deformation.gsz

5/17/2011

SW8801.1002.101

Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Clay Transition-Coupled Effective Young's Modulus (E'): 19000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Upper Clay-Coupled (MCC) O.C. Ratio: 1.6 Poisson's Ratio: 0.35 Lambda: 0.071 Kappa: 0.0078 Initial Void Ratio: 0.54 Unit Weight: 20.5 kN/m³ Phi': 25 °
 Name: Mid Clay-Coupled (MCC) O.C. Ratio: 1.3 Poisson's Ratio: 0.35 Lambda: 0.101 Kappa: 0.0111 Initial Void Ratio: 0.76 Unit Weight: 20.5 kN/m³ Phi': 26 °
 Name: Lower Clay-Coupled Effective Young's Modulus (E'): 25500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: Sand_LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Road Backfill_LT Young's Modulus (E): 22500 kPa Unit Weight: 22 kN/m³ Poisson's Ratio: 0.35



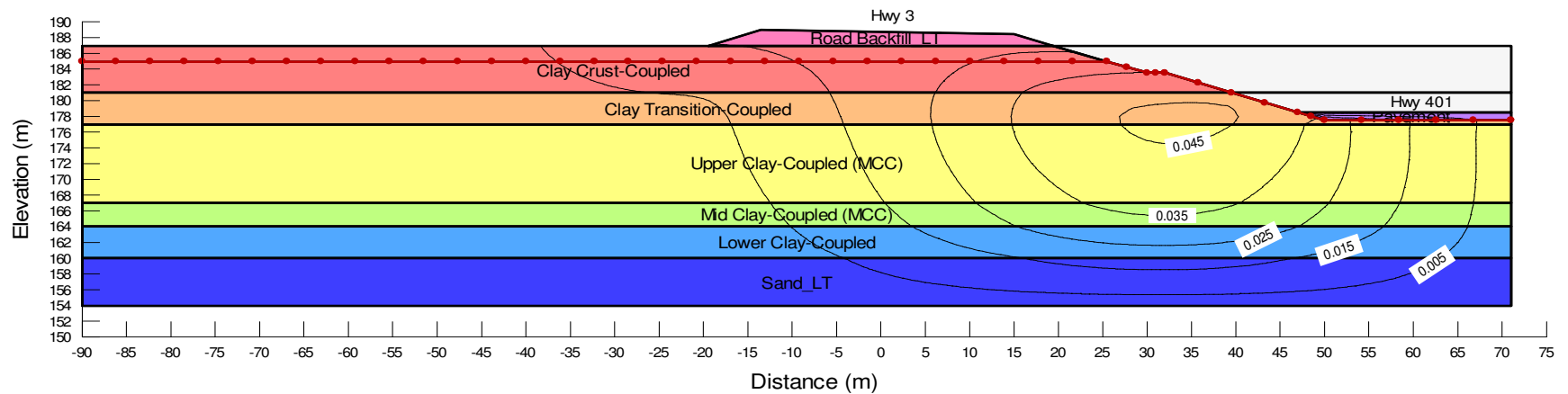
Legend:
 (-) Sign on Contourline = Horizontal Displacement opposite to Highway 401 Excavations
 No Sign on Contourline = Horizontal Displacement towards Highway 401 Excavations

Sta 10+225T - Left Slope - 9.5 m H -Deformation.gsz

5/17/2011

SW8801.1002.101

Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Clay Transition-Coupled Effective Young's Modulus (E'): 19000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Upper Clay-Coupled (MCC) O.C. Ratio: 1.6 Poisson's Ratio: 0.35 Lambda: 0.071 Kappa: 0.0078 Initial Void Ratio: 0.54 Unit Weight: 20.5 kN/m³ Phi': 25 °
 Name: Mid Clay-Coupled (MCC) O.C. Ratio: 1.3 Poisson's Ratio: 0.35 Lambda: 0.101 Kappa: 0.0111 Initial Void Ratio: 0.76 Unit Weight: 20.5 kN/m³ Phi': 26 °
 Name: Lower Clay-Coupled Effective Young's Modulus (E'): 25500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: Sand_LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Pavement Young's Modulus (E): 54000 kPa Unit Weight: 15 kN/m³ Poisson's Ratio: 0.25
 Name: Road Backfill_LT Young's Modulus (E): 22500 kPa Unit Weight: 22 kN/m³ Poisson's Ratio: 0.35



Legend:

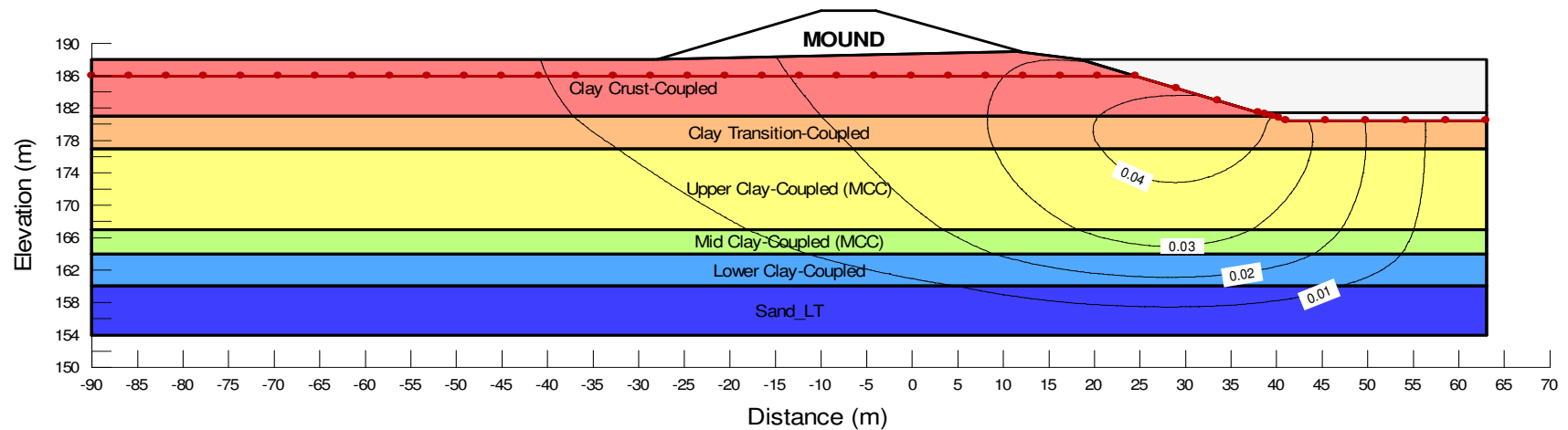
(-) Sign on Contourline = Horizontal Displacement opposite to Highway 401 Excavations
 No Sign on Contourline = Horizontal Displacement towards Highway 401 Excavations

Sta 10+500T - Right Slope - 6.5 m H -Mound EI 194m-Deformation.gsz

11/04/2011

WEP SW8801.1002.101

Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Clay Transition-Coupled Effective Young's Modulus (E'): 19000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Upper Clay-Coupled (MCC) O.C. Ratio: 1.6 Poisson's Ratio: 0.35 Lambda: 0.071 Kappa: 0.0078 Initial Void Ratio: 0.54 Unit Weight: 20.5 kN/m³ Phi': 25
 Name: Mid Clay-Coupled (MCC) O.C. Ratio: 1.3 Poisson's Ratio: 0.35 Lambda: 0.101 Kappa: 0.0111 Initial Void Ratio: 0.76 Unit Weight: 20.5 kN/m³ Phi': 26 °
 Name: Lower Clay-Coupled Effective Young's Modulus (E'): 25500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: Sand_LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³



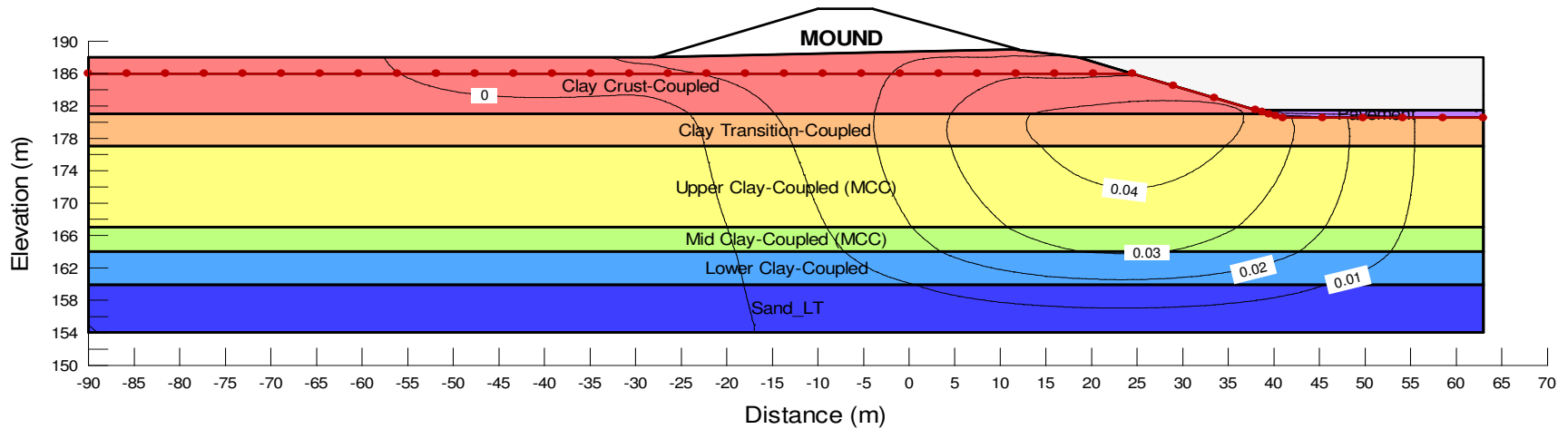
Legend:
 (-) Sign on Contourline = Horizontal Displacement opposite to Highway 401 Excavations
 No Sign on Contourline = Horizontal Displacement towards Highway 401 Excavations

Sta 10+500T - Right Slope - 6.5 m H-Mound EI 194m-Deformation.gsz

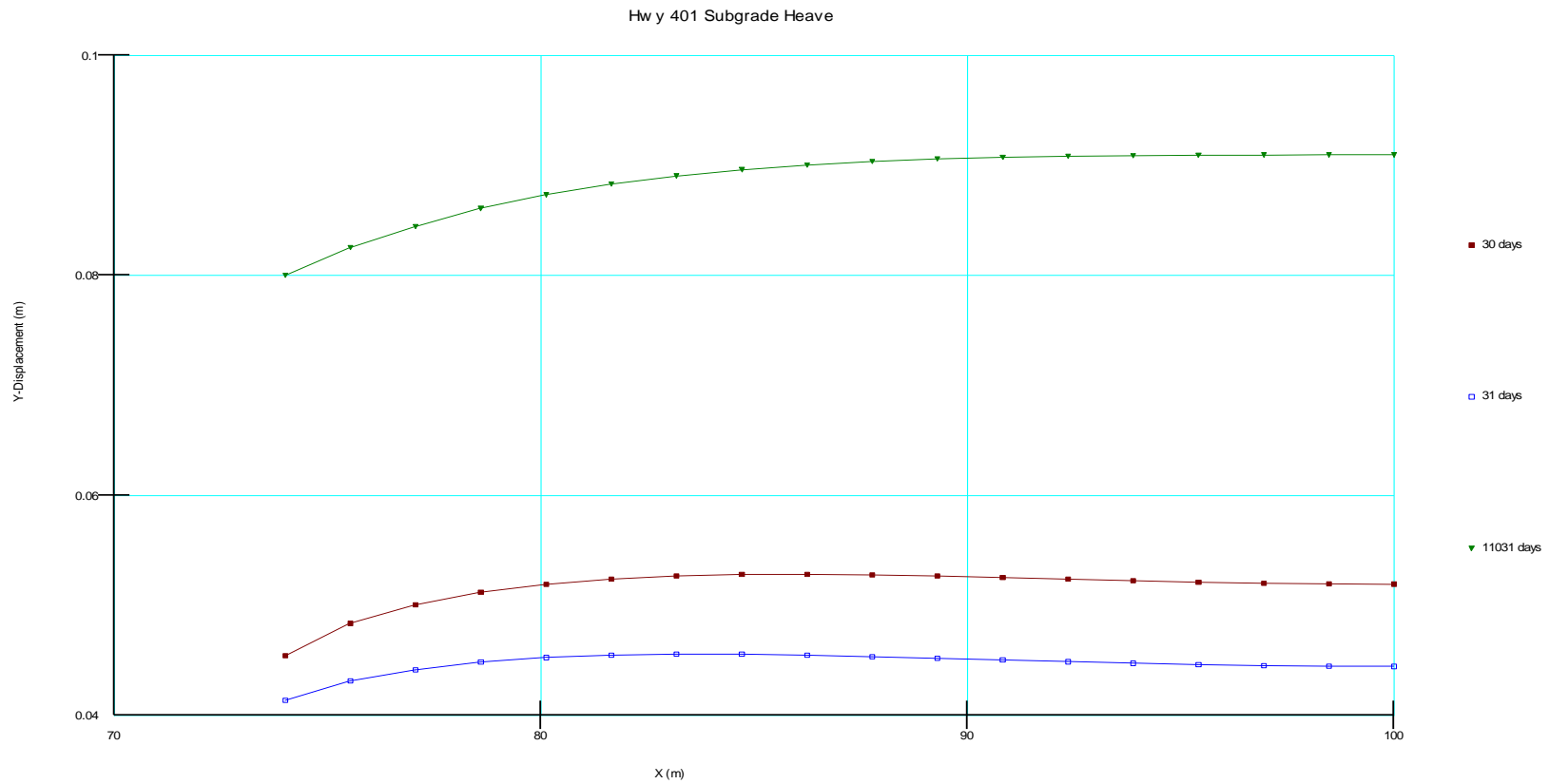
11/04/2011

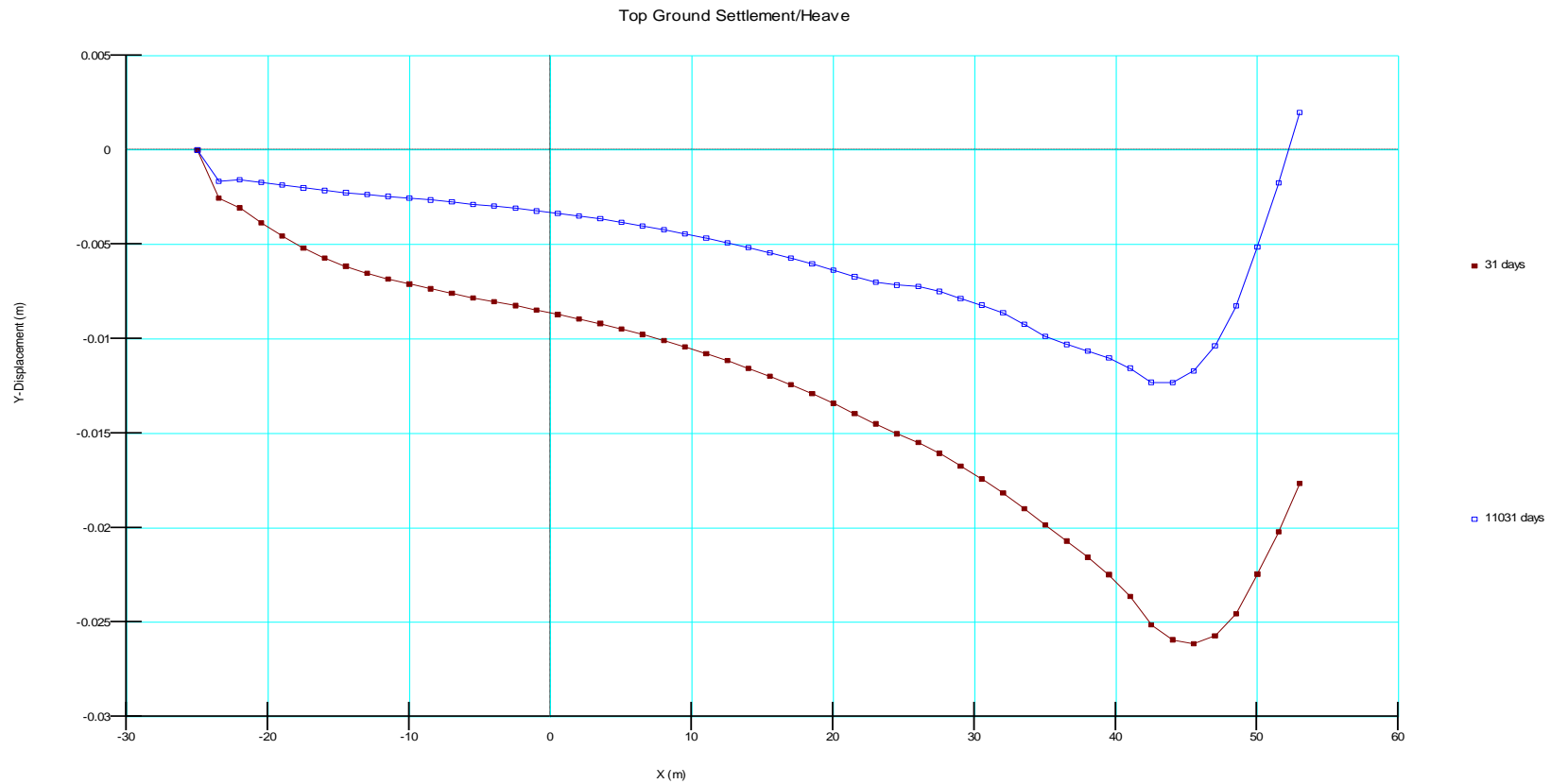
WEP SW8801.1002.101

Name: Clay Crust-Coupled Effective Young's Modulus (E'): 31000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Clay Transition-Coupled Effective Young's Modulus (E'): 19000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Upper Clay-Coupled (MCC) O.C. Ratio: 1.6 Poisson's Ratio: 0.35 Lambda: 0.071 Kappa: 0.0078 Initial Void Ratio: 0.54 Unit Weight: 20.5 kN/m³ Phi': 25 °
 Name: Mid Clay-Coupled (MCC) O.C. Ratio: 1.3 Poisson's Ratio: 0.35 Lambda: 0.101 Kappa: 0.0111 Initial Void Ratio: 0.76 Unit Weight: 20.5 kN/m³ Phi': 26 °
 Name: Lower Clay-Coupled Effective Young's Modulus (E'): 25500 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 20.5 kN/m³
 Name: Sand_LT Effective Young's Modulus (E'): 36000 kPa Poisson's Ratio: 0.35 Phi': 30 ° Unit Weight: 22 kN/m³
 Name: Pavement Young's Modulus (E): 54000 kPa Unit Weight: 15 kN/m³ Poisson's Ratio: 0.25

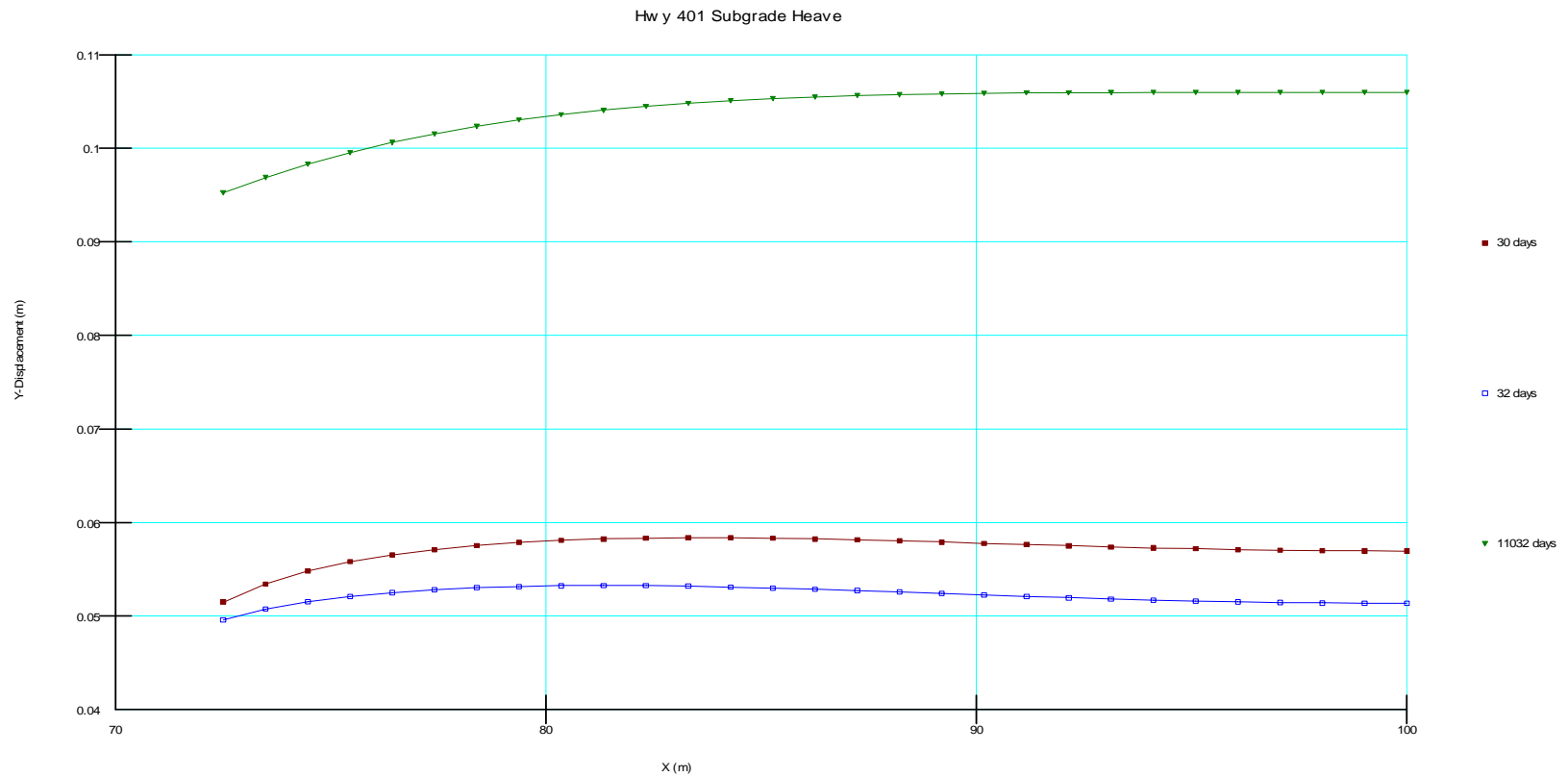


Legend:
 (-) Sign on Contourline = Horizontal Displacement opposite to Highway 401 Excavations
 No Sign on Contourline = Horizontal Displacement towards Highway 401 Excavations

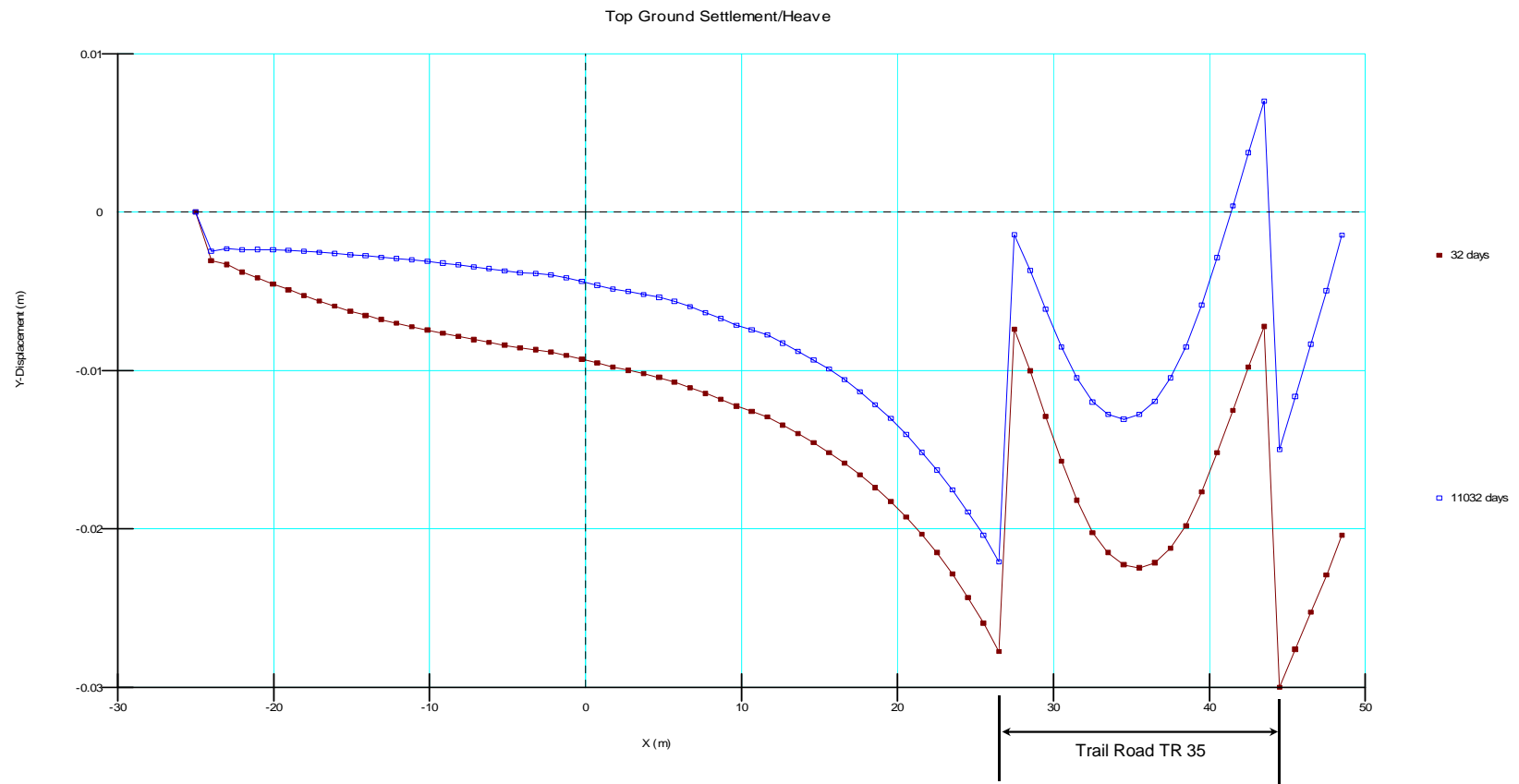


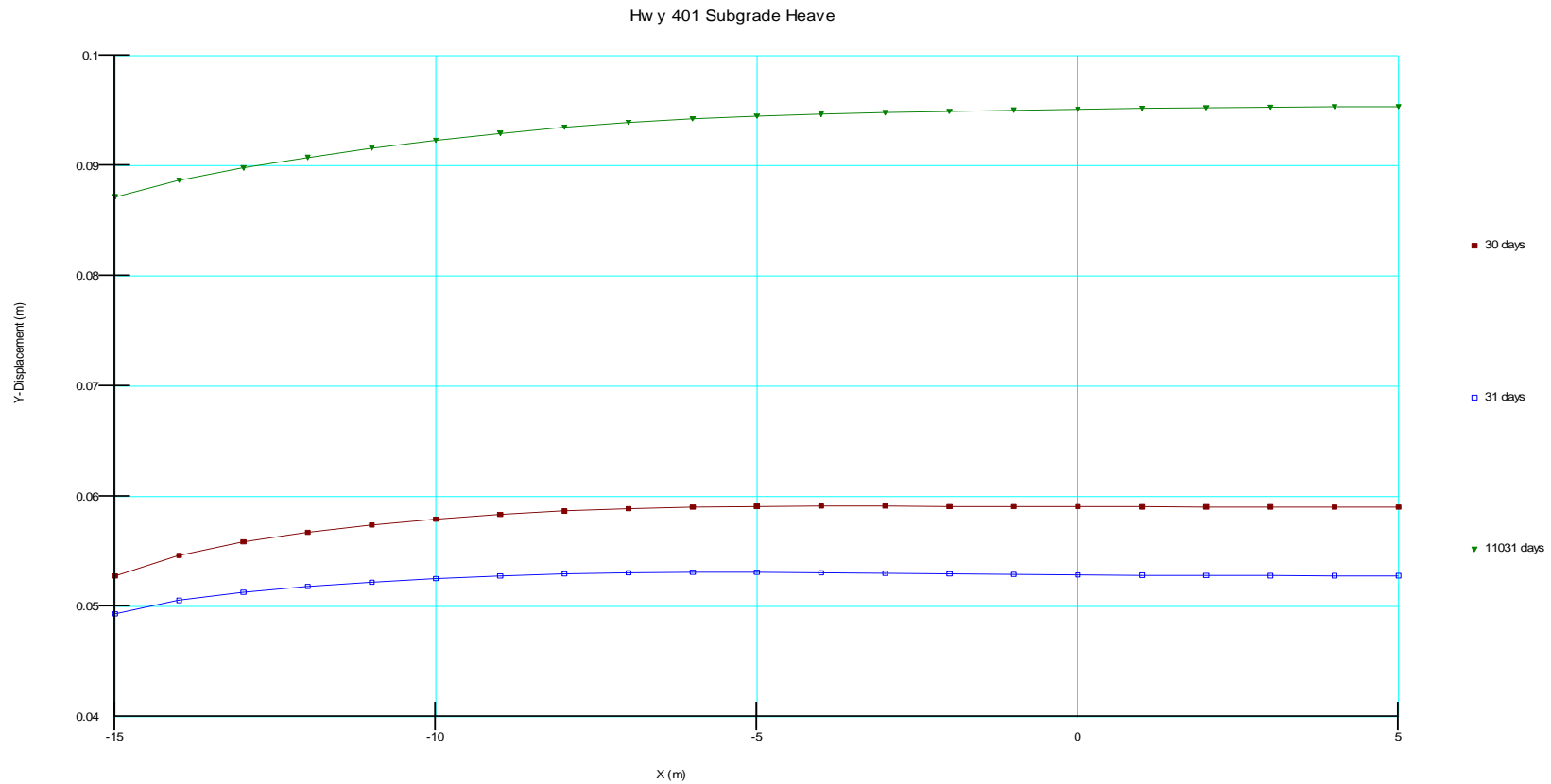


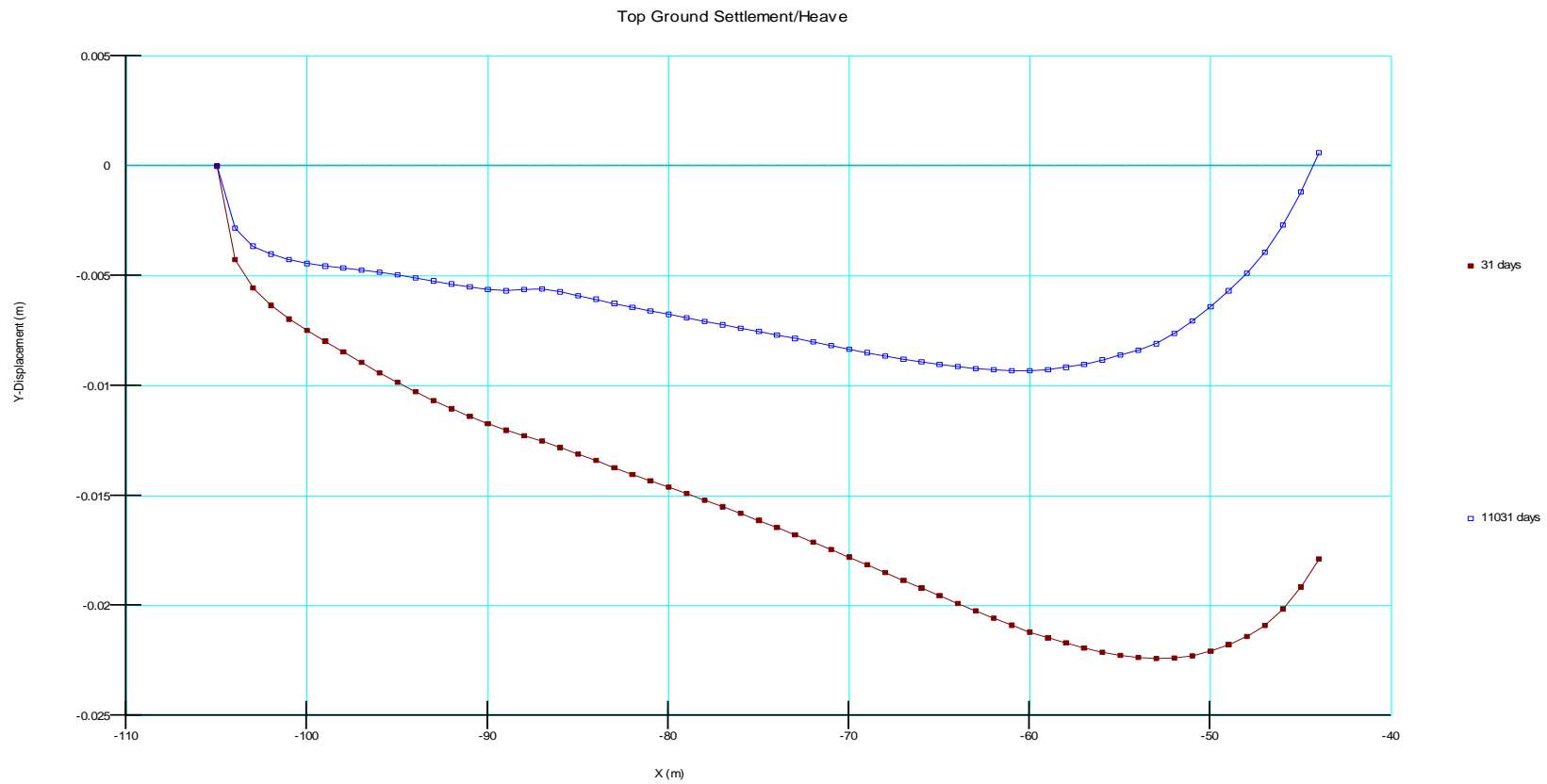
Legend:
 31 days = End of Construction
 11031 days = Long-term Condition



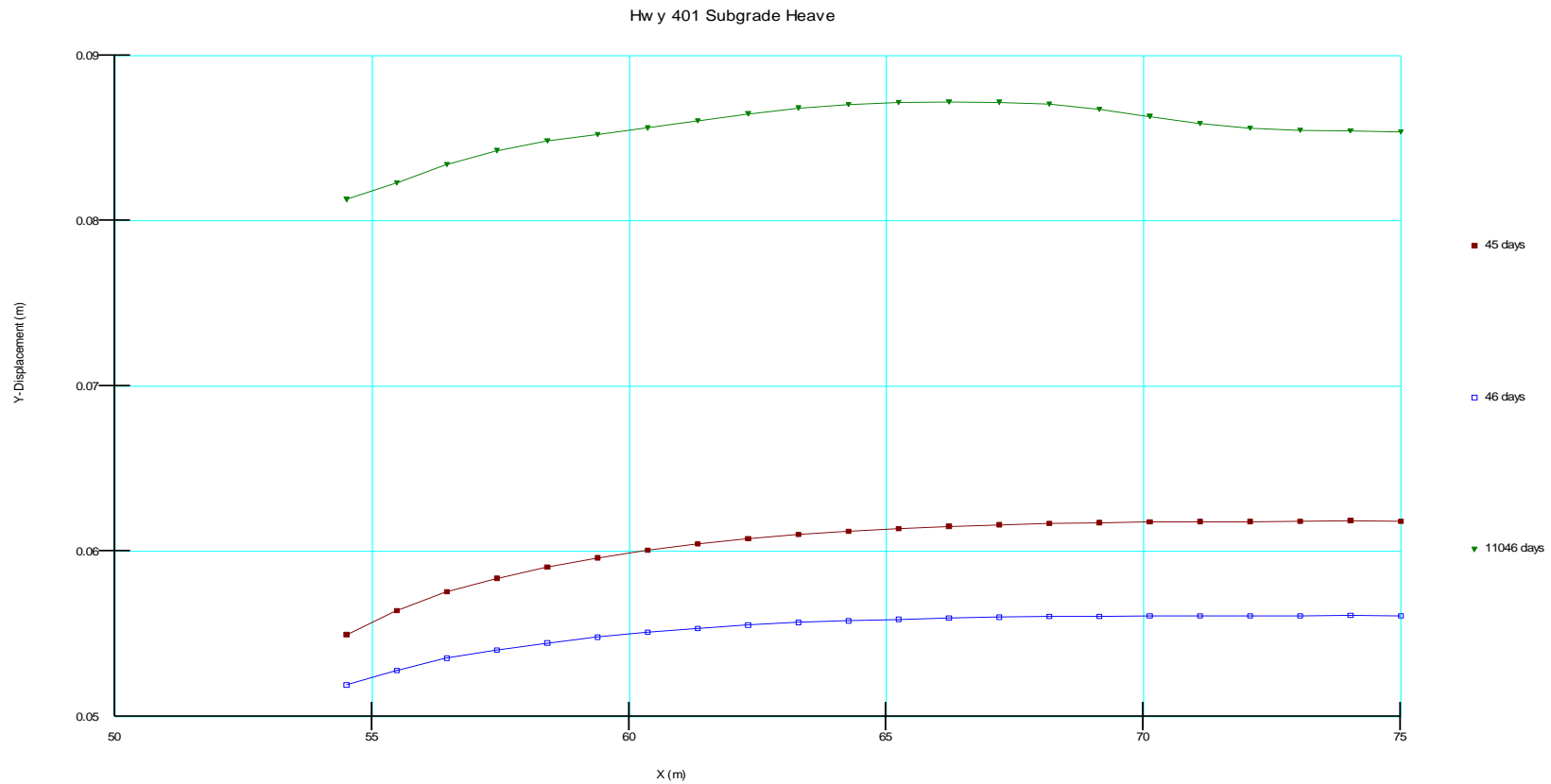
Legend:
 30 days = End of Excavation
 32 days = End of Construction
 11032 days = Long-term Condition



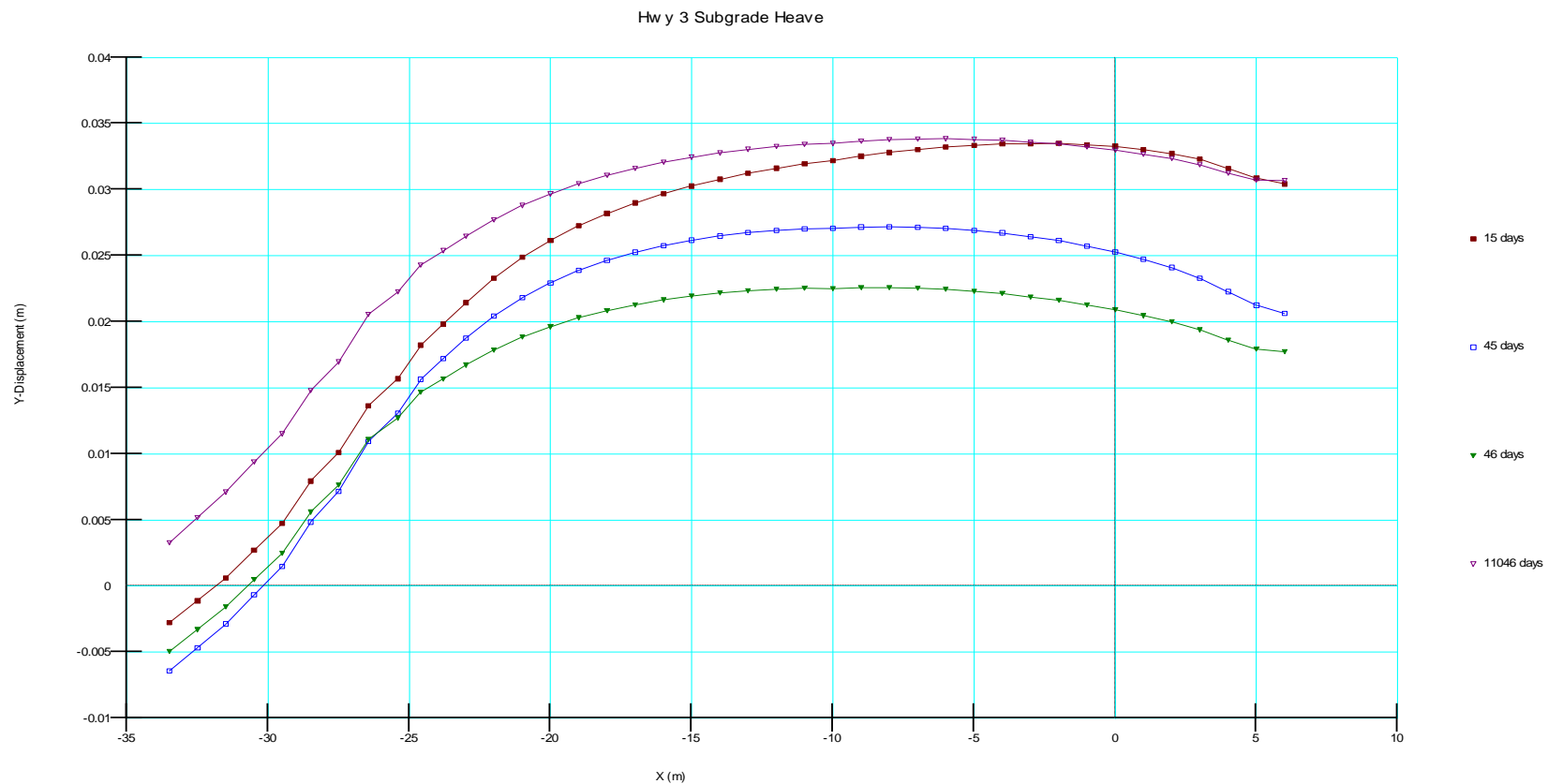




Legend:
 31 days = End of Construction
 11031 days = Long-term Condition

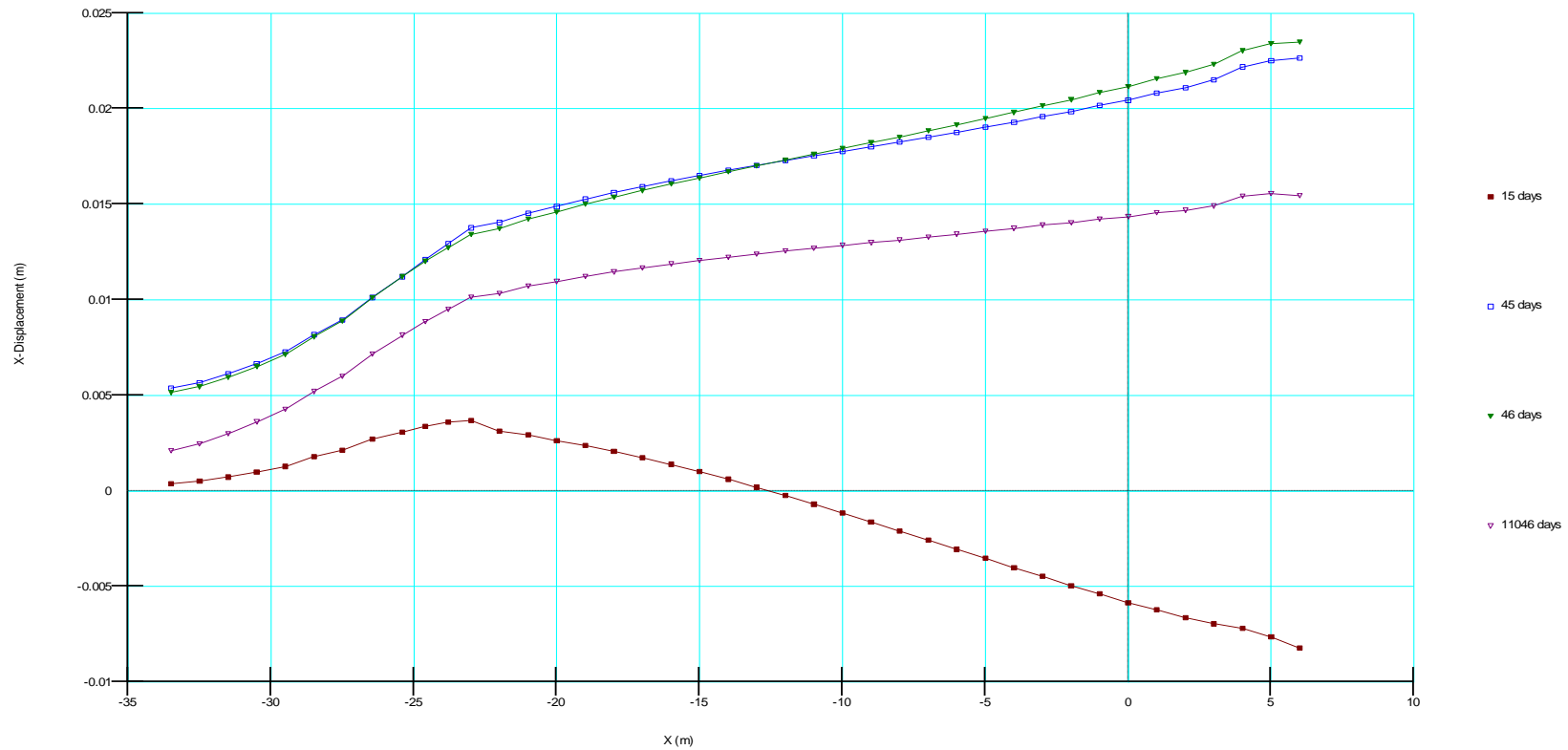


Legend:
 45 days = End of Excavation
 46 days = End of Construction
 11046 days = Long-term Condition



Legend:
 15 days = End of Excavation for Hwy 3
 45 days = End of Excavation for Highway 401
 46 days = End of Construction
 11046 days = Long-term Condition

Lateral Displacement at Hwy 3 Subgrade



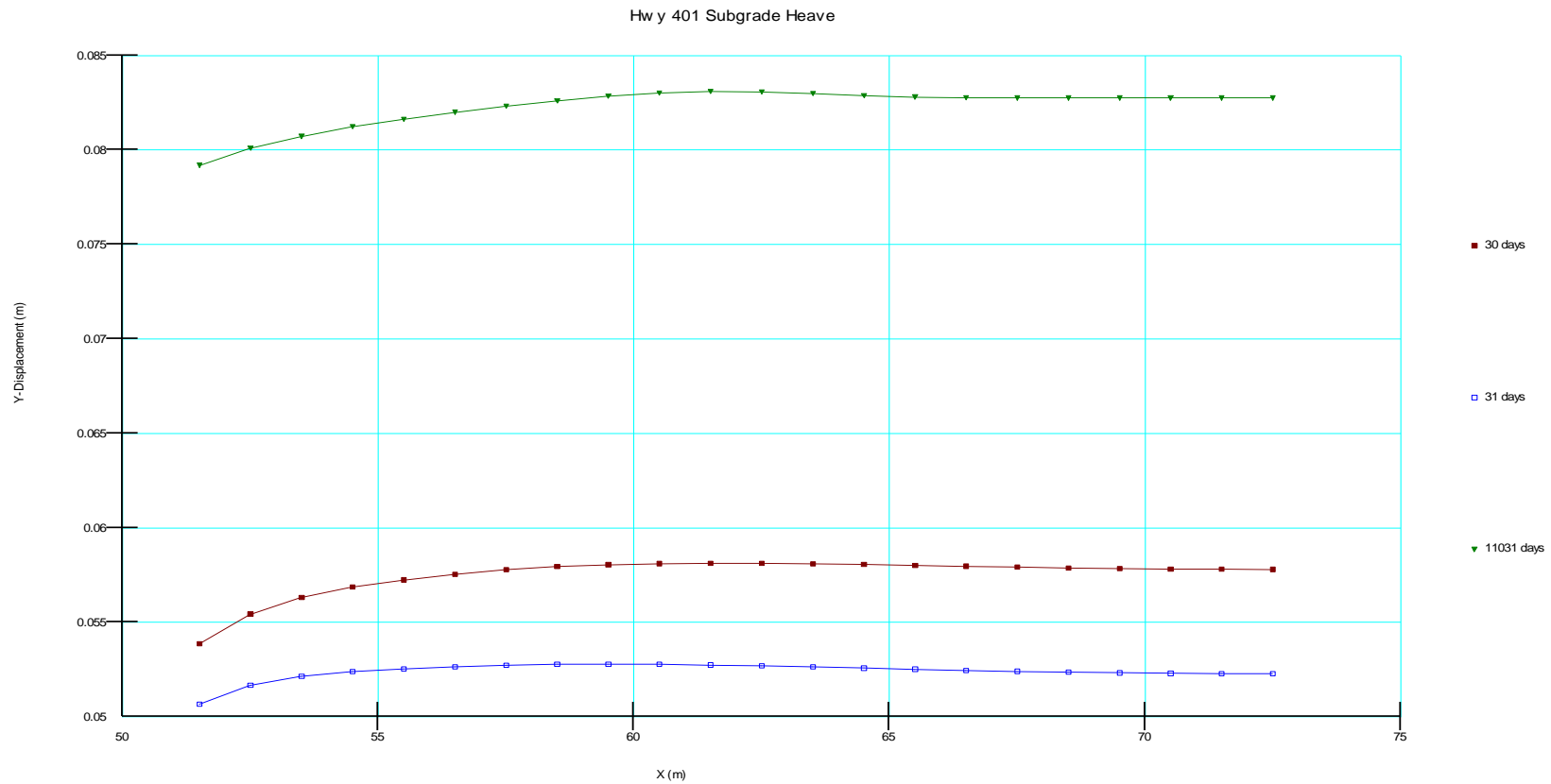
Legend:

15 days = End of Excavation for Hwy 3

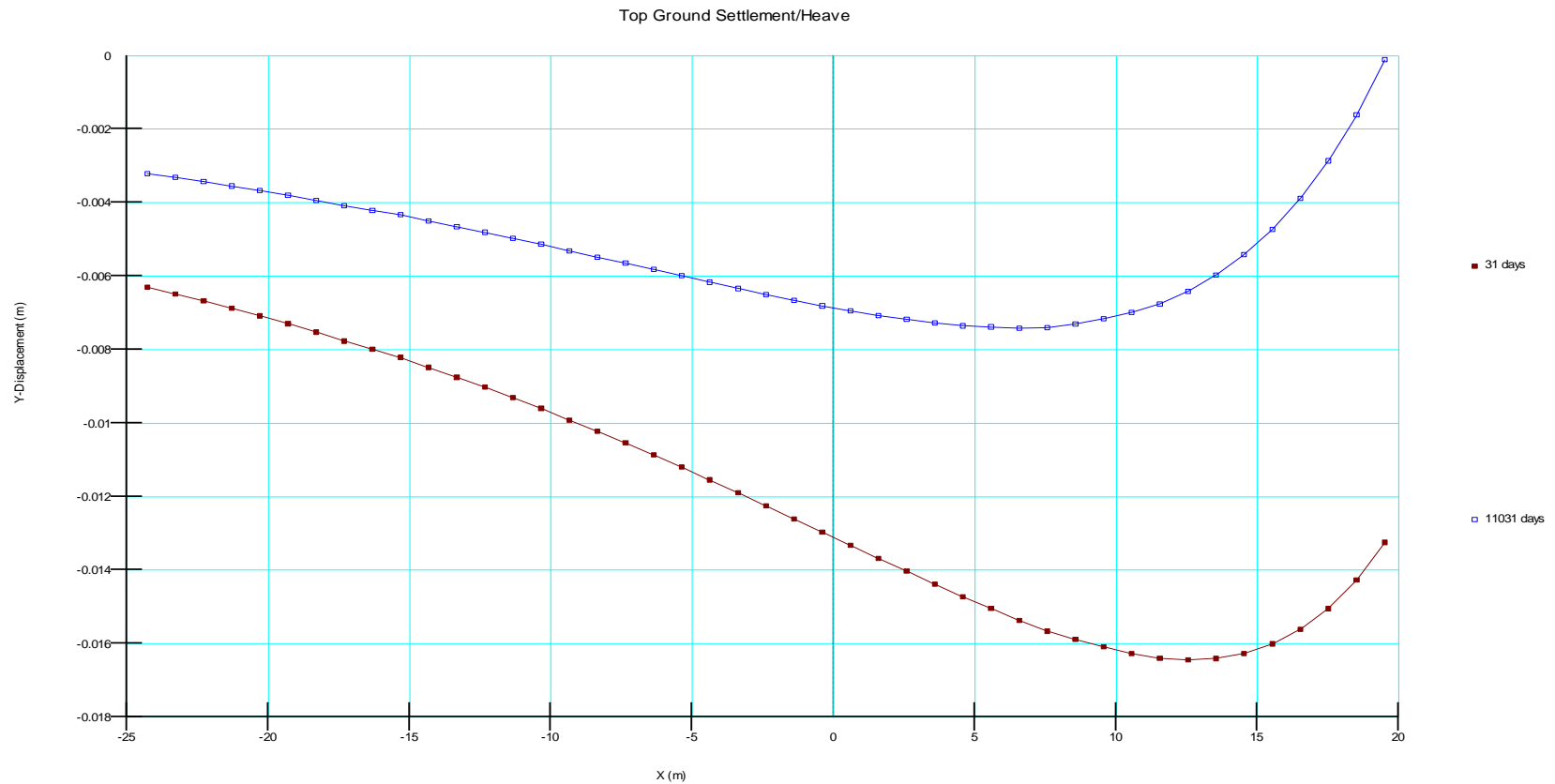
45 days = End of Excavation for Highway 401

46 days = End of Construction

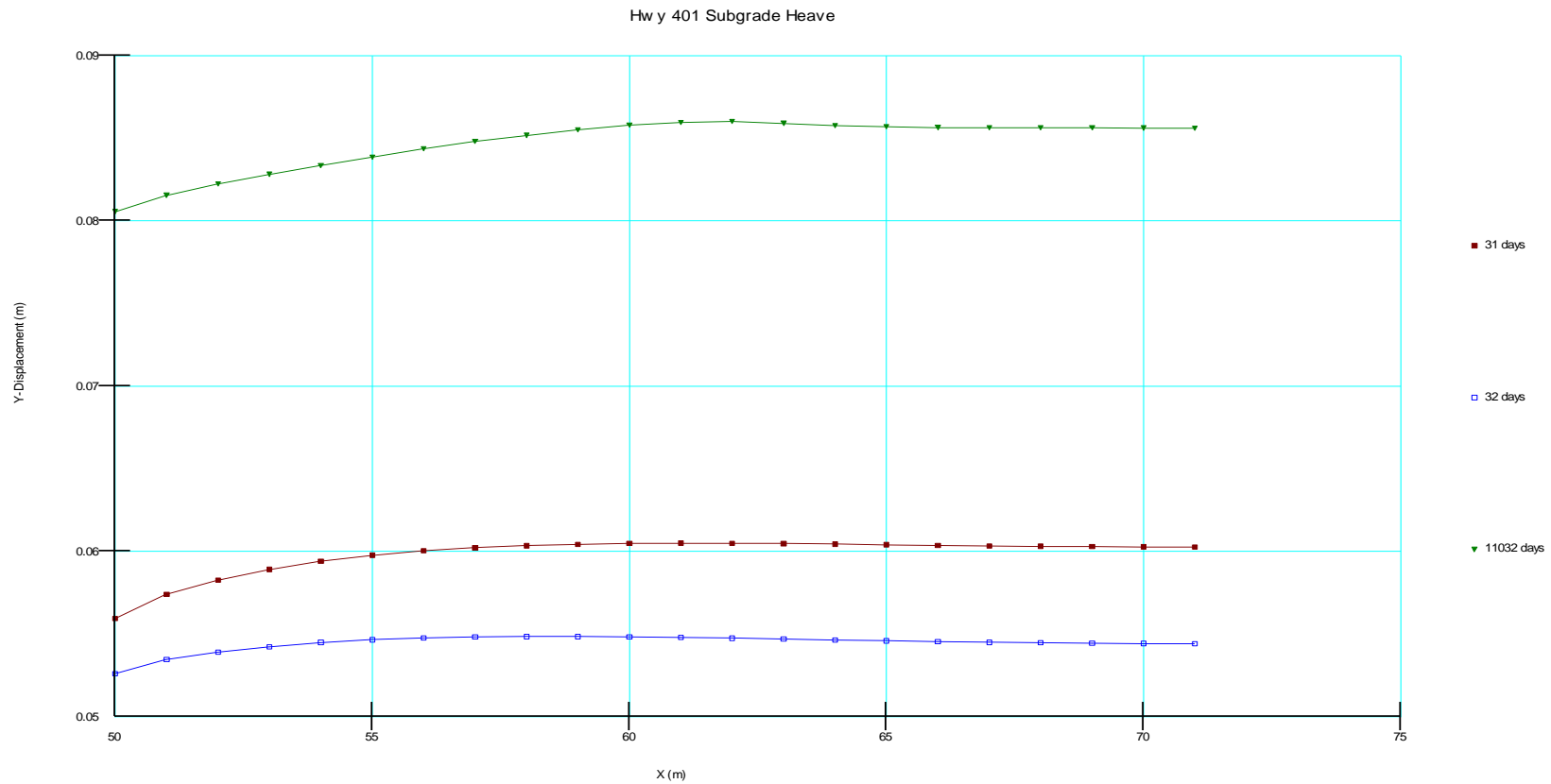
11046 days = Long-term Condition

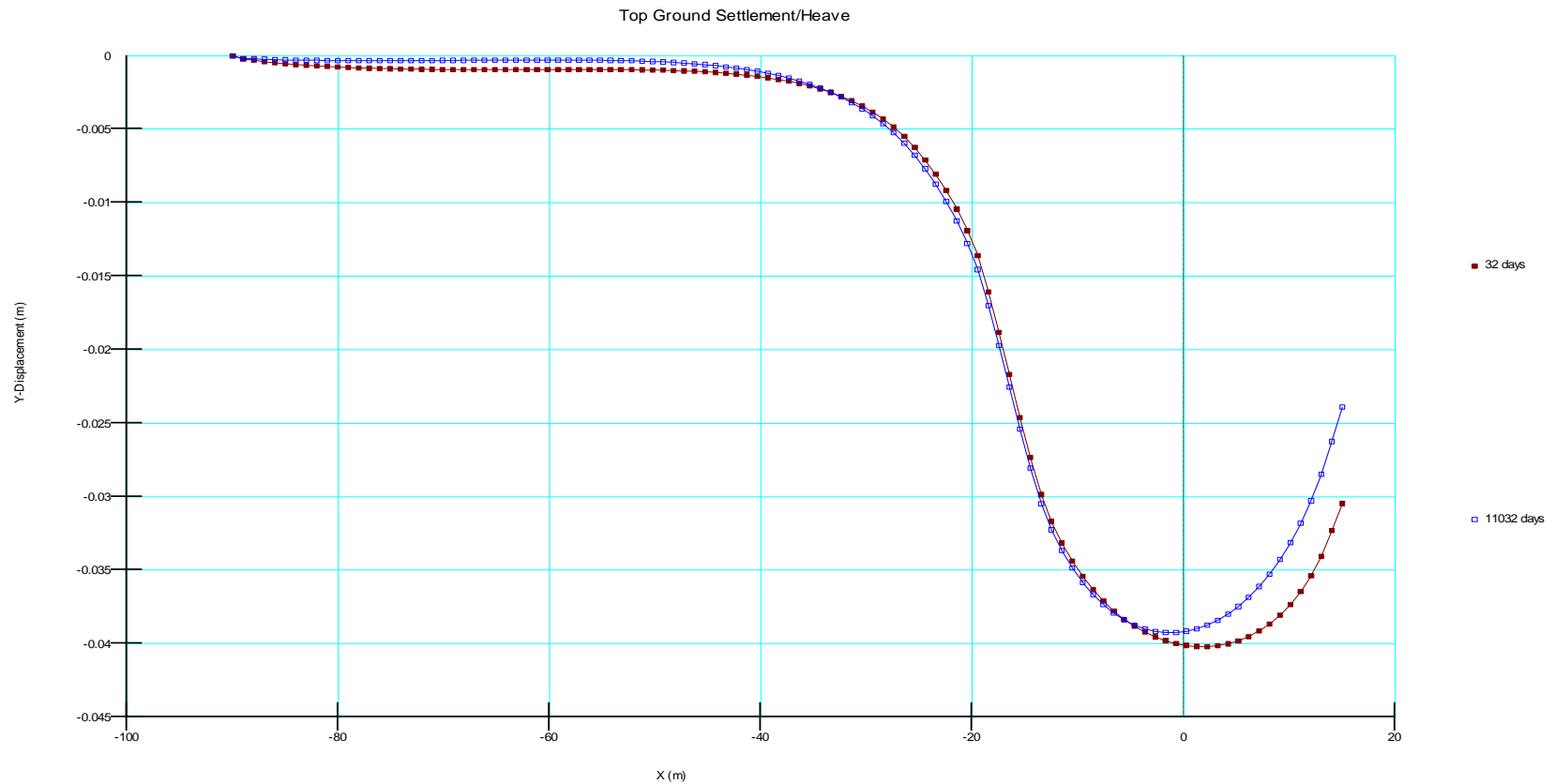


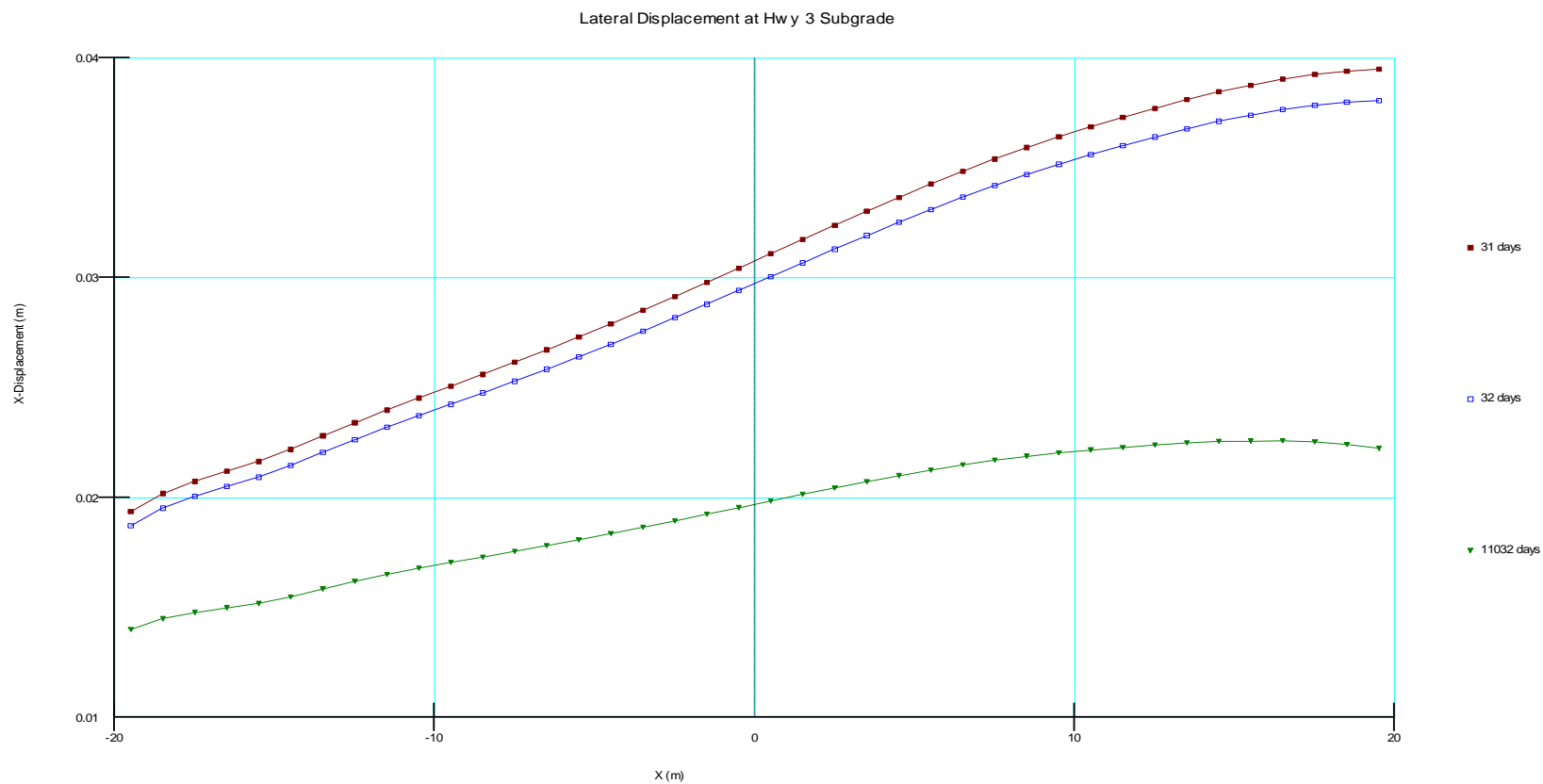
Legend:
 30 days = End of Excavation
 31 days = End of Construction
 11031 days = Long-term Condition

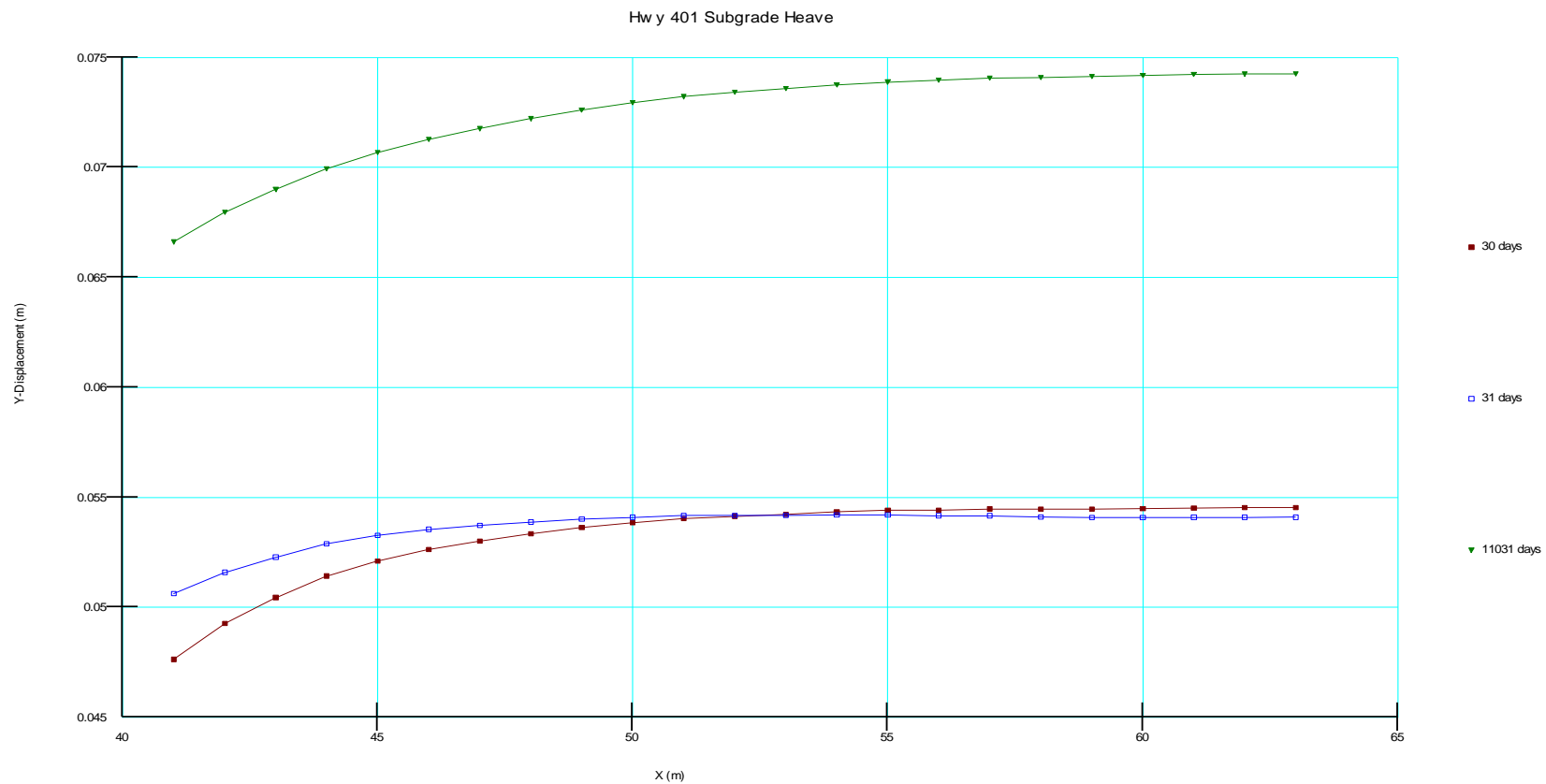


Legend:
 31 days = End of Construction
 11031 days = Long-term Condition

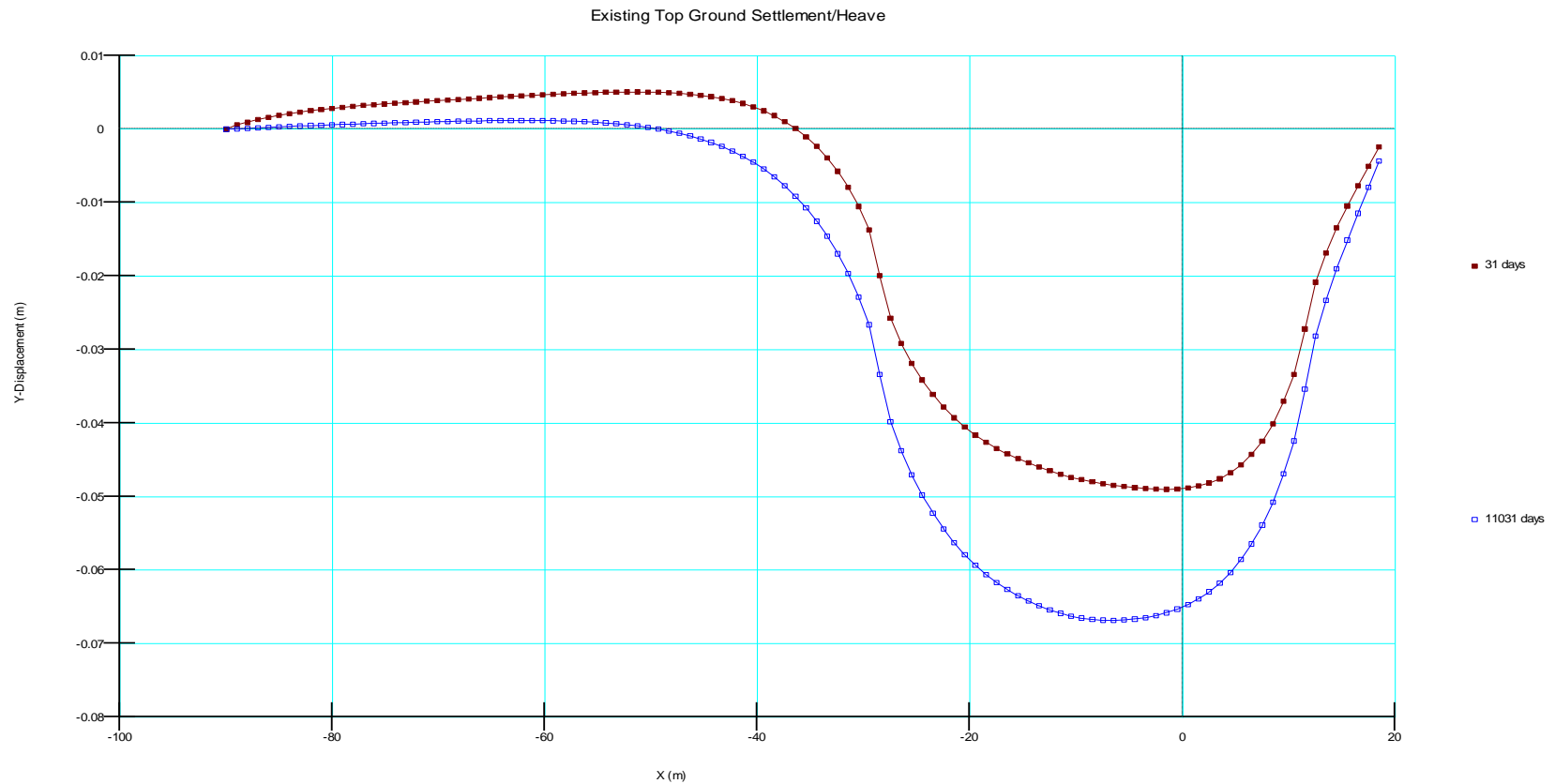








Legend:
 30 days = End of Excavation
 31 days = End of Construction
 11031 days = Long-term Condition



Legend:
 31 days = End of Construction
 11031 days = Long-term Condition

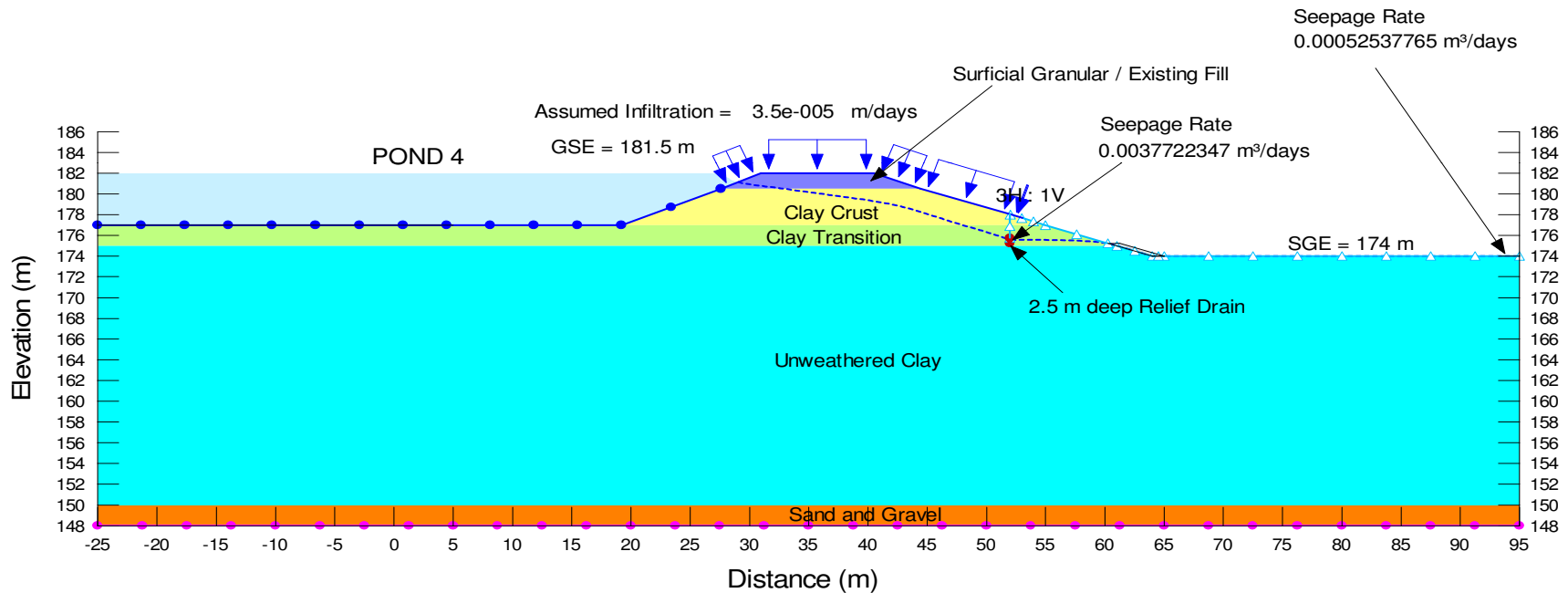
Appendix I Groundwater Seepage Analyses

Station 10+300L-7m H-Right Side-Seep.gsz

11/08/2011

WEP SW8801.1002.101

Name: Clay Crust K-Sat: 0.00059 m/days K-Ratio: 2
 Name: Clay Transition K-Sat: 0.005 m/days K-Ratio: 1
 Name: Sand and Gravel K-Sat: 0.01 m/days K-Ratio: 1
 Name: Rip Rap K-Sat: 0 m/days K-Ratio: 1
 Name: Unweathered Clay K-Sat: 9.2e-005 m/days K-Ratio: 0.5
 Name: Surficial Granular / Existing Fill K-Sat: 0.005 m/days K-Ratio: 2

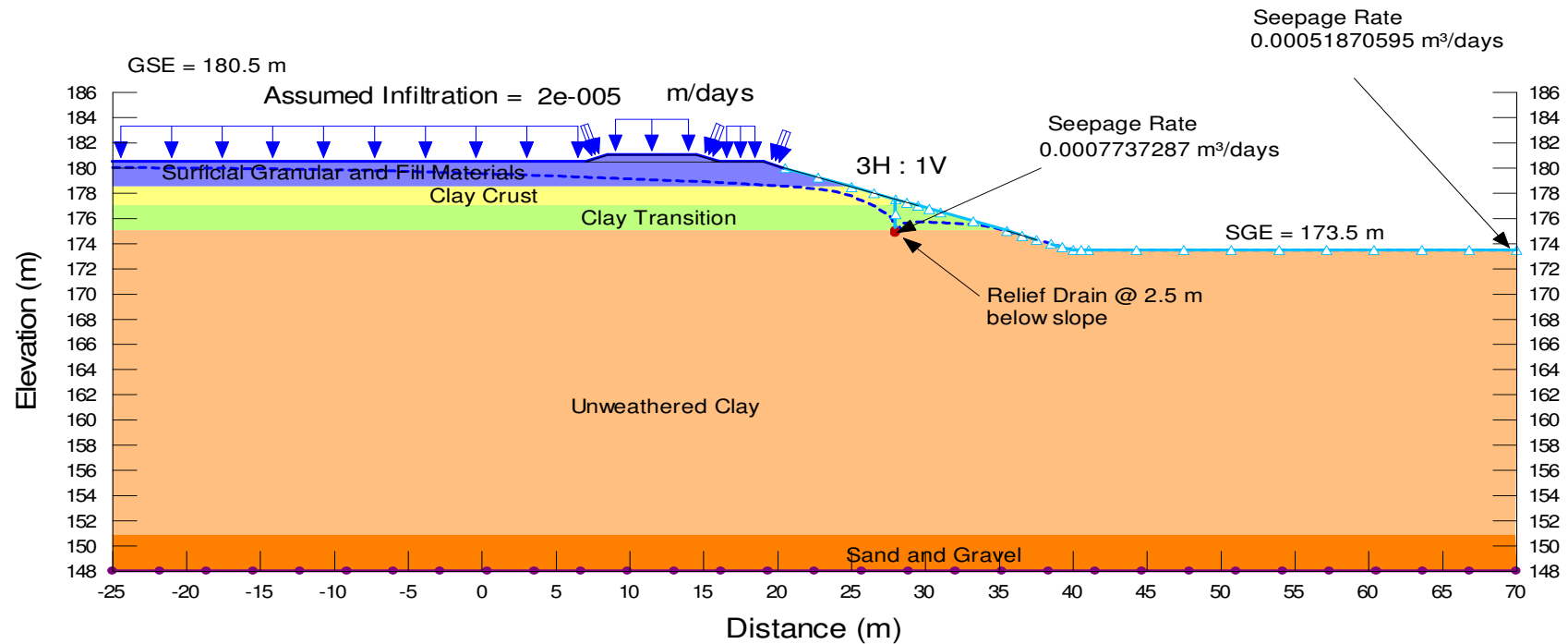


Station 10+425L-6.5m H-Right Side-Seep.gsz

11/08/2011

WEP SW8801.1002.101

Name: Clay Crust K-Sat: 0.00059 m/days K-Ratio: 2
 Name: Clay Transition K-Sat: 0.000341 m/days K-Ratio: 1
 Name: Sand and Gravel K-Sat: 0.01 m/days K-Ratio: 1
 Name: Unweathered Clay K-Sat: 9.2e-005 m/days K-Ratio: 0.5
 Name: Surficial Granular and Fill Materials K-Sat: 0.005 m/days K-Ratio: 2

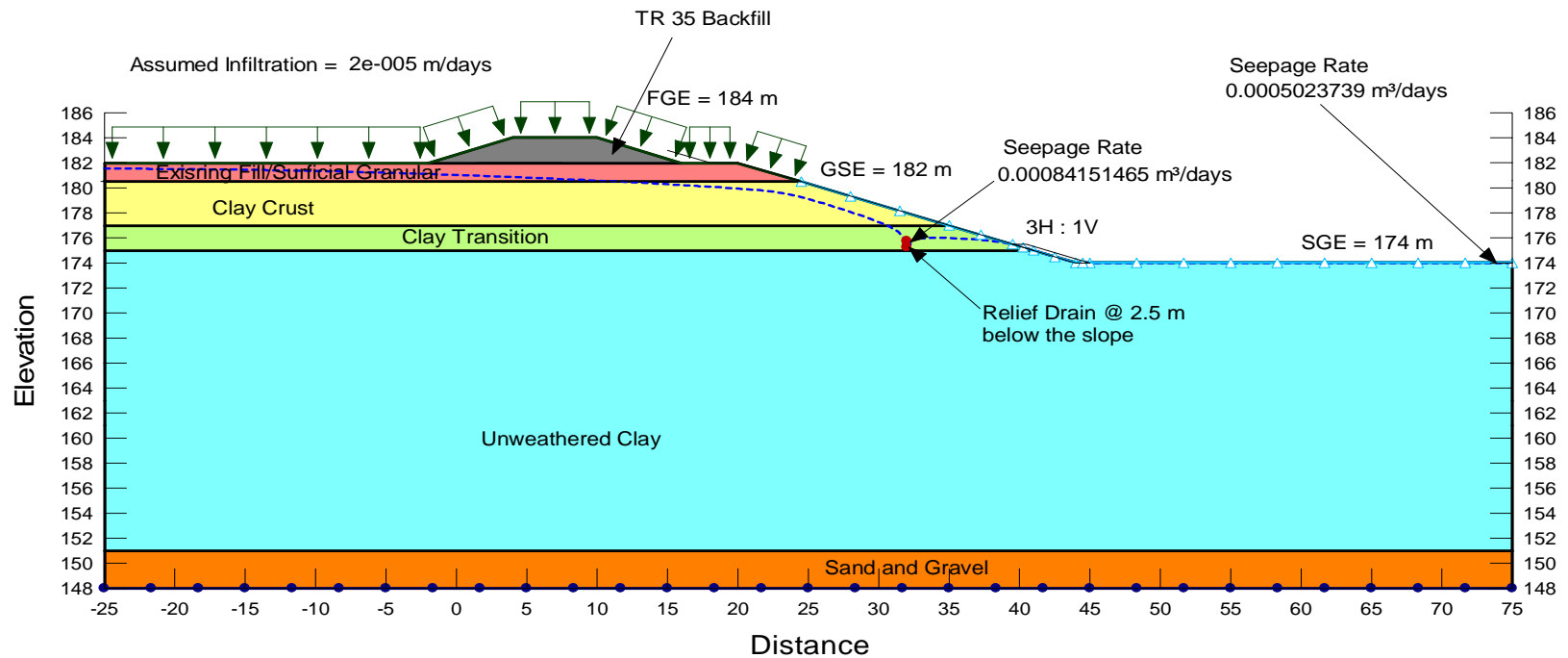


Station 10+725L-9m H-Right Side-Seep.gsz

08/07/2012

WEP SW8801.1002.101

Name: Clay Crust K-Sat: 0.00059 m/days K-Ratio: 2
 Name: Clay Transition K-Sat: 0.000341 m/days K-Ratio: 1
 Name: Unweathered Clay K-Sat: 9.2e-005 m/days K-Ratio: 0.5
 Name: Existing Fill/Surficial Granular K-Sat: 0.005 m/days K-Ratio: 1
 Name: Sand and Gravel K-Sat: 0.01 m/days K-Ratio: 1
 Name: TR 35 Backfill K-Sat: 0.000341 m/days K-Ratio: 1

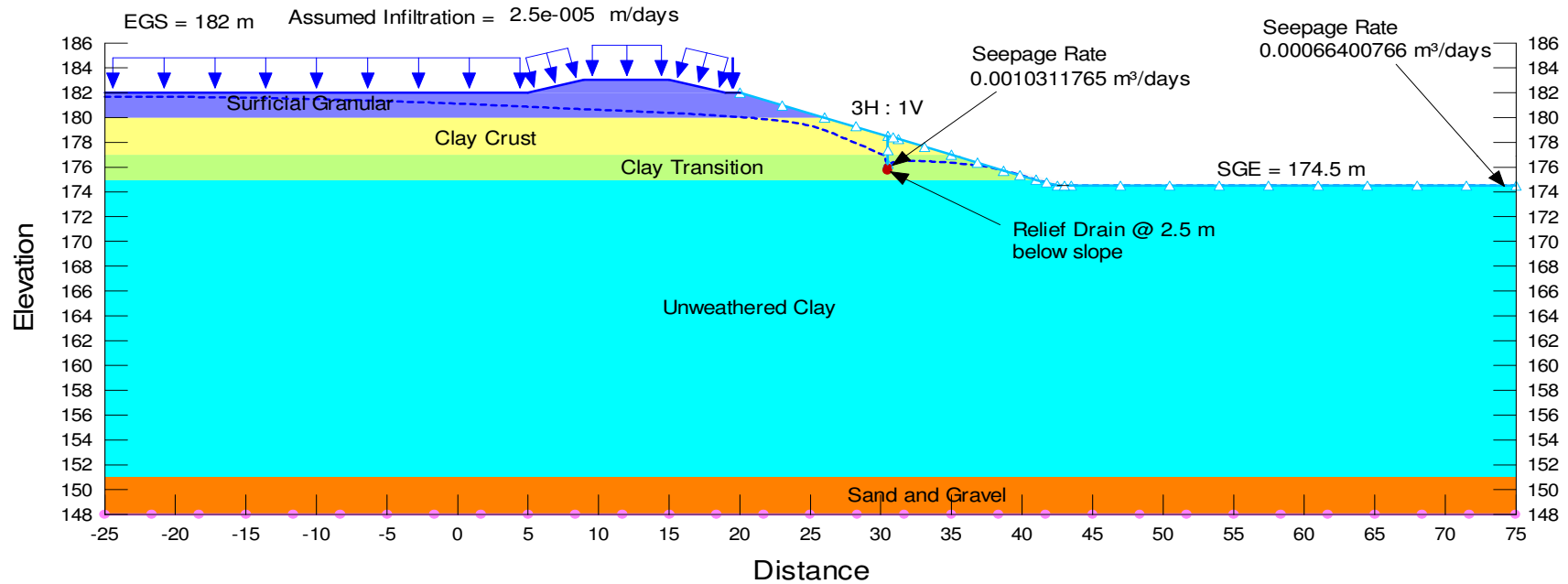


Station 10+775L-7.5m H-Right Side-Seep.gsz

11/08/2011

WEP SW8801.1002.101

Name: Clay Crust K-Sat: 0.00059 m/days K-Ratio: 2
 Name: Clay Transition K-Sat: 0.000341 m/days K-Ratio: 1
 Name: Sand and Gravel K-Sat: 0.01 m/days K-Ratio: 1
 Name: Unweathered Clay K-Sat: 9.2e-005 m/days K-Ratio: 0.5
 Name: Surficial Granular K-Sat: 0.005 m/days K-Ratio: 2

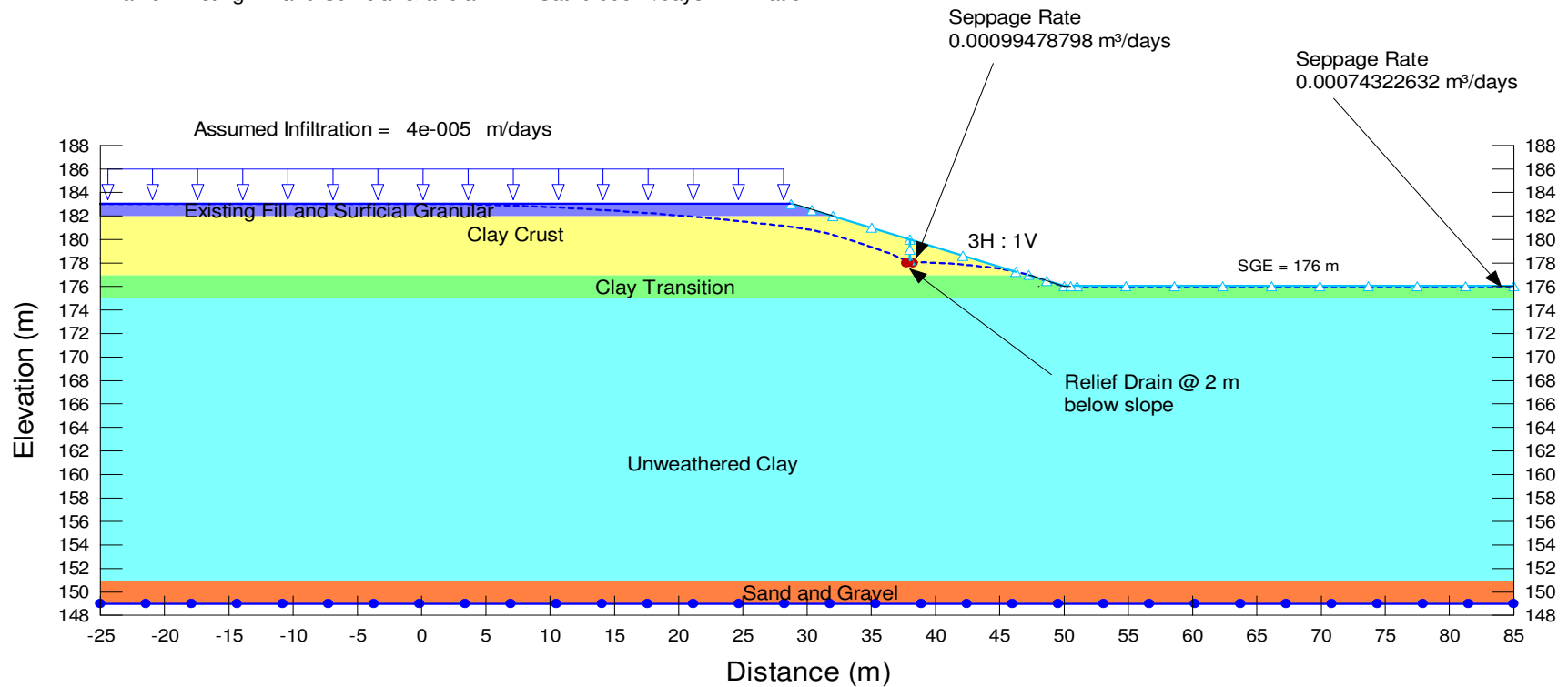


Station 11+000L-Right Side-7m H-Seep.gsz

11/08/2011

WEP SW8801.1002.101

Name: Clay Crust K-Sat: 0.00059 m/days K-Ratio: 2
 Name: Sand and Gravel K-Sat: 0.01 m/days K-Ratio: 1
 Name: Clay Transition K-Sat: 0.000341 m/days K-Ratio: 1
 Name: Unweathered Clay K-Sat: 9.2e-005 m/days K-Ratio: 0.5
 Name: Existing Fill and Surficial Granular K-Sat: 0.005 m/days K-Ratio: 2

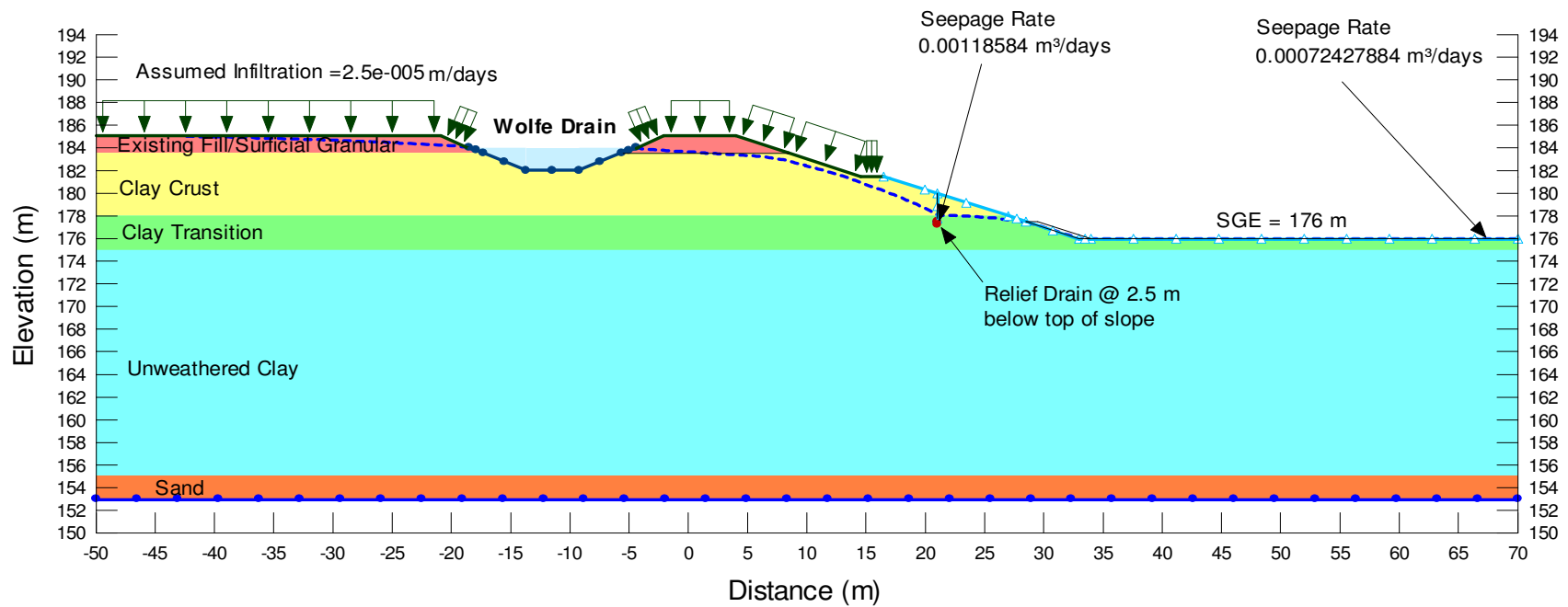


Station 12+475L-8m H-Left Side-Seep.gsz

11/08/2011

WEP SW8801.1002.101

Name: Clay Crust K-Sat: 0.00059 m/days K-Ratio: 2
 Name: Clay Transition K-Sat: 0.000341 m/days K-Ratio: 1
 Name: Unweathered Clay K-Sat: 9.2e-005 m/days K-Ratio: 0.5
 Name: Sand K-Sat: 0.01 m/days K-Ratio: 1
 Name: Existing Fill/Surficial Granular K-Sat: 0.005 m/days K-Ratio: 2

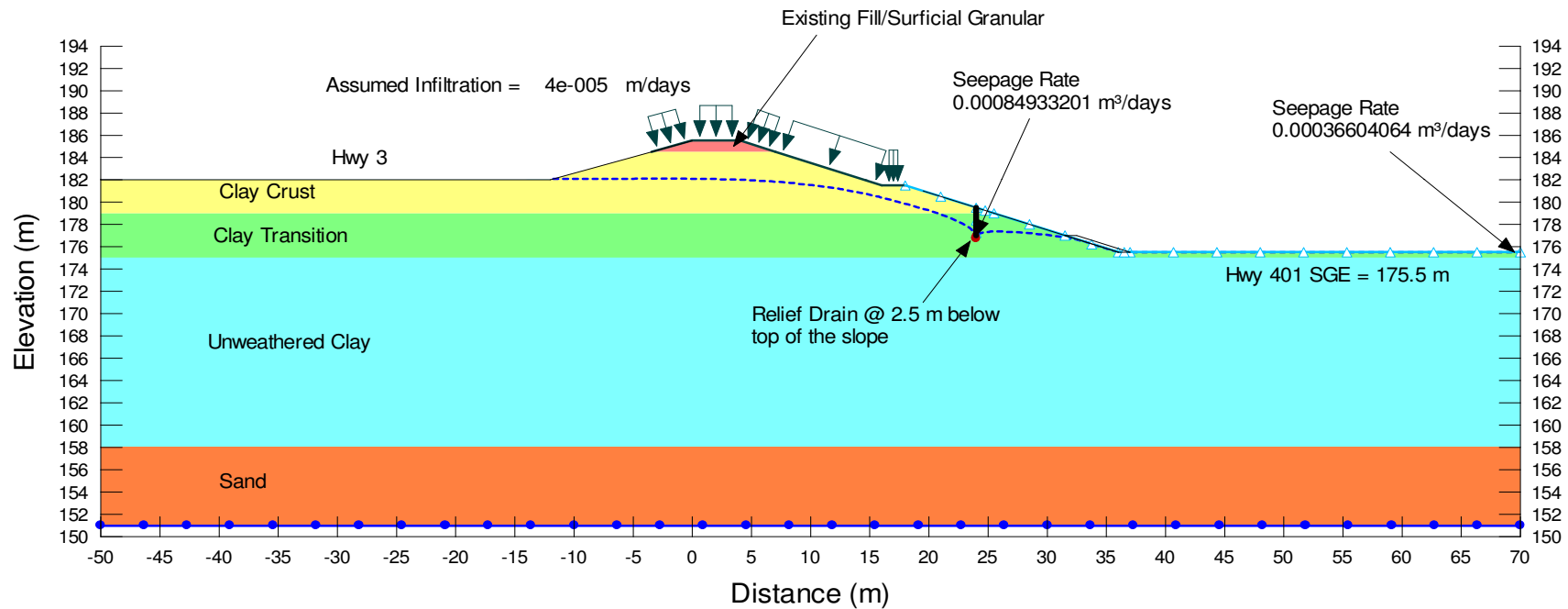


Station 12+900 L-9m H-Right Side-Seep.gsz

11/08/2011

WEP SW8801.1002.101

Name: Clay Crust K-Sat: 0.00059 m/days K-Ratio: 2
 Name: Clay Transition K-Sat: 0.000341 m/days K-Ratio: 1
 Name: Sand K-Sat: 0.01 m/days K-Ratio: 1
 Name: Unweathered Clay K-Sat: 9.2e-005 m/days K-Ratio: 0.5
 Name: Existing Fill/Surficial Granular K-Sat: 0.005 m/days K-Ratio: 2

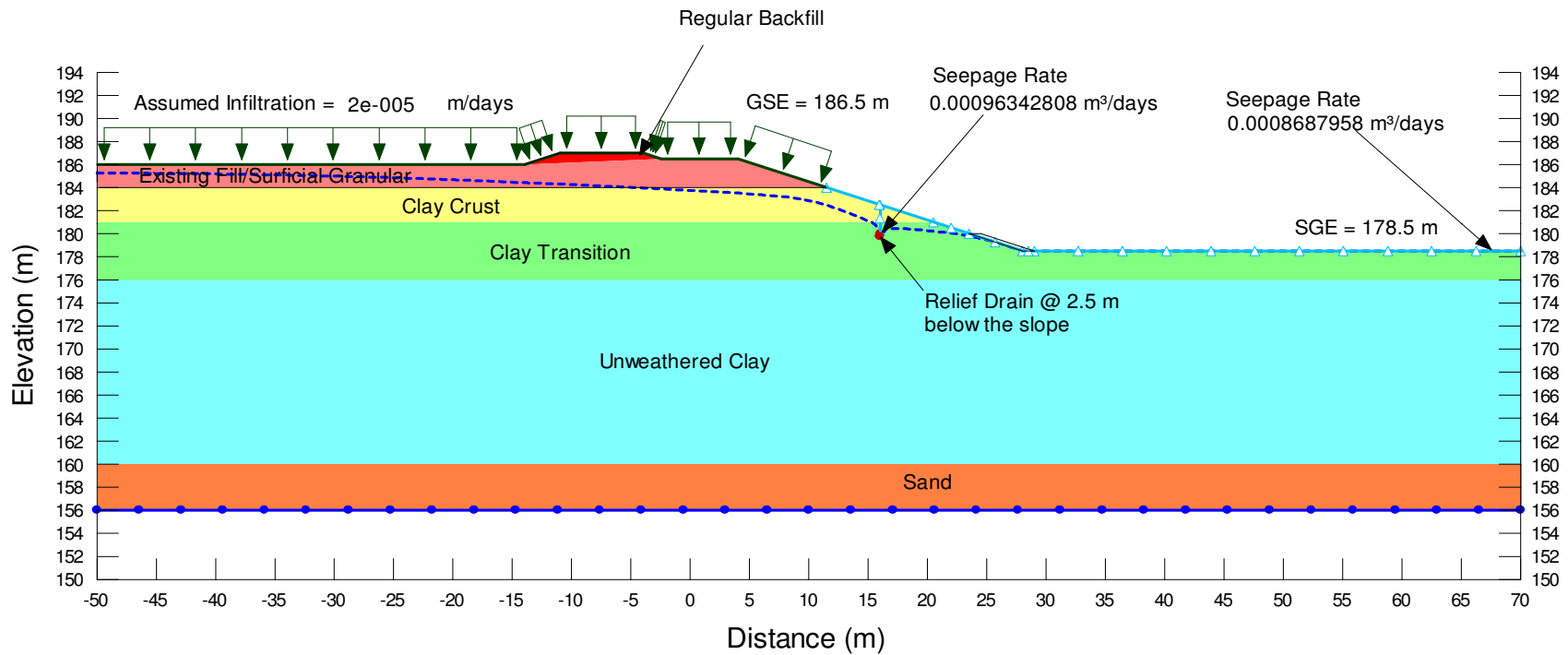


Station 13+720L - 7.5 m H-Right Side-Seep.gsz

11/15/2011

WEP SW8801.1002.101

Name: Clay Crust K-Sat: 0.00059 m/days K-Ratio: 2
 Name: Clay Transition K-Sat: 0.000341 m/days K-Ratio: 1
 Name: Unweathered Clay K-Sat: 9.2e-005 m/days K-Ratio: 0.5
 Name: Existing Fill/Surficial Granular K-Sat: 0.005 m/days K-Ratio: 1
 Name: Sand K-Sat: 0.01 m/days K-Ratio: 1
 Name: Regular Backfill K-Sat: 0.000341 m/days K-Ratio: 1

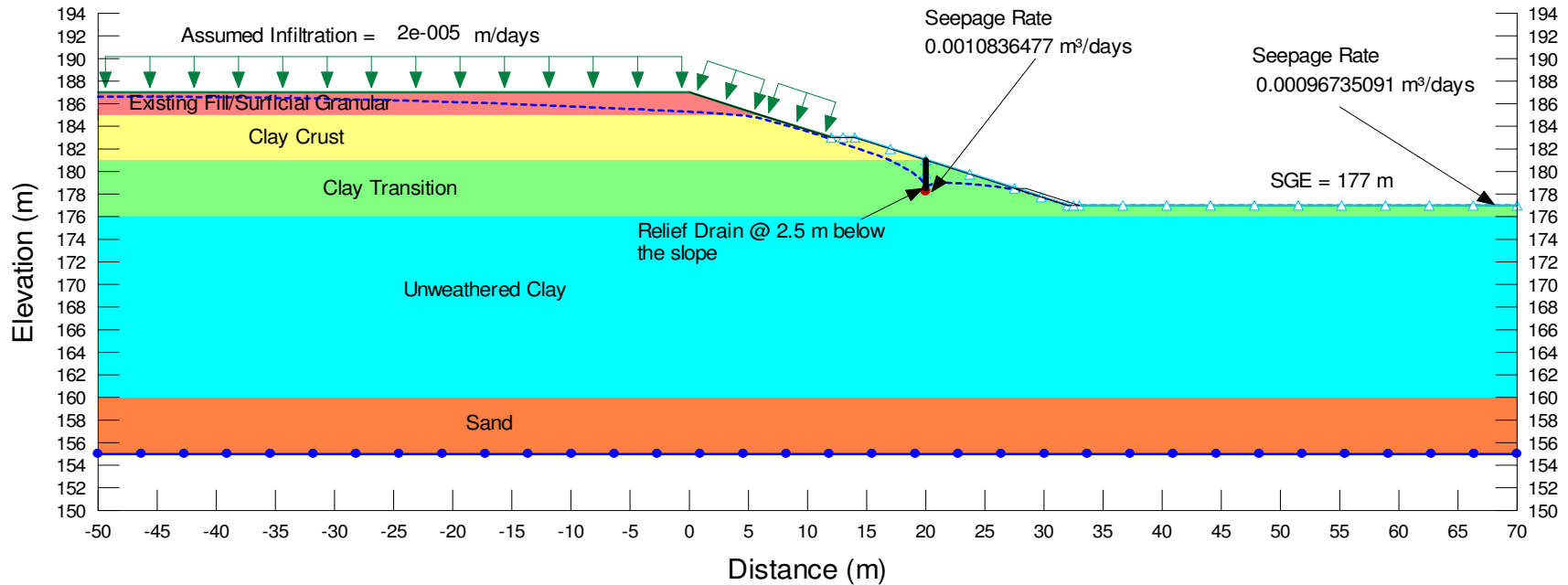


Station 10+050T-9m H-Left Side-Seep.gsz

11/08/2011

WEP SW8801.1002.101

Name: Clay Crust K-Sat: 0.00059 m/days K-Ratio: 2
 Name: Clay Transition K-Sat: 0.000341 m/days K-Ratio: 1
 Name: Sand K-Sat: 0.01 m/days K-Ratio: 1
 Name: Unweathered Clay K-Sat: 9.2e-005 m/days K-Ratio: 0.5
 Name: Existing Fill/Surficial Granular K-Sat: 0.005 m/days K-Ratio: 2

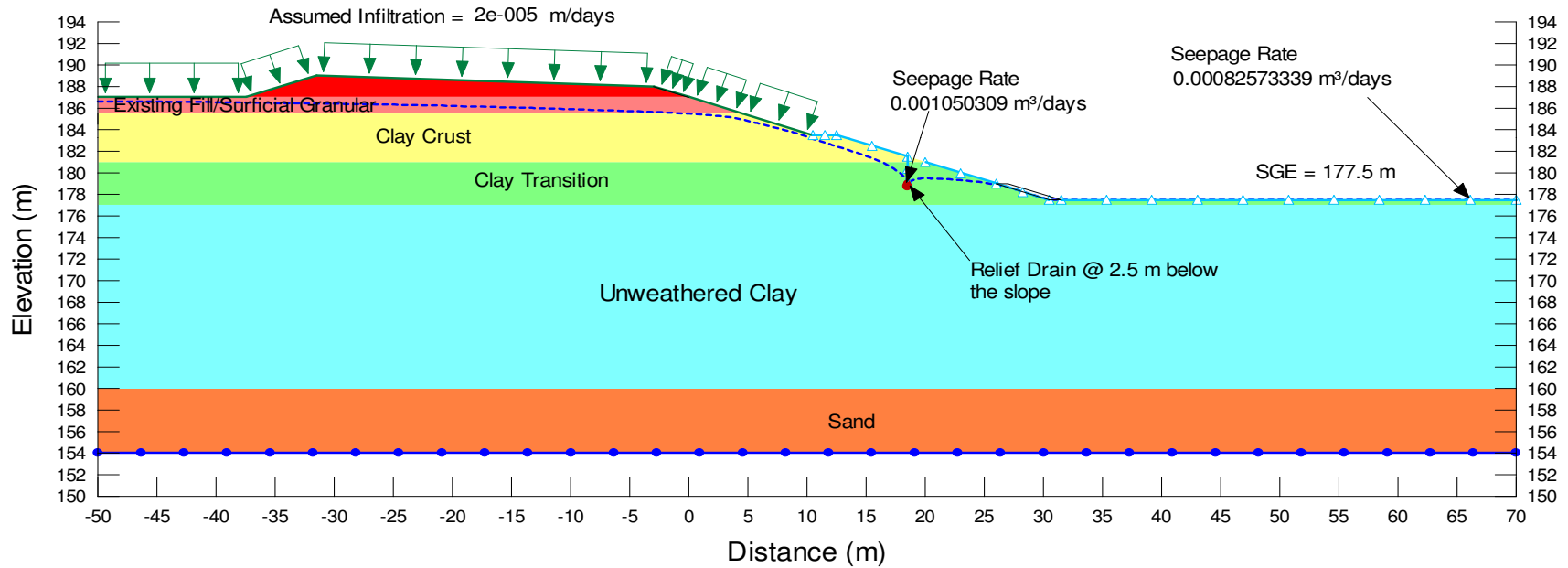


Station 10+225T-9.5m H-Left Side-Seep.gsz

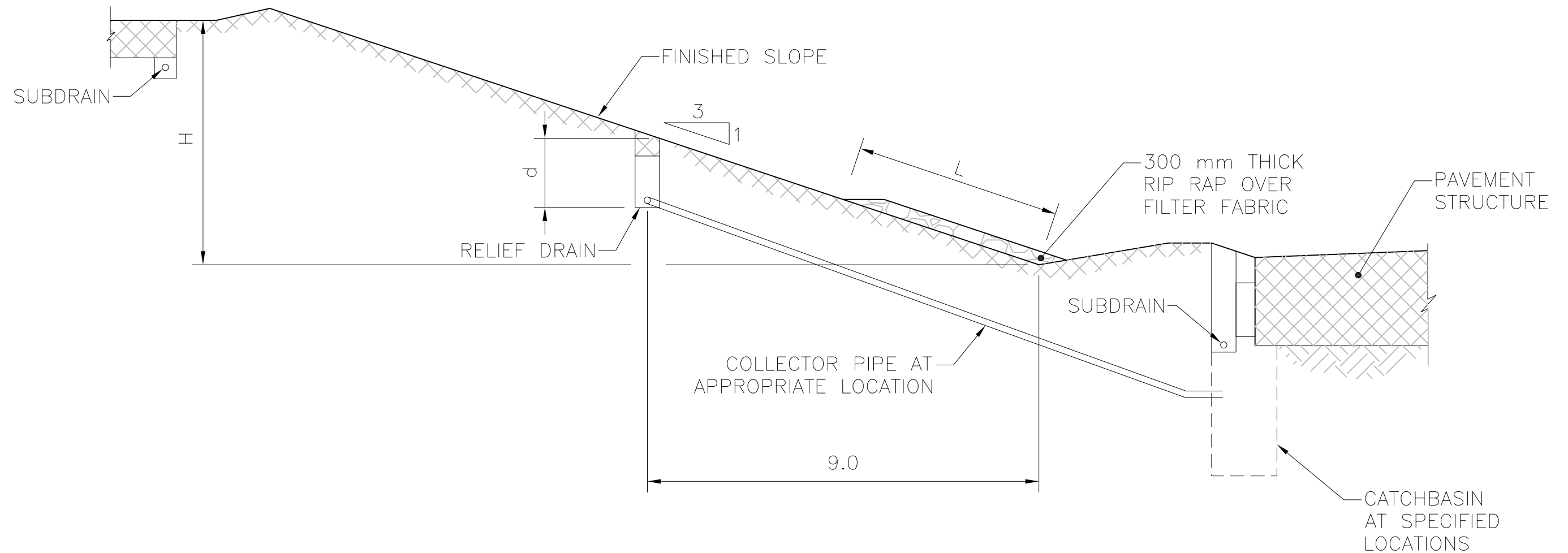
11/08/2011

WEP SW8801.1002.101

Name: Clay Crust K-Sat: 0.00059 m/days K-Ratio: 2
 Name: Clay Transition K-Sat: 0.000341 m/days K-Ratio: 1
 Name: Sand K-Sat: 0.01 m/days K-Ratio: 1
 Name: Regular Backfill K-Sat: 0.005 m/days K-Ratio: 2
 Name: Unweathered Clay K-Sat: 9.2e-005 m/days K-Ratio: 0.5
 Name: Existing Fill/Surficial Granular K-Sat: 0.005 m/days K-Ratio: 2



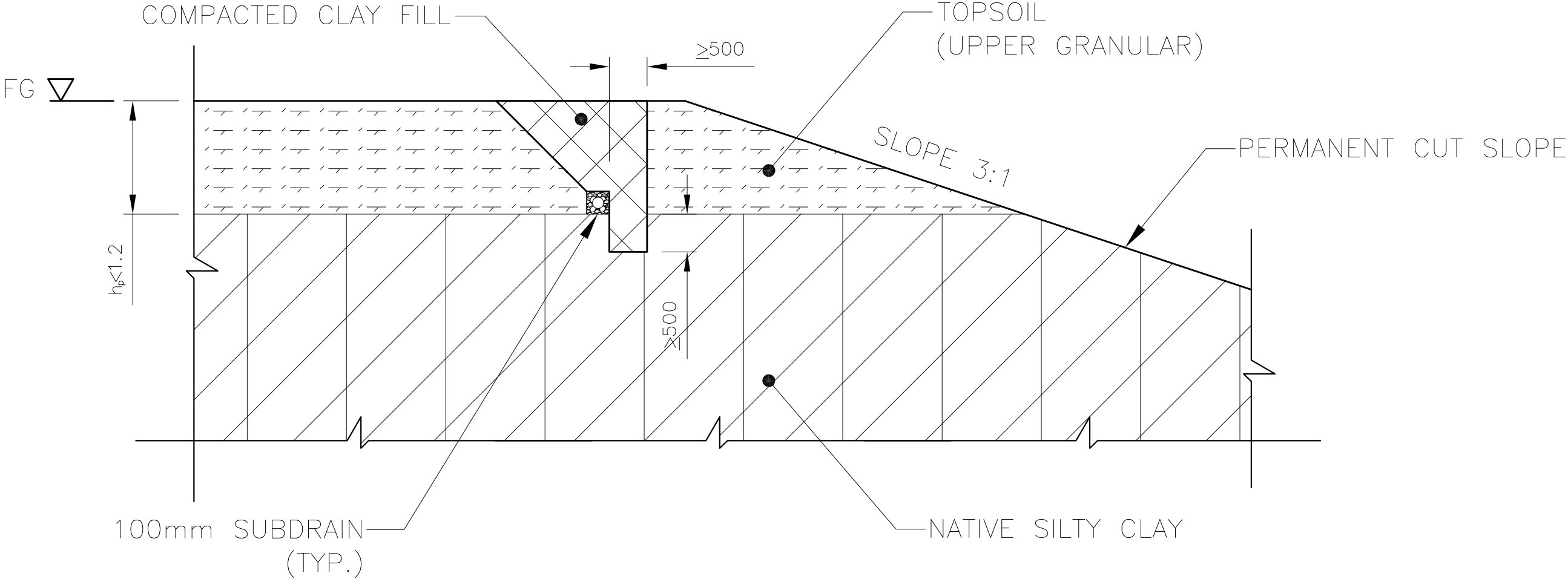
Appendix J Schematic Layout of the Permanent Subdrainage System



SCHEMATIC LAYOUT OF RELIEF DRAINAGE
AND RIP RAP PROTECTION FOR
PERMANENT CUTS AT 3H:1V

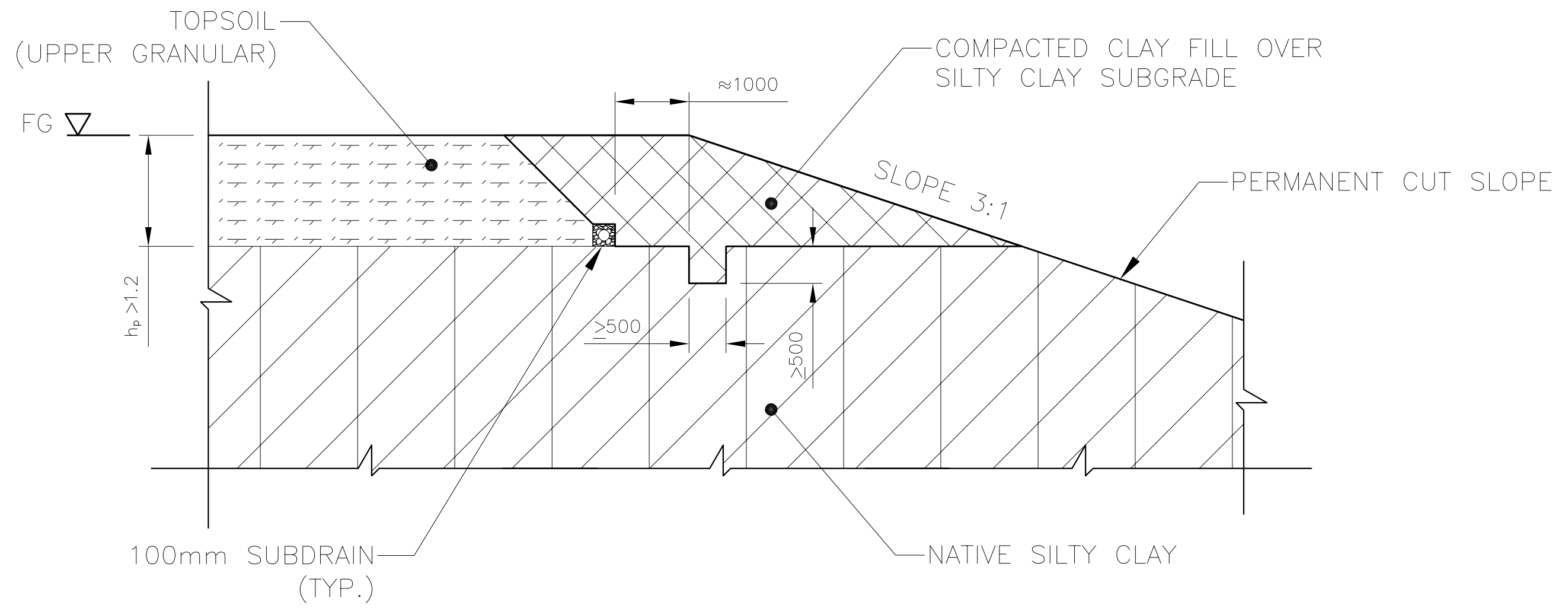
NOT TO SCALE

PERCHED GROUNDWATER CUTOFF (TYPICAL DETAIL FOR $h_p < 1.2\text{m}$)



NOT TO SCALE

PERCHED GROUNDWATER CUTOFF (TYPICAL DETAIL FOR $h_p > 1.2\text{m}$)



NOT TO SCALE

DATE PLOTTED: 8/8/2012 1:42:49 PM
FILE LOCATION: C:\working\hmm\285380\stephen\subdrain\PH I PERCH GROUNDWTR CTF FIG J.3.dwg