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FINAL

**FOUNDATION INVESTIGATION REPORT
EMBANKMENTS OVER SWAMPS
G.W.P. 290-97-00, HIGHWAY 69
FOUR LANING FROM TOWER ROAD
NORTHERLY 26.5 km TO 2.7 km NORTH OF HIGHWAY 141
DISTRICT 52, HUNTSVILLE**

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FOUNDATION INVESTIGATION REPORT
For
EMBANKMENTS OVER SWAMPS
G.W.P. 290-97-00, HIGHWAY 69
FOUR LANING FROM TOWER ROAD
NORTHERLY 26.5 km TO 2.7 km NORTH OF HIGHWAY 141
DISTRICT 52, HUNTSVILLE

INTRODUCTION

Construction of the realigned Highway 69, associated ramps and cross roads in the study corridor will involve 110 swamp crossings.

This report summarizes the results of the foundation investigation carried out for construction of embankments in the 20 swamps in which the peat thickness is generally greater than 4 m, the peat is underlain by a significant thickness of soft clay, and/or the height of embankment fill constructed on peat/clay exceeds 3 m. The swamps have been identified by number. The number and location of each swamp is provided on Table I, Appendix A; the approximate locations of the swamps are indicated on Drawing No. 1, Appendix A.

Approximately 400 m of the proposed roadway at the north end of this project overlaps the south end of the adjoining project (G.W.P. 291-97-00, Highway 69, Four Lining 2.7 km north of Highway 141 northerly 4 km to 5.5 km south of Highway 518 (Badger Road), District 52, Huntsville) carried out by Peto MacCallum Ltd. in 1998-1999 (Project No. 98TF010). Two "special" swamps (Swamps 10 and 11) were identified in this section of the roadway.

Swamps in which the thickness of peat and/or soft clay is less than 4 m are dealt with in the Pavement Design Report which is provided under separate cover (reference 97TF088).

PHYSIOGRAPHY AND GEOLOGY

The study area is part of the Precambrian Laurentian peneplane. The topography is quite irregular in detail and the area is dotted with many small lakes separated by rocky ridges. Soil cover is generally sparse. The region is wooded. Swamp environments have developed in low lying poorly drained areas.

It is underlain by metamorphic gneisses and migmatites; in many places the structural alignment influences the topography. In this regard, the rivers and lakes underlain by the Moon River syncline in Conger and Freeman Townships follow the foliation trends of the gneisses.

The bedrock formations are of Precambrian age and are largely composed of veined, banded, and homogeneous pink and grey migmatitic gneisses produced by injection and granitization of the original rock types.

INVESTIGATION PROCEDURES

The fieldwork for this investigation was carried out during the period December 1997 to April 1998.

The drilling program was carried out in accordance with the requirements of MTO Northern Region Pavement Design Practices and Guidelines (May 20, 1997). The testhole locations were established relative to stations along the centreline median of Highway 69, the centreline of pavement of the cross roads and edge of pavement for the ramps staked by Highway 69 Joint Venture. Elevations were recorded as D_{\pm} relative to the ground surface at the control lines. Geodetic elevations of the ground surfaces at the testhole locations were subsequently interpolated from survey data provided by Highway 69 Joint Venture.

The investigation comprised 507 testholes drilled to depths of 0.1 to 22.4 m below existing grade. The approximate locations of the testholes are shown on the appended Testhole Location Plans prepared for each swamp, Drawings 2 to 18, Appendix B.

The deep testholes were advanced using a track-mounted CME-55 drillrig equipped with continuous flight solid and hollow stem augers supplied by a specialist drilling contractor working under the full-time supervision of members of our engineering staff. The shallow testholes were advanced by members of our engineering staff using hand augers or a backhoe.

Representative samples of the overburden were recovered in each swamp at frequent depth intervals using a conventional split spoon sampler in conjunction with Standard Penetration Tests. In restricted access areas, soil samples were recovered with conventional split spoon sampler using manual equipment to advance the sampler. In addition, field vane tests, dynamic cone tests and shelby tube sampling were carried out at selected locations. Soils were identified visually in the field at each testhole location. Representative soil samples were returned to our laboratory for detailed visual examination, classification and laboratory testing.

Water level observations were made in the open testholes during and upon completion of augering.

The laboratory testing program consisted of:

- Moisture content determinations
- Organic content determinations
- Grain size analyses
- Atterberg Limit tests
- Wet and dry unit weight determinations
- Consolidation tests
- Consolidated undrained triaxial compression tests, and
- Consolidated drained triaxial compression tests.

The test results are presented in Appendix C.

SUBSURFACE CONDITIONS

Reference is made to the appended Log of Borehole/Probehole Sheets for details of the fieldwork including soil classifications, inferred stratigraphy, standard penetration test 'N' values, dynamic cone penetration test resistance, field vane test undrained shear strength values, groundwater observations and results of laboratory moisture content determinations and Atterberg Limit tests.

Stratigraphic profiles prepared from testhole data are presented on Drawings 2A and 2B to 18A, Appendix B. The boundaries between strata have been established at the testhole locations only. Between testholes the boundaries are assumed and may be subject to error.

SWAMP 1 – HWY 69, SBL, Station 18+250-18+350, Twp. of Freeman

A total of twelve testholes (Testholes S1-1 to S1-12) were drilled within this section of Swamp 1 at the approximate locations shown on Drawing 2, Appendix B. Stratigraphic profiles prepared from the testhole data are presented on Drawing 2A.

The subsurface stratigraphy generally comprised a surficial peat/topsoil layer overlying probable bedrock, or native sand with discontinuous sandy silt and silty clay layers mantling probable bedrock. The water level was generally at to about 0.2 m below ground surface.

Bedrock exists surficially at Testhole S1-1. A 0.2 to 0.3 m thick discontinuous topsoil layer was contacted surficially in Testholes S1-4, S1-7 and S1-10.

Amorphous to fibrous peat, ranging in thickness from 0.6 to 5.1 m, was encountered at ground surface in the remaining testholes. Standard penetration test 'N' values ranged from 0 to 2. Field vane tests carried out in the peat layer measured undrained shear strength values ranging from 5 to 14 kPa, with an average value of 7.6 kPa. The moisture content of the peat varied from 427 to 918 percent.

The peat and topsoil are underlain by sand and/or silt deposits with discontinuous sandy silt and silty clay layers. Standard penetration test 'N' values typically ranged from 2 to 24. The sand was generally loose but became compact to very dense with depth. The moisture content of the sand ranged from 9 to 19 percent.

A localized 0.5 to 0.9 m thick silty clay layer was encountered below the sand deposit in Testholes S1-9 and S1-12 at depths of 3.2 and 6.6 m. Standard penetration test 'N' value was 4. The Atterberg Limits tests measured liquid limits of 33 and 25 and plasticity index of 15 and 10. The silty clay can be classified as 'CL' in accordance with the MTC Soil Classification Manual. The grain size distribution test indicates the silty clay has 32, 51 and 17 percent clay, silt and sand sized particles, respectively.

Bedrock was exposed at the ground surface at the location of Testhole S1-1. Bedrock was inferred by auger refusal in the remaining testholes drilled at depths of 0.6 to 9.2 m.

SWAMP 1 – HWY 69, NBL, Station 18+175 to 18+350, Twp. of Freeman

A total of twenty-four testholes (Testholes S1-13 to S1-36) were drilled within this section of Swamp 1 at the approximate locations shown on Drawing 2, Appendix B. Stratigraphic profiles prepared from testhole data are presented on Drawing 2B.

The subsurface stratigraphy generally comprised a surficial peat layer overlying probable bedrock, or native sand with a discontinuous very soft to firm silty clay layer mantling probable bedrock. The water level was generally at to about 0.2 m below ground surface.

Amorphous to fibrous peat, ranging in thickness from 0.8 to 5.6 m, was encountered in all testholes. Standard penetration test 'N' values ranged from 0 to 1. Field vane tests carried out in the peat layer measured undrained shear strength values ranging from 4 to 8 kPa, with an average value of 6 kPa. The moisture content of the peat ranged from 299 to 1656 percent, the dry and wet density 116 to 1026 kg/m³, respectively. The organic content was 83 percent.

Consolidation test carried out on one peat sample measured an initial void ratio of 13.1, a recompression index of 0.42 and a compression index of 4.44.

Consolidated drained triaxial test carried out on one peat sample measured an angle of internal friction of 32°.

The peat are underlain by a sand deposit with clay seams. Standard penetration test 'N' values ranged from 0 to greater than 50 blows. The sand was generally loose but become compact to very dense with depth. The moisture content of the sand ranged from 10 to 27 percent.

A discontinuous 0.3 to 1.4 m thick silty clay layer was encountered below the sand deposit in six testholes at depths of 0.9 to 6.9 m. Standard penetration test 'N' values range from 0 to 15. The moisture content of the silty clay ranged from 23 to 45 percent.

Bedrock was inferred by auger refusal at typical depths of 1.0 to 8.4 m, 12.6 m in Testhole S1-27.

SWAMP 1A – HWY 169, CONNECTION, Station 10+085 to 10+250, Twp. of Freeman

A total of fifteen testholes (Testholes S1A-1 to S1A-15) were drilled within this swamp at the approximate locations shown on Drawing 3, Appendix B. Stratigraphic profiles prepared from testhole data are presented on Drawing 3A.

The subsurface stratigraphy generally comprised a surficial peat layer overlying probable bedrock, or native sand and/or silty clay mantling probable bedrock. The water level was generally at to about 0.3 m above ground surface.

Black amorphous peat, about 0.2 to 5.0 m thick, was encountered in Testholes S1A-1 to S1A-13. Standard penetration test 'N' values were 0. Field vane tests measured undrained shear strength values ranging from 15 to 22 kPa, with an average value of 18 kPa. The moisture content of the peat ranged from 510 to 1376 percent.

A 0.6 to 1.5 m thick layer of sand with clay seams was contacted surficially in Testhole S1A-15; and below the peat in Testholes S1A-4 to S1A-8, at depths of 3.6 to 5.1 m. Standard penetration test 'N' value was 12. The moisture content of the sand was 32 percent.

The peat in Testhole S1A-1 and S1A-5 to S1A-12 was underlain by a 0.6 to 1.8 m thick soft silty clay layer. Standard penetration test 'N' value was 1. Field vane tests measured undrained shear strength values ranging from 8 to 22 kPa, with an average value of 17 kPa. The sensitivity numbers were 3. An Atterberg Limits test measured a liquid limit of 16 and plasticity index of 10. The silty clay can be classified as 'CL' in accordance with the MTC Soil Classification Manual. The moisture content of one silty clay sample was 23 percent.

A lower sand deposit, about 0.5 to 0.8 m thick, was encountered below the silty clay in S1A-6, S1A-8 and S1A-10, at depths of 4.5 to 7.5 m. The sand contains varying amounts of silt and gravel. Standard penetration test 'N' values ranged from 4 to 22. The moisture content varies from 18 to 22 percent.

Bedrock was contacted at ground surface at the location of Testhole S1A-14. Bedrock was inferred by auger refusal in the remaining testholes at depths of 0.5 to 8.0 m.

SWAMP 1B – HWY 169 CONNECTION, S-E RAMP, Station 11+900 to 12+175, Twp. of Freeman

A total of twenty-four testholes (Testholes S1B-1 to S1B-24) were drilled within this swamp at the approximate locations shown on Drawing 4, Appendix B. Stratigraphic profiles prepared from testhole data are presented on Drawings 4A and 4B.

The subsurface stratigraphy comprised a surficial peat layer overlying probable bedrock, or native sand with discontinuous silt and clayey silt/clay layers mantling probable bedrock. The water level was generally at to about 0.3 m above ground surface.

Black amorphous peat, about 0.2 to 5.6 m thick, was encountered surficially in all testholes. Standard penetration test 'N' values ranged from 0 to 1. Field vane tests measured undrained shear

strength values ranging from 7 to 15 kPa, with an average value of 11 kPa. The moisture content of the peat ranged from 950 to 1040 percent.

The peat are underlain by a sand deposit. Standard penetration test 'N' values ranged from 5 to 10. The moisture content of the sand ranged from 20 to 23 percent.

A localized 0.9 to 1.9 m thick silt layer was encountered in the sand in Testholes S1B-5 and S1B-7, at depths of 7.2 to 7.8 m. Standard penetration test 'N' value was 4. The moisture content of the silt was 21 percent.

A discontinuous soft clayey silt to silty clay layer (about 0.5 to 1.2 m thick) was contacted below the peat in Testhole S1B-22, the silt in Testhole S1B-5 and the sand in Testholes S1B-10 and S1B-11.

Bedrock was inferred by auger refusal in all of the testholes at depths of 0.9 to 9.9 m.

SWAMP 2 – HWY 69, SBL, Station 10+240 to 10+430, Twp. of Freeman

A total of twenty-six testholes (Testholes S2-1 to S2-26) were drilled within this section of Swamp 2 at the approximate locations shown on Drawing 5, Appendix B. Stratigraphic profiles prepared from testhole data are presented on Drawings 5A.

The subsurface stratigraphy generally comprised a peat/topsoil layer overlying probable bedrock, or native sand with discontinuous silt or silty clay layers mantling probable bedrock. The water level was generally at to about 0.3 m below ground surface.

A 0.2 to 0.3 m thick surficial topsoil layer was encountered in Testholes S2-1 and S2-2.

Amorphous to fibrous peat, about 1.2 to 7.5 m thick, was contacted at ground surface in Testholes S2-3 to S2-26. Standard penetration test 'N' values ranged from 0 to 10. Field vane tests measured undrained shear strength values ranging from 0 to 45 kPa, with an average value of

17 kPa. The moisture content ranged from 169 to 1054. The wet and dry density was 985 and 101 kg/m³, respectively. The organic contents were 40 and 69 percent. The consolidation test carried out on one peat sample measured an initial void ratio of 16.3, a recompression index of 0.38 and a compression index of 5.19. Consolidated undrained and drained triaxial compression tests measured a friction angle of 17° and 20°, respectively.

A 0.2 to 3.9 m thick sand deposit was encountered below the peat in 14 of the testholes. Standard penetration test 'N' values ranged from 0 to 5. Dynamic cone penetration test resistance values ranged from 3 to 10. The moisture content of the sand ranged from 20 to 28 percent. The sand was loose but became dense below 9 m depth, based on augering resistance.

Dense silt, about 0.3 m thick, was contacted below the peat in Testhole S2-7 and the sand in Testhole S2-21 at depths of 3.3 to 4.5 m. The standard penetration test 'N' value was greater than 50. The moisture content of the silt was 18 percent.

Soft silty clay, about 0.4 to 1.4 m thick, was encountered below the peat in Testholes S2-4 and S2-6, and the sand in Testholes S2-10, S2-11 and S2-13 at depths of 3.0 to 7.5 m. Standard penetration test 'N' values ranged from 0 to 3. A field vane test measured an undrained shear strength value of 55 kPa and a sensitivity number of 2. The moisture content ranged from 22 to 28 percent. An Atterberg Limit test measured a liquid limit of 34 and a plasticity index of 16. The silty clay can be classified as 'CL' in accordance with the MTC Soil Classification Manual.

A sand layer, about 0.3 to 1.2 m thick, was contacted below the silty clay in Testholes S2-5 and S2-6, and the sand in Testholes S2-10 and S2-13. The grain size distribution test indicates the sand has 87 and 13 percent silt and sand sized particles, respectively. Standard penetration test 'N' values ranged from 17 to 43. The moisture content of the sand was 17 percent.

Bedrock was inferred by auger refusal at depths of 0.2 to 12.5 m.

SWAMP 2 – HWY 69, NBL, Station 10+225 to 10+335, Twp of Conger

A total of fifteen testholes (Testholes S2-27 to S2-41) were drilled in this section of Swamp 2 at the approximate locations shown on Drawing 5, Appendix B. Stratigraphic profiles prepared from testhole data are presented on Drawing 5B.

The subsurface stratigraphy generally comprised a surficial peat/topsoil/fill layer over probable bedrock, or native sand with a discontinuous silty clay layer mantling probable bedrock. The water level was generally at to about 0.4 m below ground surface.

A 0.2 to 0.4 m thick surficial topsoil layer was penetrated in Testholes S2-27, S2-38, S2-40 and S2-41.

Amorphous to fibrous peat, ranging in thickness from 0.1 to 4.7 m, was encountered at ground surface in the remaining testholes. Standard penetration test 'N' values were 0. Field vane tests measured undrained shear strength values from 0 to 17 kPa, with an average value of 9 kPa. The moisture content of the peat was 1447 percent.

Fill, about 0.3 m thick, was encountered surficially in Testhole S2-36. The fill material consisted of brown sand, trace silt.

A 0.1 to 0.3 m thick compact sand was contacted below the peat in Testholes S2-29, S2-31 and S2-36. The moisture content of the sand was 28 percent.

The peat in Testhole S2-34 was underlain by a 0.3 m thick clayey silt with sand layer. The moisture content of the clayey silt was 32 percent.

A discontinuous soft silty clay layer, about 0.5 m thick, was encountered below the peat in Testhole S2-33.

Bedrock was inferred by auger refusal or hammer bouncing drilled at depths of 0.1 to 5.1 m.

SWAMP 2A – HEALEY LAKE ROAD, Station 9+925 to 10+025, Twp. of Conger

A total of three testholes (Testholes S2A-1 to S2A-3) were drilled within this swamp at the approximate locations shown on Drawing 6, Appendix B. Stratigraphic profiles prepared from testhole data are presented on Drawing 6A.

The subsurface stratigraphy generally comprised a surficial peat and/or fill layer overlying native clayey silt and sand mantling probable bedrock. The water level was generally at to about 1.8 m below ground surface.

A 50 mm thick surficial asphalt layer was encountered in Testhole S2A-1.

A 4.9 m thick amorphous peat layer was encountered at ground surface in Testhole S2A-2. A 2.2 m thick layer of peat was encountered below the fill in Testhole S2A-3. The moisture content was 332 percent.

Fill, ranging in thickness from 1.5 to 2.3 m, was contacted surficially in Testhole S2A-3 and below the asphalt layer in Testhole S2A-1. The composition of the fill ranged from fine to medium sand to sand and gravel. The moisture content of the fill was 13 percent.

A 0.6 to 1.0 m thick very soft clayey silt layer was contacted below the peat in Testholes S2A-2 and S2A-3, at depths of 3.7 to 4.9 m. The moisture content of the clayey silt was 49 percent.

Compact sand, about 0.2 to 1.1 m thick, was encountered below the clayey silt in Testholes S2A-2 and S2A-3. The sand is fine to coarse grained and contains varying amounts of silt and clay. The moisture content of the sand was 22 percent.

Bedrock was inferred by auger refusal at depths of 2.3 to 6.6 m.

SWAMP 2B – HWY 69, SBL, Station 13+040 to 13+160, Twp. of Conger

A total of fifteen testholes (Testholes S2B-1 to S2B-15) were drilled in this section of Swamp 2B at the approximate locations shown on Drawing 7, Appendix B. Stratigraphic profiles prepared from testhole data are presented on Drawing 7A.

The subsurface stratigraphy generally comprised a surficial peat or topsoil layer overlying native sand with a discontinuous silty clay layer mantling probable bedrock. The water level was generally at to 0.2 m above ground surface.

A 0.4 m thick surficial topsoil layer was encountered in Testhole S2B-10.

Amorphous to fibrous peat, about 0.2 to 4.8 m thick, was encountered at ground surface in Testholes S2B-1 to S2B-9, and S2B-11 to S2B-15.

Loose to compact sand, about 0.2 to 1.9 m thick, was encountered below the peat in Testholes S2B-6, S2B-8, S2B-9 and S2B-12.

A localized 0.2 to 0.6 m thick soft silty clay was encountered below the sand in Testholes S2B-6, S2B-9 and S2B-12.

Bedrock was inferred by auger refusal in all testholes at depths of 0.2 to 8.0 m.

SWAMP 2B – HWY 69, NBL, Station 13+000 to 13+125, Twp. of Conger

A total of eighteen testholes (Testholes S2B-16 to S2B-33) were drilled in this section of Swamp 2B at the approximate locations shown on Drawing 7, Appendix B. Stratigraphic profiles prepared from testhole data are presented on Drawing 5B.

The subsurface stratigraphy generally comprised a surficial peat/topsoil layer overlying native sand with a discontinuous soft clayey silt layer mantling probable bedrock. The water level was generally within 0.3 m below to 0.3 m above ground surface.

A 0.1 to 0.3 m thick surficial topsoil layer was encountered in Testholes S2B-16 and S2B-33.

Amorphous to fibrous peat, about 0.2 to 4.6 m thick, was encountered in Testholes S2B-18 to S2B-33. The moisture content of the peat was 909 percent.

A 0.2 to 1.2 m thick loose to compact sand layer was contacted below the peat in Testholes S2B-18, S2B-20, S2B-21 and S2B-23 to S2B-28.

Below the sand stratum at depths of 3.6 to 4.8 m in Testholes S2B-25, S2B-26 and S2B-28, a localized 0.2 to 0.4 m thick clayey silt layer was contacted.

Bedrock was exposed at ground surface at the location of Testhole S2B-17. Bedrock was inferred by auger refusal in the remaining testholes drilled at depths of 0.1 to 10 m.

SWAMP 2C – HEALEY LAKE ROAD, Station 10+100 to 10+160, Twp. of Conger

A total of six testholes (Testholes S2C-1 to S2C-6) were drilled within this swamp at the approximate locations shown on Drawing 6, Appendix B. Stratigraphic profiles prepared from testhole data are presented on Drawing 6A.

Existing Roadway

Testholes S2C-1, S2C-2 and S2C-5 were drilled on the existing roadway. The subsurface stratigraphy generally revealed a surficial pavement and a fill stratum overlying peat, native silt, clay and sand deposits mantling probable bedrock. The water level was at depths of 3.8 to 4.2 m.

The pavement structure consisted of 65 mm of asphaltic concrete overlying 200 to 300 mm of gravelly sand.

Fill, ranging in thickness from 0.7 to 3.7 m, was encountered below the pavement structure. The fill consisted of fine sand with occasional boulders and cobbles. The moisture content of the fill ranged from 5 to 23 percent.

A 0.5 and 0.9 m thick amorphous peat layer was contacted below the fill in Testholes S2C-2 and S2C-5, respectively. The moisture content was 222 percent.

A localized 0.9 m thick soft silt and clay layer was encountered below the peat in Testhole S2C-2.

The peat in Testhole S2C-5 was underlain by a discontinuous 0.1 m thick layer of organic sandy silt. The sandy silt was very loose.

Compact to very dense sand, about 0.9 to 1.6 m thick, was encountered below the silt and clay in Testhole S2C-2 at a depth of 5.7 m and the organic sandy silt in Testhole S2C-5 at a depth of 4.5 m. The moisture content of the sand ranged from 17 to 23 percent.

Bedrock was inferred by auger refusal at depths of 1.0 to 6.5 m.

General Area

Testholes S2C-3, S2C-4 and S2C-6 were drilled in the swamp adjacent to the road. The subsurface stratigraphy in the testholes generally comprised a surficial peat or topsoil layer overlying native sand, silt and clay deposits underlain by probable bedrock.

Black amorphous peat, about 1.1 m thick, was encountered surficially in Testhole S2C-6.

A 0.2 m thick surficial topsoil layer was encountered in Testhole S2C-4. The topsoil comprised black sandy silt.

A 0.5 and 1.5 m thick compact sand layer was encountered at ground surface in Testhole S2C-3 and below the topsoil in Testhole S2C-4, respectively. The sand material consisted of brown to grey fine to medium sand with trace silt. The sand in Testhole S2C-4 is silty.

A localized 2.1 m thick compact silt layer was encountered below the silty sand in Testhole S2C-4. The silt material consisted of brown silt with sand, gravel, and occasional cobbles.

Very soft clay was contacted below the sand in Testhole S2C-6 at a depth of 2.0 m and extended to a depth of 2.4 m.

A 0.7 m thick sand layer was encountered below the clay in Testhole S2C-6. The sand material consisted of grey medium to coarse sand with trace gravel.

Bedrock was inferred by auger refusal at depths of 1.5 to 3.0 m; it is possible that refusal was met on cobbles/boulders at some locations, however.

SWAMP 3 – HWY 69, SBL, Station 15+400 to 15+600, Twp. of Conger

A total of twenty-seven testholes (Testholes S3-1 to S3-27) were drilled within this section of Swamp 3 at the approximate locations shown on Drawing 8, Appendix B. Stratigraphic profiles prepared from testhole data are presented on Drawing 8A.

The subsurface stratigraphy generally comprised a surficial topsoil and peat layer overlying native silty clay and sand mantling probable bedrock. The water level was generally at to 0.3 m above ground surface.

A 0.1 to 0.5 m surficial topsoil layer was encountered in Testholes S3-1, S3-3, S3-4, S3-26 and S3-27. The topsoil material consisted of black silt.

Black amorphous to fibrous peat, about 0.3 to 6.5 m thick, was contacted surficially in Testholes S3-2 and S3-5 to S3-25. Standard penetration test 'N' values were 0. Field vane tests

measured undrained shear strength values of 7 to 20 kPa, with an average value of 11 kPa. The organic content of the peat was 62 percent. The moisture content of the peat ranged from 500 to 850 percent. The wet and dry density of the peat was 1085 and 196 kg/m³, respectively. Consolidation test measured an initial void ratio of 8.5, a recompression index of 0.21, and a compression index of 3.74. Consolidated undrained and drained triaxial compression tests measured a friction angle of 18° and 20°, respectively.

A discontinuous soft silty clay, about 0.3 to 3.9 m thick, was encountered below the peat in eight testholes. Standard penetration test 'N' values were 0. Field vane tests measured undrained shear strength values of 7.5 to 10 kPa, with an average value of 9 kPa. The moisture content ranged from 65 to 71 percent. The grain size distribution test indicates the silty clay has 34, 63 and 3 percent clay, silt and sand sized particles, respectively. An Atterberg Limit test measured a liquid limit of 38 and plasticity index of 19. The silty clay can be classified as 'CI' in accordance with the MTC Soil Classification Manual.

Consolidation test measured an initial void ratio of 1.7, a recompression index of 0.04, and a compression index of 0.60. Consolidated undrained triaxial tests measured a friction angle of 12°.

A 0.2 to 4.8 m thick compact to very dense sand layer was contacted below the topsoil, peat or silty clay at depths of 0.3 to 9.2 m. Standard penetration test 'N' values were 23 and 69. The moisture content of the sand ranged from 8 to 10 percent.

A 2.5 m thick very dense sandy silt layer was encountered below the silty clay at a depth of 5.20 m. Standard penetration test 'N' values were 50 and greater than 50. The moisture contents of the sandy silt were 8 and 9%.

Bedrock was inferred by auger refusal or hammer bouncing drilled at depths of 0.1 to 11.1 m.

SWAMP 3 – HWY 69, NBL, Station 15+390 to 15+575, Twp. of Conger

A total of twenty-four testholes (Testholes S3-28 to S3-51) were drilled within this section of Swamp 3 at the approximate locations shown on Drawing 8, Appendix B. Stratigraphic profiles prepared from testhole data are presented on Drawing 8B.

The subsurface stratigraphy generally comprised a surficial topsoil and peat layer overlying native clay and sand mantling probable bedrock. The water level was generally at to about 0.3 m above ground surface.

A 0.1 to 0.3 m surficial topsoil layer was encountered in Testholes S3-42, S3-45, S3-48, S3-50 and S3-51. The topsoil consisted of black silt.

Black amorphous to fibrous peat, about 0.2 to 5.8 m thick, was contacted surficially in Testholes S3-28 to S3-41, S3-43 to S3-47, and S3-49. Standard penetration test 'N' values were 0. The moisture content ranged from 632 to 995 percent. The organic content was 38 percent. The wet and dry density was 1056 and 198 kg/m³, respectively. Consolidation test measured an initial void ratio of 9.6, a recompression index of 0.30, and a compression index of 3.25. Consolidation drained triaxial compression test measured a friction angle of 20°.

Very soft to soft silty clay, about 0.2 to 1.1 m thick, was encountered below the peat or sand at depths of 1.7 to 5.9 m. Standard penetration test 'N' values recorded were 3 and 4.

A localized 0.5 m thick compact silt layer was encountered below the topsoil in Testhole S3-42.

Loose to very dense sand, about 0.2 to 3.2 m thick, was contacted below the topsoil, peat or silty clay at depths of 0.2 to 7.0 m. Silty clay seams were noted within the sand in Testhole S3-41. Standard penetration test 'N' values recorded were 42 and 55. The moisture content of the sand ranged from 8 to 10 percent.

Bedrock was inferred by auger refusal at depths of 0.2 to 8.5 m.

SWAMP 4 – HWY 69, NBL, Station 18+075 to 18+200, Twp. of Conger

This swamp is part of a beaver pond. A total of sixteen testholes (Testholes S4-1 to S4-16) were drilled within this swamp at the approximate locations shown on Drawing 9, Appendix B. Stratigraphic profiles prepared from testhole data are presented on Drawing 9A.

The subsurface stratigraphy generally comprised a surficial peat/topsoil layer overlying probable bedrock, or loose sand with a discontinuous soft silty clay layer mantling probable bedrock. Water level was at 0.3 to 0.6 m above ground surface.

A 0.1 and 0.2 m thick topsoil layer was contacted at ground surface in Testholes S4-2 and S4-3, respectively.

Amorphous to fibrous peat, about 1.4 to 9.7 m thick, was contacted below the water in most testholes. Standard penetration test 'N' values were 0. Field vane tests measured undrained shear strength values ranging from 0.8 to 8.0, with an average value of 3.9 kPa. The moisture content ranged from 593 to 880 percent.

A discontinuous sand layer, about 0.1 to 2.7 m thick, underlies the peat in Testholes S4-4, S4-5, S4-6, S4-8, S4-10 and S4-13. Standard penetration test 'N' value was 9. Moisture content of the sand was 18 percent.

A localized 0.8 to 2.6 m thick soft silty clay layer was encountered below the peat in Testhole S4-7 at a depth of 4.6 m and below the sand in Testhole S4-6 at depth of 6.1 m. Field vane tests measured undrained shear strength values ranging from 3 to 5 kPa, with an average value of 4 kPa. The sensitivity number ranged from 1 to 2.

Bedrock was inferred by auger refusal at depths of 0.1 to 12.7 m.

SWAMP 5 – HWY 69, NBL, Station 18+925 to 19+150, Twp. of Conger

A total number of twenty-nine testholes (Testholes S5-1 to S5-29) were drilled within this swamp at the approximate locations shown on Drawing 10, Appendix B. Testholes S5-16, S5-20 and S5-23 were drilled along an existing creek. Stratigraphic profiles prepared from testhole data are presented on Drawing 10A and 10B.

The subsurface stratigraphy generally comprised a surficial peat/topsoil layer overlying loose sand to sandy silt, soft clayey silt to silty clay mantling probable bedrock. The water level was generally 1.0 m below to about 0.3 m above ground surface.

A 0.2 to 0.5 m thick surficial layer of topsoil was encountered in Testholes S5-1, S5-12, S5-17. The topsoil in Testhole S5-1 comprised black sandy silt. In Testholes S5-12 and S5-17, the topsoil consisted of black silt.

A root mat, about 0.3 m thick, was encountered at ground surface in Testhole S5-27.

A 0.5 to 7.2 m thick amorphous to fibrous peat layer was contacted surficially in most testholes. Standard penetration test 'N' values were 0. Field vane tests measured undrained shear strength values ranging from 0 to 29 kPa, with an average value of 6 kPa. The moisture contents of two peat samples were 621 and 918 percent.

A localized 1.5 to 1.8 m thick layer of loose sandy silt was encountered below the peat in Testholes S5-3 and S5-5 at depths of 3.0 to 3.4 m. Standard penetration test 'N' values ranged from 3 to 4. The moisture content ranged from 22 to 25 percent.

Loose silt, about 0.7 to 2.3 m thick, was encountered locally in Testholes S5-9 and S5-20. The silt in Testhole S5-20 contains organics.

A discontinuous 0.2 and 0.3 m thick soft silty clay layer was contacted below the peat in Testhole S5-24 and the sandy silt in Testhole S5-5, at depths of 1.8 and 5.1 m, respectively. Standard penetration test 'N' value was 3. The moisture content of the silty clay was 42 percent.

A localized 0.5 and 1.3 m thick soft clayey silt layer was encountered below the peat in Testholes S5-4 and S5-6, at depths of 2.8 to 3.1 m, respectively. A clayey silt layer, about 1.2 m thick, was contacted below the sand at a depth of 7.8 m in Testhole S5-20. The clayey silt contains trace sand. Standard penetration test 'N' values ranged from 0 to 3.

A 0.2 to 2.9 m thick very loose to compact sand was encountered below the clayey silt/silt, peat, topsoil at depths of 0.3 to 6.5 m in ten testholes. Standard penetration test 'N' values recorded ranged from 3 to 6.

Bedrock was inferred by auger refusal at depths of 0.5 to 10.3 m.

SWAMP 6 – HWY 69, SBL, Station 19+280 to 19+460, Twp. of Conger

A total of eleven testholes (Testholes S6-1 to S6-11) were drilled in this section of Swamp 6 at the approximate locations shown on Drawing 11, Appendix B. Stratigraphic profiles prepared from testhole data are presented on Drawing 11A.

The subsurface stratigraphy generally comprised a surficial peat layer overlying very loose to very dense sand with a discontinuous soft clay layer mantling probable bedrock. The water level was 0.1 to 0.3 m above ground surface.

Peat, ranging in thickness from 0.5 to 4.7 m, was encountered surficially in all testholes. Standard penetration test 'N' values were 0. Field vane tests measured undrained shear strength values ranging from 7 to 23 kPa with an average value of 12 kPa. The moisture content of the peat ranged from 611 to 877 percent.

A 0.3 to 2.1 m thick sand layer was contacted below the peat in Testholes S6-1, S6-4, S6-7 and S6-8 at depths of 0.3 to 4.3 m. Standard penetration test 'N' values ranged from 0 to 12. Dynamic cone penetration test resistance was typically 6 to 20. The sand was very loose to loose, but became compact to very dense with depth. The moisture content of the sand ranged from 10 to 20 percent.

The peat and/or sand was underlain by a discontinuous 0.3 to 2.1 m thick soft silty clay layer in four testholes. Standard penetration test 'N' value was 0. Field vane test measured undrained shear strengths of 7 to 25 kPa, with an average value of 16 kPa.

A 1.2 and 1.7 m thick sand layer was contacted below the silty clay at a depth of 4.5 and 8.5 m in Testholes S6-5 and S6-8, respectively. Standard penetration test 'N' values ranged from 7 to greater than 50. The moisture content of the sand ranged from 11 to 18 percent.

Bedrock was inferred by auger refusal at depths of 0.5 to 9.7 m.

SWAMP 6 – HWY 69, NBL, Station 19+325 to 19+450, Twp. of Conger

A total of nine testholes (Testholes S6-12 to S6-20) were drilled within this section of Swamp 6 at the approximate locations shown on Drawing 11, Appendix B. Stratigraphic profiles prepared from testhole data are presented on Drawing 11B.

The subsurface stratigraphy generally comprised a surficial layer of peat overlying loose sand and soft silty clay mantling probable bedrock. The water level was generally at to about 0.2 m above ground surface.

Amorphous to fibrous peat, about 1.1 to 6.6 m thick, was encountered at ground surface in the testholes. Standard penetration test 'N' values were 0. Field vane tests measured undrained shear strength values ranged from 10 to 20 kPa, with an average value of 14 kPa. The moisture content of the peat ranged from 807 to 1200 percent.

A 0.3 to 2.4 m thick sand layer was encountered below the peat in Testholes S6-13, S6-17 to S6-20. Standard penetration test 'N' values ranged from 27 to greater than 61. The sand was loose but became compact to very dense with depth. The moisture content of the sand ranged from 12 to 20 percent.

A 1.2 to 2.1 m thick layer of soft silty clay was contacted below the peat in Testhole S6-16 and the sand in Testholes S6-13 and S6-17, at depths of 4.8 to 9.0 m. Standard penetration test 'N' value was 0. Field vane test carried out in the silty clay in Testhole S6-16 measured an undrained shear strength value of 17 kPa. The moisture content of the silty clay was 25 percent.

The silty clay in Testholes S6-13, S6-16 and S6-17 was underlain by a 0.2 to 0.7 m thick sand layer. Standard penetration test 'N' values ranged from 23 to greater than 50. The moisture content of the sand was 12 percent.

Bedrock was inferred by auger refusal drilled at depths of 1.2 to 11.3 m.

SWAMP 7 – HWY 69, SBL, Station 21+800 to 22+310, Twp. of Conger

A total of sixty-three testholes (Testholes S7-1 to S7-63) were drilled in this section of Swamp 7 at the approximate locations shown on Drawing 12, Appendix B. Stratigraphic profiles prepared from testhole data are presented on Drawing 12A, 12B and 12C.

The subsurface stratigraphy generally comprised a surficial topsoil or peat layer overlying native sand, silt and silty clay mantling probable bedrock. The water level was at to 2.0 m below ground.

A 0.1 to 0.2 m thick surficial topsoil layer was encountered in Testholes S7-1 and S7-2. The topsoil material consisted of black silt.

Black amorphous to fibrous peat, ranging in thickness from 0.3 to 7.8 m, was encountered surficially in all but two testholes. Standard penetration test 'N' values were 0. Field vane tests measured undrained shear strength values from 6 to 21 kPa with an average value of 13.5 kPa. The moisture

content ranged from 540 to 1287 percent and the organic content from 31 to 91 percent. The wet and dry density was 1017 kg/m^3 and 107 kg/m^3 , respectively. Consolidation tests measured an initial void ratio of 13.1, a recompression index of 0.46, and a compression index of 4.31. Consolidated drained triaxial compression tests measured a friction angle of 18° .

A 0.4 to 1.7 m thick silt layer, was encountered below the peat in Testholes S7-8, S7-13, S7-14, S7-44 and S7-56. Standard penetration test 'N' values ranged from 0 to greater than 58. The moisture content of the silt ranged from 25 to 30 percent.

Loose to compact silty sand, about 0.2 to 1.2 m thick, was contacted below the peat in Testholes S7-19, S7-21, S7-36, S7-55, S7-57 and S7-63. The standard penetration test 'N' value recorded was 26. The moisture content of the silty sand was 20 percent.

A 0.3 to 2.1 m thick soft to firm silty clay layer was encountered below the peat, silt and silty sand in 23 of the testholes at depths of 1.7 to 9.0 m. Standard penetration test 'N' values ranged from 0 to 4. Field vane tests measured undrained shear strength values of 15 to 30 kPa, with an average value of 18 kPa and a sensitivity of 4. The moisture content ranged from 41 to 63 percent. An Atterberg Limits test measured a liquid limit of 42 and a plasticity index of 23. The silty clay can be classified as "CI" in accordance with the MTC Soil Classification Manual. Consolidation test measured an initial void ratio of 2.0, a recompression index of 0.13, and a compression index of 0.97. Consolidation undrained triaxial compression test measured a friction angle of 20° .

A localized 0.3 to 1.0 m thick soft clayey silt was encountered below the silty sand in Testhole S7-55 at a depth of 3.6 m and the peat in Testhole S7-54 at a depth of 2.4 m.

Loose to compact sand, about 0.2 to 0.9 m thick, was contacted below the peat or silty clay in 12 testholes at depths of 2.6 to 9.3 m.

A lower silty sand deposit, about 0.2 to 0.9 m thick, was encountered below the silty clay in Testholes S7-26, S7-34, S7-55 and S7-62 at depths of 2.6 to 8.3 m. Standard penetration test 'N' value recorded was 38. The moisture content of the silty sand was 9 percent.

Bedrock was inferred by auger refusal at depths of 0.1 to 9.6 m.

SWAMP 7 – HWY 69, NBL, Station 21+550 to 22+300, Twp. of Conger

A total number of ninety-three testholes (Testholes S7-64 to S7-156) were drilled in this section of Swamp 7 at the approximate locations shown on Drawing 12, Appendix B. Stratigraphic profiles prepared from testhole data are presented on Drawings 12D to 12F.

The subsurface stratigraphy generally comprised a surficial topsoil or peat layer overlying native sand, silt, sandy silt and silty clay deposits mantling probable bedrock. The water level was generally at 0.2 m below to 0.3 m above ground surface.

A 0.1 to 0.2 m thick surficial topsoil layer was encountered in Testholes S7-65, S7-66, S7-69 and S7-72.

Black amorphous to fibrous peat, about 0.2 to 9.5 m thick, was encountered in all but four of the testholes. Standard penetration test 'N' values were 0. Field vane tests measured undrained shear strengths of 0 kPa to 14 kPa, with an average value of 7.4 kPa. The moisture content of the peat ranged from 433 to 1360 percent. The organic content of one peat sample tested was 59 percent. The wet and dry density was 1001 and 125 kg/m³, respectively. Consolidation test measured an initial void ratio of 14.1, a recompression index of 0.33, and a compression index of 5.24. Consolidated undrained triaxial compression test measured a friction angle of 19°.

Very loose to loose silt, about 0.2 to 2.9 m thick, was encountered below the peat in 17 testholes at depths of 0.4 to 8.1 m. Standard penetration test 'N' values ranged from 0 to 5. Field vane tests measured undrained shear strength values ranged from 5 kPa to 12 kPa, with an average value of 10 kPa. The moisture content of the silt was 16 percent.

A localized 0.3 and 0.9 m thick very loose to loose sandy silt layer was contacted below the peat in Testholes S7-74 and S7-152 at depths of 2.7 and 2.9 m, respectively. Dynamic cone test

penetration resistance values ranged from 3 to 15. The moisture content of the sandy silt was 28 percent.

A 0.1 to 1.8 m thick sand to silty sand layer was encountered below the topsoil or peat in 23 testholes at depths of 0.1 to 8.0 m. Standard penetration test 'N' value was 3. Dynamic cone test penetration resistance values ranged from 2 to 9. The moisture content was 18 percent.

Very soft to firm silty clay, about 0.1 to 7.3 m thick was encountered below the peat, sandy silt, silt, sand and/or silty sand in 65 testholes at depths of 1.2 to 11.0 m. Standard penetration test 'N' values ranged from 0 to 5. Field vane tests measured undrained shear strength values of 10.5 to 38 kPa, with an average value of 18 kPa. The sensitivity number ranged from 2 to 10. Dynamic cone test penetration resistance values were 1. The moisture content of the silty clay ranged from 20 to 90 percent. The grain size distribution test indicates the silty clay has 52, 45 and 3 percent clay, silt and sand sized particles. An Atterberg Limits test measured a liquid limit of 46 and a plasticity index of 26. The silty clay can be classified as 'CI' in accordance with the MTC Soil Classification Manual. The wet and dry density was 1547 and 938 kg/m³, respectively. Consolidation test measured on initial void ratio of 1.9, a recompression index of 0.08, and a compression index of 0.96. Consolidation undrained and drained triaxial compression tests measured a friction angle of 13° and 23°, respectively.

A 0.2 to 1.5 m thick sand to silty sand deposit was contacted below the silty clay or silt in 24 testholes at depths of 3.3 to 11.7 m. The sand/silty sand was compact to very dense. Dynamic cone test penetration resistance values ranged from 23 to 100.

Compact silt, about 0.2 m thick, was contacted locally below the silty clay in Testholes S7-129 and S7-149 at depths of 2.6 to 4.6 m.

Bedrock was inferred by auger refusal at depths of 0.7 to 13.2 m below grade.

SWAMP 7A – HWY 69, NBL, Station 11+080 to 11+240, Twp. of Foley

A total of twenty-one testholes (Testholes S7A-1 to S7A-21) were drilled in this swamp at the approximate locations shown on Drawing 13, Appendix B. Stratigraphic profiles prepared from testhole data are presented on Drawing 13A.

The subsurface stratigraphy generally comprised a surficial topsoil or peat layer overlying native sand and/or silty clay mantling probable bedrock. The water level was generally at to about 0.3 m below ground surface.

A 0.2 to 0.5 m thick surficial topsoil layer was encountered in Testholes S7A-2, S7A-4, S7A-18, S7A-20 and S7A-21.

Black amorphous to fibrous peat, ranging in thickness from 1.2 to 4.8 m, was encountered in most testholes. Standard penetration test 'N' values were 0. Field vane shear tests measured undrained strength values ranging from 3 to 12 kPa, with an average value of 5 kPa. The moisture content of two peat samples were 649 and 808 percent.

Very soft to soft silty clay with sand seams, about 0.3 to 5.2 m thick, was encountered below the peat in 10 testholes. Standard penetration test 'N' values ranged from 0 to 6. Field vane tests measured shear strength values ranging from 8 to 16 kPa, with an average value of 11 kPa. The moisture content of the silty clay varied from 41 to 62 percent. The liquid limits of two silty clay samples were 28 and 41 and the plastic indices were 7 and 19, respectively. The silty clay sample from testholes S7A-3 and S7A-12 can be classified as 'CI' and 'CL' in accordance with the MTC Soil Classification Manual, respectively.

Loose to compact sand, about 0.2 to 1.5 m thick, was encountered below the peat in Testholes S7A-7, S7A-17 and S7A-19, and the silty clay in Testholes S7A-3, S7A-5, S7A-6 and S7A-8 to S7A-12. Standard penetration test 'N' values ranged from 1 to 15. The sand contains varying amounts of silt and gravel.

A localized 0.2 m thick silt and sand layer underlies the silty clay in Testhole S7A-10. Based on auger resistance, the silt and sand was judged to be loose.

A 0.6 and 2.0 m thick soft to very soft silty clay layer was encountered. The sand at a depth of 5.7 and 7.7 m in Testholes S7A-3 and S7A-5, respectively. The moisture content of the silty clay was 30 percent.

A lower sand deposit, about 0.7 m thick, was encountered below the silty clay in Testhole S7A-5 at a depth of 9.6 m. Based on auger resistance, the sand was judged to be loose.

Bedrock was exposed at ground surface in Testhole S7A-1 and inferred by auger refusal in the remaining testholes at depths of 0.2 to 10.6 m.

SWAMP 7B – HWY 69, SBL, Station 11+690 to 11+740, Twp. of Foley

This swamp is part of a beaver pond. A total of four testholes (Testholes S7B-1 to S7B-4) were drilled in this section of Swamp 7B at the approximate locations shown on Drawing 13, Appendix B. Stratigraphic profiles prepared from testhole data are presented on Drawing 7B.

The subsurface stratigraphy generally comprised a surficial peat/topsoil layer overlying native sand, silt and silty clay mantling probable bedrock. The water level was found at to 1.4 m above ground surface.

A 0.1 m thick surficial topsoil layer was encountered in Testhole S7B-4. The topsoil material comprised black silt.

Peat, about 0.2 to 0.8 m thick, was contacted at ground surface in Testholes S7B-2 and S7B-3. The peat is a black fibrous deposit.

A 0.3 and 0.8 m thick silt layer was encountered surficially in Testhole S7B-1 and below the peat in Testhole S7B-3. Standard penetration test 'N' values recorded were 3 and 12. The moisture content of two silt samples were 17 and 18 percent.

A 2.2 and 0.8 m thick sand layer underlies the silt layer in Testholes S7B-1 and S7B-3, at a depth of 1.7 m, respectively. Silt layers were noted within the sand deposit in Testhole S7B-1. Standard penetration test 'N' values ranged from 1 to 6. The moisture content of the sand ranged from 22 to 24 percent.

Very soft silty clay, about 0.5 to 3.2 m thick, was contacted below the sand in Testholes S7B-1, S7B-2 and S7B-3. Standard penetration test 'N' values ranged from 1 to 2. The moisture content of the silty clay ranged from 52 to 66 percent. The grain size distribution test indicates the silty clay has 37, 60 and 3 percent clay, silt and sand sized particles, respectively. The liquid limits of two silty clay samples were 34 and 35, and the plastic indices were 16 and 18, respectively. The silty clay sample from testholes S7B-1 can be classified as 'CL' in accordance with the MTC Soil Classification Manual. The sample from testhole S7B-3 can be classified as 'CL-CI'. The wet and dry density was 1874 and 1430 kg/m³, respectively. Consolidation test measured an initial void ratio of 0.9, a recompression index of 0.03, and a compression index of 0.28. The silty clay is overconsolidated, with an overconsolidation ratio of 2.9. Consolidated undrained triaxial compression test measured a friction angle of 17°.

A 0.2 and 0.5 m thick sand deposit was encountered below the silty clay in Testholes S7B-1 and S7B-3, at depths of 3.8 to 5.2 m, respectively. Standard penetration test 'N' values ranged from 6 to greater than 50. The moisture content of the sand ranged from 15 to 18 percent.

Bedrock was inferred by auger refusal at depths of 0.3 to 6.8 m.

SWAMP 7B – HWY 69, NBL, Station 11+680 to 11+730, Twp. of Foley

This swamp is part of a beaver pond. A total of two testholes (Testholes S7B-5 and S7B-6) were drilled in this section of Swamp 7B at the approximate locations shown on Drawing 13, Appendix B. Stratigraphic profiles prepared from testhole data are presented on Drawing 13C.

The subsurface stratigraphy generally comprised a surficial peat layer overlying native sand, silty clay and clayey silt mantling probable bedrock. The water level was at 0.8 to 1.4 m above ground surface.

A 0.1 and 0.6 m thick dark brown fibrous peat was contacted at ground surface in Testholes S7B-5 and S7B-6. The moisture content of the peat was 429 percent.

A 0.7 to 1.5 m thick sand deposit underlies the peat in both testholes. Standard penetration test 'N' values ranged from 2 to 4. The moisture content of the sand ranged from 20 to 22 percent.

Very soft silty clay with sand seams, about 0.3 m thick, was encountered below the sand in Testholes S7B-5 and S7B-6, at depths of 2.4 to 3.7 m. Standard penetration test 'N' values were 2. The moisture contents of two silty clay samples were 20 and 43 percent.

A localized 2.0 m thick soft clayey silt layer was encountered below the silty clay in Testhole S7B-5. Standard penetration test 'N' values ranged from 0 to 2.

Loose sand was contacted below the clayey silt in Testhole S7B-5 and the silty clay in Testhole S7B-6, at depths of 2.6 to 6.0 m. Standard penetration test 'N' values were 6 and 8. The moisture content of the sand ranged from 15 to 18 percent.

Bedrock was inferred by auger refusal at depths of 3.6 and 7.0 m.

SWAMP 8 – HWY 69, SBL, Station 11+990 to 12+030, Twp. of Foley

A total of six testholes (Testholes S8-1 to S8-6) were drilled in this section of Swamp 8 at the approximate locations as shown on Drawing 14, Appendix B. Stratigraphic profiles prepared from testhole data are presented on Drawing 14A.

The subsurface stratigraphy generally comprised a surficial peat/topsoil layer overlying native sand and silty clay mantling probable bedrock. The water level was generally at to about 0.3 m below ground surface.

A 0.3 m thick surficial silt topsoil layer or 0.1 to 1.5 m thick black amorphous peat was encountered at ground surface in the testholes.

A 0.5 to 2.2 m thick sand deposit was contacted below the topsoil peat in most testholes. The sand is loose and contains some silt.

Soft to firm silty clay with sand seams, about 1.5 to 3.0 m thick, was encountered below the sand in Testholes S8-1 to S8-5.

Bedrock was inferred by auger refusal at depths of 1.8 to 5.6 m.

SWAMP 8 – HWY 69, NBL, Station 11+990 to 12+030, Twp. of Foley

A total of three testholes (Testholes S8-7, S8-8 and S8-9) were drilled in this swamp at the approximate locations shown on Drawing 14, Appendix B. Stratigraphic profiles prepared from testhole data are presented on Drawing 14B.

The subsurface stratigraphy generally comprised a surficial peat layer overlying soft to firm silty clay with a localized sand layer mantling probable bedrock.

A 1.7 to 2.1 m thick fibrous peat layer was encountered surficially in all testholes drilled.

The peat is underlain by a 3.9 to 4.4 m thick soft to firm silty clay. Sand seams were noted within the silty clay stratum. Field vane tests measured undrained shear strength values ranging from 14 to 36 kPa, with an average value of 25 kPa. The moisture content of the silty clay was 41 percent.

A localized 1.9 m thick sand layer was encountered below the silty clay in Testhole S8-9. The sand is loose to compact and contains some silt.

Bedrock was inferred by auger refusal at depths of 5.8 to 7.9 m.

SWAMP 8A – BLACKSTONE/CRANE LAKE ROAD, Station 9+725 to 9+875, Twp. of Foley

Six testholes (Testholes S8A-1 and S8A-6) were drilled through the roadway at the approximate locations shown on Drawing 15A, Appendix B. Stratigraphic profiles prepared from testhole data are presented on Drawing 15A.

Existing Roadway

Two testholes (Testholes S8A-3 and S8A-5) were drilled through the roadway in the swamp.

The subsurface stratigraphy comprised a pavement structure overlying topsoil, native silt and sand, and clay mantling probable bedrock. The water level was 1.5 to 2.7 m below ground surface.

Pavement structure was contacted surficially in both testholes. The pavement structure consisted of 75 and 100 mm of asphaltic concrete overlying 1.0 to 1.3 m of brown fine to medium sand with silt.

Topsoil, about 0.3 m thick, was contacted below the pavement structure. The topsoil consisted of dark brown silty sand, with a moisture content of 30 to 34 percent.

A 0.8 m thick layered silt and silty sand deposit was encountered below the topsoil in Testhole S8A-5. The moisture content of the silt and silty sand was 17 percent.

Loose to compact sand, about 2.6 m thick, was encountered below the topsoil in Testhole S8A-3 at a depth of 1.4 m. The moisture content of the sand ranged from 18 to 19 percent.

Soft silty clay to clay, about 0.8 to 2.0 m, was contacted below the sand in Testhole S8A-3 and the silt and silty sand layer in Testhole S8A-5. The moisture content of the clay ranged from 38 to 46 percent.

A sand layer was encountered below the clay in Testhole S8A-5 at a depth of 3.2 m and extended to a depth of 5.2 m.

Boulders or bedrock was inferred by auger refusal at depths of 5.2 and 6.0 m.

General Area

Testholes S8A-1, S8A-2, S8A-4 and S8A-6 were drilled within the general area of the roadway in the swamp.

The subsurface stratigraphy revealed a surficial peat and topsoil layer overlying native silt, sand and clay mantling probable bedrock.

A 0.5 m thick black amorphous peat layer was contacted surficially in Testhole S8A-1.

A 0.2 to 0.3 m thick topsoil layer was encountered surficially in Testhole S8A-2, S8A-4 and S8A-6. The topsoil consisted of black silt.

Very soft silty clay to clay, about 1.0 to 2.5 m thick, was encountered below the peat in Testholes S8A-1 and S8A-6. The moisture content of the silty clay was 43 percent.

Silt, about 0.6 m thick, was encountered below the clay in Testhole S8A-6. The moisture content of the silt was 16 percent.

A 0.5 to 0.6 m thick loose sand layer was encountered below the topsoil in Testholes S8A-2 and S8A-4.

Bedrock was inferred by auger refusal at depths of 0.8 to 3.1 m.

SWAMP 8B – BLACKSTONE/CRANE LAKE ROAD, Station 10+225 to 10+300, Twp. of Foley

Four testholes (Testholes S8B-3 to S8B-6) were drilled through the roadway at the approximate locations shown on Drawing 15, Appendix B. Stratigraphic profiles prepared from testhole data are presented on Drawing 15B.

The subsurface stratigraphy comprised a surficial fill layer overlying peat, native clayey silt, silty clay, and sand deposits mantling probable bedrock.

Existing Roadway

Fill, ranging in thickness from 0.5 to 1.1 m, was encountered surficially in Testholes S8B-3 to S8B-6. The composition of the fill ranged from fine to medium sand trace silt to gravely sand.

A 0.5 m thick black amorphous peat was encountered below the fill in Testhole S8B-4 at a depth of 1.1 m.

Soft to stiff clayey silt, about 0.4 to 1.4 m thick, was encountered below the peat in Testhole S8B-4 at a depth of 1.6 m and the sand in Testholes S8B-5 and S8B-6 at depths of 0.7 to 1.6 m. The moisture content of the clayey silt ranged from 21 to 36 percent.

A 0.5 to 0.7 m thick sand layer was contacted below the fill in Testholes S8B-5 and S8B-6 at a depth of 0.5 m, and the clayey silt in Testhole S8B-4 at a depth of 2.0 m. The moisture content of the sand was 19 percent.

A 1.6 and 1.9 m thick loose to compact sand to silty sand layer was contacted below the silty clay in Testhole S8B-4 and the clayey silt in Testhole S8B-6 at depths of 2.2 to 3.4 m, respectively. The moisture contents of two sand samples were 8 and 19 percent.

Bedrock was inferred by auger refusal in Testholes S8-4 to S8-6, at depths of 2.6 to 5.3 m. Possible boulder may be encountered in Testhole S8-3, at a depth of 0.5 m.

General Area

Two testholes (Testholes S8B-1 and S8B-2) were drilled within the general area of the roadway in the swamp at the approximate locations shown on Drawing 15, Appendix B.

The subsurface stratigraphy revealed a discontinuous layer of peat overlying native silt, silty clay, and sand deposits mantling probable bedrock.

A 1.6 m thick black amorphous peat was contacted at ground surface in Testhole S8B-2.

Compact silt, about 2.5 m thick, was encountered surficially in Testhole S8B-1. The moisture content of the silt was 32 percent.

A 2.7 to 3.1 m thick very soft to soft silty clay was encountered below the silt in Testhole S8B-1 and the peat in Testhole S8B-2. The moisture content of the silty clay ranged from 22 to 50 percent.

Loose sand, about 0.2 m thick, was contacted below the silty clay in Testhole S8B-1. The moisture content of the sand was 9 percent.

Bedrock was inferred by auger refusal at depths of 4.3 to 5.8 m.

SWAMP 9 – HWY 69, SBL, Station 12+970 to 13+100, Twp. of Foley

A total of five testholes (Testholes S9-1 to S9-5) were drilled within this section of Swamp 9 at the approximate locations as shown on Drawing 16, Appendix B. Stratigraphic profiles prepared from testhole data are presented on Drawing 16A.

The subsurface stratigraphy generally comprised a surficial topsoil layer overlying native sand, silt and silty clay mantling probable bedrock. Water level was generally at ground surface.

Topsoil, about 0.1 to 0.3 m thick, was encountered at ground surface at the locations of Testholes S9-2 to S9-5.

Very loose sand, about 0.5 to 2.7 m thick, was encountered surficially in Testhole S9-1 and below the topsoil layer in Testholes S9-2 to S9-5. Standard penetration test 'N' value was 2. The moisture content of the sand was 7 percent.

A 2.3 m thick firm silty clay layer was encountered below the sand in Testhole S9-1, at a depth of 1.8 m. Field van tests carried out in the silty clay layer measured undrained shear strength values ranging from 10 to 13 kPa, with an average value of 11.5 kPa.

A localized 3.4 m thick compact to dense silt with sand and clay layer underlies the clay layer in Testhole S9-1 at a depth of 4.1 m. Standard penetration test 'N' values in the lower level of this unit ranged from 12 to 37. The moisture content of the silt ranged from 12 to 30 percent. Grain size distribution test indicates the silt has 14, 62 and 24 clay, silt and sand sized particles. The wet and dry density were 2070 and 1723 kg/m³, respectively. An Atterberg Limit test measured a liquid limit of 16 and plastic limit of 15, indicating the silt material is non-plastic. The silt with sand and clay can be classified as 'ML' in accordance with the MTC Soil Classification Manual. Consolidation test measured an initial void ratio of 0.60, a recompression index of 0.02 and a compression index of 0.10, respectively. Consolidated undrained and drained triaxial compression tests measured a friction angle of 32° and 38°, respectively.

A localized 0.3 to 1.6 m thick soft silty clay layer was encountered below the silt in Testhole S9-1 at depth of 7.5 m and the sand in Testholes S9-1 and S9-2 at depths of 2.7 to 2.8 m. Standard penetration test 'N' value was 4. The moisture content of the silt ranged from 33 to 62 percent.

Loose to compact silty sand, about 9.5 m thick, was contacted below the silty clay in Testhole S9-1, at depth of 8.9 m. Standard penetration test 'N' values ranged from 4 to 13. Dynamic cone test penetration resistance values ranged from 9 to 45, at depths of 15 to 18.4 m.

Bedrock was inferred by auger refusal in Testholes S9-2 to S9-3, at depths of 0.8 to 4.3 m. Testhole S9-1 was terminated on compact sand at a depth of 18.4 m.

SWAMP 9 – HWY 69, NBL, Station 12+980 to 13+125, Twp. of Foley

A total of three testholes (Testholes S9-6, S9-7 and S9-8) were drilled in this section of Swamp 9 at the approximate locations shown on Drawing 16, Appendix B. Stratigraphic profiles prepared from testhole data are presented on Drawing 16A.

The subsurface stratigraphy generally comprised a surficial topsoil layer overlying native sand, silt and clay mantling probable bedrock. Water level was generally at ground surface.

A 0.1 to 0.3 m thick topsoil layer was encountered at ground surface in Testholes S9-7 and S9-8.

Sand, about 3.9 m thick, was contacted below the topsoil layer in Testhole S9-7. Moisture content of the sand was 8 percent.

Layered sand and silt was encountered surficially in Testhole S9-6 and extended to a depth of 7.5 m. Standard penetration test 'N' values typically ranged from 2 to 16. Moisture content of the silt ranged from 23 to 35 percent. Moisture content of the sand was 16 percent.

Very soft to soft clay/silty clay, about 0.8 to 1.0 m thick, underlies the sand in Testholes S9-7 and S9-6 at depths of 4.0 to 7.5 m. Standard penetration test 'N' value was 2. The moisture content of the silt was 26 percent.

A 1.2 m thick loose silt layer was encountered below the clay in Testhole S9-6 at depth of 8.3 m. Standard penetration test 'N' value recorded was 10. The moisture content of the silt was 22 percent.

A 12.9 m thick loose to dense sand layer was encountered below the silt in Testhole S9-6 at a depth of 9.5 m. Standard penetration test "N" values ranged from 7 to 16. Dynamic cone test penetration resistance values typically ranged from 9 to 80. The moisture content of the sand ranged from 21 to 26 percent.

Bedrock was inferred by auger refusal at depths of 0.3 to 22.7 m.

SWAMP 10 – HWY 69, NBL, Station 14+440 to 14+500, Twp. of Foley

A total of nine testholes (Testholes S10-1 to S10-9) were drilled within this swamp at the approximate locations shown on Drawing 17, Appendix B. Stratigraphic profiles prepared from testhole data are presented on Drawing 17A.

The subsurface stratigraphy generally comprised a surficial layer of peat or topsoil overlying native sand mantling probable bedrock. The water level was generally at to about 0.3 m above ground surface.

A 0.1 to 0.4 m thick surficial topsoil layer was encountered in Testholes S10-1, S10-2, S10-7 and S10-8. The topsoil comprised black silty sand.

Black fibrous peat, about 0.5 to 5.9 m thick, was encountered surficially in Testholes S10-3, S10-5, S10-6 and S10-9.

A 0.6 to 1.6 m thick loose to compact sand layer was encountered below the topsoil in Testholes S10-1, S10-4, S10-5 and the peat in Testholes S10-3, S10-5 and S10-6 at depths of 0.2 to 5.9 m.

Bedrock was inferred by auger refusal at depths of 0.1 to 7.5 m.

SWAMP 11 – HWY 69, NBL, Station 14+620 to 14+700, Twp. of Foley

A total of twelve testholes (Testholes S11-1 to S11-12) were drilled in this section of Swamp 11 at the approximate locations shown on Drawing 18, Appendix B. Stratigraphic profiles prepared from testhole data are presented on Drawing 18A.

There is one chainage equation within this swamp:

$$\text{station } 14+615.435 = \text{station } 14+621.940$$

The chainage equation was provided by Stantec Consulting Inc., the design consultant for the adjoining project to the north (G.W.P. 291-97-00, Highway 69, Four Laning 2.7 km north of Highway 141 northerly 4 km to 5.5 km south of Highway 518 (Badger Road), District 52, Huntsville).

Toe of Existing Embankment

Testholes S11-1, S11-2 and S11-3 were drilled along the toe of an existing embankment.

The subsurface stratigraphy generally comprised a surficial fill stratum overlying native sand, silty sand or silty clay. The water level in Testhole S11-2 was at about 1.0 m below the ground surface. Testholes S11-1 and S11-3 were dry upon completion of augering.

Fill, ranging in thickness from 1.4 to 3.7 m, was encountered in the testholes. The fill comprised peat with rock or sand.

Sand to silty sand, about 0.3 to 0.6 m thick, was encountered below the fill in Testholes S11-1 and S11-3.

Silty clay, about 0.5 m thick, was contacted below the fill in Testhole S11-2.

Testholes S11-1, S11-2 and S11-3 were terminated above program depths to avoid potential embankment movement.

General Area

Testholes S11-4 to S11-12 were drilled in the swamp adjacent to the existing embankment.

The subsurface stratigraphy generally comprised a surficial peat layer overlying native sand, silty sand, silty clay and silt mantling bedrock. The water level was generally at to about 1.3 m below ground surface.

Black amorphous to fibrous peat, ranging in thickness from 0.9 to 2.6 m, was encountered in the testholes. Standard penetration test 'N' values recorded were 1 and 2. The moisture content of two peat samples were 192 and 410 percent.

Very loose to compact sand to silty sand, about 1.8 to 4.2 m thick, was encountered below the peat in Testholes S11-4, S11-5, S11-6, S11-11 and S11-12. Standard penetration test 'N' values ranged from 2 to 14. Dynamic cone test penetration resistance values ranged from 2 to greater than 50. The moisture content of the sand ranged from 20 to 22 percent.

Soft to firm silty clay, about 4.5 to 6.2 m thick, was contacted below the peat in Testholes S11-7 to S11-10. Standard penetration test 'N' value was 3. Field vane tests measured undrained shear strength values of 17 to 27 kPa, with an average value of 23 kPa. The sensitivity numbers ranged from 1 to 7. An Atterberg Limits test measured a liquid limit of 52 and a plasticity index of 29. The silty clay can be classified as 'CH' in accordance with the MTC Soil Classification Manual. The wet and dry density was 1460 and 928 kg/m³. Consolidation test measured an initial void ratio of 2.0, a

recompression index of 0.33, and a compression index of 1.0. Consolidation undrained triaxial compression test measured a friction angle of 14°. Grain size distribution test indicates the silty clay has 63, 34 and 3 percent clay, silt and sand sized particles.

The silty sand in Testhole S11-11 was underlain by a 1.5 m thick soft to firm silty clay. Field vane tests measured an undrained shear strength values of 18 and 32 kPa. The moisture content of the silty clay was 58 percent.

A discontinuous 1.2 and 2.0 m thick loose to compact silt layer was encountered below the clayey silt layer in Testholes S11-7 and S11-12, respectively.

Dense sand and gravel was contacted locally below the silty clay in Testhole S11-11 at a depth of 6.5 m and extended to termination depth of 8.0 m. Standard penetration test 'N' value was 80.

Bedrock was inferred by auger refusal at depths of 3.9 to 11.0 m.

CLOSURE

The field investigation was carried out under the direction and supervision of Mr. J.F. Wright, B.Sc., Senior Geologist and Mr. E. Wong, P.Eng. This report was prepared by Mr. E. Wong, P.Eng. and reviewed by Mr. D.W. Kerr, P.Eng., Manager Geotechnical and Geo-Environmental Services, Hamilton office.



Yours very truly

Peto MacCallum Ltd.

A handwritten signature in black ink, appearing to read "D. W. Kerr", written over a horizontal line.

Dennis W. Kerr, M.Eng., P.Eng.
Manager Geotechnical and
Geo-Environmental Services



A handwritten signature in black ink, appearing to read "Brian R. Gray", written over a horizontal line.

Brian R. Gray, M.Eng., P.Eng.
Vice-President
Geotechnical and
Geo-Environmental Services

EW:mmma

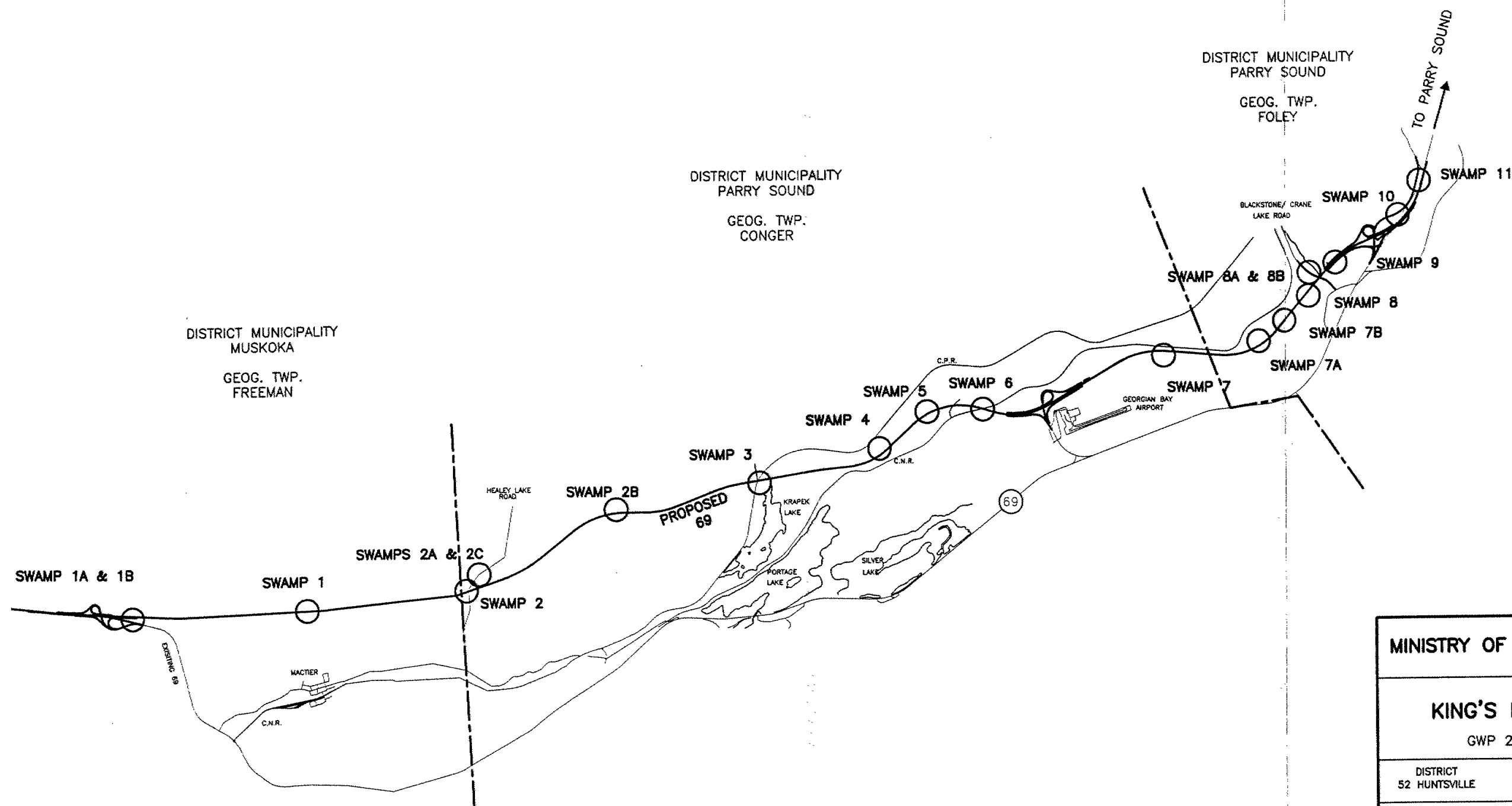
APPENDIX A

- Table I - Swamp Number and Location**
- Drawing No. 1 - Swamp Location Plan**

TABLE I

SWAMP NUMBER AND LOCATION
G.W.P. 290-97-00

SWAMP NO.	DISTRICT MUNICIPALITY	GEOG. TWP	ROAD COMPONENT	STATION
1	Muskoka	Freeman	Hwy 69, SBL	18+250 – 18+350
			Hwy 69, NBL	18+175 – 18+350
1A	Muskoka	Freeman	Hwy 169, Con	10+085 – 10+250
1B	Muskoka	Freeman	Hwy 169, Con	11+900 – 12+175
2	Parry Sound	Conger	Hwy 69, SBL	10+240 – 10+430
			Hwy 69, NBL	10+225 – 10+335
2A	Parry Sound	Conger	Healey Lake Road	9+925 – 10+025
2B	Parry Sound	Conger	Hwy 69, SBL	13+040 – 13+160
			Hwy 69, NBL	13+000 – 13+125
2C	Parry Sound	Conger	Healey Lake Road	10+100 – 10+160
3	Parry Sound	Conger	Hwy 69, SBL	15+400 – 15+600
			Hwy 69, NBL	15+390 – 15+575
4	Parry Sound	Conger	Hwy 69, NBL	18+075 – 18+200
5	Parry Sound	Conger	Hwy 69, NBL	18+925 – 19+150
6	Parry Sound	Conger	Hwy 69, SBL	19+280 – 19+460
			Hwy 69, NBL	19+325 – 19+450
7	Parry Sound	Conger	Hwy 69, SBL	21+800 – 22+310
			Hwy 69, NBL	21+550 – 22+300
7A	Parry Sound	Foley	Hwy 69, NBL	11+080 – 11+240
7B	Parry Sound	Foley	Hwy 69, SBL	11+690 – 11+740
			Hwy 69, NBL	11+690 – 11+730
8	Parry Sound	Foley	Hwy 69, SBL	11+990 – 12+030
			Hwy 69, NBL	11+990 – 12+030
8A	Parry Sound	Foley	Blackstone – Crane Lake Road	9+725 – 9+875
8B	Parry Sound	Foley	Blackstone – Crane Lake Road	10+225 – 10+320
9	Parry Sound	Foley	Hwy 69, SBL	12+970 – 13+100
			Hwy 69, NBL	12+980 – 13+125
10	Parry Sound	Foley	Hwy 69, NBL	14+440 – 14+500
11	Parry Sound	Foley	Hwy 69, NBL	14+620 – 14+700



MINISTRY OF TRANSPORTATION

KING'S HIGHWAY 69

GWP 290-97-00

DISTRICT
52 HUNTSVILLE

REGION
NORTHERN

SWAMP LOCATION PLAN

Peto MacCallum Ltd.
CONSULTING ENGINEERS
45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	J.S.	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	E.W.	MAY 1998	N.T.S.	97TF088B	1
APPROVED	D.W.K.				

APPENDIX B

List of Abbreviations

OPSD – 100.06

Testhole Logs

Drawing Nos. 2A and 2B to 18A - Testhole Location Plans

LIST OF ABBREVIATIONS

PENETRATION RESISTANCE

STANDARD PENETRATION RESISTANCE 'N', - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A STANDARD SPLIT SPOON SAMPLER 0.3 m INTO THE SUBSOIL. DRIVEN BY MEANS OF A 63.5 kg HAMMER FALLING FREELY A DISTANCE OF 0.76 m.

DYNAMIC PENETRATION RESISTANCE: - THE NUMBER OF BLOWS REQUIRED TO ADVANCE A 51 mm, 60 DEGREE CONE, FITTED TO THE END OF DRILL RODS. 0.3 m INTO THE SUBSOIL. THE DRIVING ENERGY BEING 475 J PER BLOW.

DESCRIPTION OF SOIL

THE CONSISTENCY OF COHESIVE SOILS AND THE RELATIVE DENSITY OR DENSENESS OF COHESIONLESS SOILS ARE DESCRIBED IN THE FOLLOWING TERMS:

<u>CONSISTENCY</u>	<u>'N' BLOWS/0.3 m</u>	<u>c kPa</u>	<u>DENSENESS</u>	<u>'N' BLOWS/0.3 m</u>
VERY SOFT	0 – 2	0 – 12	VERY LOOSE	0 – 4
SOFT	2 – 4	12 – 25	LOOSE	4 – 10
FIRM	4 – 8	25 – 50	COMPACT	10 – 30
STIFF	8 – 15	50 – 100	DENSE	30 – 50
VERY STIFF	15 – 30	100 – 200	VERY DENSE	> 50
HARD	> 30	> 200		
W.T.P.L. WETTER THAN PLASTIC LIMIT			D.T.P.L. DRIER THAN PLASTIC LIMIT	
A.P.L. ABOUT PLASTIC LIMIT				

TYPE OF SAMPLE

S.S.	SPLIT SPOON	T.W.	THINWALL OPEN
W.S.	WASHED SAMPLE	T.P.	THINWALL PISTON
S.B.	SCRAPER BUCKET SAMPLE	O.S.	OESTERBERG SAMPLE
A.S.	AUGER SAMPLE	F.S.	FOIL SAMPLE
C.S.	CHUNK SAMPLE	R.C.	ROCK CORE
S.T.	SLOTTED TUBE SAMPLE		
	P.H. SAMPLE ADVANCED HYDRAULICALLY		
	P.M. SAMPLE ADVANCED MANUALLY		
SS-0	SPLIT SPOON SUNK UNDER HAMMER WEIGHT		

SOIL TESTS

Qu	UNCONFINED COMPRESSION	L.V.	LABORATORY VANE
Q	UNDRAINED TRIAXIAL	F.V.	FIELD VANE
Qcu	CONSOLIDATED UNDRAINED TRIAXIAL	C	CONSOLIDATION
Qd	DRAINED TRIAXIAL		

+ - UNDISTURBED SHEAR STRENGTH DETERMINED FROM IN SITU VANE TEST.

ABBREVIATIONS FOR BORING AND TEST DATA

Accep	Acceptable	Gry	Grey	Psty	Polystyrene
Agg	Aggregate	H	Heavy	Poss	Possible
Amor	Amorphous	Hi	Highly	PST	Prime & Surface Treated
Asph	Asphalt	HP	High Plasticity	Quant	Quantity
BR	Bedrock	HM	Hot Mix	Reinf	Reinforced
Blk	Black	Lt	Light	RSS	Remoulded Shear Strength
Bl	Blue	Liq	Liquid	RF	Rock Fill
BH	Borehole	WL	Liquid Limit	Sa	Sand
Bld (y)	Boulder (y)	Lo	Loam	Sat	Saturated
Blds	Boulders	L	Loose	SH	Shale
BU	Break Up	Mrl	Marl	St	Sensitivity
Br	Brown	Matl	Material	SSM	Select Subgrade Material
CF	Channel Face	Max	Maximum	Sh Rk	Shot Rock
Cl	Clay	MDD	Maximum Dry Density	Sl (y)	Silt (y)
Co	Coarse	MWD	Maximum Wet Density	Sl (ly)	Slight (ly)
Cob	Cobbles	Med	Medium	SP	Slight Plasticity
Comp	Compact	MP	Medium Plasticity	Stn (y)	Stoney
Conc	Concrete	Mod	Moderate	DR	Relative Density
Confam	Contaminated	Mott	Mottled	Stks	Streaks
Cord	Corduroy	Mul	Mulch	Surf	Surface
Cr	Crushed	NFP	No Further Progress	Temp	Temperature
Dk	Dark	NFP (Bids)	No Further Progress (Boulders)	TH	Test Hole
Decomp	Decomposed	Num	Numerous	TP	Test Pit
D	Dense	OCC	Occasional	Tps	Topsoil
E	Earth	Wopt	Optimum Moisture Content	Tr	Trace
Fib	Fibrous	Ora	Orange	USS	Undisturbed Shear Strength
w	Field Moisture Content	Org	Organic	Unreinf	Unreinforced
F	Fine	Org M	Organic Matter	Varv	Varved
Fr Wat	Free Water	Ob	Overburden	VF	Very Fine
FB	Frost Boil	Pavt	Pavement	WT	Water Table
FH	Frost Heave	Pedo	Pedological	Weath	Weathered
Gran	Granular	Pen Mac	Penetration Macadam	W	With
Gr	Gravel (ly)	Wp	Plastic Limit	Wd (y)	Wood (y)
Grn	Green	Ip	Plasticity Index	Yel	Yellow

ONTARIO PROVINCIAL STANDARD DRAWING

Date 1986 07 18 Rev

SUSCEPTIBILITY TO FROST HEAVING

HSFH - High
MSFH - Medium
LSFH - Low

ABBREVIATIONS GEOTECHNICAL

Date

OPSD - 100.06

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 1

Station 18+250 - 18+350

Southbound Lane/Twp. of Freeman

Datum Centre Line Median

				S1-10	18+350	29.3 LT C/L	El. 242.83
S1-1	18+275	31.8 LT C/L	El. 244.13		0-150	Blk Si Tps	
	0	NFP BR			150-450	L Br Sa W Si Wet	
					450	NFP BR	
						Fr Wat @ 200	
S1-2	18+275	18.8 LT C/L	El. 242.73				
	0-1.35	Blk Amor Peat					
	1.35	NFP BR		S1-11	18+350	18.8 LT C/L	El. 242.83
		Fr Wat @ 1.00			0-600	Blk Amor Peat	
					600	NFP BR	
						Fr Wat @ 200	
S1-4	18+300	31.8 LT C/L	El. 242.61				
	0-250	Blk Si Tps					
	250	NFP BR					
S1-5	18+300	18.8 LT C/L	El. 242.61				
	0-1.55	Blk Amor Peat					
	1.55-1.95	Comp Gry Sa Tr Si Wet					
	1.95	NFP BR					
		Fr Wat @ 0					
S1-7	18+325	29.3 LT C/L	El. 242.70				
	0-300	Blk Si Tps					
	300	NFP BR					
S1-8	18+325	18.8 LT C/L	El. 242.60				
	0-1.50	Blk Amor Peat					
	1.50	NFP BR					
		Fr Wat @ 300					

LOG OF BOREHOLE NO. S1-3

PROJECT GWP 290-97-00



OUR PROJECT 97TF088B

LOCATION Station 18+275, 5.8 m Lt., Highway 69, SBL, Twp. of Freeman BORING DATE 98.02.02

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN B. G.

SOIL PROFILE				SAMPLES		SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_p				
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				WATER CONTENT %				
							BLOWS/0.3M				W_p W W_L				
	GROUND ELEVATION 242.53						20	40	60	80	10	20	30		
0	Peat Amorphous, Black		242											Upon completion of augering, borehole caved at 1.50 m with water level at 0.25 m.	
			241												
1.5															
2.25	Sand Trace Silt, Trace Gravel Grey, Wet Compact		240	1	SS	18									
3.0															
			239	2	SS	11									
3.75															
	End Of Borehole Auger Refusal Probable Bedrock		238												
4.5															
6.0															
7.5															
9.0															
10.5															
12.0															
13.5															
15.0															
16.5															

NOTES:

CHECKED BY: E. W.

LOG OF BOREHOLE NO. S1-6

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 18+300, 5.8 m Lt., Highway 69, SBL, Twp. of Freeman BORING DATE 98.02.02

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers / Vane Test

TECHNICIAN B. G.

SOIL PROFILE				SAMPLES			SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_p				
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				WATER CONTENT %				
							BLOWS/0.3M				W_p W W_L				
0	GROUND ELEVATION 242.61						20	40	60	80	10	20	30	Upon completion of augering, borehole caved at 1.20 m with water level at 0.25 m.	
	Peat Amorphous, Black		242												
1.50	-----		241	1	SS	0	+						W=87.9		
	Becoming Fibrous		240				+								
3.0			239	2	TW	P.H.	+						W=91.8		
			238	3	TW	P.H.	+								
4.50			237	4	SS	20									
5.70	Sand With Gravel Grey, Wet Compact		236	5	SS	24									
6.0	Sandy Silt Grey, Wet Compact		235												
7.20															
7.5	End Of Borehole Auger Refusal Probable Bedrock														
9.0															
10.5															
12.0															
13.5															
15.0															
16.5															

NOTES:

- Vane test was carried out at a distance of 1.5 m from the borehole.

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S1-9

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 18+325, 5.8 m Lt., Highway 69, SBL, Twp. of Freeman BORING DATE 98.02.02

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers / Vane Test

TECHNICIAN B. G.

SOIL PROFILE				SAMPLES		SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L			GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P			
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST				WATER CONTENT W			
							BLOWS/0.3M				WATER CONTENT %			
0	GROUND ELEVATION 242.65						20	40	60	80	10	20	30	Upon completion of augering, borehole caved at 2.0 m with water level at ground surface.
	Peat		242											
	Amorphous Black													
1.50	-----		241	1	TW	P.H.								
	Becoming Fibrous			2	SS	2							W=427	
			240											
3.0														
			239	3	SS	0							W=602	
				4	TW	P.H.								
4.5			238											
				5	SS	0								
5.10														
	Sand		237											
	Trace Gravel													
6.0	Grey, Wet			6	SS	2								
	Very Loose													
6.60			236											
	Silty Clay			7	AS									
	Trace Sand													
7.50	Grey, Very Soft		235											
				8	SS	24								
	Sand													
	Trace Silt, Trace Gravel		234											
	Grey, Wet													
9.0	Compact To Very Dense			9	SS	50/150mm								
9.15	End Of Borehole		233											
	Auger Refusal													
	Probable Bedrock													
10.5														
12.0														
13.5														
15.0														
16.5														

NOTES:

- Vane test was carried out at a distance of 1.5 m from the borehole.

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S1-12

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 18+350, 5.8 m Lt., Highway 69, SBL, Twp. of Freeman BORING DATE 98.02.02

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN B. G.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m VALUES	20 40 60 80				PLASTIC LIMIT W_P					
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				WATER CONTENT %					
							BLOWS/0.3M				W_P W W_L					
							20 40 60 80				10 20 30					
GROUND ELEVATION 242.83																
0	Peat Amorphous, Black Becoming Fibrous		242											Upon completion of augering, borehole caved at 1.05 m with water level at 0.20 m.		
0.75				1	SS	0									$W=471$	
1.5				241	2	SS	0									$W=608$
2.70	Sand With Gravel Grey, Wet Loose		240	3	SS	0								$W=582$		
3.0				4	SS	4										
3.60				239	5	AS										
4.5	Silty Clay Grey, Very Soft		238	6	SS	60								Sample 5, CL $W_L = 25$ $W_P = 15$ $I_P = 10$		
5.25	Sand With Silt Grey, Wet Very Dense		237													
6.0	End Of Borehole Auger Refusal Probable Bedrock															
7.5																
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

CHECKED BY: E.W.

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 1

Station 18+175 - 18+350

Northbound Lane/Twp. of Freeman

Datum Centre Line Median

S1-16	18+200	5.8 RT C/L	El. 243.20
	0-1.00	Blk Amor Peat	
	1.00	NFP BR	
		FR Wat @ 0	

S1-36	18+250	5.3 RT C/L
		El. 242.33
	0-2.10	Blk Fib Peat
	2.10-2.40	Gry Sa W Gr Wet
	2.40	NFP BR
		Fr Wat @ 0

S1-30	18+325	8.3 RT C/L	El. 242.34
	0-5.60	Blk Fib Peat	
	5.60-6.20	L Gry Sa W Gr Wet	
	6.20-6.80	Soft Gry Siy Cl	
	6.80-8.00	L To Comp Gry Siy Sa Tr Gr Wet	
	8.00	NFP BR	
		Fr Wat @ 0	

S1-33	18+350	5.3 RT C/L	El. 242.45
	0-750	Blk Amor Peat	
	750-2.70	Blk Fib Peat	
	2.70-3.30	L Gry Sa W Gr Wet	
	3.30-3.60	Soft Gry Siy Cl	
	3.60-6.00	L Gry Siy Sa Tr Gr Wet	
		% Passing	L9385 SM
		13.2 mm = 100	LSFH
		9.50 mm = 98	'K' Factor = 0.28
		4.75 mm = 90	
		2.00 mm = 86	
		850 µm = 82	
		425 µm = 76	
		250 µm = 67	
		150 µm = 58	
		75 µm = 46	
	6.00	NFP BR	
		Fr Wat @ 0	

LOG OF BOREHOLE NO. S1-13

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 18+175, 5.3 m Rt., Highway 69, NBL, Twp. of Freeman

BORING DATE 98.01.30

ENGINEER

E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN

K. H.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P					
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				WATER CONTENT W					
							BLOWS/0.3M				W_P W W_L					
							20 40 60 80				10 20 30					
0	GROUND ELEVATION 242.19															
	Peat Amorphous, Black													Upon completion of augering, borehole caved at 1.0 m with water level at 1.20 m.		
0.90																
1.20	Silty Clay Trace Sand Grey, Stiff		241	1	SS	15	•									
1.5																
2.25			240													
	Sand With Gravel Grey, Wet Compact															
3.0			239													
	End Of Borehole Auger Refusal Probable Bedrock															
4.5																
6.0																
7.5																
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

CHECKED BY: E. W.

LOG OF BOREHOLE NO. S1-14

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 18+175, 18.8 m Rt., Highway 69, NBL, Twp. of Freeman BORING DATE 98.01.28 ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - 1 VALUES	20 40 60 80				PLASTIC LIMIT W_P					
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST				WATER CONTENT W					
							BLOWS/0.3M				W_P W W_L					
							20 40 60 80				WATER CONTENT % 10 20 30					
0	GROUND ELEVATION 242.19															
	Peat Amorphous, Black		241	1	SS	1								W=560	Upon completion of augering, borehole caved at 2.0 m with water level at ground surface.	
1.5																
1.80				2	SS	0										
2.25	Sand With Silt Grey, Wet Very Loose		240													
3.0	End Of Borehole Auger Refusal Probable Bedrock															
4.5																
6.0																
7.5																
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S1-15

PROJECT GWP 290-97-00

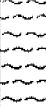

OUR PROJECT 97TF088B

LOCATION Station 18+175, 30.8 m Rt., Highway 69, NBL, Twp. of Freeman BORING DATE 98.01.30

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST *				WATER CONTENT %					
0	GROUND ELEVATION 242.19						20	40	60	80	10	20	30	Upon completion of augering, borehole caved at 1.5 m with water level at ground surface.		
	Peat Amorphous, Black		241													
1.5																
1.80				1	SS	7	•									
2.25	Sand With Gravel Grey, Wet Loose		240													
3.0																
	End Of Borehole Auger Refusal Probable Bedrock															
4.5																
6.0																
7.5																
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

CHECKED BY: E.W.




LOG OF BOREHOLE NO. S1-17

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 18+200, 18.8 m Rt., Highway 69, NBL, Twp. of Freeman BORING DATE 98.01.28 ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers TECHNICIAN K. H.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P					
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				WATER CONTENT W					
							BLOWS/0.3M				WATER CONTENT %					
0	GROUND ELEVATION 242.60						20	40	60	80	10	20	30			
	Peat Amorphous, Black		242												Upon completion of augering, borehole caved at 2.10 m with water level at 2.0 m.	
				1	SS	0								W=1037		
1.5			241	2	SS	0								W=653		
			240	3	SS	4	•				⊙					
2.70																
2.85	Sand With Gravel Grey, Wet Loose		239	4	SS	0										
4.20	Silty Clay Grey, Very Soft		238													
4.5	End Of Borehole Auger Refusal Probable Bedrock															
6.0																
7.5																
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S1-18

PROJECT GWP 290-97-00





OUR PROJECT 97TF088B

LOCATION Station 18+200, 30.8 m Rt., Highway 69, NBL, Twp. of Freeman BORING DATE 98.01.30

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P					
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				WATER CONTENT W					
							BLOWS/0.3M				WATER CONTENT %					
							20	40	60	80	10	20	30			
0	GROUND ELEVATION 242.60													Upon completion of augering, borehole caved at 1.0 m with water level at ground surface.		
	Peat Amorphous, Black		242													
1.5			241	1	SS	0										
			240													
3.0	3.00			2	SS	1										
	Sand With Gravel Grey, Wet Very Loose		239													

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S1-19

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 18+225, 5.3 m Rt., Highway 69, NBL, Twp. of Freeman BORING DATE 98.01.30

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN K. H.

[illegible]

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S1-20

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 18+225, 18.8 m Rt., Highway 69, NBL, Twp. of Freeman

BORING DATE 98.01.29

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - N	DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST				PLASTIC LIMIT W_P					
							BLOWS/0.3M				WATER CONTENT %					
							20	40	60	80	10	20	30			
							20	40	60	80	10	20	30			
0	GROUND ELEVATION 242.43															
	Peat		242													
	Amorphous, Black			1	SS	5								W=505		
1.5			241	2	SS	3								W=299		
2.25			240	3	SS	0								W=748		
	Becoming Fibrous		239	4	SS	0								W=778		
			238	5	SS	3										
4.50			237	6	SS	18										
5.25	Sand With Gravel															
	Occasional Clay Seams															
	Grey, Wet															
	Compact															
6.0	End Of Borehole															
	Auger Refusal															
	Probable Bedrock															
7.5																
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S1-21

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B


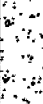



LOCATION Station 18+225, 30.8 m Rt., Highway 69, NBL, Twp. of Freeman

BORING DATE 98.01.30

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P					
							DYNAMIC CONE PENETRATION x				WATER CONTENT W					
							STANDARD PENETRATION TEST •				W_P W W_L					
							BLOWS/0.3M				WATER CONTENT %					
	GROUND ELEVATION 242.43						20 40 60 80	10 20 30								
0	Peat Fibrous, Black		242											Upon completion of augering, borehole caved at 2.0 m with water level at 0.10 m.		
			241													
1.5			240													
			239	1	SS	0										
3.0	Sand With Gravel Grey, Wet Compact		238	2	SS	11										
3.90																
4.5			237													
5.40																
6.0	Silty Clay Grey, Soft															
6.30	Sand With Gravel Grey, Wet Loose		236	3	SS	4										
6.90																
			235													
7.5	End Of Borehole Auger Refusal Probable Bedrock															
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S1-22

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 18+250, 18.8 m Rt., Highway 69, NBL, Twp. of Freeman

BORING DATE 98.01.29

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES		SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_p				
							DYNAMIC CONE PENETRATION x				WATER CONTENT W				
							STANDARD PENETRATION TEST *				W_p W W_L				
							BLOWS/0.3M				WATER CONTENT %				
							20	40	60	80	10	20	30		
0	GROUND ELEVATION 242.33														
	Peat		242												
	Amorphous, Black														
			241	1	SS	0							W=655	●	
1.5	1.65												W=1165	●	

	Becoming Fibrous														
			240												
													W=1165	●	
3.0															
			239	4	SS	0									
			238	5	SS	0									
4.20															
4.50	Sand With Gravel														
	Grey, Wet														
	Very Loose														
5.25															
	Silty Clay		237	6	SS	8									
	Grey, Soft														
6.0															
	End Of Borehole														
	Auger Refusal														
	Probable Bedrock														

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S1-23

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 18+250, 30.8 m Rt., Highway 69, NBL, Twp. of Freeman BORING DATE 98.01.30 ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_p					
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				WATER CONTENT %					
							BLOWS/0.3M				WATER CONTENT %					
							20 40 60 80				10 20 30					
0	GROUND ELEVATION 242.33													Upon completion of augering, borehole caved at 0.80 m with water level at 0.60 m.		
	Peat		242													
	Amorphous, Black															
			241													
1.50	-----			1	SS	0										
	Becoming Fibrous		240													
3.0			239	2	SS	0										
			238													
4.5																
4.65				3	SS	6	•			•						
	Sand With Gravel And Clay Seams Loose		237													
5.85																
6.0	End Of Borehole Auger Refusal Probable Bedrock		236													

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S1-24

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 18+275, 5.3 m Rt., Highway 69, NBL, Twp. of Freeman BORING DATE 98.01.30

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				PLASTIC LIMIT W_P					
							BLOWS/0.3M				WATER CONTENT %					
							20	40	60	80	10	20	30			
0	GROUND ELEVATION 242.44						20	40	60	80	10	20	30	Upon completion of augering, borehole caved at 0.90 m with water level at 0.80 m.		
	Peat Fibrous, Black		242													
1.5			241													
			1	SS	0											
			240													
3.0																
3.60			239	2	SS	0										
	Sand Trace Silt, Trace Clay Grey, Wet Loose To Compact			3	SS	6										
4.5			238													
			4	SS	9											
			237													
6.0																
6.45			236	5	SS	16										
	End Of Borehole Auger Refusal Probable Bedrock															
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S1-25

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 18+275, 18.8 m Rt., Highway 69, NBL, Twp. of Freeman BORING DATE 98.02.03 ENGINEER

E. W.

BORING METHOD Continuous Flight Hollow Stem Augers/Vane Test

TECHNICIAN K. H.

[illegible]

NOTES:

1. Vane test was carried out at a distance of 1.5m from the borehole

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S1-26

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 18+275, 30.8 m Rt., Highway, 69 NBL, Twp. of Freeman BORING DATE 98.01.30

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES			SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L			GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - 1 VALUES	DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				PLASTIC LIMIT W_p			
							BLOWS/0.3M				WATER CONTENT %			
							20	40	60	80	10	20	30	
0	GROUND ELEVATION 242.41						20	40	60	80	10	20	30	Upon completion of augering, borehole caved at 0.90 m with water level at ground surface.
	Peat Amorphous, Black		242											
1.50	Becoming Fibrous		241	1	SS	0								
			240											
3.0			239	2	SS	0								
			238											
4.5			237	3	SS	0								
4.80	Sand Trace Silt, Trace Gravel Grey, Wet Very Loose		236	4	SS	3								
6.0			235	5	SS	3								
6.90			234	6	SS	12								
7.5	Silty Clay Grey, Soft													
8.25	Sand With Gravel Grey, Wet Compact													
9.0	End Of Borehole Auger Refusal Probable Bedrock													
10.5														
12.0														
13.5														
15.0														
16.5														

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S1-27

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 18+300, 5.3 m Rt., Highway 69, NBL, Twp. of Freeman BORING DATE 98.01.30

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers/ Vane Test

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES			SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L			GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_p			
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				WATER CONTENT W			
							BLOWS/0.3M				WATER CONTENT %			
0	GROUND ELEVATION 242.35						20	40	60	80	10	20	30	Upon completion of augering, borehole caved at 2.0 m with water level at ground surface.
	Peat Fibrous, Black		242											
			241											
1.5			240											
			239											
3.0			238	1	TW	P.H.								
4.5	Sand Trace Silt, Trace Gravel Grey, Wet Loose To Compact		237											
5.55			236											
6.0			235											
7.5			234											
9.0			233											
	With Clay Seams		232											
10.5			231											
12.0			230											
12.60			229											
13.5	End Of Borehole Auger Refusal Probable Bedrock													
15.0														
16.5														

NOTES:

- Vane test carried out at a distance of 1.5m from borehole

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S1-28

PROJECT GWP 290-97-00

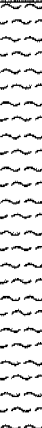
OUR PROJECT 97TF088B

LOCATION Station 18+300, 18.8 m Rt., Highway 69, NBL, Twp. of Freeman BORING DATE 98.01.29

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES			SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS		
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P						
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST				WATER CONTENT W						
							BLOWS/0.3M				W_P W W_L						
							20 40 60 80				10 20 30						
0	GROUND ELEVATION 242.35																
	Peat Fibrous, Black		242											Upon completion of augering, borehole caved at 1.0 m with water level at ground surface.			
															W=1656		
1.5					241	1	SS	0								W=1013	
					240												W=1291
3.0			239	4	SS	0								W=1542			
			238														
4.5																	

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S1-29

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 18+300, 30.8 m Rt., Highway 69, NBL, Twp. of Freeman BORING DATE 98.01.30

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P					
							DYNAMIC CONE PENETRATION x				WATER CONTENT W					
							STANDARD PENETRATION TEST *				W_P W W_L					
							BLOWS/0.3M				WATER CONTENT %					
							20	40	60	80	10	20	30			
0	GROUND ELEVATION 242.35						20	40	60	80	10	20	30	Upon completion of augering, borehole caved at 0.60 m with water level at 0.50 m.		
	Peat Fibrous, Black		242													
			241													
1.5				1	SS	0										
			240													
3.0																
			239	2	SS	0										
			238													
4.5																
			237	3	SS	0										
5.40																
	Sand With Gravel Grey, Wet Loose			4	SS	5	•					⊙				
6.0			236	5	SS	0						W=45 ⊙				
6.15																
	Silty Clay Trace Silt, Trace Sand Grey, Very Soft															
7.05			235													
7.20																
	Sand With Gravel Grey, Wet Loose															
			234													
9.0	End Of Borehole Auger Refusal Probable Bedrock															
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S1-31

PROJECT GWP 290-97-00











OUR PROJECT 97TF088B

LOCATION Station 18+325, 18.8 m Rt., Highway 69, NBL, Twp. of Freeman BORING DATE 98.01.29

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N = VALUES	DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				PLASTIC LIMIT W_p					
							BLOWS/0.3M				WATER CONTENT %					
							20	40	60	80	10	20	30			
							20	40	60	80	10	20	30			
0	GROUND ELEVATION 242.34															
	Peat Amorphous, Black		242													
			241													
1.5			240	1	SS	0							W=736	•		
				2	SS	0							W=1041	•		
3.0			239	3	SS	0										
			238													
4.5	4.50			4	SS	0							•			
	Sand With Silt Trace Gravel Grey, Wet Very Loose To Dense		237													
6.0			236	5	SS	0										
			235													
7.5				6	SS	31										
7.95																
	End Of Borehole Auger Refusal Probable Bedrock		234													
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S1-32

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 18+325, 30.8 m Rt., Highway 69, NBL, Twp. of Freeman BORING DATE 98.01.29

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES			SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_p					
							DYNAMIC CONE PENETRATION x				WATER CONTENT W					
							STANDARD PENETRATION TEST •				W_p W W_L					
							BLOWS/0.3M				WATER CONTENT %					
0	GROUND ELEVATION 242.34						20	40	60	80	10	20	30	Upon completion of augering, borehole caved at 2.0 m with water level at ground surface.		
	Peat Fibrous, Black		242													
				1	SS	0							W=496		●	
1.5				2	SS	0									W=1106	●
				240												
				3	SS	0							W=1078		●	
3.0	-3.15-		239	4	SS	0							W=201		●	
	Sand With Gravel Grey, Wet Loose To Compact															
				238												
4.5					5	SS	14	●								
				237												
6.0	-6.45-		236	6	SS	12	●									
	End Of Borehole Auger Refusal Probable Bedrock															
7.5																
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S1-34

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 18+350, 18.8 m Rt., Highway 69, NBL, Twp. of Freeman BORING DATE 98.01.29

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES			SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L			GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_p			
							DYNAMIC CONE PENETRATION x				WATER CONTENT W			
							STANDARD PENETRATION TEST •				W_p — W — W_L			
							BLOWS/0.3M				WATER CONTENT %			
							20	40	60	80	10	20	30	
0	GROUND ELEVATION 242.45													Upon completion of augering, borehole caved at 2.0 m with water level at ground surface.
	Peat		242											
	Amorphous, Black													
-0.75	-----			1	SS	0							W=785	
	Becoming Fibrous		241											
1.5				2	SS	0							W=726	
2.25			240											
	Sand With Gravel			3	SS	5								
	Grey, Wet													
3.0	Loose To Compact		239	4	SS	4								
-3.75														
4.5	End Of Borehole		238											
	Auger Refusal													
	Probable Bedrock													
6.0														
7.5														
9.0														
10.5														
12.0														
13.5														
15.0														
16.5														

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S1-35

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 18+350, 30.8 m Rt., Highway 69, NBL, Twp. of Freeman

BORING DATE 98.01.29

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES		SHEAR STRENGTH C_u (kPa) +		LIQUID LIMIT W_L		GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80		PLASTIC LIMIT W_p		
							DYNAMIC CONE PENETRATION x		WATER CONTENT W		
							STANDARD PENETRATION TEST •		W_p W W_L		
							BLOWS/0.3M		WATER CONTENT %		
0	GROUND ELEVATION 242.45						20 40 60 80		10 20 30		
0.75	Peat Amorphous, Black		242								
	Sand With Silt Grey, Wet Compact To Dense		241	1	SS	20					
				2	SS	17					
2.70				3	SS	40					
3.0	End Of Borehole Auger Refusal Probable Bedrock		239								
4.5											
6.0											
7.5											
9.0											
10.5											
12.0											
13.5											
15.0											
16.5											

NOTES:

CHECKED BY: E.W.

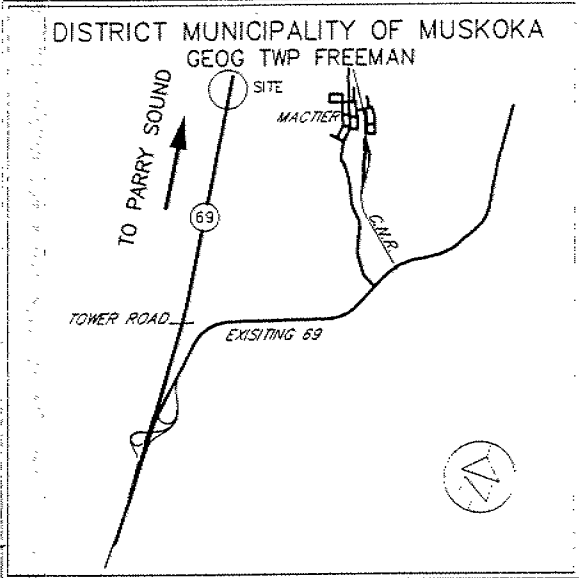
METRIC

PLATE No 790-69/35-0
DRAWING No 07900069035
CONT No C
GWP No 290-97-00

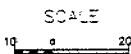


STA 17+700 TO STA 18+400
Survey 1997/12 Revised R

SHEET



KEY PLAN
(N.T.S.)



MINISTRY OF TRANSPORTATION

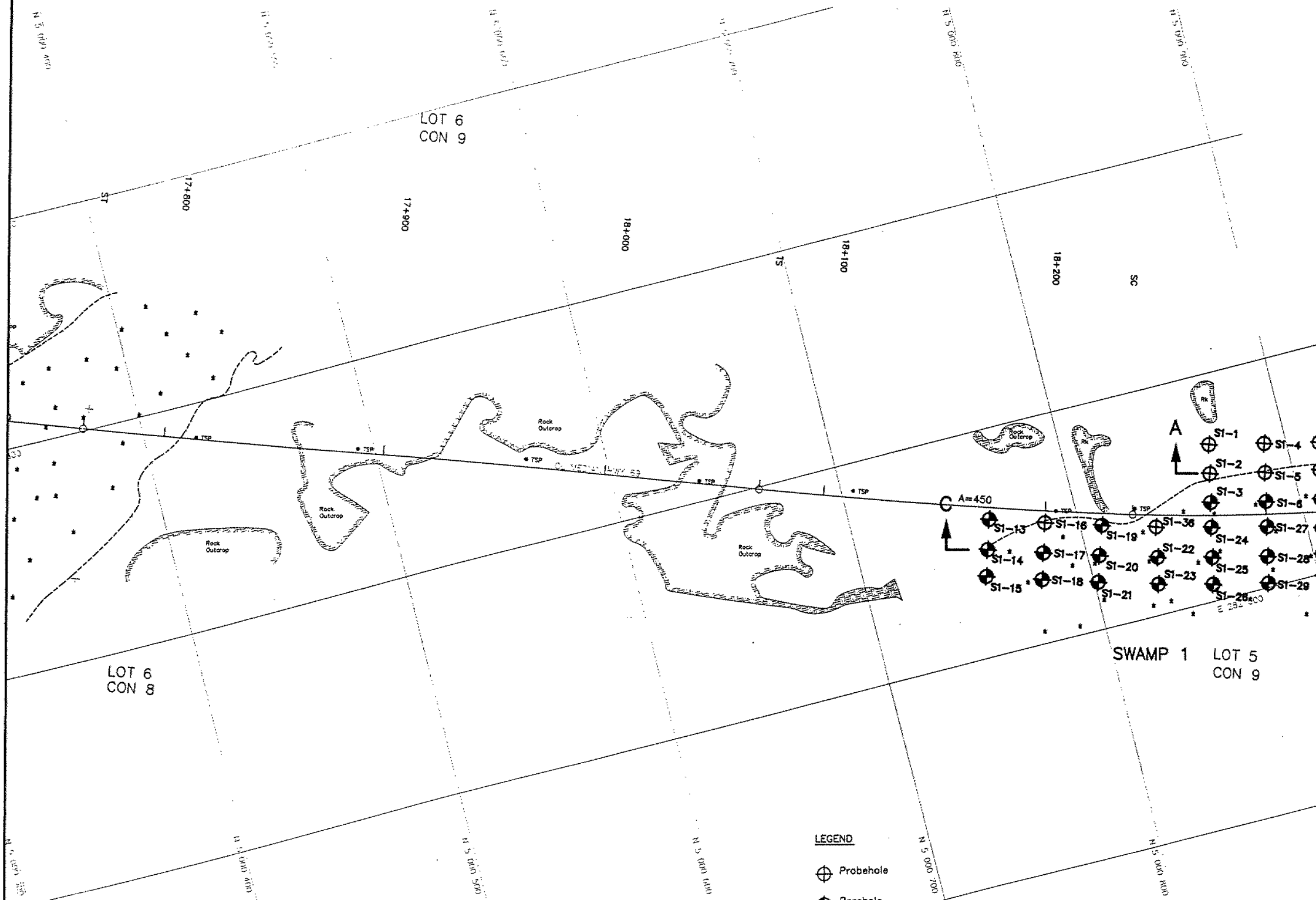
KING'S HIGHWAY 69

DISTRICT 52 HUNTSVILLE	REGION NORTHERN
GEOG. TWP. FREEMAN	DISTRICT MUNICIPALITY MUSKOKA

SWAMP 1
BOREHOLE AND PROBEHOLE LOCATION PLAN

Peto MacCallum Ltd.
CONSULTING ENGINEERS
45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C8

DRAWN J.S.	DATE MAY 1998	SCALE 1 : 2000	JOB NO. 97TF088B	DRAWING NO. 2
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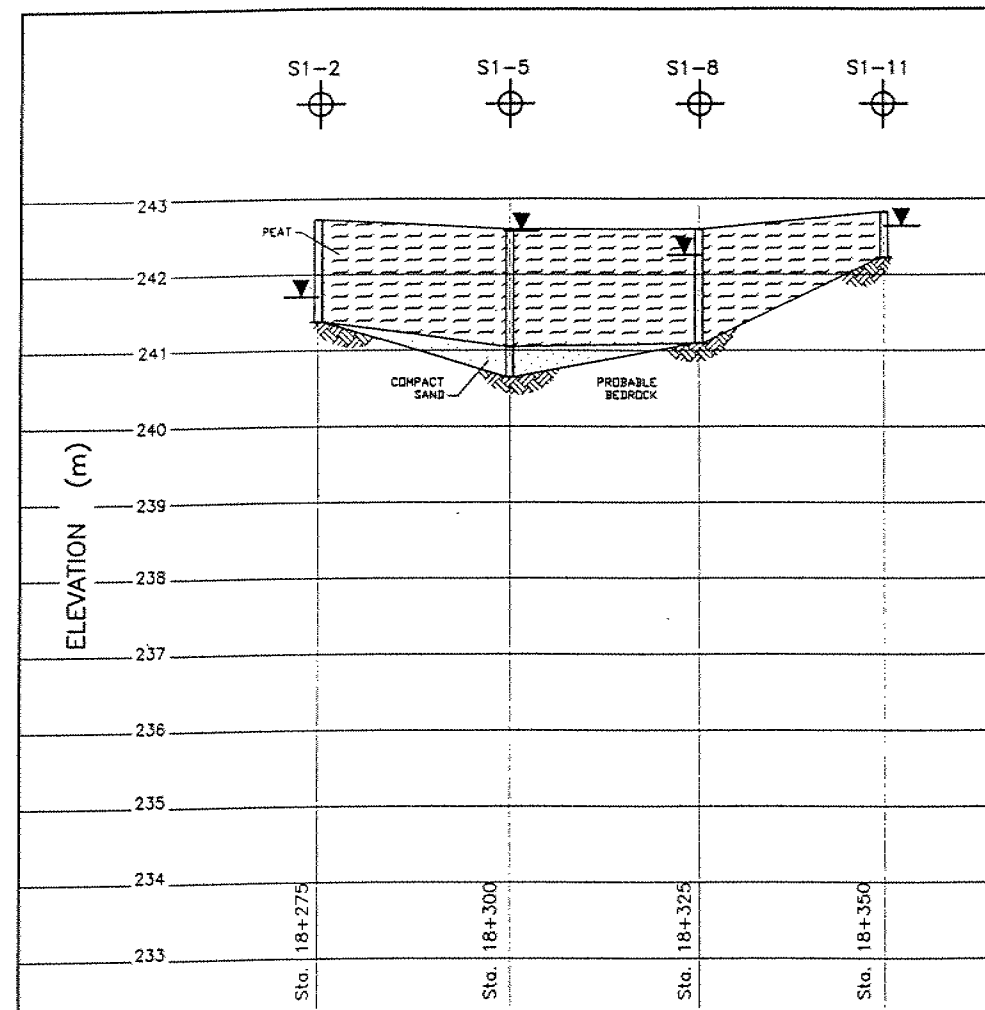


LEGEND

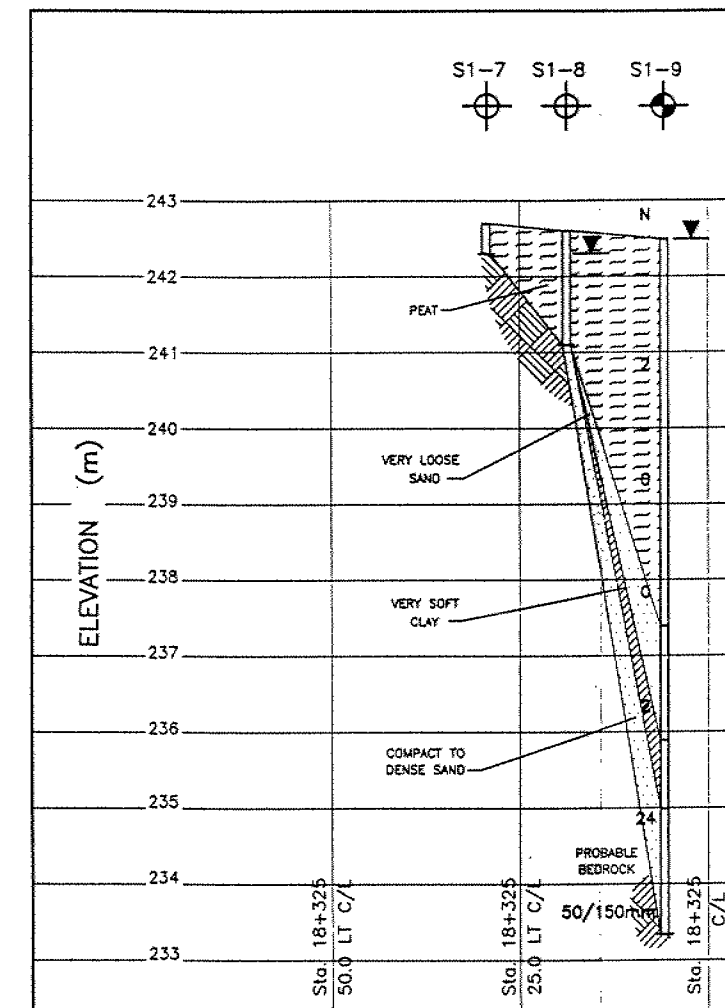
- Probehole
- Borehole

NOTES:

1. Refer to Log of Borehole and Probehole Sheets for description of subsurface conditions.
2. Refer to Drawings 2A and 2B for soil profiles.



SECTION A-A



SECTION B-B

LEGEND

	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		SILT
	CLAY		BEDROCK (INFERRED)
	WATER		ASPHALT
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		

NOTES

1. REFER TO DRAWING NO. 2 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

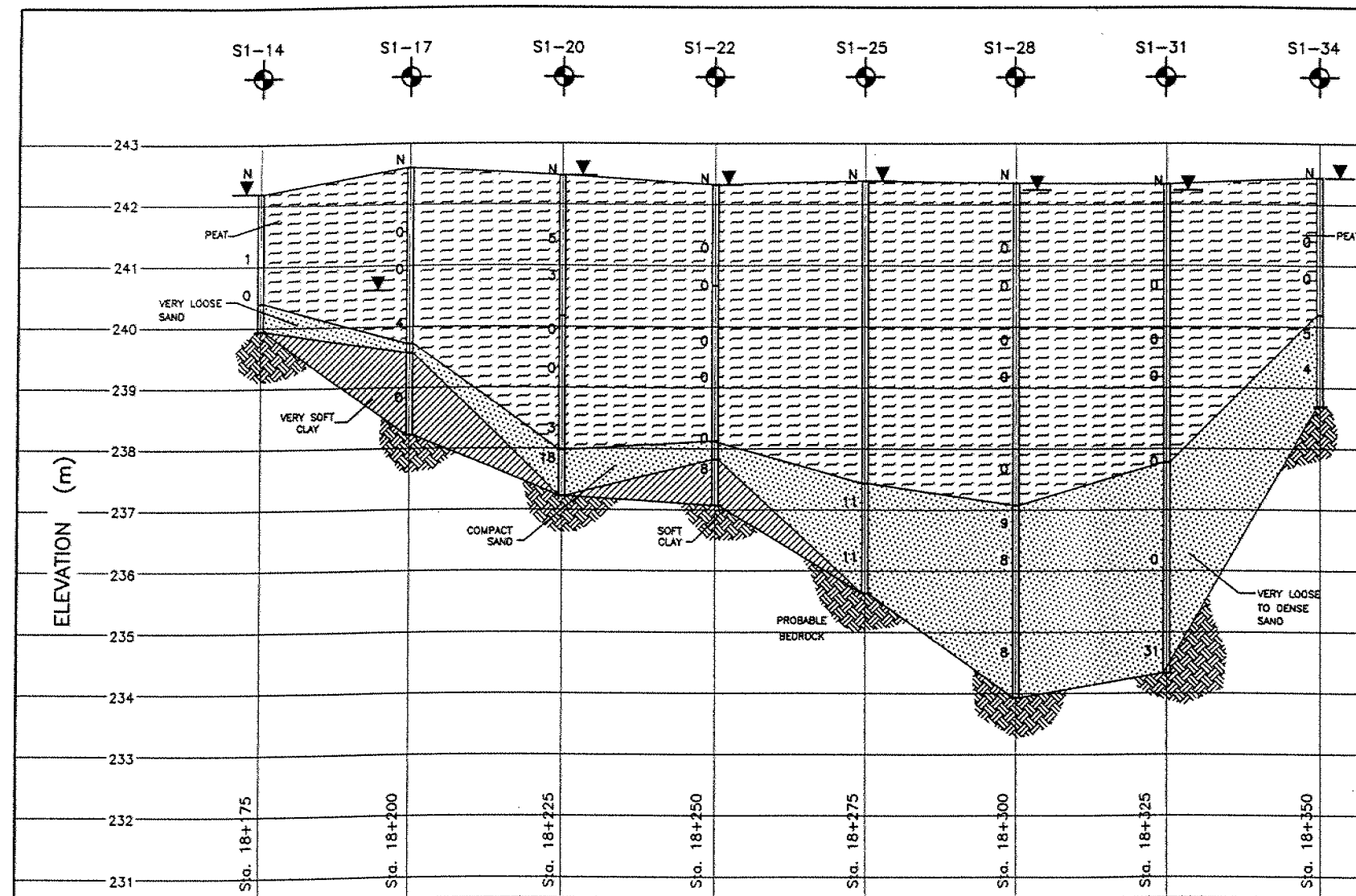
G.W.P. 290-97-00, HIGHWAY 69
SOUTHBOUND LANE/TWP. OF FREEMAN
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 1 - SOIL PROFILES

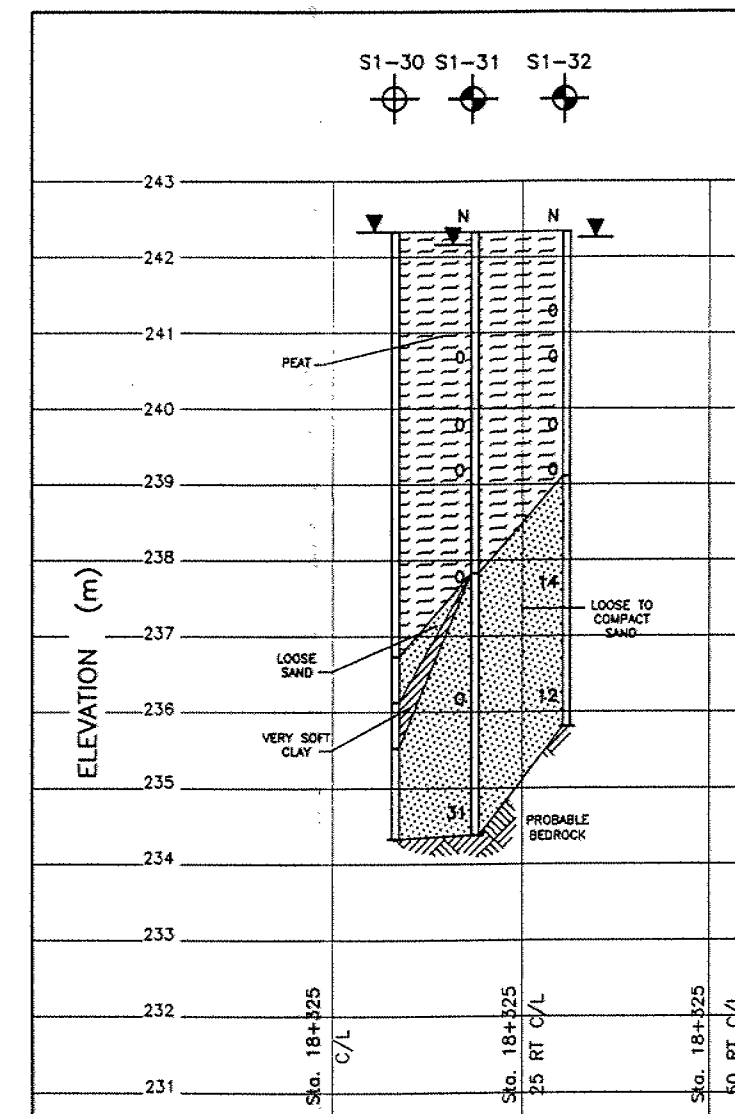
Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	VERTICAL 1:100 HORIZONTAL 1:1000	97TF088B	2A
APPROVED	DWK				



SECTION C-C



SECTION D-D

LEGEND

	PROBEHOLE		BOREHOLE		FILL		SAND		SILT		WATER
	TOPSOIL/PEAT		BEDROCK (INFERRED)		CLAY		ASPHALT				
			OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)								

NOTES

1. REFER TO DRAWING NO. 2 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

G.W.P. 290-97-00, HIGHWAY 69
NORTHBOUND LANE/TWP. OF FREEMAN
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 1 - SOIL PROFILES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	VERTICAL 1:100 HORIZONTAL 1:1000	97TF088B	2B
APPROVED	DWK				

GWP 290-97-00 Highway 69
District 52, Huntsville
Swamp 1A
Station 10+085 - 10+250
Highway 169 Connection
Twp. of Freeman
Datum Centre Line Pavement

S1A-1 10+100 17.0 LT C/L El. 239.28
0-150 Water
150-4.80 Blk Amor Peat
4.80-6.00 V Soft Gry Siy Cl
6.00 NFP BR

S1A-5 10+150 16.5 LT C/L El. 239.20
0-150 Water
150-5.10 Blk Amor Peat
5.10-6.00 Comp Gry Sa Tr Si Wet
6.00-7.50 Soft Gry Siy Cl
7.50 NFP BR

S1A-2 10+100 C/L El. 239.28
0-150 Water
150-4.55 Blk Amor Peat
w @ 2.15 = 1185%
w @ 3.65 = 510%
4.55-4.70 Gry F To Med Sa Wet
w @ 4.60 = 28%
4.70 NFP BR

S1A-7 10+150 16.5 RT C/L El. 239.20
0-200 Water
200-3.60 Blk Amor Peat
3.60-4.50 Comp Gry Sa Tr Si Wet
4.50-5.10 Soft Gry Siy Cl
5.10 NFP BR

S1A-3 10+100 17.0 RT C/L El. 239.28
0-150 Water
150-3.35 Blk Amor Peat
3.35 NFP BR

S1A-9 10+200 15.5 LT C/L El. 239.28
0-250 Water
250-3.90 Blk Amor Peat
3.90-4.95 Soft Gry Siy Cl
4.95 NFP BR

S1A-4 10+125 C/L El. 239.29
0-150 Water
150-4.75 Blk Amor Peat
4.75-5.35 Comp Gry Sa W Cl Seams Wet
5.35 NFP BR

S1A-11 10+200 15.5 RT C/L El. 239.28
0-300 Water
300-3.00 Blk Amor Peat
3.00-4.65 Soft Gry Siy Cl W Sa Seams
4.65 NFP BR

GWP 290-97-00 Highway 69
District 52, Huntsville
Swamp 1A
Station 10+085 - 10+250
Highway 169 Connection
Twp. of Freeman
Datum Centre Line Pavement

S1A-12	10+225	C/L	El. 239.27
	0-200	Water	
	200-2.25	Blk Amor Peat	
	2.25-3.15	Soft Gry Siy Cl	
	3.15	NFP BR	

S1A-13	10+250	15.0 LT C/L	El. 239.29
	0-300	Water	
	300-500	Blk Amor Peat	
	500	NFP BR	

S1A-14	10+250	C/L	El. 239.29
	0-300	Water	
	300	NFP BR	

S1A-15	10+250	15.0 RT C/L	El. 239.29
	0-250	Water	
	250-550	Br Sa Tr Si Wet	
	550	NFP BR	

LOG OF BOREHOLE NO. S1A-6

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 10+150, C/L, Highway 169 Connection, Twp. of Freeman BORING DATE 98.02.19

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers/ Vane Test

TECHNICIAN B. G.

SOIL PROFILE				SAMPLES		SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P				
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST				WATER CONTENT W				
							BLOWS/0.3m				W_P W W_L				
							20 40 60 80				10 20 30				
0	GROUND ELEVATION 239.20														
0.20	Water														
1.5	Peat Fibrous, Black		238	1	SS	0							W=1117		
2.37			237												
3.0			236	2	SS	0							W=1376		
4.20			235												
4.5	Sand Trace Silt Grey, Wet Compact		234	3	SS	12									
5.70			233	4	SS	1									
6.0	Silty Clay Grey, Soft		232												
7.50			231	5	SS	4									
7.95	Sand Trace Silt Grey, Wet Compact														
9.0	End Of Borehole Auger Refusal Probable Bedrock														
10.5															
12.0															
13.5															
15.0															
16.5															

Sample 4, CL
 $W_L = 16$
 $W_P = 6$
 $I_p = 10$

NOTES: 1. Vane test carried out at a distance of 1.5m from borehole
2. N value is disturbed
3. + Number refers to sensitivity

CHECKED BY: E. W.

LOG OF BOREHOLE NO. S1A-8

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

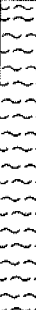



LOCATION Station 10+175, C/L, Highway 169 Connection, Twp. of Freeman

BORING DATE 98.02.19

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers/ Vane test

TECHNICIAN B. G.

SOIL PROFILE				SAMPLES		SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P				
							DYNAMIC CONE PENETRATION x				WATER CONTENT W				
							STANDARD PENETRATION TEST •				W_P W W_L				
							BLOWS/0.3M				WATER CONTENT %				
							20	40	60	80	10	20	30		
0	GROUND ELEVATION 239.25		239												
	Peat Amorphous, Black		238												
1.5															
			237												
3.0															
			236												
3.90															
	Sand Trace Silt Grey, Wet Compact		235												
4.5															
4.80															
	Silty Clay Grey, Soft		234												
5.70															
6.0			233												
	Sand Trace Silt Grey, Wet Compact														
6.20															
	End Of Borehole Auger Refusal Probable Bedrock														
7.5															
9.0															
10.5															
12.0															
13.5															
15.0															
16.5															

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S1A-10

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 10+200, C/L, Highway 169 Connection, Twp. of Freeman BORING DATE 98.02.19

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN B. G.

SOIL PROFILE				SAMPLES		SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L			GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P			
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				WATER CONTENT %			
							BLOWS/0.3M				W_P W W_L			
	GROUND ELEVATION 239.28						20	40	60	80	10	20	30	
0	-0.25	Water	239											
		Peat												
		Amorphous, Black	238											
1.5			237	1	SS	0							W=1015	•
3.0			236	2	SS	0							W=945	•
	3.60													
		Silty Clay	235											
		Grey, Soft												
4.5	4.50			3	SS	22	•					•		
		Sand With Silt	234											
		Trace Gravel, Wet												
	-5.25	Compact												
		End Of Borehole												
		Auger Refusal												
		Probable Bedrock												
6.0														
7.5														
9.0														
10.5														
12.0														
13.5														
15.0														
16.5														

NOTES:

CHECKED BY: E.W.

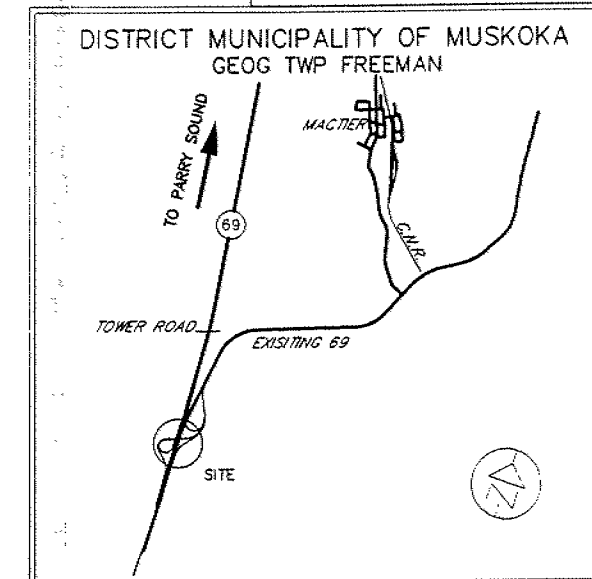
METRIC

PLATE No. 730-93 S.C. 47-3
DRAWING No. 07300068005 247
CONT No. C
GWP No. 290-97-00



STA 9+900 TO STA 10+500
Survey 1997/12 Revised R

SHEET



KEY PLAN
(N.T.S.)

SCALE
10 0 20

MINISTRY OF TRANSPORTATION

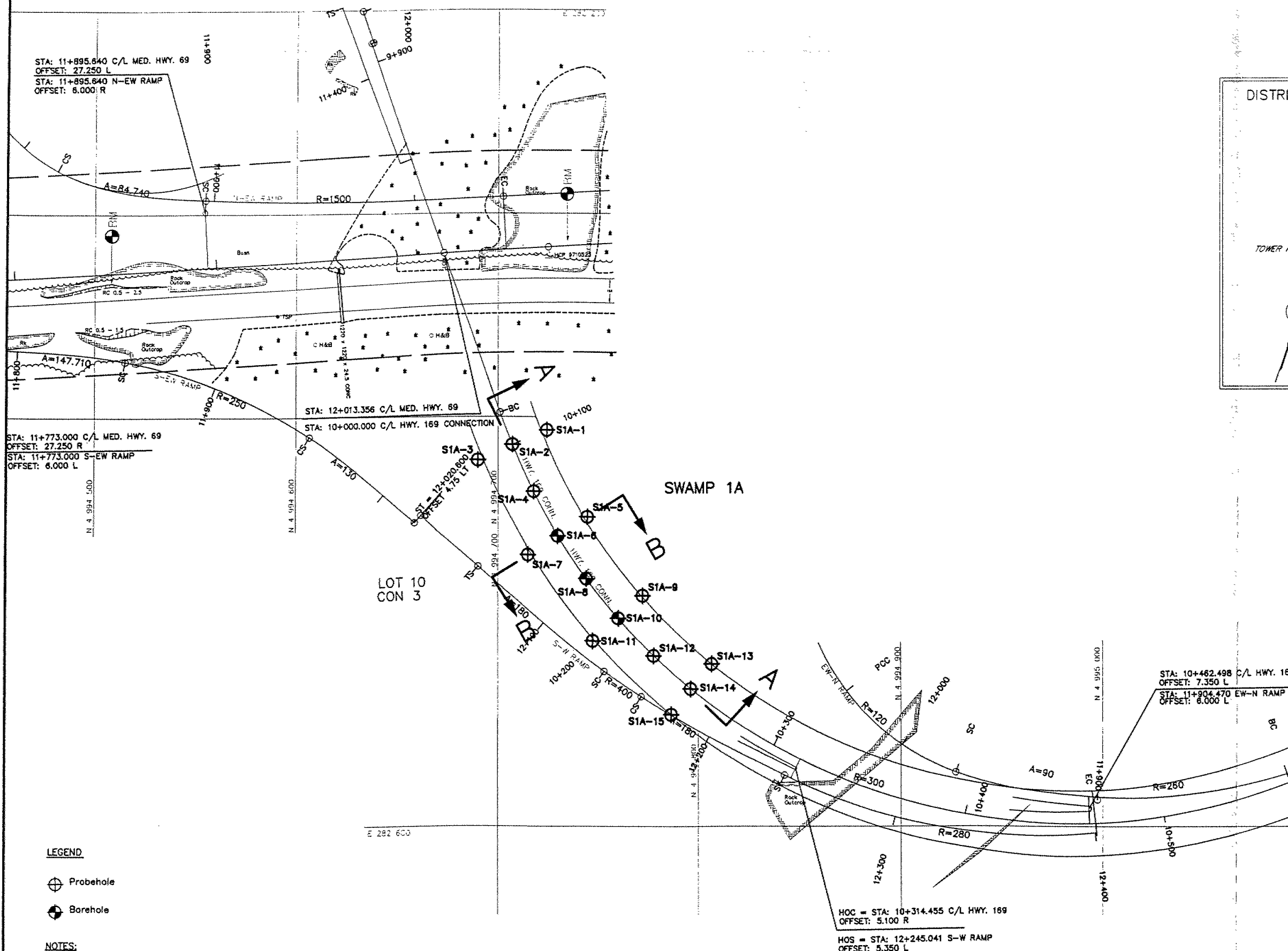
KING'S HIGHWAY 69
HWY 169 CONNECTION

DISTRICT S2 HUNTSVILLE	REGION NORTHERN
GEOG. TWP. FREEMAN	DISTRICT MUNICIPALITY MUSKOKA

SWAMP 1A
BOREHOLE AND PROBEHOLE LOCATION PLAN

Peto MacCallum Ltd.
CONSULTING ENGINEERS
45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN J.S.	DATE MAY 1998	SCALE 1 : 2000	JOB NO. 97TF0888	DRAWING NO. 3
CHECKED E.H.				
APPROVED F.H.				

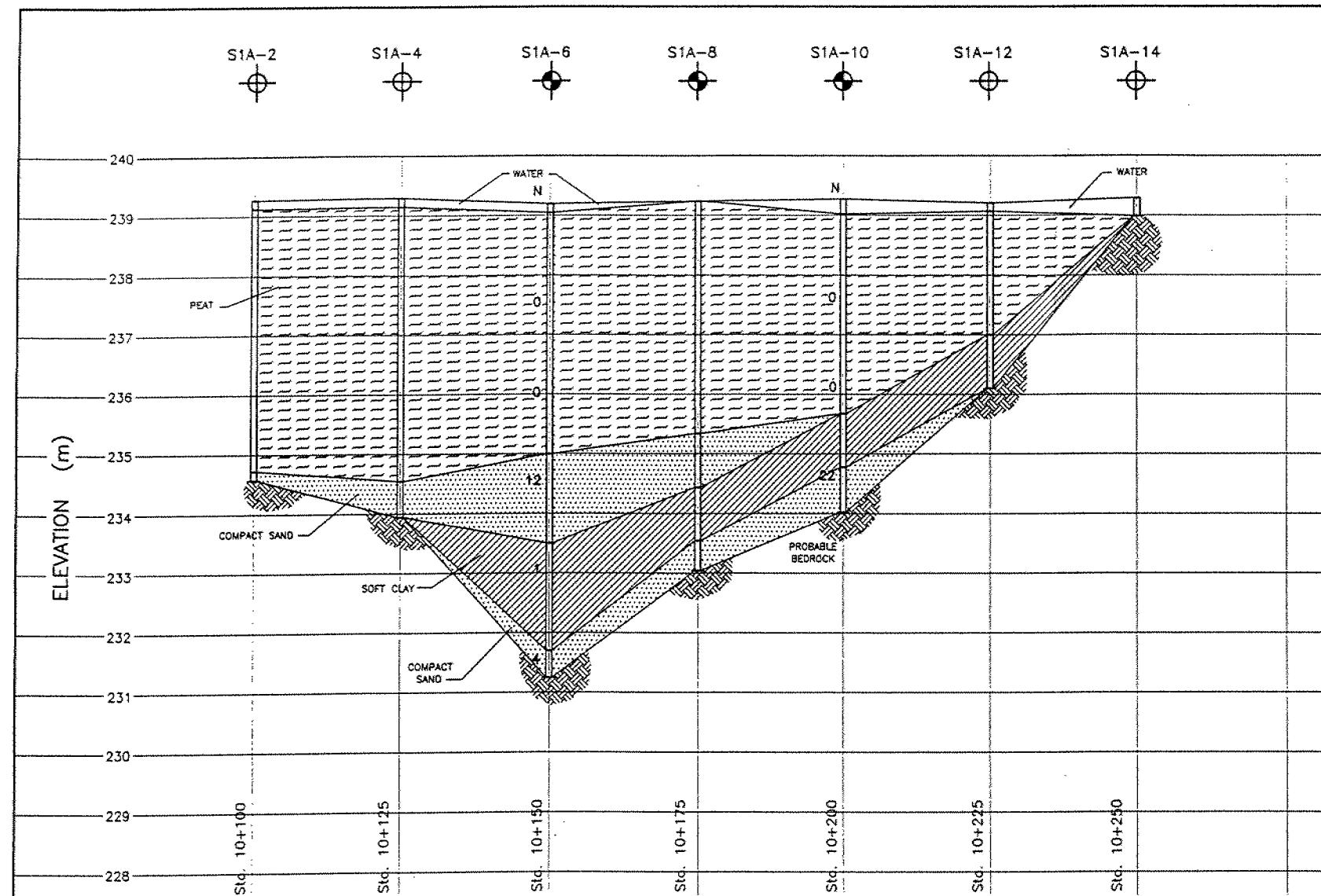


LEGEND

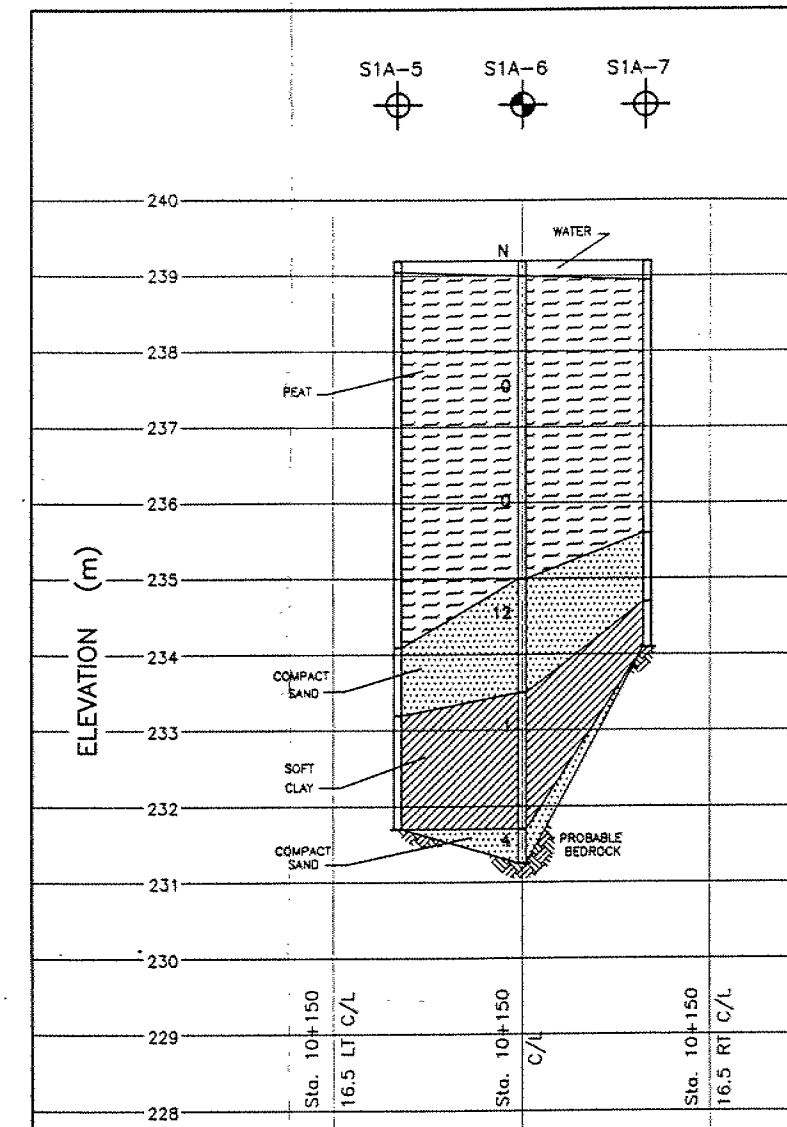
⊕ Probehole
⊙ Borehole

NOTES:

1. Refer to Log of Borehole and Probehole Sheets for description of subsurface conditions.
2. Refer to Drawing 3A for soil profiles.



SECTION A-A



SECTION B-B

LEGEND

	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		SILT
	CLAY		BEDROCK (INFERRED)
	WATER		ASPHALT
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		

NOTES

1. REFER TO DRAWING NO. 3 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

G.W.P. 290-97-00, HIGHWAY 69
HIGHWAY 169 CONNECTION/TWP. OF FREEMAN
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 1A - SOIL PROFILES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	VERTICAL 1:100 HORIZONTAL 1:1000	97TF088B	3A
APPROVED	DWK				

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 1B

Station 11+900 - 12+175

Highway 169 Connection, S-E Ramp

Twp. of Freeman

Datum Edge Pavement (E/P)

S1B-1	11+900	10.5 LT E/P	El. 239.11	S1B-6	11+950	5.5 RT E/P	El. 238.82
	0-200	Water			0-5.40	Blk Amor Peat	
	200-1.00	Blk Amor Peat			5.40-5.70	L Gry Sa Tr Si Wet	
	1.00	NFP BR			5.70	NFP BR	
S1B-2	11+900	2.5 LT E/P	El. 239.09	S1B-8	11+975	2.5 LT E/P	El. 239.09
	0-200	Water			0-250	Water	
	200-1.30	Blk Amor Peat			250-4.80	Blk Amor Peat	
	1.30	NFP BR			4.80-6.20	L Gry Sa Tr Si Tr Gr Wet	
					6.20	NFP BR	
S1B-3	11+900	5.5 RT E/P	El. 239.07	S1B-9	12+000	10.5 LT E/P	El. 239.21
	0-300	Water			0-4.20	Blk Amor Peat	
	300-1.65	Blk Amor Peat			4.20	NFP BR	
	1.65	NFP BR					
S1B-4	11+925	2.5 LT E/P	El. 239.09	S1B-10	12+000	2.5 LT E/P	El. 239.21
	0-300	Water			0-4.10	Blk Amor Peat	
	300-3.15	Blk Amor Peat			4.10-4.60	V L Gry Sa Tr Si Wet	
	3.15	NFP BR				w @ 4.30 = 20%	
					4.60-5.40	Soft Gry Layered Si And Cl	
					5.40	NFP BR	
S1B-5	11+950	8.5 LT E/P	El. 239.0				
	0-5.55	Blk Amor Peat					
	5.55-7.80	L Gry Siy Sa Wet					
	7.80-8.70	V L Gry Si Wet					
	8.70-9.85	V Soft Gry Cl					
	9.85	NFP BR					

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 1B

Station 11+900 - 12+175

Highway 169 Connection, S-E Ramp

Twp. of Freeman

Datum Edge Pavement (E/P)

S1B-11	12+000	5.5 RT E/P	El. 239.21
	0-3.60	Blk Amor Peat	
	3.60-3.80	L Gry Sa W Si Wet	
	3.80-4.30	Soft Gry Cly Si	
	4.30-4.50	L Gry Sa And Gr Wet	
	4.50	NFP BR	

S1B-16	12+075	2.5 RT E/P	El. 239.25
	0-300	Water	
	300-3.40	Blk Amor Peat	
	3.40	NFP BR	

S1B-17	12+100	5.5 LT E/P	El. 239.30
	0-200	Water	
	200-3.15	Blk Amor Peat	
	3.15-3.50	Gry F To Med Sa Tr Si Wet	
	3.50	NFP BR	

S1B-12	12+025	2.5 LT E/P	El. 239.21
	0-300	Water	
	300-3.00	Blk Amor Peat	
	3.00-3.20	L Gry Sa W Gr Tr Si Wet	
	3.20	NFP BR	

S1B-18	12+100	2.5 RT E/P	El. 239.28
	0-250	Water	
	250-3.20	Blk Amor Peat	
	3.20	NFP BR	

S1B-13	12+050	5.5 LT E/P	El. 239.23
	0-200	Water	
	200-2.00	Blk Amor Peat	
	2.00	NFP BR	

S1B-19	12+100	10.5 RT E/P	El. 239.33
	0-300	Water	
	300-3.40	Blk Amor Peat	
	3.40-3.70	L Gry Sa W Gr Tr Si Wet	
	3.70	NFP BR	

S1B-14	12+050	2.5 RT E/P	El. 239.24
	0-900	Blk Amor Peat	
	900	NFP BR	

S1B-15	12+050	10.5 RT E/P	El. 239.23
	0-150	Water	
	150-300	Blk Amor Peat	
	300-1.00	L Br Sa W Gr Tr Si Wet	
	1.00	NFP BR	

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 1B

Station 11+900 - 12+175

Highway 169 Connection, S-E Ramp

Twp. of Freeman

Datum Edge Pavement (E/P)

S1B-20	12+125	2.5 RT E/P	El. 239.32
	0-300	Water	
	300-2.95	Blk Amor Peat	
	2.95-3.15	L Gry Sa Tr Si Wet	
	3.15-4.05	Soft Gry Cly Si	
	4.05-4.70	L Gry Sa Tr Si Wet	
	4.70	NFP BR	

S1B-24	12+175	2.5 RT E/P	El. 239.20
	0-300	Water	
	300-1.00	Blk Amor Peat	
	1.00	NFP BR	

S1B-21	12+150	5.5 LT E/P	El. 239.32
	0-200	Water	
	200-2.70	Blk Amor Peat	
	2.70-3.40	L Gry Sa And Si Wet	
	3.40	NFP BR	

S1B-22	12+150	2.5 RT E/P	El. 239.28
	0-2.30	Blk Amor Peat	
	2.30-3.20	Soft Gry Si And Cl	
	3.20	NFP BR	

S1B-23	12+150	10.5 RT E/P	El. 239.18
	0-200	Water	
	200-2.40	Blk Amor Peat	
	2.40-2.90	L Gry Sa And Si Wet	
	2.90	NFP BR	

LOG OF BOREHOLE NO. S1B-7

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 11+950, E/P, Highway 169 Connection, S.E. Ramp, Twp. of Freeman

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers/ Vane Test

BORING DATE 98.02.20

TECHNICIAN L. G.

SOIL PROFILE				SAMPLES			SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L			GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P			
							DYNAMIC CONE PENETRATION x				WATER CONTENT W			
							STANDARD PENETRATION TEST •				W_P W W_L			
							BLOWS/0.3M				WATER CONTENT %			
							20	40	60	80	10	20	30	
0	GROUND ELEVATION 239.09													
	Peat Fibrous, Black		238											
1.5			237											
			236	1	SS	0	+					W=950	⊙	
3.0			235	2	SS	0	+					W=1040	⊙	
4.5			234				+							
5.40	Sand With Silt Trace Gravel Brown, Wet Loose To Compact		233	3	SS	5	•						⊙	
6.0			232	4	SS	10	•							
7.20			231											
7.5	Silt Grey, Wet Compact		230	5	SS	4	•						⊙	
8.40			229											
9.0	Layered Silt, Sand And Clay Soft													
9.10	End Of Borehole Auger Refusal Probable Bedrock													
10.5														
12.0														
13.5														
15.0														
16.5														

NOTES:

CHECKED BY: E.W.

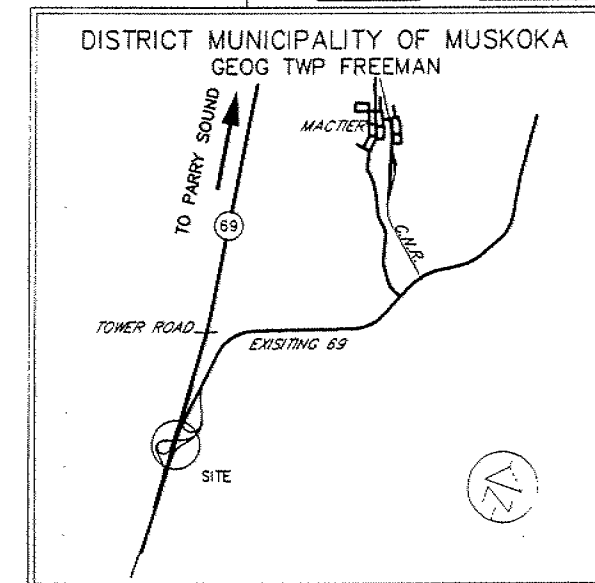
METRIC

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DRAWING NO 9700768005 047
CONT No C
GWP No 290-97-00

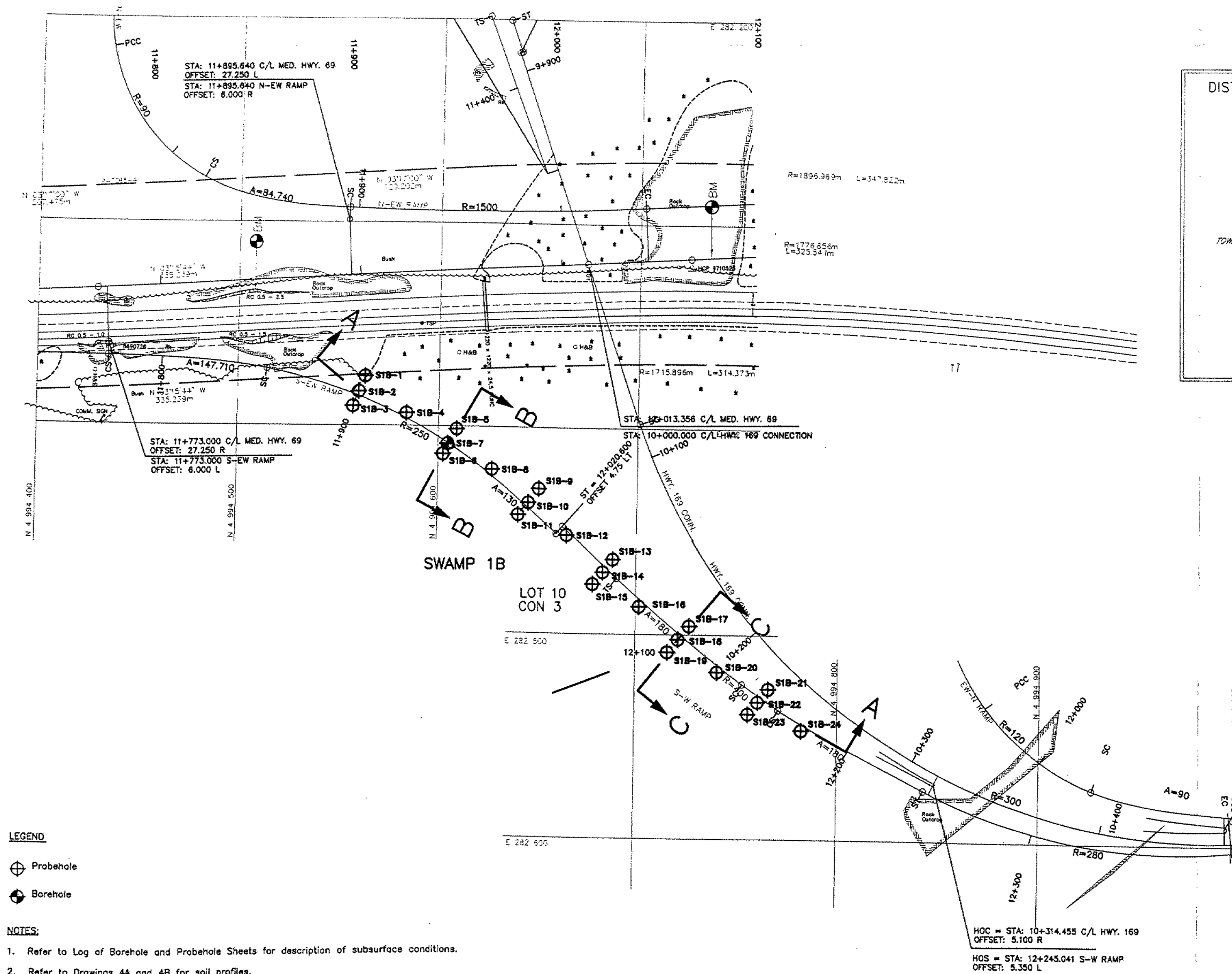


SHEET

STA 11+700 TO STA 12+400
Survey 1997/12 Revised R



KEY PLAN
(N.T.S.)



MINISTRY OF TRANSPORTATION

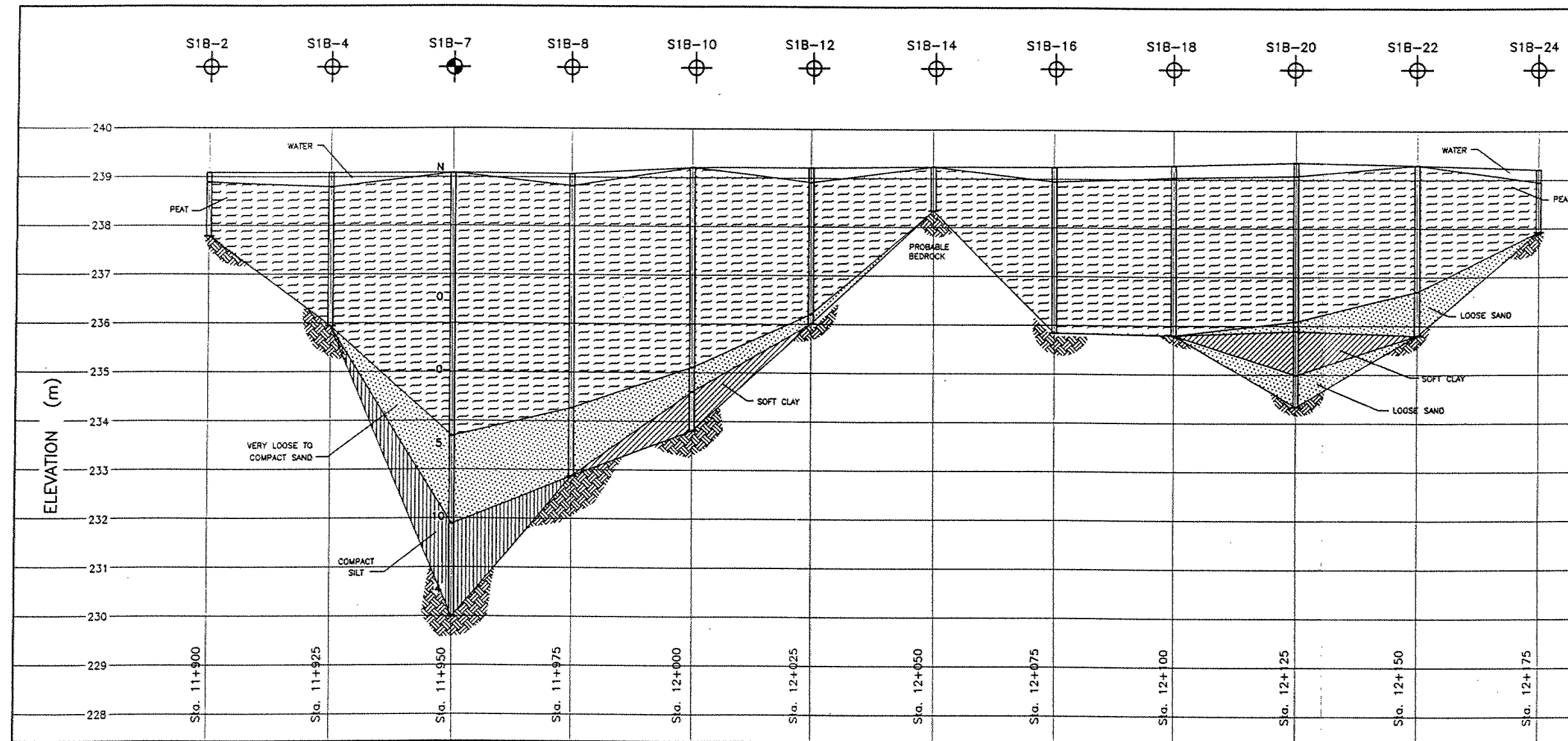
KING'S HIGHWAY 69
HWY 169 CONNECTION S-E RAMP

DISTRICT 52 HUNTSVILLE	REGION NORTHERN
GEOG. TWP. FREEMAN	DISTRICT MUNICIPALITY MUSKOKA

SWAMP 1B
BOREHOLE AND PROBEHOLE LOCATION PLAN

Peto MacCallum Ltd.
CONSULTING ENGINEERS
45 BAYFORD ROAD, NANTWICK, ONTARIO L9E 3C8

DRAWN JS	DATE MAY 1998	SCALE 1 : 2000	JOB NO. 97TF088B	DRAWING NO. 4
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SECTION A-A

LEGEND

	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		SILT
	CLAY		BEDROCK (INFERRED)
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		WATER
			ASPHALT

NOTES

1. REFER TO DRAWING NO. 4 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

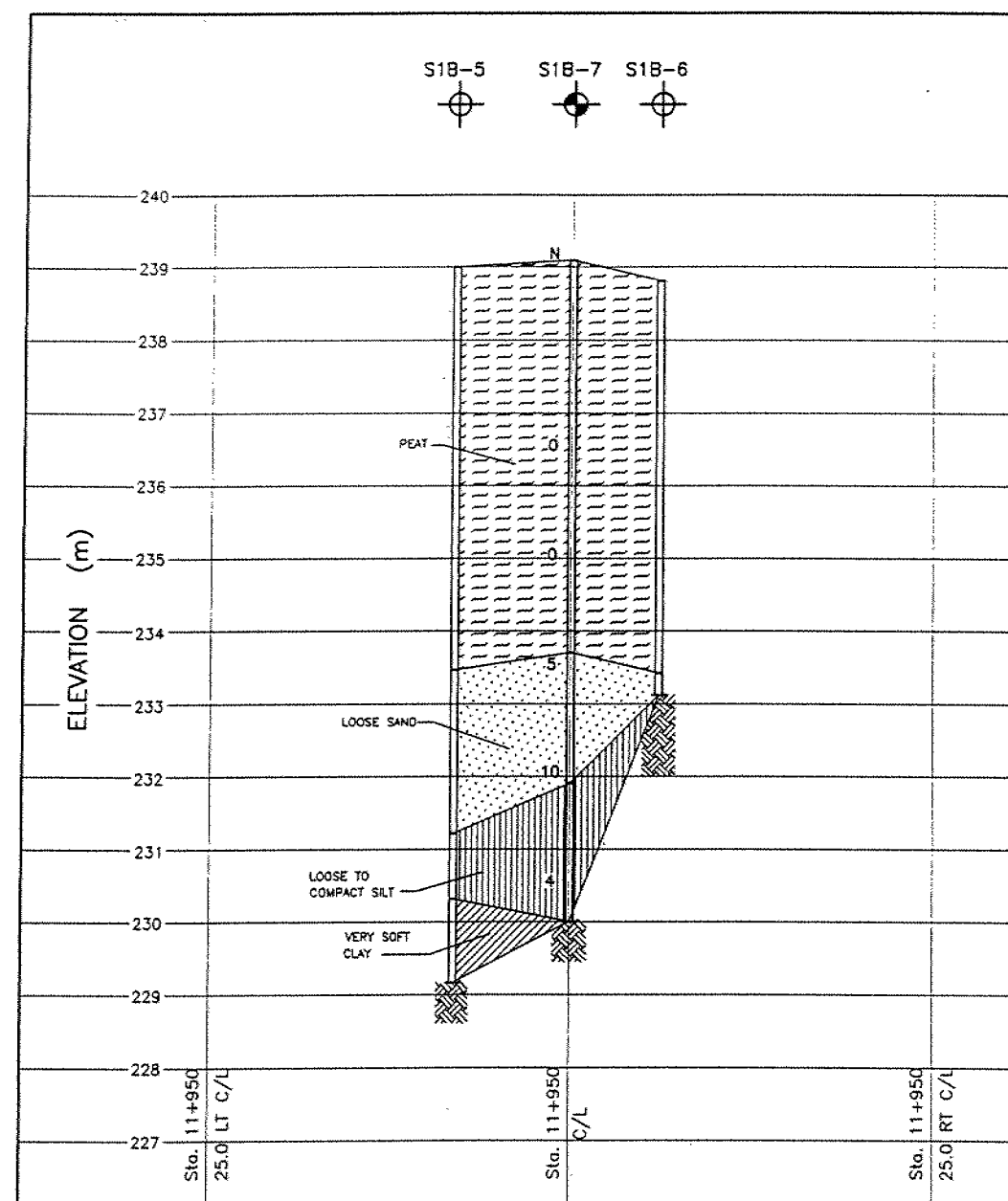
G.W.P. 290-97-00, HIGHWAY 69
HIGHWAY 169 CONNECTION, S-E RAMP/TWP. OF FREEMAN
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 1B - SOIL PROFILES

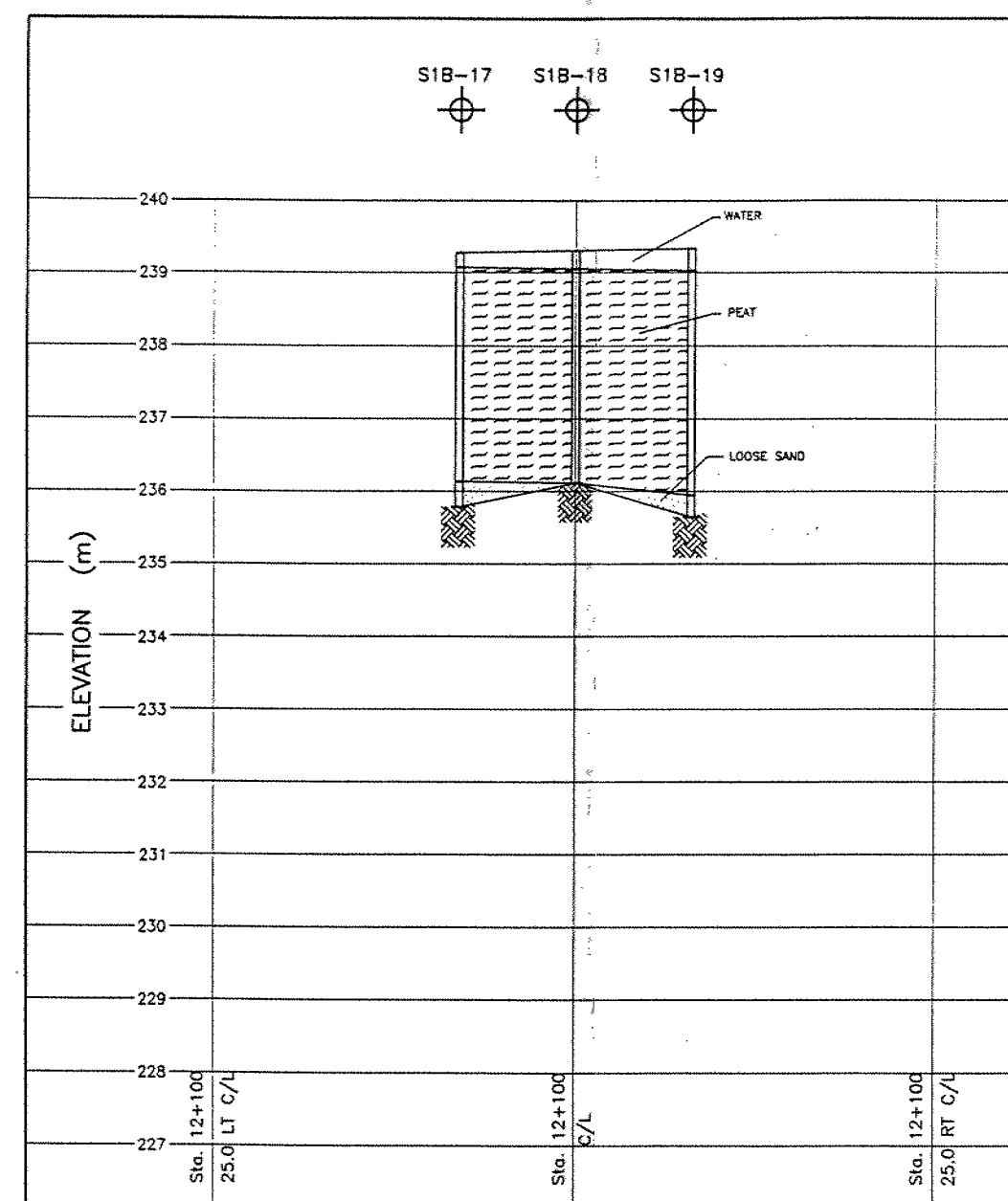
Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	VERTICAL 1:100 HORIZONTAL 1:1000	97TF088B	4A
APPROVED	DWK				



SECTION B-B



SECTION C-C

LEGEND

	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		SILT
	CLAY		BEDROCK (INFERRED)
			ASPHALT
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		

NOTES

1. REFER TO DRAWING NO. 4 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

G.W.P. 290-97-00, HIGHWAY 69
HIGHWAY 169 CONNECTION, S-E RAMP/TWP. OF FREEMAN
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 1B - SOIL PROFILES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	VERTICAL 1:100 HORIZONTAL 1:500	97TF088B	4B
APPROVED	DWK				

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 2

Station 10+240 - 10+430

Southbound Lane/Twp. of Conger

Datum Centre Line Median

S2-1	10+240	18.8 LT C/L	El. 246.29	S2-8	10+275	10.8 LT C/L	El. 244.46
	250	Blk Si Tps			0-500	Dk Br Fib Peat	
	250	NFP BR			500-4.30	Dk Br Amor Peat	
					4.30-4.50	L Gry Siy Sa Wet	
					4.50	NFP BR	
S2-2	10+240	8.0 LT C/L	El. 246.08			Fr Wat @ 300	
	0-150	Blk Si Tps					
	150	NFP BR					
S2-3	10+250	26.8 LT C/L	El. 244.65	S2-9	10+315	29.8 LT C/L	El. 244.82
	0-1.40	Blk Fib Peat			0-7.35	Blk Amor Peat	
	1.40-2.15	L Gry Sa Tr Si Tr Gr Wet			7.35-10.05	L To D Gry Sa OCC Gr Wet	
	2.15	NFP BR			10.05	NFP BR	
		Fr Wat @ 0				Fr Wat @ 300	
S2-5	10+250	10.8 LT C/L	El. 244.54	S2-11	10+315	8.3 LT C/L	El. 244.82
	0-700	Blk Fib Peat			0-300	Dk Br Fib Peat	
	700-3.00	Blk Amor Peat			300-7.40	Dk Br Amor Peat	
	3.00-3.30	L Gry Siy Sa Wet			7.40-9.30	L Gry Siy Sa Wet	
	3.30	NFP BR			9.30-11.10	Soft Gry Siy Cl	
		Fr Wat @ 0			11.10	NFP BR	
						Fr Wat @ 200	
S2-6	10+275	26.8 LT C/L	El. 244.46	S2-12	10+340	29.8 LT C/L	El. 244.14
	0-4.50	Blk Fib Peat			0-6.30	Blk Amor Peat	
	4.50-5.25	Soft Gry Siy Cl Tr Sa			6.30-7.20	D Gry Sa OCC Gr Wet	
	5.25-5.55	L Gry Sa Tr Si Wet			7.20	NFP BR	
	5.55	NFP BR				Fr Wat @ 0	
		Fr Wat @ 300					

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 2

Station 10+240 - 10+430

Southbound Lane/Twp. of Conger

Datum Centre Line Median

S2-14	10+340	8.3 LT C/L	El. 244.14	S2-20	10+390	8.3 LT C/L	El. 244.35
	0-5.90	Dk Br Amor Peat			0-1.20	Dk Br Amor Peat	
	5.90-9.80	L To D Gry Sa Tr Si Tr Gr Wet			1.20	NFP BR	
	9.80	NFP BR				Fr Wat @ 200	
		Fr Wat @ 300		S2-21	10+415	29.3 LT C/L	El. 244.37
					0-800	Dk Br Fib Peat	
					800-1.30	Dk Br Amor Peat	
S2-15	10+365	29.3 LT C/L	El. 244.11		1.30-3.30	L Gry Siy Sa Wet	
	0-400	Dk Br Fib Peat			3.30-3.60	L Gry Si Tr Sa Wet	
	400-1.30	Dk Br Amor Peat			3.60	NFP BR	
	1.30	NFP BR				Fr Wat @ 300	
		Fr Wat @ 300		S2-22	10+415	18.8 LT C/L	El. 244.37
					0-3.15	Blk Fib Peat	
S2-16	10+365	18.8 LT C/L	El. 244.11		3.15	NFP BR	
	0-2.10	Blk Amor Peat				Fr Wat @ 200	
	2.10-2.55	L Gry Sa Wet					
	2.55	NFP BR		S2-23	10+415	8.3 LT C/L	El. 244.37
		Fr Wat @ 300			0-600	Dk Br Fib Peat	
					600-3.10	Dk Br Amor Peat	
S2-17	10+365	8.3 LT C/L	El. 244.11		3.10-5.90	L Gry Sa Tr Gr Wet	
	0-600	Dk Br Fib Peat			5.90	NFP BR	
	600-2.70	Dk Br Amor Peat				Fr Wat @ 0	
	2.70	NFP BR		S2-24	10+430	29.3 LT C/L	El. 244.36
		Fr Wat @ 200			0-2.50	Blk Fib Peat	
					2.50-3.10	L Gry Sa W Si Wet	
S2-18	10+390	29.3 LT C/L	El. 244.35		3.10	NFP BR	
	0-2.00	Dk Br Amor Peat				Fr Wat @ 200	
	2.00-2.30	L Gry Siy Sa Wet					
	2.30	NFP BR					
		Fr Wat @ 300					

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 2

Station 10+240 - 10+430

Southbound Lane/Twp. of Conger

Datum Centre Line Median

S2-25	10+430	18.8 LT C/L	El. 244.36
	0-2.70	Blk Fib Peat	
	2.70-3.20	L Gry Sa W Si Wet	
	3.20	NFP BR	
		Fr Wat @ 300	

S2-26	10+430	8.3 LT C/L	El. 244.36
	0-2.80	Blk Fib Peat	
	2.80-3.00	L Gry Sa W Si Wet	
	3.00	NFP BR	
		Fr Wat @ 300	

LOG OF BOREHOLE NO. S2-4

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 10+250, 18.8 m Lt., Highway 69, SBL, Twp. of Conger BORING DATE 98.02.25

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN B. G.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P					
							DYNAMIC CONE PENETRATION x				WATER CONTENT W					
							STANDARD PENETRATION TEST •				W_P W W_L					
							BLOWS/0.3M				WATER CONTENT %					
	GROUND ELEVATION	244.45					20	40	60	80	10	20	30			
0	Peat Fibrous, Black		244											Upon completion of augering, borehole caved at 2.2 m with water level at 0.30 m.		
			243													
1.5			242	1	SS	0							W=169 ●			
2.95																
3.30	Silty Clay Trace Sand Grey Very Soft		241	2	SS	0										
4.10	Sand Trace Silt Grey, Wet Loose		240													
4.5																
	End Of Borehole Auger Refusal Probable Bedrock															
6.0																
7.5																
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S2-7

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 10+275, 18.8 m Lt., Highway 69, SBL, Twp. of Conger BORING DATE 98.02.25

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers / Vane Test

TECHNICIAN D. R.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3M N - VALUES	20 40 60 80				PLASTIC LIMIT W_P					
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST *				WATER CONTENT W					
							BLOWS/0.3M				WATER CONTENT %					
							20	40	60	80	10	20	30			
0	GROUND ELEVATION 244.46													Upon completion of augering, borehole caved at 2.0 m with water level at 0.20 m.		
	Peat Fibrous, Black		244				+									
			243				+									
1.5				1	SS	1			+							
			242						+							
3.0				2	TW	P.H.										
			241													
			240													
4.5																
4.80	Silt Trace Sand, Trace Gravel Grey, Wet Very Dense			3	SS	50/150mm					⊙					
6.0	End Of Borehole Hammer Bouncing Probable Bedrock		239													
7.5																
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

- Vane test was carried out at a distance of 1.5 m from the borehole.

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S2-10

PROJECT GWP 290-97-00

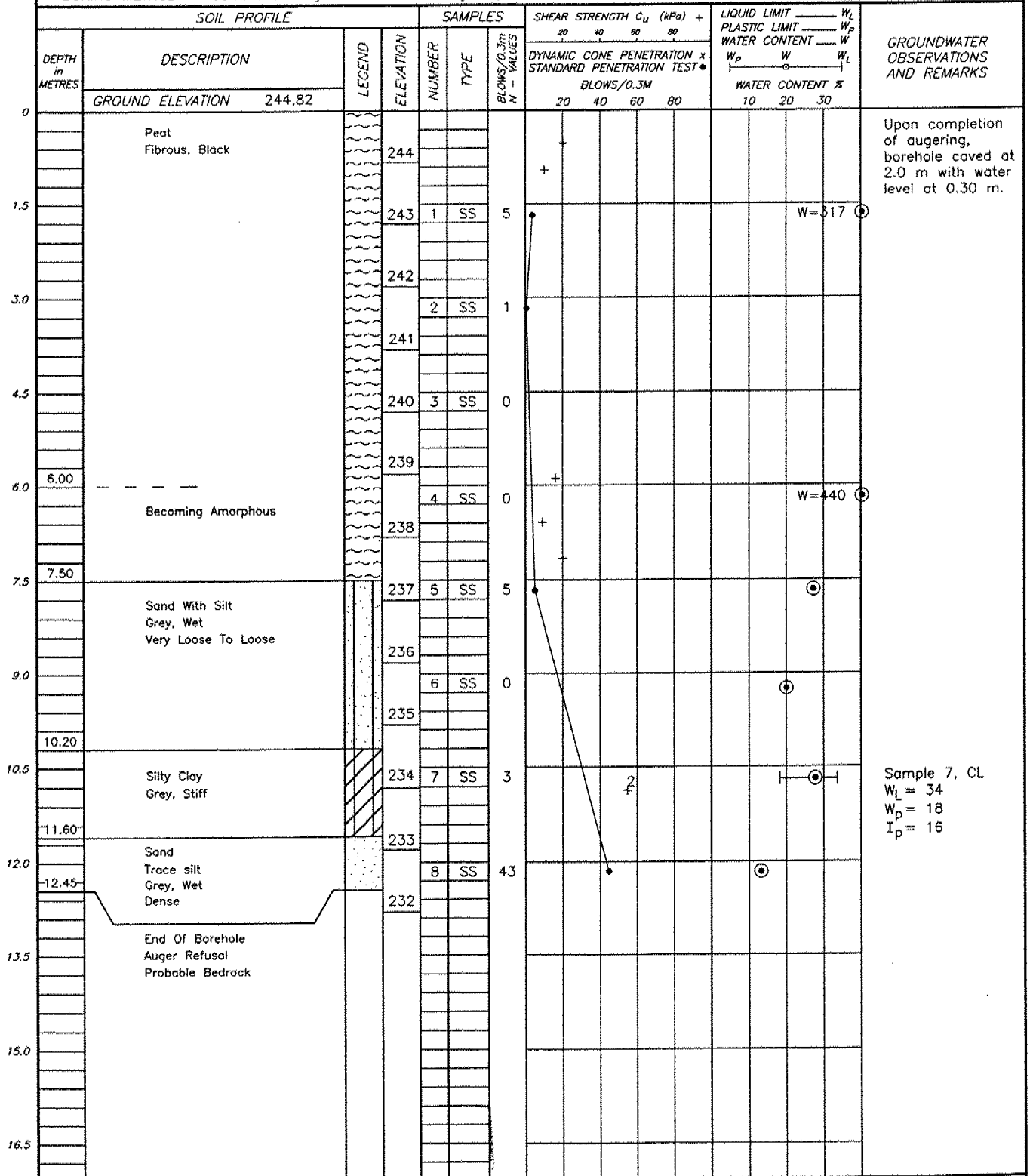
OUR PROJECT 97TF088B

LOCATION Station 10+315, 18.8 m Lt., Highway 69, SBL, Twp. of Conger BORING DATE 98.02.25

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers / Vane Test

TECHNICIAN B. G.



NOTES:

- * N value was disturbed.
- Vane test was carried out at a distance of 1.5 m from the borehole.
- +² number refers to sensitivity.

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S2-13

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 10+340, 18.8 m Lt., Highway 69, SBL, Twp. of Conger BORING DATE 98.02.26

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers/ Vane Test/ Dynamic Cone Test

TECHNICIAN D. R.

SOIL PROFILE				SAMPLES		SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_p				
							DYNAMIC CONE PENETRATION x				WATER CONTENT W				
							STANDARD PENETRATION TEST •				W_p W W_L				
							BLOWS/0.3M				WATER CONTENT %				
							20	40	60	80	10	20	30		
0	GROUND ELEVATION 244.14 /						20	40	60	80	10	20	30	Upon completion of augering, borehole caved at 1.8 m with water level at 0.20 m.	
	Peat Fibrous, Black		243												
1.5			242	1	SS	10	•	+					W=359		⊙
			241												
3.0			240	2	SS	0									
			239												
4.5			238	3	SS	0	+						W=1054		⊙
			237												
6.0			236	4	SS	0							W=836		⊙
6.60			235												
	Sand Trace Silt Grey, Wet Loose		234	5	SS	0	x	x							
7.5			233				x	x							
8.70			232				x	x							
9.0	Silty Clay Grey, Soft		231	6	SS	17*	•			*			⊙		
9.15			230												
	Sand Trace Silt, Trace Gravel Grey, Wet Very Dense		229												
10.35			228												
10.5	End Of Borehole Auger Refusal Probable Bedrock		227												
12.0															
13.5															
15.0															
16.5															

NOTES:

- Vane and cone tests were carried out at a distance of 1.5 m and 3.0 m from the borehole, respectively.
- * N value was disturbed.

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S2-19

PROJECT GWP 290-97-00




OUR PROJECT 97TF088B

LOCATION Station 10+390, 18.8 m Lt., Highway 69, SBL, Twp. of Conger BORING DATE 98.02.04

ENGINEER E. W.

BORING METHOD Continuous Flight Solid Stem Augers

TECHNICIAN D. R.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_p					
							DYNAMIC CONE PENETRATION x				WATER CONTENT W					
							STANDARD PENETRATION TEST •				W_p W W_L					
							BLOWS/0.3M				WATER CONTENT %					
0	GROUND ELEVATION 244.35						20	40	60	80	10	20	30			
	Peat		244												Upon completion of augering, borehole caved at 1.3 m with water level at 0.30 m.	
	Amorphous, Black															
			243													
1.50				1	SS	0								W=647 ④		
	End Of Borehole															
	Auger Refusal		242													
	Probable Bedrock															
3.0																
4.5																
6.0																
7.5																
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

CHECKED BY: E.W.

GWP 290-97-00 Highway 69
District 52, Huntsville
Swamp 2
Station 10+225 - 10+335
Northbound Lane/Twp. of Conger
Datum Centre Line Median

S2-27 10+225 10.8 RT C/L El. 246.53
 0-200 Blk Si Tps
 200 NFP BR

S2-28 10+225 18.8 RT C/L El. 244.59
 0-100 Blk Fib Peat
 100 NFP BR

S2-29 10+225 26.8 RT C/L El. 241.14
 0-300 Blk Fib Peat
 300-1.20 Blk Amor Peat
 1.20-1.30 Comp Gry Siy Sa Wet
 1.30 NFP BR
 Fr Wat @300

S2-30 10+250 10.8 RT C/L El. 244.64
 0-600 Blk Fib Peat
 600-2.60 Blk Amor Peat
 2.60 NFP BR
 Fr Wat @ 500

S2-32 10+250 26.8 RT C/L El. 244.64
 0-500 Blk Fib Peat
 500-3.00 Blk Amor Peat
 3.00 NFP BR
 Fr Wat @ 500

S2-33 10+275 10.8 RT C/L El. 244.49
 0-4.65 Blk Fib Peat
 4.65-5.10 V Soft Gry Siy Cl W Tr Sa
 5.10 NFP BR
 Fr Wat @ 500

S2-35 10+275 26.8 RT C/L El. 244.50
 0-600 Blk Fib Peat
 600-3.00 Blk Amor Peat
 3.00 NFP BR
 Fr Wat @ 500

S2-36 10+330 10.8 RT C/L El. 244.35
 0-300 Br Sa Tr Si Wet (Poss Fill)
 300-1.80 Blk Fib Peat
 1.80-2.10 Gry Sa W Si Wet
 2.10 NFP BR
 Fr Wat @ 0

S2-37 10+330 18.8 RT C/L El. 244.71
 0-4.50 Blk Fib Peat
 4.50 NFP BR
 Fr Wat @ 0

S2-38 10+330 26.8 RT C/L El. 246.43
 0-200 Blk Sa Tps
 200 NFP BR

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 2

Station 10+225 - 10+335

Northbound Lane/Twp. of Conger

Datum Centre Line Median

S2-39	10+355	10.8 RT C/L	El. 244.00
	0-400	Blk Fib Peat	
	400	NFP BR	
		Fr Wat @ 200	

S2-40	10+355	18.8 RT C/L	El. 245.64
	0-200	Blk Sa Tr Si Tps	
	200	NFP BR	

S2-41	10+355	26.8 RT C/L	El. 248.39
	0-400	Blk Sa Tr Si Tps	
	400	NFP BR	

LOG OF BOREHOLE NO. S2-31

PROJECT GWP 290-97-00





OUR PROJECT 97TF088B

LOCATION Station 10+250, 18.8 m Rt., Highway 69, NBL, Twp. of Conger BORING DATE 98.02.17

ENGINEER E. W.

BORING METHOD Portable Hand Sampling Equipment

TECHNICIAN B. G.

SOIL PROFILE				SAMPLES			SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P				
							DYNAMIC CONE PENETRATION x				WATER CONTENT W				
							STANDARD PENETRATION TEST *				W_P W W_L				
							GROUND ELEVATION 244.64							BLOWS/0.3M	
0							20 40 60 80	10 20 30							
	Peat Fibrous, Black		244	1	SS	0							W=14.7	Upon completion of soil sampling borehole caved at 1.8 m with water level at 0.40 m.	
1.5			243												
2.10				2	SS	25	250mm								
2.35	Sand With Silt Grey, Wet Compact		242												
3.0															
	End Of Borehole Hammer Bouncing Probable Bedrock														
4.5															
6.0															
7.5															
9.0															
10.5															
12.0															
13.5															
15.0															
16.5															

NOTES:

- Soil sampling was carried out using a 50 mm dia. split spoon equipment and a 20.5 Kg hammer dropping 750 mm (SPT N values adjusted to a 63.5 Kg hammer dropping 750 mm, using a linear relationship).

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S2-34

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 10+275, 18.8 m Rt., Highway 69, NBL, Twp. of Conger BORING DATE 98.02.17

ENGINEER E. W.

BORING METHOD Portable Hand Sampling Equipment / Vane Test

TECHNICIAN B. G.

[illegible]

NOTES:

1. Soil sampling was carried out using a 50 mm dia. split spoon equipment and a 20.5 Kg hammer dropping 750 mm (SPT N values adjusted to a 63.5 Kg hammer dropping 750 mm, using a linear relationship).
2. Vane test was carried out at a distance of 1.5 m from the borehole.

CHECKED BY: E.W.

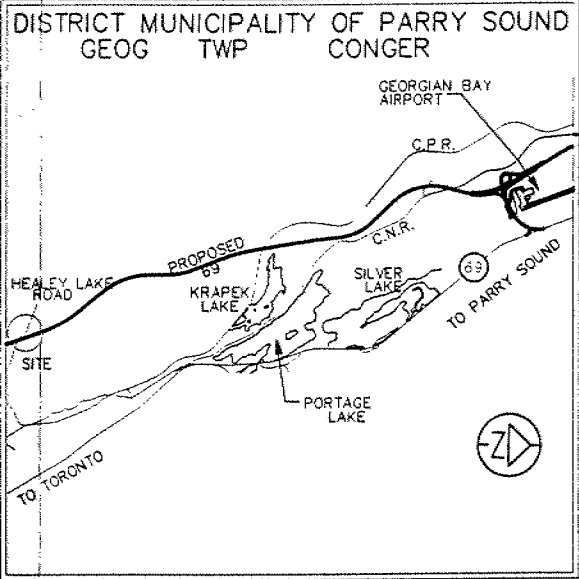
METRIC

PLATE No 120-99 44-12774-69 5-C
DRAWING No 97300069044

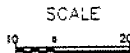
CONT No C
GWP No 290-97-00

STA 12+800 TO STA 10+840
Survey 1997/12 Revised R

SHEET



KEY PLAN
(N.T.S.)



MINISTRY OF TRANSPORTATION

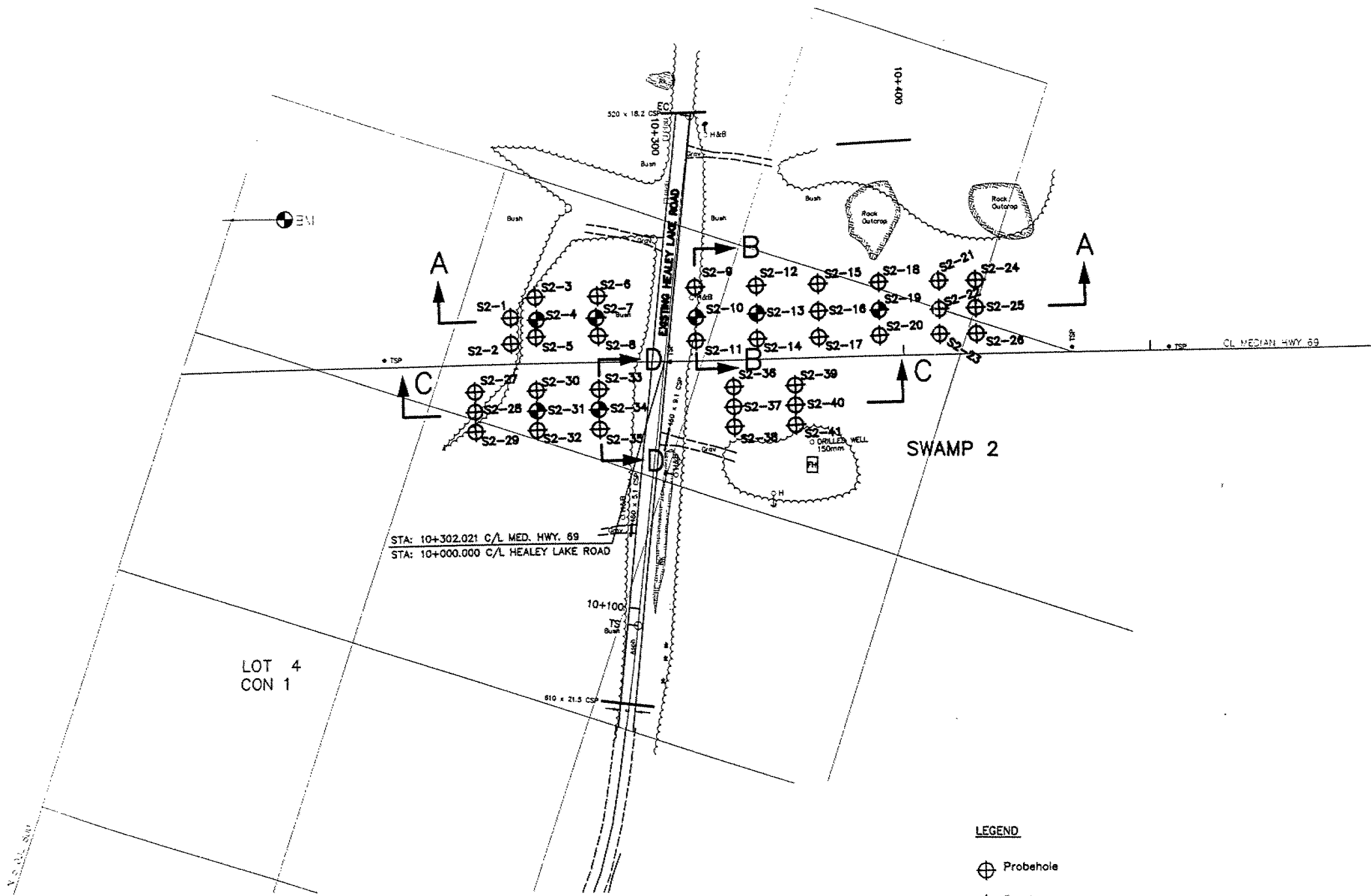
KING'S HIGHWAY 69

DISTRICT 52 HUNTSVILLE	REGION NORTHERN
GEOG. TWP. CONGER	DISTRICT MUNICIPALITY PARRY SOUND

SWAMP 2
BOREHOLE AND PROBEHOLE LOCATION PLAN

Peto MacCallum Ltd.
CONSULTING ENGINEERS
45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C8

DRAWN JS	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED EW	MAY 1998	1 : 2000	97TF0888	5
APPROVED DWK				

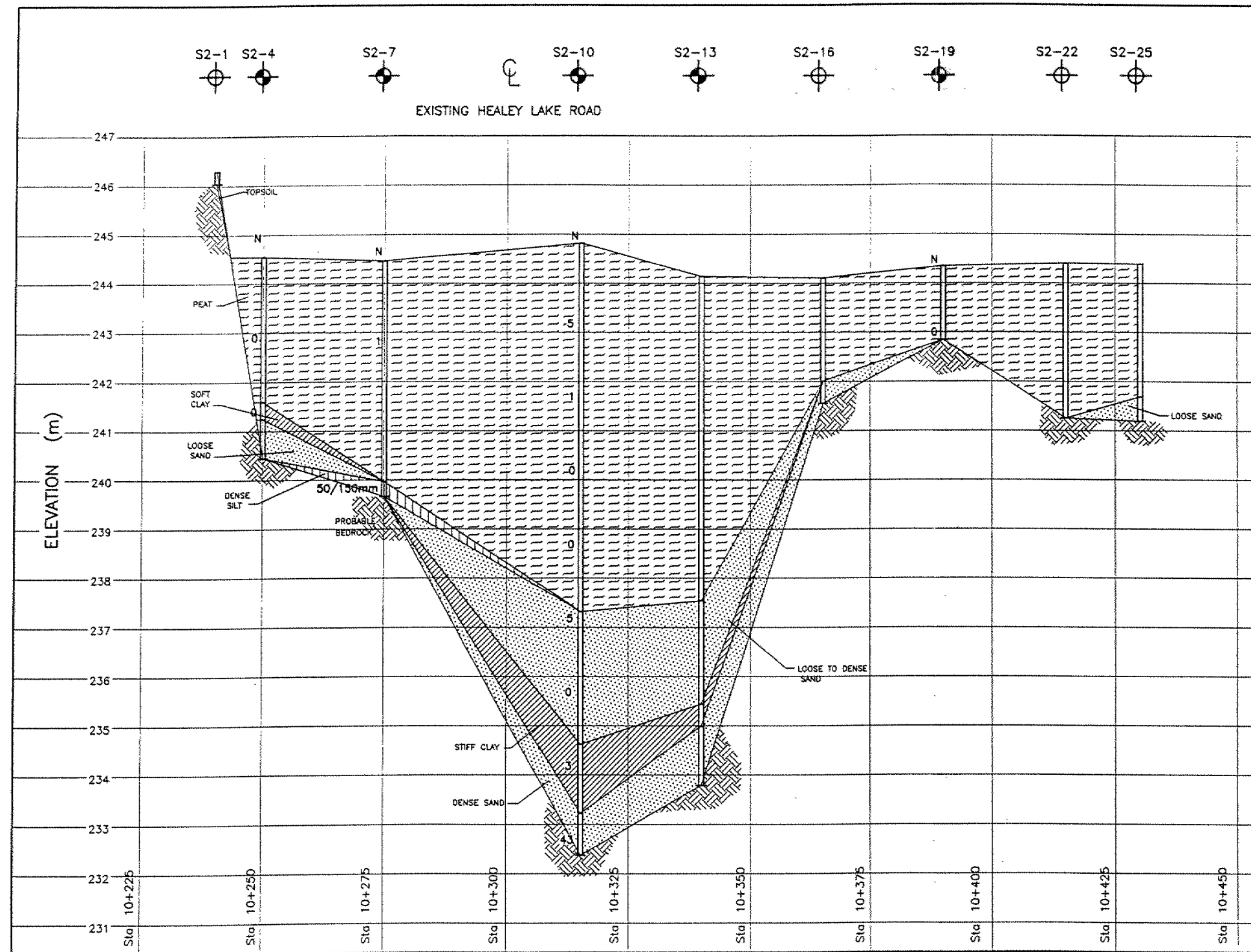


LEGEND

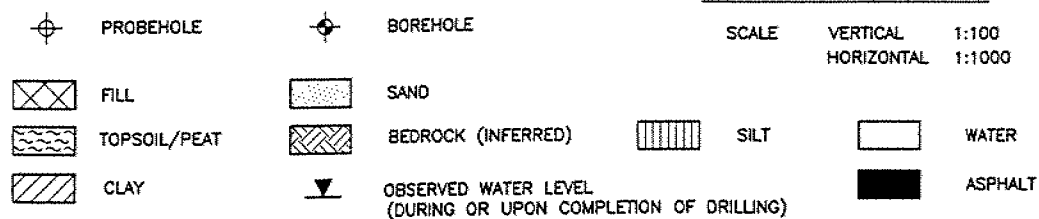
- Probehole
- Borehole

NOTES:

- Refer to Log of Borehole and Probehole Sheets for description of subsurface conditions.
- Refer to Drawings 5A and 5B for soil profiles.



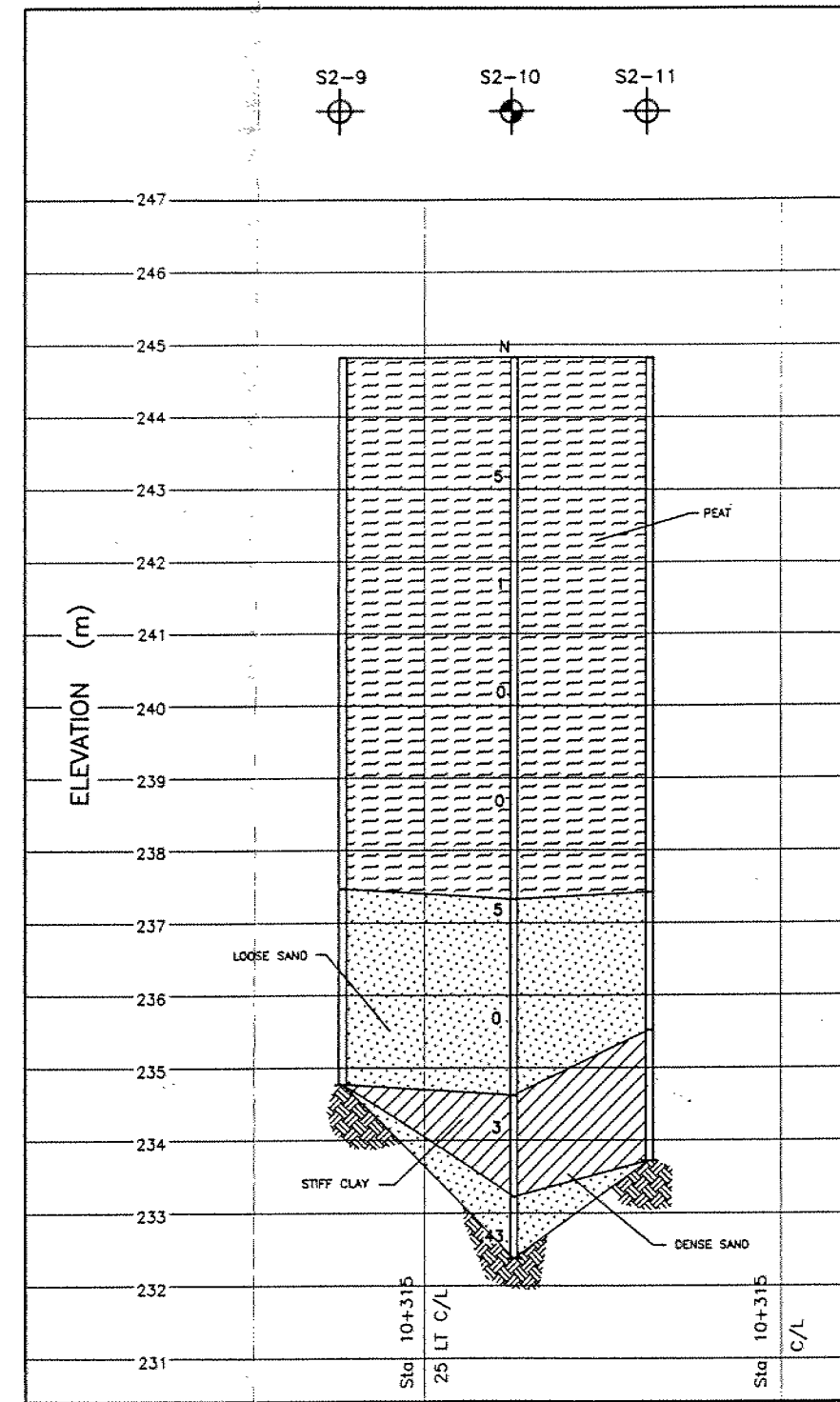
LEGEND



NOTES

1. REFER TO DRAWING NO. 5 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.
4. * N VALUE WAS DISTURBED.

SECTION A-A



SECTION B-B

SCALE VERTICAL 1:100
HORIZONTAL 1:500

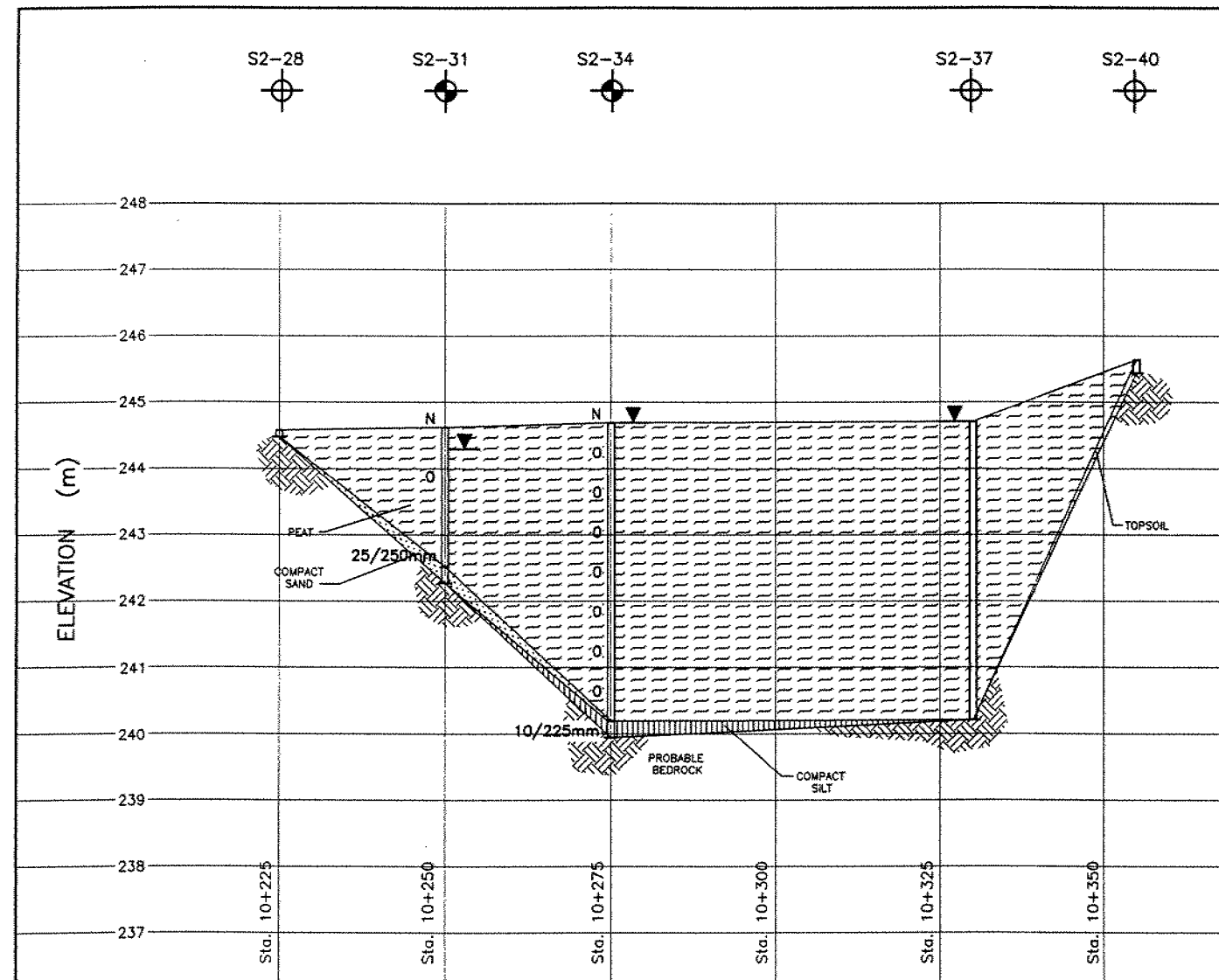
G.W.P. 290-97-00, HIGHWAY 69
SOUTHBOUND LANE/TWP. OF CONGER
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 2 - SOIL PROFILES

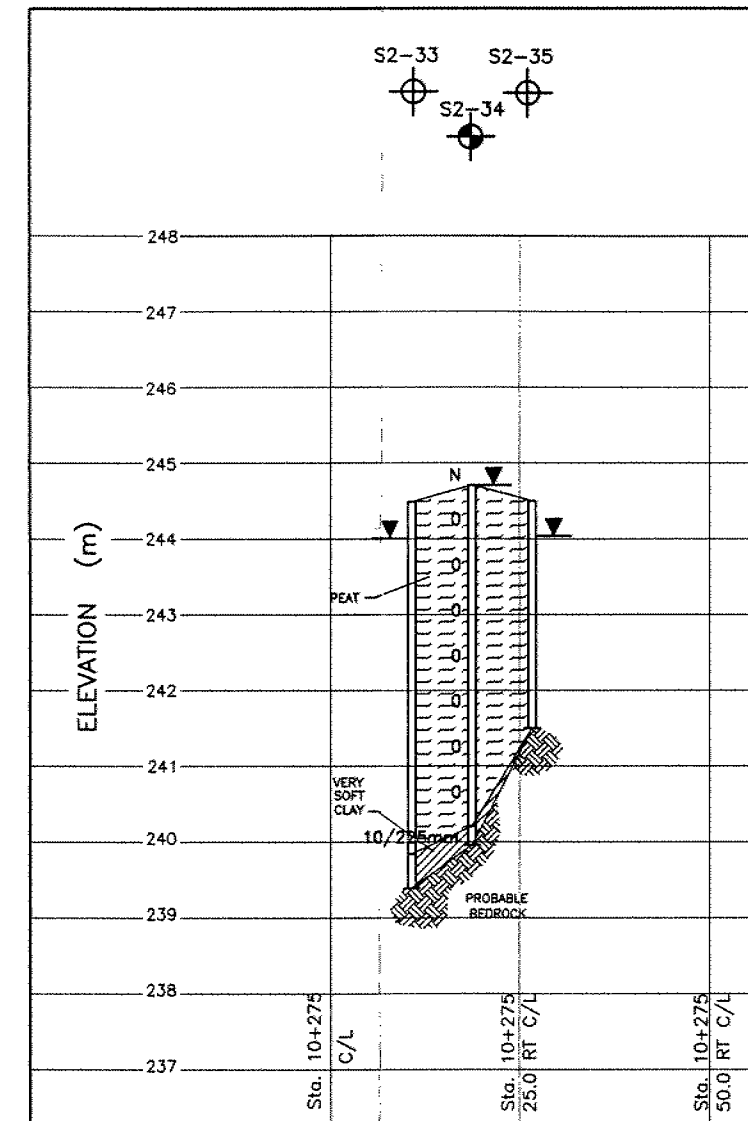
Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C8

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	AS SHOWN	97TF088B	5A
APPROVED	DWK				



SECTION C-C



SECTION D-D

LEGEND

	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		SILT
	CLAY		BEDROCK (INFERRED)
	WATER		ASPHALT
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		

NOTES

1. REFER TO DRAWING NO. 5 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

G.W.P. 290-97-00, HIGHWAY 69
NORTHBOUND LANE/TWP. OF CONGER
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 2 - SOIL PROFILES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	VERTICAL 1:100 HORIZONTAL 1:1000	97TF088B	5B
APPROVED	DWK				

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 2A

Station 9+925 - 10+025

Healey Lake Road/Twp. of Conger

Datum Centre Line Pavement

S2A-1	9+925	C/L	El. 246.58
	0-50	Asph	
	50-200	Cr Sa And Gr Fill	
	200-2.30	Comp Lt Br F Sa Fill Tr Si	
		Moist To Wet	
		w @ 2.30 = 13%	
	2.30	NFP BR/Poss Blds	
		Fr Wat @ 1.80	
S2A-2	9+950	20.5 RT C/L	El. 244.31
	0-4.90	Blk To Dk Br Amor Peat	
	4.90-5.50	V Soft Gry Cly Si Tr F Sa	
	5.50-6.55	Comp Gry Siy F To Co Sa Tr Cl Wet	
	6.55	NFP BR	
		Fr Wat @ 0	
S2A-3	9+950	20.5 LT C/L	El. 244.95
	0-1.50	Br Med Sa Fill Tr Si And Gr	
	1.50-3.65	Dk Br Amor Peat	
		w @ 3.50 = 332%	
	3.65-4.60	V Soft Gry Cly Si Tr F Sa	
		w @ 4.00 = 49%	
	4.60-4.80	Comp Gry Med To Co Sa Tr Si Wet	
		w @ 4.80 = 22%	
	4.80	NFP BR	
		Fr Wat @ 915	

CONSULTING ENGINEERS

Datum Centre Line Pavement

S2C-5	10+150	2.0 LT C/L	El. 247.94
	0-65	Asph	
	65-305	Gry To Dk Br Grly F To Co Sa Fill	
		Tr Si	
	305-3.20	Comp Lt Br F Sa Fill Tr Si Wet To	
		Dry	
		w @ 1.80 = 23%	
		w @ 3.20 = 7%	
	3.20-4.00	Lt Br Bldy F Sa Fill W Cob	
	4.00-4.50	Dk Br Amor Peat	
	4.50-4.60	V L Dk Br Org Say Si	
	4.60-6.20	Comp Gry F To Med Sa Tr Si Wet	
		w @ 4.90 = 23%	
		w @ 6.20 = 17%	
	6.20	NFP BR	
		Fr Wat @ 4.20	

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 2C

Station 10+110 - 10+160

Healey Lake Road/Twp. of Conger

Datum Centre Line Pavement

S2C-6	10+150	16.0 LT C/L	El. 244.10
	0-200	Fr Wat	
	200-1.30	Blk Amor Peat	
	1.30-2.00	Gry F To Med Sa Tr Si	
	2.00-2.35	V Soft Gry Cl	
	2.35-3.00	Gry Med To Co Sa Tr Gr	
	3.00	NFP BR	

METRIC

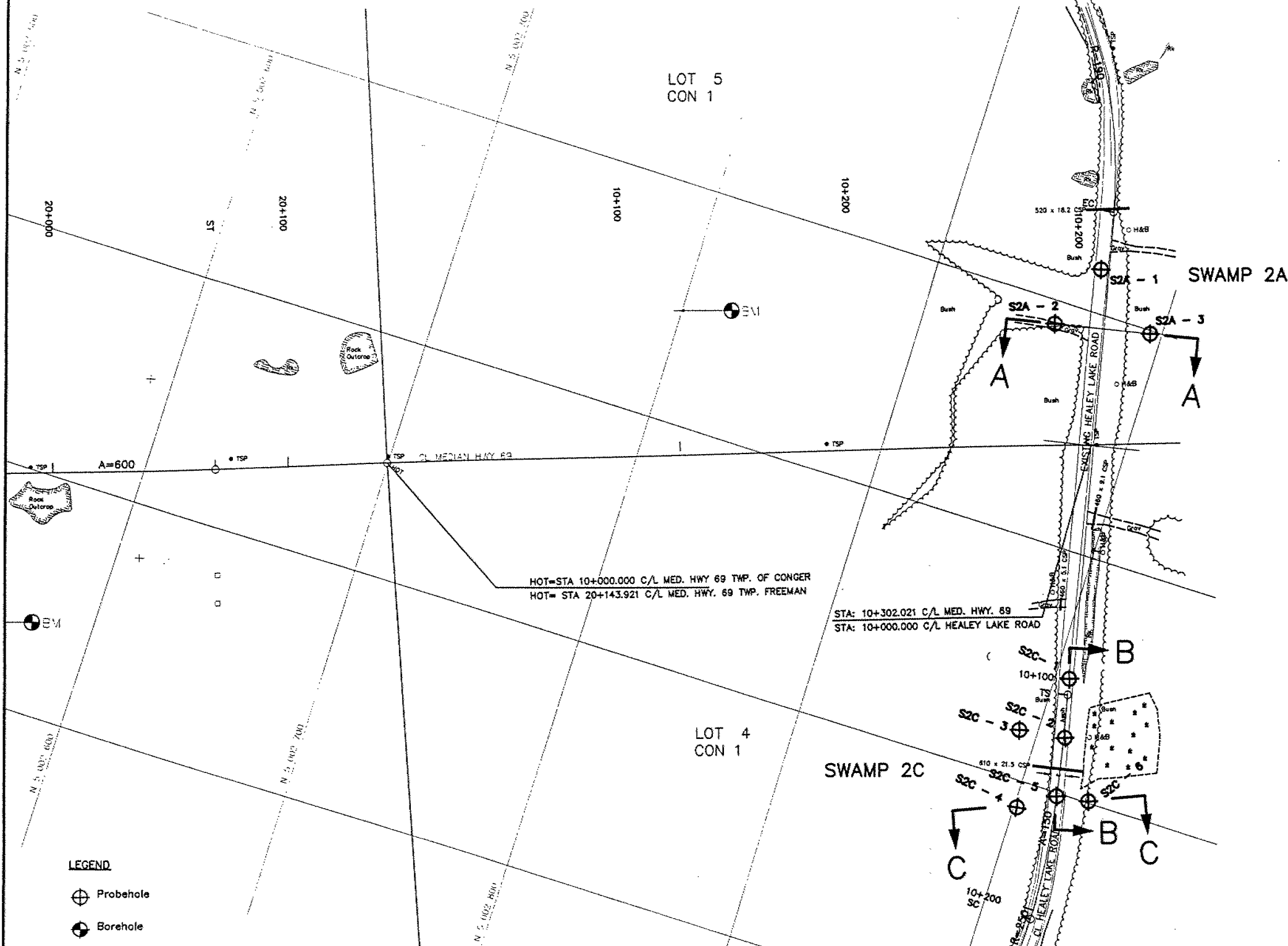
PLATE No. 190-83 44-12774-83 B-1
 DRAWING No. 07900063044
 CONT No C
 GWP No 290-97-00
 STA 19+800 TO STA 19+840
 Survey 1997/12 Revised R



SHEET

DISTRICT MUNICIPALITY OF MUSKOKA
 MUNICIPALITY OF THE TWP OF GEORGIAN BAY
 GEOGRAPHIC TWP FREEMAN

DISTRICT MUNICIPALITY OF PARRY SOUND
 MUNICIPALITY OF THE TWP OF ARCHIPELAGO
 GEOGRAPHIC TWP CONGER

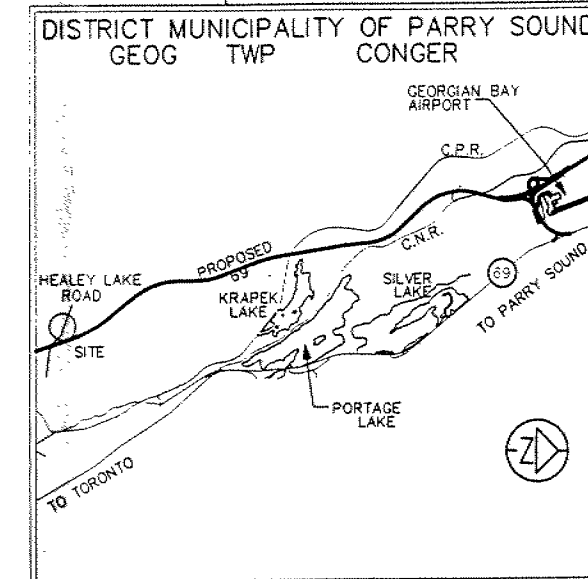


LEGEND

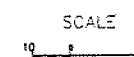
- ⊕ Probehole
- Borehole

NOTES:

1. Refer to Log of Borehole and Probehole Sheets for detailed subsurface conditions.
2. Refer to Drawing 6A for soil profiles.



KEY PLAN
 (N.T.S.)



MINISTRY OF TRANSPORTATION

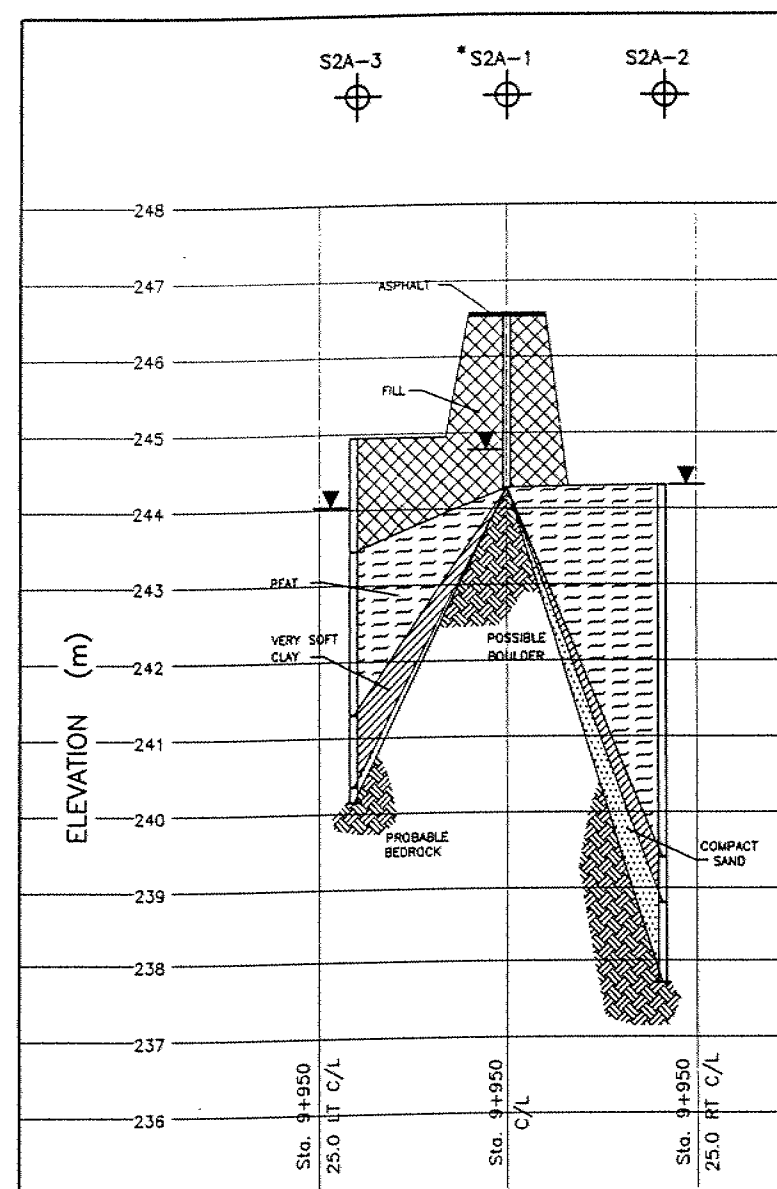
KING'S HIGHWAY 69
 HEALEY LAKE ROAD

DISTRICT 52 HUNTSVILLE	REGION NORTHERN
GEOG. TWP. CONGER	DISTRICT MUNICIPALITY PARRY SOUND

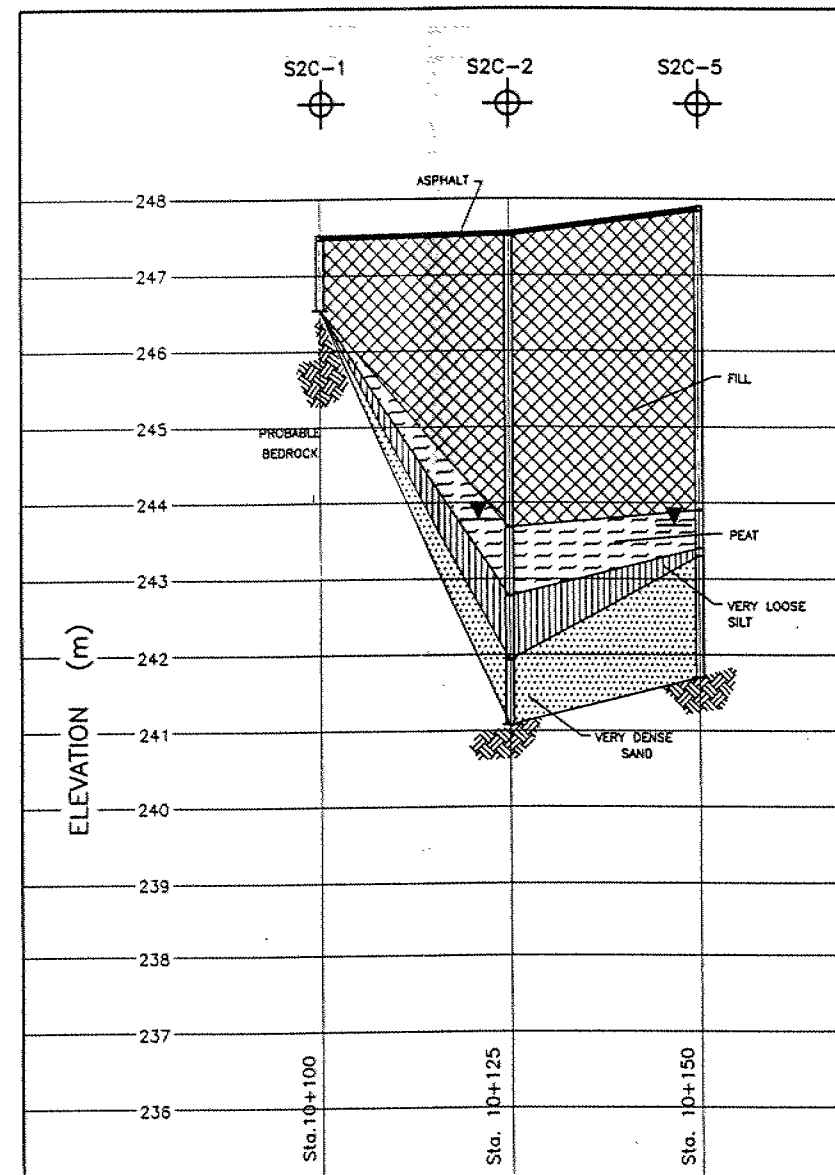
SWAMPS 2A & 2C
 BOREHOLE AND PROBEHOLE LOCATION PLAN

Peto MacCallum Ltd.
 CONSULTING ENGINEERS
 43 BURLINGTON ROAD, HAMILTON, ONTARIO L8C 3G8

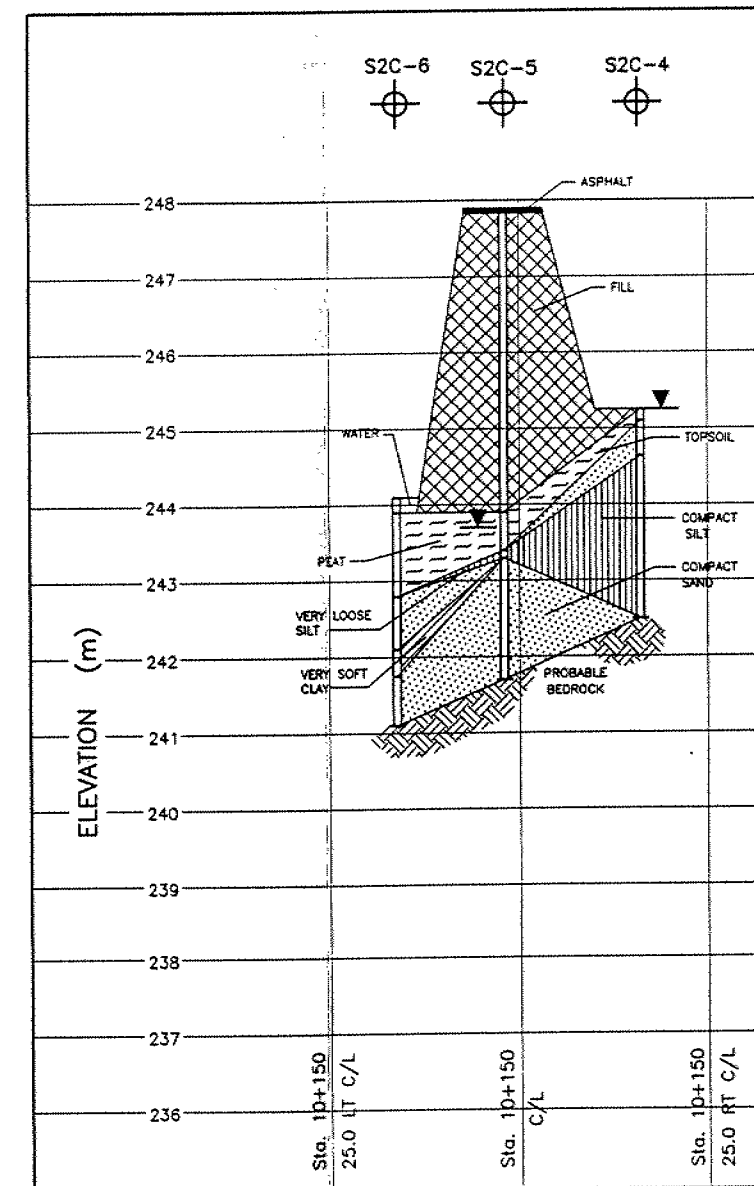
DRAWN JS	DATE MAY 1998	SCALE 1 : 2000	JOB NO. 97TF088B	DRAWING NO. 6
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SECTION A-A
(SWAMP 2A)



SECTION B-B
(SWAMP 2C)



SECTION C-C
(SWAMP 2C)

LEGEND

	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		BEDROCK (INFERRED)
	CLAY		SILT
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		WATER
	ASPHALT		

NOTES

1. REFER TO DRAWING NO. 6 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.
4. * TESTHOLE DRILLED AT STATION 9+925 C/L ON EXISTING HEALY LAKE ROAD.

G.W.P. 290-97-00, HIGHWAY 69
HEALEY LAKE ROAD/TWP. OF CONGER
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMPS 2A & 2C - SOIL PROFILES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	VERTICAL 1:100 HORIZONTAL 1:1000	97TF088B	6A
APPROVED	DWK				

GWP 290-97-00 Highway 69
District 52, Huntsville
Swamp 2B
Station 13+040 - 13+160
Southbound Lane/Twp. of Conger
Datum Centre Line Median

S2B-1 13+040 26.8 LT C/L El. 246.20
 0-200 Water
 200-800 Blk Fib Peat
 800 NFP BR

S2B-2 13+040 18.8 LT C/L El. 246.20
 0-200 Water
 200-700 Blk Fib Peat
 700 NFP BR

S2B-3 13+040 10.8 LT C/L El. 246.00
 0-100 Water
 100-600 Blk Amor Peat
 600 NFP BR

S2B-4 13+065 26.8 LT C/L El. 245.64
 0-2.50 Blk Fib Peat
 2.50 NFP BR
 Fr Wat @ 0

S2B-5 13+065 18.8 LT C/L El. 245.64
 0-3.50 Blk Fib Peat
 3.50 NFP BR
 Fr Wat @ 0

S2B-6 13+065 10.8 LT C/L El. 245.64
 0-3.60 Blk Fib Peat
 3.60-4.20 L Gry Sa W Gr Wet
 4.20-4.80 Soft Gry Siy Cl
 4.80 NFP BR
 Fr Wat @ 0

S2B-7 13+090 26.8 LT C/L El. 245.58
 0-200 Water
 200-700 Blk Amor Peat
 700 NFP BR

S2B-8 13+090 18.8 LT C/L El. 245.58
 0-3.60 Blk Fib Peat
 3.60-5.50 L Gry Sa Tr Gr Wet
 5.50 NFP BR
 Fr Wat @ 0

S2B-9 13+090 10.8 LT C/L El. 245.58
 0-4.80 Blk Fib Peat
 4.80-5.00 L Gry Sa Tr Si Tr Gr Wet
 5.00-5.20 Soft Gry Siy Cl
 5.20-6.20 L Gry Sa Tr Si Gr Wet
 6.20 NFP BR
 Fr Wat @ 0

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 2B

Station 13+040 - 13+160

Southbound Lane/Twp. of Conger

Datum Centre Line Median

S2B-10	13+115	26.8 LT C/L	El. 245.38	S2B-15	13+140	10.8 LT C/L	El. 244.91
	0-400	Blk Si Tps			0-200	Blk Fib Peat	
	400	NFP BR			200	NFP BR	
S2B-11	13+115	18.8 LT C/L	El. 245.48				
	0-4.30	Blk Fib Peat					
	4.30	NFP BR					
		Fr Wat @ 0					
S2B-12	13+115	10.8 LT C/L	El. 245.48				
	0-4.20	Blk Amor Peat					
	4.20-4.90	L Gry Sa Tr Si Wet					
	4.90-5.30	Soft Gry Siy Cl Tr Sa					
	5.30-8.00	Comp Gry Sa Tr Si Wet					
	8.00	NFP BR					
		Fr Wat @ 0					
S2B-13	13+140	26.8 LT C/L	El. 245.96				
	0-200	Water					
	200-2.50	Blk Fib Peat					
	2.50	NFP BR					
S2B-14	13+140	18.8 LT C/L	El. 245.21				
	0-200	Water					
	200-1.30	Blk Fib Peat					
	1.30	NFP BR					

GWP 290-97-00 Highway 69
District 52, Huntsville
Swamp 2B
Station 13+000 - 13+125
Northbound Lane/Twp. of Conger
Datum Centre Line Median

S2B-16 13+000 7.3 RT C/L El. 248.37
0-100 Blk Siy Sa Tps
100 NFP BR

S2B-17 13+000 18.8 RT C/L El. 245.82
0 NFP BR

S2B-18 13+000 30.3 RT C/L El. 245.65
0-300 Water
300-1.10 Blk Fib Peat
1.10-4.20 L Gry Sa Tr Si Wet
4.20 NFP BR

S2B-19 13+025 7.3 RT C/L El. 246.40
0-300 Water
300-500 Blk Amor Peat
500 NFP BR

S2B-20 13+025 18.8 RT C/L El. 245.71
0-1.00 Blk Amor Peat
1.00-1.20 L Gry Sa W Gr Wet
1.20 NFP BR
Fr Wat @ 300

S2B-21 13+025 30.3 RT C/L El. 245.64
0-200 Water
200-1.80 Blk Fib Peat
1.80-3.90 L Gry Sa Tr Si Wet
3.90 NFP BR

S2B-22 13+050 7.3 RT C/L El. 245.74
0-3.80 Blk Fib Peat
w @ 1.50 = 909%
3.80 NFP BR
Fr Wat @ 100

S2B-23 13+050 18.8 RT C/L El. 245.67
0-400 Blk Amor Peat
400-3.20 Blk Fib Peat
3.20-4.30 L To Comp Br Sa Tr Si Wet
w @ 4.00 = 20%
4.30 NFP BR
Fr Wat @ 100

S2B-24 13+050 30.3 RT C/L El. 245.61
0-400 Blk Amor Peat
400-3.60 Blk Fib Peat
3.60-4.10 L To Comp Br Sa Tr Si Wet
4.10 NFP BR
Fr Wat @ 100

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 2B

Station 13+000 - 13+125

Northbound Lane/Twp. of Conger

Datum Centre Line Median

S2B-25 13+075 8.3 RT C/L El. 245.67
 0-3.60 Blk Fib Peat
 3.60-4.80 L Gry Sa Tr Gr Wet
 4.80-5.20 V Soft Gry Cly Si
 5.20-5.40 L Gry Sa Tr Gr Wet
 5.40 NFP BR
 Fr Wat @ 300

S2B-28 13+100 8.3 RT C/L El. 245.62
 0-200 Water
 200-4.80 Blk Fib Peat
 4.80-5.00 L Gry Sa Tr Si Tr Gr Wet
 5.00-5.20 V Soft Gr Cly Si
 5.20-10.00 L Gry Sa Tr Si Tr Gr Wet
 10.00 NFP BR

S2B-26 13+075 18.8 RT C/L El. 245.67
 0-3.80 Blk Fib Peat
 3.80-4.60 L Gry Sa Tr Si Tr Gr Wet
 4.60-5.00 V Soft Cly Si
 5.00-7.00 L Gry Sa Tr Si Tr Gr Wet
 7.00 NFP BR
 Fr Wat @ 300

S2B-29 13+100 18.8 RT C/L El. 245.63
 0-4.30 Blk Fib Peat
 4.30 NFP BR
 Fr Wat @ 300

S2B-27 13+075 29.3 RT C/L El. 245.61
 0-200 Water
 200-3.60 Blk Fib Peat
 3.60-6.50 L Gry Sa And Si Wet
 % Passing L9130 ML
 4.75 μ m = 100 LSFH
 75 μ m = 42 'K' Factor = 0.27
 5 μ m = 8
 2 μ m = 5
 WL = 25.5, WP = 24.4, IP = 1.1
 6.50 NFP BR

S2B-30 13+100 29.3 RT C/L El. 245.63
 0-3.60 Blk Fib Peat
 3.60 NFP BR
 Fr Wat @ 400

S2B-31 13+125 7.8 RT C/L El. 245.38
 0-1.50 Blk Fib Peat
 1.50-4.30 Blk Amor Peat
 4.30 NFP BR
 Fr Wat @ 100

S2B-32 13+125 18.8 RT C/L El. 245.38
 0-1.60 Blk Fib Peat
 1.60 NFP BR
 Fr Wat @ 100

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 2B

Station 13+000 - 13+125

Northbound Lane/Twp. of Conger

Datum Centre Line Median

S2B-33	13+125	29.8 RT C/L	El. 246.64
	0-300	Blk Siy Sa Tps	
	300	NFP BR	

METRIC

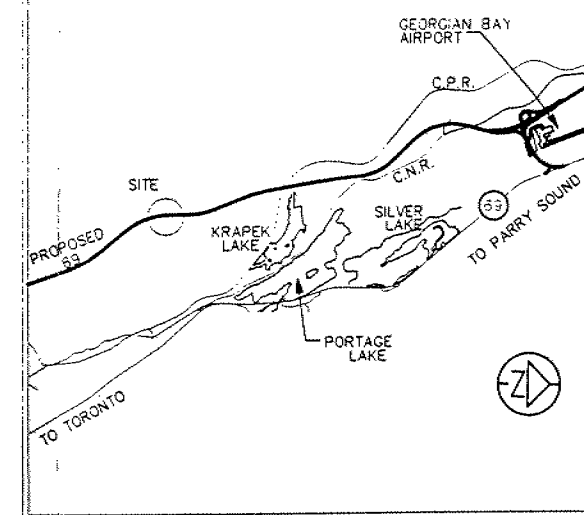
STATE NO. 774-69 20-0
DRAWING NO. 7774006000
CONT No C
GWP No 290-97-00



STA 13+000 TO STA 13+700
Survey 1997/12 Revised R

SHEET

DISTRICT MUNICIPALITY OF PARRY SOUND
GEOG TWP CONGER



KEY PLAN
(N.T.S.)

SCALE
10 0 20

MINISTRY OF TRANSPORTATION

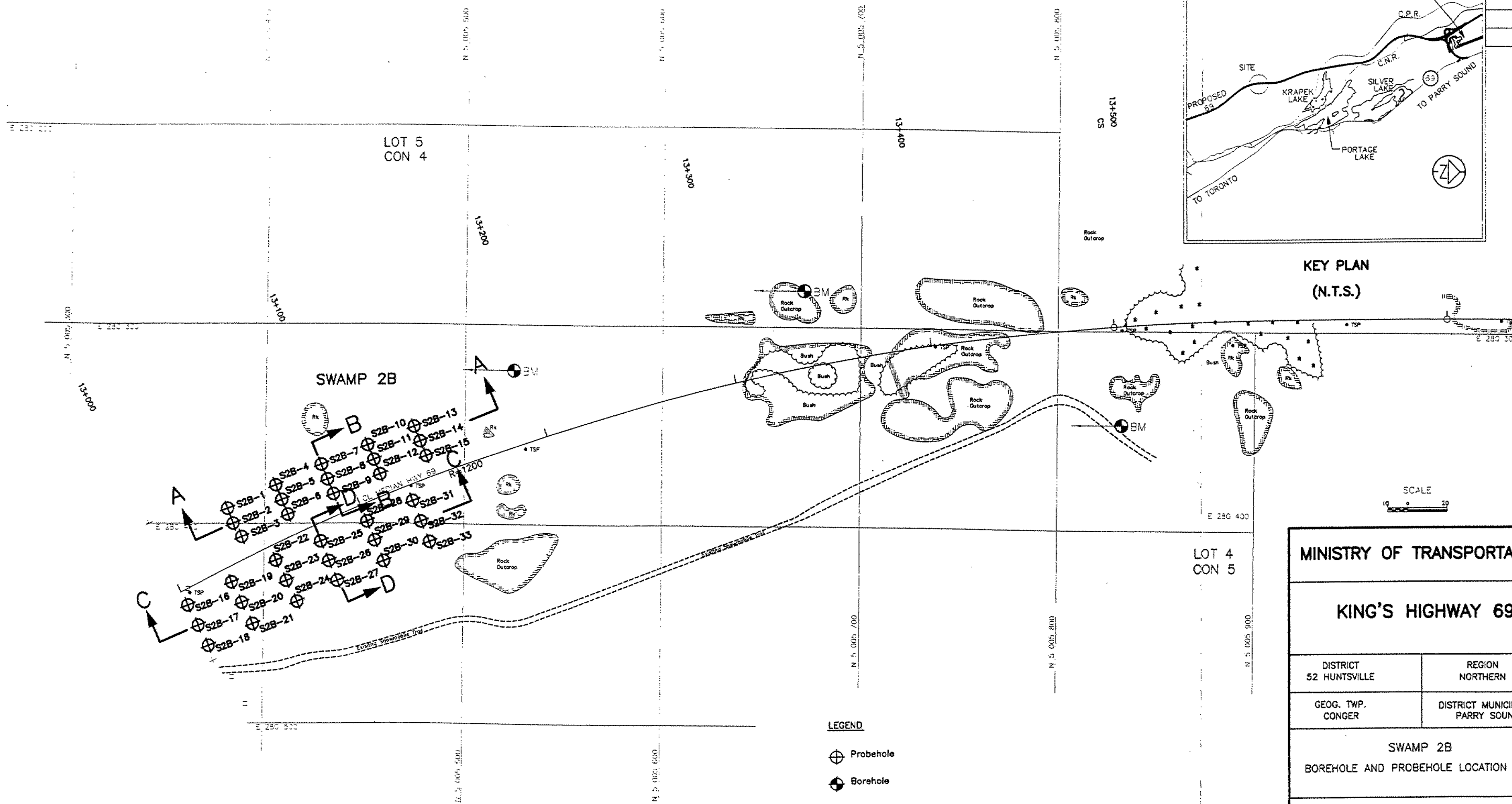
KING'S HIGHWAY 69

DISTRICT S2 HUNTSVILLE	REGION NORTHERN
GEOG. TWP. CONGER	DISTRICT MUNICIPALITY PARRY SOUND

SWAMP 2B
BOREHOLE AND PROBEHOLE LOCATION PLAN

Peto MacCallum Ltd.
CONSULTING ENGINEERS
45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C8

DRAWN J.S.	DATE MAY 1998	SCALE 1 : 2000	JOB NO. 97TF088B	DRAWING NO. 7
CHECKED E.H.				
APPROVED J.A.				

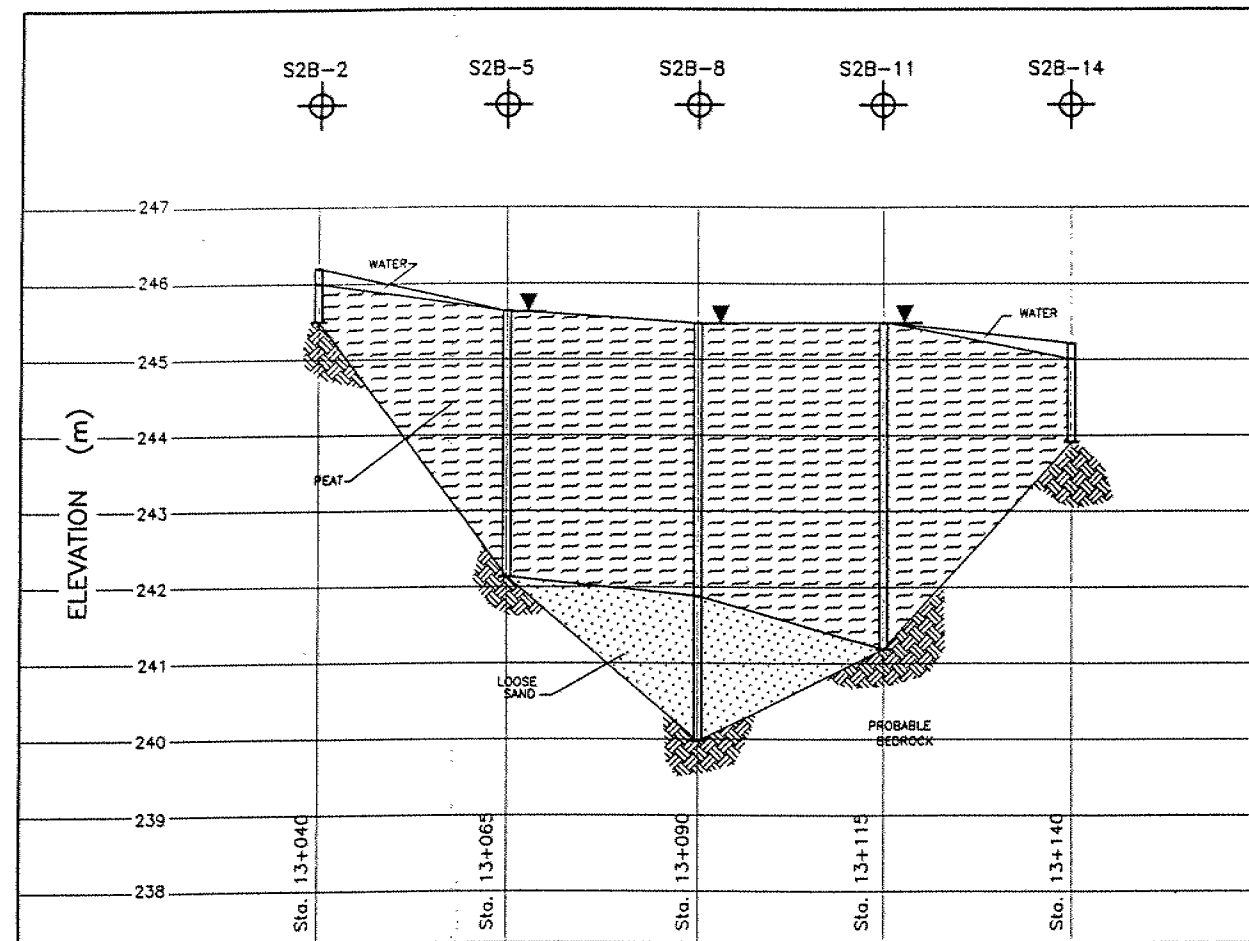


LEGEND

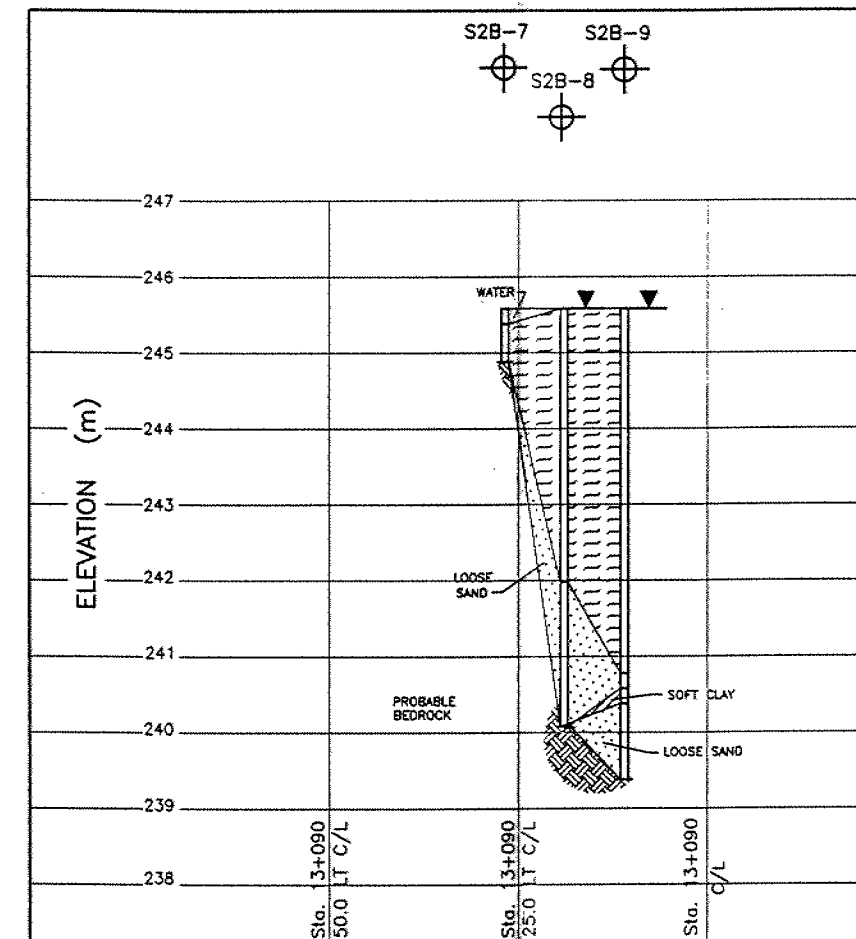
- ⊕ Probehole
- Borehole

NOTES:

1. Refer to Log of Borehole and Probehole Sheets for description of subsurface conditions.
2. Refer to Drawings 7A and 7B for soil profiles.



SECTION A-A



SECTION B-B

LEGEND

	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		SILT
	CLAY		BEDROCK (INFERRED)
	WATER		ASPHALT
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		

NOTES

1. REFER TO DRAWING NO. 7 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

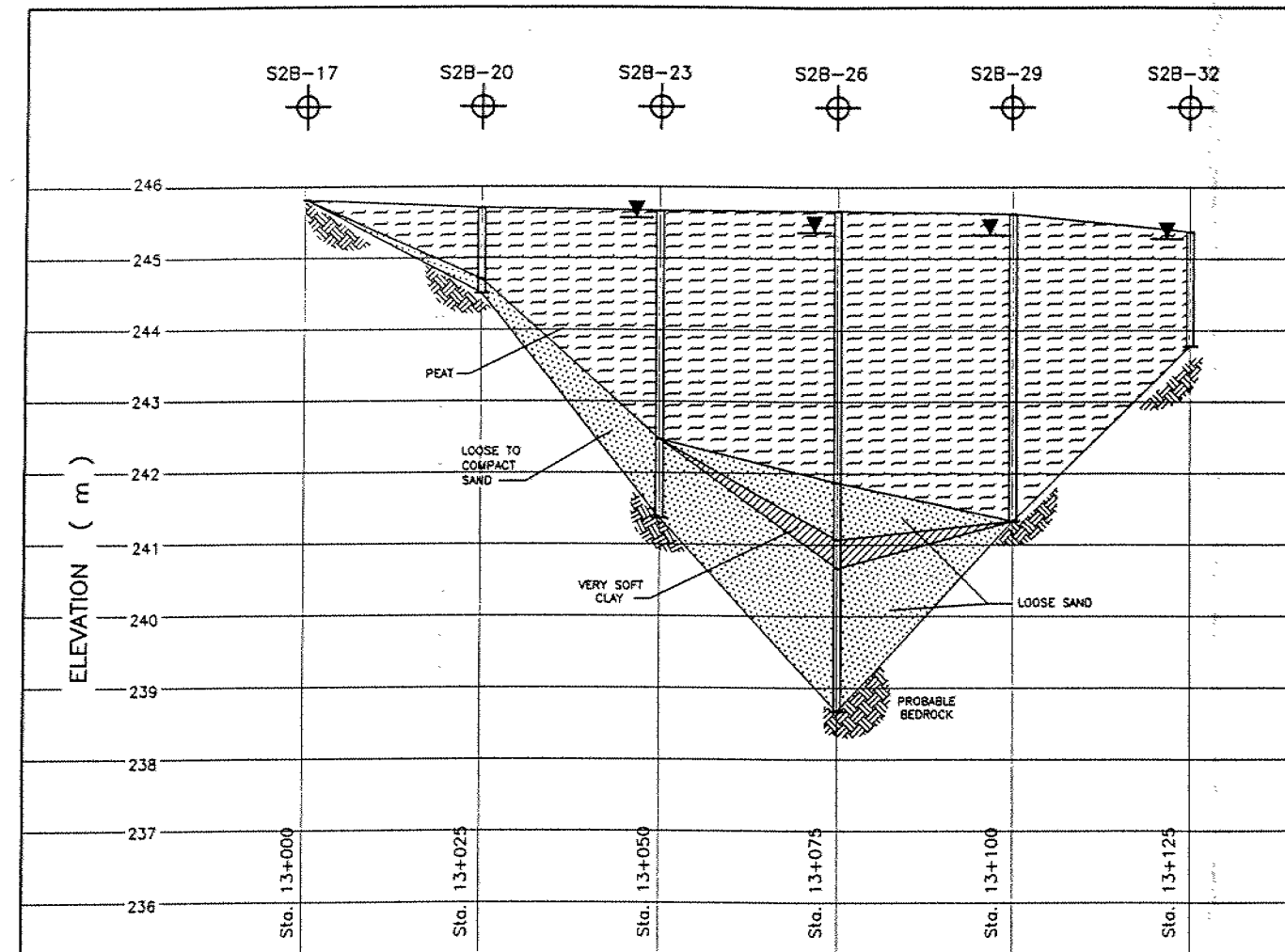
G.W.P. 290-97-00, HIGHWAY 69
SOUTHBOUND LANE/TWP. OF CONGER
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 2B - SOIL PROFILES

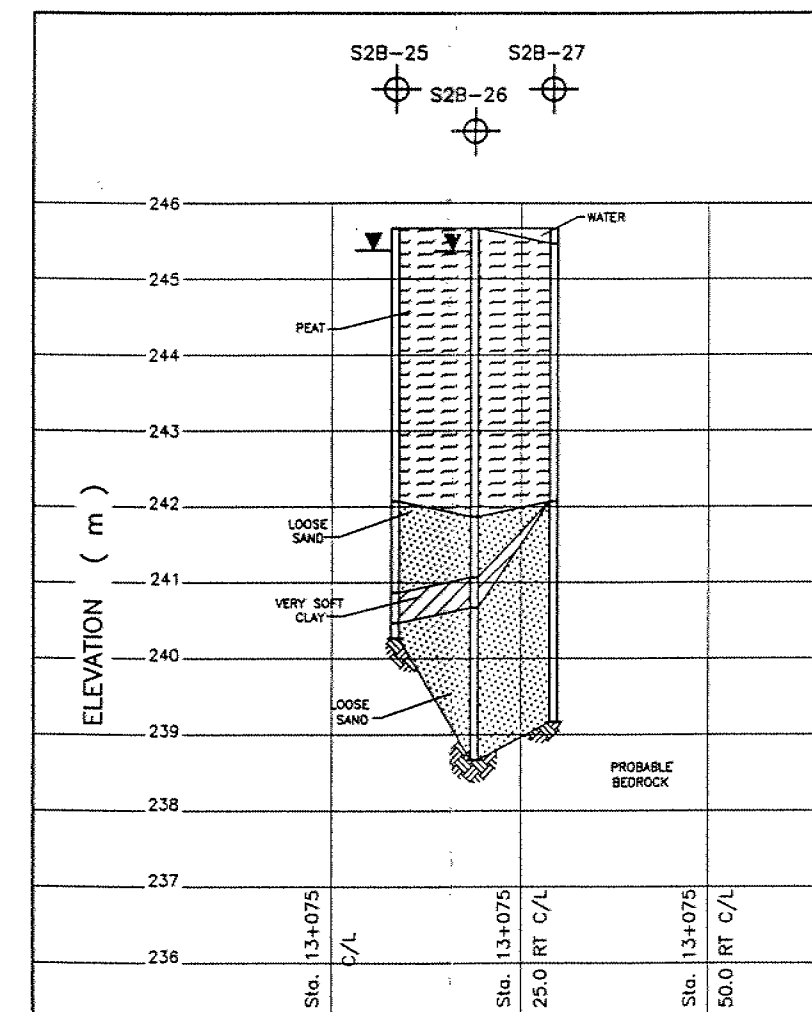
Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	VERTICAL 1:100 HORIZONTAL 1:1000	97TF088B	7A
APPROVED	DWK				



SECTION C-C



SECTION D-D

LEGEND

	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		SILT
	CLAY		BEDROCK (INFERRED)
			ASPHALT
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		

NOTES

1. REFER TO DRAWING NO. 7 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

G.W.P. 290-97-00, HIGHWAY 69
NORTHBOUND LANE/TWP. OF CONGER
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 2B - SOIL PROFILES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	VERTICAL 1:100 HORIZONTAL 1:1000	97TF088B	7B
APPROVED	DWK				

GWP 290-97-00 Highway 69
District 52, Huntsville
Swamp 3
Station 15+400 - 15+600
Southbound Lane/Twp. of Conger
Datum Centre Line Median

S3-1 15+400 29.8 LT C/L El. 237.10
 0-300 Blk Si Tps
 300-600 Comp Gry Sa W Si Moist
 600 NFP BR
 Fr Wat @ 0

S3-6 15+425 6.8 LT C/L El. 234.10
 0-200 Water
 200-4.70 Blk Amor Peat
 4.70 NFP BR
 Fr Wat @ 0

S3-2 15+400 18.8 LT C/L El. 234.26
 0-300 Blk Fib Peat
 300-600 Comp Br Sa Tr Si Wet
 600 NFP BR
 Fr Wat @ 0

S3-7 15+450 31.8 LT C/L El. 234.11
 0-200 Water
 200-5.70 Blk Amor Peat
 5.70-6.00 Gry Sa Tr Si Tr Gr Wet
 6.00 NFP BR
 Fr Wat @ 0

S3-3 15+400 6.8 LT C/L El. 234.40
 0-100 Blk Si Tps
 100 NFP BR
 Fr Wat @ 0

S3-9 15+450 5.8 LT C/L El. 234.11
 0-150 Water
 150-6.60 Blk Amor Peat
 6.60 NFP BR
 Fr Wat @ 0

S3-4 15+425 30.8 LT C/L El. 234.12
 0-400 Blk Si Tps Wet
 400 NFP BR
 Fr Wat @ 0

S3-10 15+475 32.3 LT C/L El. 234.11
 0-200 Water
 200-5.60 Blk Amor Peat
 5.60-5.90 Gry Sa Tr Si Tr Gr Wet
 5.90 NFP BR
 Fr Wat @ 0

S3-5 15+425 18.8 LT C/L El. 234.12
 0-1.50 Blk Amor Peat
 1.50-3.00 Blk Fib Peat
 3.00 NFP BR
 Fr Wat @ 0

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 3

Station 15+400 - 15+600

Southbound Lane/Twp. of Conger

Datum Centre Line Median

S3-11	15+475	18.8 LT C/L	El. 234.11
	0-150	Water	
	150-5.70	Blk Fib Peat	
	5.70-6.15	V Soft Gry Siy Cl	
	6.15-6.75	Gry Sa Tr Si Tr Gr Wet	
	6.75	NFP BR	
		Fr Wat @ 0	

S3-15	15+500	3.8 LT C/L	El. 234.10
	0-1.50	Blk Fib Peat	
	1.50- 2.10	Blk Amor Peat	
	2.10-5.45	Blk Fib Peat	
	5.40-7.20	V Soft Gry Siy Cl	
	7.20-8.40	D Gry Sa Tr Si Tr Gr Wet	
	8.40	NFP BR	
		Fr Wat @ 0	

S3-12	15+475	5.3 LT C/L	El. 234.11
	0-300	Water	
	300-5.60	Blk Amor Peat	
	5.60-6.00	Gry Sa Tr Si Tr Gr Wet	
	6.00	NFP BR	
		Fr Wat @ 0	

S3-16	15+525	34.8 LT C/L	El. 234.10
	0-200	Water	
	200-4.50	Blk Amor Peat	
	4.50-4.70	D Gry Sa Tr Si Wet	
	4.70-5.00	V Soft Siy Cl	
	5.00-5.20	D Gry Sa Tr Si Wet	
	5.20	NFP BR	
		Fr Wat @ 0	

S3-13	15+500	33.8 LT C/L	El. 234.10
	0-400	Water	
	400-3.20	Blk Fib Peat	
	3.20-4.50	Gry Sa Tr Gr Wet	
	4.50	NFP BR	
		Fr Wat @ 0	

S3-17	15+525	18.8 LT C/L	El. 234.05
	0-250	Water	
	250-5.35	Blk Fib Peat	
	5.35-6.25	Gry Sa Tr Si Tr Gr Wet	
	6.25	NFP BR	
		Fr Wat @ 0	

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 3

Station 15+400 - 15+600

Southbound Lane/Twp. of Conger

Datum Centre Line Median

S3-18 15+525 2.8 LT C/L El. 234.05
 0-200 Water
 200-4.30 Blk Fib Peat
 4.30-4.50 Gry Sa Tr Si Wet
 4.50 NFP BR
 Fr Wat @ 0

S3-19 15+550 35.8 LT C/L El. 234.10
 0-300 Water
 300-4.60 Blk Amor Peat
 4.60-5.00 Gry Sa Tr Gr Wet
 5.00 NFP BR
 Fr Wat @ 0

S3-21 15+550 1.8 LT C/L El. 234.02
 0-200 Water
 200-2.80 Blk Amor Peat
 2.80-3.10 Gry Sa Tr Si Tr Gr Wet
 3.10 NFP BR
 Fr Wat @ 0

S3-22 15+575 36.3 LT C/L El. 234.02
 0-300 Water
 300-4.80 Blk Amor Peat
 4.80-6.80 Gry Sa Tr Si Wet
 6.80 NFP BR
 Fr Wat @ 0

S3-23 15+575 18.8 LT C/L El. 234.02
 0-150 Water
 150-1.95 Blk Fib Peat
 1.95-3.15 V Soft Gry Siy Cl
 3.15-7.95 Gry Sa Tr Si Tr Gr Wet
 7.95 NFP BR
 Fr Wat @ 0

S3-24 15+575 1.3 LT C/L El. 234.15
 0-150 Water
 150-750 Blk Fib Peat
 750-1.05 V Soft Gry Siy Cl
 1.05-1.80 Gry Sa Tr Gr Tr Si Wet
 1.80 NFP BR
 Fr Wat @ 0

S3-25 15+600 28.3 LT C/L El. 234.05
 0-100 Water
 100-700 Blk Fib Peat
 700-2.00 Gry Sa Tr Gr Tr Si Wet
 2.00 NFP BR
 Fr Wat @ 0

S3-26 15+600 18.8 LT C/L El. 234.29
 0-300 Blk Si Tps
 300-650 Br Sa Tr Si Moist
 650 NFP BR

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 3

Station 15+400 - 15+600

Southbound Lane/Twp. of Conger

Datum Centre Line Median

S3-27	15+600	9.3 LT C/L	El. 236.95
	0-450	Blk Si Tps	
	450	NFP BR	

LOG OF BOREHOLE NO. S3-8

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 15+450, 18.8 m Lt, Highway 69, SBL, Twp. of Conger BORING DATE 98.02.26

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers / Vane Test

TECHNICIAN B. G.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N-VALUES	DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				WATER CONTENT %					
							BLOWS/0.3M				WATER CONTENT %					
							20	40	60	80	10	20	30			
0	GROUND ELEVATION 234.12															
0.10	Water													Upon completion of augering, borehole caved at 4.6 m.		
1.5	Peat Fibrous, Black		233				+									
			232	1	SS	0	+				W=690	●				
			231	2	SS	0	+				W=640	●				
3.0			230													
4.5				3	SS	0	+						W=65	●		
5.20	Silty Clay Grey Very Soft		229	4	TW	P.H.								Sample 3, CI $W_L = 38$ $W_p = 19$ $I_p = 19$		
6.0	Sandy Silt Trace Clay, Trace Gravel Grey, Wet Very Dense		228	5	SS	50										
			227													
7.5			226	6	SS	50/125mm										
7.70	End Of Borehole Hammer Bouncing Probable Bedrock															
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

- Vane test was carried out at a distance of 1.5 m from the borehole.

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S3-14

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 15+500, 18.8m Lt., Highway 69, SBL, Twp. of Conger BORING DATE 98.02.26

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers / Vane Test

TECHNICIAN B. G.

SOIL PROFILE				SAMPLES			SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L			GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				PLASTIC LIMIT W_P				
							BLOWS/0.3M				WATER CONTENT %				
							20	40	60	80	W_P	W	W_L		
0	GROUND ELEVATION 234.08						20	40	60	80	10	20	30	Upon completion of augering, borehole caved at 3.75 m.	
0.15	Water														
1.5	Peat Fibrous, Black		233				+								
			1	SS	0	+						W=779	•		
			232												
3.0			231				+								
			2	TW	P.H.										
			3	SS	0	+						W=851	•		
4.5			230												
			4	TW	P.H.										
5.25			229	5	SS	0							W=500		•
6.0	Silty Clay Grey Very Soft						+								
			228												
			6	SS	0							W=61	•		
			7	TW	P.H.										
7.5			227												
9.0			226	8	SS	0	+								
9.15															
			9	TW	P.H.										
10.5	Sand Trace Silt, Trace Gravel Grey, Wet Compact To Very Dense														
			10	SS	23	•									
11.10			224												
12.0															
13.5			223	11	SS	69									
15.0	End Of Borehole Hammer Bouncing Probable Bedrock														
16.5			222												

NOTES:

1. Vane test was carried out at a distance of 1.5 m from the borehole.

CHECKED BY: E. W.

LOG OF BOREHOLE NO. S3-20

PROJECT GWP 290-97-00

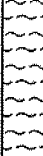

OUR PROJECT 97TF088B

LOCATION Station 15+550, 18.8 m Lt., Highway 69, SBL, Twp. of Conger BORING DATE 98.02.25

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers/ Vane Test

TECHNICIAN B. G.

SOIL PROFILE				SAMPLES		SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST *				PLASTIC LIMIT W_P				
							BLOWS/0.3M				WATER CONTENT %				
							20	40	60	80	10	20	30		
							20	40	60	80	10	20	30		
0	GROUND ELEVATION 234.02													Upon completion of augering, borehole caved at 1.5 m with water level at ground surface.	
	Peat Fibrous, Black		233												
1.5				1	SS	0							W=713		
				232											
2.70															
3.0	Silty Clay Grey Very Soft		231	2	TW	P.H.								W=77	
				3	SS	0									
4.30			230												
4.5	End Of Borehole Auger Refusal Probable Bedrock		229												
6.0															
7.5															
9.0															
10.5															
12.0															
13.5															
15.0															
16.5															

NOTES:

CHECKED BY: E. W.

GWP 290-97-00 Highway 69
District 52, Huntsville
Swamp 3
Station 15+390 - 15+575
Northbound Lane/Twp. of Conger
Datum Centre Line Median

S3-28 15+390 7.3 RT C/L El. 234.09
 0-200 Blk Amor Peat
 200 NFP BR
 Fr Wat @ 500

S3-29 15+390 18.8 RT C/L El. 234.10
 0-500 Blk Amor Peat
 500 NFP BR
 Fr Wat @ 0

S3-30 15+390 30.3 RT C/L El. 234.10
 0-2.50 Blk Amor Peat
 2.50 NFP BR
 Fr Wat @ 300

S3-31 15+425 5.3 RT C/L El. 234.10
 0-200 Water
 200-5.80 Blk Amor Peat
 5.80-7.30 D Gry Sa Tr Gr Wet
 7.30 NFP BR

S3-32 15+425 18.8 RT C/L El. 234.10
 0-5.10 Blk Fib Peat
 5.10-6.00 V Soft Gry Siy Cl
 6.00-6.30 D Gry Sa Tr Si Wet
 6.30 NFP BR
 Fr Wat @ 0

S3-33 15+425 32.3 RT C/L El. 234.10
 0-100 Water
 100-5.90 Blk Amor Peat
 5.90-7.00 Soft Gry Siy Cl
 7.00-7.20 D Gry Sa Tr Gr Wet
 7.20 NFP BR

S3-34 15+450 4.8 RT C/L El. 234.09
 0-300 Water
 300-5.60 Blk Amor Peat
 5.60-5.70 D Gry Sa Tr Si Tr Gr Wet
 5.70 NFP BR
 Fr Wat @ 0

S3-36 15+450 32.8 RT C/L El. 234.09
 0-300 Water
 300-4.80 Blk Amor Peat
 4.80 NFP BR

S3-37 15+475 3.8 RT C/L El. 234.07
 0-300 Water
 300-1.80 Blk Fib Peat
 1.80-3.30 Blk Amor Peat
 3.30-4.80 Blk Fib Peat
 4.80-5.40 V Soft Gry Siy Cl
 5.40-7.80 D Gry Sa Tr Si Tr Gr Wet
 7.80 NFP BR

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 3

Station 15+390 - 15+575

Northbound Lane/Twp. of Conger

Datum Centre Line Median

S3-38 15+475 18.8 RT C/L El. 234.07
 0-100 Water
 100-4.60 Blk Fib Peat
 4.60-5.25 V Soft Gry Siy Cl
 5.25-8.50 D Gry Sa Tr Si Tr Gr Wet
 8.50 NFP BR

S3-39 15+475 33.8 RT C/L El. 234.07
 0-250 Water
 250-1.00 Blk Fib Peat
 1.00-2.20 Comp Gry Sa Tr Si Wet
 2.20-2.35 Soft Gry Siy Cl
 2.35-2.65 D Gry Sa Tr Si Wet
 2.65 NFP BR

S3-40 15+500 2.8 RT C/L El. 234.10
 0-250 Water
 250-4.10 Blk Fib Peat
 4.10-5.60 Blk Amor Peat
 5.60-6.50 V Soft Gry Siy Cl
 6.50-7.15 D Gry Sa Tr Si Tr Gr Wet
 7.15 NFP BR

S3-42 15+500 34.8 RT C/L El. 234.07
 0-100 Blk Si Tps
 100-550 Comp Gry Si W Sa Moist
 550-900 Comp Gry Sa Tr Si Wet
 900 NFP BR
 Fr Wat @ 600

S3-43 15+525 1.3 RT C/L El. 234.08
 0-300 Water
 300-4.00 Blk Amor Peat
 4.00-4.40 D Gry Sa Tr Si Tr Gr Wet
 4.40 NFP BR

S3-44 15+525 18.8 RT C/L El. 234.08
 0-150 Water
 150-1.65 Blk Fib Peat
 1.65-2.78 V Soft Gry Siy Cl W Sa Seams
 2.78 NFP BR

S3-45 15+525 36.3 RT C/L El. 234.05
 0-200 Blk Si Tps
 200-600 Br Sa Tr Si Wet
 600 NFP BR
 Fr Wat @ 200

S3-46 15+550 3.3 RT C/L El. 234.06
 0-200 Water
 200-3.40 Blk Fib Peat
 3.40 NFP BR

S3-47 15+550 18.8 RT C/L El. 234.09
 0-600 Blk Fib Peat
 600-1.00 L Gry Sa Tr Si Wet
 1.00 NFP BR
 Fr Wat @ 300

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 3

Station 15+390 - 15+575

Northbound Lane/Twp. of Conger

Datum Centre Line Median

S3-48	15+550	34.3 RT C/L	El. 235.50
	0-300	Blk Si Tps	
	300	NFP BR	

S3-49	15+575	5.8 RT C/L	El. 234.68
	0-300	Blk Fib Peat	
	300-1.20	Br Sa Tr Gr Wet	
	1.20	NFP BR	

S3-50	15+575	18.8 RT C/L	El. 236.92
	0-200	Blk Si Tps	
	200-700	Br Sa W Si Moist	
	700	NFP BR	

S3-51	15+575	31.8 RT C/L	El. 238.33
	0-300	Blk Si Tps	
	300	NFP BR	

LOG OF BOREHOLE NO. S3-35

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 15+450, 18.8 m Rt., Highway 69, NBL, Twp. of Conger BORING DATE 98.02.25

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES		SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				PLASTIC LIMIT W_P				
							BLOWS/0.3M				WATER CONTENT %				
							20 40 60 80				W_P W W_L				
							20 40 60 80				10 20 30				
0	GROUND ELEVATION 234.09														
0.10	Water														
	Peat		233												
	Fibrous, Black														
1.5				1	SS	0							W=995		
			232												
3.0				2	TW	P.H.							W=632		
			231												
			230												
4.5				3	SS	4									
4.80															
5.05	Silty Clay		229												
	Grey, Very Soft														
	Sand		228												
	Trace Silt, Trace Gravel			4	SS	42									
	Grey, Wet														
6.0	Dense														
6.60			227												
	End Of Borehole														
	Auger Refusal														
	Probable Bedrock														
7.5															
9.0															
10.5															
12.0															
13.5															
15.0															
16.5															

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S3-41

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 15+500, 18.8 m Rt., Highway 69, NBL, Twp. of Conger BORING DATE 98.02.25

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN B. G.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P					
							DYNAMIC CONE PENETRATION x				WATER CONTENT W					
							STANDARD PENETRATION TEST •				W_P W W_L					
							BLOWS/0.3M				WATER CONTENT %					
							20	40	60	80	10	20	30			
0	GROUND ELEVATION 234.09													Upon completion of augering, borehole caved at 3.00 m with water level at ground surface.		
	Peat															
	Fibrous, Black		233													
1.5																
			232	1	SS	0							W=832 •			
2.40																
	Silty Clay															
	Grey, Soft		231													
3.40				2	SS	3										
	Sand															
	Trace Silt, Trace Gravel															
	Grey, Wet		230													
4.30	Dense To Very Dense															
4.5																
	Silty Clay, Firm			3	SS	55										
4.90			229													
5.20																
	End Of Borehole															
	Auger Refusal		228													
	Probable Bedrock															
6.0																
7.5																
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

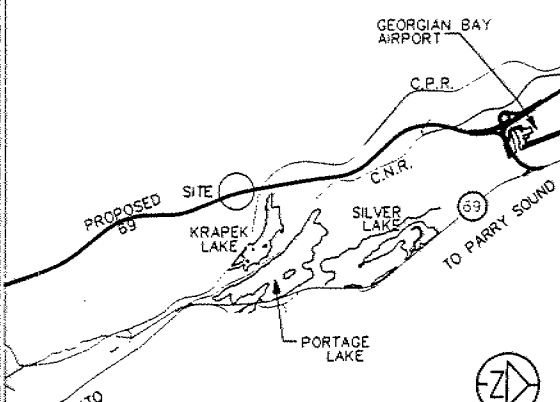
CHECKED BY: E.W.

METRIC

CONT No C
GWP No 290-97-00

STA 15+100 TO STA 15+300
Survey 1997/12 Revised R

DISTRICT MUNICIPALITY OF PARRY SOUND
GEOG TWP CONGER



KEY PLAN
(N.T.S.)

SCALE
10 0 20

MINISTRY OF TRANSPORTATION

KING'S HIGHWAY 69

DISTRICT S2 HUNTSVILLE	REGION NORTHERN
GEOG. TWP. CONGER	DISTRICT MUNICIPALITY PARRY SOUND

SWAMP 3
BOREHOLE AND PROBEHOLE LOCATION PLAN

Peto MacCallum Ltd.
CONSULTING ENGINEERS
45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3J8

DRAWN JS	DATE MAY 1998	SCALE 1 : 2000	JOB NO. 97TF088B	DRAWING NO. 8
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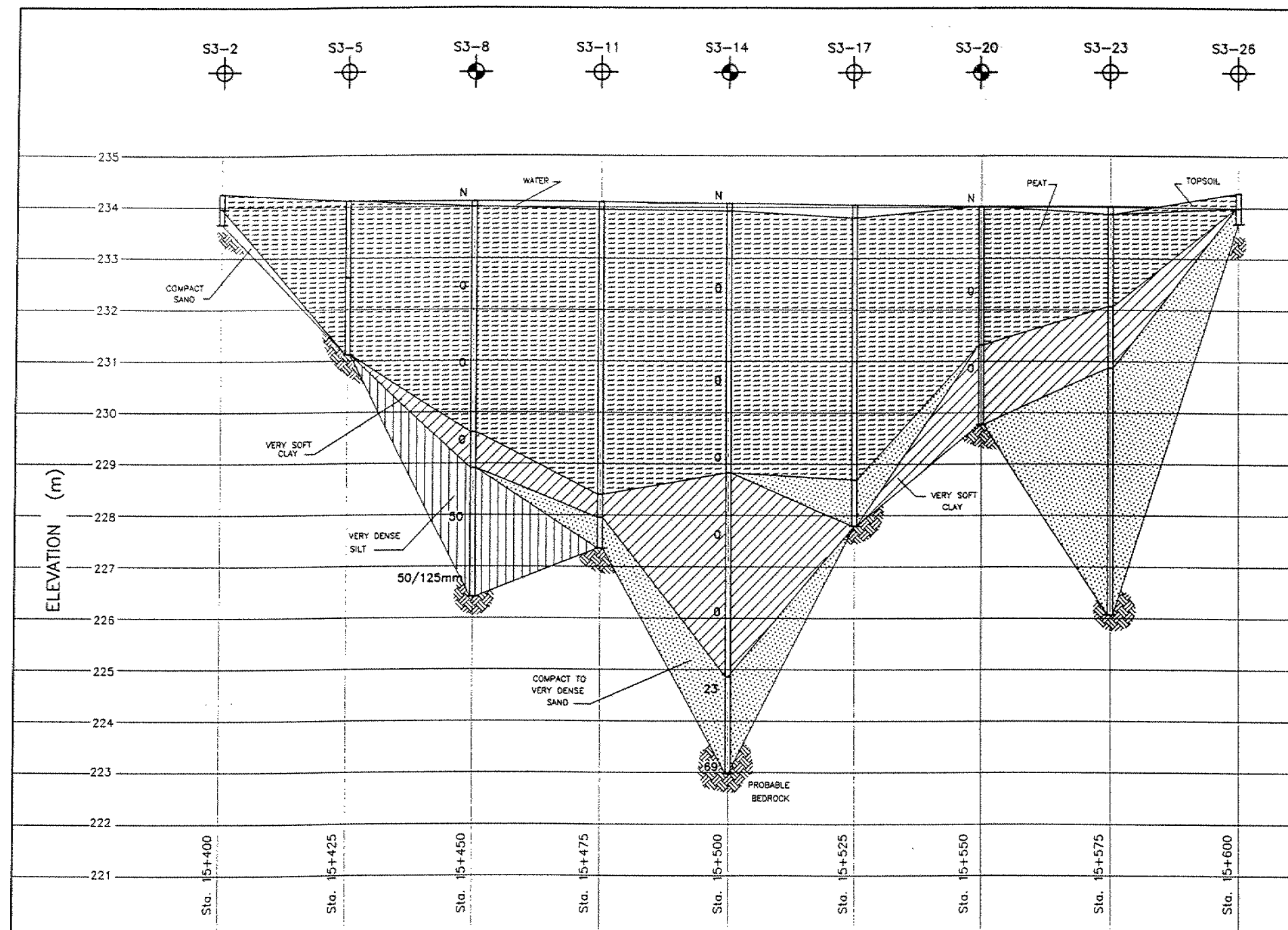


LEGEND

- Probehole
- Borehole

NOTES:

- Refer to Log of Borehole and Probehole Sheets for description of subsurface conditions.
- Refer to Drawings 8A and 8B for soil profiles.



SECTION A-A

LEGEND

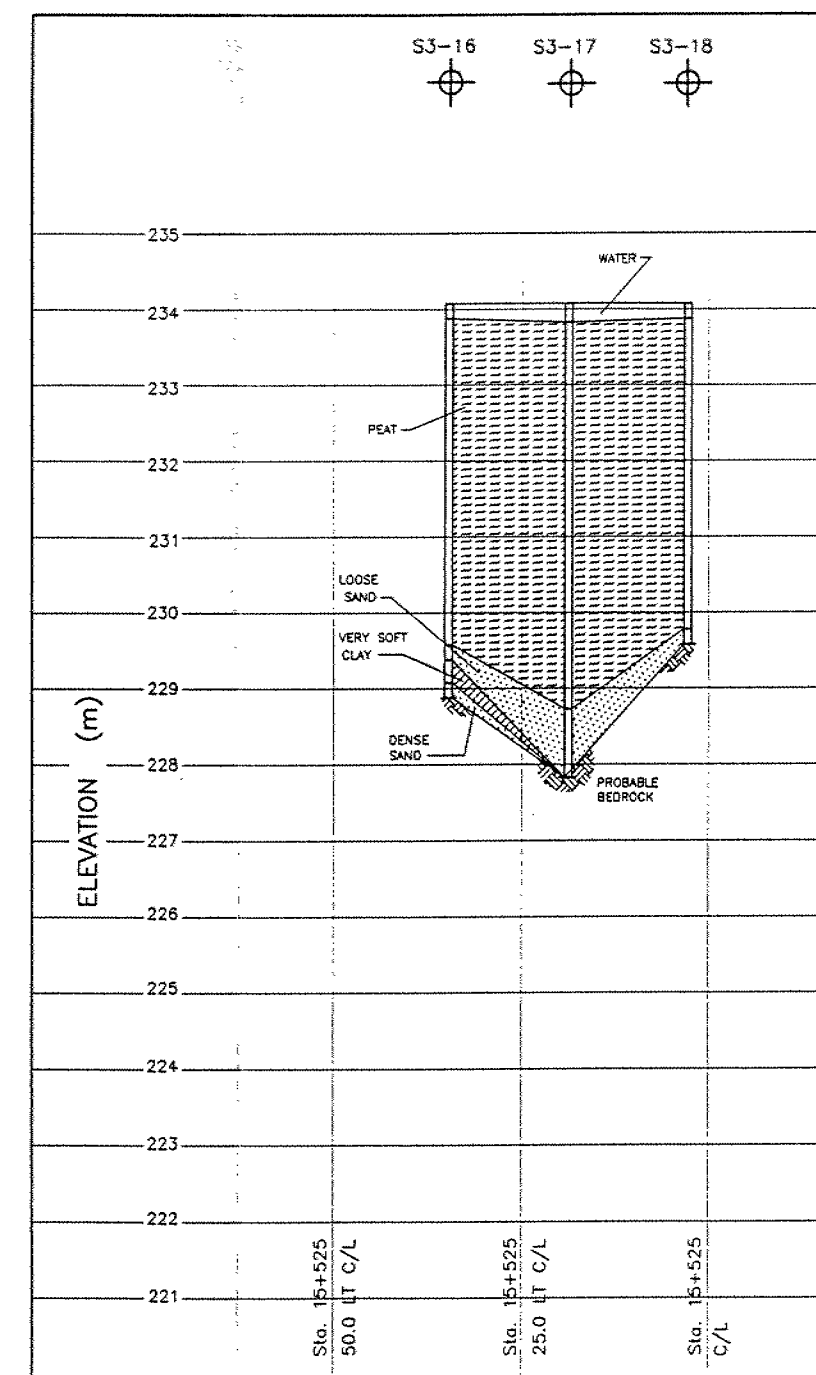
	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		SILT
	CLAY		BEDROCK (INFERRED)
	WATER		ASPHALT
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		

NOTES

1. REFER TO DRAWING NO. 8 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

G.W.P. 290-97-00, HIGHWAY 69
SOUTHBOUND LANE/TWP. OF CONGER
DISTRICT 52, HUNTSVILLE, ONTARIO

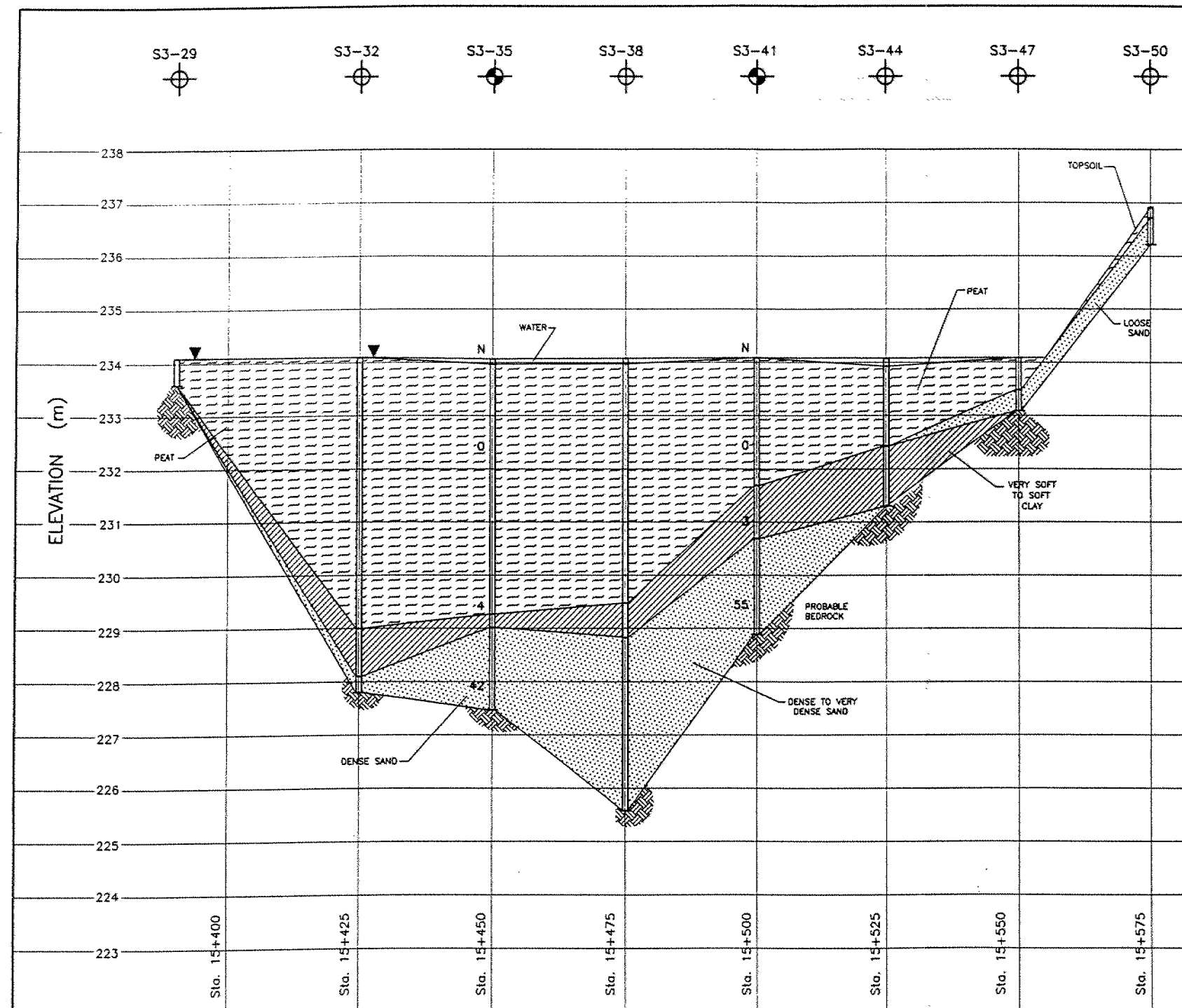
SWAMP 3 - SOIL PROFILES



SECTION B-B

Peto MacCallum Ltd.
CONSULTING ENGINEERS
45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	VERTICAL 1:100 HORIZONTAL 1:1000	97TF088B	8A
APPROVED	DWK				



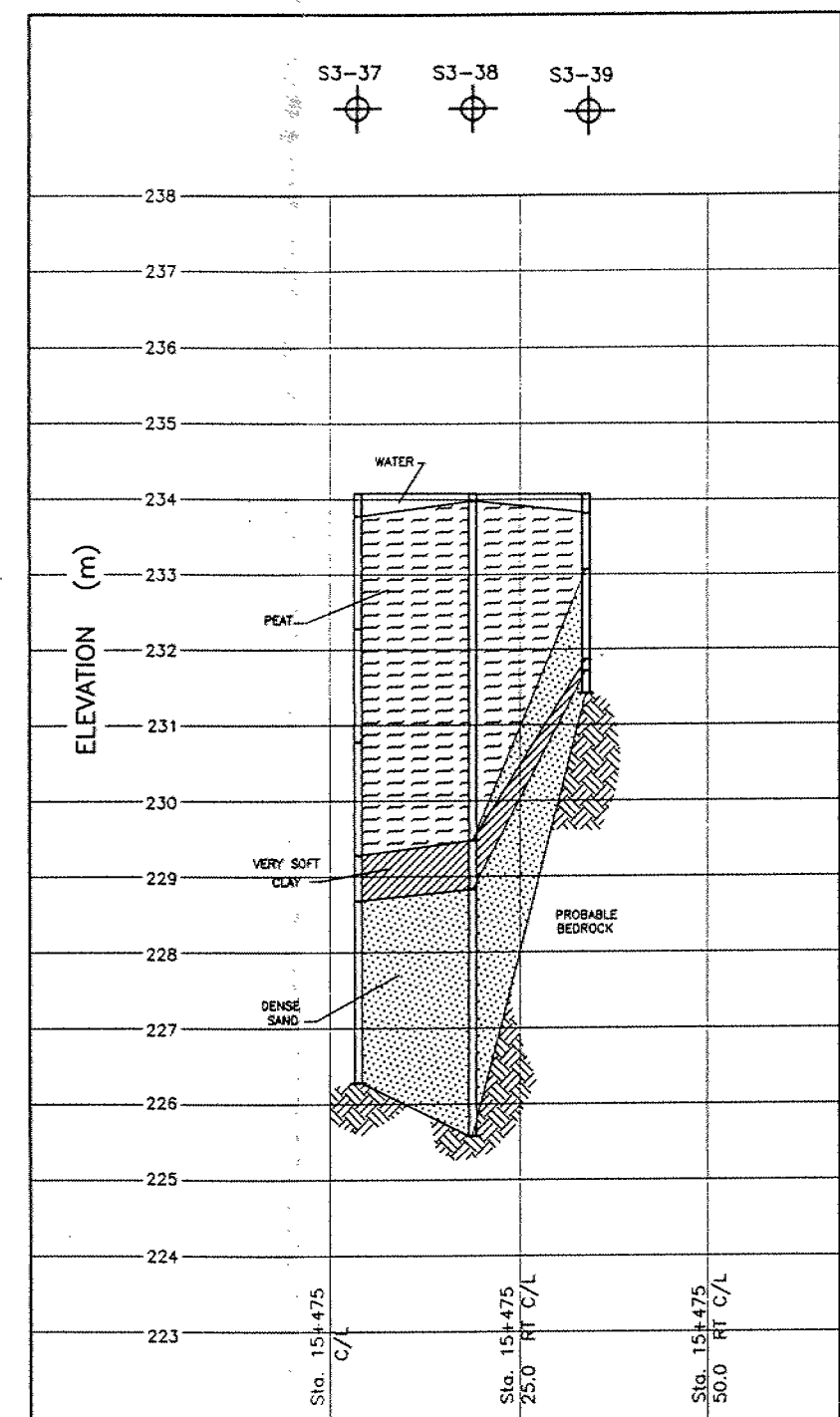
SECTION C-C

LEGEND

	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		SILT
	CLAY		BEDROCK (INFERRED)
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		WATER
			ASPHALT

NOTES

1. REFER TO DRAWING NO. 8 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.



SECTION D-D

G.W.P. 290-97-00, HIGHWAY 69
NORTHBOUND LANE/TWP. OF CONGER
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 3 - SOIL PROFILES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	VERTICAL 1:100 HORIZONTAL 1:1000	97TF088B	8B
APPROVED	DWK				

GWP 290-97-00 Highway 69
District 52, Huntsville
Swamp 4
Station 18+075 - 18+200
Northbound Lane/Twp. of Conger
Datum Centre Line Median

S4-1	18+075	10.8 RT C/L	El. 245.03	S4-8	18+150	10.8 RT C/L	El. 245.02
	0-600	Water			0-400	Water	
	600-2.00	Blk Fib Peat			400-900	Blk Fib Peat	
	2.00	NFP BR			900-2.90	Blk Amor Peat	
					2.90-3.00	L Gry Sa Wet	
					3.00	NFP BR	
S4-2	18+075	18.8 RT C/L	El. 246.03	S4-11	18+175	10.8 RT C/L	El. 245.01
	0-100	Blk Si Tps			0-300	Water	
	100	NFP BR			300-5.50	Blk Amor Peat	
					5.50	NFP BR	
S4-3	18+075	26.8 RT C/L	El. 247.16	S4-12	18+175	18.8 RT C/L	El. 245.01
	0-200	Blk Si Tps			0-300	Water	
	200	NFP BR			300-6.20	Blk Fib Peat	
					6.20	NFP BR	
S4-5	18+125	10.8 RT C/L	El. 245.02	S4-13	18+175	26.8 RT C/L	El. 245.01
	0-400	Water			0-300	Water	
	400-4.30	Blk Amor Peat			300-7.00	Blk Fib Peat	
	4.30-5.50	L Gry Sa Tr Si Wet			7.00-8.40	L Gry Siy Sa Wet	
	5.50	NFP BR			8.40	NFP BR	
S4-6	18+125	18.8 RT C/L	El. 245.02	S4-14	18+200	10.8 RT C/L	El. 245.0
	0-500	Water			0-400	Water	
	500-4.80	Blk Fib Peat			400-2.20	Blk Amor Peat	
	4.80-6.10	L Gry Sa Tr Si Wet			2.20	NFP BR	
	6.10-6.90	V Soft Gry Siy Cl Tr Sa					
	6.90-8.70	Comp Gry Sa Tr Si Wet					
	8.70	NFP BR					

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 4

Station 18+075 - 18+200

Northbound Lane/Twp. of Conger

Datum Centre Line Median

S4-16	18+200	26.8 RT C/L	El. 245.0
	0-300	Water	
	300-4.60	Blk Fib Peat	
	4.60	NFP BR	

LOG OF BOREHOLE NO. S4-4

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 18+100, 18.8 m Rt., Highway 69, NBL, Twp. of Conger BORING DATE 98.02.13

ENGINEER E. W.

BORING METHOD Portable Hand Sampling Equipment

TECHNICIAN D. R. / B. G.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				PLASTIC LIMIT W_P					
							BLOWS/0.3M				WATER CONTENT %					
							20	40	60	80	10	20	30			
0	GROUND ELEVATION 245.00						20	40	60	80	10	20	30	Upon completion of augering, borehole caved at 1.0 m.		
	Water															
0.95			244	1	SS	0							W=880 ⊕			
1.5	Peat Fibrous, Black		243													
			242	2	SS	0										
3.0			241													
4.5			240													
6.00			239													
6.60	Sand With Silt Seams Grey, Wet Loose		238	3	SS	9	•				⊕					
7.5																
	End Of Borehole Auger Refusal Probable Bedrock															
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

- Soil sampling was carried out using a 50 mm dia. split spoon equipment and a 20.5 Kg hammer dropping 750 mm (SPT N values adjusted to a 63.5 Kg hammer dropping 750 mm, using a linear relationship).

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S4-7

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 18+125, 26.8 m Rt., Highway 69, NBL, Twp. of Conger BORING DATE 98.02.12

ENGINEER E. W.

BORING METHOD Hand Augers / Vane Test

TECHNICIAN D.R./D.S.

SOIL PROFILE				SAMPLES		SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P				
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				WATER CONTENT %				
							BLOWS/0.3M				W_P W W_L				
0	GROUND ELEVATION 245.02						20	40	60	80	10	20	30	Upon completion of augering, borehole caved at 2.0 m.	
-0.40	Water														
	Peat		244			+									
	Fibrous, Black		243			+									
1.5			242			+									
			241			+									
3.0			240			+									
			239			1									
4.5	Silty Clay		238			2									
	Grey, Very Soft					2									
6.0															
7.20	End Of Borehole		237												
	Auger Refusal														
	Probable Bedrock														
7.5															
9.0															
10.5															
12.0															
13.5															
15.0															
16.5															

NOTES:

- ✓ 1. Vane test was carried out at a distance of 1.5 m from the borehole.
2. +2 Number refers to sensitivity.

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S4-9

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 18+150, 18.8 m Rt., Highway 69, NBL, Twp. of Conger BORING DATE 98.02.13

ENGINEER E. W.

BORING METHOD Portable Hand Sampling Equipment

TECHNICIAN D.R./D.S.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				PLASTIC LIMIT W_P					
							BLOWS/0.3M				WATER CONTENT %					
							20	40	60	80	10	20	30			
0	GROUND ELEVATION 245.02													Upon completion of augering, borehole caved at 2.0 m with water level at ground surface.		
	Peat		244													
	Fibrous, Black		243													
1.5																
			242													
3.0				1	SS	0							W=796			
			241													
4.5																
			240													
6.0																
			239													
7.00				2	SS	0										
	End Of Borehole		238													
7.5	Auger Refusal															
	Probable Bedrock															
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

CHECKED BY: E. W.

LOG OF BOREHOLE NO. S4-10

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 18+150, 26.8 m Rt., Highway 69, NBL, Twp. of Conger BORING DATE 98.02.13

ENGINEER E. W.

BORING METHOD Hand Augers / Vane Test

TECHNICIAN D. S.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				PLASTIC LIMIT W_P					
							BLOWS/0.3M				WATER CONTENT %					
							20	40	60	80	10	20	30			
							20	40	60	80	10	20	30			
0	GROUND ELEVATION 245.02													Upon completion of augering, borehole caved at 2.0 m.		
0.30	Water															
	Peat Fibrous, Black		244													
1.5			243													
3.0			242	1	TW*	P.H.										
			241													
4.5				2	TW*	P.H.							W=52			
			240													
6.0			239	3	TW*	P.H.										
			238													
7.5				4	TW*	P.H.										
			237													
			236													
9.0																
	235															
10.00	Sand Trace Gravel Compact To Very Dense															
10.5			234													
			233													
12.0	End Of Borehole Auger Refusal Probable Bedrock															
			232													
12.70																
13.5																
15.0																
16.5																

NOTES:

1. * Indicated no sample retrieved

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S4-15

PROJECT GWP 290-97-00


OUR PROJECT 97TF088B

LOCATION Station 18+200, 18.8 m Rt., Highway 69, NBL, Twp. of Conger BORING DATE 98.02.13

ENGINEER E. W.

BORING METHOD Portable Hand Sampling Equipment

TECHNICIAN D.R./D.S.

SOIL PROFILE				SAMPLES			SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_p				
							DYNAMIC CONE PENETRATION x				WATER CONTENT W				
							STANDARD PENETRATION TEST *				W_p W W_L				
							BLOWS/0.3M				WATER CONTENT %				
	GROUND ELEVATION	245.00					20	40	60	80	10	20	30		
0															
-0.45	Water														
	Peat Fibrous, Black		244												
			243	1	SS	0							W=59.3		
			242												
3.0			3.15												
	End Of Borehole Auger Refusal Probable Bedrock		241												
4.5															
6.0															
7.5															
9.0															
10.5															
12.0															
13.5															
15.0															
16.5															

NOTES:

- Soil sampling was carried out using a 50 mm dia. split spoon equipment and a 20.5 Kg hammer dropping 750 mm (SPT N values adjusted to a 63.5 Kg hammer dropping 750 mm, using a linear relationship).

CHECKED BY: E.W.

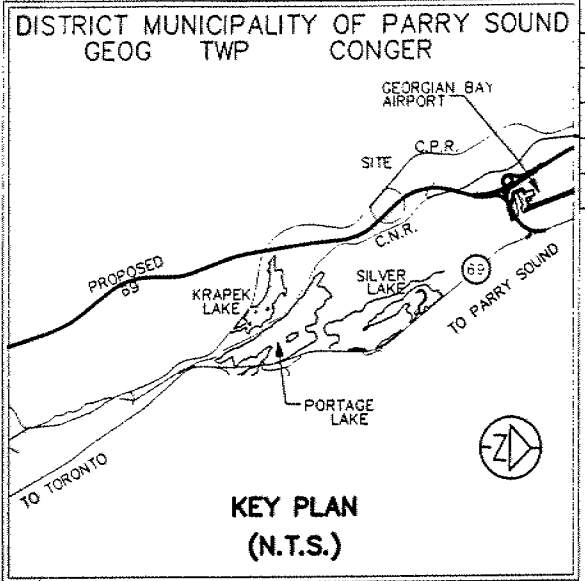
METRIC

PLATE NO. 777-83 41-0
DRAWING NO. 1774008824
CONT No C
GWP No 290-97-00

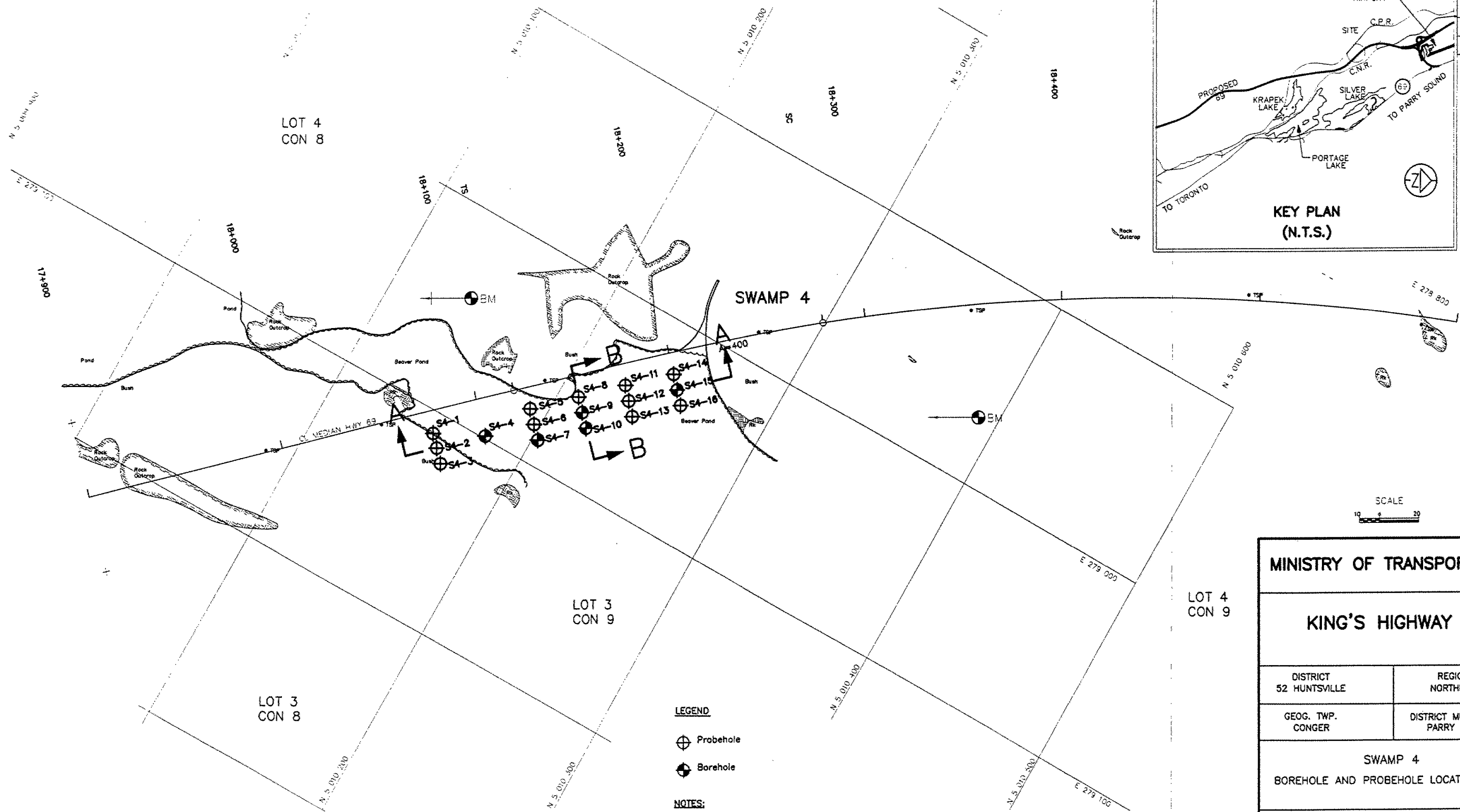


STA 17+300 TO STA 18+600
Survey 1997 Revised R

SHEET



U
D
D
D
D
D
D



LEGEND

- Probehole
- Borehole

NOTES:

1. Refer to Log of Borehole and Probehole Sheets for description of subsurface conditions.
2. Refer to Drawing 9A for soil profiles.

MINISTRY OF TRANSPORTATION

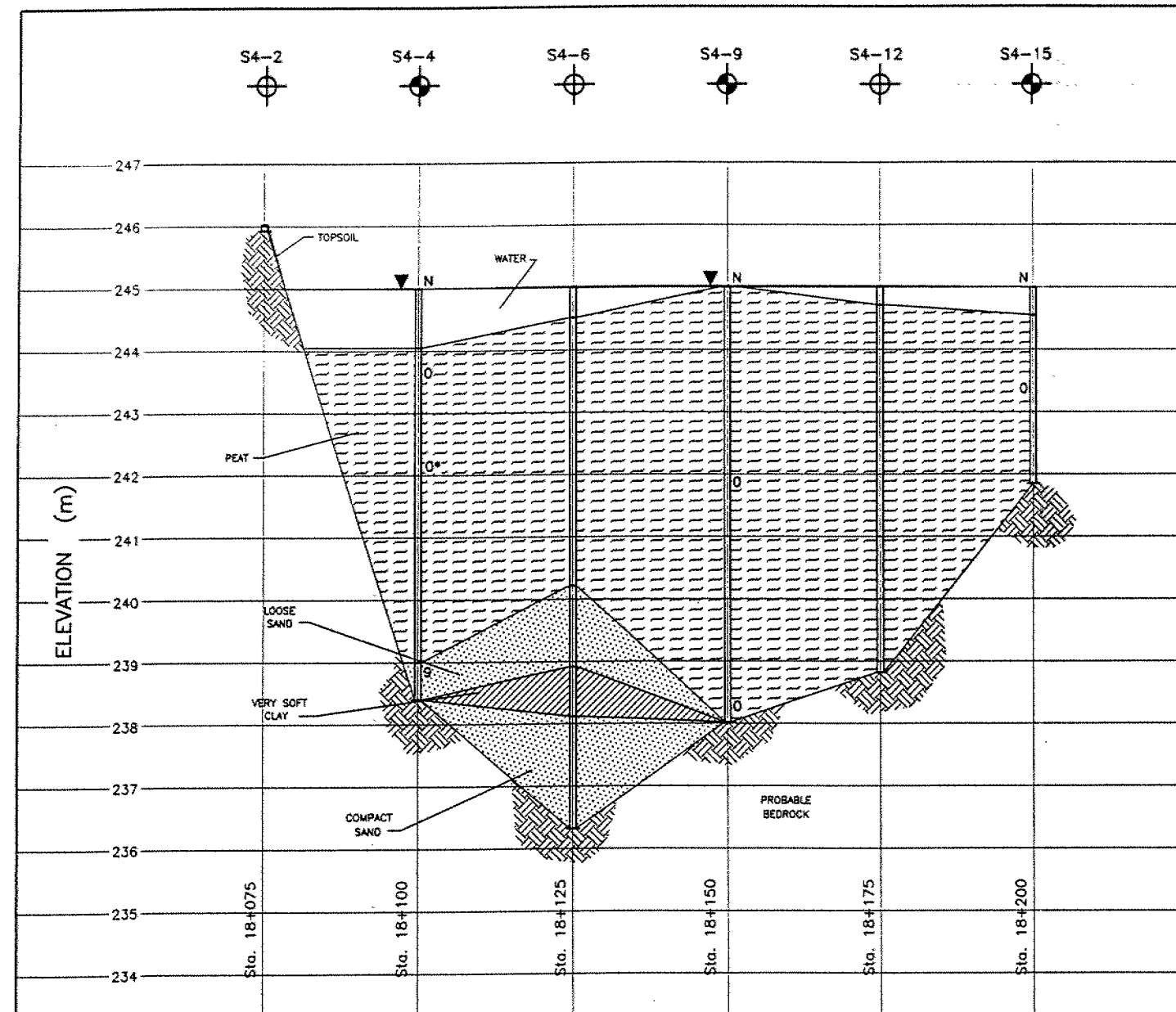
KING'S HIGHWAY 69

DISTRICT 52 HUNTSVILLE	REGION NORTHERN
GEOG. TWP. CONGR	DISTRICT MUNICIPALITY PARRY SOUND

SWAMP 4
BOREHOLE AND PROBEHOLE LOCATION PLAN

Peto MacCallum Ltd.
CONSULTING ENGINEERS
45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C8

DRAWN J.S.	DATE MAY 1998	SCALE 1 : 2000	JOB NO. 971F088B	DRAWING NO. 9
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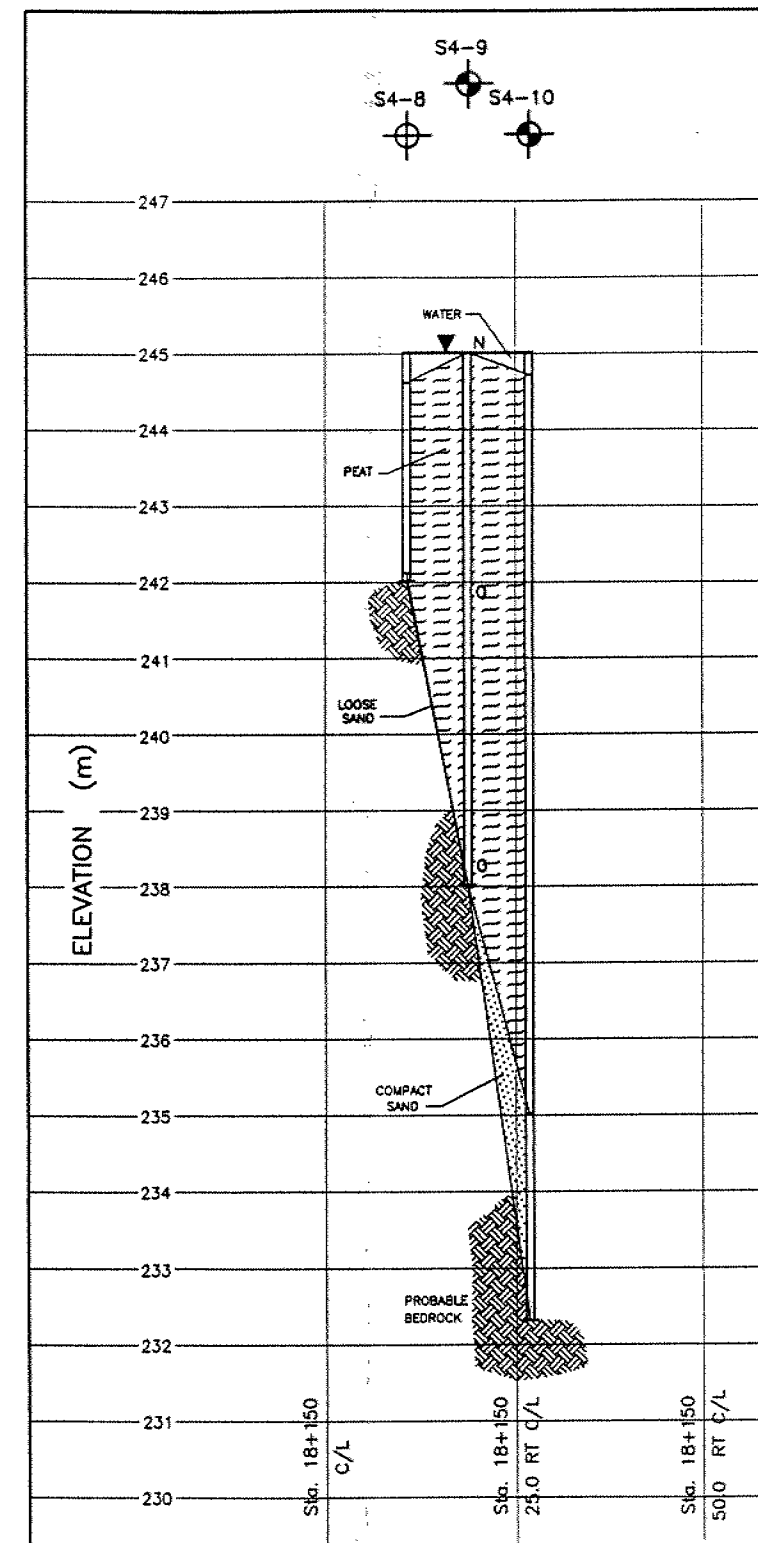
SECTION A-A

LEGEND

	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		SILT
	CLAY		BEDROCK (INFERRED)
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		ASPHALT

NOTES

1. REFER TO DRAWING NO. 9 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.



SECTION B-B

G.W.P. 290-97-00, HIGHWAY 69
NORTHBOUND LANE/TWP. OF FREEMAN
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 4 - SOIL PROFILES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	VERTICAL 1:100 HORIZONTAL 1:1000	97TF088B	9A
APPROVED	DWK				

GWP 290-97-00 Highway 69
District 52, Huntsville
Swamp 5
Station 18+925 - 19+150
Northbound Lane/Twp. of Conger
Datum Centre Line Median

S5-1	18+925	0.8 RT C/L	El. 239.41
	0-500	Blk Siy Sa Tps	
	500	NFP BR	
S5-2	18+925	18.8 RT C/L	El. 238.53
	0-350	Water	
	350-3.00	Blk Amor Peat	
	3.00-4.00	L Gry Say Si Tr Cl Wet	
	4.00	NFP BR	
S5-3	18+925	35.8 RT C/L	El. 238.89
	0-2.00	Blk Amor Peat	
	2.00-3.00	Blk Fib Peat	
	3.00-4.50	L Gry Say Si Tr Cl	
		% Passing L9206 ML	
		9.5 mm = 100 LSFH	
		425 μ m = 99 'K' Factor = 0.10	
		250 μ m = 97	
		150 μ m = 94	
		75 μ m = 66	
		2 μ m = 15	
	4.50	NFP BR	
		Fr Wat @ 200	

S5-4	18+950	0.8 RT C/L	El. 238.25
	0-1.60	Blk Amor Peat	
	1.60-2.80	Blk Fib Peat	
	2.80-3.30	Soft Gry Cly Si	
	3.30-3.50	L Br Sa Tr Si Wet	
	3.50	NFP BR	
		Fr Wat @ 200	
S5-6	18+950	36.8 RT C/L	El. 238.25
	0-3.10	Blk Amor Peat	
	3.10-4.40	Soft Gry Cly Si	
	4.40	NFP BR	
		Fr Wat @ 300	
S5-7	18+974	C/L	El. 238.27
	0-3.50	Blk Amor Peat	
	3.50-3.70	L Br Sa Tr Si Wet	
	3.70	NFP BR	
		Fr Wat @ 200	
S5-8	18+975	18.8 RT C/L	El. 238.27
	0-2.50	Blk Amor Peat	
	2.50-3.00	Comp Gry Sa W Si Seam Wet	
	3.00	NFP BR	
		Fr Wat @ 200	

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 5

Station 18+925 - 19+150

Northbound Lane/Twp. of Conger

Datum Centre Line Median

S5-9 18+975 36.8 RT C/L El. 238.39
 0-500 Blk Amor Peat
 500-1.20 L Br Si Wet
 1.20 NFP BR
 Fr Wat @ 200

S5-10 19+000 C/L El. 238.17
 0-1.00 Blk Amor Peat
 1.00 NFP BR

S5-11 19+000 18.8 RT C/L El. 238.17
 0-1.90 Blk Amor Peat
 1.90 NFP BR
 Fr Wat @ 1.00

S5-12 19+000 36.8 RT C/L El. 240.09
 0-200 Blk Si Tps
 200-400 L Br Sa W Si Wet
 400 NFP BR

S5-13 19+025 C/L El. 238.06
 0-300 Water
 300-3.20 Blk Amor Peat
 3.20 NFP BR

S5-14 19+025 18.8 RT C/L El. 238.06
 0-200 Water
 200-900 Blk Amor Peat
 900 NFP BR

S5-15 19+025 37.9 RT C/L El. 238.71
 0-300 Blk Si Tps
 300-1.20 L Br Sa Tr Si Tr Gr Wet
 1.20 NFP BR

S5-16 19+050 C/L El. 238.09
 0-300 Water
 300-2.90 Dk Br Amor Peat Wet
 2.90-3.30 L Gry Sa W Cl Seams Wet
 3.30 NFP BR

S5-17 19+050 18.8 RT C/L El. 238.09
 0-350 Blk Si Tps
 350 NFP BR

S5-18 19+050 37.8 RT C/L El. 238.32
 0-200 Water
 200-2.50 Dk Br Amor Peat
 2.50 NFP BR

Datum Centre Line Median

S5-25	19+125	18.8 RT C/L	El. 238.50
	0-3.00	Blk Amor Peat	
	3.00	NFP BR	

LOG OF BOREHOLE NO. S5-5

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 18+950, 18.8 m Rt., Highway 69, NBL, Twp. of Conger BORING DATE 98.04.02

ENGINEER E. W.

BORING METHOD Portable Hand Sampling Equipment

TECHNICIAN D. R.

SOIL PROFILE				SAMPLES			SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L			GROUNDWATER OBSERVATIONS AND REMARKS		
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				PLASTIC LIMIT W_P					
							BLOWS/0.3M				WATER CONTENT %					
							20	40	60	80	10	20	30			
0	GROUND ELEVATION 238.25						20	40	60	80						
	Peat Fibrous, Black		238	1	SS	0								W=521	Upon completion of augering, borehole caved at 1.80 m with water level at 0.30 m.	
				2	SS	0										
				237	3	SS	0									
1.5				236	4	SS	0									W=918
					5	SS	0									
3.0			235													
3.35	Sandy Silt Grey, Wet, Very Loose			6	SS	3	•							•		
				234	7	SS	4	•							•	
4.5					8	SS	4	•								
5.10				233	9	SS	3	•							W=42	
5.40	Silty Clay Grey, Soft															
6.0				232												
	End Of Borehole Auger Refusal Probable Bedrock															
7.5																
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

- Soil sampling was carried out using a 50 mm dia. split spoon equipment and a 20.5 Kg hammer dropping 750 mm (SPT N values adjusted to a 63.5 Kg hammer dropping 750 mm, using a linear relationship).

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S5-20

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 19+075, 18.8 m Rt., Highway 69, NBL, Twp. of Conger BORING DATE 98.04.02

ENGINEER E. W.

BORING METHOD Portable Hand Sampling Equipment / Vane Test

TECHNICIAN D. R.

[illegible]

NOTES:

1. Soil sampling was carried out using a 50 mm dia. split spoon equipment and a 20.5 Kg hammer, dropping 750 mm (SPT N values adjusted to a 63.5 Kg hammer dropping 750 mm, using a linear relationship).
2. Vane test was carried out at a distance of 1.5 m from the borehole.

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S5-23

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 19+100, 38.3 m Rt., Highway 69, NBL, Twp. of Conger BORING DATE 98.04.02 ENGINEER E. W.

BORING METHOD Hand Augers / Vane Test

TECHNICIAN D. R.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_p					
							DYNAMIC CONE PENETRATION x				WATER CONTENT W					
							STANDARD PENETRATION TEST •				W_p W W_L					
							BLOWS/0.3M				WATER CONTENT %					
							20	40	60	80	10	20	30			
0	GROUND ELEVATION 238.47						20	40	60	80						
0.20	Water		238											Upon completion of augering, borehole caved at 1.80 m.		
	Peat															
	Amorphous, Black															
			237													
1.5																
			236													
3.0																
			235													
4.5																
			234													
			233													
6.0																
6.00																
6.80	Sand With Clay Seams Trace Silt, Grey, Wet, Loose		232													
7.5	End Of Borehole Auger Refusal Probable Bedrock		231													
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

- Vane test was carried out at a distance of 1.5 m from the borehole.

CHECKED BY: E.W.

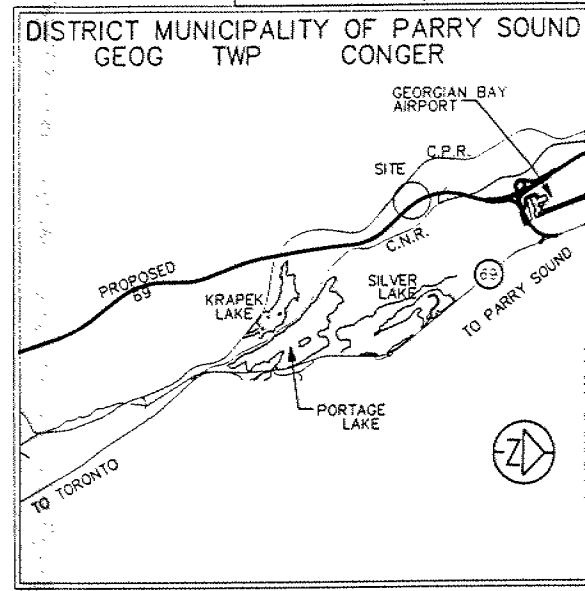
METRIC

PLATE NO. 774-89 44-1
DRAWING NO. 97740006044
CONT No C
GWP No 290-97-00



STA 18+600 TO STA 19+300
Survey 1997.12 Revised R

SHEET



STA: 18+839.374 C/L MED. HWY. 69
STA: 10+000.000 C/L LAWSON BAY ROAD

LEGEND

- ⊕ Probehole
- ⊙ Borehole

NOTES:

1. Refer to Log of Borehole and Probehole Sheets for description of subsurface conditions.
2. Refer to Drawings 10A and 10B for soil profiles.

MINISTRY OF TRANSPORTATION

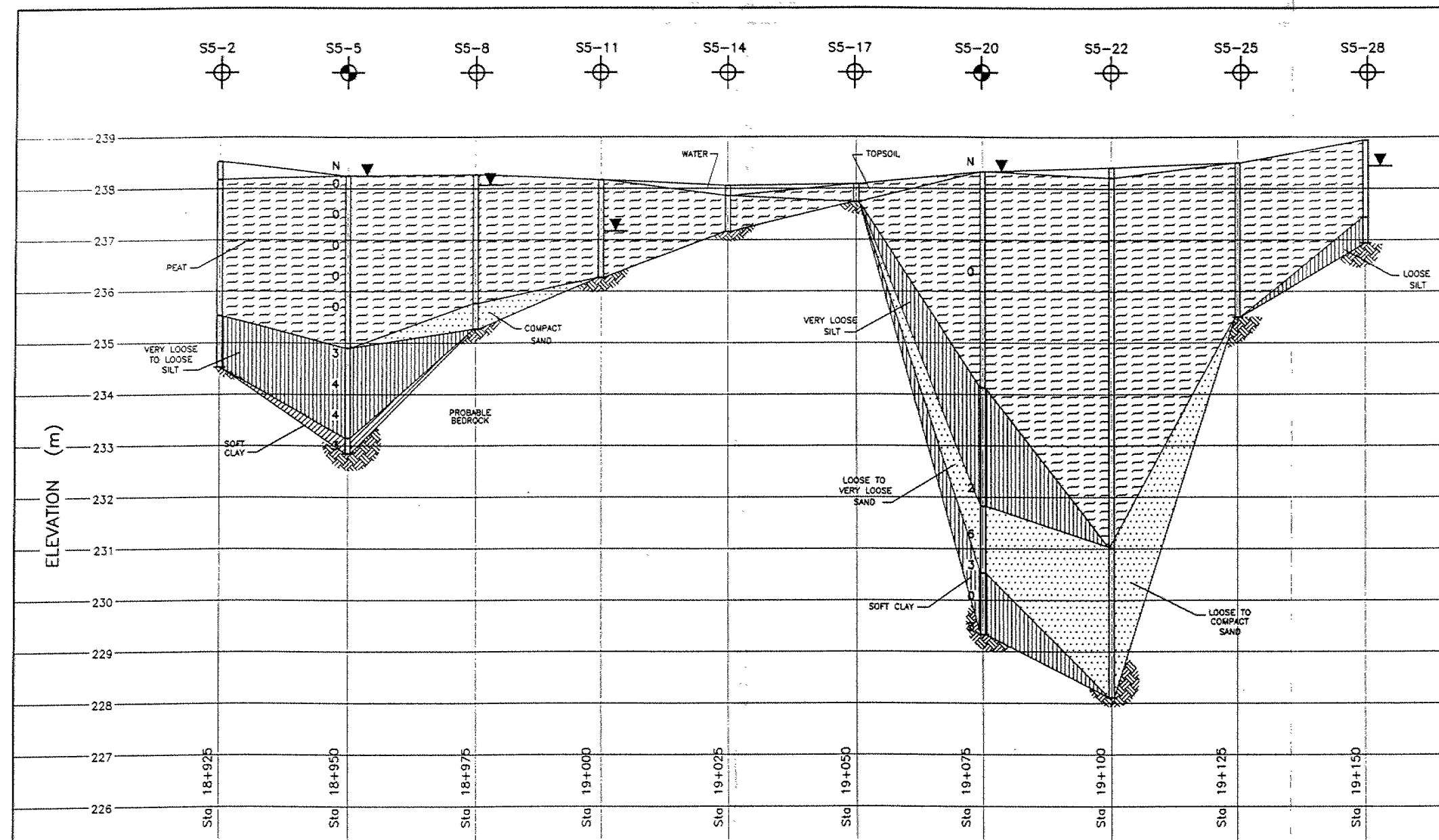
KING'S HIGHWAY 69

DISTRICT 52 HUNTSVILLE	REGION NORTHERN
GEOG. TWP. CONGER	DISTRICT MUNICIPALITY PARRY SOUND

SWAMP 5
BOREHOLE AND PROBEHOLE LOCATION PLAN

Peto MacCallum Ltd.
CONSULTING ENGINEERS
45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3G8

DRAWN JS	DATE MAY 1998	SCALE 1 : 2000	JOB NO. 977F088B	DRAWING NO. 10
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SECTION A-A

LEGEND

	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		SILT
	CLAY		BEDROCK (INFERRED)
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		ASPHALT

NOTES

1. REFER TO DRAWING NO. 10 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

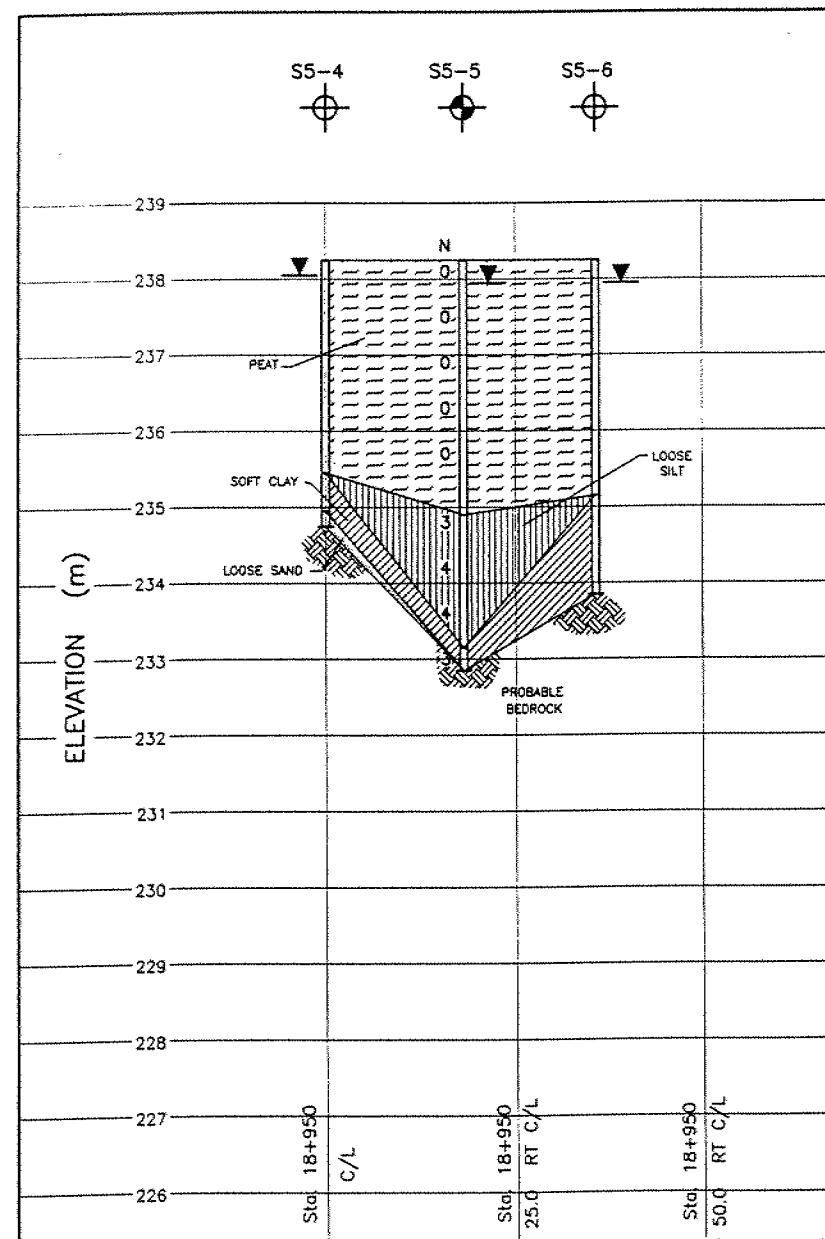
G.W.P. 290-97-00, HIGHWAY 69
NORTHBOUND LANE/TWP. OF CONGER
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 5 - SOIL PROFILES

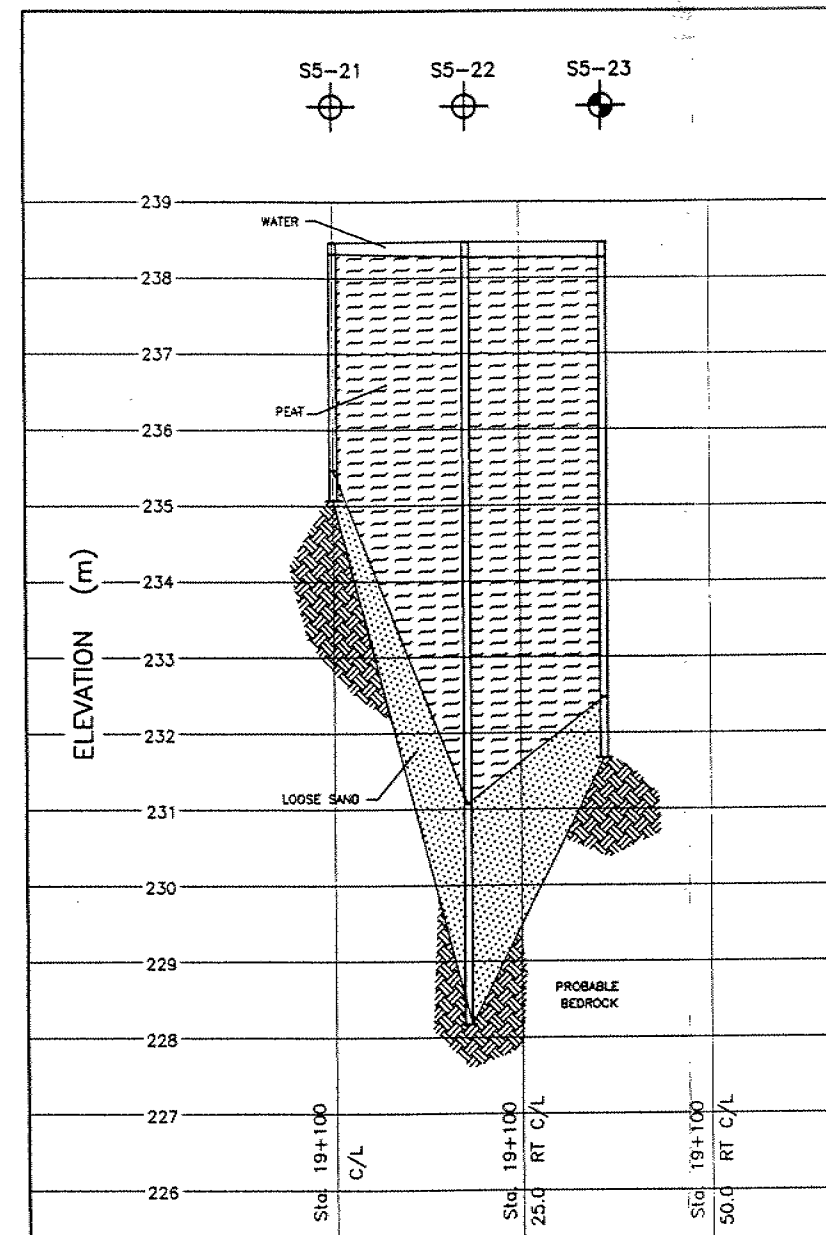
Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	VERTICAL 1:100 HORIZONTAL 1:1000	97TF088B	10A
APPROVED	DWK				



SECTION B-B



SECTION C-C

LEGEND

	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		SILT
	CLAY		BEDROCK (INFERRED)
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		ASPHALT

NOTES

1. REFER TO DRAWING NO. 10 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

G.W.P. 290-97-00, HIGHWAY 69
NORTHBOUND LANE/TWP. OF CONGER
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 5 - SOIL PROFILES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	VERTICAL 1:100 HORIZONTAL 1:1000	97TF088B	10B
APPROVED	DWK				

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 6

Station 19+280 - 19+460

Southbound Lane/Twp. of Conger

Datum Centre Line Median

S6-2	19+350	C/L	El. 239.62	S6-11	19+475	18.8 LT C/L	El. 239.05
	0-100	Water			0-450	Blk Fib Peat	
	100-3.70	Blk Fib Peat			450	NFP BR	
	3.70-4.00	V Soft Gry Siy Cl					
	4.00	NFP BR					
S6-3	19+375	18.8 LT C/L	El. 239.62				
	0-100	Water					
	100-3.40	Blk Fib Peat					
	3.40-4.50	V Soft Gry Siy Cl					
	4.50	NFP BR					
S6-4	19+400	36.0 LT C/L	El. 239.43				
	0-100	Water					
	100-2.80	Blk Fib Peat					
	2.80-3.10	L Gry Sa Tr Si Wet					
	3.10	NFP BR					
S6-6	19+400	C/L	El. 239.54				
	0-100	Water					
	100-2.50	Blk Fib Peat					
	2.50	NFP BR					
S6-10	19+450	C/L	El. 239.31				
	0-250	Water					
	250-2.45	Blk Fib Peat					
	2.45	NFP BR					

LOG OF BOREHOLE NO. S6-1

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 19+350, 18.8 m. Lt., Highway 69, SBL, Twp. of Conger BORING DATE 98.03.13

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN B. G.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST *				WATER CONTENT %					
							BLOWS/0.3M				WATER CONTENT %					
							20	40	60	80	10	20	30			
							20	40	60	80	10	20	30			
0	GROUND ELEVATION 239.36													Upon completion of augering, borehole caved at 1.30 m.		
	Water		239													
	Peat Fibrous, Black		238													
1.5				1	SS	0							W=806			
			237													
2.80																
3.0	Sand Trace Silt Brown, Wet Very Loose		236	2	SS	0										
3.45																
	Silty Clay Gray, Very Soft		235													
4.5																
	End Of Borehole Auger refusal Probable Bedrock															
6.0																
7.5																
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S6-5

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 19+400, 18.8 m. Lt., Highway 69, SBL, Twp. of Conger BORING DATE 98.03.09

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers / Vane Test

TECHNICIAN B. G.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_p					
							DYNAMIC CONE PENETRATION * STANDARD PENETRATION TEST *				WATER CONTENT %					
							BLOWS/0.3M				10 20 30					
0	GROUND ELEVATION 239.35						20	40	60	80					Upon completion of augering, borehole caved at 3.30 m.	
0-1.0	Water		239													
	Peat Fibrous, Black		238													
1.5				1	SS	0								W=611		
			237													
3.0																
			236	2	SS	0								W=877		
3.45																
	Silty Clay Grey, Very Soft		235													
4.5																
	Sand Trace Silt, Trace Gravel Grey, Wet Loose To Very Dense		234	3	SS	7										
6.0																
			233	4	SS	50/50 mm										
6.15																
	End Of Borehole Hammer Bouncing Probable Bedrock															
7.5																
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

1. Vane test was carried out at 1.5 m from the borehole.

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S6-7

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 19+425, 18.8 m. Lt., Highway 69, SBL, Twp. of Conger BORING DATE 98.03.09

ENGINEER E. W.

BORING METHOD Continuous Flight Solid Stem Augers / Vane Test

TECHNICIAN B. G.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P					
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST *				WATER CONTENT %					
							BLOWS/0.3M				10 20 30					
0	GROUND ELEVATION 238.90						20	40	60	80	10	20	30	Upon completion of augering, borehole caved at 1.5 m.		
0.10	Water															
	Peat Fibrous, Black		238													
1.5			237													
			236													
3.0			235													
4.5			234													
4.60	Sand Trace Silt, Trace Gravel Grey, Wet Loose To Compact		233													
5.35																
6.0	End Of Borehole Auger Refusal Probable Bedrock															
7.5																
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

CHECKED BY: E.W.

PetoMacCallum Ltd.

CONSULTING ENGINEERS

LOG OF BOREHOLE NO. S6-8

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 19+450, 36.0 m. Lt., Highway 69, SBL, Twp. of Conger BORING DATE 98.03.09

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers/ Vane Test

TECHNICIAN B. G.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				PLASTIC LIMIT W_P					
							BLOWS/0.3M				WATER CONTENT %					
							20	40	60	80	10	20	30			
0	GROUND ELEVATION 238.70						20	40	60	80	10	20	30	Upon completion of augering, borehole caved at 3.60 m.		
-0.10	Water		238													
	Peat Fibrous, Black		237													
1.5			236													
3.0			235													
-4.30			234	1	AS											
4.5	Sand Trace Silt, Trace Gravel Grey, Wet Loose		233													
6.0			232	2	AS											
-6.40	Silty Clay Grey Soft To Very Soft		231	3	TW	P.H.										
7.5			230													
-8.50	Sand Trace Silt, Trace Gravel Grey, Wet Loose To Very Dense		229													
9.0																
-9.70	End Of Borehole Auger Refusal Probable Bedrock		228													
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S6-9

PROJECT CWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 19+450, 18.8 m. Lt., Highway 69, SBL, Twp. of Conger BORING DATE 98.03.08

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers / Vane Test / Dynamic Cone Test

TECHNICIAN B. G.

SOIL PROFILE				SAMPLES			SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L			GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_p			
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST *				WATER CONTENT W			
							BLOWS/0.3M				W_p W W_L			
							20	40	60	80	10	20	30	
0	GROUND ELEVATION 239.31													
-0.10	Water		239											
	Peat Fibrous, Black		238											
1.5				1	SS	0							W=845	
			237				+							
							+							
3.0			236	2	SS	0	+							
			235											
4.5														
4.75				3	SS		x							
	Sand Trace Silt, Trace Gravel Grey, Wet Loose To Very Dense		234				x							
							x							
6.0			233	4	SS	12	x							
							x							
			232											
7.5														
-7.60														
	End Of Borehole Auger Refusal Probable Bedrock		231											
9.0														
10.5														
12.0														
13.5														
15.0														
16.5														

NOTES:

1. Cone test was carried out at a distance of 1.5 m from the borehole.

CHECKED BY: E.W.

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 6

Station 19+325 - 19+450

Northbound Lane/Twp. of Conger

Datum Centre Line Median

S6-12	19+325	18.8 RT C/L	El. 239.51
	0-150	Water	
	150-1.75	Blk Fib Peat	
	1.75	NFP BR	
S6-14	19+350	36.0 RT C/L	El. 239.74
	0-1.20	Blk Fib Peat	
	1.20	NFP BR	
S6-15	19+375	18.8 RT C/L	El. 239.67
	0-3.15	Blk Fib Peat	
	3.15	NFP BR	
S6-17	19+400	36.0 RT C/L	El. 239.66
	0-4.50	Blk Fib Peat	
	4.50-6.60	Blk Amor Peat	
	6.60-9.00	L Gry Sa W Cly Si Layers Tr Si	
	9.00-11.10	Soft Gry Siy Cl	
	11.10-11.25	V D Gry Sa Tr Si Wet	
	11.25	NFP BR	
		Fr Wat @ 0	
S6-20	19+450	35.0 RT C/L	El. 239.85
	0-100	Water	
	100-1.15	Blk Fib Peat	
	1.15-1.45	Comp Gry Sa Tr Si Wet	
	1.45	NFP BR	

LOG OF BOREHOLE NO. S6-13

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 19+350, 18.8 m. Rt., Highway 69, NBL, Twp. of Conger

BORING DATE 98.03.13

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers / Vane Test

TECHNICIAN B. G.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P					
							DYNAMIC CONE PENETRATION x				WATER CONTENT W					
							STANDARD PENETRATION TEST •				W_P W W_L					
							BLOWS/0.3M				WATER CONTENT %					
	GROUND ELEVATION 239.62						20	40	60	80	10	20	30			
0	Peat Fibrous, Black		239											Upon completion of augering, borehole caved at 1.5 m with water level at ground surface.		
1.5			238	1	SS	0							W=824 ●			
			237													
3.00																
3.0	Sand Trace Silt Grey, Wet Very Loose		236	2	SS	1							●			
4.5			235	3	SS	1							●			
4.80	Silty Clay Grey, Soft		234	4	TW	P.H.										
6.00																
6.15	Sand Trace Silt, Trace Gravel Grey, Wet Very Dense		233	5	SS	50/125 mm										
7.5	End Of Borehole Hammer Bouncing Probable Bedrock															
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S6-16

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 19+400, 18.8 m. Rt., Highway 69, NBL, Twp. of Conger

BORING DATE 98.03.17

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers/ Vane Test

TECHNICIAN B. G.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST *				WATER CONTENT %					
							BLOWS/0.3M				WATER CONTENT %					
							20	40	60	80	10	20	30			
							20 40 60 80				10 20 30					
0	GROUND ELEVATION 239.54															
-0.10	Water		239											Upon completion of augering, borehole caved at 1.5 m.		
	Peat Fibrous, Black															
1.5			238	1	SS	0	+						W=1072			
			237				+									
3.0			236	2	SS	0	+						W=1200			
				3	TW	P.H.										
4.5			235	4	SS	0	+						W=807			
			234				+									
6.0				5	TW	P.H.										
-6.10	Silty Clay Reddish Grey Very Soft		233	6	SS	0							W=59			
			232													
7.5				7	SS	23	•				•					
7.75																
8.40	Sand Trace Silt, Trace Gravel Occasional Cobbles Grey, Wet Compact		231													
9.0																
	End Of Borehole Auger Refusal Probable Bedrock															
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

- Vane test was carried out at the distance of 1.5 m from the borehole.

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S6-18

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 19+425, 18.8 m. Rt., Highway 69, NBL, Twp. of Conger BORING DATE 98.03.16

ENGINEER E. W.

BORING METHOD Continuous Flight Solid Stem Augers / Vane Test

TECHNICIAN B. G.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P					
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				WATER CONTENT W					
							BLOWS/0.3M				W_P W W_L					
							20 40 60 80				10 20 30					
0	GROUND ELEVATION 239.18													Upon completion of augering, borehole caved at 1.5 m.		
-0.10	Water															
	Peat Fibrous, Black		238													
1.5			237													
3.0			236	1	TW	P.H.										
-4.00			235													
-4.25	Sand Trace Silt, Trace Gravel Grey, Wet Compact															
4.5																
6.0	End Of Borehole Auger Refusal Probable Bedrock															
7.5																
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S6-19

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 19+450, 18.8 m. Rt., Highway 69, NBL, Twp. of Conger BORING DATE 98.03.08

ENGINEER E. W.

BORING METHOD Continuous Flight Solid Stem Augers

TECHNICIAN B. G.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P					
							DYNAMIC CONE PENETRATION * STANDARD PENETRATION TEST •				WATER CONTENT W					
							BLOWS/0.3M				W_P W W_L					
							20 40 60 80				10 20 30					
0	GROUND ELEVATION 239.29															
0.10	Water		239												Upon completion of augering, borehole caved at 1.3 m.	
	Peat Fibrous, Black		238													
1.25																
1.5	Sand Trace Silt, Trace Gravel Grey, Wet Compact		237	1	SS	27										
3.0			236													
3.65				2	SS	61/225mm										
	End Of Borehole Hammer Bouncing Probable Bedrock		235													
4.5																
6.0																
7.5																
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

CHECKED BY: E.W.

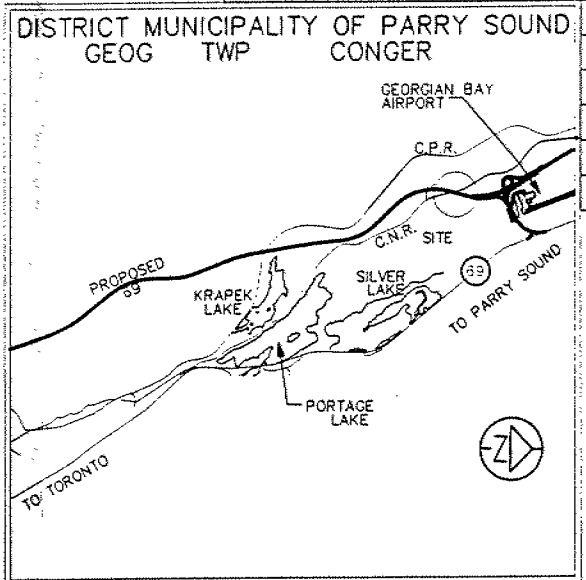
METRIC

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CONT No. C
GWP No. 290-97-00

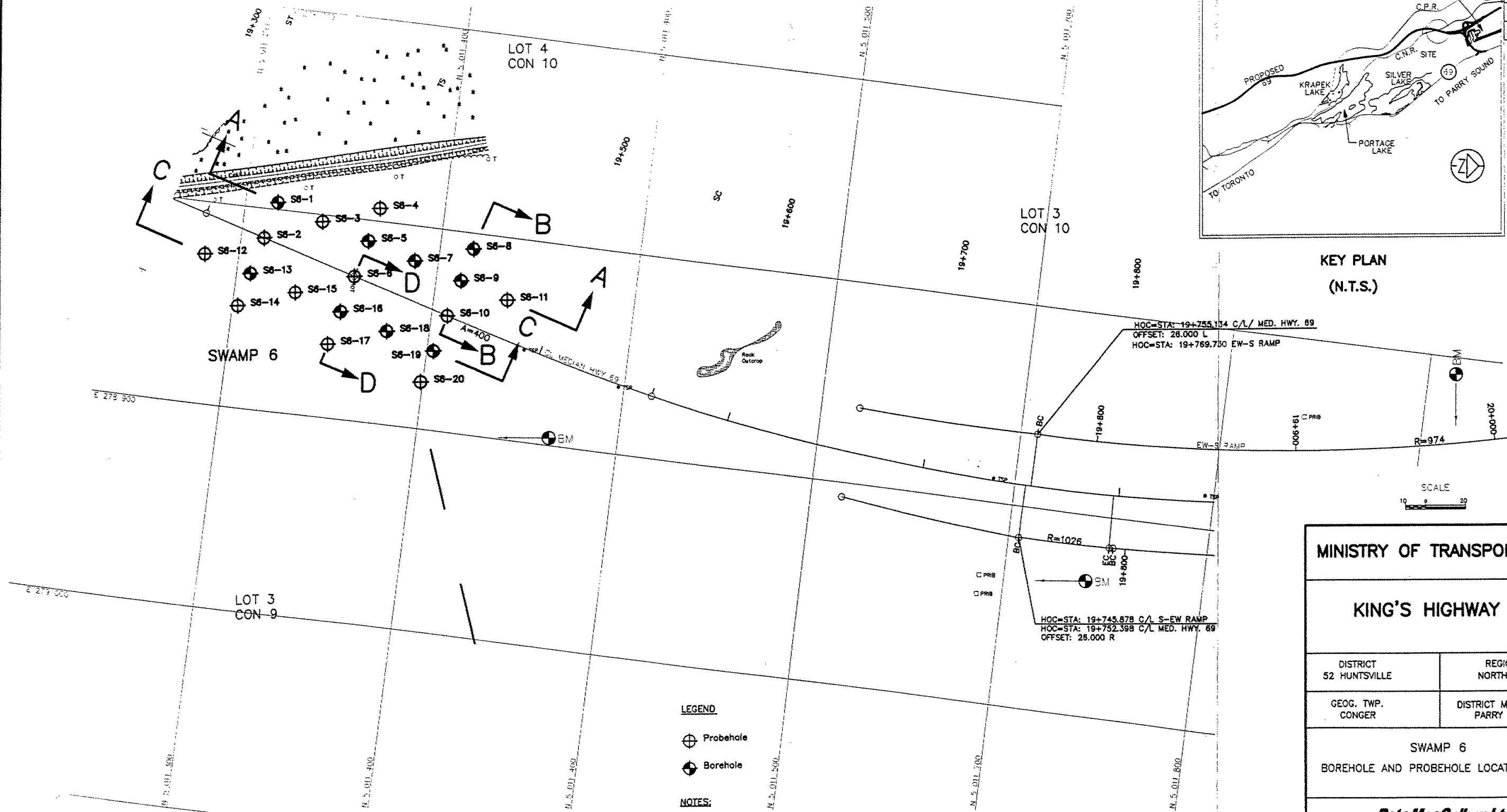


STA 19+300 TO STA 20+000
Survey 1997/12 Revised R

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KEY PLAN
(N.T.S.)



LEGEND

- Probehole
- Borehole

NOTES:

1. Refer to Log of Borehole and Probehole Sheets for description of subsurface conditions.
2. Refer to Drawings 11A and 11B for soil profiles.

MINISTRY OF TRANSPORTATION

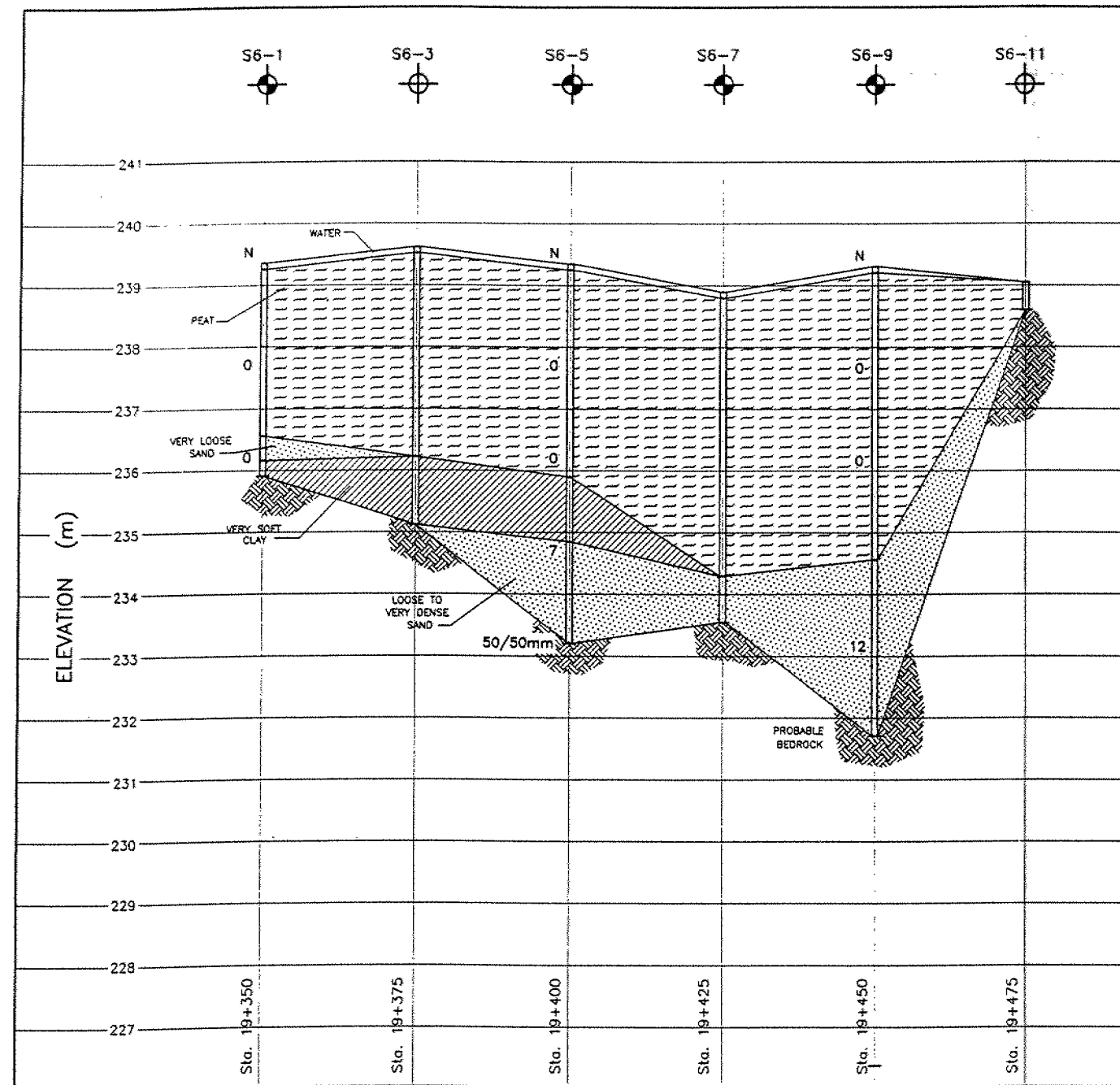
KING'S HIGHWAY 69

DISTRICT 52 HUNTSVILLE	REGION NORTHERN
GEORG. TWP. CONGER	DISTRICT MUNICIPALITY PARRY SOUND

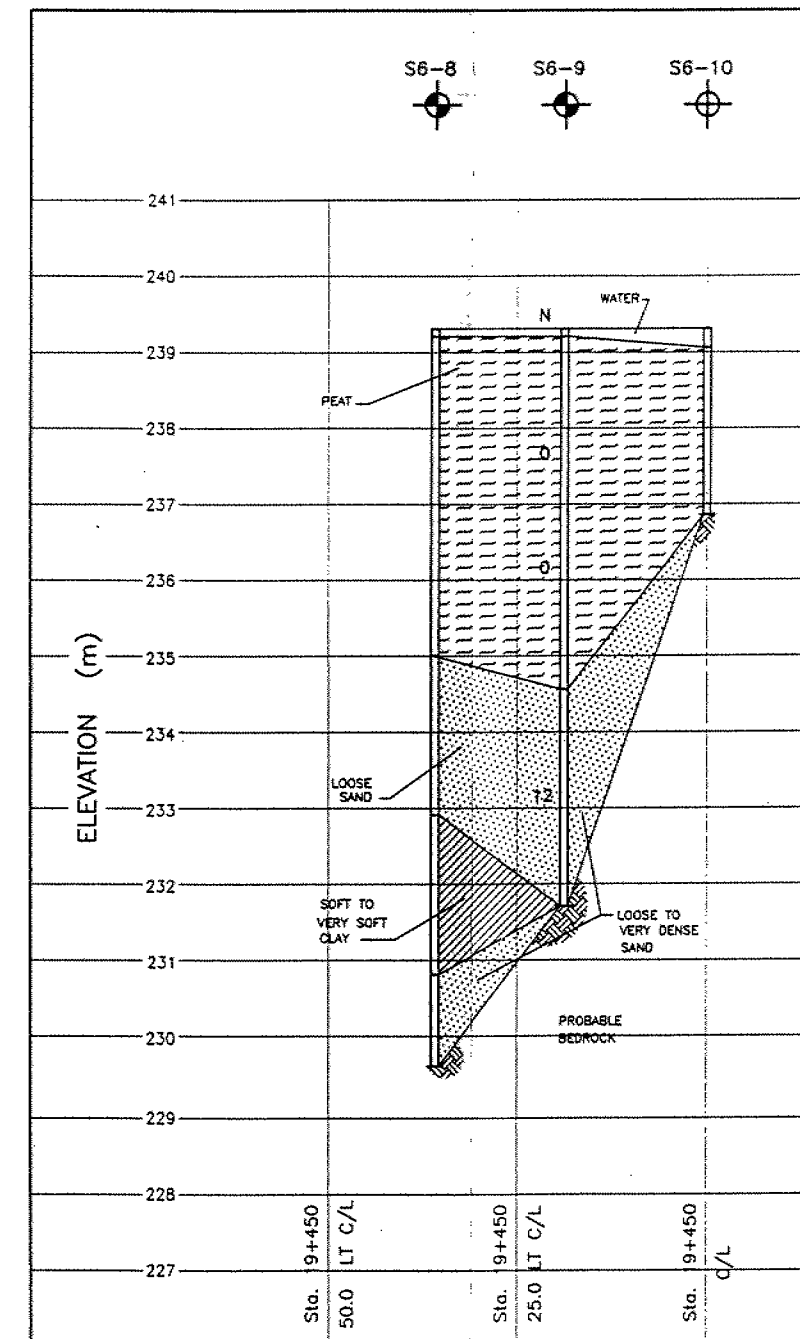
SWAMP 6
BOREHOLE AND PROBEHOLE LOCATION PLAN

Peto MacCallum Ltd.
CONSULTING ENGINEERS
45 BURNFORD ROAD, HAMILTON, ONTARIO L8E 3C8

DRAWN J.S.	DATE MAY 1998	SCALE 1 : 2000	JOB NO. 97TF088B	DRAWING NO. 11
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SECTION A-A



SECTION B-B

LEGEND

	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		SILT
	CLAY		BEDROCK (INFERRED)
	WATER		ASPHALT
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		

NOTES

1. REFER TO DRAWING NO. 11 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

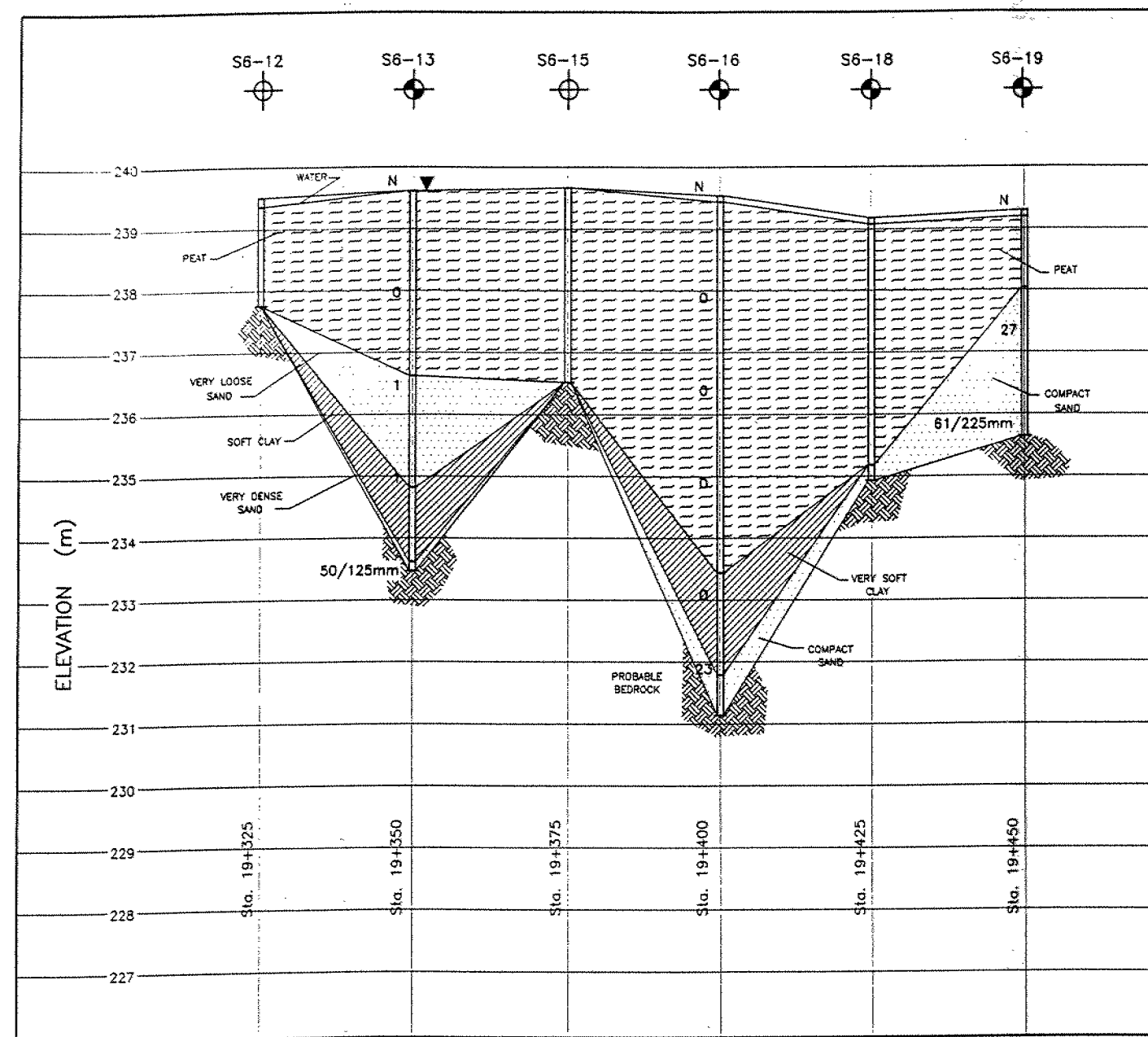
G.W.P. 290-97-00, HIGHWAY 69
SOUTHBOUND LANE/TWP. OF CONGER
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 6 - SOIL PROFILES

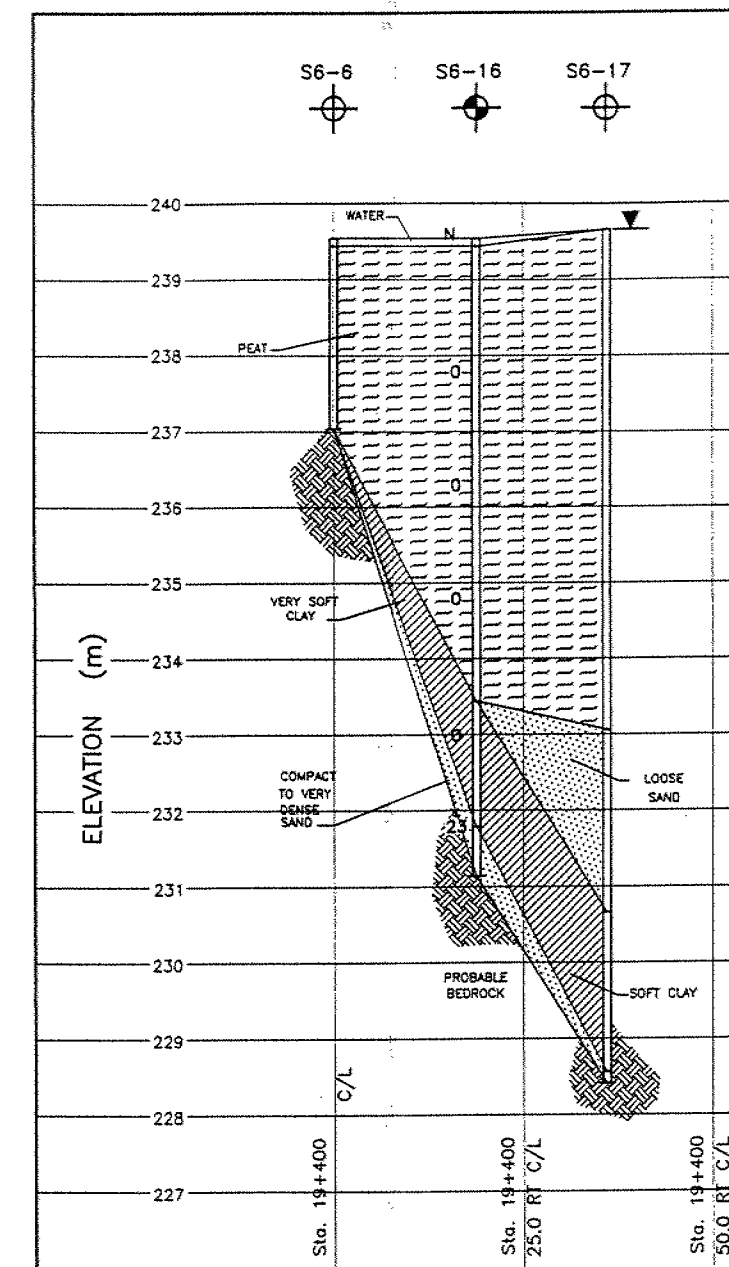
Peto MacCallum Ltd.
CONSULTING ENGINEERS

43 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	VERTICAL 1:100 HORIZONTAL 1:1000	97TF088B	11A
APPROVED	DWK				



SECTION C-C



SECTION D-D

LEGEND

	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		SILT
	CLAY		BEDROCK (INFERRED)
	WATER		ASPHALT
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		

NOTES

1. REFER TO DRAWING NO. 11 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

G.W.P. 290-97-00, HIGHWAY 69
NORTHBOUND LANE/TWP. OF CONGER
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 6 - SOIL PROFILES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	VERTICAL 1:100 HORIZONTAL 1:1000	97TF088B	11B
APPROVED	DWK				

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 7

Station 21+800 - 22+310

Southbound Lane/Twp. of Conger

Datum Centre Line Median

S7-1 21+800 26.8 LT C/L El. 238.68
 0-100 Blk Si Tps
 100 NFP BR

S7-2 21+800 18.8 LT C/L El. 238.53
 0-200 Blk Si Tps
 200 NFP BR

S7-3 21+800 10.8 LT C/L El. 238.58
 0-1.30 Blk Amor Peat
 w @ 500 = 121%
 1.30 NFP BR
 Fr Wat @ 300

S7-4 21+825 26.8 LT C/L El. 237.85
 0-300 Blk Amor Peat
 300 NFP BR
 Fr Wat @ 0

S7-5 21+825 18.8 LT C/L El. 237.75
 0-1.90 Blk Amor Peat
 1.90 NFP BR
 Fr Wat @ 300

S7-6 21+825 10.8 LT C/L El. 237.75
 0-2.00 Blk Amor Peat
 2.00 NFP BR
 Fr Wat @ 0

S7-7 21+850 26.8 LT C/L El. 237.85
 0-2.50 Blk Amor Peat
 2.50 NFP BR
 Fr Wat @ 0

S7-8 21+850 18.8 LT C/L El. 237.85
 0-3.50 Blk Amor Peat
 3.50-4.00 Comp Gry Si Wet
 w @ 3.60 = 17%
 4.00 NFP BR
 Fr Wat @ 0

S7-9 21+850 8.0 LT C/L El. 237.85
 0-4.50 Blk Amor Peat
 4.50-4.80 L Gry Si W Sa Wet
 4.80-5.50 V Soft Mott Br and Gry Siy Cl
 5.50 NFP BR
 Fr Wat @ 0

S7-10 21+875 26.8 LT C/L El. 238.10
 0-4.00 Blk Amor Peat
 w @ 3.50 = 392%
 4.00 NFP BR
 Fr Wat @ 0

S7-11 21+875 18.8 LT C/L El. 238.04
 0-5.50 Blk Amor Peat
 5.50-6.00 Comp Gry Sa Tr Si Wet
 6.00 NFP BR
 Fr Wat @ 0

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 7

Station 21+800 - 22+310

Southbound Lane/Twp. of Conger

Datum Centre Line Median

S7-12	21+875	7.8 LT C/L	El. 238.04	S7-17	21+925	18.8 LT C/L	El. 238.14
	0-7.50	Blk Fib Peat			0-3.75	Blk Fib Peat	
	7.50-8.50	Soft Gry Siy Cl			3.75-4.20	V Soft Gry Siy Cl	
	8.50	NFP BR			4.20	NFP BR	
		Fr Wat @ 0				Fr Wat @ 0	
S7-13	21+900	29.3 LT C/L	El. 238.04	S7-18	21+925	7.8 LT C/L	El. 238.14
	0-3.50	Blk Amor Peat			0-6.75	Blk Fib Peat	
	3.50-4.30	Comp Gry Si Tr Sa Wet			6.75-7.20	Gry Siy Cl Tr Si	
	4.30	NFP BR			7.20	NFP BR	
		Fr Wat @ 0				Fr Wat @ 0	
S7-15	21+900	8.0 LT C/L	El. 238.14	S7-19	21+950	29.8 LT C/L	El. 238.19
	0-7.20	Blk Fib Peat			0-1.35	Blk Fib Peat	
	7.20-9.30	V Soft Gry Siy Cl			1.35-1.50	Comp Gry Siy Sa Wet	
	9.30-9.60	D Gry Sa W Gr Wet			1.50	NFP BR	
	9.60	NFP BR				Fr Wat @ 0	
		Fr Wat @ 0					
S7-16	21+925	29.3 LT C/L	El. 238.34	S7-20	21+950	18.8 LT C/L	El. 238.19
	0-3.50	Blk Amor Peat			0-4.50	Blk Amor Peat	
	3.50-4.00	V Soft Gry Siy Cl			4.50	NFP BR	
	4.00	NFP BR				Fr Wat @ 0	
		Fr Wat @ 0					
				S7-21	21+950	7.8 LT C/L	El. 238.19
					0-7.80	Blk Fib Peat	
					7.80-9.00	L Gry Siy Sa Wet	
					9.00-9.30	Soft Gry Siy Cl	
					9.30	NFP BR	
						Fr Wat @ 0	

GWP 290-97-00 Highway 69
District 52, Huntsville
Swamp 7
Station 21+800 - 22+310
Southbound Lane/Twp. of Conger
Datum Centre Line Median

S7-22	21+975	29.8 LT C/L	El. 238.37	S7-28	22+025	29.8 LT C/L	El. 238.35
	0-3.30	Blk Fib Peat			0-2.55	Blk Fib Peat	
	3.30	NFP BR			2.55	NFP BR	
		Fr Wat @ 0				Fr Wat @ 0	
S7-23	21+975	18.8 LT C/L	El. 238.30	S7-29	22+025	18.8 LT C/L	El. 238.35
	0-6.80	Blk Fib Peat			0-6.75	Blk Fib Peat	
	6.80-8.30	Soft Gry Siy Cl			6.75-8.40	Soft Gry Siy Cl	
	8.30	NFP BR			8.40-9.15	Gry Sa Tr Si Tr Gr Wet	
					9.15	NFP BR	
						Fr Wat @ 0	
S7-24	21+975	7.8 LT C/L	El. 238.24	S7-30	22+025	7.8 LT C/L	El. 238.35
	0-7.35	Blk Fib Peat			0-4.35	Blk Fib Peat	
	7.35-8.70	Soft Gry Siy Cl			4.35-5.10	Soft Gry Siy Cl	
	8.70	NFP BR			5.10	NFP BR	
		Fr Wat @ 0				Fr Wat @ 0	
S7-25	22+000	29.8 LT C/L	El. 238.29	S7-31	22+050	29.8 LT C/L	El. 238.40
	0-6.45	Blk Fib Peat			0-3.00	Blk Fib Peat	
	6.45-6.90	Soft Gry Siy Cl			3.00-4.80	Blk Amor Peat	
	6.90-8.70	L Gry Siy Sa Wet			4.80-6.30	Soft Gry Siy Cl	
	8.70	NFP BR			6.30	NFP BR	
		Fr Wat @ 0				Fr Wat @ 0	
S7-27	22+000	7.8 LT C/L	El. 238.29				
	0-6.60	Blk Fib Peat					
	6.60-8.40	Soft Gry Siy Cl					
	8.40	NFP BR					
		Fr Wat @ 0					

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 7

Station 21+800 - 22+310

Southbound Lane/Twp. of Conger

Datum Centre Line Median

S7-33	22+050	7.8 LT C/L	El. 238.40	S7-37	22+100	29.8 LT C/L	El. 238.51
	0-3.45	Blk Fib Peat			0-2.55	Blk Fib Peat	
	3.45-4.35	Soft Gry Siy Cl			2.55	NFP BR	
	4.35	NFP BR				Fr Wat @ 0	
		Fr Wat @ 0					
S7-34	22+075	29.8 LT C/L	El. 238.45	S7-39	22+100	7.8 LT C/L	El. 238.51
	0-5.25	Blk Fib Peat			0-2.55	Blk Fib Peat	
	5.25-5.70	Soft Gry Siy Cl			2.55-3.00	Soft Gry Siy Cl	
	5.70-6.60	L Gry Siy Sa Tr Cl Wet			3.00	NFP BR	
	6.60	NFP BR				Fr Wat @ 0	
		Fr Wat @ 0					
S7-35	22+075	18.8 LT C/L	El. 238.45	S7-40	22+125	29.8 LT C/L	El. 238.56
	0-2.55	Blk Fib Peat			0-2.55	Blk Fib Peat	
	2.55-4.05	Blk Amor Peat			2.55	NFP BR	
	4.05-4.80	Soft Gry Siy Cl				Fr Wat @ 0	
	4.80	NFP BR					
		Fr Wat @ 0					
S7-36	22+075	7.8 LT C/L	El. 238.45	S7-42	22+125	7.8 LT C/L	El. 238.56
	0-2.10	Blk Fib Peat			0-2.10	Blk Fib Peat	
	2.10-2.55	L Gry Siy Sa Wet			2.10-2.40	Soft Gry Siy Cl	
	2.55	NFP BR			2.40	NFP BR	
		Fr Wat @ 0				Fr Wat @ 0	
				S7-43	22+150	29.8 LT C/L	El. 238.66
					0-1.95	Blk Fib Peat	
					1.95	NFP BR	
						Fr Wat @ 0	

GWP 290-97-00 Highway 69
District 52, Huntsville
Swamp 7
Station 21+800 - 22+310
Southbound Lane/Twp. of Conger
Datum Centre Line Median

S7-45 22+150 7.8 LT C/L El. 238.61
 0-1.50 Blk Fib Peat
 1.50 NFP BR
 Fr Wat @ 0

S7-46 22+175 29.8 LT C/L El. 238.66
 0-1.95 Blk Fib Peat
 1.95-2.40 Soft Gry Siy Cl
 2.40 NFP BR
 Fr Wat @ 0

S7-47 22+175 18.8 LT C/L El. 238.66
 0-1.50 Blk Fib Peat
 1.50-1.75 Soft Gry Siy Cl
 1.75 NFP BR
 Fr Wat @ 0

S7-48 22+175 7.8 LT C/L El. 238.66
 0-1.50 Blk Fib Peat
 1.50-1.65 L Gry Sa W Si Wet
 1.65 NFP BR
 Fr Wat @ 0

S7-49 22+200 29.8 LT C/L El. 238.71
 0-500 Blk Fib Peat
 500 NFP BR
 Fr Wat @ 0

S7-50 22+200 18.8 LT C/L El. 238.71
 0-1.70 Blk Fib Peat
 1.70 NFP BR
 Fr Wat @ 0

S7-51 22+200 7.8 LT C/L El. 238.71
 0-1.80 Blk Fib Peat
 1.80 NFP BR
 Fr Wat @ 0

S7-52 22+225 29.8 LT C/L El. 238.71
 0-4.00 Blk Fib Peat
 4.00 NFP BR
 Fr Wat @ 0

S7-53 22+225 18.8 LT C/L El. 238.71
 0-4.05 Blk Fib Peat
 4.05-4.35 Soft Gry Siy Cl
 4.35 NFP BR
 Fr Wat @ 0

S7-54 22+225 7.8 LT C/L El. 238.71
 0-5.10 Blk Fib Peat
 5.10-5.40 Soft Gry Cly Si
 5.40 NFP BR
 Fr Wat @ 2.00

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 7

Station 21+800 - 22+310

Southbound Lane/Twp. of Conger

Datum Centre Line Median

S7-55 22+250 29.8 LT C/L El. 238.72
 0-3.60 Blk Fib Peat
 3.60-4.80 L Gry Siy Sa Wet
 4.80-5.40 Soft Gry Cly Si
 5.40-5.60 L Gry Siy Sa Wet
 5.60 NFP BR
 Fr Wat @ 0

S7-57 22+250 7.8 LT C/L El. 238.72
 0-3.80 Blk Fib Peat
 3.80-4.20 L Gry Siy Sa Wet
 4.20-4.60 Soft Gry Siy Cl
 4.60-5.20 Comp Gry Sa Wet
 5.20 NFP BR
 Fr Wat @ 0

S7-58 22+275 29.8 LT C/L El. 238.69
 0-2.40 Blk Fib Peat
 2.40-3.40 Soft Gry Cly Si
 3.40-3.80 L Gry Sa Wet
 3.80 NFP BR
 Fr Wat @ 0

S7-60 22+275 7.8 LT C/L El. 238.69
 0-2.40 Blk Fib Peat
 2.40-4.20 Soft Gry Cly Si
 4.20-4.40 L Gry Sa Wet
 4.40 NFP BR
 Fr Wat @ 0

S7-61 22+300 29.8 LT C/L El. 238.68
 0-1.40 Blk Fib Peat
 1.40-2.00 Soft Gry Siy Cl Tr Sa
 2.00 NFP BR
 Fr Wat @ 0

S7-62 22+300 18.8 LT C/L El. 238.68
 0-2.25 Blk Fib Peat
 2.25-2.55 V Soft Gry Siy Cl Tr Sa
 2.55-2.85 L Gry Siy Sa Wet
 2.85 NFP BR
 Fr Wat @ 0

S7-63 22+300 7.8 LT C/L El. 238.68
 0-1.35 Blk Fib Peat
 1.35-1.70 Gry Siy Sa Wet
 1.70-2.55 Gry Siy Cl Tr Sa
 2.55 NFP BR
 Fr Wat @ 0

LOG OF BOREHOLE NO. S7-14

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 21+900, 18.8 m Lt., Highway 69, SBL, Twp. of Conger BORING DATE 98.02.12

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers/ Vane Test

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES		SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P				
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				WATER CONTENT W				
							BLOWS/0.3M				WATER CONTENT %				
0	GROUND ELEVATION 238.14						20	40	60	80	10	20	30	Upon completion of augering, borehole caved at 1.3 m with water level at ground surface.	
	Peat Fibrous, Black		237												
1.5				1	AS		+						W=718		
				236				+							
3.0				235				+							
				234				+							
4.5			233				+								
6.0			232				+								
6.30															
7.5	Silt Trace Sand, Trace Clay Very Loose		231												
7.95				230											
9.0	Silty Clay Grey, Very Soft		229	2	AS		+						W=60		
9.60				228				+							
10.5	End Of Borehole Auger Refusal Probable Bedrock														
12.0															
13.5															
15.0															
16.5															

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S7-26

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 22+000, 18.8 m Lt., Highway 69, NBL, Twp. of Conger BORING DATE 98.02.12

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES		SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_p				
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				WATER CONTENT W				
							BLOWS/0.3M				WATER CONTENT %				
	GROUND ELEVATION 238.29						20	40	60	80	10	20	30		
0	Peat Fibrous, Black		238											Upon completion of augering, borehole caved at 2.0 m with water level at ground surface.	
			237												
1.5				1	TW	P.H.							W=1014		
			236				+								
3.0			235	2	TW	P.H.							W=570		
			234				+								
4.5				3	SS	0	+						W=1900		
			233				+								
6.0			232	4	SS	0							W=70		
6.45				5	TW	P.H.									
	Silty Clay Grey, Wet Very Soft		231	6	TW	P.H.							W _L = 42		
7.5													W=63		
8.25			230				4								
8.70	Silty Sand Trace Clay, Trace Gravel Grey, Wet Dense			7	SS	38									
9.0			229												
	End Of Borehole Hammer Bouncing Probable Bedrock														
10.5															
12.0															
13.5															
15.0															
16.5															

NOTES:

- Vane test was carried out at a distance of 1.5 m from the borehole.

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S7-32

PROJECT GWP 290-97-00










OUR PROJECT 97TF088B

LOCATION Station 22+050, 18.8 m Lt., Highway 69, SBL. Twp. of Conger BORING DATE 98.02.11

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES			SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P				
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				WATER CONTENT %				
							BLOWS/0.3M				W_P W W_L				
							20 40 60 80				10 20 30				
0	GROUND ELEVATION 238.40													Upon completion of augering, borehole caved at 1.8 m with water level at ground surface.	
	Peat Fibrous, Black		238												
			237	1	SS	0									
1.5			236												
			235	2	SS	0							W=1287		
3.0			234												
4.00			233	3	SS	26									
4.5	Silty Clay Grey, Soft														
4.80															
5.10	Silty Sand Grey, Wet Compact														
6.0															
	End Of Borehole Auger Refusal Probable Bedrock														
7.5															
9.0															
10.5															
12.0															
13.5															
15.0															
16.5															

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S7-38

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 22+100, 18.8 m Lt., Highway 69, SBL, Twp. of Conger BORING DATE 98.02.11

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers/ Vane Test

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •	20 40 60 80				PLASTIC LIMIT W_P				
												WATER CONTENT W				
												WATER CONTENT %				
0	GROUND ELEVATION 238.51							20 40 60 80	10 20 30							
	Peat Fibrous, Black		238											Upon completion of augering, borehole caved at 2.0 m with water level at ground surface.		
1.5			237													
			236	1	TW	P.H.							W=826			
3.0			235				+									
							+									
4.35			234				+									
4.5	Silty Clay Trace Silt Grey, Soft		234	2	TW	P.H.							W=57			
4.80																
5.25	Sand Trace Gravel Grey, Wet Compact		233													
6.0	End Of Borehole Auger Refusal Probable Bedrock															
7.5																
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S7-41

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 22+125, 18.8 m Lt., Highway 69, SBL, Twp. of Conger BORING DATE 98.02.11

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES		SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L			GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_p			
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				WATER CONTENT W			
							BLOWS/0.3M				WATER CONTENT %			
0	GROUND ELEVATION 238.56						20	40	60	80	10	20	30	Upon completion of augering, borehole caved at 1.5 m with water level at ground surface.
	Peat Fibrous, Black		238											
1.5			237	1	SS	0								
2.55			236											
3.0	Silty Clay Trace Silt Grey, Soft		235	2	SS	4	•						W=58 •	
3.90														
4.5	Sand Trace Silt, Trace Gravel Grey, Wet Loose		234											
	End Of Borehole Auger Refusal Probable Bedrock		233											
6.0														
7.5														
9.0														
10.5														
12.0														
13.5														
15.0														
16.5														

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S7-44

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 22+150, 18.8 m Lt., Highway 69, SBL, Twp. of Conger BORING DATE 98.02.09

ENGINEER E. W.

BORING METHOD Continuous Flight Solid Stem Augers

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES		SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L			GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_p			
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST *				WATER CONTENT W			
							BLOWS/0.3M				W_p W W_L			
							20 40 60 80				10 20 30			
0	GROUND ELEVATION 238.61												Upon completion of augering, borehole caved at 1.0 m with water level at ground surface.	
	Peat Fibrous, Black		238											
1.5			237											
1.95 2.10	Silt Trace Sand Grey, Wet Compact			1	SS	58/200mm								
3.0			236											
	End Of Borehole Hammer Bouncing Probable Bedrock													
4.5														
6.0														
7.5														
9.0														
10.5														
12.0														
13.5														
15.0														
16.5														

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S7-56

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 22+250, 18.8 m Lt., Highway 69, SBL, Twp. of Conger BORING DATE 98.02.10

ENGINEER E. W.

BORING METHOD Continuous Flight Solid Stem Augers / Vane Test

TECHNICIAN D. R.

SOIL PROFILE		SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N VALUES	20 40 60 80				PLASTIC LIMIT W_P				
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				WATER CONTENT %				
							BLOWS/0.3M				10 20 30				
0	GROUND ELEVATION 238.71						20	40	60	80	10	20	30	Upon completion of augering, borehole caved at 1.5 m with water level at ground surface.	
	Peat Fibrous, Black		238												
1.5			237	1	SS	0							W=902		
			236												
3.0			235	2 3	TW TW	P.H. P.H.							W=532		
			234	4	TW	P.H.									
4.5	4.50		234	5	SS	0									
	Silt Trace Sand Grey, Wet Very Loose		233												
6.0	6.00		232	6 7	SS TW	0 P.H.							W=41 W=49		
	Silty Clay Trace Silt Grey, Firm		231												
6.90															
7.5	End Of Borehole Auger Refusal Probable Bedrock														
9.0															
10.5															
12.0															
13.5															
15.0															
16.5															

NOTES:

- Vane test was carried out at a distance of 1.5 m from the borehole.
- 4 Number refers to sensitivity.

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S7-59

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 22+275, 18.8 m Lt., Highway 69, SBL, Twp. of Conger BORING DATE 98.02.10

ENGINEER E. W.

BORING METHOD Portable Hand Sampling Equipment

TECHNICIAN D. R.

SOIL PROFILE				SAMPLES		SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L			GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P			
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				WATER CONTENT %			
							BLOWS/0.3M				W_P W W_L			
							20 40 60 80				10 20 30			
0	GROUND ELEVATION 238.69												Upon completion of augering, borehole caved at 1.5 m with water level at ground surface.	
	Peat Fibrous, Black		238											
1.5			237	1	SS	0						W=779		
2.70			236											
2.95	Sandy Silt Grey, Wet Very Loose		235	2	SS	0						W=50		
4.5	Silty Clay Trace Gravel Grey Very Soft		234											
6.0	End Of Borehole Auger Refusal Probable Bedrock													
7.5														
9.0														
10.5														
12.0														
13.5														
15.0														
16.5														

NOTES:

CHECKED BY: E.W.

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 7

Station 21+550 - 22+300

Northbound Lane/Twp. of Conger

Datum Centre Line Median

S7-64 21+550 10.8 RT C/L El. 239.35
0-400 Blk Amor Peat
400-1.20 L Mott Br And Gry Si W Sa Wet
1.20-2.50 Comp Gry Sa W Si Wet
2.50 NFP BR
Fr Wat @ 100

S7-65 21+550 18.8 RT C/L El. 239.35
0-200 Blk Siy Sa Tps
200-800 L Mott Br And Gry Siy Sa Wet
800-2.20 Comp Gry Si W Sa Wet
2.20 NFP BR
Fr Wat @ 100

S7-66 21+550 26.8 RT C/L El. 240.20
0-100 Blk Siy Sa Tps
100-1.40 Comp Br Siy Sa Wet
1.40 NFP BR
Fr Wat @ 200

S7-67 21+575 10.8 RT C/L El. 239.80
0-1.50 Blk Amor Peat
1.50-2.00 Comp Gry Sa W Si Wet
2.00 NFP BR
Fr Wat @ 100

S7-68 21+575 18.8 RT C/L El. 239.80
0-200 Blk Amor Peat
200-1.70 L Gry Siy Sa Wet
1.70 NFP BR
Fr Wat @ 100

S7-69 21+575 26.8 RT C/L El. 239.80
0-100 Blk Siy Sa Tps
100-700 Comp Br Siy Sa Moist
700 NFP BR

S7-70 21+600 10.8 RT C/L El. 239.35
0-300 Blk Amor Peat
300-1.00 Blk Fib Peat
1.00 NFP BR
Fr Wat @ 100

S7-71 21+600 18.8 RT C/L El. 239.37
0-1.80 Blk Amor Peat
1.80-2.30 L Gry Sa W Si Seams Wet
2.30 NFP BR
Fr Wat @ 200

S7-72 21+600 26.8 RT C/L El. 239.40
0-100 Br Siy Sa Tps
100-300 Comp Br Sa Tr Si Moist
300 NFP BR

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 7

Station 21+550 - 22+300

Northbound Lane/Twp. of Conger

Datum Centre Line Median

S7-73 21+625 8.3 RT C/L El. 239.26
 0-400 Blk Amor Peat
 400-3.00 Blk Fib Peat
 3.00-3.30 L Gry Sa Tr Si Wet
 3.30 NFP BR
 Fr Wat @ 0

S7-75 21+625 29.3 RT C/L El. 239.26
 0-1.20 Blk Amor Peat
 1.20-1.60 Blk Fib Peat
 1.60-2.50 L Gry Si W Sa Wet
 2.50 NFP BR
 Fr Wat @ 200

S7-76 21+650 8.3 RT C/L El. 239.13
 0-2.80 Blk Amor Peat
 2.80-3.40 Comp Gry Sa Tr Si Wet
 3.40 NFP BR
 Fr Wat @ 100

S7-77 21+650 18.8 RT C/L El. 239.13
 0-3.80 Blk Amor Peat
 3.80-4.50 Comp Mott Br And Gry Siy Sa
 Wet
 4.50 NFP BR
 Fr Wat @ 0

S7-78 21+650 29.3 RT C/L El. 239.13
 0-1.20 Blk Amor Peat
 1.20-3.00 Blk Fib Peat
 3.00-3.50 Blk Amor Peat
 3.50-4.00 Comp Gry Sa Tr Si Wet
 4.00 NFP BR
 Fr Wat @ 100

S7-79 21+675 8.3 RT C/L El. 239.03
 0-3.20 Blk Amor Peat
 3.20-4.50 Comp Gry Sa Tr Si Wet
 4.50 NFP BR
 Fr Wat @ 100

S7-80 21+675 18.8 RT C/L El. 239.03
 0-1.70 Blk Amor Peat
 1.70-3.80 Blk Fib Peat
 3.80-4.40 Comp Gry Sa W Si Wet
 4.40 NFP BR
 Fr Wat @ 0

S7-81 21+675 29.3 RT C/L El. 239.03
 0-2.00 Blk Amor Peat
 2.00-3.90 Blk Fib Peat
 3.90-4.50 Comp Gry Sa Tr Gr Wet
 4.50 NFP BR
 Fr Wat @ 0

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 7

Station 21+550 - 22+300

Northbound Lane/Twp. of Conger

Datum Centre Line Median

S7-82 21+700 7.8 RT C/L El. 238.98
 0-4.10 Blk Amor Peat
 4.10 NFP BR
 Fr Wat @ 100

S7-83 21+700 18.8 RT C/L El. 238.98
 0-4.60 Blk Amor Peat
 4.60-4.70 Soft Gry Siy Cl Tr Sa
 4.70-5.00 Comp Gry Sa Tr Gr Wet
 5.00 NFP BR
 Fr Wat @ 0

S7-84 21+700 29.8 RT C/L El. 238.98
 0-4.80 Blk Fib Peat
 4.80-5.00 Soft Gry Siy Cl Tr Sa
 5.00-5.30 Comp Gry Sa W Si Wet
 5.30 NFP BR
 Fr Wat @ 0

S7-85 21+725 7.8 RT C/L El. 238.44
 0-1.80 Blk Fib Peat
 1.80-4.30 Blk Amor Peat
 4.30-4.40 Soft Gry Siy Cl
 4.40-4.60 Comp Gry Sa Tr Gr Wet
 4.60 NFP BR
 Fr Wat @ 100

S7-86 21+725 18.8 RT C/L El. 238.44
 0-6.00 Blk Fib Peat
 6.00-8.55 L Gry Siy Sa Tr Cl
 8.55-9.60 Soft Gry Siy Cl Wet
 9.60 NFP BR
 Fr Wat @ 0

S7-87 21+725 29.8 RT C/L El. 238.44
 0-5.30 Blk Amor Peat
 5.30-5.40 Soft Gry Siy Cl
 5.40-5.60 Comp Gry Sa W Si Wet
 5.60 NFP BR
 Fr Wat @ 100

S7-88 21+750 7.8 RT C/L El. 238.77
 0-1.50 Blk Fib Peat
 1.50-5.10 Blk Amor Peat
 5.10-5.20 Soft Gry Siy Cl
 5.20-5.50 Comp Gry Sa W Si Wet
 5.50 NFP BR
 Fr Wat @ 100

S7-89 21+750 18.8 RT C/L El. 238.77
 0-4.50 Blk Fib Peat
 4.50-5.00 L Gry Sa W Si Wet
 5.00-10.80 V Soft Gry Siy Cl
 10.80-11.70 D Gry Siy Sa Tr Cl Wet
 11.70 NFP BR

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 7

Station 21+550 - 22+300

Northbound Lane/Twp. of Conger

Datum Centre Line Median

S7-90	21+750	29.8 RT C/L	El. 238.60		S7-94	21+800	7.8 RT C/L	El. 238.10
	0-5.40	Blk Fib Peat				0-2.40	Blk Fib Peat	
	5.40-12.70	V Soft Gry Siy Cl W Sa Seams				2.40-4.20	Blk Amor Peat	
	12.70-13.20	D Gry Sa W Gr Wet				4.20-4.80	V Soft Gry Siy Cl	
	13.20	NFP BR				4.80-5.25	Comp Gry Si Tr Sa Wet	
S7-91	21+775	7.8 RT C/L	El. 238.89			5.25	NFP BR	
	0-1.50	Blk Fib Peat					Fr Wat @ 0	
	1.50-5.60	Blk Amor Peat			S7-95	21+800	18.8 RT C/L	El. 237.86
	5.60	NFP BR				0-5.85	Blk Fib Peat	
		Fr Wat @ 100				5.85-7.70	V L Gry Si Tr Cl Wet	
S7-92	21+775	18.8 RT C/L	El. 238.89			7.70-9.00	V Soft Gry Siy Cl	
	0-5.90	Blk Fib Peat				9.00	NFP BR	
	5.90-6.50	L Gry Si Tr Cl Tr Sa Wet					Fr Wat @ 0	
	6.50-8.30	L Gry Sa Tr Si Wet			S7-96	21+800	29.8 RT C/L	El. 237.78
	8.30-9.20	V Soft Gry Siy Cl Wet				0-5.10	Blk Fib Peat	
S7-93	21+775	29.5 RT C/L	El. 238.89			5.10-5.55	L Gry Si Tr Sa Wet	
	0-5.10	Blk Amor Peat				5.55-7.35	V Soft Gry Siy Cl	
	5.10-5.30	V Soft Gry Siy Cl				7.35	NFP BR	
	5.30-6.00	D Gry Sa W Si Wet					Fr Wat @ 0	
	6.00	NFP BR			S7-97	21+825	7.8 RT C/L	El. 238.28
						0-5.00	Blk Amor Peat	
						5.00-5.15	Soft Gry Siy Cl	
						5.15-5.50	Comp Gry Sa W Si Wet	
						5.50	NFP BR	
							Fr Wat @ 0	

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 7

Station 21+550 - 22+300

Northbound Lane/Twp. of Conger

Datum Centre Line Median

S7-99 21+825 29.8 RT C/L El. 237.75
0-5.00 Blk Amor Peat
5.00-5.20 Soft Gry Siy Cl
5.20-6.00 Comp Gry Sa W Si Wet
6.00 NFP BR
Fr Wat @ 0

S7-105 21+875 29.8 RT C/L El. 238.04
0-3.00 Blk Fib Peat
3.00-5.85 Blk Amor Peat
5.85-6.15 L Gry Siy Sa Tr Cl Wet
6.15-7.65 V Soft Gry Siy Cl
7.65 NFP BR
Fr Wat @ 0

S7-100 21+850 7.8 RT C/L El. 237.85
0-3.00 Blk Fib Peat
3.00-5.40 Blk Amor Peat
5.40-6.45 V Soft Gry Siy Cl
6.45 NFP BR
Fr Wat @ 0

S7-106 21+900 7.8 RT C/L El. 238.14
0-4.50 Blk Fib Peat
4.50-7.80 Blk Amor Peat
7.80-8.40 L Gry Si Tr Sa Tr Cl Wet
8.40-10.05 V Soft Gry Siy Cl
10.05 NFP BR
Fr Wat @ 0

S7-102 21+850 29.8 RT C/L El. 237.85
0-2.40 Blk Fib Peat
2.40-5.25 Blk Amor Peat
5.25-5.70 L Gry Si Tr Sa Wet
5.70-6.60 V Soft Gry Siy Cl
6.60-6.75 D Gry Sa Tr Si Tr Gr Wet
6.75 NFP BR
Fr Wat @ 0

S7-108 21+900 29.8 RT C/L El. 238.14
0-7.80 Blk Fib Peat
7.80-7.95 Gry Sa Wet
7.95-8.40 Gry Si Wet
8.40-10.50 Soft Gry Siy Cl
10.50 NFP BR
Fr Wat @ 0

S7-103 21+875 7.8 RT C/L El. 238.04
0-7.20 Blk Fib Peat
7.20-9.45 Blk Amor Peat
9.45-11.55 V Soft Gry Siy Cl
11.55 NFP BR
Fr Wat @ 0

S7-109 21+925 7.8 RT C/L El. 238.19
0-6.00 Blk Fib Peat
6.00-8.10 Blk Amor Peat
8.10-11.55 Soft Gry Cl Tr Si
11.55 NFP BR
Fr Wat @ 0

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 7

Station 21+550 - 22+300

Northbound Lane/Twp. of Conger

Datum Centre Line Median

S7-111 21+925 29.8 RT C/L El. 238.19
0-3.00 Blk Fib Peat
3.00-8.10 Blk Amor Peat
8.10-10.95 L Gry Sa Tr Si Tr Cl Wet
10.95-11.55 V Soft Gry Siy Cl
11.55 NFP BR
Fr Wat @ 0

S7-114 21+950 29.8 RT C/L El. 238.19
0-5.10 Blk Fib Peat
5.10-8.40 L Gry Si Tr Sa Tr Cl Wet
8.40-9.75 V Soft Gry Siy Cl
9.75 NFP BR
Fr Wat @ 0

S7-115 21+975 7.8 RT C/L El. 238.24
0-8.70 Blk Fib Peat
8.70-10.50 V Soft Gry Siy Cl
10.50 NFP BR
Fr Wat @ 0

S7-117 21+975 29.8 RT C/L El. 238.24
0-6.75 Blk Fib Peat
6.75-7.80 Gry Siy Sa Wet
7.80-9.00 V Soft Gry Siy Cl
9.00 NFP BR
Fr Wat @ 0

S7-118 22+000 7.8 RT C/L El. 238.48
0-7.05 Blk Fib Peat
7.05-7.20 Gry Si Tr Cl Tr Sa Wet
7.20-7.95 V Soft Gry Siy Cl
7.95 NFP BR
Fr Wat @ 0

S7-119 22+000 18.8 RT C/L El. 238.48
0-2.70 Blk Amor Peat
2.70-6.00 Blk Fib Peat
6.00-7.20 V L Gry Si Tr Cl Tr Sa Wet
7.20-8.10 V Soft Gry Siy Cl
8.10-8.40 D Gry Sa Tr Gr Wet
8.40 NFP BR
Fr Wat @ 0

S7-120 22+000 29.8 RT C/L El. 238.48
0-5.25 Blk Fib Peat
5.25-6.45 V Soft Gry Siy Cl
6.45-6.75 D Gry Sa W Si Wet
6.75 NFP BR
Fr Wat @ 0

S7-121 22+025 7.8 RT C/L El. 238.35
0-3.60 Blk Fib Peat
3.60-5.25 V Soft Gry Siy Cl
5.25 NFP BR
Fr Wat @ 0

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 7

Station 21+550 - 22+300

Northbound Lane/Twp. of Conger

Datum Centre Line Median

S7-122 22+025 18.8 RT C/L El. 238.35
0-3.30 Blk Amor Peat
3.30-3.90 V L Gry Si Tr Cl Tr Sa Wet
3.90-4.35 V Soft Gry Siy Cl
4.35 NFP BR
Fr Wat @ 0

S7-127 22+075 7.8 RT C/L El. 238.45
0-3.45 Blk Fib Peat
3.45-4.05 V Soft Gry Siy Cl
4.05 NFP BR
Fr Wat @ 0

S7-123 22+025 29.8 RT C/L El. 238.35
0-2.70 Blk Fib Peat
2.70-3.90 V Soft Gry Siy Cl
3.90-4.05 D Gry Sa W Si Wet
4.05 NFP BR
Fr Wat @ 0

S7-128 22+075 18.8 RT C/L El. 238.45
0-2.70 Blk Fib Peat
2.70-3.60 V L Gry Si Tr Cl Tr Sa Wet
3.60-4.05 Comp Gry Sa W Si Wet
4.05 NFP BR
Fr Wat @ 0

S7-125 22+050 18.8 RT C/L El. 238.40
0-2.40 Blk Fib Peat
2.40-3.30 V Soft Gry Siy Cl
3.30-3.45 D Gry Sa W Si Wet
3.45 NFP BR
Fr Wat @ 0

S7-129 22+075 29.8 RT C/L El. 238.45
0-1.95 Blk Fib Peat
1.95-2.55 V Soft Gry Siy Cl
2.55-2.70 Comp Gry Si Tr Sa Wet
2.70 NFP BR
Fr Wat @ 0

S7-126 22+050 29.8 RT C/L El. 238.40
0-3.45 Blk Fib Peat
3.45-4.50 V Soft Gry Siy Cl
4.50-5.10 D Gry Sa W Si Wet
5.10 NFP BR
Fr Wat @ 0

S7-130 22+100 7.8 RT C/L El. 238.51
0-3.00 Blk Fib Peat
3.00-3.75 V Soft Gry Siy Cl Wet
3.75 NFP BR
Fr Wat @ 0

GWP 290-97-00 Highway 69
District 52, Huntsville
Swamp 7
Station 21+550 - 22+300
Northbound Lane/Twp. of Conger
Datum Centre Line Median

S7-132 22+100 29.8 RT C/L El. 238.51
0-1.80 Blk Fib Peat
1.80-1.95 Comp Gry Sa W Si Moist
1.95 NFP BR
Fr Wat @ 0

S7-139 22+175 7.8 RT C/L El. 238.66
0-2.25 Blk Fib Peat
2.25-4.35 Blk Amor Peat
4.35 NFP BR
Fr Wat @ 0

S7-133 22+125 7.8 RT C/L El. 238.56
0-2.70 Blk Fib Peat
2.70-3.00 V Soft Gry Siy Cl
3.00 NFP BR
Fr Wat @ 0

S7-140 22+175 18.8 RT C/L El. 238.66
0-3.30 Blk Amor Peat
3.30-6.45 Blk Fib Peat
6.45 NFP BR
Fr Wat @ 0

S7-134 22+125 18.8 RT C/L El. 238.56
0-2.10 Blk Fib Peat
2.10-2.70 Soft Gry Siy Cl
2.70 NFP BR
Fr Wat @ 0

S7-141 22+175 29.8 RT C/L El. 238.66
0-300 Water
300-5.50 Blk Fib Peat
5.50 NFP BR

S7-135 22+125 29.8 RT C/L El. 238.56
0-2.30 Blk Fib Peat
2.30-3.00 Comp Gry Siy Sa Wet
3.00 NFP BR

S7-142 22+200 7.8 RT C/L El. 238.71
0-4.80 Blk Fib Peat
4.80-5.10 V Soft Gry Siy Cl
5.10-5.55 Comp Gry Si W Sa Wet
5.55 NFP BR
Fr Wat @ 0

S7-136 22+150 7.8 RT C/L El. 238.61
0-3.75 Blk Fib Peat
3.75 NFP BR
Fr Wat @ 0

S7-144 22+200 29.8 RT C/L El. 238.71
0-5.88 Blk Fib Peat
5.88 NFP BR
Fr Wat @ 0

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 7

Station 21+550 - 22+300

Northbound Lane/Twp. of Conger

Datum Centre Line Median

S7-145	22+225	7.8 RT C/L	El. 238.72	S7-149	22+250	18.8 RT C/L	El. 238.72
	0-6.90	Blk Fib Peat			0-3.75	Blk Fib Peat	
	6.90-7.40	V Soft Gry Siy Cl			3.75-5.10	V Soft Gry Siy Cl	
	7.40	NFP BR			5.10-5.25	Comp Gry Si W Sa Tr Gr Wet	
		Fr Wat @ 0			5.25	NFP BR	
						Fr Wat @ 0	
S7-146	22+225	18.8 RT C/L	El. 238.72	S7-150	22+250	29.8 RT C/L	El. 238.72
	0-5.70	Blk Fib Peat			0-3.35	Blk Fib Peat	
	5.70-6.60	V Soft Gry Siy Cl			3.35	NFP BR	
	6.60	NFP BR				Fr Wat @ 0	
		Fr Wat @ 0					
S7-147	22+225	29.8 RT C/L	El. 238.72	S7-151	22+275	7.8 RT C/L	El. 238.69
	0-5.50	Blk Fib Peat			0-3.10	Blk Fib Peat	
	5.50-5.80	V Soft Gry Siy Cl			3.10-4.80	Soft Gry Siy Cl	
	5.80	NFP BR			4.80	NFP BR	
		Fr Wat @ 0				Fr Wat @ 0	
S7-148	22+250	7.8 RT C/L	El. 238.72	S7-153	22+275	29.8 RT C/L	El. 238.69
	0-3.70	Blk Fib Peat			0-2.30	Blk Fib Peat	
	3.70-4.15	L Gry Sa Tr Si Wet			2.30-4.20	L Gry Siy Sa Wet	
	4.15-4.55	Soft Gry Siy Cl			4.20	NFP BR	
	4.55-5.05	Comp Gry Sa Wet				Fr Wat @ 0	
	5.05	NFP BR					
		Fr Wat @ 0		S7-154	22+300	7.8 RT C/L	El. 238.68
					0-1.20	Blk Fib Peat	
					1.20-1.75	Firm Gry Siy Cl	
					1.75	NFP BR	
						Fr Wat @ 0	

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 7

Station 21+550 - 22+300

Northbound Lane/Twp. of Conger

Datum Centre Line Median

S7-156	22+300	29.8 RT C/L	El. 238.68
	0-1.10	Blk Fib Peat	
	1.10-1.20	L Gry Sa Wet	
	1.20	NFP BR	
		Fr Wat @ 1.10	

LOG OF BOREHOLE NO. S7-74

PROJECT CWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 21+625, 18.8 m Rt., Highway 69, NBL, Twp. of Conger

BORING DATE 98.02.19 ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers / Dynamic Cone Test

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES			SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS							
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N = VALUES	20 40 60 80				PLASTIC LIMIT W_p											
							DYNAMIC CONE PENETRATION x				WATER CONTENT W											
							STANDARD PENETRATION TEST •				W_p W W_L											
							GROUND ELEVATION 239.26							BLOWS/0.3m				WATER CONTENT %				
														20 40 60 80				10 20 30				
0														Upon completion of augering, borehole caved at 1.5 m with water level at ground surface.								
	Peat Fibrous, Black		239																			
			238																			
1.5			237																			
2.70																						
3.0	Sandy Silt Grey, Wet		236				x															
3.60	Very Loose						x															
	Silty Clay Grey		235	1	TW	P.H.	x						W=52									
4.5	Very Soft						x															
5.10			234				x															
	Sand Trace Gravel						x															
6.0	Compact To Very Dense		233				x															
7.05			232																			
7.5	End Of Borehole Auger Refusal Probable Bedrock																					
9.0																						
10.5																						
12.0																						
13.5																						
15.0																						
16.5																						

NOTES:

1. Cone test was carried out at a distance of 1.5 m from the borehole.

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S7-98

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 21+825, 18.8 m Rt., Highway 69, NBL, Twp. of Conger BORING DATE 98.02.12

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers / Vane Test / Dynamic Cone Test

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES		SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L			GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P			
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				WATER CONTENT %			
							BLOWS/0.3M				W_P — W — W_L			
							20 40 60 80				10 20 30			
0	GROUND ELEVATION 237.85												Upon completion of augering, borehole caved at 1.50 m with water level at ground surface.	
	Peat Fibrous, Black		237											
1.5			236											
			235											
3.0			234	1	AS		+					W=941		
4.5			233				+							
6.0			232				+							
6.00	Silty Sand Grey, Wet Very Loose		231				x							
7.5							x							
7.50	Silty Clay Grey Very Soft		230				x							
9.0			229				x							
9.00	Sand Trace Gravel Grey, Wet Compact To Dense		228				x		x					
9.90														
10.5	End Of Borehole Auger Refusal Probable Bedrock		227											
12.0														
13.5														
15.0														
16.5														

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S7-101

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 21+850, 18.8 m Rt., Highway 69, NBL, Twp. of Conger BORING DATE 98.02.06

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers / Vane Test

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES		SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST *				WATER CONTENT %				
							BLOWS/0.3M				WATER CONTENT %				
							20	40	60	80	10	20	30		
0	GROUND ELEVATION 237.85													Upon completion of augering, borehole caved at 1.8 m with water level at ground surface.	
	Peat Fibrous, Black		237												
1.5			236	1	SS	0							W=1172		
			235												
3.0	3.00 ----- Becoming Amorphous		234	2	SS	0	+						W=1119		
			233	3	SS	0							W=75		
4.5			232	4	SS	0									
	Silty Clay Grey Very Soft		231	5	SS	0									
6.0				6	SS	0									
							+						W=90		
6.90			230												
7.5	7.35 ----- Sand Trace Clay, Trace Gravel Grey, Wet Dense														
9.0	End Of Borehole Auger Refusal Probable Bedrock														
10.5															
12.0															
13.5															
15.0															
16.5															

NOTES:

- Vane test was carried out at a distance of 1.5 m from the borehole.
- + Number refers to sensitivity.

CHECKED BY: E. W.

LOG OF BOREHOLE NO. S7-104

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 21+875, 18.8 m Rt., Highway 69, NBL, Twp. of Conger

BORING DATE 98.02.12 ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers / Vane Test

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N-VALUES	DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				PLASTIC LIMIT W_P					
							BLOWS/0.3M				WATER CONTENT %					
							20	40	60	80	10	20	30			
0	GROUND ELEVATION 238.04															
0.30	Water													Upon completion of augering, borehole caved at 1.5 m with water level at ground surface.		
	Peat		237													
1.5	Fibrous, Black		236													
				1	AS								W=926			
3.0			235										W=852			
				2	TW	P.H.										
			234													
4.5																
			233													
				3	SS	0							W=839			
6.0			232													
			231													
7.20																
7.5	Silty Clay		230													
	Grey															
	Very Soft															
			229	4	AS	P.H.							W=63			
9.0				5	TW								W _L = 46			
			228													
10.5																
10.65			227													
11.10	Sand															
	Trace Gravel															
	Grey, Wet															
	Dense															
12.0			226													
	End Of Borehole															
	Auger Refusal															
	Probable Bedrock															
13.5																
15.0																
16.5																

NOTES:

1. Vane test was carried out at a distance of 1.5 m from the borehole.
2. +2 Number refers to sensitivity.

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S7-107

PROJECT GWP 290-97-00

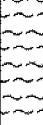

OUR PROJECT 97TF088B

LOCATION Station 21+900, 18.8 m Rt., Highway 69, NBL, Twp. of Conger BORING DATE 98.02.06

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES		SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				PLASTIC LIMIT W_p				
							BLOWS/0.3M				WATER CONTENT %				
							20	40	60	80	10	20	30		
0	GROUND ELEVATION 238.14														
	Peat Fibrous, Black		237											Upon completion of augering, borehole caved at 1.3 m with water level at ground surface.	
1.5			236	1	SS	0							W=1022		
			235												
3.00	----- Becoming Amorphous		234												
			233	2	SS	0							W=787		
			232												
4.5			231	3	SS	0									
			230												
6.0			229	4	SS	0									
			228												
7.50			227												
	Silty Clay Grey Very Soft		226	5	SS	0									
9.0			225												
9.45			224	6	SS	0									
	End Of Borehole Auger Refusal Probable Bedrock		223												
10.5			222												
12.0			221												
			220												
13.5			219												
			218												
15.0			217												
			216												
16.5			215												

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S7-110

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 21+925, 18.8 m Rt., Highway 69, NBL, Twp. of Conger BORING DATE 98.02.06

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers / Vane Test

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES		SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST *				WATER CONTENT %				
							BLOWS/0.3M				WATER CONTENT %				
							20	40	60	80	10	20	30		
0	GROUND ELEVATION 238.19						20	40	60	80	10	20	30	Upon completion of augering, borehole caved at 1.5 m with water level at ground surface.	
	Peat Fibrous, Black		237												
1.5			236				+								
							+								
3.0			235	1	TW	P.H.									
			234												
4.5															
			233				+								
							+								
							+								
6.0	6.00 Becoming Amorphous		232	2	TW	P.H.									
			231												
7.5															
8.25			230				+								
9.0	Silt Trace Clay, Trace Sand Grey, Wet Very Loose			3	SS	0									
			229												
				4	SS	0									
			228	5	SS	0									
10.5	10.50														
	Silty Clay Trace Silt Grey Firm		227	6	TW	P.H.		+							
				7	TW	P.H.									
12.0	12.30		226												
	End of Borehole Auger Refusal Probable Bedrock		225												
13.5															
15.0															
16.5															

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S7-112

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 21+950, 7.8 m Rt., Highway 69, NBL, Twp. of Conger BORING DATE 98.02.16

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers/ Vane Test

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N-1 VALUES		20 40 60 80				PLASTIC LIMIT W_p				
								DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				WATER CONTENT W				
								BLOWS/0.3M				WATER CONTENT %				
								20	40	60	80	10	20	30		
0	GROUND ELEVATION 238.19														Upon completion of augering, borehole caved at 1.3 m with water level at ground surface.	
	Peat Fibrous, Black															
			237													
1.5			236													
				1	TW	P.H.										
3.0			235													
			234													
4.5																
			233													
6.0			232													
			231													
7.5																
			230													
8.40																
	Silty Clay Grey Very Soft			2	TW*	P.H.										
9.0			229													
			228													
10.50																
	End of Borehole Auger Refusal Probable Bedrock		227													
12.0																
13.5																
15.0																
16.5																

NOTES:

1. * Indicated no samples retrieved.

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S7-113

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 21+950, 18.8 m Rt., Highway 69, NBL, Twp. of Conger BORING DATE 98.02.19

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers/ Vane Test

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				PLASTIC LIMIT W_p					
							BLOWS/0.3M				WATER CONTENT %					
							20	40	60	80	10	20	30			
0	GROUND ELEVATION 238.19															
	Peat Fibrous, Black													Upon completion of augering, borehole caved at 1.5 m with water level at ground surface.		
			237													
1.5				1	SS	0							W=769			
			236													
3.0			235	2	SS	0	+						W=1360			
			234				+									
4.5				3	SS	0							W=433			
			233				+									
			232	4	SS	0	+									
6.0							+									
			231													
7.5				5	SS	0	+									
8.10			230													
8.70	Silt Trace Clay Grey						2									
9.0			229	6	SS	0	3						W=59			
	Silty Clay Grey Very Soft			7	SS	0	2									
10.20			228													
10.5	End Of Borehole Auger Refusal Probable Bedrock															
12.0																
13.5																
15.0																
16.5																

NOTES:

- Vane test was carried out at a distance of 1.5 m from the borehole.
- 2 Number refers to sensitivity.

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S7-116

PROJECT CWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 21+975, 18.8 m Rt., Highway 69, NBL, Twp. of Conger BORING DATE 98.02.09

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers/ Vane Test

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P					
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				WATER CONTENT W					
							BLOWS/0.3M				WATER CONTENT %					
							20	40	60	80	10	20	30			
0	GROUND ELEVATION 238.24		238											Upon completion of augering, borehole caved at 1.5 m with water level at ground surface.		
	Peat Fibrous, Black		237													
			236													
				1	TW	P.H.							W=1055			
			235													
			234													
				2	TW	P.H.										
			233													
			232	3	TW*	P.H.							W=649			
			231													
7.5		7.80		230												
	Silt Trace Clay, Trace Sand Grey Very Soft		229													
			228													
10.5		10.80		227	4	TW*	P.H.									
	Silty Clay Grey Very Soft															
12.0	Sand Trace Gravel Grey, Wet		226													
12.75			225													
13.5	End Of Borehole Auger Refusal Probable Bedrock															
15.0																
16.5																

NOTES:

1. Vane test carried out at a distance of 1.5m from borehole
2. +2 Number refers to sensitivity.
3. * Indicated no sample retrieved.

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S7-124

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 22+050, 7.8 m Rt., Highway 69, NBL, Twp. of Conger BORING DATE 98.02.13

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P					
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				WATER CONTENT W					
							BLOWS/0.3M				WATER CONTENT %					
0	GROUND ELEVATION 238.40						20	40	60	80	10	20	30	Upon completion of augering, borehole caved at 1.3 m with water level at ground surface.		
	Peat		238													
	Fibrous, Black															
			237													
1.5				1	SS	0							W=914 ●			
			236													
3.00																
	Silt		235	2	SS	1							●			
	Trace Clay, Trace Sand															
	Grey															
	Loose To Very Loose		234													
4.5																
				3	SS	5										
-5.25			233													
	End Of Borehole															
	Auger Refusal															
	Probable Bedrock															
6.0																
7.5																
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

CHECKED BY: E.W

LOG OF BOREHOLE NO. S7-131

PROJECT GWP 290-97-00








OUR PROJECT 97TF088B

LOCATION Station 22+100, 18.8 m Rt., Highway 69, NBL, Twp. of Conger BORING DATE 98.02.09

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_p					
							DYNAMIC CONE PENETRATION x				WATER CONTENT W					
							STANDARD PENETRATION TEST *				W_p W W_L					
							BLOWS/0.3M				WATER CONTENT %					
0	GROUND ELEVATION 238.51 /						20	40	60	80	10	20	30	Upon completion of augering, borehole caved at 1.3 m with water level at ground surface.		
	Peat Fibrous, Black		238													
1.5			237	1	SS	0										
			236													
2.70			235	2	SS	5	•									
3.00	Silt Trace Clay Grey															
3.90	Silty Clay Grey Firm		234													
4.5	End Of Borehole Auger Refusal Probable Bedrock		233													
6.0																
7.5																
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S7-137

PROJECT GWP 290-97-00






OUR PROJECT 97TF088B

LOCATION Station 22+150, 18.8 m Rt., Highway 69, NBL, Twp. of Conger BORING DATE 98.02.09

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES			SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L			GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P			
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				WATER CONTENT W			
							BLOWS/0.3M				WATER CONTENT %			
0	GROUND ELEVATION 238.61						20	40	60	80	10	20	30	Upon completion of augering, borehole caved at 1.4 m with water level at ground surface.
	Peat Fibrous, Black		238											
1.5			237	1	SS	0							W=74.2 ●	
			236											
3.0	3.30			2	SS	0							W=54 ●	
	Silty Clay Grey Very Soft		235											
3.90														
4.5			234											
	End Of Borehole Auger Refusal Probable Bedrock													
6.0														
7.5														
9.0														
10.5														
12.0														
13.5														
15.0														
16.5														

Upon completion of augering, borehole caved at 1.4 m with water level at ground surface.

W=742

W=54

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S7-138

PROJECT GWP 290-97-00

OUR PROJECT 97TF0888

LOCATION Station 22+150, 29.8 m Rt., Highway 69, NBL, Twp. of Conger BORING DATE 98.02.02

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES		SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P				
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				WATER CONTENT W				
							BLOWS/0.3M				WATER CONTENT %				
0	GROUND ELEVATION 238.61						20	40	60	80	10	20	30	Upon completion of augering, borehole caved at 1.3 m with water level at ground surface.	
	Peat Fibrous, Black		238												
1.5			237												
2.70			236	1	TW	P.H.									
3.0	Becoming Amorphous		235												
3.90															
4.5	Silty Clay Grey Soft		234												
4.80															
5.25	Silty Sand Trace Clay Grey, Wet Compact		233												
6.0															
	End Of Borehole Auger Refusal Probable Bedrock														
7.5															
9.0															
10.5															
12.0															
13.5															
15.0															
16.5															

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S7-143

PROJECT GWP 290-97-00

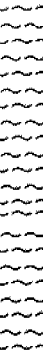
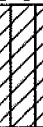

OUR PROJECT 97TF088B

LOCATION Station 22+200, 18.8 m Rt., Highway 69, NBL, Twp. of Conger BORING DATE 98.02.02

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers/ Vane Test

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES			SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P					
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST *				WATER CONTENT %					
							BLOWS/0.3M				W_P W W_L					
							20	40	60	80	10	20	30			
0	GROUND ELEVATION 238.71						20	40	60	80						
	Peat Fibrous, Black		238													
				1	SS	0								W=1159	Upon completion of augering, borehole caved at 1.3 m with water level at ground surface.	
1.5					2	TW	P.H.									
					236											
						3	SS	0								W=1167
3.0						4	TW	P.H.								
			235													
				5	SS	0								W=79		
4.40	Silty Clay Grey Very Soft		234													
					233	6	TW	P.H.								
5.90	End Of Borehole Auger Refusal Probable Bedrock															
				232												
7.5																
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

- Vane test carried out at a distance of 1.5m from borehole
- +3 Number refers to sensitivity.

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S7-152

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 22+275, 18.8 m Rt., Highway 69, NBL, Twp. of Conger

BORING DATE 98.02.24

ENGINEER

E. W.

BORING METHOD Continuous Flight Hollow Stem Augers/ Vane Test

TECHNICIAN

K. H.

SOIL PROFILE				SAMPLES		SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST *				PLASTIC LIMIT W_P				
							BLOWS/0.3M				WATER CONTENT %				
							20	40	60	80	10	20	30		
							+				+				
0	GROUND ELEVATION 238.69														
1.5	Peat Fibrous, Black		238											Upon completion of augering, borehole caved at 1.3 m with water level at ground surface.	
			237	1	TW	P.H.							W=613		
			236	2	TW	P.H.									
-2.85			235												
-3.15	Sandy Silt Grey, Wet Loose														
			234	3	TW	P.H.							W=60		
4.5	Silty Clay Grey, Firm		234												
			233	4	TW	P.H.									
-5.45															
6.0	End Of Borehole Auger Refusal Probable Bedrock														
7.5															
9.0															
10.5															
12.0															
13.5															
15.0															
16.5															

NOTES:

- +10 Number refers to sensitivity.
- Vane test carried out at a distance of 1.5 m from the borehole

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S7-155

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 22+300, 18.8 m Rt., Highway 69, NBL, Twp. of Conger BORING DATE 98.02.10

ENGINEER E. W.

BORING METHOD Portable Hand Sampling Equipment

TECHNICIAN K. H.

BORING METHOD				Portable Hand Sampling Equipment												
SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST *				PLASTIC LIMIT W_P					
							BLOWS/0.3M				WATER CONTENT %					
							20	40	60	80	10	20	30			
0	GROUND ELEVATION 238.68													Upon completion of augering, borehole caved at 1.3 m with water level at ground surface.		
	Peat Fibrous, Black		238													
1.5	-1.65		237													
	-2.25			1	SS	3										
	Sand With Silt Grey, Wet Very Loose		236													
3.0	End Of Borehole Hammer Bouncing Probable Bedrock															
4.5																
6.0																
7.5																
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

- Soil sampling was carried out using a 50 mm dia. split spoon equipment and a 20.5 Kg hammer dropping 750 mm (SPT N values adjusted to a 63.5 Kg hammer dropping 750 mm, using a linear relationship).

CHECKED BY: E.W.

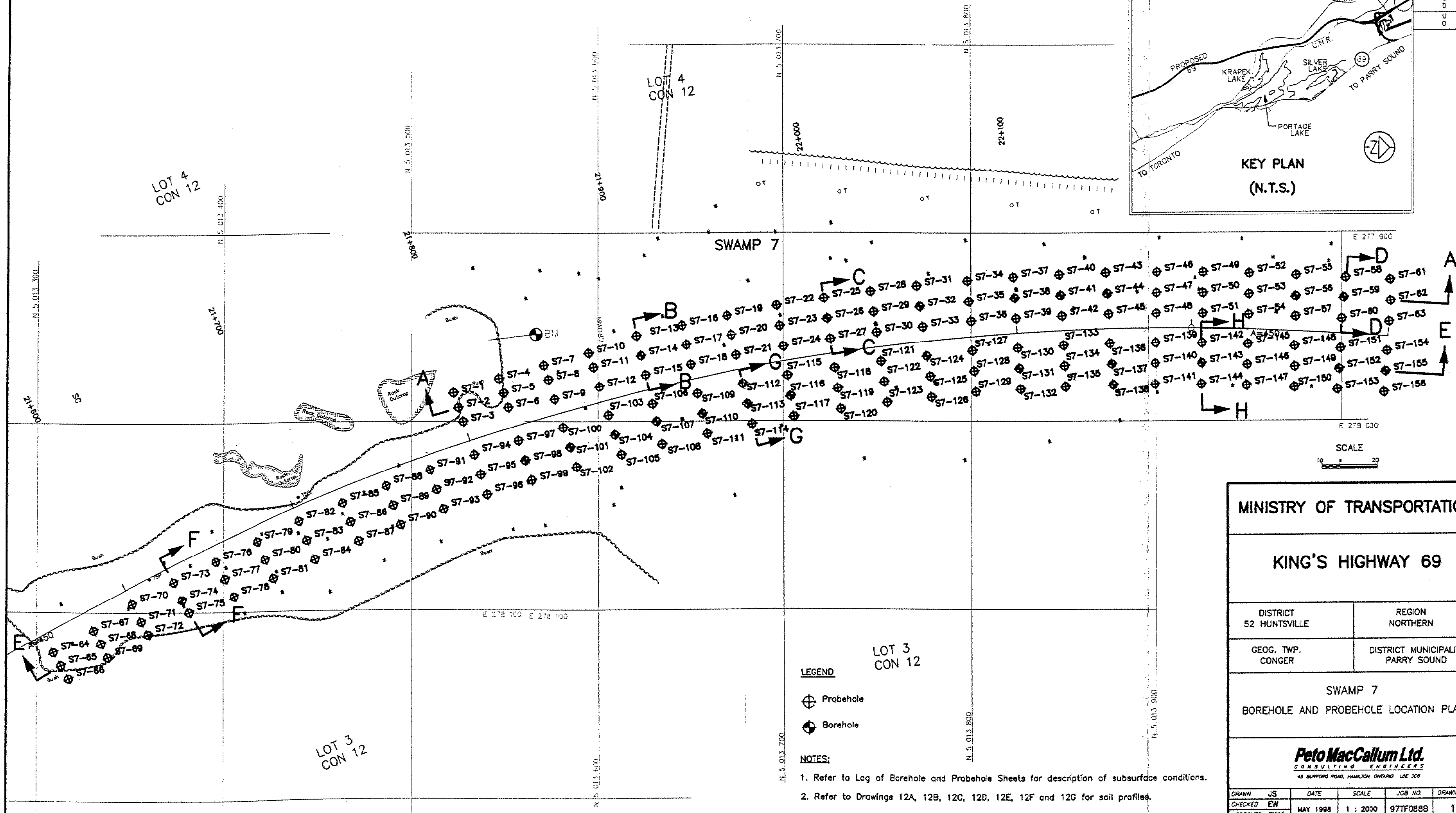
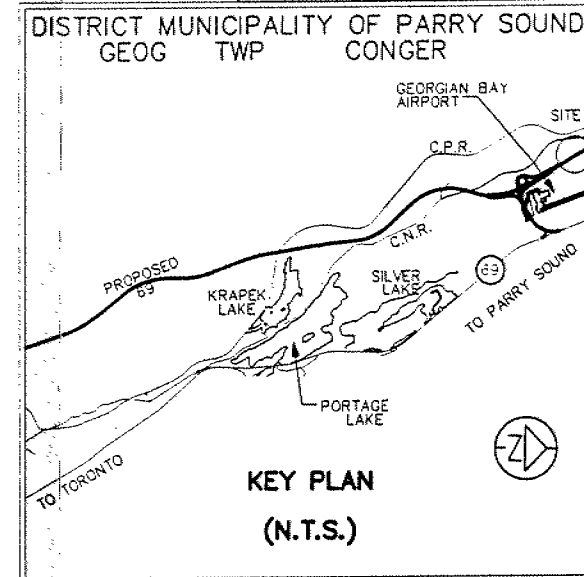
METRIC

PLATE No P
DRAWING No 7740069059
CONT No C
GWP No 290-97-00



STA S TO STA S
Survey 0 Revised R

SHEET



LEGEND

- Probehole
- Borehole

NOTES:

1. Refer to Log of Borehole and Probehole Sheets for description of subsurface conditions.
2. Refer to Drawings 12A, 12B, 12C, 12D, 12E, 12F and 12G for soil profiles.

MINISTRY OF TRANSPORTATION

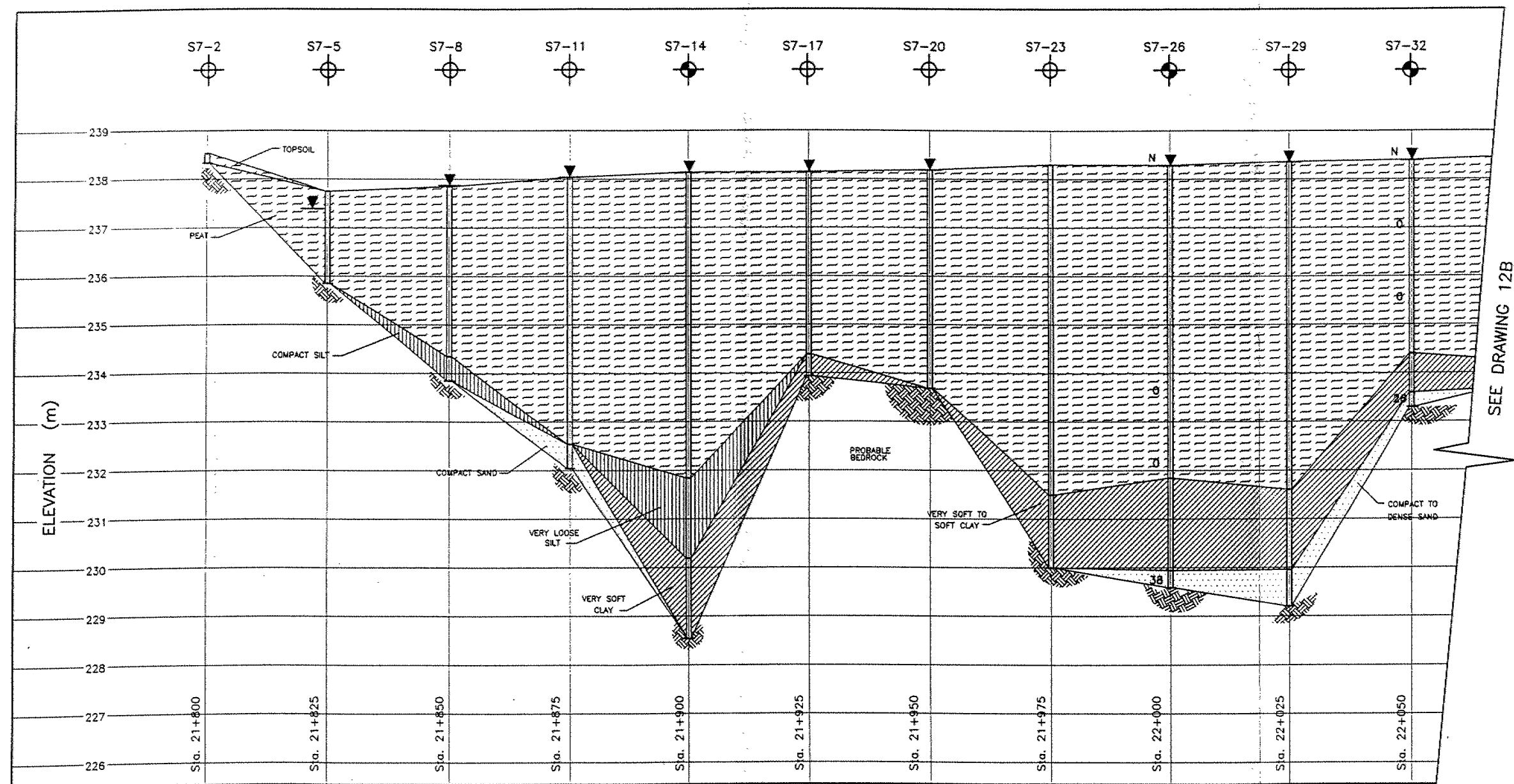
KING'S HIGHWAY 69

DISTRICT 52 HUNTSVILLE	REGION NORTHERN
GEOG. TWP. CONGER	DISTRICT MUNICIPALITY PARRY SOUND

SWAMP 7
BOREHOLE AND PROBEHOLE LOCATION PLAN

Peto MacCallum Ltd.
CONSULTING ENGINEERS
45 BURNFORD ROAD, HAMILTON, ONTARIO L8E 3C8

DRAWN JS	DATE MAY 1998	SCALE 1 : 2000	JOB NO. 97TF0888	DRAWING NO. 12
CHECKED EW				
APPROVED DWK				



SECTION A-A

LEGEND

	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		SILT
	CLAY		BEDROCK (INFERRED)
	WATER		ASPHALT
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		

NOTES

1. REFER TO DRAWING NO. 12 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

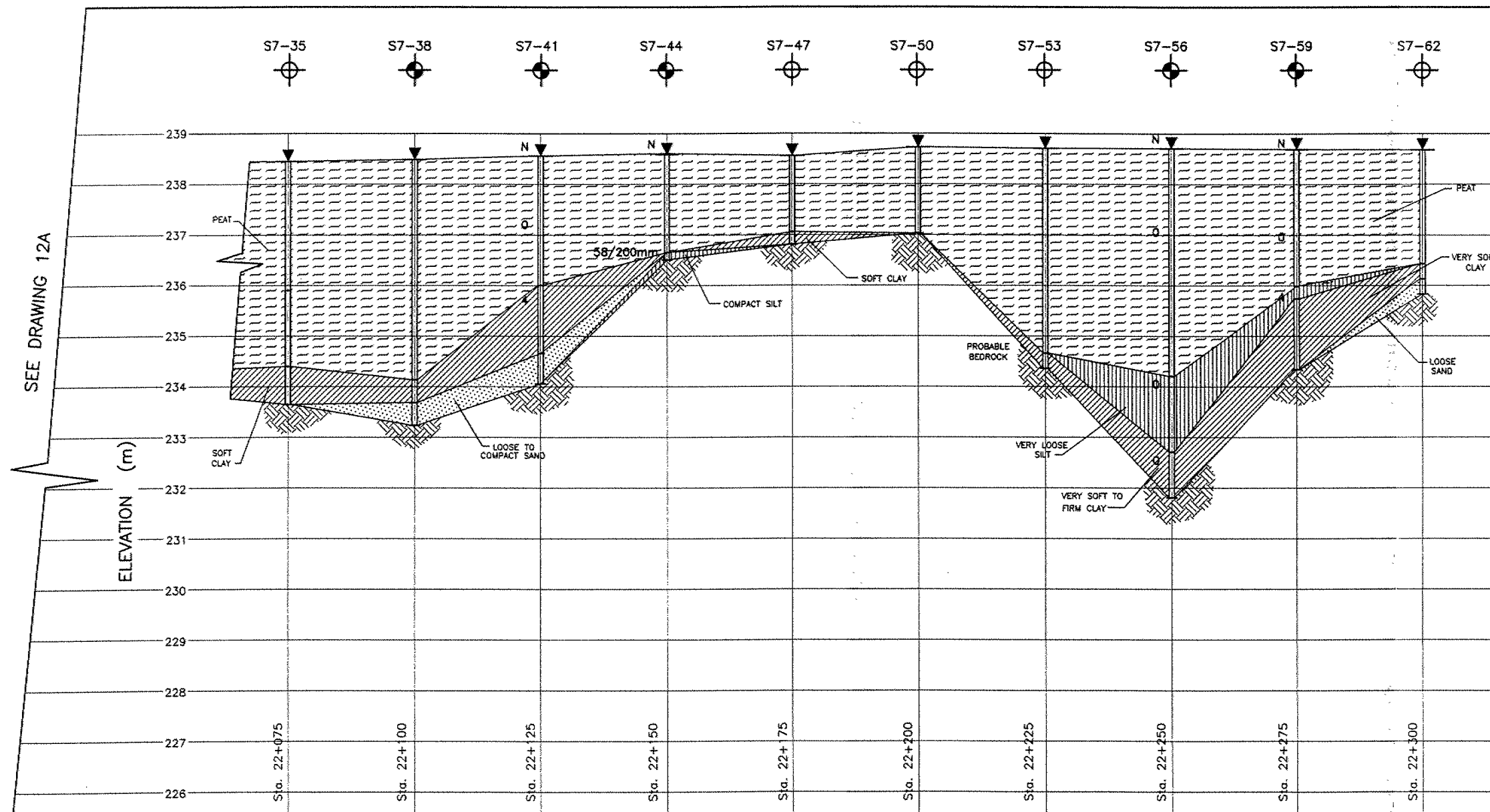
G.W.P. 290-97-00, HIGHWAY 69
SOUTHBOUND LANE/TWP. OF CONGER
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 7 - SOIL PROFILES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	VERTICAL 1:100 HORIZONTAL 1:1000	97TF088B	12A
APPROVED	DWK				



SECTION A-A (CONTINUES)

LEGEND

	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		SILT
	CLAY		WATER
	BEDROCK (INFERRED)		ASPHALT
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		

NOTES

1. REFER TO DRAWING NO. 12 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

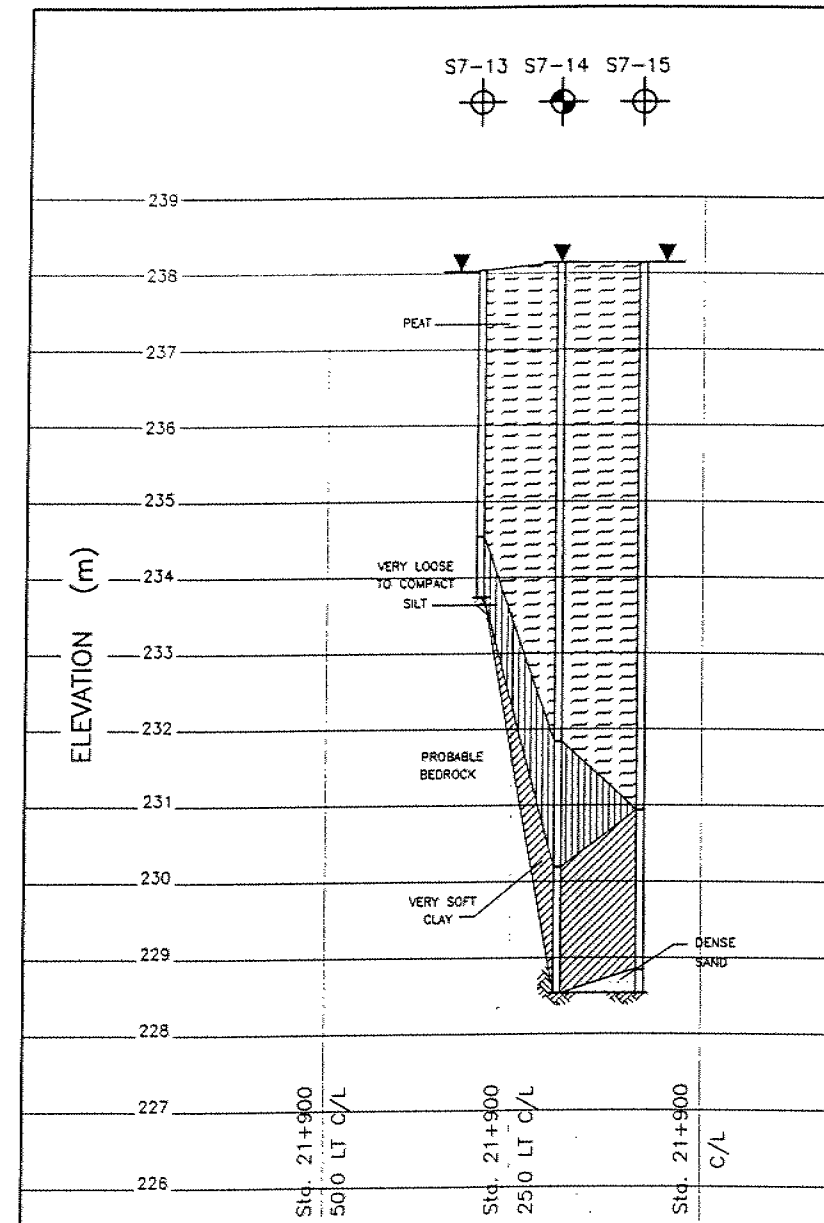
G.W.P. 290-97-00, HIGHWAY 69
SOUTHBOUND LANE/TWP. OF CONGER
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 7 - SOIL PROFILES

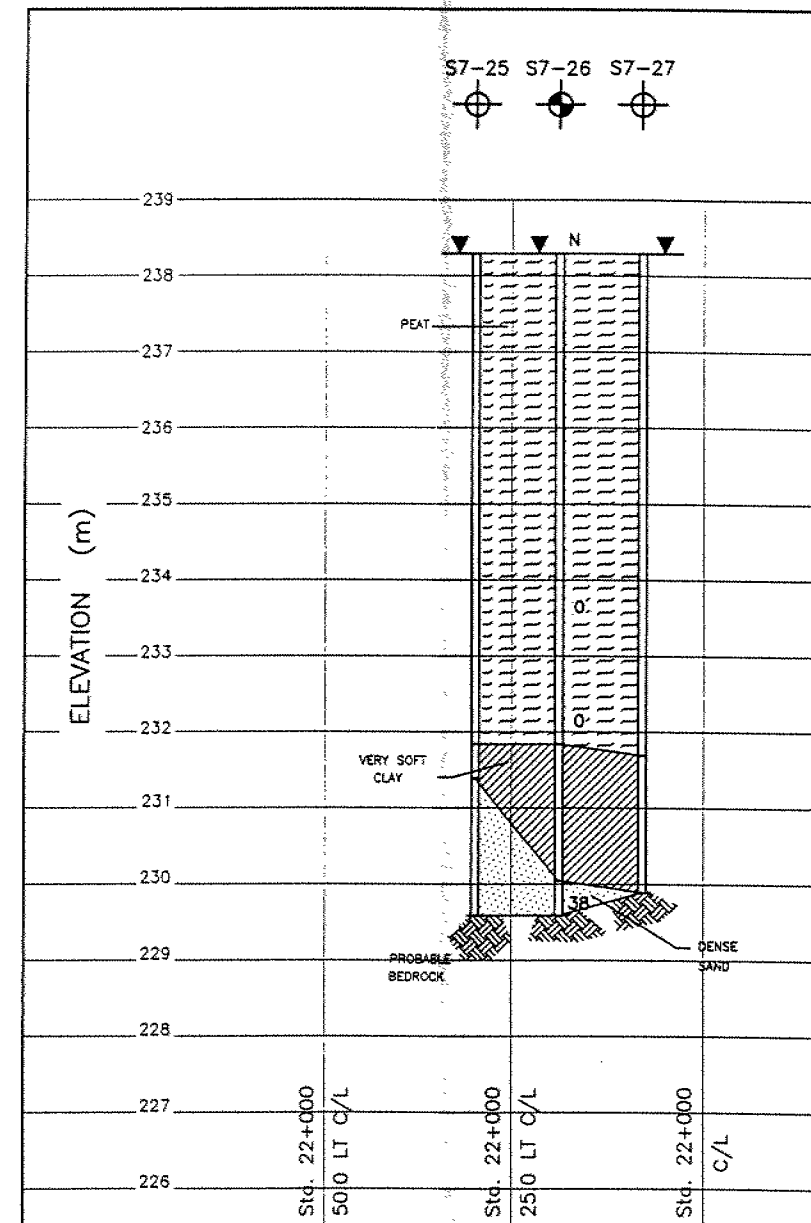
Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

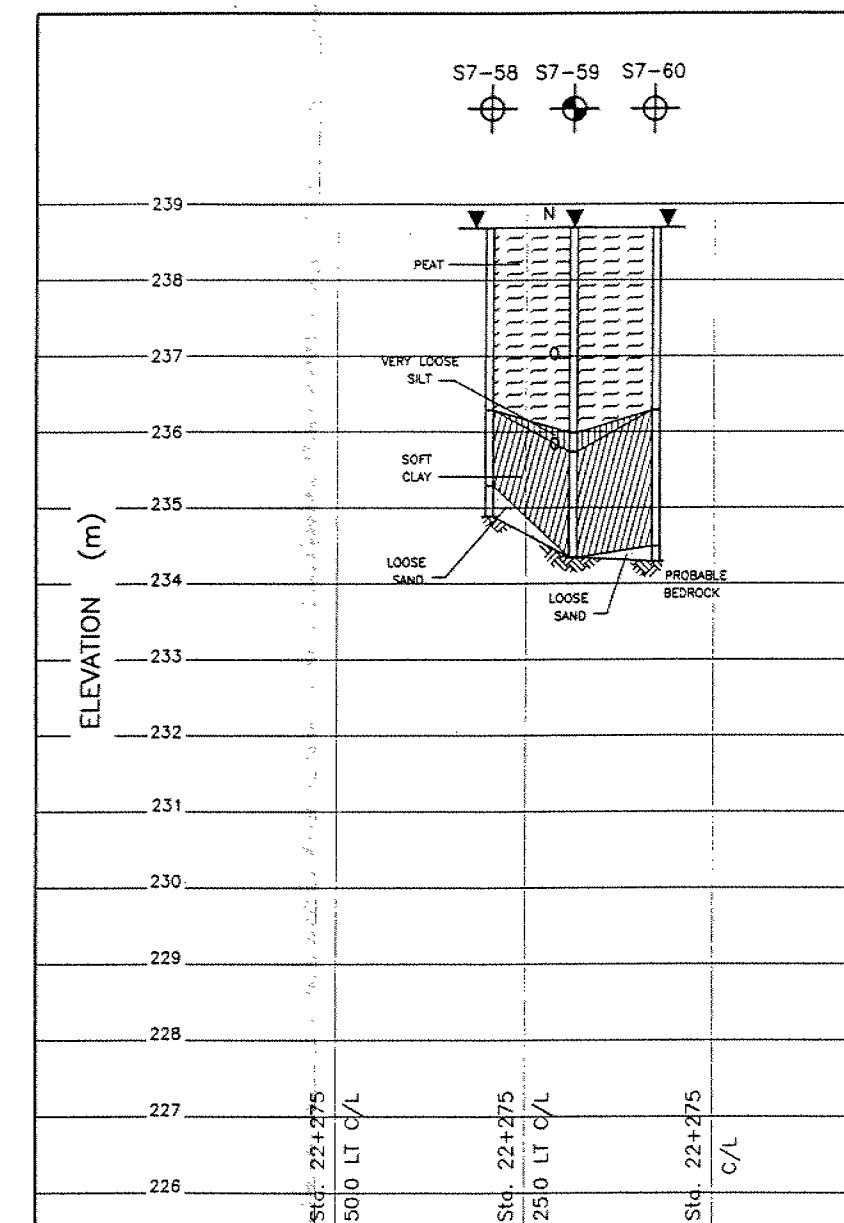
DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	VERTICAL 1:100 HORIZONTAL 1:1000	97TF088B	12B
APPROVED	DWK				



SECTION B-B



SECTION C-C



SECTION D-D

LEGEND

	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		SILT
	CLAY		BEDROCK (INFERRED)
	WATER		ASPHALT
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		

NOTES

1. REFER TO DRAWING NO. 12 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

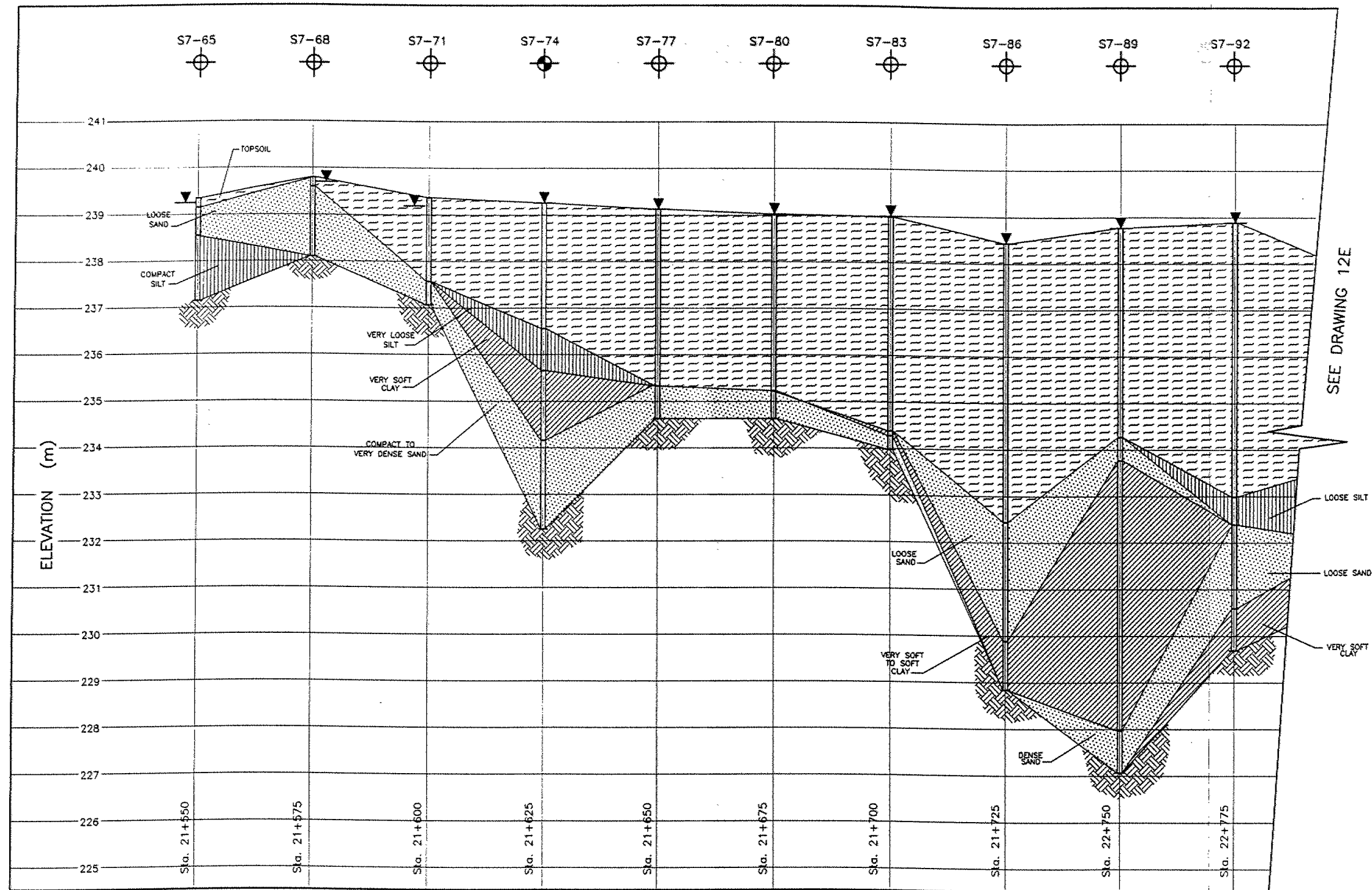
G.W.P. 290-97-00, HIGHWAY 69
SOUTHBOUND LANE/TWP. OF CONGER
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 7 - SOIL PROFILES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	VERTICAL 1:100 HORIZONTAL 1:1000	97TF088B	12C
APPROVED	DWK				



LEGEND

	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		SILT
	CLAY		BEDROCK (INFERRED)
	WATER		ASPHALT
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		

NOTES

1. REFER TO DRAWING NO. 12 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

SECTION E-E

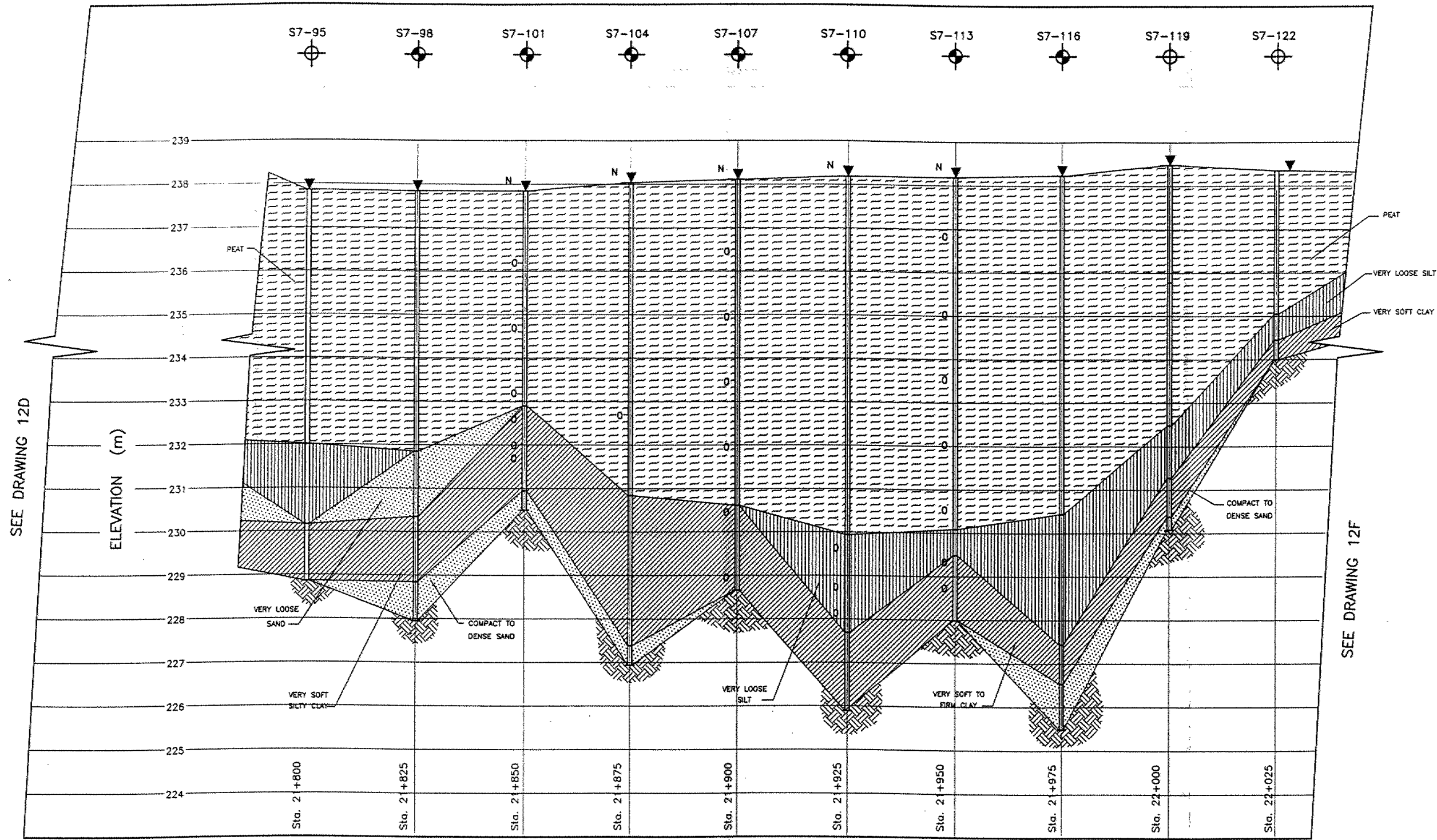
G.W.P. 290-97-00, HIGHWAY 69
NORTHBOUND LANE/TWP. OF CONGER
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 7 - SOIL PROFILES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	VERTICAL 1:100 HORIZONTAL 1:1000	97TF088B	12D
APPROVED	DWK				



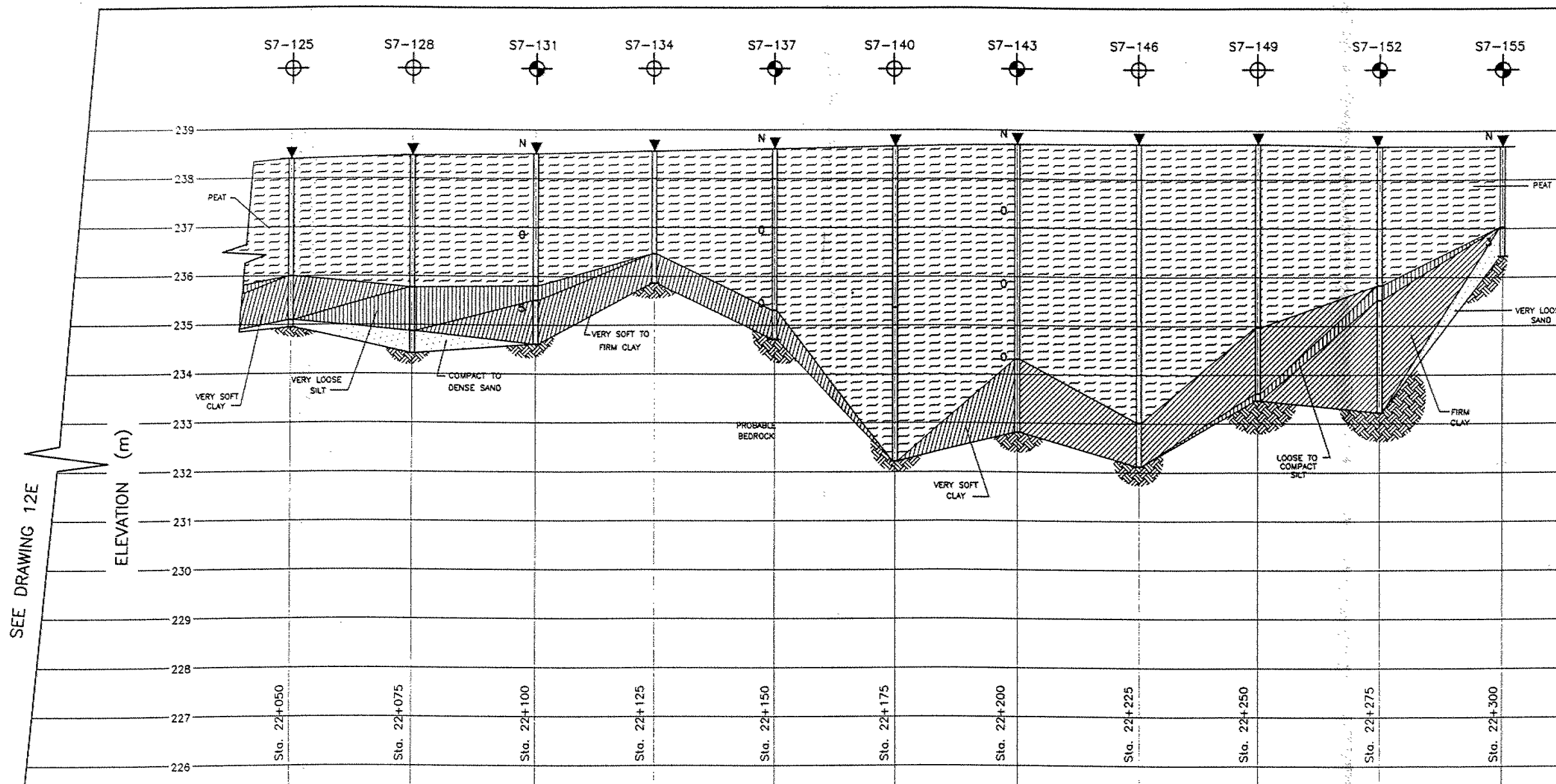
SECTION E-E (CONTINUES)

LEGEND

PROBEHOLE	BOREHOLE		
FILL	SAND	SILT	WATER
TOPSOIL/PEAT	BEDROCK (INFERRED)		ASPHALT
CLAY	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		

- NOTES**
1. REFER TO DRAWING NO. 12 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
 2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
 3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

<p>G.W.P. 290-97-00, HIGHWAY 69 NORTHBOUND LANE/TWP. OF CONGER DISTRICT 52, HUNTSVILLE, ONTARIO</p>				<p>Peto MacCallum Ltd. CONSULTING ENGINEERS 45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3G6</p>		
<p>SWAMP 7 - SOIL PROFILES</p>		<p>DRAWN LT</p> <p>CHECKED EW</p> <p>APPROVED DWK</p>	<p>DATE</p> <p>NOV. 1998</p>	<p>SCALE</p> <p>VERTICAL 1:100 HORIZONTAL 1:1000</p>	<p>JOB NO.</p> <p>97TF088B</p>	<p>DRAWING NO.</p> <p>12E</p>



SECTION E-E (CONTINUES)

LEGEND

	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		SILT
	CLAY		WATER
	BEDROCK (INFERRED)		ASPHALT
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		

NOTES

1. REFER TO DRAWING NO. 12 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

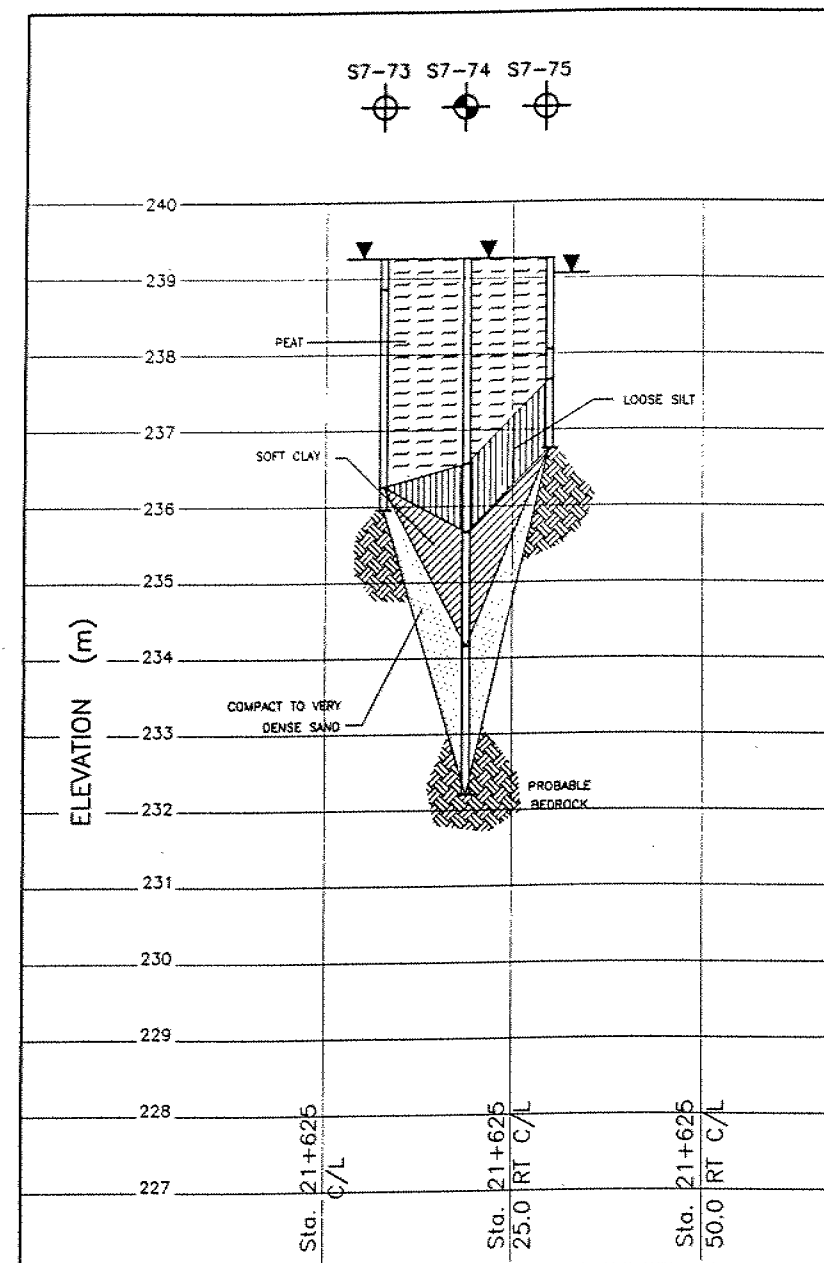
G.W.P. 290-97-00, HIGHWAY 69
NORTHBOUND LANE/TWP. OF CONGER
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 7 - SOIL PROFILES

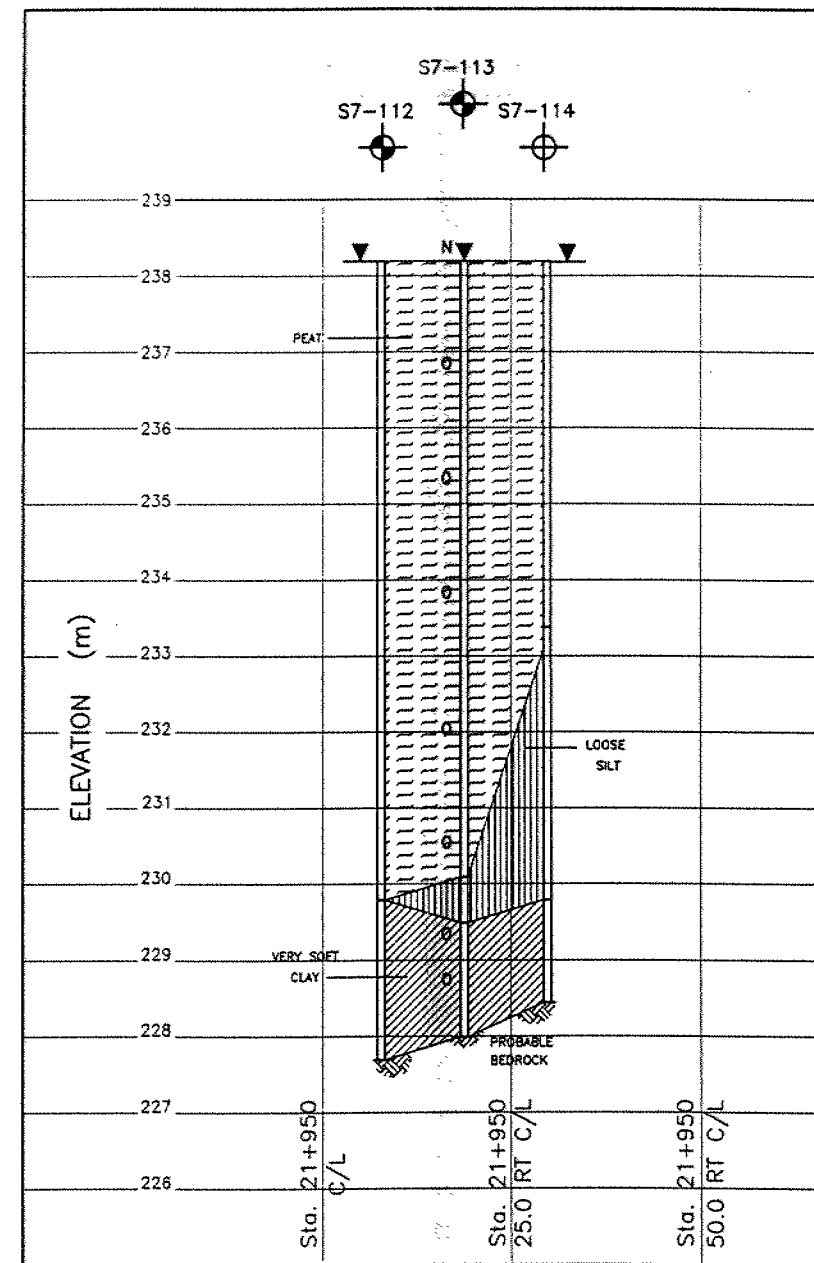
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CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

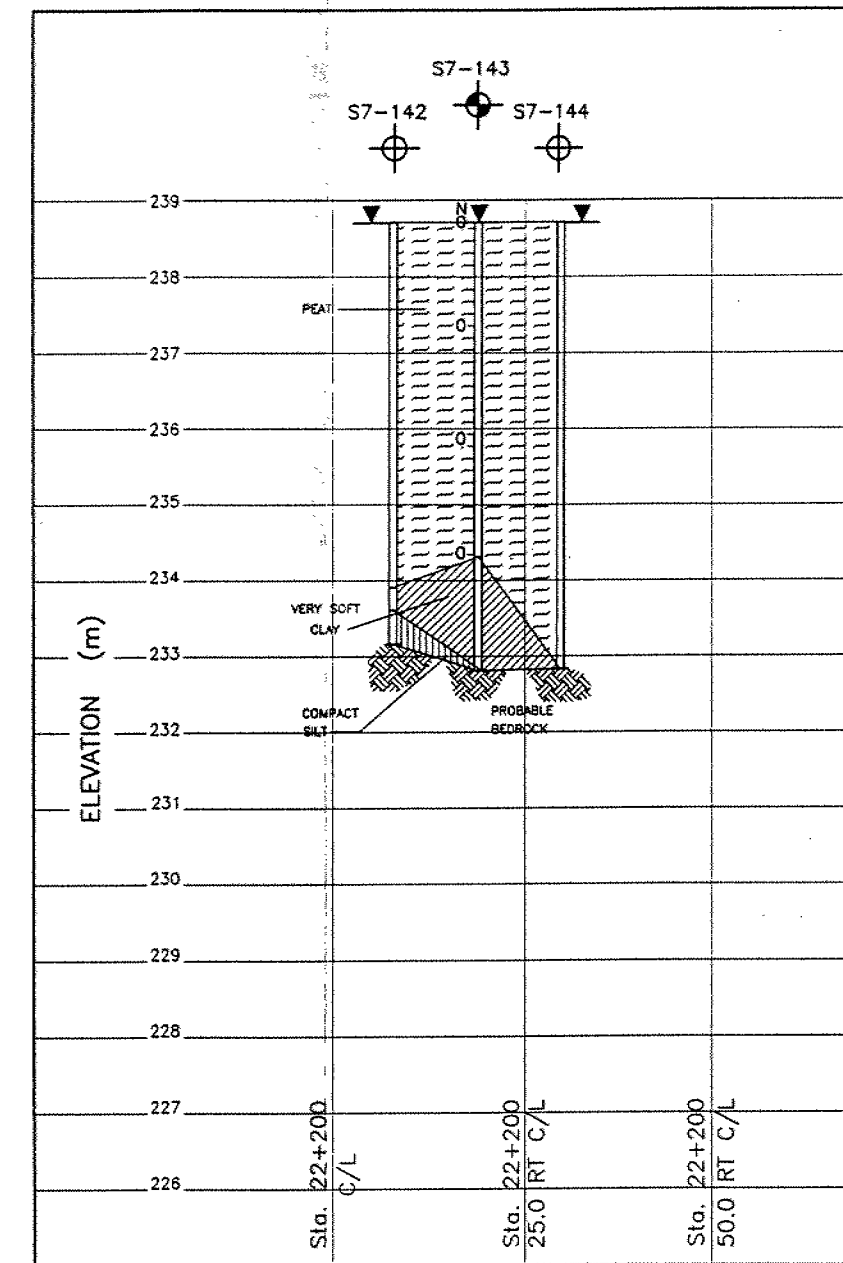
DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	VERTICAL 1:100 HORIZONTAL 1:1000	97TF088B	12F
APPROVED	DWK				



SECTION F-F



SECTION G-G



SECTION H-H

LEGEND

	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		SILT
	CLAY		BEDROCK (INFERRED)
			ASPHALT
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		

NOTES

1. REFER TO DRAWING NO. 12 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

G.W.P. 290-97-00, HIGHWAY 69
NORTHBOUND LANE/TWP. OF FREEMAN
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 7 - SOIL PROFILES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C8

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	VERTICAL 1:100 HORIZONTAL 1:1000	97TF088B	12G
APPROVED	DWK				

CONSULTING ENGINEERS

Datum Centre Line Median

S7A-1	11+080 0	8.0 RT C/L NFP BR	El. 235.61	S7A-8	11+125 0-4.25 4.25-9.40 9.4-10.60 10.60	18.8 RT C/L Blk Fib Peat V Soft Gry Siy Cl W Sa Seams L Gry Sa Tr Gr Wet NFP BR	El. 235.65
S7A-2	11+080 0-150 150	18.8 RT C/L Blk Si Tps NFP BR	El. 235.61			Fr Wat @ 300	
S7A-4	11+100 0-450 450	8.0 RT C/L Blk Si Tps NFP BR	El. 236.82	S7A-9	11+125 0-4.80 4.80-9.20 9.20-10.40 10.40	31.3 RT C/L Blk Fib Peat V Soft Gry Siy Cl L Gry Sa Tr Gr Wet NFP BR	El. 235.76
						Fr Wat @ 300	
S7A-5	11+100 0-3.90 3.90-6.45 6.45-7.65 7.65-9.60 9.60-10.30 10.30	18.8 RT C/L Blk Amor Peat V Soft Gry Siy Cl V L Gry Sa Tr Si Wet V Soft To Soft Gry Siy Cl Wet L Gry Sa Wet NFP BR	El. 235.65				
		Fr Wat @ 300		S7A-10	11+150 0-4.00 4.00-4.30 4.30-4.50 4.50	6.3 RT C/L Blk Amor Peat V Soft Gry Siy Cl L Gry Si And Sa Wet NFP BR	El. 235.76
						Fr Wat @ 200	
S7A-7	11+125 0-2.50 2.50-3.30 3.30	6.3 RT C/L Blk Amor Peat L To Comp Gry Si And Sa Wet w @ 3.00 = 13% NFP BR	El. 235.65	S7A-11	11+150 0-4.00 4.00-7.20 7.20-8.60 8.60	18.8 RT C/L Blk Fib Peat Soft Gry Siy Cl OCC Sa Seams L Gry Sa Tr Gr Wet NFP BR	El. 235.64
		Fr Wat @ 0				Fr Wat @ 300	

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 7A

Station 11+080 - 11+240

Northbound Lane/Twp. of Foley

Datum Centre Line Median

S7A-13 11+150 6.3 RT C/L El. 235.63
0-3.05 Blk Amor Peat
3.05 NFP BR
Fr Wat @ 0

S7A-18 11+200 30.8 RT C/L El. 236.67
0-200 Blk Say Si Tps
200-1.00 Br Sa W Gr Moist
1.00 NFP BR

S7A-14 11+175 18.8 RT C/L El. 235.61
0-3.00 Blk Amor Peat
3.00-4.25 Soft Gry Cly Si W Sa Seams
4.25 NFP BR
Fr Wat @ 300

S7A-19 11+225 7.3 RT C/L El. 235.73
0-1.20 Blk Amor Peat
1.20-2.50 L Gry Sa W Si Moist
2.50 NFP BR
Fr Wat @ 300

S7A-15 11+175 31.3 RT C/L El. 235.51
0-1.80 Blk Amor Peat
1.80-2.40 Soft Siy Cl Si Tr Sa
2.40 NFP BR

S7A-20 11+225 18.8 RT C/L El. 236.78
0-200 Blk Si Tps
200-1.40 L Br Sa W Gr Moist
1.40 NFP BR

S7A-16 11+200 6.8 RT C/L El. 235.67
0-3.00 Blk Amor Peat
3.00-4.00 L Gry Sa W Si Tr Gr Wet
4.00 NFP BR
Fr Wat @ 300

S7A-21 11+225 30.3 RT C/L El. 238.84
0-200 Blk Si Tps
200-1.20 L Br Sa W Gr Moist
1.20 NFP BR

S7A-17 11+200 18.8 RT C/L El. 235.63
0-1.80 Blk Amor Peat
1.80-2.70 L Gry Sa W Si Wet
2.70 NFP BR
Fr Wat @ 300

LOG OF BOREHOLE NO. S7A-3

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 11+080, 29.5 m Rt., Highway 69, NBL. Twp. of Foley BORING DATE 98.03.12

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES		SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L			GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P			
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST *				WATER CONTENT %			
							BLOWS/0.3M				W_P W W_L			
0	GROUND ELEVATION 235.75						20 40 60 80				10 20 30		Upon completion of augering, borehole caved at 1.5 m with water level at 0.30 m.	
	Peat Amorphous, Black		235											
1.5			234	1	SS	0						W=549		
3.0			233											
3.80			232	2	SS	0						W=41	Sample 3, CL $W_L = 28$ $W_P = 21$ $I_P = 7$	
4.35	Silty Clay With Sand Seams Grey Very Soft		231	3	SS	3								
4.5				4	SS	5						W=45		
5.70	Sand With Clay Seams Grey, Wet Very Loose		230	5	SS	1						W=56		
6.0				6	SS	1								
6.30				7	AS									
	Silty Clay With Sand Seams Grey Very Soft		229											
7.5	End Of Borehole Auger Refusal Probable Bedrock													
9.0														
10.5														
12.0														
13.5														
15.0														
16.5														

NOTES:

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S7A-6

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 11+100, 31.3 m Rt., Highway 69, NBL, Twp. of Foley BORING DATE 98.02.19

ENGINEER E. W.

BORING METHOD Portable Hand Sampling Equipment / Vane Test

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P					
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				WATER CONTENT %					
							BLOWS/0.3M				10 20 30					
0	GROUND ELEVATION 235.71						20	40	60	80	10	20	30	Upon completion of augering, borehole caved at 1.3 m with water level at 0.20 m.		
	Peat Fibrous, Black		235													
1.5			234													
			233													
3.0			232													
4.00			231	1	TW	P.M.										
4.5	Silty Clay Grey, Soft		230													
6.0			229													
7.5			228													
9.0			227													
9.20			226													
9.40	Sand Trace Gravel Grey, Wet Loose															
10.5																
	End Of Borehole Auger Refusal Probable Bedrock															
12.0																
13.5																
15.0																
16.5																

NOTES:

- Soil sampling was carried out using a 50 mm dia. split spoon equipment and a 20.5 Kg hammer dropping 750 mm (SPT N - values adjusted to a 63.5 Kg hammer dropping 750 mm, using a linear relationship).
- Vane test was carried out at a distance of 1.5 m from the borehole.
- +4 Number refers to sensitivity.

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S7A-12

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 11+150, 31.3 m Rt., Highway 69, NBL, Twp. of Foley BORING DATE 98.03.25

ENGINEER E. W.

BORING METHOD Portable Hand Sampling Equipment / Vane Test

TECHNICIAN D. R.

SOIL PROFILE				SAMPLES			SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_p				
							DYNAMIC CONE PENETRATION x				WATER CONTENT W				
							STANDARD PENETRATION TEST •				WATER CONTENT %				
							BLOWS/0.3M				10 20 30				
0	GROUND ELEVATION 235.73													Upon completion of augering, borehole caved at 2.0 m with water level at 0.30 m.	
	Peat		235												
	Fibrous, Black														
1.5			234	1	SS	0								W=308	
			233												
3.0															
3.30															
	Silty Clay		232	2	SS	2								W=49	
	With Sand Seams			3	SS	0								WL=41	
	Grey			4	SS	1								W=52	
	Very Soft		231												
4.5				5	TW	P.M.									
				6	SS	2									
			230												
5.85				7	SS	6									
6.0				8	SS	15									
6.60	Sand		229												
	Trace Gravel, Trace Silt														
	Grey, Wet														
	Compact														
7.5															
	End Of Borehole														
	Hammer Bouncing														
	Probable Bedrock														
9.0															
10.5															
12.0															
13.5															
15.0															
16.5															

NOTES:

- Soil sampling was carried out using a 50 mm dia. split spoon equipment and a 20.5 Kg N hammer dropping 750 mm (SPT N values adjusted to a 63.5 Kg hammer dropping 750 mm, using a linear relationship).
- Vane test was carried out at a distance of 1.5 m from the borehole.

CHECKED BY: E.W.

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 7B

Station 11+690 - 11+740

Southbound Lane/Twp. of Foley

Datum Centre Line Median

S7B-2	11+740	34.0 LT C/L	El. 235.35
	0-1.40	Water	
	1.40-2.20	Blk Fib Peat	
	2.20-3.60	L Gry Sa Tr Si Wet	
	3.60-6.80	V Soft Gry Siy Cl	
	6.80	NFP BR	

S7B-4	11+740	2.8 LT C/L	El. 235.52
	0-200	Water	
	200-310	Blk Si Tps	
	310	NFP BR	

LOG OF BOREHOLE NO. S7B-1

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 11+715, 18.8 m Lt., Highway 69, SBL, Twp. of Foley

BORING DATE 98.02.18

ENGINEER E. W.

BORING METHOD Portable Hand Sampling Equipment

TECHNICIAN K. H.

[illegible]

NOTES:

1. Soil sampling was carried out using a 50 mm dia. split spoon equipment and a 20.5 Kg hammer dropping 750 mm (SPT N values adjusted to a 63.5 Kg hammer dropping 750 mm, using a linear relationship).

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S7B-3

PROJECT GWP 290-97-00

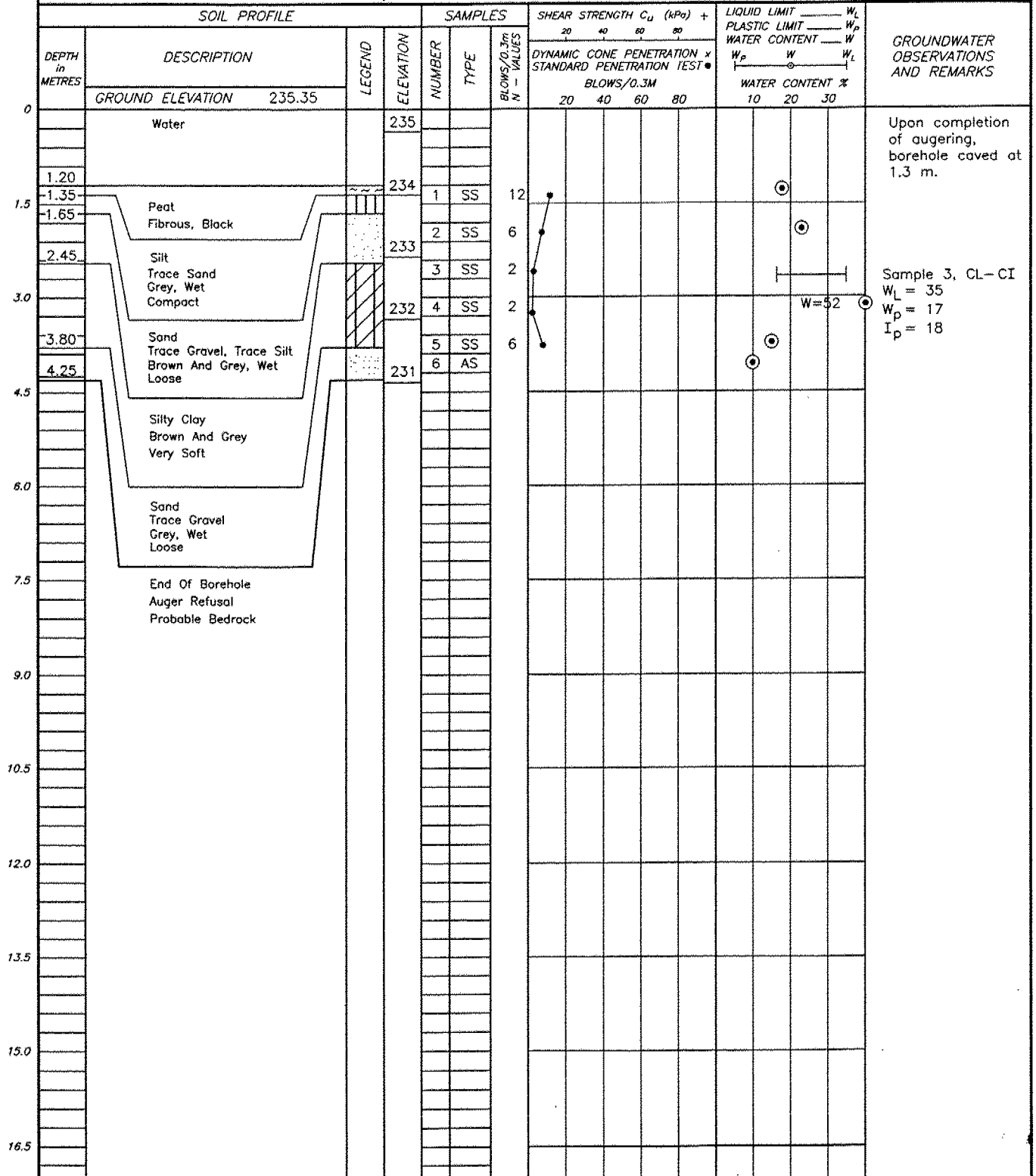
OUR PROJECT 97TF088B

LOCATION Station 11+740, 18.8 m Lt., Highway 69, SBL, Twp. of Foley BORING DATE 98.02.17

ENGINEER E. W.

BORING METHOD Portable Hand Sampling Equipment

TECHNICIAN K. H.



NOTES:

- Soil sampling was carried out using a 50 mm dia. split spoon equipment and a 20.5 Kg hammer dropping 750 mm (SPT N values adjusted to a 63.5 Kg hammer dropping 750 mm, using a linear relationship).

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S7B-5

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 11+690, 18.8m Rt., Highway 69, NBL, Twp. of Foley

BORING DATE 98.02.18

ENGINEER E. W.

BORING METHOD Portable Hand Sampling Equipment

TECHNICIAN R. L.

SOIL PROFILE				SAMPLES		SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_p				
							DYNAMIC CONE PENETRATION x				WATER CONTENT W				
							STANDARD PENETRATION TEST •				W_p W W_L				
							BLOWS/0.3M				WATER CONTENT %				
							20 40 60 80				10 20 30				
0	GROUND ELEVATION 235.52														
	Water		235											Upon completion of augering, borehole caved at 1.6 m.	
			234												
1.5	Peat Fibrous, Black			1	SS	5							W=429		
2.20				2	SS	4									
	Sand With Silt Grey, Wet Very Loose		233												
				3	SS	2									
3.0			232												
				4	SS	2							W=43		
3.70															
4.00	Silty Clay Brown And Grey Very Soft		231												
				5	SS	2									
4.5	Clayey Silt Brown And Grey Very Soft		230												
				6	SS	0									
6.00				7	SS	10									
	Silty Clay Grey Firm		229												
				8	SS	8									
7.00															
	End Of Borehole Auger Refusal Probable Bedrock		228												
7.5															
9.0															
10.5															
12.0															
13.5															
15.0															
16.5															

NOTES:

- Soil Sampling was carried out using a 50 mm dia. split spoon equipment and a 20.5 Kg hammer dropping 750 mm (SPT N values adjusted to a 63.5 Kg hammer dropping 750 mm, using a linear relationship).

CHECKED BY:

LOG OF BOREHOLE NO. S7B-6

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 11+715, 18.8 m Rt., Highway 69, NBL, Twp. of Foley

BORING DATE 98.02.18

ENGINEER

E. W.

BORING METHOD Portable Hand Sampling Equipment

TECHNICIAN

R. L.

SOIL PROFILE				SAMPLES		SHEAR STRENGTH C_u (kPa) +		LIQUID LIMIT W_L		GROUNDWATER OBSERVATIONS AND REMARKS	
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80		PLASTIC LIMIT W_p		
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •		WATER CONTENT W		
							BLOWS/0.3M		W_p W W_L		
0	GROUND ELEVATION 235.39						20 40 60 80		10 20 30		
	Water		235							Upon completion of augering, borehole caved at 0.80 m.	
0.80				1	SS	2					
0.85	Peat Fibrous, Dark Brown		234	2	SS	4					
1.5	Sand With Silt Grey, Wet Very Loose		233	3	SS	2					
2.35				4	SS	2					
2.60	Silty Clay Brown And Grey Very Soft		232	5	SS	6					
3.0											
3.55	Sand Trace Silt Grey, Wet Loose		231								
4.5	End Of Borehole Auger Refusal Probable Bedrock										
6.0											
7.5											
9.0											
10.5											
12.0											
13.5											
15.0											
16.5											

NOTES:

- Soil Sampling was carried out using a 50 mm dia. split spoon equipment and a 20.5 Kg hammer dropping 750 mm (SPT N values adjusted to a 63.5 Kg hammer dropping 750 mm, using a linear relationship).

CHECKED BY: E.W.

METRIC

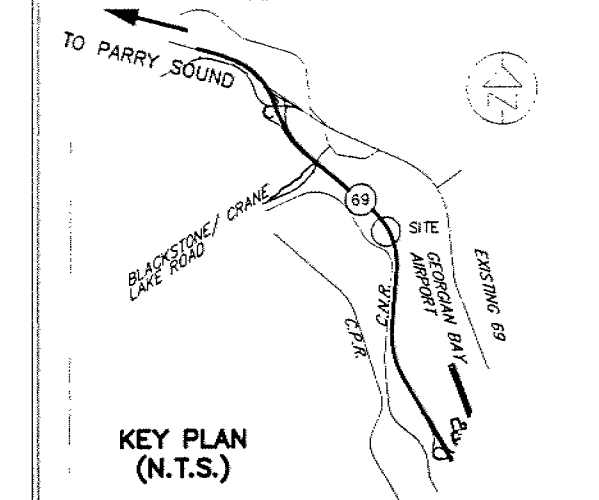
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DRAWING NO. 04510008901
CONT No C
GWP No 290-97-00



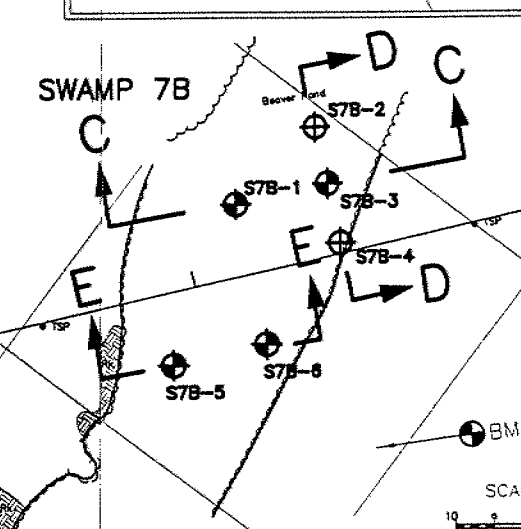
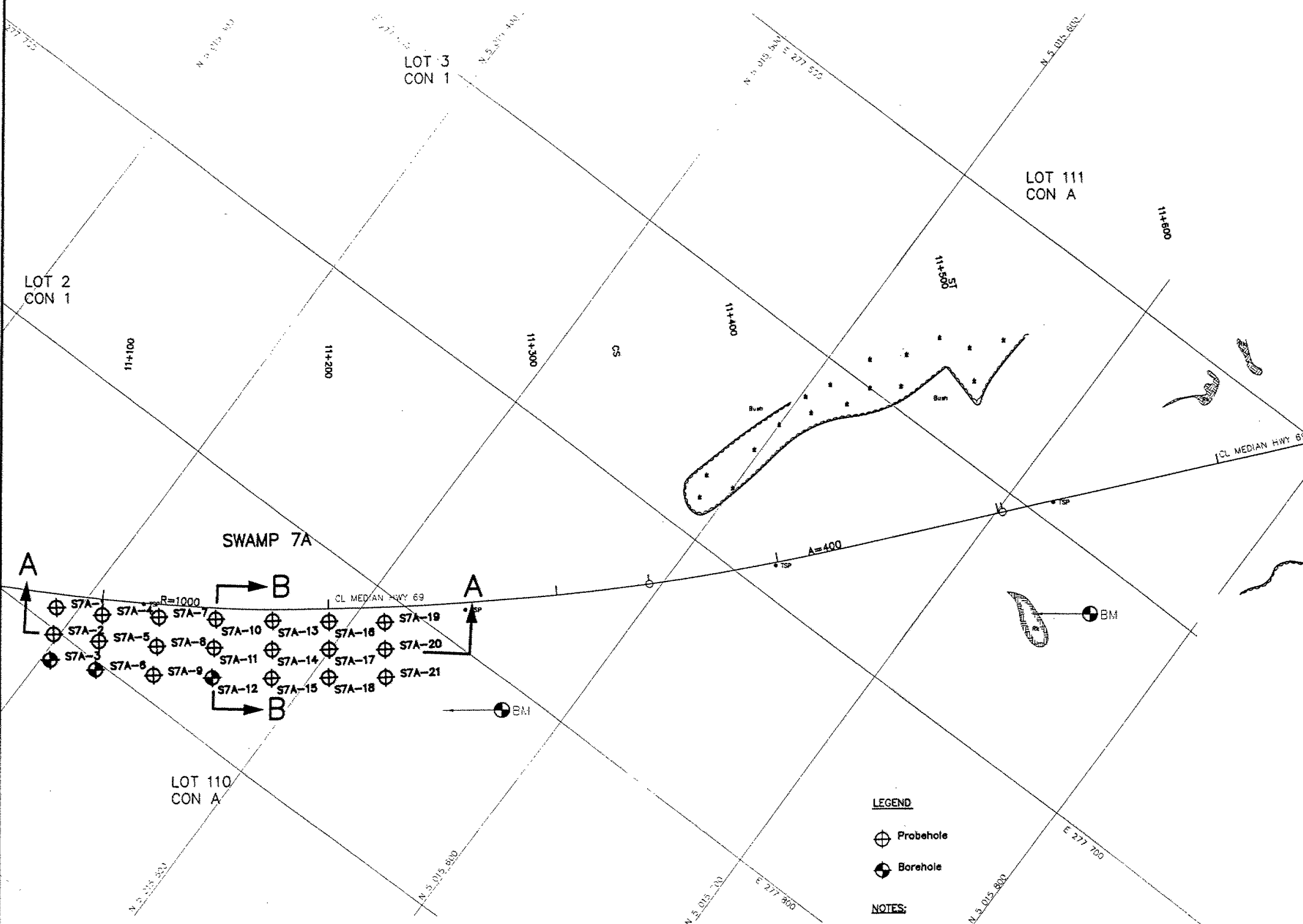
STA 11+000 TO STA 11+700
Survey 1997/12 Revised R

SHEET

DISTRICT MUNICIPALITY OF PARRY SOUND
GEOG TWP FOLEY



KEY PLAN
(N.T.S.)



MINISTRY OF TRANSPORTATION

KING'S HIGHWAY 69

DISTRICT 52 HUNTSVILLE	REGION NORTHERN
GEOG. TWP. FOLEY	DISTRICT MUNICIPALITY PARRY SOUND

SWAMPS 7A & 7B
BOREHOLE AND PROBEHOLE LOCATION PLAN

Peto MacCallum Ltd.
CONSULTING ENGINEERS
45 BLUFF ROAD, HAMILTON, ONTARIO L8E 3G8

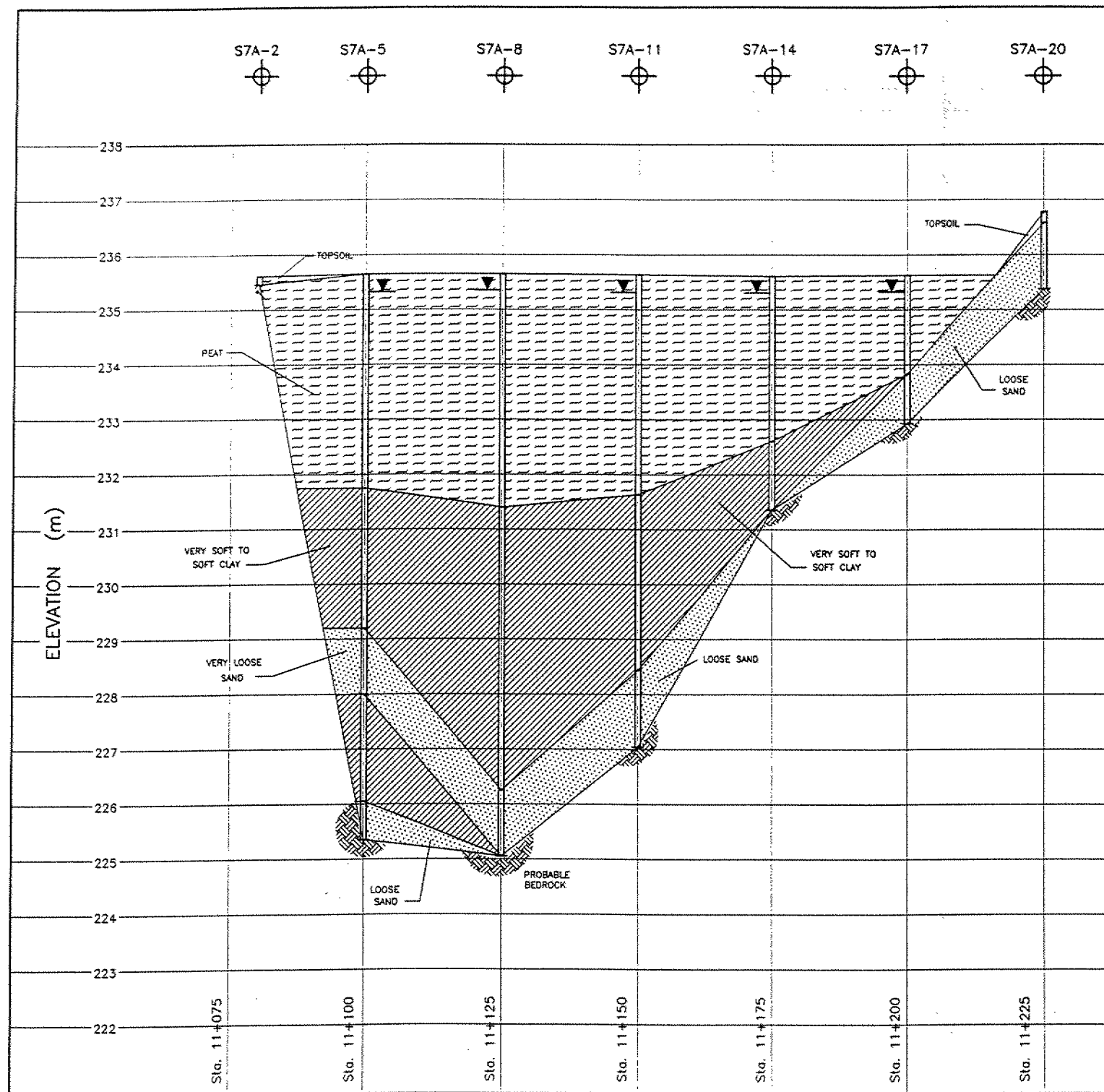
LEGEND

- Probehole
- Borehole

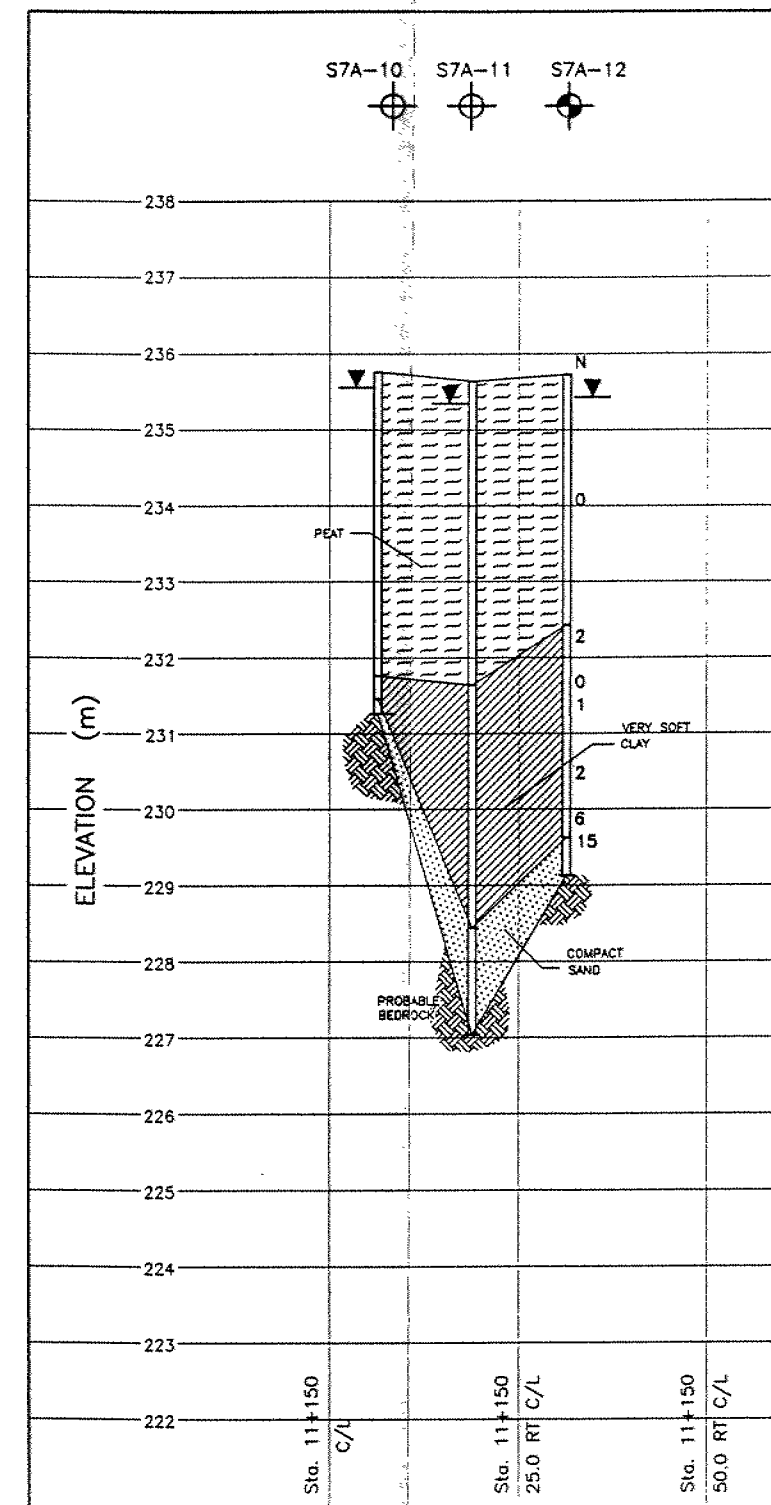
NOTES

1. Refer to Log of Borehole and Probehole Sheets for description of subsurface conditions.
2. Refer to Drawings 13A, 13B and 13C for soil profiles.

DRAWN JS	DATE MAY 1998	SCALE 1 : 2000	JOB NO. 97TF088B	DRAWING NO. 13
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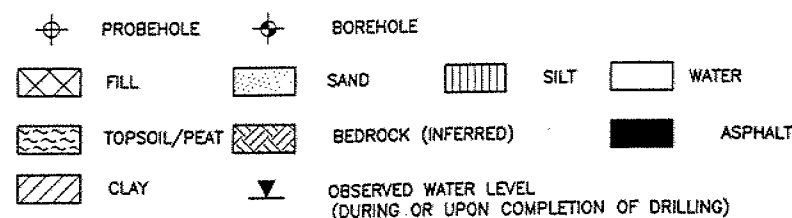


SECTION A-A



SECTION B-B

LEGEND



NOTES

1. REFER TO DRAWING NO. 13 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

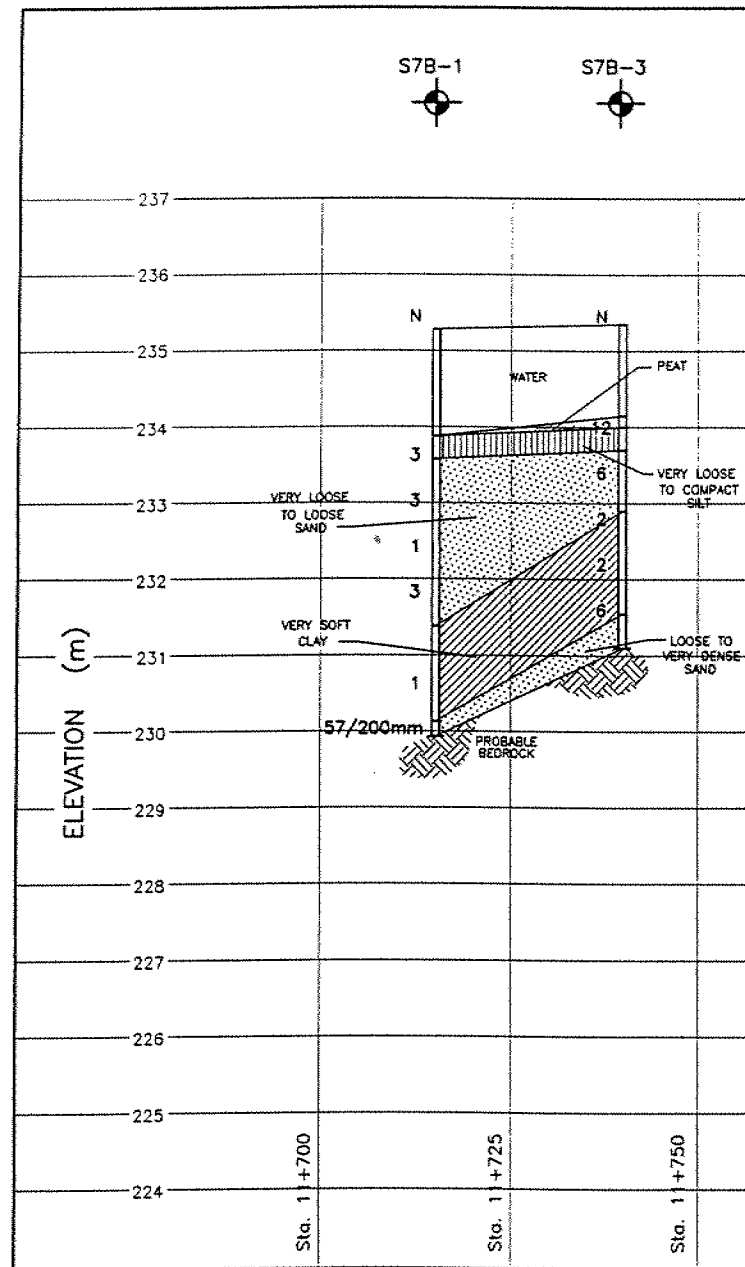
G.W.P. 290-97-00, HIGHWAY 69
NORTHBOUND LANE/TWP. OF FOLEY
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 7A - SOIL PROFILES

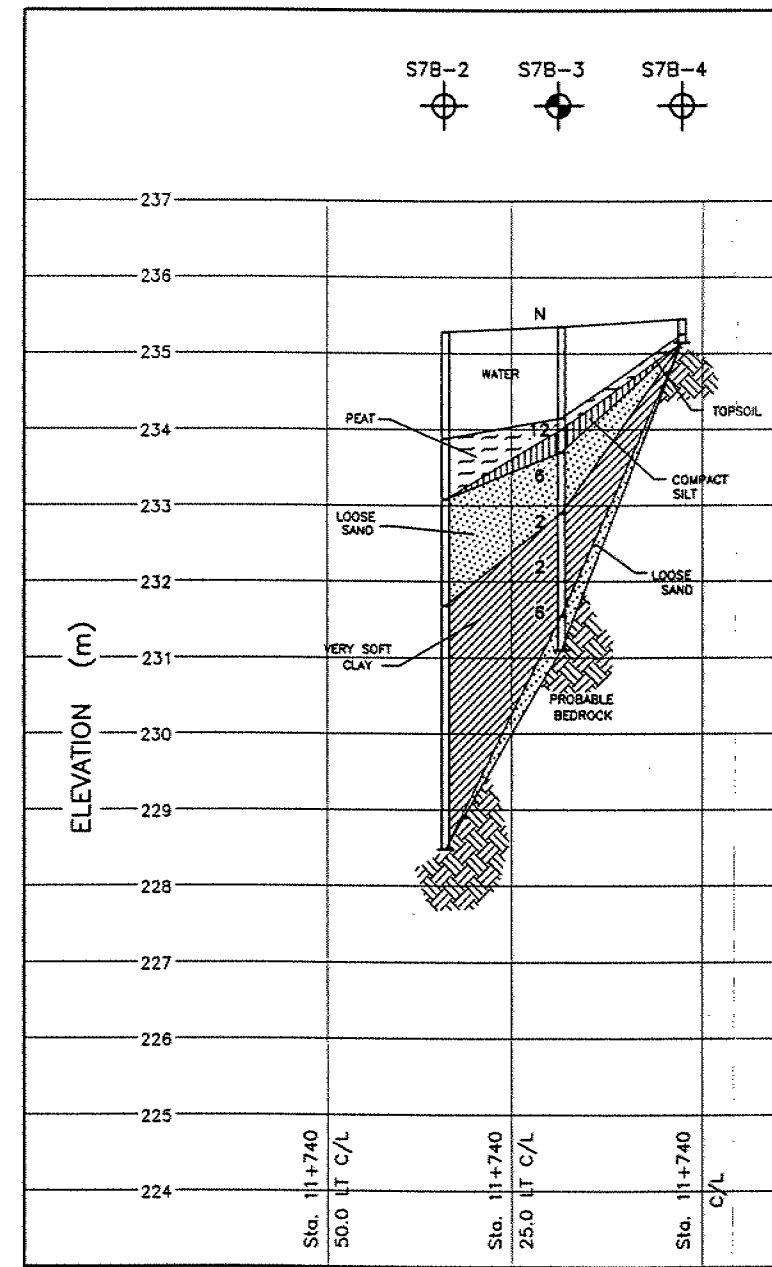
Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	VERTICAL 1:100 HORIZONTAL 1:1000	97TF088B	13A
APPROVED	DWK				



SECTION C-C



SECTION D-D

LEGEND

	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		SILT
	CLAY		WATER
	BEDROCK (INFERRED)		ASPHALT
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		

NOTES

1. REFER TO DRAWING NO. 13 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
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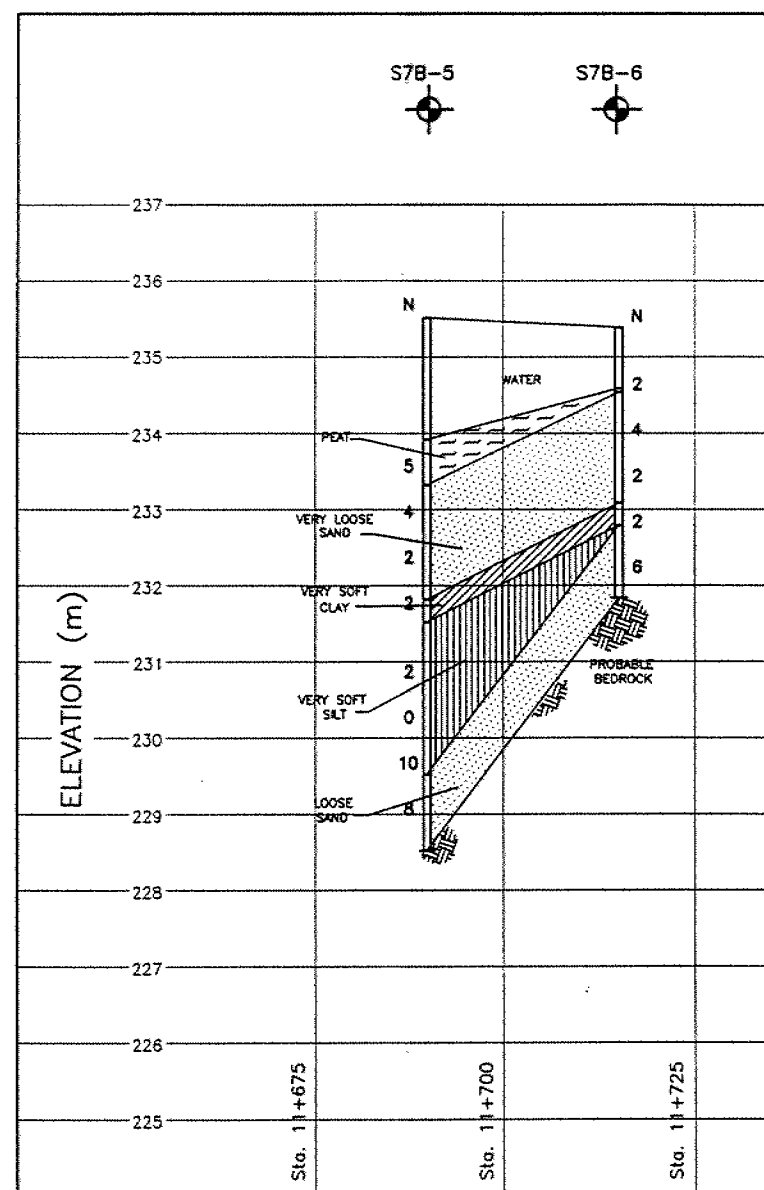
G.W.P. 290-97-00, HIGHWAY 69
SOUTHBOUND LANE/TWP. OF FOLEY
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 7B - SOIL PROFILES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	VERTICAL 1:100 HORIZONTAL 1:1000	97TF088B	13B
APPROVED	DWK				



SECTION E-E

LEGEND

	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		SILT
	CLAY		BEDROCK (INFERRED)
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		WATER
			ASPHALT

NOTES

1. REFER TO DRAWING NO. 13 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

G.W.P. 290-97-00, HIGHWAY 69
NORTHBOUND LANE/TWP. OF FOLEY
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 7B - SOIL PROFILES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	VERTICAL 1:100 HORIZONTAL 1:1000	97TF088B	13C
APPROVED	DWK				

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 8

Station 11+990 - 12+030

Southbound Lane/Twp. of Foley

Datum Centre Line Median

S8-1 12+005 32.3 LT C/L El. 234.77
 0-300 Blk Si Tps
 300-2.50 L Gry Sa W Si Wet
 2.50-4.30 Soft Gry Siy Cl W Sa Seams
 4.30 NFP BR
 Fr Wat @ 300

S8-5 12+030 18.8 LT C/L El. 234.56
 0-1.00 Blk Amor Peat
 1.00-1.50 L Gry Sa W Si Wet
 1.50-3.00 Soft To Firm Gry Siy Cl W Sa
 Seams
 3.00 NFP BR
 Fr Wat @ 0

S8-2 12+005 18.8 LT C/L El. 234.92
 0-100 Blk Amor Peat
 100-2.00 Gry Sa W Si Wet
 2.00-4.80 Soft Gry Siy Cl W Sa Seams
 4.80 NFP BR
 Fr Wat @ 0

S8-6 12+030 5.8 LT C/L El. 234.31
 0-300 Blk Si Tps
 300-1.80 L Gry Sa W Si Wet
 1.80 NFP BR
 Fr Wat @ 300

S8-3 12+005 5.3 LT C/L El. 234.67
 0-1.50 Blk Amor Peat
 1.50-5.60 Soft To Firm Gry Siy Cl W Sa
 Seams
 5.60 NFP BR
 Fr Wat @ 0

S8-4 12+030 31.8 LT C/L El. 234.36
 0-1.00 Blk Amor Peat
 1.00-1.50 L Gry Sa W Si Wet
 1.50-4.50 Soft To Firm Gry Siy Cl W Sa
 Seams
 4.50 NFP BR
 Fr Wat @ 0

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 8

Station 11+990 - 12+030

Northbound Lane/Twp. of Foley

Datum Centre Line Median

S8-8	12+005	18.8 RT C/L	El. 234.42
	0-2.00	Blk Fib Peat	
	2.00-6.40	Soft To Firm Gry Siy Cl W Sa	
		Seams	
	6.40	NFP BR	
		Fr Wat @ 0	

S8-9	12+005	30.8 RT C/L	El. 234.87
	0-2.10	Blk Fib Peat	
	2.10-6.00	Soft To Firm Gry Siy Cl W Sa	
		Seams	
	6.00-7.90	L To Comp Gry Sa Tr Si Tr Gr	
		Wet	
	7.90	NFP BR	
		Fr Wat @ 300	

LOG OF BOREHOLE NO. S8-7

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B



LOCATION Station 12+005, 6.8 m Rt., Hwy 69, NBL, Twp. of Foley

BORING DATE 98.03.27

ENGINEER E. W.

BORING METHOD Hand Augers / Vane Test

TECHNICIAN L. G.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - 1 VALUES	20 40 60 80				PLASTIC LIMIT W_P					
							DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST *				WATER CONTENT W					
							BLOWS/0.3M				WATER CONTENT %					
							20 40 60 80				10 20 30					
0	GROUND ELEVATION 234.87													Upon completion of augering, borehole caved at 1.5 m with water level at 0.30 m.		
	Peat Fibrous, Black		234													
1.5			233				+									
	Silty Clay With Sand Seams Grey Soft To Firm		232					+								
3.0			231	1	AS		+						W=41⊙			
			230	2	TW	P.M.										
4.5			229													
5.75																
6.0	End Of Borehole Auger Refusal Probable Bedrock															
7.5																
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

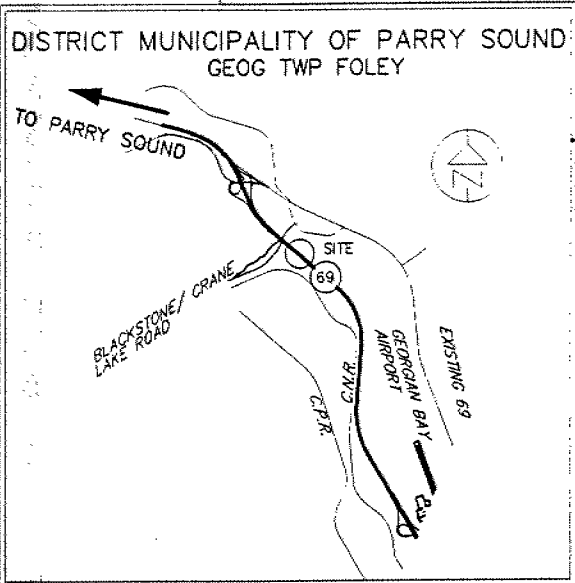
- Vane test was carried out at a distance of 1.5 m from the borehole.

CHECKED BY: E. W.

METRIC

PLATE No	451-89 14-0
DRAWING No	04510088014
CONT No	C
GWP No	290-97-00
STA 11+700 TO STA 12+400	
Survey 1997/12	Revised R

SHEET
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KEY PLAN (N.T.S.)

SCALE
10 0 20

MINISTRY OF TRANSPORTATION

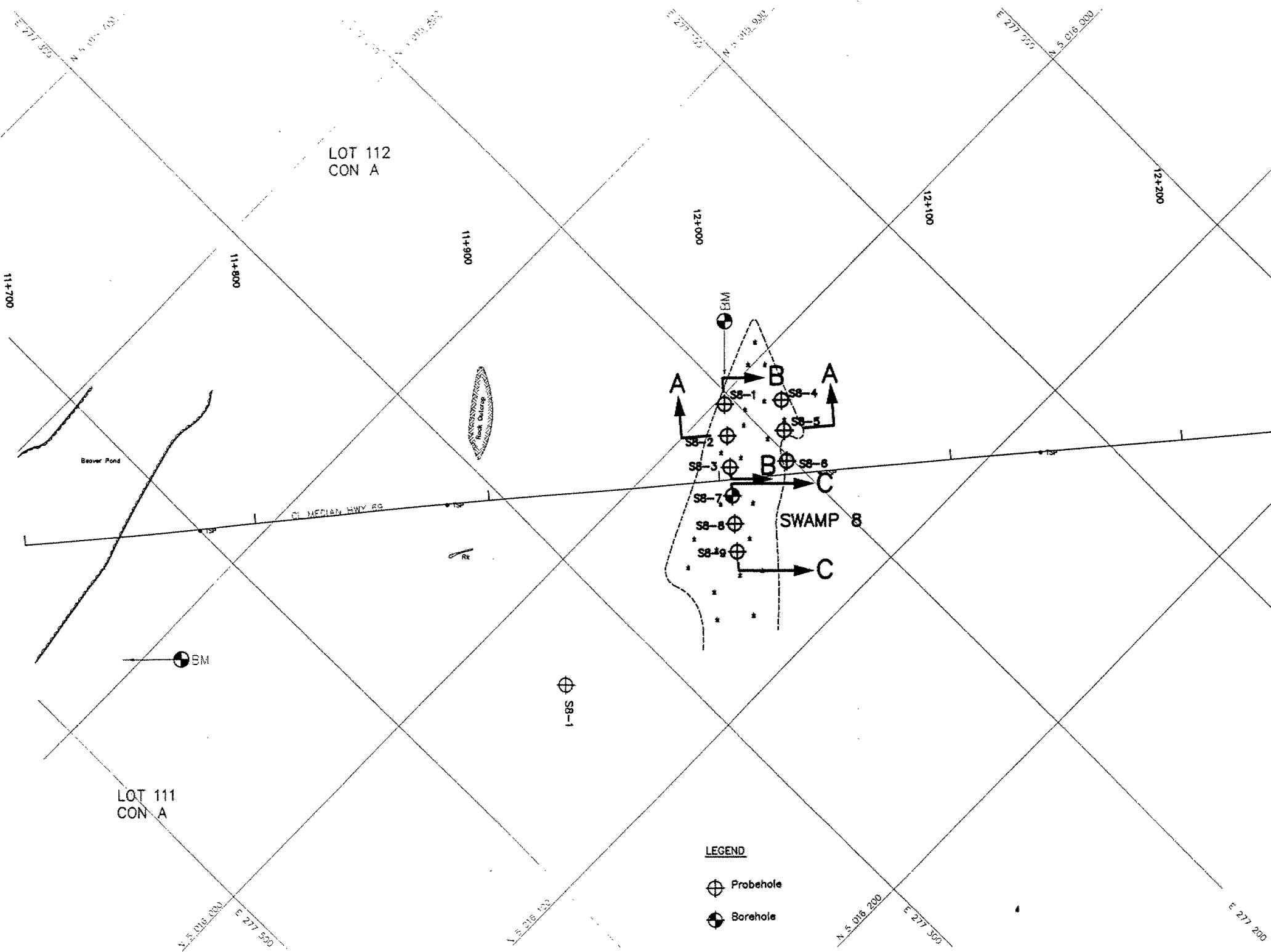
KING'S HIGHWAY 69

DISTRICT 52 HUNTSVILLE	REGION NORTHERN
GEOG. TWP. FOLEY	DISTRICT MUNICIPALITY PARRY SOUND

SWAMP 8
BOREHOLE AND PROBEHOLE LOCATION PLAN

Peto MacCallum Ltd.
CONSULTING ENGINEERS
45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3G8

DRAWN JS	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED EN	MAY 1998	1 : 2000	977F088B	14
APPROVED JNA				

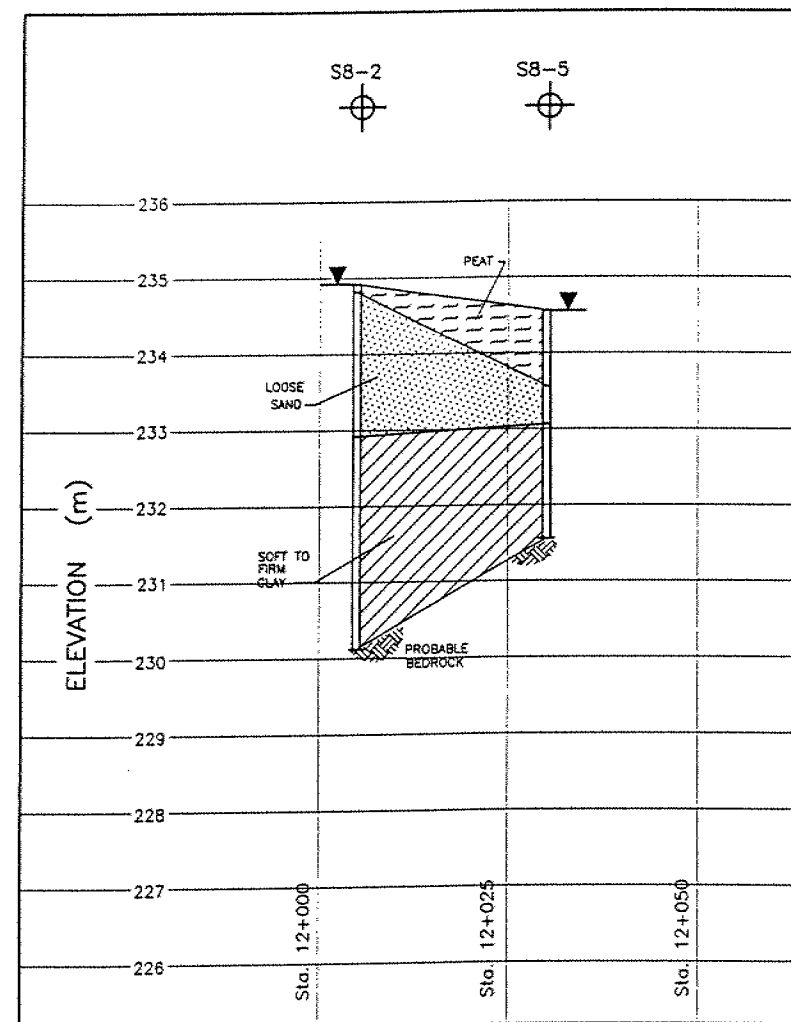


LEGEND

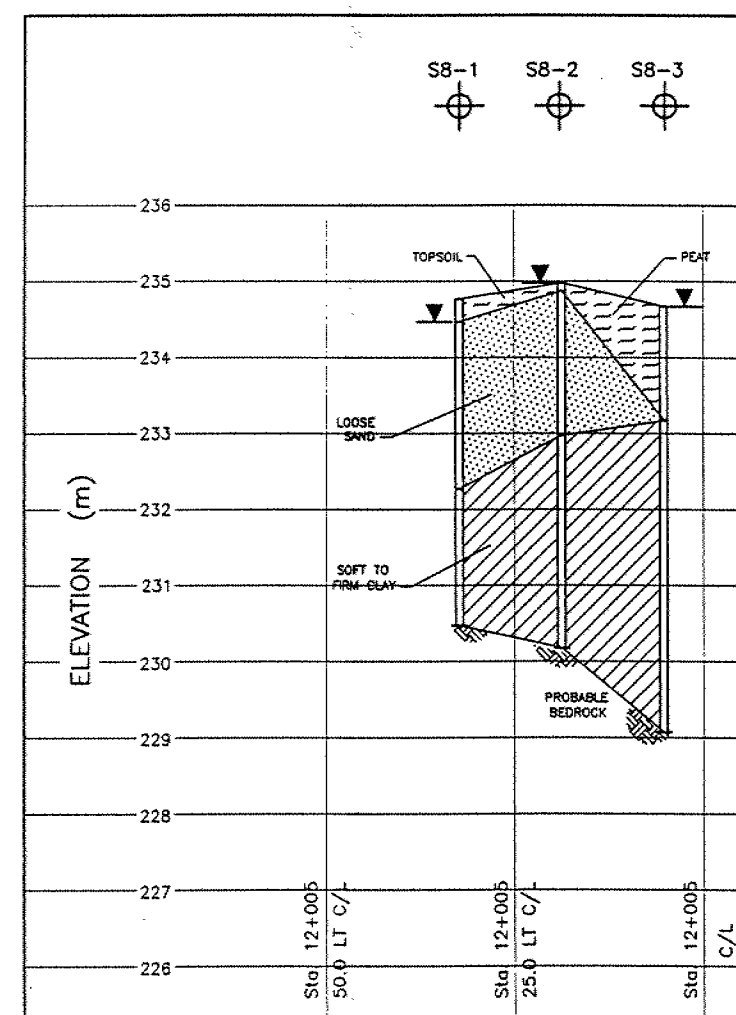
- Probehole
- Borehole

NOTES:

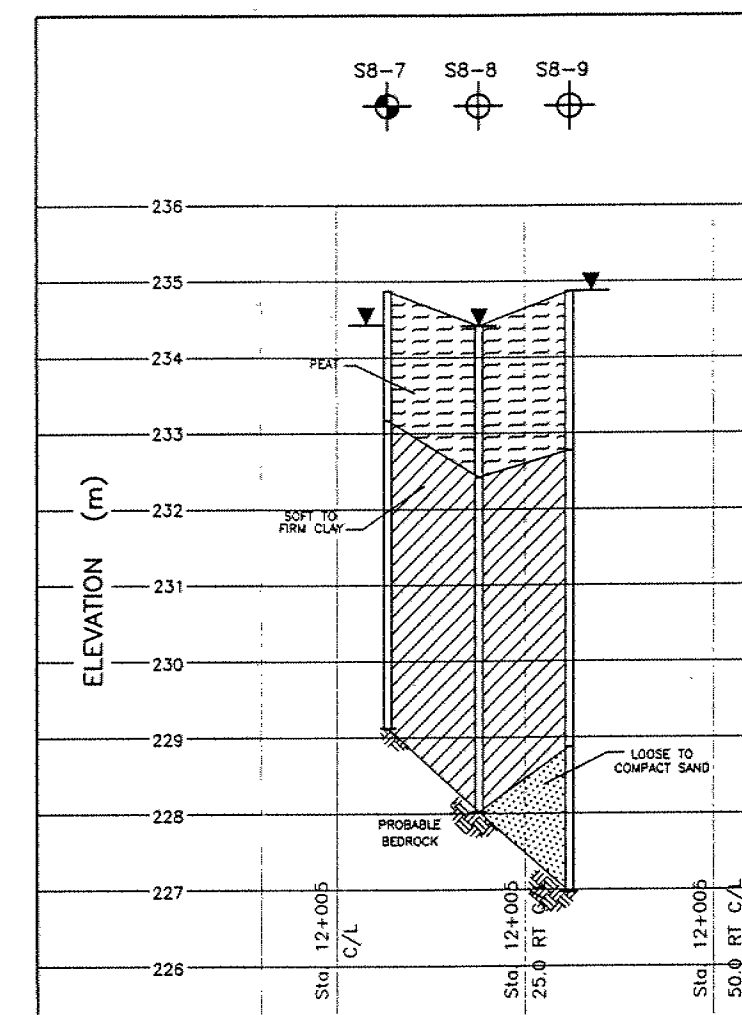
1. Refer to Log of Borehole and Probehole Sheets for description of subsurface conditions.
2. Refer to Drawing 14A for soil profiles.



SECTION A-A
(SOUTHBOUND LANE)



SECTION B-B
(SOUTHBOUND LANE)



SECTION C-C
(NORTHBOUND LANE)

LEGEND

	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		SILT
	CLAY		BEDROCK (INFERRED)
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		WATER
			ASPHALT

NOTES

1. REFER TO DRAWING NO. 14 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

G.W.P. 290-97-00, HIGHWAY 69
SOUTHBOUND LANE/NORTHBOUND LANE
TWP. OF FOLEY
DISTRICT 52, HUNTSVILLE, ONTARIO
SWAMP 8 - SOIL PROFILES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	VERTICAL 1:100 HORIZONTAL 1:1000	97TF088B	14A
APPROVED	DWK				

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 8A

Station 9+725 - 9+875

Blackstone/Crane Lake Road/Twp of Foley

Datum Centre Line Median

S8A-1 9+725 10.0 RT C/L El. 232.50
 0-450 Blk Amor Peat
 450-2.95 V Soft Br Siy Cl Tr F Sa
 w @ 2.95 = 43%
 2.95-3.10 D Br Med Sa W Gr Wet
 3.10 NFP BR

S8A-2 9+750 12.0 LT C/L El. 233.80
 0-300 Blk Si Tps
 300-800 Br F Sa W Si Tr Gr
 800 NFP BR

S8A-3 9+750 2.0 LT C/L El. 233.76
 0-75 PST
 75-1.10 Br F Sa Fill Tr Si Dry To Moist
 1.10-1.40 Dk Br Siy Sa Tps Wet
 w @ 1.40 = 30%
 1.40-4.00 L To Comp Br F To Med Sa W Si
 Wet
 w @ 2.00 = 19%
 w @ 2.50 = 18%
 4.00-5.95 V Soft Br Cl
 w @ 5.65 = 38%
 5.95 NFP BR
 Fr Wat @ 2.70

S8A-4 9+850 17.0 LT C/L El. 234.06
 0-150 Blk Si W Sa Tps
 150-760 Br F To Med Sa Tr Si Wet
 760 NFP BR

S8A-5 9+850 2.0 RT C/L El. 234.34
 0-100 PST
 100-1.40 Br F To Med Sa Fill W Gr Wet
 1.40-1.70 Dk Br Say Si Tps Wet
 w @ 1.70 = 34%
 1.70-2.45 Layered Br Say Si And Siy Sa Moist
 To Wet
 w @ 2.45 = 17%
 2.45-3.20 V Soft Br Cl
 w @ 3.20 = 46%
 3.20-5.15 Br F Sa W Si OCC Cob @ 4.10
 5.15 NFP BR/Blds
 Fr Wat @ 1.45

S8A-6 9+850 15.5 RT C/L El. 233.76
 0-150 Blk Si W Sa Tps
 150-1.10 Br Cl W Si OCC Blds
 1.10-1.70 Br Si Tr F Sa Moist To Wet
 w @ 1.50 = 16%
 1.70 NFP BR

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 8B

Station 10+225 - 10+320

Blackstone/Crane Lake Road/Twp. of Foley

Datum Centre Line Pavement

S8B-1 10+245 6.0 RT C/L El. 235.26
 0-2.50 Comp Br To Gry Si W Sa Tr Cl
 w @ 1.70 = 32%
 2.50-5.60 V Soft Gry Siy Cl Wet
 w @ 3.20 = 50%
 w @ 4.70 = 30%
 5.60-5.75 L Gry Med To Co Sa
 w @ 5.60 = 9%
 5.75 NFP BR

S8B-2 10+250 6.0 LT C/L El. 235.52
 0-1.60 Blk Amor Peat
 1.60-4.25 Soft Br To Gry Siy Cl
 w @ 3.00 = 22%
 4.25 NFP BR

S8B-3 10+250 C/L El. 235.94
 0-125 Blk Gry Sa
 125-510 Br F To Med Sa Fill W Gr Tr Si
 Dry To Moist
 510 NFP BR/Poss Blds

S8B-4 10+265 6.0 LT C/L El. 235.31
 0-1.10 Br F To Med Sa Fill Tr Gr And Si
 Wet
 1.10-1.60 Blk Amor Peat
 1.60-1.95 Soft Br To Gry Cly Si
 1.95-2.50 Br F Sa W Si Wet
 w @ 2.00 = 19%
 2.50-3.40 V Soft Br To Gry Siy Cly
 3.40-5.30 Comp Br F To Co Siy Sa Tr Gr
 Dry To Wet
 w @ 4.00 = 19%
 5.30 NFP BR

S8B-5 10+300 C/L El. 236.0
 0-500 Br Sa And Cr Gr Fill
 500-1.20 Br Med To Co Sa W Gr
 1.20-2.60 Soft Gry Cly Si
 w @ 1.65 = 36%
 2.60 NFP BR

S8B-6 10+320 C/L El. 236.0
 0-500 Br Sa And Cr Gr Fill
 500-1.20 Br Med Sa W Gr
 1.20-2.20 Stiff Gry Cly Si
 w @ 1.65 = 21%
 2.20-3.80 L Br Co Sa W Gr Dry To Moist
 w @ 3.20 = 8%
 3.80 NFP BR

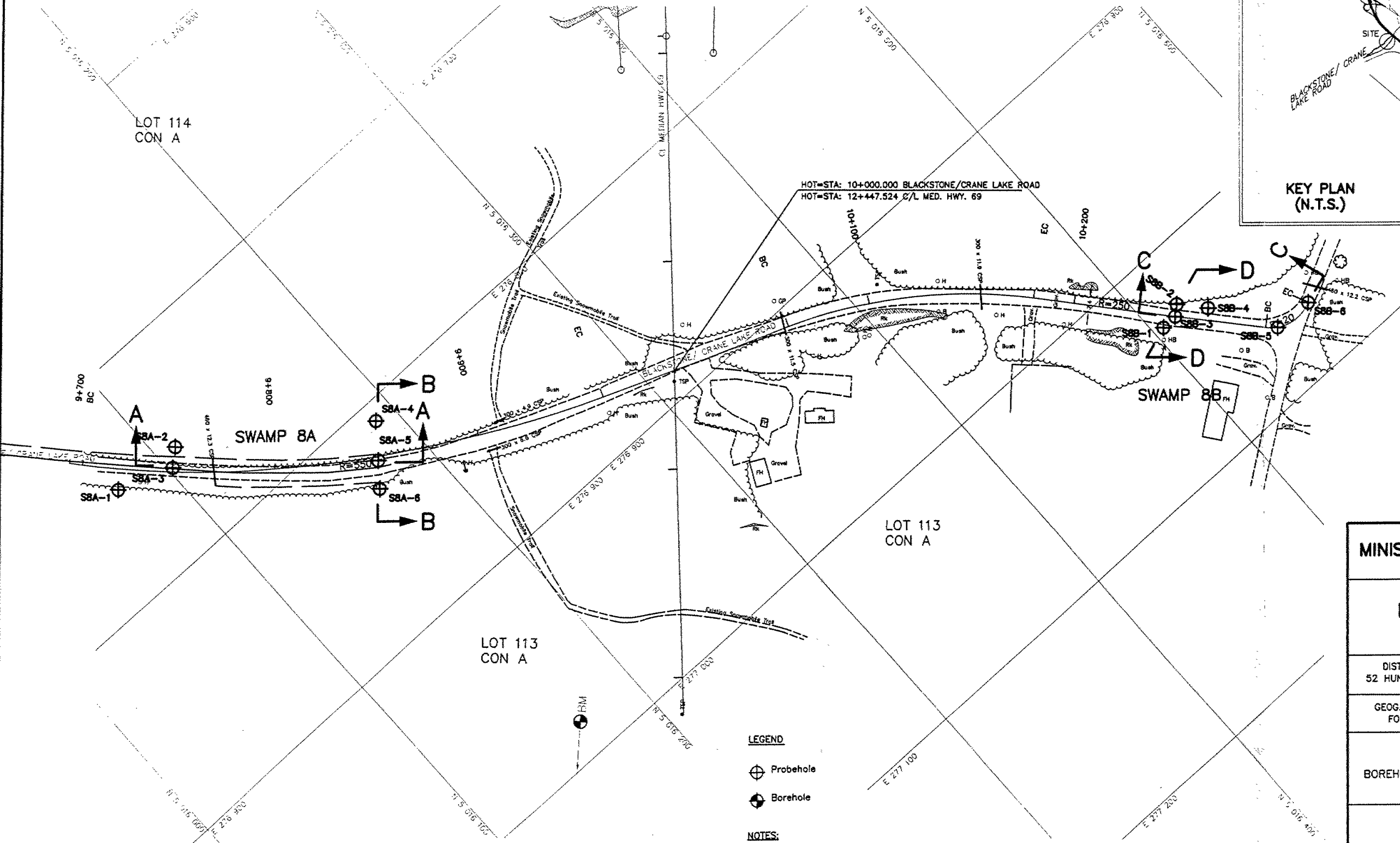
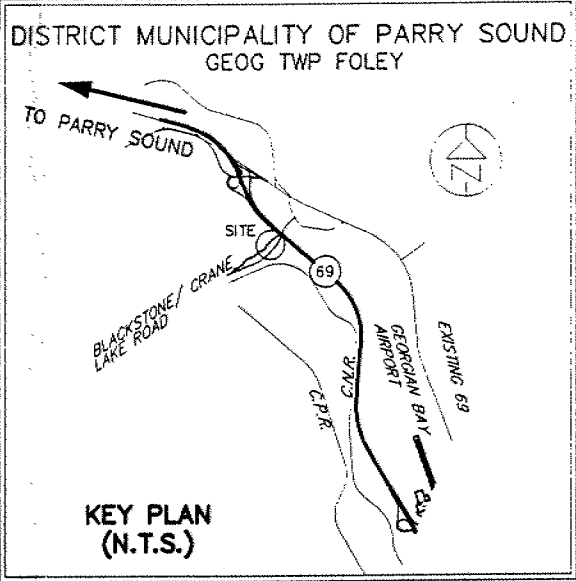
METRIC

PLATE No 451-63 44-0 46-0
DRAWING No 451-0069044 46

CONT No C
GWP No 290-97-00

STA 9+700 TO STA 10+300
Survey 1997/12 Revised R

SHEET	
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LEGEND

- Probehole
- Borehole

NOTES:

1. Refer to Log of Borehole and Probehole Sheets for description of subsurface conditions.
2. Refer to Drawing 15A and 15B for soil profiles.

MINISTRY OF TRANSPORTATION

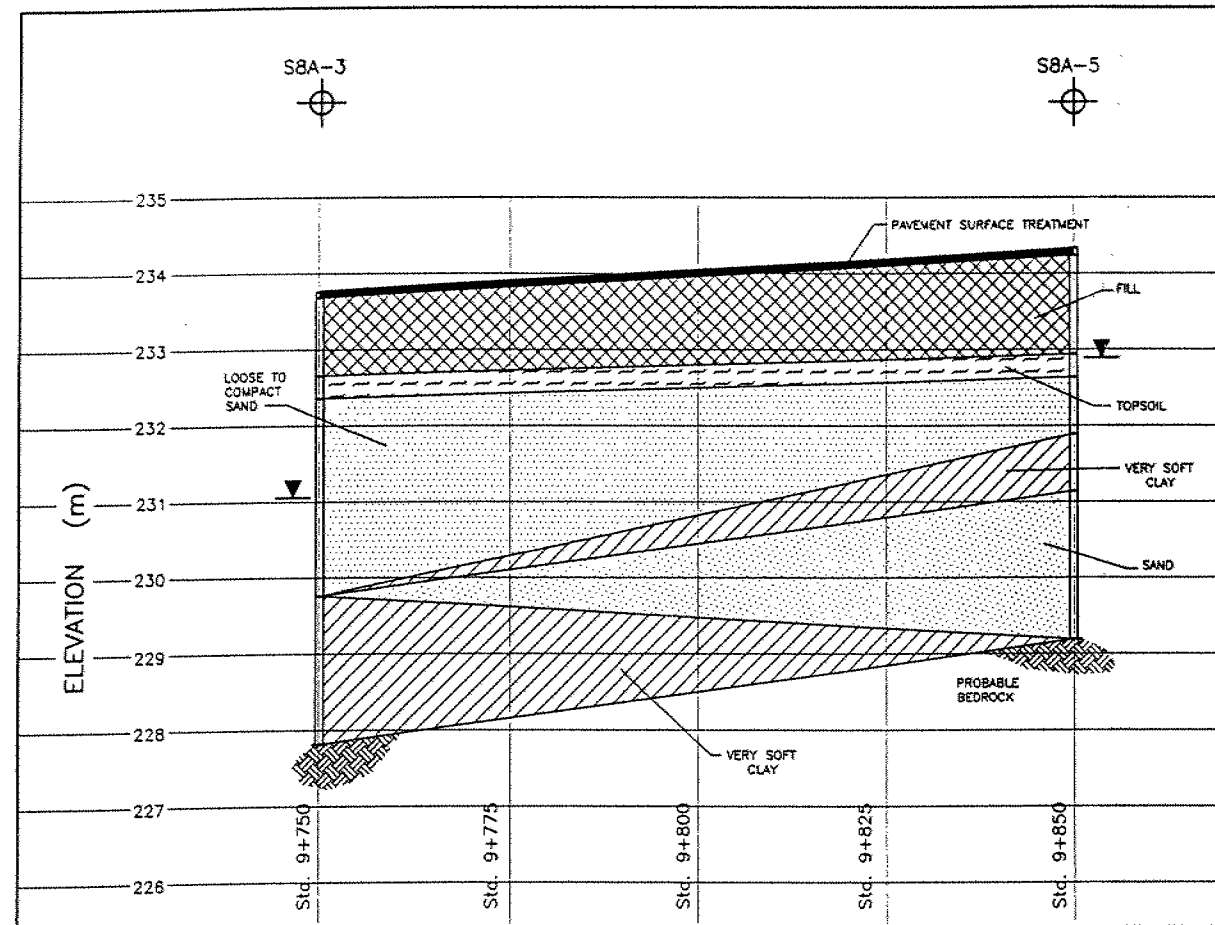
KING'S HIGHWAY 69
BLACKSTONE / CRANE LAKE ROAD

DISTRICT 52 HUNTSVILLE	REGION NORTHERN
GEOG. TWP. FOLEY	DISTRICT MUNICIPALITY PARRY SOUND

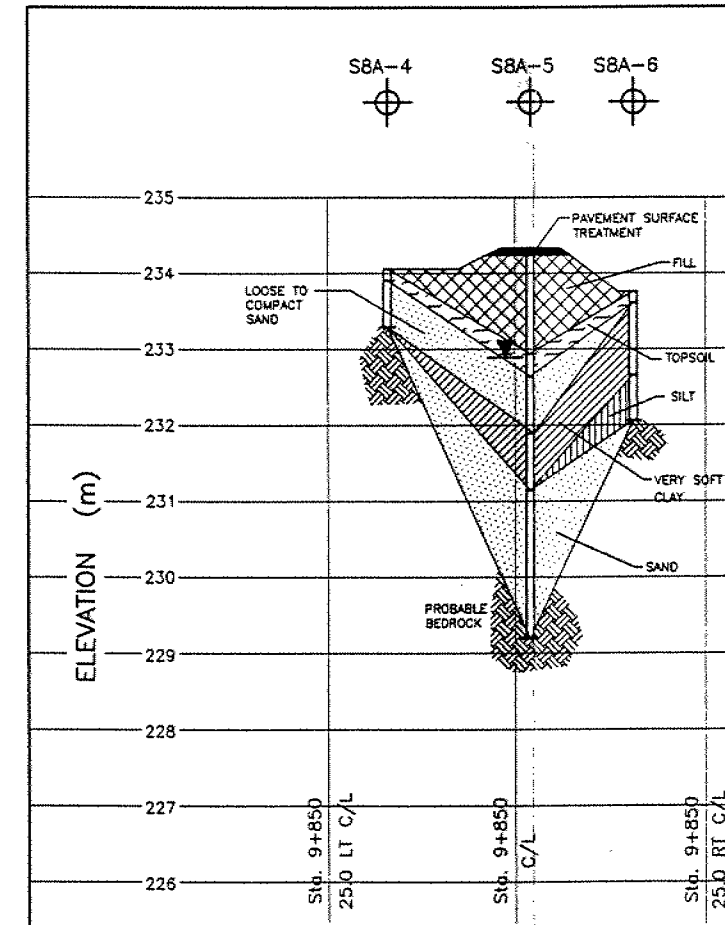
SWAMP 8A & 8B
BOREHOLE AND PROBEHOLE LOCATION PLAN

Peto MacCallum Ltd.
CONSULTING ENGINEERS
45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C8

DRAWN JS	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED EW	MAY 1998	1 : 2000	97TF0888	15
APPROVED DWK				



SECTION A-A



SECTION B-B

LEGEND

	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		SILT
	CLAY		BEDROCK (INFERRED)
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		WATER
			PAVEMENT SURFACE TREATMENT

NOTES

1. REFER TO DRAWING NO. 15 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

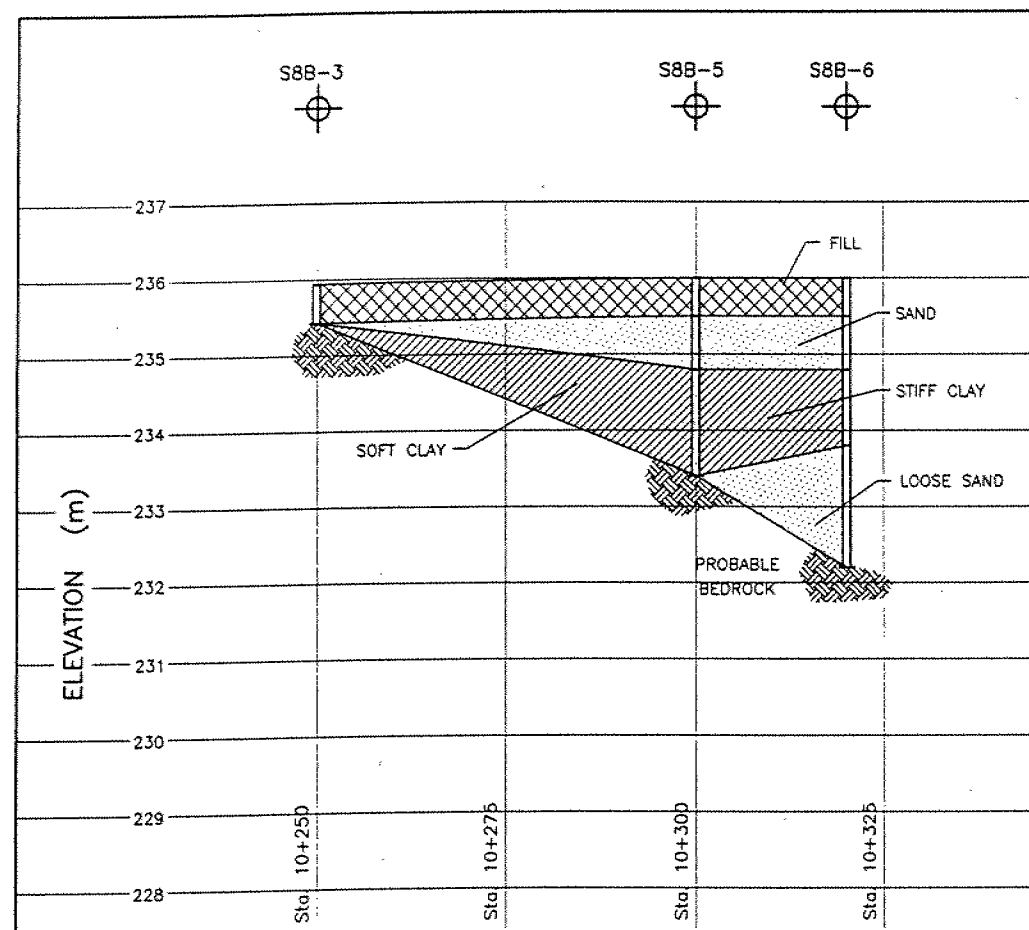
G.W.P. 290-97-00, HIGHWAY 69
BLACKSTONE/ CRANE LAKE ROAD/ TWP. OF FOLEY
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 8A - SOIL PROFILES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

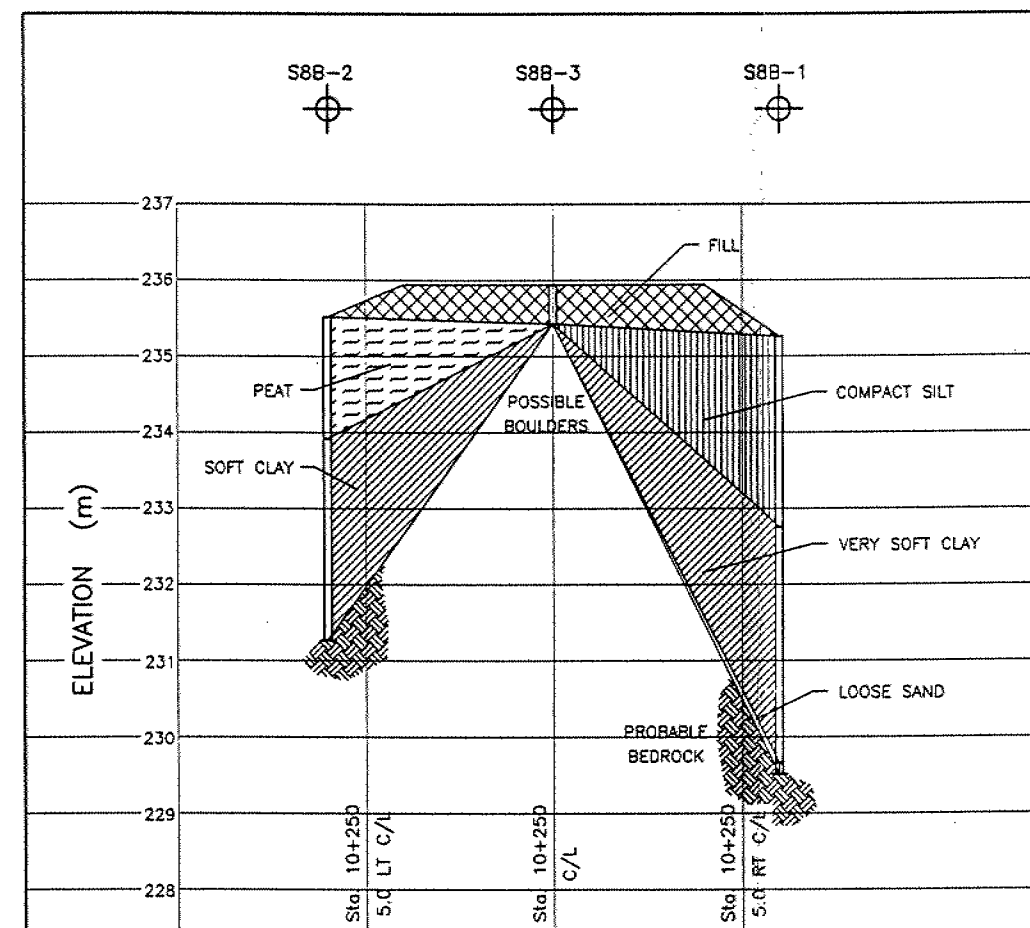
45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	VERTICAL 1:100 HORIZONTAL 1:1000	97TF088B	15A
APPROVED	DWK				



SECTION C-C

SCALE VERTICAL 1:100
HORIZONTAL 1:1000



SECTION D-D

SCALE VERTICAL 1:100
HORIZONTAL 1:200

LEGEND

	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		SILT
	CLAY		BEDROCK (INFERRED)
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		WATER
			PAVEMENT SURFACE TREATMENT

NOTES

- REFER TO DRAWING NO. 15 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
- REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
- THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

G.W.P. 290-97-00, HIGHWAY 69
BLACKSTONE/ CRANE LAKE ROAD/ TWP. OF FOLEY
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 8B - SOIL PROFILES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	AS SHOWN	97TF088B	15B
APPROVED	DWK				

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 9

Station 12+970 - 13+100

Southbound Lane/Twp. of Foley

Datum Centre Line Median

S9-2	13+000	18.8 LT C/L	El. 231.70
	0-100	Blk Say Si Tps	
	100-2.70	L Br Sa Tr Si Moist To Wet	
	2.70-3.00	V Soft Br Siy Cl Tr Sa	
	3.00	NFP BR	

S9-3	13+000	C/L	El. 231.64
	0-100	Blk Say Si Tps	
	100-2.75	L Br Sa Tr Si Wet	
	2.75-4.30	Soft Br Siy Cl	
		w @ 4.20 = 33%	
	4.30	NFP BR	

S9-4	13+050	18.8 LT C/L	El. 234.57
	0-100	Blk Say Si Tps	
	100-4.30	L To Comp Br Sa W Si Moist	
		w @ 3.00 = 7.0%	
	4.30	NFP BR	

S9-5	13+100	18.8 LT C/L	El. 237.27
	0-300	Blk Siy Sa Tps	
	300-750	L Br Sa W Si Wet	
	750	NFP BR	

LOG OF BOREHOLE NO. S9-6

PROJECT GWP 290-97-00

LOCATION Station 13+100, 50.0 m Rt., Highway 69, NBL, Twp. of Foley

BORING METHOD Continuous Flight Hollow Stem Augers / Cone Test

OUR PROJECT 97TF088B

BORING DATE 98.03.11 ENGINEER E. W.

TECHNICIAN K. H.

SOIL PROFILE				SAMPLES		SHEAR STRENGTH C_u (kPa) +		LIQUID LIMIT W_L		GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	20 40 60 80		PLASTIC LIMIT W_P		
						DYNAMIC CONE PENETRATION x		WATER CONTENT %		
						STANDARD PENETRATION TEST x		W_P W W_L		
						BLOWS/0.3M		WATER CONTENT %		
						20 40 60 80		10 20 30		
0	GROUND ELEVATION 234.98									
1.5	Sand Brown, Wet Very Loose		234							
			233	1	SS					
3.0			232							
4.5	Silt Trace Clay, Trace Sand Grey, Wet Very Loose		231	2	SS					
			230	3	SS					
6.0	Sand Trace Silt, Trace Clay Brown, Wet Compact		229							
			228	4	SS					
7.5	Silt Trace Sand Grey, W.T.P.L. Very Loose		227	5	SS					
8.25	Clay Grey, Wet Very Soft		226	6	TW					
9.0	Silt Trace Sand Grey, Wet Loose		225	7	SS					
10.5	Sand Trace Silt Grey, Wet Loose To Dense		224	8	SS					
12.0			223	9	SS					
13.5			221	10	SS					
15.0			220	11	SS					
16.5			219			X				
18.0			217			X				
21.0			214			X				
22.35	End Of Borehole Hammer Bouncing Probable Bedrock		212			X				

NOTES:

1. Cone test was carried out at a distance of 1.5 m from the borehole.

CHECKED BY

E.W.

LOG OF BOREHOLE NO. S9-1

PROJECT GWP 290-97-00

OUR PROJECT 97TF0888

LOCATION Station 13+000, 48.0 m Lt., Highway 69, SBL, Twp. of Foley

BORING DATE 98.03.11

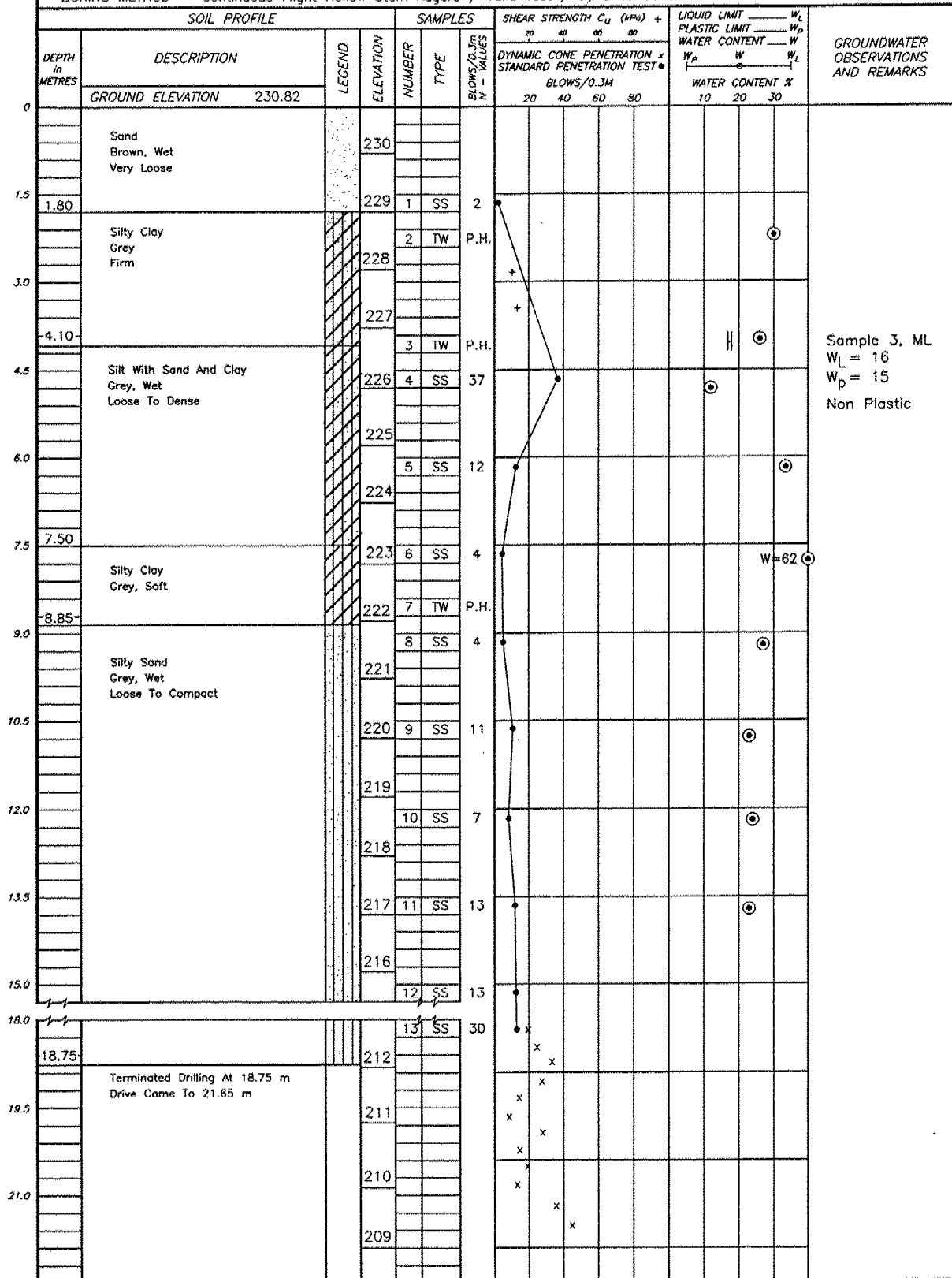
ENGINEER

E. W.

BORING METHOD Continuous Flight Hollow Stem Augers / Vane Test / Dynamic Cone Test

TECHNICIAN

K. H.



NOTES:

CHECKED BY: E. W.

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 9

Station 12+980 - 13+125

Northbound Lane/Twp. of Foley

Datum Centre Line Median

S9-7	13+050	18.8 RT C/L	El. 233.96
	0-100	Blk Say Si Tps	
	100-4.00	Lt Br F To Med Sa W Si Moist To	
		Wet	
		w @ 2.00 = 8%	
	4.00-5.00	Soft Br Siy Cl	
	5.00	NFP BR	

S9-8	13+100	18.8 RT C/L	El. 232.42
	0-250	Blk Si Tps	
	250	NFP BR	

METRIC

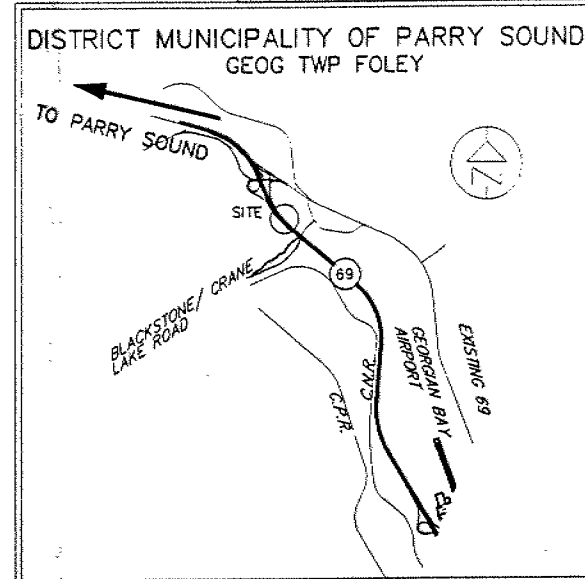
PLATE No 48-69 17-1 00-0
DRAWING No 34'5006907 000

CONT No C
GWP No 290-97-00

STA 12+900 TO STA 13+200
Survey 1997/12 Revised R



SHEET



KEY PLAN
(N.T.S.)

SCALE
10 0 20

MINISTRY OF TRANSPORTATION

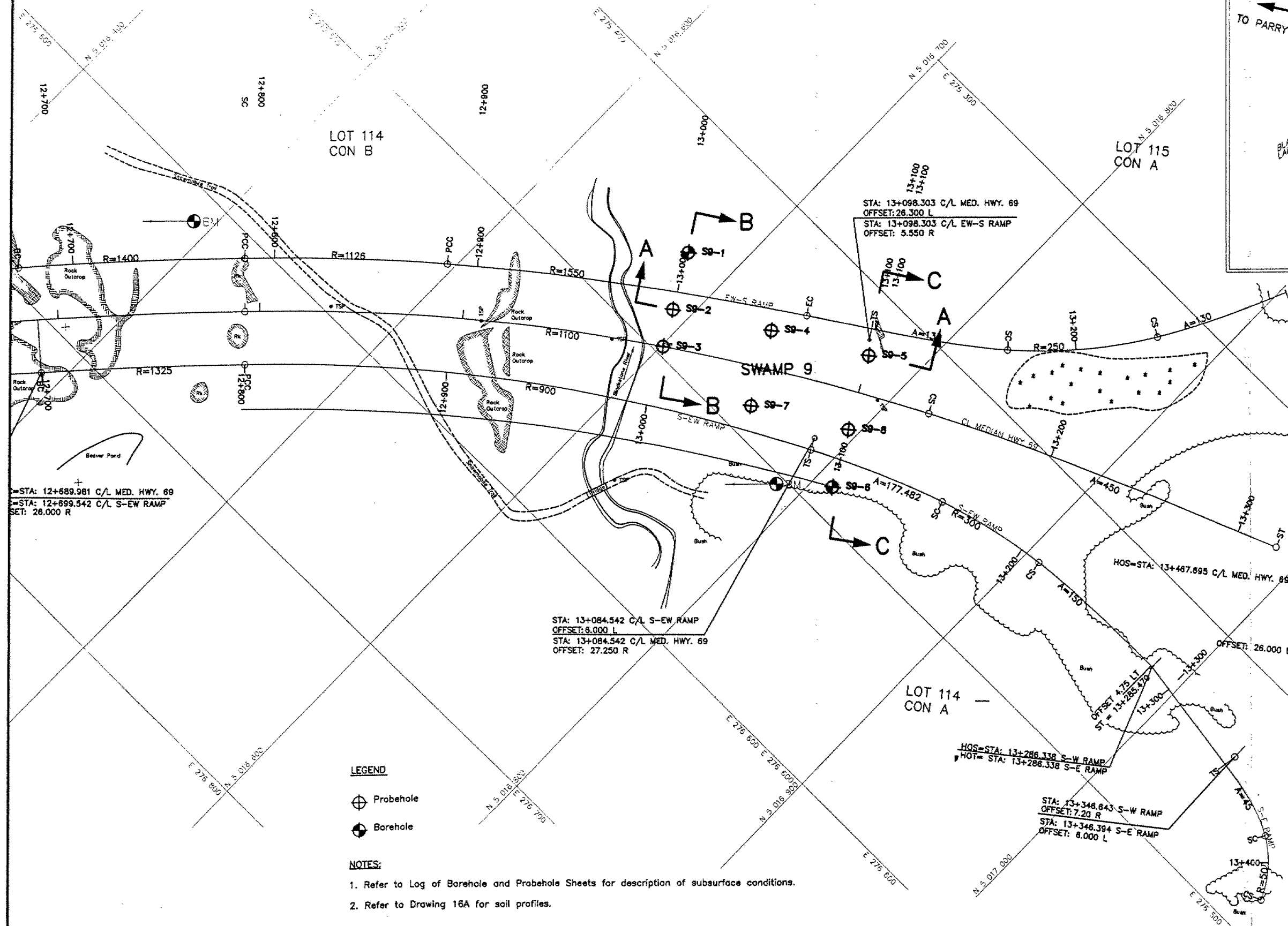
KING'S HIGHWAY 69

DISTRICT 52 HUNTSVILLE	REGION NORTHERN
GEOG. TWP. FOLEY	DISTRICT MUNICIPALITY PARRY SOUND

SWAMP 9
BOREHOLE AND PROBEHOLE LOCATION PLAN

Peto MacCallum Ltd.
CONSULTING ENGINEERS
43 BURNFORD ROAD, MARKHAM, ONTARIO L3R 3C8

DRAWN JS	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED EW	MAY 1998	1 : 2000	97TF0888	16
APPROVED DWK				

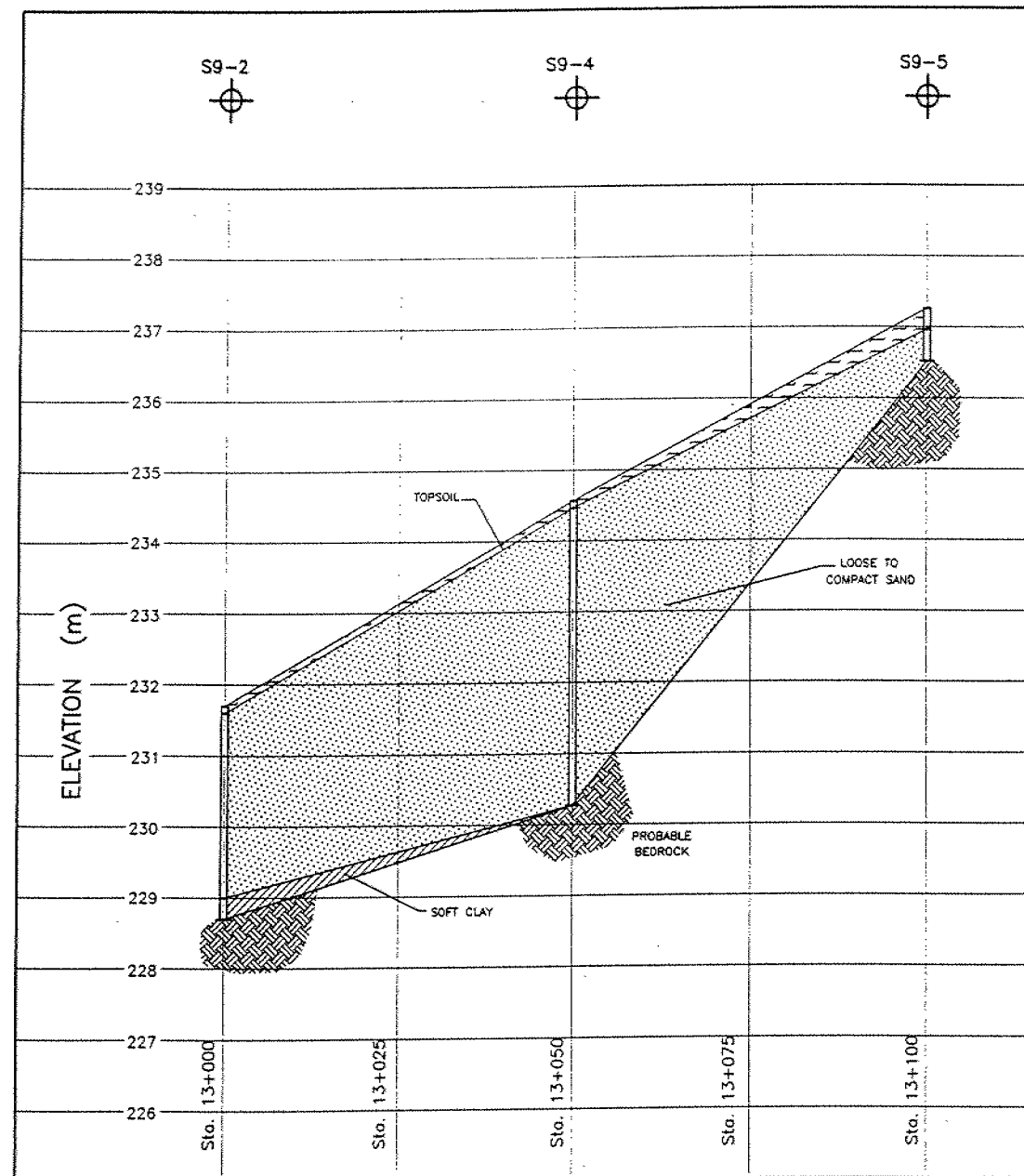


LEGEND

- Probehole
- Borehole

NOTES:

1. Refer to Log of Borehole and Probehole Sheets for description of subsurface conditions.
2. Refer to Drawing 16A for soil profiles.



SECTION A-A
(SOUTHBOUND LANE)

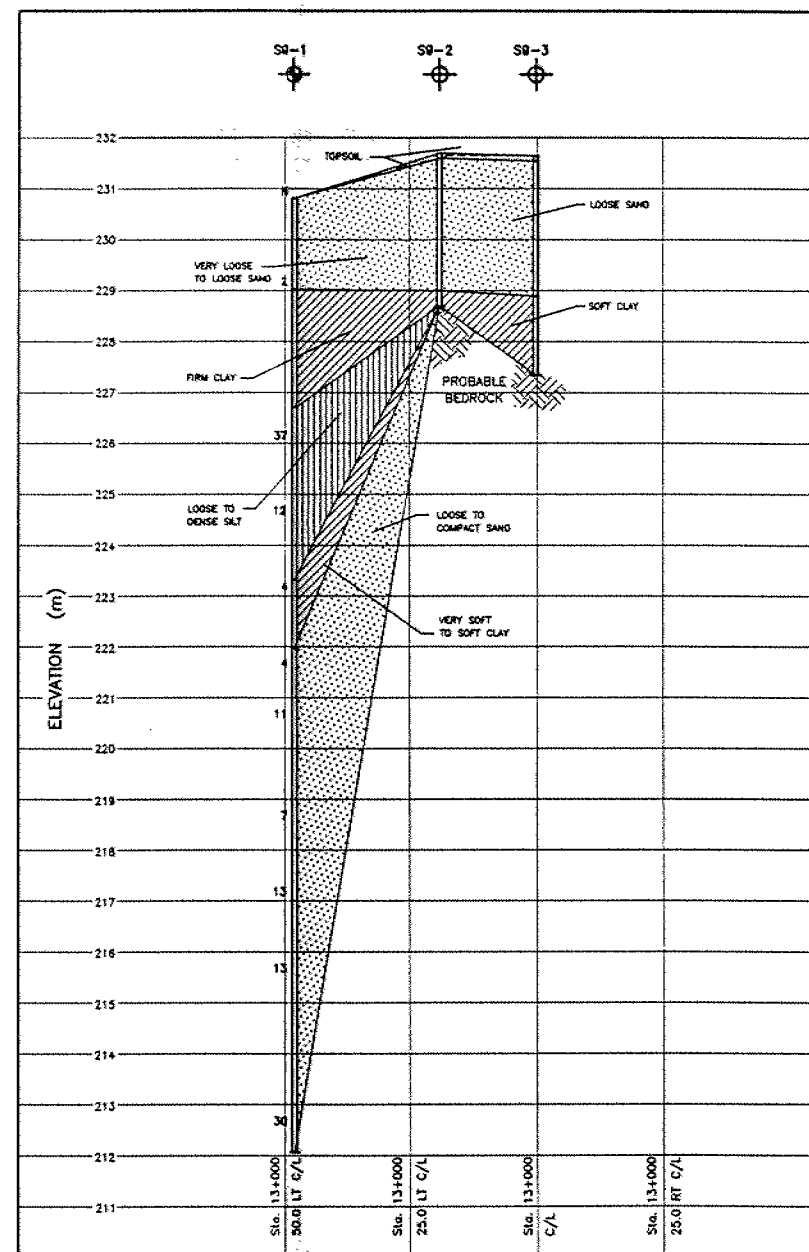
SCALE VERTICAL 1:100
HORIZONTAL 1:1000

LEGEND

	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		SILT
	CLAY		BEDROCK (INFERRED)
	WATER		ASPHALT
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		

NOTES

1. REFER TO DRAWING NO. 3 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.



SECTION B-B
(SOUTHBOUND LANE)

SCALE VERTICAL 1:150
HORIZONTAL 1:1500

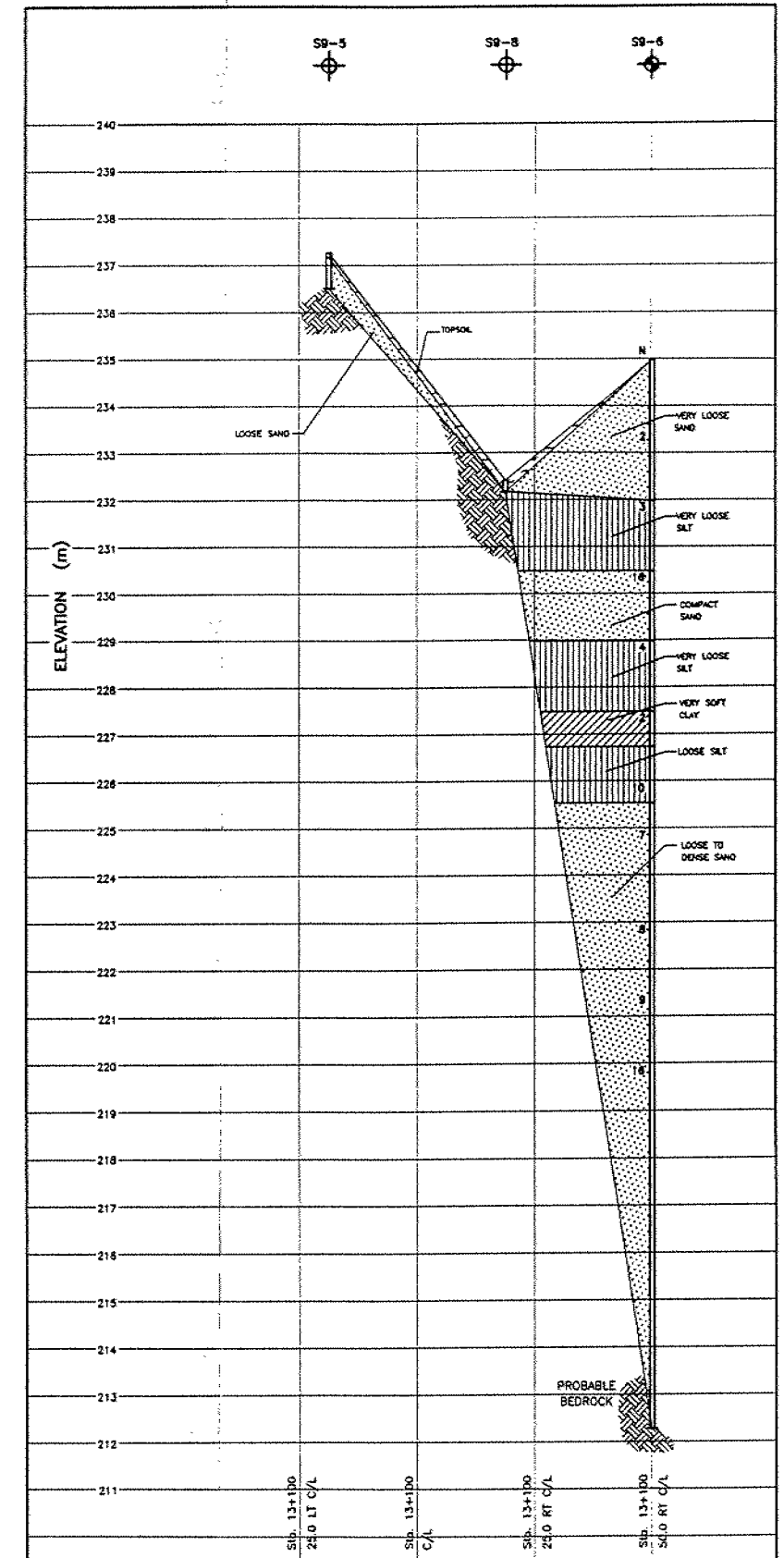
G.W.P. 290-97-00, HIGHWAY 69
SOUTHBOUND LANE/NORTHBOUND LANE
TWP. OF FOLEY
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 9 - SOIL PROFILES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	AS SHOWN	97TF088B	16A
APPROVED	DWK				



SECTION C-C
(SOUTHBOUND/NORTHBOUND LANE)

SCALE VERTICAL 1:150
HORIZONTAL 1:1500

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 10

Station 14+440 - 14+500

Northbound Lane/Twp. of Foley

Datum Centre Line Median

S10-1	14+450	C/L	El. 238.54	S10-7	14+500	C/L	El. 238.41
	0-200	Blk Sa Tps			0-100	Blk Siy Sa Tps	
	200-750	Br F To Med Sa W Si			100	NFP BR	
	750	NFP BR					
S10-2	14+450	18.80 RT C/L	El. 235.02	S10-8	14+500	18.80 RT C/L	El. 235.38
	0-350	Blk Siy Sa Tps			0-300	Blk Siy Sa Tps	
	350	NFP BR			300	NFP BR	
S10-3	14+450	40.50 RT C/L	El. 234.30	S10-9	14+500	40.50 RT C/L	El. 234.34
	0-1.00	Blk Fib Peat			0-500	Blk F Fib Peat	
	1.00-5.80	Blk Amor Peat			500	NFP BR	
	5.80	NFP BR					
S10-4	14+475	7.30 RT C/L	El. 234.89				
	0-250	Blk Siy Sa Tps					
	250-2.00	L Br Sa Wet					
	2.00	NFP BR					
S10-5	14+475	18.80 RT C/L	El. 234.18				
	0-300	Fr Wat					
	300-2.60	Blk Fib Peat					
	2.60-3.00	L Gry Sa W Gr Wet					
	3.00	NFP BR					
S10-6	14+475	30.30 RT C/L	El. 234.29				
	0-5.90	Blk Fib Peat					
	5.90-7.50	L To Comp Gry Sa W Si Wet					
	7.50	NFP BR					

METRIC

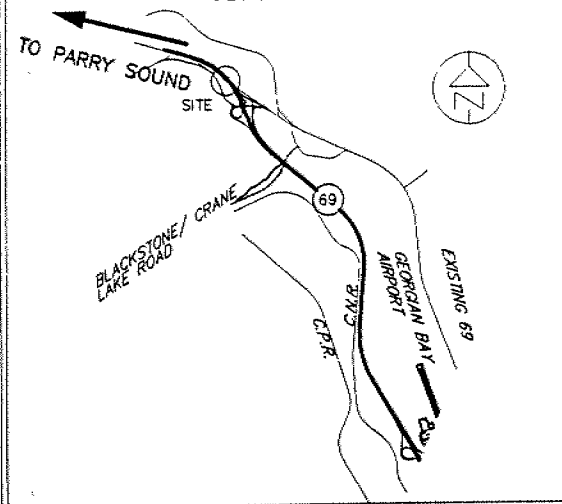
PLATE No 451-69.23-0
DRAWING No 04510069023
CONT No C
GWP No 290-97-00

STA 13+800 TO STA 14+500
Survey 1997/12 Revised R



SHEET

DISTRICT MUNICIPALITY OF PARRY SOUND
GEOG TWP FOLEY



KEY PLAN
(N.T.S.)

SCALE
10 0 20

MINISTRY OF TRANSPORTATION

KING'S HIGHWAY 69

DISTRICT S2 HUNTSVILLE	REGION NORTHERN
GEOG. TWP. FOLEY	DISTRICT MUNICIPALITY PARRY SOUND

SWAMP 10
BOREHOLE AND PROBEHOLE LOCATION PLAN

Peto MacCallum Ltd.
CONSULTING ENGINEERS
45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C8

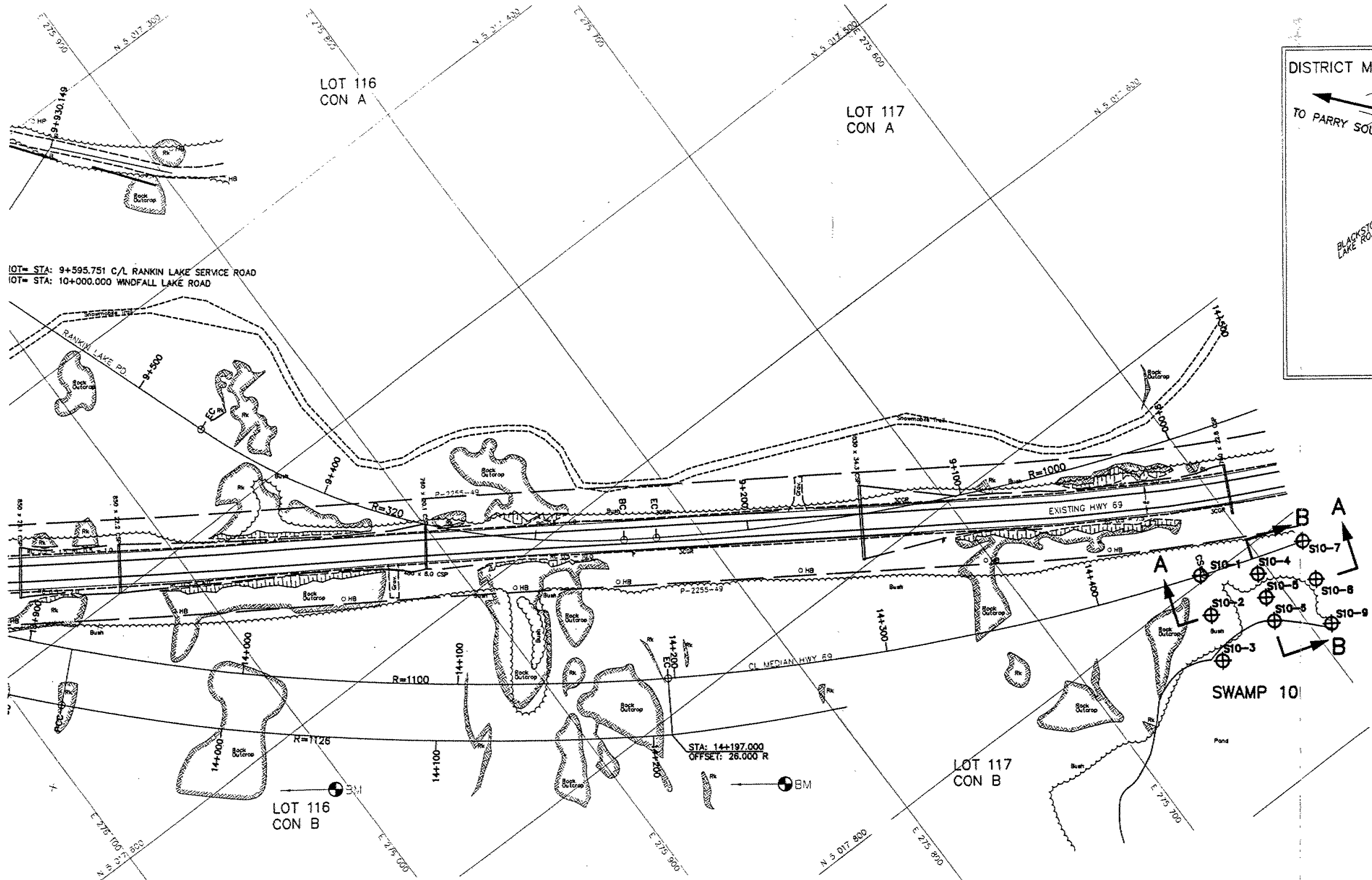
DRAWN JS	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED EW	MAY 1998	1 : 2000	97TF0888	17
APPROVED DWK				

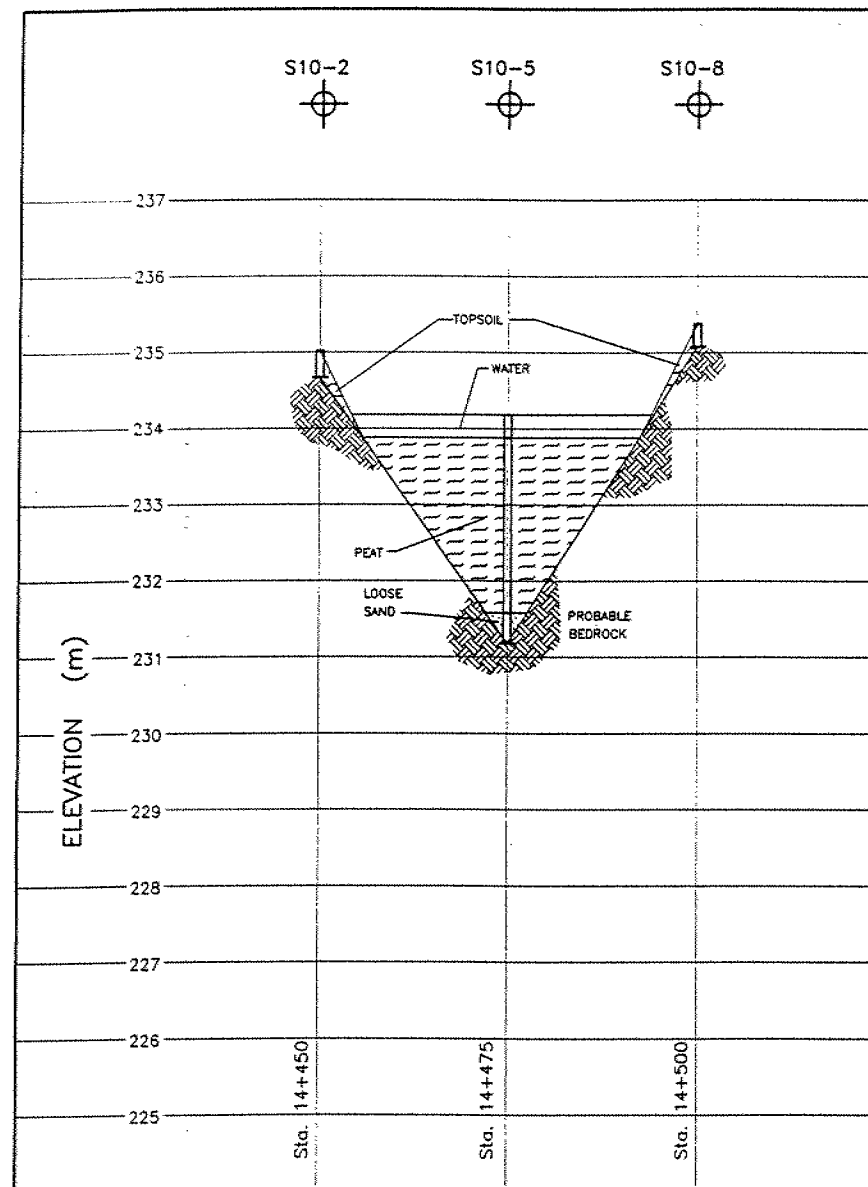
LEGEND

- Probehole
- Borehole

NOTES:

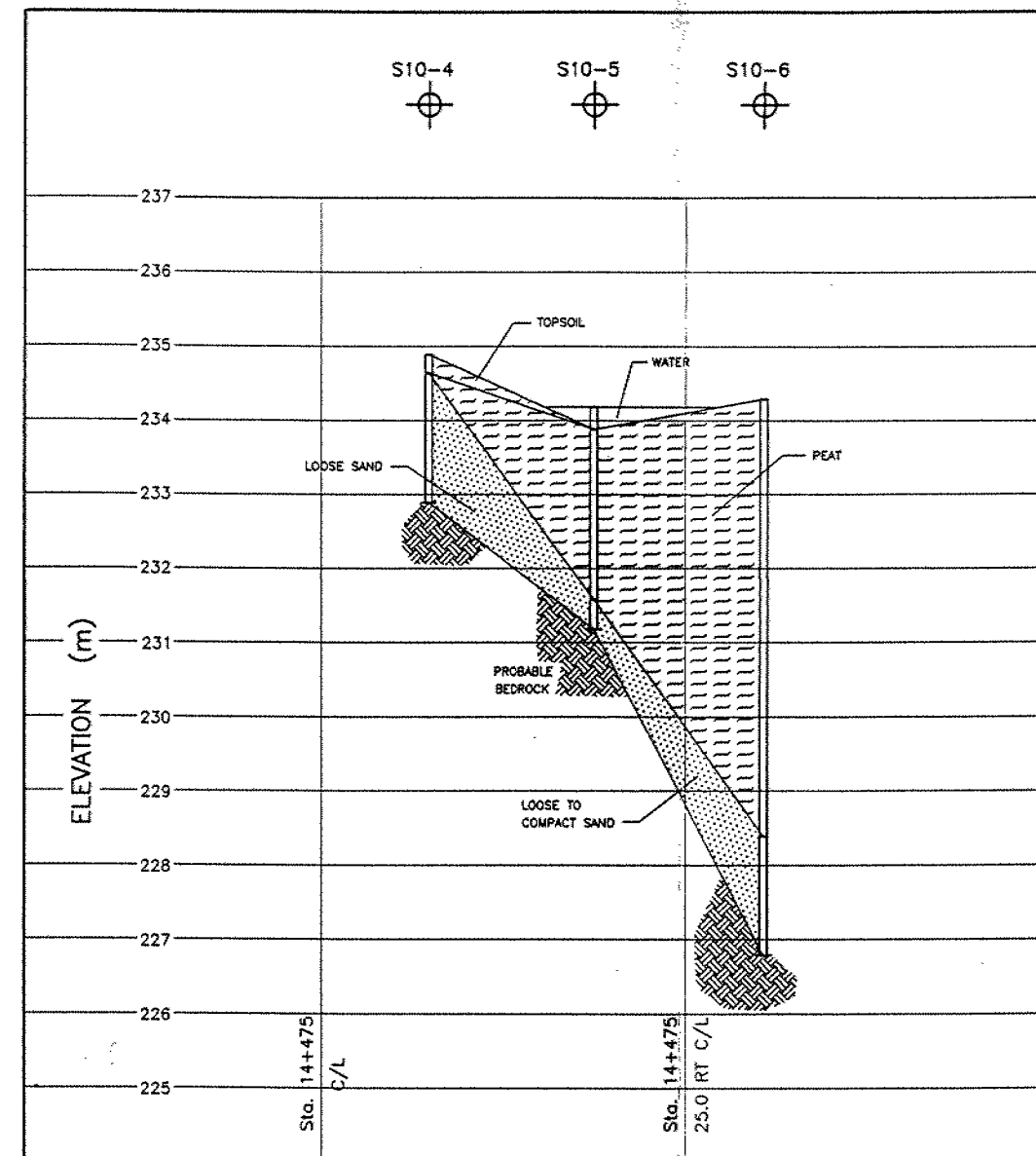
1. Refer to Log of Borehole and Probehole Sheets for description of subsurface conditions.
2. Refer to Drawing 17A for soil profiles.





SECTION A-A

SCALE VERTICAL 1:100
HORIZONTAL 1:1000



SECTION B-B

SCALE VERTICAL 1:100
HORIZONTAL 1:500

LEGEND

	PROBEHOLE		BOREHOLE
	FILL		SAND
	TOPSOIL/PEAT		SILT
	CLAY		BEDROCK (INFERRED)
	WATER		ASPHALT
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)		

NOTES

1. REFER TO DRAWING NO. 17 FOR BOREHOLE/PROBEHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF BOREHOLE/PROBEHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT BOREHOLE/PROBEHOLE LOCATIONS. BETWEEN BOREHOLES/PROBEHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

G.W.P. 290-97-00, HIGHWAY 69
NORTHBOUND LANE/TWP. OF FOLEY
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 10 - SOIL PROFILES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	AS SHOWN	97TF088B	17A
APPROVED	DWK				

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 11

Station 14+620 - 14+700

Northbound Lane/Twp. of Foley

Datum Centre Line Median

S11-1 14+631 3.00 LT C/L El. 234.39
0-800 Peat And Sa Fill
800-1.40 R F
1.40-2.00 Gry Sa W Si Wet

Note: Testhole terminated above program depth to avoid potential embankment movement.

S11-2 14+654 2.80 LT C/L El. 234.41
0-1.20 Peat Fill
1.20-3.70 R F And Peat
3.70-4.20 Gry Siy Cl
Fr Wat @ 1.00

Note: Testhole terminated above program depth to avoid potential embankment movement.

S11-3 14+677 2.80 LT C/L El. 234.91
0-1.30 Peat And Sa Fill
1.30-2.20 R F And Peat
2.20-2.50 Br Amor Peat Wet
2.50-2.80 Gry Siy Sa Wet

Note: Testhole terminated above program depth to avoid potential embankment movement.

S11-4 14+631 1.50 RT C/L El. 233.76
0-1.50 Blk Amor Peat Wet
1.50-4.50 V L Gry Siy F Sa W Cl Tr Gr
OCC Cobs Wet
4.50 NFP BR
Fr Wat @ 0

Note: Edge of Water Course

S11-6 14+631 26.50 RT C/L El. 233.76
0-1.80 Blk Amor Peat
1.80-4.50 V L Gry Siy F Sa Tr Cl Tr Gr
OCC Cob Wet
4.50 NFP BR
Fr Wat @ 0

S11-7 14+654 1.50 RT C/L El. 233.86
0-2.55 Blk Amor Peat Wet
2.55-7.05 Soft Gry Siy Cl Tr F Sa
7.05-9.00 L To Comp Gry Si Tr Cl Tr F Sa
OCC Cob Wet
9.00 NFP BR
Fr Wat @ 0

S11-9 14+654 26.30 RT C/L El. 233.86
0-1.20 Blk Amor Peat
1.20-6.00 Soft Gry Siy Cl W F Sa
Tr Gr
6.00-8.25 L To Comp Gry Med-Co Sa Tr
Gr Tr Si OCC Cob Wet
8.25 NFP BR

S11-10 14+677 2.00 RT C/L El. 233.51
0-2.40 Blk Amor Peat
2.40-8.55 Soft Gry Siy Cl W Si And F Sa
Seams
8.55-11.10 L To Comp Gry Siy F Sa
OCC Cob @ 10.20
11.10 NFP BR

GWP 290-97-00 Highway 69

District 52, Huntsville

Swamp 11

Station 14+620 - 14+700

Northbound Lane/Twp. of Foley

Datum Centre Line Median

S11-12 14+677	27.0 RT C/L	El. 233.28
0-900	Blk Amor Peat Wet	
900-2.70	L Gry F To Med Sa Tr Si Tr	
	Gr Wet	
2.70-3.90	L Lt Br Si W F Sa Tr Cl Wet	
3.90	NFP BR	
	Fr Wat @ 1.30	

LOG OF BOREHOLE NO. S11-5

PROJECT GWP 290-97-00

OUR PROJECT 97TF0888

LOCATION Station 14+631, 13.5 m Rt., Highway 69, NBL, Twp. of Foley

BORING DATE 98.03.17

ENGINEER

E. W.

BORING METHOD Continuous Flight Hollow Stem Augers / Cone Test

TECHNICIAN

D. R.

SOIL PROFILE				SAMPLES			SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS							
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	20 40 60 80				PLASTIC LIMIT W_P											
							DYNAMIC CONE PENETRATION x				WATER CONTENT %											
							STANDARD PENETRATION TEST •				W_P W W_L											
							GROUND ELEVATION 233.27							BLOWS/0.3M				WATER CONTENT %				
														20 40 60 80				10 20 30				
0			233											Upon completion of augering, borehole caved at 1.30 m with water level at ground surface.								
	Peat																					
	Fibrous, Black		232																			
1.5				1	SS	1																
			231																			
2.40																						
	Silty Sand With Clay																					
	Trace Gravel		230	2	SS	2																
3.0																						
	Occasional Cobbles at 6.0 m																					
	Grey, Wet,		229																			
	Very Loose to Very Dense																					
4.5				3	SS	2																
			228																			
6.0																						
6.60			227	4	SS	14																
	End Of Borehole																					
	Auger Refusal		226																			
	Probable Bedrock																					
7.5																						
9.0																						
10.5																						
12.0																						
13.5																						
15.0																						
16.5																						

NOTES:

1. Cone test was carried out at a distance of 1.5 m from the borehole.

CHECKED BY: E.W

LOG OF BOREHOLE NO. S11-8

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 14+654, 14.2 m Rt., Highway 69, NBL, Twp. of Foley

BORING DATE 98.05.17

ENGINEER E. W.

BORING METHOD Continuous Flight Hollow Stem Augers / Vane Test

TECHNICIAN D. R.

[illegible]

NOTES:

1. ^{1.4} Number refers to sensitivity.

CHECKED BY: E.W.

LOG OF BOREHOLE NO. S11-11

PROJECT GWP 290-97-00

OUR PROJECT 97TF088B

LOCATION Station 14+677, 15.0 m Rt., Highway 69, NBL, Twp. of Foley

BORING DATE 98.05.17




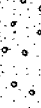
ENGINEER

E. W.

BORING METHOD Continuous Flight Hollow Stem Augers / Vane Test

TECHNICIAN

D. R.

SOIL PROFILE				SAMPLES				SHEAR STRENGTH C_u (kPa) +				LIQUID LIMIT W_L				GROUNDWATER OBSERVATIONS AND REMARKS
DEPTH in METRES	DESCRIPTION	LEGEND	ELEVATION	NUMBER	TYPE	BLOWS/0.3m N - VALUES	DYNAMIC CONE PENETRATION x STANDARD PENETRATION TEST •				PLASTIC LIMIT W_P					
							BLOWS/0.3M				WATER CONTENT %					
							20	40	60	80	10	20	30			
0	GROUND ELEVATION 233.00						20	40	60	80	10	20	30	Upon completion of augering, borehole caved at 1.50 m with water level at ground surface.		
	Peat Amorphous, Black		232													
1.5																
1.95			231	1	SS	2										
	Silty Sand With Clay Grey, Wet Very Loose		230													
3.0																
			229													
4.5																
4.95			228	3	SS	2										
	Silty Clay With Silt Seams Trace Sand Grey, Wet Soft to Firm		227													
6.0				4	SS	3										
6.45				5	TW	P.H.										
	Sand And Gravel Trace Silt Grey, Wet Dense		226													
7.5																
8.10			225	6	SS	80										
	End Of Borehole Auger Refusal Probable Bedrock		224													
9.0																
10.5																
12.0																
13.5																
15.0																
16.5																

NOTES:

1. +7 Number refers to sensitivity.

CHECKED BY: E.W.

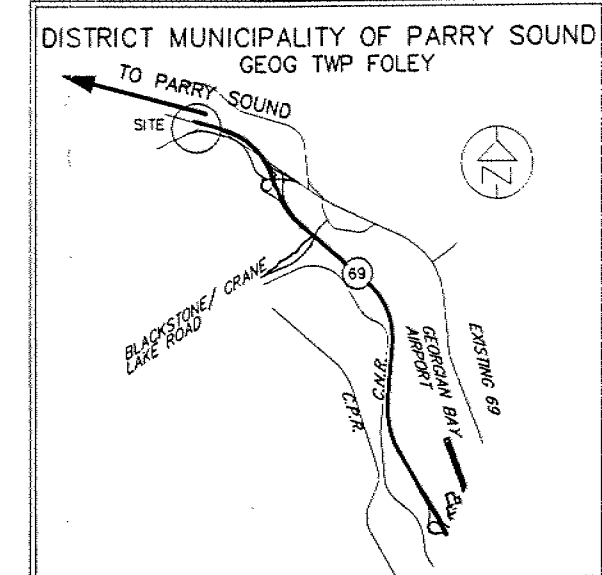
METRIC

PLATE No 451-69 28-3
DRAWING No 04510069026
CONT No C
GWP No 290-97-00



SHEET

STA 14+500 TO STA 14+897.05
Survey 1997/12 Revised R



KEY PLAN
(N.T.S.)

DISTRICT MUNICIPALITY OF PARRY SOUND
GEOGRAPHIC TWP OF FOLEY

LOT 118
CON B

LOT 117
CON A

LOT 117
CON B

SWAMP 11

LEGEND

- ⊕ Probehole
- ⊙ Borehole
- ⊞ Test Pit

NOTES:

1. Refer to Log of Borehole and Probehole Sheets for description of subsurface conditions.
2. Refer to Drawing 18A for soil profiles.

SCALE
10 0 20

MINISTRY OF TRANSPORTATION

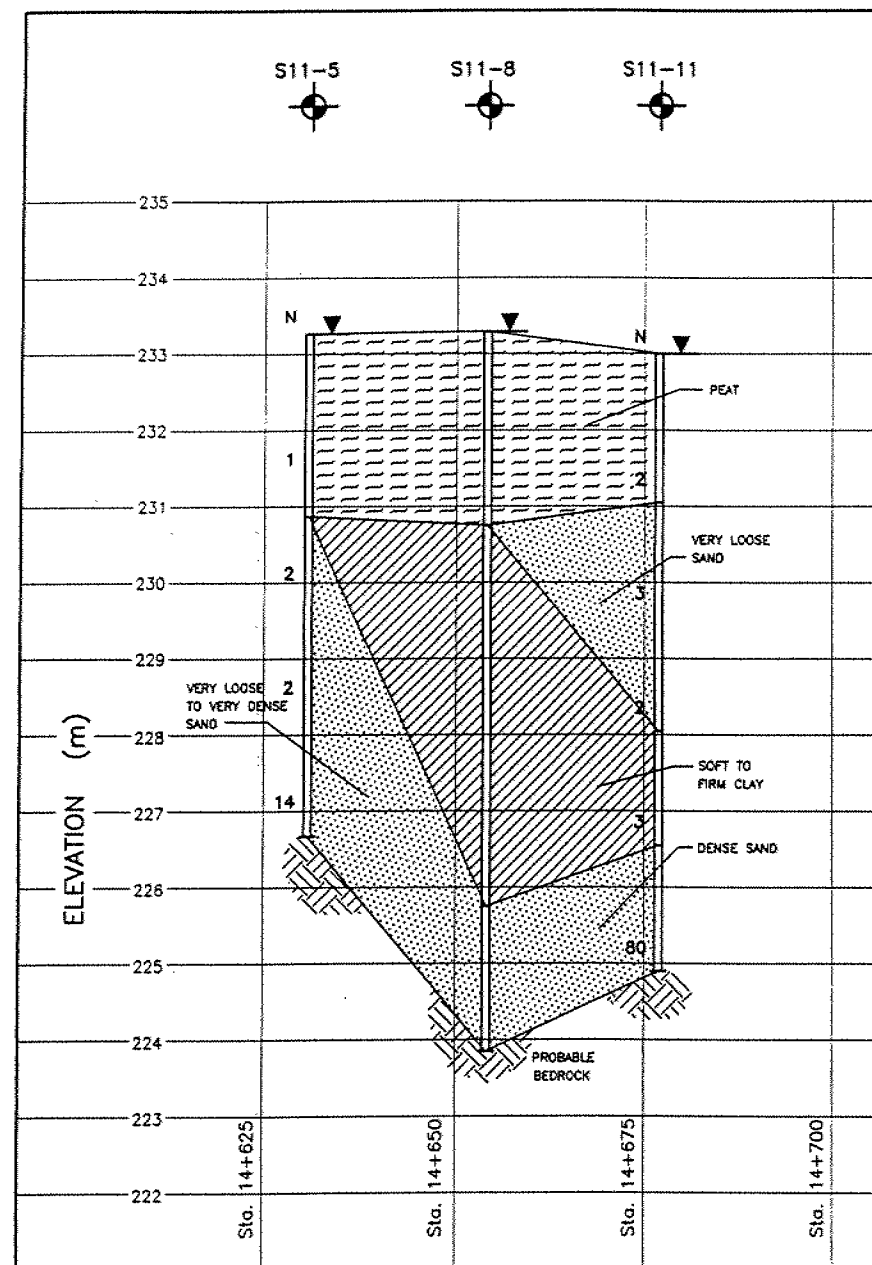
KING'S HIGHWAY 69

DISTRICT 52 HUNTSVILLE	REGION NORTHERN
GEOG. TWP. FOLEY	DISTRICT MUNICIPALITY PARRY SOUND

SWAMP 11
BOREHOLE AND PROBEHOLE LOCATION PLAN

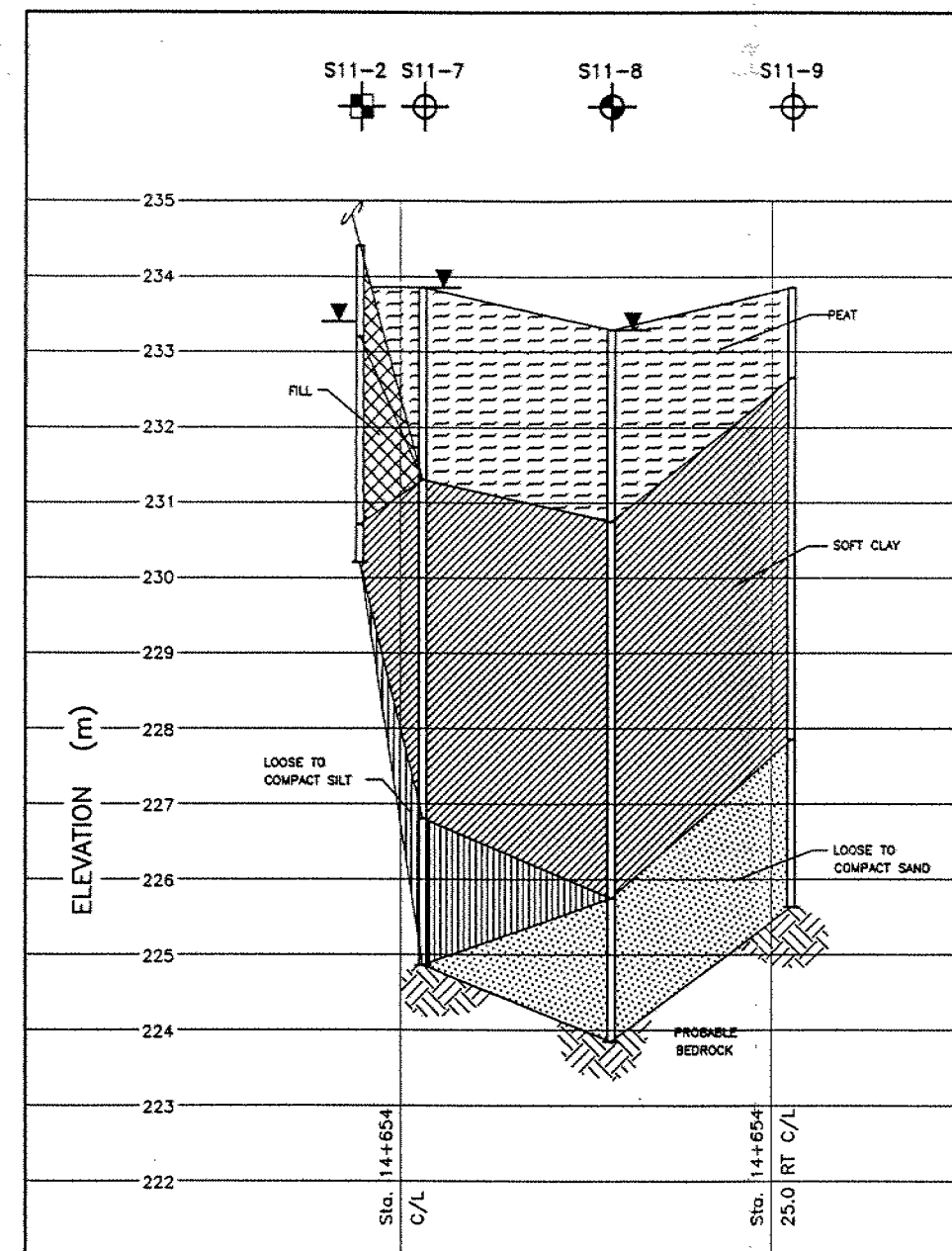
Peto MacCallum Ltd.
CONSULTING ENGINEERS
45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN JS	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED EW	MAY 1998	1 : 2000	97TF088B	18
APPROVED DWK				



SECTION A-A

SCALE VERTICAL 1:100
HORIZONTAL 1:1000



SECTION B-B

SCALE VERTICAL 1:100
HORIZONTAL 1:500

LEGEND

	PROBEHOLE		BOREHOLE		TEST PIT
	FILL		SAND		SILT
	TOPSOIL/PEAT		BEDROCK (INFERRED)		WATER
	CLAY		ASPHALT		
	OBSERVED WATER LEVEL (DURING OR UPON COMPLETION OF DRILLING)				

NOTES

1. REFER TO DRAWING NO. 18 FOR TESTHOLE AND SECTION LOCATIONS.
2. REFER TO LOG OF TESTHOLE SHEETS FOR DETAILED SUBSURFACE CONDITIONS.
3. THE BOUNDARIES BETWEEN SOIL STRATA HAVE BEEN ESTABLISHED ONLY AT TESTHOLE LOCATIONS. BETWEEN TESTHOLES, THE BOUNDARIES ARE ASSUMED FROM GEOLOGICAL EVIDENCE.

G.W.P. 290-97-00, HIGHWAY 69
NORTHBOUND LANE/TWP. OF FOLEY
DISTRICT 52, HUNTSVILLE, ONTARIO

SWAMP 11 - SOIL PROFILES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C6

DRAWN	LT	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	NOV. 1998	AS SHOWN	97TF088B	18A
APPROVED	DWK				

APPENDIX C

Laboratory Test Results

- | | | |
|-------------------------|----------|---|
| Table II | - | Laboratory Test Results
Atterberg Limits
Organic Content
Wet Unit Weight
Dry Unit Weight |
| Table III | - | Triaxial Compression Test Results |
| Figures 1 to 12 | - | Consolidation Test Results |
| Figures 13 to 19 | - | Particle Size Distribution Charts |
| Figures 20 to 22 | - | Plasticity Charts |

TABLE II
LABORATORY TEST RESULTS
G.W.P. 290-97-00

SWAMP NO.	TESTHOLE NO.	SAMPLE DEPTH (M)	SOIL TYPE	LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	ORGANIC CONTENT (%)	WET UNIT WEIGHT (kg/m ³)	DRY UNIT WEIGHT (kg/m ³)
1	S1-9	6.7-7.3	Silty Clay	33	18	15			
1	S1-12	3.2-3.6	Silty Clay	25	15	10	-	-	-
1	S1-25	3.6-4.1	Peat	-	-	-	83	1026	116
1A	S1A-6	6.0-6.3	Silty Clay	16	6	10	-	-	-
2	S2-4	1.5-1.8	Peat	-	-	-	40	-	-
2	S2-7	3.0-3.5	Peat	-	-	-	-	985	101
2	S2-10	4.5-6.1	Peat	-	-	-	69	-	-
2	S2-10	10.6-11.1	Silty Clay	34	18	16	-	-	-
3	S3-8	4.7-5.2	Silty Clay	38	19	19	-	-	-
3	S3-14	4.5-5.0	Peat	-	-	-	62	1085	196
3	S3-32	3.6-4.1	Peat				38	1056	198
7	S7-26	1.5-2.0	Peat	-	-	-	88	-	-
7	S7-26	3.0-3.6	Peat	-	-	-	59	1017	107
7	S7-26	3.0-3.6	Peat	-	-	-	91	-	-
7	S7-26	6.1-6.8	Peat	-	-	-	31	-	-
7	S7-26	7.3-7.9	Silty Clay	42	19	23	-	-	-
7	S7-104	9.0-9.7	Silty Clay	46	20	26	-	1547	938
7	S7-116	4.5-5.2	Peat	-	-	-	59	1001	125
7A	S7A-3	3.9-4.4	Silty Clay	28	21	7	-	-	-
7A	S7A-12	3.9-4.4	Silty Clay	41	22	19	-	-	-
7B	S7B-1	3.9-4.5	Silty Clay	34	18	16	-	1874	1430
7B	S7B-3	2.4-3.0	Silty Clay	35	17	18	-	-	-
9	S9-1	3.6-4.2	Silt With Sand and Clay	16	15	NP*	-	2070	1723
11	S11-8	5.5-6.1	Silty Clay	52	23	29	-	1460	928

* Non- Plastic

TABLE III
TRIAXIAL COMPRESSION TEST RESULTS
G.W.P. 290-97-00

SWAMP NO.	TESTHOLE NO.	SAMPLE DEPTH (m)	SOIL TYPE	CONSOLIDATED UNDRAINED TEST			
				CELL PRESSURE (kPa)	DEVIATOR STRESS (kPa)	SHEAR* STRENGTH (kPa)	FRICTION ANGLE (degree)
2	S2 - 7	3.0 - 3.5	Peat	55	29.2	14	17
3	S3 - 8	4.7 - 5.1	Silty Clay	55	29.2	14	12
3	S3 - 14	4.5 - 5.0	Peat	55	48.3	23	18
7	S7 - 26	7.2 - 7.8	Silty Clay	95	48.8	23	20
7	S7 - 104	9.0 - 9.7	Silty Clay	120	68.9	34	13
7	S7 - 116	4.5 - 5.2	Peat	55	52.4	25	19
7B	S7B - 1	3.9 - 4.5	Silty Clay	60	49.6	24	17
9	S9 - 1	3.6 - 4.2	Silt with Clay and Sand	145	324.2	137	32
				CONSOLIDATED DRAINED TEST			
1	S1 - 25	3.6 - 4.1	Peat	50	111	47	32
2	S2 - 7	3.0 - 3.5	Peat	35	35.6	17	20
3	S3 - 14	4.5 - 5.0	Peat	55	48.3	23	20
3	S3 - 35	3.0 - 3.6	Peat	45	47.4	22	20
7	S7 - 26	3.0 - 3.6	Peat	40	32.8	31	18
7	S7 - 104	9.0 - 9.7	Silty Clay	120	155.2	71	23
9	S9 - 1	3.6 - 4.2	Silt with Clay and Sand	145	452.3	178	38

* shear strength defined by a line drawn through the origin tangent to the failure circle.

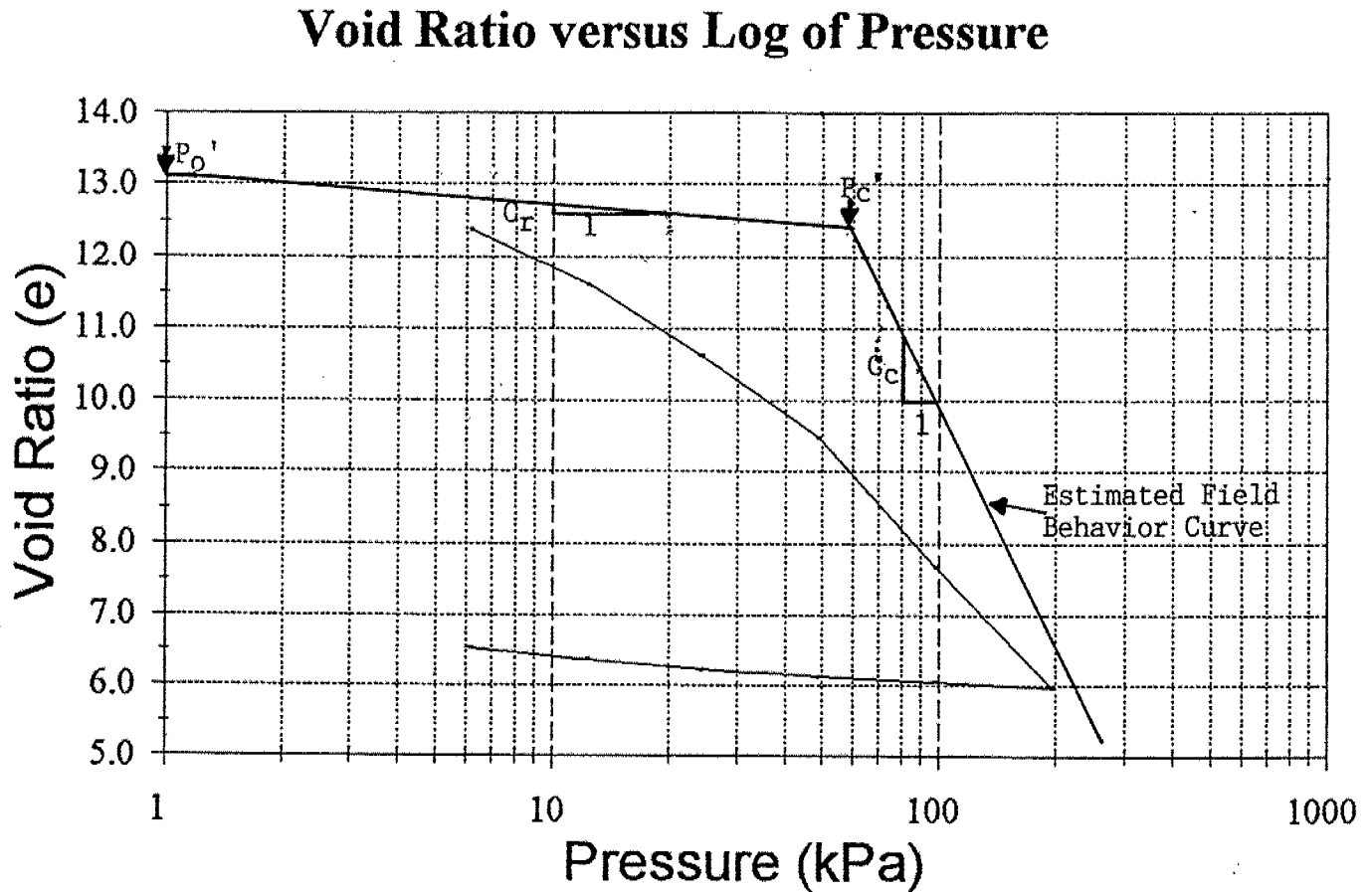
FIGURE 1

Laboratory Consolidation Test Results

Borehole S1-25, Sample 2

Depth: 3.6 – 4.1 m

Description: Peat



G.W.P. 290-97-00

97TF088B

$P'_0 = 1 \text{ kPa}$
 $P'_c = 14 \text{ kPa}$
 $C_c = 4.44$
 $C_r = 0.42$
 $e_0 = 13.07$
 $w_0 = 787\%$
 $\gamma = 10.1 \text{ kN/m}^3$

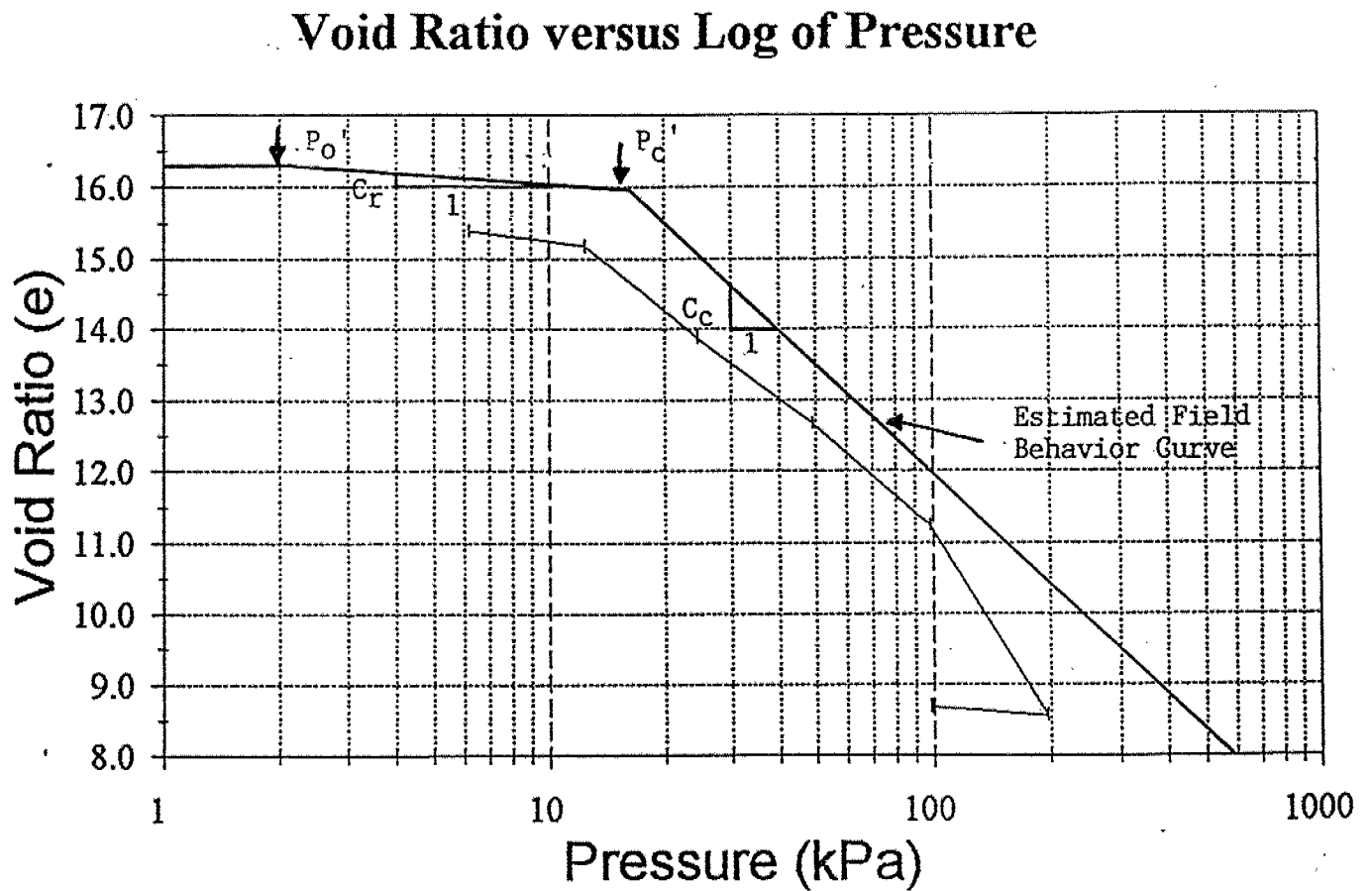
FIGURE 2

Laboratory Consolidation Test Results

Borehole S2-7, Sample 2

Depth: 3.0 – 3.5 m

Description: Peat



G.W.P. 290-97-00

97TF088B

$P'_0 = 2 \text{ kPa}$
 $P'_c = 17 \text{ kPa}$
 $C_c = 5.19$
 $C_r = 0.38$
 $e_o = 16.34$
 $w_o = 835\%$
 $\gamma = 9.65 \text{ kN/m}^3$

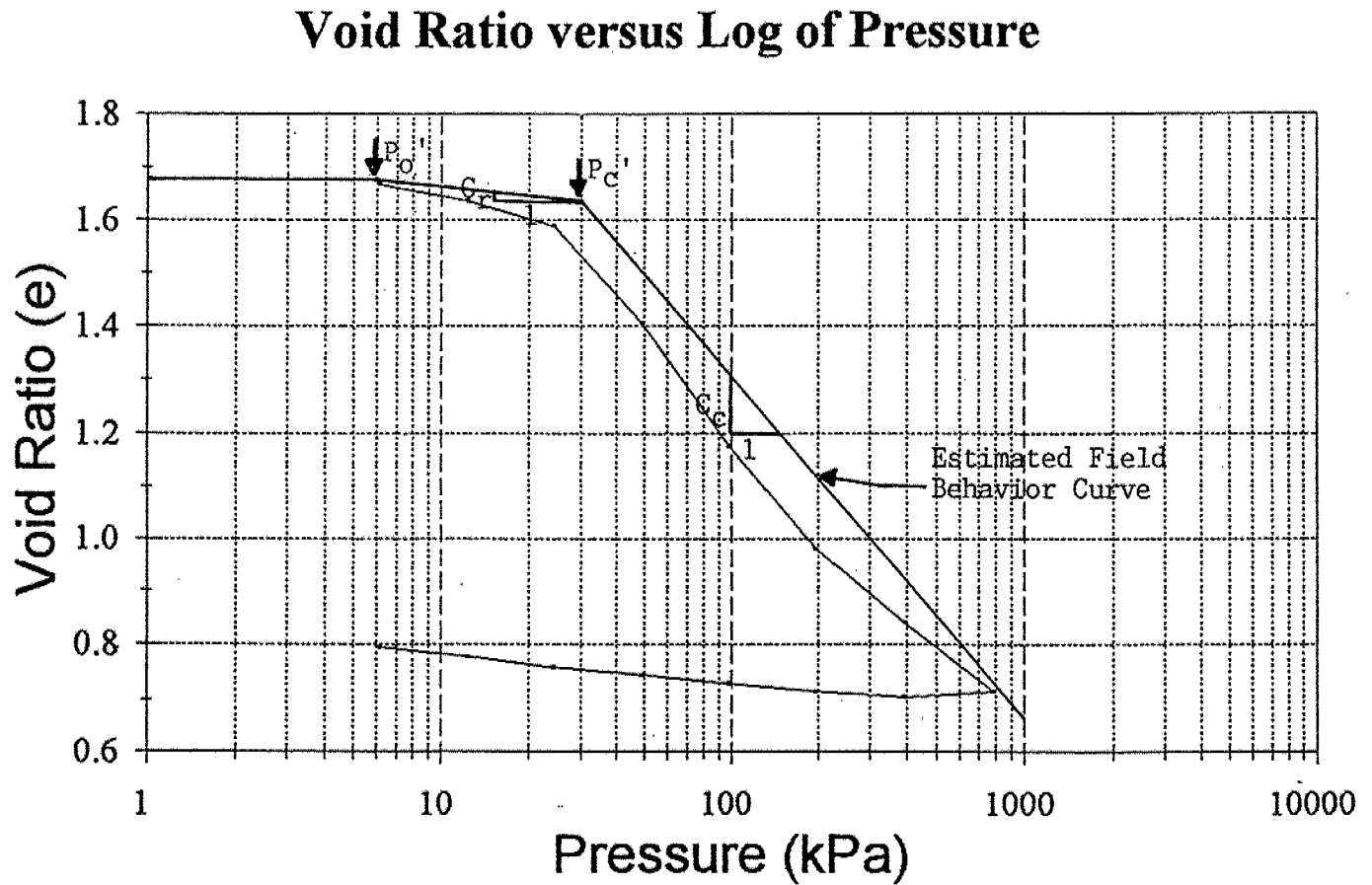
FIGURE 3

Laboratory Consolidation Test Results

Borehole S3-8, Sample 4

Depth: 4.7 – 5.1 m

Description: Silty Clay



G.W.P. 290-97-00

97TF088B

$P'_o = 6$ kPa
 $P'_c = 30$ kPa
 $C_c = 0.60$
 $C_r = 0.04$
 $e_o = 1.68$
 $w_o = 62\%$
 $\gamma = 16.32$ kN/m³

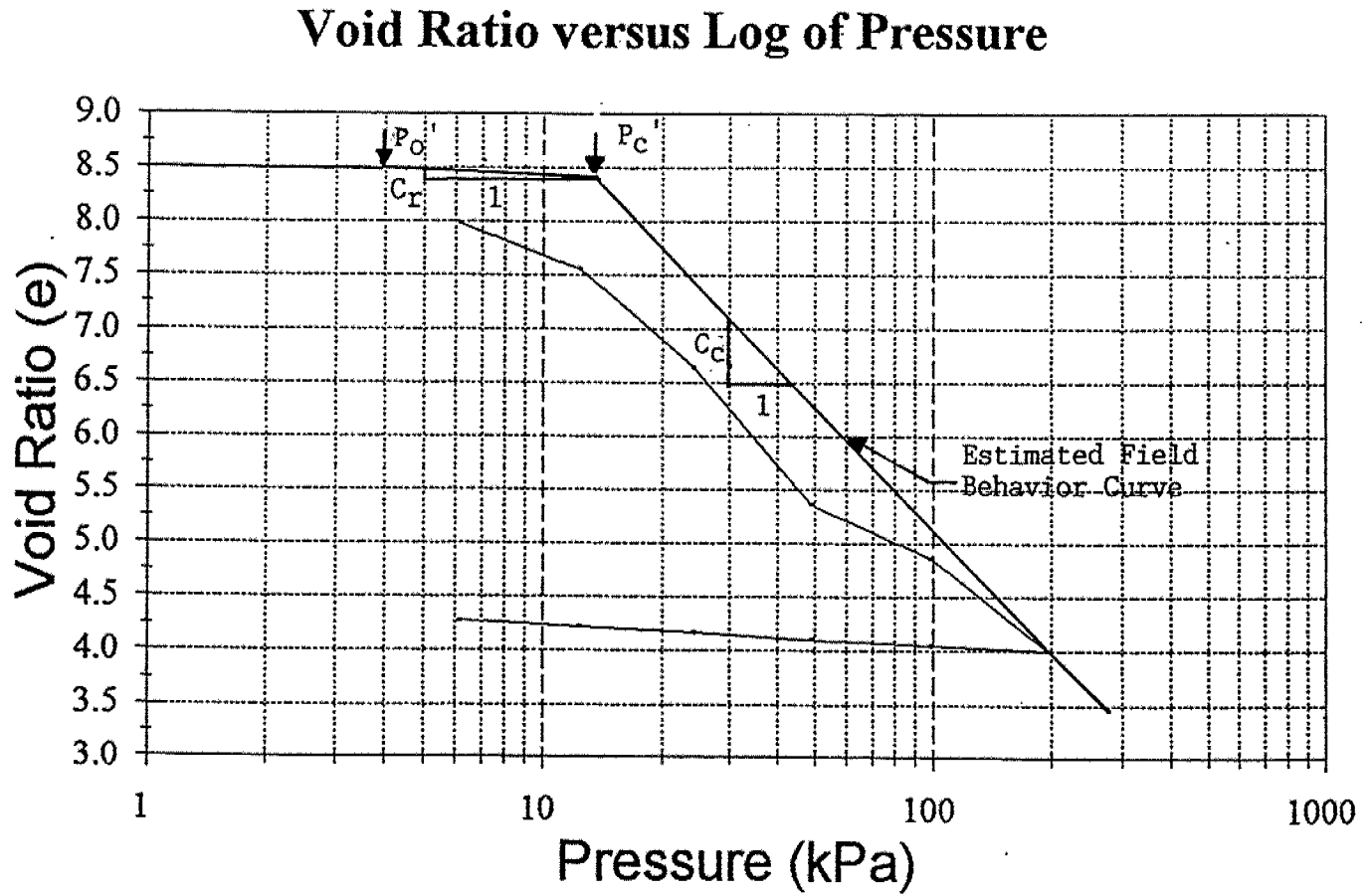
FIGURE 4

Laboratory Consolidation Test Results

Borehole S3-14, Sample 7

Depth: 4.5 – 5.0 m

Description: Peat



G.W.P. 290-97-00

97TF088B

$P'_0 = 3 \text{ kPa}$
 $P'_c = 14 \text{ kPa}$
 $C_c = 3.74$
 $C_r = 0.21$
 $e_0 = 8.51$
 $w_0 = 454\%$
 $\gamma = 10.9 \text{ kN/m}^3$

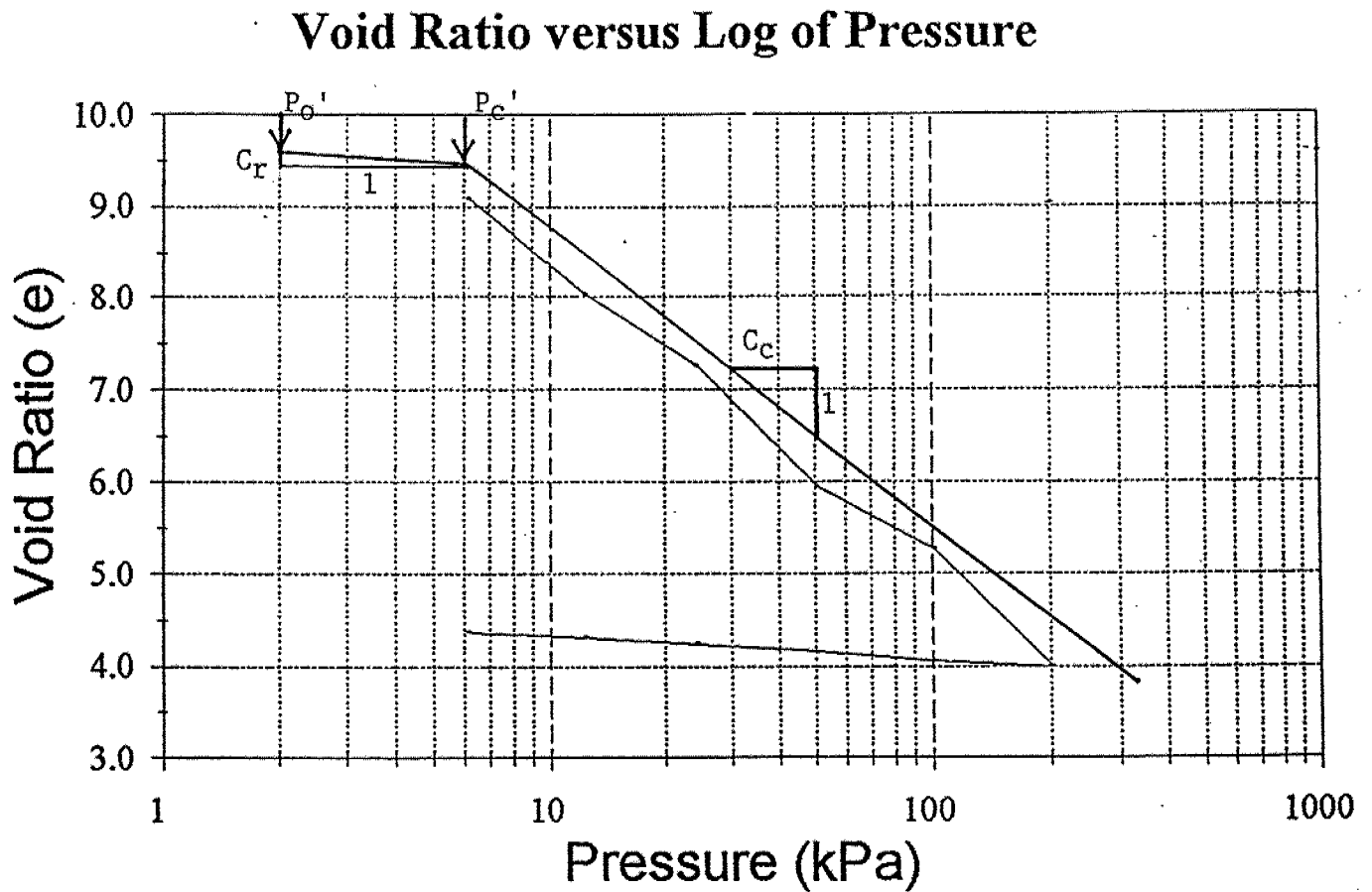
FIGURE 5

Laboratory Consolidation Test Results

Borehole S3-35, Sample 2

Depth: 3.0 – 3.6 m

Description: Peat



G.W.P. 290-97-00

97TF088B

$P'_{0'}$ = 2 kPa
 $P'_{c'}$ = 24 kPa
 C_c = 3.25
 C_r = 0.30
 e_0 = 9.59
 w_0 = 433%
 γ = 10.6 kN/m³

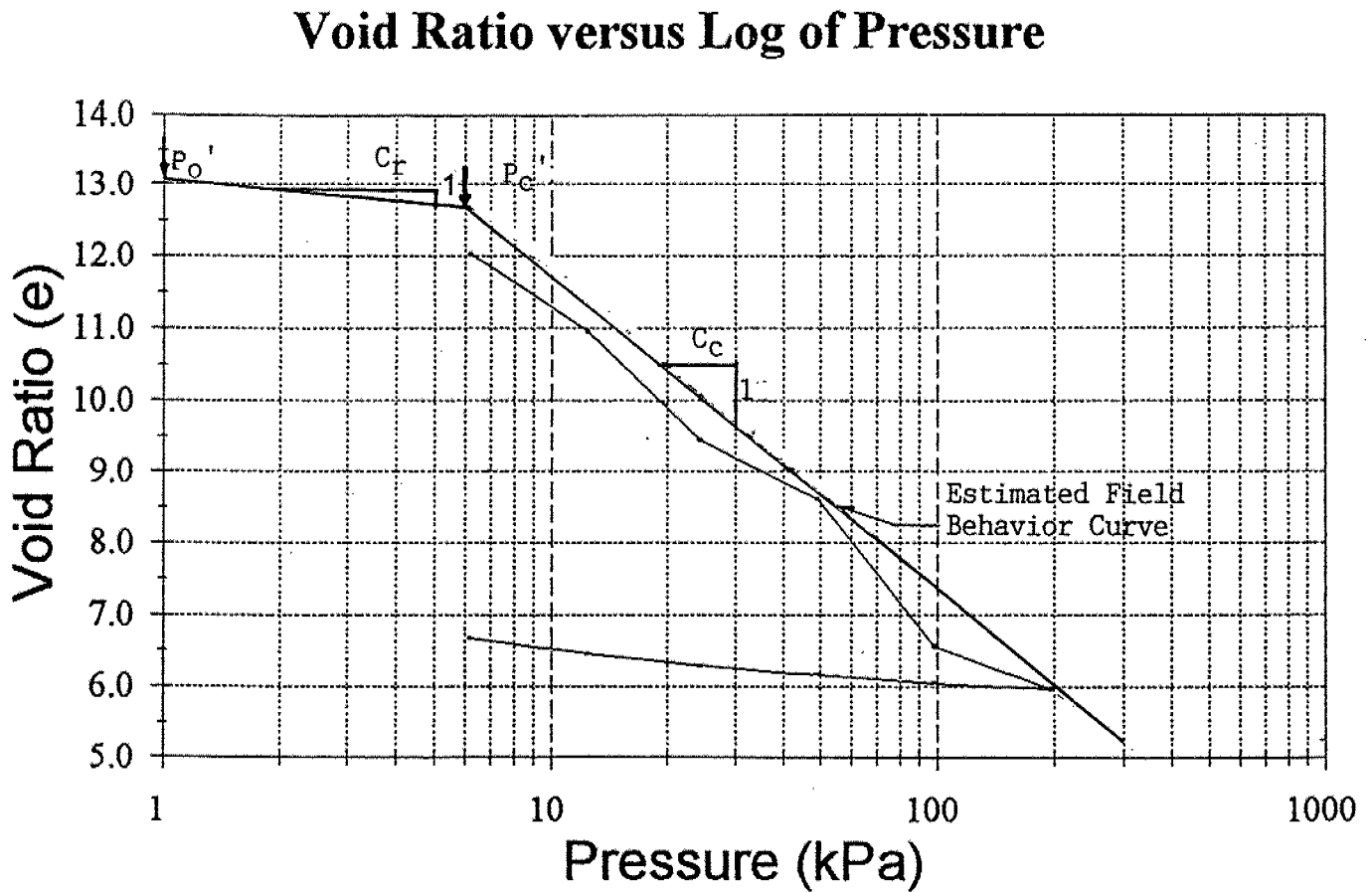
FIGURE 6

Laboratory Consolidation Test Results

Borehole S7-26, Sample 2

Depth: 3.0 – 3.5 m

Description: Peat



G.W.P. 290-97-00

97TF088B

$P'_0 = 1 \text{ kPa}$
 $P'_c = 6 \text{ kPa}$
 $C_c = 4.31$
 $C_r = 0.46$
 $e_0 = 13.14$
 $w_0 = 850\%$
 $\gamma = 10.2 \text{ kN/m}^3$

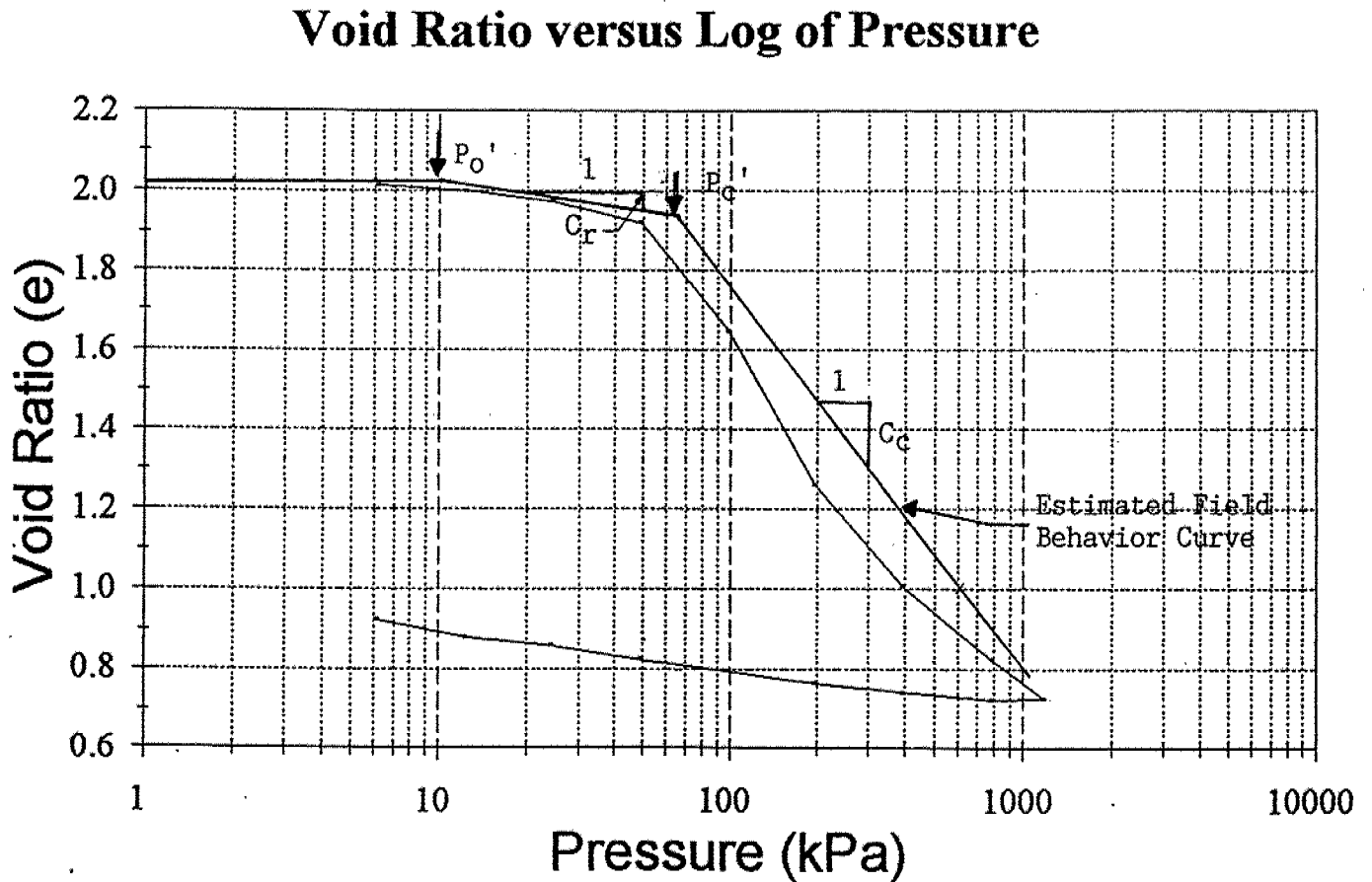
FIGURE 7

Laboratory Consolidation Test Results

Borehole S7-26, Sample 6

Depth: 7.3 – 7.9 m

Description: Silty Clay



G.W.P. 290-97-00

97TF088B

$P'_0 = 10 \text{ kPa}$
 $P'_c = 65 \text{ kPa}$
 $C_c = 0.97$
 $C_r = 0.13$
 $e_o = 2.04$
 $w_o = 77\%$
 $\gamma = 15.7 \text{ kN/m}^3$

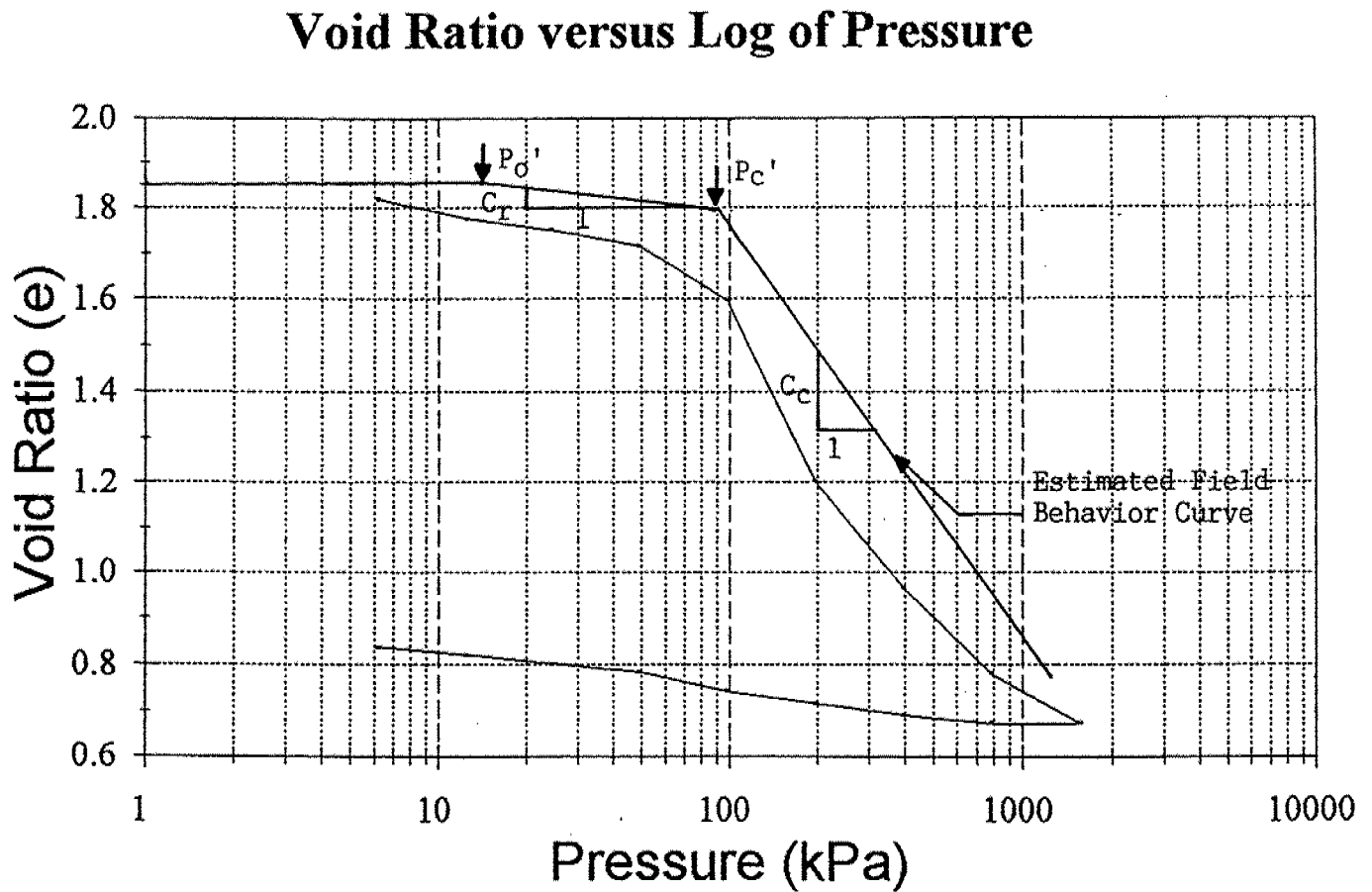
FIGURE 8

Laboratory Consolidation Test Results

Borehole S7-104, Sample 3

Depth: 9.0 – 9.6 m

Description: Silty Clay



G.W.P. 290-97-00

97TF088B

$P_o' = 15 \text{ kPa}$
 $P_c' = 90 \text{ kPa}$
 $C_c = 0.96$
 $C_r = 0.08$
 $e_o = 1.86$
 $w_o = 65\%$
 $\gamma = 15.5 \text{ kN/m}^3$

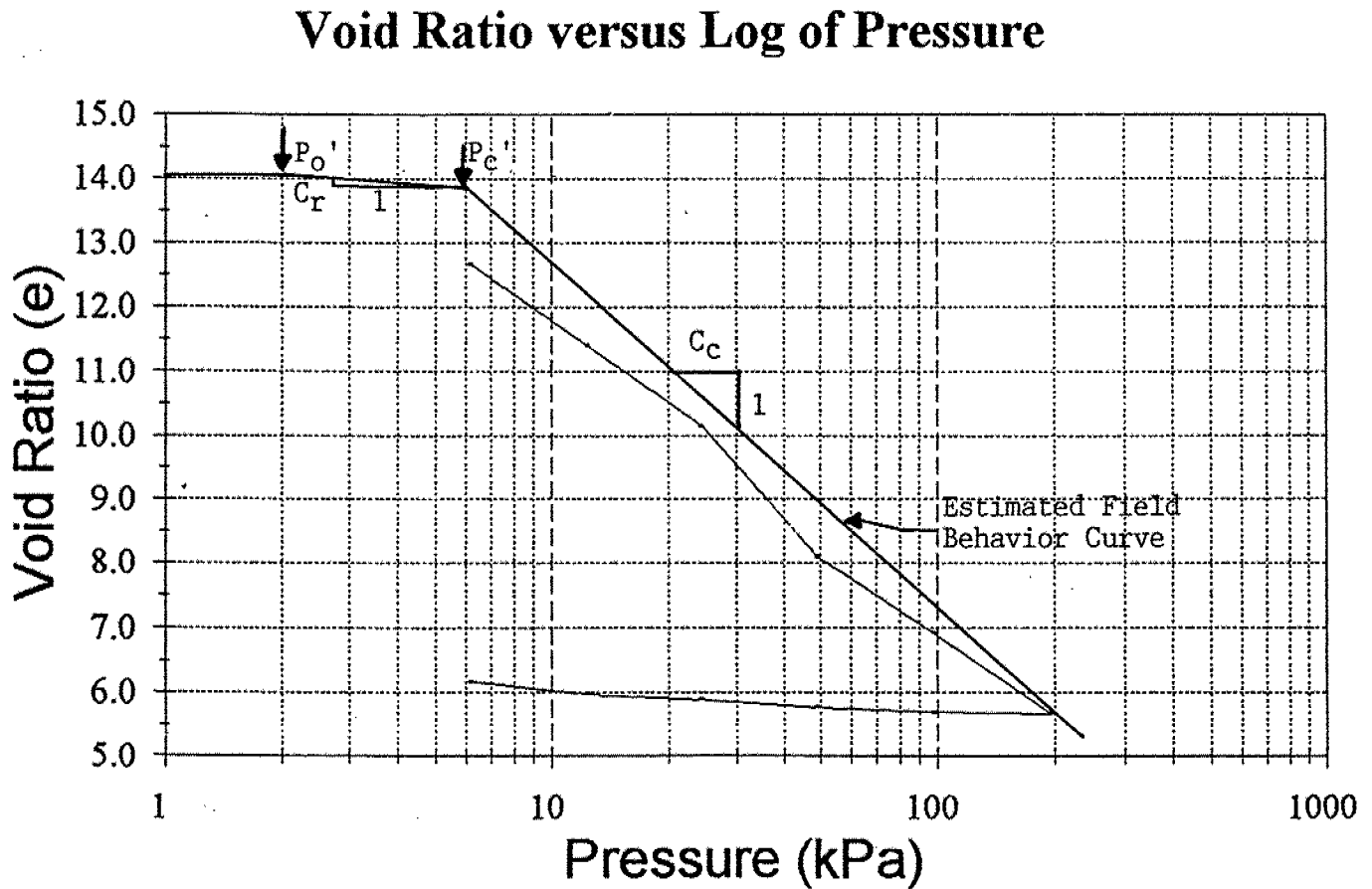
FIGURE 9

Laboratory Consolidation Test Results

Borehole S7-116, Sample 2

Depth: 4.5 – 5.2 m

Description: Peat



G.W.P. 290-97-00

97TF088B

$P'_{o'} = 2 \text{ kPa}$
 $P'_{c'} = 6 \text{ kPa}$
 $C_c = 5.24$
 $C_r = 0.33$
 $e_o = 14.08$
 $w_o = 700\%$
 $\gamma = 10.2 \text{ kN/m}^3$

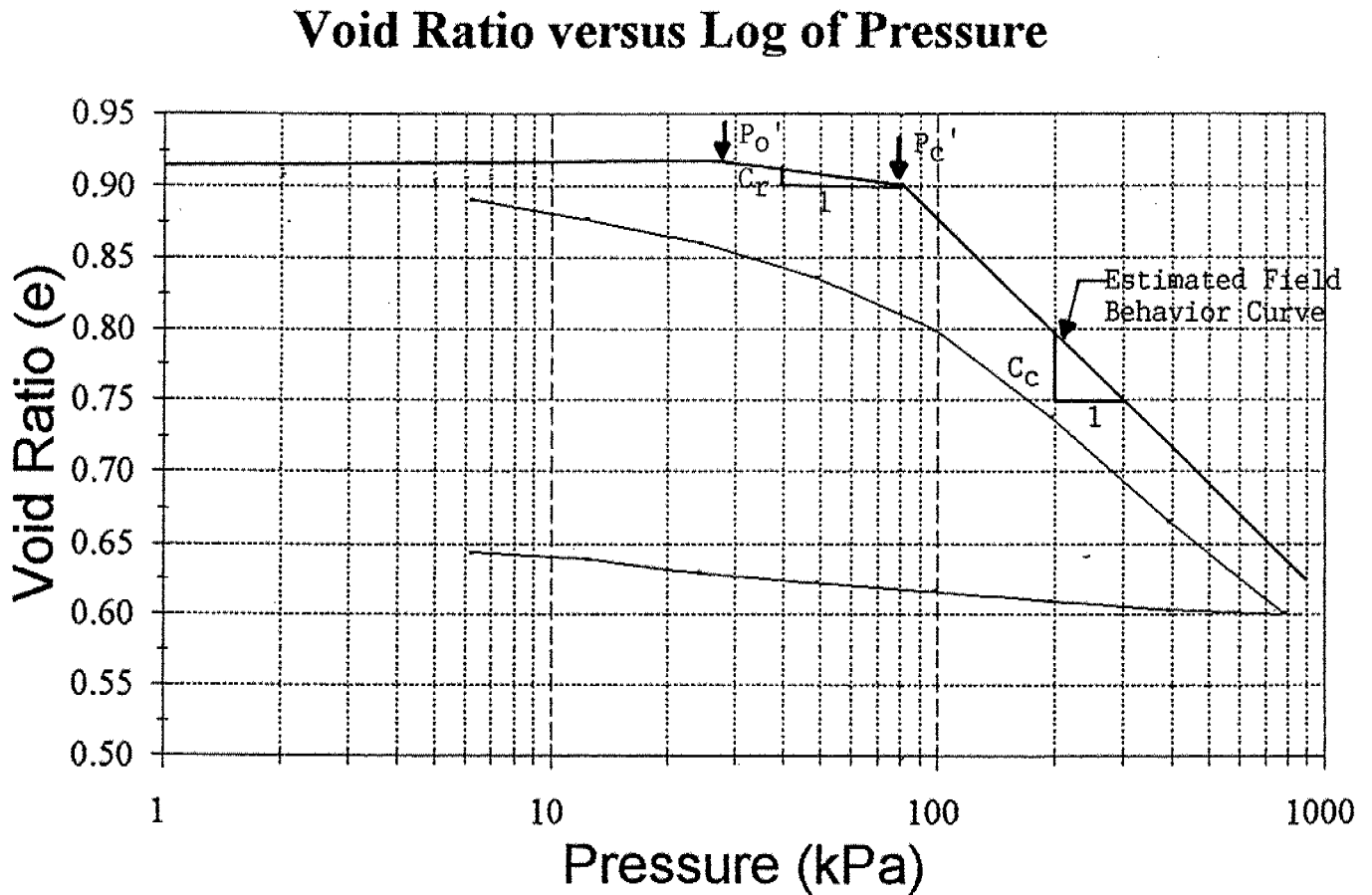
FIGURE 10

Laboratory Consolidation Test Results

Borehole S7B-1, Sample 6

Depth: 3.9 – 4.5 m

Description: Silty Clay



G.W.P. 290-97-00

97TF088B

$P'_0 = 27 \text{ kPa}$
 $P'_c = 80 \text{ kPa}$
 $C_c = 0.28$
 $C_r = 0.03$
 $e_o = 0.92$
 $w_o = 31\%$
 $\gamma = 18.7 \text{ kN/m}^3$

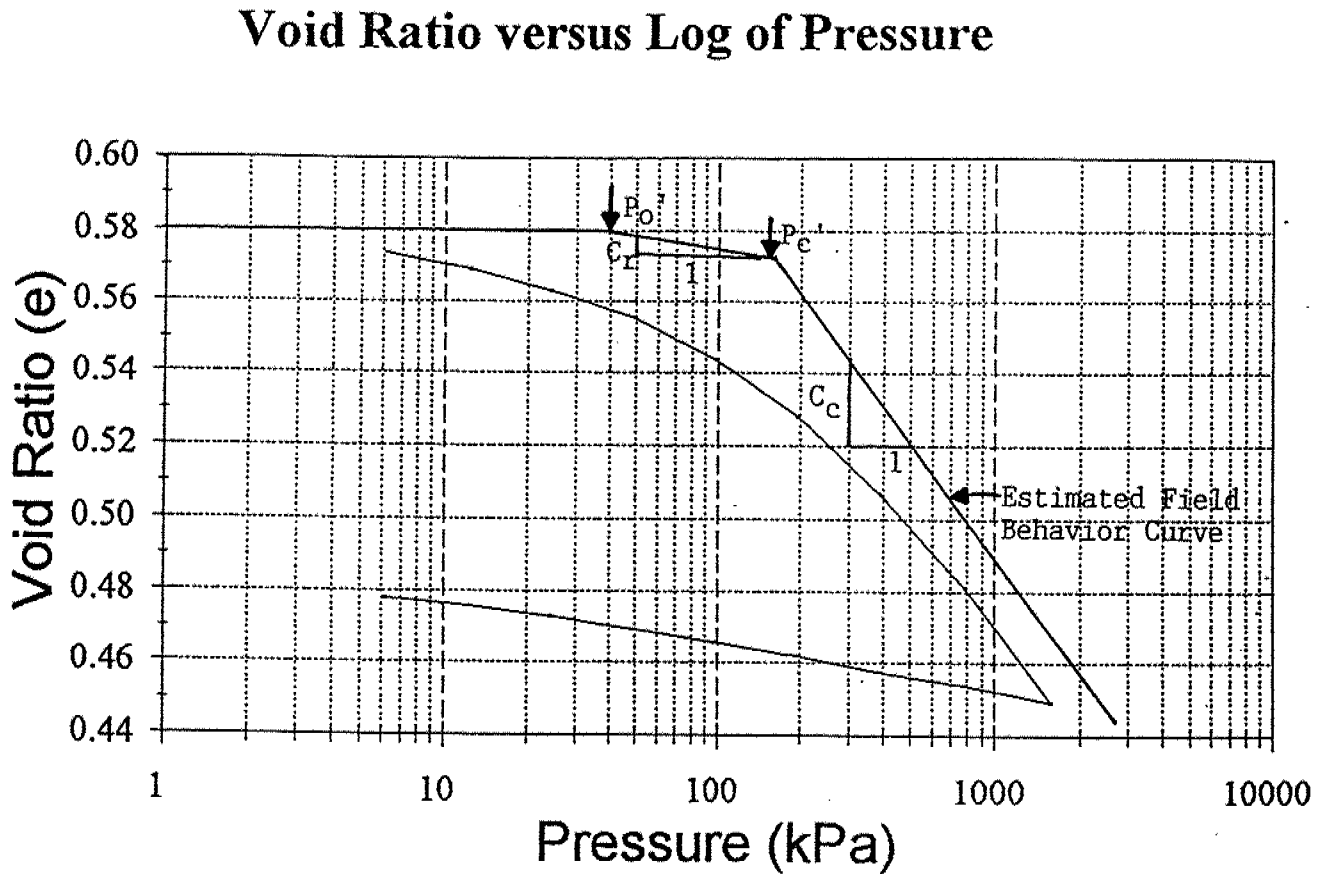
FIGURE 11

Laboratory Consolidation Test Results

Borehole S9-1, Sample 3

Depth: 3.6 – 4.2 m

Description: Silt with Clay and Sand



G.W.P. 290-97-00

97TF088B

$P'_0 = 40 \text{ kPa}$
 $P'_c = 170 \text{ kPa}$
 $C_c = 0.10$
 $C_r = 0.02$
 $e_0 = 0.58$
 $w_0 = 20\%$
 $\gamma = 20.7 \text{ kN/m}^3$

FIGURE 12

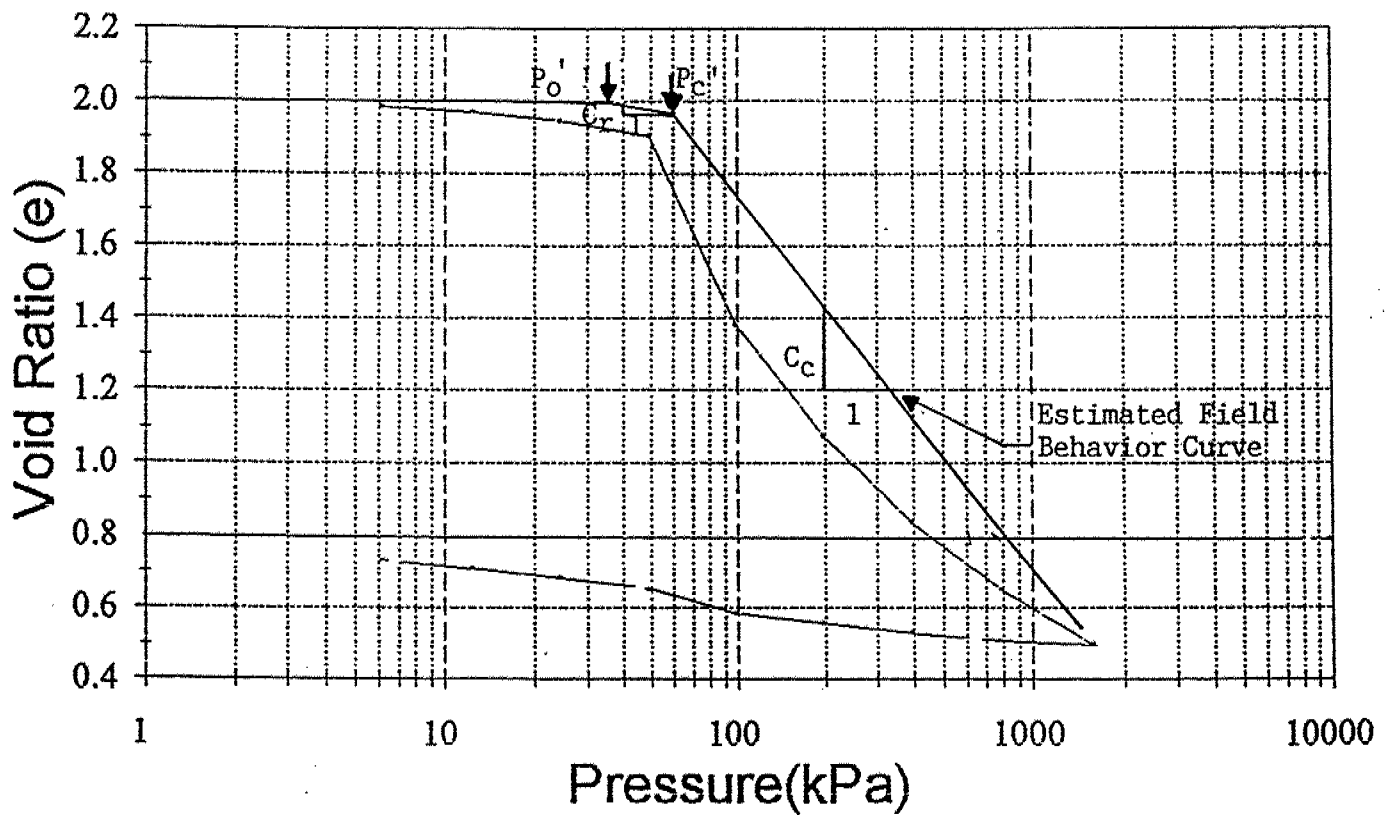
Laboratory Consolidation Test Results

Borehole S11-8, Sample 1

Depth: 5.5 – 6.1 m

Description: Silty Clay

Void Ratio versus Log of Pressure



G.W.P. 290-97-00

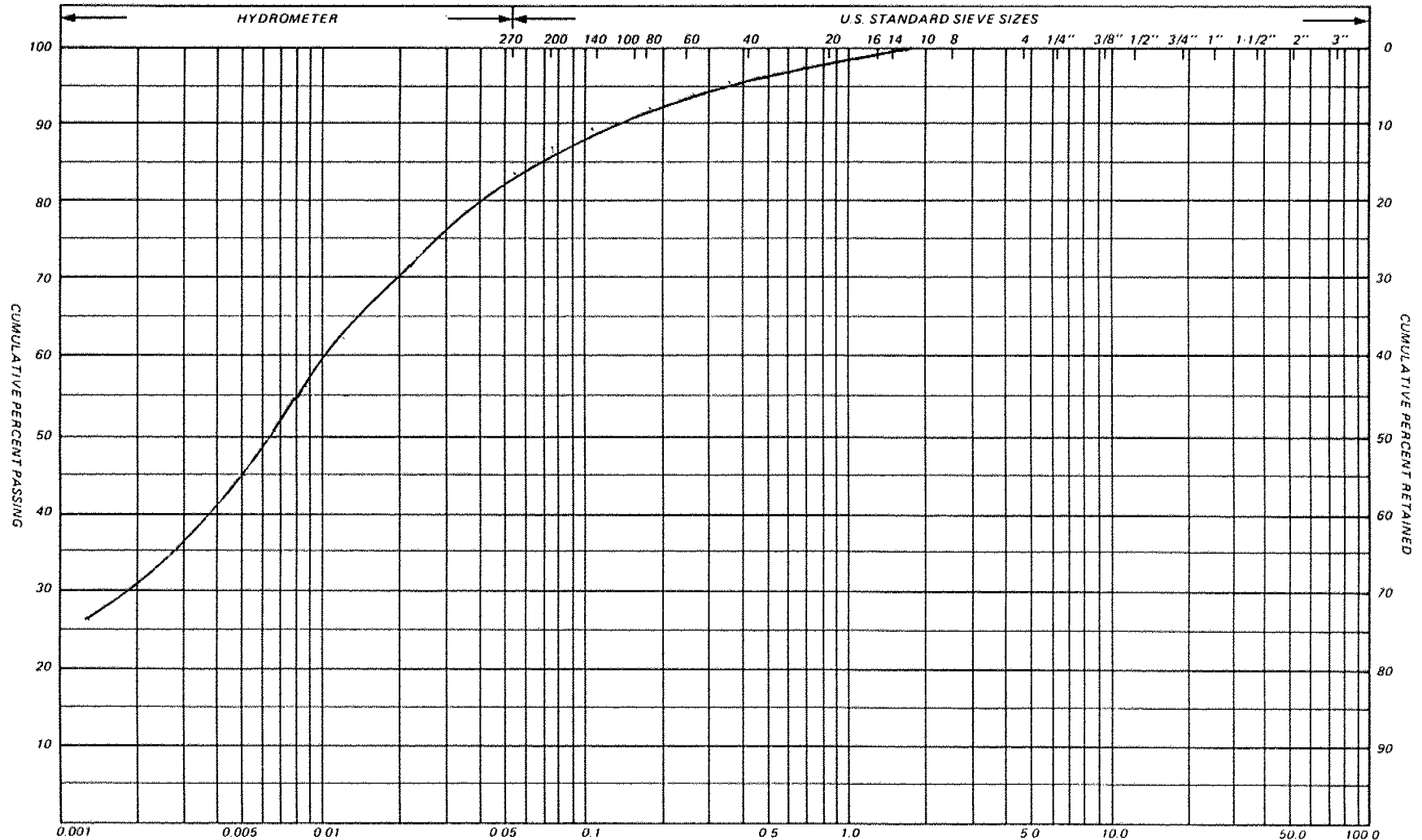
97TF088B

$P'_o = 38$ kPa
 $P'_c = 60$ kPa
 $C_c = 1.0$
 $C_r = 0.33$
 $e_o = 1.99$
 $w_o = 62\%$
 $\gamma = 17.1$ kN/m³

PARTICLE SIZE DISTRIBUTION CHART

PML REF. 97TF088B
REPORT NO. -
FIGURE 13

G.W.P. 290-97-00



GRAIN SIZE IN MILLIMETERS															
SILT & CLAY					FINE SAND			MEDIUM SAND		COARSE SAND		GRAVEL		COBBLES	
CLAY	FINE SILT		MEDIUM SILT		COARSE SILT		FINE SAND		MEDIUM SAND		COARSE SAND		GRAVEL		COBBLES
	FINE		MEDIUM		COARSE		FINE		MEDIUM		COARSE		GRAVEL		COBBLES
CLAY		SILT			V. FINE SAND		FINE SAND		MED. SAND		COARSE SAND		GRAVEL		

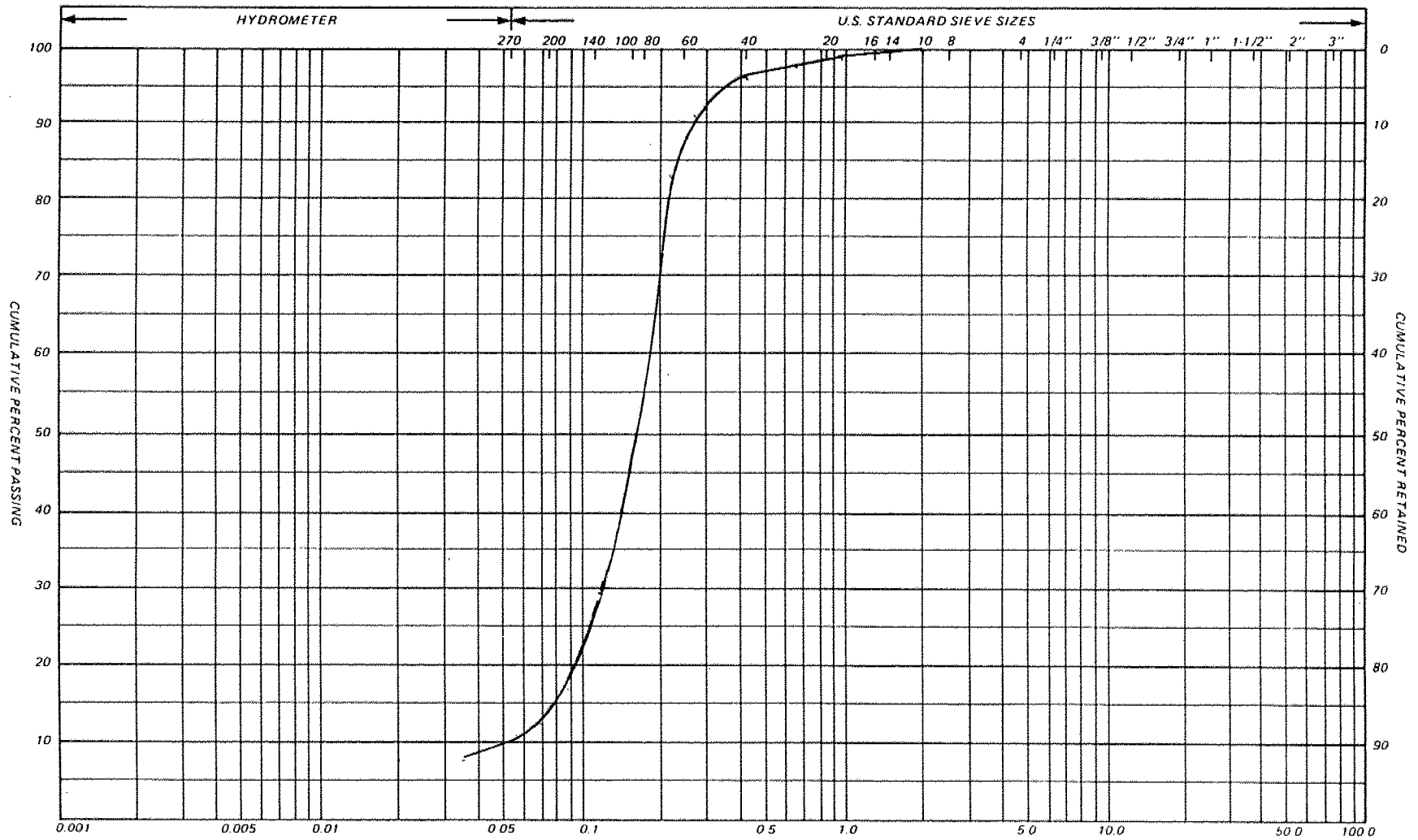
UNIFIED
M.I.T.
U.S. BUREAU

REMARKS: Silty clay, some sand
B.H. S1-12, Sample 4, Depth 3.2 - 3.6 m

PARTICLE SIZE DISTRIBUTION CHART

G.W.P. 290-97-00

PML REF. 97TF088B
REPORT NO. -
FIGURE 14



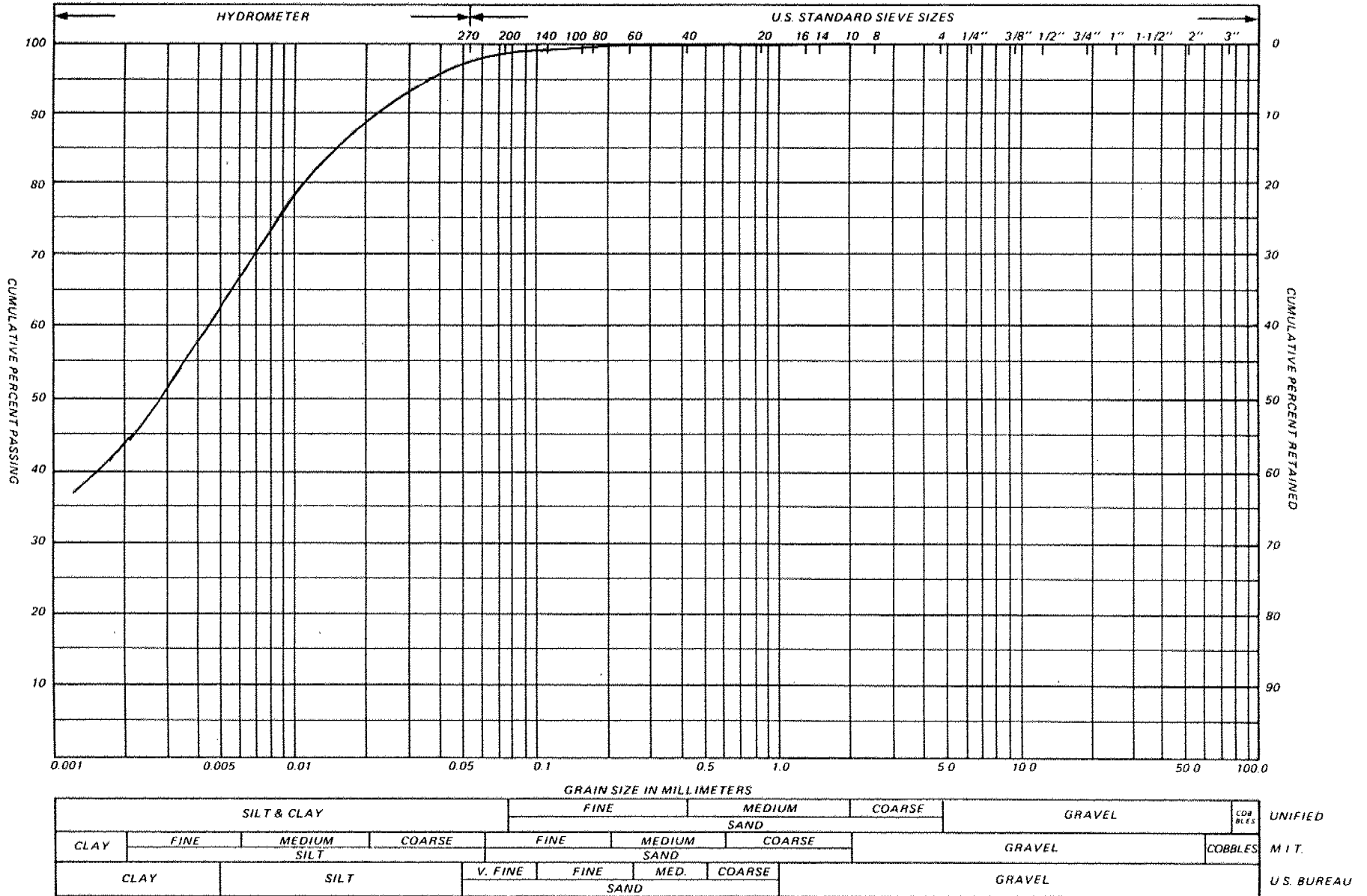
GRAIN SIZE IN MILLIMETERS										UNIFIED
SILT & CLAY			FINE		MEDIUM SAND		COARSE		GRAVEL	
CLAY	FINE	MEDIUM SILT	COARSE	FINE	MEDIUM SAND	COARSE	GRAVEL			M.I.T.
CLAY	SILT		V. FINE	FINE	MED.	COARSE	GRAVEL			U.S. BUREAU

REMARKS Sand with silt
B.H. S2-10, Sample 5, Depth 7.5 – 8.1 m

PARTICLE SIZE DISTRIBUTION CHART

G.W.P. 290-97-00

PML REF. 97TF088B
REPORT NO. -
FIGURE 15

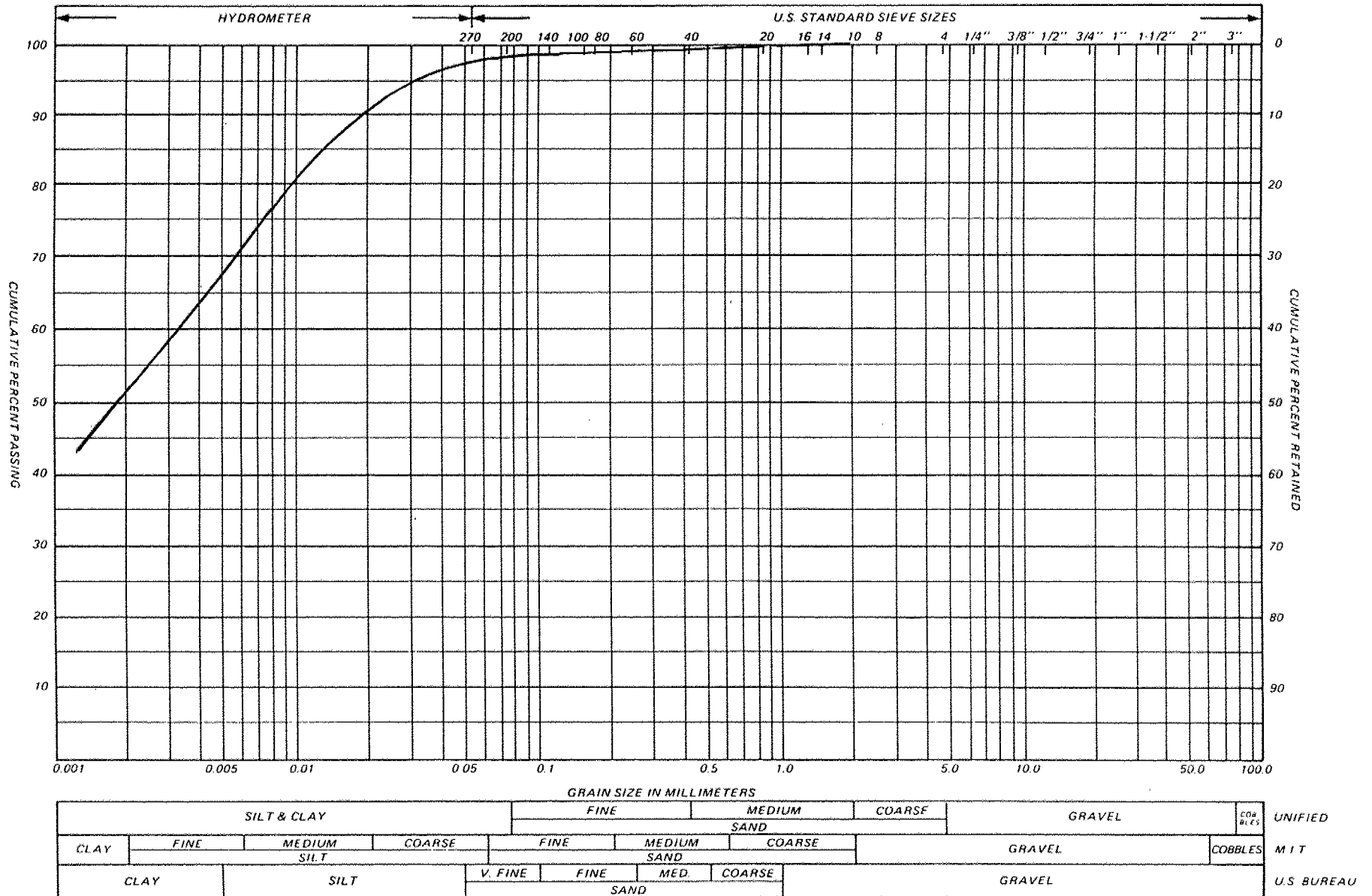


REMARKS Silty clay, trace of sand
B.H. S3-8, Sample 4, Depth 4.7 - 5.2 m

PARTICLE SIZE DISTRIBUTION CHART

G.W.P. 290-97-00

PML REF. 97TF088B
REPORT NO. -
FIGURE 16

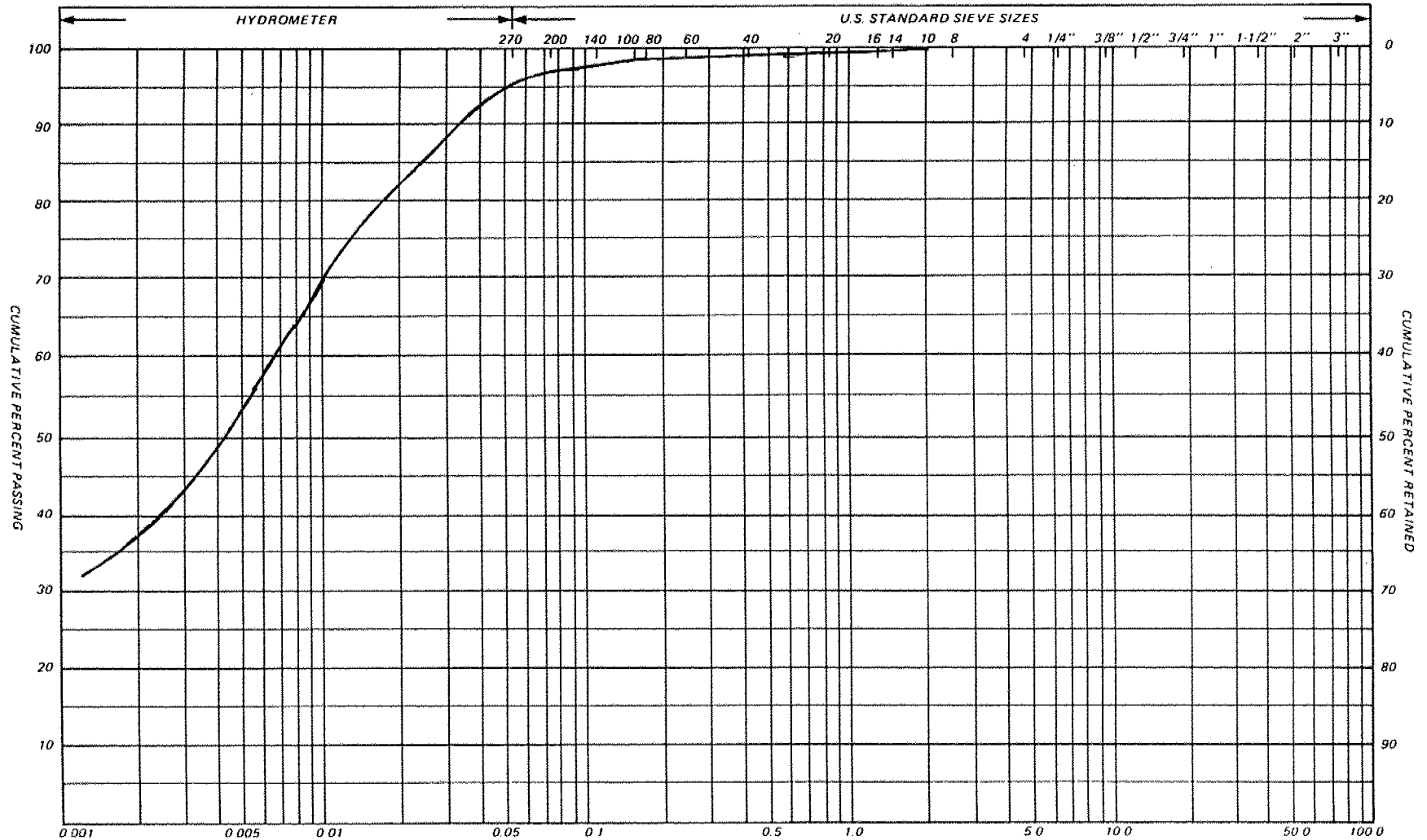


REMARKS Silty clay, trace of sand
B.H. S7-104, Sample 5, Depth 9.0 - 9.7 m

PARTICLE SIZE DISTRIBUTION CHART

G.W.P. 290-97-00

PML REF. 97TF088B
REPORT NO. -
FIGURE 17



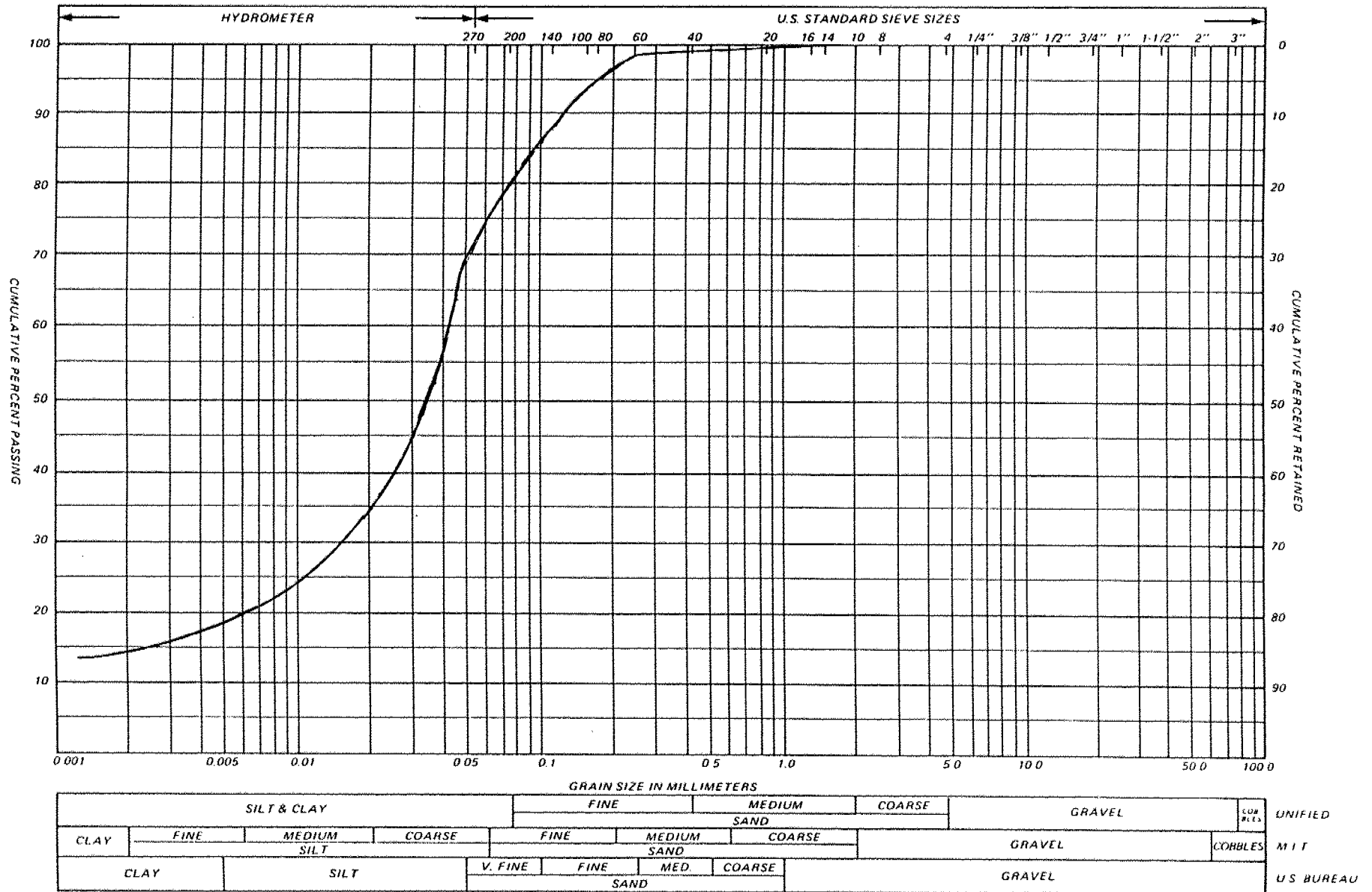
SILT & CLAY				FINE SAND			COARSE SAND	GRAVEL	COBBLES	UNIFIED
CLAY	FINE	MEDIUM SILT	COARSE	FINE	MEDIUM SAND	COARSE		GRAVEL		MIT
CLAY		SILT		V. FINE	FINE	MED.	COARSE	GRAVEL		U.S. BUREAU

REMARKS: Silty clay, trace of sand
B.H. S7B-3, Sample 3, Depth 2.4 - 3.0 m

PARTICLE SIZE DISTRIBUTION CHART

G.W.P. 290-97-00

PML REF. 97TF088B
REPORT NO. -
FIGURE 18

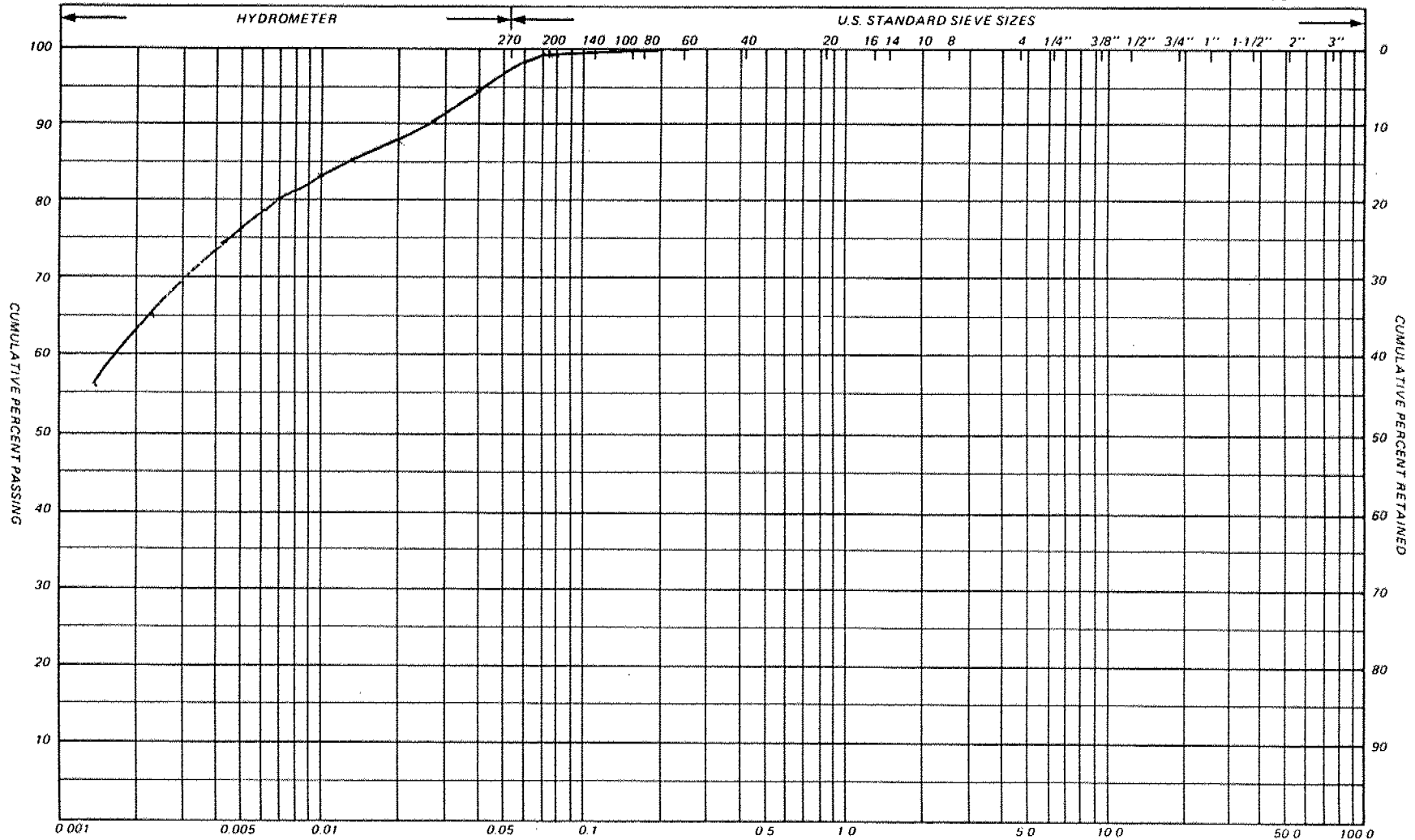


REMARKS: Silt with sand and clay
B.H. S9-1, Sample 3, Depth 3.6 - 4.2 m

PARTICLE SIZE DISTRIBUTION CHART

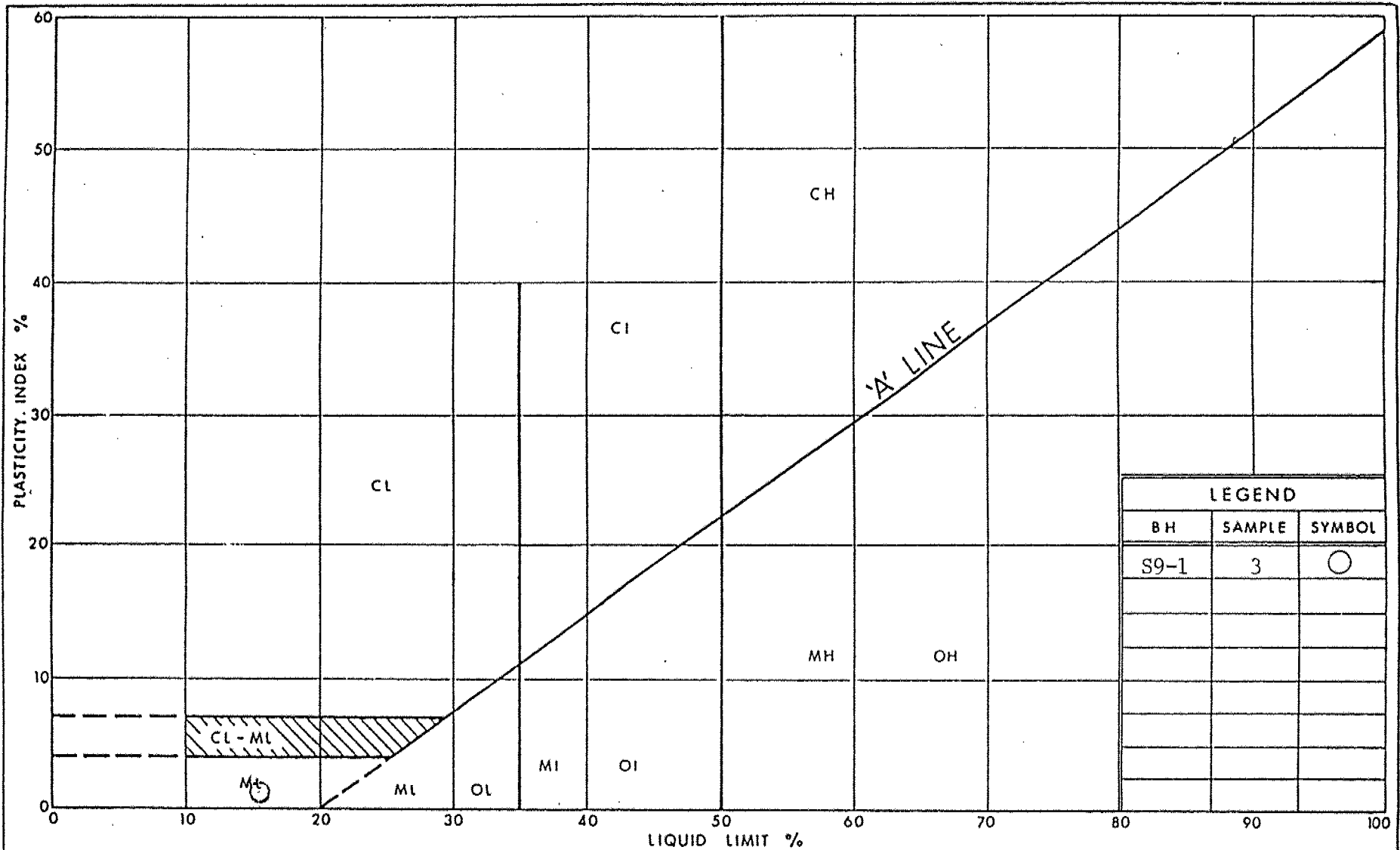
G.W.P. 290-97-00

PML REF. 97TF088B
REPORT NO. -
FIGURE 19



SILT & CLAY				GRAIN SIZE IN MILLIMETERS					COBBLES	UNIFIED			
				FINE		MEDIUM SAND		COARSE			GRAVEL		
CLAY	FINE		MEDIUM SILT	COARSE	FINE		MEDIUM SAND	COARSE	GRAVEL		COBBLES	MIT	
CLAY		SILT		V. FINE		FINE	MED.	COARSE	GRAVEL				U.S. BUREAU

REMARKS: Silty clay, trace of sand
B.H. S11-8, Sample 1, Depth 5.5 - 6.1 m



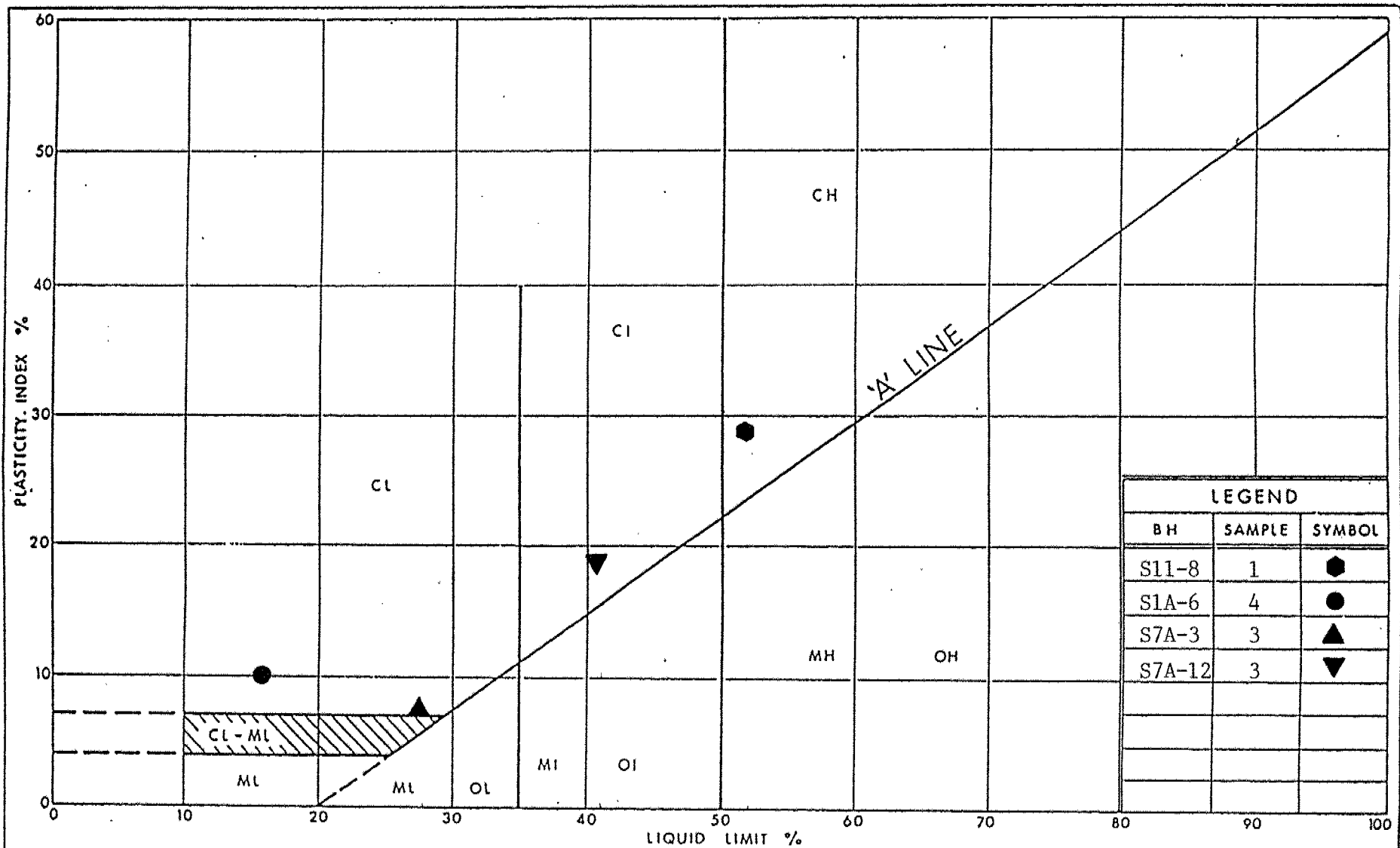
Ministry of
Transportation

Ontario

PLASTICITY CHART

SILT WITH SAND AND CLAY

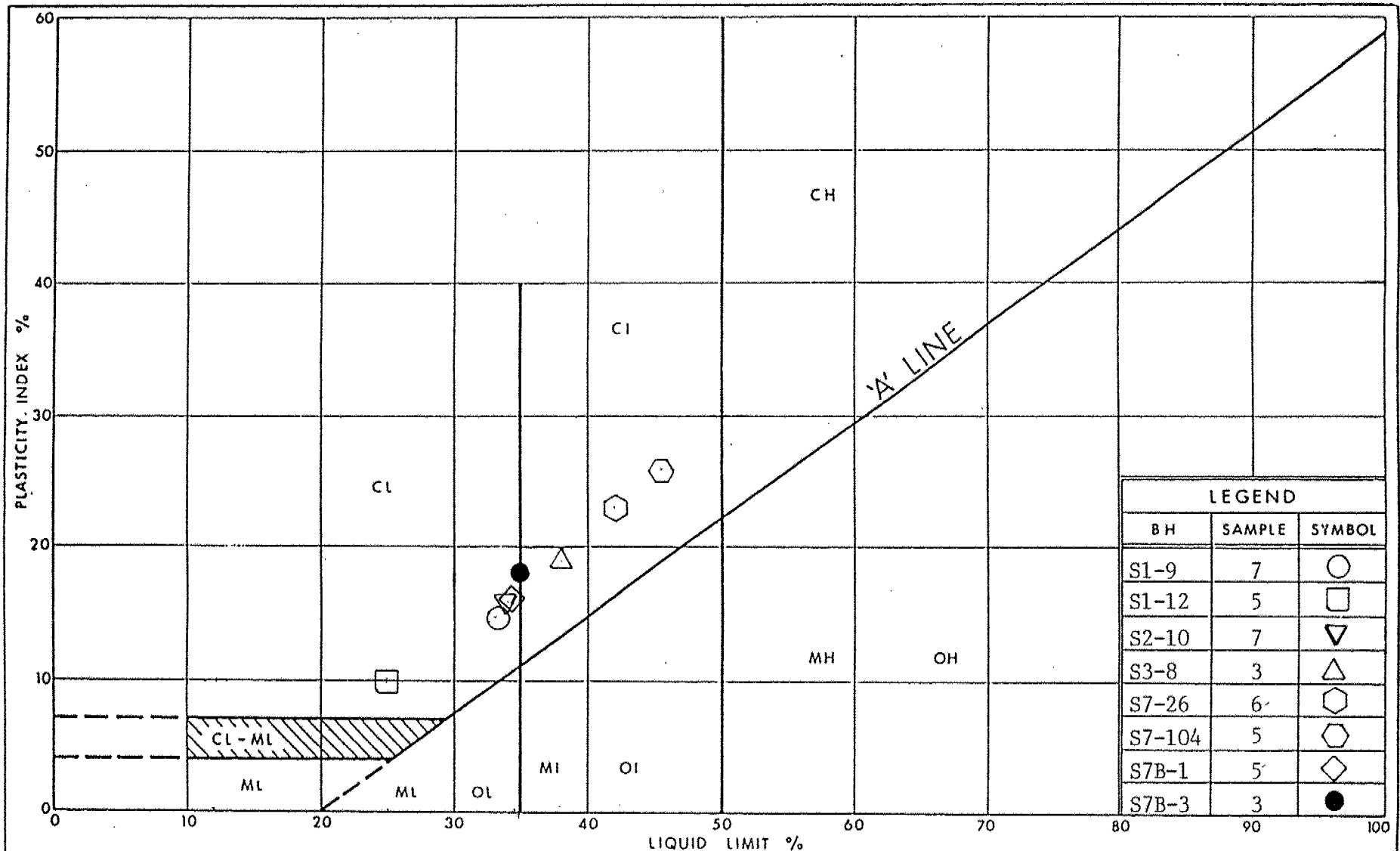
FIG No 20



Ministry of
Transportation

PLASTICITY CHART SILTY CLAY

FIG No 21



Ministry of
Transportation

Ontario

PLASTICITY CHART
SILTY CLAY

FIG No 22

**FOUNDATION DESIGN REPORT
EMBANKMENTS OVER SWAMPS
G.W.P. 290-97-00, HIGHWAY 69
FOUR LANING FROM TOWER ROAD
NORTHERLY 26.5 km TO 2.7 km NORTH OF HIGHWAY 141
DISTRICT 52, HUNTSVILLE**

Distribution:

13 cc: Highway 69 Joint Venture c/o McCormick Rankin Corporation for distribution to MTO
2 cc: Highway 69 Joint Venture c/o McCormick Rankin Corporation
1 cc: PML Hamilton
1 cc: PML Barrie
1 cc: PML Toronto

Job No. 97TF088B

February, 1999

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SWAMP TREATMENT	2
CLOSURE.....	5

TABLE IV	Swamp Crossings and Treatment
TABLE V	Computed Rockfill and Foundation Settlement

DRAWING 19	Swamp Treatment with Toe Berm
DRAWING 20	Swamp Treatment with Flattened Side Slopes

OPSD 203.010 Mod
OPSD 203.030 Mod

FOUNDATION DESIGN REPORT
For
EMBANKMENTS OVER SWAMPS
G.W.P. 290-97-00, HIGHWAY 69
FOUR LANING FROM TOWER ROAD
NORTHERLY 26.5 km TO 2.7 km NORTH OF HIGHWAY 141
DISTRICT 52, HUNTSVILLE

INTRODUCTION

Construction of the realigned Highway 69, associated ramps and cross roads in the study corridor will involve 114 swamp crossings.

This report provides recommendations for construction of embankments in the 20 swamps in which the peat thickness is generally greater than 4 m, the peat is underlain by a significant thickness of soft clay and/or the height of embankment fill constructed on peat/clay is greater than 3 m. These comments are based on the preliminary plan and profile drawings (Environmental Assessment/Route Planning Study, WP529-89-00) available at the time of the study.

Construction recommendations for the remaining relatively shallow swamps are dealt with in the Pavement Design Report which is provided under separate cover (97TF088).

This project overlaps the south end of the adjoining project (G.W.P. 291-97-00, Highway 69, Four Lining 2.7 km north of Highway 141 northerly 4 km to 5.5 km south of Highway 518 (Badger Road), district 52, Huntsville) carried out by Peto MacCallum Ltd. in 1998-1999 (Project No. 98TF010). Two "special swamps" (Swamps 10 and 11) were identified in this section of the roadway.

The preliminary profile drawings indicate that the finished road grade through the subject swamps will be 2 to 11 m above existing grade. Embankments will be constructed using rock fill.

The subsurface stratigraphy revealed in the testholes drilled in the subject swamps typically comprised a relatively thick peat deposit overlying sand/silt units and/or soft clay which mantles sand or bedrock.

The undrained shear strength of the peat generally ranged from 3 to 16 kPa, with an average value of 8.5 kPa. It is considered to be capable of supporting a fill height of only 0.5 to 2.5 m.

The undrained shear strength of the silty clay deposit ranged from 5 to 55 kPa, with an average value of 19 kPa.

SWAMP TREATMENT

The embankments will be constructed using rockfill. The construction schedule for Swamps 1 to 10 can accommodate a minimum 12 month period between completion of the embankment fill and construction of the pavement structure. In Swamp 11, the pavement structure may be constructed 6 months after completion of the embankment.

The combined thickness of peat and soft clay deposits in the swamps ranged from 2.2 to 12.7 m. Bedrock was inferred at depths up to 22.7 m typically 4 to 8 m.

The rockfill embankments in swamps along the new alignment are to be constructed in accordance with one of the following methods:

- 1 OPSD 203.010
- 2-1 OPSD 203.010 (MOD) appended (loose to compact sand/silt is considered to be "firm bottom").
- 2-2 OPSD 203.010 (MOD) to 8 m depth (excavation entirely through peat/clay).
- 2-3 OPSD 203.010 (MOD) to a depth of 8 m (excavation to extend through sand/silt and underlying clay).
- 2-4 OPSD 203.010 (MOD) to a depth of 8 m or shallower where bedrock is encountered.
- 2-5 Excavate to bedrock. Rockfill slopes to be 1.25: 1.
- 3-1 Drawing 19 (Toe Berm)
- 3-2 Drawing 20 (Flattened Slope)

- 4 OPSD 203.030 (MOD) appended. Excavate to a depth of 6 m or bedrock if shallower. Embankment fill to be placed simultaneously on both sides of existing road.

- 5 Install 600 mm diameter sand drains to bedrock spaced at 3 m intervals along toe of existing embankment fill.

Install a second row of 600 mm diameter sand drains to bedrock spaced at 3 m intervals (staggered from first row) 3 m from toe of existing embankment fill.

OPSD 203.030 (excavate to depth of 6 m) in the zone within 6 m of the toe of the existing embankment fill, subject to the following conditions:

- i) Length of excavation parallel to embankment slope NOT to exceed 5 m before placement of rockfill to at least 1 m above swamp level in excavated area.
- ii) total excavation to be backfilled to at least 1 m above swamp level at the end of each day.

OPSD 203.010 to a depth of 8 m or bedrock if shallower in the zone beyond 6 m of the toe of the existing embankment fill.

Place 4 m high surcharge above the design finished grade on the portion of the NBL to be widened.

Surcharge to be maintained for at least 6 months.

Drawing 19 calls for a toe berm to increase the stability of the embankment fill. The toe berm is required in areas where soft clay soils exist at depth within the underlying sandy soil.

Drawing 20 calls for the inclination of the rockfill slope to be flattened to increase the stability of the embankment fill. The flattened slopes are required where soft clay exists at depth within the underlying sandy soil and the embankment fill height is less than 5 m high.

The recommended measures for construction of the embankment fills through each swamp crossed are provided on Table IV – Swamp Crossings and Treatment. These procedures are based on the following criteria:

- | | | |
|-----|--|---|
| i) | Base of compressible soils is greater than 8 m below grade - | limiting <u>post construction</u> settlement of the embankment fill surface due to consolidation of the compressible foundation soils to 70 mm. |
| ii) | Base of compressible soils is less than 8 m below grade - | negligible <u>post construction</u> settlement of the embankment fill surface due to consolidation of the foundation soils. |

Post construction settlement is considered to be the settlement that occurs during the 10 year period following completion of construction of the embankment fill and is computed on the basis of a 12 month period for construction of the embankment in Swamps 1 to 10, 6 months in Swamp 11.

The “8 m” criteria was selected following review of the soil profile revealed in the boreholes, and extensive consultation with the Joint Venture concerning a reasonable magnitude of post construction settlement that could be tolerated in conjunction with the cost to extend the depth of excavation to limit consolidation of the foundation soils and the magnitude of post construction settlement that would occur in any event due to the increased thickness of rock fill.

The stability of the recommended treatment for construction of the rockfill embankments across the swamps noted on Table IV was analyzed using the Bishop Simplified Method of Analysis. The computed factor of safety against a general failure is considered to be at least 1.3 for short term construction conditions and about 1.5 in the long term.

The computed settlement of the surface of the rockfill due to “consolidation” of the rockfill embankment and consolidation of the clay deposits that exist at depth within the native sand deposit below the embankments during construction (based on a 12 month period for construction of the embankment fill in Swamps 1 to 10, 6 months in Swamp 11) and the 10 year period following completion of the embankment fill are provided on Table V – Computed Rockfill and Embankment Settlement.

At least 80% of the post construction settlement due to consolidation of the foundation soils will occur during the first two years following completion of the embankment fill.

The shoulder should be widened by 1 m in rockfill embankments constructed through swamps founded on bedrock, 2 m if founded on a firm base per MTO practice.

The rockfill should be placed in accordance with OPSD 202.010. A 2 m wide midheight berm should be constructed if the height of the embankment fill exceeds 10 m in accordance with MTO practice.

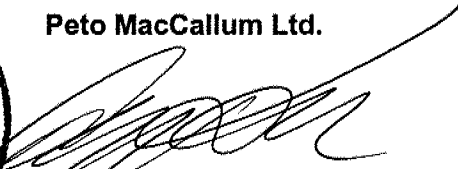
CLOSURE

This report was prepared by Mr. E. Wong, P.Eng. and reviewed by Mr. D.W. Kerr, P.Eng., Manager Geotechnical and Geo-Environmental Services, Hamilton office.


Yours very truly

Peto MacCallum Ltd.




Dennis W. Kerr, M.Eng., P.Eng.
Manager Geotechnical and
Geo-Environmental Services




Brian R. Gray, M.Eng., P.Eng.
Vice-President
Geotechnical and
Geo-Environmental Services

EW:mmma

TABLE IV

**SWAMP CROSSINGS AND TREATMENT
HIGHWAY 69 – TOWER ROAD TO HIGHWAY 141
G.W.P. 290-97-00**

SWAMP NO.	ROAD COMPONENT	MAX FILL* HEIGHT (m)	MAX. DEPTH (m)		UNDERLYING MATERIAL⊕	TREATMENT ⁺
			Peat	Peat And Clay		
1	<u>Hwy 69, SBL,</u> <u>Twp. of Freeman</u> Sta. 18+250 - 18+350	5.0	5.1	5.1	Probable bedrock or sand with local sandy silt or soft silty clay layers (0.5 to 0.9 m thick) over probable bedrock at 0.6 to 9.2 m.	2-1
	<u>Hwy 69, NBL,</u> <u>Twp. of Freeman</u> Sta. 18+175 - 18+350	5.0	5.6	5.6	Probable bedrock or sand with local 0.3 to 1.4 m thick soft silty clay layers over probable bedrock at 1.0 to 12.6 m.	2-4
1A	<u>Hwy 169, Con,</u> <u>Twp. of Freeman</u> Sta. 10+085 -10+125	8.0**	4.8	6.0	Probable bedrock or sand over probable bedrock at 3.4 to 6.0 m.	2-1
	Sta. 10+125 - 10+200	8.0**	4.8	5.1	Probable bedrock or sand with local 0.6 to 1.8 m thick soft silty clay layers over probable bedrock at 4.7 to 8.0 m.	2-4
	Sta. 10+200 - 10+250	8.0**	2.3	3.2	Probable bedrock or 0.9 m thick soft silty clay layers over probable bedrock at 0.5 to 3.2 m depth.	2-1
1B	<u>Hwy 169, Con,</u> <u>S-E Ramp,</u> <u>Twp. of Freeman</u> Sta. 11+900 - 12+050	2.4**	5.6	5.6	Probable bedrock or sand with local 0.5 to 1.2 m thick soft clay/clay and silt layers over probable bedrock at 0.9 to 9.9 m depth.	1

- * from Environmental Assessment/Route Planning Study WP529-89-00; actual height of fill as well as limits and nature of treatment is subject to final design.
- ** from June 3, 1998 fax transmittal from Totten Sims Hubicki Associates .
- ⊕ includes data from testholes only where peat/clay identified and special treatment is required.
- + refer to last page of this table for description of treatment.

TABLE IV

**SWAMP CROSSINGS AND TREATMENT
HIGHWAY 69 – TOWER ROAD TO HIGHWAY 141
G.W.P. 290-97-00**

SWAMP NO.	ROAD COMPONENT	MAX FILL* HEIGHT (m)	MAX. DEPTH (m)		UNDERLYING MATERIAL⊕	TREATMENT*
			Peat	Peat And Clay		
1B	<u>Hwy 169, Con.</u> <u>S-E Ramp.</u> <u>Twp. of Freeman</u> Sta. 12+050-12+175	2.4**	3.4	3.4	Probable bedrock or sand with local 0.9 m thick soft clayey silt/ silt and clay layers over probable bedrock at 1.0 to 4.7m depth.	1
2	<u>Hwy 69, SBL.</u> <u>Twp. of Conger</u> Sta. 10+240 - 10+275	3.0	4.5	5.3	Sand over probable bedrock at 2.2 to 5.6 m depth.	1
	Sta. 10+275 - 10+365	3.0	7.5	7.5	Sand over local 0.5 to 1.4 m thick soft to stiff clay layers over probable bedrock at 1.3 to 12.5 m.	2-5 OR 3-2
	Sta. 10+365 - 10+430	3.0	3.2	3.2	Probable bedrock or sand with local 0.3 m thick silt layer over probable bedrock at 1.2 to 5.9 m depth.	1
	<u>Hwy 69, NBL.</u> <u>Twp. of Conger</u> Sta. 10+225 - 10+335	3.0	4.7	5.1	Probable bedrock or sandy silt or sand over probable bedrock at 0.1 to 5.1 m depth.	1
	<u>Healey Lake Road.</u> <u>Twp. of Conger</u> Sta. 9+965 -10+001	9.0	8.5	11.4	Probable bedrock at 5.1 to 12.5 m depth. <u>Note:</u> Foundation Investigation report for Healey Lake Road underpass (Site 44-377) identified 4.5 to 9.3 m thick sand fill layer exists above peat.	3-1 OR 2-5

- * from Environmental Assessment/Route Planning Study WP529-89-00; actual height of fill as well as limits and nature of treatment is subject to final design.
- ** from June 3, 1998 fax transmittal from Totten Sims Hubicki Associates .
- ⊕ includes data from testholes only where peat/clay identified and special treatment is required.
- + refer to last page of this table for description of treatment.

TABLE IV

**SWAMP CROSSINGS AND TREATMENT
HIGHWAY 69 – TOWER ROAD TO HIGHWAY 141
G.W.P. 290-97-00**

SWAMP NO.	ROAD COMPONENT	MAX FILL* HEIGHT (m)	MAX. DEPTH (m)		UNDERLYING MATERIAL⊕	TREATMENT*
			Peat	Peat And Clay		
2A	<u>Healey Lake Road,</u> <u>Twp. of Conger</u> Sta. 9+925 – 10+025	9.0	4.9	5.5	<u>South Side of Road</u> Sand over probable bedrock at 2.3 to 6.6 m.	2-4
		9.0	3.7	4.6	<u>North Side of Road</u> Sand over probable bedrock at 4.8 m depth. <u>Note:</u> 1.5 m thick sand fill layer exists above peat.	2-4
2B	<u>Hwy 69, SBL,</u> <u>Twp. of Conger</u> Sta. 13+040 - 13+160	2.0	4.8	4.8	Probable bedrock or sand with local 0.2 to 0.6 m thick soft silty clay layers over probable bedrock at 0.2 to 8.0 m depth.	1
	<u>Hwy 69, NBL,</u> <u>Twp. of Conger</u> Sta. 13+000 - 13+125	3.0	4.8	4.8	Probable bedrock or sand with local 0.2 to 0.4 m thick soft clayey silt layers over probable bedrock at 0.5 to 10.0 m.	1
2C	<u>Healey Lake Road,</u> <u>Twp. of Conger</u> Sta. 10+100 - 10+160	7.0	4.8	5.7	<u>Existing Roadway</u> Sand over probable bedrock at 6.2 to 6.5 m depth. <u>Note:</u> 3.9 to 4.0 m of sand fill exists above peat along alignment of road.	4

* from Environmental Assessment/Route Planning Study WP529-89-00;
actual height of fill as well as limits and nature of treatment is subject to final design.

** from June 3, 1998 fax transmittal from Totten Sims Hubicki Associates .

⊕ includes data from testholes only where peat/clay identified and special treatment is required.

+ refer to last page of this table for description of treatment.

TABLE IV

**SWAMP CROSSINGS AND TREATMENT
HIGHWAY 69 – TOWER ROAD TO HIGHWAY 141
G.W.P. 290-97-00**

SWAMP NO.	ROAD COMPONENT	MAX FILL* HEIGHT (m)	MAX. DEPTH (m)		UNDERLYING MATERIAL⊕	TREATMENT ⁺
			Peat	Peat And Clay		
3	<u>Hwy 69, SBL.</u> <u>Twp. of Conger</u> Sta. 15+400 - 15+425	3.0	4.7	4.7	Probable bedrock or sand over probable bedrock at 0.6 to 4.7 m depth.	1
	Sta. 15+425 - 15+600	5.0	6.6	9.2	Probable bedrock or sand with local 0.3 m thick soft clay layer over probable bedrock at 1.8 to 11.1 m.	2-2
	<u>Hwy 69, NBL.</u> <u>Twp. of Conger</u> Sta. 15+390 - 15+425	3.0	2.5	2.5	Probable bedrock.	1
	Sta. 15+425 - 15+525	4.0	5.9	7.0	Probable bedrock or sand with local 0.2 m thick soft silty clay layers over probable bedrock at depths of 2.7 to 8.5 m.	2-2
	Sta. 15+525 - 15+575	5.0	4.0	4.3	Probable bedrock or sand over probable bedrock at 1.0 to 5.2 m depth.	2-1
4	<u>Hwy 69, NBL.</u> <u>Twp. of Conger</u> Sta. 18+075 - 18+200	2.0	10.0	10.0	Sand with local 0.8 m thick soft silty clay layer over probable bedrock at 2.0 to 12.7 m depth.	2-2
5	<u>Hwy 69, NBL.</u> <u>Twp. of Conger</u> Sta. 18+925 - 19+050	11.0	3.5	4.4	Probable bedrock or sand or sandy silt with local 0.3 m thick soft silty clay layer over probable bedrock at 0.9 to 5.4 m depth.	2-4

- * from Environmental Assessment/Route Planning Study WP529-89-00; actual height of fill as well as limits and nature of treatment is subject to final design.
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TABLE IV

**SWAMP CROSSINGS AND TREATMENT
HIGHWAY 69 – TOWER ROAD TO HIGHWAY 141
G.W.P. 290-97-00**

SWAMP NO.	ROAD COMPONENT	MAX FILL* HEIGHT (m)	MAX. DEPTH (m)		UNDERLYING MATERIAL⊕	TREATMENT†
			Peat	Peat And Clay		
5	<u>Hwy 69, NBL.</u> <u>Twp. of Conger</u> Sta. 19+050 - 19+150	11.0	7.4	7.4	Probable bedrock or silt and/or sand with discontinuous soft clayey silt layer (1.2 m thick) over probable bedrock at 1.8 to 10.3 m depth.	2-2
6	<u>Hwy 69, SBL.</u> <u>Twp. of Conger</u> Sta. 19+280 - 19+460	10.0	4.8	4.8	Probable bedrock or sand with local 0.3 to 2.1 m thick soft silty clay layers over probable bedrock at 0.5 to 9.7 m depth.	2-2
	<u>Hwy 69, NBL.</u> <u>Twp. of Conger</u> Sta. 19+325 - 19+450	10.0	6.6	7.8	Probable bedrock or sand with local 1.2 to 2.1 m thick soft silty clay layers over probable bedrock at 1.2 to 11.3 m depth.	2-5 OR 3-1
7	<u>Hwy 69, SBL.</u> <u>Twp. of Conger</u> Sta. 21+800 - 21+850	2.0	4.5	4.5	Probable bedrock or silt with local 0.7 m soft silty clay layer over probable bedrock at 4.0 to 5.5 m.	1
	Sta. 21+850 - 22+050	3.0	7.4	8.7	Probable bedrock or silt or sand with local 0.7 to 1.7 m thick soft clay layers over probable bedrock at 2.5 to 9.6 m depth.	2-5 OR 3-2
	Sta. 22+050 - 22+310	3.0	5.3	6.3	Probable bedrock or sandy silt or sand with discontinuous soft clayey silt/ silty clay layers (0.4 to 1.4 m thick) over probable bedrock at 0.5 to 6.6 m depth.	2-4

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TABLE IV

**SWAMP CROSSINGS AND TREATMENT
HIGHWAY 69 – TOWER ROAD TO HIGHWAY 141
G.W.P. 290-97-00**

SWAMP NO.	ROAD COMPONENT	MAX FILL* HEIGHT (m)	MAX. DEPTH (m)		UNDERLYING MATERIAL⊕	TREATMENT ⁺
			Peat	Peat And Clay		
7	<u>Hwy 69, NBL</u> <u>Twp. of Conger</u> Sta. 21+550 - 21+700	3.0	4.8	5.0	Probable bedrock or sand or silt over probable bedrock at 1.0 to 5.3 m depth.	1
	Sta. 21+700 - 22+025	3.0	9.5	12.7	Sand and/or silt with discontinuous soft silty clay layers (0.5 to 5.8 m thick) over probable bedrock at 4.6 to 13.2 m depth.	2-5 OR 3-2
	Sta. 22+025 - 22+300	3.0	6.9	7.4	Probable bedrock or silt, sandy silt or sand with discontinuous soft silty clay layers (0.4 to 2.3 m thick) over probable bedrock at 1.2 to 7.4 m depth.	2-4
7A	<u>Hwy 69, NBL</u> <u>Twp. of Conger</u> Sta. 11+080 - 11+165	4.0	4.8	9.4	Probable bedrock or sand and/or silt with discontinuous soft silty clay layers (0.6 to 2.0 m) over probable bedrock at 3.1 to 10.6 m depth.	2-2
	Sta. 11+165 - 11+240	4.0	3.0	4.3	Sand over probable bedrock at 2.4 to 4.3 m depth.	2-1

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+ refer to last page of this table for description of treatment.

TABLE IV

**SWAMP CROSSINGS AND TREATMENT
HIGHWAY 69 – TOWER ROAD TO HIGHWAY 141
G.W.P. 290-97-00**

SWAMP NO.	ROAD COMPONENT	MAX FILL* HEIGHT (m)	MAX. DEPTH (m)		UNDERLYING MATERIAL⊕	TREATMENT+
			Peat	Peat And Clay		
7B	<u>Hwy 69, SBL,</u> <u>Twp. of Conger</u> Sta. 11+690 - 11+740	7.0	2.2	2.2	Silt and/or sand with local 0.5 to 3.2 m thick soft silty clay layers over probable bedrock at 4.3 to 6.8 m.	2-4
	<u>Hwy 69, NBL,</u> <u>Twp. of Conger</u> Sta. 11+690 - 11+730	7.0	2.2	2.2	Sand with soft silty clay to clayey silt layers (0.3 to 2.3 m thick) over probable bedrock at 3.6 to 7.0 m depth.	2-4
8	<u>Hwy 69, SBL,</u> <u>Twp. of Foley</u> Sta. 11+990 - 12+030	6.0	1.5	5.6	Probable bedrock or sand over soft to firm silty clay layer (1.5 to 3.0 m thick) over probable bedrock at 3.0 to 5.6 m depth.	2-4
	<u>Hwy 69, NBL,</u> <u>Twp. of Foley</u> Sta. 11+990 - 12+030	4.0	2.1	6.4	Sand and/or probable bedrock at 5.8 to 7.9 m.	2-1
8A	<u>Blackstone/</u> <u>Crane Lake Road,</u> <u>Twp. of Foley</u> Sta. 9+725 - 9+875	8.0	0.5	6.0	<u>Existing Roadway</u> Local sand layer over probable bedrock at 5.2 to 6.0 m depth. <u>Note:</u> 4.0 m of sand exists above the clay surface.	2-4

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- + refer to last page of this table for description of treatment.

TABLE IV

**SWAMP CROSSINGS AND TREATMENT
HIGHWAY 69 – TOWER ROAD TO HIGHWAY 141
G.W.P. 290-97-00**

SWAMP NO.	ROAD COMPONENT	MAX FILL* HEIGHT (m)	MAX. DEPTH (m)		UNDERLYING MATERIAL⊕	TREATMENT ⁺
			Peat	Peat And Clay		
8B	<u>Blackstone/ Crane Lake Road, Twp. of Foley</u> Sta. 10+225 - 10+300	2.0	1.6	5.6	<u>Existing Roadway</u> Local sand layer over probable bedrock at depths of 0.5 to 5.8 m. <u>Note:</u> 1.2 to 1.8 m thick sand layer exists above peat and/or clay along roadway.	4
9	<u>Hwy 69, SBL, Twp. of Foley</u> Sta. 12+970 - 13+100	11.0	0	8.9	Discontinuous sand layer over probable bedrock at 0.8 to 18.8 m depth. <u>Note:</u> 2.7 to 7.5 m thick sand/silt layers exist above clay.	2-3
	<u>Hwy 69, NBL, Twp. of Foley</u> Sta. 12+980 -13+125	11.0	0	8.3	Probable bedrock at 5.0 to 22.7 m. <u>Note:</u> 4.0 to 7.6 m thick sand/silt layers exist above clay.	2-3
10	<u>Hwy 69, NBL, Twp. of Foley</u> Sta. 14+440 - 14+500	9.0	5.9	5.9	Probable bedrock or sand over probable bedrock at 0.5 to 7.5 m depth.	2-1

- * from Environmental Assessment/Route Planning Study WP529-89-00; actual height of fill as well as limits and nature of treatment is subject to final design.
- ** from June 3, 1998 fax transmittal from Totten Sims Hubicki Associates .
- ⊕ includes data from testholes only where peat/clay identified and special treatment is required.
- + refer to last page of this table for description of treatment.

TABLE IV

**SWAMP CROSSINGS AND TREATMENT
HIGHWAY 69 – TOWER ROAD TO HIGHWAY 141
G.W.P. 290-97-00**

SWAMP NO.	ROAD COMPONENT	MAX FILL* HEIGHT (m)	MAX. DEPTH (m)		UNDERLYING MATERIAL⊕	TREATMENT+
			Peat	Peat And Clay		
11	<u>Hwy 69, NBL,</u> <u>Twp. of Foley</u> Sta. 14+620 -14+700	8.0	3.7	4.2	<u>Toe of Existing Embankment</u> Sand, bedrock interpreted to be at 4.5 to 11.9 m depth.	5
		8.0	2.6	8.6	<u>General Area</u> Sand and/or silt with local 1.5 m thick soft silty clay layers over probable bedrock at 3.9 to 11.0 m depth.	

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actual height of fill as well as limits and nature of treatment is subject to final design.

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TABLE IV

**SWAMP CROSSINGS AND TREATMENT
HIGHWAY 69 – TOWER ROAD TO HIGHWAY 141
G.W.P. 290-97-00**

TREATMENT

- 1 OPSD 203.010
- 2-1 OPSD 203.010 (MOD) appended (loose to compact sand/silt is considered to be "firm bottom").
- 2-2 OPSD 203.010 (MOD) to 8 m depth (excavation entirely through peat/clay)
- 2-3 OPSD 203.010 (MOD) to a depth of 8 m (excavation to extend through sand/silt and underlying clay).
- 2-4 OPSD 203.010 (MOD) to a depth of 8 m or shallower where bedrock is encountered.
- 2-5 Excavate to bedrock. Rockfill slopes to be 1.25: 1.
- 3-1 Drawing 19 (Toe Berm)
- 3-2 Drawing 20 (Flattened Slopes)
- 4 OPSD 203.030 (MOD) appended. Excavate to a depth of 6 m or bedrock if shallower. Embankment fill to be placed simultaneously on both sides of existing road.
- 5 Install 600 mm diameter sand drains to bedrock spaced at 3 m intervals along toe of existing embankment fill.

Install a second row of 600 mm diameter sand drains to bedrock spaced at 3 m intervals (staggered from first row) 3 m from toe of existing embankment fill.

OPSD 203.030 (excavate to depth of 6 m) in the zone within 6 m of the toe of the existing embankment fill, subject to the following conditions:
 - i) Length of excavation parallel to embankment slope NOT to exceed 5 m before placement of rockfill to at least 1 m above swamp level in excavated area.
 - ii) Total excavation to be backfilled to at least 1 m above swamp level at the end of each day.
OPSD 203.010 to a depth of 8 m or bedrock if shallower in the zone beyond 6 m of the toe of the existing embankment fill.

Place 4 m high surcharge above the design finished grade on the portion of the NBL to be widened.

Surcharge to be maintained for at least 6 months.

TABLE V

COMPUTED ROCKFILL AND FOUNDATION SETTLEMENTS¹
EMBANKMENT OVER SWAMPS
HIGHWAY 69 – TOWER ROAD TO HIGHWAY 141
G.W.P. 290-97-00

SWAMP NO.	ROAD COMPONENT	MAX ROCKFILL ² THICKNESS	CONSTRUCTION PERIOD ³			POST CONSTRUCTION PERIOD ⁵		
			Rockfill (mm)	Foundation ⁴ (mm)	Total (mm)	Rockfill (mm)	Foundation ⁴ (mm)	Total (mm)
1	<u>Hwy 69, SBL,</u> <u>Twp. of Freeman</u> Sta. 18+250 - 18+350	10.1	50	85-125	135-175	25	10-20	35-45
	<u>Hwy 69, NBL,</u> <u>Twp. of Freeman</u> Sta. 18+175 - 18+215	9.2	45	30	75	25	0	25
	Sta. 18+215 - 18+350	13.0 ⁶	65	30	95	35	0	35
1A	<u>Hwy 169, Con,</u> <u>Twp. of Freeman</u> Sta. 10+085 -10+125	14.0	70	10	80	35	0	35
	Sta. 10+125 - 10+200	16.0 ⁶	65	0	65	35	0	35
	Sta. 10+200 - 10+250	11.2	55	0	55	30	0	30
1B	<u>Hwy 169, Con,</u> <u>S-E Ramp,</u> <u>Twp. of Freeman</u> Sta. 11+900 - 12+050	8.0	40	70-125	110-165	20	10-25	30-45
	Sta. 12+050 - 12+175	5.8	30	100	130	15	20	35
2	<u>Hwy 69, SBL,</u> <u>Twp. of Conger</u> Sta. 10+240 - 10+275	8.3	40	30	70	20	0	20
	Sta. 10+275 - 10+365	15.5 ⁶	80	70-175	150-255	40	10-35 ⁷	40-75
	Sta. 10+365 - 10+430	6.2	30	15	45	15	0	15
	<u>Hwy 69, NBL,</u> <u>Twp. of Conger</u> Sta. 10+225 - 10+335	8.1	40	50	90	20	10	30

Notes:

1. Refer to Table IV for Swamp Treatment.
2. Height of embankment plus thickness of rockfill below grade.
3. Based on a 12 month construction period for Swamps 1 to 10, 6 months for Swamp 11.
4. Settlement due to compression of sand/silt and consolidation of compressible clay layers within sand/silt deposits.
5. During 10 year period following completion of embankment fill.
6. Thickness of rock fill includes minimum 8 m depth of excavation or excavation to bedrock required for swamp treatment.
7. Foundation settlement if swamp treatment option 3-1or 3-2 is employed, 0 if treatment 2-5 is employed.

TABLE V

COMPUTED ROCKFILL AND FOUNDATION SETTLEMENTS¹
EMBANKMENT OVER SWAMPS
HIGHWAY 69 – TOWER ROAD TO HIGHWAY 141
G.W.P. 290-97-00

SWAMP NO.	ROAD COMPONENT	MAX ROCKFILL ² THICKNESS	CONSTRUCTION PERIOD ³			POST CONSTRUCTION PERIOD ⁵		
			Rockfill (mm)	Foundation ⁴ (mm)	Total (mm)	Rockfill (mm)	Foundation ⁴ (mm)	Total (mm)
2	<u>Healey Lake Road,</u> <u>Twp. of Conger</u> Sta. 9+965 – 10+001	21.5 ⁶	110	275	385	55	0	55
2A	<u>Healey Lake Road,</u> <u>Twp. of Conger</u>							
	<u>South side of road</u> Sta. 9+925 – 10+025	17.0 ⁶	85	0	85	45	0	45
	<u>North side of road</u> Sta. 9+925 – 10+025	17.0 ⁶	85	0	85	45	0	45
2B	<u>Hwy 69, SBL,</u> <u>Twp. of Conger</u> Sta. 13+040 - 13+160	6.8	35	45-75	80-110	20	5-10	25-30
	<u>Hwy 69, NBL,</u> <u>Twp. of Conger</u> Sta. 13+000 - 13+125	7.8	40	45-60	85-100	20	5-10	25-30
2C	<u>Healey Lake Road,</u> <u>Twp. of Conger</u> Sta. 10+100 - 10+160	12.7	65	80-185	145-250	35	0	35
3	<u>Hwy 69, SBL,</u> <u>Twp. of Conger</u> Sta. 15+400 - 15+425	7.7	40	30	70	20	0	20
	Sta. 15+425 - 15+600	13.0	70	65	135	35	5-10	40-45

Notes:

1. Refer to Table IV for Swamp Treatment.
2. Height of embankment plus thickness of rockfill below grade.
3. Based on a 12 month construction period for Swamps 1 to 10, 6 months for Swamp 11.
4. Settlement due to compression of sand/silt and consolidation of compressible clay layers within sand/silt deposits.
5. During 10 year period following completion of embankment fill.
6. Thickness of rock fill includes minimum 8 m depth of excavation or excavation to bedrock required for swamp treatment.
7. Foundation settlement if swamp treatment option 3-1or 3-2 is employed, 0 if treatment 2-5 is employed.

TABLE V

**COMPUTED ROCKFILL AND FOUNDATION SETTLEMENTS¹
EMBANKMENT OVER SWAMPS
HIGHWAY 69 – TOWER ROAD TO HIGHWAY 141
G.W.P. 290-97-00**

SWAMP NO.	ROAD COMPONENT	MAX ROCKFILL ² THICKNESS	CONSTRUCTION PERIOD ³			POST CONSTRUCTION PERIOD ⁵		
			Rockfill (mm)	Foundation ⁴ (mm)	Total (mm)	Rockfill (mm)	Foundation ⁴ (mm)	Total (mm)
3	<u>Hwy 69, NBL.</u> <u>Twp. of Conger</u> Sta. 15+390 - 15+425	5.5	30	0	30	15	0	15
	Sta. 15+425 - 15+525	12.0 ⁶	60	5-10	65-70	30	5	35
	Sta. 15+525 - 15+575	9.3	45	50	95	25	0	25
4	<u>Hwy 69, NBL.</u> <u>Twp. of Conger</u> Sta. 18+075 - 18+200	10.0 ⁶	60	140	200	30	5-10	35-40
5	<u>Hwy 69, NBL.</u> <u>Twp. of Conger</u> Sta. 18+925 - 19+050	16.4 ⁶	80	10-20	90-100	40	0	40
	Sta. 19+050 - 19+150	19.0 ⁶	95	10-20	105-115	50	25	75
6	<u>Hwy 69, SBL.</u> <u>Twp. of Conger</u> Sta. 19+280 - 19+460	18.0 ⁶	90	10-20	100-110	45	0	45
	<u>Hwy 69, NBL.</u> <u>Twp. of Conger</u> Sta. 19+325 - 19+450	21.3	110	190-205	300-315	55	40-60	95-115
7	<u>Hwy 69, SBL.</u> <u>Twp. of Conger</u> Sta. 21+800 - 21+850	6.5	35	85	120	20	15	35
	Sta. 21+850 - 22+050	12.6 ⁶	60	90-165	150-225	30	10-35	40-65
	Sta. 22+050 - 22+310	9.6	50	0	50	25	0	25

Notes:

1. Refer to Table IV for Swamp Treatment.
2. Height of embankment plus thickness of rockfill below grade.
3. Based on a 12 month construction period for Swamps 1 to 10, 6 months for Swamp 11.
4. Settlement due to compression of sand/silt and consolidation of compressible clay layers within sand/silt deposits.
5. During 10 year period following completion of embankment fill.
6. Thickness of rock fill includes minimum 8 m depth of excavation or excavation to bedrock required for swamp treatment.
7. Foundation settlement if swamp treatment option 3-1 or 3-2 is employed, 0 if treatment 2-5 is employed.

TABLE V
COMPUTED ROCKFILL AND FOUNDATION SETTLEMENTS¹
EMBANKMENT OVER SWAMPS
HIGHWAY 69 – TOWER ROAD TO HIGHWAY 141
G.W.P. 290-97-00

SWAMP NO.	ROAD COMPONENT	MAX ROCKFILL ² THICKNESS	CONSTRUCTION PERIOD ³			POST CONSTRUCTION PERIOD ⁵		
			Rockfill (mm)	Foundation ⁴ (mm)	Total (mm)	Rockfill (mm)	Foundation ⁴ (mm)	Total (mm)
7	<u>Hwy 69, NBL,</u> <u>Twp. of Conger</u> Sta. 21+550 - 21+700	8.0	40	30	70	20	0	20
	Sta. 21+700 - 22+025	16.2 ⁶	80	50-250	130-330	40	20-60	60-100
	Sta. 22+025 - 22+300	10.4	50	0	50	25	0	0
7A	<u>Hwy 69, NBL,</u> <u>Twp. of Conger</u> Sta. 11+080 - 11+165	12.0 ⁶	65	75-190	140-255	40	15-40	55-80
	Sta. 11+165 - 11+240	8.3	40	30	70	20	0	20
7B	<u>Hwy 69, SBL,</u> <u>Twp. of Conger</u> Sta. 11+690 - 11+740	13.8 ⁶	70	0	70	35	0	35
	<u>Hwy 69, NBL,</u> <u>Twp. of Conger</u> Sta. 11+690 - 11+730	14.0 ⁶	70	0	70	35	0	35
8	<u>Hwy 69, SBL,</u> <u>Twp. of Foley</u> Sta. 11+990 - 12+030	11.6	60	0	60	30	0	30
	<u>Hwy 69, NBL,</u> <u>Twp. of Foley</u> Sta. 11+990 - 12+030	10.4	50	30	80	25	0	25

Notes:

1. Refer to Table IV for Swamp Treatment.
2. Height of embankment plus thickness of rockfill below grade.
3. Based on a 12 month construction period for Swamps 1 to 10, 6 months for Swamp 11.
4. Settlement due to compression of sand/silt and consolidation of compressible clay layers within sand/silt deposits.
5. During 10 year period following completion of embankment fill.
6. Thickness of rock fill includes minimum 8 m depth of excavation or excavation to bedrock required for swamp treatment.
7. Foundation settlement if swamp treatment option 3-1or 3-2 is employed, 0 if treatment 2-5 is employed.

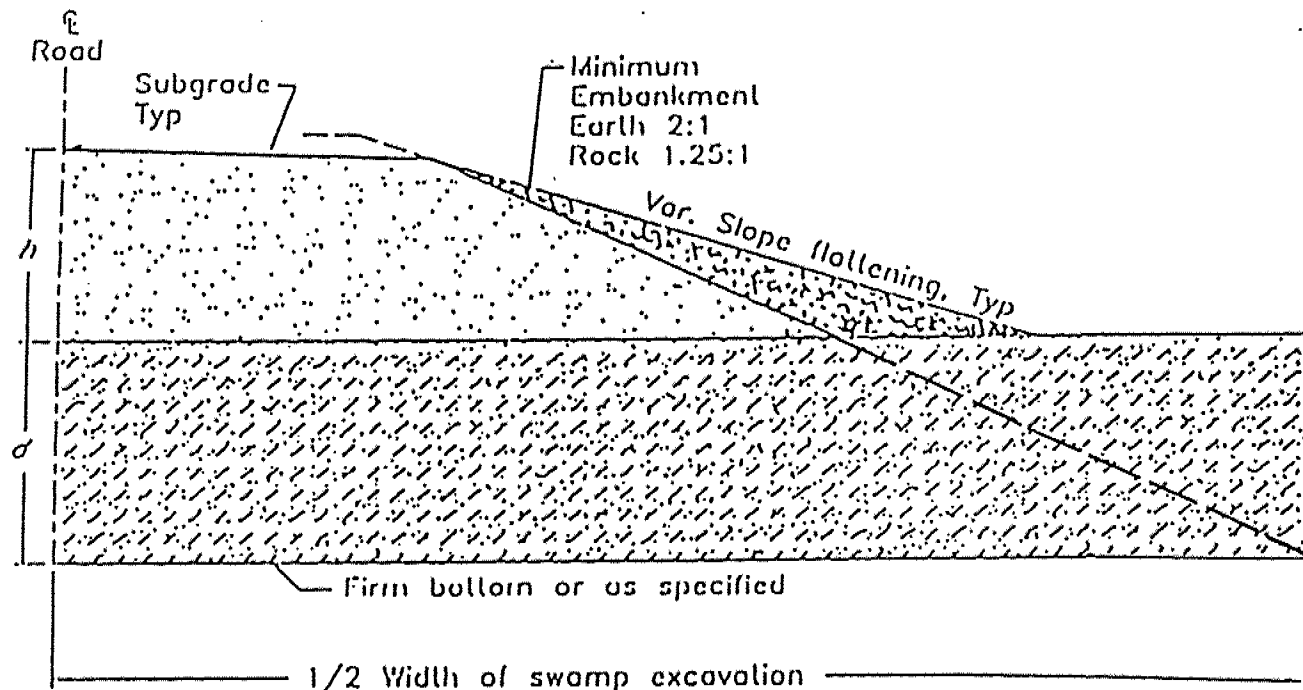
TABLE V

COMPUTED ROCKFILL AND FOUNDATION SETTLEMENTS¹
EMBANKMENT OVER SWAMPS
HIGHWAY 69 – TOWER ROAD TO HIGHWAY 141
G.W.P. 290-97-00

SWAMP NO.	ROAD COMPONENT	MAX ROCKFILL ² THICKNESS	CONSTRUCTION PERIOD ³			POST CONSTRUCTION PERIOD ⁵		
			Rockfill (mm)	Foundation ⁴ (mm)	Total (mm)	Rockfill (mm)	Foundation ⁴ (mm)	Total (mm)
8A	<u>Blackstone/ Crane Lake Road, Twp. of Foley</u> Sta. 9+725 - 9+875	14.0	70	0	70	35	0	35
8B	<u>Blackstone/ Crane Lake Road, Twp. of Foley</u> Sta. 10+225 - 10+300	7.8 ⁶	35	50-120	85-155	20	20-70	40-90
9	<u>Hwy 69, SBL, Twp. of Foley</u> Sta. 12+970 - 13+100	19.0 ⁶	95	20-40	115-135	50	0	50
	<u>Hwy 69, NBL, Twp. of Foley</u> Sta. 12+980 -13+125	19.0 ⁶	95	20-40	115-135	50	0	50
10	<u>Hwy 69, NBL, Twp. of Foley</u> Sta. 14+440 - 14+500	14.9	75	55	130	40	0	40
11	<u>Hwy 69, NBL, Twp. of Foley</u>							
	<u>Toe of Existing Embankment</u> Sta. 14+620 -14+700	12.2 ⁸	55	400 ⁹	455	55	70	125
	<u>General Area</u> Sta. 14+620 - 14+700	16.6 ⁸	70	210	280	75	0	75

Notes:

1. Refer to Table IV for Swamp Treatment.
2. Height of embankment plus thickness of rockfill below grade.
3. Based on a 12 month construction period for Swamps 1 to 10, 6 months for Swamp 11.
4. Settlement due to compression of sand/silt and consolidation of compressible clay layers within sand/silt deposits.
5. During 10 year period following completion of embankment fill.
6. Thickness of rock fill includes minimum 8 m depth of excavation or excavation to bedrock required for swamp treatment.
7. Foundation settlement if swamp treatment option 3-1or 3-2 is employed, 0 if treatment 2-5 is employed.
8. Does not include height of surcharge.
9. Includes consolidation settlement induced by rockfill surcharge.



NOTES:

- A Height of fill is the vertical difference between top of subgrade and top of swamp elevation measured at new road centreline.
- B For divided roads with median < 10 metres, excavate swamp material full width.
- C For divided roads with median ≥ 10 metres, excavate swamp material to limits shown.
- D All dimensions are in millimetres or metres unless otherwise shown.

LEGEND:

- | | |
|--|-----------------------------------|
| | Embankment materials as specified |
| | Excavated swamp material |
| | Excavate and backfill |

h — Height of fill
d — Depth of swamp

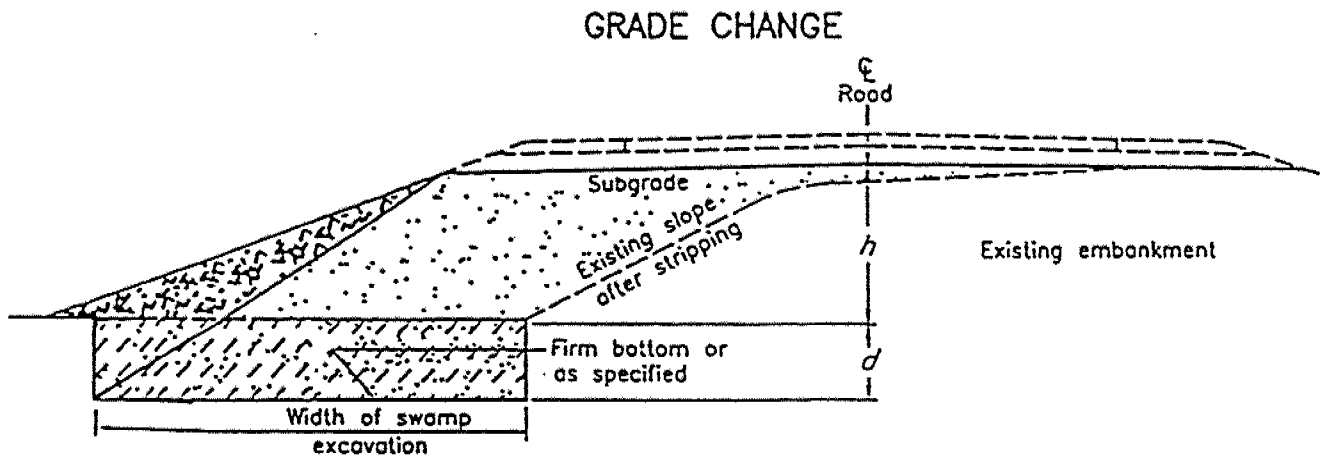
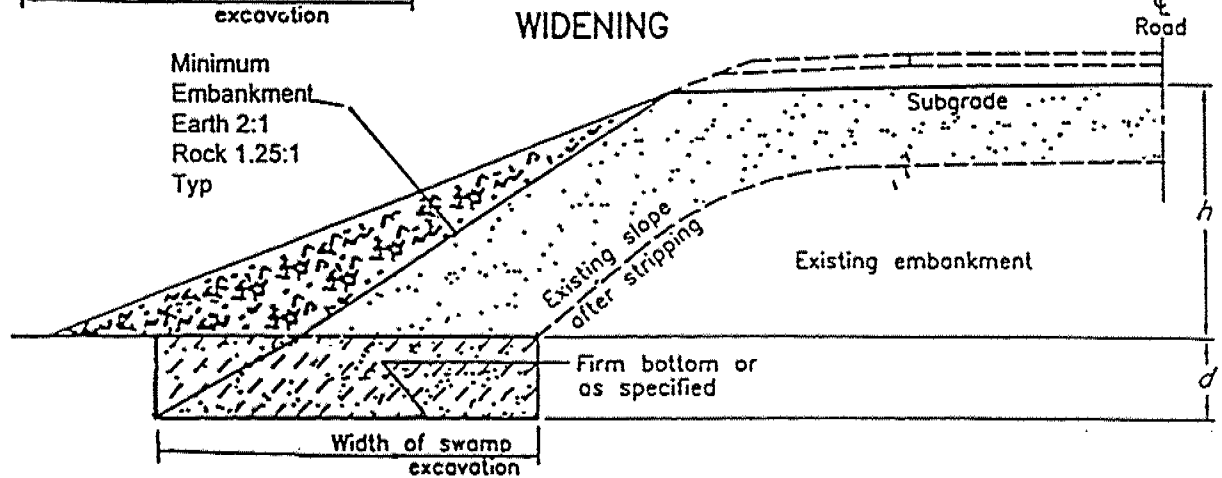
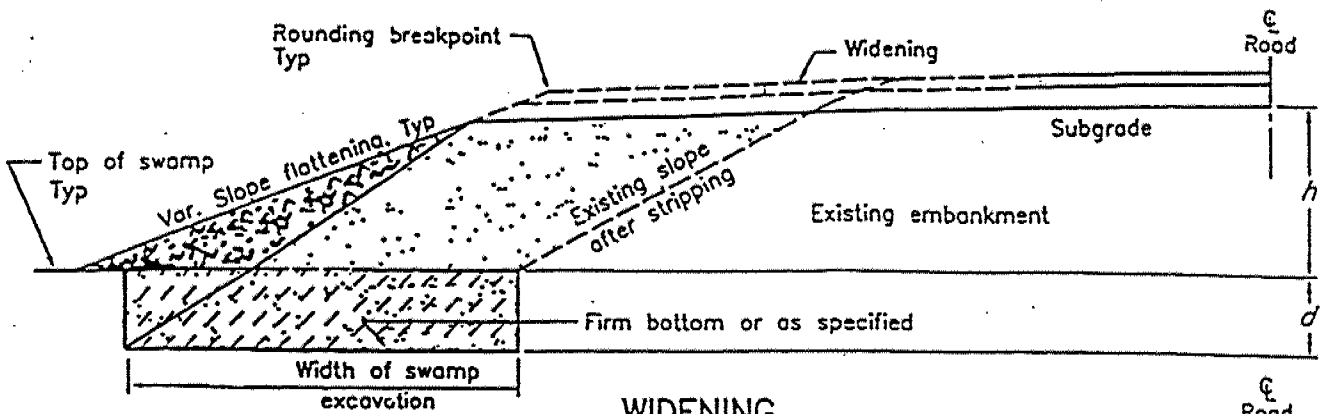
ONTARIO PROVINCIAL STANDARD DRAWING

EMBANKMENTS OVER SWAMP NEW CONSTRUCTION

1998 03 01 Rev

OPSD - 203.010 (MOD)







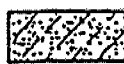
NOTES:

RE-ALIGNMENT AND GRADE CHANGE

- A Topsoil shall be stripped from existing slopes.
- B Height of fill is the vertical difference between top of subgrade and top of swamp elevation measured at new road centreline.
- C All dimensions are in millimetres or metres unless otherwise shown.

LEGEND:

h - Height of fill
 d - Depth of swamp

-  Embankment materials as specified
-  Excavated swamp material
-  Excavate and backfill

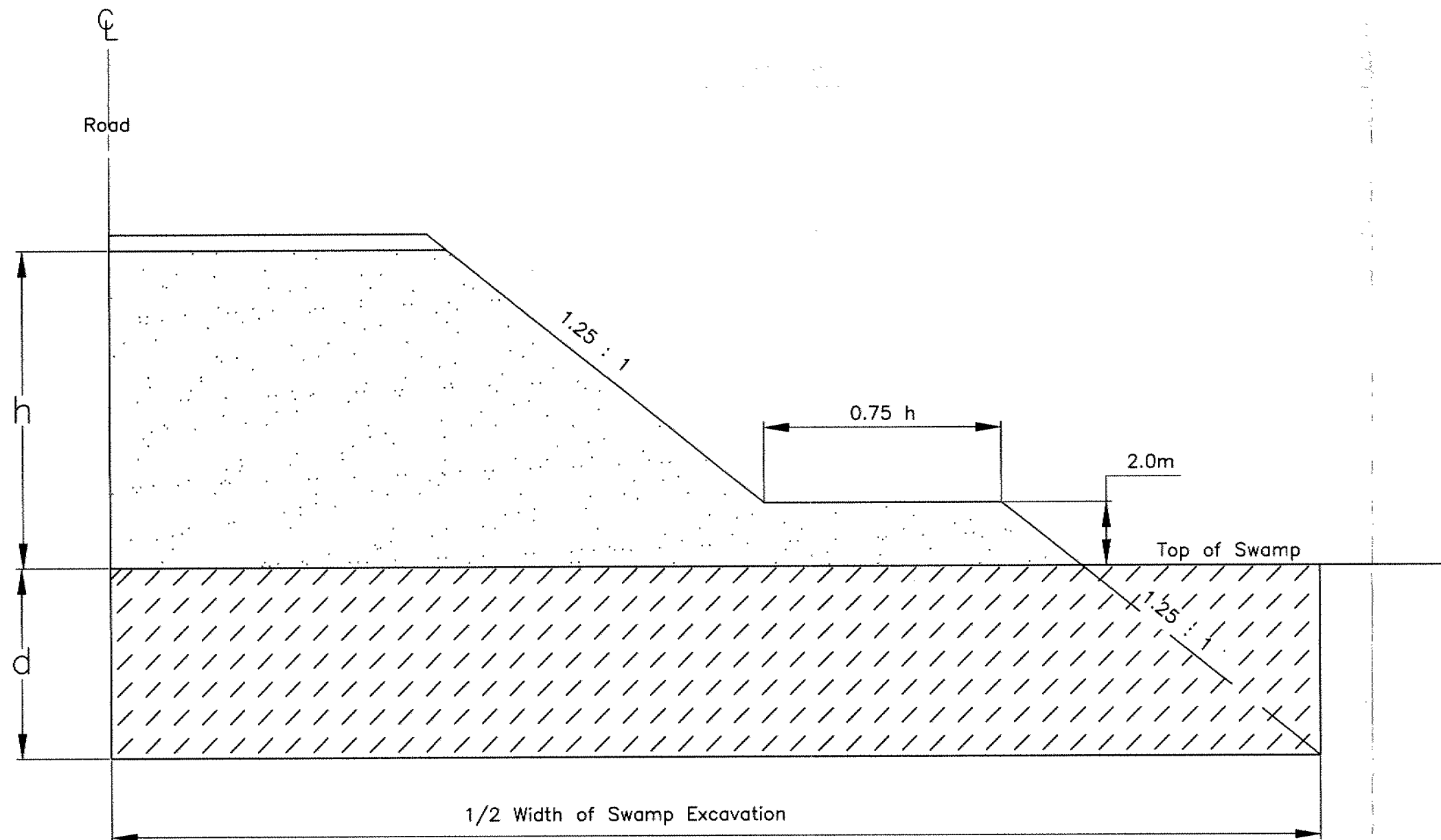
ONTARIO PROVINCIAL STANDARD DRAWING

1998 03 01 | Rev |

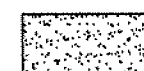
EMBANKMENTS OVER SWAMP
 EXISTING SLOPES MAINTAINED



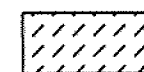
OPSD - 203.030 (MOD)



LEGEND :



Rockfill



Excavation and Backfill

h

— Height of fill (m)

d

— Depth of excavation (m)

NOTE :

1. Excavate Peat / Soft Clay to 8.0 m depth or shallower where sand or bedrock encountered.

MINISTRY OF TRANSPORTATION

KING'S HIGHWAY 69

GWP 290-97-00

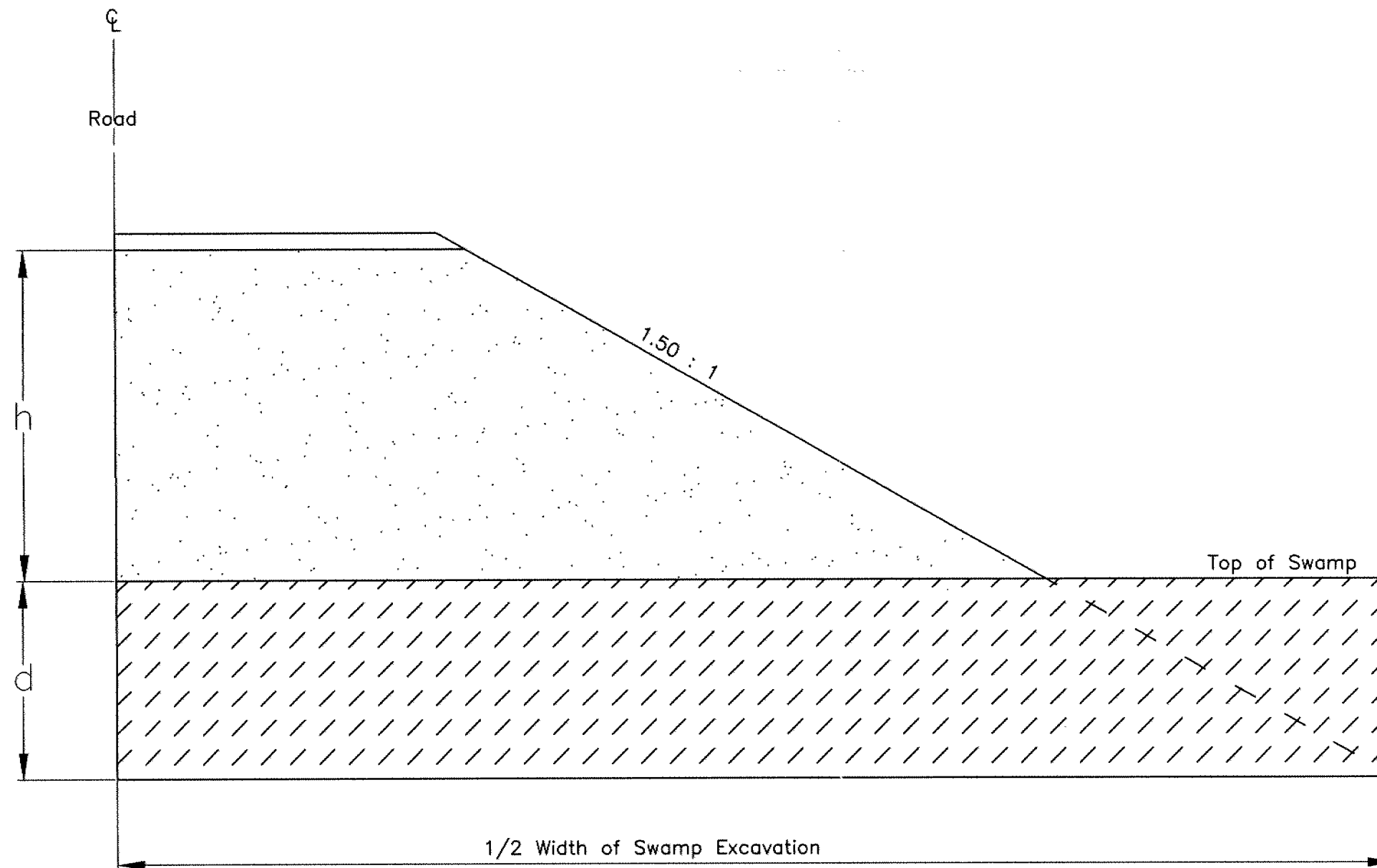
DISTRICT
52 HUNTSVILLE

REGION
NORTHERN

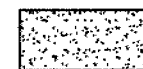
SWAMP TREATMENT
with
TOE-BERM

Peto MacCallum Ltd.
CONSULTING ENGINEERS
45 BURFORD ROAD, HAMILTON, ONTARIO L8E 3C8

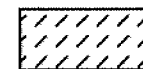
DRAWN	JS	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	MAY 1998	N.T.S.	97TF088B	19
APPROVED	DKK				



LEGEND:



Rockfill



Excavation and Backfill

h — Height of fill (m)

d — Depth of excavation (m)

NOTE :

1. Excavate Peat / Soft Clay to 8.0 m depth or shallower where sand or bedrock encountered.

MINISTRY OF TRANSPORTATION

KING'S HIGHWAY 69
GWP 290-97-00

DISTRICT
52 HUNTSVILLE

REGION
NORTHERN

SWAMP TREATMENT
WITH
FLATTENED SLOPES

Peto MacCallum Ltd.
CONSULTING ENGINEERS
45 BLAIRFORD ROAD, HAMILTON, ONTARIO L8E 3G8

DRAWN	JS	DATE	SCALE	JOB NO.	DRAWING NO.
CHECKED	EW	MAY 1998	N.T.S.	97TF088B	20
APPROVED	DRK				

S-E RAMP (OLD HWY 69)

METRIC

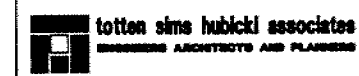


CONT No 00-00
WP No 290-97-00

PROFILES
STA 11+777.8 TO STA 12+266.8
Survey 1997 12 Revised

SHEET
70

ES&P JOINT VENTURE

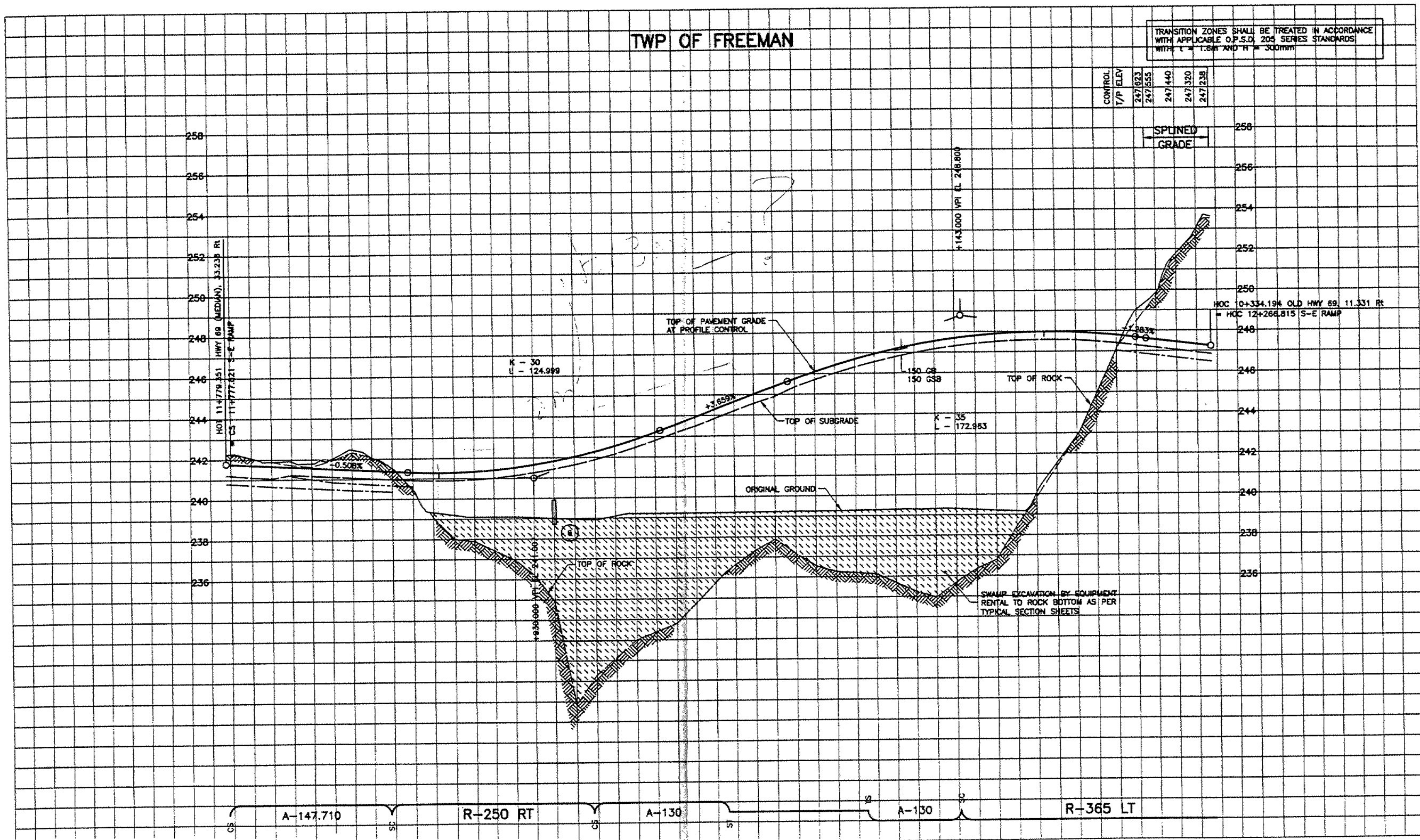


TWP OF FREEMAN

TRANSITION ZONES SHALL BE TREATED IN ACCORDANCE
WITH APPLICABLE O.P.S.D. 205 SERIES STANDARDS
WITH $L = 1.6M$ AND $H = 300mm$

CONTROL T/P	ELEV
247.623	
247.555	
247.440	
247.320	
247.235	

SPLINED
GRADE



Right Ditch
Left Ditch

SCALES
10 m 0 20 m
Horizontal
1.0 m 0 2.0 m
Vertical

MINISTRY OF TRANSPORTATION, ONTARIO
PE-0-707 04-05
XONB.DWG 05/06/98 15:01

NBL PROFILE

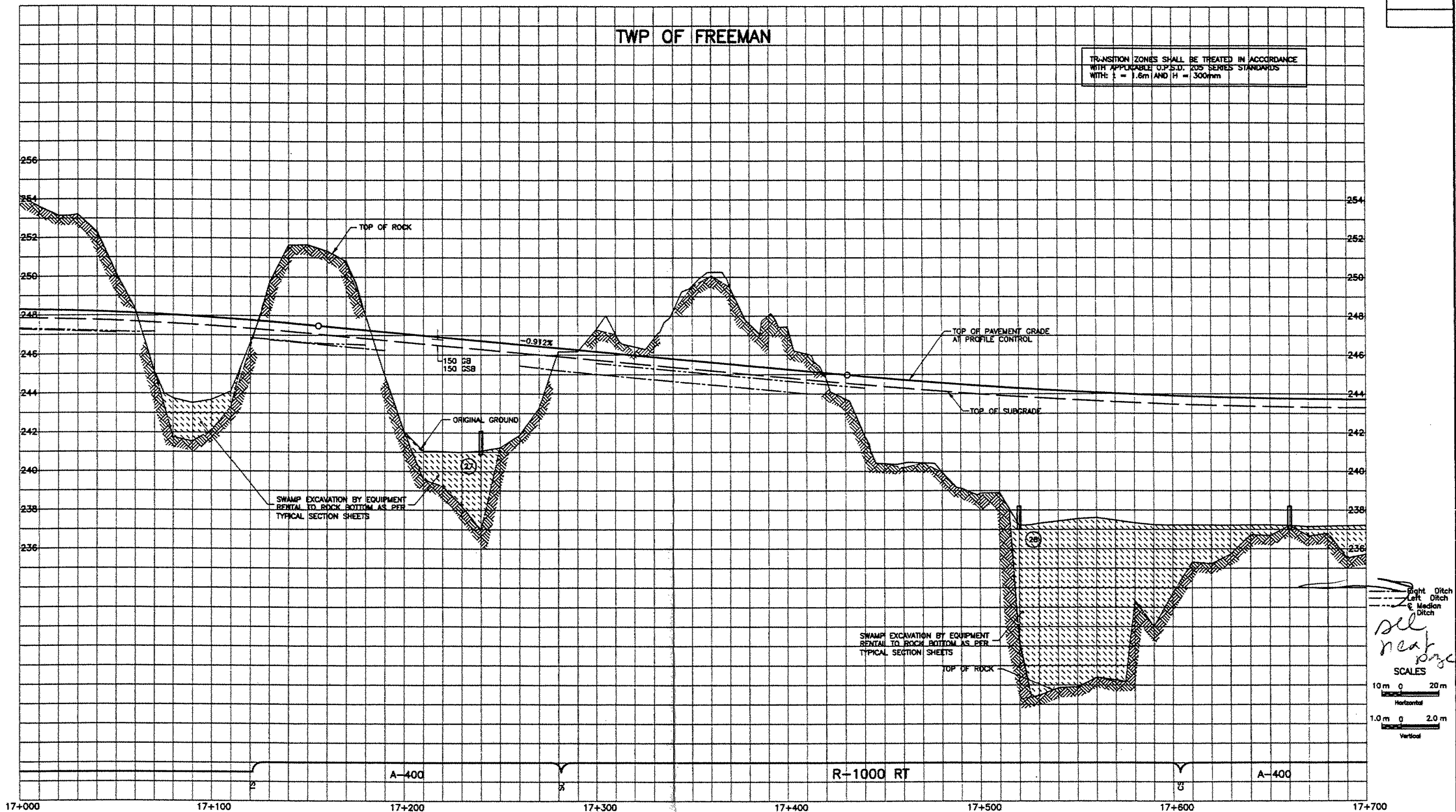


CONT No 00-00
WP No 290-97-00

PROFILES
STA 17+000 TO STA 17+700
Survey 1997 12 Revised

SHEET
100

totes sine hubicki associates
ENGINEERS ARCHITECTS AND PLANNERS



NBL PROFILE

METRIC



CONT No 00-00
WP No 290-97-00

PROFILES
STA 17+700 TO STA 18+400
Survey 1997 12 Revised

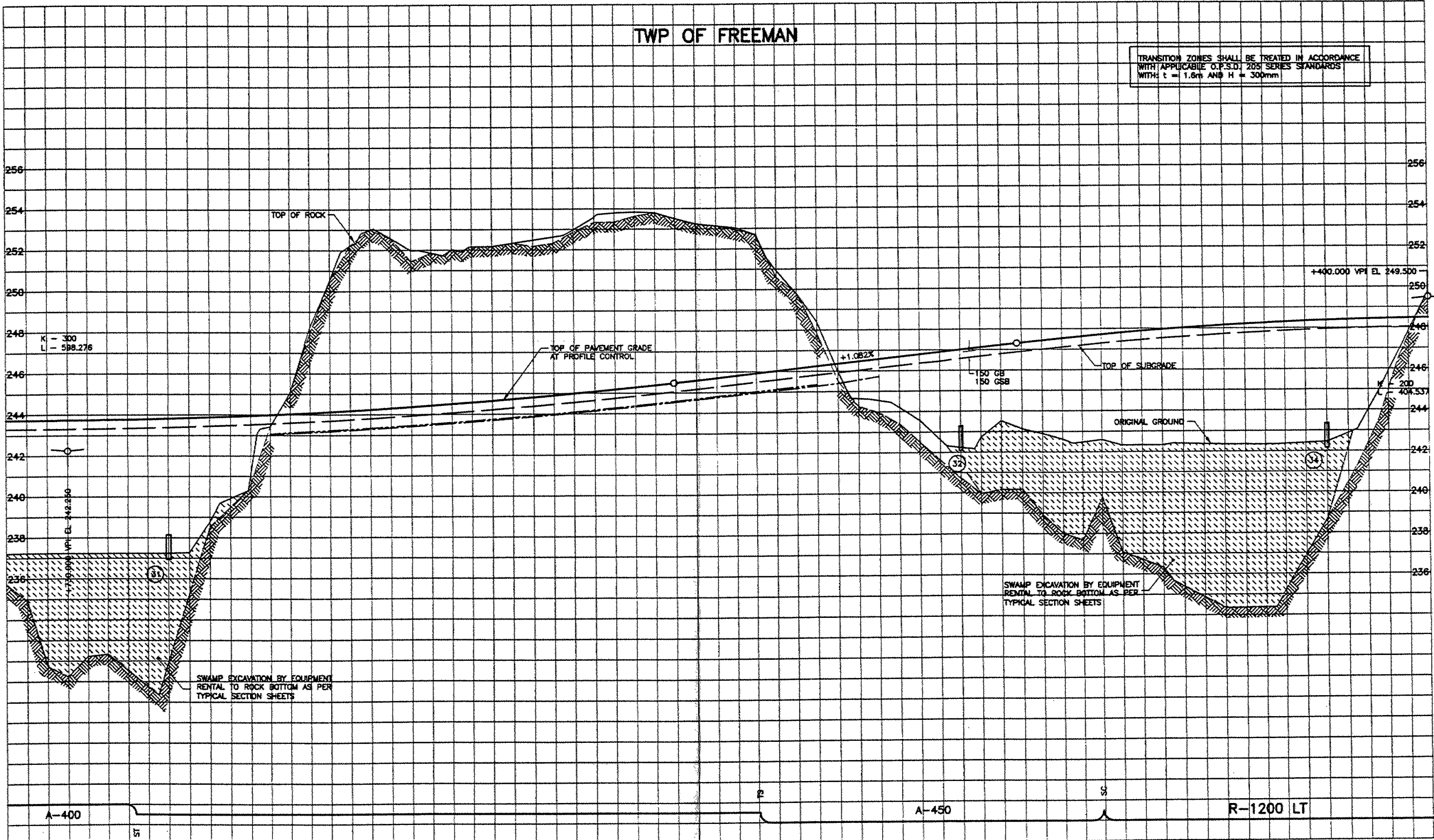
SHEET
104

69 JOINT VENTURE



TWP OF FREEMAN

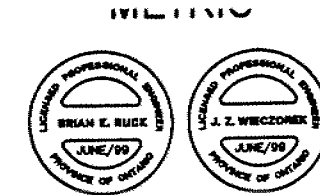
TRANSITION ZONES SHALL BE TREATED IN ACCORDANCE
WITH APPLICABLE O.P.S.D. 203 SERIES STANDARDS
WITH: $t = 1.6m$ AND $H = 300mm$



Right Ditch
Left Ditch
Median Ditch

SCALES
10 m 0 20 m
Horizontal
1.0 m 0 2.0 m
Vertical

SBL PROFILE

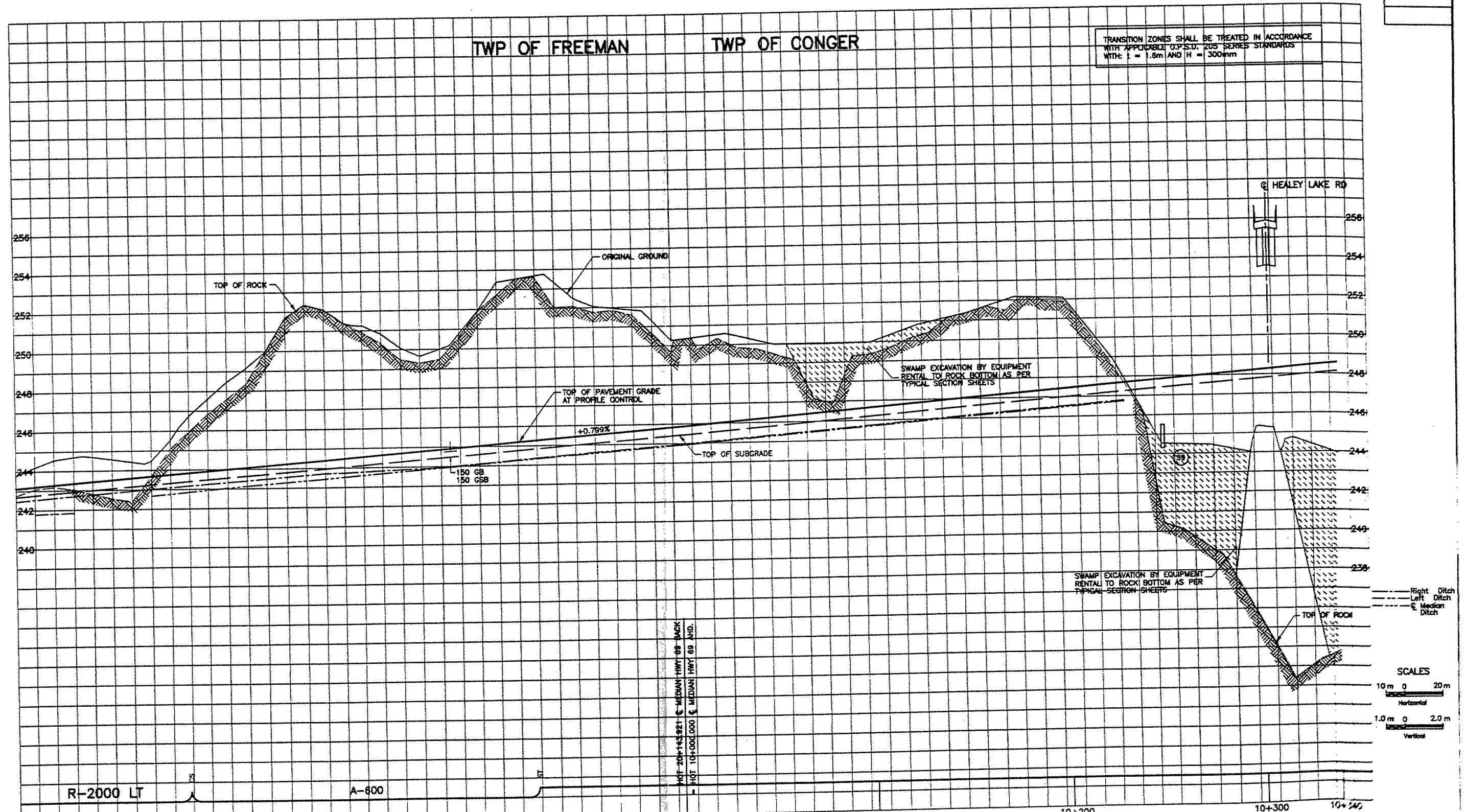


CONT No 00-00
WP No 290-97-00

PROFILES
STA 19+800 TO STA 10+340
Survey 1997 12 Revised
SHEET 116

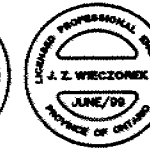
JOINT VENTURE

totten sims hubicki associates
ENGINEERS ARCHITECTS AND PLANNERS



HEALEY LAKE ROAD

METRIC



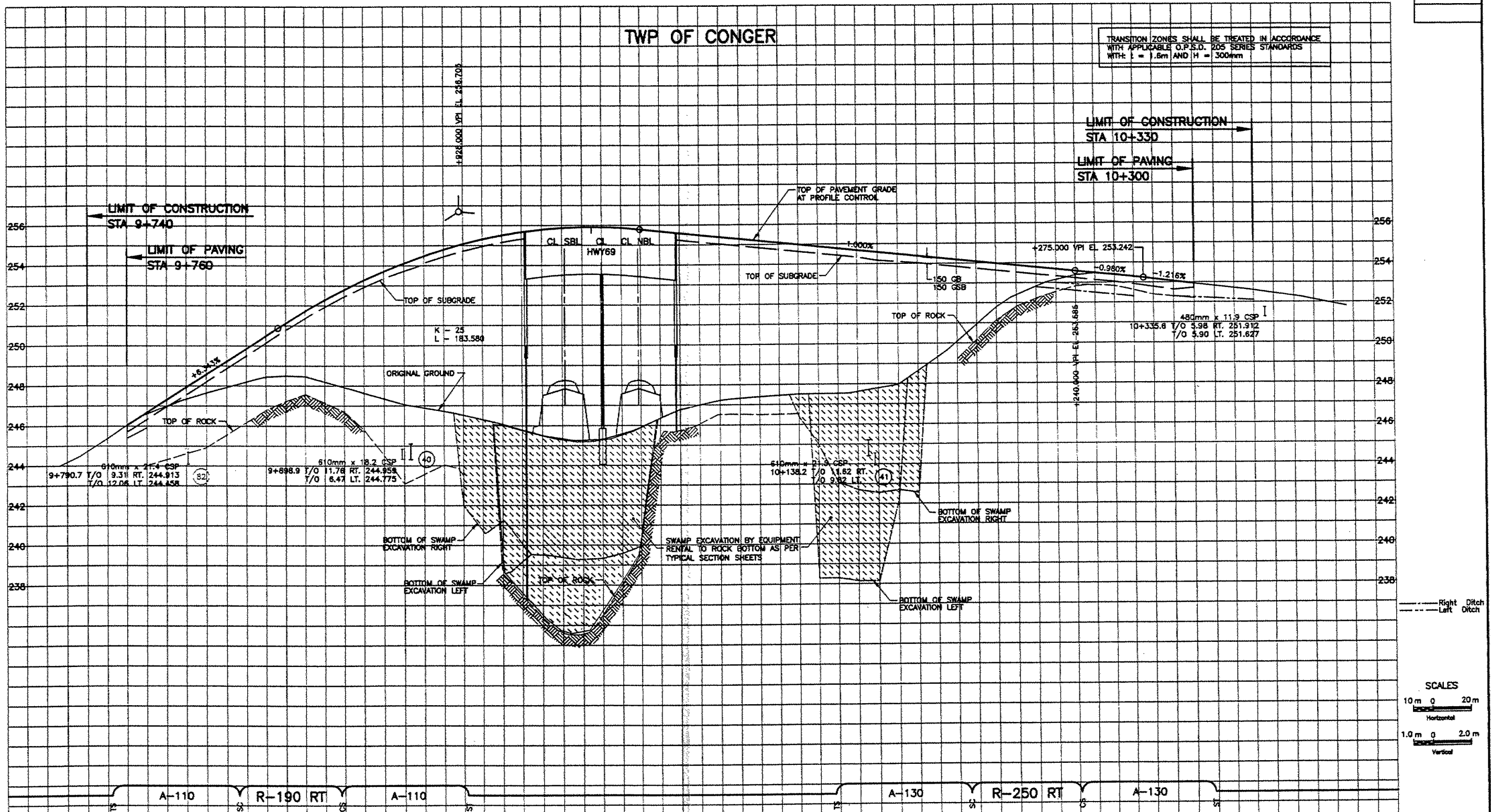
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CONT No 00-00
WP No 290-97-00

PROFILES
 STA 9+767.3 TO STA 10+300
 Survey 1997 12 Revised

SHEET
 119

69 JOINT VENTURE

totten sine hubicki associates
 ENGINEERS ARCHITECTS AND PLANNERS



TWP OF CONGER



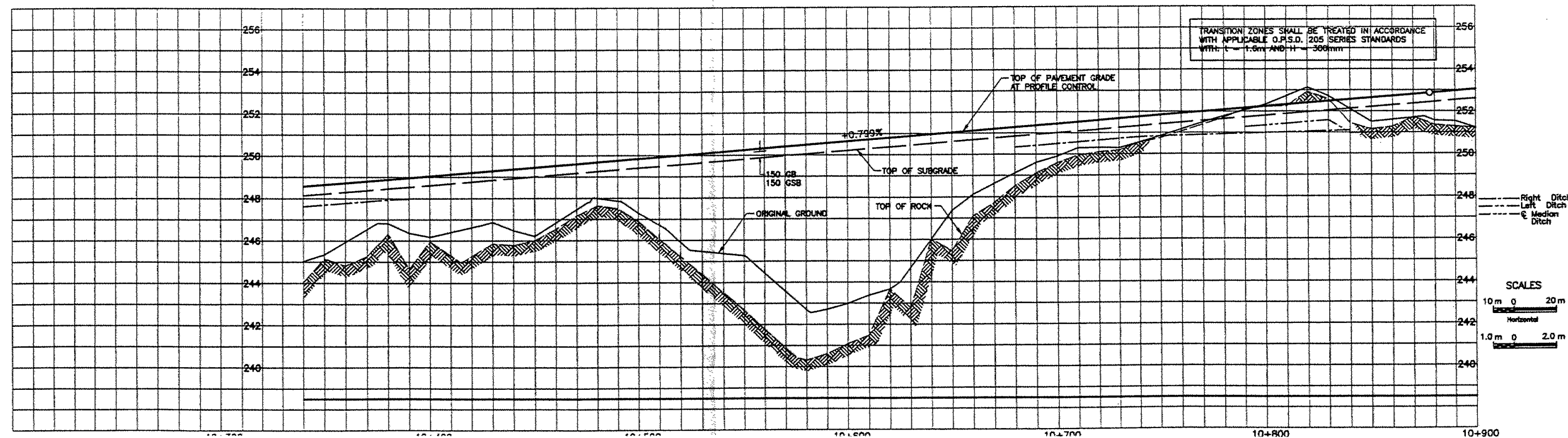
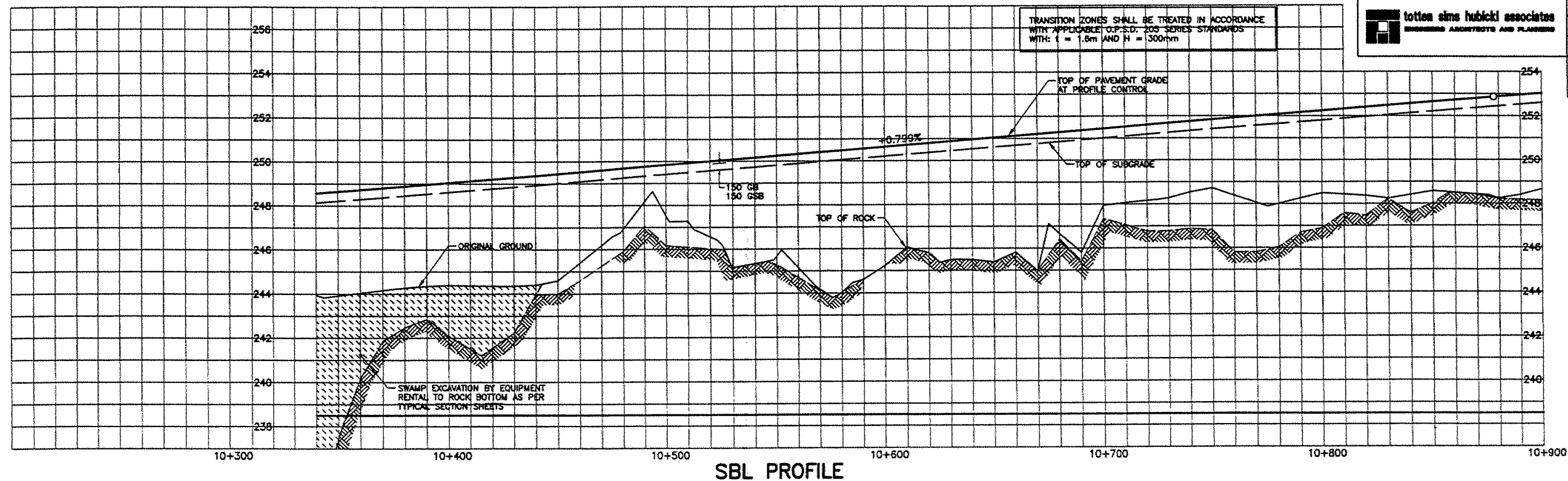
CONT No 00-00
WP No 290-97-00

PROFILES
STA 10+340 TO STA 10+900
Survey 1997 12 Revised

SHEET
122

JOINT VENTURE

totten sims hubicki associates
ENGINEERS ARCHITECTS AND PLANNERS



METRIC



PLATE No 774-69/21-0 774-69/22-0
DRAWING No 07740069021 07740069022

CONT No 00-00
WP No 290-97-00

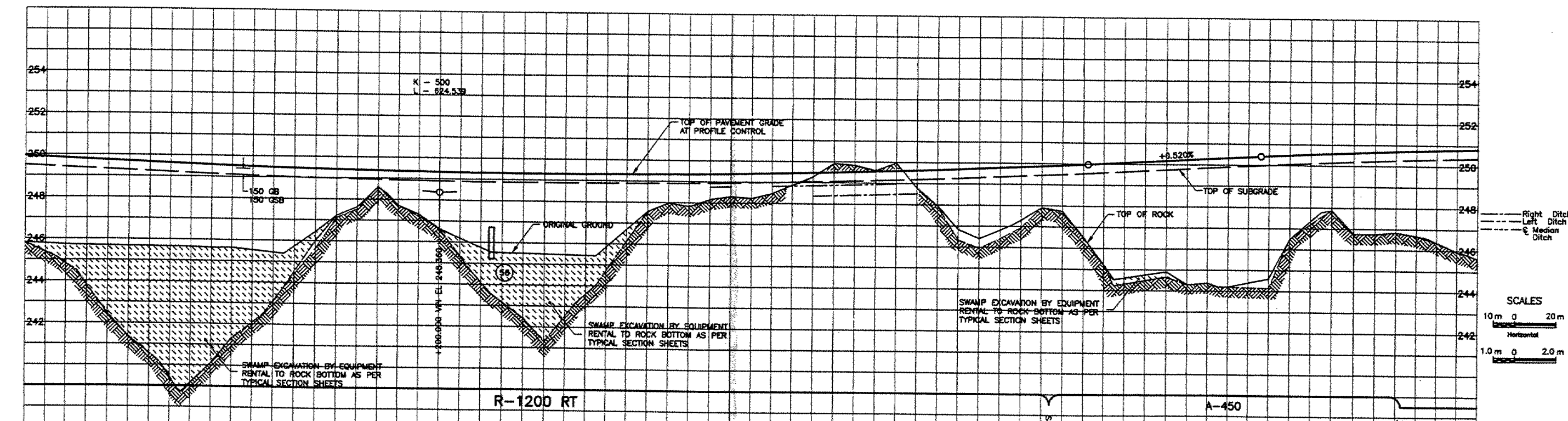
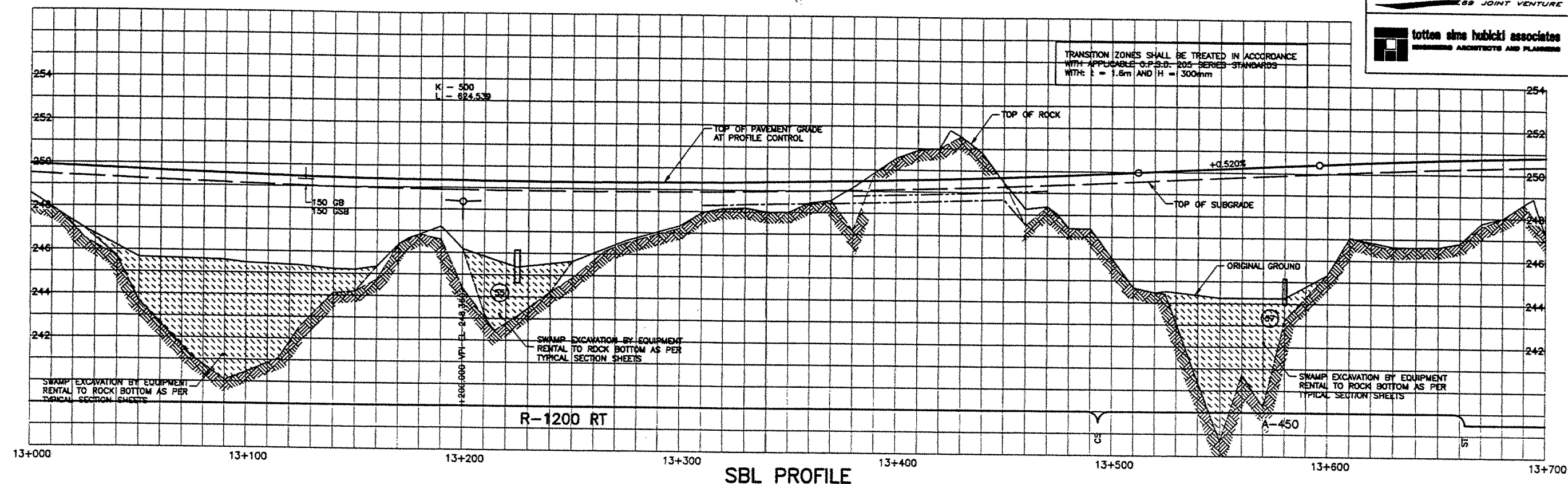
PROFILES
STA 13+000 TO STA 13+700
Survey 1997 12 Revised

SHEET
134

69 JOINT VENTURE

totem sine hubicki associates
ENGINEERS ARCHITECTS AND PLANNERS

TWP OF CONGER



METRIC



DRAWING No 07740069030
CONT No 00-00
WP No 290-97-00

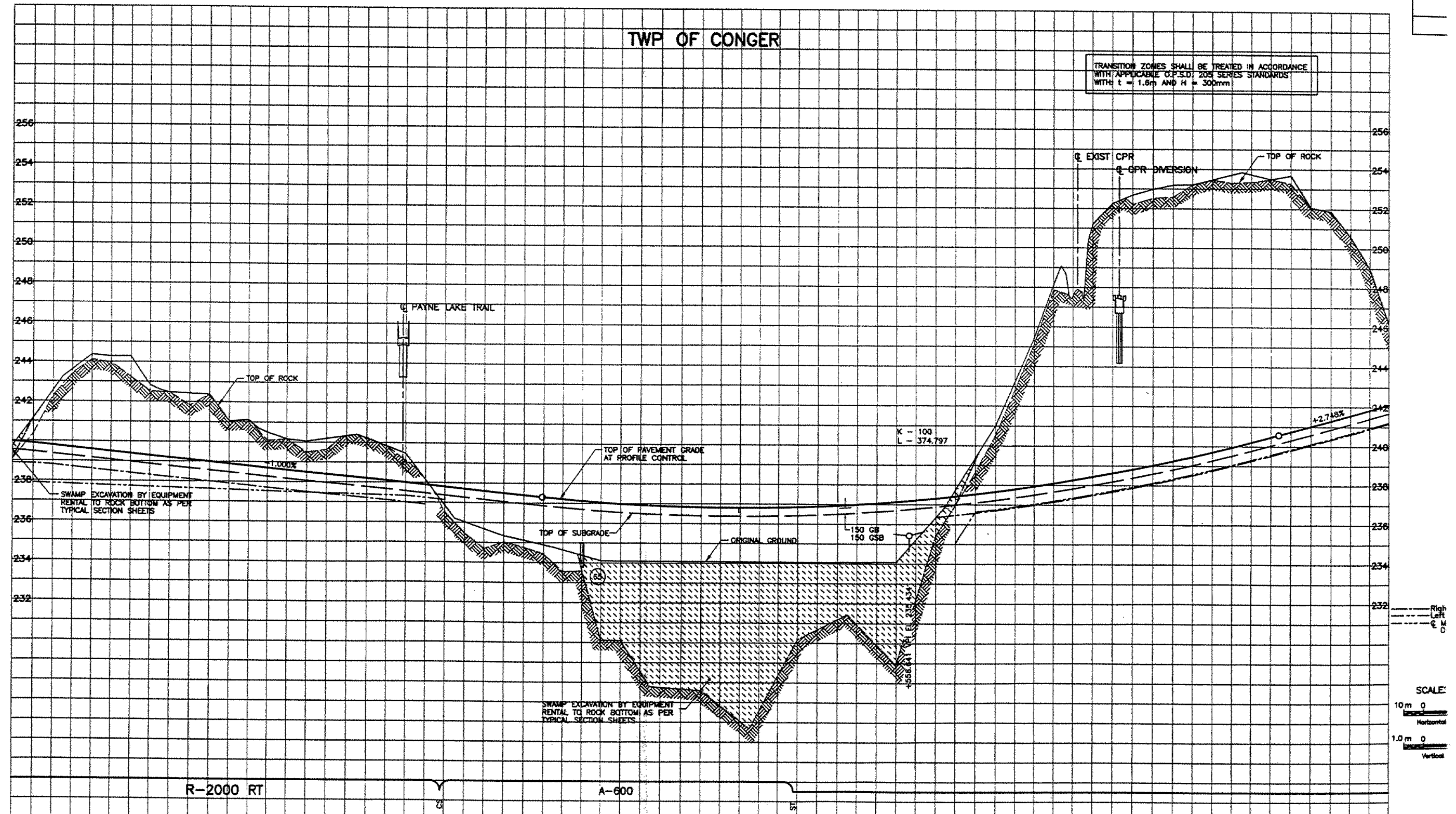
PROFILES
 STA 15+100 TO STA 15+800
 Survey 1997 12 Revised

SS JOINT VENTURE

totton sims hubicki associates
 ENGINEERS ARCHITECTS AND PLANNERS

SHI
 1

NBL PROFILE



SBL PROFILE

METRIC

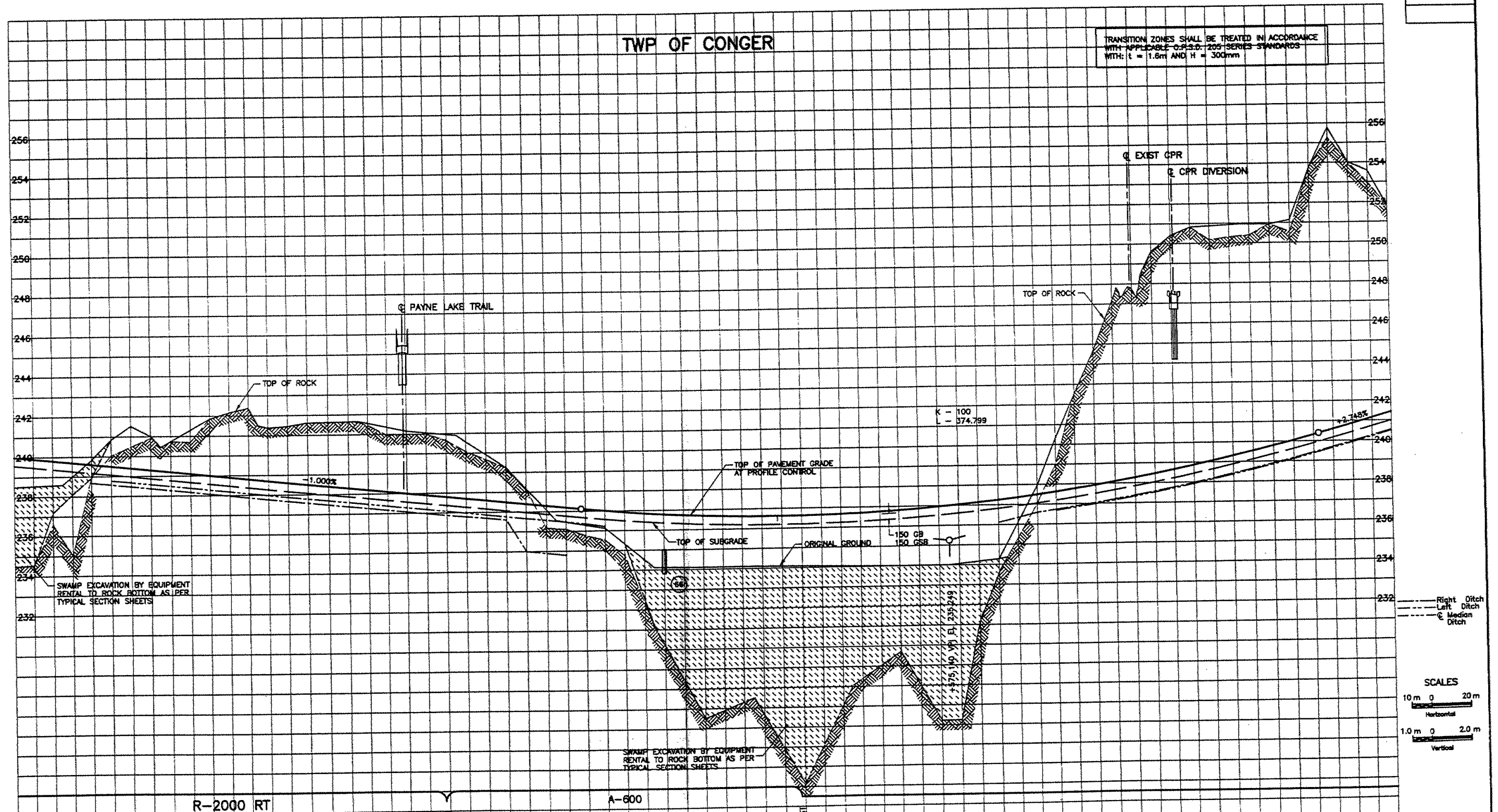


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CONT No 00-00
WP No 290-97-00

PROFILES

STA 15+100 TO STA 15+800
Survey 1997 12 Revised

SHEET
145

69 JOINT VENTURE

METRIC



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CONT No 00-00
WP No 290-97-00

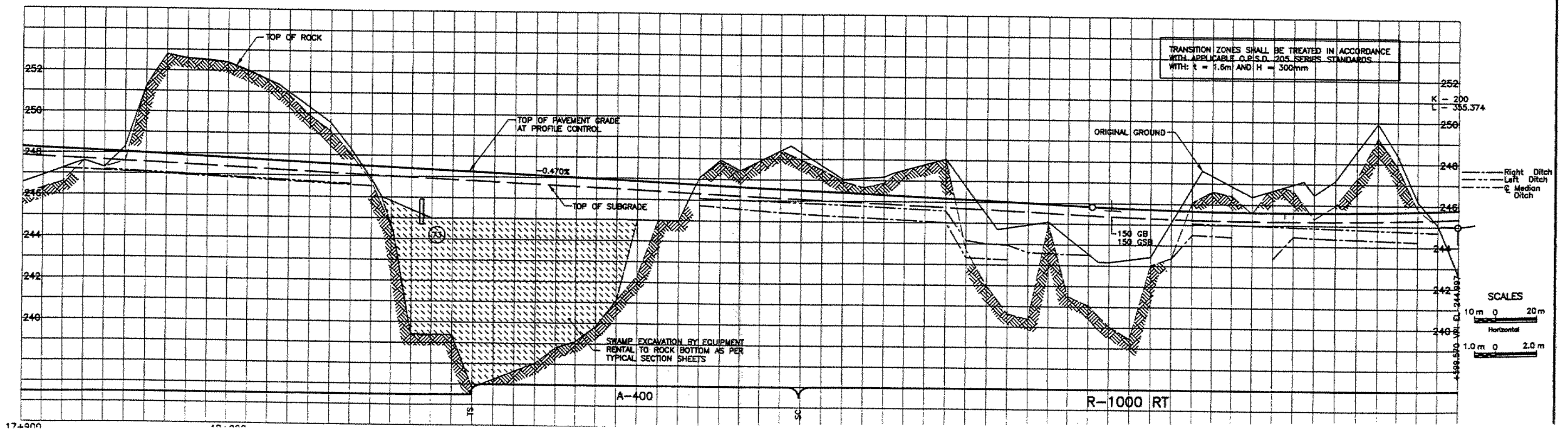
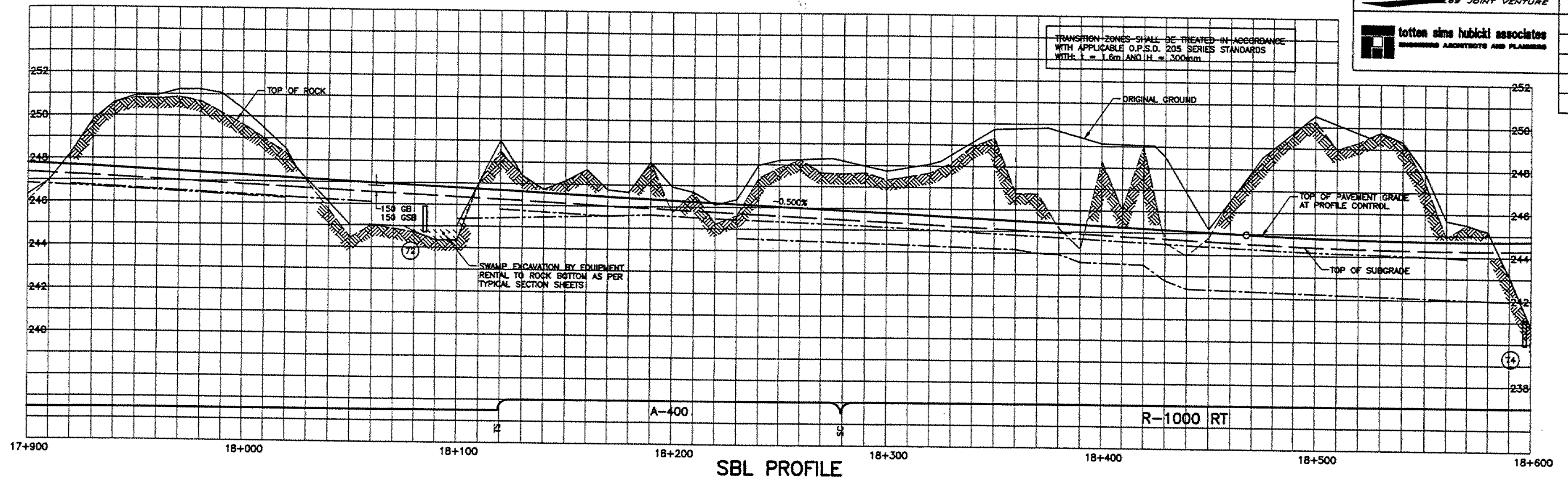
PROFILES
STA 17+900 TO STA 18+600
Survey 1987 12 Revised

SHEET
164

SS JOINT VENTURE

totten sine hubicki associates
ENGINEERS ARCHITECTS AND PLANNERS

TWP OF CONGER





METRIC

PLATE No 774-69/prf03-0
DRAWING No 077400prf03
CONT No
WP No 290-97-00

PROFILE STA 18+600 TO STA 19+300 Survey 1987 12 Revised	SHEET 167
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69 JOINT VENTURE

MRC	McCORMICK RANKIN CORPORATION	
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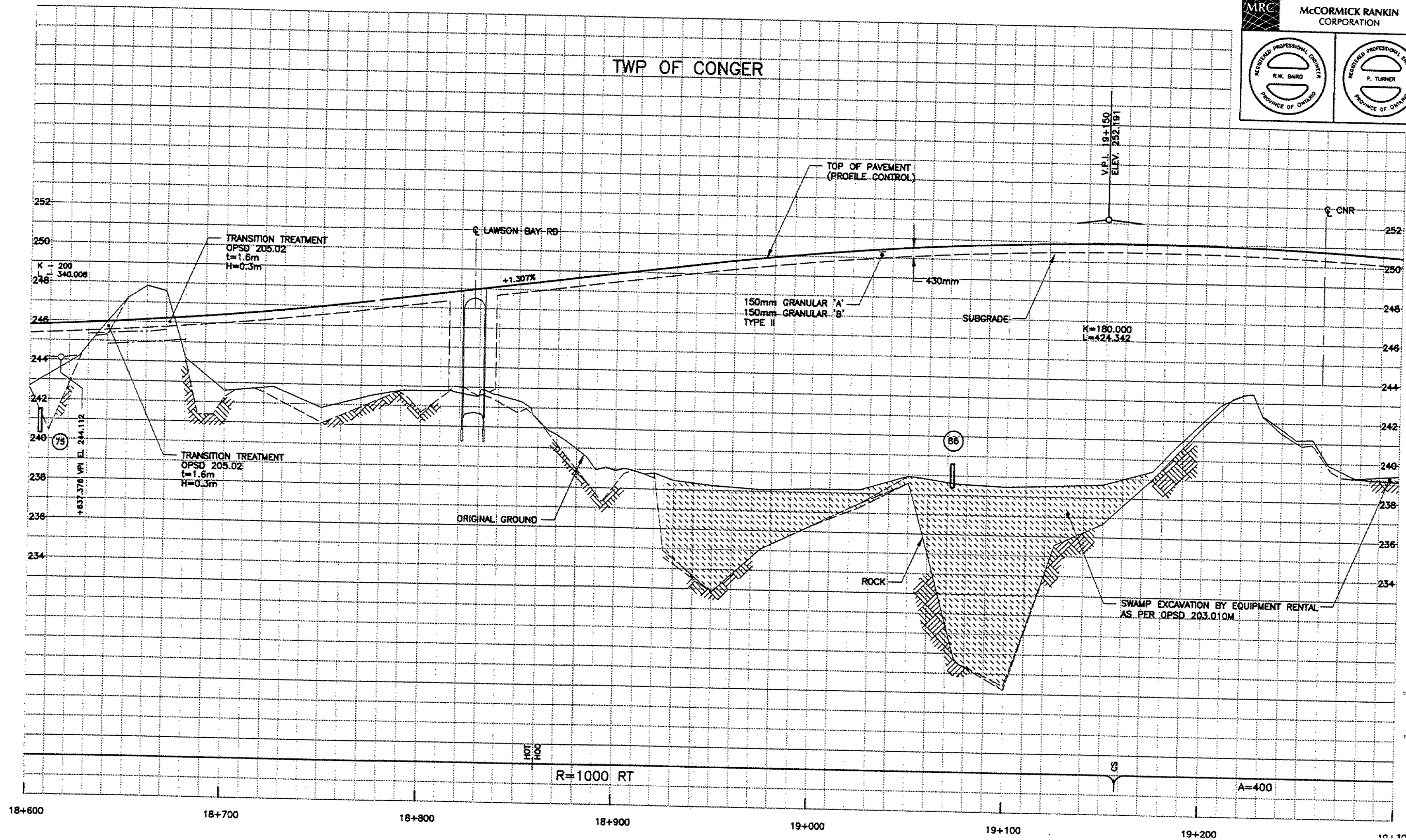
		
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18.75 RT NBL

LEGEND

 MUSKEG EXCAVATION

TWP OF CONGER



SCALES

A horizontal scale bar with markings at 10m, 0, and 20m. The bar is divided into segments, with the 0 mark in the center.

40, 200

18.75 RT NBL

LEGEND

MUSKEG EXCAVATION

DATE 11/4-89/prt04-0
DRAWING No 077400prt04
CONT No
WP No 290-97-00

PROFILE
STA 19+300 TO STA 20+000
Survey 1987 12 Revised

SHEET
172

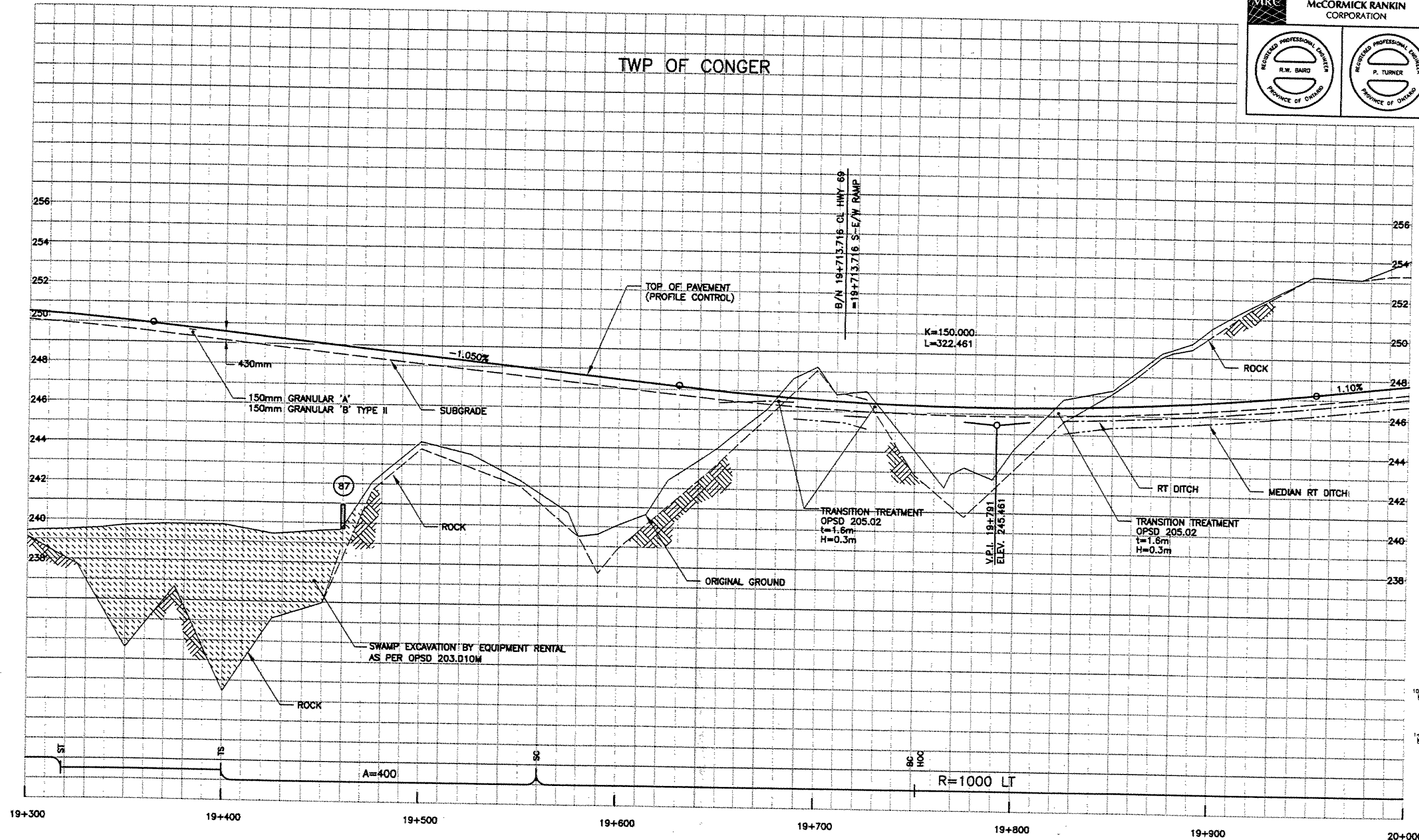
69 JOINT VENTURE

MRC

MCCORMICK RANKIN CORPORATION

REGISTERED PROFESSIONAL ENGINEER
R.W. BAIRD
PROVINCE OF ONTARIO

REGISTERED PROFESSIONAL ENGINEER
P. TURNER
PROVINCE OF ONTARIO



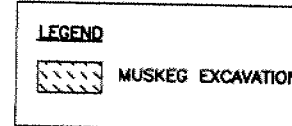
SCALES



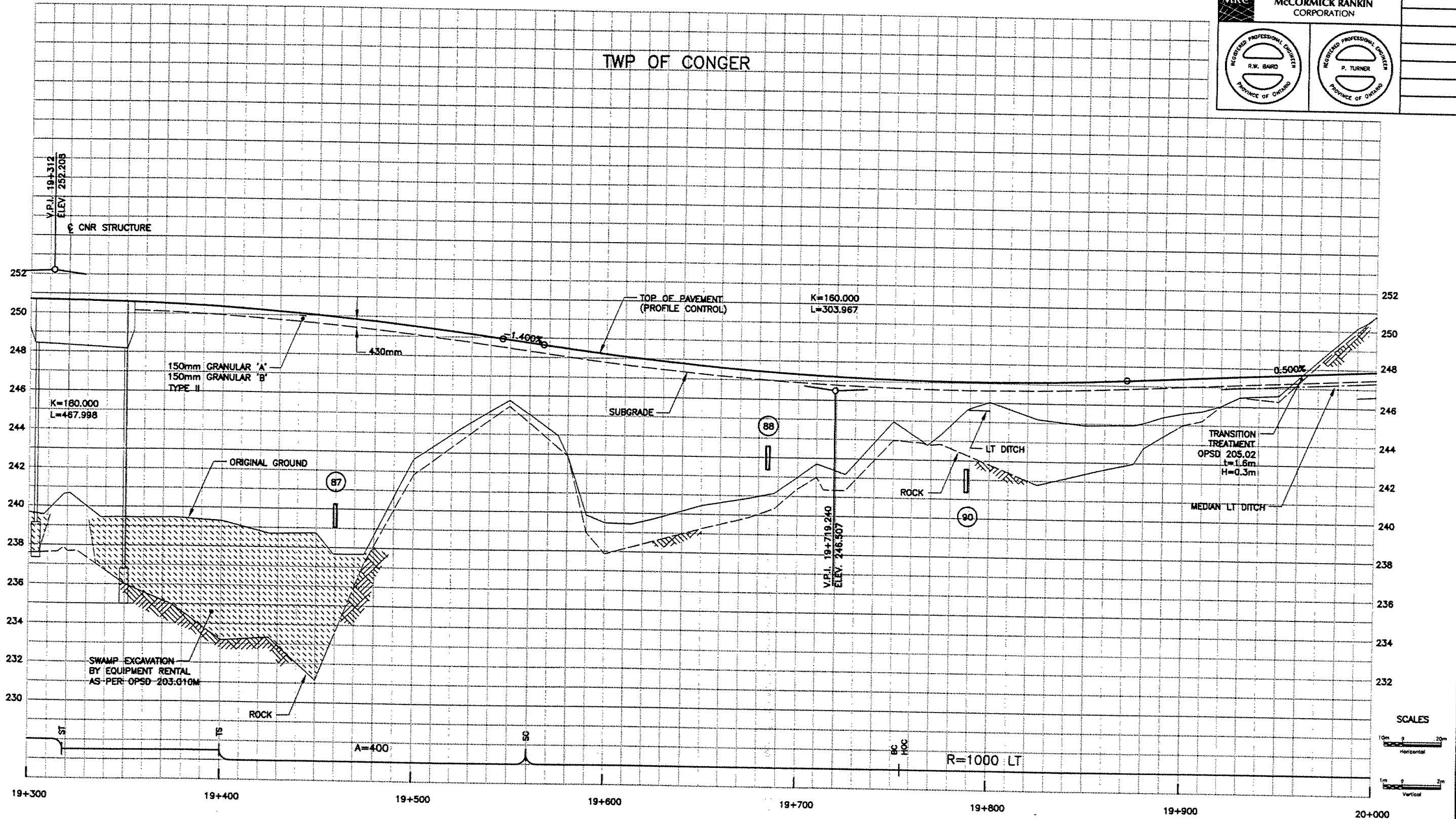
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PRF NAME: PRF-04.DWG
BY: D. CAMPBELL
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Revised

18.75 LT SBL

METRIC



DATE 1997 12/14-89/prf04-0	
DRAWING No 077400prf04	
CONT No	
WP No	290-97-00
PROFILE	
STA 19+300 TO STA 20+000	SHEET 173
Survey 1997 12 Revised	
69 JOINT VENTURE	
MRC MCCORMICK RANKIN CORPORATION	
REGISTERED PROFESSIONAL ENGINEER R.W. SARO PROVINCE OF ONTARIO	REGISTERED PROFESSIONAL ENGINEER P. TURNER PROVINCE OF ONTARIO



E/W-N RAMP HIGHWAY 141

LEGEND
MUSKEG EXCAVATION

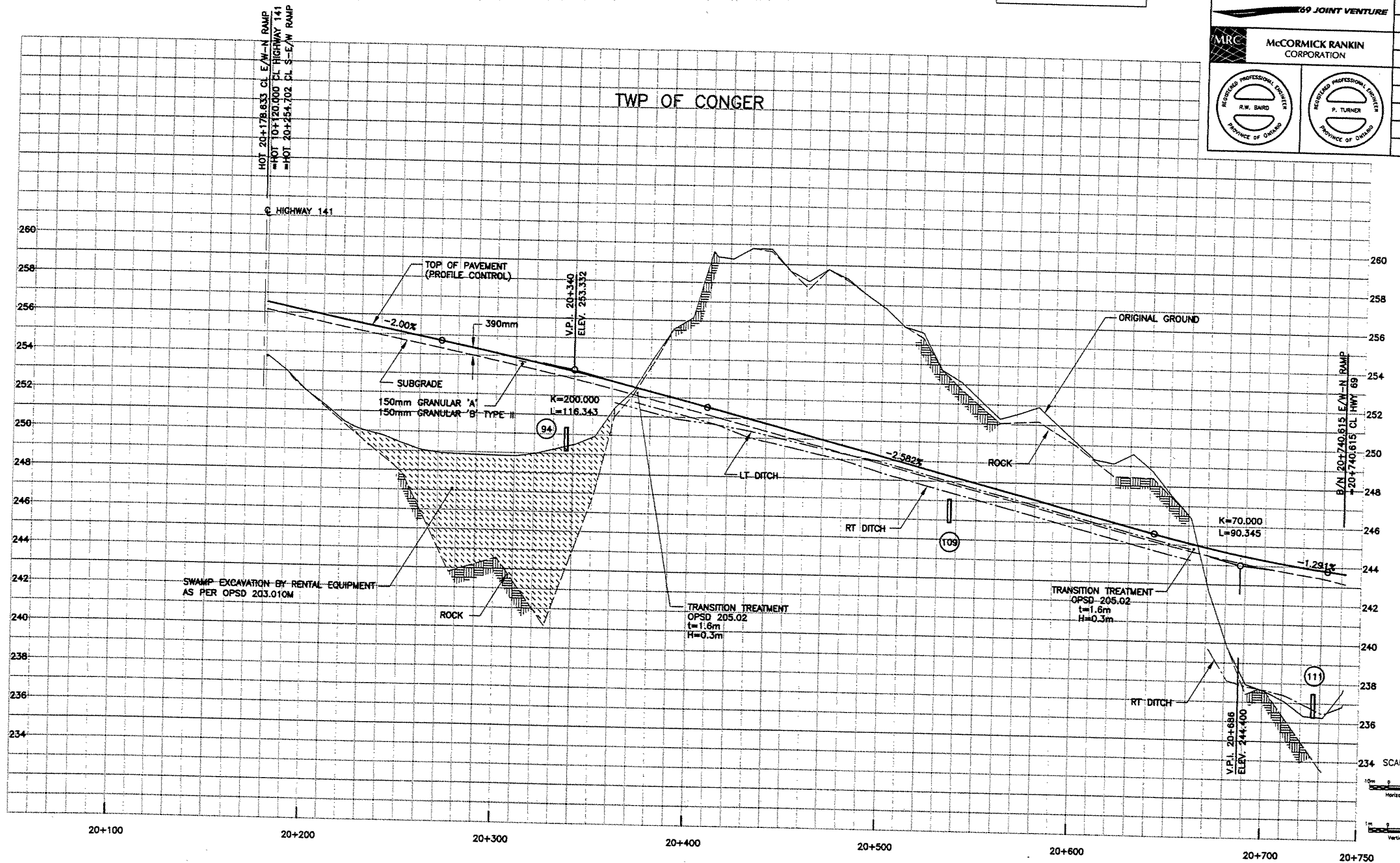
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WP No 290-97-00

PROFILE
STA 20+178.633 TO STA 20+740.615
Survey 1997 12 Revised

SHEET
183




69 JOINT VENTURE

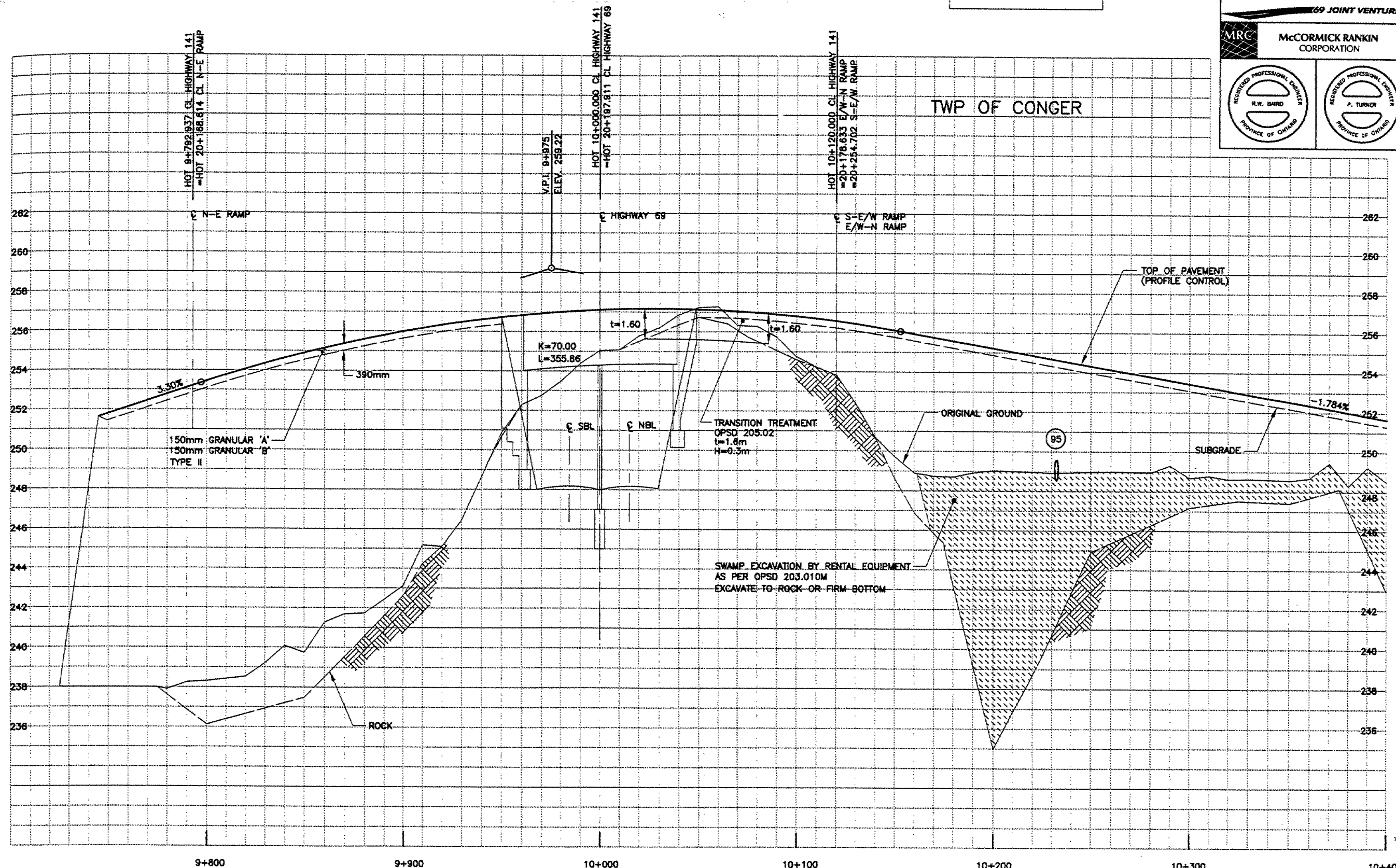
MRC
McCORMICK RANKIN
CORPORATION



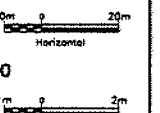
HIGHWAY 141

LEGEND
 MUSKEG EXCAVATION

DRAWING NO. 077-000177 CONT No WP No 290-97-00		SHEET 190
PROFILE STA 9+750 TO STA 10+400 Survey 1997 12 Revised		
69 JOINT VENTURE 		
MCCORMICK RANKIN CORPORATION  		



SCALES



HIGHWAY 141

DRAWING No 077400prf45
CONT No
WP No 290-97-00

PROFILE
STA 10+400 TO STA 11+270
Survey 1987 12 Revised

SHEET
191

69 JOINT VENTURE

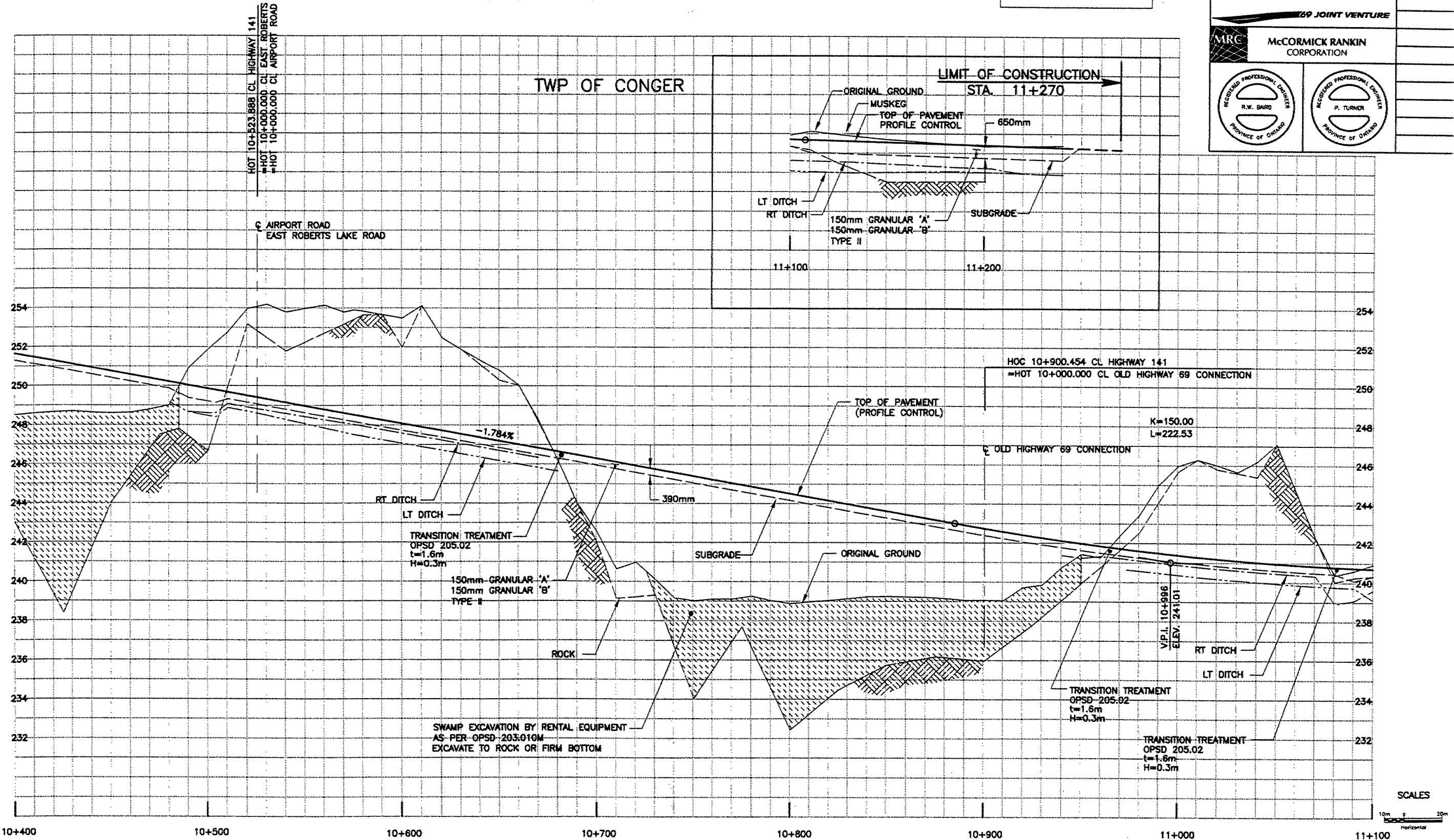
MRC

McCORMICK RANKIN CORPORATION

REGISTERED PROFESSIONAL ENGINEER
R.W. BAIRD
PROVINCE OF ONTARIO

REGISTERED PROFESSIONAL ENGINEER
P. TURNER
PROVINCE OF ONTARIO

LEGEND
MUSKEG EXCAVATION



SCALES


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Horizontal



1m 0 2m
Vertical

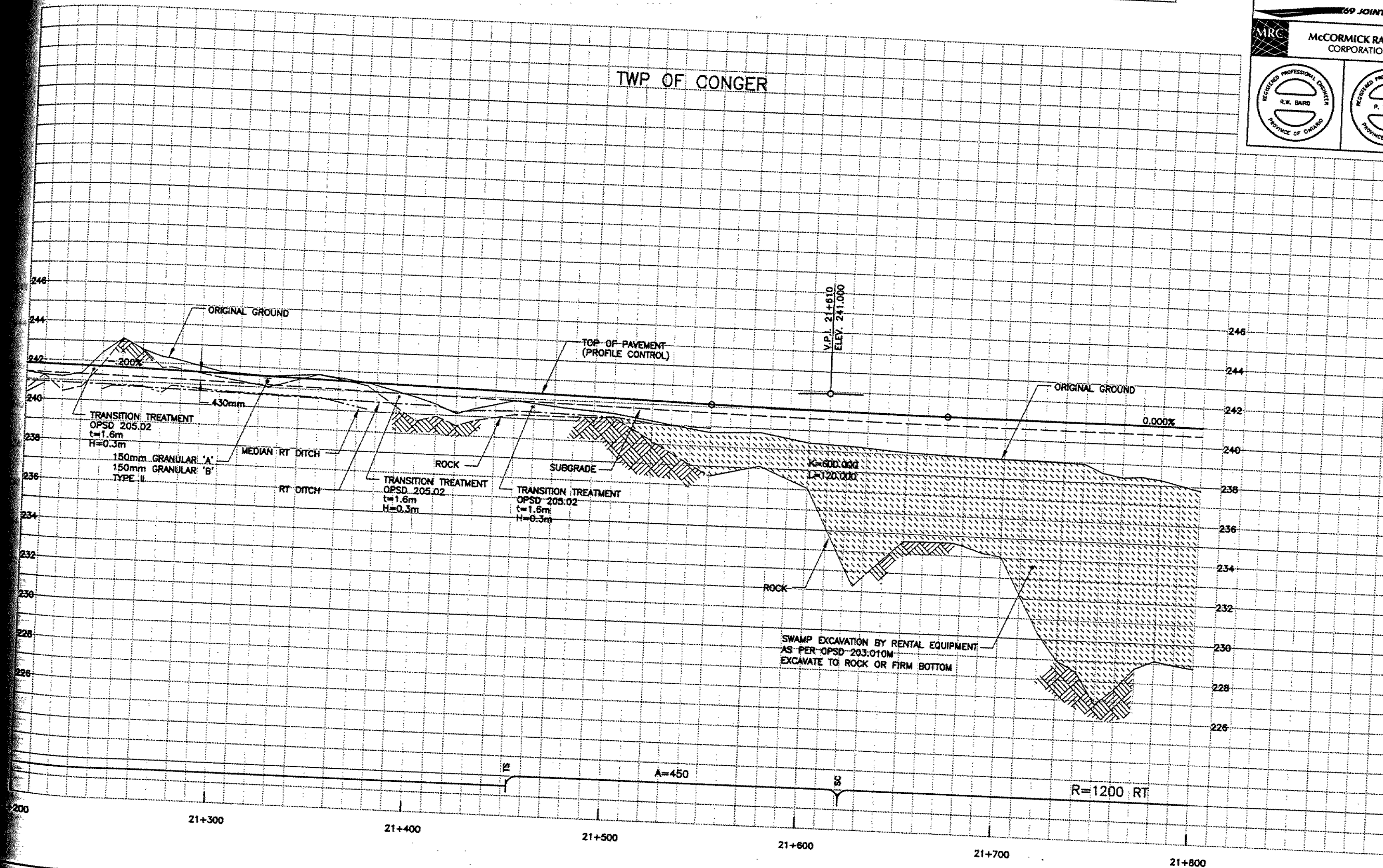
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CHECKED BY: J. L. LAMONTAGNE
DATE: 1987-12-12
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BY: D. CAMPBELL

18.75 RT NBL

LEGEND

 MUSKEG EXCAVATION

CONT No WP No 290-97-00	
PROFILE STA 21+200 TO STA 21+800 Survey 1997 12 Revised	
SHEET 197	
JOINT VENTURE	
MRC McCORMICK RANKIN CORPORATION	
	



18.75 RT NBL

LEGEND

MUSKEG EXCAVATION

CONT No
WP No 290-97-00

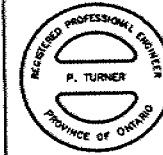
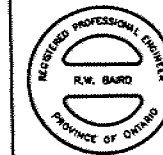
PROFILE
STA 21+800 TO STA 22+300
Survey 1987 12 Revised

SHEET
201

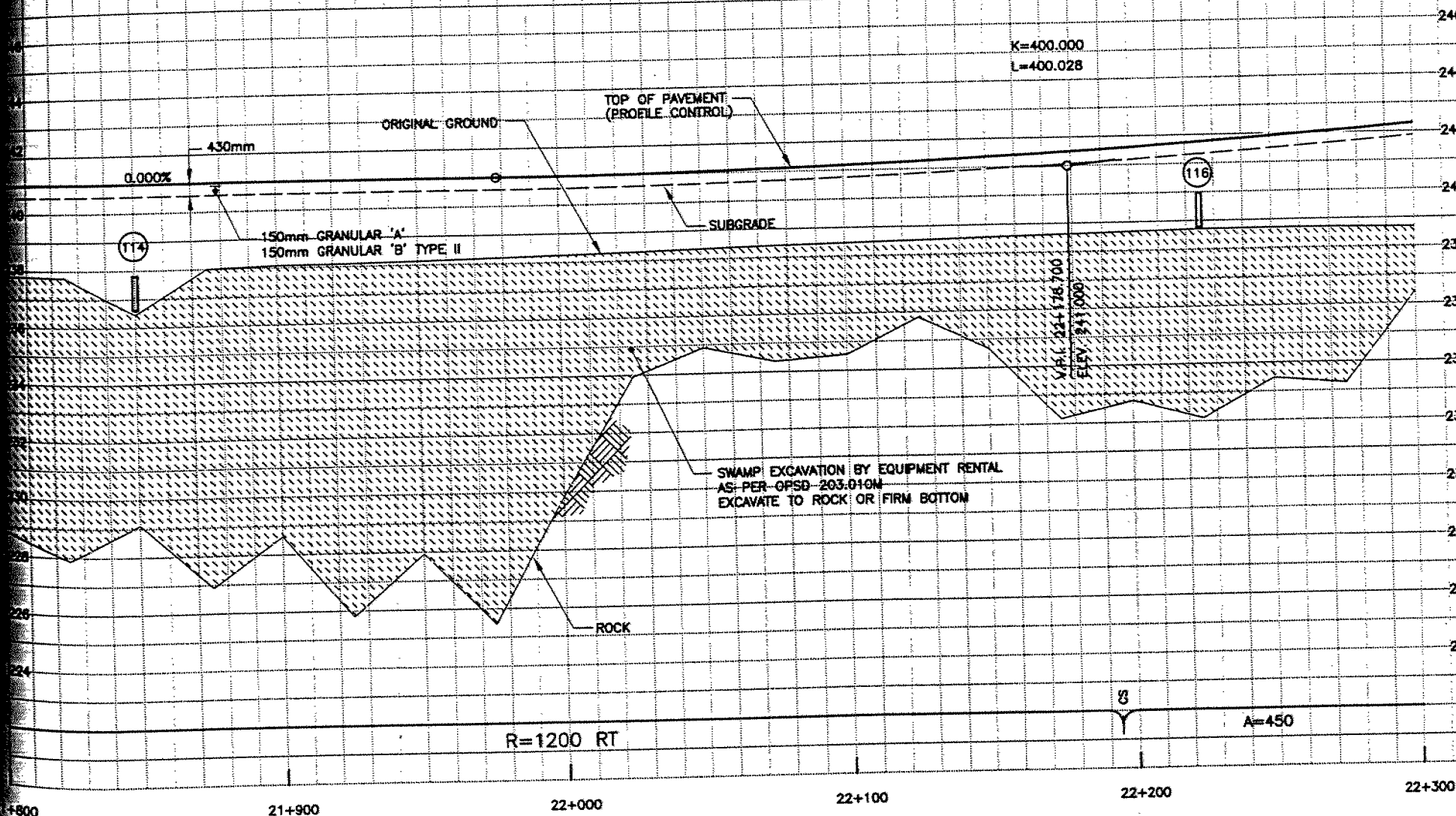
69 JOINT VENTURE

MRC

MCCORMICK RANKIN
CORPORATION



TWP OF CONGER



SCALES

10m 0 20m
Horizontal

1m 0 2m
Vertical

METRIC

18.75 LT SBL

LEGEND





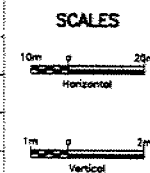
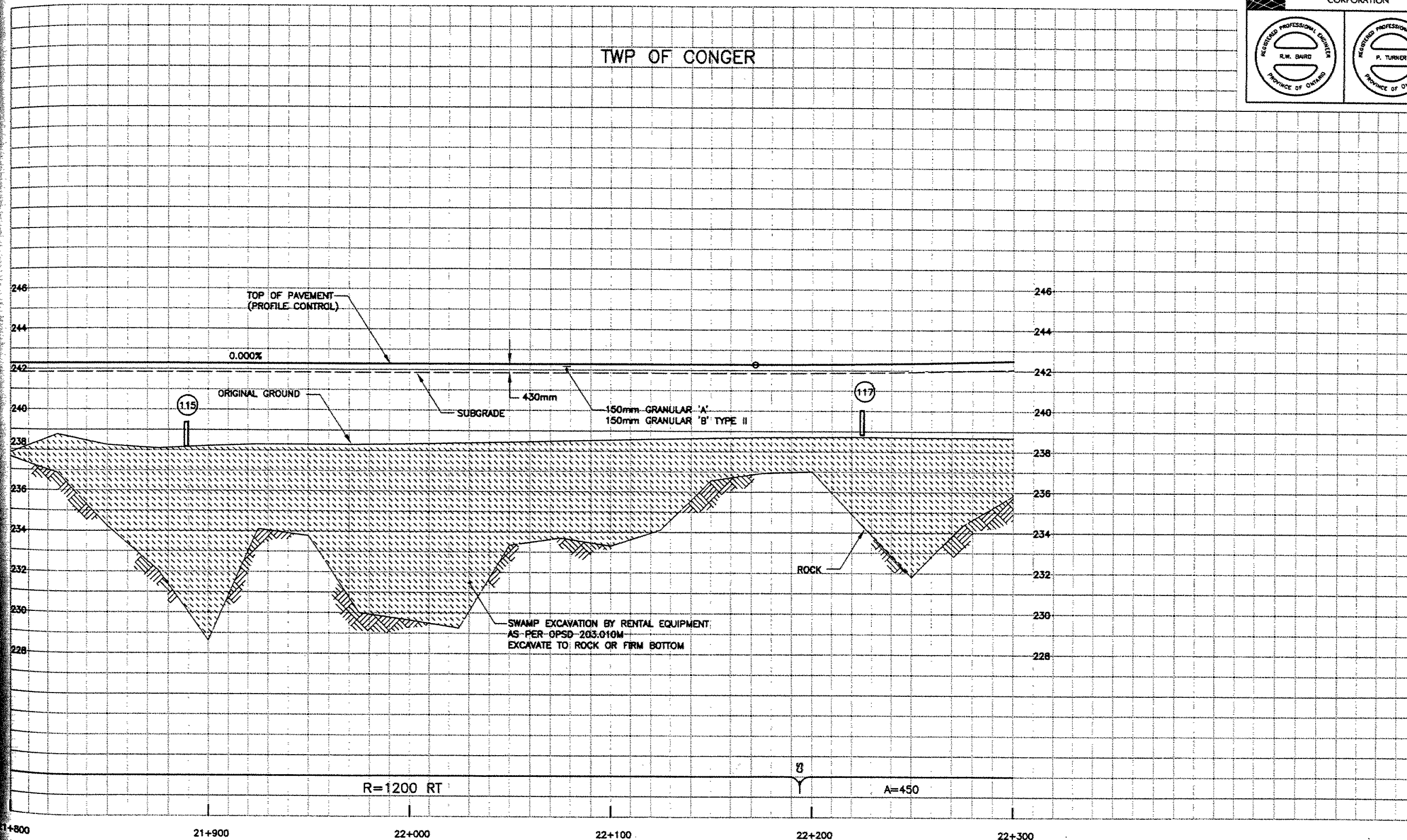
 MUSKEG EXCAVATION

PLATE No 774-69/prf08-0 DRAWING No 077400prf08 CONT No WP No 290-97-00	
PROFILE STA 21+800 TO STA 22+300 Survey 1997 12 Revised	
SHEET 202	
69 JOINT VENTURE  MCCORMICK RANKIN CORPORATION	
	

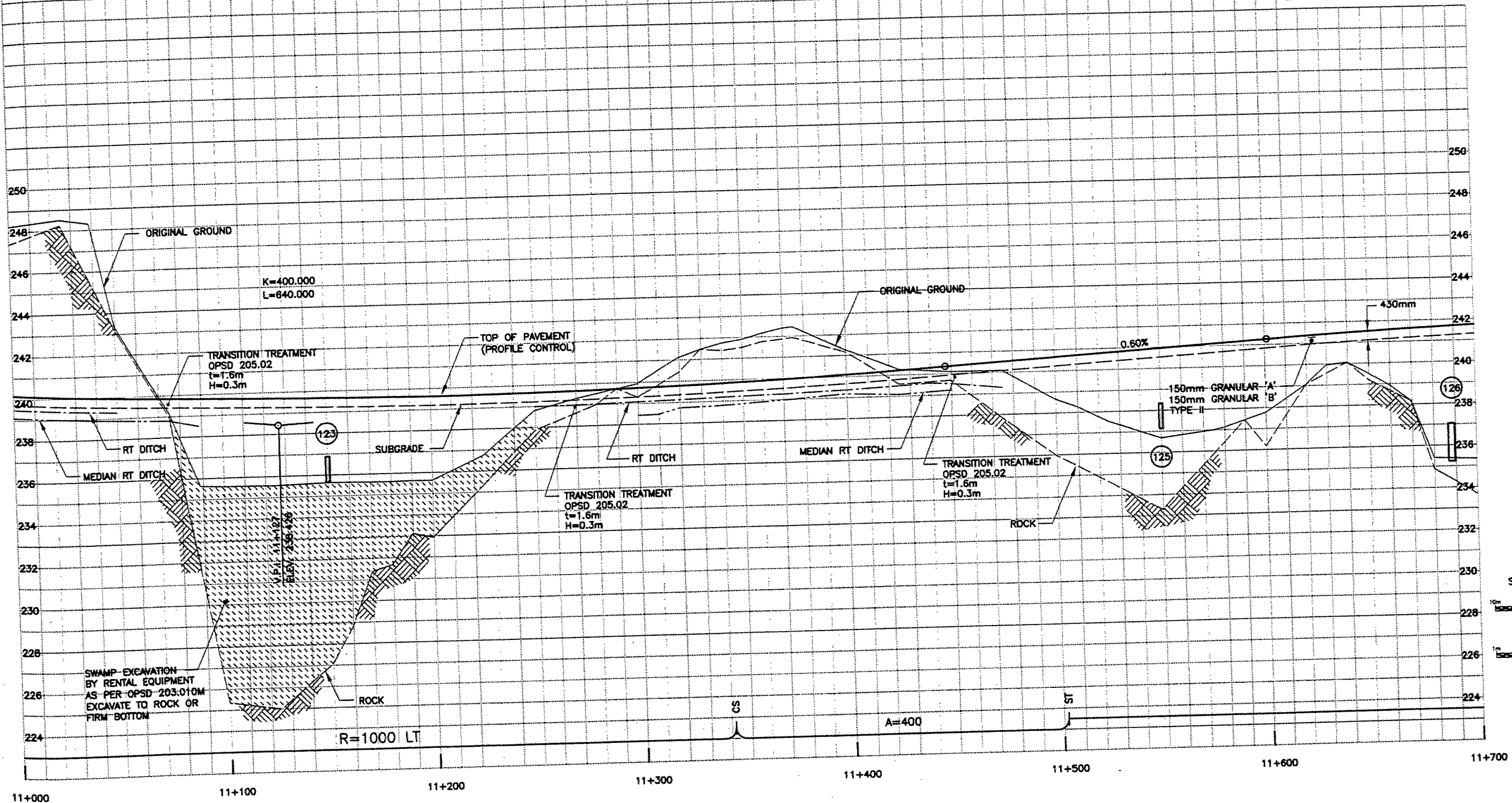


18.75 RT NBL

LEGEND
MUSKEG EXCAVATION

WP No 290-97-00	
PROFILE	
STA 11+000 TO STA 11+700	
Survey 1997 12 Revised	
69 JOINT VENTURE	
MRC MCCORMICK RANKIN CORPORATION	
REGISTERED PROFESSIONAL ENGINEER R.W. BAIRD PROVINCE OF ONTARIO	REGISTERED PROFESSIONAL ENGINEER P. TURNER PROVINCE OF ONTARIO
SHEET 213	

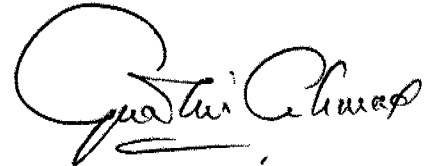
TWP OF FOLEY



SCALES
Horizontal
Vertical

2. The Pavements and Foundations Section has assigned Geocres Number for this project. The Consultant should provide the Geocres number on the Foundation Report. The Geocres number shall be shown on the lower left corner of the Title Page of the Foundation report. The Geocres Number for this project is 31E-129.

If you have any questions, please advise.



K. Ahmad, P. Eng
Foundation Engineer

For

T.C. Kim, P. Eng.
Senior Foundation Engineer

cc: P. Furst
P. Stuart
D. Smith
M. Pearsall
W. Roy
D. Yeo
I. Hussain
T. Kazmierowski



memorandum

To: Paul Lecoarer, P. Eng. 1998 08 13
Senior Project Engineer
Planning and Design Section
Northern Region

From: Pavements and Foundations Section
Room 223, Central Building
Downsview, Ontario

Re: Draft Foundation Investigation Report
Embankments over swamps
Four Laning from Tower Road Northerly 26.5km to 2.7km North of Highway 141
G.W.P. 290-97-00, Hwy 69, District 52, Huntsville

(K)

We have conceptually reviewed the draft Foundation report, dated June 1998 for the above project produced by Peto MacCallum Ltd. Consulting Engineers for McCormick Rankin Corporation to determine the consultant's performance in providing the deliverables as would be required by MTO for similar consultant assignments. The accuracy of the subsurface information and the adequacy and technical aspects of the recommendations remain the responsibility of the consultant. The Ministry assumes no responsibility or liability for these aspects of the reports. These aspects will be reviewed in order to assess the consultant's performance in this assignment upon implementation of the recommendation in the design and upon review of the performance of the foundations for the completed project. Following are our comments:

Report

1. The thickness of different soil layers reported in the body of the report and in Table IV are inconsistent.
2. The estimated total settlement for each embankment over swamp should be provided separately.
3. It is understood that the height of the embankments will range from 1m to 11m. The embankments will be constructed with the rock fill. Normally, some settlement within the rock fill takes place. The amount of settlement within the rock fill at each embankment location should be discussed.

4. In the area of high embankments, where partial excavation of the peat and soft material is recommended, long term consolidation settlement will take place. This will require on-going maintenance. If the peat and the soft material are fully excavated, this will reduce the amount of settlement. Special equipment may be required to carry out deep excavation. The Consultant should comment on the possibility of full excavation.
5. Some of the embankments will be up to 11m high. Should there be a mid height berm for high embankments?
6. In Table IV, column for "Max depth of peat", there is no explanation for the numbers in the brackets.
7. Atterberg test results should be plotted on the Plasticity Chart (A-Line chart).

Drawings

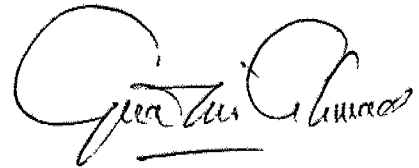
1. The depth of excavation "d" on the drawings represents the depth of swamp only. The depth of excavation shown on Table IV represented by "d" means peat plus soft soil. Although, the total depth of excavation is shown on Table IV. There may be some confusion due to the term "d", which represent two different things on the drawing and in the table. This should be corrected.
2. There is already one OPSD 203.010 (MOD) drawing attached in the report. To avoid any confusion, reference to OPSD 203.010 (MOD) should be removed from Drawing No. 19.
3. On Drawing No. 19 a toe berm is shown for the rock fill embankments. The report does not give any details why the toe berm is needed. If this is for stability purposes then please specify.
4. On Drawing No. 20, It is not clear why a slope of 1.5H:1V for the rock fill is recommended. Rock fill slope construction at 1.5H:1V will be difficult. If this is for stability purposes, then please verify.
5. Typical cross sections at each swamp locations would be necessary to show the extent and geometry of the peat and soft material.
6. The limits of proposed swamp excavations should be shown on the plan on each drawing.
7. Some of the key maps on the borehole location plans have a label for Highway 69 "To North Bay". This should read "To Sudbury".

Logs

1. It is preferable to have locations of the boreholes shown by northings and eastings.
2. Ground elevation should be shown on the Borehole logs.

The reports are not signed by the MTO designated principals. The MTO policy requires that the Foundation reports should be signed by one of the MTO designated principal. The MTO designated principal of Peto MacCallum are Brian Gray or G.D. Bonner. The borehole location plans should also be stamped.

If you have any questions, please advise.



K. Ahmad, P. Eng
Foundation Engineer

For

T.C. Kim, P. Eng.
Senior Foundation Engineer

cc: D. Smith
J. McDougal
T. Kazmierowski

From: Dale Smith
To: MTOHO1.TORHO2.Ahmad
Date: Aug 4, 1998 1:50pm
Subject: W.P. 290-97-00, Highway 69 4-Laning, Draft Foundation Report for Swamp Crossings

Hi Ken,

I have reviewed the draft report entitled Draft Foundation Investigation Report, Embankments Over Swamps, prepared by Peto MacCallum Ltd. in some detail. The following comments are for your consideration:

- ✓ 1. There is some inconsistency between the body of the report and Table IV. For example, for swamp 1 SBL, the body refers to a 0.3 to 0.5 m thick silty clay layer, while Table IV refers to 0.5 to 0.9 thick silty clay layer. Similarly, for swamp 1B S-E ramp, the body refers to a 0.5 to 1.9 m silty clay layer while the table refers to 0.2 to 1.2 m thick silty clay layer.
- ✓ 2. It is not clear whether the consultant recommends removal of the peat and underlying soft clay, or just the peat. Clarification is required.
- ? 3. Swamp 2 on Table IV seems to be mixed up. Its hard to understand what is recommended, especially in regards to Healy Lake Road.
- ✓ 4. With respect to note 3 of Table IV, the consultant should give a maximum allowable height difference similar to that used for backfilling culverts.
- ✓ 5. The key maps on the borehole location plans have a label "To North Bay". This should be "To Sudbury".
- ✓ 6. The 1.50:1 slope shown on drawing 20 is difficult to achieve using rockfill. Rock fill typically falls to form a 1.25:1 slope, as shown on the OPSD 200 series.
- X 7. For swamp 6, given the height of the fill, the toe berms will overlap in the median. Has the impact of this overlap on the embankment stability been evaluated?
- X 8. For swamp 7, from Sta. 21+700-22+025 and Sta. 22+025-22+300, two separate treatments and surcharge periods are recommended here. Consideration should be given to a uniform treatment from Sta. 21+700-22+300.
- ✓ 9. Borehole Logs - no OG elevations. No grain size summary. Are Northing and Easting coordinates preferred? (these can be calculated using the Station and Offset)
- ✓ 10. For swamp 9, drawing 20 is recommended to be applied here, yet there is no peat indicated, and no excavation is recommended. Thus it would be inconsistent and possibly misleading to apply drawing 20 at this location.
- X 11. For drawings 19 and 20, note 1, should "sand" be "firm bottom"?
- ✓ 12. There are 2 OPSD 203.010 (Mod) drawings. There can only be one in the contract. Suggest drawing 20 be renamed Swamp Treatment with Toe Berm.

13. Estimated total consolidation settlements and %consolidation after the surcharge period should be provided for each swamp. The Regional Director has indicated that for expansion projects, settlements shall be minimized. The Region is willing to pay a "premium" to minimize settlements.

14. Are the toe berms to be placed simultaneously with the embankment fill? If so, this should be stated on the drawing.

15. It appears that the treatment recommendations are based on the information from discrete boreholes. Is it feasible to use the borehole information and **statistics** to estimate the maximum depth of removal and the average depth of removal, for design and estimating purposes?

Hopefully the above comments will prove to be of some use.

Dale.

CC: McDougal