



MERLEX ENGINEERING LTD.

CONSULTING GEOTECHNICAL ENGINEERS

FOUNDATION INVESTIGATION AND DESIGN REPORT

W.P. 167-90-00

Highway 63,
From 1.0 km N of Jct. of Hwy 533, N'ly to Quebec Border, 23.5 km

M.T.O. District 54, Sudbury

Merlex Reference No. 00/04/00036-F

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Submitted to

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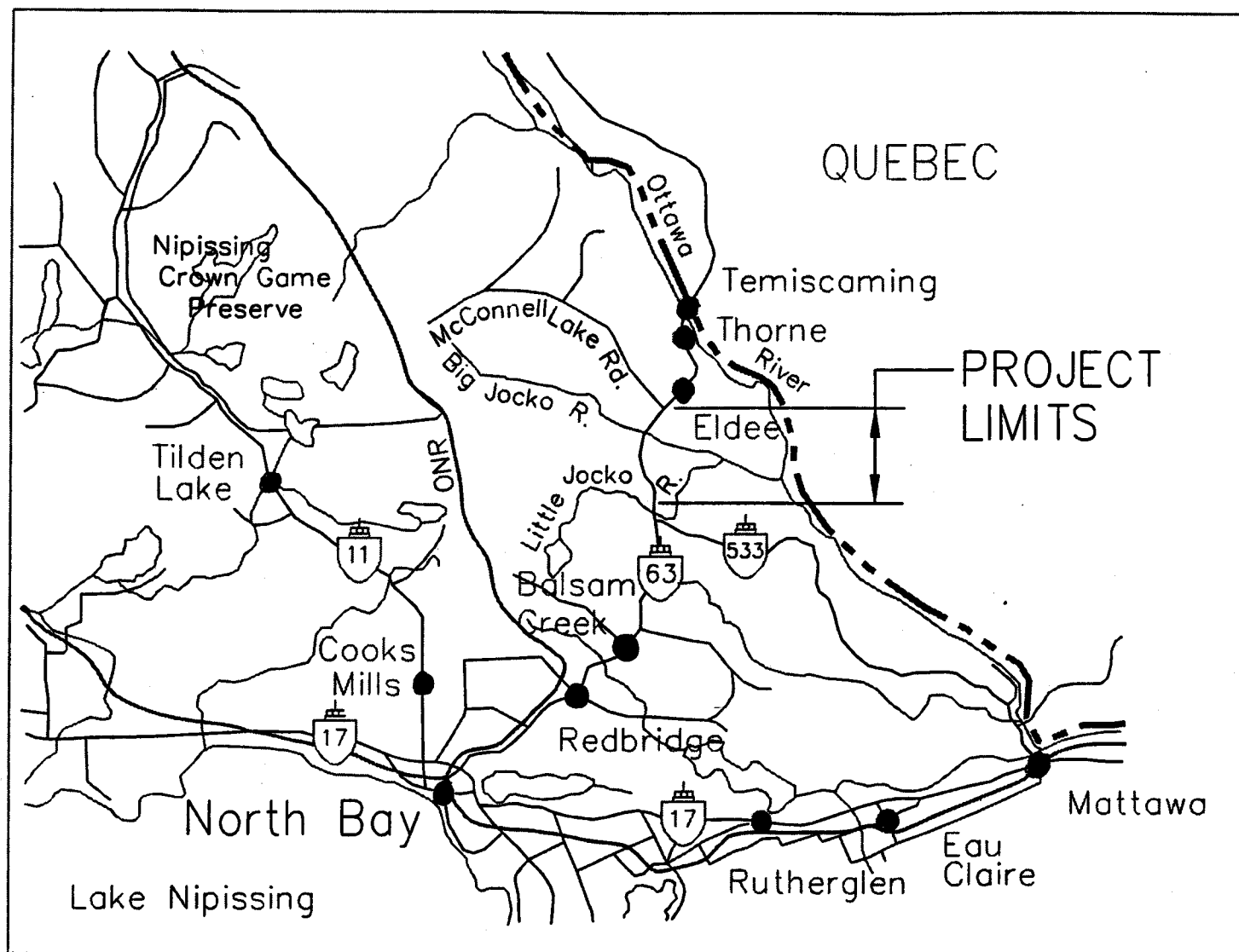
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Highway 63

From 1.0 km N of Jct. of Hwy 533, N'ly to
Quebec Border, 23.5 km
M.T.O. District 54, Sudbury

W.P. 167-90-00



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1.0 INTRODUCTION

Merlex Engineering Ltd. has been retained by Earth Tech (Canada) Inc., on behalf of the Ministry of Transportation to carry out a foundation investigation at the site of the proposed horizontal realignment of Highway 63, in the area of the Jocko/Clarkson Township line. The new alignment eliminates a 250 radius curve with a tangent section between Station 20+875 Jocko and Station 10+350 Clarkson (new chainage).

The purpose of this investigation was to delineate the subsurface conditions along the new horizontal alignment with sampled boreholes. During the geotechnical investigation, relatively deep deposits of peat were encountered at two additional locations, Station 13+250 to 13+825 and Station 20+300 to 20+450 Township of Jocko, where platform widening is to be carried out on the right side. A foundation investigation was subsequently requested for these areas.

The terms of reference for this scope of work are outlined in our proposal P-00-12 dated March 16, 2000 and subsequent proposal, for the additional areas, dated July 24, 2000. The work was carried out in accordance with the "Guidelines for Professional Engineers Providing Geotechnical Engineering Services" (1993) and the provisions in the RFP Terms of Reference.

2.0 SITE DESCRIPTION

The initial area of investigation is located to the west of the existing Highway 63 at the Jocko/Clarkson Township line approximately 2 km north of the Big Jocko River and has been designated as Area 3 in this report. The two additional foundation investigation sites, Station 13+250 to 13+825 and Station 20+300 to 20+450, Township of Jocko, have been designated Areas 1 and 2 respectively. Area 1 is located 5 km south of the Big Jocko River, whereas Area 2 is 1.5 km to the north. These sites are located within the MTO District 54 approximately 45 km north of the City of North Bay.

The proposed construction consists of widening the existing platform 3.3 m and 2.25 m to the right in Areas 1 and 2, respectively and constructing a new road platform in Area 3. Plans and profiles, of the areas, are shown on the enclosed Figures 2 to 8 inclusive. Throughout Areas 1, 2 and 3 the ground surface is generally flat and varies between about elevation 305, 302 and 289 m respectively.

3.0 INVESTIGATION PROCEDURES

The field work for this investigation was carried out during the period of July 27 and August 31, 2000 and consisted of a total of 45 boreholes along with 42 dynamic cone penetration tests at the boring locations.

The borings were advanced with a bombardier mounted CME 45B diesel powered drill rig, equipped with 160 mm outside diameter (O.D.) continuous flight hollow stem augers. Soil samples were obtained at regular intervals of depth using a 50 mm O.D. split spoon sampler in accordance with the Standard Penetration Test (SPT) procedure. The boreholes were advanced to a 10 m depth or practical auger refusal, whichever occurred first, whereas the

dynamic cone penetration tests were advanced to refusal or below the deeper boreholes into a dense stratum. The in-situ shear strength of the peat deposits was measured in the boreholes using an "N" size MTO vane and calibrated torque-meter. The groundwater conditions in the open boreholes were observed during the drilling operation and are described on the Record of Borehole sheets that follow the text.

The field work was under the supervision of a senior member of our field engineering staff, who was responsible for locating the boreholes and dynamic cone penetration test locations, supervising the drilling, sampling and testing operations, logging the boreholes along with examining and preparing the samples for shipment to our North Bay Laboratory for further examination and select testing. Laboratory testing included: natural moisture content and grain size analysis. The results of the laboratory testing are given on the Record of Borehole Sheets.

Investigation locations, Boreholes 1 to 11 inclusive, were marked in the field and surveyed by the firm of Simpson and Osburn Surveying Inc., whereas the locations of Boreholes 13 to 45 inclusive were established relative to new chainage and center line offset as surveyed in the field.

4.0 SUBSURFACE CONDITIONS

The subsurface conditions encountered at the borehole locations, along with the laboratory test results, are presented on the Record of Borehole sheets. The stratigraphic boundaries indicated on the Records of Borehole are inferred from non-continuous sampling, observations taken during drilling, the results of Standard Penetration Tests (SPT's), and Dynamic Cone Penetration Resistance test values. The boundaries between various strata shown on the Record of Borehole generally represent transition from one soil type to another and should not

be regarded as exact planes of geological change. Furthermore, subsurface conditions will vary between and beyond the borehole locations.

In general, the native subsurface conditions consist of peat (varying in thickness from 300 mm to 4.2 m) underlain by non-cohesive deposits of varying composition (fine sands with varying silt content to silt with varying fine sand content). At boreholes put down through the existing platform shoulder granular fills were present overlying the peat deposit. Refusal to further advance of the augers or advance of the dynamic cone penetration test was generally met at depths of 5 to 10 m below grade.

Laboratory test results for the predominant soil types are shown on the Record of Borehole Sheets. The laboratory testing was carried out in accordance with the MTO LS Manual and ASTM Standards.

A summary of the general subsurface conditions at each of the areas is as follows:

4.1 Area 1: Township of Jocko Station 13+250 to 13+825

A plan and profile showing the borehole locations and stratigraphies for Area 1 is shown on Figures 2, 3A, 3B, 4A and 4B. Boreholes 34 to 45 inclusive, were advanced through the existing right shoulder, where the ground surface elevation at the boreholes varied between 308.9 to 304.0 m. Boreholes 13 to 25 inclusive, were put down at a location off-set from the right toe of slope, where the ground surface elevation at the boreholes varied between 307.8 to 303.5 m. The boreholes were advanced to depths ranging from 1.4 to 10.9 m (average depth 7.2 m).

At the toe of slope, a peat deposit was encountered at the borehole locations and extended to depths ranging between 1.9 to 4.2 m, with an average depth of 3.1 m. The peat was described as a black fine fibrous peat with occasional coarse fibers and occasional organic silt seams. The average in-situ vane shear strength was measured at 32.7 kPa (range 15 to 58 kPa) (see Figure 9). The variation in natural moisture content of this deposit, ranged from 89 to 831% (average 366%) as shown on Figure 11.

Boreholes put down through the right shoulder encountered a thin crushed gravel layer underlain by a sand (platform) fill which extended to depths ranging between 1.1 to 2.0 m (average 1.4 m). The platform fill was underlain by the black fine fibrous peat, average thickness 2.4 m, with an average in-situ vane shear strength measured at 55.3 kPa (range 30 to 90 kPa) as shown on Figure 10. The variation in natural moisture content of this deposit ranged from 88 to 653% (average 309%) as shown on Figure 11.

Underlying the peat deposits a cohesionless deposit of varying composition (silty sand with varying fine sand and silt content, and frequently containing gravel and occasional cobbles at depth) was encountered at the boreholes. Based on the Standard Penetration Test (N) values and Dynamic Cone Penetration Test (DCPT) values, the relative density of the cohesionless soils varied from loose to very dense, generally compact. Grain size data is shown on the individual borehole records. These cohesionless deposits were encountered to the depths at which refusal to further auger penetration was met or termination of the borehole (average depth 7.2 m).

4.2 Area 2: Township of Jocko Station 20+300 to 20+450

A plan and profile showing borehole locations and stratigraphies of Area 2 is shown on Figures 5a and 5b. Boreholes 30 to 33 inclusive, were advanced through the right shoulder of the

existing road platform, where the ground surface elevation at the borehole locations, varied between 302.8 to 303.6 m. Boreholes 26 to 29 inclusive, were put down at locations offset from the right toe of slope, where the ground surface elevation at the boreholes varied between elevation 301.6 to 302.1 m. The boreholes were advanced to depths ranging between 4.4 to 8.5 m (average 6.1 m) below existing grade.

At the toe of slope, a peat deposit was penetrated at the borehole locations and extended to depths ranging between 1.7 to 3.3 m, with an average depth of 2.4 m. The peat was described as black fine fibrous peat with occasional coarse fibers and occasional organic silt seam. The average in-situ vane shear strength, was measured at 24.9 kPa (range 12 to 32 kPa) (see Figure 9). The variation in natural moisture content of this deposit ranged between 131% to 694% (average 483%) as shown on Figure 12.

Boreholes put down through the road platform, right shoulder, (Boreholes 30 to 33 inclusive) encountered a thin crushed gravel layer underlain by a sand (platform) fill, which extended to depths ranging between 1.5 to 2.0 m. Based on (N) values, this stratum of platform fill was in very loose to compact (generally loose) state of relative density. Directly underlying the platform granular fill, a black fine fibrous peat was encountered with a thickness ranging from 0.6 to 1.8 m (average 1.1m) The average in-situ shear strength was measured at 48.0 kPa (range 37 to 75 kPa) (see Figure 10). The variation of natural moisture content of this deposit ranged from 222% to 376% (average 273%) as shown on Figure 12.

Underlying the peat stratum, a cohesionless deposit of varying composition (silty sand with varying fine sand and silt content and frequently containing gravel and occasional cobbles at depth) was penetrated at the borehole locations. Based on the Standard Penetration Tests (N) values and Dynamic Cone Penetration Tests values, the relative density of the cohesionless soils varied from loose to very dense, generally compact. Grain size data is shown on the

individual borehole records. Refusal to further penetration of the augers or advanced of the Dynamic Cone Penetration Test, was met at depths ranging between 4.4 to 8.5 m (average 6.1 m).


4.3 Area 3: Township of Jocko Station 20+150 to Township of Clarkson Station 10+350

A plan and profile showing the borehole locations and stratigraphies for Area 3 is shown on Figures 6 to 8 inclusive. Boreholes 1 to 11 inclusive were advanced along the approved new centreline. The existing grade at the borehole locations was at elevation $289.0 \text{ m} \pm$, except at Borehole 11 where the grade rose to 292.4 m. The boreholes were advanced to an average depth of 9.6 m below existing grade (range 1.4 to 12.2 m). At Boreholes 1 through 10 inclusive, a black fine fibrous peat deposit was penetrated from the ground surface. This stratum ranged in thickness from 1.8 to 2.4 m (average 2.1 m) and the average in-situ vane shear strength was measured at 29.3 kPa (range 18 to 44 kPa) (see Figure 9). The variation in natural moisture content of this deposit ranged between 87% to 921% (average 604%) as shown on Figure 13. Underlying the peat deposit a cohesionless stratum of varying composition (sands to silty sands with varying fine sand and silt content frequently contained gravel and cobbles at depth) was encountered at the borehole locations. Based on the Standard Penetration Tests (N) values and the Dynamic Cone Penetration Tests the relative density of this cohesionless soil varied from loose to very dense, generally compact. Grain size data for individual samples is shown on the enclosed Borehole Logs 1 through 11 inclusive.

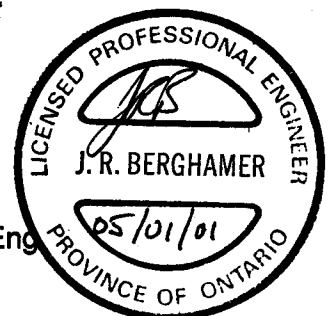
MERLEX ENGINEERING LTD.



M. A. Merleau, P. Eng.
Principal



J. R. Berghamer, P. Eng.



5.0 DESIGN COMMENTS AND RECOMMENDATIONS

5.1 General

Throughout Areas 1 and 2, the shift in the horizontal alignment to the right had been established prior to this investigation. The vertical alignment will essentially remain constant, or increase slightly (order of 300 mm \pm), throughout these areas to accommodate the lateral shift in the new platform. Typical cross-section schematics through the central area of the widening in Area 1 are shown on Figure 14 (Station 13+450 and 13+700).

In Area 3, a new horizontal and vertical alignment was established to correct a substandard horizontal curve.

5.2 Design Options

In Areas 1 and 2, a shift of 3.3 and 2.25 m to the right respectively has been approved. Throughout these two areas, the existing road platform, which varies in average thickness from 1.4 to 1.8 m (Areas 1 and 2 respectively), is underlain by a fine fibrous peat of average thickness 2.4 and 1.1 m respectively. At the toe of slope, to the right of the existing platform (area of embankment widening) the average peat depth, from existing grade, is 3.1 to 2.4 m respectively. For construction of the embankment widening to one side in these two areas, the following three options have been considered and are summarized on Table 1:

- Excavation of peat, to underlying sands, as per OPSD 203.020 in area of widening.
- Full width excavation of all peat from under platform.
- Place embankment widening fill directly on existing peat grade.

In Area 3, the proposed new alignment traverses an area of shallow peat cover (average thickness 2.1 m) underlain by competent, generally compact cohesionless soils (sands, silty sands and sandy silt). The embankment height reduces from approximately 8 and 5.5 m, at the

south and north ends respectively to some 1.5 m throughout the sag. Considering the relatively shallow depth of peat, as identified at Boreholes 1 to 11 inclusive, the only option considered is to excavate out the peat to mineral soil and construct the embankment as per OPSD 203.010, for the full platform width, since "floating" the road platform over the shallow peat deposit is not considered appropriate for a road of this standard.

Although final quantities for the project have not been calculated at the time of preparation of this report, it is likely that large quantities of rock fill will not be available for backfilling. Therefore, we assume swamp backfill will consist of a select subgrade material.

5.3 FOUNDATION

5.3.1 Area 1: Township of Jocko Station 13+250 to 13+825

Throughout this area the shift in the horizontal alignment is 3.3 m to the right. Between Stations 13+250 and 13+825, Boreholes 13 to 25 were put down at the right toe of slope and Boreholes 34 to 45 inclusive were put down through the right shoulder of the existing platform. The latter series of borings indicate that the existing platform was constructed of sand fills (average 1.4 m thick), overlying the native fine fibrous peat stratum, which, on average, was 2.4 m thick. Boreholes put down beyond the right toe of slope encountered the fine fibrous peat deposit at existing grade and indicated an average thickness of 3.1 m. The peat stratum was underlain by competent cohesionless deposits of sands and silty sands with varying silt content frequently containing cobbles/gravel at depths generally greater than 6 m. The mineral soil, underlying the peat, can safely support the proposed granular fill widening material. The following three options have been considered for construction of the widening:

Option A-1

- Excavate out the existing peat on the right, under area of widening, as per OPSD 203.020, down to mineral soil and backfill with granular fill.

This option has the following disadvantages. Firstly, by the depth of peat underlying the existing platform, at the boring locations, varies from 0.7 to 3.2 m (average of 2.4 m). The measured in-situ shear strength ranged from 30 to 90 kPa. A total stress slope stability analysis was carried out for a section at Station 13+700 modelling the excavation stage. The analysis was performed using the commercially available program SLOPE/W (version 4.0). The program has the capability of either using a constant undrained shear strength value or a linear shear strength pattern within a given soil layer. The program uses the general equilibrium method of analysis to calculate the factor of safety of numerous potential trial failure surfaces and minimum factor of safety, which is defined as the ratio of the forces tending to resist failure to the driving forces tending to cause failure. Using a shear strength, reduced for anisotropy, the factor of safety is just shy of unity (ie 0.98), indicating the peat will fail if left unsupported for even a short period of time. A method of carrying out this excavation, and minimizing the risk of local embankment instability, would be to excavate in windows perpendicular to the slope, maximum open face 3 m, and backfill immediately. Traffic, passing the area of excavation, must be kept back outside the zone of influence. This zone can be defined by an imaginary line drawn up into the platform, on a 45° to the horizontal, from the bottom of the excavation face, plus 1 m. A typical example of this zone of influence is shown on Cross-Sectional Schematic Figure 14.

Secondly, differential movement will occur, continuously, between the portion of the existing road platform founded on the peat and the portion of the widening founded on mineral soil. In addition, differential settlement will develop, below the triangular section of new platform fill, due to compressions of the peat remaining under the existing platform. As can be seen from the typical section at Station 13+700, Figure 14, the thickness of new fill above the inside vertical face of embankment widening excavation is

some 500 mm, and on average 300 mm thick at the new centre line. Compression of the peat, remaining below the existing platform, has been estimated to be up to 50% of the thickness of new fill. This settlement will be greatest in the area of the right lane. Differential movement and settlements of this magnitude are considered unacceptable for a highway of this standard, considering the stated desire of the Ministry to reduce the amount of future settlement to the minimum achievable.

Option A-2

This section is a modification of Option A-1 and consists of partial excavation of the peat in order to improve the stability of the excavation face during construction. Stability analysis at Typical Section 13+700 (see Figure 15) indicates the factor of safety increases by some 22% to 1.26 if only half the peat deposit (1.5 m depth) is excavated. However, settlement of the widening will now develop due to compression of the remaining peat associated with new load resulting from the 3 m \pm of widening fill.

Option B

- Full width excavation of all peat from under the existing platform and widening.

With the full width excavation of the peat subgrade, the underlying competent cohesionless granular soils will adequately support the platform. Future distortions/distress of the paved surface and possible future liability associated with differential settlement resulting from compression of the peat subgrade, will be eliminated. Maintenance cost will also be reduced and the Ministry's desire to reduce the amount of future settlement to the minimum achievable will be satisfied.

Removal of the peat can be carried out in two different ways:

1. Continuously excavate the existing right slope (one end, progressing to other end) as per OPSD 203.020, construct the widening and extend the widening further to the right to accommodate a detour; or

2. Float a temporary detour road, offset adequately from existing platform to eliminate risk of instability resulting from the excavation and commence excavation of the existing platform as per OPSD 203.010. The detour road must be constructed beyond the zone of influence. This is achievable since the right of way on this project is 60.96 m.

There are several major advantages of constructing a temporary detour road offset from the existing alignment:

- a) The impact on traffic of local slope instability occurring during embankment excavation is eliminated.
- b) Additional widening to the right, to accommodate a detour, will require peat excavation and backfilling approaching the volume required to excavate the existing platform to the left of the widening, resulting in a much higher cost for detour construction.
- c) Mass excavation of the existing platform, as per OPSD 203.010, will be much quicker, therefore more cost effective.

The temporary detour should consist of a 1 m thick platform of granular fill placed over a separating layer of Class I geotextile, reinforced with a geogrid (similar to Tensar BX1100).

In addition to the high compressibility of this peat deposit, the shear strengths are somewhat low and detour filling operations must be carried out such that embankment failures do not occur. If the peat is overloaded in the filling operations, an embankment failure is likely to occur and create a "mud wave" in front of the advancing fill displacing the majority of the peat and subsequently, increasing the volumes of fill required to construct the detour. As such, we recommend the following guidelines be adhered to during the construction of the detour:

1. Utilize a geogrid, similar to Tensar BX1100, directly overtop of the existing "undisturbed" peat surface. This geogrid should be overlapped a minimum of 2.0 m on the ends. A Class I geotextile should be placed over the grid to control loss of sand fill into the peat.

It is imperative to ensure the natural higher shear strength of the peat surface is not deteriorated during construction.

2. Commence end dumping the lift of free draining granular fill, similar to coarse Granular B. The thickness of this lift should be maintained at 1.0 m, over the entire length to prevent embankment failure.
3. Filling operations should commence at one end such that a free draining boundary is maintained in three directions to reduce the build up of excess pore water pressure.

Option C

- Place embankment widening fill directly on existing peat grade.

Fill for widening will be placed directly over the existing ditch on the right. Calculations based on the in-situ vane testing, adjusted downward for the anisotropic characteristics of peat, indicate local bearing failure during relatively rapid placement of widening fill will occur. Therefore, a geogrid has been considered to improve stability.

Design of the fill widening reinforcement has been carried out by Tensar Corporation. Their recommendation is enclosed in Appendix D.

This will provide stability for the fill widening, however, settlement of the widening will occur. Settlement with the geogrid reinforcement will probably be of similar magnitude as that of an equivalent thickness of fill placed directly on the peat surface.

Settlement

Settlement of embankments will occur when new load (fill) is placed. The magnitude of settlement varies between different peat deposits and is generally estimated as a percentage of the thickness of new fill. In Area 1 the average thickness of peat under

the existing platform is 0.7 m less than the average thickness of peat at the toe of slope, where no fill is present. The average platform thickness throughout this area is 1.4 m. This represents a peat compression equal to 50% of the fill thickness.

Therefore, on this project, it is reasonable to estimate platform settlement as 50% of the thickness of new fill. Of this total settlement, the immediate compression of the peat will likely be in the order of 40 to 50% of the total settlement and will occur rapidly with the addition of the fill. The balance of settlement will likely occur slowly, due to secondary compression of the peat and will likely occur over a period of a decade with the majority occurring within a period of 2 to 3 years. This settlement will be further aggravated since new fill will have to be added to maintain cross-fall grade.

5.3.2 Area 2: Township of Jocko Station 20+300 to 20+450

Throughout this area the shift in horizontal alignment will be 2.25 m to the right. Boreholes 30 to 33 inclusive, put down through the existing right shoulder and Boreholes 26 to 29 inclusive, put down offset from the toe of slope, revealed similar subsurface conditions as those in Area 1. The platform fill averaged 1.8 m thick overlying an average peat thickness of 1.1 m (range 0.6 to 1.8 m). The peat thickness at the toe of slope (no surcharge) averaged 2.4 m thick (range 1.7 to 3.3 m). The soils, underlying the peat, were cohesionless deposits of silty sands with varying silt and fine sand content, which can safely support the proposed platform widening.

Typical cross-sections of Area 2 are shown in Appendix C Figure C-2. The profile grade will be retained or lowered, as is the case at Station 20+450, therefore, maintaining or decreasing the load over the existing platform area. As such, if the peat under the area of widening is excavated, as per OPS 203.020, differential settlement of the platform should be negligible and therefore, Option A-1 would be applicable.

However, lowering the platform, in the area of Station 20+450, may reduce the thickness of platform supporting the pavement structure on the existing peat subgrade. This platform thickness should not be less than 1 m. If insufficient platform remains then Option B "Full Width Excavation" will have to be undertaken in this area.

5.3.3 Area 3: Township of Jocko Station 20+750 to Township of Clarkson 10+350

Boreholes 1 to 11 inclusive were put down along the new alignment and indicate a somewhat uniform peat deposit (on average 2.1 m thick range 1.8 to 2.4 m) underlain by competent, generally compact, cohesionless soils, except at Borehole 11, where the peat was absent and shallow auger refusal was met, probably on bedrock.

Through this section, the fill height will generally be less than 3 m high, except at the two ends. All peat must be excavated as per OPSD 203.010. Where the embankment height exceeds 3 m the side slopes should be constructed at a 2:1 and the fill should be placed full platform width, from the centreline out to the sides, in lifts not exceeding a 2 m height.

Backfill with either SSM (Select Subgrade Material, as per OPSS1010) or rock fill. If SSM is used, ensure it is compacted as per OPSS Series 500.

6.0 CLOSURE

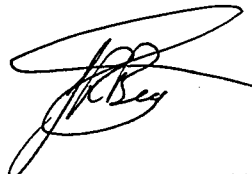
Information provided in this report is valid only at the locations drilled. Any assumptions of continuity of soil stratigraphy between boreholes, as shown on the enclosed cross-sections, is intended as an aid for design purposes only and does not constitute a statement of existing conditions for contractual or construction purposes.

Details of the investigation, the material analysis and recommendation in this report are considered to be complete. However, should any questions arise, please do not hesitate to contact the undersigned.

MERLEX ENGINEERING LTD.



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Principal



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Report Distribution: 17 Full Copies - Earth Tech (Canada) Inc.
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RECORD OF BOREHOLES

Area 1:

Boreholes 13 to 25
and
Boreholes 34 to 45

ENCLOSURE NO.:

METRIC**RECORD OF BOREHOLE No. 13**

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 13+250 8.7m RT D -1.3m; N'y 5158453.068 E'y 330900.929 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 17/8/00 - 17/8/00 TIME 11:10:00 AM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES								
307.79	Ground Surface												
0.0	PEAT												
307.49	(Very Loose) SILTY SAND		1	AS									
0.30	Grey fine sandy silt to yellow silt trace fine sand to grey silt trace of fine sand. Trace of gravel/cobble with depth. (Loose to Compact)		2	SS	10								
			3	SS	6								
			4	SS	13								
			5	SS	55								
304.29	Auger refusal (Boulder/Bedrock) End of Borehole												
3.50													

COMMENTS	+ 3, X 3 : Numbers refer to Sensitivity		WATER LEVEL RECORDS		
	O 3% STRAIN AT FAILURE		Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)
			17/8/00; 11:15:00 AM	0.3	1.42

MEL-GEO 00036F GPJ MEL-GEO GDT 6/1/01

ENCLOSURE NO.:

METRIC**RECORD OF BOREHOLE No. 14**

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 13+300 8.7m RT D -1.1m; N'y 5158500.578 E'y 330885.347 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 17/8/00 - 17/8/00 TIME 1:10:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES								
306.57	Ground Surface												
0.0	PEAT		1	AS									
	Black fine fibrous peat 150mm black/grey organic silt seam at 1.2m (Very Loose)		2	SS	WH								
			3	SS	WH								
304.27													
2.30	SAND		4	AS	11								
	Fine to medium sand some silt some gravel. (Wet) (Compact)		5	SS	16								
			6	SS	10								
300.37													
6.20	Auger refusal (Boulder/Bedrock) End of borehole												
COMMENTS							+ 3, X 3 : Numbers refer to Sensitivity O 3% STRAIN AT FAILURE			WATER LEVEL RECORDS Date (dd/mm/yy) Time Water Depth (m) Cave In Level (m) 17/8/00; 1:16:00 PM 0.28 2.29			

MEL-GEO 00036F GPJ MEL-GEO GDT 6/1/01

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 15

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 13+350 8.7m RT D -1.4m; N'y 5158548.088 E'y 330869.764 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 17/8/00 - 17/8/00 TIME 2:38:00 PM CHECKED BY MAM

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT NATURAL MOISTURE CONTENT LIQUID LIMIT			UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	20 40 60 80 100	20 40 60 80 100	W _p	W		
306.17 0.0	Ground Surface PEAT Black fine fibrous peat Cobble @ 2.9		1	AS		306						103	
			2	AS	WH	305						107	
			3	SS	1	304						140	
			4	SS	2	303						133	
303.27 2.90	SILTY SAND Grey silty fine sand trace of gravel to fine sand with silt some gravel. (Compact to Dense)		5	SS	17	302							
			6	AS	32	301							
300.37 5.80	Auger refusal (Boulder/Bedrock) End of borehole												
COMMENTS						$+^3, \times^3$: Numbers refer to Sensitivity \circ 3% STRAIN AT FAILURE			WATER LEVEL RECORDS Date (dd/mm/yy)/Time Water Depth (m) Cave In Level (m) 17/8/00; 2:40:00 PM 0.0				

MEL-GEO 00036F GPJ MEL-GEO.GDT 6/1/01

METRIC

RECORD OF BOREHOLE No. 16

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 13+400 8.7m RT D -1.0m; N'y 5158595.598 E'y 330854.182 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 17/8/00 - 17/8/00 TIME 4:37:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	"N" VALUES								
305.44	Ground Surface												
0.0	PEAT		1	AS								117.5	
	Black fine fibrous peat												
	Grey silt seam @ 2.6m (12mm thick)		2	SS	WH							121.5	
	(Very Loose)												
			3	AS	2							247.7	
			4	SS	WH							140.8	
			5	SS	WH							89.3	
301.24	SILTY SAND		6	SS	27								
4.20	Grey fine to medium sand trace gravel trace silt to silty fine sand trace gravel. Occasional cobble												
	(Compact to Dense)												
			7	AS	31								
298.04	Auger refusal (Boulder)												
297.77	End of sampling												
7.67	Refusal on DCPT												
	End of Borehole												
COMMENTS								+ ³ , X ³ : Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE		WATER LEVEL RECORDS Date (dd/mm/yy)/Time Water Depth (m) Cave In Level (m)			

MEL-GEO 00036F.GPJ MEL-GEO.GDT 6/1/01

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 17

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 13+450 8.7m RT, N'y 5158643.108 E'y 330838.600 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 21/8/00 - 21/8/00 TIME 11:20:00 AM CHECKED BY MAM

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	20					
305.17 0.0	Ground Surface PEAT Black fine fibrous peat Occasional coarse fibre		1	AS									
			2	SS	WH								
			3	SS	WH								
			4	AS	WH								
			5	SS	WH								
301.27 3.90	SILT Grey silt trace fine sand trace of clay (Loose)		6	SS	8								
298.77 6.40	SILTY SAND Grey silty fine sand trace gravel some clay. (Loose to Compact)		7	SS	9								
			8	SS	8								
295.57 9.60	End of sampling		9	SS	26								
294.27 10.90	Refusal on DCPT End of borehole												

COMMENTS	+ 3, X 3 : Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE	WATER LEVEL RECORDS		
		Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)
		31/8/00; 11:45:00 AM	0.2	1.98

MEL-GEO 00036F-GPJ MEL-GEO GDT 6/1/01

METRIC

RECORD OF BOREHOLE No. 18

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 13+500 8.7m RT D -850; N'y 5158690.618 E'y 330823.018 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 21/8/00 - 21/8/00 TIME 2:23:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES								
304.89 0.0	Ground Surface PEAT Dark brown to black fine fibrous peat		1	AS									
			2	AS	2								
			3	SS	WH								
			4	SS	WH								
301.69 3.20	SILT Grey silt trace fine sand trace of clay (Loose)		5	SS	6								
299.89 5.00	SILTY SAND Silty fine sand trace gravel trace clay to fine/medium sand some gravel some silt occasional cobble/boulder. (Compact)		6	SS	17								
			7	SS	25								
297.99 6.90	Auger refusal (Boulder) End of sampling		8	AS									
296.69 8.20	Refusal on DCPT End of borehole												
COMMENTS								+ 3, X 3 : Numbers refer to Sensitivity O 3% STRAIN AT FAILURE		WATER LEVEL RECORDS Date (dd/mm/yy)/Time 21/8/00; 2:23:00 PM Water Depth (m) 0.76 Cave In Level (m) 1.52			

MEL-GEO 00036F GPJ MEL-GEO.GDT 6/1/01

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 19

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 13+550 8.7m RT D -700; N'y 5158738.128 E'y 330807.435 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 21/8/00 - 21/8/00 TIME 4:00:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)									
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES																	
304.52	Ground Surface																					
0.0	PEAT																					
	Black fine fibrous peat		1	AS																		
			2	AS	WH																	
			3	SS	WH																	
			4	SS	1																	
301.17	SAND		5	SS	6																	
3.35	Grey fine to medium sand some silt (Loose)																					
299.92	SILTY SAND		6	SS	25																	
4.60	Silty fine sand trace gravel trace clay occasional cobble/boulder (Till structure evident) (Compact to Dense)		7	SS	37																	
297.52	Auger refusal (Boulder)																					
297.92	End of sampling																					
7.20	Refusal on DCPT																					
	End of borehole																					
COMMENTS								+ 3, X 3 : Numbers refer to Sensitivity O 3% STRAIN AT FAILURE		WATER LEVEL RECORDS <table border="1"> <thead> <tr> <th>Date (dd/mm/yy)/Time</th> <th>Water Depth (m)</th> <th>Cave In Level (m)</th> </tr> </thead> <tbody> <tr> <td>21/8/00; 4:05:00 PM</td> <td>0.86</td> <td>1.83</td> </tr> <tr> <td>31/8/00; 11:35:00 AM</td> <td>0.3</td> <td>1.32</td> </tr> </tbody> </table>				Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)	21/8/00; 4:05:00 PM	0.86	1.83	31/8/00; 11:35:00 AM	0.3	1.32
Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)																				
21/8/00; 4:05:00 PM	0.86	1.83																				
31/8/00; 11:35:00 AM	0.3	1.32																				

MEL-GEO 00036F.GPJ MEL-GEO.GDT 6/1/01

METRIC

RECORD OF BOREHOLE No. 20

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 13+600 8.7m RT; N'y 5158785.637 E'y 330791.853 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 21/8/00 - 22/8/00 TIME 10:05:00 AM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT w_p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w_L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL	
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40						60
304.26 0.0	Ground Surface PEAT Black fine fibrous peat (Very Loose)		1	AS		▽	304						317.3		
			2	SS	WH		303								541.7
			3	SS	WH		302								473.5
			4	SS	1		301								831.2
			5	SS	6		300								305.5
			6	SS	8		299								
			7	AS	40		298								
301.06 3.20	SILTY SAND Grey silty fine sand trace gravel trace clay occasional cobble/boulder from 3.6m (Till structure evident with depth) (Loose to Dense)														
297.56 6.70	Auger refusal (Boulder) End of sampling														

COMMENTS	+ 3, X ³ : Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE	WATER LEVEL RECORDS		
		Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)
			22/8/00; 10:10:00 AM	0.66
	31/8/00; 11:40:00 AM	0.2	2.13	

MEL-GEO 00036F.GPJ MEL-GEO.GDT 6/1/01

METRIC

RECORD OF BOREHOLE No. 21

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 13+650 8.7m RT D -700, N'y 5158833.147 E'y 330776.271 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 22/8/00 - 22/8/00 TIME 11:40:00 AM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40					
303.96 0.0	Ground Surface PEAT Black fine fibrous peat		1	SS	WH									
			2	SS	WH									
302.06 1.90	SILTY SAND Grey silty fine sand trace gravel (Loose to Compact to Very dense with depth)		3	SS	1									
			4	SS	8									
			5	SS	4									
			6	SS	18									
			7	SS	78									
297.36 6.70	Auger refusal End of sampling Refusal on DCPT End of Borehole													

COMMENTS	+ 3, X 3 : Numbers refer to Sensitivity O 3% STRAIN AT FAILURE	WATER LEVEL RECORDS		
		Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)
		22/8/00; 11:42:00 AM	0.41	2.49
		31/8/00; 11:45:00 AM	0.15	1.83

MEL-GEO 00036F GPJ MEL-GEO GDT 6/1/01

ENCLOSURE NO.:

METRIC**RECORD OF BOREHOLE No. 22**

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 13+700 8.7m RT D -650; N'y 5158880.657 E'y 330760.688 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 22/8/00 - 22/8/00 TIME 1:37:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)				
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40						60	80	100	20
303.70	Ground Surface																	
0.0	PEAT																	
	Fine fibrous peat Occasional coarse fibres (Very Loose)		1	SS	WH													
			2	SS	WH													
			3	SS	WH													
			4	SS	WH													
300.20			5	SS	3													
3.50	SILTY SAND																	
	Grey silty fine sand trace gravel trace clay occasional cobble. Silt content increasing with depth. Gravel/Medium sand below 6m (Loose to Compact)		6	SS	WH													
			7	SS	3													
			8	AS														
296.00																		
7.70	Auger refusal End of borehole																	
COMMENTS								+ 3, X 3 : Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE		WATER LEVEL RECORDS								
										Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)						
										22/8/00; 1:44:00 PM	0.46	2.34						

MEL-GEO 00036F GPJ MEL-GEO.GDT 6/1/01

METRIC

RECORD OF BOREHOLE No. 23

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 13+750 8.7m RT D -500; N'y 5158928.167 E'y 330745.106 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 22/8/00 - 22/8/00 TIME 2:45:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES								
303.54	Ground Surface												
0.0	PEAT												
	Black fine fibrous peat		1	SS	WH								
			2	SS	WH								
			3	SS	WH								
301.14	SILTY SAND		4	SS	9								
2.40	Fine to medium sand some silt to silty fine sand Occasional cobble/gravel with increasing depth (Loose to Compact)		5	SS	7								
299.24	Auger refusal End of sampling												
4.30													
298.34	Refusal on DCPT (30blows/0mm) End of Borehole												
5.20													

COMMENTS	+ 3, X 3 : Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE	WATER LEVEL RECORDS		
		Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)
		22/8/00; 2:48:00 PM	0.91	2.59

MEL-GEO 00036F GPJ MEL-GEO.GDT 6/1/01

METRIC

RECORD OF BOREHOLE No. 24

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 13+800 8.7m RT D -700' N'y 5158976.667 E'y 330729.524 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 22/8/00 - 22/8/00 TIME 3:30:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)									
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES																	
304.27	Ground Surface		1	SS	4	304																
304.02 0.15	TOPSOIL SILT																					
303.36	Yellow silt trace fine sand																					
303.36 300.97 1.10	(Loose) SAND Fine to medium sand some silt trace gravel (Loose) End of borehole		2	SS	9																	
AP#24 13+792 8.7m RT D -1.0 0 - 305 Silty organics 305 - 1.37 Silty fine sand Wet @ 0.46m																						
COMMENTS							+ ³ , × ³ : Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE		WATER LEVEL RECORDS <table border="1"> <tr> <th>Date (dd/mm/yy)/Time</th> <th>Water Depth (m)</th> <th>Cave In Level (m)</th> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </table>					Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)						
Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)																				

MEL-GEO 00036F.GPJ MEL-GEO.GDT 6/1/01

ENCLOSURE NO.:

METRIC**RECORD OF BOREHOLE No. 25**

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 13+825 8.7m RT; N'y 5158999.432 E'y 330721.733 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 22/8/00 - 22/8/00 TIME _____ CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT					PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa									
							20	40	60	80	100	20	40	60			
307.00	Ground Surface																
306.89	TOPSOIL																
0.15	SILTY SAND		1	SS	6												
	Silty fine sand trace gravel to fine/medium sand trace gravel trace silt																
305.80	Occasional cobble		2	AS													
1.20	(Loose) Auger refusal End of borehole																

COMMENTS	+ ³ , × ³ : Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE	WATER LEVEL RECORDS		
		Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)

MEL-GEO 00036F GPJ MEL-GEO GDT 6/1/01

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 34

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 13+250 0.9m RT; N'y 5158450.637 E'y 330893.517 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 28/8/00 - 28/8/00 TIME 1:00:00 PM CHECKED BY MAM

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE								
308.93	Ground Surface											
308.69	CRUSHED GRAVEL											
308.65	ASPHALT COATED SAND											
0.24												
	Fine to medium sand some/trace silt		1	SS	9							
	(Loose)											
307.43	SILTY SAND		2	SS	9							
1.50												
	Yellow to greyfine sandy silt to silty fine and medium sand with trace of gravel/cobble with depth.											
	(Loose to Compact)											
			3	SS	10							
			4	SS	20							
303.83	Auger refusal											
5.10	Refusal on DCPT											
	End of Borehole											
COMMENTS							+ 3, X 3 : Numbers refer to Sensitivity O 3% STRAIN AT FAILURE		WATER LEVEL RECORDS Date (dd/mm/yy)/Time Water Depth (m) Cave In Level (m)			

MEL-GEO 00036F GPJ MEL-GEO.GDT 6/1/01

ENCLOSURE NO.:

METRIC**RECORD OF BOREHOLE No. 35**

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 13+300 0.9m RT; N'y 5158498.147 E'y 330877.935 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 28/8/00 - 28/8/00 TIME 3:45:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	"N" VALUES								
307.78 0.0	Ground Surface CRUSHED GRAVEL												
307.02 0.76	SILTY SAND Yellow/Grey silty fine sand		1	SS	7								
306.10 1.68	(Loose) PEAT Fine fibrous peat		2	AS	0								
304.48 3.30	SILTY SAND Grey fine sands some silt to silty fine sand trace gravel Cobble and boulder @ depth (Compact)		3	SS	WH								
301.08 6.80	Auger refusal End of Sampling Refusal on DCPT (20 blows/0mm) End of Borehole		4	SS	22								
			5	SS	21								
			6	SS	28								
COMMENTS							+ 3 × 3 : Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE			WATER LEVEL RECORDS Date (dd/mm/yy)/Time Water Depth (m) Cave In Level (m)			

MEL-GEO 00036F GPJ MEL-GEO.GDT 6/1/01

ENCLOSURE NO.:

METRIC**RECORD OF BOREHOLE No. 36**

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 13+350 0.9m RT; N'y 5158545.657 E'y 330862.353 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 29/8/00 - 29/8/00 TIME 11:00:00 AM CHECKED BY MAM

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE								
307.25	Ground Surface											
0.0	CRUSHED GRAVEL											
306.72	SAND											
0.53	Fine to medium sand some gravel trace silt (Compact to Loose)		1	SS	10							
305.27	PEAT		2	SS	4							
1.98	Dark brown fine fibrous peat		3	SS	2							
303.90	SILTY SAND		4	SS	2							
3.35	Grey silty fine sand to silty fine sand some gravel (Loose to Compact)		5	SS	28							
301.95	Auger refusal End of sampling											
5.30												
300.90	End of DCPT End of Borehole											
6.35												
COMMENTS						+ ³ , × ³ : Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE		WATER LEVEL RECORDS Date (dd/mm/yy)/Time Water Depth (m) Cave In Level (m) 29/8/00; 11:06:00 AM 1.28 1.29				

MEL-GEO 00036F GPJ MEL-GEO.GDT 6/1/01

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 37

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 13+400 0.9m RT; N'y 5158593.167 E'y 330846.771 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 29/8/00 - 29/8/00 TIME 2:00:00 PM CHECKED BY MAM

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)								
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE			"N" VALUES	20						40	60	80	100	20	40	60	20
306.56	Ground Surface																				
0.0	CRUSHED GRAVEL																				
306.18	ASPHALT																				
306.36	SAND																				
0.46																					
305.36	Fine sand some silt 50mm of AC granular to grey silty fine sand with depth		1	SS	11																
1.20	(Loose) PEAT		2	AS	0																
	Black fine fibrous peat; Cobble/Boulder @ 3.7		3	SS	1																
			4	SS	1																
302.46	SILTY SAND		5	SS	20																
4.10	Grey silty fine sand occasional trace cobble/gravel (Till structure evident at depth) (Compact)		6	SS	17																
			7	SS	26																
299.66	Auger Refusal End of sampling																				
6.90																					
297.46	Refusal on DCPT (25 blows/0mm) End of Borehole																				
9.10																					

COMMENTS

+ 3, X 3 : Numbers refer to Sensitivity

○ 3% STRAIN AT FAILURE

WATER LEVEL RECORDS

Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)
29/8/00;		

MEL-GEO 00036F GPJ MEL-GEO.GDT 6/1/01

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 38

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 13+450 0.9m RT; N'y 5158640.677 E'y 330831.188 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 29/8/00 - 29/8/00 TIME 4:40:00 PM CHECKED BY MAM

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE								
306.00	Ground Surface											
0.0	CRUSHED GRAVEL											
	Crushed gravel/occasional cobble											
305.24												
0.76	SAND		1	SS	10							
304.80	Fine to medium sand some gravel trace of silt to fine sand some silt											
1.20	(Loose)		2	SS	0							
	PEAT											
	Black fine fibrous peat		3	SS	0							
			4	SS	2							
			5	SS	0							
301.60												
4.40	SILTY SAND		6	SS	7							
	Silty fine and medium sand trace of gravel (Silt content decreasing with depth)											
	Cobble and boulder at depth											
	(Compact)		7	SS	19							
			8	SS	25							
297.62												
8.38	Auger refusal											
	End of sampling											
296.10												
9.90	Refusal on DCPT											
	End of Borehole											
COMMENTS						+ 3, X 3 : Numbers refer to Sensitivity O 3% STRAIN AT FAILURE		WATER LEVEL RECORDS Date (dd/mm/yy)/Time Water Depth (m) Cave In Level (m)				

MEL-GEO 00036F GPJ MEL-GEO.GDT 6/1/01

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 39

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 13+500 0.9m RT; N'y 5158688.187 E'y 330815.606 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 30/8/00 - 30/8/00 TIME 11:16:00 AM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)		
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	"N" VALUES										
305.55	Ground Surface														
0.0	CRUSHED GRAVEL														
305.19	SAND														
0.36	Fine to medium sand trace gravel trace of silt		1	SS	7										
304.23	(Loose) PEAT		2	SS	0										
1.32	Fine fibrous peat with trace of coarse inclusion		3	SS	0										
			4	SS	2										
301.25	SILTY SAND		5	SS	27										
4.30	Grey silty fine sand trace gravel Occasional cobble/boulder (Till structure evident with depth) (Compact)		6	SS	21										
			7	SS	29										
297.05	Auger Refusal														
8.50	End of Sampling														
	End of Borehole														
COMMENTS								+ 3, X 3 : Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE		WATER LEVEL RECORDS					
										Date (dd/mm/yy)/Time		Water Depth (m)		Cave In Level (m)	
										30/8/00; 11:10:00 AM		1.37		4.57	

MEL-GEO 00036F GPJ MEL-GEO.GDT 6/1/01

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 40

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 13+550 0.9m RT; N'y 5158735.697 E'y 330800.024 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 30/8/00 - 30/8/00 TIME 1:20:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES								
305.16	Ground Surface												
304.88	CRUSHED GRAVEL												
0.28	SAND												
	Fine to medium sand trace gravel trace of silt		1	SS	3								
303.96	(Loose) PEAT												
1.20	Fine fibrous peat with trace of wood		2	SS	0								
			3	SS	0								
			4	SS	0								
300.96	SILTY SAND												
4.20	Grey silty fine sand to fine sandy silt trace of gravel trace of clay (Compact)		5	SS	10								
			6	SS	31								
298.16			7	AS									
298.00	End of sampling												
7.13	Auger refusal Refusal on DCPT End of Borehole												
COMMENTS								+ 3, × 3 : Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE		WATER LEVEL RECORDS Date (dd/mm/yy)/Time Water Depth (m) Cave In Level (m)			

MEL-GEO 00036F GPJ MEL-GEO.GDT 6/1/01

ENCLOSURE NO.:

METRIC**RECORD OF BOREHOLE No. 41**

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 13+600 0.9m RT; N'y 5158783.207 E'y 330784.441 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 30/8/00 - 30/8/00 TIME 2:50:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)									
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	"N" VALUES			20	40						60	80	100	20	40	60	20	40	60
304.81	Ground Surface																						
304.58	CRUSHED GRAVEL																						
0.26	SAND																						
303.61	Fine to medium sand trace gravel trace of silt to fine sand with silt		1	SS	7																		
1.20	(Loose to Compact) PEAT		2	SS	0																		
	Fine fibrous peat		3	SS	2																		
			4	SS	4																		
300.51	SILTY SAND		5	SS	27																		
4.30	Grey silt some fine sand to grey silty fine sand trace gravel trace clay		6	SS	13																		
	(Compact)		7	AS																			
297.41	Refusal on DCPT																						
297.44	End of sampling																						
7.50	Auger refusal																						
COMMENTS							+ 3, X 3 : Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE		WATER LEVEL RECORDS <table border="1"> <tr> <th>Date (dd/mm/yy)/Time</th> <th>Water Depth (m)</th> <th>Cave In Level (m)</th> </tr> <tr> <td>30/8/00; 3:00:00 PM</td> <td>1.78</td> <td>1.98</td> </tr> </table>									Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)	30/8/00; 3:00:00 PM	1.78	1.98
Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)																					
30/8/00; 3:00:00 PM	1.78	1.98																					

MEL-GEO 00036F GPJ MEL-GEO.GDT 6/1/01

METRIC

RECORD OF BOREHOLE No. 42

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 13+650 0.9m RT; N'y 5158830.717 E'y 330768.859 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 30/8/00 - 30/8/00 TIME 5:00:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES								
304.60	Ground Surface												
304.35	CRUSHED GRAVEL												
0.25	SAND												
	Fine to medium sand trace gravel trace of silt to fine sand with silt		1	SS	2								
303.40	(Loose) PEAT												
1.20	Fine fibrous peat		2	SS	4								
302.50	SILTY SAND												
2.10	Grey silty fine sand trace gravel; occasional cobble/boulder trace of clay (Till structure evident with depth) (Compact to Very Dense)		3	SS	16								
			4	SS	54								
			5	SS	42								
			6	AS									
298.80	End of sampling Auger refusal (Boulder)												
5.80													
298.20	Refusal on DCPT End of Borehole												
6.40													

COMMENTS	+ 3, X 3 : Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE	WATER LEVEL RECORDS		
		Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)
		30/8/00; 5:10:00 PM	1.27	1.32

MEL-GEO 00036F.GPJ MEL-GEO.GDT 8/1/01

ENCLOSURE NO.:

METRIC**RECORD OF BOREHOLE No. 43**

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 13+700 0.9m RT; N'y 5158878.226 E'y 330753.277 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 31/8/00 - 31/8/00 TIME 11:30:00 AM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 	PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	"N" VALUES								
304.21	Ground Surface												
0.0	CRUSHED GRAVEL												
303.91	SAND												
0.30	Fine to medium sand trace gravel trace of silt to fine sand with silt		1	SS	6								
303.11	(Loose to Compact) PEAT		2	SS	0								
1.10	Fine fibrous peat		3	SS	3								
			4	SS	0								
300.41	SILTY SAND		5	SS	4								
3.80	Fine to medium sand trace of gravel Grey fine sandy silt to silt with fine sand to fine sandy silt Sand content increasing with depth as well as cobble and gravel (Loose to Compact/Dense)		6	SS	2								
			7	SS	10								
295.71	End of sampling Auger refusal												
8.50	Refusal on DCPT (25 blows/0mm) End of Borehole												
295.31													
8.90													
COMMENTS							+ 3, X 3 : Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE			WATER LEVEL RECORDS Date (dd/mm/yy)/Time 31/8/00; 11:40:00 AM Water Depth (m) 1.68 Cave In Level (m)			

MEL-GEO 00036F GPJ MEL-GEO GDT 6/1/01

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 44

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 13+750 0.9m RT; N'y 5158925.736 E'y 330737.695 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 31/8/00 - 31/8/00 TIME 1:40:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	"N" VALUES								
304.03	Ground Surface												
0.0	CRUSHED GRAVEL												
303.73	SAND												
0.30	Fine to medium sand trace gravel trace of silt to grey fine sand with silt		1	SS	10								
302.83	(Loose to Compact) PEAT		2	AS									
1.20	Fine fibrous peat trace of inclusions		3	SS	0								
300.83	SAND		4	SS	9								
3.20	Fine to medium sand trace of silt to silty sand with depth Sand and gravel content increasing with depth (Compact)		5	SS	3								
297.43	Auger refusal		6	SS	30								
296.80	End of sampling												
6.80	Refusal on DCPT (20 blows/0mm)												
	End of Borehole												
COMMENTS							+ 3, X 3 : Numbers refer to Sensitivity O 3% STRAIN AT FAILURE		WATER LEVEL RECORDS Date (dd/mm/yy)/Time Water Depth (m) Cave In Level (m) 31/8/00; 1:45:00 PM 1.68 1.83				

MEL-GEO 00036F GPJ MEL-GEO.GDT 6/1/01

ENCLOSURE NO.:

METRIC**RECORD OF BOREHOLE No. 45**

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 13+800 0.9m RT; N'y 5158973.246 E'y 330722.112 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 31/8/00 - 31/8/00 TIME 2:40:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)				
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40						60	80	100	20
304.69	Ground Surface																	
304.39	CRUSHED GRAVEL																	
304.30	SAND																	
303.29	Fine to medium sand trace gravel trace of silt to grey fine sand with silt		1	SS	10													
303.29	(Compact) PEAT		2	AS														
302.59	Fine black fibrous peat																	
302.59	SILTY SAND																	
	Grey silty fine sand to grey silt some fine sand (Wet)		3	SS	27													
	(Compact to Dense)		4	SS	36													
300.99	Auger refusal End of borehole Refusal on DCPT (20 blows/0mm)																	
3.70																		

COMMENTS

+ 3, X 3 : Numbers refer to Sensitivity

○ 3% STRAIN AT FAILURE

WATER LEVEL RECORDS

Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)
31/8/00; 2:40:00 PM	2.03	2.44

MEL-GEO 00036F.GPJ MEL-GEO.GDT 6/1/01

RECORD OF BOREHOLES

Area 2:

Boreholes 26 to 33

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 26

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 20+400 8.8m RT D - 1.2; N'y 5164750.121 E'y 331231.671 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 22/8/00 - 23/8/00 TIME 11:26:00 AM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)	
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	"N" VALUES									
302.07	Ground Surface													
0.0	PEAT													
	Black fine fibrous peat		1	SS	WH									
			2	SS	WH									
300.37														
1.70	SAND		3	SS	6									
	Fine to medium sand trace silt to fine/medium sand some silt some gravel													
	(Very Loose to Compact)		4	SS	3									
			5	SS	15									
	(Very Dense beyond 5.4m)													
			6	SS	14									
			7	AS										
296.07														
6.00	Auger refusal End of borehole													
COMMENTS								+ 3, X 3 : Numbers refer to Sensitivity		WATER LEVEL RECORDS				
								O 3% STRAIN AT FAILURE		Date (dd/mm/yy)/Time		Water Depth (m)		Cave In Level (m)
										23/8/00; 11:30:00 AM		0.15		0.86

MEL-GEO 00036F.GPJ MEL-GEO.GDT 8/1/01

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 27

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 20+350 8.8m RT D -1.3; N'y 5164721.345 E'y 331190.782 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 23/8/00 - 23/8/00 TIME 1:03:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES										
301.62 0.0	Ground Surface SILTY SAND														
	152mm of silty organics Grey silty sand trace gravel trace organics/muck mixed at depth		1	AS											
300.42 1.20	(Very Loose) PEAT		2	SS	2										
	Fine fibrous peat		3	SS	WH										
			4	SS	1										
			5	SS	WH										
297.22 4.40	SAND		6	SS	WH										
	Grey fine sand to fine sand some silt Gravel and occasional cobble with depth (Loose to Compact)		7	SS	23										
294.42 7.20	Auger refusal														
294.02	End of sampling														
7.60	Refusal on DCPT														
COMMENTS								+ 3, X ³ : Numbers refer to Sensitivity		WATER LEVEL RECORDS					
								O 3% STRAIN AT FAILURE		Date (dd/mm/yy)/Time		Water Depth (m)		Cave In Level (m)	
										23/8/00; 1:07:00 PM		1.1		2.3	

MEL-GEO 00036F.GPJ MEL-GEO.GDT 6/1/01

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 28

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 20+300 8.8m RT D -1.3; N'y 5164692.568 E'y 331149.893 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 23/8/00 - 23/8/00 TIME 2:50:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES								
301.76	Ground Surface												
0.0	PEAT		1	SS	WH							218.5	
	Fine fibrous peat		2	SS	WH							665.7	
			3	SS	WH							672.5	
299.16	SILTY SAND		4	SS	24								
2.60	Grey fine sandy silt occasional cobble to gravelly fine to medium sand some silt occasional cobble with depth.		5	SS	12								34 61 (5)
	(Compact)												
297.66	Auger refusal												
4.10	End of sampling												
296.86	Refusal on DCPT (20 blows/0mm)												
4.90	End of Borehole												
COMMENTS								+ 3. X 3 : Numbers refer to Sensitivity O 3% STRAIN AT FAILURE		WATER LEVEL RECORDS Date (dd/mm/yy)/Time 23/8/00; 2:51:00 PM Water Depth (m) 0.76 Cave In Level (m) 2.13			

MEL-GEO 00036F.GPJ MEL-GEO.GDT 6/1/01

METRIC

RECORD OF BOREHOLE No. 29

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 20+450 8.8m RT D-1.7; N'y 5164778.898 E'y 331272.560 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 23/8/00 - 23/8/00 TIME 4:00:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES								
302.01	Ground Surface												
0.0	PEAT												
	Black fine fibrous peat Trace silt at depth		1	AS									
			2	SS	WH								
			3	SS	WH								
299.91	SILT												
2.10													
299.41	Grey silt trace fine sand Boulder/cobble @ 2.3m		4	AS									
2.60	(Dense) Auger refusal End of sampling												
295.71	Refusal on DCPT End of Borehole												
6.30													
COMMENTS								$+^3, \times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE		WATER LEVEL RECORDS Date (dd/mm/yy) Time Water Depth (m) Cave In Level (m) 23/8/00; 4:03:00 PM 0.2 1.88			

MEL-GEO 00036F.GPJ MEL-GEO.GDT 6/1/01

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 30

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 20+450 2.0m RT; N'y 5164784.459 E'y 331268.646 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 24/8/00 - 24/8/00 TIME 11:10:00 AM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES								
303.60	Ground Surface												
0.0	CRUSHED GRAVEL												
303.25													
0.35	SAND												
302.87													
302.63	Fine to medium sand trace gravel/silt												
0.69	ASPHALT COATED SAND		1	SS	5								
302.40	SAND												
1.20	Fine sand some silt												
302.11													
1.49	(Loose) SHOT ROCK												
	Shot rock (Wet)												
	Auger refusal												
	End of sampling												
299													
298.17													
5.43	Refusal on DCPT (30 blows/0mm) End of Borehole												

COMMENTS	+ 3, X ³ : Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE	WATER LEVEL RECORDS		
		Date (dd/mm/yy)/Time	Water Depth (m)	Cave in Level (m)

MEL-GEO 00036F.GPJ MEL-GEO.GDT 6/1/01

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 30A

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 20+450 2.0m RT; N'y 5164785.035 E'y 331269.464 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 28/8/00 - 28/8/00 TIME 11:13:00 AM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)						
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES														
303.61	Ground Surface																		
0.0	CRUSHED GRAVEL																		
303.26	SAND																		
0.35	Fine to medium sand trace gravel/silt Layer of Asphalt Coated layer @ .64m to .69m																		
302.24	SHOT ROCK																		
1.37	Shot rock/ sand and peat at depth		1	SS	8														
301.63	(Loose) PEAT																		
1.98																			
301.02	Black/brown fine fibrous peat		2	SS	3														
2.59	SILTY SAND																		
	Grey silt some fine sand to sand with silt to gravelly sand some silt with depth.																		
300.01	Cobble @ 3.2m		3	SS	21														
3.60	(Compact) Auger refusal End of borehole																		
COMMENTS								$+3 \times 3$: Numbers refer to Sensitivity \bigcirc 3% STRAIN AT FAILURE		WATER LEVEL RECORDS <table border="1"> <tr> <td>Date (dd/mm/yy)/Time</td> <td>Water Depth (m)</td> <td>Cave In Level (m)</td> </tr> <tr> <td>3/8/00; 11:15:00 AM</td> <td></td> <td>1.2</td> </tr> </table>				Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)	3/8/00; 11:15:00 AM		1.2
Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)																	
3/8/00; 11:15:00 AM		1.2																	

MEL-GEO 00036F.GPJ MEL-GEO.GDT 6/1/01

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 31

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 20+300 2.0m RT; N'y 5164698.129 E'y 331145.979 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 24/8/00 - 24/8/00 TIME _____ CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT w _p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES								
302.75	Ground Surface												
0.0	CRUSHED GRAVEL												
302.39	(Loose) SAND												
0.36													
301.55	Fine to medium sand trace gravel trace of silt												
1.20	(Loose to Compact) SHOT ROCK FILL												
300.65	(Loose) PEAT		1	SS	4								
2.10	Black fine fibrous peat		2	AS									
299.65	End of sampling												
3.10													
297.25	Refusal on DCPT												
5.50	End of Borehole												

COMMENTS	$+3, \times^3$: Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE	WATER LEVEL RECORDS		
		Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)

MEL-GEO 00036F.GPJ MEL-GEO.GDT 6/1/01

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 31A

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 20+299 2.0m RT; N'y 5164697.553 E'y 331145.162 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 24/8/00 - 24/8/00 TIME 2:15:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	"N" VALUES								
302.77	Ground Surface												
0.0	CRUSHED GRAVEL												
302.41	(Loose) SAND												
0.36													
301.57	Fine to medium sand trace gravel trace of silt												
1.20	(Loose to Compact) SHOT ROCK FILL												
300.77	(Loose) PEAT												
2.00	Black fine fibrous peat		1	SS	2							376	
			2	SS	WH							231.6	
298.97	SILTY SAND												
3.80													
298.37	Grey silty fine sand trace gravel occasional cobble		3	AS									
4.40	Auger Refusal End of borehole												
COMMENTS							+ 3, X ³ : Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE		WATER LEVEL RECORDS Date (dd/mm/yy)/Time Water Depth (m) Cave In Level (m)				

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 32

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 20+350 2.0m RT; N'y 5164726.906 E'y 331186.868 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 24/8/00 - 24/8/00 TIME 5:00:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT w_p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w_L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL												
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa																		
302.75	Ground Surface																									
302.50	CRUSHED GRAVEL																									
0.25	SAND																									
	Fine to medium sand trace gravel trace of silt to fine to medium sand some silt		1	AS																						
301.25	(Loose)																									
1.50	SHOT ROCK/BOULDER																									
300.95	PEAT																									
1.80	Fine fibrous peat		2	SS	1																					
300.05	SAND																									
2.70	Grey fine to medium sand trace silt to fine sand with silt (Very Loose)		3	SS	4																					
			4	SS	1																					
			5	SS	1																					
295.85	SAND																									
6.90	Fine sand some silt trace gravel (Till structure evident) (Dense to Very Dense)																									
			6	AS																						
294.35	Auger refusal																									
294.24	End of sampling																									
8.50	Refusal on DCPT																									
	End of Borehole																									
COMMENTS								$+3 \times 3$: Numbers refer to Sensitivity \circ 3% STRAIN AT FAILURE		WATER LEVEL RECORDS <table border="1"> <thead> <tr> <th>Date (dd/mm/yy)/Time</th> <th>Water Depth (m)</th> <th>Cave In Level (m)</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td></tr> </tbody> </table>					Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)									
Date (dd/mm/yy)/Time	Water Depth (m)	Cave In Level (m)																								

MEL-GEO 00036F.GPJ MEL-GEO.GDT 6/1/01

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 33

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 20+400 2.0m RT; N'y 5164755.682 E'y 331227.757 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 24/8/00 - 25/8/00 TIME 11:00:00 AM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES								
303.01	Ground Surface												
0.0	CRUSHED GRAVEL												
302.68	SAND												
0.33													
301.91	Fine to medium sand trace gravel trace of silt to fine to medium sand some silt												
1.10	SHOT ROCK												
301.51	PEAT												
1.50	Fine fibrous peat		1	SS	4								
300.41													
2.60	SILT		2	SS	WH								
299.81	Organic silt												
3.20	(Wet) (Very Loose) SAND		3	SS	5								
	Fine and medium sand trace silt some gravel.												
	(Compact) (Wet)		4	SS	11								
297.41													
5.60	Auger refusal End of sampling Refusal on DCPT End of Borehole												
COMMENTS								+ 3, X ³ : Numbers refer to Sensitivity		WATER LEVEL RECORDS			
								O 3% STRAIN AT FAILURE		Date (dd/mm/yy)/Time			
										Water Depth (m)			
										Cave In Level (m)			

MEL-GEO 00036F.GPJ MEL-GEO.GDT 6/1/01

RECORD OF BOREHOLES

Area 3:

Boreholes 1 to 11

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 1

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 10+000 On Centerline; N'y 5165060.985 E'y 331658.175 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 27/7/00 - 27/7/00 TIME 4:07:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES								
288.96	Ground Surface												
0.0	PEAT		1	AS								920.5	
	Brown fine Fibrous Peat		2	SS	2							660.3	
			3	SS	WH							548.8	
286.68	SILTY SAND		4	SS	3								
2.28	Grey silty fine sand with layer of fine Sandy Silt (Loose to Compact)		5	SS	6								0 59 38 3
	Occ. cobble		6	SS	17								0 12 80 8
282.86	SAND		7	SS	WH								
6.10	Grey silty fine sand to fine sand some silt with depth (Dense)		8	SS	4								7 82 (11)
279.36	End of Sampling		9	SS	52								
276.66	Refusal on DCPT												
9.70	End of Borehole												
AP 1a 10m LT D = 0 0 - 2.28 Peat 2.28 - 2.5 Fine sand with silt AP 1b 10m RT D = 0 0 - 2.54 Peat 2.54 NFP Boulder													
COMMENTS							+ 3 × 3 : Numbers refer to Sensitivity ○ 3% STRAIN AT FAILURE			WATER LEVEL RECORDS Date (dd/mm/yy)/Time 27/7/00; 4:27:00 PM Water Depth (m) 0.76 Cave in Level (m) 2.6			

MEL-GEO 00036F.GPJ MEL-GEO.GDT 6/1/01

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 2

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 20+875 On Centerline; N'y 5165033.781 E'y 331619.521 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 28/7/00 - 28/7/00 TIME 12:45:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	"N" VALUES			20	40					
289.12	Ground Surface													
0.0	PEAT		1	AS									702.6	
	Brown fine Fibrous Peat		2	SS	WH								784.5	
			3	AS									856.7	
			4	SS	WH								497.7	
286.74	SAND		5	SS	3									0 78 20 2
2.38	Fine to medium sand trace to some silt trace of organics		6	SS	3									1 89 (10)
	(Loose)													
284.82	SILTY SAND		7	SS	8									0 28 68 4
4.30	Silty fine sand with some gravel and occasional cobble and boulder with depth.		8	SS	5									0 62 34 4
	(Loose to Compact)													
	Refusal on DCPT @ 7.4 m (Boulder)		9	SS	14									0 70 27 3
			10	SS	11									0 64 31 5
279.32	End of Borehole													
9.80														
	AP 2a 10m LT D = +500 0 - 2.6 Peat 2.6 - 3.2 Silty fine sand													
	AP 2b 10m RT D = 0 0 - 2.6 Peat 2.6 - 3.2 Silty fine sand													
COMMENTS								+ 3, X ³ : Numbers refer to Sensitivity		WATER LEVEL RECORDS				
								O 3% STRAIN AT FAILURE		Date (dd/mm/yy)/Time		Water Depth (m)		Cave In Level (m)
										28/7/00; 12:45:00 PM		0.0		1.7

MEL-GEO 00036F.GPJ MEL-GEO.GDT 6/1/01

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 3

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 20+800 On Centerline, N'y 5164990.616 E'y 331558.187 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 28/7/00 - 28/7/00 TIME 3:50:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT 	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES								
289.02	Ground Surface												
0.0	PEAT		1	AS									
	Brown Fibrous Peat		2	SS	WH								
			3	SS	WH								
286.92	SILTY SAND												
2.10	Silty fine sand (moist to wet) (Loose)		4	SS	WH								
			5	SS	2								
284.45	End of Sampling Hollow Stems sanded-in.												
4.57													
278.52	Refusal on DCPT (Boulder/Bedrock) End of borehole												
10.50													
	AP 3a 10m RT D = 0 0 - 2.4 Peat 2.4 - 3.2 Fine sand some silt												
	AP 3b 10m LT D = +200 0 - 1.95 Peat 1.95 - 2.2 Silty fine sand												
COMMENTS							+ 3, X ³ : Numbers refer to Sensitivity		WATER LEVEL RECORDS				
							○ 3% STRAIN AT FAILURE		Date (dd/mm/yy)/Time		Water Depth (m)	Cave In Level (m)	
									28/7/00;		0.15	4.6	

MEL-GEO 00036F.GPJ MEL-GEO.GDT 6/1/01

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 4

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 20+750 On Centerline, N'y 5164961.839 E'y 331517.298 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 1/8/00 - 1/8/00 TIME CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	'N' VALUES										
288.96 0.0	Ground Surface PEAT Brown Fibrous Peat		1	AS								715.5			
			2	SS	WH							506.6			
287.16 1.80	SAND Fine to medium sand trace/some silt. Colour change from grey to yellow with depth. Trace of gravel and cobble @ 4.9m (Loose to compact with depth)		3	SS	2							332.7			
			4	SS	4										
			5	SS	6								6 90 (4)		
			6	SS	19								21 66 (13)		
283.42 5.54	Auger Refusal BLD End of Sampling														
279.46 9.50	Refusal on DCPT (Boulder/Bedrock) End of borehole AP 4 10m LT 0 - 2.29 Peat 2.29 - 3.05 Grey fine sand with/some silt														
COMMENTS								+ 3, X 3 : Numbers refer to Sensitivity		WATER LEVEL RECORDS					
								O 3% STRAIN AT FAILURE		Date (dd/mm/yy)/Time		Water Depth (m)		Cave In Level (m)	
										1/8/00; 4:10:00 PM		0.36		2.4	

MEL-GEO 00036F.GPJ MEL-GEO GDT 6/1/01



MERLEX ENGINEERING LTD.
Consulting Geotechnical Engineers

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 6

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 10+100 On Centerline, N'y 5165118.538 E'y 331739.952 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 2/8/00 - 2/8/00 TIME 3:37:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE	"N" VALUES								
288.71	Ground Surface												
0.0	PEAT												
	Brown Fibrous Peat		1	AS			3.5					830.3	
			2	AS			2.5					635	
			3	SS	WH		1.8					437.3	
286.31	SAND		4	SS	4								1 81 (18)
2.40	Grey fine sand some/with silt to silt and fine sand. (Very Loose to Loose)		5	SS	6								0 80 18 2
			6	SS	2								0 83 (17)
			7	SS	4								0 79 (21)
			8	AS									0 34 58 8
279.61	End of Sampling/ Auger Refusal		9	AS									0 75 20 5
9.10													
276.51	End of DCPT End of borehole												
12.20	AP 6 10m LT 0 - 2.32 Peat 2.32 - 3.1 Fine sand some/with silt												
COMMENTS							+ 3, X ³ : Numbers refer to Sensitivity		WATER LEVEL RECORDS				
							○ 3% STRAIN AT FAILURE		Date (dd/mm/yy)/Time		Water Depth (m)		Cave In Level (m)
									2/8/00; 3:40:00 PM		0.0		1.2

MEL-GEO 00036F.GPJ MEL-GEO.GDT 6/1/01

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 7

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 10+150 On Centerline; N'y 5165147.315 E'y 331780.841 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 3/8/00 - 3/8/00 TIME 10:20:00 AM CHECKED BY MAM

SOIL PROFILE		SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT w_p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w_L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV. DEPTH	DESCRIPTION	STRAT. PLOT	NUMBER	TYPE			"N" VALUES	SHEAR STRENGTH kPa					
288.76 0.0	Ground Surface PEAT Brown Fibrous Peat (Very Loose)		1	SS	WH		20	40	60	80	100	704	
			2	SS	WH		20	40	60	80	100	600	
			3	SS	WH		20	40	60	80	100	505	
286.76 2.00	SILTY SAND to SANDY SILT Grey silty fine sand to fine sandy silt (Loose to Very Loose to Compact at depth)		4	SS	5		20	40	60	80	100		0 68 29 3
			5	SS	4		20	40	60	80	100		0 25 68 7
			6	SS	WH		20	40	60	80	100		0 65 30 5
			7	SS	2		20	40	60	80	100		0 58 40 2
			8	SS	30		20	40	60	80	100		0 65 29 6
279.66 9.10	End of sampling		9	SS			20	40	60	80	100		0 31 61 8
276.56 12.20	End of DCPT End of borehole						20	40	60	80	100		
COMMENTS						+ 3, X 3 : Numbers refer to Sensitivity O 3% STRAIN AT FAILURE	WATER LEVEL RECORDS						
							Date (dd/mm/yyyy) Time		Water Depth (m)		Cave In Level (m)		
							3/8/00; 10:28:00 AM		0.3		4		

MEL-GEO 00036F GPJ MEL-GEO GDT 6/1/01

ENCLOSURE NO.:

METRIC**RECORD OF BOREHOLE No. 8**

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 10+200 On Centerline, N'y 5165176.097 E'y 331821.726 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 3/8/00 - 3/8/00 TIME 1:04:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			20	40					
288.52	Ground Surface													
0.0	PEAT													
	Brown Fibrous Peat		1	SS	WH								509.5	
	(Very Loose)		2	SS	WH								540.35	
			3	SS	WH								591.91	
286.52	SILTY SAND to SAND													
2.00	Grey silty fine sand to fine sand with silt.		4	SS	3									
	(Very Loose to Loose to Compact at depth)		5	SS	3									
			6	SS	2									
			7	SS	2									
			8	SS	8									
			9	SS	14									
279.42	End of sampling													
9.10														
276.32	End of DCPT													
12.20	End of Borehole													
	AP 8 10m LT													
	0 - 2.13 Peat													
	2.13 - 2.29 Silty fine sand													
	2.13 - 3.1 Fine sand with silt													
COMMENTS							+ 3, X ³ : Numbers refer to Sensitivity		WATER LEVEL RECORDS					
							○ 3% STRAIN AT FAILURE		Date (dd/mm/yy)/Time		Water Depth (m)		Cave In Level (m)	
									3/8/00; 1:10:00 PM		0.2		2.4	

MEL-GEO 00036F.GPJ MEL-GEO GDT 6/1/01

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 9

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 10+250 On Centerline; N'y 5165205.479 E'y 331862.180 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 3/8/00 - 3/8/00 TIME 3:10:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT w_p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT w_L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%)
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa						
288.59	Ground Surface													
0.0	PEAT		1	SS	WH		288	4.5				553.2		
	Brown Fibrous Peat (Very Loose)		2	SS	WH		287	1.7				541		
286.59			3	SS	WH							505.4		
2.00	SILTY SAND to SILT WITH SAND													
	Grey silty fine sand to silt with sand (Loose to Very Loose)		4	SS	7		286						0 60 37 3	
			5	SS	5		285						0 24 70 6	
			6	SS	5		284						0 59 38 3	
			7	SS	0		283						0 22 72 6	
			8	SS	1		282						0 47 45 8	
			9	SS	6		280						0 57 39 4	
279.49	End of sampling						279							
9.10							278							
276.99	End of DCPT End of borehole						277							Hammer bouncing
11.60														
COMMENTS							+ ³ , X ³ : Numbers refer to Sensitivity		WATER LEVEL RECORDS					
							O 3% STRAIN AT FAILURE		Date (dd/mm/yy)/Time		Water Depth (m)		Cave In Level (m)	
									3/8/00; 3:15:00 PM		0.3		1.5	

MEL-GEO 00036F.GPJ MEL-GEO.GDT 6/1/01

ENCLOSURE NO.:

METRIC

RECORD OF BOREHOLE No. 10

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 10+300 On Centerline; N'y 5165236.664 E'y 331901.255 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers, Dynamic Cone Penetration Test COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 3/8/00 - 3/8/00 TIME 4:57:00 PM CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT	PLASTIC LIMIT W _p	NATURAL MOISTURE CONTENT W	LIQUID LIMIT W _L	UNIT WEIGHT γ	REMARKS & GRAIN SIZE DISTRIBUTION (%)		
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES										
288.56 0.0	Ground Surface PEAT														
	Brown Fibrous Peat (Very Loose)		1	SS	WH							459.73			
			2	SS	WH							479.97			
286.76 1.80	SAND		3	SS	7										
	Grey fine sand with silt to brown fine to medium sand trace of gravel.														
285.86 2.70	(Loose to compact) SILTY SAND		4	SS	18										
	Grey silty fine sand trace of gravel occasional cobble (Till structure evident)		5	SS	9										
	(Compact to Very Dense)														
283.46 5.10	Auger Refusal (Boulder/Bedrock) End of Borehole		6	SS	52										
	AP 10a 10m LT 0 - 1.98 Peat 1.98 - 2.74 Silty fine sand 2.74 - 3.1 Silty fine sand trace gravel														
	AP 10b 10m RT 0 - 0.91 Peat 0.91 - 1.37 Peat and boulder 1.37 - 3.1 Silty fine sand														
COMMENTS								+ 3, X ³ : Numbers refer to Sensitivity		WATER LEVEL RECORDS					
								O 3% STRAIN AT FAILURE		Date (dd/mm/yy)/Time		Water Depth (m)		Cave In Level (m)	
										3/8/00;					

MEL-GEO 00036F.GPJ MEL-GEO.GDT 6/1/01

ENCLOSURE NO.:

METRIC**RECORD OF BOREHOLE No. 11**

1 OF 1



REFERENCE 00/04/00036 DATUM Geodetic LOCATION Sta 10+350 On Centerline; N'ly 5165269.764 E'ly 331938.724 ORIGINATED BY ELS
 PROJECT Highway No. 63 W.P. 167-90-00 BOREHOLE TYPE Hollow Stem Augers COMPILED BY MR
 CLIENT EarthTech DATE (Started/Completed) 4/8/00 - 4/8/00 TIME _____ CHECKED BY MAM

SOIL PROFILE			SAMPLES			GROUND WATER CONDITIONS	ELEVATION SCALE	DYNAMIC CONE PENETRATION RESISTANCE PLOT		PLASTIC LIMIT W_p	NATURAL MOISTURE CONTENT w	LIQUID LIMIT W_L	UNIT WEIGHT γ kN/m ³	REMARKS & GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
ELEV DEPTH	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES			SHEAR STRENGTH kPa 20 40 60 80 100 ○ UNCONFINED + FIELD VANE ● QUICK TRIAXIAL X LAB VANE						
292.42	Ground Surface													
292.42 0.10	PEAT													
	Brown Fibrous Peat (Very Loose) SAND		1	SS	20									
291.02 1.40	Yellow fine sand trace of gravel some silt (Wet) (Compact) Auger Refusal (Boulder/Bedrock) End of Borehole													20 68 (12)
	AP 11a 10m RT 0 - 100 Organics 100 - 400 Fine to med. sand some silt trace gravel 400 - 2.7 Silty fine sand trace of gravel 2.7 NFP BR													
	AP 11b 10m LT 0 - 100 Organics 100 - 500 Fine to med. sand some silt trace gravel 500 - 1.3 Silty fine sand trace gravel 1.3 NFP BLD/BR													
	AP 11c 10+320 CL 0 - 100 Silty organics 100 - 1.5 Silty fine sand trace gravel (wet) 1.5 NFP BLD/BR													
	AP 11d 10+400 CL 0 - 50 Silty organics 50 - 2.3 Silty fine sand trace gravel occasional boulder and cobble 2.3 NFP													
COMMENTS							+ 3 X 3 : Numbers refer to Sensitivity		WATER LEVEL RECORDS					
							○ 3% STRAIN AT FAILURE		Date (dd/mm/yy)/Time		Water Depth (m)		Cave In Level (m)	

MEL-GEO 00036F.GPJ MEL-GEO.GDT 6/1/01

TABLE 1

Option Comparison Area 1 & 2

TABLE 1

OPTION COMPARISONS AREA 1 & 2

OPTIONS	ADVANTAGE	DISADVANTAGE	ESTIMATED POSSIBLE TOTAL SETTLEMENTS AT TYPICAL SECTION 13+700 AREA 1 *	
			EXISTING PLATFORM (MM)	WIDENING (MM)
A-1) Full depth excavation of peat from under widening (OPSD 203.020)	<ul style="list-style-type: none"> - Eliminates distress under widening - Approximately 70% less costly than Option B 	<ul style="list-style-type: none"> - Movement will occur due to differential subgrade conditions - Differential settlement of existing platform will occur 	0 – 150	0
A-2) Partial depth excavation of peat (1/2 depth) from under widening.	<ul style="list-style-type: none"> - Improves stability during partial excavation (approximately 22%) - Approximately 80% less costly than Option B 	<ul style="list-style-type: none"> - Does not effectively reduce settlement associated with peat compression 	0 – 150	< 750
B) Full width excavation of all peat.	<ul style="list-style-type: none"> - No post construction distress / distortion - No maintenance costs associated with compression of peat subgrade. - No post construction liability, due to differential settlement in driving lane 	<ul style="list-style-type: none"> - Highest cost 	0	0
C) Place fill widening directly on peat.	<ul style="list-style-type: none"> - Least cost 	<ul style="list-style-type: none"> - Long term differential settlement under widening & existing platform 	0 – 150	750 **

* Estimates of settlement based on loadings of 300 mm new fill being placed over new center line and 1.5 m new fill over existing right ditch line (see Figure 14).

Compressions of peat estimate based on 50% of new fill thickness up to ½ the thickness of the peat layer.

** It is estimated 50% of peat compression will occur during construction with the remaining compression occurring at a decreasing rate, over a period of a decade with or without geogrid reinforcement.

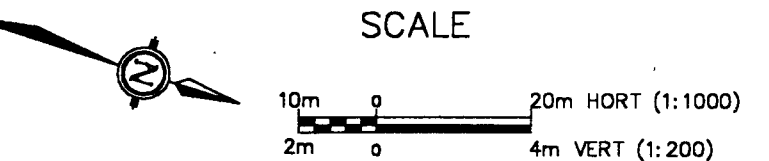
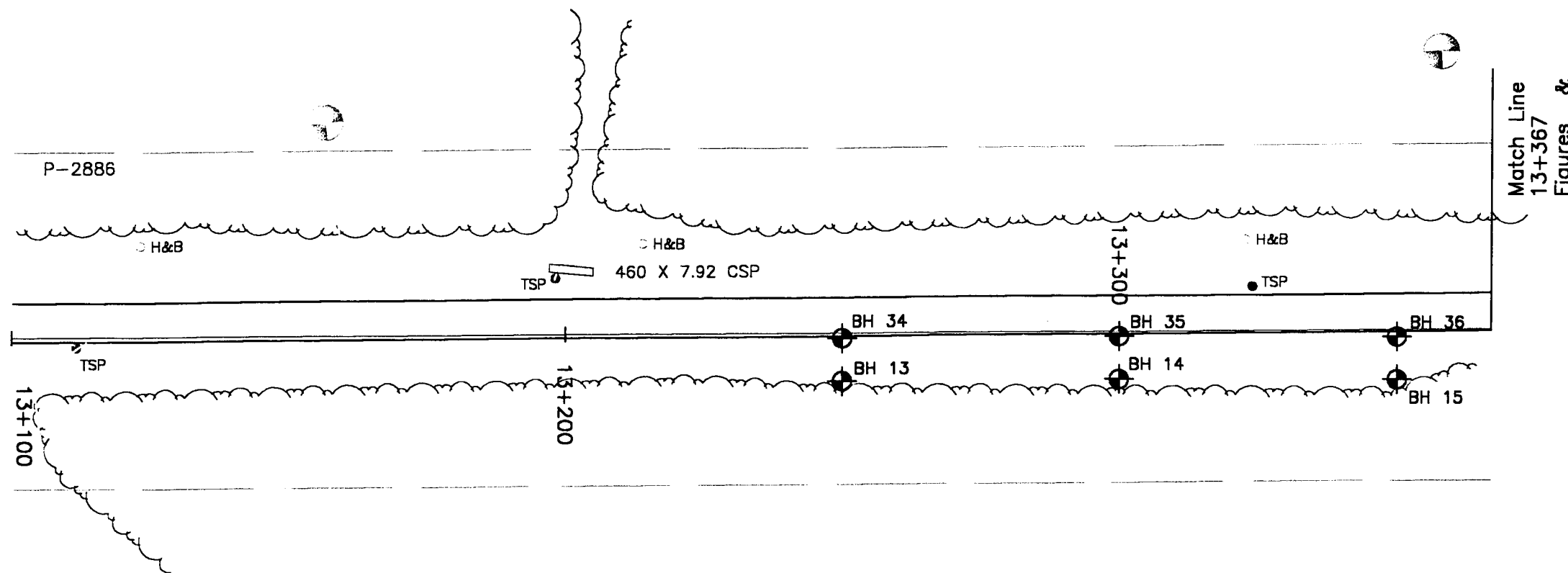
FIGURES 2 TO 8

Borehole Location and Soil Strata (3 Areas)

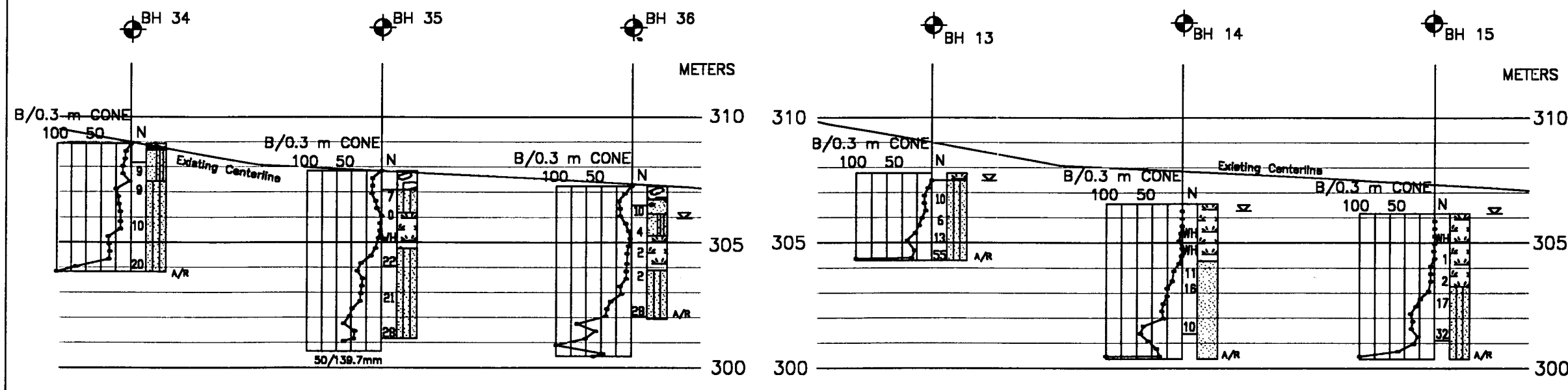
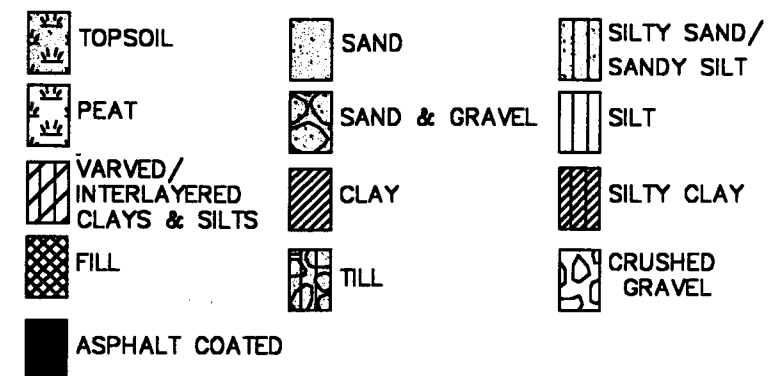
CONT NO.
W.P. NO. 167 - 90 - 00

HWY 63
FOUNDATION INVESTIGATION - AREA 1
BOREHOLE LOCATIONS AND SOIL STRATA

FIGURE
2



STRATIGRAPHY LEGEND



LEGEND

- Borehole and Dynamic Cone Penetration Test
- Borehole
- N Blows/0.3 m
- Water Level at Time of Investigation
- Auger Refusal at Elevation

Borehole No.	Co-ordinates		Elevation
	North	East	
BOREHOLE No. 00-34	5158450.837	330893.517	308.928m
BOREHOLE No. 00-35	5158498.147	330877.935	307.783m
BOREHOLE No. 00-36	5158545.657	330882.353	307.245m
BOREHOLE No. 00-13	5158453.068	330900.929	307.792m
BOREHOLE No. 00-14	5158500.578	330885.347	308.574m
BOREHOLE No. 00-15	5158548.088	330889.784	308.186m

NOTE 1:

The boundaries between soil strata have been established at the borehole locations only. The boundaries between boreholes are assumed based on borehole data.



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PROJECT: HWY. 63, Foundation Investigation

REFERENCE NO: 00036F

DATE: August 28, 2000

DRAWN BY: M.R.

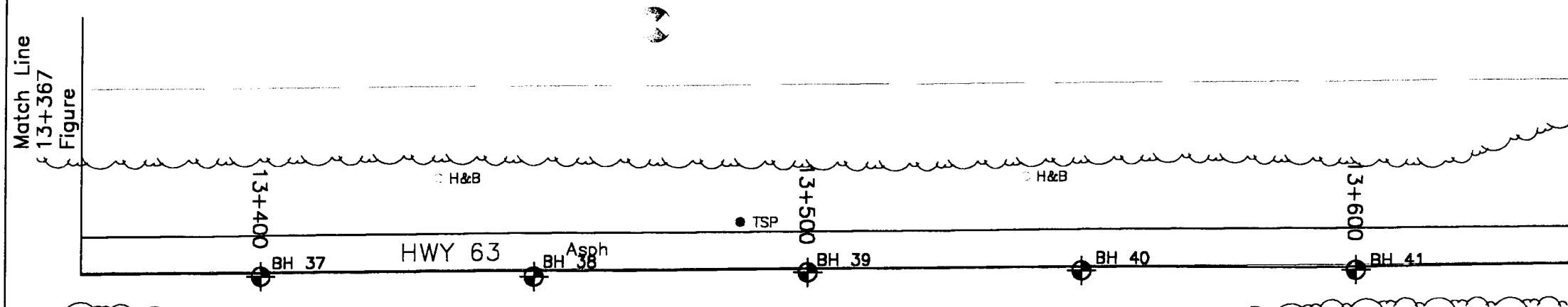
CHECKED BY: MAM

NOTE: FOR DETAILED SUBSOIL AND BOREHOLE INFORMATION REFER TO RECORD OF BOREHOLE.

CONT NO.
W.P. NO. 167 - 90 - 00

HWY 63
FOUNDATION INVESTIGATION - AREA 1
BOREHOLE LOCATIONS AND SOIL STRATA

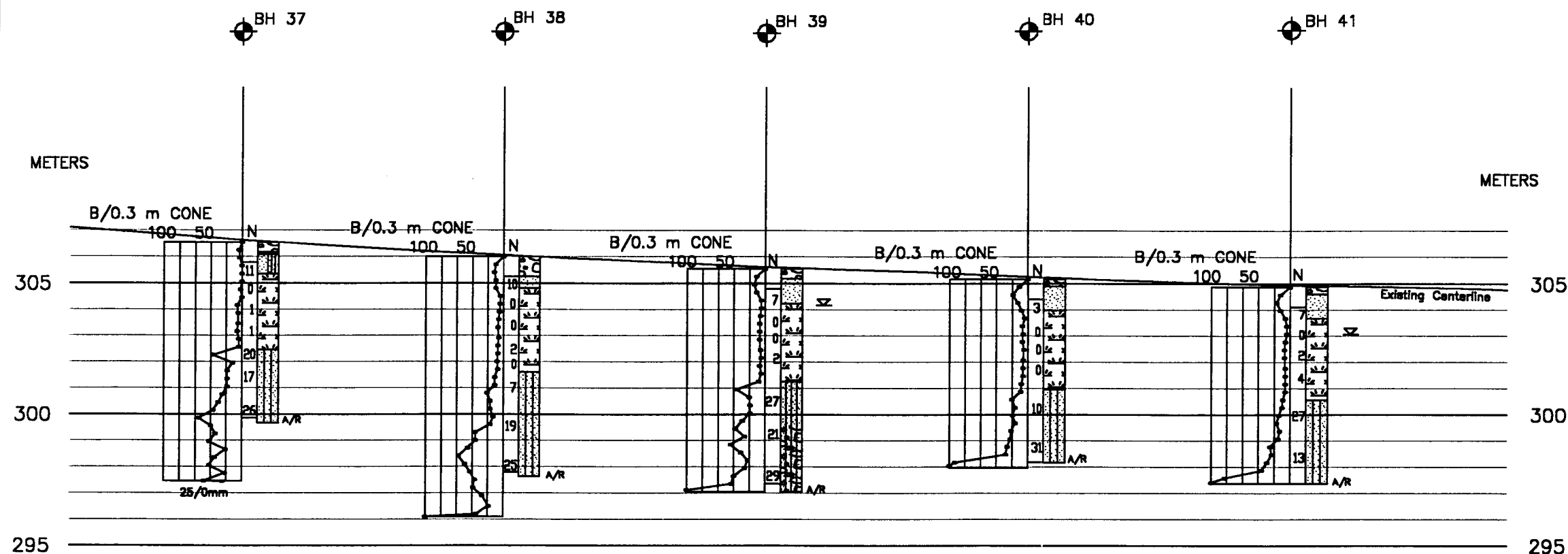
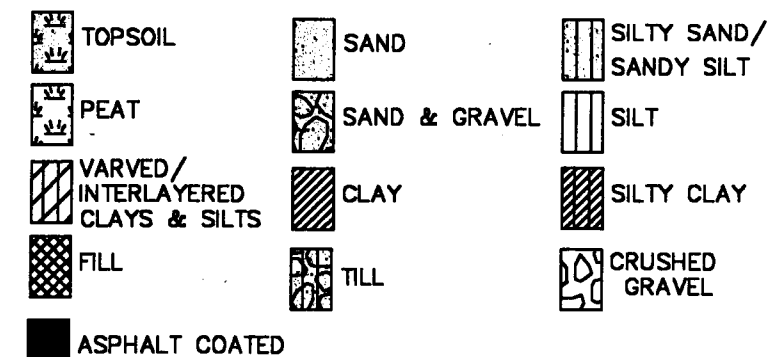
FIGURE
3A



SCALE

10m 0 20m HORT (1:1000)
2m 0 4m VERT (1:200)

STRATIGRAPHY LEGEND



LEGEND

- Borehole and Dynamic Cone Penetration Test
- Borehole
- N Blows/0.3 m
- Water Level at Time of Investigation
- Auger Refusal at Elevation

Borehole No.	Co-ordinates		Elevation
	North	East	
BOREHOLE No. 00-37	5158583.187	330848.771	308.555m
BOREHOLE No. 00-38	5158640.677	330831.188	305.997m
BOREHOLE No. 00-39	5158688.187	330815.606	305.545m
BOREHOLE No. 00-40	5158735.897	330800.024	305.181m
BOREHOLE No. 00-41	5158783.207	330784.441	304.870m

NOTE 1:
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Consulting Geotechnical Engineers

PROJECT: HWY. 63, Foundation Investigation
REFERENCE NO.: 00036F DATE: August 28, 2000
DRAWN BY: M.R. CHECKED BY: MAM

NOTE: FOR DETAILED SUBSOIL AND BOREHOLE INFORMATION REFER TO RECORD OF BOREHOLE.

CONT NO.
W.P. NO. 167 - 90 - 00

HWY 63
FOUNDATION INVESTIGATION - AREA 1
BOREHOLE LOCATIONS AND SOIL STRATA

FIGURE
3B

Match Line
13+367
Figure

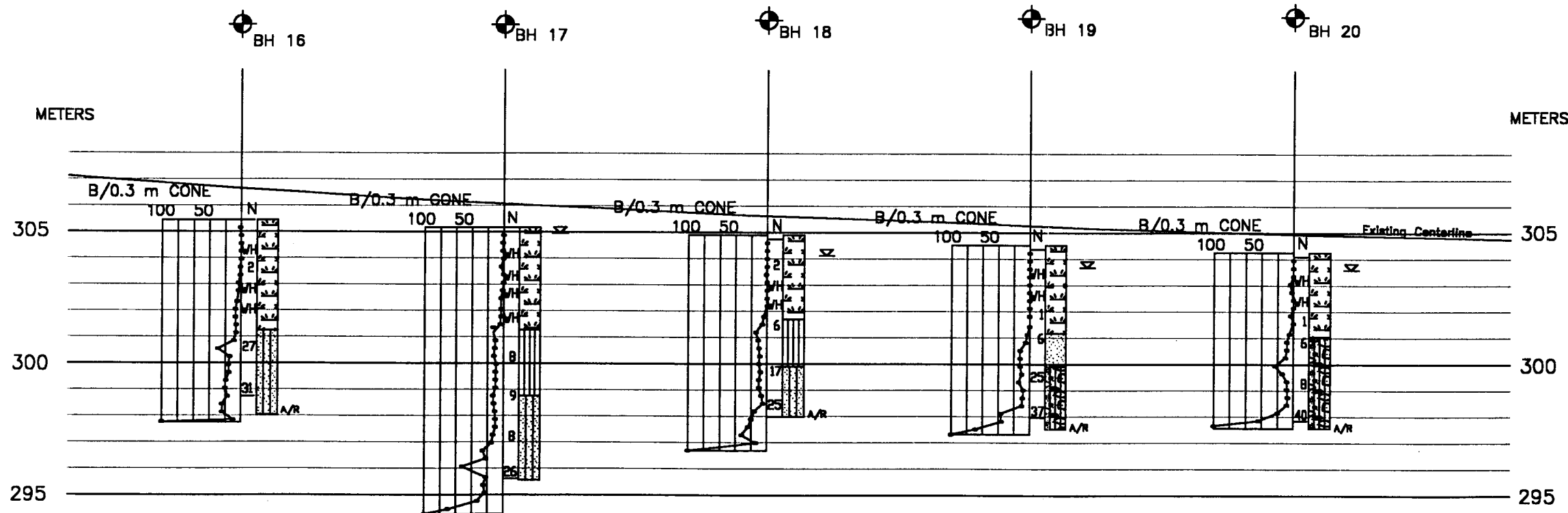
Match Line
13+642
Figures &

SCALE

10m 0 20m HORT (1:1000)
2m 0 4m VERT (1:200)

STRATIGRAPHY LEGEND

	TOPSOIL		SAND		SILTY SAND/ SANDY SILT
	PEAT		SAND & GRAVEL		SILT
	VARVED/ INTERLAYERED CLAYS & SILTS		CLAY		SILTY CLAY
	FILL		TILL		CRUSHED GRAVEL
	ASPHALT COATED				



LEGEND

- Borehole and Dynamic Cone Penetration Test
- Borehole
- N Blows/0.3 m
- Water Level at Time of Investigation
- Auger Refusal at Elevation

Borehole No.	Co-ordinates		Elevation
	North	East	
BOREHOLE No. 00-16	5158566.588	330854.182	305.442m
BOREHOLE No. 00-17	5158643.108	330838.800	305.189m
BOREHOLE No. 00-18	5158690.818	330823.018	304.893m
BOREHOLE No. 00-19	5158738.128	330807.435	304.519m
BOREHOLE No. 00-20	5158785.837	330791.853	304.255m

NOTE 1:
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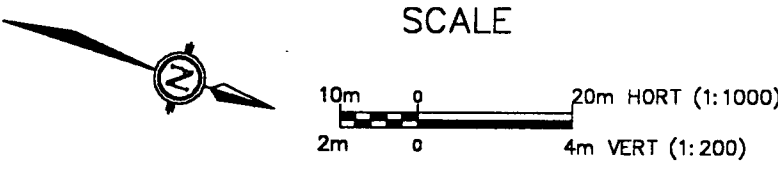
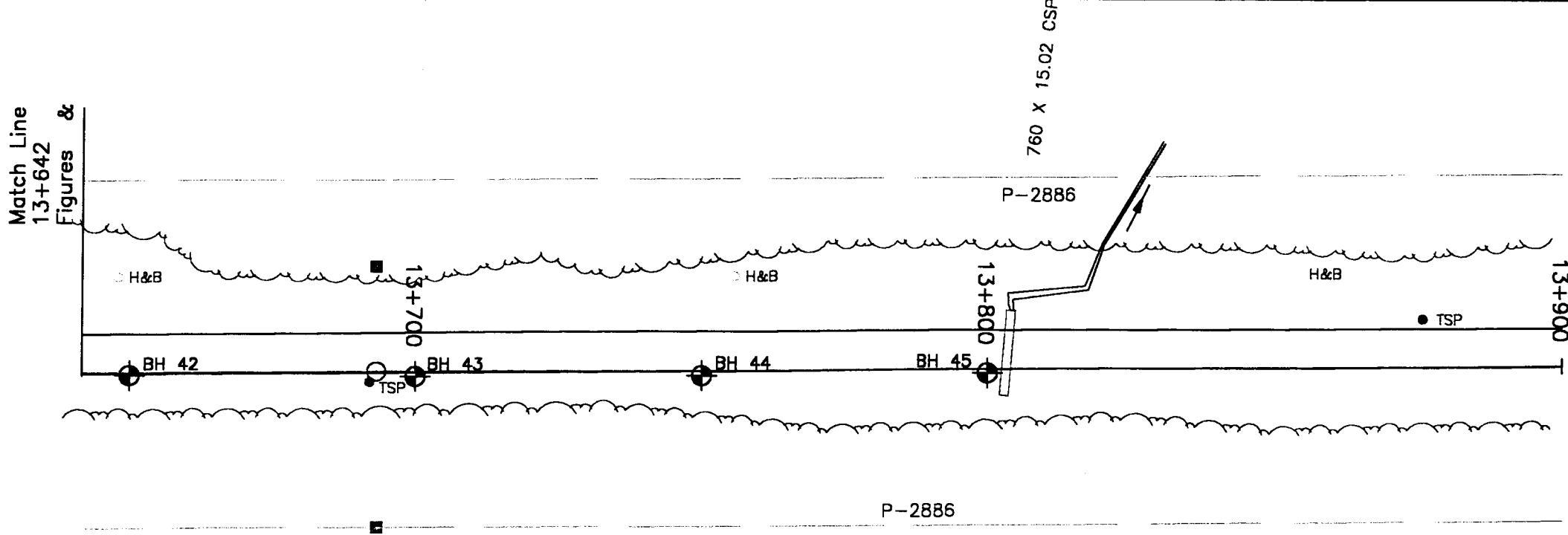
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REFERENCE NO: 00036F DATE: August 28, 2000
DRAWN BY: M.R. CHECKED BY: MAM

NOTE: FOR DETAILED SUBSOIL AND BOREHOLE INFORMATION REFER TO RECORD OF BOREHOLE.

CONT NO.
W.P. NO. 167 - 90 - 00

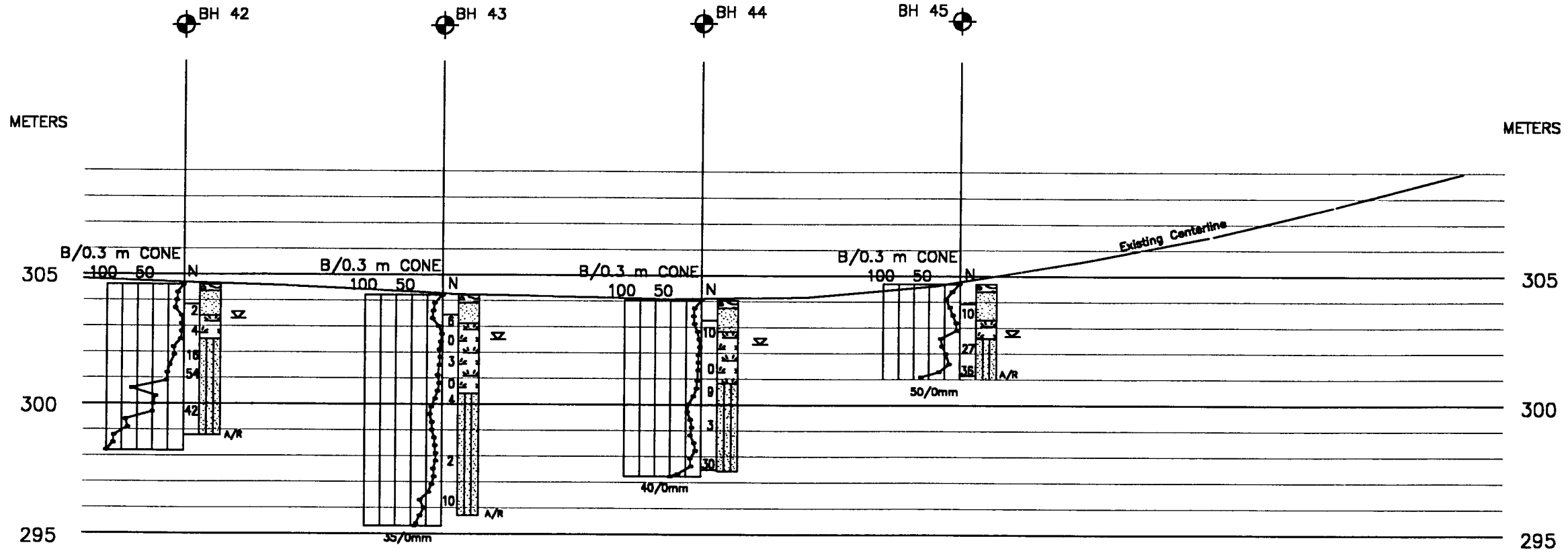
HWY 63
FOUNDATION INVESTIGATION - AREA 1
BOREHOLE LOCATIONS AND SOIL STRATA

FIGURE
4A




STRATIGRAPHY LEGEND

- TOPSOIL
- PEAT
- VARVED/INTERLAYERED CLAYS & SILTS
- FILL
- ASPHALT COATED
- SAND
- SAND & GRAVEL
- CLAY
- TILL
- SILTY SAND/SANDY SILT
- SILT
- SILTY CLAY
- CRUSHED GRAVEL



LEGEND			
	Borehole and Dynamic Cone Penetration Test		
	Borehole		
N	Blows/0.3 m		
SZ	Water Level at Time of Investigation		
A/R	Auger Refusal at Elevation		
Borehole No.	Co-ordinates		Elevation
	North	East	
BOREHOLE No. 00-42	5158830.717	330768.859	304.801m
BOREHOLE No. 00-43	5158878.228	330753.277	304.211m
BOREHOLE No. 00-44	5158925.738	330737.895	304.034m
BOREHOLE No. 00-45	5158973.248	330722.112	304.894m

NOTE 1:
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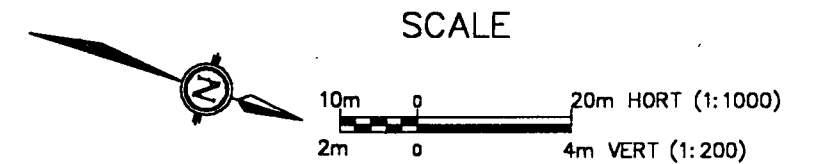
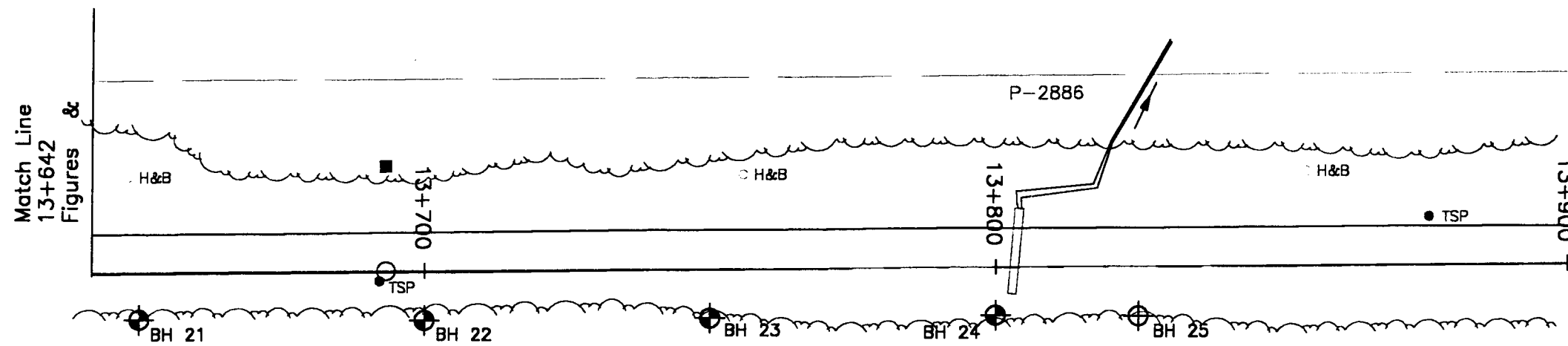
PROJECT: HWY. 63, Foundation Investigation	
REFERENCE NO.: 00036F	DATE: August 28, 2000
DRAWN BY: M.R.	CHECKED BY: MAM

NOTE: FOR DETAILED SUBSOIL AND BOREHOLE INFORMATION REFER TO RECORD OF BOREHOLE.

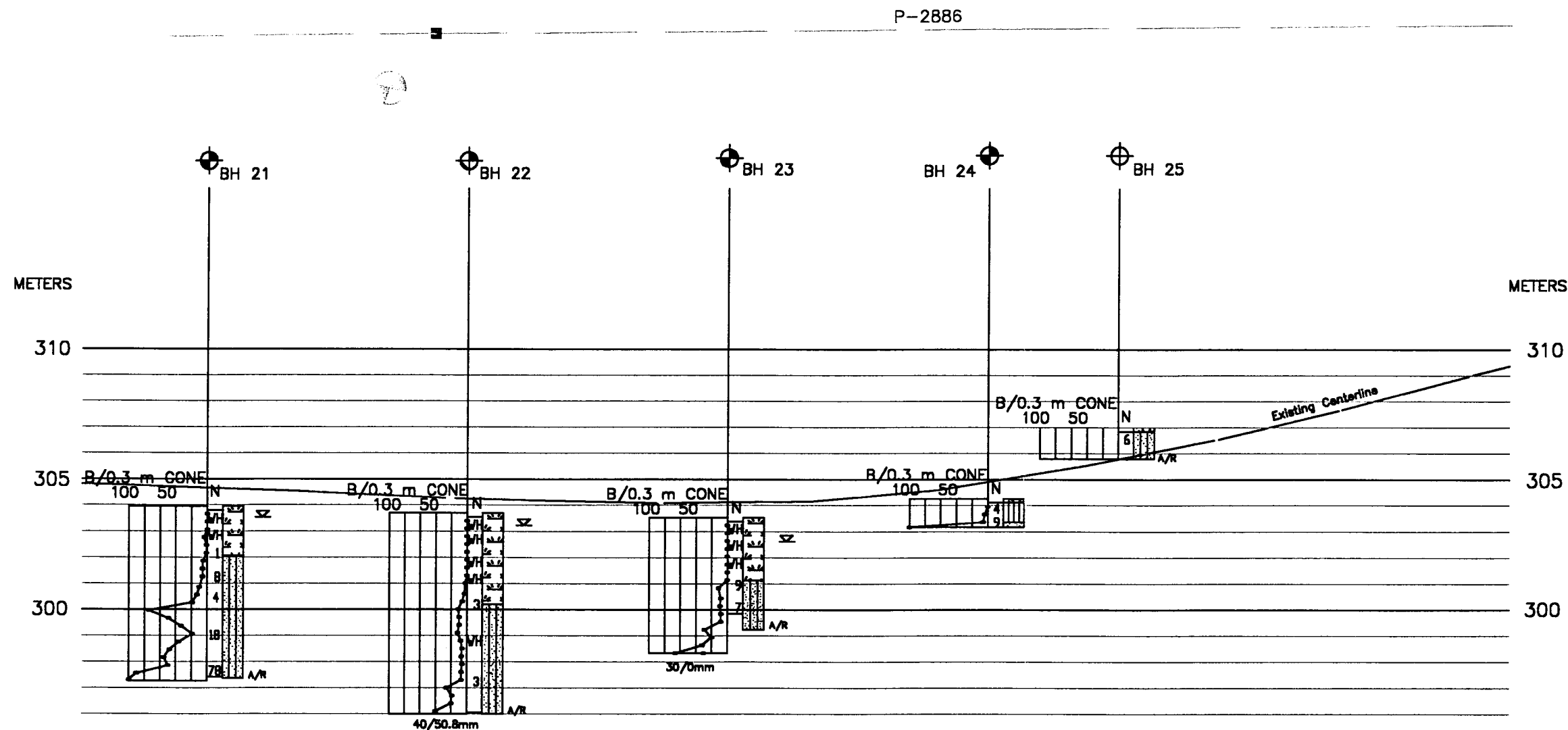
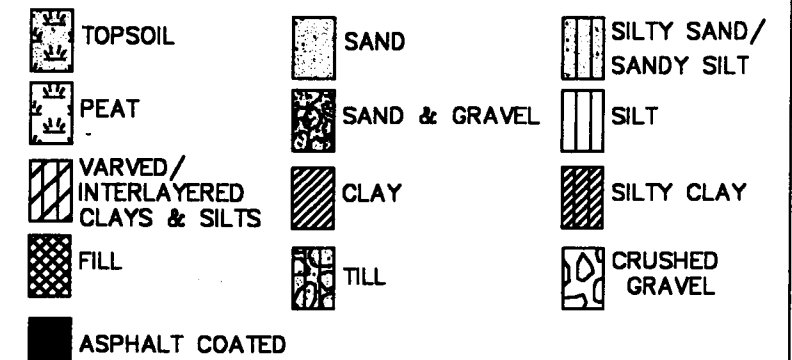
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HWY 63
FOUNDATION INVESTIGATION - AREA 1
BOREHOLE LOCATIONS AND SOIL STRATA

FIGURE
4B



STRATIGRAPHY LEGEND



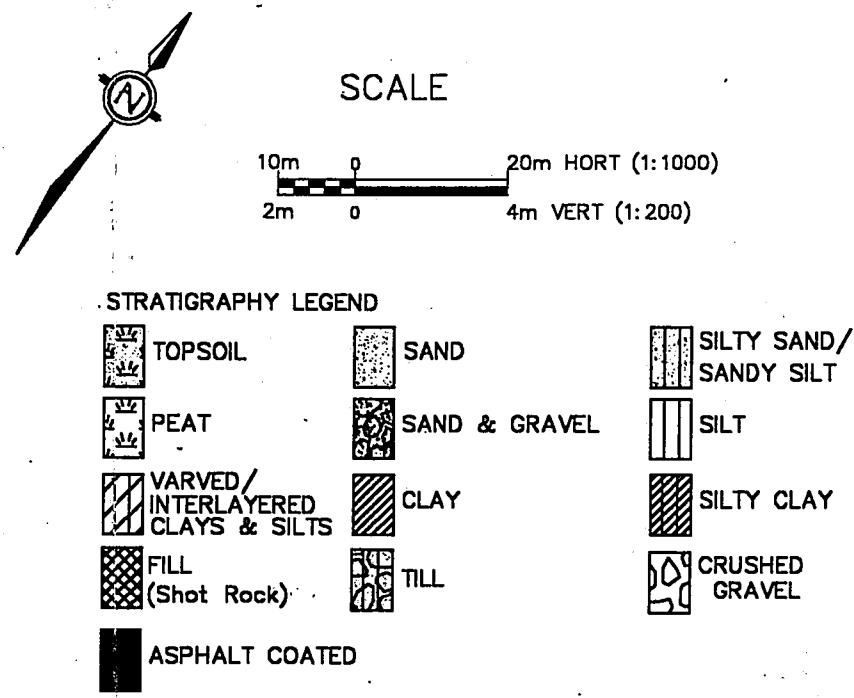
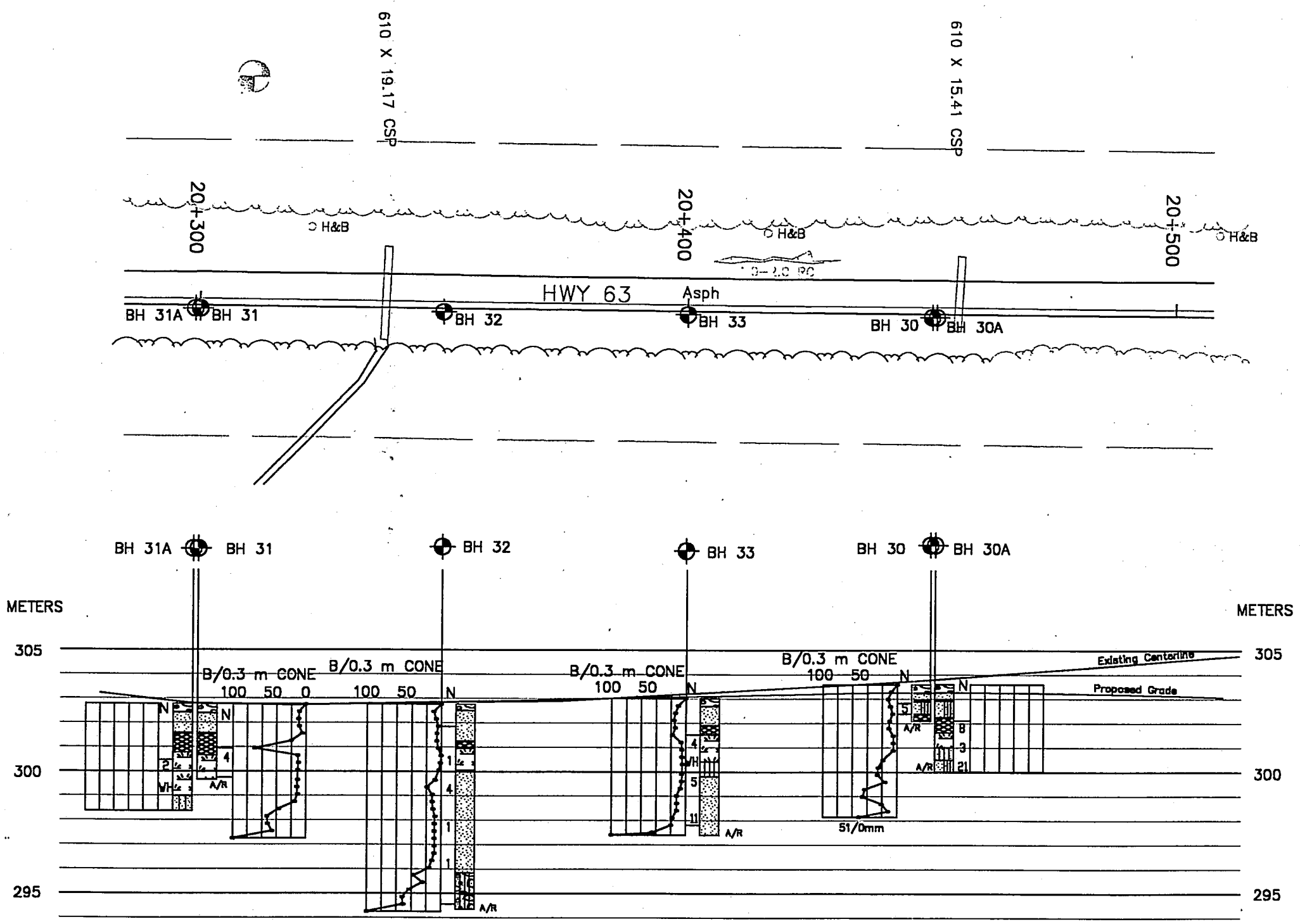
LEGEND			
	Borehole and Dynamic Cone Penetration Test		
	Borehole		
N	Blows/0.3 m		
Σ	Water Level at Time of Investigation		
A/R	Auger Refusal at Elevation		
Borehole No.	Co-ordinates		Elevation
	North	East	
BOREHOLE No. 00-21	5158833.147	330778.271	303.983m
BOREHOLE No. 00-22	5158880.657	330760.688	303.703m
BOREHOLE No. 00-23	5158928.167	330745.108	303.537m
BOREHOLE No. 00-24	5158975.877	330729.524	304.270m
BOREHOLE No. 00-25	5158999.432	330721.733	308.999m

NOTE 1:
The boundaries between soil strata have been established at the borehole locations only. The boundaries between boreholes are assumed based on borehole data.



PROJECT: HWY. 63, Foundation Investigation
REFERENCE NO.: 00036F
DRAWN BY: M.R.
DATE: August 28, 2000
CHECKED BY: MAM

NOTE: FOR DETAILED SUBSOIL AND BOREHOLE INFORMATION REFER TO RECORD OF BOREHOLE.



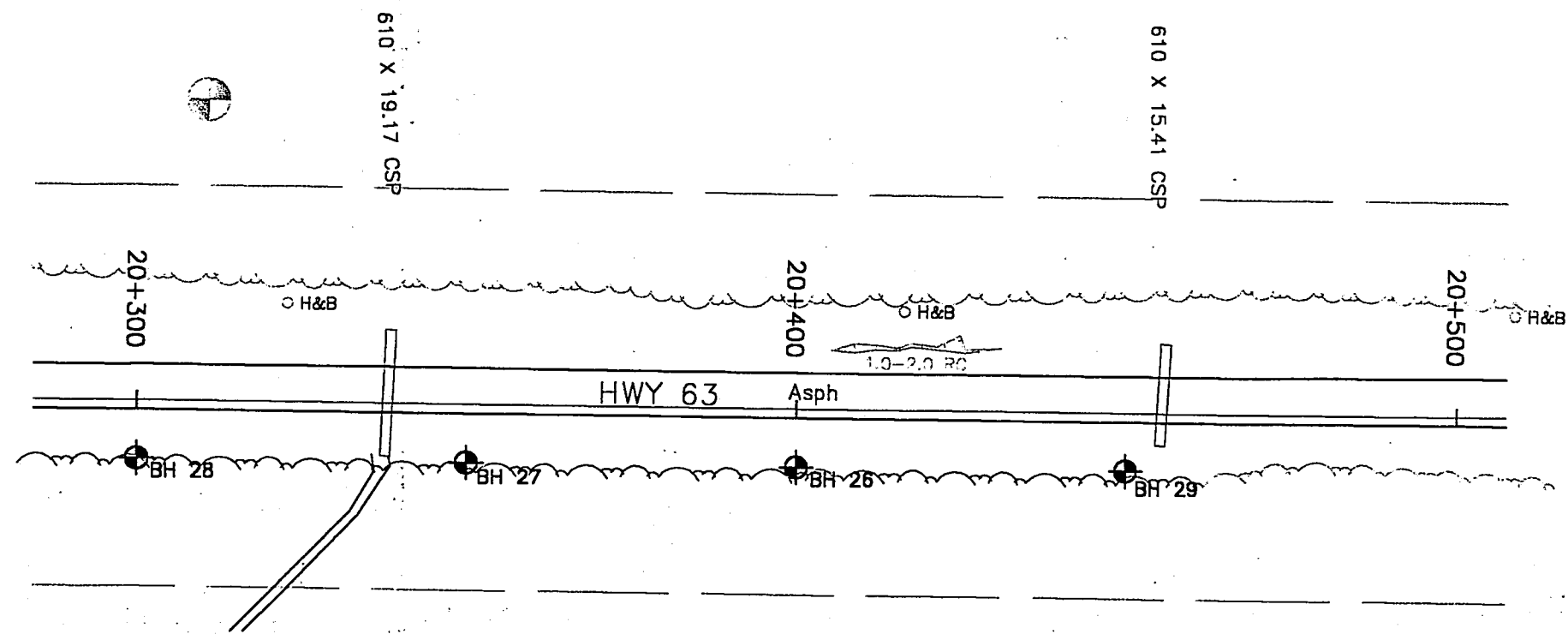
LEGEND			
	Borehole and Dynamic Cone Penetration Test		
	Borehole		
N	Blows/0.3 m		
	Water Level at Time of Investigation		
	Auger Refusal at Elevation		
Borehole No.	Co-ordinates		Elevation
	North	East	
BOREHOLE No. 00-31A	5184897.553	331145.182	302.774m
BOREHOLE No. 00-31	5184898.129	331145.879	302.751m
BOREHOLE No. 00-32	5184728.908	331186.868	302.752m
BOREHOLE No. 00-33	5184755.882	331227.757	303.012m
BOREHOLE No. 00-30	5184784.459	331268.846	303.598m
BOREHOLE No. 00-30A	5184785.035	331269.484	303.811m

NOTE 1:
The boundaries between soil strata have been established at the borehole locations only. The boundaries between boreholes are assumed based on borehole data.

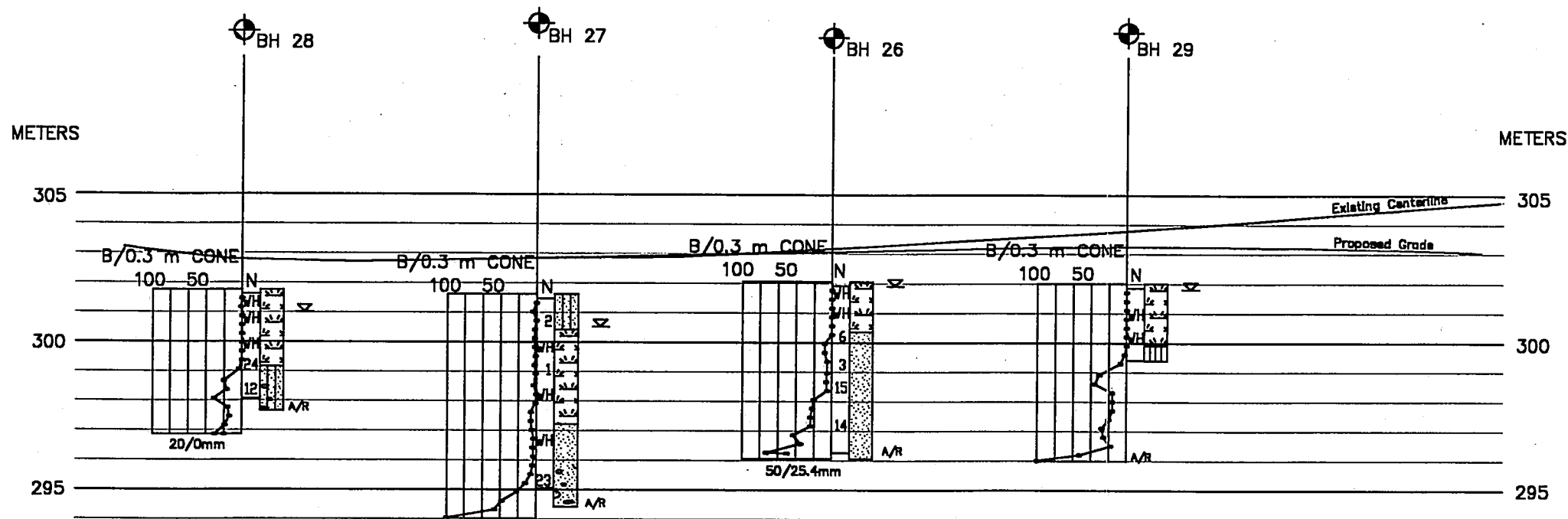
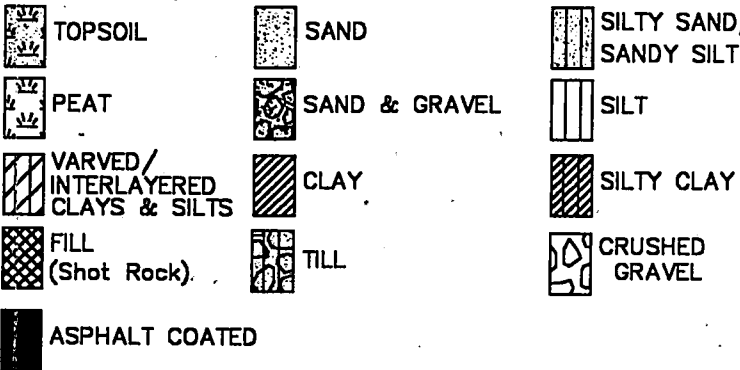
CONT NO.
W.P. NO. 167 - 90 - 00

HWY 63
FOUNDATION INVESTIGATION - AREA 2
BOREHOLE LOCATIONS AND SOIL STRATA

FIGURE
5B



STRATIGRAPHY LEGEND



LEGEND

- Borehole and Dynamic Cone Penetration Test
- Borehole
- N Blows/0.3 m
- ≡ Water Level at Time of Investigation
- A/R Auger Refusal at Elevation

Borehole No.	Co-ordinates		Elevation
	North	East	
BOREHOLE No. 00-28	5164692.568	331149.893	301.763m
BOREHOLE No. 00-27	5164721.345	331190.782	301.620m
BOREHOLE No. 00-26	5164750.121	331231.671	302.067m
BOREHOLE No. 00-29	5164778.898	331272.560	302.007m

NOTE 1:
The boundaries between soil strata have been established at the borehole locations only. The boundaries between boreholes are assumed based on borehole data.



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PROJECT: HWY. 63, Foundation Investigation
REFERENCE NO: 00036F
DATE: August 28, 2000
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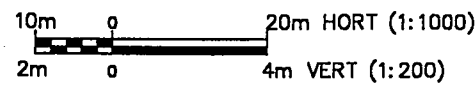
NOTE: FOR DETAILED SUBSOIL AND BOREHOLE INFORMATION REFER TO RECORD OF BOREHOLE.

CONT NO.
W.P. NO. 167 - 90 - 00

HWY 63
FOUNDATION INVESTIGATION - AREA 3
BOREHOLE LOCATIONS AND SOIL STRATA

FIGURE
6

SCALE



STRATIGRAPHY LEGEND

- TOPSOIL
- PEAT
- VARVED/INTERLAYERED CLAYS & SILTS
- FILL
- SAND
- SAND & GRAVEL
- CLAY
- TILL
- SILTY SAND/SANDY SILT
- SILT
- SILTY CLAY
- CRUSHED GRAVEL

ASPHALT COATED

LEGEND

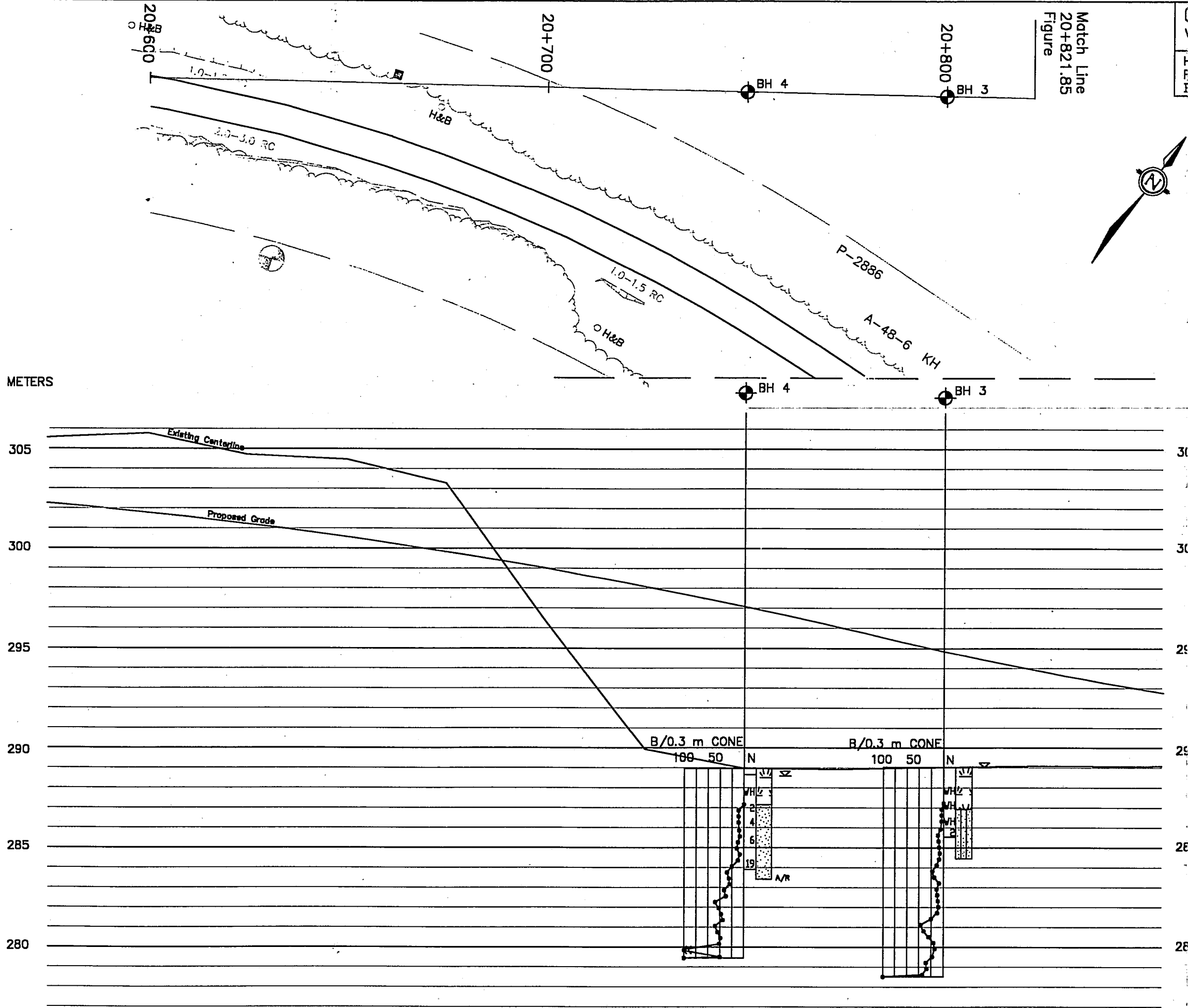
- Borehole and Dynamic Cone Penetration Test
- Borehole
- N Blows/0.3 m
- Water Level at Time of Investigation
- A/R Auger Refusal at Elevation

Borehole No.	Co-ordinates		Elevation
	North	East	
BOREHOLE No. 00-04	5164961.839	331517.288	288.957m
BOREHOLE No. 00-03	5164990.816	331558.187	289.022m

NOTE 1:
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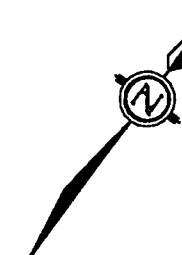


NOTE: FOR DETAILED SUBSOIL AND BOREHOLE INFORMATION REFER TO RECORD OF BOREHOLE.

CONT NO.
W.P. NO. 167 - 90 - 00

HWY 63
FOUNDATION INVESTIGATION - AREA 3
BOREHOLE LOCATIONS AND SOIL STRATA

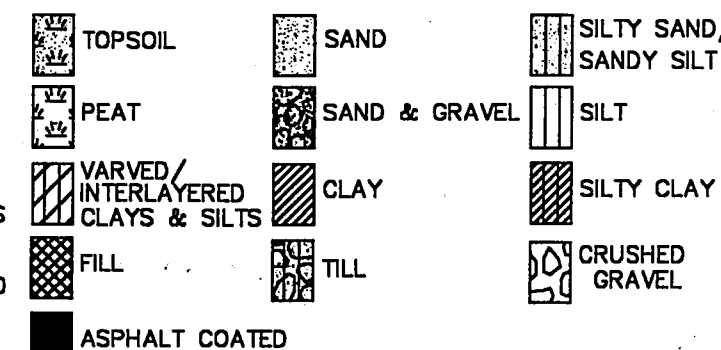
FIGURE
7



SCALE



STRATIGRAPHY LEGEND



LEGEND

- Borehole and Dynamic Cone Penetration Test
- Borehole
- N Blows/0.3 m
- Water Level at Time of Investigation
- Auger Refusal at Elevation

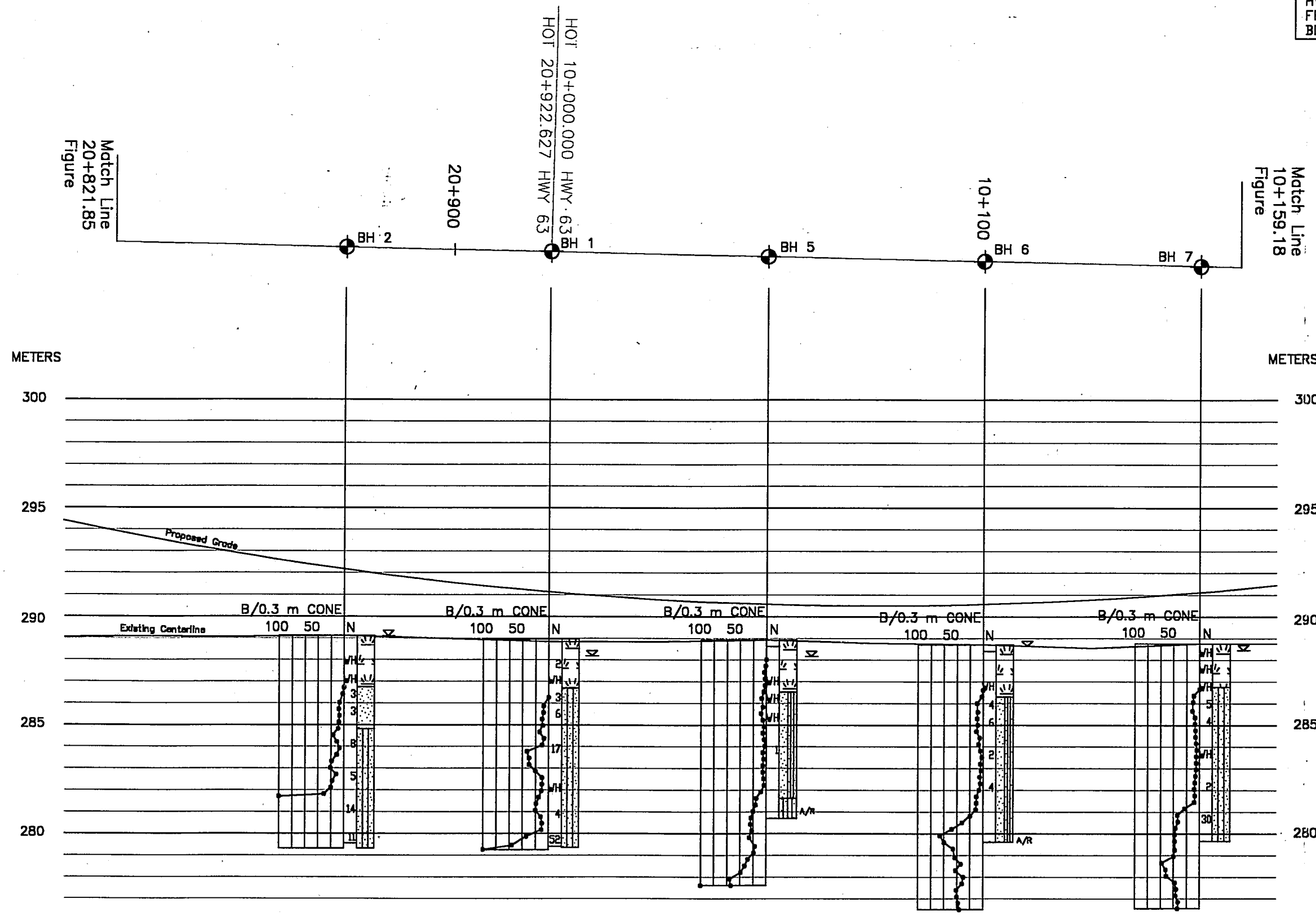
Borehole No.	Co-ordinates		Elevation
	North	East	
BOREHOLE No. 00-02	5185033.781	331819.521	289.117m
BOREHOLE No. 00-01	5185060.985	331858.175	288.957m
BOREHOLE No. 00-05	5185089.781	331899.083	288.922m
BOREHOLE No. 00-08	5185118.538	331739.952	288.707m
BOREHOLE No. 00-07	5185147.315	331780.841	288.757m

NOTE 1:
The boundaries between soil strata have been established at the borehole locations only. The boundaries between boreholes are assumed based on borehole data.



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REFERENCE NO. 00036F DATE: August 28, 2000
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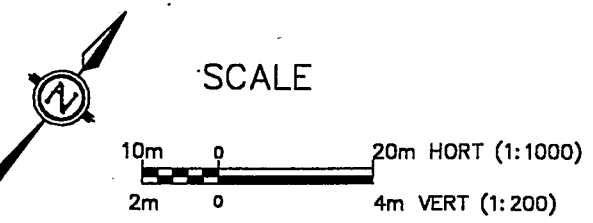
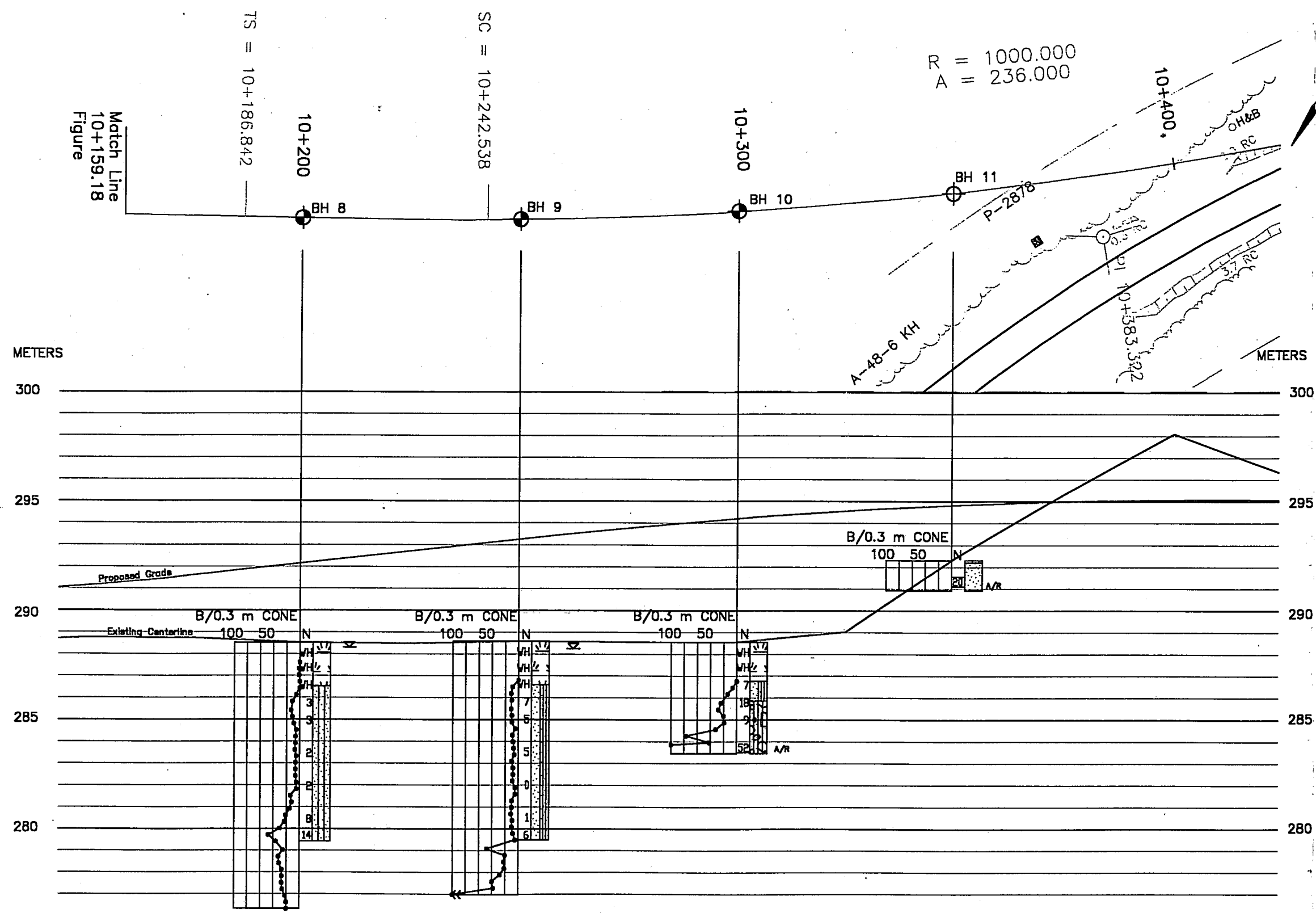
NOTE: FOR DETAILED SUBSOIL AND BOREHOLE INFORMATION REFER TO RECORD OF BOREHOLE.



CONT NO.
W.P. NO. 167 - 90 - 00

HWY 63
FOUNDATION INVESTIGATION - AREA 3
BOREHOLE LOCATIONS AND SOIL STRATA

FIGURE
8



STRATIGRAPHY LEGEND

- | | | |
|--|---------------|---------------------------|
| TOPSOIL | SAND | SILTY SAND/
SANDY SILT |
| PEAT | SAND & GRAVEL | SILT |
| VARVED/
INTERLAYERED
CLAYS & SILTS | CLAY | SILTY CLAY |
| FILL | TILL | CRUSHED
GRAVEL |
| ASPHALT COATED | | |

LEGEND

- Borehole and Dynamic Cone Penetration Test
- Borehole
- N Blows/0.3 m
- Water Level at Time of Investigation
- Auger Refusal at Elevation

Borehole No.	Co-ordinates		Elevation
	North	East	
BOREHOLE No. 00-08	5185178.097	331821.728	288.517m
BOREHOLE No. 00-09	5185205.479	331862.180	288.587m
BOREHOLE No. 00-10	5185238.884	331801.255	288.582m
BOREHOLE No. 00-11	5185258.764	331838.724	282.424m

NOTE 1:
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PROJECT: HWY. 63, Foundation Investigation
REFERENCE NO: 00036F DATE: August 28, 2000
DRAWN BY: M.R. CHECKED BY: MAM

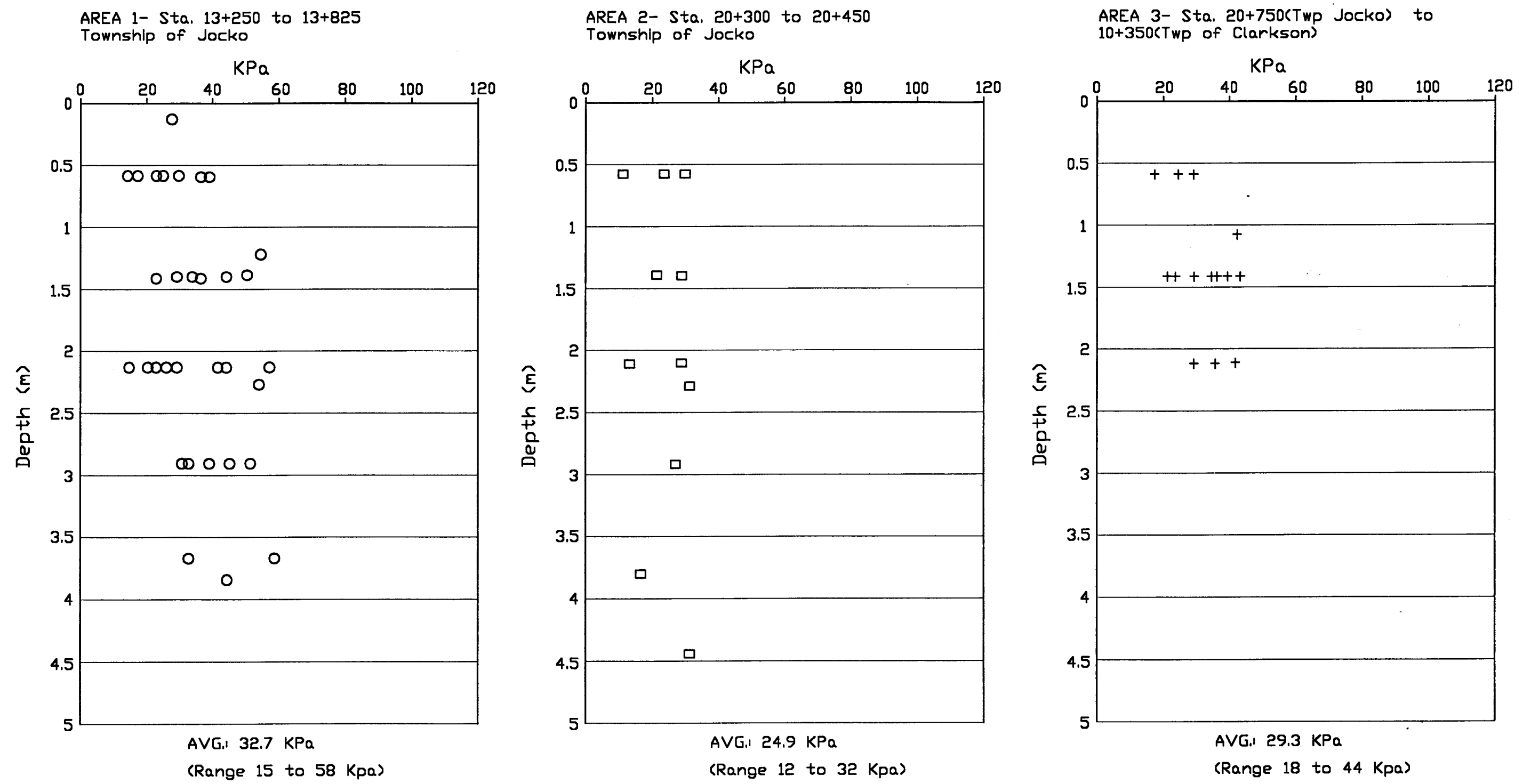
NOTE: FOR DETAILED SUBSOIL AND BOREHOLE INFORMATION REFER TO RECORD OF BOREHOLE.

FIGURE 9

Undrained Shear Strength – Peat (No Surcharge)

PEAT UNDRAINED SHEAR STRENGTH
AREAS 1, 2, and 3 (NO SURCHARGE)
HWY 63 - W.P. 167-90-00

FIGURE 9



NOTE: No Surcharge refers to areas outside the existing area affected by the overlying roadway.

FIGURE 10

Undrained Shear Strength – Peat (With Surcharge)

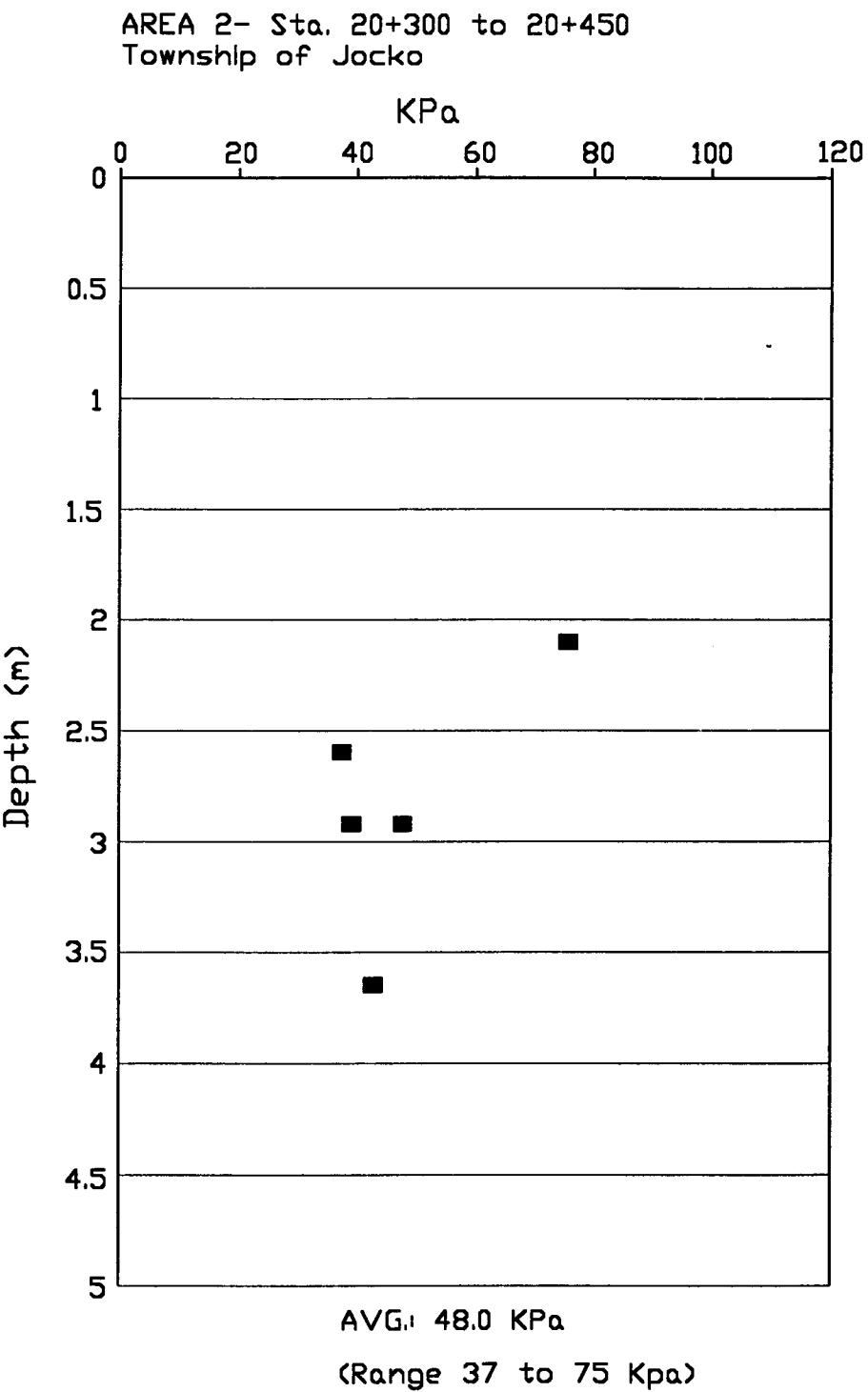
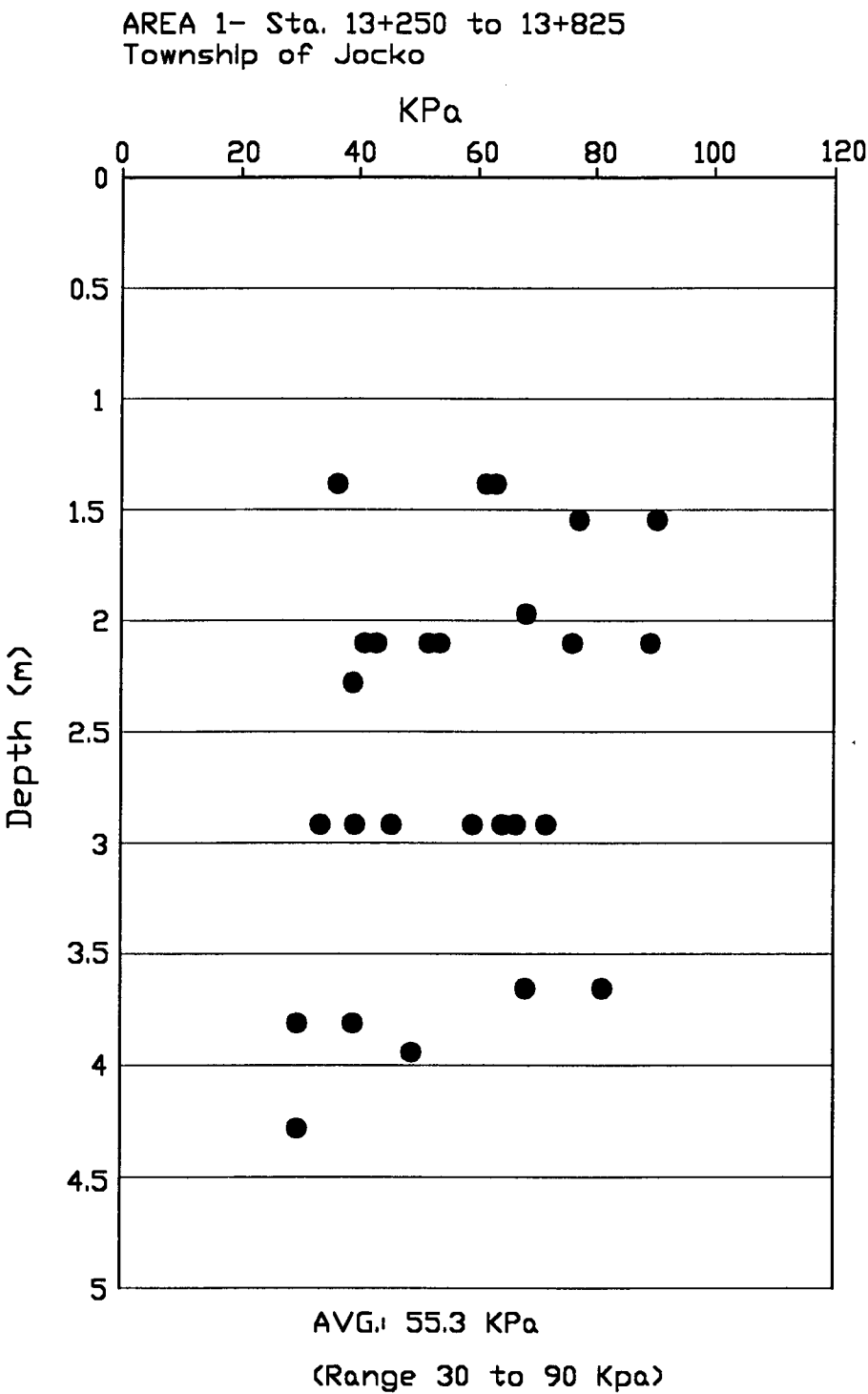
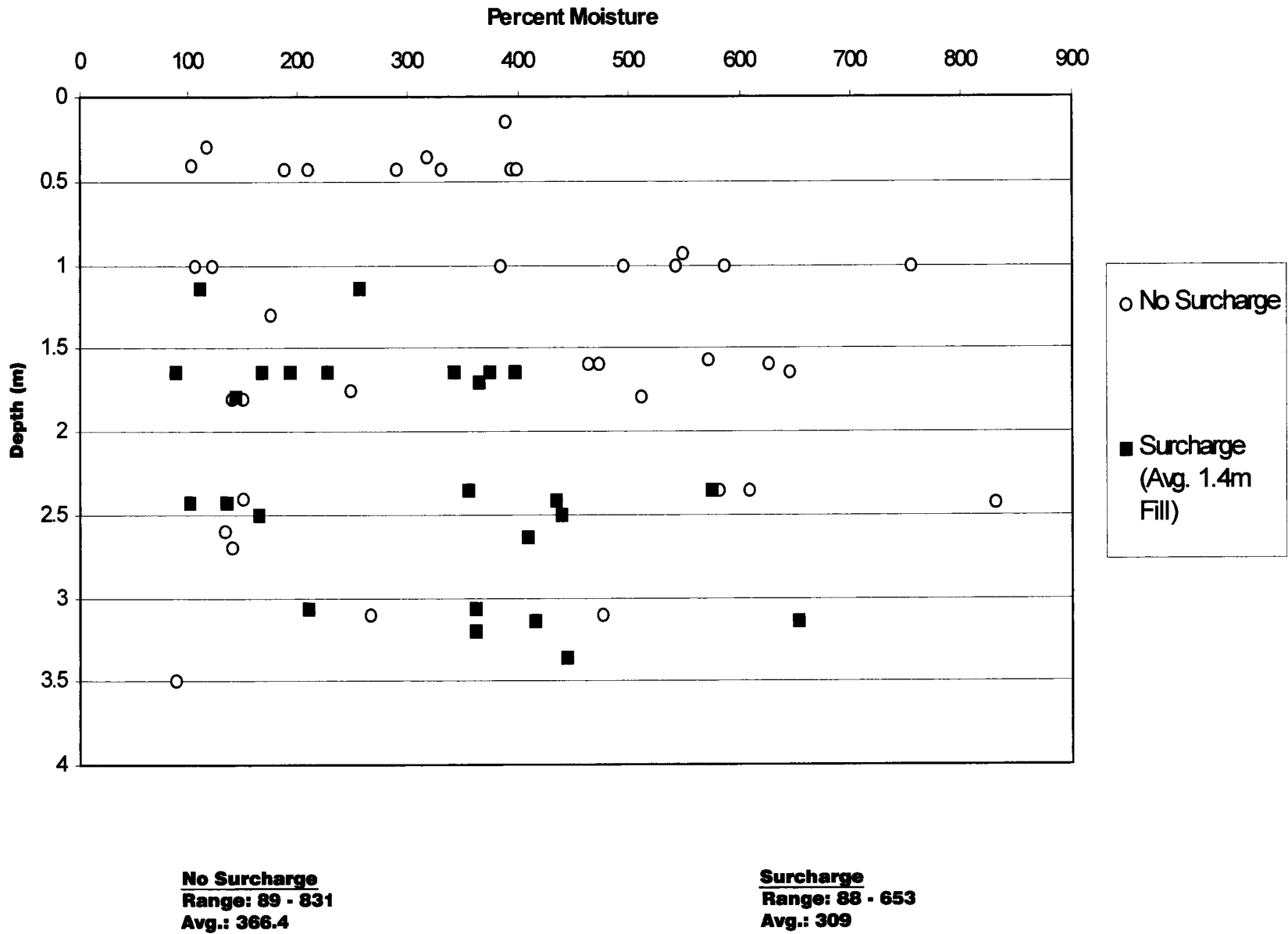


FIGURE 11 TO 13

Natural Moisture Content – Peat (Areas 1, 2 and 3)

Natural Moisture Content of Peat
Area 1 Sta. 13+250 to 13+825
Twp. Jocko

FIGURE 11



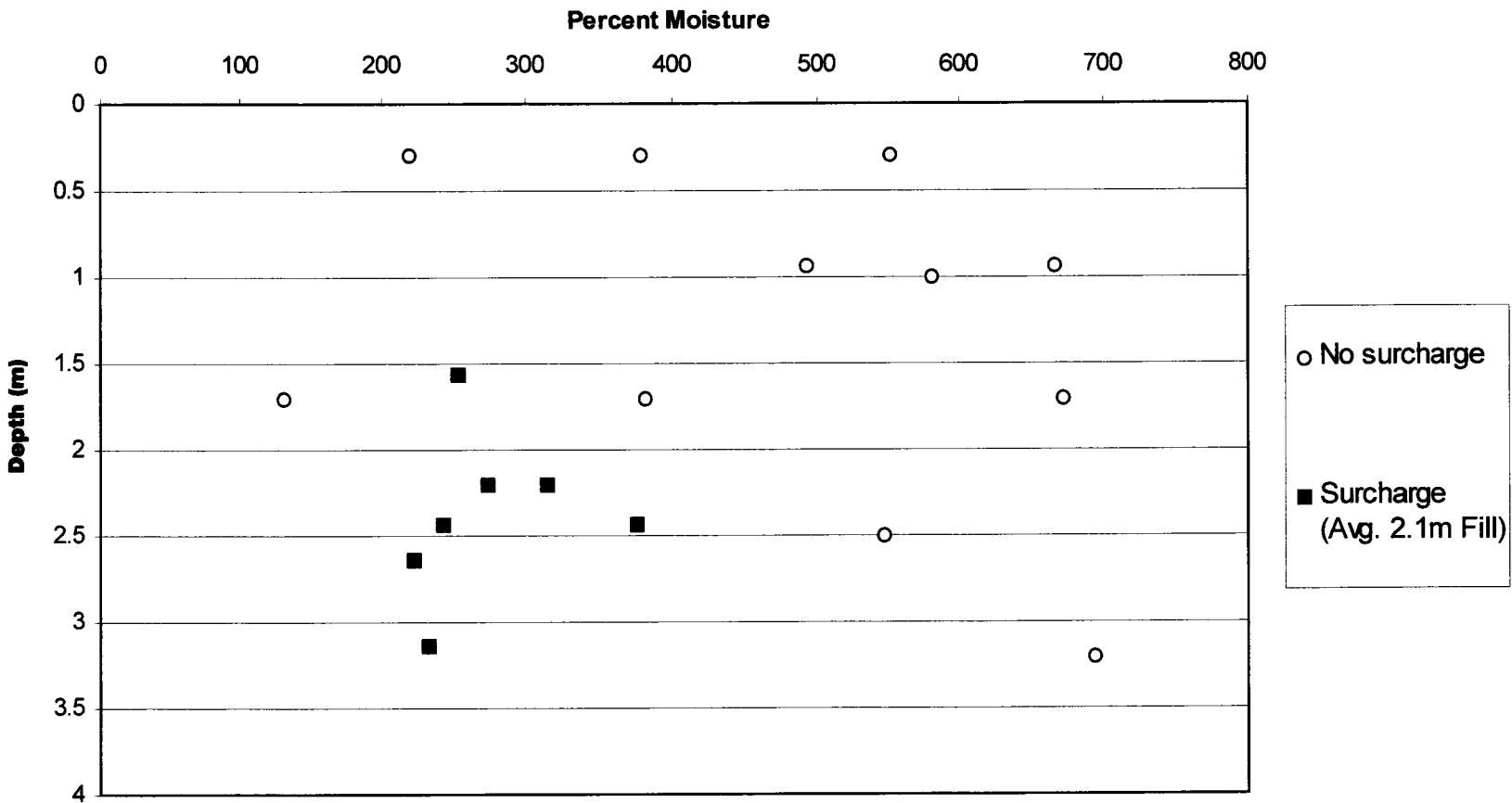
Date: November 13, 2000
Project: 00036

HERLEY ENGINEERING LTD.
Consulting Geotechnical Engineers

Drawn: MR
Chkd: MAM

Natural Moisture Content of Peat
Area 2 Sta. 20+300 to 20+450
Twp. Jocko

FIGURE 12



No Surcharge
Range: 130.8 - 694
Avg.: 483

Surcharge
Range: 221.5-376
Avg.: 272.7

Date: November 13, 2000

Project: 00036



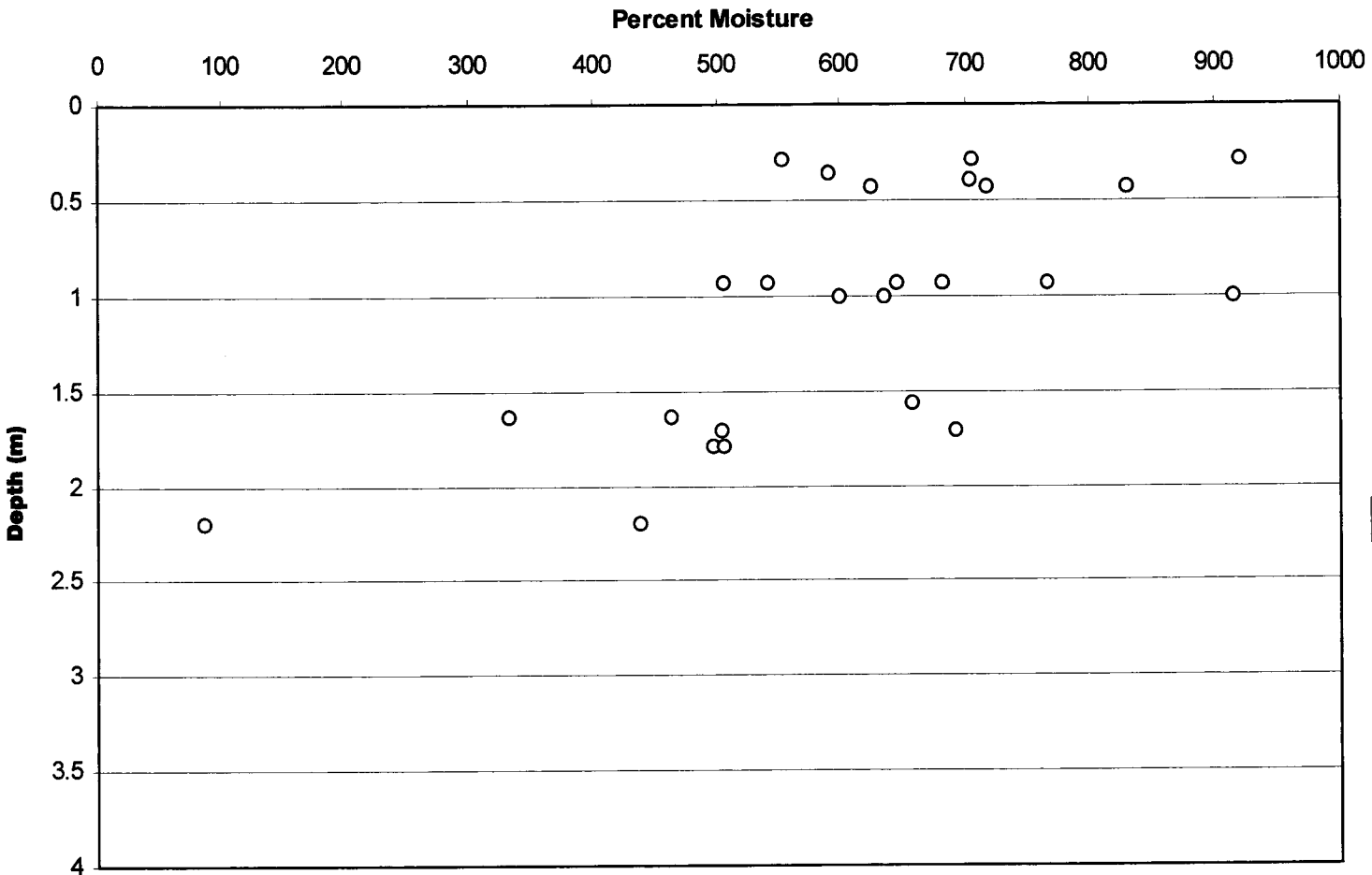
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Consulting Geotechnical Engineers

Drawn: MR.

Chkd: MAM

Natural Moisture Content of Peat
Area 3 Sta. 20+750 (Twp Jocko) to 10+350 (Twp Clarkson)

FIGURE 13



No Surcharge
Range: 86.6 - 920.8
Avg.: 604.2

Date: November 13, 2000

Project: 00036



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Consulting Geotechnical Engineers

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Chkd: MAM

FIGURE 14

Cross-Sectional Schematic – Station 13+700 (Typ.)

FIGURE 14

The diagram is a geotechnical cross-section on a grid. The vertical axis on the left is labeled with elevations 295, 300, and 305. The horizontal axis at the top lists various soil types and their corresponding values:

Soil Type	Value 1	Value 2	Value 3
BD	13.3	2.82	
BD	12.6	2.96	
BD	12.4	2.86	
	10.2	3.70	
ES	9.3	4.00	
	9.2	4.01	
EP	6.8	4.22	
	6.5	4.23	
CR	3.3	4.33	
CL	0	4.28	
EP	0	304.28	
	0.2	4.27	
	0.4	4.26	
ES	2.2	4.11	
	2.8	4.01	
BD	4.7	3.65	
	5	3.51	
BD	5.7	3.25	
	5.8	3.25	
BD	6.4	3.32	
	7.1	3.52	
	7.3	3.61	
	7.8	3.67	
	9.5	3.74	
	17.7	3.89	
	25.4	4.24	
	26.9	4.24	
	27.3	4.60	
	27.4	4.61	
	27.6	4.80	

Key features and labels in the diagram include:

- Existing Granular Platform:** Indicated by a horizontal line at the top left.
- Excavation as per OPSD 203.020:** A large area of excavation shown with diagonal hatching.
- Peat:** A layer of soil shown with a wavy pattern.
- Silty Sand:** A layer of soil shown with a stippled pattern.
- Groundwater Levels:** Indicated by horizontal lines with labels such as 13+700, 13+700 RT, 13+700, 13+700 RT, and 13+700.
- Typical Zone of Influence:** A horizontal line with arrows indicating the extent of influence.
- Other Labels:** 13+700 8.2m LT, 13+700 18.7m RT, 13+700 20.7m RT, 13+700 22.7m RT, 13+700 24.7m RT, 13+700 26.7m RT, 13+700 28.7m RT, 13+700 30.7m RT, 13+700 32.7m RT, 13+700 34.7m RT, 13+700 36.7m RT, 13+700 38.7m RT, 13+700 40.7m RT, 13+700 42.7m RT, 13+700 44.7m RT, 13+700 46.7m RT, 13+700 48.7m RT, 13+700 50.7m RT, 13+700 52.7m RT, 13+700 54.7m RT, 13+700 56.7m RT, 13+700 58.7m RT, 13+700 60.7m RT, 13+700 62.7m RT, 13+700 64.7m RT, 13+700 66.7m RT, 13+700 68.7m RT, 13+700 70.7m RT, 13+700 72.7m RT, 13+700 74.7m RT, 13+700 76.7m RT, 13+700 78.7m RT, 13+700 80.7m RT, 13+700 82.7m RT, 13+700 84.7m RT, 13+700 86.7m RT, 13+700 88.7m RT, 13+700 90.7m RT, 13+700 92.7m RT, 13+700 94.7m RT, 13+700 96.7m RT, 13+700 98.7m RT, 13+700 100.7m RT.

ॐ

Drawn: ..MR.....

Chkd:MAM.....

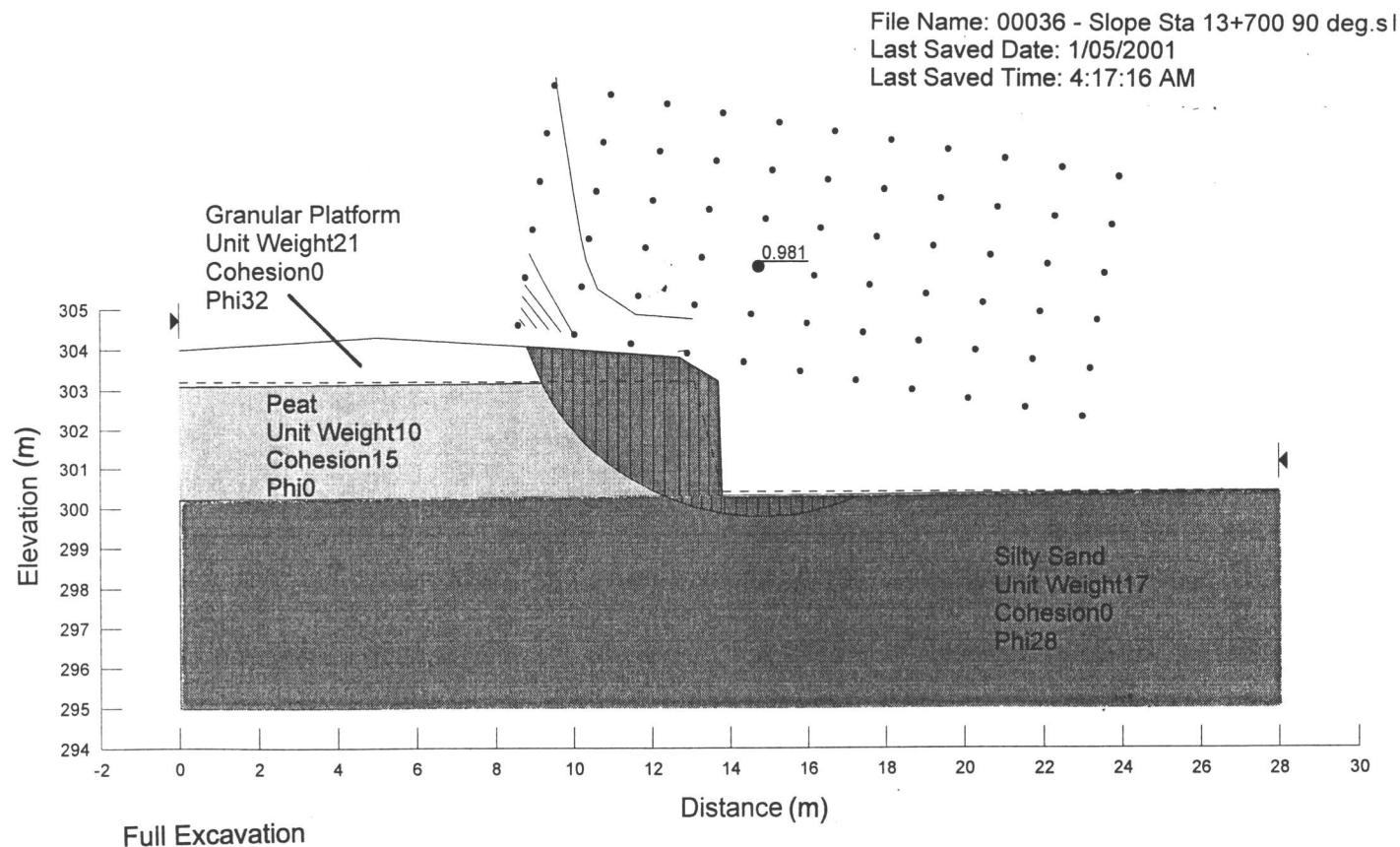
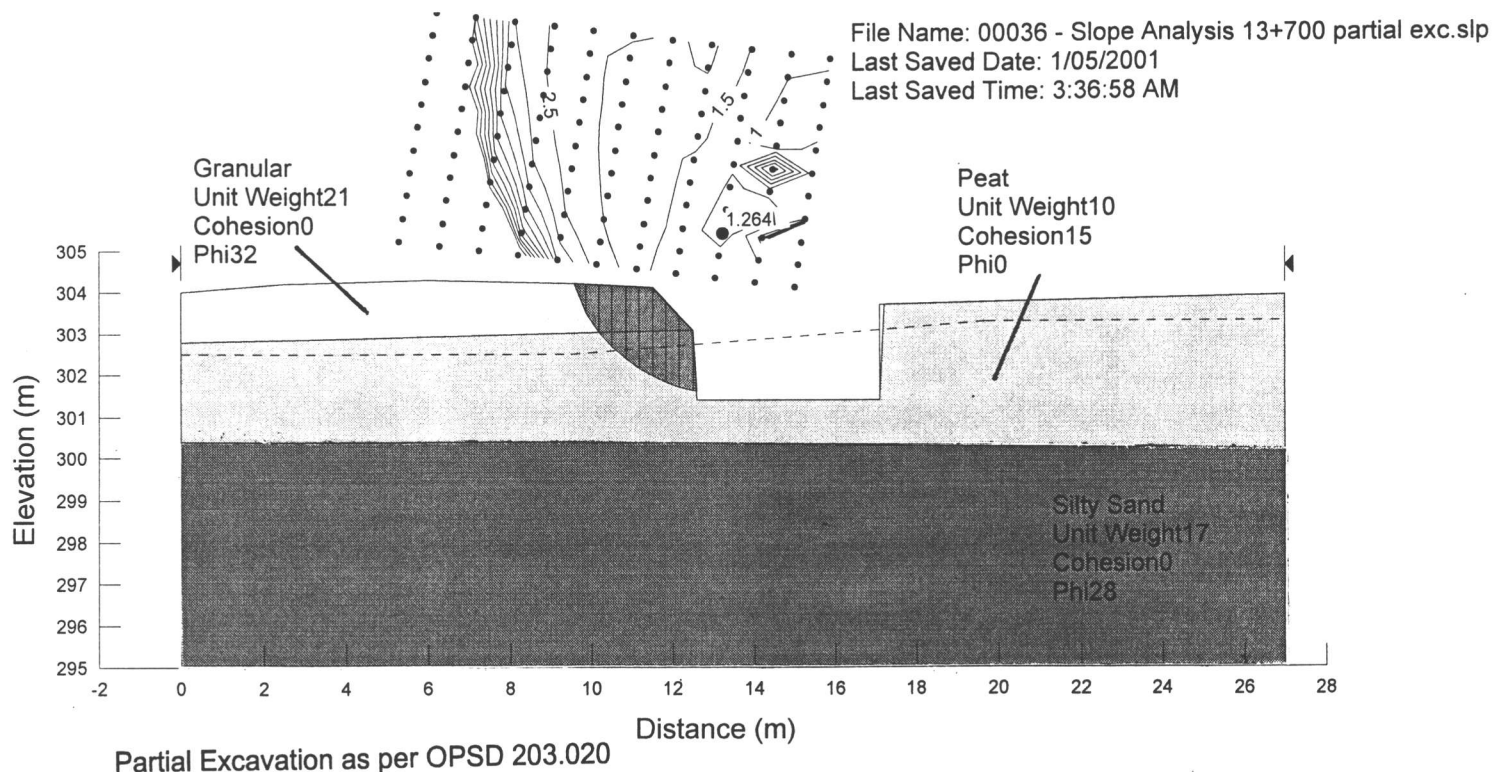
FIGURE 15

Slope Stability Cross-Section (Area 1)

Slope Stability Analysis - Area 1

Station 13+700 Hwy 63

FIGURE 15



Date: January 4, 2001

Project: 00036



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Consulting Geotechnical Engineers

Drawn: MR

Chkd: MAM

APPENDIX A

Geotechnical Data and Pedo – Area 1
Geotechnical Data and Pedo – Area 2
Pedological Sketches – Area 3

GEOTECHNICAL SURVEY DATA

W.P. 167 - 90 - 00

JOCKO TWP

METRIC

AREA 1

13+250 13.3 m Lt C/L D-1.4 0 - 2.0 Fib Muck Amor wet @ 300 2.0 - 3.2 Si F Sa Tr Gr	13+300 7.7 m Rt C/L D-1.5 0 - 2.0 Muck Amor 2.0 NFP Bld/BR	13+475 8.3 m Lt C/L D-0 0 - 280 Cr Gr 280 - 300 PST 300 - 800 Med F Sa Tr Gr Tr Si OCC Bld 800 - 1.5 F Sa W Si (wet @ 1.2) 1.5 - 4.8 Muck Amor 4.8 - 5.2 Si F Sa Tr Cl	13+625 13.3 m Lt C/L D-1.0 0 - 2.5 Fib Muck Amor wet @ 300 2.5 - 3.2 Si Sa Tr Gr	13+797 6.9 m Lt C/L D-0 0 - 300 Cr Gr 300 - 550 Med F Sa Tr Si Tr Gr 550 - 700 F Sa Some Si 700 - 1.5 Si F Sa wet @ 1.0 1.5 - 2.3 Muck Amor 2.3 NFP Bld
13+250 8.3 m Lt C/L D-0 0 - 300 Cr Gr 300 - 750 Med F Sa Tr Gr Tr Si OCC Cob 750 - 1.5 F Sa W Si 1.5 - 3.5 Muck Amor 3.5 - 3.7 Si F Sa Tr Gr	13+325 13.3 m Lt C/L D-1.7 0 - 500 Fib Muck Amor wet @ 200 500 NFP Bld	13+500 13.3 m Lt C/L D-1.1 0 - 2.1 Fib Muck Amor 2.1 - 3.2 Si Some F Sa	13+650 13.3 m Lt C/L D-1.3 0 - 1.3 Fib Muck Amor wet @ Surf 1.3 - 2.0 Si F Sa Tr Gr	13+800 1.6 m Rt C/L D-0 0 - 290 Cr Gr 290 - 550 Med F Sa Tr Gr Tr Si Tr Cob 550 - 1.2 F Sa W Si Tr Gr 1.2 NFP Bld
13+250 1.7 m Rt C/L D-0 0 - 140 Cr Gr 140 - 240 Asp 240 - 620 Med F Sa Tr Gr Tr Si 620 - 1.4 F Sa W Si 1.4 - 1.7 Muck Amor 1.7 - 2.0 F Sa W Si	13+325 1.7 m Rt C/L D-0 0 - 240 Asp 240 - 350 AC Gran 350 - 700 Med F Sa Tr Gr Tr Si 700 - 1.5 Si F Sa 1.5 - 2.7 Muck Amor 2.7 - 3.0 Med F Sa Some Si 3.0 NFP Bld/BR	13+500 8.3 m Lt C/L D-0 0 - 280 Cr Gr 280 - 300 PST 300 - 750 Med F Sa Tr Gr Tr Si OCC Bld 750 - 1.4 F Sa W Si 1.4 - 4.8 Muck Amor 4.8 - 5.0 Si F Sa Tr Gr	13+650 8.1 m Lt C/L D-0 0 - 260 Cr Gr 260 - 290 PST 290 - 750 Med F Sa Some Gr Tr Si 750 - 1.4 F Sa W Si wet @ 1.3 1.4 - 4.2 Muck Amor 4.2 - 4.5 Si F Sa	13+800 6.7 m Rt C/L D-1.7 0 - 300 Wat 300 - 1.6 Si F Sa Tr Gr 1.6 NFP Bld/BR
13+400 7.7 m Rt C/L D-1.2 0 - 3.8 Muck Amor 3.8 - 4.6 Sa Si	13+325 7.7 m Rt C/L D-1.4 0 - 1.7 Muck Amor 1.7 - 2.0 Si Sa 2.0 NFP Bld/BR	13+500 5.5 m Lt C/L D-0 0 - 80 Asp 80 - 150 Cr Gr 150 - 180 Asp 180 - 320 Cr Gr 320 - 700 Med F Sa Tr Gr Tr Si 700 - 1.5 F Sa Some Si 1.5 - 4.3 Muck Amor 4.3 - 5.0 Si F Sa	13+650 1.7 m Rt C/L D-0 0 - 240 Cr Gr 240 - 600 Med F Sa Tr Gr Tr Si Tr Cob 600 - 1.3 F Sa W Si Tr Gr 1.3 - 3.7 Muck Amor 3.7 - 4.0 Si F Sa	13+802.812 8.1 m Lt C/L D-0 0 - 280 Cr Gr 280 - 500 Med F Sa Tr Gr Tr Si 500 - 1.4 Si F Sa 1.4 - 2.2 Muck Amor 2.2 - 3.0 Si Some F Sa
13+425 7.7 m Rt C/L D-1.0 0 - 3.7 Muck Amor 3.7 - 4.5 Si F Sa	13+350 13.3 m Lt C/L D-1.7 0 - 1.0 Fib Muck Amor wet @ 300 1.0 - 1.5 Si F Sa Tr Gr	13+500 1.7 m Rt C/L D-0 0 - 220 Cr Gr 220 - 320 Asp 320 - 750 Med F Sa Tr Gr Tr Si 750 - 1.4 F Sa W Si 1.4 - 4.2 Muck Amor 4.2 - 5.0 Si F Sa	13+650 7.7 m Rt C/L D-1.1 0 - 1.7 Muck Amor 1.7 - 2.5 Si F Sa	13+803 15.3 m Lt C/L D-1.7 0 - 1.3 Muck Amor 1.3 - 2.0 Si Some F Sa
13+450 13.3 m Lt C/L D-1.2 0 - 2.2 Fib Muck Amor 2.2 - 3.2 Si Some F Sa	13+350 8.1 m Lt C/L D-0 0 - 300 Cr Gr 300 - 900 Med F Sa Tr Gr Tr Si OCC Cob 900 - 1.7 F Sa W Si 1.7 - 3.0 Muck Amor 3.0 - 4.0 Si Sa Tr Cl	13+500 7.7 m Rt C/L D-900 0 - 3.5 Muck Amor wet @ surf 3.5 - 4.5 Si F Sa	13+700 13.3 m Lt C/L D-900 0 - 2.8 Muck Amor 2.8 NFP Bld	13+803 9.7 m Rt C/L D-1.0 0 - 2.0 Med F Sa Some Si Tr Gr wet
13+450 8.1 m Lt C/L D-0 0 - 280 Cr Gr 280 - 330 PST 330 - 800 Med F Sa Tr Gr Tr Si OCC Bld 800 - 1.5 F Sa W Si wet @ 1.2 1.5 - 4.8 Muck Amor 4.8 - 5.2 Si F Sa Tr Cl	13+350 1.7 m Rt C/L D-0 0 - 370 Cr Gr 370 - 680 Med F Sa Tr Gr Tr Si 680 - 700 PST 700 - 1.8 F Sa W Si 1.8 - 4.5 Muck Amor 4.5 - 4.6 Cr Si 4.6 - 4.7 Med F Sa Some Si 4.7 NFP Bld/BR	13+525 13.3 m Lt C/L D-1.1 0 - 2.0 Fib Muck Amor Fr Wat @ 200 2.0 - 2.5 Si F Sa Tr Gr Tr Cob 2.5 NFP Bld	13+700 8.2 m Lt C/L D-0 0 - 260 Cr Gr 260 - 290 PST 290 - 800 Med F Sa Tr Gr Tr Si 800 - 1.2 F Sa W Si 1.2 - 3.8 Muck Amor 3.8 - 4.7 Si Some F Sa	13+808 6.9 m Lt C/L D-0 0 - 220 Cr Gr 220 - 650 Med F Sa Tr Si Tr Gr 650 - 750 F Sa Some Si 750 - 1.5 Si F Sa 1.5 - 2.2 Muck Amor 2.2 - 2.5 Si Some F Sa
13+250 7.7 m Rt C/L D-1.3 0 - 100 Si Org 100 - 1.8 Si F Sa wet @ 200	13+350 7.7 m Rt C/L D-1.6 0 - 300 Wat 300 - 3.0 Muck Amor 3.0 - 3.1 Med F Sa Some Si 3.1 NFP Bld/BR	13+550 13.3 m Lt C/L D-1.3 0 - 2.0 Fib Muck Amor 36ELS115 w @ 200 = 670.9 2.0 - 3.0 Si F Sa Tr Gr	13+700 1.7 m Rt C/L D-0 0 - 300 Cr Gr 300 - 750 Med F Sa Tr Gr Tr Si Tr Cob 750 - 1.3 F Sa W Si Tr Gr 1.3 - 3.7 Muck Amor 3.7 - 4.6 Si F Sa	13+813 8.1 m Lt C/L D-0 0 - 280 Cr Gr 280 - 750 Med F Sa Tr Gr Tr Si OCC Cob 750 - 1.8 F Sa W Si 1.8 - 2.2 Muck Amor 2.2 - 2.7 Si F Sa
13+275 13.3 m Lt C/L D-1.5 0 - 1.0 Fib Muck Amor Fr Wat @ Surf 1.0 - 1.4 Muck Amor RF 1.4 - 1.7 Si F Sa Tr Gr	13+375 13.3 m Lt C/L D-1.7 0 - 1.6 Fib Muck Amor 1.6 - 3.2 Si F Sa Tr Gr	13+550 9.8 m Lt C/L D-400 0 - 280 Cr Gr 280 - 600 Med F Sa Tr Gr Tr Si OCC Cob 600 - 1.0 F Sa W Si 1.0 - 3.4 Muck Amor 3.4 - 4.0 Si F Sa Tr Gr	13+700 7.7 m Rt C/L D-800 0 - 3.4 Muck Amor 3.4 - 4.5 Si F Sa	13+823 8.2 m Lt C/L D-0 0 - 240 Cr Gr 240 - 270 PST 270 - 900 Med F Sa Tr Gr Tr Si OCC Cob 900 - 1.7 F Sa W Si 1.7 - 2.0 Si Org 2.0 - 2.3 F Sa W Si
13+275 8.3 m Lt C/L D-0 0 - 150 Cr Gr 150 - 200 Asp 200 - 750 Med F Sa Tr Gr Tr Si OCC Cob 750 - 1.4 F Sa W Si 1.4 - 3.8 Muck Amor 3.8 - 4.0 Si F Sa Tr Gr	13+375 1.7 m Rt C/L D-0 0 - 270 Cr Gr 270 - 1.7 Med F Sa Tr Gr Tr Si wet @ 1.2 1.7 - 5.5 Muck Amor 5.5 - 5.7 Sa Si	13+550 8.3 m Lt C/L D-0 0 - 280 Cr Gr 280 - 300 PST 300 - 750 Med F Sa Tr Gr Tr Si OCC Cob 750 - 1.4 F Sa W Si 1.4 - 3.7 Muck Amor 3.7 - 5.0 Si F Sa	13+725 7.7 m Rt C/L D-800 0 - 200 Wat 200 - 3.4 Muck Amor 3.4 - 4.2 Si F Sa	13+850 19.3 m Lt C/L D-2.6 0 - 200 Si Org 200 - 2.6 F Sa W Si wet @ 500
13+275 1.7 m Rt C/L D-0 0 - 260 Asp 260 - 340 AC Gran 340 - 600 Med F Sa Tr Gr Tr Si 600 - 1.5 Si F Sa wet @ 1.5 1.5 - 2.7 Muck Amor 2.7 - 2.8 Med F Sa Some Si 2.8 NFP Bld/BR	13+375 7.7 m Rt C/L D-1.4 0 - 3.8 Muck Amor 3.8 - 4.6 Sa Si	13+550 1.7 m Rt C/L D-0 0 - 220 Cr Gr 220 - 270 Asp 270 - 750 Med F Sa Tr Gr Tr Si 750 - 1.4 F Sa W Si Tr Gr 1.4 - 4.2 Muck Amor 4.2 - 4.5 Si F Sa	13+750 13.3 m Lt C/L D-700 0 - 2.5 Muck Amor 2.5 - 3.2 Si F Sa	13+850 8 m Lt C/L D-0 0 - 240 Cr Gr 240 - 270 PST 270 - 600 Med F Sa Tr Gr Tr Si 600 - 2.9 Si Some F Sa wet @ 1.0 2.9 NFP Bld
13+275 7.7 m Rt C/L D-1.1 0 - 1.4 Fib Muck Amor, wet 1.4 NFP Bld/BR	13+400 13.3 m Lt C/L D-1.6 0 - 2.0 Fib Muck Amor wet @ 200 2.0 NFP Bld	13+550 7.7 m Rt C/L D-800 0 - 3.8 Muck Amor 3.8 - 4.7 Si Sa	13+750 8.3 m Lt C/L D-0 0 - 260 Cr Gr 260 - 290 PST 290 - 650 Med F Sa Tr Gr Tr Si 650 - 1.3 F Sa W Si 1.3 - 3.3 Muck Amor 3.3 - 4.7 Si Some F Sa	13+850 1.6 m Rt C/L D-0 0 - 280 Cr Gr 280 - 500 Med F Sa Tr Gr Tr Si Tr Cob wet @ 500 500 - 1.5 F Sa W Si Tr Gr 1.5 NFP Bld
13+300 13.3 m Lt C/L D-1.6 0 - 1.0 Fib Muck Amor wet @ 500 1.0 - 1.5 Muck Amor RF 1.5 - 3.3 Si F Sa Tr Gr	13+400 1.7 m Rt C/L D-0 0 - 380 Cr Gr 380 - 480 Asp 480 - 800 Med F Sa Tr Si Tr Gr 800 - 850 AC Gran 850 - 1.6 F Sa W Si 1.6 - 3.0 Muck Amor 3.0 - 4.2 Fib Muck Amor 4.2 - 5.0 Si F Sa Tr Cl	13+600 13.3 m Lt C/L D-1.2 0 - 2.8 Fib Muck Amor wet @ 300 2.8 - 3.2 Si F Sa Tr Gr	13+750 1.5 m Rt C/L D-0 0 - 290 Cr Gr 290 - 700 Med F Sa Tr Gr Tr Si Tr Cob 700 - 1.3 F Sa W Si Tr Gr 1.3 - 3.5 Muck Amor 3.5 - 3.9 Si F Sa	13+850 3.3 m Rt C/L D-300 0 - 200 Cr Gr 200 - 500 Med F Sa Tr Gr Tr Si Tr Cob 500 - 1.2 F Sa W Si Tr Gr 1.2 NFP Bld
13+300 6.9 m Lt C/L D-0 0 - 200 Cr Gr 200 - 660 Med F Sa Tr Gr Tr Si OCC Cob 660 - 1.4 F Sa W Si 1.4 - 3.1 Muck Amor 3.1 NFP Bld/BR	13+450 1.7 m Rt C/L D-0 0 - 300 Cr Gr 300 - 350 Asp 350 - 800 Med F Sa Tr Gr Tr Si OCC Cob 800 - 1.5 Si F Sa wet @ 1.5 1.5 - 2.7 Muck Amor 2.7 - 2.8 Med F Sa Some Si 2.8 NFP Bld/BR	13+600 8.1 m Lt C/L D-0 0 - 260 Cr Gr 260 - 290 PST 290 - 760 Med F Sa Tr Gr Tr Si 760 - 1.5 F Sa W Si wet @ 1.4 1.5 - 4.0 Muck Amor 4.0 - 5.0 Si F Sa	13+775 7.7 m Rt C/L D-800 0 - 1.8 Muck Amor 1.8 NFP Bld/BR	13+850 5.7 m Rt C/L D+500 0 - 50 Si Org 50 - 2.0 Med F Sa Some Si
13+300 1.7 m Rt C/L D-0 0 - 260 Asp 260 - 340 AC Gran 340 - 600 Med F Sa Tr Gr Tr Si 600 - 1.5 Si F Sa wet @ 1.5 1.5 - 2.7 Muck Amor 2.7 - 2.8 Med F Sa Some Si 2.8 NFP Bld/BR	13+450 7.7 m Rt C/L D-1.2 0 - 3.7 Muck Amor 3.7 - 4.5 Si F Sa	13+600 1.7 m Rt C/L D-0 0 - 290 Cr Gr 290 - 350 Asp 350 - 900 Med F Sa Tr Gr Tr Si W Cob 900 - 1.4 F Sa W Si Tr Gr 1.4 - 4.2 Muck Amor 4.2 - 4.7 Si F Sa	13+792 8.3 m Lt C/L D-0 0 - 260 Cr Gr 260 - 550 Med F Sa Tr Gr Tr Si 550 - 1.5 Si F Sa 1.5 - 2.2 Muck Amor 2.2 - 2.6 Si Some F Sa	13+880 7.7 m Rt C/L D+700 0 - 50 Si Org 50 - 2.2 Med F Sa Tr Si Tr Gr 2.2 NFP Bld/BR
		13+600 7.7 m Rt C/L D-1.0 0 - 3.2 Muck Amor 3.2 - 4.7 Si F Sa		13+899 5.7 m Rt C/L D+1.0 0 - 50 Si Org Bld @ Surf 50 - 1.2 Med F Sa Tr Si Tr Gr 1.2 NFP Bld/BR
				13+900 19.3 m Lt C/L D-3.5 0 - 100 Si Org 100 - 500 Sa Si, wet 500 NFP Bld

Date: November 17, 2000

Drawn: MR

Project: 00036



MERLEX ENGINEERING LTD.
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Chkd: MAM

GEOTECHNICAL SURVEY DATA

W.P. 167 - 90 - 00

JOCKO TWP

METRIC

AREA 2

20+319.6 12.3 m Lt C/L D-600 0 - 3.7 Muck Amor, wet 3.7 - 4.5 F Sa W Si 20+319.6 6.1 m Lt C/L D-0 0 - 250 Cr Gr 250 - 800 Med F Sa Some Si Tr Gr 800 - 1.8 F Sa Some Si 1.8 - 4.3 Muck Amor 4.3 - 4.8 F Sa W Si 20+319.6 1.3 m Rt C/L D-0 0 - 370 Cr Gr 370 - 800 Med F Sa Tr Gr Tr Si 800 - 1.1 F Sa Some Si 1.1 - 1.5 F Sa Some Si Some Gr wet @ 1.4 1.5 - 1.8 RF 20+319.6 11.3 m Rt C/L D-850 0 - 50 Si Org 50 - 5.4 Muck Amor 5.4 - 6.0 Med F Sa Some Si 20+326.6 8.8 m Lt C/L D-0 0 - 140 Cr Gr 140 - 200 AC Gran 200 - 570 Cr Gr 570 - 980 Med F Sa Tr Gr Tr Si 980 - 1.02 PST 1.02 - 2.0 Si F Sa Tr Gr Fr Wat @ 1.02 20+331.6 1.0 m Rt C/L D-0 0 - 280 Cr Gr 280 - 750 Med F Sa Tr Gr Tr Si 750 - 800 Si Org 800 - 1.5 F Sa Some Si Some Gr 20+336.6 1.2 m Rt C/L D-0 0 - 270 Cr Gr 270 - 1.3 Med F Sa Tr Gr Tr Si Fr Wat @ 860 1.3 - 1.5 F Sa Some Si Some Gr 36ELS142 Accep GRANULAR B TYPE I 1.5 NFP RF 20+341.6 12.3 m Lt C/L D-700 0 - 1.9 Muck Amor, wet 1.9 - 2.3 Med F Sa Some Si 20+341.6 10.3 m Rt C/L D-1.5 0 - 300 Wat 300 - 4.3 Muck Amor 4.3 - 4.6 Med F Sa Some Si 20+342.1 1.1 m Rt C/L D-0 0 - 240 Cr Gr 240 - 1.5 Med F Sa Tr Gr Tr Si 1.5 - 1.8 Med F Sa Some Si wet @ 1.5 1.8 - 3.0 Muck Amor 3.0 - 3.5 F Sa Some Si	20+344.6 1.3 m Rt C/L D-0 0 - 270 Cr Gr 270 - 1.0 Med F Sa Tr Gr Tr Si 1.0 - 1.3 F Sa Some Gr Some Si 1.3 - 1.8 RF 1.8 - 3.0 Muck Amor 3.0 - 3.5 F Sa Some Si 20+346.6 1.1 m Rt C/L D-0 0 - 270 Cr Gr 270 - 1.0 Med F Sa Tr Gr Tr Si 1.0 - 1.3 Med F Sa Some Si Some Gr wet @ 1.2 1.3 NFP RF 20+351.6 1.2 m Rt C/L D-0 0 - 280 Cr Gr 280 - 1.0 Med F Sa Tr Gr Tr Si 1.0 - 1.3 Med F Sa Some Si Some Gr wet @ 1.2 1.3 NFP RF 20+356.6 1.2 m Rt C/L D-0 0 - 280 Cr Gr 280 - 1.0 Med F Sa Tr Gr Tr Si 1.0 - 1.4 Med F Sa Some Si Some Gr wet @ 1.2 1.4 NFP RF 20+369.6 12.3 m Lt C/L D-700 0 - 200 Wat 200 - 1.0 Med F Sa Some Si Tr Gr OCC Cob 1.0 NFP Bld 20+369.6 1.7 m Rt C/L D-0 0 - 300 Cr Gr 300 - 1.3 Med F Sa Tr Gr Tr Si 1.3 - 2.8 Muck Amor 2.8 - 4.2 Med F Sa Some Si 20+369.6 11.3 m Rt C/L D-1.2 0 - 100 Si Org 100 - 2.9 Muck Amor 2.9 - 3.2 Med F Sa Some Si 20+374.6 5.6 m Lt C/L D-0 0 - 120 Asph 120 - 240 Cr Gr 240 - 900 Med F Sa Tr Si Tr Gr Fr Wat @ 800 900 - 1.0 F Sa Some Si 1.0 NFP RF 20+394.6 12.3 m Lt C/L D-600 0 - 300 Wat 300 - 900 Muck Amor 900 - 1.7 Med F Sa Some Si 20+394.6 5.7 m Lt C/L D-0 0 - 120 Asph 120 - 240 Cr Gr 240 - 600 Med F Sa Tr Si Tr Gr 600 - 670 PST 670 - 1.0 F Sa Some Si 1.0 NFP RF	20+394.6 1.3 m Rt C/L D-0 0 - 390 Cr Gr 390 - 850 Med F Sa Tr Gr Tr Si 850 - 1.3 F Sa Some Si 1.3 NFP RF 20+394.6 11.3 m Rt C/L D-1.3 0 - 100 Si Org 100 - 1.7 Muck Amor 1.7 - 3.0 F Sa W Si 20+414.6 12.3 m Lt C/L D+2.1 0 NFP BR 20+414.6 5.7 m Lt C/L D-0 0 - 120 Asph 120 - 240 Cr Gr 240 - 850 Med F Sa Tr Si Tr Gr 650 - 720 PST 720 - 1.0 F Sa Some Si 1.0 NFP Sh Rk/BR 20+414.6 1.2 m Rt C/L D-0 0 - 340 Cr Gr 340 - 730 Med F Sa Tr Gr Tr Si 730 - 760 PST 760 - 1.3 F Sa Some Si 1.3 NFP RF 20+419.6 11.3 m Rt C/L D-400 0 - 100 Si Org 100 NFP Bld/RF 20+434.6 12.3 m Lt C/L D-900 0 - 300 Si Org Fr Wat @ Surf 300 NFP Bld/BR 20+434.6 6.2 m Lt C/L D-0 0 - 240 Cr Gr 240 - 730 Med F Sa Tr Si Tr Gr 730 - 800 PST 800 - 1.0 F Sa Some Si 1.0 NFP Sh Rk/BR 20+434.6 1.5 m Rt C/L D-0 0 - 160 Asph 160 - 460 Cr Gr 460 - 830 Med F Sa Tr Gr Tr Si 830 - 880 PST 880 - 1.3 F Sa Some Si 1.3 NFP Sh Rk/BR 20+442.6 5.6 m Lt C/L D-0 0 - 120 Asph 120 - 240 Cr Gr 240 - 830 Med F Sa Tr Si Tr Gr 830 - 900 PST 900 - 1.2 F Sa Some Si 1.2 NFP RF	20+444.6 1.2 m Rt C/L D-0 0 - 360 Cr Gr 360 - 650 Med F Sa Tr Gr Tr Si 650 - 700 PST 700 - 1.2 F Sa Some Si 1.2 NFP RF 20+444.6 11.3 m Rt C/L D-1.5 0 - 2.0 Muck Amor. 2.0 - 2.8 F Sa W Si 2.8 NFP Bld 20+447.6 5.6 m Lt C/L D-0 0 - 120 Asph 120 - 240 Cr Gr 240 - 830 Med F Sa Tr Si Tr Gr 830 - 900 PST 900 - 1.1 F Sa Some Si 1.1 NFP RF 20+450 C/L 0 - 350 Cr Gr 350 - 700 Med F Sa Tr Gr Tr Si 700 - 1.4 F Sa Some Si 1.4 - 2.0 Sh Rk/Sa & Pest 2.0 - 2.8 Muck Amor 2.6 - 3.1 Si Some F Sa 3.1 - 3.6 F Sa W Si Cob @ 3.2 3.6 NFP Bld/BR
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Date: November 17, 2000

Drawn: MR

Project: 00036



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Chkd: MAM

13+500

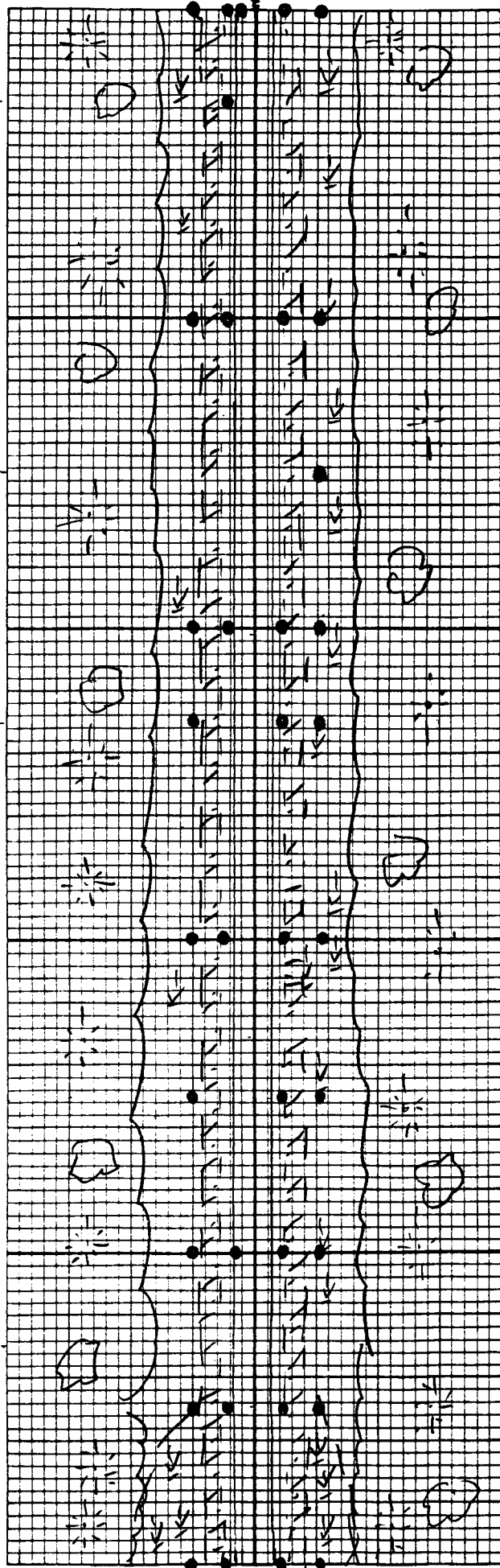
13+450

13+400

13+350

13+300

13+250



131750

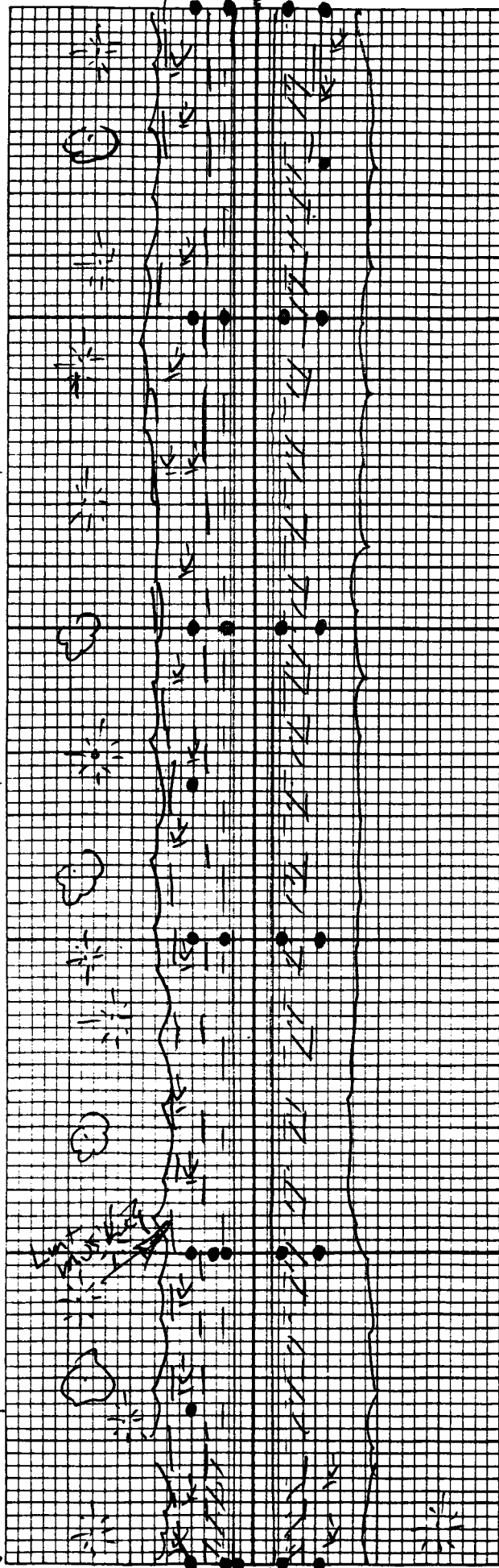
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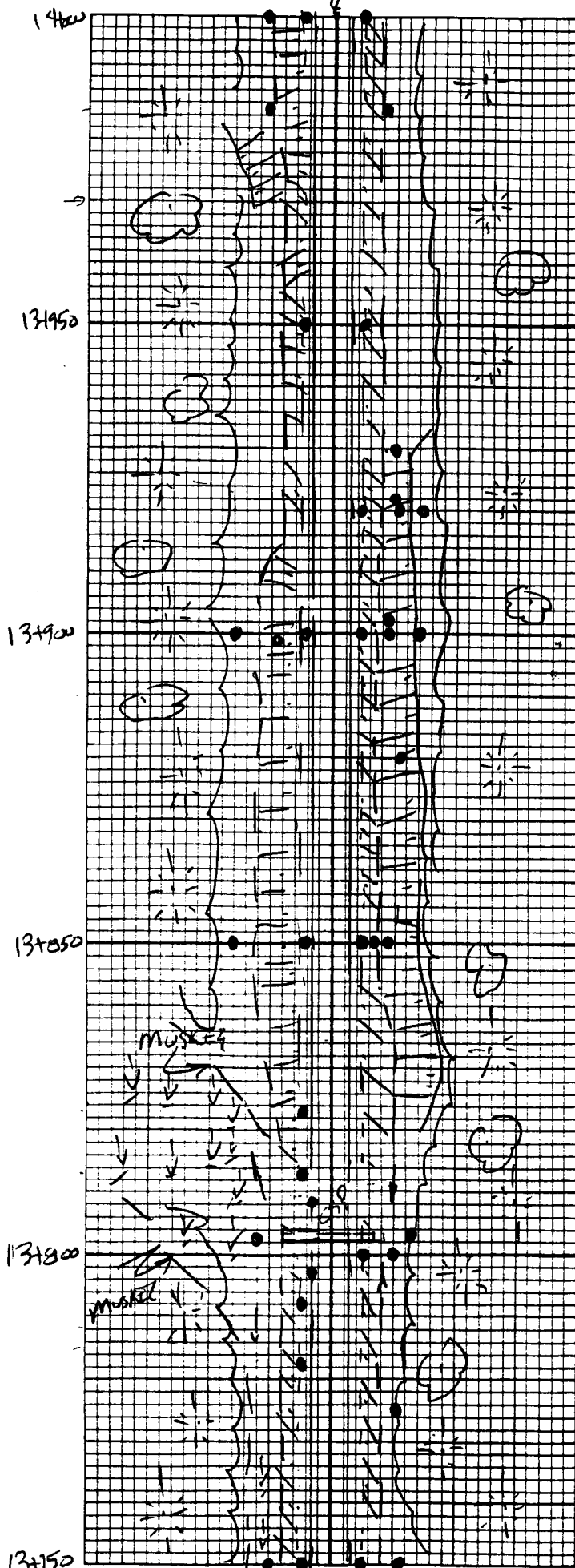
131650

131600

131550

131500





↑
BOULDERS IN CUT (RIGHT)
↓

20+500

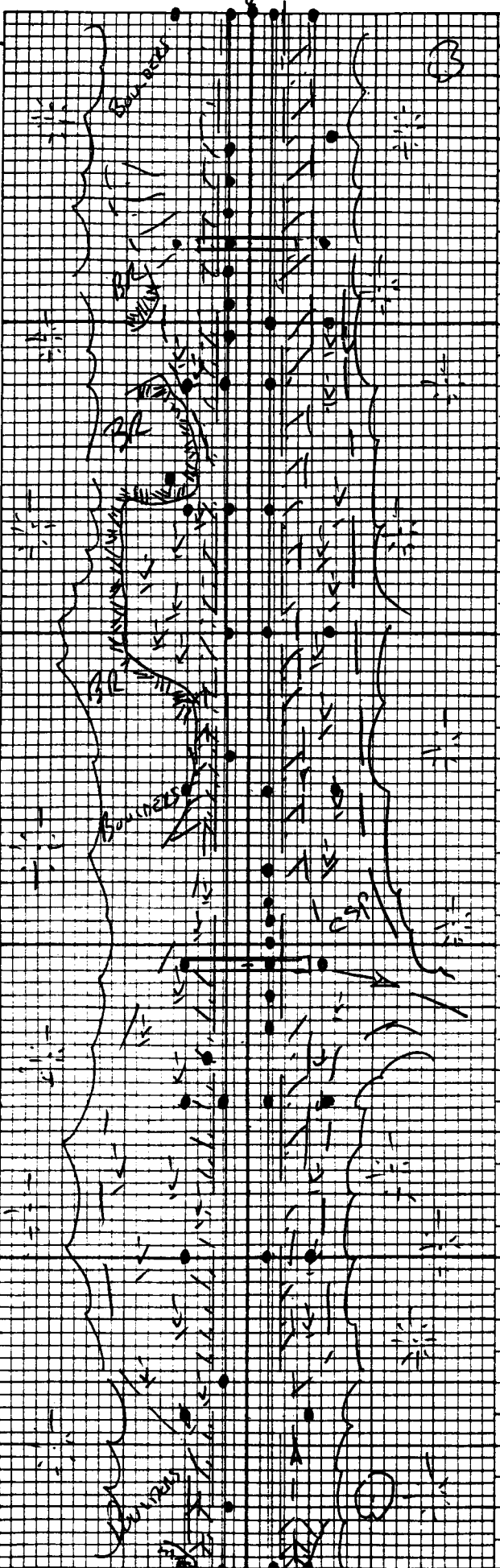
20+450

20+400

20+350

20+300

20+250



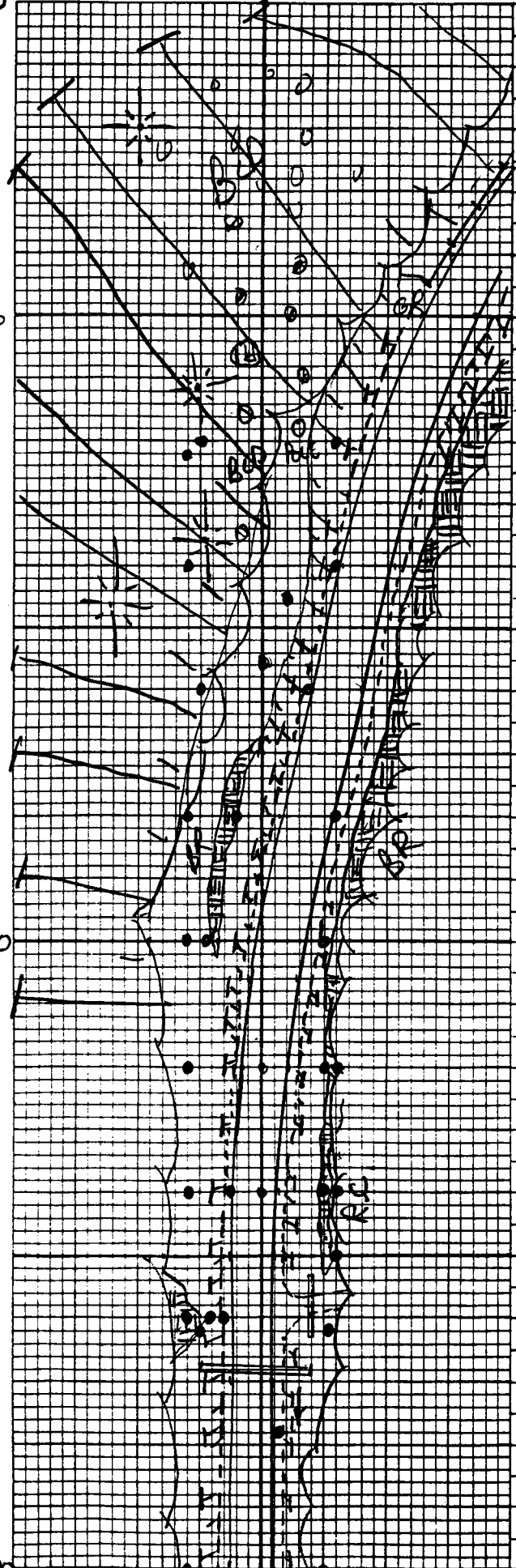
(20+347 CSP)

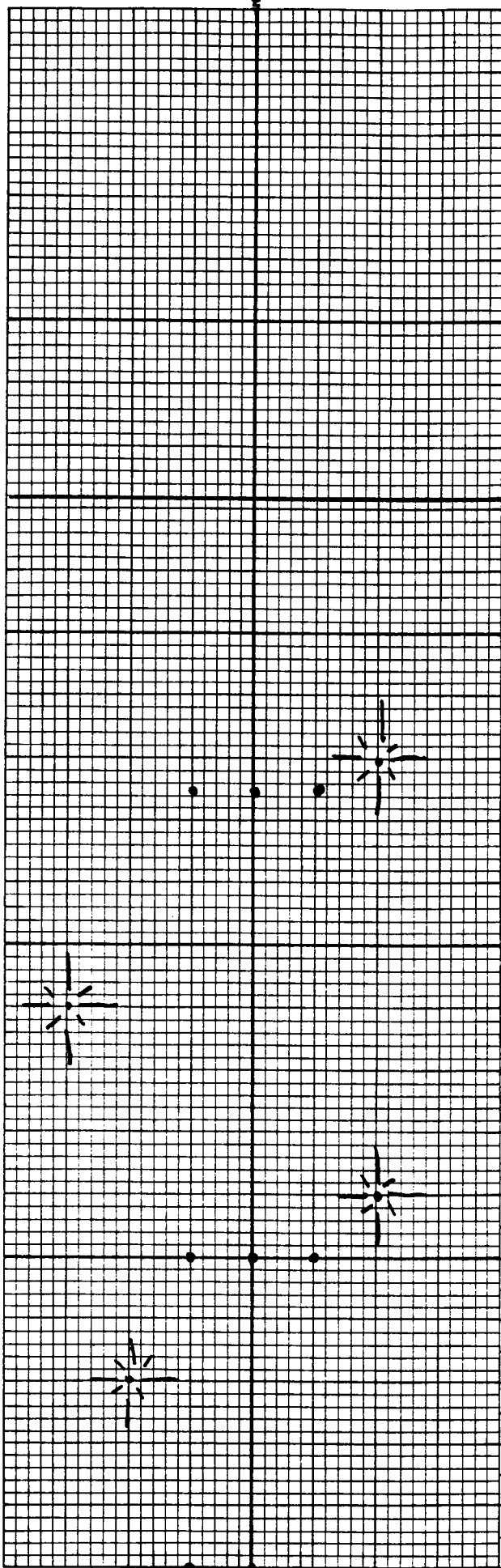
20+750

20+700

20+600

20+500





20+922.627

20+900

20+800

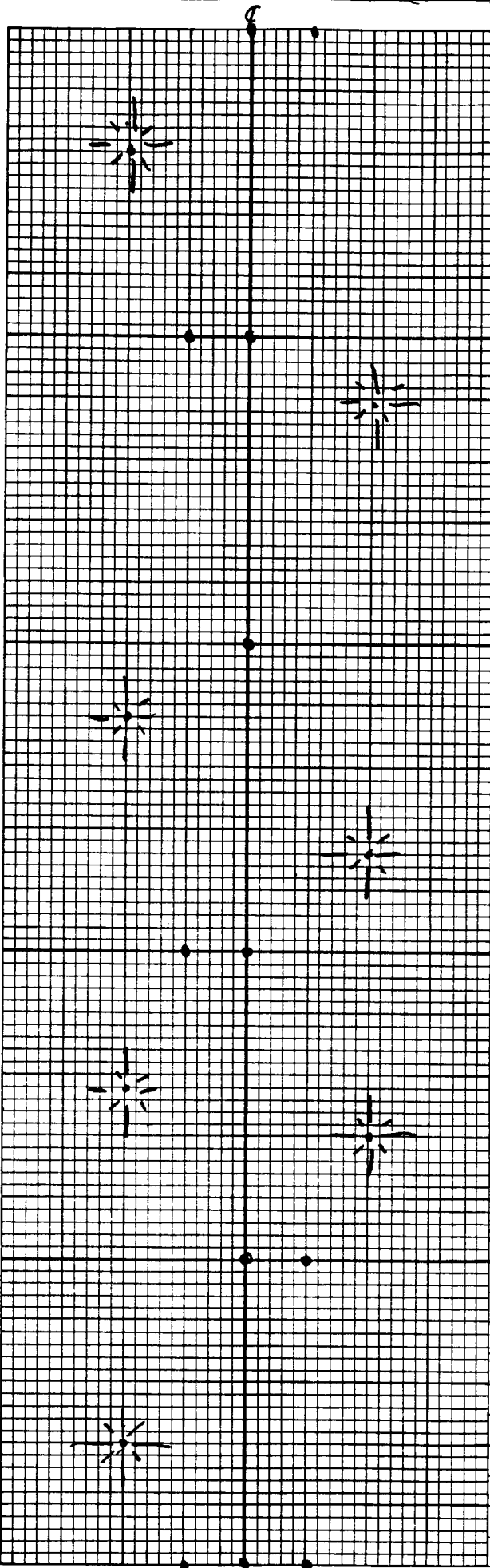
20+750

10+250

10+200

10+100

10+000



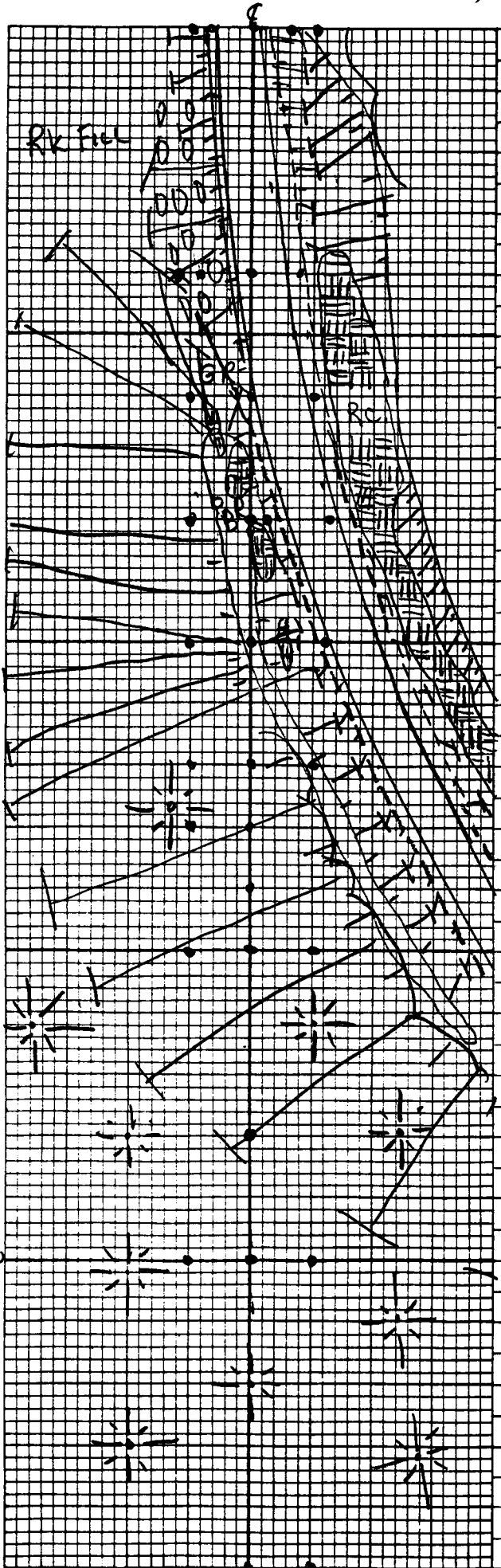
10+500

10+450

10+400

10+300

10+250



APPENDIX B

Geotechnical Survey Data – Possible Detour Areas

HWY 63
FROM 1.0 KM N OF JCT. OF HWY 533
N'LY TO QUEBEC BORDER
WP 167-90-00

13+300 25.7 m Rt C/L D-1.3

0 - 1.5 F Fib Peat
1.5 - 1.8 Med F Sa Some Si Tr
Gr

JOCKO TOWNSHIP

13+250 15.7 m Rt C/L D-1.4

0 - 250 Si Org
250 - 1.0 Si F Sa
1.0 NFP Bld

13+325 20.7 m Rt C/L D-1.3

0 - 1.5 F Fib Peat Moist
1.5 - 1.7 Si Some F Sa Wet

13+250 20.7 m Rt C/L D-1.4

0 - 200 Si Org
200 - 1.0 Si F Sa
1.0 NFP Bld

13+350 15.7 m Rt C/L D-1.4

0 - 2.3 F Fib Peat
2.3 - 2.4 Gry Si Some F Sa Wet

13+250 25.7 m Rt C/L D-1.4

0 - 200 Si Org
200 - 1.0 Si F Sa
1.0 NFP Bld

13+350 20.7 m Rt C/L D-1.2

0 - 1.5 F Fib Peat
1.5 - 1.6 Gry Si Some F Sa Wet

13+275 20.7 m Rt C/L D-1.6

0 - 50 Si Org
50 - 1.7 F Fib Peat
1.7 - 2.0 Gry Si Some F Sa Wet
2.0 NFB Bld

13+350 25.7 m Rt C/L D-1.1

0 - 1.4 F Fib Peat
1.4 - 1.6 Gry Si Some F Sa Wet

13+300 15.7 m Rt C/L D-1.3

0 - 50 Si Org
50 - 2.5 F Fib Peat
2.5 NFP Bld

13+375 20.7 m Rt C/L D-1.2

0 - 2.4 F Fib Peat
2.4 - 2.8 Gry Si Some F Sa Wet

13+300 20.7 m Rt C/L D-1.3

0 - 2.5 F Fib Peat
2.5 - 2.8 Si Some F Sa wet
2.8 NFP Bld

13+400 15.7 m Rt C/L D-1.3

0 - 3.9 F Fib Peat OCC Wd
3.9 - 4.0 Si Some F Sa Wet

13+400 20.7 m Rt C/L D-1.3

0 - 4.5 F Fib Peat
4.5 NFP Bld

13+400 25.7 m Rt C/L D-1.3

0 - 3.4 F Fib Peat OCC Wd
3.4 - 3.5 Gry Si Some F Sa Wet

13+400	30.7 m Rt C/L D-1.3	13+525	20.7 m Rt C/L D-1.0
0 - 1.4	F Fib Peat OCC Wd	0 - 3.6	F Fib Peat
1.4 - 1.6	Gry Si Some F Sa Wet	3.6 - 3.8	Gry Si F Sa Wet
13+425	20.7 m Rt C/L D-1.3	13+550	15.7 m Rt C/L D-1.1
0 - 4.0	F Fib Peat	0 - 3.5	F Fib Peat OCC Wd
4.0 - 4.4	Gry Si Some F Sa Wet	3.5 - 3.6	Gry Si Some F Sa Wet
13+450	15.7 m Rt C/L D-1.0	13+550	20.7 m Rt C/L D-1.1
0 - 4.2	F Fib Peat	0 - 3.0	F Fib Peat OCC Wd
4.2 - 4.4	Med F Sa Some Si Tr Gr Wet	3.0 - 3.1	Gry Si Some F Sa Wet
13+450	20.7 m Rt C/L D-1.0	13+550	25.7 m Rt C/L D-1.1
0 - 3.8	F Fib Peat	0 - 2.4	F Fib Peat OCC Wd
3.8 - 3.9	Gry Si Some F Sa Wet	2.4 - 2.6	Gry Si Some F Sa Wet
13+450	25.7 m Rt C/L D-1.1	13+575	20.7 m Rt C/L D-1.1
0 - 3.3	F Fib Peat	0 - 2.5	F Fib Peat OCC Wd
3.3 - 3.6	Gry Si Some F Sa Wet	2.5	NFP Bld
13+475	20.7 m Rt C/L D-1.1	13+575	22.7 m Rt C/L D-1.1
0 - 3.0	F Fib Peat OCC Wd	0 - 2.5	F Fib Peat OCC Wd
3.0 - 3.1	Gry Si Some F Sa Wet	2.5 - 2.6	Gry Si Some F Sa Wet
13+500	15.7 m Rt C/L D-1.0	13+600	15.7 m Rt C/L D-1.1
0 - 3.3	F Fib Peat	0 - 4.3	F Fib Peat OCC Wd
3.3 - 3.4	Gry Si F Sa Wet	4.3 - 4.4	Gry Si Some F Sa Wet
13+500	20.7 m Rt C/L D-1.0	13+600	20.7 m Rt C/L D-1.1
0 - 3.1	F Fib Peat	0 - 3.3	F Fib Peat OCC Wd
3.1 - 3.3	Gry Si Some F Sa Wet	3.3 - 3.4	Gry Si Some F Sa Wet
13+500	25.7 m Rt C/L D-1.0	13+600	25.7 m Rt C/L D-1.1
0 - 3.8	F Fib Peat	0 - 3.3	F Fib Peat OCC Wd
3.8 - 3.9	Gry Si F Sa Wet	3.3	NFP Bld

13+625	20.7 m Rt C/L	D-800	13+725	18.7 m Rt C/L	D-800
0 - 4.0	F Fib Peat OCC Wd		0 - 2.4	F Fib Peat OCC Wd	
4.2 - 4.2	Gry Si Some F Sa Wet		2.4	NFP Bld	
13+650	15.7 m Rt C/L	D-700	13+725	20.7 m Rt C/L	D-800
0 - 3.6	F Fib Peat		0 - 2.3	F Fib Peat OCC Wd	
3.6 - 3.8	Gry Si Some F Sa wet		2.3	NFP Bld	
13+650	20.7 m Rt C/L	D-700	13+750	15.7 m Rt C/L	D-700
0 - 4.0	F Fib Peat OCC Wd		0 - 1.6	F Fib Peat	
4.0 - 4.2	Gry Si Some F Sa Wet		1.6	NFP Bld	
13+650	25.7 m Rt C/L	D-700	13+750	20.7 m Rt C/L	D-700
0 - 4.3	F Fib Peat OCC Wd		0 - 1.4	F Fib Peat OCC Wd	
4.3 - 4.4	Gry Si Some F Sa Wet		1.4	NFP Bld	
13+675	19.7 m Rt C/L	D-700	13+750	25.7 m Rt C/L	D-400
0 - 3.4	F Fib Peat OCC Wd		0 - 400	Si Org	
3.4 - 3.6	Gry Si F Sa Wet		400	NFP Bld/BR	
13+675	20.7 m Rt C/L	D-700	13+775	15.7 m Rt C/L	D-400
0 - 2.8	F Fib Peat OCC Wd		0 - 400	Si Org	
2.8	NFP Bld		400	NFP Bld	
13+700	15.7 m Rt C/L	D-500	13+775	17.7 m Rt C/L	D-0
0 - 3.4	F Fib Peat		0 - 100	Si Org	
3.4 - 3.5	Gry Si F Sa wet		100 - 800	Med F Sa With Si Tr Gr	
13+700	20.7 m Rt C/L	D-300	800	NFP Bld	
0 - 3.5	F Fib Peat OCC Wd				
3.5 - 3.6	Gry Si F Sa Wet				
13+700	25.7 m Rt C/L	D-100			
0 - 2.4	F Fib Peat OCC Wd				
2.4 - 2.8	Gry Si F Sa Wet				

HWY 63

FROM 1.0 KM N OF JCT. OF HWY 533
N'LY TO QUEBEC BORDER

WP 167-90-00

JOCKO TOWNSHIP

20+244.6 16.8 m Rt C/L D-0

0 - 50 Si Org
50 - 200 Si F Sa
200 NFP Bld

20+244.6 17.8 m Rt C/L D-0

0 - 50 Si Org
50 - 300 Si F Sa
300 NFP Bld

20+244.6 21.8 m Rt C/L D-1.8

0 - 300 Si Org
300 NFP Bld

20+244.6 26.8 m Rt C/L D-1.8

0 - 700 F Fib Peat
700 NFP Bld

20+244.6 27.8 m Rt C/L D-1.8

0 - 800 F Fib Peat
800 NFP Bld

20+269.6 21.8 m Rt C/L D-1.5

0 - 1.6 F Fib Peat
1.6 - 1.8 Gry F Sa Some Si Wet

20+294.6 16.8 m Rt C/L D-1.3

0 - 4.0 F Fib Peat OCC Wd
4.0 - 4.1 Gry Med F Sa Some Si
Some Gr Wet

20+294.6 21.8 m Rt C/L D-1.3

0 - 3.4 F Fib Peat OCC Wd
3.4 - 3.6 Gry Med F Sa Some Si
Some Gr Wet

20+294.6 26.8 m Rt C/L D-1.3

0 - 3.8 F Fib Peat OCC Wd
3.8 - 3.9 Gry Med F Sa Some Si
Some Gr Wet

20+319.6 21.8 m Rt C/L D-1.1

0 - 5.0 F Fib Peat OCC Wd
5.0 - 5.1 Gry Med F Sa Some Si
Some Gr Wet

20+344.6 16.8 m Rt C/L D-1.1

0 - 4.8 F Fib Peat OCC Wd
48 - 4.9 Gry Med F Sa Some Si
Some Gr Wet

20+344.6 21.8 m Rt C/L D-1.1

0 - 5.0 F Fib Peat OCC Wd
5.0 - 5.1 Gry Med F Sa Some Si
Some Gr Wet

20+344.6 26.8 m Rt C/L D-1.1

0 - 5.5 F Fib Peat OCC Wd
5.5 - 5.6 Gry Med F Sa Some Si
Some Gr Wet

20+369.6 21.8 m Rt C/L D-1.3

0 - 4.2 F Fib Peat OCC Wd
4.2 - 4.3 Gry Med F Sa Some Si
Wet

20+394.6	16.8 m Rt C/L D-1.0	20+469.6	23.8 m Rt C/L D-1.0
0 - 2.2	F Fib Peat OCC Wd	0 - 50	Si Org
2.2 - 2.4	Gry Med F Sa W Si	50 - 700	Br Si F Sa Wet
Wet		700	NFP Bld/BR
20+394.6	21.8 m Rt C/L D-1.0		
0 - 3.4	F Fib Peat OCC Wd		
3.4 - 3.6	Gry Med F Sa Some Si		
	Wet		
20+394.6	26.8 m Rt C/L D-1.0		
0 - 3.0	F Fib Peat OCC Wd		
3.0	NFP Bld		
20+419.6	21.8 m Rt C/L D-1.3		
0 - 3.6	F Fib Peat OCC Wd		
Wet			
	@ 200		
3.6 - 3.7	Gry Med F Sa Some Si		
	Some Gr Wet		
20+444.6	16.8 m Rt C/L D-1.8		
0 - 2.0	F Fib Peat OCC Wd		
2.0 - 2.1	Si F Sa Wet		
2.1	NFP Bld		
20+444.6	21.8 m Rt C/L D-1.8		
0 - 2.9	F Fib Peat OCC Wd		
2.9 - 3.0	Si F Sa Wet		
20+444.6	26.8 m Rt C/L D-1.8		
0 - 4.0	F Fib Peat OCC Wd		
4.0 - 4.1	Si F Sa Wet		
20+469.6	21.8 m Rt C/L D-800		
0 - 50	Si Org		
50 - 600	Br Si F Sa Wet		
600	NFP Bld/BR		

APPENDIX C

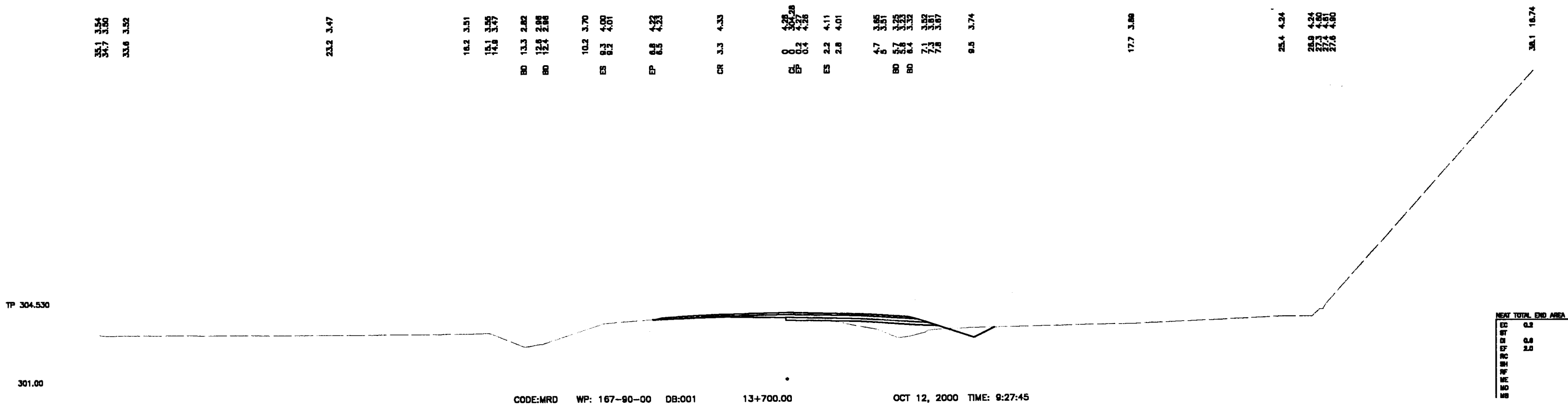
Typical Cross Sections

Figure C-1 Area 1

Figure C-2 Area 2

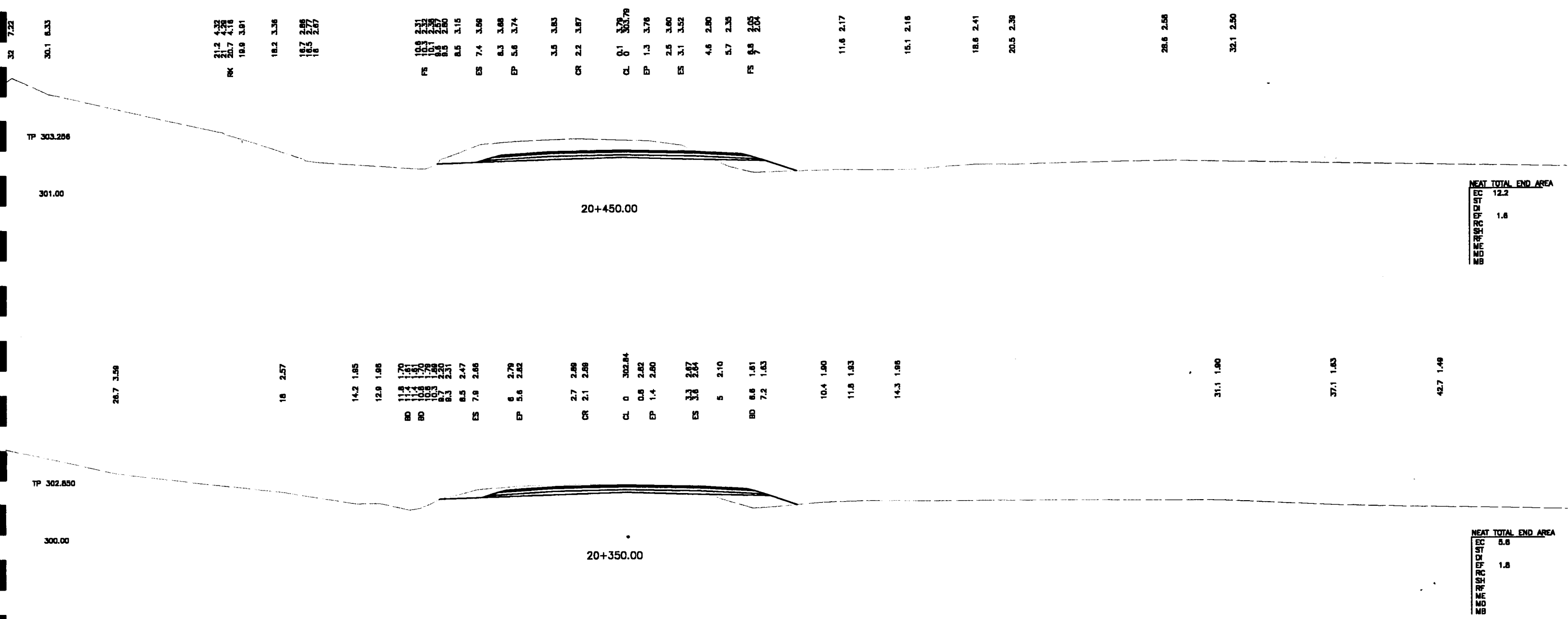
HWY 63 - W.P. 167-90-00
Typical Cross-Section Area 1

FIGURE C-1
Reference No. 00036
Scale 1:200



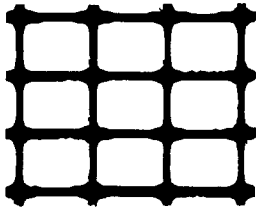
HWY 63 - W.P. 167-90-00
Typical Cross-Section Area 2

FIGURE C-2
Reference No. 00036
Scale 1:200



APPENDIX D

Fill Widening Reinforcement



Tensar Earth Technologies, Inc.

5883 Glenridge Drive
Suite 200
Atlanta, Georgia 30328
Tel: 404-250-1290
Fax: 404-250-9185

DESIGN CALCULATIONS

Prepared for

MERLEX ENGINEERING LTD.

HIGHWAY 63

CANADA

TET # E00501

CONTENTS

Design Assumptions

Page 1 - 2

Stability Analysis

Page 3 - 6

Calculated by:



Jack Fu, PhD

Checked by:



Kevin Lee, PE

January 5, 2001

DESIGN ASSUMPTIONS

Project Name: Hwy 63, Canada
Project Number E00501

Date: 01/05/01
Engineer: XJF

THE FOLLOWING ASSUMPTIONS HAVE BEEN ADOPTED BY TET FOR THE PURPOSE OF DEVELOPING THIS PRELIMINARY DESIGN. ALL ASSUMPTIONS MUST BE VERIFIED IN WRITING PRIOR TO FINAL DESIGN AND CONSTRUCTION.

1. Design Methodology

Tensar Design Guideline.

2. Slope Geometry

Approximately 1.3 m high new fill will be placed on the existing grade with approximately 3(H):1(V) side slope.

3. Soil Properties

Soil	Unit Weight γ , (kN/m ³)	Friction Angle ϕ' , (deg)	Cohesion c , (kPa)
New and Existing Fill	21	32	0
Foundation 1 (Peat)	10	0	15
Foundation 2 (Silty Sand)	17	28	0

4. Loading

Traffic loading = 12 kPa

5. Minimum Factors of Safety

Factor of safety for Global stability = 1.5

6. Geogrid Reinforcement

Geogrid Type	Ultimate Tensile Strength, (kN/m)	Creep Limit Strength, (kN/m)	RF_{1D}	RF_D	Design Strength, (kN/m)	Percent Coverage, R_c (%)
BX1100	19	2.55	1.0	1.15	2.22	100

Soil-geogrid interaction coefficient

Static
= 0.6

7. Groundwater

Water table is assumed to be at El. 303.

8. Geogrid Placement

Place the geogrid on the existing grade in the direction parallel to the center line of road way, from the merge of existing grade and new fill to toe of proposed new fill slope.

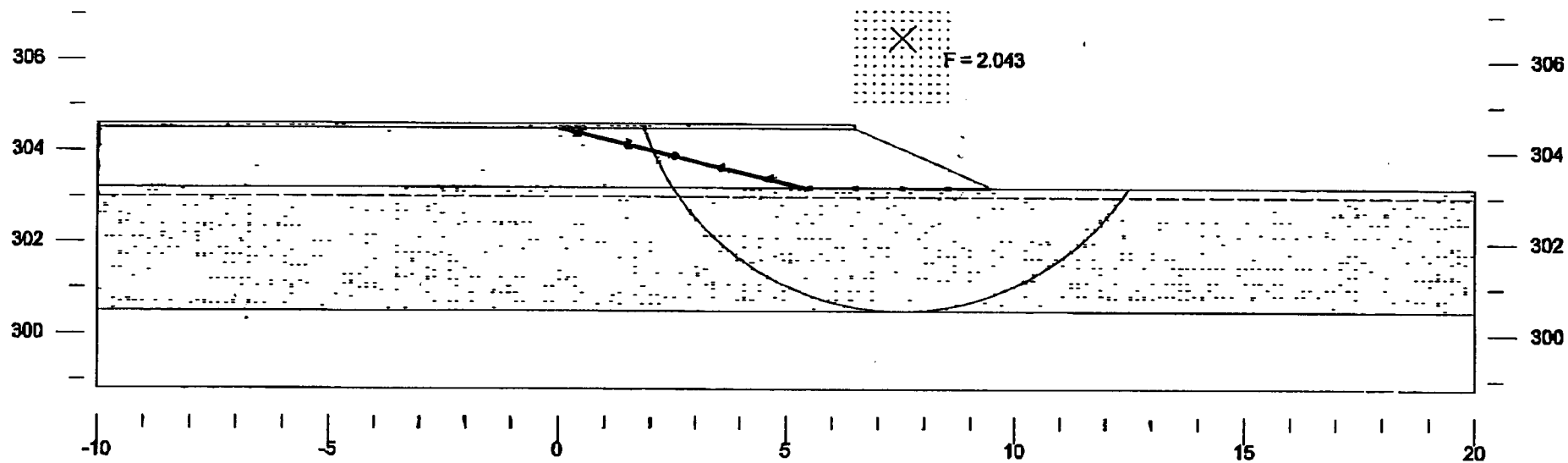
9. Notes

- A. Seismicity, flood conditions and rapid drawdown were not considered in this design.
- B. The design presented herein is based on the information provided by Merlex Engineering LTD. Tensar Earth Technologies, Inc. accepts no liability for the information or verification of information.
- C. Tensar Earth Technologies, Inc. assumes no liability for interpretation of subsurface conditions, suitability of soil design parameters, and subsurface groundwater conditions.
- D. **Bearing capacity, total and differential settlement and their effects on this system are the responsibility of the owner or owner's representative. Tensar Earth Technologies, Inc. accepts no responsibility or liability for the evaluation of settlements.**
- E. The owner or owner's representative is responsible to review and verify in writing the design parameters described in sections 1 - 7 prior to construction.

	Gamma kN/m ³	C kPa	Phi deg	Piezo Surf.	Ru
Traffic Load	120	0	0	1	0
New Fill	21	0	32	1	0
Existing Fill	21	0	32	1	0
Foundation 1	10	15	0	1	0
Foundation 2	17	0	28	1	0

Tensar Earth Technologies - Atlanta
E00501
Hwy 63 Extend road way
1/5/2001

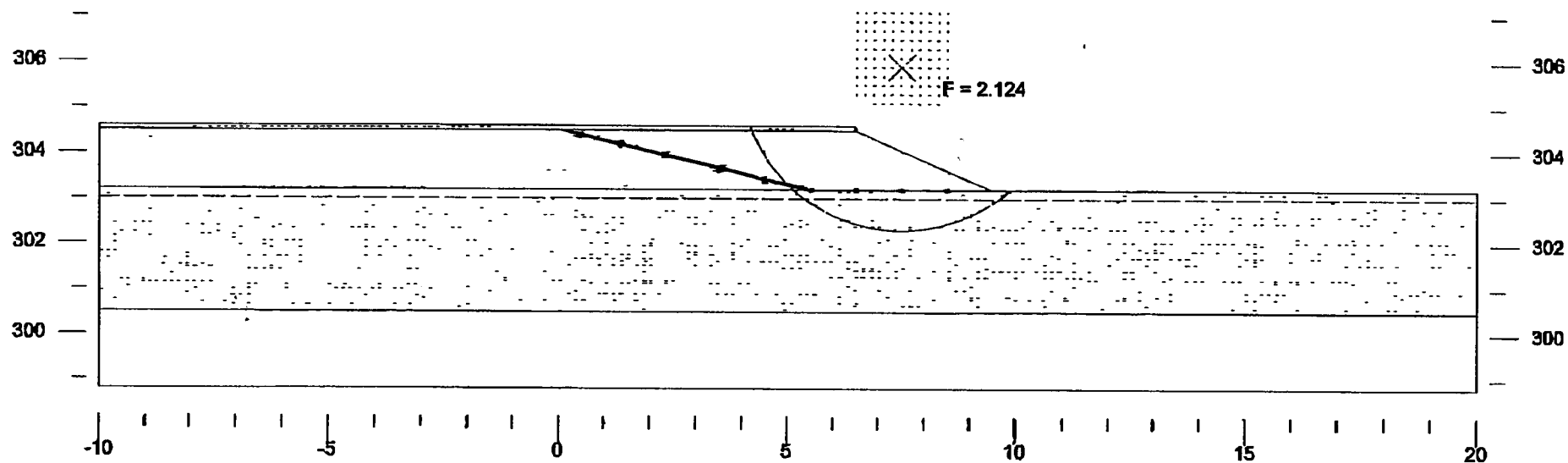
H=1.3 ft



	Gamma kN/m ³	C kPa	Phi deg	Piezo Surf.	Ru
Traffic Load	120	0	0	1	0
New Fill	21	0	32	1	0
Existing Fill	21	0	32	1	0
Foundation 1	10	15	0	1	0
Foundation 2	17	0	28	1	0

Tensar Earth Technologies - Atlanta
E00501
Hwy 63 Extend road way
1/5/2001

H=1.3 ft



DATA FILE NAME..... K:\E00501\HWY63.GSL

Job Number E00501
 Title Hwy 63 Extend road way
 Date 1/5/2001
 Label A
 Label B H=1.3 ft

Maximum Slice Width 1
 Number of Soil Layers: (1 to 20) 5
 Earthquake Acceleration: 0
 No. of External Forces: (0 to 100) 0
 Piezometric Surfaces: (0 to 9) 1
 Unit weight of Water: 9.81
 Reinforcement Layers: (0 to 100) 1
 FoS against Pullout: 1.5

Material	Unit Wt	Cohesion	Friction Angle	Piezo Surf.	Ru	Interaction Coefficient
1 Traffic Load	120	0	0	1	0	.6
2 New Fill	21	0	32	1	0	.6
3 Existing Fill	21	0	32	1	0	.6
4 Foundation 1	10	15	0	1	0	.6
5 Foundation 2	17	0	28	1	0	.6

Upper Surface of Material # 1 (Traffic Load)

X-Coord	Y-Coord
-10	304.6
0	304.6
6.49	304.6
6.5	304.5
9.5	303.2
20	303.2

Upper Surface of Material # 2 (New Fill)

X-Coord	Y-Coord
-10	304.5
0	304.5
6.5	304.5
9.5	303.2
20	303.2

Upper Surface of Material # 3 (Existing Fill)

X-Coord	Y-Coord
-10	304.5
0	304.5
5.5	303.2
9.5	303.2
20	303.2

Upper Surface of Material # 4 (Foundation 1)

X-Coord	Y-Coord
-10	303.2
0	303.2
6.5	303.2
9.5	303.2

Upper Surface of Material # 5 (Foundation 2)

X-Coord	Y-Coord
-10	300.5
0	300.5
6.5	300.5
9.5	300.5
20	300.5

Piezometric Surface No. 1

X-Coord	Y-Coord
-10	303
20	303

There are no explicit external forces in the data set.

Reinforcement Layer No.	Horizontal Extents X1 \longleftrightarrow X2	Reinforcement Layer Elevation	Tallowable per unit width	Tconnection per unit width
1	5.5 9.5	303.2	2.22	0