

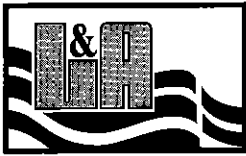
PRELIMINARY GEOTECHNICAL INVESTIGATION
OF LIQUEFACTION AND SETTLEMENT POTENTIAL,
PROPOSED RESIDENTIAL DEVELOPMENT AT THE
LOWLAND PORTION OF NEWPORT/BANNING RANCH,
NORTHEAST OF PACIFIC COAST HIGHWAY
AND THE SANTA ANA RIVER,
CITY OF NEWPORT BEACH, CALIFORNIA

May 16, 1997

Project No. 1970011-01

Prepared for:

Taylor Woodrow Homes
24461 Ridge Route Drive
Laguna Hills, California 92653-1686



LEIGHTON AND ASSOCIATES, INC.

Geotechnical and Environmental Engineering Consultants

May 16, 1997

Project No. 1970011-01

To: Taylor Woodrow Homes
24461 Ridge Route Drive
Laguna Hills, California 92653-1686

Attention: Mr. Tom Redwitz

Subject: Preliminary Geotechnical Investigation of Liquefaction and Settlement Potential,
Lowland Portion of Newport/Banning Ranch, Northeast of Pacific Coast Highway
and Santa Ana River, City of Newport Beach, California

In accordance with your request, Leighton and Associates, Inc. (Leighton) has performed a preliminary geotechnical investigation of liquefaction and settlement potential at the lowland portion of the Newport/Banning Ranch. The Newport/Banning Ranch is located northeast of Pacific Coast Highway and Santa Ana River, in the City of Newport Beach, California. The purpose of the geotechnical investigation is to characterize the subsurface conditions, evaluate the liquefaction and settlement potential of the subsurface soils, and provide preliminary recommendations for remediation measures. Our scope of work for this study included review of existing reports, field exploration consisting of hollow stem borings and CPT soundings, laboratory testing, geotechnical analyses of collected data, and preparation of this report.

This report presents the results of our field investigation, laboratory testing, and geotechnical analyses, and provides our conclusions and recommendations for remediation measures of liquefaction and settlement potential at the site.

If you have any questions regarding this report, please do not hesitate to contact this office. We appreciate this opportunity to be of service.

Respectfully submitted,

LEIGHTON AND ASSOCIATES, INC.

Rosalind Munro, CEG 1269
Principal Geologist

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Senior Project Engineer



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1.0 INTRODUCTION

1.1 Purpose and Scope

This report presents the results of our preliminary geotechnical investigation at the subject site. The purpose of this study was to characterize the subsurface soil conditions, and to evaluate the potential of liquefaction and settlement of the subsurface soils. The evaluation of a splay of the Newport-Inglewood fault that has been reported to cross the southwestern portion of the Newport/Banning Ranch is not part of this report. The scope of work of this study included the following tasks:

- Review available data pertinent to the site to obtain necessary information and clearances for the field investigation.
- Perform subsurface exploration consisting of excavating, logging, and sampling of 6 geotechnical borings. Representative undisturbed and bulk soil samples were collected at selected depth intervals and transported to our laboratory for testing. In addition, 10 CPT soundings were performed at selected locations to obtain continuous stratigraphy and strength data of subsurface soils.
- Perform laboratory tests on selected representative samples to evaluate engineering characteristics of onsite soils within the exploration depths.
- Perform geotechnical evaluation of collected data to assess liquefaction and settlement potential at the site.
- Prepare this report summarizing our findings, conclusions and recommendations.

1.2 Site Description and Proposed Development

The Newport/Banning Ranch is located north of the Pacific Coast Highway, immediately east of the Santa Ana River. The western one-third of the property consists of low-lying lands (average elevations of 4 to 6 feet) which rise abruptly to elevations 50 to 105 feet along an east-west to north trending escarpment. The current study area is the lowland portion of the Newport/Banning Ranch (see Figure 1). This parcel is roughly rectangular in shape, approximately 125 acres in area, and has been a producing oil field since the early 1940s. Oil wells, pipelines, roads, buildings, and other facilities exist over the site. Vegetated areas including bushes and trees are scattered throughout the site. No specific design plans were available at the time this report was prepared.

1.3 Field Investigation

Prior to field exploration, a site reconnaissance was performed by a project engineer and a principal geologist from our staff to evaluate and mark the proposed locations of field exploration, taking into consideration access for heavy equipment and subsurface structures. The subsurface investigation program consisted of hollow-stem borings and Cone Penetration Tests (CPT) soundings.

Six borings (B-1 through B-6) were drilled on November 4, 1996, using an 8-inch-diameter, hollow-stem auger, to a depth of 51.5 feet below existing ground surface. The borings were logged and sampled using the SPT and California Ring samplers at selected intervals. The SPT and Ring samplers were driven using a 140-pound hammer (automatic hammer) falling freely for 30 inches for a total penetration of 18 inches, and the blow counts were noted for every six inches of penetration. Sampling procedures generally followed Standard Penetration Test (SPT) and Split-Barrel Sampling of Soils (ASTM D1586). In addition, representative bulk samples were collected from the borings. Each soil sample collected was inspected and described in accordance with the Unified Soil Classification System. The soil descriptions were entered on the boring logs which are included in Appendix B. All samples were sealed and packaged for transportation to our laboratory. The borings were backfilled with bentonite chips after completion of drilling. Figure 2 and Plate 1 shows the approximate locations of the boreholes within the subject site.

The Cone Penetration Tests were performed according to ASTM D3441-94. The tests consisted of pushing an instrumented cone-tipped probe at a rate of 20-mm per second (approximately 4 feet per minute) into the ground while simultaneously recording the tip resistance and side friction resistance of the soil during penetration. A 23-ton truck, used to transport and house the test equipment, provided the required reaction weight for pushing the cone assembly. A total of 10 CPT soundings were performed on November 4 and 5, 1996, to collect continuous stratigraphy and strength data of subsurface soils. The depth of soundings varied from 32 to 52 feet. Locations of the CPT soundings are shown on the boring and CPT location maps (Figure 2 and Plate 1). Three of the soundings were performed with continuous pore pressure measurement and with two pore pressure dissipation tests per sounding. Plots of friction and tip resistance along with interpretation of the CPT soundings describing subsurface stratigraphy, converted SPT blowcounts, relative density, and strength characteristics are included in Appendix C.

1.4 Laboratory Testing

Laboratory tests were performed on representative samples to verify the field classification of the recovered samples and to determine the geotechnical properties of the subsurface soils. The following tests were performed:

- In-situ moisture content and density
- Grain-size distribution
- Atterberg Limits
- Consolidation

All laboratory testing was performed in general accordance with ASTM or Caltrans procedures. The results of the in-situ moisture and density tests are shown on our geotechnical boring logs (Appendix B). The results of other laboratory tests are presented in Appendix D.

2.0 GEOTECHNICAL FINDINGS

2.1 Previous Geotechnical Studies

Geotechnical investigations were previously performed for the site by Guptill and Heath (1981), Woodward-Clyde Consultants (1985), the Earth Technology Corporation (1986), and Pacific Soils Engineering, Inc. (1993). The studies conducted by Guptill and Heath and the Earth Technology were mainly related to the geological evaluation of splays of the Newport-Inglewood fault. Two distinct zones of faulting were identified within the site. The studies by Woodward-Clyde Consultants and Pacific Soils Engineering, Inc., covered other geotechnical aspects including liquefaction and settlement. Both studies concluded that the upper 10 to 12 feet of the subsurface soils were highly susceptible to liquefaction. Below 10 to 12 feet, localized zones of liquefiable soils were encountered. In addition, the study by Woodward-Clyde found that the upper 4 to 10 feet of the subsurface materials contained soft, highly plastic clay that might not be suitable for use as structural fill. The borings and CPT soundings performed by Woodward-Clyde and Pacific Soils Engineering, Inc., are presented on Figure 2 and Plate 1.

2.2 Subsurface Soil and Ground-Water Conditions

A layer of clay was encountered in our borings and CPT soundings within the upper 15 feet of the subsurface soils. The clay was generally soft and highly plastic, ranging in thickness from approximately 1 to 13 feet. Below 15 feet, the subsurface soils to the depth of our borings mainly consisted of fine to coarse grained sand and silty sand, with pockets of silt and silty clay. The consistency of the sand ranged from loose to medium dense to a depth of 30 feet and medium dense to dense below 30 feet. Ground-water was encountered in our borings at depths of 6 to 10 feet below existing ground surface.

2.3 Soil Compressibility

Consolidation tests were performed on representative samples of the highly plastic clay encountered within the upper 15 feet of our borings. Our observations during field explorations and the consolidation test results indicate that the clay layer is highly compressible.

2.4 Seismic Design Parameters

Woodward-Clyde used a peak ground acceleration of 0.25g and an earthquake magnitude of 7.0 for liquefaction analysis. Pacific Soils Engineering, Inc., used a peak ground acceleration of 0.7g and an earthquake magnitude of 7.5. We have performed deterministic and probabilistic seismic analyses for the site assuming that the main active trace of the Newport-Inglewood fault is less than 1 mile from the site and the Palos Verdes fault is within 11 miles from the site. The results of the analyses are presented in Appendix E. The above-mentioned faults are capable of generating significant ground shaking at the site. With a 10 percent probability of exceedance in 50 years, the peak ground acceleration at the site is estimated to be approximately 0.32g. This ground acceleration value along with an

earthquake magnitude of 7.1 were used in our liquefaction analysis. These parameters were estimated based on the earthquake database currently available.

2.5 Liquefaction Potential and Seismically-Induced Settlement

Liquefaction is the loss of soil strength or stiffness due to a build-up of pore-water pressure during a shaking event. Liquefaction is associated primarily with loose, saturated, fine- to medium-grained cohesionless soils. As the shaking action of an earthquake progresses, the soil grains are rearranged and the soil densifies. Densification of the soil results in a build-up of pore-water pressure. When the pore-water pressure equals the total overburden pressure, soil strength becomes near zero and liquefaction occurs. Effects of liquefaction on level ground include sand boils, settlement, and bearing capacity failures below structural foundations.

The liquefaction analysis was performed using the computer program LIQUEFY2 which is based on the simplified SPT blow count method presented by Seed et al. (1983 and 1985). The SPT blowcounts obtained during our field investigation were converted to standard SPT blowcounts by applying correction factors for hammer efficiency, effective overburden pressure, and fine contents. The analysis assumed no major changes in grade and a ground water depth at 5 feet. The results of the analysis are presented in Appendix F and plotted on Figures 3 and 4 in term of blowcounts versus depths.

The thick line on Figures 3 and 4 represents the critical blowcount for which the factor of safety of 1.0 was calculated for liquefaction. The line is discontinuous where the soil layers are not considered susceptible to liquefaction. When the actual blowcounts from borings or CPT soundings are plotted to the left of the thick line, the potential for liquefaction is considered high. Conversely, the liquefaction potential is considered low when the blowcounts are plotted to the right of the line. These figures indicate the presence of soil layers that are susceptible to liquefaction. These soil layers appear to be localized and relatively thin, with thicknesses ranging from 1 to 10 feet. These layers were encountered at depths varying from 6 to 50 feet below existing ground surface and do not appear to be continuous throughout the site. As such, lateral spreading or horizontal deformation as a result of liquefaction of underlying soils is not expected to be significant.

Seismically induced settlement was evaluated using the method suggested by Tokimatsu and Seed (1987). The settlement was estimated to be on the order of 1 to 3 inches. The depth of liquefiable layer in each boring and CPT, and the estimated liquefaction induced settlement are presented in the table below.

Estimated Liquefaction-Induced Settlement

Boring or CPT Nos.	Depth of Liquefiable Layers (feet)	Estimated Liquefaction-Induced Settlement (in.)
B-1	25 - 27	< 1.0
B-2	6 - 15 and 20 - 25	2.8
B-3	-	-
B-4	11 - 15 and 40 - 45	1.9
B-5	8 - 20	2.5
B-6	15 - 25 and 35 - 40	3.0
CPT-1	7 - 9.5, 11 - 13, 21 - 23, and 27 - 29.5	1.3
CPT-2	-	-
CPT-3	10 - 16 and 48 - 50	1.7
CPT-4	-	-
CPT-5	19 - 21 and 28 - 30	1.3
CPT-6	8 - 9	< 1.0
CPT-7	8 - 10, 16 - 18, 28 - 34, and 36 - 38	2.7
CPT-8	7 - 11 and 16 - 17	1.4
CPT-9	7 - 11 and 31 - 33	1.6
CPT-10	-	-

2.6 Settlement of Clay Layer

The clay layer within the upper 15 feet of the subsurface soils is generally soft and highly plastic. This layer is likely to undergo settlement and is not suitable for support of structural fill and/or structures without remediation. One of the remedial measures that may be considered is preloading the area for a period of time until the remaining settlement is acceptable for construction. We have evaluated the settlement of a 15-foot thick clay layer with a surcharge load consisting of 15 feet of fill. This analysis was performed to provide a preliminary estimate of the waiting period for construction. The assumption of 15 feet of clay is conservative since the thickness of the clay layer encountered during our field investigation varied from 1 to 13 feet. We have evaluated two alternatives: one without removal and one with 5 feet of removal prior to placement of the surcharge load. The remaining settlement as a function of time after placement of 15 feet of fill is summarized in the following table.

Remaining Settlement with 15-foot Surcharge

Time since completion of fill placement (days)	Remaining Settlement (inches)	
	10' Clay Layer (w/ 5' removal)	15' Clay Layer (without removal)
30	2.1	2.8
60	1.7	2.5
90	1.4	2.3
120	1.2	2.1
50	1.1	2.0
180	1.0	1.8
210	1.0	1.7
240	0.9	1.6
270	0.9	1.5
300	0.6	1.5
330	0.6	1.4
360	0.6	1.3

3.0 CONCLUSIONS

- Based on our preliminary investigation, we conclude that, with proper planning, design, and sound construction practices, the hazards of liquefaction and settlement can be mitigated for anticipated land use. The recommendations presented in this report should be fully implemented in design and construction of the project.
- A highly plastic clay layer ranging from 1 to 13 feet in thickness was encountered in the upper 15 feet of our borings and CPT soundings. The clay is soft and highly plastic. Below 15 feet, the subsurface soils generally consist of sand and silty sand.
- Ground water was encountered in our borings at the depths of 6 to 10 feet.
- The clay layer is highly compressible and, without remediation, is not suitable for support of structures.
- Layers of potentially liquefiable soils were encountered between 6 and 50 feet below existing ground surface in our borings and CPT soundings. The layers appear to be relatively thin and localized. Seismically induced settlement, without remediation, was estimated to be on the order of 1 to 3 inches. The potential for lateral spreading is expected to be low.



4.0 RECOMMENDATIONS

4.1 Remediation Measures for Liquefaction

The recommendations presented below are intended for preliminary planning purposes. When plans are available, additional field investigation and laboratory testing should be performed to refine the liquefaction analysis based on proposed development. The preliminary project design should include measures to mitigate the liquefaction hazards. Mitigation measures may include one or a combination of the following alternatives:

4.1.1 Stiffened Foundation System

The majority of borings and CPT soundings at the site indicate seismically induced settlement on the order of 1 to 3 inches. Reinforced floor slabs properly designed to tolerate the potential settlement and prevent potential cracking damage to the structures may be considered for support of the buildings. However, there are localized areas where higher magnitude of settlement may occur. In such areas, this foundation system may not be economical. Other improvements would not be protected.

4.1.2 Gravel Blanket

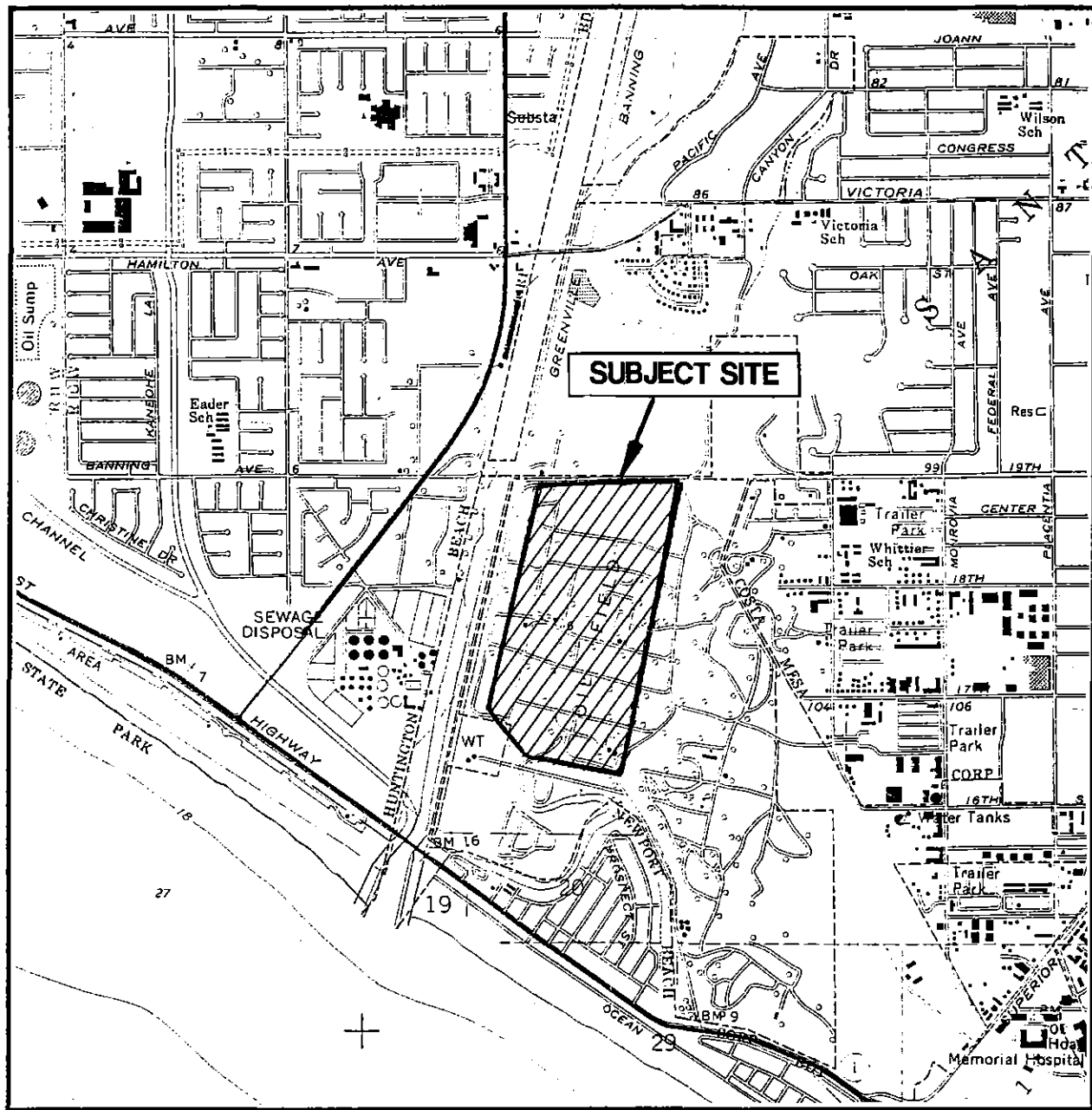
Another liquefaction-related concern is potential surface damage in the forms of ground cracking and sand boils. To mitigate this concern, a gravel or well-graded sand blanket about one foot thick may be placed at the removal bottom prior to fill placement. The gravel layer will serve to provide horizontal drainage resulting in controlled and more rapid dissipation of excess pore water pressure and preventing sand boils from propagating to the ground surface.

4.1.3 Grouting

Grouting may be performed in areas where the subsurface soils are susceptible to liquefaction. Since the liquefiable layers are localized and relatively thin, grouting can be performed on the specific layers to improve the in-place density. Additional field exploration will be required to delineate areas and subsurface layers where grouting should be performed.

4.2 Remediation Measures for Consolidation Settlement

Remediation measures will be required to reduce the amount of settlement of the clay layer. Removal of the clay layer and replacement with relatively sandy material may be performed. However, the clay layer extends below the groundwater table, and removal and recompaction of soils below groundwater table may not be economical. Preloading along with removal of the compressible layer above groundwater table may be considered. The preloading may consist of placement of surcharge fill and monitoring the settlement. Estimated settlement period for a 15-foot high surcharge fill with and without partial removal of the clay layer is presented in Section 2.6. Settlement gages should be installed to monitor the actual settlement in the field. The surcharge fill may be removed once the remaining settlement is considered acceptable for construction of proposed structures.



SITE LOCATION MAP

BASE MAP: USGS 7.5 MINUTE NEWPORT BEACH QUADRANGLE (PHOTOREVISED 1972)

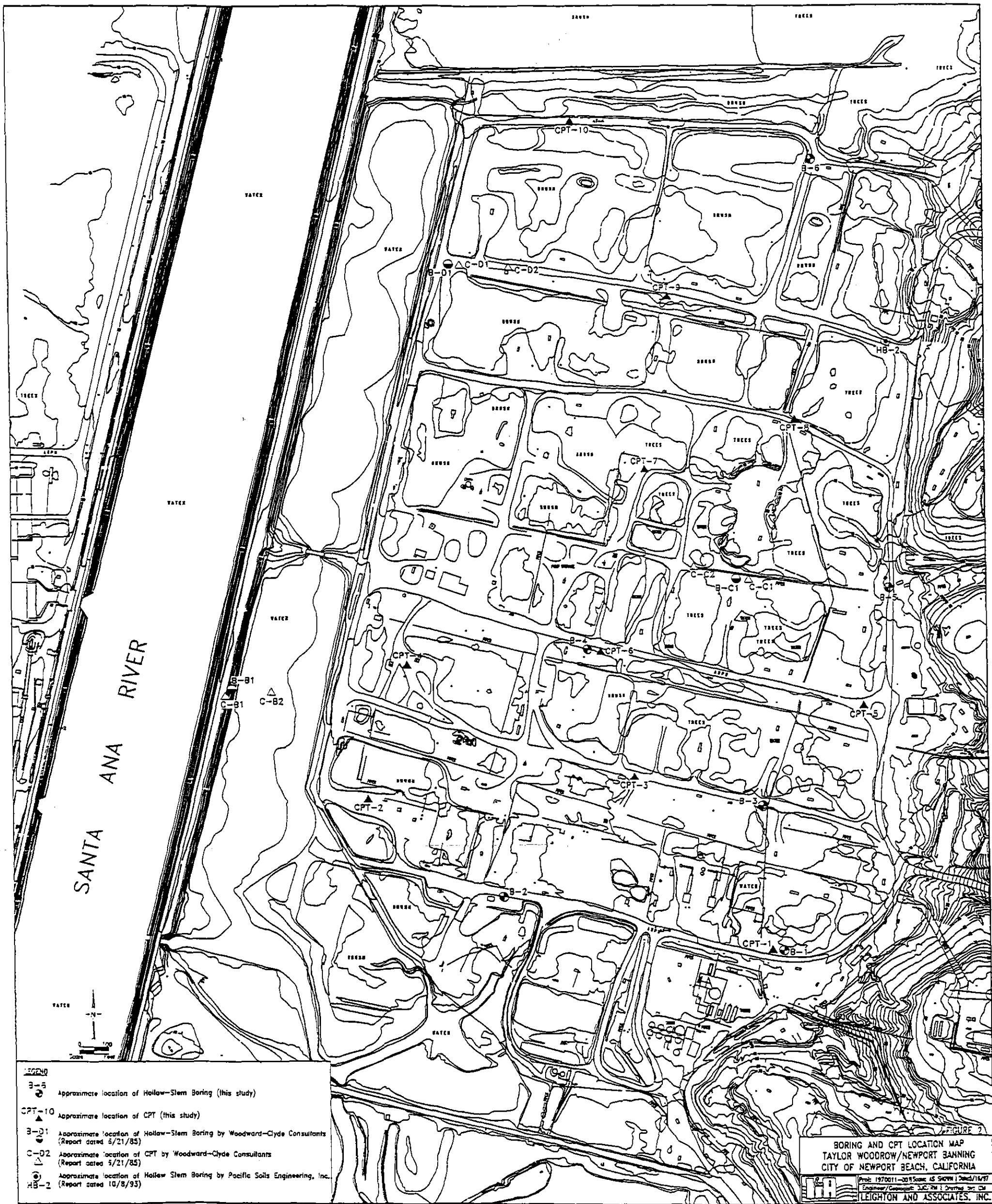
**LOWLAND PORTION OF
NEWPORT / BANNING RANCH
CITY OF NEWPORT BEACH, CALIFORNIA**

Project No. 1970011-01

Date 5/16/97



Figure No. 1

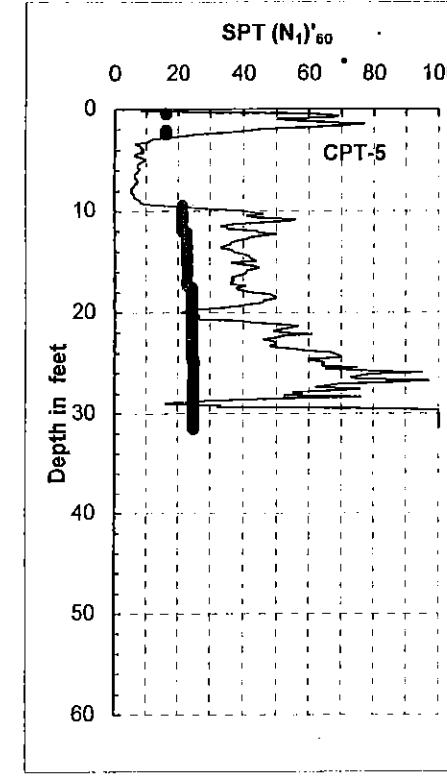
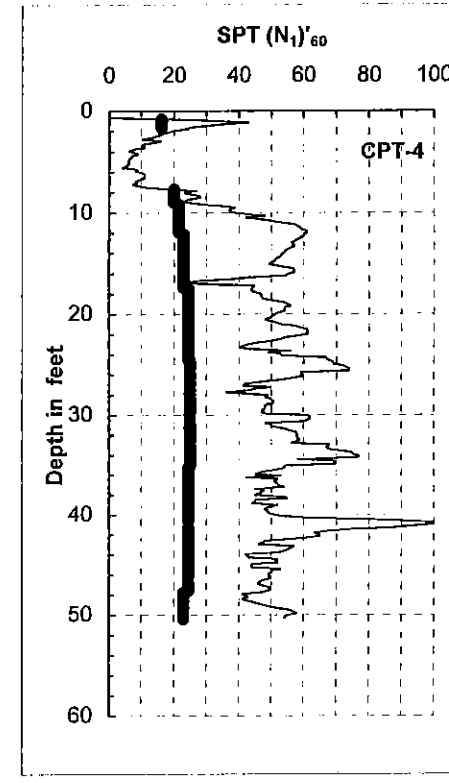
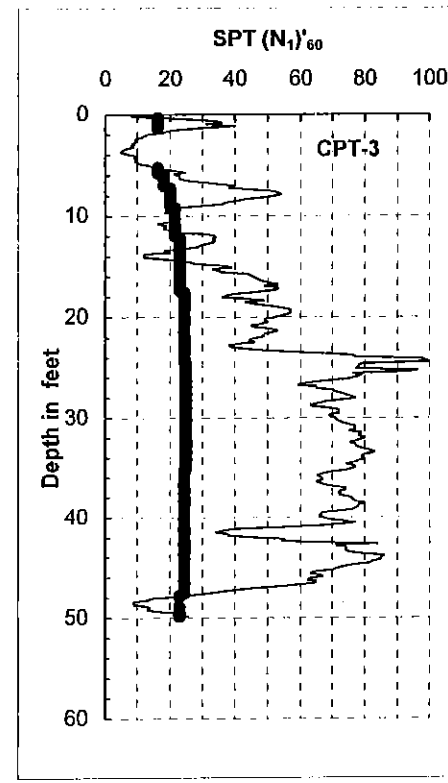
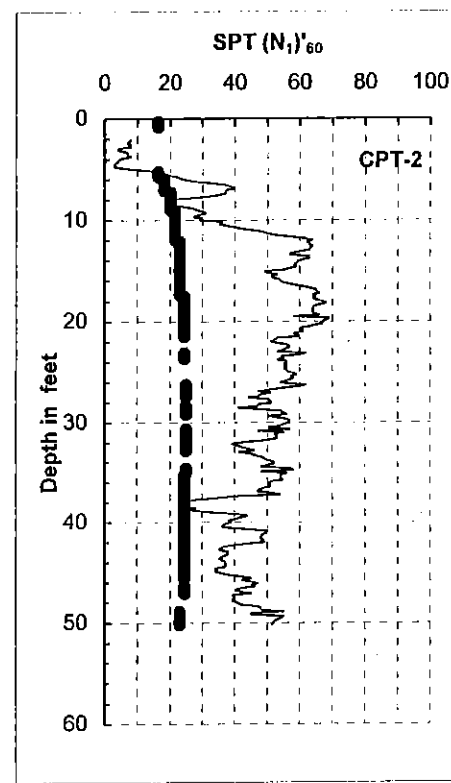
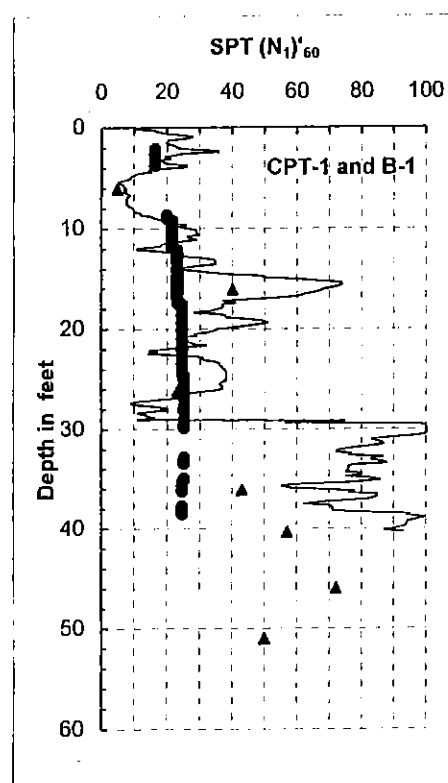


- LEGEND**
- B-5 Approximate location of Hollow-Stem Boring (this study)
 - CPT-10 Approximate location of CPT (this study)
 - B-01 Approximate location of Hollow-Stem Boring by Woodward-Clyde Consultants (Report dated 5/21/85)
 - C-02 Approximate location of CPT by Woodward-Clyde Consultants (Report dated 5/21/85)
 - B-02 Approximate location of Hollow-Stem Boring by Pacific Soils Engineering, Inc. (Report dated 10/8/93)
 - HB-2

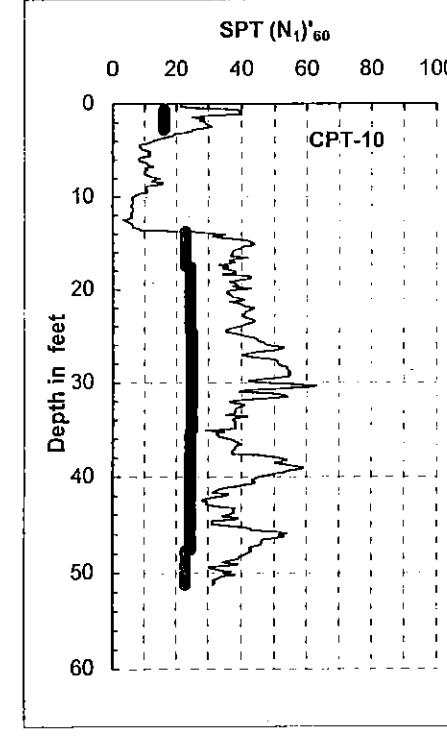
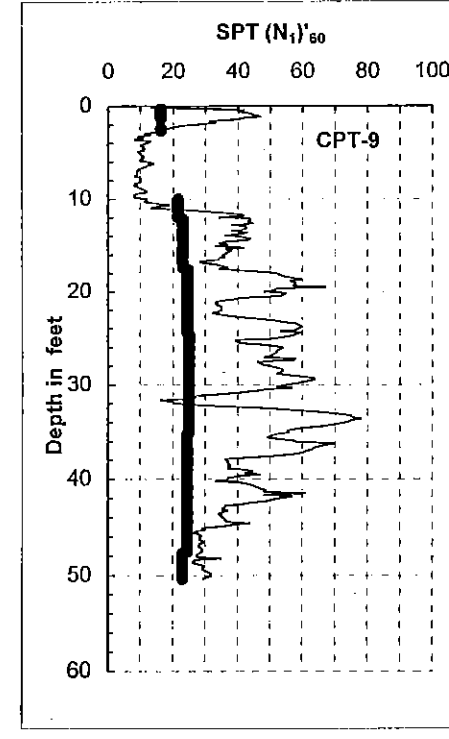
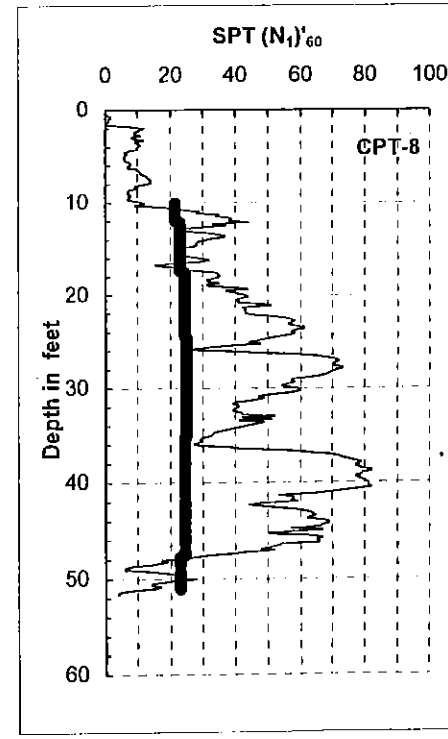
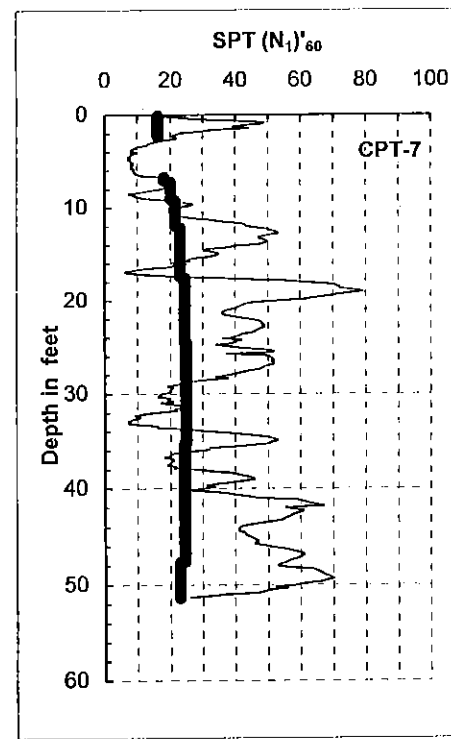
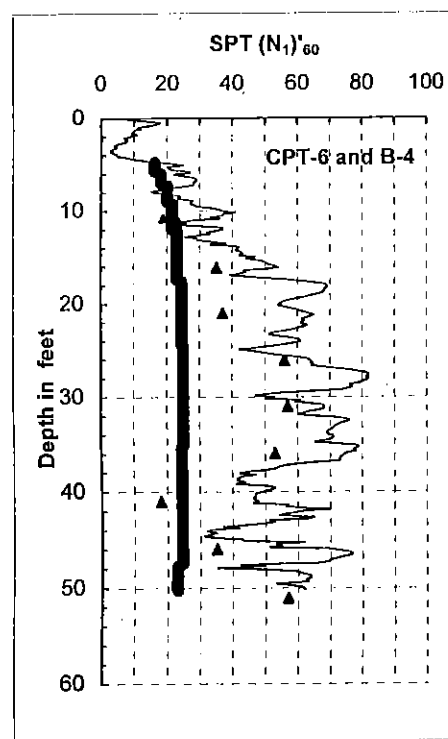
FIGURE 2

BORING AND CPT LOCATION MAP
TAYLOR WOODROW/NEWPORT BANNING
CITY OF NEWPORT BEACH, CALIFORNIA

Project 1970011-0019 Scale AS SHOWN Date 11/8/97
 Engineer/Geologist J.E. PM I Drilling Inc. CM
LEIGHTON AND ASSOCIATES, INC.



LEGEND:
 — Blow Count Estimated from CPT data
 ●●●●●●●●●● Blow Count Required to Prevent Liquefaction
 ▲ Blow Count from HSA Boring

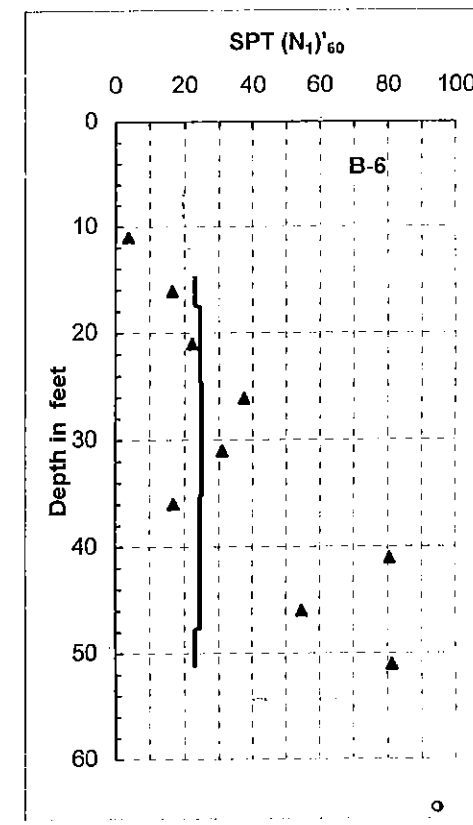
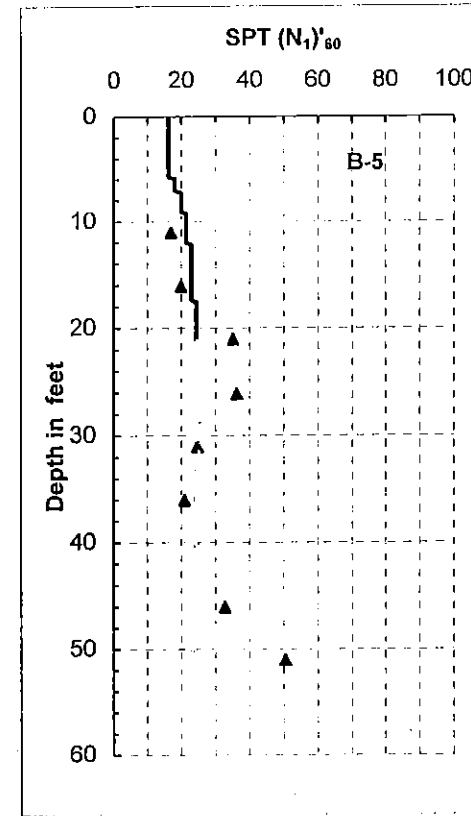
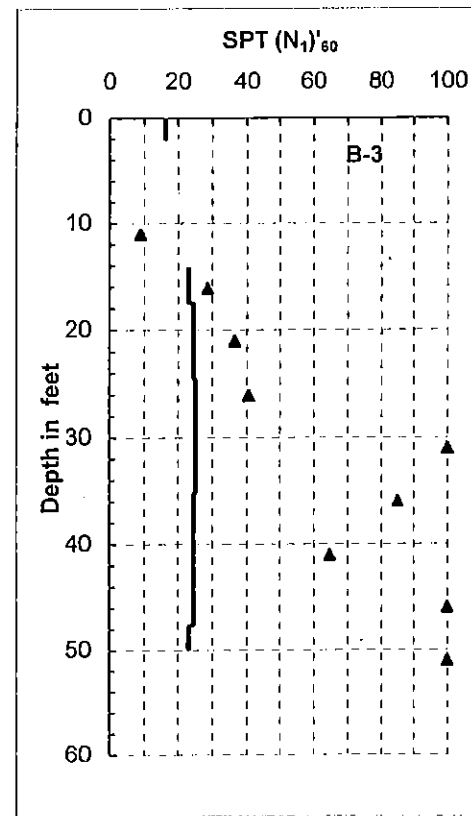
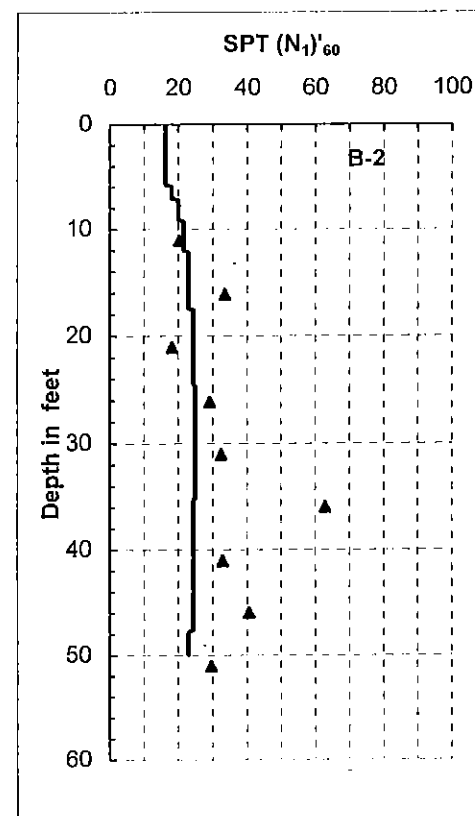


SPT BLOWCOUNTS FROM BORINGS B-1 AND B-4 AND CPT DATA VERSUS CRITICAL BLOWCOUNTS

Project No. 1970011-01
 Scale NONE
 Eng DJC/RM
 Drafted By LAF
 Date 5/16/97



Figure No. 3



See Figure 3 for legend

SPT BLOWCOUNTS FROM BORINGS B-2, B-3, B-5 AND B-6 Vs. CRITICAL BLOWCOUNTS

Project No. 1970011-01
 Scale NONE
 Eng DJC/RM
 Drafted By LAF
 Date 5/16/97



Figure No. 4

APPENDIX A

References

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- Earth Technology Corporation, 1986, "Geological Evaluation of Faulting Potential, West Newport Oil Field, Orange County, California", Project No. 86-820-01, dated July 31, 1986.
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- Pacific Soils Engineering, Inc., 1993, "Geotechnical Feasibility Investigation, Newport/Banning Ranch Project, County of Orange, California, Work Order 500236, dated October 8, 1993.
- Seed, H. B., Idriss, I. M., Arango, I., 1983, "Evaluation of Liquefaction Potential Using Field Performance Data", Journal of Geotechnical Engineering, ASCE, Vol. 09, No. 3.
- Seed, H. B., Tokimatsu, K., and Harder, L. F., 1985, "Influence of Standard Penetration Test Procedures in Soil Liquefaction Resistance Evaluations", Journal of Geotechnical Engineering, ASCE, Vol. 111, No. 12.
- Tokimatsu, K., and Seed, H.B., 1987, "Evaluation of Settlements in Sands due to Earthquake Shaking", Journal of Geotechnical Engineering, ASCE, Vol. 113, No. 8.
- Woodward-Clyde Consultants, 1985, "Preliminary Geotechnical Engineering Studies, Long Range Planning Program, West Newport Oil Company", Project No. 41890A, dated June 21, 1985.

GEOTECHNICAL BORING LOG B-1

Date 11-4-96 Sheet 1 of 2
 Project TW Homes/Banning Lowland Project No. 1970011-01
 Drilling Co. 2R DRILLING Type of Rig CME-55
 Hole Diameter 8" Drive Weight 140 lbs Drop 30"
 Elevation Top of Hole 5' Location See Plate 1

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Tube Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	GEOTECHNICAL DESCRIPTION	Type of Tests
									Logged By <u>DXS</u> Sampled By <u>DXS</u>	
0	0			Bag #1					SILTY CLAY with sand and gravel, medium stiff, grey, slightly moist	
				R-1	17			SP	2': SAND, loose, yellowish brown, slightly moist, fine grained sand	
0	5			S-1	3			CH	5': SILTY CLAY, soft, greyish blue, very moist, high plasticity	AL
-5	10			R-2	11			SM	10': SILTY SAND, medium dense, bluish grey, saturated, fine to coarse grained sand, shell at tip, trace gravel	
-10	15			S-2	24			SM	15': Same material, layers of sea shell and pea gravel	SA
-15	20			R-3	13				20': Coarser sand	
-20	25			S-3	17				25': Fine grained sand, no sea shell	
-25	30									

SAMPLE TYPES:

S SPLIT SPOON
 R RING SAMPLE
 B BULK SAMPLE
 T TUBE SAMPLE

TYPE OF TESTS:

DS DIRECT SHEAR
 MD MAXIMUM DENSITY
 CN CONSOLIDATION
 CR CORROSION

SA SIEVE ANALYSIS
 AL ATTERBERG LIMITS
 EI EXPANSION INDEX
 HD HYDROMETER & SIEVE

GEOTECHNICAL BORING LOG B-1

Date 11-4-96 Sheet 2 of 2
 Project TW Homes/Banning Lowland Project No. 1970011-01
 Drilling Co. 2R DRILLING Type of Rig CME-55
 Hole Diameter 8" Drive Weight 140 lbs Drop 30"
 Elevation Top of Hole 5' Location See Plate 1

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Tube Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	GEOTECHNICAL DESCRIPTION	Type of Tests
									Logged By <u>DXS</u> Sampled By <u>DXS</u>	
30				R-4	59			SM	30': SILTY SAND, medium dense to dense, grey, very moist, fine to coarse grained sand, silt (20 %), trace gravel	
-30	35			S-4	33			SP-SM	35': SAND, dense, grey, saturated, rounded and some angular gravel pieces, pea gravel	
-35	40			S-5	49			SW-SM	40': SAND with silt and gravel, more pea gravel, rounded and angular gravel pieces	SA
-40	45			S-6	64				45': Same material	
-45	50			S-7	44				50': Same material	
-50	55								NOTES: Total depth = 51'6" Ground water encountered at 7' Backfilled with native and bentonite chips upto 20'	
-55	60									

SAMPLE TYPES:

S SPLIT SPOON

R RING SAMPLE

B BULK SAMPLE

T TUBE SAMPLE

TYPE OF TESTS:

DS DIRECT SHEAR

MD MAXIMUM DENSITY

CN CONSOLIDATION

CR CORROSION

SA SIEVE ANALYSIS

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HD HYDROMETER & SIEVE

GEOTECHNICAL BORING LOG B-2

Date 11-4-96 Sheet 1 of 2
 Project TW Homes/Banning Lowland Project No. 1970011-01
 Drilling Co. 2R DRILLING Type of Rig CME-55
 Hole Diameter 8" Drive Weight 140 lbs Drop 30"
 Elevation Top of Hole 5' Location See Plate 1

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Tube Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	GEOTECHNICAL DESCRIPTION	Type of Tests
									Logged By <u>DXS</u> Sampled By <u>DXS</u>	
0	0			Bag #1					SAND, loose, brown, moist, fine to coarse grained sand with some gravel	
				R-1	6			SP	2': Same material	
0	5			R-2	9			CL	5': Top 1', silty clay, soft, grey, very moist, high plasticity; followed by SILTY SAND, loose, grey, saturated 6': Ground water encountered	
-5	10			S-1	11			SM	10': Same material	SA
-10	15			S-2	20			SM	15': medium dense, grey, saturated, fine grained sand	
-15	20			S-3	12				20': Some mica, rounded gravel	
-20	25			S-4	21				25': Same material, shell, and pea gravel	
-25	30									

SAMPLE TYPES:

S SPLIT SPOON
 R RING SAMPLE
 B BULK SAMPLE
 T TUBE SAMPLE

TYPE OF TESTS:

DS DIRECT SHEAR
 MD MAXIMUM DENSITY
 CN CONSOLIDATION
 CR CORROSION

SA SIEVE ANALYSIS
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GEOTECHNICAL BORING LOG B-2

Date 11-4-96 Sheet 2 of 2
 Project TW Homes/Banning Lowland Project No. 1970011-01
 Drilling Co. 2R DRILLING Type of Rig CME-55
 Hole Diameter 8" Drive Weight 140 lbs Drop 30"
 Elevation Top of Hole 5' Location See Plate 1

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Tube Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	GEOTECHNICAL DESCRIPTION	Type of Tests
									Logged By <u>DXS</u> Sampled By <u>DXS</u>	
	30			S-5	25			SP-SM	30': SAND, medium dense, grey, saturated, fine to coarse grained sand, trace gravel, some shell, black specks	SA
	35			S-6	51				35': Same material, very dense, a lot of shell, mica, pea gravel, coarser sand	
	40			S-7	28				40': finer sand, medium dense	
	45			S-8	36				45': Same material, dense	
	50			S-9	27				50': Same material	
	55								NOTES: Total depth = 51'6" Ground water encountered at 6' Backfilled with native and bentonite chips upto 20'	
	60									

SAMPLE TYPES:

S SPLIT SPOON

R RING SAMPLE

B BULK SAMPLE

T TUBE SAMPLE

TYPE OF TESTS:

DS DIRECT SHEAR

MD MAXIMUM DENSITY

CN CONSOLIDATION

CR CORROSION

SA SIEVE ANALYSIS

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HD HYDROMETER & SIEVE

GEOTECHNICAL BORING LOG B-3

Date 11-4-96 Sheet 1 of 2
 Project TW Homes/Banning Lowland Project No. 1970011-01
 Drilling Co. 2R DRILLING Type of Rig CME-55
 Hole Diameter 8" Drive Weight 140 lbs Drop 30"
 Elevation Top of Hole 5' Location See Plate 1

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Tube Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	GEOTECHNICAL DESCRIPTION	Type of Tests
									Logged By <u>DXS</u> Sampled By <u>DXS</u>	
0	0			Bag #1					GRAVELLY SAND, loose, brown, moist, fine to coarse grained sand with some clay	
				R-1	47			SC	2': CLAYEY SAND, medium dense, dark grey, moist, fine to coarse grained, some oil smell	
0	5			R-2	6	79.4	40.2	CL	5': SILTY CLAY, soft, grey, very moist, high plasticity; 6': Ground water encountered	AL,CN
-5	10			S-1	5			SC	10': CLAYEY SAND, loose, grey, very moist, fine to coarse grained sand	
-10	15			S-2	17			ML	15': SILT with sand, very stiff, grey, saturated, fine grained sand	SA
-15	20			S-3	24			SP-SM	20': SAND, medium dense, grey, saturated, mica, shell, rounded gravel	
-20	25			S-4	29				25': Same material	
-25	30									

SAMPLE TYPES:

S SPLIT SPOON
 R RING SAMPLE
 B BULK SAMPLE
 T TUBE SAMPLE

TYPE OF TESTS:

DS DIRECT SHEAR
 MD MAXIMUM DENSITY
 CN CONSOLIDATION
 CR CORROSION

SA SIEVE ANALYSIS
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GEOTECHNICAL BORING LOG B-3

Date 11-4-96 Sheet 2 of 2
 Project TW Homes/Banning Lowland Project No. 1970011-01
 Drilling Co. 2R DRILLING Type of Rig CME-55
 Hole Diameter 8" Drive Weight 140 lbs Drop 30"
 Elevation Top of Hole 5' Location See Plate 1

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Tube Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	GEOTECHNICAL DESCRIPTION	Type of Tests
									Logged By <u>DXS</u> Sampled By <u>DXS</u>	
30				S-5	83			SP-SM	30': SAND, very dense, dark grey, saturated, coarse grained sand, rounded and angular gravel pieces, some shell, black specks, and pea gravel	SA
-30	35			S-6	69				35': Same material, a lot of rounded and angular gravel	
-35	40			S-7	55				40': GRAVELLY SAND, very dense, grey, saturated, coarse sand, rounded and angular gravel pieces, pea gravel	
-40	45			S-8	95/11.5'			SP-SM	45': Same material	SA
-45	50			S-9	94/11.5'				50': Same material	
-50	55								NOTES: Total depth = 51'6" Ground water encountered at 6' Backfilled with native and bentonite chips upto 20'	
-55	60									

SAMPLE TYPES:

S SPLIT SPOON
 R RING SAMPLE
 B BULK SAMPLE
 T TUBE SAMPLE

TYPE OF TESTS:

DS DIRECT SHEAR
 MD MAXIMUM DENSITY
 CN CONSOLIDATION
 CR CORROSION

SA SIEVE ANALYSIS
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GEOTECHNICAL BORING LOG B-4

 Date 11-4-96

 Sheet 1 of 2

 Project TW Homes/Banning Lowland

 Project No. 1970011-01

 Drilling Co. 2R DRILLING

 Type of Rig CME-55

 Hole Diameter 8" Drive Weight 140 lbs

 Elevation Top of Hole 5' Location See Plate 1

 Drop 30"

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Tube Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	GEOTECHNICAL DESCRIPTION		Type of Tests
									Logged By <u>DXS</u>	Sampled By <u>DXS</u>	
0				Bag #1					SILTY CLAY, stiff, grey, moist, high plasticity		
				R-1	5	73.3	46.7	CL	2': SILTY CLAY, medium stiff, grey, very moist, high plasticity, bottom rings consist of SILTY SAND, loose, bluish, very moist, fine grained		CN
0	5			R-2	12			SP	5': SAND with some silt, loose, brownish grey, very moist		
									7': Ground water encountered		
-5	10			S-1	10			SP-SM	10': SAND with silt, loose, grey, saturated, fine grained		SA
-10	15			S-2	21				15': Same material		
-15	20			S-3	25			SP-SM	20': medium dense, mica, shell, rounded gravel		
-20	25			S-4	41				25': Same material, dense, a lot of shell, pea gravel		
-25	30										

SAMPLE TYPES:

S SPLIT SPOON
 R RING SAMPLE
 B BULK SAMPLE
 T TUBE SAMPLE

TYPE OF TESTS:

DS DIRECT SHEAR
 MD MAXIMUM DENSITY
 CN CONSOLIDATION
 CR CORROSION

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GEOTECHNICAL BORING LOG B-4

Date 11-4-96 Sheet 2 of 2
 Project TW Homes/Banning Lowland Project No. 1970011-01
 Drilling Co. 2R DRILLING Type of Rig CME-55
 Hole Diameter 8" Drive Weight 140 lbs Drop 30"
 Elevation Top of Hole 5' Location See Plate 1

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Tube Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	GEOTECHNICAL DESCRIPTION	Type of Tests
									Logged By <u>DXS</u> Sampled By <u>DXS</u>	
30				S-5	44			SP-SM	30': SAND, dense, grey, saturated, fine to coarse grained sand (20 to 30 % silt)	SA
-30	35			S-6	43				35': Same material	
-35	40			S-7	16				40': Same material, medium dense, mica, rounded and angular gravel pieces, pea gravel	
-40	45			S-8	31			SM	45': SILTY SAND, medium dense to dense, grey, saturated, mica, pea gravel	SA
-45	50			S-9	51				50': SAND with gravel, very dense, saturated, angular and rounded gravel pieces, pea gravel	
-50	55								NOTES: Total depth = 51'6" Ground water encountered at 7' Backfilled with native and bentonite chips upto 20'	
-55	60									

SAMPLE TYPES:

S SPLIT SPOON

R RING SAMPLE

B BULK SAMPLE

T TUBE SAMPLE

TYPE OF TESTS:

DS DIRECT SHEAR

MD MAXIMUM DENSITY

CN CONSOLIDATION

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HD HYDROMETER & SIEVE

GEOTECHNICAL BORING LOG B-5

Date 11-4-96 Sheet 1 of 2
 Project TW Homes/Banning Lowland Project No. 1970011-01
 Drilling Co. 2R DRILLING Type of Rig CME-55
 Hole Diameter 8" Drive Weight 140 lbs Drop 30"
 Elevation Top of Hole 10' Location See Plate 1

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Tube Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	GEOTECHNICAL DESCRIPTION	Type of Tests
10	0			Bag #1					Logged By <u>DXS</u> Sampled By <u>DXS</u>	
				R-1	16			SP	2': Same material	
5	5			R-2	23			SM	5': SILTY SAND, medium dense, brownish grey, moist, fine to coarse grained sand.	
0	10			S-1	10			SM	10': Ground water encountered 10': SILTY SAND to SANDY SILT, loose, grey, saturated, fine grained	SA
-5	15			S-2	13				15': Same material, medium dense, 30% silt	
-10	20			S-3	25				20': Same material	
									21': SANDY CLAY, very stiff, yellowish, brown, moist, low to medium plasticity	
-15	25			S-4	26			CL	25': Same material	SA
-20	30									

SAMPLE TYPES:

S SPLIT SPOON

R RING SAMPLE

B BULK SAMPLE

T TUBE SAMPLE

TYPE OF TESTS:

DS DIRECT SHEAR

MD MAXIMUM DENSITY

CN CONSOLIDATION

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HD HYDROMETER & SIEVE

GEOTECHNICAL BORING LOG B-5

Date 11-4-96 Sheet 2 of 2
 Project TW Homes/Banning Lowland Project No. 1970011-01
 Drilling Co. 2R DRILLING Type of Rig CME-55
 Hole Diameter 8" Drive Weight 140 lbs Drop 30"
 Elevation Top of Hole 10' Location See Plate 1

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Tube Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	GEOTECHNICAL DESCRIPTION	Type of Tests
-20	30			S-5	19			CL	Logged By <u>DXS</u> Sampled By <u>DXS</u> 30': SANDY CLAY, very stiff, yellowish brown, moist	
-25	35			S-6	17				35': Same material	
-30	40			R-3	63				40': hard, brownish grey, very moist, fine grained sand, medium plasticity	
-35	45			S-7	29			CL	45': CLAY with sand	SA
-40	50			S-8	46				50': Same material	
-45	55								NOTES: Total depth = 51'6" Ground water encountered at 10' Backfilled with native and bentonite chips upto 20'	
-50	60									

SAMPLE TYPES:

S SPLIT SPOON

R RING SAMPLE

B BULK SAMPLE

T TUBE SAMPLE

TYPE OF TESTS:

DS DIRECT SHEAR

MD MAXIMUM DENSITY

CN CONSOLIDATION

CR CORROSION

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HD HYDROMETER & SIEVE

GEOTECHNICAL BORING LOG B-6

Date 11-4-96 Sheet 1 of 2
 Project TW Homes/Banning Lowland Project No. 1970011-01
 Drilling Co. 2R DRILLING Type of Rig CME-55
 Hole Diameter 8" Drive Weight 140 lbs Drop 30"
 Elevation Top of Hole 9' Location See Plate 1

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Tube Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	GEOTECHNICAL DESCRIPTION		Type of Tests
									Logged By <u>DXS</u>	Sampled By <u>DXS</u>	
0				Bag #1					CLAYEY SAND, loose, brown, moist, fine to coarse grained sand		
				R-1	5			CL	2': SILTY CLAY, medium stiff, brownish grey, moist, high plasticity, white caliche		AL
5				R-2	5	76.6	42.5		5': Same material		CN
									7': Ground water encountered		
0				S-1	2			CL	10': CLAY with sand, very soft, grey, saturated, fine grained sand, sea shell, medium to high plasticity		SA
-5				S-2	10			SP-SM	15': SILTY SAND, loose, grey, saturated, a lot of sea shell, fine grained sand		
-10				S-3	15				20': medium dense, mica, shell, pea gravel and rounded gravel pieces		
-15				S-4	29				25': Same material		
-20											
-25											
-30											

SAMPLE TYPES:

S SPLIT SPOON
 R RING SAMPLE
 B BULK SAMPLE
 T TUBE SAMPLE

TYPE OF TESTS:

DS DIRECT SHEAR
 MD MAXIMUM DENSITY
 CN CONSOLIDATION
 CR CORROSION

SA SIEVE ANALYSIS
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GEOTECHNICAL BORING LOG B-6

Date 11-4-96 Sheet 2 of 2
 Project TW Homes/Banning Lowland Project No. 1970011-01
 Drilling Co. 2R DRILLING Type of Rig CME-55
 Hole Diameter 8" Drive Weight 140 lbs Drop 30"
 Elevation Top of Hole 9' Location See Plate 1

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Tube Sample No.	Blows Per Foot	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	GEOTECHNICAL DESCRIPTION	Type of Tests
									Logged By <u>DXS</u> Sampled By <u>DXS</u>	
30				S-5	24			SP	30': SAND with silt, medium dense, grey, saturated, coarse grained sand, pea gravel, a lot of sea shell	SA
-25										
35				S-6	14				35': Same material	
-30										
40				S-7	69				40': SAND with some gravel, very dense, saturated, coarse sand, mica, rounded and angular gravel pieces, pea gravel	
-35										
45				S-8	49				45': Same material with a clay lense of 6 inch thick	
-40										
50				S-9	74				50': Same material	
-45										
55									NOTES: Total depth = 51'6" Ground water encountered at 7' Backfilled with native and bentonite chips upto 20'	
-50										
60										

SAMPLE TYPES:

S SPLIT SPOON

R RING SAMPLE

B BULK SAMPLE

T TUBE SAMPLE

TYPE OF TESTS:

DS DIRECT SHEAR

MD MAXIMUM DENSITY

CN CONSOLIDATION

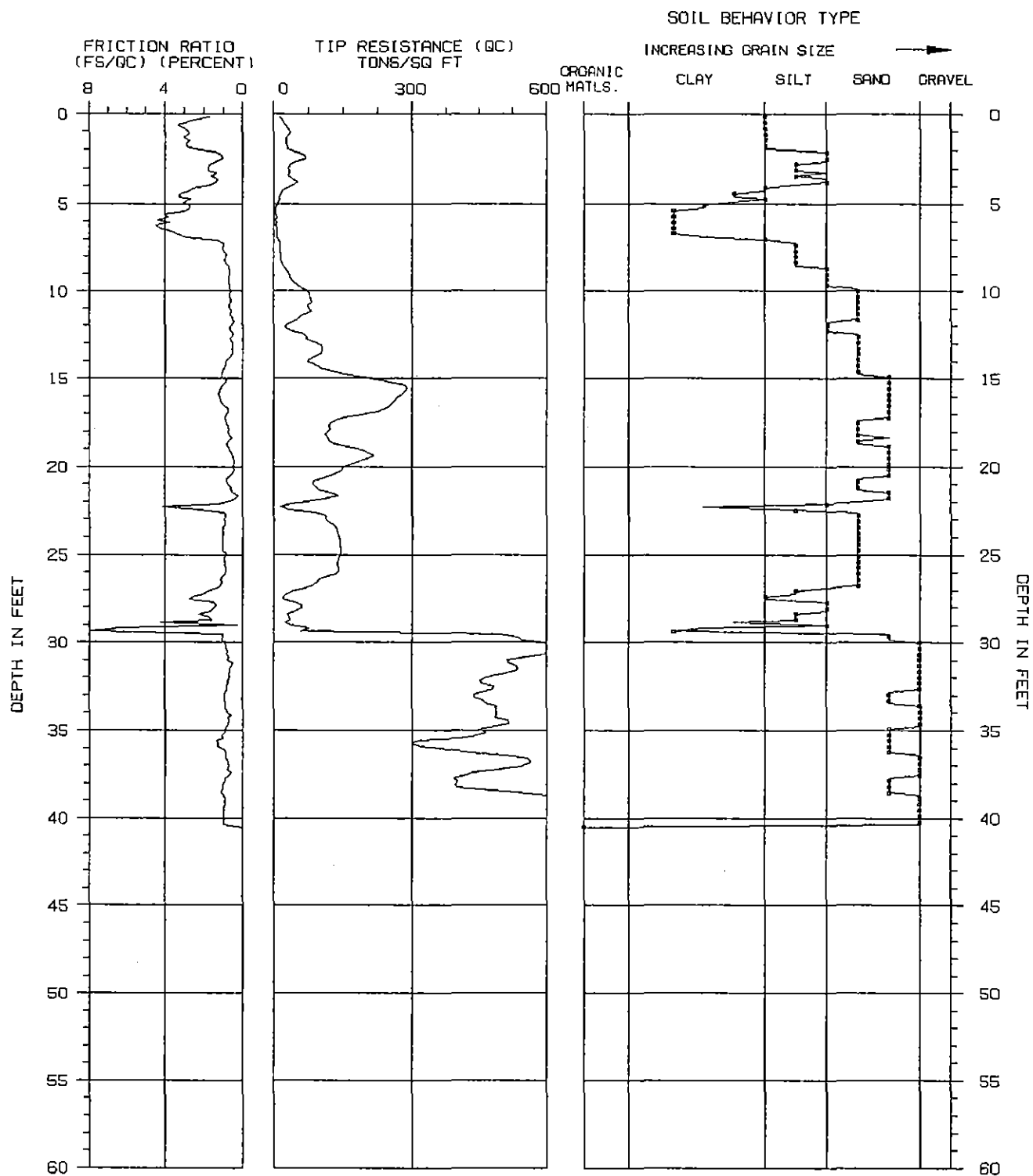
CR CORROSION

SA SIEVE ANALYSIS

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EI EXPANSION INDEX

HD HYDROMETER & SIEVE



TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

ASSUMED TOTAL UNIT WT = 120 PCF

ASSUMED DEPTH OF WATER TABLE = 5.0 FT

SOIL BEHAVIOR TYPE INTERPRETATIONS BASED ON: OUTLINES FOR GEOTECHNICAL DESIGN USING THE CPT AND CPTU,
SOIL MECHANICS SERIES #120, UNIVERSITY OF BRITISH COLUMBIA, SEPTEMBER 1989, BY P.K. ROBERTSON AND R.O. CAMPANELLA.

CONE PENETRATION TEST

SOUNDING NUMBER: CPT-01

PROJECT NAME : L&A\TYLR-WOODROW

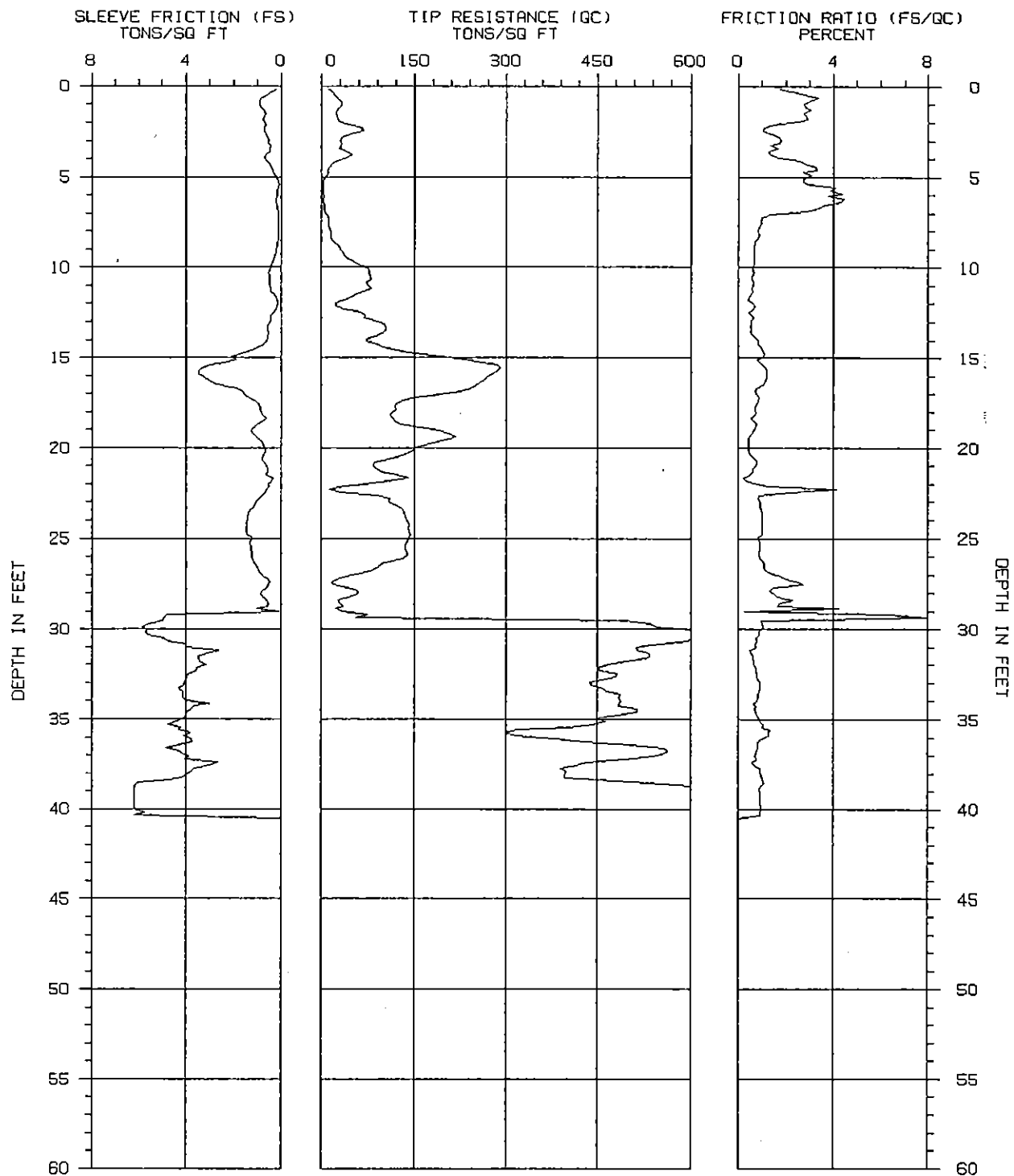
CONE/RIG : 469\#1

PROJECT NUMBER : 970011-001

DATE/TIME: 11-04-96 12:49



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TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

CONE PENETRATION TEST

SOUNDING NUMBER: CPT-01

PROJECT NAME : L&A\TYLR-WOODROW

CONE/RIG : 469\#1

PROJECT NUMBER : 970011-001

DATE/TIME: 11-04-96 12:49



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 * SOUNDING : CPT-01 PROJECT No.: 970011-001
 * PROJECT : L&A\TYLR-WOODROW CONE/RIG : 469\#1
 * DATE/TIME: 11-04-96 12:49
 *

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DEPTH	DEPTH	TIP	FRICTION	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr	Su	PHI
(m)	(ft)	RESISTANCE (tsf)	RATIO (%)				(%)	(tsf)	(Degrees)
.150	.49	21.71	2.95	CLAYEY SILT to SILTY CLAY	11	17		1.4	
.300	.98	34.40	2.76	CLAYEY SILT to SILTY CLAY	17	28		2.3	
.450	1.48	24.67	2.72	CLAYEY SILT to SILTY CLAY	12	20		1.6	
.600	1.97	28.85	2.50	CLAYEY SILT to SILTY CLAY	14	23		1.9	
.750	2.46	67.86	1.05	SILTY SAND to SANDY SILT	23	36	65		47.0
.900	2.95	30.17	1.79	SANDY SILT to CLAYEY SILT	12	19		2.4	
1.050	3.44	28.94	1.66	SANDY SILT to CLAYEY SILT	12	19		2.3	
1.200	3.94	40.98	1.71	SANDY SILT to CLAYEY SILT	16	26		3.3	
1.350	4.43	13.81	3.26	CLAY to SILTY CLAY	9	15		.9	
1.500	4.92	8.82	3.06	CLAY to SILTY CLAY	6	9		.6	
1.650	5.41	3.36	2.98	CLAY	3	5		.2	
1.800	5.91	4.36	4.36	CLAY	4	7		.3	
1.950	6.40	4.65	4.30	CLAY	5	7		.3	
2.100	6.89	5.23	2.87	CLAY	5	8		.4	
2.250	7.38	12.39	.97	SANDY SILT to CLAYEY SILT	5	8		1.2	
2.400	7.87	14.26	.84	SANDY SILT to CLAYEY SILT	6	9		1.4	
2.550	8.37	16.40	.85	SANDY SILT to CLAYEY SILT	7	10		1.6	
2.700	8.86	28.15	.67	SILTY SAND to SANDY SILT	9	15	40		38.5
2.850	9.35	37.33	.70	SILTY SAND to SANDY SILT	12	19	48		39.5
3.000	9.84	60.59	.66	SAND to SILTY SAND	15	23	62		42.0
3.150	10.33	77.27	.66	SAND to SILTY SAND	19	29	69		43.0
3.300	10.83	72.36	.69	SAND to SILTY SAND	18	26	67		42.5
3.450	11.32	66.52	.65	SAND to SILTY SAND	17	24	65		42.0
3.600	11.81	38.07	.42	SILTY SAND to SANDY SILT	13	18	49		39.0
3.750	12.30	36.94	.62	SILTY SAND to SANDY SILT	12	17	48		38.5
3.900	12.80	68.15	.67	SAND to SILTY SAND	17	24	65		42.0
4.050	13.29	103.59	.55	SAND to SILTY SAND	26	35	77		43.5
4.200	13.78	86.47	.66	SAND to SILTY SAND	22	29	71		42.5
4.350	14.27	88.78	.84	SAND to SILTY SAND	22	29	72		42.5
4.500	14.76	150.80	1.11	SAND to SILTY SAND	38	49	87		44.5
4.650	15.26	259.61	.94	SAND	52	67	100		47.0
4.800	15.75	285.19	1.22	SAND	57	73	100		47.0
4.950	16.24	263.44	1.16	SAND	53	67	100		46.5
5.100	16.73	242.36	.78	SAND	48	61	99		46.5
5.250	17.22	151.28	.90	SAND	30	37	85		44.5
5.400	17.72	119.46	.75	SAND to SILTY SAND	30	37	78		43.0
5.550	18.21	110.35	.71	SAND to SILTY SAND	28	33	75		42.5
5.700	18.70	127.55	.79	SAND to SILTY SAND	32	38	79		43.5
5.850	19.19	204.38	.59	SAND	41	49	92		45.0
6.000	19.69	186.87	.44	SAND	37	44	90		44.5
6.150	20.18	147.16	.45	SAND	29	34	82		43.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
 ASSUMED TOTAL UNIT WT = 120 pcf
 ASSUMED DEPTH OF WATER TABLE = 5.0 ft
 N(60) = EQUIVALENT SPT VALUE (60% Energy)
 N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
 Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
 Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
 PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-01

DEPTH	DEPTH	TIP	FRICTION	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr	Su	PHI
(m)	(ft)	RESISTANCE (tsf)	RATIO (%)				(%)	(tsf)	(Degrees)
6.300	20.67	99.87	.79	SAND to SILTY SAND	25	29	71		42.0
6.450	21.16	88.91	.63	SAND to SILTY SAND	22	25	67		41.0
6.600	21.65	139.62	.24	SAND	28	32	80		43.0
6.750	22.15	37.65	1.25	SILTY SAND to SANDY SILT	13	14	42		37.0
6.900	22.64	88.99	.90	SAND to SILTY SAND	22	25	67		40.5
7.050	23.13	116.80	.93	SAND to SILTY SAND	29	32	74		42.0
7.200	23.62	133.35	1.04	SAND to SILTY SAND	33	36	78		42.5
7.350	24.11	140.75	1.05	SAND to SILTY SAND	35	38	79		43.0
7.500	24.61	142.13	1.04	SAND to SILTY SAND	36	38	79		43.0
7.650	25.10	140.75	.91	SAND to SILTY SAND	35	38	79		42.5
7.800	25.59	135.88	.93	SAND to SILTY SAND	34	36	77		42.5
7.950	26.08	132.42	.95	SAND to SILTY SAND	33	35	76		42.5
8.100	26.57	91.93	1.09	SAND to SILTY SAND	23	24	66		40.0
8.250	27.07	40.96	1.81	SANDY SILT to CLAYEY SILT	16	17		3.1	
8.400	27.56	19.91	2.71	CLAYEY SILT to SILTY CLAY	10	10		1.2	
8.550	28.05	58.15	1.53	SILTY SAND to SANDY SILT	19	20	52		38.0
8.700	28.54	31.29	1.73	SANDY SILT to CLAYEY SILT	13	13		2.4	
8.850	29.04	33.99	.26	SILTY SAND to SANDY SILT	11	11	36		36.0
9.000	29.53	493.94	1.01	SAND	99	98	100		47.0
9.150	30.02	606.35	.93	GRAVELLY SAND to SAND	100	100	100		
9.300	30.51	629.97	.78	GRAVELLY SAND to SAND	100	100	100		
9.450	31.00	512.02	.78	GRAVELLY SAND to SAND	85	83	100		47.0
9.600	31.50	535.99	.65	GRAVELLY SAND to SAND	89	87	100		
9.750	31.99	467.39	.67	GRAVELLY SAND to SAND	78	75	100		46.5
9.900	32.48	481.94	.81	GRAVELLY SAND to SAND	80	77	100		47.0
10.050	32.97	437.92	.93	SAND	88	83	100		46.5
10.200	33.46	464.26	.89	SAND	93	88	100		46.5
10.350	33.96	487.40	.81	GRAVELLY SAND to SAND	81	76	100		46.5
10.500	34.45	514.27	.74	GRAVELLY SAND to SAND	86	80	100		47.0
10.650	34.94	447.10	.91	SAND	89	83	100		46.5
10.800	35.43	404.20	1.04	SAND	81	75	100		46.0
10.950	35.93	317.19	1.29	SAND	63	58	98		45.0
11.100	36.42	503.61	.85	GRAVELLY SAND to SAND	84	76	100		46.5
11.250	36.91	559.31	.76	GRAVELLY SAND to SAND	93	84	100		
11.400	37.40	433.16	.61	GRAVELLY SAND to SAND	72	65	100		46.0
11.550	37.89	399.08	.94	SAND	80	71	100		45.5
11.700	38.39	450.92	1.04	SAND	90	80	100		46.0
11.850	38.88	679.75	.91	GRAVELLY SAND to SAND	100	100	100		
12.000	39.37	642.89	.96	GRAVELLY SAND to SAND	100	94	100		
12.150	39.86	635.20	.97	GRAVELLY SAND to SAND	100	93	100		
12.300	40.35	641.06	.96	GRAVELLY SAND to SAND	100	93	100		

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL

ASSUMED TOTAL UNIT WT = 120 pcf

ASSUMED DEPTH OF WATER TABLE = 5.0 ft

N(60) = EQUIVALENT SPT VALUE (60% Energy)

N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)

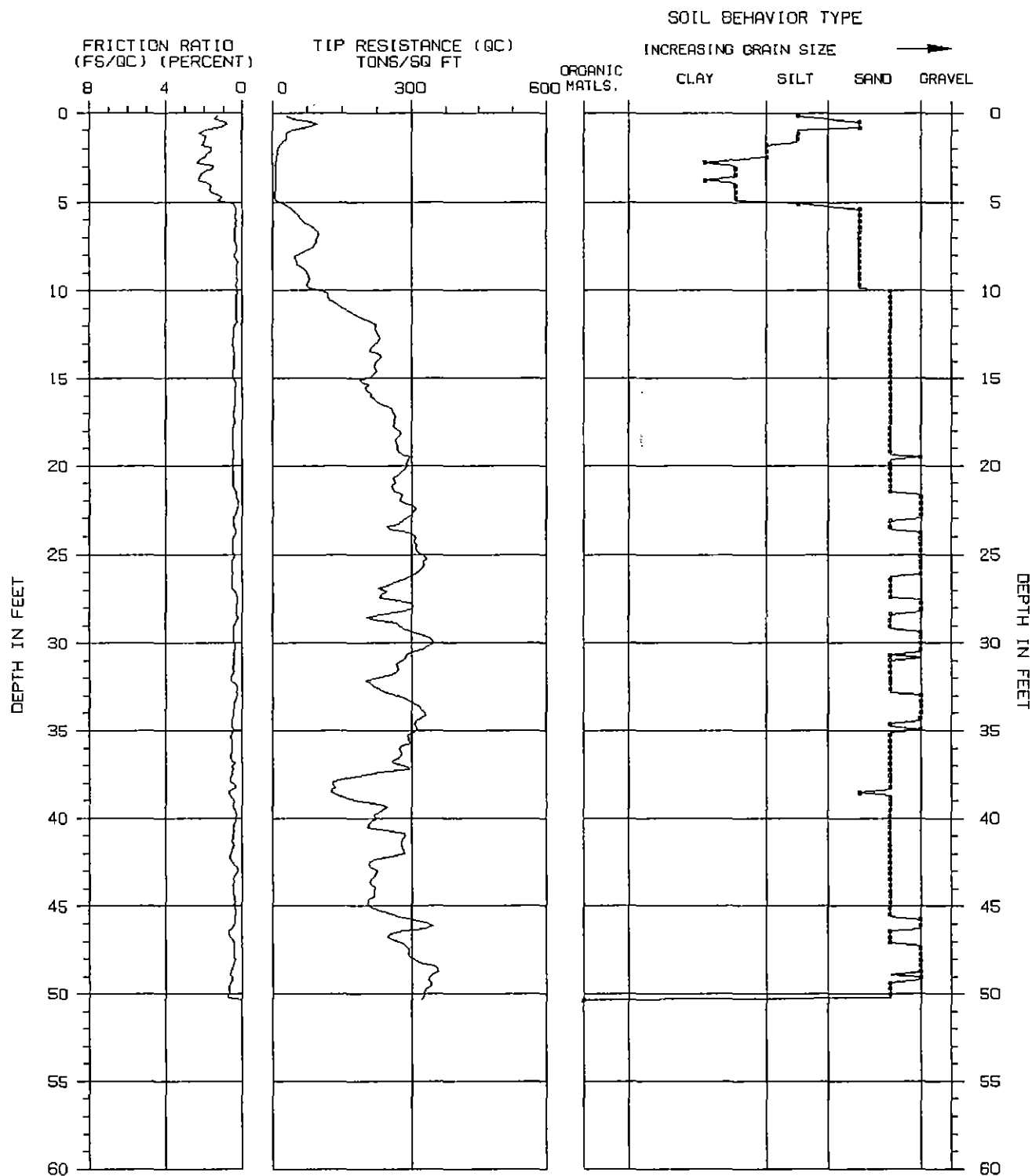
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY

Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH

PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.



TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

ASSUMED TOTAL UNIT WT = 120 PCF

ASSUMED DEPTH OF WATER TABLE = 5.0 FT

SOIL BEHAVIOR TYPE INTERPRETATIONS BASED ON: GUIDELINES FOR GEOTECHNICAL DESIGN USING THE CPT AND CPTU.
SOIL MECHANICS SERIES #120. UNIVERSITY OF BRITISH COLUMBIA, SEPTEMBER 1989. BY P.K. ROBERTSON AND R.G. CAMPANELLA.

CONE PENETRATION TEST

SOUNDING NUMBER: CPT-02

PROJECT NAME : L&ANTYLR-WOODROW

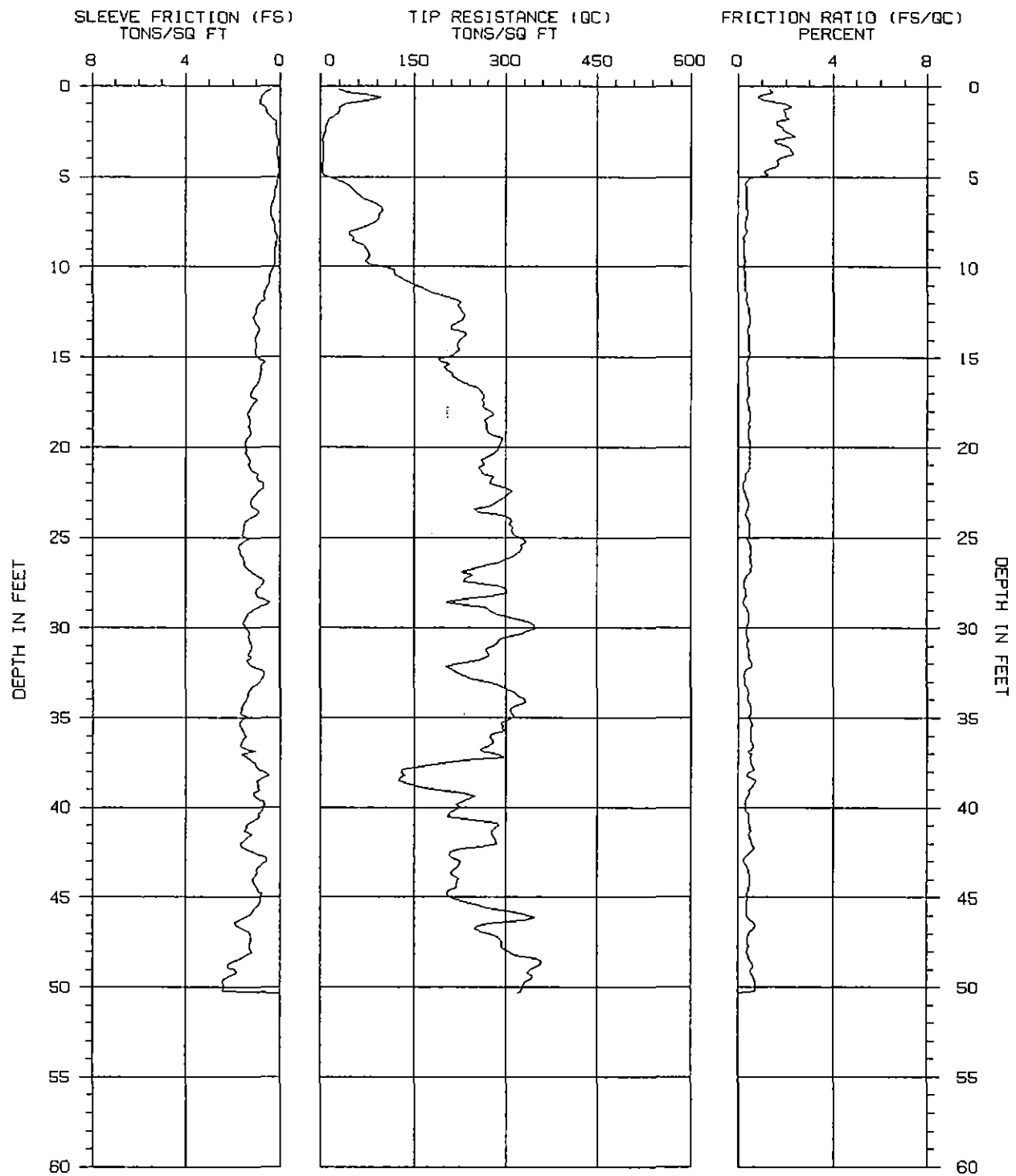
CONE/RIG : 469\#1

PROJECT NUMBER : 970011-001

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TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

CONE PENETRATION TEST

SOUNDING NUMBER: CPT-02

PROJECT NAME : L&A TYLER-WOODROW

CONE/RIG : 469\#1

PROJECT NUMBER : 970011-001

DATE/TIME: 11-04-96 08:42



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 * CPT INTERPRETATIONS *
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 * SOUNDING : CPT-02 PROJECT No.: 970011-001 *
 * PROJECT : L&A\TYLR-WOODROW CONE/RIG : 469\#1 *
 * DATE/TIME: 11-04-96 08:42 *
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 PAGE 1 of 3

DEPTH	DEPTH	TIP	FRICTION	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr	Su	PHI
(m)	(ft)	RESISTANCE (tsf)	RATIO (%)				(%)	(tsf)	(Degrees)
.150	.49	81.26	.91	SAND to SILTY SAND	20	32	70		
.300	.98	42.60	1.95	SANDY SILT to CLAYEY SILT	17	27		2.8	
.450	1.48	29.57	1.96	SANDY SILT to CLAYEY SILT	12	19		2.4	
.600	1.97	11.73	1.62	CLAYEY SILT to SILTY CLAY	6	9		.9	
.750	2.46	8.82	1.93	CLAYEY SILT to SILTY CLAY	4	7		.7	
.900	2.95	4.57	1.53	SENSITIVE FINE GRAINED	2	4		.4	
1.050	3.44	6.50	2.15	CLAY to SILTY CLAY	4	7		.5	
1.200	3.94	5.06	1.78	CLAY to SILTY CLAY	3	5		.4	
1.350	4.43	4.36	1.61	SENSITIVE FINE GRAINED	2	3		.4	
1.500	4.92	6.27	1.28	SENSITIVE FINE GRAINED	3	5		.6	
1.650	5.41	41.70	.34	SAND to SILTY SAND	10	17	51		42.0
1.800	5.91	58.23	.38	SAND to SILTY SAND	15	23	61		43.0
1.950	6.40	82.47	.36	SAND to SILTY SAND	21	33	71		44.5
2.100	6.89	99.00	.39	SAND to SILTY SAND	25	40	76		45.0
2.250	7.38	91.78	.35	SAND to SILTY SAND	23	37	74		44.5
2.400	7.87	63.37	.33	SAND to SILTY SAND	16	25	63		43.0
2.550	8.37	53.07	.24	SAND to SILTY SAND	13	21	58		42.0
2.700	8.86	70.15	.27	SAND to SILTY SAND	18	27	66		43.0
2.850	9.35	79.60	.29	SAND to SILTY SAND	20	31	70		43.5
3.000	9.84	79.54	.29	SAND to SILTY SAND	20	30	70		43.0
3.150	10.33	119.03	.32	SAND	24	35	81		45.0
3.300	10.83	139.94	.33	SAND	28	41	86		45.5
3.450	11.32	173.00	.35	SAND	35	50	92		46.0
3.600	11.81	214.36	.31	SAND	43	61	98		46.5
3.750	12.30	225.73	.45	SAND	45	63	100		47.0
3.900	12.80	229.93	.49	SAND	46	63	100		47.0
4.050	13.29	210.98	.45	SAND	42	57	97		46.5
4.200	13.78	233.74	.44	SAND	47	63	100		46.5
4.350	14.27	220.44	.47	SAND	44	59	98		46.5
4.500	14.76	217.46	.49	SAND	43	57	97		46.0
4.650	15.26	193.67	.35	SAND	39	50	93		46.0
4.800	15.75	203.44	.40	SAND	41	52	94		46.0
4.950	16.24	220.05	.40	SAND	44	56	96		46.0
5.100	16.73	252.83	.44	SAND	51	63	100		46.5
5.250	17.22	264.50	.47	SAND	53	66	100		46.5
5.400	17.72	260.91	.46	SAND	52	64	100		46.5
5.550	18.21	279.20	.49	SAND	56	68	100		46.5
5.700	18.70	267.75	.48	SAND	54	64	100		46.5
5.850	19.19	271.11	.46	SAND	54	64	100		46.5
6.000	19.69	293.52	.50	SAND	59	69	100		46.5
6.150	20.18	286.06	.50	SAND	57	67	100		46.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
 ASSUMED TOTAL UNIT WT = 120 pcf
 ASSUMED DEPTH OF WATER TABLE = 5.0 ft
 N(60) = EQUIVALENT SPT VALUE (60% Energy)
 N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
 Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
 Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
 PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-02

DEPTH	DEPTH	TIP	FRICTION	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr	Su	PHI
(m)	(ft)	RESISTANCE (tsf)	RATIO (%)				(%)	(tsf)	(Degrees)
6.300	20.67	260.65	.49	SAND	52	60	99		46.0
6.450	21.16	255.51	.51	SAND	51	58	98		46.0
6.600	21.65	280.20	.34	GRAVELLY SAND to SAND	47	53	100		46.0
6.750	22.15	283.45	.24	GRAVELLY SAND to SAND	47	53	100		46.0
6.900	22.64	302.91	.34	GRAVELLY SAND to SAND	50	56	100		46.0
7.050	23.13	281.13	.45	SAND	56	62	99		46.0
7.200	23.62	252.98	.35	SAND	51	55	96		45.5
7.350	24.11	309.32	.47	GRAVELLY SAND to SAND	52	56	100		46.0
7.500	24.61	309.11	.50	GRAVELLY SAND to SAND	52	55	100		46.0
7.650	25.10	326.17	.41	GRAVELLY SAND to SAND	54	58	100		46.0
7.800	25.59	326.96	.54	GRAVELLY SAND to SAND	54	58	100		46.0
7.950	26.08	307.94	.51	GRAVELLY SAND to SAND	51	54	100		46.0
8.100	26.57	262.71	.57	SAND	53	55	96		45.0
8.250	27.07	244.85	.41	SAND	49	51	94		45.0
8.400	27.56	258.83	.28	GRAVELLY SAND to SAND	43	44	95		45.0
8.550	28.05	300.87	.34	GRAVELLY SAND to SAND	50	51	99		45.5
8.700	28.54	202.76	.22	SAND	41	41	88		44.0
8.850	29.04	273.34	.43	SAND	55	55	96		45.0
9.000	29.53	321.18	.46	GRAVELLY SAND to SAND	54	53	100		45.5
9.150	30.02	347.63	.41	GRAVELLY SAND to SAND	58	57	100		46.0
9.300	30.51	302.31	.43	GRAVELLY SAND to SAND	50	50	98		45.5
9.450	31.00	279.90	.43	SAND	56	55	96		45.0
9.600	31.50	272.57	.49	SAND	55	53	95		44.5
9.750	31.99	225.00	.60	SAND	45	43	89		44.0
9.900	32.48	219.33	.31	SAND	44	42	88		44.0
10.050	32.97	259.85	.31	GRAVELLY SAND to SAND	43	41	93		44.5
10.200	33.46	305.33	.43	GRAVELLY SAND to SAND	51	48	97		45.0
10.350	33.96	330.23	.43	GRAVELLY SAND to SAND	55	52	99		45.5
10.500	34.45	310.58	.53	GRAVELLY SAND to SAND	52	48	97		45.0
10.650	34.94	313.30	.45	GRAVELLY SAND to SAND	52	48	98		45.0
10.800	35.43	294.45	.58	SAND	59	54	96		44.5
10.950	35.93	276.03	.55	SAND	55	51	94		44.5
11.100	36.42	277.92	.60	SAND	56	51	94		44.5
11.250	36.91	259.46	.41	SAND	52	47	91		44.0
11.400	37.40	230.25	.54	SAND	46	41	88		43.5
11.550	37.89	131.53	.66	SAND	26	24	72		40.5
11.700	38.39	127.92	.56	SAND	26	23	71		40.0
11.850	38.88	157.89	.58	SAND	32	28	77		41.5
12.000	39.37	248.05	.43	SAND	50	44	89		43.5
12.150	39.86	217.70	.31	SAND	44	38	85		43.0
12.300	40.35	206.27	.44	SAND	41	36	84		42.5
12.450	40.85	285.53	.46	SAND	57	49	93		44.0
12.600	41.34	277.39	.54	SAND	55	48	92		44.0
12.750	41.83	283.41	.54	SAND	57	49	92		44.0
12.900	42.32	226.13	.66	SAND	45	39	86		43.0
13.050	42.81	211.34	.27	SAND	42	36	84		42.5
13.200	43.31	219.31	.42	SAND	44	37	85		42.5
13.350	43.80	211.96	.49	SAND	42	36	83		42.5
13.500	44.29	218.52	.48	SAND	44	37	84		42.5
13.650	44.78	204.08	.38	SAND	41	34	82		42.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL

ASSUMED TOTAL UNIT WT = 120 pcf

ASSUMED DEPTH OF WATER TABLE = 5.0 ft

N(60) = EQUIVALENT SPT VALUE (60% Energy)

N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)

Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY

Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH

PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-02

DEPTH	DEPTH	TIP	FRICTION	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr	Su	PHI
(m)	(ft)	RESISTANCE (tsf)	RATIO (%)				(%)	(tsf)	(Degrees)
13.800	45.28	232.27	.37	SAND	46	38	86		42.5
13.950	45.77	303.10	.39	GRAVELLY SAND to SAND	51	42	93		44.0
14.100	46.26	330.23	.53	GRAVELLY SAND to SAND	55	45	96		44.0
14.250	46.75	247.52	.67	SAND	50	40	87		43.0
14.400	47.24	287.46	.43	GRAVELLY SAND to SAND	48	39	91		43.5
14.550	47.74	290.82	.44	GRAVELLY SAND to SAND	48	39	91		43.5
14.700	48.23	315.21	.46	GRAVELLY SAND to SAND	53	42	94		44.0
14.850	48.72	357.00	.62	GRAVELLY SAND to SAND	60	48	97		44.0
15.000	49.21	335.37	.56	GRAVELLY SAND to SAND	56	45	95		44.0
15.150	49.70	331.91	.73	SAND	66	53	95		44.0
15.300	50.20	325.41	.75	SAND	65	51	94		44.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL

ASSUMED TOTAL UNIT WT = 120 pcf

ASSUMED DEPTH OF WATER TABLE = 5.0 ft

N(60) = EQUIVALENT SPT VALUE (60% Energy)

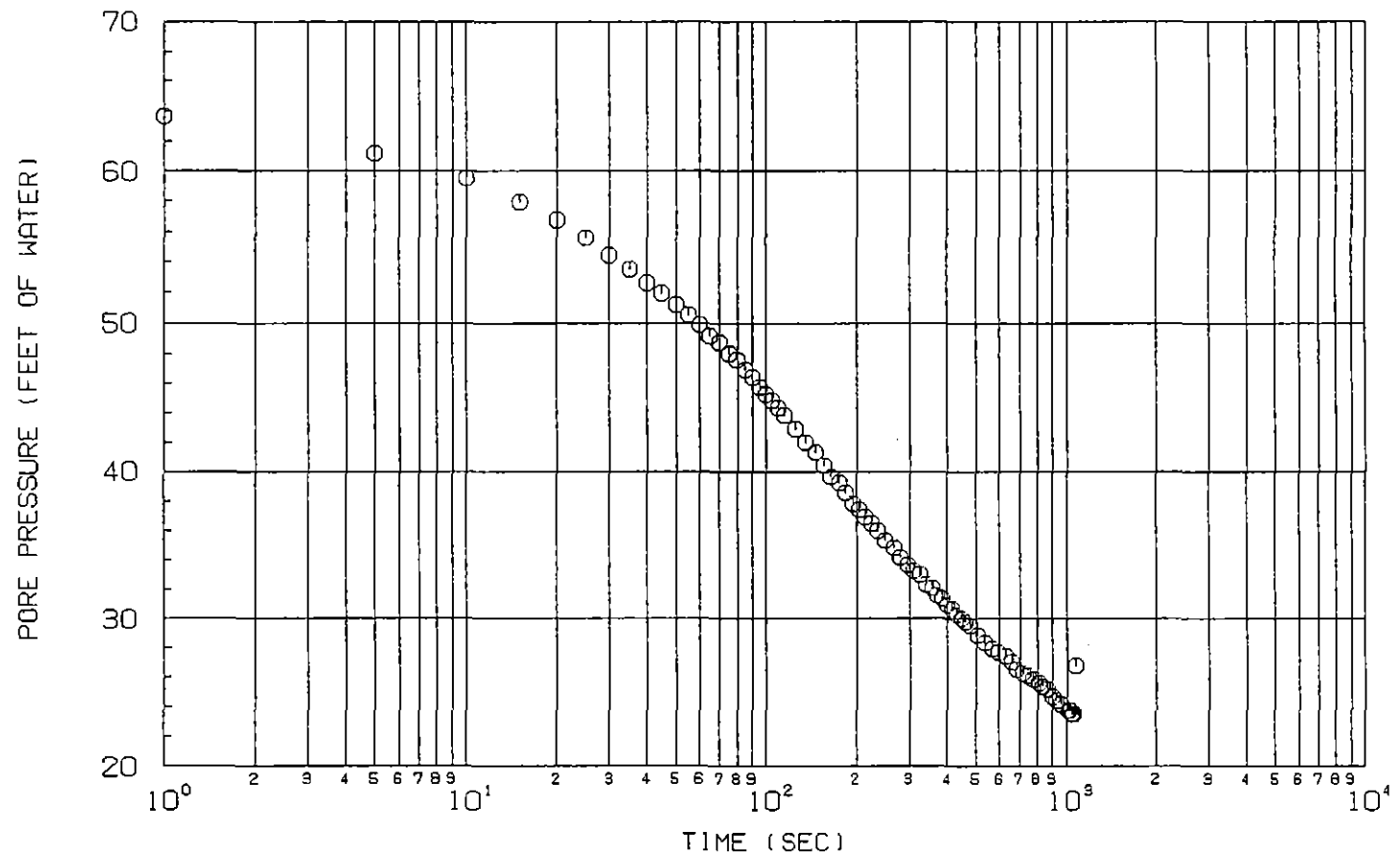
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)

Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY

Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH

PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

PORE PRESSURE DISSIPATION CURVES



DEPTH: 17.6 FT

TIP-SENSING PIEZOMETRIC CPT

SOUNDING NUMBER: CPT-02

PROJECT NAME : L&A\TYLR-WOODROW

CONE/RIG : 469\#1

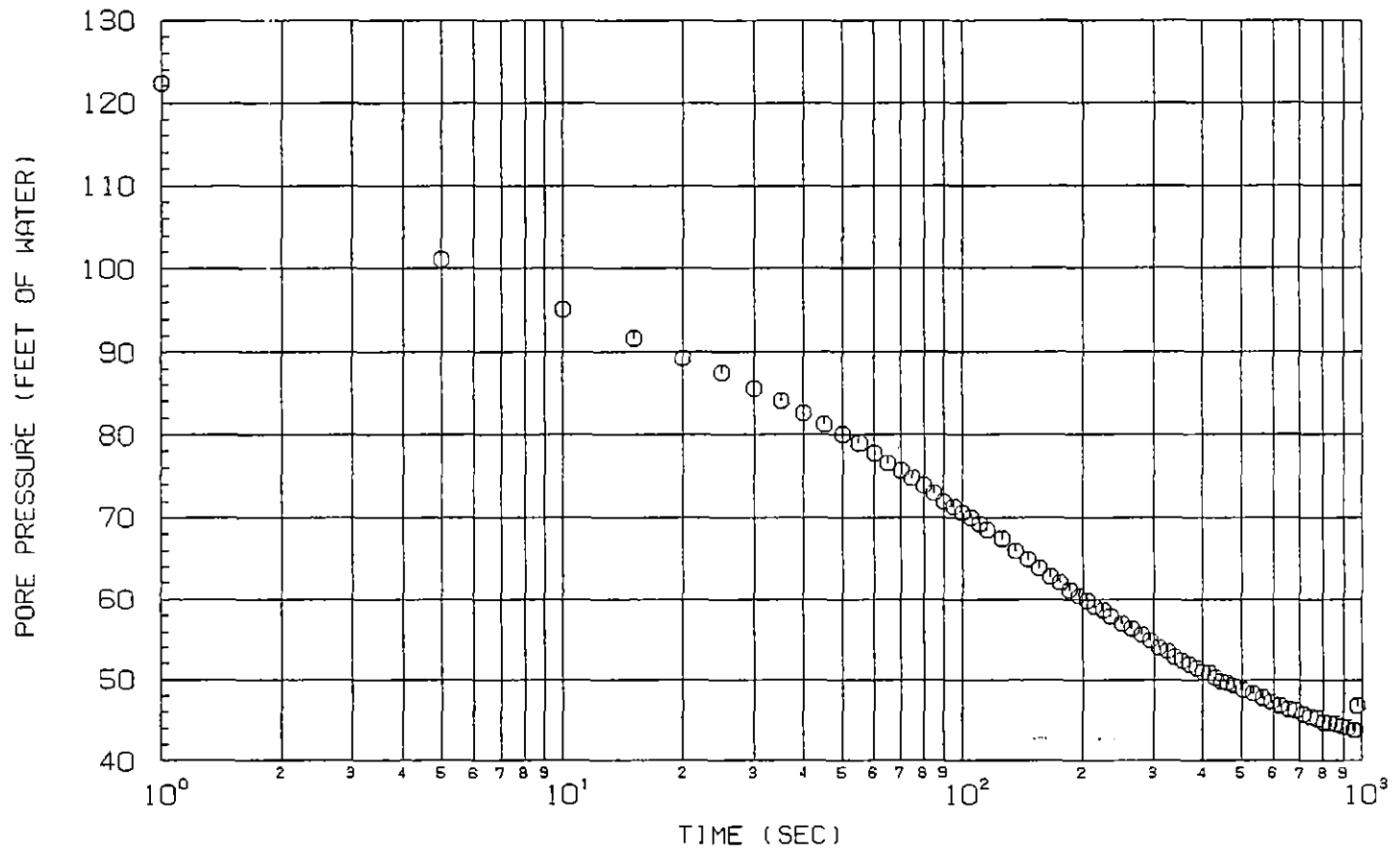
PROJECT NUMBER : 970011-001

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PORE PRESSURE DISSIPATION CURVES



DEPTH: 38.4 FT

TIP-SENSING PIEZOMETRIC CPT

SOUNDING NUMBER: CPT-02

PROJECT NAME : L&A\TYLR-WOODROW

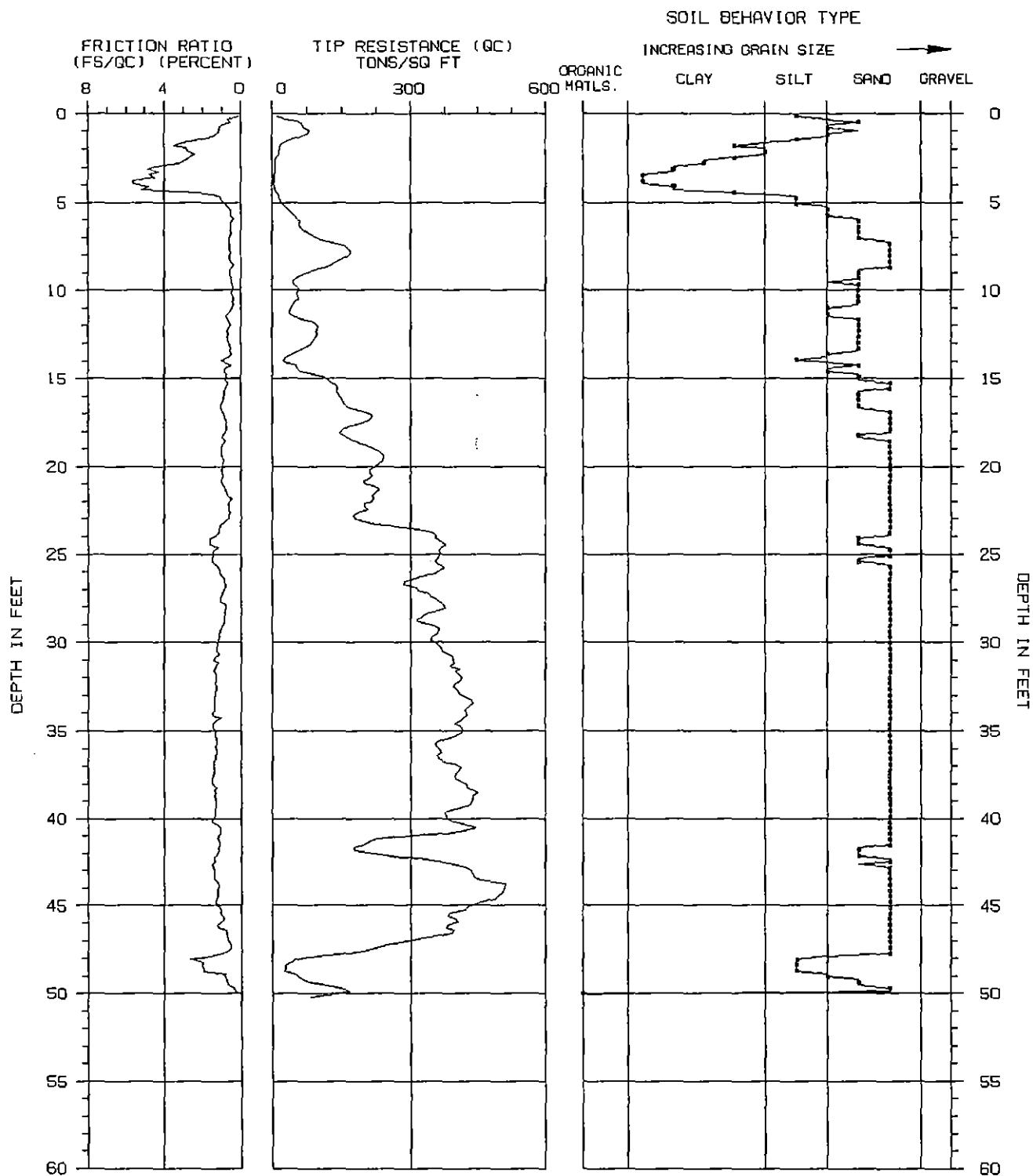
CONE/RIG : 469\pi1

PROJECT NUMBER : 970011-001

DATE/TIME: 11-04-96 08:42



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TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

ASSUMED TOTAL UNIT WT = 120 PCF

ASSUMED DEPTH OF WATER TABLE = 5.0 FT

SOIL BEHAVIOR TYPE INTERPRETATIONS BASED ON: GUIDELINES FOR GEOTECHNICAL DESIGN USING THE CPT AND CPTU.
SOIL MECHANICS SERIES #120. UNIVERSITY OF BRITISH COLUMBIA, SEPTEMBER 1989. BY P.K. ROBERTSON AND R.G. CAMPANELLA.

CONE PENETRATION TEST

SOUNDING NUMBER: CPT-03

PROJECT NAME : L&A\TYLR-WOODROW

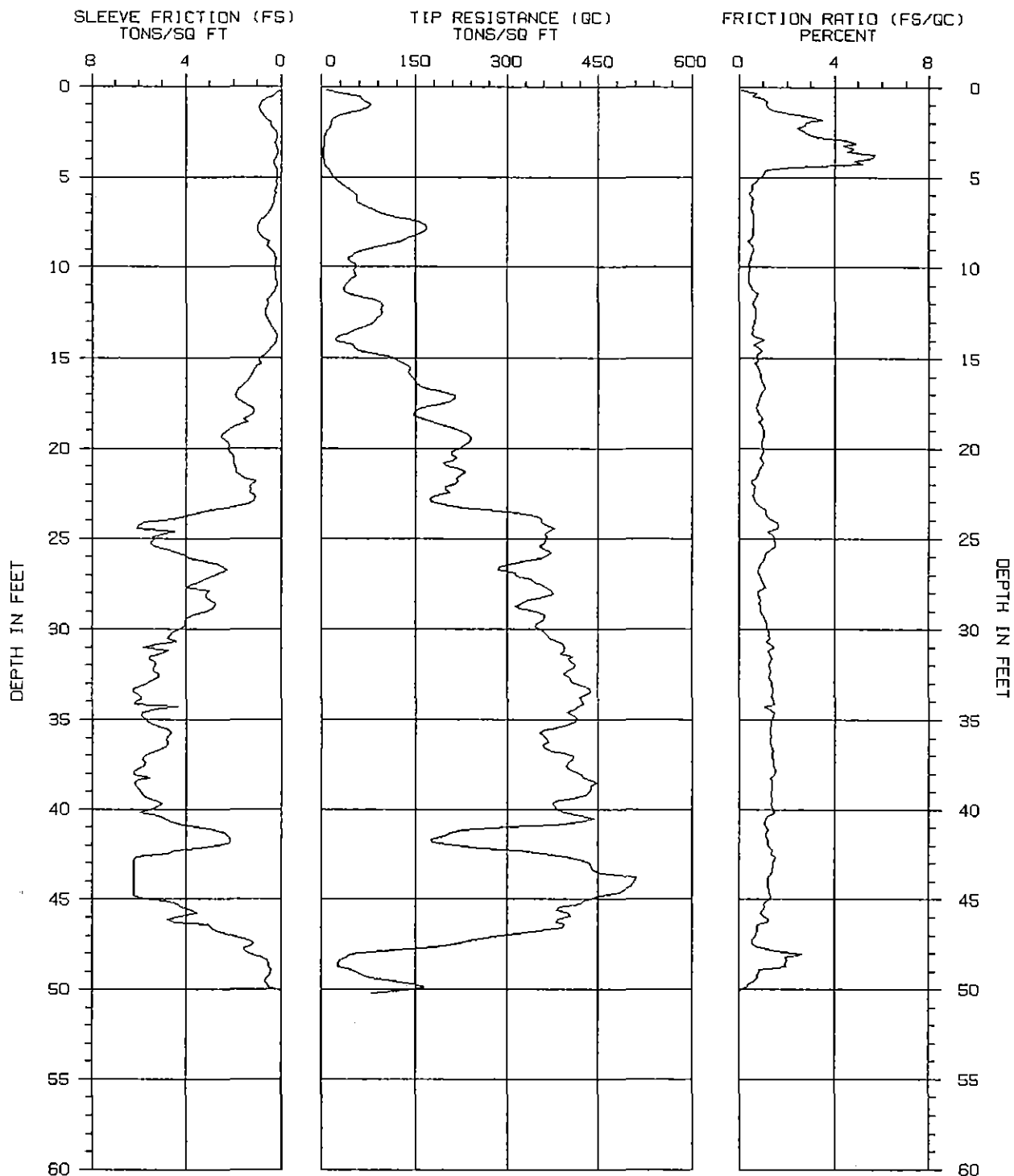
CONE/RIG : 469\#1

PROJECT NUMBER : 970011-001

DATE/TIME: 11-04-96 12:00



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TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

CONE PENETRATION TEST

SOUNDING NUMBER: CPT-03

PROJECT NAME : L&A\TYLR-WOODROW

CONE/RIG : 469\#1

PROJECT NUMBER : 970011-001

DATE/TIME: 11-04-96 12:00



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 * SOUNDING : CPT-03 PROJECT No.: 970011-001
 * PROJECT : L&A\TYLR-WOODROW CONE/RIG : 469\#1
 * DATE/TIME: 11-04-96 12:00
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PAGE 1 of 3

DEPTH	DEPTH	TIP	FRICTION	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr	Su	PHI
(m)	(ft)	RESISTANCE (tsf)	RATIO (%)				(%)	(tsf)	(Degrees)
.150	.49	62.93	.56	SAND to SILTY SAND	16	25	63		
.300	.98	78.31	1.14	SAND to SILTY SAND	20	31	69		
.450	1.48	37.96	2.13	SANDY SILT to CLAYEY SILT	15	24		2.5	
.600	1.97	16.27	2.83	CLAYEY SILT to SILTY CLAY	8	13		1.1	
.750	2.46	8.88	2.70	CLAY to SILTY CLAY	6	9		.7	
.900	2.95	4.91	4.48	CLAY	5	8		.3	
1.050	3.44	3.74	4.81	CLAY	4	6		.2	
1.200	3.94	4.12	5.58	CLAY	4	7		.3	
1.350	4.43	9.01	2.22	CLAY to SILTY CLAY	6	10		.7	
1.500	4.92	17.12	.99	SANDY SILT to CLAYEY SILT	7	11		1.3	
1.650	5.41	33.65	.53	SILTY SAND to SANDY SILT	11	18	45		40.5
1.800	5.91	53.05	.41	SAND to SILTY SAND	13	21	58		42.5
1.950	6.40	57.81	.55	SAND to SILTY SAND	14	23	61		43.0
2.100	6.89	87.89	.53	SAND to SILTY SAND	22	35	73		44.5
2.250	7.38	137.94	.60	SAND	28	44	86		46.0
2.400	7.87	169.15	.57	SAND	34	54	91		47.0
2.550	8.37	136.84	.56	SAND	27	43	85		46.0
2.700	8.86	93.07	.60	SAND to SILTY SAND	23	36	74		44.0
2.850	9.35	50.54	.51	SAND to SILTY SAND	13	19	57		41.0
3.000	9.84	56.09	.41	SAND to SILTY SAND	14	21	60		42.0
3.150	10.33	54.15	.42	SAND to SILTY SAND	14	20	59		41.5
3.300	10.83	43.91	.41	SAND to SILTY SAND	11	16	53		39.5
3.450	11.32	37.73	.69	SILTY SAND to SANDY SILT	13	18	48		39.0
3.600	11.81	87.17	.67	SAND to SILTY SAND	22	31	72		43.0
3.750	12.30	94.45	.70	SAND to SILTY SAND	24	33	75		43.5
3.900	12.80	88.78	.70	SAND to SILTY SAND	22	31	73		43.0
4.050	13.29	67.22	.57	SAND to SILTY SAND	17	23	64		41.5
4.200	13.78	27.55	.65	SILTY SAND to SANDY SILT	9	12	39		37.5
4.350	14.27	50.44	.57	SAND to SILTY SAND	13	17	55		39.5
4.500	14.76	85.79	.77	SAND to SILTY SAND	21	28	70		42.5
4.650	15.26	128.59	.65	SAND	26	33	82		44.0
4.800	15.75	138.32	.86	SAND to SILTY SAND	35	44	83		44.0
4.950	16.24	149.22	.94	SAND to SILTY SAND	37	47	85		44.5
5.100	16.73	168.28	1.08	SAND to SILTY SAND	42	53	88		45.0
5.250	17.22	214.13	.86	SAND	43	53	95		46.0
5.400	17.72	162.37	.74	SAND	32	40	87		44.5
5.550	18.21	146.44	.92	SAND to SILTY SAND	37	44	83		44.0
5.700	18.70	191.82	.95	SAND	38	46	91		45.0
5.850	19.19	234.35	1.05	SAND	47	56	96		46.0
6.000	19.69	237.52	.93	SAND	48	56	96		46.0
6.150	20.18	209.01	1.05	SAND	42	49	92		45.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
 ASSUMED TOTAL UNIT WT = 120 pcf
 ASSUMED DEPTH OF WATER TABLE = 5.0 ft
 N(60) = EQUIVALENT SPT VALUE (60% Energy)
 N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
 Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
 Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
 PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-03

DEPTH	DEPTH	TIP	FRICTION	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr	Su	PHI
(m)	(ft)	RESISTANCE (tsf)	RATIO (%)				(%)	(tsf)	(Degrees)
6.300	20.67	209.67	.96	SAND	42	48	92		45.0
6.450	21.16	223.88	.86	SAND	45	51	94		45.5
6.600	21.65	216.14	.72	SAND	43	49	93		45.0
6.750	22.15	198.89	.66	SAND	40	45	90		44.5
6.900	22.64	183.83	.60	SAND	37	41	87		44.0
7.050	23.13	195.20	.80	SAND	39	43	89		44.5
7.200	23.62	314.85	1.11	SAND	63	69	100		46.0
7.350	24.11	356.87	1.63	SAND to SILTY SAND	89	97	100		46.5
7.500	24.61	368.70	1.21	SAND	74	79	100		46.5
7.650	25.10	362.76	1.48	SAND	73	77	100		46.5
7.800	25.59	359.55	1.35	SAND	72	76	100		46.5
7.950	26.08	354.94	1.08	SAND	71	75	100		46.5
8.100	26.57	286.55	.85	SAND	57	60	98		45.5
8.250	27.07	315.40	.92	SAND	63	65	100		46.0
8.400	27.56	356.51	1.06	SAND	71	73	100		46.0
8.550	28.05	376.80	.84	SAND	75	77	100		46.5
8.700	28.54	323.98	.85	SAND	65	66	100		46.0
8.850	29.04	345.67	.91	SAND	69	69	100		46.0
9.000	29.53	358.72	1.12	SAND	72	72	100		46.0
9.150	30.02	356.89	1.22	SAND	71	71	100		46.0
9.300	30.51	369.04	1.30	SAND	74	73	100		46.0
9.450	31.00	394.01	1.47	SAND	79	77	100		46.0
9.600	31.50	408.58	1.36	SAND	82	79	100		46.5
9.750	31.99	413.72	1.28	SAND	83	80	100		46.5
9.900	32.48	392.69	1.31	SAND	79	75	100		46.0
10.050	32.97	408.54	1.37	SAND	82	78	100		46.0
10.200	33.46	438.17	1.41	SAND	88	83	100		46.5
10.350	33.96	423.26	1.44	SAND	85	79	100		46.0
10.500	34.45	410.75	1.30	SAND	82	77	100		46.0
10.650	34.94	415.38	1.39	SAND	83	77	100		46.0
10.800	35.43	381.00	1.32	SAND	76	70	100		46.0
10.950	35.93	359.10	1.32	SAND	72	66	100		45.5
11.100	36.42	357.61	1.34	SAND	72	65	100		45.5
11.250	36.91	394.58	1.40	SAND	79	71	100		46.0
11.400	37.40	401.31	1.43	SAND	80	72	100		46.0
11.550	37.89	410.49	1.51	SAND	82	74	100		46.0
11.700	38.39	434.63	1.38	SAND	87	77	100		46.0
11.850	38.88	438.13	1.37	SAND	88	78	100		46.0
12.000	39.37	410.07	1.37	SAND	82	72	100		45.5
12.150	39.86	379.22	1.37	SAND	76	66	100		45.5
12.300	40.35	421.56	1.22	SAND	84	73	100		45.5
12.450	40.85	380.22	1.09	SAND	76	66	100		45.0
12.600	41.34	206.46	1.14	SAND	41	36	83		42.5
12.750	41.83	176.99	1.21	SAND to SILTY SAND	44	38	79		42.0
12.900	42.32	317.69	1.41	SAND	64	54	96		44.5
13.050	42.81	419.54	1.48	SAND	84	71	100		45.5
13.200	43.31	439.47	1.41	SAND	88	74	100		45.5
13.350	43.80	511.00	1.21	SAND	100	86	100		46.0
13.500	44.29	501.97	1.23	SAND	100	84	100		46.0
13.650	44.78	454.85	1.36	SAND	91	76	100		45.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL

ASSUMED TOTAL UNIT WT = 120 pcf

ASSUMED DEPTH OF WATER TABLE = 5.0 ft

N(60) = EQUIVALENT SPT VALUE (60% Energy)

N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)

Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY

Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH

PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.

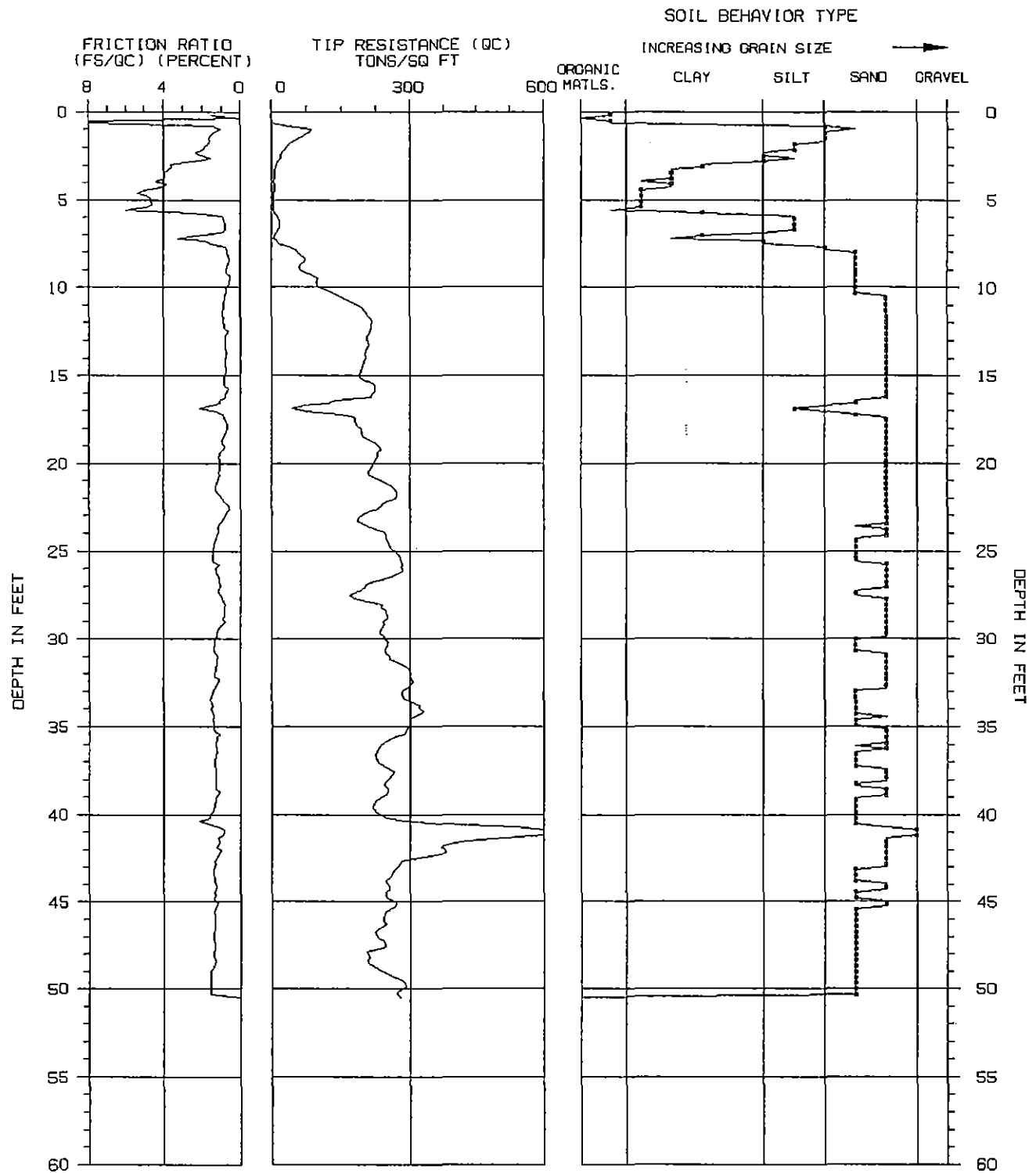
SOUNDING : CPT-03

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	421.50	1.03	SAND	84	70	100		45.0
13.950	45.77	400.97	.88	SAND	80	66	100		45.0
14.100	46.26	380.94	1.17	SAND	76	62	100		44.5
14.250	46.75	353.41	.78	SAND	71	58	97		44.5
14.400	47.24	245.21	.55	SAND	49	40	87		42.5
14.550	47.74	162.37	.97	SAND	32	26	75		40.5
14.700	48.23	40.60	1.92	SANDY SILT to CLAYEY SILT	16	13		2.5	
14.850	48.72	26.56	1.96	SANDY SILT to CLAYEY SILT	11	9		1.9	
15.000	49.21	63.97	.77	SAND to SILTY SAND	16	13	48		36.5
15.150	49.70	145.89	.40	SAND	29	23	71		39.5
15.300	50.20	81.07	*****		0	0			44.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
 ASSUMED TOTAL UNIT WT = 120 pcf
 ASSUMED DEPTH OF WATER TABLE = 5.0 ft
 N(60) = EQUIVALENT SPT VALUE (60% Energy)
 N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
 Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
 Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
 PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.



TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

ASSUMED TOTAL UNIT WT = 120 PCF

ASSUMED DEPTH OF WATER TABLE = 5.0 FT

SOIL BEHAVIOR TYPE INTERPRETATIONS BASED ON: GUIDELINES FOR GEOTECHNICAL DESIGN USING THE CPT AND CPTU.
SOIL MECHANICS SERIES #120, UNIVERSITY OF BRITISH COLUMBIA, SEPTEMBER 1989, BY P.K. ROBERTSON AND R.D. CAMPANELLA.

CONE PENETRATION TEST

SOUNDING NUMBER: CPT-04

PROJECT NAME : L&A\TYLR-WOODROW

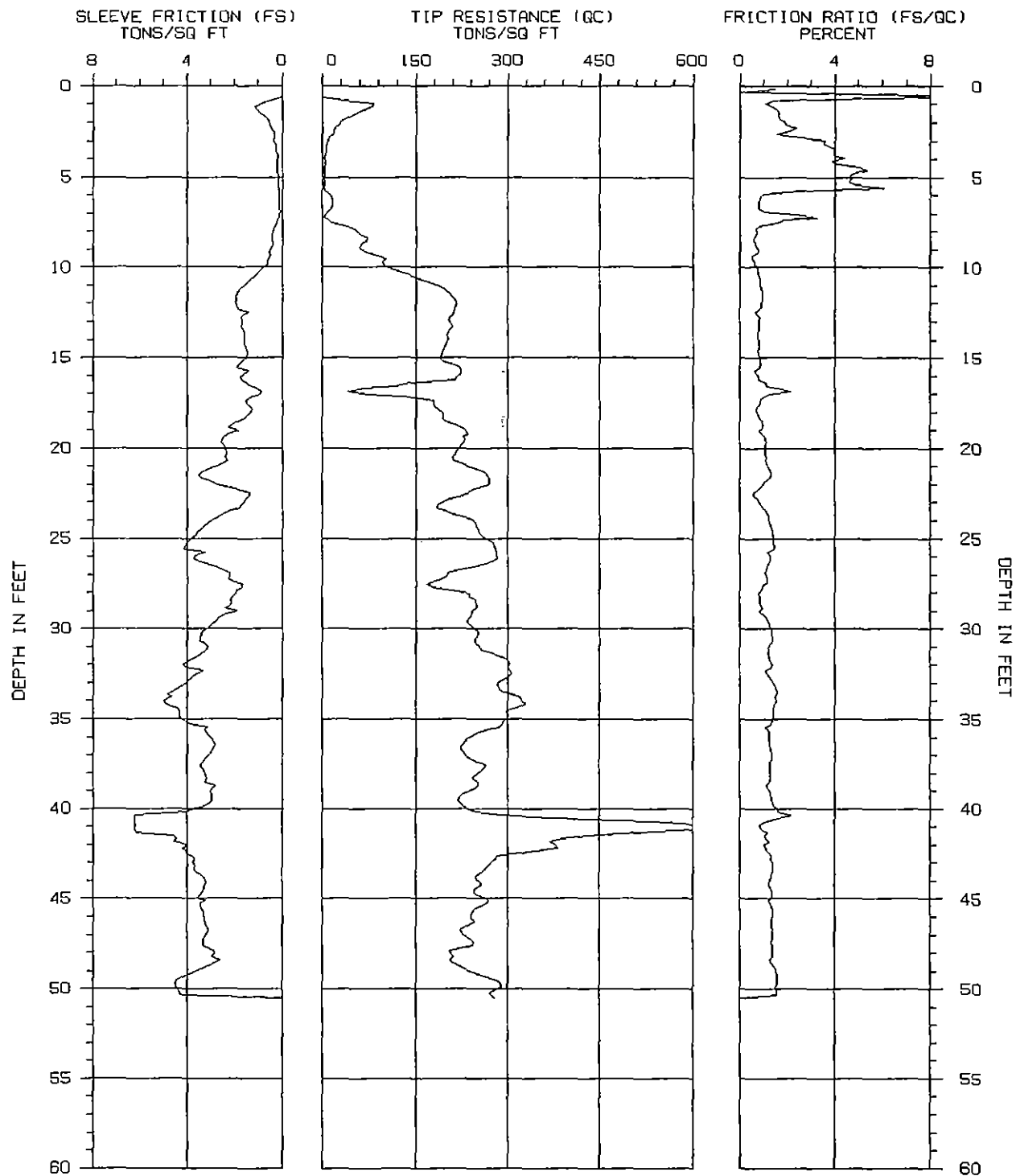
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PROJECT NUMBER : 970011-001

DATE/TIME: 11-04-96 11:19



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TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

CONE PENETRATION TEST

SOUNDING NUMBER: CPT-04

PROJECT NAME : L&A\TYLR-WOODROW

CONE/RIG : 469\#1

PROJECT NUMBER : 970011-001

DATE/TIME: 11-04-96 11:19



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 * **CPT INTERPRETATIONS** *
 *
 * SOUNDING : CPT-04 PROJECT No.: 970011-001 *
 * PROJECT : L&A\TYLR-WOODROW CONE/RIG : 469\#1 *
 * DATE/TIME: 11-04-96 11:19 *
 *

PAGE 1 of 3

DEPTH	DEPTH	TIP	FRICTION	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr	Su	PHI
(m)	(ft)	RESISTANCE (tsf)	RATIO (%)				(%)	(tsf)	(Degrees)
.150	.49	.06	12.00	ORGANIC MATERIAL	0	0		.0	
.300	.98	82.43	1.08	SAND to SILTY SAND	21	33	71		
.450	1.48	55.90	1.68	SILTY SAND to SANDY SILT	19	30	60		48.0
.600	1.97	31.27	1.87	SANDY SILT to CLAYEY SILT	13	20		2.5	
.750	2.46	19.12	2.06	CLAYEY SILT to SILTY CLAY	10	15		1.5	
.900	2.95	9.92	3.62	CLAY	10	16		.6	
1.050	3.44	6.54	3.96	CLAY	7	10		.4	
1.200	3.94	3.65	4.41	CLAY	4	6		.2	
1.350	4.43	4.61	5.03	CLAY	5	7		.3	
1.500	4.92	3.97	4.69	CLAY	4	6		.2	
1.650	5.41	3.25	4.91	CLAY	3	5		.2	
1.800	5.91	13.02	.97	SANDY SILT to CLAYEY SILT	5	8		1.3	
1.950	6.40	16.87	.84	SANDY SILT to CLAYEY SILT	7	11		1.6	
2.100	6.89	10.60	1.03	CLAYEY SILT to SILTY CLAY	5	8		1.0	
2.250	7.38	11.24	1.84	CLAYEY SILT to SILTY CLAY	6	9		.9	
2.400	7.87	51.56	.70	SILTY SAND to SANDY SILT	17	27	57		42.0
2.550	8.37	71.66	.60	SAND to SILTY SAND	18	28	67		43.0
2.700	8.86	59.87	.70	SAND to SILTY SAND	15	23	62		42.5
2.850	9.35	89.59	.57	SAND to SILTY SAND	22	34	73		44.0
3.000	9.84	99.21	.62	SAND to SILTY SAND	25	37	76		44.0
3.150	10.33	130.55	.77	SAND to SILTY SAND	33	48	84		45.0
3.300	10.83	169.68	.87	SAND	34	50	91		46.0
3.450	11.32	200.74	.93	SAND	40	58	96		46.5
3.600	11.81	213.11	.92	SAND	43	61	98		46.5
3.750	12.30	213.04	.87	SAND	43	60	98		46.5
3.900	12.80	205.22	.84	SAND	41	57	97		46.5
4.050	13.29	210.54	.81	SAND	42	57	97		46.5
4.200	13.78	200.57	.79	SAND	40	54	95		46.0
4.350	14.27	198.38	.80	SAND	40	53	95		46.0
4.500	14.76	192.61	.77	SAND	39	51	94		46.0
4.650	15.26	198.85	.86	SAND	40	52	94		46.0
4.800	15.75	222.92	.63	SAND	45	57	97		46.0
4.950	16.24	213.15	.79	SAND	43	54	95		46.0
5.100	16.73	67.35	1.55	SILTY SAND to SANDY SILT	22	28	62		40.5
5.250	17.22	146.70	.93	SAND to SILTY SAND	37	45	84		44.0
5.400	17.72	180.56	.73	SAND	36	44	90		45.0
5.550	18.21	193.03	.75	SAND	39	47	91		45.0
5.700	18.70	214.21	.98	SAND	43	51	94		45.5
5.850	19.19	235.86	.95	SAND	47	56	96		46.0
6.000	19.69	228.04	1.12	SAND	46	54	95		45.5
6.150	20.18	215.55	1.08	SAND	43	50	93		45.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
 ASSUMED TOTAL UNIT WT = 120 pcf
 ASSUMED DEPTH OF WATER TABLE = 5.0 ft
 N(60) = EQUIVALENT SPT VALUE (60% Energy)
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 PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-04

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	211.30	1.10	SAND	42	49	93		45.0
6.450	21.16	248.25	1.26	SAND	50	57	97		46.0
6.600	21.65	270.60	1.24	SAND	54	61	99		46.0
6.750	22.15	257.87	.91	SAND	52	58	97		46.0
6.900	22.64	226.75	.61	SAND	45	50	93		45.0
7.050	23.13	185.32	.92	SAND	37	41	87		44.0
7.200	23.62	205.39	1.19	SAND to SILTY SAND	51	56	90		44.5
7.350	24.11	246.38	1.27	SAND	49	53	95		45.0
7.500	24.61	254.09	1.39	SAND to SILTY SAND	64	68	96		45.5
7.650	25.10	268.41	1.43	SAND to SILTY SAND	67	72	97		45.5
7.800	25.59	280.54	1.47	SAND to SILTY SAND	70	74	98		45.5
7.950	26.08	284.06	1.32	SAND	57	60	98		45.5
8.100	26.57	245.27	1.15	SAND	49	51	94		45.0
8.250	27.07	200.51	1.10	SAND	40	41	88		44.0
8.400	27.56	167.09	1.01	SAND to SILTY SAND	42	43	82		43.0
8.550	28.05	239.13	.82	SAND	48	49	92		44.5
8.700	28.54	248.22	.86	SAND	50	50	93		44.5
8.850	29.04	241.34	.79	SAND	48	48	92		44.5
9.000	29.53	233.82	1.17	SAND	47	47	91		44.5
9.150	30.02	244.63	1.33	SAND to SILTY SAND	61	61	92		44.5
9.300	30.51	248.01	1.39	SAND to SILTY SAND	62	61	93		44.5
9.450	31.00	255.64	1.22	SAND	51	50	93		44.5
9.600	31.50	285.08	1.25	SAND	57	55	96		45.0
9.750	31.99	303.29	1.37	SAND	61	58	98		45.0
9.900	32.48	306.31	1.17	SAND	61	59	98		45.0
10.050	32.97	285.38	1.40	SAND to SILTY SAND	71	68	96		44.5
10.200	33.46	288.61	1.59	SAND to SILTY SAND	72	68	96		44.5
10.350	33.96	321.43	1.54	SAND to SILTY SAND	80	75	99		45.0
10.500	34.45	310.64	1.42	SAND	62	58	97		45.0
10.650	34.94	299.49	1.43	SAND to SILTY SAND	75	69	96		44.5
10.800	35.43	286.63	1.10	SAND	57	53	95		44.5
10.950	35.93	243.23	1.27	SAND	49	45	90		44.0
11.100	36.42	226.43	1.26	SAND to SILTY SAND	57	52	88		43.5
11.250	36.91	227.91	1.33	SAND to SILTY SAND	57	52	88		43.5
11.400	37.40	252.49	1.32	SAND	50	45	91		44.0
11.550	37.89	256.11	1.29	SAND	51	46	91		44.0
11.700	38.39	245.44	1.31	SAND to SILTY SAND	61	55	89		43.5
11.850	38.88	246.86	1.20	SAND	49	44	89		43.5
12.000	39.37	219.88	1.34	SAND to SILTY SAND	55	48	86		43.0
12.150	39.86	226.07	1.46	SAND to SILTY SAND	57	49	87		43.0
12.300	40.35	289.44	2.14	SAND to SILTY SAND	72	63	93		44.0
12.450	40.85	713.17	.87	GRAVELLY SAND to SAND	100	100	100		
12.600	41.34	512.53	1.20	SAND	100	88	100		46.5
12.750	41.83	368.89	1.24	SAND	74	63	100		45.0
12.900	42.32	358.10	1.13	SAND	72	61	99		45.0
13.050	42.81	279.24	1.32	SAND	56	47	92		44.0
13.200	43.31	263.67	1.39	SAND to SILTY SAND	66	56	90		43.5
13.350	43.80	247.88	1.34	SAND to SILTY SAND	62	52	88		43.0
13.500	44.29	256.13	1.28	SAND	51	43	89		43.0
13.650	44.78	250.16	1.39	SAND to SILTY SAND	63	52	88		43.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL

ASSUMED TOTAL UNIT WT = 120 pcf

ASSUMED DEPTH OF WATER TABLE = 5.0 ft

N(60) = EQUIVALENT SPT VALUE (60% Energy)

N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)

Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY

Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH

PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-04

DEPTH	DEPTH	TIP	FRICTION	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr	Su	PHI
(m)	(ft)	RESISTANCE (tsf)	RATIO (%)				(%)	(tsf)	(Degrees)
13.800	45.28	266.56	1.30	SAND	53	44	90		43.5
13.950	45.77	241.87	1.37	SAND to SILTY SAND	60	50	87		43.0
14.100	46.26	246.18	1.33	SAND to SILTY SAND	62	50	87		43.0
14.250	46.75	223.86	1.38	SAND to SILTY SAND	56	46	84		42.5
14.400	47.24	239.49	1.38	SAND to SILTY SAND	60	49	86		42.5
14.550	47.74	230.80	1.37	SAND to SILTY SAND	58	47	85		42.5
14.700	48.23	211.41	1.40	SAND to SILTY SAND	53	43	82		42.0
14.850	48.72	221.14	1.43	SAND to SILTY SAND	55	44	83		42.0
15.000	49.21	252.07	1.57	SAND to SILTY SAND	63	50	87		42.5
15.150	49.70	288.82	1.56	SAND to SILTY SAND	72	57	91		43.5
15.300	50.20	272.32	1.59	SAND to SILTY SAND	68	54	89		43.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL

ASSUMED TOTAL UNIT WT = 120 pcf

ASSUMED DEPTH OF WATER TABLE = 5.0 ft

N(60) = EQUIVALENT SPT VALUE (60% Energy)

N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)

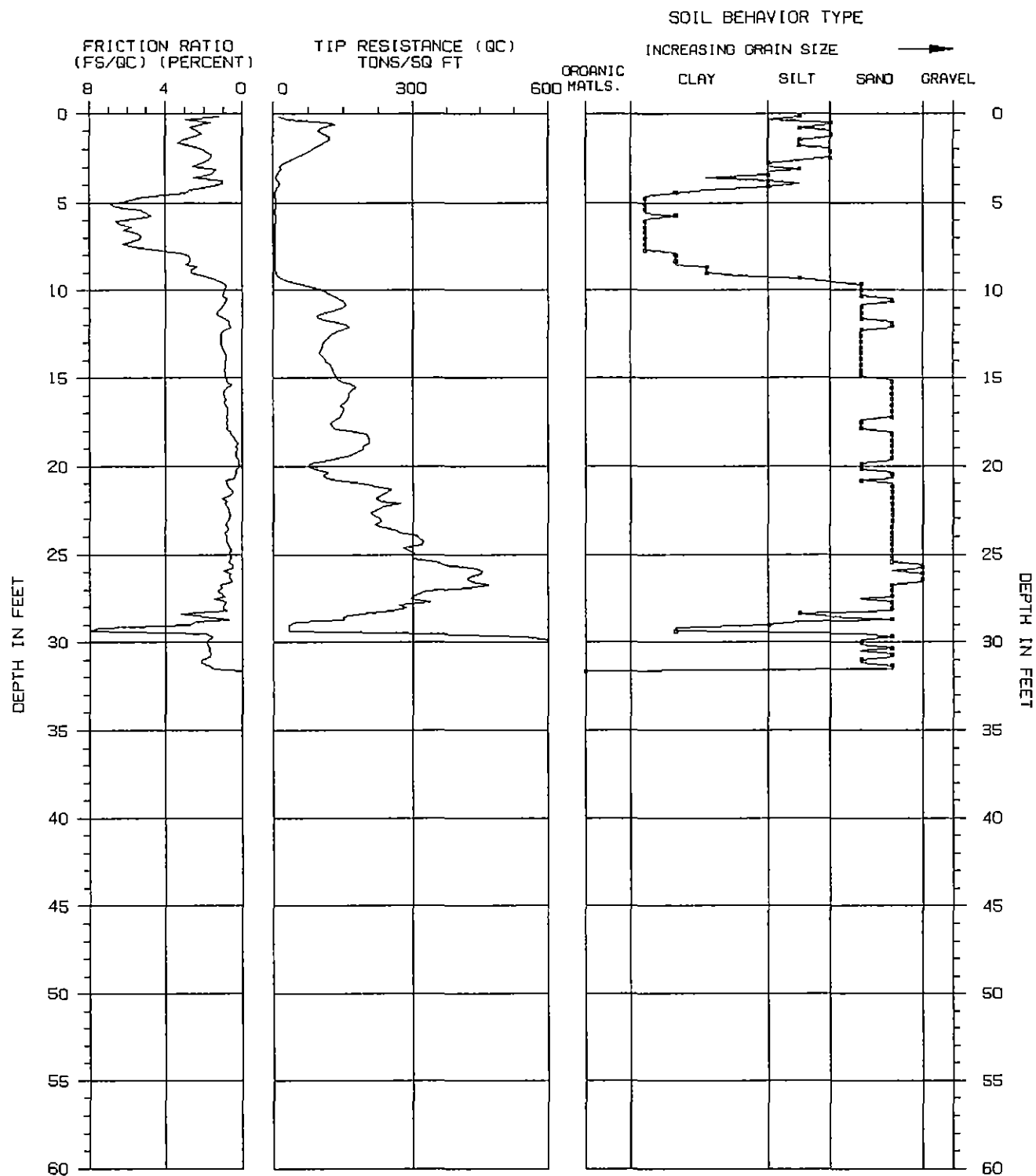
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY

Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH

PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.



TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

ASSUMED TOTAL UNIT WT = 120 PCF

ASSUMED DEPTH OF WATER TABLE = 5.0 FT

SOIL BEHAVIOR TYPE INTERPRETATIONS BASED ON: GUIDELINES FOR GEOTECHNICAL DESIGN USING THE CPT AND CPTU.
SOIL MECHANICS SERIES #120, UNIVERSITY OF BRITISH COLUMBIA, SEPTEMBER 1989, BY P.K. ROBERTSON AND R.G. CAMPANELLA.

CONE PENETRATION TEST

SOUNDING NUMBER: CPT-05

PROJECT NAME : L&A\TYLR-WOODROW

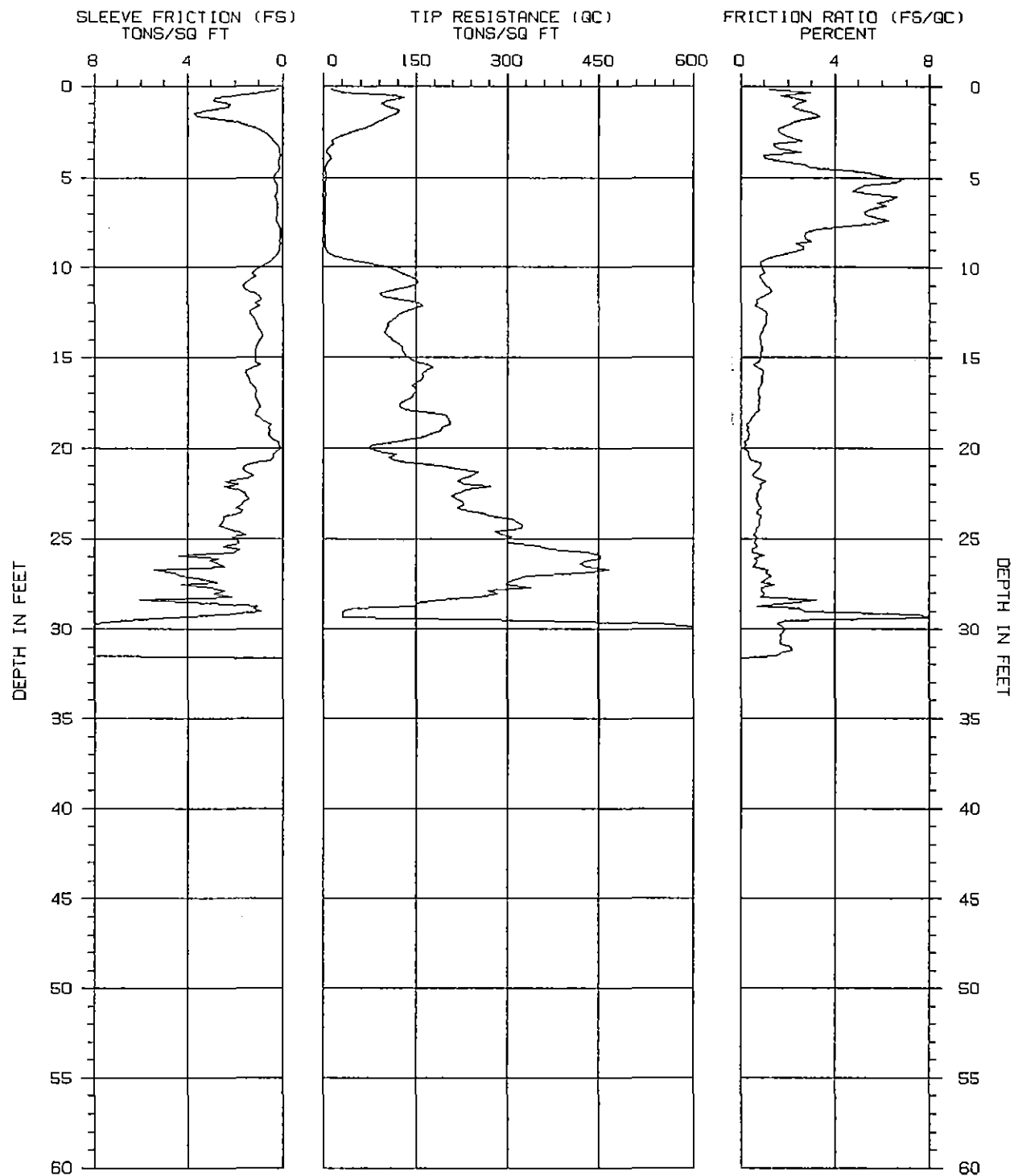
CONE/RIG : 469\#1

PROJECT NUMBER : 970011-001

DATE/TIME: 11-04-96 14:38



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TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

CONE PENETRATION TEST

SOUNDING NUMBER: CPT-05

PROJECT NAME : L&A\TYLR-WOODROW

CONE/RIG : 469\#1

PROJECT NUMBER : 970011-001

DATE/TIME: 11-04-96 14:38



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 * CPT INTERPRETATIONS *
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 * SOUNDING : CPT-05 PROJECT No.: 970011-001 *
 * PROJECT : L&A\TYLR-WOODROW CONE/RIG : 469\#1 *
 * DATE/TIME: 11-04-96 14:38 *
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PAGE 1 of 2

DEPTH	DEPTH	TIP	FRICTION	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr	Su	PHI
(m)	(ft)	RESISTANCE (tsf)	RATIO (%)				(%)	(tsf)	(Degrees)
.150	.49	115.17	1.69	SILTY SAND to SANDY SILT	38	61	80		
.300	.98	94.14	2.37	SILTY SAND to SANDY SILT	31	50	75		
.450	1.48	120.16	3.11	SANDY SILT to CLAYEY SILT	48	77		7.1	
.600	1.97	87.19	2.21	SILTY SAND to SANDY SILT	29	46	72		49.0
.750	2.46	48.59	1.62	SILTY SAND to SANDY SILT	16	26	56		46.0
.900	2.95	14.62	2.58	CLAYEY SILT to SILTY CLAY	7	12		1.0	
1.050	3.44	8.05	1.68	CLAYEY SILT to SILTY CLAY	4	6		.6	
1.200	3.94	14.74	1.05	SANDY SILT to CLAYEY SILT	6	9		1.2	
1.350	4.43	4.06	2.95	CLAY	4	6		.3	
1.500	4.92	6.22	6.00	CLAY	6	10		.4	
1.650	5.41	4.38	5.30	CLAY	4	7		.3	
1.800	5.91	4.91	5.68	CLAY	5	8		.3	
1.950	6.40	3.87	5.78	CLAY	4	6		.2	
2.100	6.89	4.10	5.26	CLAY	4	7		.2	
2.250	7.38	4.02	6.27	CLAY	4	6		.2	
2.400	7.87	2.83	3.24	CLAY	3	5		.2	
2.550	8.37	3.95	2.75	CLAY	4	6		.3	
2.700	8.86	4.25	2.68	CLAY	4	7		.3	
2.850	9.35	16.44	1.57	SANDY SILT to CLAYEY SILT	7	10		1.3	
3.000	9.84	85.43	.88	SAND to SILTY SAND	21	32	72		43.5
3.150	10.33	125.22	1.03	SAND to SILTY SAND	31	46	83		45.0
3.300	10.83	153.79	.98	SAND to SILTY SAND	38	56	89		46.0
3.450	11.32	103.55	1.36	SAND to SILTY SAND	26	37	77		44.0
3.600	11.81	124.77	.71	SAND	25	35	83		44.5
3.750	12.30	143.36	.91	SAND to SILTY SAND	36	50	87		45.0
3.900	12.80	117.38	1.07	SAND to SILTY SAND	29	41	81		44.0
4.050	13.29	104.38	1.01	SAND to SILTY SAND	26	36	77		43.5
4.200	13.78	104.35	.82	SAND to SILTY SAND	26	35	77		43.5
4.350	14.27	121.18	.87	SAND to SILTY SAND	30	40	81		44.0
4.500	14.76	130.17	.88	SAND to SILTY SAND	33	43	82		44.0
4.650	15.26	150.54	.78	SAND	30	39	86		44.5
4.800	15.75	166.73	.92	SAND	33	43	89		45.0
4.950	16.24	158.68	.89	SAND	32	40	87		44.5
5.100	16.73	148.67	.78	SAND	30	37	85		44.5
5.250	17.22	143.36	.80	SAND	29	36	83		44.0
5.400	17.72	124.22	.74	SAND to SILTY SAND	31	38	79		43.5
5.550	18.21	198.70	.59	SAND	40	48	92		45.5
5.700	18.70	205.56	.23	SAND	41	49	93		45.5
5.850	19.19	175.65	.35	SAND	35	42	88		44.5
6.000	19.69	115.66	.17	SAND	23	27	76		42.5
6.150	20.18	89.33	.32	SAND to SILTY SAND	22	26	68		41.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
 ASSUMED TOTAL UNIT WT = 120 pcf
 ASSUMED DEPTH OF WATER TABLE = 5.0 ft
 N(60) = EQUIVALENT SPT VALUE (60% Energy)
 N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
 Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
 Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
 PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-05

DEPTH	DEPTH	TIP	FRICTION	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr	Su	PHI
(m)	(ft)	RESISTANCE	RATIO				(%)	(tsf)	(Degrees)
		(tsf)	(%)						
6.300	20.67	115.15	.46	SAND	23	27	75		42.5
6.450	21.16	217.40	.78	SAND	43	50	93		45.0
6.600	21.65	229.15	.67	SAND	46	52	94		45.5
6.750	22.15	272.34	.90	SAND	54	61	99		46.0
6.900	22.64	208.39	.74	SAND	42	46	91		44.5
7.050	23.13	228.62	.76	SAND	46	50	93		45.0
7.200	23.62	257.87	.69	SAND	52	56	97		45.5
7.350	24.11	315.17	.81	SAND	63	68	100		46.0
7.500	24.61	280.13	.67	SAND	56	60	99		46.0
7.650	25.10	299.23	.63	SAND	60	64	100		46.0
7.800	25.59	369.06	.50	GRAVELLY SAND to SAND	62	65	100		46.5
7.950	26.08	452.11	.60	GRAVELLY SAND to SAND	75	79	100		47.5
8.100	26.57	431.10	.57	GRAVELLY SAND to SAND	72	75	100		47.0
8.250	27.07	331.36	1.29	SAND	66	69	100		46.0
8.400	27.56	296.05	1.44	SAND to SILTY SAND	74	76	99		45.5
8.550	28.05	283.96	1.02	SAND	57	58	97		45.5
8.700	28.54	150.60	1.99	SILTY SAND to SANDY SILT	50	51	79		42.5
8.850	29.04	32.59	2.71	CLAYEY SILT to SILTY CLAY	16	16		2.1	
9.000	29.53	343.27	1.94	SAND to SILTY SAND	86	86	100		46.0
9.150	30.02	679.92	1.89	SAND to SILTY SAND	100	100	100		
9.300	30.51	795.45	1.74	SAND to SILTY SAND	100	100	100		
9.450	31.00	766.96	2.14	*SAND to CLAYEY SAND	100	100			
9.600	31.50	948.71	1.52	SAND	100	100	100		

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL

ASSUMED TOTAL UNIT WT = 120 pcf

ASSUMED DEPTH OF WATER TABLE = 5.0 ft

N(60) = EQUIVALENT SPT VALUE (60% Energy)

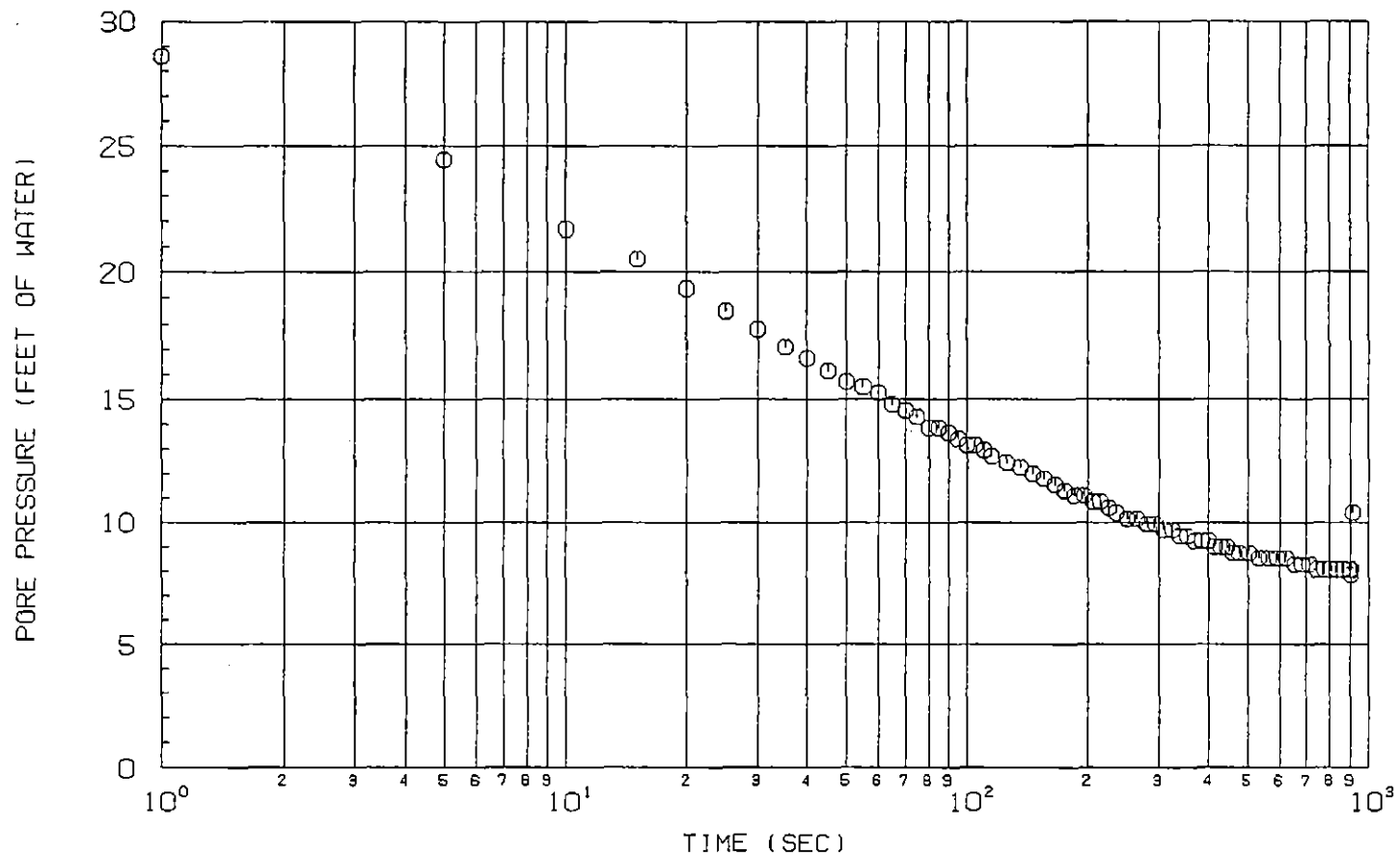
N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)

Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY

Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH

PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

PORE PRESSURE DISSIPATION CURVES



DEPTH: 10.7 FT

TIP-SENSING PIEZOMETRIC CPT

SOUNDING NUMBER: CPT-05

PROJECT NAME : L&A\TYLR-WOODROW

CGNE/RIG : 469\#1

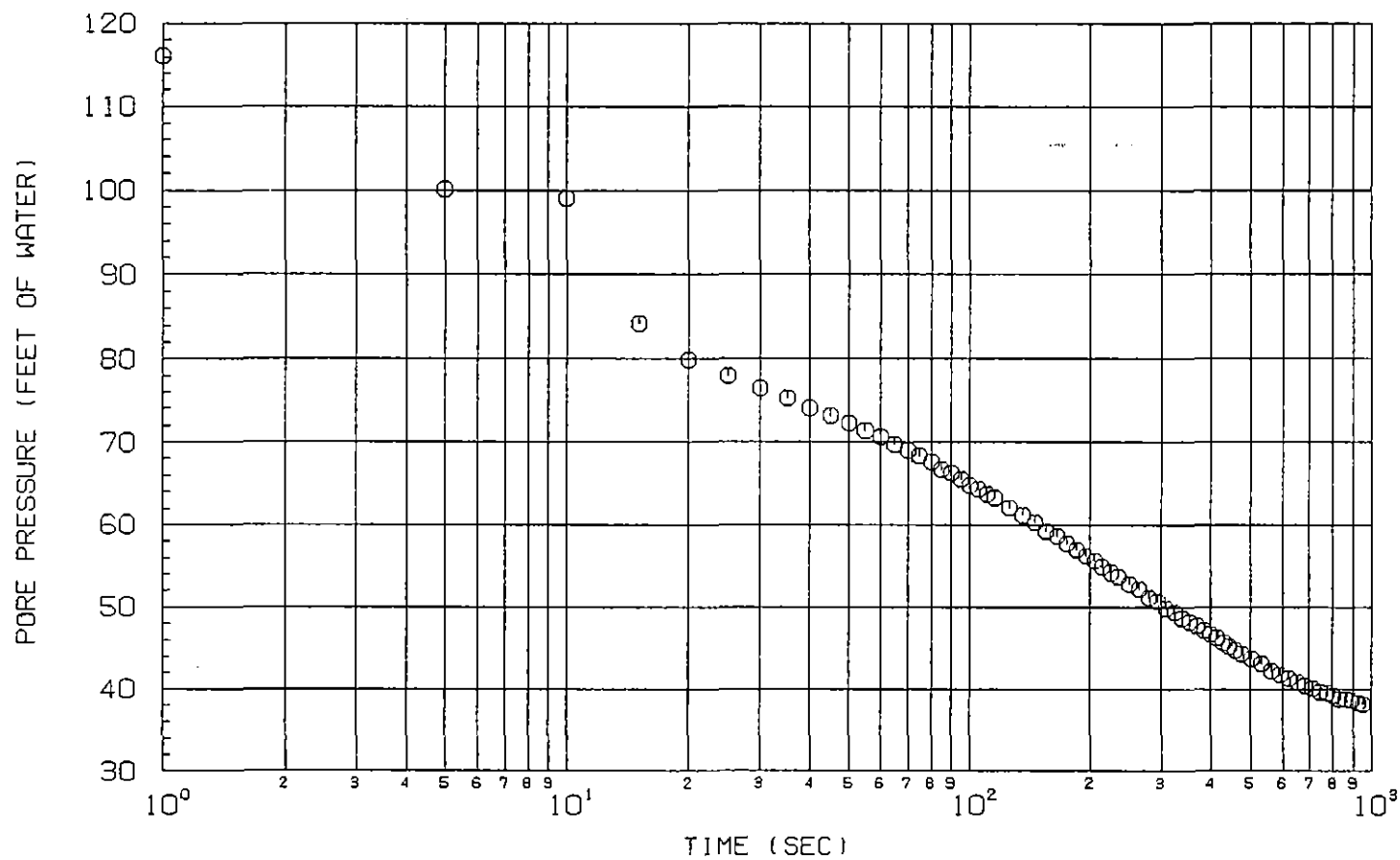
PROJECT NUMBER : 970011-001

DATE/TIME: 11-04-96 14:38



HEA

PORE PRESSURE DISSIPATION CURVES



DEPTH: 31.8 FT

TIP-SENSING PIEZOMETRIC CPT

SOUNDING NUMBER: CPT-05

PROJECT NAME : L&A TYLER-WOODROW

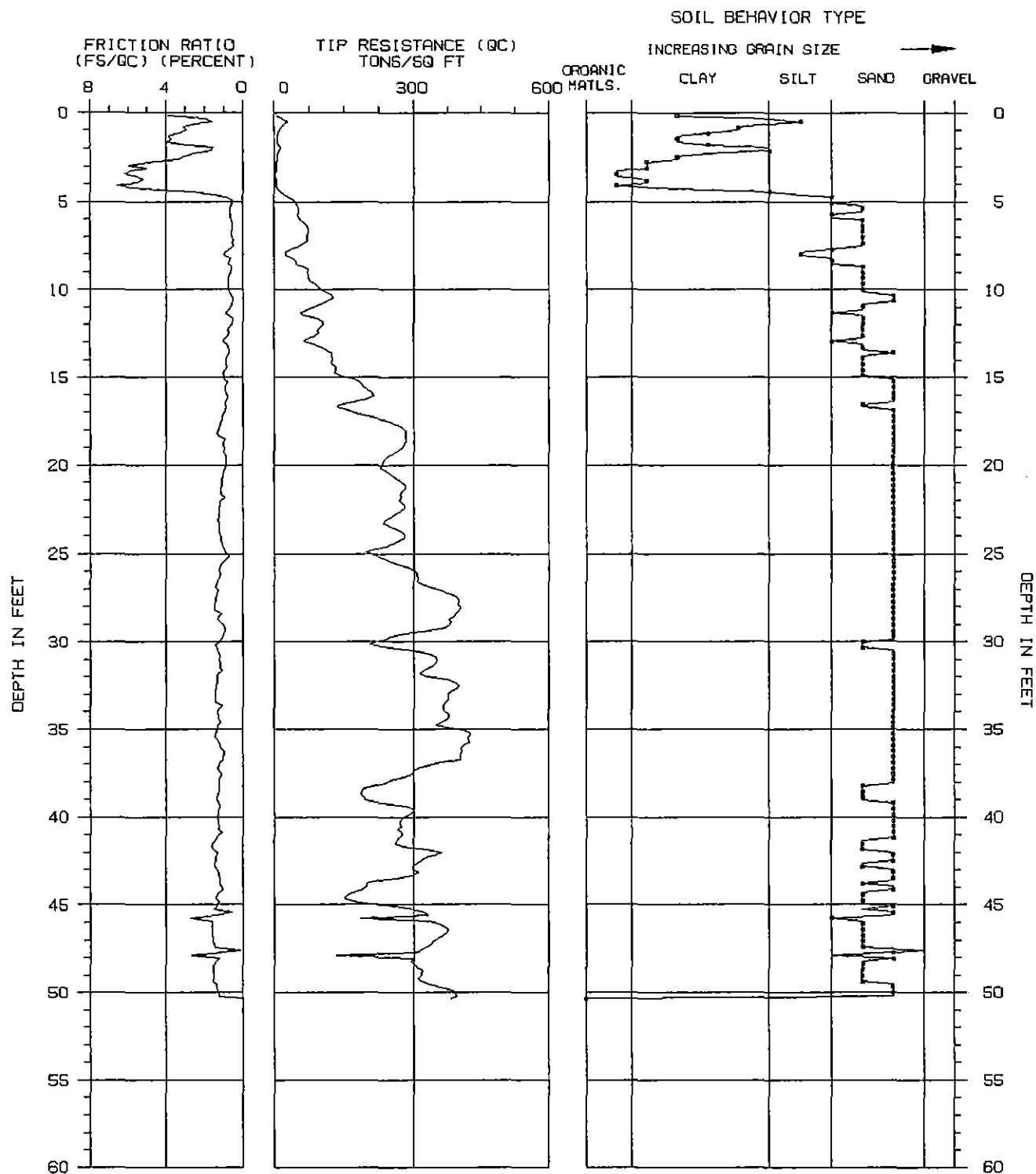
CONE/RIG : 469\#1

PROJECT NUMBER : 970011-001

DATE/TIME: 11-04-96 14:38



HFA



TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

ASSUMED TOTAL UNIT WT = 120 PCF

ASSUMED DEPTH OF WATER TABLE = 5.0 FT

SOIL BEHAVIOR TYPE INTERPRETATIONS BASED ON: GUIDELINES FOR GEOTECHNICAL DESIGN USING THE CPT AND CPTU.
SOIL MECHANICS SERIES #120, UNIVERSITY OF BRITISH COLUMBIA, SEPTEMBER 1989, BY P.K. ROBERTSON AND R.D. CAMPANELLA.

CONE PENETRATION TEST

SOUNDING NUMBER: CPT-06

PROJECT NAME : L&ANTYLR-WOODROW

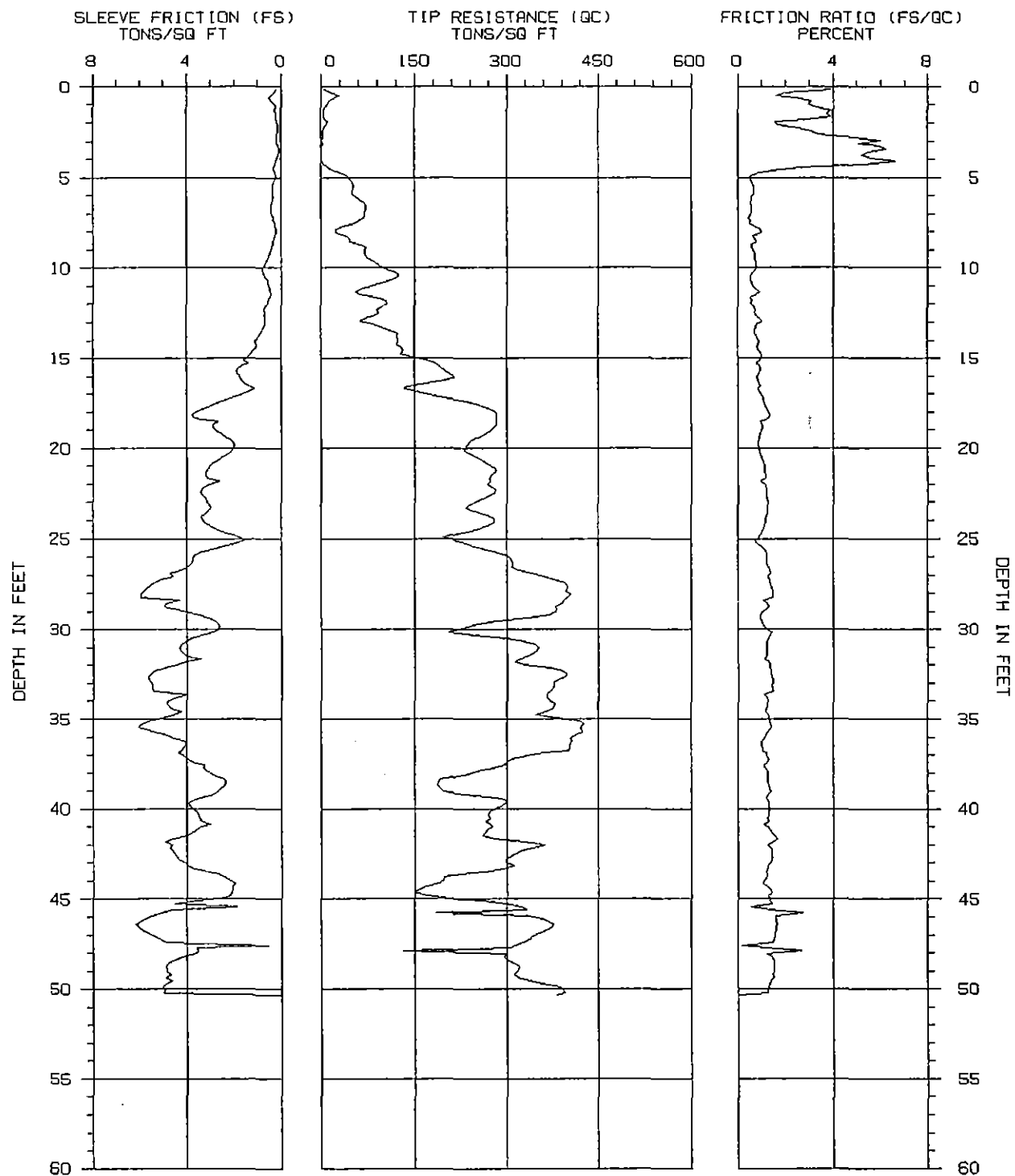
CONE/RIG : 469\#1

PROJECT NUMBER : 970011-001

DATE/TIME: 11-04-96 10:32



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TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

CONE PENETRATION TEST

SOUNDING NUMBER: CPT-06

PROJECT NAME : L&A\TYLR-WOODROW

CONE/RIG : 469\#1

PROJECT NUMBER : 970011-001

DATE/TIME: 11-04-96 10:32



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 * SOUNDING : CPT-06 PROJECT No.: 970011-001 *
 * PROJECT : L&A\TYLR-WOODROW CONE/RIG : 469\#1 *
 * DATE/TIME: 11-04-96 10:32 *
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PAGE 1 of 3

DEPTH	DEPTH	TIP	FRICTION	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr	Su	PHI
(m)	(ft)	RESISTANCE (tsf)	RATIO (%)				(%)	(tsf)	(Degrees)
.150	.49	28.11	1.60	SANDY SILT to CLAYEY SILT	11	18		2.2	
.300	.98	9.92	2.93	CLAY to SILTY CLAY	7	11		.7	
.450	1.48	6.27	3.76	CLAY	6	10		.4	
.600	1.97	11.64	1.56	CLAYEY SILT to SILTY CLAY	6	9		.9	
.750	2.46	4.72	3.05	CLAY	5	8		.4	
.900	2.95	2.74	6.00	CLAY	3	4		.2	
1.050	3.44	1.66	6.20	ORGANIC MATERIAL	2	3		.1	
1.200	3.94	2.93	5.59	CLAY	3	5		.2	
1.350	4.43	12.32	2.63	CLAYEY SILT to SILTY CLAY	6	10		.8	
1.500	4.92	41.87	.54	SILTY SAND to SANDY SILT	14	22	51		42.0
1.650	5.41	51.67	.66	SAND to SILTY SAND	13	21	57		43.0
1.800	5.91	51.16	.67	SILTY SAND to SANDY SILT	17	27	57		42.5
1.950	6.40	69.94	.56	SAND to SILTY SAND	17	28	66		44.0
2.100	6.89	70.45	.60	SAND to SILTY SAND	18	28	66		43.5
2.250	7.38	62.91	.54	SAND to SILTY SAND	16	25	63		43.0
2.400	7.87	23.62	.94	SANDY SILT to CLAYEY SILT	9	15		1.9	
2.550	8.37	45.40	.72	SILTY SAND to SANDY SILT	15	24	54		41.0
2.700	8.86	71.43	.59	SAND to SILTY SAND	18	28	67		43.0
2.850	9.35	71.83	.74	SAND to SILTY SAND	18	28	67		43.0
3.000	9.84	94.41	.77	SAND to SILTY SAND	24	36	75		44.0
3.150	10.33	123.33	.60	SAND	25	37	82		45.0
3.300	10.83	97.58	.59	SAND to SILTY SAND	24	36	76		44.0
3.450	11.32	54.96	.90	SILTY SAND to SANDY SILT	18	26	59		41.0
3.600	11.81	103.31	.58	SAND to SILTY SAND	26	37	77		44.0
3.750	12.30	91.01	.76	SAND to SILTY SAND	23	32	74		43.0
3.900	12.80	72.10	.92	SAND to SILTY SAND	18	25	67		42.0
4.050	13.29	97.81	.76	SAND to SILTY SAND	24	33	75		43.5
4.200	13.78	122.31	.81	SAND to SILTY SAND	31	41	81		44.0
4.350	14.27	122.41	.86	SAND to SILTY SAND	31	41	81		44.0
4.500	14.76	129.08	1.01	SAND to SILTY SAND	32	42	82		44.0
4.650	15.26	182.94	.76	SAND	37	47	92		45.5
4.800	15.75	199.96	.95	SAND	40	51	94		46.0
4.950	16.24	200.04	.84	SAND	40	51	94		46.0
5.100	16.73	133.35	.87	SAND to SILTY SAND	33	42	82		44.0
5.250	17.22	198.02	1.07	SAND	40	49	93		45.5
5.400	17.72	263.54	1.18	SAND	53	65	100		46.5
5.550	18.21	283.49	1.32	SAND	57	69	100		46.5
5.700	18.70	282.62	1.01	SAND	57	68	100		46.5
5.850	19.19	264.69	.95	SAND	53	63	100		46.0
6.000	19.69	239.13	.85	SAND	48	56	97		46.0
6.150	20.18	230.44	.92	SAND	46	54	95		45.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
 ASSUMED TOTAL UNIT WT = 120 pcf
 ASSUMED DEPTH OF WATER TABLE = 5.0 ft
 N(60) = EQUIVALENT SPT VALUE (60% Energy)
 N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
 Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
 Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
 PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-06

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	259.25	1.05	SAND	52	60	98		46.0
6.450	21.16	282.26	1.10	SAND	56	65	100		46.0
6.600	21.65	271.02	1.16	SAND	54	61	99		46.0
6.750	22.15	273.76	1.18	SAND	55	61	99		46.0
6.900	22.64	271.13	1.22	SAND	54	60	99		46.0
7.050	23.13	237.88	1.27	SAND	48	52	95		45.0
7.200	23.62	258.36	1.24	SAND	52	57	97		45.5
7.350	24.11	279.65	1.15	SAND	56	61	99		46.0
7.500	24.61	237.26	1.04	SAND	47	51	94		45.0
7.650	25.10	214.15	.73	SAND	43	46	91		44.5
7.800	25.59	265.82	1.12	SAND	53	56	97		45.5
7.950	26.08	306.18	1.21	SAND	61	64	100		46.0
8.100	26.57	308.75	1.29	SAND	62	64	100		46.0
8.250	27.07	360.31	1.26	SAND	72	75	100		46.5
8.400	27.56	398.79	1.38	SAND	80	82	100		46.5
8.550	28.05	404.61	1.47	SAND	81	82	100		46.5
8.700	28.54	389.10	1.25	SAND	78	79	100		46.5
8.850	29.04	380.52	1.05	SAND	76	76	100		46.5
9.000	29.53	283.38	.99	SAND	57	56	97		45.0
9.150	30.02	214.45	1.26	SAND to SILTY SAND	54	53	89		44.0
9.300	30.51	298.51	1.28	SAND	60	59	98		45.0
9.450	31.00	350.75	1.22	SAND	70	68	100		46.0
9.600	31.50	330.91	1.21	SAND	66	64	100		45.5
9.750	31.99	328.81	1.35	SAND	66	63	100		45.5
9.900	32.48	397.38	1.38	SAND	79	76	100		46.0
10.050	32.97	376.52	1.46	SAND	75	72	100		46.0
10.200	33.46	369.19	1.46	SAND	74	70	100		46.0
10.350	33.96	369.91	1.28	SAND	74	69	100		46.0
10.500	34.45	374.86	1.23	SAND	75	70	100		46.0
10.650	34.94	381.45	1.32	SAND	76	71	100		46.0
10.800	35.43	421.16	1.44	SAND	84	78	100		46.0
10.950	35.93	411.38	1.18	SAND	82	75	100		46.0
11.100	36.42	402.87	1.00	SAND	81	73	100		46.0
11.250	36.91	359.04	1.21	SAND	72	65	100		45.5
11.400	37.40	300.68	1.25	SAND	60	54	96		44.5
11.550	37.89	251.86	1.25	SAND	50	45	90		44.0
11.700	38.39	192.67	1.25	SAND to SILTY SAND	48	43	82		42.5
11.850	38.88	191.95	1.34	SAND to SILTY SAND	48	42	82		42.5
12.000	39.37	282.77	1.20	SAND	57	50	93		44.0
12.150	39.86	291.50	1.32	SAND	58	51	94		44.0
12.300	40.35	269.68	1.31	SAND	54	47	91		44.0
12.450	40.85	274.02	1.10	SAND	55	47	92		44.0
12.600	41.34	264.33	1.42	SAND to SILTY SAND	66	57	91		43.5
12.750	41.83	328.72	1.49	SAND to SILTY SAND	82	70	97		44.5
12.900	42.32	326.21	1.41	SAND	65	56	96		44.5
13.050	42.81	298.32	1.45	SAND to SILTY SAND	75	63	94		44.0
13.200	43.31	295.09	1.24	SAND	59	50	93		44.0
13.350	43.80	198.68	1.20	SAND to SILTY SAND	50	42	82		42.0
13.500	44.29	169.24	1.23	SAND to SILTY SAND	42	35	77		41.0
13.650	44.78	169.72	1.27	SAND to SILTY SAND	42	35	77		41.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL

ASSUMED TOTAL UNIT WT = 120 pcf

ASSUMED DEPTH OF WATER TABLE = 5.0 ft

N(60) = EQUIVALENT SPT VALUE (60% Energy)

N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)

Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY

Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH

PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-06

DEPTH	DEPTH	TIP	FRICTION	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr	Su	PHI
(m)	(ft)	RESISTANCE (tsf)	RATIO (%)				(%)	(tsf)	(Degrees)
13.800	45.28	298.36	1.49	SAND to SILTY SAND	75	62	93		44.0
13.950	45.77	185.59	2.73	SILTY SAND to SANDY SILT	62	51	79		41.5
14.100	46.26	368.53	1.63	SAND to SILTY SAND	92	76	99		44.5
14.250	46.75	364.26	1.60	SAND to SILTY SAND	91	74	98		44.5
14.400	47.24	337.83	1.50	SAND to SILTY SAND	84	69	96		44.0
14.550	47.74	307.16	1.16	SAND	61	50	93		44.0
14.700	48.23	294.18	1.42	SAND to SILTY SAND	74	59	92		43.5
14.850	48.72	320.39	1.52	SAND to SILTY SAND	80	64	94		44.0
15.000	49.21	311.13	1.50	SAND to SILTY SAND	78	62	93		43.5
15.150	49.70	357.93	1.36	SAND	72	57	97		44.0
15.300	50.20	394.98	1.26	SAND	79	62	100		44.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL

ASSUMED TOTAL UNIT WT = 120 pcf

ASSUMED DEPTH OF WATER TABLE = 5.0 ft

N(60) = EQUIVALENT SPT VALUE (60% Energy)

N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)

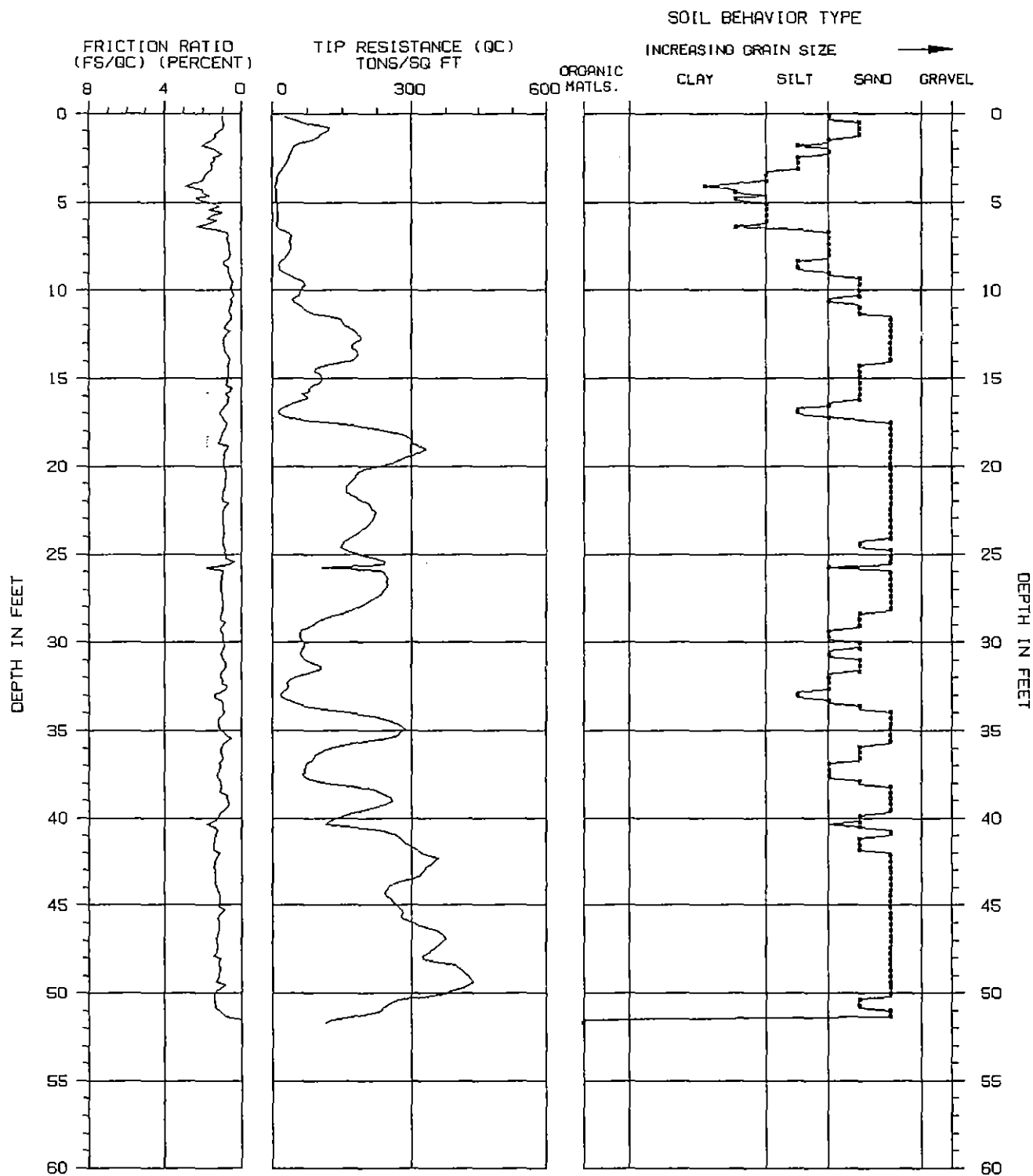
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY

Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH

PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.



TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

ASSUMED TOTAL UNIT WT = 120 PCF

ASSUMED DEPTH OF WATER TABLE = 5.0 FT

SOIL BEHAVIOR TYPE INTERPRETATIONS BASED ON: GUIDELINES FOR GEOTECHNICAL DESIGN USING THE CPT AND CPTU. SOIL MECHANICS SERIES #120. UNIVERSITY OF BRITISH COLUMBIA, SEPTEMBER 1989, BY P.K. ROBERTSON AND R.O. CAMPANELLA.

CONE PENETRATION TEST

SOUNDING NUMBER: CPT-07

PROJECT NAME : L&A\TYLR-WOODROW

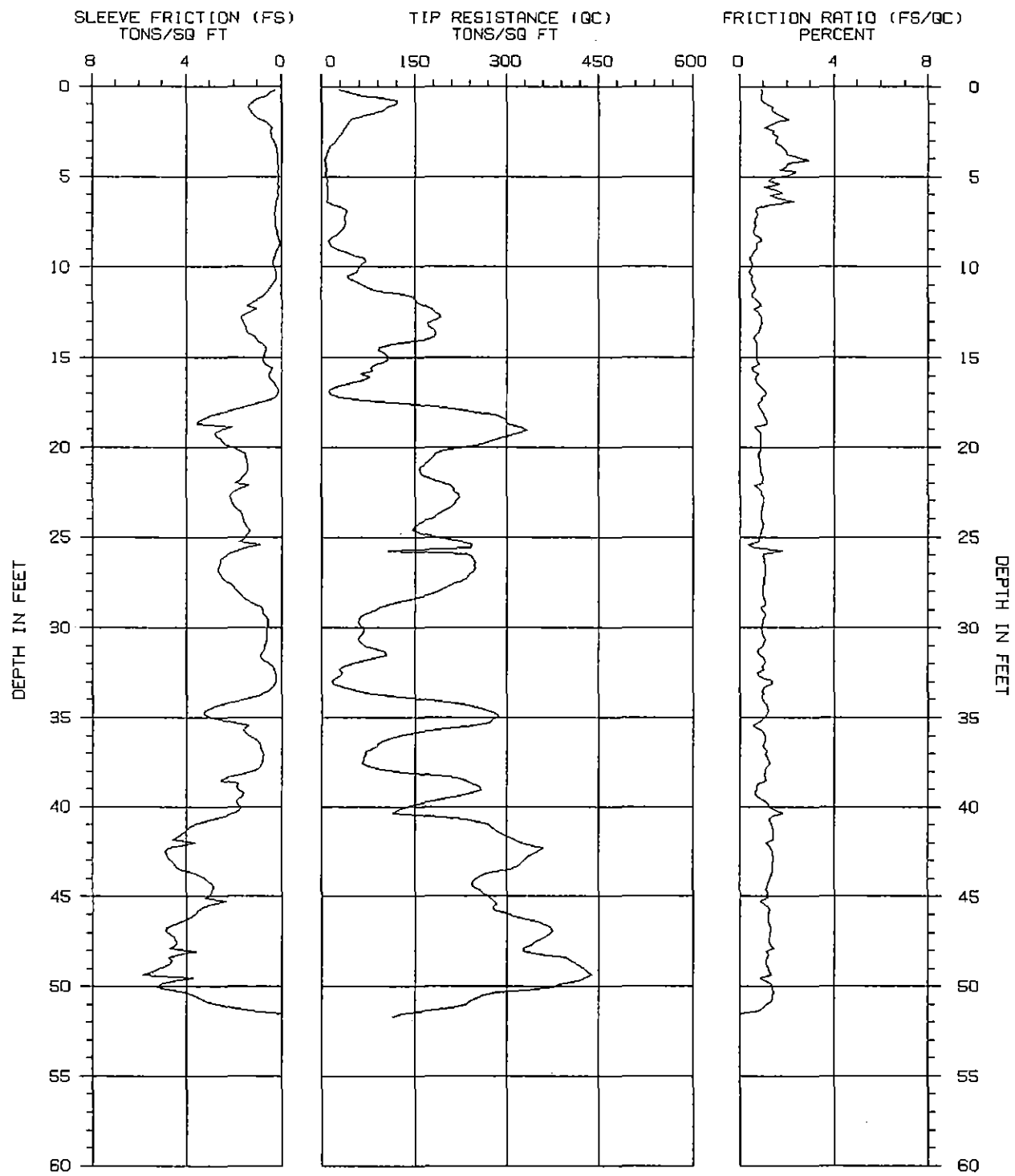
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TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

CONE PENETRATION TEST

SOUNDING NUMBER: CPT-07

PROJECT NAME : L&A\TYLR-WOODROW

CONE/RIG : 469\#1

PROJECT NUMBER : 970011-001

DATE/TIME: 11-05-96 10:46



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 * **CPT INTERPRETATIONS** *
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 * SOUNDING : CPT-07 PROJECT No.: 970011-001 *
 * PROJECT : L&A\TYLR-WOODROW CONE/RIG : 469\#1 *
 * DATE/TIME: 11-05-96 10:46 *
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 PAGE 1 of 3

DEPTH	DEPTH	TIP	FRICTION	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr	Su	PHI
(m)	(ft)	RESISTANCE (tsf)	RATIO (%)				(%)	(tsf)	(Degrees)
1.150	1.49	66.05	.92	SAND to SILTY SAND	17	26	64		
1.300	.98	119.33	1.13	SAND to SILTY SAND	30	48	81		
1.450	1.48	82.11	1.52	SILTY SAND to SANDY SILT	27	44	71		
1.600	1.97	43.21	1.57	SILTY SAND to SANDY SILT	14	23	52		46.0
1.750	2.46	33.89	1.45	SANDY SILT to CLAYEY SILT	14	22		2.7	
1.900	2.95	23.22	1.51	SANDY SILT to CLAYEY SILT	9	15		1.8	
1.050	3.44	12.53	1.84	CLAYEY SILT to SILTY CLAY	6	10		1.0	
1.200	3.94	7.29	2.47	CLAY to SILTY CLAY	5	8		.6	
1.350	4.43	7.56	1.98	CLAY to SILTY CLAY	5	8		.6	
1.500	4.92	7.05	2.13	CLAY to SILTY CLAY	5	8		.5	
1.650	5.41	9.48	1.69	CLAYEY SILT to SILTY CLAY	5	8		.7	
1.800	5.91	10.71	1.77	CLAYEY SILT to SILTY CLAY	5	9		.8	
1.950	6.40	9.60	2.29	CLAY to SILTY CLAY	6	10		.7	
2.100	6.89	40.15	.67	SILTY SAND to SANDY SILT	13	21	50		41.0
2.250	7.38	37.77	.66	SILTY SAND to SANDY SILT	13	20	48		40.0
2.400	7.87	34.97	.63	SILTY SAND to SANDY SILT	12	19	46		39.5
2.550	8.37	16.51	.91	SANDY SILT to CLAYEY SILT	7	10		1.3	
2.700	8.86	15.42	.71	SANDY SILT to CLAYEY SILT	6	10		1.5	
2.850	9.35	49.88	.56	SAND to SILTY SAND	12	19	56		41.0
3.000	9.84	63.90	.56	SAND to SILTY SAND	16	24	63		42.5
3.150	10.33	56.34	.41	SAND to SILTY SAND	14	21	60		41.5
3.300	10.83	57.11	.54	SAND to SILTY SAND	14	21	60		41.5
3.450	11.32	90.78	.62	SAND to SILTY SAND	23	33	74		43.5
3.600	11.81	150.22	.69	SAND	30	43	88		45.5
3.750	12.30	177.12	.60	SAND	35	50	93		46.0
3.900	12.80	191.14	.90	SAND	38	53	95		46.0
4.050	13.29	172.61	.87	SAND	35	47	91		46.0
4.200	13.78	181.24	.65	SAND	36	49	93		46.0
4.350	14.27	114.47	.71	SAND to SILTY SAND	29	38	79		44.0
4.500	14.76	100.66	.71	SAND to SILTY SAND	25	33	75		43.0
4.650	15.26	99.36	.77	SAND to SILTY SAND	25	32	74		43.0
4.800	15.75	80.39	.55	SAND to SILTY SAND	20	26	68		42.0
4.950	16.24	65.52	.69	SAND to SILTY SAND	16	21	62		40.5
5.100	16.73	18.27	.93	SANDY SILT to CLAYEY SILT	7	9		1.4	
5.250	17.22	29.04	.96	SILTY SAND to SANDY SILT	10	12	38		37.0
5.400	17.72	182.07	.82	SAND	36	45	90		45.0
5.550	18.21	279.31	1.03	SAND	56	68	100		46.5
5.700	18.70	299.62	1.18	SAND	60	72	100		46.5
5.850	19.19	317.57	.88	SAND	64	75	100		47.0
6.000	19.69	272.87	.91	SAND	55	64	100		46.0
6.150	20.18	197.00	.89	SAND	39	46	91		45.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
 ASSUMED TOTAL UNIT WT = 120 pcf
 ASSUMED DEPTH OF WATER TABLE = 5.0 ft
 N(60) = EQUIVALENT SPT VALUE (60% Energy)
 N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
 Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
 Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
 PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-07

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	175.80	.84	SAND	35	41	87		44.5
6.450	21.16	159.42	.88	SAND	32	36	84		44.0
6.600	21.65	166.47	.97	SAND	33	38	85		44.0
6.750	22.15	207.94	.65	SAND	42	47	91		45.0
6.900	22.64	221.90	.96	SAND	44	49	93		45.0
7.050	23.13	212.96	.97	SAND	43	47	91		44.5
7.200	23.62	192.73	.91	SAND	39	42	88		44.5
7.350	24.11	164.29	.96	SAND	33	36	84		43.5
7.500	24.61	145.68	.92	SAND to SILTY SAND	36	39	80		43.0
7.650	25.10	193.86	.80	SAND	39	41	88		44.0
7.800	25.59	240.17	.64	SAND	48	51	94		45.0
7.950	26.08	242.55	1.00	SAND	49	51	94		45.0
8.100	26.57	245.97	1.07	SAND	49	51	94		45.0
8.250	27.07	238.32	1.07	SAND	48	49	93		44.5
8.400	27.56	215.15	1.01	SAND	43	44	90		44.0
8.550	28.05	183.09	.99	SAND	37	37	85		43.5
8.700	28.54	123.94	1.09	SAND to SILTY SAND	31	31	73		42.0
8.850	29.04	87.85	.93	SAND to SILTY SAND	22	22	63		39.5
9.000	29.53	59.68	.99	SILTY SAND to SANDY SILT	20	20	52		38.0
9.150	30.02	67.26	.91	SAND to SILTY SAND	17	17	55		38.5
9.300	30.51	61.04	1.02	SILTY SAND to SANDY SILT	20	20	52		38.0
9.450	31.00	68.83	1.00	SAND to SILTY SAND	17	17	56		38.5
9.600	31.50	104.46	.85	SAND to SILTY SAND	26	25	67		40.0
9.750	31.99	50.97	1.08	SILTY SAND to SANDY SILT	17	16	47		37.0
9.900	32.48	34.12	.76	SILTY SAND to SANDY SILT	11	11	35		35.0
10.050	32.97	17.10	1.40	SANDY SILT to CLAYEY SILT	7	7		1.2	
10.200	33.46	50.78	.98	SILTY SAND to SANDY SILT	17	16	46		37.0
10.350	33.96	160.78	.95	SAND	32	30	79		42.0
10.500	34.45	249.75	1.17	SAND	50	47	91		44.0
10.650	34.94	286.25	1.08	SAND	57	53	95		44.5
10.800	35.43	247.16	.56	SAND	49	46	91		44.0
10.950	35.93	139.56	1.05	SAND to SILTY SAND	35	32	74		41.0
11.100	36.42	89.87	1.02	SAND to SILTY SAND	22	20	61		38.5
11.250	36.91	71.13	1.18	SILTY SAND to SANDY SILT	24	21	54		38.0
11.400	37.40	66.67	1.21	SILTY SAND to SANDY SILT	22	20	52		38.0
11.550	37.89	95.67	1.07	SAND to SILTY SAND	24	21	63		39.0
11.700	38.39	216.74	1.09	SAND	43	39	86		43.0
11.850	38.88	255.00	.74	SAND	51	45	90		43.5
12.000	39.37	221.35	.74	SAND	44	39	86		43.0
12.150	39.86	155.66	1.19	SAND to SILTY SAND	39	34	76		41.5
12.300	40.35	113.15	1.81	SILTY SAND to SANDY SILT	38	33	67		39.0
12.450	40.85	253.58	1.31	SAND	51	44	90		43.5
12.600	41.34	282.11	1.42	SAND to SILTY SAND	71	61	92		44.0
12.750	41.83	313.59	1.45	SAND to SILTY SAND	78	67	95		44.5
12.900	42.32	359.74	1.32	SAND	72	61	99		45.0
13.050	42.81	333.90	1.43	SAND	67	57	97		44.5
13.200	43.31	317.44	1.40	SAND	63	54	95		44.0
13.350	43.80	261.10	1.34	SAND	52	44	89		43.5
13.500	44.29	242.68	1.20	SAND	49	41	87		43.0
13.650	44.78	260.40	1.15	SAND	52	43	89		43.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL

ASSUMED TOTAL UNIT WT = 120 pcf

ASSUMED DEPTH OF WATER TABLE = 5.0 ft

N(60) = EQUIVALENT SPT VALUE (60% Energy)

N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)

Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY

Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH

PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-07

DEPTH	DEPTH	TIP	FRICTION	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr	Su	PHI
(m)	(ft)	RESISTANCE (tsf)	RATIO (%)				(%)	(tsf)	(Degrees)
13.800	45.28	277.58	.85	SAND	56	46	91		43.5
13.950	45.77	280.03	1.25	SAND	56	46	91		43.5
14.100	46.26	333.29	1.20	SAND	67	55	96		44.0
14.250	46.75	372.00	1.30	SAND	74	61	99		44.5
14.400	47.24	362.44	1.25	SAND	72	59	98		44.5
14.550	47.74	340.38	1.32	SAND	68	55	96		44.0
14.700	48.23	352.09	1.22	SAND	70	57	97		44.0
14.850	48.72	412.74	1.14	SAND	83	66	100		45.0
15.000	49.21	431.42	1.26	SAND	86	69	100		45.0
15.150	49.70	415.46	1.10	SAND	83	66	100		45.0
15.300	50.20	331.55	1.38	SAND	66	52	95		44.0
15.450	50.69	249.29	1.37	SAND to SILTY SAND	62	49	86		42.5
15.600	51.18	210.11	.99	SAND	42	33	81		42.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL

ASSUMED TOTAL UNIT WT = 120 pcf

ASSUMED DEPTH OF WATER TABLE = 5.0 ft

N(60) = EQUIVALENT SPT VALUE (60% Energy)

N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)

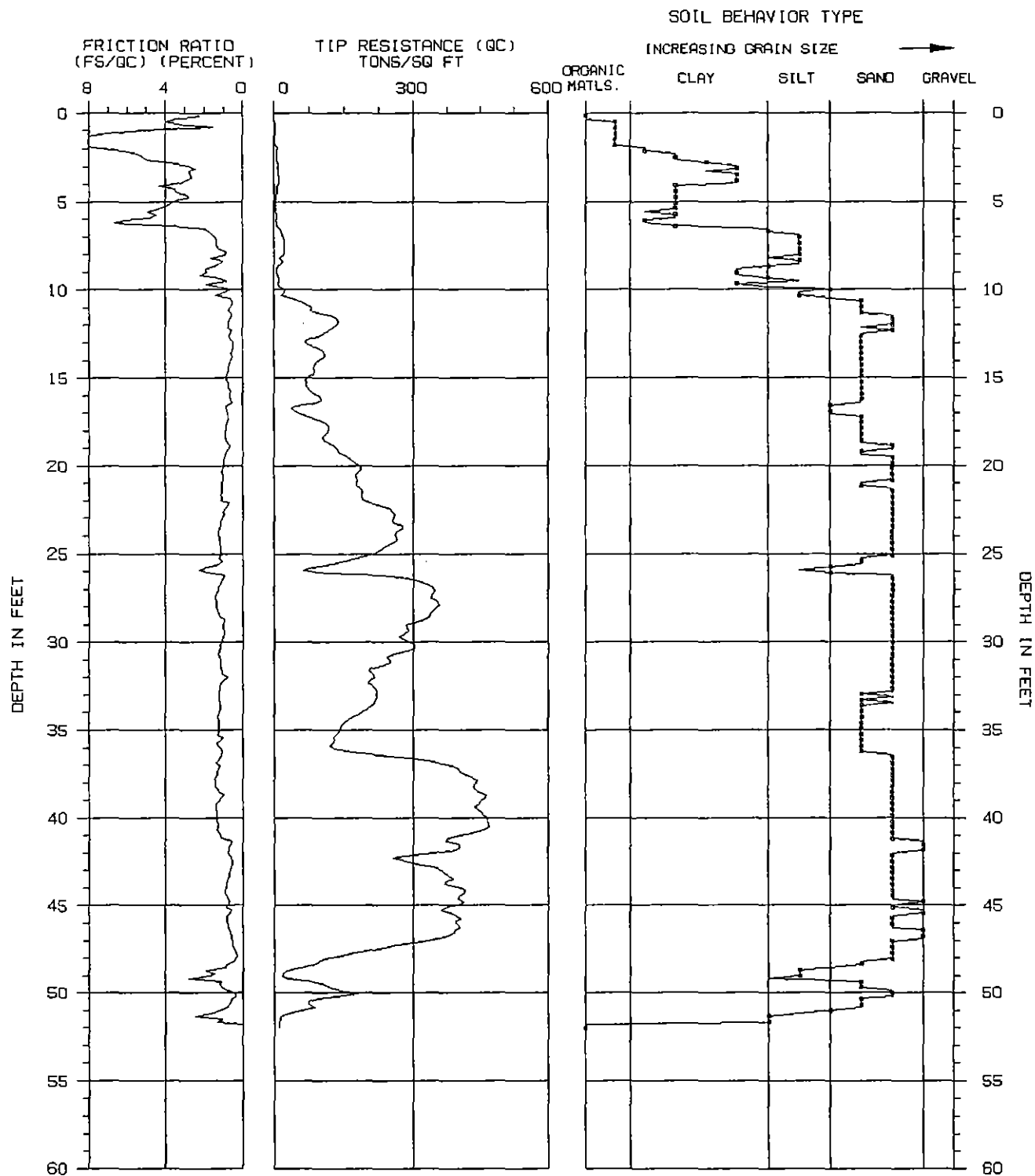
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY

Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH

PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.



TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

ASSUMED TOTAL UNIT WT = 120 PCF

ASSUMED DEPTH OF WATER TABLE = 6.0 FT

SOIL BEHAVIOR TYPE INTERPRETATIONS BASED ON: GUIDELINES FOR GEOTECHNICAL DESIGN USING THE CPT AND CPTU,
SOIL MECHANICS SERIES #120, UNIVERSITY OF BRITISH COLUMBIA, SEPTEMBER 1989, BY P.K. ROBERTSON AND R.O. CAMPANELLA.

CONE PENETRATION TEST

SOUNDING NUMBER: CPT-08

PROJECT NAME : L&A\TYLR-WOODROW

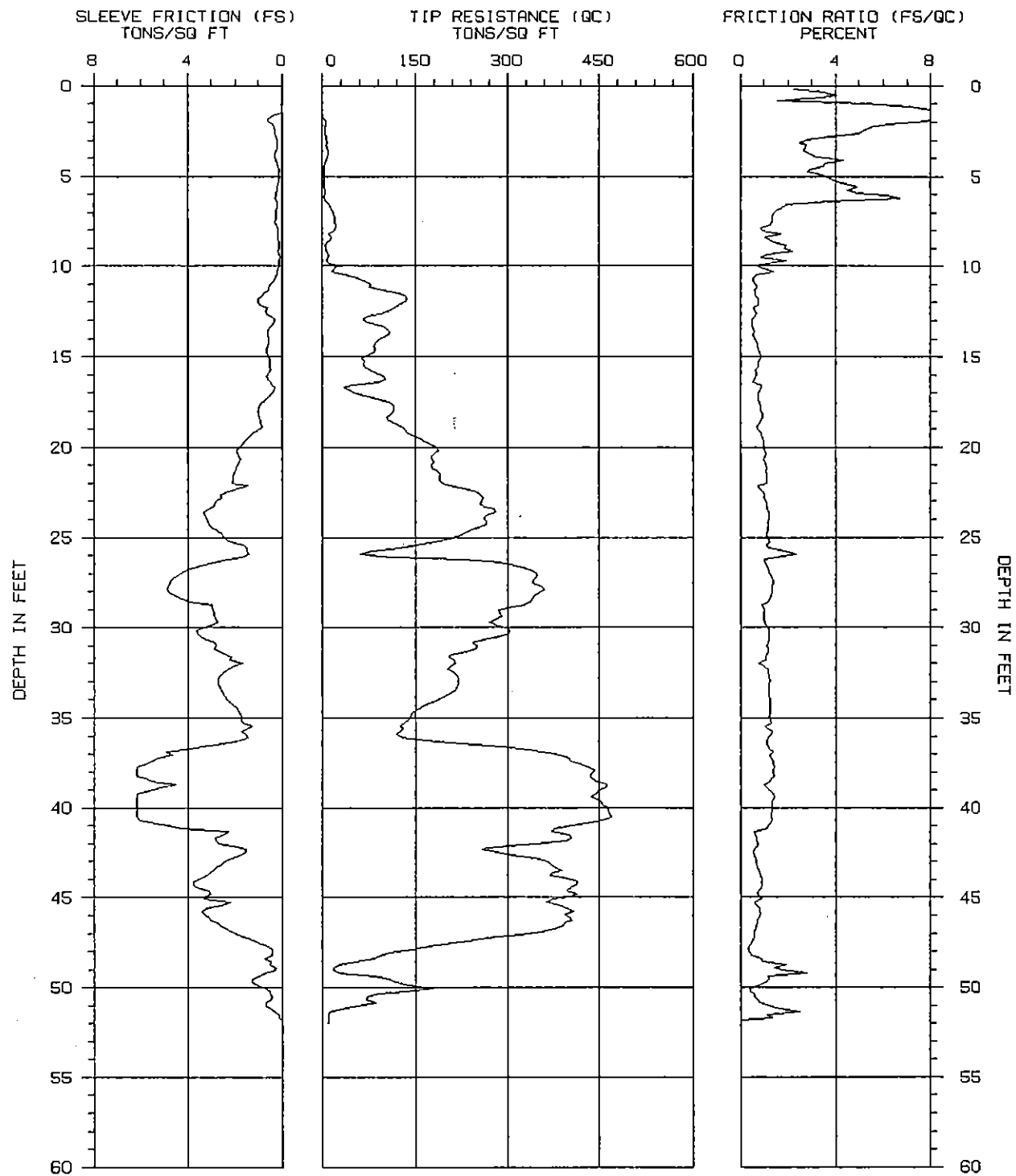
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TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

CONE PENETRATION TEST

SOUNDING NUMBER: CPT-08

PROJECT NAME : L&A\TYLR-WOODROW

CONE/RIG : 469\#1

PROJECT NUMBER : 970011-001

DATE/TIME: 11-05-96 10:03



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 * SOUNDING : CPT-08 PROJECT No.: 970011-001 *
 * PROJECT : L&A\TYLR-WOODROW CONE/RIG : 469\#1 *
 * DATE/TIME: 11-05-96 10:03 *
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PAGE 1 of 3

DEPTH	DEPTH	TIP	FRICTION	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr	Su	PHI
(m)	(ft)	RESISTANCE (tsf)	RATIO (%)				(%)	(tsf)	(Degrees)
.150	.49	.11	4.00	ORGANIC MATERIAL	0	0		.0	
.300	.98	.42	5.24	ORGANIC MATERIAL	0	1		.0	
.450	1.48	.23	19.26	ORGANIC MATERIAL	0	0		.0	
.600	1.97	7.75	7.85	CLAY	8	12		.5	
.750	2.46	5.74	5.16	CLAY	6	9		.4	
.900	2.95	7.65	2.81	CLAY to SILTY CLAY	5	8		.6	
1.050	3.44	8.20	2.72	CLAY to SILTY CLAY	5	9		.6	
1.200	3.94	9.41	3.20	CLAY to SILTY CLAY	6	10		.6	
1.350	4.43	4.59	3.47	CLAY	5	7		.3	
1.500	4.92	3.72	3.40	CLAY	4	6		.3	
1.650	5.41	3.87	4.41	CLAY	4	6		.2	
1.800	5.91	4.99	4.88	CLAY	5	8		.3	
1.950	6.40	6.52	3.71	CLAY	7	10		.4	
2.100	6.89	16.53	1.54	SANDY SILT to CLAYEY SILT	7	11		1.3	
2.250	7.38	21.10	1.35	SANDY SILT to CLAYEY SILT	8	13		1.7	
2.400	7.87	21.84	.85	SANDY SILT to CLAYEY SILT	9	14		1.7	
2.550	8.37	15.87	1.03	SANDY SILT to CLAYEY SILT	6	10		1.2	
2.700	8.86	6.42	1.93	CLAY to SILTY CLAY	4	7		.5	
2.850	9.35	9.82	1.14	CLAYEY SILT to SILTY CLAY	5	8		.9	
3.000	9.84	12.19	1.16	CLAYEY SILT to SILTY CLAY	6	9		.9	
3.150	10.33	14.98	1.39	SANDY SILT to CLAYEY SILT	6	9		1.1	
3.300	10.83	67.47	.56	SAND to SILTY SAND	17	25	65		42.0
3.450	11.32	98.17	.59	SAND to SILTY SAND	25	35	76		44.0
3.600	11.81	136.50	.75	SAND	27	39	85		45.0
3.750	12.30	116.23	.54	SAND	23	33	81		44.0
3.900	12.80	73.38	.63	SAND to SILTY SAND	18	25	67		42.0
4.050	13.29	92.97	.49	SAND to SILTY SAND	23	32	74		43.0
4.200	13.78	107.14	.57	SAND to SILTY SAND	27	36	77		43.5
4.350	14.27	84.62	.70	SAND to SILTY SAND	21	28	70		42.5
4.500	14.76	83.28	.79	SAND to SILTY SAND	21	27	69		42.0
4.650	15.26	68.68	.75	SAND to SILTY SAND	17	22	64		41.0
4.800	15.75	75.19	.65	SAND to SILTY SAND	19	24	66		41.5
4.950	16.24	101.87	.59	SAND to SILTY SAND	25	32	74		43.0
5.100	16.73	36.26	.88	SILTY SAND to SANDY SILT	12	15	44		38.0
5.250	17.22	73.02	.77	SAND to SILTY SAND	18	23	64		40.5
5.400	17.72	115.40	.85	SAND to SILTY SAND	29	35	77		43.0
5.550	18.21	109.69	.93	SAND to SILTY SAND	27	33	75		42.5
5.700	18.70	116.46	.81	SAND to SILTY SAND	29	35	77		43.0
5.850	19.19	137.45	.89	SAND to SILTY SAND	34	41	81		43.5
6.000	19.69	164.37	.98	SAND	33	39	86		44.0
6.150	20.18	187.21	1.04	SAND	37	44	89		44.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
 ASSUMED TOTAL UNIT WT = 120 pcf
 ASSUMED DEPTH OF WATER TABLE = 5.0 ft
 N(60) = EQUIVALENT SPT VALUE (60% Energy)
 N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
 Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
 Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
 PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-08

DEPTH	DEPTH	TIP	FRICTION	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr	Su	PHI
(m)	(ft)	RESISTANCE (tsf)	RATIO (%)				(%)	(tsf)	(Degrees)
6.300	20.67	176.42	1.00	SAND	35	41	87		44.5
6.450	21.16	176.84	1.10	SAND to SILTY SAND	44	51	87		44.5
6.600	21.65	187.85	1.12	SAND	38	43	89		44.5
6.750	22.15	205.93	.70	SAND	41	46	91		44.5
6.900	22.64	254.47	1.02	SAND	51	57	97		45.5
7.050	23.13	254.85	1.12	SAND	51	56	97		45.5
7.200	23.62	279.33	1.19	SAND	56	61	99		46.0
7.350	24.11	265.77	1.19	SAND	53	58	97		45.5
7.500	24.61	236.96	1.15	SAND	47	51	94		45.0
7.650	25.10	205.56	1.16	SAND	41	44	89		44.5
7.800	25.59	123.37	1.22	SAND to SILTY SAND	31	33	75		42.0
7.950	26.08	111.71	1.55	SILTY SAND to SANDY SILT	37	39	72		41.5
8.100	26.57	311.05	1.11	SAND	62	65	100		46.0
8.250	27.07	348.29	1.26	SAND	70	72	100		46.0
8.400	27.56	340.34	1.39	SAND	68	70	100		46.0
8.550	28.05	350.75	1.36	SAND	70	71	100		46.0
8.700	28.54	335.75	1.17	SAND	67	68	100		46.0
8.850	29.04	285.51	1.02	SAND	57	57	97		45.0
9.000	29.53	280.84	.99	SAND	56	56	96		45.0
9.150	30.02	296.05	1.16	SAND	59	59	98		45.5
9.300	30.51	286.61	1.21	SAND	57	56	97		45.0
9.450	31.00	250.41	1.12	SAND	50	49	93		44.5
9.600	31.50	206.05	1.14	SAND	41	40	87		43.5
9.750	31.99	215.27	.78	SAND	43	41	88		43.5
9.900	32.48	211.07	1.18	SAND	42	40	87		43.5
10.050	32.97	218.80	1.24	SAND to SILTY SAND	55	52	88		43.5
10.200	33.46	214.55	1.20	SAND	43	41	87		43.5
10.350	33.96	188.02	1.24	SAND to SILTY SAND	47	44	83		43.0
10.500	34.45	158.97	1.24	SAND to SILTY SAND	40	37	78		42.0
10.650	34.94	141.96	1.23	SAND to SILTY SAND	35	33	75		41.5
10.800	35.43	125.49	1.01	SAND to SILTY SAND	31	29	71		40.5
10.950	35.93	119.14	1.32	SAND to SILTY SAND	30	27	69		40.0
11.100	36.42	225.77	1.12	SAND	45	41	88		43.5
11.250	36.91	354.04	1.39	SAND	71	64	100		45.5
11.400	37.40	403.18	1.37	SAND	81	73	100		46.0
11.550	37.89	442.83	1.39	SAND	89	79	100		46.0
11.700	38.39	437.15	1.31	SAND	87	78	100		46.0
11.850	38.88	460.97	1.12	SAND	92	82	100		46.0
12.000	39.37	436.60	1.41	SAND	87	77	100		46.0
12.150	39.86	455.96	1.35	SAND	91	80	100		46.0
12.300	40.35	467.30	1.32	SAND	93	81	100		46.0
12.450	40.85	428.42	1.25	SAND	86	74	100		46.0
12.600	41.34	372.04	.61	GRAVELLY SAND to SAND	62	53	100		45.0
12.750	41.83	396.79	.70	GRAVELLY SAND to SAND	66	57	100		45.5
12.900	42.32	256.87	.61	SAND	51	44	89		43.5
13.050	42.81	343.72	.62	SAND	69	58	98		44.5
13.200	43.31	377.07	.74	SAND	75	64	100		45.0
13.350	43.80	368.72	.87	SAND	74	62	99		45.0
13.500	44.29	413.38	.91	SAND	83	69	100		45.0
13.650	44.78	412.15	.74	GRAVELLY SAND to SAND	69	57	100		45.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL

ASSUMED TOTAL UNIT WT = 120 pcf

ASSUMED DEPTH OF WATER TABLE = 5.0 ft

N(60) = EQUIVALENT SPT VALUE (60% Energy)

N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)

Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY

Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH

PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-08

DEPTH	DEPTH	TIP	FRICTION	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr	Su	PHI
(m)	(ft)	RESISTANCE (tsf)	RATIO (%)				(%)	(tsf)	(Degrees)
13.800	45.28	362.86	.61	GRAVELLY SAND to SAND	60	50	98		44.5
13.950	45.77	407.58	.84	SAND	82	67	100		45.0
14.100	46.26	404.31	.75	SAND	81	66	100		45.0
14.250	46.75	376.78	.63	GRAVELLY SAND to SAND	63	51	99		44.5
14.400	47.24	264.92	.58	SAND	53	43	89		43.0
14.550	47.74	172.66	.37	SAND	35	28	77		41.0
14.700	48.23	94.43	.47	SAND to SILTY SAND	24	19	59		38.0
14.850	48.72	26.47	1.94	SANDY SILT to CLAYEY SILT	11	8		1.9	
15.000	49.21	27.45	2.76	CLAYEY SILT to SILTY CLAY	14	11		1.6	
15.150	49.70	118.72	1.08	SAND to SILTY SAND	30	24	65		38.5
15.300	50.20	132.91	.40	SAND	27	21	68		39.0
15.450	50.69	71.15	.70	SAND to SILTY SAND	18	14	50		37.0
15.600	51.18	30.42	1.66	SANDY SILT to CLAYEY SILT	12	10		2.2	
15.750	51.67	11.07	1.34	CLAYEY SILT to SILTY CLAY	6	4		.6	

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL

ASSUMED TOTAL UNIT WT = 120 pcf

ASSUMED DEPTH OF WATER TABLE = 5.0 ft

N(60) = EQUIVALENT SPT VALUE (60% Energy)

N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)

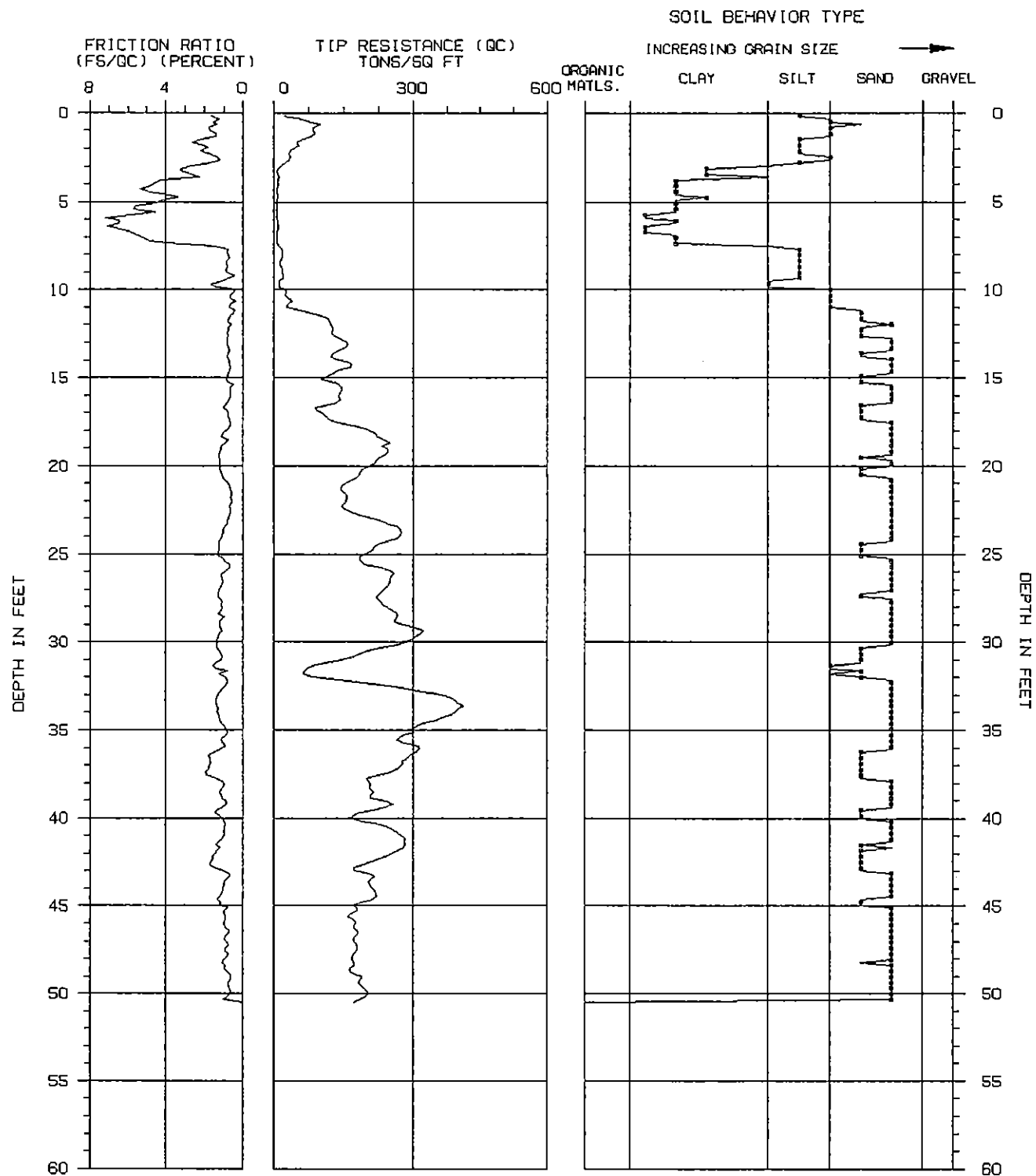
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY

Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH

PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.



TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

ASSUMED TOTAL UNIT WT = 120 PCF

ASSUMED DEPTH OF WATER TABLE = 5.0 FT

SOIL BEHAVIOR TYPE INTERPRETATIONS BASED ON: GUIDELINES FOR GEOTECHNICAL DESIGN USING THE CPT AND CPTU.
SOIL MECHANICS SERIES #120, UNIVERSITY OF BRITISH COLUMBIA, SEPTEMBER 1989, BY P.K. ROBERTSON AND R.O. CAMPANELLA.

CONE PENETRATION TEST

SOUNDING NUMBER: CPT-09

PROJECT NAME : L&A\TYLR-WOODROW

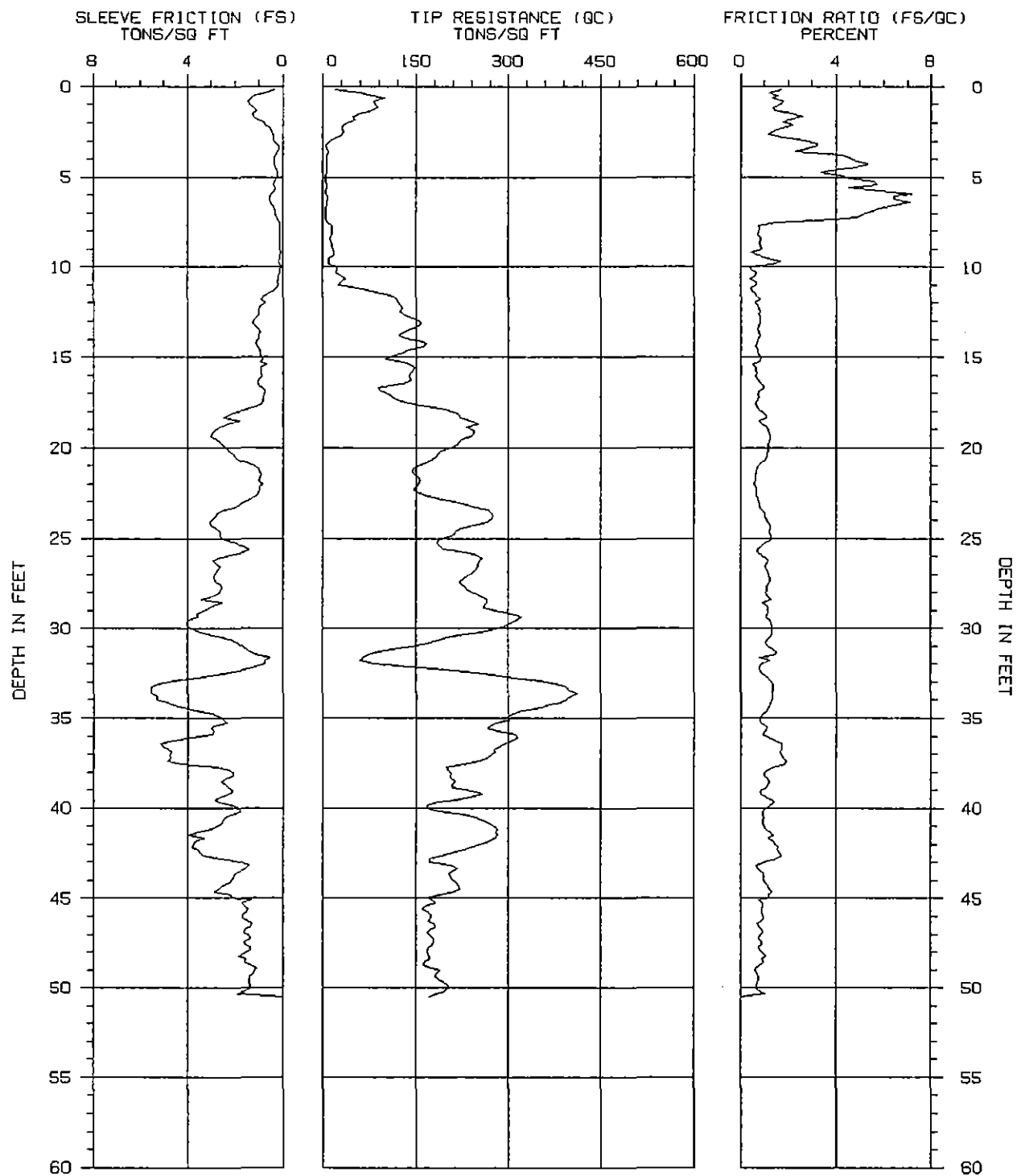
CONE/RIG : 495\#1

PROJECT NUMBER : 970011-001

DATE/TIME: 11-04-96 16:02



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TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

CONE PENETRATION TEST

SOUNDING NUMBER: CPT-09

PROJECT NAME : L&A\TYLR-WOODROW

CONE/RIG : 495\#1

PROJECT NUMBER : 970011-001

DATE/TIME: 11-04-96 16:02



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 * CPT INTERPRETATIONS *
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 * SOUNDING : CPT-09 PROJECT No.: 970011-001 *
 * PROJECT : L&A\TYLR-WOODROW CONE/RIG : 495\#1 *
 * DATE/TIME: 11-04-96 16:02 *
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PAGE 1 of 3

DEPTH	DEPTH	TIP	FRICTION	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr	Su	PHI
(m)	(ft)	RESISTANCE (tsf)	RATIO (%)				(%)	(tsf)	(Degrees)
.150	.49	78.29	1.59	SILTY SAND to SANDY SILT	26	42	69		
.300	.98	83.79	1.70	SILTY SAND to SANDY SILT	28	45	71		
.450	1.48	60.65	2.13	SANDY SILT to CLAYEY SILT	24	39		4.0	
.600	1.97	44.19	1.81	SANDY SILT to CLAYEY SILT	18	28		2.9	
.750	2.46	34.59	1.37	SILTY SAND to SANDY SILT	12	18	46		44.5
.900	2.95	14.21	2.66	CLAYEY SILT to SILTY CLAY	7	11		.9	
1.050	3.44	6.88	2.75	CLAY	7	11		.5	
1.200	3.94	7.33	4.60	CLAY	7	12		.5	
1.350	4.43	6.63	4.84	CLAY	7	11		.4	
1.500	4.92	5.69	4.17	CLAY	6	9		.4	
1.650	5.41	6.69	5.73	CLAY	7	11		.4	
1.800	5.91	6.50	7.21	CLAY	7	10		.4	
1.950	6.40	7.44	7.09	CLAY	7	12		.5	
2.100	6.89	5.78	5.50	CLAY	6	9		.4	
2.250	7.38	5.40	3.93	CLAY	5	9		.3	
2.400	7.87	16.17	.80	SANDY SILT to CLAYEY SILT	6	10		1.6	
2.550	8.37	13.07	.87	SANDY SILT to CLAYEY SILT	5	8		1.3	
2.700	8.86	16.34	.88	SANDY SILT to CLAYEY SILT	7	10		1.3	
2.850	9.35	18.25	.76	SANDY SILT to CLAYEY SILT	7	11		1.8	
3.000	9.84	10.86	1.37	CLAYEY SILT to SILTY CLAY	5	8		.8	
3.150	10.33	22.56	.66	SILTY SAND to SANDY SILT	8	11	34		37.5
3.300	10.83	30.08	.66	SILTY SAND to SANDY SILT	10	15	42		38.0
3.450	11.32	78.97	.51	SAND to SILTY SAND	20	28	70		43.0
3.600	11.81	118.50	.80	SAND to SILTY SAND	30	42	81		44.5
3.750	12.30	126.36	.79	SAND to SILTY SAND	32	44	83		44.5
3.900	12.80	138.03	.80	SAND	28	38	85		45.0
4.050	13.29	153.26	.76	SAND	31	42	88		45.0
4.200	13.78	121.61	.83	SAND to SILTY SAND	30	41	81		44.0
4.350	14.27	167.43	.69	SAND	33	44	90		45.5
4.500	14.76	128.53	.75	SAND	26	34	82		44.0
4.650	15.26	128.79	.77	SAND to SILTY SAND	32	42	82		44.0
4.800	15.75	145.78	.64	SAND	29	37	85		44.5
4.950	16.24	142.34	.71	SAND	28	36	84		44.0
5.100	16.73	88.61	1.01	SAND to SILTY SAND	22	28	70		42.0
5.250	17.22	111.47	.76	SAND to SILTY SAND	28	35	76		43.0
5.400	17.72	169.17	.67	SAND	34	41	88		44.5
5.550	18.21	218.76	1.03	SAND	44	53	95		46.0
5.700	18.70	249.44	.92	SAND	50	60	98		46.0
5.850	19.19	244.00	1.21	SAND	49	58	97		46.0
6.000	19.69	219.80	1.20	SAND	44	52	94		45.5
6.150	20.18	190.50	1.18	SAND to SILTY SAND	48	55	90		44.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
 ASSUMED TOTAL UNIT WT = 120 pcf
 ASSUMED DEPTH OF WATER TABLE = 5.0 ft
 N(60) = EQUIVALENT SPT VALUE (60% Energy)
 N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
 Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
 Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
 PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-09

DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
6.300	20.67	175.86	1.06	SAND	35	41	87		44.5
6.450	21.16	144.68	.70	SAND	29	33	81		43.5
6.600	21.65	155.45	.62	SAND	31	35	83		43.5
6.750	22.15	151.99	.63	SAND	30	34	82		43.5
6.900	22.64	165.39	.68	SAND	33	37	84		44.0
7.050	23.13	231.99	.79	SAND	46	51	94		45.0
7.200	23.62	271.44	1.01	SAND	54	59	98		46.0
7.350	24.11	265.45	1.16	SAND	53	58	97		45.5
7.500	24.61	214.02	1.22	SAND to SILTY SAND	54	58	91		44.5
7.650	25.10	187.46	1.31	SAND to SILTY SAND	47	50	87		44.0
7.800	25.59	193.56	.73	SAND	39	41	88		44.0
7.950	26.08	257.36	1.08	SAND	51	54	95		45.0
8.100	26.57	250.37	1.05	SAND	50	52	94		45.0
8.250	27.07	234.08	1.23	SAND	47	48	92		44.5
8.400	27.56	223.45	1.17	SAND	45	46	91		44.5
8.550	28.05	244.68	1.08	SAND	49	50	93		44.5
8.700	28.54	265.75	.96	SAND	53	54	95		45.0
8.850	29.04	277.78	1.18	SAND	56	56	96		45.0
9.000	29.53	315.23	1.25	SAND	63	63	100		45.5
9.150	30.02	279.03	1.34	SAND	56	55	96		45.0
9.300	30.51	199.72	1.26	SAND to SILTY SAND	50	49	86		43.5
9.450	31.00	144.34	1.16	SAND to SILTY SAND	36	35	77		42.0
9.600	31.50	69.73	1.39	SILTY SAND to SANDY SILT	23	23	56		38.5
9.750	31.99	81.33	.91	SAND to SILTY SAND	20	20	60		38.5
9.900	32.48	244.46	.92	SAND	49	47	91		44.0
10.050	32.97	352.49	1.30	SAND	70	67	100		45.5
10.200	33.46	397.53	1.38	SAND	80	75	100		46.0
10.350	33.96	393.20	1.36	SAND	79	74	100		46.0
10.500	34.45	353.75	1.19	SAND	71	66	100		45.5
10.650	34.94	298.11	.88	SAND	60	55	96		44.5
10.800	35.43	269.17	1.08	SAND	54	50	93		44.0
10.950	35.93	310.83	.95	SAND	62	57	97		45.0
11.100	36.42	293.67	1.75	SAND to SILTY SAND	73	67	95		44.5
11.250	36.91	278.56	1.67	SAND to SILTY SAND	70	63	93		44.0
11.400	37.40	251.75	1.91	SAND to SILTY SAND	63	57	90		44.0
11.550	37.89	201.78	1.10	SAND	40	36	84		42.5
11.700	38.39	207.58	1.16	SAND	42	37	85		43.0
11.850	38.88	208.07	1.08	SAND	42	37	84		43.0
12.000	39.37	238.43	1.10	SAND	48	42	88		43.5
12.150	39.86	169.00	1.26	SAND to SILTY SAND	42	37	78		42.0
12.300	40.35	226.79	.94	SAND	45	40	86		43.0
12.450	40.85	268.15	.95	SAND	54	46	91		44.0
12.600	41.34	280.37	1.27	SAND	56	48	92		44.0
12.750	41.83	267.81	1.37	SAND to SILTY SAND	67	57	91		43.5
12.900	42.32	228.28	1.56	SAND to SILTY SAND	57	49	86		43.0
13.050	42.81	171.66	1.53	SAND to SILTY SAND	43	36	78		41.5
13.200	43.31	217.06	.72	SAND	43	37	84		42.5
13.350	43.80	205.63	.99	SAND	41	35	83		42.5
13.500	44.29	217.97	1.16	SAND	44	36	84		42.5
13.650	44.78	188.38	1.15	SAND to SILTY SAND	47	39	80		42.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL

ASSUMED TOTAL UNIT WT = 120 pcf

ASSUMED DEPTH OF WATER TABLE = 5.0 ft

N(60) = EQUIVALENT SPT VALUE (60% Energy)

N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)

Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY

Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH

PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-09

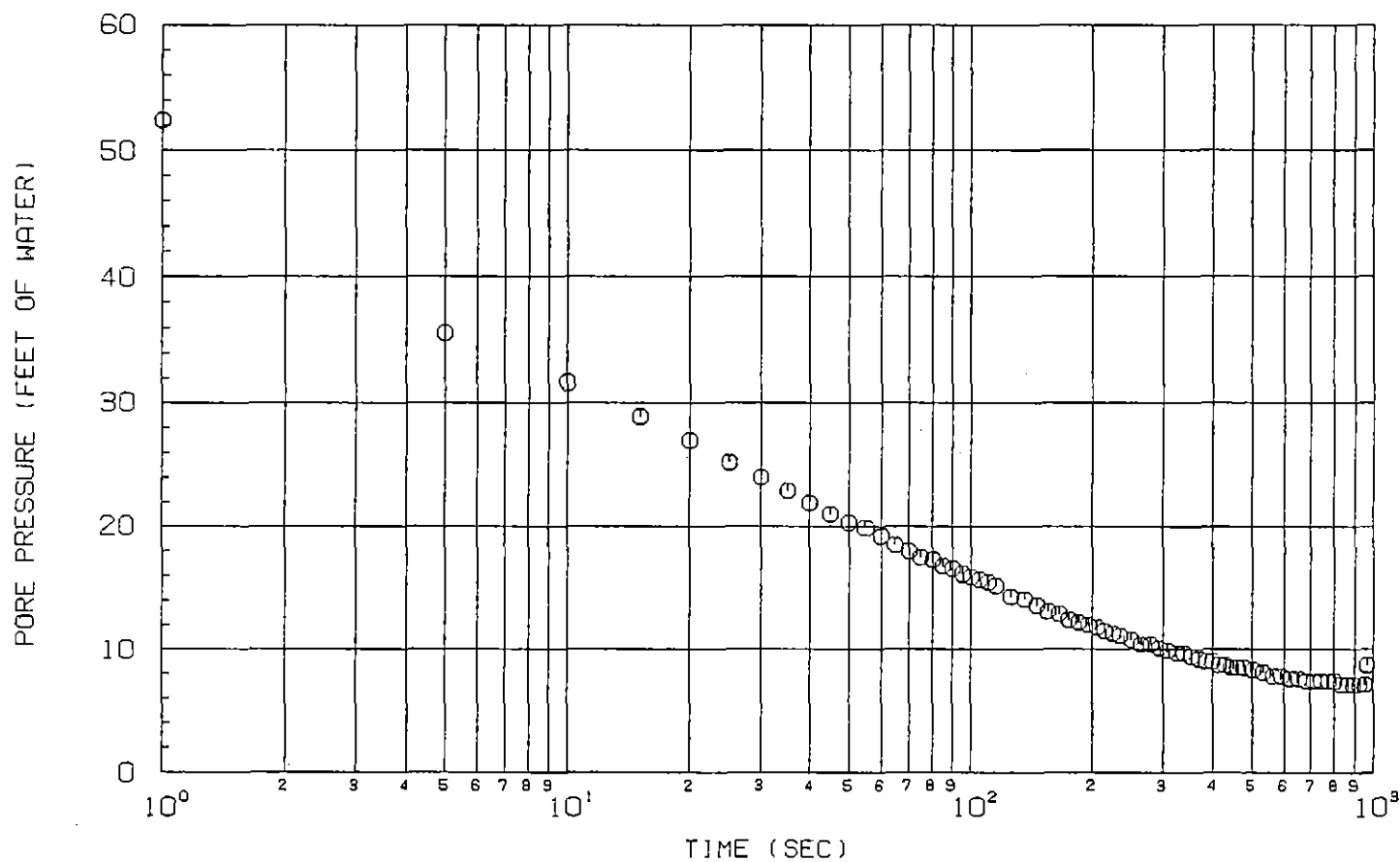
DEPTH (m)	DEPTH (ft)	TIP RESISTANCE (tsf)	FRICTION RATIO (%)	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr (%)	Su (tsf)	PHI (Degrees)
13.800	45.28	181.18	.97	SAND	36	30	79		41.5
13.950	45.77	170.00	.91	SAND	34	28	77		41.0
14.100	46.26	170.85	.86	SAND	34	28	77		41.0
14.250	46.75	173.78	.91	SAND	35	28	77		41.0
14.400	47.24	177.88	.78	SAND	36	29	78		41.0
14.550	47.74	172.34	.79	SAND	34	28	76		41.0
14.700	48.23	172.66	1.08	SAND to SILTY SAND	43	35	76		40.5
14.850	48.72	162.10	.81	SAND	32	26	74		40.0
15.000	49.21	184.36	.68	SAND	37	29	78		41.0
15.150	49.70	194.77	.73	SAND	39	31	79		41.5
15.300	50.20	195.01	.87	SAND	39	31	79		41.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL
 ASSUMED TOTAL UNIT WT = 120 pcf
 ASSUMED DEPTH OF WATER TABLE = 5.0 ft
 N(60) = EQUIVALENT SPT VALUE (60% Energy)
 N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)
 Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY
 Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH
 PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.

PORE PRESSURE DISSIPATION CURVES



DEPTH: 12.1 FT

TIP-SENSING PIEZOMETRIC CPT

SOUNDING NUMBER: CPT-09

PROJECT NAME : L&A\TYLR-WOODROW

CONE/RIG : 495\pi1

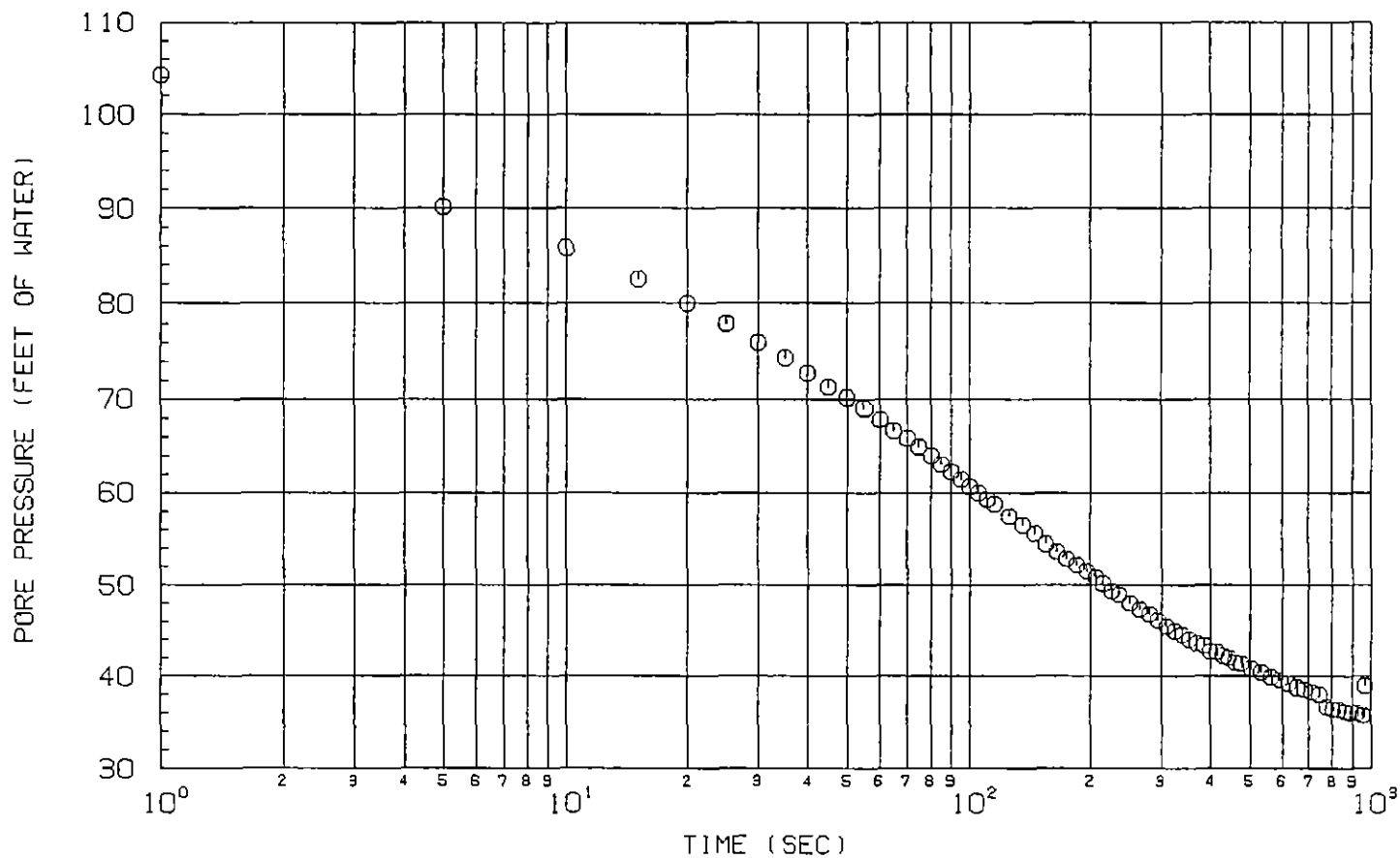
PROJECT NUMBER : 970011-001

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PORE PRESSURE DISSIPATION CURVES



DEPTH: 37.9 FT

TIP-SENSING PIEZOMETRIC CPT

SOUNDING NUMBER: CPT-09

PROJECT NAME : L&ANTYLR-WOODROW

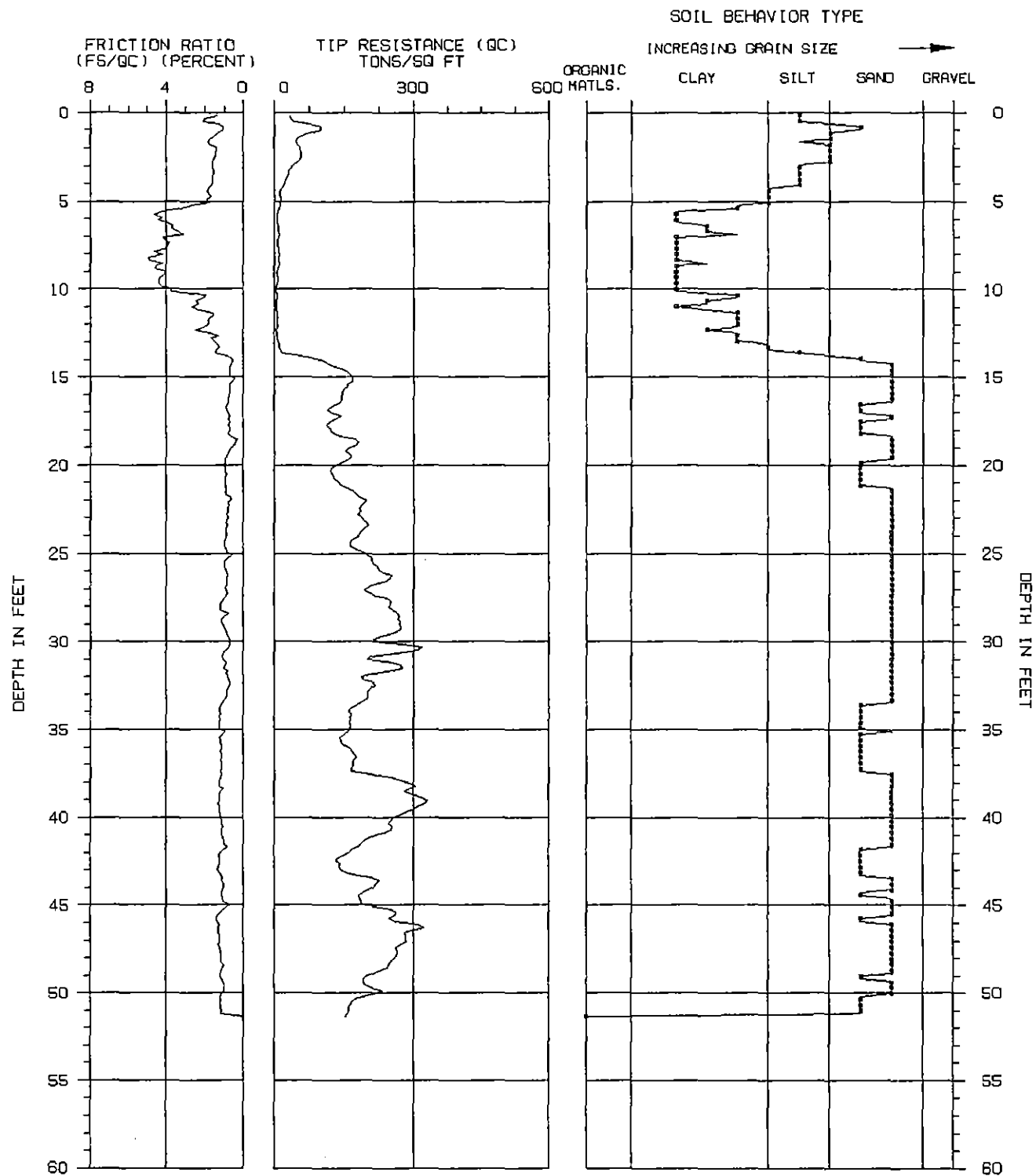
CONE/RIG : 495\#1

PROJECT NUMBER : 970011-001

DATE/TIME : 11-04-96 16:02



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TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

ASSUMED TOTAL UNIT WT = 120 PCF

ASSUMED DEPTH OF WATER TABLE = 5.0 FT

SOIL BEHAVIOR TYPE INTERPRETATIONS BASED ON: GUIDELINES FOR GEOTECHNICAL DESIGN USING THE CPT AND CPTU,
SOIL MECHANICS SERIES #120, UNIVERSITY OF BRITISH COLUMBIA, SEPTEMBER 1989, BY P.K. ROBERTSON AND R.G. CAMPANELLA.

CONE PENETRATION TEST

SOUNDING NUMBER: CPT-10

PROJECT NAME : L&A\TYLR-WOODROW

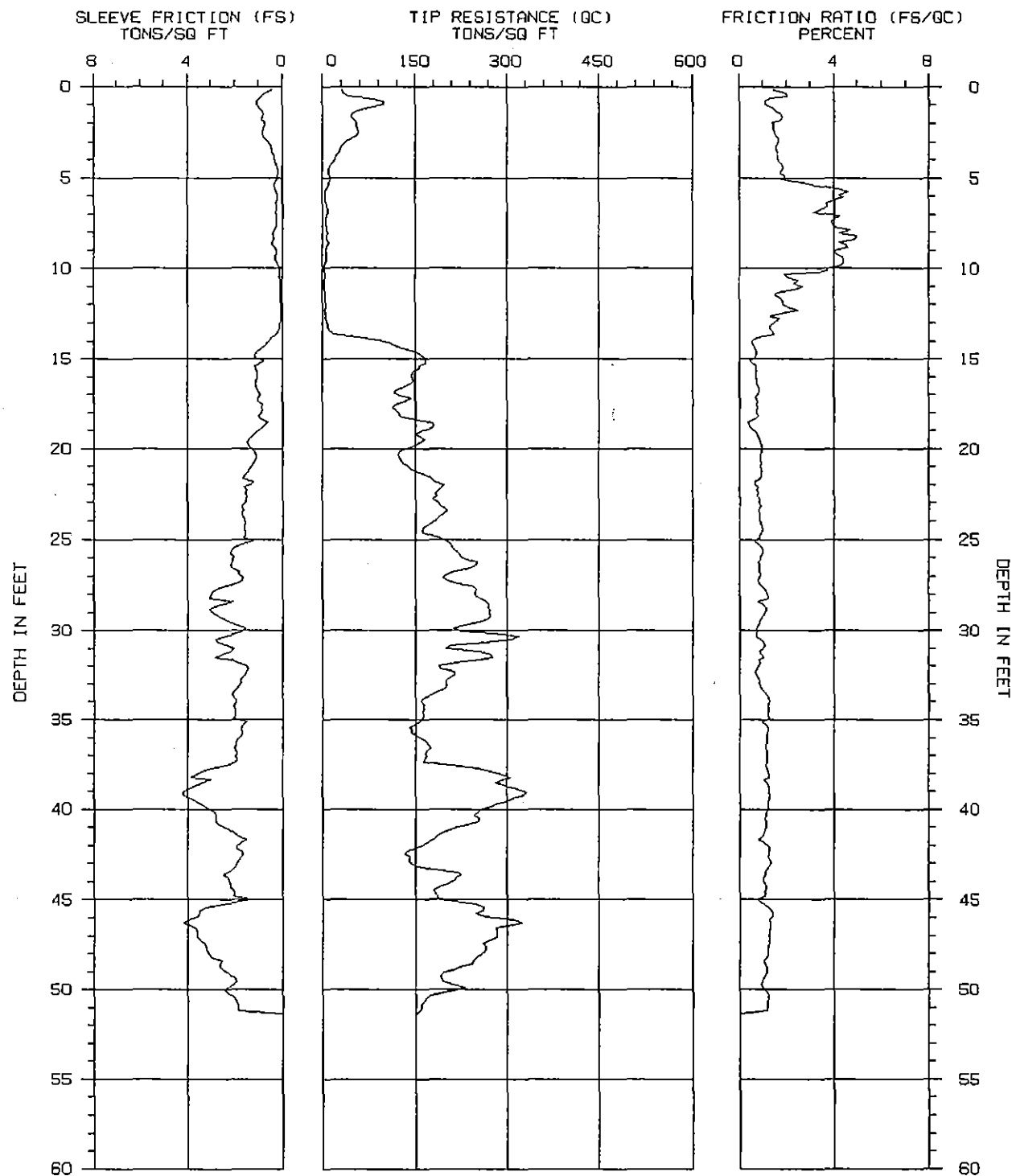
CONE/RIG : 469\#1

PROJECT NUMBER : 970011-001

DATE/TIME: 11-05-96 11:36



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TIP RESISTANCE NOT CORRECTED FOR END AREA EFFECT

CONE PENETRATION TEST

SOUNDING NUMBER: CPT-10

PROJECT NAME : L&A\TYLR-WOODROW

CONE/RIG : 469\#1

PROJECT NUMBER : 970011-001

DATE/TIME: 11-05-96 11:36



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*                               CPT INTERPRETATIONS
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*
*   SOUNDING   : CPT-10                      PROJECT No.: 970011-001
*   PROJECT    : L&A\TYLR-WOODROW             CONE/RIG  : 469\#1
*   DATE/TIME  : 11-05-96 11:36
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DEPTH	DEPTH	TIP	FRICTION	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr	Su	PHI
(m)	(ft)	RESISTANCE	RATIO				(%)	(tsf)	(Degrees)
		(tsf)	(%)						
.150	.49	40.68	2.07	SANDY SILT to CLAYEY SILT	16	26		2.7	
.300	.98	98.09	1.08	SAND to SILTY SAND	25	39	76		
.450	1.48	46.78	1.73	SILTY SAND to SANDY SILT	16	25	55		47.5
.600	1.97	53.64	1.41	SILTY SAND to SANDY SILT	18	29	58		47.0
.750	2.46	57.32	1.46	SILTY SAND to SANDY SILT	19	31	60		46.5
.900	2.95	38.81	1.64	SANDY SILT to CLAYEY SILT	16	25		3.1	
1.050	3.44	29.15	1.55	SANDY SILT to CLAYEY SILT	12	19		2.3	
1.200	3.94	20.99	1.62	SANDY SILT to CLAYEY SILT	8	13		1.7	
1.350	4.43	10.56	1.88	CLAYEY SILT to SILTY CLAY	5	8		.8	
1.500	4.92	11.85	1.95	CLAYEY SILT to SILTY CLAY	6	9		.9	
1.650	5.41	10.47	3.23	CLAY to SILTY CLAY	7	11		.7	
1.800	5.91	5.23	4.24	CLAY	5	8		.3	
1.950	6.40	6.78	3.65	CLAY	7	11		.4	
2.100	6.89	9.56	3.11	CLAY to SILTY CLAY	6	10		.6	
2.250	7.38	6.44	3.87	CLAY	6	10		.4	
2.400	7.87	7.31	4.66	CLAY	7	12		.5	
2.550	8.37	7.50	4.91	CLAY	8	12		.5	
2.700	8.86	7.18	4.60	CLAY	7	11		.4	
2.850	9.35	7.41	4.34	CLAY	7	11		.5	
3.000	9.84	4.44	4.21	CLAY	4	7		.3	
3.150	10.33	6.18	1.91	CLAY to SILTY CLAY	4	6		.4	
3.300	10.83	4.14	2.33	CLAY	4	6		.3	
3.450	11.32	5.84	1.62	CLAY to SILTY CLAY	4	6		.4	
3.600	11.81	5.40	1.83	CLAY to SILTY CLAY	4	5		.4	
3.750	12.30	4.14	2.45	CLAY	4	6		.3	
3.900	12.80	5.86	1.69	CLAY to SILTY CLAY	4	5		.4	
4.050	13.29	9.05	1.24	CLAYEY SILT to SILTY CLAY	5	6		.8	
4.200	13.78	55.43	.82	SILTY SAND to SANDY SILT	18	25	59		40.0
4.350	14.27	115.02	.61	SAND	23	31	79		44.0
4.500	14.76	158.76	.72	SAND	32	42	88		45.0
4.650	15.26	167.18	.58	SAND	33	43	89		45.0
4.800	15.75	146.72	.73	SAND	29	38	85		44.5
4.950	16.24	146.21	.77	SAND	29	37	85		44.5
5.100	16.73	121.97	.86	SAND to SILTY SAND	30	38	79		43.5
5.250	17.22	143.55	.70	SAND	29	36	83		44.0
5.400	17.72	111.30	.79	SAND to SILTY SAND	28	34	76		43.0
5.550	18.21	124.28	.80	SAND to SILTY SAND	31	38	79		43.5
5.700	18.70	179.65	.41	SAND	36	43	89		44.5
5.850	19.19	151.67	.79	SAND	30	36	84		44.0
6.000	19.69	158.49	.91	SAND	32	37	85		44.0
6.150	20.18	122.88	.95	SAND to SILTY SAND	31	36	77		43.0

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-10

DEPTH	DEPTH	TIP	FRICTION	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr	Su	PHI
(m)	(ft)	RESISTANCE (tsf)	RATIO (%)				(%)	(tsf)	(Degrees)
6.300	20.67	126.66	.91	SAND to SILTY SAND	32	37	78		43.0
6.450	21.16	143.02	.95	SAND to SILTY SAND	36	41	81		43.5
6.600	21.65	177.29	.92	SAND	35	40	87		44.0
6.750	22.15	193.56	.83	SAND	39	43	89		44.5
6.900	22.64	185.85	.79	SAND	37	41	88		44.5
7.050	23.13	190.69	.89	SAND	38	42	88		44.5
7.200	23.62	194.64	.88	SAND	39	43	89		44.5
7.350	24.11	177.44	.88	SAND	35	38	86		44.0
7.500	24.61	162.06	.97	SAND	32	35	83		43.5
7.650	25.10	198.09	.63	SAND	40	42	88		44.0
7.800	25.59	214.49	.99	SAND	43	45	90		44.5
7.950	26.08	233.10	.89	SAND	47	49	93		44.5
8.100	26.57	240.60	.86	SAND	48	50	93		45.0
8.250	27.07	194.84	.85	SAND	39	40	87		44.0
8.400	27.56	243.68	.96	SAND	49	50	93		44.5
8.550	28.05	248.10	1.20	SAND	50	51	94		44.5
8.700	28.54	269.32	.98	SAND	54	54	96		45.0
8.850	29.04	269.21	1.08	SAND	54	54	95		45.0
9.000	29.53	253.26	.85	SAND	51	50	94		44.5
9.150	30.02	225.87	.76	SAND	45	45	90		44.0
9.300	30.51	308.45	.91	SAND	62	61	99		45.5
9.450	31.00	200.30	1.01	SAND	40	39	86		43.5
9.600	31.50	275.97	1.02	SAND	55	54	95		44.5
9.750	31.99	188.19	.81	SAND	38	36	84		43.0
9.900	32.48	215.12	.73	SAND	43	41	88		43.5
10.050	32.97	199.93	.86	SAND	40	38	85		43.0
10.200	33.46	185.36	1.09	SAND	37	35	83		43.0
10.350	33.96	158.23	1.24	SAND to SILTY SAND	40	37	78		42.0
10.500	34.45	164.18	1.21	SAND to SILTY SAND	41	38	79		42.0
10.650	34.94	162.69	1.24	SAND to SILTY SAND	41	38	79		42.0
10.800	35.43	140.68	1.22	SAND to SILTY SAND	35	32	74		41.5
10.950	35.93	150.63	1.15	SAND to SILTY SAND	38	35	76		42.0
11.100	36.42	172.30	1.14	SAND to SILTY SAND	43	39	80		42.0
11.250	36.91	167.15	1.15	SAND to SILTY SAND	42	38	79		42.0
11.400	37.40	164.35	1.18	SAND to SILTY SAND	41	37	78		42.0
11.550	37.89	271.89	1.23	SAND	54	49	92		44.0
11.700	38.39	293.82	1.02	SAND	59	52	95		44.5
11.850	38.88	316.80	1.25	SAND	63	56	97		44.5
12.000	39.37	308.58	1.26	SAND	62	54	96		44.5
12.150	39.86	272.76	1.20	SAND	55	48	92		44.0
12.300	40.35	244.80	1.14	SAND	49	43	89		43.5
12.450	40.85	235.01	1.13	SAND	47	41	87		43.0
12.600	41.34	192.16	1.05	SAND	38	33	81		42.0
12.750	41.83	167.86	1.04	SAND to SILTY SAND	42	36	77		41.5
12.900	42.32	136.80	1.27	SAND to SILTY SAND	34	29	71		40.0
13.050	42.81	138.60	1.30	SAND to SILTY SAND	35	29	72		40.0
13.200	43.31	179.05	1.16	SAND to SILTY SAND	45	38	79		42.0
13.350	43.80	217.38	1.05	SAND	43	37	84		42.5
13.500	44.29	188.91	1.15	SAND to SILTY SAND	47	39	80		42.0
13.650	44.78	184.77	1.10	SAND	37	31	79		42.0

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL

ASSUMED TOTAL UNIT WT = 120 pcf

ASSUMED DEPTH OF WATER TABLE = 5.0 ft

N(60) = EQUIVALENT SPT VALUE (60% Energy)

N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)

Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY

Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH

PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

Interpretations based on: Robertson and Campanella, 1989.

SOUNDING : CPT-10

DEPTH	DEPTH	TIP	FRICTION	SOIL BEHAVIOR TYPE	N(60)	N1(60)	Dr	Su	PHI
(m)	(ft)	RESISTANCE (tsf)	RATIO (%)				(%)	(tsf)	(Degrees)
13.800	45.28	249.07	1.02	SAND	50	41	88		43.0
13.950	45.77	247.82	1.40	SAND to SILTY SAND	62	51	87		43.0
14.100	46.26	323.60	1.28	SAND	65	53	95		44.0
14.250	46.75	283.09	1.26	SAND	57	46	91		43.5
14.400	47.24	271.83	1.27	SAND	54	44	90		43.0
14.550	47.74	265.20	1.21	SAND	53	43	89		43.0
14.700	48.23	249.92	1.18	SAND	50	40	87		42.5
14.850	48.72	224.15	1.17	SAND	45	36	84		42.0
15.000	49.21	191.67	1.14	SAND to SILTY SAND	48	38	79		41.5
15.150	49.70	210.45	.97	SAND	42	33	82		42.0
15.300	50.20	190.82	1.19	SAND to SILTY SAND	48	38	79		41.5
15.450	50.69	163.25	1.18	SAND to SILTY SAND	41	32	74		40.0
15.600	51.18	157.40	1.18	SAND to SILTY SAND	39	31	73		39.5

*INDICATES OVERCONSOLIDATED OR CEMENTED MATERIAL

ASSUMED TOTAL UNIT WT = 120 pcf

ASSUMED DEPTH OF WATER TABLE = 5.0 ft

N(60) = EQUIVALENT SPT VALUE (60% Energy)

N1(60) = OVERBURDEN NORMALIZED EQUIVALENT SPT VALUE (60% Energy)

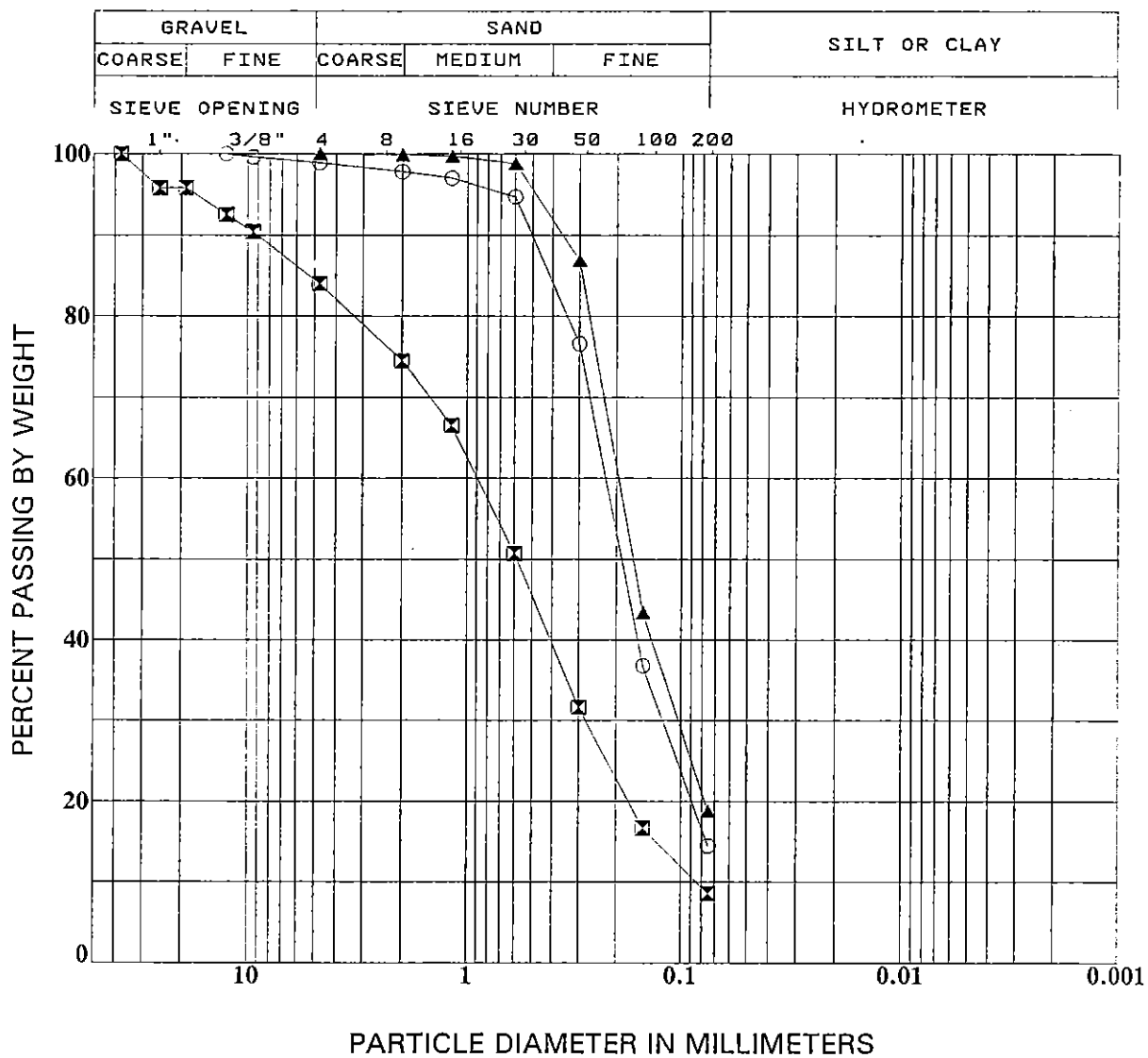
Dr = OVERBURDEN NORMALIZED EQUIVALENT RELATIVE DENSITY

Su = OVERBURDEN NORMALIZED UNDRAINED SHEAR STRENGTH

PHI = OVERBURDEN NORMALIZED EQUIVALENT FRICTION ANGLE

HOLGUIN, FAHAN & ASSOCIATES, INC.

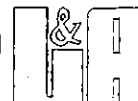
Interpretations based on: Robertson and Campanella, 1989.

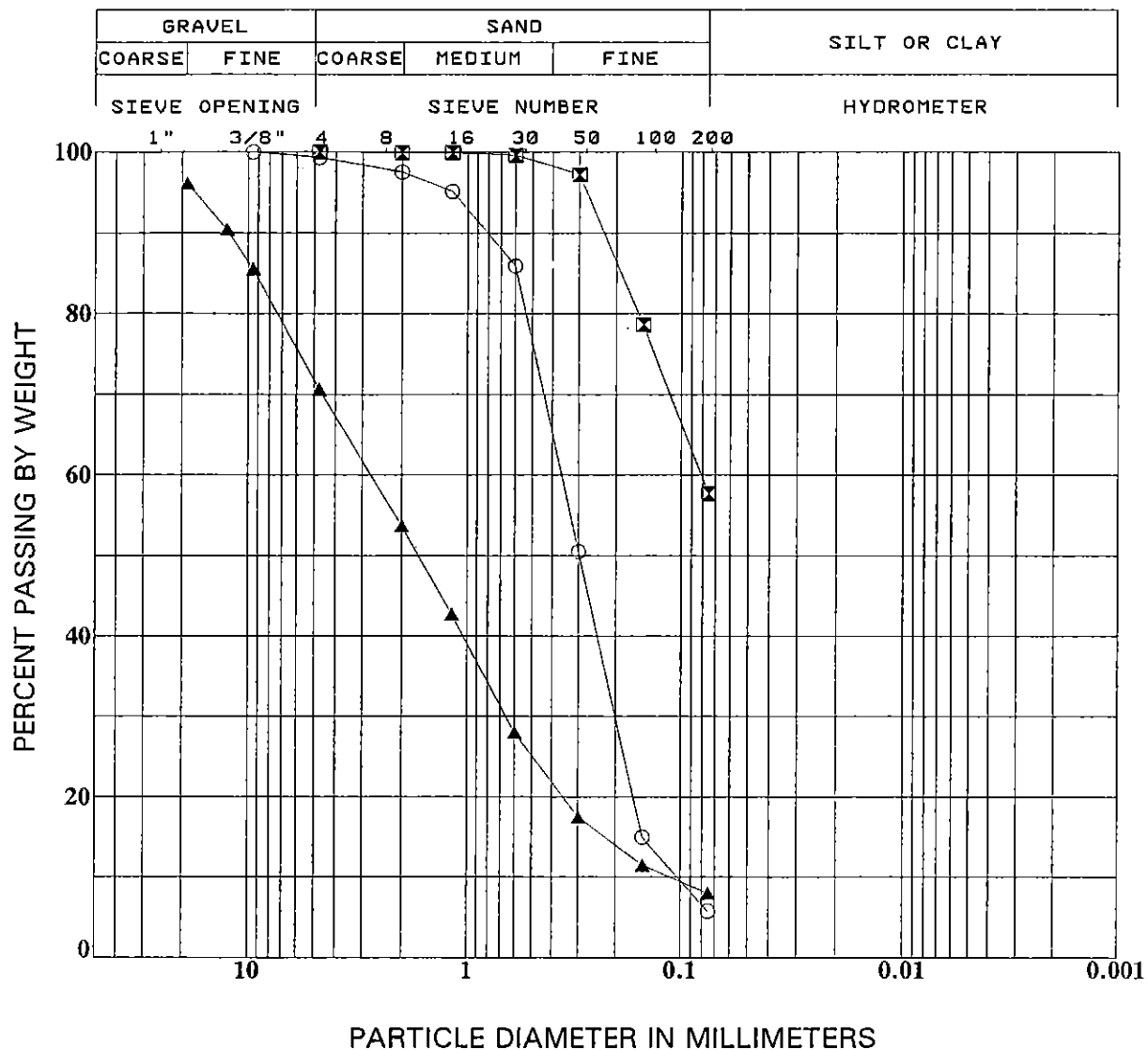


Symbol	Boring Number	Sample Number	Sample Depth (feet)	Percent Passing No. 200 Sieve	Soil Type
○	B-1	S-2	15.0	15	SM
⊠	B-1	S-5	40.0	9	SW-SM
▲	B-2	S-1	10.0	19	SM

GRAIN SIZE DISTRIBUTION CURVE
ASTM D422

Project No. 1970011-01
 Project Name TW Homes/Banning Lowland
 Date 5/16/97 Figure No. D-1



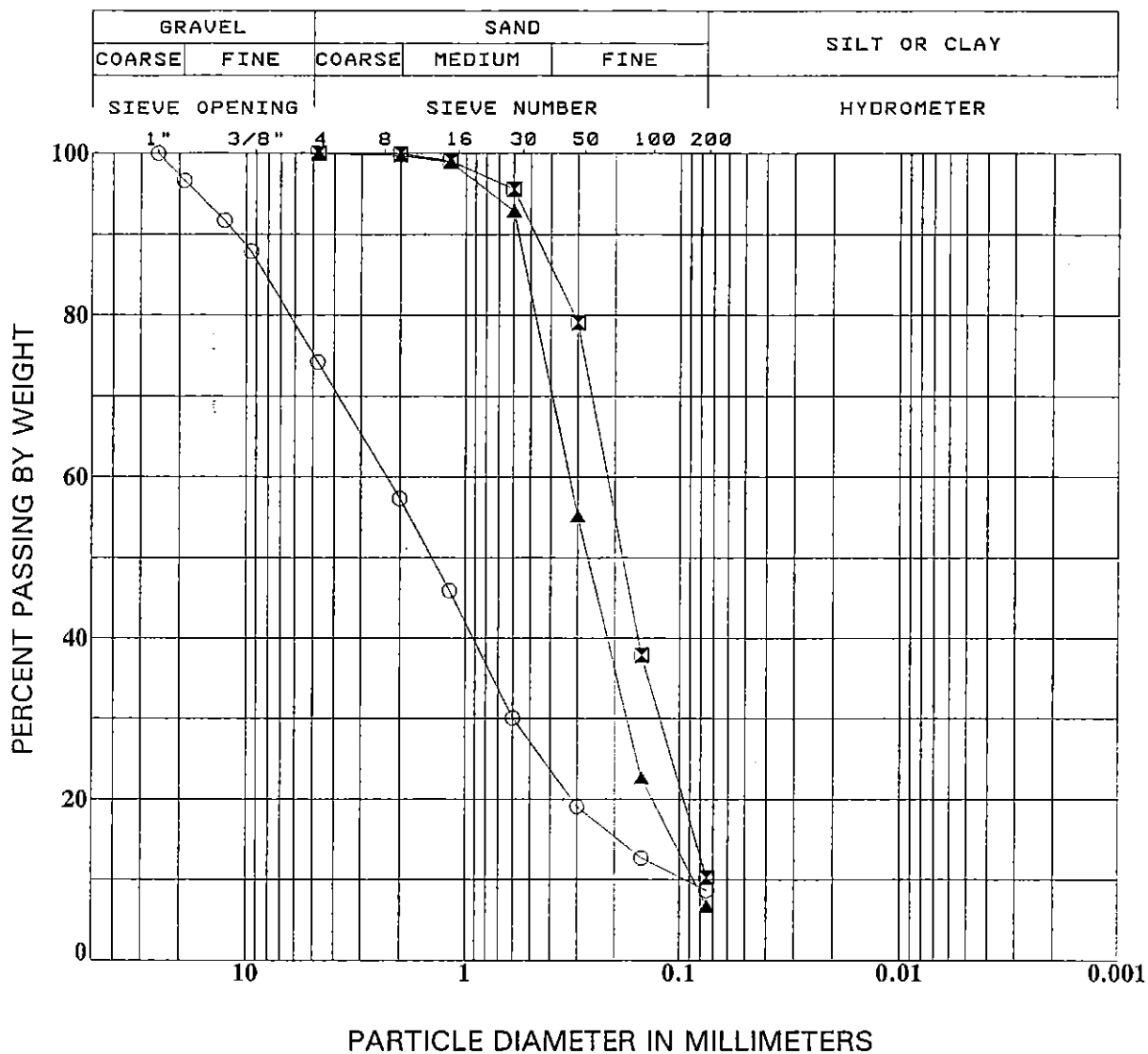


Symbol	Boring Number	Sample Number	Sample Depth (feet)	Percent Passing No. 200 Sieve	Soil Type
○	B-2	S-5	30.0	6	SP-SM
☒	B-3	S-2	15.0	58	ML
▲	B-3	S-5	30.0	8	SP-SM

GRAIN SIZE DISTRIBUTION CURVE
ASTM D422

Project No. 1970011-01
 Project Name TW Homes/Banning Lowland
 Date 5/16/97 Figure No. D-2



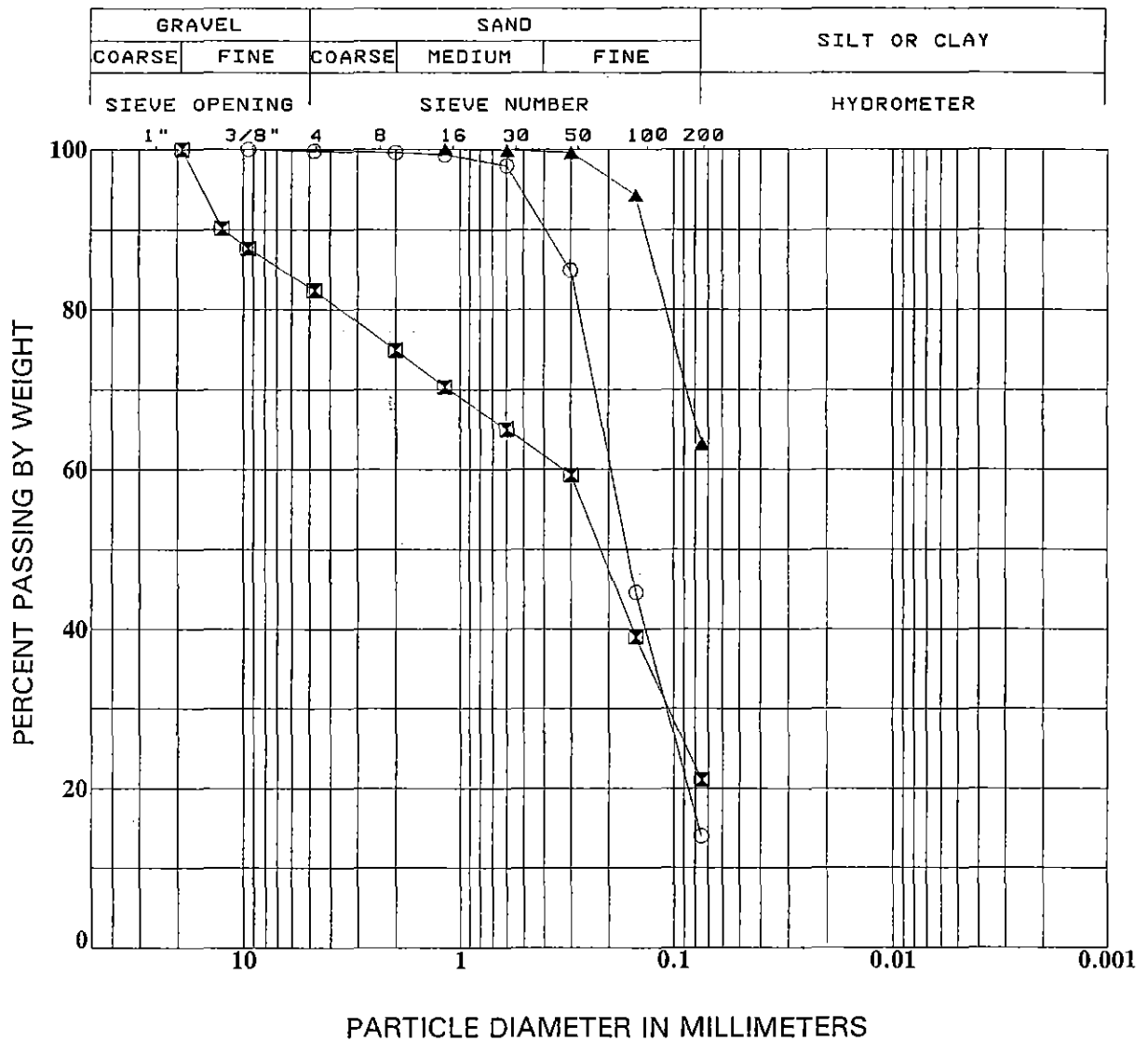


Symbol	Boring Number	Sample Number	Sample Depth (feet)	Percent Passing No. 200 Sieve	Soil Type
○	B-3	S-8	45.0	9	SP-SM
☒	B-4	S-1	10.0	10	SP-SM
▲	B-4	S-5	30.0	7	SP-SM

GRAIN SIZE DISTRIBUTION CURVE
ASTM D422

Project No. 1970011-01
 Project Name TW Homes/Banning Lowland
 Date 5/16/97 Figure No. D-3



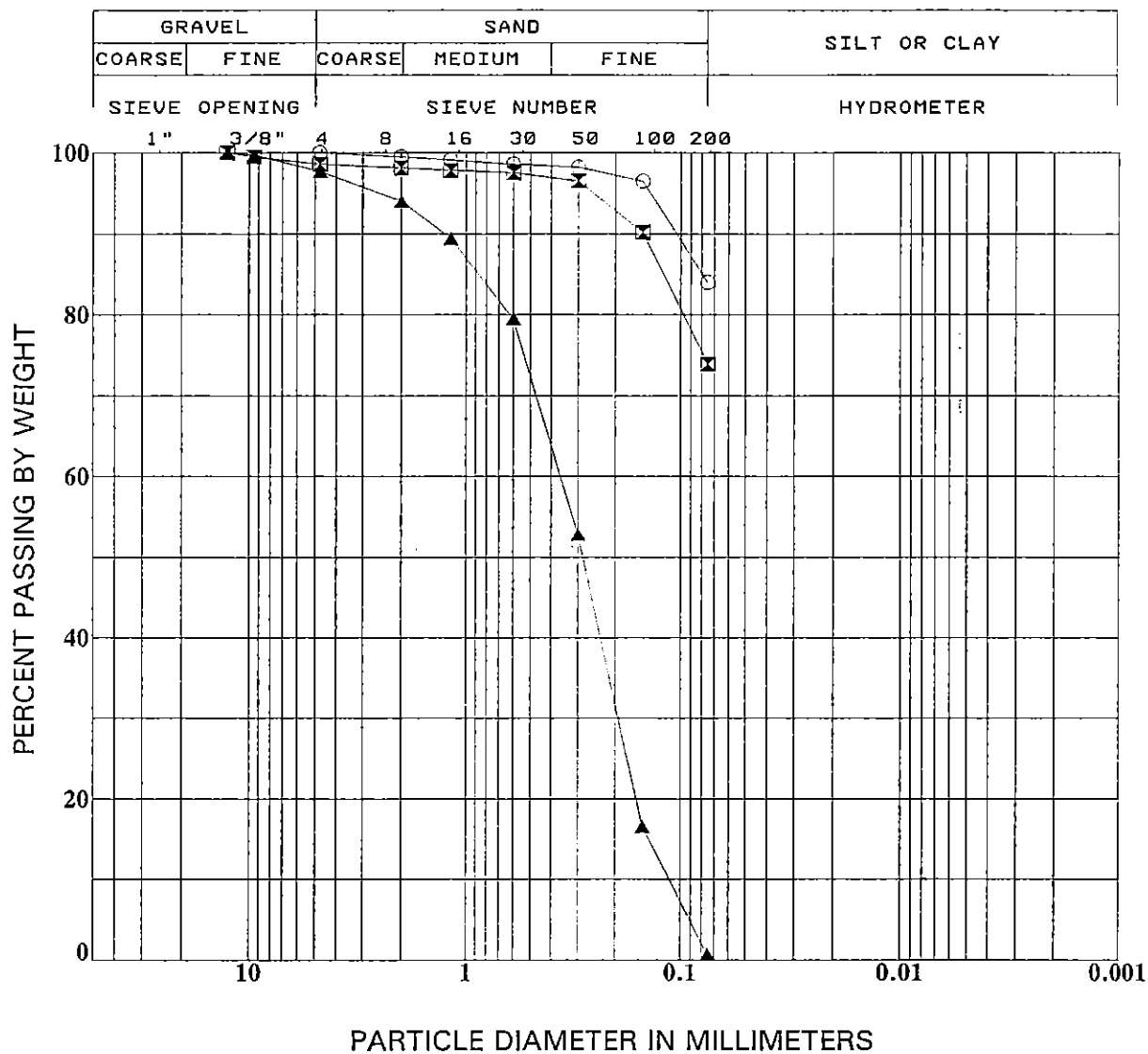


Symbol	Boring Number	Sample Number	Sample Depth (feet)	Percent Passing No. 200 Sieve	Soil Type
○	B-4	S-8	45.0	14	SM
⊠	B-5	S-1	10.0	21	SM
▲	B-5	S-4	25.0	63	CL

GRAIN SIZE DISTRIBUTION CURVE
ASTM D422

Project No. 1970011-01
 Project Name TW Homes/Banning Lowland
 Date 5/16/97 Figure No. D-4



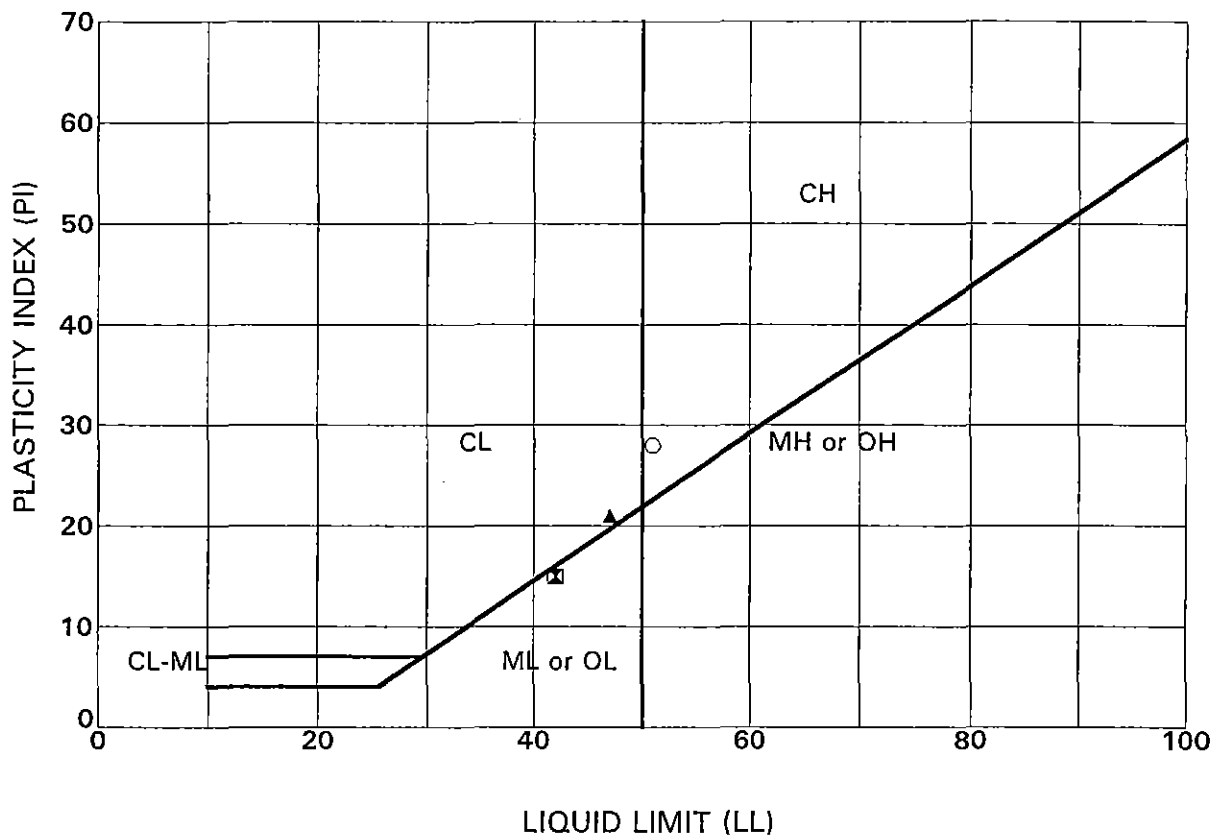


Symbol	Boring Number	Sample Number	Sample Depth (feet)	Percent Passing No. 200 Sieve	Soil Type
○	B-5	S-7	45.0	84	CL
⊠	B-6	S-1	10.0	74	CL
▲	B-6	S-5	30.0	1	SP

**GRAIN SIZE DISTRIBUTION CURVE
ASTM D422**

Project No. 1970011-01
 Project Name TW Homes/Banning Lowland
 Date 5/16/97 Figure No. D-5





Symbol	Boring Number	Sample Number	Depth (feet)	Field Moisture (%)	LL	PI	U.S.C.S. Symbol
○	B-1	S-1	5.0		51	28	CH
▣	B-3	R-2	5.0	40.2	42	15	ML
▲	B-6	R-1	2.0		47	21	CL

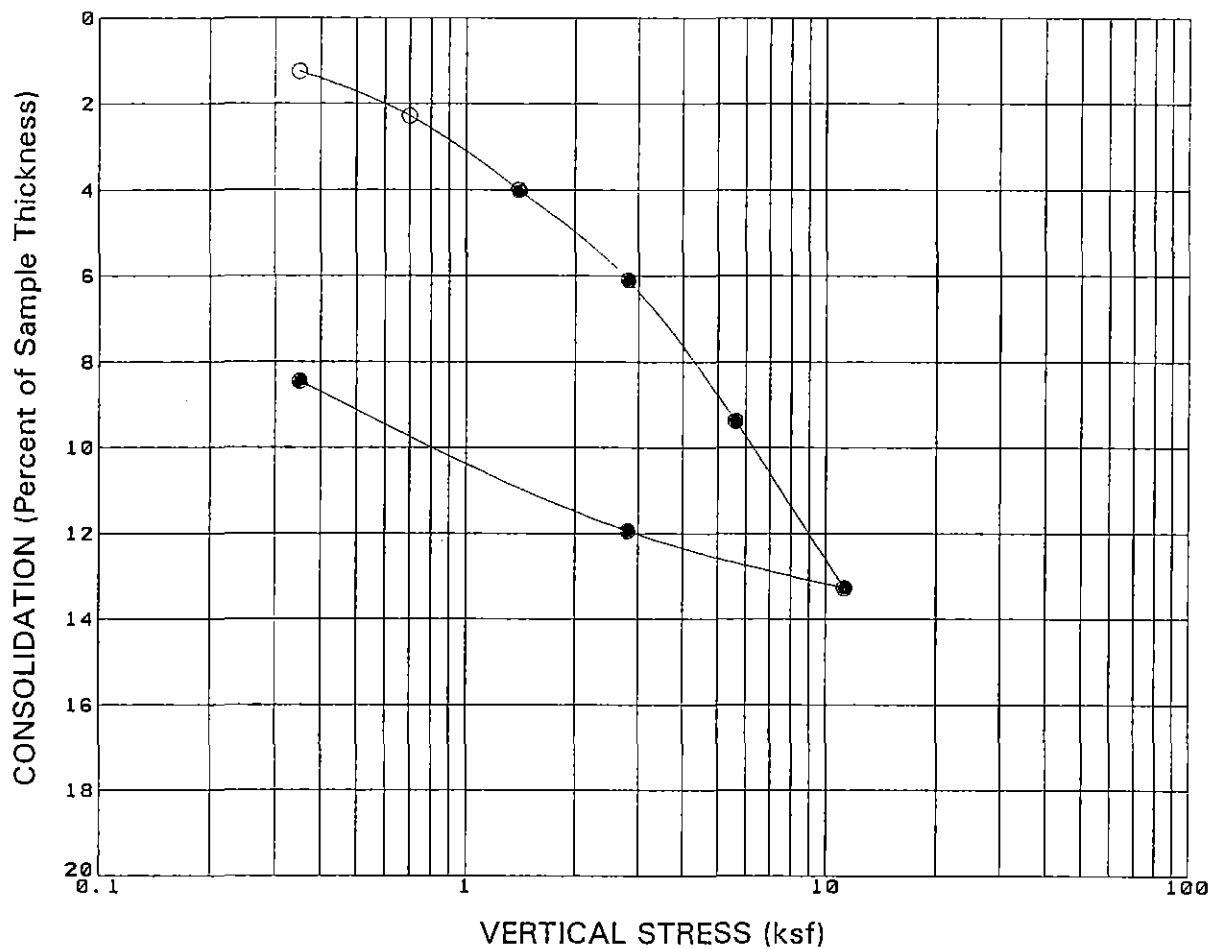
ATTERBERG LIMITS
ASTM D4318

Project No. 1970011-01

Project Name TW Homes/Banning Lowland

Date 5/16/97 Figure No. D-6





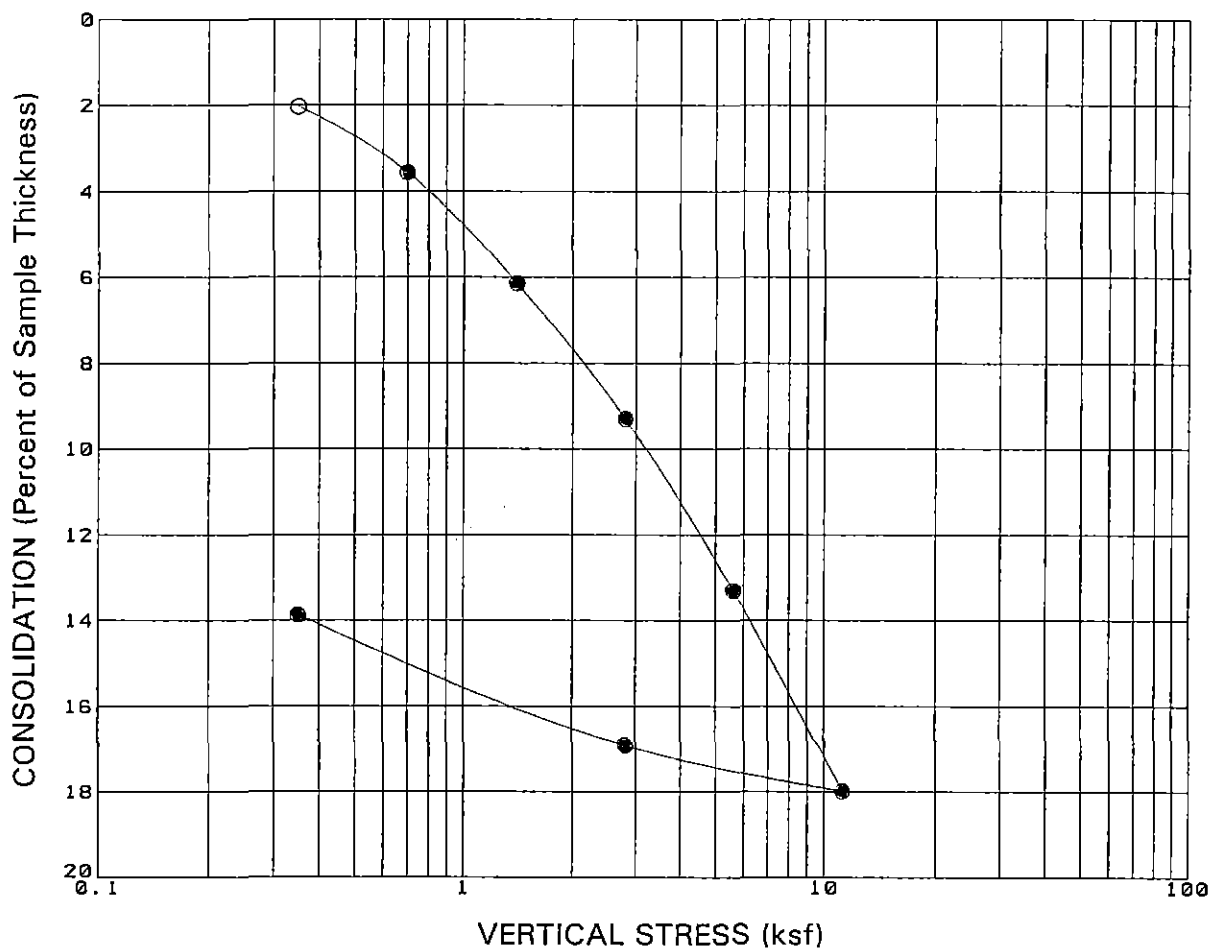
LEGEND: ○ At Field Moisture
● After Addition of Water

Boring No.	<u>B-3</u>	Dry Density (psf)	<u>79.4</u>
Sample No.	<u>R-2</u>	Moisture Content (%):	
Depth (ft)	<u>5.0</u>	Before	<u>40.2</u>
Soil Type	<u>CL</u>	After	<u>35.7</u>
Sample Description	<u>Silty Clay</u>		

CONSOLIDATION CURVE ASTM D2435

Project No. 1970011-01
Project Name TW Homes/Banning Lowland
Date 5/16/97 Figure No. D-7





LEGEND: ○ At Field Moisture
● After Addition of Water

Boring No.	<u>B-4</u>	Dry Density (psf)	<u>73.3</u>
Sample No.	<u>R-1</u>	Moisture Content (%):	
Depth (ft)	<u>2.0</u>	Before	<u>46.7</u>
Soil Type	<u>CL</u>	After	<u>37.9</u>
Sample Description	<u>Silty Clay</u>		

CONSOLIDATION CURVE ASTM D2435

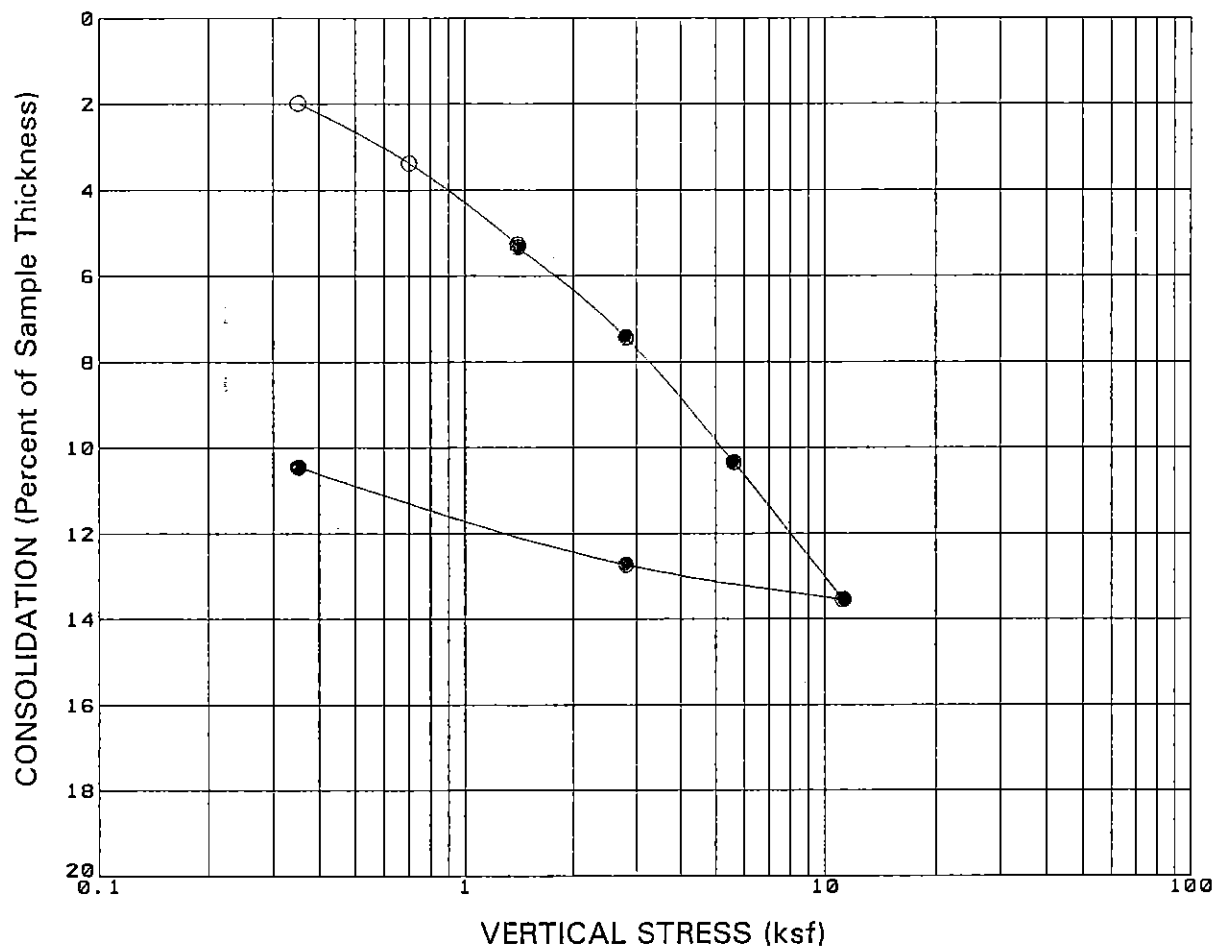
Project No. 1970011-01

Project Name TW Homes/Banning Lowland

Date 5/16/97

Figure No. D-8





LEGEND: ○ At Field Moisture
● After Addition of Water

Boring No.	<u>B-6</u>	Dry Density (psf)	<u>76.6</u>
Sample No.	<u>R-2</u>	Moisture Content (%):	
Depth (ft)	<u>5.0</u>	Before	<u>42.5</u>
Soil Type	<u>CL</u>	After	<u>36.9</u>
Sample Description	<u>Silty Clay</u>		

CONSOLIDATION CURVE ASTM D2435

Project No. 1970011-01

Project Name TW Homes/Banning Lowland

Date 5/16/97 Figure No. D-9



DATE: Friday, November 1, 1996

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*           E Q F A U L T           *
*
*           Ver. 2.20               *
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(Estimation of Peak Horizontal Acceleration
From Digitized California Faults)

SEARCH PERFORMED FOR:

JOB NUMBER: 970011-01

JOB NAME: Newport Buildings

SITE COORDINATES:

LATITUDE: 33.6333 N
LONGITUDE: 117.95 W

SEARCH RADIUS: 62 mi

ATTENUATION RELATION: 1) Campbell & Bozorgnia (1994) Horiz. - Alluvium

UNCERTAINTY (M=Mean, S=Mean+1-Sigma): M

SCOND: 0

COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED: CALIFLT.DAT

SOURCE OF DEPTH VALUES (A=Attenuation File, F=Fault Data File): A

DETERMINISTIC SITE PARAMETERS

Page 1

ABBREVIATED FAULT NAME	APPROX. DISTANCE mi (km)	MAX. CREDIBLE EVENT			MAX. PROBABLE EVENT		
		MAX.	PEAK	SITE	MAX.	PEAK	SITE
		CRED. MAG.	SITE ACC. g	INTENS MM	PROB. MAG.	SITE ACC. g	INTENS MM
ANACAPA	52 (84)	7.00	0.044	VI	5.70	0.016	IV
CASA LOMA-CLARK (S.Jacin.)	54 (88)	7.00	0.043	VI	7.00	0.043	VI
CATALINA ESCARPMENT	32 (51)	7.00	0.085	VII	6.10	0.039	V
CHINO	25 (41)	7.00	0.117	VII	5.40	0.034	V
CLAMSHELL-SAWPIT	37 (60)	6.60	0.051	VI	4.90	0.013	III
CORONADO BANK-AGUA BLANCA	19 (30)	7.50	0.229	IX	6.70	0.127	VIII
CUCAMONGA	40 (65)	6.90	0.058	VI	6.10	0.031	V
EL SINORE	27 (43)	7.50	0.157	VIII	6.60	0.076	VII
ELYSIAN PARK SEISMIC ZONE	30 (48)	7.10	0.103	VII	5.80	0.038	V
GLN.HELEN-LYTLER CR-CLREMNT	48 (77)	7.00	0.051	VI	6.70	0.039	V
HOT S-BUCK RDG.(S.Jacinto)	60 (97)	7.00	0.038	V	6.10	0.017	IV
MALIBU COAST	45 (72)	6.90	0.051	VI	5.60	0.018	IV
NEWPORT-INGLEWOOD (NORTH)	18 (29)	6.70	0.133	VIII	4.20	0.015	IV
NEWPORT-INGLEWOOD-OFFSHORE	1 (1)	7.10	0.499	X	5.90	0.394	X
NORTH FRONTAL FAULT ZONE	54 (87)	7.70	0.081	VII	6.00	0.018	IV
NORTHRIDGE HILLS	51 (82)	6.50	0.031	V	5.50	0.014	III
OAK RIDGE (Eastern Blind)	52 (84)	7.00	0.065	VI	5.50	0.020	IV
PALOS VERDES HILLS	11 (18)	7.20	0.295	IX	6.20	0.153	VIII
RAYMOND	35 (56)	7.50	0.111	VII	4.90	0.014	IV
ROSE CANYON	46 (74)	7.00	0.053	VI	5.90	0.020	IV
SAN ANDREAS (Mojave)	53 (85)	8.00	0.107	VII	7.40	0.064	VI
SAN ANDREAS (S. Bern.Mtn.)	52 (84)	8.00	0.108	VII	6.70	0.035	V
SAN CLEMENTE - SAN ISIDRO	52 (84)	8.00	0.107	VII	6.50	0.029	V
SAN DIEGO TRGH.-BAHIA SOL.	45 (73)	7.50	0.084	VII	6.20	0.027	V
SAN GABRIEL	39 (62)	7.40	0.094	VII	5.60	0.019	IV

 DETERMINISTIC SITE PARAMETERS

Page 2

ABBREVIATED FAULT NAME	APPROX. DISTANCE mi (km)	MAX. CREDIBLE EVENT			MAX. PROBABLE EVENT		
		MAX.	PEAK	SITE	MAX.	PEAK	SITE
		CRED.	SITE	INTENS	PROB.	SITE	INTENS
		MAG.	ACC. g	MM	MAG.	ACC. g	MM
SAN GORGONIO - BANNING	49 (80)	7.50	0.070	VI	6.60	0.034	V
SAN JOSE	30 (48)	6.70	0.071	VI	5.00	0.016	IV
SANTA MONICA - HOLLYWOOD	37 (60)	7.00	0.069	VI	5.80	0.027	V
SANTA MONICA MTNS. THRUST	39 (63)	7.20	0.114	VII	6.30	0.057	VI
SANTA SUSANA	56 (90)	6.90	0.037	V	6.30	0.023	IV
SIERRA MADRE-SAN FERNANDO	35 (57)	7.30	0.094	VII	6.30	0.044	VI
SIMI - SANTA ROSA	62 (99)	7.10	0.038	V	5.40	0.010	III
VERDUGO	35 (57)	6.70	0.060	VI	5.20	0.018	IV
WHITTIER - NORTH ELSINORE	21 (35)	7.10	0.148	VIII	6.00	0.059	VI
WILSHIRE ARCH	34 (54)	5.70	0.044	VI	5.00	0.025	V

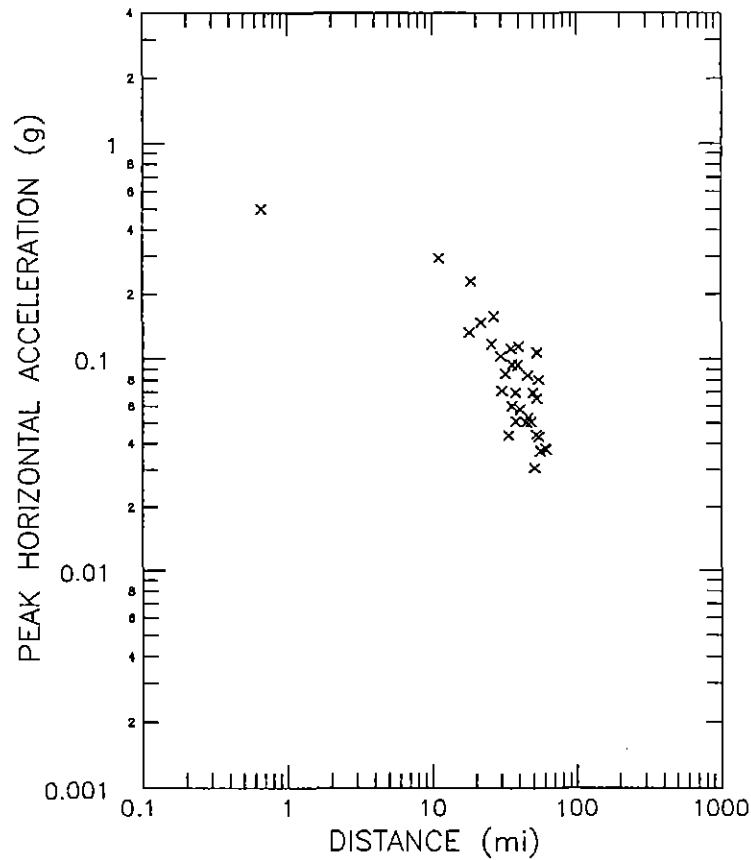
35 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE NEWPORT-INGLEWOOD-OFFSHORE FAULT IS CLOSEST TO THE SITE.
 IT IS ABOUT 0.7 MILES AWAY.

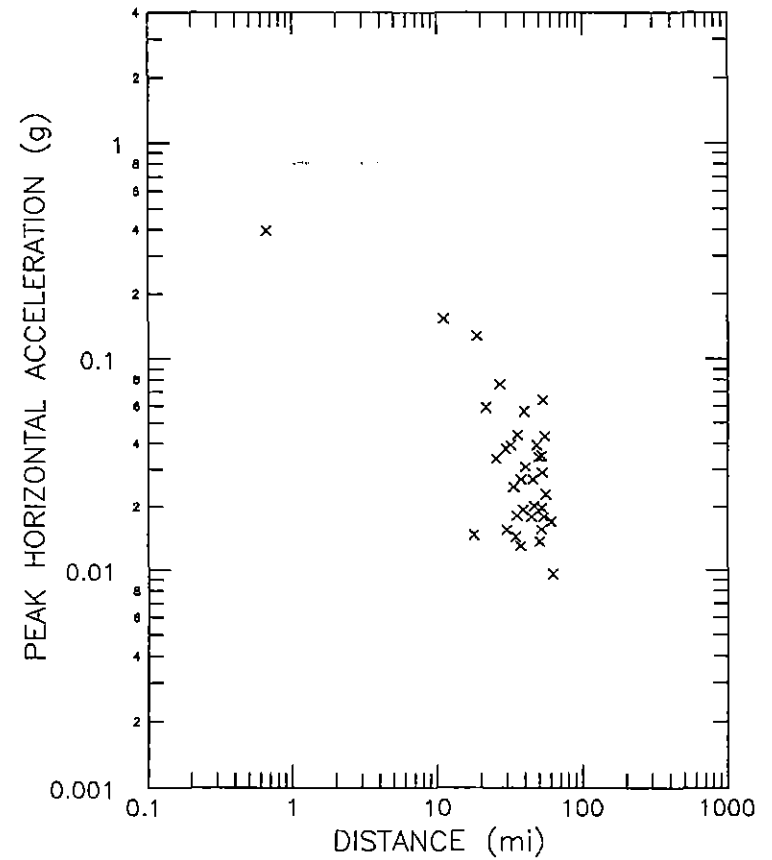
LARGEST MAXIMUM-CREDIBLE SITE ACCELERATION: 0.499 g
 LARGEST MAXIMUM-PROBABLE SITE ACCELERATION: 0.394 g

COMPARISON OF MAXIMUM EARTHQUAKES

MAXIMUM CREDIBLE EARTHQUAKES

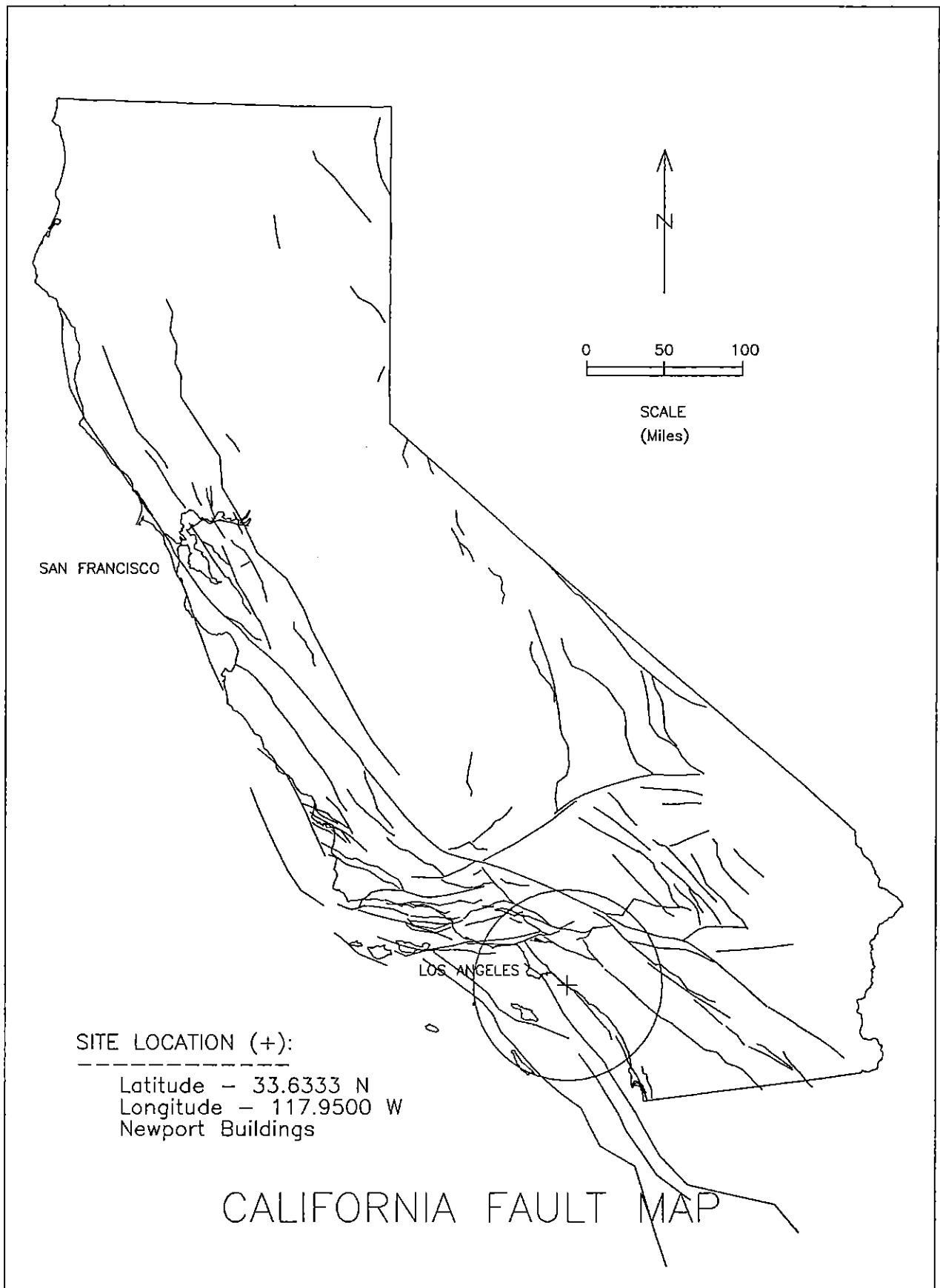


MAXIMUM PROBABLE EARTHQUAKES



JOB NO.: 970011-01

LATITUDE: 33.6333 N — LONGITUDE: 117.9500 W



DATE: Friday, November 1, 1996

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*           E Q S E A R C H           *
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*           Ver. 2.01                 *
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(Estimation of Peak Horizontal Acceleration
From California Earthquake Catalogs)

SEARCH PERFORMED FOR:

JOB NUMBER: 970011-01

JOB NAME: Newport Buildings

SITE COORDINATES:

LATITUDE: 33.6333 N

LONGITUDE: 117.95 W

TYPE OF SEARCH: RADIUS

SEARCH RADIUS: 62 mi

SEARCH MAGNITUDES: 4.0 TO 9.0

SEARCH DATES: 1800 TO 1997

ATTENUATION RELATION: 1) Campbell (1993) Horiz. - 0=Soil 1=Rock

UNCERTAINTY (M=Mean, S=Mean+1-Sigma): M

SCOND: 0

FAULT TYPE ASSUMED (DS=Reverse, SS=Strike-Slip): DS

COMPUTE PEAK HORIZONTAL ACCELERATION

EARTHQUAKE-DATA FILE USED: ALLQUAKE.DAT

TIME PERIOD OF EXPOSURE FOR STATISTICAL COMPARISON: 25 years

SOURCE OF DEPTH VALUES (A=Attenuation File, E=Earthquake Catalog): A

FILE	LAT.	LONG.	DATE	TIME	DEPTH	QUAKE	SITE	SITE	APPROX.
CODE	NORTH	WEST		(GMT)	(km)	MAG.	ACC.	MM	DISTANCE
				H M Sec			g	INT.	mi (km)
DMG	33.000	117.300	11/22/1800	2130 0.0	3.0	6.50	0.023	IV	58 [93]
DMG	33.700	117.900	12/ 8/1812	15 0 0.0	3.0	6.90	0.511	X	5 [9]
T-A	34.000	118.250	9/23/1827	0 0 0.0	7.3	5.00	0.021	IV	31 [49]
MGI	34.100	118.100	7/11/1855	415 0.0	3.0	6.30	0.048	VI	33 [54]
T-A	34.000	118.250	1/10/1856	0 0 0.0	7.3	5.00	0.021	IV	31 [49]
T-A	34.000	118.250	5/ 2/1856	810 0.0	7.3	4.30	0.012	III	31 [49]
T-A	34.000	118.250	1/17/1857	1 0 0.0	7.3	4.30	0.012	III	31 [49]
T-A	34.000	118.250	5/ 4/1857	6 0 0.0	7.3	4.30	0.012	III	31 [49]
MGI	34.000	117.500	12/16/1858	10 0 0.0	3.0	7.00	0.071	VI	36 [58]
T-A	34.170	117.320	12/ 2/1859	2210 0.0	7.3	4.30	0.005	II	52 [83]
MGI	34.100	118.200	1/27/1860	830 0.0	7.3	4.30	0.010	III	35 [57]
T-A	34.000	118.250	3/26/1860	0 0 0.0	7.3	5.00	0.021	IV	31 [49]
T-A	34.080	117.250	10/ 7/1869	0 0 0.0	7.3	4.30	0.005	II	51 [81]
T-A	34.000	118.250	3/21/1880	1425 0.0	7.3	4.30	0.012	III	31 [49]
T-A	33.500	117.070	12/29/1880	7 0 0.0	7.3	4.30	0.005	II	51 [83]
T-A	34.170	118.170	3/ 7/1888	1554 0.0	7.3	4.30	0.008	III	39 [63]
T-A	34.000	117.420	4/12/1888	1315 0.0	7.3	4.30	0.008	III	40 [64]
DMG	34.100	117.900	8/28/1889	215 0.0	6.8	5.20	0.022	IV	32 [52]
DMG	34.200	117.500	6/14/1892	1325 0.0	7.3	4.90	0.010	III	47 [75]
DMG	34.300	118.600	4/ 4/1893	1940 0.0	6.2	5.40	0.009	III	59 [95]
DMG	34.300	117.600	7/30/1894	512 0.0	4.0	5.90	0.019	IV	50 [81]
DMG	34.200	117.400	7/22/1899	046 0.0	5.8	5.50	0.014	III	50 [81]
DMG	34.300	117.500	7/22/1899	2032 0.0	3.0	6.50	0.027	V	53 [85]
DMG	33.800	117.000	12/25/1899	1225 0.0	3.0	6.60	0.026	V	56 [90]
MGI	34.100	117.300	12/27/1901	11 0 0.0	7.3	4.60	0.007	II	49 [79]
MGI	33.800	117.900	5/22/1902	740 0.0	7.3	4.30	0.041	V	12 [19]
DMG	33.700	117.100	6/11/1902	245 0.0	7.3	4.50	0.007	II	49 [79]
MGI	33.700	117.900	7/ 8/1902	945 0.0	7.3	4.00	0.066	VI	5 [9]
DMG	33.800	117.600	9/16/1903	1210 0.0	7.3	4.00	0.015	IV	23 [37]
MGI	34.000	118.000	12/25/1903	1745 0.0	7.3	5.00	0.027	V	25 [41]
MGI	34.100	117.300	7/15/1905	2041 0.0	6.5	5.30	0.012	III	49 [79]
MGI	34.000	118.300	9/ 3/1905	540 0.0	6.5	5.30	0.024	V	32 [52]
MGI	34.000	117.400	5/22/1907	652 0.0	7.3	4.60	0.010	III	40 [65]
DMG	34.000	117.500	7/ 3/1908	1255 0.0	7.3	4.00	0.008	II	36 [58]
DMG	33.700	117.400	4/11/1910	757 0.0	7.3	5.00	0.019	IV	32 [51]
DMG	33.700	117.400	5/13/1910	620 0.0	7.3	5.00	0.019	IV	32 [51]
DMG	33.700	117.400	5/15/1910	1547 0.0	3.5	6.00	0.041	V	32 [51]
DMG	34.100	118.800	5/10/1911	1340 0.0	7.3	4.00	0.003	I	58 [94]
MGI	34.100	117.300	11/22/1911	257 0.0	7.3	4.00	0.004	I	49 [79]
MGI	34.200	117.300	4/13/1913	1045 0.0	7.3	4.00	0.004	I	54 [87]
DMG	33.800	118.000	10/21/1913	938 0.0	7.3	4.00	0.034	V	12 [19]
DMG	34.000	118.500	11/ 8/1914	1140 0.0	7.3	4.50	0.009	III	40 [65]
MGI	33.800	118.500	6/18/1915	15 5 0.0	7.3	4.00	0.009	III	34 [54]
MGI	34.100	118.200	5/ 2/1916	1432 0.0	7.3	4.00	0.008	III	35 [57]
MGI	34.000	118.200	2/13/1917	13 5 0.0	7.3	4.60	0.017	IV	29 [47]
MGI	33.800	117.800	5/19/1917	635 0.0	7.3	4.00	0.027	V	14 [23]
MGI	33.800	117.800	5/19/1917	719 0.0	7.3	4.00	0.027	V	14 [23]
MGI	33.800	117.800	5/20/1917	945 0.0	7.3	4.00	0.027	V	14 [23]
MGI	34.000	118.200	6/26/1917	424 0.0	7.3	4.00	0.011	III	29 [47]
MGI	34.000	118.200	6/26/1917	2115 0.0	7.3	4.60	0.017	IV	29 [47]
MGI	34.000	118.200	6/26/1917	2120 0.0	7.3	4.60	0.017	IV	29 [47]
MGI	34.000	118.200	6/26/1917	2130 0.0	7.3	4.60	0.017	IV	29 [47]
DMG	34.000	118.500	3/ 6/1918	1820 0.0	7.3	4.00	0.006	II	40 [65]
MGI	34.000	118.500	3/ 8/1918	1230 0.0	7.3	4.00	0.006	II	40 [65]
DMG	33.750	117.000	4/21/1918	223225.0	3.0	6.80	0.031	V	55 [89]
MGI	33.800	117.600	4/22/1918	2115 0.0	7.3	5.00	0.031	V	23 [37]
MGI	33.800	116.900	4/23/1918	1415 0.0	7.3	4.00	0.003	I	61 [99]
MGI	33.800	116.900	4/29/1918	2 0 0.0	7.3	4.00	0.003	I	61 [99]

FILE	LAT.	LONG.	DATE	TIME	DEPTH	QUAKE	SITE	SITE	APPROX.
CODE	NORTH	WEST		(GMT)	(km)	MAG.	ACC.	MM	DISTANCE
				H M Sec			g	INT.	mi [km]
DMG	33.750	117.000	6/ 6/1918	2232 0.0	7.3	5.00	0.008	II	55 [89]
MGI	33.800	116.900	6/14/1918	1024 0.0	7.3	4.00	0.003	I	61 [99]
MGI	34.000	118.500	11/19/1918	2018 0.0	7.3	5.00	0.013	III	40 [65]
MGI	34.000	118.400	2/22/1920	1610 0.0	7.3	4.60	0.012	III	36 [58]
DMG	33.500	118.250	6/18/1920	10 8 0.0	7.3	4.50	0.027	V	20 [31]
DMG	34.000	118.500	6/22/1920	248 0.0	7.3	4.90	0.012	III	40 [65]
MGI	34.000	118.300	6/22/1920	2035 0.0	7.3	4.00	0.009	III	32 [52]
MGI	34.000	118.500	6/23/1920	1220 0.0	7.3	4.00	0.006	II	40 [65]
MGI	34.000	118.300	6/30/1920	350 0.0	7.3	4.00	0.009	III	32 [52]
MGI	34.080	118.260	7/16/1920	18 8 0.0	7.3	5.00	0.017	IV	36 [57]
MGI	34.100	118.300	7/16/1920	2022 0.0	7.3	4.60	0.011	III	38 [61]
MGI	34.100	118.300	7/16/1920	2127 0.0	7.3	4.60	0.011	III	38 [61]
MGI	34.100	118.300	7/16/1920	2130 0.0	7.3	4.60	0.011	III	38 [61]
MGI	34.100	118.300	7/26/1920	1215 0.0	7.3	4.00	0.007	II	38 [61]
T-A	34.000	117.420	9/10/1920	1415 0.0	7.3	4.30	0.008	III	40 [64]
MGI	33.800	116.900	12/18/1920	1726 0.0	7.3	4.00	0.003	I	61 [99]
MGI	34.200	118.000	1/ 9/1921	530 0.0	7.3	4.60	0.011	III	39 [63]
MGI	34.100	118.200	4/21/1921	1538 0.0	7.3	4.00	0.008	III	35 [57]
MGI	34.100	117.200	4/23/1923	2113 0.0	7.3	4.00	0.004	I	54 [86]
DMG	34.000	117.000	6/30/1923	022 0.0	7.3	4.50	0.004	I	60 [97]
DMG	34.000	117.250	7/23/1923	73026 0.0	3.0	6.25	0.027	V	47 [76]
DMG	33.500	117.000	8/ 8/1925	1013 0.0	7.3	4.50	0.005	II	55 [89]
MGI	33.800	117.800	11/ 4/1926	2238 0.0	7.3	4.60	0.041	V	14 [23]
MGI	33.800	117.800	11/ 7/1926	1948 0.0	7.3	4.60	0.041	V	14 [23]
MGI	33.800	117.800	11/ 9/1926	1535 0.0	7.3	4.60	0.041	V	14 [23]
MGI	33.800	117.800	11/10/1926	1723 0.0	7.3	4.60	0.041	V	14 [23]
MGI	34.000	118.400	1/29/1927	2324 0.0	7.3	4.00	0.008	II	36 [58]
MGI	34.000	118.400	2/ 7/1927	429 0.0	7.3	4.60	0.012	III	36 [58]
DMG	34.000	118.500	8/ 4/1927	1224 0.0	7.3	5.00	0.013	III	40 [65]
MGI	33.900	118.200	10/ 8/1927	1914 0.0	7.3	4.60	0.023	IV	23 [38]
MGI	33.800	118.300	12/31/1928	1045 0.0	7.3	4.00	0.015	IV	23 [37]
MGI	34.000	118.000	5/ 5/1929	1 7 0.0	7.3	4.60	0.020	IV	25 [41]
MGI	34.000	118.000	5/ 5/1929	735 0.0	7.3	4.00	0.013	III	25 [41]
DMG	33.900	118.100	7/ 8/1929	1646 6.7	7.3	4.70	0.029	V	20 [33]
DMG	33.630	118.200	9/13/1929	132338.2	7.3	4.00	0.027	V	14 [23]
MGI	34.000	117.700	12/ 3/1929	9 5 0.0	7.3	4.00	0.011	III	29 [47]
MGI	34.100	118.000	1/27/1930	2026 0.0	7.3	4.60	0.014	IV	32 [52]
DMG	33.950	118.632	8/31/1930	04036 0.0	6.8	5.20	0.013	III	45 [72]
MGI	34.000	118.400	10/ 1/1930	040 0.0	7.3	4.60	0.012	III	36 [58]
DMG	34.100	117.300	2/16/1931	1327 0.0	7.3	4.00	0.004	I	49 [79]
DMG	34.100	117.800	3/31/1931	2033 0.0	7.3	4.00	0.009	III	33 [54]
DMG	33.770	118.480	4/24/1931	182754.8	7.3	4.40	0.013	III	32 [51]
DMG	33.800	118.300	11/ 3/1931	16 5 0.0	7.3	4.00	0.015	IV	23 [37]
DMG	34.000	117.250	11/ 1/1932	445 0.0	7.3	4.00	0.005	II	47 [76]
DMG	33.617	117.967	3/11/1933	154 7.8	3.0	6.30	0.691	XI	1 [2]
DMG	33.750	118.083	3/11/1933	2 4 0.0	7.3	4.90	0.067	VI	11 [18]
DMG	33.750	118.083	3/11/1933	2 5 0.0	7.3	4.30	0.044	VI	11 [18]
DMG	33.750	118.083	3/11/1933	2 9 0.0	7.3	5.00	0.072	VII	11 [18]
DMG	33.750	118.083	3/11/1933	210 0.0	7.3	4.60	0.055	VI	11 [18]
DMG	33.750	118.083	3/11/1933	211 0.0	7.3	4.40	0.048	VI	11 [18]
DMG	33.750	118.083	3/11/1933	216 0.0	7.3	4.80	0.063	VI	11 [18]
DMG	33.600	118.000	3/11/1933	217 0.0	7.3	4.50	0.116	VII	4 [6]
DMG	33.750	118.083	3/11/1933	222 0.0	7.3	4.00	0.036	V	11 [18]
DMG	33.750	118.083	3/11/1933	227 0.0	7.3	4.60	0.055	VI	11 [18]
DMG	33.750	118.083	3/11/1933	230 0.0	7.1	5.10	0.078	VII	11 [18]
DMG	33.600	118.000	3/11/1933	231 0.0	7.3	4.40	0.108	VII	4 [6]
DMG	33.750	118.083	3/11/1933	252 0.0	7.3	4.00	0.036	V	11 [18]
DMG	33.750	118.083	3/11/1933	257 0.0	7.3	4.20	0.041	V	11 [18]

FILE	LAT.	LONG.	DATE	TIME	DEPTH	QUAKE	SITE	SITE	APPROX.
CODE	NORTH	WEST		(GMT)	(km)	MAG.	ACC.	MM	DISTANCE
				H M Sec			g	INT.	mi [km]
DMG	33.750	118.083	3/11/1933	258 0.0	7.3	4.00	0.036	V	11 [18]
DMG	33.750	118.083	3/11/1933	259 0.0	7.3	4.60	0.055	VI	11 [18]
DMG	33.750	118.083	3/11/1933	3 5 0.0	7.3	4.20	0.041	V	11 [18]
DMG	33.750	118.083	3/11/1933	3 9 0.0	7.3	4.40	0.048	VI	11 [18]
DMG	33.750	118.083	3/11/1933	311 0.0	7.3	4.20	0.041	V	11 [18]
DMG	33.750	118.083	3/11/1933	323 0.0	7.3	5.00	0.072	VII	11 [18]
DMG	33.750	118.083	3/11/1933	336 0.0	7.3	4.00	0.036	V	11 [18]
DMG	33.750	118.083	3/11/1933	339 0.0	7.3	4.00	0.036	V	11 [18]
DMG	33.750	118.083	3/11/1933	347 0.0	7.3	4.10	0.039	V	11 [18]
DMG	33.750	118.083	3/11/1933	436 0.0	7.3	4.60	0.055	VI	11 [18]
DMG	33.750	118.083	3/11/1933	439 0.0	7.3	4.90	0.067	VI	11 [18]
DMG	33.750	118.083	3/11/1933	440 0.0	7.3	4.70	0.059	VI	11 [18]
DMG	33.700	118.067	3/11/1933	51022.0	7.1	5.10	0.105	VII	8 [13]
DMG	33.750	118.083	3/11/1933	513 0.0	7.3	4.70	0.059	VI	11 [18]
DMG	33.750	118.083	3/11/1933	515 0.0	7.3	4.00	0.036	V	11 [18]
DMG	33.575	117.983	3/11/1933	518 4.0	6.8	5.20	0.176	VIII	4 [7]
DMG	33.750	118.083	3/11/1933	521 0.0	7.3	4.40	0.048	VI	11 [18]
DMG	33.750	118.083	3/11/1933	524 0.0	7.3	4.20	0.041	V	11 [18]
DMG	33.750	118.083	3/11/1933	553 0.0	7.3	4.00	0.036	V	11 [18]
DMG	33.750	118.083	3/11/1933	555 0.0	7.3	4.00	0.036	V	11 [18]
DMG	33.750	118.083	3/11/1933	611 0.0	7.3	4.40	0.048	VI	11 [18]
DMG	33.750	118.083	3/11/1933	618 0.0	7.3	4.20	0.041	V	11 [18]
DMG	33.850	118.267	3/11/1933	629 0.0	7.3	4.40	0.019	IV	24 [38]
DMG	33.750	118.083	3/11/1933	635 0.0	7.3	4.20	0.041	V	11 [18]
DMG	33.683	118.050	3/11/1933	658 3.0	5.8	5.50	0.171	VIII	7 [11]
DMG	33.750	118.083	3/11/1933	751 0.0	7.3	4.20	0.041	V	11 [18]
DMG	33.750	118.083	3/11/1933	759 0.0	7.3	4.10	0.039	V	11 [18]
DMG	33.750	118.083	3/11/1933	8 8 0.0	7.3	4.50	0.051	VI	11 [18]
DMG	33.750	118.083	3/11/1933	832 0.0	7.3	4.20	0.041	V	11 [18]
DMG	33.750	118.083	3/11/1933	837 0.0	7.3	4.00	0.036	V	11 [18]
DMG	33.700	118.067	3/11/1933	85457.0	7.1	5.10	0.105	VII	8 [13]
DMG	33.750	118.083	3/11/1933	910 0.0	7.1	5.10	0.078	VII	11 [18]
DMG	33.750	118.083	3/11/1933	911 0.0	7.3	4.40	0.048	VI	11 [18]
DMG	33.750	118.083	3/11/1933	926 0.0	7.3	4.10	0.039	V	11 [18]
DMG	33.750	118.083	3/11/1933	1025 0.0	7.3	4.00	0.036	V	11 [18]
DMG	33.750	118.083	3/11/1933	1045 0.0	7.3	4.00	0.036	V	11 [18]
DMG	33.750	118.083	3/11/1933	11 0 0.0	7.3	4.00	0.036	V	11 [18]
DMG	33.750	118.133	3/11/1933	11 4 0.0	7.3	4.60	0.045	VI	13 [21]
DMG	33.750	118.083	3/11/1933	1129 0.0	7.3	4.00	0.036	V	11 [18]
DMG	33.750	118.083	3/11/1933	1138 0.0	7.3	4.00	0.036	V	11 [18]
DMG	33.750	118.083	3/11/1933	1141 0.0	7.3	4.20	0.041	V	11 [18]
DMG	33.750	118.083	3/11/1933	1147 0.0	7.3	4.40	0.048	VI	11 [18]
DMG	33.683	118.050	3/11/1933	1250 0.0	7.3	4.40	0.075	VII	7 [11]
DMG	33.733	118.100	3/11/1933	1350 0.0	7.3	4.40	0.048	VI	11 [18]
DMG	33.750	118.083	3/11/1933	1357 0.0	7.3	4.00	0.036	V	11 [18]
DMG	33.850	118.267	3/11/1933	1425 0.0	7.3	5.00	0.030	V	24 [38]
DMG	33.733	118.100	3/11/1933	1447 0.0	7.3	4.40	0.048	VI	11 [18]
DMG	33.883	118.317	3/11/1933	1457 0.0	7.3	4.90	0.023	IV	27 [44]
DMG	33.733	118.100	3/11/1933	15 9 0.0	7.3	4.40	0.048	VI	11 [18]
DMG	33.750	118.083	3/11/1933	1547 0.0	7.3	4.00	0.036	V	11 [18]
DMG	33.750	118.083	3/11/1933	1653 0.0	7.3	4.80	0.063	VI	11 [18]
DMG	33.750	118.083	3/11/1933	1944 0.0	7.3	4.00	0.036	V	11 [18]
DMG	33.750	118.083	3/11/1933	1956 0.0	7.3	4.20	0.041	V	11 [18]
DMG	33.750	118.083	3/11/1933	22 0 0.0	7.3	4.40	0.048	VI	11 [18]
DMG	33.750	118.083	3/11/1933	2231 0.0	7.3	4.40	0.048	VI	11 [18]
DMG	33.750	118.083	3/11/1933	2232 0.0	7.3	4.10	0.039	V	11 [18]
DMG	33.750	118.083	3/11/1933	2240 0.0	7.3	4.40	0.048	VI	11 [18]
DMG	33.750	118.083	3/11/1933	23 5 0.0	7.3	4.20	0.041	V	11 [18]

FILE	LAT.	LONG.	DATE	TIME	DEPTH	QUAKE	SITE	SITE	APPROX.
CODE	NORTH	WEST		(GMT)	(km)	MAG.	ACC.	MM	DISTANCE
				H M Sec			g	INT.	mi [km]
DMG	33.750	118.083	3/12/1933	027 0.0	7.3	4.40	0.048	VI	11 [18]
DMG	33.750	118.083	3/12/1933	034 0.0	7.3	4.00	0.036	V	11 [18]
DMG	33.750	118.083	3/12/1933	448 0.0	7.3	4.00	0.036	V	11 [18]
DMG	33.750	118.083	3/12/1933	546 0.0	7.3	4.40	0.048	VI	11 [18]
DMG	33.750	118.083	3/12/1933	6 1 0.0	7.3	4.20	0.041	V	11 [18]
DMG	33.750	118.083	3/12/1933	616 0.0	7.3	4.60	0.055	VI	11 [18]
DMG	33.750	118.083	3/12/1933	740 0.0	7.3	4.20	0.041	V	11 [18]
DMG	33.750	118.083	3/12/1933	835 0.0	7.3	4.20	0.041	V	11 [18]
DMG	33.750	118.083	3/12/1933	15 2 0.0	7.3	4.20	0.041	V	11 [18]
DMG	33.750	118.083	3/12/1933	1651 0.0	7.3	4.00	0.036	V	11 [18]
DMG	33.750	118.083	3/12/1933	1738 0.0	7.3	4.50	0.051	VI	11 [18]
DMG	33.750	118.083	3/12/1933	1825 0.0	7.3	4.10	0.039	V	11 [18]
DMG	33.750	118.083	3/12/1933	2128 0.0	7.3	4.10	0.039	V	11 [18]
DMG	33.750	118.083	3/12/1933	2354 0.0	7.3	4.50	0.051	VI	11 [18]
DMG	33.750	118.083	3/13/1933	343 0.0	7.3	4.10	0.039	V	11 [18]
DMG	33.750	118.083	3/13/1933	432 0.0	7.3	4.70	0.059	VI	11 [18]
DMG	33.750	118.083	3/13/1933	617 0.0	7.3	4.00	0.036	V	11 [18]
DMG	33.750	118.083	3/13/1933	131828.0	6.5	5.30	0.091	VII	11 [18]
DMG	33.750	118.083	3/13/1933	1532 0.0	7.3	4.10	0.039	V	11 [18]
DMG	33.750	118.083	3/13/1933	1929 0.0	7.3	4.20	0.041	V	11 [18]
DMG	33.750	118.083	3/14/1933	036 0.0	7.3	4.20	0.041	V	11 [18]
DMG	33.750	118.083	3/14/1933	1219 0.0	7.3	4.50	0.051	VI	11 [18]
DMG	33.617	118.017	3/14/1933	19 150.0	7.1	5.10	0.170	VIII	4 [6]
DMG	33.750	118.083	3/14/1933	2242 0.0	7.3	4.10	0.039	V	11 [18]
DMG	33.750	118.083	3/15/1933	2 8 0.0	7.3	4.10	0.039	V	11 [18]
DMG	33.750	118.083	3/15/1933	432 0.0	7.3	4.10	0.039	V	11 [18]
DMG	33.750	118.083	3/15/1933	540 0.0	7.3	4.20	0.041	V	11 [18]
DMG	33.617	118.017	3/15/1933	111332.0	7.3	4.90	0.146	VIII	4 [6]
DMG	33.750	118.083	3/16/1933	1456 0.0	7.3	4.00	0.036	V	11 [18]
DMG	33.750	118.083	3/16/1933	1529 0.0	7.3	4.20	0.041	V	11 [18]
DMG	33.750	118.083	3/16/1933	1530 0.0	7.3	4.10	0.039	V	11 [18]
DMG	33.750	118.083	3/17/1933	1651 0.0	7.3	4.10	0.039	V	11 [18]
DMG	33.750	118.083	3/18/1933	2052 0.0	7.3	4.20	0.041	V	11 [18]
DMG	33.750	118.083	3/19/1933	2123 0.0	7.3	4.20	0.041	V	11 [18]
DMG	33.750	118.083	3/20/1933	1358 0.0	7.3	4.10	0.039	V	11 [18]
DMG	33.750	118.083	3/21/1933	326 0.0	7.3	4.10	0.039	V	11 [18]
DMG	33.750	118.083	3/23/1933	840 0.0	7.3	4.10	0.039	V	11 [18]
DMG	33.750	118.083	3/23/1933	1831 0.0	7.3	4.10	0.039	V	11 [18]
DMG	33.750	118.083	3/25/1933	1346 0.0	7.3	4.10	0.039	V	11 [18]
DMG	33.750	118.083	3/30/1933	1225 0.0	7.3	4.40	0.048	VI	11 [18]
DMG	33.750	118.083	3/31/1933	1049 0.0	7.3	4.10	0.039	V	11 [18]
DMG	33.750	118.083	4/ 1/1933	642 0.0	7.3	4.20	0.041	V	11 [18]
DMG	33.750	118.083	4/ 2/1933	8 0 0.0	7.3	4.00	0.036	V	11 [18]
DMG	33.750	118.083	4/ 2/1933	1536 0.0	7.3	4.00	0.036	V	11 [18]
DMG	33.750	118.167	5/16/1933	205855.0	7.3	4.00	0.026	V	15 [24]
DMG	33.750	118.183	8/ 4/1933	41748.0	7.3	4.00	0.025	V	16 [25]
DMG	33.783	118.133	10/ 2/1933	91017.6	6.2	5.40	0.072	VI	15 [24]
DMG	33.617	118.017	10/ 2/1933	1326 1.0	7.3	4.00	0.079	VII	4 [6]
DMG	33.950	118.133	10/25/1933	7 046.0	7.3	4.30	0.017	IV	24 [39]
DMG	33.867	118.200	11/13/1933	2128 0.0	7.3	4.00	0.016	IV	22 [35]
DMG	33.783	118.133	11/20/1933	1032 0.0	7.3	4.00	0.026	V	15 [24]
DMG	34.100	117.683	1/ 9/1934	1410 0.0	7.3	4.50	0.011	III	36 [57]
DMG	34.100	117.683	1/18/1934	214 0.0	7.3	4.00	0.008	II	36 [57]
DMG	33.617	118.117	1/20/1934	2117 0.0	7.3	4.50	0.059	VI	10 [16]
DMG	33.567	117.983	4/17/1934	1833 0.0	7.3	4.00	0.070	VI	5 [8]
DMG	33.633	118.400	10/17/1934	938 0.0	7.3	4.00	0.013	III	26 [42]
DMG	33.750	118.000	11/16/1934	2126 0.0	7.3	4.00	0.046	VI	9 [14]
DMG	33.267	117.017	6/ 7/1935	1633 0.0	7.3	4.00	0.003	I	59 [96]

FILE	LAT.	LONG.	DATE	TIME	DEPTH	QUAKE	SITE	SITE	APPROX.
CODE	NORTH	WEST		(GMT)	(km)	MAG.	ACC.	MM	DISTANCE
				H M Sec			g	INT.	mi [km]
DMG	33.717	117.517	6/19/1935	1117 0.0	7.3	4.00	0.013	III	26 [41]
DMG	34.200	117.900	7/13/1935	105416.5	7.3	4.70	0.011	III	39 [63]
DMG	34.033	117.317	9/ 3/1935	647 0.0	7.3	4.50	0.008	II	46 [73]
DMG	33.500	116.917	11/ 4/1935	355 0.0	7.3	4.50	0.004	I	60 [97]
DMG	33.600	118.017	12/25/1935	1715 0.0	7.3	4.50	0.105	VII	4 [7]
DMG	34.127	117.338	2/23/1936	222042.7	7.3	4.50	0.007	II	49 [79]
DMG	34.140	117.339	2/26/1936	93327.6	7.3	4.00	0.004	I	50 [80]
DMG	33.454	116.898	7/29/1936	142252.8	7.3	4.00	0.003	I	62 [99]
DMG	33.767	117.817	8/22/1936	521 0.0	7.3	4.00	0.033	V	12 [19]
DMG	33.561	118.058	1/15/1937	183547.0	7.3	4.00	0.049	VI	8 [13]
DMG	34.112	117.426	3/19/1937	12338.4	7.3	4.00	0.005	II	45 [72]
DMG	33.567	117.983	7/ 7/1937	1112 0.0	7.3	4.00	0.070	VI	5 [8]
DMG	34.211	117.530	9/ 1/1937	1348 8.2	7.3	4.50	0.007	II	47 [75]
DMG	34.183	117.548	9/ 1/1937	163533.5	7.3	4.50	0.008	II	44 [71]
DMG	33.038	118.734	9/13/1937	221439.5	7.3	4.00	0.003	I	61 [98]
DMG	33.617	118.033	5/21/1938	944 0.0	7.3	4.00	0.071	VI	5 [8]
DMG	33.699	117.511	5/31/1938	83455.4	5.8	5.50	0.039	V	26 [41]
DMG	33.456	116.896	6/16/1938	55916.9	7.3	4.00	0.003	I	62 [100]
DMG	33.682	117.553	7/ 5/1938	18 655.7	7.3	4.50	0.021	IV	23 [37]
DMG	33.717	117.507	8/ 6/1938	22 056.0	7.3	4.00	0.013	III	26 [42]
DMG	33.759	118.253	8/31/1938	31814.2	7.3	4.50	0.027	V	19 [31]
DMG	33.903	118.431	11/29/1938	192115.8	7.3	4.00	0.009	III	33 [54]
DMG	34.000	118.417	12/ 7/1938	338 0.0	7.3	4.00	0.007	II	37 [59]
DMG	34.127	117.521	12/27/1938	10 928.6	7.3	4.00	0.006	II	42 [68]
DMG	34.043	117.228	4/ 3/1939	25044.7	7.3	4.00	0.004	I	50 [81]
DMG	33.767	118.117	11/ 4/1939	2141 0.0	7.3	4.00	0.030	V	13 [21]
DMG	34.000	117.283	11/ 7/1939	1852 8.4	7.3	4.70	0.009	III	46 [74]
DMG	33.783	118.200	12/27/1939	192849.0	7.3	4.70	0.035	V	18 [28]
DMG	33.783	118.133	1/13/1940	749 7.0	7.3	4.00	0.026	V	15 [24]
DMG	33.700	118.067	2/ 8/1940	165617.0	7.3	4.00	0.048	VI	8 [13]
DMG	33.983	118.300	2/11/1940	192410.0	7.3	4.00	0.010	III	31 [51]
DMG	34.017	117.050	2/19/1940	12 655.7	7.3	4.60	0.005	II	58 [93]
DMG	34.033	117.350	4/18/1940	184343.9	7.3	4.40	0.007	II	44 [71]
DMG	33.833	117.400	6/ 5/1940	82727.0	7.3	4.00	0.008	III	34 [55]
DMG	33.700	118.067	7/20/1940	4 113.0	7.3	4.00	0.048	VI	8 [13]
DMG	33.767	118.450	10/11/1940	55712.3	7.3	4.70	0.017	IV	30 [49]
DMG	33.783	118.417	10/12/1940	024 0.0	7.3	4.00	0.011	III	29 [46]
DMG	33.783	118.417	10/14/1940	205111.0	7.3	4.00	0.011	III	29 [46]
DMG	33.783	118.417	11/ 1/1940	725 3.0	7.3	4.00	0.011	III	29 [46]
DMG	33.633	118.200	11/ 1/1940	20 046.0	7.3	4.00	0.027	V	14 [23]
DMG	33.783	118.417	11/ 2/1940	25826.0	7.3	4.00	0.011	III	29 [46]
DMG	33.967	118.050	1/30/1941	13446.9	7.3	4.10	0.015	IV	24 [38]
DMG	33.517	118.100	3/22/1941	82240.0	7.3	4.00	0.034	V	12 [19]
DMG	34.217	117.467	3/25/1941	234341.0	7.3	4.00	0.005	II	49 [79]
DMG	33.950	117.583	4/11/1941	12024.0	7.3	4.00	0.010	III	30 [49]
DMG	33.817	118.217	10/22/1941	65718.5	7.3	4.90	0.035	V	20 [32]
DMG	33.783	118.250	11/14/1941	84136.3	6.2	5.40	0.049	VI	20 [32]
DMG	32.800	117.833	1/24/1942	214148.0	7.3	4.00	0.003	I	58 [93]
DMG	33.367	118.150	4/16/1942	72833.0	7.3	4.00	0.016	IV	22 [35]
DMG	32.850	117.483	2/23/1943	92112.0	7.3	4.00	0.003	I	60 [97]
DMG	33.933	117.367	10/24/1943	02921.0	7.3	4.00	0.007	II	39 [63]
DMG	33.867	118.217	6/19/1944	0 333.0	7.3	4.50	0.023	IV	22 [36]
DMG	33.867	118.217	6/19/1944	3 6 7.0	7.3	4.40	0.021	IV	22 [36]
DMG	34.400	117.800	2/24/1946	6 752.0	7.3	4.10	0.004	I	54 [86]
DMG	34.167	117.533	3/ 1/1948	81213.0	7.3	4.70	0.009	III	44 [71]
DMG	34.183	117.583	10/ 3/1948	24628.0	7.3	4.00	0.006	II	43 [70]
DMG	33.939	118.205	1/11/1950	214135.0	7.3	4.10	0.014	IV	26 [41]
DMG	34.118	117.341	9/22/1951	82239.1	7.3	4.30	0.006	II	48 [78]

FILE	LAT.	LONG.	DATE	TIME	DEPTH	QUAKE	SITE	SITE	APPROX.
CODE	NORTH	WEST		(GMT)	(km)	MAG.	ACC.	MM	DISTANCE
				H M Sec			g	INT.	mi [km]
DMG	32.817	118.350	12/26/1951	04654.0	4.0	5.90	0.013	III	61 [98]
DMG	32.867	118.250	2/13/1952	151337.0	7.3	4.70	0.006	II	56 [90]
DMG	33.996	117.270	2/17/1952	123658.3	7.3	4.50	0.007	II	46 [75]
DMG	33.733	117.467	10/26/1954	162226.0	7.3	4.10	0.012	III	29 [46]
DMG	34.124	117.480	5/15/1955	17 326.0	7.3	4.00	0.006	II	43 [70]
DMG	33.725	117.498	1/ 3/1956	02548.9	7.3	4.70	0.020	IV	27 [43]
DMG	34.116	117.475	6/28/1960	20 048.0	7.3	4.10	0.006	II	43 [69]
DMG	33.854	117.752	10/ 4/1961	22131.6	7.3	4.10	0.021	IV	19 [31]
DMG	33.654	117.994	10/20/1961	194950.5	7.3	4.30	0.110	VII	3 [5]
DMG	33.659	117.981	10/20/1961	20 714.5	7.3	4.00	0.093	VII	3 [4]
DMG	33.665	117.979	10/20/1961	214240.7	7.3	4.00	0.091	VII	3 [4]
DMG	33.671	118.012	10/20/1961	223534.2	7.3	4.10	0.081	VII	4 [7]
DMG	33.680	117.993	11/20/1961	85334.7	7.3	4.00	0.078	VII	4 [7]
DMG	33.738	117.187	4/27/1962	91232.1	7.3	4.10	0.006	II	44 [72]
DMG	33.543	118.340	9/14/1963	35116.2	7.3	4.20	0.017	IV	23 [37]
DMG	33.710	116.925	9/23/1963	144152.6	7.3	5.00	0.007	II	59 [95]
DMG	34.268	118.445	8/30/1964	225737.1	7.3	4.00	0.004	I	52 [84]
DMG	34.140	117.515	1/ 1/1965	8 418.0	7.3	4.40	0.008	II	43 [69]
DMG	34.132	117.426	4/15/1965	20 833.3	7.3	4.50	0.008	II	46 [74]
DMG	33.632	118.467	1/ 8/1967	73730.4	7.3	4.00	0.010	III	30 [48]
DMG	33.663	118.413	1/ 8/1967	738 5.3	7.3	4.00	0.012	III	27 [43]
DMG	33.996	117.975	6/15/1967	458 5.5	7.3	4.10	0.014	IV	25 [40]
DMG	34.304	117.570	5/ 5/1969	16 2 9.6	7.3	4.40	0.006	II	51 [82]
DMG	33.545	117.807	10/27/1969	1316 2.3	7.3	4.50	0.055	VI	10 [16]
DMG	34.267	117.518	9/12/1970	141011.2	7.3	4.10	0.005	II	50 [81]
DMG	34.270	117.540	9/12/1970	143053.0	6.2	5.40	0.013	III	50 [80]
DMG	34.281	117.552	9/13/1970	44748.6	7.3	4.40	0.006	II	50 [81]
DMG	34.411	118.401	2/ 9/1971	14 041.8	3.0	6.40	0.020	IV	60 [96]
DMG	34.411	118.401	2/ 9/1971	14 1 8.0	4.5	5.80	0.013	III	60 [96]
DMG	34.411	118.401	2/ 9/1971	14 133.0	7.3	4.20	0.004	I	60 [96]
DMG	34.411	118.401	2/ 9/1971	14 140.0	7.3	4.10	0.003	I	60 [96]
DMG	34.411	118.401	2/ 9/1971	14 150.0	7.3	4.50	0.005	II	60 [96]
DMG	34.411	118.401	2/ 9/1971	14 154.0	7.3	4.20	0.004	I	60 [96]
DMG	34.411	118.401	2/ 9/1971	14 159.0	7.3	4.10	0.003	I	60 [96]
DMG	34.411	118.401	2/ 9/1971	14 2 3.0	7.3	4.10	0.003	I	60 [96]
DMG	34.411	118.401	2/ 9/1971	14 230.0	7.3	4.30	0.004	I	60 [96]
DMG	34.411	118.401	2/ 9/1971	14 231.0	7.3	4.70	0.005	II	60 [96]
DMG	34.411	118.401	2/ 9/1971	14 244.0	4.5	5.80	0.013	III	60 [96]
DMG	34.411	118.401	2/ 9/1971	14 325.0	7.3	4.40	0.004	I	60 [96]
DMG	34.411	118.401	2/ 9/1971	14 346.0	7.3	4.10	0.003	I	60 [96]
DMG	34.411	118.401	2/ 9/1971	14 4 7.0	7.3	4.10	0.003	I	60 [96]
DMG	34.411	118.401	2/ 9/1971	14 434.0	7.3	4.20	0.004	I	60 [96]
DMG	34.411	118.401	2/ 9/1971	14 439.0	7.3	4.10	0.003	I	60 [96]
DMG	34.411	118.401	2/ 9/1971	14 444.0	7.3	4.10	0.003	I	60 [96]
DMG	34.411	118.401	2/ 9/1971	14 446.0	7.3	4.20	0.004	I	60 [96]
DMG	34.411	118.401	2/ 9/1971	14 541.0	7.3	4.10	0.003	I	60 [96]
DMG	34.411	118.401	2/ 9/1971	14 550.0	7.3	4.10	0.003	I	60 [96]
DMG	34.411	118.401	2/ 9/1971	14 710.0	7.3	4.00	0.003	I	60 [96]
DMG	34.411	118.401	2/ 9/1971	14 730.0	7.3	4.00	0.003	I	60 [96]
DMG	34.411	118.401	2/ 9/1971	14 745.0	7.3	4.50	0.005	II	60 [96]
DMG	34.411	118.401	2/ 9/1971	14 8 4.0	7.3	4.00	0.003	I	60 [96]
DMG	34.411	118.401	2/ 9/1971	14 8 7.0	7.3	4.20	0.004	I	60 [96]
DMG	34.411	118.401	2/ 9/1971	14 838.0	7.3	4.50	0.005	II	60 [96]
DMG	34.411	118.401	2/ 9/1971	14 853.0	7.3	4.60	0.005	II	60 [96]
DMG	34.361	118.306	2/ 9/1971	141021.5	7.3	4.70	0.006	II	54 [87]
DMG	34.411	118.401	2/ 9/1971	141028.0	6.5	5.30	0.009	III	60 [96]
DMG	34.339	118.332	2/ 9/1971	141612.9	7.3	4.10	0.004	I	53 [86]
DMG	34.357	118.406	2/ 9/1971	141950.2	7.3	4.00	0.003	I	56 [91]

FILE	LAT.	LONG.	DATE	TIME	DEPTH	QUAKE	SITE	SITE	APPROX.
CODE	NORTH	WEST		(GMT)	(km)	MAG.	ACC.	MM	DISTANCE
				H M Sec			g	INT.	mi [km]
DMG	34.387	118.364	2/ 9/1971	143917.8	7.3	4.00	0.003	I	57 [92]
DMG	34.433	118.398	2/ 9/1971	144017.4	7.3	4.10	0.003	I	61 [98]
DMG	34.308	118.454	2/ 9/1971	144346.7	6.8	5.20	0.009	III	55 [88]
DMG	34.335	118.331	2/ 9/1971	155820.7	7.3	4.80	0.007	II	53 [86]
DMG	34.370	118.302	2/10/1971	31212.0	7.3	4.00	0.004	I	55 [88]
DMG	34.411	118.329	2/10/1971	5 636.0	7.3	4.30	0.004	I	58 [93]
DMG	34.426	118.414	2/10/1971	518 7.2	7.3	4.50	0.004	I	61 [98]
DMG	34.384	118.455	2/10/1971	113134.6	7.3	4.20	0.004	I	59 [96]
DMG	34.399	118.419	2/10/1971	134953.7	7.3	4.30	0.004	I	59 [95]
DMG	34.361	118.487	2/10/1971	143526.7	7.3	4.20	0.004	I	59 [95]
DMG	34.396	118.366	2/10/1971	173855.1	7.3	4.20	0.004	I	58 [93]
DMG	34.397	118.439	2/21/1971	55052.6	7.3	4.70	0.005	II	60 [96]
DMG	34.392	118.427	2/21/1971	71511.7	7.3	4.50	0.005	II	59 [95]
DMG	34.353	118.456	3/ 7/1971	13340.5	7.3	4.50	0.005	II	58 [93]
DMG	34.356	118.474	3/25/1971	2254 9.9	7.3	4.20	0.004	I	58 [94]
DMG	34.296	118.464	3/30/1971	85443.3	7.3	4.10	0.004	I	54 [88]
DMG	34.286	118.515	3/31/1971	145222.5	7.3	4.60	0.006	II	55 [89]
DMG	34.428	118.413	4/ 1/1971	15 3 3.6	7.3	4.10	0.003	I	61 [98]
DMG	34.284	118.528	4/ 2/1971	54025.0	7.3	4.00	0.004	I	56 [90]
DMG	34.265	118.577	4/15/1971	111432.0	7.3	4.20	0.004	I	56 [91]
DMG	34.368	118.314	4/25/1971	1448 6.5	7.3	4.00	0.004	I	55 [88]
DMG	34.273	118.532	6/21/1971	16 1 8.5	7.3	4.00	0.004	I	55 [89]
DMG	33.748	117.479	6/22/1971	104119.0	7.3	4.20	0.013	III	28 [45]
DMG	34.399	118.473	3/ 9/1974	05431.9	7.3	4.70	0.005	II	61 [98]
DMG	34.431	118.369	8/14/1974	144555.2	7.3	4.20	0.004	I	60 [97]
PAS	32.756	117.988	1/12/1975	212214.8	7.3	4.80	0.006	II	61 [98]
PAS	33.965	117.886	1/ 1/1976	172012.9	7.3	4.20	0.017	IV	23 [37]
PAS	32.759	117.906	10/18/1976	172753.1	7.3	4.20	0.004	I	60 [97]
PAS	34.380	118.459	8/12/1977	21926.1	7.3	4.50	0.005	II	59 [95]
PAS	33.944	118.681	1/ 1/1979	231438.9	7.3	5.00	0.010	III	47 [76]
PAS	33.933	118.669	10/17/1979	205237.3	7.3	4.20	0.006	II	46 [74]
PAS	34.211	117.530	10/19/1979	122237.8	7.3	4.10	0.005	II	47 [75]
PAS	33.630	119.020	10/23/1981	172816.9	7.3	4.60	0.005	II	62 [99]
PAS	33.538	118.207	5/25/1982	134430.3	7.3	4.10	0.025	V	16 [26]
PAS	34.135	117.448	1/ 8/1983	71930.4	7.3	4.10	0.006	II	45 [72]
PAS	33.033	117.944	2/22/1983	21830.4	7.3	4.30	0.008	II	41 [67]
PAS	33.471	118.061	2/27/1984	101815.0	7.3	4.00	0.031	V	13 [21]
PAS	32.945	117.806	9/ 7/1984	11 313.4	7.3	4.30	0.006	II	48 [78]
PAS	34.023	117.245	10/ 2/1985	234412.4	7.3	4.80	0.008	III	49 [78]
PAS	32.971	117.870	7/13/1986	1347 8.2	6.5	5.30	0.014	III	46 [74]
PAS	32.990	117.849	7/13/1986	14 133.0	7.3	4.60	0.008	III	45 [72]
PAS	32.970	117.803	7/14/1986	03246.2	7.3	4.00	0.005	II	47 [75]
USG	33.017	117.817	7/14/1986	11112.6	7.3	4.12	0.006	II	43 [70]
USG	33.017	117.817	7/16/1986	1247 3.7	7.3	4.11	0.006	II	43 [70]
PAS	32.933	117.841	7/29/1986	81741.6	7.3	4.30	0.006	II	49 [78]
PAS	32.945	117.831	7/29/1986	81741.8	7.3	4.10	0.005	II	48 [77]
PAS	32.986	117.844	10/ 1/1986	201218.6	7.3	4.00	0.005	II	45 [73]
USG	34.139	117.386	2/21/1987	231530.1	7.3	4.07	0.005	II	48 [77]
PAS	34.061	118.079	10/ 1/1987	144220.0	4.0	5.90	0.041	V	30 [49]
PAS	34.049	118.101	10/ 1/1987	144541.5	7.3	4.70	0.017	IV	30 [48]
PAS	34.076	118.090	10/ 1/1987	1448 3.1	7.3	4.10	0.010	III	32 [51]
PAS	34.060	118.100	10/ 1/1987	1449 5.9	7.3	4.70	0.017	IV	31 [49]
PAS	34.052	118.090	10/ 1/1987	151231.8	7.3	4.70	0.017	IV	30 [48]
PAS	34.050	118.087	10/ 1/1987	155953.5	7.3	4.00	0.010	III	30 [48]
PAS	34.073	118.098	10/ 4/1987	105938.2	6.5	5.30	0.025	V	32 [51]
PAS	34.077	118.047	2/11/1988	152555.7	7.3	4.70	0.016	IV	31 [50]
PAS	34.136	117.709	6/26/1988	15 458.5	7.3	4.60	0.011	III	37 [60]
PAS	33.508	118.071	11/20/1988	53928.7	7.3	4.50	0.051	VI	11 [18]

FILE	LAT.	LONG.	DATE	TIME	DEPTH	QUAKE	SITE	SITE	APPROX.
CODE	NORTH	WEST		(GMT)	(km)	MAG.	ACC.	MM	DISTANCE
				H M Sec			g	INT.	mi [km]
PAS	34.149	118.135	12/ 3/1988	113826.4	7.3	4.90	0.014	IV	37 [60]
PAS	32.947	117.736	1/15/1989	153955.2	7.3	4.20	0.005	II	49 [79]
PAS	33.919	118.627	1/19/1989	65328.8	7.3	5.00	0.012	III	44 [70]
PAS	34.006	117.739	2/18/1989	717 4.8	7.3	4.30	0.014	IV	28 [46]
GSP	33.620	117.900	4/ 7/1989	200730.2	7.3	4.50	0.125	VII	3 [5]
GSP	34.030	118.180	6/12/1989	165718.4	7.3	4.40	0.014	III	30 [49]
GSP	34.020	118.180	6/12/1989	172225.5	7.3	4.10	0.011	III	30 [48]
GSP	34.190	117.390	12/28/1989	094108.1	7.3	4.50	0.006	II	50 [81]
GSP	34.140	117.700	2/28/1990	234336.6	6.8	5.20	0.017	IV	38 [61]
GSP	34.130	117.700	3/ 1/1990	003457.1	7.3	4.00	0.007	II	37 [60]
GSP	34.150	117.720	3/ 1/1990	032303.0	7.3	4.70	0.012	III	38 [61]
GSP	34.140	117.690	3/ 2/1990	172625.4	7.3	4.60	0.011	III	38 [61]
GSP	32.970	117.810	4/ 4/1990	085439.3	7.3	4.00	0.005	II	47 [75]
GSP	34.110	117.720	4/17/1990	223227.2	7.3	4.60	0.012	III	35 [57]
GSP	34.262	118.002	6/28/1991	144354.5	6.2	5.40	0.016	IV	44 [70]
GSP	34.250	117.990	6/28/1991	170055.5	7.3	4.30	0.007	II	43 [69]
GSP	34.213	118.537	1/17/1994	123055.4	3.0	6.70	0.032	V	52 [84]
GSP	34.261	118.534	1/17/1994	123939.8	7.3	4.50	0.005	II	55 [88]
GSP	34.269	118.576	1/17/1994	125546.8	7.3	4.10	0.004	I	57 [91]
GSP	34.254	118.545	1/17/1994	130627.9	7.3	4.60	0.006	II	55 [88]
GSP	34.317	118.455	1/17/1994	132644.7	7.3	4.70	0.006	II	55 [89]
GSB	34.285	118.624	1/17/1994	135602.4	7.3	4.70	0.005	II	59 [95]
GSP	34.331	118.442	1/17/1994	141430.3	7.3	4.50	0.005	II	56 [90]
GSP	34.304	118.473	1/17/1994	150703.2	7.3	4.20	0.004	I	55 [89]
GSP	34.228	118.573	1/17/1994	175608.2	7.3	4.60	0.006	II	54 [88]
GSP	34.311	118.456	1/17/1994	193534.3	7.3	4.00	0.004	I	55 [89]
GSB	34.301	118.565	1/17/1994	204602.4	6.8	5.20	0.008	III	58 [93]
GSB	34.334	118.484	1/17/1994	223152.1	7.3	4.20	0.004	I	57 [92]
GSB	34.333	118.623	1/18/1994	072356.0	7.3	4.30	0.004	I	62 [99]
GSP	34.218	118.607	1/18/1994	113509.9	7.3	4.20	0.004	I	55 [89]
GSB	34.319	118.558	1/18/1994	132444.1	7.3	4.50	0.005	II	59 [95]
GSP	34.245	118.471	1/18/1994	155144.9	7.3	4.00	0.004	I	52 [83]
GSB	34.360	118.571	1/19/1994	044048.0	7.3	4.50	0.004	I	61 [99]
GSP	34.287	118.466	1/19/1994	071406.2	7.3	4.00	0.004	I	54 [87]
GSP	34.215	118.510	1/19/1994	140914.8	7.3	4.50	0.006	II	51 [83]
GSP	34.292	118.466	1/19/1994	144635.2	7.3	4.00	0.004	I	54 [87]
GSB	34.300	118.466	1/21/1994	183915.3	7.3	4.70	0.006	II	55 [88]
GSB	34.310	118.474	1/21/1994	184228.8	7.3	4.20	0.004	I	56 [89]
GSP	34.301	118.452	1/21/1994	185244.2	7.3	4.30	0.005	II	54 [87]
GSP	34.297	118.458	1/21/1994	185344.6	7.3	4.30	0.005	II	54 [87]
GSB	34.299	118.428	1/23/1994	085508.7	7.3	4.20	0.004	I	53 [86]
GSB	34.345	118.552	1/24/1994	041518.8	7.3	4.80	0.006	II	60 [97]
GSP	34.274	118.563	1/27/1994	171958.8	7.3	4.60	0.005	II	56 [91]
GSP	34.374	118.495	1/28/1994	200953.4	7.3	4.20	0.004	I	60 [96]
GSP	34.305	118.579	1/29/1994	112036.0	7.1	5.10	0.008	II	59 [95]
GSP	34.278	118.611	1/29/1994	121656.4	7.3	4.30	0.004	I	58 [94]
GSP	34.299	118.439	2/ 3/1994	162335.4	7.3	4.20	0.004	I	54 [87]
GSP	34.291	118.476	2/ 6/1994	131926.9	7.3	4.10	0.004	I	54 [88]
GSP	34.357	118.480	2/25/1994	125912.6	7.3	4.10	0.003	I	58 [94]
GSP	34.231	118.475	3/20/1994	212012.3	6.5	5.30	0.011	III	51 [82]
GSP	34.312	118.393	5/25/1994	125657.1	7.3	4.40	0.005	II	53 [86]
GSP	34.311	118.398	6/15/1994	055948.6	7.3	4.20	0.004	I	53 [86]
GSP	34.293	118.389	12/ 6/1994	034834.5	7.3	4.50	0.006	II	52 [84]
PDP	32.985	117.818	6/21/1995	211736.2	7.3	4.10	0.006	II	45 [73]

-END OF SEARCH- 460 RECORDS FOUND

COMPUTER TIME REQUIRED FOR EARTHQUAKE SEARCH: 0.8 minutes

MAXIMUM SITE ACCELERATION DURING TIME PERIOD 1800 TO 1997: 0.691g

MAXIMUM SITE INTENSITY (MM) DURING TIME PERIOD 1800 TO 1997: XI

MAXIMUM MAGNITUDE ENCOUNTERED IN SEARCH: 7.00

NEAREST HISTORICAL EARTHQUAKE WAS ABOUT 1 MILES AWAY FROM SITE.

NUMBER OF YEARS REPRESENTED BY SEARCH: 198 years

RESULTS OF PROBABILITY ANALYSES

TIME PERIOD OF SEARCH: 1800 TO 1997
 LENGTH OF SEARCH TIME: 198 years
 ATTENUATION RELATION: 1) Campbell (1993) Horiz. - 0=Soil 1=Rock
 *** TIME PERIOD OF EXPOSURE FOR PROBABILITY: 25 years

PROBABILITY OF EXCEEDANCE FOR ACCELERATION

ACC. g	NO.OF TIMES EXCED	AVE. OCCUR. #/yr	RECURR. INTERV. years	COMPUTED PROBABILITY OF EXCEEDANCE						
				in 0.5 yr	in 1 yr	in 10 yr	in 50 yr	in 75 yr	in 100 yr	in *** yr
0.01	270	1.364	0.733	0.4943	0.7443	1.0000	1.0000	1.0000	1.0000	1.0000
0.02	189	0.955	1.048	0.3795	0.6150	0.9999	1.0000	1.0000	1.0000	1.0000
0.03	154	0.778	1.286	0.3222	0.5406	0.9996	1.0000	1.0000	1.0000	1.0000
0.04	101	0.510	1.960	0.2251	0.3996	0.9939	1.0000	1.0000	1.0000	1.0000
0.05	49	0.247	4.041	0.1164	0.2192	0.9158	1.0000	1.0000	1.0000	0.9979
0.06	34	0.172	5.824	0.0823	0.1578	0.8204	0.9998	1.0000	1.0000	0.9863
0.07	29	0.146	6.828	0.0706	0.1362	0.7688	0.9993	1.0000	1.0000	0.9743
0.08	17	0.086	11.647	0.0420	0.0823	0.5762	0.9863	0.9984	0.9998	0.8831
0.09	16	0.081	12.375	0.0396	0.0776	0.5543	0.9824	0.9977	0.9997	0.8674
0.10	13	0.066	15.231	0.0323	0.0635	0.4814	0.9625	0.9927	0.9986	0.8063
0.11	9	0.045	22.000	0.0225	0.0444	0.3653	0.8970	0.9669	0.9894	0.6790
0.12	7	0.035	28.286	0.0175	0.0347	0.2978	0.8293	0.9295	0.9709	0.5868
0.13	6	0.030	33.000	0.0150	0.0298	0.2614	0.7802	0.8970	0.9517	0.5312
0.14	6	0.030	33.000	0.0150	0.0298	0.2614	0.7802	0.8970	0.9517	0.5312
0.15	5	0.025	39.600	0.0125	0.0249	0.2232	0.7171	0.8495	0.9200	0.4681
0.16	5	0.025	39.600	0.0125	0.0249	0.2232	0.7171	0.8495	0.9200	0.4681
0.17	4	0.020	49.500	0.0101	0.0200	0.1829	0.6358	0.7802	0.8674	0.3965
0.18	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.19	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.20	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.21	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.22	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.23	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.24	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.25	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.26	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.27	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.28	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.29	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.30	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.31	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.32	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.33	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.34	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.35	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.36	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.37	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.38	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.39	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.40	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.41	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.42	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.43	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.44	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.45	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.46	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.47	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.48	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.49	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.50	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232
0.51	2	0.010	99.000	0.0050	0.0101	0.0961	0.3965	0.5312	0.6358	0.2232

ACC. g	NO. OF TIMES EXCED	AVE. OCCUR. #/yr	RECURR. INTERV. years	COMPUTED PROBABILITY OF EXCEEDANCE						
				in 0.5 yr	in 1 yr	in 10 yr	in 50 yr	in 75 yr	in 100 yr	in *** yr
0.52	1	0.005	198.000	0.0025	0.0050	0.0493	0.2232	0.3153	0.3965	0.1186
0.53	1	0.005	198.000	0.0025	0.0050	0.0493	0.2232	0.3153	0.3965	0.1186
0.54	1	0.005	198.000	0.0025	0.0050	0.0493	0.2232	0.3153	0.3965	0.1186
0.55	1	0.005	198.000	0.0025	0.0050	0.0493	0.2232	0.3153	0.3965	0.1186
0.56	1	0.005	198.000	0.0025	0.0050	0.0493	0.2232	0.3153	0.3965	0.1186
0.57	1	0.005	198.000	0.0025	0.0050	0.0493	0.2232	0.3153	0.3965	0.1186
0.58	1	0.005	198.000	0.0025	0.0050	0.0493	0.2232	0.3153	0.3965	0.1186
0.59	1	0.005	198.000	0.0025	0.0050	0.0493	0.2232	0.3153	0.3965	0.1186
0.60	1	0.005	198.000	0.0025	0.0050	0.0493	0.2232	0.3153	0.3965	0.1186
0.61	1	0.005	198.000	0.0025	0.0050	0.0493	0.2232	0.3153	0.3965	0.1186
0.62	1	0.005	198.000	0.0025	0.0050	0.0493	0.2232	0.3153	0.3965	0.1186
0.63	1	0.005	198.000	0.0025	0.0050	0.0493	0.2232	0.3153	0.3965	0.1186
0.64	1	0.005	198.000	0.0025	0.0050	0.0493	0.2232	0.3153	0.3965	0.1186
0.65	1	0.005	198.000	0.0025	0.0050	0.0493	0.2232	0.3153	0.3965	0.1186
0.66	1	0.005	198.000	0.0025	0.0050	0.0493	0.2232	0.3153	0.3965	0.1186
0.67	1	0.005	198.000	0.0025	0.0050	0.0493	0.2232	0.3153	0.3965	0.1186
0.68	1	0.005	198.000	0.0025	0.0050	0.0493	0.2232	0.3153	0.3965	0.1186
0.69	1	0.005	198.000	0.0025	0.0050	0.0493	0.2232	0.3153	0.3965	0.1186

PROBABILITY OF EXCEEDANCE FOR MAGNITUDE

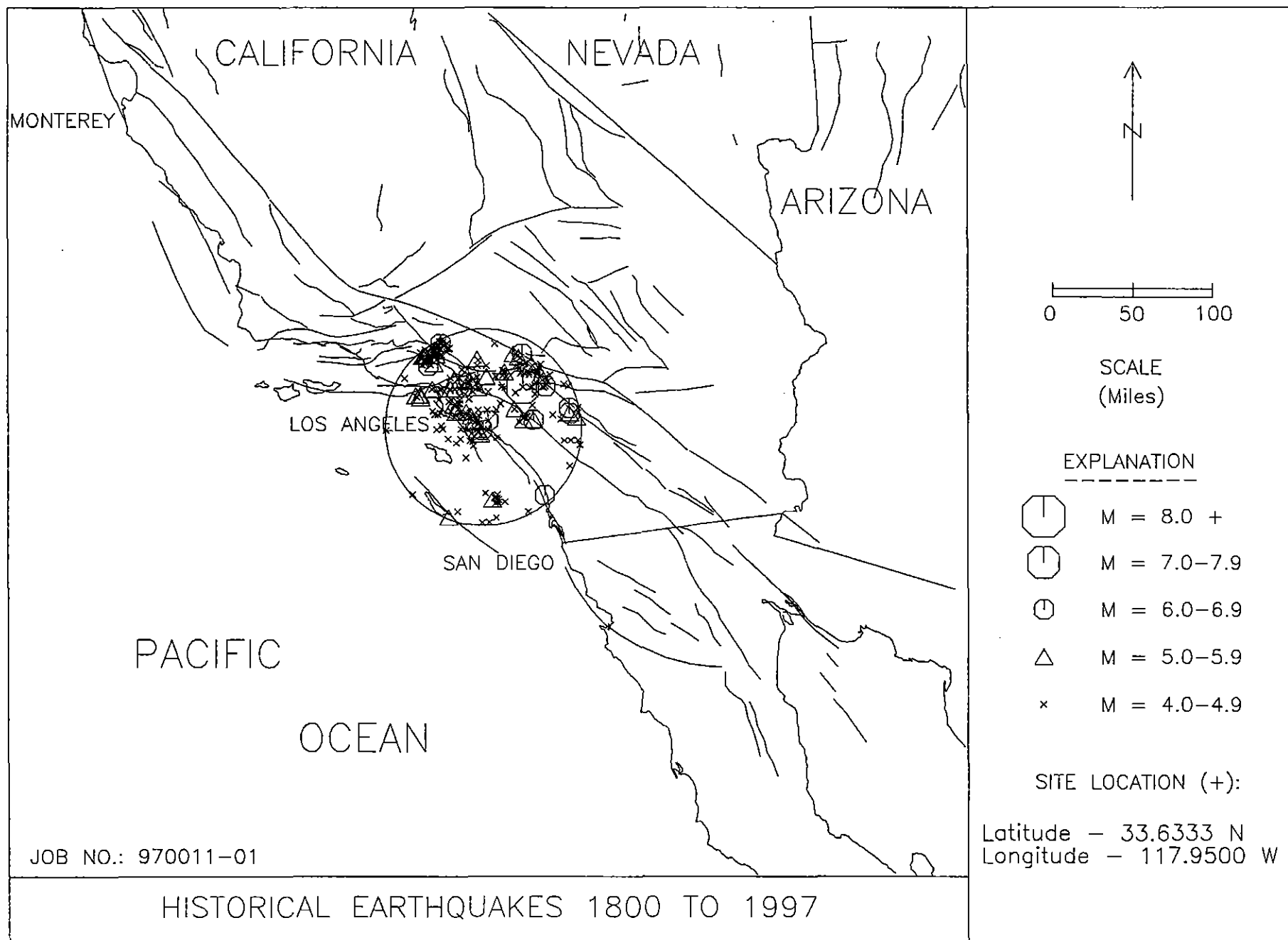
MAG.	NO.OF	AVE.	RECURR.	COMPUTED PROBABILITY OF EXCEEDANCE						
	TIMES	OCCUR.	INTERV.	in	in	in	in	in	in	in
	EXCED	#/yr	years	0.5 yr	1 yr	10 yr	50 yr	75 yr	100 yr	*** yr
4.00	460	2.323	0.430	0.6870	0.9020	1.0000	1.0000	1.0000	1.0000	1.0000
4.50	175	0.884	1.131	0.3572	0.5868	0.9999	1.0000	1.0000	1.0000	1.0000
5.00	61	0.308	3.246	0.1428	0.2651	0.9541	1.0000	1.0000	1.0000	0.9995
5.50	20	0.101	9.900	0.0493	0.0961	0.6358	0.9936	0.9995	1.0000	0.9200
6.00	12	0.061	16.500	0.0298	0.0588	0.4545	0.9517	0.9894	0.9977	0.7802
6.50	7	0.035	28.286	0.0175	0.0347	0.2978	0.8293	0.9295	0.9709	0.5868
7.00	1	0.005	198.000	0.0025	0.0050	0.0493	0.2232	0.3153	0.3965	0.1186

GUTENBERG & RICHTER RECURRENCE RELATIONSHIP:

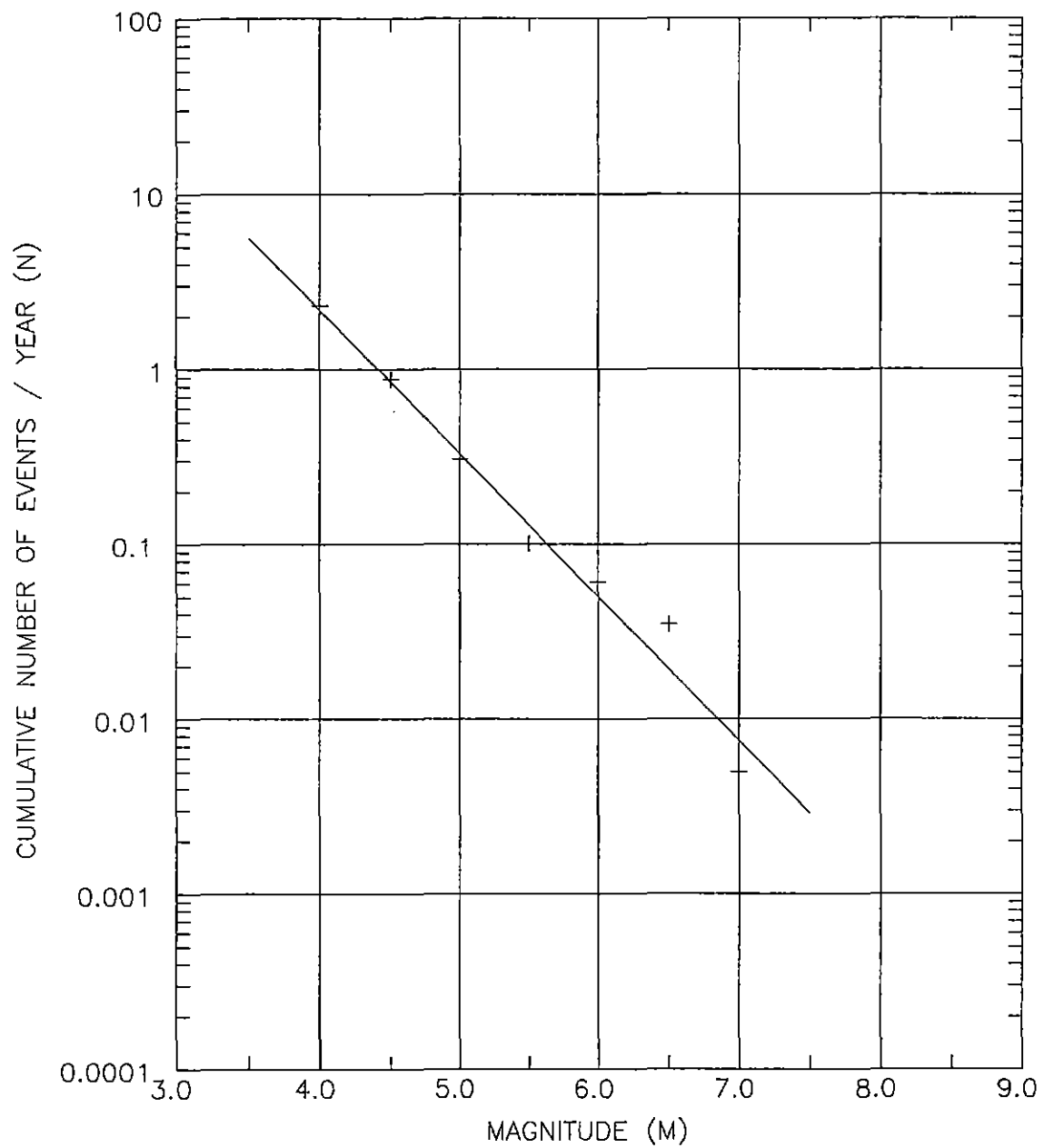
a-value= 3.627

b-value= 0.822

beta-value= 1.892



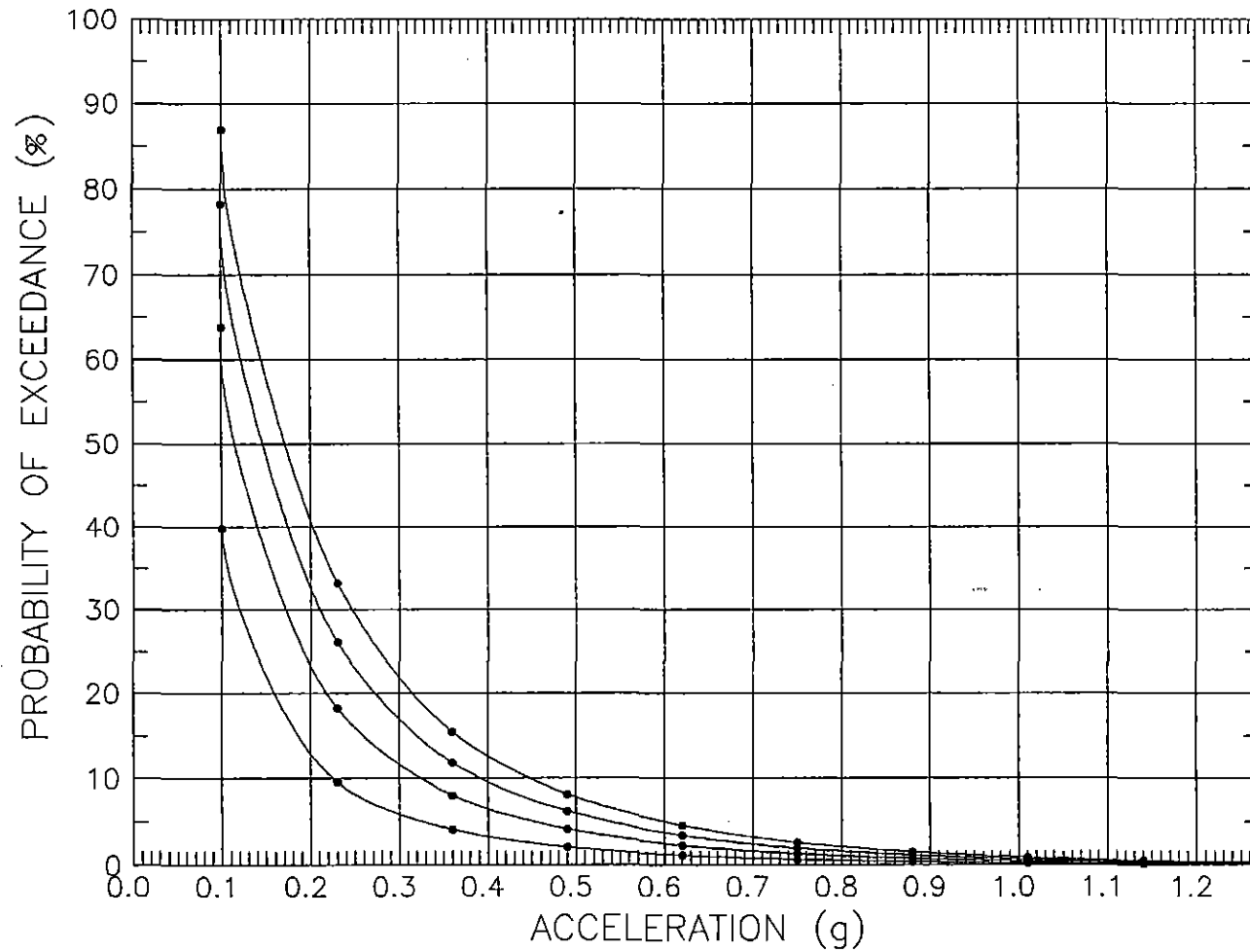
$$\text{LOG } N = 3.627 - 0.822M$$



SEISMIC RECURRENCE CURVE

HISTORICAL EARTHQUAKES FROM 1800 TO 1997

PROBABILITY OF EXCEEDANCE vs. ACCELERATION

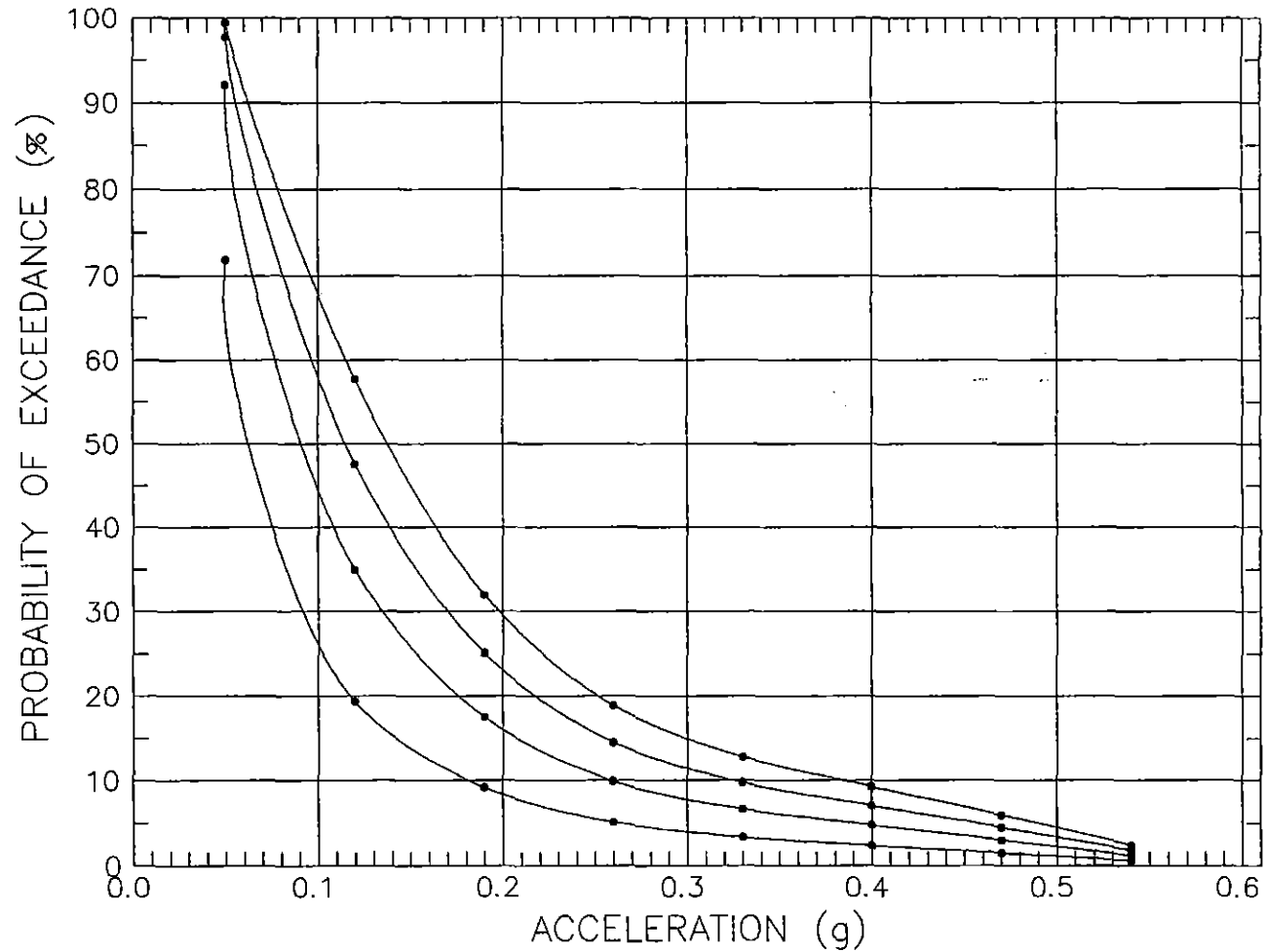


EXPOSURE PERIODS:
25 years 75 years
50 years 100 years

CAMPBELL (1993) HORZ. + DISP

JOB No.: 970011-01

PROBABILITY OF EXCEEDANCE vs. ACCELERATION

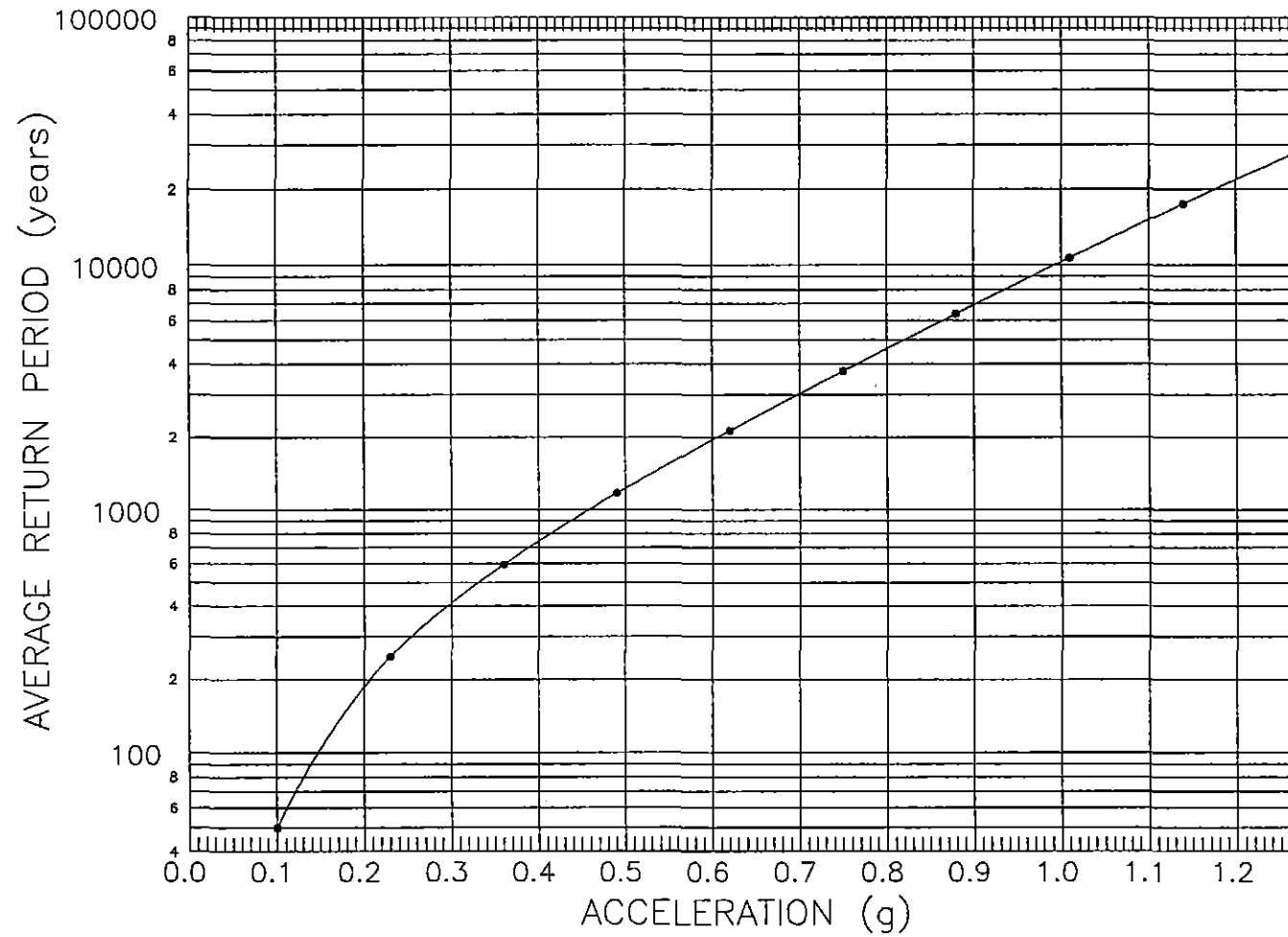


EXPOSURE PERIODS:
25 years 75 years
50 years 100 years

CAMPBELL (1993) HORZ. MEAN

JOB No.: 970011-01

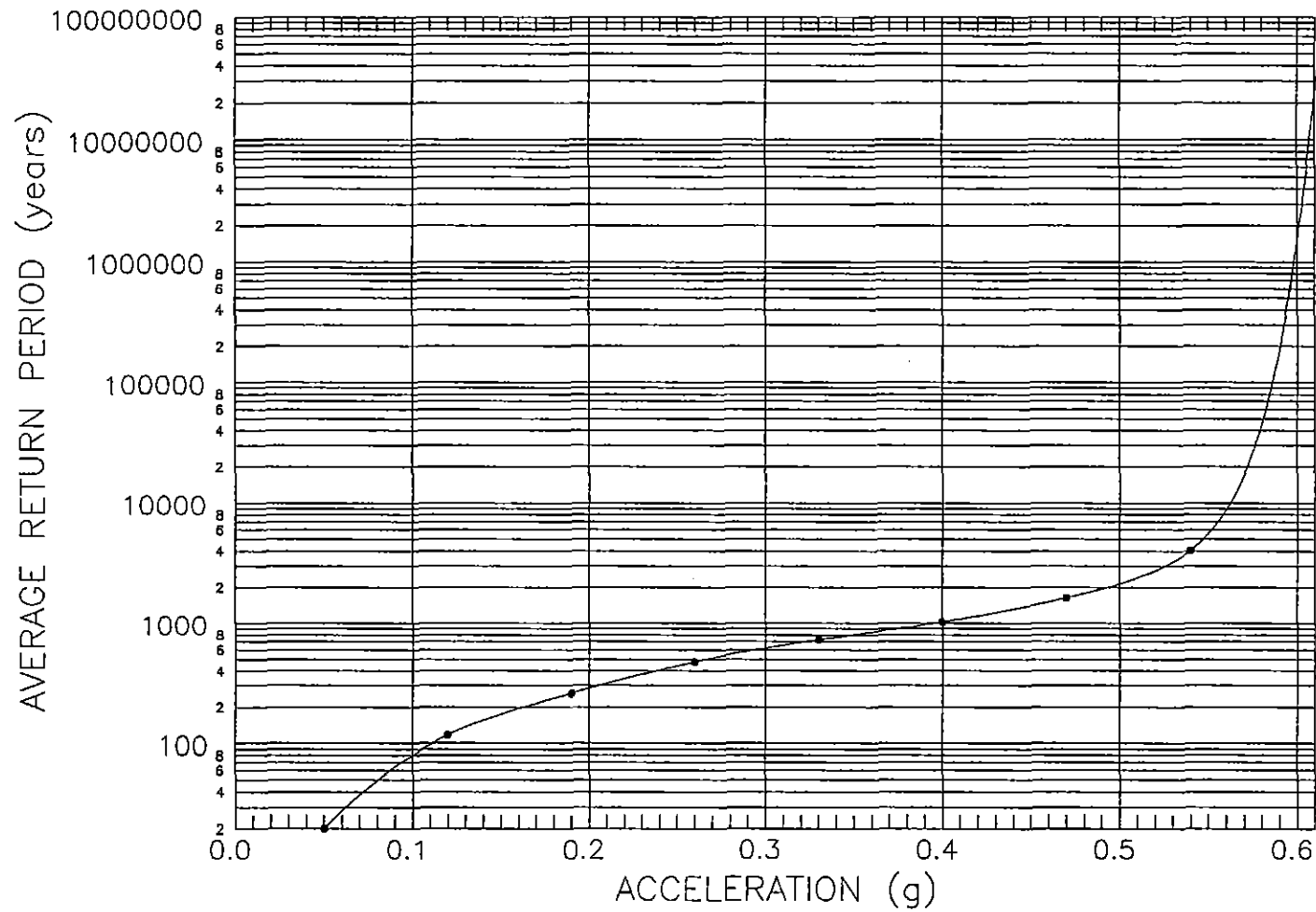
AVERAGE RETURN PERIOD vs. ACCELERATION



NEWPORT BUILDINGS
CAMPBELL (1993) HORZ. + DISP

JOB No.: 970011-01

AVERAGE RETURN PERIOD vs. ACCELERATION



NEWPORT BUILDINGS
CAMPBELL (1993) HORZ. MEAN

JOB No.: 970011-01

 *
 * SOIL PROFILE LOG *
 *

 SOIL PROFILE NAME: TWB1

LAYER #	BASE DEPTH (ft)	SPT FIELD-N (blows/ft)	LIQUEFACTION SUSCEPTIBILITY	WET UNIT WT. (pcf)	FINES %<#200	D (mm) 50	DEPTH OF SPT (ft)
1	7.0	3.0	UNSUSCEPTIBLE (0)	120.0	15.0	0.200	5.25
2	20.0	24.0	SUSCEPTIBLE (1)	120.0	15.0	0.200	15.25
3	30.0	17.0	SUSCEPTIBLE (1)	120.0	15.0	0.200	25.25
4	35.0	33.0	SUSCEPTIBLE (1)	120.0	15.0	0.200	30.25
5	40.0	33.0	SUSCEPTIBLE (1)	120.0	9.0	0.600	35.25
6	45.0	49.0	SUSCEPTIBLE (1)	120.0	9.0	0.600	40.25
7	50.0	64.0	SUSCEPTIBLE (1)	120.0	9.0	0.600	45.25

 * *
 * L I Q U E F Y 2 *
 * *
 * Version 1.20 *
 * *

EMPIRICAL PREDICTION OF
 EARTHQUAKE-INDUCED LIQUEFACTION POTENTIAL

JOB NUMBER: 970011-01 DATE: Wednesday, November 13, 1996

JOB NAME: TW HOMES - BANNING LOWLAND

LIQUEFACTION CALCULATION NAME: BORING B-1

SOIL-PROFILE NAME: TWB1

GROUND WATER DEPTH: 7.0 ft

DESIGN EARTHQUAKE MAGNITUDE: 7.10

SITE PEAK GROUND ACCELERATION: 0.320 g

K sigma BOUND: M

rd BOUND: M

N60 CORRECTION: 1.33

FIELD SPT N-VALUES < 10 FT DEEP ARE CORRECTED FOR SHORT LENGTH OF DRIVE RODS

NOTE: Relative density values listed below are estimated using equations of
 Giuliani and Nicoll (1982).

LIQUEFACTION ANALYSIS SUMMARY

Seed and Others [1985] Method

PAGE 1

SOIL NO.	CALC. DEPTH (ft)	TOTAL STRESS (tsf)	EFF. STRESS (tsf)	FIELD N (B/ft)	Est.D r (%)	C N	CORR. (N1) 60 (B/ft)	LIQUE. STRESS RATIO	INDUC. STRESS d	LIQUE. SAFETY FACTOR
1	0.25	0.015	0.015	3	-	@	@	@	@	@ @
1	0.75	0.045	0.045	3	-	@	@	@	@	@ @
1	1.25	0.075	0.075	3	-	@	@	@	@	@ @
1	1.75	0.105	0.105	3	-	@	@	@	@	@ @
1	2.25	0.135	0.135	3	-	@	@	@	@	@ @
1	2.75	0.165	0.165	3	-	@	@	@	@	@ @
1	3.25	0.195	0.195	3	-	@	@	@	@	@ @
1	3.75	0.225	0.225	3	-	@	@	@	@	@ @
1	4.25	0.255	0.255	3	-	@	@	@	@	@ @
1	4.75	0.285	0.285	3	-	@	@	@	@	@ @
1	5.25	0.315	0.315	3	-	@	@	@	@	@ @
1	5.75	0.345	0.345	3	-	@	@	@	@	@ @
1	6.25	0.375	0.375	3	-	@	@	@	@	@ @
1	6.75	0.405	0.405	3	-	@	@	@	@	@ @
2	7.25	0.435	0.427	24	80	1.236	39.5	Infin	0.985	0.209 Infin
2	7.75	0.465	0.442	24	80	1.236	39.5	Infin	0.984	0.216 Infin
2	8.25	0.495	0.456	24	80	1.236	39.5	Infin	0.983	0.222 Infin
2	8.75	0.525	0.470	24	80	1.236	39.5	Infin	0.982	0.228 Infin
2	9.25	0.555	0.485	24	80	1.236	39.5	Infin	0.981	0.234 Infin
2	9.75	0.585	0.499	24	80	1.236	39.5	Infin	0.980	0.239 Infin
2	10.25	0.615	0.514	24	80	1.236	39.5	Infin	0.979	0.244 Infin
2	10.75	0.645	0.528	24	80	1.236	39.5	Infin	0.978	0.249 Infin
2	11.25	0.675	0.542	24	80	1.236	39.5	Infin	0.977	0.253 Infin
2	11.75	0.705	0.557	24	80	1.236	39.5	Infin	0.976	0.257 Infin
2	12.25	0.735	0.571	24	80	1.236	39.5	Infin	0.975	0.261 Infin
2	12.75	0.765	0.586	24	80	1.236	39.5	Infin	0.974	0.265 Infin
2	13.25	0.795	0.600	24	80	1.236	39.5	Infin	0.972	0.268 Infin
2	13.75	0.825	0.614	24	80	1.236	39.5	Infin	0.971	0.271 Infin
2	14.25	0.855	0.629	24	80	1.236	39.5	Infin	0.970	0.274 Infin
2	14.75	0.885	0.643	24	80	1.236	39.5	Infin	0.969	0.277 Infin
2	15.25	0.915	0.658	24	80	1.236	39.5	Infin	0.968	0.280 Infin
2	15.75	0.945	0.672	24	80	1.236	39.5	Infin	0.967	0.283 Infin

2	16.25	0.975	0.686	24	80	1.236	39.5	Infin	0.966	0.285	Infin
2	16.75	1.005	0.701	24	80	1.236	39.5	Infin	0.965	0.288	Infin
2	17.25	1.035	0.715	24	80	1.236	39.5	Infin	0.964	0.290	Infin
2	17.75	1.065	0.730	24	80	1.236	39.5	Infin	0.963	0.292	Infin
2	18.25	1.095	0.744	24	80	1.236	39.5	Infin	0.961	0.294	Infin
2	18.75	1.125	0.758	24	80	1.236	39.5	Infin	0.960	0.296	Infin
2	19.25	1.155	0.773	24	80	1.236	39.5	Infin	0.959	0.298	Infin
2	19.75	1.185	0.787	24	80	1.236	39.5	Infin	0.958	0.300	Infin
3	20.25	1.215	0.802	17	62	1.031	23.3	0.415	0.957	0.302	1.38
3	20.75	1.245	0.816	17	62	1.031	23.3	0.415	0.955	0.303	1.37
3	21.25	1.275	0.830	17	62	1.031	23.3	0.415	0.954	0.305	1.36
3	21.75	1.305	0.845	17	62	1.031	23.3	0.415	0.952	0.306	1.36
3	22.25	1.335	0.859	17	62	1.031	23.3	0.415	0.951	0.307	1.35
3	22.75	1.365	0.874	17	62	1.031	23.3	0.415	0.949	0.308	1.34

Seed and Others [1985] Method

PAGE 2

SOIL NO.	CALC. DEPTH (ft)	TOTAL STRESS (tsf)	EFF. STRESS (tsf)	FIELD N (B/ft)	Est.D (%)	r	C	CORR. (N1)60 (B/ft)	LIQUE. STRESS RATIO	INDUC. STRESS d	LIQUE. SAFETY FACTOR
3	23.25	1.395	0.888	17	62	1.031	23.3	0.415	0.947	0.310	1.34
3	23.75	1.425	0.902	17	62	1.031	23.3	0.415	0.946	0.311	1.34
3	24.25	1.455	0.917	17	62	1.031	23.3	0.415	0.944	0.312	1.33
3	24.75	1.485	0.931	17	62	1.031	23.3	0.415	0.943	0.313	1.33
3	25.25	1.515	0.946	17	62	1.031	23.3	0.415	0.941	0.314	1.32
3	25.75	1.545	0.960	17	62	1.031	23.3	0.415	0.939	0.314	1.32
3	26.25	1.575	0.974	17	62	1.031	23.3	0.415	0.937	0.315	1.32
3	26.75	1.605	0.989	17	62	1.031	23.3	0.415	0.934	0.315	1.31
3	27.25	1.635	1.003	17	62	1.031	23.3	0.415	0.932	0.316	1.31
3	27.75	1.665	1.018	17	62	1.031	23.3	0.414	0.930	0.317	1.31
3	28.25	1.695	1.032	17	62	1.031	23.3	0.414	0.928	0.317	1.31
3	28.75	1.725	1.046	17	62	1.031	23.3	0.413	0.926	0.317	1.30
3	29.25	1.755	1.061	17	62	1.031	23.3	0.413	0.923	0.318	1.30
3	29.75	1.785	1.075	17	62	1.031	23.3	0.413	0.921	0.318	1.30
4	30.25	1.815	1.090	33	84	0.968	42.5	Infin	0.919	0.318	Infin
4	30.75	1.845	1.104	33	84	0.968	42.5	Infin	0.916	0.318	Infin
4	31.25	1.875	1.118	33	84	0.968	42.5	Infin	0.913	0.318	Infin
4	31.75	1.905	1.133	33	84	0.968	42.5	Infin	0.910	0.318	Infin
4	32.25	1.935	1.147	33	84	0.968	42.5	Infin	0.907	0.318	Infin
4	32.75	1.965	1.162	33	84	0.968	42.5	Infin	0.904	0.318	Infin
4	33.25	1.995	1.176	33	84	0.968	42.5	Infin	0.902	0.318	Infin
4	33.75	2.025	1.190	33	84	0.968	42.5	Infin	0.899	0.318	Infin
4	34.25	2.055	1.205	33	84	0.968	42.5	Infin	0.896	0.318	Infin
4	34.75	2.085	1.219	33	84	0.968	42.5	Infin	0.893	0.318	Infin
5	35.25	2.115	1.234	33	81	0.916	40.2	Infin	0.890	0.317	Infin
5	35.75	2.145	1.248	33	81	0.916	40.2	Infin	0.886	0.317	Infin
5	36.25	2.175	1.262	33	81	0.916	40.2	Infin	0.882	0.316	Infin
5	36.75	2.205	1.277	33	81	0.916	40.2	Infin	0.878	0.315	Infin
5	37.25	2.235	1.291	33	81	0.916	40.2	Infin	0.874	0.315	Infin
5	37.75	2.265	1.306	33	81	0.916	40.2	Infin	0.870	0.314	Infin

File: twb1.out

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5	38.25	2.295	1.320	33	81	0.916	40.2	Infin	0.866	0.313	Infin
5	38.75	2.325	1.334	33	81	0.916	40.2	Infin	0.862	0.313	Infin
5	39.25	2.355	1.349	33	81	0.916	40.2	Infin	0.858	0.312	Infin
5	39.75	2.385	1.363	33	81	0.916	40.2	Infin	0.855	0.311	Infin
6	40.25	2.415	1.378	49	96	0.878	57.2	Infin	0.850	0.310	Infin
6	40.75	2.445	1.392	49	96	0.878	57.2	Infin	0.845	0.309	Infin
6	41.25	2.475	1.406	49	96	0.878	57.2	Infin	0.840	0.308	Infin
6	41.75	2.505	1.421	49	96	0.878	57.2	Infin	0.836	0.306	Infin
6	42.25	2.535	1.435	49	96	0.878	57.2	Infin	0.831	0.305	Infin
6	42.75	2.565	1.450	49	96	0.878	57.2	Infin	0.826	0.304	Infin
6	43.25	2.595	1.464	49	96	0.878	57.2	Infin	0.821	0.303	Infin
6	43.75	2.625	1.478	49	96	0.878	57.2	Infin	0.816	0.301	Infin
6	44.25	2.655	1.493	49	96	0.878	57.2	Infin	0.811	0.300	Infin
6	44.75	2.685	1.507	49	96	0.878	57.2	Infin	0.806	0.299	Infin
7	45.25	2.715	1.522	64	107	0.843	71.8	Infin	0.801	0.297	Infin
7	45.75	2.745	1.536	64	107	0.843	71.8	Infin	0.796	0.296	Infin
7	46.25	2.775	1.550	64	107	0.843	71.8	Infin	0.791	0.295	Infin
7	46.75	2.805	1.565	64	107	0.843	71.8	Infin	0.786	0.293	Infin
7	47.25	2.835	1.579	64	107	0.843	71.8	Infin	0.781	0.292	Infin
7	47.75	2.865	1.594	64	107	0.843	71.8	Infin	0.776	0.290	Infin
7	48.25	2.895	1.608	64	107	0.843	71.8	Infin	0.771	0.289	Infin
7	48.75	2.925	1.622	64	107	0.843	71.8	Infin	0.765	0.287	Infin
7	49.25	2.955	1.637	64	107	0.843	71.8	Infin	0.760	0.286	Infin

Seed and Others [1985] Method

PAGE 3

SOIL NO.	CALC. DEPTH (ft)	TOTAL STRESS (tsf)	EFF. STRESS (tsf)	FIELD N (B/ft)	Est.D (%)	r	C	CORR. (N1)60 (B/ft)	LIQUE. STRESS RATIO	INDUC. STRESS d	LIQUE. SAFETY FACTOR
7	49.75	2.985	1.651	64	107	0.843	71.8	Infin	0.755	0.284	Infin

File: twb1.out

11/13/96 15:17 Page 4

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 * SOIL PROFILE LOG *
 *

 SOIL PROFILE NAME: TWB2

LAYER #	BASE DEPTH (ft)	SPT FIELD-N (blows/ft)	LIQUEFACTION SUSCEPTIBILITY	WET UNIT WT. (pcf)	FINES %<#200	D (mm) 50	DEPTH OF SPT (ft)
1	6.0	9.0	UNSUSCEPTIBLE (0)	120.0	6.0	0.300	3.25
2	10.0	9.0	SUSCEPTIBLE (1)	120.0	6.0	0.300	5.25
3	15.0	11.0	SUSCEPTIBLE (1)	120.0	6.0	0.300	10.25
4	20.0	20.0	SUSCEPTIBLE (1)	120.0	19.0	0.180	15.25
5	25.0	12.0	SUSCEPTIBLE (1)	120.0	19.0	0.180	20.25
6	30.0	21.0	SUSCEPTIBLE (1)	120.0	19.0	0.180	25.25
7	35.0	25.0	SUSCEPTIBLE (1)	120.0	6.0	0.300	30.25
8	40.0	51.0	SUSCEPTIBLE (1)	120.0	6.0	0.300	35.25
9	45.0	28.0	SUSCEPTIBLE (1)	120.0	6.0	0.300	40.25
10	50.0	36.0	SUSCEPTIBLE (1)	120.0	6.0	0.300	45.25

 * L I Q U E F Y 2 *
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 * Version 1.20 *
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EMPIRICAL PREDICTION OF
 EARTHQUAKE-INDUCED LIQUEFACTION POTENTIAL

JOB NUMBER: 970011-01 DATE: Wednesday, November 13, 1996

JOB NAME: TW HOMES - BANNING LOWLAND

LIQUEFACTION CALCULATION NAME: BORING B-2

SOIL-PROFILE NAME: TWB2

GROUND WATER DEPTH: 6.0 ft

DESIGN EARTHQUAKE MAGNITUDE: 7.10

SITE PEAK GROUND ACCELERATION: 0.320 g

K sigma BOUND: M

rd BOUND: M

NGO CORRECTION: 1.33

FIELD SPT N-VALUES < 10 FT DEEP ARE CORRECTED FOR SHORT LENGTH OF DRIVE RODS

NOTE: Relative density values listed below are estimated using equations of
 Giuliani and Nicoll (1982).

LIQUEFACTION ANALYSIS SUMMARY

Seed and Others [1985] Method

PAGE 1

SOIL NO.	CALC. DEPTH (ft)	TOTAL STRESS (tsf)	EFF. STRESS (tsf)	FIELD N (B/ft)	Est.D r (%)	C N	CORR. (N1)60 (B/ft)	LIQUE. STRESS RATIO	r d	INDUC. STRESS RATIO	LIQUE. SAFETY FACTOR
1	0.25	0.015	0.015	9	-	@	@	@	@	@	@
1	0.75	0.045	0.045	9	-	@	@	@	@	@	@
1	1.25	0.075	0.075	9	-	@	@	@	@	@	@
1	1.75	0.105	0.105	9	-	@	@	@	@	@	@
1	2.25	0.135	0.135	9	-	@	@	@	@	@	@
1	2.75	0.165	0.165	9	-	@	@	@	@	@	@
1	3.25	0.195	0.195	9	-	@	@	@	@	@	@
1	3.75	0.225	0.225	9	-	@	@	@	@	@	@
1	4.25	0.255	0.255	9	-	@	@	@	@	@	@
1	4.75	0.285	0.285	9	-	@	@	@	@	@	@
1	5.25	0.315	0.315	9	-	@	@	@	@	@	@
1	5.75	0.345	0.345	9	-	@	@	@	@	@	@
2	6.25	0.375	0.367	9	55	1.740	15.6	0.192	0.987	0.210	0.91
2	6.75	0.405	0.382	9	55	1.740	15.6	0.192	0.986	0.218	0.88
2	7.25	0.435	0.396	9	55	1.740	15.6	0.192	0.985	0.225	0.85
2	7.75	0.465	0.410	9	55	1.740	15.6	0.192	0.984	0.232	0.83
2	8.25	0.495	0.425	9	55	1.740	15.6	0.192	0.983	0.238	0.80
2	8.75	0.525	0.439	9	55	1.740	15.6	0.192	0.982	0.244	0.78
2	9.25	0.555	0.454	9	55	1.740	15.6	0.192	0.981	0.250	0.77
2	9.75	0.585	0.468	9	55	1.740	15.6	0.192	0.980	0.255	0.75
3	10.25	0.615	0.482	11	57	1.397	20.4	0.251	0.979	0.260	0.97
3	10.75	0.645	0.497	11	57	1.397	20.4	0.251	0.978	0.264	0.95
3	11.25	0.675	0.511	11	57	1.397	20.4	0.251	0.977	0.268	0.94
3	11.75	0.705	0.526	11	57	1.397	20.4	0.251	0.976	0.272	0.92
3	12.25	0.735	0.540	11	57	1.397	20.4	0.251	0.975	0.276	0.91
3	12.75	0.765	0.554	11	57	1.397	20.4	0.251	0.974	0.279	0.90
3	13.25	0.795	0.569	11	57	1.397	20.4	0.251	0.972	0.283	0.89
3	13.75	0.825	0.583	11	57	1.397	20.4	0.251	0.971	0.286	0.88
3	14.25	0.855	0.598	11	57	1.397	20.4	0.251	0.970	0.289	0.87
3	14.75	0.885	0.612	11	57	1.397	20.4	0.251	0.969	0.292	0.86
4	15.25	0.915	0.626	20	73	1.263	33.6	Infin	0.968	0.294	Infin
4	15.75	0.945	0.641	20	73	1.263	33.6	Infin	0.967	0.297	Infin

4	16.25	0.975	0.655	20	73	1.263	33.6	Infin	0.966	0.299	Infin
4	16.75	1.005	0.670	20	73	1.263	33.6	Infin	0.965	0.301	Infin
4	17.25	1.035	0.684	20	73	1.263	33.6	Infin	0.964	0.303	Infin
4	17.75	1.065	0.698	20	73	1.263	33.6	Infin	0.963	0.305	Infin
4	18.25	1.095	0.713	20	73	1.263	33.6	Infin	0.961	0.307	Infin
4	18.75	1.125	0.727	20	73	1.263	33.6	Infin	0.960	0.309	Infin
4	19.25	1.155	0.742	20	73	1.263	33.6	Infin	0.959	0.311	Infin
4	19.75	1.185	0.756	20	73	1.263	33.6	Infin	0.958	0.312	Infin
5	20.25	1.215	0.770	12	55	1.144	18.3	0.295	0.957	0.314	0.94
5	20.75	1.245	0.785	12	55	1.144	18.3	0.295	0.955	0.315	0.94
5	21.25	1.275	0.799	12	55	1.144	18.3	0.295	0.954	0.316	0.93
5	21.75	1.305	0.814	12	55	1.144	18.3	0.295	0.952	0.318	0.93
5	22.25	1.335	0.828	12	55	1.144	18.3	0.295	0.951	0.319	0.93
5	22.75	1.365	0.842	12	55	1.144	18.3	0.295	0.949	0.320	0.92

Seed and Others [1985] Method

PAGE 2

SOIL NO.	CALC. DEPTH (ft)	TOTAL STRESS (tsf)	EFF. STRESS (tsf)	FIELD N (B/ft)	Est. r (%)	C N (B/ft)	CORR. (N1)60 (B/ft)	LIQUE. STRESS RATIO	r d	INDUC. STRESS RATIO	LIQUE. SAFETY FACTOR
5	23.25	1.395	0.857	12	55	1.144	18.3	0.295	0.947	0.321	0.92
5	23.75	1.425	0.871	12	55	1.144	18.3	0.295	0.946	0.322	0.92
5	24.25	1.455	0.886	12	55	1.144	18.3	0.295	0.944	0.323	0.91
5	24.75	1.485	0.900	12	55	1.144	18.3	0.295	0.943	0.324	0.91
6	25.25	1.515	0.914	21	70	1.049	29.3	Infin	0.941	0.324	Infin
6	25.75	1.545	0.929	21	70	1.049	29.3	Infin	0.939	0.325	Infin
6	26.25	1.575	0.943	21	70	1.049	29.3	Infin	0.937	0.325	Infin
6	26.75	1.605	0.958	21	70	1.049	29.3	Infin	0.934	0.326	Infin
6	27.25	1.635	0.972	21	70	1.049	29.3	Infin	0.932	0.326	Infin
6	27.75	1.665	0.986	21	70	1.049	29.3	Infin	0.930	0.327	Infin
6	28.25	1.695	1.001	21	70	1.049	29.3	Infin	0.928	0.327	Infin
6	28.75	1.725	1.015	21	70	1.049	29.3	Infin	0.926	0.327	Infin
6	29.25	1.755	1.030	21	70	1.049	29.3	Infin	0.923	0.327	Infin
6	29.75	1.785	1.044	21	70	1.049	29.3	Infin	0.921	0.328	Infin
7	30.25	1.815	1.058	25	73	0.979	32.6	Infin	0.919	0.328	Infin
7	30.75	1.845	1.073	25	73	0.979	32.6	Infin	0.916	0.328	Infin
7	31.25	1.875	1.087	25	73	0.979	32.6	Infin	0.913	0.328	Infin
7	31.75	1.905	1.102	25	73	0.979	32.6	Infin	0.910	0.327	Infin
7	32.25	1.935	1.116	25	73	0.979	32.6	Infin	0.907	0.327	Infin
7	32.75	1.965	1.130	25	73	0.979	32.6	Infin	0.904	0.327	Infin
7	33.25	1.995	1.145	25	73	0.979	32.6	Infin	0.902	0.327	Infin
7	33.75	2.025	1.159	25	73	0.979	32.6	Infin	0.899	0.327	Infin
7	34.25	2.055	1.174	25	73	0.979	32.6	Infin	0.896	0.326	Infin
7	34.75	2.085	1.188	25	73	0.979	32.6	Infin	0.893	0.326	Infin
8	35.25	2.115	1.202	51	102	0.927	62.9	Infin	0.890	0.326	Infin
8	35.75	2.145	1.217	51	102	0.927	62.9	Infin	0.886	0.325	Infin
8	36.25	2.175	1.231	51	102	0.927	62.9	Infin	0.882	0.324	Infin
8	36.75	2.205	1.246	51	102	0.927	62.9	Infin	0.878	0.323	Infin
8	37.25	2.235	1.260	51	102	0.927	62.9	Infin	0.874	0.322	Infin
8	37.75	2.265	1.274	51	102	0.927	62.9	Infin	0.870	0.322	Infin

8	38.25	2.295	1.289	51	102	0.927	62.9	Infin	0.866	0.321	Infin
8	38.75	2.325	1.303	51	102	0.927	62.9	Infin	0.862	0.320	Infin
8	39.25	2.355	1.318	51	102	0.927	62.9	Infin	0.858	0.319	Infin
8	39.75	2.385	1.332	51	102	0.927	62.9	Infin	0.855	0.318	Infin
9	40.25	2.415	1.346	28	73	0.886	33.0	Infin	0.850	0.317	Infin
9	40.75	2.445	1.361	28	73	0.886	33.0	Infin	0.845	0.316	Infin
9	41.25	2.475	1.375	28	73	0.886	33.0	Infin	0.840	0.315	Infin
9	41.75	2.505	1.390	28	73	0.886	33.0	Infin	0.836	0.313	Infin
9	42.25	2.535	1.404	28	73	0.886	33.0	Infin	0.831	0.312	Infin
9	42.75	2.565	1.418	28	73	0.886	33.0	Infin	0.826	0.311	Infin
9	43.25	2.595	1.433	28	73	0.886	33.0	Infin	0.821	0.309	Infin
9	43.75	2.625	1.447	28	73	0.886	33.0	Infin	0.816	0.308	Infin
9	44.25	2.655	1.462	28	73	0.886	33.0	Infin	0.811	0.307	Infin
9	44.75	2.685	1.476	28	73	0.886	33.0	Infin	0.806	0.305	Infin
10	45.25	2.715	1.490	36	81	0.850	40.7	Infin	0.801	0.304	Infin
10	45.75	2.745	1.505	36	81	0.850	40.7	Infin	0.796	0.302	Infin
10	46.25	2.775	1.519	36	81	0.850	40.7	Infin	0.791	0.301	Infin
10	46.75	2.805	1.534	36	81	0.850	40.7	Infin	0.786	0.299	Infin
10	47.25	2.835	1.548	36	81	0.850	40.7	Infin	0.781	0.297	Infin
10	47.75	2.865	1.562	36	81	0.850	40.7	Infin	0.776	0.296	Infin
10	48.25	2.895	1.577	36	81	0.850	40.7	Infin	0.771	0.294	Infin
10	48.75	2.925	1.591	36	81	0.850	40.7	Infin	0.765	0.293	Infin
10	49.25	2.955	1.606	36	81	0.850	40.7	Infin	0.760	0.291	Infin

Seed and Others [1985] Method

PAGE 3

	CALC.	TOTAL	EFF.	FIELD	Est.D		CORR.	LIQUE.		INDUC.	LIQUE.
SOIL	DEPTH	STRESS	STRESS	N	r	C	(N1)60	STRESS	r	STRESS	SAFETY
NO.	(ft)	(tsf)	(tsf)	(B/ft)	(%)	N	(B/ft)	RATIO	d	RATIO	FACTOR
10	49.75	2.985	1.620	36	81	0.850	40.7	Infin	0.755	0.289	Infin

 *
 * SOIL PROFILE LOG *
 *

 SOIL PROFILE NAME: TWB3

LAYER #	BASE DEPTH (ft)	SPT FIELD-N (blows/ft)	LIQUEFACTION SUSCEPTIBILITY	WET UNIT WT. (pcf)	FINES %<#200	D (mm) 50	DEPTH OF SPT (ft)
1	6.0	6.0	UNSUSCEPTIBLE (0)	120.0	39.0	0.130	5.25
2	10.0	6.0	UNSUSCEPTIBLE (0)	120.0	39.0	0.130	5.25
3	15.0	5.0	UNSUSCEPTIBLE (0)	120.0	39.0	0.130	10.25
4	20.0	17.0	SUSCEPTIBLE (1)	120.0	39.0	0.130	15.25
5	25.0	24.0	SUSCEPTIBLE (1)	120.0	8.0	1.800	20.25
6	30.0	29.0	SUSCEPTIBLE (1)	120.0	8.0	1.800	25.25
7	35.0	83.0	SUSCEPTIBLE (1)	120.0	8.0	1.800	30.25
8	40.0	69.0	SUSCEPTIBLE (1)	120.0	8.0	1.800	35.25
9	45.0	55.0	SUSCEPTIBLE (1)	120.0	9.0	1.300	40.25
10	50.0	95.0	SUSCEPTIBLE (1)	120.0	9.0	1.300	45.25

 * L I Q U E F Y 2 *
 * Version 1.20 *

EMPIRICAL PREDICTION OF
 EARTHQUAKE-INDUCED LIQUEFACTION POTENTIAL

JOB NUMBER: 970011-001 DATE: Wednesday, November 13, 1996

JOB NAME: TW HOMES - BANNING LOWLAND

LIQUEFACTION CALCULATION NAME: BORING B-3

SOIL-PROFILE NAME: TWB3

GROUND WATER DEPTH: 6.0 ft

DESIGN EARTHQUAKE MAGNITUDE: 7.10

SITE PEAK GROUND ACCELERATION: 0.320 g

K sigma BOUND: M

rd BOUND: M

N60 CORRECTION: 1.33

FIELD SPT N-VALUES < 10 FT DEEP ARE CORRECTED FOR SHORT LENGTH OF DRIVE RODS

NOTE: Relative density values listed below are estimated using equations of
 Giuliani and Nicoll (1982).

LIQUEFACTION ANALYSIS SUMMARY

Seed and Others [1985] Method

PAGE 1

SOIL NO.	CALC. DEPTH (ft)	TOTAL STRESS (tsf)	EFF. STRESS (tsf)	FIELD N (B/ft)	Est.D (%)	C	CORR. (N1)60 (B/ft)	LIQUE. STRESS RATIO	INDUC. STRESS RATIO	LIQUE. SAFETY FACTOR
1	0.25	0.015	0.015	6	-	@	@	@	@	@ @
1	0.75	0.045	0.045	6	-	@	@	@	@	@ @
1	1.25	0.075	0.075	6	-	@	@	@	@	@ @
1	1.75	0.105	0.105	6	-	@	@	@	@	@ @
1	2.25	0.135	0.135	6	-	@	@	@	@	@ @
1	2.75	0.165	0.165	6	-	@	@	@	@	@ @
1	3.25	0.195	0.195	6	-	@	@	@	@	@ @
1	3.75	0.225	0.225	6	-	@	@	@	@	@ @
1	4.25	0.255	0.255	6	-	@	@	@	@	@ @
1	4.75	0.285	0.285	6	-	@	@	@	@	@ @
1	5.25	0.315	0.315	6	-	@	@	@	@	@ @
1	5.75	0.345	0.345	6	-	@	@	@	@	@ @
2	6.25	0.375	0.367	6	-	-	-	-	-	--
2	6.75	0.405	0.382	6	-	-	-	-	-	--
2	7.25	0.435	0.396	6	-	-	-	-	-	--
2	7.75	0.465	0.410	6	-	-	-	-	-	--
2	8.25	0.495	0.425	6	-	-	-	-	-	--
2	8.75	0.525	0.439	6	-	-	-	-	-	--
2	9.25	0.555	0.454	6	-	-	-	-	-	--
2	9.75	0.585	0.468	6	-	-	-	-	-	--
3	10.25	0.615	0.482	5	-	-	-	-	-	--
3	10.75	0.645	0.497	5	-	-	-	-	-	--
3	11.25	0.675	0.511	5	-	-	-	-	-	--
3	11.75	0.705	0.526	5	-	-	-	-	-	--
3	12.25	0.735	0.540	5	-	-	-	-	-	--
3	12.75	0.765	0.554	5	-	-	-	-	-	--
3	13.25	0.795	0.569	5	-	-	-	-	-	--
3	13.75	0.825	0.583	5	-	-	-	-	-	--
3	14.25	0.855	0.598	5	-	-	-	-	-	--
3	14.75	0.885	0.612	5	-	-	-	-	-	--
4	15.25	0.915	0.626	17	68	1.263	28.6	Infin	0.968	0.294
4	15.75	0.945	0.641	17	68	1.263	28.6	Infin	0.967	0.297

4	16.25	0.975	0.655	17	68	1.263	28.6	Infin	0.966	0.299	Infin
4	16.75	1.005	0.670	17	68	1.263	28.6	Infin	0.965	0.301	Infin
4	17.25	1.035	0.684	17	68	1.263	28.6	Infin	0.964	0.303	Infin
4	17.75	1.065	0.698	17	68	1.263	28.6	Infin	0.963	0.305	Infin
4	18.25	1.095	0.713	17	68	1.263	28.6	Infin	0.961	0.307	Infin
4	18.75	1.125	0.727	17	68	1.263	28.6	Infin	0.960	0.309	Infin
4	19.25	1.155	0.742	17	68	1.263	28.6	Infin	0.959	0.311	Infin
4	19.75	1.185	0.756	17	68	1.263	28.6	Infin	0.958	0.312	Infin
5	20.25	1.215	0.770	24	77	1.144	36.5	Infin	0.957	0.314	Infin
5	20.75	1.245	0.785	24	77	1.144	36.5	Infin	0.955	0.315	Infin
5	21.25	1.275	0.799	24	77	1.144	36.5	Infin	0.954	0.316	Infin
5	21.75	1.305	0.814	24	77	1.144	36.5	Infin	0.952	0.318	Infin
5	22.25	1.335	0.828	24	77	1.144	36.5	Infin	0.951	0.319	Infin
5	22.75	1.365	0.842	24	77	1.144	36.5	Infin	0.949	0.320	Infin

Seed and Others [1985] Method

PAGE 2

SOIL NO.	CALC. DEPTH (ft)	TOTAL STRESS (tsf)	EFF. STRESS (tsf)	FIELD N (B/ft)	Est.D (%)	C N	CORR. (N1)60 (B/ft)	LIQUE. STRESS RATIO	r d	INDUC. STRESS RATIO	LIQUE. SAFETY FACTOR
5	23.25	1.395	0.857	24	77	1.144	36.5	Infin	0.947	0.321	Infin
5	23.75	1.425	0.871	24	77	1.144	36.5	Infin	0.946	0.322	Infin
5	24.25	1.455	0.886	24	77	1.144	36.5	Infin	0.944	0.323	Infin
5	24.75	1.485	0.900	24	77	1.144	36.5	Infin	0.943	0.324	Infin
6	25.25	1.515	0.914	29	82	1.049	40.5	Infin	0.941	0.324	Infin
6	25.75	1.545	0.929	29	82	1.049	40.5	Infin	0.939	0.325	Infin
6	26.25	1.575	0.943	29	82	1.049	40.5	Infin	0.937	0.325	Infin
6	26.75	1.605	0.958	29	82	1.049	40.5	Infin	0.934	0.326	Infin
6	27.25	1.635	0.972	29	82	1.049	40.5	Infin	0.932	0.326	Infin
6	27.75	1.665	0.986	29	82	1.049	40.5	Infin	0.930	0.327	Infin
6	28.25	1.695	1.001	29	82	1.049	40.5	Infin	0.928	0.327	Infin
6	28.75	1.725	1.015	29	82	1.049	40.5	Infin	0.926	0.327	Infin
6	29.25	1.755	1.030	29	82	1.049	40.5	Infin	0.923	0.327	Infin
6	29.75	1.785	1.044	29	82	1.049	40.5	Infin	0.921	0.328	Infin
7	30.25	1.815	1.058	83	134	0.979	108.1	Infin	0.919	0.328	Infin
7	30.75	1.845	1.073	83	134	0.979	108.1	Infin	0.916	0.328	Infin
7	31.25	1.875	1.087	83	134	0.979	108.1	Infin	0.913	0.328	Infin
7	31.75	1.905	1.102	83	134	0.979	108.1	Infin	0.910	0.327	Infin
7	32.25	1.935	1.116	83	134	0.979	108.1	Infin	0.907	0.327	Infin
7	32.75	1.965	1.130	83	134	0.979	108.1	Infin	0.904	0.327	Infin
7	33.25	1.995	1.145	83	134	0.979	108.1	Infin	0.902	0.327	Infin
7	33.75	2.025	1.159	83	134	0.979	108.1	Infin	0.899	0.327	Infin
7	34.25	2.055	1.174	83	134	0.979	108.1	Infin	0.896	0.326	Infin
7	34.75	2.085	1.188	83	134	0.979	108.1	Infin	0.893	0.326	Infin
8	35.25	2.115	1.202	69	118	0.927	85.1	Infin	0.890	0.326	Infin
8	35.75	2.145	1.217	69	118	0.927	85.1	Infin	0.886	0.325	Infin
8	36.25	2.175	1.231	69	118	0.927	85.1	Infin	0.882	0.324	Infin
8	36.75	2.205	1.246	69	118	0.927	85.1	Infin	0.878	0.323	Infin
8	37.25	2.235	1.260	69	118	0.927	85.1	Infin	0.874	0.322	Infin
8	37.75	2.265	1.274	69	118	0.927	85.1	Infin	0.870	0.322	Infin

8	38.25	2.295	1.289	69	118	0.927	85.1	Infin	0.866	0.321	Infin
8	38.75	2.325	1.303	69	118	0.927	85.1	Infin	0.862	0.320	Infin
8	39.25	2.355	1.318	69	118	0.927	85.1	Infin	0.858	0.319	Infin
8	39.75	2.385	1.332	69	118	0.927	85.1	Infin	0.855	0.318	Infin
9	40.25	2.415	1.346	55	103	0.886	64.8	Infin	0.850	0.317	Infin
9	40.75	2.445	1.361	55	103	0.886	64.8	Infin	0.845	0.316	Infin
9	41.25	2.475	1.375	55	103	0.886	64.8	Infin	0.840	0.315	Infin
9	41.75	2.505	1.390	55	103	0.886	64.8	Infin	0.836	0.313	Infin
9	42.25	2.535	1.404	55	103	0.886	64.8	Infin	0.831	0.312	Infin
9	42.75	2.565	1.418	55	103	0.886	64.8	Infin	0.826	0.311	Infin
9	43.25	2.595	1.433	55	103	0.886	64.8	Infin	0.821	0.309	Infin
9	43.75	2.625	1.447	55	103	0.886	64.8	Infin	0.816	0.308	Infin
9	44.25	2.655	1.462	55	103	0.886	64.8	Infin	0.811	0.307	Infin
9	44.75	2.685	1.476	55	103	0.886	64.8	Infin	0.806	0.305	Infin
10	45.25	2.715	1.490	95	131	0.850	107.5	Infin	0.801	0.304	Infin
10	45.75	2.745	1.505	95	131	0.850	107.5	Infin	0.796	0.302	Infin
10	46.25	2.775	1.519	95	131	0.850	107.5	Infin	0.791	0.301	Infin
10	46.75	2.805	1.534	95	131	0.850	107.5	Infin	0.786	0.299	Infin
10	47.25	2.835	1.548	95	131	0.850	107.5	Infin	0.781	0.297	Infin
10	47.75	2.865	1.562	95	131	0.850	107.5	Infin	0.776	0.296	Infin
10	48.25	2.895	1.577	95	131	0.850	107.5	Infin	0.771	0.294	Infin
10	48.75	2.925	1.591	95	131	0.850	107.5	Infin	0.765	0.293	Infin
10	49.25	2.955	1.606	95	131	0.850	107.5	Infin	0.760	0.291	Infin

Seed and Others [1985] Method

PAGE 3

	CALC.	TOTAL	EFF.	FIELD	Est.D		CORR.	LIQUE.		INDUC.	LIQUE.
SOIL	DEPTH	STRESS	STRESS	N	r	C	(N1)60	STRESS	r	STRESS	SAFETY
NO.	(ft)	(tsf)	(csf)	(B/ft)	(%)	N	(B/ft)	RATIO	d	RATIO	FACTOR
10	49.75	2.985	1.620	95	131	0.850	107.5	Infin	0.755	0.289	Infin

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 * SOIL PROFILE LOG *
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 SOIL PROFILE NAME: TWB4

LAYER #	BASE DEPTH (ft)	SPT FIELD-N (blows/ft)	LIQUEFACTION SUSCEPTIBILITY	WET UNIT WT. (pcf)	FINES %<#200	D (mm) 50	DEPTH OF SPT (ft)
1	7.0	12.0	UNSUSCEPTIBLE (0)	120.0	10.0	0.180	5.25
2	10.0	10.0	SUSCEPTIBLE (1)	120.0	10.0	0.180	5.25
3	15.0	10.0	SUSCEPTIBLE (1)	120.0	10.0	0.180	10.25
4	20.0	21.0	SUSCEPTIBLE (1)	120.0	10.0	0.180	15.25
5	25.0	25.0	SUSCEPTIBLE (1)	120.0	7.0	0.280	20.25
6	30.0	41.0	SUSCEPTIBLE (1)	120.0	7.0	0.280	25.25
7	35.0	44.0	SUSCEPTIBLE (1)	120.0	7.0	0.280	30.25
8	40.0	43.0	SUSCEPTIBLE (1)	120.0	7.0	0.280	35.25
9	45.0	16.0	SUSCEPTIBLE (1)	120.0	7.0	0.280	40.25
10	50.0	31.0	SUSCEPTIBLE (1)	120.0	14.0	0.170	45.25

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 * L I Q U E F Y 2 *
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 * Version 1.20 *
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EMPIRICAL PREDICTION OF
 EARTHQUAKE-INDUCED LIQUEFACTION POTENTIAL

JOB NUMBER: 970011-001 DATE: Wednesday, November 13, 1996

JOB NAME: TW HOMES - BANNING LOWLAND

LIQUEFACTION CALCULATION NAME: BORING B-4

SOIL-PROFILE NAME: TWB4

GROUND WATER DEPTH: 7.0 ft

DESIGN EARTHQUAKE MAGNITUDE: 7.10

SITE PEAK GROUND ACCELERATION: 0.320 g

K sigma BOUND: M

rd BOUND: M

N60 CORRECTION: 1.33

FIELD SPT N-VALUES < 10 FT DEEP ARE CORRECTED FOR SHORT LENGTH OF DRIVE RODS

NOTE: Relative density values listed below are estimated using equations of
 Giuliani and Nicoll (1982).

 LIQUEFACTION ANALYSIS SUMMARY

 Seed and Others [1985] Method

PAGE 1

SOIL	CALC.	TOTAL	EFF.	FIELD	Est.D		CORR.	LIQUE.		INDUC.	LIQUE.
NO.	DEPTH	STRESS	STRESS	N	r	C	(N1)60	STRESS	r	STRESS	SAFETY
	(ft)	(tsf)	(tsf)	(B/ft)	(%)	N	(B/ft)	RATIO	d	RATIO	FACTOR
1	0.25	0.015	0.015	12	~	@	@	@	@	@	@ @
1	0.75	0.045	0.045	12	~	@	@	@	@	@	@ @
1	1.25	0.075	0.075	12	~	@	@	@	@	@	@ @
1	1.75	0.105	0.105	12	~	@	@	@	@	@	@ @
1	2.25	0.135	0.135	12	~	@	@	@	@	@	@ @
1	2.75	0.165	0.165	12	~	@	@	@	@	@	@ @
1	3.25	0.195	0.195	12	~	@	@	@	@	@	@ @
1	3.75	0.225	0.225	12	~	@	@	@	@	@	@ @
1	4.25	0.255	0.255	12	~	@	@	@	@	@	@ @
1	4.75	0.285	0.285	12	~	@	@	@	@	@	@ @
1	5.25	0.315	0.315	12	~	@	@	@	@	@	@ @
1	5.75	0.345	0.345	12	~	@	@	@	@	@	@ @
1	6.25	0.375	0.375	12	~	@	@	@	@	@	@ @
1	6.75	0.405	0.405	12	~	@	@	@	@	@	@ @
2	7.25	0.435	0.427	10	58	1.740	17.4	0.240	0.985	0.209	1.15
2	7.75	0.465	0.442	10	58	1.740	17.4	0.240	0.984	0.216	1.11
2	8.25	0.495	0.456	10	58	1.740	17.4	0.240	0.983	0.222	1.08
2	8.75	0.525	0.470	10	58	1.740	17.4	0.240	0.982	0.228	1.05
2	9.25	0.555	0.485	10	58	1.740	17.4	0.240	0.981	0.234	1.03
2	9.75	0.585	0.499	10	58	1.740	17.4	0.240	0.980	0.239	1.01
3	10.25	0.615	0.514	10	54	1.358	18.1	0.250	0.979	0.244	1.03
3	10.75	0.645	0.528	10	54	1.358	18.1	0.250	0.978	0.249	1.01
3	11.25	0.675	0.542	10	54	1.358	18.1	0.250	0.977	0.253	0.99
3	11.75	0.705	0.557	10	54	1.358	18.1	0.250	0.976	0.257	0.97
3	12.25	0.735	0.571	10	54	1.358	18.1	0.250	0.975	0.261	0.96
3	12.75	0.765	0.586	10	54	1.358	18.1	0.250	0.974	0.265	0.95
3	13.25	0.795	0.600	10	54	1.358	18.1	0.250	0.972	0.268	0.93
3	13.75	0.825	0.614	10	54	1.358	18.1	0.250	0.971	0.271	0.92
3	14.25	0.855	0.629	10	54	1.358	18.1	0.250	0.970	0.274	0.91
3	14.75	0.885	0.643	10	54	1.358	18.1	0.250	0.969	0.277	0.90
4	15.25	0.915	0.658	21	74	1.236	34.5	Infin	0.968	0.280	Infin
4	15.75	0.945	0.672	21	74	1.236	34.5	Infin	0.967	0.283	Infin

4	16.25	0.975	0.686	21	74	1.236	34.5	Infin	0.966	0.285	Infin
4	16.75	1.005	0.701	21	74	1.236	34.5	Infin	0.965	0.288	Infin
4	17.25	1.035	0.715	21	74	1.236	34.5	Infin	0.964	0.290	Infin
4	17.75	1.065	0.730	21	74	1.236	34.5	Infin	0.963	0.292	Infin
4	18.25	1.095	0.744	21	74	1.236	34.5	Infin	0.961	0.294	Infin
4	18.75	1.125	0.758	21	74	1.236	34.5	Infin	0.960	0.296	Infin
4	19.25	1.155	0.773	21	74	1.236	34.5	Infin	0.959	0.298	Infin
4	19.75	1.185	0.787	21	74	1.236	34.5	Infin	0.958	0.300	Infin
5	20.25	1.215	0.802	25	78	1.119	37.2	Infin	0.957	0.302	Infin
5	20.75	1.245	0.816	25	78	1.119	37.2	Infin	0.955	0.303	Infin
5	21.25	1.275	0.830	25	78	1.119	37.2	Infin	0.954	0.305	Infin
5	21.75	1.305	0.845	25	78	1.119	37.2	Infin	0.952	0.306	Infin
5	22.25	1.335	0.859	25	78	1.119	37.2	Infin	0.951	0.307	Infin
5	22.75	1.365	0.874	25	78	1.119	37.2	Infin	0.949	0.308	Infin

Seed and Others [1985] Method

PAGE 2

SOIL NO.	CALC. DEPTH (ft)	TOTAL STRESS (tsf)	EFF. STRESS (tsf)	FIELD N (B/ft)	Est.D (%)	r	C	CORR. (N1)60 (B/ft)	LIQUE. STRESS RATIO	r	INDUC. STRESS RATIO	LIQUE. SAFETY FACTOR
5	23.25	1.395	0.888	25	78	1.119	37.2	Infin	0.947	0.310	Infin	
5	23.75	1.425	0.902	25	78	1.119	37.2	Infin	0.946	0.311	Infin	
5	24.25	1.455	0.917	25	78	1.119	37.2	Infin	0.944	0.312	Infin	
5	24.75	1.485	0.931	25	78	1.119	37.2	Infin	0.943	0.313	Infin	
6	25.25	1.515	0.946	41	96	1.031	56.2	Infin	0.941	0.314	Infin	
6	25.75	1.545	0.960	41	96	1.031	56.2	Infin	0.939	0.314	Infin	
6	26.25	1.575	0.974	41	96	1.031	56.2	Infin	0.937	0.315	Infin	
6	26.75	1.605	0.989	41	96	1.031	56.2	Infin	0.934	0.315	Infin	
6	27.25	1.635	1.003	41	96	1.031	56.2	Infin	0.932	0.316	Infin	
6	27.75	1.665	1.018	41	96	1.031	56.2	Infin	0.930	0.317	Infin	
6	28.25	1.695	1.032	41	96	1.031	56.2	Infin	0.928	0.317	Infin	
6	28.75	1.725	1.046	41	96	1.031	56.2	Infin	0.926	0.317	Infin	
6	29.25	1.755	1.061	41	96	1.031	56.2	Infin	0.923	0.318	Infin	
6	29.75	1.785	1.075	41	96	1.031	56.2	Infin	0.921	0.318	Infin	
7	30.25	1.815	1.090	44	97	0.968	56.6	Infin	0.919	0.318	Infin	
7	30.75	1.845	1.104	44	97	0.968	56.6	Infin	0.916	0.318	Infin	
7	31.25	1.875	1.118	44	97	0.968	56.6	Infin	0.913	0.318	Infin	
7	31.75	1.905	1.133	44	97	0.968	56.6	Infin	0.910	0.318	Infin	
7	32.25	1.935	1.147	44	97	0.968	56.6	Infin	0.907	0.318	Infin	
7	32.75	1.965	1.162	44	97	0.968	56.6	Infin	0.904	0.318	Infin	
7	33.25	1.995	1.176	44	97	0.968	56.6	Infin	0.902	0.318	Infin	
7	33.75	2.025	1.190	44	97	0.968	56.6	Infin	0.899	0.318	Infin	
7	34.25	2.055	1.205	44	97	0.968	56.6	Infin	0.896	0.318	Infin	
7	34.75	2.085	1.219	44	97	0.968	56.6	Infin	0.893	0.318	Infin	
8	35.25	2.115	1.234	43	93	0.916	52.4	Infin	0.890	0.317	Infin	
8	35.75	2.145	1.248	43	93	0.916	52.4	Infin	0.886	0.317	Infin	
8	36.25	2.175	1.262	43	93	0.916	52.4	Infin	0.882	0.316	Infin	
8	36.75	2.205	1.277	43	93	0.916	52.4	Infin	0.878	0.315	Infin	
8	37.25	2.235	1.291	43	93	0.916	52.4	Infin	0.874	0.315	Infin	
8	37.75	2.265	1.306	43	93	0.916	52.4	Infin	0.870	0.314	Infin	

8	38.25	2.295	1.320	43	93	0.916	52.4	Infin	0.866	0.313	Infin
8	38.75	2.325	1.334	43	93	0.916	52.4	Infin	0.862	0.313	Infin
8	39.25	2.355	1.349	43	93	0.916	52.4	Infin	0.858	0.312	Infin
8	39.75	2.385	1.363	43	93	0.916	52.4	Infin	0.855	0.311	Infin
9	40.25	2.415	1.378	16	55	0.854	18.2	0.226	0.850	0.310	0.73
9	40.75	2.445	1.392	16	55	0.854	18.2	0.226	0.845	0.309	0.73
9	41.25	2.475	1.406	16	55	0.854	18.2	0.226	0.840	0.308	0.74
9	41.75	2.505	1.421	16	55	0.854	18.2	0.226	0.836	0.306	0.74
9	42.25	2.535	1.435	16	55	0.854	18.2	0.226	0.831	0.305	0.74
9	42.75	2.565	1.450	16	55	0.854	18.2	0.226	0.826	0.304	0.74
9	43.25	2.595	1.464	16	55	0.854	18.2	0.226	0.821	0.303	0.75
9	43.75	2.625	1.478	16	55	0.854	18.2	0.226	0.816	0.301	0.75
9	44.25	2.655	1.493	16	55	0.854	18.2	0.225	0.811	0.300	0.75
9	44.75	2.685	1.507	16	55	0.854	18.2	0.225	0.806	0.299	0.75
10	45.25	2.715	1.522	31	75	0.843	34.8	Infin	0.801	0.297	Infin
10	45.75	2.745	1.536	31	75	0.843	34.8	Infin	0.796	0.296	Infin
10	46.25	2.775	1.550	31	75	0.843	34.8	Infin	0.791	0.295	Infin
10	46.75	2.805	1.565	31	75	0.843	34.8	Infin	0.786	0.293	Infin
10	47.25	2.835	1.579	31	75	0.843	34.8	Infin	0.781	0.292	Infin
10	47.75	2.865	1.594	31	75	0.843	34.8	Infin	0.776	0.290	Infin
10	48.25	2.895	1.608	31	75	0.843	34.8	Infin	0.771	0.289	Infin
10	48.75	2.925	1.622	31	75	0.843	34.8	Infin	0.765	0.287	Infin
10	49.25	2.955	1.637	31	75	0.843	34.8	Infin	0.760	0.286	Infin

Seed and Others [1985] Method

PAGE 3

SOIL NO.	CALC. DEPTH (ft)	TOTAL STRESS (tsf)	EFF. STRESS (tsf)	FIELD N (B/ft)	Est.D (%)	r	C	CORR. (N1)60 (B/ft)	LIQUE. STRESS RATIO	r	INDUC. STRESS RATIO	LIQUE. SAFETY FACTOR
10	49.75	2.985	1.651	31	75	0.843	34.8	Infin	0.755	0.284	Infin	

 *
 * SOIL PROFILE LOG *
 *

 SOIL PROFILE NAME: TWB5

LAYER #	BASE DEPTH (ft)	SPT FIELD-N (blows/ft)	LIQUEFACTION SUSCEPTIBILITY	WET UNIT WT. (pcf)	FINES %#200	D (mm) 50	DEPTH OF SPT (ft)
1	10.0	10.0	UNSUSCEPTIBLE (0)	120.0	21.0	0.210	5.25
2	15.0	10.0	SUSCEPTIBLE (1)	120.0	21.0	0.210	10.25
3	20.0	13.0	SUSCEPTIBLE (1)	120.0	21.0	0.210	15.25
4	21.0	25.0	SUSCEPTIBLE (1)	120.0	21.0	0.210	20.25
5	25.0	25.0	UNSUSCEPTIBLE (0)	120.0	63.0	0.500	20.25
6	30.0	26.0	UNSUSCEPTIBLE (0)	120.0	63.0	0.500	25.25
7	35.0	19.0	UNSUSCEPTIBLE (0)	120.0	63.0	0.500	30.25
8	40.0	17.0	UNSUSCEPTIBLE (0)	120.0	63.0	0.500	35.25
9	45.0	29.0	UNSUSCEPTIBLE (0)	120.0	63.0	0.500	40.25
10	50.0	29.0	UNSUSCEPTIBLE (0)	120.0	63.0	0.500	45.25

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 * L I Q U E F Y 2 *
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 * Version 1.20 *
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EMPIRICAL PREDICTION OF
 EARTHQUAKE-INDUCED LIQUEFACTION POTENTIAL

JOB NUMBER: 970011-001 DATE: Wednesday, November 13, 1996

JOB NAME: TW HOMES - BANNING LOWLAND

LIQUEFACTION CALCULATION NAME: BORING B-5

SOIL-PROFILE NAME: TWB5

GROUND WATER DEPTH: 10.0 ft

DESIGN EARTHQUAKE MAGNITUDE: 7.10

SITE PEAK GROUND ACCELERATION: 0.320 g

K sigma BOUND: M

rd BOUND: M

N60 CORRECTION: 1.33

FIELD SPT N-VALUES < 10 FT DEEP ARE CORRECTED FOR SHORT LENGTH OF DRIVE RODS

NOTE: Relative density values listed below are estimated using equations of
 Giuliani and Nicoll (1982).

 LIQUEFACTION ANALYSIS SUMMARY

 Seed and Others [1985] Method

PAGE 1

SOIL NO.	CALC. DEPTH (ft)	TOTAL STRESS (tsf)	EFF. STRESS (tsf)	FIELD N (B/ft)	Est.D r (%)	C N	CORR. (N1)60 (B/ft)	LIQUE. STRESS RATIO	r d	INDUC. STRESS RATIO	LIQUE. SAFETY FACTOR
1	0.25	0.015	0.015	10	-	@	@	@	@	@	@ @
1	0.75	0.045	0.045	10	-	@	@	@	@	@	@ @
1	1.25	0.075	0.075	10	-	@	@	@	@	@	@ @
1	1.75	0.105	0.105	10	-	@	@	@	@	@	@ @
1	2.25	0.135	0.135	10	-	@	@	@	@	@	@ @
1	2.75	0.165	0.165	10	-	@	@	@	@	@	@ @
1	3.25	0.195	0.195	10	-	@	@	@	@	@	@ @
1	3.75	0.225	0.225	10	-	@	@	@	@	@	@ @
1	4.25	0.255	0.255	10	-	@	@	@	@	@	@ @
1	4.75	0.285	0.285	10	-	@	@	@	@	@	@ @
1	5.25	0.315	0.315	10	-	@	@	@	@	@	@ @
1	5.75	0.345	0.345	10	-	@	@	@	@	@	@ @
1	6.25	0.375	0.375	10	-	@	@	@	@	@	@ @
1	6.75	0.405	0.405	10	-	@	@	@	@	@	@ @
1	7.25	0.435	0.435	10	-	@	@	@	@	@	@ @
1	7.75	0.465	0.465	10	-	@	@	@	@	@	@ @
1	8.25	0.495	0.495	10	-	@	@	@	@	@	@ @
1	8.75	0.525	0.525	10	-	@	@	@	@	@	@ @
1	9.25	0.555	0.555	10	-	@	@	@	@	@	@ @
1	9.75	0.585	0.585	10	-	@	@	@	@	@	@ @
2	10.25	0.615	0.607	10	52	1.279	17.0	0.279	0.979	0.206	1.35
2	10.75	0.645	0.622	10	52	1.279	17.0	0.279	0.978	0.211	1.32
2	11.25	0.675	0.636	10	52	1.279	17.0	0.279	0.977	0.216	1.30
2	11.75	0.705	0.650	10	52	1.279	17.0	0.279	0.976	0.220	1.27
2	12.25	0.735	0.665	10	52	1.279	17.0	0.279	0.975	0.224	1.25
2	12.75	0.765	0.679	10	52	1.279	17.0	0.279	0.974	0.228	1.23
2	13.25	0.795	0.694	10	52	1.279	17.0	0.279	0.972	0.232	1.21
2	13.75	0.825	0.708	10	52	1.279	17.0	0.279	0.971	0.235	1.19
2	14.25	0.855	0.722	10	52	1.279	17.0	0.279	0.970	0.239	1.17
2	14.75	0.885	0.737	10	52	1.279	17.0	0.279	0.969	0.242	1.15
3	15.25	0.915	0.751	13	57	1.159	20.0	0.343	0.968	0.245	1.40
3	15.75	0.945	0.766	13	57	1.159	20.0	0.343	0.967	0.248	1.38

3	16.25	0.975	0.780	13	57	1.159	20.0	0.343	0.966	0.251	1.37
3	16.75	1.005	0.794	13	57	1.159	20.0	0.343	0.965	0.254	1.35
3	17.25	1.035	0.809	13	57	1.159	20.0	0.343	0.964	0.257	1.34
3	17.75	1.065	0.823	13	57	1.159	20.0	0.343	0.963	0.259	1.33
3	18.25	1.095	0.838	13	57	1.159	20.0	0.343	0.961	0.261	1.31
3	18.75	1.125	0.852	13	57	1.159	20.0	0.343	0.960	0.264	1.30
3	19.25	1.155	0.866	13	57	1.159	20.0	0.343	0.959	0.266	1.29
3	19.75	1.185	0.881	13	57	1.159	20.0	0.343	0.958	0.268	1.28
4	20.25	1.215	0.895	25	76	1.060	35.2	Infin	0.957	0.270	Infin
4	20.75	1.245	0.910	25	76	1.060	35.2	Infin	0.955	0.272	Infin
5	21.25	1.275	0.924	25	-	-	-	-	-	-	-
5	21.75	1.305	0.938	25	-	-	-	-	-	-	-
5	22.25	1.335	0.953	25	-	-	-	-	-	-	-
5	22.75	1.365	0.967	25	-	-	-	-	-	-	-

Seed and Others [1985] Method

PAGE 2

SOIL NO.	CALC. DEPTH (ft)	TOTAL STRESS (tsf)	EFF. STRESS (tsf)	FIELD N (B/ft)	Est.D (%)	r	C	CORR. (N1) 60 (B/ft)	LIQUE. STRESS RATIO	r	INDUC. STRESS RATIO	LIQUE. SAFETY FACTOR
5	23.25	1.395	0.982	25	-	-	-	-	-	-	-	-
5	23.75	1.425	0.996	25	-	-	-	-	-	-	-	-
5	24.25	1.455	1.010	25	-	-	-	-	-	-	-	-
5	24.75	1.485	1.025	25	-	-	-	-	-	-	-	-
6	25.25	1.515	1.039	26	-	-	-	-	-	-	-	-
6	25.75	1.545	1.054	26	-	-	-	-	-	-	-	-
6	26.25	1.575	1.068	26	-	-	-	-	-	-	-	-
6	26.75	1.605	1.082	26	-	-	-	-	-	-	-	-
6	27.25	1.635	1.097	26	-	-	-	-	-	-	-	-
6	27.75	1.665	1.111	26	-	-	-	-	-	-	-	-
6	28.25	1.695	1.126	26	-	-	-	-	-	-	-	-
6	28.75	1.725	1.140	26	-	-	-	-	-	-	-	-
6	29.25	1.755	1.154	26	-	-	-	-	-	-	-	-
6	29.75	1.785	1.169	26	-	-	-	-	-	-	-	-
7	30.25	1.815	1.183	19	-	-	-	-	-	-	-	-
7	30.75	1.845	1.198	19	-	-	-	-	-	-	-	-
7	31.25	1.875	1.212	19	-	-	-	-	-	-	-	-
7	31.75	1.905	1.226	19	-	-	-	-	-	-	-	-
7	32.25	1.935	1.241	19	-	-	-	-	-	-	-	-
7	32.75	1.965	1.255	19	-	-	-	-	-	-	-	-
7	33.25	1.995	1.270	19	-	-	-	-	-	-	-	-
7	33.75	2.025	1.284	19	-	-	-	-	-	-	-	-
7	34.25	2.055	1.298	19	-	-	-	-	-	-	-	-
7	34.75	2.085	1.313	19	-	-	-	-	-	-	-	-
8	35.25	2.115	1.327	17	-	-	-	-	-	-	-	-
8	35.75	2.145	1.342	17	-	-	-	-	-	-	-	-
8	36.25	2.175	1.356	17	-	-	-	-	-	-	-	-
8	36.75	2.205	1.370	17	-	-	-	-	-	-	-	-
8	37.25	2.235	1.385	17	-	-	-	-	-	-	-	-
8	37.75	2.265	1.399	17	-	-	-	-	-	-	-	-

8	38.25	2.295	1.414	17	-	-	-	-	-	-	-	-
8	38.75	2.325	1.428	17	-	-	-	-	-	-	-	-
8	39.25	2.355	1.442	17	-	-	-	-	-	-	-	-
8	39.75	2.385	1.457	17	-	-	-	-	-	-	-	-
9	40.25	2.415	1.471	29	-	-	-	-	-	-	-	-
9	40.75	2.445	1.486	29	-	-	-	-	-	-	-	-
9	41.25	2.475	1.500	29	-	-	-	-	-	-	-	-
9	41.75	2.505	1.514	29	-	-	-	-	-	-	-	-
9	42.25	2.535	1.529	29	-	-	-	-	-	-	-	-
9	42.75	2.565	1.543	29	-	-	-	-	-	-	-	-
9	43.25	2.595	1.558	29	-	-	-	-	-	-	-	-
9	43.75	2.625	1.572	29	-	-	-	-	-	-	-	-
9	44.25	2.655	1.586	29	-	-	-	-	-	-	-	-
9	44.75	2.685	1.601	29	-	-	-	-	-	-	-	-
10	45.25	2.715	1.615	29	-	-	-	-	-	-	-	-
10	45.75	2.745	1.630	29	-	-	-	-	-	-	-	-
10	46.25	2.775	1.644	29	-	-	-	-	-	-	-	-
10	46.75	2.805	1.658	29	-	-	-	-	-	-	-	-
10	47.25	2.835	1.673	29	-	-	-	-	-	-	-	-
10	47.75	2.865	1.687	29	-	-	-	-	-	-	-	-
10	48.25	2.895	1.702	29	-	-	-	-	-	-	-	-
10	48.75	2.925	1.716	29	-	-	-	-	-	-	-	-
10	49.25	2.955	1.730	29	-	-	-	-	-	-	-	-

Seed and Others [1985] Method

PAGE 3

SOIL NO.	CALC. DEPTH (ft)	TOTAL STRESS (tsf)	EFF. STRESS (tsf)	FIELD N (B/ft)	Est.D (%)	r	C	CORR. (N1) 60 (B/ft)	LIQUE. STRESS RATIO	r	INDUC. STRESS RATIO	LIQUE. SAFETY FACTOR
10	49.75	2.985	1.745	29	-	-	-	-	-	-	-	-

 *
 * SOIL PROFILE LOG *
 *

 SOIL PROFILE NAME: TWB6

LAYER #	BASE DEPTH (ft)	SPT FIELD-N (blows/ft)	LIQUEFACTION SUSCEPTIBILITY	WET UNIT WT. (pcf)	FINES %<#200	D (mm) 50	DEPTH OF SPT (ft)
1	7.0	2.0	UNSUSCEPTIBLE (0)	120.0	39.0	0.130	5.25
2	10.0	2.0	UNSUSCEPTIBLE (0)	120.0	39.0	0.130	5.25
3	15.0	2.0	SUSCEPTIBLE (1)	120.0	1.0	0.290	10.25
4	20.0	10.0	SUSCEPTIBLE (1)	120.0	1.0	0.290	15.25
5	25.0	15.0	SUSCEPTIBLE (1)	120.0	1.0	0.290	20.25
6	30.0	29.0	SUSCEPTIBLE (1)	120.0	1.0	0.290	29.75
7	35.0	24.0	SUSCEPTIBLE (1)	120.0	1.0	0.290	30.25
8	40.0	14.0	SUSCEPTIBLE (1)	120.0	1.0	0.290	35.25
9	45.0	69.0	SUSCEPTIBLE (1)	120.0	1.0	0.290	40.25
10	50.0	49.0	SUSCEPTIBLE (1)	120.0	1.0	0.290	45.25

 * L I Q U E F Y 2 *
 * *
 * Version 1.20 *
 * *

EMPIRICAL PREDICTION OF
 EARTHQUAKE-INDUCED LIQUEFACTION POTENTIAL

JOB NUMBER: 970011-001 DATE: Wednesday, November 13, 1996

JOB NAME: TW HOMES - BANNING LOWLAND

LIQUEFACTION CALCULATION NAME: BORING B-6

SOIL-PROFILE NAME: TWB6

GROUND WATER DEPTH: 7.0 ft

DESIGN EARTHQUAKE MAGNITUDE: 7.10

SITE PEAK GROUND ACCELERATION: 0.320 g

K sigma BOUND: M

rd BOUND: M

N60 CORRECTION: 1.33

FIELD SPT N-VALUES < 10 FT DEEP ARE CORRECTED FOR SHORT LENGTH OF DRIVE RODS

NOTE: Relative density values listed below are estimated using equations of
 Giuliani and Nicoll (1982).

LIQUEFACTION ANALYSIS SUMMARY

Seed and Others (1985) Method

PAGE 1

SOIL NO.	CALC. DEPTH (ft)	TOTAL STRESS (tsf)	EFF. STRESS (tsf)	FIELD N (B/ft)	Est.D (%)	r	C	CORR. (N1)60 (B/ft)	LIQUE. STRESS RATIO	INDUC. STRESS RATIO	LIQUE. SAFETY FACTOR
1	0.25	0.015	0.015	2	-	@	@	@	@	@	@ @
1	0.75	0.045	0.045	2	-	@	@	@	@	@	@ @
1	1.25	0.075	0.075	2	-	@	@	@	@	@	@ @
1	1.75	0.105	0.105	2	-	@	@	@	@	@	@ @
1	2.25	0.135	0.135	2	-	@	@	@	@	@	@ @
1	2.75	0.165	0.165	2	-	@	@	@	@	@	@ @
1	3.25	0.195	0.195	2	-	@	@	@	@	@	@ @
1	3.75	0.225	0.225	2	-	@	@	@	@	@	@ @
1	4.25	0.255	0.255	2	-	@	@	@	@	@	@ @
1	4.75	0.285	0.285	2	-	@	@	@	@	@	@ @
1	5.25	0.315	0.315	2	-	@	@	@	@	@	@ @
1	5.75	0.345	0.345	2	-	@	@	@	@	@	@ @
1	6.25	0.375	0.375	2	-	@	@	@	@	@	@ @
1	6.75	0.405	0.405	2	-	@	@	@	@	@	@ @
2	7.25	0.435	0.427	2	-	-	-	-	-	-	--
2	7.75	0.465	0.442	2	-	-	-	-	-	-	--
2	8.25	0.495	0.456	2	-	-	-	-	-	-	--
2	8.75	0.525	0.470	2	-	-	-	-	-	-	--
2	9.25	0.555	0.485	2	-	-	-	-	-	-	--
2	9.75	0.585	0.499	2	-	-	-	-	-	-	--
3	10.25	0.615	0.514	2	24	1.358	3.6	0.042	0.979	0.244	0.17
3	10.75	0.645	0.528	2	24	1.358	3.6	0.042	0.978	0.249	0.17
3	11.25	0.675	0.542	2	24	1.358	3.6	0.042	0.977	0.253	0.17
3	11.75	0.705	0.557	2	24	1.358	3.6	0.042	0.976	0.257	0.17
3	12.25	0.735	0.571	2	24	1.358	3.6	0.042	0.975	0.261	0.16
3	12.75	0.765	0.586	2	24	1.358	3.6	0.042	0.974	0.265	0.16
3	13.25	0.795	0.600	2	24	1.358	3.6	0.042	0.972	0.268	0.16
3	13.75	0.825	0.614	2	24	1.358	3.6	0.042	0.971	0.271	0.16
3	14.25	0.855	0.629	2	24	1.358	3.6	0.042	0.970	0.274	0.15
3	14.75	0.885	0.643	2	24	1.358	3.6	0.042	0.969	0.277	0.15
4	15.25	0.915	0.658	10	51	1.236	16.4	0.193	0.968	0.280	0.69
4	15.75	0.945	0.672	10	51	1.236	16.4	0.193	0.967	0.283	0.68

4	16.25	0.975	0.686	10	51	1.236	16.4	0.193	0.966	0.285	0.68
4	16.75	1.005	0.701	10	51	1.236	16.4	0.193	0.965	0.288	0.67
4	17.25	1.035	0.715	10	51	1.236	16.4	0.193	0.964	0.290	0.66
4	17.75	1.065	0.730	10	51	1.236	16.4	0.193	0.963	0.292	0.66
4	18.25	1.095	0.744	10	51	1.236	16.4	0.193	0.961	0.294	0.66
4	18.75	1.125	0.758	10	51	1.236	16.4	0.193	0.960	0.296	0.65
4	19.25	1.155	0.773	10	51	1.236	16.4	0.193	0.959	0.298	0.65
4	19.75	1.185	0.787	10	51	1.236	16.4	0.193	0.958	0.300	0.64
5	20.25	1.215	0.802	15	60	1.119	22.3	0.265	0.957	0.302	0.88
5	20.75	1.245	0.816	15	60	1.119	22.3	0.265	0.955	0.303	0.88
5	21.25	1.275	0.830	15	60	1.119	22.3	0.265	0.954	0.305	0.87
5	21.75	1.305	0.845	15	60	1.119	22.3	0.265	0.952	0.306	0.87
5	22.25	1.335	0.859	15	60	1.119	22.3	0.265	0.951	0.307	0.86
5	22.75	1.365	0.874	15	60	1.119	22.3	0.265	0.949	0.308	0.86

Seed and Others [1985] Method

PAGE 2

SOIL NO.	CALC. DEPTH (ft)	TOTAL STRESS (tsf)	EFF. STRESS (tsf)	FIELD N (B/ft)	Est.D (%)	r	C	CORR. (N1)60 (B/ft)	LIQUE. STRESS RATIO	INDUC. STRESS d	LIQUE. SAFETY FACTOR
5	23.25	1.395	0.888	15	60	1.119	22.3	0.265	0.947	0.310	0.86
5	23.75	1.425	0.902	15	60	1.119	22.3	0.265	0.946	0.311	0.85
5	24.25	1.455	0.917	15	60	1.119	22.3	0.265	0.944	0.312	0.85
5	24.75	1.485	0.931	15	60	1.119	22.3	0.265	0.943	0.313	0.85
6	25.25	1.515	0.946	29	79	0.973	37.5	Infin	0.941	0.314	Infin
6	25.75	1.545	0.960	29	79	0.973	37.5	Infin	0.939	0.314	Infin
6	26.25	1.575	0.974	29	79	0.973	37.5	Infin	0.937	0.315	Infin
6	26.75	1.605	0.989	29	79	0.973	37.5	Infin	0.934	0.315	Infin
6	27.25	1.635	1.003	29	79	0.973	37.5	Infin	0.932	0.316	Infin
6	27.75	1.665	1.018	29	79	0.973	37.5	Infin	0.930	0.317	Infin
6	28.25	1.695	1.032	29	79	0.973	37.5	Infin	0.928	0.317	Infin
6	28.75	1.725	1.046	29	79	0.973	37.5	Infin	0.926	0.317	Infin
6	29.25	1.755	1.061	29	79	0.973	37.5	Infin	0.923	0.318	Infin
6	29.75	1.785	1.075	29	79	0.973	37.5	Infin	0.921	0.318	Infin
7	30.25	1.815	1.090	24	71	0.968	30.9	Infin	0.919	0.318	Infin
7	30.75	1.845	1.104	24	71	0.968	30.9	Infin	0.916	0.318	Infin
7	31.25	1.875	1.118	24	71	0.968	30.9	Infin	0.913	0.318	Infin
7	31.75	1.905	1.133	24	71	0.968	30.9	Infin	0.910	0.318	Infin
7	32.25	1.935	1.147	24	71	0.968	30.9	Infin	0.907	0.318	Infin
7	32.75	1.965	1.162	24	71	0.968	30.9	Infin	0.904	0.318	Infin
7	33.25	1.995	1.176	24	71	0.968	30.9	Infin	0.902	0.318	Infin
7	33.75	2.025	1.190	24	71	0.968	30.9	Infin	0.899	0.318	Infin
7	34.25	2.055	1.205	24	71	0.968	30.9	Infin	0.896	0.318	Infin
7	34.75	2.085	1.219	24	71	0.968	30.9	Infin	0.893	0.318	Infin
8	35.25	2.115	1.234	14	53	0.902	16.8	0.195	0.890	0.317	0.61
8	35.75	2.145	1.248	14	53	0.902	16.8	0.195	0.886	0.317	0.62
8	36.25	2.175	1.262	14	53	0.902	16.8	0.195	0.882	0.316	0.62
8	36.75	2.205	1.277	14	53	0.902	16.8	0.194	0.878	0.315	0.62
8	37.25	2.235	1.291	14	53	0.902	16.8	0.194	0.874	0.315	0.62
8	37.75	2.265	1.306	14	53	0.902	16.8	0.194	0.870	0.314	0.62

8	38.25	2.295	1.320	14	53	0.902	16.8	0.194	0.866	0.313	0.62
8	38.75	2.325	1.334	14	53	0.902	16.8	0.194	0.862	0.313	0.62
8	39.25	2.355	1.349	14	53	0.902	16.8	0.194	0.858	0.312	0.62
8	39.75	2.385	1.363	14	53	0.902	16.8	0.194	0.855	0.311	0.62
9	40.25	2.415	1.378	69	114	0.878	80.6	Infin	0.850	0.310	Infin
9	40.75	2.445	1.392	69	114	0.878	80.6	Infin	0.845	0.309	Infin
9	41.25	2.475	1.406	69	114	0.878	80.6	Infin	0.840	0.308	Infin
9	41.75	2.505	1.421	69	114	0.878	80.6	Infin	0.836	0.306	Infin
9	42.25	2.535	1.435	69	114	0.878	80.6	Infin	0.831	0.305	Infin
9	42.75	2.565	1.450	69	114	0.878	80.6	Infin	0.826	0.304	Infin
9	43.25	2.595	1.464	69	114	0.878	80.6	Infin	0.821	0.303	Infin
9	43.75	2.625	1.478	69	114	0.878	80.6	Infin	0.816	0.301	Infin
9	44.25	2.655	1.493	69	114	0.878	80.6	Infin	0.811	0.300	Infin
9	44.75	2.685	1.507	69	114	0.878	80.6	Infin	0.806	0.299	Infin
10	45.25	2.715	1.522	49	94	0.843	54.9	Infin	0.801	0.297	Infin
10	45.75	2.745	1.536	49	94	0.843	54.9	Infin	0.796	0.296	Infin
10	46.25	2.775	1.550	49	94	0.843	54.9	Infin	0.791	0.295	Infin
10	46.75	2.805	1.565	49	94	0.843	54.9	Infin	0.786	0.293	Infin
10	47.25	2.835	1.579	49	94	0.843	54.9	Infin	0.781	0.292	Infin
10	47.75	2.865	1.594	49	94	0.843	54.9	Infin	0.776	0.290	Infin
10	48.25	2.895	1.608	49	94	0.843	54.9	Infin	0.771	0.289	Infin
10	48.75	2.925	1.622	49	94	0.843	54.9	Infin	0.765	0.287	Infin
10	49.25	2.955	1.637	49	94	0.843	54.9	Infin	0.760	0.286	Infin

Seed and Others [1985] Method

PAGE 3

SOIL NO.	CALC. DEPTH (ft)	TOTAL STRESS (tsf)	EFF. STRESS (tsf)	FIELD N (B/ft)	Est.D (%)	r	C	CORR. (N1)60 (B/ft)	LIQUE. STRESS RATIO	INDUC. STRESS d	LIQUE. SAFETY FACTOR
10	49.75	2.985	1.651	49	94	0.843	54.9	Infin	0.755	0.284	Infin

Consolidation Parameters For Undisturbed Samples - TW Homes/Banning Lowland

Soil Type	Bore hole	Depth (ft)	C _{ce}	C _{re}	Average C _a	Average C _v (ft ² /day)	P _c (psf)
CL	B-3	5.0	0.129	0.032	0.0035	0.080	3100
CL	B-4	2.0	0.157	0.027	0.0033	0.074	2000
CL	B-6	5.0	0.107	0.020	0.0029	0.210	2600
AVERAGE:			0.131	0.026	0.00323	0.121	2567

TABLE 1: ESTIMATED SETTLEMENT OF A 10 ft. THICK SILTY CLAY LAYER (In case of 5 ft. removal)

Unit Weight of Compacted Fill =	125 pcf	C _{ce} =	0.131
Height of Compacted Fill =	20 ft	C _{re} =	0.026
Unit Weight of Silty Clay Deposi	120 pcf		

Layer No.	Layer thickness H (ft)	In-situ Normal Stress (psf)	Stress Increment (psf)	P _o (psf)	Total Stress (psf)	NC or OC	Layer Settlement (in)
1	1	60	2500	2567	2560	OC	0.5
2	1	180	2500	2567	2680	NC	0.4
3	1	300	2500	2567	2800	NC	0.4
4	1	420	2500	2567	2920	NC	0.3
5	1	540	2500	2567	3040	NC	0.3
6	1	660	2500	2567	3160	NC	0.3
7	1	780	2500	2567	3280	NC	0.3
8	1	900	2500	2567	3400	NC	0.3
9	1	1020	2500	2567	3520	NC	0.3
10	1	1140	2500	2567	3640	NC	0.3
Total Settlement =							3.59

TABLE 2: ESTIMATED SETTLEMENT OF A 15 ft. THICK SILTY CLAY LAYER

Unit Weight of Compacted Fill =	125 pcf	C _{ce} =	0.131
Height of Compacted Fill =	15 ft	C _{re} =	0.026
Unit Weight of Silty Clay Deposi	120 pcf		

Layer No.	Layer thickness H (ft)	In-situ Normal Stress (psf)	Stress Increment (psf)	P' _c (psf)	Total Stress (psf)	NC or OC	Layer Settlement (in)
1	1	60	1875	2567	1935	OC	0.5
2	1	180	1875	2567	2055	OC	0.3
3	1	300	1875	2567	2175	OC	0.3
4	1	420	1875	2567	2295	OC	0.2
5	1	540	1875	2567	2415	OC	0.2
6	1	660	1875	2567	2535	OC	0.2
7	1	780	1875	2567	2655	NC	0.2
8	1	900	1875	2567	2775	NC	0.2
9	1	1020	1875	2567	2895	NC	0.2
10	1	1140	1875	2567	3015	NC	0.2
11	1	1260	1875	2567	3135	NC	0.2
12	1	1380	1875	2567	3255	NC	0.2
13	1	1500	1875	2567	3375	NC	0.3
14	1	1620	1875	2567	3495	NC	0.3
15	1	1740	1875	2567	3615	NC	0.3
Total Settlement =							3.79

EVALUATION OF POST-CONSTRUCTION SETTLEMENT

1	2	3	4	5	6	7	8	9	10	11	12	13
Layer Thickness H, (ft)	Drainage Path Length (ft)	Cv (ft ² /day)	t98 field (days)	Construction Period, tc (days)	Total Settlement (in)	Secondary Settlement (in)	Tv till the End of Construction	U (%) till the End of Construction	Remaining settlement at end of construction (in)	Tv at time tg	1-U at time tg (%)	Remain. settlement at time tg (in)
10	5	0.121	77.48	20	3.59	0.83	0.10	35.1	2.6	1.84	0.87	0.6
15	7.5	0.121	174.33	15	3.79	1.04	0.03	20.3	3.2	0.81	11.07	1.3

- NOTES:**
1. Assumed rate of fill placement = 1 ft/day
 2. Secondary Compression Ratio, Ca = 0.0032
 3. Time for completion of total settlement, t = 30 years (including secondary)
 4. Time since completion of Grading, tg = 360 days
 5. U = degree of consolidation (%), and Tv = time factor

EXPLANATION FOR COLUMNS 4 THROUGH 13

COLUMN NO:

- 4 Time (tp) for 98% of primary consolidation to be over, from equation $tp = Tv \cdot H^2 / Cv$, with $Tv = 1.5$
- 5 Construction period (tc) at the assumed filling rate.
- 6 Total settlement estimated in Tables 1 and 2, respectively.
- 7 Secondary settlement evaluated from equation $Ca \cdot H \cdot 100 \cdot \log(t/tp)$, where tp is time(days) for 98% of primary consolidation in column 4, H is the layer thickness.
- 8 Time factor Tv considered at the end of construction based on $Tv = Cv \cdot tc / (H^2 / 2)$, where tc is time taken for construction (column 5).
- 9 Degree of primary consolidation from equation $U = (4 \cdot Tv^2 / \pi^2)$ for $Tv < 0.287$ and $U = 100 - 10^{\{(1.781 - Tv) / 0.933\}}$ for $Tv > 0.287$
- 10 Remaining settlement at end of construction, from equation $[(\text{column } 9) \cdot (\text{column } 6 - \text{column } 7) / 100 + \text{column } 7]$ when (column 9) < 98% and from equation $[\text{column } 7 - Ca \cdot H \cdot 100 \cdot \log(tc/tp)]$ when (column 9) > 98%.
- 11 Time factor Tv for the fill thickness considered at end of construction based on $Tv = Cv \cdot (tc + t) / H^2$, where tc is time taken for construction (column 5).
- 12 Remaining primary consolidation, $(1-U)$ where U is the Degree of consolidation from equation $U = (4 \cdot (\text{column } 11)^2 / \pi^2)$ for (column 11) < 0.287 and $U = 100 - 10^{\{(1.781 - (\text{column } 11)) / 0.933\}}$ for (column 11) > 0.287
- 13 Remaining settlement at time (t+tc), from equation $[(\text{column } 12) \cdot (\text{column } 6 - \text{column } 7) / 100 + \text{column } 7]$ when column 12 > 2, and from equation $[\text{column } 7 - Ca \cdot H \cdot 100 \cdot \log((tc + t) / tp)]$ when column 12 < 2.

SUMMARY TABLE OF REMAINING SETTLEMENT

tg * (days)	Remaining Settlement (in)	
	10 ft. Layer	15 ft. Layer
30	2.1	2.8
60	1.7	2.5
90	1.4	2.3
120	1.2	2.1
150	1.1	2.0
180	1.0	1.8
210	1.0	1.7
240	0.9	1.6
270	0.9	1.5
300	0.6	1.5
330	0.6	1.4
360	0.6	1.3

* Time since completion of grading