SUPPLEMENTAL GEOTECHNICAL EVALUATION NRG EL SEGUNDO POWER REDEVELOPMENT EL SEGUNDO, CALIFORNIA

PREPARED FOR:
Shaw Stone & Webster Engineering Consultant
9201 East Drycreek Road
Centennial, Colorado 80112

PREPARED BY:
Ninyo & Moore
Geotechnical and Environmental Sciences Consultants
475 Goddard, Suite 200
Irvine, California 92618

April 6, 2007
Project No. 206954002

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Mr. James Meisenheimer
Shaw Stone & Webster Engineering Consultants
9201 East Drycreek Road
Centennial, Colorado 80112

Subject: Supplemental Geotechnical Evaluation
NRG El Segundo Power Redevelopment
El Segundo, California

Dear Mr. Meisenheimer:

In accordance with your authorization, Ninyo & Moore has performed a supplemental geotechnical evaluation of the stability of the existing slope along the east side of Units 1 and 2 of the NRG El Segundo Power Plant located at 301 Vista del Mar in El Segundo, California. The purpose of this study was to perform a geologic evaluation and assess the slope stability, as required by the California Energy Commission (CEC) for their approval of the redevelopment project. This report presents our findings, conclusions, and recommendations regarding the slope located to the east of Units 1 and 2.

We appreciate the opportunity to be of service on this project.

Sincerely,
NINYO & MOORE

Original Document Signed By:

Soumitra Guha, Ph.D., G.E.
Principal Engineer

Original Document Signed By:

Carol A. Price, C.E.G.
Principal Geologist

MKM/SG/CAP/emp

Distribution: (3) Addressee

TABLE OF CONTENTS

Page

1. INTRODUCTION

In accordance with your request and authorization, we have performed a supplemental geotechnical evaluation of the soil and geologic conditions along the easterly slope of the existing NRG El Segundo Power Plant in El Segundo, California (Figure 1). We previously performed a limited geotechnical evaluation for the proposed redevelopment of Units 1 and 2 at the NRG El Segundo facility (Ninyo & Moore, 2006). The purpose of this evaluation was to assess the stability of the existing slope located along the east side of the redevelopment site for Units 1 and 2. This slope stability analysis has been performed in general compliance with Conditions of Certification GEO-3 presented in the California Energy Commission (CEC) Decision for El Segundo Power Redevelopment Project, Application for Certification (00-AFC-14) dated February 2005. This report presents our geotechnical findings, conclusions, and recommendations regarding the easterly slope.

2. SCOPE OF SERVICES

Geotechnical services during this evaluation were provided in general accordance with our proposal dated January 23, 2007 (Ninyo & Moore, 2007), and included the following:

- Project coordination and review of readily available background materials, including geologic and topographic maps, published literature, stereoscopic aerial photographs, in-house information, and Cone Penetration Testing (CPT) data obtained from our previous study for the redevelopment project (Ninyo & Moore, 2006).
- Acquisition of an excavation permit from the City of El Segundo for our exploratory borings within the Vista del Mar right-of-way.
- Performance of a site reconnaissance to mark the proposed boring locations and to coordinate with Underground Service Alert (USA) for utility clearance.
- Subsurface exploration consisting of the drilling, sampling, and logging of two small-diameter, hollow-stem auger borings to depths of up to approximately 76 feet below the paved surface along Vista del Mar.
- Laboratory testing of representative soil samples to evaluate in-place moisture content and dry density, percent of particles finer than the No. 200 sieve, and direct shear strength.
- Data compilation and geotechnical analysis of the field and laboratory data, including analyses to evaluate the stability of the existing slope.

- Preparation of this report presenting our geotechnical findings, conclusions, and recommendations regarding the stability of the subject slope.

3. SITE DESCRIPTION

The site for the proposed project is located within the existing NRG El Segundo Power Plant at 301 Vista Del Mar in El Segundo, California (Figure 1). The slope is located along the east side of the redevelopment site for Units 1 and 2 and ascends approximately 50 to 60 feet to Vista del Mar at inclinations ranging from approximately 1¾:1 to 2:1 (horizontal to vertical). Vista del Mar is a four-lane roadway that extends in the north-south direction at elevations ranging from approximately 74 to 90 feet above mean low level water (MLLW). Units 1 and 2 (currently decommissioned) are situated at the base of the slope on relatively level terrain near the southern end of El Segundo Beach, at an elevation of approximately 19½ feet above MLLW.

4. SUBSURFACE EVALUATION AND LABORATORY TESTING

Our subsurface exploration at the subject site was performed on February 13, 2007, and consisted of the drilling, logging, and sampling of two small-diameter borings. The approximate locations of the exploratory borings are shown on Figure 2. The borings were drilled to depths of up to approximately 76 feet below the pavement surface on Vista del Mar and were logged by a representative from our firm. Bulk and relatively undisturbed soil samples were obtained at selected depths for laboratory testing. The logs of the exploratory borings are presented in Appendix A.

Laboratory testing of representative soil samples was performed to evaluate in-situ moisture content and dry density, percent of particles finer than the No. 200 sieve, and direct shear strength. The results of our in-situ moisture content and dry density evaluation are presented on the boring logs in Appendix A. The remaining laboratory testing results are presented in Appendix B.

5. GEOLOGY AND SUBSURFACE CONDITIONS

5.1. Regional Geology

The site for the proposed improvements is located within the Los Angeles Basin, which is bounded on the north by the Transverse Ranges geomorphic province (Norris and Webb, 1990). The Los Angeles Basin has been divided into four blocks, which are generally separated by prominent fault systems: the northwestern block, the southwestern block, the central block, and the northeastern block. The project area is located within the southwestern block, which is bounded on the east by the onshore segment of the Newport-Inglewood fault zone. The southwestern block includes anticlinal and synclinal structural features within the basement rocks that are overlain by younger sedimentary rocks and alluvium.

The Los Angeles Basin is traversed by several major active faults. The Palos Verdes and Newport-Inglewood fault zones are major active faults within the southwestern block of the Los Angeles Basin. Our review of geologic literature indicates that a segment of the Palos Verdes fault is located about 3 miles southwest of the site. The on-shore segment of the Newport-Inglewood fault is located approximately 6 miles northeast of the site.

5.2. Site Geology

Based on our review of stereoscopic aerial photographs and pertinent geologic maps, the site is underlain by Holocene-age alluvial and dune deposits consisting of silty sand and sand. The subsurface materials encountered in our borings consisted of eolian deposits (underlying the asphalt concrete pavement section) consisting of medium dense to very dense, poorly graded sand to silty sand to depths of approximately 30 feet in boring B-1 and approximately 25 feet in boring B-2. The eolian deposits are underlain by older alluvium to the explored depths of up to about 76 feet. The older alluvium generally consisted of dense to very dense, poorly graded sand to silty sand. Detailed descriptions are presented on the boring logs in Appendix A.

6. GROUNDWATER

Groundwater was encountered in boring B-2 at a depth of approximately 73 feet below the ground surface. Groundwater was not encountered in boring B-1. Fluctuations in groundwater levels may, however, occur due to tidal fluctuations, variations in precipitation, ground surface topography, subsurface stratification, local irrigation, and other factors which may not have been evident at the time of our field evaluation.

7. FAULTING AND SEISMICITY

Based on our review of referenced geologic maps and stereoscopic aerial photographs, the ground surface in the vicinity of the subject site is not mapped as being transected by any known active or potentially active fault; therefore, the potential for surface fault rupture is considered to be low. The site is not located within a State of California Earthquake Fault Zone (Alquist-Priolo Special Studies Zone, Hart and Bryant, 1997). However, the subject site is located in a seismically active area, as is the majority of southern California, and the potential for strong ground motion at the site is considered significant. The nearest known active fault is the Palos Verdes fault located approximately 3 miles southwest of the site.

Table 1 lists selected principal known active faults that may affect the subject site, the maximum moment magnitude (M_{max}) as published for the California Geological Survey (CGS) by Cao, et al. (2003), and the type of fault as defined in Table 16A-U of the California Building Code (CBC, 2001). The approximate fault to site distances were calculated by the computer program FRISKSP developed by Blake (2001).

Table 1 – Principal Active Faults

Fault	Approximate Fault to Site Distance in miles (km)	Maximum Moment Magnitude[1] (M_{max})	Fault Type[2]
Palos Verdes	3.2 (5.1)	7.3	B
Newport-Inglewood (Los Angeles Basin)	6.2 (10.0)	7.1	B
Santa Monica	9.5 (15.3)	6.6	B
Malibu Coast	10.6 (17.1)	6.7	B
Hollywood	12.3 (19.8)	6.4	B
Puente Hills Blind Thrust	12.6 (20.3)	7.1	B
Northridge	17.0 (27.3)	7.0	B
Verdugo	20.4 (32.9)	6.9	B
Sierra Madre	24.9 (40.1)	7.2	B
San Andreas – 1857 Rupture	47.8 (76.9)	7.4	A

Notes:
[1] Cao et al. 2003.
[2] CBC, 2001; Cao et al., 2003.

The principal seismic hazards at the subject site are surface ground rupture and ground shaking. A brief description of these hazards and the potential for their occurrences on site are discussed in the following sections.

7.1. Ground Rupture

The probability of damage from surface ground rupture is low due to the lack of known active faults directly underlying the subject site or its vicinity. Surface ground cracking related to shaking from distant events is not considered a significant hazard, although it is a possibility.

7.2. Ground Shaking

Our evaluation of the ground shaking hazard included review of a probabilistic seismic hazard assessment that consisted of statewide estimates of peak horizontal ground accelerations conducted for California (Peterson, et al., 1996). In addition, for the purposes of evaluating seismically induced geotechnical hazards at the site, a site-specific probabilistic seismic hazard analysis was performed to evaluate anticipated peak ground accelerations (PGAs) using the computer program FRISKSP developed by Blake (2001). A probabilistic analysis incorporates uncertainties in time, recurrence intervals, size, and location (along faults) of hypothetical earthquakes. This method thus accounts for likelihood (rather than certainty) of occurrence and provides levels of ground acceleration that might be more reasonably hypothesized for a finite exposure period. FRISKSP calculates the probability of occurrence of various ground accelerations at a site over a period of time and the probability of exceeding expected ground accelerations within the lifetime of the proposed structures from the significant earthquakes within a specific radius of search. For the present case, a search radius of 62 miles (i.e., 100 kilometers) was selected. The earthquake magnitudes used in this program are based on the current CGS fault model.

The published guidelines of CGS (2004) define a PGA with a 10 percent probability of exceedance in 50 years as the Design Basis Earthquake (PGA_{DBE}) ground motion, and this value is typically used for residential, commercial, and industrial structures. The PGA with a 10 percent probability of exceedance in 100 years is defined as the Upper Bound Earthquake (PGA_{UBE}) ground motion and is used for public schools, hospitals, and other essential facilities in California. The statistical return periods for the PGA_{DBE} and PGA_{UBE} are approximately 475 and 949 years, respectively.

In evaluating the seismic hazards associated with the subject site, we have considered a PGA that has a 10 percent probability of being exceeded in 50 years (i.e., PGA_{DBE}) and used an attenuation relation proposed by Boore, et al. (1997), for soil Type D (with an average shear wave velocity of 820 feet or 250 meters per second). The PGA_{DBE} for the site was calculated as 0.37g when weighted to an earthquake magnitude of 7.5.

8. SLOPE STABILITY

In order to evaluate the global stability of the easterly ascending slope, we prepared a representative cross section of the slope (Cross Section A-A’) using the ground elevation contours depicted on a site plan prepared by Brinderson (Brinderson, 2006). The approximate location of the cross section is shown on Figure 2. The slope profile and the geologic units pertinent to Cross Section A-A’ are presented on Figure 3. The intent of our global stability analyses was to evaluate the potential for rotational (Modified Bishop) failures through the existing slope. A two-dimensional stability analysis program, GSTABL7 (Gregory, 2003), was used for this purpose. The design factors of safety under static and pseudo-static loading conditions were 1.5 and 1.1, respectively, following accepted geotechnical practices and agency guidelines. A horizontal acceleration coefficient of 0.15g was used to evaluate the pseudo-static stability.

The eolian deposits and older alluvium were assigned homogeneous, isotropic strength properties derived from laboratory direct shear tests performed on relatively undisturbed samples retrieved from our exploratory borings. Ultimate shear strength values were used for evaluating stability under both static and pseudo-static loading conditions. The design shear strength parameters used in our stability analysis are summarized in Table 2.

Table 2 – Strength Parameters Used in Slope Stability Evaluation

Earth Material	**Ultimate Shear Strength**	
	Cohesion, c (psf)	**Friction Angle, φ (degree)**
Eolian Deposits	50	30
Older Alluvium	250	32
Note: psf – pounds per square foot		

The results of our global stability evaluation indicate that the static and pseudo-static factors of safety of the subject slope are adequate in its current configuration. The GSTABL7 outputs are presented in Appendix C.

9. CONCLUSIONS AND RECOMMENDATIONS

The purpose of our geotechnical evaluation was to provide an opinion regarding the stability of the existing slope located along the east side of the redevelopment site for Units 1 and 2. Our evaluation indicates that, from a geotechnical standpoint, the static and pseudo-static stability conditions of the slope are satisfactory. The eolian deposits that constitute the upper approximately 30 feet of the slope, however, may be subject to surficial instability if not adequately maintained. The slope face should be kept vegetated to reduce the likelihood of sloughing and surficial failure. If surficial failures are observed on the slope, corrective measures should be taken to stabilize the slope and protect the various improvements located at the base of the slope.

10. LIMITATIONS

The field evaluation and geotechnical analyses presented in this geotechnical report have been conducted in general accordance with current practice and the standard of care exercised by geotechnical consultants performing similar tasks in the project area. No warranty, expressed or implied, is made regarding the conclusions, recommendations, and opinions presented in this report. There is no evaluation detailed enough to reveal every subsurface condition. Variations may exist and conditions not observed or described in this report may be encountered during construction. Uncertainties relative to subsurface conditions can be reduced through additional subsurface exploration. Additional subsurface evaluation will be performed upon request.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Ninyo & Moore should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document.

Our conclusions, recommendations, and opinions are based on an analysis of the observed site conditions. If geotechnical conditions different from those described in this report are encountered, our office should be notified and additional recommendations, if warranted, will be provided upon request. It should be understood that the conditions of a site can change with time as a result of natural processes or the activities of man at the subject site or nearby sites. In addition, changes to the applicable laws, regulations, codes, and standards of practice may occur due to government action or the broadening of knowledge. The findings of this report may, therefore, be invalidated over time, in part or in whole, by changes over which Ninyo & Moore has no control.

This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

11. SELECTED REFERENCES

Blake, T.F., 2001, FRISKSP (Version 4.00) A Computer Program for the Probabilistic Estimation of Peak Acceleration and Uniform Hazard Spectra Using 3-D Faults as Earthquake Sources.

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California Department of Conservation, Division of Mines and Geology, 1998, Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada: International Conference of Building Officials, dated February.

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California Geological Survey (CGS), 2004, Checklist for the Review of Engineering Geology and Seismology Reports for California Public Schools, Hospitals, and Essential Services Buildings: Note 48, dated January 1.

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City of Los Angeles, 1996, Safety Element of the Los Angeles City General Plan, adopted November 26.

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Peterson, M.D., Bryant, W.A., Cramer, C.H., Cao, T., Reichle, M.S., Frankel, A.D., Lienkaemper, J.J., McCrory, P.A., and Schwartz, D.P., 1996, Probabilistic Seismic Hazard Assessment for the State of California: California Department of Conservation, Division of Mines and Geology Open File Report 96-08.

United States Geological Survey, 1964 (Photorevised 1981), Venice, California Quadrangle Map, 7.5 Minute Series: Scale 1:24,000.

AERIAL PHOTOGRAPHS				
Source	**Scale**	**Date**	**Flight**	**Numbers**
USDA	1:20,000	11-19-53	AXJ-14K	73 and 74

REFERENCE: 2007 THOMAS GUIDE FOR LOS ANGELES/ORANGE COUNTIES, STREET GUIDE AND DIRECTORY

0 2400 4800

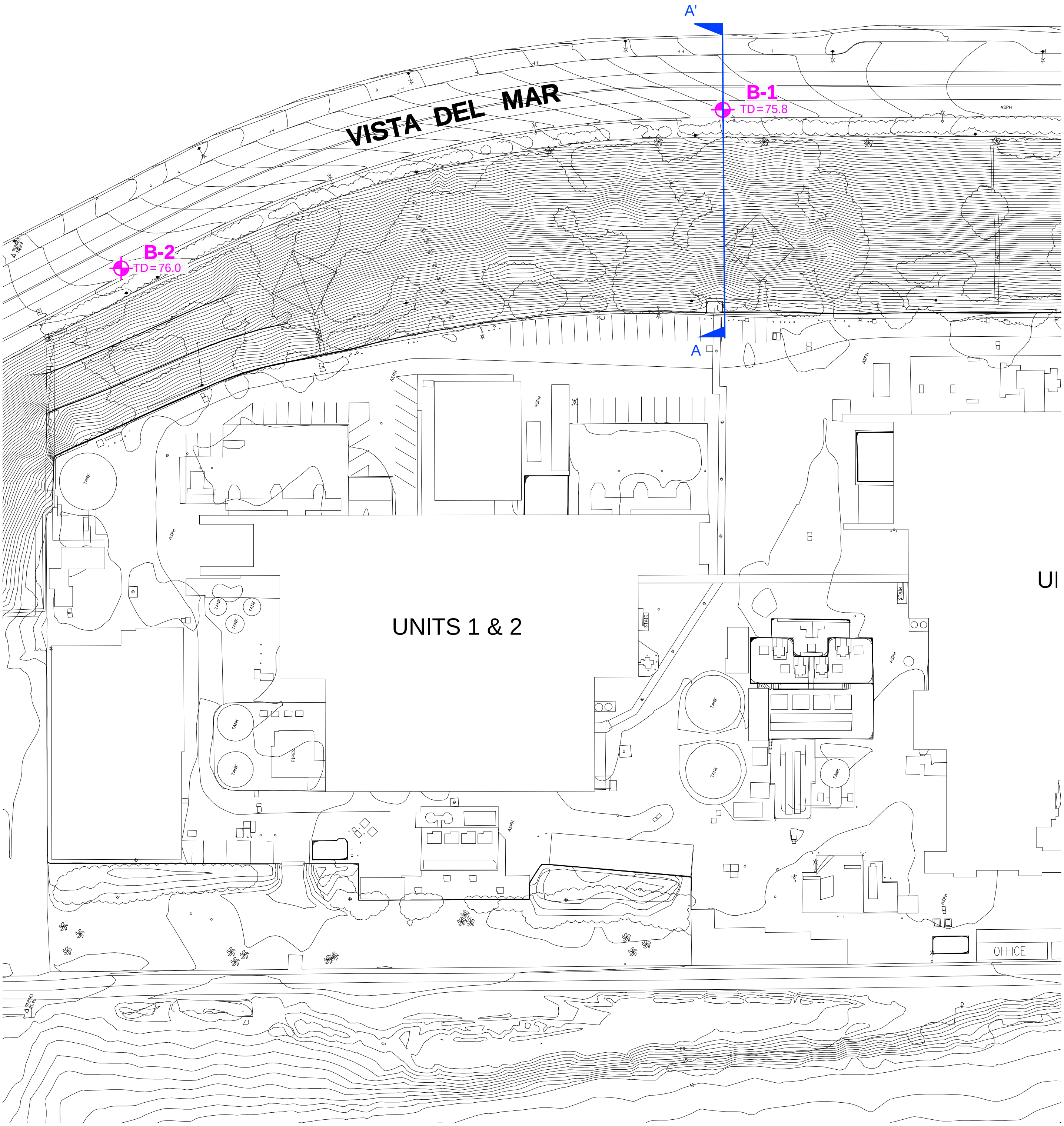
APPROXIMATE SCALE IN FEET

N

206954-A1.DWG

NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

Ninyo & Moore		SITE LOCATION MAP	FIGURE
PROJECT NO.	DATE	NRG EL SEGUNDO POWER REDEVELOPMENT EL SEGUNDO, CALIFORNIA	1
206954002	4/07		



REFERENCE: BRINDERSON, 2006, NRG-EL SEGUNDO PROPOSED SITE PLAN, DATED OCTOBER 9.

APPROXIMATE SCALE IN FEET

0 100 200

NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

N

LEGEND

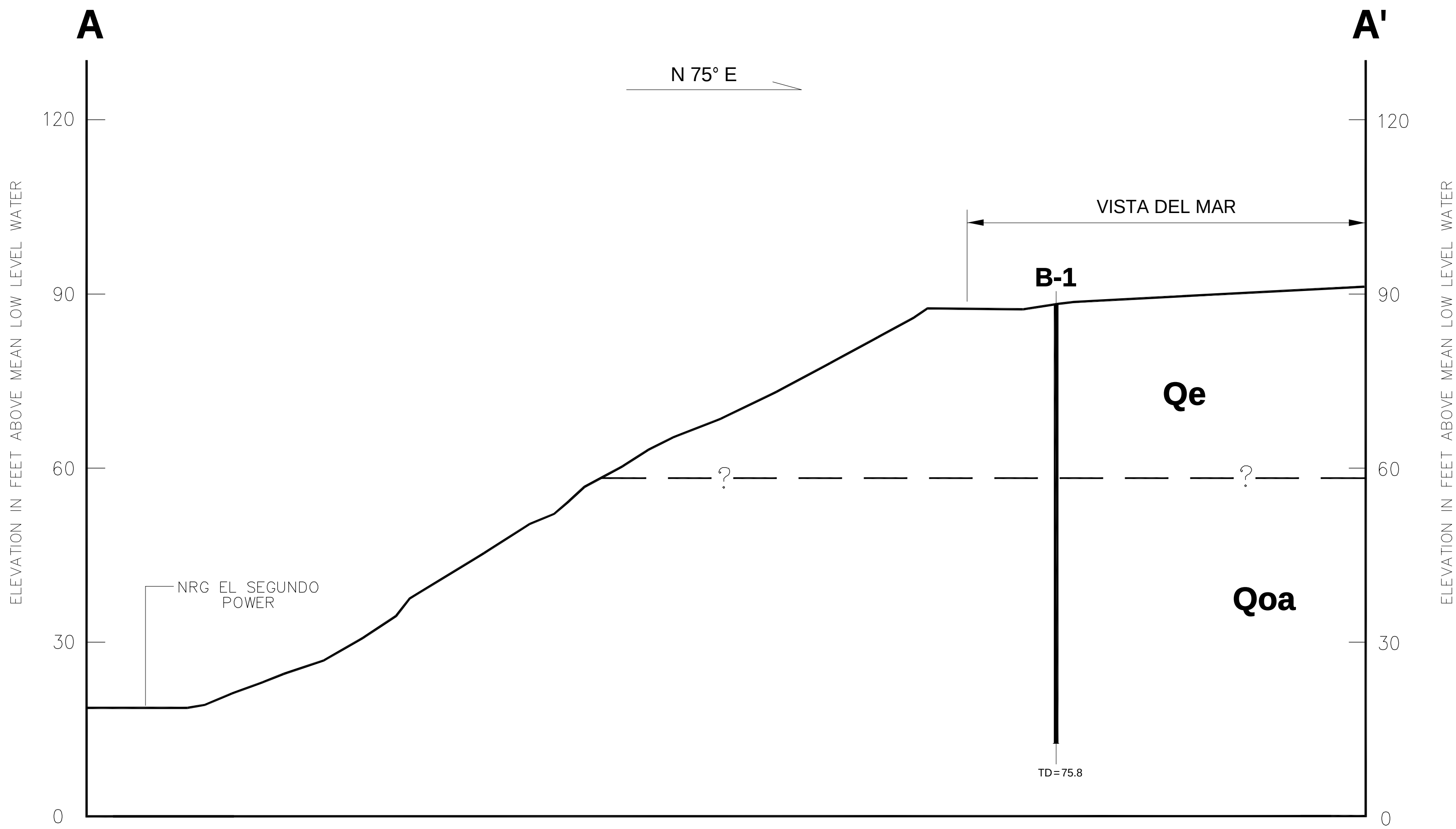
B-2 TD=76.0 — APPROXIMATE LOCATION OF EXPLORATORY BORING FOR CONDENSATE TANKS
TD=TOTAL DEPTH IN FEET

A A' — APPROXIMATE LOCATION OF CROSS SECTION

206954-A3.DWG

Ninyo & Moore

PROJECT NO.	DATE	BORING LOCATION MAP	FIGURE
206954002	4/07	NRG EL SEGUNDO POWER REDEVELOPMENT EL SEGUNDO, CALIFORNIA	2



LEGEND

(solid line)	GROUND SURFACE	**B-1** TD=75.8	APPROXIMATE LOCATION OF EXPLORATORY BORING; TD=TOTAL DEPTH IN FEET
— — —?—	APPROXIMATE GEOLOGIC CONTACT; QUERIED WHERE INFERRED		
Qe	EOLIAN DEPOSITS		
Qoa	OLDER ALLUVIUM		

APPROXIMATE SCALE IN FEET

0 30 60

NOTE: ALL DIMENSIONS, DIRECTIONS AND LOCATIONS ARE APPROXIMATE.

206954-A2.DWG

Ninyo & Moore		CROSS SECTION A-A'	FIGURE
PROJECT NO.	DATE	NRG EL SEGUNDO POWER REDEVELOPMENT EL SEGUNDO, CALIFORNIA	3
206954002	4/07		

APPENDIX A

BORING LOGS

Field Procedure for the Collection of Disturbed Samples

Disturbed soil samples were obtained in the field using the following method.

Bulk Samples

Bulk samples of representative earth materials were obtained from the exploratory borings. The samples were bagged and transported to the laboratory for testing.

Field Procedure for the Collection of Relatively Undisturbed Samples

Relatively undisturbed soil samples were obtained in the field using the following method.

The Modified Split-Barrel Drive Sampler

The sampler, with an external diameter of 3 inches, was lined with 1-inch-long, thin brass rings with inside diameters of approximately 2.4 inches. The sampler barrel was driven into the ground with the weight of a hammer or the kelly bar of the drill rig in general accordance with American Society for Testing and Materials (ASTM) D 3550-01. The driving weight was permitted to fall freely. The approximate length of the fall, the weight of the bar, and the number of blows per foot of driving are presented on the boring log as an index to the relative resistance of the materials sampled. The samples were removed from the sampler barrel in the brass rings, sealed, and transported to the laboratory for testing.

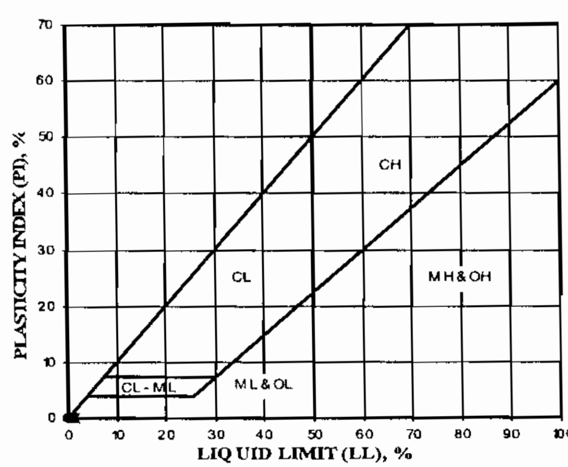
U.S.C.S. METHOD OF SOIL CLASSIFICATION

MAJOR DIVISIONS		SYMBOL	TYPICAL NAMES
COARSE-GRAINED SOILS (More than 1/2 of soil >No. 200 sieve size)	GRAVELS (More than 1/2 of coarse fraction > No. 4 sieve size)	GW	Well graded gravels or gravel-sand mixtures, little or no fines
		GP	Poorly graded gravels or gravel-sand mixtures, little or no fines
		GM	Silty gravels, gravel-sand-silt mixtures
		GC	Clayey gravels, gravel-sand-clay mixtures
	SANDS (More than 1/2 of coarse fraction <No. 4 sieve size)	SW	Well graded sands or gravelly sands, little or no fines
		SP	Poorly graded sands or gravelly sands, little or no fines
		SM	Silty sands, sand-silt mixtures
		SC	Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS (More than 1/2 of soil <No. 200 sieve size)	SILTS & CLAYS Liquid Limit <50	ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean
		OL	Organic silts and organic silty clays of low plasticity
	SILTS & CLAYS Liquid Limit >50	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts
		CH	Inorganic clays of high plasticity, fat clays
		OH	Organic clays of medium to high plasticity, organic silty clays, organic silts
HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils

GRAIN SIZE CHART

CLASSIFICATION	RANGE OF GRAIN SIZE	
	U.S. Standard Sieve Size	Grain Size in Millimeters
BOULDERS	Above 12"	Above 305
COBBLES	12" to 3"	305 to 76.2
GRAVEL Coarse Fine	3" to No. 4 3" to 3/4" 3/4" to No. 4	76.2 to 4.76 76.2 to 19.1 19.1 to 4.76
SAND Coarse Medium Fine	No. 4 to No. 200 No. 4 to No. 10 No. 10 to No. 40 No. 40 to No. 200	4.76 to 0.075 4.76 to 2.00 2.00 to 0.420 0.420 to 0.075
SILT & CLAY	Below No. 200	Below 0.075

PLASTICITY CHART



BORING LOG EXPLANATION SHEET

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	
0								Bulk sample.
								Modified split-barrel drive sampler.
								No recovery with modified split-barrel drive sampler.
								Sample retained by others.
								Standard Penetration Test (SPT).
5								No recovery with a SPT.
			XX/XX					Shelby tube sample. Distance pushed in inches/length of sample recovered in inches.
								No recovery with Shelby tube sampler.
								Continuous Push Sample.
								Seepage.
10								Groundwater encountered during drilling.
								Groundwater measured after drilling.
							SM	ALLUVIUM: Solid line denotes unit change.
								Dashed line denotes material change.
								Attitudes: Strike/Dip b: Bedding c: Contact j: Joint f: Fracture F: Fault cs: Clay Seam s: Shear bss: Basal Slide Surface sf: Shear Fracture sz: Shear Zone sbs: Sheared Bedding Surface
15								
								The total depth line is a solid line that is drawn at the bottom of the boring.
20								

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BORING LOG

EXPLANATION OF BORING LOG SYMBOLS

PROJECT NO.	DATE	FIGURE
	Rev. 01/03	

DATE DRILLED	2/13/07	BORING NO.	B-1			
GROUND ELEVATION	87' ± (MLLW)	SHEET	1	OF	4	
METHOD OF DRILLING	8" Hollow-Stem Auger (Martini Drilling)					
DRIVE WEIGHT	140 lbs. (Auto. Trip Hammer)	DROP	30"			
SAMPLED BY	MKM	LOGGED BY	MKM	REVIEWED BY	SG/CAP	

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0								ASPHALT CONCRETE: Approximately 7 inches thick.
							GP	AGGREGATE BASE: Brown, moist, medium dense, sandy GRAVEL; approximately 5 inches thick.
	X						SP	EOLIAN DEPOSITS: Light brown, damp to moist, medium dense, poorly graded SAND.
5		X	21					
10		X	25					Dark brown.
15		X	29	3.1	102.6			Light brown.
20								

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BORING LOG

NRG El Segundo Power Redevelopment
El Segundo, California

PROJECT NO.	DATE	FIGURE
206954002	4/07	A-1

DATE DRILLED 2/13/07 BORING NO. B-1

GROUND ELEVATION 87' ± (MLLW) SHEET 2 OF 4

METHOD OF DRILLING 8" Hollow-Stem Auger (Martini Drilling)

DRIVE WEIGHT 140 lbs. (Auto. Trip Hammer) DROP 30"

SAMPLED BY MKM LOGGED BY MKM REVIEWED BY SG/CAP

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
20		■	30				SP	EOLIAN DEPOSITS: (Continued) Light brown, moist, medium dense, poorly graded SAND.
							SP-SM	Dark brown, moist, medium dense, poorly graded SAND to silty SAND.
25		■	23					
30		■	66	12.2	109.1		SP-SM	OLDER ALLUVIUM: Dark brown, moist, dense, poorly graded SAND to silty SAND.
35		■	50/4"					Orange brown; very dense.
							SP	Light brown, moist, very dense, poorly graded SAND.
40								

Ninyo & Moore

BORING LOG		
NRG El Segundo Power Redevelopment El Segundo, California		
PROJECT NO.	DATE	FIGURE
206954002	4/07	A-2

DATE DRILLED 2/13/07 BORING NO. B-1

GROUND ELEVATION 87' ± (MLLW) SHEET 3 OF 4

METHOD OF DRILLING 8" Hollow-Stem Auger (Martini Drilling)

DRIVE WEIGHT 140 lbs. (Auto. Trip Hammer) DROP 30"

SAMPLED BY MKM LOGGED BY MKM REVIEWED BY SG/CAP

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
40		■	85/11"				SP	OLDER ALLUVIUM: (Continued) Light brown, moist, very dense, poorly graded SAND.
45		■	63	5.2	97.2			Dense.
50		■	87/10"					Very dense.
55		■	50/5"					Interbedded brown silty sand; few coarse sand to fine gravel.
							SP-SM	Dark brown, moist, very dense, poorly graded SAND to silty coarse SAND.
60								

DATE DRILLED	2/13/07	BORING NO.	B-1
GROUND ELEVATION	87' ± (MLLW)	SHEET 4	OF 4
METHOD OF DRILLING	8" Hollow-Stem Auger (Martini Drilling)		
DRIVE WEIGHT	140 lbs. (Auto. Trip Hammer)	DROP	30"
SAMPLED BY MKM	LOGGED BY MKM	REVIEWED BY	SG/CAP

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
60		■	50/6"				SP-SM	OLDER ALLUVIUM: (Continued) Dark brown, moist, very dense, poorly graded SAND to silty coarse SAND.
65		■	50/6"	3.1	102.2			
							SP	Light brown, moist, very dense, poorly graded SAND.
70		■	50/3"					
75		■	50/4"					Interbedded dark brown silty sand.
								Total Depth = 75.8 feet. No groundwater encountered during drilling. Backfilled with on-site soils on 2/13/07. Note: Groundwater, though not encountered at the time of drilling, may rise to a higher level due to seasonal variations in precipitation and several other factors as discussed in the report.
80								

Ninyo & Moore

BORING LOG

NRG El Segundo Power Redevelopment
El Segundo, California

PROJECT NO.	DATE	FIGURE
206954002	4/07	A-4

DATE DRILLED	2/13/07	BORING NO.	B-2
GROUND ELEVATION	76' ± (MLLW)	SHEET	1 OF 4
METHOD OF DRILLING	8" Hollow-Stem Auger (Martini Drilling)		
DRIVE WEIGHT	140 lbs. (Auto. Trip Hammer)	DROP	30"
SAMPLED BY	MKM	LOGGED BY	MKM
REVIEWED BY	SG/CAP		

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
0								ASPHALT CONCRETE: Approximately 7 inches thick.
							GP	AGGREGATE BASE: Brown, damp, medium dense, sandy GRAVEL; approximately 5 inches thick.
	X						SP	EOLIAN DEPOSITS: Brown, damp, dense, poorly graded SAND.
5		X	61	2.7	104.2			Moist.
10		X	25					Medium dense; laminated.
							SP-SM	Dark brown, moist, medium dense, poorly graded SAND to silty SAND.
15		X	21					
20								

Ninyo & Moore

BORING LOG

NRG El Segundo Power Redevelopment
El Segundo, California

PROJECT NO.	DATE	FIGURE
206954002	4/07	A-5

DATE DRILLED	2/13/07	BORING NO.	B-2
GROUND ELEVATION	76' ± (MLLW)	SHEET	2 OF 4
METHOD OF DRILLING	8" Hollow-Stem Auger (Martini Drilling)		
DRIVE WEIGHT	140 lbs. (Auto. Trip Hammer)	DROP	30"
SAMPLED BY	MKM	LOGGED BY	MKM
REVIEWED BY	SG/CAP		

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
20		■	29				SP-SM	EOLIAN DEPOSITS: (Continued) Dark brown, moist, medium dense, poorly graded SAND to silty SAND.
25		■	67	10.8	111.2		SP-SM	OLDER ALLUVIUM: Orange brown, moist, dense, poorly graded SAND to silty SAND; interbedded with gray sand.
30		■	73	10.3	106.2			Very dense.
							SP	Light brown, moist, dense, poorly graded SAND.
35		■	62					
40								

Ninyo & Moore

BORING LOG

NRG El Segundo Power Redevelopment
El Segundo, California

PROJECT NO.	DATE	FIGURE
206954002	4/07	A-6

DATE DRILLED 2/13/07	BORING NO. B-2	
GROUND ELEVATION 76' ± (MLLW)	SHEET 3 OF 4	
METHOD OF DRILLING 8" Hollow-Stem Auger (Martini Drilling)		
DRIVE WEIGHT 140 lbs. (Auto. Trip Hammer)	DROP 30"	
SAMPLED BY MKM	LOGGED BY MKM	REVIEWED BY SG/CAP

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
40		■	60				SP	OLDER ALLUVIUM: (Continued) Light brown, moist, dense, poorly graded SAND.
45		■	50/6"					Very dense.
50		■	50/3"	3.2	108.6			Trace fine gravel.
55		■	50/6"					
60								

DATE DRILLED	2/13/07
BORING NO.	B-2
GROUND ELEVATION	76' ± (MLLW)
SHEET	4 OF 4
METHOD OF DRILLING	8" Hollow-Stem Auger (Martini Drilling)
DRIVE WEIGHT	140 lbs. (Auto. Trip Hammer)
DROP	30"
SAMPLED BY	MKM
LOGGED BY	MKM
REVIEWED BY	SG/CAP

DEPTH (feet)	SAMPLES Bulk	SAMPLES Driven	BLOWS/FOOT	MOISTURE (%)	DRY DENSITY (PCF)	SYMBOL	CLASSIFICATION U.S.C.S.	DESCRIPTION/INTERPRETATION
60		■	50/6"				SP	OLDER ALLUVIUM: (Continued) Light brown, moist, very dense, poorly graded SAND; coarse gravel.
65		■	50/6"	5.4	102.5			Orange brown.
70		■	50/6"					Interbedded with gray and brown sand.
				▼				@73': Groundwater measured at completion of drilling. Dark gray; saturated; fuel odor.
75		■	50/6"					
80								Total Depth = 76 feet. Groundwater measured at completion of drilling at approximately 73 feet. Backfilled with soil and bentonite on 2/13/07. Note: Groundwater may rise to a level higher than that measured in borehole due to seasonal variations in precipitation and several other factors as discussed in the report.

Ninyo & Moore

BORING LOG

NRG El Segundo Power Redevelopment
El Segundo, California

PROJECT NO.	DATE	FIGURE
206954002	4/07	A-8

APPENDIX B

LABORATORY TESTING

Classification

Soil materials were visually and texturally classified in accordance with the Unified Soil Classification System (USCS) in general accordance with ASTM D 2488-00. Soil classifications are indicated on the logs of exploratory borings in Appendix A.

In-Place Moisture and Density Tests

The moisture content and dry density of relatively undisturbed soil samples obtained from the exploratory borings were evaluated in general accordance with ASTM D 2937-04. The test results are presented on the logs of exploratory borings in Appendix A.

200 Wash

An evaluation of the percentage of particles finer than the No. 200 sieve was performed on selected soil samples in general accordance with ASTM D 1140-00. The results of the tests are presented on Figure B-1.

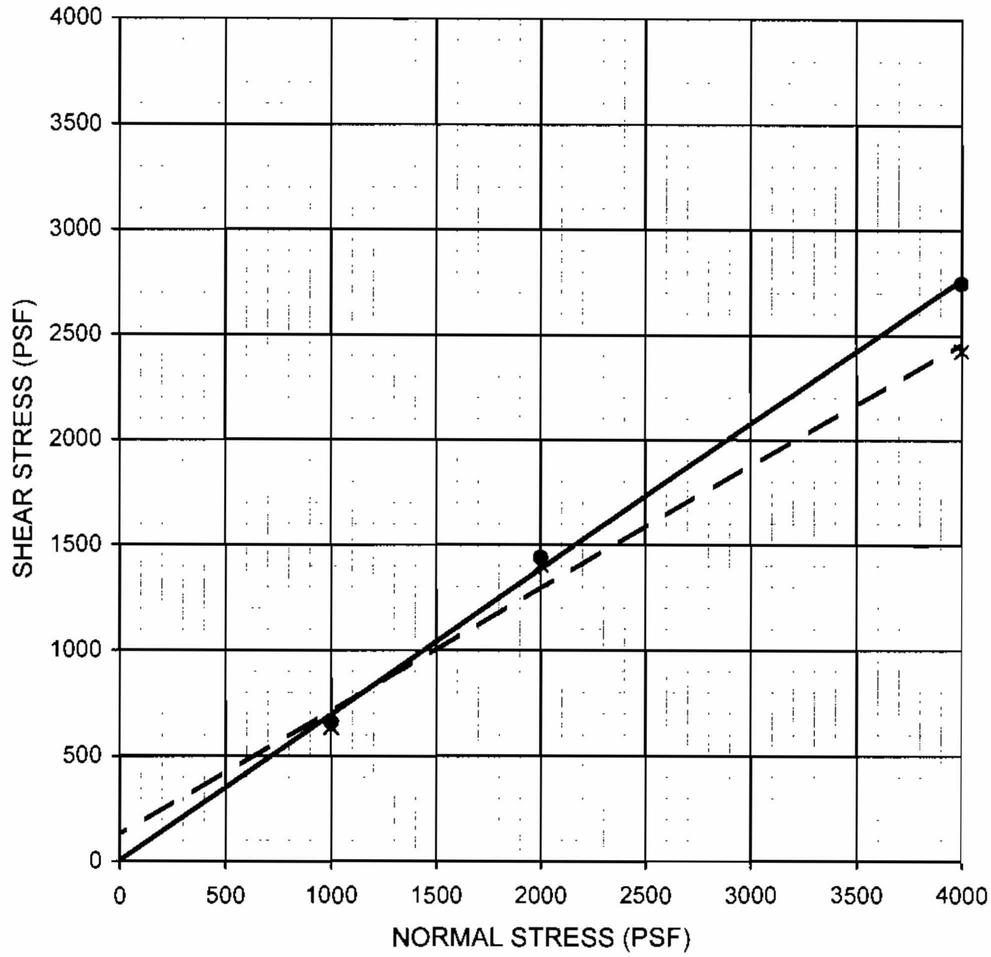
Direct Shear Tests

Direct shear tests were performed on relatively undisturbed soil samples in general accordance with ASTM D 3080-04 to evaluate the shear strength characteristics of selected earth materials. The samples were inundated during shearing to represent adverse field conditions. The test results are presented on Figures B-2 through B-5.

SAMPLE LOCATION	SAMPLE DEPTH (FT)	DESCRIPTION	PERCENT PASSING NO. 4	PERCENT PASSING NO. 200	USCS (TOTAL SAMPLE)
B-1	5.0-6.5	Poorly Graded SAND	100	1	SP
B-1	15.0-16.5	Poorly Graded SAND	100	2	SP
B-1	45.0-46.5	Poorly Graded SAND	100	3	SP
B-1	70.0-70.8	Poorly Graded SAND	100	3	SP
B-2	10.0-11.5	Poorly Graded SAND	99	1	SP
B-2	30.0-31.5	Poorly Graded SAND with Silt	100	5	SP-SM
B-2	50.0-51.5	Poorly Graded SAND	81	2	SP
B-2	65.0-66.0	Poorly Graded SAND	100	2	SP

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 1140-00

Ninyo & Moore		NO. 200 SIEVE ANALYSIS	FIGURE
PROJECT NO.	DATE	NRG EL SEGUNDO POWER REDEVELOPMENT EL SEGUNDO, CALIFORNIA	B-1
206954002	4/07		

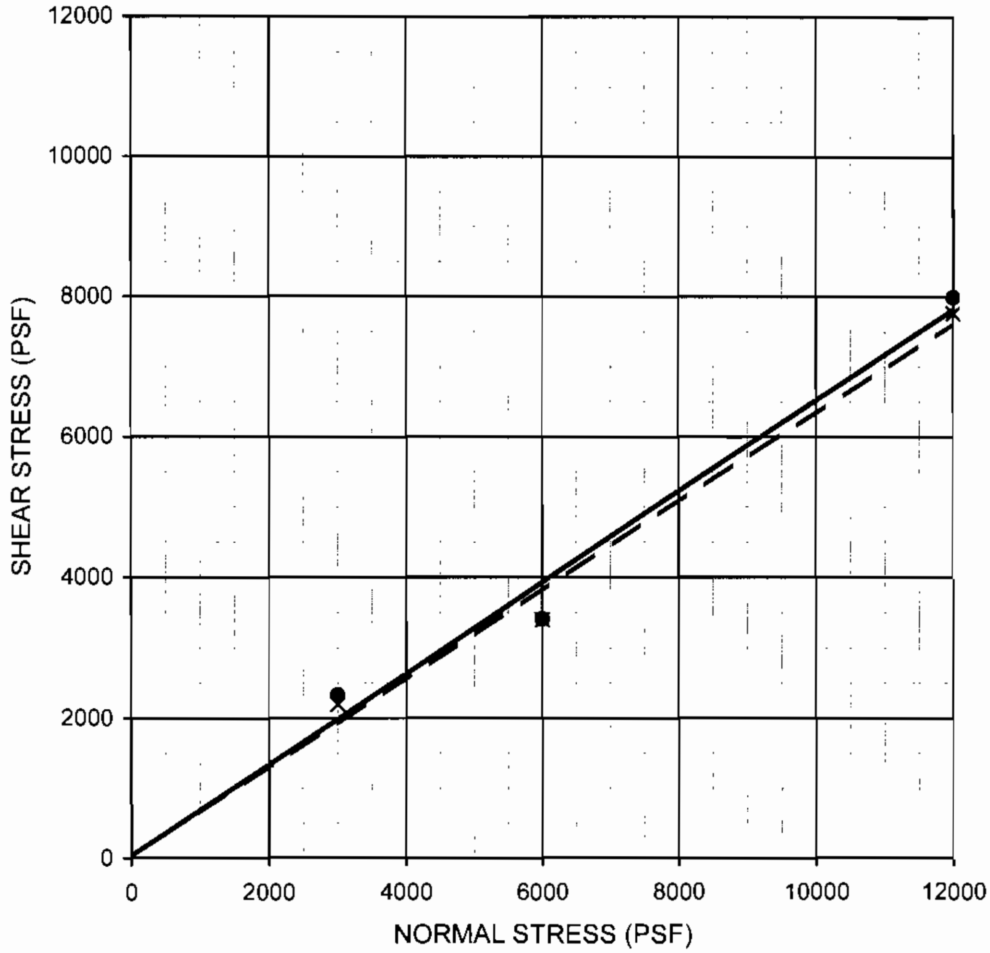


Description	Symbol	Sample Location	Depth (ft)	Shear Strength	Cohesion, c (psf)	Friction Angle, ϕ (degrees)	Soil Type
Poorly Graded SAND	—●—	B-1	15.0-16.5	Peak	6	35	SP
Poorly Graded SAND	- - x - -	B-1	15.0-16.5	Ultimate	126	30	SP

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 3080-04

Ninyo & Moore		DIRECT SHEAR TEST RESULTS	FIGURE
PROJECT NO.	DATE	NRG EL SEGUNDO POWER REDEVELOPMENT EL SEGUNDO, CALIFORNIA	B-2
206954002	4/07		

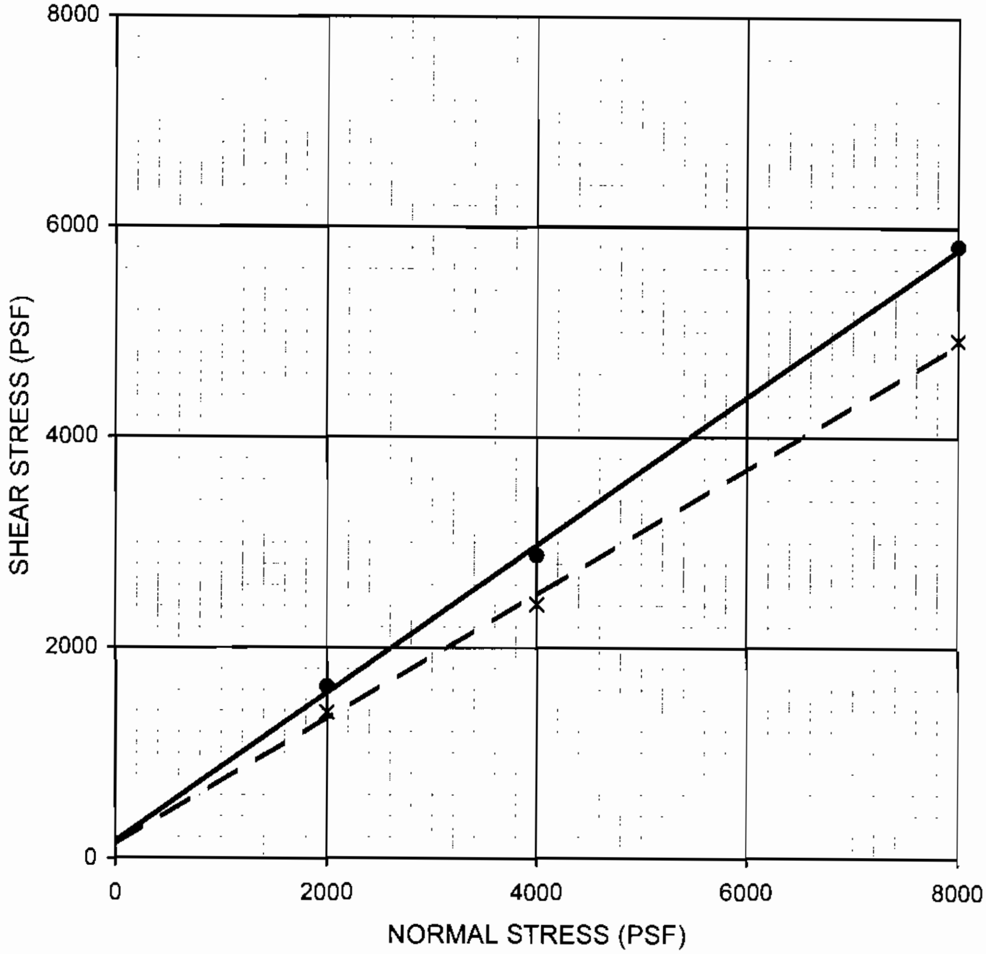
206954002 B-2 Sheer, B-1@15.0-16.5.xls



Description	Symbol	Sample Location	Depth (ft)	Shear Strength	Cohesion, c (psf)	Friction Angle, φ (degrees)	Soil Type
Poorly Graded SAND	—●—	B-1	70.0-70.8	Peak	36	33	SP
Poorly Graded SAND	- - x - -	B-1	70.0-70.8	Ultimate	12	32	SP

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 3080-04

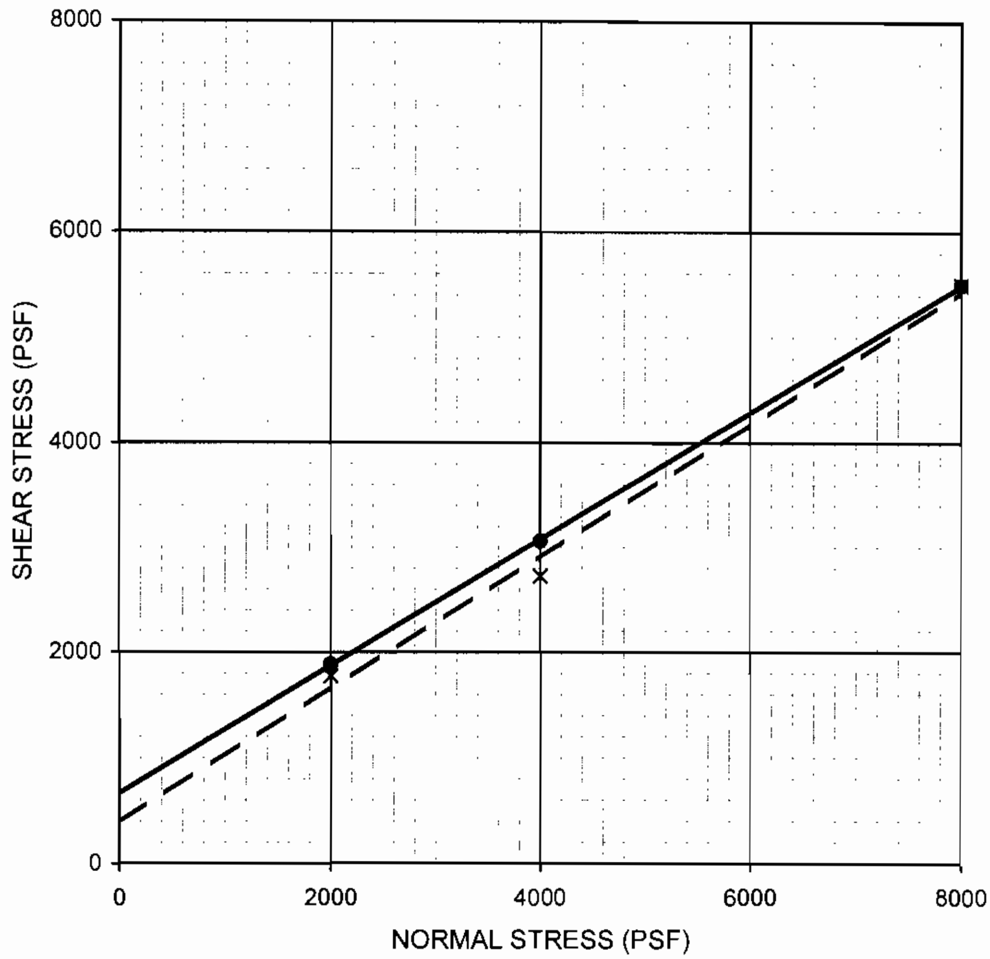
Ninyo & Moore		DIRECT SHEAR TEST RESULTS	FIGURE
PROJECT NO.	DATE	NRG EL SEGUNDO POWER REDEVELOPMENT EL SEGUNDO, CALIFORNIA	B-3
206954002	4/07		



Description	Symbol	Sample Location	Depth (ft)	Shear Strength	Cohesion, c (psf)	Friction Angle, ϕ (degrees)	Soil Type
Poorly Graded SAND with Silt	—●—	B-2	30.0-31.5	Peak	162	35	SP-SM
Poorly Graded SAND with Silt	- - X - -	B-2	30.0-31.5	Ultimate	126	31	SP-SM

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 3080-04

Ninyo & Moore		DIRECT SHEAR TEST RESULTS	FIGURE
PROJECT NO.	DATE	NRG EL SEGUNDO POWER REDEVELOPMENT EL SEGUNDO, CALIFORNIA	B-4
206954002	4/07		



Description	Symbol	Sample Location	Depth (ft)	Shear Strength	Cohesion, c (psf)	Friction Angle, ϕ (degrees)	Soil Type
Poorly Graded SAND	——●——	B-2	50.0-51.5	Peak	666	31	SP
Poorly Graded SAND	– – x – –	B-2	50.0-51.5	Ultimate	386	32	SP

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 3080-04

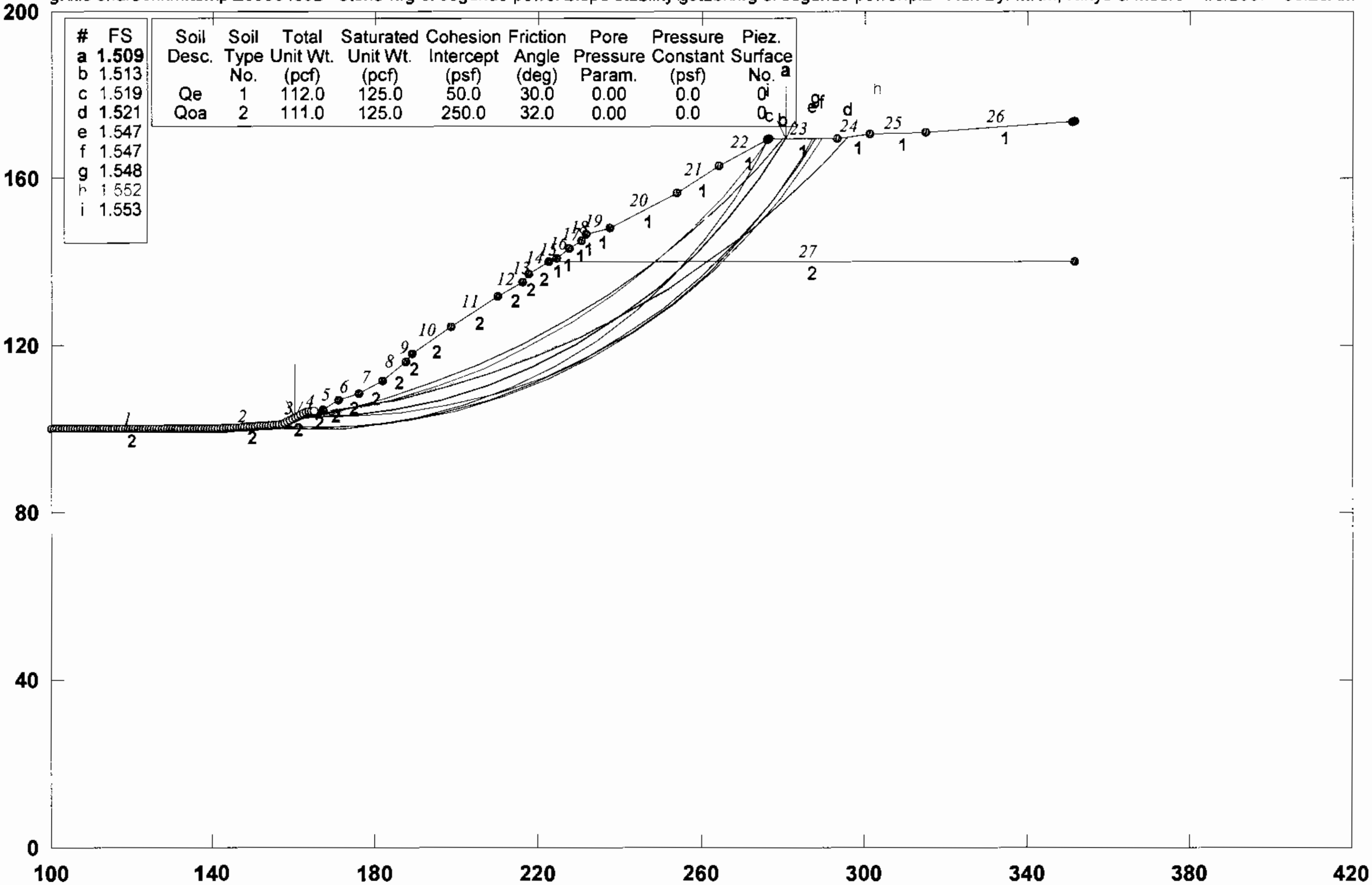
Ninyo & Moore	DIRECT SHEAR TEST RESULTS	FIGURE
PROJECT NO. / DATE	NRG EL SEGUNDO POWER REDEVELOPMENT EL SEGUNDO, CALIFORNIA	B-5
206954002 / 4/07		

APPENDIX C

SLOPE STABILITY EVALUATION

Shaw/NRG El Segundo Power Redevelopment

g:\file share\mkm.temp\206954002 - stone-nrg el segundo power\slope stability\gstabl\nrg el segundo power.pl2 Run By: MKM, Ninyo & Moore 4/6/2007 08:28AM



GSTABL7 v.2 FSmin=1.509

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **
** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **

****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 4/6/2007
Time of Run: 08:28AM
Run By: MKM, Ninyo & Moore
Input Data Filename: g:\File Share\MKM.temp\206954002 - Stone-NRG El Segundo Power\Slope Stability\GSTABL\nrg el segundo power.in
Output Filename: g:\File Share\MKM.temp\206954002 - Stone-NRG El Segundo Power\Slope Stability\GSTABL\nrg el segundo power.OUT
Unit System: English
Plotted Output Filename: g:\File Share\MKM.temp\206954002 - Stone-NRG El Segundo Power\Slope Stability\GSTABL\nrg el segundo power.PLT
PROBLEM DESCRIPTION: Shaw/NRG El Segundo Power Redevelopment
BOUNDARY COORDINATES
26 Top Boundaries
27 Total Boundaries

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	100.00	100.00	140.00	100.00	2
2	140.00	100.00	157.00	101.00	2
3	157.00	101.00	163.00	104.00	2
4	163.00	104.00	167.00	104.50	2
5	167.00	104.50	171.00	107.00	2
6	171.00	107.00	176.00	108.50	2
7	176.00	108.50	181.50	111.50	2
8	181.50	111.50	187.50	116.00	2
9	187.50	116.00	189.00	118.00	2
10	189.00	118.00	198.50	124.50	2
11	198.50	124.50	210.00	131.50	2
12	210.00	131.50	216.00	135.00	2
13	216.00	135.00	217.50	137.00	2
14	217.50	137.00	222.50	140.00	2
15	222.50	140.00	224.50	141.00	1
16	224.50	141.00	227.50	143.00	1
17	227.50	143.00	230.50	145.00	1
18	230.50	145.00	231.50	146.50	1
19	231.50	146.50	237.50	148.00	1
20	237.50	148.00	254.00	156.50	1
21	254.00	156.50	264.00	163.00	1
22	264.00	163.00	276.50	169.50	1
23	276.50	169.50	293.00	169.50	1
24	293.00	169.50	301.00	170.50	1
25	301.00	170.50	315.00	171.00	1
26	315.00	171.00	351.50	173.50	1
27	222.50	140.00	351.50	140.00	2

Default Y-Origin = 0.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)
ISOTROPIC SOIL PARAMETERS
2 Type(s) of Soil

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	112.0	125.0	50.0	30.0	0.00	0.0	0
2	111.0	125.0	250.0	32.0	0.00	0.0	0

A Critical Failure Surface Searching Method, Using A Random

```
Technique For Generating Circular Surfaces, Has Been Specified.
1000 Trial Surfaces Have Been Generated.
  10 Surface(s) Initiate(s) From Each Of   100 Points Equally Spaced
Along The Ground Surface Between  X = 100.00(ft)
                                and  X = 165.00(ft)
Each Surface Terminates Between   X = 276.00(ft)
                               and  X = 351.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is  Y =      0.00(ft)
12.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
      Failure Surfaces Evaluated. They Are
      Ordered - Most Critical First.
      * * Safety Factors Are Calculated By The Modified Bishop Method * *
      Total Number of Trial Surfaces Attempted =  1000
      Number of Trial Surfaces With Valid FS = 1000
      Statistical Data On All Valid FS Values:
         FS Max =    3.373   FS Min =    1.509   FS Ave =    2.371
         Standard Deviation =     0.436   Coefficient of Variation =   18.39 %
      Failure Surface Specified By 13 Coordinate Points
        Point       X-Surf       Y-Surf
         No.         (ft)         (ft)
          1        160.404      102.702
          2        172.397      103.112
          3        184.310      104.555
          4        196.054      107.020
          5        207.542      110.489
          6        218.688      114.935
          7        229.409      120.326
          8        239.625      126.621
          9        249.260      133.773
         10        258.243      141.730
         11        266.506      150.432
         12        273.988      159.814
         13        280.429      169.500
      Circle Center At X =   161.651 ; Y =   241.726 ; and Radius =   139.029
             Factor of Safety
            ***   1.509   ***
           Individual data on the    33  slices
```

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	2.6	174.2	0.0	0.0	0.	0.	0.0	0.0	0.0
2	4.0	617.5	0.0	0.0	0.	0.	0.0	0.0	0.0
3	4.0	1222.7	0.0	0.0	0.	0.	0.0	0.0	0.0
4	1.4	639.1	0.0	0.0	0.	0.	0.0	0.0	0.0
5	3.6	1851.2	0.0	0.0	0.	0.	0.0	0.0	0.0
6	5.5	3735.1	0.0	0.0	0.	0.	0.0	0.0	0.0
7	2.8	2547.9	0.0	0.0	0.	0.	0.0	0.0	0.0
8	3.2	3510.2	0.0	0.0	0.	0.	0.0	0.0	0.0
9	1.5	1934.3	0.0	0.0	0.	0.	0.0	0.0	0.0
10	7.1	11066.5	0.0	0.0	0.	0.	0.0	0.0	0.0
11	2.4	4418.1	0.0	0.0	0.	0.	0.0	0.0	0.0
12	9.0	18194.5	0.0	0.0	0.	0.	0.0	0.0	0.0
13	2.5	5394.8	0.0	0.0	0.	0.	0.0	0.0	0.0
14	6.0	13709.0	0.0	0.0	0.	0.	0.0	0.0	0.0
15	1.5	3636.0	0.0	0.0	0.	0.	0.0	0.0	0.0
16	1.2	2987.7	0.0	0.0	0.	0.	0.0	0.0	0.0
17	3.8	9716.6	0.0	0.0	0.	0.	0.0	0.0	0.0
18	2.0	5139.3	0.0	0.0	0.	0.	0.0	0.0	0.0
19	3.0	7794.3	0.0	0.0	0.	0.	0.0	0.0	0.0
20	1.9	5047.9	0.0	0.0	0.	0.	0.0	0.0	0.0
21	1.1	2908.6	0.0	0.0	0.	0.	0.0	0.0	0.0
22	1.0	2719.0	0.0	0.0	0.	0.	0.0	0.0	0.0
23	6.0	15885.8	0.0	0.0	0.	0.	0.0	0.0	0.0
24	2.1	5344.9	0.0	0.0	0.	0.	0.0	0.0	0.0

25	9.6	22977.3	0.0	0.0	0.	0.	0.0	0.0	0.0
26	4.7	10282.0	0.0	0.0	0.	0.	0.0	0.0	0.0
27	2.3	4680.0	0.0	0.0	0.	0.	0.0	0.0	0.0
28	2.0	3885.1	0.0	0.0	0.	0.	0.0	0.0	0.0
29	5.8	10553.2	0.0	0.0	0.	0.	0.0	0.0	0.0
30	2.5	4080.9	0.0	0.0	0.	0.	0.0	0.0	0.0
31	7.5	9322.7	0.0	0.0	0.	0.	0.0	0.0	0.0
32	2.5	2009.9	0.0	0.0	0.	0.	0.0	0.0	0.0
33	3.9	1300.1	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	159.091	102.046
2	170.877	104.304
3	182.507	107.257
4	193.942	110.897
5	205.141	115.208
6	216.064	120.177
7	226.672	125.786
8	236.929	132.015
9	246.798	138.841
10	256.244	146.242
11	265.235	154.190
12	273.737	162.659
13	279.835	169.500

Circle Center At X = 126.985 ; Y = 301.502 ; and Radius = 202.024

Factor of Safety

*** 1.513 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	160.404	102.702
2	172.277	104.441
3	183.995	107.029
4	195.496	110.453
5	206.721	114.695
6	217.613	119.733
7	228.113	125.541
8	238.170	132.089
9	247.729	139.343
10	256.742	147.265
11	265.162	155.815
12	272.946	164.948
13	276.163	169.325

Circle Center At X = 142.182 ; Y = 268.509 ; and Radius = 166.805

Factor of Safety

*** 1.519 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	161.717	103.359
2	173.623	104.860
3	185.424	107.037
4	197.082	109.882
5	208.559	113.387
6	219.817	117.540
7	230.821	122.327
8	241.534	127.733
9	251.922	133.740
10	261.951	140.329
11	271.589	147.479
12	280.804	155.165
13	289.566	163.365
14	295.743	169.843

Circle Center At X = 141.456 ; Y = 312.536 ; and Radius = 210.156

Factor of Safety

*** 1.521 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	162.374	103.687
2	174.365	103.219
3	186.348	103.853
4	198.223	105.581
5	209.889	108.390
6	221.249	112.257
7	232.207	117.148
8	242.671	123.023
9	252.553	129.831
10	261.768	137.517
11	270.241	146.014
12	277.900	155.253
13	284.680	165.154
14	287.104	169.500

Circle Center At X = 173.541 ; Y = 233.624 ; and Radius = 130.416

Factor of Safety

*** 1.547 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	151.869	100.698
2	163.857	100.157
3	175.849	100.595
4	187.765	102.011
5	199.526	104.393
6	211.053	107.728
7	222.270	111.991
8	233.102	117.155
9	243.477	123.186
10	253.325	130.043
11	262.581	137.680
12	271.183	146.047
13	279.073	155.088
14	286.200	164.742
15	289.145	169.500

Circle Center At X = 164.486 ; Y = 247.135 ; and Radius = 146.979

Factor of Safety

*** 1.547 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	148.586	100.505
2	160.568	99.841
3	172.563	100.155
4	184.494	101.443
5	196.280	103.698
6	207.844	106.904
7	219.109	111.041
8	229.999	116.080
9	240.444	121.989
10	250.373	128.728
11	259.720	136.253
12	268.425	144.513
13	276.428	153.454
14	283.678	163.016
15	287.809	169.500

Circle Center At X = 162.721 ; Y = 247.187 ; and Radius = 147.361

Factor of Safety

*** 1.548 ***

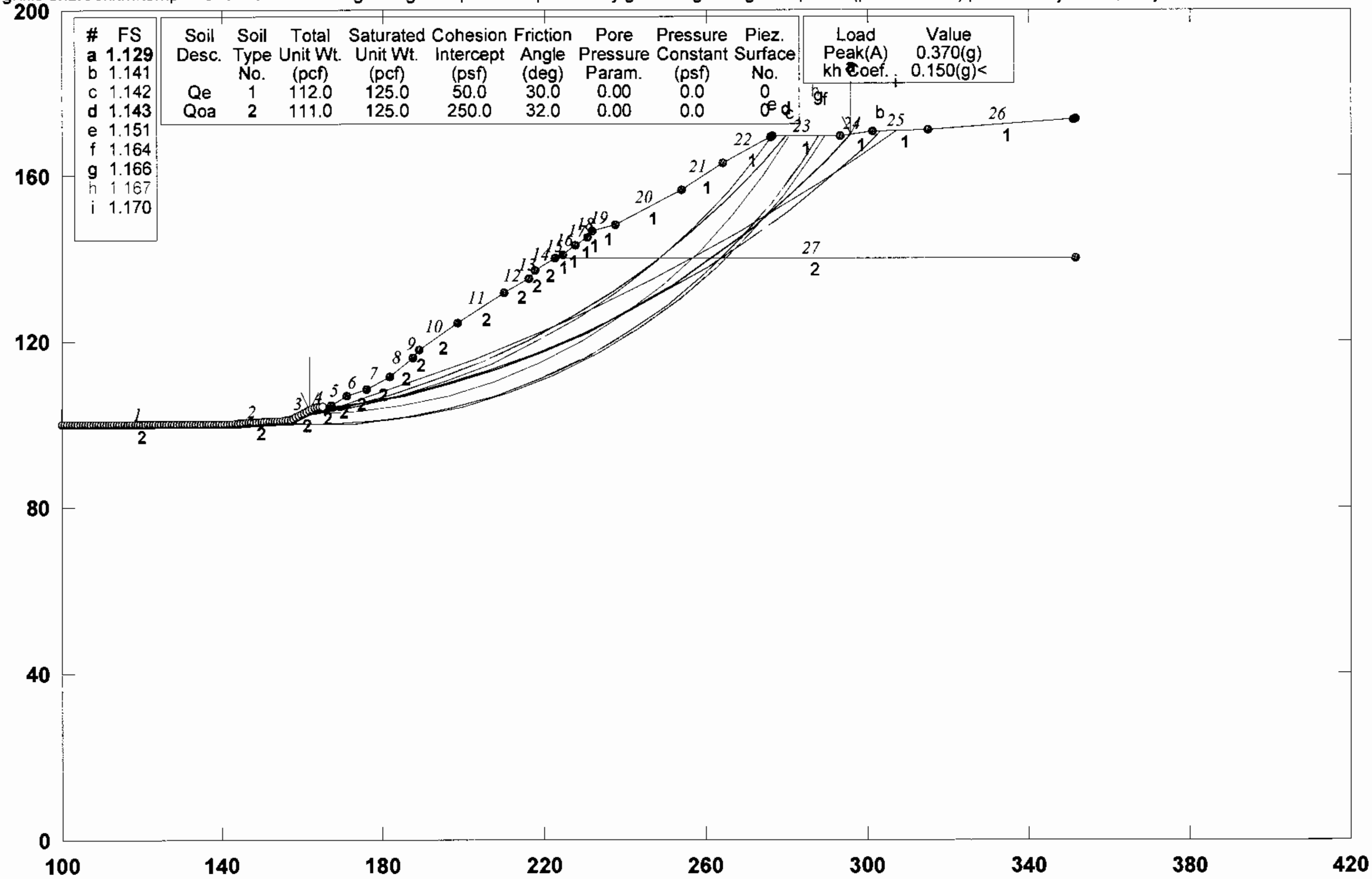
Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	159.091	102.046
2	170.939	103.950

```
     3        182.688      106.392
     4        194.314      109.365
     5        205.792      112.864
     6        217.100      116.881
     7        228.213      121.409
     8        239.109      126.437
     9        249.765      131.955
    10        260.158      137.953
    11        270.269      144.417
    12        280.075      151.334
    13        289.556      158.689
    14        298.693      166.469
    15        303.093      170.575
Circle Center At X =   123.154 ; Y =   363.385 ; and Radius =   263.799
       Factor of Safety
      ***    1.552   ***
Failure Surface Specified By 14 Coordinate Points
  Point       X-Surf      Y-Surf
   No.         (ft)        (ft)
     1        154.495      100.853
     2        166.483      100.316
     3        178.466      100.954
     4        190.329      102.761
     5        201.959      105.720
     6        213.243      109.802
     7        224.074      114.968
     8        234.348      121.169
     9        243.965      128.345
    10        252.835      136.428
    11        260.872      145.339
    12        267.998      154.994
    13        274.146      165.300
    14        276.000      169.240
Circle Center At X =   166.044 ; Y =   222.467 ; and Radius =   122.161
       Factor of Safety
      ***    1.553   ***
Failure Surface Specified By 14 Coordinate Points
  Point       X-Surf      Y-Surf
   No.         (ft)        (ft)
     1        157.778      101.389
     2        169.301      104.739
     3        180.690      108.519
     4        191.929      112.725
     5        203.001      117.351
     6        213.892      122.390
     7        224.586      127.835
     8        235.067      133.678
     9        245.321      139.911
    10        255.334      146.525
    11        265.091      153.511
    12        274.578      160.859
    13        283.782      168.558
    14        284.826      169.500
Circle Center At X =    74.651 ; Y =   408.993 ; and Radius =   318.638
       Factor of Safety
      ***    1.563   ***
          **** END OF GSTABL7 OUTPUT ****
```

Shaw/NRG El Segundo Power Redevelopment

g:\file share\mkm.temp\206954002 - stone-nrg el segundo power\slope stability\gstabl\nrg el segundo power (pseudostatic).pl2 Run By: MKM, Ninyo & Moore 4/6/2007 08:29AM



GSTABL7 v.2 FSmin=1.129

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **
** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **

****
SLOPE STABILITY ANALYSIS SYSTEM
Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.
****

```
Analysis Run Date:        4/6/2007
Time of Run:              08:29AM
Run By:                   MKM, Ninyo & Moore
Input Data Filename:      g:\File Share\MKM.temp\206954002 - Stone-NRG El Segundo Powe
r\Slope Stability\GSTABL\nrg el segundo power (pseudostatic).in
Output Filename:          g:\File Share\MKM.temp\206954002 - Stone-NRG El Segundo Powe
r\Slope Stability\GSTABL\nrg el segundo power (pseudostatic).OUT
Unit System:              English
Plotted Output Filename:  g:\File Share\MKM.temp\206954002 - Stone-NRG El Segundo Powe
r\Slope Stability\GSTABL\nrg el segundo power (pseudostatic).PLT
PROBLEM DESCRIPTION:  Shaw/NRG El Segundo Power Redevelopment
BOUNDARY COORDINATES
   26 Top   Boundaries
   27 Total Boundaries
```

Boundary No.	X-Left (ft)	Y-Left (ft)	X-Right (ft)	Y-Right (ft)	Soil Type Below Bnd
1	100.00	100.00	140.00	100.00	2
2	140.00	100.00	157.00	101.00	2
3	157.00	101.00	163.00	104.00	2
4	163.00	104.00	167.00	104.50	2
5	167.00	104.50	171.00	107.00	2
6	171.00	107.00	176.00	108.50	2
7	176.00	108.50	181.50	111.50	2
8	181.50	111.50	187.50	116.00	2
9	187.50	116.00	189.00	118.00	2
10	189.00	118.00	198.50	124.50	2
11	198.50	124.50	210.00	131.50	2
12	210.00	131.50	216.00	135.00	2
13	216.00	135.00	217.50	137.00	2
14	217.50	137.00	222.50	140.00	2
15	222.50	140.00	224.50	141.00	1
16	224.50	141.00	227.50	143.00	1
17	227.50	143.00	230.50	145.00	1
18	230.50	145.00	231.50	146.50	1
19	231.50	146.50	237.50	148.00	1
20	237.50	148.00	254.00	156.50	1
21	254.00	156.50	264.00	163.00	1
22	264.00	163.00	276.50	169.50	1
23	276.50	169.50	293.00	169.50	1
24	293.00	169.50	301.00	170.50	1
25	301.00	170.50	315.00	171.00	1
26	315.00	171.00	351.50	173.50	1
27	222.50	140.00	351.50	140.00	2

```
Default Y-Origin = 0.00(ft)
Default X-Plus Value = 0.00(ft)
Default Y-Plus Value = 0.00(ft)
ISOTROPIC SOIL PARAMETERS
 2 Type(s) of Soil
```

Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
1	112.0	125.0	50.0	30.0	0.00	0.0	0
2	111.0	125.0	250.0	32.0	0.00	0.0	0

Specified Peak Ground Acceleration Coefficient (A) = 0.370(g)

Specified Horizontal Earthquake Coefficient (kh) = 0.150(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
1000 Trial Surfaces Have Been Generated.
10 Surface(s) Initiate(s) From Each Of 100 Points Equally Spaced
Along The Ground Surface Between X = 100.00(ft)
and X = 165.00(ft)
Each Surface Terminates Between X = 276.00(ft)
and X = 351.00(ft)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(ft)
12.00(ft) Line Segments Define Each Trial Failure Surface.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 1000
Number of Trial Surfaces With Valid FS = 1000
Statistical Data On All Valid FS Values:
FS Max = 2.423 FS Min = 1.129 FS Ave = 1.731
Standard Deviation = 0.315 Coefficient of Variation = 18.19 %
Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	161.717	103.359
2	173.623	104.860
3	185.424	107.037
4	197.082	109.882
5	208.559	113.387
6	219.817	117.540
7	230.821	122.327
8	241.534	127.733
9	251.922	133.740
10	261.951	140.329
11	271.589	147.479
12	280.804	155.165
13	289.566	163.365
14	295.743	169.843

Circle Center At X = 141.456 ; Y = 312.536 ; and Radius = 210.156
Factor of Safety
*** 1.129 ***
Individual data on the 35 slices

Slice No.	Width (ft)	Weight (lbs)	Water Force Top (lbs)	Water Force Bot (lbs)	Tie Force Norm (lbs)	Tie Force Tan (lbs)	Earthquake Force Hor (lbs)	Earthquake Force Ver (lbs)	Surcharge Load (lbs)
1	1.3	34.1	0.0	0.0	0.	0.	5.1	0.0	0.0
2	4.0	212.0	0.0	0.0	0.	0.	31.8	0.0	0.0
3	4.0	654.0	0.0	0.0	0.	0.	98.1	0.0	0.0
4	2.6	785.8	0.0	0.0	0.	0.	117.9	0.0	0.0
5	2.4	808.5	0.0	0.0	0.	0.	121.3	0.0	0.0
6	5.5	2560.6	0.0	0.0	0.	0.	384.1	0.0	0.0
7	3.9	2742.5	0.0	0.0	0.	0.	411.4	0.0	0.0
8	2.1	1827.7	0.0	0.0	0.	0.	274.2	0.0	0.0
9	1.5	1544.0	0.0	0.0	0.	0.	231.6	0.0	0.0
10	8.1	10647.2	0.0	0.0	0.	0.	1597.1	0.0	0.0
11	1.4	2190.8	0.0	0.0	0.	0.	328.6	0.0	0.0
12	10.1	17540.3	0.0	0.0	0.	0.	2631.0	0.0	0.0
13	1.4	2785.5	0.0	0.0	0.	0.	417.8	0.0	0.0
14	6.0	12137.8	0.0	0.0	0.	0.	1820.7	0.0	0.0
15	1.5	3262.0	0.0	0.0	0.	0.	489.3	0.0	0.0
16	2.3	5293.9	0.0	0.0	0.	0.	794.1	0.0	0.0
17	2.7	6275.3	0.0	0.0	0.	0.	941.3	0.0	0.0
18	2.0	4742.5	0.0	0.0	0.	0.	711.4	0.0	0.0
19	3.0	7255.6	0.0	0.0	0.	0.	1088.3	0.0	0.0

20	3.0	7493.0	0.0	0.0	0.	0.	1124.0	0.0	0.0
21	0.3	820.4	0.0	0.0	0.	0.	123.1	0.0	0.0
22	0.7	1774.9	0.0	0.0	0.	0.	266.2	0.0	0.0
23	6.0	15406.1	0.0	0.0	0.	0.	2310.9	0.0	0.0
24	4.0	10033.4	0.0	0.0	0.	0.	1505.0	0.0	0.0
25	10.4	25520.7	0.0	0.0	0.	0.	3828.1	0.0	0.0
26	2.1	5001.3	0.0	0.0	0.	0.	750.2	0.0	0.0
27	7.5	17813.9	0.0	0.0	0.	0.	2672.1	0.0	0.0
28	0.5	1196.9	0.0	0.0	0.	0.	179.5	0.0	0.0
29	2.0	4874.4	0.0	0.0	0.	0.	731.2	0.0	0.0
30	7.6	17262.6	0.0	0.0	0.	0.	2589.4	0.0	0.0
31	4.9	10283.4	0.0	0.0	0.	0.	1542.5	0.0	0.0
32	4.3	7774.9	0.0	0.0	0.	0.	1166.2	0.0	0.0
33	8.8	10044.1	0.0	0.0	0.	0.	1506.6	0.0	0.0
34	3.4	1667.2	0.0	0.0	0.	0.	250.1	0.0	0.0
35	2.7	389.2	0.0	0.0	0.	0.	58.4	0.0	0.0

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	159.091	102.046
2	170.939	103.950
3	182.688	106.392
4	194.314	109.365
5	205.792	112.864
6	217.100	116.881
7	228.213	121.409
8	239.109	126.437
9	249.765	131.955
10	260.158	137.953
11	270.269	144.417
12	280.075	151.334
13	289.556	158.689
14	298.693	166.469
15	303.093	170.575

Circle Center At X = 123.154 ; Y = 363.385 ; and Radius = 263.799

Factor of Safety

*** 1.141 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	160.404	102.702
2	172.397	103.112
3	184.310	104.555
4	196.054	107.020
5	207.542	110.489
6	218.688	114.935
7	229.409	120.326
8	239.625	126.621
9	249.260	133.773
10	258.243	141.730
11	266.506	150.432
12	273.988	159.814
13	280.429	169.500

Circle Center At X = 161.651 ; Y = 241.726 ; and Radius = 139.029

Factor of Safety

*** 1.142 ***

Failure Surface Specified By 13 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	159.091	102.046
2	170.877	104.304
3	182.507	107.257
4	193.942	110.897
5	205.141	115.208
6	216.064	120.177
7	226.672	125.786
8	236.929	132.015

```
   9        246.798      138.841
  10        256.244      146.242
  11        265.235      154.190
  12        273.737      162.659
  13        279.835      169.500
Circle Center At X =   126.985 ; Y =   301.502 ; and Radius =   202.024
       Factor of Safety
      ***   1.143   ***
Failure Surface Specified By 13 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1       160.404     102.702
    2       172.277     104.441
    3       183.995     107.029
    4       195.496     110.453
    5       206.721     114.695
    6       217.613     119.733
    7       228.113     125.541
    8       238.170     132.089
    9       247.729     139.343
   10       256.742     147.265
   11       265.162     155.815
   12       272.946     164.948
   13       276.163     169.325
Circle Center At X =   142.182 ; Y =   268.509 ; and Radius =   166.805
       Factor of Safety
      ***   1.151   ***
Failure Surface Specified By 15 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1       151.869     100.698
    2       163.857     100.157
    3       175.849     100.595
    4       187.765     102.011
    5       199.526     104.393
    6       211.053     107.728
    7       222.270     111.991
    8       233.102     117.155
    9       243.477     123.186
   10       253.325     130.043
   11       262.581     137.680
   12       271.183     146.047
   13       279.073     155.088
   14       286.200     164.742
   15       289.145     169.500
Circle Center At X =   164.486 ; Y =   247.135 ; and Radius =   146.979
       Factor of Safety
      ***   1.164   ***
Failure Surface Specified By 15 Coordinate Points
  Point      X-Surf      Y-Surf
   No.        (ft)        (ft)
    1       148.586     100.505
    2       160.568      99.841
    3       172.563     100.155
    4       184.494     101.443
    5       196.280     103.698
    6       207.844     106.904
    7       219.109     111.041
    8       229.999     116.080
    9       240.444     121.989
   10       250.373     128.728
   11       259.720     136.253
   12       268.425     144.513
   13       276.428     153.454
   14       283.678     163.016
   15       287.809     169.500
Circle Center At X =   162.721 ; Y =   247.187 ; and Radius =   147.361
```

Factor of Safety
*** 1.166 ***

Failure Surface Specified By 14 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	162.374	103.687
2	174.365	103.219
3	186.348	103.853
4	198.223	105.581
5	209.889	108.390
6	221.249	112.257
7	232.207	117.148
8	242.671	123.023
9	252.553	129.831
10	261.768	137.517
11	270.241	146.014
12	277.900	155.253
13	284.680	165.154
14	287.104	169.500

Circle Center At X = 173.541 ; Y = 233.624 ; and Radius = 130.416

Factor of Safety
*** 1.167 ***

Failure Surface Specified By 15 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	157.121	101.061
2	168.675	104.304
3	180.143	107.836
4	191.519	111.654
5	202.796	115.757
6	213.967	120.142
7	225.023	124.805
8	235.960	129.744
9	246.769	134.956
10	257.444	140.437
11	267.978	146.185
12	278.365	152.195
13	288.597	158.463
14	298.669	164.987
15	307.047	170.716

Circle Center At X = 33.635 ; Y = 563.164 ; and Radius = 478.319

Factor of Safety
*** 1.170 ***

Failure Surface Specified By 16 Coordinate Points

Point No.	X-Surf (ft)	Y-Surf (ft)
1	157.778	101.389
2	169.422	104.289
3	180.982	107.509
4	192.449	111.048
5	203.813	114.901
6	215.067	119.066
7	226.201	123.541
8	237.208	128.321
9	248.079	133.403
10	258.805	138.783
11	269.379	144.458
12	279.792	150.422
13	290.036	156.671
14	300.105	163.200
15	309.989	170.005
16	311.165	170.863

Circle Center At X = 58.694 ; Y = 524.211 ; and Radius = 434.276

Factor of Safety
*** 1.171 ***

**** END OF GSTABL7 OUTPUT ****