



## **13.4 Geotechnical and Geological Report**

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# **AESCO**

**TECHNOLOGIES, INC.**

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Huntington Beach, California 92648  
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**GEOTECHNICAL AND GEOLOGIC REPORT  
GUN RANGE  
GOTHARD STREET  
HUNTINGTON BEACH, CA**

**AESCO PROJECT NO. 20080175-A2918**

**Prepared for:**

**City of Huntington Beach  
P.O. Box 190  
Huntington Beach, CA 92648**

**Attention: Mr. Eric Charlonne**

**Prepared By:**

**AESCO Technologies, Inc.  
17782 Georgetown Lane  
Huntington Beach, California 92648**

**Adam Chamaa, P.E., Manager**

**November 18, 2008  
Revised March 12, 2009**

# AESCO

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November 18, 2008  
Revised March 12, 2009

Mr. Eric Charlonne  
City of Huntington Beach  
200 Main Street  
P.O. Box 190  
Huntington Beach, California 92648

**Subject: Geotechnical and Geologic Report  
Gun Range  
Gothard Street  
Huntington Beach, CA  
AESCO Project No. 20080175-A2918**

Dear Mr. Charlonne:

AESCO Technologies, Incorporated (AESCO) is pleased to provide you five (5) copies of the geotechnical and geologic report for the closed gun range located on the west side of Gothard Street, south of Talbert Street. The report is an EIR-level report and meets the requirements of the CEQA checklist for geology and soils.

AESCO will be happy to assist you further on this project by furnishing any Construction Materials Testing and Inspection Services you may require during the construction phase of the project. We are a full service-testing laboratory and inspection service and can supply the full range of testing and inspection services such as soils, concrete, asphalt, steel, welding, etc. that may be necessary for construction of this project.

# AESCO

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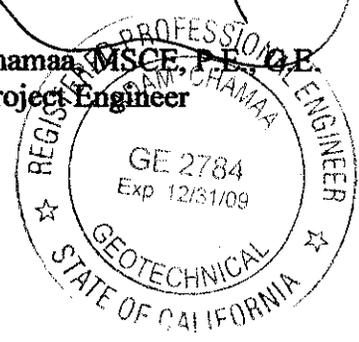
Please do not hesitate to contact us if you have any questions or if we may be of any additional assistance. We look forward to assisting you during the construction of the proposed facility.

Sincerely,  
AESCO Technologies, Inc.

*Debra L. Perez*

Debra L. Perez  
Project Manager

*Adam Chamaa*  
Adam Chamaa, MSCE, P.E., C.E.  
Senior Project Engineer



*Gary Butler*

Gary Butler, P.G., C.E.G.  
Project Geologist



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**Addendum 2  
Geotechnical Report for CEQA Requirements  
Closed Gun Range  
Gothard Street  
Huntington Beach, CA**

This report (authorized by the City of Huntington Beach as defined in our proposal dated September 9, 2008) presents the results of a supplemental investigation performed by AESCO Technologies, Incorporated (AESCO) for the closed gun range in Huntington Beach.

The purpose of this study was to provide geotechnical data in accordance with the requirements of the CEQA. The scope of our services included the following:

- Coordinating site access for the field investigation;
- Obtaining utility clearances for the field investigation;
- Performing geotechnical drilling and sampling at the site;
- Performing laboratory testing of representative samples;
- Reconnaissance level geologic mapping;
- Performing a liquefaction analysis;
- and preparing this report.

This report summarizes our findings and the results of soil borings and laboratory testing, and the liquefaction analysis, as well as any impacts to the site and associated mitigation.

It is our professional opinion that development of the site will not expose people or structures to adverse effects provided that the recommendations set forth in this report are followed.

## **SECTION TWO**

## **Existing Conditions**

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### **2.1 EXISTING CONDITIONS**

#### **2.1.1 Field Investigation**

Nine hollow-stem augered borings (B-1 through B-9) were drilled at the site on March 9, May 25 and June 8, 2007 to obtain information on the subsurface conditions. Boring B-1 was drilled to a depth of 30 feet below the existing ground surface; borings B-2 through B-5 were drilled to a depth of 5 feet, boring B-6 was drilled to a depth of 20 feet, and borings B-7 through B-9 were drilled to a depth of 50 feet. The boring locations are shown on the Site Sketch, Figure 1. AESCO personnel logged the borings and visually classified and collected samples of the subsurface materials encountered in the borings. The borings were backfilled with bentonite. The Logs of Borings B-6 through B-9 are presented in the attached Appendix.

Drive samples were taken in the borings using either a Standard Penetration Test (SPT) sampler or a Modified California (MC) sampler. The sampler was driven 18 inches into the bottom of the borehole using a 140-pound hammer falling a distance of 30 inches. The MC sampler barrel was lined with stainless steel liners to collect relatively undisturbed soil samples. All of the samples were sealed and packaged to help preserve the natural moisture content and to protect them from further disturbance.

Since the site is a former landfill, AESCO implemented a health and safety monitoring and protection program for the drilling operations. Protective equipment was used and consisted of safety clothing and air respirators. Calibrated monitoring equipment for combustible gas, hydrogen sulfide chemical reagent diffusion tube indicator and an oxygen analyzer was used during the drilling operations.

#### **2.1.2 Laboratory Testing**

All testing was performed in accordance with ASTM Standards and California Test Methods. Laboratory testing performed in our Huntington Beach, California geotechnical laboratory consisted of water content (ASTM D4959), dry density (ASTM D2937), direct shear (ASTM D3080), expansion index (ASTM 4829), and washed sieve analysis (ASTM D1140). Results of the laboratory tests are summarized on the Boring Logs and are included in the attached Appendix. Chemical analyses, including pH (ASTM D1293), soluble sulfates (CT417) and soluble chlorides (CT422) were also performed. Chemical test results are presented in Section 4.5.

## **SECTION THREE**

## **Site Conditions**

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### **3.1.1 Subsurface Conditions**

The closed gun range is located on Gothard Street and is south of Central Park. The site was used as a landfill many years ago and in the recent past was the site of an outdoor gun range. There are pockets of exposed trash on the ground surface. The site is relatively flat and covered with dirt, weeds and debris. Existing underground utilities may be present within the site boundary.

Fill material was encountered in all of the borings with the exception of B-5. The fill material extended to the maximum depth drilled of 50 feet in boring B-9. The material underlying boring B-1 consisted of silty clay fill with gravel to a depth of 3 feet and medium dense to dense clayey sand to the total depth drilled of 30 feet. The material encountered in boring B-2 consisted of medium dense silty sand fill with gravel to the total depth drilled of 5 feet. Stiff sandy silt fill with gravel was encountered in boring B-3 to the total depth drilled of 5 feet. Loose clayey sand fill was encountered in boring B-4 to the total depth drilled of 5 feet. Clayey sand with minor gravel was encountered in boring B-6 to a depth of 3 feet underlain by very stiff sandy clay to the total depth drilled of 5 feet. The material encountered in boring B-6 consists of fill material composed of loose to medium dense silty sand to a depth of 8 feet and medium dense to very dense silty sand to the total depth drilled of 20 feet. Medium dense to very dense silty sand fill material was encountered in boring B-7 to a depth of 45 feet underlain by medium dense silty sand to the total depth drilled of 50 feet. Loose to very dense silty sand fill material was encountered in boring B-8 to a depth of 43 feet underlain by medium dense to dense sand to the total depth drilled of 50 feet. The material underlying boring B-9 consists of medium dense silty sand fill material to a depth of 5 feet and medium stiff to very stiff sandy silt fill material to the total depth drilled of 50 feet. Large quantities of debris such as glass, wood and organics were encountered within the fill material throughout the borings. The soil profiles are shown in Figures 2 through 4 in the Appendix.

### **3.1.2 Regional Geologic Setting**

The project site is located in Huntington Beach, California, within the southern portion of the Los Angeles basin, in the transition between the northern portion of the Peninsular Ranges physiographic province and the southern portion of the Transverse Ranges physiographic province. The project area is considered to be within the Transverse Ranges physiographic

## **SECTION THREE**

## **Site Conditions**

province by Norris and Webb (1990) and within the Peninsular Ranges physiographic province by Yerkes et al. (1965). These two physiographic provinces have contrasting tectonic characteristics that overlap within the Los Angeles basin resulting in a complex tectonic environment marked by active faulting and historic seismicity. Geologic materials at the ground surface in the vicinity of the site consist of Quaternary alluvial sediments deposited by the Santa Ana River or its tributaries. The site is located in the United States Geological Survey Newport Beach Quadrangle.

### **3.1.3 Geologic Materials**

Geologic materials underlying the site consist of Quaternary marine terrace deposits. These deposits consist of clay, sand, and clayey sand mixture deposited in the last 1.8 million years. Bedrock was not encountered in our drill holes at the time of our investigation and is assumed to be present at a great depth due to the down warping of the Los Angeles Basin.

### **3.1.4 Geologic Structure**

The site is located to the north of the roughly east-west trending Newport – Inglewood Fault zone. The Newport – Inglewood Fault is primarily a strike slip fault with a sense of right lateral sense of movement. Locally, the Newport – Inglewood Fault exhibits a reverse slip sense of movement. The 6.4 Long Beach earthquake of 1933 is attributed to the Newport – Inglewood Fault.

### **3.1.5 Groundwater**

Groundwater was not encountered within the borings. Based on the California Geological Survey (1997), the historical highest groundwater level in the project vicinity is approximately 30 feet below the ground surface. However, based on two nearby wells, maintained by the California Department of Water Resources, historical high depth to groundwater has ranged from 0.5 feet (1994) to 51 feet (1993). This is from data obtained from wells located approximately 2 miles and 1.5 miles, respectively, from the project site. The depth to groundwater may fluctuate, depending on rainfall and possible groundwater recharge or pumping activity in the site vicinity.

### **3.1.6 Mineral Resources**

We believe that the site was originally sand and gravel pit which was then used as a waste disposal site. There is an old sand and gravel quarry just south of the site. There are no

## **SECTION THREE**

## **Site Conditions**

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economic metallic ore deposits within or directly adjacent to the project site. There is an active oil field located approximately 1 ½ miles southwest of the site.

## SECTION FOUR

## Geologic Hazards

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### 4.1 GEOLOGIC HAZARDS

#### 4.1.1 Faulting and Seismicity

A seismic hazards screening was performed for this site to evaluate potential seismic hazards. The computer program (EQFAULT, Version 3.00b) and data published by the CGS "The Revised 2002 California Probabilistic Seismic Hazard Maps," June 2003, were reviewed. Results of the fault search are presented in the Appendix. There are several active or potentially active faults within southern California that could affect the site in terms of ground shaking. Of these the Newport-Inglewood (L.A. Basin) Fault Zone ( $3.7 \pm$  kilometers from the site), the Compton Thrust Fault ( $7.1 \pm$  kilometers from the site), and the Newport-Inglewood (Offshore) ( $7.1 \pm$  kilometers from the site) are the most prominent due to the proximity and seismic potential.

The CGS (Special Publication 42, 2000) does not delineate this site as being within an Alquist-Priolo Earthquake Fault Zone. However, with the active faults in the region, the site could be subjected to future strong ground shaking that may result from earthquakes on local to distant sources.

#### 4.1.2 Historic Earthquakes

Historically, the San Andreas Fault Zone Complex and the Newport-Inglewood Fault Zone has rendered many earthquakes of the magnitude range of 5.0Mw or greater ('Mw' is the Moment Magnitude as defined by the USGS) in the last 200 years. Since the recording of seismic events began in the mid 18th century, at least 50 major earthquakes ( $> 5.0Mw$ ) have occurred within 62.1 miles (100km) of the subject site (Blake, 2000a). These major quakes have been estimated to be in the range of 5.0Mw to 7.0Mw. Each of these major quakes has rendered light to moderate damage to buildings and roads. For reference purposes, a summary of the significant ( $>6.0Mw$ ) earthquakes that affected the site are provided below.

**SECTION FOUR****Geologic Hazards**

Date	Quake Moment Magnitude (M <sub>w</sub> )	Approximate Distance (kilometers)
03/11/1933	6.30	9.7
07/11/1855	6.30	45.4
05/15/1910	6.00	55.6
12/16/1858	7.00	57.1
01/17/1994	6.70	75.4
07/30/1894	6.00	76.3
07/23/1923	6.25	77.0
12/19/1880	6.00	77.3
07/22/1899	6.50	81.2
12/08/1812	7.00	81.2
04/04/1893	6.00	86.5
02/09/1971	6.40	87.2
04/21/1918	6.80	92.7
12/25/1899	6.40	93.2
09/24/1827	7.0	98.0

A complete printout of the published cataloged quakes within 100 kilometers of the subject site is included at the end of this appendix.

### 4.1.3 Fault Rupture

In general terms, an earthquake is caused when movement along a plane of weakness in the rock releases strain energy. Fault movement may then propagate upward and cause displacement at the ground surface. Surface rupture usually occurs along the traces of known active or potentially active faults.

No known active or potentially active faults or splays traverse the project site. However, due to the site being in close approximation to the Newport-Inglewood Fault Zone, there is a small possibility of ground rupture due to strong ground motion which is typical of this region.

### 4.1.4 Ground Shaking

Strong to severe ground shaking will be experienced in the project area if a large magnitude earthquake occurs on one of the nearby principal late Quaternary faults.

## **SECTION FOUR**

## **Geologic Hazards**

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The number or frequency of large magnitude earthquakes that may occur during the life of the project cannot be predicted reliably. However, it is probable the project area will experience at least one major earthquake during the next 50 years. The potential hazards or adverse effects of ground shaking would depend on several factors that include the severity of ground shaking, the nature, depth, and extent of the seismic event; the type of structure involved, and the local topography. Based on the effects of local historical earthquakes, building foundations may fail resulting in excessive building settlement or collapse, underground tanks or buried utilities may be prone to uplift or failure; and access roadways may become blocked or impassable. In addition, broken utilities may result in fires, inhibit or contaminate water supplies and cut off services to the site.

### **4.1.5 Tsunamis/Seiches**

Tsunamis are large ocean waves that may be generated by earthquakes, submarine volcanic eruptions, or large submarine landslides. In the last 150 years there have been over 80 tsunamis along the coast of California (State of California Seismic Safety Commission, 2005). Seiches are similar; however, they are generally smaller with lower energy waves that form in smaller bodies of water such as lakes or bays.

Due to the project site elevation (approximately 55 feet above mean sea level), its proximity to the ocean (approximately 2 miles), and the fact that there are no enclosed bodies of water near the site, the project site is considered to have minor damage potential from tsunamis and seiches.

### **4.1.6 Liquefaction Potential**

Liquefaction is a mode of ground failure that results from the generation of high pore water pressures during earthquake ground shaking, causing loss of shear strength. Liquefaction is typically a hazard where loose sandy soils exist below groundwater. The CGS has designated certain areas within southern California as potential liquefaction hazard zones. These are areas considered at a risk of liquefaction-related ground failure during a seismic event, based upon mapped surficial deposits and the presence of a relatively shallow water table. The project site is located within a potential liquefaction hazard zone as designated by the CGS (1997). Materials encountered at the project site generally consist of loose to very dense sand and silt fill material containing debris and native soils. Groundwater was not encountered within the borings which were drilled to a maximum depth of 50 feet beneath the existing ground surface. Based on the California Geological Survey, historical high groundwater in the project vicinity is approximately 30 feet below the ground surface (1997).

## **SECTION FOUR**

### **Geologic Hazards**

Liquefaction analysis for the site was performed in accordance with the DMG Special Publication 117 and is attached. The liquefaction study utilized the software "LiquefyPro" by CivilTech Software and calculated liquefaction assuming a depth to groundwater of 30 feet for the historic high water table (CGS, 1997). This analysis was based on the soils data from the exploratory boring log and laboratory test results. Maximum acceleration was calculated using the UBE of 0.41g as determined by the CGS website. Liquefaction potential was calculated from a depth of 0 to 50 feet below the ground surface. The factor of safety was greater than 1.5 with the exception of depths 31 feet where the factor of safety was between 0.34 and 0.43. Based on our analysis and test results we have concluded that the potential for liquefaction at the site is high.

Based on calculation results, seismically-induced settlement of saturated and dry sands is estimated to be 10 inches and differential settlement is estimated to be 5 to 7 inches.

#### **4.1.7 Lateral Spreading**

Lateral spreading occurs during an earthquake in a near-surface liquefiable soil layer. Based on the type of soil at the site, historical depth to groundwater and the liquefaction analysis, there is a high potential for lateral spreading to occur at the site.

#### **4.1.8 Landslides**

The site is relatively flat; therefore the possibility of a landslide occurring at the site is negligible.

#### **4.1.9 Soil Erosion**

The site is relatively flat and is mostly underlain by an old landfill. There is very little topsoil at the site. The possibility of soil erosion is negligible.

#### **4.1.10 Expansive Soil**

Two expansion index tests were performed. The results indicate that the soil is considered to have low expansion potential.

#### **4.1.11 Use of Septic Tanks**

The site is located within the City of Huntington Beach and is accessible to the sewer system.

## **SECTION FIVE**

## **Impacts and Mitigation**

### **5.1 IMPACTS TO THE SITE**

The most significant potential impacts to the site could be as a result of the following:

- Fault rupture-due to the close proximity of the Newport-Inglewood Fault Zone there is a small potential for fault rupture
- Ground shaking-the site will most likely experience one major earthquake in the next fifty years
- Tsunamis/Seiches-the site is located within 2 miles of the coast and is at a relatively low elevation; therefore, the project site is considered to have slight damage potential from tsunamis and seiches
- Liquefaction Potential-the site is located within a liquefaction zone as designated by the CGS (1997) and liquefaction analysis showed that the potential for liquefaction is high
- Lateral Spreading-based on the depth to groundwater and the potential for liquefaction the potential for lateral spreading is high

### **5.2 MITIGATION MEASURES**

#### **5.2.1 Fault Rupture and Ground Shaking**

To reduce the impact due to possible fault rupture and ground shaking, any structures constructed at the site should be constructed in accordance with the seismic design standards of the 2007 California Building Code. Such design standards could include ground stabilization through densification of the soil in the upper 5 feet or through the installation of a geogrid reinforcement.

#### **5.2.2 Liquefaction and Lateral Spreading**

To reduce the potential impact due to liquefaction and lateral spreading and to minimize differential settlement of any new construction, we recommend that any new structures be supported by a deep foundation system such as driven piles or caissons. The foundation system should be designed to withstand negative dragdown due to existing fill and to mitigate for liquefaction and lateral spreading.

### **5.3 LIMITATIONS**

It must be recognized that conclusions reached in this report are based on conditions, which exist at the boring location and are assumed to exist over the entire site. In any subsoil investigation, it is necessary to assume that the subsoil conditions between boring(s) do not change significantly. The number of the borings, locations, and spacing are chosen in such a manner as

**SECTION FIVE****Impacts and Mitigation**

to decrease the possibility of undiscovered anomalies, while considering the nature of loading, size, existing structures, and cost of the project. Note that the boring(s) were placed as close to the location of the proposed structure(s) as possible. Consequently, careful observations must be made during construction to detect significant deviations of actual conditions throughout the construction area from those inferred from the exploratory borings.

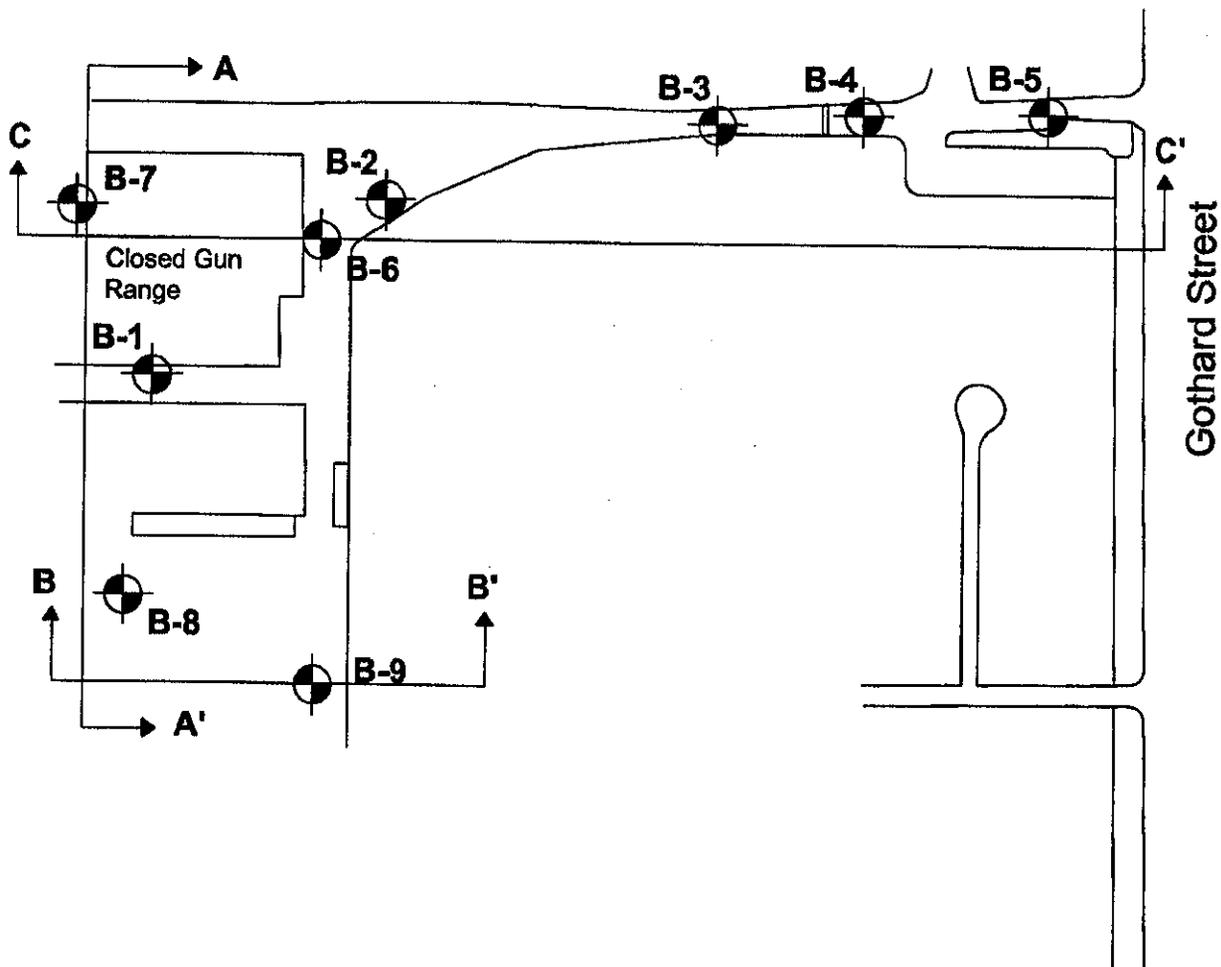
Should any unusual conditions be encountered during construction, this office should be notified immediately so that further investigations and supplemental recommendations can be made. Geotechnical observations and testing should be provided on a continuous basis during placement and compaction of the structural sections and/or overlay. If parties other than AESCO are engaged to provide geotechnical services during construction, they will be required to assume the full responsibility for the geotechnical phase of the project by adhering to the recommendations of this report.

Analysis by:

Adam Chamaa, P.E., G.E.

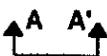
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**APPENDIX A**  
**SITE SKETCH**



**LEGEND**

 B-1      Approximate Location of Borings

      Cross Sections

<b>AESCO</b> Technologies, Inc.	<b>City of Huntington Beach</b>		
	Project No. : 20080175-A2918	Scale: 1 inch $\approx$ 110 feet	
	Site Name: Closed Gun Range	County of Orange	
	Site Address: Gothard st., Huntington Beach, CA		
<b>SITE SKETCH</b>		Date: 07-05-07	Figure 1

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**APPENDIX B**  
**BORING LOGS B-1 through B-9**

LOG OF BORING NO. B - 1

AESCO TECHNOLOGIES, INC.

Project: New Access Road  
Closed Gun Range

Location: Gothard Street  
Huntington Beach, CA

WATER: Not Encountered

Client: City of Huntington Beach

Logger:  
Project No. 29880175-A2918

DRILLING:  
Hollow Stem Auger

FIELD DATA		LABORATORY DATA											DESCRIPTION OF STRATUM	
SOIL SYMBOL	DEPTH (FT)	TESTS	MOISTURE CONTENT %	DRY DENSITY PCF	LIQUID LIMITS %	PLASTIC LIMITS %	PLASTICITY INDEX %	Unconsolidated Comp.		PASING 20 SIEVE %	DIRECT SHEAR			EXPANSION INDEX
		N <sub>60</sub> T <sub>20</sub> P <sub>100</sub>						TSF	SW		COHESION PSF	ANGLE Deg		
	3		11.8											FILL-Dark gray to black silty CLAY (CL), moist, w/gravel
C	6	N=38 P=4.0	16.9	110.6						44.5	600	8		FILL-Dark gray clayey SAND (SC), dense, moist, w/pieces of broken bottles, organics
	8													
	10	N=19												Medium dense, no sample recovery at 8'
	13	N=14	23.8											
C	15	N=13	32.8							45.4				
	18													
	20	N=10	22.4											Continues same at 18'
	23													
C	25	N=14 P=1.6	42.4	72.7										Wet, w/pieces of wood at 23'
	28													
	30	N=22	37.6		28	19	9							W/gravel at 28'

Boring Terminated at 30 Feet

TUBE SAMPLE  
 AUGER SAMPLE  
 CALIFORNIA MODIFIED SAMPLER  
 SPLIT SPOON  
 NO RECOVERY  
 Ground Water Level  
 Hydrostatic Ground Water Level  
 N= SPT, BLOWS/FT  
 T= THD, BLOWS/FT  
 P= HAND PEN, TSP

REMARKS:  
 NP: Non Plastic Materials  
 \* Remolded Samples

LOG OF BORING NO. B - 2

AESCO TECHNOLOGIES, INC.

Project: New Access Road  
Closed Gun Range

Location: Gothard Street  
Huntington Beach, CA

WATER: Not Encountered

Client: City of Huntington Beach

Logger: Project No. 20080175-A2918

DRILLING:  
Hollow Stem Auger

FIELD DATA TESTS LABORATORY DATA DESCRIPTION OF STRATUM

SOIL SYMBOL	DEPTH (FT)	N <sub>T</sub> T <sub>20</sub> P <sub>a</sub>	MOISTURE CONTENT %	DRY DENSITY PCF	LIQUID LIMITS %	PLASTIC LIMITS %	PLASTICITY INDEX %	Unsat'd Comp.		PASSING 200 SIEVE %	DIRECT SHEAR		EXPANSION INDEX
								TSF	Sw		COHESION PSF	ANGLE Deg	
C	3		5.4										
	5	N=24 P=2.0	11.4	91.8									

2.5" Base

FILL-Dark gray silty SAND (SM), moist

Medium dense, w/gravel and organics at 3'

Boring Terminated at 5 Feet

TUBE SAMPLE  
AUGER SAMPLE  
CALIFORNIA MOON/IED SAMPLER  
SPLIT SPOON  
NO RECOVERY

Ground Water Level Hydraulic Ground Water Level

N= SPT, BLOW/FT  
T= THD, BLOW/FT  
P= HAND PEN, TSF

REMARKS:  
NP: Non Plastic Materials  
\* Remolded Samples



LOG OF BORING NO. B - 3

AESCO TECHNOLOGIES, INC.

Project: New Access Road  
Closed Gun Range

Location: Gothard Street  
Huntington Beach, CA

WATER: Not Encountered

Client: City of Huntington Beach

Logger:  
Project No. 20080175-A2818

DRILLING:  
Hollow Stem Auger

FIELD DATA		LABORATORY DATA										EXPANSION INDEX	DESCRIPTION OF STRATUM		
SOIL SYMBOL	DEPTH (FT)	N <sub>v</sub> T <sub>v</sub> P <sub>v</sub>	MOISTURE CONTENT %	DRY DENSITY PCF	LIQUID LIMITS %	PLASTIC LIMITS %	PLASTICITY INDEX %	Unconfined Comp.		PASSEDS 200 SIEVE %	DIRECT SHEAR			EXPANSION INDEX	
								TSF	Stress %		COHESION PSF				ANGLE Deg
C	3	N=15 P=3.0	12.6		26	19	7							1" AC/2" Base	
	5		16.2	108.2											

Boring Terminated at 6 Feet

TUBE SAMPLE  
AUGER SAMPLE  
CALIFORNIA MODIFIED SAMPLER  
SPLIT SPCON  
NO RECOVERY

Ground Water Level  
Hydrostatic Ground Water Level

N= SPT, BLOWS/FT  
T= THD, BLOWS/FT  
P= HAND PEN, TSF

REMARKS:  
NP: Non Plastic Materials  
\* Remolded Samples

ML

LOG OF BORING NO. B - 4

AESCO TECHNOLOGIES, INC.

Project: New Access Road  
Closed Gun Range

Location: Gothard Street  
Huntington Beach, CA

WATER: Not Encountered

Client: City of Huntington Beach

Logger:  
Project No. 20080176-A2918

DRILLING:  
Hollow Stem Auger

FIELD DATA		TESTS		LABORATORY DATA										DESCRIPTION OF STRATUM
SOIL SYMBOL	DEPTH (FT)	N=	MOISTURE CONTENT %	DRY DENSITY PCF	LIQUID LIMITS %	PLASTIC LIMITS %	PLASTICITY INDEX %	Unconfined Comp.		PASSING 200 SIEVE %	DIRECT SHEAR		EXPANSION INDEX	
								TSF	Stem %		COHESION PSF	ANGLE Deg		
C	3		15.3							46.1				FILL-Dark brown clayey SAND (SC), moist, w/organics and broken bottles  Loose at 3'
	5	N=4 P=2.5	20.0	103.8										

Spring Terminated at 5 Feet

TUBE SAMPLE  
 AUGER SAMPLE  
 CALIFORNIA MODIFIED SAMPLER  
 SPLIT SPOON  
 NO RECOVERY

Ground Water Level  
 Hydrostatic Ground Water Level

N= SPT, BLOWS/FT  
 T= THD, BLOWS/FT  
 P= HAND PEN., TSF

**REMARKS:**  
 NP: Non Plastic Materials  
 \* Remolded Samples

SC

LOG OF BORING NO. B - 5

AESCO TECHNOLOGIES, INC.

Project: New Access Road  
Closed Gun Range

Location: Gothard Street  
Huntington Beach, CA

WATER: Not Encountered

Client: City of Huntington Beach

Logger:  
Project No. 20080175-A2918

DRILLING:  
Hollow Stem Auger

FIELD DATA		TESTS		LABORATORY DATA										DESCRIPTION OF STRATUM
BOL. SYMBOCL	DEPTH (FT)	N <sub>a</sub> T <sub>a</sub> P <sub>a</sub>	MOISTURE CONTENT %	DRY DENSITY PCF	LIQUID LIMITS %	PLASTIC LIMITS %	PLASTICITY INDEX %	Unconsolidated Comp.		PASSING 200 SIEVE %	DIRECT SHEAR		EXPANSION INDEX	
								TSP	Strain %		COHESION PSF	ANGLE Deg		
	3		6.9											Light brown clayey SAND (SC), moist, w/minor gravel
C	5	N=30 P=4.8	8.9	110.1						54.4				Light brown sandy CLAY (CL), very stiff, moist

Boring Terminated at 5 Feet

TUBE SAMPLE  
 AUGER SAMPLE  
 CALIFORNIA MODIFIED SAMPLER  
 SPLIT SPOON  
 NO RECOVERY

Ground Water Level  
 Hydrostatic Ground Water Level

N= SPT, BLOWS/FT  
 T= TMC BLOWS/FT  
 P= HAND PEN, TSP

SC  
 CL

REMARKS:  
NP: Non Plastic Materials  
\* Remolded Samples

**LOG OF BORING NO. B - 6**

**AESCO TECHNOLOGIES, INC.**

**Project:** New Access Road  
Closed Gun Range

**Location:** Gothard Street  
Huntington Beach, CA

WATER: Not Encountered

**Client:** City of Huntington Beach

**Logger:**  
**Project No. 20080175-A2915**

**DRILLING:**  
Hollow Stem Auger

FIELD DATA		TESTS		LABORATORY DATA										DESCRIPTION OF STRATUM
SOIL SYMBOL	DEPTH (FT)	N <sub>60</sub> T <sub>90</sub> P <sub>100</sub>	MOISTURE CONTENT %	DRY DENSITY PCF	LIQUID LIMITS %	PLASTIC LIMITS %	PLASTICITY INDEX %	Unified Comp.		PASSED 200 SIEVE %	DIRECT SHEAR		EXPANSION INDEX	
								TSF	Strain %		COHESION PSF	ANGLE Deg		
C	3	N=7	10.4										35	FILL-Dark brown clayey SAND (SC), moist, w/trash  Loose at 3'  Medium dense at 5'
	5		16.2											
	7	N=22	11.3											
	8													
SM	10	N=37	20.3											Brown silty SAND (SM), dense, wet   Very dense, moist at 13'   Medium dense at 15'
	13	N=50/5"	12.9											
	15													
	18	N=28	10.9											
20														

Boring Terminated at 20 Feet

TUBE SAMPLE  
 AUGER SAMPLE  
 CALIFORNIA MODIFIED SAMPLER  
 SPLIT SPOON  
 NO RECOVERY

Ground Water Level  
 Hydrostatic Ground Water Level

N= SPT, BLOWS/FT  
 T= THO. BLOWS/FT  
 P= HAND PEN. T&F

**REMARKS:**  
NP: Non Plastic Materials  
\* Retrievd Samples

 SC
  SM

LOG OF BORING NO. 9 - 7

AESCO TECHNOLOGIES, INC.

Project: New Access Road  
Closed Gun Range

Location: Gothard Street  
Huntington Beach, CA

WATER: Not Encountered

Client: City of Huntington Beach

Logger:  
Project No. 20080175-A2818

DRILLING:  
Hollow Stem Auger

DESCRIPTION OF STRATUM

FIELD DATA		LABORATORY DATA											EXPANSION INDEX	DESCRIPTION OF STRATUM	
SOIL SYMBOL	DEPTH (FT)	N-75	MOISTURE CONTENT %	DRY DENSITY PCF	LIQUID LIMITS %	PLASTIC LIMITS %	PLASTICITY INDEX %	Unclassified Comp.		PASSING 200 SIEVE %	DIRECT SHEAR				EXPANSION INDEX
								TSF	Strain %		COHESION PSF	ANGLE Deg			
	3		9.2												FILL-Brown silty SAND (SM), moist
	5	N=14	13.1									100	20		Light brown, medium dense at 3'
C	7	N=20	14.0	109.6						17.7					Brown at 5'
	8														
	10	N=16	11.5												Increase in sand, w/gravel
	13														
C	15	N=12	19.7	63.0											Gray brown at 13'
	18														
	20	N=30	46.3												Gray, dense, saturated, w/trash and newspaper
	23														
C	25	N=60/5"	67.6												Gray, very dense at 23'
	28														
	30	N=28	3.7												Medium dense, dry, w/gravel at 28'
	33														
C	35	N=37													No sample recovery at 33'
	38														
	40	N=11	0.4												Light brown silty SAND (SM), medium dense, dry
	43														
C	45	N=19	1.2												
	48														Light brown silty SAND (SM), medium dense, moist
	50	N=14	10.6							48.5					

Boring Terminated at 50 Feet

TUBE SAMPLE  
 AUGER SAMPLE  
 CALIFORNIA MODIFIED SAMPLER  
 SPLIT SPICON  
 NO RECOVERY

Ground Water Level  
 Hydraulic Ground Water Level

N = SPT, BLOW/FT  
 T = THD, BLOW/FT  
 P = HAND PEN, TSF

000000 SM

REMARKS:  
 NP: Non Plastic Materials  
 \* Remolded Samples

LOG OF BORING NO. B - 8

AESCO TECHNOLOGIES, INC.

Project: New Access Road  
Closed Gun Range

Location: Gothard Street  
Huntington Beach, CA

WATER: Not Encountered

Client: City of Huntington Beach

Logger: \_\_\_\_\_  
Project No. 20060175-A2918

DRILLING:  
Hollow Stem Auger

FIELD DATA		LABORATORY DATA											DESCRIPTION OF STRATUM		
SOIL SYMBOL	DEPTH (FT)	N <sub>60</sub> T <sub>60</sub> P <sub>60</sub>	MOISTURE CONTENT %	DRY DENSITY POF	LIQUID LIMITS %	PLASTIC LIMITS %	PLASTICITY INDEX %	Liquid Limit Comp.		PASSING 200 SIEVE %	DIRECT SHEAR			EXPANSION INDEX	
								TSF	Strain %		COHESION PSF	ANGLE Deg			
C	3		6.7											FILL-Light brown silty SAND (SM), moist	
	5	N=9	14.8											Loose, increase in moisture, w/trash at 3'	
	7	N=13	10.8	116.7										Medium dense, w/trash including concrete at 5'	
	8														
	10	N=10	10.1												
	13														
	15	N=4	12.7	73.3											Loose at 13'
	18														
	20	N=6	21.9												Wet at 18'
	25														
C	25	N=8 P=1.5	17.3	78.3											
	28														
	30	N=13	19.2											Medium dense at 28'	
	33														
C	35	N=50/5"	24.6	78.5										Very dense at 33'	
	38														
	40	N=19	10.9											Medium dense, moist at 38'	
	43														
C	45	N=19	3.7	117.7							50	15°		Light brown SAND (SP), medium dense, dry	
	48														
	50	N=42	2.8							4.1	0	15°		Dense at 48'	

Boring Terminated at 50 Feet

TUBE SAMPLE  
 AUGER SAMPLE  
 CALIFORNIA MODIFIED SAMPLER  
 SPLIT SPOON  
 NO RECOVERY

Ground Water Level  
 Hydraulic Ground Water Level

N= SPT, BLOW/FT  
 T= THD, BLOW/FT  
 P= HAND PEN, T/FT

OOOOOO GM  
 ..... SP

REMARKS:  
NP: Non Plastic Materials  
\* Remolded Samples

LOG OF BORING NO. B-9

AESCO TECHNOLOGIES, INC.

Project: New Access Road  
Closed Gun Range

Location: Gothard Street  
Huntington Beach, CA

WATER: Not Encountered

Client: City of Huntington Beach

Loggar:  
Project No. 20080178-A2818

DRILLING:  
Hollow Stem Auger

FIELD DATA		LABORATORY DATA											DESCRIPTION OF STRATUM		
SOIL SYMBOL	DEPTH (FT)	TESTS		MOISTURE CONTENT %	DRY DENSITY PCF	LIQUID LIMITS %	PLASTIC LIMITS %	PLASTICITY INDEX %	Unsat'd Comp.		FABRNG 200 SIEVE %	DIRECT SHEAR		EXPANSION INDEX	
		N <sub>T</sub>	P <sub>n</sub>						TBF	Stab		COHESION PSF			ANGLE Deg
[Pattern]	3			8.3											FILL-Light brown silty SAND (SM), moist
	6	N=20		7.9											Medium dense at 3'
[Pattern]	7	N=19		13.3	111.6										FILL- dark gray sandy SILT (ML), very stiff, moist
	8														
[Pattern]	10	N=6		18.9											Black, medium stiff, w/orgarics and pieces of wood at 8'
	13														
[Pattern]	15	N=11		14.6	85.8										Stiff at 13'
	18														
[Pattern]	20	N=8		16.8											Medium stiff at 18'
	23														
[Pattern]	25	N=14		28.0											Stiff, wet at 23'
	28														
[Pattern]	30	N=6		23.6											Medium stiff at 28'
	33														
[Pattern]	36	N=5		24.1	78.6										
	38														
[Pattern]	40	N=4		18.7											Continues same at 38'
	43														
[Pattern]	45	N=10		14.1	103.1										Moist at 43'
	48														
[Pattern]	50	N=10		10.5											Continues same at 48'

Boring Terminated at 60 Feet

TUBE SAMPLE  
 AUGER SAMPLE  
 CALIFORNIA MODIFIED SAMPLER  
 SPLIT SPOON  
 NO RECOVERY

Ground Water Level  
 Hydrostatic Ground Water Level

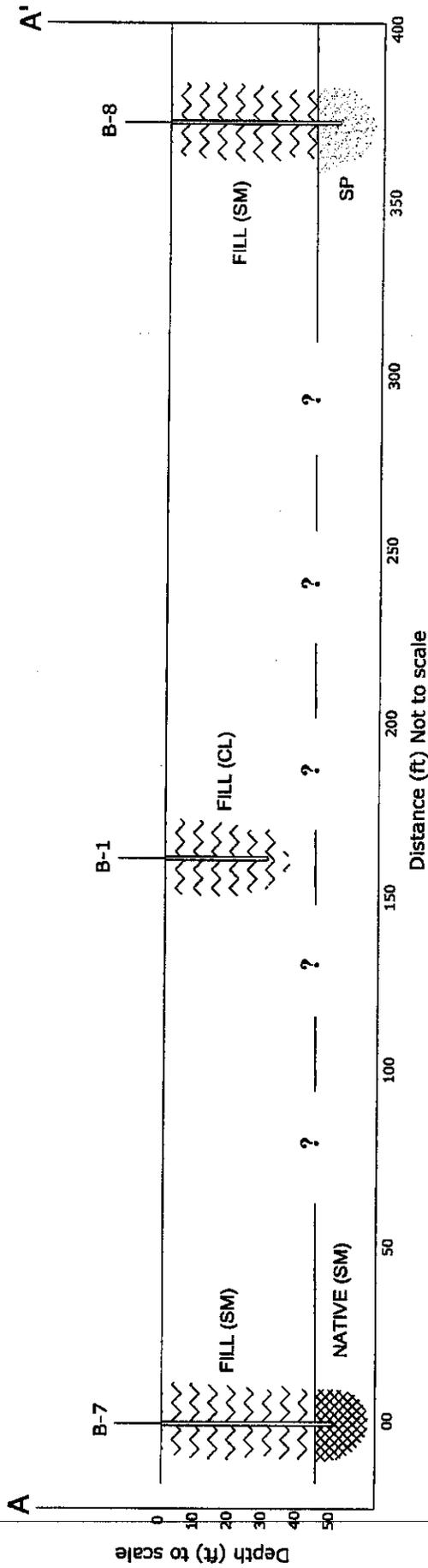
N= SPT, BLOW/FT  
 T= THD BLOW/FT  
 P= HAND PENL, T/F

[Pattern] SM  
 [Pattern] ML

REMARKS:  
NP: Non Plastic Materials  
\* Remolded Samples

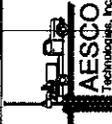
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**APPENDIX C**  
**SOIL PROFILES**  
**(Figures 2 and 3)**



**LEGEND**

-  Fill (SM)
-  Silty Sand (SM)
-  Sand (SP)


  
**AESCO** Technologies, Inc.

City of Huntington Beach  
 Project No.: 20080175-02918  
 Site Name: Closed Gun Range  
 Site Address: Gothard St, Huntington Beach, CA

SECTION A - A'  
 Figure 2

Drawn by:	S/K	REVISIONS	DATE	BY
Checked by:	FH			
Approved by:	AC			
NOT TO SCALE				
Date:	07-19-07			

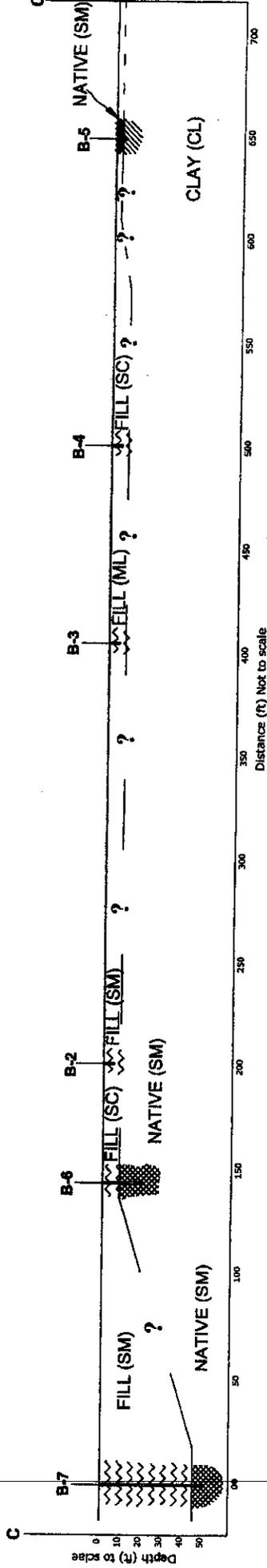
**AESCO** TECHNOLOGIES INC.  
 17785 Georgetown Ln, Huntington Beach,  
 California 92647 • TEL: (714) 375-3830

APPROVED BY:

ADAM CHAMPA, PE.

53992





**LEGEND**

-  Fill (SM)
-  Silty Sand (SM)
-  Sand (SC)
-  Clay (CL)

	City of Huntington Beach Project No.: 20080175-A2018 Site Name: Closed Gun Range Site Address: Gothard St., Huntington Beach, CA		Drawn by: AH Checked by: DP Approved by: AC NOT TO SCALE	DATE: _____ BY: _____
	SECTION C - C		Date: 11-11-08 Figure 4	APPROVED BY: _____ ADM CHAMMA, PE.
AESCO Technologies, Inc. 17782 Georgetown Ln., Huntington Beach, California 92647 / TEL: (714) 395-3630		APPROVED BY: _____ ADM CHAMMA, PE.		

---

**APPENDIX D**  
**LABORATORY TEST DATA**

*Aesco Technologies, Inc.*  
*17782 Georgetown Lane*  
*Huntington Beach, California 92647*

SITE/CLIENT: Closed Gun Range

Project NO: 20080175-A2918

BORING NO: B-7

DEPTH: 3-5

W=14.0%  $\gamma_d=94.3$  PCF C=100 PSF

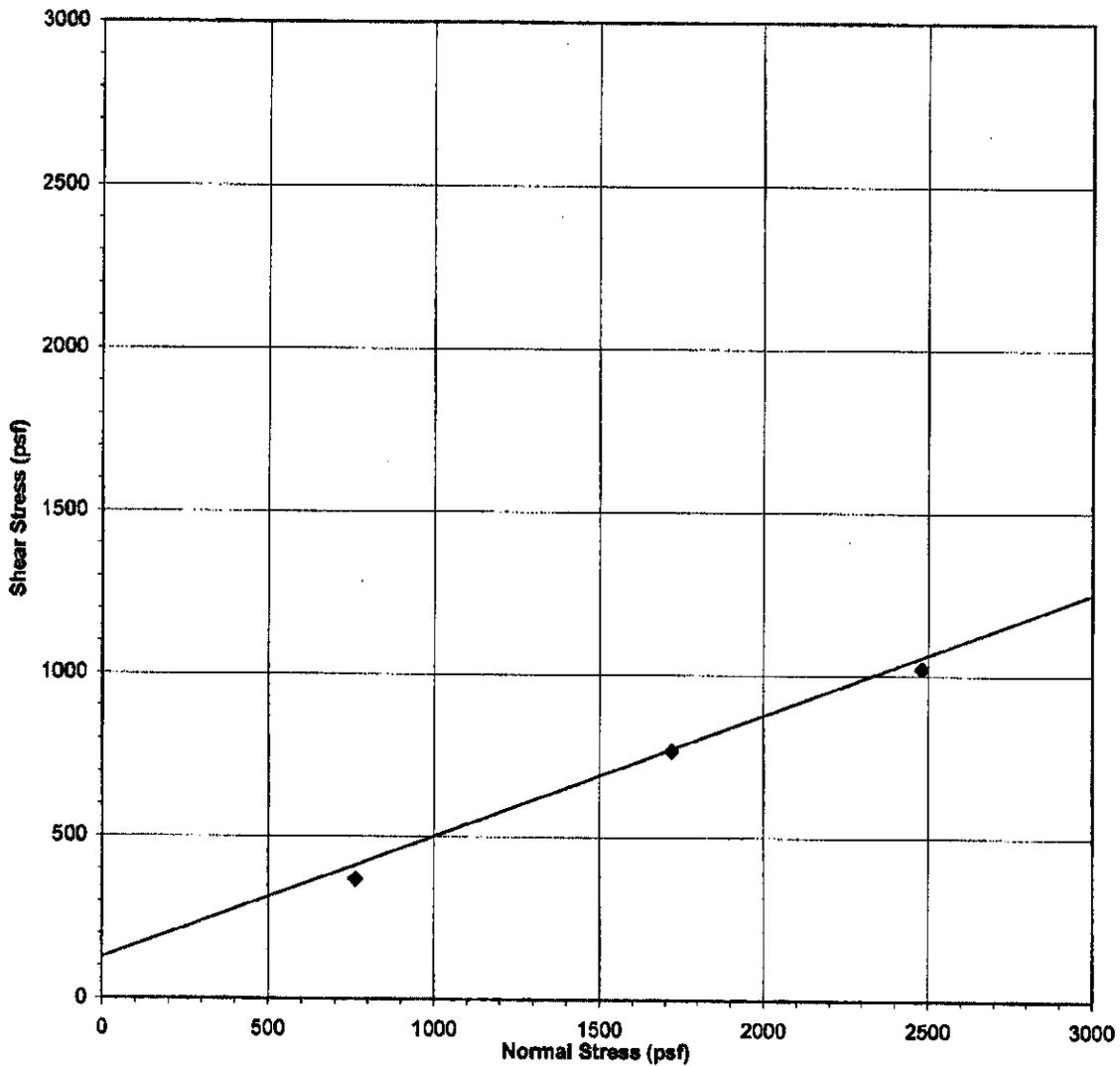
$\phi=20$  deg

UNDISTRIBUTED: \*

REMOLDED:

RESIDUAL:

CLASSIFICATION: SM



*Aesco Technologies, Inc.*  
*17782 Georgetown Lane*  
*Huntington Beach, California 92647*

**SITE/CLIENT:** Closed Gun Range

**Project NO:** 20080175-A2918

**BORING NO:** B-8

**DEPTH:** 43-45

**W=**3.7%

**$\gamma_d$ =** 102.8 PCF

**C=**50 PSF

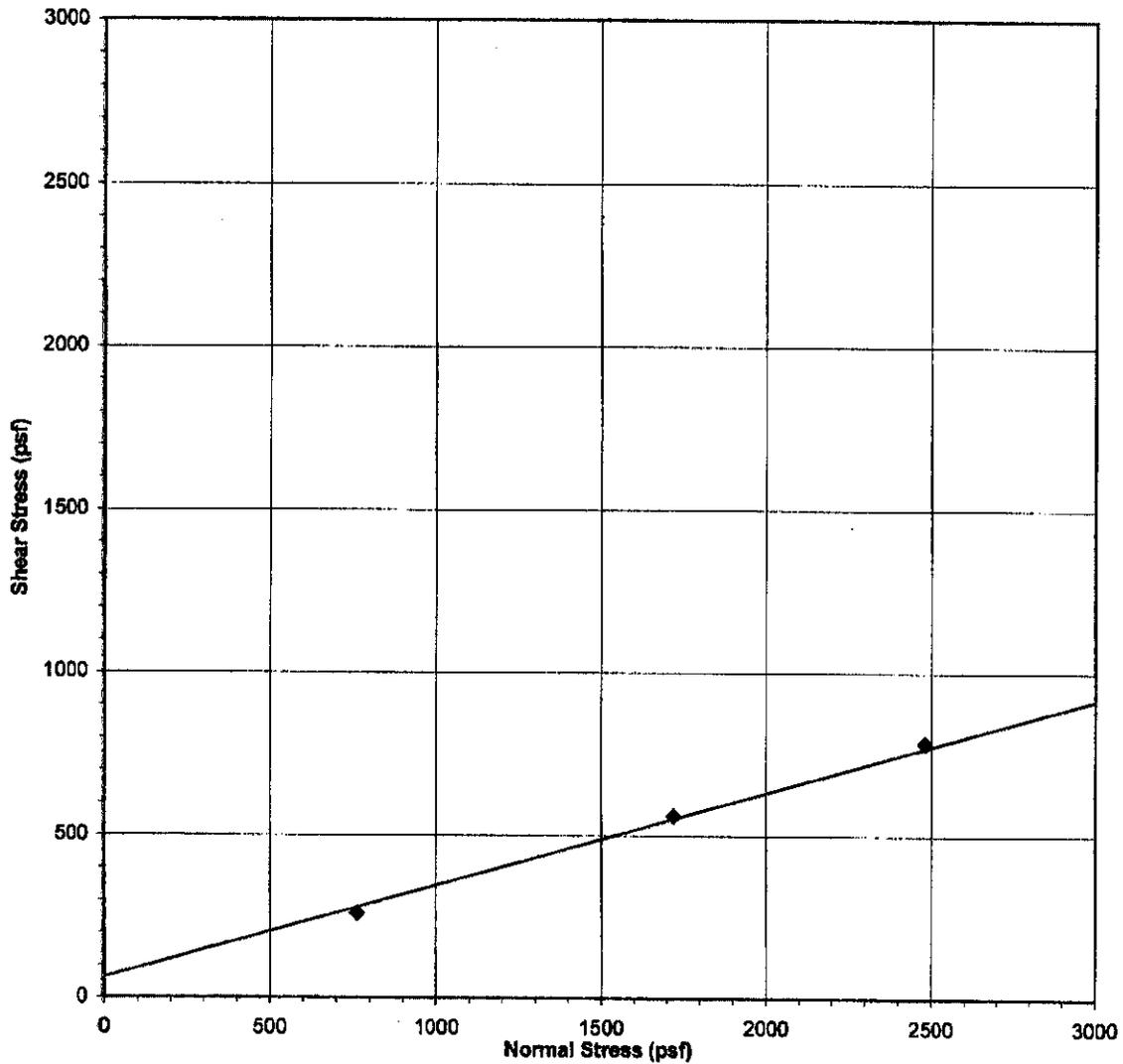
**$\phi$ =** 15 deg

**UNDISTRIBUTED:**

**REMOLED:** \*

**RESIDUAL:**

**CLASSIFICATION:** SM



*Aesco Technologies, Inc.*  
*17782 Georgetown Lane*  
*Huntington Beach, California 92647*

SITE/CLIENT: Closed Gun Range

Project NO: 20080175-A2918

BORING NO: B-8

DEPTH: 48-50

W=3.7%

$\gamma_d = 101.4$  PCF

C=0 PSF

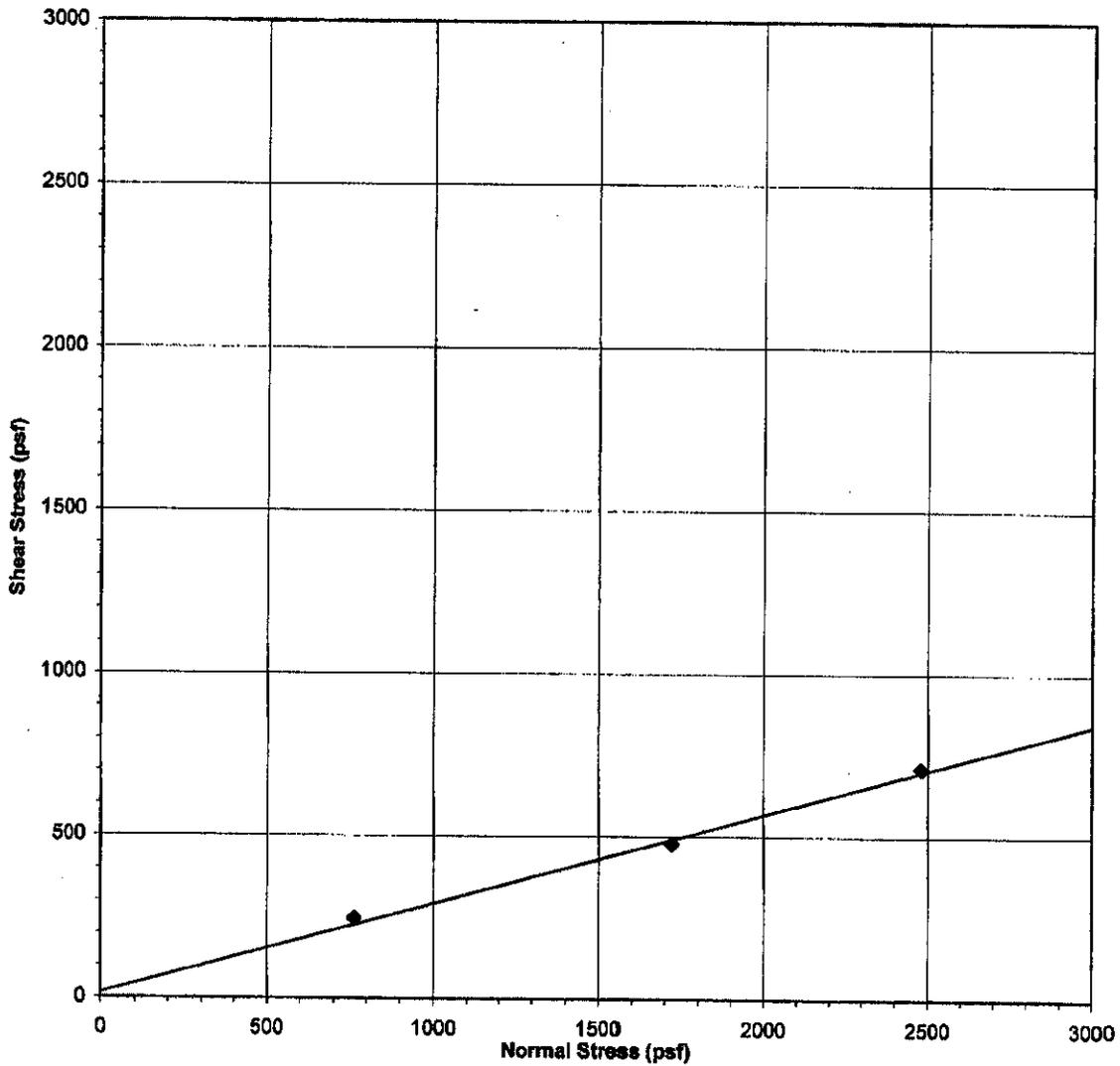
$\phi = 15$  deg

UNDISTRIBUTED:

REMOLDED: \*

RESIDUAL:

CLASSIFICATION: SM



*Aesco Technologies, Inc.*  
*17782 Georgetown Lane*  
*Huntington Beach, California 92647*

SITE/CLIENT: Closed Gun Range

Project NO: 20080175-

BORING NO: B-1

DEPTH: 3-5

W=16.9%    A2918  
           $\gamma_d = 101.0$  PCF    C=600 PSF

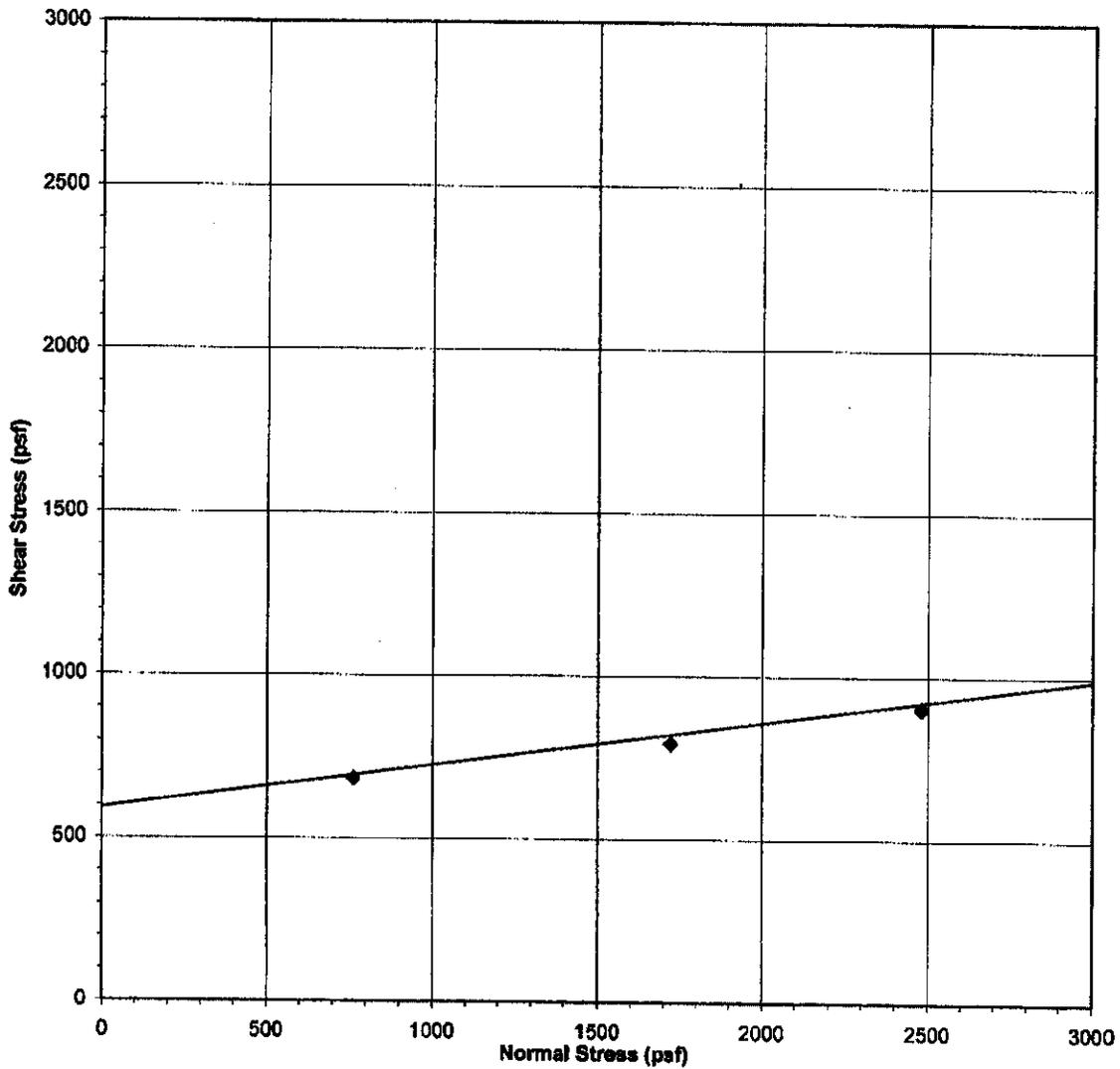
$\phi = 8$  deg

UNDISTURBED: \*

REMOLDED:

RESIDUAL:

CLASSIFICATION: SC



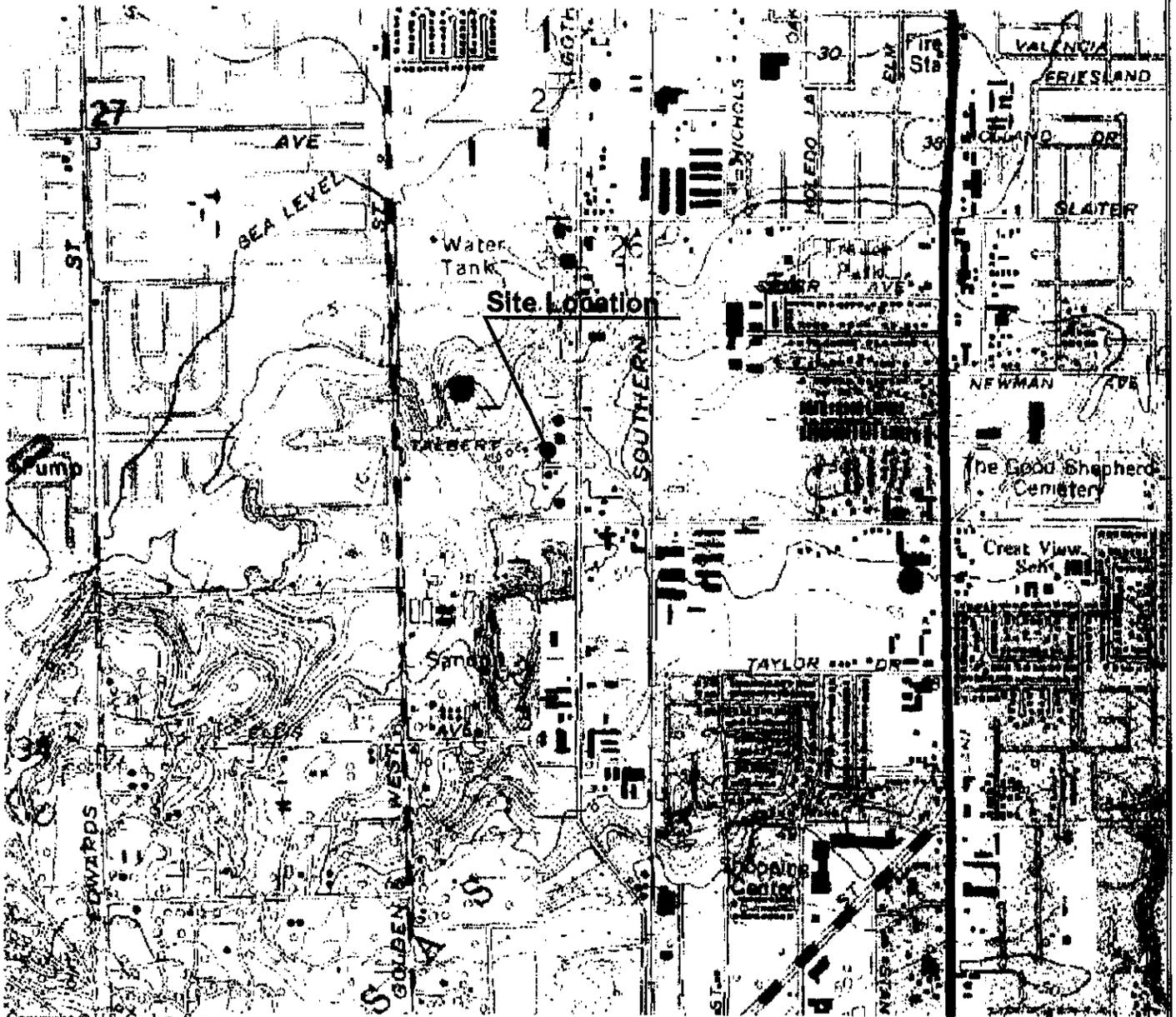
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**APPENDIX E**  
**GEOLOGIC MAP**  
**(Figure 5)**



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**APPENDIX F**  
**TOPOGRAPHIC MAP**  
**(Figure 6)**



Copyright © U.S. Geology Survey

**SANTA ANA QUADRANGLE  
1981**

**CITY OF HUNTINGTON BEACH**

Project No. : 20080175

Scale: 1 inch = 1000 feet

Site Name: CLOSED GUN RANGE

Site Address: GOTHARD ST & TALBERT AVE., HUNTINGTON BEACH, CA

**TOPOGRAPHIC MAP**

Date: 11-11-08

Figure 6



---

**APPENDIX G**  
**NEARBY FAULTS**

TEST.OUT

```
*****  
*  
*   E Q F A U L T   *  
*  
*   Version 3.00   *  
*  
*****
```

DETERMINISTIC ESTIMATION OF  
PEAK ACCELERATION FROM DIGITIZED FAULTS

JOB NUMBER: 20080175-A2918

DATE: 11-19-2008

JOB NAME: Huntington Beach Gun Range

CALCULATION NAME: Test Run Analysis

FAULT-DATA-FILE NAME: CDMGFLTE.DAT

SITE COORDINATES:

SITE LATITUDE: 33.6994  
SITE LONGITUDE: 118.0018

SEARCH RADIUS: 62.1 mi

ATTENUATION RELATION: 14) Campbell & Bozorgnia (1997 Rev.) - Alluvium  
UNCERTAINTY (M=Median, S=Sigma): S      Number of sigmas: 1.0  
DISTANCE MEASURE: cdist  
SCOND: 0  
Basement Depth: 5.00 km      Campbell SSR: 0      Campbell SHR: 0  
COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED: CDMGFLTE.DAT

MINIMUM DEPTH VALUE (km): 3.0

## EQFAULT SUMMARY

## DETERMINISTIC SITE PARAMETERS

Page 1

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE		ESTIMATED MAX. EARTHQUAKE EVENT		
	mi	(km)	MAXIMUM EARTHQUAKE MAG. (Mw)	PEAK SITE ACCEL. g	EST. SITE INTENSITY MOD. MERC.
NEWPORT-INGLEWOOD (L.A. Basin)	2.3	( 3.7)	6.9	0.714	XI
COMPTON THRUST	4.4	( 7.1)	6.8	0.794	XI
NEWPORT-INGLEWOOD (offshore)	9.2	(14.8)	6.9	0.432	X
PALOS VERDES	11.4	(18.3)	7.1	0.408	X
ELYSIAN PARK THRUST	12.9	(20.8)	6.7	0.325	IX
WHITTIER	18.0	(29.0)	6.8	0.223	IX
CHINO-CENTRAL AVE. (Elsinore)	23.1	(37.1)	6.7	0.174	VIII
ELSINORE-GLEN IVY	23.6	(38.0)	6.8	0.170	VIII
SAN JOSE	24.9	(40.1)	6.5	0.140	VIII
CORONADO BANK	30.1	(48.5)	7.4	0.202	VIII
RAYMOND	31.1	(50.1)	6.5	0.106	VII
VERDUGO	32.4	(52.1)	6.7	0.117	VII
HOLLYWOOD	32.6	(52.4)	6.4	0.092	VII
SIERRA MADRE	33.2	(53.5)	7.0	0.138	VIII
CUCAMONGA	34.5	(55.6)	7.0	0.132	VIII
CLAMSHELL-SAWPIT	34.7	(55.8)	6.5	0.091	VII
SANTA MONICA	35.8	(57.6)	6.6	0.094	VII
ELSINORE-TEMECULA	37.8	(60.9)	6.8	0.100	VII
MALIBU COAST	38.5	(61.9)	6.7	0.092	VII
NORTHRIDGE (E. Oak Ridge)	43.6	(70.1)	6.9	0.091	VII
SIERRA MADRE (San Fernando)	45.2	(72.7)	6.7	0.074	VII
SAN GABRIEL	45.7	(73.5)	7.0	0.094	VII
ANACAPA-DUME	45.9	(73.8)	7.3	0.115	VII
SAN JACINTO-SAN BERNARDINO	46.5	(74.9)	6.7	0.070	VI
SAN JACINTO-SAN JACINTO VALLEY	49.2	(79.1)	6.9	0.078	VII
SAN ANDREAS - 1857 Rupture	50.0	(80.4)	7.8	0.159	VIII
SAN ANDREAS - Mojave	50.0	(80.4)	7.1	0.091	VII
SAN ANDREAS - San Bernardino	50.0	(80.5)	7.3	0.109	VII
SAN ANDREAS - Southern	50.0	(80.5)	7.4	0.118	VII
ROSE CANYON	51.5	(82.9)	6.9	0.074	VII
CLEGHORN	52.4	(84.3)	6.5	0.051	VI
SANTA SUSANA	52.8	(85.0)	6.6	0.054	VI
HOLSER	57.2	(92.0)	6.5	0.045	VI
NORTH FRONTAL FAULT ZONE (west)	59.3	(95.4)	7.0	0.064	VI
ELSINORE-JULIAN	61.1	(98.3)	7.1	0.071	VI
OAK RIDGE (Onshore)	61.7	(99.3)	6.9	0.055	VI
SIMI-SANTA ROSA	62.0	(99.7)	6.7	0.047	VI

\*\*\*\*\*

TEST.OUT

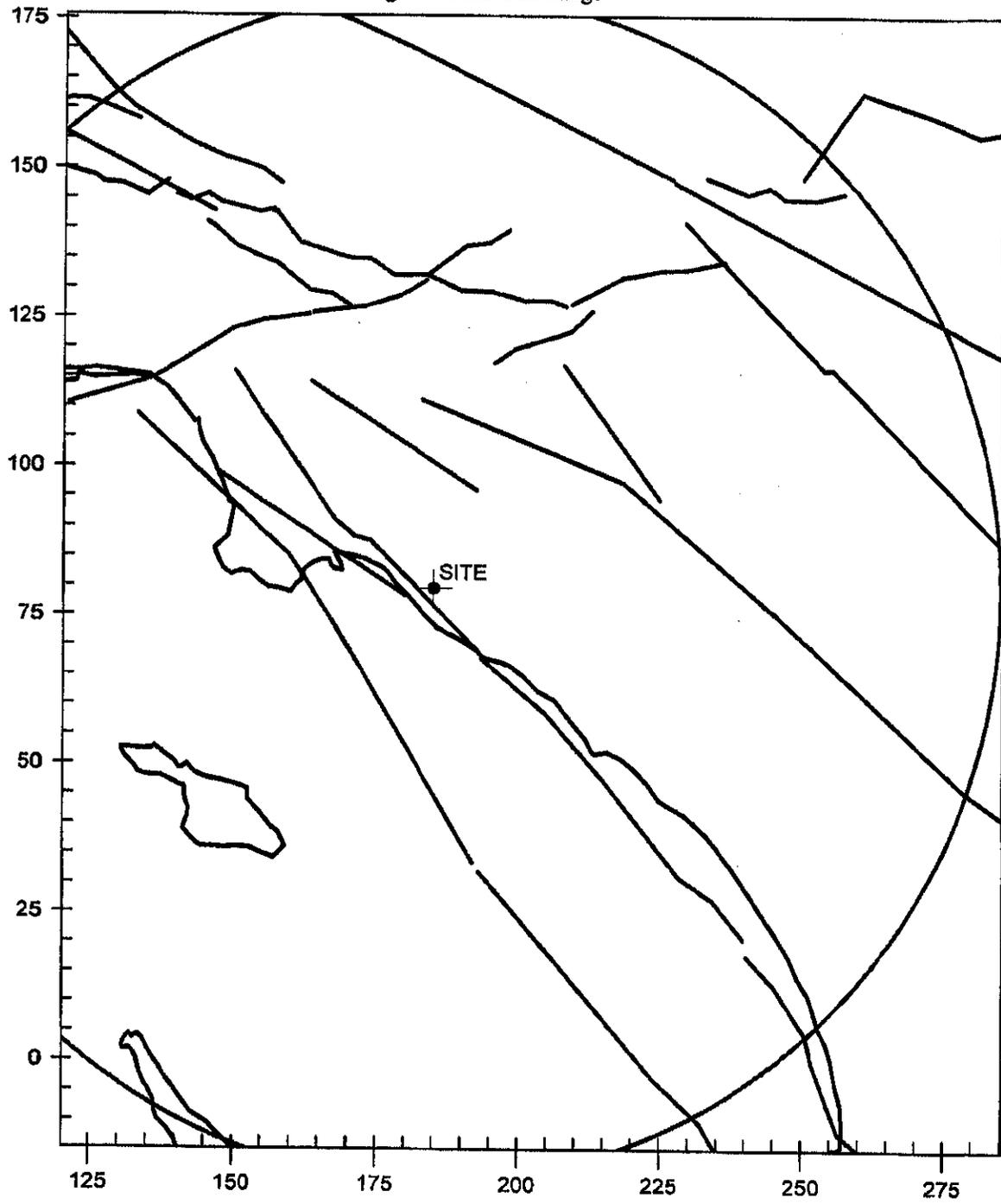
-END OF SEARCH- 37 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE NEWPORT-INGLEWOOD (L.A.Basin) FAULT IS CLOSEST TO THE SITE.  
IT IS ABOUT 2.3 MILES (3.7 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.7945 g

# CALIFORNIA FAULT MAP

Huntington Beach Gun Range



---

**APPENDIX H**  
**HISTORICAL EARTHQUAKES**

TEST.OUT

```
*****  
*                               *  
*   E Q S E A R C H           *  
*                               *  
*   Version 3.00             *  
*                               *  
*****
```

ESTIMATION OF  
PEAK ACCELERATION FROM  
CALIFORNIA EARTHQUAKE CATALOGS

JOB NUMBER: 20080175

DATE: 11-11-2008

JOB NAME: Huntington BEach Gun Range

EARTHQUAKE-CATALOG-FILE NAME: ALLQUAKE.DAT

MAGNITUDE RANGE:

MINIMUM MAGNITUDE: 4.00

MAXIMUM MAGNITUDE: 9.00

SITE COORDINATES:

SITE LATITUDE: 33.6994

SITE LONGITUDE: 118.0018

SEARCH DATES:

START DATE: 1808

END DATE: 2008

SEARCH RADIUS:

62.1 mi

99.9 km

ATTENUATION RELATION: 14) Campbell & Bozorgnia (1997 Rev.) - Alluvium

UNCERTAINTY (M=Median, s=Sigma): S Number of Sigmas: 1.0

ASSUMED SOURCE TYPE: DS [SS=Strike-slip, DS=Reverse-slip, BT=Blind-thrust]

SCOND: 0 Depth Source: A

Basement Depth: 5.00 km Campbell SSR: 0 Campbell SHR: 0

COMPUTE PEAK HORIZONTAL ACCELERATION

MINIMUM DEPTH VALUE (km): 3.0

-----  
EARTHQUAKE SEARCH RESULTS  
-----

Page 1

FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	33.6800	117.9930	11/20/1961	85334.7	4.4	4.00	0.191	VIII	1.4( 2.3)
DMG	33.6710	118.0120	10/20/1961	223534.2	5.6	4.10	0.193	VIII	2.0( 3.3)
DMG	33.6650	117.9790	10/20/1961	214240.7	7.2	4.00	0.169	VIII	2.7( 4.4)
DMG	33.6830	118.0500	03/11/1933	1250 0.0	0.0	4.40	0.212	VIII	3.0( 4.8)
DMG	33.6830	118.0500	03/11/1933	658 3.0	0.0	5.50	0.487	X	3.0( 4.8)
DMG	33.6590	117.9810	10/20/1961	20 714.5	6.1	4.00	0.162	VIII	3.0( 4.9)
DMG	33.6540	117.9940	10/20/1961	194950.5	4.6	4.30	0.194	VIII	3.2( 5.1)
DMG	33.7500	118.0000	11/16/1934	2126 0.0	0.0	4.00	0.153	VIII	3.5( 5.6)
DMG	33.7000	118.0670	03/11/1933	51022.0	0.0	5.10	0.303	IX	3.7( 6.0)
DMG	33.7000	118.0670	03/11/1933	85457.0	0.0	5.10	0.303	IX	3.7( 6.0)
DMG	33.7000	118.0670	02/08/1940	165617.0	0.0	4.00	0.149	VIII	3.7( 6.0)
DMG	33.7000	118.0670	07/20/1940	4 113.0	0.0	4.00	0.149	VIII	3.7( 6.0)
DMG	33.6170	118.0170	03/15/1933	111332.0	0.0	4.90	0.206	VIII	5.8( 9.3)
DMG	33.6170	118.0170	10/02/1933	1326 1.0	0.0	4.00	0.114	VII	5.8( 9.3)
DMG	33.6170	118.0170	03/14/1933	19 150.0	0.0	5.10	0.237	IX	5.8( 9.3)
DMG	33.7500	118.0830	03/11/1933	611 0.0	0.0	4.40	0.148	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	515 0.0	0.0	4.00	0.112	VII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	521 0.0	0.0	4.40	0.148	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	8 8 0.0	0.0	4.50	0.158	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	555 0.0	0.0	4.00	0.112	VII	5.8( 9.4)
DMG	33.7500	118.0830	03/13/1933	1929 0.0	0.0	4.20	0.129	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	513 0.0	0.0	4.70	0.180	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	837 0.0	0.0	4.00	0.112	VII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	926 0.0	0.0	4.10	0.121	VII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	1025 0.0	0.0	4.00	0.112	VII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	1045 0.0	0.0	4.00	0.112	VII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	11 0 0.0	0.0	4.00	0.112	VII	5.8( 9.4)
DMG	33.7500	118.0830	04/01/1933	642 0.0	0.0	4.20	0.129	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	910 0.0	0.0	5.10	0.235	IX	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	911 0.0	0.0	4.40	0.148	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	439 0.0	0.0	4.90	0.205	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	1147 0.0	0.0	4.40	0.148	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	440 0.0	0.0	4.70	0.180	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	832 0.0	0.0	4.20	0.129	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	1357 0.0	0.0	4.00	0.112	VII	5.8( 9.4)
DMG	33.7500	118.0830	03/13/1933	1532 0.0	0.0	4.10	0.121	VII	5.8( 9.4)
DMG	33.7500	118.0830	03/12/1933	546 0.0	0.0	4.40	0.148	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/14/1933	036 0.0	0.0	4.20	0.129	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/14/1933	1219 0.0	0.0	4.50	0.158	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	1547 0.0	0.0	4.00	0.112	VII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	1653 0.0	0.0	4.80	0.192	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	1944 0.0	0.0	4.00	0.112	VII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	618 0.0	0.0	4.20	0.129	VIII	5.8( 9.4)

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DMG	33.7500	118.0830	03/11/1933	1129	0.0	0.0	4.00	0.112	VII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	1138	0.0	0.0	4.00	0.112	VII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	1141	0.0	0.0	4.20	0.129	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	751	0.0	0.0	4.20	0.129	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	759	0.0	0.0	4.10	0.121	VII	5.8( 9.4)
DMG	33.7500	118.0830	03/12/1933	027	0.0	0.0	4.40	0.148	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/12/1933	034	0.0	0.0	4.00	0.112	VII	5.8( 9.4)
DMG	33.7500	118.0830	03/12/1933	448	0.0	0.0	4.00	0.112	VII	5.8( 9.4)
DMG	33.7500	118.0830	03/19/1933	2123	0.0	0.0	4.20	0.129	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/12/1933	6 1	0.0	0.0	4.20	0.129	VIII	5.8( 9.4)

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EARTHQUAKE SEARCH RESULTS  
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FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC)			DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE	
				H	M	Sec					mi	[km]
DMG	33.7500	118.0830	03/12/1933	616	0.0	0.0	4.60	0.169	VIII	5.8( 9.4)		
DMG	33.7500	118.0830	03/12/1933	740	0.0	0.0	4.20	0.129	VIII	5.8( 9.4)		
DMG	33.7500	118.0830	03/12/1933	835	0.0	0.0	4.20	0.129	VIII	5.8( 9.4)		
DMG	33.7500	118.0830	03/12/1933	15 2	0.0	0.0	4.20	0.129	VIII	5.8( 9.4)		
DMG	33.7500	118.0830	03/12/1933	1651	0.0	0.0	4.00	0.112	VII	5.8( 9.4)		
DMG	33.7500	118.0830	03/12/1933	1738	0.0	0.0	4.50	0.158	VIII	5.8( 9.4)		
DMG	33.7500	118.0830	03/12/1933	1825	0.0	0.0	4.10	0.121	VII	5.8( 9.4)		
DMG	33.7500	118.0830	03/12/1933	2128	0.0	0.0	4.10	0.121	VII	5.8( 9.4)		
DMG	33.7500	118.0830	03/12/1933	2354	0.0	0.0	4.50	0.158	VIII	5.8( 9.4)		
DMG	33.7500	118.0830	03/13/1933	343	0.0	0.0	4.10	0.121	VII	5.8( 9.4)		
DMG	33.7500	118.0830	03/13/1933	432	0.0	0.0	4.70	0.180	VIII	5.8( 9.4)		
DMG	33.7500	118.0830	03/13/1933	617	0.0	0.0	4.00	0.112	VII	5.8( 9.4)		
DMG	33.7500	118.0830	03/13/1933	1318	28.0	0.0	5.30	0.274	IX	5.8( 9.4)		
DMG	33.7500	118.0830	03/15/1933	432	0.0	0.0	4.10	0.121	VII	5.8( 9.4)		
DMG	33.7500	118.0830	03/20/1933	1358	0.0	0.0	4.10	0.121	VII	5.8( 9.4)		
DMG	33.7500	118.0830	03/21/1933	326	0.0	0.0	4.10	0.121	VII	5.8( 9.4)		
DMG	33.7500	118.0830	03/11/1933	524	0.0	0.0	4.20	0.129	VIII	5.8( 9.4)		
DMG	33.7500	118.0830	03/11/1933	553	0.0	0.0	4.00	0.112	VII	5.8( 9.4)		
DMG	33.7500	118.0830	03/14/1933	2242	0.0	0.0	4.10	0.121	VII	5.8( 9.4)		
DMG	33.7500	118.0830	03/15/1933	2 8	0.0	0.0	4.10	0.121	VII	5.8( 9.4)		
DMG	33.7500	118.0830	03/18/1933	2052	0.0	0.0	4.20	0.129	VIII	5.8( 9.4)		
DMG	33.7500	118.0830	03/15/1933	540	0.0	0.0	4.20	0.129	VIII	5.8( 9.4)		
DMG	33.7500	118.0830	03/11/1933	635	0.0	0.0	4.20	0.129	VIII	5.8( 9.4)		
DMG	33.7500	118.0830	03/16/1933	1456	0.0	0.0	4.00	0.112	VII	5.8( 9.4)		
DMG	33.7500	118.0830	03/16/1933	1529	0.0	0.0	4.20	0.129	VIII	5.8( 9.4)		
DMG	33.7500	118.0830	03/16/1933	1530	0.0	0.0	4.10	0.121	VII	5.8( 9.4)		
DMG	33.7500	118.0830	03/17/1933	1651	0.0	0.0	4.10	0.121	VII	5.8( 9.4)		
DMG	33.7500	118.0830	03/30/1933	1225	0.0	0.0	4.40	0.148	VIII	5.8( 9.4)		
DMG	33.7500	118.0830	03/31/1933	1049	0.0	0.0	4.10	0.121	VII	5.8( 9.4)		
DMG	33.7500	118.0830	03/11/1933	252	0.0	0.0	4.00	0.112	VII	5.8( 9.4)		
DMG	33.7500	118.0830	03/11/1933	257	0.0	0.0	4.20	0.129	VIII	5.8( 9.4)		
DMG	33.7500	118.0830	03/23/1933	840	0.0	0.0	4.10	0.121	VII	5.8( 9.4)		
DMG	33.7500	118.0830	03/23/1933	1831	0.0	0.0	4.10	0.121	VII	5.8( 9.4)		
DMG	33.7500	118.0830	03/25/1933	1346	0.0	0.0	4.10	0.121	VII	5.8( 9.4)		
DMG	33.7500	118.0830	03/11/1933	227	0.0	0.0	4.60	0.169	VIII	5.8( 9.4)		
DMG	33.7500	118.0830	03/11/1933	230	0.0	0.0	5.10	0.235	IX	5.8( 9.4)		
DMG	33.7500	118.0830	03/11/1933	336	0.0	0.0	4.00	0.112	VII	5.8( 9.4)		
DMG	33.7500	118.0830	04/02/1933	8 0	0.0	0.0	4.00	0.112	VII	5.8( 9.4)		
DMG	33.7500	118.0830	04/02/1933	1536	0.0	0.0	4.00	0.112	VII	5.8( 9.4)		

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DMG	33.7500	118.0830	03/11/1933	436 0.0	0.0	4.60	0.169	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	222 0.0	0.0	4.00	0.112	VII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	2 4 0.0	0.0	4.90	0.205	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	2 5 0.0	0.0	4.30	0.138	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	2 9 0.0	0.0	5.00	0.218	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	1956 0.0	0.0	4.20	0.129	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	211 0.0	0.0	4.40	0.148	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	258 0.0	0.0	4.00	0.112	VII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	259 0.0	0.0	4.60	0.169	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	347 0.0	0.0	4.10	0.121	VII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	2240 0.0	0.0	4.40	0.148	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	23 5 0.0	0.0	4.20	0.129	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	311 0.0	0.0	4.20	0.129	VIII	5.8( 9.4)
DMG	33.7500	118.0830	03/11/1933	323 0.0	0.0	5.00	0.218	VIII	5.8( 9.4)

EARTHQUAKE SEARCH RESULTS

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FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC)			DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE	
				H	M	Sec					mi	[km]
DMG	33.7500	118.0830	03/11/1933	216	0.0	0.0	0.0	4.80	0.192	VIII	5.8( 9.4)	
DMG	33.7500	118.0830	03/11/1933	2232	0.0	0.0	0.0	4.10	0.121	VII	5.8( 9.4)	
DMG	33.7500	118.0830	03/11/1933	22 0	0.0	0.0	0.0	4.40	0.148	VIII	5.8( 9.4)	
DMG	33.7500	118.0830	03/11/1933	3 5	0.0	0.0	0.0	4.20	0.129	VIII	5.8( 9.4)	
DMG	33.7500	118.0830	03/11/1933	3 9	0.0	0.0	0.0	4.40	0.148	VIII	5.8( 9.4)	
DMG	33.7500	118.0830	03/11/1933	339	0.0	0.0	0.0	4.00	0.112	VII	5.8( 9.4)	
DMG	33.7500	118.0830	03/11/1933	210	0.0	0.0	0.0	4.60	0.169	VIII	5.8( 9.4)	
DMG	33.7500	118.0830	03/11/1933	2231	0.0	0.0	0.0	4.40	0.148	VIII	5.8( 9.4)	
MGI	33.7000	117.9000	07/08/1902	945	0.0	0.0	0.0	4.00	0.112	VII	5.8( 9.4)	
DMG	33.6170	118.0330	05/21/1938	944	0.0	0.0	0.0	4.00	0.110	VII	6.0( 9.6)	
DMG	33.6170	117.9670	03/11/1933	154	7.8	0.0	0.0	6.30	0.542	X	6.0( 9.7)	
DMG	33.7330	118.1000	03/11/1933	15 9	0.0	0.0	0.0	4.40	0.143	VIII	6.1( 9.8)	
DMG	33.7330	118.1000	03/11/1933	1447	0.0	0.0	0.0	4.40	0.143	VIII	6.1( 9.8)	
DMG	33.7330	118.1000	03/11/1933	1350	0.0	0.0	0.0	4.40	0.143	VIII	6.1( 9.8)	
DMG	33.6000	118.0000	03/11/1933	231	0.0	0.0	0.0	4.40	0.130	VIII	6.9( 11.0)	
DMG	33.6000	118.0000	03/11/1933	217	0.0	0.0	0.0	4.50	0.139	VIII	6.9( 11.0)	
DMG	33.6000	118.0170	12/25/1935	1715	0.0	0.0	0.0	4.50	0.138	VIII	6.9( 11.1)	
DMG	33.8000	118.0000	10/21/1913	938	0.0	0.0	0.0	4.00	0.095	VII	6.9( 11.2)	
GSP	33.6200	117.9000	04/07/1989	200730.2	13.0	0.0	13.0	4.50	0.121	VII	8.0( 12.9)	
DMG	33.7670	118.1170	11/04/1939	2141	0.0	0.0	0.0	4.00	0.081	VII	8.1( 13.0)	
DMG	33.7500	118.1330	03/11/1933	11 4	0.0	0.0	0.0	4.60	0.126	VIII	8.3( 13.4)	
DMG	33.5750	117.9830	03/11/1933	518	4.0	0.0	0.0	5.20	0.182	VIII	8.7( 13.9)	
DMG	33.6170	118.1170	01/20/1934	2117	0.0	0.0	0.0	4.50	0.111	VII	8.7( 14.0)	
MGI	33.8000	117.9000	05/22/1902	740	0.0	0.0	0.0	4.30	0.091	VII	9.1( 14.6)	
DMG	33.5670	117.9830	07/07/1937	1112	0.0	0.0	0.0	4.00	0.071	VI	9.2( 14.8)	
DMG	33.5670	117.9830	04/17/1934	1833	0.0	0.0	0.0	4.00	0.071	VI	9.2( 14.8)	
DMG	33.7830	118.1330	11/20/1933	1032	0.0	0.0	0.0	4.00	0.068	VI	9.5( 15.3)	
DMG	33.7830	118.1330	01/13/1940	749	7.0	0.0	0.0	4.00	0.068	VI	9.5( 15.3)	
DMG	33.7830	118.1330	10/02/1933	91017.6	0.0	0.0	0.0	5.40	0.193	VIII	9.5( 15.3)	
DMG	33.5610	118.0580	01/15/1937	183547.0	10.0	0.0	10.0	4.00	0.063	VI	10.1( 16.2)	
DMG	33.7500	118.1670	05/16/1933	205855.0	0.0	0.0	0.0	4.00	0.063	VI	10.1( 16.3)	
DMG	33.7500	118.1830	08/04/1933	41748.0	0.0	0.0	0.0	4.00	0.057	VI	11.0( 17.7)	
DMG	33.7670	117.8170	08/22/1936	521	0.0	0.0	0.0	4.00	0.054	VI	11.6( 18.6)	
DMG	33.6330	118.2000	11/01/1940	20 046.0	0.0	0.0	0.0	4.00	0.050	VI	12.3( 19.7)	
DMG	33.6300	118.2000	09/13/1929	132338.2	0.0	0.0	0.0	4.00	0.050	VI	12.4( 19.9)	

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DMG	33.7830	118.2000	12/27/1939	192849.0	0.0	4.70	0.083	VII	12.8( 20.5)
MGI	33.8000	117.8000	11/10/1926	1723 0.0	0.0	4.60	0.071	VI	13.5( 21.7)
MGI	33.8000	117.8000	05/19/1917	719 0.0	0.0	4.00	0.044	VI	13.5( 21.7)
MGI	33.8000	117.8000	05/20/1917	945 0.0	0.0	4.00	0.044	VI	13.5( 21.7)
MGI	33.8000	117.8000	05/19/1917	635 0.0	0.0	4.00	0.044	VI	13.5( 21.7)
MGI	33.8000	117.8000	11/04/1926	2238 0.0	0.0	4.60	0.071	VI	13.5( 21.7)
MGI	33.8000	117.8000	11/09/1926	1535 0.0	0.0	4.60	0.071	VI	13.5( 21.7)
MGI	33.8000	117.8000	11/07/1926	1948 0.0	0.0	4.60	0.071	VI	13.5( 21.7)
PAS	33.5080	118.0710	11/20/1988	53928.7	6.0	4.50	0.064	VI	13.8( 22.2)
DMG	33.5170	118.1000	03/22/1941	82240.0	0.0	4.00	0.043	VI	13.8( 22.2)
DMG	33.8170	118.2170	10/22/1941	65718.5	0.0	4.90	0.081	VII	14.8( 23.8)
DMG	33.9000	118.1000	07/08/1929	1646 6.7	13.0	4.70	0.068	VI	14.9( 24.1)
DMG	33.7590	118.2530	08/31/1938	31814.2	10.0	4.50	0.058	VI	15.0( 24.1)
DMG	33.7830	118.2500	11/14/1941	84136.3	0.0	5.40	0.115	VII	15.4( 24.7)
DMG	33.5450	117.8070	10/27/1969	1316 2.3	6.5	4.50	0.055	VI	15.5( 24.9)
PAS	33.4710	118.0610	02/27/1984	101815.0	6.0	4.00	0.035	V	16.1( 26.0)
DMG	33.8670	118.2000	11/13/1933	2128 0.0	0.0	4.00	0.035	V	16.2( 26.1)
PAS	33.5380	118.2070	05/25/1982	134430.3	13.7	4.10	0.038	V	16.2( 26.1)

## EARTHQUAKE SEARCH RESULTS

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FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	33.8670	118.2170	06/19/1944	3 6 7.0	0.0	4.40	0.045	VI	16.9( 27.2)
DMG	33.8670	118.2170	06/19/1944	0 333.0	0.0	4.50	0.049	VI	16.9( 27.2)
DMG	33.8540	117.7520	10/04/1961	22131.6	4.3	4.10	0.033	V	17.9( 28.8)
MGI	33.9000	118.2000	10/08/1927	1914 0.0	0.0	4.60	0.049	VI	17.9( 28.8)
GDP	33.8060	117.7150	03/07/2000	002028.2	11.0	4.00	0.030	V	18.0( 29.0)
DMG	33.8500	118.2670	03/11/1933	1425 0.0	0.0	5.00	0.065	VI	18.4( 29.7)
DMG	33.8500	118.2670	03/11/1933	629 0.0	0.0	4.40	0.040	V	18.4( 29.7)
DMG	33.8000	118.3000	11/03/1931	16 5 0.0	0.0	4.00	0.029	V	18.5( 29.7)
MGI	33.8000	118.3000	12/31/1928	1045 0.0	0.0	4.00	0.029	V	18.5( 29.7)
DMG	33.9670	118.0500	01/30/1941	13446.9	0.0	4.10	0.031	V	18.7( 30.1)
DMG	33.9500	118.1330	10/25/1933	7 046.0	0.0	4.30	0.036	V	18.9( 30.4)
PAS	33.9650	117.8860	01/01/1976	172012.9	6.2	4.20	0.032	V	19.5( 31.4)
DMG	33.5000	118.2500	06/18/1920	10 8 0.0	0.0	4.50	0.040	V	19.8( 31.9)
DMG	33.9390	118.2050	01/11/1950	214135.0	0.4	4.10	0.028	V	20.2( 32.6)
DMG	33.9960	117.9750	06/15/1967	458 5.5	10.0	4.10	0.027	V	20.5( 33.0)
MGI	34.0000	118.0000	05/05/1929	1 7 0.0	0.0	4.60	0.040	V	20.8( 33.4)
MGI	34.0000	118.0000	05/05/1929	735 0.0	0.0	4.00	0.025	V	20.8( 33.4)
MGI	34.0000	118.0000	12/25/1903	1745 0.0	0.0	5.00	0.056	VI	20.8( 33.4)
PDP	33.9220	118.2700	10/28/2001	162745.6	21.0	4.00	0.023	IV	21.7( 35.0)
DMG	33.8830	118.3170	03/11/1933	1457 0.0	0.0	4.90	0.047	VI	22.1( 35.5)
DMG	33.5430	118.3400	09/14/1963	35116.2	2.2	4.20	0.027	V	22.2( 35.8)
PDP	33.9550	117.7460	12/14/2001	120135.5	13.0	4.00	0.022	IV	22.9( 36.9)
DMG	33.6330	118.4000	10/17/1934	938 0.0	0.0	4.00	0.021	IV	23.3( 37.5)
MGI	34.0000	118.2000	06/26/1917	2115 0.0	0.0	4.60	0.034	V	23.7( 38.1)
MGI	34.0000	118.2000	06/26/1917	2130 0.0	0.0	4.60	0.034	V	23.7( 38.1)
MGI	34.0000	118.2000	06/26/1917	424 0.0	0.0	4.00	0.021	IV	23.7( 38.1)
MGI	34.0000	118.2000	02/13/1917	13 5 0.0	0.0	4.60	0.034	V	23.7( 38.1)
MGI	34.0000	118.2000	06/26/1917	2120 0.0	0.0	4.60	0.034	V	23.7( 38.1)
DMG	33.6630	118.4130	01/08/1967	738 5.3	17.7	4.00	0.021	IV	23.8( 38.2)
MGI	33.8000	117.6000	04/22/1918	2115 0.0	0.0	5.00	0.045	VI	24.1( 38.8)
DMG	33.8000	117.6000	09/16/1903	1210 0.0	0.0	4.00	0.020	IV	24.1( 38.8)

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GSP	33.9510	117.7090	01/05/1998	181406.5	11.0	4.30	0.026	V	24.2( 38.9)
GSP	34.0200	118.1800	06/12/1989	172225.5	16.0	4.10	0.022	IV	24.4( 39.2)
DMG	33.3670	118.1500	04/16/1942	72833.0	0.0	4.00	0.020	IV	24.5( 39.4)
DMG	33.7830	118.4170	11/01/1940	725 3.0	0.0	4.00	0.020	IV	24.5( 39.5)
DMG	33.7830	118.4170	10/14/1940	205111.0	0.0	4.00	0.020	IV	24.5( 39.5)
DMG	33.7830	118.4170	11/02/1940	25826.0	0.0	4.00	0.020	IV	24.5( 39.5)
DMG	33.7830	118.4170	10/12/1940	024 0.0	0.0	4.00	0.020	IV	24.5( 39.5)
PAS	34.0500	118.0870	10/01/1987	155953.5	10.4	4.00	0.020	IV	24.7( 39.7)
PAS	34.0490	118.1010	10/01/1987	144541.5	13.6	4.70	0.034	V	24.8( 39.9)
PAS	34.0520	118.0900	10/01/1987	151231.8	10.8	4.70	0.034	V	24.9( 40.0)
GSP	34.0300	118.1800	06/12/1989	165718.4	16.0	4.40	0.027	V	25.0( 40.2)
T-A	34.0000	118.2500	03/26/1860	0 0 0.0	0.0	5.00	0.043	VI	25.2( 40.5)
T-A	34.0000	118.2500	03/21/1880	1425 0.0	0.0	4.30	0.024	V	25.2( 40.5)
T-A	34.0000	118.2500	09/23/1827	0 0 0.0	0.0	5.00	0.043	VI	25.2( 40.5)
T-A	34.0000	118.2500	01/10/1856	0 0 0.0	0.0	5.00	0.043	VI	25.2( 40.5)
T-A	34.0000	118.2500	05/02/1856	810 0.0	0.0	4.30	0.024	V	25.2( 40.5)
T-A	34.0000	118.2500	01/17/1857	1 0 0.0	0.0	4.30	0.024	V	25.2( 40.5)
T-A	34.0000	118.2500	05/04/1857	6 0 0.0	0.0	4.30	0.024	V	25.2( 40.5)
PAS	34.0610	118.0790	10/01/1987	144220.0	9.5	5.90	0.088	VII	25.4( 40.8)
PAS	34.0600	118.1000	10/01/1987	1449 5.9	11.7	4.70	0.033	V	25.5( 41.1)
DMG	33.6820	117.5530	07/05/1938	18 655.7	10.0	4.50	0.028	V	25.8( 41.5)
PAS	34.0060	117.7390	02/18/1989	717 4.8	3.3	4.30	0.023	IV	26.0( 41.8)

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EARTHQUAKE SEARCH RESULTS  
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FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC)			DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
				H	M	Sec					
DMG	33.9830	118.3000	02/11/1940	19	24	10.0	0.0	4.00	0.018	IV	26.0( 41.8)
DMG	33.7670	118.4500	10/11/1940	55	71	2.3	0.0	4.70	0.032	V	26.2( 42.1)
PAS	34.0770	118.0470	02/11/1988	15	25	55.7	12.5	4.70	0.032	V	26.2( 42.2)
PAS	34.0730	118.0980	10/04/1987	10	59	38.2	8.2	5.30	0.051	VI	26.4( 42.4)
PAS	34.0760	118.0900	10/01/1987	14	48	3.1	11.7	4.10	0.019	IV	26.5( 42.6)
MGI	34.0000	118.3000	06/22/1920	20	35	0.0	0.0	4.00	0.017	IV	26.9( 43.3)
MGI	34.0000	118.3000	09/03/1905	54	0	0.0	0.0	5.30	0.050	VI	26.9( 43.3)
MGI	34.0000	118.3000	06/30/1920	35	0	0.0	0.0	4.00	0.017	IV	26.9( 43.3)
MGI	34.0000	117.7000	12/03/1929	9	5	0.0	0.0	4.00	0.017	IV	27.0( 43.5)
DMG	33.6320	118.4670	01/08/1967	73	73	0.4	11.4	4.00	0.017	IV	27.1( 43.7)
MGI	34.1000	118.0000	01/27/1930	20	26	0.0	0.0	4.60	0.027	V	27.7( 44.5)
DMG	33.7170	117.5170	06/19/1935	11	17	0.0	0.0	4.00	0.017	IV	27.9( 44.8)
DMG	33.7700	118.4800	04/24/1931	18	27	54.8	0.0	4.40	0.023	IV	27.9( 44.9)
DMG	33.6990	117.5110	05/31/1938	83	45	5.4	10.0	5.50	0.055	VI	28.2( 45.4)
MGI	34.1000	118.1000	07/11/1855	41	5	0.0	0.0	6.30	0.104	VII	28.2( 45.4)
DMG	33.9030	118.4310	11/29/1938	19	21	15.8	10.0	4.00	0.016	IV	28.4( 45.6)
DMG	33.7170	117.5070	08/06/1938	22	05	6.0	10.0	4.00	0.016	IV	28.4( 45.8)
DMG	33.7250	117.4980	01/03/1956	02	54	8.9	13.7	4.70	0.028	V	29.0( 46.6)
MGI	33.8000	118.5000	06/18/1915	15	5	0.0	0.0	4.00	0.015	IV	29.4( 47.4)
DMG	33.9500	117.5830	04/11/1941	12	02	4.0	0.0	4.00	0.015	IV	29.6( 47.6)
MGI	34.1000	118.2000	04/21/1921	15	38	0.0	0.0	4.00	0.015	IV	29.9( 48.1)
MGI	34.1000	118.2000	01/27/1860	83	0	0.0	0.0	4.30	0.019	IV	29.9( 48.1)
MGI	34.1000	118.2000	05/02/1916	14	32	0.0	0.0	4.00	0.015	IV	29.9( 48.1)
DMG	34.1000	117.8000	03/31/1931	20	33	0.0	0.0	4.00	0.015	IV	30.0( 48.2)
MGI	34.0800	118.2600	07/16/1920	18	8	0.0	0.0	5.00	0.033	V	30.2( 48.5)
DMG	33.7480	117.4790	06/22/1971	10	41	19.0	8.0	4.20	0.017	IV	30.2( 48.6)
DMG	33.7330	117.4670	10/26/1954	16	22	26.0	0.0	4.10	0.016	IV	30.8( 49.6)

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MGI	34.0000	118.4000	02/22/1920	1610 0.0	0.0	4.60	0.023	IV	30.9( 49.6)
MGI	34.0000	118.4000	02/07/1927	429 0.0	0.0	4.60	0.023	IV	30.9( 49.6)
MGI	34.0000	118.4000	10/01/1930	040 0.0	0.0	4.60	0.023	IV	30.9( 49.6)
MGI	34.0000	118.4000	01/29/1927	2324 0.0	0.0	4.00	0.014	IV	30.9( 49.6)
DMG	34.0000	118.4170	12/07/1938	338 0.0	0.0	4.00	0.014	IV	31.6( 50.8)
PAS	34.1490	118.1350	12/03/1988	113826.4	13.3	4.90	0.028	V	32.0( 51.4)
MGI	34.1000	118.3000	07/16/1920	2022 0.0	0.0	4.60	0.022	IV	32.5( 52.3)
MGI	34.1000	118.3000	07/16/1920	2127 0.0	0.0	4.60	0.022	IV	32.5( 52.3)
MGI	34.1000	118.3000	07/26/1920	1215 0.0	0.0	4.00	0.013	III	32.5( 52.3)
MGI	34.1000	118.3000	07/16/1920	2130 0.0	0.0	4.60	0.022	IV	32.5( 52.3)
GSP	34.1100	117.7200	04/17/1990	223227.2	4.0	4.60	0.022	IV	32.5( 52.3)
DMG	34.1000	117.6830	01/18/1934	214 0.0	0.0	4.00	0.013	III	32.6( 52.5)
DMG	34.1000	117.6830	01/09/1934	1410 0.0	0.0	4.50	0.019	IV	33.1( 53.3)
PDP	34.0590	118.3870	09/09/2001	235918.0	4.0	4.20	0.015	IV	33.1( 53.3)
T-A	34.1700	118.1700	03/07/1888	1554 0.0	0.0	4.30	0.016	IV	33.2( 53.5)
GSP	34.1300	117.7000	03/01/1990	003457.1	4.0	4.00	0.012	III	33.9( 54.5)
PAS	34.1360	117.7090	06/26/1988	15 458.5	7.9	4.60	0.020	IV	33.9( 54.5)
MGI	34.2000	118.0000	01/09/1921	530 0.0	0.0	4.60	0.020	IV	34.4( 55.3)
DMG	33.7000	117.4000	04/11/1910	757 0.0	0.0	4.60	0.020	IV	34.5( 55.5)
DMG	33.7000	117.4000	05/15/1910	1547 0.0	0.0	5.00	0.027	V	34.6( 55.6)
DMG	33.7000	117.4000	05/13/1910	620 0.0	0.0	6.00	0.062	VI	34.6( 55.6)
GSP	34.1400	117.7000	02/28/1990	234336.6	5.0	5.00	0.027	V	34.6( 55.6)
GSP	34.1500	117.7200	03/01/1990	032303.0	11.0	5.20	0.032	V	34.6( 55.6)
DMG	34.2000	117.9000	08/28/1889	215 0.0	0.0	4.70	0.021	IV	35.0( 56.3)
DMG	34.2000	117.9000	07/13/1935	105416.5	0.0	5.50	0.040	V	35.0( 56.4)
GSP	34.1400	117.6900	03/02/1990	172625.4	6.0	4.70	0.021	IV	35.0( 56.4)
						4.60	0.019	IV	35.3( 56.8)

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FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
MGI	34.0000	118.5000	06/23/1920	1220 0.0	0.0	4.00	0.012	III	35.3( 56.8)
DMG	34.0000	118.5000	06/22/1920	248 0.0	0.0	4.90	0.025	V	35.3( 56.8)
DMG	34.0000	118.5000	08/04/1927	1224 0.0	0.0	5.00	0.027	V	35.3( 56.8)
DMG	34.0000	118.5000	03/06/1918	1820 0.0	0.0	4.00	0.012	III	35.3( 56.8)
MGI	34.0000	118.5000	11/19/1918	2018 0.0	0.0	5.00	0.027	V	35.3( 56.8)
MGI	34.0000	118.5000	03/08/1918	1230 0.0	0.0	4.00	0.012	III	35.3( 56.8)
DMG	34.0000	118.5000	11/08/1914	1140 0.0	0.0	4.50	0.018	IV	35.3( 56.8)
MGI	34.0000	117.5000	12/16/1858	10 0 0.0	0.0	7.00	0.128	VIII	35.5( 57.1)
DMG	34.0000	117.5000	07/03/1908	1255 0.0	0.0	4.00	0.012	III	35.5( 57.1)
DMG	33.8330	117.4000	06/05/1940	82727.0	0.0	4.00	0.012	III	35.7( 57.5)
GSP	34.2500	117.9900	06/28/1991	170055.5	9.0	4.30	0.014	III	38.0( 61.2)
GSP	34.2620	118.0020	06/28/1991	144354.5	11.0	5.40	0.032	V	38.8( 62.5)
PAS	33.9190	118.6270	01/19/1989	65328.8	11.9	5.00	0.023	IV	38.9( 62.7)
T-A	34.0000	117.4200	04/12/1888	1315 0.0	0.0	4.30	0.013	III	39.3( 63.2)
T-A	34.0000	117.4200	09/10/1920	1415 0.0	0.0	4.30	0.013	III	39.3( 63.2)
DMG	33.9330	117.3670	10/24/1943	02921.0	0.0	4.00	0.010	III	39.8( 64.1)
DMG	33.9500	118.6320	08/31/1930	04036.0	0.0	5.20	0.026	V	40.1( 64.5)
MGI	34.0000	117.4000	05/22/1907	652 0.0	0.0	4.60	0.016	IV	40.3( 64.8)
DMG	34.1270	117.5210	12/27/1938	10 928.6	10.0	4.00	0.010	III	40.4( 65.0)
DMG	34.1830	117.5830	10/03/1948	24628.0	0.0	4.00	0.010	III	41.1( 66.2)
DMG	34.1400	117.5150	01/01/1965	8 418.0	5.9	4.40	0.013	III	41.3( 66.4)
PAS	33.9330	118.6690	10/17/1979	205237.3	5.5	4.20	0.011	III	41.5( 66.8)
DMG	34.1160	117.4750	06/28/1960	20 048.0	12.0	4.10	0.010	III	41.7( 67.1)

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DMG	34.1240	117.4800	05/15/1955	17 326.0	7.6	4.00	0.009	III	41.9( 67.4)
DMG	34.1670	117.5330	03/01/1948	81213.0	0.0	4.70	0.016	IV	42.0( 67.6)
DMG	34.1830	117.5480	09/01/1937	163533.5	10.0	4.50	0.014	III	42.3( 68.1)
PAS	33.9440	118.6810	01/01/1979	231438.9	11.3	5.00	0.020	IV	42.5( 68.3)
DMG	34.1120	117.4260	03/19/1937	12338.4	10.0	4.00	0.009	III	43.6( 70.1)
PAS	34.1350	117.4480	01/08/1983	71930.4	4.6	4.10	0.010	III	43.7( 70.3)
DMG	34.0330	117.3500	04/18/1940	184343.9	0.0	4.40	0.012	III	43.9( 70.6)
DMG	34.2110	117.5300	09/01/1937	1348 8.2	10.0	4.50	0.013	III	44.5( 71.6)
PAS	34.2110	117.5300	10/19/1979	122237.8	4.9	4.10	0.009	III	44.5( 71.6)
DMG	34.1320	117.4260	04/15/1965	20 833.3	5.5	4.50	0.013	III	44.5( 71.6)
DMG	34.2000	117.5000	06/14/1892	1325 0.0	0.0	4.90	0.017	IV	44.9( 72.3)
DMG	34.0330	117.3170	09/03/1935	647 0.0	0.0	4.50	0.012	III	45.5( 73.2)
GSP	34.2310	118.4750	03/20/1994	212012.3	13.0	5.30	0.024	IV	45.6( 73.4)
GSP	34.2150	118.5100	01/19/1994	140914.8	17.0	4.50	0.012	III	46.0( 74.0)
PAS	33.0330	117.9440	02/22/1983	21830.4	10.0	4.30	0.010	III	46.1( 74.2)
DMG	34.0000	117.2830	11/07/1939	1852 8.4	0.0	4.70	0.014	IV	46.1( 74.3)
GSP	34.2450	118.4710	01/18/1994	155144.9	12.0	4.00	0.008	III	46.3( 74.5)
GSP	34.2840	118.4040	01/14/2001	022614.1	8.0	4.30	0.010	III	46.5( 74.8)
USG	34.1390	117.3860	02/21/1987	231530.1	2.6	4.07	0.008	III	46.5( 74.9)
GSP	34.2930	118.3890	12/06/1994	034834.5	9.0	4.50	0.012	III	46.6( 75.0)
DMG	33.9960	117.2700	02/17/1952	123658.3	16.0	4.50	0.012	III	46.7( 75.1)
GSP	34.2890	118.4030	01/14/2001	025053.7	8.0	4.00	0.008	III	46.7( 75.2)
DMG	34.2680	118.4450	08/30/1964	225737.1	15.4	4.00	0.008	III	46.7( 75.2)
DMG	33.7380	117.1870	04/27/1962	91232.1	5.7	4.10	0.009	III	46.9( 75.4)
GSP	34.2130	118.5370	01/17/1994	123055.4	18.0	6.70	0.070	VI	46.9( 75.4)
DMG	34.2170	117.4670	03/25/1941	234341.0	0.0	4.00	0.008	II	47.1( 75.7)
DMG	34.3000	117.6000	07/30/1894	512 0.0	0.0	6.00	0.039	V	47.4( 76.3)
DMG	34.2700	117.5400	09/12/1970	143053.0	8.0	5.40	0.024	V	47.4( 76.3)
DMG	34.1180	117.3410	09/22/1951	82239.1	11.9	4.30	0.010	III	47.6( 76.7)
DMG	34.2810	117.5520	09/13/1970	44748.6	8.0	4.40	0.011	III	47.7( 76.8)

EARTHQUAKE SEARCH RESULTS

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FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	34.3350	118.3310	02/09/1971	155820.7	14.2	4.80	0.015	IV	47.8( 76.8)
DMG	34.0000	117.2500	11/01/1932	445 0.0	0.0	4.00	0.008	II	47.8( 77.0)
DMG	34.0000	117.2500	07/23/1923	73026.0	0.0	6.25	0.047	VI	47.8( 77.0)
GSP	34.3120	118.3930	05/25/1994	125657.1	7.0	4.40	0.011	III	47.9( 77.0)
GSP	34.3110	118.3980	06/15/1994	055948.6	7.0	4.20	0.009	III	47.9( 77.1)
DMG	34.2670	117.5180	09/12/1970	141011.2	8.0	4.10	0.008	III	48.0( 77.2)
DMG	34.3390	118.3320	02/09/1971	141612.9	11.1	4.10	0.008	III	48.0( 77.3)
DMG	33.9000	117.2000	12/19/1880	0 0 0.0	0.0	6.00	0.039	V	48.0( 77.3)
GSB	34.2990	118.4280	01/23/1994	085508.7	6.0	4.20	0.009	III	48.0( 77.3)
DMG	34.1270	117.3380	02/23/1936	222042.7	10.0	4.50	0.011	III	48.1( 77.5)
USG	33.0170	117.8170	07/14/1986	11112.6	10.0	4.12	0.008	III	48.3( 77.7)
USG	33.0170	117.8170	07/16/1986	1247 3.7	10.0	4.11	0.008	III	48.3( 77.7)
GSP	34.2990	118.4390	02/03/1994	162335.4	8.0	4.20	0.009	III	48.4( 77.8)
GSP	34.2870	118.4660	01/19/1994	071406.2	11.0	4.00	0.008	II	48.5( 78.0)
DMG	34.3040	117.5700	05/05/1969	16 2 9.6	8.8	4.40	0.010	III	48.5( 78.1)
DMG	34.1400	117.3390	02/26/1936	93327.6	10.0	4.00	0.008	II	48.7( 78.3)
GSP	34.1900	117.3900	12/28/1989	094108.1	15.0	4.50	0.011	III	48.7( 78.4)
GSP	34.2920	118.4660	01/19/1994	144635.2	6.0	4.00	0.007	II	48.8( 78.5)
PAS	34.0230	117.2450	10/02/1985	234412.4	15.2	4.80	0.014	IV	48.8( 78.5)

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MGI	34.1000	117.3000	11/22/1911	257 0.0	0.0	4.00	0.007	II	48.8( 78.5)
MGI	34.1000	117.3000	07/15/1905	2041 0.0	0.0	5.30	0.021	IV	48.8( 78.5)
MGI	34.1000	117.3000	12/27/1901	11 0 0.0	0.0	4.60	0.012	III	48.8( 78.5)
DMG	34.1000	117.3000	02/16/1931	1327 0.0	0.0	4.00	0.007	II	48.8( 78.5)
DMG	34.2000	117.4000	07/22/1899	046 0.0	0.0	5.50	0.025	V	48.8( 78.5)
GSP	34.2970	118.4580	01/21/1994	185344.6	7.0	4.30	0.010	III	48.8( 78.6)
GSP	34.3010	118.4520	01/21/1994	185244.2	7.0	4.30	0.010	III	48.9( 78.7)
DMG	34.3610	118.3060	02/09/1971	141021.5	5.0	4.70	0.013	III	48.9( 78.7)
DMG	34.2960	118.4640	03/30/1971	85443.3	2.6	4.10	0.008	III	49.0( 78.8)
GSP	34.2280	118.5730	01/17/1994	175608.2	19.0	4.60	0.012	III	49.0( 78.9)
GSP	34.2910	118.4760	02/06/1994	131926.9	11.0	4.10	0.008	III	49.0( 78.9)
GDP	34.0470	117.2550	02/21/2000	134943.1	15.0	4.50	0.011	III	49.1( 79.0)
GSB	34.3000	118.4660	01/21/1994	183915.3	10.0	4.70	0.013	III	49.2( 79.3)
GSP	34.2610	118.5340	01/17/1994	123939.8	14.0	4.50	0.011	III	49.3( 79.4)
GSP	34.2540	118.5450	01/17/1994	130627.9	0.0	4.60	0.012	III	49.3( 79.4)
DMG	34.3080	118.4540	02/09/1971	144346.7	6.2	5.20	0.019	IV	49.3( 79.4)
DMG	34.3700	118.3020	02/10/1971	31212.0	0.8	4.00	0.007	II	49.4( 79.5)
DMG	34.3680	118.3140	04/25/1971	1448 6.5	-2.0	4.00	0.007	II	49.5( 79.7)
GSP	34.3110	118.4560	01/17/1994	193534.3	2.0	4.00	0.007	II	49.6( 79.8)
GSP	34.0240	117.2300	03/11/1998	121851.8	14.0	4.50	0.011	III	49.6( 79.8)
GSP	34.3040	118.4730	01/17/1994	150703.2	2.0	4.20	0.009	III	49.7( 80.0)
DMG	34.4000	117.8000	02/24/1946	6 752.0	0.0	4.10	0.008	II	49.7( 80.0)
PAS	32.9900	117.8490	07/13/1986	14 133.0	12.0	4.60	0.012	III	49.8( 80.1)
GSP	34.2180	118.6070	01/18/1994	113509.9	12.0	4.20	0.009	III	49.8( 80.2)
DMG	34.2730	118.5320	06/21/1971	16 1 8.5	4.1	4.00	0.007	II	49.9( 80.3)
GSP	34.3170	118.4550	01/17/1994	132644.7	2.0	4.70	0.013	III	49.9( 80.3)
GSP	34.1680	117.3370	06/28/1997	214525.1	9.0	4.20	0.009	III	50.0( 80.4)
DMG	34.2860	118.5150	03/31/1971	145222.5	2.1	4.60	0.012	III	50.0( 80.5)
GSB	34.3100	118.4740	01/21/1994	184228.8	7.0	4.20	0.008	III	50.1( 80.6)
PAS	32.9860	117.8440	10/01/1986	201218.6	6.0	4.00	0.007	II	50.1( 80.6)
DMG	34.0430	117.2280	04/03/1939	25044.7	10.0	4.00	0.007	II	50.3( 80.9)
GSP	34.3310	118.4420	01/17/1994	141430.3	1.0	4.50	0.011	III	50.4( 81.0)
DMG	34.2840	118.5280	04/02/1971	54025.0	3.0	4.00	0.007	II	50.4( 81.0)
DMG	34.3000	117.5000	07/22/1899	2032 0.0	0.0	6.50	0.054	VI	50.4( 81.2)

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FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
GSP	32.9850	117.8180	06/21/1995	211736.2	6.0	4.30	0.009	III	50.4( 81.2)
T-A	34.0800	117.2500	10/07/1869	0 0 0.0	0.0	4.30	0.009	III	50.5( 81.2)
DMG	34.3700	117.6500	12/08/1812	15 0 0.0	0.0	7.00	0.080	VII	50.5( 81.2)
GSP	34.3740	117.6490	08/20/1998	234958.4	9.0	4.40	0.010	III	50.8( 81.7)
T-A	34.1700	117.3200	12/02/1859	2210 0.0	0.0	4.30	0.009	III	50.8( 81.8)
PAS	32.9710	117.8700	07/13/1986	1347 8.2	6.0	5.30	0.020	IV	50.9( 81.8)
DMG	34.3570	118.4060	02/09/1971	141950.2	11.8	4.00	0.007	II	51.0( 82.0)
GSP	34.2740	118.5630	01/27/1994	171958.8	14.0	4.60	0.011	III	51.0( 82.1)
DMG	34.2650	118.5770	04/15/1971	111432.0	4.2	4.20	0.008	III	51.1( 82.2)
GSP	34.2690	118.5760	01/17/1994	125546.8	16.0	4.10	0.008	II	51.3( 82.5)
GSP	32.9700	117.8100	04/04/1990	085439.3	6.0	4.00	0.007	II	51.6( 83.0)
PAS	32.9700	117.8030	07/14/1986	03246.2	10.0	4.00	0.007	II	51.6( 83.1)
GSG	34.3340	118.4840	01/17/1994	223152.1	10.0	4.20	0.008	III	51.8( 83.3)
DMG	34.3870	118.3640	02/09/1971	143917.8	-1.6	4.00	0.007	II	51.8( 83.4)
DMG	33.7000	117.1000	06/11/1902	245 0.0	0.0	4.50	0.010	III	51.8( 83.4)

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DMG	34.3530	118.4560	03/07/1971	13340.5	3.3	4.50	0.010	III	52.1( 83.8)
DMG	34.3960	118.3660	02/10/1971	173855.1	6.2	4.20	0.008	III	52.4( 84.3)
DMG	34.4110	118.3290	02/10/1971	5 636.0	4.7	4.30	0.009	III	52.6( 84.6)
GSB	34.3010	118.5650	01/17/1994	204602.4	9.0	5.20	0.018	IV	52.6( 84.6)
DMG	34.3560	118.4740	03/25/1971	2254 9.9	4.6	4.20	0.008	II	52.8( 84.9)
PAS	32.9450	117.8310	07/29/1986	81741.8	10.0	4.10	0.007	II	53.0( 85.3)
GSP	34.3570	118.4800	02/25/1994	125912.6	1.0	4.10	0.007	II	53.0( 85.3)
MGI	34.2000	117.3000	04/13/1913	1045 0.0	0.0	4.00	0.007	II	53.0( 85.3)
GSP	34.2780	118.6110	01/29/1994	121656.4	2.0	4.30	0.008	III	53.0( 85.3)
GSP	34.3050	118.5790	01/29/1994	112036.0	1.0	5.10	0.016	IV	53.3( 85.8)
PAS	32.9450	117.8060	09/07/1984	11 313.4	6.0	4.30	0.008	III	53.3( 85.8)
GSB	34.3190	118.5580	01/18/1994	132444.1	1.0	4.50	0.010	III	53.3( 85.8)
DMG	34.3610	118.4870	02/10/1971	143526.7	4.4	4.20	0.008	II	53.5( 86.0)
DMG	34.1000	118.8000	05/10/1911	1340 0.0	0.0	4.00	0.007	II	53.5( 86.0)
MGI	34.1000	117.2000	04/23/1923	2113 0.0	0.0	4.00	0.007	II	53.6( 86.3)
DMG	34.3920	118.4270	02/21/1971	71511.7	7.2	4.50	0.010	III	53.6( 86.3)
PAS	32.9330	117.8410	07/29/1986	81741.6	10.0	4.30	0.008	III	53.7( 86.4)
DMG	34.3000	118.6000	04/04/1893	1940 0.0	0.0	6.00	0.033	V	53.8( 86.5)
PAS	34.3800	118.4590	08/12/1977	21926.1	9.5	4.50	0.010	III	53.8( 86.5)
DMG	34.3990	118.4190	02/10/1971	134953.7	9.7	4.30	0.008	III	53.9( 86.7)
GSB	34.2850	118.6240	01/17/1994	135602.4	19.0	4.70	0.011	III	53.9( 86.7)
DMG	34.3840	118.4550	02/10/1971	113134.6	6.0	4.20	0.008	II	53.9( 86.8)
PAS	32.9470	117.7360	01/15/1989	153955.2	6.0	4.20	0.008	II	54.2( 87.2)
DMG	34.4110	118.4010	02/09/1971	14 2 3.0	8.0	4.10	0.007	II	54.2( 87.2)
DMG	34.4110	118.4010	02/09/1971	14 041.8	8.4	6.40	0.045	VI	54.2( 87.2)
DMG	34.4110	118.4010	02/09/1971	14 730.0	8.0	4.00	0.006	II	54.2( 87.2)
DMG	34.4110	118.4010	02/09/1971	14 434.0	8.0	4.20	0.008	II	54.2( 87.2)
DMG	34.4110	118.4010	02/09/1971	14 710.0	8.0	4.00	0.006	II	54.2( 87.2)
DMG	34.4110	118.4010	02/09/1971	14 133.0	8.0	4.20	0.008	II	54.2( 87.2)
DMG	34.4110	118.4010	02/09/1971	14 159.0	8.0	4.10	0.007	II	54.2( 87.2)
DMG	34.4110	118.4010	02/09/1971	14 244.0	8.0	5.80	0.028	V	54.2( 87.2)
DMG	34.4110	118.4010	02/09/1971	14 346.0	8.0	4.10	0.007	II	54.2( 87.2)
DMG	34.4110	118.4010	02/09/1971	14 550.0	8.0	4.10	0.007	II	54.2( 87.2)
DMG	34.4110	118.4010	02/09/1971	141028.0	8.0	5.30	0.018	IV	54.2( 87.2)
DMG	34.4110	118.4010	02/09/1971	14 150.0	8.0	4.50	0.010	III	54.2( 87.2)
DMG	34.4110	118.4010	02/09/1971	14 444.0	8.0	4.10	0.007	II	54.2( 87.2)
DMG	34.4110	118.4010	02/09/1971	14 325.0	8.0	4.40	0.009	III	54.2( 87.2)
DMG	34.4110	118.4010	02/09/1971	14 541.0	8.0	4.10	0.007	II	54.2( 87.2)

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FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
DMG	34.4110	118.4010	02/09/1971	14 154.0	8.0	4.20	0.008	II	54.2( 87.2)
DMG	34.4110	118.4010	02/09/1971	14 140.0	8.0	4.10	0.007	II	54.2( 87.2)
DMG	34.4110	118.4010	02/09/1971	14 446.0	8.0	4.20	0.008	II	54.2( 87.2)
DMG	34.4110	118.4010	02/09/1971	14 4 7.0	8.0	4.10	0.007	II	54.2( 87.2)
DMG	34.4110	118.4010	02/09/1971	14 230.0	8.0	4.30	0.008	III	54.2( 87.2)
DMG	34.4110	118.4010	02/09/1971	14 8 7.0	8.0	4.20	0.008	II	54.2( 87.2)
DMG	34.4110	118.4010	02/09/1971	14 439.0	8.0	4.10	0.007	II	54.2( 87.2)
DMG	34.4110	118.4010	02/09/1971	14 231.0	8.0	4.70	0.011	III	54.2( 87.2)
DMG	34.4110	118.4010	02/09/1971	14 853.0	8.0	4.60	0.010	III	54.2( 87.2)
DMG	34.4110	118.4010	02/09/1971	14 838.0	8.0	4.50	0.010	III	54.2( 87.2)
DMG	34.4110	118.4010	02/09/1971	14 1 8.0	8.0	5.80	0.028	V	54.2( 87.2)

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DMG	34.4110	118.4010	02/09/1971	14 8 4.0	8.0	4.00	0.006	II	54.2( 87.2)
DMG	34.4110	118.4010	02/09/1971	14 745.0	8.0	4.50	0.010	III	54.2( 87.2)
DMG	34.3970	118.4390	02/21/1971	55052.6	6.9	4.70	0.011	III	54.3( 87.3)
GSP	34.3740	118.4950	01/28/1994	200953.4	0.0	4.20	0.008	II	54.5( 87.6)
GSB	34.3450	118.5520	01/24/1994	041518.8	6.0	4.80	0.012	III	54.6( 87.8)
DMG	34.4310	118.3690	08/14/1974	144555.2	8.2	4.20	0.007	II	54.7( 88.0)
DMG	34.3990	118.4730	03/09/1974	05431.9	24.4	4.70	0.011	III	55.3( 89.0)
T-A	33.5000	117.0700	12/29/1880	7 0 0.0	0.0	4.30	0.008	III	55.3( 89.0)
DMG	34.4260	118.4140	02/10/1971	518 7.2	5.8	4.50	0.009	III	55.3( 89.2)
DMG	34.4330	118.3980	02/09/1971	144017.4	-2.0	4.10	0.007	II	55.5( 89.3)
DMG	34.4280	118.4130	04/01/1971	15 3 3.6	8.0	4.10	0.007	II	55.5( 89.4)
GSB	34.3600	118.5710	01/19/1994	044048.0	2.0	4.50	0.009	III	56.0( 90.2)
GSB	34.3330	118.6230	01/18/1994	072356.0	14.0	4.30	0.008	II	56.4( 90.7)
GSP	34.3790	118.5610	01/18/1994	152346.9	7.0	4.80	0.012	III	56.8( 91.4)
GSP	34.3790	118.5630	01/18/1994	003935.0	7.0	4.40	0.008	III	56.9( 91.5)
DMG	34.4460	118.4360	02/10/1971	185441.7	8.1	4.20	0.007	II	57.2( 92.1)
DMG	34.3440	118.6360	02/09/1971	143436.1	-2.0	4.90	0.012	III	57.4( 92.4)
DMG	33.7500	117.0000	06/06/1918	2232 0.0	0.0	5.00	0.013	III	57.6( 92.7)
DMG	33.7500	117.0000	04/21/1918	223225.0	0.0	6.80	0.056	VI	57.6( 92.7)
PAS	34.4630	118.4090	09/24/1977	212824.3	5.0	4.20	0.007	II	57.6( 92.7)
GSP	34.0490	118.9150	02/19/1995	212418.1	15.0	4.30	0.008	II	57.6( 92.8)
GSP	34.3620	118.6150	03/20/1996	073759.8	13.0	4.10	0.006	II	57.7( 92.8)
GSB	34.3580	118.6220	01/18/1994	040126.8	1.0	4.50	0.009	III	57.7( 92.8)
DMG	34.4570	118.4270	02/09/1971	161926.5	-1.0	4.20	0.007	II	57.7( 92.8)
DMG	34.5190	118.1980	08/23/1952	10 9 7.1	13.1	5.00	0.013	III	57.7( 92.8)
DMG	33.8000	117.0000	12/25/1899	1225 0.0	0.0	6.40	0.041	V	57.9( 93.2)
GSP	34.3590	118.6290	01/24/1994	055024.3	12.0	4.30	0.007	II	58.0( 93.3)
GSP	34.3630	118.6270	01/24/1994	055421.1	10.0	4.20	0.007	II	58.1( 93.5)
PAS	34.3470	118.6560	04/08/1976	152138.1	14.5	4.60	0.009	III	58.3( 93.8)
GSG	34.4080	118.5590	01/17/1994	200205.4	0.0	4.00	0.006	II	58.4( 94.0)
GSB	34.3430	118.6660	01/17/1994	234925.4	8.0	4.30	0.007	II	58.5( 94.1)
GSP	34.3740	118.6220	01/17/1994	155410.8	12.0	4.80	0.011	III	58.6( 94.2)
GSP	34.3780	118.6180	01/19/1994	211144.9	11.0	5.10	0.014	IV	58.6( 94.4)
GSG	34.3040	118.7220	01/17/1994	221922.3	10.0	4.00	0.006	II	58.7( 94.4)
PAS	33.6300	119.0200	10/23/1981	172816.9	12.0	4.60	0.009	III	58.7( 94.5)
GSP	34.3680	118.6370	01/17/1994	194353.4	13.0	4.10	0.006	II	58.7( 94.5)
DMG	34.0170	117.0500	02/19/1940	12 655.7	0.0	4.60	0.009	III	58.8( 94.6)
GSP	34.3260	118.6980	01/17/1994	233330.7	9.0	5.60	0.021	IV	58.8( 94.6)
DMG	34.3800	118.6230	10/29/1936	223536.1	10.0	4.00	0.006	II	58.9( 94.8)
DMG	32.8670	118.2500	02/13/1952	151337.0	0.0	4.70	0.010	III	59.2( 95.3)
DMG	33.5000	117.0000	08/08/1925	1013 0.0	0.0	4.50	0.009	III	59.2( 95.3)
GSP	34.3040	118.7370	01/19/1994	091310.9	13.0	4.10	0.006	II	59.3( 95.4)

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FILE CODE	LAT. NORTH	LONG. WEST	DATE	TIME (UTC) H M Sec	DEPTH (km)	QUAKE MAG.	SITE ACC. g	SITE MM INT.	APPROX. DISTANCE mi [km]
GSP	34.3970	118.6090	07/22/1999	095724.0	11.0	4.00	0.006	II	59.4( 95.6)
DMG	34.0170	118.9670	04/16/1948	222624.0	0.0	4.70	0.010	III	59.5( 95.8)
GSP	34.3770	118.6490	04/27/1997	110928.4	15.0	4.80	0.011	III	59.7( 96.0)
GSP	34.3690	118.6720	04/26/1997	103730.7	16.0	5.10	0.014	III	60.1( 96.7)
DMG	34.5650	118.1130	02/28/1969	45612.4	5.3	4.30	0.007	II	60.1( 96.7)
PAS	34.0540	118.9640	04/13/1982	11 212.2	16.6	4.00	0.006	II	60.3( 97.1)
GSP	34.3540	118.7040	05/01/1996	194956.4	14.0	4.10	0.006	II	60.5( 97.3)

Page 11

TEST OUT

PAS	34.0160	118.9880	10/26/1984	172043.5	13.3	4.60	0.009	III	60.6 ( 97.6)
PAS	33.6370	119.0560	10/23/1981	191552.5	6.3	4.60	0.009	III	60.7 ( 97.7)
DMG	34.0000	119.0000	09/24/1827	4 0 0.0	0.0	7.00	0.061	VI	60.9 ( 98.0)
MGI	34.0000	119.0000	12/14/1912	0 0 0.0	0.0	5.70	0.022	IV	60.9 ( 98.0)
DMG	34.0000	117.0000	06/30/1923	022 0.0	0.0	4.50	0.008	III	61.1 ( 98.3)
GSP	34.3650	118.7080	01/19/1994	044314.5	12.0	4.10	0.006	II	61.2 ( 98.5)
GSP	34.3940	118.6690	06/26/1995	084028.9	13.0	5.00	0.012	III	61.3 ( 98.6)
GSP	34.3770	118.6980	01/18/1994	004308.9	11.0	5.20	0.014	IV	61.4 ( 98.9)
DMG	34.4850	118.5210	07/16/1965	74622.4	15.1	4.00	0.005	II	61.8 ( 99.5)
DMG	33.7100	116.9250	09/23/1963	144152.6	16.5	5.00	0.012	III	61.9 ( 99.5)
GSB	34.3790	118.7110	01/19/1994	210928.6	14.0	5.50	0.018	IV	62.0 ( 99.8)
GSP	34.1920	117.0950	04/06/1994	190104.1	7.0	4.80	0.010	III	62.1 ( 99.9)

\*\*\*\*\*  
 -END OF SEARCH- 496 EARTHQUAKES FOUND WITHIN THE SPECIFIED SEARCH AREA.

TIME PERIOD OF SEARCH: 1808 TO 2008

LENGTH OF SEARCH TIME: 201 years

THE EARTHQUAKE CLOSEST TO THE SITE IS ABOUT 1.4 MILES (2.3 km) AWAY.

LARGEST EARTHQUAKE MAGNITUDE FOUND IN THE SEARCH RADIUS: 7.0

LARGEST EARTHQUAKE SITE ACCELERATION FROM THIS SEARCH: 0.542 g

COEFFICIENTS FOR GUTENBERG & RICHTER RECURRENCE RELATION:

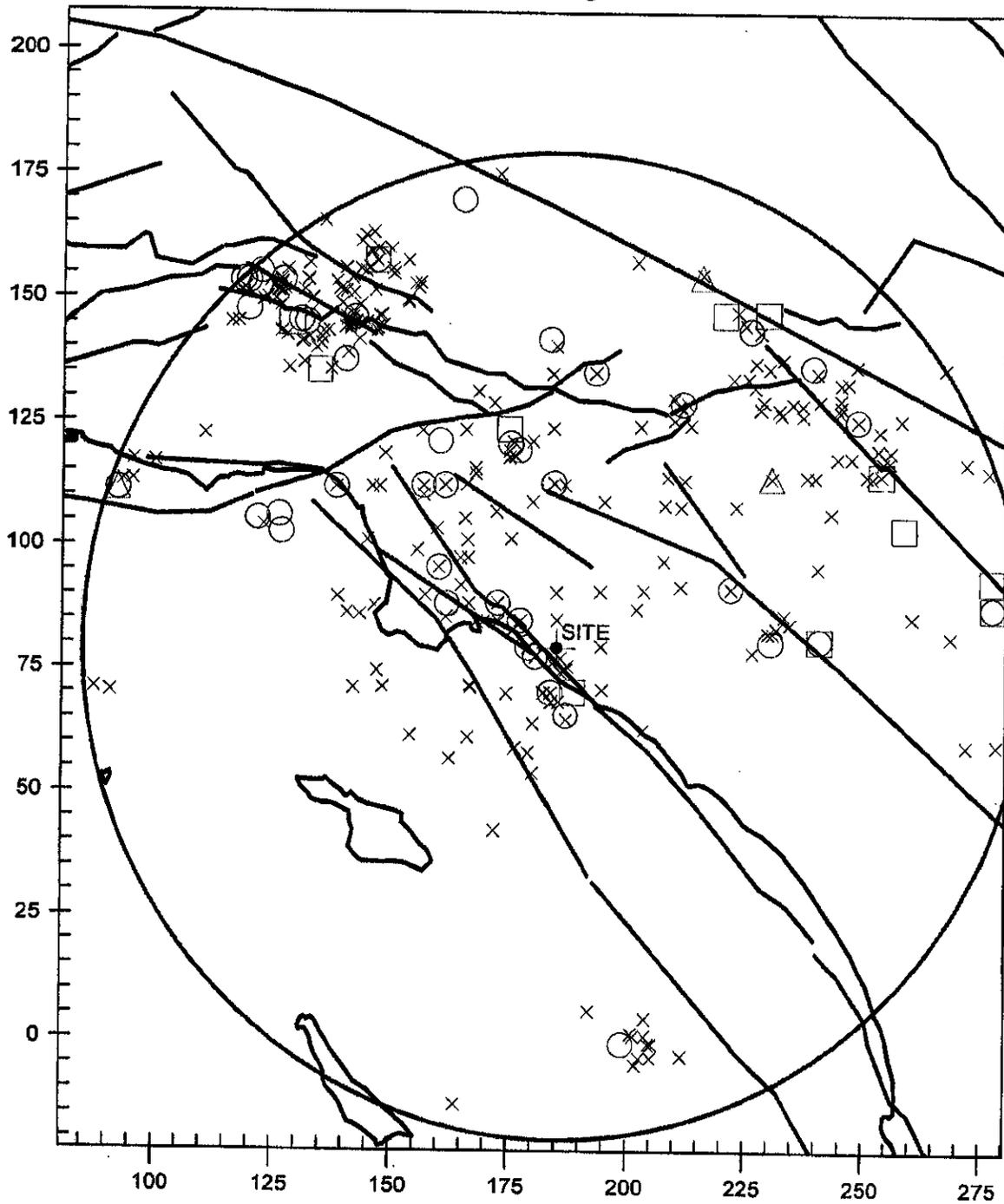
a-value= 3.502  
 b-value= 0.785  
 beta-value= 1.808

-----  
 TABLE OF MAGNITUDES AND EXCEEDANCES:  
 -----

Earthquake Magnitude	Number of Times Exceeded	Cumulative No. / Year
4.0	496	2.46766
4.5	193	0.96020
5.0	69	0.34328
5.5	25	0.12438
6.0	15	0.07463
6.5	6	0.02985
7.0	3	0.01493

# EARTHQUAKE EPICENTER MAP

Huntington Beach Gun Range



---

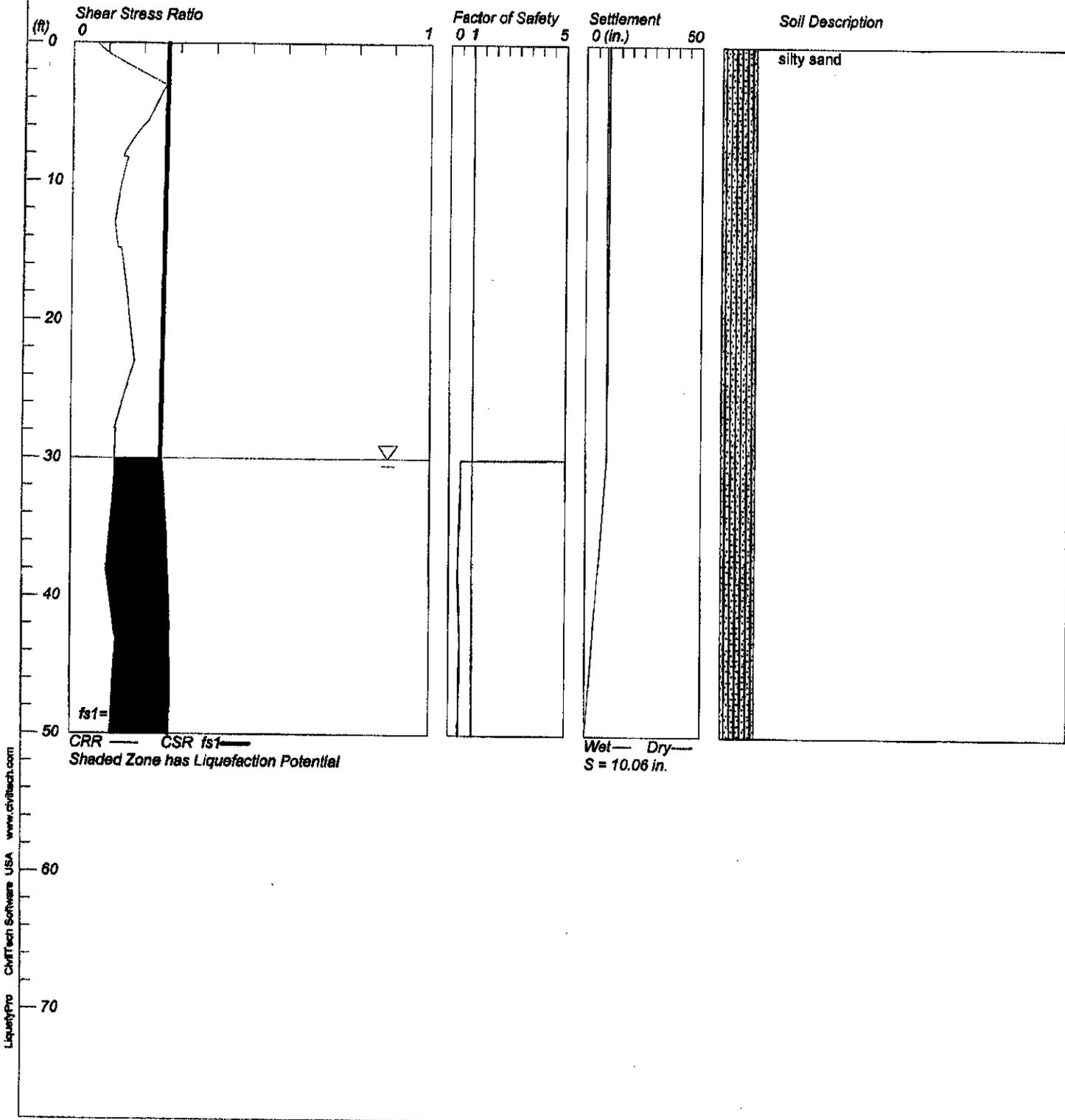
**APPENDIX I**  
**LIQUEFACTION ANALYSIS**

# LIQUEFACTION ANALYSIS

## Hunitngton Beach Gun Range

Hole No.=B-1 Water Depth=30 ft

Magnitude=6.9  
Acceleration=0.41g



gun range.sum

\*\*\*\*\*  
\*\*\*\*\*

LIQUEFACTION ANALYSIS CALCULATION SHEET

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\*\*\*\*\*  
\*\*\*\*\*

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Input File Name: J:\2008\20080175-A2918 RBF City of Huntington Beach Closed  
Gun Range - Huntington Central Park Feasibility Study\CEQA\gun range.liq  
Title: Huntington Beach Gun Range  
Subtitle: 20080175-A2918

Surface Elev.=  
Hole No.=B-1  
Depth of Hole= 50.0 ft  
Water Table during Earthquake= 30.0 ft  
Water Table during In-Situ Testing= 50.0 ft  
Max. Acceleration= 0.41 g  
Earthquake Magnitude= 6.9

Input Data:

Surface Elev.=  
Hole No.=B-1  
Depth of Hole=50.0 ft  
Water Table during Earthquake= 30.0 ft  
Water Table during In-Situ Testing= 50.0 ft  
Max. Acceleration=0.41 g  
Earthquake Magnitude=6.9

- 1. SPT or BPT Calculation.
  - 2. Settlement Analysis Method: Ishihara / Yoshimine\*
  - 3. Fines Correction for Liquefaction: Stark/Olson et al.\*
  - 4. Fine Correction for Settlement: During Liquefaction\*
  - 5. Settlement Calculation in: All zones\*
  - 6. Hammer Energy Ratio,
  - 7. Borehole Diameter,
  - 8. Sampling Method,
  - 9. User request factor of safety (apply to CSR) , User= 1  
Plot one CSR curve (fs1=User)
  - 10. Use Curve Smoothing: Yes\*
- \* Recommended Options

Ce = 1.25  
Cb= 1.15  
Cs= 1

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
0.0	0.0	119.7	17.7
3.0	9.0	124.0	17.7
8.0	5.0	122.2	17.7
13.0	4.0	75.4	17.7
18.0	6.0	91.5	17.7
23.0	8.0	91.8	17.7
28.0	5.0	93.3	17.7
33.0	5.0	97.8	17.7
38.0	4.0	87.1	17.7
43.0	10.0	117.6	4.1

48.0 10.0 113.9 4.1 gun range.sum

Output Results:

Settlement of saturated sands=9.07 in.  
 Settlement of dry sands=1.00 in.  
 Total settlement of saturated and dry sands=10.06 in.  
 Differential Settlement=5.030 to 6.640 in.

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
0.00	0.07	0.27	5.00	9.07	1.00	10.06
1.00	0.12	0.27	5.00	9.07	0.99	10.05
2.00	0.19	0.27	5.00	9.07	0.98	10.04
3.00	0.26	0.26	5.00	9.07	0.97	10.04
4.00	0.24	0.26	5.00	9.07	0.97	10.03
5.00	0.22	0.26	5.00	9.07	0.96	10.03
6.00	0.20	0.26	5.00	9.07	0.95	10.02
7.00	0.17	0.26	5.00	9.07	0.94	10.00
8.00	0.14	0.26	5.00	9.07	0.92	9.98
9.00	0.15	0.26	5.00	9.07	0.89	9.96
10.00	0.14	0.26	5.00	9.07	0.87	9.93
11.00	0.13	0.26	5.00	9.07	0.84	9.90
12.00	0.12	0.26	5.00	9.07	0.80	9.86
13.00	0.12	0.26	5.00	9.07	0.75	9.82
14.00	0.12	0.26	5.00	9.07	0.70	9.77
15.00	0.14	0.26	5.00	9.07	0.65	9.72
16.00	0.14	0.26	5.00	9.07	0.61	9.68
17.00	0.15	0.26	5.00	9.07	0.57	9.64
18.00	0.15	0.26	5.00	9.07	0.53	9.60
19.00	0.16	0.25	5.00	9.07	0.49	9.56
20.00	0.16	0.25	5.00	9.07	0.45	9.52
21.00	0.17	0.25	5.00	9.07	0.41	9.48
22.00	0.17	0.25	5.00	9.07	0.37	9.43
23.00	0.18	0.25	5.00	9.07	0.34	9.40
24.00	0.16	0.25	5.00	9.07	0.31	9.37
25.00	0.15	0.25	5.00	9.07	0.28	9.34
26.00	0.14	0.25	5.00	9.07	0.24	9.30
27.00	0.13	0.25	5.00	9.07	0.19	9.26
28.00	0.12	0.25	5.00	9.07	0.13	9.20
29.00	0.12	0.25	5.00	9.07	0.07	9.13
30.00	0.12	0.25	5.00	9.07	0.00	9.07
31.00	0.12	0.25	0.48*	8.64	0.00	8.64
32.00	0.12	0.25	0.47*	8.19	0.00	8.19
33.00	0.12	0.26	0.46*	7.73	0.00	7.73
34.00	0.11	0.26	0.44*	7.27	0.00	7.27
35.00	0.11	0.26	0.42*	6.80	0.00	6.80
36.00	0.11	0.26	0.40*	6.32	0.00	6.32
37.00	0.10	0.26	0.39*	5.83	0.00	5.83
38.00	0.10	0.27	0.37*	5.34	0.00	5.34
39.00	0.10	0.27	0.39*	4.84	0.00	4.84
40.00	0.11	0.27	0.41*	4.37	0.00	4.37
41.00	0.11	0.27	0.42*	3.91	0.00	3.91
42.00	0.12	0.27	0.44*	3.46	0.00	3.46
43.00	0.13	0.27	0.46*	3.03	0.00	3.03
44.00	0.12	0.27	0.45*	2.61	0.00	2.61
45.00	0.12	0.27	0.45*	2.18	0.00	2.18
46.00	0.12	0.27	0.44*	1.75	0.00	1.75
47.00	0.12	0.27	0.43*	1.32	0.00	1.32
48.00	0.12	0.27	0.42*	0.88	0.00	0.88
49.00	0.11	0.27	0.42*	0.44	0.00	0.44
50.00	0.11	0.27	0.41*	0.00	0.00	0.00

gun range.sum

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\* F.S.<1, Liquefaction Potential Zone  
(F.S. is limited to 5, CRR is limited to 2, CSR is limited to 2)

Units Depth = ft, Stress or Pressure = tsf (atm), Unit weight =  
pcf, Settlement = in.

---

CRRm	Cyclic resistance ratio from soils
CSRfs	Cyclic stress ratio induced by a given earthquake (with user
request factor of safety)	
F.S.	Factor of safety against liquefaction, F.S.=CRRm/CSRfs
S_sat	Settlement from saturated sands
S_dry	Settlement from dry sands
S_all	Total settlement from saturated and dry sands
NOliq	No-Liquefy soils

\*\*\*\*\*gun\_range\*\*\*\*\*

LIQUEFACTION ANALYSIS CALCULATION SHEET

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Input File Name: J:\2008\20080175-A2918 RBF City of Huntington Beach Closed Gun Range - Huntington  
Central Park Feasibility Study\CEQA\gun\_range.liq  
Title: Huntington Beach Gun Range  
Subtitle: 20080175-A2918

Input Data:

Surface Elev.=  
Hole No.=B-1  
Depth of Hole=50.0 ft  
Water Table during Earthquake= 30.0 ft  
Water Table during In-Situ Testing= 50.0 ft  
Max. Acceleration=0.41 g  
Earthquake Magnitude=6.9

- 1. SPT or BPT Calculation.
- 2. Settlement Analysis Method: Ishihara / Yoshimine\*
- 3. Fines Correction for Liquefaction: Stark/Olson et al.\*
- 4. Fine Correction for Settlement: During Liquefaction\*
- 5. Settlement Calculation in: All zones\*
- 6. Hammer Energy Ratio,
- 7. Borehole Diameter,
- 8. Sampling Method,
- 9. User request factor of safety (fs1=User)
- 10. Plot one CSR curve (fs1=User)

Ce = 1.25  
Cb= 1.15  
Cs= 1

\* Recommended Options  
\* User request factor of safety (apply to CSR) , User= 1

In-Situ Test Data:

Depth ft	SPT	Gamma pcf	Fines %
0.0	0.0	119.7	17.7
3.0	9.0	124.0	17.7
8.0	5.0	122.2	17.7
13.0	4.0	75.4	17.7
18.0	6.0	91.5	17.7
23.0	8.0	91.8	17.7
28.0	5.0	93.3	17.7
33.0	5.0	97.8	17.7
38.0	4.0	87.1	17.7

gun range

43.0 10.0 117.6 4.1  
 48.0 10.0 113.9 4.1

Output Results:

Calculation segment, dz=0.050 ft  
 User defined Print Interval, dp=1.00 ft

CSR Calculation:

Depth ft	gamma pcf	sigma tsf	gamma' pcf	sigma' tsf	rd	CSR	fs1	CSRfs *fs1
0.00	119.7	0.000	119.7	0.000	1.00	0.27	1.0	0.27
1.00	121.1	0.060	121.1	0.060	1.00	0.27	1.0	0.27
2.00	122.6	0.121	122.6	0.121	1.00	0.27	1.0	0.27
3.00	124.0	0.183	124.0	0.183	0.99	0.26	1.0	0.26
4.00	123.6	0.245	123.6	0.245	0.99	0.26	1.0	0.26
5.00	123.3	0.306	123.3	0.306	0.99	0.26	1.0	0.26
6.00	122.9	0.368	122.9	0.368	0.99	0.26	1.0	0.26
7.00	122.6	0.429	122.6	0.429	0.98	0.26	1.0	0.26
8.00	122.2	0.491	122.2	0.491	0.98	0.26	1.0	0.26
9.00	112.8	0.549	112.8	0.549	0.98	0.26	1.0	0.26
10.00	103.5	0.604	103.5	0.604	0.98	0.26	1.0	0.26
11.00	94.1	0.653	94.1	0.653	0.97	0.26	1.0	0.26
12.00	84.8	0.698	84.8	0.698	0.97	0.26	1.0	0.26
13.00	75.4	0.738	75.4	0.738	0.97	0.26	1.0	0.26
14.00	78.6	0.777	78.6	0.777	0.97	0.26	1.0	0.26
15.00	81.8	0.817	81.8	0.817	0.97	0.26	1.0	0.26
16.00	85.1	0.858	85.1	0.858	0.96	0.26	1.0	0.26
17.00	88.3	0.902	88.3	0.902	0.96	0.26	1.0	0.26
18.00	91.5	0.947	91.5	0.947	0.96	0.26	1.0	0.26
19.00	91.6	0.992	91.6	0.992	0.96	0.25	1.0	0.25
20.00	91.6	1.038	91.6	1.038	0.95	0.25	1.0	0.25
21.00	91.7	1.084	91.7	1.084	0.95	0.25	1.0	0.25
22.00	91.7	1.130	91.7	1.130	0.95	0.25	1.0	0.25
23.00	91.8	1.176	91.8	1.176	0.95	0.25	1.0	0.25
24.00	92.1	1.222	92.1	1.222	0.94	0.25	1.0	0.25
25.00	92.4	1.268	92.4	1.268	0.94	0.25	1.0	0.25
26.00	92.7	1.314	92.7	1.314	0.94	0.25	1.0	0.25
27.00	93.0	1.360	93.0	1.360	0.94	0.25	1.0	0.25
28.00	93.3	1.407	93.3	1.407	0.93	0.25	1.0	0.25
29.00	94.2	1.454	94.2	1.454	0.93	0.25	1.0	0.25
30.00	95.1	1.501	95.1	1.501	0.93	0.25	1.0	0.25
31.00	96.0	1.549	96.0	1.549	0.92	0.25	1.0	0.25
32.00	96.9	1.597	96.9	1.597	0.91	0.25	1.0	0.25
33.00	97.8	1.646	97.8	1.646	0.91	0.26	1.0	0.26
34.00	95.7	1.694	95.7	1.694	0.90	0.26	1.0	0.26

Depth ft	SPT	Cebs	from SPT or BPT	sigma' tsf	Cn	(N1)60	Fines %	d(N1)60	(N1)60F	CRR7.5
35.00	93.5	1.742	31.1	1.587	0.89	gun range 0.26	1.0	0.26		
36.00	91.4	1.788	29.0	1.602	0.88	0.26	1.0	0.26		
37.00	89.2	1.833	26.8	1.616	0.87	0.26	1.0	0.26		
38.00	87.1	1.877	24.7	1.629	0.86	0.27	1.0	0.27		
39.00	93.2	1.922	30.8	1.643	0.86	0.27	1.0	0.27		
40.00	99.3	1.970	36.9	1.660	0.85	0.27	1.0	0.27		
41.00	105.4	2.021	43.0	1.680	0.84	0.27	1.0	0.27		
42.00	111.5	2.075	49.1	1.703	0.83	0.27	1.0	0.27		
43.00	117.6	2.133	55.2	1.729	0.82	0.27	1.0	0.27		
44.00	116.9	2.191	54.5	1.756	0.82	0.27	1.0	0.27		
45.00	116.1	2.249	53.7	1.783	0.81	0.27	1.0	0.27		
46.00	115.4	2.307	52.2	1.810	0.80	0.27	1.0	0.27		
47.00	114.6	2.365	52.2	1.836	0.79	0.27	1.0	0.27		
48.00	113.9	2.422	51.5	1.862	0.78	0.27	1.0	0.27		
49.00	113.9	2.479	51.5	1.888	0.78	0.27	1.0	0.27		
50.00	113.9	2.536	51.5	1.913	0.77	0.27	1.0	0.27		

CSR is based on water table at 30.0 during earthquake

Depth ft	SPT	Cebs	from SPT or BPT	sigma' tsf	Cn	(N1)60	Fines %	d(N1)60	(N1)60F	CRR7.5
0.00	0.00	1.44	0.75	0.000	1.70	0.00	17.70	3.05	3.05	0.06
1.00	3.00	1.44	0.75	0.060	1.70	5.50	17.70	3.05	8.55	0.09
2.00	6.00	1.44	0.75	0.121	1.70	11.00	17.70	3.05	14.04	0.15
3.00	9.00	1.44	0.75	0.183	1.70	16.50	17.70	3.05	19.54	0.21
4.00	8.20	1.44	0.75	0.245	1.70	15.03	17.70	3.05	18.08	0.20
5.00	7.40	1.44	0.75	0.306	1.70	13.56	17.70	3.05	16.61	0.18
6.00	6.60	1.44	0.75	0.368	1.65	11.73	17.70	3.05	14.78	0.16
7.00	5.80	1.44	0.75	0.429	1.53	9.54	17.70	3.05	12.59	0.14
8.00	5.00	1.44	0.75	0.491	1.43	7.70	17.70	3.05	10.74	0.12
9.00	4.80	1.44	0.85	0.549	1.35	7.91	17.70	3.05	10.96	0.12
10.00	4.60	1.44	0.85	0.604	1.29	7.23	17.70	3.05	10.28	0.11
11.00	4.40	1.44	0.85	0.653	1.24	6.65	17.70	3.05	9.70	0.11
12.00	4.20	1.44	0.85	0.698	1.20	6.14	17.70	3.05	9.19	0.10
13.00	4.00	1.44	0.85	0.738	1.16	5.69	17.70	3.05	8.74	0.10
14.00	4.00	1.44	0.85	0.777	1.13	6.10	17.70	3.05	9.15	0.10
15.00	4.80	1.44	0.95	0.817	1.11	7.25	17.70	3.05	10.30	0.11
16.00	5.20	1.44	0.95	0.858	1.08	7.67	17.70	3.05	10.71	0.12
17.00	5.60	1.44	0.95	0.902	1.05	8.05	17.70	3.05	11.10	0.12
18.00	6.00	1.44	0.95	0.947	1.03	8.42	17.70	3.05	11.47	0.12
19.00	6.40	1.44	0.95	0.992	1.00	8.77	17.70	3.05	11.82	0.13
20.00	6.80	1.44	0.95	1.038	0.98	9.11	17.70	3.05	12.16	0.13
21.00	7.20	1.44	0.95	1.084	0.96	9.44	17.70	3.05	12.49	0.14
22.00	7.60	1.44	0.95	1.130	0.94	9.76	17.70	3.05	12.81	0.14
23.00	8.00	1.44	0.95	1.176	0.92	10.08	17.70	3.05	13.12	0.14
24.00	7.40	1.44	0.95	1.222	0.90	9.14	17.70	3.05	12.19	0.13

Depth ft	sigC tsf	CRR7.5 tsf	Ksigma	CRRV	MSF	CRRM	CSRfs	F.S. CRRm/CSRfs
25.00	6.80	1.44	0.95	1.268	0.89	gun range	17.70	3.05
26.00	6.20	1.44	0.95	1.314	0.87	8.25	17.70	3.05
27.00	5.60	1.44	0.95	1.360	0.86	7.39	17.70	3.05
28.00	5.00	1.44	1.00	1.407	0.84	6.56	17.70	3.05
29.00	5.00	1.44	1.00	1.454	0.83	6.06	17.70	3.05
30.00	5.00	1.44	1.00	1.501	0.82	5.96	17.70	3.05
31.00	5.00	1.44	1.00	1.549	0.80	5.87	17.70	3.05
32.00	5.00	1.44	1.00	1.597	0.79	5.78	17.70	3.05
33.00	5.00	1.44	1.00	1.646	0.78	5.69	17.70	3.05
34.00	4.80	1.44	1.00	1.694	0.77	5.60	17.70	3.05
35.00	4.60	1.44	1.00	1.742	0.76	5.30	17.70	3.05
36.00	4.40	1.44	1.00	1.788	0.75	5.01	17.70	3.05
37.00	4.20	1.44	1.00	1.833	0.74	4.73	17.70	3.05
38.00	4.00	1.44	1.00	1.877	0.73	4.46	17.70	3.05
39.00	5.20	1.44	1.00	1.922	0.72	4.20	17.70	3.05
40.00	6.40	1.44	1.00	1.970	0.71	5.39	14.98	2.40
41.00	7.60	1.44	1.00	2.021	0.70	6.55	12.26	1.74
42.00	8.80	1.44	1.00	2.075	0.69	7.68	9.54	1.09
43.00	10.00	1.44	1.00	2.133	0.68	8.78	6.82	0.44
44.00	10.00	1.44	1.00	2.191	0.68	9.84	4.10	0.00
45.00	10.00	1.44	1.00	2.249	0.67	9.71	4.10	0.00
46.00	10.00	1.44	1.00	2.307	0.66	9.58	4.10	0.00
47.00	10.00	1.44	1.00	2.365	0.65	9.46	4.10	0.00
48.00	10.00	1.44	1.00	2.422	0.64	9.35	4.10	0.00
49.00	10.00	1.44	1.00	2.479	0.64	9.24	4.10	0.00
50.00	10.00	1.44	1.00	2.536	0.63	9.13	4.10	0.00
						9.03	4.10	0.00

CRR is based on water table at 50.0 during In-Situ Testing

Factor of Safety, - Earthquake Magnitude= 6.9:

Depth ft	sigC tsf	CRR7.5 tsf	Ksigma	CRRV	MSF	CRRM	CSRfs	F.S. CRRm/CSRfs
0.00	0.00	0.06	1.00	0.06	1.24	0.07	0.27	5.00
1.00	0.04	0.09	1.00	0.09	1.24	0.12	0.27	5.00
2.00	0.08	0.15	1.00	0.15	1.24	0.19	0.27	5.00
3.00	0.12	0.21	1.00	0.21	1.24	0.26	0.26	5.00
4.00	0.16	0.20	1.00	0.20	1.24	0.24	0.26	5.00
5.00	0.20	0.18	1.00	0.18	1.24	0.22	0.26	5.00
6.00	0.24	0.16	1.00	0.16	1.24	0.20	0.26	5.00
7.00	0.28	0.14	1.00	0.14	1.24	0.17	0.26	5.00
8.00	0.32	0.12	1.00	0.12	1.24	0.14	0.26	5.00
9.00	0.36	0.11	1.00	0.12	1.24	0.15	0.26	5.00
10.00	0.39	0.11	1.00	0.11	1.24	0.14	0.26	5.00
11.00	0.42	0.11	1.00	0.11	1.24	0.13	0.26	5.00
12.00	0.45	0.10	1.00	0.10	1.24	0.12	0.26	5.00
13.00	0.48	0.10	1.00	0.10	1.24	0.12	0.26	5.00
14.00	0.50	0.10	1.00	0.10	1.24	0.12	0.26	5.00

15.00	0.53	0.11	1.00	0.11	1.24	0.14	0.26	5.00
16.00	0.56	0.12	1.00	0.12	1.24	0.14	0.26	5.00
17.00	0.59	0.12	1.00	0.12	1.24	0.15	0.26	5.00
18.00	0.62	0.12	1.00	0.12	1.24	0.15	0.26	5.00
19.00	0.64	0.13	1.00	0.13	1.24	0.16	0.25	5.00
20.00	0.67	0.13	1.00	0.13	1.24	0.16	0.25	5.00
21.00	0.70	0.14	1.00	0.14	1.24	0.17	0.25	5.00
22.00	0.73	0.14	1.00	0.14	1.24	0.17	0.25	5.00
23.00	0.76	0.14	1.00	0.14	1.24	0.18	0.25	5.00
24.00	0.79	0.13	1.00	0.13	1.24	0.16	0.25	5.00
25.00	0.82	0.12	1.00	0.12	1.24	0.15	0.25	5.00
26.00	0.85	0.11	1.00	0.11	1.24	0.14	0.25	5.00
27.00	0.88	0.10	1.00	0.10	1.24	0.13	0.25	5.00
28.00	0.91	0.10	1.00	0.10	1.24	0.12	0.25	5.00
29.00	0.95	0.10	1.00	0.10	1.24	0.12	0.25	5.00
30.00	0.98	0.10	1.00	0.10	1.24	0.12	0.25	5.00
31.00	1.01	0.10	1.01	0.10	1.24	0.12	0.25	5.00
32.00	1.04	0.10	1.00	0.10	1.24	0.12	0.25	0.48 *
33.00	1.07	0.09	1.00	0.09	1.24	0.12	0.25	0.47 *
34.00	1.10	0.09	0.99	0.09	1.24	0.11	0.26	0.46 *
35.00	1.13	0.09	0.99	0.09	1.24	0.11	0.26	0.44 *
36.00	1.16	0.09	0.98	0.09	1.24	0.11	0.26	0.42 *
37.00	1.19	0.08	0.98	0.08	1.24	0.11	0.26	0.40 *
38.00	1.22	0.08	0.97	0.08	1.24	0.10	0.26	0.39 *
39.00	1.25	0.09	0.97	0.08	1.24	0.10	0.27	0.37 *
40.00	1.28	0.09	0.96	0.08	1.24	0.10	0.27	0.39 *
41.00	1.31	0.09	0.96	0.09	1.24	0.11	0.27	0.41 *
42.00	1.35	0.10	0.95	0.09	1.24	0.11	0.27	0.42 *
43.00	1.39	0.10	0.95	0.10	1.24	0.12	0.27	0.44 *
44.00	1.42	0.11	0.94	0.10	1.24	0.13	0.27	0.46 *
45.00	1.46	0.11	0.94	0.10	1.24	0.12	0.27	0.45 *
46.00	1.50	0.10	0.93	0.10	1.24	0.12	0.27	0.45 *
47.00	1.54	0.10	0.93	0.09	1.24	0.12	0.27	0.44 *
48.00	1.57	0.10	0.92	0.09	1.24	0.12	0.27	0.43 *
49.00	1.61	0.10	0.92	0.09	1.24	0.12	0.27	0.42 *
50.00	1.65	0.10	0.91	0.09	1.24	0.11	0.27	0.42 *

\* F.S.<1: Liquefaction Potential Zone, (If above water table: F.S.=5)  
(F.S. is limited to 5, CRR is limited to 2, CSR is limited to 2)

CPT convert to SPT for Settlement Analysis:  
Fines Correction for Settlement Analysis:  
Depth Ic qc/N60 qc1 tsf (N1)60 Fines d(N1)60 (N1)60s  
ft %

0.00	-	-	-	3.05	17.7	0.00	3.05
1.00	-	-	-	8.55	17.7	0.00	8.55

2.00	14.04	17.7	gun range	14.04	17.7	0.00	14.04
3.00	19.54	17.7		19.54	17.7	0.00	19.54
4.00	18.08	17.7		18.08	17.7	0.00	18.08
5.00	16.61	17.7		16.61	17.7	0.00	16.61
6.00	14.78	17.7		14.78	17.7	0.00	14.78
7.00	12.59	17.7		12.59	17.7	0.00	12.59
8.00	10.74	17.7		10.74	17.7	0.00	10.74
9.00	10.96	17.7		10.96	17.7	0.00	10.96
10.00	10.28	17.7		10.28	17.7	0.00	10.28
11.00	9.70	17.7		9.70	17.7	0.00	9.70
12.00	9.19	17.7		9.19	17.7	0.00	9.19
13.00	8.74	17.7		8.74	17.7	0.00	8.74
14.00	9.15	17.7		9.15	17.7	0.00	9.15
15.00	10.30	17.7		10.30	17.7	0.00	10.30
16.00	10.71	17.7		10.71	17.7	0.00	10.71
17.00	11.10	17.7		11.10	17.7	0.00	11.10
18.00	11.47	17.7		11.47	17.7	0.00	11.47
19.00	11.82	17.7		11.82	17.7	0.00	11.82
20.00	12.16	17.7		12.16	17.7	0.00	12.16
21.00	12.49	17.7		12.49	17.7	0.00	12.49
22.00	12.81	17.7		12.81	17.7	0.00	12.81
23.00	13.12	17.7		13.12	17.7	0.00	13.12
24.00	12.19	17.7		12.19	17.7	0.00	12.19
25.00	11.30	17.7		11.30	17.7	0.00	11.30
26.00	10.43	17.7		10.43	17.7	0.00	10.43
27.00	9.60	17.7		9.60	17.7	0.00	9.60
28.00	9.11	17.7		9.11	17.7	0.00	9.11
29.00	9.01	17.7		9.01	17.7	0.00	9.01
30.00	8.91	17.7		8.91	17.7	0.00	8.91
31.00	8.82	17.7		8.82	17.7	0.00	8.82
32.00	8.74	17.7		8.74	17.7	0.00	8.74
33.00	8.65	17.7		8.65	17.7	0.00	8.65
34.00	8.35	17.7		8.35	17.7	0.00	8.35
35.00	8.06	17.7		8.06	17.7	0.00	8.06
36.00	7.78	17.7		7.78	17.7	0.00	7.78
37.00	7.51	17.7		7.51	17.7	0.00	7.51
38.00	7.24	17.7		7.24	17.7	0.00	7.24
39.00	7.79	15.0		7.79	15.0	0.00	7.79
40.00	8.30	12.3		8.30	12.3	0.00	8.30
41.00	8.77	9.5		8.77	9.5	0.00	8.77
42.00	9.22	6.8		9.22	6.8	0.00	9.22
43.00	9.84	4.1		9.84	4.1	0.00	9.84
44.00	9.71	4.1		9.71	4.1	0.00	9.71
45.00	9.58	4.1		9.58	4.1	0.00	9.58
46.00	9.46	4.1		9.46	4.1	0.00	9.46
47.00	9.35	4.1		9.35	4.1	0.00	9.35
48.00	9.24	4.1		9.24	4.1	0.00	9.24
49.00	9.13	4.1		9.13	4.1	0.00	9.13

50.00 - - - 9.03 4.1 0.00 9.03 gun range

(NL)60s has been fines corrected in liquefaction analysis, therefore d(NL)60=0.  
 Fines=Noliq means the soils are not liquefiable.

Settlement of Saturated Sands:  
 Settlement Analysis Method: Ishihara / Yoshimine\*

Depth ft	CSRfs	F.S.	Fines %	(NL)60s Dr %	ec %	dsz in.	dsp in.	S in.
49.95	0.27	0.41	4.1	9.03	48.16	2.2E-2	0.022	0.022
49.00	0.27	0.42	4.1	9.13	48.41	2.2E-2	0.421	0.443
48.00	0.27	0.42	4.1	9.24	48.67	2.2E-2	0.440	0.883
47.00	0.27	0.43	4.1	9.35	48.95	2.2E-2	0.437	1.319
46.00	0.27	0.44	4.1	9.46	49.23	2.2E-2	0.433	1.752
45.00	0.27	0.45	4.1	9.58	49.53	2.1E-2	0.430	2.182
44.00	0.27	0.45	4.1	9.71	49.84	2.1E-2	0.426	2.608
43.00	0.27	0.46	4.1	9.84	50.16	2.1E-2	0.422	3.030
42.00	0.27	0.44	6.8	9.22	48.62	2.2E-2	0.432	3.462
41.00	0.27	0.42	9.5	8.77	47.50	2.3E-2	0.446	3.908
40.00	0.27	0.41	12.3	8.30	46.27	2.3E-2	0.460	4.368
39.00	0.27	0.39	15.0	7.79	44.91	2.4E-2	0.476	4.844
38.00	0.27	0.37	17.7	7.24	43.43	2.5E-2	0.493	5.337
37.00	0.26	0.39	17.7	7.51	44.15	2.5E-2	0.497	5.834
36.00	0.26	0.40	17.7	7.78	44.89	2.4E-2	0.488	6.322
35.00	0.26	0.42	17.7	8.06	45.64	2.4E-2	0.479	6.801
34.00	0.26	0.44	17.7	8.35	46.41	2.3E-2	0.470	7.271
33.00	0.26	0.46	17.7	8.65	47.19	2.3E-2	0.461	7.731
32.00	0.25	0.47	17.7	8.74	47.40	2.3E-2	0.455	8.186
31.00	0.25	0.48	17.7	8.82	47.63	2.3E-2	0.452	8.638
30.05	0.25	0.49	17.7	8.91	47.85	2.2E-2	0.427	9.065

Settlement of Saturated Sands=9.065 in.  
 qcl and (NL)60 is after fines correction in liquefaction analysis  
 dsz is per each segment, dz=0.05 ft  
 dsp is per each print interval, dp=1.00 ft  
 S is cumulated settlement at this depth

Settlement of Dry Sands:	Depth	sigma' sigC'	(NL)60s CSRfs	Gmax	g*Ge/Gm	g_eff	ec7.5	Cec	ec	dsz	dsp
ft	tsf	tsf		tsf		%	%	%	%	in.	in.
30.00	1.50	0.98	8.91	915.3	4.1E-4	0.1174	0.3154	0.90	0.2837	3.40E-3	



	0.013	0.051	0.20	16.61	0.26	508.7	1.6E-4	0.0285	0.0358	0.90	0.0322	3.86E-4
0.009	0.009	0.31	0.16	18.08	0.26	467.6	1.4E-4	0.0238	0.0268	0.90	0.0241	2.89E-4
0.007	0.007	0.18	19.54	0.26	414.7	1.2E-4	0.0249	0.0253	0.90	0.0227	2.73E-4	
0.005	0.005	0.12	14.04	0.27	302.5	1.1E-4	0.0219	0.0341	0.90	0.0306	3.68E-4	
0.006	0.006	0.06	8.55	0.27	180.7	8.9E-5	0.0164	0.0461	0.90	0.0415	4.98E-4	
0.009	0.009	0.00	3.05	0.27	1.7	1.6E-6	0.0010	0.0048	0.90	0.0043	5.13E-5	

Settlement of Dry Sands=0.996 in.  
 dsz is per each segment, dz=0.05 ft  
 dsp is per each print interval, dp=1.00 ft  
 S is cumulated settlement at this depth

Total Settlement of Saturated and Dry Sands=10.061 in.  
 Differential Settlement=5.030 to 6.640 in.

Units Depth = ft, Stress or Pressure = tsf (atm), Unit weight = pcf, Settlement = in.

- SPT Field data from Standard Penetration Test (SPT)
- BPT Field data from Becker Penetration Test (BPT)
- qc Field data from Cone Penetration Test (CPT)
- fs Friction from CPT testing
- gamma Total unit weight of soil
- gamma' Effective unit weight of soil
- Fines Fines content [%]
- D50 Mean grain size
- Dr Relative Density
- sigma Total vertical stress [tsf]
- sigma' Effective vertical stress [tsf]
- sigC' Effective confining pressure [tsf]
- rd Stress reduction coefficient
- CRR7.5 Cyclic resistance ratio (M=7.5)
- Ksigma Overburden stress correction factor for CRR7.5
- CRRV CRR after overburden stress correction, CRRV=CRR7.5 \* Ksigma
- MSF Magnitude scaling factor for CRR (M=7.5)
- CRRM After magnitude scaling correction CRRM=CRRV \* MSF
- F.S. Calculated factor of safety against liquefaction F.S.=CRRM/CRRfs
- User User request factor of safety which may apply to CSR
- fs1 First CSR curve in graphic defined in #9 of Advanced page
- fs2 2nd CSR curve in graphic defined in #9 of Advanced page

