Recommendations

Site Preparation/Overexcavation

All grading and backfills should be performed in accordance with the attached General Earthwork and Grading Specifications (Appendix E) except as modified in the text of this report.

The building/grading areas should be cleared of all vegetation, irrigation lines, roots, debris and deleterious materials which should be hauled offsite. Subsequent to site clearance and debris removal, the building area, extending at least 5 feet beyond building lines in plan (including any canopies/exterior footings), should be overexcavated to a depth of at least 4 feet below existing ground or proposed grade (whichever is deeper) to remove loose soils and roots and expose underlying firm soils. Locally deeper overexcavations should not be precluded specially to remove roots and expose competent soils. Vegetation roots should be traced and completely removed if encountered in bottom of the overexcavated areas. Root pickers may be required for this purpose. After any overexcavation, the exposed surfaces should be further scarified to a depth of at least 12-inches, watered and recompacted to at least 90 percent of the maximum dry density, as determined by ASTM D1557-09 Test Method, prior to placement of fill. All fills should be compacted to at least 90 percent of the maximum dry density.

Foundation Design

Following site preparation, the use of shallow spread footings supported on compacted fill is feasible for proposed structures. A net allowable bearing value of 1500 psf is recommended for foundations extending at least 12 inches into the compacted fill. This bearing value may be increased by one third for temporary (wind or seismic) loads. Reinforcement and other recommendations for residential structures are presented on Plate 2 and may be designed for very low expansion category. All foundations should be designed by a qualified structural engineer in accordance with the latest applicable building codes and structural considerations may govern. All foundations should be provided with at least 3 feet of compacted fill mat below bottom of footings. Please note foundation design is under the purview of structural engineer and structural engineer may have more stringent requirements.

Residential slabs-on-grade should be at least 4 inches thick, and should be reinforced with at least No. 3 bars at 18-inches on-center both ways, properly centered in mid-thickness of slabs. Slabs-on-grade should be underlain by a 10-mil Visqueen moisture barrier placed over two inches of clean rolled sand and overlain by two-inch layer of clean rolled sand to aid in concrete curing. Other additional recommendations for residential structures are presented on Plate 2.

Special Considerations

Slab-on-grade thickness and reinforcement should be evaluated by the structural engineer and designed in compliance with applicable codes. Excess soils generated from foundation excavations should not be placed on building pads and driveway without proper moisture and compaction. All slab subgrades should be verified to contain 1.2 times the soil optimum moisture content to a depth of 6 inches prior to placement of slab building materials. Moisture content should be tested in the field by the soil engineer. Slabs subgrade should be kept moist and the surface should not be allowed to desiccate.

The addition of fiber mesh in the concrete and careful control of water/cement ratios may lessen the potential for slab cracking. In hot or windy weather, the contractor must take appropriate curing precautions after the placement of concrete. The use of mechanically compacted/dense low slump concrete (not exceeding 4 inches at the time of placement) is recommended. We recommend that a slipsheet (or equivalent) be utilized if grouted tiles or other crack sensitive flooring (such as marble tiles) is planned directly on concrete slabs.

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Retaining Walls/Lateral Earth Pressures

The following lateral earth pressures and soil parameters, in conjunction with the above-recommended bearing value of 1500 psf, may be used for design of retaining walls with free draining compacted backfills. If passive earth pressure and friction are combined to provide required resistance to lateral forces, the value of the passive pressure should be reduced to two-thirds the following recommendations.

Active Earth Pressure with level backfill (Pa)	35 psf (EFP), drained, yielding
At Rest Pressure (P ₀)	50 psf (EFP), drained, non-yielding (part of building wall)
Passive Earth Pressure (Pp)	300 psf (EFP), drained, maximum of 3000 psf
Horizontal Coefficient of Friction (µ)	0.30
Unit Soil Weight (yt)	120 pcf

We recommend drainage for retaining walls to be provided in accordance with Plate 3 of this report. Maximum precautions should be taken when placing drainage materials and during backfilling. All wall backfills should be properly compacted to at least 90 percent relative compaction. Any waterproofing of the walls must be evaluated by the project architect and considered during planning and construction.

Expansion Index/Soluble Sulfates

Based on observation and soil classification, the expansion potential of the onsite sandy soils is anticipated to be very low (EI<20). However, we recommend that expansion potential of the soils should be verified subsequent to completion of site preparation. Soluble sulfate content of the foundation soils should also be determined subsequent to completion of grading/prior to start of construction. Tentatively we recommend Type II cement and concrete slump not exceeding 4 inches at the time of placement. If critical, these should be further verified by your structural and/or a corrosion engineer.

Seismic Design

The site is approximately 8.5 and 8.6 miles from the Chino-Central Ave. (Elsinore) and Elsinore-Glen Ivy faults, respectively. Moderate to strong ground shaking can be expected and there is a 10 percent probability in 50 years that ground acceleration will exceed 0.425g at the site. A soil profile, site class D (stiff soil), has been considered for the site. The structural engineer should consider City/County local codes, California Building Code (CBC) 2010, seismic data presented in this report (Appendix D), the latest requirements of the Structural Engineers Association, and any other pertinent data in selecting design parameters.

Drainage

Positive drainage must be provided and maintained for the life of the project around the perimeter of the structure and all foundations toward streets or approved drainage devices to minimize water infiltrating into the underlying natural and engineered fill soils. In addition, finish subgrade adjacent to exterior footings should be sloped down and away to facilitate surface drainage. Roof drainage should be collected and directed away from foundations via nonerosive devices. Water, either natural or by irrigation, should not be permitted to pond or saturate the foundation soils.

Infiltration Test Procedure

Three 8-inch diameter, two-feet deep test holes (I-1, I-2 and I-3) were excavated at the randomly selected locations. The soil at the test locations was visually classified as silty sand (USCS "SM"). To mitigate any possible caving or sloughing of the test hole, an 8-inch diameter perforated canister was placed in the hole.

The testing was conducted after presoaking. Water level was adjusted to 6 inches above the bottom of the test hole. Consecutive measurements were taken at 30 minute intervals on test holes I-1 and I-2 and 10 minute intervals on test hole I-3, until a stabilized rate of drop was obtained. The drop that occurred during the final reading was used for design purposes.

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Infiltration Tests/Tabulated Results

Test No.	Depth of Test (feet)	Earth Material	Infiltration Rate (in/hr)
I-1	2	Silty Sand ("SM")	2.82
I-2	2	Silty Sand ("SM")	4.56
I-3	2	Silty Sand ("SM")	17.9

We recommend that a suitable factor of safety should be applied to the rate in design of the system.

Cal/OSHA Classification/Trench Excavations/Backfills

In general Cal/OSHA classification of onsite soils appears to be Type B.

Temporary trench excavations deeper than 5 feet should be shored or sloped at 1:1 or flatter in compliance with Cal/OSHA requirements. All utility trenches and wall backfills should be mechanically compacted to the minimum requirements of at least 90 percent relative compaction. No jetting, ponding, or flooding should be permitted within the building area or where trenches are in zone of influence of footing loads. Excavated material from footing trenches should not be placed in slab-on-grade and driveways areas unless properly compacted and tested.

Foundation Plan Review/Observations and Testing

The recommendations provided in this report are based on preliminary design information and subsurface conditions as interpreted from limited exploratory work. Our conclusions and recommendations should also be reviewed, verified during grading and construction, and revised as necessary. Soil Exploration Co., Inc. should review the foundation plan and observe and/or test at the following stages of construction:

- During all overexcavations, site preparation and grading.
- Following footing excavations and prior to placement of footing materials.
- During wetting of slab subgrade (1.2 optimum moisture to a depth of 6 inches) and prior to placement of slab materials.
- During all trench backfills and pavements subgrade/base compaction.
- When any unusual conditions are encountered.

Final Compaction Report

A final report of compaction control should be prepared subsequent to the completion of site preparation. The report should include a summary of work performed, laboratory test results, and the results, locations and elevations of field density tests performed during rough grading.

Limitation of Investigation

Our investigation was performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable Geotechnical Engineers practicing in this or similar locations. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report. The field and laboratory test data are believed representative of the project site; however, soil conditions can vary significantly. As in most projects, conditions revealed during grading may be at variance with preliminary findings. If this condition occurs, the possible variations must be evaluated by the Project Geotechnical Engineer and adjusted as required or alternate design recommended. This report is issued with the understanding that it is the responsibility of the owner, or his representative, to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and incorporated into the plans, and the necessary steps are taken to see that the

contractor and subcontractor carry out such recommendations in the field. This firm does not practice or consult in the field of safety engineering. We do not direct the contractor's operations, and we cannot be responsible for other than our own personnel on the site; therefore, the safety of others is the responsibility of the contractor. The contractor should notify the owner if he considers any of the recommended actions presented herein to be unsafe. The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they be due to natural processes or the works of man on this or adjacent properties. In additions, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge.

This report was prepared for the client based on client's needs, directions and requirements at the time. This report is not authorized for use by and is not to be relied upon by any party except the client with whom Soil Exploration Co., Inc. contracted for the work. Use of, or reliance on, this report by any other party is at that party's risk. Unauthorized use of or reliance on this report constitutes an agreement to defend and indemnify Soil Exploration Co., Inc. from and against any liability which may arise as a result of such use or reliance, regardless of any fault, negligence, or strict liability of Soil Exploration Co., Inc.

Closure

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

Very truly yours, Soil Exploration Co. Inc. Gene K. Luu, PE 53417 Project Engineer	053417 EL 053417 EL G/3415 CIVIL F CALIFORNIT	
Distribution:	[3] Addressee	
Attachments:	Figure 1 Figure 2	Site Location Map USGS Geologic Map
	Plate 1 Plate 2 Plate 3	Exploratory Boring & Infiltration Test Location Map Minimum Foundation and Slab Recommendations for Expansive Soils Retaining Wall Backfill and Subdrain Detail
	Appendix A Appendix B Appendix C Appendix D Appendix E	References Exploratory Boring Logs Laboratory Test Results Deterministic and CBC (2010) Seismic Parameters General Earthwork and Grading Specifications







	EXPANSION INDEX (ASTM D 4829) 0-20 VERY LOW EXPANSION
1-Story Footings (See Note 1)	All footings 12" deep. Reinforcement for continuous footings: two No. 4 bars top and two No. 4 bars at bottom
2-Story Footings (See Note 1)	All footings at least 18" deep. Reinforcement for continuous footings: Two No. 4 bars top and two No. 4 bars at bottom
Minimum Footing Width	Continuous: 12" for 1-story Continuous: 15" for 2-story
Pad Footings	Isolated column: 24" wide and 24" deep, tied to continuous footings in two directions
Garage Door Grade Beam (See Note 2)	A grade beam 12" deep for 1-story and 18" deep for 2-story by 12" wide for 1-story and 15" wide for 2-story should be provided across the garage entrance and other openings.
Living Area Floor Slabs (See Notes 3, 4 and 5)	4" thick slab. No. 3 rebar at 18 inches on-center reinforcement at mid-height, 10-mil Visqueen moisture barrier above 2" sand base with 2" sand above Visqueen
Garage Floor Slabs (See Notes 4 and 6)	4" thick slab. No. 3 rebar at 18 inches on-center with 2" sand base above and below a 10-mil Visqueen moisture barrier. Garage slabs should be quarter-sawn
Presoaking of Living Areas & Garage Slabs Subgrade*	(1.2) times optimum moisture to a depth of at least 6"

The Above Are Minimum Recommendations. All Work Should Comply with Applicable/Governing Agency Codes and Requirements

*Presoaking of living areas and garage slabs should be observed and tested by the project geotechnical engineer.

NOTES:

- 1. Depth of interior or exterior footings to be measured from lowest adjacent finish grade.
- 2. The base of the grade beam should be at the same elevation as that of the adjoining footings.
- 3. Living areas slabs may be tied to the footings as directed by the structural engineer.
- 4. We recommend the use of at least No. 3 bars at 18 inches on-center, each way, for all slabs.
- 5. 10-mil Visqueen sheeting welded at laps has proved successful. Equivalents are acceptable.
- 6. Garage slabs should be isolated from stem wall footings with a minimum 3/8" felt expansion joint.
- 7. Sand base should have a Sand Equivalent (SE) of 30 or greater (e.g., washed concrete sand).

Post-Tensioned Slabs

As an alternative to conventional foundations, building may be supported on post-tensioned slabs, to be designed by a structural engineer in consultation with the geotechnical consultant. In addition, a post-tensioned slab is also recommended for VERY HIGH expansion potential (Expansion Index greater than 130), if encountered. Post-tensioned slabs should have perimeter footings embedded a minimum of 12 inches below the adjacent grade. The slabs should be designed such that they can be deformed approximately 1-inch vertically over a width of 30 feet without distress in the event of shrinkage or swelling of the supporting soils. Living area slabs should be underlain by a 10-mil Visqueen moisture barrier covered by a 2-inch layer of sand. Presoaking is recommended for post tensioned slabs: (1.2) x optimum to a depth of 12 inches, (1.3) x optimum to a depth of 18 inches, and (1.4) x optimum to a depth of 24 inches for LOW, MEDIUM, and HIGH expansion potential soils, respectively. LOW and MEDIUM expansive soil lots using conventional foundation should comply with 2010 CBC. For very high expansion potential (Expansion Index greater than 130), specific recommendations by the geotechnical consultant will be required. Placement of 4 inches of sand base is also suggested for post-tensioned slab systems. Unless stated in the attached report, for EI=21-50 use PI-25, and EI=51-90 use PI=35.

Minimum Foundation and Slab Recommendations For Expansive Soils



Soil Exploration Co. Inc.

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Plate:

ONE- AND TWO-STORY RESIDENTIAL BUILDINGS



APPENDIX A



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REFERENCES

- Envicom, 1976, Seismic Hazards Map, City of Riverside Area, Plate VA, Dated September 1976.
- Envicom, 1976, Safety Element Map, City of Riverside Area, Plate VB, Dated September 1976.
- Department of the Interior, U.S. Geological Survey, Contour Map Showing Minimum Depth to Ground Water, Upper Santa Ana River Valley, California 1973-1979 (Sheet 2 of 2), By Scott E. Carson and Jonathan C. Matti, Dated 1985.
- U.S. Department of the Interior, U.S. Geological Survey, Geologic Map of the Riverside West Quadrangle, Riverside County, California, Dated 1994.
- TLMA, County of Riverside, Geotechnical/Liquefaction Map, Dated September 26, 1997.
- CDMG, Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada, Dated February 1998.

APPENDIX B



- MAJOR DIVISIONS		SYM	BOLS	TYPICAL NAMES	
	LS sieve)		GW	K C	Well-graded gravels or gravel-sand mixtures, little or no fines
LS.		GRAVELS	GP	0	Poorly graded gravels or gravel-sand mixtures, little or no fines
D SO	0. 200	(wore than ½ or coarse fraction > No. 4 sieve size)	GM	9393	Silty gravels, gravel-sand-silt mixtures
AINEI	oil < No	4 0000 01207	GC	HII/J	Clayey gravels, gravel-sand-clay mixtures
-GR	2 of sc		sw		Well-graded sands or gravely sands, little or no fines
ARSI	than ¹	SANDS	SP	0000000	Poorly graded sands or gravelly sands, little or no fines
8	CO (More	(More than ½ of coarse fraction < No.	SM		Silty sands, sand-salt mixtures
		4 SIEVE SIZE/	SC		Clayey sands, sand-clay mixtures
	00		ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
SOILS	No. 2	SILTS & CLATS	CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
VED (soil < (e)	_ LL < 50	OL		Organic silts and organic silty clays of low plasticity.
GRAII	un ½ o sier		MH		Inorganic silts, caceous or diatonaceous fine sandy or silty soils, elastic silts
INE-(SILTS & CLATS	СН		Inorganic clays of medium to high plasticity, organic silty clays, organic silts	
	(Wć	LL > 50	ОН		Organic clays of medium to high plasticity, organic silty clays, organic silts
		HIGHLY ORGANIC SOILS	Pt		Peat and other highly organic soils

CLASSIFICATION CHART (UNIFIED SOIL CLASSIFICATION SYSTEM)

	RANGE OF GRAIN SIZES			
CLASSIFICATION	U.S. Standard Sieve Size	Grain Size in Millimeters		
BOULDER	ABOVE 12"	ABOVE 305		
COBBLES	³ to 12"	305 to 76.2		
GRAVEL COARSE FINE	3" to No. 4 3" TO ¾" ¾""to No. 4	762 to 4.76 76.2 to 19.1 19.1 to 4.76		
SAND COARSE MEDIUM FINE	No. 4 to 200 No. 4 to 10 No. 10 to 40 No. 40 to 200	4.76 to 0.074 4.76 to 2.00 2.00 to 0.420 0.420 to 0.074		
SILT & CLAY	BELOW No. 200	BELOW 0.074		



GRAIN SIZE CHART

PLASTICITY CHART

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Ring Sample Bag Sample NR SPT Sample Seepage	No Recovery Classification in accordance with ASTM D2487 Description and visual observation in accordance with ASTM D2488 All Sieve Sizes shown are US Standard SPT Refusal is defined as one of the following: 10 blows for no apparent displacement 50 blows for less than 6 inches advancement 100 blows for 6 to 18 inches advancement
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GEOTECHNICAL BORING LOGS

Drill Hole No. B-1 Date: January 17, 2014 Project No. 13167-01 WDI **Drilling Company:** Type of Rig: B-61 Hole Diameter: 8" Drive Weight: 140 lbs. Drop: 30" Elevation: 816± DEPTH TYPE SAMPL BLOWS DRY MOISTURE SOIL **GEOTECHNICAL DESCRIPTION** OF TEST (feet) E TEST PER DENSITY (%) CLASSIFICATION LOGGED BY: <u>GL</u> SAMPLED BY: <u>GL</u> 6 INCH (%) USCS SILTY SAND: Light brown, fine to coarse grained, dry, 1 Alluvium SM medium dense 2 3 Dry, medium dense, micaceous 4/8/10 108.4 3.4 % Passing No. 200 Sieve = 43 4 SE = 18 5 6 3/4/4 Slightly moist, loose 7 8 9 10 11 3/6/4 Medium dense 12 13 14 15 16 7/9/11 ML SANDY SILT: Light brown, slightly moist, stiff 17 18 19 20 SILTY SAND: Light brown, fine to coarse grained, very 21 Bedrock 15/37/50 SM dense 22 23 Very dense TOTAL DEPTH = 25 FEET 24 NO GROUNDWATER 19/39/50 NO CAVING 25 BORING BACKFILLED

GEOTECHNICAL BORING LOGS Drill Hole No.____B-2___

Date:	January 1	7, 2014					Project No. 13167-01
	Company	y:	WDI ivo Woigh	+ 140 lbo	Drene 20	.89	Type of Rig: B-61
DEPTH	TYPE	SAMP	BLOWS		Drop: 30		Elevation: 818.5±
(feet)	OF TEST	LE TEST	PER 6 INCH	DENSITY (%)	(%)	CLASSIFICATION USCS	LOGGED BY: SAMPLED BY:
1	Alluvium					SM	SILTY SAND: Light brown, fine to medium grained, slightly moist, loose, micaceous
2							
3							
4		\square	2/2/2	-	-		Loose SE = 29
5							
6		n fa Linn Linn	3/4/4	113.3	13.1	ML	SANDY SILT: Light brown, moist, loose, micaceous % Passing No. 200 Sieve = 59
7							
8							
9							~
10							
11		\times	2/3/3	-	-		Loose
12							
13							<i>A</i>
14						CL-ML	SILTY CLAY: Light brown, moist, stiff
15		\bigtriangleup	7/9/13	-	-		
16							
17							TOTAL DEPTH = 15 FEET NO GROUNDWATER
18							NO CAVING BORING BACKFILLED
19							
20							
21							
22							
23							
24							
25							

GEOTECHNICAL BORING LOGS Drill Hole No.___B-3___

Date: January 17, 2014 Project No. 13167-01 WDI **Drilling Company:** Type of Rig: B-61 Hole Diameter: 8" Drive Weight: 140 lbs. Drop: 30" Elevation: 822.5± DEPTH TYPE SAMPL BLOWS DRY MOISTURE SOIL GEOTECHNICAL DESCRIPTION (feet) OF TEST E TEST PER DENSITY (%) CLASSIFICATION LOGGED BY: <u>GL</u> SAMPLED BY: <u>GL</u> 6 INCH (%) USCS SILTY SAND: Light brown, fine to medium grained, 1 SM Alluvium dry, loose 2 3 4 5 6 3/4/4 7 8 9 10 11 ML 5/6/7 _ SANDY SILT: Light brown, moist, stiff 12 13 14 15 16 Bedrock 7/9/13 SM SILTY SAND: Light gray, weathered, medium dense --17 18 19 9/17/22 -20 21 TOTAL DEPTH = 20 FEET 22 NO GROUNDWATER NO CAVING 23 **BORING BACKFILLED** 24 25

GEOTECHNICAL BORING LOGS Drill Hole No. B-4

Date:	January 17	, 2014					Project No. 13167-01
Drilling Company: WDI Hole Diameter: 8" Drive Weight: 140 lbs			Drop: 20"		Type of Rig:B-61		
DEPTH	TYPE	SAMPL	BLOWS	DRY	MOISTURE	SOIL	
(feet)	OF TEST	E TEST	PER 6 INCH	DENSITY (%)	(%)	CLASSIFICATION USCS	LOGGED BY: <u>GL</u> SAMPLED BY: <u>GL</u>
1	Alluvium					SM	SILTY SAND: Light brown, fine to medium grained, slightly moist, loose
2							
3							
4							
5							
6		\times	3/4/5	-	-		Loose
7							
8					-		
9							
10							
11		\times	5/5/5	-	-		Medium dense
12							
13							
14							
15							
16		\times	5/8/11	-	-	ML	SANDY SILT: Light brown, slightly moist, stiff
17							
18							
19							SILTY SAND: Light brown, fine to coarse grained
20	Bedrock	\square	27/33/39	-	-	SM	very dense
21							
22							TOTAL DEPTH = 20 FEET NO GROUNDWATER
23							NO CAVING BORING BACKFILLED
24							
25							

APPENDIX C



.

LABORATORY TEST RESULTS

SEC of Victoria Avenue and La Sierra Avenue City of Riverside, California

SIEVE SIZE	B-1 @ 2.5' % PASSING	B-2 @ 5' % PASSING		
3/8"	100	•		
No. 4	99.5	100		
No. 8	98	98		
No. 16	93	91		
No. 30	86	83		
No. 50	78	77		
No. 100	65	69		
No. 200	43	59		
SIEVE ANALYSIS TEST DATA				

B-1 @ 2.5'	B-2 @ 2.5'	
18	29	
SAND EQUIVALE	ENT TEST DATA	

APPENDIX D



* EQFAULT 4 * Version 3.00 * ****** DETERMINISTIC ESTIMATION OF PEAK ACCELERATION FROM DIGITIZED FAULTS JOB NUMBER: 13167-01 DATE: 12-30-2013 JOB NAME: Adkan Engineers CALCULATION NAME: Test Run Analysis FAULT-DATA-FILE NAME: CDMGFLTE.DAT SITE COORDINATES: SITE LATITUDE: 33.8875 SITE LONGITUDE: 117.4619 SEARCH RADIUS: 50 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 Campbell SSR: 0 Basement Depth: 5.00 km Campbell SHR: 0 COMPUTE PEAK HORIZONTAL ACCELERATION FAULT-DATA FILE USED: CDMGFLTE.DAT MINIMUM DEPTH VALUE (km): 3.0

EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

 seen were were and and any spin that had also and pro you have say and the seen root	the state when your more not and and part and

			ESTIMATED N	AX. EARTHQ	JAKE EVENT	
	APPROXIMATE					
ABBREVIATED	DISTA	NCE	MAXIMUM	PEAK	EST. SITE	
FAULT NAME	mi	(km)	EARTHQUAKE	I SITE	INTENSITY	
			MAG.(Mw)	ACCEL. g	MOD.MERC.	
CHINO-CENTRAL AVE. (Elsinore)	8.5(13.6)	6.7	0.501	X	
ELSINORE-GLEN IVY	8.6(13.8)	6.8	0.431	X	
WHITTIER	10.5(16.9)	6.8	0.366	IX	
SAN JACINTO-SAN BERNARDINO	15.1(24.3)	6.7	0.248	IX	
SAN JACINTO-SAN JACINTO VALLEY	15.8(25.4)	6.9	0.270	IX	
ELSINORE-TEMECULA	18.2(29.3)	6.8	0.221	IX	
SAN JOSE	21.0(33.8)	6.5	0.171	I VIII	
CUCAMONGA	21.9(35.3)	1 7.0	0.221	IX	
SAN ANDREAS - Southern	23.7(38.1)	7.4	I 0.255	I IX	
SAN ANDREAS - San Bernardino	23.7(38.1)	7.3	0.239	I IX	
SIERRA MADRE	23.7(38.2)	7.0	0.203	I VIII	
ELYSIAN PARK THRUST	23.7(38.2)	6.7	0.168	I VIII	
CLEGHORN	27.9(44.9)	6.5	0.114	UII I	
SAN ANDREAS - 1857 Rupture	29.6(47.6)	1 7.8	0.268	I IX	
SAN ANDREAS - Mojave	29.6(47.6)	7.1	0.167	I VIII	
NORTH FRONTAL FAULT ZONE (West)	30.1(48.4)	1 7.0	0.155	I VIII	
COMPTON THRUST	30.6(49.3)	6.8	0.134	VIII	
NEWPORT-INGLEWOOD (Offshore)	32.5(52.3)	6.9	0.131	VIII	
NEWPORT-INGLEWOOD (L.A.Basin)	32.9(53.0)	6.9	0.129	I VIII	
SAN JACINTO-ANZA	32.9(53.0)	1 7.2	0.160	I VIII	
CLAMSHELL-SAWPIT	34.7(55.9)	6.5	0.091	I VII	
RAYMOND	37.2(59.8)	6.5	0.083	I VII	
VERDUGO	42.8(68.8)	6.7	0.079	VII	
ELSINORE-JULIAN	43.7(70.3)	7.1	0.109	VII	
PINTO MOUNTAIN	44.1(70.9)	1 7.0	0.098	I VII	
PALOS VERDES	44.6(71.7)	7.1	0.106	I VII	
NORTH FRONTAL FAULT ZONE (East)	44.7(71.9)	6.7	0.075	I VII	
HOLLYWOOD	47.2(76.0)	6.4	0.054	I VI	
HELENDALE - S. LOCKHARDT	47.7(76.7)	7.1	0.097	I VII	

-END OF SEARCH- 29 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS. THE CHINO-CENTRAL AVE. (Elsinore) FAULT IS CLOSEST TO THE SITE. IT IS ABOUT 8.5 MILES (13.6 km) AWAY. LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.5006 g



EQFAULT SUMMARY

DETERMINISTIC SITE PARAMETERS

1			ESTIMATED N	AX. EARTHQU	UAKE EVENT
	APPROXIMATE				
ABBREVIATED	DISTA	NCE	MAXIMUM	PEAK	EST. SITE
FAULT NAME	mi	(km)	EARTHQUAKE	SITE	INTENSITY
1			MAG.(Mw)	ACCEL. g	MOD.MERC.
			=========	=======================================	=======
CHINO-CENTRAL AVE. (Elsinore)	8.5(13.6)	6.7	0.339	IX
ELSINORE-GLEN IVY	8.6(13.8)	6.8	0.292	I IX
WHITTIER	10.5(16.9)	6.8	0.248	I IX
SAN JACINTO-SAN BERNARDINO	15.1(24.3)	6.7	0.161	VIII
SAN JACINTO-SAN JACINTO VALLEY	15.8(25.4)	6.9	0.178	I VIII
ELSINORE-TEMECULA	18.2(29.3)	6.8	0.142	VIII
SAN JOSE	21.0(33.8)	6.5	0.105	VII
CUCAMONGA	21.9(35.3)	1 7.0	0.141	VIII
SAN ANDREAS - Southern	23.7(38.1)	7.4	0.167	VIII
SAN ANDREAS - San Bernardino	23.7(38.1)	1 7.3	0.155	VIII
SIERRA MADRE	23.7(38.2)	1 7.0	0.128	VIII
ELYSIAN PARK THRUST	23.7(38.2)	6.7	0.103	I VII
CLEGHORN	27.9(44.9)	6.5	0.066	I VI
SAN ANDREAS - 1857 Rupture	29.6(47.6)	1 7.8	0.177	VIII
SAN ANDREAS - Mojave	29.6(47.6)	1 7.1	0.102	VII
NORTH FRONTAL FAULT ZONE (West)	30.1(48.4)	1 7.0	0.094	VII
COMPTON THRUST	30.6(49.3)	6.8	0.079	I VII
NEWPORT-INGLEWOOD (Offshore)	32.5(52.3)	6.9	0.077	I VII
NEWPORT-INGLEWOOD (L.A.Basin)	32.9(53.0)	6.9	0.075	I VII
SAN JACINTO-ANZA	32.9(53.0)	7.2	0.097	I VII
CLAMSHELL-SAWPIT	34.7(55.9)	6.5	0.052	I VI
RAYMOND	37.2(59.8)	6.5	0.048	I VI
VERDUGO	42.8(68.8)	6.7	0.046	I VI
ELSINORE-JULIAN	43.7(70.3)	1 7.1	0.063	I VI
PINTO MOUNTAIN	44.1(70.9)	7.0	0.057	I VI
PALOS VERDES	44.6(71.7)	7.1	0.061	I VI
NORTH FRONTAL FAULT ZONE (East)	44.7(71.9)	6.7	0.043	I VI
HOLLYWOOD	47.2(76.0)	1 6.4	0.031	U V
HELENDALE - S. LOCKHARDT	47.7(76.7)	1 7.1	0.056	I VI
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-END OF SEARCH- 29 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS. THE CHINO-CENTRAL AVE. (Elsinore) FAULT IS CLOSEST TO THE SITE. IT IS ABOUT 8.5 MILES (13.6 km) AWAY. LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.3390 q

PROBABILITY OF EXCEEDANCE CAMP. & BOZ. (1997 Rev.) AL 1



2010 CBC – SEISMIC PARAMETERS					
Mapped Spectral Response Acceleration	S _s = 1.50	S ₁ = 0.60			
Site Coefficients (Class "D")	F _a = 1.00	F _v = 1.50			
Maximum Considered Earthquake (MCE) Spectral Response Acceleration	S _{MS} = 1.500	S _{M1} = 0.900			
Design Spectral Response Acceleration Parameters	S _{DS} = 1.000	S _{D1} = 0.600			
Seismic Design Category	D				

References:

- Earthquake.usgs.gov/research/hazmaps/design
- 2010 California Building Code, California Code of Regulations, Title 24, Part 2, Volume 2 of 2, Section 1613, Earthquake Loads

Soil Exploration Co., Inc.

APPENDIX E

