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.

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 (P_a)	35 psf (EFP), drained, yielding
At Rest Pressure (P_0)	50 psf (EFP), drained, non-yielding (part of building wall)
Passive Earth Pressure (P_p)	300 psf (EFP), drained, maximum of 3000 psf
Horizontal Coefficient of Friction (μ)	0.30
Unit Soil Weight (γ_t)	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.

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.

REGISTERED PROFESSIONAL ENGINEER
GENE KINH-TOAN LUU
C 053417
EXP. 6/30/15
CIVIL
STATE OF CALIFORNIA

Gene K. Luu, PE 53417
Project Engineer

Distribution: [3] Addressee

Attachments:

Figure 1	Site Location Map
Figure 2	USGS Geologic Map
Plate 1	Exploratory Boring & Infiltration Test Location Map
Plate 2	Minimum Foundation and Slab Recommendations for Expansive Soils
Plate 3	Retaining Wall Backfill and Subdrain Detail
Appendix A	References
Appendix B	Exploratory Boring Logs
Appendix C	Laboratory Test Results
Appendix D	Deterministic and CBC (2010) Seismic Parameters
Appendix E	General Earthwork and Grading Specifications

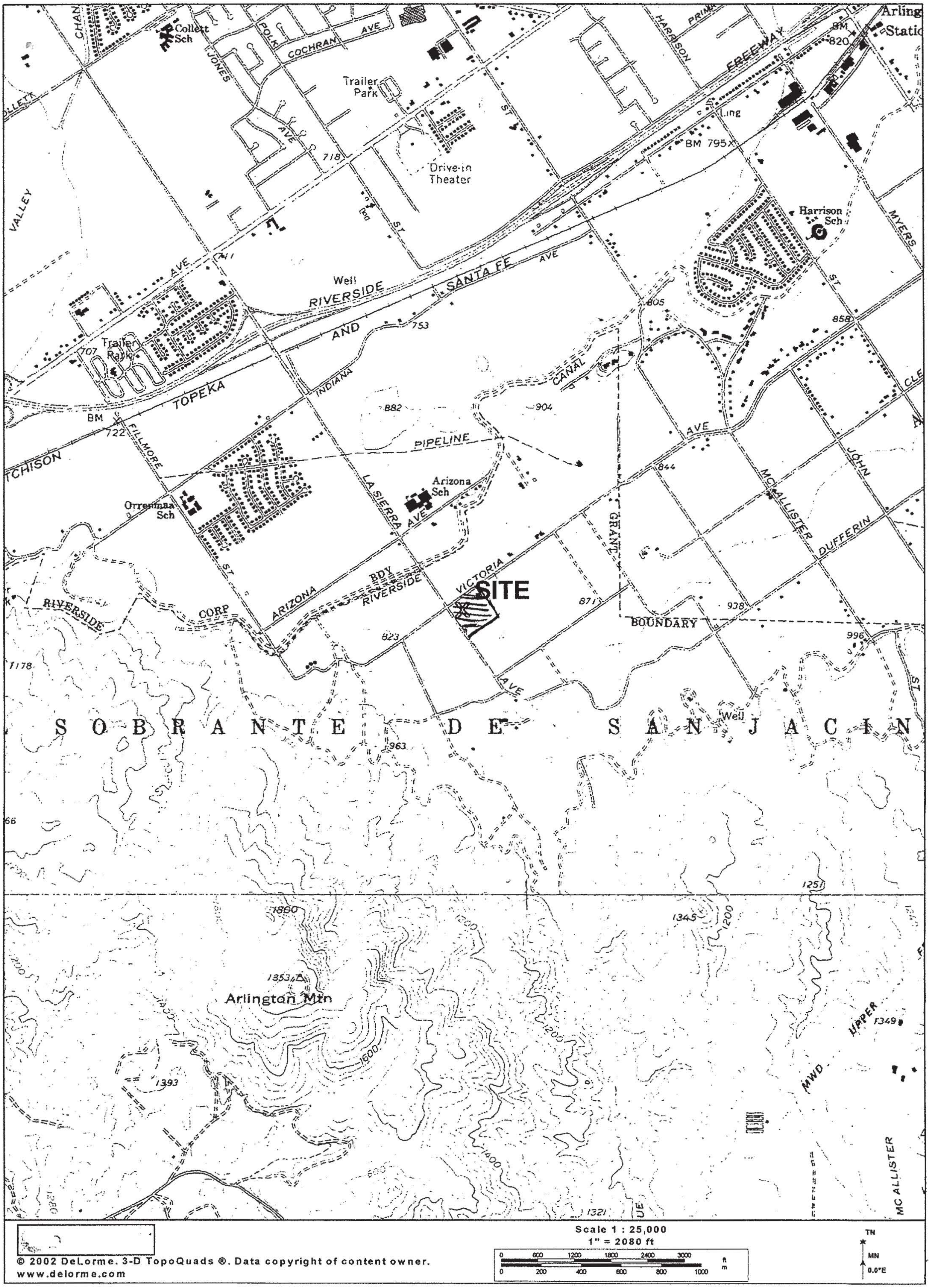
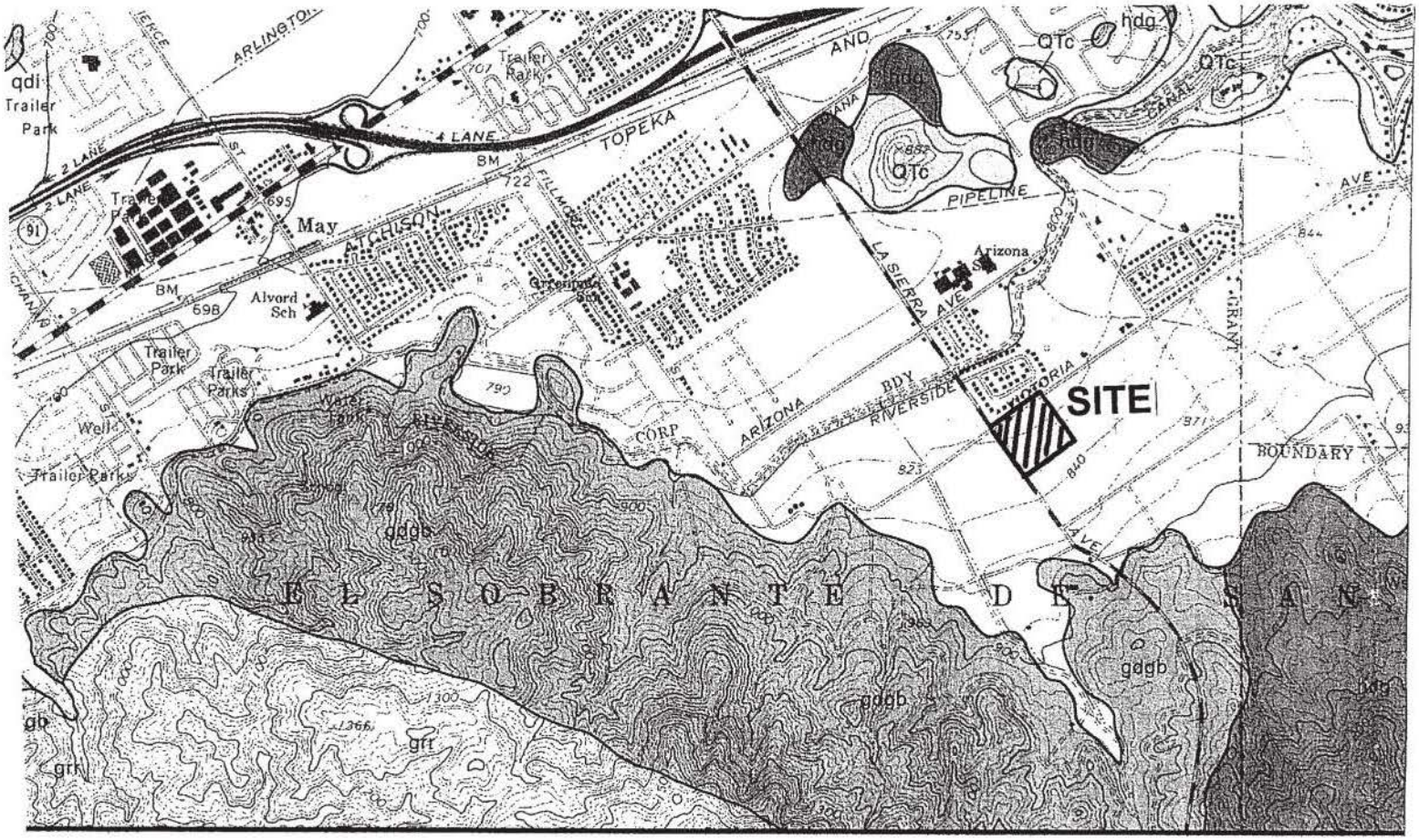

SITE
Collett Sch
COCHRAN AVE
POLK AVE
JONES
HARRISON
FREEWAY
Trailer Park
Drive-in Theater
BM 820
BM 795
Ling
Harrison Sch
MYERS
VALLEY
RIVERSIDE AVE
SANTA FE AVE
AND
TOPEKA
Well
INDIANA
CANAL
PIPELINE
FILLMORE
LA SIERRA AVE
Arizona Sch
Orrenmaa Sch
ARIZONA
VICTORIA
GRANT
MC ALLISTER
DUFFERIN
JOHN
RIVERSIDE CORP BDY
BOUNDARY
S O B R A N T E   D E   S A N   J A C I N
Arlington Mtn
UPPER
MWD
Scale 1 : 25,000
1" = 2080 ft
© 2002 DeLorme. 3-D TopoQuads ®. Data copyright of content owner.
www.delorme.com

Figure 1



Base Map: **Geologic Map of the Riverside West/South ½ of Fontana Quadrangles, San Bernardino and Riverside County, California, By Thomas W. Dibblee, Jr., 2004.**

LEGEND:

Qoa: Alluvial fan deposits of sand, minor gravel, tan to light reddish brown.

SEC of Victoria Avenue and La Sierra Avenue (APN 136-220-016) City of Riverside, California	**Soil Exploration Co., Inc.** **Project No.: 13167-01** **Date: January 24, 2014** **Figure: 2**


VICTORIA AVENUE
WIRE FENCE
B-1
I-1
WIRE FENCE
I-2
B-2
MILLSPORT PLACE
WIRE FENCE
B-3
B-4
I-3
LA SIERRA AVENUE
N
WIRE FENCE
EXPLORATORY BORING & INFILTRATION TEST LOCATION MAP
PLATE 1
LEGEND
B-4 ● Approximate Location of Boring
I-3 ▲ Approximate Location of Infiltration Test
Soil Exploration Co., Inc.
Project No. 13167-01 January 24, 2014
Base Map: Provided by Client

	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

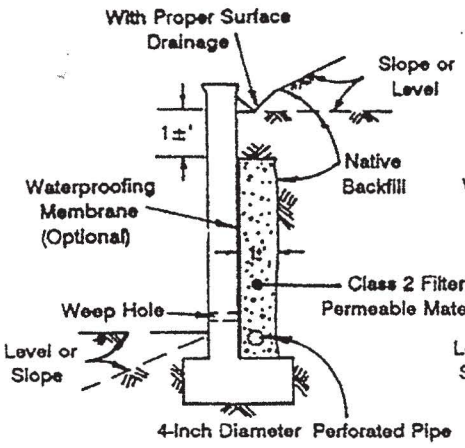
ONE- AND TWO-STORY RESIDENTIAL BUILDINGS

Soil Exploration Co. Inc.

Plate: 2

SUBDRAIN OPTIONS FOR NATIVE MATERIAL BACKFILL

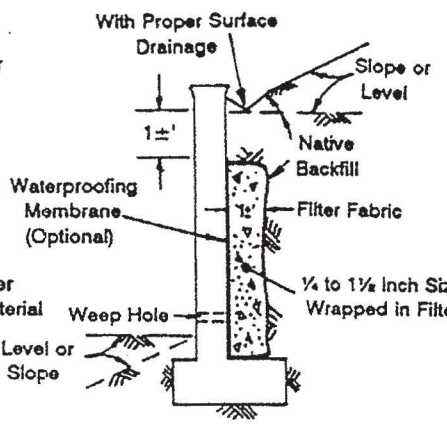
OPTION N2: Pipe Surrounded with Class 2 Material



Class 2 Filter Permeable Material Grading Per Caltrans Specifications

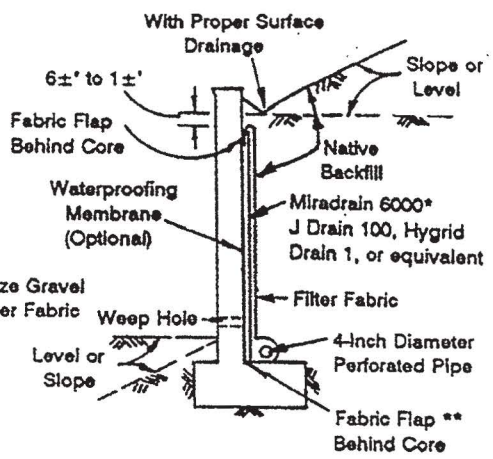
Sieve Size	Percent Passing
1"	100
3/4"	90-100
3/8"	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

OPTION N1: Gravel Wrapped in Filter Fabric



Proper Outlet Should be Provided for Gravel Subdrain (See Notes)

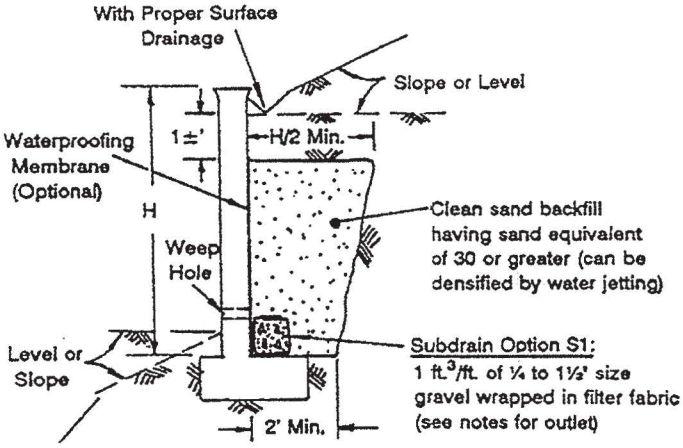
OPTION N3: Geotextile Drain

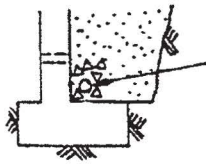


*Miradrain 6000 or J Drain 100 for non-waterproofed walls; Miradrain 6200 or J Drain 200 for completed waterproofed walls

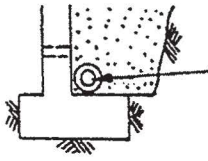
**Peel back the bottom fabric flap, place pipe next to core, wrap fabric around pipe and tuck behind core.

SUBDRAIN OPTIONS FOR CLEAN SAND BACKFILL





Subdrain Option S2:
4" diameter perforated pipe surrounded with 1 ft³/ft. of Class 2 filter material per Caltrans specifications as above



Subdrain Option S3:
4" diameter perforated pipe wrapped in filter fabric

Notes:

- Pipe type should be ASTM D1527 Acrylonitrile Butediene Styrene (ABS) SDR35 or ASTM D1785 Polyvinyl Chloride plastic (PVC), Schedule 40, Armco A2000 PVC, or approved equivalent. Pipe should be installed with perforations down.
- Filter fabric should be Mirafi 140N, 140NS, Supac 4NP, Amoco 4545, Trevira 1114, or approved equivalent.
- All drains should have a gradient of 1 percent minimum.
- Outlet portion for gravel subdrain should have a 4"-diameter pipe with the perforated portion inserted into the gravel approximately 2' minimum and the nonperforated portion extending approximately 1' outside the gravel. Proper sealing should be provided at the pipe insertion enabling water to run from the gravel portion into rather than outside the pipe.
- Waterproofing membrane may be required for a specific retaining wall such as a stucco or basement wall.
- Weephole should be 2" minimum diameter and provided at 25' minimum in length of wall. If exposure is permitted, weephole should be located at 3±" above finished grade. If exposure is not permitted such as for a wall adjacent to a sidewalk/curb, a pipe under the sidewalk to discharge through the curb face or equivalent should be provided, or for a basement-type wall, a proper subdrain outlet system should be provided. Open vertical masonry joints (i.e., omit mortar from joints of first course above finished grade) at 32" maximum intervals may be substituted for weepholes. Screening such as with a filter fabric should be provided for weepholes/open joints to prevent earth materials from entering the holes/joints.

RETAINING WALL BACKFILL AND SUBDRAIN DETAIL

Soil Exploration Co. Inc.

Plate: 3

APPENDIX A

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.

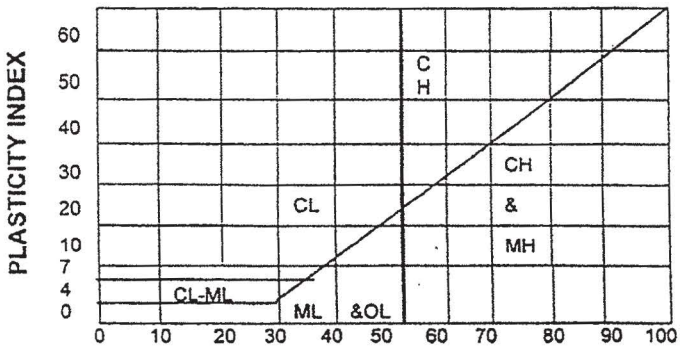
APPENDIX B

MAJOR DIVISIONS		SYMBOLS		TYPICAL NAMES
COARSE-GRAINED SOILS (More than ½ of soil < No. 200 sieve)	GRAVELS (More than ½ of coarse fraction > No. 4 sieve size)	GW		Well-graded gravels or gravel-sand mixtures, little or no fines
		GP		Poorly graded gravels or gravel-sand mixtures, little or no fines
		GM		Silty gravels, gravel-sand-silt mixtures
		GC		Clayey gravels, gravel-sand-clay mixtures
	SANDS (More than ½ of coarse fraction < No. 4 sieve size)	SW		Well-graded sands or gravely sands, little or no fines
		SP		Poorly graded sands or gravelly sands, little or no fines
		SM		Silty sands, sand-salt mixtures
		SC		Clayey sands, sand-clay mixtures
FINE-GRAINED SOILS (More than ½ of soil < No. 200 sieve)	SILTS & CLAYS LL < 50	ML		Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity.
		CL		Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
		OL		Organic silts and organic silty clays of low plasticity.
	SILTS & CLAYS LL > 50	MH		Inorganic silts, caceous or diatonaceous fine sandy or silty soils, elastic silts
		CH		Inorganic clays of medium to high plasticity, organic silty clays, organic silts
		OH		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)

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



GRAIN SIZE CHART

PLASTICITY CHART

Ring Sample	Bag Sample	NR 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
SPT Sample	= Seepage		

GEOTECHNICAL BORING LOGS

Drill Hole No. B-1

Date: January 17, 2014
Drilling Company: WDI
Hole Diameter: 8" **Drive Weight:** 140 lbs. **Drop:** 30"

Project No. 13167-01
Type of Rig: B-61
Elevation: 816±

DEPTH (feet)	TYPE OF TEST	SAMPLE TEST	BLOWS PER 6 INCH	DRY DENSITY (%)	MOISTURE (%)	SOIL CLASSIFICATION USCS	GEOTECHNICAL DESCRIPTION LOGGED BY: GL SAMPLED BY: GL
1	Alluvium					SM	**SILTY SAND:** Light brown, fine to coarse grained, dry, medium dense
2							
3							
4		■	4/8/10	108.4	3.4		Dry, medium dense, micaceous % Passing No. 200 Sieve = 43 SE = 18
5							
6		X	3/4/4	-	-		Slightly moist, loose
7							
8							
9							
10							
11		X	3/6/4	-	-		Medium dense
12							
13							
14							
15							
16		X	7/9/11	-	-	ML	**SANDY SILT:** Light brown, slightly moist, stiff
17							
18							
19							
20							
21	Bedrock	X	15/37/50	-	-	SM	**SILTY SAND:** Light brown, fine to coarse grained, very dense
22							
23							Very dense
24							TOTAL DEPTH = 25 FEET NO GROUNDWATER
25		X	19/39/50				NO CAVING BORING BACKFILLED

GEOTECHNICAL BORING LOGS

Drill Hole No. B-2

Date: January 17, 2014
Drilling Company: WDI
Hole Diameter: 8" **Drive Weight:** 140 lbs. **Drop:** 30"

Project No. 13167-01
Type of Rig: B-61
Elevation: 818.5±

DEPTH (feet)	TYPE OF TEST	SAMPLE TEST	BLOWS PER 6 INCH	DRY DENSITY (%)	MOISTURE (%)	SOIL CLASSIFICATION USCS	GEOTECHNICAL DESCRIPTION LOGGED BY: GL SAMPLED BY: GL
1	Alluvium					SM	**SILTY SAND:** Light brown, fine to medium grained, slightly moist, loose, micaceous
2							
3							
4		X	2/2/2	-	-		Loose SE = 29
5							
6		■	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		X	2/3/3	-	-		Loose
12							
13							
14						CL-ML	**SILTY CLAY:** Light brown, moist, stiff
15		X	7/9/13	-	-		
16							TOTAL DEPTH = 15 FEET NO GROUNDWATER NO CAVING BORING BACKFILLED
17							
18							
19							
20							
21							
22							
23							
24							
25							

GEOTECHNICAL BORING LOGS

Drill Hole No. B-3

Date: January 17, 2014
Drilling Company: WDI
Hole Diameter: 8" **Drive Weight:** 140 lbs. **Drop:** 30"

Project No. 13167-01
Type of Rig: B-61
Elevation: 822.5±

DEPTH (feet)	TYPE OF TEST	SAMPLE TEST	BLOWS PER 6 INCH	DRY DENSITY (%)	MOISTURE (%)	SOIL CLASSIFICATION USCS	GEOTECHNICAL DESCRIPTION LOGGED BY: GL SAMPLED BY: GL
1	Alluvium					SM	**SILTY SAND:** Light brown, fine to medium grained, dry, loose
2							
3							
4							
5							
6		X	3/4/4	-	-		
7							
8							
9							
10							
11		X	5/6/7	-	-	ML	**SANDY SILT:** Light brown, moist, stiff
12							
13							
14							
15							
16	Bedrock	X	7/9/13	-	-	SM	**SILTY SAND:** Light gray, weathered, medium dense
17							
18							
19							
20		X	9/17/22	-	-		
21							TOTAL DEPTH = 20 FEET NO GROUNDWATER NO CAVING BORING BACKFILLED
22							
23							
24							
25							

GEOTECHNICAL BORING LOGS

Drill Hole No. B-4

Date: January 17, 2014
Drilling Company: WDI
Hole Diameter: 8" **Drive Weight:** 140 lbs. **Drop:** 30"

Project No. 13167-01
Type of Rig: B-61
Elevation: 824±

DEPTH (feet)	TYPE OF TEST	SAMPLE TEST	BLOWS PER 6 INCH	DRY DENSITY (%)	MOISTURE (%)	SOIL CLASSIFICATION USCS	GEOTECHNICAL DESCRIPTION LOGGED BY: GL SAMPLED BY: GL
1	Alluvium					SM	**SILTY SAND:** Light brown, fine to medium grained, slightly moist, loose
2							
3							
4							
5							
6		X	3/4/5	-	-		Loose
7							
8							
9							
10							
11		X	5/5/5	-	-		Medium dense
12							
13							
14							
15							
16		X	5/8/11	-	-	ML	**SANDY SILT:** Light brown, slightly moist, stiff
17							
18							
19							
20	Bedrock	X	27/33/39	-	-	SM	**SILTY SAND:** Light brown, fine to coarse grained, very dense
21							TOTAL DEPTH = 20 FEET NO GROUNDWATER NO CAVING BORING BACKFILLED
22							
23							
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 EQUIVALENT TEST DATA	

APPENDIX D

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

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	PEAK SITE ACCEL. g	EST. SITE INTENSITY 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	VIII
CUCAMONGA	21.9(35.3)	7.0	0.221	IX
SAN ANDREAS - Southern	23.7(38.1)	7.4	0.255	IX
SAN ANDREAS - San Bernardino	23.7(38.1)	7.3	0.239	IX
SIERRA MADRE	23.7(38.2)	7.0	0.203	VIII
ELYSIAN PARK THRUST	23.7(38.2)	6.7	0.168	VIII
CLEGHORN	27.9(44.9)	6.5	0.114	VII
SAN ANDREAS - 1857 Rupture	29.6(47.6)	7.8	0.268	IX
SAN ANDREAS - Mojave	29.6(47.6)	7.1	0.167	VIII
NORTH FRONTAL FAULT ZONE (West)	30.1(48.4)	7.0	0.155	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	VIII
SAN JACINTO-ANZA	32.9(53.0)	7.2	0.160	VIII
CLAMSHELL-SAWPIT	34.7(55.9)	6.5	0.091	VII
RAYMOND	37.2(59.8)	6.5	0.083	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)	7.0	0.098	VII
PALOS VERDES	44.6(71.7)	7.1	0.106	VII
NORTH FRONTAL FAULT ZONE (East)	44.7(71.9)	6.7	0.075	VII
HOLLYWOOD	47.2(76.0)	6.4	0.054	VI
HELENDALE - S. LOCKHARDT	47.7(76.7)	7.1	0.097	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

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*  E Q F A U L T  *
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*  Version 3.00  *
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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): M Number of Sigmas: 0.0
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

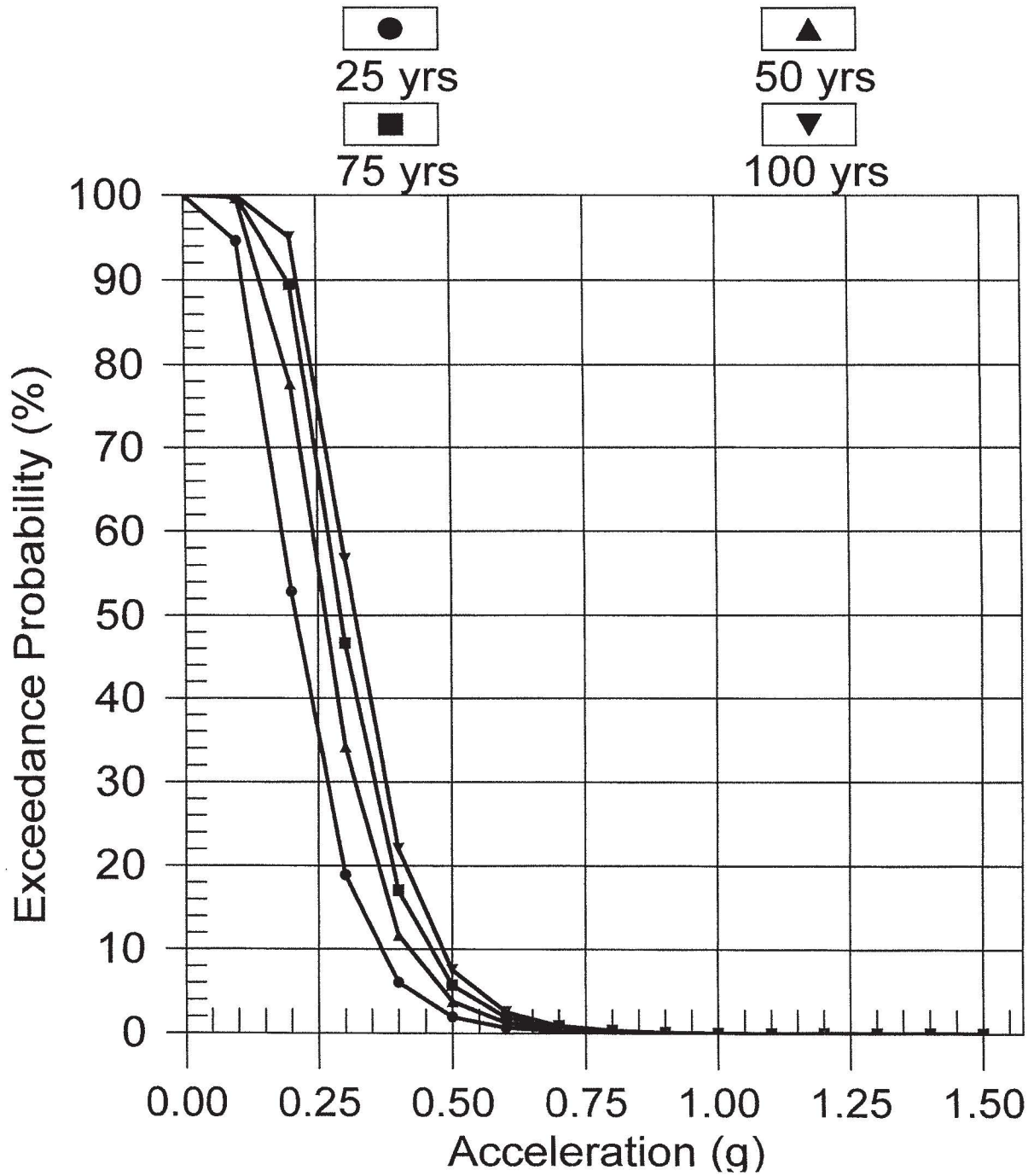
DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	ESTIMATED MAX. EARTHQUAKE EVENT: PEAK SITE ACCEL. g	ESTIMATED MAX. EARTHQUAKE EVENT: EST. SITE INTENSITY 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	IX
WHITTIER	10.5(16.9)	6.8	0.248	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	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)	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)	7.3	0.155	VIII
SIERRA MADRE	23.7(38.2)	7.0	0.128	VIII
ELYSIAN PARK THRUST	23.7(38.2)	6.7	0.103	VII
CLEGHORN	27.9(44.9)	6.5	0.066	VI
SAN ANDREAS - 1857 Rupture	29.6(47.6)	7.8	0.177	VIII
SAN ANDREAS - Mojave	29.6(47.6)	7.1	0.102	VII
NORTH FRONTAL FAULT ZONE (West)	30.1(48.4)	7.0	0.094	VII
COMPTON THRUST	30.6(49.3)	6.8	0.079	VII
NEWPORT-INGLEWOOD (Offshore)	32.5(52.3)	6.9	0.077	VII
NEWPORT-INGLEWOOD (L.A.Basin)	32.9(53.0)	6.9	0.075	VII
SAN JACINTO-ANZA	32.9(53.0)	7.2	0.097	VII
CLAMSHELL-SAWPIT	34.7(55.9)	6.5	0.052	VI
RAYMOND	37.2(59.8)	6.5	0.048	VI
VERDUGO	42.8(68.8)	6.7	0.046	VI
ELSINORE-JULIAN	43.7(70.3)	7.1	0.063	VI
PINTO MOUNTAIN	44.1(70.9)	7.0	0.057	VI
PALOS VERDES	44.6(71.7)	7.1	0.061	VI
NORTH FRONTAL FAULT ZONE (East)	44.7(71.9)	6.7	0.043	VI
HOLLYWOOD	47.2(76.0)	6.4	0.031	V
HELENDALE - S. LOCKHARDT	47.7(76.7)	7.1	0.056	VI

-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 g

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

APPENDIX E