Source: Background-ESRI world imagery, TRdesign group

S:\active projects\Southwest Justice Center Hab. Assessment 1455400574\maps

Vegetation Communities Map
Southwest Justice Center
Juvenile Hall Courts Relocation Projecct

FIGURE
4

APPENDIX B

SITE PHOTOGRAPHS

Photo 1. View of the proposed "New Road Location." Note the weedy vegetation and disturbed nature of the site.

Photo 2. View top the north, showing the nonnative grassland.

Photo 3. View of the southwest corner of the site, showing the small remnant patch of coastal sage scrub, dominated by California Buckwheat.

Photo 4. Another view of the nonnative grassland and previous ground disturbance, looking north from the southeastern corner of the site.

Photo 5. View along the western boundary of the site, showing the existing storm drain.

Photo 6. View east of the site, showing undeveloped open space and potential Burrowing Owl foraging habitat.

APPENDIX C

SPECIES OBSERVED LIST

Vascular Plants Observed on the Southwest Justice Center Juvenile Hall Courts Relocation Project Site, Riverside County, California

4 February 2014

EUDICOT FLOWERING PLANTS

Asteraceae	**Sunflower Family**
*Centaurea melitensis**	tocalote
Corethrogyne filaginifolia	California-aster
Erigeron canadensis	horseweed
Hemizonia sp.	tarplant
Heterotheca grandiflora	telegraph weed
Boraginaceae	**Borage Family**
Amsinckia intermedia	common fiddleneck
Brassicaceae	**Mustard Family**
*Brassica nigra**	black mustard
*Hirschfeldia incana**	shortpod mustard
Crassulaceae	**Stonecrop Family**
Crassula connata	pygmy-weed
Euphorbiaceae	**Spurge Family**
Croton setigerus	dove weed
Fabaceae	**Pea Family**
Acmispon glaber	deerweed
*Medicago polymorpha**	burclover
Geraniaceae	**Geranium Family**
*Erodium cicutarium**	redstem filaree
Polygonaceae	**Buckwheat Family**
Eriogonum fasciculatum	California buckwheat
Solanaceae	**Nightshade Family**
*Nicotiana glauca**	tree tobacco

MONOCOT FLOWERING PLANTS

Poaceae	**Grass Family**
**Bromus madritensis* ssp. *rubens*	red brome
**Schismus barbatus*	Mediterranean schismus

* - denotes a nonnative species

Vertebrates Observed or Detected on the Southwest Justice Center
Juvenile Hall Courts Relocation Project Site,
Riverside County, California

4 February 2014

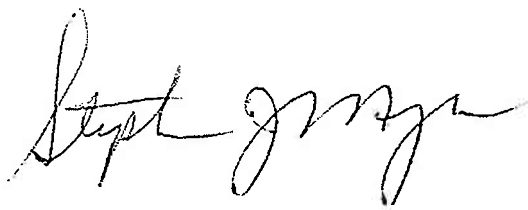
<u>BIRDS</u>	**<u>AVES</u>**
Kites, Eagles, Hawks, and allies	**Accipitridae**
Red-tailed Hawk	*Buteo jamaicensis*
Caracaras and Falcons	**Falconidae**
American Kestrel	*Falco sparverius*
Pigeons and Doves	**Columbidae**
Mourning Dove	*Zenaida macroura*
Hummingbirds	**Trochilidae**
Anna’s Hummingbird	*Calypte anna*
Tyrant Flycatchers	**Tyrannidae**
Say’s Phoebe	*Sayornis saya*
Jays, Magpies, and Crows	**Corvidae**
Common Raven	*Corvus corax*
Thrashers and Mockingbirds	**Mimidae**
Northern Mockingbird	*Mimus polyglottos*
Emberizids	**Emberizidae**
White-crowned Sparrow	*Zonotrichia leucophrys*
Icterids	**Icteridae**
Western Meadowlark	*Sturnella neglecta*
Fringilline and Cardueline Finches	**Fringillidae**
House Finch	*Haemorhous mexicanus*

<u>MAMMALS</u>	**<u>MAMMALIA</u>**
Rabbits and Hares	**Leporidae**
Desert Cottontail	*Sylvilagus audubonii*
Squirrels, Chipmunks, and Marmots	**Sciuridae**
California ground squirrel	*Spermophilus beecheyi*
Pocket Gophers	**Geomyidae**
Botta’s Pocket opher	*Thomomys bottae*

APPENDIX D

CERTIFICATION

I hereby certify that the statements furnished above in the attached exhibits present the data and information required for this biological evaluation, and that the facts, statements, and information presented are true and correct to the best of my knowledge and belief.



Stephen J. Myers
Wildlife Biologist/Ornithologist
AMEC Environment & Infrastructure, Inc.

Memo

To	Cheryl DeGano Albert A. Webb Associates	Type/Title of Project:	**Southwest Justice Center Juvenile Hall Courts Relocation Project**
From	Nathan T. Moorhatch	Project # 1455400574	
Date	June 4, 2014		

Subject **Southwest Justice Center Juvenile Hall Courts Relocation Project Narrow Endemic and Criteria Area Plant Species Survey**

Introduction

On May 28, 2014 AMEC Environment & Infrastructure, Inc. (AMEC) Biologist Nathan T. Moorhatch conducted a focused survey for Narrow Endemic and Criteria Area plant species as defined by the Western Riverside County Multiple Species Habitat Conservation Plan (MSHCP) on the approximately 3-acre project site. This survey was a recommended measure to comply with the MSHCP, as proposed in the unpublished Draft Biological Habitat Assessment Report for the Southwest Justice Center Juvenile Hall Courts Relocation Project (AMEC 2014). This report is intended as an addendum to the original Biological Habitat Assessment. Project information including location, surrounding land uses, and soil types present on the project site have been previously presented in the Biological Habitat Assessment, and to avoid redundancy will not be presented again in this report.

Methods

The Draft Biological Habitat Assessment Report identified seven Criteria Area plant species known from the project area; of these seven species only two: thread-leaved brodiaea (*Brodiaea filifolia*) and round-leaved filaree (*California macrophylla*) were identified as having potential to occur on the project site. The Biological Assessment also identified six Narrow Endemic plant species known from the greater project area. Only two of these species: Munz's onion (*Allium munzii*) and many-stemmed dudleya (*Dudleya multicaulis*) were thought to have any potential for occurrence on the site. The potential for occurrence for all four plant species on the project site was based mainly on the presence of Bosanko clay soils on the northern quarter of the project site. The original field survey of the project site was conducted on February 4, 2014, which is before the blooming period for all four plants, and also likely too early to detect them in their vegetative (non-blooming) state.

Mr. Moorhatch performed the focused rare plant survey on the project site on May 28, 2014. Weather conditions consisted of approximately 70% cloud cover, 0-3 mph wind, and a temperature of 74ºF upon arrival; to approximately 85% cloud cover, 3-7 mph wind, and a temperature of 79ºF upon departure from the site. Mr. Moorhatch surveyed the entire project site on foot. All plant species observed were recorded in field notes (please see attached species list). Certain plant specimens were collected and taken to Andrew Sanders (Curator) of the University of California Riverside herbarium for identification.

Results

Mr. Moorhatch observed 27 plant species on the project site during the survey. When combined with the plants observed on the February 4, 2014 field survey performed for the aforementioned Draft Biological Habitat Assessment, a total of 31 plant species were identified on this site. There are no native plant communities present on the site, save for a small stand of California buckwheat (*Eriogonum fasciculatum*) on the southwest corner of the site. This stand of buckwheat likely represents a remnant patch of California Buckwheat Scrub (Sawyer et al 2008). The remainder of the site is dominated by non-native "weedy" plants with some native plant species sparsely distributed throughout the site. This plant community has been classified as Non-native Grassland by Holland (Holland 1986), or as "Upland Mustards" and "Yellow Star-thistle Fields" by Sawyer (Sawyer et al 2008). Apart from the southwest corner of the site, the dominant plant species on this project site are shortpod mustard (*Hirschfeldia incana*), yellow star-thistle or tocalote (*Centaurea melitensis*), and red-stemmed filaree (*Erodium* *cicutarium*). All of these dominant plants are non-native. Seventeen of the thirty-one plants identified on the project site are non-native, so a little over half (55%) of all plants found on the site are introduced, weedy species that are not native to California. This high percentage of weedy, introduced species is indicative of disturbed, ruderal areas throughout southern California. The project site is a vacant, disturbed lot that shows signs of having been cleared in the past (see Figure 1.)

Figure 1. View from northeast corner of site looking west. Showing open, disturbed ground with shortpod mustard and tocalote.

The northern ¼ of the project site has been identified as Bosanko clay soil, and the presence of this soil type is the primary reason that the four sensitive plants listed in the first paragraph of this document were thought to have some probability to occur on the site. During the May 28, 2014 survey of the site, Mr. Moorhatch observed that the most of the northern ¼ of the project site containing Bosanko clay soils was heavily disturbed, and appeared to have a significant covering of gravel/pebbles over much of it (see Figure 2). No thread-leaved brodiaea, round-leaved filaree, many-stemmed dudleya, or Munz's onion were observed on the project site during the current field survey (or during the previous survey in February). Mr. Moorhatch has observed both Munz's onion and many-stemmed dudleya in the field in the past, and is familiar with the appearance and habitat of both species and would not have missed these plants if they had been present. Apart from three species of non-native grasses, no other monocots were found on the site, not even the common blue dicks (*Dichelostemma capitatum*). It appears that the project site is too disturbed to support thread-leaved brodiaea, a plant that is not tolerant of discing, mowing, and similar anthropogenic impacts that commonly occur on vacant lots. Mr. Moorhatch did find two species of non-native filaree on the site: red-stemmed filaree and long-beaked filaree (*Erodium botrys*). Both of these filarees are widespread and common weedy introduced species. No round-leaved filaree were found on the site, which is not suprising considering the disturbed nature and small size of the project area. Mr. Moorhatch did find one "sensitive" plant species on the project site: paniculate tarplant (*Deinandra paniculata*). Paniculate tarplant is not a federal or state listed endangered or threatened species, and is not on the MSHCP Narrow Endemic or Criteria Area plant species lists. Paniculate tarplant has a California Native Plant Society ranking of 4.2 (basically a "watch-list" species).

Figure 2. Closeup view of the disturbed, gravel-covered Bosanko clay soils present on the northern ¼ of the site.

Figure 3. Central “plateau” portion of site, looking north. Another view of the shortpod mustard and tocalote dominated “habitat’.

Figure 4. Southwest corner of site, showing remnant California Buckwheat Scrub

Discussion

The 2012-2013 rain season totals for the general project vicinity were 7.71 inches, which represents a little over half of the average yearly rainfall of 14.53 inches for the Murrieta area (MurrietaWeatherCurrents.com 2014). 2014 is another drought year, although the Murrieta area appears to have had slightly better rainfall (8.92 inches) compared to the previous rain year (MurrietaWeatherCurrents.com 2014). Despite the drought conditions, AMEC biologists were able to identify 31 plant species on the relatively small (approximately 3 acre) project site. After having surveyed the site twice in 2014, once during the winter (February) and again in the spring (May); no MSHCP Narrow Endemic or Criteria Area rare plant species were observed on the site. It is AMEC's opinion that these plant species are not present on the Southwest Justice Center Juvenile Hall Courts Relocation site. AMEC biologists feel the reason for this absence is due to the disturbed and degraded nature of the "habitat" present on the site; an opinion supported by the fact that over half of the plants observed on the site are non-native. The site appears to have been subjected to a variety of impacts such as clearing and gravel-deposition in the past.

Sincerely,

Nathan Moorhatch

Nathan T. Moorhatch
nathan.moorhatch@amec.com

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AMEC Environment & Infrastructure, Inc.
3120 Chicago Avenue, Suite 110
Riverside, CA 92507
Tel 951.369.8060

S:\active projects\Southwest Justice Center Hab. Assessment 1455400574\maps

Vegetation Communities Map
Southwest Justice Center
Juvenile Hall Courts Relocation Projecct

amec

FIGURE 1

Vascular Plants Observed on the Southwest Justice Center
Juvenile Hall Courts Relocation Project Site,
Riverside County, California

4 February & 28 May 2014

EUDICOT FLOWERING PLANTS

Amaranthaceae	**Amaranth Family**
**Amaranthus albus*	white pigweed
Asteraceae	**Sunflower Family**
Ambrosia acanthicarpa	annual bur-sage
**Centaurea melitensis*	tocalote
Corethrogyne filaginifolia	California-aster
Deinandra paniculata	paniculate tarplant
Erigeron canadensis	horseweed
Helianthus annuus	sunflower
Heterotheca grandiflora	telegraph weed
**Sonchus oleraceus*	common sowthistle
Boraginaceae	**Borage Family**
Amsinckia intermedia	common fiddleneck
Brassicaceae	**Mustard Family**
**Brassica nigra*	black mustard
**Hirschfeldia incana*	shortpod mustard
**Sinapis arvensis*	charlock
Chenopodiaceae	**Goosefoot Family**
Chenopodium berlandieri	pitseed goosefoot
**Salsola tragus*	Russian thistle
Crassulaceae	**Stonecrop Family**
Crassula connata	pygmy-weed
Euphorbiaceae	**Spurge Family**
Croton setiger	dove weed
Euphorbia albomarginata	rattlesnake weed
Fabaceae	**Pea Family**
Acmispon glaber	deerweed
**Medicago polymorpha*	burclover
**Melilotus indicus*	sourclover
Geraniaceae	**Geranium Family**
**Erodium botrys*	long-beaked filaree
**Erodium cicutarium*	redstem filaree
Myrsinaceae	**Myrsine Family**
**Anagallis arvensis*	scarlet pimpernel
Onagraceae	**Evening-Primrose Family**
Epilobium ciliatum	willowherb

Vascular Plants Observed on the Southwest Justice Center Juvenile Hall Courts Relocation Project Site, Riverside County, California (Continued)

Polygonaceae	**Buckwheat Family**
Eriogonum fasciculatum	California buckwheat
**Rumex crispus*	curly dock
Solanaceae	**Nightshade Family**
**Nicotiana glauca*	tree tobacco
MONOCOT FLOWERING PLANTS	
Poaceae	**Grass Family**
**Bromus madritensis* ssp. *rubens*	red brome
**Polypogon monspeliensis*	rabbitfoot grass
**Schismus barbatus*	Mediterranean schismus

* - denotes a nonnative species

Vertebrates Observed or Detected on the Southwest Justice Center
Juvenile Hall Courts Relocation Project Site,
Riverside County, California

4 February & 28 May 2014

<u>REPTILES</u>	**<u>REPTILIA</u>**
Spiny and Horned Lizards	**Phrynosomatidae**
Great Basin Fence Lizard	*Sceloporus occidentalis longipes*
<u>BIRDS</u>	**<u>AVES</u>**
Swans, Geese, and Ducks	**Anatidae**
Mallard	*Anas platyrhynchos*
Kites, Eagles, Hawks, and allies	**Accipitridae**
Red-tailed Hawk	*Buteo jamaicensis*
Caracaras and Falcons	**Falconidae**
American Kestrel	*Falco sparverius*
Pigeons and Doves	**Columbidae**
Mourning Dove	*Zenaida macroura*
Swifts	**Apodidae**
White-throated Swift	*Aeronautes saxatalis*
Hummingbirds	**Trochilidae**
Anna’s Hummingbird	*Calypte anna*
Tyrant Flycatchers	**Tyrannidae**
Say’s Phoebe	*Sayornis saya*
Cassin’s ingbird	*Tyrannus vociferans*
Jays, Magpies, and Crows	**Corvidae**
Common Raven	*Corvus corax*
Swallows	**Hirundinidae**
Cliff Swallow	*Petrochelidon pyrrhonota*
Thrashers and Mockingbirds	**Mimidae**
Northern Mockingbird	*Mimus polyglottos*
Emberizids	**Emberizidae**
Lark Sparrow	*Chondestes grammacus*
White-crowned Sparrow	*Zonotrichia leucophrys*
Icterids	**Icteridae**
Western Meadowlark	*Sturnella neglecta*
Fringilline and Cardueline Finches	**Fringillidae**
House Finch	*Haemorhous mexicanus*
American Goldfinch	*Spinus tristis*

<u>**MAMMALS**</u>	<u>**MAMMALIA**</u>
Rabbits and Hares	**Leporidae**
Desert Cottontail	*Sylvilagus audubonii*
Squirrels, Chipmunks, and Marmots	**Sciuridae**
California ground squirrel	*Spermophilus beecheyi*
Pocket Gophers	**Geomyidae**
otta’s ocket opher	*Thomomys bottae*

Memorandum

DATE: September 4, 2014

TO: Laura Ballestros
Facilities Project Manager III
Economic Development Agency

FROM: Michele Felix,
Ecological Resource Specialist
Environmental Programs Division

RE: Results of Burrowing Owl Focused Survey at SJWC

Introduction

The Riverside County Environmental Programs Division (EPD) performed a Burrowing Owl (*Athene cunicularia*) Focused Survey, prior to the commencement of new construction at the Southwest Justice Center. Construction will provide various improvements to the center and relocate the juvenile hall court. It was requested that EPD conduct focused burrowing owl surveys prior to site disturbance in order to establish whether burrowing owls are occupying the project site or adjacent areas.

Project Description

The survey area is located in the City of Murrieta at the southwest corner of Auld and Leon Road. The project site is also located within Section 7, Township 7 South, Range 2 West. An aerial view of the project site can be seen in Site Map. The property contains a courthouse, detention center and undeveloped space. The County of Riverside is planning on relocating the juvenile hall court to a currently undeveloped portion of the property. An aerial view of the site can be found below.

Methods

The proposed project is within the MSHCP survey area for burrowing owl and was earlier determined to contain suitable burrowing owl habitat; therefore a focused burrowing owl survey was deemed necessary. Burrowing owls can use a variety of habitats for nesting and foraging however habitats are typically characterized by wide open areas with low growing vegetation. Critical to the survival of burrowing owls is the presence of burrowing mammals. Burrowing owls do not typically dig their own burrows but rely on the abandoned burrows of animals such as the prairie dog and ground squirrel. Burrowing owls are also known to utilize rock piles and man-made structures for perching and shelter.

The Southwest Justice Center relocation lot was surveyed for burrowing owls and burrowing owl activity during the week of August 18th, 2014. See Table 1 for weather data, survey dates and times. The project site is characterized by low to moderate growing vegetation, plowed fields and man-made structures. The portion of property where construction will commence and a 500ft buffer was searched for small mammal burrows, burrowing owl individuals and sign. The project site was inspected by walking 30 foot interval transects throughout the property and buffer area. This allowed for 100% visual coverage of the ground surface. All surveys were completed in accordance with the Burrowing Owl Survey Instruction for the MSHCP, dated March 29, 2006. As described in Step II Part A of the burrowing owl survey instructions, a burrow survey was conducted on August 19, 2014. Step II Part B, focused burrowing owl surveys were completed on August 19th, 21st, 22nd and 28th of 2014. Binoculars (10x42 optic power) and a Kestrel 3000 Pocket Weather Meter were used to conduct observations and record weather data.

Results

Moderate bird activity was observed on the property. The species observed included House Finch (*Carpodacus mexicanus*), Mourning Dove (*Zenaida macroura*), Lesser Goldfinch (*Spinus psaltria)*, American Crow (*Corvus brachyrhynchos*), European Starling (*Sturnus vulgaris*), Western Kingbird (*Tyrannus verticalis*) and Rock Pigeon (*Columba livia*).

Several small mammal burrows were located on the project property. Burrow locations can be found below on the Burrow Map along with photo documentation. None of the burrows were found to contain sign of active nesting or occupation (feathers, white wash, pellets, ornamental decorations or egg shell fragments). No evidence of burrowing owl utilization was observed on the County of Riverside Southwest Justice Center property or adjacent 500ft buffer areas.

Conclusions and Recommendations

Relocation of the juvenile court and improvements to the Southwest Justice Center may proceed as planned. In accordance with the Burrowing Owl Survey Instructions for the MSHCP and Burrowing Owl Species Objective 6, a 30-day Preconstruction Burrowing Owl Survey shall be conducted prior to any grading, vegetation removal or site disturbance. The pre-construction survey shall be performed by a qualified biologist and conducted according to the Burrowing Owl Survey Instructions for the MSHCP. The pre-construction surveys are valid for 30 days. If site disturbance has not commenced within the 30 days then a subsequent survey must be performed. If burrowing owls are found at the time of the 30 day clearance then a Burrowing Owl Relocation and Monitoring Plan shall be generated by a qualified biologist with a current MOU with the County of Riverside. The Regional Conservation Authority (RCA) shall be consulted on whether to proceed with active or passive relocation. The RCA will also be consulted on proper procedures and protocols for relocations. The Burrowing Owl Relocation and Monitoring Plan shall be submitted to the RCA and EPD for review and approval.

If you have any questions, please contact me directly at (951) 955-0314 or via email at mhfelix@rctlma.org.

Table 1

Survey Date	Survey Times	Surveyor	Temperature	Weather
8/19/2014	0556-0750	C. Young	Start: 66 F End: 70 F	Cloudy, Winds from the west 2mph
8/21/2014	0604-0726	M. Felix	Start: 62 End: 65	Partly cloudy, light wind 0-1mph
8/22/2014	0553-0800	C. Young	Start:66 F End:70 F	Clear, Calm
8/28/2014	0602-0705	M. Felix	Start: 64 F End: 67 F	Clear, Calm, No wind

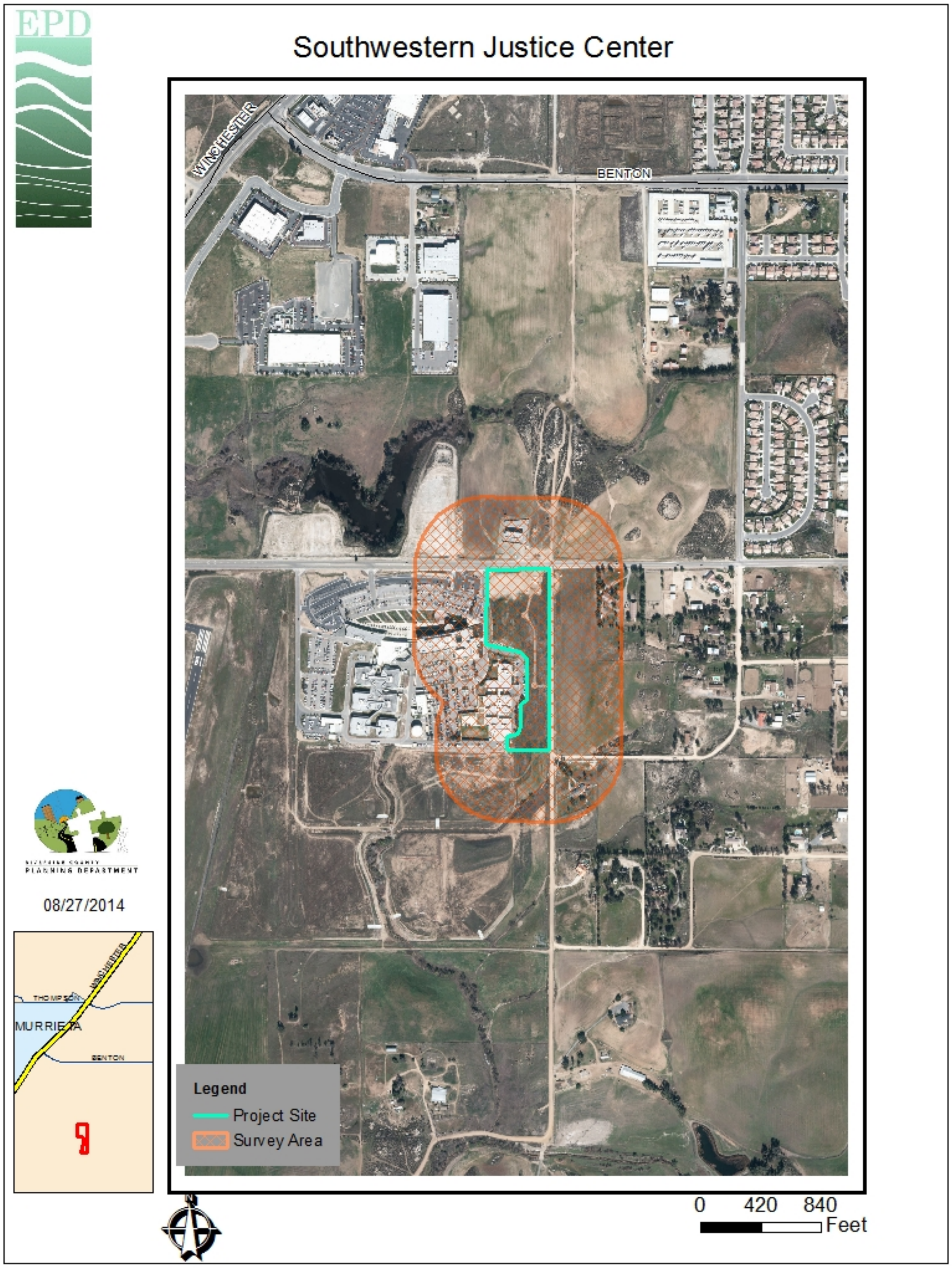
Site Photos

Burrows, No owl sign

Burrows, No owl sign

Views of Property

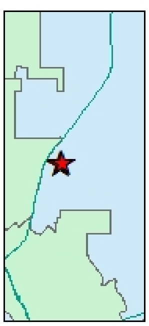
Site Map


EPD
Southwestern Justice Center
WINCHESTER
BENTON
Legend
Project Site
Survey Area
08/27/2014
THOMPSON
MURRIETA
BENTON
0 420 840
Feet

Burrow Map

Number of Burrows and Locations

08/26/14



Leighton Consulting, Inc.
A LEIGHTON GROUP COMPANY

TRANSMITTAL

To: Riverside County Economic Development Agency
3133 Mission Inn Avenue
Riverside, California 92507

April 22, 2014

Project No: 10625.001

Attention: Mr. Sergio Pena
Supervising Facilities Project Manager

Transmitted:		***The Following:***		***For:***	
X	Mail/Overnight	___	Draft Report	X	Your Use
___	Courier	X	Final Report	___	As Requested
___	Pick Up	___	Extra Report		
		___	Proposal		
		___	Other		

Subject: **Geotechnical Exploration, Southwest Justice Center (SWJC) Juvenile Courthouse Relocation, 30755 Auld Road, Riverside County, California**

LEIGHTON CONSULTING, INC.

By: Simon I. Saiid, GE

Distribution: (4) Addressee (plus one PDF copy)

41715 Enterprise Circle N., Suite 103 ▪ Temecula, CA 92590-5661
951.296.0530 ▪ Fax 951.296.0534

GEOTECHNICAL EXPLORATION
SOUTHWEST JUSTICE CENTER (SWJC)
JUVENILE COURTHOUSE RELOCATION
30755 AULD ROAD, RIVERSIDE COUNTY, CALIFORNIA

Prepared for

RIVERSIDE COUNTY ECONOMIC DEVELOPMENT AGENCY
3133 Mission Inn Avenue
Riverside, California 92507

Project No. 10625.001

April 22, 2014

Leighton Consulting, Inc.
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Leighton Consulting, Inc.
A LEIGHTON GROUP COMPANY

April 22, 2014

Project No. 10625.001

Riverside County Economic Development Agency
3133 Mission Inn Avenue
Riverside, California 92507

Attention: Mr. Sergio Pena
Supervising Facilities Project Manager

Subject: Geotechnical Exploration
Southwest Justice Center (SWJC) Juvenile Courthouse Relocation
30755 Auld Road, Riverside County, California

In accordance with your request, we have performed a geotechnical exploration for the subject project located southwest of the intersection of Auld Road and Leon Road in Riverside County, California (see Figure 1). This report summarizes our geotechnical findings, conclusions and recommendations regarding the design and construction of the proposed project. Based on the results of our exploration, it is our opinion that the site is suitable for the proposed project provided the recommendations included in this report are implemented during design and construction phases of development.

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

Respectfully submitted,
LEIGHTON CONSULTING, INC.

Simon I. Saiid
GE 2641 (Exp. 09/30/15)
Principal Engineer

Robert F. Riha
CEG 1921 (Exp. 02/29/16)
Senior Principal Geologist

Distribution: (4) Addressee (plus one PDF copy)

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951.296.0530 ▪ Fax 951.296.0534

TABLE OF CONTENTS

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Leighton

Accompanying Tables, Figures, Plates and Appendices

Tables

Figures (end of text)

Appendices

1.0 INTRODUCTION

1.1 Scope of Work

Our scope of services for this geotechnical exploration included the following:

- Review of available site-specific geologic information (see references) and provided site plans.
- A site reconnaissance and excavation of 7 exploratory borings. Approximate locations of these borings are depicted on Figure 4.
- Percolation testing at two selected locations at depth of 3 to 5 feet below existing ground surface (BGS) along the northern portion of the site.
- Geotechnical laboratory testing of selected soil samples obtained from this exploration. Test results are presented in Appendix B.
- Geotechnical engineering analyses performed or as directed by a California registered Geotechnical Engineer (GE) and reviewed by a California Certified Engineering Geologist (CEG).
- Preparation of this report which presents our geotechnical conclusions and recommendations for the proposed building.

This report is not intended to be used as an environmental assessment (Phase I or other), or foundation plan review.

1.2 Site Location and Description

The site of the proposed project is located at the southwest intersection of Auld Road and Leon Road, Unincorporated Riverside County, California (*see Figure 1, Site Location Map*). The overall property consists of approximately 2.5 acres. The site of the proposed building is generally a ridge top with existing cut slopes descending (~10 to 20 feet) along the southern and western sides to the existing driveway. Site vegetation generally consists of annual weeds and grasses.

1.3 Project Description

Based on a provided site plan by TR Design Group, the project generally consists of a 13,425 square-foot (sq-ft) single-story building and associated site improvements including a basement area, a tunnel, and parking areas. Building pad construction will require cut and fill grading to achieve finish design grades. A cut-fill transition subgrade condition is anticipated along the south side of the building due to existing cut slope/driveway. A stormwater retention basin is planned for the northern portion of the site. Excavation for the proposed tunnel will expose footings of existing courthouse building and extend to a depth of 8 feet below existing foundations. The excavation for the proposed basement area will require cuts in the order of 10 to 15 feet BGS into granitic bedrock.

2.0 FIELD EXPLORATION AND LABORATORY TESTING

2.1 Field Exploration

Our field exploration consisted of the excavation of seven (7) borings to provide basis for foundation design and construction of the proposed improvements. During exploration, in-situ undisturbed (Cal Ring) and disturbed/bulk samples were collected from the borings for further laboratory testing and evaluation. Approximate locations of these exploratory borings along with previous applicable borings are depicted on the *Boring Location Plan* (Figure 4). Sampling was conducted by a staff geologist/engineer from our firm. After logging and sampling, the excavations were loosely backfilled with spoils generated during excavation. The exploration logs from this exploration and adjacent borings from previous investigations are included in Appendix A.

2.2 Laboratory Testing

Laboratory tests were performed on representative bulk samples to provide a basis for development of remedial earthwork and geotechnical design parameters. The laboratory testing program included maximum dry density and optimum moisture, particle size, expansion index, swell or settlement potential, in-situ moisture and density and soluble sulfate content. In addition, agricultural suitability testing was performed on two samples of onsite soils. The results of our laboratory testing are presented in Appendix B.

3.0 GEOTECHNICAL AND GEOLOGIC FINDINGS

3.1 Regional Geology

The site is located within a prominent natural geomorphic province in southwestern California known as the Peninsular Ranges. This province is characterized by steep, elongated ranges and valleys that trend northwestward. More specifically, the site is situated near the southwestern boundary of the relatively stable Perris Block.

The Perris Block, approximately 20 miles by 50 miles in extent, is bounded by the San Jacinto Fault Zone to the northeast, the Elsinore Fault Zone to the southwest, the Cucamonga Fault Zone to the northwest, and the Temecula Basin to the southeast. The Perris Block has had a complex tectonic history, apparently undergoing relative vertical land-movements of several thousand feet in response to movement on the Elsinore and San Jacinto Fault Zones. Thin sedimentary and volcanic materials locally mantle crystalline bedrock. Very old axial-channel deposits and granitic rock underlie the site, as mapped regionally on Figure 2, *Regional Geologic Map*.

3.2 Site Specific Geology

3.2.1 Earth Materials

Our field exploration, observations, and review of the pertinent literature indicate that the site is underlain by existing artificial fill (associated with the existing courthouse), young to very old axial-channel deposits (or referred to hereafter as older alluvium) and cretaceous-aged granitic bedrock. In addition, more recent alluvial soils (younger alluvium) were also found overlaying the older alluvium. These units are discussed further in the following sections in order of increasing age. A more detailed description of each unit is provided on the logs of borings in Appendix A.

- **Artificial Fill:** Artificial fill materials were encountered in Borings LB-6 and LB-7 adjacent to existing building and appear to be associated with previous site grading. These materials are relatively dense and consist of sandy clay to clayey sand soils (SC/CL)
- **Younger/Quaternary Alluvial Deposits:** Younger alluvium was generally encountered in the northern portion of the site (by proposed detention basin) and mantling the bedrock in the eastern portion of the site. As encountered in the exploratory excavations, these materials consist of loose to medium dense, silty to clayey sand and sandy clay.

These materials are expected to possess medium collapse potential (up to 6 percent) and low expansion potential based on the results of laboratory testing (Appendix B).

- **Older Alluvium:** Older alluvial deposits were generally encountered below the younger alluvium and expected to mantle the granitic bedrock at depth. As encountered in the exploratory excavations, these materials consist of dense to very dense silty sand. These materials are expected to possess very low collapse and expansion potential based on the results of our laboratory testing.
- **Granitic Bedrock:** Granitic bedrock was generally encountered in the southern portion of the site and exposed along most of the cut slopes for the existing driveway. As encountered, the bedrock was completely to highly weathered, and was recovered as silty to well-graded sand with varying amounts of gravel. The granitic rock is generally covered with a thin layer of topsoil and/or colluvium. Auger refusal was encountered in two of our borings (LB-3 and LB-4) at depths of approximately 16 and 22 feet, respectively.

3.2.2 Rock Rippability

Based on the results of our geotechnical borings, we anticipate that the granitic bedrock to be rippable to a depth of 15 to 20 feet below existing ground surface with conventional heavy earth moving equipment in good operating conditions (Caterpillar D9L or D10 with single shank ripper and rock teeth). However, localized marginally rippable to unrippable rock may be encountered shallower, as may be indicated by exploration of Boring LB-3. Other areas may also encounter buried core stones or non-rippable rock within shallow depth or excavation depth of underground utility trenches. In addition, due to differential weathering of the granitic bedrock materials, very heavy ripping and/or other specialized excavation techniques may be required to maintain desired excavation rates. For proposed building pads and utility trenches in marginally rippable to non-rippable rock areas, it may be desirable to over-excavate at least 2 feet below the bottom of proposed utility trenches or 3 to 5 feet below pad grade to facilitate future trenching operations. Moreover, the California Building Code and County of Riverside require that no oversize rock be placed within 10 feet of the surface of a structural fill and/or building pad. The grading plan should be carefully reviewed to verify that oversized rocks are buried below 10-foot fill cap. If insufficient deep fill areas are not available, size reduction processing or off-site disposal may be required. Other uses of resistant rock may include onsite riprap or crushing/processing for aggregate base materials.

3.3 Groundwater and Surface Water

Groundwater was not encountered during our field exploration. Historic groundwater data, as reported by Eastern Municipal Water District's (EMWD) in the vicinity of the site reflect a groundwater depth greater than 50 feet below existing ground surface.

3.4 Regional Faulting and Fault Activity

The subject site, like the rest of Southern California, is located within a seismically active region as a result of being located near the active margin between the North American and Pacific tectonic plates. The principal source of seismic activity is movement along the northwest-trending regional fault systems such as the San Andreas, San Jacinto, and Elsinore Fault Zones. Based on published geologic hazard maps, this site is not located within a currently designated Alquist-Priolo Earthquake Fault Zone or County of Riverside Fault Zone. The nearest known active fault is the Elsinore-Temecula Fault Zone located approximately 6.5 miles (10.4 kilometers) southeast of the site.

3.5 Site-Specific Seismic Analysis

A site-specific ground motion analysis was performed in accordance with the 2013 California Building Code (CBC) and following the procedures of ASCE 7-10 Publication, Section 21.2, as presented in Appendix C.

The probabilistic seismic hazard analysis was performed using the computer program EZ-FRISK (Risk Engineering, 2011) to estimate peak horizontal ground acceleration (PHGA) that could occur at the site, and to develop design response spectra. Various probabilistic density functions were used in this analysis to assess uncertainty inherent in these calculations with respect to magnitude, distance and ground motion. An averaging of the following four next-generation attenuation relationships (NGAs) was used with equal weights to calculate site-specific PHGA and spectra:

- Abrahamson-Silva (2008)
- Boore-Atkinson (2008),
- Campbell-Bozorgnia (2008), and
- Chiou-Youngs (2007)

The design response spectrum shown on Figure C-1 is derived from a comparison of probabilistic Maximum Considered Earthquake (MCE) and the 150 percent of the deterministic MCE as presented in Figures C-2 through C-3. In accordance with the 2013 CBC, peak ground accelerations are estimated based on maximum considered earthquake ground motion having a 2 percent probability of exceedance in 50 years) or site specific seismic hazard analysis (ASCE, 2010). Based on results of this analysis, a peak ground acceleration of 0.76g with a moment magnitude of 7.8 Mw is estimated for this site. The site-specific seismic coefficients are presented in Table 1 below.

In addition, the 2013 CBC seismic coefficients were calculated utilizing an interactive program on current United States Geological Survey (USGS) website using ASCE 7-10 procedures (referred to as USGS General Procedure). Based on our borings, the building will be underlain by dense older alluvium and/or granitic rock. Therefore, in accordance with the 2013 CBC, this site should be classified as a Class **C** site, and the site-specific seismic coefficients following this USGS general procedure are also presented in Table 1 below. We recommend the higher of the S_{DS} *and* S_{D1} included in table below be used in the structural design of the building.

Table 1. 2013 CBC Site-Specific Seismic Coefficients

CBC Categorization/Coefficient		USGS General Procedure (g)*	EZ-Frisk Procedure (g)*
Site Longitude (decimal degrees)	-117.1165		
Site Latitude (decimal degrees)	33.5839		
Site Class Definition	C		
Mapped Spectral Response Acceleration at 0.2s Period, S_s		**1.58**	**1.90**
Mapped Spectral Response Acceleration at 1s Period, S_1		**0.67**	**0.77**
Short Period Site Coefficient at 0.2s Period, F_a		**1.00**	
Long Period Site Coefficient at 1s Period, F_v		**1.30**	
Adjusted Spectral Response Acceleration at 0.2s Period, S_{MS}		**1.58**	
Adjusted Spectral Response Acceleration at 1s Period, S_{M1}		**0.87**	
Design Spectral Response Acceleration at 0.2s Period, S_{DS}		**1.06**	**1.27**
Design Spectral Response Acceleration at 1s Period, S_{D1}		**0.58**	**0.54***
Peak Ground Acceleration adjusted for site class, PGA_M		**0.62**	**0.76**

* g- Gravity acceleration
** S_{D1} *is calculated based on 2xSa* at 2s

3.6 Secondary Seismic Hazards

Ground shaking can induce "secondary" seismic hazards such as liquefaction, dynamic densification, and differential subsidence along ground fissures, seiches and tsunamis, as discussed in the following subsections:

3.6.1 Dynamic Settlement (Liquefaction and Dry Settlement)

Liquefaction is the loss of soil strength or stiffness due to a buildup of pore-water pressure during severe ground shaking. Liquefaction is associated primarily with loose (low density), saturated, fine- to medium-grained, cohesionless soils. Due to the dense nature of the onsite soils and lack of shallow groundwater, the potential for liquefaction is considered very low.

3.6.2 Ground Rupture

Since no active faults are known to cross the site, the possibility of damage due to ground surface-fault-rupture at this site is considered very low.

3.6.3 Seiches, Tsunamis, Inundation Due to Large Water Storage Facilities

Due to the great distance to large bodies of water, the possibility of seiches and tsunamis impacting the site is considered remote. This report does not address conventional flood hazard risk.

3.6.4 Slope Stability and Landslides

Due to the relatively modest relief across the site and dense nature of subsurface soils, the risk of deep-seated slope failure on this site is considered very low. The site is not considered susceptible to seismically induced landslides.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 General

The proposed improvements appear feasible from a geotechnical viewpoint provided that the following recommendations are incorporated into the design and construction phases of development. The main geotechnical concerns associated with the proposed improvements are the proposed cuts into granitic rock and tunnel construction along the west side of the existing building. As indicated in Section 3.2.2, localized marginally rippable to unrippable rock may be encountered within the depth of proposed excavation for the basement and hence special excavation techniques may be required. The excavation for the proposed tunnel will extend up to 8 feet below bottom of exiting footings and special excavation procedures should be implemented as discussed further in Section 4.7 to minimize disturbance or undermining of adjacent foundations.

4.2 Earthwork Considerations

Earthwork should be performed in accordance with the following recommendations and the *Earthwork and Grading Specifications* included in Appendix D of this report. In case of conflict, the following recommendations should supersede those in Appendix D. The contract between the Owner and the earthwork contractor should be worded such that it is the responsibility of the contractor to place fill properly and in accordance with recommendations presented in this report, including the guide specifications in Appendix D, notwithstanding the testing and observation of the geotechnical consultant.

4.2.1 Site Preparation and Remedial Grading

Prior to grading, the proposed structural improvement areas (i.e. all-structural fill areas, pavement areas, buildings, etc.) should be cleared of surface and subsurface obstructions or organic materials. Heavy vegetation, roots and debris should be disposed of offsite. Although not anticipated, water wells, septic tanks and cesspools, if encountered, should be removed or abandoned in accordance with the Riverside County Department of Health Services guidelines. Voids created by removal of buried material should be backfilled with properly compacted soil in general accordance with the recommendations of this report. Area specific remedial grading recommendations are provided as follows:

The near surface soils (including topsoil/colluvium and younger alluvium) are potentially compressible in their present state and may settle under the

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surcharge of fills or foundation loads. As such, these materials should be removed in all settlement-sensitive areas including building pads, pavement, and slopes. These materials are conditionally suitable for use as compacted fill as further described in Section 4.2.4. The depth of removal should extend into underlying dense older alluvium or granitic bedrock, but not expected to exceed a maximum depth of 10 feet as per Boring LB-5. Dense/competent older alluvium should possess a minimum of 85 percent relative compaction (based on ASTM D1557). Acceptability of all removal bottoms should be reviewed by an engineering geologist or geotechnical engineer and documented in the as-graded geotechnical report. The removal limit should be established by a 1:1 (horizontal:vertical) projection from the edge of fill soils supporting settlement-sensitive structures downward and outward to competent material identified by the geotechnical consultant. Removal will also include benching into competent material as the fills rise.

However, proposed excavations should not encroach within the influence zone of any existing foundations or underground utilities. The outside limit of this influence zone is defined by an imaginary line sloping down and away at 45 degrees from the outside bottom edge of footings. If any excavation is to encroach to within this zone (i.e. tunnel excavation), proper shoring or slot cutting procedures should be implemented to prevent undermining of existing foundations.

4.2.2 Cut/Fill Transition Subgrade

In order to mitigate the impact of underlying cut/fill transition subgrade and potential differential fill settlement (especially where proposed building spans over existing cut slope/driveway), the cut portion should be over-excavated (OX) to a minimum depth of 2 feet below the bottom of the proposed footings or one-half of the maximum fill thickness between two adjacent footings. Over-excavation does not necessarily need to encompass the entire building pad as long as the maximum differential fill between two adjacent footings is restricted to a maximum of 5 feet. The OX should extend laterally beyond the outside edge of foundations a horizontal distance equal to the depth of OX or to a minimum distance of 5 feet, whichever is greater.

In areas of proposed concrete flatwork or pavement, a minimum remedial removal and recompaction of 18-inches below existing grade or 12-inch below proposed subgrade elevation, whichever is deeper, should be performed. Geotechnical observation of removal bottoms should be performed during grading to confirm the competency of the materials being left in place. After completion of the recommended removal of unsuitable soils and prior to fill placement, the exposed surface should be scarified to a minimum depth of 8-inches, moisture conditioned as necessary to near optimum moisture content and recompacted using heavy compaction equipment to an unyielding condition.

4.2.3 Structural Fills

Areas to receive structural fill and/or other surface improvements should be scarified to a minimum depth of 8 inches, conditioned to at least optimum moisture content, and recompacted. Fill soils should be placed at a minimum of 90 percent relative compaction (based on ASTM D1557) and near or above optimum moisture content. However, if differential fill exceeds 5 feet in depth between two adjacent footings, such fill should be compacted to 95 percent relative compaction. Placement and compaction of fill should be performed in accordance with local grading ordinances under the observation and testing of the geotechnical consultant. The optimum lift thickness to produce a uniformly compacted fill will depend on the type and size of compaction equipment used. In general, fill should be placed in uniform lifts not exceeding 8 inches in thickness.

Fill slope keyways will be necessary at the toe of all fill slopes and at fill-over-cut contacts. Keyway schematics, including dimensions and subdrain recommendations, are provided in Appendix D. All keyways should be excavated into dense bedrock or dense alluvium as determined by the geotechnical engineer. The cut portions of all slope and keyway excavations should be geologically mapped and approved by a geologist prior to fill placement.

Fills placed on slopes steeper than 5:1 (horizontal:vertical) should be benched into dense soils (see Appendix D for benching detail). Benching should be of sufficient depth to remove all loose material. A minimum bench height of 2 feet into approved material should be maintained.

4.2.4 Suitability of Site Soils for Fills

Topsoil and vegetation layers, root zones, and similar surface materials should be striped and stockpiled for either reuse in landscape surface areas or removed from the site. Site alluvium possessing high clay content and relatively low R-value should not be used in building or pavement subgrade. Older alluvium and granitic rock possessing very low expansion potential (EI<21) are considered suitable for re-use as compacted fills provided the recommendations contained herein are followed. If cobbles and boulders larger than 6-inches in largest diameter are encountered or produced during grading, these oversized cobbles and boulders should be reduced to less than 6 inches or placed in structural fill as outlined in Appendix D.

4.2.5 Oversized Rock

Based on our observations, we anticipate that grading of the subject site may produce oversized rock (greater than 6 inches in maximum dimension). Oversized rock may be placed in the deeper fill portions of the site (>10 feet, if any) in accordance with the following guidelines and the specifications contained in Appendix D.

Within the upper 5 feet of finish grade, fill soils should not contain rock greater than 6 inches in maximum dimension in order to facilitate foundation and utility trench excavation. For fill soils between 5 and 10 feet below finish grade, the fill may contain rock up to 12 inches in maximum dimension and should be mixed with sufficient soil to eliminate voids. Below a depth of 10 feet, rocks up to a maximum dimension of 36 inches may be incorporated into the fill provided adequate fines to fill all voids are present. Rocks greater than 36 inches in diameter may be placed on a case-by-case basis.

4.2.6 Import Soils

Import soils and/or borrow sites, if needed, should be evaluated by us prior to import. Import soils should be uncontaminated, granular in nature, free of organic material (loss on ignition less-than 2 percent), have very low expansion potential (with an Expansion Index less than 21) and have a low corrosion impact to the proposed improvements.

4.2.7 Utility Trenches

Utility trenches should be backfilled with compacted fill in accordance with utility Agency standard requirements and the *Standard Specifications for Public Works Construction,* ("Greenbook"), 2012 Edition. Fill material above the pipe zone should be placed in lifts not exceeding 8 inches in uncompacted thickness and should be compacted to at least 90 percent relative compaction (ASTM D 1557) by mechanical means only. Site soils may generally be suitable as trench backfill provided these soils are screened of rocks over 1½ inches in diameter and organic matter. If imported sand is used as backfill, the upper 3 feet in building and pavement areas should be compacted to 95 percent. The upper 6 inches of backfill in all pavement areas should be compacted to at least 95 percent relative compaction.

Where granular backfill is used in utility trenches adjacent moisture sensitive subgrades and foundation soils, we recommend that a cut-off "plug" of impermeable material be placed in these trenches at the perimeter of buildings, and at pavement edges adjacent to irrigated landscaped areas. A "plug" can consist of a 5-foot long section of clayey soils with more than 35-

percent passing the No. 200 sieve, or a Controlled Low Strength Material (CLSM) consisting of one sack of Portland-cement plus one sack of bentonite per cubic-yard of sand. CLSM should generally conform to requirements of the "Greenbook". This is intended to reduce the likelihood of water permeating trenches from landscaped areas, then seeping along permeable trench backfill into the building and pavement subgrades, resulting in wetting of moisture sensitive subgrade earth materials under buildings and pavements.

Excavation of utility trenches should be performed in accordance with the project plans, specifications and the *California Construction Safety Orders* (2006 Edition or more current). The contractor should be responsible for providing a "competent person" as defined in Article 6 of the *California Construction Safety Orders*. Contractors should be advised that sandy soils (such as fills generated from the onsite alluvium) could make excavations particularly unsafe if all safety precautions are not properly implemented. In addition, excavations at or near the toe of slopes and/or parallel to slopes may be highly unstable due to the increased driving force and load on the trench wall. Spoil piles from the excavation(s) and construction equipment should be kept away from the sides of the trenches. Leighton Consulting, Inc. does not consult in the area of safety engineering.

4.2.8 Shrinkage

The volume change of excavated onsite soils upon recompaction is expected to vary with materials, density, insitu moisture content, and location and compaction effort. The in-place and compacted densities of soil materials vary and accurate overall determination of shrinkage and bulking cannot be made. Therefore, we recommend site grading include, if possible, a balance area or ability to adjust grades slightly to accommodate some variation. Based on our geotechnical laboratory results, we expect recompaction shrinkage (when recompacted to an average 92 percent of ASTM D1557) of 10- to 15-percent by volume for the younger alluvium and 0- to 5-percent for the older alluvium. Bulking of 0- to 10- percent may result in the granitic rock depending on depth. In addition, we recommend that a surface subsidence value of 0.15 foot be applied to topographic elevations in most areas underlain by topsoil/granite bedrock.

4.2.9 Drainage

All drainage should be directed away from structures and pavements by means of approved permanent/temporary drainage devices. Adequate storm drainage of any proposed pad should be provided to avoid wetting of foundation soils. Irrigation adjacent to buildings should be avoided when possible. As an option, sealed-bottom planter boxes and/or drought resistant vegetation should be used within 5-feet of buildings.

4.2.10 Slope Design and Construction

We expect that all fill and cut slopes will be designed and constructed at 2:1 (horizontal:vertical) to a maximum height of 20 feet. These slopes are considered grossly stable for static and pseudostatic conditions. Higher or steeper slopes (up to 1.5:1) in the granitic rock may be considered subject to further review and evaluation. Such slopes should be observed by an engineering geologist during grading to verify jointing or fracture patterns and recommend remedial measures, if needed.

The outer portion of fill slopes should be either overbuilt by 2 feet (minimum) and trimmed back to the finished slope configuration or compacted in vertical increments of 5 feet (maximum) by a weighted sheeps foot roller as the fill is placed. The slope face should then be track-walked by dozers of appropriate weight to achieve the final slope configuration and compaction to the slope face.

Slope faces are inherently subject to erosion, particularly if exposed to rainfall and irrigation. Landscaping and slope maintenance should be conducted as soon as possible in order to increase long-term surficial stability. Berms should be provided at the top of fill slopes. Drainage should be directed such that surface runoff on the slope face is minimized.

4.2.11 Slot Cutting Excavation

As described in Section 1.3, tunnel construction will require temporary excavation along the west side of the existing courthouse building. The proposed excavation will expose existing footings and extend to a depth of 8 feet below bottom of footings. As such, existing foundations should be properly shored/braced (i.e. tiebacks, cast-in-place concrete piles, etc.) prior to excavation or an 'ABC' slot cut method should be implemented as further described below.

To maintain the structural integrity of the existing building, we recommend that excavation for the tunnel immediately adjacent to the existing foundations proceeds by making a series of adjacent slot cut excavations perpendicular to the existing buildings in a sequential 'ABC' method. All of the 'A' slots (every third slot cut) should be excavated and then backfilled/compacted prior to the 'B' slots. Similarly, the 'C' slots are excavated after the 'B' slots are backfilled/completed. This will limit the width of excavation adjacent to the existing building/foundations at any given time, thus reducing the potential for undermining the existing foundations. The maximum width of the slot cuts should be initially 6 feet. If 6-foot-wide slot cuts are excavated without evidence of distress to foundation or caving of exposed soils, and field conditions indicate suitable

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soils, it may be possible to increase the slot cut width to 8 feet pending approval of the geotechnical consultant. The bottom of each slot cut should extend a minimum of 8 feet laterally from the existing building so cut slopes of adjacent excavation is no steeper than 1:1. If isolated column footings exist, the proposed excavations should not expose more than half of the existing footing at any given time.

The excavations should be left open for as short of a period as feasible and be avoided when rain and potential construction delays are anticipated. Prior to excavation, it is recommended that the depth of existing footings and subgrade soils conditions be further verified by excavating additional potholes.

The above recommendations for slot cutting technique are presented based on anticipated soil conditions, dense existing compacted fill (clayey sand to sandy clay) underlain by granitic rock. Variations in soil conditions may occur and require modifications to the recommendations presented above. If non-cohesive soils are encountered (i.e. cohesionless sands: SM, SW, SP), vertical excavations will be difficult to achieve without prior shoring. In the event supporting, subgrade soils for existing foundations become disturbed or collapse, underpinning will be required to extend footings into undisturbed soils founded at same elevation as new foundations for tunnel structure. If underpinning is not required, the structural engineer should incorporate the added loads from the existing foundations into the design of the retaining wall/footings of the tunnel structure.

The contractor is responsible for all temporary excavations at the site and the design of any required temporary shoring. Shoring, bracing and benching should be performed by the contractor in accordance with the current edition of the *California Construction Safety Orders*, see:
http://www.dir.ca.gov/title8/sb4a6.html

During construction, exposed earth material conditions should be regularly evaluated to verify that conditions are as anticipated. The contractor is responsible for providing the "competent person" required by OSHA standards to evaluate soil conditions. Close coordination between the competent person and geotechnical consultant should be maintained to facilitate construction while providing safe excavations. In general, onsite alluvial soils are classified as OSHA soil Type C. Therefore, unshored temporary cut slopes should be no steeper than 1½:1 (horizontal:vertical), for a height no-greater-than (≤) 20 feet (*California Construction Safety Orders*, Appendix B to Section 1541.1, Table B-1). These recommended temporary cut slopes assume a level ground surface for a distance equal to one-and-a-half (x1.5) the depth of excavation. For steeper temporary slopes, deeper excavations, and/or where slopes terrain exists within close proximity to excavation (<1.5xdepth), appropriate shoring methods or flatter slopes may be required to protect the workers in the excavation and adjacent improvements. Such methods should be implemented by the contractor and approved by the geotechnical consultant.

4.3 Foundation Design

Shallow spread or continuous footings bearing on a newly placed properly compacted fill are anticipated for the proposed structures.

4.3.1 Design Parameters – Spread/Continuous Shallow Footings

Conventional spread/continuous shallow footings appear to be feasible to support the proposed structures. Footings should be embedded at least 12-inches below lowest adjacent grade for the proposed structure. Footing embedment should be measured from lowest adjacent finished grade, considered as the top of interior slabs-on-grade or the finished exterior grade, excluding landscape topsoil, whichever is lower. Footings located adjacent to utility trenches or vaults should be embedded below an imaginary 1:1 (horizontal:vertical) plane projected upward and outward from the bottom edge of the trench or vault, up towards the footing.

- **Bearing Capacity**: A net allowable bearing capacity of 2,000 pounds per square foot (psf) may be used for design assuming that footings have a minimum base width of 18 inches for continuous wall footings and a minimum bearing area of 3 square feet (1.75-ft by 1.75-ft) for pad foundations. The bearing pressure value may be increased by 250 psf for each additional foot of embedment or each additional foot of width to a maximum vertical bearing value of 3,000 psf. These bearing values may also be increased by one-third when considering short-term seismic or wind loads. A net allowable bearing capacity of 4,000 psf may be used if footings are founded directly into granitic rock.

- **Lateral loads**: Lateral loads may be resisted by friction between the footings and the supporting subgrade. A maximum allowable frictional resistance of 0.35 may be used for design. In addition, lateral resistance may be provided by passive pressures acting against foundations poured neat against properly compacted granular fill. We recommend that an allowable passive pressure based on an equivalent fluid pressure of 300 pounds-per-cubic-foot (pcf) be used in design. These friction and passive values have already been reduced by a factor-of-safety of 1.5.

4.3.2 Settlement Estimates

For settlement estimates, we assumed that column loads will be no larger than 90 kips, with bearing wall loads not exceeding 5 kips per foot of wall. If greater column or wall loads are required, we should re-evaluate our foundation recommendation, and re-calculate settlement estimates.

Buildings located on compacted fill soils (as recommended in Section 4.2) should be designed in anticipation of 0.75 inch of total static settlement and 0.25-inch of static differential settlement within a 30 foot horizontal distance. The majority of this settlement is anticipated to occur during construction as the load is applied. These settlement estimates should be reevaluated by this firm when foundation plans and actual loads for the proposed structure(s) become available.

4.4 Retaining Walls

Retaining wall earth pressures are a function of the amount of wall yielding horizontally under load. If the wall can yield enough to mobilize full shear strength of backfill soils, then the wall can be designed for "active" pressure. If the wall cannot yield under the applied load, the shear strength of the soil cannot be mobilized and the earth pressure will be higher. Such walls should be designed for "at rest" conditions. If a structure moves toward the soils, the resulting resistance developed by the soil is the "passive" resistance. Retaining walls backfilled with non-expansive soils should be designed using the following equivalent fluid pressures:

Table 2. Retaining Wall Design Earth Pressures (Static, Drained)

Loading Conditions	Equivalent Fluid Density (pcf)	
	Level Backfill	2:1 Backfill
Active	35	50
At-Rest	50	85
Passive*	300	150 (2:1, sloping down)

* This assumes level condition in front of the wall will remain for the duration of the project, not to exceed 3,500 psf at depth.

Unrestrained (yielding) cantilever walls should be designed for the active equivalent-fluid weight value provided above for very low to low expansive soils that are free draining. In the design of walls restrained from movement at the top (non-yielding) such as basement or elevator pit/utility vaults, the at-rest equivalent fluid weight value should be used. Total depth of retained earth for design of cantilever walls should be measured as the vertical distance below the ground

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surface measured at the wall face for stem design, or measured at the heel of the footing for overturning and sliding calculations. Should a sloping backfill other than a 2:1 (horizontal:vertical) be constructed above the wall (or a backfill is loaded by an adjacent surcharge load), the equivalent fluid weight values provided above should be re-evaluated on an individual case basis by us. Non-standard wall designs should also be reviewed by us prior to construction to check that the proper soil parameters have been incorporated into the wall design.

All retaining walls should be provided with appropriate drainage. The outlet pipe should be sloped to drain to a suitable outlet. Wall backfill should be non-expansive (EI $\leq$ 21) sands compacted by mechanical methods to a minimum of 90 percent relative compaction (ASTM D 1557). Clayey site soils should not be used as wall backfill. Walls should not be backfilled until wall concrete attains the 28-day compressive strength and/or as determined by the Structural Engineer that the wall is structurally capable of supporting backfill. Lightweight compaction equipment should be used, unless otherwise approved by the Structural Engineer.

4.5 Vapor Retarder

It has been a standard of care to install a moisture-vapor retarder underneath all slabs where moisture condensation is undesirable. Moisture vapor retarders may retard but not totally eliminate moisture vapor movement from the underlying soils up through the slabs. Moisture vapor transmission may be additionally reduced by use of concrete additives. Leighton Consulting, Inc. does not practice in the field of moisture vapor transmission evaluation/mitigation. Therefore, we recommend that a qualified person/firm be engaged/consulted with to evaluate the general and specific moisture vapor transmission paths and any impact on the proposed construction. This person/firm should provide recommendations for mitigation of potential adverse impact of moisture vapor transmission on various components of the structure as deemed appropriate.

4.6 Soil Corrosivity

Corrosion testing should be performed on representative finish grade soils at the completion of site grading. Leighton Consulting, Inc. is not a corrosion consultant. A corrosion consultant should be consulted to review the results of our limited laboratory tests and provide specific recommendations if corrosion sensitive materials, such as buried metal conduits or strap-type tie downs, are to be used.

Table below summarizes current standards for concrete exposed to sulfate-containing solutions.

Table 3. Sulfate Concentration and Sulfate Exposure

Sulfate In Water (parts-per-million)	Water-Soluble Sulfate (SO4) in soil (percentage by weight)	Sulfate Exposure
0-150	0.00 - 0.10	Negligible
150-1,500	0.10 - 0.20	Moderate (Seawater)
1,500-10,000	0.20 - 2.00	Severe
>10,000	Over 2.00	Very Severe

The sulfate content was determined in the laboratory for representative onsite soil sample. The results indicate that the water soluble sulfate range is less than 0.2 percent by weight, which is considered moderate per Table 4 above. Based on the test results, Type II cement or equivalent may be used.

Many factors can affect corrosion potential of soil including soil moisture content, resistivity, permeability and pH, as well as chloride and sulfate concentration. In general, soil resistivity, which is a measure of how easily electrical current flows through soils, is the most influential factor. Based on the findings of studies presented in ASTM STP 1013 titled “Effects of Soil Characteristics on Corrosion” (February, 1989), the approximate relationship between soil resistivity and soil corrosiveness was developed as shown in Table below.

Table 4. Relationship between Soil Resistivity and Soil Corrosivity

Soil Resistivity (ohm-cm)	Classification of Soil Corrosiveness
0 to 900	Very Severely Corrosive
900 to 2,300	Severely Corrosive
2,300 to 5,000	Moderately Corrosive
5,000 to 10,000	Mildly Corrosive
10,000 to >100,000	Very Mildly Corrosive

Acidity is an important factor of soil corrosivity. The lower the pH (the more acidic the environment), the higher the soil corrosivity will be with respect to buried metallic structures and utilities. As soil pH increases above 7 (the neutral value), the soil is increasingly more alkaline and less corrosive to buried steel structures, due to protective surface films, which form on steel in high pH environments. The pH of representative onsite soil samples is 7.7 which is generally considered less active from a corrosion standpoint. Chloride and sulfate ion concentrations, and pH appear to play secondary roles in affecting corrosion potential. High chloride levels tend to reduce soil resistivity and break down otherwise protective surface deposits, which can result in corrosion of buried steel or reinforced concrete structures.

Based on laboratory testing results of soil resistivity, the onsite soil is considered very severely corrosive. Ferrous pipe can be protected by polyethylene bags, tape or coatings, di-electric fittings, concrete encasement or other means to separate the pipe from wet onsite soils. Further testing of import and possibly site soil corrosivity could be performed and specific recommendations for corrosion protection may need to be provided by a qualified corrosion engineer.

4.7 Preliminary Pavement Design

Our preliminary pavement design is based on an R-value of 35 for subgrade soils (derived from onsite older alluvium and granitic rock) and the Caltrans Highway Design Manual. For planning and estimating purposes, the pavement sections are calculated based on Traffic Indexes (TI) as indicated in Table below:

Table 5. Asphalt Pavement Sections

General Traffic Condition	Design Traffic Index (TI)	Asphalt Concrete (inches)	Aggregate Base* (inches)
Automobile Parking Lanes	4.5	3.0	4.0
	5.0	3.0	5.0
Truck Access & Driveways	6.0	3.5	7.0
	6.5	3.5	8.0

Appropriate Traffic Index (TI) should be selected or verified by the project civil engineer and actual R-value of the subgrade soils will need to be verified after completion of site grading to finalize the pavement design. Pavement design and construction should also conform to applicable local, county and industry standards. The Caltrans pavement section design calculations were based on a pavement life of approximately 20 years with a normal amount of flexible pavement maintenance

Where applicable, we recommend that a minimum of 6 inches of PCC pavement be used, in high impact load areas or if to be subjected to truck traffic. The PCC pavement should be placed on a minimum 4-inch aggregate base. The PCC pavement may be placed directly on a compacted subgrade with an R-Value of 40 or higher. The PCC pavement should have a minimum of 28-day flexural strength of 650 psi. Other requirements of Caltrans Standard Specifications regarding mixing and placing of concrete should be followed.

The upper 8 inches of the subgrade soils should be moisture-conditioned to near optimum moisture content, compacted to at least 95 percent relative compaction (ASTM D1557) and kept in this condition until the pavement section is constructed. Minimum relative compaction requirements for aggregate base should be 95 percent of the maximum laboratory density as determined by ASTM D1557. If applicable, aggregate base should conform to the "Standard Specifications for Public Works Construction" (green book) current edition or Caltrans Class 2 aggregate base.

If pavement areas are adjacent to heavily watered landscape areas, some deterioration of the subgrade load bearing capacity may result. Moisture control measures such as deepened curbs or other moisture barrier materials may be used to prevent the subgrade soils from becoming saturated. The use of concrete cutoff or edge barriers should be considered when pavement is planned adjacent to either open (unfinished) or irrigated landscaped areas.

4.8 Infiltration Rates

Percolation testing at two selected locations at depth of 3 to 5 feet below existing ground surface (BGS) was performed in the northern portion of the site (see Figure 4). The percolation tests were performed in accordance with the procedures of Section 2.3 of the RCFC&WCD Design Handbook. Results reported below are the readings in minutes per inch drop (MPI) and converted to infiltration rates (in/hr) using the Prochet Method.

Table 6. Summary of Percolation/Infiltration Test Results

Test Hole #	Depth BGS (ft)	Percolation Rate (MPI)	Infiltration Rate (in/hr)	Soil Description
P-1	3.0	120	0.05	Clayey Sand
P-2	7.0	60	0.10	Clayey Sand

5.0 GEOTECHNICAL CONSTRUCTION SERVICES

Geotechnical review is of paramount importance in engineering practice. Poor performances of many foundation and earthwork projects have been attributed to inadequate construction review. We recommend that Leighton Consulting, Inc. be provided the opportunity to review the grading plan and foundation plan(s) prior to bid.

Reasonably-continuous construction observation and review during site grading and foundation installation allows for evaluation of the actual soil conditions and the ability to provide appropriate revisions where required during construction. Geotechnical conclusions and preliminary recommendations should be reviewed and verified by Leighton Consulting, Inc. during construction, and revised accordingly if geotechnical conditions encountered vary from our findings and interpretations. Geotechnical observation and testing should be provided:

- After completion of site demolition and clearing,
- During over-excavation of compressible soil,
- During compaction of all fill materials,
- After excavation of all footings and prior to placement of concrete,
- During utility trench backfilling and compaction, and
- When any unusual conditions are encountered.

Additional geotechnical exploration and analysis may be required based on final development plans, for reasons such as significant changes in proposed structure locations/footprints. We should review grading (civil) and foundation (structural) plans, and comment further on geotechnical aspects of this project.

6.0 LIMITATIONS

This report was based in part on data obtained from a limited number of observations, site visits, soil excavations, samples and tests. Such information is, by necessity, incomplete. The nature of many sites is such that differing soil or geologic conditions can be present within small distances and under varying climatic conditions. Changes in subsurface conditions can and do occur over time. Therefore, our findings, conclusions and recommendations presented in this report are based on the assumption that we (Leighton Consulting, Inc.) will provide geotechnical observation and testing during construction as the Geotechnical Engineer of Record for this project. Please refer to Appendix E, ASFE's *Important Information About Your Geotechnical Report*, prepared by the Associated Soil and Foundation Engineers (ASFE) presenting additional information and limitations regarding geotechnical engineering studies and reports.

This report was prepared for the sole use of Client and their design team, for application to design of the proposed Southwest Justice Center (SWJC) Juvenile Courthouse Relocation, in accordance with generally accepted geotechnical engineering practices at this time in California. In addition, if our report is subject to review by the California Geological Survey (CGS) and/or the California Division of the State Architect (DSA), we recommend that geologic/geotechnical data in this report be only used in the design of this project after review and approval by CGS. Any premature (before CGS approval) or unauthorized use of or reliance on this report constitutes an agreement to defend and indemnify Leighton Consulting, 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 Leighton Consulting, Inc.

REFERENCES

Army Corps of Engineers, Evaluation of Settlement for Dynamic and Transient Loads, Technical Engineering and Design Guides as Adapted from the US Army Corps of Engineers, No. 9, American Society of Civil Engineers Press.

American Society of Civil Engineers, 2010, Minimum Design Loads for Buildings and Other Structures, ASCE/SEI 7-10 Publication.

Blake T.F., 2000b, EQFAULT, Version 3, A Computer Program for the Deterministic Prediction of Peak Horizontal Acceleration from Digitized California Faults, User's Manual, 77pp.

Bryant, W. A. and Hart, E.W., 2007, Fault-Rupture Hazard Zones in California, Alquist-Priolo Earthquake Fault Zoning with Index to Earthquake Zones Maps: Department of Conservation, Division of Mines and Geology, Special Publication 42. Interim Revision 2007.

California Building Code, 2010, California Code of Regulations Title 24, Part 2, Volume 2 of 2.

California Geologic Survey (CGS), 2003. The Revised 2002 California Probabilistic Seismic Hazard Maps, June 2003. By Tianquing Cao, William A. Bryant, Badie Rowshandel, David Branum and Christopher J. Wills.

California Geological Survey, (CGS), 2006, Geologic Map of the San Bernardino and Santa Ana 30' X 60' Quadrangle, Southern California, Version 1.0, Compiled by Douglas M. Morton and Fred K. Miller, Open File Report 06-1217.

California Geological Survey, (CGS), 2011, Note 48, Checklist for the Review of Engineering Geology and Seismology Reports for California Public Schools, Hospitals, and Essential Services Buildings, dated January 11.

EZ-FRISK, 2011, EZ_FRISK Version 7.33, A Computer Program for Evaluation of Seismic Hazard Spectral.

Gastil, G., et al, 1978, Mesozoic History of Peninsular California and Related Areas East of the Gulf of California, in: Mesozoic Paleogeography at the Western United States, D.G. Howell and K.A. McDougall, eds. Pacific Section of the S.E.P.M., Los Angeles, California.

Jennings, C.W., 1994, Fault Activity Map of California and Adjacent Areas, California Division of Mines and Geology, Geologic Data Map Series, No. 6, Scale 1:750,000.

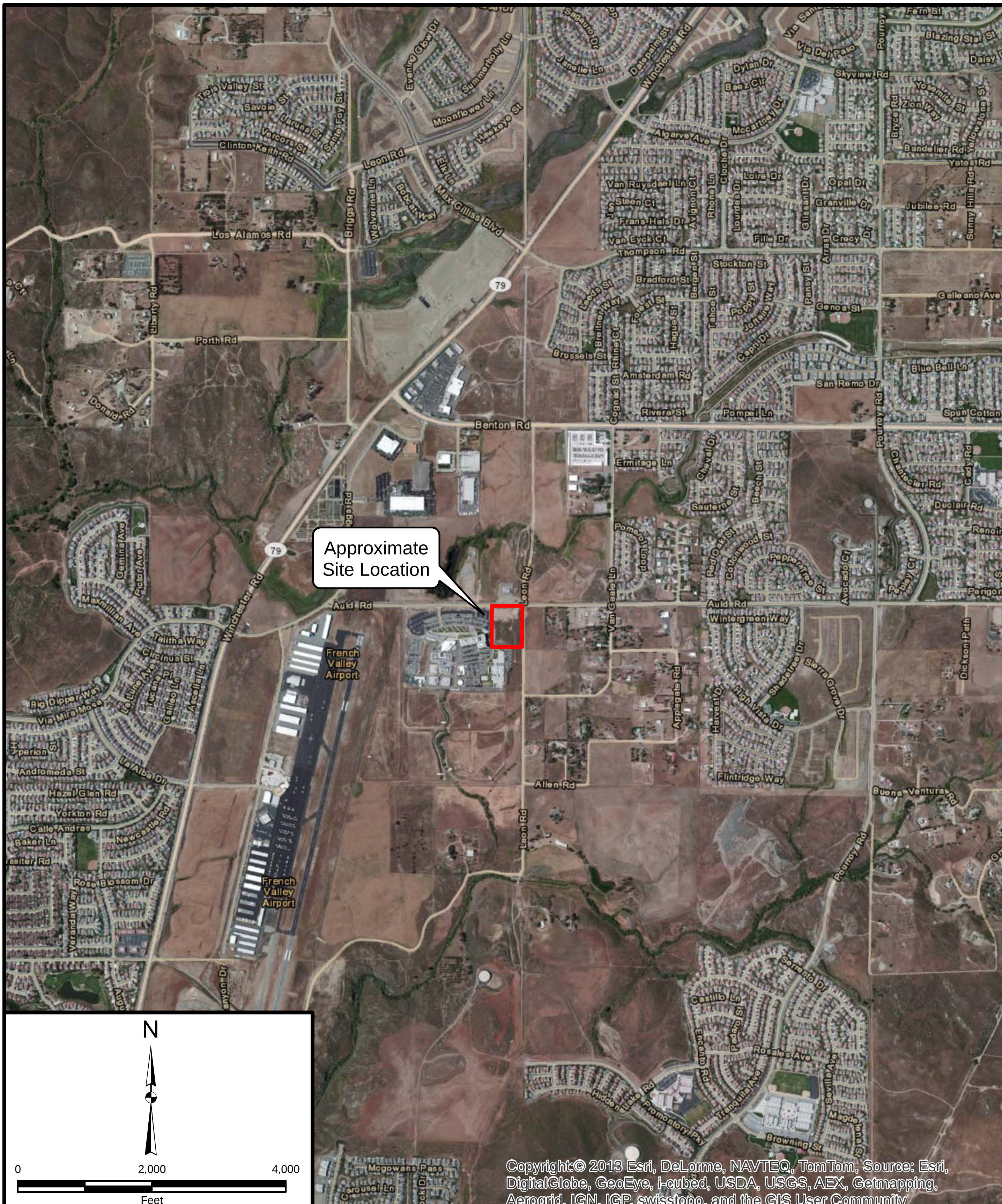
Public Works Standard, Inc., 2012, *Greenbook, Standard Specifications for Public Works Construction: 2012 Edition*, BNI Building News, Anaheim, California.

Riverside County, 2003, *County of Riverside General Plan*, Riverside County Integrated Project Website.

Yerkes, R.F., McCulloh, T.H., Schoellhamer, J.E. and Vedder, J.G., 1965, Geology of the Los Angeles Basin, California -- An Introduction: U. S. Geological Survey Professional Paper 420-A, 57 p.

Tokimatsu, K., and Seed, H.B., 1987, Evaluation of Settlements in Sands Due to Earthquake Shaking, ASCE Journal of Geotechnical Engineering, Vol. 113, No. 8, dated August.

USGS, 2014, an interactive computer program on USGS website to calculate Seismic Response and Design Parameters based on ASCE 7-15 seismic procedures.



Project: 10625.001	Eng/Geol: SIS/RFR
Scale:1 " = 2,000 '	Date: March 2014

Base Map: ESRI ArcGIS Online 2014
Thematic Information: Leighton
Author: (mmurphy)

SITE LOCATION MAP

Southwest Justice Center Courts Relocation
30755 Auld Road, Murrieta, CA

Figure 1

Leighton

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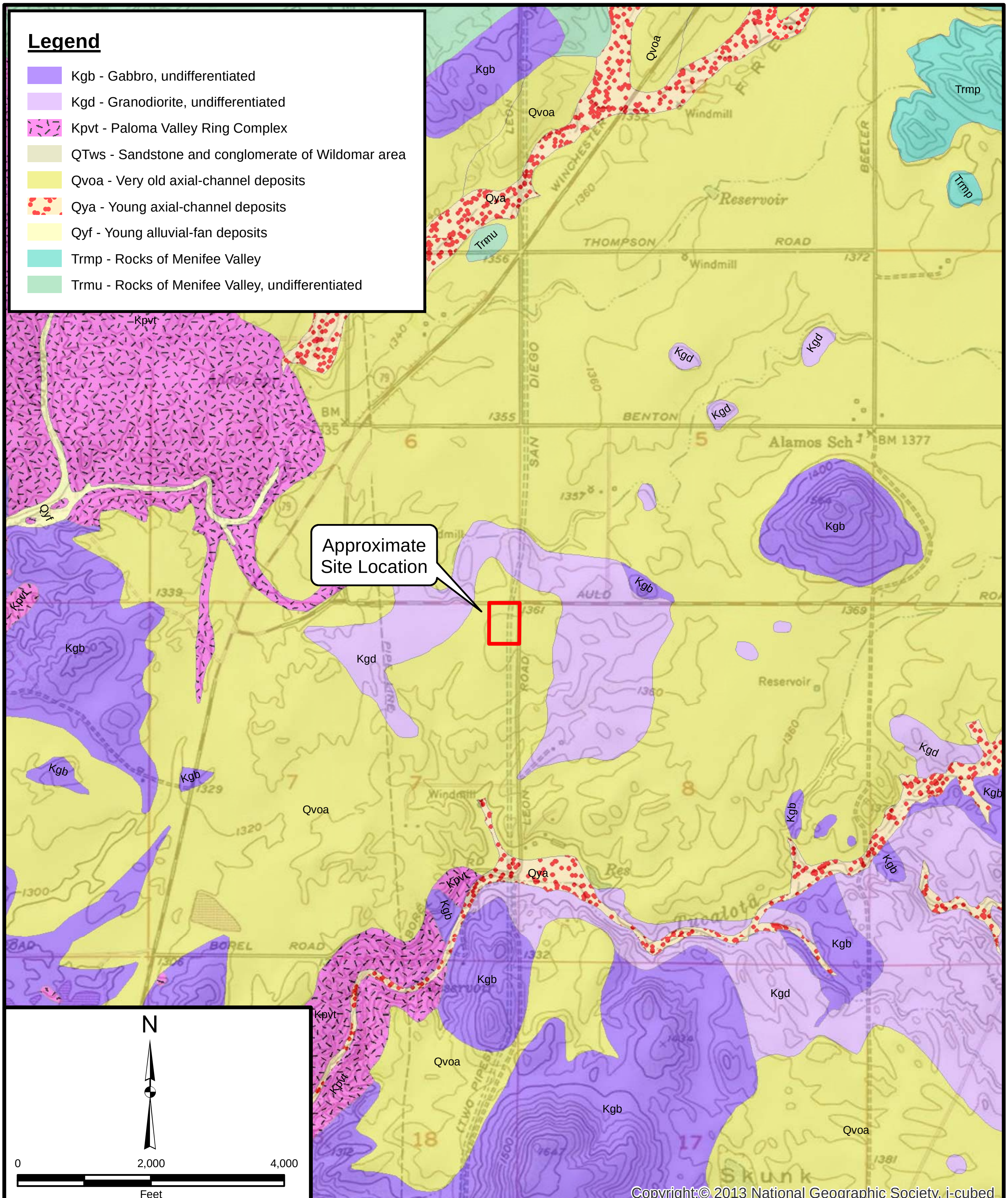


Project: 10625.001	Eng/Geol: SIS/RFR
Scale:1 " = 2,000 '	Date: March 2014

USGS, 2006, Geologic map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California, Version 1.0, Open File Report 2006-1217
Author: (mmurphy)

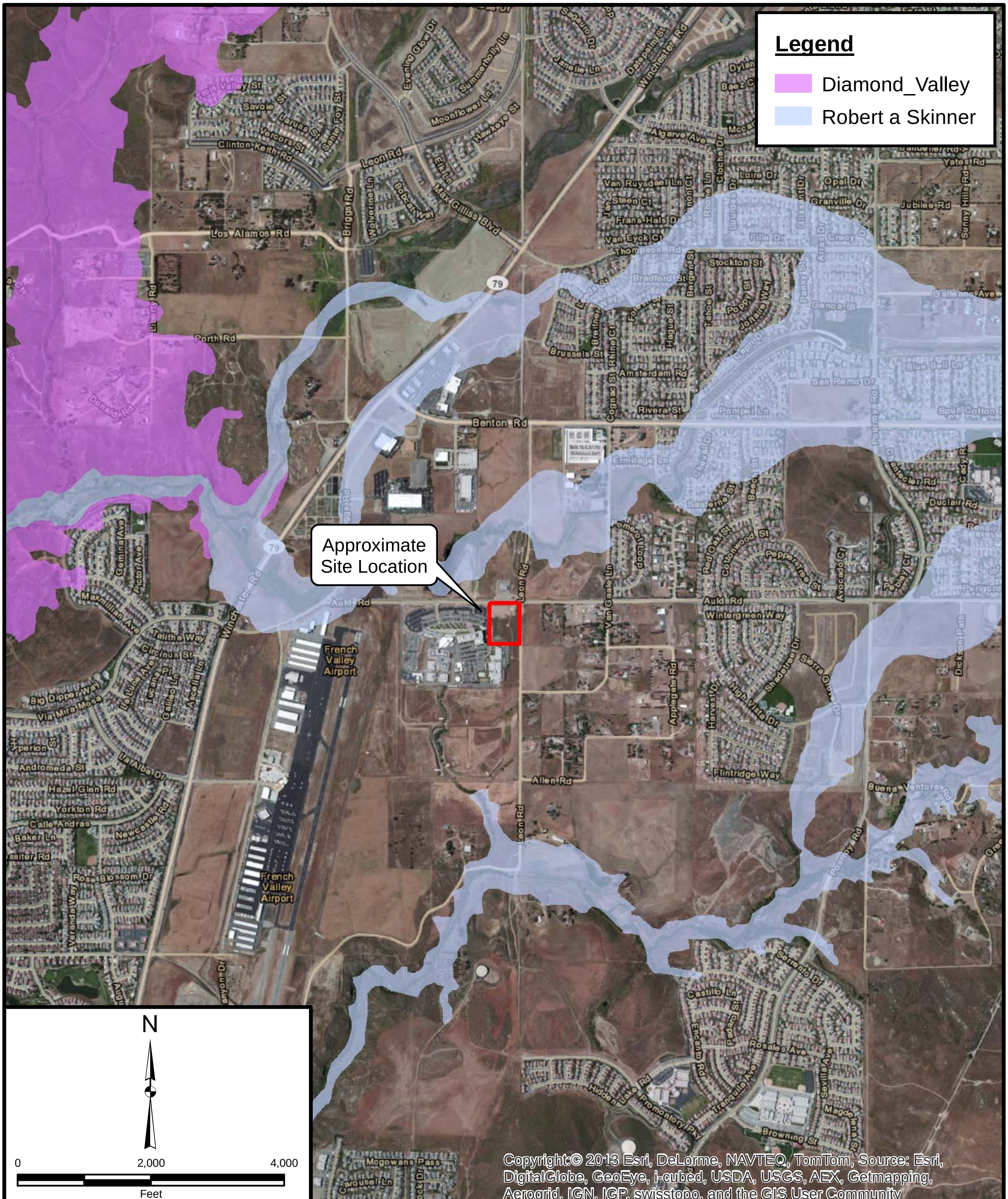
REGIONAL GEOLOGY MAP

Southwest Justice Center Courts Relocation
30755 Auld Road, Murrieta, CA

Figure 2

Leighton

Map Saved as P:\drafting\10625\001\GIS\of_2014-03-19\10625_Figure2_GeoMap.mxd on 3/19/2014 4:14:39 PM



Project: 10625.001	Eng/Geol: SIS/RFR	DAM INUNDATION MAP	Figure 3
Scale:1 " = 2,000 '	Date: March 2014	Southwest Justice Center Courts Relocation 30755 Auld Road, Murrieta, CA	Leighton
Base Map: ESRI ArcGIS Online 2014 Thematic Information: Leighton Author: (mmurphy)			

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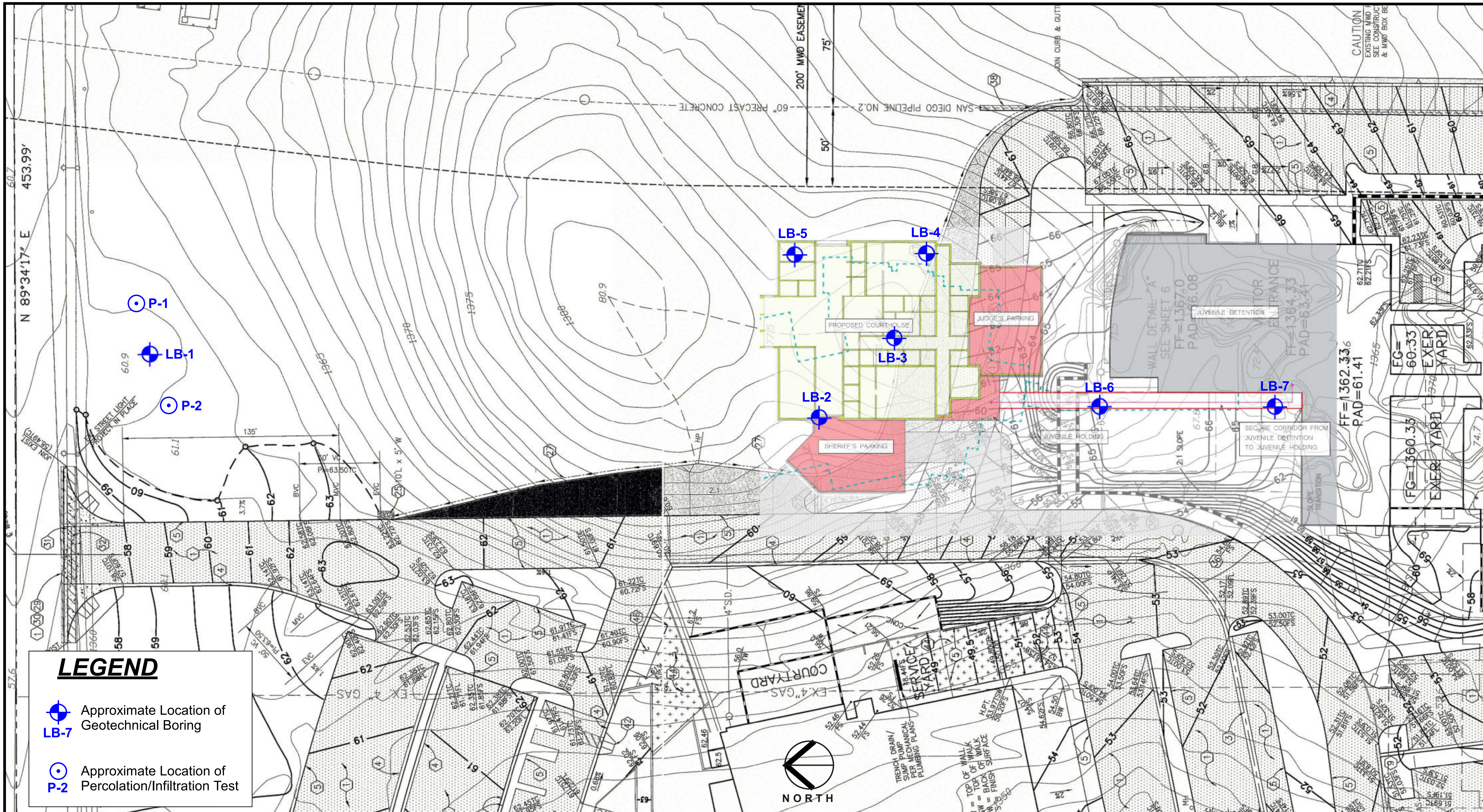


Southwest Justice Center Courts Relocation

30755 Auld Road, Murrieta, California

BORING AND PERCOLATION TEST LOCATION PLAN

Project No.	10625.001
Scale	1" ~ 60'
Engr./Geol.	SIS/RFR
Drafted By	JTD
Date	March 2014

Figure 4

APPENDIX A

LOGS OF EXPLORATORY BORINGS / FIELD EXPLORATION

Encountered earth materials were continuously logged and sampled in the field by our representative and described in accordance with the Unified Soil Classification System (ASTM D 2488). During drilling, bulk and relatively undisturbed ring-lined split-barrel driven earth material samples were obtained from our borings for geotechnical laboratory testing and classification. Drive-samples were driven with a 140-pound auto-hammer falling 30-inches. Samples were transported to our in-house Temecula laboratory for geotechnical testing. After logging and sampling, our borings were backfilled with spoils generated during drilling.

The attached subsurface exploration logs and related information depict subsurface conditions only at the locations indicated and at the particular date designated on these logs. Subsurface conditions at other locations may differ from conditions occurring at these logged locations. Passage of time may result in altered subsurface conditions due to environmental changes. In addition, any stratification lines on these logs represent an approximate boundary between sampling intervals and soil types; and transitions may be gradual.

GEOTECHNICAL BORING LOG LB-1

Project No.	10625.001	**Date Drilled**	3-10-14
Project	Southwest Justice Center	**Logged By**	JTD
Drilling Co.	Cal Pac Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Auto - 30" Drop	**Ground Elevation**	~1361'
Location	See Boring Location Plan	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
									This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
	0							SW-SM	**Quaternary Alluvium (Qal)**; Well-graded SAND with SILT and GRAVEL, light brownish gray, dry to moist, fine to coarse grained sand with gravel to 1"	
								SM	SILTY SAND with GRAVEL, brown, moist, fine to coarse grained sand with fine gravel, gravel and cobble to 4"	
	5			S-1	3 4 3			CL	SANDY Lean CLAY, medium stiff, very dark brown, moist, fine to medium grained sand	
									SANDY Lean CLAY, dark brown, moist, fine to coarse grained sand	
								SM	**Older Alluvium (Qalo)**; SILTY SAND, dark yellowish brown, moist, fine to medium grained sand	
	10			S-2	14 25 46					
	15			S-3	8 16 25				SILTY SAND, medium dense, dark yellowish brown, moist, fine to medium grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with Cuttings	
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

* * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * *

GEOTECHNICAL BORING LOG LB-2

Project No.	10625.001	**Date Drilled**	3-10-14
Project	Southwest Justice Center	**Logged By**	JTD
Drilling Co.	Cal Pac Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Auto - 30" Drop	**Ground Elevation**	~1376'
Location	See Boring Location Plan	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
									This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
	0			B-1				SM	**Quaternary Alluvium (Qal)**; SILTY SAND with GRAVEL, dark brown, moist, fine to coarse grained sand with gravel and cobble to 6"	
								SC-SM	SILTY, CLAYEY SAND, brown, dry to moist, fine to coarse grained sand	MD, RV, EI, AG*
	5			R-1	23 39 39	109	19	SM	**Older Alluvium (Qalo)**; SILTY SAND with GRAVEL, dense, light reddish brown, moist, fine to coarse grained sand with angular gravel to 1"	
									SILTY SAND, reddish brown, moist, fine to medium grained sand	
	10			R-2	16 27 50/3"	115	11		SILTY SAND, dense, olive gray, moist, fine to medium grained sand	
								SW	**Granitic Bedrock (Kgr)**; Moderately weathered, recovered as: Well-graded SAND wtih GRAVEL, light brownish gray, dry to moist, fine to coarse graiend sand with fine gravel	
	15			S-1	50/3"				Well-graded SAND with GRAVEL, dense, light brownish gray, dry to moist, fine to coarse grained sand with fine gravel	
	20			S-2	17 19 50/3"				Well-graded SAND with GRAVEL, dense, light brownish gray, dry to moist, fine to coarse grained sand with fine gravel	
									Drilled to 21.25' Sampled to 21.25' Groundwater not encountered Backfilled with Cuttings * AG - Agricultural Suitability	
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** This log is a part of a report by Leighton and should not be used as a stand-alone document. ***

GEOTECHNICAL BORING LOG LB-3

Project No.	10625.001	**Date Drilled**	3-10-14
Project	Southwest Justice Center	**Logged By**	JTD
Drilling Co.	Cal Pac Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Auto - 30" Drop	**Ground Elevation**	~1381'
Location	See Boring Location Plan	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	Soil Description	Type of Tests
	0							SW-SM	**Quaternary Colluvium (Qcol)**; Well-graded SAND with SILT and GRAVEL, brown, dry to moist, fine to coarse grained sand with gravel, cobble and boulders to 12"	
								SW-SM	**Granitic Bedrock (Kgr)**; Severely Weathered, Recovered as: Well-graded SAND with SILT, olive gray, dry to moist, fine to medium grained sand	
	5			R-1	50/3"	98	7	SW	Well-graded SAND with GRAVEL, dense, light brownish gray, dry to moist, fine to coarse grained sand with fine gravel	
								SW-SM	Well-graded SAND with SILT, light brownish gray, dry to moist, fine to medium grained sand	
	10			S-1	50/2"			SW	Moderately Weathered, Recovered as: Well-graded SAND with SILT and GRAVEL, dense, light gray, dry to moist, fine to coarse grained sand with fine gravel	
	15			S-2	50/2"				Slightly Weathered, Recovered as: Well-graded SAND with GRAVEL, dense, light gray, dry to moist, fine to coarse grained sand with fine gravel	
									Auger Refusal @ 16' Groundwater not encountered Backfilled with Cuttings	
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** This log is a part of a report by Leighton and should not be used as a stand-alone document. ***

GEOTECHNICAL BORING LOG LB-4

Project No.	10625.001	**Date Drilled**	3-10-14
Project	Southwest Justice Center	**Logged By**	JTD
Drilling Co.	Cal Pac Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Auto - 30" Drop	**Ground Elevation**	~1377'
Location	See Boring Location Plan	**Sampled By**	JTD

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			B-1				SW-SM	**Quaternary Colluvium (Qcol)**; Well-graded SAND with SILT and GRAVEL, brown, dry to moist, fine to coarse grained sand wtih gravel cobble and boulders to 12"	SE, SA, AG*
								SW-SM	**Granitic Bedrock (Kgr)**; Highly Weathered, Recovered as: Well-graded SAND with SILT, light gray, dry to moist, fine to medium grained sand	
	5			R-1	50/2"			SW	Moderately Weathered, Recovered as: Well-graded SAND with GRAVEL, dense, grayish brown, dry to moist, fine to coarse grained sand with fine gravel	
								SW-SM	Well-graded SAND with SILT, light gray, dry to moist, fine to medium grained sand	
	10			S-1	50/4"			SW	Well-graded SAND with GRAVEL, dense, light gray, dry to moist, fine to coarse grained sand with fine gravel	
	15			S-2	50/2"				Slightly Weathered to Fresh, Recovered as: Well-graded SAND with GRAVEL, dense, light gray, dry to moist, fine to coarse grained sand with fine gravel	
	20			S-3	50/3"				no recovery	
									Drilled to 22' Sampled to 22' Groundwater not encountered Backfilled with Cuttings Auger Refusal @ 22' *AG - Agricultural Suitability	
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

GEOTECHNICAL BORING LOG LB-5

Project No.	10625.001	**Date Drilled**	3-10-14
Project	Southwest Justice Center	**Logged By**	JTD
Drilling Co.	Cal Pac Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Auto - 30" Drop	**Ground Elevation**	~1376'
Location	See Boring Location Plan	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	Soil Description	Type of Tests
	0			B-1				SM	**Quaternary Alluvium (Qal)**; SILTY SAND with GRAVEL, dark brown, dry to moist, fine to coarse grained sand with gravel cobble and boulders to 18"	
								SC-SM	SILTY, CLAYEY SAND with GRAVEL, dark brown, moist, fine to coarse grained sand with fine gravel	
	5			R-1	4 6 11	104	21	ML	SANDY SILT, stiff, light brownish gray, moist, very fine to fine grained sand, (CO = 6%)	CO
								SM	SILTY SAND, light brownish gray, moist, very fine to medium grained sand	
	10			R-2	11 28 50/5"	113	9	SM	**Older Alluvium (Qalo)**; SILTY SAND, dense, pale brown, moist, fine to medium grained sand	
	15			R-3	16 23 50/5"				SILTY SAND, dense, dark yellowish brown, moist, fine to coarse grained sand	
	20			R-4	16 50				SILTY SAND, dense, dark reddish brown, moist, fine to coarse grained sand with fine gravel, angular gravel to 1"	
									Drilled to 21' Sampled to 21' Groundwater not encountered Backfilled with Cuttings	
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

* * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * *

GEOTECHNICAL BORING LOG LB-6

Project No.	10625.001	**Date Drilled**	3-10-14
Project	Southwest Justice Center	**Logged By**	JTD
Drilling Co.	Leighton Consulting	**Hole Diameter**	4"
Drilling Method	Hand Auger - Manual	**Ground Elevation**	~1366'
Location	See Boring Location Plan	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
									This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.	
	0							SC	**Artificial Fill (Af)**; CLAYEY SAND, dark brown, moist, fine to medium grained sand (EI = 29)	
				R-1		116	9	CL	SANDY Lean CLAY, dark brown, moist, fine to medium grained sand	EI
								SW-SM	**Granitic Bedrock (Kgr)**; Moderately Weathered, Recovered as: Well-graded SAND with SILT, light brownish gray, moist, fine to coarse grained sand	
									Hand Auger Refusal @ 2.5' Groundwater not encountered Backfilled with Cuttings	
	5									
	10									
	15									
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

GEOTECHNICAL BORING LOG LB-7

Project No.	10625.001	**Date Drilled**	3-10-14
Project	Southwest Justice Center	**Logged By**	JTD
Drilling Co.	Leighton Consulting	**Hole Diameter**	4"
Drilling Method	Hand Auger - Manual	**Ground Elevation**	~1364'
Location	See Boring Location Plan	**Sampled By**	JTD

SOIL DESCRIPTION

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0							SC-SM	**Artificial Fill (Af)**; SILTY, CLAYEY SAND, dark brown, moist, fine to coarse grained sand	
								SC	CLAYEY SAND, dark brown, moist, fine to medium grained sand	
				R-1		98	22	CL	Lean CLAY, dark brown, moist	
	5									
									Hand Auger to 5.0' No groundwater encountered, backfilled with spoils	
	10									
	15									
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG P-1

Project No.	10625.001	**Date Drilled**	3-10-14
Project	Southwest Justice Center	**Logged By**	JTD
Drilling Co.	Cal Pac Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Auto - 30" Drop	**Ground Elevation**	~1361'
Location	See Boring Location Plan	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION *This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	Type of Tests
	0							SC-SM	**Quaternary Alluvium (Qal)**; Well-graded SAND with SILT and GRAVEL, dark brown, moist, fine to coarse grained sand	
				P-1				SC	CLAYEY SAND with GRAVEL, dark brown, moist, fine to coarse grained sand with angular gravel to 1"	
	5								Drilled to 3' Sampled to 3' Groundwater not encountered Backfilled with	
	10									
	15									
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

GEOTECHNICAL BORING LOG P-2

Project No.	10625.001	**Date Drilled**	3-10-14
Project	Southwest Justice Center	**Logged By**	JTD
Drilling Co.	Cal Pac Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Auto - 30" Drop	**Ground Elevation**	~1361'
Location	See Boring Location Plan	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION *This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	Type of Tests
	0							SW-SM	<u>Quaternary Alluvium (Qal)</u>; Well-graded SAND with SILT and GRAVEL, brown, dry to moist, fine to coarse grained sand with gravel and cobble to 4"	
								SM	SILTY SAND, dark brown, moist, fine to coarse grained sand	
								SC-SM	SILTY, CLAYEY SAND, dark brown, moist, fine to coarse grained sand	
	5			P-2						
									Drilled to 5' Sampled to 5' Groundwater not encountered Backfilled with	
	10									
	15									
	20									
	25									
	30									

SAMPLE TYPES:
- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:
- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

APPENDIX B

B-1: RESULTS OF GEOTECHNICAL LABORATORY TESTING

B-2: RESULTS OF AGRICULTURAL SUITABILITY TESTING

MODIFIED PROCTOR COMPACTION TEST

Leighton

ASTM D 1557

Project Name:	SWJC	Tested By :	RTS	Date:	3/11/14
Project No.:	10625.001	Input By :	MRV	Date:	3/12/14
Location:	**	Depth (ft.)	0 - 5.0		
Sample No. :	LB-2, B-1				
Soil Identification:	SILTY CLAYEY SAND WITH TRACE GRAVEL (SC-SM), reddish brown.				

Preparation Method: [X] Moist [ ] Dry — [ ] Mechanical Ram [X] Manual Ram

Mold Volume (ft³) 0.03317 — *Ram Weight = 10 lb.; Drop = 18 in.*

Moisture Added (ml)	-100	-50	0	50		
TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	6052	6186	6291	6255		
Weight of Mold (g)	4200	4200	4200	4200		AS REC'D
Net Weight of Soil (g)	1852	1986	2091	2055		MOISTURE
Wet Weight of Soil + Cont. (g)	997.6	1138.1	825.1	891.2		179.1
Dry Weight of Soil + Cont. (g)	946.2	1065.9	754.4	807.1		165.8
Weight of Container (g)	142.6	214.7	81.2	136.3		38.9
Moisture Content (%)	6.4	8.5	10.5	12.5		10.5
Wet Density (pcf)	123.1	132.0	138.9	136.6		
Dry Density (pcf)	115.7	121.7	125.7	121.4		

Maximum Dry Density (pcf) 126.0 **Optimum Moisture Content (%)** 10.5

PROCEDURE USED

[X] **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

[ ] **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

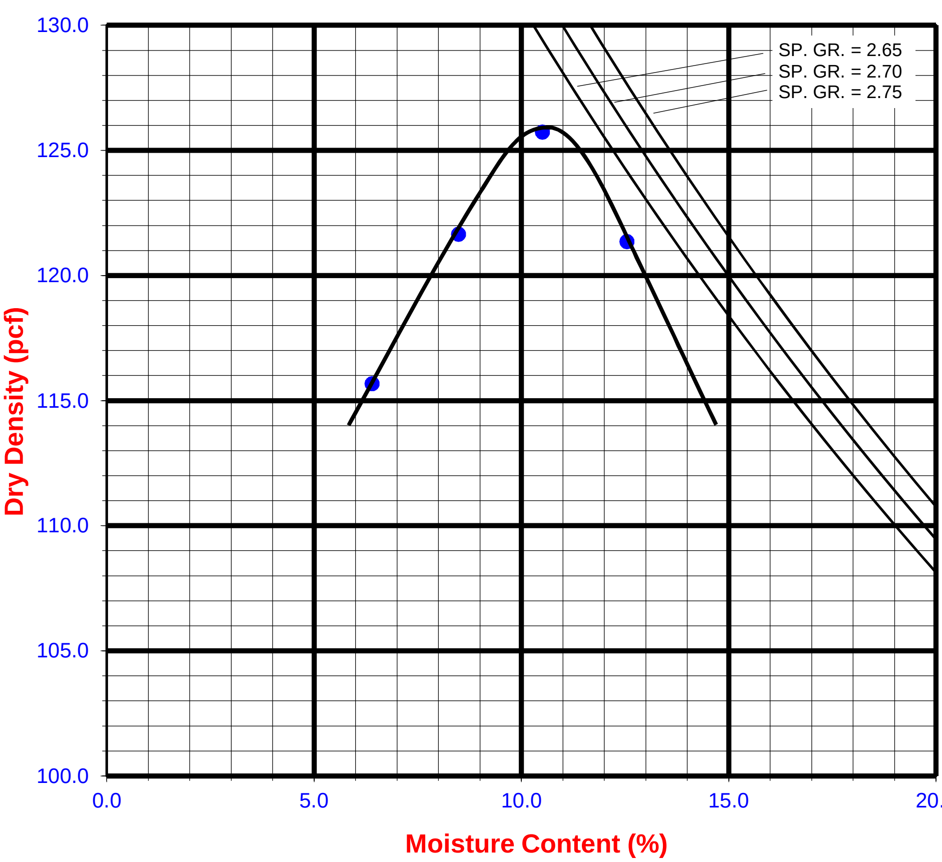
[ ] **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

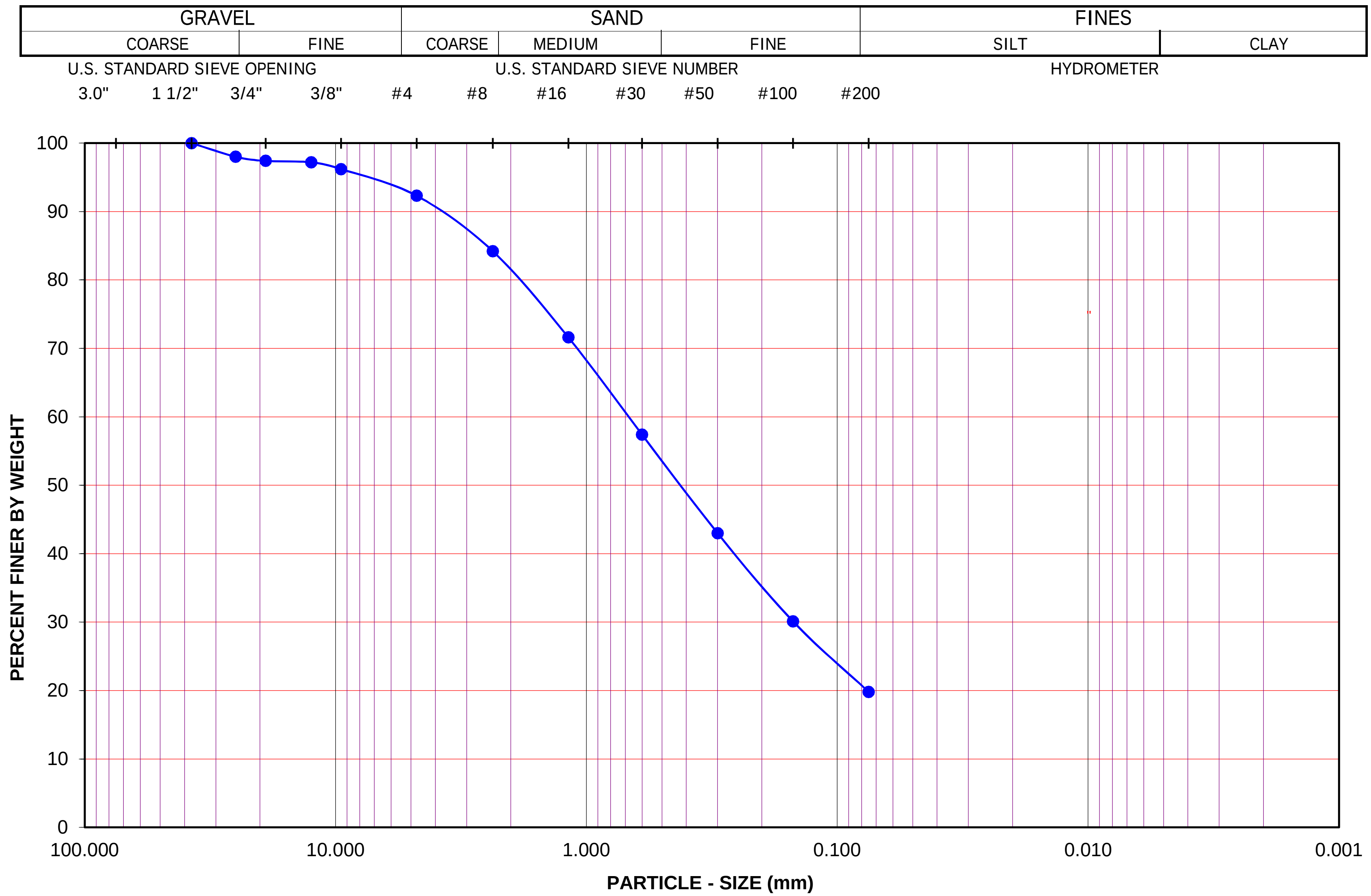
Particle-Size Distribution:

GR:SA:FI

Atterberg Limits:

LL,PL,PI





Project Name: SWJC

Project No.: 10625.001

Exploration No.: LB-4 Sample No.: B-1

Depth (feet): 0 - 5.0 Soil Type : SM

Soil Identification: SILTY SAND WITH FEW GRAVEL (SM), brown.

GR:SA:FI : (%) **8 : 72 : 20**

Leighton

PARTICLE - SIZE DISTRIBUTION ASTM D 6913

Mar-14

Leighton

EXPANSION INDEX of SOILS

ASTM D 4829

Project Name:	SWJC	Tested By:	MRV	Date:	3/17/14
Project No. :	10625.001	Checked By:	JHW	Date:	3/19/14
Boring No.:	LB-6,7	Depth (ft.)	1.5 - 3.0		
Sample No. :	R-1	Location:	**		
Sample Description:	CLAYEY SAND WITH TRACE GRAVEL (SC), dark brown.				

Dry Wt. of Soil + Cont. (gm.)	1542.3
Wt. of Container No. (gm.)	0.0
Dry Wt. of Soil (gm.)	1542.3
Weight Soil Retained on #4 Sieve	6.7
Percent Passing # 4	99.6

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	1.0290
Wt. Comp. Soil + Mold (gm.)	558.5	597.7
Wt. of Mold (gm.)	189.5	189.5
Specific Gravity (Assumed)	2.70	2.70
Container No.	5	5
Wet Wt. of Soil + Cont. (gm.)	349.6	597.7
Dry Wt. of Soil + Cont. (gm.)	312.8	323.7
Wt. of Container (gm.)	49.6	189.5
Moisture Content (%)	14.0	26.1
Wet Density (pcf)	111.3	123.0
Dry Density (pcf)	97.6	97.5
Void Ratio	0.727	0.777
Total Porosity	0.421	0.437
Pore Volume (cc)	87.1	93.1
Degree of Saturation (%) [S meas]	**52.0**	**90.8**

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h.

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
3/17/14	8:41	1.0	0	0.5000
3/17/14	8:51	1.0	10	0.5000
	Add Distilled Water to the Specimen			
3/18/14		1.0	909	0.5290
3/18/14	1:00	1.0	969	0.5290

Expansion Index (EI meas) =	((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	29.0
Expansion Index (Report) =	Nearest Whole Number or Zero (0) if Initial Height is > than Final Height	**29**

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Leighton

EXPANSION INDEX of SOILS
ASTM D 4829

Project Name:	SWJC	Tested By:	MRV	Date:	3/17/14
Project No. :	10625.001	Checked By:	JHW	Date:	3/19/14
Boring No.:	LB-2	Depth (ft.)	0 - 5.0		
Sample No. :	B-1	Location:	**		
Sample Description:	SILTY CLAYEY SAND WITH TRACE GRAVEL (SC-SM), reddish brown.				

Dry Wt. of Soil + Cont. (gm.)	1647.3
Wt. of Container No. (gm.)	0.0
Dry Wt. of Soil (gm.)	1647.3
Weight Soil Retained on #4 Sieve	4.1
Percent Passing # 4	99.8

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	1.0467
Wt. Comp. Soil + Mold (gm.)	577.6	611.3
Wt. of Mold (gm.)	181.2	181.2
Specific Gravity (Assumed)	2.70	2.70
Container No.	4	4
Wet Wt. of Soil + Cont. (gm.)	338.9	611.3
Dry Wt. of Soil + Cont. (gm.)	310.4	358.7
Wt. of Container (gm.)	38.9	181.2
Moisture Content (%)	10.5	19.9
Wet Density (pcf)	119.6	129.6
Dry Density (pcf)	108.2	108.1
Void Ratio	0.558	0.631
Total Porosity	0.358	0.387
Pore Volume (cc)	74.1	83.8
Degree of Saturation (%) [S meas]	**50.8**	**85.2**

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h.

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
3/17/14	7:35	1.0	0	0.5000
3/17/14	7:45	1.0	10	0.4994
	Add Distilled Water to the Specimen			
3/18/14		1.0	975	0.5467
3/18/14	1:00	1.0	1035	0.5467

Expansion Index (EI meas) =	((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	47.3
Expansion Index (Report) =	Nearest Whole Number or Zero (0) if Initial Height is > than Final Height	**47**

Rev. 03-08

SAND EQUIVALENT TEST
ASTM D 2419 / DOT CA Test 217

Leighton

Project Name:	SWJC	Tested By:	MRV	Date:	3/12/14
Project No. :	10625.001	Computed By:	MRV	Date:	3/12/14
Client:	**	Checked By:	JHW	Date:	3/19/14

Boring No.	Sample No.	Depth (ft.)	Soil Description	T1	T2	T3	T4	R1	R2	SE	Average SE
LB-4	B-1	0- 5.0	SM, brown	08:00	08:10	08:12	08:32	8.0	2.1	27	**26**
				08:02	08:12	08:14	08:34	10.5	2.5	24	

T1 = Starting Time

T2 = (T1 + 10 min) Begin Agitation

T3 = Settlement Starting Time

T4 = (T3 + 20 min) Take Clay Reading (R1)

Sand Equivalent = R2 / R1 * 100

Record SE as Next Higher Integer

One-Dimensional Swell or Settlement Potential of Cohesive Soils
(ASTM D 4546) -- Method 'B'

Leighton

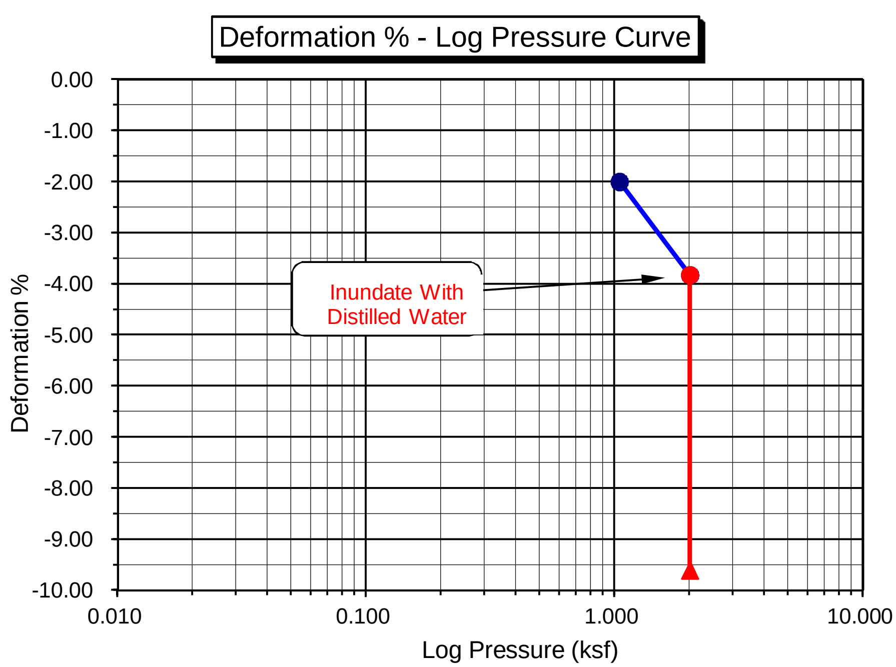
Project Name: SWJC | Tested By: MRV | Date: 3/13/14
Project No.: 10625.001 | Checked By: JHW | Date: 3/19/14
Boring No.: **LB-5** | Sample Type: IN SITU
Sample No.: **R-1** | Depth (ft.) 5.0
Sample Description: SILT (ML), pale yellow.
Source and Type of Water Used for Inundation: Arrowhead (Distilled)
** Note: Loading After Wetting (Inundation) not Performed Using this Test Method.

Initial Dry Density (pcf):	65.5
Initial Moisture (%):	16.3
Initial Height (in.):	0.9940
Initial Dial Reading (in):	0.0500
Inside Diameter of Ring (in):	2.407

Final Dry Density (pcf):	73.9
Final Moisture (%) :	45.7
Initial Void ratio:	1.5741
Specific Gravity (assumed):	2.70
Initial Degree of Saturation (%):	28.0

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
1.050	0.0759	0.9741	0.00	-2.00	1.5226	-2.00
2.013	0.0941	0.9559	0.00	-3.83	1.4755	-3.83
H_2O	0.1515	0.8985	0.00	-9.61	1.3268	-9.61

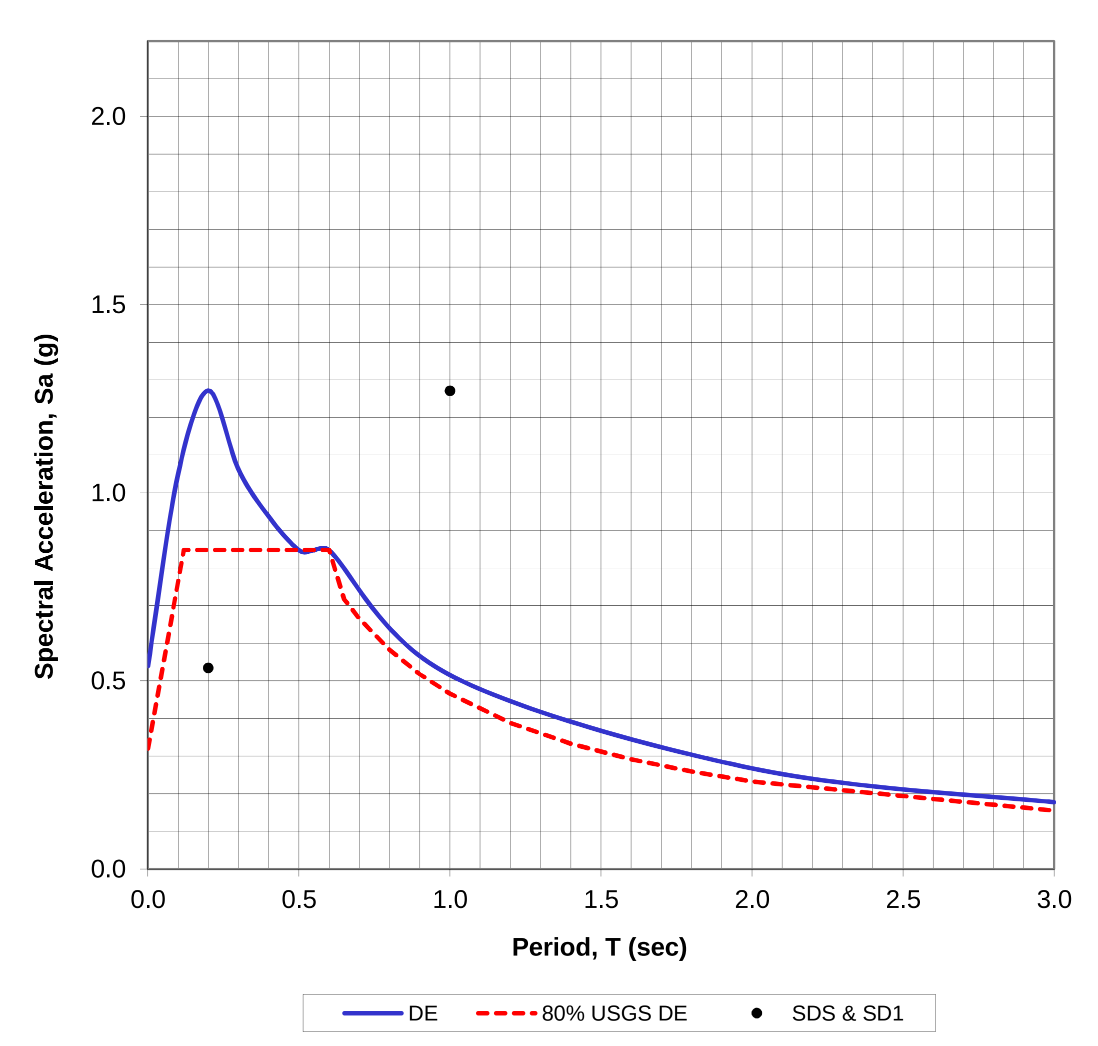
Percent Swell / Settlement After Inundation = -6.00



Rev. 01-10

DESIGN RESPONSE SPECTRUM AND SITE SPECIFIC S_{DS} AND S_{D1}

Project: EDA SWJC Courts Relocation
Project Number: 10625.001
Location: Riverside County, CA



DESIGN RESPONSE SPECTRUM

PERIOD T (s)	DE CURVE Sa (g)	
PGA	0.539	
0.1	1.050	
0.2	1.271	$=S_{DS}$ *
0.3	1.062	
0.4	0.937	
0.5	**0.847**	
0.55	**0.847**	
0.6	**0.847**	
1.0	0.515	
2.0	0.267	x 2 $=S_{D1}$ **
3.0	0.177	

*** S_{DS} > 90% of any S_a**

**** S_{D1} = 2 X S_a @ 2.0 s > S_a @ 1.0 s**

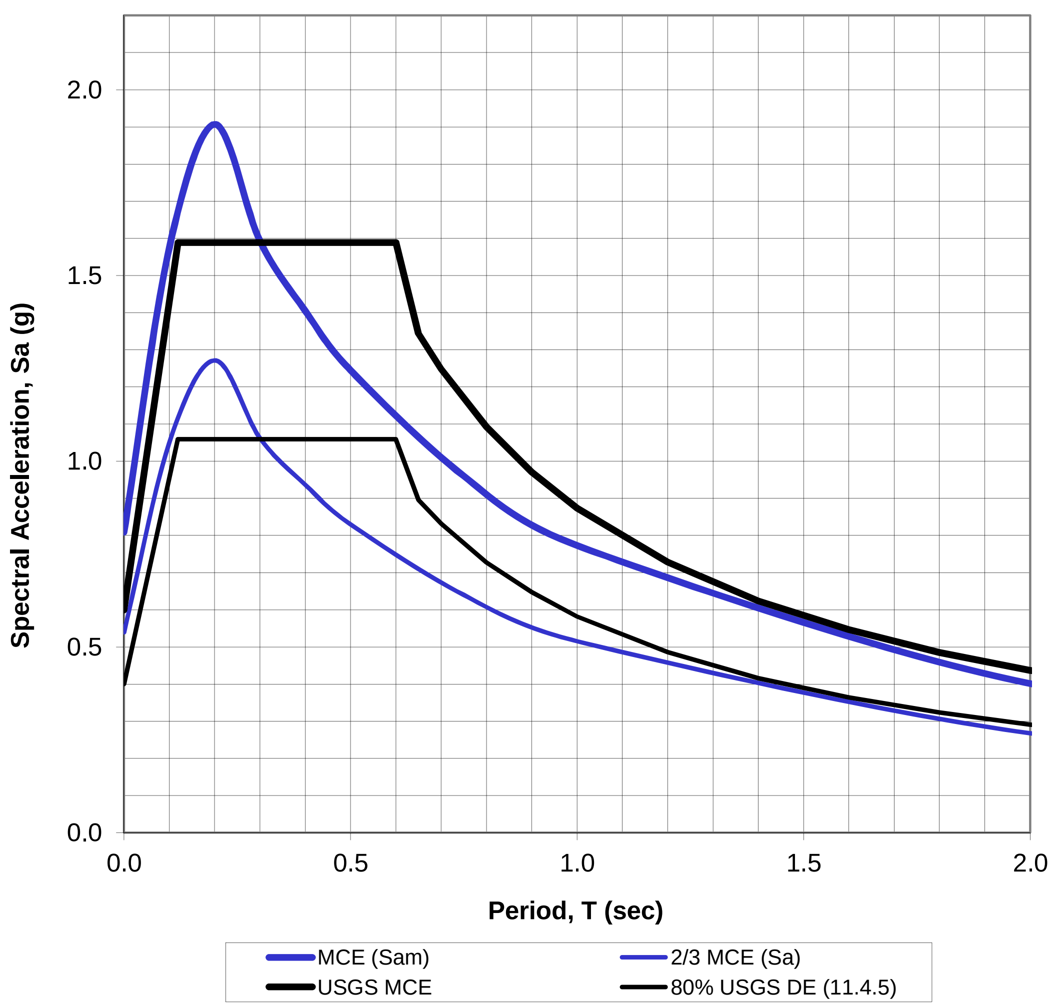
80% USGS SEISMIC HAZARD CURVE

PERIOD T (s)	USGS DE CURVE Sa (g)	80% USGS DE CURVE Sa (g)
PGA	0.400	0.320
0.119	1.059	0.847
0.2	1.059	0.847
0.595	1.059	0.847
0.6	1.059	0.847
0.65	0.896	0.717
0.7	0.832	0.666
0.8	0.728	0.582
0.9	0.647	0.518
1	0.582	0.466
1.2	0.485	0.388
1.4	0.416	0.333
1.6	0.364	0.291
1.8	0.324	0.259
2	0.291	0.233
3	0.194	0.155

Figure C1

SITE MODIFIED MCE AND 2/3 SITE MODIFIED MCE RESPONSE SPECTRUM

Project: EDA SWJC Courts Relocation
Project Number: 10625.001
Location: Riverside County, CA

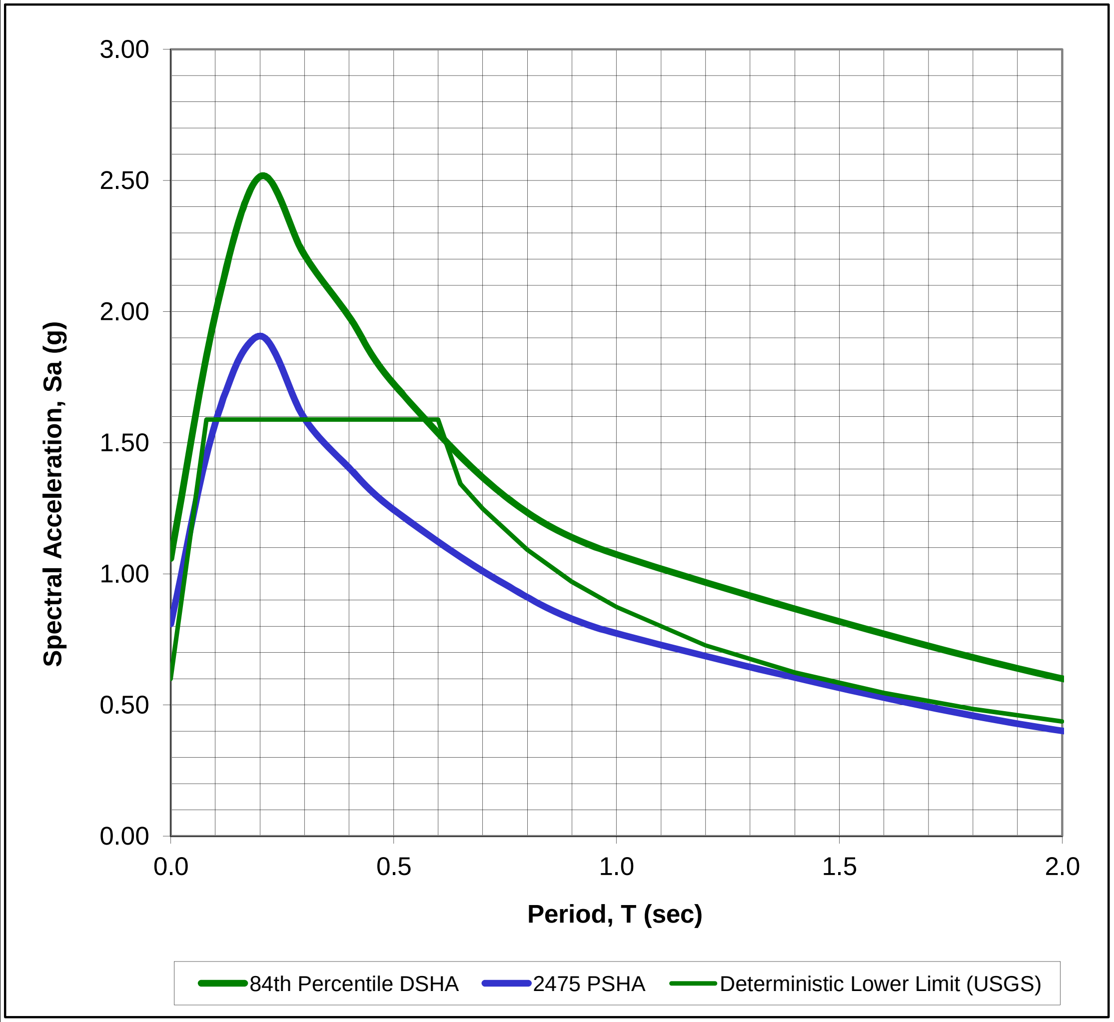


SITE MODIFIED MCE AND 2/3 SITE MODIFIED MCE RESPONSE SPECTRA			2002 USGS SEISMIC HAZARD CURVE		
PERIOD T (s)	SITE MOD. MCE CURVE Sa (g)	2/3 SITE MOD. MCE CURVE Sa (g)	PERIOD T (s)	SITE MOD. USGS MCE CURVE Sa (g)	USGS DESIGN CURVE Sa (g)
PGA	0.809	0.539	PGA	0.600	0.400
0.1	1.575	1.050	0.119	1.589	1.059
0.2	1.907	1.271	0.2	1.589	1.059
0.3	1.593	1.062	0.595	1.589	1.059
0.4	1.405	0.937	0.6	1.589	1.059
0.5	1.245	0.830	0.65	1.344	0.896
0.75	0.960	0.640	0.7	1.248	0.832
1.0	0.773	0.515	0.8	1.092	0.728
2.0	0.401	0.267	0.9	0.971	0.647
3.0	0.266	0.177	1	0.874	0.582
			1.2	0.728	0.485
			1.4	0.624	0.416
			1.6	0.546	0.364
			1.8	0.485	0.324
			2	0.437	0.291
			3	0.291	0.194

Figure C2

DETERMINISTIC AND PROBABILISTIC SEISMIC HAZARD ANALYSIS SUMMARY

Project: EDA SWJC Courts Relocation
Project Number: 10625.001
Location: Riverside County, CA



SITE FACTORS	
F_a =	1
F_v =	1.3

DSHA (21.2.2)		DETERMINISTIC LOWER LIMIT		PSHA (21.2.1)	
PERIOD T (s)	84th Percentile MRC Sa (g)	PERIOD T (s)	DLL CURVE Sa (g)	PERIOD T (s)	MRC Sa (g)
PGA	1.059	0.00	0.600	PGA	0.809
0.1	1.989	0.1	1.589	0.1	1.575
0.2	2.515	0.2	1.589	0.2	1.907
0.3	2.216	0.3	1.589	0.3	1.593
0.4	1.981	0.4	1.589	0.4	1.405
0.5	1.725	0.5	1.589	0.5	1.245
0.75	1.296	0.6	1.589	0.8	0.960
1.0	1.074	0.65	1.344	1.0	0.773
2.0	0.600	0.7	1.248	2.0	0.401
3.0	0.322	0.8	1.092	3.0	0.266
		0.9	0.971		
		1.0	0.874		
		1.2	0.728		
		1.4	0.624		
		1.6	0.546		
		1.8	0.485		
		2.0	0.437		

Figure C3

Deterministic Spectra Results using EZ-FRISK 7.62 Build 001

Largest Amplitudes of Ground Motions Considering All Sources Calculated using Weighted Mean of Attenuation Equations

Amplitude Units: Acceleration (g)

Fractile: 0.5

Period	Amplitude	Magnitude	Closest Distance(km)	Region	Controlling Source
PGA	5.844e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.05	7.557e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.1	1.095e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.2	1.386e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.3	1.210e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.4	1.083e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.5	9.357e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.75	6.916e-001	7.85 Mw	3.95	USGS 2008 California	Elsinore
1	5.681e-001	7.85 Mw	3.95	USGS 2008 California	Elsinore
2	3.062e-001	7.85 Mw	3.95	USGS 2008 California	Elsinore
3	2.163e-001	7.85 Mw	3.95	USGS 2008 California	Elsinore
4	1.618e-001	7.85 Mw	3.95	USGS 2008 California	Elsinore

Fractile: 0.84

Period	Amplitude	Magnitude	Closest Distance(km)	Region	Controlling Source
PGA	1.059e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.05	1.369e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.1	1.989e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded

0.2	2.515e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.3	2.216e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.4	1.981e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.5	1.725e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.75	1.296e+000	7.85 Mw	3.95	USGS 2008 California	Elsinore
1	1.074e+000	7.85 Mw	3.95	USGS 2008 California	Elsinore
2	6.003e-001	7.85 Mw	3.95	USGS 2008 California	Elsinore
3	4.266e-001	7.85 Mw	3.95	USGS 2008 California	Elsinore
4	3.215e-001	7.85 Mw	3.95	USGS 2008 California	Elsinore

Largest Amplitudes of Ground Motions Considering Sources Calculated with Boore-Atkinson (2008) NGA USGS 2008 MRC

Amplitude Units: Acceleration (g)

Fractile: 0.5

Period	Amplitude	Magnitude	Closest Distance(km)	Region	Controlling Source
PGA	5.976e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.05	7.631e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.1	1.102e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.2	1.453e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.3	1.295e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.4	1.203e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.5	1.011e+000	7.00 Mw	5.00	USGS 2008 California	California Gridded
0.75	7.221e-001	7.00 Mw	5.00	USGS 2008 California	California Gridded
1	5.443e-001	7.00 Mw	5.00	USGS 2008 California	