



**DUE DILIGENCE GEOTECHNICAL ASSESMENT
FOR SITE EIR;
CITY OF COLTON SUPER BLOCK,
APPROXIMATELY 350-ACRE SITE
ROUGHLY BOUNDED BY SAN BERNARDINO
AVENUE, I-10 FREEWAY,
RIVERSIDE AVENUE AND HERMOSA AVENUE,
CITIES OF RIALTO AND COLTON,
SAN BERNARDINO COUNTY, CALIFORNIA**

Ms. Nancy Ferguson
MICHAEL BRANDMAN ASSOCIATES
*340 South Farrell Drive, Suite A-210
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*April 28, 2008
J.N. 150-08*

Desert Region

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April 28, 2008
J.N. 150-08

Ms. Nancy Ferguson
MICHAEL BRANDMAN ASSOCIATES
340 South Farrell Drive, Suite A-210
Palm Springs, Ca 92262

Subject: Due Diligence Geotechnical Assessment for site EIR; City of Colton Super Block, approximately 350-acre site roughly bounded by San Bernardino Avenue, I-10 Freeway, Riverside Avenue and Hermosa Avenue, Cities of Rialto and Colton, San Bernardino County, California.

Dear Ms. Ferguson:

Petra Geotechnical, Inc., (Petra) is pleased to submit this report presenting our findings and opinions regarding the feasibility of the proposed project and the geotechnical concerns that may have an impact on the site development. The conclusions and recommendations presented herein are based on our review of published and unpublished geotechnical reports and maps pertaining to the site and vicinity. Particular attention has been given to evaluating potential faulting in the eastern portion of the site. This work was performed in accordance with our proposal (P.N. 1089-08) dated February 28, 2008. No subsurface field work (test pits, borings, CPT, etc) were conducted for this report.

We utilized a Preliminary Master Land Use Plan and Alternative 1 Land Use Concept Statistical Summary sheet prepared by JHA Consulting, Inc. dated February 7, 2008 in preparation of this report. It should be noted that this preliminary geotechnical evaluation does not address soil contamination or other environmental issues, which may affect the property. Some of these issues will be provided in a separate Phase I environmental report prepared by Petra Geotechnical Environmental Division.

Petra appreciates this opportunity to be of service and looks forward to continuing to provide consulting services to you on and this and other projects in the future.

Respectfully submitted,
PETRA GEOTECHNICAL, INC.



Dr. Miles Kenney, PG
Senior Project Geologist
Fault Hazard Specialist

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TABLE OF CONTENTS

INTRODUCTION 1

SITE LOCATION AND DESCRIPTION..... 1

PROPOSED DEVELOPMENT 2

PURPOSE AND SCOPE OF SERVICES..... 2

BACKGROUND INFORMATION 2

AERIAL PHOTOGRAPH ANALYSIS 3

FINDINGS 4

 Regional Geology 4

 Subsurface Geology and Soil Conditions..... 5

 Artificial Fill (Qaf) 5

 Quaternary Eolian and Fluvial Deposits (Qyes₁ and Qoed₃) 6

 Groundwater 6

 Faulting and Seismicity..... 7

 Air Photo Lineament Analysis 8

CONCLUSIONS AND RECOMMENDATIONS 8

 General Feasibility 8

 Fault Surface Rupture 9

 Strong Ground Motion 10

 Liquefaction Potential 11

 Seismic Compression of Alluvial Materials..... 12

 Subsidence 12

 Wind Erosion 12

 Potential for Flooding, Tsunami and Seiche 12

RECOMMENDATIONS FOR ADDITIONAL STUDY 13

INVESTIGATION LIMITATIONS..... 13

REFERENCES

TABLES

- Table 1- Aerial Photographs Reviewed
- Table 2- 2007 CBC Section 1613, Earthquake Loads

FIGURES

- Figure 1- Site Location Map
- Figure 2- Regional Geologic Map
- Figure 3- Regional Fault Map
- Figure 4- State of California Earthquake Fault Zones (EFZ)
- Figure 5- California Geologic Survey Fault Evaluation Report: Rialto-Colton Fault
- Figure 6- San Bernardino County Landslide & Liquefaction Hazard Map
- Figure 7- San Bernardino County Flood & Dam Inundation Hazard Map

Plates

- Plate 1- Geotechnical Map

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ROUGHLY BOUNDED BY SAN BERNARDINO AVENUE,
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CITIES OF RIALTO AND COLTON,
SAN BERNARDINO COUNTY, CALIFORNIA**

INTRODUCTION

Petra Geotechnical, Inc. is pleased to present the results of our due diligence level geologic assessment for contribution to the site Environmental Impact Report (EIR). A Phase I environmental assessment report is also being prepared by Petra and submitted as an independent report.

This investigation included a review of published and unpublished literature, geotechnical maps and aerial photographs with respect to local geologic conditions primarily addressing local soils, seismicity, ground shaking, and potential faulting.

SITE LOCATION AND DESCRIPTION

The property comprises about 350 acres within the region bounded by San Bernardino Avenue and W Olive Street to the north, Riverside Avenue to the west, Interstate Highway 10 to the south, and Hermosa Avenue on the east (Figure 1). Plate 1 is a Geotechnical Map of the property that delineates the approximate site boundary on a 2002 aerial photograph. The subject site is primarily within the City of Colton; however, a small portion in the western area is within the City of Rialto. The subject site is also discussed and described as the West Subarea Land Use Plan within the West Valley Specific Plan for the City of Colton prepared by the Arroyo Group (1996).

Based on our review of published maps, historical photographs, discussions with you, and a recent site visit, most of the property has been disturbed by human activity. We identified an abandoned airport runway, an abandoned reservoir, an active storm retention basin, golf course, graded cut-fill pads, undocumented fill dams, fences, and abundant trash and debris. Numerous existing business and county businesses currently exist on the property. A few areas of the property appear to be fairly natural and exhibit a gentle landscape of vegetated sand dunes and minor drainages. The results of our site evaluation are provided on the Geotechnical Map Plate 1.

PROPOSED DEVELOPMENT

Our review of the provided Land Use Concept Statistical Summary (Alternative 1) data sheet indicates that proposed improvements include business parks, medical offices, residential homes, K-8 schools, auto business park, and retail offices.

PURPOSE AND SCOPE OF SERVICES

The purpose of this investigation was to:

1. Obtain information regarding surface and subsurface geologic conditions within the project area based on published data for subsurface soils and geologic field mapping for surficial soils.
2. Evaluate the general engineering properties of the subsurface soil materials utilizing geotechnical reports for the Arrowhead Regional Medical Facility.
3. Evaluate potential faulting on site from published data and an aerial photograph analysis.
4. Perform site reconnaissance geologic mapping

To accomplish these objectives, our scope of services included the following:

1. Review of available reports and literature concerning soil and geologic conditions within and adjacent to the site.
2. Review of historical stereoscopic pairs of aerial photographs from the years 1968, 1959, and 1949 to evaluate potential faulting
3. Performance of a field investigation consisting of geologic mapping.
4. Determine preliminary ground shaking estimates.
5. Preparation of this report presenting the results of our preliminary investigation and preliminary recommendations for the proposed development.

BACKGROUND INFORMATION

Regulatory Earthquake Fault Zones near the property are designated by the State of California Alquist-Priolo Earthquake Fault Zone Act of 1972 (Hart and Bryant, 1999). Regional fault location and activity publications include Hart (1977), Jennings, (1994), Hart and Bryant (1999), and Morton and Miller (2006; Figure 2). Gary Rasmussen & Associates (GRA, 1991a, 199b) investigated a possible fault branch

of the Rialto-Colton fault zone in the eastern portion of the site (Arrowhead Regional Medical Facility). Historical seismicity (earthquakes) data was obtained from the Southern California Earthquake Center website (scec.org).

Subsurface geotechnical data was obtained from geotechnical studies conducted at the Arrowhead Regional Medical Facility (GRA, 1991b, 1992) and a regional geologic map by Morton and Miller (2006; Figures 1 and 2). These reports provided near surface and subsurface geologic unit descriptions for the area. Historical ground water data was obtained in reports prepared by GRA (1991c, 1992), and Wildermuth Environmental, Inc. (Wildermuth, 2000). Liquefaction potential within the property was evaluated from the San Bernardino County General Plan Geologic Hazard Overlay maps, and evaluation of referenced reports providing historical depth to groundwater data. Potential site flooding, dam inundation, and landsliding were evaluated from the San Bernardino County General Plan Geologic Hazard Overlay maps.

AERIAL PHOTOGRAPH ANALYSIS

An aerial photograph review was performed to assess previous land use, lineaments suggestive of active faulting, past flooding and evidence suggestive of past grading. Photos reviewed include stereo-paired black-and-white aerial photographs for years 1949, 1959 and 1968, and non-stereo aerial photographs for years ranging from 1930 to 2002. Table I below provides a list of the aerial photographs reviewed during our study.

TABLE I
Aerial Photographs Reviewed

Flight No.	Frames	Date	Scale	Color	Stereo or Nonstereo
		1930	1"=800'	B/W	Nonstereo
		1938	1"=800'	B/W	Nonstereo
AXL-3F	173-174	5-6-1949	1"=1,666'	B/W	Stereo
		1953	1"=800'	B/W	Nonstereo
AXL-15W	121-122	10-15-1959	1"=1,000'	B/W	Stereo
		1966	1"=800'	B/W	Nonstereo
AXL-11JJ	4 and 5	8-21-68	1"=1,666'	B/W	Stereo
AXL-12JJ	7 and 8	9-9-68	1"=1,666'	B/W	Stereo
		1978	1"=800'	B/W	Nonstereo
		1989	1"=800'	B/W	Nonstereo
		1995	1"=800'	B/W	Nonstereo
		2002	1"=800'	B/W	Nonstereo

FINDINGS

Regional Geology

The subject site is located within the Peninsular Ranges Geomorphic Province that extends from the southern San Gabriel Mountains to the tip of Baja California. Tectonically, the property is located within the Perris Block bounded by the east-west trending Cucamonga fault to the north, and the northwest trending San Jacinto and Elsinore Fault Zones to the east and west respectively (Morton and Miller, 2002; Jennings, 1994; Figure 3). The property exists on the geomorphic Rialto-Colton Terrace that extends from near the City of Rialto at the San Gabriel Mountains in the north to the Santa Ana River Valley to the south (Figure 2). The Rialto-Colton Terrace represents late Pleistocene deposition from primarily Lytle Creek wash in the south eastern San Gabriel Mountains to the north. Fluvial sediments from the Santa Ana River were also possibly deposited in the region of the property during the late Pleistocene. Near surface sediments at the site primarily consist of late Pleistocene sand dune and fluvial deposits

composed of slightly to moderately consolidated, fine to medium grained sand and lesser amounts of silty sand and slightly gravelly sand (Morton and Miller, 2006). Some minor Holocene re-worked wind blown sand and wash deposits also exist across the site.

The most major active fault zone near the property is the San Jacinto fault located approximately 2 miles northeast of the eastern edge of the property (Hart and Bryant, 1999; Jennings, 1994). A portion of the fault map by Jennings (1994) is provided in Figure 3. The Rialto-Colton fault represents a fault branch emanating northwest from the San Jacinto Fault Zone and is primarily concealed by Holocene and the latest Pleistocene sediments approximately one half mile northeast of the site (Hart, 1977; Stephenson, et. al., 2002; Figures 2, 3, 4 and 5). The San Jacinto and Rialto-Colton faults exhibit strong near surface groundwater barriers (Hart, 1977; DWR, 2004) and gravity anomalies suggesting offset bedrock at depth (Stephenson, et. al., 2002). Based on groundwater data, Gosling (1966) also mapped a fault branch emanating northwest from the Rialto-Colton fault that transects the eastern portion of the site (Figure 5).

Subsurface Geology and Soil Conditions

The result of our geologic mapping of surficial geologic units at the site is shown on Plate 1. Descriptions of subsurface geologic units were primarily obtained by referencing published geologic maps (Morton and Miller, 2006) and available Geotechnical Reports for adjacent properties (GRA, 1991b, 1991c, and 1992). When possible, verification of soil units and compositions were determined in the field during field mapping of the site (Plate 1). Detailed soil descriptions for the site geologic units are provided below.

Artificial Fill (Qaf)

Artificial fill was identified across the site during our field mapping. The artificial fill is likely associated with past grading activities within the property associated with the abandoned reservoir, abandoned airfield, golf course, existing developed properties, flood retention basin, and graded cut-fill pads. Where exposed at the surface at a few localities, the fill generally consisted of re-worked native soils primarily composed of very fine to medium sand with a minor component of silt. Isolated localities across the site contain imported fills containing silty sand and construction debris (concrete and asphalt) and trash.

Quaternary Eolian and Fluvial Deposits Qyes₁ and Qoed₃

Most of the property is underlain by sand dune deposits interbedded with minor fluvial deposits. This evaluation is based on our review of the regional geologic map by Morton and Miller (2006), the fault trench logs in the Arrowhead Regional Medical Facility by GRA (1991b), and our field geologic mapping. A portion of the Morton and Miller (2006) geologic map for the region of the site is included in Figure 2. Based on this map, the dominant surficial geologic unit across the site is unit Qoed₃, described as late to middle Pleistocene eolian and fluvial deposits composed of moderately to slightly consolidated, interbedded sands and gravels. Our field mapping identified a few cut slopes exposing unit Qoed₃ within the property demonstrating very similar characteristics as those described by Morton and Miller (2006). A lithologic boring log by GRA (1992) in the Arrowhead Regional Medical Facility indicated that sediments exist to a depth of 707 feet, which was the total depth of the boring.

GRA (1992b) performed a subsurface "trench" investigation within the Arrowhead Regional Medical Facility to study to possibility of faulting within the site and provided a good description of local soils. The GRA (1992b) report indicates that near surface soils (within the upper 19-feet) consist of massive cross-bedded sand dune deposits and alluvial (fluvial) deposits. The fluvial deposits were described as containing significantly weathered (in-situ) granitic gravel. The GRA (1992b) report also indicated the presence of a clay bearing late Pleistocene (11,000 years old minimum) argillic paleosol (ancient soil).

Groundwater

The property is located within the Riverside-Arlington Subbasin (DWR, 2004). Wildermuth Environmental (2000) indicated on regional groundwater depth maps a depth to groundwater in the proximity of the site of 250 feet BGS. GRA (1992) indicated a depth to groundwater ~172 feet below the ground surface (BGS) within a lithologic boring log extending to a depth of 707 feet BGS. Based on these data, it is likely that the depth to groundwater at the site likely resides deeper than 150 feet BGS. However, it should be noted that rainfall, irrigation and other possible factors may change local groundwater and perched water conditions. Current changes to groundwater depth from pumping activities and recharge are unknown.

Faulting and Seismicity

Moderate to major earthquakes occurring on an active fault generally cause two primary hazards: Fault surface rupture where the rupturing fault reaches the surface, and local to regional ground shaking. The geologic structure of southern California is dominated by northwest-trending strike-slip faults associated with the San Andreas Fault System (Powell 1993). Some of the major strike-slip fault zones within the San Andreas Fault System include, from west to east, the Whittier-Chino-Elsinore, San Jacinto, and the San Andreas fault zones (Figure 3). The Cucamonga-Sierra Madre Fault Zone represents thrust faults located along the southern and western flanks of the San Gabriel Mountains (Figure 3). All of these major fault zones are seismically active as defined by the State of California (Hart and Bryant, 1999), and the San Jacinto and San Andreas fault zones are known to have ruptured the ground surface in historic time. However, no regulatory Earthquake Fault Zones (State, County or City) are mapped within the property.

Relative to the site, the closest active fault is the San Jacinto Fault Zone that consists of the main fault zone located approximately 2 miles northeast of the site (Figures 2 and 4) and the Rialto-Colton fault branch located approximately a quarter of a mile northeast of the site (Figure 4). In addition, Hart (1977) referenced a possible northwest trending fault by Gosling (1967) that transects the eastern portion of the property and the Arrowhead Regional Medical Facility (ARMF; Figure 5). GRA (1991b) performed a subsurface investigation within the Arrowhead Regional Medical Facility (ARMF) to investigate this fault. The GRA (1991b) study involved a 2624 foot long fault trench excavated to depths of 19 feet across the mapped trace of the fault. The approximate location of their trench is shown on Plate 1. They identified late Pleistocene sand dune and fluvial deposits (Qoed3 of Morton and Miller, 2006) within the entire trench with no evidence of fault displacement. In addition, the GRA (1992b) investigation indicates that no fault related structures such as fractures, joints, in-filled cracks, or folding (warping) were identified within the trench exposure.

A listing of historical earthquakes published by the National Earthquake Information Center (2004) indicates that the largest earthquake occurring within a radius of approximately 60 miles of the site was the Magnitude 7.3 Landers earthquake in 1992. This event, along with the associated aftershocks, occurred approximately 60 miles east of the property near Yucca Valley. The closest documented

earthquake greater than a magnitude 6.0 was the magnitude 6.3 occurring on July 22, 1923. This earthquake occurred on the nearby San Jacinto fault zone east of the property.

Air Photo Lineament Analysis

Our review of the stereo-paired black and white historical aerial photographs identified a very weak tonal and possibly geomorphic lineament in the eastern portion of the site. Plate 1 shows the location of the identified lineament. The lineament trends toward the northwest from the southeast corner of the property and is most identifiable within the Arrowhead Regional Medical Facility (ARMF). GRA (1991b) excavated, logged and analyzed a fault trench across our mapped lineament within the ARMF. Plate 1 shows the location of the GRA (1991b) fault trench relative to our mapped lineament. The GRA fault trench exposed undeformed latest Pleistocene sediments and they concluded that no faulting had occurred in the property since the late Pleistocene.

CONCLUSIONS AND RECOMMENDATIONS

General Feasibility

Based on our preliminary review of the existing data, it is our opinion that the proposed development for the property is feasible from a geotechnical standpoint. However, there are a number of geotechnical constraints inherent to the property that should be considered by the Client and other members of the design team during the due diligence period. Most of these constraints are directly associated with past human activity within the property. These constraints and other preliminary design considerations are presented in the following paragraphs.

1. Removal of Undocumented Fill: Where encountered during future grading, these materials should be excavated and replaced as properly compacted fill. These surficial fills vary in age and depth, and likely exist across much of the property to various extents. For example, there are likely old undocumented fills associated with the abandoned air strip, abandoned reservoir, and within the golf course to name a few. Debris such as pieces of asphalt, concrete, plant matter, should be removed from the artificial fill during future grading within the property.
2. Re-evaluation of Documented Fill: Although not confirmed during this study, it is possible that the artificial fill associated with the numerous vacant cut and fill pads within the property (both in developed and undeveloped areas) were tested and documented during placement. Plate 1 shows the areas of the site containing vacant fill pads. Whether this is the case or not, it would be prudent to perform a geotechnical subsurface investigation in these areas to evaluate these fill soils if these pads

are to be utilized for structural improvements. In addition, it is currently unknown whether or not these pads represent cut pads in structural late Pleistocene sediments, or documented fill pads. Fills and cuts also likely occur associated with existing structures. Evaluation of these soils should be considered depending on future proposed development.

3. Overexcavation of Near-Surface Soils: Based on the results of our limited study, the site contains relatively loose soils in the near surface across most of the undeveloped portions of the site including the vacant cut-fill pads. These loose soils are associated with historic human activity (dumping, minor grading), wind blown sands, erosion, and near surface weathering. Therefore, in areas where these materials will not be completely removed as a result of design grading, the near-surface alluvium will require overexcavation and recompaction to mitigate excessive settlement and removal of deleterious material.
4. Cut/Fill Transitions: On lots exposing both compacted fill and competent native soil at or near finish grade, the potential exists for excessive differential settlement to occur between the different material types. This may be the case with the existing graded pads within the property. Therefore, to mitigate the potential for differential settlement and to provide a relatively uniform bearing surface for the proposed structures supported thereon, the cut portions of the building pads should be overexcavated and replaced as compacted fill. Petra generally specifies that the overexcavation depth be equal to at least one-half of the maximum fill depth below the footprint of the proposed structure (3 foot minimum, 15 foot maximum).
5. Surficial Stability of Existing Fill and Cut Slopes: Numerous small to medium-sized fill and cut slopes exist within the site. Since onsite soils consist largely of granular, non-cohesive sands and possibly gravelly sands, the fill slopes may be subject to erosion.

Fault Surface Rupture

No regulatory Earthquake Fault Zones are mapped within the property. The only published mapped fault within the property (Gosling, 1967) was investigated by GRA (1991b) utilizing a fault trench across the mapped fault into latest Pleistocene sediments (Plate 1). The GRA report determined that active faulting had not occurred in the Arrowhead Regional Medical Facility site. The GRA fault trench also crossed a weak tonal lineament identified during our aerial photo analysis, which is shown on Plate 1. Based on our review of the GRA (1991b) fault trench log, and their interpretation that no faulting was identified throughout the length of the trench, we conclude that the identified lineament is not associated with faulting. In summary, based on our review and analysis of the existing data, the potential for fault surface rupture across the property is considered very low.

Strong Ground Motion

The property will probably experience ground shaking from local and regional earthquakes during the life of the proposed development. Furthermore, it should be recognized that the southern California region is an area of moderate to high seismic risk and that it is not considered feasible to make structures totally resistant to seismic related hazards. Structures within the site should be designed and constructed to resist the effects of seismic ground motions as provided in Sections 1626 through 1633 of the 2007 CBC. The method of design will be dependent on the seismic zoning, site characteristics, occupancy category, building configuration, type of structural system, and building height.

For structural design in accordance with the 2007 CBC, a computer program, Earthquake Ground Motion Parameters Version 5.07, developed by the United States Geological Survey (USGS, 2007) was utilized to provide ground motion parameters for the subject site. The program includes hazard curves, uniform hazard response spectra and design parameters for sites in the 50 United States, Puerto Rico and the United States Virgin Islands. Based on the latitude, longitude and site classification, seismic design parameters and spectral response for both short periods and 1-second periods are calculated including Mapped Spectral Response Acceleration Parameter, Site Coefficient, Adjusted Maximum Considered Earthquake Spectral Response Acceleration Parameter and Design Spectral Response Acceleration Parameter. The program is based on USGS research and publications in cooperation with the California Geological Survey for evaluation of California faulting and seismicity (USGS, 1996a, 1996b, 2002, 2007). The results of our analysis are shown in Table II below for Latitude 34.0718 and Longitude - 117.3623.

TABLE II

2007 CBC Section 1613. Earthquake Loads	
Site Class Definition (Table 1613.5.2)	D
Mapped Spectral Response Acceleration Parameter, S_s (Figure 1613.5(3) for 0.2 second)	1.643
Mapped Spectral Response Acceleration Parameter, S_1 (Figure 1613.5(4) for 1.0 second)	0.6
Site Coefficient, F_a (Table 1613.5.3(1) short period)	1.0
Site Coefficient, F_v (Table 1613.5.3(2) 1-second period)	1.50
Adjusted Maximum Considered Earthquake Spectral Response Acceleration Parameter, S_{MS} (Eq. 16-37)	1.643
Adjusted Maximum Considered Earthquake Spectral Response Acceleration Parameter, S_{M1} (Eq. 16-38)	0.90
Design Spectral Response Acceleration Parameter, S_{DS} (Eq. 16-39)	1.096
Design Spectral Response Acceleration Parameter, S_{D1} (Eq. 16-40)	0.6

Liquefaction Potential

Geologic conditions susceptible for liquefaction include saturated (below the water table) fine sandy soils within 50-feet of the surface. Figure 6 shows the San Bernardino County Land Use Plan Geologic Hazard Overlay Map FH30C identifying liquefaction zones within the region of the property. Based on this map, the site is not within a liquefaction susceptibility zone. Although the site does contain abundant fine sands (sand dune deposits) within 50-feet of the surface, the published depth of groundwater beneath the site is greater than 150 feet (GRA, 1991c, 1992; Wildermuth, 2000). The GRA (1992b) fault investigation within the Arrowhead Regional Medical Facility also indicated that no evidence of liquefaction was observed within the 19-foot deep fault trench (see Plate 1 for location). Based on these data, the potential for earthquake-induced liquefaction and lateral spreading at the site is considered negligible.

Seismic Compression of Alluvial Materials

The settlements of dry sandy deposits as well as recently placed fill materials have been known to occur as a result of seismic activity (Stewart 2001, 2002). The site is located close to active fault zones that could produce relatively strong ground motions inducing dynamic settlements. We recommend that a dynamic settlement analysis be conducted as part of a subsurface geotechnical investigation at the site.

Subsidence

Subsidence is the settlement or deformation of the land surface that can be caused by several different sources including tectonic activity but is most generally associated with changes in the groundwater level. Lowering of the water level below ground changes the effective stress placed on the sediments by the overburden. When the stress is increased beyond the highest level of the past, the amount of consolidation of the sediments will be increased. Consolidation of the sediments results in settlement of the ground surface. Partial recovery of the ground settlement may be possible if the water table is recharged and if the stress increases induced at the low point were not generally above the past pressure. Most settlement is not recoverable when the stress has increased beyond the highest past pressure.

Wind Erosion

The site is located in an area containing extensive sand dunes indicating that sand barring winds to occur in the region. These deposits were primarily formed from northwest to northerly winds (winds coming from the northwest and north). The magnitude of the potential hazard associated with sand barring winds has likely decreased in historical times due to developments that have covered the natural ground (asphalt, buildings, concrete, etc). However, natural ground surfaces still occur in relatively large areas in the region of the site and wind blown sands will likely occur.

Potential for Flooding, Tsunami and Seiche

Seismically induced flooding which might be considered a potential hazard to a site normally includes flooding associated with a tsunamis (large sea waves), a seiche (i.e., a wave-like oscillation of the surface of water in an enclosed basin that may be initiated by a strong earthquake) or failure of a major reservoir or retention structure upstream of the site. The site is located many miles from the Pacific Ocean and at

an elevation of more than 1,100 feet above sea level indicating that the hazard associated with tsunamis at the site is nil. Figure 7 is the San Bernardino County Flood and Dam Inundation map with base data provided by FEMA. This map indicates that the site is not located with a 100- or 500-year flood zone or potential dam (reservoir) zone. Flood zones are identified with the Santa Ana wash located approximately 1.2 miles south of the property. Based on the regulatory map of Figure 7, the potential hazard associated with flooding and dam inundation is considered very low.

RECOMMENDATIONS FOR ADDITIONAL STUDY

The findings and conclusions presented in this preliminary geotechnical investigation report are based on our review of the current site conditions and without development plans. When final grading plans for the site have been developed they should be submitted to Petra for review. Based on the results of that review, additional studies (possibly including supplemental subsurface investigation and geotechnical analysis) may be necessary to provide detailed recommendations that are appropriate for the grading and construction proposed. Specific mention within this report of the need for a more detailed study of the potential seismically induced settlement of dry sands has been made.

INVESTIGATION LIMITATIONS

This report is based on the proposed project and geologic data as described herein. This study did not perform any subsurface geotechnical work or lab analysis of the subsurface soils within the property. Our provided results are based on surface geologic mapping and review of existing reports referenced throughout the body of this report. The conclusions and recommendations contained in this report are presented on that basis.

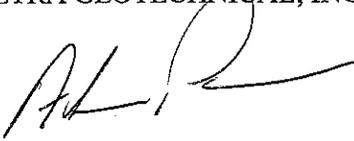
This report has been prepared consistent with the level of care being provided by other professionals providing similar services at the same locale and in the same time period. This report provides our professional opinions and as such, they are not to be considered a guaranty or warranty. This report should be reviewed and updated after a period of one year or if the site conditions, ownership or project concept changes from that described herein.

This report has not been prepared for use by parties or projects other than those named or described herein. This report may not contain sufficient information for other parties or other purposes.

This opportunity to be of service is sincerely appreciated. Should you have any questions pertaining to this report, please do not hesitate to call.

Respectfully submitted,

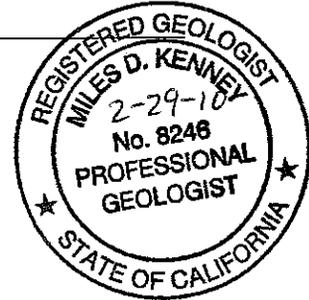
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REFERENCES

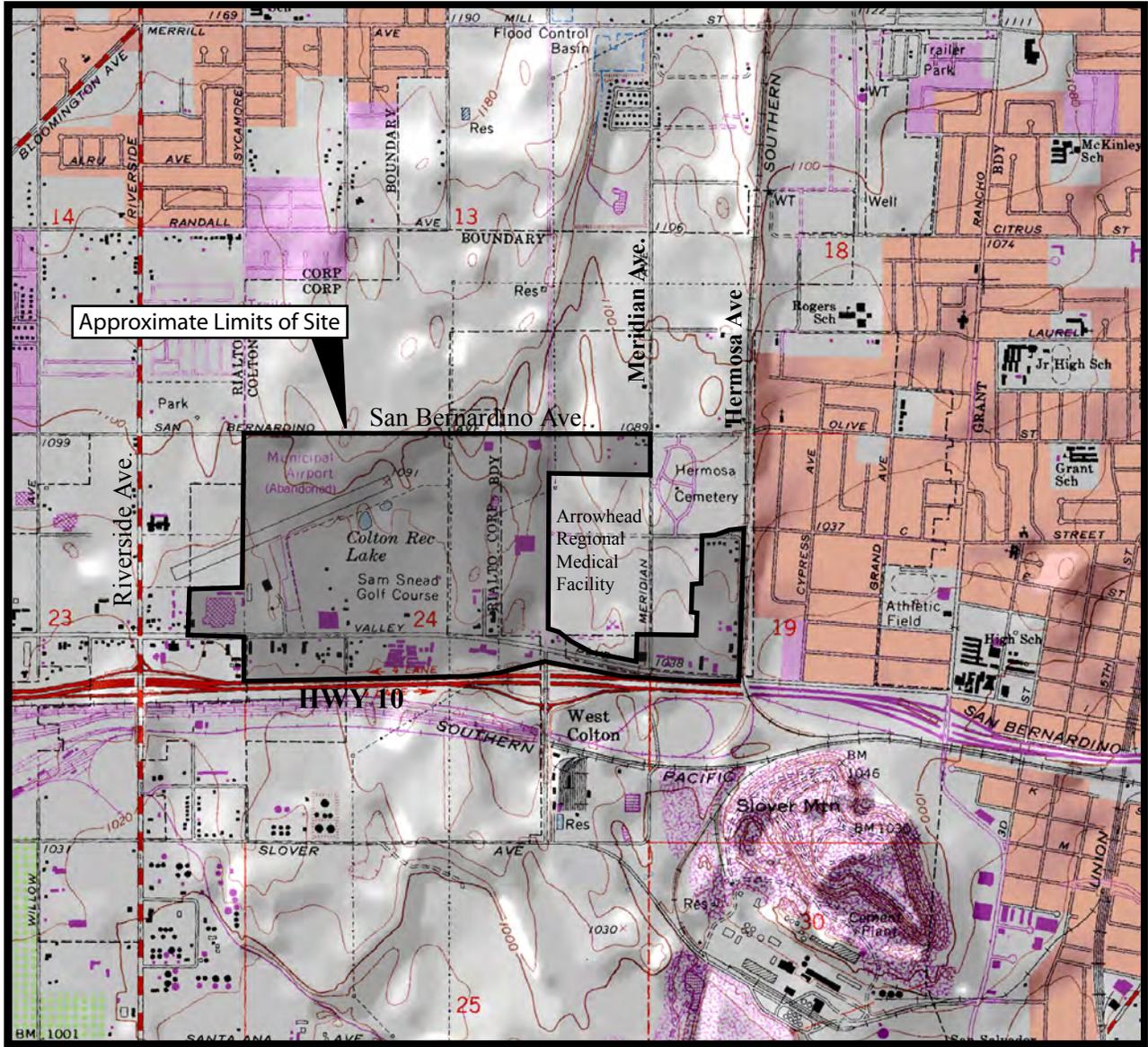
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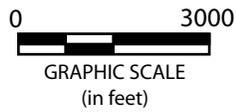
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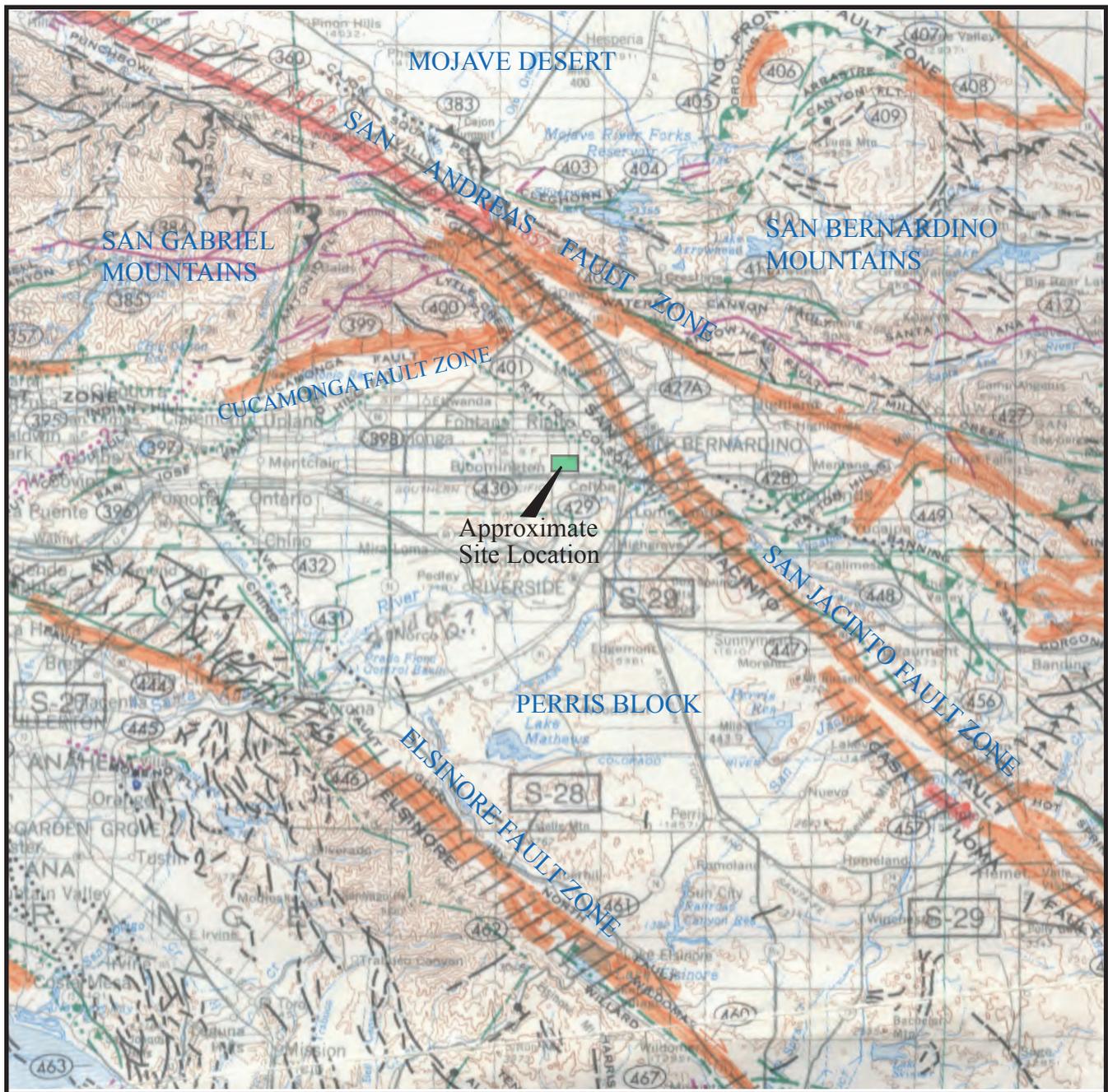
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BASE MAP: All Topo Maps V7 Professional Map Reference Set, California Release 2, San Bernardino South Quadrangle.



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MBA COLTON SUPER BLOCK		
Site Location Map		
DATE: April 2008	J.N.: 150-08	Figure 1
DWG BY: DBS	SCALE: bar scale	



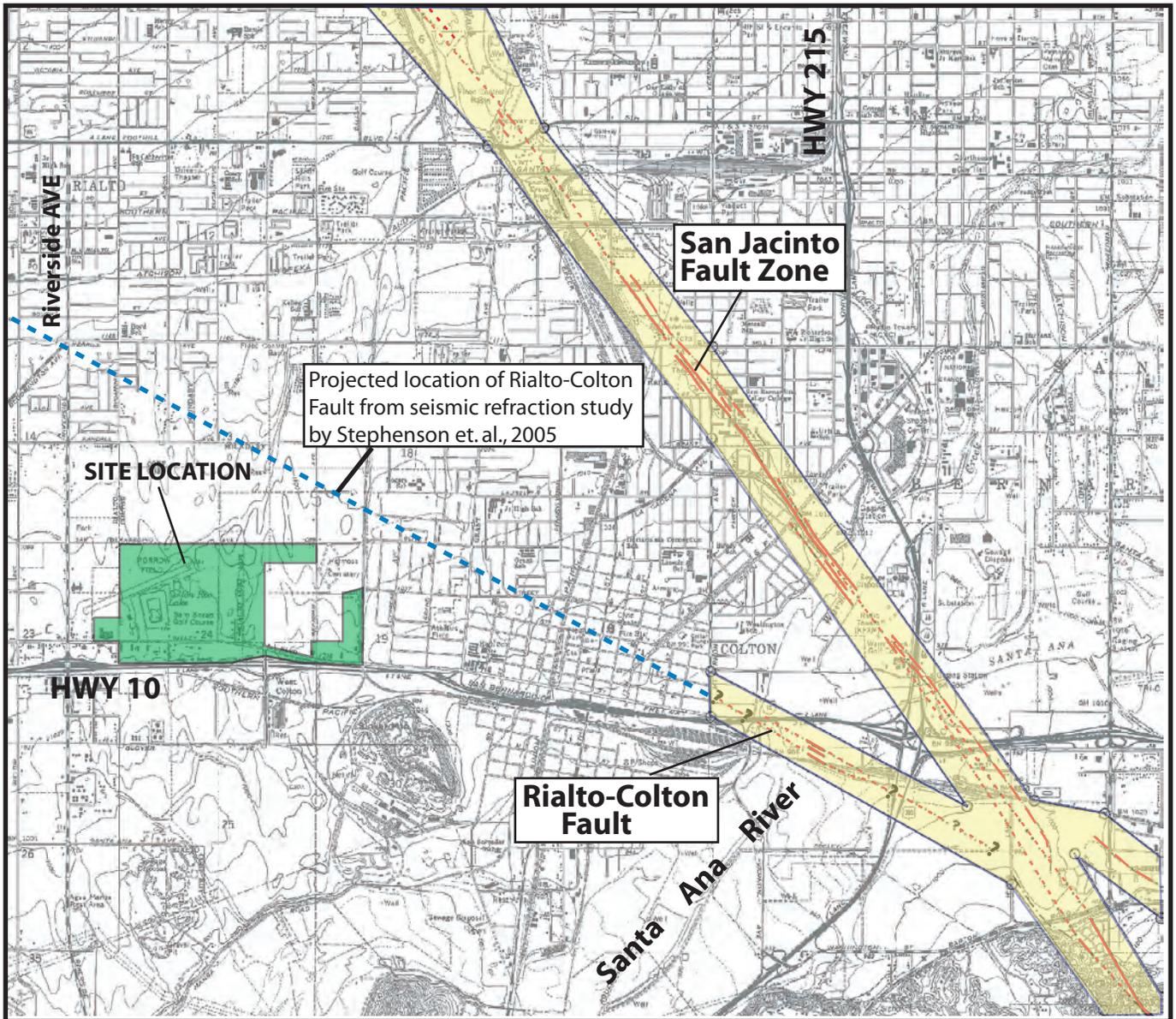
Base Map: Jennings, 1994; Fault Activity Map of California and Adjacent Areas, with Locations and Ages of Recent Volcanic Eruptions, Division of Mines and Geology (now California Geological Survey), California Geologic Data Map Series, Map No. 6.



Fault Symbols

- Fault displaying Historical (past 200 years) surface displacement.
- Fault displaying Holocene (past 11,000 years) surface displacement.

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MBA COLTON SUPER BLOCK PROJECT		
Regional Fault Map		
DATE: April 2008	J.N.: 150-08	Figure 3
DWG BY: MDK	SCALE: see above	



Base Map Reference: Hart, E.W., and Bryant, W.A.; 1997; Fault-rupture hazard zones in California; California Geological Survey Special Publication 42; with 1999 supplements; San Bernardino South 7.5-minute Quadrangle.

Symbol Descriptions



State of California Earthquake Fault Zone (EFZ)



Faults considered to have been active during the Quaternary time: solid line where accurately located, long dash where approximately located, short dash where inferred, dotted where consealed; query (?) indicates additional uncertainty.



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MBA
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State of California
 Earthquake Fault Zones (EFZ)

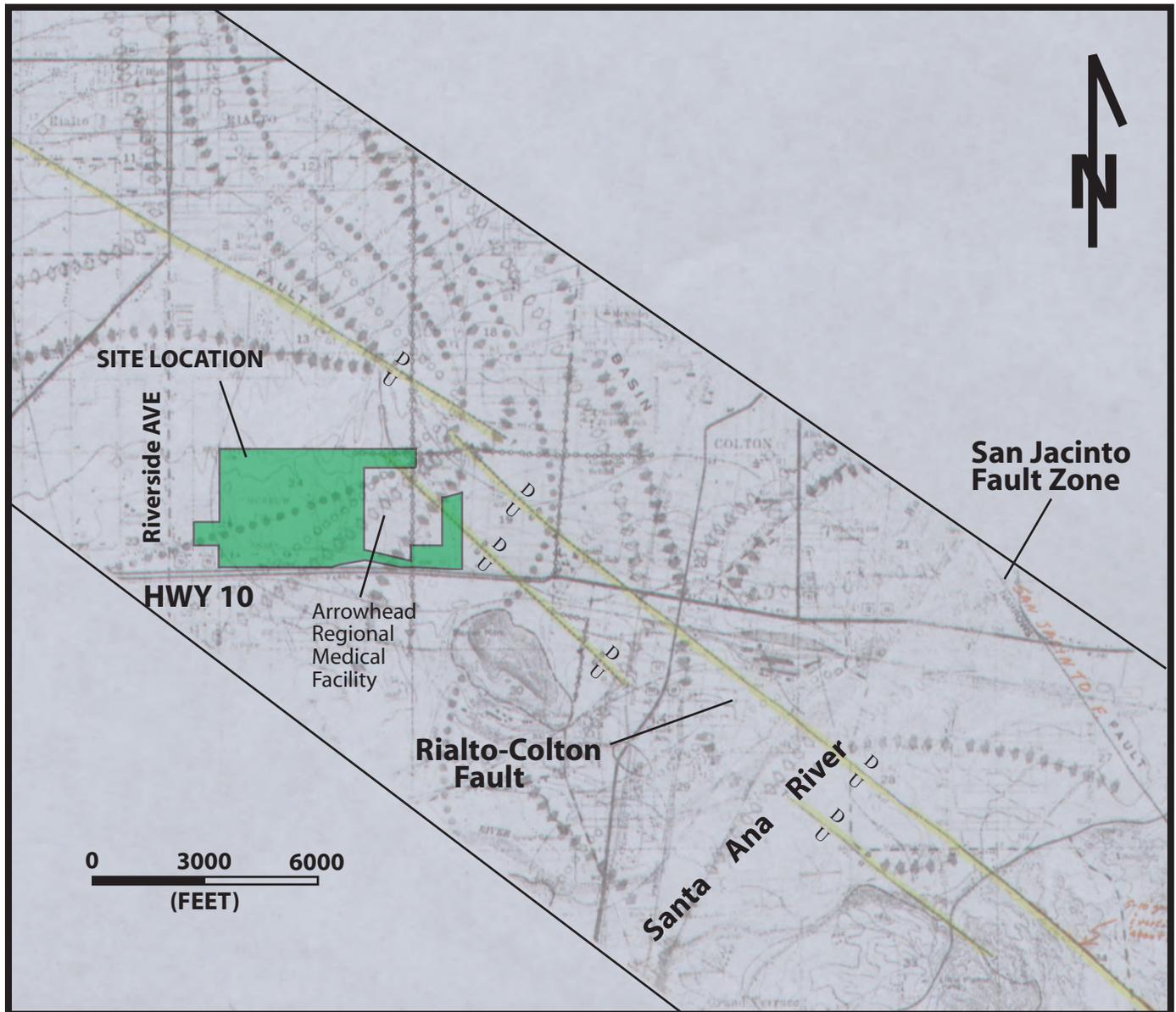
DATE: April 2008

J.N.: 150-08

DWG BY: MDK

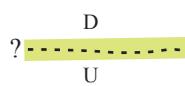
SCALE: see above

Figure 4

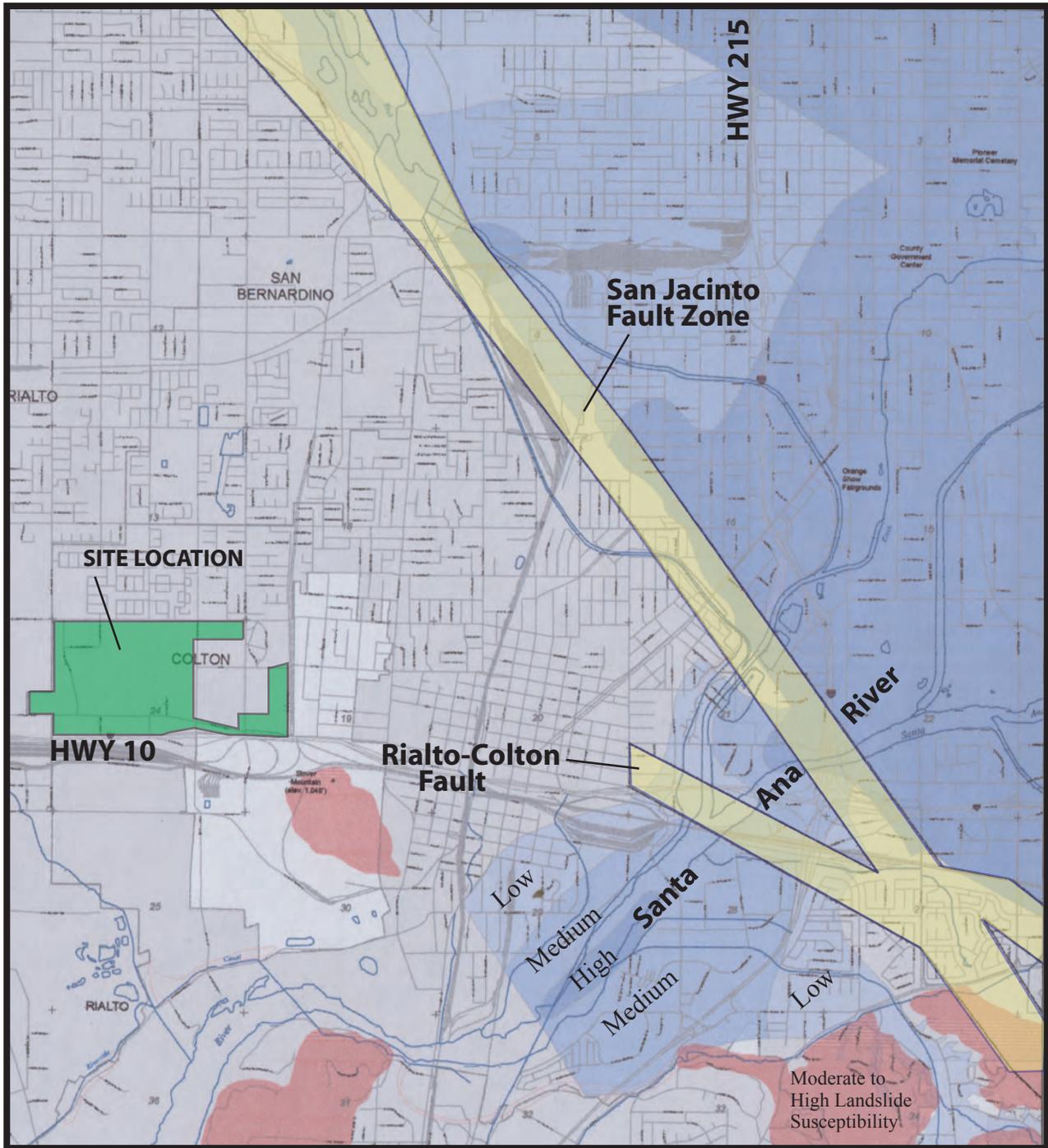


Hart, E.W., 1977; Fault Evaluation Report FER-30, Rialto-Colton Fault; California Division of Mines and Geology (now California Geological Survey); report dated March 2, 1977 and supplement letter report dated July 26, 1977.

Symbol Descriptions


 Possible subsurface (concealed) Faults based on variations in groundwater depths across fault; D - indicates downward movement, U- indicates upward movement. Faults originally mapped by Gosling, 1967.

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MBA COLTON SUPER BLOCK PROJECT					
California Geological Survey Fault Evaluation Report: Rialto-Colton Fault					
DATE: April 2008		J.N.: 150-08		Figure 5	
DWG BY: MDK		SCALE: see above			



Base Map: San Bernardino County Land Use Plan ,GENERAL PLAN, Geologic Hazard Overlays
 SCALE 1:14,400, map FH30 C, San Bernardino South Quadrangle.

Generalized Liquefaction Susceptibility

- Low
- Medium
- High

Generalized Landslide Susceptibility

- Moderate to high

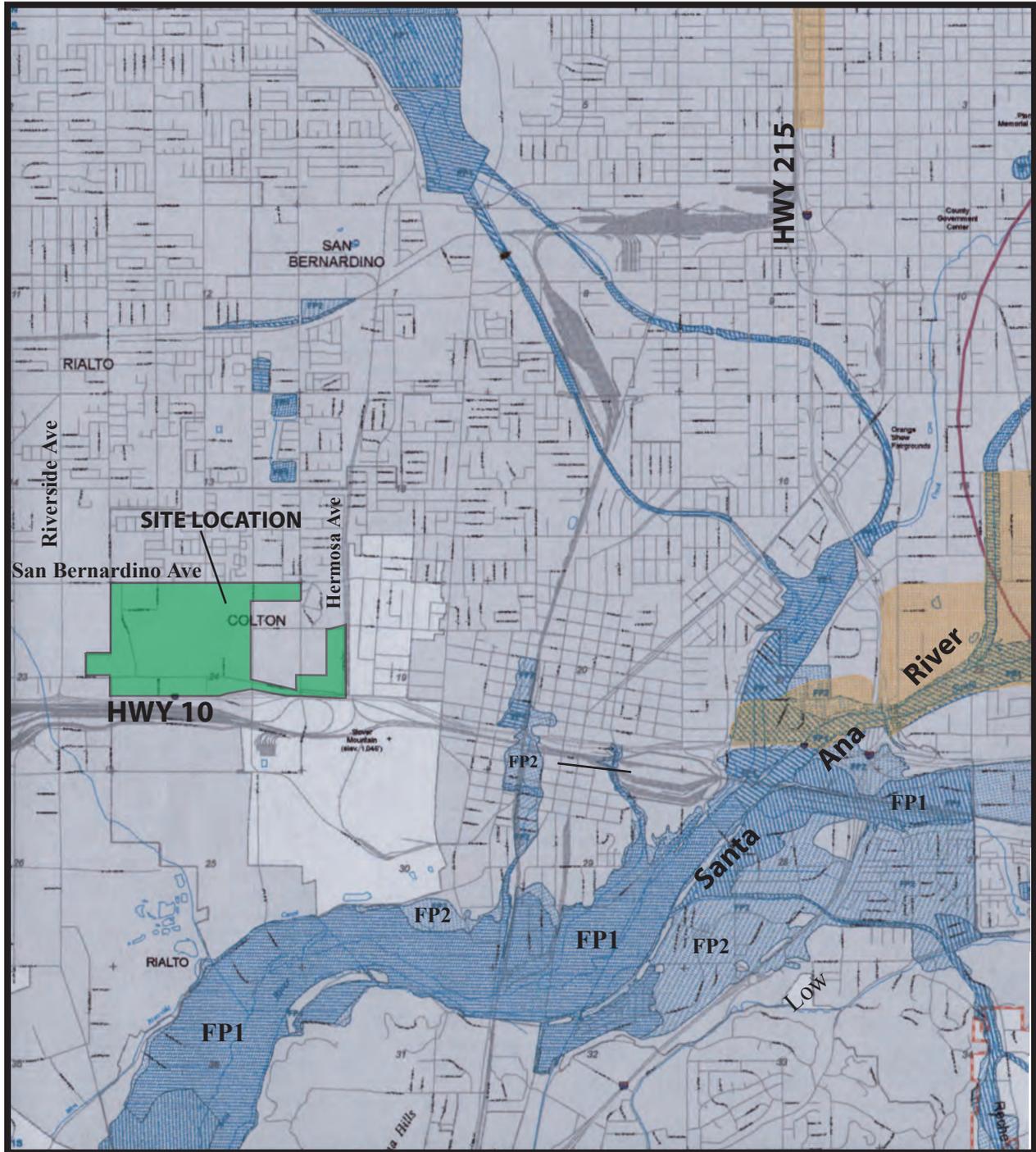
State of California Earthquake Fault Zone (EFZ)

- Bounds the San Jacinto and Rialto-Colton Fault Zones



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COSTA MESA MURRIETA SAN DIEGO SANTA CLARITA	
MBA COLTON SUPER BLOCK PROJECT	
San Bernardino County Landslide & Liquefaction Hazard Map	
DATE: April 2008	J.N.: 150-08
DWG BY: MDK	SCALE: see above

Figure 6



Base Map: San Bernardino County Land Use Plan ,GENERAL PLAN, Geologic Hazard Overlays
 SCALE 1:14,400, map FH30 B, San Bernardino South Quadrangle.

Flood Plain Safety (FP) Overlay District

FEMA

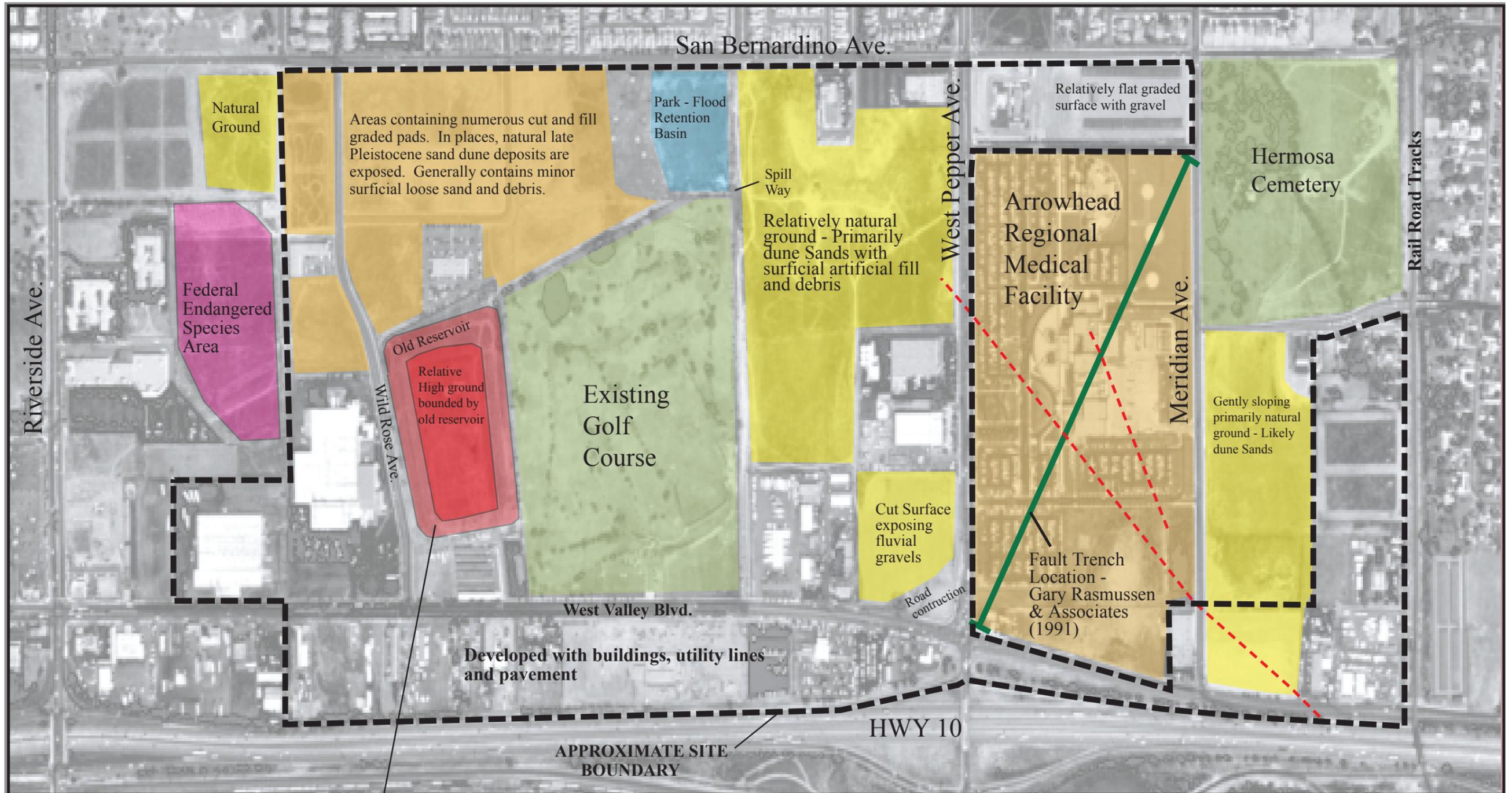
-  FP1 (Zone A - inside 100-year flood plain)
-  FP2 (Zone X - inside 500-year flood plain)

Dam Inundation

-  Area of inundation

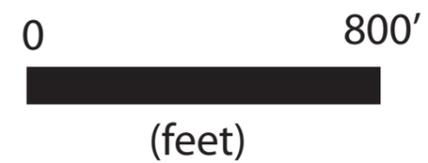


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MBA COLTON SUPER BLOCK PROJECT		
San Bernardino County Flood & Dam Inundation Hazard Map		
DATE: April 2008	J.N.: 150-08	Figure 7
DWG BY: MDK	SCALE: see above	



Aerial Photo taken in 2002.

Donut shaped reservoir with "island" dry ground in the middle was created between 1959 to 1966. The reservoir was dry and/or partially filled with unknown materials prior to 1978.



Lineaments Symbol Description
 - - - - - Weak Tonal Lineaments identified on historical stereo aerial photographs



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MBA COLTON SUPER BLOCK PROJECT		
GEOTECHNICAL MAP		
DATE: April 2008	J.N.: 150-08	Plate 1
DWG BY: MDK	SCALE: see above	



United States
Department of
Agriculture



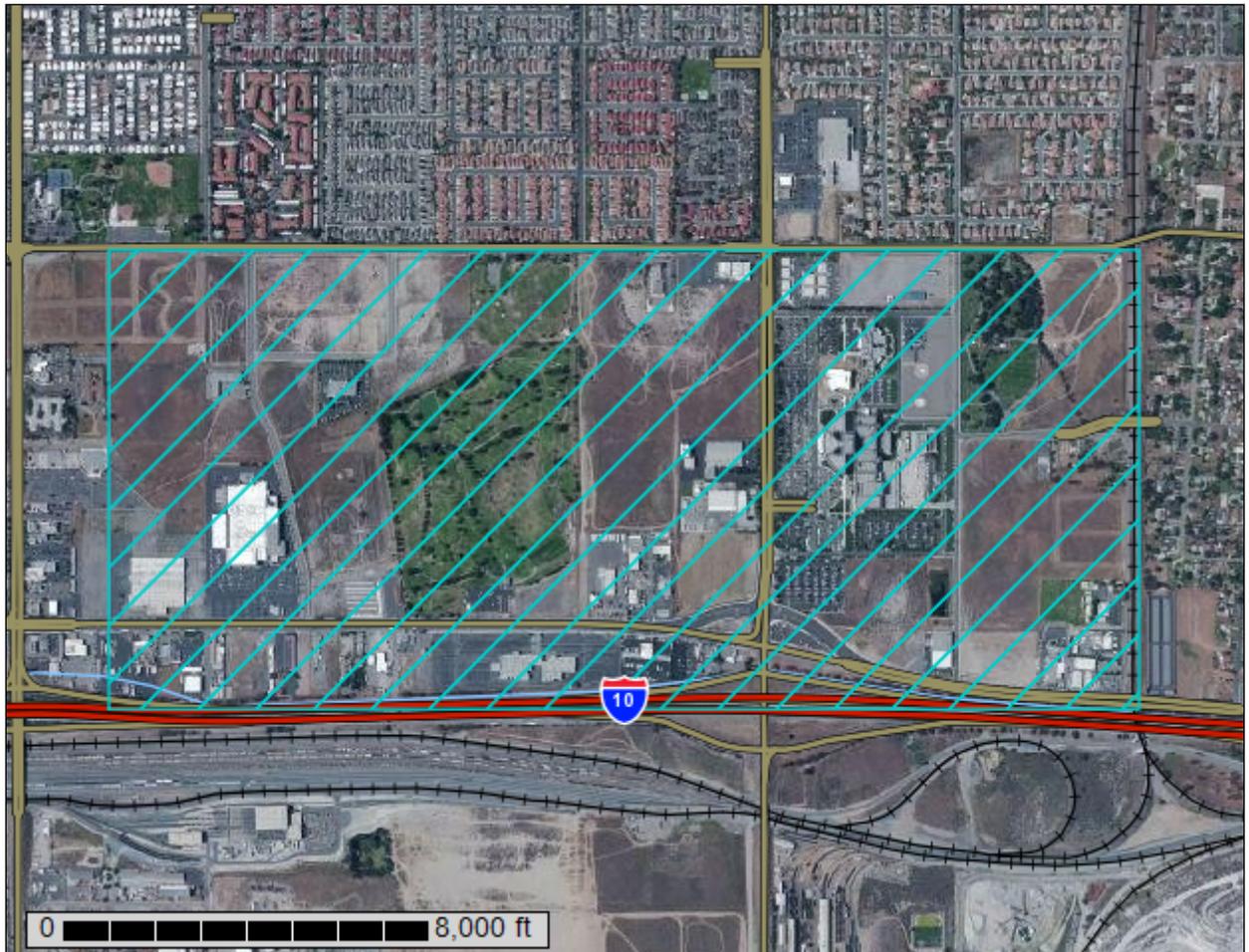
NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for San Bernardino County Southwestern Part, California

CHCCSP Project Area



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://soils.usda.gov/sqi/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<http://offices.sc.egov.usda.gov/locator/app?agency=nrsc>) or your NRCS State Soil Scientist (http://soils.usda.gov/contact/state_offices/).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Soil Data Mart Web site or the NRCS Web Soil Survey. The Soil Data Mart is the data storage site for the official soil survey information.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means

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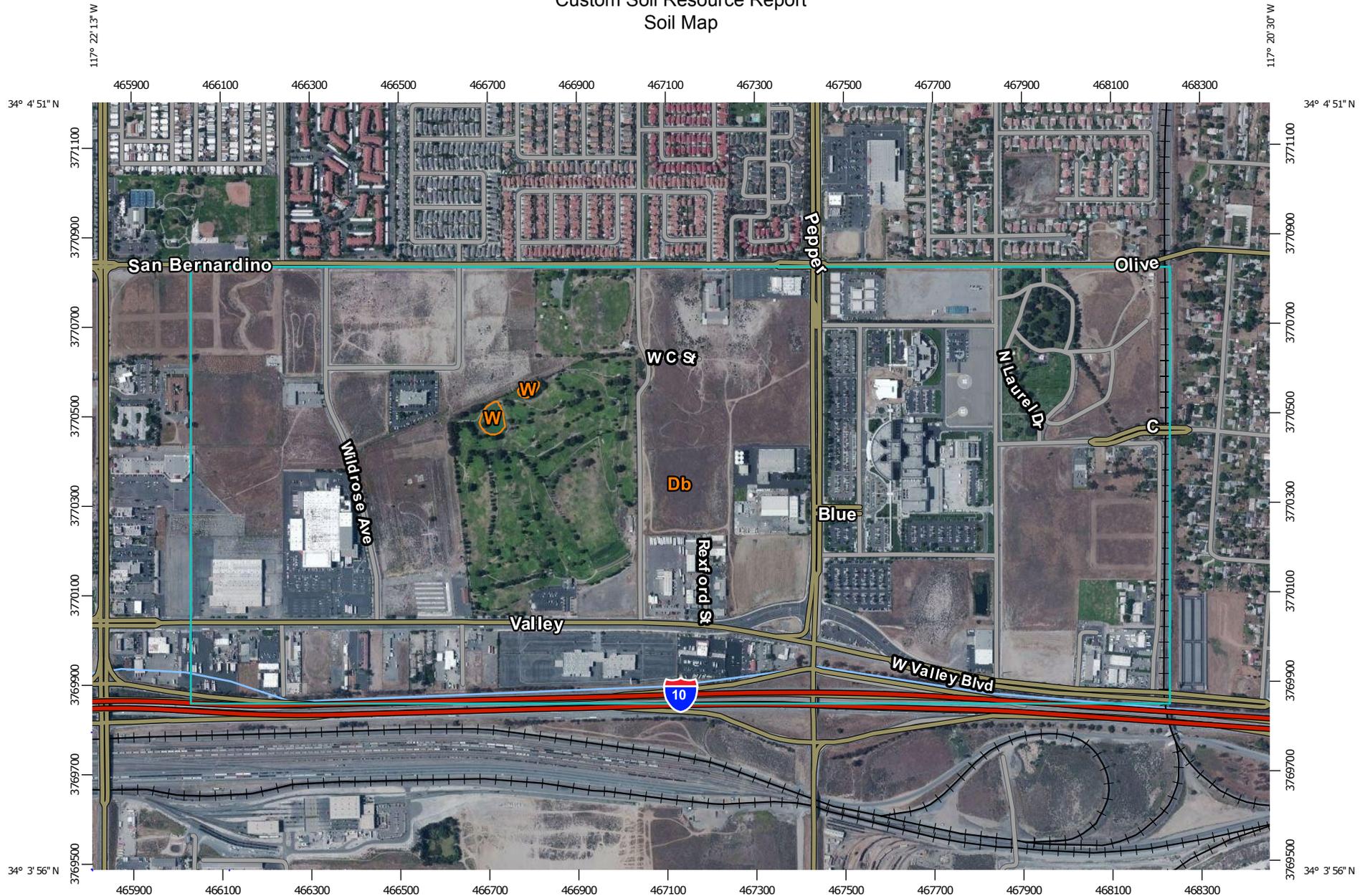
Contents

Preface	2
Soil Map	5
Soil Map.....	6
Legend.....	7
Map Unit Legend.....	8
Map Unit Descriptions.....	8
San Bernardino County Southwestern Part, California.....	10
Db—DELHI FINE SAND.....	10
W—WATER.....	11
References	12

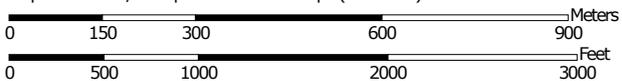
Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



Map Scale: 1:12,100 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

-  Blowout
-  Borrow Pit
-  Clay Spot
-  Closed Depression
-  Gravel Pit
-  Gravelly Spot
-  Landfill
-  Lava Flow
-  Marsh or swamp
-  Mine or Quarry
-  Miscellaneous Water
-  Perennial Water
-  Rock Outcrop
-  Saline Spot
-  Sandy Spot
-  Severely Eroded Spot
-  Sinkhole
-  Slide or Slip
-  Sodic Spot

-  Spoil Area
-  Stony Spot
-  Very Stony Spot
-  Wet Spot
-  Other
-  Special Line Features

Water Features

 Streams and Canals

Transportation

-  Rails
-  Interstate Highways
-  US Routes
-  Major Roads
-  Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
 Web Soil Survey URL: <http://websoilsurvey.nrcs.usda.gov>
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Bernardino County Southwestern Part, California
 Survey Area Data: Version 4, Jan 3, 2008

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 5, 2010—Jul 3, 2010

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

San Bernardino County Southwestern Part, California (CA677)			
Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Db	DELHI FINE SAND	531.9	99.8%
W	WATER	1.0	0.2%
Totals for Area of Interest		532.9	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Custom Soil Resource Report

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

San Bernardino County Southwestern Part, California

Db—DELHI FINE SAND

Map Unit Setting

Elevation: 30 to 1,400 feet

Mean annual precipitation: 10 to 16 inches

Mean annual air temperature: 59 to 64 degrees F

Frost-free period: 225 to 310 days

Map Unit Composition

Delhi and similar soils: 85 percent

Minor components: 15 percent

Description of Delhi

Setting

Landform: Alluvial fans

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Sandy alluvium derived from granite

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat excessively drained

Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water capacity: Low (about 4.4 inches)

Interpretive groups

Farmland classification: Prime farmland if irrigated

Land capability classification (irrigated): 3e

Land capability (nonirrigated): 4e

Hydrologic Soil Group: A

Typical profile

0 to 18 inches: Fine sand

18 to 60 inches: Sand

Minor Components

Unnamed

Percent of map unit: 5 percent

Landform: Depressions

Unnamed

Percent of map unit: 5 percent

Tujunga loamy sand

Percent of map unit: 5 percent

W—WATER

Map Unit Composition

Water: 100 percent

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