FOR CONTRACT NO: 11-091831
PROJECT ID: 1100020125

INFORMATION HANDOUT

WATER QUALITY

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD PERMIT AND AMENDMENT

PERMITS

UNITED STATES ARMY CORPS OF ENGINEERS PERMIT AND EXTENSION
PERMIT NO. SPL-1995-2015100-TCD

AGREEMENTS

CALIFORNIA DEPARTMENT OF FISH AND GAME AGREEMENT AND EXTENSION
NOTIFICATION NO.-1600-2004-0513-R5
UNITED STATES FISH AND WILDLIFE SERVICE AGREEMENT AND AMENDMENTS

MATERIALS INFORMATION

LOG OF TEST BORINGS (PROJECT PLANS)
GEOTECHNICAL DESIGN REPORT
SUMMARY OF FOUNDATION RECOMMENDATION REPORTS
WATER SOURCE INFORMATION
STRUCTURAL SECTION AND CORROSION RECOMMENDATION

ROUTE: 11-SD-905/805-R8.4/R9.8, 3.1/4.2

CALIFORNIA DEPARTMENT OF TRANSPORTATION

GEOTECHNICAL DESIGN REPORT

11-SD-905
KP 9.2/18.0
11-091821

Prepared for:
District 11
Design

By:

OFFICE OF GEOTECHNICAL
DESIGN SERVICES-SOUTH 2

September, 2005

State of California — Business, Transportation and Housing Agency

Memorandum

Flex Your Power!
Be energy efficient!

To: Mr. Chuck Davis
Project Manager-Design
(M. S. 35)

Date: September 14, 2005
File: 11-SD-905
KP 9.2/18.0
EA 11 – 091821

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
Geotechnical Services
Office of Geotechnical Design – South 2, Branch D

Subject: Geotechnical Design Report

In accordance with your request, the Office of Geotechnical Design South 2 (OGDS-South 2) has prepared the attached Geotechnical Design Report for the proposed SR-905 project, in the City of San Diego, San Diego County, California. The report presents the results of our field investigation, laboratory tests, and engineering analysis. The geotechnical data were developed for use in the design and construction phases of this project.

OGDS (South 2) staff will be available for further assistance. Should you have any questions or comments regarding this report, please contact Zia Yazdani at (858) 467-4054 or Ali Lari at (858) 637-5547

Ali Lari
Transportation Engineer (Civil)

Zia Yazdani
Associate Materials and Research Engineer

cc Brian Hinman
File

11-SD-905
KP 9.2/18.0
EA 11 – 091821

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1.0 INTRODUCTION

The proposed project involves construction of a six-lane freeway from 1.1 KM East of the Route 905/805 Separation to 0.6 KM West of the Mexican border in San Diego County (see Figure 1- Site Location and Figure 2- Site Plan). The purpose of this report is to document subsurface geotechnical conditions, provide analysis of anticipated site conditions as they pertain to the project described herein, and to recommend design and construction criteria for the roadway portions of the project. This report also establishes a geotechnical baseline to be used in assessing the existence and scope of any changed conditions. The geotechnical investigation consisted of a review of existing reports and geotechnical literature, subsurface exploration (soil borings), laboratory testing and engineering analysis.

This report is intended for use by the project roadway engineer, construction personnel, bidders and contractors.

2.0 EXISTING FACILITIES AND PROPOSED IMPROVEMENTS

The Site Plan shows the proposed alignment relative to the existing Route 905 and the local streets. The existing Route 905 (Interim) is a four-lane road with a median, connecting Interstate-5 and Route 805 to the Otay Mesa International Border Crossing. The proposed alignment will traverse the existing Route 905 to Station 126+00 then trend south east, crossing Caliente Avenue, Heritage Road, Cactus Road, Brittania Boulevard, La Media Road, and Airway Road and connect to the Siempre Viva road interchange.

The project lies just North of the Tijuana river and is located between Brown Field and the Tijuana International Airport. Its proposed layout skirts fallow agricultural fields, graded and terraced pads (engineered fills), undeveloped coastal chaparral stands, and steep sided canyons. The corridor passes through predominantly rural land where land use has been divided between agricultural, light industrial, businesses, salvage, mining, and rural residential. Historically, truck farming comprised the major portion of the land use.

The freeway would include six travel lanes; three in each direction with standard width inside and outside shoulders. The inside shoulders will at some point in the future be developed into high occupancy vehicle (HOV) lanes. A median of width 13.8m will separate the eastbound and westbound freeway lanes. Preliminary plans indicate that the pavement sections will be of asphalt concrete construction although concrete sections may be considered as an alternative. Diamond interchanges will be provided at the freeway intersection with Caliente Avenue and Britannia Boulevard and a two quadrant cloverleaf interchange will be provided at La Media Road. Caliente Avenue and Britannia Boulevard would be reconstructed as over-crossing structures, while La Media road would be an under-crossing structure. The Heritage Road and Airway Road intersections will also be under-crossing structures. The plans also include improvements to existing city streets. The existing access from Otay Mesa Road to Route 905 would be terminated and Otay Mesa Road would be converted to a cul-de-sac approximately 500m west of the Caliente Avenue over-crossing. A cul-de-sac would be constructed along Cactus Road south of Otay Mesa Road. A two-lane frontage road would be constructed from the terminus of Cactus Road on the south side of Route 905 to Gateway Park Drive.

Additionally, the existing Britannia Boulevard and La Media Road which serve as truck access roads to the border with Mexico will be redesigned for heavy truck traffic loading.

Proposed grading plans indicate that approximately 1 million cubic meters of material will be generated from cuts located mainly to the west of Britannia Boulevard. The project will be mostly in fill to the east of Britannia Boulevard. The estimated fill volume is about 3 million cubic meters of which about 2 million cubic meters will need to be imported. The maximum height of cut will be about 8m and the maximum height of fill will be about 20m.

Drainage provisions will include at least six detention basins and three reinforced concrete box culverts.

The proposed project will include the construction of several bridges. From west to east these are:

- Caliente Avenue Over Crossing, Bridge No. 57-1142 at Station 133+00
- Spring Canyon Bridge No. 57-1155 between Stations 142+60 and 144+00
- Heritage Road Under Crossing, Bridge No. 57-1143 at Station 150+00
- Britannia Boulevard Over Crossing, Bridge No. 57-1144 at Station 166+00
- La Media Road Under Crossing, Bridge No. 57-1145 at Station 182+00
- Airway Road Under Crossing, Bridge No. 57-1148 at Station 200+00

Foundation investigations for these structures are outside the scope of work of this report and are being separately addressed by the Office of Geotechnical Design Services-2.

In addition several retaining structures will be constructed and these are discussed later in this report.

3.0 PERTINENT REPORTS AND INVESTIGATIONS

The following pertinent reports were referred to during the preparation of this document;

1. Draft Project Report (DPR) on Route 905 in San Diego County from 0.8 Kilometer East of Route 805 to the Otay Mesa Border Crossing, August 2001, prepared by California Department of Transportation District 11 Division of Design, 11-SD-905, KP 9.2/19.3, 11224-093160.

2. Draft Environmental Impact Report (DEIR), August 2001, prepared by California Department of Transportation District 11.

3. Geotechnical Design Report (GDR) for the Construction of Six-Lane Freeway from Airway Road to the Otay Mesa Border Crossing, State Route 905 (Phase I), June 2001, by California Department of Transportation Division of Engineering Services- Office of Geotechnical Services-Geotechnical Design Branch-South 2, 11-SD-905 KP 18.5/19.3, 11-091801.

4. A 60% constructability set of plans, March 2004, prepared by District 11 Design, 11-SD-905 KP 9.2/18.0, 11-091821.

5. Geologic Hazards Investigation Environmental Study 11-SD-905 P.M 5.7/12.0 State Route 905 from Interstate 805 to the Otay Mesa Border Crossing and Palm Avenue at I-805, June 27, 1994, prepared by Department of Transportation- District 11, Engineering Geology Section. 11-SD-905 PM 5.7-12.0, 11-093160.

6. Geotechnical Recommendations for Proposed Freeway Construction Cactus Road Landfill (Barnhart/Dantzler Properties), June 19, 2000, prepared by California Department of Transportation- Roadway Geotechnical Engineering- South, 11-SD-905, PM 5.7/12.0, 11-093160.

4.0 PHYSICAL SETTING

4.1 Climate

The project site is located in a semi arid coastal climate characterized by low rainfall and moderate temperatures.

Mean temperatures range from approximately 21 degrees Celsius in September to approximately 13 degrees Celsius in January, with a mean annual temperature of 17 degrees Celsius. The Chula Vista weather station, which is closest to the project site, has been maintaining records since July 1948. The average annual total precipitation for this station is approximately 24 cm, with the heaviest rainfall occurring in the months of January through March. January has the average monthly precipitation of approximately 5-cm. The area experiences approximately 340 frost-free days annually.

4.2 Topography and Drainage

The project is situated on Otay Mesa, which is an east-west trending drainage divide between the Otay and Tijuana Rivers. Otay Mesa is a relic wave cut (ocean) terrace. It is a mostly flat feature of youthful topography. It occupies elevations between 61m to 213m above mean sea level. Most of the mesa is in low relief with a gentle southwest gradient with a slope of about 1 vertical to 11 horizontal. The inland center of the mesa contains gently sloped mound- like hills. These hills are elongate to dome shaped. Their peaks are smooth features that are about 6.1m to 30.5m above the average mesa top elevation. Slope gradient increases subtly eastward up to the transition zone of the interior uplands where it increases rapidly. The project begins mid slope, around elevation 70m on the west-facing slope of the mesa and traverses the mesa top at elevation 152m to 183m. It crosses the northern ends of the west and east forks of Spring Canyon that exhibit a differential elevation of 46m. It continues eastward across the mesa and turns south-south- eastward where it skirts the flank of the mound like hills, at about elevation 165m. It follows this gradient to the International Border.

Drainage varies along the project corridor. The mesa's drainage patterns are youthful and parallel to dendritic. Drainage across most of the mesa's top is by sheet flow. Mesa top gradients predominantly trend southwestward toward the Tijuana River valley. Channels around the Mesa's fringe are youthful with steep gradients. The friable mesa rock has enabled streams to incise deep, narrow, steep-sided canyons into the mesa. Dennery Canyon drains northward from Otay Mesa Road to the Otay River and several branches of Spring Canyon drain southward toward the Tijuana River.

4.3 Regional Geology and Seismicity

4.3.1 Stratigraphy

The project site is located within the Peninsular Range geomorphic Province, one of the eleven primary geomorphic provinces that comprise California. The Peninsular Range Province is characterized by a series of northwest trending mountain ranges that are separated by sub parallel fault zones. Locally, the Peninsular Ranges are comprised of three crystalline rock units: The Paleozoic/Mesozoic Julian Schist; the Jurassic Santiago Peak Volcanics (metavolcanic and metasedimentary rocks); and the Cretaceous igneous rocks of the southern California Batholith (silica rich rocks collectively termed "granitics"). These crystalline rocks combine to form the basement rock complex underlying the region upon which, to the west, a moderately thick succession of marine and non-marine sediments have been deposited. Crystalline rock is not exposed within the project corridor; however it does outcrop both to the north and east of the project. Borings developed along the project corridor were not advanced to sufficient depths to contact basement rock; therefore for seismic considerations, the site is characterized as a thin soil over soft rock site.

The Peninsular Range Province is subdivided into two minor physiographic/geomorphic provinces: these are the Coastal Plain and the Interior Upland. The project site is located entirely within the Coastal Plain province, however, the transition to the Interior Upland is located approximately 5km to the east. The Coastal Plain is predominantly comprised of upper Cretaceous, Tertiary, and Quaternary sedimentary rock formations. Within the project corridor, these sedimentary formations are principally comprised of indurated to friable pebble, cobble and boulder conglomerates, sandstones, siltstones, mudstones, and claystones. Bentonite beds, lenses, and laminae are highly prevalent in the area's stratigraphy. Due to their expansive nature and their role in facilitating development of landslides in the areas slopes, they are of engineering significance.

4.3.2 Geomorphology and Geologic Structure

Structurally the site is characterized as a repeated series of marine and non-marine sedimentary units deposited upon the basement rock complex. While bedding typically dips subtly westward to south westward; local contacts, which are usually erosional in nature, may dip more steeply with dip direction concordant with the

depositional system at the time of deposition. Tertiary and Quaternary sea advances and retreats have cut these soft-rock formations into a series of regionally 5 to 7 terraces whose escarpments parallel the present coastline. The project is contained within the Lindavista Terrace. Incision by the regions significant drainages has transformed the terraces into the vicinity's characteristic mesa topography. Both the interior upland and the coastal plain province exhibit evidence of continued faulting throughout their evolution. Two dominant types of faulting are evident in the vicinity containing the project site: These are Right Lateral Strike-Slip faulting arising from and facilitating northeastward movement of the Pacific Plate along the western edge of the North American Plate. The Rose Canyon and Coronado Banks Faults are local examples of this style of faulting. The second mode of faulting is Dip-Slip in Nature. This mode is the result of extensional forces developed to accommodate fault-block rotations and the bends in the regions strike-slip faults. Both the La Nacion and the San Ysidro Fault Zones are examples of this style of faulting.

4.3.3 Faulting

The project is located on the eastern margin of the Pacific Plate. The Pacific Plate is one of a series of plates (discrete blocks) that comprise the outer surface of the earth. The margin is a land mass (both on and offshore) fractured and transected by numerous faults and shears upon which the Pacific Plate's northward movement is accommodated. The San Andreas Fault, which is a transform fault, is the tectonic boundary formed by the oblique collision of the Pacific Plate with the North American Plate. The width of the plate margin extends from the San Andreas Fault westward to well offshore of San Diego. Movement of the plate is accommodated along a series of faults and shears and results in the generation of seismic waves known as earthquakes. The region containing the project is considered seismically active and has experienced numerous moderate to high intensity earthquakes that originate from faults both near and distant to the project site.

The project lies outside of zones requiring special studies as mandated under the Alquist-Priolo (AP) Earthquake Fault Zoning Act. The nearest AP-zone is the Rose Canyon Fault zone located west-north-west of the project. Table 1 presents the names of active faults within approximately 100km of the project site and their characteristic deterministic parameters. The table summarizes parameters of known "active" faults within a 100km radius of the project site. The faults are listed in order of increasing distance from the project site, including approximate site-to-source distances and maximum credible earthquake magnitudes. Due to proximity to the project site, the Newport Inglewood Rose Canyon fault and the Coronado Banks fault dominate seismicity along the project corridor. These faults exhibit right-lateral strike-slip style of faulting.

Not included in the table are two significant, active fault systems, located south of the border within 60 km of the project site. These are the Agua Blanca Fault and the San Miguel Fault zone. Both systems are believed capable of generating

earthquakes destructive to San Diego (Legg, 1989). It is believed that the San Miguel Fault zone is the southern extension of the Rose Canyon Fault Zone (Legg et al, 1979). It experienced several significant ruptures with magnitudes ranging up to 6.6 in 1956. The Agua Blanca Fault is believed to be the southern extension of the Coronado Banks Fault (Legg, 1989). Preliminary estimated annual slip rates for this fault range from 1mm to 13mm/year (Rockwell et al, 1987; Webb, 1989). Both faults contribute to the project site seismicity; however due to their distance from the project it is anticipated that site intensities and bedrock accelerations arising from rupture along these systems would be subordinate to those of the significant fault systems located closer to the project corridor.

The La Nacion Fault Zone is classified as potentially active. Its mapped trace is within one kilometer of the west end of the project. It was a formerly considered a design concern by Caltrans. It is included in the City of San Diego's Model Seismic Safety Element; in the 1983 Seismic Safety Study; and in the Geology For Planning Imperial Beach 7.5 Minute Quadrangle, San Diego, California (1980 CDMG OFR 80-16, Bushnell, Mualchin, et al) and other regional planning documents and reports. The La Nacion Fault Zone is comprised of a series of left stepping en-echelon dip-slip faults in which the west-side has been down-dropped relative to the east-side. The fault zone is approximately 33 km in length and approximately 4.2 km wide. Deterministically, it can be assigned a maximum credible moment magnitude of 6.2 to 6.75 (CDMG OFR 80-16map sheet 45; 1992). Due to its recently assigned potentially active classification, this fault is excluded from design consideration by current professional practice. Therefore, its relevance to the project, as well as other faults and shears of the San Ysidro Fault Zone (also potentially active and located adjacent to the project), is that shears associated with these zones may be encountered in excavations. If present, and oriented adverse to cuts and/or slopes, these features may facilitate slope failures. Kennedy and Tan (1975) have mapped one such feature within the project corridor. It is topographically expressed and is located right of Station 125+00 on the project Geologic Map. Anomalous terrain was noted at this location during field mapping, and at the time, it was considered to be a result of shallow slumping, which is a common feature, observed in area canyon walls exposing Otay Formation. Kennedy and Tan also mapped other minor faults (potentially active) adjacent to the project, both north and south of the alignment. If these features are daylighted by cut during construction, then a geologist should review the slope before the cut is completed.

Table 1: **Fault Parameters**

ABBREVIATED FAUL NAME	Distance (km	Maximum Credible Magnitude (M	Estimated Sit Peak Accelerat [1]	Estimated Si Intensity[1]	Maximum Credible Sit Acceleration
ROSE CANYON	18.4	6.9	0.305	IX	7
CORONADO BANK	23.7	7.4	0.328	IX	7.5
ELSINORE-JULIAN	73.0	7.1	0.088	VII	7.5*

ABBREVIATED FAUL NAME	Distance (km	Maximum Credible Magnitude (M	Estimated Sit Peak Accelerat [1]	Estimated Si Intensity[1]	Maximum Credible Sit Acceleration
ELSINORE-COYOTE MOUNTAIN	76.8	6.8	.068	VI	7.5*
EARTHQUAKE VALLE	78.5	6.5	0.054	VI	6.5
NEWPORT-INGLEWOC Offshore	75.3	6.9	.074	VII	*
ELSINORE-TEMECUL	90.0	6.8	.057	VI	*
SAN JACINTO - BORRE	105.4	6.6	0.042	VI	*
SAN JACINTO-COYOT CREEK	105.1	6.8	0.049	VI	7.5
LAGUNA SALADA	101	7	0.058	VI	7.25
SUPERSTITION MTN. S Jacinto	107.3	6.6	0.042	VI	*
SAN JACINTO-ANZA	107.6	7.2	0.063	VI	7.5
ELMORE RANCH	114.8	6.6	0.039	V	
SUPERSTITION HILLS S Jacinto	115.4	6.6	0.039	V	7
PALOS VERDES	116.4	7.1	0.054	VI	*
ELSINORE-GLEN IVY	123.2	6.8	0.041	V	*
SAN JACINTO-SAN JACINTO VALLEY	132.3	6.9	0.041	V	*
IMPERIAL	134.8	7	0.043	VI	*
BRAWLEY SEISMIC ZO	141.2	6.4	0.027	V	6.25
SAN ANDREAS - Coachella	144	7.1	0.043	VI	*
SAN ANDREAS - South	144	7.4	0.053	VI	*
NEWPORT-INGLEWOC L.A.Basin	142.6	6.9	0.038	V	*
CHINO-CENTRAL AVI Elsinore	147.7	6.7	0.045	VI	6.5
SAN ANDREAS - San Bernardino	158.6	7.3	0.045	VI	*
WHITTIER	153.9	6.8	0.031	V	7.5*

[1] Output from EQ Fault version 3.00B By Thomas Blake, 2000. Attenuation Bozorggnia, Cambell, Niazi 1999; horizontal soft rock corrected.

[2] From Maulchin, Maximum Credible Earthquakes 1996.

* Not listed individually in Maulchins publication; or combined with other segments and weighted as an aggregate

4.4 Soil Survey Mapping

Based on the United States Department of Agriculture-Soil Conservation Service (USDA-SCS) publication dated December 1973, land use in this area prior to the date of the report was devoted principally to agriculture and therefore development had not significantly altered the natural soil profile. Since 1973, however, there has been substantial commercial and light industrial development on both sides of the existing State Route 905.

The soil units mapped along the project alignment are Stockpen (SuA and SuB), Olivenhain (OhF), Salinas clay (ScA), and Diablo clay (DaC and DaD).The Stockpen unit is defined as consisting of moderately well-drained loams to gravelly clay loams that have a subsoil of clay or gravelly clay with 0 to 5 percent slopes. The Olivenhain unit is defined as consisting of well-drained cobbly loams and gravelly loams that have a gravelly clay subsoil over a hardpan with 2 to 9 percent slopes. The Salinas clay consists of a surface layer of clay and a substratum of clay to clay loam with 0 to 2 percent slopes. The Diablo clay(DaC and DaD) consists of well-drained, moderately deep to deep clays derived from soft, calcareous sandstone and shale. These soils have slopes of 2 to 15 percent. All of these material types were encountered in our subsurface investigation.

According to the USDA-SCS publication the Stockpen unit has low permeability, very low runoff and a slight erosion hazard. The Olivehain unit has low permeability, rapid runoff and a high erosion hazard. The Salinas clay has low permeability, very slow runoff and a slight erosion hazard. The Diablo clay has low permeability, slow to medium runoff and a slight to moderate erosion hazard.

5.0 EXPLORATION

A geotechnical subsurface investigation was conducted to establish a vertical soil profile across the site and to determine soil types and their engineering characteristics within the proposed project limits. These characteristics have been used to anticipate soil behavior during and after construction of the proposed improvements.

5.1 Drilling and Sampling

A total of 71 exploratory soil borings were conducted for the roadway during the period from early February 2004 through July 2005. Additionally, a total of 23 borings were performed for the retaining walls that were investigated at the time of this report. The logs of all test borings are presented in the Appendix. The locations of all the test borings are shown on Figure 3. The soil borings were advanced into the ground utilizing different kinds of rigs (CS 2000, CS 500, B47) and auger and bentonite mud rotary drilling techniques. The mud-rotary technique uses a drilling fluid thickened with bentonite powder or polymer to stabilize the walls of the borehole and to bring cuttings to the surface. Standard Penetration tests were conducted at intervals of 1.5 meters. SPT blow counts were used to determine soil consistency or relative density. Based on SPT data, disturbed bulk samples and relatively undisturbed 50-mm brass lined California samples were obtained at several boring locations for laboratory testing. The soil borings along the alignment were drilled to depths up to 10 meters below the existing ground surface. The deeper borings coincided with locations of the earth retaining walls. After drilling all test borings were backfilled with bentonite pellets.

5.2 Geologic Mapping

Detailed geologic mapping of the freeway alignment was performed at a scale of 1:2400 and the resulting geologic map is presented as Figure 3. The geologic map is based on

field studies, published geologic maps and reports, and the results of our subsurface explorations.

5.3 Geophysical Studies

No geophysical studies were performed for this project.

5.4 Instrumentation

At this time field instrumentation of the subject alignment was not deemed applicable to the project and thus was not performed.

5.5 Exploration Notes

During the drilling operations considerable difficulty was experienced in several of the borings that were advanced through the Quaternary Linda Vista Formation. At these boring locations hard to very hard drilling was observed while the borings were being advanced through very dense gravelly sand, cobbles and possibly boulders. In some instances the borings were continued utilizing rock coring techniques and in other cases terminated if close to the desired depth of exploration. In five borings circulation loss was noted at varying depths below top of hole elevation indicating that fluid loss may have resulted from flow into fractured rock.

Some planned borings could not be performed due to environmental issues. These borings are associated with the proposed Retaining Wall 170 and Retaining Wall 146 between Station 146+05 to Station 147+15. These areas will be investigated when the permit to enter issues are resolved and an addendum report presenting the results of our investigation will be issued later.

6.0 GEOTECHNICAL TESTING

6.1 In-Situ Testing

In-situ testing consisted of Standard Penetration Tests performed in accordance with ASTM D 1587-00. The tests were, in general, performed at 1.5 m depth intervals. The results of the SPT tests are shown on the log of test borings that are presented in the appendix.

The exploration program did not reveal the presence of any adverse soil conditions that would warrant additional forms of in-situ testing.

6.2 Laboratory Testing

Laboratory testing of representative soil samples obtained from the test borings was performed in Translab in Sacramento. These tests included in-situ moisture content, in-

situ dry density, mechanical analysis, Atterberg Limits, Falling Head Soil Permeability and corrosion tests. The results of the laboratory tests are presented in the Appendix.

7.0 GEOTECHNICAL CONDITIONS

7.1 Site Geology

Based on our geologic mapping, the subsurface investigation, and review of published geologic maps and literature, the project area is predominantly underlain by Quaternary and Tertiary sedimentary formations. Beds comprising the formations range from very dense/hard soil to rock. The Quaternary and Tertiary deposits range from friable to indurated. Some beds may be well cemented; others are very dense nonindurated; finally some are very dense slightly indurated deriving coherency from clay binder. Cementing agents include ferruginous cements (typical of the Lindavista and San Diego Formations) while others are calcite (San Diego and Otay Formations).

Strata typically dip subtly westward; however due to erosional unconformities and cross bedding, localized intermediate steeper dips (20 to 30 degrees) with trends that differ significantly from the regional average may be encountered. Therefore, cuts should be evaluated for conditions adverse to slope stability before grading is competed.

Many of the formational units, terrace, colluvial, and alluvial deposits contain pebbles, cobbles, and small boulders. Locally cobbles may comprise from 10% to 60% of a given stratum. Rare boulders of very strong volcanic and granitic rock up to one cubic meter in size were observed across the length of the project corridor. The gravels, cobbles, and boulders are comprised of subangular well rounded prismoidal, to discoidal clasts of very intensely weathered to slightly weathered, weak to very strong very hard clasts of metavolcanic, volcanic, and granitic rock. The conglomerates are typically matrix supported; however localized beds and stringers of clast supported beds are not uncommon. Conglomerate matrix is typically clayey sand and silts and locally none of the conglomeratic outcrops exhibited cementation.

Locally surface materials are covered, in some areas, by documented, undocumented and non-engineered fills, topsoil, rubbish, soils, and recent colluvial, and alluvial deposits. Site topsoils are typically cohesive and exhibit characteristics consistent with highly expansive materials. They are typically dark grayish brown to black, overconsolidated and desiccated, and deeply fissured by desiccation cracks. In the dry state, they are very hard. In most areas they have been disturbed by farming and may contain a significant accumulation of salts and organic detritus. Generally they contain up to 10% gravel and cobbles with rare boulders. Attempts were made to determine the thickness of the expansive soils at numerous locations, considerable difficulties were experienced because of the presence of common cobbles and the very hard clays. Based upon exposures along slopes, and shallow cuts, it is believed that these deposits are approximately 1 to 1.5m in thickness. Conditions consistent with expansive and highly expansive soils are depicted on the project geologic map as dashed and solid cross hashers respectively.

A geologic map of the project alignment showing the approximate limits of the various geologic units is presented as Figure 3. A brief description of each unit is presented below:

RUBBISH (R)

Rubbish was encountered over much of the project; it is depicted on the project Geologic Map by the symbol "**R**". Typically rubbish is not considered a mappable unit on a geologic map; however, such large accumulations of rubbish have been stockpiled on the corridor, that it was deemed appropriate to include it on the map. Rubbish has been stock piled as canyon fill, mats, and discrete piles. Where piles are significantly concentrated within a given area, the area is depicted on the geologic map by the symbol "X".

Rubbish is comprised of unauthorized dumping of household garbage, lumber, garden and tree trimmings, machine and electronic components, plastic and rubber detritus, tires, cars and car parts, batteries, household and office appliances and furniture, and construction detritus including concrete up to three cubic meters in size, asphalt, pipe (metal, reinforced concrete pipe, asbestos, plastic), telephone poles, and excess concrete spoil. Often the rubbish is intermixed with soils or is winnowed with cobble and boulder stockpiles, which are probably spoils from quarry operations.

FILL (AF; AFE)

Several areas of fill were mapped along the project alignment. These fills are comprised of both engineered and undocumented fills. Engineered Fills are depicted on the map symbol by "**AFE**". Engineered fills are associated with the existing roadway improvements and the commercial and residential developments that are present in the area. Materials for these fills appear to have been derived from on-site sources. They are characterized as cobbly-gravelly, silty sands with clay. Cobbles and gravels may comprise from 10 to 20% of the materials. At the time of writing, documentation for these fills is yet to be obtained; however, as the improvements are recent, it is assumed that they were completed under modern building codes, and thus construction was consistent with modern engineering practice. One notable exception to this statement, is that some small drainages, arroyos and some vacant engineered terraces (foundation pads) have been filled or constructed as embankment. As they currently do not support improvements, without documentation, they should be assumed to be non-engineered. A small failure has developed in one such arroyo fill located right of the surface street located to the right of Station 152+00 (approximately). A well developed tension crack has developed in the fill adjacent to the mesa, and the fill is down-dropped relative to the mesa. During the mapping phase of the investigation it was noted that engineered fills are at slope ratios of 1:1 or flatter.

Undocumented fill is denoted by map symbol (**AF**). Undocumented fills are comprised of soils, cobbles and boulders as well as miscellaneous debris such as those described under Rubbish. Unauthorized dumping sites were also observed along the project alignment. Undocumented soil fills occur as drainage infill, spoil piles, and berms, and were likely placed with little or no compactive effort. Field observations indicated that the debris and dumped materials contain rubbish that consist of large chunks of concrete, asphalt, appliances, electronic machine parts, tree trimmings, car bodies, clothing and household trash. Stock piles of clayey spoil are common along the alignment. The undocumented fill soils, as well as the debris sites, are not considered suitable foundation materials in their present condition.

Potentially hazardous materials underlie an infilled drainage crossing Cactus Road between Airway Road and Camino Maquiladora. This area is known as the "Tripp Landfill" and may contain several meters of buried metal and ash. A portion of the "Tripp Landfill" is on the Barnhart/Dantzler properties and will be traversed by the proposed freeway. Our office previously investigated this area, and produced a report that provided recommendations regarding the contaminated undocumented fills. This report is listed in Section 3 above.

During the mapping phase of the investigation it was noted that non-engineered fills are at slope ratios of 1:1.5 or flatter. Much of the materials identified as undocumented fill are suitable for common embankment; if removed, mixed with suitable materials, and are replaced per standard specifications.

Where fills could not be differentiated from terrace deposits, they are depicted on the Geologic Map as **AF/QT; AF?; AFE/QT;** etc. Final designation will be made from the subsurface investigation and/or during construction grading control per standard specifications.

TOPSOIL/COLLUVIUM (COL)

Topsoil and colluvium deposits exist along the major portion of the undeveloped area of the freeway alignment. These deposits are comprised of silty and sandy clay, and silty and clayey sand with varying amounts of gravel and cobbles. These deposits are up to two meters thick. Some of the more clayey topsoils are highly expansive and will require removal in pavement areas.

ALLUVIUM (QAL)

Alluvium encountered in the river beds and channels is mostly comprised of poorly consolidated deposits of clay, silt and sand with varying amounts of gravel, cobbles and possibly boulders. The thickness of the alluvium is estimated to vary from 0.3 to 2m. Cobbles and gravels are frequently nested within the alluvial deposits. They occur as gravel bars where drainage gradients change from high-gradient slope rills to the low-gradient tread located along the arroyo/canyon bottoms.

STREAM TERRACE DEPOSITS

Stream terrace deposits of late Pleistocene or Holocene age probably occur locally as terraces bordering the valley floors. Deposits include unconsolidated sand and gravel derived from nearby sources and are comprised of debris from sedimentary, igneous and metamorphic rocks. As the current hydrologic regime is one of rapid down cutting from ephemeral flows, these features are poorly developed and indistinguishable from colluvial and alluvial deposits and therefore are not depicted on the project geologic map.

QUATERNARY TERRACE DEPOSITS (QT)

The Quaternary/Tertiary (Pliocene-Pleistocene) terrace deposits capping the Otay Mesa is the Lindavista Formation depicted by map symbol **(QT)** on the project geologic map. The San Diego Formation is a Pliocene-Pleistocene accumulation of near shore marine and non marine sediments (Kennedy and Tan). These deposits were deposited on a wave cut platform – the Lindavista terrace. The Lindavista Formation is comprised mainly of reddish brown, interbedded sandstone and conglomerate. Hematite cementation renders the Lindavista Formation resistant to erosion; thus it forms a resistant cap rock that protects the more erodible materials of the San Diego and Otay Formations. The Lindavista Formation is comprised of soft rock comprised of sandstones, siltstones, and shales derived from erosion of local bedrock and tertiary deposits. Gravel, cobble, and boulder rich (estimated 40% gravel cobble) horizons/stringers are common. The Lindavista is thought to vary from that of a gradational contact to a disconformable erosional contact with the underlying San Diego Formation. The Linda Vista was observed to stand at slope ratios from 1:1.25 to near vertical. It appears that erosion of the underlying formation exerts significant control on the slope ratios seen in the Lindavista Formation. The Lindavista Formation appears to pinch out just east of Station 178+00.

SAN DIEGO FORMATION (TSD)

The Tertiary (Pliocene) San Diego Formation was mostly observed along the flanks of arroyos and cut slopes of the project alignment. The San Diego Formation consists of inter-fingered reddish-brown ferruginous cemented cobble-boulder conglomerate and yellowish brown, calcite cemented fine to coarse grained sandstone and a cobble conglomerate within a sandstone matrix. Bedding within the San Diego Formation is believed to dip gently to the northeast and southwest. Gravel and cobbles form as much as 60% of the conglomeratic beds of the formation. Cobbles are comprised of subangular to well rounded intensely to moderately weathered, hard clasts of volcanic and granitic rock. Slopes comprised of the San Diego Formation are steep and are straight to concave upward. Where the sandstone component of the unit is exposed in slope, or by cut, it is highly susceptible to erosion and it forms bad land (barranca) type erosional surfaces. The ferruginous cemented conglomerate is more resistant and forms steeper cap rock. Natural slope ratios in the San Diego formation are at 1:1 or steeper. Colluvial deposits developed on slopes of the San Diego Formation are typically and

distinctly armored by well rounded pebbles and cobbles. The San Diego Formation thins eastward and appears to pinch out in the vicinity of La Media Road at approximately station 158+00. Locally the formation disconformably contacts the Otay Formation.

OTAY FORMATION (TO)

The Tertiary (Oligocene) Otay Formation (Walsh and Demere, 1991) is depicted by the map symbol (**TO**) on the project geologic map. Otay formation has been mapped along the top of the mesa near the eastern portion of the freeway alignment east of station 186+00 and in arroyos along the central and western portion of the alignment. Demere and Walsh (1991) are developing a model that depicts the the Otay formation is an alluvial fan/fluvial deposit comprised of a basal conglomerate member, a gritstone member, a fine to medium grained sandstone member with interbedded siltstones and mudstones. The formation as suggested by Walsh and Demere is more extensive and thicker than that proposed by other investigators.

The unit is very weak to weak rock and varies from calcite cemented beds to poorly indurated very dense beds where coherence is imparted by a clay matrix binder. The formation contains abundant beds, lenses, and laminae of pure and impure bentonite. The bentonite and bentonitic mudstones are highly expansive. Locally, bentonite was economically mined from this formation. Coloration of the formation is highly variable – but related to the depositional member. It varies from greenish gray (conglomerate), to reddish (sandstone and mudstones), to yellowish brown and very pale gray and gray white (sandstones), and to a pale reddish brown and greenish yellow (mudstones). The bentonitic seams and beds are pink to bluish gray when pure. The bentonites are of very high plasticity and are highly expansive in nature.

The Otay formation disconformably overlies the Eocene (Walsh and Demere) Sweetwater Formation, and further to the east, unconformably overlies crystalline basement rock. Natural slopes exposed in arroyos are typically convex upward and are at slope ratios of 1:1 or flatter. Many of the outcrops exhibit a hummock appearance which is the result of slumps, shallow and deep-seated slope failures. No failures are recognized within the project corridor; however shallow slope failures have been mapped in arroyos adjacent to the project right-of-way lines. Locally, colluvial deposits developed on slopes of the Otay Formation are typically fine-grained, greenish gray, fine sands and silts. These colluvial soils have a spongy texture. It was noted that evergreen woody shrubs of the rhus family seem to prefer the Otay Formation while Jojoba, chamise, and various cacti seem to prefer soils developed on the San Diego/Lindavista Formations. It is not clear at this time if these are true associations or the result of the historical use of the area.

7.2 Subsurface Soil Conditions

Based on the results of the subsurface exploration program, in general, the subsurface materials encountered in the borings to the maximum depth explored of 9.2 m appear to be comprised predominantly of granular soils. These soils were identified in the field as medium dense to dense, light to dark brown and light to dark gray, silty to well graded sand and clayey sand with abundant gravel and scattered cobbles and possibly some boulders. Random layers of stiff to hard, medium to high plasticity, clayey silt and silty clay were also encountered at depth within the borings. However, these clayey materials were present to a lesser degree than the granular materials. These materials are mostly part of the Lindavista Formation. A mantle of topsoil/colluvium appears to overlie these granular materials. The thickness of the topsoil/colluvium is generally less than about 2 m. The topsoil/colluvium increases in thickness to about 4 m west of approximately Station 150+00. The topsoil/colluvium is generally comprised of light brown to brown, loose to medium dense silty sand, and firm to stiff silty and sandy clay of medium to high plasticity. These larger thicknesses of topsoils are probably associated with the farming operations that have existed in these areas over the years. The more clayey topsoils are believed to be highly to critically expansive. Experience has shown that these materials may have an E.I.(Expansion Index) greater that 150. Existing fill soils were also encountered at some of the boring locations. In Borings CB-14,CB-15,CB-16,CB-17 and CB-18, fills comprised of loose to medium dense silty and gravelly sand with some cobbles and stiff sandy and silty clay were encountered to a depth of about 2 m. These fills appear to be undocumented and of poor quality with respect to material selection and degree of compaction.

Between Station 156+40 and Station 156+80 (approximately) at about the Cactus Road intersection, existing undocumented fills are known to be present. These fills are associated with the Barnhart property which was a dump site for burn-ash originating from the City of Coronado Municipal Landfill facility. As stated previously in Section 7.1, the geotechnical investigation for this site was performed by our office. Recommendations for adequate support of the freeway section traversing this property was presented in the previously referenced report. The environmental aspects of the dump site was outside the scope of our investigations and was addressed by Caltrans' environmental group.

Conditions observed during geotechnical investigation that may or may not be represented on the project geologic map and might influence design, constructability and/or project costs are provided in Table 2:

Table 2 : Locations and Approximate Volumes of Unsuitable Materials

STATION	CONDITION	AREA/VOLUME
13m left 137+20	Rubbish Piles	Estimated 150 m3
70+/- m Rt. 140+70	Well	
0 to 60m Lt. 146+30 to 147+00	Undocumented Canyon Fill with rubbish and rubble.	Indeterminate without boring or trench

STATION	CONDITION	AREA/VOLUME
40m Lt. To 30m Rt. Station 146+90 to 149+60	Scattered rubbish and rubble.	Guess average pile npt compacted –2.5 m3 200 piles (?) 500m^3
40 to 120m Lt. Station 148+60 to 149+50	Pond with standing water and phreatophytes	
80 to 100m Rt. 144+80	Rubbish and rubble sliver fill along canyon rim and natural slope down into arroyo invert.	Estimated 1000 m3
85m Rt. 149+40	Sewer Manhole Cover – Probable sewer line not identified on plans.	
5mto 50m Lt. 149+20 to 149–4(	Rubbish and rubble piles	Estimated 100 m^3
Rt. And Lt. Of 150+00 to 151+4	Pre-existing terraced pads of unknown engineering comprised of cobbles and boulders in dense sand matrix place on sedimentary terrace deposits of similar constituents.	
Lt Station 155+40	Concrete rubble pile; clean-out for concrete plant. Pile estimated cone 8 m high. Individual blocks/slabs of concrete 1.4mx2.5mx2m m3	Estimated 35,000 m^3 of waste concrete in in blocks as large as 7m^3 We estimated the volume by treating the stock pile as a right circular cone with diameter ranging from 65 to 75m and height ranging from 10 to 12m .and using half the calculated volume.
185m 151+80 to 152+05 Sliver fill along arroyo wall with open tension cracks behind slope edge. Shallow failure.		
80 to 100m Rt. 153+75 to 154+20	Canyon Fill with rubbish and rubble.	Depends upon thickness of fill – indeterminate from surface exposure.
+/-40m Lt. To +/-10m Rt. Sta. 159+90+/- to Sta. 160+10+/-	Undocumented Fill with rubbish and rubble.	Estimated 150m^3
23m Rt. Sta. 160+00	Well or riser to pipeline.	
43m Rt. Sta. 162+15	Well or riser to pipeline.	
43m Rt. Sta. 163+15	Well or riser to pipeline.	
+/-15m Lt. To +/-15m Rt. Sta. 160+85+/- to Sta. 161+90+/-	Undocumented Fill with rubbish and rubble.	Estimated 600 m3
0 to 20m Rt. 171+20 to 171+30	Small surficial failure in terrace.	
70m Lt. To 390m Rt. Flooded (suspected unlined) ditch/canal feeding small flood plane/ shallow basin located along NW corner of intersection of Airway Road and La Media Road.		

Rubbish is manufactured and/or organic waste products derived from the activities of man which include tree trimmings, furniture appliances or components, electronic and mechanical components, plastics, household garbage and organic soils.

Rubble is comprised of rough, irregular pieces of broken stone and building debris consisting of brick, masonry, stone and lumber. Individual clasts may be greater than one cubic meter in size/volume.

7.3 WATER

7.3.1 Surface Water

The majority of the project area is composed of a series of smooth terraces known as mesas. These mesas are relatively flat; however, their general slope along the project corridor is from north to south. Drainage generated from area basins and sub-basins therefore flow predominantly from north to south, crossing Otay Mesa Road in numerous existing culverts. Runoff is conveyed in natural swales and channels with some overland flow, street flow and storm drain flow. A major factor affecting runoff is the potential for soil infiltration. The soils in the project area have a high clay content with low infiltration, which is conducive to high runoff potential. Drainage south of Otay Mesa Road is carried mostly within steep canyons and gullies, particularly west of Britannia Road. This area drains toward the west.

Standing surface water was observed at two locations along the project corridor. The first location is a series of man-made ponds located immediately west of Heritage Road, left of centerline station 149. The second is location is within a manmade, unlined channel located along the west side of La Media Road. The channel continues southward toward Airway road and connects to a man-made depression supporting phreatophytes.

Six detention basins and three reinforced box culverts will be constructed to accommodate storm runoff. These proposed facilities are discussed in other sections of this report.

7.3.2 Scour

Runoff from precipitation will be contained by the drainage improvements for this project. Accordingly, it is anticipated that the potential for scour will be minimal.

7.3.3 Erosion

The existing formational materials are deemed to be erodible. Recommendations for erosion control measures are presented later in this report.

7.3.4 Groundwater

Perched groundwater was encountered in some of the borings during this investigation. The regional groundwater table is located at a significant depth relative to the proposed construction and consequently, will not impact the project.

The contractor may, however, encounter some perched water seepage in cuts as a result of regular and relatively heavy landscape irrigation within the project limits.

7.4 Project Site Seismicity

7.4.1 Ground Motion

The project corridor is contained within the seismically active continental margin. The area containing the project has been affected by historic and Holocene and older seismic activity. For the interval between the period of 1800 to 2004, there have been at least 167 seismic events greater than or equal to a magnitude 4 within 100km of the project site. The nearest event was a magnitude 4.1 located 15km west of the project site; the largest known event was a 6.7 earthquake which occurred in 1892 within 67km of the project; and the highest site seismic intensity was a Modified Mercalli (MM) VIII from an 1862, estimated, 4.0 magnitude event that occurred 24km northwest of the project site.

The 1990 and the 1996 revision of the California Seismic Hazard Map developed by Lalliana Mualchin was used to determine the peak ground acceleration at the project site for a maximum credible earthquake event. Figure 6 in the California Seismic Hazard Map-1996 publication shows the relationships between the regional faults and their acceleration isopacs with the project site. Acceleration isopachs on Maulchin's 1996 map indicates that the site's peak bedrock acceleration ranges from 0.45g at the western project limit to 0.32g at the eastern project limit. An average acceleration value of 0.38g has been selected for analysis; however, for critical structures, the specific acceleration for the specific site can be interpolated from Maulchin's map. A better way to handle the variation in horizontal acceleration is to envelop the analysis with the two extreme acceleration values; the resultant will be indicative of the sensitivity to a change in acceleration. Engineering discretion can then be used to settle upon an acceleration value appropriate to the site and the specific improvement being analyzed.

The dominant faults affecting the site are the Rose Canyon Fault and the Coronado Banks Fault. A Maximum Credible Event (MCE) magnitude of 7.0 is assigned to the Rose Canyon Fault. Studies on the Rose Canyon segment of the Rose Canyon Fault indicate a minimum slip rate of 1.1mm/year. The Coronado Banks Fault is located 23km west of the project site. An MCE of 7.4 is assigned to the Coronado Banks Fault and it is believed to have a minimum slip rate of 2.0 mm/year. Based upon the Bozorgnia, Campbell, Niazi attenuation relation, an MCE of 7.4 on the Coronado Banks Fault would generate a site intensity of MM IX with a corresponding site acceleration (horizontal) of 0.328g.

Based upon the UBC-97: the site is in seismic zone 4; is classified as a Very Dense Soil and Soft Rock (S_c) and Rock (S_B); and is Seismic Source Type B. Probabilistic ground motion values are provided in Table 3. These values are derived from the USGS latitude-longitude ground motion calculation page, a product of their

Earthquake Hazard Program. Ground motion values are calculated for firm rock; therefore the user should keep in mind that soil sites may amplify or de-amplify the values.

Table 3: From the USGS latitude-longitude ground motion calculation page, a product of their Earthquake Hazard Program

	10% Excedence[3] in 50 years	2% Excedence[3] in 50 years
PGA[1]	0.2294 g	0.4438 g
0.2 Second SA[2]	0.5372 g	1.064 g
1.0 Second SA[2]	0.2005 g	0.3992 g

[1] Peak Ground Acceleration
[2] Spectral Acceleration
[3] Based upon coordinate: N 32.5681 **Latitude** –117.0317 **Longitude** (West end of project).

Due to the absence of known active faults, it is felt that ground rupture is unlikely; however it is probable that the site will be subjected to multiple events of strong seismogenic shaking during the facility's life.

7.3.2 Ground Rupture

There are no known active faults that cross the project site and thus there is no potential for ground rupture based on current fault information. Mapped fault traces exhibiting ruptured early Quaternary deposits are within, parallel to and truncated by the project corridor. Holocene deposits cover these features and are not known to be faulted. Current geotechnical practice does not typically consider faults that do not exhibit rupture within the last 11,000 years; however, these faults can adversely affect slope stability. At this time, there are no known fault planes or shears that cross intervals of planned excavation; however, if they are encountered during construction, then the excavation and the fault/shear should be evaluated by a geologist prior to the completion of the excavation.

8.0 GEOTECHNICAL ANALYSIS AND DESIGN

8.1 Dynamic Analysis

The design ground motion parameters recommended for the project are summarized below:

Controlling Faults: Rose Canyon and Coronado Banks
Maximum Credible Event Magnitude: 7.5

Maximum Probable Event Magnitude:	6.25
Peak Horizontal Ground Acceleration:	0.328g (EQFAULT)
Peak Horizontal Ground Acceleration:	**0.38g (Mualchin)**

8.1.1 Liquefaction Analysis

Liquefaction is a phenomenon that occurs in loose, saturated sandy soils that are subjected to seismic shaking. During an earthquake these soils tends to lose strength and become fluid. The consequent soil movement can result in significant settlement of the roadway and related structures. The liquefaction potential of the soils is directly related to the size and duration of the seismic event, the depth of groundwater, the soil type, and the in-place density of the soils.

The maximum cyclic stress ratios produced at the project site by a seismic event are relatively low (around 0.2). The exploratory borings revealed that the occurrence of loose clean sand and sand with silt below the groundwater table is rare along the route alignment. These sand layers are typically thin and confined by bedrock below and stiffer soils above. In addition, these sand layers will densify in response to the increased overburden of the embankment fill. Accordingly, the potential for damage to the freeway facilities due to liquefaction is considered to be very low and no remedial measures are deemed to be required.

8.1.2 Earthquake Induced Settlement

In view of the very low liquefaction potential of the soils underlying the route alignment, it is concluded that the subsurface materials are not likely to experience any significant earthquake induced settlement.

8.2 Cuts and Excavations

8.2.1 Stability

The freeway construction will involve cuts between Stations 123+50 and 142+85(approximately). The maximum depth of cut will be about 8.5 m and will occur at Station 129+00. The inclination of the cut will be at 1:2(vertical to horizontal). Based on our geologic mapping we anticipate that the San Diego Formation will be exposed between Station 123+50 to Station 127+00 and the Lindavista Formation will be exposed between Station 127+00 to Station 142+85. A surficial layer of top soil and/or existing fill soil will overlie the formational materials. Slope stability analyses were performed for the proposed cut slope based on the geologic conditions expected to be encountered. Shear strength parameters used in the analyses were based on our previous experience with these materials and our professional judgment. The shear strength parameters used in our analysis are indicated in the computer output presented in the appendix.

Slope stability analyses were performed utilizing the GSTABL7 computer program developed by G. Gregory (2003). Critical failure surfaces were generated using the "CIRCLE" search option included in the program. Numerous failure surfaces were searched until the most critical surface and its corresponding factor of safety was identified. The analysis was based on both static and earthquake loading conditions. In case of earthquake loading a pseudo-static coefficient of 0.12 was input into the computer program. The results of our analysis show that the cut slope will be grossly stable against deep seated failures for both of the loading conditions considered in the analysis. Safety factors of 3.3 and 2.2 were obtained for static and earthquake loading conditions, respectively. The minimum acceptable safety factor for static and earthquake loading conditions are 1.5 and 1.1, respectively.

Materials exposed on the cut slope face are deemed to be highly erodible. Cut slopes should therefore be protected from erosion by planting as soon as practical after the completion of grading. Erosion control and planting should be in accordance with Section 20 of the Caltrans Standard Specifications.

Clayey expansive materials should not be left exposed on the slope face. These materials if encountered should be removed horizontally to a distance of 2.4 m and replaced with low expansion potential material with an Expansion Index of 50 or less.

8.2.2 Rippability

The preliminary project plans indicate that there will be some major cuts in the project. These cuts are anticipated to be mainly in the Lindavista Formation. The Lindavista Formation may be considered to be rippable utilizing conventional heavy grading equipment. It is anticipated that blasting will not be required. However, some cobbles and large boulders will likely be encountered during grading and may require special handling. These oversized materials should be buried in the deeper fill areas in accordance with Sections 19-5 and 19-6 of the Standard Specifications. No nesting of oversized materials should be permitted.

8.2.3 Grading Factor

Materials for fill will be derived mostly from cuts made in the topsoil and the Lindavista formation. Based on the results of our field exploration, our experience and professional judgment, we recommend a grading factor of approximately 0.95 for the topsoil present at the site. This corresponds to 5% shrinkage. For the Lindavista Formation we recommend a grading factor of 1.03 which corresponds to a swell of 3%.

8.3 Embankment

Based on profile grade sheets provided by District Design, the majority of the roadway will be constructed on embankment fill. Fill materials for embankment construction will be obtained partially from excavation in cut areas and partially imported from off-site borrow sources. The maximum height of fill of approximately 20 m will be at Spring Canyon stations 146+00 to 147+00. The placement and compaction of the embankment fill should conform to Section 19-6 "Embankment Construction" of the Caltrans Standard Specifications.

8.3.1 Foundation Treatment

As previously discussed in Section 7.1 sections of the freeway alignment are underlain by highly to critically expansive clayey soils. These materials should be removed and replaced by Class 5 Aggregate Sub base (Class 5 AS) comprised of non to low expansive fill materials. The minimum depth of expansive soil removal will vary but will not exceed 1.4m below the bottom of the pavement structural section.. The actual estimated depths of removal at station locations where highly expansive soils are anticipated are presented in Table 3.

Table 3: Depth of Expansive Soil Removal

Stations	Depth of Expansive Soils Replacement Below Pavement Structural Section (Meters)
160+00 to 160+85 E4	0
160+85 to 161+40 E4	0.8
161+40 to 163+30 E4	1
163+30 to 167+50 E4	1.4
167+50 to 170+30 E4	0
170+30 to 171+30 E4	1.2
171+30 to 171+90 E4	0.5
171+90 to 173+40 E4	1
173+40 to 174+15 E4	1.4
174+15 to 175+00 E4	1.2
175+00 to 176+20 E4	1.4
176+20 to 178+00 E4	0.6
178+00 to 186+60 E4	0
186+60 to 188+20 E4	1.2
188+20 to 191+20 E4	1
191+20 to 193+20 E4	1.4
193+20 to 194+70 E4	1
194+70 to 196+20 E4	1.4
196+20 to 197+00 E4	0.6
197+00 to 199+80 E4	0

Stations	Depth of Expansive Soils Replacement Below Pavement Structural Section (Meters)
166+00 to 169+80 BR1	0
166+00 to 168+00 BR2	0
168+00 to 169+40 BR2	0.6
169+40 to 170+10 BR2	0
161+20 to 162+20 BR3	0.5
162−20 to 166+10 BR3	0
160+50 to 161+00 BR4	0
161+00 to 161+60 BR4	0.8
161+60 to 164+20 BR4	1.2
164+20 to 166+00 BR4	0
91+90 to 93+60 BRN1	1.4
93+60 to 94+00 BRN1	0.5
94+00 to 97+80 BRN1	0
97+80 to 100+00 BRN1	1.4
92+00 to 99+70 DET1	1.4
10+00 to 11+00 LMD1	1.4
11+00 to 13+80 LMD1	0.6
13+80 to 14+40 LMD1	0
14+40 to 17+00 LMD1	0.5
17+00 to 17+96 LMD1	0
10+00 to 14+60 LMD2	0
14+60 to 15+00 LMD2	0.6
15+00 to 15+86 LMD2	1.4
10+00 to 10+80 LMD3	0
10+80 to 12+80 LMD3	0.6
12+80 to 15+60 LMD3	1.4
10+00 to 10+60 LMD4	0.8
10+60 to 13+46 LMD4	0
10+00 to 10+60 LMD5	0.8
10+60 to 13+20 LMD5	0
13+20 to 14+00 LMD5	0.6
14+00 to 14+95 LMD5	1.4
93+70 to 94+85 LMD	1.4
94+85 to 96+30 LMD	0.9
96+30 to 99+00 LMD	1.4
199+80 to 202+80 E2	0
202+80 to 203+40 E2	0
203+40 to 204+40 E2	0

Class 5 AS replacement materials may be obtained from excavation cuts or imported from off-site sources. Class 5 materials should possess an R(Resistance)-value greater than 10 and a Plasticity Index (PI) of less than 12.

Alternatively, a Sand Equivalent (SE) of 15 or greater may be used to qualify the material in lieu of the R-value and PI.

In all other pavement areas where compressible loose/soft top soils may be present, the foundation treatment should consist of the following:

1) Remove the upper 0.6 meters of the existing soils within the roadbed prism

2) Replace with excavated material and recompact to 90 percent relative compaction in accordance with Section 19-5 of the Standard Specifications.

8.3.2 Removal of Undocumented Fill Materials and Rubbish

Areas of the project that are underlain by undocumented fills, rubble and rubbish are depicted on the site geology map(Figure 3). Locations where these materials are expected to be encountered are also indicated in Table 2. These materials are deemed to be unsuitable for support of the pavement sections and other freeway improvements and should be removed prior to placement of embankment fill. All of the rubble and rubbish materials should be hauled away and disposed of off-site. Estimated quantities of rubble and rubbish removal are indicated in Table 2.

8.3.3 Embankment Fill in Tripp Landfill Area

Between Stations 156+40 to 156+80 where existing fills associated with the Tripp landfill are known to be present the following recommendations are applicable:

After removal of the existing Asphalt Concrete cap over the landfill along the freeway alignment, a 300mm layer of compacted clay barrier should be placed over the ground surface. The materials utilized to construct the clay cap should be obtained from on-site sources and compacted to 90 percent relative compaction.

After placement of the clay layer, a 3.3 meter height of surcharge should be placed over the entire width and length of the proposed roadway traversing the landfill. The surcharge materials may be obtained from on-site sources and comprised of either sandy or clayey materials and need not be compacted. A waiting period will be required to permit 90 percent of the anticipated consolidation settlements of the in-situ compressible clayey soils in the landfill to be completed. A settlement monitoring program will be required to verify that settlements have stabilized with time.

After settlements have fully occurred, the surcharge fill should be fully removed to the depth of the previously placed clay layer. A visual inspection should then be made of the clay layer to determine if it has maintained its integrity as a result of the compression of the underlying in-situ clays that are present in the landfill.

If the clay cap has cracked and been damaged then it should either be repaired 0r replaced in order to maintain its essentially impermeable characteristics. The next step would be to place embankment fill below the proposed structural section.in accordance with the requirements of the Caltrans Standard Specifications.

In a previous report (Section 3, Reference 6) it was recommended that the upper 1.75m of the existing landfill materials be removed and recompacted. In view of environmental constraints this recommendation is being rescinded. Thus the existing landfill materials will not be handled during the grading operations. However as a result of this change we recommend the use of flexible pavement in this area since some settlement of the landfill above the level of perched water and the in-situ clayey soils, may still occur with time. A geotechnical fabric need not be incorporated into the design of the roadway over the landfill.

8.3.4 Embankment Fill Slope Stability

The proposed embankment fill slopes will about 20m in maximum height and inclined at no steeper than 1(vertical) to 2(horizontal). Stability analysis was performed to evaluate the long term stability of the embankment fill slopes. Our analysis indicated a safety factor in excess of the minimum acceptable value of 1.5. Under pseudo-static conditions our analysis yielded a safety factor in excess of the minimum acceptable value of 1.1.

Materials exposed on the fill slope face may be highly erodible. Fill slopes should therefore be protected from erosion by planting as soon as practical after the completion of grading. Erosion control and planting should be in accordance with Section 20 of the Caltrans Standard Specifications.

Materials for fill may be obtained from on-site sources. The highly expansive clayey materials may be used as embankment fill. These materials can be buried in the deeper sections of the embankment provided they are adequately compacted. The highly expansive clayey materials should not be placed closer than a horizontal distance of 2.4m from the slope face. SEE EMAIL ZIA-YAZDANI TO C. DAVIS, 10/4/05 (ATTACHED)

8.3.5 Embankment Settlement

The height of the freeway embankment fill will vary but will not exceed to exceed about 10m in height. The embankment fill will be supported mostly on clayey topsoil overlying the Lindavista Quaternary terrace deposits. The clayey top soils will undergo compression whereas the terrace deposits will be relatively incompressible. Settlement calculations were performed at two boring locations where the clayey topsoil encountered was at its maximum height of about 3m. Fill heights at these two boring locations namely EB-9 and CB-19 were estimated to be about 8.5 and 3m, respectively. The calculations show estimated settlements of 60 mm and 100 mm at boring locations CB-19 and EB-9, respectively. These settlements are deemed to be nominal and are expected to occur rapidly upon

application of the embankment fill loads Accordingly, embankment settlement should not impact the integrity of the roadway.

9.0 EARTH RETAINING SYSTEMS

Several retaining walls are planned for the project alignment. Most of these walls have been investigated as of the writing of this report. These walls are designated as Wall Nos.123, 125, 126, 157, 158, 177, 183, RW-2 (Airway) and RW-H17 (Harvest). Walls 146 155, 158A, 171, 182, 173, and 175, have not yet been investigated due to either environmental constraints or lack of permits to enter. The field investigations for these walls will be completed at a later time and the results of the investigations will be submitted at that time. With regard to walls for which the field investigations have been completed a description of subsurface conditions and foundation recommendations for each wall are presented in the following sub-sections.

9.1 Retaining Wall 123

This wall will be a vertical reinforced concrete crib wall. The length of this wall will be 136m. It will extend from Station 122+88 to 124+44. The maximum height of this wall will be 12m.

A total of four borings namely RW1-1, RW1-2, RW1-3, and RW1-4 were drilled to investigate subsurface soil conditions along the wall alignment. The borings indicated the presence of existing fill soils over formational sandstone, siltstone and claystone. Fill depths varied from 9.1 to 20.4m at boring locations RW1-1, RW1-2 and RW1-4 to top of formational soil. At boring location RW1-3 fill was encountered to the maximum explored depth of 20.4m. In general, the fill was comprised of gray and light to dark brown, medium dense to dense silty and clayey sand, stiff to very stiff clayey silt, sandy clay and silty clay. Scattered gravel and cobbles are also present in the fill. No ground water was encountered in any of the borings.

From a geotechnical engineering standpoint, the subsurface conditions along the alignment of Wall 123 are suitable for the design and construction of the 12m high vertical crib wall. Based on the results of the subsurface investigation it is recommended that the Standard Plan vertical crib wall Type E or F be used for this wall.

9.2 Retaining Wall 125

This wall will be a vertical reinforced concrete crib wall. The length of this wall will be 154m. It will extend from Station 125+80 to 127+34. The maximum height of this wall will be 15m.

A total of four borings namely RW3-1, RW3-2, RW3-3 and RW3-4 were drilled to investigate subsurface soil conditions along the wall alignment. The borings indicated the presence of existing fill materials over weakly to moderately cemented formational sandstone and siltstone. The fill materials extended to depths varying between 6.1 to 16.8m below existing ground surface. At one boring location; RW3-2, the fill materials

extended to the maximum explored depth of 20.3 meters. In general, the fills were comprised of a mixture of sandy and clayey materials with a medium dense and stiff to very stiff consistency .Gravels and cobbles were found to be scattered in the fill materials. No ground water was encountered in any of the borings.

From a geotechnical engineering standpoint, the subsurface conditions along the alignment of wall 125 are suitable for the design and construction of the proposed 15 meter high vertical concrete crib wall. Based on the results of our subsurface investigation it is recommended that the Standard Plan vertical concrete crib wall Type F be used for this wall.

9.3 Retaining Wall 126

This wall will be about 73 meters in length. It will extend from Station 125+89 to Station 126+62. The maximum height of the wall will be 3.5 meters. The wall will support a Type 736A(modified) concrete barrier.

A total of three borings namely RW2-1, RW2-2 and RW2-3 were drilled to investigate subsurface soil conditions along the alignment of the wall. The borings indicated the presence of existing fill materials over weakly to moderately cemented formational sandstone, siltstone and claystone. The depth of the fill varied between 5.2 and 13.7 meters below existing ground surface elevation. The fill was comprised of grayish brown to reddish brown and tan, medium dense to dense silty sand and gravelly sand and stiff to very stiff clayey silt with occasional cobbles. No ground water was encountered in any of the borings.

From a geotechnical engineering standpoint, the subsurface conditions along the alignment of wall 126 are suitable for the design and construction of the proposed 3.5 meter high wall. The wall may be supported on a spread footing. Based on the results of the subsurface investigation, it is recommended that the Standard Plan Retaining Wall Type 1 or Type 5 design be used for Wall 126.

9.4 Retaining Wall –157

The length of this wall will be about 182 meters. It will extend from Station 157+00 to Station 158+82. The maximum height of this wall will be 4.2 meters. The wall will support a 736A (modified) concrete barrier and a sound wall.

A total of four borings namely RW157-1, RW157-2, RW157-3 and RW157-4 were drilled and sampled to investigate subsurface soil conditions along the wall alignment. The borings indicated the presence of existing fill soils over formational claystone and sandstone. The depth of fill varied from 5.3 to 7.6 meters. In general the fill was comprised of tan, gravelly silty sand and tan to gray, firm to very stiff, silty clay with scattered cobbles. No ground water was encountered in any of the borings.

From a geotechnical engineering standpoint, the subsurface conditions along the alignment of wall 157 are suitable for the design and construction of the proposed maximum 4.2m high wall. The wall may be supported on a spread footing. Based on layouts and cross sections of the proposed wall, and the results of our subsurface investigation, it is recommended that the Standard Structures Plan Sheet XS 3-51 titled "Sound Wall on Retaining Wall" be used for Wall 157.

9.5 Retaining Wall 158

The length of this wall will be about 65m. It will extend from Station 157+33 to Station 157+98 The height of this wall will be a maximum of 4.8m. The wall will support a 736A (modified) concrete barrier and a sound wall.

One boring namely RW-158 was drilled and sampled to investigate subsurface soil conditions along the wall alignment. The boring indicated the presence of about 5m of fill over formational claystone and sandstone. The fill was comprised of light brown to tan, dense to very dense silty sand and gravelly sand with some cobbles. Ground water was encountered at a depth of about 9.70m.

From a geotechnical engineering standpoint, the subsurface conditions along the alignment of wall RW-158 are suitable for the design and construction of the proposed maximum 4.8m high Type 1 wall. The wall may be supported on a spread footing. Based on layouts and cross sections of the proposed wall and the results of our subsurface investigation, it is recommended that the Standard Structures Plan Sheet XS3-51 titled "Sound Wall on Retaining Wall be used for Wall-158.

9.6 Retaining Wall RW-177

The length of this wall will be about 45m. It will extend from Station 170+22 to170+67 The maximum height of this wall is 5m. This wall will support a Type 736A concrete barrier.

One boring namely RW-2 was drilled and sampled to investigate subsurface soil conditions along the wall alignment. The boring indicated the presence of about 3m of fill over terrace deposits. The fill was comprised of light brown, medium dense silty sand and very stiff sandy silt and silty clay. The terrace deposits consist of light brown, clayey fine to medium sand. Ground water was encountered at a depth of about 4m.

From a geotechnical engineering standpoint, the subsurface conditions along the alignment of wall RW-177 are suitable for the design and construction of the proposed maximum 5m high Type 1 wall. The wall may be supported on a spread footing. Based on layouts and cross sections of the proposed wall and the results of our subsurface investigation, it is recommended that the Standard Plan Retaining Wall Type 1 design be used for Wall RW-177

9.7 Retaining Wall 183

The length of this wall will be about 30 meters. It will extend from Station 14+50 to 14+80 The maximum height of this wall is 3 meters This wall will support a Type 736A concrete barrier.

One boring namely RW-1 LMD was drilled and sampled to investigate subsurface soil conditions along the wall alignment. The boring indicated the presence of about 3 meters of clayey topsoil over terrace deposits. The topsoil comprises of brown, soft to stiff, silty clay with high plasticity. The terrace deposit consists of reddish brown, medium dense, fine sand with gravel and possibly some boulders. No ground water was encountered in the boring. From a geotechnical engineering standpoint, the subsurface conditions along the alignment of wall RW LMD are suitable for the design and construction of the proposed 3 meter high wall. The wall may be supported on a spread footing. Based on layouts and cross sections of the proposed wall and the results of the subsurface investigation, it is recommended that the Standard Plan Retaining Wall Type 1 design be used for wall RW LMD.

9.8 Retaining Wall RW-2 Airway

The length of this wall will be about 83 meters. It will extend from Station 108+96 to 109+79.The maximum height of this wall will be 3 meters.

Three borings namely RW-1 Airway, RW-2 Airway and RW-1 Airway were drilled and sampled to investigate subsurface soil conditions along the wall alignment. The borings indicated the presence of about 1.5meters of existing fill over weakly to moderately cemented formational sandstone. The fills were comprised of gray, medium dense, poorly graded sand and silly sand with scattered gravel In one of the borings (RW-1 Airway) perched ground water was encountered at a depth of about 6.7 meters.

From a geotechnical engineering standpoint, the subsurface conditions along the alignment of wall RW-1 Airway are suitable for the design and construction of the proposed maximum 3 meter high wall. The wall may be supported on a spread footing. Based on layouts and cross sections of the proposed wall and the results of the subsurface investigation, it is recommended that the Standard Plan Type1 Retaining Wall design be used for Wall RW-1 Airway.

9.9 Retaining Wall RW-H17 Harvest

The length of this wall will be about 45 meters in length. It will extend from Station 17+35 to Station 17+80 on the Harvest 1 line. The maximum height of this wall will be 2.4 meters.

Two borings namely RW-H17-1 and RW-H17-2 were drilled along the alignment of this wall. The borings indicated the presence of 1.6 meters of fill materials over formational siltstone. The fill was comprised of soft, dark brown sandy clay with medium dense fine sand. Formational siltstone was encountered to the maximum depth explored of 6.5 meters at both boring locations. The siltstone was found to be moderately to highly cemented. No ground water was encountered in the borings.

From a geotechnical engineering standpoint, the subsurface conditions at this wall location are suitable for the design and construction of the proposed 2.4 meter high wall. The wall may be supported on a spread footing. Based on layouts and cross sections of the proposed and the results of the subsurface investigation, it is recommended that the Standard Plan Type 1 or Type 5 Retaining Wall design be used for Wall RW-H17Harvest.

10.0 CULVERT FOUNDATIONS

A total of three box culverts are being planned for the project alignment. These culverts will be located in the Britannia, La Media and Airway segments of the project alignment. Geotechnical recommendations for each of these culverts are presented in the following sections.

10.1 *Britannia Segment*

This culvert will be located between Station 170+20 to 175+00 on the E-4 line. It will be a double box 3.05 meter by 2.745 meter in dimensions and founded about 0.6 meter below existing ground surface elevation. Fill heights above the culvert are expected to range from 0.5 to 4 meters with an average height of about 2 meters.

A total of three borings, namely BC-1, BC-2 and BC-3, were drilled along the alignment of this culvert. In Boring BC-1 fill soils comprised of dense, silty sand and stiff silty clay with occasional cobbles and boulders were encountered to the maximum depth explored of 3 meters. Ground water was encountered at a depth of 2 meters below existing ground surface elevation. In Boring BC-2 fill soils comprised of firm sandy and silty clay were encountered to a depth of about 2.5 meters. Below this depth hard formational claystone and siltstone was encountered to the maximum depth explored of 4 meters. No ground water was encountered in this boring. In Boring BC-3, top soil consisting of silty clay was encountered to a depth of about 1.7 meters. Below this depth terrace deposits comprised of medium dense gravelly sand and sandy clay with cobbles were encountered to the maximum depth explored 0f 4.5 meters. In this boring ground water was en countered at a depth of 3 meters below existing ground surface elevation.

Based on the results of the exploratory borings the culvert box structure may be placed on existing subsurface materials. No remedial grading is anticipated. The estimated maximum differential settlement from fill loads is not expected to exceed 25 mm. During

excavation for this structure, ground water seepage may be encountered. If the bottom of the excavation becomes unstable because of ground water conditions it may be necessary to stabilize it by placing a layer of clean gravel or Class 3 permeable material. The minimum thickness of the stabilizing gravel or Class 3 permeable material should be 150 mm. Depending on actual field conditions a thicker layer of stabilizing material may be required. The gravel or Class 3 permeable material should be wrapped in filter fabric to minimize the potential for piping of the native soils into the voids of the gravel and increase the potential for additional settlements.

10.2 La Media Segment

This culvert will be located between Station 95+20 and Station 99+00 on the LMD line. It will be a quadruple concrete box with dimensions of 2.44m by 1.22m and will be founded about 0.6m below existing grade elevation. This culvert will connect to an existing triple box culvert under Otay Mesa Road, which in turn is connected to an existing trapezoidal concrete open channel. Fill heights above this culvert are not expected to exceed 1.5m.

A total of two borings, namely EB-10 and EB-21 were drilled along the alignment of this culvert. In Boring EB-10, topsoil comprised of soft to firm silty clay was encountered to a depth of about 1.9m. Below the layer of topsoil, terrace deposits consisting of gravels and cobbles in a clayey matrix were encountered to the maximum depth explored of 3.7m. No ground water was encountered in this boring.

Based on the results of the exploratory borings the box culvert may be based on existing subsurface materials. No remedial grading is anticipated. The estimated maximum differential settlement from fill loads is not expected to exceed 25 mm. If ground water seepage is encountered during construction, the recommendations for filter fabric and gravel presented in Section 10.1 above should be followed.

10.3 Airway Segment

This culvert will be located between Station 190+40 and Station 191+70 on the E-6 line. It will be a double concrete box culvert with dimensions of 2.13m by 1.53m and will be founded about 0.6m below existing grade elevation. Fill heights above this culvert are not expected to exceed 2m.

One boring namely EB-20 was drilled to evaluate subsurface soil conditions along the alignment of this culvert. In this boring fill soils comprised of sandy clay were encountered to a depth of about one meter. Below the fill layer the Otay Formation was encountered to the maximum depth explored of 8m. The Otay Formation is comprised of dense to very dense well graded sand with scattered gravel. No ground water was encountered in this boring.

Based on the results of our subsurface exploration the culvert box structure may be placed on existing subsurface materials. No remedial grading is anticipated. The

maximum estimated differential settlement from new fill loads is not expected to exceed 13 mm. If ground water seepage is encountered during construction, the recommendations for filter fabric and gravel presented in Section 10.1 above should be followed.

11.0 MATERIAL SOURCES

This section will be addressed by the District Materials Engineer in the Materials report for the project to be issued separately.

12.0 MATERIAL DISPOSAL

There are significant amounts of unsuitable materials on-site that will require hauling and disposal to off-site locations. These materials consist of previously dumped trash, rubble and other deleterious materials that are unsuitable for the support of the roadway section. The location of these areas containing trash and rubble are shown on the geology map and indicated in Table 2. The highly expansive clayey materials that will be excavated from on-site sources need not be hauled away. These materials may be used as embankment fill in accordance with the recommendations presented earlier in Section 8.3.4 of this report.

13.0 CORROSION

The corrosion potential of the on-site materials were evaluated based on corrosivity tests performed on selected samples obtained from the soil borings. These tests included pH, minimum electrical resistivity, sulfate and chloride determinations. A total of 16 minimum resistivity tests, 16 pH tests, 12 chloride content and 12 sulfate content determinations were made. The results of these tests are summarized in tabular form and are presented in the Appendix to this report.

Laboratory test results indicate that the pH of the tested samples ranged from 6.5 to 8.8, minimum electrical resistivity from 65 to 2600, chloride content from 24 to 9000 ppm and sulfate content from 29 to 6300 ppm. The results of these tests indicate that in general the on-site subsurface materials are potentially corrosive. The concrete mix design and the type of cement should be based on the potential for corrosion of the subsurface materials.

The following concrete design is deemed suitable for providing a 50-year design life for reinforced concrete structures in direct contact with soil.

Cement Type:	Type II Modified or Type V
Minimum Cement	313.5 kg/cubic meter
Mineral Admixture Replacement	33%
Minimum cover over reinforcing steel	64 mm

Conduit and pipe design recommendations are the responsibility of Caltrans District 11 Materials Laboratory, which will provide corrosion analysis and recommendations for the project based on the results of their study.

14.0 SOIL PERMEABILITY VALUES

Soil permeability tests were performed on selected samples of the upper clayey materials in order to develop data for the design of the infiltration basins. The results of the soil permeability are presented in the Appendix to this report. In sample BB-13-1 the average permeability over the range of loads under which the tests were performed was 0.0000445 feet/day ($1.6x10^{-8}$ cms/second). In sample EB-3-1 the average permeability value was 0.0000618 feet/day ($2.2x10^{-8}$ cms/second). In sample EB-3-2 the average permeability value was 0.00047 feet/day ($1.66x10^{-7}$ cms/second). Based on these permeability test data it can be concluded that the degree of permeability of the upper clayey soils is very low to practically impermeable

15.0 CONSTRUCTION CONSIDERATIONS

15.1 Differing Conditions

Differing site conditions are conditions that were not encountered during the site investigation, or are latent physical conditions that differ materially from those indicated within this Geotechnical Design Report. It is imperative that the designers, the resident engineer, and/or the contractor notify the geotechnical staff of the Office of Geotechnical Design Services-South 2 immediately upon recognition of any condition differing from that described in this report. The Office of Geotechnical Design Services South-2 can be reached through Brian Hinman at (858) 467-4051.

16.0 RECOMMENDATIONS AND SPECIFICATIONS

The following is a summary of the geotechnical recommendations. Also included are design and construction recommendations that should be included in the special provisions of the project specifications.

Permanent cut slopes should be no steeper than 1(vertical) to 2(horizontal) along the alignment of the project. Cut slopes should be protected from erosion by planting as soon as practical after grading. Clayey expansive materials should not be left exposed on the cut slope face. Expansive materials should be removed horizontally a distance of 2.4 meters and replaced with materials with an Expansion Index of 50 or less.

Along sections of the freeway alignment where highly expansive soils are present the subgrade should be over-excavated to depths shown in Table 3.The expansive materials should be replaced with Class 5 AS materials which may be obtained from on-site excavation cuts or imported from off-site sources. Class 5 material is defined as material possessing an R-value greater than 10 and a Plasticity Index of less than 12 or alternatively a material with a Sand Equivalent of 15 or greater.

In pavement areas where highly expansive soils are not known to be present the upper 0.6m of the existing soils should be over-excavated, the next lower 0.3m scarified and

recompacted to 90 percent relative compaction and the over-excavated material replaced with Class 5 material compacted to 90 percent relative compaction.

All rubbish and rubble identified on the geology map (Figure 3) and in Table 2 should be removed and hauled away to off-site sources. All undocumented fills underlying pavement areas should also be removed and recompacted.

In the Tripp landfill area special recommendations apply as indicated in Section 8.3.3 of this report. These recommendations include a surcharge fill and a settlement monitoring period. The existing landfill materials need not be handled during grading operations.

Embankment fill slopes should be no steeper than 1:2 in fill areas. Erosion control measures should be implemented to protect the slope face. Highly expansive materials may be used as embankment fill provided these materials are buried in the deeper sections of the embankment. The highly expansive clayey materials should not be placed closer than a horizontal distance of 2.4 meters from the slope face.

Embankment settlements are expected to be low and not expected to exceed an estimated value of 100 mm. These settlements will occur rapidly upon application of the fill loads.

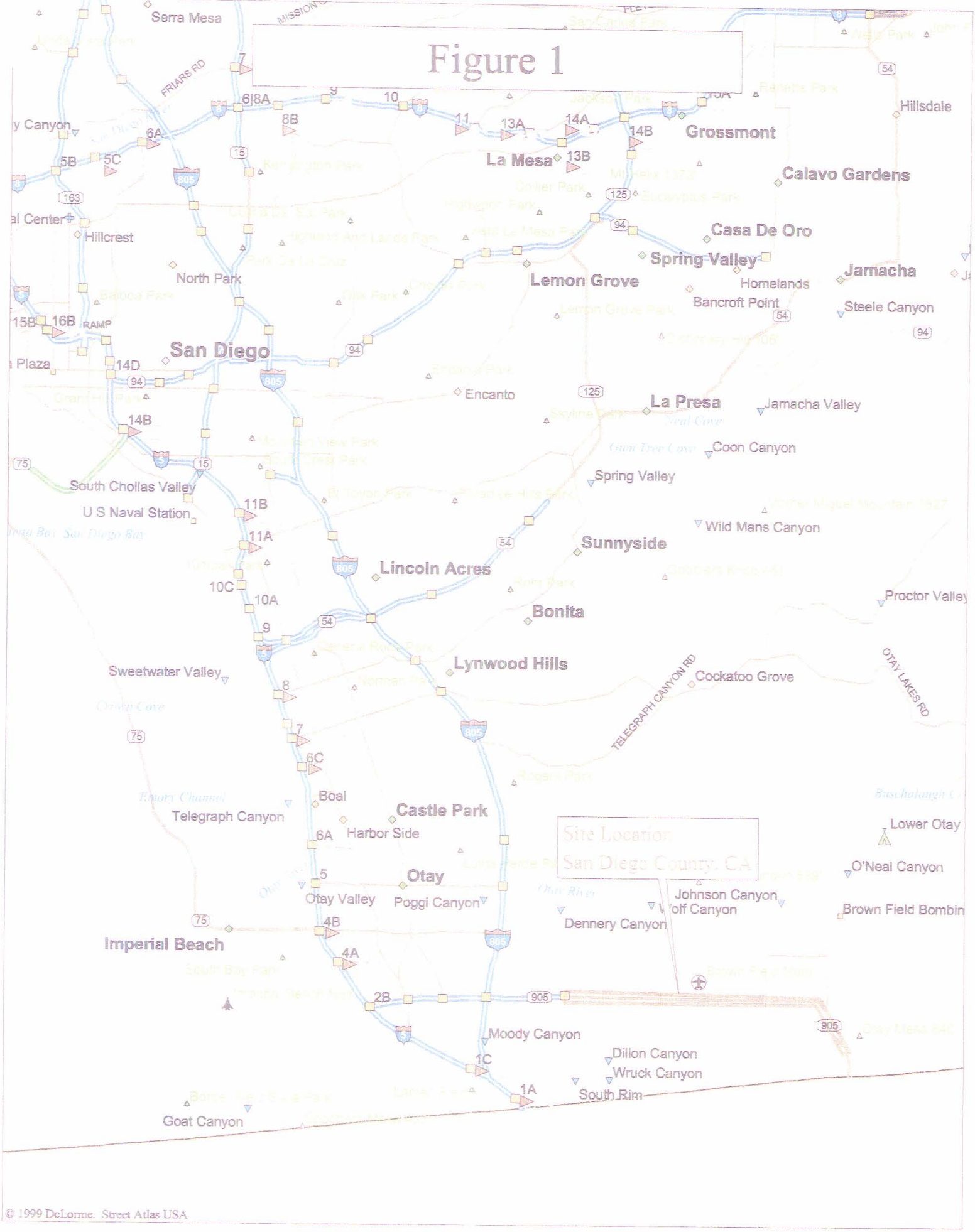
Foundation materials are deemed competent enough to support the retaining walls proposed for the project. Standard Plan designs are deemed applicable to these walls.

Wet pumping conditions may be encountered at the bottom of the excavations required for installation of culverts .A minimum 150 mm of Class 3 permeable material or gravel wrapped in filter fabric may be required to provide a stable platform for construction of the culverts.

The site is considered to be corrosive with regard to chloride concentrations. Sulfate concentrations are also deemed to be high. Therefore, Type II Modified or Type V cement should be used for concrete structures in direct contact with soil.

FIGURES

Figure 1



© 1999 DeLorme. Street Atlas USA

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
11	SD	905	9.2/18.0	—	XXXX

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

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NOTE:
FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

CURVE DATA			
No.	R	DELTA	L
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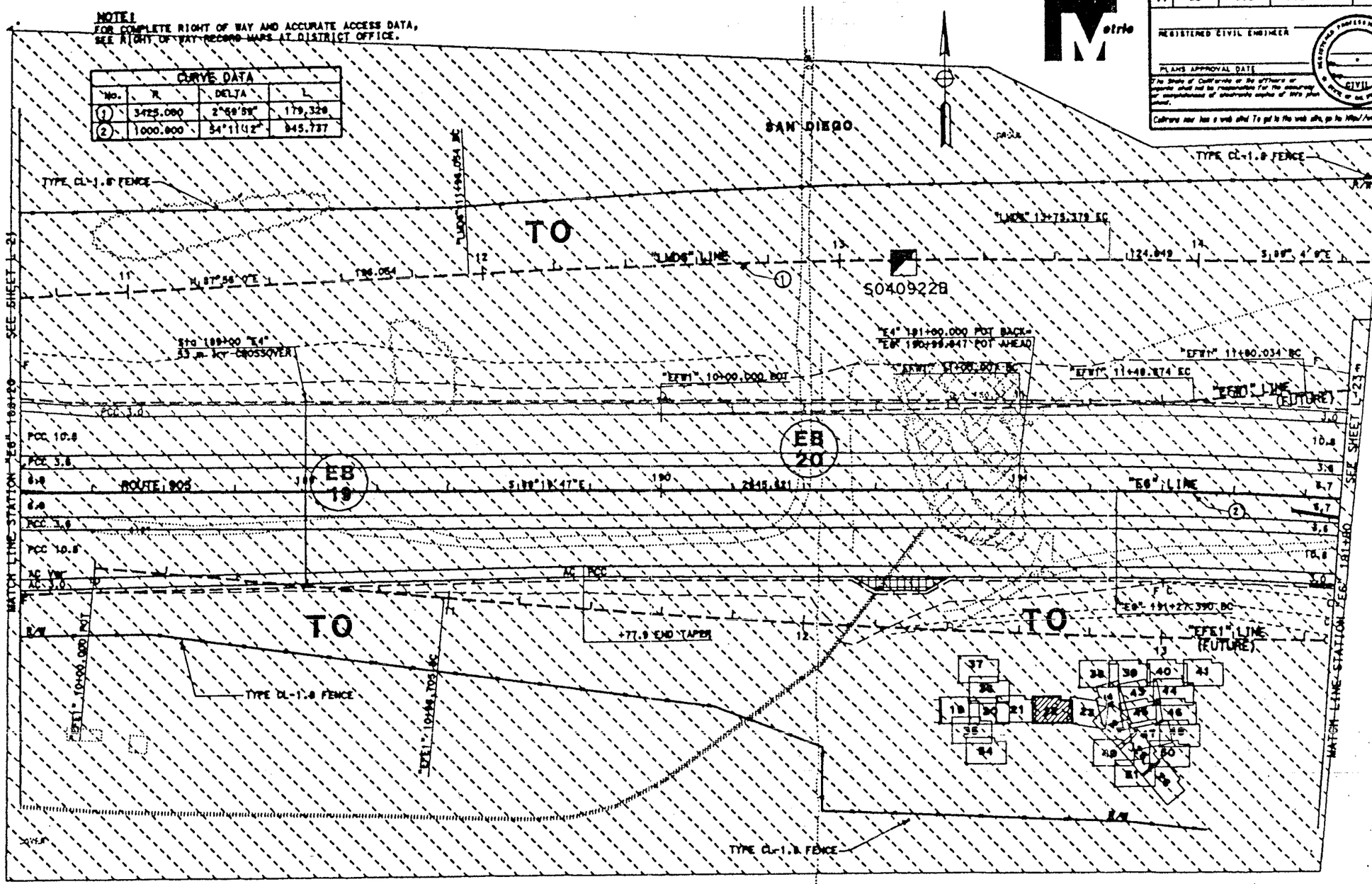
2	1000.000	54°11'12"	945.737



ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

GEOLOGICAL MAP AND LAYOUT

FIGURE 3 SCALE 1:2400 L-22

RELATIVE BORDER SCALE IS IN MILLIMETERS

CU 11224 EA 091821

02-23-05

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	905	9.2/10.0		XXXX

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

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DATE REVISED BY DATE REVISED

CALCULATED/DESIGNED BY

CHECKED BY

PROJECT ENGINEER

MATCH LINE SEE SHEET L-20

BB

BC 0+54.715

CHAIN LINK FENCE (TYPE CL-1.8)

SD40928A

QT / TO

TO

TYPE 160 LAYOUT
ALTERNATIVE FLARED TERMINAL SYSTEM
END ANCHOR ASSEMBLY
(TYPE SKT)

"E4" 185+28
END MBGR

"E4" 186+20
IRRIGATION CROSSOVER

"E4" 188+01.60
END MBGR
BEGIN SKT MBGR

VARIES

"E4" 187+96.20
BEGIN MBGR

CRASH CUSHION (TYPE CAT)

"E4" LINE 2

"E4" 187+81.00
BEGIN DOUBLE MBGR

"E4" 188+19.00
END DBL MBGR

"E4" 187+92.40
END DBL MBGR
BEGIN MBGR

"E4" 188+03.80
END MBGR

"E4" 188+00.00
END PCC LANE
END PCC SHOULDER
BEGIN AC PAVEMENT
BEGIN LANE TAPER

SEE SHEET L-22

MATCH LINE

EB 16

EB 18

105 ROUTE 905

106 S 89°19'41"E 2645.62'

DCE

DRAINAGE EASEMENT

TCE

CHAIN LINK FENCE (TYPE CL-1.8)

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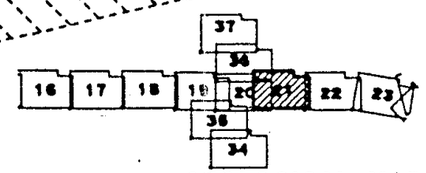

GEOLOGICAL MAP AND LAYOUT
FIGURE 3 SCALE 1:2400 L-21

RELATIVE BORDER SCALE IS IN MILLIMETERS 0 20 40 60 80

USERNAME => tstoll
DGN FILE => 905l.dgn

CU 11224

EA 091821

DATE PLOTTED => 26-JAN-2005
TIME PLOTTED => 11:57

05-19-04

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
11	SD	905	9.2/18.0		XXXX

REGISTERED CIVIL ENGINEER

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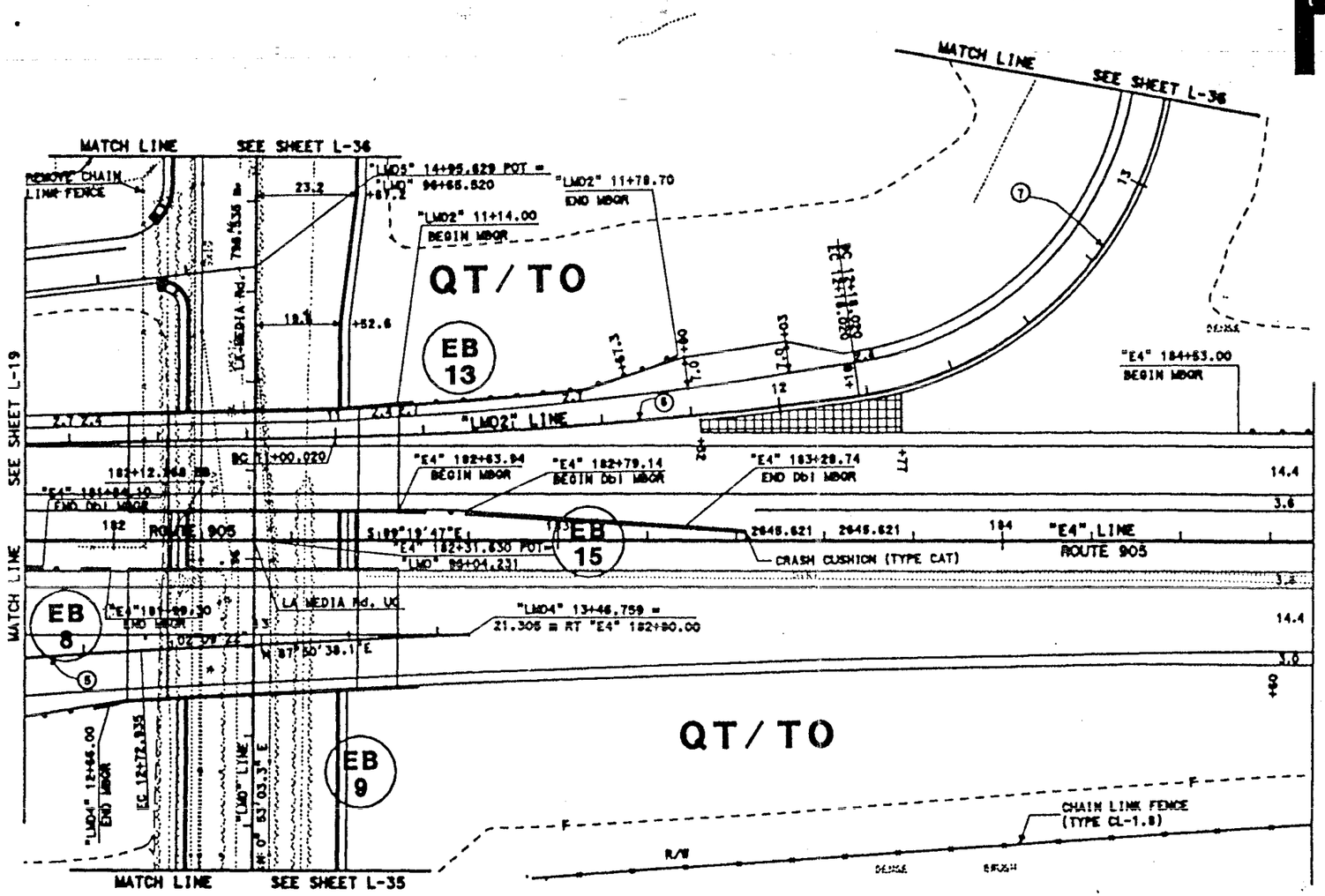
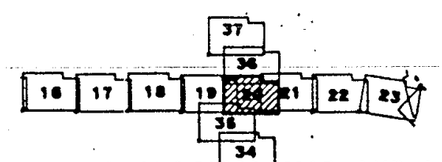


CURVE DATA				
No.	R	Δ	T	L
5	1000.000	02°53'50.0"	25.29 m	50.57 m
6	1000.000	06°45'39.2"	59.07 m	118.00 m
7	81.240	172°45'49"	1284.75 m	244.96 m

QT/TO



NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN.

GEOLOGICAL MAP AND LAYOUT
FIGURE 3 SCALE 1:2400 L-20

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

PROJECT ENGINEER | CALCULATED/DESIGNED BY | CHECKED BY | DATE | REVISED BY | DATE REVISED

RELATIVE BORDER SCALE IS IN MILLIMETERS

CU 11224 | EA 091821

05-20-04

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
11	SD	905	9.2/18.0		XXXX

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

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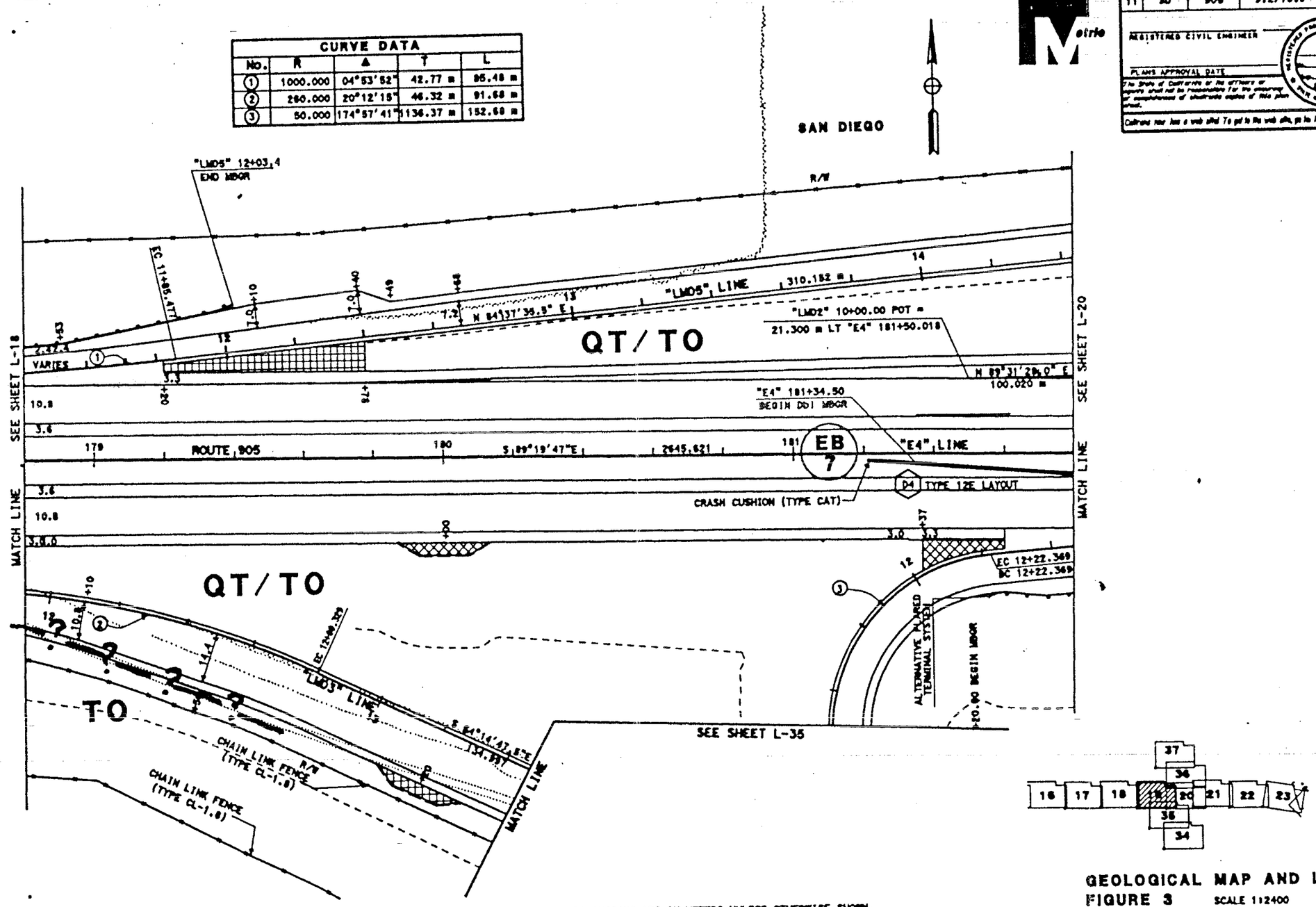
Metric

CURVE DATA				
No.	R	Δ	T	L
1	1000.000	04°53'52"	42.77 m	85.48 m
2	260.000	20°12'15"	46.32 m	91.68 m
3	50.000	174°57'41"	1136.37 m	152.68 m



NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN.

GEOLOGICAL MAP AND LAYOUT
FIGURE 3 SCALE 1:2400 L-19

RELATIVE BORDER SCALE IS IN MILLIMETERS

CU 11224 EA 091821

DATE REVISED BY | DATE REVISED | CALCULATED/DESIGNED BY | CHECKED BY | PROJECT ENGINEER

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
11	SD	905	9.2/18.0		XXXX

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

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DATE | REVISED BY | DATE REVISED

CALCULATED/ DESIGNED BY

CHECKED BY

PROJECT ENGINEER

SAN DIEGO

"LMD5" 10+00.00 POT = 21.300 m LT "E4" 177+38.168

CHAIN LINK FENCE (TYPE CL-1.8)

"E4" 178+14 BEGIN MBOR

BEGIN MBOR
END AC DIKE
BEGIN AC DIKE (TYPE E)

EB 3 — D2 — TYPE 16B LAYOUT ALTERNATIVE FLARED TERMINAL SYSTEM END ANCHOR ASSEMBLY (TYPE SFT)

EB 4

R/W

MATCH LINE SEE SHEET L-17

MATCH LINE SEE SHEET L-19

QT

QT

QT/TO?

ROUTE 905

EB 2

S 89°19'47"E 2645.621

EB 6

"E4" LINE

REMOVE CHAIN LINK FENCE

QAL

EB 5

S 84°27'02.4"E 88.645

"LMD3" LINE

"E4" 175+77 BEGIN MBOR

TYPE 16B LAYOUT ALTERNATIVE FLARED TERMINAL SYSTEM END ANCHOR ASSEMBLY (TYPE SFT) — D1

"E4" 176+52 END MBOR

CHAIN LINK FENCE (TYPE CL-1.8)

TO?

"LMD3" 10+00.00 POT = 21.306 m RT "E4" 176+87.880

CHAINLINK FENCE (TYPE CL-1.8)

16 17 19 20 21 22 23 34 35 37

NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN.

GEOLOGICAL MAP AND LAYOUT

FIGURE 3 SCALE 1:2400 L-18

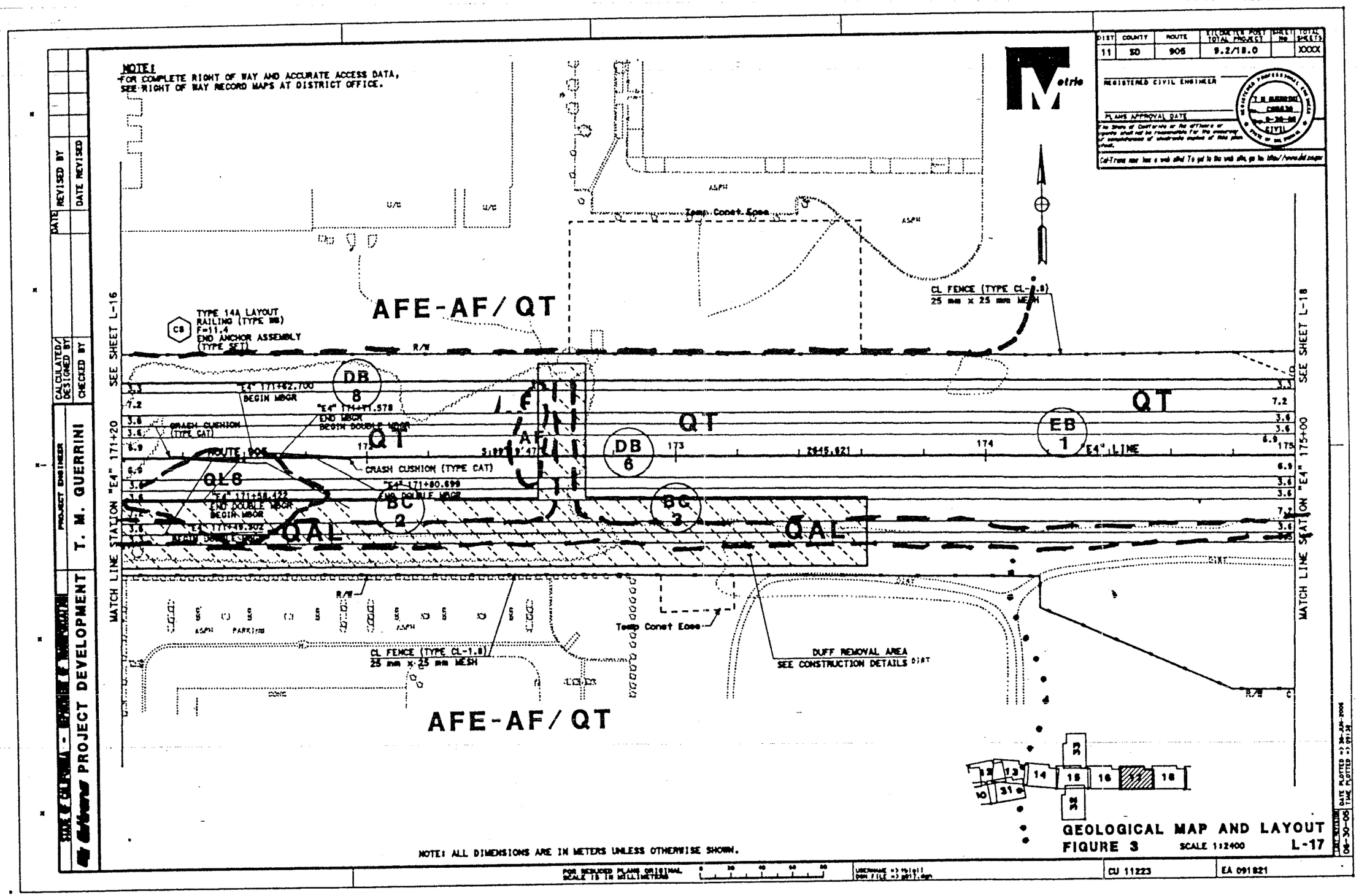
RELATIVE BORDER SCALE IS IN MILLIMETERS 0 20 40 60 80

USERNAME = rbloll
DGN FILE = e01l.dgn

CU 11224 EA 091821

DATE PLOTTED = 30-JUN-2006
TIME PLOTTED = 10:19

06-18-04



NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN.

GEOLOGICAL MAP AND LAYOUT
FIGURE 3 SCALE 1:2400 L-17

PROJECT DEVELOPMENT T. M. GUERRINI

CU 11223 EA 091821

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
11	SD	905	9.2/18.0		XXXX

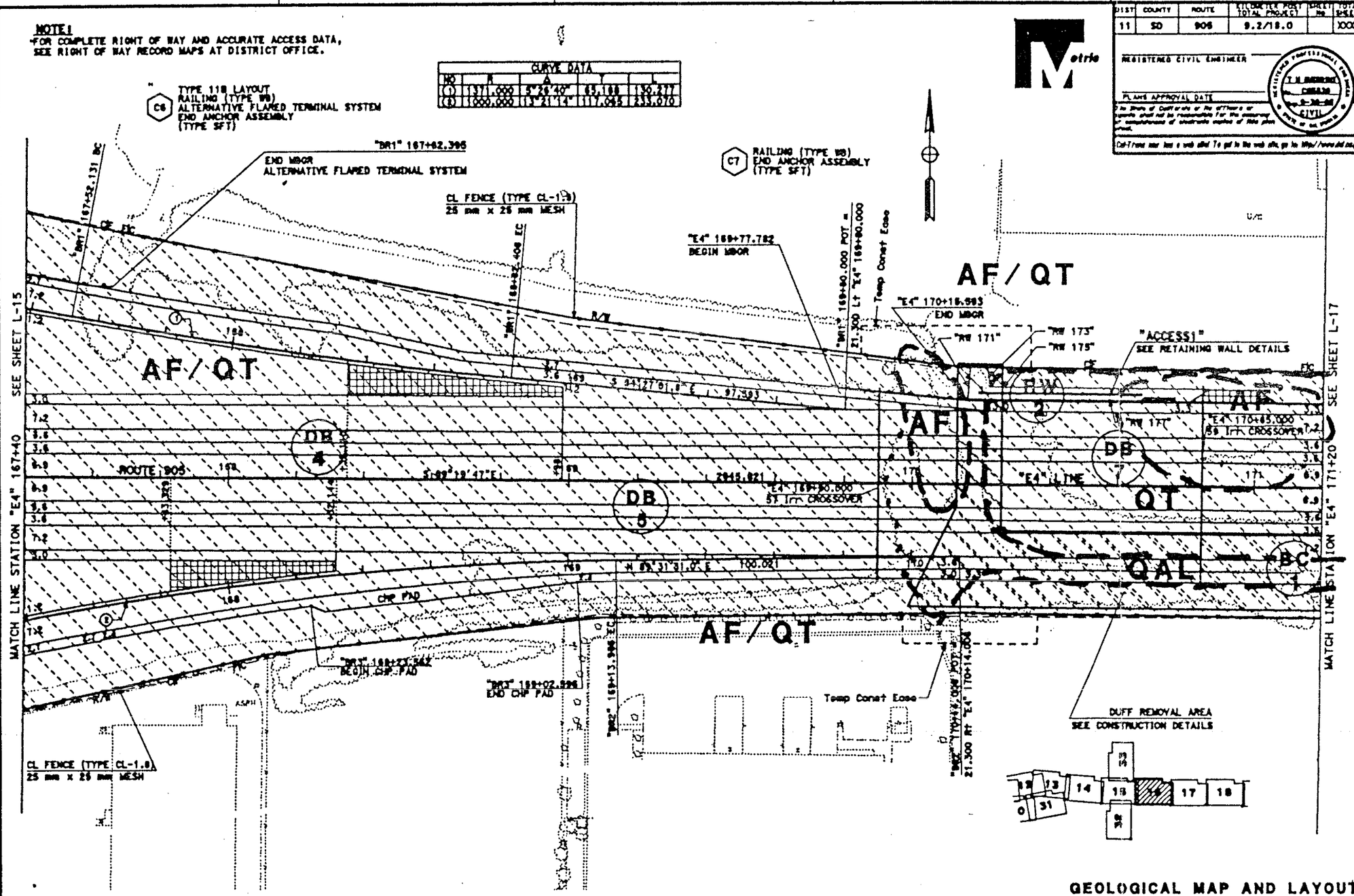
REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

Metric

NOTE:
*FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

CURVE DATA				
NO	R	Δ	T	L
(1)	1371.000	5°26'40"	65.188	130.277
(2)	1000.000	13°21'14"	117.065	233.070



NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN.

GEOLOGICAL MAP AND LAYOUT
FIGURE 3 SCALE 1:2400 L-16

PROJECT ENGINEER T. M. GUERRINI

CALCULATED/DESIGNED BY | CHECKED BY | DATE | REVISED BY | DATE REVISED

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
PROJECT DEVELOPMENT

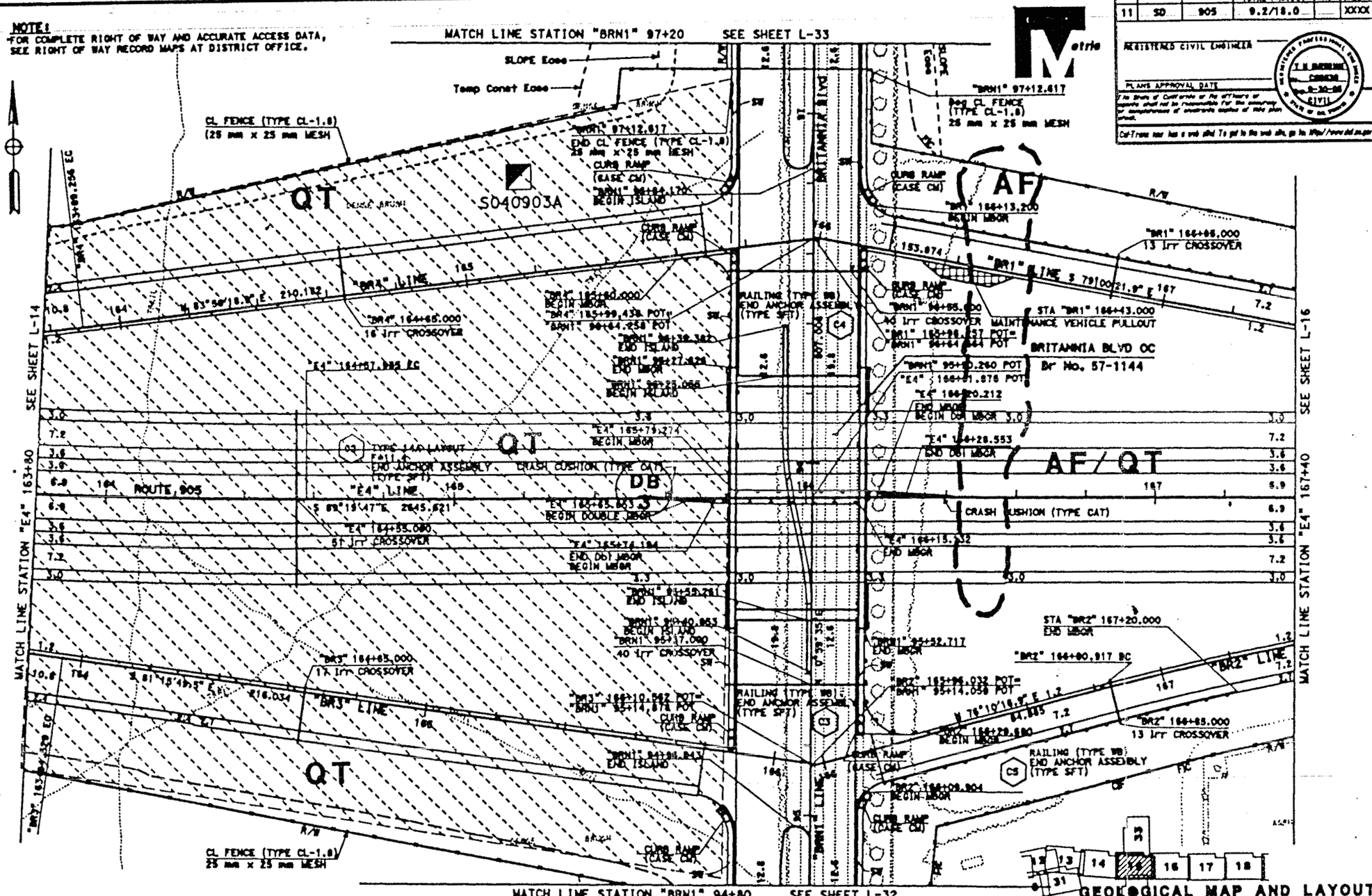
CJ 11223 | EA 091821

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
11	SD	905	9.2/18.0		XXXX

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

NOTE:
FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.



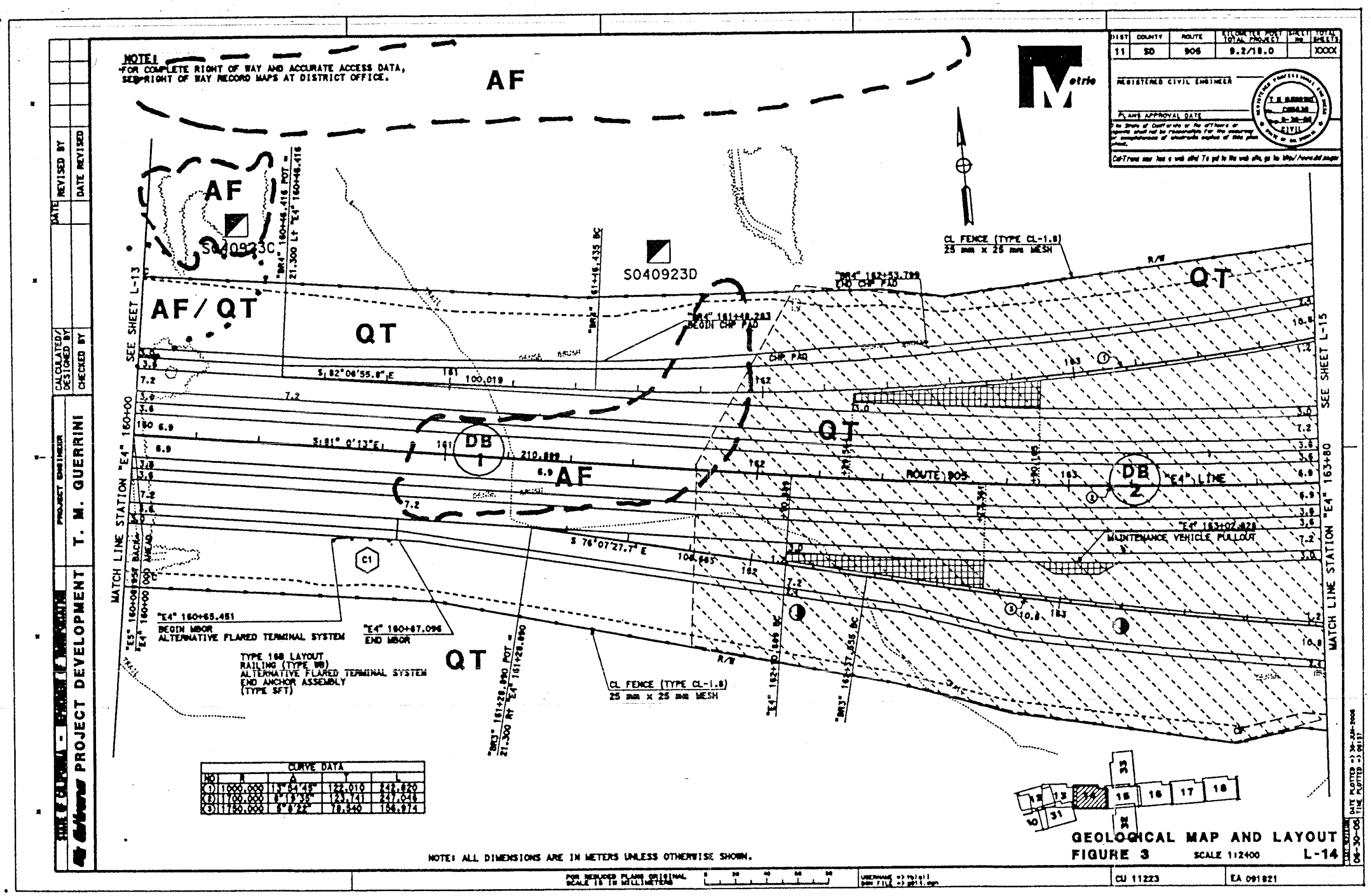
NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN.

GEOLOGICAL MAP AND LAYOUT
FIGURE 3 SCALE 1:2400 L-15

CU 11223 EA 091821

PROJECT DEVELOPMENT T. M. GUERRINI

REVISED BY | DATE REVISED | CALCULATED/DESIGNED BY | CHECKED BY



CURVE DATA				
NO	R	Δ	T	L
1	1000.000	13°54'45"	122.010	242.820
2	1700.000	8°19'35"	123.741	247.046
3	1750.000	5°8'22"	78.540	156.974

NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN.

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
11	SD	905	9.2/18.0		XXXX

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

Metric

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

PROJECT DEVELOPMENT

PROJECT ENGINEER T. M. GUERRINI

CALCULATED/DESIGNED BY | CHECKED BY | DATE REVISED BY | DATE REVISED

GEOLOGICAL MAP AND LAYOUT

FIGURE 3 SCALE 1:2400 L-14

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS

CU 11223 | EA 091821

DATE PLOTTED => 30-JUN-2006
TIME PLOTTED => 06:57
06-30-06

NOTE:
FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

CURVE DATA				
No.	R	DELTA	L	T
(1)	1660.00	19°15'18"	557.87	281.59

DIST	COUNTY	ROUTE	KILOPOST (OR POST MILE) TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	905	9.2/10.0		XXXX

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

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SAN DIEGO

Permit to Enter
See Const DRIVEWAY
SEE Const DETAILS

Permit to Enter

Const DRIVEWAY
SEE Const DETAILS

Permit to Enter

REMOVE BASE AND SURFACING

Temp Const Ease

CL FENCE (TYPE CL-1.8)

1-2 W CHAIN LINK GATE (TYPE CL-1.8)

CACTUS ROAD

N 6°36'46.1" E

"CAC" LINE

DRAINAGE EASEMENT

CL FENCE (TYPE CL-1.8)

Temp Const Ease

1-2 W CHAIN LINK GATE (TYPE CL-1.8)

28,378m Lt 156+19 "ES"
END WALL "RW158" DIRT

MATCH LINE STATION "ES" 156+90

SEE SHEET L-12

QT

AF

TSD

AF/QT

RW 2

RW 3

RW 4

RW 158

CB 24

CB 22

CB 21

CB 23

ROUTE 905

"ES" LINE

26,194 m
S81°00'12.6"E

MATCH LINE STATION "ES" 160+06.302 Bk
= "E4" 160+00 Ahd

SEE SHEET L-14

27.9 m Rt 157+33 "ES"
END WALL "RW156"
28,378 m Rt 157+33 "ES"
BEGIN WALL "RW158"

1-2 W CHAIN LINK GATE (TYPE CL-1.8)

CL FENCE (TYPE CL-1.8)

28,350 m Rt 158+38 "ES"
END WALL "RW158A"

51 FT. CROSSOVER

1-2 W CHAIN LINK GATE (TYPE CL-1.8)

Temp FENCE (TYPE ESA)

CL FENCE (TYPE CL-1.8)

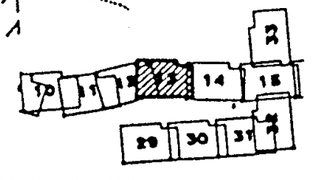
57.2 m Rt 159+76.1 "ES"
END Temp FENCE (TYPE ESA)

159+79.109 EC "ES"

ESA

QT

CAC LINE



GEOLOGICAL MAP AND LAYOUT
FIGURE 3 SCALE 1:2400 L-13

NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN.

DATE	REVISED BY	DATE REVISED

CALCULATED/DESIGNED BY

CHECKED BY

PROJECT ENGINEER X.X. XXXXX

PROJECT DEVELOPMENT

FOR REDUCED PLANS ORIGINAL SCALE IS IN INCHES / METERS

CU 11200

EA 091821

DATE PLOTTED = 29-JAN-2008
TIME PLOTTED = 09:16

DATE PLOTTED = 15-NOV-04
TIME PLOTTED = 09:16

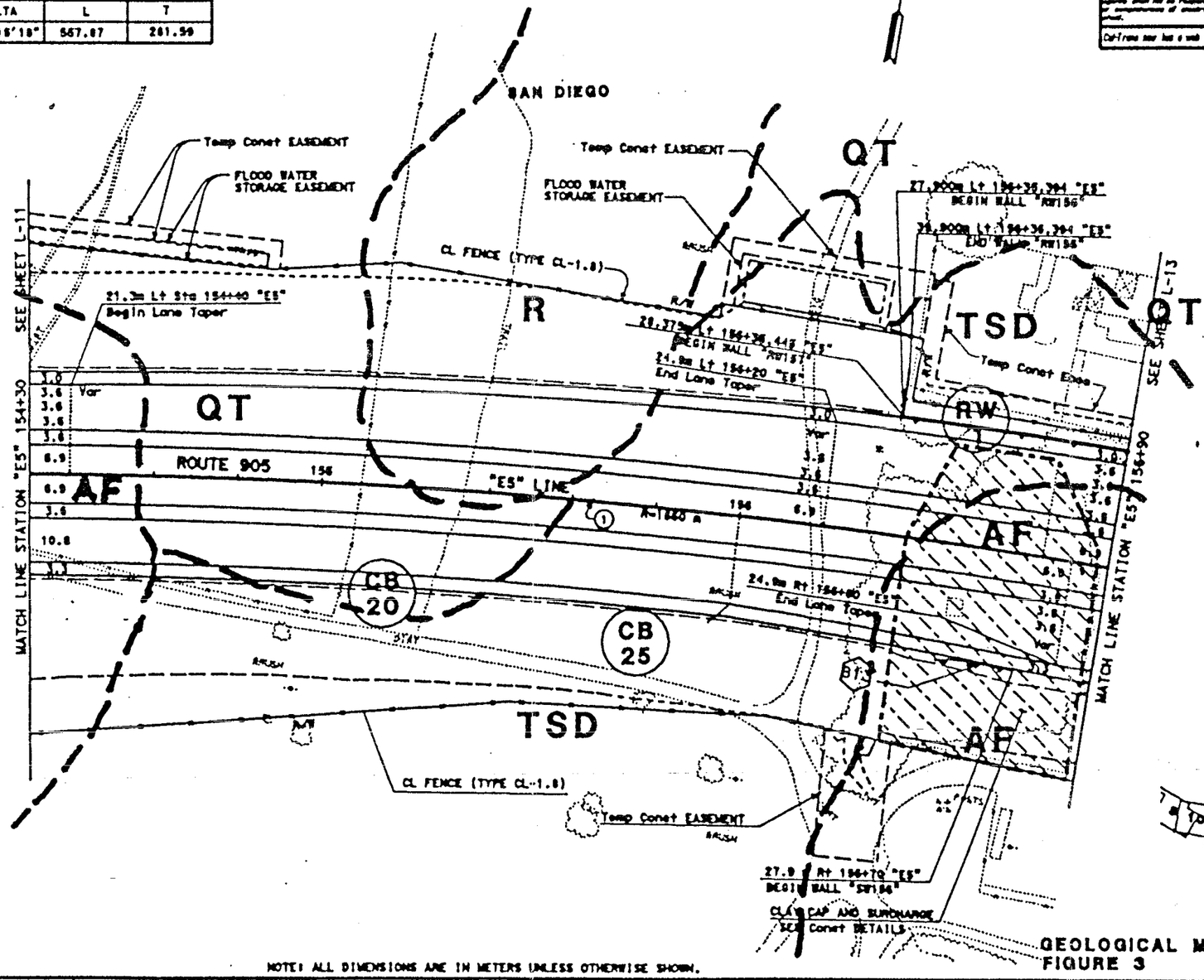
NOTE:
*FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

CURVE DATA				
No.	R	DELTA	L	T
(1)	1640.00	19°15'19"	567.87	286.59

DIST	COUNTY	ROUTE	KILOMETER POST BEGIN / END	SHEET NO.	TOTAL SHEETS
11	SD	905	9.2/10.0		XXXX

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE



GEOLOGICAL MAP AND LAYOUT
FIGURE 3 SCALE 1:2400 I-12

NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN.

PROJECT DEVELOPMENT
PROJECT ENGINEER X.X. XXXX
CALCULATED/DESIGNED BY
CHECKED BY
REVISED BY
DATE REVISED

CU 11220C
EA 091821

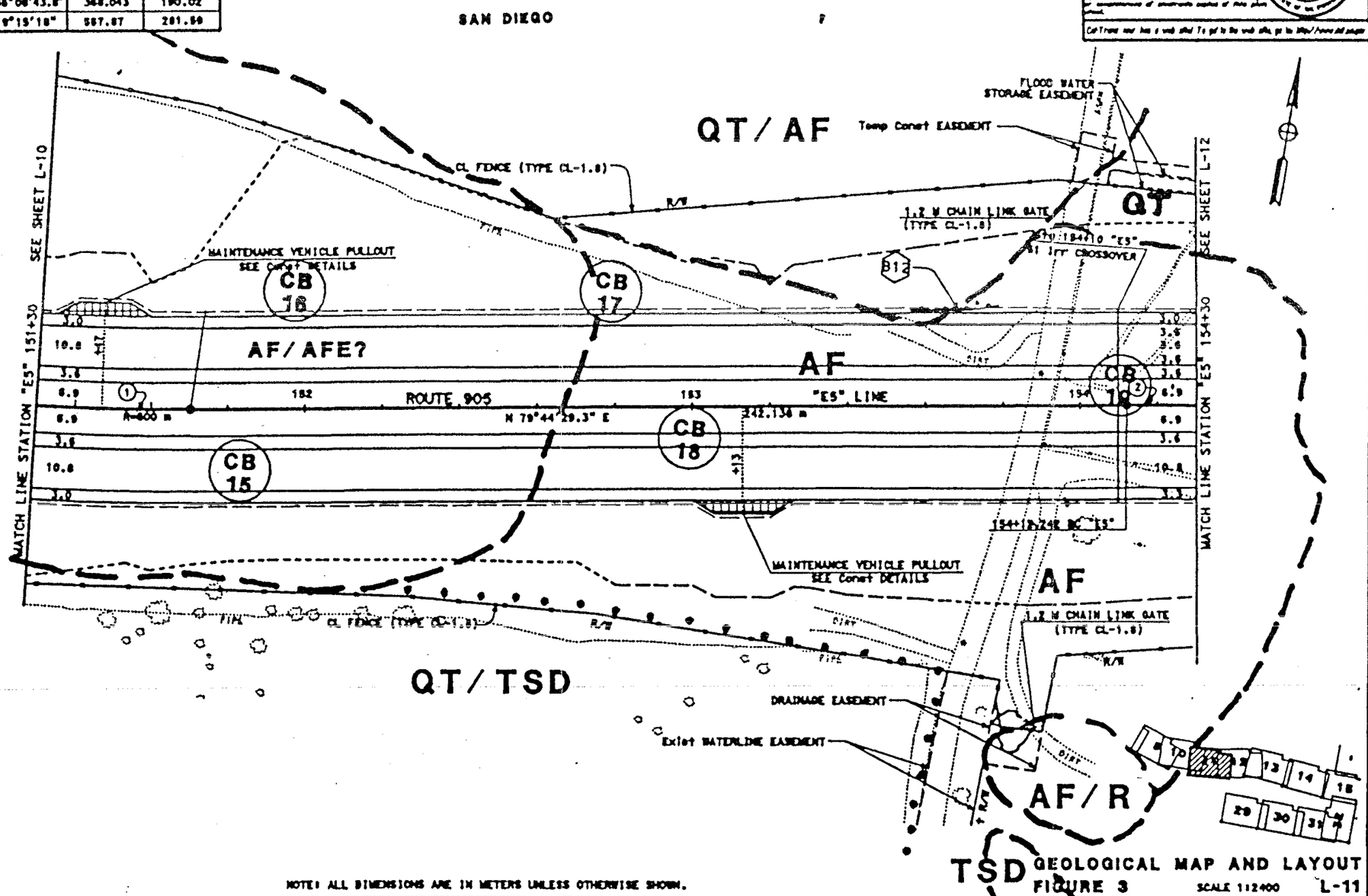
NOTE:
FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

CURVE DATA				
No.	R	DELTA	L	T
1	600.000	35°08'43.8"	368.043	190.02
2	1660.00	19°15'18"	557.87	281.59

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
11	SD	905	9.2/18.0		XXXX

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

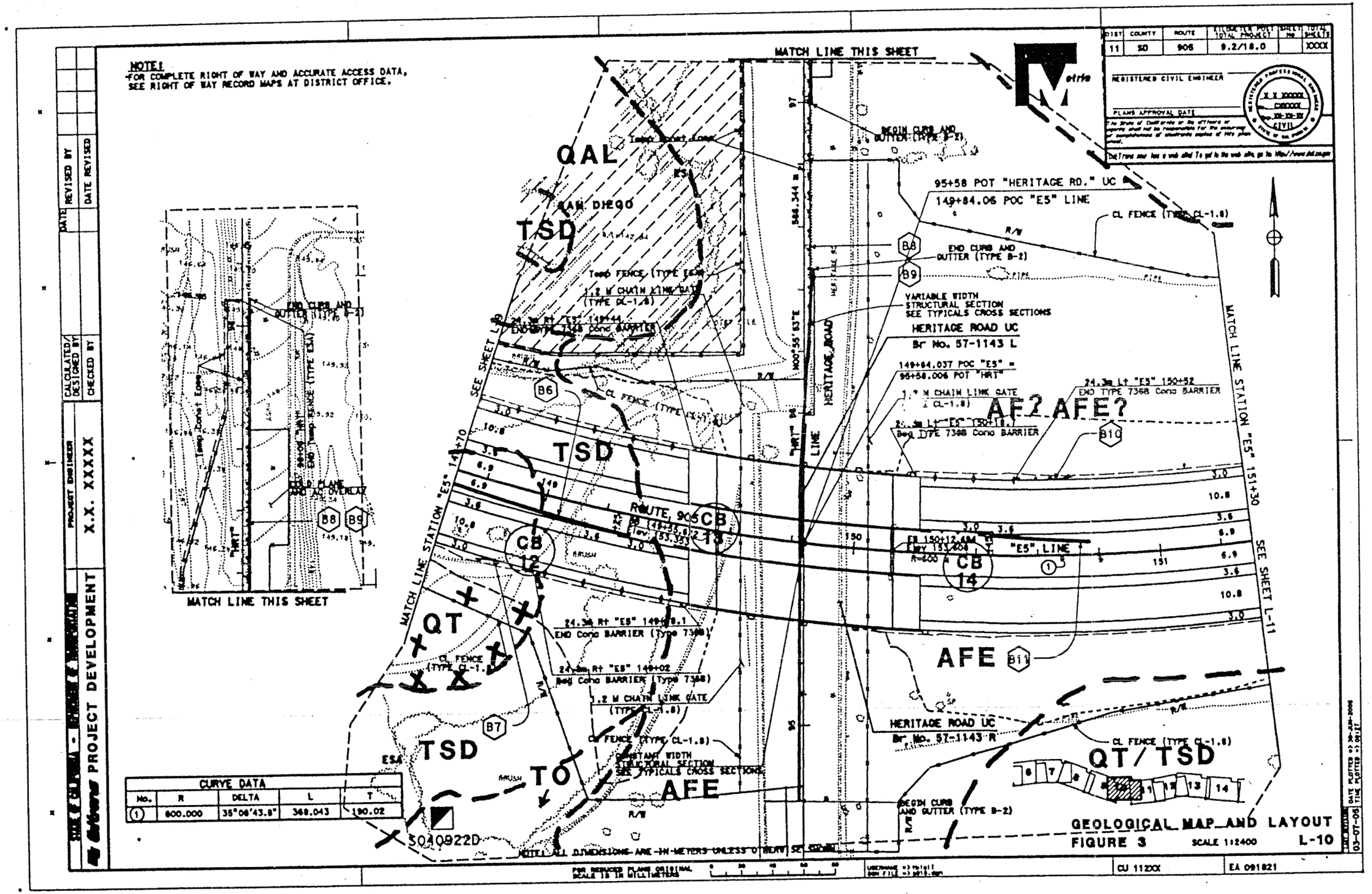


NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN.

GEOLOGICAL MAP AND LAYOUT
FIGURE 3
SCALE 1:2400
L-11

PROJECT DEVELOPMENT
X.X. XXXXX
CALCULATED/DESIGNED BY
CHECKED BY
DATE REVISED BY
DATE REVISED

CU 112XX
EA 091821



CURVE DATA				
No.	R	DELTA	L	T
1	600.000	35°06'43.8"	368.043	190.02

GEOLOGICAL MAP AND LAYOUT
FIGURE 3 SCALE 1:2400 L-10

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
11	SD	905	9.2/18.0		XXXX

REGISTERED CIVIL ENGINEER
PLANS APPROVAL DATE

PROJECT ENGINEER X.X. XXXXX
CALCULATED/DESIGNED BY
CHECKED BY
REVISED BY
DATE REVISED
DATE
PROJECT DEVELOPMENT

CU 112XX
EA 091821

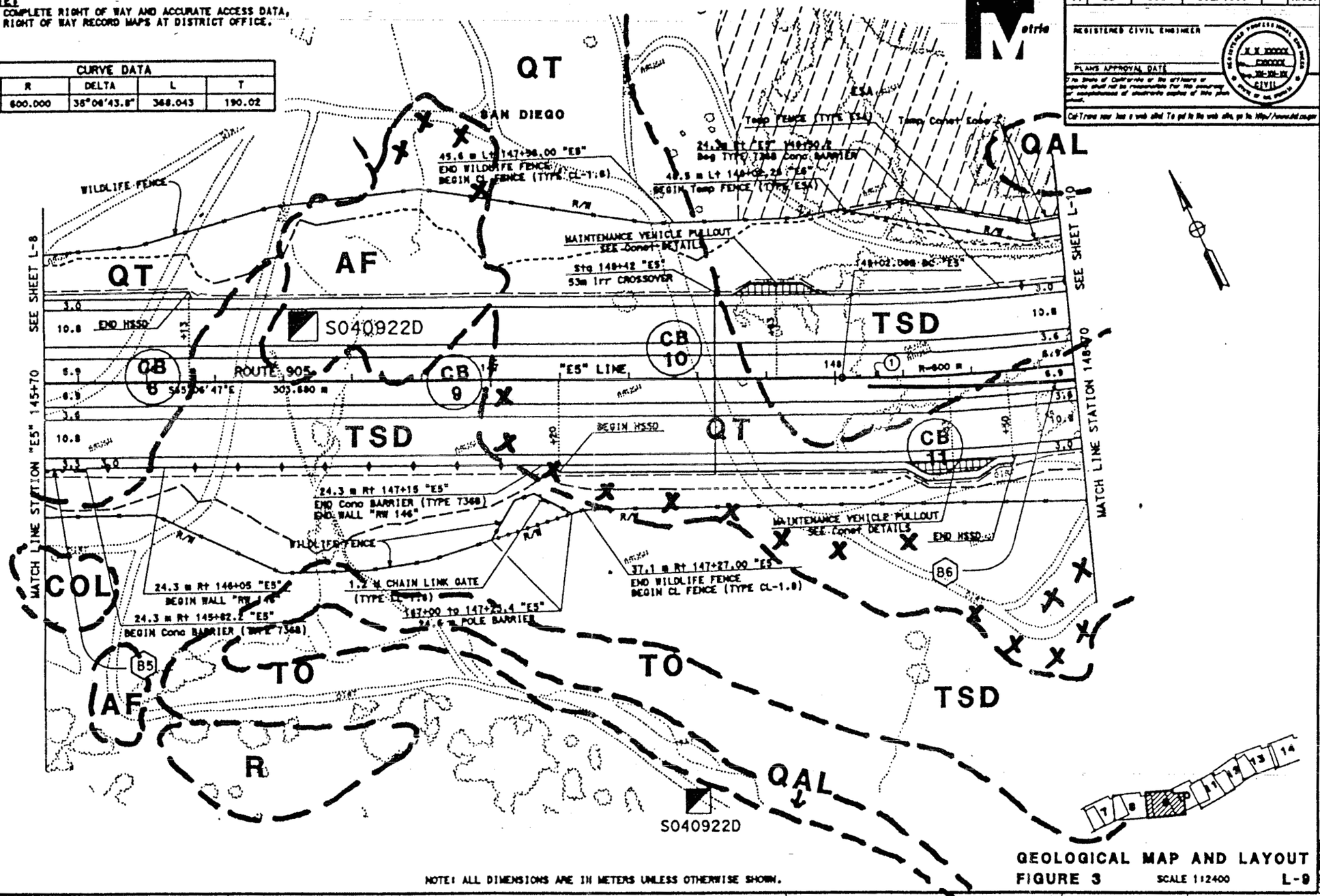
DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
11	SD	905	9.2/18.0		XXXX

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

NOTE:
FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

CURVE DATA				
No.	R	DELTA	L	T
1	600.000	36°06'43.8"	368.043	190.02



NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN.

GEOLOGICAL MAP AND LAYOUT
FIGURE 3 SCALE 1:2400 L-9

CU 112XX EA 091821

PROJECT DEVELOPMENT X.X. XXXXX

CALCULATED/DESIGNED BY | CHECKED BY | DATE REVISED BY | DATE REVISED

10-01-04

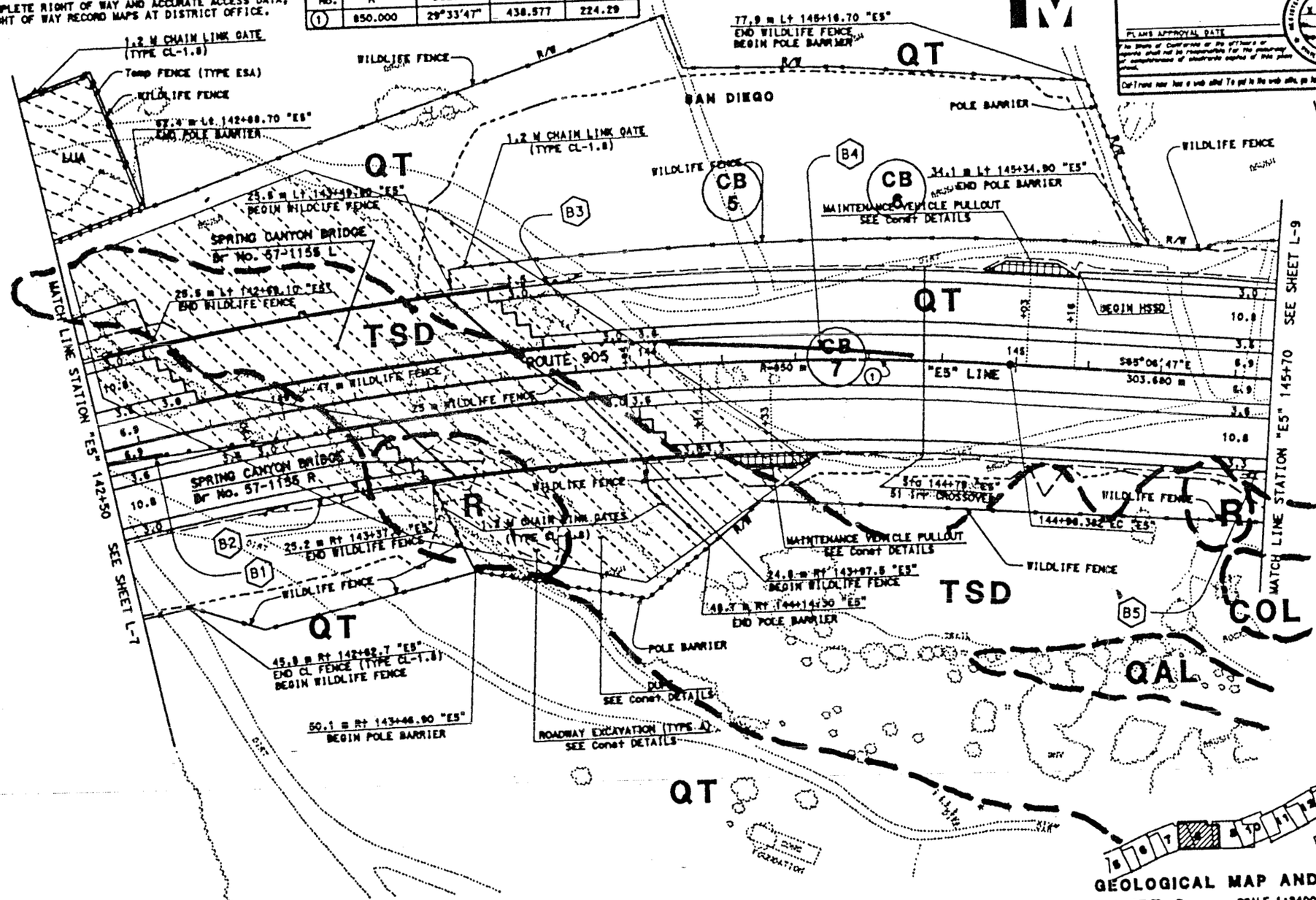
DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
11	SD	905	9.2/18.0		XXXX

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

NOTE:
FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

CURVE DATA				
No.	R	DELTA	L	T
1	850.000	29°33'47"	438.577	224.29



GEOLOGICAL MAP AND LAYOUT
FIGURE 3 SCALE 1:2400 L-8

NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN.

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS

CU 112XX EA 091821

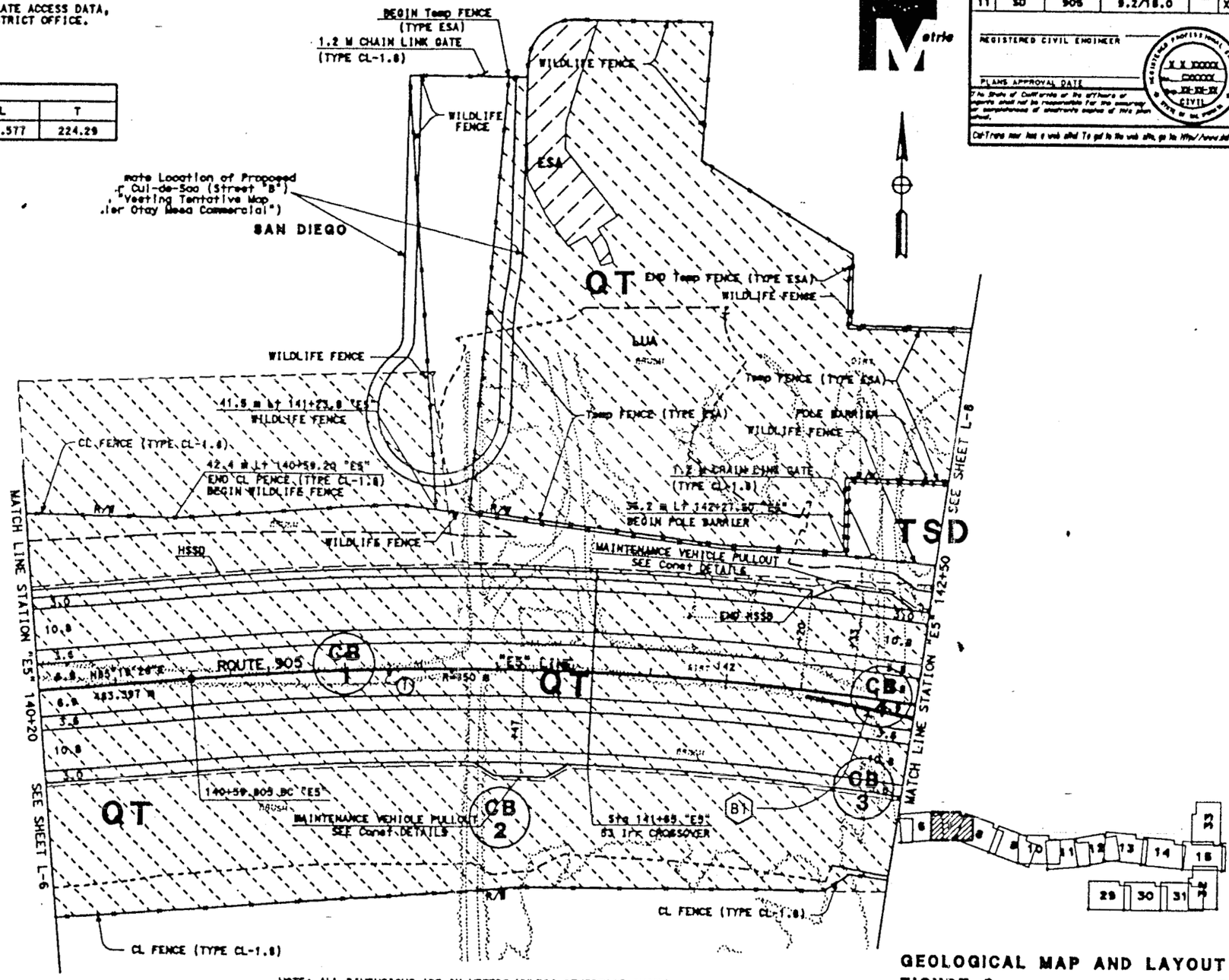
PROJECT ENGINEER X.X. XXXXX

CALCULATED/DESIGNED BY | CHECKED BY | DATE REVISED BY | DATE REVISED

PROJECT DEVELOPMENT

NOTE:
FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

CURVE DATA				
No.	R	DELTA	L	T
1	850.000	29°33'47"	438.577	224.29



NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN.

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	905	9.2/18.0		XXXX

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

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STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans PROJECT DEVELOPMENT

PROJECT ENGINEER X.X. XXXXX

CALCULATED/DESIGNED BY | CHECKED BY | DATE | REVISED BY | DATE REVISED

GEOLOGICAL MAP AND LAYOUT
FIGURE 3

SCALE 1:2400

L-7

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS

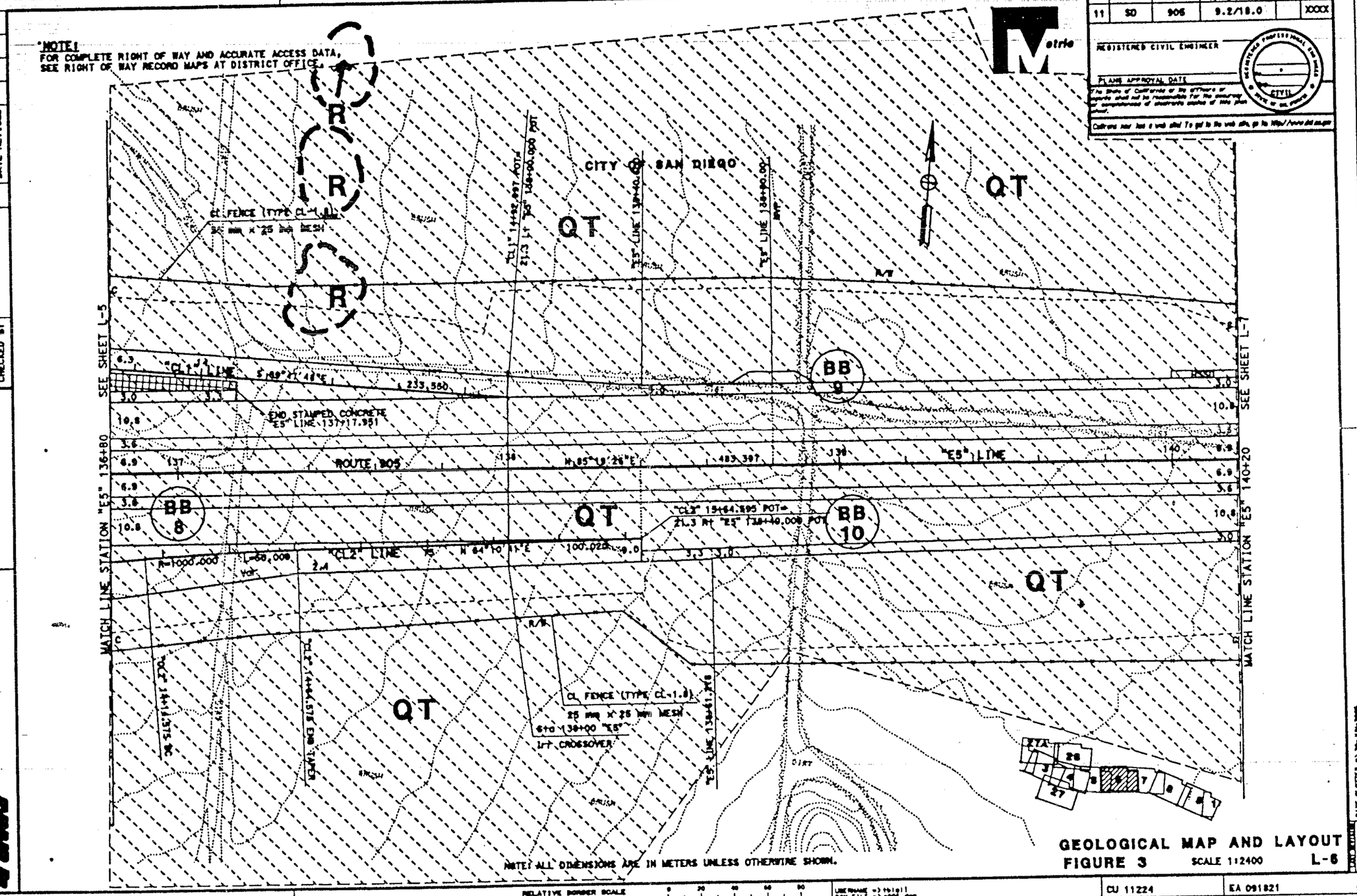
USERNAME => tblall
DGN FILE => g007.dgn

CU 112XX

EA 091821

DATE PLOTTED => 30-JUN-2005
TIME PLOTTED => 09:22

12-13-04


NOTE!
FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA,
SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.
CITY OF SAN DIEGO
QT
SEE SHEET L-5
SEE SHEET L-7
MATCH LINE STATION "E5" 136+80
MATCH LINE STATION "E5" 140+20
ROUTE 805
"E5" LINE
"CL2" LINE
BB 8
BB 9
BB 10
CL FENCE (TYPE CL-1.8)
25 mm X 25 mm MESH
6 to 136+00 "E5"
1rt CROSSOVER
END STAMPED CONCRETE
"E5" LINE 137+17.951
DIRT
NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN.
RELATIVE PLOTTER SCALE
IS IN MILLIMETERS
GEOLOGICAL MAP AND LAYOUT
FIGURE 3
SCALE 1:2400
L-6
CU 11224
EA 091821
DIST
11
COUNTY
SD
ROUTE
905
KILOMETER POST TOTAL PROJECT
9.2/18.0
SHEET NO.
TOTAL SHEETS
XXXX
REGISTERED CIVIL ENGINEER
PLANS APPROVAL DATE
CALCULATED/ DESIGNED BY
CHECKED BY
PROJECT ENGINEER
DATE REVISED
REVISED BY
DATE
Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
11	SD	905	9.2/18.0		XXXX

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

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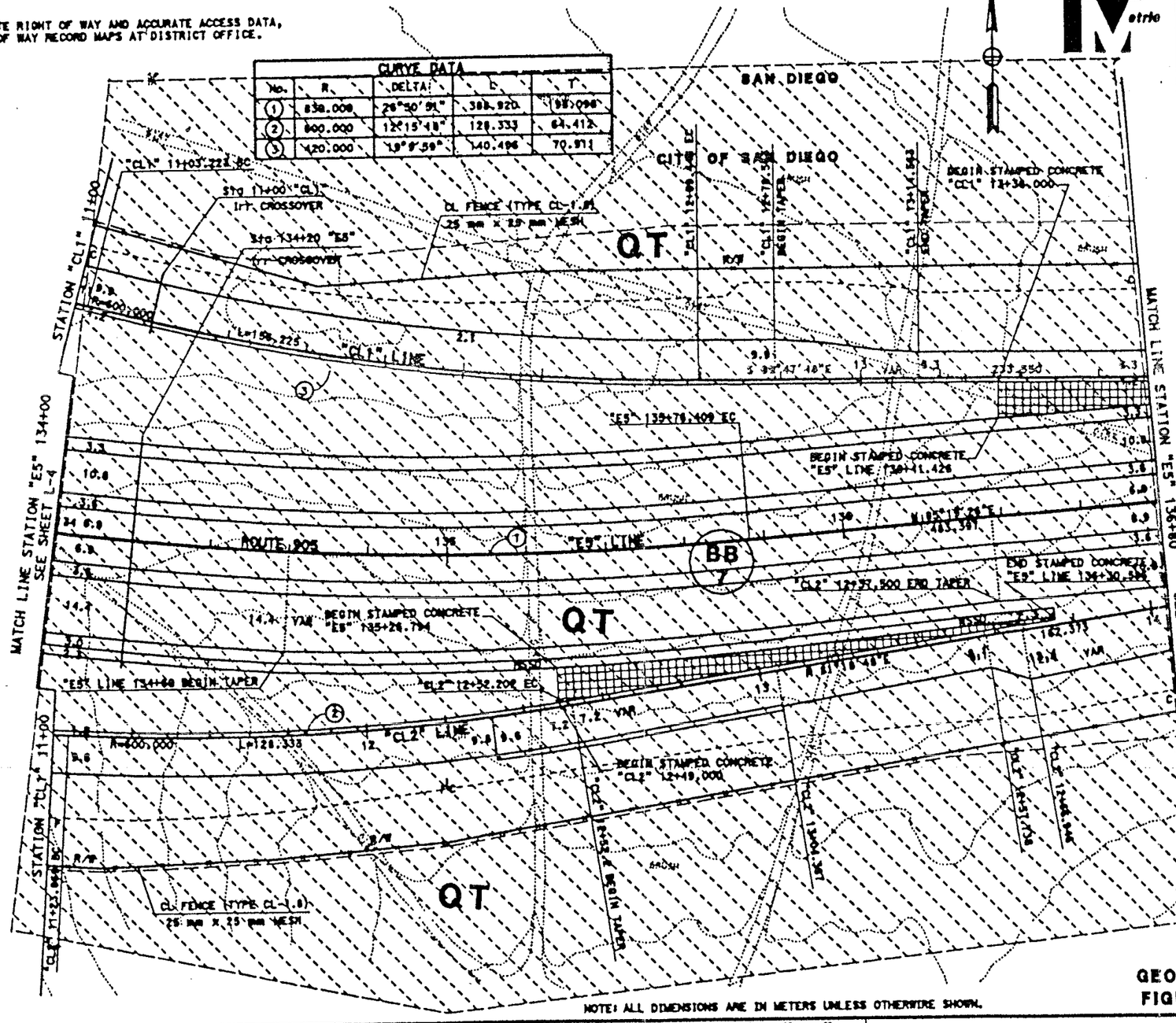
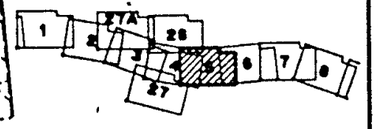
NOTE:
FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

CURVE DATA				
No.	R	DELTA	L	T
(1)	838.008	26°30'51"	388.920	197.098
(2)	600.000	12°15'48"	128.333	64.412
(3)	420.000	19°9'59"	140.496	70.911





NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN.

GEOLOGICAL MAP AND LAYOUT
FIGURE 3 SCALE 1:2400 L-5

RELATIVE BORDER SCALE IS IN MILLIMETERS 0 30 40 60 80

CU 11224 EA 091821

DATE REVISED BY | DATE REVISED
CALCULATED/DESIGNED BY
CHECKED BY
PROJECT ENGINEER
DATE PLOTTED = 30-JAN-2006
TIME PLOTTED = 08:17

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
11	SD	905	9.2/18.0		XXXX

REGISTERED CIVIL ENGINEER

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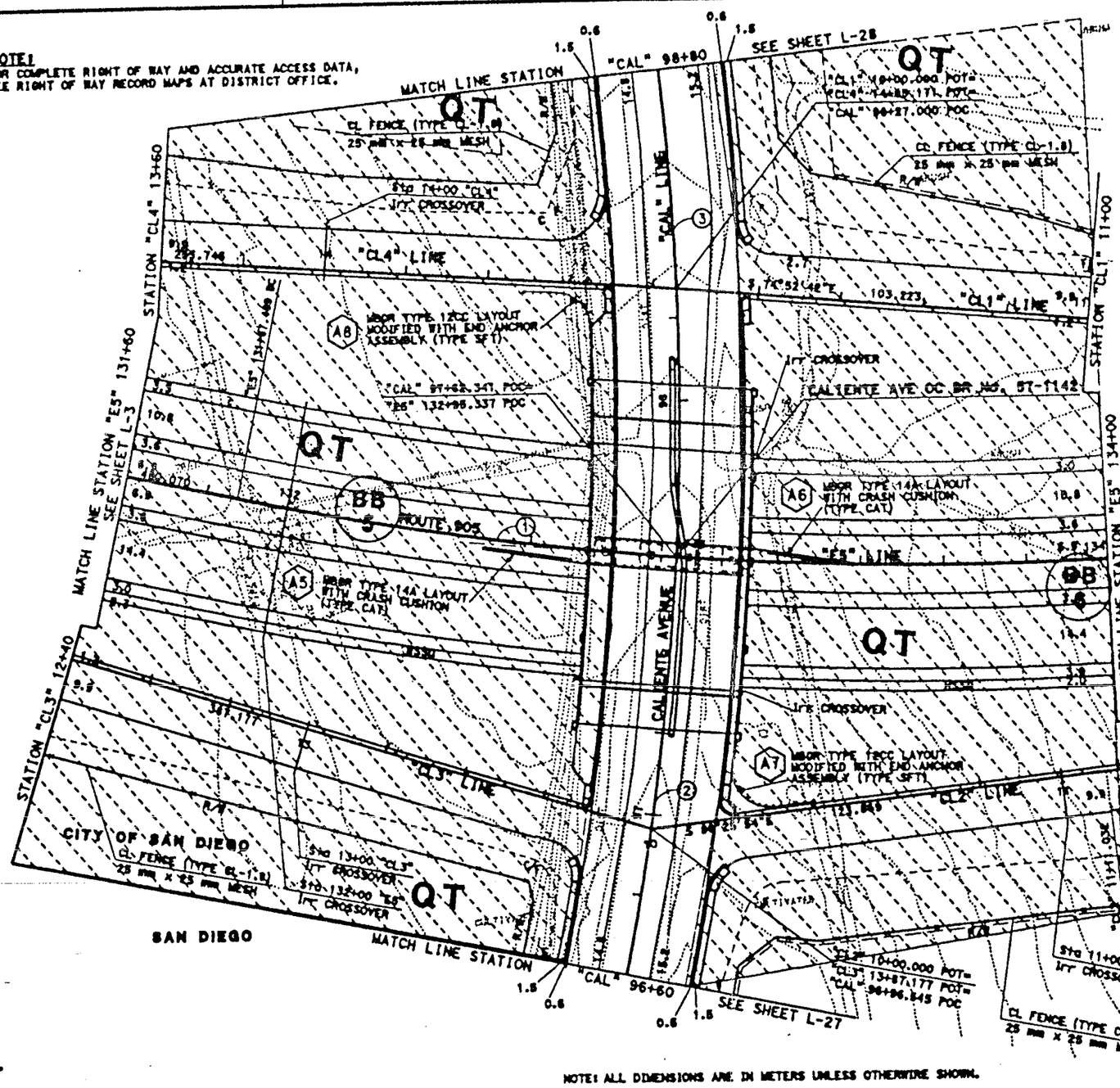
NOTE:
FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.



CURVE DATA				
No.	R	DELTA	L	T
1	830.000	26°50'51"	388.920	198.098
2	731.522	16°30'43"	210.815	106.143
3	731.522	13°6'10"	167.290	84.012

NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN.

RELATIVE BORDER SCALE IS IN MILLIMETERS

GEOLOGICAL MAP AND LAYOUT
FIGURE 3 SCALE 1:2400 L-4

CU 11224 EA 091821

DATE REVISED BY | DATE REVISED | CALCULATED/DESIGNED BY | CHECKED BY | PROJECT ENGINEER

NOTE!
FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

CURVE DATA				
No.	R	DELTA	L	T
(1)	185.95	54°29'6"	178.82	95.74

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	905	9.2/18.0		XXXX

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

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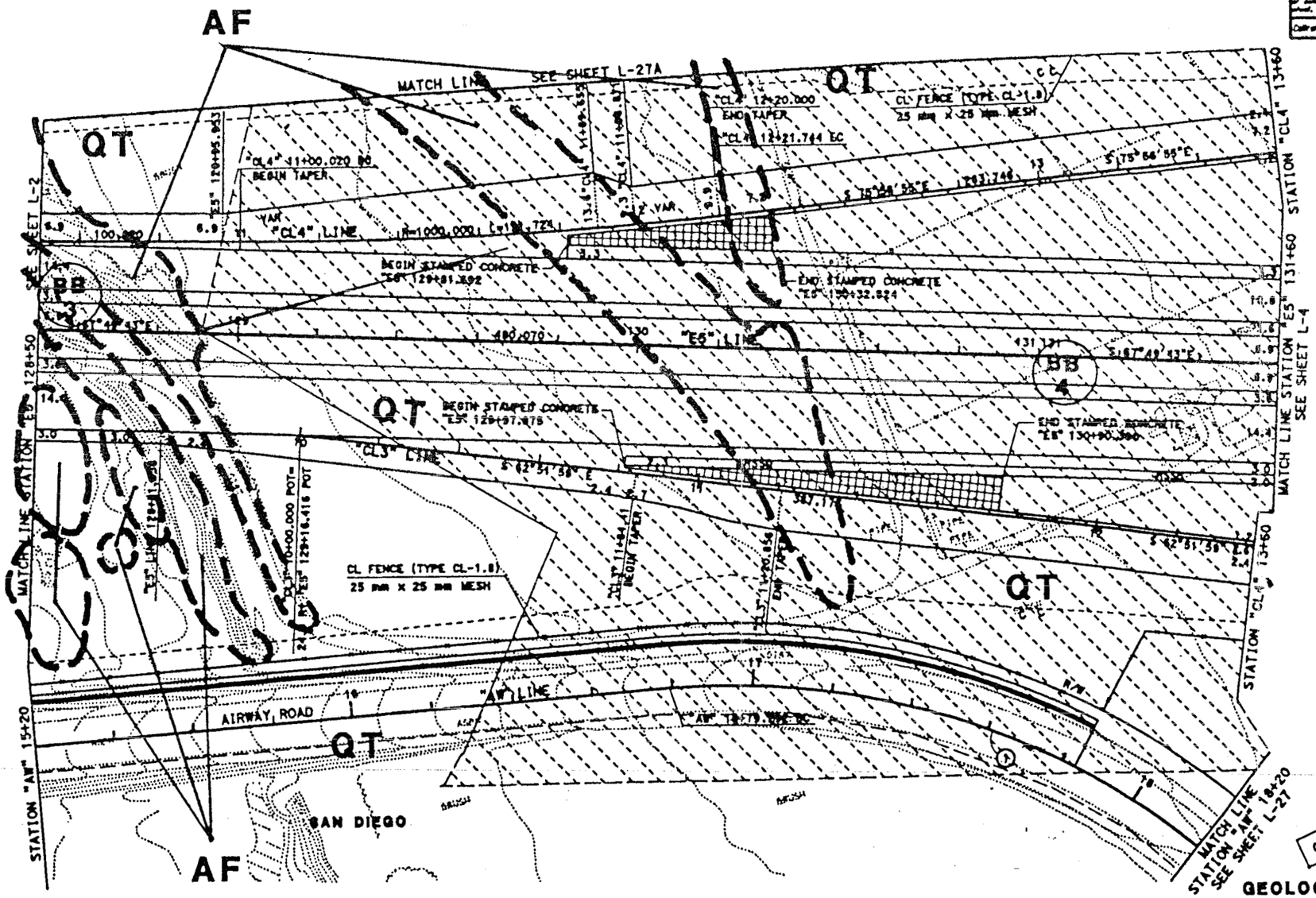
DATE | REVISED BY | DATE REVISED

CALCULATED/DESIGNED BY

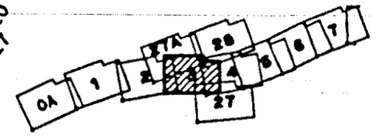
CHECKED BY

PROJECT ENGINEER

CITY OF SAN DIEGO



NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN.



GEOLOGICAL MAP AND LAYOUT
FIGURE 3 SCALE 1:2400 L-3

RELATIVE BORDER SCALE IS IN MILLIMETERS

CU 11224 EA 091821

DATE PLOTTED = 29-JAN-2006
TIME PLOTTED = 09:18
03-08-05

DIST	COUNTY	ROUTE	KILOPOST (POST MILES) TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
11	SD	905	9.2/18.0		XXX

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

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CIVIL

DATE REVISED BY | DATE REVISED

CALCULATED/DESIGNED BY | CHECKED BY

PROJECT ENGINEER

SAN DIEGO

CITY OF SAN DIEGO

"ES" 125+97.17
END CONCRETE BARRIER TYPE 60C
BEGIN RETAINING WALL

TEMPORARY CONSTRUCTION EASEMENT

"ES" 126+66.000
END RETAINING WALL
ANCHOR BLOCK

CL FENCE (TYPE CL-1.8)
25 mm X 25 mm MESH

RETAINING WALL NO. 125

CL FENCE (TYPE CL-1.8)
25 mm X 25 mm MESH

MATCH LINE
SEE SHEET L-27A

"OTAY MESA ROAD" LINE

MATCH LINE STATION "ES" 125+30
SEE SHEET L-1

"ES" LINE

"ES" 126+92.560

"ES" 126+80.063
END RETAINING WALL
EXIST GRADE

MINOR TYPE 14A LAYOUT WITH TERMINAL SYSTEM (TYPE CAT)

"ES" 129+09.000 POT

ROUTE 905

REINFORCED CONCRETE CURB WALL NO. 127
VERTICAL WALL

"ES" 127+80.000 POT

"ES" 127+80 "ES"
1rr CROSSOVER

CL FENCE (TYPE CL-1.8)
25 mm X 25 mm MESH

"ES" 127+80.000 POT

"ES" 128+13.00 POT

"ES" LINE TANGENT

MATCH LINE STATION "ES" 128+50

STATION "AW" 15+20

MANHOLE (FIBEROPTIC CABLE)

AFB

AF

AFE

TSD

QT

U

D

RW 2-1
RW 2-2
RW 2-3
RW 3-1
RW 3-2
RW 3-3
RW 3-4

BB 2

A2
A3
A4

INACTIVE FAULT AS MAPPED BY
MICHAEL P. KENNEDY
AND SIANG S. TAN 1977

CURVE DATA				
No.	R	DELTA	L	T
(1)	830.000	26°46'7"	387.778	197.495
(2)	91.323	45°5'45"	71.878	37.917

NOTE:
FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN.

0A 1 2 2A 2B 3 4 5 6 27

GEOLOGICAL MAP AND LAYOUT

FIGURE 3 SCALE 1:2400 L-2

RELATIVE BORDER SCALE TO BE IN MILLIMETERS 0 20 40 60 80

USERNAME => tsigrist
DGN FILE => 2006.dgn

DATE PLOTTED => 29-JUN-2006
TIME PLOTTED => 09:32

CU 11224 EA 091821

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
11	SD	905	9.2/18.0		XXXX

DESIGN STUDY ONLY
REGISTERED CIVIL ENGINEER

70% SUBMITTAL
PLANS APPROVAL DATE

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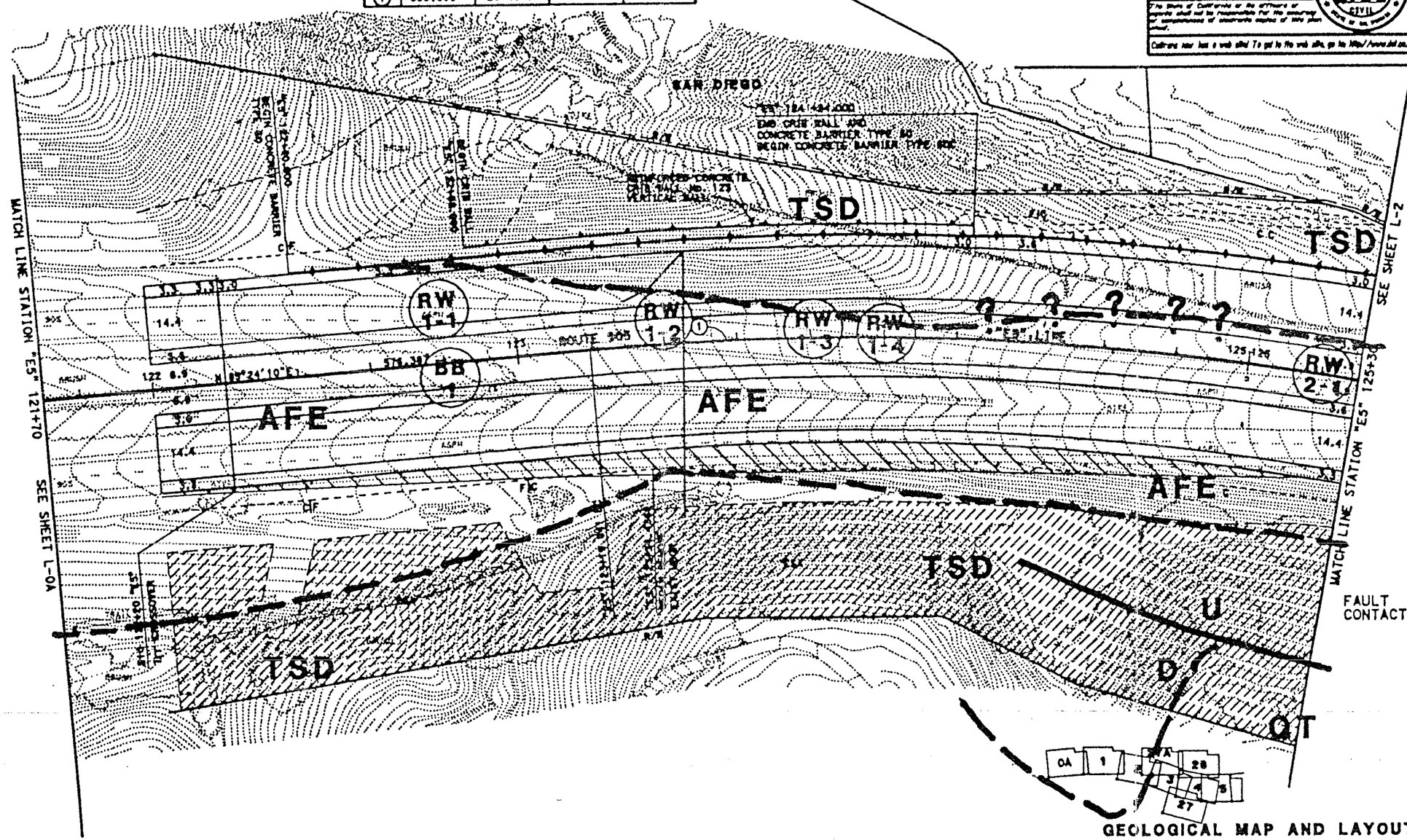
NOTE:
FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

CURVE DATA				
No.	R	DELTA	L	T
1	830.000	26°46'7"	387.778	197.495



GEOLOGICAL MAP AND LAYOUT
FIGURE 3 SCALE 1:2400 **L-1**

HORIZONTAL DATUM: CCS83 (1991.36) ZONE 6

NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN.

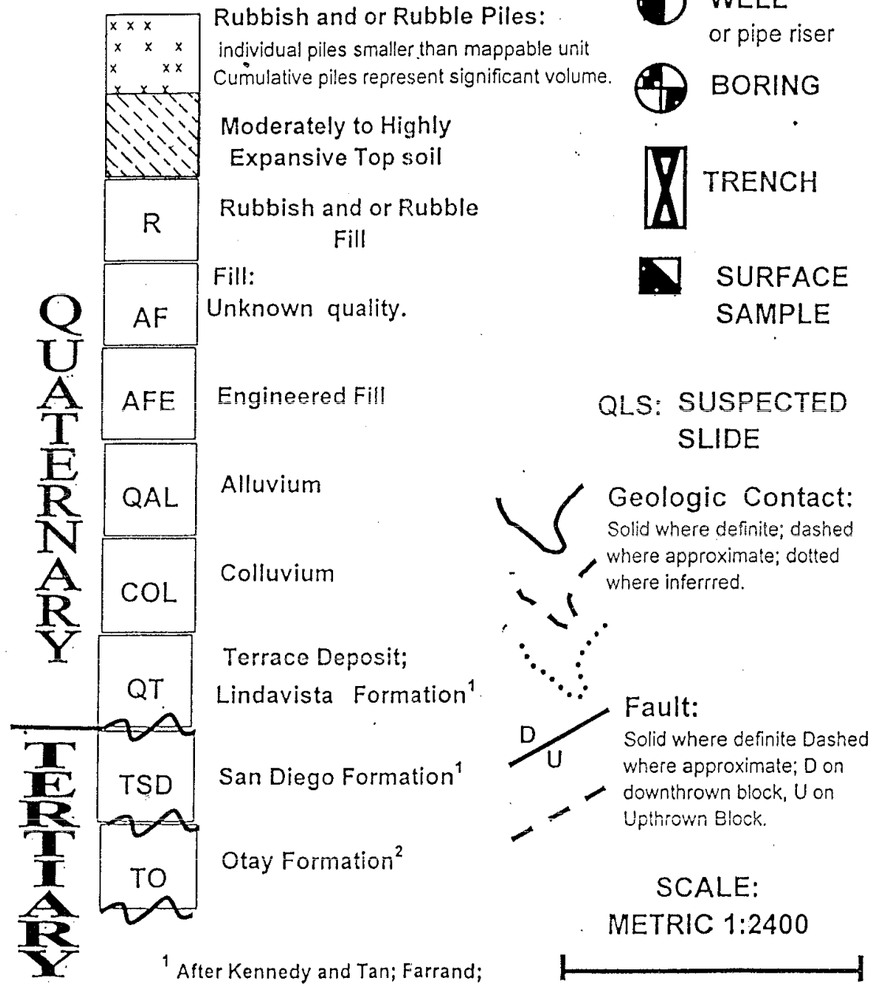
RELATIVE BORDER SCALE IS IN MILLIMETERS

CU 11224 | EA 091821

PROJECT ENGINEER: N. A. DAO
CALCULATED/DESIGNED BY | CHECKED BY
DATE | REVISED BY | DATE REVISED

PROJECT DEVELOPMENT

LEGEND TO GEOLOGIC MAP OF
11-SD-905 9.2/18.0



[1] After Kennedy and Tan; Farrand;

[2] Walsh and Demere et al.

INDEX OF SHEETS

Sheet No.	Description
1	Title and Location Map
2-68	Typical Cross Sections
69-120	Layouts
121-231	Profiles & Superelevation Diagrams
232-377	Construction Details & NPDES
378-429	Contour Grading
430-709	Drainage Plans, Profiles, Details and Quantities
710-734	Sanitary Sewer Plans, Profiles, Details and Quantities
735-799	Utility Plans and Quantities
800-864	Stage Construction and Traffic Handling Plans
865-868	Detour Layouts
869-878	Summary of Quantities
879-918	Retaining Wall Plans and Details
919-988	Pavement Delineation Plans and Quantities
989-990	Sign Plans, Details and Quantities
991-1006	Landscaping Plans, Details and Quantities
1007-1051N	Electrical Plans

STRUCTURES
1052-1074 Caliente Ave OC
1075-1107 Spring Canyon Br
1108-1131 Heritage Road UC
1132-1152 Brittania Blvd OC
1153-1173 La Media Rd UC
1174-1198 Airway Rd UC

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

PROJECT PLANS FOR CONSTRUCTION ON
STATE HIGHWAY
IN SAN DIEGO COUNTY
IN SAN DIEGO
FROM 1.1 KM EAST OF THE ROUTE 905/805 SEPARATION TO 0.6 KM WEST OF MEXICO BORDER

65%

To be supplemented by Standard Plans dated July, ~~1999~~ 2004

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	
11	SD	905	9.2/18.0	1

DESIGN STUDY ONLY

Caltrans

SUBMITTAL

LOCATION MAP

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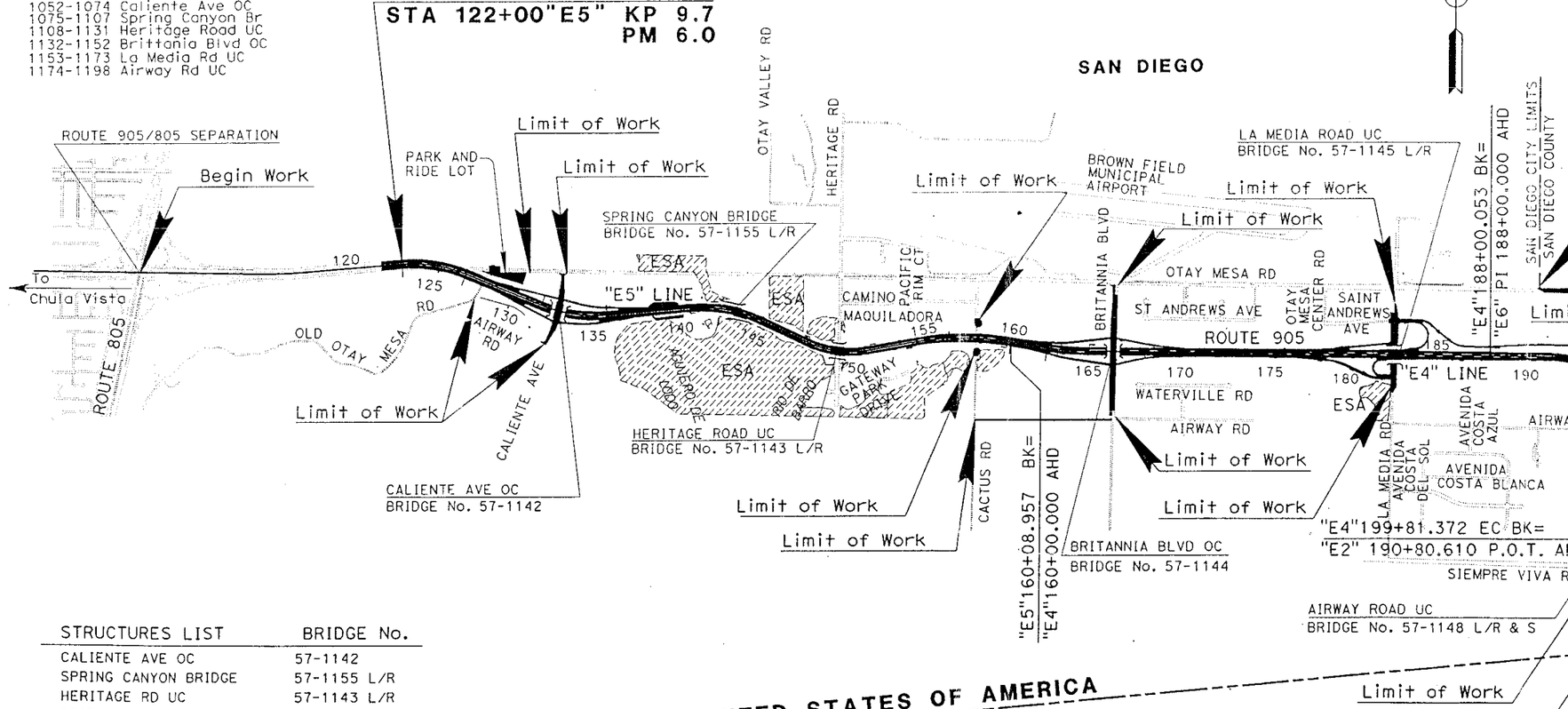
To get to the Caltrans web site, go to: http://www.dot.ca.gov

BEGIN CONSTRUCTION
STA 122+00"E5" KP 9.7
PM 6.0



STRUCTURES LIST	BRIDGE No.
CALIENTE AVE OC	57-1142
SPRING CANYON BRIDGE	57-1155 L/R
HERITAGE RD UC	57-1143 L/R
BRITANNIA BLVD OC	57-1144
LA MEDIA RD UC	57-1145 L/R
AIRWAY RD UC	57-1148 L/R

The Contractor shall possess the class (or classes) of license as specified in the ''Notice to Contractors.''

FIGURE 2 - SITE PLAN

Project Engineer Date
Registered Civil Engineer

W.R. LOPEZ
No. C 58085
Exp 6-30-06
CIVIL
STATE OF CALIFORNIA

Plans Approval Date

NO SCALE

Caltrans Metric

Contract No. 11-091824

PROJECT ENGINEER | DATE | PROJECT MANAGER | DATE

LAST REVISION 00-00-00 | DATE PLOTTED => 20-DEC-2004 14:29
12-20-04

P:\11-091824.plt

FORM DC-OE-93-PF (REV. 3/88)

RELATIVE BORDER SCALE IS IN MILLIMETERS 0 20 40 60 80

USERNAME => tbrony

CU 00000 11200 EA 000000 091821

DIST	COUNTY	ROUTE	KILOMETER POST / TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	905	9.2/18.0		XXXX

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

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DATE REVISED BY | DATE REVISED

CALCULATED/DESIGNED BY | CHECKED BY

PROJECT ENGINEER

MATCH LINE SEE SHEET G-49

TO

MATCH LINE STATION "A1" 109+30 SEE SHEET G-25

AIRWAY ROAD

RW 1 RW 2 RW 3

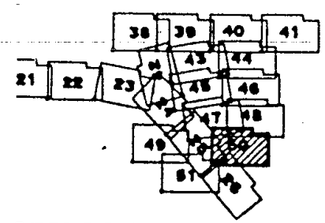
"A1" LINE

"A2" LINE

EASEMENT

R/W

TO



NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN.

GEOLOGICAL MAP AND LAYOUT
FIGURE 3 SCALE 1:500 L-50

RELATIVE BORDER SCALE IS IN MILLIMETERS 0 20 40 60 80

CU 11224 EA 091821

DATE PLOTTED = 30-JAN-2006
TIME PLOTTED = 11:19
05-26-04

CURVE DATA				
No.	R	Δ	T	L
⑧	120.000	38°11'50"	41.86 m	80.00 m

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	905	9.2/18.0		

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

To be shown of Contractor of the attached or separate sheet not to commencement of construction copies of this plan sheet.

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REVISED BY | DATE REVISED

CALCULATED/DESIGNED BY | CHECKED BY

PROJECT ENGINEER

MATCH LINE SEE SHEET L-37

QT/TO

+50 CONFORM
JOIN EXIST SIDEWALK
END ROADWAY RECONST
END CONCRETE CURB
& SIDEWALK

"LMD1"
10+00.00 POT =
"LMD" 98+00.710

"LMD2"
15+86.414 POT =
"LMD" 97+97.100

ST. ANDREWS Ave.

"LMD" 98+00 END TAPER
END ROADWAY RECONSTRUCTION
END REMOVE AC DIKE

EB 21

TEMPORARY CONSTRUCTION EASEMENT

LJ MEDIA Rd.

EB 11

+50 CONFORM
END PAVEMENT
END CONCRETE CURB & SIDEWALK
END CHAIN LINK FENCE
BEGIN ROADWAY RECONSTRUCTION
BEGIN TAPER

QT/TO

CHAIN LINK FENCE (TYPE CL-1.8)

SAN DIEGO

R/W

"SAVE 10+91.887 =
"LMD" 98+09.211
S 90°00'00" E

TYPE 1 RET WALL

"LMD2" 15+40.00
END CONC BARRIER
(TYPE 60C)

"LMD2" 14+90
END RET WALL
BEGIN CONC BARRIER
(TYPE 60C)

"LMD2" 14+50
BEGIN RET WALL
CONC BARRIER

"LMD2" 14+20
(TYPE 60C)

"LMD1" LINE

"LMD2" 13+65 "LMD1" 12+65
IRRIGATION CROSSOVER

"LMD1" 97+78 23.77m Lt
END REMOVE
CHAIN LINK FENCE
JOIN EXIST
CHAIN LINK FENCE

"LMD" LINE

QT/TO

QT/TO

QT/TO

EB 10

EB 14

MATCH LINE SEE SHEET L-20

MATCH LINE SEE SHEET L-21

MATCH LINE SEE SHEET L-20

37				
18	19	20	21	22
		35		
		34		

NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN.

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS

0 20 40 60 80

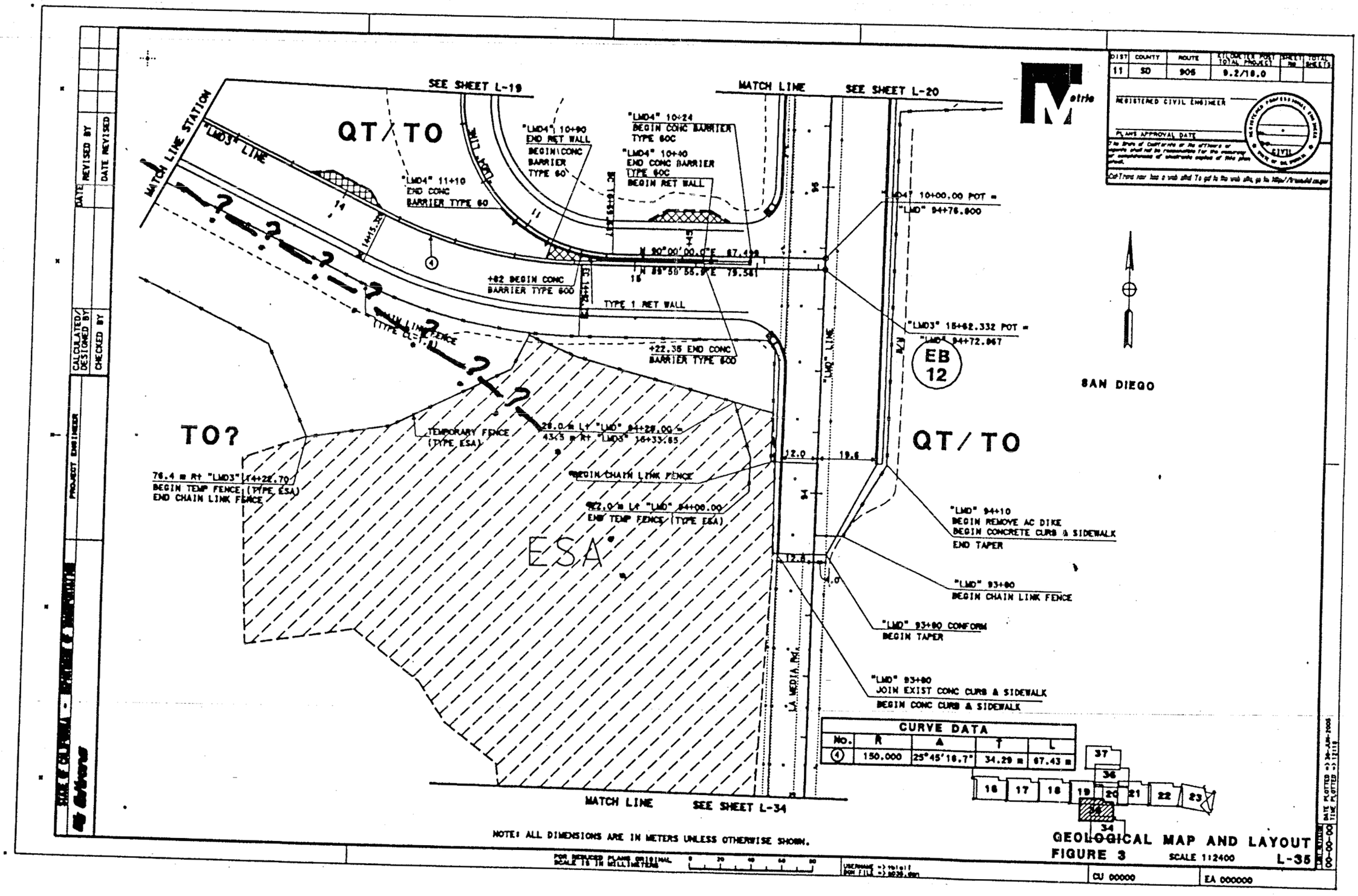
USERNAME => tsloll
DGN FILE => 9935.dgn

DATE PLOTTED => 30-JUN-2005
TIME PLOTTED => 11:32

05-21-04

CU 00000 | EA 000000

GEOLOGICAL MAP AND LAYOUT
FIGURE 3 SCALE 1:2400 L-36



CURVE DATA				
No.	R	Δ	T	L
4	150.000	25°45'16.7"	34.29 m	67.43 m

NOTE: ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN.

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
11	SD	905	9.2/18.0		

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

CALCULATED/DESIGNED BY | CHECKED BY | DATE REVISED BY | DATE REVISED

PROJECT ENGINEER

GEOLOGICAL MAP AND LAYOUT

FIGURE 3 SCALE 1:2400 L-35

CU 00000 EA 000000

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
11	SD	905	9.2/18.0		XXXX

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

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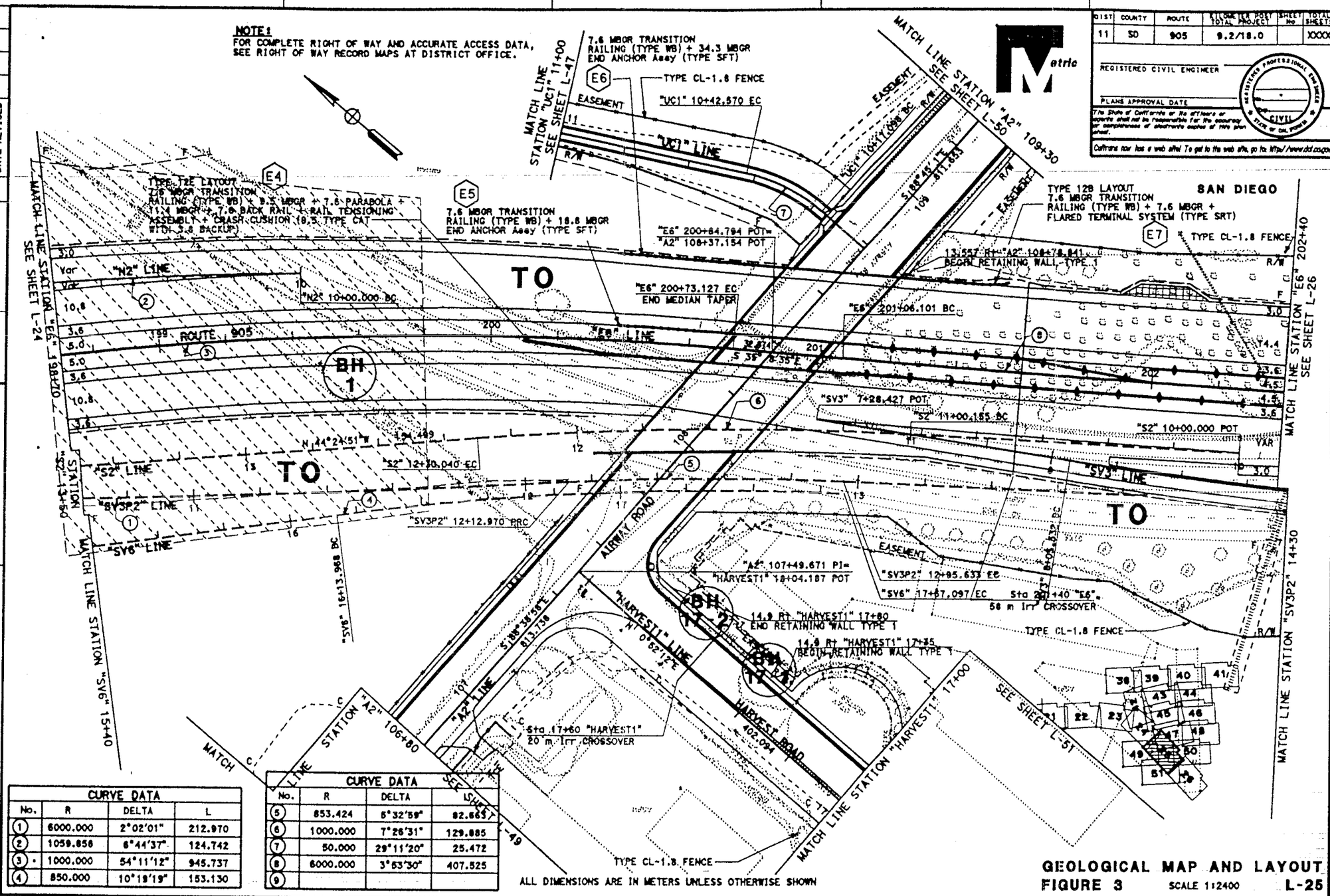

CURVE DATA			
No.	R	DELTA	L
1	6000.000	2°02'01"	212.970
2	1059.858	6°44'37"	124.742
3	1000.000	54°11'12"	945.737
4	850.000	10°19'19"	153.130

CURVE DATA			
No.	R	DELTA	L
5	853.424	5°32'59"	82.663
6	1000.000	7°26'31"	129.885
7	50.000	29°11'20"	25.472
8	6000.000	3°53'30"	407.525
9			

GEOLOGICAL MAP AND LAYOUT
FIGURE 3 SCALE 1:2400 L-25

RELATIVE BORDER SCALE IS IN MILLIMETERS 0 20 40 60 80

USERNAME => tblail
DGN FILE => g025.dgn

CU 11224 EA 091821

DATE PLOTTED => 11-AUG-2005
TIME PLOTTED => 11:22

02-23-05

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

PROJECT ENGINEER

CALCULATED/DESIGNED BY

CHECKED BY

DATE REVISED BY

DATE REVISED

NOTE:
FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

CURVE DATA			
No.	R	DELTA	L
(1)	1020.000	4°37'17"	82.270
(2)	1000.000	54°11'12"	945.737
(3)	952.325	29°24'26"	488.783
(4)	1069.858	6°44'37"	124.742
(5)	490.000	31°52'24"	272.583
(6)	500.000	28°56'32"	252.568

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	905	9.2/18.0		XXXX

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

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DATE	REVISED BY	DATE REVISED

CALCULATED/DESIGNED BY

CHECKED BY

PROJECT ENGINEER

Metric

S040922C

SAN DIEGO

MATCH LINE STATION "M2" 13+00 SEE SHEET L-12

STATION "M2" 16+00

"M2" LINE

"LMD6" 18+21.438 EC

"LMD6" 18+29.765 BC

STATION "LMD6" 18+20

"E6" LINE

ROUTE 905

BH 1

BH 2

BH 3

TO

"SV3R2" LINE

"SV6" LINE

"SV6" 14+43.719 EC

"SV6" 10+00.000 PC

STATION "S2" 13+50

MATCH LINE STATION "SV6" 15+40

MATCH LINE "E6" 195+40 SEE SHEET L-23

STATION "SV6" 12+30

TYPE CL-1.8 FENCE

MATCH LINE STATION "E6" 198+70 SEE SHEET L-25

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

GEOLOGICAL MAP AND LAYOUT

FIGURE 3 SCALE 1:2400 L-24

RELATIVE BORDER SCALE TO BE IN MILLIMETERS 0 20 40 60 80

USERNAME => 75101

DGN FILE => 3241.dgn

CU 11224

EA 091821

DATE PLOTTED => 30-JUN-2006

TIME PLOTTED => 15:15

NOTE:
FOR COMPLETE RIGHT OF WAY AND ACCURATE ACCESS DATA, SEE RIGHT OF WAY RECORD MAPS AT DISTRICT OFFICE.

DIST	COUNTY	ROUTE	KILOPOST (KP) TOTAL PROJECT	PHASE NO	TOTAL SHEETS
11	SD	905	9.2/18.0		XXXX

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

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DATE | REVISED BY | DATE REVISED

CALCULATED/DESIGNED BY | CHECKED BY

PROJECT ENGINEER

TYPE CL-1.8 FENCE

STATION "LM06V1" 14+50

R/W

"LM06" 15+00.029 BC

"LM06" LINE

124.645

TYPE 14A LAYOUT
END ANCHOR Assy (TYPE SFT)
3.7 MBGR + 7.6 PARABOLA +
3.8 TYPE CAT BACKUP +
9.5 TYPE CAT CRASH CUSHION

E2

TYPE 14A LAYOUT
END ANCHOR Assy (TYPE SFT)
3.7 MBGR + 7.6 PARABOLA +
3.8 TYPE CAT BACKUP +
9.5 TYPE CAT CRASH CUSHION

E3

TO

"EFE1" LINE (FUTURE)

"LM06" 16+44.965 EC

SAN DIEGO

S 58°33' W

784.601

MATCH LINE STATION "EFW1" 15+60 SEE SHEET L-42

STATION "EFE1" 17+10

MATCH LINE STATION "LM06V1" 18+20

ROUTE 905

"E6" LINE

"EFE1" LINE (FUTURE)

"SV6" LINE

"EFE1" 14+79.100 EC

TO

E1

TYPE 10B LAYOUT
9.5 MBGR +
TERMINAL SYSTEM (TYPE SRT)

STA 194+00 "E6"
40 m 1rt. CROSSOVER

MATCH LINE STATION "EFE1" 19+90 SEE SHEET L-22

MATCH LINE STATION "E6" 19+40 SEE SHEET L-24

STATION "SV6" 12+30

TYPE CL-1.8 FENCE

R/W

CURVE DATA			
No.	R	DELTA	L
1	300.000	32°36'55"	170.772
2	1000.000	34°11'12"	845.737
3	952.325	29°24'26"	488.783

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

GEOLOGICAL MAP AND LAYOUT

FIGURE 3 SCALE 1:2400 L-23

DATE PLOTTED = 26-JAN-2006
TIME PLOTTED = 12:04

RELATIVE BORDER SCALE IS IN MILLIMETERS 0 20 40 60 80

USERNAME = tblail
DGN FILE = b023l.dgn

CU 11224 EA 091821

APPENDIX

LOGS OF TEST BORINGS

State of California - Department of Transportation - Office of Geotechnical Services

SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
BB-1	2/4/2004	2/4/2004	A. Lari	SR-905	11-091821

op Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
136 m	Offset & Station: CtrL 122+90	Ref Line E5	GDR Investigation	11-SD-905

Drilling Method	Drilling Equipment
Wet Core Drilling	Truck Mounted Rig (CS 2000)

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth 9.60 m

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	
1												SP	Poorly graded Sand, loose to medium dense, gray, dry (Fill)
2													
3	1												
4													
5													- no sample was retrieved, empty sampler, on rock
6			11							16	29		
	2		13										
8													
9													
10	3											SP	Poorly Graded Sand with Silt, medium dense, gray, dry (Fill)
11			7							10	22		
12			12										
13	4												
14													
15													- greenish gray, with oxidation stains, broken clay pipe pieces (Fill)
16			8							9	21		
17	5		12										
18													
20	6												

Continued on Page 2 of 2

State of California - Department of Transportation - Office of Geotechnical Services

SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
BB-1	2/4/2004	2/4/2004	A. Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
136 m	Offset & Station: CtrL 122+90	Ref Line E5	GDR Investigation	11-SD-905

Groundwater Level: Date Measured | Depth to Water

Total Hole Depth 9.60 m

Drilling Method	Drilling Equipment
Wet Core Drilling	Truck Mounted Rig (CS 2000)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
21			7 50								50+	SM	Silty Sand, greenish gray, refusal, high blow count due to gravel in sampler
22													
23	7												
24													
25													
26			7 8 10								18		- medium dense, damp
28													
29	8												
30	9												
31			7 8 10								18		
32													End of boring at 9.3 meters
33	10												Ground water was not encountered during the drilling operations.
34													
35													
36													
37	11												
38													
40	12												

State of California - Department of Transportation - Office of Geotechnical Services

SOILS AND GEOLOGICAL EXPLORATION LOG

Page 1 of 2

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
BB-2	4/20/2004	4/20/2004	A. Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
154 m	Offset & Station 20 m Lt. 125+95	Ref Line E5	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth 9.60 m

Drilling Method: Wet Core Drilling

Drilling Equipment: Truck Mounted Rig (CS 2000)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Lithological Description
1–5	1												
6–10	2–3		9 8 7								15	CL	Silty Clay with Sand, stiff, gray, medium plasticity (Fill / Topsoil)
11–15	4		6 9 10								19	SM	Silty Sand, medium dense, gray, dry (Fill) - brown
16–20	5–6		20 20 18								38	SP	Poorly Graded Sand, dense, yellow, fine grained (a piece of rock plugged the sampler tip) (Fill)

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
BB-2	4/20/2004	4/20/2004	A. Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
154 m	Offset & Station 20 m Lt. 125+95	Ref Line E5	GDR Investigation	11-SD-905

Groundwater Level		Drilling Method	Drilling Equipment
Date Measured	Depth to Water	Wet Core Drilling	Truck Mounted Rig (CS 2000)

Total Hole Depth

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: 15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
21			8									SP	Poorly Graded Sand, medium dense, yellow, fine grained (Fill)
			10								24		
22			14										
23	7												
24													
25			10										- gray
26			11								22		
	8		11										
28													
29													
30	9		25										High blow counts due to gravel in sampler
31			39								50+		
32			42										
													End of boring at 9.3 meters
33	10												Ground water was not encountered during the drilling operations.
34													
35													
36													
37	11												
38													
39													
40	12												

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
BB-3	4/8/2004	4/8/2004	A. Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
164 m	Offset & Station 10 m Lt., 128+60	Ref Line E5	GDR Investigation	11-SD-905

Groundwater Level	
Date Measured	Depth to Water

Total Hole Depth 3.30 m

Drilling Method	Drilling Equipment
Wet Core Drilling	Truck Mounted Rig (CS 2000)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log
1												
2												
3	1											
4												
5												
6												
	2											
8												
9												
10	3											
11												
12												
13	4											
14												
15												
16												
17	5											
18												
20	6											

Mixture of sand, gravel and possibly cobbles (Fill)

- refusal for 50 mm of penetration, no sample was retreived

- very slow drilling

End of boring at 3.5 meters

Ground water was not encountered during the drilling operations.

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
BB-4	4/8/2004	4/8/2004	M Jandal	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
165 m	Offset & Station 10 m Rt., 131+00	Ref Line E-5	GDR Investigation	11-SD-905

Groundwater Level: Date Measured — Depth to Water

Total Hole Depth 7.60 m

Drilling Method	Drilling Equipment
Hollow Stem Auger Drilling	Truck Mounted Rig (CS 500)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	Lithological Description
1–5	1												
5–10	2–3		15 20 31								50+	CL	Sandy Lean Clay, hard, dry with calcareous nodules and ferrous strains, medium plasticity (Terrace Deposit)
10–15	3–4		14 18 14								32	SM	Silty Sand, dense, yellowish brown and gray, with occasional gravel (Terrace Deposit)
15–20	5–6		12 28 40								50+	SW	Well Graded Sand, very dense, gray and reddish brown, with gravel, refusal, 40 blows for 2" of penetration (Terrace Deposit)

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
BB-4	4/8/2004	4/8/2004	M Jandal	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
165 m	Offset & Station 10 m Rt., 131+00	Ref Line E-5	GDR Investigation	11-SD-905

Groundwater Level: Date Measured — Depth to Water

Total Hole Depth 7.60 m

Drilling Method: Wet core drilling

Drilling Equipment: Truck Mounted Rig (CS 500)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	Description
21			41									GP/SC	Sandy Gravel/Clayey Sand, very dense, gray and brown, refusal, 20 blows for 1" of penetration (Terrace Deposit)
			27								50+		
22			20										- hit a solid layer, slow drilling
23	7												
24													
25													- refusal, 20 blows for 1" of penetration
													End of boring at 7.6 meters
26			20										Ground water was not encountered during the drilling operations.
28	8												
29													
30	9												
31													
32													
33	10												
34													
35													
36													
37	11												
38													
40	12												

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
BB-5	4/8/2004	4/8/2004	M Jandal	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
165 m	Offset & Station: CtrL. 132+20	Ref Line E5	GDR Investigation	11-SD-905

Groundwater Level: Date Measured — Depth to Water

Total Hole Depth

Drilling Method: Hollow Stem Auger Drilling

Drilling Equipment: Truck Mounted Rig (CS 500)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	Lithological Description
1	1												
2													
3													
4													
5													
6	2		27							28	50+	SM	Silty Sand, very dense, light gray and reddish brown, slightly moist with gravel and calcareous nodules (Terrace Deposit)
			23										- at 2 m hit a layer of gravel
8													
9	3												
10			25							60	50+	GP	Poorly Graded Sandy Gravel, very dense, reddish brown (Terrace Deposit)
11													
12													
13	4												
14													
15													- refusal, 12 blows for 25 mm of penetration (the hammer was bouncing upon impact)
16			12										
17	5												
18													
9													
20	6												

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No. BB-5	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	4/8/2004	4/8/2004	M Jandal	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
165 m	Offset & Station: CtrL. 131+00	Ref Line E5	GDR Investigation	11-SD-905

Groundwater Level		Drilling Method	Drilling Equipment
Date Measured	Depth to Water	Wet core drilling	Truck Mounted Rig (CS 500)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	Total Hole Depth: SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	
21	7		60 50								50+	SM	Gravelly Silty Sand, very dense, tan and gray, refusal, 50 blows for 75 mm of penetration (Terrace Deposit)
22													
23													End of boring at 6.4 meters
24													
25													Ground water was not encountered during the drilling operations.
26	8												
28													
29													
30	9												
31													
32													
33	10												
34													
35													
36													
37	11												
38													
40	12												

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
BB-6	4/7/2004	4/7/2004	A. Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
160 m	Offset & Station: 10 m Rt. 134+00	Ref Line E5	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth:

Drilling Method: Wet core drilling | Drilling Equipment: Truck Mounted Rig (CS 500)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Lithological Description
1–5	1		32 / 50								50+	CL	Sandy Clay, hard, mottled light brown and white, dry , medium plasticity (Terrace Deposit)
6–8	2		50										
9–10	3		46 / 50								50+	SM	Silty Sand, very dense, mottled light brown and white, dry (Terrace Deposit)
11–15	4		20 / 50								50+		- some rock
16–18	5												
20	6		9 / 40										Poorly Graded Sand, very dense, dark gray

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Boring No. BB-6	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 2 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	4/7/2004	4/7/2004	A. Lari	SR-905	11-091821
Top Hole Elev.	Location			Purpose of work	Dist - Co. - Rte. - PM
160 m	Offset & Station: 10 m Rt. 134+00		Ref Line E-5	GDR Investigation	11-SD-905

Groundwater Level: Date Measured — Depth to Water

Drilling Method: Wet core drilling — Drilling Equipment: Truck Mounted Rig (CS 500)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	Total Hole Depth: SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	
21											50+	SP	Poorly Graded Sand, very dense, dark gray (Terrace Deposit)
22													- hit rock, slow drilling
23	7												
24													
25			30									GW	Well Graded gravel, very dense, dark gray, refusal, 30 blows for 75 mm of penetration (Terrace Deposit)
26													
	8												
28													End of boring at 8.2 meters
29													Ground water was not encountered during the drilling operations.
30	9												
31													
32													
33	10												
34													
35													
36													
37	11												
38													
40	12												

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
BB-7	4/7/2004	4/7/2004	M. Jandal	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
160 m	Offset & Station: 10 m Rt. 135+63	Ref Line E5	GDR Inestigation	11-SD-905

Drilling Method	Drilling Equipment
Wet Core Drilling	Truck Mounted Rig (CS 2000)

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth:

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	
1													
2													
3	1												
4													
5													
6			15							19	42	SM	Silty Sand, dense to very dense, light gray, slightly moist with gravel and fine calcareous material (Terrace Deposit)
	2		23										
8													
9													
10	3												- with occasional gravel
11			16							20	40		
12			20										
13	4												
14													
15													
16			26							50	50+	GP	Poorly Graded Gravel, very dense, greenish gray, with oxidation stains, refusal, 50 blows for 50 mm of penetration (Terrace Deposit)
17	5												
18													
20	6												

Boring No. BB-7	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 2 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	4/7/2004	4/7/2004	M. Jandal	SR-905	11-091821
Top Hole Elev.	Location			Purpose of work	Dist - Co. - Rte. - PM
160 m	Offset & Station: 10 m Rt. 135+63		Ref Line E5	GDR Inestigation	11-SD-905

Groundwater Level: Date Measured — Depth to Water

Total Hole Depth

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log
21			50									
22												
23	1											
24												
25												
26												
	2											
28												
29												
30	3											
31												
32												
33	4											
34												
35												
36												
37	5											
38												
40	6											

Drilling Method	Drilling Equipment
Wet Core Drilling	Truck Mounted Rig (CS 2000)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. *Structure*
10. Cementation
11. *Organics*
12. Fill Material
13. Other

Poorly Graded Gravel, very dense, greenish gray, with oxidation stains, refusal, 50 blows for 75 mm of penetration (Terrace Deposit)

End of boring at 6.3 meters

Ground water was not encountered during the drilling operations.

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
BB-8	4/7/2004	4/7/2004	M. Jandal	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
159 m	Offset & Station: 15 m Rt. 137+00	Ref Line E5	GDR Investigation	11-SD-905

Groundwater Level		Drilling Method	Drilling Equipment
Date Measured	Depth to Water	Wet Core Drilling	Truck Mounted Rig (CS 2000)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	Total Hole Depth	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
1														
2														
3	1													
4														
5														
6				30							50	50+	SM	Silty Sand, medium dense to very dense, light gray, slightly moist with gravel and fine calcareous material, refusal, 50 blows for 100 mm of penetration(Terrace Deposit)
	2													
8														
9														
10	3													
11				14							14	50+		
12				14							50			- layer of gravel
13	4			50										
14														
15														
16				17							21	45	SC	Clayey Sand, medium dense, greenish gray, slightly moist with some cementation(Terrace Deposit)
17	5			24										- hard layer of gravel
18														- back in sand
														- hard layer of gravel
20	6													

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Boring No. BB-8	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 2 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	4/7/2004	4/7/2004	M. Jandal	SR-905	11-091821
Top Hole Elev.	Location			Purpose of work	Dist - Co. - Rte. - PM
159 m	Offset & Station: 15 m Rt. 137+00		Ref Line E5	GDR Investigation	11-SD-905

Groundwater Level: Date Measured | Depth to Water

Total Hole Depth

Drilling Method: Wet Core Drilling | Drilling Equipment: Truck Mounted Rig (CS 2000)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
21			30									GP	Poorly Graded Gravel, very dense, medium to coarse grained, refusal, 30 blows for 100 mm of penetration (Terrace Deposit)
22													
23	1												
24													
25													- refusal, 20 blows for 25 mm of penetration
26			20										End of boring at 7.7 meters
	2												Ground water was not encountered during the drilling operations.
28													
29													
30	3												
31													
32													
33	4												
34													
35													
36													
37	5												
38													
39													
40	6												

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
BB-9	4/7/2004	4/7/2004	A. Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
157 m	Offset & Station: 20 m Lt. 129+00	Ref Line E5	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth:

Drilling Method	Drilling Equipment
Wet Core Drilling	Truck Mounted Rig (CS 2000)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Description
1–5	1	BB-13-1	25 / 35 / 50									CL	Silty Clay with trace of sand, hard, dark gray, dry, high plasticity, 50 blows for 125 mm of penetration (Terrace Deposit)
		BB-13-2											
6–10	2–3												- encountered hard layer, very slow drilling
11–15	4												End of boring at 3.0 meters
16–20	5–6												Ground water was not encountered during the drilling operations.

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
BB-10	4/7/2004	4/7/2004	A. Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
156 m	Offset & Station: 20 m Rt. 139+00	Ref Line E5	GDR Investigation	11-SD-905

Groundwater Level		Drilling Method	Drilling Equipment
Date Measured	Depth to Water	Wet Core Drilling	Truck Mounted Rig (CS 2000)

Total Hole Depth

Boring Depth (ft) | Boring Depth (meter) | Sample Number | SPT | CA Modified | Coring | Total Recovery | % Recovery | RQD | Lab Work Assigned | SPT Blows per .3 meter: .15 meter | SPT total | Graphic Log

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	SPT total	Graphic Log	Lithological Description
1	1	1	15	37	CH	Silty Clay, hard, mottled gray and white, high plasticity (Topsoil/Terrace Deposit)
2						
3						
4						
5			17			
6	2	2	20			
8						- encountered hard layer, very slow drilling
9						- refusal, 100 mm of penetration
10	3	3				
11						
12						
13	4	4				- changed to diamond drilling bit
14						
15						
16						
17	5	5				
18						
19						
20	6	6				

End of boring at 5.5 meters

Ground water was not encountered during the drilling operations.

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
CB-1	3/16/2004	3/16/2004	A Lari/S Romouzi	SR-905	11-091821

Tip Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
154 m	Offset & Station: CtrL 141+00	Ref Line E	GDR Investigation	11-SD-905

Groundwater Level: Date Measured — Depth to Water

Total Hole Depth

Drilling Method: Wet Core Drilling

Drilling Equipment: Truck Mounted Rig (CS 2000)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	Lithological Description
1												CH	Silty Clay, very stiff, grayish brown, moist, high plasticity (Topsoil)
2	1												
3													
4													
5													
6	2												
8			4 10								19	SW	Gravelly Sand, very dense, grayish green, fine to coarse gravel (Terrace Deposit)
9			9										
10	3												
11													
12													
13	4	CB-1-1	23 37 50								87		
14													
15													
16													
17	5												
18			25										- refusal, 25 blows for 50 mm of penetration
20	6												

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
CB-1	3/16/2004	3/16/2004	A Lari/S Romouzi	SR-905/Border	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
154 m	Offset & Station: CtrL 141+00	Ref Line E	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth

Drilling Method	Drilling Equipment
Wet Core Drilling	Truck Mounted Rig (CS 2000)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
21													Gravelly Sand, very dense, grayish green, fine to coarse gravel (Terrace Deposit)
22													
23	7			50									- refusal, 50 blows for 37 mm of penetration
24													
25													End of boring at 7.3 meters
26	8												Ground water was not encountered during the drilling operations.
28													
29													
30	9												
31													
32													
33	10												
34													
35													
36													
37	11												
38													
9													
40	12												

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Boring No. CB-2	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 1 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	3/18/2004	3/18/2004	A Lari	SR-905	11-091821
T· Hole Elev.	Location			Purpose of work	Dist - Co. - Rte. - PM
154 m	Offset & Station: 40 m Rt, 141+40		Ref Line E	GDR Investigation	11-SD-905

Groundwater Level: Date Measured — Depth to Water

Drilling Method: Wet Core Drilling — Drilling Equipment: Truck Mounted Rig (CS 2000)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	Total Hole Depth	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
1														
2														
3	1													
4														
5				12									SP	Gravelly Sand, dense, light brown, with fine to coarse gravel (Terrace Deposit)
				17								45		
6				28										
	2													
8														
9														
10	3			15									SP	Fine to medium grained Sand, dense, gray (Terrace Deposit)
				22								49		
11				27										
12														
13	4													
14														
15				14										
				14								40		
16				26										
17	5													
18														
19														
20	6													-Sampler refusal on rock

SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
CB-2	3/18/2004	3/18/2004	A Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
154 m	Offset & Station: 40 m Rt, 141+40	Ref Line E	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: — Depth to Water:

Drilling Method: Wet Core Drilling

Drilling Equipment: Truck Mounted Rig (CS 2000)

Total Hole Depth

Boring Depth (ft) | Boring Depth (meter) | Sample Number | SPT | CA Modified | Coring | Total Recovery | % Recovery | RQD | Lab Work Assigned | SPT Blows per .3 meter: .15 meter | SPT total | Graphic Log

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)
21	
22	
23	7
24	
25	
26	8
28	
29	
30	9
31	
32	
33	10
34	
35	
36	
37	11
38	
39	
40	12

- refusal on rock

End of boring at 7.3 meters

Ground water was not encountered during the drilling operations.

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
CB-3	3/11/2004	3/11/2004	A Lari	SR-905	11-091821

Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
154 m	Offset & Station: 30 m Rt, 142+40	Ref Line E	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth

Drilling Method: Wet Core Drilling | Drilling Equipment: Truck Mounted Rig (CS 2000)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	
1												CL	Sandy Clay, brown, moist, medium plasticity (Topsoil)
2	1												
3													
4												ML	Sandy Silt, light brown (Topsoil)
5													
6			12									SP	Poorly Graded Sand, medium dense, light brown, fine grained (Terrace Deposit)
	2		17								26		
8			9										
9													
10	3												
11			34									SP	Gravelly Sand, very dense, grayish brown, fine to coarse gravel (Terrace Deposit)
12			50								50+		
13	4		0										
14													
15													
16													- Sampler refusal on rock
17	5												
18													
20	6												

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Boring No. CB-3	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 2 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	3/11/2004	3/11/2004	A Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
154 m	Offset & Station: 30 m Rt, 142+40	Ref Line E	GDR Investigation	11-SD-905

Groundwater Level		Drilling Method	Drilling Equipment
Date Measured	Depth to Water	Wet Core Drilling	Truck Mounted Rig (CS 2000)

Total Hole Depth

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log
21												
22												
23	7											
24												
25												
26												
	8											
28												
29												
30	9											
31												
32												
33	10											
34												
35												
36												
37	11											
38												
39												
40	12											

Lithological Descriptions

1. Group Name	8. Plasticity
2. Group Symbol	9. Structure
3. Consistancy/Relative Density	10. Cementation
4. Color	11. Organics
5. Moisture	12. Fill Material
6. Partical Size & Shape	13. Other
7. Gradation	

-Sampler refusal

End of boring at 7.6 meters

Ground water was not encountered during the drilling operations.

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Boring No. CB-4	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 1 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	3/11/2004	3/11/2004	A Lari	SR-905	11-091821
T· Hole Elev.	Location			Purpose of work	Dist - Co. - Rte. - PM
153 m	Offset & Station: CtrL 142+40		Ref Line E	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth:

Drilling Method: Wet Core Drilling | Drilling Equipment: Truck Mounted Rig (CS 2000)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	
1													
2													
3	1												
4													
5													
6			50									SP	Gravelly Sand, very dense, light brown, fine gravel (Terrace Deposit)
	2												
8													
9													
10	3												
11			22										
12			29								60		- a piece of rock plugged the sampler
			31										
13	4												
14													
15													
16													-Sampler refusal, on rock
17	5												
18													
19													
20	6												

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
CB-4	3/11/2004	3/11/2004	A Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
153 m	Offset & Station: CtrL 142+40	Ref Line E	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth

Drilling Method	Drilling Equipment
Wet Core Drilling	Truck Mounted Rig (CS 2000)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	Lithological Description
21													
22													
23	7												- loose gravel
24													
25													
26													
	8												End of boring at 7.9 meters
28													
29													Ground water was not encountered during the drilling operations.
30	9												
31													
32													
33	10												
34													
35													
36													
37	11												
38													
39													
40	12												

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
CB-5	3/10/2004	3/10/2004	A Lari	SR-905	11-091821

Top Hole Elev.	Location	Purpose of work	Dist - Co. - Rte. - PM
155 m	Offset & Station: 40 m Lt, 144+30 Ref Line E	GDR Investigation	11-SD-905

Groundwater Level: Date Measured — Depth to Water

Total Hole Depth

Drilling Method: Wet Core Drilling

Drilling Equipment: Truck Mounted Rig (CS 2000)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Lithological Description
1–5	1												
6	2		45							45	92	SW	Gravelly Well Graded Sand, very dense, grayish brown, fine to coarse gravel (high blow count may have resulted from a rock fragment blocking the sampler) (Terrace Deposit)
8–10	3		47							47			
11	4		14							18	36	SP	Poorly Graded Sand, dense, grayish brown, with silt (Terrace Deposit)
12–15			18							18			
16	5		6							7	14	CL	Sandy Clay, stiff, light brown, medium plasticity (Terrace Deposit)
17			7							7			
18–19													
20	6												

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Boring No. CB-5	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 2 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	3/10/2004	3/10/2004	A Lari	SR-905	11-091821
Top Hole Elev.	Location			Purpose of work	Dist - Co. - Rte. - PM
155 m	Offset & Station: 40 m Lt, 144+30		Ref Line E	GDR Investigation	11-SD-905

Groundwater Level: Date Measured | Depth to Water

Drilling Method: Wet Core Drilling | Drilling Equipment: Truck Mounted Rig (CS 2000)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	Total Hole Depth: SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	
21			30									SW	Gravelly Well Graded Sand, very dense, light brown (Terrace Deposit)
22			47								50+		
23	7		32										
24													
25													
26			34									GW	Sandy Well Graded Gravel, very dense, light brown, Sampler refusal, on rock (Terrace Deposit)
	8		44								50+		
28													
29													
30	9												- Sampler refusal, on rock
31													End of boring at 9.1 meters
32													Ground water was not encountered during the drilling operations.
33	10												
34													
35													
36													
37	11												
38													
40	12												

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Boring No. CB-6	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 1 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	3/9/2004	3/9/2004	A. Lari	SR-905	11-091821
To Hole Elev.	Location			Purpose of work	Dist - Co. - Rte. - PM
154 m	Offset & Station: 40 m Lt, 144+70 Ref Line E			GDR Investigation	11-SD-905

Groundwater Level: Date Measured — Depth to Water

Total Hole Depth

Drilling Method: Wet Core Drilling

Drilling Equipment: Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Lithological Description
1													
2													
3	1												
4													
5													
6			10									SP	Poorly Graded Sand, medium dense, yellowish gray with some gravel (Terrace Deposit)
	2		10								20		
8			10										
9													
10	3												
11													
12			11										- dense, high blow count may have resulted from rock in the Sampler
13			23								50+		
14	4		35										
15													
16			50								50+	SW	Gravelly Well Graded Sand, very dense, yellowish gray, refusal, 50 blows for 100 mm of penetration (Terrace Deposit)
17	5												
18													
19													
20	6												

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Boring No. CB-6	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 2 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	3/9/2004	3/9/2004	A. Lari	SR-905	11-091821
Top Hole Elev.	Location			Purpose of work	Dist - Co. - Rte. - PM
154 m	Offset & Station: 40 m Lt, 144+70 Ref Line E			GDR Investigation	11-SD-905

Groundwater Level: Date Measured — Depth to Water

Total Hole Depth

Drilling Method: Wet Core Drilling

Drilling Equipment: Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: 15 meter	SPT total	Graphic Log	
21			24									CL	Silty Clay, very stiff, light brown, medium plasticity (Terrace Deposit)
22			14								28		
23	7		14										
24													
25													
26			34									SP	Poorly Graded fine grained Sand with Gravel, very dense, yellowish gray (Terrace Deposit)
	8		34								65		
28			31										
29													
30	9												
31			50										- Sampler refusal, 50 blows for 125 mm of penetration
32													End of boring at 9.3 meters
33	10												Ground water was not encountered during the drilling operations.
34													
35													
36													
37	11												
38													
39													
40	12												

Boring No. CB-7	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 1 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	3/8/2004	3/9/2004	A. Lari	SR-905	11-091821
Total Hole Elev.	Location			Purpose of work	Dist - Co. - Rte. - PM
153 m	Offset & Station: CtrL 144+50		Ref Line E	GDR Investigation	11-SD-905

Groundwater Level: Date Measured — Depth to Water

Total Hole Depth

Drilling Method: Wet Core Drilling

Drilling Equipment: Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
1													
2													
3	1												
4													
5													
6			22									SW	Gravelly Well Graded Sand, very dense, light brown, Sampler refusal, on rock (Terrace Deposit)
	2												
8													
9													
10	3												- Sampler refusal, on rock
11													
12													
13	4												
14													
15													
16													- Sampler refusal, on rock
17	5												- no sample was recovered, the hole caved in
18													
19													
20	6												

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Boring No. CB-7	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 2 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	3/8/2004	3/9/2004	A. Lari	SR-905	11-091821
Top Hole Elev.	Location			Purpose of work	Dist - Co. - Rte. - PM
153 m	Offset & Station: CtrL 144+50		Ref Line E	GDR Investigation	11-SD-905

Groundwater Level: Date Measured — Depth to Water

Total Hole Depth

Drilling Method: Wet Core Drilling

Drilling Equipment: Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	Lithological Descriptions
21													- no sample was retrieved, the hole caved in
22													
23	7												
24													
25													
26			24									SW	Well Graded Sand with Gravel, very dense, light brown (Terrace Deposit)
	8		40								90		
			50										
28													
29													
30	9												
31			24										
32			40								80		
			40										End of boring at 9.8 meters
33	10												
34													Ground water was not encountered during the drilling operations.
35													
36													
37	11												
38													
39													
40	12												

SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
CB-8	3/4/2004	3/4/2004	A. Lari	SR-905	11-091821

Total Hole Elev.	Location	Purpose of work	Dist - Co. - Rte. - PM
152 m	Offset & Station: CtrL 146+00 Ref Line E	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth:

Drilling Method: Wet Core Drilling

Drilling Equipment: Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. *Gradation*
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
1												SW	Gravelly well graded Sand, dense (Terrace Deposit)
2	1												
3													
4													
5													
6													
	2												
8													
9													
10	3												
11			45									SW	Gravelly Well Graded Sand, very dense with silt (Terrace Deposit)
12			45								50+		
13			40										
14	4												
15													
16													- Sampler refusal, on rock
17	5												
18													
19													
20	6												

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Boring No. CB-8	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 2 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	3/4/2004	3/4/2004	A. Lari	SR-905	11-091821
Top Hole Elev.	Location			Purpose of work	Dist - Co. - Rte. - PM
152 m	Offset & Station: CtrL 146+00 Ref Line E			GDR Investigation	11-SD-905

Groundwater Level		Drilling Method	Drilling Equipment
Date Measured	Depth to Water	Wet Core Drilling	Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	Total Hole Depth	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	Lithological Descriptions
21														- gravelly Sand
22														
23	7													
24														End of boring at 7.0 meters
25														
26														Ground water was not encountered during the drilling operations.
	8													
28														
29														
30	9													
31														
32														
33	10													
34														
35														
36														
37	11													
38														
39														
40	12													

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Boring No. CB-9	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 1 of 1
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	3/3/2004	3/4/2004	A. Lari	SR-905	11-091821
Top Hole Elev.	Location			Purpose of work	Dist - Co. - Rte. - PM
149 m	Offset & Station: CtrL 146+90		Ref Line E5	GDR Investigation	11-SD-905

Groundwater Level: Date Measured — Depth to Water

Total Hole Depth

Drilling Method: Wet Core Drilling

Drilling Equipment: Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. *Group Symbol*
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	
1–5	1											SW	Gravelly Well Graded Sand, with cobbles and boulders (Terrace Deposit)
6–10	2–3												- encounterd a solid layer of rock and gravelly sand, changed drilling tool to diamond bit, slow drilling
11–15	4												
16–20	5–6												End of boring at 3.7 meters Ground water was not encountered during the drilling operation.

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Boring No. CB-10	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 1 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	3/3/2004	3/3/2004	A. Lari	SR-905	11-091821
Top Hole Elev.	Location			Purpose of work	Dist - Co. - Rte. - PM
155 m	Offset & Station: 10 m Lt, 147+50		Ref Line E	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth:

Drilling Method: Wet Core Drilling | Drilling Equipment: Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Lithological Description
1–5	1											SW	Gravelly Well Graded Sand, with cobbles and boulders (Terrace Deposit)
6	2		25										- light brown, Sampler refusal, 25 blows for 25 mm of penetration
8–10	3												
11	4		19									SW	Well Graded Sand with Gravel, dense, light brown (Terrace Deposit)
12			15								34		
13–15			19										
16	5		25										- Sampler refusal, 25 blows for 100 mm of penetration
17–19													
20	6												

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
CB-10	3/3/2004	3/3/2004	A. Lari	SR-905	11-091821

Top Hole Elev.	Location	Purpose of work	Dist - Co. - Rte. - PM
155 m	Offset & Station: 10 m Lt, 147+50 Ref Line E	GDR Investigation	11-SD-905

Groundwater Level: Date Measured | Depth to Water

Total Hole Depth

Drilling Method: Wet Core Drilling

Drilling Equipment: Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
21			24									SW	Well Graded Sand with Gravel, very dense, light brown, Sampler refusal (Terrace Deposit)
22													
23	7												
24													
25													
26			28										- Sampler refusal
	8												
28													End of boring at 8.5 meters
29													
30	9												Ground water was not encountered during the drilling operations.
31													
32													
33	10												
34													
35													
36													
37	11												
38													
39													
40	12												

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No. CB-11	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	3/3/2004	3/3/2004	A. Lari	SR-905	11-091821

T- Hole Elev.	Location	Purpose of work	Dist - Co. - Rte. - PM
152 m	Offset & Station: 15 m Rt, 148+00 Ref Line E5	GDR Investigation	11-SD-905

Groundwater Level: Date Measured — Depth to Water

Drilling Method: Wet Core Drilling — Drilling Equipment: Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	Total Hole Depth: SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Lithological Description
1–5	1											SW	Gravelly Well Graded Sand, with cobbles and boulders (Terrace Deposit)
6–10	2–3												- hard solid layer was encountered, Sampler refusal
11–15	4	CB-11-1	30 40 42								50+		- very dense, light brown and black
16–20	5–6		30										- Sampler refusal, 30 blows for 75 mm of penetration

End of boring at 4.9 meters

Ground water was not encountered during the drilling operations.

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Boring No. CB-12	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 1 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	3/2/2004	3/2/2004	A. Lari	SR-905	11-091821
T... Hole Elev.	Location			Purpose of work	Dist - Co. - Rte. - PM
152 m	Offset & Station: 20 m Rt, 149+00		Ref Line E	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth:

Drilling Method: Wet Core Drilling | Drilling Equipment: Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
1													
2													
3	1												
4													
5													
6			12									SP	Poorly Graded Sand, medium dense, light brown with coarse gravel (Terrace Deposit)
	2		11								22		
8			11										
9													
10	3												
11			37									SW	Gravelly Well Graded Sand, very dense, light brown (Terrace Deposit)
12			43								83		
13	4		50										
14													
15													
16			25									GW	Sandy Well Graded Gravel, very dense, light brown (Terrace Deposit)
17	5		28								50		
18			22										
19													
20	6												

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Boring No. CB-12	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 2 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	3/2/2004	3/2/2004	A. Lari	SR-905	11-091821
Top Hole Elev.	Location			Purpose of work	Dist - Co. - Rte. - PM
150 m	Offset & Station: 20 m Rt, 149+00 Ref Line E			GDR Investigation	11-SD-905

Groundwater Level: Date Measured | Depth to Water

Total Hole Depth

Drilling Method: Wet Core Drilling | Drilling Equipment: Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
21			20									GW	Sandy Well Graded Gravel, very dense, light brown, Sampler refusal, 20 blows for 50 mm of penetration (Terrace Deposit)
22													
23	7												
24													
25													
26													- Sampler refusal
	8												
28													
29													
30	9												
31			16 15 16								31	SP	Poorly Graded Fine Sand with Gravel and Cobbles, dense, light brown (Terrace Deposit)
32													End of boring at 9.3 meters
33	10												Ground water was not encountered during the drilling operations.
34													
35													
36													
37	11												
38													
39													
40	12												

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
CB-13	3/2/2004	3/2/2004	A Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
143 m	Offset & Station: CtrL 149+55	Ref Line E	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth

Drilling Method	Drilling Equipment
Wet Core Drilling	Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified.	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	
1													
2													
3	1												
4													
5													
6			13									SW	Gravelly Well Graded Sand, medium dense, light brown (Terrace Deposit)
8	2		8								14		
9			6										
10	3												
11			23										- Sampler refusal, 23 blows for 50 mm of penetration
12													
13	4												
14													
15													
16			14										- a piece of rock plugged the sampler, no sample was retrieved
17	5		14								37		
18			23										
20	6												

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
CB-13	3/2/2004	3/2/2004	A Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
143 m	Offset & Station: CtrL 149+55	Ref Line E	GDR Investigation	11-SD-905

Groundwater Level		Drilling Method	Drilling Equipment
Date Measured	Depth to Water	Wet Core Drilling	Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified.	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Description
21			17									SC	Clayey Sand, medium dense, light brown, with trace gravel (Terrace Deposit)
22			10								17		
23	7		7										
24													
25													
26			4										- a piece of rock plugged the sampler, no sample was retrieved
	8		16								32		
28			16										
29													
30	9												
31			15										- no material was retrieved
32			8								16		
33	10		8										End of boring at 9.3 meters
34													
35													Ground water was not encountered during the drilling operations.
36													
37	11												
38													
40	12												

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
CB-14	3/1/2004	3/1/2004	A Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
150 m	Offset & Station: CtrL 150+50	Ref Line E	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth

Drilling Method: Wet Core Drilling | Drilling Equipment: Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Lithological Description
1–5	1												
6	2	CB-14-1	12							14	28	SP	Poorly Graded Sand, medium dense, light brown, fine grained, with silt (Fill)
8–10	3		14										
11–15	4												- Sampler refusal, on rock
16–17	5	CB-14-2	20							50	50+	GS	Sandy Gravel, very dense, black and brown, fine to coarse grained, Sampler refusal, 50 blows for 75 mm of penetration (Fill)
18–20	6												

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
CB-14	3/1/2004	3/1/2004	A Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
150 m	Offset & Station: CtrL 150+50	Ref Line E	GDR Investigation	11-SD-905

Groundwater Level		Drilling Method	Drilling Equipment
Date Measured	Depth to Water	Wet Core Drilling	Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
21			25									SP	Poorly Graded Sand, very dense, light brown, fine grained (Fill)
22			26								52		
23	7		26										
24													
25													
26													- Sampler refusal
	8												
28													
29													
30	9												- Sampler refusal, 22 blows for 75 mm of penetration
31			22										
32													End of boring at 9.3 meters
33	10												Ground water was not encountered during the drilling operations.
34													
35													
36													
37	11												
38													
40	12												

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
CB-15	2/24/2004	2/24/2004	A Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
154 m	Offset & Station: 10 m Rt, CtrL 151+80	Ref Line E	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth

Drilling Method	Drilling Equipment
Wet Core Drilling	Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Description
1–5	1												Sandy Gravel with cobbles and boulders, hard drilling (Fill)
													Sandy Clay with rock
6–10	2–3		6 9 12								21	CH	Silty Clay with Sand, very stiff, light brown, high plasticity (Fill)
11–15	4		10 13 17								30	SC	Clayey Sand, medium dense, light brown (Fill)
													- with gravel and cobbles
16–20	5–6		17 17 17								34		- dense

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No. CB-15	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	2/24/2004	2/24/2004	A Lari	SR-905	11-091821

Tr[illegible]ole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
154 m	Offset & Station: 10 m Rt, CtrL 151+80	Ref Line E	GDR Investigation	11-SD-905

Drilling Method	Drilling Equipment
Wet Core Drilling	Mobil Drill (B 47)

Groundwater Level

Date Measured	Depth to Water

Total Hole Depth

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
21			21									SC	Clayey Sand, very dense, light brown, with gravel, Sampler refusal, 21 blows for 25 mm of penetration (Fill)
22													
23	7												
24													
25													
25													
	8												
28													
29													
30	9												
31													
32													
33	10												
34													
35													
36													
37	11												
38													
40	12												

End of boring at 7.0 meters

Ground water was not encountered during the drilling operations.

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
CB-16	2/25/2004	2/25/2004	A Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
154 m	Offset & Station: 30 m Lt, CtrL 152+00	Ref Line E	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: — Depth to Water:

Total Hole Depth:

Drilling Method	Drilling Equipment
Wet Core Drilling	Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
1													Gravelly Sand, top soil, (Fill)
2	1											CH	Silty Clay, light brown, high plasticity (Fill)
3													
4													
5													- with coarse gravel
6													
	2		9								14	SC	Clayey Sand, medium dense, light brown, fine grained (Fill)
			9										
8			5										
9													
10	3												
11			10								28	SP	Poorly Graded Sand, medium dense, light brown (Fill)
12			13										
13	4		15										- with coarse gravel
14													
15													
16													
17	5		14								38		- dense with silt
18			18										
			20										
20	6												

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No. CB-16	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	2/25/2004	2/25/2004	A Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
154 m	Offset & Station: 30 m Lt, CtrL 152+00	Ref Line E	GDR Investigation	11-SD-905

Groundwater Level		Drilling Method	Drilling Equipment
Date Measured	Depth to Water	Wet Core Drilling	Mobil Drill (B 47)

Total Hole Depth

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified.	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
21			17									SP	Poorly Graded Sand, dense, light brown (Fill)
22			14								50		
23	7		36										
24													
25													
26			14										
	8		19								45		
28			26										
29													
30	9												
31													
32													
33	10												
34													
35													
36													
37	11												
38													
40	12												

End of boring at 8.2 meters

Ground water was not encountered during the drilling operations.

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
CB-17	2/25/2004	2/25/2004	A Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
153 m	Offset & Station: 30 m Lt, CtrL 152+80	Ref Line E	GDR Investigation	11-SD-905

Groundwater Level	Drilling Method	Drilling Equipment
Date Measured: — Depth to Water: — Total Hole Depth: —	Wet Core Drilling	Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified.	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	Lithological Description
1–5	1	CB17-1										CL	Push sampler down 0.3 m. Silty Clay, light brown, moist, with trace of fine sand (Fill)
6–10	2–3	CB17-2	4 5 6								11	SC	Clayey Fine Sand, medium dense, light brown (Fill)
11–15	4		11 16 19								35	SP	Poorly Graded Sand, dense, light brown (Fill)
16–20	5–6		18 20 22								42		- with some gravel

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
CB-17	2/25/2004	2/25/2004	A Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
153 m	Offset & Station: 30 m Lt, CtrL 152+80	Ref Line E	GDR Investigation	11-SD-905

Groundwater Level		Drilling Method	Drilling Equipment
Date Measured	Depth to Water	Wet Core Drilling	Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	Total Hole Depth: SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	
21			14									SP	Poorly Graded Sand, dense, light brown (Fill)
22			17								37		
23	7		20										
24													
25													
26													
	8												
28													
29													
30	9												
31													
32													
33	10												
34													
35													
36													
37	11												
38													
40	12												

End of boring at 7.0 meters

Ground water was not encountered during the drilling operations.

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
CB-18	2/24/2004	2/24/2004	A Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
152 m	Offset & Station: 10 m Rt, 153+00	Ref Line E	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth

Drilling Method	Drilling Equipment
Wet Core Drilling	Mobil Drill (B 47)

Material Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Material Description
1													Sandy gravel (Fill)
2													
3	1												
4													
5													
6													
7	2		28 23 26								49	SW	Well Graded Sand with Gravel, dense, light brown, dry
8													
9													
10	3												
11													- hard drilling, no SPT
12													
13	4												
14													
15													
16													- Sampler refusal
17	5												- drilling very slow due to hard/very dense material
18													
19													
20	6												

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
CB-18	2/24/2004	2/24/2004	A Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
152 m	Offset & Station: 10 m Rt, 153+00	Ref Line E	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: — Depth to Water: —

Total Hole Depth

Drilling Method	Drilling Equipment
Wet Core Drilling	Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: 15 meter	SPT total	Graphic Log	
21												SW	Gravelly Well Graded Sand, refusal
22													
23	7												
24													End of boring at 7.0 meters
25													
26													
	8												
28													
29													
30	9												
31													
32													
33	10												
34													
35													
36													
37	11												
38													
39													
41	12												

The boring was terminated at 7.0 meters below the gorund surface. Ground water was not encountered during the drilling operation.

SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
CB-19	3/18/2004	3/18/2004	M. Fordham	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
153 m	Offset & Station: CtrL 154+10	Ref Line E5	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: — Depth to Water:

Total Hole Depth:

Drilling Method: Wet Core Drilling — Drilling Equipment: Mobil Drill (SC 500)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	Description
1	1	1	17 35 25								60	CH/SP	Sandy Clay, hard, medium to dark brown, moist, fine to coarse sand, medium plasticity
6	2	2	8 12 15								27	CH	Silty Clay, very stiff, light brown, moist, high plasticity
11	4		15 25 50								75	GW	Well Graded Gravel with Clayey Sand, very dense, light brown, moist
16	5	3	23 50								50+	SP	Poorly Graded Sand, very dense, light brown, fine grained, moist, Sampler refusal, 50 blows for 125 mm of penetration

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
CB-19	3/18/2004	3/18/2004	M. Fordham	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
153 m	Offset & Station: CtrL 154+10	Ref Line E5	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth

Drilling Method: Wet Core Drilling | Drilling Equipment: Mobil Drill (SC 500)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	
21			50								50+	SM	Silty Sand, very dense, light brown, fine grained, moist, Sampler refusal, 50 blows for 75 mm of penetration (Terrace Deposit)
22													
23	7												
24													
25													
26													End of boring at 7.6 meters
	8												Ground water was not encountered during the drilling operations.
28													
29													
30	9												
31													
32													
33	10												
34													
35													
36													
37	11												
38													
39													
40	12												

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Boring No. CB-20	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 1 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	3/18/2004	3/18/2004	M. Fordham	SR-905	11-091821
Top Hole Elev.	Location			Purpose of work	Dist - Co. - Rte. - PM
153 m	Offset & Station: CtrL 155+08		Ref Line E5R	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth:

Drilling Method: Wet Core Drilling | Drilling Equipment: Mobil Drill (SC 500)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Lithological Description
1–5	1												
6	2		9 11 27								38	CH	Silty Clay with Sand, very stiff, light brown, moist, high plasticity, fine to medium sand (Topsoil)
8–10	3												
11	4		27 50								50+	SC	Clayey Sand with Gravel, very dense, light brown, fine to coarse gravel, refusal, 50 blows for 25 mm of penetration (Terrace Deposit) With cobbles and boulders
15–18	5												The sampler was plugged with piece of rock, no sample was retrieved
20	6												

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No. CB-20	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	3/18/2004	3/18/2004	M. Fordham	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
153 m	Offset & Station: CtrL 155+08	Ref Line E5R	GDR Investigation	11-SD-905

Drilling Method	Drilling Equipment
Wet Core Drilling	Mobil Drill (SC 500)

Groundwater Level: Date Measured — Depth to Water

Total Hole Depth

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
20			50								50+	SC	Clayey Sand with Gravel, very dense, light brown, fine to coarse gravel, refusal, 50 blows for 125 mm of penetration (Terrace Deposit)
21													
22													End of boring at 6.6 meters
23	7												Ground water was not encountered during the drilling operations.
24													
25													
26													
27	8												
28													
29													
30	9												
31													
32													
33	10												
34													
35													
36													
37	11												
38													
39													
40	12												

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
CB-21	12/8/2004	12/8/2004	A. Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
153 m	Offset & Station: 20 m Rt 158+20	Ref Line E5R	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: — Depth to Water: —

Total Hole Depth: —

Drilling Method	Drilling Equipment
Wet Core Drilling	Mobil Drill (SC 500)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	Lithological Description
1												CH	Sandy clay with fine to coarse gravel, brown, moist, high plasticity (Fill)
2	1												
3													
4													
5													
6			27								32	SC	Clayey fine sand, dense, tan, moist (Fill)
	2		18										
			14										With well graded gravel fine to coarse
8													
9													
10	3												
11			10								34		Very dense
			17										
12			17										
13	4												
14													
15													
16			34								68	SW	Gravelly sand fine to coarse, very dense, tan, moist (Fill)
			34										
17	5		34										Very slow drilling
18													Cobbles
19													
20	6												

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
CB-21	12/8/2004	12/8/2004	A. Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
153 m	Offset & Station: 20 m Rt. 158+20	Ref Line E5R	GDR Investigation	11-SD-905

Groundwater Level		Drilling Method	Drilling Equipment
Date Measured	Depth to Water	Wet Core Drilling	Mobil Drill (SC 500)
		Total Hole Depth	

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
21			8								51	SW	Drilling very slow
			27										
22			24										
23	7												
24												CH	Silty clay, gray, moist, high plasticity (Terrace Deposit)
25			6								20		Very stiff
26			8										
	8		12										
28													
29													
	9												
30			12								42		Hard
31			18										
32			24										
	10												
34													
35													
36													
	11												
38													
39													
40	12												

End of Boring at 9.6 m

Ground water was not encountered during the drilling operations.

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
CB-22	12/8/2004	12/8/2004	A. Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
152 m	Offset & Station: 20 m Rt. 157+90	Ref Line E5R	GDR Investigation	11-SD-905

Drilling Method	Drilling Equipment
Wet Core Drilling	Mobil Drill (SC 500)

Groundwater Level: Date Measured — Depth to Water

Total Hole Depth

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Description
1–5	1											SP	Gravelly sand with silt, brown, moist (Fill) Rock No SPT
6–10	2–3												Poorly graded sand with gravel and silt, tan, moist, fine sand (Fill) Cobbles and boulders No SPT
11–15	4											ML	Sandy Silt, very stiff, Tan, moist, fine sand (Formation)
15–20	5–6		5 7 9								16		Tan with orange mottling

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
CB-22	12/8/2004	12/8/2004	A Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
152 m	Offset & Station:20 m Rt 157+90	Ref Line E5R	GDR Investigation	11-SD-905

Groundwater Level		Drilling Method	Drilling Equipment
Date Measured	Depth to Water	Wet Core Drilling	Mobil Drill (SC 500)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	Total Hole Depth	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
21	7			6 8 25								33	SM	Silty Sand, dense, gray with orange mottling, moist, fine sand(Terrace Deposit)
25	8			8 15 21								36	CH	Sandy clay, hard, brown, moist, high plasticity, fine sand (Terrace Deposit)
30	9													
35	10													
40	11													
	12													

End of boring at 8.00 meters

Ground water was not encountered during the drilling operations.

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No. CB-23	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	3/18/2004	3/18/2004	A Lari / Shawn	SR-905	11-091821

Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
153 m	Offset & Station: CtrL 159+20	Ref Line E5R	GDR Investigation	11-SD-905

Groundwater Level: Date Measured | Depth to Water

Total Hole Depth

Drilling Method: Wet Core Drilling

Drilling Equipment: Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
1	1												
2													
3													
4													
5													
6	2		5							22	50+	SC	Clayey Sand with Gravel, very dense, dark gray, moist, fine to coarse grained sand & gravel (Fill)
8			30										
9	3												
10													
11			50								50+		- refusal, 50 blows for 25 mm of penetration
12													
13	4												
14													
15													
16			18									SP	Fine to medium Sand with fine gravel, very dense, brown, moist, refusal 50 blows for 75 mm of penetration (Terrace Deposit)
17	5	CB-23-1	50								50+		
18													
19													
20	6												

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Boring No. CB-23	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 2 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	3/18/2004	3/18/2004	A Lari / Shawn	SR-905	11-091821
Top Hole Elev.	Location			Purpose of work	Dist - Co. - Rte. - PM
153 m	Offset & Station: CtrL 159+20		Ref Line E5R	GDR Investigation	11-SD-905

Groundwater Level: Date Measured | Depth to Water

Total Hole Depth

Drilling Method: Wet Core Drilling | Drilling Equipment: Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
21			17									SP	Poorly Graded Sand, dense, brown, moist, with fine gravel (Terrace Deposit)
			21								44		
22			23										
23	7												
24													
25													
			41										Gravelly Sand, very dense, brown, moist, fine to coarse gravel with silt (Terrace Deposit)
26			50								50+		
	8												
28													
29													
30	9												- Sampler refusal, on rock, 50 blows for 25 mm of penetration
31													End of boring at 9.2 meters
32													Ground water was not encountered during the drilling operations.
33	10												
34													
35													
36													
37	11												
38													
39													
40	12												

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
CB-24	12/16/2004	12/16/2004	A Lari / Shawn	SR-905	11-091821

T Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
152 m	Offset & Station: 15 m Rt, 157+60	Ref Line E5R	GDR Investigation	11-SD-905

Groundwater Level		Drilling Method	Drilling Equipment
Date Measured	Depth to Water	Wet Core Drilling	Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	Lithological Description
1													Gravelly sand, brown, moist (Fill)
2	1												
3													
4													
5												SW	Well Graded Sand with fine Gravel, medium dense, tan, moist (Fill)
6			9							12	27		
	2		12							15			
8			15										
9													Cobbles and boulders
10	3											GW	very dense
11		CB-24-1	25							23	51		
12			23							28			
13	4		28										
14													
15												SW	Dense
16			21							27	46		
17	5		27							19			
18			19										
19													
20	6												

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
CB-24	12/16/2004	12/16/2004	A Lari / Shawn	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
152 m	Offset & Station: 15 m Rt, 157+60	Ref Line E5R	GDR Investigation	11-SD-905

Groundwater Level		Drilling Method	Drilling Equipment
Date Measured	Depth to Water	Wet Core Drilling	Mobil Drill (B 47)

Total Hole Depth

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Description
21	7	CB 24-2	8 13 14								27	CH	Sandy clay, very stiff, gray with red mottling, moist, plastic (Terrace Deposit)
25	8	CB 24-3	20 24 29								53		Hard
26													End of boring at 8.00 meters
28													Ground water was not encountered during the drilling operations.
29	9												
30													
31													
32													
33	10												
34													
35													
36													
37	11												
38													
39													
40	12												

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No. CB-25	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	3/18/2004	3/18/2004	Shawn/Ali	SR-905	11-091821

Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
152 m	Offset & Station: 30 m Rt, 155+80	Ref Line E	GDR Investigation	11-SD-905

Groundwater Level: Date Measured	Depth to Water	Drilling Method	Drilling Equipment
		Wet Core Drilling	Mobil Drill (B 47)

Total Hole Depth

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	Lithological Description
1	1												
2													
3													
4													
5													
6	2		25							50	50+	SW	Well Graded Sand with Gravel, very dense, grayish brown, moist, fine to coarse gravel, sampler refusal, 50 blows for 125 mm of penetration (Terrace Deposit)
8													
9													
10	3												
11		CB-25-1	18							41	91	GW	Sandy Well Graded Gravel, very dense, gray brown and greenish blue, moist (Terrace Deposit)
12			50										
13	4												
14													
15													
16		CB-25-2	19							23	54	SW	Gravelly Well Graded Sand, very dense, brown and white, moist (Terrace Deposit)
17	5		31										
18													
19													
20	6												

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
CB-25	3/18/2004	3/18/2004	Shawn/Ali	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
152 m	Offset & Station: 30 m Rt, 155+80	Ref Line E5R	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth

Drilling Method: Wet Core Drilling

Drilling Equipment: Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. ~~Plasticity~~
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Lithological Description
21			28									CH	Silty Clay with fine to medium gravel, hard, gray, moist, high plasticity (Terrace Deposit)
			42								92		
22			50										
23	7												
24													
25													
26		CB25-3											The sampler was pushed 0.30 m
	8		14										Siltstone, hard, grayish green, moist
28		CB-25-4	24								48		
29			24										
30	9												
31													
32													
33	10		16										- grayish brown
			20								70		
34			50										
35													End of boring at 10.0 meters
36													Ground water was not encountered during the drilling operations.
37	11												
38													
39													
40	12												

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
DB1	3/18/2004	3/18/2004	A Lari	SR-905	11-091821

Top Hole Elev.	Location	Purpose of work	Dist - Co. - Rte. - PM
154 m	Offset & Station: CtrL 161+00 Ref Line E	GDR Investigation	11-SD-905

Drilling Method	Drilling Equipment
Wet Core Drilling	Mobil Drill (B 47)

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth:

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified.	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
1	1	1	4 7								24	SM	Silty fine Sand, medium dense, light brown (Terrace Deposit)
6	2	2	17										
10	3	3	15 17								27	SP	Poorly Graded Sand, medium dense, light brown with gravel (Terrace Deposit)
15	4	4	10 21 24								74		- very dense
20	6	5	50 14 20								41		- encountered a hard layer possibly boulder, drilling is very slow

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
DB-1	3/18/2004	3/18/2004	A Lari	SR-905	11-091821

Top Hole Elev.	Location	Purpose of work	Dist - Co. - Rte. - PM
154 m	Offset & Station: CtrL. 161+00 Ref Line E	GDR Investigation	11-SD-905

Drilling Method	Drilling Equipment
Wet Core Drilling	Mobil Drill (B 47)

Groundwater Level: Date Measured | Depth to Water

Total Hole Depth

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Description
21			21									SP	Poorly Graded Sand, dense, light brown with gravel ((Terrace Deposit)
22													
23	7												
24													
25			40 42								70		
26			28										End of boring at 7.6 meters
28	8												Ground water was not encountered during the drilling operations.
29													
30	9												
31													
32													
33	10												
34													
35													
36													
37	11												
38													
39													
40	12												

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
DB-2	3/17/2004	3/17/2004	A Lari/Shawn	SR-905	11-091821

Hole Elev.	Location	Purpose of work	Dist - Co. - Rte. - PM
155 m	Offset & Station: CtrL. 163+20 Ref Line E4	GDR Investigation	11-SD-905

Groundwater Level: Date Measured — Depth to Water

Total Hole Depth

Drilling Method	Drilling Equipment
Wet Core Drilling	Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Lithological Description
1–5	1												
5–10	2		10 11 11								22	CL	Silty Clay, very stiff, brown, moist, medium plasticity (Topsoil)
10–15	3–4	DB-2-1	5 7 24								31	SP	Poorly Graded Sand with Gravel, dense, fine to medium grained (a rock plugged up the tip of the sampler) (Terrace Deposit)
15–20	5–6		10 23 37								60		- very dense, no sample was retrieved

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Boring No. DB-2	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 2 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	3/17/2004	3/17/2004	A Lari/Shawn	SR-905	11-091821
Top Hole Elev.	Location			Purpose of work	Dist - Co. - Rte. - PM
155 m	Offset & Station: CtrL. 163+20 Ref Line E//			GDR Investigation	11-SD-905

Groundwater Level: Date Measured — Depth to Water

Drilling Method: Wet Core Drilling — Drilling Equipment: Mobil Drill (B-47)

Total Hole Depth

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Lithological Description
21												SP	Poorly Graded Sand with Gravel, dense, fine to medium grained (no sample was retrieved) (Terrace Deposit)
22													
23	7												
24													
25													
26			17 / 33 / 50								83		-Sampler refusal, 50 blows for 75 mm of penetration
	8												
28													
29													
30	9												
			50								50+		-Sampler refusal, 50 blows for 100 mm of penetration
31													End of boring at 9.3 meters
32													Ground water was not encountered during the drilling operations.
33	10												
34													
35													
36													
37	11												
38													
39													
40	12												

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
DB-3	3/17/2004	3/17/2004	A Lari	SR-905	11-091821

Top Hole Elev.	Location	Purpose of work	Dist - Co. - Rte. - PM
155 m	Offset & Station: CtrL. 165+60 Ref Line E	GDR Investigation	11-SD-905

Groundwater Level - Date Measured: — Depth to Water: —

Total Hole Depth: —

Drilling Method	Drilling Equipment
Wet Core Drilling	Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	Lithological Description
1	1												
2													
3													
4													
5													
6	2	DB3-1	3									CH	Silty Clay, firm, light brown, high plasticity (Topsoil)
8			4										
9			4										
10	3												
11												SP	Poorly Graded Sand, medium dense, gray, fine to medium grained (Terrace Deposit)
12			12								25		
13	4		14										
14			11										
15													
16													
17	5		7								60		- very dense
18			24										
19			36										
20	6												

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Boring No. DB-3	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 2 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	3/17/2004	3/17/2004	A Lari	SR-905	11-091821
Top Hole Elev.	Location			Purpose of work	Dist - Co. - Rte. - PM
155 m	Offset & Station CtrL. 165+60 Ref Line E			GDR Investigation	11-SD-905

Groundwater Level: Date Measured — Depth to Water

Drilling Method: Wet Core Drilling — Drilling Equipment: Mobil Drill (B 47)

Total Hole Depth

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Description
21												SM	Poorly Graded Sand, very dense, gray, fine to medium grained (Terrace Deposit)
22			17										
			25								51		
23	7		26										
24													
25													
26													- Sampler refusal, on rock
	8												
28													
29													
30	9												
31			24										
			24								45		
32			21										End of boring at 9.6 meters
33	10												Ground water was not encountered during the drilling operations.
34													
35													
36													
37	11												
38													
39													
40	12												

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Boring No. DB-4	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 1 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	12/16/2004	12/16/2004	A Lari	SR-905	11-091821
Top Hole Elev.	Location			Purpose of work	Dist - Co. - Rte. - PM
152 m	Offset & Station:10 m Lt.168+20 Ref Line E5			GDR Investigation	11-SD-905

Groundwater Level: Date Measured — Depth to Water

Total Hole Depth

Drilling Method: Wet Core Drilling — Drilling Equipment: Mobil Drill (B 47)

Material Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Material Description
1–5	1											SC	Clayey sand, stiff, brown, wet, high plasticity (Terrace Deposit)
6	2		1							5	15		moist
			5							10			
8–10	3												
11	4		4							4	12		
			4										
12–15	4												
16	5		2							6	11		Medium dense, tan
			6							5			
17	5		5										
18													Coarse gravel and cobbles
20	6												

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Boring No. DB-4	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 2 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	12/16/2004	12/16/2004	A Lari	SR-905	11-091821
Top Hole Elev.	Location			Purpose of work	Dist - Co. - Rte. - PM
152 m	Offset & Station:10 m Lt.168+20 Ref Line E5			GDR Investigation	11-SD-905

Groundwater Level: Date Measured — Depth to Water

Total Hole Depth

Drilling Method	Drilling Equipment
Wet Core Drilling	Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	Lithological Descriptions
21													Sampler refusal on rock Very slow drilling Sandy clay with cobbles, gray, high plasticity
22													
23	1												Drilling completed at depth of 6.5 m
24													Ground water was not encountered during the drilling operations.
25													
26													
	2												
28													
29													
30	3												
31													
32													
33	4												
34													
35													
36													
37	5												
38													
40	6												

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
DB-5	12/15/2004	12/15/2004	A Lari	SR-905	11-091821

Top Hole Elev.	Location	Purpose of work	Dist - Co. - Rte. - PM
151 m	Offset & Station:10 m Rt 169+30 Ref Line E5	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth

Drilling Method	Drilling Equipment
Wet Core Drilling	Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
1												CH	Silty clay with fine sand, stiff, grayish-brown, moist, high (Topsoil / Fill)
2													
3	1												
4													
5													
6			4							6	10		
			6										
	2		4										Lost circulation
8													
9													
10	3												
11			1							3	6		Silty Clay with fine sand, firm, brown, moist, high plasticity (Topsoil / Fill)
			3										
12			3										
13	4												
14													
15													
16			12							30	51	SW	Well graded sand, fine to coarse with some gravel and fine, dense grayish white, moist (Terrace Deposit)
			21										
17	5		30										End of boring at depth of 5.0 m
18													Ground water was not encountered during the drilling operations.
20	6												

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
DB-7	5/24/05	5/24/05	A. Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
152 M	Offset & Station: 10 M Lt. 170+70	Ref Line E5	GDR Investigation	11-SD-905

Groundwater Level: Date Measured — Depth to Water

Total Hole Depth 9.60 m

Drilling Method	Drilling Equipment
Wet Core Drilling	Truck Mounted Rig (CS 2000)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Lithological Description
1–5	1											ML	Sandy Silt, Soft, light brown, dry, (Fill)
6–10	2–3									33 38 21	59	SW	Clayey fine to coarse Sand with trace of Gravel, very dense, light brown, moist, (Fill)
11–15	4									1 10 11	21		Medium dense
16–20	5–6									10 20 25	45		Silty Sand, fine to medium grained, dense, light brown, moist (Terrace Deposit)

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
DB-7	5/24/05	5/24/05	A. Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
152 m	Offset & Station: 10 M. Lt. 170+70	Ref Line E5	GDR Investigation	11-SD-905

Groundwater Level		Drilling Method	Drilling Equipment
Date Measured	Depth to Water	Wet Core Drilling	Truck Mounted Rig (CS 2000)
		Total Hole Depth 9.60 m	

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	Lithological Description
21										28		SM	Silty fine to medium Sand, very dense, greenish brown, moist (Terrace Deposit)
22										24	50		
23	7									26			
24													
25													
26													
	8												
28													
29													
30	9												
31													
32													
33	10												
34													
35													
36													
37	11												
38													
40	12												

The boring terminated at 6.5 meter depth. The ground water was not encountered during drilling operation.

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
BC-1	6/8/05	6/8/05	A.LARI	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
149 M	Offset & Station: 20 M. Rt. 171+15	Ref Line E5	GDR Investigation	11-SD-905

Groundwater Level: Date Measured 6/8/05 — Depth to Water 2.00 M

Total Hole Depth 3.00 M

Drilling Method	Drilling Equipment
Hollow Stem Auger Drilling 3 1/4 "	CME 750 ALL TRAIN

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Description
1												SM	Silty Sand fine to coarse, dense, green, moist, (Fill)
2										23 / 21	39		
3	1									18			Boulders/Cobbles
4												CL	Silty Clay, Light brown, moist, medium plasticity, (Fill)
5													
6												▽	Ground water at 2.00 meter
	2									17 / 36	59		Wet, high plasticity
8										23			
9													Boulders
10	3												Drilling very slow
11													Drilling terminated at 3.00 meter depth. The ground water was not encountered during drilling operation.
12													
13	4												
14													
15													
16													
17	5												
18													
19													
20	6												

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
BC-2	6/7/05	6/7/05	A. Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
149 M.	Offset & Station: 20 m Rt. 172+10	Ref Line E5	GDR Investigation	11-SD-905

Groundwater Level: Date Measured — Depth to Water

Total Hole Depth

Drilling Method	Drilling Equipment
HOLLOW STEM AUGER 3 1/4 "	CM 750 ALL TRAIN

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	
1	1									3		CL	Silty Clay with fine Sand, light brown, moist, high plasticity. (Fill)
2										3	6		
3										3			Sandy Clay fine sand, firm, black-brown, moist, medium plasticity (Fill)
4													
5													
6	2												
8										10		CL	Claystone/Siltstone, hard, gray, dry (Terrace Deposit)
9										30	50+		Sampler refusal at 3.00 meter
10	3												Encountered boulders
11													
12													Drilling very slow
13	4												
14													Drilling terminated at 4.00 meter depth.
15													The ground water was not encountered during drilling operation.
16													
17	5												
18													
20	6												

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
BC-3	6/7/05	6/7/05	A. Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
149 m	Offset & Station: 25 m Rt. 173+00	Ref Line E5	GDR Investigation	11-SD-905

Groundwater Level: Date Measured 6/7/05; Depth to Water 3.00 meter

Total Hole Depth 4.50 m

Drilling Method	Drilling Equipment
Hollow stem auger 3 1/4 "	CM 750 ALL TRAIN

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	
1												CH	Silty Clay, light brown, moist, high plasticity (top soil)
2	1												
3													
4													
5													
6										3		SW	Gravelliy Sand fine to coarse, medium dense, greenish gray,
										5	15		moist, (Terrace Deposit)
	2									10			
8													Cobbles
9													
10	3											▽	Ground water at 3.00 meter
11													Sampler refusal
12													Sandy Clay with fine Sand, light brown, high plasticity
13	4												(Terrace Deposit)
14													Cobbles, drilling slow
15													
16													Sampler refusal on Cobbles.
17	5												Drilling terminated at 4.5 meter depth.
18													The ground water was encountered at depth of 3.00 meter.
19													
20	6												

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
DB-6	4/22/2004	4/22/2004	A Lari	SR-905	11-091821

Top Hole Elev.	Location	Purpose of work	Dist - Co. - Rte. - PM
151 m	Offset & Station:CtrL. 172+80 Ref Line E4	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth:

Drilling Method: Wet Core Drilling | Drilling Equipment: Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Lithological Description
1–5	1												
6–10	2–3		4 4 5								9	CL	Silty Clay with Sand, stiff, brown, moist, medium plasticity (Topsoil)
11–15	4		4 4 4								8	CH	Silty Clay with Sand, stiff, brown, moist, high plasticity (Topsoil / Terrace Deposit)
16–20	5–6		7 9 18								27		- encountered rock and fine sand

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
DB-6	4/22/2004	4/22/2004	A Lari	SR-905	11-091821

Top Hole Elev.	Location	Purpose of work	Dist - Co. - Rte. - PM
151 m	Offset & Station:CtrL. 172+80 Ref Line E4	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth

Drilling Method	Drilling Equipment
Wet Core Drilling	Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Description
21			14										Sandy Silt, very dense/hard, brown, Sampler refusal, 14 blows for 25 mm of penetration (Terrace Deposit)
22													
23	7												- changed drilling bit to diamond core
24													
25													
26													Cobbles, fine to coarse Sand with Clay, yellow, High plasticity (Terrace Deposit)
	8												
28													
29													
30	9												- Sampler refusal
31													End of boring at 9.1 meters
32													
33	10												Ground water was not encountered during the drilling operations.
34													
35													
36													
37	11												
38													
40	12												

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
DB-8	5/24/05	5/24/05	A.LARI	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
152 M	Offset & Station: 10 M Lt. 172+20	Ref Line E5	GDR Investigation	11-SD-905

Groundwater Level: Date Measured — Depth to Water

Drilling Method	Drilling Equipment
Hollow stem auger 2 1/2 "	B 47

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Lithological Description
	1											ML	Sandy Silt, soft, light brown, dry (Fill)
	2											CL	Sandy Clay with fine to coarse sand, stiff, light brown, moist, medium plasticity (Fill)
	3									2 10 10	20		Very stiff
	4									9 14 16	30		
	5									4 8 18	26	SM	Silty Sand fine to medium grained, medium dense, light brown, moist (Terrace Deposit)
	6												Drilling terminated at 5.00 M depth. The ground water was not encountered during drilling operation.

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
EB-1	3/17/2004	3/17/2004	M. Fordham	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
151 m	Offset & Station: 10 M Lt. 174+22	Ref Line E4	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: — Depth to Water: —

Total Hole Depth: —

Drilling Method: Wet Core Drilling

Drilling Equipment: Mobil Drilling Rig (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified.	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Description
1	1		6							15	37	CH	Silty Clay with Gravel, hard, medium to dark brown, dry to moist, high plasticity with fine gravel and coarse sand (Terrace Deposit)
2			22										
3													
4													
5			8							11	22	SM	Silty Sand, medium dense, brown, moist, nonplastic, fine to medium grained (Terrace Deposit)
6	2		11										
8													
9													
10	3												
11			17							28	57	SW	Well Graded Sand, very dense, light to medium brown, moist (Terrace Deposit)
12			29										
13	4												
14													
15													- medium dense, with fine gravel
16			17							15	27		
17	5		12										
18													
20	6												

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
EB-1	3/17/2004	3/17/2004	M. Fordham	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
151 m	Offset & Station: 10 M Lt. 174+22	Ref Line E4	GDR Investigation	11-SD-905

Groundwater Level		Drilling Method	Drilling Equipment
Date Measured	Depth to Water	Wet Core Drilling	Mobil Drilling Rig (B 47)

Total Hole Depth

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
21			24									SM	Silty Sand, very dense, medium brown with fine to medium gravel, Sampler refusal, 50 blows for 135 mm of penetration (Terrace Deposit)
			50								50+		
22													
23	7												
24													
25													
26													End of boring at 7.6 meters
	8												Ground water was not encountered during the drilling operations.
28													
29													
30	9												
31													
32													
33	10												
34													
35													
36													
37	11												
38													
40	12												

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
EB-2	3/17/2004	3/17/2004	M. Fordham	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
151 m	Offset & Station: CtrL 175+70	Ref Line E4	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: — Depth to Water: —

Total Hole Depth

Drilling Method: Wet Core Drilling

Drilling Equipment: Mobil Drilling Rig (CS 500)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	Lithological Description
1	1		4 9 16								25	CL	Sandy Clay, very stiff, dark brown, medium plasticity with roots and fine to medium size gravel (Topsoil)
5	2		2 2								5	CH	Silty Clay, firm, light brown, moist, high plasticity m (Topsoil)
10	3		3 34 52								50+	SW	Well Graded Sand, very dense, medium brown, moist with fine to coarse gravel, refusal, 52 blows for 100 mm of penetration (Terrace Deposit)
15	4		50								50+	GW	Sandy Silty Well Graded Gravel, very dense, medium to reddish brown, fine to coarse sand, refusal, 50 blows for 100 mm of penetration (Terrace Deposit) - core barrel blocking off because of cobbles
20	5 6												End of boring at 6.1 m Ground water was not encountered during the drilling operations

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
EB-3	3/17/2004	3/17/2004	A. Lari/Shawn	SR-905	11-091821

Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
151 m	Offset & Station: 40 m Lt, 176+40	Ref Line E4	GDR Investigation	11-SD-905

Groundwater Level		Drilling Method	Drilling Equipment
Date Measured	Depth to Water	Wet Core Drilling	Mobil Drilling Rig (B 47)

Total Hole Depth

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified.	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
1	1	EB-3-1										CH	Silty Clay with Gravel, brown, high plasticity (Topsoil)
2		EB-3-2											
3													
4													
5													
6	2		3								10		- stiff with sand and gravel
			4										
			6										
8													
9													
10	3											SW	Gravelly Well Graded Sand, medium dense, brown (Terrace Deposit)
			27								30		
11			16										
12			14										
13	4												
14													
15													- Sampler refusal, on rock, 50 blows for 50 mm of penetration
16			50										
17	5												
18													
20	6												

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
EB-3	3/17/2004	3/17/2004	A. Lari/Shawn	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
151 m	Offset & Station: 40 m Lt, 176+40	Ref Line E4	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: — Depth to Water: —

Total Hole Depth

Drilling Method: Wet Core Drilling

Drilling Equipment: Mobil Drilling Rig (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	
21			12									SW	Gravelly Well Graded Sand, very dense, brown, refusal, 12 blows for 25 mm of penetration (Terrace Deposit)
22													
23	7												
24													
25													
26			50									GW	Sandy Well Graded Gravel, very dense, moist, Sampler refusal, 50 blows for 125 mm of penetration (Terrace Deposit)
	8												
28													
29													
30	9												- refusal, 9 blows for 25 mm of penetration
31													End of boring at 9.3 meters
32													Ground water was not encountered during the drilling operations.
33	10												
34													
35													
36													
37	11												
38													
40	12												

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
EB-4	3/16/2004	3/17/2004	A. Lari/ Norman	SR-905	11-091821

Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
150 m	Offset & Station: 40 m Lt, 177+80	Ref Line E4	GDR Investigation	11-SD-905

Groundwater Level		Drilling Method	Drilling Equipment
Date Measured	Depth to Water	Wet Core Drilling	Mobil Drilling Rig (B 47)

Total Hole Depth

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	Lithological Description
1													
2													
3	1											ML	Sandy Silt with Gravel (Fill)
4													
5													
6			21									ML	Clayey Silt with Sand, very dense, brown, medium plasticity, fine grained sand (Terrace Deposit)
	2		35								79		
			44										
8													- hard drilling, change to diammond coring
9													
10	3												
			50								50+	GW	Well Graded Gravel with Sand, very dense, dark gray, refusal, 50 blows for 125 mm of penetration (Terrace Deposit)
11													
12													
13	4												
14													
15													- refusal, 50 blows for 125 mm of penetration
			28								50+		
16			50										
17	5												
18													
19													
20	6												

End of boring at 6.1 meters

Ground water was not encountered during the drilling operations.

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Boring No. EB-5	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 1 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	3/16/2004	3/17/2004	A Lari/Shawn	SR-905	11-091821
T 'ole Elev.	Location			Purpose of work	Dist - Co. - Rte. - PM
149 m	Offset & Station: 40 m Rt, 177+60		Ref Line LMD3	GDR Investigation	11-SD-905

Groundwater Level: Date Measured — Depth to Water

Total Hole Depth

Drilling Method: Wet Core Drilling

Drilling Equipment: Mobil Drilling Rig (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified.	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Lithological Description
1	1												
2													
3													
4													
5													
6	2	EB-5-1	6							9	19	CL	Silty Clay, very stiff, medium brown, moist, medium plasticity (Topsoil)
			9							10			
8			10										Silty Sand, very dense, grayish green, moist (Terrace Deposit)
9													
10	3												
11			50								50+		- Sampler refusal on rock, 50 blows for 75 mm of penetration
12													
13	4												
14													
15													
16			50								50+		- refusal, 50 blows for 25 mm of penetration
17	5												
18													
20	6												

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
EB-5	3/16/2004	3/17/2004	A Lari/Shawn	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
149 m	Offset & Station: 40 m Rt, 177+60	Ref Line LMD3	GDR Investigation	11-SD-905

Groundwater Level		Drilling Method	Drilling Equipment
Date Measured	Depth to Water	Wet Core Drilling	Mobil Drilling Rig (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	Total Hole Depth	SPT	CA Modified.	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log
21				32									
22				50								50+	
23	7												
24													
25													
26				50								50+	
28	8												
29													
30	9			50								50+	
31													
32													
33	10												
34													
35													
36													
37	11												
38													
40	12												

Silty Sand, very dense, grayish green, moist, Sampler refusal, 50 blows for 50 mm of penetration (Terrace Deposit)

- Sampler refusal, 50 blows for 125 mm of penetration

- Sampler refusal, 50 blows for 125 mm of penetration

End of boring at 9.5 meters

Ground water was not encountered during the drilling operations.

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Boring No. EB-6	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 1 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	3/16/2004	3/16/2004	M. Fordham	SR-905	11-091821
T Hole Elev.	Location			Purpose of work	Dist - Co. - Rte. - PM
148 m	Offset & Station: CtrL 178+15		Ref Line E4	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth:

Drilling Method: Wet Core Drilling | Drilling Equipment: Mobil Drilling Rig (SC 500)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Lithological Description
1–5	1												
6–10	2–3		50								50+	CL	Sandy Silty Clay, hard, medium brown, moist, medium plasticity, with coarse gravel to cobbles, Sampler refusal, 50 blows for 75 mm of penetration (Terrace Deposit)
11–15	4		50								50+	SC	Clayey sand, very dense, medium brown, with coarse gravel and cobbles, slightly plastic, Sampler refusal, 50 blows for 25 mm of penetration (Terrace Deposit) - with silt, light to medium brown, with coarse gravel and boulders
16–20	5–6												- refusal, no SPT, on rock

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
EB-6	3/16/2004	3/16/2004	M. Fordham	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
148 m	Offset & Station: CtrL 178+15	Ref Line E4	GDR Investigation	11-SD-905

Drilling Method	Drilling Equipment
Wet Core Drilling	Mobil Drilling Rig (SC 500)

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth:

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified.	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	
21												CL	Sandy Clay, very hard, light to medium brown, moist, with coarse gravel to boulders, medium plasticity (conglomerate gravel to boulders in matrix of sandy to silty clay) (Terrace Deposit)
22													
23	7												
24													
25													
26													End of boring at 7.6 meters
	8												Ground water was not encountered during the drilling operations.
28													
29													
30	9												
31													
32													
33	10												
34													
35													
36													
37	11												
38													
40	12												

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
EB-7	2/18/2004	2/18/2004	A. Lari	SR-905	11-091821

Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
147 m	Offset & Station: CtrL 181+10	Ref Line E4	GDR Investigation	11-SD-905

Groundwater Level: Date Measured | Depth to Water

Total Hole Depth

Drilling Method: Wet Core Drilling

Drilling Equipment: Truck Mounted Drilling Rig (SC 2000)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Lithological Description
1–5	1												
6–10	2		3 4 5								9	CH	Silty Clay, stiff, light brown, moist, high plasticity, slightly sandy (Topsoil)
10–15	3		9 20 33								53	SM	Silty Sand with Gravel, very dense, light brown, moist, fine to medium gravel (Terrace Deposit)
15–20	4–6											GM	Gravel and Cobbles with Silt, hit very dense layer, change to diamond coring bit, no SPT (Terrace Deposit)

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
EB-7	2/18/2004	2/18/2004	A. Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
147 m	Offset & Station: CtrL 181+10	Ref Line E4	GDR Investigation	11-SD-905

Groundwater Level		Drilling Method	Drilling Equipment
Date Measured	Depth to Water	Wet Core Drilling	Truck Mounted drilling Rig (SC 2000)

Total Hole Depth

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified.	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
21			50									SC	Clayey Sand with Gravel, very dense, light brown, fine to coarse grained, Sampler refusal (Terrace Deposit)
22													
23	7												
24													
25													
26			20									GW	Well Graded Gravel with Silt, very dense, light brown with cobbles, refusal, 50 blows for 60 mm of penetration (Terrace Deposit)
	8		50										
28													
29													
30	9												- Sampler refusal
31													End of boring at 9.3 meters
32													
33	10												Ground water was not encountered during the drilling operations.
34													
35													
36													
37	11												
38													
40	12												

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Boring No. EB-8	SOILS AND GEOLOGICAL EXPLORATION LOG			Page 1 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	2/18/2004	2/18/2004	A. Lari	SR-905	11-091821

T Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
146 m	Offset & Station: 20 m Rt, 181+90	Ref Line E4	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: — Depth to Water:

Drilling Method: Wet Core Drilling

Drilling Equipment: Truck Mounted Drilling Rig (SC 2000)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	Total Hole Depth: SPT	CA Modified.	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Lithological Description
1	1	EB-8-1										CH	Silty Clay, soft, light brown, wet, high plasticity, perched water was encountered at 0.914 m below surface (Topsoil)
2													
3													
4													
5													
6	2		1 4 26								30		- very stiff
8													
9													
10	3												
11			10 26 40								50+	GW	Well Graded Gravel with Sand and Fine, very dense, grayish brown (Terrace Deposit)
12													
13	4												
14													
15													
16			19 26 50								50+	SW	Well Graded Sand with Gravel and Fine, very dense, grayish brown (Terrace Deposit)
17	5												
18													
20	6												

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SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
EB-8	2/18/2004	2/18/2004	A. Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
146 m	Offset & Station: 20 m Rt, 181+90	Ref Line E4	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth

Drilling Method: Wet Core Drilling

Drilling Equipment: Truck Mounted Drilling Rig (SC 2000)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
21			50									SW	Well Graded Sand with Gravel, very dense, grayish brown, with cobbles, refusal, 50 blows for 4" of penetration (Terrace Deposit)
22													
23	7												
24													
25													
26													
	8												
28													
29													
30	9												
31													
32													
33	10												
34													
35													
36													
37	11												
38													
40	12												

End of boring at 7.2 meters

Ground water was not encountered during the drilling operations.

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Boring No. EB-9	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 1 of 1
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	4/6/2004	4/6/2004	A. Lari	SR-905	11-091821
Hole Elev.	Location			Purpose of work	Dist - Co. - Rte. - PM
146 m	Offset & Station: 30 m Rt, 95+50		Ref Line LMD	GDR Investigation	11-SD-905

Groundwater Level: Date Measured | Depth to Water

Total Hole Depth

Drilling Method: Wet Core Drilling

Drilling Equipment: Mobil Drilling Rig (CS 500)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log
1												
2												
3	1											
4												
5			8 9								18	
6			9									
	2											
8												
9												
10	3											
11												
12												
13	4											
14												
15												
16												
17	5											
18												
20	6											

Gravel and Cobbles in sandy matrix (Fill)

- no sample was collected, the sampler was plugged with piece of rock

- changed to coring bit

- cobbles and coarse gravel, no STP

End of boring at 3.7 meters

Ground water was not encountered during the drilling operations.

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
EB-10	1/27/2004	1/27/2004	M. Fordham	SR-905	11-091821

Tr[illegible]ole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
146 m	Offset & Station: 30 m Rt. 97+20	Ref Line LMD	GDR Investigation	11-SD-905

Date Measured	Depth to Water	Drilling Method	Drilling Equipment
		Auger Drilling	Truck Mounted Drilling Rig (CS 2000)

Total Hole Depth

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	Lithological Description
1												CL	Sandy Clay, soft, medium brown, moist (Topsoil)
2													
3	1												- light brown and tan, medium plasticity with some fine gravel
4													
5													
6													- no sample was retrieved
	2												
8												GC	Gravel in Clay matrix, hard, light brown, moist, medium plasticity (Terrace Deposit)
9													
10	3												
11			19 29 30								50+		- cobbles and coarse gravel, no SPT
12													- unable to auger, moved 5' to the south, stopped at the same depth, encountered cobbles
13	4												End of boring at 3.7 meters
14													Ground water was not encountered during the drilling operations.
15													
16													
17	5												
18													
20	6												

c:\Geotech\905\Boring Log AB BB

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Boring No. EB-11	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	1/27/2004	1/27/2004	M. Fordham	SR-905	11-091821

Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
146 m	Offset & Station: 30 m Rt, 98+60	Ref Line LMD	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: — Depth to Water:

Total Hole Depth:

Drilling Method: Auger Drilling

Drilling Equipment: Truck Mounted Drilling Rig (SC 2000)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Description
1–5	1												Sandy Clay, loose with organics, light brown (Topsoil)
6–10	2–3		6 6 8								14	CL	Sandy Clay, stiff, light brown, moist, medium plasticity (Topsoil)
11–15	4		11 28 30								58	SP/SM	Silty Sand/Poorly Graded Sand with Gravel, very dense, light brown, moist, fine grained, fine to coarse gravel (Terrace Deposit)
16–20	5–6		17 50								50+	GC	Clayey Gravel, very dense, light brown, moist, medium plasticity, Sampler refusal, 50 blows for 50 mm of penetratoin (Terrace Deposit) End of boring at 6.1 m Ground water was not encountered during the drilling operations.

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
EB-12	4/6/2004	4/6/2004	B. Hinman	SR-905	11-091821

Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
146 m	Offset & Station: 30 m Rt. 94+50	Ref Line LMD	GDR Investigation	11-SD-905

Groundwater Level: Date Measured — Depth to Water

Drilling Method: Auger Drilling

Drilling Equipment: Truck Mounted Drilling Rig (SC 2000)

Total Hole Depth

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Description
1–5		1											
6		2	22 38 45								50+	SP	Gravelly Poorly Graded Sand with Clay, very dense, grayish brown and reddish brown, subangular gravel (Terrace Deposit)
8–10		3											- Sampler refusal
11–15		4											- Sampler refusal
16–17		5											End of boring at 4.7 meters
18–20		6											Ground water was not encountered during the drilling operations.

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SOILS AND GEOLOGICAL EXPLORATION LOG

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
EB-13	4/6/2004	4/6/2004	B. Hinman	SR-905	11-091821

Total Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
146 m	Offset & Station: 50 m Lt, 182+90	Ref Line E4	GDR Investigation	11-SD-905

Groundwater Level: Date Measured — Depth to Water

Total Hole Depth

Drilling Method: Auger Drilling

Drilling Equipment: Truck Mounted Drilling Rig (SC 2000)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
1													
2													
3	1												
4													
5													
6			5									CL	Sandy Clay, hard, mottled grayish brown and reddish brown, moist, low plasticity (Topsoil)
	2		15								34		
8			19									SP	Gravely Sand, dense, mottled grayish brown and reddish brown, moist with clay, gravel angular to subrounded to 25mm (Terrace Deposit)
9													
10	3												
11			11										
12			19								42		
13			23										
14	4												
15													
16			20										
17			50+								50+		End of boring at 6.1 meters
18	5												Ground water was not encountered during the drilling operations.
19													
20	6												

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Boring No. EB-14	SOILS AND GEOLOGICAL EXPLORATION LOG			Page 1 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	4/6/2004	4/6/2004	M. Jandal	SR-905	11-091821

Total Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
146 m	Offset & Station: 20 m Lt. 13+50	Ref Line LMD2	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Drilling Method: Wet Core Drilling | Drilling Equipment: Mobil Drilling Rig (B 47)

Total Hole Depth

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Lithological Description
1–5	1												
6	2												
8	3		4 6 33								39	CH	Silty Clay, hard, grayish brown, moist, with occasional gravel and fine calcareous material (Terrace Deposit)
11–15	4		40 24 50								50+		- Sampler refusal, 50 blows for 125 mm of penetration
16–17	5											SW	Well Graded Sand with Gravel, very dense, grayish brown (Terrace Deposit)
18–20	6		20										- Sampler refusal, 20 blows for 25 mm of penetration, no sample was retrieved

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Boring No. EB-14	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 2 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	4/6/2004	4/6/2004	M. Jandal	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
146 m	Offset & Station: 20 m Lt. 13+50	Ref Line LMD2	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth

Drilling Method	Drilling Equipment
Wet Core Drilling	Mobil Drilling Rig (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
21												SW	Well Graded Sand with Gravel, very dense, grayish brown (Terrace Deposit)
22													
23	7												
24													
25			50									GP	Poorly Graded Gravel, very dense, reddish brown, slightly weathered (Terrace Deposit)
26													
	8												End of boring at 8.2 meters
28													Ground water was not encountered during the drilling operations.
29													
30	9												
31													
32													
33	10												
34													
35													
36													
37	11												
38													
39													
40	12												

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
EB-15	2/5/2004	2/5/2004	A. Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
146 m	Offset & Station: CtrL 183+00	Ref Line E4	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: — Depth to Water:

Total Hole Depth:

Drilling Method: Wet Core Drilling

Drilling Equipment: Mobil Drill (B 47)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	Lithological Description
1													
2													
3	1											CH	- loss of drilling fluid circulation Silty Clay with Fine Sand and fine to coarse Gravel, light brown (Topsoil)
4													
5													
6			3									CH	Silty Clay with fine Sand, firm, light brown, moist, high plasticity (Topsoil / Terrace Deposit)
	2		3								8		
			5										
8													- with gravel and cobbles
9													
10	3												
11													- Sampler refusal, on rock
12													Drilling very slow, gravel and cobble
13	4												
14													
15													
16			22										Fractured rock with fine, very dense, light brown, moist
			50								100		
17	5		50										
18													
19													
20	6												

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Boring No. EB-15	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 2 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	2/5/2004	2/5/2004	A. Lari	SR-905	11-091821
Top Hole Elev.	Location			Purpose of work	Dist - Co. - Rte. - PM
146 m	Offset & Station: CtrL 183+00		Ref Line E4	GDR Investigation	11-SD-905

Groundwater Level: Date Measured | Depth to Water

Total Hole Depth

Drilling Method: Wet Core Drilling

Drilling Equipment: Mobil Drill (B 47)

Boring Depth (ft) | Boring Depth (meter) | Sample Number | SPT | CA Modified | Coring | Total Recovery | % Recovery | RQD | Lab Work Assigned | SPT Blows per .3 meter: .15 meter | SPT total | Graphic Log

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	Lithological Description
21			Fractured rock with fine, very dense, light brown, moist
22			
23	7		
24			End of boring at 7.0 meters
25			Ground water was not encountered during the drilling operations.
26			
	8		
28			
29			
30	9		
31			
32			
33	10		
34			
35			
36			
37	11		
38			
39			
40	12		

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
EB-16	1/29/2004	1/29/2004	M. Fordham/A. Lari	SR-905	11-091821

T 'ole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
147 m	Offset & Station: CtrL 184+80	Ref Line E4	GDR Investigation	11-SD-905

Groundwater Level: Date Measured — Depth to Water

Total Hole Depth

Drilling Method: Wet Core Drilling

Drilling Equipment: Truck Mounted Drilling Rig (SC 2000)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
1	1											ML	Sandy Silt with Clay, light brown (Topsoil)
2													
3												CH	Silty Clay, firm, light brown, high plasticity (Topsoil / Terrace Deposit)
4													
5													
6	2	Bag-1	3							3	7		
			3										
			4										
8													
9													
10	3												
11		Bag-2	7							9	21	SP	Poorly Graded Sand with Silt, medium dense, light brown, fine grained (Terrace Deposit)
			9										
12			12										
13	4												
14													- with coarse gravel and cobbles
15													
16			16							28	54	GW	Well Graded Gravel with Sand, very dense, grayish brown (Terrace Deposit)
			28										
17	5		26										End of boring at 5.0 meters
18													Ground water was not encountered during the drilling operations.
20	6												

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Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
EB-17	4/6/2004	4/6/2004	A. Lari	SR-905	11-091821

T 'ole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
147 m	Offset & Station: CtrL 13+60	Ref Line E4	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth:

Drilling Method	Drilling Equipment
Wet Core Drilling	Mobil Drilling Rig (SC 500)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Lithological Description
1													
2													
3	1		3									CH	Silty Clay, firm, light brown, high plasticity (Topsoil / Terrace Deposit)
4			3								8		
5													
6			5										
	2												
8													
9													- Sampler refusal, on rock
10	3												
11													
12													
13	4												
14		Bag, EB-20-1	18									SM	Silty Sand, brown, 18 blows for 100 mm of penetration (Terrace Deposit)
15													- very slow drilling
16													End of boring at 4.7 meters
17	5												Ground water was not encountered during the drilling operations.
18													
20	6												

c:\Geotech\905\Boring Log AB BB

State of California - Department of Transportation - Office of Geotechnical Services

SOILS AND GEOLOGICAL EXPLORATION LOG

Page 1 of 2

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
EB-18	1/28/2004	1/28/2004	M. Fordham/A. Lari	SR-905	11-091821

T 'ole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
150 m	Offset & Station: CtrL 187+00	Ref Line E4	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: — Depth to Water:

Drilling Method: Wet Core Drilling — Drilling Equipment: Mobil Drill (SC 500)

Total Hole Depth

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Lithological Description
1–5	1											ML	Sandy Silt with Clay and Gravel, light brown, fine to coarse gravel, cobbles and boulders (Fill)
1–5	1											CL	Sandy Clay with Silt and Gravel, light brown, fine to coarse gravel (Fill)
6	2	Bag	1							3	7		- firm
6	2	Bag	3							4			
8–10	3												
11	4		1							3	8	CL	Silty Clay with Sand, firm, light brown, moist, medium plasticity (Fill)
11	4		3							5			
12–14	4												
15	4											SC	Clayey Sand with Gravel, light brown, moist, low plasticity, fine gravel
16	5		3							4	10	SP	Silty Poorly Graded Sand, loose, light brown, moist, fine grained (Fill)
16	5		4							6			
17–18	5												
20	6												

Continued on Page 2 of 2

Boring No. EB-18	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 2 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	1/28/2004	1/28/2004	M. Fordham/A. Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
150 m	Offset & Station: CtrL 187+00	Ref Line E4	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	Lithological Description
20													
21			50								50+	SP	Silty Poorly Graded Sand, very dense, light brown, moist, fine grained, refusal, 50 blows for 125 mm of penetration (Terrace Deposit)
22													
23	7												
24													
25													
26			50								50+		- Sampler refusal, 50 blows for 50 mm of penetration, on rock
	8												
28													
29													
30	9												
			50								50+		- Sampler refusal, 50 blows for 140 mm of penetration, on rock
31													End of boring at 9.1 meters
32													Ground water was not encountered during the drilling operations.
33	10												
34													
35													
36													
37	11												
38													
40	12												

Drilling Method	Drilling Equipment
Wet Core Drilling	Truck Mounted Drilling Rig (SC 2000)

Lithological Descriptions

1. Group Name	8. Plasticity
2. Group Symbol	9. Structure
3. Consistancy/Relative Density	10. Cementation
4. Color	11. Organics
5. Moisture	12. Fill Material
6. Partical Size & Shape	13. Other
7. Gradation	

State of California - Department of Transportation - Office of Geotechnical Services

SOILS AND GEOLOGICAL EXPLORATION LOG

Page 1 of 2

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
EB-19	1/28/2004	1/28/2004	M. Fordham	SR-905	11-091821

Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
150 m	Offset & Station: CtrL 189+05	Ref Line E4	GDR Investigation	11-SD-905

Groundwater Level: Date Measured — Depth to Water

Total Hole Depth

Drilling Method: Wet Core Drilling

Drilling Equipment: Mobil Drill (SC 500)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified.	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log	
1	1												
2													
3													
4													
5													
6	2		7 5 5								10	CL	Sandy Clay, stiff, medium brown, moist, medium plasticity, fine to coarse gravel (Fill)
8												SW	Well Graded Sand with Gravel, loose, light brown, moist, fine to coarse gravel (Otay Formation)
9													
10	3												
11			20 47 50+								50+		- very dense, refusal
12													
13	4												- with cobbles
14													
15													
16			18 28 50+								50+		- refusal, on rock
17	5												
18													
20	6												

Continued on Page 2 of 2

State of California - Department of Transportation - Office of Geotechnical Services

Boring No. EB-19	SOILS AND GEOLOGICAL EXPLORATION LOG				Page 2 of 2
	Date Started	Date Ended	Geologist & Crew	Project Name	EA
	1/28/2004	1/28/2004	M. Fordham	SR-905	11-091821
Top Hole Elev.	Location			Purpose of work	Dist - Co. - Rte. - PM
150 m	Offset & Station: CtrL 189+05		Ref Line E4	GDR Investigation	11-SD-905

Groundwater Level: Date Measured | Depth to Water

Total Hole Depth

Drilling Method: Wet Core Drilling

Drilling Equipment: Truck Mounted Drilling Rig (SC 2000)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT Blows per .3 meter: SPT total	Graphic Log
21	7		19									
22			31								50+	
23			27									
24												
25												
26	8		50+								50+	
28												
29												
30	9											
31			50+								50+	
32												
33	10											
34												
35												
36	11											
37												
38												
40	12											

- Sampler refusal

- Sampler refusal

- Sampler refusal

End of boring at 9.3 meters

Ground water was not encountered during the drilling operations.

State of California - Department of Transportation - Office of Geotechnical Services

SOILS AND GEOLOGICAL EXPLORATION LOG

Page 1 of 2

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
EB-20	1/27/2004	1/27/2004	M. Fordham	SR-905	11-091821

T 'ole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
152 m	Offset & Station: CtrL 190+40	Ref Line E4	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth:

Drilling Method: Wet Core Drilling | Drilling Equipment: Mobil Drilling Rig (SC 500)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified.	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Lithological Description
1–5	1												Sandy Clay, medium brown, moist (Fill)
1–5	1											SW	Well Graded Sand, light brown/tan, moist, fine gravel (Otay Formations)
6	2		6 9 8								17		- medium dense
8–10	3												- with fine to coarse gravel
11	4		20 39 37								50+		- very dense with fine to coarse gravel
16–17	5		8 21 21								42		- dense
18–20	6												

Continued on Page 2 of 2

SOILS AND GEOLOGICAL EXPLORATION LOG

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
EB-20	1/27/2004	1/27/2004	M. Fordham	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
152 m	Offset & Station: CtrL 190+40	Ref Line E4	GDR Investigation	11-SD-905

Groundwater Level: Date Measured | Depth to Water

Total Hole Depth

Drilling Method: Wet Core Drilling

Drilling Equipment: Truck Mounted Drilling Rig (SC 2000)

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Lithological Description
21			14									SW	Well Graded Sand, light brown and tan, dense, moist, fine gravel (Otay Formation)
22			18								40		
23	7		22										
24													
25													
26			36								50+		- rock/gravel, refusal, 50 blows for 125 mm of penetration
	8		50+										
28													End of boring at 7.9 meters
29													Ground water was not encountered during the drilling operations.
30	9												
31													
32													
33	10												
34													
35													
36													
37	11												
38													
40	12												

State of California - Department of Transportation - Office of Geotechnical Services

SOILS AND GEOLOGICAL EXPLORATION LOG

Page 1 of 1

Boring No.	Date Started	Date Ended	Geologist & Crew	Project Name	EA
EB-21	5/25/05	5/25/05	A. Lari	SR-905	11-091821

Top Hole Elev.	Location		Purpose of work	Dist - Co. - Rte. - PM
147 M	Offset & Station 60 M Rt. 99+00	Ref Line LMD	GDR Investigation	11-SD-905

Groundwater Level — Date Measured: | Depth to Water:

Total Hole Depth:

Drilling Method	Drilling Equipment
HOLLOW STEM AUGURE 2 1/4 "	B 47

Lithological Descriptions

1. Group Name
2. Group Symbol
3. Consistancy/Relative Density
4. Color
5. Moisture
6. Partical Size & Shape
7. Gradation
8. Plasticity
9. Structure
10. Cementation
11. Organics
12. Fill Material
13. Other

Boring Depth (ft)	Boring Depth (meter)	Sample Number	SPT	CA Modified	Coring	Total Recovery	% Recovery	RQD	Lab Work Assigned	SPT Blows per .3 meter: .15 meter	SPT total	Graphic Log	Lithological Description
	1											CH	Silty Clay soft to firm, dry, high plasticity (Top soil)
	2									4 12 13	25		Soft, moist
	3												
	4									8 50	50+		Sampler refusal Hit rocks at 3.30 meter Hard drilling
	5												Sampler refusal Drilling terminated at 4.50 meter depth. The ground water was not encountered during drilling operation.
	6												

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
11	SD	905			

REGISTERED CIVIL ENGINEER — 4-27-05

PLANS APPROVAL DATE

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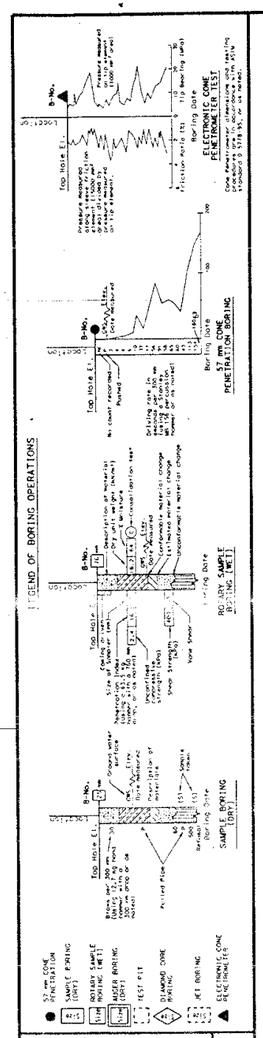
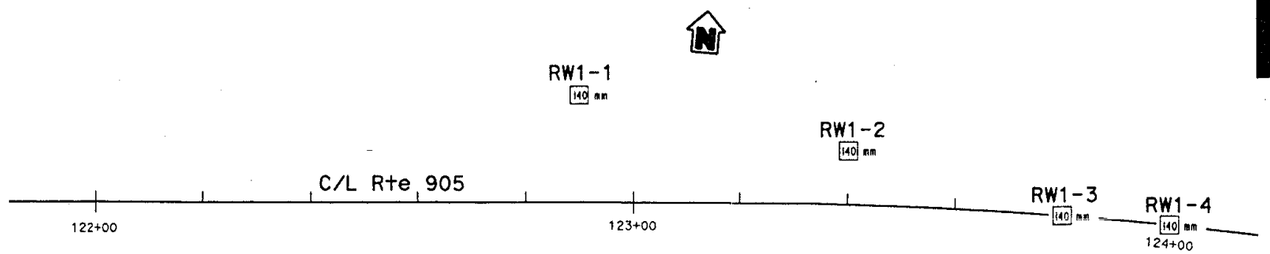
REGISTERED PROFESSIONAL ENGINEER — Ali Lari — No. C65846 — Exp. 12-31-05 — CIVIL — STATE OF CALIFORNIA

Caltrans Metric



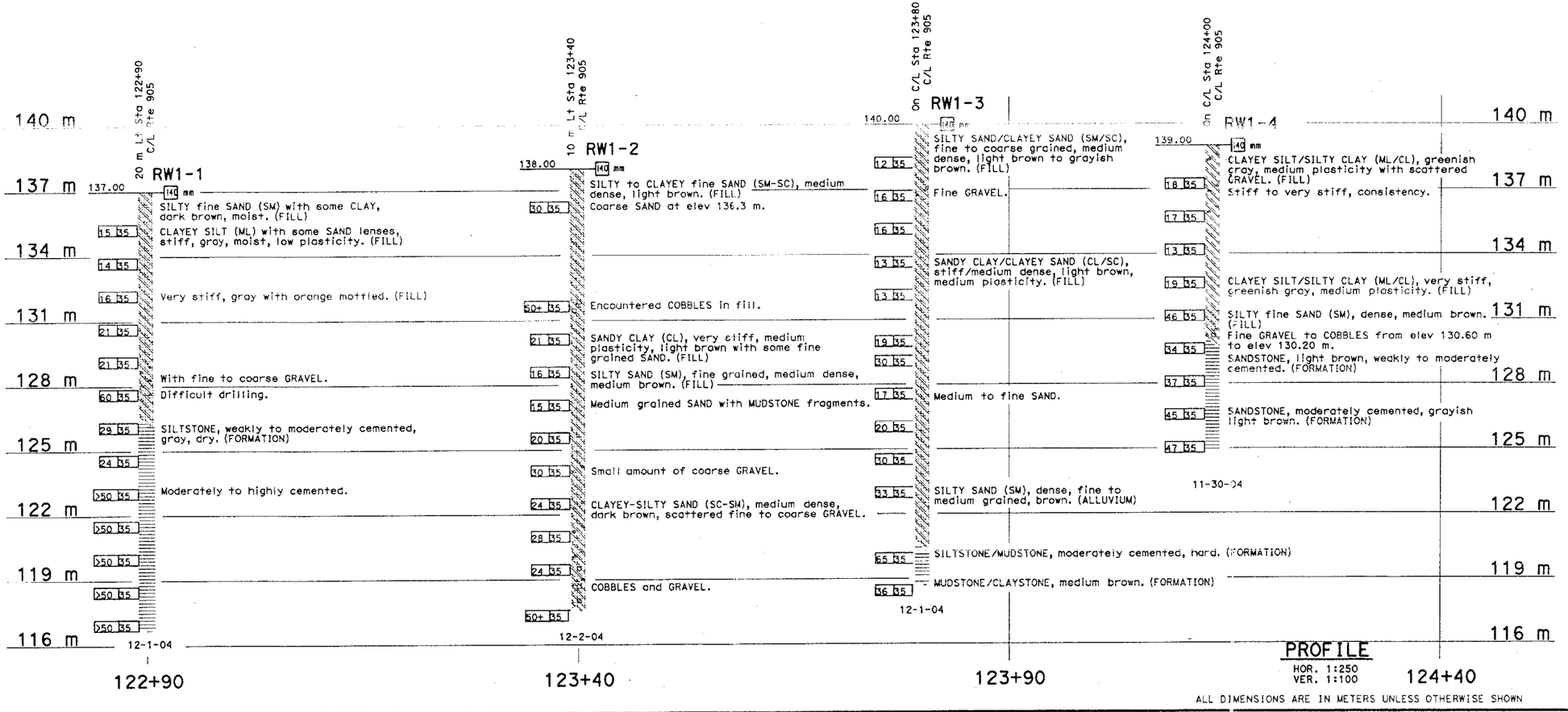


PLAN
1:500

BENCH MARK

The elevations have been derived from the cross sections prepared by District 11 Design.

Note: No ground water encountered during field investigation.



PROFILE
HOR. 1:250
VER. 1:100

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

ENGINEERING SERVICES	GEOTECHNICAL SERVICES
DRAWN BY	F. Nguyen 3/05
CHECKED BY	A. Lari

FIELD INVESTIGATION BY:
A. Lari,
S. Romouzi, M. Fordham

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
DIVISION OF STRUCTURES
STRUCTURE DESIGN

BRIDGE NO.
KILOMETER POST 6.0-11.1

RETAINING WALL 1
LOG OF TEST BORINGS 1 OF 2

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 11
EA 091821

FILE => rw1-1of2.cgn

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY)										SHEET	OF
4-20-05											

005 CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 4/04)

USERNAME => TOTOT DATE PLOTTED => 13-SEP-2005 TIME PLOTTED => 12:55

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
11	SD	905			

REGISTERED CIVIL ENGINEER 4-27-05

PLANS APPROVAL DATE

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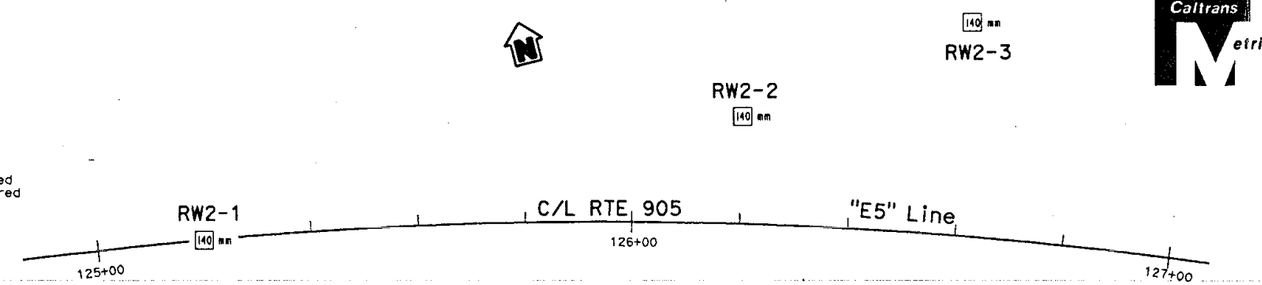
REGISTERED PROFESSIONAL ENGINEER Ali Lari No. C65846 Exp. 12-31-05 CIVIL STATE OF CALIFORNIA

Caltrans Metric

BENCH MARK

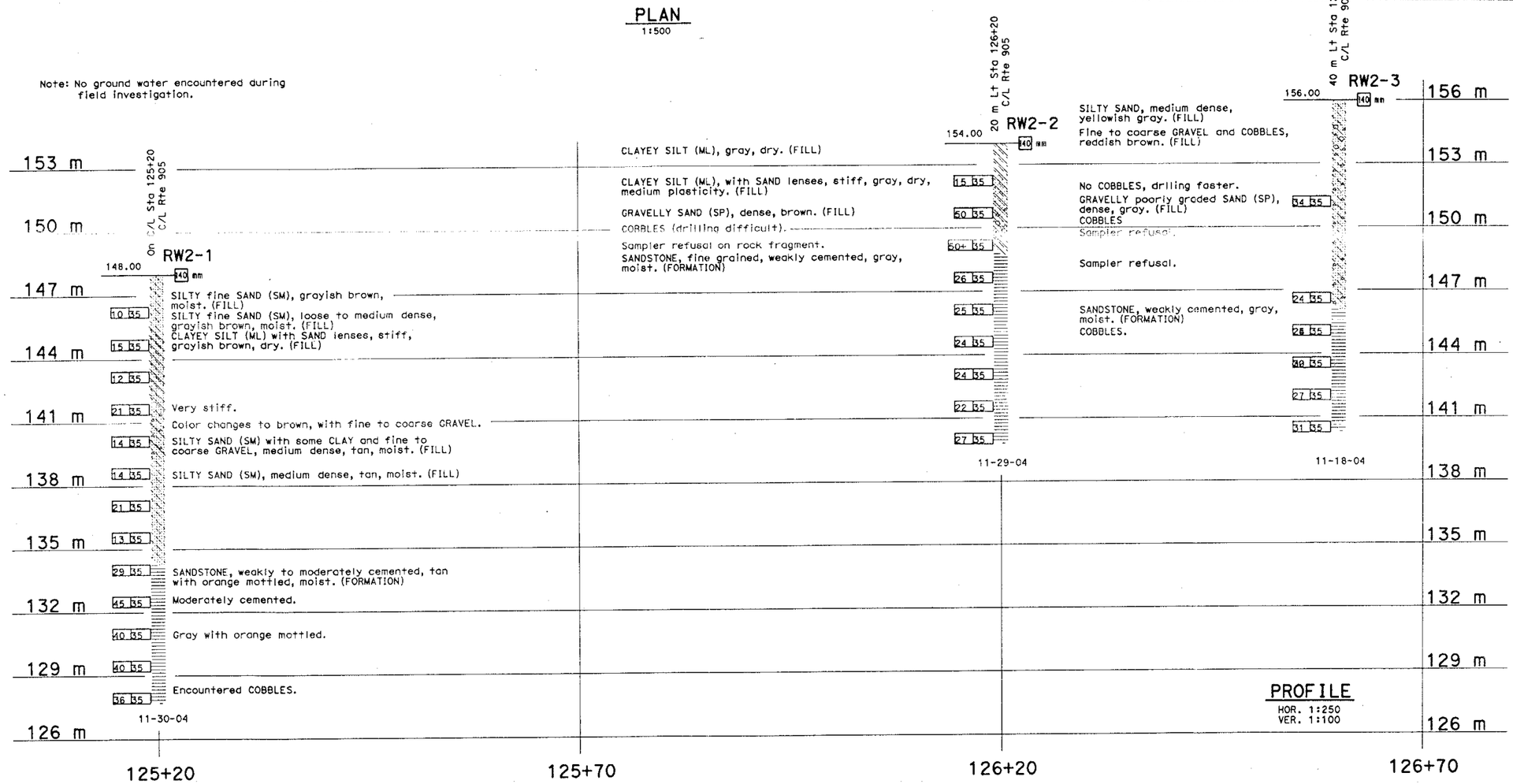
The elevations have been derived from the cross sections prepared by District 11 Design.



PLAN

1:500

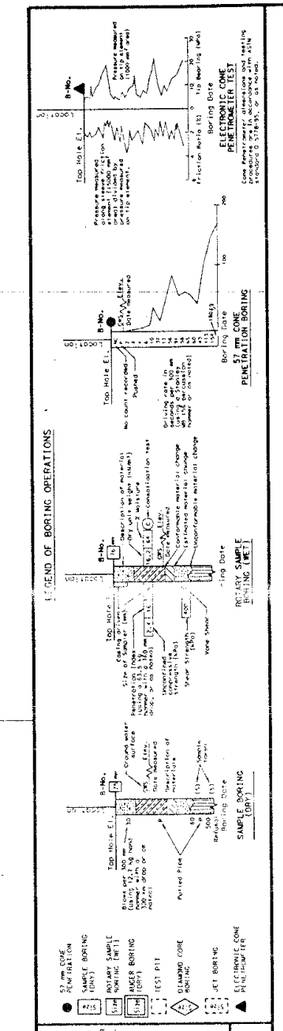
Note: No ground water encountered during field investigation.



PROFILE

HOR. 1:250
VER. 1:100

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN



LEGEND OF EARTH MATERIALS

CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration Test

SPT N-Value (Blows/0.3m)	Granular	SPT N-Value (Blows/0.3m)	Cohesive
0-4	Very Loose	<2	Very Soft
5-10	Loose	2-4	Soft
11-30	Medium Dense	5-8	Firm
31-50	Dense	9-15	Stiff
>50	Very Dense	16-30	Very stiff
		>30	Hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

ENGINEERING SERVICES	GEOTECHNICAL SERVICES
DRAWN BY	F. Nguyen 3/05
CHECKED BY	A. Lari

FIELD INVESTIGATION BY: A. Lari

STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

DIVISION OF STRUCTURES STRUCTURE DESIGN

BRIDGE NO.

KILOMETER POST 6.0-11.1

RETAINING WALL 2

LOG OF TEST BORINGS 1 OF 2

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 11
EA 091821

DISREGARD PRINTS BEARING EARLIER REVISION DATES 04-20-05

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

FILE => rw2-1of2.dgn

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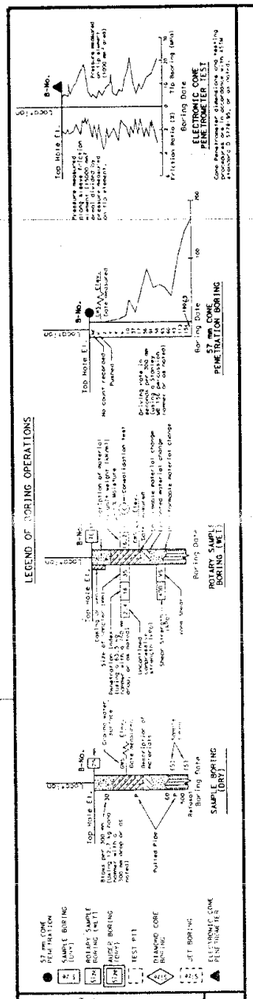
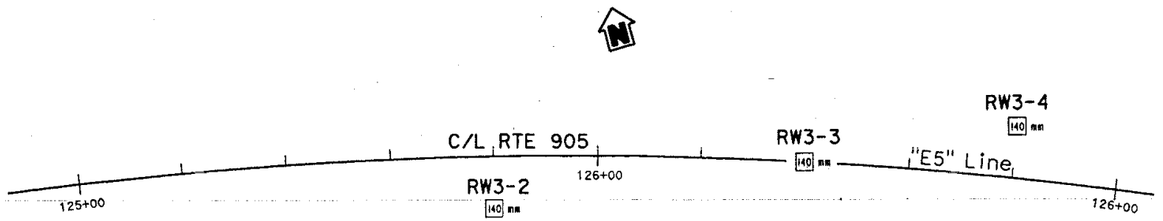


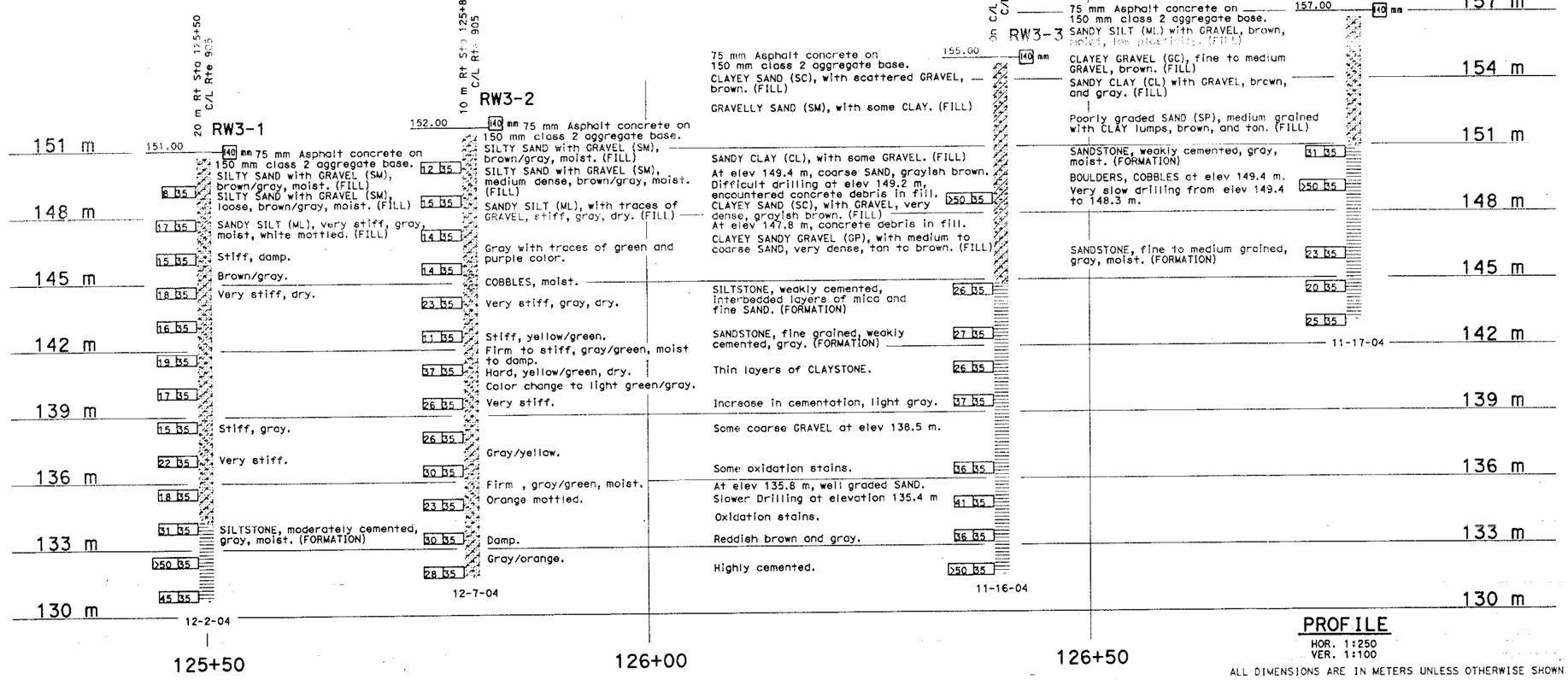


PLAN
1:500

BENCH MARK

The elevations have been derived from the cross sections prepared by District 11 Design.

Note: No ground water encountered during field investigation.



PROFILE
HOR. 1:250
VER. 1:100

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
11	SD	905			

REGISTERED CIVIL ENGINEER — 4-27-05
PLANS APPROVAL DATE
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REGISTERED PROFESSIONAL ENGINEER — Ali Lari — No. C65846 — Exp. 12-31-05 — CIVIL — STATE OF CALIFORNIA

ENGINEERING SERVICES	GEOTECHNICAL SERVICES
DRAWN BY	F. Nguyen 3/05
CHECKED BY	A. Lari

FIELD INVESTIGATION BY: M. Jandal / S. Romouzi

STATE OF CALIFORNIA — DEPARTMENT OF TRANSPORTATION
DIVISION OF STRUCTURES — STRUCTURE DESIGN
CU 11
EA 091821

BRIDGE NO.
KILOMETER POST 6.0-11.1

RETAINING WALL 3
LOG OF TEST BORINGS 1 OF 2

DISREGARD PRINTS BEARING EARLIER REVISION DATES
REVISION DATES (PRELIMINARY STAGE ONLY): 9-2-05
SHEET OF

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

FILE => rw3-1of2.dgn

DGS CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 4/04)

USERNAME => tdiott — DATE PLOTTED => 13-SEP-2005 — TIME PLOTTED => 12:59

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
11	SD	905			

REGISTERED CIVIL ENGINEER 4-27-05

PLANS APPROVAL DATE

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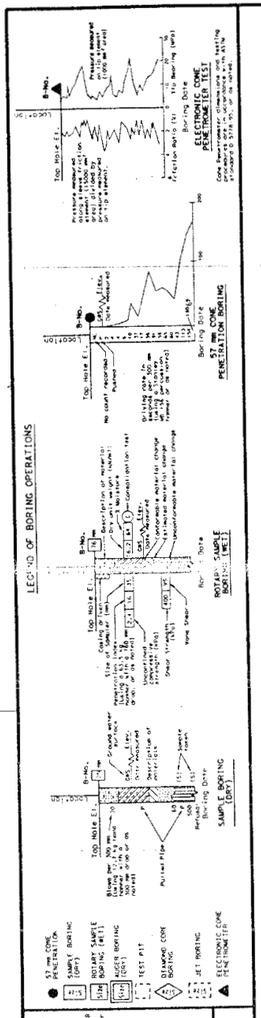
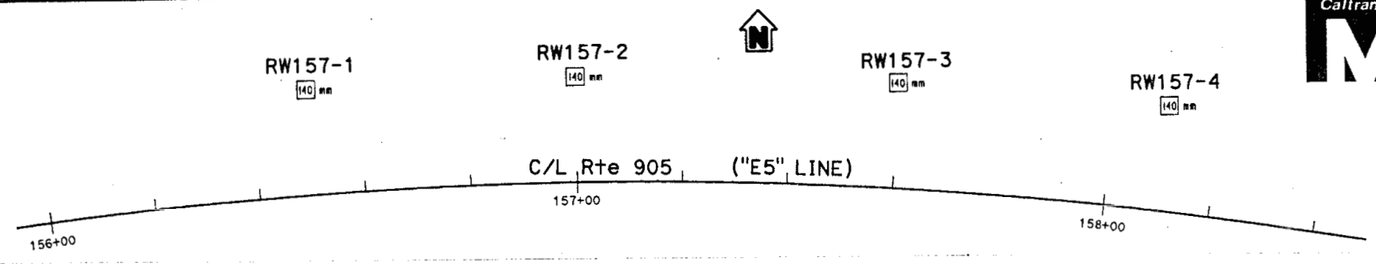
REGISTERED PROFESSIONAL ENGINEER Ali Lari No. C65846 Exp. 12-31-05 CIVIL STATE OF CALIFORNIA

Caltrans Metric





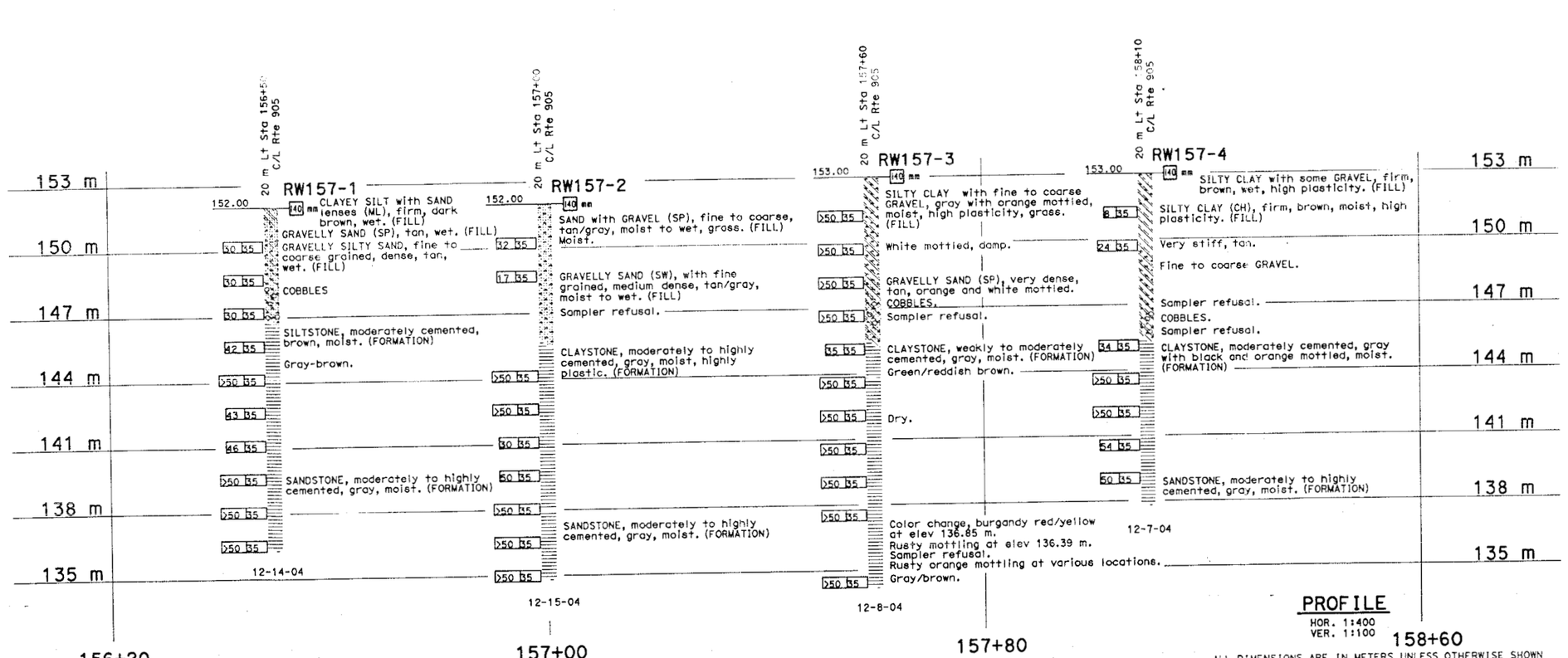
BENCH MARK

The elevations have been derived from the cross sections prepared by District 11 Design.

PLAN

1:500

Note: No ground water encountered during field investigation.



PROFILE

HOR. 1:400
VER. 1:100

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

LEGEND OF EARTH MATERIALS: GRAVEL, SAND, SILT, CLAY, SANDY CLAY or CLAYEY SAND, SANDY SILT or SILTY SAND, SILTY CLAY, CLAYEY SILT, PEAT and/or ORGANIC MATTER, COBBLES and/or BOULDERS, IGNEOUS ROCK, SEDIMENTARY ROCK, METAMORPHIC

CONSISTENCY CLASSIFICATION FOR SOILS — According to the Standard Penetration Test

SPT N-Value (Blows/0.3m)	Granular	SPT N-Value (Blows/0.3m)	Cohesive
0-4	Very Loose	<2	Very Soft
5-10	Loose	2-4	Soft
11-30	Medium Dense	5-8	Firm
31-50	Dense	9-15	Stiff
>50	Very Dense	16-30	Very stiff
		>30	Hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

ENGINEERING SERVICES	GEOTECHNICAL SERVICES	FIELD INVESTIGATION BY:	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF STRUCTURES STRUCTURE DESIGN	BRIDGE NO.	RETAINING WALL 157
DRAWN BY F. Nguyen 3/05		A. Lari/ S. Romouzi			KILOMETER POST 6.0-11.1	LOG OF TEST BORINGS 1 OF 2
CHECKED BY A. Lari				CU 11 EA 091821		

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

DISREGARD PRINTS BEARING EARLIER REVISION DATES 04-27-05

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF

FILE => rw157-1of2.dgn

OGS CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 4/04)

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
11	SD	905			

REGISTERED CIVIL ENGINEER 8-31-05

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Ali Lari — No. C65846 — Exp. 12-31-05 — CIVIL — STATE OF CALIFORNIA

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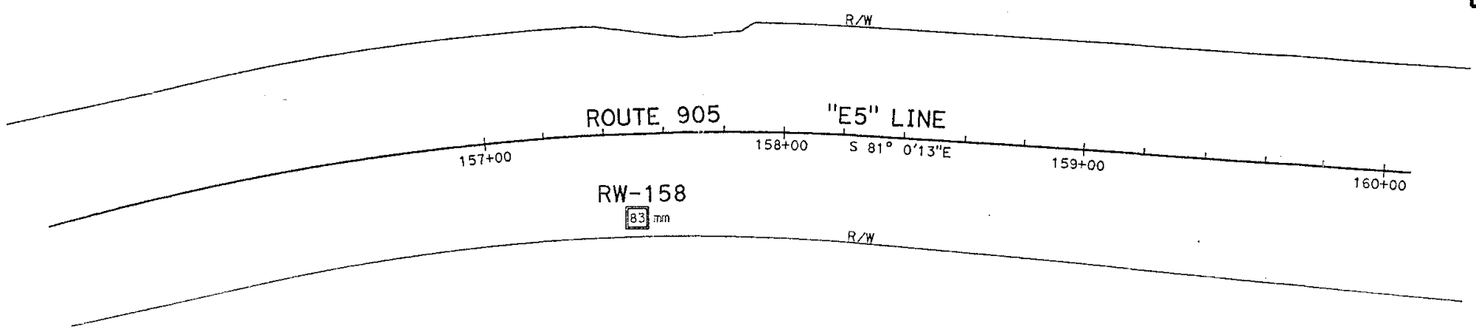
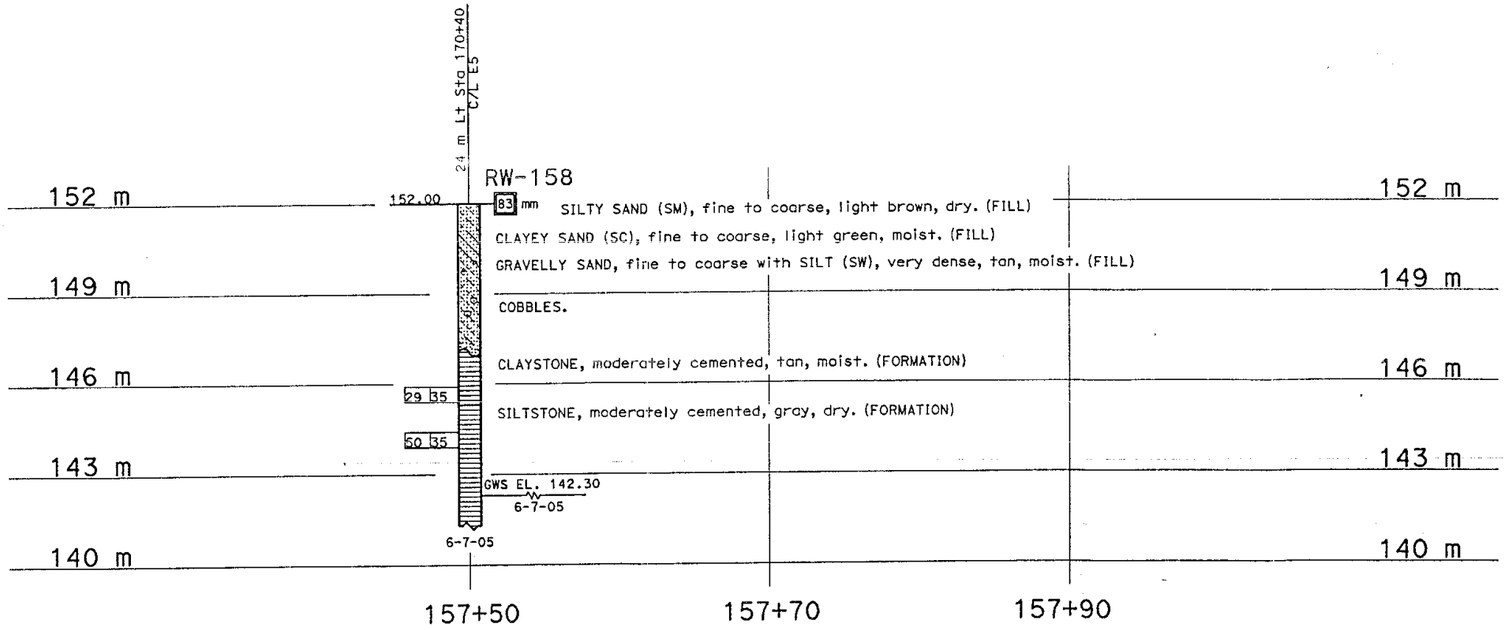


PLAN
1:1000

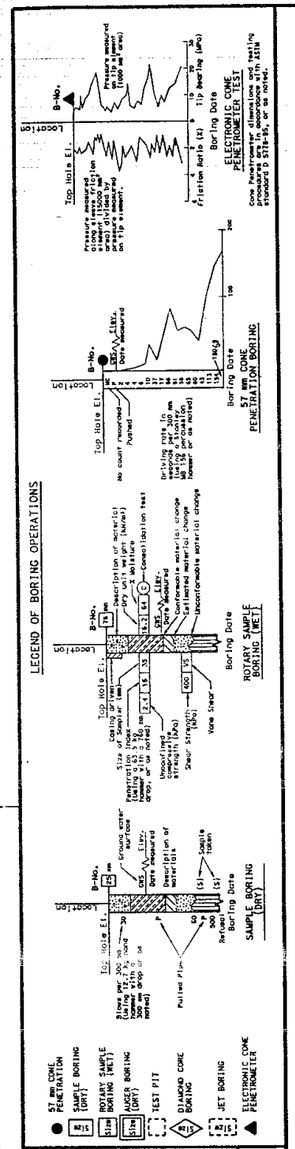
BENCH MARK

The elevations have been derived from the cross sections prepared by District 11 Design.



PROFILE
HOR. 1:200
VER. 1:100

LEGEND OF BORING OPERATIONS



LEGEND OF EARTH MATERIALS

GRAVEL · SAND · SILT · CLAY · SANDY CLAY or CLAYEY SAND · SANDY SILT or SILTY SAND · SILTY CLAY · CLAYEY SILT · PEAT and/or ORGANIC MATTER · COBBLES and/or BOULDERS · IGNEOUS ROCK · SEDIMENTARY ROCK · METAMORPHIC ROCK

CONSISTENCY CLASSIFICATION FOR SOILS

According to the Standard Penetration Test

		SPT N-Value (Blows/0.3m)	
Granular	Very Loose	0-4	
	Loose	5-10	
	Medium Dense	11-30	
	Dense	31-50	
	Very Dense	>50	
Cohesive	Very Soft	<2	
	Soft	2-4	
	Firm	5-8	
	Stiff	9-15	
	Very stiff	16-30	
	Hard	>30	

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

OGS CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 4/04)

Caltrans Metric

GEOTECHNICAL SERVICES	
DRAWN BY	W. Tang 08/05
CHECKED BY	A. Lari

FIELD INVESTIGATION BY: A. Lari

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES
STRUCTURE DESIGN
DESIGN BRANCH

BRIDGE NO.
KILOMETER POST PM6.0-11.1

RETAINING WALL 158
LOG OF TEST BORINGS 1 OF 2

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 11
EA 091821

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY)										SHEET	OF
06-30-05											

FILE => rw158-1of2.dgn

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
11	SD	905			

REGISTERED CIVIL ENGINEER — 8-31-05

PLANS APPROVAL DATE

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REGISTERED PROFESSIONAL ENGINEER — Ali Lari — No. C65846 — Exp. 12-31-05 — CIVIL — STATE OF CALIFORNIA

WEATHERING DESCRIPTORS

Modified from United States Bureau of Reclamation, Engineering Geology Field Manual.

Descriptors		Diagnostic features: Chemical weathering-Discoloration and/or oxidation		Mechanical weathering-Grain boundary conditions (disaggregation) primarily for granitics and some coarse-grained sediments	Texture and solutioning		General characteristics § (strength, excavation, etc.)
Alphanumeric descriptor	Descriptive term	Body of rock	Fracture surfaces		Texture	Solutioning	
W1	Fresh	No discoloration, not oxidized.	No discoloration or oxidation.	No separation, intact (tight).	No change.	No solutioning.	Hammer rings when crystalline rocks are struck. Almost always rock excavation except for naturally weak or weakly cemented rocks such as siltstones or shales.
W2	Slightly weathered to fresh°						
W3	Slightly weathered	Discoloration or oxidation is limited to surface of, or short distance from, fractures; some feldspar crystals are dull.	Minor to complete discoloration or oxidation of most surfaces.	No visible separation, intact (tight).	Preserved.	Minor leaching of some soluble minerals may be noted.	Hammer rings when crystalline rocks are struck. Body of rock not weakened. With few exceptions, such as siltstones or shales, classified as rock excavation.
W4	Moderately to slightly weathered°						
W5	Moderately weathered	Discoloration or oxidation extends from fractures usually throughout; Fe-Mg minerals are "rusty," feldspar crystals are "cloudy."	All fracture surfaces are discolored or oxidized.	Partial separation of boundaries visible.	Generally preserved.	Soluble minerals may be mostly leached.	Hammer does not ring when rock is struck. Body of rock is slightly weakened. Depending on fracturing, usually is rock excavation except in naturally weak rocks such as siltstones or shales.
W6	Intensely to moderately weathered°						
W7	Intensely weathered	Discoloration or oxidation throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent; or chemical alteration produces in-situ disaggregation, see grain boundary conditions.	All fracture surfaces are discolored or oxidized, surfaces friable.	Partial separation, rock is friable; in semiarid conditions granitics are disaggregated.	Texture altered by chemical disintegration (hydration, argillation).	Leaching of soluble minerals may be complete.	Dull sound when struck with hammer, usually can be broken with moderate to heavy manual pressure or by light hammer blow without reference to planes of weakness such as incipient or hairline fractures, or veinlets. Rock is significantly weakened. Usually common excavation.
W8	Very intensely weathered						
W9	Decomposed	Discolored or oxidized throughout, but resistant minerals such as quartz may be unaltered; all feldspars and Fe-Mg minerals are completely altered to clay.		Complete separation of grain boundaries (disaggregated).	Resembles a soil, partial or complete remnant rock structure may be preserved; leaching of soluble minerals usually complete.		Can be granulated by hand. Always common excavation. Resistant minerals such as quartz may be present as "stringers" or "dikes."

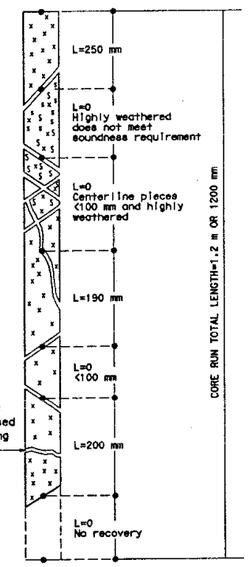
Note: This chart and its horizontal categories are more readily applied to rocks with feldspars and mafic minerals. Weathering in various sedimentary rocks, particularly limestones and poorly indurated sediments, will not always fit the categories established. This chart and weathering categories may have to be modified for particular site conditions or alteration such as hydrothermal effects; however, the basic framework and similar descriptors are to be used.

° Combination descriptors are permissible where equal distribution of both weathering characteristics are present over significant intervals or where characteristics present are "in between" the diagnostic feature. However, dual descriptors should not be used where significant, identifiable zones can be delineated. When given as a range only two adjacent terms may be combined. "Decomposed to slightly weathered," or "moderately weathered to fresh" are not acceptable.

† Does not include directional weathering along shears or faults and their associated features. For example, a shear zone that carried weathering to great depths into a fresh rock mass would not require the rock mass to be classified as weathered.

§ These are generalizations and should not be used as diagnostic features for weathering or excavation classification. These characteristics vary to a large extent based on naturally weak materials or cementation and type of excavation

ROCK QUALITY DESIGNATION (RQD) & PERCENT RECOVERY (REC) LOGGING



RQD (ROCK QUALITY DESIGNATION)	DESCRIPTION OF ROCK QUALITY
0 - 25%	VERY POOR
25 - 50%	POOR
50 - 75%	FAIR
75 - 90%	GOOD
90 - 100%	EXCELLENT

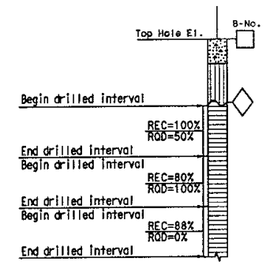
REC = Percent Core Recovery

$$REC = \frac{\sum \text{Length of all core pieces}}{\text{Total core run length}}$$

$$RQD = \frac{\sum \text{Length of sound core pieces} \geq 100\text{ mm}}{\text{Total core run length}}$$

$$RQD = \frac{250+190+200}{1200} \times 100\%$$

RQD = 53% (fair)



(No Scale)
After Deere & Deere, 1989

FRACTURE DENSITY

Modified from United States Bureau of Reclamation, Engineering Geology Field Manual.

FRACTURE DENSITY- Based on the spacing of all natural fractures in an exposure or core recovery lengths in boreholes; excludes mechanical breaks, shears, and shear zones; however, shear-disturbed zones (fracturing outside the shear) are included. Descriptors for fracture density apply to all rock exposures such as tunnel walls, dozer trenches, outcrops, or foundation cut slopes and inverts, as well as boreholes. Descriptive criteria presented below are based on borehole cores where lengths are measured along the core axis, for other exposures the criteria is distance measured between fractures (size of blocks).

UNFRACTURED (FD0): No fractures.

VERY SLIGHTLY FRACTURED (FD1): Core recovered mostly in lengths greater than 1 m.

SLIGHTLY TO VERY SLIGHTLY FRACTURED (FD2)*

SLIGHTLY FRACTURED (FD3): Core recovered mostly in lengths from 300 to 1000 mm, with few scattered lengths less than 300 mm or greater than 1000 mm.

MODERATELY TO SLIGHTLY FRACTURED (FD4)*

MODERATELY FRACTURED (FD5): Core recovered mostly in 100 to 300 mm lengths with most lengths about 200 mm.

INTENSELY TO MODERATELY FRACTURED (FD6)*

INTENSELY FRACTURED (FD7): Lengths average from 30 to 100 mm with scattered fragmented intervals. Core recovered mostly in lengths less than 100 mm.

VERY INTENSELY TO INTENSELY FRACTURED (FD8)*

VERY INTENSELY FRACTURED (FD9): Core recovered mostly as chips and fragments with a few scattered short core lengths.

* Combinations of fracture densities (e.g. very intensely to intensely fractured, or moderately to slightly fractured) are used where equal distribution of both fracture density characteristics are present over a significant interval or exposure, or where characteristics are "in between" the descriptor definitions.

ROCK HARDNESS DESCRIPTORS

Alphanumeric Descriptor	Descriptor	Criteria
H1	Extremely hard	Core, fragment, or exposure cannot be scratched with knife or sharp pick; can only be chipped with repeated heavy hammer blows.
H2	Very hard	Cannot be scratched with knife of sharp pick. Core or fragment breaks with repeated heavy hammer blows.
H3	Hard	Can be scratched with knife or sharp pick with difficulty (heavy pressure). Heavy hammer blow required to break specimen.
H4	Moderately hard	Can be scratched with knife or sharp pick with light or moderate pressure. Core or fragment breaks with moderate hammer blow.
H5	Moderately soft	Can be grooved 2 mm deep by knife or sharp pick with moderate or heavy pressure. Core or fragment breaks with light hammer blow or heavy manual pressure.
H6	Soft	Can be grooved or gouged easily by knife or sharp pick with light pressure, can be scratched with fingernail. Breaks with light to moderate manual pressure.
H7	Very soft	Can be readily indented, grooved or gouged with fingernail, or carved with a knife. Breaks with light manual pressure.

Any bedrock unit softer than H7, very soft, is to be described using ASTM D-2488 consistency descriptors.

Note: Although "sharp pick" is included in these definitions, descriptions of ability to be scratched, grooved or gouged by a knife is the preferred criteria.

Modified from United States Bureau of Reclamation, Engineering Geology Field Manual.

BEDDING, FOLIATION, OR FLOW TEXTURE DESCRIPTORS

Descriptors	Thickness / Spacing
Massive	Greater than 3 m
Very thickly (bedded, foliated, or banded)	1 to 3 m
Thickly	300 mm to 1 m
Moderately	100 to 300 mm
Thinly	30 to 100 mm
Very thinly	10 to 30 mm
Laminated (intensely foliated or banded)	Less than 10 mm

Modified from United States Bureau of Reclamation, Engineering Geology Field Manual.

Caltrans Metric

ENGINEERING SERVICES	GEOTECHNICAL SERVICES
PREPARED BY	I. G-Remmen
CHECKED BY	A. Lari

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

DIVISION OF ENGINEERING SERVICES
STRUCTURE DESIGN
DESIGN BRANCH

BRIDGE NO.
KILOMETER POST PM6.0-11.1

CU 11
EA 091821

RETAINING WALL 177 (RW2)
LOG OF TEST BORINGS 2 OF 2

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES: 08-31-05

SHEET OF

OGS CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 8/05)

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

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USERNAME => tdguerri DATE PLOTTED => 23-SEP-2005 TIME PLOTTED => 10:08

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
11	SD	905			

REGISTERED CIVIL ENGINEER 8-31-05

PLANS APPROVAL DATE

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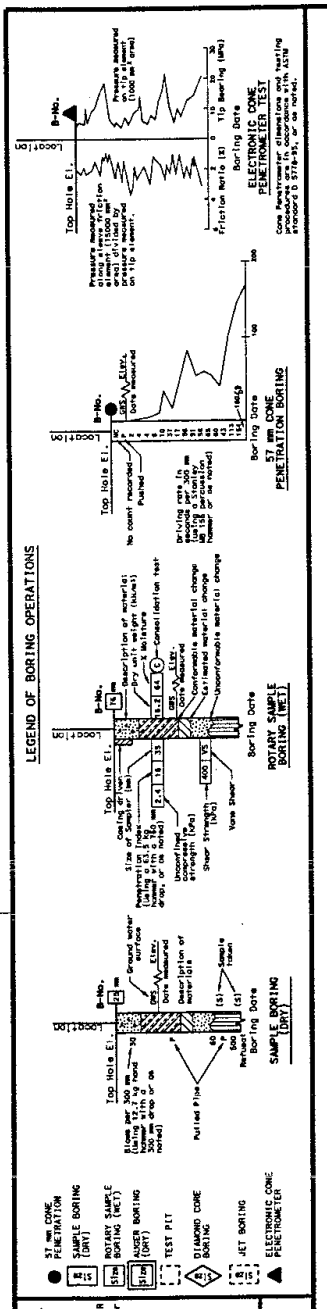
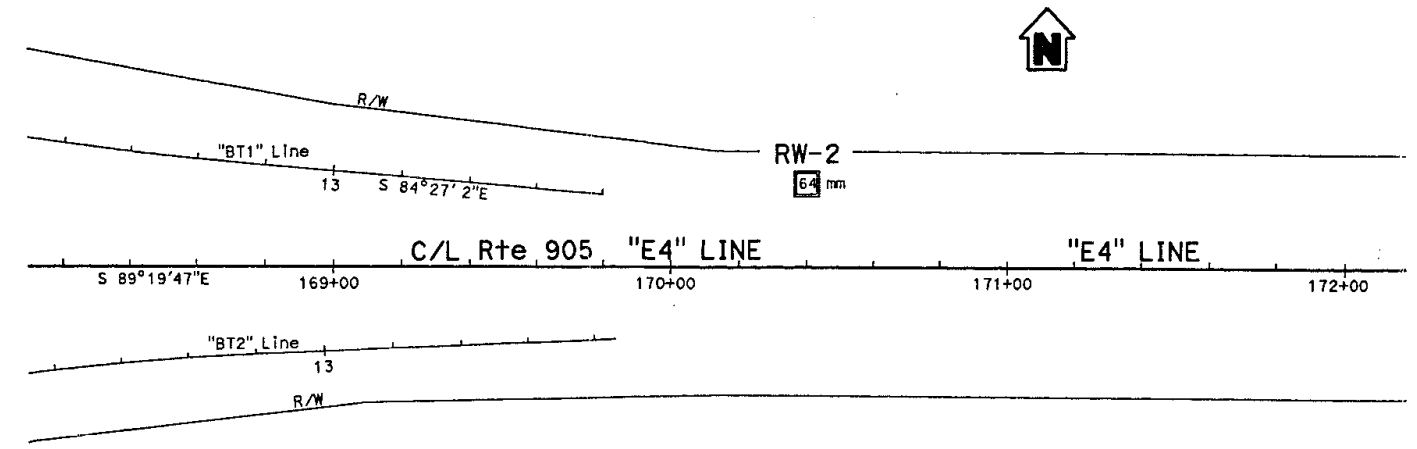
REGISTERED PROFESSIONAL ENGINEER
Ali Lari
No. C65846
Exp. 12-31-05
CIVIL
STATE OF CALIFORNIA





BENCH MARK

The elevations have been derived from the cross sections prepared by District 11 Design.

PLAN
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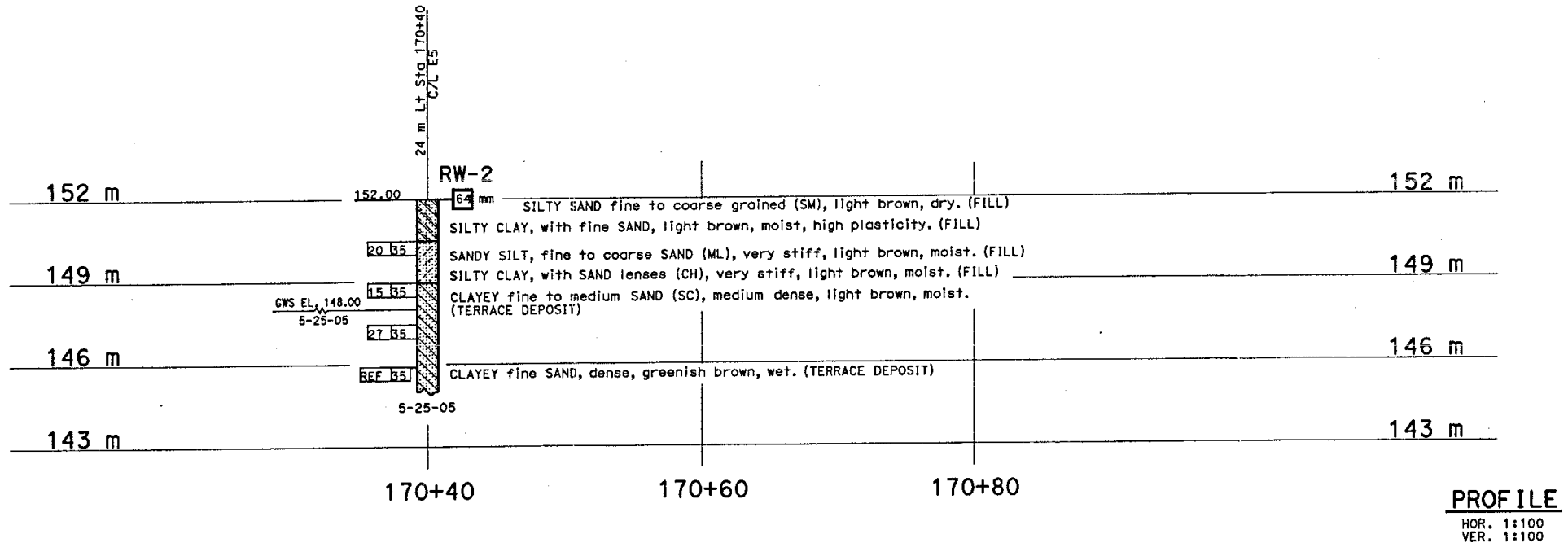

PROFILE
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VER. 1:100

Caltrans Metric

GEOTECHNICAL SERVICES		FIELD INVESTIGATION BY:	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN	BRIDGE NO.	RETAINING WALL 177 (RW2)
DRAWN BY	W. Tang 08/05	A. Lari		DESIGN BRANCH	KILOMETER POST PM6.0-11.1	LOG OF TEST BORINGS 1 OF 2
CHECKED BY	A. Lari					

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 11
EA 091821

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DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

08-31-05

USERNAME => tbguerri DATE PLOTTED => 23-SEP-2005 TIME PLOTTED => 10:08

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
11	SD	905			

REGISTERED CIVIL ENGINEER — 8-31-05

REGISTERED PROFESSIONAL ENGINEER — Ali Lari, No. C65846, Exp. 12-31-05, CIVIL, STATE OF CALIFORNIA

PLANS APPROVAL DATE

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BENCH MARK

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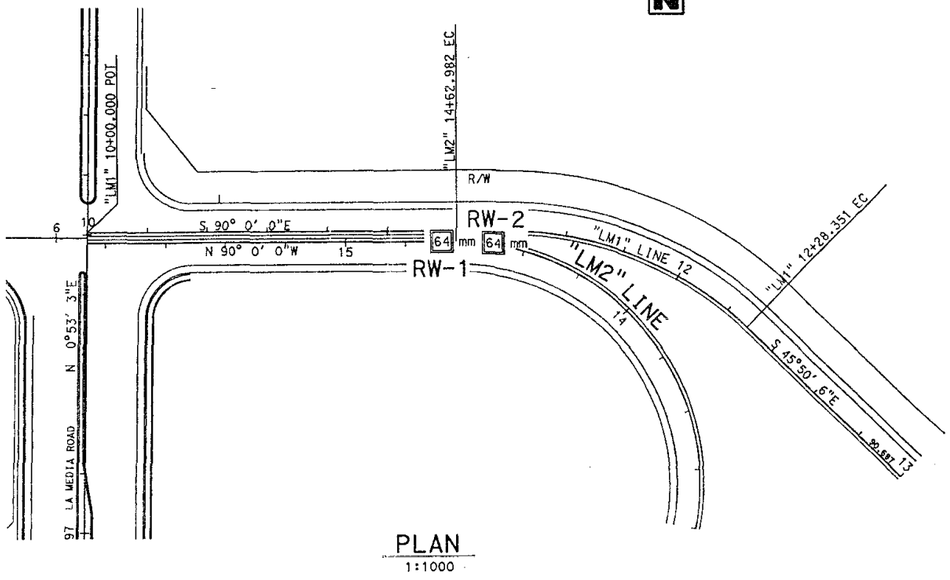

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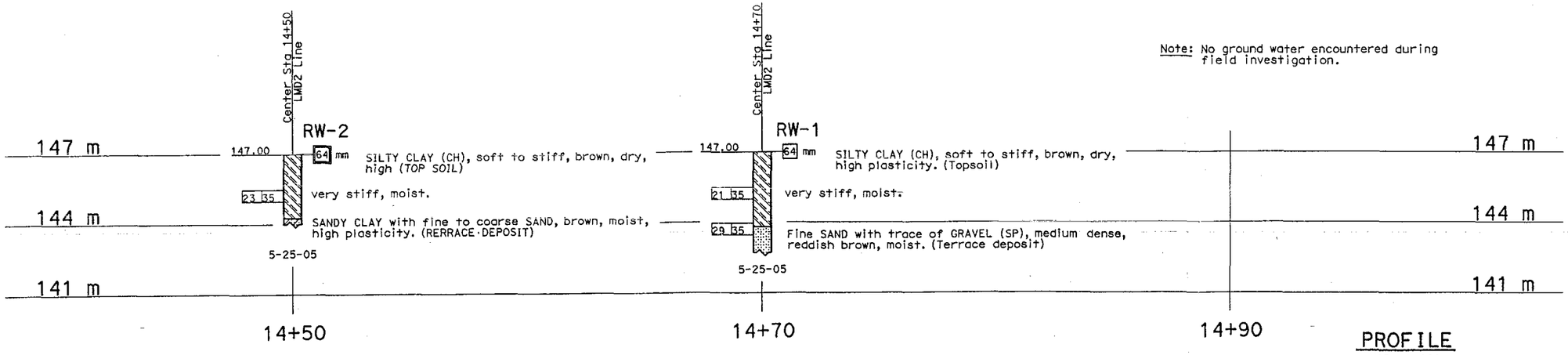
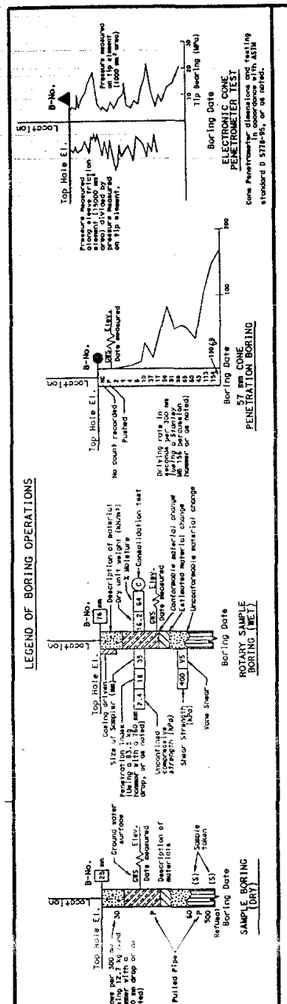


Note: No ground water encountered during field investigation.

PROFILE
HOR. 1:100
VER. 1:100

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

LEGEND OF BORING OPERATIONS



LEGEND OF EARTH MATERIALS

GRAVEL · SAND · SILT · CLAY · SANDY CLAY or CLAYEY SAND · SANDY SILT or SILTY SAND · SILTY CLAY · CLAYEY SILT · PEAT and/or ORGANIC MATTER · COBBLES and/or BOULDERS · IGNEOUS ROCK · SEDIMENTARY ROCK · METAMORPHIC

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According to the Standard Penetration Test

SPT N-Value (Blows/0.3m)	Granular	SPT N-Value (Blows/0.3m)	Cohesive
0-4	Very Loose	<2	Very Soft
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11-30	Medium Dense	5-8	Firm
31-50	Dense	9-15	Stiff
>50	Very Dense	16-30	Very stiff
		>30	Hard

NOTE: Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis.

OCS CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 4/04)

Caltrans Metric

GEOTECHNICAL SERVICES		FIELD INVESTIGATION BY:	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN	BRIDGE NO.	RETAINING WALL LMD
DRAWN BY	W. Tang, I.G-Remmen 8/05	A. Lari		DESIGN BRANCH	KILOMETER POST PM6.0-11.1	LOG OF TEST BORINGS
CHECKED BY	A. Lari					

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 11
EA 091821

FILE => rw-lmd.dgn

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY)										SHEET	OF
08-31-05											

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
11	SD	905			

REGISTERED CIVIL ENGINEER 4-27-05

PLANS APPROVAL DATE

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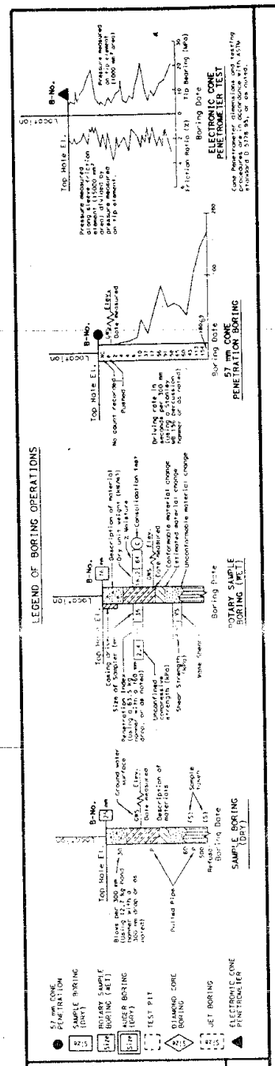
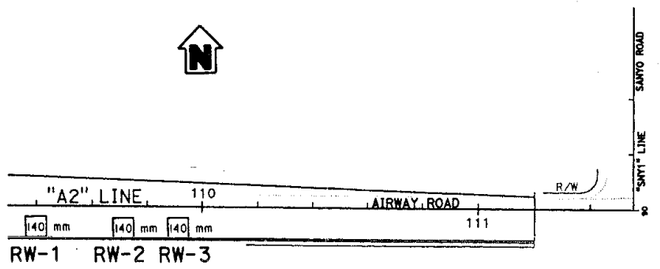
REGISTERED PROFESSIONAL ENGINEER — Ali Lari — No. C65846 — Exp. 12-31-05 — CIVIL — STATE OF CALIFORNIA





PLAN
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BENCH MARK

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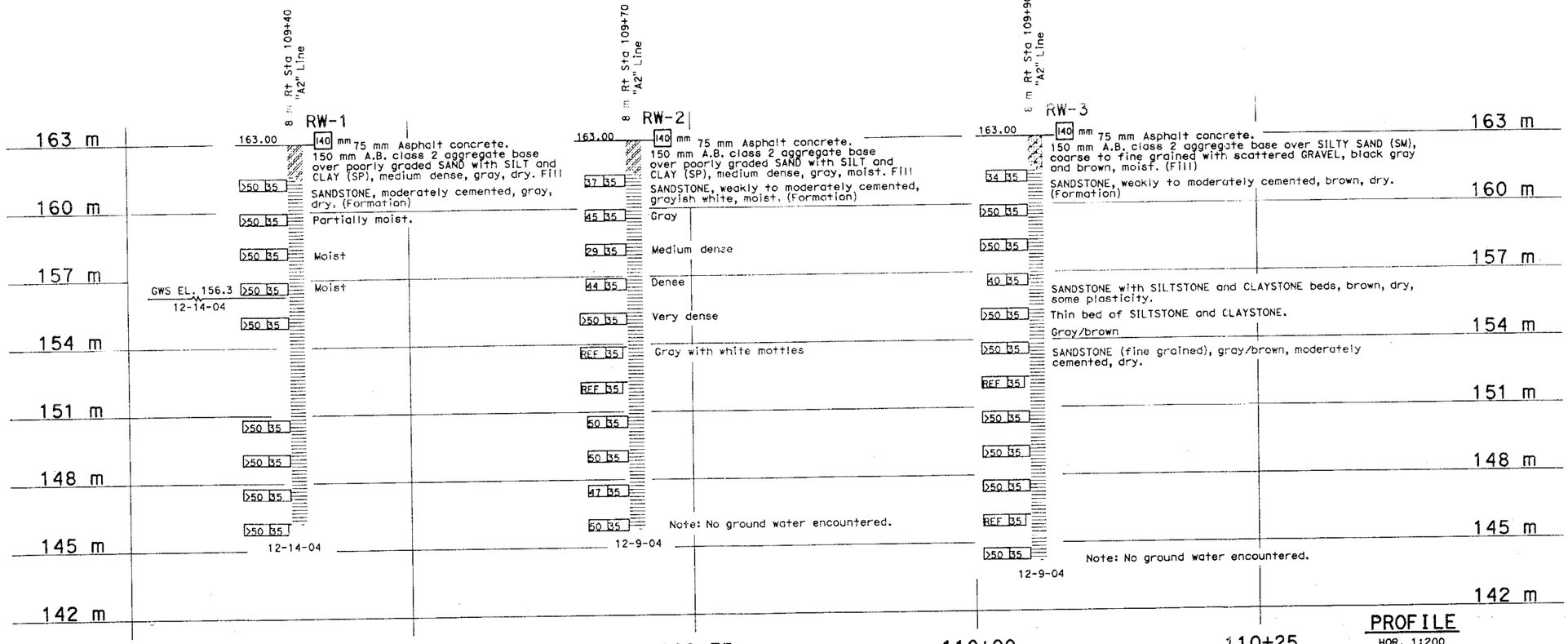

PROFILE
HOR. 1:200
VER. 1:100

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

ENGINEERING SERVICES	GEOTECHNICAL SERVICES
DRAWN BY	I. G-Remmen 3/05
CHECKED BY	Ali Lar

FIELD INVESTIGATION BY: Ali Lari/Shawn Romauzi

STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION
DIVISION OF STRUCTURES
STRUCTURE DESIGN

CU 11
EA 091821

BRIDGE NO.
KILOMETER POST 6.0-11.1

AIRWAY RETAINING WALL
LOG OF TEST BORINGS 1 OF 2

DISREGARD PRINTS BEARING EARLIER REVISION DATES →
REVISION DATES (PRELIMINARY STAGE ONLY): 04-20-05
SHEET OF

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

FILE => airway.dgn

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OGS CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 4/04)

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No	TOTAL SHEETS
11	SD	905			

REGISTERED CIVIL ENGINEER — 08-31-05

PLANS APPROVAL DATE

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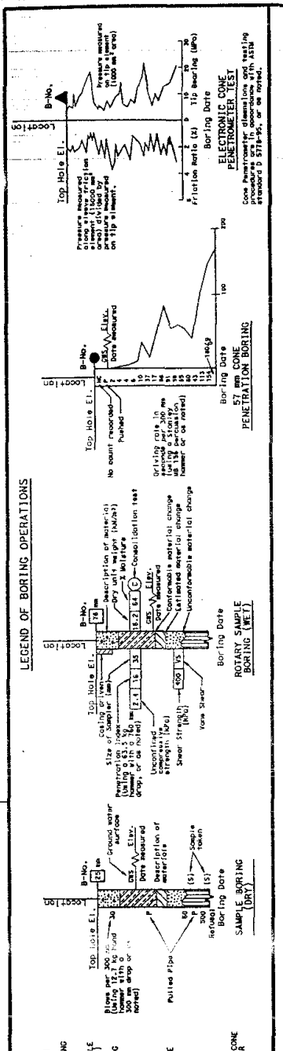
REGISTERED PROFESSIONAL ENGINEER — Ali Lari — No. C65846 — Exp. 12-31-05 — CIVIL — STATE OF CALIFORNIA

LEGEND OF BORING OPERATIONS



LEGEND OF EARTH MATERIALS

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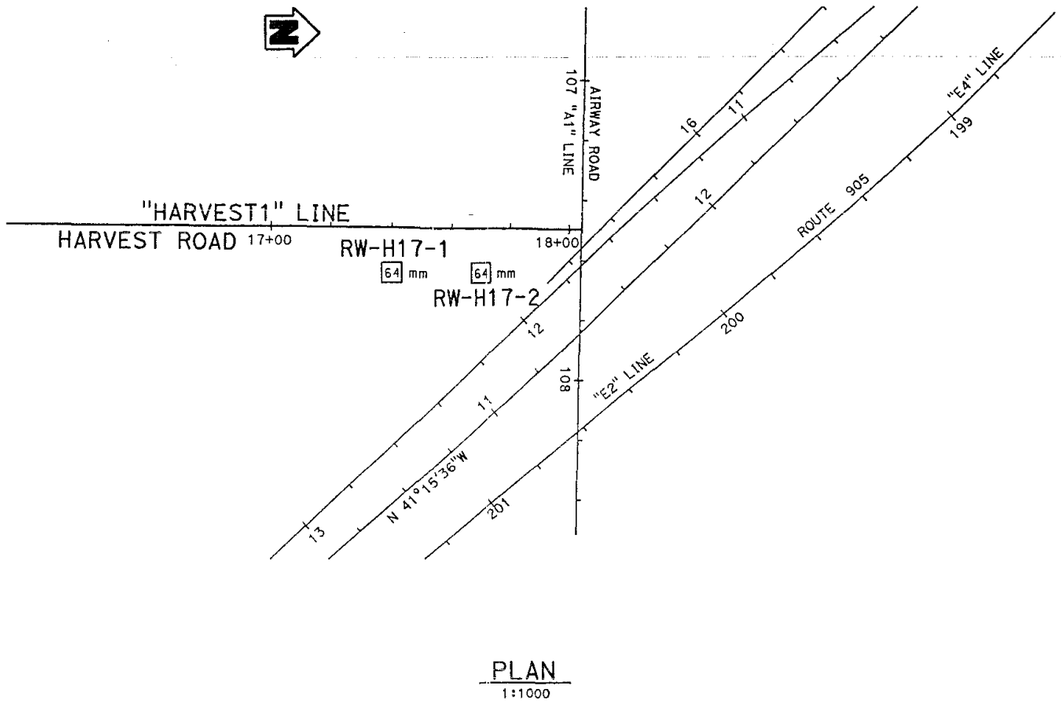
OGS CIVIL LOG OF TEST BORINGS SHEET (METRIC) (REV. 4/04)

BENCH MARK

The elevations have been derived from the cross sections prepared by District 11 Design.



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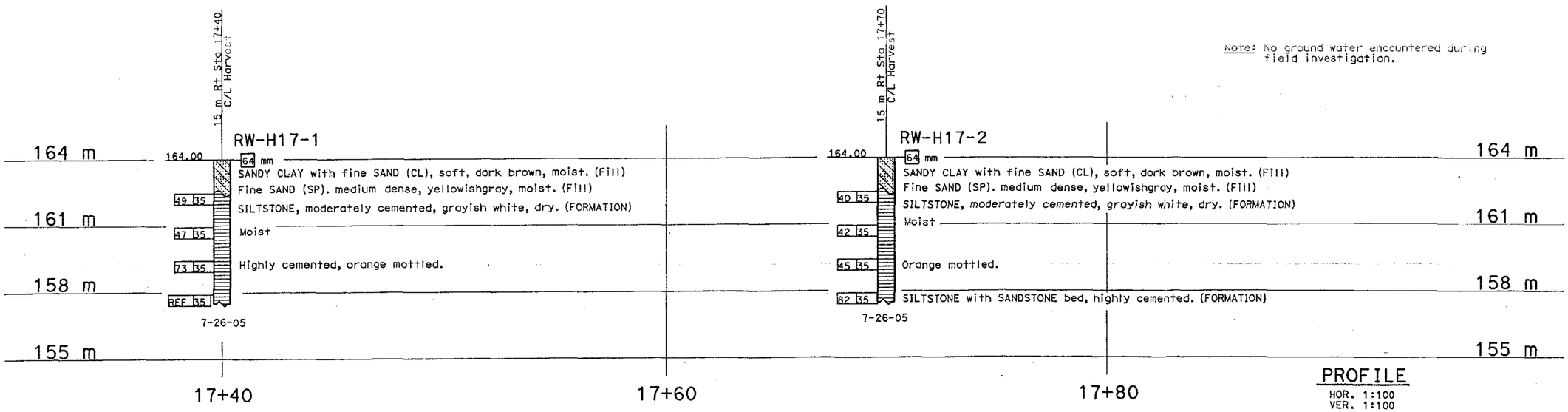


Note: No ground water encountered during field investigation.

PROFILE

HOR. 1:100
VER. 1:100

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

Caltrans Metric

GEOTECHNICAL SERVICES		FIELD INVESTIGATION BY:	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF ENGINEERING SERVICES STRUCTURE DESIGN	BRIDGE NO.	RETAINING WALL H17
DRAWN BY	W. Tang 08/05	A. Lari		DESIGN BRANCH	KILOMETER POST PM6.0-11.1	LOG OF TEST BORINGS 1 OF 2
CHECKED BY	A. Lari					

ALL DIMENSIONS ARE IN METERS UNLESS OTHERWISE SHOWN

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 11
EA 091821

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY): 08-31-05

SHEET OF

FILE => rwh17-1of2.dgn

TUE PLOTTED => 13-SEP-2005 14:07

Caltrans Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO	TOTAL SHEETS
11	SD	905			

REGISTERED CIVIL ENGINEER

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — Ali Lari — No. C65846 — Exp. 12-31-05 — CIVIL — STATE OF CALIFORNIA

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

WEATHERING DESCRIPTORS

Modified from United States Bureau of Reclamation, Engineering Geology Field Manual.

Descriptors		Diagnostic features: Chemical weathering-Discoloration and/or oxidation		Mechanical weathering-Grain boundary conditions (disaggregation) primarily for granitics and some coarse-grained sediments	Texture and solutioning		General characteristics (strength, excavation, etc.)§
Alphanumeric descriptor	Descriptive term	Body of rock	Fracture surfaces†		Texture	Solutioning	
W1	Fresh	No discoloration, not oxidized.	No discoloration or oxidation.	No separation, intact (tight).	No change.	No solutioning.	Hammer rings when crystalline rocks are struck. Almost always rock excavation except for naturally weak or weakly cemented rocks such as siltstones or shales.
W2	Slightly weathered to fresh[O]						
W3	Slightly weathered	Discoloration or oxidation is limited to surface of, or short distance from, fractures; some feldspar crystals are dull.	Minor to complete discolorgtion or oxidation of most surfaces.	No visible separation, intact (tight).	Preserved.	Minor leaching of some soluble minerals may be noted.	Hammer rings when crystalline rocks are struck. Body of rock not weakened. With few exceptions, such as siltstones or shales, classified as rock excavation.
W4	Moderately to slightly weathered[O]						
W5	Moderately weathered	Discoloration or oxidation extends from fractures usually throughout; Fe-Mg minerals are "rusty," feldspar crystals are "cloudy."	All fracture surfaces are discolored or oxidized.	Partial separation of boundaries visible.	Generally preserved.	Soluble minerals may be mostly leached.	Hammer does not ring when rock is struck. Body of rock is slightly weakened. Depending on fracturing, usually is rock excavation except in naturally weak rocks such as siltstones or shales.
W6	Intensely to moderately weathered[O]						
W7	Intensely weathered	Discoloration or oxidation throughout; all feldspars and Fe-Mg minerals are altered to clay to some extent; or chemical alteration produces in-situ disaggregation, see grain boundary conditions.	All fracture surfaces are discolored or oxidized, surfaces friable.	Partial separation, rock is friable; in semiarid conditions granitics are disaggregated.	Texture altered by chemical disintegration (hydration, argillation).	Leaching of soluble minerals may be complete.	Dull sound when struck with hammer, usually can be broken with moderate to heavy manual pressure or by light hammer blow without reference to planes of weakness such as incipient or hairline fractures, or veinlets. Rock is significantly weakened. Usually common excavation.
W8	Very intensely weathered						
W9	Decomposed	Discolored or oxidized throughout, but resistant minerals such as quartz may be unaltered; all feldspars and Fe-Mg minerals are completely altered to clay.		Complete separation of grain boundaries (disaggregated).	Resembles a soil, partial or complete remnant rock structure may be preserved; leaching of soluble minerals usually complete.		Can be granulated by hand. Always common excavation. Resistant minerals such as quartz may be present as "stringers" or "dikes."

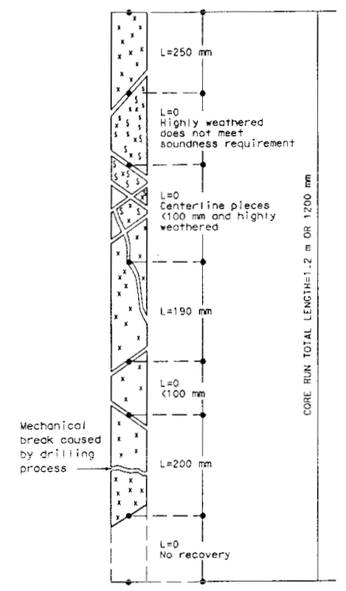
Note: This chart and its horizontal categories are more readily applied to rocks with feldspars and mafic minerals. Weathering in various sedimentary rocks, particularly limestones and poorly indurated sediments, will not always fit the categories established. This chart and weathering categories may have to be modified for particular site conditions or alteration such as hydrothermal effects; however, the basic framework and similar descriptors are to be used.

[O] Combination descriptors are permissible where equal distribution of both weathering characteristics are present over significant intervals or where characteristics present are "in between" the diagnostic feature. However, dual descriptors should not be used where significant, identifiable zones can be delineated. When given as a range only two adjacent terms may be combined. "Decomposed to slightly weathered," or "moderately weathered to fresh" are not acceptable.

† Does not include directional weathering along shears or faults and their associated features. For example, a shear zone that carried weathering to great depths into a fresh rock mass would not require the rock mass to be classified as weathered.

§ These are generalizations and should not be used as diagnostic features for weathering or excavation classification. These characteristics vary to a large extent based on naturally weak materials or cementation and type of excavation.

ROCK QUALITY DESIGNATION (RQD) & PERCENT RECOVERY (REC) LOGGING



ROD (ROCK QUALITY DESIGNATION)	DESCRIPTION OF ROCK QUALITY
0 - 25%	VERY POOR
25 - 50%	POOR
50 - 75%	FAIR
75 - 90%	GOOD
90 - 100%	EXCELLENT

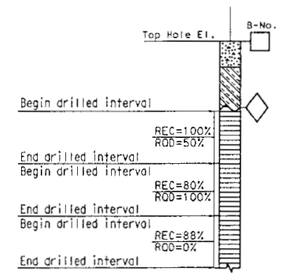
REC = Percent Core Recovery

$$REC = \frac{\sum \text{Length of all core pieces}}{\text{Total core run length}}$$

$$ROD = \frac{\sum \text{Length of sound core pieces} \geq 100 \text{ mm}}{\text{Total core run length}}$$

$$ROD = \frac{250+190+200}{1200} \times 100\%$$

ROD = 53% (fair)



(No Scale)
After Deere & Deere, 1989

FRACTURE DENSITY

Modified from United States Bureau of Reclamation, Engineering Geology Field Manual.

FRACTURE DENSITY- Based on the spacing of all natural fractures in an exposure or core recovery lengths in boreholes; excludes mechanical breaks, shears, and shear zones; however, shear-disturbed zones (fracturing outside the shear) are included. Descriptors for fracture density apply to all rock exposures such as tunnel walls, dozer trenches, outcrops, or foundation cut slopes and inverts, as well as boreholes. Descriptive criteria presented below are based on borehole cores where lengths are measured along the core axis, for other exposures the criteria is distance measured between fractures (size of blocks).

UNFRACTURED (FD0): No fractures.

VERY SLIGHTLY FRACTURED (FD1): Core recovered mostly in lengths greater than 1 m.

SLIGHTLY TO VERY SLIGHTLY FRACTURED (FD2)*

SLIGHTLY FRACTURED (FD3): Core recovered mostly in lengths from 300 to 1000 mm, with few scattered lengths less than 300 mm or greater than 1000 mm.

MODERATELY TO SLIGHTLY FRACTURED (FD4)*

MODERATELY FRACTURED (FD5): Core recovered mostly in 100 to 300 mm lengths with most lengths about 200 mm.

INTENSELY TO MODERATELY FRACTURED (FD6)*

INTENSELY FRACTURED (FD7): Lengths average from 30 to 100 mm with scattered fragmented intervals. Core recovered mostly in lengths less than 100 mm.

VERY INTENSELY TO INTENSELY FRACTURED (FD8)*

VERY INTENSELY FRACTURED (FD9): Core recovered mostly as chips and fragments with a few scattered short core lengths.

* Combinations of fracture densities (e.g. very intensely to intensely fractured, or moderately to slightly fractured) are used where equal distribution of both fracture density characteristics are present over a significant interval or exposure, or where characteristics are "in between" the descriptor definitions.

ROCK HARDNESS DESCRIPTORS

Alphanumeric Descriptor	Descriptor	Criteria
H1	Extremely hard	Core, fragment, or exposure cannot be scratched with knife or sharp pick; can only be chipped with repeated heavy hammer blows.
H2	Very hard	Cannot be scratched with knife of sharp pick. Core or fragment breaks with repeated heavy hammer blows.
H3	Hard	Can be scratched with knife or sharp pick with difficulty (heavy pressure). Heavy hammer blow required to break specimen.
H4	Moderately hard	Can be scratched with knife or sharp pick with light or moderate pressure. Core or fragment breaks with moderate hammer blow.
H5	Moderately soft	Can be grooved 2 mm deep by knife or sharp pick with moderate or heavy pressure. Core or fragment breaks with light hammer blow or heavy manual pressure.
H6	Soft	Can be grooved or gouged easily by knife or sharp pick with light pressure, can be scratched with fingernail. Breaks with light to moderate manual pressure.
H7	Very soft	Can be readily indented, grooved or gouged with fingernail, or carved with a knife. Breaks with light manual pressure.

Any bedrock unit softer than H7, very soft, is to be described using ASTM D-2488 consistency descriptors.

Note: Although "sharp pick" is included in these definitions, descriptions of ability to be scratched, grooved or gouged by a knife is the preferred criteria.

Modified from United States Bureau of Reclamation, Engineering Geology Field Manual.

BEDDING, FOLIATION, OR FLOW TEXTURE DESCRIPTORS

Descriptors	Thickness / Spacing
Massive	Greater than 3 m
Very thickly (bedded, foliated, or banded)	1 to 3 m
Thickly	300 mm to 1 m
Moderately	100 to 300 mm
Thinly	30 to 100 mm
Very thinly	10 to 30 mm
Laminated (intensely foliated or banded)	Less than 10 mm

Modified from United States Bureau of Reclamation, Engineering Geology Field Manual.

ENGINEERING SERVICE CENTER	GEOTECHNICAL SERVICES				
PREPARED BY	F. Nguyen 3/05	STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	DIVISION OF STRUCTURES STRUCTURE DESIGN	BRIDGE NO.	RETAINING WALL 1
CHECKED BY				KILOMETER POST 6.0-11.1	LOG OF TEST BORINGS 2 OF 2

OSF GEOLOGIST LOG OF TEST BORINGS SHEET (METRIC) (REV. 5/2003)

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

CU 11
EA 091821

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET | OF

FILE => practice.dgn

LABORATORY TEST RESULTS

DIVISION OF
ENGINEERING SERVICES
OFFICE OF GEOTECHNICAL SUPPORT
GEOTECHNICAL LABORATORY
5900 Folsom Boulevard
Sacramento, CA 95819

Date: 11/18/2004

To: Zia Yazdani / GDS-2

From: Lilibeth C. Purta / (916) 227-5239

RE: Laboratory Test Report -- EA: 11-091821

Final test results.

Note: All remaining test specimens will be disposed of in 30 calendar days from the release date of the final test results.

AASHTO R18

STATE OF CALIFORNIA
DEPT OF TRANSPORTATION
GEOTECHNICAL LAB

E.A. 11-091821

Br. #

CLASSIFICATION TEST SUMMARY

LOCATION	% FINER THAN																	ATT. LIMITS		Gs	AS RECEIVED		LAB. COMP	
Sample I.D.	2 1/2	2	1 1/2	1	3/4	1/2	3/8	4	8	16	30	50	100	200	5μ	2μ	1μ	LL	PI		γ_d	%m	γ_d	%m
S040902A			100	96	94	91	90	88	86	83	80	69	57	50	31	-	25	28	16					
S040903A								100	99	97	95	92	88	84	63	-	54							
S040903B			100	97	96	95	94	93	92	90	86	80	74	68	49	-	38							
S040903C		100	98	96	95	93	92	89	87	84	78	70	60	44	28	-	23							
S040922A	100	98	98	97	96	94	93	90	86	82	79	73	63	53	38	-	28							
S040922A1				100	99	99	98	97	94	92	89	83	73	62	50	-	38	48	31					
S040922B		100	98	97	97	96	96	95	94	93	91	84	65	46	21	-	13	21	7					
S040922C									100	99	98	93	80	70	52	-	35							
S040922C2										100	99	94	82	71	53	-	51	55	40					
S040922D1								100	99	97	96	94	90	73	2	-	0	50	26					
S040922D2								100	99	98	97	95	89	58	2	-	0							

NP - Non-plastic
* Sample received fractured -- Not suitable for testing
** Sample disintegrated while preparing for testing -- Not suitable for testing
*** Sample received desiccated -- Test results may not represent the true soil conditions

E.A.

STATE OF CALIFORNIA
DEPT OF TRANSPORTATION
GEOTECHNICAL LAB

Br. #

TION TEST SUMMARY

LOCATION	ER THAN															ATT. IMITS		Gs	RECEIV
Sample I.D.	1 1/2	1	3/4	1/2	3/8	4	8	16	30	50	100	200	5m	2m	1m	LL	PI		γδ
AB-4-1					100	99	97	91	81	68	57	49	26	-	9	74	37		
AB-4-2					100	96	89	83	79	77	75	72	16	-	7	63	34		
CB-5-1							100	99	98	97	94	72	24	-	15				
CB-5-2	100	86	75	64	56	45	37	30	25	22	19	17	11	-	7				
CB-6-1						100	92	65	39	25	16	10	4	-	3		NP		
CB-6-2							100	99	95	90	83	73	27	-	15	51	25		
CB-7-1		100	87	79	71	62	50	37	26	19	13	10	3	-	2				
CB-11-1	100	91	88	78	76	70	62	50	40	32	26	21	9	-	4				
CB-12-1	100	90	90	90	90	89	83	66	42	28	21	18	12	-	8				
CB-17-1																47	27		
CB-19-1																			
CB-19-2						100	99	97	94	91	89	86	65	-	47	58	37		
CB-20-1						100	98	92	82	70	61	55	34	-	27	42	28		
CB-25-1	100	89	84	76	71	62	50	40	32	26	23	20	14	-	10				
DB-2-1					100	99	98	94	86	63	29	18	9	-	6				
DB-3-1																84	55		
EB-1-1																48	26		
EB-1-2				100	98	97	94	89	79	64	54	49	33	-	27	36	18		
EB-1-3					100	98	88	71	53	33	19	12	7	-	4				
EB-1-4		100	88	88	87	85	74	54	36	25	16	11	4	-	3				
EB-2-1				100	99	99	98	97	94	89	83	78	53	-	43	58	35		

1-091821

ED	LAB. COMP	
%m	γδ	%m
24.2		
19.2		
16.9		
3.8		
9.4		
17.3		
4.6		
6.9		
4.2		
25.2		
21.5		
6.4		
2.8		
6.2		
5.3		
4.1		
3.8		
9.0		

EB-2-2								100	98	96	92	88	67	-	53	72	49		
EB-2-3			100	97	95	89	82	76	68	59	52	47	32	-	25	55	33		
EB-5-1						100	99	98	94	88	80	73	52	-	40				

NP - Non-plastic

* Sample received fractured -- Not suitable for testing

** Sample disintegrated while preparing for testing -- Not suitable for testing

*** Sample received desiccated -- Test results may not represent the true soil conditions

22.8		
10.2		
12.2		

"Lopez, Rudy" <Rudy_C_Lopez@dot.ca.gov> on 02/03/2005 08:06:40 AM

To: "Yazdani, Zia" <zia_yazdani@dot.ca.gov>
cc:
Subject: Corrosion Test Summary Report EA: 11-091821 (Corr. #s CR050385, CR050397-CR050399, CR050404, CR050405, CR050407-CR050411)

Division of Engineering Services
Materials Engineering and Testing Services
Corrosion Technology Branch
Report Date: 2/3/2005
Reported By: Lopez, Rudy

CORROSION TEST SUMMARY REPORT - Soil/Water

Bridge Name:
Bridge Number:
EA No.: **11-0918 21**
Dist/Co/Rte/ **11 / SD**
PM or KP: **/ 905 / kp 9.2/18**

SIC Number (TL101)	Sample Location	Sample Type	Sample Depth	Minimum Resistivity[1] (ohm-cm)	pH[2]	Chloride Content[3] (ppm)	Sulfate Content[4] (ppm)
C578530E		SOIL	RW 2-4 (RW 2-41)	3500	7.68		
C578530L		SOIL	RW 157-1 (157-12)	1060	8.78		
C578530M		SOIL	RW 157-2 (157-21)	310	6.50	1026	268
C578530J		SOIL	RW-31	490	8.09	614	54
C578530I		SOIL	RW 2 (RW 22)	2500	8.24		
C578530H		SOIL	RW 3-4-1	790	8.25	38	6300
C578530G		SOIL	RW 3-3-1	580	8.21	236	37
C578530C		SOIL	RW 1-3	930	7.58	244	85
C578530F		SOIL	RW 3-1 (RW 3-15,16,17)	500	8.11	610	255
C578530D		SOIL	RW 1-4	420	7.17	843	119
C578530A		SOIL	RW 1-1 (RW 1-11)	430	8.42	810	140

☐ This site is not corrosive to foundation elements (see note below for MSE wall backfill)

☒ This site is corrosive (if checked). Controlling corrosion parameters are as follows:

- 6.5 pH
- 1026 ppm Chloride
- 6300 ppm Sulfate

Note: For MSE wall structure backfill material, minimum resisitivity must be 1500 ohm-cm or greater, pH must be between 5.5 and 10.0, chloride content must not be greater than 500 ppm, and sulfate content must not be greater than 2000 ppm.

[1,2]CTM 643, [3]CTM 422, [4]CTM 417

Division of Engineering Services
Materials Engineering and Testing Services
Corrosion Technology Branch
Report Date: 11/16/2004
Reported By: Lopez, Rudy

CORROSION TEST SUMMARY REPORT - Soil/Water

Bridge Name:
Bridge Number:
EA No.: **11-0918 21**
Dist/Co/Rte /PM or KP: **11 / SD / 905 / 9.2/18.0**

SIC Number (TL101)	Sample Location	Sample Type	Sample Depth	Minimum Resistivity[1] (ohm-cm)	pH[2]	Chloride Content[3] (ppm)	Sulfate Content[4] (ppm)
C578529C	SAN DIEGO-905	SOIL	SURFACE / SAMPLE #5040903B	820	7.86	46	69
C578529E	SAN DIEGO-905	SOIL	SURFACE/ SAMPLE #5040922A	450	8.14	340	460
C578529G	SAN DIEGO-905	SOIL	SURFACE/ SAMPLE #5040922B	2600	6.95		
C578529H	SAN DIEGO 905	SOIL	SURFACE/ #S040922C	780	7.47	24	29
C578529K	SAN DIEGO 905	SOIL	SURFACE/ #S040922D2	65	7.65	9000	770

☐ This site is not corrosive to foundation elements (see note below for MSE wall backfill)

☒ This site is corrosive (if checked). Controlling corrosion parameters are as follows:

- 6.95 pH
- 9000 ppm Chloride
- 770 ppm Sulfate

Note: For MSE wall structure backfill material, minimum resisitivity must be 1500 ohm-cm or greater, pH must be between 5.5 and 10.0, chloride content must not be greater than 500 ppm, and sulfate content must not be greater than 2000 ppm.

[1,2]CTM 643, [3]CTM 422, [4]CTM 417

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
OFFICE OF GEOTECHNICAL SUPPORT - GEOTECHNICAL LABORATORY

DENSITY - WATER CONTENT

JOB NUMBER **11-091821** DATE 5-Aug-04 TEST BY LP CHECKED BY

SAMPLE NO.	WET WT. +TARE (g)	DRY WT. +TARE (g)	WT. OF WATER (g)	TARE WT. (g)	WT. OF DRY SOIL (g)	% WATER	DIAM. SAMPLE (mm)	LENGTH SAMPLE (mm)	VOLUME (cm^3)	WET WT. + TARE (g)	TARE WT. (g)	WT. OF WET SOIL (g)	WET DENS (g/cm^3)	DRY DENS (g/cm^3)
CB-17-1	165.5	144.7	20.8	62.2	82.5	**25.2**	48.0	102.6	185.6			363.4	**1.96**	**1.56**
EB-9-1	156.4	130.5	25.9	64.7	65.8	**39.4**	49.0	99.0	186.7			334.3	**1.79**	**1.29**
EB-12-2	150.4	141.3	9.1	62.2	79.1	**11.5**	45.7	56.8	93.2			203.2	**2.18**	**1.96**

* Received fractured
** Disintegrated while preparing for testing
*** Received dessicated - results may not represent true soil conditions

DIVISION OF
ENGINEERING SERVICES
OFFICE OF GEOTECHNICAL SUPPORT
GEOTECHNICAL LABORATORY
5900 Folsom Boulevard
Sacramento, CA 95819

Date: 8/19/2004

To: Zia Yazdani / GDS-2

From: Lilibeth C. Purta / (916) 227-5239

RE: Laboratory Test Report -- EA: 11-091821

Permeability test results.

AASHTO R18

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
OFFICE OF GEOTECHNICAL SUPPORT
GEOTECHNICAL LABORATORY

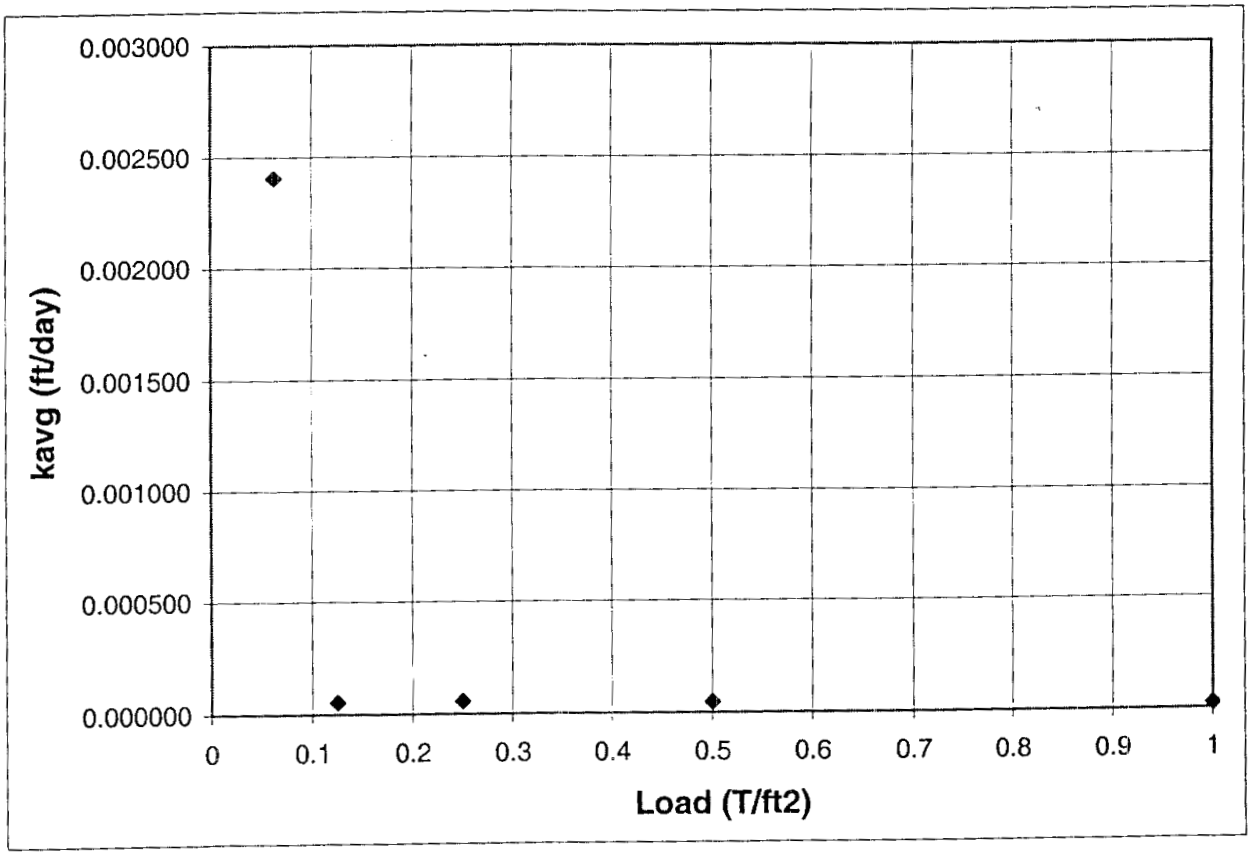
Falling Head Permeability

Job # 11-091821 **Date** 8/9/2004

Sample # BB-13-1 **Tested By** LP
Calc By LP
Checked By 10/8/19

Wet Unit Weight = 133.61 pcf
Dry Unit Weight = 113.85 pcf

Load (T/ft2)	kavg (ft/day)
1/16	0.002405
1/8	0.000053
1/4	0.000057
1/2	0.000045
1	0.000023



Sample Description:
Moist, gray-black, hard clay with silt and tiny pieces of gravel.

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
OFFICE OF GEOTECHNICAL SUPPORT
GEOTECHNICAL LABORATORY

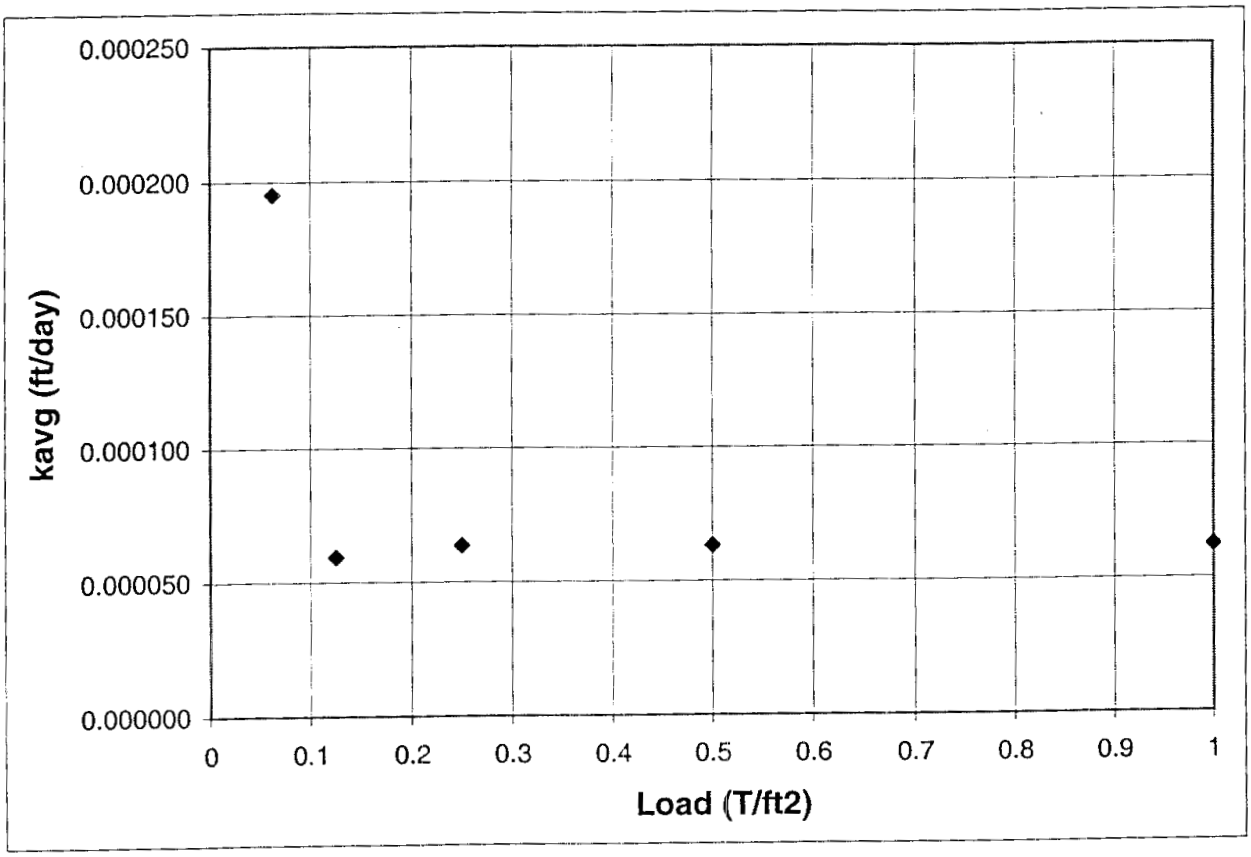
Falling Head Permeability

Job # 11-091821 **Date** 8/9/2004

Sample # EB-3-1 **Tested By** LP
Calc By LP
Checked By [illegible]

Wet Unit Weight = 125.53 pcf
Dry Unit Weight = 107.69 pcf

Load (T/ft2)	kavg (ft/day)
1/16	0.000195
1/8	0.000059
1/4	0.000063
1/2	0.000063
1	0.000062



Sample Description:
Moist, brown, hard, silty clay with tiny pieces of gravel. Loose in tube. Patched.

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
OFFICE OF GEOTECHNICAL SUPPORT
GEOTECHNICAL LABORATORY

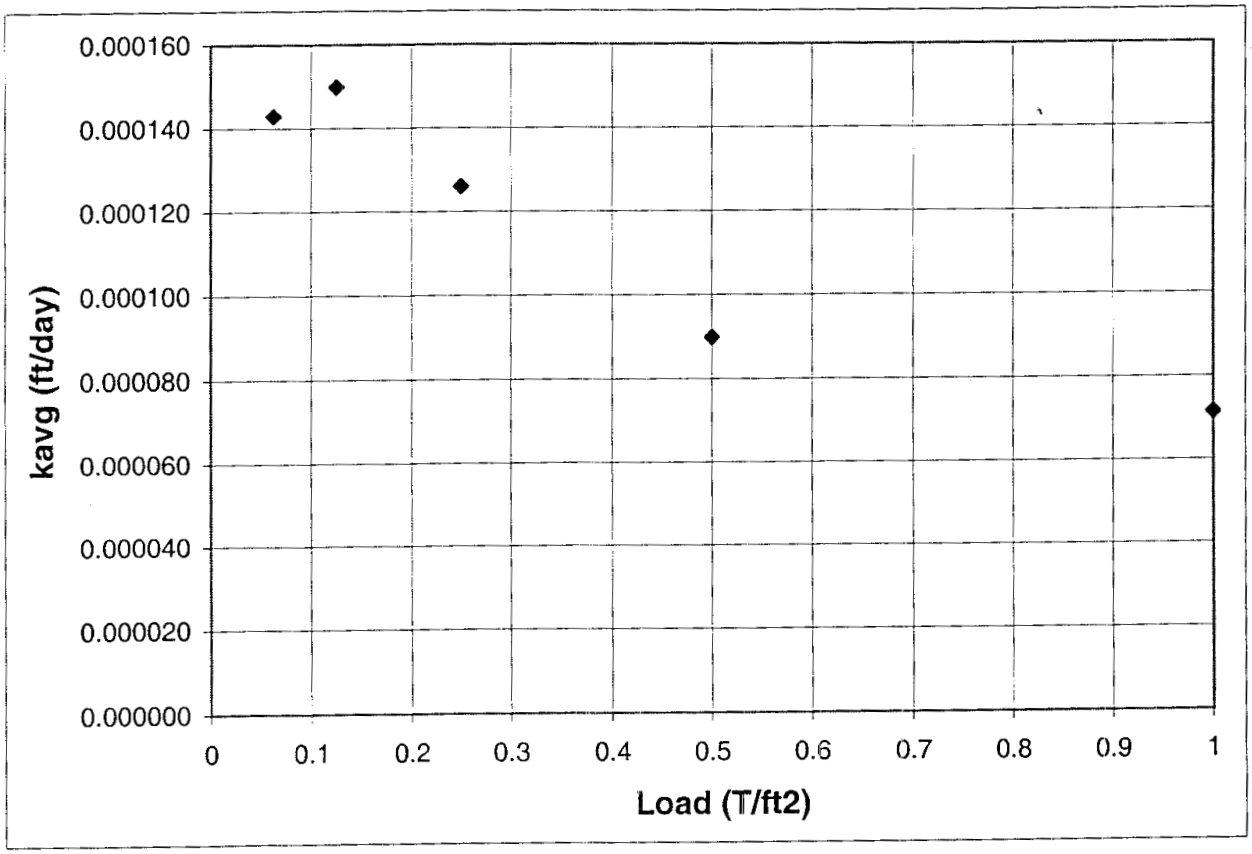
Falling Head Permeability

Job # 11-091821 **Date** 8/9/2004

Sample # EB-3-2 **Tested By** LP
Calc By LP
Checked By 10/8/04

Wet Unit Weight = 120.01 pcf
Dry Unit Weight = 100.63 pcf

Load (T/ft2)	kavg (ft/day)
1/16	0.000143
1/8	0.000150
1/4	0.000126
1/2	0.000090
1	0.000071



Sample Description:
Moist, brown, hard, silty clay. Loose in tube. Patched.

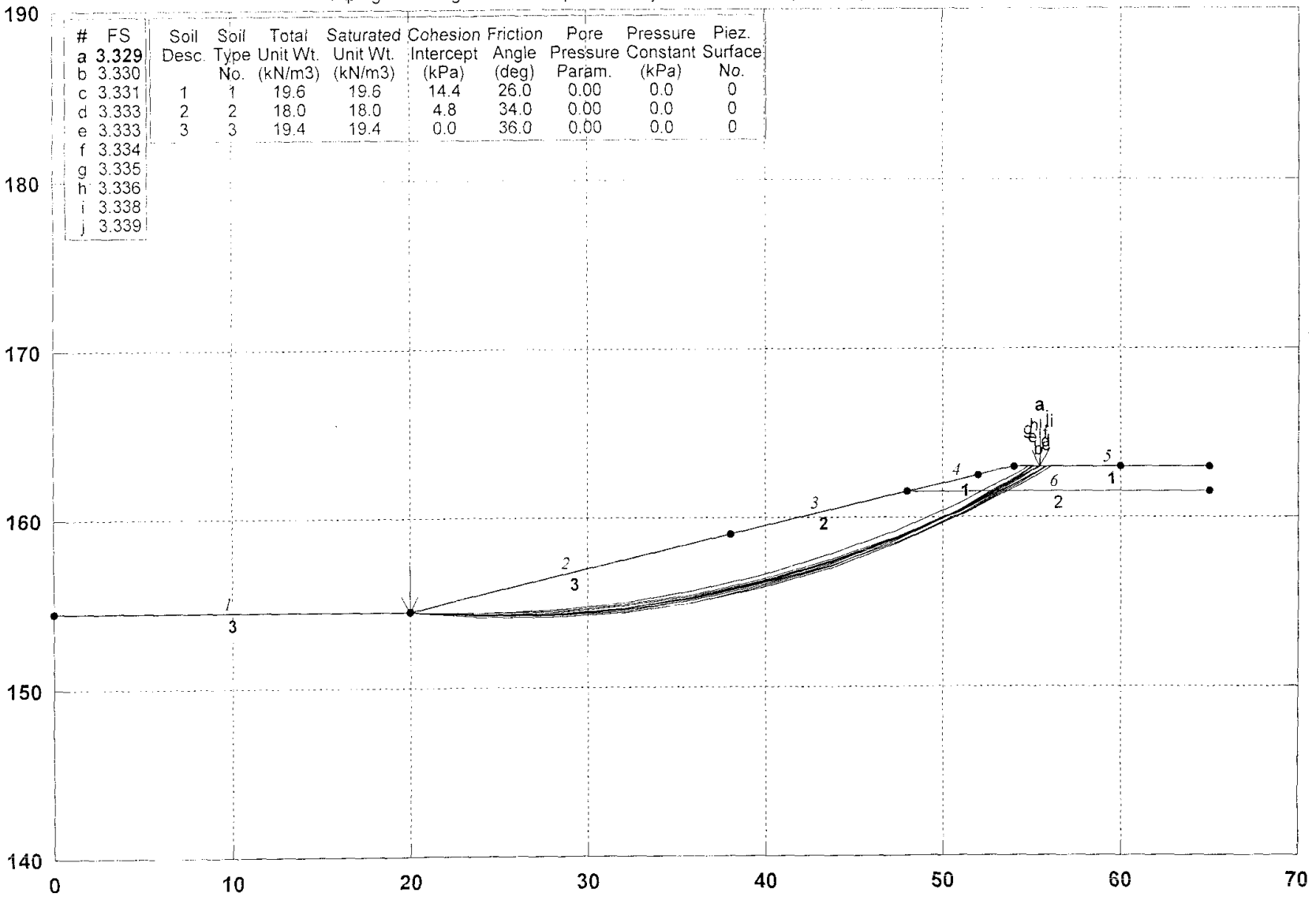
ANALYSES

SR 905 Proposed Road Improvement Proposed 8.5m Cut @ Sta. 129+00

c:\program files\g72sw\sr905a.pl2 Run By: Moussa Jandal (Caltrans) 10/5/04 10:15AM

#	FS
a	3.329
b	3.330
c	3.331
d	3.333
e	3.333
f	3.334
g	3.335
h	3.336
i	3.338
j	3.339

Soil Desc.	Soil Type No.	Total Unit Wt. (kN/m3)	Saturated Unit Wt. (kN/m3)	Cohesion Intercept (kPa)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (kPa)	Piez. Surface No.
1	1	19.6	19.6	14.4	26.0	0.00	0.0	0
2	2	18.0	18.0	4.8	34.0	0.00	0.0	0
3	3	19.4	19.4	0.0	36.0	0.00	0.0	0



GSTABL7 v.2 FSmin=3.329

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

***** GSTABL7 *****

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **

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****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 10/5/04
Time of Run: 10:15AM
Run By: Moussa Jandal (Caltrans)
Input Data Filename: C:\Program Files\G72SW\sr905a.
Output Filename: C:\Program Files\G72SW\sr905a.OUT
Unit System: SI
Plotted Output Filename: C:\Program Files\G72SW\sr905a.PLT
PROBLEM DESCRIPTION: SR 905 Proposed Road Improvement
Proposed 8.5m Cut @ Sta. 129+00

BOUNDARY COORDINATES
5 Top Boundaries
6 Total Boundaries

Boundary No.	X-Left (m)	Y-Left (m)	X-Right (m)	Y-Right (m)	Soil Type Below Bnd
1	0.00	154.50	20.00	154.50	3
2	20.00	154.50	38.00	159.00	3
3	38.00	159.00	48.00	161.50	2
4	48.00	161.50	54.00	163.00	1
5	54.00	163.00	65.00	163.00	1
6	48.00	161.50	65.00	161.50	2

User Specified Y-Origin = 140.00(m)
Default X-Plus Value = 0.00(m)
Default Y-Plus Value = 0.00(m)

ISOTROPIC SOIL PARAMETERS
3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (kN/m3)	Saturated Unit Wt. (kN/m3)	Cohesion Intercept (kPa)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (kPa)	Piez. Surface No.
1	19.6	19.6	14.4	26.0	0.00	0.0	0
2	18.0	18.0	4.8	34.0	0.00	0.0	0
3	19.4	19.4	0.0	36.0	0.00	0.0	0

A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
300 Trial Surfaces Have Been Generated.
300 Surface(s) Initiate(s) From Each Of 1 Points Equally Spaced
Along The Ground Surface Between X = 20.00(m)
and X = 45.00(m)
Each Surface Terminates Between X = 52.00(m)
and X = 60.00(m)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(m)
4.00(m) Line Segments Define Each Trial Failure Surface.
Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -10.0
And 60.0 deg.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 300
Number of Trial Surfaces With Valid FS = 300
Statistical Data On All Valid FS Values:
FS Max = 18.808 FS Min = 3.329 FS Ave = 3.781
Standard Deviation = 1.523 Coefficient of Variation = 40.28 %
Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	20.000	154.500
2	23.994	154.273
3	27.993	154.327
4	31.979	154.662
5	35.932	155.277
6	39.831	156.169
7	43.658	157.332
8	47.394	158.762
9	51.020	160.450
10	54.518	162.390
11	55.456	163.000

Circle Center At X = 25.223 ; Y = 211.101 ; and Radius = 56.841

Factor of Safety

*** 3.329 ***

Individual data on the 14 slices

Slice No.	Width (m)	Weight (kN)	Water Force Top (kN)	Water Force Bot (kN)	Tie Force Norm (kN)	Tie Force Tan (kN)	Earthquake Force Hor (kN)	Earthquake Force Ver (kN)	Surcharge Load (kN)
1	4.0	47.5	0.0	0.0	0.	0.	0.0	0.0	0.0
2	4.0	131.8	0.0	0.0	0.	0.	0.0	0.0	0.0
3	4.0	193.5	0.0	0.0	0.	0.	0.0	0.0	0.0
4	4.0	231.5	0.0	0.0	0.	0.	0.0	0.0	0.0
5	2.1	129.5	0.0	0.0	0.	0.	0.0	0.0	0.0
6	1.8	107.8	0.0	0.0	0.	0.	0.0	0.0	0.0
7	3.8	219.5	0.0	0.0	0.	0.	0.0	0.0	0.0
8	3.7	190.6	0.0	0.0	0.	0.	0.0	0.0	0.0
9	0.6	27.5	0.0	0.0	0.	0.	0.0	0.0	0.0
10	3.0	117.6	0.0	0.0	0.	0.	0.0	0.0	0.0
11	1.9	54.7	0.0	0.0	0.	0.	0.0	0.0	0.0
12	1.1	22.6	0.0	0.0	0.	0.	0.0	0.0	0.0
13	0.5	7.7	0.0	0.0	0.	0.	0.0	0.0	0.0
14	0.9	5.6	0.0	0.0	0.	0.	0.0	0.0	0.0

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	20.000	154.500
2	23.992	154.244
3	27.992	154.276
4	31.979	154.597
5	35.932	155.204
6	39.832	156.096
7	43.657	157.266
8	47.387	158.709
9	51.004	160.418
10	54.488	162.383
11	55.419	163.000

Circle Center At X = 25.545 ; Y = 209.629 ; and Radius = 55.407

Factor of Safety

*** 3.330 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	20.000	154.500
2	23.996	154.328
3	27.995	154.419
4	31.979	154.773
5	35.932	155.390
6	39.835	156.266
7	43.671	157.396
8	47.425	158.778
9	51.080	160.404
10	54.620	162.267
11	55.815	163.000

Circle Center At X = 24.612 ; Y = 214.982 ; and Radius = 60.658

Factor of Safety
*** 3.331 ***
Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	20.000	154.500
2	23.998	154.359
3	27.996	154.475
4	31.979	154.845
5	35.930	155.470
6	39.832	156.346
7	43.671	157.470
8	47.430	158.837
9	51.094	160.442
10	54.648	162.277
11	55.852	163.000

Circle Center At X = 24.196 ; Y = 216.873 ; and Radius = 62.514

Factor of Safety
*** 3.333 ***
Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	20.000	154.500
2	23.988	154.194
3	27.988	154.193
4	31.977	154.498
5	35.930	155.107
6	39.825	156.016
7	43.640	157.221
8	47.351	158.713
9	50.937	160.484
10	54.378	162.525
11	55.055	163.000

Circle Center At X = 25.997 ; Y = 206.460 ; and Radius = 52.305

Factor of Safety
*** 3.333 ***
Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	20.000	154.500
2	23.990	154.221
3	27.990	154.229
4	31.979	154.526
5	35.937	155.108
6	39.842	155.974
7	43.674	157.119
8	47.415	158.537
9	51.044	160.220
10	54.542	162.159
11	55.830	163.000

Circle Center At X = 25.871 ; Y = 209.740 ; and Radius = 55.551

Factor of Safety
*** 3.334 ***
Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	20.000	154.500
2	23.999	154.399
3	27.996	154.559
4	31.973	154.979
5	35.916	155.656
6	39.806	156.588
7	43.627	157.771
8	47.363	159.201
9	50.998	160.870
10	54.516	162.772
11	54.879	163.000

Circle Center At X = 23.544 ; Y = 215.861 ; and Radius = 61.463

Factor of Safety

*** 3.335 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	20.000	154.500
2	23.985	154.152
3	27.985	154.117
4	31.975	154.397
5	35.931	154.988
6	39.828	155.889
7	43.643	157.093
8	47.351	158.592
9	50.930	160.378
10	54.358	162.439
11	55.145	163.000

Circle Center At X = 26.424 ; Y = 205.017 ; and Radius = 50.924

Factor of Safety

*** 3.336 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	20.000	154.500
2	23.994	154.272
3	27.993	154.316
4	31.981	154.631
5	35.938	155.215
6	39.846	156.067
7	43.688	157.181
8	47.445	158.553
9	51.101	160.177
10	54.638	162.045
11	56.182	163.000

Circle Center At X = 25.350 ; Y = 213.218 ; and Radius = 58.961

Factor of Safety

*** 3.338 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	20.000	154.500
2	23.987	154.177
3	27.987	154.151
4	31.978	154.421
5	35.938	154.986
6	39.845	155.843
7	43.678	156.987
8	47.415	158.412
9	51.037	160.110
10	54.523	162.072
11	55.919	163.000

Circle Center At X = 26.344 ; Y = 208.066 ; and Radius = 53.940

Factor of Safety

*** 3.339 ***

**** END OF GSTABL7 OUTPUT ****

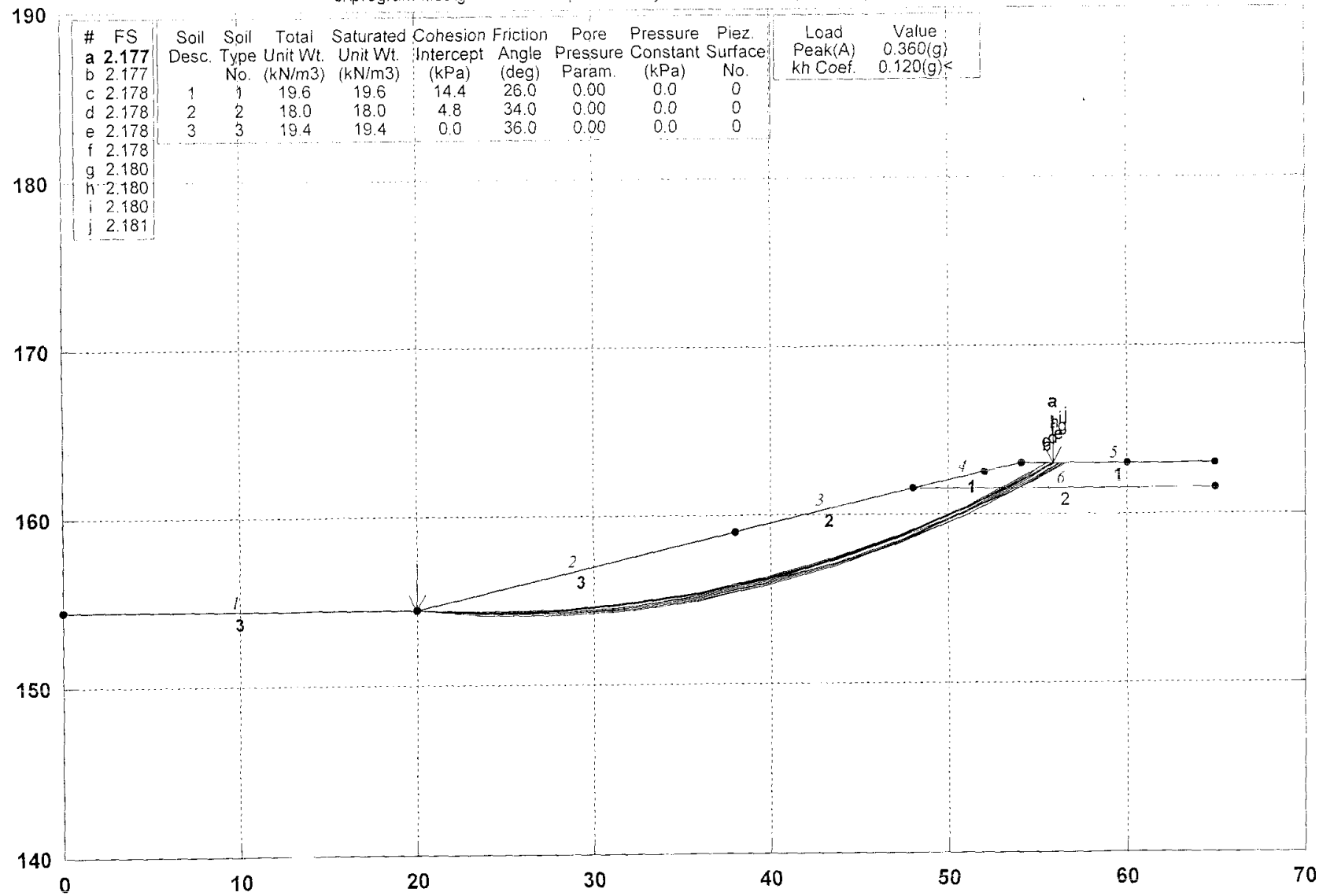
SR 905 Proposed Road Improvement Proposed 8.5m Cut @ Sta. 129+00

c:\program files\g72sw\sr905e.pl2 Run By: Moussa Jandal (Caltrans) 10/5/04 10:13AM

#	FS
a	2.177
b	2.177
c	2.178
d	2.178
e	2.178
f	2.178
g	2.180
h	2.180
i	2.180
j	2.181

Soil Desc.	Soil Type No.	Total Unit Wt. (kN/m3)	Saturated Unit Wt. (kN/m3)	Cohesion Intercept (kPa)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (kPa)	Piez. Surface No.
1	1	19.6	19.6	14.4	26.0	0.00	0.0	0
2	2	18.0	18.0	4.8	34.0	0.00	0.0	0
3	3	19.4	19.4	0.0	36.0	0.00	0.0	0

Load	Value
Peak(A)	0.360(g)
kh Coef.	0.120(g)<



GSTABL7 v.2 FSmin=2.177

Safety Factors Are Calculated By The Modified Bishop Method

GSTABL7

*** GSTABL7 ***

** GSTABL7 by Garry H. Gregory, P.E. **

** Original Version 1.0, January 1996; Current Version 2.004, June 2003 **

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****

SLOPE STABILITY ANALYSIS SYSTEM

Modified Bishop, Simplified Janbu, or GLE Method of Slices.
(Includes Spencer & Morgenstern-Price Type Analysis)
Including Pier/Pile, Reinforcement, Soil Nail, Tieback,
Nonlinear Undrained Shear Strength, Curved Phi Envelope,
Anisotropic Soil, Fiber-Reinforced Soil, Boundary Loads, Water
Surfaces, Pseudo-Static & Newmark Earthquake, and Applied Forces.

****

Analysis Run Date: 10/5/04
Time of Run: 10:13AM
Run By: Moussa Jandal (Caltrans)
Input Data Filename: C:\Program Files\G72SW\SR905E.
Output Filename: C:\Program Files\G72SW\SR905E.OUT
Unit System: SI
Plotted Output Filename: C:\Program Files\G72SW\SR905E.PLT
PROBLEM DESCRIPTION: SR 905 Proposed Road Improvement
Proposed 8.5m Cut @ Sta. 129+00

BOUNDARY COORDINATES
5 Top Boundaries
6 Total Boundaries

Boundary	X-Left	Y-Left	X-Right	Y-Right	Soil Type

No.	(m)	(m)	(m)	(m)	Below Bnd
1	0.00	154.50	20.00	154.50	3
2	20.00	154.50	38.00	159.00	3
3	38.00	159.00	48.00	161.50	2
4	48.00	161.50	54.00	163.00	1
5	54.00	163.00	65.00	163.00	1
6	48.00	161.50	65.00	161.50	2

User Specified Y-Origin = 140.00(m)
Default X-Plus Value = 0.00(m)
Default Y-Plus Value = 0.00(m)
ISOTROPIC SOIL PARAMETERS
3 Type(s) of Soil

Soil Type No.	Total Unit Wt. (kN/m3)	Saturated Unit Wt. (kN/m3)	Cohesion Intercept (kPa)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (kPa)	Piez. Surface No.
1	19.6	19.6	14.4	26.0	0.00	0.0	0
2	18.0	18.0	4.8	34.0	0.00	0.0	0
3	19.4	19.4	0.0	36.0	0.00	0.0	0

Specified Peak Ground Acceleration Coefficient (A) = 0.360(g)
Specified Horizontal Earthquake Coefficient (kh) = 0.120(g)
Specified Vertical Earthquake Coefficient (kv) = 0.000(g)
Specified Seismic Pore-Pressure Factor = 0.000
A Critical Failure Surface Searching Method, Using A Random
Technique For Generating Circular Surfaces, Has Been Specified.
300 Trial Surfaces Have Been Generated.
300 Surface(s) Initiate(s) From Each Of 1 Points Equally Spaced
Along The Ground Surface Between X = 20.00(m)
and X = 45.00(m)
Each Surface Terminates Between X = 52.00(m)
and X = 60.00(m)
Unless Further Limitations Were Imposed, The Minimum Elevation
At Which A Surface Extends Is Y = 0.00(m)
4.00(m) Line Segments Define Each Trial Failure Surface.
Restrictions Have Been Imposed Upon The Angle Of Initiation.
The Angle Has Been Restricted Between The Angles Of -10.0
And 60.0 deg.
Following Are Displayed The Ten Most Critical Of The Trial
Failure Surfaces Evaluated. They Are
Ordered - Most Critical First.
* * Safety Factors Are Calculated By The Modified Bishop Method * *
Total Number of Trial Surfaces Attempted = 300
Number of Trial Surfaces With Valid FS = 300
Statistical Data On All Valid FS Values:
FS Max = 12.649 FS Min = 2.177 FS Ave = 2.457
Standard Deviation = 1.032 Coefficient of Variation = 42.01 %
Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	20.000	154.500
2	23.996	154.328
3	27.995	154.419
4	31.979	154.773
5	35.932	155.390
6	39.835	156.266
7	43.671	157.396
8	47.425	158.778
9	51.080	160.404
10	54.620	162.267
11	55.815	163.000

Circle Center At X = 24.612 ; Y = 214.982 ; and Radius = 60.658
Factor of Safety
*** 2.177 ***
Individual data on the 14 slices

Slice No.	Width (m)	Weight (kN)	Water Force Top (kN)	Water Force Bot (kN)	Tie Force Norm (kN)	Tie Force Tan (kN)	Earthquake Force Hor (kN)	Earthquake Force Ver (kN)	Surcharge Load (kN)

1	4.0	45.4	0.0	0.0	0.	0.	5.4	0.0	0.0
2	4.0	126.1	0.0	0.0	0.	0.	15.1	0.0	0.0
3	4.0	185.6	0.0	0.0	0.	0.	22.3	0.0	0.0
4	4.0	222.9	0.0	0.0	0.	0.	26.7	0.0	0.0
5	2.1	125.2	0.0	0.0	0.	0.	15.0	0.0	0.0
6	1.8	104.7	0.0	0.0	0.	0.	12.6	0.0	0.0
7	3.8	214.6	0.0	0.0	0.	0.	25.8	0.0	0.0
8	3.8	189.2	0.0	0.0	0.	0.	22.7	0.0	0.0
9	0.6	26.1	0.0	0.0	0.	0.	3.1	0.0	0.0
10	3.1	122.0	0.0	0.0	0.	0.	14.6	0.0	0.0
11	2.1	62.6	0.0	0.0	0.	0.	7.5	0.0	0.0
12	0.8	19.3	0.0	0.0	0.	0.	2.3	0.0	0.0
13	0.6	10.9	0.0	0.0	0.	0.	1.3	0.0	0.0
14	1.2	8.6	0.0	0.0	0.	0.	1.0	0.0	0.0

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	20.000	154.500
2	23.994	154.273
3	27.993	154.327
4	31.979	154.662
5	35.932	155.277
6	39.831	156.169
7	43.658	157.332
8	47.394	158.762
9	51.020	160.450
10	54.518	162.390
11	55.456	163.000

Circle Center At X = 25.223 ; Y = 211.101 ; and Radius = 56.841

Factor of Safety

*** 2.177 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	20.000	154.500
2	23.992	154.244
3	27.992	154.276
4	31.979	154.597
5	35.932	155.204
6	39.832	156.096
7	43.657	157.266
8	47.387	158.709
9	51.004	160.418
10	54.488	162.383
11	55.419	163.000

Circle Center At X = 25.545 ; Y = 209.629 ; and Radius = 55.407

Factor of Safety

*** 2.178 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	20.000	154.500
2	23.998	154.359
3	27.996	154.475
4	31.979	154.845
5	35.930	155.470
6	39.832	156.346
7	43.671	157.470
8	47.430	158.837
9	51.094	160.442
10	54.648	162.277
11	55.852	163.000

Circle Center At X = 24.196 ; Y = 216.873 ; and Radius = 62.514

Factor of Safety

*** 2.178 ***

Failure Surface Specified By 11 Coordinate Points

Point	X-Surf	Y-Surf

No.	(m)	(m)
1	20.000	154.500
2	23.994	154.272
3	27.993	154.316
4	31.981	154.631
5	35.938	155.215
6	39.846	156.067
7	43.688	157.181
8	47.445	158.553
9	51.101	160.177
10	54.638	162.045
11	56.182	163.000

Circle Center At X = 25.350 ; Y = 213.218 ; and Radius = 58.961

Factor of Safety

*** 2.178 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	20.000	154.500
2	23.990	154.221
3	27.990	154.229
4	31.979	154.526
5	35.937	155.108
6	39.842	155.974
7	43.674	157.119
8	47.415	158.537
9	51.044	160.220
10	54.542	162.159
11	55.830	163.000

Circle Center At X = 25.871 ; Y = 209.740 ; and Radius = 55.551

Factor of Safety

*** 2.178 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	20.000	154.500
2	23.991	154.237
3	27.991	154.251
4	31.981	154.540
5	35.941	155.103
6	39.853	155.938
7	43.698	157.041
8	47.458	158.407
9	51.114	160.028
10	54.650	161.898
11	56.426	163.000

Circle Center At X = 25.800 ; Y = 212.180 ; and Radius = 57.971

Factor of Safety

*** 2.180 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	20.000	154.500
2	23.987	154.177
3	27.987	154.151
4	31.978	154.421
5	35.938	154.986
6	39.845	155.843
7	43.678	156.987
8	47.415	158.412
9	51.037	160.110
10	54.523	162.072
11	55.919	163.000

Circle Center At X = 26.344 ; Y = 208.066 ; and Radius = 53.940

Factor of Safety

*** 2.180 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	20.000	154.500
2	23.989	154.198
3	27.989	154.134
4	31.979	154.457
5	35.940	155.015
6	39.851	155.857
7	43.691	156.977
8	47.440	158.369
9	51.080	160.028
10	54.592	161.943
11	56.236	163.000

Circle Center At X = 26.189 ; Y = 209.839 ; and Radius = 55.684

Factor of Safety

*** 2.180 ***

Failure Surface Specified By 11 Coordinate Points

Point No.	X-Surf (m)	Y-Surf (m)
1	20.000	154.500
2	23.998	154.359
3	27.996	154.465
4	31.981	154.817
5	35.936	155.414
6	39.847	156.254
7	43.698	157.333
8	47.476	158.648
9	51.165	160.194
10	54.752	161.964
11	56.561	163.000

Circle Center At X = 24.285 ; Y = 219.184 ; and Radius = 64.825

Factor of Safety

*** 2.181 ***

**** END OF GSTABL7 OUTPUT ****

Settlement Computation of Clay Layer

Project:	11-SD-905 (from SR 125 to the Border)	EA 091821
EB-9	Section E4 from Sta. 178+50 to Sta. 182+55	KP 9.2/18.0

Embankment	Heigth of fill (m):	8.50	Unit Weight of fill (KN/m^3):	19.62
	Calculated stress of the Fill (kPa) =	166.8		

Clay Layer	Heigth of Clay (m):	3.0	e_o =	0.54	
			c_r =	0.034	Over Consolidated Clay

Depth of Ground water (m):	8.5

Settlement Computations

1	2	3	4	5	6	7	8	9	10	11
Depth Below Ground Surface	Average Depth Below Ground Surface	Effective Unit Weight	σ'_{vo}	$\Delta\sigma$	$\frac{\sigma'_{vo}+\Delta\sigma}{\sigma'_{vo}}$	Log of Column (6)	C_r	$\frac{C_r}{1+e_o}$	Thickness of Depth Increment	Settlement
m	m	kN/m^3	kPa	kPa					m	m
8.5	8.75	9.8	2.5	166.8	69.00	1.839	0.034	0.02	0.5	0.020
9	9.25	9.8	7.4	166.8	23.67	1.374	0.034	0.02	0.5	0.015
9.5	9.75	9.8	12.3	166.8	14.60	1.164	0.034	0.02	0.5	0.013
10	10.25	9.8	17.2	166.8	10.71	1.030	0.034	0.02	0.5	0.011
10.5	10.75	9.8	22.1	58.9	3.67	0.564	0.034	0.02	0.5	0.006
11	11.25	9.8	27.0	166.8	7.18	0.856	0.034	0.02	0.5	0.009
11.5	11.75	9.8	31.9	166.8	6.23	0.795	0.034	0.02	0.5	0.009
12	12.25	9.8	36.8	166.8	5.53	0.743	0.034	0.02	0.5	0.008
12.5	12.75	9.8	41.7	166.8	5.00	0.699	0.034	0.03	0.5	0.011
13										0.000
									$S_c=\Sigma\Delta H$	0.104

Settlement Computation of Clay Layer

Project:	11-SD-905 (from SR 125 to the Border)	EA 091821
CB-19	Section E5 from Sta. 153+00 to Sta. 195+20	KP 9.2/18.0

Embankment	Heigth of fill (m):	3.00	Unit Weight of fill (KN/m^3):	19.62
	Calculated stress of the Fill (kPa) =	58.9		

Clay Layer	Heigth of Clay (m):	3.0	e_o =	0.54	
			c_r =	0.034	Over Consolidated Clay

Depth of Ground water (m): 3

Settlement Computations

1	2	3	4	5	6	7	8	9	10	11
Depth Below Ground Surface	Average Depth Below Ground Surface	Effective Unit Weight	σ'_{vo}	$\Delta\sigma$	$\frac{\sigma'_{vo}+\Delta\sigma}{\sigma'_{vo}}$	Log of Column (6)	C_r	$\frac{C_r}{1+e_o}$	Thickness of Depth Increment	Settlement
m	m	kN/m^3	kPa	kPa					m	m
3	3.25	9.8	2.5	58.9	25.00	1.398	0.034	0.02	0.5	0.015
3.5	3.75	9.8	7.4	58.9	9.00	0.954	0.034	0.02	0.5	0.011
4	4.25	9.8	12.3	58.9	5.80	0.763	0.034	0.02	0.5	0.008
4.5	4.75	9.8	17.2	58.9	4.43	0.646	0.034	0.02	0.5	0.007
5	5.25	9.8	22.1	58.9	3.67	0.564	0.034	0.02	0.5	0.006
5.5	5.75	9.8	27.0	58.9	3.18	0.503	0.034	0.02	0.5	0.006
6	6.25	9.8	31.9	58.9	2.85	0.454	0.034	0.02	0.5	0.005
6.5	6.75	9.8	36.8	58.9	2.60	0.415	0.034	0.02	0.5	0.005
7										0.000
										0.000
									$S_c=\Sigma\Delta H$	0.063

State of California

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: MR. MAJID MADANI
Structures Design
Office of Bridge Design-South
Bridge Design Branch 14
MS #9-4/11G

Attention: Mr. Ron Bromenschenkel

Date: March 2, 2004

File: 11-SD-905-KP 3.51
11-091821
Del Sol Blvd. UC (Widen)
Br. #57-0854R

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF ENGINEERING SERVICES
GEOTECHNICAL SERVICES
OFFICE OF GEOTECHNICAL DESIGN – SOUTH II
DESIGN BRANCH B, MS #5

Subject: Foundation Recommendations

This report presents the foundation recommendations for the proposed widening of Del Sol Blvd. Undercrossing (UC) Right Bridge (Br. No. 57-0854R). The following foundation recommendations are based on subsurface information gathered during the recent foundation investigation (December 2003) performed by Caltrans, along with a review of original foundation report dated 1970, "As-Built" plans and "As-Built" Log of Test Borings (LOTB) dated 1975. The foundation investigation performed in December 2003 consisted of drilling one mud rotary exploratory boring. The boring location and data are shown on the LOTB sheets. With regards to the current foundation recommendations, all elevations referenced within this report and shown on the recent LOTB sheets are based on the NAVD 1988 vertical datum.

Project Description

The Del Sol Blvd. UC site is located on Route 805 Freeway in the southern portion of the City of San Diego where Del Sol Blvd. passes under the Route 805 Freeway. The proposed widening is part of the proposed Route 905 Freeway project which is being built to connect the Otay Mesa international border crossing with the north/south trending Route 805 Freeway to the west. The proposed structure widening is to consist of a 3.9 m widening to the right side of the existing Del Sol Blvd. UC Right Bridge (Br. No. 57-0854R). The proposed widening consists of a single-span, cast-in-place, pre-stressed, box girder structure, on end diaphragm abutments.

History of Existing Structure

Del Sol Blvd. UC (Br. NO. 57-0854R/L) was constructed in 1975 and consists of two single-span structures with end diaphragm abutments supported on spread footings. The spread footings were constructed on original ground at the approximate elevation of 75.9 m (249 ft) and were designed using a gross allowable bearing capacity of 288 kPa (6 ksf).

Site Geology

The recent foundation investigation performed for the proposed widening consisted of one mud rotary boring extending down to a maximum depth of 30.5 m (100.0 ft) located approximately at the proposed Abutment 2 location. The foundation investigation revealed that the earth materials encountered can be generally separated into two units. The upper unit is a thin layer of fill consisting of stiff, fine to medium grained sandy clay with scattered fine gravel. The fill soils are underlain by sedimentary (formational) rock that consists of typically soft to moderately soft claystone, sandstone and siltstone with moderately to non-cemented zones to an approximate depth of 19.5 m (elevation 60.7 m). Below this point the sedimentary rock is typically soft to very soft, poorly indurated, weakly to non-cemented, and friable.

Groundwater

Groundwater was not encountered during the recent 2003 field investigation to the maximum explored depth of 30.5 m (elev. 49.7 m) in Boring B-1-03. During the 1970 field investigation, groundwater was not encountered in three of the mud rotary exploratory borings (approximate minimum elevation 61.0 m). Groundwater elevations are subject to seasonal fluctuations and will be encountered at higher or lower elevations depending on conditions at time of construction.

Scour Potential

There is no scour potential at the site, since the bridge does not span any watercourse.

Corrosion

Corrosion test results for some soil samples collected from Boring B-1-03 are shown below in Table 1. Based on current Caltrans standards, the site is considered corrosive. Corrosion mitigation in accordance with Article 8.22 of Bridge Design Specifications is required. For specific test results, please refer to Table 1 below.

Table 1 – Corrosion Test Summary

Sample No.	SIC Number	Sample Depth (m)	Minimum Resistivity (Ohm-Cm)	pH	Chloride Content (ppm)	Sulfate Content (ppm)
1	C638643 A	0-1.7	235	7.75	785	1357
2	C638643 B	6.6-7.6	215	8.09	1408	330
3	C638643 C	13.7-15.2	455	7.67	534	187
4	C638643 D	20.3-21.3	900	8.12	257	127
5	C638643 E	24.7-24.8	790	4.76	254	123

Note: Caltrans currently defines a site to be corrosive to foundation elements if one or more of the following conditions exist for the representative soil and/or water samples taken at the site: Chloride concentration is more than 500 ppm, sulfate concentration is greater than or equal to 2000 ppm, or the pH is 5.5 or less.

Fault and Seismic Data

The structure site may potentially be subject to strong ground motions from nearby earthquake sources during the design life of the new structure. The Office of Geotechnical Design-South II has provided Final Seismic Design Recommendations for the site in the memorandum dated January 6, 2004. The controlling fault for the site is the Newport-Inglewood-Rose Canyon/E Fault (NIE) with a maximum credible earthquake Mw=7.0 located approximately 3.6 kilometers from the site. The corresponding Peak Bedrock Acceleration is estimated to be 0.6g.

Liquefaction Potential

Final Seismic Design Recommendations, dated January 6, 2004, state that the potential for liquefaction at this site is considered negligible.

Foundation Recommendations

The following recommendations are for the widening of Del Sol Blvd. UC (Br. No. 57-0834R) as shown on the General Plan dated January 22, 2004. Spread footings are recommended for support of the proposed widening at Abutment 1 and 2 locations. The recommended bottom of footing elevations and gross allowable soil bearing pressures to be used for design are listed in Table 2 below.

Table 2: Spread Footing Data (Br. No. 57-0834R)

Support Location	Minimum Footing Width	Bottom of Footing Elevation	Recommended Soil Bearing Pressures	
			ASD [1]	LFD [2]
			Gross Allowable Soil Bearing Pressure (q_{all})	Ultimate Soil Bearing Pressure (q_{ult}*)
Abutment 1	2.44 m (8.0 ft.)	76.51 m (251.0 ft.)	288 kPa (6.0 ksf)	N/A
Abutment 2	2.44 m (8.0 ft.)	76.05 m (249.5 ft.)	288 kPa (6.0 ksf)	N/A

Notes: 1) Allowable Stress Design (ASD). The Maximum Contact Pressure, (q_{max}), is not to exceed the recommended Gross Allowable Soil Bearing Pressure, (q_{all}). The Ultimate Soil Bearing Capacity, (q_{ult}), will equal or exceed 3 times the recommended Gross Allowable Soil Bearing Pressure (q_{all}).
2) Load Factor Design, (LFD). The Maximum Contact Pressure, (q_{max}), divided by the Strength Reduction Factor, (ϕ), is not to exceed the recommended Ultimate Soil Bearing Pressure, (q_{ult}*). The Ultimate Soil Bearing Capacity, (q_{ult}), will equal or exceed the recommended Ultimate Soil Bearing Pressure, (q_{ult}*).

The recommended Soil Bearing Pressures provided in Table 2, above, are based on the following design criteria:

1) The abutment spread footings shall have minimum footing widths as listed in Table 2.

2) All spread footings are to be constructed at or below the elevations shown above in Table 2.

3) All abutment footings shall be positioned such that there will be a minimum horizontal distance of 1.52 m (5 ft) from the near face/top of the footing to the face of the finished slope for the end diaphragm abutments (Bridge Design Details 6-21). The finished slope in front of the footing is not to exceed a 1:1.5 (vertical to horizontal) ratio.

Should there be any reduction in the minimum footing width, horizontal setback distance or an increase in the bottom of footing elevation, the Office of Geotechnical Design-South II, Branch B, shall be contacted to reevaluate the gross allowable bearing capacity.

General Notes:

1) All support locations are to be plotted in plan view on the LOTB as stated in "Memo to Designers" 4-2. The plotting of support locations should be made prior to requesting a final foundation review.

Construction Considerations:

1. At the abutment support locations, the footing concrete shall be placed neat against undisturbed formational materials at the bottom of the footing excavation. Should the bottom of the footing excavation be disturbed, the bottom footing elevation shall be extended down by 0.15-meter intervals until undisturbed formational materials are observed and approved by the Engineer. The subexcavated material is to be replaced with Class 3 concrete. The native disturbed material is not to be recompacted.

2. At the abutment support locations, the footing excavations are to be inspected and approved by a representative of the Office of Geotechnical Design-South II, Branch B, after the excavation has been completed to the final grade and prior to placing any steel, forms, or concrete in the footing excavation. Once the subexcavations have been completed to the specified elevations, the contractor is to allow Office of Geotechnical Design-South II, Branch B, five (5) working days to perform the inspection. The structure representative is to provide the Office of Geotechnical Design-South II, Branch B a one-week notification prior to begin the five-day contractor waiting period.

3. To accommodate for differential settlement between the existing and new structure, a closure pour between the existing and new spread footings shall be incorporated into the design.

The recommendations contained in this report are based on specific project information regarding structure type, location, and design loads that have been provided by the Office of Bridge Design-South. If any conceptual changes are made during final project design, the Office of Geotechnical Design-South II, Design Branch B should review those changes to determine if these foundation recommendations are still applicable. Any questions regarding the above recommendations should be directed to the attention of David TM Liao, (916) 227-5756

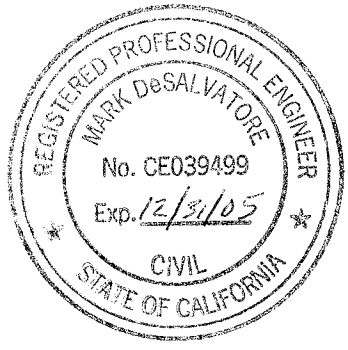
(CALNET 498-4565), or Mark DeSalvatore, (916) 227-5391 (CALNET 498-5391), at the Office of Geotechnical Design-South II, Branch B.

Prepared by: Date: 3/2/04

Supervised by: Date: 3/2/04

TM Liao, R.C.E.#59838
Transportation Engineer-Civil
Office of Geotechnical Design-South II
Design Branch B

Mark DeSalvatore, R.C.E., 039499
Senior Materials & Research Engineer
Office of Geotechnical Design-South II
Design Branch B



cc: R.E. Pending File
John Stayton - Specs & Estimates (4)
Dave Pajouhesh – PCE
Randy Sanchez – District 11 (Project Manager)
Chuck Davis – District 11 (Design Project Manager)
Abbas Abghari – OGDS-II
Project File-North
Project File-South

THE CITY OF SAN DIEGO

November 25, 2009

Chris M. Thomas
Caltrans, District 11
4050 Taylor Street
San Diego, CA 92110

Dear Mr. Thomas,

Subject: Caltrans Will Serve Letter – State Route 905, Caliente Avenue @ Airway Road, 11-SD-905, Construction Project SR-905 Phase 2

The project is located within the City of San Diego water service area. City water mains are located in the fronting City streets (Caliente Avenue). The water mains are complete and will provide adequate potable water service for normal use during construction.

Note: the City of San Diego is at this time at a 'Level 2 Drought Alert Condition'. San Diego's water customers are encouraged to use water efficiently and not to waste it or use it unreasonably.
The City of San Diego will be able to provide adequate potable water for this project. The service connection (Temporary Construction Meter) is to be installed by the City.

Water service connections are available. These connections are requested per required demand. All services are governed by City ordinances and regulations concerning connections, construction, capacity charges, permit fees and matters pertaining thereto.

If further information is required, please contact Rudy Benitez at (619) 533-5146.

Sincerely,

Paul J. Buehler, PE
Associate Civil Engineer

cc: Bobbi Salvini, Senior Civil Engineer, Public Utilities Department
Rudy Benitez, Assistant Civil Engineer, Public Utilities Department

State of California Business, Transportation and Housing Agency

Memorandum

To : Ricardo Padilla
Project Development

Date: August 10, 2010

File: 11-SD-905, 805
KP R8.4/R9.8 (905)
KP 3.1/4.2 (805)
EA 11-091831

From : **DEPARTMENT OF TRANSPORTATION - DISTRICT 11**
PAVEMENT ENGINEERING SECTION

Subject: **STRUCTURAL SECTION RECOMMENDATIONS**

The following structural section recommendations for provided for the 805/905 Interchange.

The following structural section recommendations are in accordance with the Highway Design Manual, Section 600. The basement soil R-value of 5 has been obtained from other projects constructed in the vicinity of this project.

Since the designer has chosen an AC shoulder, the PCC pavement is designed with a no lateral support condition.

Main Lane

275 mm JPCP
155 mm HMA-A
215 mm AB – Class 2

Shoulder

125 mm AC (Type A)
260 mm AB – Class 2
230 mm AS – Class 4

Ramp Traveled Way

480 mm HMA-A

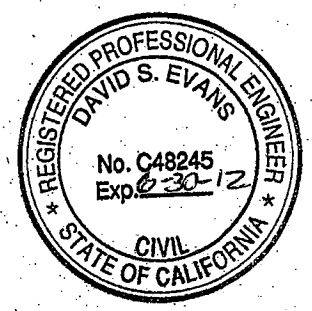
Design Notes

1. The recommended aggregate grading for HMA (Type A) is dense graded, 19 mm maximum, coarse.

2. JPCP is Jointed Plane Concrete Pavement as described in HDM Section 600.

If you have questions with regards to this memorandum, please contact me at 858-467-4056 or FAX at 858-467-4063.

David Evans
District Pavement Engineer
District 11 Materials Lab



cc: A Padilla (DME)
M Peinado (MS 330)
905_805.091831.ss.doc

----- Forwarded by Thuong Ton/D11/Caltrans/CAGov on 03/11/2009 10:31 AM -----

John Scandore/D11/Caltrans/CAGov

03/11/2009 09:45 AM

To: Thuong Ton/D11/Caltrans/CAGov@DOT

cc:

Subject: Re: Fw: 805/905 project, EA 091834, alternative pipes recommendation request

Thuong,

Please use the MIB from 288801, which should be the same project you are referring to. I have clipped out the culvert rec's for your convenience.

RECOMMENDED CULVERT ALTERNATIVES

1. Reinforced Concrete Pipe (RCP) may be used utilizing 6 sack Cement (Type II Modified or Type 5) with 1" cover to reinforcing steel.

2. Thick wall Plastic Pipes satisfy design criteria. The pipe should be fabricated from either High Density Polyethylene (HDPE) or Polyvinyl Chloride (PVC).

3. 18 ga (0.052") Polymeric Sheet Coated Steel pipe may be used. 16 ga Composite Steel Spiral Ribbed Pipe may be used.

Any imported backfill material will need to be representatively sampled and tested to ensure it satisfies the pH and resistivity requirements found in figure 854.3B of the Highway Design Manual.

John

California Regional Water Quality Control Board

San Diego Region

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Governor

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http:// www.waterboards.ca.gov/sandiego

Action on Request for
Clean Water Act section 401 Water Quality Certification
and Waiver of Waste Discharge Requirements
for Discharge of Dredged and/or Fill Materials

PROJECT: Route 905
(File No. 04C-132)

APPLICANT: California Department of Transportation
Attention: Michelle Trudell
P.O. Box 85406, M.S. 46
San Diego, CA 92186-5406

ACTION:

☐ Order for Low Impact Certification

☐ Order for Denial of Certification

☑ Order for Technically-conditioned Certification

☑ Waiver of Waste Discharge Requirements

STANDARD CONDITIONS:

The following three standard conditions apply to all certification actions, except as noted under Condition 3 for denials (Action 3).

1. This certification action is subject to modification or revocation upon administrative or judicial review, including review and amendment pursuant to section 13330 of the California Water Code and section 3867 of Title 23 of the California Code of Regulations (23 CCR).

2. This certification action is not intended and shall not be construed to apply to any discharge from any activity involving a hydroelectric facility requiring a Federal Energy Regulatory Commission (FERC) license or an amendment to a FERC license unless the pertinent certification application was filed pursuant to 23 CCR subsection 3855(b) and the application specifically identified that a FERC license or amendment to a FERC license for a hydroelectric facility was being sought.

3. The validity of any non-denial certification action (Actions 1 and 2) shall be conditioned upon total payment of the full fee required under 23 CCR section 3833, unless otherwise stated in writing by the certifying agency.

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and cut your energy costs, see our Web-site at http://www.swrcb.ca.gov.
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ADDITIONAL CONDITIONS:

In addition to the three standard conditions, the California Department of Transportation, shall satisfy the following:

A. General Conditions

1. The California Department of Transportation, shall, at all times, fully comply with the engineering plans, specifications and technical reports submitted with this application for 401 Water Quality Certification and all subsequent submittals required as part of this certification.

2. The California Department of Transportation, shall comply with the requirements of State Water Resources Control Board Water Quality Order No. 99-08-DWQ, the NPDES General Permit for Storm Water Discharges Associated with Construction Activity.

3. The California Department of Transportation, shall maintain a copy of this certification, the application, and supporting documentation at the project site at all times for review by site personnel and agencies.

4. Prior to the start of the project and annually thereafter, the California Department of Transportation, shall educate all personnel on the requirements in this certification, pollution prevention measures, and spill response.

5. The California Department of Transportation, shall permit the Board or its authorized representative at all times, upon presentation of credentials:

   a) Entry onto project premises, including all areas on which wetland fill or wetland mitigation is located or in which records are kept.
   b) Access to copy any records required to be kept under the terms and conditions of this certification.
   c) Inspection of any treatment equipment, monitoring equipment, or monitoring method required by this certification.
   d) Sampling of any discharge or surface water covered by this Order.

6. The California Department of Transportation, shall notify the Regional Board within 24 hours of any unauthorized discharge to waters of the U.S. and/or State; measures that were implemented to stop and contain the discharge; measures implemented to clean-up the discharge; the volume and type of materials discharged and recovered; and additional BMPs or other measures that will be implemented to prevent future discharges.

7. The California Department of Transportation, shall, at all times, maintain appropriate types and sufficient quantities of materials onsite to contain any spill or inadvertent release of materials that may cause a condition of pollution or nuisance if the materials reached a waters of the U.S. and/or State.

8. This Certification is not transferable to any person(s) except after notice to the Executive Officer of the San Diego Regional Water Quality Control Board (Regional Board). The applicant shall submit this notice in writing at least 30 days in advance of any proposed transfer. The notice must include a written agreement between the existing and new owner(s) containing a specific date for the transfer of this Certification's responsibility and coverage between the current discharger and the new discharger(s). This agreement shall include an acknowledgement that the existing owner is liable for compliance and violations up to the transfer date and that the new owner(s) is/are liable from the transfer date on.

9. In the event of any violation or threatened violation of the conditions of this certification, the violation or threatened violation shall be subject to any remedies, penalties, process or sanctions as provided for under state law. For purposes of section 401(d) of the Clean Water Act, the applicability of any state law authorizing remedies, penalties, process or sanctions for the violation or threatened violation constitutes a limitation necessary to assure compliance with the water quality standards and other pertinent requirements incorporated into this certification.

10. In response to a suspected violation of any condition of this certification, the Regional Water Quality Control Board (RWQCB) may require the holder of any permit or license subject to this certification to furnish, under penalty of perjury, any technical or monitoring reports the RWQCB deems appropriate, provided that the burden, including costs, of the reports shall be a reasonable relationship to the need for the reports and the benefits to be obtained from the reports.

11. In response to any violation of the conditions of this certification, the RWQCB may add to or modify the conditions of this certification as appropriate to ensure compliance.

B. Post Construction Storm Water Management

1. All of the elements of the Storm Water Management Plan for the Route 905 development, dated October 14, 2005, shall be implemented and maintained by California Department of Transportation or successive owners of the Route 905 development.

2. All storm drain inlet structures within the project boundaries shall be stamped and/or stenciled in English and Spanish languages prohibiting non-storm water discharges.

3. One pole-mounted sign shall be located adjacent to freeway every mile warning motorists in English and Spanish not to discharge trash from a moving vehicle or dump debris on the side of the freeway under penalty of monetary fines.

4. Post-construction BMPs must be installed and functional prior to occupancy and/or planned use of areas.

5. California Department of Transportation, their designated party, or other parties that assume future transferred liability under this Certification, shall inspect and maintain post-construction structural BMPs per the manufacturers' specifications and/or engineering design specifications. An inspection and maintenance log shall be maintained for review by germane agencies. Copies of the inspection and maintenance log shall be provided to the Regional Board upon request.

6. Before occupancy, California Department of Transportation, their designated party or the successor owners of the Route 905 development, shall submit a letter to the Regional Board describing where the post-construction inspection and maintenance log will be kept. Failure to maintain a post-construction inspection and maintenance log will be a violation of this Certification.

C. MITIGATION

1. Compensatory mitigation is described in the May 2004 Caltrans' Draft Wetland Mitigation Plan for the State Route 905 Extension Project and the U.S. Fish and Wildlife Service's Biological Opinion for State Route 905 Extension Project, San Diego County, California, July 12, 2004. Proposed mitigation for impacts to Waters of the U.S. shall consist of the onsite creation of 3.26-acres riparian, offsite creation of 3.73-acres of riparian, offsite restoration of 6.06-acres of riparian, and offsite enhancement of 5.91-acres of riparian. Offsite mitigation shall be implemented at the Bonita Meadows site. Proposed mitigation for impacts to Waters of the State (vernal pools and road vernal pools) shall consist of the offsite (nearby) creation of 0.39-acre of vernal pools at the Wall-Hudson property owned by the City of San Diego.

2. The California Department of Transportation shall monitor and maintain the mitigation areas until as outlined in the Mitigation Plan and Biological Opinion. The California Department of Transportation shall maintain and monitor the mitigation areas until the Regional Board concurs that mitigation success criteria has been reached.

3. Within 90 days of the issuance of this certification, California Department of Transportation, shall provide a draft preservation mechanism (e.g. deed restriction, conservation easement, etc.) that will protect all mitigation areas and their buffers in

perpetuity. The conservation easement or other legal limitation on the mitigation property shall be adequate to demonstrate that the site will be maintained without future development or encroachment on the site or which could otherwise reduce the functions and values of the site for the variety of beneficial uses of waters of the U.S. that it supports. The conservation easement or other appropriate legal limitation shall prohibit, without exception, all residential, commercial, industrial, institutional, and transportation development, and any other infrastructure development that would not maintain or enhance the wetland functions and values of the site. Other infrastructure development to be prohibited includes, but is not limited to, additional utility lines, paved maintenance roads, and areas of maintained landscaping for recreation. The California Department of Transportation, shall submit proof of a completed preservation mechanism within one year of issuance of this certification.

4. California Department of Transportation, shall submit a report (including topography maps and planting locations) to the Regional Board within 90 days of completion of mitigation site preparation and planting, describing as-built status of the mitigation project. If the site grading and planting are not completed within six weeks of each other, separate reports will be submitted describing those specific as-built conditions.

5. The construction of proposed mitigation shall be completed within the same calendar year as impacts occur, or at least no later than 9 months following the close of the calendar year in which impacts first occur (e.g., if impacts occur in June 2003, construction of mitigation for all impacts must be completed no later than September 2004). Delays in implementing mitigation shall result in an increased mitigation ratio by 1.0 acre for each acre of impact for each year, or part thereof, of delay.

6. Mitigation areas shall be maintained free of perennial exotic plant species including, but not limited to, pampas grass, giant reed, tamarisk, sweet fennel, tree tobacco, castor bean, and pepper tree. Annual exotic plant species shall not occupy more than 5 percent of the onsite or offsite mitigation areas.

7. If at any time during the implementation and establishment of the mitigation area(s), and prior to verification of meeting success criteria, a catastrophic natural event (e.g., fire, flood) occurs and impacts the mitigation area, California Department of Transportation, shall be responsible for repair and replanting of the damaged area(s).

8. Mitigation monitoring reports shall be submitted annually until mitigation has been deemed successful. Monitoring reports shall be submitted no later than 30 days following the end of the monitoring period. Monitoring reports shall include, but not be limited to, the following:

    a) Names, qualifications, and affiliations of the persons contributing to the report;
    b) Tables presenting the raw data collected in the field as well as analyses of the physical and biological data;

c) Qualitative and quantitative comparisons of current mitigation conditions with pre-construction conditions and previous mitigation monitoring results;
d) Photodocumentation from established reference points;
e) Survey report documenting boundaries of mitigation area; and
f) Other items specified in the draft and final Wetland and Riparian Mitigation and Monitoring Plan.

9. For the purpose of determining mitigation credit for the removal of exotic/invasive plant species, only the actual area occupied by exotic/invasive plant species shall be quantified to comply with mitigation requirements.

10. For purposes of this certification, creation is defined as the creation of vegetated or unvegetated waters of the U.S. where they have never been documented or known to occur (e.g., conversion of nonnative grassland to freshwater marsh). Restoration is defined as the creation of waters of the U.S. where they previously occurred (e.g., removal of fill material to restore a drainage). Enhancement is defined as modifying existing waters of the U.S. to enhance functions and values (e.g., removal of exotic plant species from jurisdictional areas and replacing with native species).

D. Reporting

1. All information requested in this Certification is pursuant to California Water Code (CWC) section 13267. Civil liability may be administratively imposed by the Regional Board for failure to furnish requested information pursuant to CWC section 13268.

2. All applications, reports, or information submitted to the Regional Board shall be signed and certified as follows:

> *"I certify under penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment."*

3. California Department of Transportation, shall submit reports required under this certification, or other information required by the Regional Board, to:

> Executive Officer
> California Regional Water Quality Control Board
> San Diego Region
> Attn: 401 Certification; File No. 04C-132
> 9174 Sky Park Court, Suite 100
> San Diego, California 92123

PUBLIC NOTIFICATION OF PROJECT APPLICATION:

On November 22, 2004, receipt of the project application was posted on the SDRWQCB web site to serve as appropriate notification to the public.

REGIONAL WATER QUALITY CONTROL BOARD CONTACT PERSON:

Mike Porter
California Regional Water Quality Control Board, San Diego Region
9174 Sky Park Court, Suite 100
San Diego, CA 92123
858-467-2726
mporter@waterboards.ca.gov

WATER QUALITY CERTIFICATION:

I hereby certify that the proposed discharge from the **Route 905** project (File No. 04C-132) will comply with the applicable provisions of sections 301 ("Effluent Limitations"), 302 ("Water Quality Related Effluent Limitations"), 303 ("Water Quality Standards and Implementation Plans"), 306 ("National Standards of Performance"), and 307 ("Toxic and Pretreatment Effluent Standards") of the Clean Water Act. This discharge is also regulated under California Regional Water Quality Control Board, San Diego Region, Waiver of Waste Discharge Requirements (Waiver Policy) No. 17. Please note that this waiver is conditional and, should new information come to our attention that indicates a water quality problem, the Regional Board may issue waste discharge requirements at that time.

Except insofar as may be modified by any preceding conditions, all certification actions are contingent on (a) the discharge being limited and all proposed mitigation being completed in strict compliance with the applicants' project description and/or on the attached Project Information Sheet, and (b) on compliance with all applicable requirements of the Regional Water Quality Control Board's Water Quality Control Plan (Basin Plan).

John H. Robertus
Executive Officer
Regional Water Quality Control Board

2/27/2006
Date

Attachments:

1. Project Information
2. Distribution List
3. Location Map
4. Site Map
5. Mitigation Map

ATTACHMENT 1
PROJECT INFORMATION

Applicant:	California Department of Transportation Attention: Ms. Michelle Trudell P.O. Box 85406, M.S. 46 San Diego, CA 92186-5406 Telephone: 858-616-6631 Facsimile: 858-619-6606 E-mail: michelle_trudell@dot.ca.gov
Applicant Representatives:	None
Project Name:	Route 905
Project Location:	The project is located in southwestern San Diego County, east of State Route 805, and parallel and adjacent to the U.S./Mexico border. The project is approximately located at latitude 32.4942° north, longitude 116.9357° east to 32.5658° north, longitude 117.0165°.
Type of Project:	Transportation infrastructure construction.
Project Description:	The 345.9-acres site is proposed to be developed into a six-lane freeway commencing just east of Interstate 805 in San Ysidro and ending at Airway Road in Otay Mesa. The proposed alignment was chosen to maximize avoidance of Waters of the U.S. and State. The proposed design incorporates significant post-construction storm water treatment.
Federal Agency/Permit:	Army Corps of Engineers, Individual Permit – Terrence Dean
Other Required Regulatory Approvals:	California Department of Fish and Game, Streambed Alteration Agreement - Kelly Fisher U.S. Fish and Wildlife Service, Section 7 Consultation – Susan Wynn
California Environmental Quality Act (CEQA) Compliance:	California Department of Transportation, Route 905 Final Environmental Impact Statement/Report, July 2004, SCH No. 950310131, 11-SD-905/I-805.
Receiving Water:	Spring Canyon and unnamed ephemeral/intermittent streams tributary to the Tijuana River. Tijuana Hydrologic Unit, Tijuana Valley hydrologic area, San Ysidro hydrologic subarea (911.11) and Water Tanks hydrologic subarea (911.12).
Impacted Waters of the United States:	The proposed project will permanently impact (fill) 1.57-acre of unvegetated waters of the U.S. and 3.66-acres of wetland waters of the

U.S. (13,134 linear feet of combined impacts).

Impacted Waters of the State:	The proposed project will permanently impact 0.14-acre of Waters of the State as vernal pools and road vernal pools.
Dredge Volume:	None
Related Projects Implemented/to be Implemented by the Applicant(s):	The California Department of Transportation has not disclosed a related project.
Compensatory Mitigation:	Compensatory mitigation is described in the May 2004 Caltrans' Draft Wetland Mitigation Plan for the State Route 905 Extension Project and the U.S. Fish and Wildlife Service's Biological Opinion for State Route 905 Extension Project, San Diego County, California, July 12, 2004. Proposed mitigation for impacts to Waters of the U.S. consists of the onsite creation of 3.26-acres riparian, offsite creation of 3.73-acres of riparian, offsite restoration of 6.06-acres of riparian, and offsite enhancement of 5.91-acres of riparian. This mitigation will result in a cumulative mitigation ratio of 3.6:1. The mitigation area is owned by California Department of Transportation. Proposed mitigation for impacts to Waters of the State (vernal pools and road vernal pools) will consist of the offsite (nearby) creation of 0.39-acre of vernal pools at the Wall-Hudson property owned by the City of San Diego. This mitigation will result in a mitigation ratio of 2.78:1.
Best Management Practices:	The Water Quality Data report Route 905 (January 2006) prepared by Caltrans, proposes adequate construction and post-construction BMPs. This project is subject to the SWRCB Order No. 99-06, NPDES Permit for Storm Water Discharges for the State of California, Department of Transportation Properties, Facilities, and Activities. *Construction Phase* The Water Quality Data report proposes standard construction structural and non-structural Best Management Practices (BMPs). Some of these BMP categories include, solid waste containment, erosion control, sediment control, construction materials delivery and storage, hazardous materials and waste management and storage, concrete waste management, stabilized construction exists, vehicle and equipment maintenance, and landscaping. *Post-Construction Phase* The Water Quality Data report proposes adequate treatment control BMPs to treat post-construction storm water and non-storm water runoff.

Treatment control BMPs include 12 detention basins, 8 biofiltration strips, and 6 biofiltration swales.

Public Notice: November 22, 2004

Fees: Total Due: $40,000.00

Total Paid: $500.00 (check No. 816518)
$39,500.00 (check No. 835104)

ATTACHMENT 2
DISTRIBUTION LIST

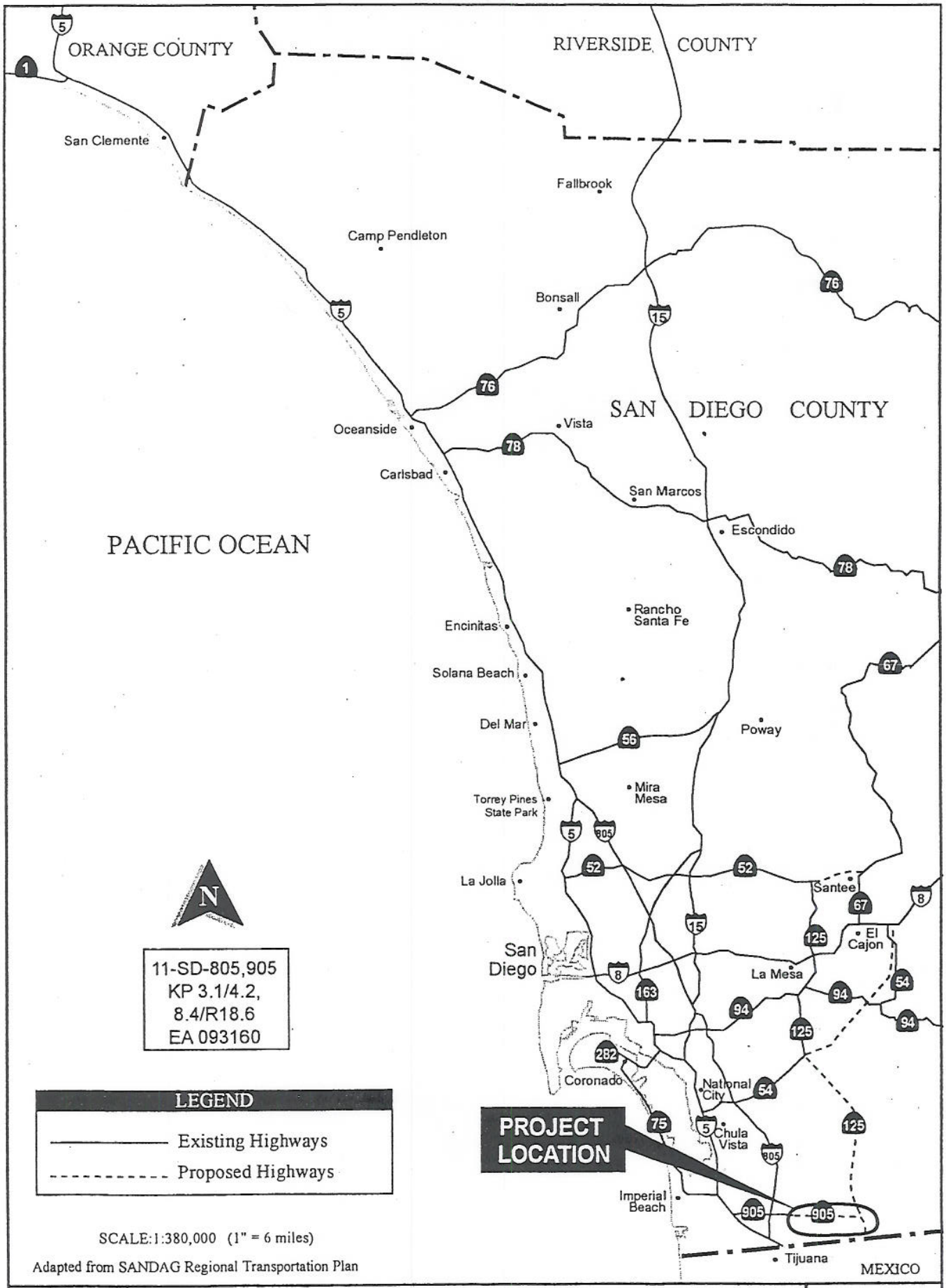
Mr. Terrence Dean
U.S. Army Corps of Engineers

Ms. Kelly Fisher
California Department of Fish and Game

State Water Resources Control Board
Division of Water Quality

ATTACHMENT 3

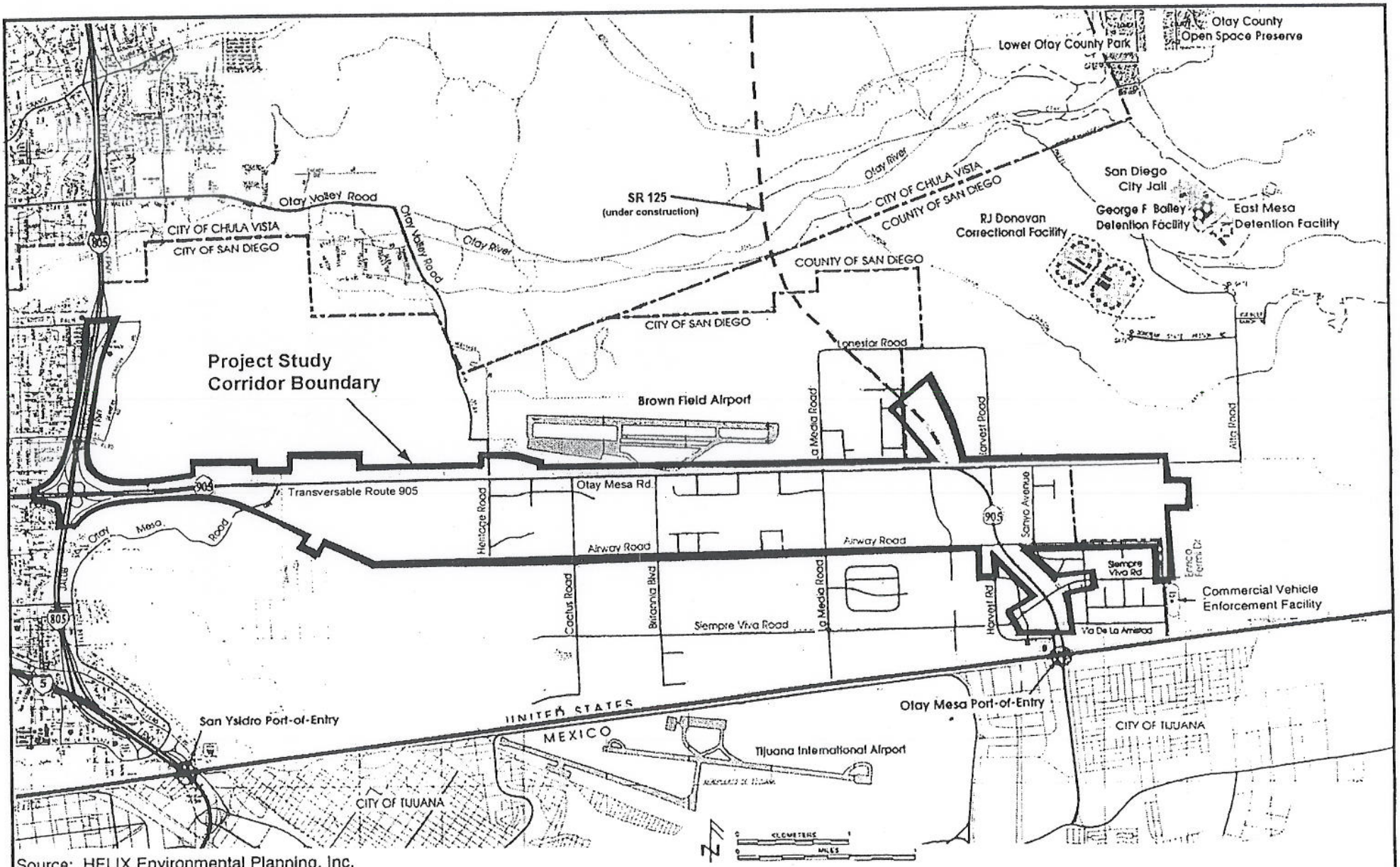
LOCATION MAPS



Route 905

Regional Project Location

Figure 1-1



Source: HELIX Environmental Planning, Inc.

Revised June 2004

Route 905

Project Vicinity

Figure 1-2

ATTACHMENT 4

SITE MAPS

California Regional Water Quality Control Board
San Diego Region

Over 50 Years Serving San Diego, Orange, and Riverside Counties
Recipient of the 2004 Environmental Award for Outstanding Achievement from USEPA

9174 Sky Park Court, Suite 100, San Diego, California 92123-4340
(858) 467-2952 • Fax (858) 571-6972
http:// www.waterboards.ca.gov/sandiego

Linda S. Adams
Acting Secretary for Environmental Protection

Arnold Schwarzenegger
Governor

October 5, 2009

In reply refer to: 04C-132:lpardy

Certified Mail Number:
7008-1140-0002-4285-4008

California Department of Transportation, District 11
Attention: Ms. Michelle Trudell
Environmental Stewardship Branch
Environmental Division, MS-242
4050 Taylor Street
San Diego, CA 92110

File No.	04C-132
CIWQS	
Reg. Meas.:	149753
Place ID:	258549
Party ID:	7549
Case No:	18-2004132
WDID:	9000001331

Dear Ms. Michelle Trudell:

SUBJECT: Amendment to Clean Water Act Section 401 Water Quality Certification No. 04C-132 and Waste Discharge Requirements for Discharge of Dredged and/or Fill Materials

On August 18, 2009 the California Regional Water Quality Control Board, San Diego Region (Regional Board) received a request from the California Department of Transportation (Caltrans) to amend the State Route 905 (SR-905) Extension Project (Project), section 401 Water Quality Certification No. 04C-132 (Certification) to allow permanent impacts to an additional 0.011 acre of vernal pool habitat and 0.19 acre of its contributing watershed due to the construction of a temporary haul road. The temporary haul road will be located on the Handler property at the southwest corner of Otay Mesa Road and Corporate Center Drive in Otay Mesa, and would impact additional areas outside Caltrans right of way that were not previously addressed in the original SR-905 project footprint that was used to determine the extent of construction-related and operational impacts.

Based on mitigation ratios utilized for the larger SR-905 Project, vernal pool habitat is proposed to be preserved and/or enhanced at a 3:1 ratio and the contributing watershed is proposed to be preserved and/or enhanced at a 10:1 ratio to offset impacts to these habitat types. Mitigation for the additional impacts to the vernal pool habitat and its watershed has been proposed with the off-site

Caltrans Dennery Canyon restoration site (previously referred to as the Wall-Hudson restoration site in the Biological Opinion) as follows:

1. Restoration of 0.033 acre of vernal pool habitat, and
2. Restoration of 1.9 acres of vernal pool watershed.

After a review of the Project's file, and the mitigation proposed for the additional impacts to the vernal pool habitat and its watershed, I concur that the proposed changes are reasonable modifications to the original section 401 Water Quality Certification. As a result, the section 401 Water Quality Certification No. 04C-132 for the SR-905 Extension Project has been amended to reflect these changes. The amendments are included as Enclosure 1.

The heading portion of this letter includes a Regional Board code number noted after "in reply to." In order to assist us in the processing of your correspondence please include this code number in the heading or subject line portion of all correspondence and reports to the Regional Board pertaining to this matter. If you have questions regarding this notification, please contact Ms. Linda Pardy at (858) 627-3932 or LPardy@waterboards.ca.gov.

Respectfully,

JOHN H. ROBERTUS
Executive Officer

Enclosures
1. Addendum to Clean Water Act section 401 Water Quality Certification No. 04C-132

cc (via email and hard copy (non-certified):

U.S. Army Corps of Engineers, Regulatory Branch
San Diego Field Office
6010 Hidden Valley Road, Suite 105
San Diego, CA 92011-4213
Mr. Terrence Dean, E-mail: terrence.dean@usace.army.mil

California Department of Fish and Game, South Coast Region,
Habitat Conservation Planning – South
4949 Viewridge Avenue
San Diego, CA 92123
Ms. Kelly Fisher, E-mail: kfisher@dfg.ca.gov

U.S. Department of the Interior,
Fish and Wildlife Service
6010 Hidden Valley Road
Carlsbad, CA 92011
Mr. Jim Bartel; E-mail: jim_bartel@fws.gov

(via email only)
U.S. Environmental Protection Agency, Region 9, Wetlands Regulatory Office
Attn: Ms. Elizabeth Goldmann; E-mail: R9-WTR8-Mailbox@epa.gov

State Water Resources Control Board, Division of Water Quality, 401 Water Quality Certification and Wetlands Unit
E-mail: Stateboard401@waterboards.ca.gov

California Department of Transportation, District 11, Environmental Stewardship Branch
Mr. Bruce April; E-mail: bruce.april@dot.ca.gov
Mr. Michael Galloway; E-mail: michael.galloway@dot.ca.gov

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

ADDENDUM TO

CLEAN WATER ACT SECTION 401
WATER QUALITY CERTIFICATION NO. 04C-132

FOR

STATE ROUTE 905 (SR-905) EXTENSION PROJECT

Additional Condition "C. Mitigation 11" is added:

The California Department of Transportation shall provide compensatory mitigation for the additional permanent impacts to waters of the State due to loss of 0.011 acre of vernal pool habitat and 0.19 acre of its watershed for construction of the temporary haul road for the SR-905 Extension Project. The additional permanent impacts to waters of the State are shown as Figure 1 entitled, "*Aerial map of the vernal pool and watershed located on Handler Property, north of the State Route 905 Project footprint*" in the July 7, 2009 letter from the California Department of Transportation to Mr. Jim Bartel, U.S. Fish and Wildlife Service, regarding the "Second Amendment to the Biological Opinion for the State Route 905 (SR-905) Extension Project, San Diego County, CA (FWS-SDG-2296.5). The impact to waters of the State for the temporary haul road must not exceed 0.011 acre of vernal pool habitat and 0.19 acre of its vernal pool watershed.

Additional Condition "C. Mitigation, 12" is added:

Mitigation for the permanent loss of vernal pool habitat due to construction of the temporary haul road must be achieved at a 3:1 ratio, and through the withdrawal of 0.033 acre of restored vernal pool from the off-site California Department of Transportation Dennery Canyon restoration site (previously referred to as the Wall-Hudson restoration site in the U.S. Fish and Wildlife Service's *Biological Opinion for State Route 905 Extension Project, San Diego County, California*. Mitigation for the permanent loss of the associated vernal pool watershed due to construction of the temporary haul road must be achieved at a 10:1 ratio, and through the withdrawal of 1.9 acres of restored vernal pool watershed from the off-site California Department of Transportation Dennery Canyon restoration site.

Additional Condition "C. Mitigation, 13" is added:

If at any time after the establishment of the mitigation area(s) identified in Conditions "C. Mitigation, 11 through 14" (for the temporary haul road), a catastrophic natural event (e.g., fire, flood) occurs and impacts the mitigation area, the California Department of Transportation is responsible for repair and replanting of the damaged area(s).

Additional Condition "C. Mitigation, 14" is added:

If, after all other establishment criteria have been met, monitoring shows that the mitigation area(s) identified in Conditions "C. Mitigation, 11 through 14" (for the temporary haul road) are not meeting the functional success criteria proposed, the Regional Board has the option to modify this certification to require changes to the mitigation plans, including but not limited to additional or different mitigation to compensate for the lack of or diminished functional mitigation.

Additional Condition "E. Photo Documentation Procedure, 1" is added:

The California Department of Transportation, or its successors, must conduct photo documentation of the project site identified in Conditions "C. Mitigation, 11 through 12" (for the temporary haul road), including all areas of permanent and temporary impact, and mitigation areas, prior to and after project construction. Photo documentation must be conducted in accordance with the State Water Resources Control Board Standard Operating Procedure 4.2.1.4: Stream Photo Documentation Procedure, or an equivalent photo documentation procedure acceptable to the Regional Board. In addition, photo documentation must include Geographic Positioning System (GPS) coordinates for each of the photo points referenced. The California Department of Transportation must submit this information in a photo documentation report to the Regional Board within **30 days** of completion of the project's construction. The report must include a compact disc that contains digital files of all the photos (jpeg file type or similar).

Additional Condition "F. Geographic Information System, 1" is added:

The California Department of Transportation must submit Geographic Information System (GIS) shape files of the impact and mitigation areas identified in Conditions "C. Mitigation, 11 through 12" (for the temporary haul road) within **90 days** of final project impacts and the mitigation areas within **90 days** of Certification. All impact and mitigation areas shapefiles must be polygons. Two GPS readings (points) must be taken on each line of the polygon and the polygon must have a minimum of 10 points. GIS metadata must also be submitted.

Attachment 1, Project information is revised:

This amendment revises Attachment 1, Project Information as shown in "Attachment 1, Project Information (revised), below. Revisions shown in blue underline are additions, and revisions shown in red strikeout are deletions.

WATER QUALITY CERTIFICATION:

I hereby certify that the proposed discharge from the **State Route 905 Extension Project** (Certification No. 04C-132) will comply with the applicable provisions of sections 301 ("Effluent Limitations"), 302 ("Water Quality Related Effluent Limitations"), 303 ("Water Quality Standards and Implementation Plans"), 306 ("National Standards of Performance"), and 307 ("Toxic and Pretreatment Effluent Standards") of the Clean Water Act. This discharge is also regulated under State Water Board Order No. 2003-0017-DWQ, "General Waste Discharge Requirements for Dredged or Fill Discharges that have Received State Water Quality Certification," which requires compliance with all conditions of this Water Quality Certification.

Please note that enrollment under this Order is conditional and, should new information come to attention that indicates a water quality problem, the Regional Board may issue waste discharge requirements at that time.

Except insofar as may be modified by any preceding conditions, all certification actions are contingent on (a) the discharge being limited and all proposed mitigation being completed in strict compliance with the applicants' project description and/or on the attached Project Information Sheet, and (b) on compliance with all applicable requirements of the *Water Quality Control Plan for the San Diego Basin (9)*(Basin Plan).

John H Robertus
JOHN H. ROBERTUS
Executive Officer

5 October 2009
Date

Attachments:
1. Project Information [Revised 9-28-2009]
2. Map of Proposed Additional Impacts [Newly added 9-28-2009]
3. Map of Proposed Additional Mitigation Area [Newly added 9-28-2009]

ATTACHMENT 1
PROJECT INFORMATION [Revised 9-28-2009]

Applicant:	California Department of Transportation, District 11 Attention: Ms. Michelle Trudell Environmental Stewardship Branch Environmental Division, MS-242 4050 Taylor Street San Diego, CA 92110 Telephone: 619 688-0107 Facsimile: 619 688-6998 Email: michelle_trudell@dot.ca.gov
Applicant Representatives:	None
Project Name:	State Route 905 (SR-905) Extension Project, Otay Mesa, San Diego County, Certification No. 04C-132
Project Location:	The project is located in southwestern San Diego County, east of State Route 805, and parallel and adjacent to the U.S. Mexico border. The project is approximately located at latitude 32.4942° north, longitude 116.9357° east to 32.5658° north, longitude 117.0165°.
Type of Project:	Temporary infrastructure construction.
Project Description:	The 345.9 acres site is proposed to be developed into a six-lane freeway commencing just east of Interstate 805 in San Ysidro and ending at Airway Road in Otay Mesa. The proposed alignment was chosen to maximize avoidance of waters of the U.S. and State. The proposed design incorporates significant post-construction storm water treatment. In addition, a temporary haul road will be constructed on an area outside of the California Department of Transportation right of way on the eastern part of the 45.5-acre Handler property located at the southwest corner of Otay Mesa Road and Corporate Center Drive in Otay Mesa.
Federal Agency/Permit:	U.S. Army Corps of Engineers, Individual Permit – Terrance Dean

Other Required Regulatory Approvals:	California Department of Fish and Game, Streambed Alteration Agreement – Kelly Fisher U.S. Fish and Wildlife Service, section 7 consultation - Susan Wynn
California Environmental Quality Act (CEQA) Compliance:	California Department of Transportation, Route 905 Final Environmental Impact Statement/Report, July 2004, SCH No. 950310131, 11-SD-905/I-805.
Receiving Water:	Spring Canyon and unnamed ephemeral/intermittent streams tributary to the Tijuana River. Tijuana Hydrologic Unit, Tijuana Valley hydrologic area, San Ysidro hydrologic subarea (911.11) and Water Tanks hydrologic subarea (911.12).
Impacted Waters of the United States:	The proposed project will permanently impact (fill) 1.57 acres of unvegetated waters of the U.S. and 3.66 acres of wetland waters of the U.S. (13,134 lineal feet of combined impacts).
Impacted Waters of the State:	The proposed project will permanently impact ~~0.14-acre~~ 0.151-acre of waters of the State as vernal pools and road vernal pools.
Dredge Volume:	None
Related Projects Implemented/to be Implemented by the Applicant(s):	The California Department of Transportation has not disclosed a related project.

Compensatory Mitigation:

Compensatory mitigation is described in the May 2004 Caltrans' Draft Wetland Mitigation Plan for the State Route 905 Extension Project and the U.S. Fish and Wildlife Service's Biological Opinion for State Route 905 Extension Project, San Diego County, California, July 12, 2004.

Proposed mitigation for impacts to Waters of the U.S. consists of the onsite creation of 3.26-acres riparian, offsite creation of 3.73-acres of riparian, offsite restoration of 6.06-acres of riparian, and offsite enhancement of 5.91-acres of riparian. This mitigation will result in a cumulative mitigation ratio of 3.6:1.

Proposed mitigation for impacts to Waters of the State (vernal pools and road vernal pools) will consist of the offsite (nearby) creation of (0.39-acre + 0.033-acre = 0.423-acre) of vernal pools at the California Department of Transportation Dennery Canyon Restoration Site (formerly Wall-Hudson property owned by the City of San Diego). This mitigation will result in a mitigation ratio of ~~2.78:1~~ 2.8:1.

Best Management Practices:

The Water Quality Data report Route 905 (January 2006) prepared by Caltrans, proposes adequate construction and post-construction BMPs. This project is subject to the SWRCB Order No. 99-06, NPDES Permit for Storm Water Discharge5 for the State of California, Department of Transportation Properties, Facilities, and Activities.

Construction Phase

The Water Quality Data report proposes standard construction structural and non-structural Best Management Practices (BMPs). Some of these BMP categories include, solid waste containment, erosion control, sediment control, construction materials delivery and storage, hazardous materials and waste management and storage, concrete waste management, stabilized construction exists, vehicle and equipment maintenance, and landscaping.

Post-Construction Phase

The Water Quality Data report proposes adequate treatment control BMPs to treat post-construction storm water and non-storm water runoff. Treatment control BMPs include 12 detention basins, 8 biofiltration strips, and 6 biofiltration swales.

Public Notice:	November 22, 2004
Fees:	Total Due: $41.746.00 ~~$40,000.00~~
	Total Paid: $500.00 (Check No. 816518) $39,500.00 (Check No. 835104) $1,746.00 (Check No. 335064)

Attachment 2. Map of Proposed Additional Impacts.

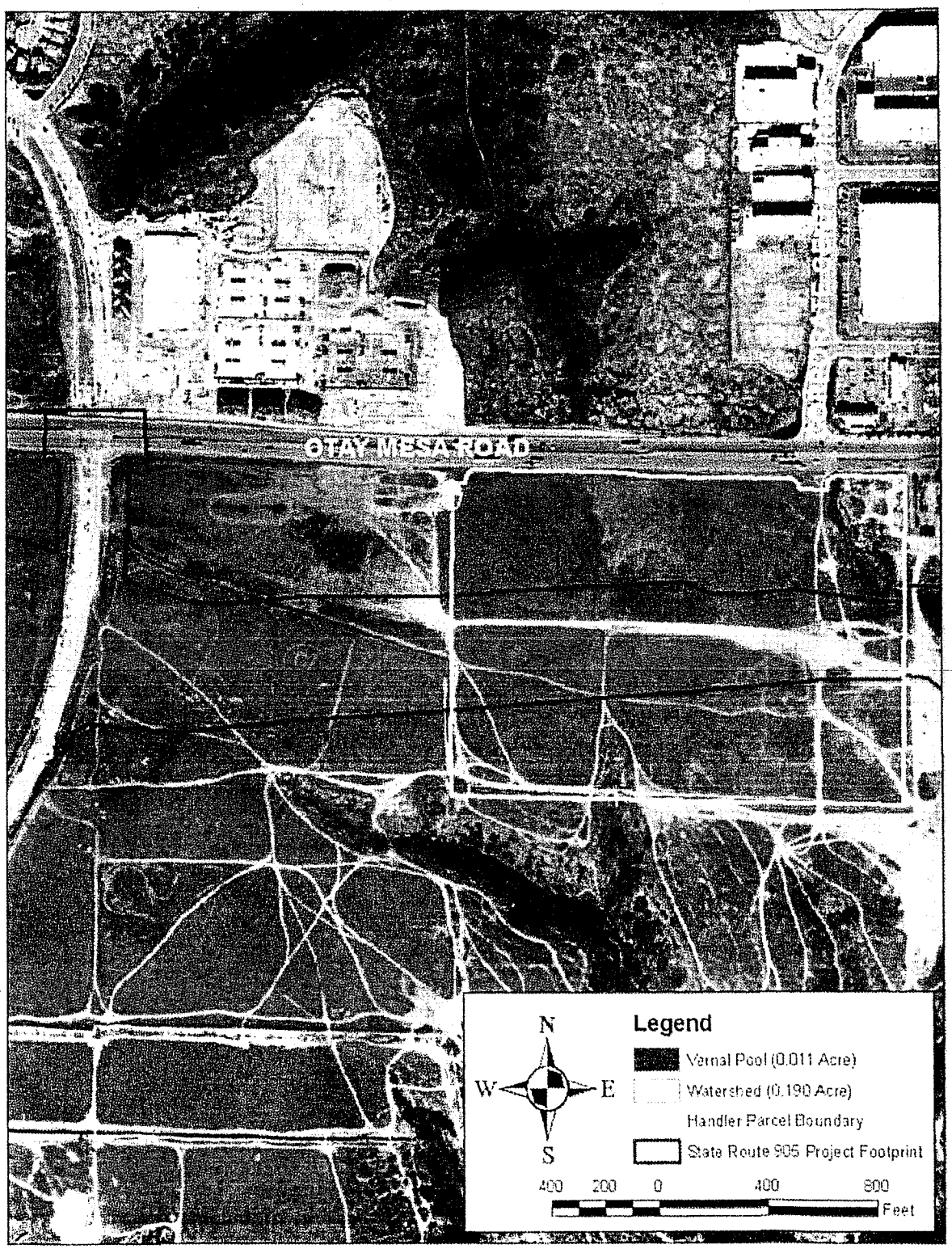
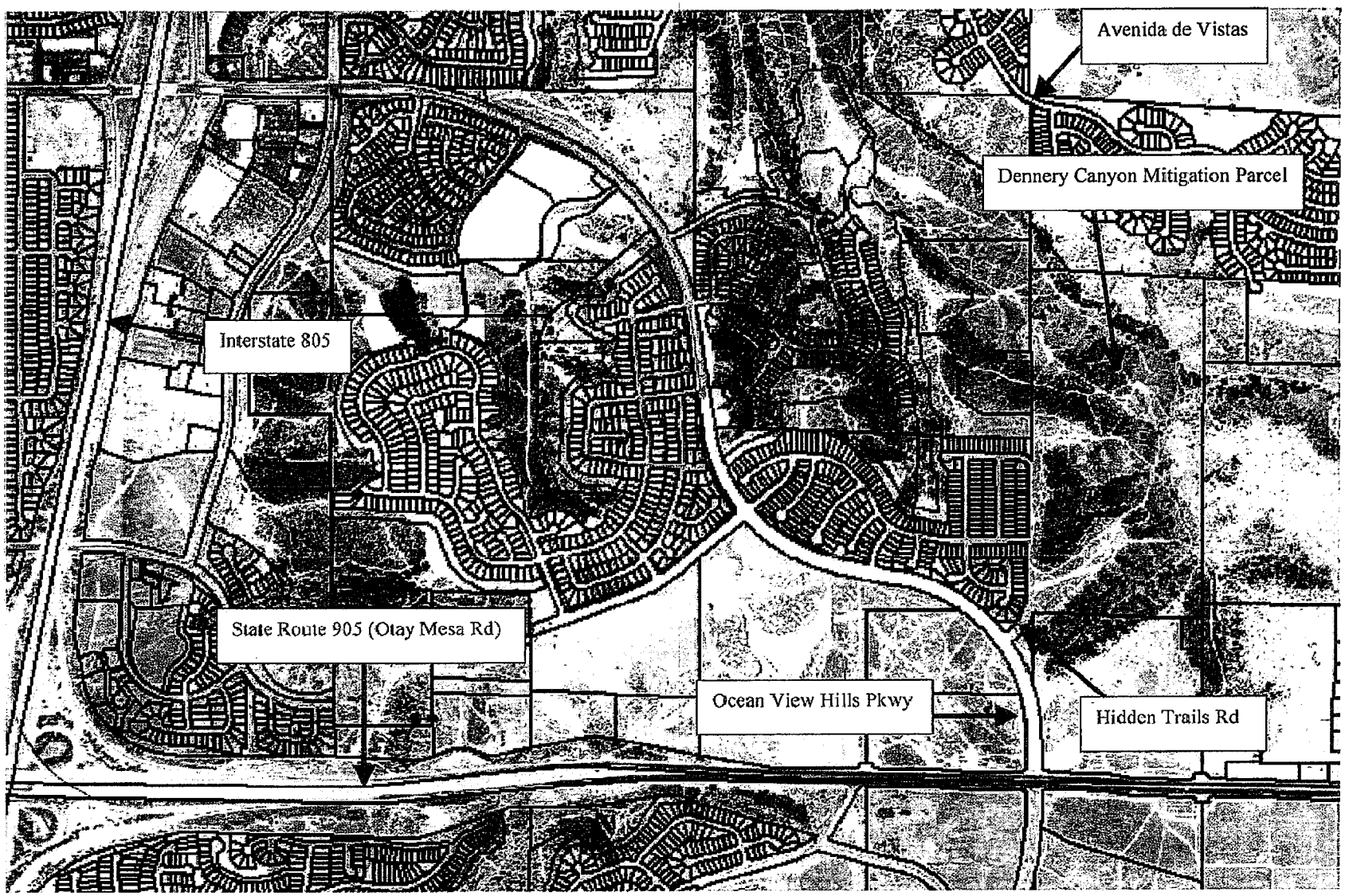


Figure 1. Aerial map of the vernal pool and watershed located on Handler Property, north of the State Route 905 Project footprint.

Attachment 3. Map of Proposed Additional Mitigation Area (Dennery Canyon Mitigation Parcel)



STATE ROUTE 905
Dennery Canyon Mitigation Parcel (APN 645-050-32) 08/08/05

LOS ANGELES DISTRICT
U.S. ARMY CORPS OF ENGINEERS

DEPARTMENT OF THE ARMY PERMIT

Permittee: California Department of Transportation District 11, MS-46

Permit Number: 952015100-TCD

Issuing Office: Los Angeles District

Note: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description: To construct State Route 905 (SR 905) as a six-lane controlled access highway from Interstate 805 (I-805) to the Otay Mesa Port of Entry (POE) with Mexico in San Diego County, California. The project will include the construction of local interchanges at Caliente Avenue, Heritage Road, Britannia Boulevard, and La Media Road, a freeway-to-freeway interchange at SR 125 South, and a bridge structure at Spring Canyon. The project will result in direct and permanent impacts to approximately 5.23 acres of Corps-regulated waters of the United States, including approximately 3.66 acres of jurisdictional wetlands and 1.57 acres of jurisdictional non-wetland waters.

Project Location: The work is proposed in eight unnamed drainage areas of natural and human-mad origins, which are tributary to navigable waters of the United States, in southwestern San Diego, San Diego County, California.

Permit Conditions:

General Conditions:

1. The time limit for completing the authorized activity ends on March 18, 2009. If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this

requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification from this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished with the terms and conditions of your permit.

Special Conditions:

1 Prior to initiation of project construction, the Permittee shall notify the U.S. Fish and Wildlife Service in writing of the intended project initiation date and anticipated duration of the construction period.

2 This Corps permit does not authorize you to take a Federally listed threatened or endangered species, in particular the coastal California gnatcatcher *(Polioptila californica)*, San Diego fairy shrimp *(Branchinecta sandiegonensis)*, Riverside fairy shrimp *(Streptocephalus wootoni)*, Quino checkerspot butterfly *(Euphydryas editha quino)*, and San Diego button celery, or to impact designated critical habitat for Quino, tarplant, and Riverside and San Diego fairy shrimp. In order to legally take a listed species or impact designated critical habitat, you must have separate authorization under the Endangered Species Act (ESA) (e.g. ESA Section 10 permit, or a Biological Opinion (BO) under ESA Section 7, with "incidental take" provisions with which you must comply). The US Fish and Wildlife Service (USFWS) promulgated *Biological Opinion for the State Route 905 Extension Project, San Diego County, California (1-6-04-F-2296.5, File #: 11-SD-905 KP 9.2 – 19.3, EA 093160)* with the Federal Highway Administration (FHWA) on July 12, 2004. This BO contains mandatory terms and conditions to implement the reasonable and prudent measures that are associated with "incidental take" that is also specified in the BO. Your authorization under this Corps permit is conditional upon your compliance with all of the mandatory terms and conditions associated with incidental take of the BO. Since the Corps has adopted the FHWA's FEIS as its NEPA document which

includes the BO, the terms and conditions of the BO are incorporated by reference in this permit. Failure to comply with the terms and conditions associated with incidental take of the BO, where a take of the listed species occurs, will therefore constitute an unauthorized take, and it will also constitute non-compliance with your Corps permit. The USFWS is the appropriate authority to determine compliance with the terms and conditions of its BO and with the ESA.

1. The permittee shall mitigate impacts to permanent impacts to 5.19 acres of waters of the United States, including approximately 3.64 acres of jurisdictional wetlands and 1.55 acres of non-wetland waters of the U.S., through onsite and offsite creation and enhancement of approximately 7.27 acres of jurisdictional wetland habitat. The permittee shall mitigate for .04 acres of temporary impacts, including approximately .02 acres of jurisdictional wetlands and .02 acre of unvegetated waters of the U.S., through onsite restoration of approximately .04 acres of jurisdictional wetland habitat.

2. A final mitigation plan, based on the approved Final Wetland Mitigation Plan for Bonita Meadows Open Space Preserve *(Approved Mitigation and Monitoring Plan)* dated April 14, 2006, prepared by Sue Scatolini, shall be submitted to the Corps (cc: EPA, USFWS, CDFG, and RWQCB) for approval within 30 days of the date of this permit, and shall include the following:

    a) All final specifications and topography-based layout grading, planting, and irrigation (with 0.5-foot contours) shall be provided to the Corps prior to mitigation construction (cc: EPA, USFWS, CDFG, and RWQCB); All wetland mitigation areas shall be graded to the same elevation as the adjacent existing wetlands and/or within one foot of the groundwater table, and shall be left in a rough grade state with microtopographic relief (including channels) that mimics natural wetland topography, as directed by the Corps; Planting and irrigation shall not be installed until the Corps has approved the mitigation site grading; The permittee shall contact the Corps for verification of proper grading of the mitigation site a minimum of 15 days prior to the planned date of initiating planting; All planting shall be installed in such a manner that mimics natural plant distribution (e.g., random distribution rather than uniform rows);
    b) Submittal of as-built drawings of the mitigation grading, planting, and irrigation to the Corps (cc: EPA, USFWS, CDFG, and RWQCB);
    c) At the first anniversary of plant installation, all dead plants shall be replaced unless their function has been replaced by natural recruitment as verified by the Corps;
    d) A final implementation schedule that indicates when all wetland/waters impacts, as well as mitigation site grading, planting, and irrigation will begin and end;
    e) Five years of success criteria for wetland creation and temporary impact restoration areas;
    f) A minimum of five years of maintenance and monitoring of wetland creation and temporary impact restoration areas, unless success criteria are met earlier and all artificial water supply has been stopped for a minimum of two years;

g) Planting pallets (plant species, size, and number per acre) and seed mix (plant species and pounds per acre);
h) A wetland delineation to confirm that Corps jurisdictional wetlands have been successfully created prior to Corps final approval of the mitigation; and
i) Annual mitigation maintenance and monitoring reports shall be submitted to the Corps (cc: EPA, USFWS, CDFG, and RWQCB) in January of each year, after the annual maintenance and monitoring has been performed, in order to establish a comparative program for the reports.

3. Temporary impacts to waters of the United States, including jurisdictional wetlands and non-wetland waters, shall be mitigated through the restoration of all temporary impact areas to per-construction contours. All disturbed areas shall be revegetated with pre-existing and/or native wetland vegetation.

4. The permittee shall permanently impact no more than 5.19 acres, and/or temporarily impact no more than .04 acres, of waters of the United States, including jurisdictional wetlands. The permittee shall fence (with silt barriers) the limits of the construction corridor in the vicinity of any waters of the US, including jurisdictional wetlands, to prevent additional waters/wetlands impacts and the spread of silt from the construction zone into adjacent waters/wetlands. The permittee shall submit to the Corps (cc: USFWS, RWQCB, and CDFG) for approval final construction and excavation plans and dated/labeled photographs showing fenced and marked limits of impacts, and all Corps jurisdictional areas to be impacted and preserved, a minimum of 30 days prior to initiating waters/wetlands impacts authorized by this permit. If waters/wetlands impacts occur outside these limits, all work shall cease, and the Corps shall be notified immediately.

5. If the project authorized by this permit requires periodic maintenance in waters of the United States, including jurisdictional wetlands, no maintenance activities shall be conducted unless an Operation and Maintenance (O&M) Plan has first been approved by the Corps. Alternatively, subsequent Corps authorization may be requested for such activities.

6. If the project authorized by this permit increases the extent of the OHWM and/or wetlands that meet the Corps parameters for jurisdictional wetlands, the full extent of such increased area shall become waters of the United States, and therefore, regulated by the Corps of Engineers. Such areas may require Corps authorization for any future impacts, and may be subject to the provisions and scope of any approved O&M Plan.

7. The permittee shall staff a qualified biologist on site periodically during project construction in the vicinity of waters of the United States, including jurisdictional wetlands, to ensure compliance with all requirements of this permit, and shall produce reports that document compliance with these requirements. The biologist will specifically monitor construction activities that may affect waters/wetlands, such as vegetation removal, and the installation of Best Management Practices (BMPs) and Environmentally Sensitive Area (ESA) fencing to ensure that all avoidance and minimization measures are properly constructed and followed. The permittee shall submit the biologist's name, address, telephone number, email address (if available), and

work schedule, which will be periodic, on the project to the Corps a minimum of 15 days prior to the planned date of initiating waters/wetlands impacts authorized by this permit. The permittee shall report any violation to the Corps within one day of its occurrence, and shall submit compliance reports (including photographs of all areas of authorized impact) on a monthly basis to the Corps (cc: USFWS, RWQCB, and CDFG). In addition, the Environmental Liaison will monitor construction to ensure that all permit conditions are implemented. Note: All biologist site inspection schedules, BMPs, and ESA fencing procedures are subject to future agency review and modification.

8. The permittee shall submit to the Corps (cc: EPA, USFWS, RWQCB, and CDFG) within (60) days of completion of waters/wetlands impacts authorized by this Individual Permit a report that will include as-built construction drawings with an overlay of waters/wetlands that were impacted and those that were preserved, dated and labeled photographs of waters/wetland areas that are impacted and those to be preserved, and a summary of all project activities which documents that authorized waters/wetlands impacts were not exceeded, and compliance with all permit conditions.

9. The permittee shall ensure that water quality is maintained within the channels, at and downstream of the project site, by incorporating appropriate design elements into the project (e.g., maintaining a soft bottom channel, installing detention basins, etc.) as approved by the Corps and RWQCB. Terms and conditions of the Section 401 Water Quality Certification (File No.04C-132), issued by the California Regional Water Quality Control Board on February 27, 2006, shall become conditions of this permit.

10. The permittee shall ensure that no net loss of wetlands will result with implementation of this project.

11. Within 90 days of the issuance of this permit, the California Department of Transportation, shall provide a draft preservation mechanism (e.g. deed restriction, conservation easement, etc.) that will protect all mitigation areas and their buffers in perpetuity. The conservation easement or other legal limitation on the mitigation property shall be adequate to demonstrate that the site will be maintained without future development or encroachment on the site or which could otherwise reduce the functions and values of the site for the variety of beneficial uses of waters of the U.S. that it supports. The conservation easement or other appropriate legal limitation shall prohibit, without exception, all residential, commercial, industrial, institutional, and transportation development, and any other infrastructure development that would not maintain or enhance the wetland functions and values of the site. Other infrastructure development to be prohibited includes, but is not limited to, additional utility lines, paved maintenance roads, and areas of maintained landscaping for recreation. The California Department of Transportation, shall submit proof of a completed preservation mechanism within one year of issuance of this permit.

12. The permittee shall provide all Caltrans inspectors a copy of this permit with General Conditions and Special Conditions. The permittee shall ensure that all of the above personnel read, understand, agree to, and comply with all terms and conditions of the verification. The permittee shall provide the Corps written confirmation of this special

condition prior to construction, including names phone numbers, and addresses of all of the above personnel, including signatures indicating agreement with all General and Special Conditions of this authorization. As new personnel are brought onto the project during the construction phase, updated written confirmation of this special condition shall be provided to the Corps prior to their involvement in the construction activities. A copy of this permit, with General and Special Conditions, shall be on site at all times during construction activities, and will be made available to all contractors, subcontractors, and forepersons.

13. The permittee shall provide written notification to the Corps of anticipated starting and completion dates of activities authorized by this Individual Permit prior to or within one week of initiating construction.

14. The permittee shall allow Corps representatives to inspect the authorized activities at any time deemed necessary to ensure compliance with permit terms and conditions.

15. The permittee shall ensure that all construction materials, staging, storage, dispensing, furling, and maintenance activities are located in upland areas outside Corps jurisdiction, and that adequate measures are taken to prevent any potential runoff from entering waters of the United States (WUS).

16. The permittee shall not use mechanized equipment below the ordinary high water mark (OHWM), except when necessary in the immediate vicinity of the current authorized activity, in pending or on-going projects to prevent impacts to WUS beyond the authorized project footprint. Mechanized equipment shall be operated, whenever practicable, from the bank above the OHWM, and shall use existing road crossings to traverse WUS when access is necessary.

17. No debris, sand, silt, trash, concrete or washings thereof, oil or other petroleum products or washings thereof, or other foreign materials shall be allowed to enter or be placed where it may be washed by rainfall or runoff waters into WUS. Upon project completion, any and all excess construction materials, debris, and/or other excess project materials shall be removed to an appropriate upland disposal site (not WUS, including jurisdictional wetlands).

18. The permittee shall clearly mark all areas of Corps jurisdiction, including any associated riparian vegetation, that are not to be removed or otherwise adversely impacted during project implementation. Markers and/or barricades shall be clearly located to restrict access and ensure all movement of equipment and personnel to within the authorized construction/impact areas in Corps jurisdiction.

19. The permittee shall install silt fences to trap eroded sediments on-site and to divert runoff around disturbed soils. Silt fences shall also be placed along the tops and toes of slopes of access roads to prevent silt from discharging into WUS.

20. The permittee shall regularly apply water to construction areas to control dust in order to minimize impacts to WUS adjacent to construction areas.

21. The permittee shall ensure that equipment necessary to extinguish small brush fires (from sparking vehicles, etc.) is present on-site during all phases of project activities, along with trained personnel for use of such equipment.

22. All correspondence and submittals shall reference the Corps project name (State Route 905) and File Number *(200952015100--TCD)*, conspicuously on any transmittal letter and/or the first page/paragraph of the text, and on any graphics or photographs. All plans and photographs shall be labeled and dated. Failure to provide this information may cause the Corps to determine that the submittals are incomplete, not submitted by the due date, or non-existent, and therefore, not compliant with permit conditions.

Further Information:

1. Congressional Authorities. You have been authorized to undertake the activity described above pursuant to:

( )Section 10 of the River and Harbor Act of 1899 (33 U.S.C. 403).

(X)Section 404 of the Clean Water Act (33 U.S.C. 1344).

( )Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. Limits of this authorization.

a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.

b. This permit does not grant any property rights or exclusive privileges.

c. This permit does not authorize any injury to the property or rights of others.

d. This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.

e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data. The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).

c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measure ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General condition 1 establishes a time limit for the completion of the activity authorized by this permit. Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give you favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

PERMITTEE

6/12/06
DATE

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

Mark Durham for

David J. Castanon
Chief, Regulatory Branch

12 June 2006
DATE

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

TRANSFEREE

DATE

LOS ANGELES DISTRICT
U.S. ARMY CORPS OF ENGINEERS

CERTIFICATION OF COMPLIANCE WITH DEPARTMENT OF THE ARMY PERMIT

Permit Number: 952015100-TCD

Name of Permittee: California Department of Transportation District 11, MS-46

Date of Issuance: May 18, 2006

Upon completion of the activity authorized by this permit, sign this certification and return it to the following address:

Regulatory Branch - Los Angeles District Office
ATTN: CESPL-CO-R-952015100-TCD
P.O. Box 532711
Los Angeles, California 90053-2325

Please note that your permitted activity is subject to a compliance inspection by an Army Corps of Engineers representative. If you fail to comply with this permit you may be subject to permit suspension, modification, or revocation.

I hereby certify that the work authorized by the above referenced permit has been completed in accordance with the terms and conditions of said permit.

_____ _____

Signature of Permittee Date

DEPARTMENT OF THE ARMY
LOS ANGELES DISTRICT, CORPS OF ENGINEERS
6010 Hidden Valley Road, Suite 105
Carlsbad, California 92011

March 16, 2009

REPLY TO
ATTENTION OF:
Office of the Chief
Regulatory Division

California Department of Transportation, District 11
Attn: Mr. Bruce April
Chief, Environmental Stewardship Branch
PO Box 85406
San Diego, California 92186-5406

Dear Mr. April:

I am replying to your request of March 2, 2009, to amend Permit No. SPL-1995-2015100-TCD which authorized you to discharge fill into waters of the United States associated with the Caltrans/SR 905 Extension Project, in Otay Mesa, San Diego County, California.

Under the provisions of 33 Code of Federal Regulations 325.6(d), the start date is to remain the same and the completion date is extended from March 18, 2009 to March 18, 2011. Although you requested a five year time extension until the year 2013, we are unable to grant you an extension of that period of time due to the potential for additional biological impacts to result from your project over time. You noted that you may need to request a further time extension once the currently approved time extension has expired. At that time we will consider your request. However, it will then be necessary for you to perform biological surveys and submit reports of any biological resources that may exist and may potentially be impacted by the remaining work to be performed by the proposed-to-be-extended project.

The terms and conditions of Permit No. SPL-1995-2015100, except as changed herein, remain in full force and effect.

Please note that a copy of this letter is being forwarded to Mr. Jim Bartel, Field Supervisor, Ecological Services Field Office, U.S. Fish and Wildlife Service, 6010 Hidden Valley Road, Carlsbad, California 92011; U.S. Environmental Protection Agency, Attn: Mr. Tim Vendlinski, Supervisor, Wetlands Regulatory Office (WTR-8), 75 Hawthorne Street, San Francisco, California 94105; California Department of Fish and Game, Attention: Larry Eng, 4949 View Ridge Avenue, San Diego, California 92123; and the California Regional Water Quality Control Board, Attn: John Robertus, 9174 Sky Park Court, Suite 100, San Diego, California 92123-4340.

Thank you for participating in our regulatory program. If you have any questions, please call me at 760.602.4833 or e-mail me at Terrence.Dean@usace.army.mil.

Please be advised that you can now comment on your experience with Regulatory Division by accessing the Corps web-based customer survey form at: http://per2.nwp.usace.army.mil/survey.html.

Sincerely,

Terry Dean
Senior Project Manager
South Coast Branch
San Diego Section

Enclosure(s)

CALIFORNIA DEPARTMENT OF FISH AND GAME
4949 Viewridge Avenue
San Diego, California 92123

Notification No. 1600-2004-0513-R5
September 19, 2005

AGREEMENT REGARDING PROPOSED STREAM OR LAKE ALTERATION

THIS AGREEMENT, entered into between the State of California, Department of Fish and Game, hereinafter called the **Department**, and Ismael Salazar of California Department of Transportation, District 11 (2829 Juan Street, P.O. Box 85406, Mail Station 27, San Diego, CA 92186-5406; 619-688-6766) hereinafter called the **Operator**, is as follows:

WHEREAS, pursuant to Section 1602 of California Fish and Game Code, the Operator, on the 10th day of November, 2004, notified the Department that they intend to divert or obstruct the natural flow of, or change the bed, channel, or bank of, or use material from the streambed(s) of, the following water(s): unnamed tributaries to Tijuana River, San Diego County, California, Sectionalized lands (USGS Map: Otay Mesa; Range 1 West, Township 18 South, Sections 31 – 36, SBM).

WHEREAS, the Department (represented by Kelly Fisher through a site visit on the 5th day of January, 2005) has determined that such operations may substantially adversely affect those existing fish and wildlife resources within unnamed tributaries to Tijuana River, specifically identified as follows: invertebrates: San Diego fairy shrimp *(Banchinecta sandiegonensis)*, Riverside fairy shrimp *(Streptocephalus wootonii)*; amphibians: Pacific tree frog *(Hyla regilla)*, western spadefoot *(Spea hammondii)*; reptiles: California striped racer *(Masticphis lateralis)*, gopher snake *(Pituophis melanoleucus)*, San Diego horned lizard *(Phrynosoma coronatum blainvillii)*, western fence lizard *(Sceloporus occidentalis)*, side-blotched lizard *(Uta stansburiana)*, orange-throated whiptail *(Aspidoscelis hyperythrus beldingi)*, common kingsnake *(Lampropeltis getulus)*, western rattlesnake *(Crotalus viridis helleri)*; birds: pied-billed grebe *(Podilymbus podiceps)*, great egret *(Ardea alba egretta)*, black-crowned night-heron *(Nycticorax nycticorax)*, turkey vulture *(Cathartes aura meridionalis)*, ruddy duck *(Oxyura jamaicensis rubida)*, white-fronted goose *(Anser albifrons frontalis)*, mallard *(Anas platyrhynchos)*, cinnamon teal *(Anas cyanoptera)*, white-tailed kite *(Elanus leucurus)*, northern harrier *(Circus cyaneus hudsonius)*, Cooper's hawk *(Accipiter cooperii)*, red-tailed hawk *(Buteo jamaicensis)*, golden eagle *(Aquila chrysaetos canadensis)*, American kestrel *(Falco sparverius)*, California quail *(Callipepla californica californica)*, American coot *(Fulica americana)*, willet *(Catoptrophorus semipalmatus inornatus)*, greater yellowlegs *(Tringa melanoleuca)*, killdeer *(Charadrius vociferus vociferus)*, Bonaparte's gull *(Larus philadelphia)*, mourning dove *(Zenaida macroura marginella)*, greater roadrunner *(Geococcyx californianus)*, barn owl *(Tyto alba)*, great horned owl *(Bubo virginianus)*, burrowing owl *(Speotyto cunicularia)*, Anna's hummingbird *(Calypte anna)*, Costa's hummingbird *(Calypte costae)*, Nuttall's woodpecker *(Picoides nuttallii)*, northern flicker *(Colaptes auratus)*, Say's phoebe *(Sayornis saya)*, black phoebe *(Sayornis nigricans semiatra)*, Cassin's kingbird *(Tyrannus vociferans vociferans)*, western kingbird *(Tyrannus verticalis)*, loggerhead shrike *(Lanius ludovicianus)*, western scrub jay *(Aphelocoma californica obscura)*, common raven *(Corvus corax clarionensis)*, phainopepla *(Phainopepla nitens)*, hermit thrush *(Catharus guttatus)*, northern mockingbird *(Mimus polyglottus)*, California thrasher *(Toxostoma redivivum)*, Bewick's wren *(Thryomanes bewickii)*, house wren *(Troglodytes aedon parkmanii)*, coastal California gnatcatcher *(Polioptila californica californica)*, bushtit *(Psaltriparus minimus malanurus)*, cliff swallow *(Hirundo pyrrhonta)*, ruby-crowned kinglet *(Regulus calendula)*, wrentit *(Chamaea fasciata henshawi)*, California horned lark *(Eremophila alpestris actia)*, American pipit (*Anthus rubescens pacificus)*, lesser goldfinch *(Carduelis psaltria)*, house finch *(Carpodacus mexicanus frontalis)*, song sparrow *(Melospiza melodia)*, white-crowned sparrow *(Zonotrichia leucophrys)*, lark sparrow *(Chondestes grammacus strigatus)*, southern California rufous-crowned sparrow *(Aimophila ruficeps canescens)*, spotted towhee *(Pipilo maculatus megalonyx)*, California towhee *(Pipilo crissalis)*, orange-crowned warbler *(Vermivora celata)*, yellow-rumped warbler *(Dendroica coronata)*, common yellowthroat *(Geothlypis trichas)*, northern oriole *(Icterus galbula)*, red-winged blackbird *(Agelaius phoeniceus neutralis)*, western meadowlark *(Sturnella*

neglecta), Brewer's blackbird *(Euphagus cyanocephalus)*; mammals: California ground squirrel *(Spermophilus beecheyi)*, San Diego black-tailed jackrabbit *(Lepus californicus bennettii)*, cottontail rabbit *(Sylvilagus audubonnii)*, Botta's pocket gopher *(Thomomys bottae)*, coyote *(Canis latrans)*; riparian vegetation which provides habitat for those species, and all other aquatic and wildlife resources in the project vicinity.

THEREFORE, the Department hereby proposes measures to protect fish and wildlife resources during the Operator's work. The Operator hereby agrees to accept the following measures/conditions as part of the proposed work.

If the Operator's work changes from that stated in the notification specified above, this Agreement is no longer valid and a new notification shall be submitted to the Department of Fish and Game. Failure to comply with the provisions of this Agreement and with other pertinent code sections, including but not limited to Fish and Game Code Sections 5650, 5652, 5937, and 5948, may result in prosecution.

Nothing in this Agreement authorizes the Operator to trespass on any land or property, nor does it relieve the Operator of responsibility for compliance with applicable federal, state, or local laws or ordinances. A consummated Agreement does not constitute Department of Fish and Game endorsement of the proposed operation, or assure the Department's concurrence with permits required from other agencies.

This Agreement becomes effective the date of Department's signature and terminates **July 31, 2010**, for project construction only. This Agreement shall remain in effect for that time necessary to satisfy the terms/conditions of this Agreement.

1. The following provisions constitute the limit of activities agreed to and resolved by this Agreement. The signing of this Agreement does not imply that the Operator is precluded from doing other activities at the site. However, activities not specifically agreed to and resolved by this Agreement shall be subject to separate notification pursuant to Fish and Game Code Sections 1600 et seq.

Project Location and Description

2. The Operator proposes to alter the stream to construct a new six-lane freeway extending approximately from Interstate 805 to the Otay Mesa Border Port of Entry, two auxiliary lanes between Route 125 and Airway Road, and right-of-way for two additional high occupancy vehicle lanes. To construct this freeway, the following drainage improvements will need to be included: replace existing pipe drainages, build retention and detention basins, build bridges, build curb and gutter, and create earthen-bottom drainages. Native riparian habitats found on site include: southern willow scrub, mule fat scrub, freshwater marsh, disturbed wetland, open water, and unvegetated stream.

3. The agreed work includes activities associated with No. 2 above. The project area is located south of Otay Mesa Road between Interstate 805 and Enrico Fermi Drive, in Otay Mesa, San Diego County. Specific work areas and mitigation measures are described on/in the plans and documents submitted by the Operator, including the Route 905 Final Environmental Impact Statement/Report (Caltrans 2004), State Route 905 Jurisdictional Delineation (HELIX Environmental Planning, Inc. 2004), Draft Wetland Mitigation Plan for the State Route 905 Extension Project (Caltrans 2004), Biological Opinion for the State Route 905 Extension Project (US Fish and Wildlife Service, 2004), Revised Impact Figures for Drainage 8 (provided to the Department 7/25/05), and the Notification Package for the State Route 905 Project and shall be implemented as proposed unless directed differently by this agreement.

4. The Operator shall not impact/fill more than 8.364 acres of streambed as a result of constructing the project. The project will result in temporary impacts to 0.02 acre of southern willow scrub and 0.02 acre of streambed, and permanent impacts to 0.38 acre of freshwater marsh, 2.90 acres of southern willow scrub, 1.92 acres of mule fat scrub, 2.91 acres of disturbed wetland, and 0.214 acres of streambed. An additional 0.003 acre (73 square meters) of temporary impact will result from the installation of mitigation at Bonita Meadows due to four temporary crossings.

Mitigation Requirements

5. The Operator shall mitigate for temporary impacts to 0.02 acres of southern willow scrub at a mitigation-to-impact ratio of 1:1 through the restoration of stream morphology to pre-construction conditions and installation of southern willow scrub vegetation where impacts occur.

6. The Operator shall mitigate for temporary impacts to 0.02 acre of streambed at a mitigation-to-impact ratio of 1:1 through the restoration of stream morphology to pre-construction conditions and installation of southern willow scrub vegetation where impacts occur.

7. The Operator shall mitigate for permanent impacts to 2.90 acres of southern willow scrub at a mitigation-to-impact ratio of 2:1 through the creation of 2.90 acres of southern willow scrub and the enhancement, restoration, and/or creation of 2.90 acres of southern willow scrub.

8. The Operator shall mitigate for permanent impacts to 1.92 acres of mule fat scrub at a mitigation-to-impact ratio of 2:1 through the creation of 1.92 acres of riparian scrub and the enhancement, restoration, and/or creation of 1.92 acres of riparian scrub.

9. The Operator shall mitigate for permanent impacts to 0.38 acre freshwater marsh at a mitigation-to-impact ratio of 2:1 through the creation of 0.38 acre of riparian habitat and the enhancement, restoration, and/or creation of 0.38 acre riparian habitat.

10. The Operator shall mitigate for permanent impacts to 2.91 acres of disturbed wetland at a mitigation-to-impact ratio of 1:1 through the creation of 2.91 acres of riparian habitat.

11. The Operator shall mitigate for permanent impacts to 0.214 acres of streambed at a mitigation-to-impact ratio of 1:1 through the creation of 0.214 acres of riparian habitat.

12. The following table summarizes the mitigation obligations contained in Conditions 5 – 11, above.

Impacted Habitat	Restoration of Temporary Impacts	Creation	Creation/Restoration/ Enhancement
Southern Willow Scrub	0.02	2.90	2.90
Mule Fat Scrub		1.92	1.92
Freshwater Marsh		0.38	0.38
Disturbed Wetland		2.91	
Streambed	0.02	0.214	
Total	0.04	8.324	5.20

13. Mitigation shall commence the first summer/fall season prior to, or concurrently with, the start of project construction. Any delay in the installation of mitigation will require an amendment to this Agreement and may result in the application of higher mitigation ratios than are currently required by this Agreement to offset the additional temporal loss of habitat function.

14. The Operator shall submit a Final "Habitat Mitigation Plan for SR-905 Permanent Impacts" for Department review and approval no fewer than 90 days prior to impacting stream and/or associated riparian/wetland habitats. The Operator shall receive Department approval prior to project initiation/impacts. The plan shall be prepared by persons with expertise in southern California ecosystems and native plant revegetation techniques. The plan shall identify those areas that are anticipated to be impacted by the project (including haul routes and staging/storage areas) and shall include, at a minimum: (a) the location of the mitigation site; (b) the plant species to be used, container sizes, and seeding rates; (c) a schematic depicting the mitigation area; (d) planting schedule; (e) a description of the irrigation methodology; (f) measures to control exotic vegetation on site; (g) the method to assess the performance of the revegetated areas and specific success criteria; (h) a detailed monitoring program; (i) contingency measures should the

success criteria not be met; (j) a long-term maintenance provision; and (k) identification of the party or parties responsible for meeting the success criteria and providing for conservation of the mitigation site in perpetuity.

15. The Operator shall submit for the Department's approval Restoration/Revegetation plans for all temporary project impacts to streams and associated wetland/riparian habitats no fewer than 90 days prior to the scheduled/anticipated commencement of stream and/or riparian/wetland habitat restoration work. The plans shall be prepared to customary professional habitat restoration standards, and shall include topographic/grading sheet(s), planting layout sheet(s) with planting palette(s), temporary irrigation (if applicable) sheet(s), and include technical planting details as necessary to fully restore impacted streams and riparian/wetland habitats. Revegetation shall use only native species.

Vegetation, Revegetation and Restoration

16. The Operator shall submit a report to the Department within 90 days of completion of site preparation and planting, acknowledging the completion of the installation phase and documenting the as-built status of the mitigation project. The report shall include a plan or map diagram showing the mitigation area and the final as-built locations of plantings, irrigation, and other installations. Photographs from representative vantage points shall also be included to document the final site conditions.

17. All planting should be done between October 1 and April 30 to take advantage of the winter rainy season.

18. To ensure a successful revegetation effort, all plants shall be monitored and maintained as necessary for a minimum of five years. All mitigation plantings that die during the first year will be replaced. Percent cover for years 2-5 shall be based on transect data collected from an agency-approved appropriate reference site, and this will be detailed in the Final Mitigation Plan. If the survival and cover requirements have not been met, the Operator is responsible for replacement planting to achieve these requirements. Replacement plants shall be monitored with the same survival and growth requirements for 5 years after planting. At the completion of the monitoring period, the mitigation site shall have received NO supplemental irrigation for a period of two consecutive years, nonnative plants shall not make up more than 5% of the entire cover of the site, and the site shall be free of invasive exotic plant species such as tamarisk.

19. The Operator shall have a qualified biologist conduct semiannual surveys of the mitigation area to document the bird, wildlife, and fish use of the site. The surveys shall be conducted in the spring and fall of each year, and at appropriate times of the day. The surveys shall be initiated after the planting/revegetation has occurred and shall continue until the monitoring of the mitigation site is completed or a minimum of 5 years. Semiannual summary reports may be submitted to the Department along with, and/or as a component of, the annual monitoring report.

20. If any sensitive species are observed in project or monitoring surveys, the Operator shall submit a California Native Species Field Survey Form and survey map to the Natural Diversity Database (NDDB) within five working days of the sightings. The form and instructions for completing the form are available on-line at http://www.dfg.ca.gov/whdab/html/by_product_type.html#FieldForms. The form and survey map shall be sent to the Department of Fish and Game, California Natural Diversity Database, 1807 13th Street, Suite 202, Sacramento, CA 95814, with copies sent to the Department at 4949 Viewridge Avenue, San Diego, CA 92123, Attn: Streambed Alteration Program – SAA #1600-2004-0513-R5.

21. An annual report shall be submitted to the Department by January 1 of each year for 5 years after the restoration/planting. This report shall include the survival, % cover, species composition, and a qualitative discussion of the habitat. The number by species of plants replaced, an overview of the revegetation effort,

and the method used to assess these parameters shall also be included. Photos from designated photo stations shall be included.

22. The Operator shall not be released from these maintenance and monitoring obligations until such time as all of the following have occurred:

a. The Operator has requested and received written concurrence from the Department that the success criteria have been met;
b. A Habitat Management Plan has been developed for all mitigation areas;
c. An endowment to fund maintenance in perpetuity has been developed using a PAR analysis; and
d. The mitigation sites have been preserved as wildlife habitat in perpetuity through a mechanism acceptable to the Department.

Work Periods and Time Limits

23. The Operator shall not remove vegetation within the stream from March 15 to September 15 to avoid impacts to nesting birds. However, the Operator may remove vegetation during this time if a qualified biologist conducts a survey for nesting birds within one week of the vegetation removal, and ensures no nesting birds shall be impacted by the project. If nesting birds are present, measures that may be incorporated into the project include: monitoring during grading and construction to ensure no impacts occur to the occupied site; designation of the location as an Environmentally Sensitive Area; and delaying and restricting project activities until nesting/fledging is complete. The appropriate measures to be implemented will be determined in coordination with the Department.

Habitat Protection

24. Prior to any construction, including that related to mitigation activities, the Operator shall install temporary construction fencing to identify the agreed limits of disturbance and prevent damage to adjacent habitat. A qualified biologist shall be onsite during the installation of the temporary construction fencing.

25. All temporary fences, barriers, and/or flagging shall be completely removed from the project site and properly disposed of upon completion of project activities.

26. Disturbance or removal of vegetation shall not exceed the limits approved by the Department. If a stream's low flow channel, bed or banks have been altered, these shall be returned as nearly as possible to their original configuration and width, without creating future erosion problems. Restoration shall include the revegetation of stripped or exposed areas with vegetation native to the area.

27. The work area and/or mitigation site(s) shall be secured from trespass when (as determined in coordination with Department) fish or wildlife resources are vulnerable to damage from unsupervised public access.

28. Temporary fills shall be constructed of nonerodible materials and shall be removed immediately upon work completion.

29. The Operator shall mitigate at a minimum 5:1 ratio for impacts beyond those authorized in this Agreement or in subsequent Amendments. In the event that additional mitigation is required, the type of mitigation shall be determined by the Department and may include creation, restoration, enhancement and/or preservation.

30. The Department recommends the use of native plants to the greatest extent feasible in the landscape areas adjacent and/or near the mitigation/open space and wetland/riparian areas. The Operator shall not plant, seed or otherwise introduce invasive exotic plant species to the landscaped areas adjacent and/or near the mitigation/open space and wetland/riparian areas. Exotic plant species not to be used include those species listed on Lists A & B of the California Invasive Plant Council's list of "Exotic Pest Plants of Greatest Ecological Concern in California as of October 1999." This list includes such species as: pepper trees, pampas grass, fountain grass, ice plant, myoporum, tree of heaven, black locust, capeweed, periwinkle, sweet alyssum, English ivy, French broom, Scotch broom, and Spanish broom. A copy of the complete list can be obtained by accessing the California Invasive Plant Council web site at http://www.caleppc.org.

Structures

31. Installation of bridges, culverts, or other structures shall be such that water flow is not impaired. Bottoms of temporary culverts shall be placed at stream channel grade and bottoms of permanent culverts shall be placed at or below stream channel grade.

32. Storm drain lines/culverts shall be adequately sized to carry peak storm flows. The storm drain lines/culverts and the outfall structures shall be properly aligned within the stream and otherwise engineered, installed, and maintained to assure resistance to washout and to erosion of the stream bed, stream banks, and/or fill. Water velocity shall be dissipated at the outfall to reduce erosion.

33. Any temporary dam or other artificial obstruction constructed shall only be built from materials such as clean gravel which will cause little or no siltation, and shall be approved by the Department prior to construction. Upon completion of the project and after all flowing water in the area is clear of turbidity, the gravel along with the trapped sediment shall be removed from the stream.

34. Flow diversions shall be done in a manner that shall prevent pollution and/or siltation and which shall provide flows to downstream reaches. Flows to downstream reaches shall be provided during all times that the natural flow would have supported aquatic life. Said flows shall be sufficient quality and quantity, and of appropriate temperature to support fish and other aquatic life both above and below the diversion. Diversions shall be engineered, installed, and maintained to assure resistance to washout and erosion of the streambed and banks. Normal flows shall be restored to the effected stream immediately upon completion of work at that location.

Equipment and Access

35. Vehicles shall not be driven or equipment operated in water covered portions of a stream or lake, or where wetland vegetation, riparian vegetation, or aquatic organisms may be destroyed, except as otherwise provided for in the Agreement and as necessary to complete authorized work.

36. If operations require moving of equipment across a flowing stream, such operations shall be conducted without increasing stream turbidity. For repeated crossings, the operator shall install a bridge, culvert, or rock-fill crossing.

37. When work in a flowing stream is unavoidable, the entire stream flow shall be diverted around the work area by a barrier, temporary culvert, new channel, or other means approved by the Department. Location of the upstream and downstream diversion points shall be approved by the Department. Construction of the barrier and/or the new channel shall normally begin in the downstream area and continue in an upstream direction, and the flow shall be diverted only when construction of the diversion is completed. Channel bank or barrier construction shall be adequate to prevent seepage into or from the work area. Channel banks or barriers shall not be made of earth or other substances subject to erosion unless first enclosed by sheet piling, rock rip-rap, or other protective material. The enclosure and the supportive material shall be removed when the work is completed and removal shall normally proceed from downstream in an upstream direction. The Operator shall obtain all written approvals from the Department prior to initiation of construction activities.

38. Any equipment or vehicles driven and/or operated within or adjacent to the stream shall be checked and maintained daily, to prevent leaks of materials that if introduced to water could be deleterious to aquatic life.

39. Stationary equipment such as cranes, motors, pumps, generators, and welders located within or adjacent to the stream shall be positioned over drip pans.

40. The clean-up of all spills shall begin immediately. The Department shall be notified immediately by the Operator of any spills and shall be consulted regarding clean-up procedures.

Turbidity/Siltation

41. Water containing mud, silt or other pollutants from aggregate washing or other activities shall not be allowed to enter a flowing stream or placed in locations that may be subjected to high storm flows.

42. Preparation shall be made so that runoff from steep, erodible surfaces will be diverted into stable areas with little erosion potential. Frequent water checks shall be placed on dirt roads, cat tracks, or other work trails to control erosion.

43. All exposed/disturbed areas within the project site shall be stabilized to the greatest extent possible. Erosion control measures, such as, silt fences, straw hay bales, gravel or rock lined ditches, water check bars, and broadcasted straw shall be used where ever silt laden water has the potential to leave the work site and enter State waters. Erosion control measures shall be monitored during and after each storm event. Modifications, repairs and improvements to erosion control measures shall be made whenever it is needed.

Exotic Species Removal and Pesticide Use

44. Native vegetation shall be adequately identified by a qualified biologist to prevent its disturbance during the enhancement activities.

45. The Operator shall dispose of all nonnative vegetation in a legal manner offsite; in all cases it shall be placed in a location which prevents its reestablishment in the stream and in such a manner so that it does not negatively affect other sensitive native habitat communities. If the Operator determines that the treated non-native vegetation should be left in place, the Operator shall provide the Department a written (letter, fax, E-mail) description of where and why the treated vegetation should not be removed. If the Operator does not receive a written (letter, fax, E-mail) positive response from the Department, the treated exotic vegetation shall be removed.

46. All herbicide use conditions for mixing, application and clean-up shall conform to all applicable federal, State, and local regulations. Nothing in this Agreement represents a pesticide use recommendation that allows for an action that conflicts with pesticide use regulations.

47. Any application of herbicide shall be done by a licensed or certified applicator in accordance with all applicable, federal, state, and local laws.

48. Backpack sprayers may be used in all situations where the exotic plants are growing in small clumps interspersed with the native vegetation and in those situations where truck or ATV access is limited or impossible.

49. The mitigation activities shall be conducted in such a manner to minimize overspray of herbicide onto adjacent native vegetation.

50. A small amount of selective trimming of native species (e.g. willow, oak and sycamore) may occur to prevent overspray of herbicide from reaching these branches, but only as provided within the conditions of this Agreement. Native vegetation may only be trimmed; individual plants shall not be removed. Material in excess of three (3) inches in diameter shall require specific notice to and consultation with the Department.

51. If trimming is necessary, a qualified biological monitor shall be present and/or shall examine the site and mark native vegetation that is to be trimmed with flagging to ensure impacts are within the conditions of this Agreement.

52. Herbicide mixing sites shall only be located in areas devoid of vegetation, and where there is no potential of a spill reaching a vegetated area or a stream, for example avoid mixing at a storm water-inlet.

53. Any herbicide used where there is the possibility that the herbicide could come into direct contact with water shall be approved for use in an aquatic environment (e.g. Rodeo). Great care shall be taken to avoid contact with any native vegetation, and herbicide shall only be applied on calm days to prevent undesired airborne transfer.

Pollution, Litter and Cleanup

54. Staging/storage areas for equipment and materials shall be located outside of the stream.

55. Structures and associated materials not designed to withstand high seasonal flows shall be removed to areas above the high water mark before such flows occur.

56. Raw cement/concrete or washings thereof, asphalt, paint or other coating material, oil or other petroleum products, or any other substances which could be hazardous to aquatic life, resulting from project related activities, shall be prevented from contaminating the soil and/or entering the waters of the state. These materials, placed within or where they may enter a stream/lake, by Operator or any party working under contract, or with the permission of the Operator, shall be removed immediately.

57. Poured concrete shall be excluded from the wetted channel for a period of 30 days after it is poured. During that time the poured concrete shall be kept moist, and runoff from the concrete shall not be allowed to enter a live stream. Commercial sealants (e.g. Deep Seal, Elasto-Deck BT Reservoir Grade) may be applied to the poured concrete surface where difficulty in excluding water flow for a long period may occur. If sealant is used, water shall be excluded from the site until the sealant is dry.

58. No debris, soil, silt, sand, bark, slash, sawdust, rubbish, cement or concrete or washings thereof, oil or petroleum products or other organic or earthen material from any construction, or associated activity of whatever nature shall be allowed to enter into or placed where it may be washed by rainfall or runoff into, waters of the state. When operations are completed, any excess materials or debris shall be removed from the work area. No rubbish shall be deposited within 150 feet of the high water mark of any stream or lake, unless measures are provided to ensure containment.

59. The Operator shall comply with all litter and pollution laws. All contractors, subcontractors and employees shall also obey these laws and it shall be the responsibility of the Operator to ensure compliance.

60. No equipment maintenance shall be done within or near any stream channel where petroleum products or other pollutants from the equipment may enter these areas under any flow.

Other Conditions

61. The Operator shall provide a copy of this Agreement to all contractors, subcontractors, and the Operator's project supervisors. Copies of the Agreement shall be readily available at work sites at all times during periods of active work and must be presented to any Department personnel, or personnel from another agency upon demand.

62. The Department reserves the right to enter the project site at any time to ensure compliance with terms/conditions of this Agreement.

63. The Operator shall notify the Department, in writing, at least five (5) days prior to initiation of construction (project) activities and at least five (5) days prior to completion of construction (project) activities. Notification shall be sent to the Department at 4949 Viewridge Avenue, San Diego, CA 92123, Attn: Streambed Alteration Program – SAA # 1600-2004-0513-R5.

64. All provisions of this Agreement remain in force throughout the term of the Agreement. Any provisions of the Agreement may be amended or the Agreement may be terminated at any time provided such amendment and/or termination is agreed to in writing by both parties. Mutually approved amendments become part of the original Agreement and are subject to all previously negotiated provisions.

65. The Operator may request one extension of this Agreement, if the Operator requests the extension prior to the expiration of its original term. The Department shall grant the extension unless it determines that the Agreement requires modification because the measures contained in the agreement no longer protect the fish and wildlife resources that the activity may substantially adversely affect. In the event the Department makes that determination, the Department shall propose measures intended to protect those resources. If the Operator disagrees with the Department's determination that the Agreement requires modification to protect fish and wildlife resources or with the measures proposed by the Department, the disagreement shall be resolved pursuant to the procedures described in subdivision (b) of Section 1603. The Department may not extend an agreement for more than five years. The original Agreement shall remain in effect until the Department grants the extension request, or new measures are imposed to protect fish and wildlife resources by agreement or through the arbitration process, however, the original Agreement may not remain in effect for more than one year after its expiration date. If the Operator fails to submit a request to extend an agreement prior to its expiration, the Operator shall submit a new notification before commencing or continuing the activity covered by the Agreement. Any activities conducted under an expired agreement constitute a violation of Fish and Game Code Section 1600 et seq.

66. It is understood the Department has entered into this Streambed Alteration Agreement for purposes of establishing protective features for fish and wildlife. The decision to proceed with the project is the sole

responsibility of the Operator, and is not required by this Agreement. It is further agreed all liability and/or incurred cost related to or arising out of the Operator's project and the fish and wildlife protective conditions of this Agreement remain the sole responsibility of the Operator. The Operator agrees to hold harmless the State of California and the Department of Fish and Game against any related claim made by any party or parties for personal injury or any other damages.

67. The Department reserves the right to suspend or cancel this Agreement for reasons including but not limited to the following:

a. The Department determines that the information provided by the Operator in support of the Notification/Agreement is incomplete or inaccurate;
b. The Department obtains new information that was not known to it in preparing the terms and conditions of the Agreement;
c. The project or project activities as described in the Notification/Agreement have changed;
d. The conditions affecting fish and wildlife resources change or the Department determines that project activities will result in a substantial adverse effect on the environment.

68. Before any suspension or cancellation of the Agreement, the Department will notify the Operator in writing of the circumstances which the Department believes warrant suspension or cancellation. The Operator will have seven (7) working days from the date of receipt of this notification to respond in writing to the circumstances described in the Department's notification. During the seven (7) day response period, the Operator shall not continue the specified activities until that time when the Department notifies the Operator in writing that adequate methods and/or measures have been identified and agreed upon to mitigate or eliminate the significant adverse effect.

CONCURRENCE

California Department of Transportation, District 11

X _____ 9-28-05
(Signature) (Date)

X ISMAEL SALAZAR, PM.
(Type or print name and title)

Department of Fish and Game

_____ 9/29/05
(Signature) (Date)

FOR
Michael J. Mulligan, Deputy Regional Manager

Prepared by: Kelly Fisher

California Natural Resources Agency
DEPARTMENT OF FISH AND GAME
South Coast Region
4949 Viewridge Avenue
San Diego, California 92123
(858) 467-4201
www.dfg.ca.gov

ARNOLD SCHWARZENEGGER, Governor

June 15, 2010

Mr. Ismael Salazar
c/o Mr. Bruce April
California Department of Transportation
4050 Taylor Street, Mail Station 242
San Diego, California 92110

Subject: Extension of Lake or Streambed Alteration Agreement
Notification No. 1600-2004-0513-R5
State Route 905

Dear Mr. Salazar:

The Department of Fish and Game ("Department") received your request to extend Lake or Streambed Alteration Agreement ("Agreement") and extension fee, for the above referenced agreement. The Department hereby grants your request to extend the Agreement from July 31, 2010, to July 31, 2015. All other conditions in the original Agreement remain in effect.

Copies of the original Agreement and this letter must be readily available at project worksites and must be presented when requested by a Department representative or other agency with inspection authority.

If you have any questions regarding this matter, please contact me at (858) 467-4207 or kfisher@dfg.ca.gov.

Sincerely,

Kelly Fisher

Ms. Kelly Fisher
Environmental Scientist

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
6010 Hidden Valley Road
Carlsbad, California 92009

In Reply Refer To:
FWS-SDG-2296.5

Mr. Gene K. Fong
Division Administrator
U.S. Department of Transportation
Federal Highway Administration
650 Capitol Mall, Suite 4-100
Sacramento, California 95814

JUL 1 2 2004

Re: Biological Opinion for the State Route 905 Extension Project, San Diego County, California (1-6-04-F-2296.5, File #: 11-SD-905 KP 9.2 - 19.3, EA 093160)

Dear Mr. Fong:

This document transmits the Fish and Wildlife Service's (Service) biological opinion (Opinion) based on our review of the proposed State Route 905 (SR-905) Extension Project (Project) between Interstate 805 (I-805) and the Otay Mesa Port of Entry (POE) in San Diego County, California, and its effects on the federally threatened coastal California gnatcatcher (*Polioptila californica californica*; gnatcatcher) and designated critical habitat for the gnatcatcher, and endangered San Diego fairy shrimp (*Branchinecta sandiegonenis*), Riverside fairy shrimp (*Streptocephalus woottoni*), Quino checkerspot butterfly (*Euphydryas editha quino*; Quino), and San Diego button celery (*Eryngium aristulatum* var. *parishii*; button celery) in accordance with section 7 of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 et seq.). In addition, your letter requests concurrence that the proposed Project may affect, but is not likely to adversely affect, the federally threatened Otay tarplant (*Deinandra conjugens*; tarplant) and spreading navarretia (*Navarretia fossalis*), and endangered California Orcutt grass (*Orcuttia californica*; Orcutt grass) and Otay Mesa mint (*Pogogyne nudiuscula*). Your May 21, 2004, request for formal consultation was received at our office on May 24, 2004.

Within the action area is designated or proposed critical habitat for Quino, tarplant, and Riverside and San Diego fairy shrimp. No primary constituent elements within proposed or designated critical habitat for these species will be impacted by the proposed Project, therefore, critical habitat for Quino, tarplant, and Riverside and San Diego fairy shrimp will not be discussed further. Provided the description of the proposed action and conservation measures described

TAKE PRIDE IN AMERICA

below are implemented, we concur that the proposed Project may affect, but is not likely to adversely affect Otay tarplant, spreading navarretia, California Orcutt grass, and Otay Mesa mint. Therefore, these species will not be addressed in this Opinion. Should Project plans change or if these plant species are detected on-site, this determination may be reconsidered and formal consultation may be required.

This Opinion is based on information provided in the *Biological Assessment* (BA) *State Route 905 Extension*, dated May, 2004 (Caltrans); discussions during site visits to the proposed Project site and Wall Hudson property conducted on February 6, 2003, and May 20, 2004; and the final project description with conservation measures developed in cooperation with Federal Highway Administration (FHWA) and Caltrans.

CONSULTATION HISTORY

Planning for the SR-905 Extension has been ongoing since 1995. In a letter dated April 7, 1995, the Service responded to the February 28, 1995, Notice of Intent to prepare a joint Environmental Impact Report/Environmental Impact Statement (EIR/EIS) for the proposed Project. The FHWA letter, dated May 5, 1995, requested that the Service to be a cooperating Agency for the SR-905 EIR/EIS. Included with this letter was a Fact Sheet for the proposed Project, dated April 1995. On April 12, 1995, the Service provided Caltrans with a species list. The FHWA sent a May 10, 1995, letter to the City of San Diego (City), with a carbon copy to Nancy Gilbert of the Service, iterating the need to analyze wildlife crossings to be consistent with the City's Multiple Species Conservation Program (MSCP). In our May 25, 1995, letter, we agreed to participate as a cooperating agency.

On May 11, 1995, the Service met with the City, Caltrans, U.S. Army Corps of Engineers (ACOE), California Department of Fish and Game (CDFG), Helix Environmental, Inc. (Helix), and Sweetwater Environmental Biologists, Inc (SEB) to discuss wildlife crossings and the City's preserve design. On June 7, 1995, Caltrans issued a letter discussing the results of the May 11, 1995, meeting. On June 10, 1995, the City sent a letter to Caltrans, with a carbon copy to the Service, discussing the Otay Mesa Wildlife Connection. On June 15, 1995, the Service met with Caltrans, the City, ACOE, U.S. Environmental Protection Agency (EPA), Helix, and SEB to discuss three Project alternatives (north, central and south) and the status of other development in the area. On June 20, 1995, the Service met with Caltrans, SEB and Helix to discuss the status and results of fairy shrimp and Quino surveys. On September 19, 1995, the Service met with the City, Caltrans, SEB, CDFG, ACOE, and Helix to continue discussions on the wildlife crossings and alternatives development. On March 4, 1997, Caltrans sent a letter to the Service regarding the establishment of the Cal Terraces Vernal Pool Preserve which lies within the alignment of the northern alternative. This letter also discussed the alignment of the southern alternative and the impacts the MSCP preserve around Spring Canyon. The alignment of the central alternative was suggested as the best vernal pool avoidance alternative based on technical studies (RECON 1994, Helix 1995). The figure attached to the letter presented three alignments for the central alternative and the impacts to vernal pools from each alignment.

On March 19, 1997, the Service met with Caltrans, FHWA, EPA, Helix, ACOE, SEB, and the City to further discuss alignments for the central alternative with regards to endangered species issues. In our May 14, 1997, letter, the Service concurred with moving forward with the three alternatives developed through early coordination. The Service's May 14, 1997, letter to the City concurred with the three alignments presented in the figures and data for the proposed central alternative provided by Helix. On February 10, 1998, the Service received the draft biological impact maps generated by Helix. The April 27, 1998, Caltrans letter to the Service initiated the National Environmental Policy Act and Clean Water Act Section 404 Integration Process (NEPA/404 Integration Process) and requested our concurrence with the basic Purpose and Need and criteria for alternative selection. Attached to this letter was a history of the collaborative effort to date. On July 15, 1998, we responded that we will continue to participate in the NEPA/404 Integration Process. In this letter, we concurred with the basic Purpose and Needs and we referenced the issues addressed in our May 14, 1997, letter regarding our position on the alternatives as it relates to the three alignment variations. However, we did not address the proposed alignment project designs. Instead, we stated that more information was needed to analyze the preferred alternative and alignments.

On May 18, 1999, the Service provided Caltrans with an updated species list. On November 16, 2000, the Service met with the ACOE, CDFG, Caltrans, the County of San Diego, EPA, FHWA, and City to discuss final issues before completing the draft EIR/EIS and circulating for public review. In a January 2, 2001, Memorandum to the Resource Agencies, Caltrans provided responses to Resource Agency comments discussed during the November 16, 2000, meeting. In their February 27, 2001, letter, Caltrans requested to withdraw from the NEPA/404 Integration Process since potential wetland impacts from the preferred alternative were below 0.5 acres and these impacts would potentially qualify for a Nationwide Permit from the ACOE. In our May 15, 2001, electronic mail message to Caltrans, we deferred to the ACOE and EPA for withdrawal from the NEPA/404 Integration Process. We also recommended that a variety of alignments be examined within the preferred alternative, a bridge be constructed over Spring Canyon, the need for the proposed interchange at Heritage Road be fully addressed, and the Project area be surveyed for Quino.

On September 26, 2001, the Service met with the City, Caltrans, FHWA, EPA, CDFG, and McMillan Biological consulting to review the Wall-Hudson property as a parcel to offset impacts from the proposed Project. On October 2, 2001, we submitted a letter to FHWA addressing our comments and concerns on the draft EIR/EIS for the proposed Project. During telephone discussions in August 2002, the Service iterated the need to revegetate the corridor with native species and to strictly avoid the use of non-native plant species, and particularly invasive exotic plant species, in areas adjacent to the MHPA. In response to a Caltrans January 30, 2003, request, the Service supplied an updated species list on March 6, 2003. On February 6, 2003, the Service met with Caltrans for a site review of both the proposed Project alignment and the Wall-Hudson property.

On October 1, 2003, the FHWA sent a letter to the Service stating that the wetland impacts exceeded the 5-acre threshold for implementing the NEPA/404 Integration Process. This was due to incorrectly defining jurisdictional wetlands as per the ACOE regulatory definitions. The

October 1, 2003, letter requested that the Project not be required to reenter the NEPA/404 Integration Process. The Service coordinated with the ACOE and EPA and we requested information from Caltrans on this issue. This information was never provided and we continued to defer to the ACOE and EPA on the status of the NEPA/404 Integration Process. On May 20, 2004, the Service met with Caltrans staff to conduct a field review of the conservation strategy for the proposed Project. In your May 21, 2004, letter, you requested initiation of formal consultation. On June 1, 2004, we concurred that the proposed State Route 905 (SR 905) Project does not need to be further reviewed through the NEPA/404 Integration Process.

BIOLOGICAL OPINION

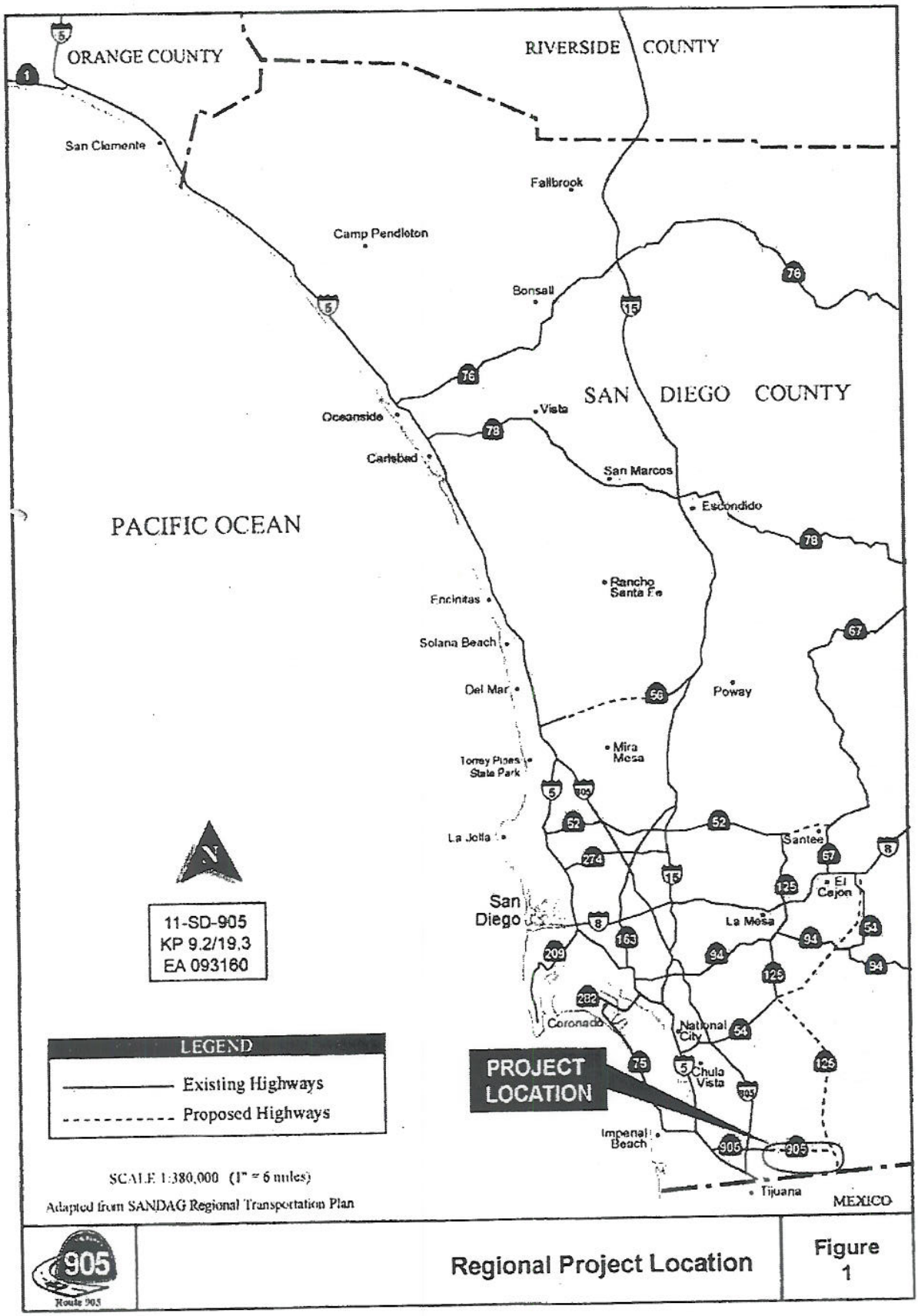
DESCRIPTION OF THE PROPOSED ACTION

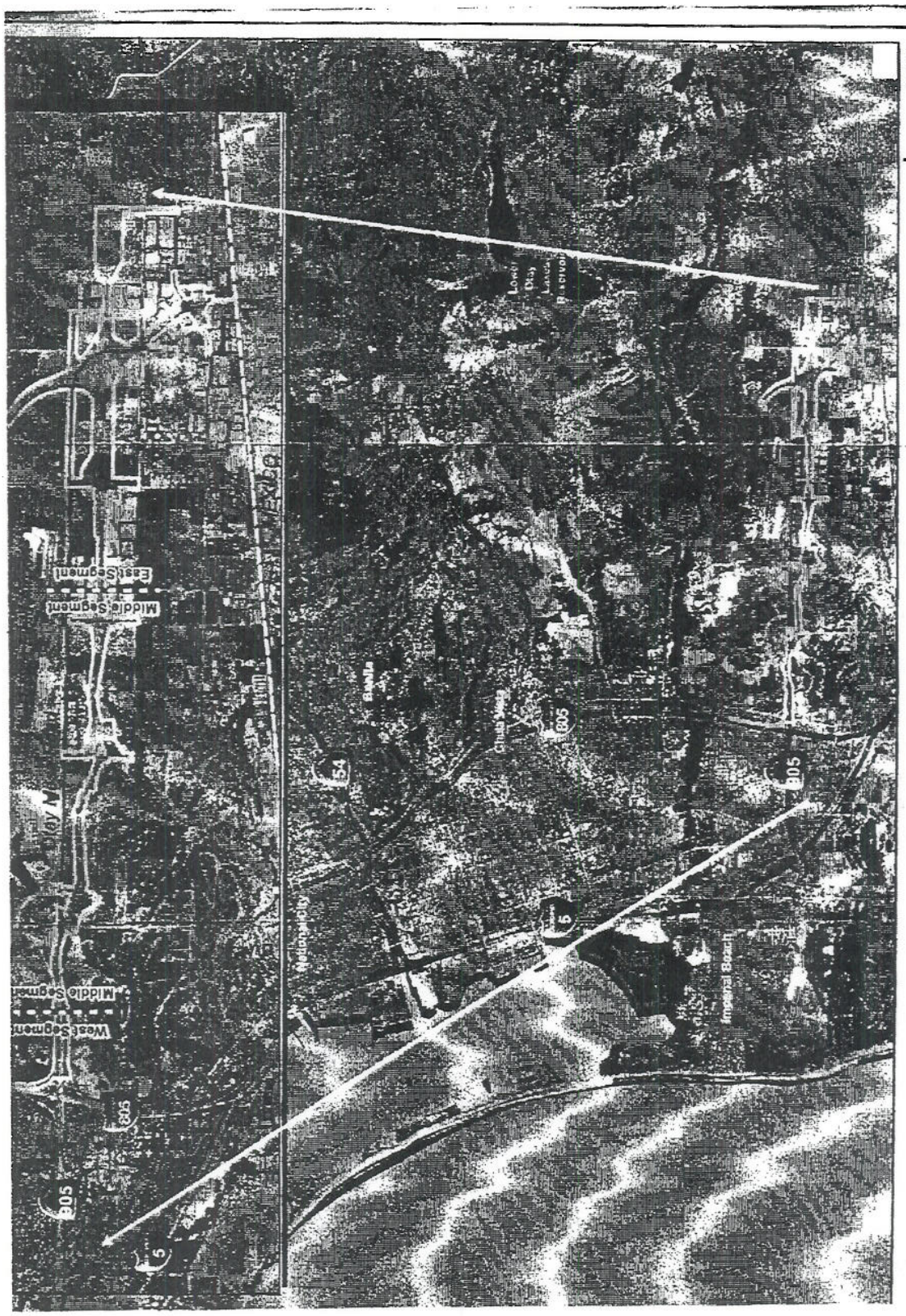
Caltrans and FHWA propose to construct the extension of SR-905 from approximately I-805 to the Otay Mesa Point-of-Entry (POE) in southern San Diego County, California (Figure 1). The past widening of Otay Mesa Road has increased roadway functioning; however, the corridor is projected to reach capacity by the year 2005. The primary purpose of the Project is to: reduce traffic congestion; provide for effective transportation of people, goods, and services; and improve the mobility of local, regional, interregional, and international traffic between I-805 and the Otay Mesa POE. Overall, the extension of SR-905 will offset congestion on Otay Mesa Road and allow direct access to I-805 and I-5. Inadequate transportation services currently exist in the Otay Mesa region of San Diego County and conditions will continue to deteriorate without proper improvements. In addition, the proposed Project will bypass all developments and Brown Field Airport along Otay Mesa Road, allowing for improved functioning of SR-905, and likely reducing the accident rate in Otay Mesa.

The proposed Project will construct a new six lane (three lanes in each direction) freeway, as well as sufficient right-of-way (ROW) to accommodate two, future HOV lanes in the median (Figure 2). The total roadway length will be approximately 6.2 miles, with a ROW area requirement of approximately 314 acres. The west end of the existing Otay Mesa Road will be terminated in a cul-de-sac approximately 1,150 feet west of the proposed intersection with Caliente Avenue. The Project boundaries will be fenced along the north and south ROW lines of the alignment. Local interchanges will be provided at Caliente Avenue, Heritage Road, Britannia Boulevard, and La Media Road, with additional improvements in the vicinity of Siempre Viva Road. A freeway-to-freeway interchange will be constructed at State Route 125 (SR-125). The current schedule indicates that project-related work will commence in the fiscal year 2004/2005 and require approximately five years for the completion of all roadway features.

The major roadway design elements of the proposed Project are as follows:

- A 2,400-foot long auxiliary lane that will be constructed along northbound I-805 between Palm Avenue and the westbound SR-905 to northbound I-805 connector to accommodate merging traffic from westbound SR-905.


ORANGE COUNTY
RIVERSIDE COUNTY
SAN DIEGO COUNTY
PACIFIC OCEAN
San Clemente
Fallbrook
Camp Pendleton
Bonsall
Oceanside
Vista
Carlsbad
San Marcos
Escondido
Rancho Santa Fe
Encinitas
Solana Beach
Del Mar
Poway
Mira Mesa
Torrey Pines State Park
La Jolla
Santee
El Cajon
San Diego
La Mesa
Coronado
National City
Chula Vista
Imperial Beach
Tijuana
MEXICO
11-SD-905
KP 9.2/19.3
EA 093160
LEGEND
Existing Highways
Proposed Highways
PROJECT LOCATION
SCALE 1:380,000 (1" = 6 miles)
Adapted from SANDAG Regional Transportation Plan
905
Route 905
Regional Project Location
Figure 1



Project Vicinity Map

Figure 2

- A total of four lanes in each direction along SR-905, immediately east of I-805 to provide connections to and from I-805. The southbound I-805 to eastbound SR-905 connector will remain as two lanes. SR-905 will transition to three lanes in each direction at the Caliente Avenue Interchange.

- Modification of the westbound SR-905 to northbound I-805 direct connector to allow for a two-lane exit and a two-lane entrance.

- A 1.2-mile long westbound truck climbing lane that will be constructed from the northbound I-805 to eastbound SR-905 connector ramp to just east of Caliente Avenue.
- Diamond-type interchanges that cross over the SR-905 facility will be constructed at Caliente Avenue and Britannia Boulevard.

- The future Heritage Road interchange will incorporate loop ramps on the eastbound exit and westbound entrance. All access will be from the east of Heritage Road to minimize impacts to Spring Canyon.

- A Park-and-Ride lot, with provisions for public bus service, will be constructed in the northwest quadrant of the Caliente Avenue interchange and provide approximately 210 parking spaces within a 2.2-acre lot.

- South of Otay Mesa Road, SR-905 will interrupt Cactus Road. North of the freeway, Cactus Road will terminate in a cul-de-sac. On the south side of SR-905, a two-lane frontage road will maintain existing circulation by connecting Gateway Park Drive to Cactus Road.

- All utilities will be relocated within the proposed Project's disturbance footprint in coordination with the responsible utility companies. There will be no utility relocations near sensitive biological resources (i.e., the I-805/SR-905 interchange, Spring Canyon, and La Media Road).

- All staging areas and access routes will be placed entirely within the proposed Project footprint.

- Two parallel bridge structures will traverse Spring Canyon, which serves as the primary MSCP wildlife corridor in the Otay Mesa area. Each bridge will be centrally supported by columns to minimize impacts to waters of the U.S. within the canyon. The westbound bridge will be 253 feet long, 62 feet wide, and 5 feet deep. The eastbound bridge will be approximately 180 feet long, 62 feet wide, and 8 feet deep. The minimum clearance from the canyon bottom to the base of each bridge will be 27 feet.

- A minimum 6-foot high fence will follow the length of the alignment on both sides to preclude human access into the adjacent habitat and prevent wildlife from traversing the freeway. The fence will be buried to a depth of approximately 1-foot (only near the wildlife crossing) to prevent animals from digging under the barrier.

- The Otay Corporate Center South (OCCS) vernal pool preserve will be connected to Spring Canyon (on the south side) by an approximately 300-foot long and 5-foot high culvert extending under the freeway. In addition, a fenced/protected wildlife corridor (consisting of a detention basin and native vegetation) will be maintained between the OCCS and Spring Canyon (to the west side), that will be approximately 164 feet wide and 984 feet long.

- Construction will include approximately 23,190 linear feet of fill slope, with the largest slope being approximately 5,900 feet long and 98 feet high near the SR-905/SR-125 Interchange. An estimated 16,300 linear feet of cut slope will be required, with maximum heights of approximately 65 feet.

- A two-quadrant clover leaf interchange will be built at La Media Road.

- Otay Mesa Road will be widened to six lanes plus the width required for double left turn lanes within the ROW for the SR-125 Interchange with Otay Mesa Road. In addition, the Otay Mesa Road undercrossings will be constructed to accommodate future installation of the light rail transit extension. East of the interchange, Otay Mesa Road will be widened to four lanes between the SR-125 ROW and Sanyo Avenue. The unfinished portion of Sanyo Avenue will be widened from two to four lanes, for approximately 1,900 feet, between Otay Mesa Road and Airway Road.

- A four-lane access ramp will extend approximately 1.2 miles east from the SR-905/SR-125 Interchange to Enrico Fermi Drive. To minimize impacts to existing, adjacent industries, retaining walls up to 21 feet high will be constructed adjacent to the road, extending from Sanyo Road east for approximately 1,300 feet. Grading for the proposed local access ramp will include an adjacent material site just west of the intersection with proposed Enrico Fermi Drive. Each side of the roadway will be inclined at a 1:6 (V:H) slope and contour graded to blend with the existing terrain. The operation will generate sufficient fill material to balance the earthwork for the alignment. A temporary construction easement will allow excavation of the area outside the ROW. Additionally, a connection is proposed for westbound traffic on the local access ramp to northbound SR-125.

- SR-125 has been scheduled for completion prior to the conclusion of SR-905. The plans for SR-125 anticipate an at-grade connection at Otay Mesa Road. The proposed SR-905 will include a multi-level SR-905/SR-125 Interchange, with connectors for southbound SR-125 to westbound SR-905, eastbound SR-905 to northbound SR-125, southbound SR-125 to eastbound SR-905, and westbound SR-905 to northbound SR-125. A number of bridge structures will be required for the various ramp and roadway crossings. The SR-905 to SR-125 Interchange will necessitate removal of some facilities, including the interim SR-905 between Airway Road and Otay Mesa Road.

- Relocation of overhead electric power lines will be required along the east side of Harvest Road.

- Harvest Road will be permanently closed between Otay Mesa Road and Airway Road, with local access from Otay Mesa Road for properties abutting Harvest Road north of the SR-905/SR-125 Interchange.

- Permanent low sodium lights will be installed at all interchanges. High pressure lighting will be used to illuminate overhead directional signs. The direction of the high pressure lighting will be focused up on the signs and away from all sensitive biological resources. No permanent lights will be installed adjacent to sensitive biological resources, except one low sodium light required by Caltrans safety standards approximately 65 feet north of the San Diego button-celery preserve along La Media Road.

Soil sampling and geotechnical borings will be required at various locations within the Project footprint. A mud-rotary drilling technique will be used to bore holes approximately 4 inches in diameter to a maximum depth of 150-200 feet. In addition, test pits will be excavated near/adjacent to the borings to acquire other soil information. An area approximately 10 feet by 10 feet will be sliced with a backhoe, the samples collected, and the site backfilled with the remaining soils. Work at each location could require a maximum of 2 months and will not be expected to involve any nighttime drilling/excavating. Equipment used in the these operations will be stored or staged at a local Caltrans maintenance yard.

All impacts occurring within the proposed Project footprint have been assessed as permanent impacts, with the exception of the two bridge crossings at Spring Canyon. At the proposed Spring Canyon bridges, permanent impacts will be generated from pier construction and the effects of shading, and will be compensated with habitat creation/restoration. At Spring Canyon, temporary impacts will be generated from clearing within the project footprint, and all temporary impacts will be revegetated upon Project completion.

Through negotiations with the Service and other Resource Agencies, the proposed Project footprint was moved to the north of the J14 vernal pool complex on the mesa above Spring Canyon. Additional design features to avoid the J14 vernal pool complex include: placing the road surface below the existing topography as it approaches the Spring Canyon bridge; revegetating the cutslope and temporary disturbance areas with native plant species; recontouring the top of the cutslope to maintain surface water drainage patterns; and implementing best management practices (BMPs) to prevent soil from eroding and depositing in vernal pools within the J14 vernal pool complex.

The proposed Project will permanently impact 9.45 acres of maritime succulent scrub (MSS), 29.02 acres of Diegan coastal sage scrub (CSS), 134.1 acres of non-native grassland, 0.14 acre of vernal/road pool, 12.15 acres of wetlands and waters of the U.S./State of California, 0.31 acres of non-jurisdictional wetlands, 32.7 acres of agriculture, 9.3 acres of non-native vegetated communities, 309 acres of disturbed land, and 223.9 acres of developed land (Table 1). The proposed Project will permanently impact 31.67 acres of Multiple Habitat Planning Area (MHPA) of the MSCP. Proposed temporary impacts to 2.55 acres at the Spring Canyon bridges include 0.93 acre of MSS, 0.81 acre of CSS, 0.02 acre of southern willow scrub, 0.02 acre of

Table 1. Permanent impacts by habitat type for the proposed SR-905 Extension Project.

Habitat Type	Permanent Impacts (acres)*	Permanent Impacts w/in MHPA (acres)*	Mitigation Ratio	Total Compensation (acres)	Mitigation Location
Maritime Succulent Scrub	Direct: 3.2 Temporal/ Indirect: 6.25	Direct: 2.7 Temporal/ Indirect: 5.88	Direct: 2:1 Temporal/ Indirect: 1:1	Direct: 6.4 Temporal/ Indirect: 6.25	Wall-Hudson 12.65 acres
Coastal Sage Scrub	Direct: 12.3 Temporal/ Indirect: 16.72	Direct: 2.9 Temporal/ Indirect: 14.76	1:1	Direct: 12.3 Temporal/ Indirect: 16.72	Wall-Hudson 29.02acres
Non-native grassland	134.1	5.3	0.5:1	67.1	Wall-Hudson 22.4 acres, Bonita Meadows 44.7 acres
Vernal Pool (VP) and Road Pool (RP) w/fairy shrimp, Watershed (WS)	VP: 0.11 RP: 0.03	VP: 0.05	VP: 3:1 RP: 2:1 WS: 10:1	VP: 0.33 RP: 0.06 WS: 3.90	Wall-Hudson 0.39 acre of VP surface area with 3.9 acres of contributing watershed for a total of 4.29 acres
Quino checkerspot butterfly habitat**				VP: 0.51 WS: 4.15	Wall-Hudson 0.51 acre of VP surface area with 4.15 acres of contributing watershed for a total of 4.66 acres
Freshwater Marsh	0.40		2:1	0.80	La Media Road and Bonita Meadows 0.80 acre
Southern Willow Scrub	3.10	0.03	2:1	6.20	La Media Road and Bonita Meadows 6.20 acres
Mulefat Scrub	1.98	0.05	2:1	3.96	La Media Road and Bonita Meadows 3.96 acres
Disturbed Wetlands	3.02		1:1	3.02	La Media Road and Bonita Meadows 3.02 acres
Seasonal pond/ linear streambed	3.96		1:1	3.96	Bonita Meadows 3.96 acres

* Unless otherwise noted, all impacts are direct.

** Unquantified impacts to Quino will be offset by restoring Quino habitat at Wall-Hudson.

seasonal pond/linear streambed, 0.52 acre of non-native grassland, and 0.25 acre of disturbed habitat.

Restoration activities (grading, planting, weeding) will occur at the Wall-Hudson property (Wall-Hudson), Bonita Meadows Open Space Preserve (Bonita Meadows), and the on-site La Media drainage (Figure 3). On Wall-Hudson, approximately 9.06 acres of mesa top, consisting of north and south fingers extending into Dennery Canyon currently support degraded vernal pools, non-native grasslands, and MSS. Grading to restore vernal pools will occur within and around the degraded vernal pools on the mesa top. In addition, seed of native threatened, endangered, and sensitive vernal pool/upland plant species will be collected from adjacent off-site areas, and dispersed throughout the enhanced pools and associated watersheds. Restoration grading at Bonita Meadows will occur in select areas along the un-named creek flowing through the property. Restoration at the La Media drainage will entail constructing a new drainage facility and planting/seeding with native species.

Action Area

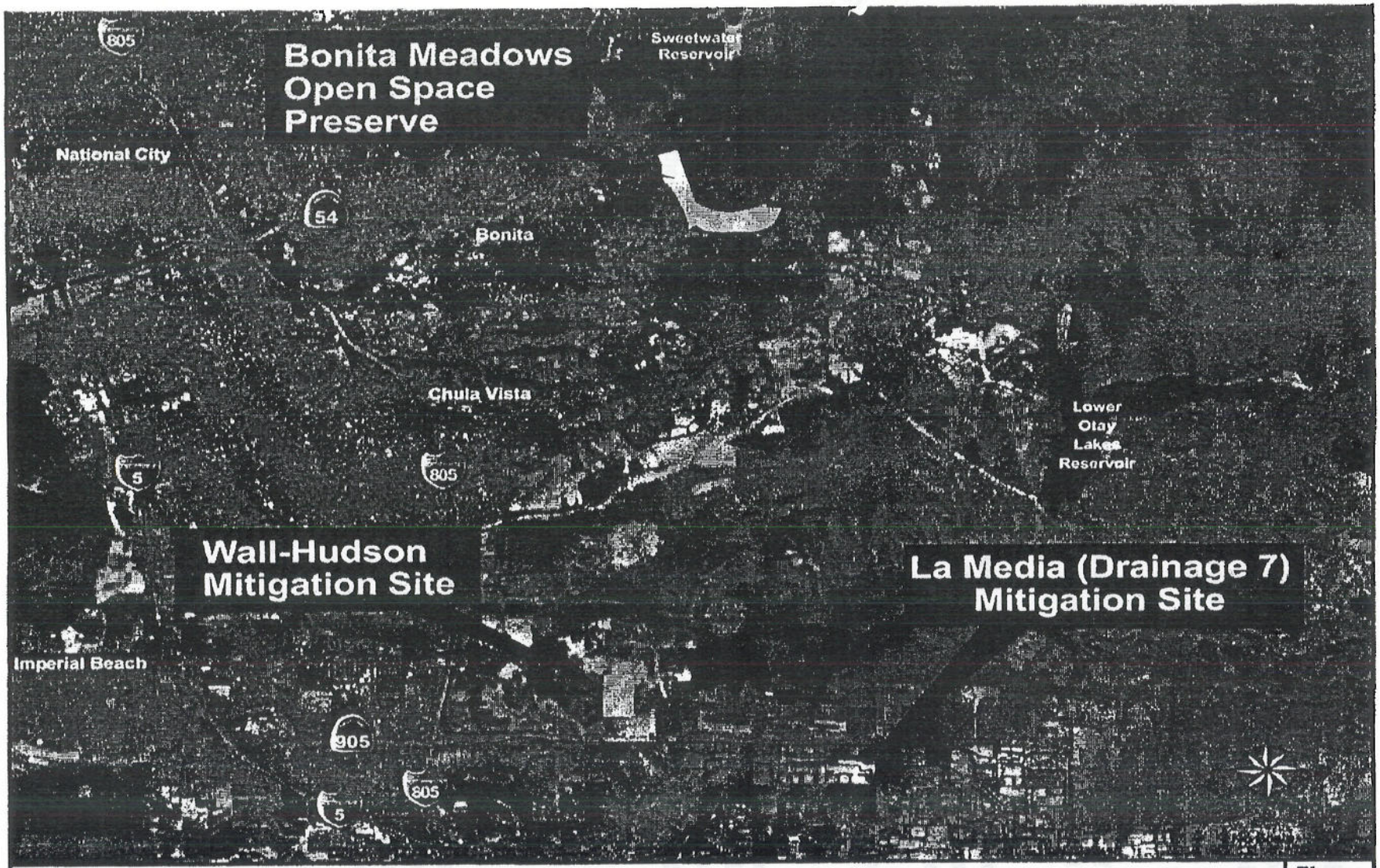
The Service describes the action area to include the general area surrounding Otay Mesa, and the Bonita Meadows Open Space Preserve immediately north of the City of Chula Vista Sub-area planning area within unincorporated San Diego County.

Conservation Measures

The proposed action includes the following conservation measures which will be implemented to avoid or otherwise minimize potential adverse effects of the action on federally listed species:

1. To offset impacts from clearing 12.3 acres of CSS, 3.2 acres of MSS and 134.1 acres of non-native grassland, 12.3 acres of CSS (1:1 ratio), 6.4 acre of MSS (2:1 ratio), and 22.4 acres (0.5:1 ratio) of non-native grassland, respectively, will be preserved at Wall-Hudson. The remaining 44.7 acres of non-native grassland will also be preserved at Bonita Meadows. To offset impacts to 0.11 acre of vernal pool and 0.03 acre of road pool with fairy shrimp, 4.29 acres of habitat including 0.39 acre of vernal pool surface area and 3.9 acres of contributing watershed will be enhanced/restored at Wall-Hudson. Approximately 0.113 acre of existing vernal pool surface area will be enhanced and an additional 0.277 acre of vernal pool surface area will be restored.

2. To offset impacts to ACOE and CDFG regulated wetlands/waters, and non-jurisdictional wetlands, 0.80 acre of freshwater marsh, 6.2 acres of southern willow scrub, 3.96 acres of mulefat scrub, 3.02 acres of wetlands and 3.96 acres of seasonal pond/linear streambeds will be enhanced/restored at La Media Drainage and Bonita Meadows. A wetland enhancement/restoration plan will be approved by the Service and other Resource Agencies prior to the start of Project construction.



Adapted from AMEC's SR-905 Project Survey Area & Alignment Alternatives Map

Project Mitigation Sites

Figure 3

f. Enhancement/restoration success will be determined by measuring the ponding of water; and density of viable cysts, hatched fairy shrimp, and gravid females, within the enhanced/restored ponds. Water measurements will be taken in the enhanced/restored ponds to determine the depth, duration and quality (i.e., pH, temperature, total dissolved solids, and salinity) of ponding. Dry samples will be taken in the enhanced/restored pools to determine the density of viable cysts in the soils. Wet samples will also be taken in the enhanced and restored pools to determine the density of hatched fairy shrimp and gravid females. The enhanced and restored pools must pond for a period of time similarly to reference vernal pools during an average rainfall year and at an appropriate depth and quality to support fairy shrimp. The enhanced and restored pond's average viable cyst, hatched fairy shrimp, and gravid female density must not differ significantly ($p<0.05$) from reference pools for at least three wet seasons before a determination of success can be made.

g. Native plants and animals will be restored within the enhanced and restored pools and their watersheds. This can be accomplished by redistributing topsoil containing seeds, spores, bulbs, eggs, and other propagules from adjacent vernal pool and upland habitats; by the translocation of propagules of individual species from off-site habitats; and by the use of commercially available native plant species. Topsoil and plant materials from the native habitats to be impacted on-site will be applied to the watersheds of the enhanced and restored pools to the maximum extent practicable. Exotic weed control will be implemented within the restoration areas to protect and enhance habitat remaining on-site. The Plan will include success criteria for restoring native plants and animals.

h. A 6-year maintenance and monitoring program for the enhanced and restored pools and their contributing watersheds. The monitoring program will consist of quantitative hydrological, viable cyst, hatched fairy shrimp, and gravid female measurements as required in measure 5.f., complete floral and fauna inventories, quantitative vegetation transects, and photographic documentation.

i. If a performance criterion as defined in 5.f. is not met for any of the enhanced and restored pools in any year, or if the final success criteria are not met, the Project proponent will prepare an analysis of the cause(s) of failure and, if deemed necessary by the Service, propose remedial actions for approval. If any of the enhanced/restored pools have not met a performance criterion during the initial 6-year period, the Project proponent's maintenance and monitoring obligations will continue until the Service deems the enhancement/restoration successful, or contingency measures must be implemented.

j. Perimeter fencing on the west side of the mesa top at Wall-Hudson will be installed prior to Project construction.

9. Within the proposed Project footprint, the soil of all pools supporting San Diego or Riverside fairy shrimp will be salvaged and stored off-site. Vernal pool soil (inoculum) will be collected when dry to avoid damaging or destroying fairy shrimp cysts. A hand trowel or similar instrument will be used to collect the inoculum. Whenever possible, soil will be collected in chunks. The trowel will be used to pry up intact chunks of soil, rather than loosening the soil by raking and shoveling.

The soil from each pond will be stored individually in labeled boxes that are adequately ventilated and kept out of direct sunlight in order to prevent the occurrence of fungus or excessive heating of the soil, and stored off-site at an appropriate facility for vernal pool inoculum. Soil will not be collected from any on-site ponds until approved by the Service. Soil collected from pools only containing San Diego fairy shrimp (pools 2, 55, and 58) will be stored off-site until an appropriate location on Otay Mesa near Spring Canyon is found to accept the inoculum from the proposed Project, as coordinated and approved by the Service.

The salvaged soil from pool 7 containing both Riverside and San Diego fairy shrimp cysts will be used to inoculate restored pools at Wall-Hudson. Following the Wall-Hudson restoration plan, the restored pools to be inoculated with Riverside fairy shrimp will be recontoured deep enough to pond water long enough to support Riverside fairy shrimp. Inoculum will not be introduced into the restored pools until after the restored ponds have been demonstrated to retain water for a minimum of 60 days, and will be placed in a manner that preserves, to the maximum extent possible, the orientation of the fairy shrimp cysts within the surface layer of soil (e.g., collected inoculum will be shallowly distributed within the pond so that cysts have the potential to be brought into solution upon inundation).

10. Prior to any disturbance to pool 56, all seed from button celery plants will be collected, placed in paper bags, and stored in a cool, dry location following Service recommended guidelines (e.g. Center for Plant Conservation). The topsoil from the vernal pool will be salvaged, stockpiled, and redistributed into enhanced pools on Wall-Hudson. The collected seed will be sown/broadcast in the same locations as the reapplied soil or onto other appropriate habitat. All plants will be removed with hand tools by digging up the root system and surrounding soil. These individuals and their associated soil will be placed in temporary containers and stored out of direct sunlight. All individuals will be replanted within the post-grading, upper pool margins at Wall-Hudson. Button celery propagules will not be introduced into the restored pools until after the pools have been demonstrated to retain water for a minimum of 60 days. Salvaged plants will be planted to the same rooting depth as existed in the original pool.

Button celery seed collected from pool 56 will be introduced along the upper margins of all enhanced and restored pools once these restored/enhanced pools meet first year hydrology success criteria as per the approved restoration plan. Some seed will be stored off-site and according to horticultural practices. This seed will be used to inoculate the enhanced and restored pools in the event that initial inoculation fails. If the initial

inoculation is successful, then the seed can be used for off-site restoration activities within the Dennery Canyon/Spring Canyon watersheds as approved by the Service. The final details of the restoration effort will be outlined in the Service approved restoration plan for Wall-Hudson.

11. Impacts from fugitive dust will be offset though implementation of Caltrans Standard Specifications, including Section 7-1.01F Air Pollution Control, Section 10 Dust Control, Section 17 Watering, and Section 18 Dust Palliative. The Project biologist will periodically monitor the work area to ensure that construction-related activities do not generate excessive amounts of dust or cause other disturbances. Erosion control measures will be regularly checked by Caltrans inspectors, the biologist, and/or Resident Engineer (RE).

12. During construction and operation, runoff generated by the proposed Project will be channeled to detention basins as a means of preventing contaminated discharge from potentially entering nearby sensitive habitat. BMPs to address erosion and excess sedimentation will be incorporated into the Project plans. Measures that could be implemented include silt fencing, gravel bags, hay bales, fiber rolls, native plantings, retaining walls or other slope stabilizing techniques, and protection/velocity dissipation at drainage outlet points. Vegetation filters, such as swales or biostrips may also be used to remove sediment and other contaminants from runoff prior to off-site flow.

13. BMPs employed during construction and operation will follow the applicable Caltrans guidelines and be detailed in the Project's Storm Water Management Plan, Storm Water Pollution Prevention Plan, and Water Pollution Control Program. Specific plans will be reviewed by a biologist and modified, if necessary, prior to implementation. The biologist will have the ability to suggest changes to reduce the probability of erosion/siltation or spills of chemicals/fuels that could potentially affect sensitive habitat areas, including, but not limited to, vernal pool basins and watersheds, and rare plant populations. Photographs of installed BMPs will be submitted to the Service at least seven days prior to initial grading and clearing.

14. No invasive, exotic plant species will be seeded or planted adjacent to or near sensitive vegetation communities or waters of the U.S. In compliance with Executive Order 13112, temporarily disturbed areas will be reseeded with plant species native to the local habitat types. Species identified on Lists A & B of the California Exotic Pest Plant Council's list of Exotic Pest Plants of Greatest Ecological Concern in California as of October 1999 will be avoided to the extent practicable. Areas hydroseeded for temporary erosion control will use native plant species, as well.

15. Temporary disturbance to both upland and riparian habitat, within Spring Canyon, will be offset through native revegetation of the area upon completion of the two bridges. All seeding/planting will occur on-site within the disturbed habitat and involve replacement with in-kind/similar species, to the maximum extent practicable, or with appropriate native species, in locations where exotics were previously established. All revegetation

efforts in areas that drain directly into the MHPA or sensitive habitats will follow the Service approved restoration/mitigation plans for uplands and wetlands.

Any graded habitat (e.g., slopes, ROW) adjacent to the Spring Canyon corridor or within/near the MHPA (including the La Media drainage) will be revegetated with an appropriate native plant mix. The proposed seed palette and revegetation methods (e.g., hydroseeding, planting, duff, irrigation) will be developed in coordination with the Service and a Caltrans biologist, prior to the start of construction.

16. Revegetation with native plant species will follow grading (where applicable) and be accompanied with periodic monitoring and maintenance to ensure adequate coverage, and prevent erosion and siltation into adjacent biologically sensitive areas. Native seed will be incorporated into the Bonded-Fiber-Matrix mix and sprayed onto the exposed soils prior to the onset of the rainy season.

17. All plants used in revegetation within the ROW will comply with Federal, State, and county laws requiring inspection for disease or insect infestations. The vendor will provide certification of inspection from the County of San Diego Department of Agriculture. The plants will also be inspected by the Project Landscape Inspector before accepting delivery. In all areas where stormwater runoff from the proposed Project alignment enters drainage systems that drain into the MHPA or other sensitive habitats, landscaping plans will be developed in coordination with the Service prior to implementation.

All container plants will be checked for the presence of Argentine ants prior to delivery to the planting locations. The potential introduction of Argentine ants could lead to the displacement of native ant species and could lead to the demise of those species which subsist on ants (e.g. horned lizards). Any containers contaminated with Argentine ants will be immediately removed from the Project area.

18. All vegetation within the Project footprint will be cleared between September 1 and February 14 to avoid the gnatcatcher breading season and minimize impacts to migratory birds and raptors. If clearing activities must occur during the gnatcatcher breeding season, then pre-construction surveys will be conducted to ensure that no breeding gnatcatchers or nesting birds are present within or immediately adjacent to the proposed clearing area. Should a breeding gnatcatcher or nest be located, then the Service will be contacted and discussions will commence to determine how to proceed.

19. Immediately prior to delineating Environmentally Sensitive Areas (ESAs) or clearing of CSS/MSS, the biologist will survey the Project area for gnatcatchers. If gnatcatchers are found within the Project footprint outside of the breeding season, the biologist will direct construction personnel to begin initial vegetation clearing/grubbing in an area away from the gnatcatchers. In addition, the biologist will walk ahead of the clearing/grubbing equipment to flush birds towards areas of CSS/MSS to be avoided. It will be the responsibility of the biologist to ensure that gnatcatchers will not be injured or killed by

initial vegetation clearing/grubbing. The biologist will also record the number and map the location of gnatcatchers disturbed by initial vegetation clearing/grubbing or project construction and report these numbers and locations to the Carlsbad Fish and Wildlife Office within 24 hours.

20. Sensitive habitat outside the proposed Project footprint will be designated an ESA and depicted as such on project maps. Sensitive vegetation types (e.g., vernal pools) or plant locations (Otay tarplant, spreading navarretia, California Orcutt grass, and Otay Mesa mint) will be marked and protected by temporary fencing (e.g., orange plastic snow fencing) or another appropriate method to prevent encroachment or unnecessary disturbance to the sites. Prior to and during construction, barriers will be established in key areas to deter public entry into the site. Additionally, fencing will be provided to restrict access to sensitive habitat adjoining the work limits. Photographs of the fencing will be submitted to the Service at least seven days prior to initiation of Project construction.

All sensitive vegetation within the ROW, but outside of the Project footprint will be delineated by the project biologist as ESAs in coordination with other appropriate Environmental Specialists. All parties in conjunction with the Project will strictly avoid these areas. No construction activities, materials, or equipment will be permitted in the ESAs. Work areas will be marked clearly in the field and confirmed by the biologist prior to habitat clearing, and the marked boundaries maintained throughout the construction period.

21. A Service approved biologist will oversee compliance with protective measures for the biological resources in the Project area during clearing and construction activities. The biologist will be familiar with the habitats, plants, and wildlife of Otay Mesa, and maintain communications with the RE, to ensure that issues relating to biological resources are appropriately and lawfully managed. The biologist will be made available for both the pre-construction and construction phases to review grading plans, address protection of sensitive biological resources and monitor ongoing work. The biologist will specifically monitor construction activities that may affect listed species, such as vegetation removal, and the installation of BMPs and ESA fencing to ensure that all avoidance and minimization measures are properly constructed and followed. The biologist will immediately notify the RE to halt all associated Project activities which may be in violation of this Opinion. In such an event, the RE will halt all construction activities and contact the Service within 24 hours. The biologist will submit weekly reports during initial grading and clearing, and when construction occurs near sensitive biological resources; and provide a final report documenting compliance with avoidance and minimization measures within 60 days of project completion.

22. A minimum 6-foot high fence will follow the length of the alignment on both sides to preclude human access into the adjacent habitat and prevent wildlife from traversing the freeway. Near the Spring Canyon wildlife crossing, the fence will be buried to a depth of approximately one (1) foot to prevent animals from digging under the barrier. The fence

will be installed prior to opening the new road to the public. Photographs of the installed fence will be submitted to the Service within two weeks of installation.

23. An approximately 164-foot wide and 984-foot long fenced and protected wildlife corridor (consisting of a detention basin and native vegetation) will be created and maintained between the OCCS preserve and Spring Canyon.

24. Each employee (including temporary, contractors, and subcontractors) will participate in a training/awareness program that will be presented by the biologist, prior to working on the proposed Project. At a minimum, the program will include the following topics: occurrence of the listed and sensitive species in the area, their general ecology, species sensitivity to human activities, legal protection afforded listed species, penalties for violations of Federal and State laws, reporting requirements, and Project features designed to reduce the impacts to these species and promote their persistence/ survival within the Project area. Included in this program will be a fact sheet that includes color photographs of the listed species, which will be shown to the employees. Following the education program, the fact sheet will be posted in the contractor and RE's office, where they will remain through the duration of the Project. Caltrans and the biologist will be responsible for ensuring that employees are aware of the listed species.

25. Pile driving associated with construction of the Spring Canyon crossing will be conducted between September 1 and February 14 to reduce noise affects to nesting/breeding birds within the Project vicinity, including the coastal California gnatcatcher.

26. The changing of oil, refueling, and other actions that could result in a release of a hazardous substance will be restricted to designated areas that are a minimum of 100 feet from any sensitive plant populations, sensitive habitats, or drainages. Such designated areas will be surrounded with berms, sandbags, or other barriers to further prevent the accidental spill of fuel, oil, or chemicals. Any accidental spills will be immediately contained, cleaned up, and properly disposed.

27. Storage and staging areas will be placed as far from sensitive areas as possible, and kept free from trash and other waste. Staging areas for construction work will be located within previously disturbed sites and not adjacent to or within sensitive habitat.

28. The Project site will be kept clear of debris to avoid attracting predators to listed wildlife. All trash and food will be placed in sealed containers and regularly removed from the site.

29. No pets will be permitted inside the Project boundaries at any time.

30. Vehicle speeds on unpaved access roads to the proposed Project area will be restricted to a maximum of 25 MPH.

31. Any night lighting for Project construction will be selectively placed, shielded, and directed away from all native vegetative communities.

32. Linne soil sites will be surveyed for sensitive plant species prior to construction. In areas where the species are located, the soil will be salvaged for subsequent redistribution onto other similar, temporarily impacted areas. Soils will be stockpiled for the shortest time practicable and no taller than four (4) feet high, to assure the viability of soil biota. All work will be overseen by a project biologist familiar with the sensitive plant species associated with Linne soils. Salvaging methods will be included in the Service approved upland restoration plan.

33. Salvaging and transplantation of San Diego barrel cactus (*Ferocactus viridescens*) and other sensitive plant species will be conducted to the maximum extent practicable. A qualified biologist/restoration ecologist will oversee any seed collection, plant removal, or transplantation to ensure proper management of the salvaged materials. Salvaging methods will be included in the Service approved upland restoration plan.

34. To ensure that the construction and operation of the Project does not adversely affect the J14 vernal pool complex and other vernal pools south of the alignment and west of Spring Canyon, monitoring will be conducted throughout the rainy season to determine whether surface runoff is causing erosion and sediment delivery to the J14 complex and other vernal pools south of the alignment. Monitoring will occur during the construction of the Project and for three years following the opening of the road to the public. A monitoring report will be submitted by August 1 following each monitoring season.

35. To ensure that the construction and operation of the Project does not adversely affect the button-celery population at La Media Road immediately south of the Project footprint, monitoring will be conducted throughout the rainy season to determine whether surface runoff is causing erosion and sediment delivery to the button-celery population. Monitoring will occur during the construction of the Project and for three years following the opening of the road to the public. A monitoring report will be submitted by August 1 following each monitoring season.

36. Pursuant to the Burrowing Owl Survey Protocol and Mitigation Guidelines (CBOC 1993) and the Staff Report on Burrowing Owl Mitigation (CDFG 1995), a preconstruction survey of the Project footprint will be conducted for burrowing owls prior to clearing and grading. During the nonbreeding season (September 1 to January 31), a qualified biologist will survey and excavate all potential owl burrows within and immediately beyond the impact zone to discourage any on-site occupancy. If owls are found nesting within the ROW between February 1 and August 31, the burrow will be designated an ESA and no activities will be allowed within a 246-foot radius of the site. Surveys will be performed regularly to monitor the behavior of the owls and determine when nesting is complete, so that construction can resume.

37. The Spring Canyon Bridge will maintain design features that will provide bats with potential sites for day/night roosting.

38. Seed of Otay tarplant, Otay mesa mint, spreading navarretia, and Orcutt grass will be collected from adjacent or nearby populations and distributed throughout the vernal pools and/or uplands as part of the restoration activities on Wall-Hudson in coordination with the Service in accordance with the following guidelines:

    a. Seed will be collected from areas where at least 20 individuals of each target species occur as a sub-population.

    b. No more than five (5) percent of the projected annual seed production of any individual plant or discrete population of plants will be collected.

    c. Collections will be made in a manner that captures the majority of the genetic variation found in the sampled populations. Different genotypes will not be intermingled during conservation activities.

    d. All seed collected will be placed in brown paper bags and stored off-site at an appropriate seed storage facility.

    e. Collection of seed will be conducted in a manner that will not significantly harm the reproductive potential of the population for that year.

39. The following measures will be implemented at the Wall-Hudson and Bonita Meadows restoration sites to avoid and minimize effects to gnatcatchers during the five-year restoration period:

    a. When maintenance and monitoring activities are conducted during the gnatcatcher breeding season, a qualified biologist will conduct surveys for nesting gnatcatchers no more than one week prior to the start of proposed activities.

    b. If nesting gnatcatchers are observed on-site, no maintenance activities will be conducted within 100 feet of a gnatcatcher nest (exclusion zone), except repairs to broken irrigation lines. If an irrigation line is broken and workers need to encroach into the 100-foot exclusion zone, then Caltrans and the Service will be notified immediately. Prior to maintenance workers accessing the 100-foot exclusion zone, Caltrans and the Service will determine the most appropriate timing and method of repair without causing harm to the nest and/or the nesting pair.

    Herbicide application will occur outside of the 100-foot exclusion zone to avoid drift towards the nest. Only hand spraying downwind of the nest will be allowed.

    An education program will be implemented to ensure that all maintenance workers know the location of all gnatcatcher nests and are aware of the above described conservation measures.

40. The following measures will be implemented at the Wall-Hudson restoration site to avoid and minimize affects to Quino. Conservation measures a. and b. below pertain only to initial implementation during the winter/spring. The remaining conservation measures listed below will be implemented during the entire five years of restoration:

a. Prior to the start of grading activities, the perimeter, and access to, the Wall-Hudson restoration area will be delineated with flagging. No grading or other equipment work will occur outside of the flagged limits.

b. During initial implementation, locations where dot seed plantain occur will be monitored for post-diapause Quino caterpillars by an experienced Service approved biologist. If Quino caterpillars are detected, the biologist will assist weeders with caterpillar detection and weeders will look for Quino caterpillars while weeding, and will avoid stepping on caterpillars or dot seed plantain plants. Areas where caterpillars are detected will be flagged and only hand weeding will occur within 100 feet of the flagging.

c. Beginning the first spring following restoration implementation and occurring each consecutive year thereafter, protocol level surveys for adult Quino will be conducted on the mesa fingers at Wall-Hudson.

d. Beginning the first spring following restoration implementation and occurring each consecutive year thereafter, cluster webbing surveys for pre-diapause Quino larvae will be conducted at both the Quino and vernal pool restoration sites four weeks after the first reported adult is observed (as per the Service's website for Quino protocol level surveying). These pre-diapause surveys will be conducted once a week for four weeks. Areas where webbing is detected will be flagged and only hand weeding will occur within 30 feet of flagging.

e. Beginning the first spring following restoration implementation and occurring each consecutive year thereafter, the Quino and vernal pool restoration sites will be monitored for post-diapause Quino caterpillars by an experienced Service approved biologist. The monitoring will occur at the initiation of weeding during the post-diapause season. If Quino caterpillars are detected, the biologist will assist weeders with caterpillar detection and weeders will look for Quino caterpillars while weeding, and will avoid stepping on caterpillars or dot seed plantain plants. Areas where caterpillars are detected will be flagged and only hand weeding will occur within 100 feet of the flagging.

f. In areas where caterpillars or larval cluster webbing are not detected, mechanical weeding may occur.

g. All personnel who will be conducting weeding activities will be trained by a qualified biologist to recognize Quino caterpillars. A qualified biologist will be on-site during all weeding operations to assist weeders with Quino caterpillar identification.

h. Flagging installed to denote areas where Quino larvae have been observed will be left in place until deemed ready for removal by the approved biologist in coordination with the Service. All flagging installed to denote Quino larval stages will be marked with permanent markers with the following information: date of placement, type of Quino larvae detected, and the last name of the person marking the flagging. Flagging will provide direction for all weeding activities on-site.

STATUS OF THE SPECIES

Coastal California Gnatcatcher (*Polioptila californica californica*)

Listing Status

The Service listed the gnatcatcher as threatened on March 30, 1993 (*Federal Register* 58:16742-16757). As part of the Federal listing, the Service issued a special rule, pursuant to section 4(d) of the Act, defining the conditions under which take of the gnatcatcher would not be a violation of section 9 (*Federal Register* 58: 65088-65096). This special rule recognized the State's Natural Community Conservation Planning (NCCP) Program, and several local governments' ongoing multi-species conservation planning efforts (e.g., the Multiple Species Conservation Program (MSCP)) that intend to apply Act standards to activities affecting the gnatcatcher. An interim process was established whereby jurisdictions actively involved in NCCP planning would be allowed to take up to five percent of the remaining coastal sage habitat for projects that were consistent with the NCCP conservation guidelines (CDFG and California Resources Agency 1993).

Species Description

The gnatcatcher is a small (length: 11 centimeters; weight: 6 grams), long-tailed member of the old-world warbler and gnatcatcher family *Sylviidae* (American Ornithologists' Union 1998). The bird's plumage is dark blue-gray above and grayish-white below. The tail is mostly black above and below. The male has a distinctive black cap which is absent during the winter. Both sexes have a distinctive white eye-ring.

The coastal California gnatcatcher is one of three subspecies of the California gnatcatcher (*Polioptila californica*) (Atwood 1991). Prior to 1989, the California gnatcatcher was classified as a subspecies of the Black-tailed gnatcatcher (*Polioptila melanura*). Atwood (1980, 1988) concluded that the species was distinct from *P. melanura*, based on differences in ecology and behavior. Recent mitochondrial DNA sequencing confirmed the species-level recognition of the California gnatcatcher (Zink and Blackwell 1998).

Distribution

Gnatcatchers occur on coastal slopes in southern California, ranging from southern Ventura southward through Palos Verdes Peninsula in Los Angeles County through Orange, Riverside, San Bernardino and San Diego Counties into Baja California to El Rosario, Mexico, at about 30 degrees north latitude (Atwood 1991). In 1990, Atwood reported that ninety-nine percent of all gnatcatcher locality records occurred at or below an elevation of 300 meters (m) (984 feet (ft)). In 1992, Atwood and Bolsinger reported that, of 324 sites of recent occurrence, 272 (84 percent) were located below 250 m (820 ft) in elevation, 315 (97 percent) were below 500 m (1,640 ft), and 324 (100 percent) were below 750 m (2,460 ft). Since that time, additional data collected at higher elevations shows that this species may occur as high as 912 m (3,000 ft) and that more than 99 percent of the known gnatcatcher locations occurred below 770 m (2,500 ft) (Service 2000a).

Habitat Affinities

Gnatcatchers typically occur in or near coastal sage scrub habitat. Coastal sage scrub is patchily distributed throughout the range of the gnatcatcher, and the gnatcatcher is not uniformly distributed within the structurally and floristically variable coastal sage scrub community. Rather, the subspecies tends to occur most frequently within California sagebrush (*Artemisia californica*)-dominated stands on mesas, gently sloping areas, and along the lower slopes of the coast ranges (Atwood 1990). An analysis of the percent gap in shrub canopy supports the hypothesis that gnatcatchers prefer relatively open stands of coastal sage scrub (Weaver 1998). The gnatcatcher occurs in high frequencies and densities in scrub with an open or broken canopy while it is absent from scrub dominated by tall shrubs and occurs in low frequencies and densities in low scrub with a closed canopy (Weaver 1998). Territory size increases as vegetation density decreases and with distance from the coast, probably due to food resource availability.

Gnatcatchers also use chaparral, grassland, and riparian habitats where they occur adjacent to sage scrub (Campbell *et al.* 1998). The use of these habitats appears to be most frequent during late summer, autumn, and winter, with smaller numbers of birds using such areas during the breeding season. These non-sage scrub habitats are used for dispersal, but data on dispersal use are largely anecdotal (Campbell *et al.* 1998). Linkages of habitat along linear features such as highways and power-line corridors may be of significant value in linking populations of the gnatcatcher (Famolaro and Newman 1998). Although existing quantitative data may reveal relatively little about gnatcatcher use of these other habitats, these areas may be critical during certain times of year for dispersal or as foraging areas during drought conditions (Campbell *et al.* 1998). Breeding territories have also been documented in non-sage scrub habitat. Campbell *et al.* (1998) discuss likely scenarios explaining why habitats other than coastal sage scrub are used by gnatcatchers including food source availability, dispersal areas for juveniles, temperature extremes, fire avoidance, and lowered predation rate for fledglings.

Critical Habitat

Final determination of critical habitat for the gnatcatcher was published in the *Federal Register* on October 24, 2000 (Service 2000a). On June 11, 2002, the U.S. District Court for the Central District of California remanded the critical habitat rule to the Service so that we may prepare a new economic analysis. Areas previously designated as critical habitat for the gnatcatcher in 2000, will remain in place until such time as a new, final designation becomes effective. On April 24, the Service re-proposed critical habitat for the gnatcatcher (*Federal Register* 68:20228-20312).

Critical habitat for the gnatcatcher includes 207,868 hectares (ha) (513,650 acres [ac]) of Federal, state, local, and private land in Los Angeles, Orange, Riverside, San Bernardino, and San Diego Counties (Service 2000a). Primary constituent elements for the gnatcatcher are those habitat components that are essential for the primary biological needs of foraging, nesting, rearing of young, intra-specific communication, roosting, dispersal, genetic exchange, or sheltering (Atwood 1990). Primary constituent elements are provided in (1) undeveloped areas, including agricultural lands, that support or have the potential to support, through natural successional processes, various types of sage scrub, or (2) undeveloped areas that support chaparral, grassland, or riparian habitats where they occur proximal to sage scrub and where they may be utilized for the biological needs of dispersal and foraging, and (3) undeveloped areas, including agricultural areas, that provide or could provide connectivity or linkage between or within larger core areas, including open space and disturbed areas that may receive only periodic use.

Life History

The gnatcatcher is primarily insectivorous, nonmigratory, and exhibits strong site tenacity (Atwood 1990). Diet deduced from fecal samples resulted in leaf- and plant-hoppers and spiders predominating the samples. True bugs, wasps, bees, and ants were only minor components of the diet (Burger *et al.* 1999). Gnatcatcher adults selected prey to feed their young that was larger than expected given the distribution of arthropods available in their environment. Both adults and young consumed more sessile than active prey items (Burger *et al.* 1999).

The gnatcatcher seems to become highly territorial by late February or early March each year, as males become more vocal during this time period (Mock *et al.* 1990). In southwestern San Diego County the mean breeding season territory size ranged from 5 to 11 ha (12 to 27 ac) per pair and non-breeding season territory size ranged from 5 to 17 ha (12 to 42 ac) per pair (Preston *et al.* 1998). During the non-breeding season, gnatcatchers have been observed to wander in adjacent territories and unoccupied habitat increasing their home range size to approximately 78 percent larger than their breeding territory (Preston *et al.* 1998).

The breeding season of the gnatcatcher extends from mid-February through the end of August, with the peak of nesting activity occurring from mid-March through mid-May. The gnatcatcher's nest is a small, cup-shaped basket usually found 0.3 to 1 m (1 to 3 ft) above the ground in a small shrub or cactus. Clutch sizes range between three and five eggs, with the average being four. Juvenile birds associate with their parents for several weeks (sometimes months) after fledging

(Atwood 1990). Nest building begins in mid-March with the earliest recorded egg date of March 20 (Mock *et al.* 1990). Post-breeding dispersal of fledglings occurs between late May and late November. Nest predation is the most common cause of nest failure (Grishaver *et al.* 1998). Gnatcatchers are persistent nest builders and often attempt multiple broods, which is suggestive of a high reproductive potential. This is, however, typically offset by high rates of nest predation and brood parasitism (Atwood 1990). Nest site attendance by male gnatcatchers was determined to be equal to that of females for the first nest attempt and then decline to almost a third of female nest attendance for later nesting attempts (Sockman 1998).

Gnatcatchers typically live for two to three years, although ages of up to five years have been recorded for some banded birds (Dudek and Associates 2000). Observations indicate that gnatcatchers are highly vulnerable to extreme cold, wet weather (Mock *et al.* 1990). Predation occurs in greater proportion in the upper and lower third of the nest shrub. Predation is lower in nests with full clutch sizes (Sockman 1997). Potential nest predators are numerous, and include snakes, raccoons, and corvids (Grishaver *et al.* 1998). The California gnatcatcher also is known to be affected by nest parasitism of the brown-headed cowbird (*Molothrus ater*). Nest parasitism apparently has resulted in earlier nesting dates of the gnatcatcher which may help compensate for the negative effect of parasitism (Patten and Campbell 1998). However, the gains in nest success from decreased nest parasitism appear to be negated by increased nest abandonment due to predation before cowbirds have migrated into an area (Braden *et al.* 1997).

The natal dispersal, for a nonmigratory bird, such as the gnatcatcher, is an important aspect of the biology of the species (Galvin 1998). The mean dispersal distance of gnatcatchers banded in San Diego County is reported at less than 1.9 miles (Bailey and Mock 1998). Although the mean dispersal distances that have been documented above are relatively low, dispersal of juveniles is difficult to observe and to document without extensive banding studies. Therefore, it is likely that the few current studies underestimate the gnatcatcher's typical dispersal capacity (Bailey and Mock 1998). Juvenile gnatcatchers are apparently able to traverse highly man-modified landscapes for at least short distances (Bailey and Mock 1998). Natural and restored coastal sage scrub habitat along highway corridors is used for foraging and nesting by gnatcatchers and may serve important dispersal functions (Famolaro and Newman 1998). Typically, however, the dispersal of juveniles requires a corridor of native vegetation which provides foraging and cover opportunities to link larger patches of appropriate sage scrub vegetation (Soulé 1991). These dispersal corridors may facilitate the exchange of genetic material and provide a path for recolonization of areas from which the species has been extirpated (Soulé 1991, Galvin 1998).

Population Trend

The gnatcatcher was considered locally common in the mid-1940's, but by the 1960's this subspecies had declined substantially in the United States owing to widespread destruction of its habitat (Atwood 1990). By 1980, Atwood (1980) estimated that no more than 1,000 to 1,500 pairs remained in the United States. In 1993, at the time the gnatcatcher was listed as threatened, the Service estimated that approximately 2,562 pairs of gnatcatchers occurred in the United States. Of these, 30 pairs occurred in Los Angeles County, 757 pairs occurred in Orange County, 261 pairs occurred in Riverside County, and 1,514 pairs occurred in San Diego County (Service

1993a). In October 1996, the total number of gnatcatchers in the United States was estimated at 2,899 pairs with two-thirds occurring in San Diego County (Service 1996), after subtracting out all gnatcatcher pairs authorized for take under Habitat Loss Permits, approved Natural Community Conservation Plans, Habitat Conservation Plans, and section 7 consultations. These population estimates were intended to represent a coarse approximation of the number of gnatcatchers in southern California. Confidence intervals have not been calculated for these estimates and therefore, we can not be sure of their precision. Recent fires across southern California have significantly reduced quality gnatcatcher habitat which may result in a reduction in gnatcatcher populations, particularly in San Diego County where the Paradise, Cedar, and Otay fires consumed large areas of occupied gnatcatcher habitat. CSS is fire adapted and should recover over time. It is unknown what the long-term affect to the gnatcatcher population will be due to the unprecedented size of the fires.

Threats

The loss, fragmentation, and adverse modification of habitat are the principal reasons for the gnatcatcher's federally threatened status (Service 1993a). The amount of coastal sage scrub available to gnatcatchers has continued to decrease during the period after the listing of the species. It is estimated that up to 90 percent of coastal sage scrub vegetation has been lost as a result of development and land conversion (Westman 1981a, 1981b, Barbour and Major 1977), and coastal sage scrub is considered to be one of the most depleted habitat-types in the United States (Kirkpatrick and Hutchinson 1977, O'Leary 1990). The fragmentation of habitat may artificially increase populations in adjacent preserved habitat; however, these population surpluses may be lost in subsequent years due to crowding and lack of resources (Scott 1993). In addition, agricultural use, such as grazing and field crops, urbanization, air pollution, and the introduction of non-native plants have all had an adverse impact on extant sage scrub habitat. A consequence of urbanization that is contributing to the loss, degradation, and fragmentation of coastal sage scrub is an increase in wildfires due to anthropogenic ignitions. High fire frequencies and the lag period associated with recovery of the vegetation may significantly reduce the viability of affected subpopulations (Dudek and Associates 2000). Furthermore, nest-parasitism by the brown-headed cowbird (Unitt 1984) and nest predation threaten the recovery of the gnatcatcher (Atwood 1980, Unitt 1984).

San Diego fairy shrimp (*Branchinecta sandiegonenis*)

Listing Status

The San Diego fairy shrimp was federally listed as endangered on February 3, 1997 (62 FR 4925). A vernal pool recovery plan which included San Diego fairy shrimp was published in September 1998 (Service 1998a). Critical habitat was proposed for this species on April 23, 2003 (68 FR:19888).

Species Description

Branchinecta sandiegonenis, is a small aquatic crustacean (Order: *Anostraca*) restricted to vernal pools. *B. sandiegonenis* was originally described by Fugate (1993) from samples collected on Del Mar Mesa, San Diego County. Mature individuals lack a carapace (hard outer covering of the head and thorax) and have a delicate elongate body, large stalked compound eyes, and 11 pairs of swimming legs (Service 2000b). Adult male San Diego fairy shrimp range in size form 9 to 16 millimeters (0.35 to 0.63 in); adult females are 8 to 14 millimeters (0.31 to 0.55 in) long. The second pair of antennae in males are greatly enlarged and specialized for clasping the females during copulation, while the second pair of antennae in the females are cylindrical and elongate. Refer to Fugate (1993) for a detailed description of the identifying characteristics of *B. sandiegonenis*.

Distribution

San Diego fairy shrimp occur in vernal pools from Marine Corps Base Camp Pendleton, inland to Ramona and south through Del Mar Mesa, Proctor Valley, and Otay Mesa, San Diego County, California. The species has recently been documented in Orange County in the Fairview Park vernal pools and at Saddleback Meadows (Service 1997a). In Baja California, it has been recorded at two localities (Valle de Palmas, south of Tecate and Baja Mar, north of Ensenada) and a single isolated female was reported from vernal pools in Isla Vista, Santa Barbara County, California (Service 1995).

Habitat Affinities

San Diego fairy shrimp tend to inhabit shallow, small vernal pools and vernal pool-like depressions (e.g., ruts in dirt roads) with water temperatures of 10-26° C. They are ecologically dependent on seasonal fluctuations in their habitat, such as absence or presence of water during specific times of the year, duration of inundation, and other environmental factors that likely include specific salinity, conductivity, dissolved solids, and pH levels. Gonzalez *et al.* (1996) found water chemistry as an important factor in determining the distribution of the San Diego fairy shrimp.

Life History

San Diego fairy shrimp are non-selective particle filter-feeders, or omnivores. Detritus, bacteria, algal cells, and other items between 0.3 to 100 microns may be filtered and ingested (Eriksen and Belk 1999). Adult fairy shrimp are usually observed from January to March; however, in years with early or late rainfall, the hatching period may be extended (Service 2000b). This species hatches in 3 to 8 days and matures in about 7 to 17 days depending on water temperature (Hathaway and Simovich 1996). San Diego fairy shrimp may only persist for about 4 to 6 weeks after hatching (Hathaway and Simovich 1996). The eggs are either dropped to the pool bottom or remain in the brood sac until the female dies and sinks (Service 2000b). Eggs may persist in the substrate for several years. When the pools refill in the same or subsequent rainy seasons, some but not all of the eggs may hatch (Service 2000b). Fairy shrimp may be eaten by a wide

variety of species, including beetles, dragonfly larvae, and other arthropods, frog, salamander, and toad tadpoles, shorebirds, ducks, and even other fairy shrimp.

Population Trend

San Diego fairy shrimp are known to occur in most of the vernal pool complexes in coastal San Diego County (Service, 1998a). Many populations of San Diego fairy shrimp have likely been extirpated or have experienced drastic declines due to the substantial loss of habitat in southern California. The majority of the vernal pools within the range of the San Diego fairy shrimp were lost prior to 1990 (Service 1998a). The greatest recent losses of vernal pool habitat in San Diego County have occurred in Mira Mesa, Rancho Penasquitos, and Kearny Mesa, which accounted for 73 percent of all the pools destroyed in the region from 1979 to 1986 (Keeler-Wolf *et al.* 1998). Other substantial losses have occurred in the Otay Mesa area, where over 40 percent of the vernal pools were destroyed between 1979 and 1990. Similar to San Diego County, vernal pool habitat was once extensive on the coastal plain of Los Angeles and Orange counties. Unfortunately, there has been a near total loss of vernal pool habitat in these areas (Keeler-Wolf *et al.* 1998).

Threats

The San Diego fairy shrimp is especially vulnerable to alteration in hydrology, thus the protection of watershed function is critical to its survival. San Diego fairy shrimp are also threatened by urban, agricultural development, modified hydrology due to adjacent road construction, and illegal trash dumping. Unpredictable natural events such as drought or fire may extirpate the San Diego fairy shrimp due to its fragmented and restricted range. They are also vulnerable to contaminants in runoff waters and watershed quality. Low levels of genetic variability may affect the species potential for long term viability (Service 1997a).

Riverside fairy shrimp (*Streptocephalus woottoni*)

Listing Status

The Riverside fairy shrimp was listed as endangered on August 3, 1993 (58 FR 41391). A vernal pool recovery plan, which included Riverside fairy shrimp, was published in September 1998 (Service 1998a). Critical habitat was proposed on April 27, 2004 (69 FR 23024).

Species Description

Streptocephalus woottoni is a small freshwater crustacean in the Family *Streptocephalidae*, of the Order *Anostraca*. The species was first collected in 1979 by Dr. Clyde Erickson and formally described as a new species in 1990 (Eng *et al.* 1990). Mature males are between 13 and 25 millimeters (0.5 to 1.0 in) long. The cercopods (structures that enhance the rudder-like function of the abdomen) are separate with plumose setae (feathery bristles) along the borders. Mature females are between about 13 and 22 millimeters (0.5 to 0.87 in) in length. The brood pouch extends to the seventh, eighth, or ninth abdominal segment. The cercopods of females are the

same as in males. The species most taxonomically similar to *S. woottoni* is *S. seali* (Eng *et al.* 1990). However, in *S. woottoni*, both the male and the female have the red color of the cercopods covering the ninth and 30 to 40 percent of the eighth abdominal segments (Eng *et al.* 1990). No red extends onto the abdominal segments in living *S. seali* of either sex (Eng *et al.* 1990). A full description of identifying characteristics for this species is given by Eng *et al.* (1990).

Distribution

The Riverside fairy shrimp is believed to have the most restricted distribution of an endemic California fairy shrimp (Eng *et al.* 1990, Simovich and Fugate 1992). The northern distribution limit for the Riverside fairy shrimp is Cruzan Mesa, Los Angeles County and the former Carlsberg Ranch, Ventura County (Service 2001a). In Baja California, Mexico it has been documented at two locations: Valle de Las Palmas, south of Tecate, and Bajamar, north of Ensenada (Brown *et al.* 1993). With the exception of the Riverside populations, all populations are within 15 kilometers of the coast over a north-south distance of about 140 kilometers (Eriksen and Belk 1999). All known populations lie between 30 and 415 meters in elevation. In San Diego County it is known to occur at Marine Corps Base Camp Pendleton, City of Carlsbad, one complex at Marine Corps Air Station Miramar, and on Otay Mesa.

Habitat Affinities

Riverside fairy shrimp are restricted to deep (greater than 25 cm in depth) seasonal vernal pools, vernal pool like ephemeral ponds, and stock ponds (Eng *et al.* 1990, Service 1993b). They prefer warm-water pools that have low to moderate dissolved solids (Eriksen and Belk 1999). Pools are generally open and unvegetated with turbid water conditions and low total dissolved solids, alkalinity, and chloride levels, as evidenced by approximately neutral pH values (Eng *et al.* 1990). All known habitat lies within annual grasslands, which may be interspersed through chaparral or coastal sage scrub vegetation.

Life History

Riverside fairy shrimp are non-selective particle-feeding filter-feeders, or omnivores. Detritus, bacteria, algal cells, and other items between 0.3 to 100 microns may be filtered and ingested (Eriksen and Belk 1999). Females produce between 17 and 427 cysts over their lifetime (Simovich and Hathaway 1997). Presumably because of the ephemeral and unpredictable nature of the pool resource, few of the available cysts hatch at a time (Eriksen and Belk 1999). Cysts may hatch when water temperature is at 10° C but develop slowly below 15° C (Eriksen and Belk 1999). Hathoway and Simovich (1996) found that Riverside fairy shrimp hatched in 7 to 12 days when water temperature was between 10° and 20° C and maturity was noted between 48 to 56 days. The eggs are either dropped to the pool bottom or remain in the brood sac until the female dies and sinks (Service 2001a). Eggs may persist in the substrate for several years. When the pools refill in the same or subsequent rainy seasons, some but not all of the eggs may hatch (Service 2001a). Fairy shrimp may be eaten by a wide variety of species, including beetles,

dragonfly larvae, and other arthropods, frog, salamander, and toad tadpoles, shorebirds, ducks, and even other fairy shrimp.

Population Trends

Many populations of Riverside fairy shrimp have likely been extirpated or have experienced drastic declines due to the substantial loss of habitat in southern California. The majority of the vernal pools within the range of the Riverside fairy shrimp were lost prior to 1990 (Service 1998a). Substantial losses have occurred in the Otay Mesa area, where over 40 percent of the vernal pools were destroyed between 1979 and 1990. Similar to San Diego County, vernal pool habitat was once extensive on the coastal plain of Los Angeles and Orange counties. Unfortunately, there has been a near total loss of vernal pool habitat in these areas (Keeler-Wolf *et al.* 1998). Significant losses of vernal pools supporting this species have also occurred in Riverside County (Service 2001a).

Threats

The Riverside fairy shrimp is especially vulnerable to alteration in hydrology, thus the protection of watershed function is critical to its survival. Riverside fairy shrimp are also threatened by urban and agricultural development, modified hydrology due to adjacent road construction, and illegal trash dumping. Unpredictable natural events such as drought or fire may extirpate the Riverside fairy shrimp due to its fragmented and restricted range. They are also vulnerable to contaminants in runoff waters and watershed quality. Low levels of genetic variability may affect the species potential for long term viability (Service 1993b). With the long distance isolation between the few remaining pools, gene flow is greatly if not completely reduced.

The Riverside fairy shrimp faces threats throughout its range. These threats can be divided into three major categories: 1) direct destruction of vernal pools and vernal pool habitat as a result of construction, vehicle traffic, domestic animal grazing, dumping, and deep plowing; 2) indirect threats which degrade or destroy vernal pools and vernal pool habitat over time including altered hydrology (e.g., damming or draining), invasion of alien species, habitat fragmentation, and associated deleterious effects resulting from adjoining urban land uses; and 3) long-term threats including the effect of isolation on genetic diversity and locally adapted genotypes, air and water pollution, climatic variations, and changes in nutrient availability (Bauder 1986; Service 1993b).

Quino Checkerspot Butterfly (*Euphydryas editha quino*)

Listing Status

On August 4, 1994, the Service published a petition finding in the Federal Register (*Federal Register* 59: 39868) with a proposed rule to list the Quino checkerspot butterfly as endangered. We published the final rule listing the species on January 16, 1997 (*Federal Register* 62: 2313). We proposed designating critical habitat for the Quino checkerspot butterfly on February 7, 2002 (*Federal Register* 66: 9476), and finalized the designation on April 15, 2002 (*Federal Register* 67: 18356). A final recovery plan for this species was issued on August 11, 2003.

Species Description

The Quino checkerspot butterfly (*Euphydryas editha quino*) is a recognized subspecies of Edith's checkerspot (*E. editha*), and is a member of the Nymphalidae family, the brush-footed butterflies, and the Melitaeinae subfamily, checkerspots and fritillaries. Quino differs from the other *E. editha* subspecies in size, wing coloration, and larval and pupal phenotypes (Mattoni *et al* 1997). Among the other subspecies of *E. editha*, Quino is moderate in size with a wingspan of approximately 4 cm (1.5 in). The dorsal (top) side of its wings is covered with a red, black, and cream colored checkered pattern, the ventral (bottom) side is mottled with tan and gold. Its abdomen generally has bright red stripes across the top. Quino larvae are black and have a row of nine, orange-colored tubercles (fleshy/hairy extensions) on their back. Pupae are extremely cryptic and are mottled black and blue-gray.

Distribution

Quino was historically distributed throughout the coastal slopes of southern California, including Los Angeles, Orange, Riverside, San Diego, and San Bernardino counties, and northern Baja California, Mexico (Mattoni *et al.* 1997; Service database). That distribution included the westernmost slopes of the Santa Monica Mountains, the Los Angeles Plain and Transverse Ranges to the edge of the upper Anza-Borrego Desert, and south to El Rosario in Baja California, Mexico (Emmel and Emmel 1973; Mattoni *et al.* 1997; Service database). Although historical collection records allow for an estimate of a species' range, such records usually underestimate the number of historical sites and extent of local distributions. Collectors tended to frequent well-known sites, and no systematic or comprehensive surveys for Quino have ever been conducted (Mattoni *et al.* 1997).

As recently as the 1950's, collectors described Quino as occurring on every coastal bluff, inland mesa top, and lower mountain slope in San Diego County and coastal northern Baja California. These observations indicate that Quino was historically widespread throughout the southern California landscape, and occurred in a variety of vegetation types, including coastal sage scrub, open chaparral, juniper woodland, meadows, and grasslands. By the 1970's, most of the coastal bluff and mesa habitats in southern California had been urbanized or otherwise disturbed. However, Quino still occupied known habitat locations inland and at higher elevations including Dictionary Hill, Otay Lakes, and San Miguel Mountain in San Diego County, and the Gavilan Hills in Riverside County. By the middle 1980's the species was thought to have disappeared from the known locations; the petition to list the species in 1988 suggested that it might be extinct. Nonetheless, new populations were discovered in Riverside County, Quino was rediscovered in San Diego County, and the species continued to survive in northern Baja California, Mexico. Current information suggests that Quino has been extirpated from Los Angeles, Orange, and San Bernardino Counties.

Habitat Affinities

In southwestern San Diego County, the primary host plant for Quino is the dot-seed plantain (*Plantago erecta*), however Quino may use other species of plantain (*Plantago* spp.) and annual

owl's-clover (*Castilleja exserta*) as primary or secondary host plants. Another apparently important, but only recently documented, primary host plant is white snapdragon (*Antirrhinum coulterianum*; Pratt 2001). Quino is generally found in open areas and ecotone situations which may occur in a number of plant communities, including grasslands, coastal sage scrub, chaparral, and sparse native woodlands. Open areas within a given vegetation community seem to be a critical landscape feature for butterfly populations. Optimal habitat appears to contain little or no invasive exotic vegetation, and especially, a well-developed cryptogramic crust. In its adult stage, Quino uses a number of flowering plants as nectar sources.

Life History

The life cycle of Quino typically entails one generation of adults per year, with a 4- to 6-week flight period occurring generally February to May, depending on weather conditions (Emmel and Emmel 1973, Orsak 1978). During the flight period, adult butterflies move about and search for nectar sources and mates. Females lay multiple masses of 20 to150 eggs (M. Singer, C. Parmesan, and G. Pratt unpubl. data) with a single female capable of producing more than 1,000 eggs. The eggs hatch in about 10 days and the larvae begin to feed immediately. At lower elevations in San Diego County, the primary host plant for Quino is the dot-seed plantain (*Plantago erecta*), however Quino may use other species of plantain (*Plantago* spp.) and annual owl's-clover (*Castilleja exserta*). As the larvae grow, they periodically shed their skin. Each phase between skin molts is referred to as an "instar" with the first instar being the first larval stage after hatching.

As summer approaches the food plants dry out. In their third or fourth instar, larvae enter into an obligatory diapause. Diapause is a low-metabolic resting state that may last for a year or more, depending on conditions. Diapause allows larvae to survive the regular seasonal climatic extremes and also to better survive times of extended adverse conditions, such as drought. After termination of diapause, larvae become active and feed. They then enter their pupal stage and within two to six weeks, transform into the adults and emerge as butterflies. The butterflies feed, disperse, reproduce, and then die.

Adult Quino, and *E. editha* in general, are sedentary by nature and generally fly close to the ground. Evidence from the bay checkerspot (*E. editha bayensis*; bay checkerspot) suggests that long-distance dispersal is rare (Ehrlich 1961, Brussard and Ehrlich 1970, Ehrlich and Murphy 1981). *Bay checkerspots* have been documented to move up to about 4.5 km (2.8 mi) to colonize distant habitat patches (Harrison 1989). For Quino, many experts familiar with the species believe that Quino populations separated by more than about 3 km (approximately 2 mi) may be demographically isolated. However, responses to abiotic factors, such as weather, may increase the distance butterflies will move (Ehrlich and Murphy 1987). Additionally, adult Quino are known to "hilltop". Hilltopping is a behavior where the males butterflies form territories on hilltops, ridgelines, and other prominent geographic features in order to locate mates.

Population Trend

Until as recently as the 1980s, Quino may have been one of the most abundant butterflies in coastal southern California. More than 75 percent of Quino's historic range has been lost (Brown 1991; Service database), and more than 90 percent of the species' coastal mesa and bluff habitat, where most historic records are located, has been destroyed by habitat fragmentation, degradation, and loss (Service database). It is estimated that Quino population density range-wide has been reduced 95 percent by human-caused impacts. Sources of habitat loss and habitat degradation include competition from non-native plants, livestock grazing, off-road vehicle activity, and fire management practices. Additionally, the butterfly larva are susceptible to predation by exotic invertebrates.

Recent studies have shown competitive exclusion by non-native plants may be accelerated by nitrogen deposition from atmospheric pollution in southern California vegetation communities (Allen et al. 1997, Eliason and Allen 1997, Padgett and Allen 1999, Padgett et al. 1999). The non-native weeds may also directly out-compete the native plants, including butterfly host-plant species. This effect has been documented in a native plant community that supports Bay checkerspot in the San Francisco Bay area (Weiss 1999). Not only does the increase in weeds degrade the quality of the native habitat, it may also increase the frequency or severity of wildfires, further impacting the vegetation community and the wildlife species inhabiting it. Recent fires across southern California have significantly reduced quality Quino habitat which may result in a reduction in Quino populations, particularly in San Diego County where the Cedar and Otay fires consumed large areas of occupied Quino habitat. The vegetation comprising Quino habitat is fire adapted and should recover over time. It is unknown what the long-term affect to the Quino population will be due to the unprecedented size of the fires.

Threats

Quino is threatened primarily by urban and agricultural development, non-native plant species invasion, off-road vehicle use, grazing, and fire management practices (*Federal Register* 62: 2313). These threats destroy and degrade the quality of habitat and result in the extirpation of local Quino populations. Quino population decline likely has been, and will continue to be, caused in part by enhanced nitrogen deposition, elevated atmospheric carbon dioxide concentrations, and climate change. Nonetheless, urban development poses the greatest threat and exacerbates all other threats. Activities resulting in habitat fragmentation or host or nectar plant removal reduce habitat quality and increase the probability of local Quino population extirpation and species extinction.

Other threats to the species identified in the final listing rule (*Federal Register* 62: 2313) include illegal trash dumping and predation. Dumping, a documented problem for some populations (G. Pratt *fide Federal Register* 67: 18356), is detrimental because of resulting habitat degradation and destruction. Over-collection by butterfly hobbyists and dealers is a probable threat, although the magnitude of this activity is unknown. Stamp (1984) and White (1986) examined the effects of parasitism and predation on the genus *Euphydryas*, although it is not clear whether these mortality factors pose a significant threat to this species. Predation by Argentine ants

(*Iridomyrmex humilis*) has been observed in colonies of the butterfly in the laboratory (G. Pratt *fide Federal Register* 67: 18356) and intense predation by nonnative Brazilian fire ants (*Solenopsis invicta*) is likely where they co-occur with Quino (Porter and Savignano 1990). Brazilian fire ants were documented in 1998 in the vicinity of historic Quino habitat in Orange County and have subsequently been found in Riverside and Los Angeles Counties (California Department of Food and Agriculture 1999).

San Diego Button-Celery (*Eryngium aristulatum* var. *parishii*)

Listing Status

San Diego button-celery was federally listed as endangered on August 3, 1993 (*Federal Register* 58: 41391), after the Service determined that the present range and continued existence of the species was being rapidly destroyed by habitat loss and degradation due to urban and agricultural development, grazing, off-road vehicle use, trampling, invasion from weedy non-native plants and other factors. It has been listed as endangered in the State of California since July 1979. Critical habitat has not been designated for this species. A vernal pool recovery plan which included San Diego button-celery was published in September 1998 (U.S. Fish and Wildlife Service 1998b).

Species Description

San Diego button-celery is a perennial herb with a persistent tap root. The plant has a spreading to erect habit, reaching a height of 41 centimeters (16 inches) or more. The stems and toothed leaves are gray green with spinose lobes, giving it a prickly appearance. Inflorescences form on short peduncles (stalks) with few to many-flowered heads. Flowers are white and vary in length from 1.7 to 2.8 mm (Munz 1974, Hickman 1996).

San Diego button-celery is one of three subspecies of *Eryngium aristulatum* and belongs to the family *Apiaceae* (Hickman 1996). *Eryngium aristulatum* var. *parishii* is separated from *Eryngium aristulatum* var. *aristulatum* by having styles in fruit that are about the same length as the calyx (outer whorl of protective leaves around the flower) and is separated from *Eryngium aristulatum* var. *hooveri* by having bractlets (modified leaves) without callused margins (Hickman 1996). The majority of populations once identified as *Eryngium aristulatum* var. *parishii* on Camp Pendleton Marine Corps Base have been placed under a recently described species: *Eryngium pendletonensis* (Marsden and Simpson 1999). San Diego button celery is distinguished from *Eryngium pendletonensis* by a combination of leaf and flower structures.

Distribution

San Diego button-celery occurs in vernal pools from the Santa Rosa Plateau, Riverside County, California, south to the mesas north of Ensenada, Mesa de Colonet, and San Quintin, Baja California, Mexico ([K. Marsden, pers. comm,. 1997] in Service 1998). In San Diego County it is found in pools on Del Mar Mesa, Mira Mesa, Kearny Mesa, Marine Corps Air Station Miramar, Marine Corps Base Camp Pendleton, and at sites within the cities of Tierrasanta, San

Marcos, Carlsbad, and Ramona; it was extirpated from a site in the city of La Jolla (Bauder 1986). San Diego button-celery is also found in the southern portion of San Diego County on Otay Mesa, near the Lower Otay Reservoir and in Proctor Valley. It also was found near the Tijuana Airport, but is believed to be extirpated at this locale. There are no known herbarium collections of San Diego button-celery from the San Diego Mesa (e.g., Normal Heights, San Diego State University) (Service 1998). The California Native Plant Society (2001) notes that this plant has been found at elevations from 20-620 meters above mean-sea-level.

Habitat Affinities

San Diego button-celery is associated with white clay bottom vernal pools devoid of hardpans (Service 1993c). However, this species is somewhat more tolerant of peripheral vernal pool habitat than most obligate vernal pool species such as San Diego Mesa mint (*Pogogyne abramsii*) with which it sometimes grows (Reiser 1996).

Life History

Most commonly a perennial herb with a persistent tap root, San Diego button-celery is occasionally an annual under less favorable conditions. San Diego button-celery blooms from April to June. It reproduces by outcrossing and is presumably insect-pollinated (Ogden Environmental *et al.* 2000). It is reliant on vernally wet conditions and has developed mechanisms such as Aerenchyma tissue that promotes gas exchange underwater to cope with this habitat.

Population Trend

In 1979, San Diego button-celery was known from 65 pool groups; by 1986, this plant remained in 61 pool groups (Service 1993c); and by 1998, San Diego button celery continued to exist in 61 pool groups (Service 1998b). Although several sites receive some protection, Reiser (1996) stated that this subspecies is severely declining with continued losses. Many existing pool groups are remnant colonies of once larger populations and are subject to various forms of authorized and unauthorized disturbance (Service 1993c, Reiser 1996).

Threats

This species is threatened by land conversions, habitat fragmentation and degradation, livestock grazing, competition from non-native plant species, and other factors. Urban development remains the primary threat to vernal pool complexes inhabited by San Diego button celery (Bauder 1987). Some proposed projects include expansion of airports and landfills, construction of major roadways, utility infrastructure, resorts and recreational facilities, commercial and industrial properties, and residential housing tracts. Generally, these projects directly impact pools through elimination of the habitat (Service 1998b).

Where pools remain, dumping, trampling, vehicular activity, runoff, and intrusion of non-native species are continued threats. Hydrological changes and erosion can cause profound changes in

the pool flora (Bauder 1987, 1992). Trenching for utilities, on-going operations within easements and lease holding, responses to emergencies such as fire or air crashes, fuel and chemical spills, and recreational activities, such as off-highway-vehicle (OHV) use, can all cause serious damage to vernal pools, particularly during the aquatic or drying phases when soils are most vulnerable and the organisms are growing or reproducing. When disturbance is sever, it can lead to local extirpations of pool species (Service 1998b).

ENVIRONMENTAL BASELINE

Regulations implementing the Act (50 CFR § 402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation and the impacts of State and private actions which are contemporaneous with the consultation in progress.

The entire alignment of the proposed Project occurs within an approved NCCP/HCP that is referred to as the MSCP. The MSCP Planning Area encompasses 582,000 acres within southwestern San Diego County. Except for Bonita Meadows, the proposed Project lies wholly within the City of San Diego's MSCP boundaries. Bonita Meadows is within the San Diego County MSCP boundaries. With the exception of Quino, all species addressed in this Opinion are covered species[1] under the MSCP. Taking of covered species will be allowed in accordance with approved subarea plans and implementing agreement, therefore most of the anticipated impacts associated with private actions (i.e., urban development) have already been analyzed through this program. Table 3-5 "Species Evaluated for Coverage Under the MSCP" of the MSCP (August 1998) outlines the anticipated conservation and impacts for each species. Other federal actions in the action area include the Immigration and Naturalization Service border fence and associated activities, and SR-125.

Coastal California gnatcatcher

The gnatcatcher occupies numerous territories in Spring Canyon both within the proposed Project footprint and in the adjacent side and main canyons to the south of the proposed road corridor. Spring Canyon is preserved as part of the City of San Diego's MSCP and is designated as MHPA lands. Prior to 1999, five gnatcatcher pairs were detected within or adjacent to the study corridor. During surveys conducted in 2002, a new location supporting one gnatcatcher pair was detected west of Old Otay Mesa Road, one pair and one individual were observed in the central section of Spring Canyon to the east of Caliente Avenue, two gnatcatcher pairs were detected to the west of Heritage Road, one pair and one individual was detected in the canyon

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[1]"Covered species" means those species within the MSCP Area which will be adequately conserved by the MSCP when the MSCP is implemented through the subarea plans for which will be adequately conserved through the permitting process pursuant to Section 404 of the Clean Water Act, 33 U.S.S. § 1344

near the southern end of Heritage Road. During surveys for rare plants and Quino, gnatcatchers were observed within and immediately adjacent to the proposed Project footprint. Gnatcatchers are also known from Dennery Canyon adjacent to Wall-Hudson and at Bonita Meadows.

Quino checkerspot butterfly

Quino historically occurred throughout Otay Mesa. Habitat for Quino exists in areas along the proposed Project alignment. Focused surveys for Quino resulted in no Quino being detected within the action area. In 2001, an adult female Quino was detected within the perimeter of the OCCS preserve, adjacent to the proposed Project alignment. The larval host plant, dot seed plantain (*Plantago erecta*), is found along the upper canyon rims throughout the action area.

During the last few years, Quino have been detected within the Otay River drainage to the north of the proposed Project. Dennery Canyon drains into Otay River and there is the potential that Quino occupy areas within Dennery Canyon and the adjacent Otay River.

Vernal Pool Species

Riverside fairy shrimp, San Diego fairy shrimp, and San Diego button celery historically occurred in vernal pool complexes throughout the Otay Mesa ecosystem which is part of the San Diego: Southern Coastal Mesa Management Area identified in the Vernal Pool Recovery Plan (Service 1998). Many of these vernal pool complexes have been developed, converted to agriculture, or degraded by OHV use. Most of the historic vernal pool habitat in the northwestern portion of Otay Mesa have either been graded or developed as part of the Pardee Development Projects. Impacts from these development projects have been offset at the Dennery Canyon vernal pool preserve along the southern side of Dennery Canyon and at the OCCS preserve. In addition, the City of San Diego has restored a vernal pool complex adjacent to Dennery Canyon vernal pool preserve for impacts by construction of Otay Mesa Road. The City of San Diego has also purchased property containing the J16-18 vernal pool complexes immediately south of the ROW adjacent to Spring Canyon. Northeast of the Pardee developments and along Dennery Canyon is a vernal pool mitigation site for the Robinhood Ridge Development. To offset impacts to Riverside fairy shrimp and San Diego fairy shrimp from construction of the international border triple fence (Border Infrastructure System), the ACOE Planning is currently restoring 20 acres of vernal pool habitat for south of the ROW adjacent of Spring Canyon. Several other smaller mitigation sites also occur in the vicinity of Spring Canyon. The remaining vernal pool habitat is on private property and receives no management or monitoring.

The vernal pool complexes in the Spring Canyon area have been degraded by OHV activity. Due to recent construction north of Otay Mesa Road, there appears to be increased activity south of Otay Mesa Road. The pools continue to be degraded due to lack of management.

Prior to 1999, and within the three alignments of the central alternative, San Diego fairy shrimp were found in eleven vernal pools and four road pools. Six of these pools are currently within the OCCS preserve. Of the remaining pools, two are now outside of the proposed alignment and

seven pools have been destroyed by development or disturbance. In 2002, San Diego fairy shrimp were detected within six vernal pools and four road pools within the project ROW. In addition, 27 pools within the OCCS preserve support San Diego fairy shrimp. San Diego fairy shrimp are known to occur within pools on the terraces above Spring Canyon south of the Project (e.g., J14 complex) and to the north around Dennery Canyon including Wall-Hudson.

In southern San Diego County, Riverside fairy shrimp historically occurred in eight pool complexes on Otay Mesa near the U.S./Mexico border. A number of these pool complexes have been converted for residential or commercial use. Within the Project survey area, Riverside fairy shrimp were detected in five vernal pools, three of which are situated near Spring Canyon and two to the west near Caliente Boulevard near the intersection of Otay mesa road and Airway Road. Twenty pools within the OCCS preserve also support Riverside fairy shrimp.

Within the Spring Canyon watershed, there are ten historic vernal pool complexes that may still contain extant populations of San Diego button celery. In addition to the Dennery Canyon vernal pool preserve, there is a vernal pool complex that supports button-celery immediately north of Otay Mesa Road on the Saint Jerome's Church property. This parcel is currently undeveloped. Recent surveys conducted in 2003 detected San Diego button celery within the parcel boundaries. To the east of Arnie's Point (near La Media Road) and immediately north of the Mexican border is an area where three vernal pool complexes containing San Diego button celery historically occurred. The current status of these vernal pool complexes is unknown. North of this area and to the southwest of the intersection of Otay Mesa Road and La Media Road is an emergent wetland that is dominated by non-native grasses. Surveys of this wetland for the proposed Project detected approximately 5221 individuals of San Diego button celery (Waldecker 2003). Directly north of these complexes and immediately north of Brown Field Airport are two historic vernal pool complexes that contain San Diego button celery.

Within the proposed alignment, three pools support San Diego fairy shrimp, one pool supports both San Diego fairy shrimp and Riverside fairy shrimp, and one pool supports fifteen individuals of San Diego button celery. Fairy shrimp surveys at the Wall-Hudson property detected San Diego fairy shrimp in four of the five pools on the north mesa and 20 of the 34 pools on the south mesa.

EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated and interdependent with that action, that will be added to the environmental baseline. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

Effects to the Natural Community Conservation Planning Program

The proposed Project will directly effect 11.75 acres within the MSCP's MHPA including 2.7 acres of MSS, 2.9 acres of CSS, 5.3 acres of non-native grassland, 0.05 acre of vernal pool surface area, and 0.08 acre of southern willow scrub/mulefat scrub. The proposed Project will temporally and indirectly effect 5.88 acre of MSS and 14.76 acre of CSS within the MSCP's MHPA. To avoid reducing the size of the MHPA in the area, 9.06 acres of mesa top immediately adjacent to the MHPA on the Wall-Hudson property in Dennery Canyon will be restored/ enhanced and preserved in perpetuity. In addition, 6.24 acres of upland/wetland habitat will be created along the relocated drainage channel west of La Media Road including 3.28 acres of southern willow scrub/freshwater marsh and 2.96 acre of adjacent upland habitat. The La Media drainage is immediately upstream from and drains into a San Diego button-celery preserve which is immediately adjacent to and drains into the MHPA.

The Bonita Meadows Open Space Preserve is within the NCCP planning areas, but outside of the MHPA and the preserve design for the City of Chula Vista Sub-area Plan. To offset impacts to non-native grasslands within the proposed ROW, 44.7 acres of disturbed native grassland will be preserved and managed in perpetuity. In addition, 14.03 acres of ACOE and CDFG jurisdictional areas will be created/restored/enhanced within the drainage corridor of the unnamed creek that crosses Bonita Meadows Open Space Preserve. Much of the remaining acreage at the Bonita Meadows Open Space Preserve is preserved to offset impacts to Otay tarplant from the construction of SR-125 and to offset impacts to CSS and gnatcatchers from the construction of the managed lanes on I-15. The remaining habitat available at the Bonita Meadows Open Space Preserve will be available to offset impacts from future Caltrans projects in the area.

Coastal California gnatcatcher

The proposed Project has the potential to directly affect the gnatcatcher. Direct effects will occur from the temporary and permanent removal of habitat, potential effects of noise during construction, potential effects of lighting during construction, and restoration activities to offset permanent and temporary impacts.

Direct effects to one gnatcatcher pair are expected from the permanent removal of 12.3 acres of CSS and 3.2 acres of MSS, and portions of the 134.1 acres of non-native grassland. Although gnatcatchers were not observed directly within the proposed ROW, one pair was detected immediately adjacent to the Project footprint. Since the occupied CSS and MSS are continuous with the occupied gnatcatcher habitat, it is likely that the removal of CSS, MSS and non-native grassland will harm the gnatcatchers in these areas. To offset direct impacts from habitat destruction to the gnatcatcher, 12.3 acres of CSS and 6.2 acres of MSS will be preserved at the Wall-Hudson property. An additional 67.1 acres of disturbed native grassland will be preserved at Wall-Hudson (22.4 acres) and Bonita Meadows (44.7 acres).

Gnatcatchers typically maintain year-round territories that fluctuate in size (breeding vs. non-breeding seasons) and may shift slightly between years (Preston *et al.* 1998). If construction is

conducted during the breeding season (February 15 through August 31), noise and disturbance associated with construction would likely adversely affect gnatcatchers in adjacent occupied habitat by disrupting breeding and foraging, and causing the birds to frequently flush from the nest, endangering eggs and chicks. Construction noise is a concern if it is at such a level that it masks vital communication signals (Awbrey 1993), normal singing behavior, or alters the ability to detect conspecific encroachments, defend a territory, attract a mate, detect or warn of the approach of a predator or other interspecific intruder, and/or forage adequately. Direct effects to one pair of gnatcatchers west of Otay Mesa Road, and another pair of gnatcatcher pairs in the central section of Spring Canyon, detected within 500 feet of the ROW are expected due to construction and operational noise. Indirect effects from construction noise were quantified as occurring within an area 500 feet wide along the length of the ROW, and impacts to 16.72 acres of CSS and 6.25 acres of MSS within this 500-foot wide corridor will be considered permanent. To offset these impacts, 22.97 acres of CSS/MSS will be preserved in perpetuity at Wall-Hudson.

The proposed Project will be constructed during the daytime and nighttime hours. Lighting introduced onto the project site during construction may adversely affect adjacent habitat areas and facilitate predation of gnatcatchers. However, Caltrans proposes to reduce the potential for such impacts by selectively placing, shielding, and directing lights away from adjacent habitat.

Although no gnatcatchers were detected within the Wall-Hudson restoration site, gnatcatchers may occur on lands adjacent to, or within the restoration area. In addition, gnatcatchers do occupy the CSS adjacent to the riparian corridor at Bonita Meadows where restoration will occur to offset impacts to State and Federal jurisdictional waters. Therefore, restoration and maintenance activities during the gnatcatcher breeding season could potentially disrupt breeding and foraging, and cause the birds to frequently flush from the nest, endangering eggs and chicks. To avoid and minimize potential direct effects to breeding gnatcatchers during restoration and maintenance activities, a qualified biologist will monitor the restoration site and adjacent habitat for breeding activity prior to initiating restoration and maintenance activities. A qualified biologist will locate gnatcatcher nests at the restoration site prior to initiating maintenance work. If a nest is detected, maintenance activities will occur by hand and outside of a 100-foot exclusion zone around the nest. Details of the restoration program will be developed in coordination with the Service.

Any direct impacts to designated critical habitat for the gnatcatcher at Bonita Meadows will be beneficial. Enhancing and restoring the riparian habitat along the stream corridor at Bonita Meadows will ultimately benefit the gnatcatcher.

Quino checkerspot butterfly

The proposed Project has the potential to directly affect Quino. Direct effects would occur due to the temporary and permanent removal of habitat, fragmentation of breeding and foraging habitat, restoration activities to offset permanent and temporary impacts, fugitive dust during construction, and adult Quino colliding with construction equipment and personal vehicles of construction staff.

The proposed Project has the potential to harm or kill Quino during clearing and grading activities. All individuals living within the ROW that will be cleared and graded will be killed when the habitat that they occupy is destroyed. All individuals living adjacent to the ROW may be harmed by the loss of available breeding habitat. To offset this loss, 4.66 acres of mesa top and upper canyon rim at Wall-Hudson will be restored/enhanced to support the life stages of Quino. In addition, the entire ROW will be surveyed for adult Quino prior to the start of construction. If adult Quino are detected, then larval surveys will be conducted and if detected, salvaging of Quino larvae will occur with the salvaged material being translocated to an appropriate location within Dennery Canyon.

In addition, the proposed Project will fragment the mesa tops around the northern portion of Spring Canyon. The mesa tops to the east and west of Spring Canyon are continuous from Otay Mesa Road to the Mexican border. The proposed Project will completely separate the mesa tops to the south with the mesa tops to the north, including the OCCS preserve. Since Quino were sighted within the OCCS preserve, Quino that attempt to fly between the areas on the north side of the ROW and areas to the south of the ROW will have to cross SR905 increasing the chances of collisions with motor vehicles. To reduce the effects of fragmentation, Spring Canyon will be spanned by two bridges creating a wildlife corridor. In addition, a corridor along the northern ROW will connect Spring Canyon with the OCCS preserve.

During restoration activities, there is the potential to harm or kill Quino larvae by inadvertently stepping on individuals, pulling weedy plants that may have Quino larvae on them, or by crushing individuals during grading activities. To avoid and minimize impacts to Quino during restoration activities, restoration areas on the mesa tops at Wall-Hudson will implement conservation measures that include surveying areas with dot seed plantain for Quino larvae, flagging and avoiding areas where Quino larvae are detected, and hand weeding within 10 meters of flagged areas.

To offset impacts from fugitive dust, dust control BMPs will be implemented according the Caltrans Standard Specifications, including Section 7-1.01F Air Pollution Control, Section 10 Dust control, Section 17 Watering, and Section 18 Dust palliative. To avoid and minimize the potential for collisions of adult Quino with motor construction vehicles and personal vehicles of construction staff, vehicle speeds on access roads to the proposed Project footprint will be maintained at below 25 MPH.

Vernal Pool Species

The rarity of the vernal pool species is clearly related to their adaptation to a very specialized and naturally rare habitat. The continued existence fo these species is entirely dependent upon the long-term survival of a functioning vernal pool ecosystem. Destruction of the remaining vernal pools, including pools which are suitable but presently unoccupied by listed species, precludes potential recovery efforts for the many listed species dependent upon vernal pools. Task 2 in the Vernal Pool Recovery Plan states that "Restoration and reintroduction are necessary to expand the current ranges of these (vernal pool species) endemic species to reduce risk of extinction through random and natural events." The proposed Project alignment between Caliente

Boulevard and Heritage Road crosses Stockpen gravelly clay loam soils (Stockpen soils). Stockpen soils on Otay Mesa support numerous vernal pool complexes including J14 between Caliente Boulevard and Heritage Road. The loss of Stockpen soils due to constructing the proposed Project will reduce the amount of suitable land available for the restoration and reintroduction of vernal pools and listed vernal pool species respectively.

Clearing and grading activities will directly effect three pools supporting San Diego fairy shrimp, one pool supporting both San Diego and Riverside fairy shrimp and one pool containing 15 button-celery plants. Direct impacts to 0.14 acre of pool habitat and the contributing watersheds will be offset by restoring/enhancing 0.39 acre of pool surface area and 3.9 acres of contributing watershed for a total of 4.29 acres of vernal pool complex at Wall-Hudson. In addition, the enhancement activities to offset impacts to Quino would include enhancing vernal pools and their contributing watersheds.

To minimize impacts to San Diego and Riverside fairy shrimp, a series of conservation measures directing the planning and implementation of restoration efforts at Wall-Hudson are discussed above, including the collection of topsoil from vernal pools to be impacted that area occupied by fairy shrimp. However, there is the potential for the loss of fairy shrimp cysts during the salvage and storage of soils containing vernal pool inoculum. The longer inoculum is stored, the higher the potential for loss of fairy shrimp cysts because of unknown factors such as, natural aging and loss of viability; and infestation by disease, fungus, or some other pest. The Project proponent will implement conservation measures to salvage correctly and store the soil inoculum for one year until the restored pools to be inoculated pond water for a sufficient period of time to support the life cycle of Riverside fairy shrimp.

Indirect Effects

Indirect effects to the gnatcatcher, Quino and, the three vernal pool species may occur from operation and maintenance activities within the road effect zone. The estimates of indirect effects used a habitat-based approach and considered: (1) the degradation of habitat adjacent to the highway as a result of vehicle traffic noise and other proximity effects (wildlife/vehicle collisions) altering the mobility and behavior patterns of wildlife species within the area, (2) the isolation or fragmentation of remaining adjacent habitat following highway construction and the effect on wildlife corridors between these areas, and (3) the introduction and spread of exotic plant species has the potential to convert native habitat into disturbed habitat unsuitable for federally threatened and endangered species.

The road effect zone (Forman *et al.* 1997, 2000) is the area from the road edge to some outer limit within which road traffic has significant ecological effects on wildlife. The effect distance of the road effect zone is based on traffic intensity, whether the road is a two lane or greater than two lane roadway, the species present along the roadway, and a variety of ecological variables. Changes in traffic intensity can alter the effect of roads and the width of the road effect zone. For each species, there is a threshold where the distance of the road effect zone stabilizes. For the SR-125 South Project, Caltrans established a road effect zone threshold width of 300 feet on each side of the roadway where habitat exists. The 300 foot distance is based on the reasonable

assumption that most effects would be diminished to an inconsequential level beyond this distance.

Indirect effects to the gnatcatcher and Quino may occur from operational impacts of SR905 (roadkill, fugitive dust, elevated noise levels) and the introduction and spread of exotic plant species. During the operation of the SR 905 Extension, gnatcatchers and adult Quino that travel into the ROW have the potential to be struck by vehicles. In addition, habitat can become degraded from elevated noise levels and fugitive dust settling on native vegetation. To offset indirect effects to gnatcatchers and Quino from vehicle strikes, fugitive dust and elevated noise levels, 6.5 acres of CSS and 4.8 acres of MSS will be preserved at Wall-Hudson. This acreage overlaps the direct impacts from the temporal habitat loss and therefore is included in offsetting measures for direct temporal loss of habitat.

Invasive species are now recognized as a threat to biodiversity within native vegetation, second only to direct habitat loss and fragmentation (Pimm and Gilpin 1989, Scott and Wilcove 1998). Non-native, weedy species may out-compete and exclude native species potentially altering the structure of the vegetation, degrading or eliminating habitat needed by the gnatcatcher for breeding and foraging south of the ROW, riparian communities downstream of the ROW, vernal pool species adjacent to the ROW and east of the POE, and providing food and cover for undesirable non-native animals (Bossard *et al* 2000).

Caltrans has a history of using invasive exotic species as part of their planting pallette along roads within their ROW. In our April 24, 1998, letter to the Chief Landscape Architect and our September 9, 1998, letter to the Wildflower Program Coordinator at Caltrans, we expressed our concern with the continued use of invasive plant species in road construction and improvement projects. We encouraged Caltrans to follow Executive Order 11987 to "restrict the introduction of exotic species into the natural ecosystems on lands and waters which they own, lease, or hold for purposes of administration; and, shall encourage the States, local governments, and private citizens to prevent the introduction of exotic species into natural ecosystems of the United States." Caltrans landscape architects continue to design landscaping plans using invasive species such as iceplant (*Mesembryanthemum crystallinum*) and cat's claw (*Acacia* ssp.). Caltrans landscape architects also continue to incorporate new, unknown exotic plant species into their project designs. The long-term affect of these new plants on the natural environment is often unknown until it is too late when the species becomes problematic. We have been working with Caltrans to transition away from using known invasive exotics, but continue to meet with resistance to change, even though our 1998, letters resulted in a Memorandum from the Chief of the Office of State Landscape Architecture encouraging local Districts to "Use regionally-appropriate native plant materials wherever possible, and avoid the use on non-native plant materials in areas near natural open space or wildlands, which may escape and colonize, or hybridize with native species." The indirect effects from introducing invasive exotic plant species along road sides continues to be problematic. To minimize the potential effects to gnatcatchers, and Riverside and San Diego fairy shrimp due to exotic plant invasion into natural habitat, the Service will coordinate with Caltrans Landscape Architects to develop appropriate planting palettes for the Project.

Cumulative Effects

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

We anticipate that a wide range of activities within the action area may affect the species addressed in this Opinion. Such activities include, but are not limited to, urban, water, flood control, highway, and utility projects; as well as conversion or degradation of habitat resulting from agricultural use. Many of these activities will be reviewed under section 7 of the Act as a result of a federal nexus and therefore would not be considered cumulative impacts. However, emergency repairs to water and sewer infrastructure often never receive permits from regulatory agencies or the permitting occurs after-the-fact. In addition, gnatcatcher, Quino, and vernal pool habitat continues to be degraded from the lack of effective habitat management and protection from off road vehicles, illegal dumping, and invasive weeds. In particular, invasive weeds such as bromes (*Bromus* spp.), artichoke thistle (*Cynara cardunculus*), sweet fennel (*Foeniculum vulgare*) and mustards (*Brassica* spp.) are changing the habitat characteristics to be unfavorable to the long term viability of sensitive and listed plant species.

CONCLUSION

After reviewing the current status of the species at issue, the environmental baseline for the action area, the effects of the proposed SR-905 Extension Project, and the cumulative effects, it is the Service's biological opinion that the project, as proposed, is not likely to jeopardize the continued existence of the coastal California gnatcatcher, Quino checkerspot butterfly, San Diego fairy shrimp, Riverside fairy shrimp, and San Diego button-celery; and will not adversely affect designated critical habitat for the gnatcatcher.

We present this conclusion based on the following reasons:

1. The proposed action would harm three (3) pairs of gnatcatchers, a small portion of the range-wide populations of this species. The permanent and temporal loss of 29.02 acres of CSS and 9.45 acres of MSS is not large relative to the extent of habitat remaining over the coastal California gnatcatcher's range. The anticipated loss of CSS and MSS will be minimized by preserving 38.47 acres of CSS/MSS at Wall-Hudson.

2. The anticipated loss of CSS, MSS, and non-native grassland near Spring Canyon and the OCCS preserve is not expected to significantly decrease the long-term viability of the Quino checkerspot butterfly. To minimize impacts to Quino, 4.61 acres of canyon rim and mesa top will be enhanced/restored at Dennery Canyon.

3. The anticipated loss of three pools containing San Diego fairy shrimp and one pool supporting San Diego and Riverside fairy shrimp, and the permanent disturbance of one pool supporting 15 San Diego button-celery plants is not expected to significantly

decrease the long-term viability of these three vernal pool species. The loss of 0.14 acre of pool surface area and contributing watershed is not large relative to the extent of habitat remaining over the San Diego button-celery's range, and the San Diego and Riverside fairy shrimp's range. To minimize impacts to these three species, 0.39 acre of vernal pool surface area and 3.9 acres of contributing watershed will be restored/ enhanced on the mesa tops at Wall-Hudson. To further minimize impacts to San Diego button-celery, seed will collected from the impact area and distributed within pools at Wall-Hudson and the fifteen individuals within the proposed Project footprint will be salvaged and transplanted within pools at Wall-Hudson.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by FHWA and/or agencies and individuals designated by FHWA, as the lead federal agency for the project. FHWA has ongoing responsibility to regulate the activity that is covered by this incidental take statement. If FHWA: (1) fails to assume and implement the terms and conditions or (2) fails to require its designated agency(ies) and individual(s) to adhere to the terms and conditions of this incidental take statement through enforceable terms incorporated into contracts, grants, and permits related to work activities associated with the project, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of the incidental take, FHWA or its designated agency(ies) or individual(s), must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR § 402.14(I)(3)].

Sections 7(b)(4) and 7(o)(2) of the Act generally do not apply to listed plant species. However, limited protection of listed plants from take is provided to the extent that the Act prohibits the removal and reduction to possession of federally listed endangered plants or the malicious damage of such plants on areas under Federal jurisdiction, or the destruction of endangered plants on non-Federal areas in violation of State law or regulation or in the course of any violation of a State criminal trespass law.

The Service will not refer the incidental take of any such migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions (including the amount and/or number) specified herein.

AMOUNT OR EXTENT OF TAKE

The Service anticipates that three (3) pairs of gnatcatchers could be harmed as a result of this proposed action. The take of one pair of gnatcatchers may be in the form of harm as a result of the removal of 12.3 acres of CSS and 3.2 acres of MSS and temporal loss of 16.72 acres of CSS and 6.25 acres of MSS that otherwise could be utilized by the gnatcatcher as foraging and/or nesting habitat. The take of the other two pairs of gnatcatchers detected within 500 feet of the ROW may be in the form of harm from construction and operational noise.

The Service anticipates that an unknown, but small number of Quino could be harmed as a result of this proposed action. The take may be in the form of harm due to fugitive dust during construction, adult Quino colliding with construction equipment and personal vehicles of construction staff, removal of potential Quino habitat in the Project ROW adjacent to the OCCS preserve and Spring Canyon. Take may also occur during restoration activities at Wall-Hudson.

The Service anticipates that an unknown, but small percentage of the populations of cysts/eggs of San Diego and Riverside fairy shrimp in the bottom substrate within the four pools could be harmed by the proposed action. The take may be in the form of harm as a result of the salvaging of pool substrate and the grading and recontouring of the areas containing vernal and road pools.

EFFECT OF THE TAKE

This level of take is not likely to result in jeopardy to the coastal California gnatcatcher, Quino checkerspot butterfly, San Diego fairy shrimp and the Riverside fairy shrimp.

REASONABLE AND PRUDENT MEASURES

The Service believes the following Reasonable and Prudent Measure is necessary and appropriate to minimize take of gnatcatchers, Quino, San Diego fairy shrimp, and Riverside fairy shrimp:

1. The FHWA and their representatives shall ensure that construction activities, and anthropogenic disturbances to listed species and their habitats are avoided and/or minimized.

2. Unavoidable Project impacts will be offset by the implementation of the mitigation as described in the EIS, Biological Assessment, and biological opinion.

3. The Project proponent shall ensure that the conservation goals for the covered species and habitat types of the MSCP are not adversely affected due to the subject Project.

4. To minimize the potential take of Riverside and San Diego fairy shrimp due to loss of cysts in stored inoculum, fairy shrimp vernal pool restoration will commence the first summer/fall season prior to or concurrently with the start of Project construction.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, FHWA and their representatives must comply with the following term and condition, which implements the reasonable and prudent measures described above and outline required reporting/monitoring requirements. This term and condition is non-discretionary.

The FHWA shall implement reasonable and prudent measures 1, 2, and 3 through the following terms and conditions:

1. The FHWA and their representatives shall fully implement all of the Conservation Measures included as part of the project description of this Opinion.

2. The FHWA and their representatives shall submit all landscape designs and planting palettes to the Service for approval at least 60 days prior to scheduled implementation. All landscaping for the Project shall follow the Service approved landscaping plans.

The FHWA shall implement reasonable and prudent measure 4 through the following term and condition:

1. Because stored fairy shrimp cyst viability may decrease and the probability that cysts may be otherwise be harmed in storage (e.g., fungus, heat, etc...) increases over time, any temporal loss of vernal pools caused by delays in initiating restoration shall be compensated through additional fairy shrimp occupied vernal pool preservation and/or restoration at a 0.5:1 ratio for every 6 months of delay (i.e., 1:1 for 12 months delay, 1.5:1 for 18 months delay, etc.). The Service shall waive the requirement for additional vernal pool preservation an/or restoration only if a justification for any delay is provided to us in writing and we concur with the justification.

The Service retains the right to access and inspect the project site for compliance with the proposed project description and with the term and condition of this biological opinion. Any habitat destroyed that is not in the identified project footprint should be disclosed immediately to the Service for possible reinitiation of consultation. Compensation for such habitat loss will be requested at a minimum ratio of 5:1 (habitat in kind).

Reporting Requirements

In order to demonstrate compliance with the foregoing Project Description and Conservation Measures, FHWA, or its designated contact, shall submit an annual report to the Service that describes and summarizes the implementation of the proposed project and its associated Conservation Measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans or to develop information.

1. FHWA and their representative agencies should implement a process that leads to the discontinuance of invasive exotic plant species in their landscaping plans and transition into using only non-reproducing exotic plant species and local native plant species.

2. FHWA and their representative agencies should purchase for long-term preservation, all lands supporting the J14 vernal pool complex and other properties with vernal pools on Stockpen gravelly clay loam soils within parcel boundaries required to be purchased for the SR905 ROW. These lands should be added to the MHPA.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefitting listed species or their habitats, the Service requests notification of the implementation of any conservation recommendations.

REINITIATION NOTICE

This concludes formal consultation on the SR-905 Extension Project outlined in the initiation request. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if (1) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (2) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (3) a new species is listed or critical habitat designated that may be affected by the action.

If you have any questions or concerns about this biological opinion, please contact John DiGregoria of my staff at (760) 431-9440.

Sincerely,

for

Therese O'Rourke
Assistant Field Supervisor

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
6010 Hidden Valley Road
Carlsbad, California 92011

In Reply Refer To:
FWS-SDG-2296.6

AUG 2 3 2007

Mr. Chris White
Environmental Resources Studies
California Department of Transportation
4050 Taylor Street
San Diego, California 92110

Re: Amendment to the Biological Opinion for the State Route 905 Extension Project, San Diego County, California

Dear Mr. White:

This document amends our biological opinion (1-6-04-F-2296) for the State Route 905 Extension Project in the County of San Diego, California. In our biological opinion (Opinion) for the State Route 905 Extension Project, we concluded that the project was not likely to jeopardize the continued existence of the threatened California gnatcatcher (*Polioptila californica californica*) and the endangered San Diego fairy shrimp (*Branchinecta sandiegonenis*), Riverside fairy shrimp (*Streptocephalus woottoni*), Quino checkerspot butterfly (*Euphydryas editha quino*), and San Diego button celery (*Eryngium aristulatum* var. *parishi*). We issued our Opinion on July 12, 2004, in accordance with section 7 of the Endangered Species Act of 1973 as amended (16 U.S.C. 1531 et seq.). On August 20, 2007, we received a letter from your office dated August 16, 2007, requesting an amendment to the Opinion. This document amends our Opinion for the State Route 905 Extension Project. The U.S. Fish and Wildlife Service concurs with the following change/addition to the project description:

"To accommodate soil excavation and transportation to stockpile sites, a temporary haul road would be constructed on the north side of Otay Mesa Road. The haul road extends 100 feet from the edge of pavement, outside of the Caltrans right-of-way, on private property. Approximately, 0.7 acre agricultural, 0.04 acre developed, and 2.4 acres non-native grassland habitats would be temporarily impacted. Temporary impacts to 2.4 acres non-native grassland habitat would be offset at 0.5:1 by Caltrans to the Otay Mesa Grassland Management Fund. Documentation that mitigation has been completed would be provided prior to any impacts by Caltrans. The amount of the contribution would be calculated based on the monetary equivalent of purchasing 1.2 acres of Tier II habitat (MSCP). Areas temporarily impacted by the haul road would be ripped and seeded with appropriate native species."

TAKE PRIDE® IN AMERICA

If you have any questions or concerns about this letter, please contact Kurt Roblek of my staff at (760) 431-9440.

Sincerely,

for Therese O'Rourke
Assistant Field Supervisor

Cc: Larry Vinzant, Federal Highway Administration

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Ecological Services
Carlsbad Fish and Wildlife Office
6010 Hidden Valley Road, Suite 101
Carlsbad, California 92011

In Reply Refer To:
FWS-SDG-08B0479-09F1139

OCT 2 1 2009

Ms. Kim Smith
California Department of Transportation, District 11
Environmental Resource Studies Office
4050 Taylor Street, MS-242
San Diego, California 92110

Subject: Reinitiation of Section 7 Consultation for the State Route 905, San Diego County, California

Dear Ms. Smith:

The U.S. Fish and Wildlife Service (Service) has reviewed the request from the California Department of Transportation (Caltrans) dated July 20, 2009, on behalf of the Federal Highway Administration, to amend the State Route 905 (SR-905) biological opinion to include construction of a haul road across the Handler Property on Otay Mesa. Reinitiation of the section 7 consultation is needed to address the effects of the haul road on the federally endangered San Diego fairy shrimp (*Branchinecta sandiegonensis*).

Effects to fairy shrimp from the haul road were not addressed in the original biological opinion (FWS-SDG-2296.5) issued for the SR-905 because the haul road was not part of the project at the time the consultation was completed. While this biological opinion (08B0479-09F1139) supplements our original biological opinion to address the effects of the haul road on the San Diego fairy shrimp, the analyses, conclusions, and the incidental take statement in our original biological opinion addressing the endangered San Diego fairy shrimp, Riverside fairy shrimp (*Streptocephalus woottoni*), Quino checkerspot butterfly (*Euphydryas editha quino*), and San Diego button celery (*Eryngium aristulatum* var. *parishi*) and threatened coastal California gnatcatcher (*Polioptila californica californica*) remain valid, and the original biological opinion is hereby incorporated by reference.

This biological opinion is based on information contained in the project file for the original biological opinion, Caltrans' July 20, 2009, the *Handler Otay Mesa Commercial Project San Diego, California Biological Technical Report* (Helix Environmental Planning, Inc., January 14, 2003), and the *Dry Season Protocol Level Survey Report for San Diego and Riverside Fairy Shrimp: Handler Otay Mesa Commercial Project* (Helix Environmental Planning, Inc., July 27, 2007). The complete project file for this consultation is maintained at the Carlsbad Fish and Wildlife Office (CFWO).

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CONSULTATION HISTORY

The Service rendered a biological opinion (FWS-SDG-2296.5) on July 12, 2004, which considered the impacts of the SR-905 on the gnatcatcher, San Diego fairy shrimp, Riverside fairy shrimp, quino, and button celery. In our 2004 biological opinion, we concluded the proposed project was not likely to adversely affect and therefore not likely to jeopardize the continued existence of these federally listed species. We also issued an amendment to the biological opinion on August 23, 2007 (FWS-SDG-2296.6). On July 22, 2009, we received your letter dated July 20, 2009, requesting an amendment to the original SR-905 biological opinion (FWS-SDG-2296.5). We reinitiated formal consultation to address the effects of the haul road on San Diego fairy shrimp on July 22, 2009, the date we received your letter requesting an amendment to the original SR-905 biological opinion.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

Project Description

The proposed haul road will be approximately 6 meters (m) [20 feet (ft)] wide and will be constructed along the western boundary line of the Handler Property between Otay Mesa Road and SR-905. One vernal pool [0.004 hectare (ha) (0.011 acre (ac))] of vernal pool habitat and 0.077 ha (0.19 ac) of vernal pool watershed] occurs in the northwest corner of the Handler Property where the haul road is proposed. A dry season survey in 2007 found *Branchinecta* sp. cysts in the subject vernal pool that are likely San Diego fairy shrimp cysts (Helix 2007). Construction of the haul road will permanently impact the occupied vernal pool.

Conservation Measures

Caltrans proposes to offset adverse effects to the San Diego fairy shrimp by restoring 0.013 ha (0.033 ac) of vernal pool habitat occupied by the San Diego fairy shrimp and 0.77 ha (1.9 ac) of vernal pool watershed at the Caltrans-owned Dennery Canyon restoration site (aka Wall-Hudson) north of the Handler property on Otay Mesa. The additional restoration has already been initiated as part of the ongoing vernal pool restoration to offset impacts to San Diego and Riverside fairy shrimp addressed in the original SR-905 biological opinion. Caltrans will also implement all conservation measures and terms and conditions of the SR-905 South biological opinion.

STATUS OF THE SPECIES

Listing Status

The San Diego fairy shrimp was federally listed as endangered on February 3, 1997, (62 FR 4925). In September 1998, the Service published the *Recovery Plan for Vernal Pools of Southern*

California (Recovery Plan) (Service 1998). The San Diego fairy shrimp is included in this Recovery Plan. Critical habitat for the San Diego fairy shrimp was designated on October 23, 2000, (65 FR 63438). Critical habitat was remanded, but not vacated, by the Central District Court of California on June 12, 2002. Critical habitat was re-proposed on April 22, 2003, (68 FR 19887). Revised critical habitat for the San Diego fairy shrimp was designated on December 12, 2007 (72 FR 70648). No designated critical habitat for the San Diego fairy shrimp will be affected by the project.

Species Description

The San Diego fairy shrimp is a small, freshwater crustacean in the family Branchinectidae of the order Anostraca. The species was originally described by Fugate (1993) from samples collected on Del Mar Mesa, San Diego County. Male San Diego fairy shrimp are distinguished from males of other species of Branchinecta by differences found at the distal tip of the second antennae. Females are distinguishable from females of other species of Branchinecta by the shape and length of the brood sac, the length of the ovary, and by the presence of paired dorsolateral (located on the sides, toward the back) spines on five of the abdominal segments (Fugate 1993). Adult male San Diego fairy shrimp range in size from 9 to 16 millimeters (mm) [0.35 to 0.63 inches (in)] and adult females are 8 to 14 mm (0.31 to 0.55 in) long.

Distribution

The range of the San Diego fairy shrimp includes Orange and San Diego counties in southern California, and northwestern Baja California, Mexico (Service 1998, Brown et al. 1993). In Baja California, San Diego fairy shrimp have been recorded at two localities: Valle de Palmas, south of Tecate and Baja Mar, north of Ensenada. A single isolated female was previously reported from vernal pools in Isla Vista, Santa Barbara County, California; however, directed surveys have not located any additional individuals (62 FR 4925).

In Orange County, San Diego fairy shrimp have been documented at Fairview Park (CNDDB occurrence #11, 1996), Newport Banning Ranch, Irvine Ranch Land Reserve, and within the San Juan Creek watershed at Chiquita Ridge and Radio Tower Road.

In San Diego County, the species occurs in vernal pools from Marine Corps Base Camp Pendleton (MCBCP), inland to Ramona, and south through Del Mar Mesa, Proctor Valley, and Otay Mesa. Over 279 and 1,899 pools on MCBCP and Marine Corps Air Station Miramar (MCAS-Miramar), respectively, are known to be occupied by San Diego fairy shrimp (Service 2008). Of the 62 vernal pool complexes[1] mapped by the City of San Diego[2], 29 were found to be occupied by

[1] Vernal pool complexes are defined as a series of vernal pool groups that are hydrologically connected with similar soil types and species compositions. They were first described and surveyed by Beauchamp and Cass 1979 and subsequently updated in 1986a (Bauder) and 1998 (Recovery Plan).

[2] The City of San Diego conducted non-protocol surveys for San Diego fairy shrimp. Therefore this inventory may under-represent the true number of vernal pools with occurrences of San Diego fairy shrimp.

San Diego fairy shrimp and occur at the following localities: Del Mar Mesa (1), Carmel Mountain (1), Mira Mesa (6), Nobel Drive (3), Kearny Mesa (3), Mission Trails Regional Park (1), and Otay Mesa (14) (City of San Diego 2004).

Additional vernal pool complexes with occurrences of San Diego fairy shrimp located in San Diego County, but not included in the City of San Diego's inventory include: Carlsbad, San Marcos, Ramona, Poway, Santee, Rancho Santa Fe, Murphy Canyon, Otay Lakes, Imperial Beach, East Otay Mesa, Marron Valley, and Proctor Valley (CNDDB Occurrence #27, 2001).

Habitat Affinity

San Diego fairy shrimp are restricted to vernal pools and vernal pool-like depressions (e.g., ruts in dirt roads). Vernal pools are ephemeral wetlands that occur from southern Oregon through California into northern Baja California, Mexico (Service 1998). Vernal pools require a unique combination of climatic, topographic, geologic, and evolutionary factors for their formation and persistence. These seasonal wetlands form in regions with Mediterranean climates where shallow depressions fill with water during fall and winter rains and then dry up when the water evaporates in the spring (Collie and Lathrop 1976; Holland 1976; Holland and Jain 1977, 1988).

Downward percolation of water within the pools is prevented by an impervious subsurface layer consisting of claypan, hardpan, or volcanic stratum (Holland 1976, Holland and Jain 1988). Seasonal inundation makes vernal pools too wet for adjacent upland plant species adapted to drier soil conditions, while rapid drying during late spring makes pool basins unsuitable for typical marsh or aquatic species that require a more persistent source of water. Local upland vegetation communities associated with vernal pools include needlegrass grassland, annual grassland, coastal sage scrub, maritime succulent scrub, and chaparral (Service 1998).

San Diego fairy shrimp tend to inhabit shallow, small vernal pools and vernal pool-like depressions that range in temperature from 10° to 26° Celsius (C) [50° to 79° Fahrenheit (F)]. They are ecologically dependent on seasonal fluctuations in their habitat, such as absence or presence of water during specific times of the year, duration of inundation, and other environmental factors that likely include specific salinity, conductivity, dissolved solids, and pH levels (Gonzalez et al. 1996, Hathaway and Simovich 1996, and Holtz 2003).

Life History

San Diego fairy shrimp are non-selective, particle-feeding filter-feeders, or omnivores. Detritus, bacteria, algal cells, and other items between 0.3 to 100 microns may be filtered and ingested (Eriksen and Belk 1999). Adult fairy shrimp are usually observed from January to March; however, in years with early or late rainfall, the hatching period may be extended (65 FR 63438). San Diego fairy shrimp have a two-stage life cycle and spend the majority of their life cycle in the cyst stage (Templeton and Levin 1979, Schaal and Leverich 1981, Herzig 1985, Hairston and

De Stasio 1988, Venable 1989). After hatching, San Diego fairy shrimp reach sexual maturity in about 7 to 17 days, depending on water temperature and persist for about 4 to 6 weeks (Hathaway and Simovich 1996). Fairy shrimp mate upon reaching maturity, and female San Diego fairy shrimp produce between 164 and 479 cysts (eggs) over their lifetime (Simovich and Hathaway 1997). The cysts are either dropped by the females to settle into the mud at the bottom of the pool, or they remain in the brood sac until the female dies and sinks to the bottom (Eriksen and Belk 1999). Fairy shrimp cysts may persist in the soil for several years until conditions are favorable for successful reproduction (Simovich and Hathaway 1997). The cysts will hatch in 3 to 5 days when water temperatures are between 10° and 20° C (50° and 70°F) (Hathaway and Simovich 1996). Not all cysts are likely to hatch in a season, thus providing a mechanism for survival if water quality and ponding conditions are not favorable in a given year (Simovich and Hathaway 1997, Ripley et al., 2004).

Population Trend

At the time of listing, San Diego fairy shrimp were known to inhabit a minimum of 25 vernal pool complexes in coastal areas of San Diego, Orange, and Santa Barbara counties, and northwestern Baja California, Mexico (62 FR 4925). Currently, 137 complexes occupied by San Diego fairy shrimp have been identified in the U.S.; an additional 3 complexes that were identified as occupied at listing have since been extirpated (Service 2008). Most of these additional complexes fall within the extant range of the San Diego fairy shrimp known at the time of listing. Therefore, we estimate that the overall San Diego fairy shrimp distribution has not decreased or increased appreciably since listing. A summary of occupied vernal pool complexes is provided in Appendix 1 of the *San Diego Fairy Shrimp (Branchinecta sandiegonensis) 5-Year Review: Summary and Evaluation* (Service 2008).

ENVIRONMENTAL BASELINE

Regulations implementing the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq.*) (50 CFR §402.02) define the environmental baseline as the past and present impacts of all Federal, State, or private actions and other human activities in the action area. Also included in the environmental baseline are the anticipated impacts of all proposed Federal projects in the action area that have undergone section 7 consultation, and the impacts of State and private actions which are contemporaneous with the consultation in progress.

The proposed project is located 0.8 kilometer (km) [0.5 mile (mi)] north of the international border, 2.9 km (1.8 mi) east of I-805, and a matter of feet south of Otay Mesa Boulevard. The Handler property is located within the City of San Diego's Multiple Species Conservation Plan area with a connectivity corridor or designated Multiple Habitat Planning Area located in the northeastern corner of the property.

The 18-ha (45-ac) Handler property consists primarily of non-native annual grassland. Within the grassland habitat, 22 vernal pools have been identified (Helix 2003). All of the vernal pools,

except for one, are located in the southeastern quarter of the property. The lone vernal pool not in the southeastern quarter is located within the haul road alignment along the northwestern property line. San Diego fairy shrimp historically occurred in vernal pool complexes throughout the Otay Mesa ecosystem which is part of the San Diego: Southern Coastal Mesa Management Area identified in the Vernal Pool Recovery Plan (Service 1998). Many of these vernal pool complexes have been developed, converted to agriculture, and/or degraded by off-highway vehicle (OHV) use. The Recovery Plan (Service 1998) identifies several vernal pool complexes on Otay Mesa. The vernal pool in the haul road on the Handler property is not identified in the Recovery Plan, and it occurs to the north of the J14 complex identified in the plan.

Attributed to the disturbed nature of the habitat on site, minimal vernal pool flora is present, however, in 1998 a few scattered patches of wooly marbles (*Psilocarphus brevissimus*) were observed in the vernal pool in the haul road (Helix 2007). Dry season fairy shrimp surveys of the vernal pool in 2007 detected two *Branchinecta* sp. cysts that are likely San Diego fairy shrimp cysts (Helix 2007). The vernal pool in the haul road is currently subject to continual degradation primarily due to vehicle traffic and is of low conservation value, as evidenced by the lack of vernal pool flora and low fairy shrimp cyst density.

EFFECTS OF THE ACTION

Effects of the action refer to the direct and indirect effects of an action on the species or critical habitat that will be added to the environmental baseline, along with the effects of other activities that are interrelated and interdependent with that action. Interrelated actions are those that are part of a larger action and depend on the larger action for their justification. Interdependent actions are those that have no independent utility apart from the action under consideration. Indirect effects are those that are caused by the proposed action and are later in time, but are still reasonably certain to occur.

Construction of the haul road on the Handler property for the SR-905 project will grade and fill one vernal pool [0.004 ha (0.011 ac)] occupied by San Diego fairy shrimp. Loss of the vernal pool and its 0.077 ha (0.19 ac) watershed will be offset by restoring 0.013 ha (0.033 ac) of vernal pool habitat occupied by the San Diego fairy shrimp and 0.77 ha (1.9 ac) of vernal pool watershed at the Caltrans-owned Dennery Canyon restoration site (aka Wall-Hudson) north of the Handler property on Otay Mesa. The additional restoration has already been initiated as part of the ongoing vernal pool restoration to offset impacts to San Diego and Riverside fairy shrimp addressed in the original SR-905 biological opinion.

Because the San Diego fairy shrimp occupied vernal pool to be impacted is isolated, disturbed and immediately adjacent to Otay Mesa Road, it has low long-term conservation value. Soil containing fairy shrimp cysts will not be salvaged from this vernal pool because of the low cyst density in the pool and the restoration pools have already been inoculated with San Diego fairy shrimp cysts. The Recovery Plan does not acknowledge this vernal pool nor identify it as necessary for the stabilization and/or downlisting of San Diego fairy shrimp.

Project implementation is not expected to result in indirect effects to the other vernal pools in the area as the potential for unintentional fill and/or runoff entering these pools is unlikely to occur from 0.4 km (0.25 mi) away and has been addressed in the original biological opinion. All measures incorporated into the original biological opinion apply to this reinitiation and will be followed during project construction and operation.

The status of San Diego fairy shrimp has remained unchanged from the time of listing (Service 2008). This project will not change that determination. The overall acreage of impacts is small relative to the overall habitat available for San Diego fairy shrimp rangewide and the quality of the pool is poor. Loss of the individual fairy shrimp and cyst bank within this one pool is not expected to result in an appreciable reduction in the number, reproduction, or distribution of the San Diego fairy shrimp range-wide. We expect the proposed preservation and/or restoration to adequately offset this small impact and to support recovery of the San Diego fairy shrimp.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, Tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act.

The Service is not aware of any future actions that may result in cumulative effects to the San Diego fairy shrimp in the action area of this project.

CONCLUSION

After reviewing the current status of the San Diego fairy shrimp, the environmental baseline for the action area, the direct and indirect effects of the proposed action, and the cumulative effects, it is our opinion that the action, as proposed, is not likely to jeopardize the continued existence of the San Diego fairy shrimp. We reached this conclusion by considering the following:

1. The loss of one degraded vernal pool and the individual San Diego fairy shrimp and cyst bank it supports is not expected to appreciably reduce the long-term viability of this species. The loss of approximately 0.004 ha (0.011 ac) of vernal pool habitat and 0.077 ha (0.19 ac) of vernal pool watershed is not significant given the extent of habitat remaining over the range of the San Diego fairy shrimp. The vernal pool to be impacted is of low long-term conservation value.

2. Impacts to San Diego fairy shrimp habitat will be offset through the preservation and/or restoration of a greater area of habitat at a location that is expected to be of higher long-term conservation value.

3. Implementation of a perpetual maintenance and monitoring plan for the preserved and restored San Diego fairy shrimp habitat will ensure that quality habitat for the San Diego fairy shrimp is available over the long-term thus supporting recovery of the species.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, collect, or to attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavior patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

AMOUNT OR EXTENT OF TAKE

The reproductive success of San Diego fairy shrimp is dependent on seasonal fluctuations in their habitat, such as presence or absence of water during specific times of the year, duration of inundation, and other environmental factors that likely include specific salinity, conductivity, dissolved solids, and pH levels. Therefore, the population of San Diego fairy shrimp within any pool varies dramatically and can include both adult shrimp and the cyst bank of the pool. The Service is unable to quantify the precise number of San Diego fairy shrimp and cysts that will be killed by the proposed action because the population size within the vernal pool is unknown and difficult to estimate due to the dynamic conditions associated with San Diego fairy shrimp habitat. The level of incidental take of fairy shrimp is thus provided in terms of habitat impacts as follows:

- San Diego fairy shrimp and cysts within the one vernal pool to be impacted will be taken in the form of direct mortality by grading and filling activities; the take threshold will be exceeded if any areas supporting San Diego fairy shrimp outside the 0.004 ha (0.011 ac) of vernal pool habitat and 0.077 ha (0.19 ac) of vernal pool watershed are impacted.

EFFECT OF TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to San Diego fairy shrimp.

REASONABLE AND PRUDENT MEASURES

We have not identified any additional reasonable and prudent measures beyond the minimization measures committed to by Caltrans, and described in the project description of this biological opinion, that are necessary or appropriate to further minimize the incidental take of the San Diego fairy shrimp during project implementation.

TERMS AND CONDITIONS

To be exempt from the prohibitions of section 9 of the Act, Caltrans must comply with terms and conditions which implement the reasonable and prudent measures described above. Since no further reasonable and prudent measures are identified, no terms and conditions are necessary.

REINITIATION NOTICE

This concludes the reinitiation of formal consultation on the SR-905 project outlined in materials submitted to us. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

If you have any questions regarding this document, please contact Kurt Roblek of my office at (760) 431-9440, extension 308.

Sincerely,

Jim A. Bartel
Field Supervisor

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