

APPENDIX I – Geotechnical Study

**PRELIMINARY
GEOTECHNICAL
ENGINEERING REPORT**

**CAPITOL
STATION 65**

**WKA No.
7169.01**

**July 13,
2006**

Preliminary Geotechnical Engineering Report

CAPITOL STATION 65

Sacramento, California

WKA No. 7169.01

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**WALLACE • KUHL
& ASSOCIATES INC.**

Geotechnical Engineering

Engineering Geology

Environmental Consulting

Remediation Services

Construction Inspection

Materials Testing

Preliminary Geotechnical Engineering Report

CAPITOL STATION 65

Richards Boulevard
Sacramento, California

WKA No. 7169.01

July 13, 2006

INTRODUCTION

This report presents the results of our preliminary geotechnical engineering evaluation of the Capitol Station 65 property in Sacramento, California. The purpose of this investigation has been to provide preliminary findings and conclusions regarding the soil-related aspects of developing the property with mid-rise to high-rise structures. Information contained in this report is preliminary in nature. Design and construction recommendations must be provided in site-specific reports for individual buildings after they are located on the property, and the size and height of the structures are known.

Work Scope

Our scope of work included the following:

1. site reconnaissance;
2. review of historic USGS topographic maps and aerial photographs of the property;
3. review of geotechnical engineering reports for nearby properties;
4. review of pertinent information related to the adjacent American River levee;
5. subsurface investigation, including the drilling and sampling of four borings to a maximum depth of approximately 60 feet below existing site grades, the performance of two cone penetration tests (CPTs) to a maximum depth of 56 feet below the ground surface, and the excavation and sampling of eight test pits to a maximum depth of 11 feet below existing site grades;

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6. collection of representative bulk samples of anticipated pavement subgrade soils;
7. laboratory testing of selected soil samples
8. engineering analysis; and,
9. preparation of this report, Figures and Attachments

Figures and Attachments

This report contains a Vicinity Map as Figure 1, a Site Plan showing approximate boring, test pit and cone penetration test locations as Figure 2. Logs of Test Borings as Figures 3 through 6 and Logs of Test Pits as Figures 7 through 10. An explanation of the symbols and classification system used on the logs is contained on Figure. Results of the Cone Penetration Tests are presented on Figures 12 through 15. Appendix A contains general information regarding project concepts, exploratory methods used during our field investigation, and laboratory test results not included on the logs. Appendix B contains information regarding our liquefaction analysis. Appendix C is letters prepared by the Army Corp of Engineers and the Federal Emergency Management Agency regarding the American River Levee.

FINDINGS

Site Description

The Capitol Station 65 property is located north of Richards Boulevard in Sacramento, California (see Figure 1). The property encompasses approximately 65 acres of industrial development adjacent to the American River.

The site is bounded to the north by the curve of the American River and its southern levee; to the west by North 5th Street, beyond which are industrial and office buildings; to the south by Richards Boulevard, beyond which are industrial and office buildings; and to the east by North 7th Street, beyond which are industrial and office buildings.

At the time of our site visits, in May and June, 2006, portions of the site were in active use, while other areas had been cleared and were lying vacant with a low growth of grasses and weeds. A



building in the northwest portion of the property had been demolished and cleared; some rubble and debris, a concrete pad and asphalt concrete paved area remain. A stockpile of loose fill, approximately three to four feet high lies to the south of the demolished building area. Vacant land lies to the east of the fill pile, beyond which are a series of occupied and unoccupied warehouse buildings located through the central portion of the site from Richards Boulevard to the property's northern extent.

The vacant buildings were once used as a peach cannery. Numerous peach pits in varied concentrations are scattered on the surface in the northwest portion of the site. A pump house is located in the northwest portion of the site. A 12-inch water line runs from the pump house to the northern edge of North 5th Street. Other buildings on site include a trucking warehouse; a concrete batch facility operated by Precision Concrete; a thrift store warehouse; and, to the northeast of the termination of North 7th Street, a hay packing facility.

Review of historical aerial photographs indicates that several of the existing structures were constructed prior to the earliest photograph available (1961). The existing vacant portion located along the western edge of the property had previously been developed with several small structures. It appears the area had also been utilized as a storage area for large containers and small equipment. Railroad tracks running in a north/south direction near the western central and northern portion of the site are present in the photos from the early 1960's and mid 1970's.

The surface elevation across the property is approximately +25 feet relative to mean sea level (msl) based on review of the United States Geological Survey *Topographic Map of Sacramento East Quadrangle, California* (1992).

Soil Conditions

Our investigation revealed the surface and near-surface soils at the site to consist of soft silts and clayey silts, extending to approximately 15 to 20 feet below site grade. Beneath these, lie loose silty and clean sands overlying a layer of sandy gravels encountered between 42 and 56 feet below site grades. However, at one location (Boring D4), exploration conducted to 60 feet below grade did not encounter gravels.



Fill soils (stockpile) were found on the western side of the site, in a berm approximately three to four feet high, parallel to North 5th Street. These fill soils are loose and generally consist of gravely sands, with scattered demolition debris.

Our test pits revealed peach pit refuse approximately six inches thick located on the surface along the western portion of the site. Our previous experience on the west side of North 5th Street indicates heavy organic refuse may exist in the area. This heavy organic refuse typically consists of trenches (eight to ten feet deep) filled with organic waste from peach processing operations. Our subsurface investigation did not encounter the heavy organics typically seen in the area. However, concentrations of organics may still exist on the property.

Two CPTs were performed to a depth of approximately 56 feet below the ground surface. The results from the CPT soundings are generally consistent with our soils encountered in our borings performed on the site.

For more detail regarding the soil conditions at a specific location, please refer to the Logs of Borings, Figures 3 through 6, Logs of Test Pits, Figures 7 through 10, and Cone Penetration Tests, Figures 12 through 15.

Ground Water

The current Sacramento County, California ground water map (published Spring 2003) indicates that the ground water in the vicinity of the Capitol Station 65 property is located at +0 feet msl, or approximately 25 feet below the ground surface. Our borings encountered saturated soil conditions at approximately seven feet below existing site grades. Please note, utilizing mud rotary drilling methods does not allow for accurate measurement of ground water depths in borings. Our test pit exploration in the northwest portion of the site, which extended to a depth of 11 feet below the ground surface, did not encounter free ground water, but did encounter saturated soil conditions. Results from pore water dissipation testing conducted during the CPT investigation indicate ground water levels at 4.9 feet below grade at CPT1 and 12.4 feet below grade at CPT2 (approximately +12 to +20 feet msl).



Site Settlement Observations

Based on our site reconnaissance and discussions with employees of the industrial facilities on the site, building distress and settlement is common in the area. Observations of building distress included doors out of plumb in the hay packing facility, and wavering rooflines in some locations of site warehouses. Discussions with local employees revealed that interior asphalt pavements for the hay packing facility are considerably warped, and the interior slab required repaving twice over the lifetime of the building.

CONCLUSIONS

Evaluation of Existing Site Flood Protection

The Capitol Station 65 property lies within the area of the American and Sacramento Rivers. These rivers influence the flood protection level of the subject property and the surrounding area. Accordingly, the Corp of Engineers (COE) studied both river levees influencing the site and provided partial certification that the pertinent reaches (river miles) of the levee were adequately designed and constructed to withstand the base flood event, as indicated in their letter dated December 9, 2004 letter sent to Mr. Stein Buer, Executive Director of the Sacramento Area Flood Control Agency (SAFCA). A copy of this letter is included in Appendix C. The letter relies on the interior drainage criteria to be performed by others (SAFCA and the State of California) to complete this component of the FEMA certification evaluation (see paragraph b, 44 CFR 65.10) designation, this analysis has apparently been submitted and approved by FEMA.

The current Flood Insurance Rate Map (FIRM), *City of Sacramento, California, Sacramento County, Panel 25 of 30 Community Panel Number 060266 0025F* revised July 6, 1998, published by FEMA shows the Capitol Station 65 property to lie within a Special Flood Hazard Area (SFHA) Zone AR. The FEMA *Letter of Map Revision* letter (LOMR) dated May 22, 2000, to the Honorable Joe Serna, Mayor of the City of Sacramento, indicates the site was changed from a SFHA Zone AR to Zone A99. SFHA A99 designates an area to be protected from the 1% (100 year) annual chance flood event by a Federal flood protection system under construction; no base flood (1% chance, 100 year) elevations determined.



In a subsequent letter from FEMA to the Honorable Heather Fargo, Mayor of the City of Sacramento dated February 18, 2005, the SFHA designation of the site was once again changed from Zone A99 to a Zone X (Zone X shaded). Zone X designates an area protected from the base flood by the construction of a levee, dike or other structural means. Thus, the current FEMA updated FIRMS with LOMR revisions show the site in a Zone X. This SFHA designation is the same as the majority of Sacramento areas near waterways. There is no further action required by the landowners in this zone.

It should be noted that this certification is based on the base flood event flow of 145,000 cubic feet per second (cfs) pursuant to the agreement signed between SAFCA and the Bureau of Reclamation dated December 3, 2004. Should the upstream hydrology or hydraulics change from this flow rate, then a reanalysis might be necessary. For example, if the flows released from Folsom Dam or upstream reservoirs on the Sacramento River or the Yolo Bypass were to change, the base flood elevation may change.

It should also be noted that regulatory and permitting agencies may impose restrictions to improvements on or adjacent to the levee. This is especially true near the landside levee toe and includes improvements and setback restrictions. While some levee toe improvements may improve levee stability (buttress fill) and reduce levee seepage potential (drainage blanket), they must be approved by the proper permitting agencies. This would include the State Board of Reclamation and the City of Sacramento.

Seismic Code Parameters

Review of the *Maps of Known Active Fault Near-Source Zones in California and Adjacent Portions of Nevada*, dated February 1998, prepared by the State of California Department of Conservation - Division of Mines and Geology to be used with the 1997 Uniform Building Code (UBC) indicates that there are no Type "A" or "B" faults located within 15 kilometers of the site. The following parameters may be used for seismic design of structures at the site using the 1997 UBC or 2001 California Building Code (CBC), depending upon which is the governing code for this project:



	1997 UBC Table/Figure	Factor/Coefficient	Value
Seismic Zone	Figure 16-2	Zone	3
Seismic Zone Factor	Table 16-I	Z	0.30
Soil Profile Type	Table 16-J	S _D	--
Seismic Coefficient	Table 16-Q	C _a	0.36
Seismic Coefficient	Table 16-R	C _v	0.54
Near-Source Factor	Table 16-S	N _a	1.0
Near-Source Factor	Table 16-T	N _v	1.0
Seismic Source Type	Table 16-U	B	--

Earthquake Ground Motion – General

In order to evaluate potential future earthquake ground motions occurring at the site, we performed a site-specific ground response analysis. Our analysis consisted of two parts: 1) a review of historical seismicity; and, 2) probabilistic and deterministic seismic hazard analyses, PSHA and DSHA, respectively.

Historic Seismicity

Data pertinent to the greatest historical earthquakes affecting the site are contained within the database of the EQSEARCH computer program (Blake, 2000; database updated to December, 2004). The EQSEARCH database was developed by extracting records of events greater than magnitude 4.0 from the Division of Mines and Geology (DMG) *Comprehensive Computerized Earthquake Catalog*, and supplemented by records from the United States Geologic Survey (USGS); University of California, Berkeley; the California Institute of Technology; and, the University of Nevada at Reno.

According to the data, the most intense earthquake ground shaking in the vicinity of the site resulted from the M_R 8.25 San Francisco earthquake of April 18, 1906, with an epicenter located approximately 83 miles southwest of the site. The closest earthquake to the site is indicated to be a M_R 4.2 aftershock of the Vacaville-Winters earthquake on April 30, 1892, with an epicenter located approximately 22 miles west of the site.



Earthquake Ground Motion

The Upper Bound Earthquake Ground Motion is defined by the 2001 (CBC) §1629A.2.6 as "the motion having a 10% probability of being exceeded in a 100-year period or maximum level of motion which may ever be expected at the building site within the known geologic framework." Criteria for determining the Upper Bound Earthquake Ground Motion include the seismic history of the vicinity, the geologic province in which the faults under consideration are located, fault lengths, faulting mechanisms and regional geologic structure.

We have analyzed the probability of seismic activity affecting the site using FRISKSP (Blake, 2000, adapted from McGuire, 1978). We analyzed the cumulative effect of fault activity within a 100-mile radius to include the influence of San Francisco Bay Area faults (including the San Andreas Fault), as well as western Coast Ranges and eastern Sierra Nevada faults. Based on the soil characteristics, an S_D site classification with estimated shear wave velocities of 820 feet per second (250 meters per second) is considered appropriate (Boore et al. 1997). The results of our analyses indicate that the site has a 10 percent probability of exceeding 0.21g horizontal ground acceleration (PGA) in 100 years.

In our opinion, M_{MAX} , the maximum deterministic level of ground motion expected at the site "within the known geologic framework," would result from a 6.9 M_w event on Segment 3 of the Great Valley fault system located approximately 28 miles west of the site (Peterson et al, 1996; Cao, 2003). Using the attenuation relationships published by Boore (1997) for dip-slip fault movement, the Great Valley fault system could produce a peak horizontal ground motion on the order of 0.23g. Located about 22 miles to the east is the Foothills Fault System, capable of generating slightly smaller magnitude earthquake magnitudes of 6.5, with resulting site accelerations of approximately 0.23g.

Liquefaction Potential

The results of our subsurface investigation show that the soils beneath the site include silty and relatively clean sands that transition to sandy gravels at depths between 42 and 57 feet below the existing ground surface. Loose, cohesionless sands are considered susceptible to liquefaction as the result of strong ground shaking during earthquakes. Soft silty materials are considered



susceptible to strength reduction during cyclic loading (earthquakes). These soils require analysis for liquefaction potential, and liquefaction-related hazards. Hazards to buildings associated with liquefaction include shallow and deep foundation bearing capacity failure, lateral spreading, and differential settlement of foundations, which can contribute to structural damage or collapse.

The relatively loose sand and silt deposits combined with the high ground water levels typical of near-river environments are conditions that increase the potential for liquefaction. Depending upon the magnitude and duration of shaking during a seismic event, these soils could experience considerable liquefaction induced settlement. However, to our knowledge there have been no reported instances of liquefaction having occurred within downtown Sacramento during the major earthquake events of 1892 (Vacaville-Winters), 1906 (San Francisco) and 1989 (Loma Prieta).

ConeTec® and Gregg In-Situ developed an Excel® spreadsheet which will read in CPT data files and, given earthquake input energy, calculate Factors of Safety against liquefaction. The spreadsheet references Robertson Wride (1998) and Robertson and Brachman (2002), which present work with the results of the National Center for Earthquake Engineering Research (NCEER) (1998) liquefaction evaluation methods. We implemented the spreadsheet with the results from Gregg In-Situ CPT on CPT1 and CPT2 to arrive at a Factor of Safety against liquefaction and post-liquefaction settlement. Settlement calculations are conducted within the spreadsheet, and were verified by hand using the Ishihara and Yoshimine (1992) prescribed methods for estimation of volumetric strain. The spreadsheet results are presented in Appendix B, with a summary presented below. Laboratory testing of collected samples included determination of fines content and density.

The values used as input for the liquefaction analysis are the Upper Bound Earthquake Ground Motion PGA, 0.21g and the M_{MAX} possible within the known geologic framework of 6.9. Also required for the liquefaction analysis is the depth to ground water, which at the time of our investigation was calculated to be seven feet below surface elevation by results of a pore pressure dissipation test conducted by Gregg In-Situ.



Liquefaction Analysis Results

Based on the analysis for CPT1, the silts, silty sands and sands encountered have factors of safety ranging from 0.39 to 3.22 against liquefaction, or were considered nonliquefiable based on fines content or cone tip resistance. Analysis of the results of CPT2 result in factors of safety against liquefaction ranging from 0.48 to 3.96. A factor of safety of 1.3 or greater is generally considered acceptable, with little or no associated estimated settlement.

We have estimated the potential settlement of soil under the site using the results of the liquefaction analysis and using the methods of Ishihara and Yoshimine (1992). The analysis indicates that the strain (settlement) of discrete layers of soil beneath the site may be as high as 6.0 percent.

The total post-liquefaction settlement is estimated at 18 inches, with up to 12 inches differential settlement possible across 50 feet, depending on subsurface variability and proximity to the American River.

Material Suitability

The existing on-site materials are considered suitable for use as engineered fill, provided they are free of significant quantities of organics, rubble, and deleterious materials.

Bearing Capacity and Preliminary Foundation Alternatives

Our field investigation indicates that the upper 40 to 60 feet of soils at the site are variable in densities. In our opinion, these soils are not considered capable of supporting mid-rise (three to five stories) or high-rise (six stories and higher) structures without experiencing damaging differential settlements.

Mid-rise Structures

Mid-rise structures, at a minimum, will require significant overexcavation and recompaction to minimize the effects of differential settlement and may require the use of a deep foundation



system. Overexcavation will likely extend to depths ranging between three to five feet below foundations or depths equal to twice the footing width, and will achieve bearing capacities of approximately 3000 pounds per square feet (psf) for dead plus live load conditions.

As an alternative to overexcavation, shallow soil modification systems are available which may help to minimize the effects of differential settlements. One alternative is the overexcavation and recompaction utilizing a Geogrid reinforcement system. A Geogrid reinforcement system will typically reduce the depth of overexcavation by 30 to 40 percent to achieve bearing capacities of approximately 3000 psf. A second alternative is the use of Geopier soil reinforcement system (rammed aggregate piers). Geopiers are typically constructed to depths ranging between 10 and 20 feet below pad grades and can provide bearing capacities in the range of 5000 to 6000 psf for dead plus live load conditions. Although these systems help mitigate the differential settlements that may occur beneath structures, they may not completely reduce the effects of global settlements of the entire site.

High-rise Structures

High-rise structures will require the use of a deep foundation system (such as driven piles or auger-cast piles) that extend into the dense underlying sands and gravels. Driven piles (typically 12 inch square pre-cast concrete) extending into the dense underlying soils will likely possess dead plus live load capacities ranging between 90 to 100 tons per pile. Similar capacities can be expected for auger-cast piles extending into the dense materials. Deep foundation systems are less susceptible to settlement of the soft upper soils, and will help prevent damaging effects of settlement from liquefaction at the site.

Support of interior floor slabs will require overexcavation and recompaction of the upper three to five feet of soils within building foot prints, regardless of the type of foundation system selected.

Pavement and flatwork areas likely will require overexcavation and recompaction of the upper two to three feet of soil. Please be aware some minor movement of the underlying soils may occur which will result in the routine maintenance of the pavement and flatwork areas.



Although not encountered in our test pits, there is still a potential for trenches filled with peach refuse being encountered during construction. Full or partial removal of these organics deposits will be required, depending on the location of these materials (under buildings or within pavement areas).

Soil Expansion Potential

Our site reconnaissance, combined with our previous experience and our laboratory testing, indicates that the surface and near-surface soils are by nature granular or non-plastic fines and possess a low potential for expansion.

Ground Water

It is well established that ground water elevations beneath much of downtown Sacramento are directly related to the levels of the Sacramento and American Rivers. Since late December, 2005 the Sacramento River level measured at the I Street Bridge has averaged +18 feet msl and has been as high as +27 feet. It is these sustained high water levels that cause ground water to rise throughout downtown Sacramento. Ground water elevation beneath the site is presently at approximately +12 to +20 feet msl, based on the estimated existing ground surface elevation. Based upon historical well record data, we have previously estimated high ground water elevations for this area of Sacramento at +12 feet msl, suggesting current ground water elevations may be at or near their historic high. Considering the current ground water elevations and our previous estimates it is our opinion that a ground water level of +15 feet msl be assumed for structural design of floor slabs and below-grade walls. Normal ground water levels during periods of low rainfall and river stage (summer, fall and early winter months) are anticipated to be between elevation 0 and +5 feet msl.

We understand the city of Sacramento no longer allows permanent site dewatering using slab underdrains or wells. Therefore, any slab-on-grade floors for basements and any basement walls that will encounter ground water must be sealed, waterproofed and designed to resist hydrostatic uplift and lateral stresses exerted by the ground water.



From a construction standpoint, scheduling of the site excavation work and foundation construction during periods of extended low river stage (summer to early winter) likely would result in an excavation free of ground water or at least require only relatively minor construction dewatering. It is our opinion that ground water should be maintained (either naturally or by dewatering) at least three feet below the lowest anticipated excavation depth to provide a sufficiently stable surface for construction equipment, provided the system is designed, installed and operated by a competent dewatering contractor.

Dewatering can cause increased internal stresses to develop within the dewatered soil that could result in settlement of adjacent improvements. As dewatering becomes more extensive, potential for impact on adjacent improvements increases. If significant dewatering for building construction is required, surveying locations should be established to periodically measure the extent of surface settlements. Alternative methods (i.e. sheet piles or soil cement columns) may be utilized to allow localized dewatering of excavations, which helps prevent dewatering of adjacent sites and the associated settlement potential.

Seasonal Water

Grading operations attempted following the onset of winter rains and prior to prolonged periods of drying will be hampered by high soil moisture contents. Such soils, intended for use as engineered fill, will require considerable aeration or periods of drying to reach a moisture content to allow the specified degree of compaction to be achieved.

Excavation Conditions

The soils at the site should be excavatable with conventional construction equipment. Excavations less than five feet deep likely will stand at near-vertical inclination for short periods of time. However, on-site soils may be susceptible to sloughing and caving, if zones or pockets of clean cohesionless soils are encountered, especially when dry, or if construction is performed during the rainy season. Excavations encountering ground water may slough or cave if left open for an extended period of time. Excavations entered by workers must conform to current Cal/OSHA requirements (i.e., sloped excavations or braced shoring). Temporarily sloped excavations should be constructed no steeper than one horizontal to one vertical (1:1).



Temporary slopes likely will stand at this inclination for the short-term duration of construction, provided significant pockets of loose or saturated sands are not encountered that could slough into excavations.

Preliminary Soil Corrosivity

Two soil samples were submitted to Sunland Analytical for testing to determine pH, resistivity, and sulfate and chloride concentrations to help evaluate the potential for corrosive attack upon reinforced concrete and buried metal. The test results revealed minimum resistivities of 4,020 and 11,790 ohm-centimeters (Ω -cm), and soil pH readings of 5.73 and 5.74, respectively. Sulfates were recorded at 79.4 and 10.0 parts per million (ppm), and chlorides at 20.8 and 13.5 ppm, respectively. Results of the corrosion testing performed by Sunland Analytical Lab are summarized in Appendix A on Figures A6 and A7.

Published literature¹ defines a corrosive area as an area where the soil and/or water contains more than 500 parts per million (ppm) of chlorides, more than 2000 ppm of sulfates, or has a pH of less than 5.5. Based on this criterion, the on-site soils are not considered to be very corrosive for the samples tested. Table 19-A-4 of the 1997 UBC, *Requirements for Concrete Exposed to Sulfate-Containing Solutions*, indicates the sulfate exposure for the samples tested to be *Negligible*. Ordinary Type I-II Portland cement is indicated to be suitable for use on this project, assuming a minimum cover is maintained over the reinforcement.

Wallace-Kuhl & Associates are not corrosion engineers. Therefore, to further define the soil corrosion potential at the site, a corrosion engineer could be consulted.

Preliminary Pavement Sections

Laboratory test results indicate the native, near-surface soils are good quality materials for the support of asphalt concrete pavements. Based on the laboratory test results a Resistance ("R") value of thirty is considered appropriate for preliminary design of pavements.

¹ California Department of Transportation Division of Engineering Services Materials Engineering and Testing Services Corrosion Technology Branch, Corrosion Guidelines Version 1.0, September 2003.



The following pavement sections have been calculated using resistance values for untreated and treated subgrade soils, traffic indices required by the City of Sacramento and the design procedures in the "Flexible Pavement Design Guide for California, Cities and Counties," Fourth Edition, 1987.

PAVEMENT DESIGN ALTERNATIVES			
R-value = 30			
Traffic Index (TI)	Curb-to-Curb Width	Type B Asphalt Concrete (inches)	Class 2 Aggregate Base (inches)
5.0	53' Right-of-Way / Auto Parking	2½*	7
		3*	6
6.0	71' Right-of-Way / Light Truck Traffic	2½	10
		3½*	8
7.0	83' Right-of-Way	3	12
		4*	10
8.0	99' Right of Way	3½	14
		5*	12

* = Asphalt thickness includes Caltrans Factor of Safety.

Additional laboratory testing will be necessary to determine final pavement subgrade qualities, specifically in areas where overexcavation and recompaction is necessary.

LIMITATIONS

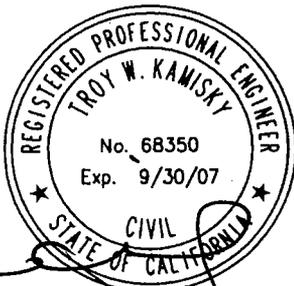
The conclusions and comments provided in this report should be considered a general overview of the geotechnical engineering aspects of site development. They are not intended for specific design or construction of any of the project improvements. At an appropriate time prior to



development, our firm should conduct comprehensive, site specific Geotechnical Engineering Investigations for the various phases of this project.

We appreciate this opportunity to be of service.

Wallace-Kuhl & Associates, Inc.

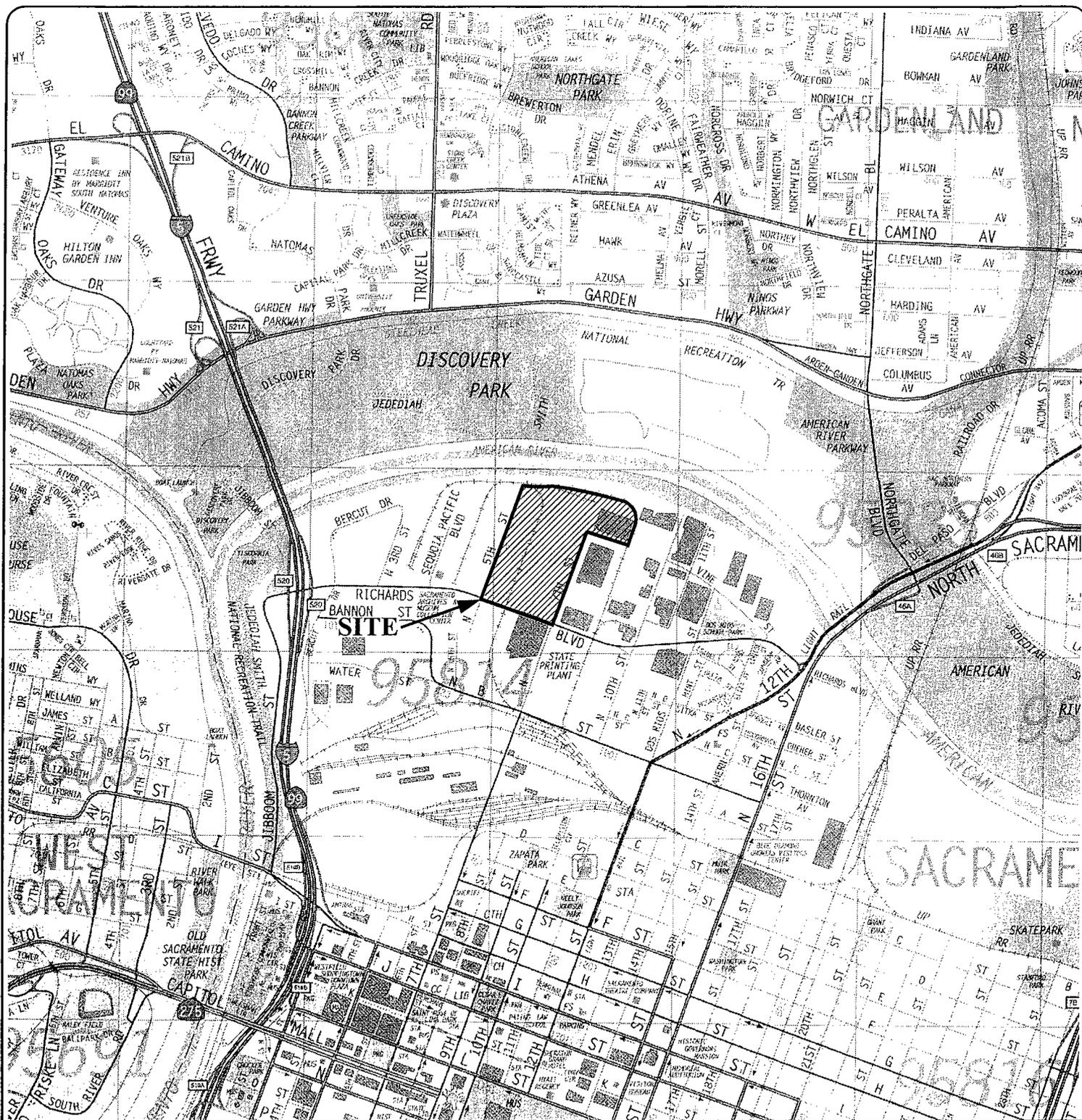


Troy W. Kamisky
Project Engineer



Todd G. Kamisky
Senior Engineer

TWK:TGK:SLF



Adapted from the Thomas Guide
Sacramento and Solano Counties
Street Guide and Directory, 2005 edition.



0 1000 2000
SCALE IN FEET



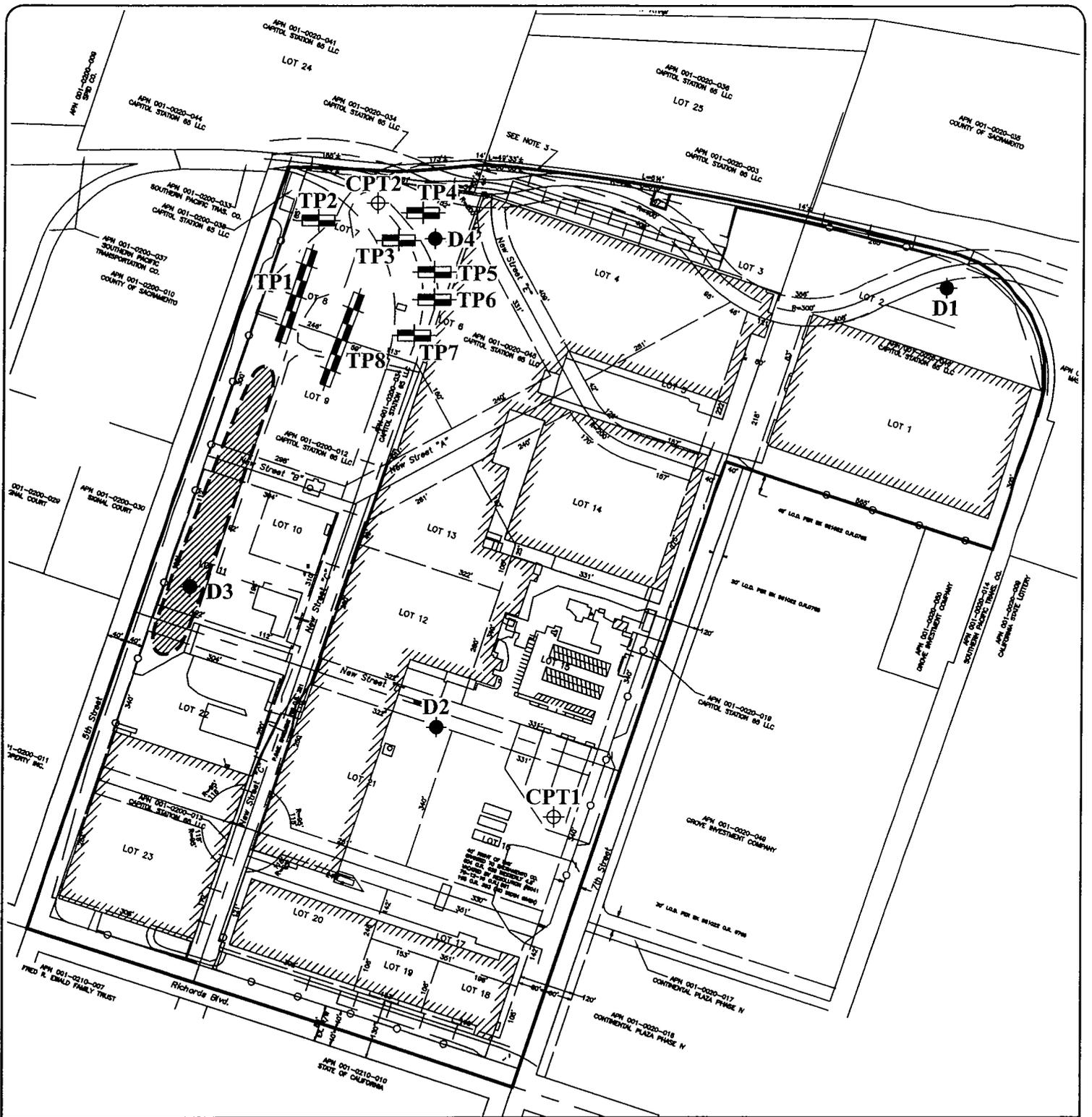
WALLACE-KUHL &
ASSOCIATES, INC.

VICINITY MAP
CAPITOL STATION 65
Sacramento, California

FIGURE 1

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	7/06

WKA NO. 7169.01



Note:

Adapted from a CAD drawing provided by Nolte Engineering, dated March 9, 2006.

Legend:

- ⊕ Approximate location of CPT sounding, 5/12/06
- Approximate soil boring location, 5/17 and 5/18/06
- ▣ Approximate test pit location, 6/9/06
- Approximate location of on-site berm



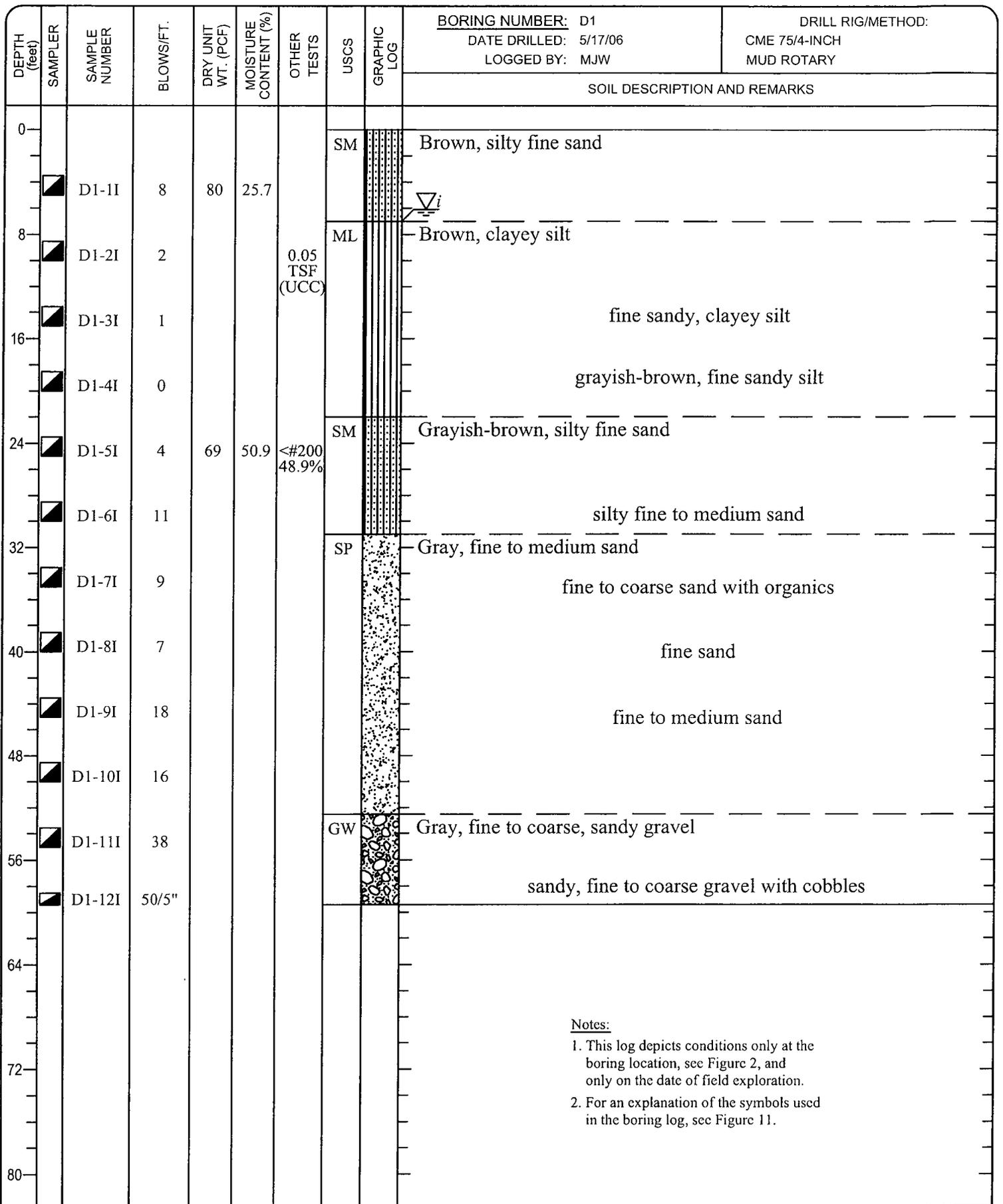
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SITE PLAN
CAPITOL STATION 65
Sacramento, California

FIGURE 2

DRAWN BY	MAH
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	7/06

WKA NO. 7169.01



- Notes:
1. This log depicts conditions only at the boring location, see Figure 2, and only on the date of field exploration.
 2. For an explanation of the symbols used in the boring log, see Figure 11.



LOG OF BORING D1
CAPITOL STATION 65
Sacramento, California

FIGURE 3

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	7/06

WKA NO. 7169.01

DEPTH (feet)	SAMPLER	SAMPLE NUMBER	BLOWS/FT.	DRY UNIT WT. (PCF)	MOISTURE CONTENT (%)	OTHER TESTS	USCS	GRAPHIC LOG	BORING NUMBER: D2		DRILL RIG/METHOD:			
									DATE DRILLED: 5/17/06		CME 75/4-INCH			
									LOGGED BY: MJW				MUD ROTARY	
SOIL DESCRIPTION AND REMARKS														
0								ML		Brown, clayey silt				
8	D2-1I	1								grayish-brown, fine sandy silt				
16	D2-2I	0				0.3 TSF (UCC)								
16	D2-3I	4	82	34.3			SM			Gray, silty fine sand				
24	D2-4I	4								dark gray, with some organics, silty sand				
24	D2-5I	8								dark gray to black, with some organics				
32	D2-6I	10								gray, silty fine to medium sand				
32	D2-7I	4								variably silty fine sand				
40	D2-8I	16	102	16.7			SP			Gray, gravelly fine to coarse sand				
48	D2-9I	26					GW			Gray, sandy gravel				
48	D2-10I	28					SW			Gray, gravelly sand				
56							GW			Gray, gravel with sand				
64														
72														
80														

- Notes:
1. This log depicts conditions only at the boring location, see Figure 2, and only on the date of field exploration.
 2. Ground water was not measured due to drilling method.
 3. For an explanation of the symbols used in the boring log, see Figure 11.



LOG OF BORING D2
CAPITOL STATION 65
Sacramento, California

FIGURE 4

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	7/06

WKA NO. 7169.01

DEPTH (feet)	SAMPLER	SAMPLE NUMBER	BLOWS/FT.	DRY UNIT WT. (PCF)	MOISTURE CONTENT (%)	OTHER TESTS	USCS	GRAPHIC LOG	BORING NUMBER: D3		DRILL RIG/METHOD:			
									DATE DRILLED: 5/18/06		CME 75/4-INCH			
									LOGGED BY: MJW				MUD ROTARY	
SOIL DESCRIPTION AND REMARKS														
0	█	D3-1I	6					SM	Light brown, gravelly sand with debris					
	█	D3-2I	25					SM	Brown, silty fine sand			FILL ↑		
8								ML	Brown, fine sandy silt					
16	█	D3-3I	1			<#200 94.4%		SM	Dark gray, silty fine sand					
	█	D3-4I	1	70	41.9	<#200 48.9%								
24	█	D3-5I	9	82	38.3				gray					
	█	D3-6I	20	88	29.1	<#200 8.8%		SP	Gray, fine sand					
32	█	D3-7I	14						fine to medium sand					
40	█	D3-8I	10	98	25.2									
	█	D3-9I	26											
48	█	D3-10I	24					SW	Gray, fine to medium sand with gravel					
	█	D3-11I	17					GW	Gray, sandy gravel with cobbles					
56	█	D3-12I	25					SW	Gray, gravelly sand					
								GW	Gray, sandy gravel					
64														
72														
80														

- Notes:
1. This log depicts conditions only at the boring location, see Figure 2, and only on the date of field exploration.
 2. Ground water was not measured due to drilling method.
 3. For an explanation of the symbols used in the boring log, see Figure 11.



LOG OF BORING D3
CAPITOL STATION 65
Sacramento, California

FIGURE 5

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	7/06

WKA NO. 7169.01

DEPTH (feet)	SAMPLER	SAMPLE NUMBER	BLOWS/FT.	DRY UNIT WT. (PCF)	MOISTURE CONTENT (%)	OTHER TESTS	USCS	GRAPHIC LOG	BORING NUMBER: D4		DRILL RIG/METHOD:			
									DATE DRILLED: 5/18/06		CME 75/4-INCH			
									LOGGED BY: MJW				MUD ROTARY	
SOIL DESCRIPTION AND REMARKS														
0								SM	Brown, silty sand with debris					
6	■	D4-1I	6					ML	Brown, clayey, fine sandy silt			FILL ↑		
8	■	D4-2I	0						brown and gray, fine sandy silt					
16	■	D4-3I	4					SM	Brown, silty fine sand					
24	■	D4-4I	14	95	23.9				silty fine to medium sand					
32	■	D4-5I	11						gray, silty fine sand					
40	■	D4-6I	13	93	25.3									
48	■	D4-7I	12	93	19.9			SP	Gray, fine to medium sand					
56	■	D4-8I	15						fine to medium sand with some gravel					
64	■	D4-9I	11	89	13.2				fine to medium sand					
72	■	D4-10I	10	76	41.0	<#200 52.4%		ML	Gray, fine sandy silt					
80	■	D4-11I	9					SM	Gray, silty sand			some gravel		
	■	D4-12I	10	70	46.2			ML	Gray, fine sandy silt					

- Notes:
1. This log depicts conditions only at the boring location, see Figure 2, and only on the date of field exploration.
 2. Ground water was not measured due to drilling method.
 3. For an explanation of the symbols used in the boring log, see Figure 11.



LOG OF BORING D4
CAPITOL STATION 65
Sacramento, California

FIGURE 6	
DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	7/06
WKA NO. 7169.01	

LOGS OF TEST PITS

Test Pit 1a*

0 to 2' Light brown, gravelly, silty sand (SM) FILL
 2' to 6' Brown, silty fine sand (SM)
 Bottom of test pit at 6'. No ground water.

Test Pit 1b*

0 to 1½' Light brown, gravelly, silty sand (SM) FILL
 1½' to 7' Brown, silty fine sand (SM)
 Bottom of test pit at 7'. No ground water. 6" PVC buried pipe at approximately 4'.

Test Pit 1c*

0 to 1' Light brown, gravelly, silty sand (SM) FILL
 1' to 4' Brown, silty fine sand (SM)
 4' to 10½' Brown, fine sandy silt (ML)
 Bottom of test pit at 10½'. No ground water, increasing moisture with depth.

Test Pit 1d*

0 to 1' Light brown, gravelly, silty sand (SM) FILL
 1' to 7' Brown, silty fine sand (SM)
 7' to 7½' Brown, fine sandy silt (ML)
 Bottom of test pit at 7½'. No ground water.

Test Pit 1e*

0 to 1' Light brown, gravelly, silty sand (SM) FILL
 1' to 2' Brown, fine sandy silt (ML)
 2' to 3' Light brown, fine sand (SP)
 3' to 8' Brown, silty fine sand (SM)
 Bottom of test pit at 8'. No ground water.

Test Pit 1f*

0 to ½' Light brown, gravelly, silty sand (SM) FILL
 ½' to 6' Brown, silty fine sand (SM)
 Bottom of test pit at 6'. No ground water.

Test Pit 1g*

0 to ½' Light brown, gravelly, silty sand (SM) FILL
 ½' to 6' Brown, variably silty fine sand (SM)
 6' to 11' Brown, fine sandy silt (ML)
 Bottom of test pit at 11'. No ground water, increasing moisture with depth.



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LOGS OF TEST PITS

CAPITOL STATION 65

Sacramento, California

FIGURE 7

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	7/06

WKA NO. 7169.01

LOGS OF TEST PITS

Test Pit 1h*

0 to ½' Light brown, gravelly, silty sand (SM) FILL
 ½' to 6' Brown, silty fine sand (SM)
 6' to 7½' Brown, fine sandy silt (ML)
 Bottom of test pit at 7½'. No ground water.

Test Pit 1i*

0 to 2½" Asphalt concrete (AC)
 2½" to 8½" Gravel and cobbles base course (GP)
 8½" to 6' Light brown, silty fine sand (SM) FILL
 6' to 8' Brown, fine sandy silt (ML)
 Bottom of test pit at 8'. No ground water.

Test Pit 1j*

0 to 2½" Asphalt concrete (AC)
 2½" to 8½" Gravel and cobbles base course (GP)
 8½" to 5' Light brown, silty fine sand (SM) FILL
 5' to 8' Brown, fine sandy silt (ML)
 Bottom of test pit at 8'. No ground water. 12" water main encountered at 4'.

* Test pit excavated approximately every 15 feet for 150 feet, pits 1a – 1j extending south to north.
 See site plan.

Test Pit 2

0 to ½' Light brown, gravelly, silty sand (SM) FILL
 ½' to 2' Light brown, fine sand (SP)
 2' to 6' Light brown, silty fine sand (SM)
 6' to 8' Brown, fine sandy silt (ML)
 Tree roots were encountered to a depth of 8' (¾" maximum diameter)
 Bottom of test pit at 8'. No ground water.

Test Pit 3

0 to 8' Light brown to brown, silty fine sand (SM)
 Bottom of test pit at 8'. No ground water.



LOGS OF TEST PITS
 CAPITOL STATION 65
 Sacramento, California

FIGURE 8

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	7/06

WKA NO. 7169.01

LOGS OF TEST PITS

Test Pit 4

Peach pit refuse on surface.
 0 to ½' Light brown, gravelly, silty sand (SM) FILL
 ½' to 5' Light brown, silty fine sand (SM)
 5' to 11' Brown, fine sandy silt (ML)
 Bottom of test pit at 11'. No ground water.

Test Pit 5

Peach pit refuse on surface.
 0 to 2' Light brown, silty sand (SM)
 Bottom of test pit at 2'. No ground water.

Test Pit 6

Peach pit refuse on surface.
 0 to 3' Light brown, silty sand (SM)
 Bottom of test pit at 3'. No ground water.

Test Pit 7

0 to ½' Peach pit refuse (surface only).
 ½ to 1½' Light brown, silty sand (SM)
 Bottom of test pit at 1½'. No ground water.

Test Pit 8a**

0 to 2' Brown, silty sand (SM)
 2' to 8' Dark Brown, fine sandy silt (ML)
 Bottom of test pit at 8'. No ground water.

Test Pit 8b**

0 to 2' Light brown, gravelly, silty sand (SM)
 2' to 5' Brown, fine sandy silt (ML)
 Bottom of test pit at 5'. No ground water.

Test Pit 8c**

0 to ½' Light brown, silty sand with concrete debris lens (SM) FILL
 ½' to 4' Brown, silty fine sand (SM)
 4' to 5½' Brown, fine sandy silt (ML)
 Bottom of test pit at 5½'. No ground water.



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LOGS OF TEST PITS
CAPITOL STATION 65
 Sacramento, California

FIGURE 9

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	7/06

WKA NO. 7169.01

LOGS OF TEST PITS

Test Pit 8d**

0 to 6' Light brown, silty sand (SM)
 Bottom of test pit at 6'. No ground water.

Test Pit 8e**

0 to 4' Light brown, silty sand (SM)
 4' to 5' Brown, fine sandy silt (ML)
 Bottom of test pit at 5'. No ground water.

Test Pit 8f**

0 to 5' Light brown, silty sand (SM)
 5' to 7' Brown, fine sandy silt (ML)
 Bottom of test pit at 7'. No ground water.

Test Pit 8g**

0 to 3' Light brown, silty sand (SM)
 3' to 4' Brown, fine sandy silt (ML)
 Bottom of test pit at 4'. No ground water.

** Test pit excavated approximately every 15 feet for 100 feet, pits 8a – 8g extending south to north. See site plan.



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LOGS OF TEST PITS
 CAPITOL STATION 65
 Sacramento, California

FIGURE 10

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	7/06

WKA NO. 7169.01

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS	SYMBOL	CODE	TYPICAL NAMES
COARSE GRAINED SOILS <small>(More than 50% of soil > no. 200 sieve size)</small>	GRAVELS		
		GW	Well graded gravels or gravel - sand mixtures, little or no fines
		GP	Poorly graded gravels or gravel - sand mixtures, little or no fines
		GM	Silty gravels, gravel - sand - silt mixtures
		GC	Clayey gravels, gravel - sand - clay mixtures
	SANDS		
		SW	Well graded sands or gravelly sands, little or no fines
		SP	Poorly graded sands or gravelly sands, little or no fines
FINE GRAINED SOILS <small>(50% or more of soil < no. 200 sieve size)</small>	SILTS & CLAYS		
	<u>LL < 50</u>		
		ML	Inorganic silts and very fine sands, rock flour, silty or clayey fine sands or clayey silts with slight plasticity
		CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays
		OL	Organic silts and organic silty clays of low plasticity
	SILTS & CLAYS		
	<u>LL ≥ 50</u>		
	MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts	
	CH	Inorganic clays of high plasticity, fat clays	
	OH	Organic clays of medium to high plasticity, organic silty clays, organic silts	
HIGHLY ORGANIC SOILS		Pt	Peat and other highly organic soils
ROCK		RX	Rocks, weathered to fresh

OTHER SYMBOLS

	= Drive Sample: 2-1/2" O.D. Modified California sampler
	= Drive Sample: no recovery
	= SPT Sample
	= Initial Water Level
	= Final Water Level
- - - - -	= Estimated or gradational material change line
—————	= Observed material change line
<u>Laboratory Tests</u>	
PI	= Plasticity Index
EI	= Expansion Index
UCC	= Unconfined Compression Test
TR	= Triaxial Compression Test
GR	= Gradational Analysis (Sieve)
K	= Permeability Test

GRAIN SIZE CLASSIFICATION

CLASSIFICATION	RANGE OF GRAIN SIZES	
	U.S. Standard Sieve Size	Grain Size in Millimeters
BOULDERS	Above 12"	Above 305
COBBLES	12" to 3"	305 to 76.2
GRAVEL coarse (c) fine (f)	3" to No. 4	76.2 to 4.76
	3" to 3/4" 3/4" to No. 4	76.2 to 19.1 19.1 to 4.76
SAND coarse (c) medium (m) fine (f)	No. 4 to No. 200	4.76 to 0.074
	No. 4 to No. 10	4.76 to 2.00
	No. 10 to No. 40 No. 40 to No. 200	2.00 to 0.420 0.420 to 0.074
SILT & CLAY	Below No. 200	Below 0.074



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UNIFIED SOIL CLASSIFICATION SYSTEM

CAPITOL STATION 65

Sacramento, California

FIGURE 11

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	7/06

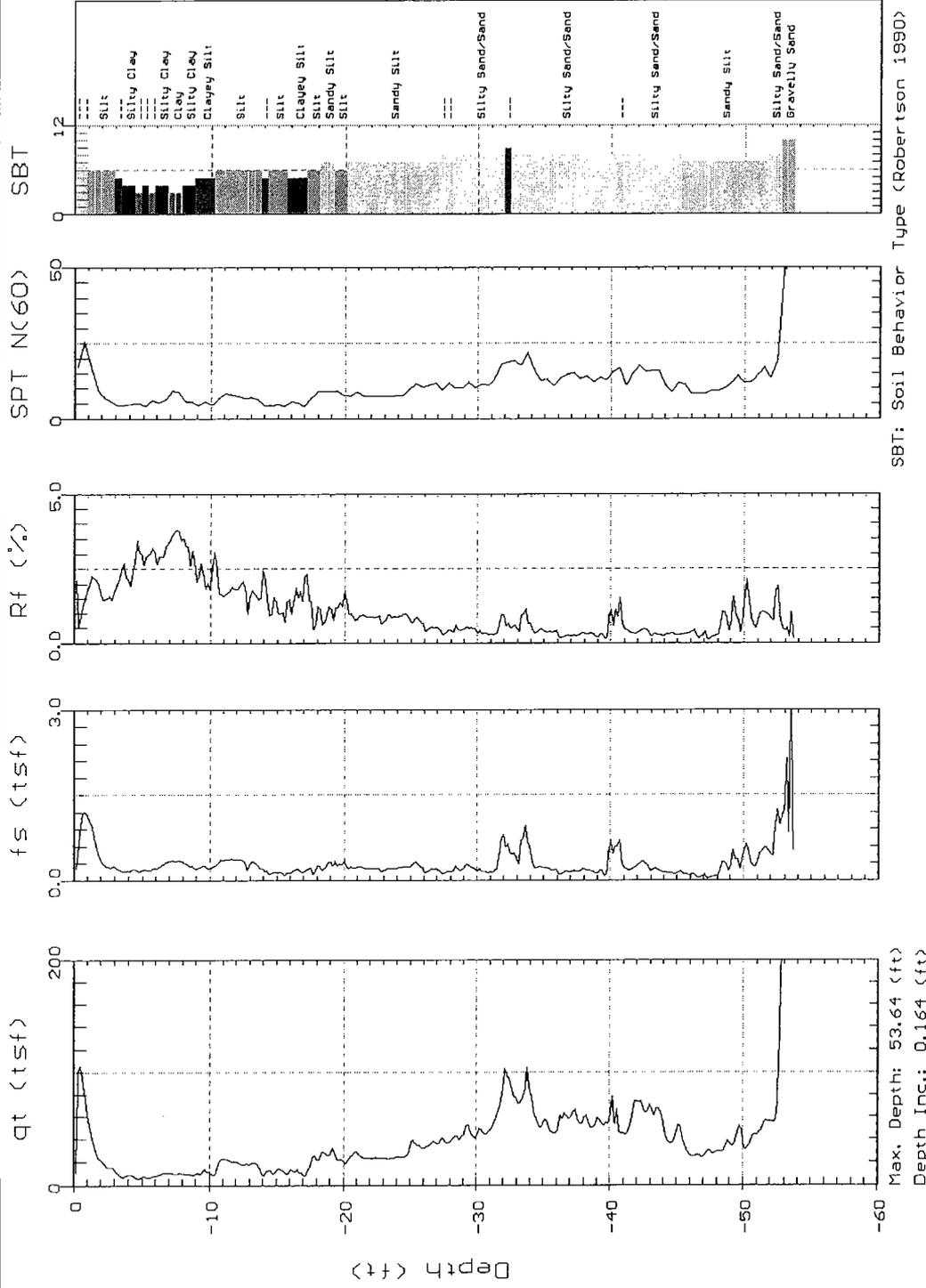
WKA NO. 7169.01



WALLACE KUHL

Site: CAPITOL STATION 65
Location: CPT-01

Engineer: M. WALKER
Date: 05/12/06 08:50



CONE PENETRATION TESTS
CAPITOL STATION 65
 Sacramento, California

FIGURE 12

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	7/06
WKA NO. 7169.01	

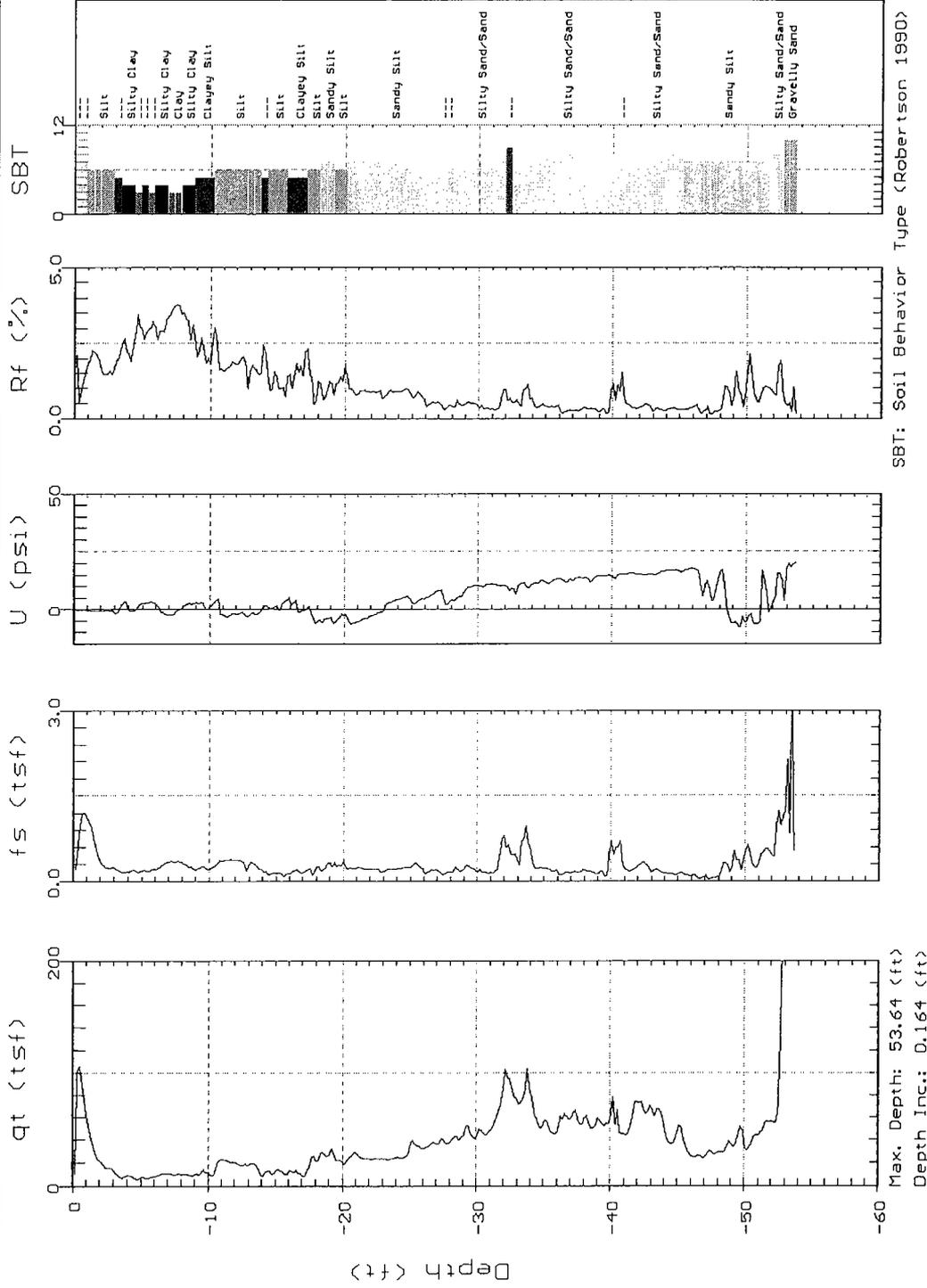




WALLACE KUHL

Site: CAPITOL STATION 65
Location: CPT-01

Engineer: M. WALKER
Date: 05/12/06 08:50



SBT: Soil Behavior Type (Robertson 1990)



CONE PENETRATION TESTS
CAPITOL STATION 65
Sacramento, California

FIGURE 13

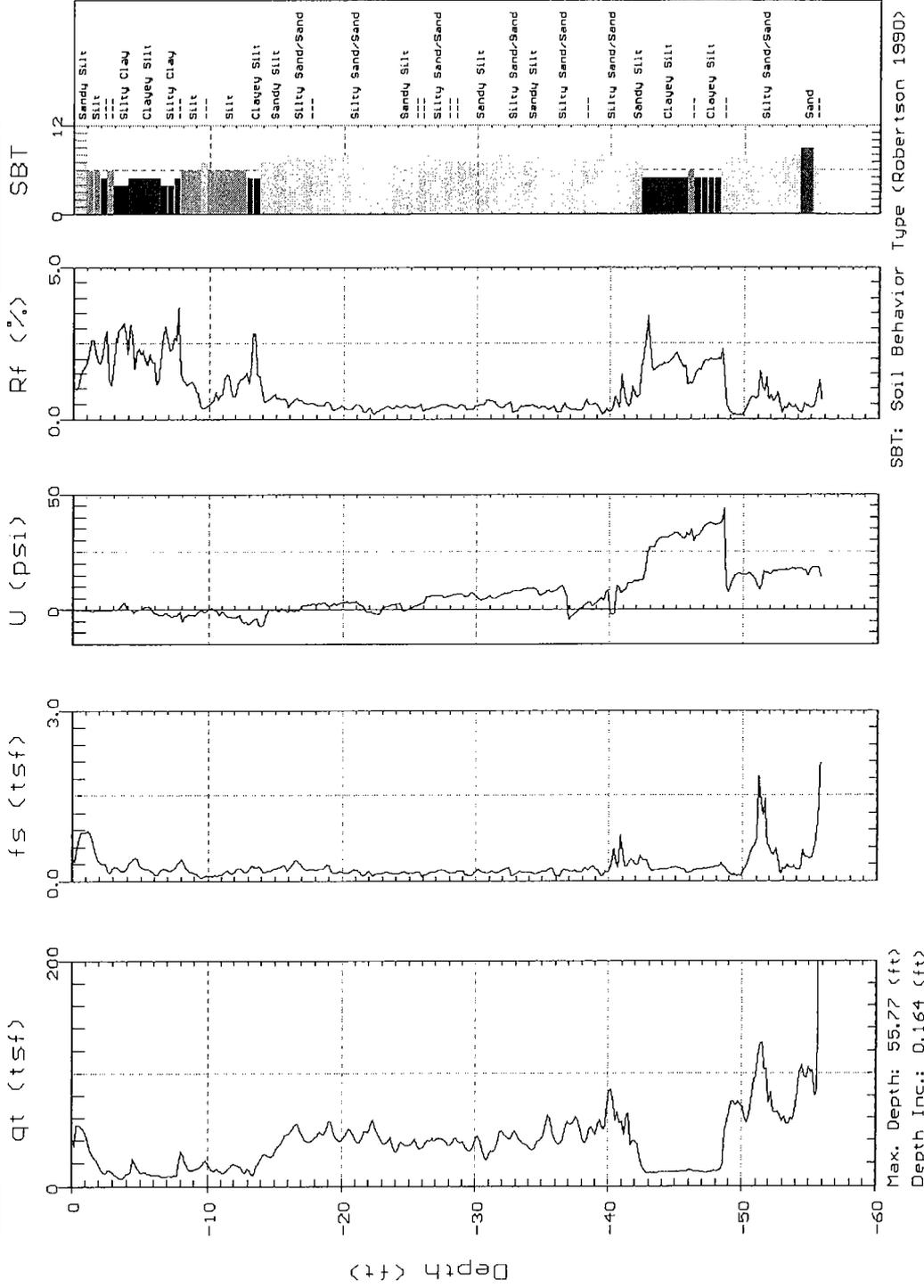
DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	7/06
WKA NO. 7169.01	



WALLACE KUHL

Site: CAPITOL STATION 65
Location: CPT-02

Engineer: M. WALKER
Date: 05/12/06 09:59



CONE PENETRATION TESTS
 CAPITOL STATION 65
 Sacramento, California

FIGURE 15

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	7/06
WKA NO. 7169.01	

APPENDICES



APPENDIX A



APPENDIX A

A. GENERAL INFORMATION

The preparation of a preliminary geotechnical engineering report for the Capitol Station 65 project, located North of Russell Boulevard in Sacramento, California, was authorized on May 8, 2006 by Mr. Steve Goodwin of Capitol Station 65, LLC. Authorization was for an investigation as described in our proposal letter of April 28, 2006, sent to our client, whose mailing address is 424 North 7th Street, Second Floor, Sacramento, California 95814; telephone (916) 482-7900; facsimile (916) 482-2086.

The civil engineering consultant for this project is Nolte Engineering whose mailing address is 2495 Natomas Park Drive, Forth Floor, Sacramento, California 95833; telephone (916) 641-9100; facsimile (916) 641-9222.

In performing this investigation, we made reference to site plan, dated March 9, 2006, prepared by Nolte Engineering.

B. FIELD EXPLORATION

Four exploratory borings were drilled on May 17 and 18, 2006 to a maximum depth of approximately 60 feet below existing grade, with a CME-75 truck-mounted drill rig utilizing five-inch diameter mud rotary. The approximate boring locations are indicated on Figure 2. At various intervals relatively undisturbed soil samples were recovered with a 2½-inch O.D., 2-inch I.D. California sampler driven by a 140 pound hammer freely falling 30 inches. The number of blows of the hammer required to drive the 18-inch long sampler each 6-inch interval was recorded with the sum of the blows required to drive the sampler the lower 12-inch interval, or portion thereof, being designated the penetration resistance or "blow count" for that particular drive.

The samples were retained in 2-inch diameter by 6-inch long thin-walled brass tubes contained within the sampler. Immediately after recovery, the soils in the tubes were visually classified by the field engineer and the ends of the tubes were sealed to preserve the natural moisture contents.

Test pits were excavated at the site on June 9, 2006 utilizing a Case 580 rubber-tire backhoe equipped with an 18-inch wide bucket. The eight test pits were excavated to a maximum depth of about eight feet below adjacent grades at the approximate locations indicated on Figure 2. The materials encountered at each test pit were visually classified by the field engineer.



Two cone penetration test (CPT) soundings were completed on May 8, 2006, at the approximate locations indicated on Figure 2. The CPT soundings were advanced to a maximum depth of about 56 feet below existing grades.

In addition to the drive samples from the borings, bulk samples of near-surface soils were also collected. All samples were taken to our laboratory for additional soil classification and selection of samples for testing.

The Logs of Borings, Figures 3 through 6, and the Logs of Test Pits, Figures 7 through 10, contain descriptions of the soils encountered in each boring and excavation. An explanation of the Unified Soil Classification System symbols used in the descriptions is contained on Figure 11. Results of the CPT soundings are presented on Figures 12 through 15.

C. LABORATORY TESTING

Selected undisturbed soil samples were tested for in-place dry unit weight (ASTM D2937), natural moisture content (ASTM D2216) and unconfined compressive strength (ASTM D2166). Selected soil samples were tested to determine amount of material finer than the No. 200 sieve (ASTM D1140). The results of the moisture content, dry unit weight, unconfined compression tests and percent finer than No. 200 sieve are included on the boring logs at the depth each sample was obtained.

The shear strength of the materials was evaluated by triaxial compression testing (ASTM D4767); the results of the triaxial compression testing are presented on Figures A1 and A2.

One soil sample was tested to determine grain size distribution (ASTM D422). Results of the analysis are presented on Figure A3.

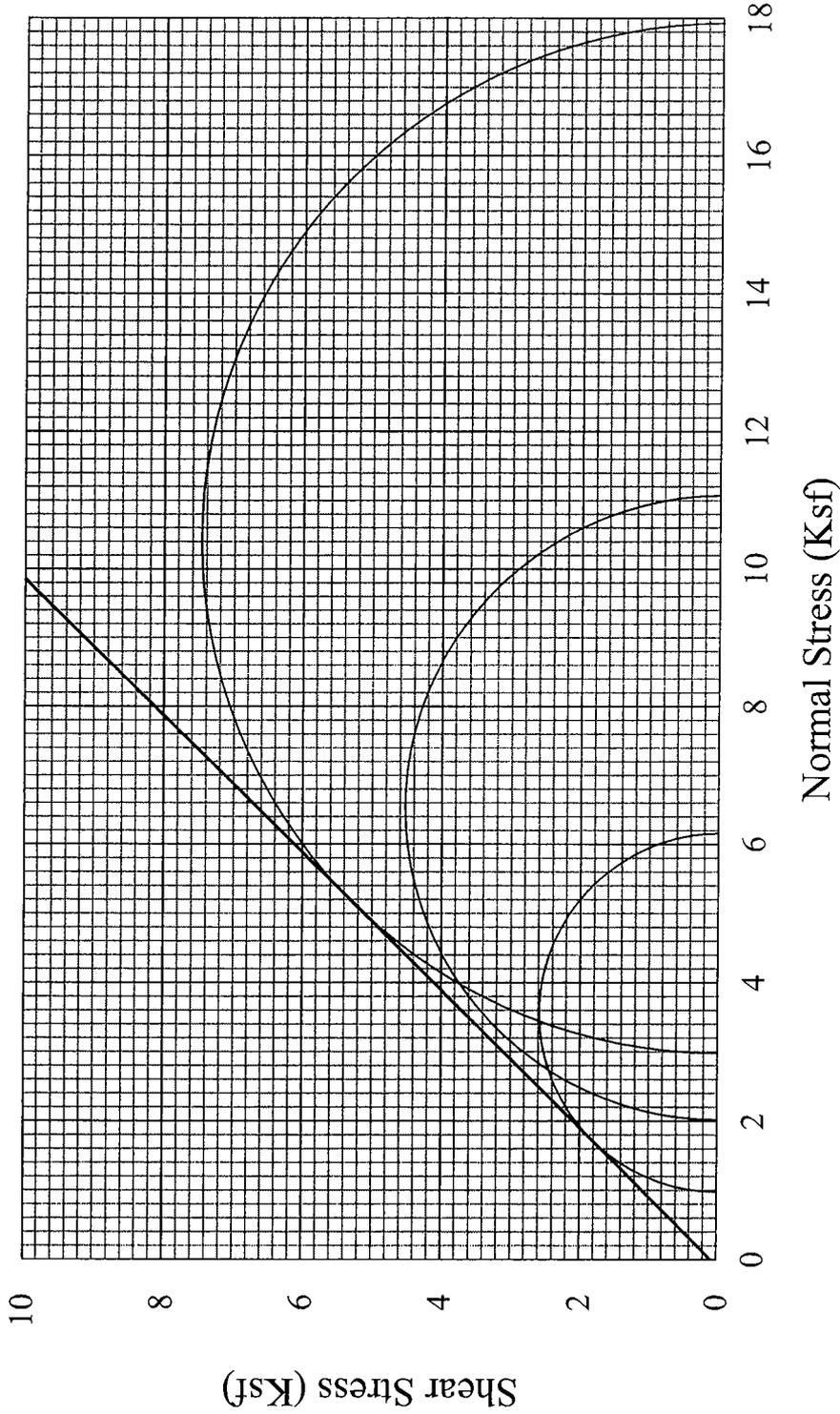
Two representative bulk samples of anticipated pavement subgrade soils were subjected to Resistance-value ("R") testing in accordance with California Test 301. Results of the R-value tests, which were used in the pavement design, are contained on Figures A4 and A5.

Two representative samples of the near-surface soil were submitted to Sunland Analytical to determine the soil pH and minimum resistivity (California Test 643), sulfate concentration (California Test 417) and chloride concentration (California Test 422). Results from these tests are included as Figures A6 and A7.



TRIAXIAL COMPRESSION TEST

ASTM D4767-04



<p><u>SAMPLE NO.:</u> D1-8I</p> <p><u>SAMPLE CONDITION:</u> Undisturbed</p> <p><u>SAMPLE DESCRIPTION:</u> Gray, fine sand</p>	<p>DRY DENSITY (PCF) : 100</p> <p>INITIAL MOISTURE (%) : 23</p> <p>FINAL MOISTURE (%) : 20.3</p>
<p>ANGLE OF INTERNAL FRICTION (ϕ) : 45°</p> <p>COHESION (PSF) : 0</p>	

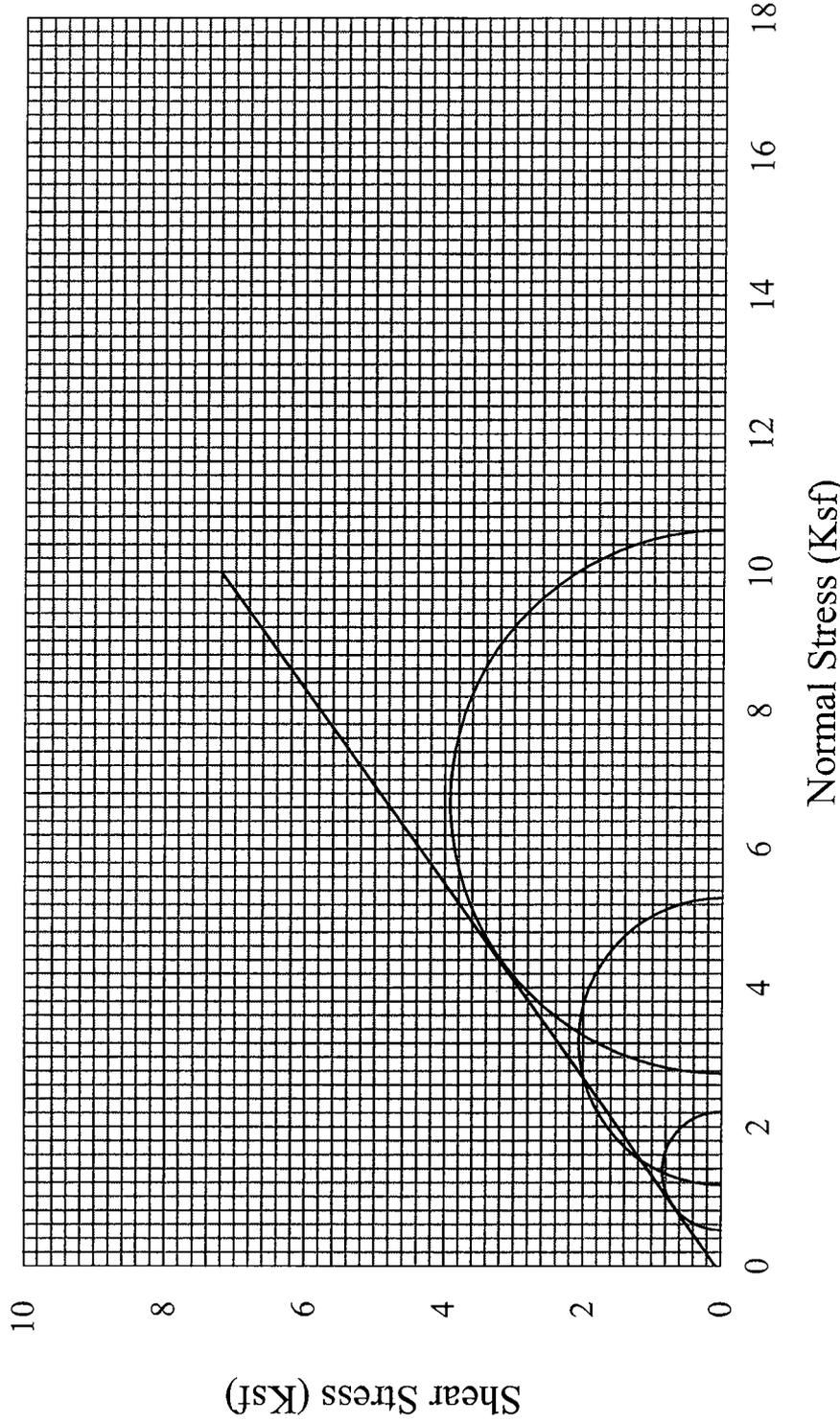


TRIAXIAL COMPRESSION TEST
 CAPITOL STATION 65
 Sacramento, California

FIGURE A1	
DRAWN BY	MAH
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	7/06
WKA NO.	7169.01

TRIAXIAL COMPRESSION TEST

ASTM D4767-04



SAMPLE NO.: D4-2I

SAMPLE CONDITION: Undisturbed

SAMPLE DESCRIPTION: Brown, fine sandy silt

DRY DENSITY (PCF) : 74
 INITIAL MOISTURE (%) : 45.6
 FINAL MOISTURE (%) : 36.6

ANGLE OF INTERNAL FRICTION (ϕ) : 36°
 COHESION (PSF) : 135



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TRIAXIAL COMPRESSION TEST

CAPITOL STATION 65

Sacramento, California

DRAWN BY
MAH

CHECKED BY
TWK

PROJECT MGR
TWK

DATE
7/06

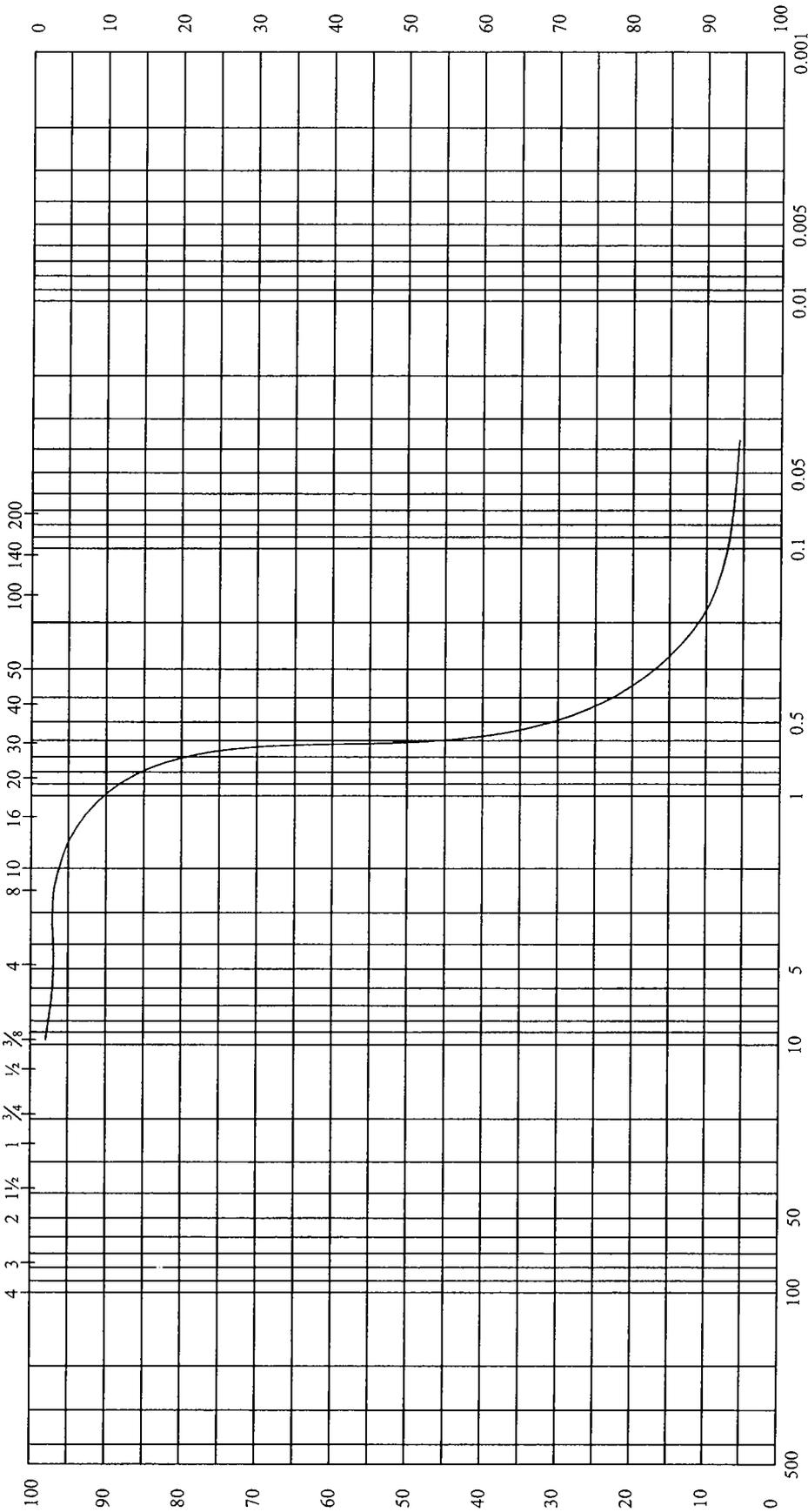
FIGURE A2
WKA NO. 7169.01

ASTM D422

ASTM C136

U.S. STANDARD SIEVE
OPENING IN INCHES

U.S. STANDARD SIEVE NUMBERS



PERCENT LARGER BY WEIGHT

COBBLES	GRAVEL		SAND			SILT OR CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	

SAMPLE NO. D2-8I



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SIEVE ANALYSIS
CAPITOL STATION 65
Sacramento, California

FIGURE A3

DRAWN BY	MAH
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	7/06

WKA NO. 7169.01

RESISTANCE VALUE TEST RESULTS (California Test 301)

MATERIAL DESCRIPTION: Brown, silty fine sand with rock

LOCATION: B1 (0'-1')

Specimen No.	Dry Unit Weight (pcf)	Moisture @ Compaction (%)	Exudation Pressure (psi)	Expansion Pressure		R Value
				(dial)	(psf)	
1	118	11.8	326	21	91	61
2	116	13.0	135	12	52	49
3	117	10.9	701	15	65	64

R-Value at 300 psi exudation pressure = 60



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RESISTANCE VALUE TEST RESULTS

CAPITOL STATION 65

Sacramento, California

FIGURE A4

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	7/06

WKA NO. 7169.01

RESISTANCE VALUE TEST RESULTS (California Test 301)

MATERIAL DESCRIPTION: Brown, silty, clayey fine sand with rock

LOCATION: B2 (0'-2')

Specimen No.	Dry Unit Weight (pcf)	Moisture @ Compaction (%)	Exudation Pressure (psi)	Expansion Pressure		R Value
				(dial)	(psf)	
1	109	12.2	804	0	0	57
2	107	14.3	573	8	35	56
3	104	16.4	199	60	260	42

R-Value at 300 psi exudation pressure = 46



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RESISTANCE VALUE TEST RESULTS

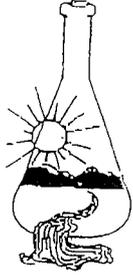
CAPITOL STATION 65

Sacramento, California

FIGURE A5

DRAWN BY	TJC
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	7/06

WKA NO. 7169.01



Sunland Analytical

11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 07/07/2006
Date Submitted 07/03/2006

To: Martin Walker
Wallace-Kuhl & Associates
P.O. Box 1137
West Sacramento, Ca 95691

From: Gene Oliphant, Ph.D. \ Randy Horney
General Manager \ Lab Manager *RO*

The reported analysis was requested for the following location:
Location : 7169.01 Site ID : D2-2II.
Your purchase order number is 1623.
Thank you for your business.

* For future reference to this analysis please use SUN # 48062-95607.

EVALUATION FOR SOIL CORROSION

Soil pH	5.73		
Minimum Resistivity	4.02	ohm-cm	(x1000)
Chloride	20.8 ppm	00.00208	%
Sulfate	79.4 ppm	00.00794	%

METHODS

pH and Min.Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422



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ASSOCIATES, INC.

CORROSION TEST RESULTS

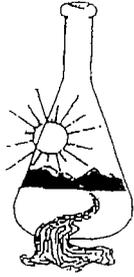
CAPITOL STATION 65

Sacramento, California

FIGURE A6

DRAWN BY	MAH
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	7/06

WKA NO. 7169.01



Sunland Analytical

11353 Pyrites Way, Suite 4
Rancho Cordova, CA 95670
(916) 852-8557

Date Reported 07/07/2006
Date Submitted 07/03/2006

To: Martin Walker
Wallace-Kuhl & Associates
P.O. Box 1137
West Sacramento, Ca 95691

From: Gene Oliphant, Ph.D. \ Randy Horney *ROH*
General Manager \ Lab Manager

The reported analysis was requested for the following location:
Location : 7169.01 Site ID : D2-5II.
Your purchase order number is 1624.
Thank you for your business.

* For future reference to this analysis please use SUN # 48063-95608.

EVALUATION FOR SOIL CORROSION

Soil pH	5.74		
Minimum Resistivity	11.79	ohm-cm (x1000)	
Chloride	13.5 ppm	00.00135	%
Sulfate	10.0 ppm	00.00100	%

METHODS

pH and Min. Resistivity CA DOT Test #643
Sulfate CA DOT Test #417, Chloride CA DOT Test #422



WALLACE-KUHL &
ASSOCIATES, INC.

CORROSION TEST RESULTS

CAPITOL STATION 65

Sacramento, California

FIGURE A7

DRAWN BY	MAH
CHECKED BY	TWK
PROJECT MGR	TWK
DATE	7/06

WKA NO. 7169.01

APPENDIX B

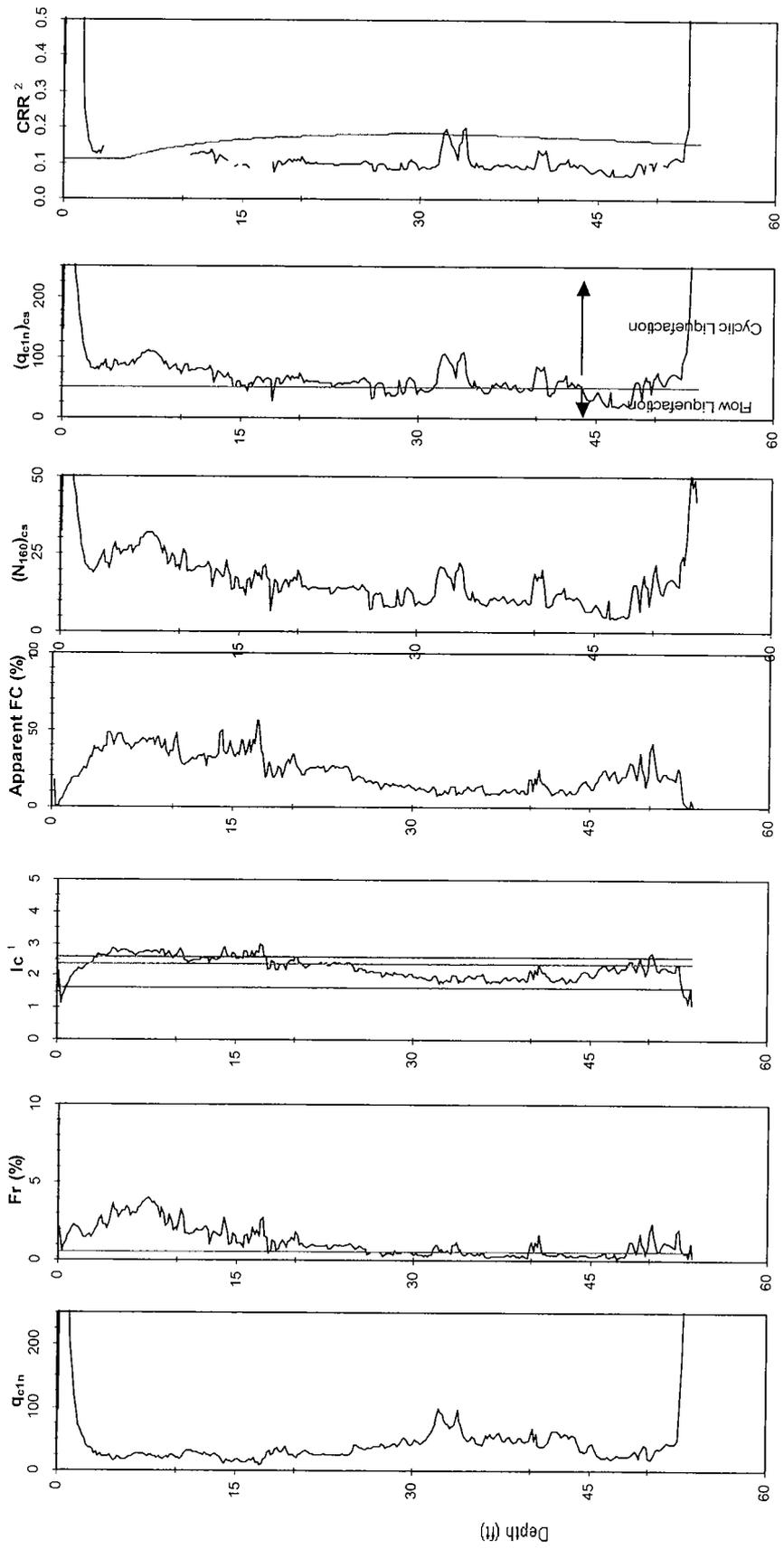




APPLICATION OF THE INTEGRATED CPT METHOD FOR ESTIMATING LIQUEFACTION PARAMETERS

(Robertson, Wride 1998; Zhang, Robertson, Brachman 2002)

CPT: CAPITOL STATION 85 Location: CPT-01 WT: 5.00ft Date: 05/12/06 Hole Depth: 53.64ft Plots(1)



CSR mag = 6.90
 max a 1 = 0.21
 max a 2 = 0.21

..... Ic = 1.64
 Ic = 2.36
 Ic = 2.60

..... Fr = 0.5%

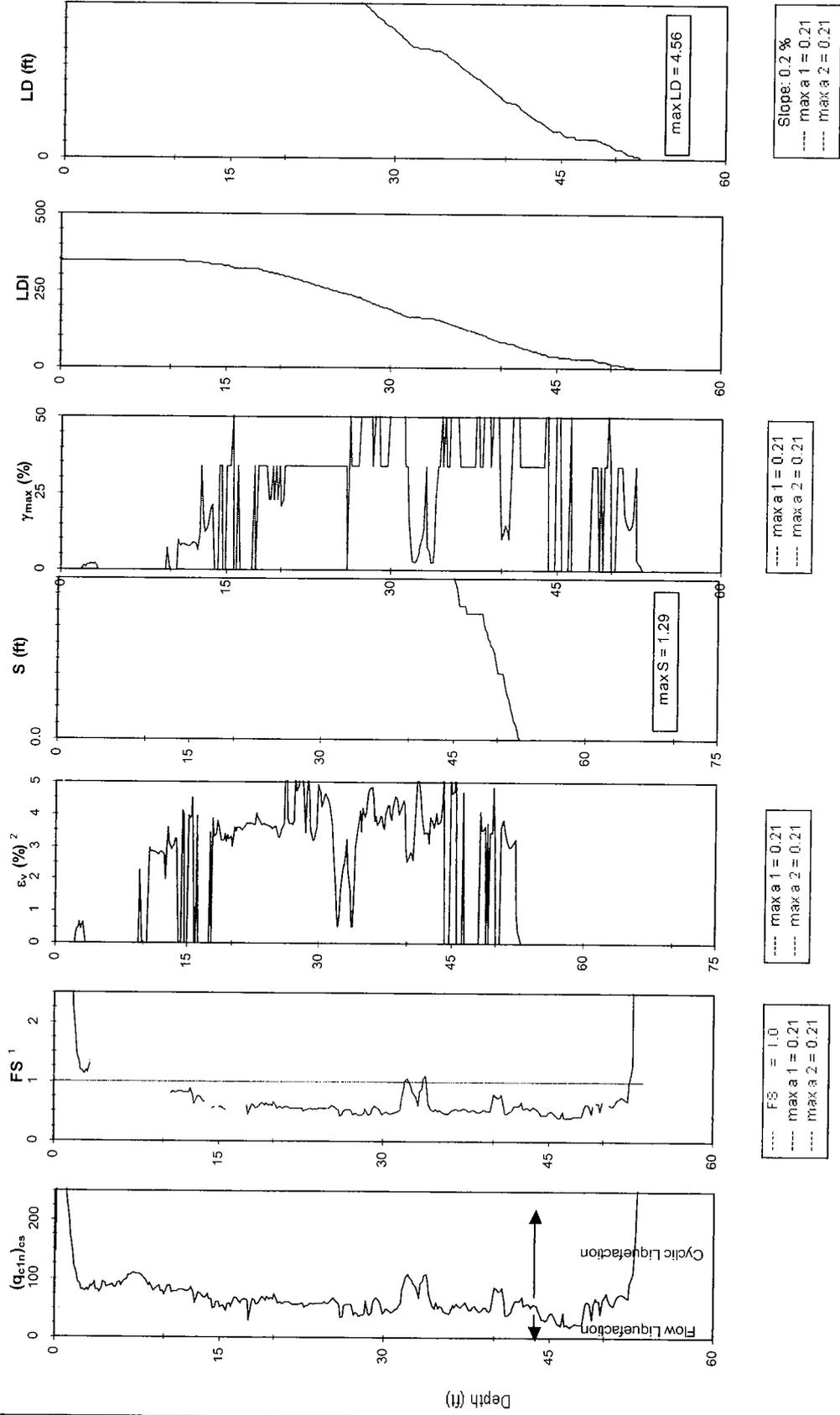
#####

Ic greater than 2.6 indicates clayey silt, silty clay, or clay material that is likely not liquefiable. This conclusion should, however, be verified by samples.
 * Empirical data indicate no observed liquefaction below 20m (65ft).



APPLICATION OF THE INTEGRATED CPT METHOD FOR ESTIMATING LIQUEFACTION PARAMETERS
 (Robertson, Wilde 1998; Zhang, Robertson, Brachman 2002)

CPT: CAPITOL STATION 85 Location: CPT-01 WT: 5.00ft Date: 05/12/06 Hole Depth: 63.64ft Plots(2)



¹ Empirical data indicate no observed liquefaction below 20m (65ft).
² Volumetric strain may be overpredicted in interface zones between soil types and in sand layers less than 1m (3ft) thick.

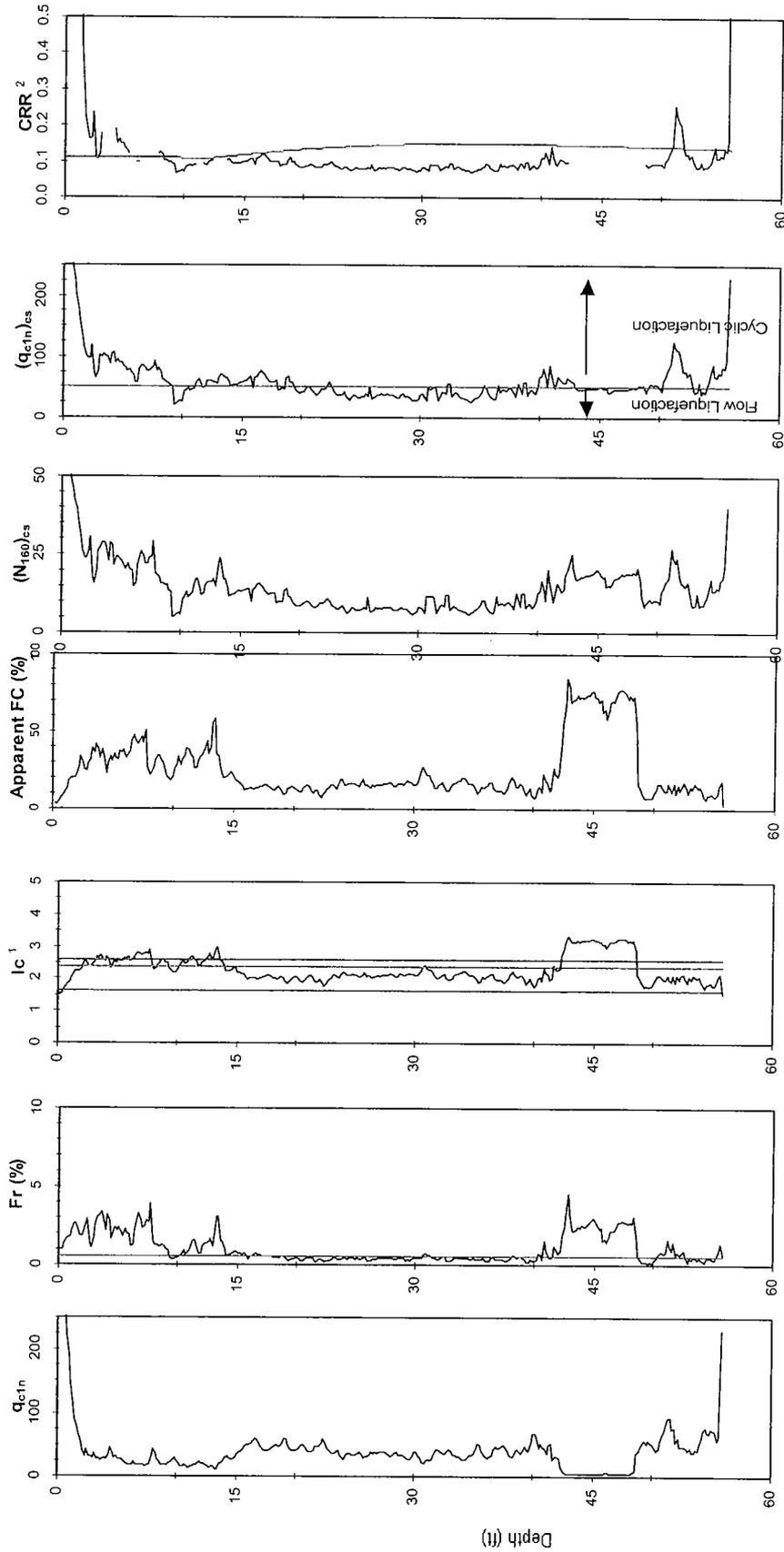
#####



APPLICATION OF THE INTEGRATED CPT METHOD FOR ESTIMATING LIQUEFACTION PARAMETERS

(Robertson, Wride 1998; Zhang, Robertson, Brachman 2002)

CPT: CAPITOL STATION 65 Location: CPT-02 WT: 12.40ft Date: 05/12/06 Hole Depth: 55.77ft Plots(1)



CSR mag = 6.90
 max a 1 = 0.21
 max a 2 = 0.21

..... I_c = 1.64
 I_c = 2.36
 I_c = 2.60

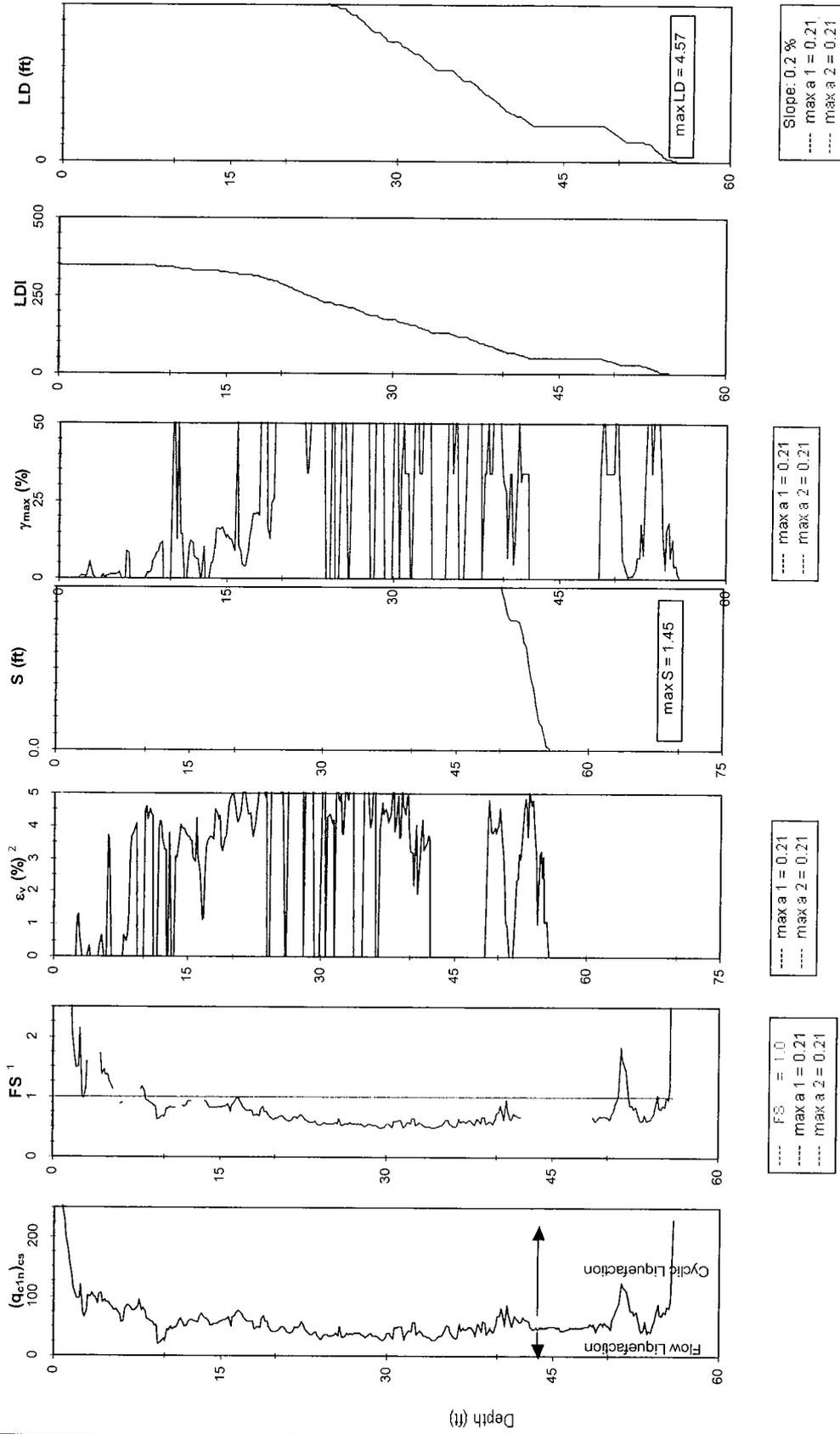
..... Fr = 0.5%

#####

¹ I_c greater than 2.6 indicates clayey silt, silty clay, or clay material that is likely not liquefiable. This conclusion should, however, be verified by samples.
² Empirical data indicate no observed liquefaction below 20m (65ft).



APPLICATION OF THE INTEGRATED CPT METHOD FOR ESTIMATING LIQUEFACTION PARAMETERS
 (Robertson, Wride 1998; Zhang, Robertson, Brachman 2002)
 CPT: CAPITOL STATION 65 Location: CPT-02 WT: 12.40ft Date: 05/12/06 Hole Depth: 55.77ft Plots(2)



¹ Empirical data indicate no observed liquefaction below 20m (65ft).
² Volumetric strain may be overpredicted in interface zones between soil types and in sand layers less than 1m (3ft) thick.

#####

APPENDIX C





Federal Emergency Management Agency

Washington, D.C. 20472

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable Heather Fargo
Mayor, City of Sacramento
City Hall
730 I Street, Room 321
Sacramento, CA 95814

IN REPLY REFER TO:
Case No.: 05-09-0120P

Community: City of Sacramento, CA
Community No.: 060266
Panels Affected: 0005 F, 0010 F, 0015 F,
0025 F, and 0030 F

Effective Date of **FEB 18 2005**
This Revision:

102-D

Dear Mayor Fargo:

This responds to a request that the Department of Homeland Security's Federal Emergency Management Agency (FEMA) revise the effective Flood Insurance Rate Map (FIRM) for your community in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated October 26, 2004, Mr. David Brent, P.E., Manager, Engineering Services Division, Department of Utilities, City of Sacramento, requested that FEMA revise the FIRM to show the effects of updated topographic information, the completion and certification of the Sacramento Urban Levee Reconstruction Project and the Common Features Project, adequate progress on the South Sacramento County Streams Project, completion of construction of improvements to Folsom Dam, and the resumption of operation of the Folsom Reservoir. The Sacramento Urban Levee Reconstruction Project was constructed along the Sacramento River from Freeport (River Mile (RM) 46) to Verona (RM 79), and the Common Features Project was completed along the American River from approximately 1,600 feet downstream of H Street to approximately 400 feet downstream of Howe Street. The South Sacramento County Streams Project includes improvements to the North Beach levee and approximately 20 miles of floodwalls and levee improvements along Morrison, Elder, Florin, and Unionhouse Creeks. The improvements to Folsom Dam and the re-operation of Folsom Reservoir have reduced the discharges from the reservoir to the American River during the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) and are integral to the ability of the levees along the American River to meet the requirements of Section 65.10 of the NFIP regulations.

All data required to complete our review of this request were submitted with letters from Mr. Brent. Because this Letter of Map Revision (LOMR) shows the effects of a federally sponsored flood-control project where 50 percent or more of the project's costs are federally funded, fees were not assessed for the review.

We have completed our review of the submitted data and the flood data shown on the effective FIRM. We have revised the FIRM to modify the zone designations of the base flood along the Sacramento River from RM 47 to the confluence with the American River; along the American River from the confluence with the Sacramento River to Watt Avenue; along Morrison Creek from the confluence with the Sacramento River to Franklin Boulevard; along Unionhouse Creek from the confluence with Morrison Creek to approximately 300 feet downstream of State Highway 99; and along Florin Creek from the confluence with Morrison Creek to approximately 2,000 feet upstream of Power Inn Road. As a result of the modifications, the widths of the Special Flood Hazard Areas (SFHAs), the areas that would be inundated by the base

flood, for the Sacramento River, the American River, Morrison Creek, Unionhouse Creek, and Florin Creek all decreased, and the zone designation in the overbank areas was changed from Zone A99, an area to be protected from the base flood by a Federal flood-protection system where construction has reached specified statutory milestones, to Zone X (shaded), an area protected from the base flood by the construction of a levee, dike, or other structural measure. This revision does not include any revision to the effective SFHA boundaries, the boundaries of the effective regulatory floodway, the Base Flood Elevations, or the flood profiles for the American River as a result of this reduced base flood discharge. The modifications are shown on the enclosed annotated copies of FIRM Panels 0005 F, 0010 F, 0015 F, 0025 F, and 0030 F. This LOMR hereby revises the above-referenced panels of the effective FIRM dated July 6, 1998.

Because this revision request also affects the unincorporated areas of Sacramento County, a separate LOMR for that community was issued on the same date as this LOMR.

The modifications are effective as of the date shown above. The map panels as listed above and as modified by this letter will be used for all flood insurance policies and renewals issued for your community.

A review of the determination made by this LOMR and any requests to alter this determination should be made within 30 days. Any request to alter the determination must be based on scientific or technical data.

We are preparing a revised FIRM and FIS report for Sacramento County in our countywide format; therefore, we will not physically revise and republish the FIRM and FIS report for your community to incorporate the modifications made by this LOMR at this time. Preliminary copies of the countywide FIRM and FIS report, which will present information from the effective FIRMs and FIS reports for your community and other incorporated communities in Sacramento County, will be distributed for review in approximately 2 months. We will incorporate the modifications made by this LOMR into the Preliminary copies of the countywide FIRM before it is distributed, and the modifications will be included when the countywide FIRM becomes effective.

This LOMR is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all floodplain development and for ensuring all necessary permits required by Federal or State law have been received. State, county, and community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction in the SFHA. If the State, county, or community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence over the minimum NFIP criteria.

Because this LOMR will not be printed and distributed to primary users, such as local insurance agents and mortgage lenders, your community will serve as a repository for these new data. We encourage you to disseminate the information reflected by this LOMR throughout the community, so that interested persons, such as property owners, local insurance agents, and mortgage lenders, may benefit from the information. We also encourage you to prepare an article for publication in your community's local newspaper. This article should describe the changes that have been made and the assistance that officials of your community will give to interested persons by providing these data and interpreting the NFIP maps.

This determination has been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and is in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain

management regulations that meet or exceed NFIP criteria. These criteria are the minimum requirements and do not supersede any State or local requirements of a more stringent nature. This includes adoption of the effective FIRM to which the regulations apply and the modifications described in this LOMR.

If you have any questions regarding floodplain management regulations for your community or the NFIP in general, please contact the Consultation Coordination Officer (CCO) for your community. Information on the CCO for your community may be obtained by calling the Director, Federal Insurance and Mitigation Division of FEMA in Oakland, California, at (510) 627-7103. If you have any questions regarding this LOMR, please call our Map Assistance Center, toll free, at 1-877-FEMA MAP (1-877-336-2627).

Sincerely,



Michael B. Godesky, CFM, Project Engineer
Hazard Identification Section
Mitigation Division
Emergency Preparedness
and Response Directorate

For: Doug Bellomo, P.E., CFM, Chief
Hazard Identification Section
Mitigation Division
Emergency Preparedness
and Response Directorate

Enclosures

cc: The Honorable Roger Dickenson
Chair, Sacramento County
Board of Supervisors

Mr. Pete Ghelfi
Director of Engineering
Sacramento Area Flood Control Agency

Mr. David Brent, P.E.
Manager
Engineering Services Division
Department of Utilities
City of Sacramento

Mr. George Booth, P.E.
Associate Civil Engineer
Water Resources Division
County of Sacramento

 P.E.
Nolte and Associates, Inc.



Federal Emergency Management Agency

Washington, D.C. 20472

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

IN REPLY REFER TO:
Case No.: 99-09-1286P

The Honorable Joe Serna, Jr.
Mayor, City of Sacramento
City Hall
915 I Street, Room 205
Sacramento, CA 95814

Community: City of Sacramento, CA
Community No.: 060266
Panels Affected: 0005 F, 0010 F, 0015 F,
0025 F, and 0030 F
Effective Date of This Revision: **MAY 22 2000**

102-D

Dear Mayor Serna:

This responds to a request that the Federal Emergency Management Agency (FEMA) revise the effective Flood Insurance Rate Map (FIRM) for your community in accordance with Part 65 of the National Flood Insurance Program (NFIP) regulations. In a letter dated September 1, 1999, Mr. Robert P. Thomas, City Manager, City of Sacramento, requested that FEMA revise the FIRM to show the effects of adequate progress, as defined in Section 61.12 of the NFIP regulations, toward the completion and expected certification of federally sponsored flood-control projects along the American and Sacramento Rivers.

All data required to complete our review of this request were submitted with letters from Colonel Michael J. Walsh, District Engineer, U.S. Army Corps of Engineers, Sacramento District; Mr. Keith Devore, Chief, Water Resources Division, Public Works Agency, Sacramento County; and Mr. Thomas.

Because this Letter of Map Revision (LOMR) shows the effects of a federally sponsored flood-control project where 50 percent or more of the project's costs are federally funded, fees were not assessed for the review.

We have completed our review of the submitted data and the flood data shown on the effective FIRM. We have revised the FIRM to modify the zone designations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) along the left (looking downstream) overbank areas of the Sacramento River from approximately 2,000 feet south of the interchange between Interstate Highway 5 and Freeport Boulevard to its confluence with the American River; along the left overbank areas of the American River from its confluence with the Sacramento River to Watt Avenue; and along the right overbank areas of the American River from its confluence with Natomas East Main Drainage Canal to approximately 2,500 feet east of Howe Avenue. As a result of the modifications, the base flood elevations (BFEs) in the overbank areas of both the American and Sacramento Rivers were removed to reflect the change in flood zone designations. Areas previously designated Zone AR, a Special Flood Hazard Area (SFHA), the area that would be inundated by the base flood, that results from the decertification of a previously accredited flood-protection system that is determined to be in the process of being restored to provide protection from the base flood or a greater level of protection, were redesignated Zone A99, an SFHA to be protected from the base flood by a Federal flood-protection system under construction, with no BFEs determined. The modifications are shown on the enclosed annotated copies of FIRM Panel(s) 0005 F,

0010 F, 0015 F, 0025 F, and 0030 F. This LOMR hereby revises the above-referenced panel(s) of the effective FIRM dated July 6, 1998.

Because this revision request also affects the unincorporated areas of Sacramento County, a separate LOMR for that community was issued on the same date as this LOMR.

The modifications are effective as of the date shown above. The map panel(s) as listed above and as modified by this letter will be used for all flood insurance policies and renewals issued for your community.

A review of the determination made by this LOMR and any requests to alter this determination should be made within 30 days. Any request to alter the determination must be based on scientific or technical data.

We will incorporate the modifications described in this LOMR into FIRM Panels 0005 F, 0010 F, 0015 F, 0025 F, and 0030 F and into the Flood Insurance Study (FIS) report as a physical map revision. Under separate cover, we will send you preliminary copies of the revised FIRM panels and FIS report for review by your community.

This LOMR is based on minimum floodplain management criteria established under the NFIP. Your community is responsible for approving all floodplain development and for ensuring all necessary permits required by Federal or State law have been received. State, county, and community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction in the SFHA. If the State, county, or community has adopted more restrictive or comprehensive floodplain management criteria, these criteria take precedence over the minimum NFIP criteria.

Because this LOMR will not be printed and distributed to primary users, such as local insurance agents and mortgage lenders, your community will serve as a repository for these new data. We encourage you to disseminate the information reflected by this LOMR throughout the community, so that interested persons, such as property owners, local insurance agents, and mortgage lenders, may benefit from the information. We also encourage you to prepare a related article for publication in your community's local newspaper. This article should describe the assistance that officials of your community will give to interested persons by providing these data and interpreting the NFIP maps.

Interested persons and lenders who wish to obtain a copy of this LOMR may contact the FEMA Map Assistance Center, toll free, at 1-877-FEMA MAP (1-877-336-2627) or may visit our Web site at www.fema.gov/mit/tsd/ST_order.htm. Persons who wish to obtain copies of all Letters of Map Change (LOMCs) as they are issued may subscribe to the LOMC Distribution Service. Information regarding this subscription service is available through the FEMA Map Service Center by calling, toll free, 1-800-358-9616.

This determination has been made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and is in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria are the minimum requirements and do not supersede any State or local requirements of a more stringent nature. This includes adoption of the effective FIRM and FIS report to which the regulations apply and the modifications described in this LOMR.

FEMA makes flood insurance available in participating communities; in addition, we encourage communities to develop their own loss reduction and prevention programs. Through the *Project Impact: Building Disaster Resistant Communities* initiative, launched by FEMA Director James Lee Witt

in 1997, we seek to focus the energy of businesses, citizens, and communities in the United States on the importance of reducing their susceptibility to the impact of all natural disasters, including floods, hurricanes, severe storms, earthquakes, and wildfires. Natural hazard mitigation is most effective when it is planned for and implemented at the local level, by the entities who are most knowledgeable of local conditions and whose economic stability and safety are at stake. For your information, we are enclosing a copy of a pamphlet describing this nationwide initiative. For additional information on *Project Impact*, please visit our Web site at www.fema.gov/impact.

If you have any questions regarding floodplain management regulations for your community or the NFIP in general, please contact the Consultation Coordination Officer (CCO) for your community. Information on the CCO for your community may be obtained by contacting the Director, Mitigation Division of FEMA in San Francisco, California, at (415) 923-7177. If you have any questions regarding this LOMR, please contact the FEMA Map Assistance Center, toll free, at 1-877-FEMA MAP (1-877-336-2627).

Sincerely,



Max H. Yuan, P.E., Project Engineer
Hazards Study Branch
Mitigation Directorate

For: Matthew B. Miller, P.E., Chief
Hazards Study Branch
Mitigation Directorate

Enclosures

cc: The Honorable Muriel Johnson
Chairperson, Sacramento County
Board of Supervisors

Mr. Robert P. Thomas
City Manager
City of Sacramento

Mr. Keith Devore
Chief, Water Resources Division
Public Works Agency
County of Sacramento

Mr. Kenneth J. Zwickl
Office of the Chief of Engineers
U.S. Army Corps of Engineers

Colonel Michael J. Walsh
District Engineer
U.S. Army Corps of Engineers,
Sacramento District

NOTICE TO SUBSCRIBERS

SOME ATTACHMENTS TO THIS LETTER OF MAP REVISION WERE TOO LARGE TO BE INCLUDED IN THIS PACKAGE. FOR COPIES OF THESE ATTACHMENTS, FREE OF ADDITIONAL CHARGE, PLEASE CONTACT THE LOMC DISTRIBUTION COORDINATOR AT THE ADDRESS BELOW:

**LOMC DISTRIBUTION COORDINATOR
MICHAEL BAKER JR., INC.
3601 EISENHOWER AVENUE, SUITE 600
ALEXANDRIA, VIRGINIA 22304
FAX NO.: 703-960-9125**



REPLY TO
ATTENTION OF

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, SACRAMENTO
CORPS OF ENGINEERS
1325 J STREET
SACRAMENTO, CALIFORNIA 95814-2922

December 9, 2004

Hydraulic Design Section

Mr. Stein Buer
Executive Director
Sacramento Area Flood Control Agency (SAFCA)
1007 7th Street, 7th Floor
Sacramento, CA 95814

Dear Mr. Buer:

The Corps was requested by the City and County of Sacramento in letters dated March 8, 1999 (City) and March 10, 1999 (County) to evaluate portions of the north and south levee of the American River and the east levee of the Sacramento River, for FEMA certification for the base flood event. The Corps agreed to perform this evaluation and this letter summarizes the results of that evaluation and addresses the issue of certification.

The Corps' evaluation focused on five of the design criteria in paragraph b of 44 CFR 65.10. These included freeboard, closures, embankment protection, embankment and foundation stability, and settlement. Other criteria, including interior drainage, for certifications identified in 44 CFR 65.10 were not addressed by the Corps evaluation, but are being addressed by SAFCA and the State of California.

The reaches of levees addressed by this letter are identified below and shown on the enclosed figure. Please note that there are minor adjustments to the specific river miles from those identified in our September 30, 2004 letter (i.e. River Mile 10.7 should have been 10.9):

- Left (south) bank levee of the American River from the Mayhew Drain at River Mile 10.9 down to the Sacramento River at River Mile 0.0
- Right (north) bank levee of the American River from the most upstream point at River Mile 13.2 down to the Natomas East Main Drainage Canal at River Mile 1.8
- Left (east) bank levee of the Sacramento River from the confluence of the American River at River Mile 60.1 down to the break between the Little Pocket and the Pocket area at River Mile 53.7

In our conditional certification letter to you dated September 30, 2004, we identified five erosion sites that were under construction. Construction at these five sites has been satisfactorily completed for FEMA certification. Pursuant to the signed agreement between SAFCA and the Bureau of Reclamation dated December 3, 2004, the base flood event flow is 145,000 cubic feet per second (cfs). By this letter, the Corps is providing certification that the above listed three reaches of levee were adequately designed and constructed to withstand the base flood event.

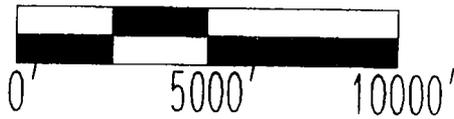
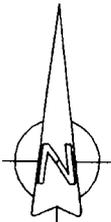
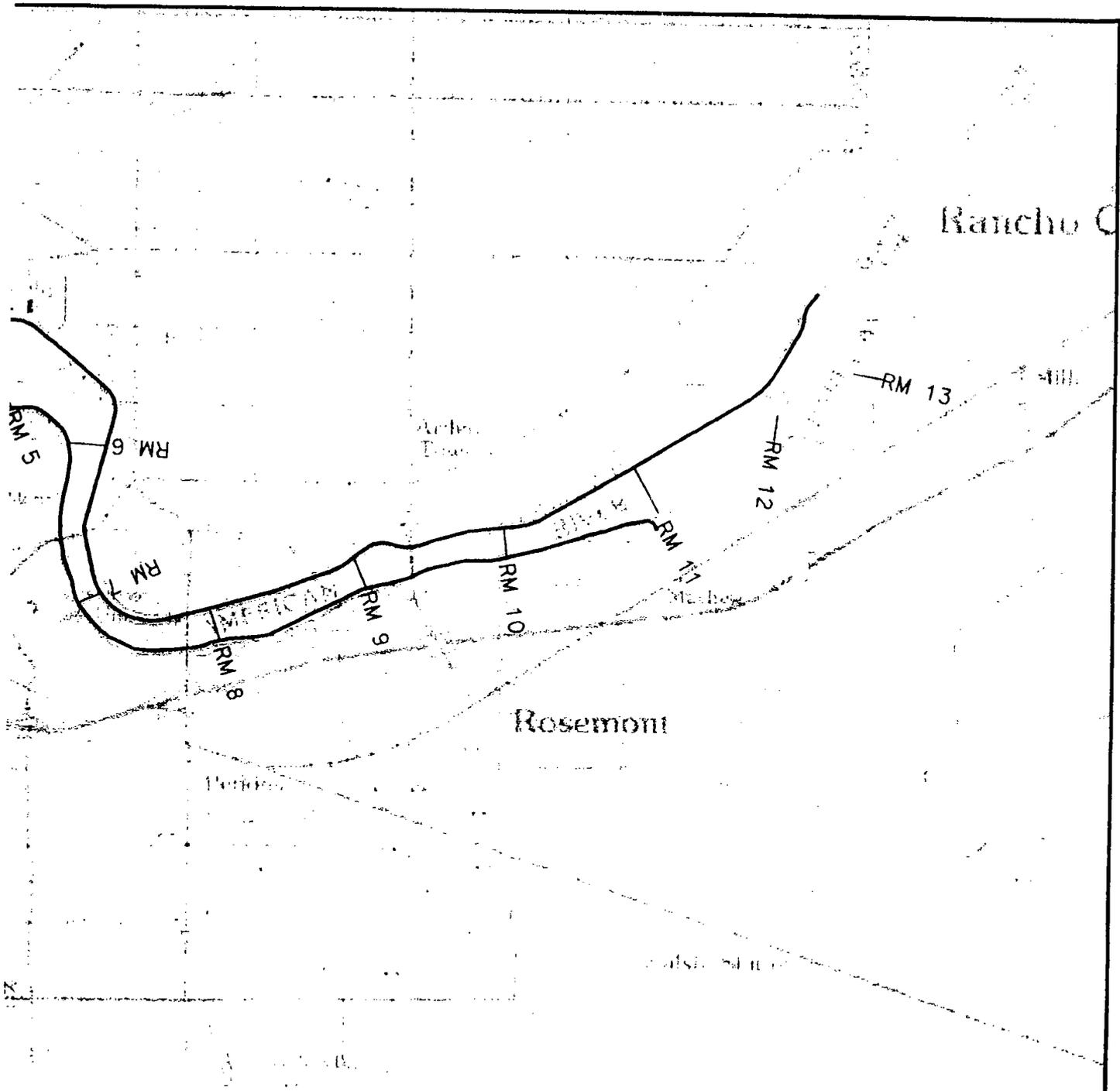
If you have any questions regarding the evaluation for certification of the American River north and south levee or the Sacramento River east levee, please contact our Project Manager, Mr. Mark Ellis at (916) 557-6892, or our Chief, Design Branch, Mr. Ronald Muller at (916) 557-7837.

Sincerely,

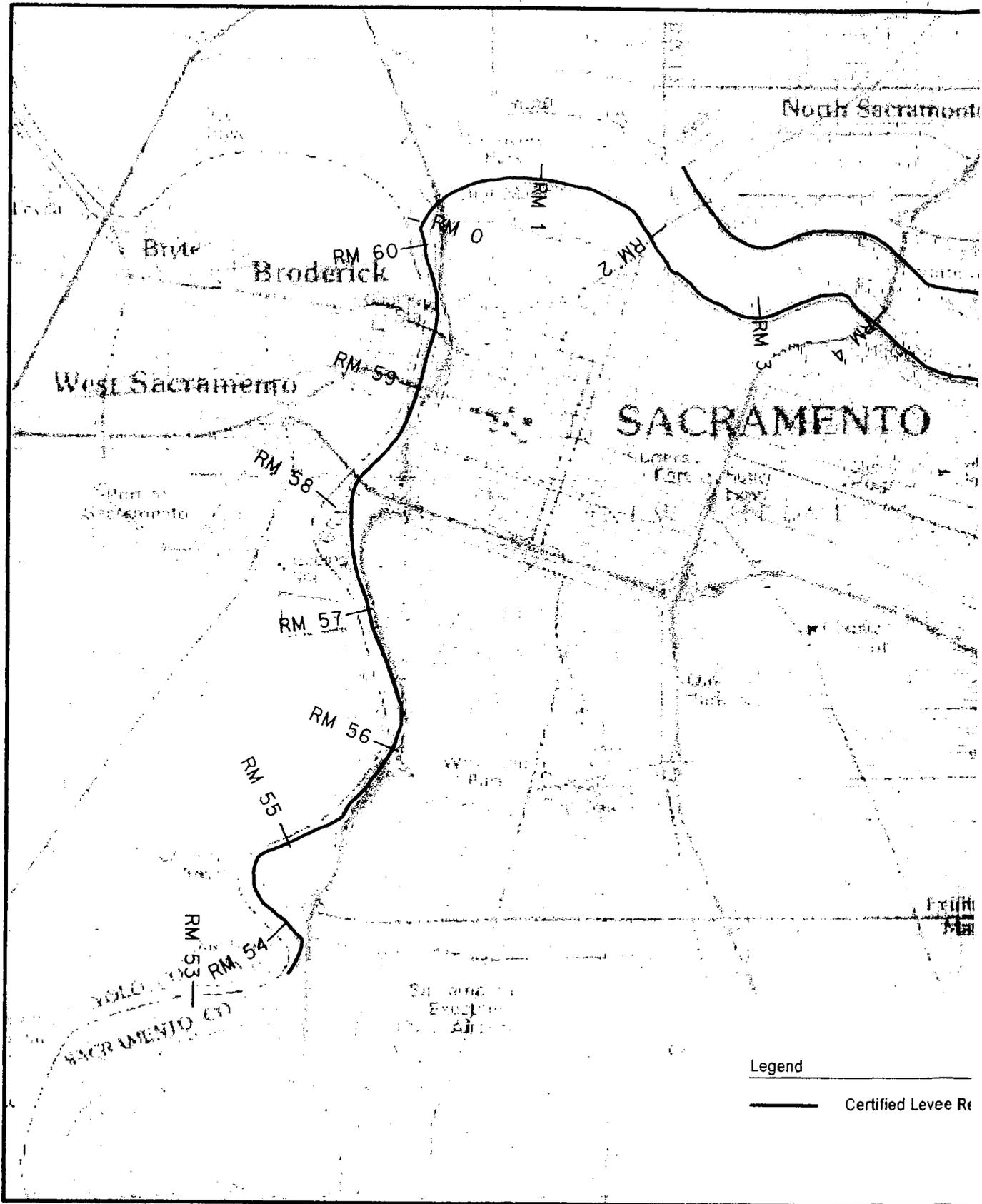
A handwritten signature in black ink that reads "Thomas E. Trainer". The signature is fluid and cursive, with a large initial "T" and a long, sweeping underline.

Thomas E. Trainer, P.E.
Chief, Engineering Division

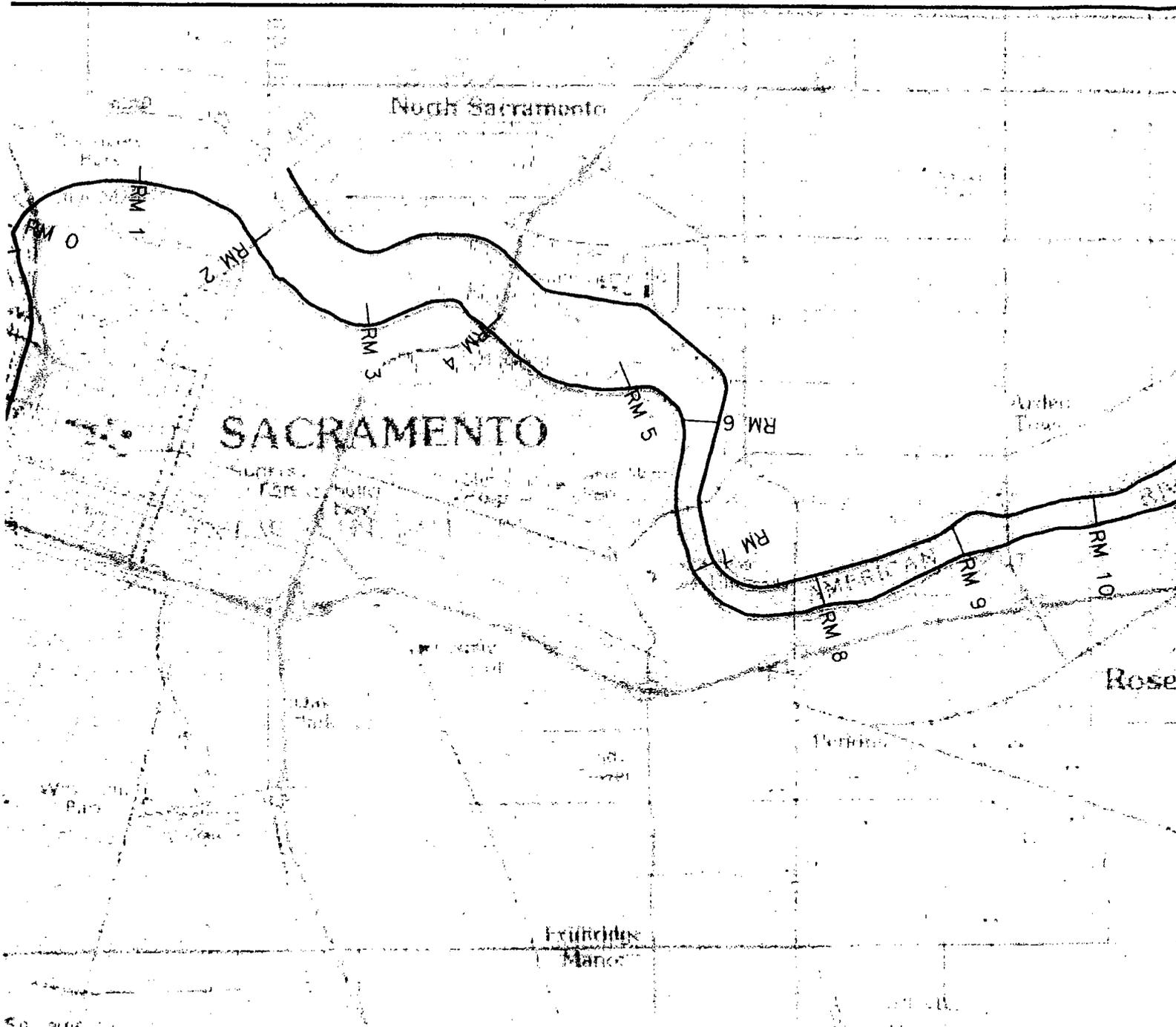
Enclosure



American River Common Features Project
Plate 1 Location Map of American and Sacramento River Levees for FEMA Certification
U.S. Army Corps of Engineers Sheet 1 of 1
December, 2004



Legend
— Certified Levee Route



Legend

— Certified Levee Reach

