DRAFT REPORT

PROPOSED INTEGRATED FACILITY AT WEBB TRACT SUPPLEMENTAL GEOTECHNICAL EXPLORATION

Prepared for

Department of Water Resources
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URS

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26814887

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1.1 BACKGROUND AND PURPOSE OF INVESTIGATION

The Department of Water Resources (DWR) is conducting feasibility-level engineering and environmental studies under the Integrated Storage Investigations Program. As part of the project evaluations, DWR is evaluating the technical feasibility and conducting engineering investigation for the In-Delta Storage Program. The engineering investigation will aim at developing solutions to enhance project reliability through improved embankment design and consolidation of inlet and outlet structures.

As part of this feasibility study, DWR requested that URS Corporation (URS) perform supplemental geotechnical explorations to evaluate the foundation conditions at the site for a newly proposed integrated facility at the northwest corner of Webb Tract. The supplemental geotechnical exploration consisted of drilling and sampling two foundation exploration borings for the proposed integrated facility. This newly proposed location has been chosen to explore the benefits it may have over the integrated facility proposed on the northeast corner of the island, where previous explorations were conducted. The data collected will be used to perform engineering analyses and design of the proposed integrated facility under a separate task order. The work was conducted in accordance with all applicable standards and guidelines contained in Standard Agreement No. 4600001747 between DWR and URS, and in coordination with DWR staff.

1.2 SCOPE OF WORK

The scope of work is described in Task Order No. IDS-1004-1747-012 issued by DWR dated October 21, 2004. The scope of our geotechnical engineering study included the following items:

- Drill two soil borings (DH-1 and DH-2) to a depth of 100 feet below the existing ground surface on Webb Tract to obtain soil samples. However, as discussed in Section 4.1, access to DH-2 was not achievable during the winter weather conditions at the project site. Therefore, only Boring DH-1 was completed.
- Conduct laboratory testing of the samples collected for engineering properties.
- Prepare a summary report of findings.

The site vicinity plan is shown on Figure 1, and the site location plan on Webb Tract is shown on Figure 2.

The intent of the exploration is to conduct a feasibility-level characterization of foundation conditions at the newly proposed integrated facility at the northwest corner of Webb Tract, adjacent to the San Joaquin River near Fisherman's Cut. The drilling locations correspond to the location of the integrated facility's fish screen structure (DH-1) and the pump station structure (DH-2).

The exploration is intended for feasibility-level design and preliminary cost estimates. Additional subsurface exploration is required for the final design and construction of the proposed integrated facility.

Task 1.1 – Conduct Drilling and Sampling

Drill two soil borings to a depth of 100 feet below the existing ground surface in the island floor of Webb Tract at the locations shown on Figure 3 to obtain samples for laboratory testing. However, as discussed above, only DH-1 was drilled. DH-1 is located approximately 150 feet from the centerline of the levee road (near the levee toe). DH-2 was to be located approximately 1,000 feet from the centerline of the levee road. Borehole location surveys are not included in this scope of work.

Task 1.2 – Conduct Laboratory Testing

Conduct laboratory testing on the soil samples collected during drilling. The soil samples were obtained at selected depths using the Modified California sampler, Standard Penetration Test (SPT) sampler, and Shelby Tube sampler. Laboratory testing consisted of the following tests: triaxial compression, unconfined compression, moisture content and dry density, Atterberg limits, sieve analysis, and sieve-wash analysis.

Task 1.3 – Prepare Summary Report of Findings

Prepare a geotechnical report summarizing the results of the supplemental exploration program at the project site. The report includes the final log of boring DH-1, laboratory test results on the soil samples, a site plan, geotechnical properties profile, and a summary of findings and conclusions.

Geotechnical recommendations, engineering properties of the subsurface soils for use in the design of foundation systems (e.g., allowable bearing capacity, and pile capacities, etc.), and estimates of settlement would be the subject of a separate engineering report that would consider the proposed structure configuration and applied foundation loads. That engineering report would also contain geotechnical recommendations for construction of the proposed structure.

2.1 SITE LOCATIONS AND ACCESSBILITY

Webb Tract is located in the Sacramento – San Joaquin River Delta, near Stockton, California. The site vicinity map is shown on Figure 1. Webb Tract is located at the northeastern corner of the Contra Costa County limit near Oakley, California. The island is accessible by a ferry. The ferry station is located on the northeastern corner of Jersey Island on the False River side. The ferry ramp location on Webb Tract is shown on Figure 2. The ferry station is accessible to vehicles by taking the Jersey Island Road from the Cypress Road off California Highway 4 in Oakley. The ferry operates once every hour starting at 8:00 A.M. until 5:00 P.M. with no service at 12:00 P.M.

2.2 SURFACE CONDITIONS

The Sacramento-San Joaquin River Delta was developed for agricultural purposes from a tidal marsh in 1800s. As part of the development, levees were constructed on the underlying peat and soft clay to form islands. The existing channels were improved, and new channels were dredged. Farming is a primary land use on Webb Tract. The interior of the island was divided and linked by unpaved embankment roads to agricultural area and irrigation ponds. Ditches were excavated throughout the islands as part of the irrigation and drainage systems.

Webb Tract encompasses about 5,500 acres. The ground elevation of Webb Tract, initially, was near sea level. Land subsidence has steadily decreased the surface elevation primarily as a result of the loss of organic material and peat. The loss is caused by exposure of peat to oxygen (oxidation), wind erosion, burning as well as other factors. Based on the aerial survey data provided by DWR, the existing ground surface elevation within the proposed integrated facility site ranges from about -14.5 feet to -7.5 feet. The estimated ground surface elevations (from the aerial survey data) at borings DH-1 and DH-2 are approximately -10 feet and -14 feet, respectively.

The project site is currently covered with plowed soil for future crop growing or dried crops left from the previous harvest. Areas with no agricultural use are covered with grass and shrubs. The ground surface at the project site after the wet weather conditions is very soft and saturated with water from the precipitation and high groundwater level. Construction operation following wet weather conditions may encounter difficulties due to accessibility.

3.1 FIELD EXPLORATION

The field exploration program for this study included performing a field reconnaissance and drilling and sampling.

A URS engineer and a DWR environmental scientist conducted a geotechnical and environmental field reconnaissance on Webb Tract on November 3, 2004. The objectives of the field reconnaissance were to observe the site conditions for environmental clearance, and to evaluate accessibility to the proposed boring locations. Areas within 50-foot radius around each soil boring location were observed for potential burrows and surface cracks. The proposed soil borings locations were cleared for potential habitats or endangered species. The soil borings were located on disturbed areas along the access road to the active agricultural areas.

DWR informed URS regarding the environmental and archeological restrictions related to the proposed field exploration, and issued an environmental clearance memorandum dated November 3, 2004. Permission to enter Webb Tract for the proposed field exploration was issued by Delta Wetlands in a letter dated November 16, 2004. Underground Service Alert (USA) was notified of the boring locations at least 48 hours prior to the scheduled date of the field exploration. The boring locations were cleared for underground utility lines.

On November 22, 2004, a truck-mounted drilling rig attempted to access boring DH-2 location to start the subsurface exploration program. However, the ground conditions along the access road were too soft and wet to support the drilling rig, which became stuck and had to be recovered. The drilling rig was moved to the DH-1 location. In order to provide firmer access to the boring location, timber mats were used to spread the tire loads of the drilling rig so that it could access the DH-1 location to complete the soil boring operation.

Exploratory soil boring DH-1 was drilled to a depth of 101.5 feet during November 22 and 23, 2004, at the location shown on Figure 2. The boring was drilled using a truck-mounted CME-75 drilling rig owned and operated by Fugro Geosciences, Inc. of Oakland, California. The boring was advanced using a 3-inch diameter rotary drill.

A URS engineer logged the soil cuttings and samples from DH-1 in the field and visually classified the soils, as the drilling proceeded. Samples of the subsurface materials were obtained at 5-foot intervals using a Standard Penetration Test (SPT) split-spoon sampler with an outside diameter of 2 inches and inside diameter of 1.5 inches, or a 2.5-inch outside diameter and 2-inch inside diameter Modified California Sampler fitted with brass liner tubes. Osterberg piston sampling using a 3-inch outside diameter Shelby tube was attempted at a depth of 40 feet below the existing ground surface, but the soil conditions at that depth were too stiff to push the tube into the ground. A sample of very soft organic silt from 10 feet to 13 feet below the ground surface was collected using the Osterberg piston head with Shelby tube. The SPT and Modified California samplers were advanced with a 140-pound automatic hammer with a 30-inch drop. Drill cuttings and wash water were spread on the ground near the boring location. The boring was grouted with neat cement using tremie method upon completion.

The soil samples collected were taken to the URS geotechnical laboratory in Pleasant Hill, California, for further visual examination and testing. A log of Boring DH-1 was prepared based on the field observations, visual examination in the laboratory, and the laboratory testing results, and is presented in Appendix A. Descriptions of the procedures used to drill the boring and to obtain soil samples are provided in Appendix A.

In an attempt to gain access to DH-2, a Fraste Multidrill-XL track-mounted drill rig was mobilized on December 9, 2004. This drill rig is owned and operated by Pitcher Drilling Company of East Palo Alto, California. However, due to soft, wet ground conditions similar to those encountered during the first attempt, the drill rig and support truck could not access the DH-2 boring location. The drilling rig was therefore demobilized.

After about two weeks without rain, URS and Pitcher Drilling Company made a site visit on January 20, 2005, to observe and evaluate the site conditions for the track-mounted drill rig. Again, site conditions were found to be too soft and wet for access, and the scheduled mobilization for January 24, 2005 was cancelled.

3.2 LABORATORY TESTING

Selected soil samples obtained from the exploratory borings were tested in our Pleasant Hill geotechnical laboratory to evaluate their engineering properties for use in foundation design. The following laboratory tests were performed on selected soil samples:

- Grain size analyses (ASTM D422)
- Materials finer than the No. 200 Sieve (ASTM D1140)
- Water content and dry density determination (ASTM D2216)
- Atterberg limits determination (ASTM D4318)
- Unconfined compression (ASTM D2166)
- Triaxial compression - unconsolidated undrained (ASTM D2850).

The results of the geotechnical laboratory testing are summarized in the log of Boring DH-1 at the corresponding sample depths. Geotechnical laboratory test results are presented in Appendix B.

4.1 SUBSURFACE SOIL CONDITIONS

The subsurface conditions at the location of Boring DH-1 in Webb Tract generally consist of a layer of very soft, low to high plasticity, highly compressible, black organic silt with organic debris and peat to a depth of about 18 feet. The near surface soil appears to be lighter in color due to higher degree of oxidation. The black organic silt and peat layer is underlain by alternating layers of alluvial gray and brown, silty sand (SM and SP-SM), clayey and sandy silt (ML), and silty clay (CL) to the bottom of the boring at 101.5 feet. The engineering properties of the silty sand and clayey/silty soils described below are based on the results of the laboratory test data presented in Appendix B.

Silty Sand Soils: The relative density of the sandy soils ranged from loose to medium dense between about 18 feet and 29 feet below the ground surface. Below 29 feet, the sandy soils ranged from medium dense to dense, with SPT blow counts and Modified California sampler blow counts (corrected to SPT values by reducing the Modified California sampler blow counts by 20 percent) ranging from 12 to 37. The penetration resistance values (SPT-N values) are shown graphically on Figure 4. Based on the laboratory testing data (Appendix B), the fines content (materials passing the No. 200 U.S. Standard Sieve) generally ranged from about 6% to 30% fines; one sample at 41 feet had a fines content of 2%.

Clayey and Silty Soils: The clayey and silty soils generally are low plasticity, with the plasticity index between 5 and 20. In-situ water contents range from about 22% to 38%. The consistency of the clayey and silty soils ranges from stiff to hard. The undrained shear strengths (S_u) from the unconsolidated undrained triaxial compression tests and the unconfined compression tests generally range from 2,000 psf to 5,400 psf above a depth of 90 feet. As shown on Figure 4, the normalized undrained shear strengths (S_u/effective overburden pressure, σ'_{vo}) of soils above 90 feet range from about 0.8 to 1.3. These values indicate that the soils are overconsolidated. The undrained shear strengths of two soil samples below this depth are about 1,200 psf to 1,300 psf with the normalized undrained shear strength of about 0.25. These undrained shear strengths indicate that these soils are normally consolidated.

4.2 GROUNDWATER CONDITIONS

The level of groundwater encountered at the time of drilling was about 4.5 feet below the ground surface. The groundwater levels are largely affected by the irrigation and drainage system within the island. The ground surface elevation within most of the island is lower than sea level, and the water level outside the perimeter of the island is higher than the ground surface of the island. Static groundwater levels were not recorded due to the immediate backfill of the boring with tremie grout.

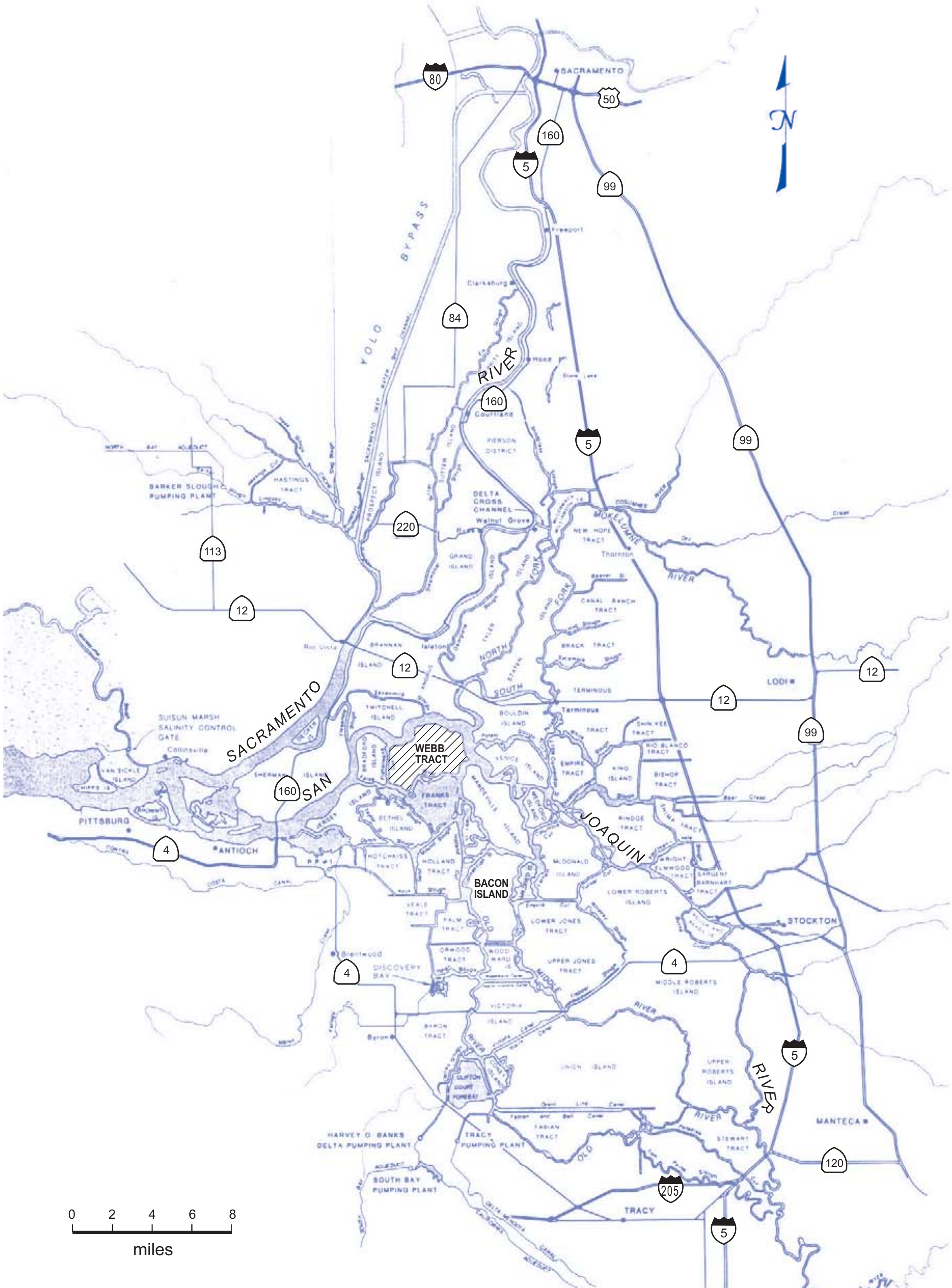
This report presents the results of a supplemental geotechnical exploration to evaluate the foundation conditions at the site for a newly proposed integrated facility at the northwest corner of Webb Tract. The data collected will be used to perform engineering analyses and design of the proposed integrated facility under a separate task order.

The original scope of work included drilling two soil borings (DH-1 and DH-2) to a depth of 100 feet below the existing ground surface on Webb Tract to obtain soil samples. The drilling locations correspond to the location of the integrated facility's fish screen structure (DH-1) and the pump station structure (DH-2). However, access to DH-2 was not achievable during the winter weather conditions at the project site. Therefore, only Boring DH-1 was completed.

To evaluate the engineering properties of the foundation soils, laboratory testing was performed that consisted of triaxial compression, unconfined compression, moisture content and dry density, Atterberg limits, sieve analysis, and sieve-wash analysis.

The subsurface conditions at the location of Boring DH-1 generally consist of a layer of very soft, low to high plasticity, highly compressible, black organic silt with organic debris and peat to a depth of about 18 feet. The black organic silt and peat layer is underlain by alternating layers of gray and brown, silty sand (SM and SP-SM), clayey and sandy silt (ML), and silty clay (CL) to the bottom of the boring. The sandy soils are loose to medium dense between about 18 feet and 29 feet below the ground surface; below 29 feet, the sandy soils are medium dense to dense. The consistency of the clayey and silty soils ranges from stiff to hard.

This geotechnical study has been conducted in accordance with the standard of care commonly used as state-of-practice in the profession. No other warranties are either expressed or implied. The conclusions and recommendations presented in this report are developed exclusively for the proposed integrated facility described in this report. The recommendations made in this report are based on the assumption that the subsurface soil and groundwater conditions do not deviate appreciably from those disclosed in the exploratory boring. If any variations or undesirable conditions are encountered during construction, URS should be notified so that additional recommendations can be made.

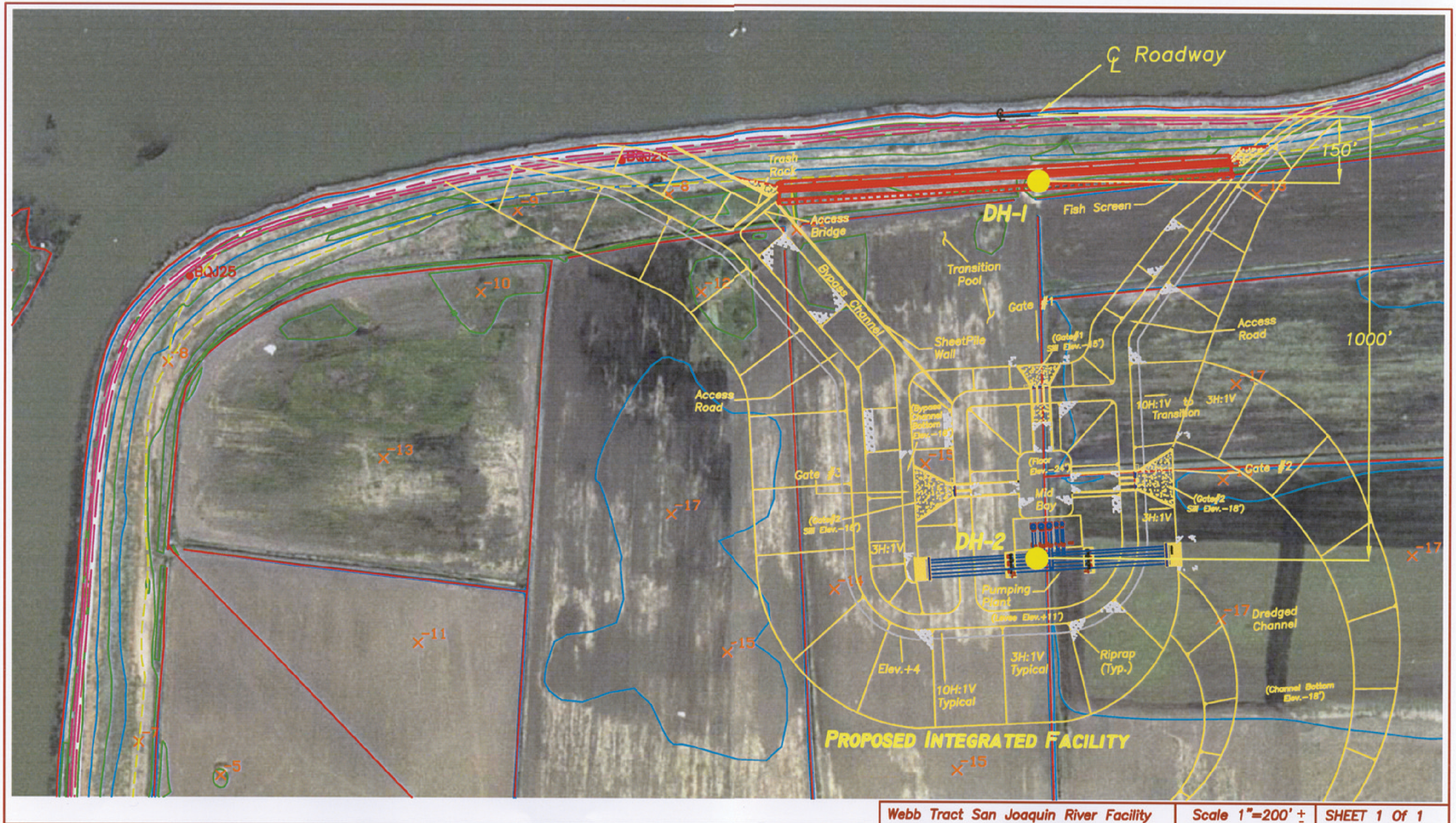


Source: Department of Water Resources, Sacramento-San Joaquin Delta Atlas

URS	Project No. 26814887 STATE OF CALIFORNIA DEPARTMENT OF WATER RESOURCES	SITE VICINITY	FIGURE 1

26814170.01200/012103/gos

URS	26814887 STATE OF CALIFORNIA DEPARTMENT OF WATER RESOURCES	Webb Tract - Site Plan	FIGURE 2



NOTE: DH-2 was not drilled due to site accessibility problems as discussed in the report.

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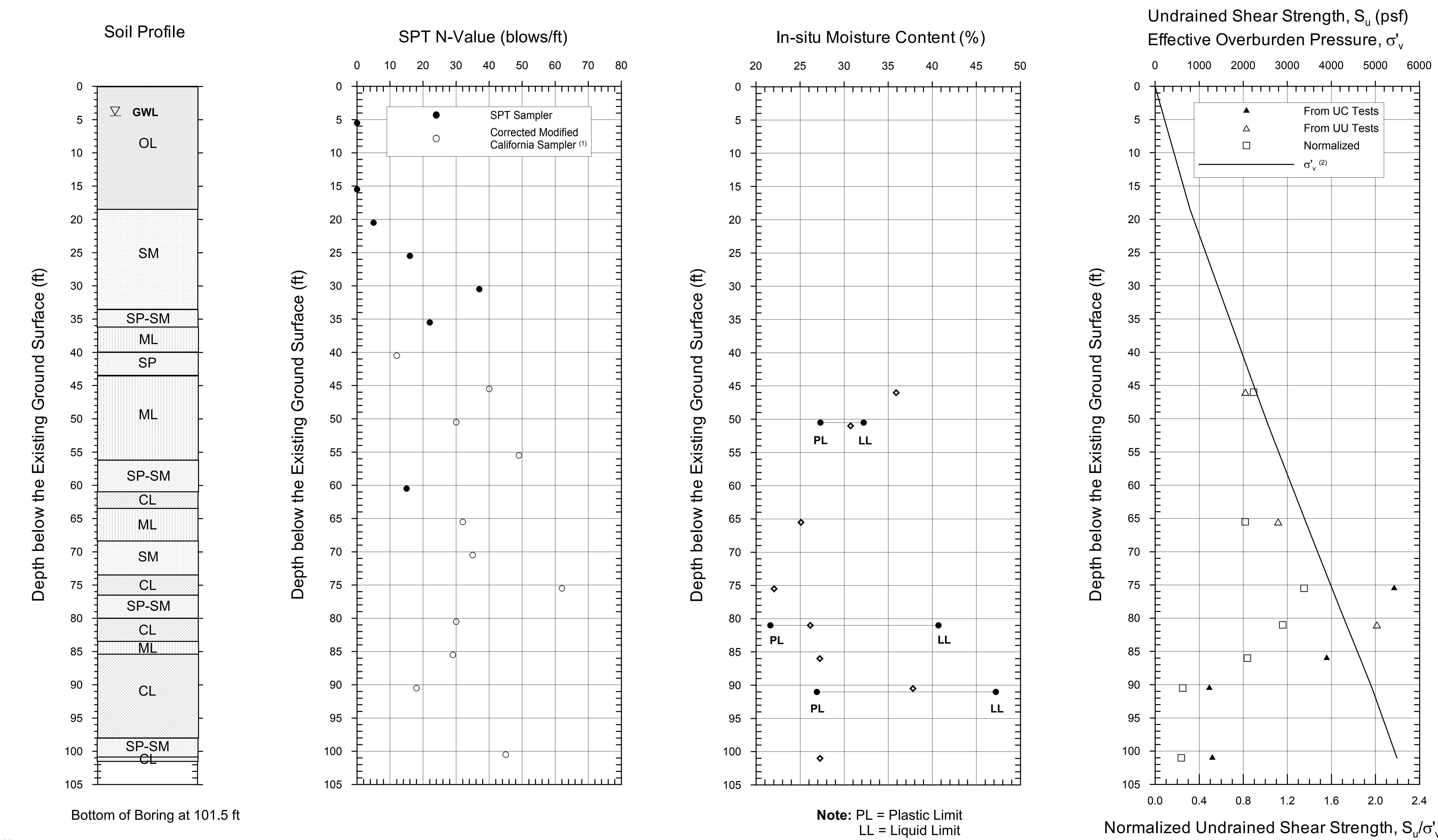
URS	26814887 STATE OF CALIFORNIA DEPARTMENT OF WATER RESOURCES	Webb Tract - Exploration Plan	FIGURE 3



Notes:

1) Blowcounts from the Modified California Sampler are reduced to 80% to obtain appoximate SPT N-values.

2) Effective overburden pressure is calculated based on 18.5 ft of OL with a total unit weight of 90 pcf. The total unit weight of materials below OL layer is based on the laboratory test results as presented on the log of boring. The groundwater level is at 4.5 ft below the existing ground surface.

Project No. 26814887	State of California Department of Water Resources	**Soil Properties Versus Depth Boring DH-1**	**Figure 4**
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Appendix A

Geotechnical Drilling and Sampling Program

A.1 FIELD EXPLORATION

A 101.5-foot-deep exploratory boring (DH-1) was drilled for this study to collect soil samples for use in design of the foundation system for the integrated facility near the northwestern corner of Webb Tract. The boring was drilled on November 22 through November 23, 2004 under the observation of Mr. Asi Ooraikul of our firm. The borings were drilled using a truck-mounted CME-75 drilling rig owned and operated by Fugro Geosciences, Inc. of Oakland, California. The boring was advanced using an 8-inch hollow-stem auger to a depth of about 10 feet below the ground surface after which the rotary wash drilling method was implemented. The groundwater level was observed at the time of drilling at a depth of about 4 feet. The borings were continued with a 3-inch-diameter drill bit on drilling rods below a depth of 10 feet.

A.2 SOIL SAMPLING

Drilling and Sampling Methods

Soil samples were obtained at selected depths in Boring DH-1 by advancing the sampler into the soils at the bottom of the borehole. Three types of sampling equipment were utilized:

- A Standard Penetration Test (SPT) split-spoon sampler with 2-inch outside diameter and 1.5-inch inside diameter with no liner was used primarily in granular soils.
- A Modified California sampler with 2.5-inch outside diameter and 2-inch inside diameter equipped with three thin brass liners, each 6 inches long, was used primarily in cohesive soils.
- An Osterberg piston head with Shelby Tube thin-wall sampler of 3-inch outside diameter, 2.86-inch inside diameter, and 36-inch long was used to collect undisturbed sample of very soft organic silt from 10 feet to 13 feet.

The SPT and Modified California samplers were threaded to fit a cutting shoe on one end and a check-valve connection at the other end. The borehole was advanced using a 3-inch diameter rotary drill with drag bit. After the borehole was drilled to the specified depth, the drill rods were removed, and the sampler was lowered down through the hole to the bottom, seated, and then driven into the soil with a 140-pound automatic trip hammer falling 30 inches for each blow. The number of hammer blows required to advance the sampler each of the three successive 6-inch increments was counted in the field. The number of blows required to advance the sampler the last 12 inches was recorded as the penetration resistance (blows per foot) as presented on the log of boring.

After drilling and sampling, the borehole was backfilled with neat cement grout using tremie method in accordance with the Contra Costa Environmental Health Division. Excess drill cuttings were spread on the surface within the approved 50-foot radius around the borehole.

Sample Handling

Soil recovered from the SPT split-spoon sampler was placed in sealed "Ziploc" bags that were labeled with the sample number, depth, and date of sampling. Brass liner tubes from the Modified California sampler and the Shelby Tube sample were likewise labeled, and capped.

A.3 LOG OF BORING

The soil samples and cuttings were examined and classified in the field as the drilling proceeded. The samples were later taken to our geotechnical laboratory in Pleasant Hill, California, for further examination and testing. Preliminary visual soil classifications were made in accordance with the Unified Soil Classification System (ASTM D2487) and confirmed by examination of the samples in the laboratory and by testing. The log of Boring DH-1 was prepared from the field observations and laboratory test data.

The log of the boring shows the soil classifications (according to the Unified Soil Classification System) of materials encountered, locations where soil samples were obtained, type of sampler used, penetration resistance, and the results of the laboratory tests.

Project: Supplemental Soil Borings
Project Location: Webb Tract, Oakley, California
Project Number: 26814887.01100

Key to Log of Boring

Sheet 1 of 1

Elevation feet	Depth, feet	SAMPLES: Type	SAMPLES: Number	SAMPLES: Sampling Resistance	SAMPLES: Recovery, %	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Unconfined Compressive Strength, psf	REMARKS AND OTHER TESTS
1	2	3	4	5	6	7	8	9	10	11	12

COLUMN DESCRIPTIONS

1 **Elevation:** Elevation in feet referenced to mean sea level (MSL) or site datum.

2 **Depth:** Depth in feet below the ground surface.

3 **Sample Type:** Type of soil sample collected at depth interval shown; sampler symbols are explained below.

4 **Sample Number:** Sample identification number.

5 **Sampling Resistance:** Number of blows required to advance driven sampler 12 inches beyond first 6-inch interval, or distance noted, using a 140-lb hammer with a 30-inch drop.

6 **Recovery:** Percentage of driven or pushed sample length recovered; "NA" indicates data not recorded.

7 **Graphic Log:** Graphic depiction of subsurface material encountered; typical symbols are explained below.

8 **Material Description:** Description of material encountered; may include density/consistency, moisture, color, and grain size.

9 **Water Content:** Water content of soil sample measured in laboratory, expressed as percentage of dry weight of specimen.

10 **Dry Unit Weight:** Dry weight per unit volume of soil measured in laboratory, expressed in pounds per cubic feet (pcf).

11 **Unconfined Compressive Strength:** Unconfined compressive strength of soil sample measured in laboratory, expressed in psf.

12 **Remarks and Other Tests:** Comments and observations regarding drilling or sampling made by driller or field personnel. Other field and laboratory test results, using the following abbreviations:

LL	Liquid Limit (from Atterberg Limits test), percent
PI	Plasticity Index (from Atterberg Limits test), percent
NA	Not applicable
NP	Nonplastic Atterberg determination
SA	Sieve analysis, percent passing #200 sieve
WA	Wash on #200 sieve, percent passing #200 sieve
TX-UU	Unconsolidated undrained triaxial test, peak deviator stress and confining pressure in psf

TYPICAL MATERIAL GRAPHIC SYMBOLS

- POORLY GRADED SAND (SP)
- POORLY GRADED SAND WITH SILT (SP-SM)
- SILTY SAND (SM)
- CLAYEY SAND (SC)
- POORLY GRADED GRAVEL (GP)
- LEAN CLAY (CL)
- FAT CLAY (CH)
- SILTY CLAY (CL)
- WELL-GRADED GRAVEL (GW)
- SILT (ML)
- ORGANIC SILT (OL)
- CLAYEY SILT (ML)

TYPICAL SAMPLER GRAPHIC SYMBOLS

- Standard Penetration Test (SPT) unlined split spoon
- Modified California (2.5-inch OD) with brass liners
- California (3-inch OD) with brass liners
- Shelby tube (3-inch OD, thin-wall, fixed head)
- Osterberg (piston head) with Shelby tube liner
- Grab sample retained in plastic bag

OTHER GRAPHIC SYMBOLS

- First water encountered at time of drilling and sampling (ATD)
- Static water level measured after drilling and sampling completed
- Change in material properties within a lithologic stratum
- Inferred or transitional contact between lithologies

GENERAL NOTES

1. Soil classifications are based on the Unified Soil Classification System. Descriptions and stratum lines are interpretive; actual lithologic changes may be gradual. Field descriptions may have been modified to reflect results of lab tests.
2. Descriptions on these logs apply only at the specific boring locations and at the time the borings were advanced. They are not warranted to be representative of subsurface conditions at other locations or times.

Report: GEO_10B1_OAK_KEY; File: OAK_WEBTRACT.GPJ; 1/31/2005 keyweb

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Project: Supplemental Soil Borings	**Log of Boring DH-1**
Project Location: Webb Tract, Oakley, California	Sheet 1 of 4
Project Number: 26814887.01100	

Date(s) Drilled	**11/22/04 and 11/23/04**	Logged By	**A. Ooraikul**	Checked By	**M. Forrest**
Drilling Method	**CME-75**	Drill Bit Size/Type	**Rotary Wash**	Total Depth of Borehole	**101.5 feet**
Drill Rig Type	**3-inch drag bit**	Drilling Contractor	**Fugro Geosciences, Inc.**	Surface Elevation	**Not available**
Groundwater Level(s)	**4.5 feet bgs**	Sampling Method(s)	**SPT, Modified California, Osterberg**	Hammer Data	**Automatic hammer; 140 lbs, 30-inch drop**
Borehole Backfill	**Neat cement, tremied, per CCEH**	Location	**1900 feet E of NW corner of Webb Trace, 150 feet S of levee**		

Elevation feet	Depth, feet	SAMPLES Type	Number	Sampling Resistance, blows / foot	Recovery, %	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Unconfined Compressive Strength, psf	REMARKS AND OTHER TESTS
	0						ORGANIC SILT (OL) Very soft, moist, black, low plasticity, trace fine-grained sand [logged from cuttings to 5 feet]				Start at 14:40 on 11/22/04. Drill to 10 ft using 8-in.-OD hollow-stem auger as casing.
	5		1-1	0	100		With some roots				
	10		1-2	0 psi	100		With some grass stems and wood pieces				Switch to rotary wash after 10-ft sample.
	15		1-3	0	100		No wood debris				
							SILTY SAND (SM) Loose, wet, gray, fine- to medium-grained sand				
	20		1-4	5	100						SA: 25%<#200 sieve
	25		1-5	16	70		Becomes medium dense; decreasing silt content				WA: 16%<#200 sieve
	30						Becomes dense; sand grades fine-grained; increasing silt content				

Project: Supplemental Soil Borings
Project Location: Webb Tract, Oakley, California
Project Number: 26814887.01100

Log of Boring DH-1

Elevation feet	Depth, feet	SAMPLES Type	Number	Sampling Resistance, blows / foot	Recovery, %	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Unconfined Compressive Strength, psf	REMARKS AND OTHER TESTS
	30		1-6	37	100		SILTY SAND (SM), dense, wet, gray, fine-grained sand (continued)				SA: 30%<#200 sieve Lose circulation at 30 ft.
							POORLY GRADED SAND WITH SILT (SP-SM) Medium dense, wet, gray, fine-grained sand				Stop at 16:30 to repair pump; resume at 16:43.
	35		1-7	22	100						
							CLAYEY SILT (ML) Stiff to very stiff, wet, gray, low plasticity				End drilling for 11/22/04 at 17:15; insufficient light to work. Resume drilling on 11/23/04 at 09:00. Osterberg can be pushed only 6 inches. Switch to Mod Cal and discard upper liner.
	40		1-8	600 psi	0		POORLY GRADED SAND (SP) Medium dense, wet, gray, fine- to medium-grained sand, trace silt				
			1-9	15	55						SA: 2%<#200 sieve Lose circulation completely at 42 ft. Driller adds cement to drilling mud to seal sand layer.
							CLAYEY SILT (ML) Very stiff to hard, wet, dark gray, low plasticity, trace fine-grained sand, trace cemented silt nodules, occasional silty sand interbeds				
	45		1-10	50	100		Silt nodules in fine-grained sand	35.9	85.8		PI=NP TX-UU: Peak Deviator Stress=4100 psf Confining Pressure=1800 psf
	50						Becomes stiff to very stiff				
			1-11	37	90		Gray SILTY SAND (SM) interbed	30.7	91.3	NA	LL=32, PI=5 Stop at 10:05 due to clogged pump; add water to thin drill fluid, and resume at 10:55. Stop for pump problem again at 11:10, add water, and resume at 11:55.
	55		1-12	61	100		POORLY GRADED SAND WITH SILT (SP-SM) Dense to very dense, wet, dark gray, fine- to medium-grained sand				
	60						Becomes medium dense				
			1-13	15	55						WA: 8%<#200 sieve
							SILTY CLAY (CL) Stiff, wet, brownish gray mottled with orange-brown, low plasticity				
							CLAYEY SILT (ML) Hard, wet, grayish brown with white streaks, low plasticity				
	65										

Report: GEO_10B1_OAK; File: OAK_WEBTRACT.GPJ; 1/31/2005 DH-01

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Figure A-2

Project: Supplemental Soil Borings
Project Location: Webb Tract, Oakley, California
Project Number: 26814887.01100

Log of Boring DH-1

Elevation feet	Depth, feet	Type	Number	Sampling Resistance, blows / foot	Recovery, %	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Unconfined Compressive Strength, psf	REMARKS AND OTHER TESTS
	65		1-14	40	90		CLAYEY SILT (ML), hard, wet, grayish brown with white streaks, low plasticity, trace fine-grained sand (continued)	25.1	100.2		TX-UU: Peak Deviator Stress=5590 psf Confining Pressure=2600 psf
							SANDY SILT (ML) Hard, wet, grayish brown, low plasticity, fine-grained sand				
							SILTY SAND (SM) Dense, wet, brown, fine- to medium-grained sand				
	70		1-15	44	85						SA: 16%<#200 sieve
							SILTY CLAY (CL) Hard, moist, light brown mottled with brownish gray, low to medium plasticity, weakly cemented				
	75		1-16	77	85			22.1	105.9	10850	
							POORLY GRADED SAND WITH SILT (SP-SM) Very dense, wet, dark brown, fine- to medium-grained sand				
	80		1-17	37	100		SILTY CLAY (CL) Hard, moist, light brown mottled with brown, low plasticity, some cemented nodules	26.2	98.4		LL=41, PI=19 TX-UU: Peak Deviator Stress=10070 psf Confining Pressure=3300 psf
							CLAYEY SILT (ML) Stiff to very stiff, wet, brown, low plasticity				
	85		1-18	36	70		SILTY CLAY (CL) Very stiff to hard, moist, brownish gray mottled with brown, low plasticity	27.2	96.3	7800	
	90		1-19	23	100		Becomes stiff to very stiff; increasing clay content	37.8	83.4	2460	LL=47, PI=20
	95										
							POORLY GRADED SAND WITH SILT (SP-SM) Dense to very dense, wet, brown, fine- to medium-grained sand				
	100										

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Elevation feet	Depth, feet	SAMPLES Type	Number	Sampling Resistance, blows / foot	Recovery, %	Graphic Log	MATERIAL DESCRIPTION	Water Content, %	Dry Unit Weight, pcf	Unconfined Compressive Strength, psf	REMARKS AND OTHER TESTS
			1-20	56	100		POORLY GRADED SAND WITH SILT (SP-SM), dense to very dense, wet, brown, fine- to medium-grained sand (continued)				SA: 6%<#200 sieve
							SILTY CLAY (CL) Stiff to very stiff, wet, grayish brown mottled with brown, low plasticity	27.3	66.7	2600	
							Bottom of boring at 101.5 feet				Finish grouting borehole at 17:15 on 11/23/04.
	105										
	110										
	115										
	120										
	125										
	130										
	135										

Appendix B

Geotechnical Laboratory Test Results

Selected soil samples obtained from the exploratory borings were tested in URS' Pleasant Hill geotechnical laboratory to evaluate their engineering properties. The following laboratory tests were performed on the soil samples:

- Grain size analyses (ASTM D422)
- Materials finer than the No. 200 Sieve (ASTM D1140)
- Water content and dry density determination (ASTM D2216)
- Atterberg limits determination (ASTM D4318)
- Unconfined compression (ASTM D2166)
- Triaxial compression - unconsolidated undrained (ASTM D2850).

The results of the geotechnical laboratory testing are summarized in Table B-1. The Plasticity Chart is shown on Figure B-1 and Particle Size Distribution Curves are presented on Figure B-2. Stress-strain curves from the unconsolidated undrained triaxial compression tests are shown on Figures B-3 to B-5.

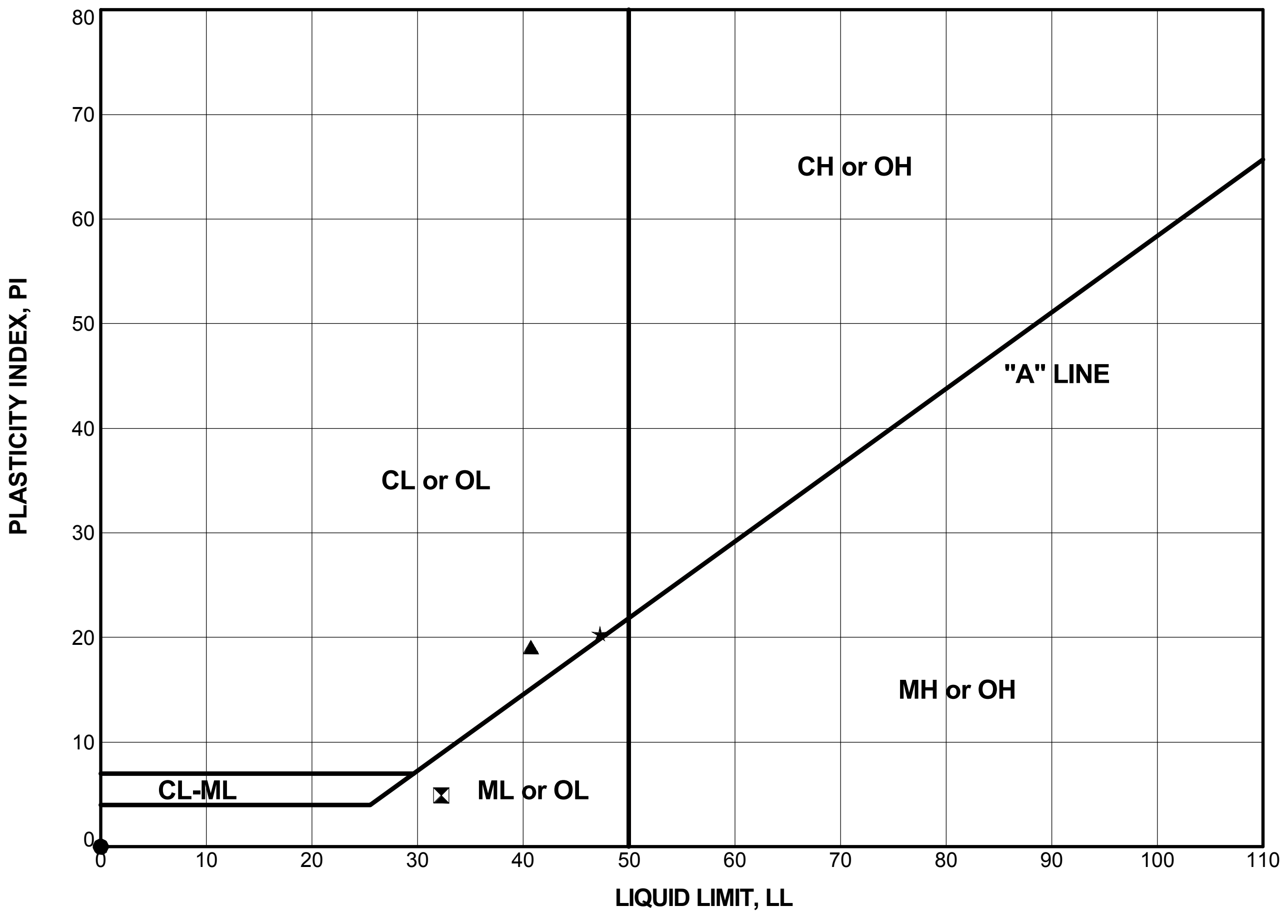
TABLE B-1
SUMMARY OF SOIL LABORATORY DATA

Sample Information				USCS Group Symbol	In Situ Water Content, %	In Situ Dry Unit Weight, pcf	Sieve			Atterberg Limits			Unconfined Compressive Strength, psf	UU Triaxial	
Boring Number	Sample Number	Depth, feet	Elevation, feet MSL				Gravel, %	Sand, %	<#200, %	LL	PL	PI		Peak Deviator Stress, psf	Confining Pressure, psf
DH-1	1-4	20-21.5	NA	SM			0	75	25						
DH-1	1-5	25-26.5	NA	SM					16						
DH-1	1-6	30-31.5	NA	SM			0	70	30						
DH-1	1-9	40.5-41.5	NA	SP			0	98	2						
DH-1	1-10-2	45.5-46	NA	SM						NP	NP	NP			
DH-1	1-10-3	46-46.5	NA	ML	35.9	85.8								4,100	1,800
DH-1	1-11-2	50.5-51	NA	ML						32	27	5			
DH-1	1-11-3	51-51.5	NA	SM	30.7	91.3							NA		
DH-1	1-13	60-61	NA	SP-SM					8						
DH-1	1-14-2	65.5-66	NA	ML	25.1	100.2								5,590	2,600
DH-1	1-15-2/3	70.5-71.5	NA	SM			0	84	16						
DH-1	1-16-2	75.5-76	NA	CL	22.1	105.9							10,850		
DH-1	1-17-2	80.5-81	NA	CL						41	22	19			
DH-1	1-17-3	81-81.5	NA	CL	26.2	98.4								10,070	3,300
DH-1	1-18-3	86-86.5	NA	CL	27.2	96.3							7,800		
DH-1	1-19-2	90.5-91	NA	CL	37.8	83.4							2,460		
DH-1	1-19-3	91-91.5	NA	CL						47	27	20			
DH-1	1-20-1	100-100.5	NA	SP-SM			0	94	6						
DH-1	1-20-3	101-101.5	NA	CL	27.3	66.7							2,600		

NOTE: The laboratory tests were performed in general accordance with the following standards:

Water Content - ASTM Test Method D2216
Dry Unit Weight - ASTM Test Method D2937
Particle Size Distribution Analysis by Mechanical Sieving - ASTM D422 (-#200 by ASTM D1140)
Atterberg Limits - ASTM Test Method D4318
Unconfined Compressive Strength Test - ASTM Test Method D2166
Unconsolidated Undrained Triaxial Test (UU Triaxial) - ASTM Test Method D2850

Report SOIL_1_PORTRAIT_SA_AL_UCUU; OAK_WEBTRACT.GPJ; 01/31/2005



Boring Number	Sample Number	Depth (feet)	Test Symbol	Water Content (%)	LL	PL	PI	Classification
DH-1	1-10-2	45.5-46	●		NP	NP	NP	Silty Sand (SM)
DH-1	1-11-2	50.5-51	⧗		32	27	5	Clayey Silt (ML)
DH-1	1-17-2	80.5-81	▲		41	22	19	Silty Clay (CL)
DH-1	1-19-3	91-91.5	★		47	27	20	Silty Clay (CL)

Supplemental Soil Borings
Webb Tract, Oakley, California
26814887.01100

PLASTICITY CHART

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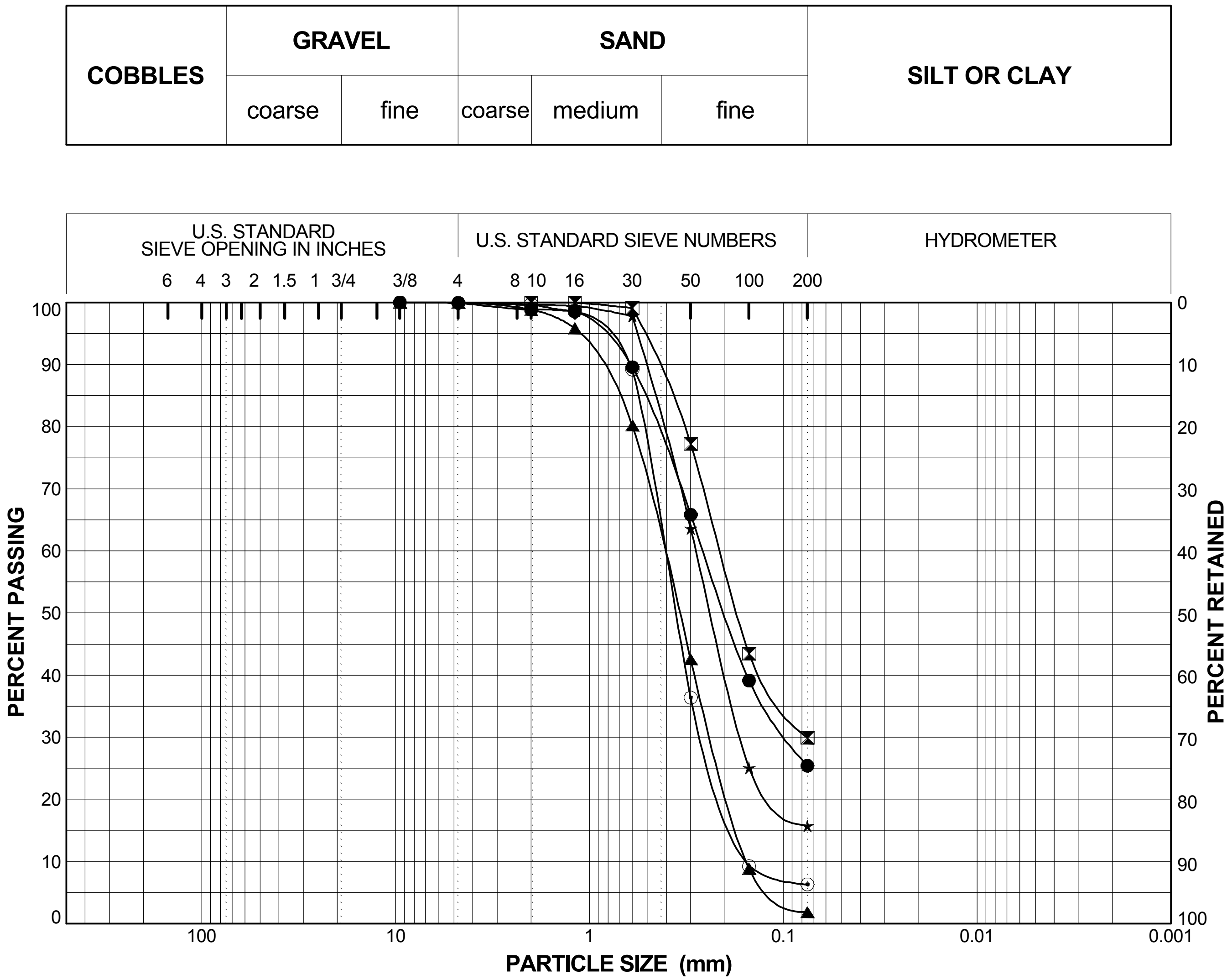

Boring Number	Sample Number	Depth (feet)	Symbol	LL	PI	Classification
DH-1	1-4	20-21.5	●			Silty Sand (SM)
DH-1	1-6	30-31.5	⧗			Silty Sand (SM)
DH-1	1-9	40.5-41.5	▲			Poorly Graded Sand (SP)
DH-1	1-15-2/3	70.5-71.5	★			Silty Sand (SM)
DH-1	1-20-1	100-100.5	⊙			Poorly Graded Sand with Silt (SP-SM)

Report: SIEVE_5_CURVES_OAK; File: OAK_WEBTRACT.GPJ; 1/31/2005 DH-01

Supplemental Soil Borings
Webb Tract, Oakley, California
26814887.01100

PARTICLE SIZE DISTRIBUTION CURVES

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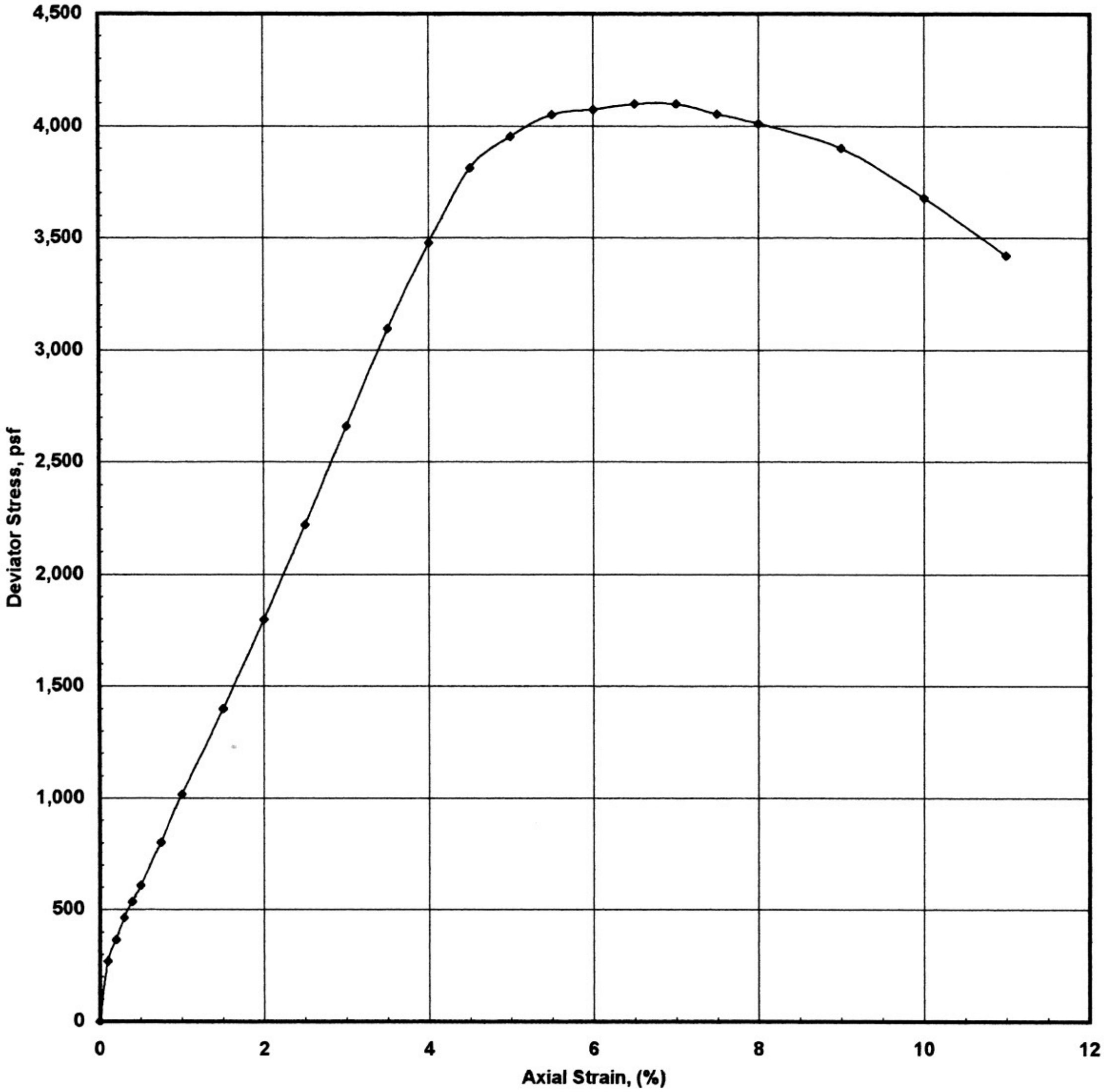
Figure B-2



Description: Gray fine sandy silty clay/clayey silt

Boring Number	Sample Number	Sample Depth (feet)	Dry Unit Weight (pcf)	Initial Moisture Content (%)	Specific Gravity (assumed)	Void Ratio	Initial Saturation (%)	Height/ Diameter Ratio	Rate of Shearing (%/min)	Confining Pressure (psf)	Peak Deviator Stress (psf)	Peak Shear Stress (psf)
DH-1	10-3	46-46.5	85.8	35.9	2.78	1.022	97.7	2.05	0.75	1,800	4,099	2,049

Project Name: IDS-012 Supplemental Study

Project Number: 26814887

Location: Oakley, CA

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST
STRESS VS. STRAIN
ASTM D2850

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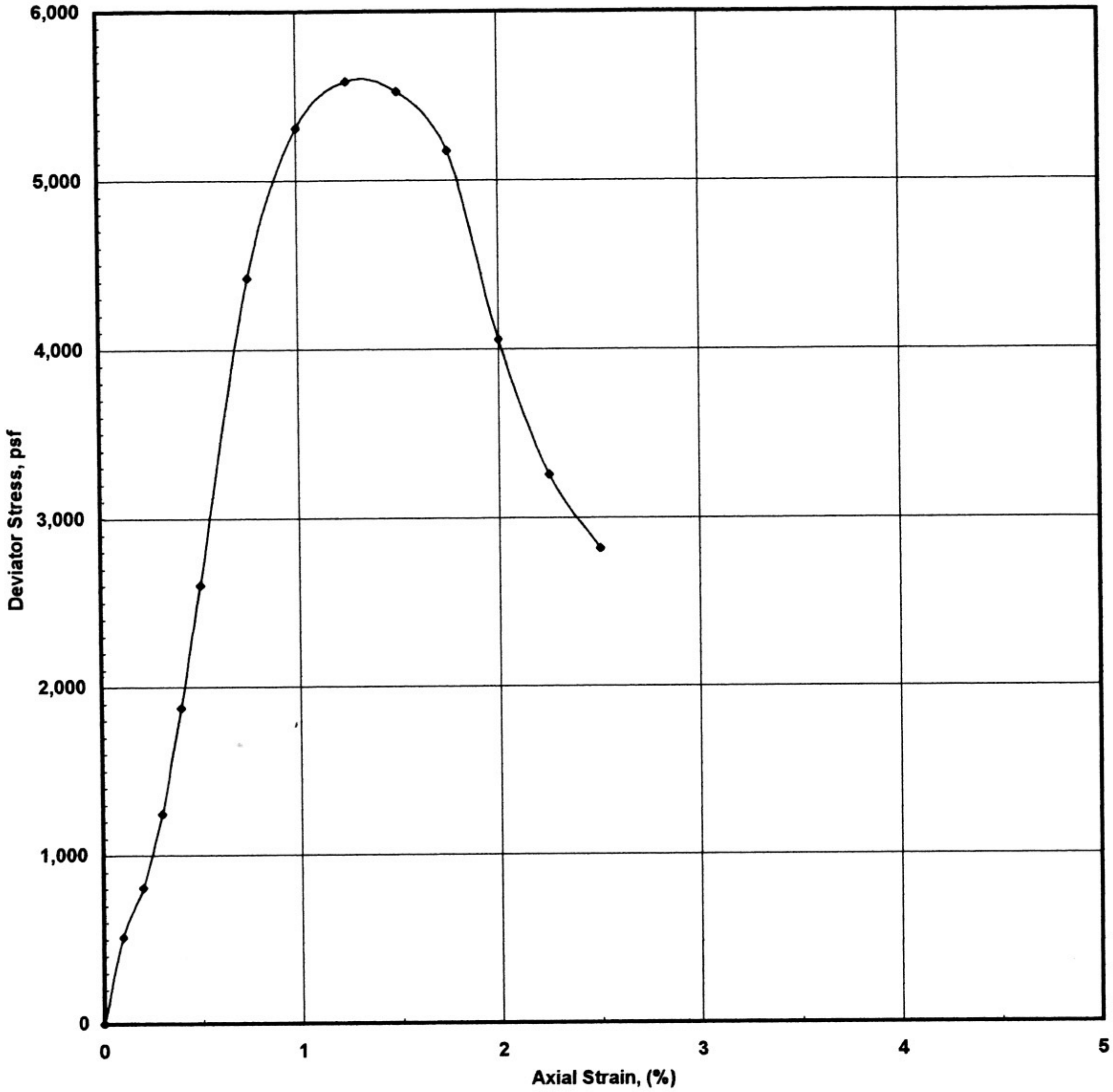
Figure No.
B-3



Description: Light brown silty clay

Boring Number	Sample Number	Sample Depth (feet)	Dry Unit Weight (pcf)	Initial Moisture Content (%)	Specific Gravity (assumed)	Void Ratio	Initial Saturation (%)	Height/ Diameter Ratio	Rate of Shearing (%/min)	Confining Pressure (psf)	Peak Deviator Stress (psf)	Peak Shear Stress (psf)
DH-1	14-2	65.5-66	100.2	25.1	2.78	0.732	95.3	2.05	0.75	2,600	5,585	2,793

Project Name: IDS-012 Supplemental Study

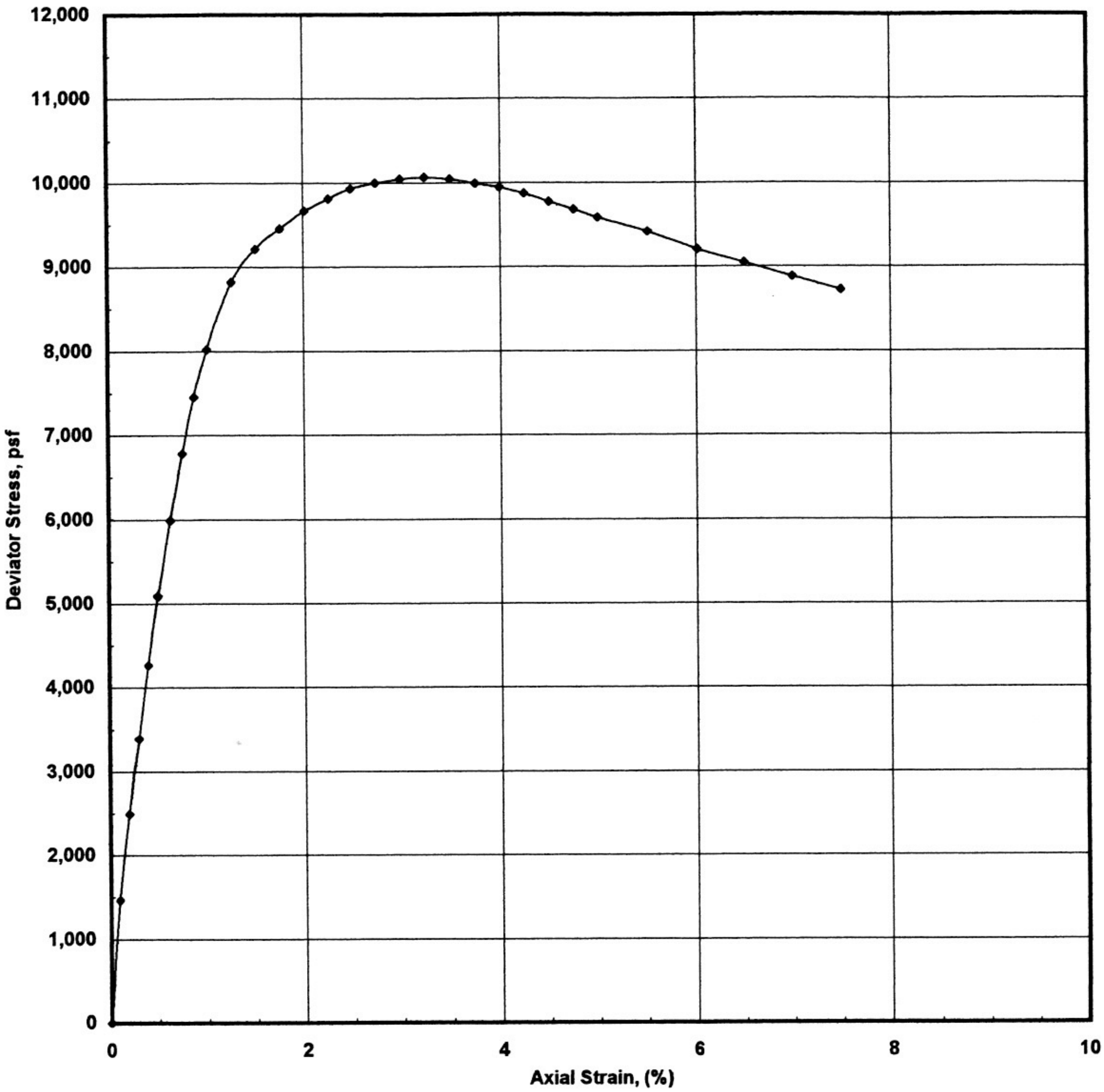
Project Number: 26814887

Location: Oakley, CA

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST
STRESS VS. STRAIN
ASTM D2850

URS

Figure No.
B-4



Description: Light brown silty clay

Boring Number	Sample Number	Sample Depth (feet)	Dry Unit Weight (pcf)	Initial Moisture Content (%)	Specific Gravity (assumed)	Void Ratio	Initial Saturation (%)	Height/ Diameter Ratio	Rate of Shearing (%/min)	Confining Pressure (psf)	Peak Deviator Stress (psf)	Peak Shear Stress (psf)
DH-1	17-3	81-81.5	98.4	26.2	2.78	0.764	95.2	2.05	0.75	3,300	10,068	5,034

Project Name: IDS-012 Supplemental Study

Project Number: 26814887

Location: Oakley, CA

UNCONSOLIDATED UNDRAINED TRIAXIAL TEST
STRESS VS. STRAIN
ASTM D2850

URS

Figure No.
B-5