

8.6 Geotechnical Characterization Report





PORT OF RICHMOND POINT POTRERO MARINE TERMINAL
RICHMOND, CALIFORNIA

GEOTECHNICAL CHARACTERIZATION REPORT

SUBMITTED TO
Mr. Matt Trowbridge PE, SE
Moffatt & Nichol
1300 Clay Street, Suite 350
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PREPARED BY
ENGEO Incorporated

July 17, 2025
Revised July 25, 2025

PROJECT NO.
26829.000.001

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July 17, 2025
Revised July 25, 2025

Mr. Matt Trowbridge PE, SE
Project Manager/Vice President
Moffatt & Nichol
1300 Clay Street, Suite 350
Oakland, CA 94612

Subject: Port of Richmond Point Potrero Marine Terminal
1322 Canal Blvd
Richmond, California

GEOTECHNICAL CHARACTERIZATION REPORT

Dear Mr. Trowbridge:

We prepared this geotechnical characterization report for the Point Potrero Marine Terminal at the Port of Richmond as outlined in our agreement dated February 14, 2025. The purpose of this report is to provide a summary of the geotechnical conditions at the terminal property based on historical explorations and review of other historical data.

If you have any questions or comments regarding this report, please call and we will be glad to discuss them with you.

Sincerely,

ENGEO Incorporated


Jeff Fippin, GE

jaf/rhb/jf




Robert H. Boeche, CEG

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1.0 INTRODUCTION

1.1 PURPOSE AND SCOPE

We prepared this geotechnical characterization report for the Port of Richmond Point Potrero Marine Terminal in Richmond, California. As outlined in our agreement dated February 14, 2025, Moffatt & Nichol (M&N) authorized ENGEO to conduct the following scope of services.

- Review historical geotechnical explorations
- Review historical aerial photographs and maps
- Perform a site visit
- Perform limited analyses
- Prepare this report

For our use, we received the following geotechnical documents via email.

1. Fugro West, Inc. 2002. Conceptual Level Geotechnical Investigation, Aggregate Storage Facility, Port of Richmond, Richmond, California. November 19, 2002. Project No. 1484.002.
2. Fugro West, Inc. 2003a. Geotechnical Study, Operable Unit No. 1 Surface Improvements, Port of Richmond, Richmond, California. February 21, 2003. Report No. 1111.002.
3. Fugro West, Inc. 2003b. Geotechnical Investigation, Hanson Aggregates, Port of Richmond, Richmond, California. March 21, 2003. Project Number 1484.004.
4. Cornerstone Earth Group. 2008. Memorandum, Preliminary Long-Term Settlement, Honda Rail Expansion – Port of Richmond. September 16, 2008. Project No. 281-1-1.
5. Cornerstone Earth Group. 2009a. Memorandum, Honda Rail Expansion – Port of Richmond. January 23, 2009. Project No. 281-1-3.
6. Cornerstone Earth Group. 2009b (Draft). Geotechnical Investigation, Honda Port of Entry, Canal Boulevard, Richmond, California. September 9, 2009. Project Number 281-1-3.
7. Fugro West, Inc. 2010. Geotechnical Recommendations for Proposed Point Potrero Wharf Repair Project, Honda Automotive Facility, Port of Richmond, California. January 27, 2010. Project No. 1413.005.
8. Cornerstone Earth Group. 2010. Geotechnical Consultation, Parcel 7 Parking Lot Pavement Study, Canal Boulevard – Port of Richmond, Richmond, California. August 6, 2010. Project No. 281-1-7.

We also received the following plans for various projects via email.

1. Guy F. Atkinson Company. WISCO – Richmond. September 29, 1969.
2. Kaiser Company, Inc. Basins. May 23, 1942.
3. Kaiser Company, Inc. Various plans for Fitting Out Dock at Richmond Yard No. 3. Various dates 1942 to 1944.
4. L.H. Nishkian Consulting Engineer. Deepening of Existing Ship Basins, Kaiser Co. Inc. Yard No. 3, Richmond, California. June 20, 1945.
5. Liftech Consultants Inc. Point Potrero Wharf Repair for Honda Automotive Facility, Port of Richmond, Issued for Construction. Project No. Z1800. January 25, 2010.

6. Liftech Consultants Inc. Point Potrero Pile Replacement for Honda Automotive Facility, Port of Richmond. Project No. Z1800. February 8, 2012.

This report was prepared for the exclusive use of our client, the Port of Richmond, and their consultants for the purpose of documenting the known geotechnical conditions at the Potrero Point Marine Terminal site. We also provide estimates of foundation capacity for the purpose of evaluating the existing conditions and planning upgrades. In the event a retrofit is pursued, a report should be prepared specifically for the retrofit concept and the locations of any retrofit foundations. This document may not be reproduced in whole or in part by any means whatsoever, nor may it be quoted or excerpted without our express written consent.

1.2 PROJECT LOCATION

Figure 1 displays a Site Vicinity Map. The Point Potrero Marine Terminal site (Site) is located southwest of the Richmond Harbor Channel and includes Berths 5 and 6, and 7 and 8 along the southeastern and eastern edges of the shoreline, respectively. To the west of Berth 5, there are former graving basins. Along the eastern shoreline, there are two finger piers. Canal Boulevard forms most of the western and northern boundary of the Site (except for the previously mentioned finger piers). A rail spur enters the Site from the north. Figure 2 shows the site boundaries.

2.0 FINDINGS

2.1 SITE HISTORY

Portions of the Site are beyond the historical shoreline mapped in 1874; The blue dashed line on Figure 2 shows the approximate location of the historical shoreline. The area inland of the historical shoreline was a ridge that sloped into the San Francisco Bay. Portions of the site on the waterside of the historical shoreline are former shallow water areas and marshlands. An aerial photograph from 1939 (Exhibit 2.1-1) shows that portions of the current land have been filled. We understand that the Kaiser Shipbuilding Company developed the site in 1942 to create a private shipyard. By the time of a 1946 photograph, all the land comprising the Site had been reclaimed, and much of the Site had been developed for shipbuilding. Based on historical records, the Site was in use to construct Liberty Ships for World War II. The 1946 aerial photograph shows the site occupied with buildings, a marginal wharf along the southeast and eastern shore, five graving basins along the southern shore, and two finger piers along the western shore. We understand that the shipyard was closed after World War II, and an aerial photograph from 1958 shows the site with no shipbuilding activity evident. A 1965 aerial photograph shows the site in use as ship storage with what appears to be stockpiled material in various places. One of the reports we reviewed indicated that the site was used for ship dismantling, and much of the site was used as a scrap yard up until the 1980s.

EXHIBIT 2.1-1 Aerial Photograph with Site Boundary in Black (1939)

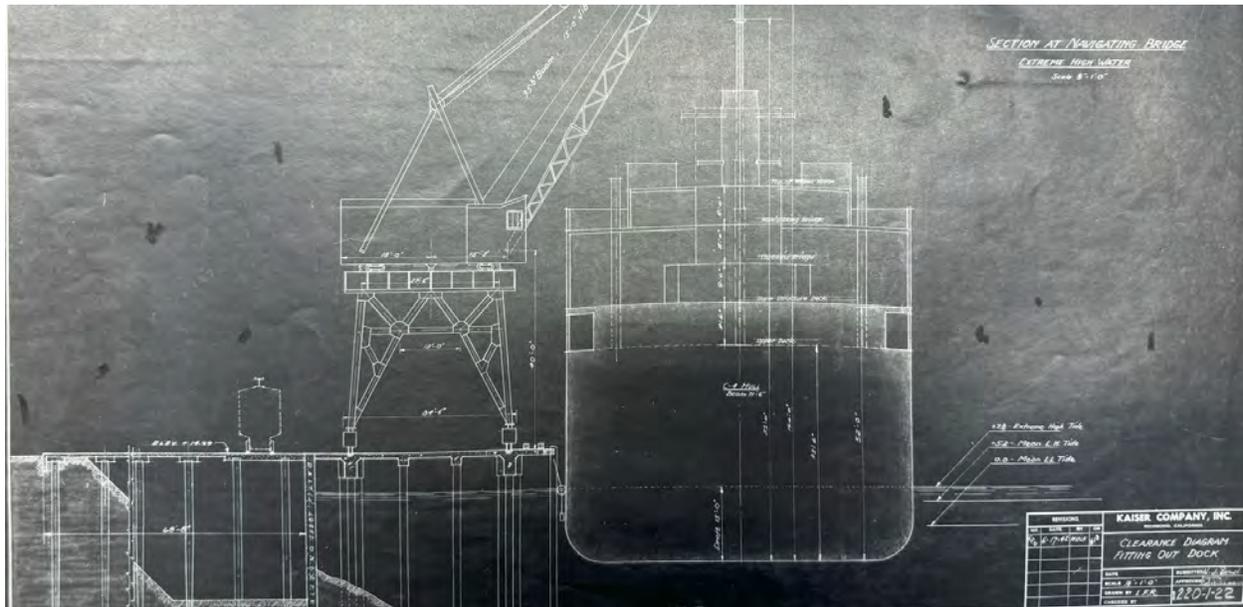


The Port of Richmond redeveloped approximately 52 acres of the Site, creating the paved parking lot on the western side. This work included placing over 375,000 cubic yards of dredged material and then removing and recompact that material. The purpose of this fill was to cap contaminated fill that was left in place. Other improvements at the time included repairs to the Berths 7 and 8 wharf to allow importing of Kia and Hyundai and storage on the Site before loading onto trucks for delivery to a BNSF terminal located north of Cutting Boulevard. In 2009 and 2010, additional improvements were performed, including extending BNSF tracks into the northern portion of the site for transfer of vehicles to rail, additional structural repairs to the wharf, access road improvements, new lighting, extension of the Bay Trail, and new entrance gate and employee parking. These improvements were called the Honda Port of Entry Project and facilitated importing Honda automobiles to the Site. In 2011, Subaru began using the terminal for importing vehicles.

The site currently retains buildings constructed during the shipbuilding days, including the four-story concrete General Warehouse and the single-story building that formerly occupied the Sheet Metal Shop, Riggers Loft, and Paint Shop. A historical Whirley Crane (formerly operated at the Port of Richmond's Shipyard No. 1) was relocated to the Site in 2005. The Red Oak Victory, a liberty ship constructed at the former shipyard and launched in 1944, was reclaimed from the Naval Reserve Fleet in Suisun Bay in 1998 and moved to the Site; it is moored in Graving Basin 5.

Exhibit 2.1-2 shows a cross-section of the marginal wharf along the Berths 7 and 8 segment from the 1942 plans by Kaiser Company, Inc. Other plans indicate that the structure comprised from left to right in Exhibit 2.1-1, a 68³/₄-foot-wide cast-in-place concrete deck supported on timber plumb piles, a concrete sheet pile wall, and a 46¹/₂-foot-wide cast-in-place concrete deck supported on pre-cast-concrete plumb piles. The plans show the pre-cast piles as 18-inch square sections with chamfered corners. A plan sheet from 1942 indicates sand fill was placed below the water surface in front of the sheet pile wall between pile lines 40 and 50.

EXHIBIT 2.1-2: Section of Berths 7/8 Area (Kaiser Company, Inc., 1942)



According to a report titled “Berths 6C, 6D, and 7 of the Point Potrero Marine Terminal Condition Survey,” by Vickerman/ Zachary/Miller, Inc., dated July 2, 1990, the area between the shoreline below the wharf and the sheet piles was originally planned to be backfilled. Due to low blow counts during driving the sheets and concerns about their ability to laterally support the soil backfill, only the northernmost 320 feet of Berth 8 was constructed with backfill behind the sheets. In this area, the report indicates the portion of the structure west of the sheets is not supported on piles, and the concrete deck sits on the backfill.

The plans (Sheet 220-0-12) indicate that the “South End” of the structure, which is the current day Berth 5 and 6 area, is a cast-in-place concrete deck that is approximately 60 feet wide. The South End was supported by concrete columns cast inside of a 36-inch-diameter steel shell that penetrated 6 feet minimum into “solid rock.”

The plans include various repairs performed, including the replacement of select piles in support of the Honda Port of Entry Project. One of the plan sets shows placement of steel wedges at the tops of piles and support of those wedges with 6-inch-wide-by-8-inch-thick-by-4-foot-long pads bolted on opposite sides of piles for a retrofit. The plans indicate this retrofit was performed to address subsiding piles, though the locations of the repairs

The graving basins are located immediately west of the end of Berth 5. They are numbered 1 through 5 from west to east. The various plans for the graving basins indicate they are precast concrete structures. The basins are formed by concrete walls on the northern, western, and eastern sides of each. Between each basin is a 34-foot-wide concrete structure formerly used to support crane rails. The columns supporting the structure and the walls sit on footings. The various plans indicate the footings sit on excavated bedrock or lean cement fill placed on top of the bedrock where the bedrock dips below the foundation depth. The basins have a concrete slab-on-grade floor. A 1943 plan sheet by the Kaiser Company, Inc. indicates that the original construction of the basins included a floor at Elevation -18 feet (Datum: Elevation 0 feet = Mean Lower Low Water). Basins 2 and 3 were deepened and the new floor slab was set at Elevation -30 feet. Each Basin is 100 feet wide with the deepened portion of Basins 2 and 3 being 88 feet wide.

2.2 SURFACE CONDITIONS

We performed several site visits at various times during 2025. In two of those visits, we performed underdeck observations. On March 18, 2025, we participated in a structural inspection below Berths 5 and 6 from a boat. On March 19, 2025, we participated in a structural inspection below Berths 7 and 8 from land. The purpose of both our observations was to check for geotechnical conditions and any soil-related distress to the structures.

During our site visits, we observed areas of the ground surface where the ground surface had settled either at the interface of the land and the marginal wharf (Berths 5, 7, and 8) or where the deck of the wharf settled (Berth 6). There are two prominent locations where we observed ground settlement and deck settlement in the areas of Berths 5 and 6. Exhibit 2.2-1 shows an aerial photograph with these areas approximately outlined.

EXHIBIT 2.2-1: Aerial Photograph with Prominent Areas of Surface Distress



2.3 GEOLOGY AND SEISMICITY

2.3.1 Regional Geology

The site is located within the Coast Ranges geomorphic province of California. The Coast Ranges province is typified by a system of northwest-trending, fault-bounded mountain ranges and intervening alluvial valleys. More specifically, the site is located at the southern end of a northwest-oriented, resistant ridge located adjacent to the San Francisco Bay.

Bedrock in the Coast Ranges comprises igneous, metamorphic, and sedimentary rocks that range in age from Jurassic to Pleistocene. The present physiography and geology of the Coast Ranges are the result of deformation and deposition along the tectonic boundary between the North American plate and the Pacific plate. Plate boundary fault movements are largely concentrated along the well-known fault zones, which in the area include the San Andreas, Calaveras, and Hayward faults, as well as other lesser-order faults.

2.3.2 Site Geology

According to published maps covering the site by Dibblee (1980) and Graymer (2000), the Site is capped by artificial fill. The adjacent hillside northwest of the Site is mapped by Graymer as primarily underlain by Late Cretaceous metasandstone associated with the Franciscan complex (Figure 3). Graymer describes the sandstone as a distinctly bedded to massive, fine- to coarse-grained, mica bearing, lithic wacke. Based on the development of the site described in Section 2.1, we anticipate that the shallowest bedrock at the site is the metasandstone of the adjacent hillside. Based on the historical lands reclamation, in the portions of the site on the waterside of the historical shoreline, the fill is likely underlain by Holocene Bay Deposits over the bedrock.

2.3.3 Seismicity

The site is located in a seismically active area that contains numerous faults. Small earthquakes occur every year in the San Francisco Bay Area and larger earthquakes have been recorded and can be expected to occur in the future. Faults have been cataloged and mapped by the United States Geological Survey (USGS) in the Quaternary Fault and Fold Database of the United States. An active fault is defined by the California Geologic Survey as one that experienced surface displacement within Holocene time (about the last 11,700 years) (CGS, 2018). Figure 4 shows the approximate locations of known active faults along with other Quaternary faults based on the USGS Quaternary Fault and Fold Database as well as significant historical earthquakes recorded within the San Francisco Bay Area.

To identify nearby faults that are capable of generating strong seismic ground shaking at the site, we utilized the USGS Earthquake Hazard Toolbox and the 2023 National Seismic Hazard Model (NSHM) to perform a disaggregation of the seismic hazard at the peak ground acceleration (PGA) for a return period of 2,475 years. The resulting faults are listed in Table 2.3.3-1.

TABLE 2.3.3-1: Faults Considered Capable of Producing Strong Ground Shaking at the Site*

SOURCE NAME	RUPTURE DISTANCE, R_{RUP}		MOMENT MAGNITUDE, M_w
	(km)	(mi)	
Hayward (north) (4)	7.7	6.3	7.2
Hayward (north) (3)	7.7	14.6	6.8
Hayward (north) (5)	8.7	5.9	6.5
Hayward (north) (2)	9.5	4.8	6.9
Hayward (north) (1)	13.1	16.3	6.9
San Andreas (Peninsula) (14)	23.6	4.8	7.9
San Gregorio (north) (2)	26.2	5.4	7.9

*Based on USGS Earthquake Hazard Toolbox: NSHM Conterminous U.S. 2023

These results represent known fault sources contributing at least 1 percent to the seismic hazard at the site considering the peak ground acceleration (PGA). The rupture distances (R_{RUP}) and mean moment magnitudes (M_w) listed are based on values assigned according to the 2023 NSHM, and the numbers in parentheses after the fault names correspond to fault subsections assigned by the NSHM. The above fault table is not an exhaustive list and other faults in the region may generate seismic shaking at the project site.

2.4 SUBSURFACE CONDITIONS

The site has been explored several times by various geotechnical engineers for different purposes/projects. The eight reports listed in Section 1.1 include logs of explorations comprising both borings and cone penetration tests (CPTs). The historical explorations we identified in our file review are shown in Figure 2. We broke the site into subareas based on existing geotechnical data and subsurface conditions.

2.4.1 Operable Unit No. 1

The area of the Site referred to as Operable Unit No. 1 (OU-1) is approximately shown in Figure 2. The majority of OU-1 is currently used as parking and is bounded on the north, west, and south by Canal Boulevard. The report by Fugro West, Inc. (Fugro, 2003b) in this area includes borings by Peter Kaldveer and Associates, Inc. (PKA) from 1987, before the dredged fill discussed in Section 2.1 was placed in this area. This report also includes the locations of borings by Hart Crowser and Subsurface Consultants that we have not located at this time. The borings by PKA generally encountered fill. The majority of the borings are shallower than 5 feet. Most of the borings terminated in the fill at shallow depths, and several encountered bedrock or refusal conditions at the bottom of the boring. The fill described in the boring logs generally comprises a heterogeneous mix of loose to very dense sand and gravel. The fill is also described to contain debris such as metal, concrete, and wood. A limited number of deeper borings, such as PB-77 and PB-78 encountered layers of Bay sediments and alluvium below the fill. The ground surface elevation reported by PKA on the boring logs ranges from Elevation 11 feet to 19 feet. Fugro describes the fill as ranging from 1 to 10 feet in thickness. Generally, based on site development history, the fill was approximately 1 to 4 feet thick in the eastern portions of OU-1 over shallow bedrock with the depth to bedrock increasing to the south and west.

Subsequent to the time the PKA borings were drilled, perimeter containment berms were constructed, and several episodes of placement of dredged material occurred. The dredged material is described by Fugro as mostly clayey.” At the time of the Fugro 2003b report, the ground surface in OU-1 ranged from Elevation 16 feet to Elevation 27 feet. The Fugro report recommends removal of the dredged material and recompacting it as engineered fill at a minimum relative density of 92 percent of ASTM D1557. The original “bottoms” fill was not to be removed due to contamination issues.

2.4.2 Graving Basins

Portions of the graving basins are excavated into the formerly shallow bedrock (on the east) while portions are located in areas of dipping bedrock (on the west). The as-built plans indicate that where the bedrock surface was deeper than the base of the excavation for basin construction, the soil above the bedrock was removed and the area between the excavated bedrock and the graving basin foundation was backfilled with lean concrete fill with a minimum 28-day compressive strength of 300 pounds per square inch (Sheet 200-4-2, Kaiser Company, Inc., undated).

2.4.3 Berths 5 and 6

The former ridgeline that was excavated to create the Site ends north of the Berths 5/6 area. We did not find boring logs in this area during our data review. Based on our underdeck observations in this area, the embankment slope under the deck generally comprises exposed bedrock. Sheet 220-0-12 (Kaiser Company, Inc. 1943), indicates that at the western end of Berth 5, the bedrock is approximately 45 feet below the top of pile based on the indicated length of cylinder

and minimum 6-foot embedment into rock. Near the middle of Berth 5, the same sheet indicates that the bedrock sits at the mudline based on contours of mudline and bedrock depth. The mudline then dips rapidly at the eastern end of Berth 6 near the transition to Berth 7.

Our local experience indicates that the majority of the soil between the mudline and bedrock is likely Young Bay Mud and other Bay deposits.

2.4.4 Berths 7 and 8

We were provided with undated and untitled plan and profile cross-section based on borings by Harding-Lawson & Associates (HLA, 1975) and Dames & Moore (D&M, 1942). A similar figure is described by Fugro (2010), and this plan and profile is likely an attachment to the Fugro memorandum. We do not have logs of these borings with the exception of HLA's Boring 4, but we geolocated them in Figure 2 based on the locations shown on this plan and profile. The profiles, which appear to be based on MLLW datum, indicate that the Berth 7 area is underlain by Young Bay Mud (generally 20 to 30 feet in thickness) over a thin layer of sandy clay (depicted as approximately 5 feet in thickness) over shale bedrock. The profile shows the Berth 8 area with an increasing thickness of Young Bay Mud (up to 40 feet thick) at the northern end, as well as a layer of Old Bay Clay below the sandy clay that is also up to 40 feet thick at the northern end. The profile terminates approximately 300 feet south of the end of the wharf at the location where fill was placed behind the sheet pile wall.

2.4.5 Rail Extension Area

Cornerstone Earth Group (Cornerstone, 2009a) drilled five borings in the northeastern portion of the site in support of expansion of the BNSF rail spur to create an approximately 6,600-foot-long extension of the BNSF rail by adding new loading tracks and vehicle loading pads. The boring logs indicate between 2 and 10 feet of loose to dense gravel and clay fill over up to 40 feet of Young Bay Mud over alluvium. Cornerstone encountered shallow bedrock in the western side of the area.

Fugro (2002, 2003b) drilled several borings and performed several CPTs in the southern portion of this area in 2002 and 2003 in support of an aggregate storage facility that was not constructed. Their explorations encountered medium dense to dense gravel fill. In the western portions of their study area, the fill was 2 to 4 feet in thickness and directly over bedrock. In the eastern portions of their study area, they encountered fill over Young Bay Mud over Old Bay Clay and alluvium over bedrock. In the easternmost portion of their study area, Fugro drilled a 100-foot-deep boring that did not encounter bedrock.

2.4.6 Finger Piers

The facility includes two finger piers that are constructed along the western shoreline. The piers are cast-in-place concrete decks, approximately 540 feet long and approximately 50 feet wide and supported on precast concrete plumb piles. At the time of this report, we do not have pile records of borings in this area. Based on proximity to the OU-1 area, it is likely that this area is underlain by Young Bay Mud over bedrock. Plate 4 of the California Division of Mines and Geology's Special Report 97, "Geologic and Engineering Aspects of San Francisco Bay Fill," indicated Young Bay Mud in this area is likely on the order of 20 feet in thickness.

2.5 GROUNDWATER CONDITIONS

Bedrock was not logged on all of the borings; however, where encountered at the time of drilling, it was generally encountered at approximately Elevation 5 to 7 feet (MLLW datum). Due to proximity to the San Francisco Bay, it is reasonable to assume that the groundwater is tidally influenced and fluctuates with tide.

2.6 UNDERDECK SLOPE STABILITY

As discussed in our letter titled “Port of Richmond, Point Potrero Marine Terminal, Richmond, California, Underdeck Geotechnical Inspection,” dated April 28, 2025, we performed a site walk and visual observation of the area under the Berth 7 and 8 deck west of the sheet pile wall on March 19, 2025. We also observed the conditions under the deck of Berths 5 and 6 areas from a boat on March 18, 2025.

During our observations, we did not observe any areas of potential slope movement or obvious slope instability. We observed areas where there was no headwall at the interface between the slope and wharf structure and erosion at the top of the slope resulted in settlement of the pavement where it directly abuts the wharf structure. We recommend a conceptual fix to address these areas of settlement and limit their recurrence in the future in the referenced letter.

3.0 PILES

We understand that the design team has identified a need for new pile foundations in various areas of the Site. On a preliminary basis, we understand that the following piles are being considered to address visually identified deficiencies.

- Precast, prestressed concrete piles (18-inch-square) at the finger piers and outer wharf of Berths 7 and 8
- Timber piles (12-inch-diameter) inner wharf at Berths 5 and 8
- Steel pipe piles (30-inch-diameter) outer wharf at Berths 5 and 6

In general, new piles for retrofit should be driven to refusal in the shallow bedrock. Piles driven to refusal in bedrock will achieve significant capacity. On a preliminary basis, it would be reasonable to assume that a precast concrete or timber pile driven to refusal in bedrock would have an allowable bearing capacity on the order of 100 kips per square foot of end area. This capacity would apply to most of the site. In the northern end of Berth 8, there is a substantial amount of Old Bay Clay between the mudline and the bedrock, in these areas, additional capacity could be achieved in skin friction in the Old Bay Clay. On a preliminary basis, the mobilized allowable skin friction of a precast driven pile in the Old Bay Clay could be assumed to be 700 pounds per square foot of surface area.

Driven steel piles will likely be able to penetrate deeper into the bedrock. Our experience indicates that steel pipe piles driven to refusal conditions in bedrock would likely have capacities of at least 600 kips.

If greater capacity is necessary for pipes, our experience indicates that predrilling approximately 10 feet into the rock and then driving the pile to refusal would achieve a higher end bearing capacity. Pile driving analysis (PDA) should be used during pile driving to confirm the pile capacity.

These capacities assume dead-plus-live loading and are provided for conceptual purposes only. Once a pile demand is developed, these capacities should be reevaluated based on the location of the pile.

4.0 BEARING CAPACITY – GRAVING BASINS

As previously mentioned, the footings for the walls and columns at the graving basin either sit on excavated bedrock or on lean concrete placed on excavated bedrock. Based on the rock outcrops in this area, we recommend using an allowable bearing capacity of 8,000 pounds per square foot (psf) for dead-plus-live loading for elements bearing on the bedrock. For load combinations that include seismic loading, this allowable capacity can be increased to 10,500 psf. These elements were heavily loaded by the shipbuilding activities that historically occurred at the site. If back analysis of shipbuilding loading can demonstrate higher bearing loads than these capacities, we can reevaluate the maximum values.

5.0 LIMITATIONS AND UNIFORMITY OF CONDITIONS

This report presents geotechnical characterization and recommendations for the Point Potrero Marine Terminal at the Port of Richmond in Richmond, California. If additional subsurface information becomes available, we should be allowed to review this report and provide additional recommendations, if any. It is the responsibility of the owner to transmit the information and recommendations of this report to the appropriate organizations or people involved in design of the project, including but not limited to developers, owners, buyers, architects, engineers, and designers.

We strive to perform our professional services in accordance with generally accepted principles and practices currently employed in the area; there is no warranty, express or implied. There are risks of earth movement and property damages inherent in building on or with earth materials. We are unable to eliminate all risks; therefore, we are unable to guarantee or warrant the results of our services.

This report is based upon field and other conditions discovered at the time of report preparation. We developed this report with limited subsurface exploration data collected by others. We assumed that the subsurface exploration data are representative of the actual subsurface conditions across the site. Considering possible underground variability of soil and groundwater, additional costs may be required to complete the project. We recommend that the owner establish a contingency fund to cover such costs. If unexpected conditions are encountered, we must be notified immediately to review these conditions and provide additional and/or modified recommendations, as necessary.

Our services did not include excavation sloping or shoring, soil volume change factors, flood potential, or a geohazard exploration. In addition, our geotechnical exploration did not include work to assess the existence of possible hazardous materials. If any hazardous materials are encountered during construction, the proper regulatory officials must be notified immediately.

This document must not be subject to unauthorized reuse, that is, reusing without our written authorization. Such authorization is essential because it requires us to evaluate the document's applicability given new circumstances, not the least of which is passage of time.

Actual field or other conditions will necessitate clarifications, adjustments, modifications, or other changes to our documents. Therefore, we must be engaged to prepare the necessary clarifications, adjustments, modifications, or other changes before construction activities commence or further activity proceeds. If our scope of services does not include on-site construction observation, or if other persons or entities are retained to provide such services, we cannot be held responsible for any or all claims arising from or resulting from the performance of such services by other persons or entities, and from any or all claims arising from or resulting from clarifications, adjustments, modifications, discrepancies or other changes necessary to reflect changed field or other conditions.



FIGURES

FIGURE 1: Vicinity Map

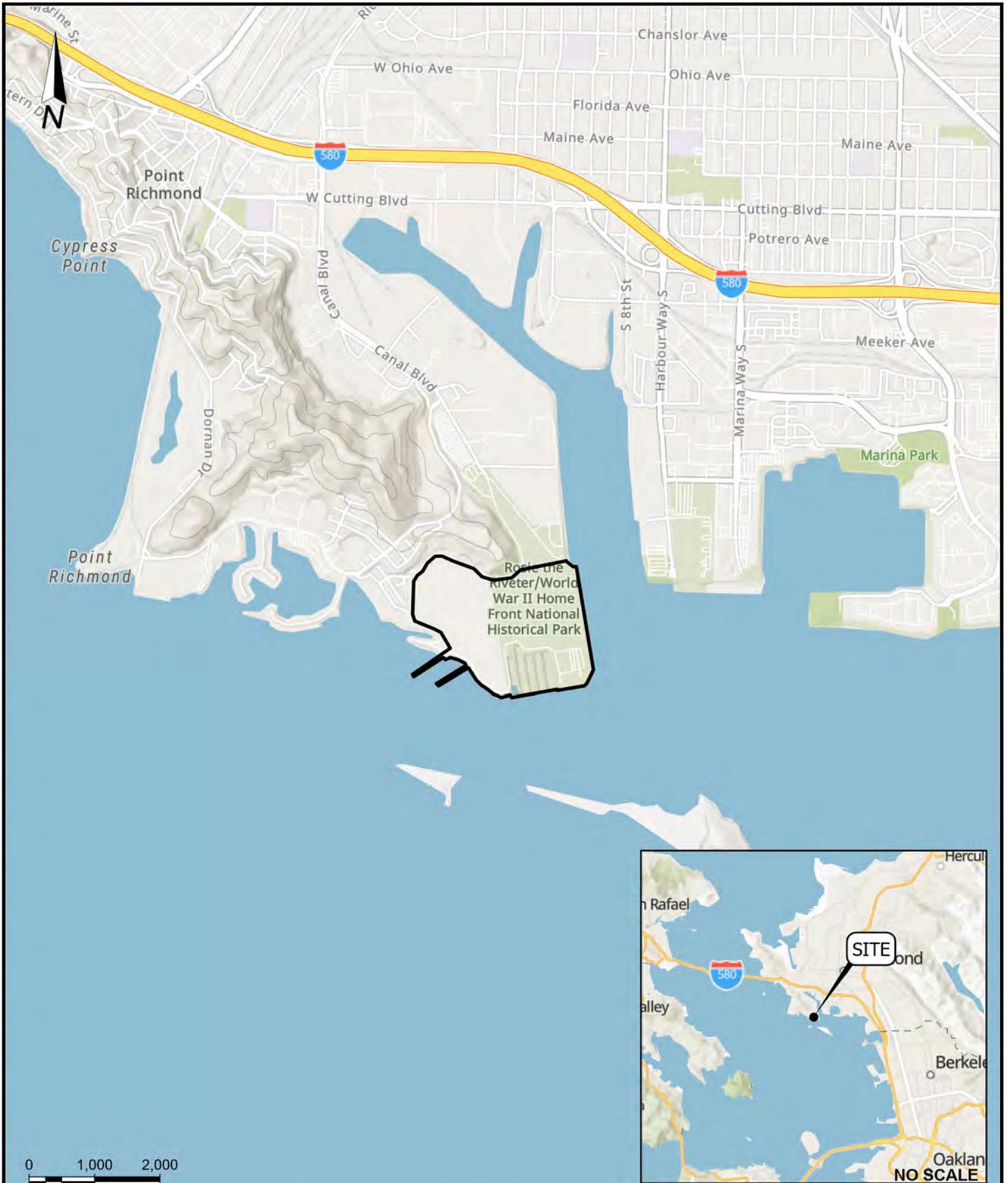
FIGURE 2: Site Plan

FIGURE 3: Regional Geologic Map (Graymer, 2000)

FIGURE 4: Regional Faulting and Seismicity Map

FIGURE 5: Seismic Hazard Zones Map

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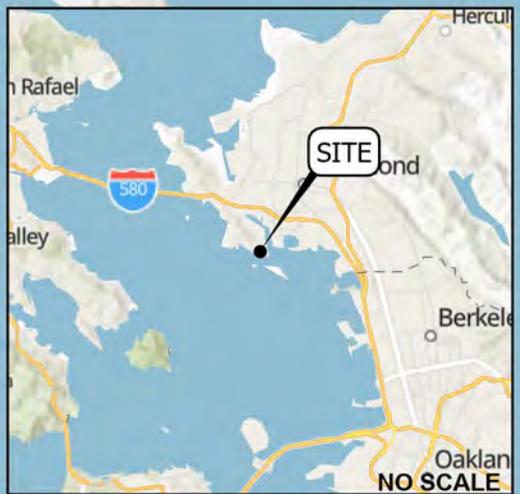
BASEMAP SOURCE: ENGEO INC, ESRI WORLD TOPO MAP



VICINITY MAP
 PORT OF RICHMOND - POINT POTRERO MARINE TERMINAL
 RICHMOND, CALIFORNIA

PROJECT NO.: 26829.000.001
 SCALE: AS SHOWN
 DRAWN BY: JAF CHECKED BY: RHB

FIGURE NO.
1



EXPLANATION

Project Site

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EXPLANATION	
ALL LOCATIONS ARE APPROXIMATE	
	BNSF Rail Extension Area
	Historical Shoreline (TJ Arnold, 1874)
	Boring (Harding Lawson Associates, 1975)
	Boring (Peter Kaldveer, 1977)
	Boring (Hart Crowser, 1982)
	Boring (Peter Kaldveer, 1987)
	Boring (Dames & Moore, 1942)
	Boring (Subsurface Consultants, 2001)
	Boring (Fugro, 2002)
	Boring (Fugro, 2003)
	Boring (Cornerstone Earth, 2008)
	Cone Penetration Test (Fugro, 2002)
	Cone Penetration Test (Fugro, 2003)

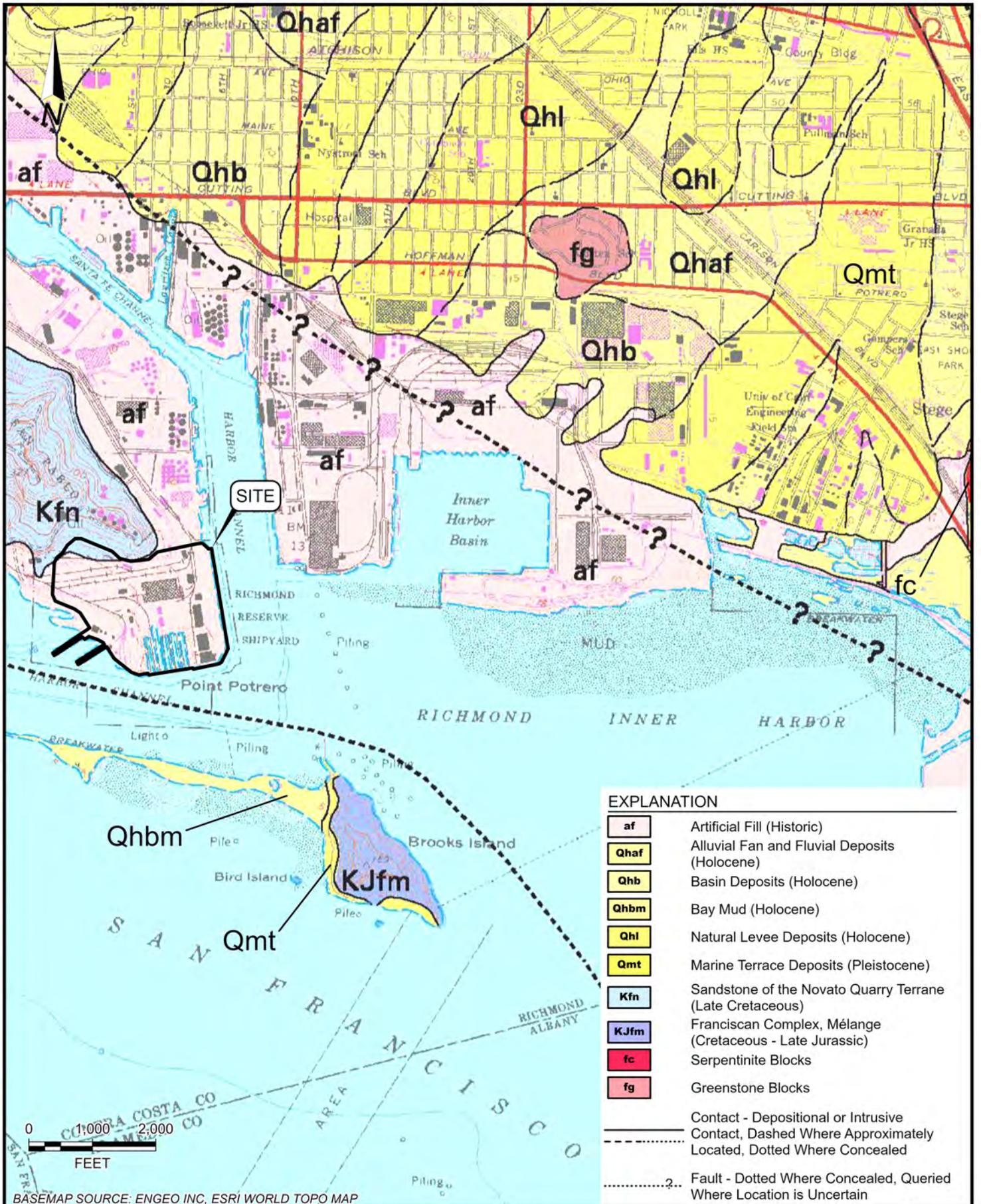
BASEMAP SOURCE: GOOGLE EARTH MAPPING SERVICE, 2024



SITE PLAN
 PORT OF RICHMOND - POINT POTRERO MARINE TERMINAL
 RICHMOND, CALIFORNIA

PROJECT NO.: 26829.000.001	FIGURE NO. 2
SCALE: AS SHOWN	
DRAWN BY: NWC	CHECKED BY: RHB

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EXPLANATION

af	Artificial Fill (Historic)
Qhaf	Alluvial Fan and Fluvial Deposits (Holocene)
Qhb	Basin Deposits (Holocene)
Qhbm	Bay Mud (Holocene)
Qhl	Natural Levee Deposits (Holocene)
Qmt	Marine Terrace Deposits (Pleistocene)
Kfn	Sandstone of the Novato Quarry Terrane (Late Cretaceous)
KJfm	Franciscan Complex, Mélange (Cretaceous - Late Jurassic)
fc	Serpentinite Blocks
fg	Greenstone Blocks
	Contact - Depositional or Intrusive
	Contact, Dashed Where Approximately Located, Dotted Where Concealed
	Fault - Dotted Where Concealed, Queried Where Location is Uncertain

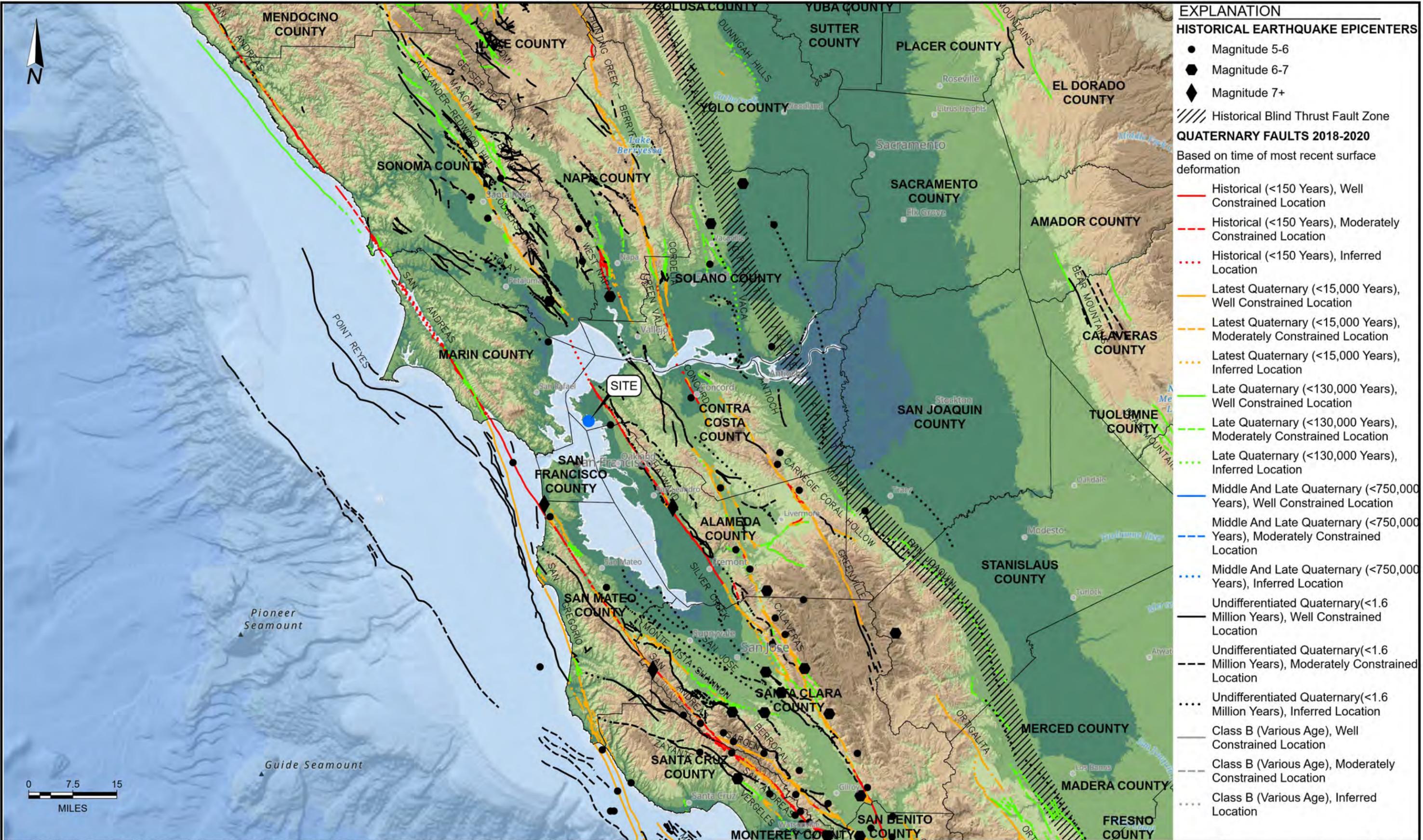
BASEMAP SOURCE: ENGEO INC, ESRI WORLD TOPO MAP



REGIONAL GEOLOGIC MAP
 PORT OF RICHMOND - POINT POTRERO MARINE TERMINAL
 RICHMOND, CALIFORNIA

PROJECT NO.: 26829.000.001
 SCALE: AS SHOWN
 DRAWN BY: NWC CHECKED BY: RHB

FIGURE NO.
3



EXPLANATION	
HISTORICAL EARTHQUAKE EPICENTERS	
●	Magnitude 5-6
●	Magnitude 6-7
◆	Magnitude 7+
	Historical Blind Thrust Fault Zone
QUATERNARY FAULTS 2018-2020	
Based on time of most recent surface deformation	
—	Historical (<150 Years), Well Constrained Location
- - -	Historical (<150 Years), Moderately Constrained Location
⋯	Historical (<150 Years), Inferred Location
—	Latest Quaternary (<15,000 Years), Well Constrained Location
- - -	Latest Quaternary (<15,000 Years), Moderately Constrained Location
⋯	Latest Quaternary (<15,000 Years), Inferred Location
—	Late Quaternary (<130,000 Years), Well Constrained Location
- - -	Late Quaternary (<130,000 Years), Moderately Constrained Location
⋯	Late Quaternary (<130,000 Years), Inferred Location
—	Middle And Late Quaternary (<750,000 Years), Well Constrained Location
- - -	Middle And Late Quaternary (<750,000 Years), Moderately Constrained Location
⋯	Middle And Late Quaternary (<750,000 Years), Inferred Location
—	Undifferentiated Quaternary (<1.6 Million Years), Well Constrained Location
- - -	Undifferentiated Quaternary (<1.6 Million Years), Moderately Constrained Location
⋯	Undifferentiated Quaternary (<1.6 Million Years), Inferred Location
—	Class B (Various Age), Well Constrained Location
- - -	Class B (Various Age), Moderately Constrained Location
⋯	Class B (Various Age), Inferred Location

BASE MAP SOURCE: ESRI, GEBCO, GARMIN, NATURALVUE, COUNTY OF MARIN, CALIFORNIA STATE PARKS, ESRI, TOMTOM, GARMIN, SAFEGRAPH, FAO, METI/NASA, USGS, BUREAU OF LAND MANAGEMENT, EPA, NPS, USFWS
 COLOR HILLSHADE IMAGE BASED ON THE NATIONAL ELEVATION DATA SET (NED) AT 30 METER RESOLUTION
 U.S.G.S. QUATERNARY FAULT DATABASE, 2020
 C.G.S. HISTORIC EARTHQUAKE DATABASE



REGIONAL FAULTING & SEISMICITY MAP
 PORT OF RICHMOND - POINT POTRERO MARINE TERMINAL
 RICHMOND, CALIFORNIA

PROJECT NO.: 26829.000.001	FIGURE NO.
SCALE: AS SHOWN	4
DRAWN BY: NWC	CHECKED BY: RHB

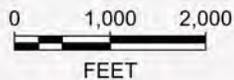
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EXPLANATION

-  Project Site
-  Liquefaction Zones
Areas Where The Historical Occurrence Of Liquefaction, Or Local Geological, Geotechnical And Groundwater Conditions Indicate A Potential For Permanent Ground Displacements Such That Mitigation As Defined In Public Resources Code Section 2693(C) Would Be Required
-  Earthquake-Induced Landslide Zones
Areas Where The Previous Occurrence Of Landslide Movement, Or Local Topographic, Geological, Geotechnical And Subsurface Water Conditions Indicate A Potential For Permanent Ground Displacements Such That Mitigation As Defined In Public Resources Code Section 2693(C) Would Be Required.



BASEMAP SOURCE: GOOGLE EARTH MAPPING SERVICE 2022



SEISMIC HAZARD ZONES MAP
 PORT OF RICHMOND - POINT POTRERO MARINE TERMINAL
 RICHMOND, CALIFORNIA

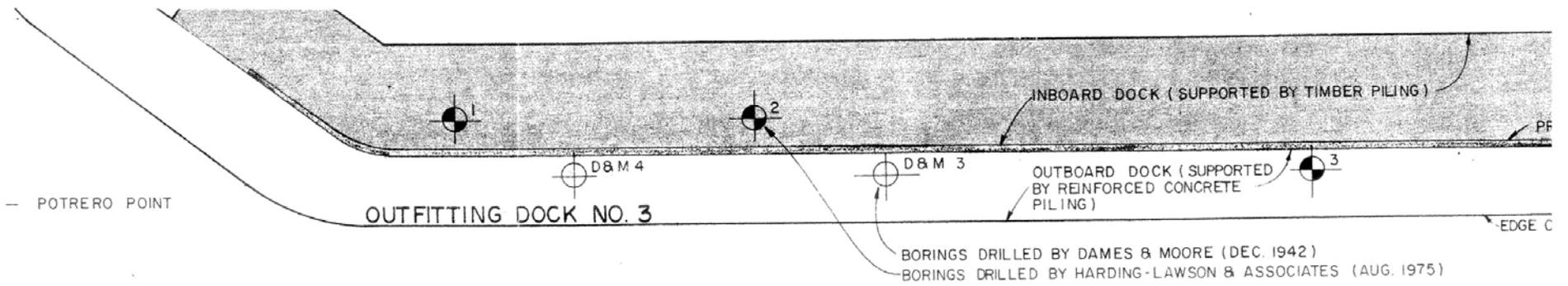
PROJECT NO.: 26829.000.001
 SCALE: AS SHOWN
 DRAWN BY: JAF CHECKED BY: RHB

FIGURE NO.
5



APPENDIX A

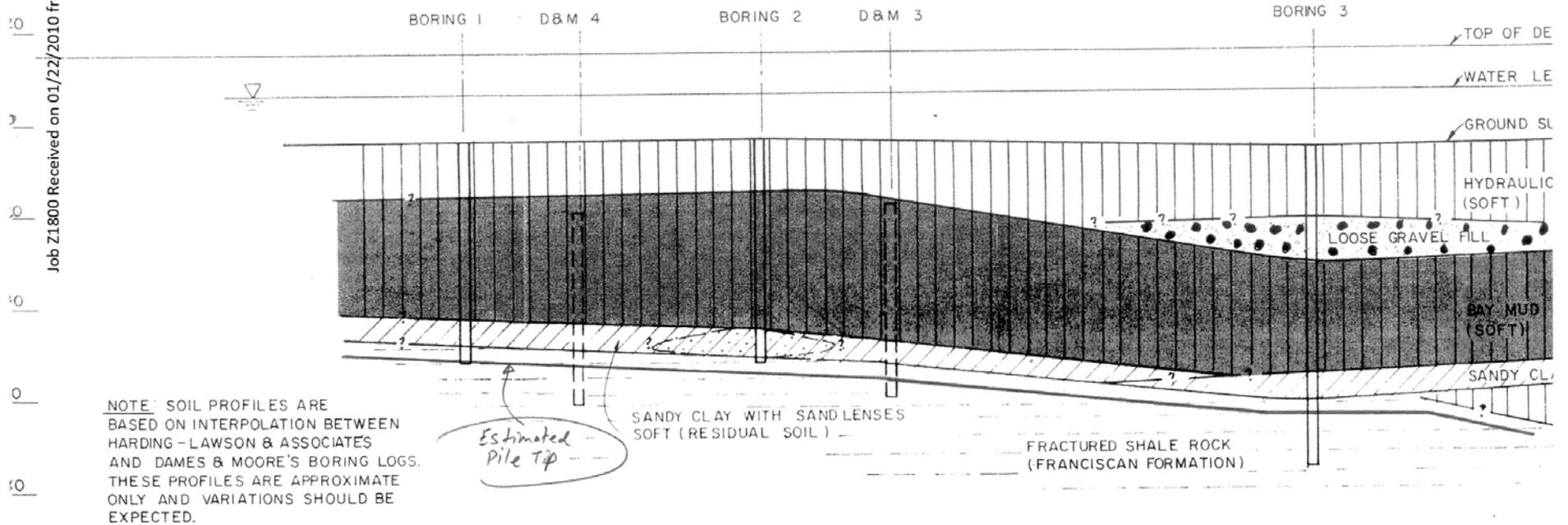
HISTORICAL BORING LOGS AND CPTS



SITE PLAN AND BORING LOCATIONS

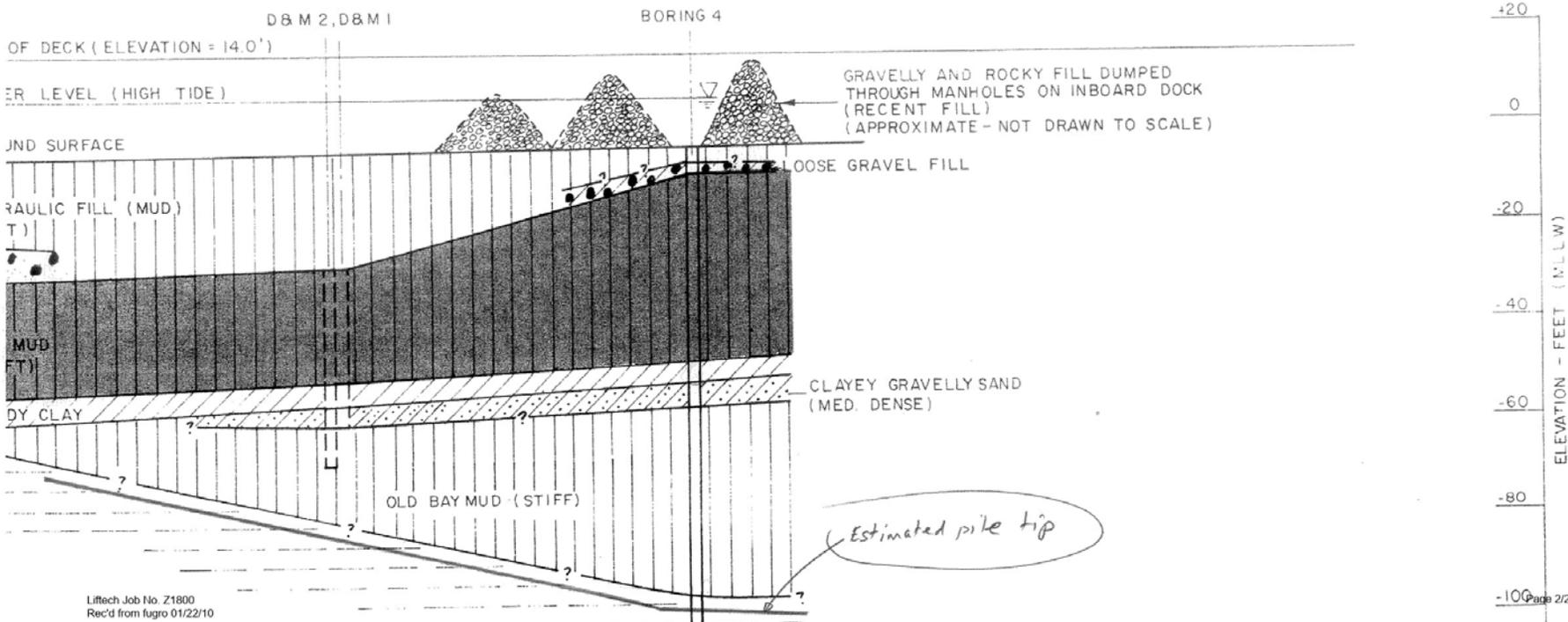
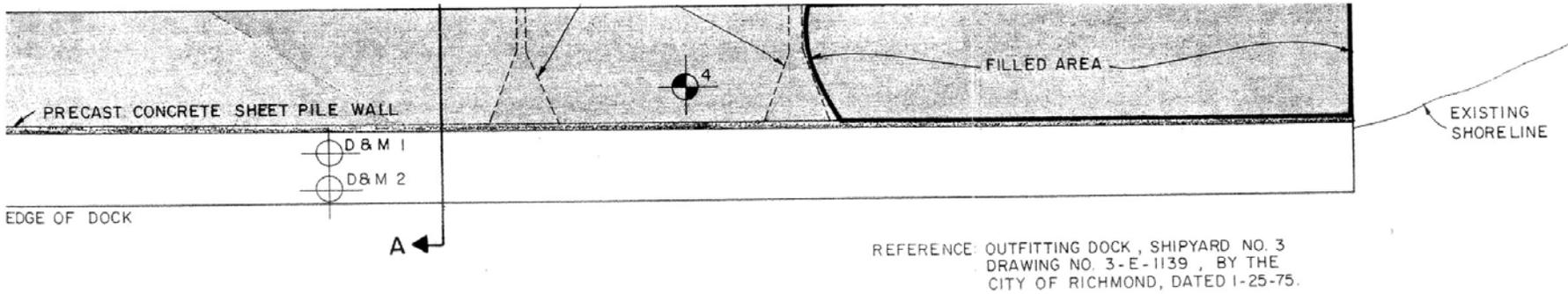


Job Z1800 Received on 01/22/2010 from Fugro



Liftech Job No. Z1800
Rec'd from fugro 01/22/10

Page 1/2



Job Z1800 Received on 01/22/2010 from Fugro

LOG OF BORING 4

Shear Strength (lbs/sq ft)

Blows/ft

Moisture Content (%)

Dry Density (pcf)

Depth (ft)

Sample

Equipment
Elevation

Rotary Wash
+14

Date 8/11/75

CONCRETE DECK (8 Inches)

water level 8/11/75

-4.0 MLLW
BLACK CLAYEY SANDY SILT (MH)
very soft, saturated, with gray sand lenses
BROWN CLAYEY GRAVEL (GC)
loose, saturated, with small pieces of wood
GRAY CLAYEY SANDY SILT (MH)
medium stiff, saturated, with shell fragments
becoming soft @ 29'

FILL

Shear Strength (lbs/sq ft)

Blows/ft

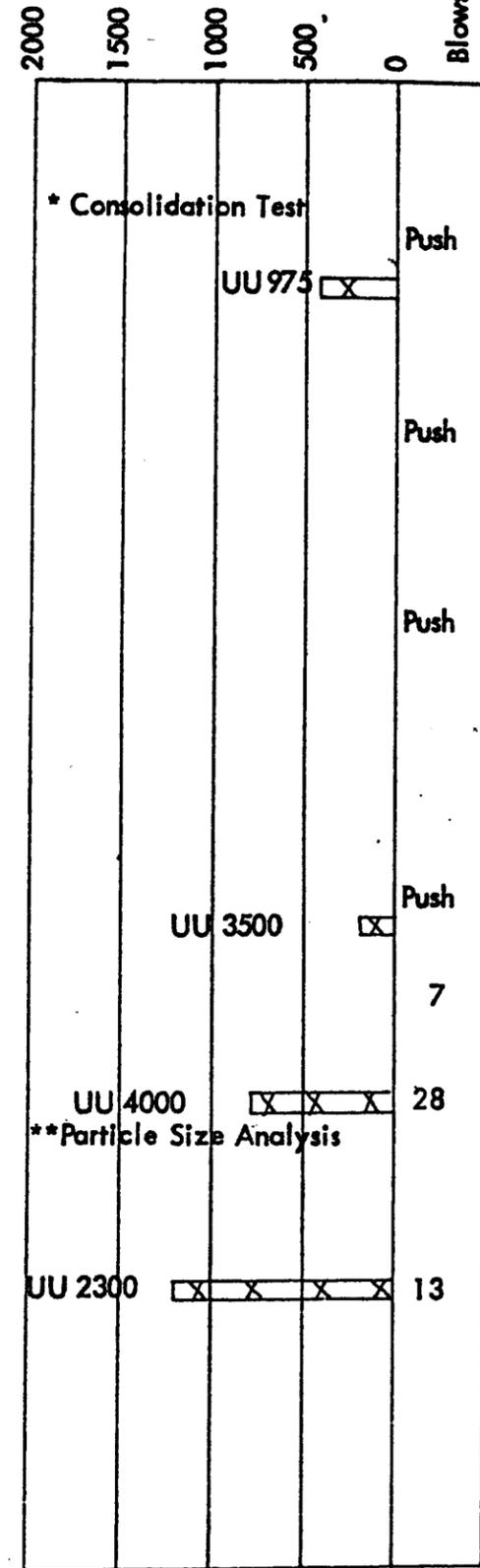
Moisture Content (%)

Dry Density (pcf)

Depth (ft)

Sample

(Continuation of Log)



no longer sandy below 44'

slightly peaty @ 49'

BLACK SANDY CLAY (CL)
soft to medium stiff, saturated, with occasional peat, small pebbles, and lenses of soft brown-gray peaty clay becoming medium stiff to stiff @ 65'
MOTTLED GRAY CLAYEY GRAVELLY SAND (SC)- medium dense, saturated, with brown clay lenses
GRAY CLAYEY SILT (MH)
stiff, saturated, with peat (Old Bay Mud) with small lense of clayey sand @ 77'

(Continued on Plate 7)

HARDING - LAWSON ASSOCIATES



Consulting Engineers and Geologists

Job No. 8003,008.04

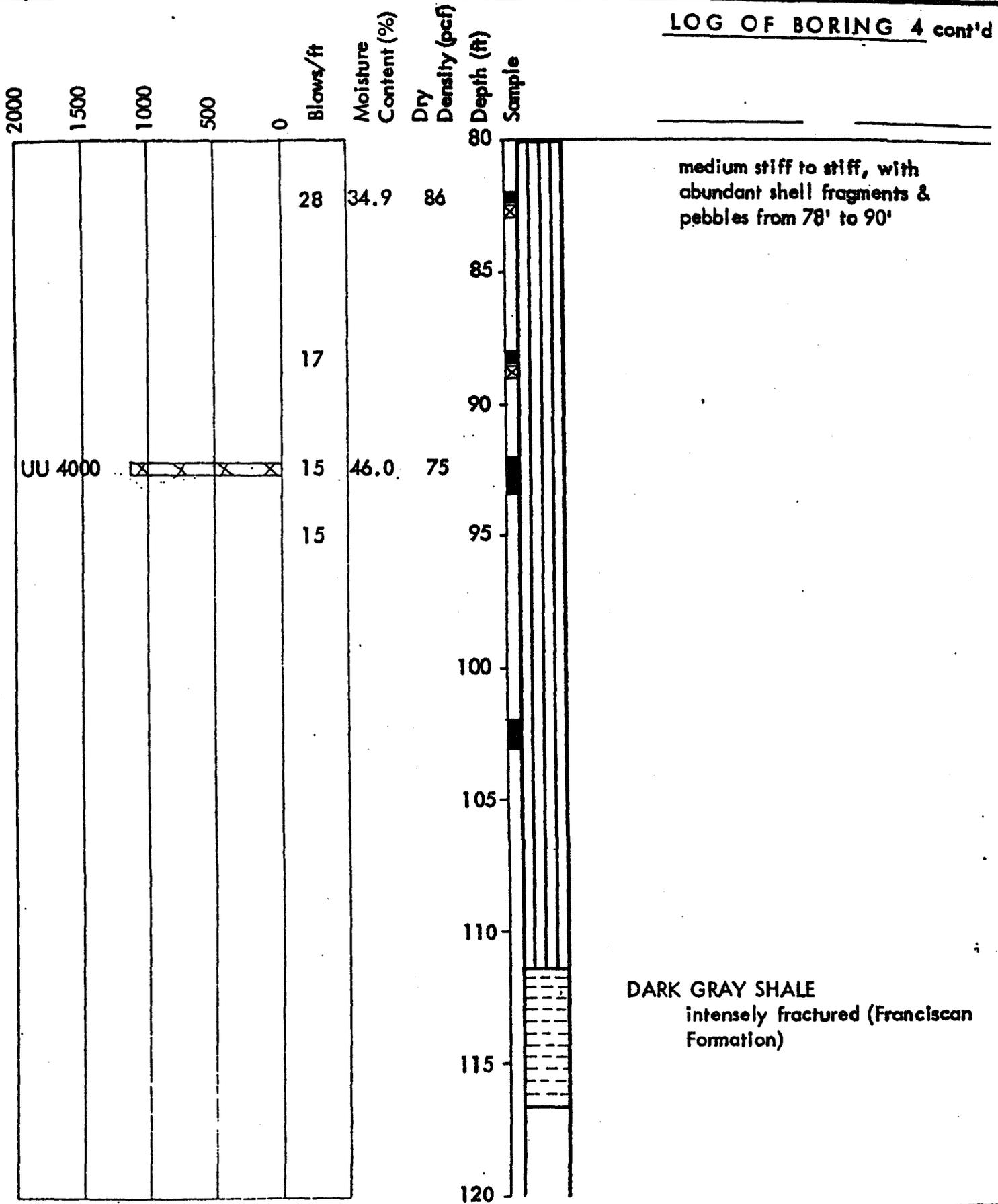
Appr. Date 8/22/75

LOG OF BORING 4
Outfitting Dock, Shipyard No. 3
Port of Richmond
Richmond, California

PLATE

6

LOG OF BORING 4 cont'd



HARDING-LAWSON ASSOCIATES



Consulting Engineers and Geologists

Page 432 of 518

LOG OF BORING 4
Outfitting Dock, Shipyard No. 3
Port of Richmond
Richmond, California

PLATE

7

8003-008-04

Date 8/22/75

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION ±15 Feet	LOGGED BY JN
DEPTH TO GROUNDWATER Not Established	BORING DIAMETER 6 Inches	DATE DRILLED 9/9/86

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (K.SF.)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
3" AC over 5" Baserock									
GRAVEL (fine-coarse grained), some sand (fine-coarse grained) silt (FILL)	tan grey	dense	GP	1	⊗	50*/6'			
SILTSTONE	tan orange	medium hard	BED-ROCK	2					
				3	⊏	50*/5'	8		
				4					
				5					
				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14	⊗	50*/3'			
Bottom of Boring = 13½ Feet				15					
Notes: 1. The stratification lines represent the approximate boundaries between material types and the transition may be gradual. 2. For an explanation of penetration resistance values marked with an asterisk (*) see first page, Appendix A.				16					
				17					
				18					
				19					
				20					

PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>	EXPLORATORY BORING LOG		
	PROPOSED PASHA CAR TERMINAL Richmond, California		
	PROJECT NO.	DATE	BORING NO.
	K431-81	June 1987	23

DRILL RIG Continuous Flight Auger				SURFACE ELEVATION ±16 Feet		LOGGED BY JN			
DEPTH TO GROUNDWATER Not Established				BORING DIAMETER 6 Inches		DATE DRILLED 9/9/86			
DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
2½" AC over 4" Baserock									
GRAVEL (fine-coarse grained), sandy (fine-coarse grained), trace of silt (grading 3"+ cobbles) (rock fragments) (interbedded moist sand lense) (FILL) ↓	tan	dense	GW	1	X	50*			
				2					
				3	X	30*			
				4					
				5					
				6					
				7					
				8					
				9					
				10					
Bottom of Boring = 10 Feet				11					
Notes: 1. The stratification line represents the approximate boundary between soil types and the transition may be gradual. 2. For an explanation of penetration resistance values marked with an asterisk (*) see first page, Appendix A.				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					
				PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>				EXPLORATORY BORING LOG	
PROPOSED PASHA CAR TERMINAL Richmond, California									
PROJECT NO.		DATE						BORING NO.	
K431-81		June 1987						NO. 25	

DRILL RIG Continuous Flight Auger				SURFACE ELEVATION ±16 Feet		LOGGED BY JN			
DEPTH TO GROUNDWATER Not Established				BORING DIAMETER 6 Inches		DATE DRILLED 9/9/86			
DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
2" AC over 3" Baserock									
GRAVEL (fine-coarse grained), with cobbles & debris (FILL)	grey	medium dense	GP	1					
Bottom of Boring = 1 Foot (refusal*)				2					
				3					
				4					
				5					
				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					
<p>* 3 additional borings were drilled within a 50 foot radius of this boring, and the holes were logged with approximately the same A.C. section and refusal at approximately 1 foot.</p> <p>Note: The stratification line represents the approximate boundary between soil types and the transition may be gradual.</p>									
<p>PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i></p>				EXPLORATORY BORING LOG					
				PROPOSED PASHA CAR TERMINAL Richmond, California					
				PROJECT NO. K431-81		DATE June 1987		BORING NO. 26	

DRILL RIG Continuous Flight Auger			SURFACE ELEVATION ±16 Feet		LOGGED BY JN				
DEPTH TO GROUNDWATER Not Established			BORING DIAMETER 6 Inches		DATE DRILLED 9/9/86				
DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (K.S.F.)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
GRAVEL (coarse grained), with sand (fine-medium grained) (FILL) ↑	brown grey	medium dense	GP	1					
				2					
				3					
SAND (fine-medium grained), trace of gravels (fine grained) (FILL)	brown	medium dense	SP	4					
				5					
Bottom of Boring = 5 Feet (refusal) Note: The stratification line represents the approximate boundary be- tween soil types and the transi- tion may be gradual.				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					
				PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>				EXPLORATORY BORING LOG	
PROPOSED PASHA CAR TERMINAL Richmond, California									
PROJECT NO.		DATE						BORING NO.	
K 431-81		June 1987						28	

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION ±19 Feet	LOGGED BY JN
DEPTH TO GROUNDWATER Not Established	BORING DIAMETER 6 Inches	DATE DRILLED 9/10/86

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
1/2" AC over 3" Baserock									
GRAVEL (fine-coarse grained), sandy (fine-coarse grained) (FILL) ↑	grey	medium dense	GP	1		40			
SILT, some sand (fine-coarse grained), trace of clay	orange tan	hard	ML	2					
				3					
CLAY, silty, trace of sand (fine-medium grained) Liquid Limit = 23% Plasticity Index = 8% Passing #200 Sieve = 75%	mottled orange tan	very stiff	CL	4		29			
				5					
				6					
				7					
				8					
				9					
Bottom of Boring = 9 1/2 Feet				10		55			
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					

PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>	EXPLORATORY BORING LOG		
	PROPOSED PASHA CAR TERMINAL Richmond, California		
	PROJECT NO.	DATE	BORING NO.
	K431-81	June 1987	38

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION ±13 Feet	LOGGED BY JN
DEPTH TO GROUNDWATER Not Established	BORING DIAMETER 6 Inches	DATE DRILLED 9/10/86

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
SAND (fine-coarse grained), with silt, trace of gravel (fine grained) (grading silty)	brown	very dense	SM	1	23/2"		7		
				2					
				3					
			SM ML	4					
GRAVELS (4"+) (FILL) ↑	grey	medium dense	GP	5					
Bottom of Boring = 5½ Feet (refusal) Note: The stratification line represents the approximate boundary between soil types and the transition may be gradual.				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					

PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>	EXPLORATORY BORING LOG		
	PROPOSED PASHA CAR TERMINAL Richmond, California		
	PROJECT NO.	DATE	BORING NO.
	K431-81	June 1987	41

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION ±15 Feet	LOGGED BY JN
DEPTH TO GROUNDWATER Not Established	BORING DIAMETER 6 Inches	DATE DRILLED 9/10/86

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (K.S.F.)	
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE							
SAND (fine-coarse grained), silty, trace of gravel (fine-coarse grained) (FILL) ↑	brown	very dense	SP	1		50/6"				
				2						
GRAVEL (fine-coarse grained), sandy (fine-coarse grained) (FILL) ↑	grey	medium dense	GP	3		14	16			
				4						
SILT, some sand (very fine-medium grained), clay (sample is moist)	orange brown	stiff	ML-SM	5		6*	19	108		
				6						
				7		6*	19	108		
				8						
				9		6*	19	108		
		firm		10						
Bottom of Boring = 10 Feet				11						
Notes: 1. The stratification lines represent the approximate boundaries between soil types and the transition may be gradual. 2. For an explanation of penetration resistance values marked with an asterisk (*) see first page, Appendix A.				12						
					13					
					14					
					15					
					16					
					17					
					18					
					19					
					20					

PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>	EXPLORATORY BORING LOG		
	PROPOSED PASHA CAR TERMINAL Richmond, California		
	PROJECT NO.	DATE	BORING NO.
	K431-81	June 1987	42

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION ±12 Feet	LOGGED BY JN
DEPTH TO GROUNDWATER 9' (see note 2)	BORING DIAMETER 6 Inches	DATE DRILLED 9/10/86

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (K.SF.)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
GRAVEL (fine-coarse grained), sandy (fine-coarse grained) (crushed rock)	grey	dense	GP	1		35			
(FILL) ↑				2					
				3					
CLAY, some silt, sand (fine-coarse grained), gravel (fine-coarse grained)	brown	very stiff	CL	4		25	9		
(FILL) ↑				5					
				6					
				7					
GRAVEL (fine-coarse grained), some sand (fine-coarse grained)	brown grey	loose	GP	8		6	▽		
(FILL) ↑				9					
				10					
Bottom of Boring = 10 Feet				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					

PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>	EXPLORATORY BORING LOG		
	PROPOSED PASHA CAR TERMINAL Richmond, California		
	PROJECT NO.	DATE	BORING NO.
	K431-81	June 1987	NO. 43

DRILL RIG Continuous Flight Auger				SURFACE ELEVATION ±14 Feet		LOGGED BY JN				
DEPTH TO GROUNDWATER 9½" (see note 2)				BORING DIAMETER 6 Inches		DATE DRILLED 9/10/86				
DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)	
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE							
2" AC over 4" Baserock										
GRAVEL (fine-coarse grained), some sand (fine-coarse grained) (grading some clay) (FILL) ↑	grey	very dense	GP	1		55/9"	8			
				2						
				3						
		medium dense	GC	4		20				
				5						
				6						
		loose	GC CL	7		9				
				8						
				9						
										10
Bottom of Boring = 10 Feet				11						
Notes:				12						
1. The stratification line represents the approximate boundary between soil types and the transition may be gradual.				13						
2. Groundwater level was measured at 9½ feet at time of drilling.				14						
				15						
				16						
				17						
				18						
				19						
				20						
PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>					EXPLORATORY BORING LOG					
					PROPOSED PASHA CAR TERMINAL Richmond, California					
					PROJECT NO.		DATE		BORING NO.	
					K431-81		June 1987		44	

DRILL RIG Continuous Flight Auger			SURFACE ELEVATION ±17 Feet		LOGGED BY JN				
DEPTH TO GROUNDWATER Not Established			BORING DIAMETER 6 Inches		DATE DRILLED 9/10/86				
DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (PSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
GRAVEL (fine-coarse grained) (FILL) †									
SILT, some sand (fine-coarse grained) trace of clay (Bedrock Debris)	orange yellow	hard	ML	1		50			
				2					
SILTSTONE	yellow orange grey	soft-rock hardness	BED-ROCK	3		50/2"	11		
				4					
				5					
Bottom of Boring = 5½ Feet Note: The stratification lines represent the approximate boundaries between soil types and the transition may be gradual.				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
18									
19									
20									

**PETER KALDVEER
AND ASSOCIATES, INC.**
Geotechnical Consultants

EXPLORATORY BORING LOG

PROPOSED PASHA CAR TERMINAL
Richmond, California

PROJECT NO.

DATE

BORING NO.

K431-81

June 1987

NO. 45

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION ±16 Feet	LOGGED BY JN
DEPTH TO GROUNDWATER Not Established	BORING DIAMETER 6 Inches	DATE DRILLED 9/10/86

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
GRAVEL (fine-coarse grained), sandy (fine-coarse grained) (gravels to 3"+)	grey	medium dense	GP	1					
				2					
				3					
				4					
SAND (fine-medium grained), some gravels (fine grained) (grading gravelly) (FILL) ↑	tan	medium dense	SP	5					
				6					
				7					
				8					
				9					
				10					
Bottom of Boring = 10 Feet Note: The stratification line represents the approximate boundary between soil types and the transition may be gradual.				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					

PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>	EXPLORATORY BORING LOG		
	PROPOSED PASHA CAR TERMINAL Richmond, California		
	PROJECT NO.	DATE	BORING NO.
	K 431-81	June 1987	47

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION ±16 Feet	LOGGED BY JN
DEPTH TO GROUNDWATER Not Established	BORING DIAMETER 6 Inches	DATE DRILLED 9/10/86

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
GRAVEL (fine-coarse grained) (concrete debris)	grey	medium dense	GP	1					
				2					
				3					
				4					
				5					
				6					
(FILL) ↑									
Bottom of Boring = 6 Feet (refusal)				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					

PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>	EXPLORATORY BORING LOG		
	PROPOSED PASHA CAR TERMINAL Richmond, California		
	PROJECT NO.	DATE	BORING NO.
	K431-81	June 1987	50

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION ±16 Feet	LOGGED BY BK
DEPTH TO GROUNDWATER ½' (see note)	BORING DIAMETER 6 Inches	DATE DRILLED 3/11/87

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
GRAVEL (fine-coarse grained), clayey with sand (fine-coarse grained)	brown	medium	GC	1			▽		
				2					
				3					
				4					
(FILL) ↑									
Bottom of Boring = 4 Feet				5					
Note: Groundwater level was measured at time of drilling.				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					

PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>	EXPLORATORY BORING LOG		
	PROPOSED PASHA CAR TERMINAL Richmond, California		
	PROJECT NO.	DATE	BORING NO.
	K 431-81	June 1987	56

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION ±15 Feet	LOGGED BY BK
DEPTH TO GROUNDWATER Not Established	BORING DIAMETER 6 Inches	DATE DRILLED 3/12/87

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
GRAVEL (fine-coarse grained), some clay, some sand (fine-coarse grained), some debris	light brown	very dense	GM-GC	1		40/6"			
GRAVEL (fine-coarse grained), some asphalt and debris	grey	very dense	GM	2		45/6"	4		
SAND (fine-coarse grained), clayey with gravel (fine grained) Passing #200 Sieve = 14% (FILL) ↑	yellow	dense	SC	3		30/6"			
Bottom of Boring = 4½ Feet				4					
<p>Note: The stratification lines represent the approximate boundaries between soil types and the transition may be gradual.</p>				5					
				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					

PETER KALDVEER AND ASSOCIATES, INC. Geotechnical Consultants	EXPLORATORY BORING LOG		
	PROPOSED PASHA CAR TERMINAL Richmond, California		
	PROJECT NO.	DATE	BORING NO.
	K431-81	June 1987	58

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION ±15 Feet	LOGGED BY BK
DEPTH TO GROUNDWATER Not Established	BORING DIAMETER 6 Inches	DATE DRILLED 3/12/87

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
CLAY, silty, gravel (fine-coarse grained) with debris (pieces of metal 4-5" wide, 1/8" thick) Passing #200 Sieve = 19%	brown	hard	CL	1		10/1"			
				2		27/6"			
				3		36/6"			
GRAVEL (fine-coarse grained), clayey, some sand (fine-coarse grained) (grading with less debris)	brown	dense	GC	4			9		
GRAVEL (coarse grained) (FILL) ↓	grey	very dense	GP	5		22/4"			
Bottom of Boring = 5½ Feet Note: The stratification lines represent the approximate boundaries between soil types and the transition may be gradual.				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					

PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>	EXPLORATORY BORING LOG		
	PROPOSED PASHA CAR TERMINAL Richmond, California		
	PROJECT NO.	DATE	BORING NO.
	K431-81	June 1987	59

DRILL RIG Continuous Flight Auger		SURFACE ELEVATION ±14 Feet		LOGGED BY BK									
DEPTH TO GROUNDWATER Not Established		BORING DIAMETER 6 Inches		DATE DRILLED 3/12/87									
DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (K.SF)				
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE										
GRAVEL (fine-coarse grained), clayey, some sand (fine-coarse grained), with debris	brown	dense	GC	1		27/6"	13						
				2		42/6"	6						
GRAVEL (coarse grained), with debris (FILL) ↓	grey	very dense	GP	3									
				4		10/1"							
Bottom of Boring = 3½ Feet				5									
<p>Note: The stratification line represents the approximate boundary between soil types and the transition may be gradual.</p>				6									
				7									
				8									
				9									
				10									
				11									
				12									
				13									
				14									
				15									
				16									
				17									
				18									
				19									
				20									
				PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>				EXPLORATORY BORING LOG					
								PROPOSED PASHA CAR TERMINAL Richmond, California					
PROJECT NO.		DATE						BORING NO.					
K431-81		June 1987						60					

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION ±14 Feet	LOGGED BY BK
DEPTH TO GROUNDWATER Not Established	BORING DIAMETER 6 Inches	DATE DRILLED 3/12/87

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
GRAVEL (fine-coarse grained), some clay, some sand (fine-coarse grained)	yellow brown	dense	GM	1		25/6"	7		
GRAVEL (fine-coarse grained) (FILL) ↑	grey	very dense	GP	2		54/9"	2		
Bottom of Boring = 2½ Feet Note: The stratification line represents the approximate boundary between soil types and the transition may be gradual.				3					
				4					
				5					
				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					

PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>	EXPLORATORY BORING LOG		
	PROPOSED PASHA CAR TERMINAL Richmond, California		
	PROJECT NO.	DATE	BORING NO.
	K431-81	June 1987	61

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION ±15 Feet	LOGGED BY BK
DEPTH TO GROUNDWATER Not Established	BORING DIAMETER 6 Inches	DATE DRILLED 3/11/87

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
GRAVEL (fine-coarse grained), some clay, some sand (fine-coarse grained)	yellow brown	very dense	GC-GM	1		38/6"	8		
GRAVEL (fine-coarse grained) (FILL) ↑	grey	very dense	GP	2					
				3		10/1"			
Bottom of Boring = 3 Feet				4					
				5					
				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					

Note:
The stratification line represents the approximate boundary between soil types and the transition may be gradual.

PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>	EXPLORATORY BORING LOG		
	PROPOSED PASHA CAR TERMINAL Richmond, California		
	PROJECT NO.	DATE	BORING NO.
	K 431-81	June 1987	63

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION ±14 Feet	LOGGED BY BK
DEPTH TO GROUNDWATER Not Established	BORING DIAMETER 6 Inches	DATE DRILLED 3/11/87

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
GRAVEL, some clay, some sand Passing #200 Sieve = 13% (FILL) ↑	yellow brown	very dense	GC GM	1		40/6"			
				2					
				3		51			
				4					
				5		35			
Bottom of Boring = 5½ Feet				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					

PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>	EXPLORATORY BORING LOG		
	PROPOSED PASHA CAR TERMINAL Richmond, California		
	PROJECT NO.	DATE	BORING NO.
	K431-81	June 1987	64

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION ±12 Feet	LOGGED BY BK
DEPTH TO GROUNDWATER Not Established	BORING DIAMETER 6 Inches	DATE DRILLED 3/12/87

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
SAND (fine-coarse grained), some gravel (fine grained), some clay Passing #200 Sieve = 7% (FILL) ↑	yellow brown	dense	SM-SC	1		49/10"			
				2					
Bottom of Boring = 2 Feet				3					
				4					
				5					
				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					

PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>	EXPLORATORY BORING LOG		
	PROPOSED PASHA CAR TERMINAL Richmond, California		
	PROJECT NO.	DATE	BORING NO.
	K 431-81	June 1987	65

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION ±14 Feet	LOGGED BY BK
DEPTH TO GROUNDWATER Not Established	BORING DIAMETER 6 Inches	DATE DRILLED 3/12/87

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
CLAY, silty with gravel (fine-coarse grained), and with debris Passing #200 Sieve = 6%	black	firm	CL	1	[SAMPLER]	43			
				2					
				3					
				4					
				5					
(FILL) ↑				5		4/4"	30		
Bottom of Boring = 5½ Feet				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					

PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>	EXPLORATORY BORING LOG		
	PROPOSED PASHA CAR TERMINAL Richmond, California		
	PROJECT NO.	DATE	BORING NO.
	K 431-81	June 1987	66

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION ±12 Feet	LOGGED BY BK
DEPTH TO GROUNDWATER Not Established	BORING DIAMETER 6 Inches	DATE DRILLED 3/11/87

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
GRAVEL (fine-coarse grained), clayey, some sand (fine-coarse grained), with debris Passing #200 Sieve = 24%	brown	very dense	GC	1		13/2"			
				2					
	yellow brown				3		40/10'		
					4				
CLAY, sandy (fine-coarse grained) trace of gravel (coarse grained) Passing #200 Sieve = 25% (FILL) ↑	yellow brown	very stiff	CL	5		24			
				6					
Bottom of Boring = 6 Feet Note: The stratification line represents the approximate boundary between soil types and the transition may be gradual.				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
18									
19									
20									

PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>	EXPLORATORY BORING LOG		
	PROPOSED PASHA CAR TERMINAL Richmond, California		
	PROJECT NO.	DATE	BORING NO.
	K431-81	June 1987	67

DRILL RIG Continuous Flight Auger				SURFACE ELEVATION ±15 Feet.		LOGGED BY BK			
DEPTH TO GROUNDWATER Not Established				BORING DIAMETER 6 Inches		DATE DRILLED 3/18/87			
DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
GRAVEL (fine grained), sandy (fine-coarse grained) (grading trace of clay) (FILL) ↑	light brown	dense	GM	1		38	3		
	yellow brown	very dense		2		36/3"	7		
				3		32			
Bottom of Boring = 3½ Feet				4					
				5					
				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					
PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>				EXPLORATORY BORING LOG					
				PROPOSED PASHA CAR TERMINAL Richmond, California					
				PROJECT NO.		DATE		BORING NO.	
				K 431-81		June 1987		68	

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION ±12 Feet	LOGGED BY BK
DEPTH TO GROUNDWATER Not Established	BORING DIAMETER 6 Inches	DATE DRILLED 3/18/87

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
GRAVEL (fine-coarse grained), sandy (fine-coarse grained) Passing #200 Sieve = 12%	dark brown	dense	GM	1		37			
SAND (fine-coarse grained), clayey with gravel (fine grained)	yellow brown	medium dense	SC	2 3		18	9		
GRAVEL (coarse grained) (FILL) ↑	grey	very dense	GP	4		20			
Bottom of Boring = 4½ Feet				5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20					

Note:
The stratification lines represent the approximate boundaries between soil types and the transition may be gradual.

PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>	EXPLORATORY BORING LOG		
	PROPOSED PASHA CAR TERMINAL Richmond, California		
	PROJECT NO.	DATE	BORING NO.
	K431-81	June 1987	69

DRILL RIG Continuous Flight Auger				SURFACE ELEVATION ±12 Feet		LOGGED BY BK			
DEPTH TO GROUNDWATER Not Established				BORING DIAMETER 6 Inches		DATE DRILLED 3/18/87			
DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
Wood, Debris and Gravel (fine-coarse grained)	brown	medium dense	GM	1		56/10"			
GRAVEL (fine grained), sandy (fine-coarse grained)	grey black	medium dense	GM	2					
SAND (fine-coarse grained), clayey trace of gravel (fine grained)	yellow brown	dense	SC	3		34 40/2"	1		
GRAVEL (fine-coarse grained) (FILL) ↑	grey	dense	GP	4					
Bottom of Boring = 3 Feet				5					
				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					
PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>				EXPLORATORY BORING LOG					
				PROPOSED PASHA CAR TERMINAL Richmond, California					
				PROJECT NO.		DATE		BORING NO.	
				K431-81		June 1987		NO. 70	

DRILL RIG Continuous Flight Auger		SURFACE ELEVATION ±11 Feet		LOGGED BY BK					
DEPTH TO GROUNDWATER Not Established		BORING DIAMETER 6 Inches		DATE DRILLED 3/18/87					
DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
GRAVEL (fine-coarse grained), some clay	dark brown	dense	GC	1		30/6"	15		
SAND (fine-coarse grained), some white marble chips (FILL) ↑	red & yellow	dense	SM	2					
Bottom of Boring = 1 Foot				3					
<p>Note: The stratification line represents the approximate boundary between soil types and the transition may be gradual.</p>				4					
				5					
				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					
				PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>				EXPLORATORY BORING LOG	
PROPOSED PASHA CAR TERMINAL Richmond, California									
PROJECT NO. K431-81		DATE June 1987						BORING NO. 71	

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION ±11 Feet	LOGGED BY BK
DEPTH TO GROUNDWATER Not Established	BORING DIAMETER 6 Inches	DATE DRILLED 3/18/87

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
CLAY, sandy (fine-coarse grained)	brown	stiff	CL	1		25/6"			
SAND (fine-coarse grained), trace of gravel (fine grained) Passing #200 Sieve = 19%	yellow brown	medium dense	SC						
GRAVEL (coarse grained) (FILL) ↑	grey	very dense	GP						
Bottom of Boring = 1 Foot				2					
				3					
				4					
				5					
				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					

PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>	EXPLORATORY BORING LOG		
	PROPOSED PASHA CAR TERMINAL Richmond, California		
	PROJECT NO.	DATE	BORING NO.
	K 431-81	June 1987	72

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION ±12 Feet	LOGGED BY BK
DEPTH TO GROUNDWATER Not Established	BORING DIAMETER 6 Inches	DATE DRILLED 3/18/87

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
GRAVEL (fine-coarse grained), sandy (fine-coarse grained)	grey	medium dense	GM	1		23	10		
SAND (fine-coarse grained), clayey with gravel (fine grained) (FILL) ↑	yellow brown	dense	SC	2		36/4"			
Bottom of Boring = 2½ Feet				3					
				4					
				5					
				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					

Note:
The stratification line represents the approximate boundary between soil types and the transition may be gradual.

PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>	EXPLORATORY BORING LOG		
	PROPOSED PASHA CAR TERMINAL Richmond, California		
	PROJECT NO.	DATE	BORING NO.
	K431-81	June 1987	73

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION ±11 Feet	LOGGED BY BK
DEPTH TO GROUNDWATER Not Established	BORING DIAMETER 6 Inches	DATE DRILLED 3/18/87

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
SAND (fine-medium grained), trace of clay Passing #200 Sieve = 8%	brown	medium dense	SM	1		13			
GRAVEL (fine grained), clayey, sandy (fine-coarse grained) Passing #200 Sieve = 19% (FILL) ↑	yellow brown	very dense	GC-GM	2		50			
Bottom of Boring = 3 Feet				3					
<p>Note: The stratification line represents the approximate boundary between soil types and the transition may be gradual.</p>				4					
				5					
				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					

PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>	EXPLORATORY BORING LOG		
	PROPOSED PASHA CAR TERMINAL Richmond, California		
	PROJECT NO.	DATE	BORING NO.
	K431-81	June 1987	74

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION ±11 Feet	LOGGED BY BK
DEPTH TO GROUNDWATER Not Established	BORING DIAMETER 6 Inches	DATE DRILLED 3/18/87

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
SAND (fine-medium grained), with debris	rust brown	dense	SM	1		32	16		
SAND (fine-coarse grained), trace of clay	grey brown	medium dense	SM	2		29	13		
SAND (fine-coarse grained), clayey, trace of gravel (fine grained) (FILL) ↑	yellow	medium	SC	3		36/5"	8		
Bottom of Boring = 4 Feet				4					
<p>Note: The stratification lines represent the approximate boundaries between soil types and the transition may be gradual.</p>				5					
				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					

PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>	EXPLORATORY BORING LOG		
	PROPOSED PASHA CAR TERMINAL Richmond, California		
	PROJECT NO.	DATE	BORING NO.
	K431-81	June 1987	8 75

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION ±14 Feet	LOGGED BY BK
DEPTH TO GROUNDWATER Not Established	BORING DIAMETER 6 Inches	DATE DRILLED 3/18/87

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
2" Asphalt				1					
SAND (fine-medium grained) 2" (FILL) ↑				2					
Bottom of Boring = ½ Foot (concrete)				3					
				4					
				5					
				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					

PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>	EXPLORATORY BORING LOG		
	PROPOSED PASHA CAR TERMINAL Richmond, California		
	PROJECT NO.	DATE	BORING NO.
	K 431-81	June 1987	76

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION ±15 Feet	LOGGED BY BK
DEPTH TO GROUNDWATER 17' (see note 3)	BORING DIAMETER 6 Inches	DATE DRILLED 3/18/87

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (K.SF.)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
Ground covered with Gravel (fine grained)	grey			1		17	14		
SAND (fine-medium grained), clayey, trace of gravel (fine grained)	yellow	medium dense	SC-CL	2		26	15		
(FILL) ↓				3					
CLAY, sandy (fine-medium grained)	blue grey	very stiff	CL	4		22	17		
(grading silty)			CH	5					
(grading with oil)				6					
				7					
				8					
				9					
		firm		10	X	11*	81	52	
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
CLAY, silty, sandy (fine-medium grained), some pea gravel	yellow	stiff	CL	19	X	27*	15	117	0.7
Bottom of Boring = 20½ Feet				20	X				

PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>	EXPLORATORY BORING LOG		
	PROPOSED PASHA CAR TERMINAL Richmond, California		
	PROJECT NO.	DATE	BORING NO.
	K431-81	June 1987	77

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION ±15 Feet	LOGGED BY BK
DEPTH TO GROUNDWATER Not Established	BORING DIAMETER 6 Inches	DATE DRILLED 3/18/87

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
Gravel on Surface (fine grained)				1	X	22			
SAND (fine-coarse grained), clayey, trace of gravel (fine grained) Passing #200 Sieve = 62% (FILL) ↓	yellow	medium dense	SC	2		18	19		
SILT, some clay	grey brown	stiff	ML	3					
SAND (fine-coarse grained), clayey Passing #200 Sieve = 37%	yellow	dense	SC	4		37	10		
				5					
				6					
				7					
				8					
CLAY, silty, with shells	grey black			9					
				10		8	19		
CLAY, silty	olive grey	firm	CL	11					
	yellow			12					
				13					
		stiff		14					
				15	X	33*			
Bottom of Boring = 15½ Feet Notes: 1. The stratification lines represent the approximate boundaries between soil types and the transition may be gradual. 2. For an explanation of penetration resistance values marked with an asterisk (*) see first page, Appendix A.				16					
				17					
				18					
				19					
				20					

PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>	EXPLORATORY BORING LOG		
	PROPOSED PASHA CAR TERMINAL Richmond, California		
	PROJECT NO.	DATE	BORING NO.
	K431-81	June 1987	NO. 78

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION ±16 Feet	LOGGED BY BK
DEPTH TO GROUNDWATER Not Established	BORING DIAMETER 6 Inches	DATE DRILLED 3/18/87

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
GRAVEL (fine-coarse grained), with sand (fine-coarse grained), trace of clay	grey & brown	very dense	GM	1					
SAND (fine-medium grained), clayey, gravelly (fine grained) Passing #200 Sieve = 16%	yellow	medium	SC	2		56			
				3					
(FILL) ↑				4		13	7		
Bottom of Boring = 4½ Feet				5					
Note: The stratification line represents the approximate boundary between soil types and the transition may be gradual.				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					

PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>	EXPLORATORY BORING LOG		
	PROPOSED PASHA CAR TERMINAL Richmond, California		
	PROJECT NO.	DATE	BORING NO.
	K431-81	June 1987	79

DRILL RIG Continuous Flight Auger				SURFACE ELEVATION ±15 Feet		LOGGED BY BK						
DEPTH TO GROUNDWATER Not Established				BORING DIAMETER 6 Inches		DATE DRILLED 3/18/87						
DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)			
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE									
SAND (fine-medium grained)	brown & white	medium dense	SP	1		22	44					
CLAY, silty	blue grey	stiff	CL	2								
SAND (fine-coarse grained)	dark orange brown	medium dense	SM	3		10	8					
SAND (fine-coarse grained), clayey, some gravel (fine grained)	yellow brown	medium dense	SC	4		23/9"						
				5								
GRAVEL (fine-coarse grained) Passing #200 Sieve = 13% (FILL) ↑	grey	medium dense	GP	6		15						
Bottom of Boring = 6½ Feet Note: The stratification lines represent the approximate boundaries between soil types and the transition may be gradual.				7								
				8								
				9								
				10								
				11								
				12								
				13								
				14								
				15								
				16								
				17								
				18								
19												
20												
PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>				EXPLORATORY BORING LOG								
				PROPOSED PASHA CAR TERMINAL Richmond, California								
				PROJECT NO.		DATE		BORING NO.				
				K 431-81		June 1987		NO. 80				

DRILL RIG Continuous Flight Auger		SURFACE ELEVATION ± 10 Feet		LOGGED BY BK					
DEPTH TO GROUNDWATER: Not Established		BORING DIAMETER 6 Inches		DATE DRILLED 3/19/87					
DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
SAND (fine-medium grained), some clay, some gravel (fine grained) Passing #200 Sieve = 9%	dark brown	dense	SC	1		35/4"			
SAND (fine-medium grained), with clay and gravel (fine grained) (FILL) ↑	black	very dense	SC	2		25/2"	12		
Bottom of Boring = 1½ Feet				3					
<p>Note: The stratification line represents the approximate boundary between soil types and the transition may be gradual.</p>				4					
				5					
				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					
				PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>				EXPLORATORY BORING LOG	
PROPOSED PASHA CAR TERMINAL Richmond, California									
PROJECT NO.		DATE						BORING NO.	
K431-81		June 1987						81	

DRILL RIG Continuous Flight Auger			SURFACE ELEVATION ±15 Feet		LOGGED BY BK							
DEPTH TO GROUNDWATER Not Established			BORING DIAMETER 6 Inches		DATE DRILLED 3/19/87							
DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)			
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE									
SAND (fine-medium grained), clayey	dark brown	medium dense	SC	1		36/4" 12/1"	5					
SAND (fine-medium grained), with gravel (FILL) ↑	light yellow	very dense	SM	2								
Bottom of Boring = 1 Foot				3								
<p>Note: The stratification line represents the approximate boundary between soil types and the transition may be gradual.</p>				4								
				5								
				6								
				7								
				8								
				9								
				10								
				11								
				12								
				13								
				14								
				15								
				16								
				17								
				18								
				19								
				20								
				PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>				EXPLORATORY BORING LOG				
PROPOSED PASHA CAR TERMINAL Richmond, California												
PROJECT NO.		DATE						BORING NO.				
K431-81		June 1987						NO. 82				

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION ±14 Feet	LOGGED BY BK
DEPTH TO GROUNDWATER Not Established	BORING DIAMETER 6 Inches	DATE DRILLED 3/19/87

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
SAND (fine-medium grained), with clay, some gravel (fine-coarse grained)	brown	dense	SC SM	1		57/11"	7		
GRAVEL (fine-coarse grained) (FILL) ↓	grey	very dense	GP						
Bottom of Boring = 1 Foot				2					
				3					
				4					
				5					
Note: The stratification line represents the approximate boundary between soil types and the transition may be gradual.				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					

PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>	EXPLORATORY BORING LOG		
	PROPOSED PASHA CAR TERMINAL Richmond, California		
	PROJECT NO.	DATE	BORING NO.
	K431-81	June 1987	83

DRILL RIG Continuous Flight Auger				SURFACE ELEVATION ±14 Feet		LOGGED BY BK			
DEPTH TO GROUNDWATER Not Established				BORING DIAMETER 6 Inches		DATE DRILLED 3/19/87			
DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
CLAY, silty, sandy (fine-coarse grained), some gravel (fine grained)	brown	firm	CL	1		57/11"	18		
SAND (fine-medium grained), some clay with some gravel (fine-coarse grained) (some pieces of metal 3"+) (FILL) ↑	black	stiff	SC	2					
Bottom of Boring = 1 Foot				3					
				4					
				5					
				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					
PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>				EXPLORATORY BORING LOG					
				PROPOSED PASHA CAR TERMINAL Richmond, California					
				PROJECT NO.		DATE		BORING NO.	
				K 431-81		June 1987		84	

DRILL RIG Continuous Flight Auger				SURFACE ELEVATION ±15 Feet		LOGGED BY BK			
DEPTH TO GROUNDWATER Not Established				BORING DIAMETER 6 Inches		DATE DRILLED 3/19/87			
DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
GRAVEL (fine grained), some sand (fine-medium grained) (grading without sand) (FILL) ↑	grey	dense	GM	1		36/5"	2		
			GP	2		30/2"			
Bottom of Boring = 2 Feet				3					
				4					
				5					
				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					
PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>				EXPLORATORY BORING LOG					
				PROPOSED PASHA CAR TERMINAL Richmond, California					
				PROJECT NO.		DATE		BORING NO.	
				K431-81		June 1987		NO. 85	

DRILL RIG Continuous Flight Auger			SURFACE ELEVATION ±12 Feet			LOGGED BY BK			
DEPTH TO GROUNDWATER Not Established			BORING DIAMETER 6 Inches			DATE DRILLED 3/18/87			
DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
SAND (fine-medium grained), clayey	brown	medium dense	SC	1		54			
SAND (fine-medium grained), some clay with gravel (fine grained) Passing #200 Sieve = 3%	black yellow	dense	SM-SC	2		20/1"			
GRAVEL (fine-coarse grained) (FILL) ↓	grey	very dense	GF	3					
Bottom of Boring = 1½ Feet				4					
<p>Note: The stratification lines represent the approximate boundaries between soil types and the transition may be gradual.</p>				5					
				6					
				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					
				PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>				EXPLORATORY BORING LOG	
PROPOSED PASHA CAR TERMINAL Richmond, California									
PROJECT NO.		DATE						BORING NO.	
K431-81		June 1987						NO. 86	

DRILL RIG Continuous Flight Auger	SURFACE ELEVATION ±15 Feet	LOGGED BY BK
DEPTH TO GROUNDWATER Not Established	BORING DIAMETER 6 Inches	DATE DRILLED 3/18/87

DESCRIPTION AND CLASSIFICATION				DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT.)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)
DESCRIPTION AND REMARKS	COLOR	CONSIST.	SOIL TYPE						
SAND (fine-medium grained)	brown white	medium dense	SP	1		47			
SAND (fine-medium grained), with debris	black	medium dense	SM	2					
SAND (fine-medium grained), with debris and white powder	white & blue black	medium dense	SM	3		47			
SAND (fine-medium grained), with debris	black	dense	SM	4					
SAND (fine-coarse grained), with gravel (fine grained), some clay Passing #200 Sieve = 6%	yellow	dense	SM	5		15/3"	4		
GRAVEL (fine-coarse grained) (FILL) *	grey	dense	GP	6					
Bottom of Boring = 5 Feet				7					
				8					
				9					
				10					
				11					
				12					
				13					
				14					
				15					
				16					
				17					
				18					
				19					
				20					

Note:
The stratification lines represent the approximate boundaries between soil types and the transition may be gradual.

PETER KALDVEER AND ASSOCIATES, INC. <i>Geotechnical Consultants</i>	EXPLORATORY BORING LOG		
	PROPOSED PASHA CAR TERMINAL Richmond, California		
	PROJECT NO.	DATE	BORING NO.
	K431-81	June 1987	87

DRILL RIG	Failing 750, Rotary	SURFACE ELEVATION	11.2 Feet	LOGGED BY	JCH
DEPTH TO GROUND WATER	Not Encountered	BORING DIAMETER	5-inch	DATE DRILLED	8/26/02

DESCRIPTION AND CLASSIFICATION		DEPTH	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT(%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)	OTHER TESTS
DESCRIPTION AND REMARKS	CONSIST	(FEET)						
PAVEMENT: 2 inches Asphalt Concrete over 8 inches Aggregate Baserock FILL: GRAVEL (GC), light brown, fine to medium, subangular, sandy (fine- to medium- grained), trace clay, damp	Medium Dense			22				
	Loose	5		8				
grading some cobbles (up to 5 inches) at 6 feet								
grading coarse gravel and rock fragments at 8½ feet		10		11				
BAY MUD: CLAY (CH), gray, silty, trace shell fragments, wet	Very Soft	15		2	28	93		PP = 250 tsf
grading with shells at 18½ feet		20		300 psi				PP = 500 psf
grading trace shells at 23½ feet		25		2	53	70		
				125 psi				

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1000 Broadway
Ste. 200, Oakland
California 94607

EXPLORATORY BORING LOG		
AGGREGATE STORAGE FACILITY, PORT OF RICHMOND Richmond, California		
PROJECT NO.	DATE	BORING NO.
1484.002	August 2002	B-1

DRILL RIG	Failing 750, Rotary	SURFACE ELEVATION	11.2 Feet	LOGGED BY	JCH
DEPTH TO GROUND WATER	Not Encountered	BORING DIAMETER	5-inch	DATE DRILLED	8/26/02

DESCRIPTION AND CLASSIFICATION		DEPTH	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT(%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)	OTHER TESTS
DESCRIPTION AND REMARKS	CONSIST	(FEET)						
SAND (SM), gray, silty, wet	Loose							PP = 2,500 psf
BAY MUD: CLAY (CH), gray, silty, wet	Very Soft			3				PP = 1,500 psf
		35		5	95	46		PP = 1,500 psf
grading some brown organics at 36 feet	Soft							
		40		5	67	60		PP = 1,000 psf
		45		6	69	59		PP = 1,000 psf
		50						
CLAY (CL), greenish gray, sandy (fine-grained), wet	Very Stiff			34	28	98		PP = 6,000 psf

Bottom of Boring = 55 feet

Notes:

1. The stratification lines represent the approximate boundaries between material types and the transition may be gradual.
2. For an explanation of the penetration resistance values see the first page of Appendix A.
3. A 140-lb safety hammer was used to advance the sampler. The hammer was raised using a rope and cathead.
4. PP = Pocket Penetrometer (undrained shear strength).

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1000 Broadway
Ste. 200, Oakland
California 94607

EXPLORATORY BORING LOG

**AGGREGATE STORAGE FACILITY, PORT OF RICHMOND
Richmond, California**

PROJECT NO.	DATE	BORING NO.
1484.002	August 2002	B-1

DRILL RIG	Failing 750, Rotary	SURFACE ELEVATION	12.5 Feet	LOGGED BY	JCH
DEPTH TO GROUND WATER	Not Encountered	BORING DIAMETER	5-inch	DATE DRILLED	8/26/02

DESCRIPTION AND CLASSIFICATION		DEPTH	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT(%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)	OTHER TESTS
DESCRIPTION AND REMARKS	CONSIST	(FEET)						
PAVEMENT: 3 inches Asphalt Concrete over 3 inches Aggregate Baserock FILL: GRAVEL (GC), brown, fine to coarse, subrounded to subangular, some clay, damp, some sand (fine- to coarse-grained), damp	Loose	0-5	X	14	10	121		
SILT (ML), greenish gray, sandy (fine-grained), trace clay, wet	Firm	5-10	X	8				Passing #200 Sieve = 91%
BAY MUD: CLAY (CH), dark gray, silty, wet	Very Soft	10-15	X	2	55	68		PP = 400 psf
Six-inch lense of some shells and gravel (medium, subrounded) at 18 feet grading trace to some organics at 18½ feet		15-20		2				
		20-25		100 psi	61	67		Consolidation Test (see figure B-1) TX = 984 psf PP = 400 psf
grading sandy (fine- grained), with shells at 29 feet	Soft	25-30	X	5	30	93		PP = 400 psf

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1000 Broadway
Ste. 200, Oakland
California 94607

EXPLORATORY BORING LOG		
AGGREGATE STORAGE FACILITY, PORT OF RICHMOND Richmond, California		
PROJECT NO.	DATE	BORING NO.
1484.002	August 2002	B-2

DRILL RIG	Failing 750, Rotary	SURFACE ELEVATION	12.5 Feet	LOGGED BY	JCH
DEPTH TO GROUND WATER	Not Encountered	BORING DIAMETER	5-inch	DATE DRILLED	8/26/02

DESCRIPTION AND CLASSIFICATION		DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT(%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)	OTHER TESTS
DESCRIPTION AND REMARKS	CONSIST							
BAY MUD: CLAY (CH) , dark gray, sandy (fine- grained), with shells, wet grading trace sand, silty at 32 feet								
	Soft							
		35		120 psi	72	60		TX = 801 psf PP = 800 psf
		40		4	83	51		PP = 1,000 psf
		45						
		50		50/5"				
GRAVEL (GC) , greenish gray, fine to coarse, angular, some clay, wet BEDROCK								
Bottom of Boring = 50½ feet								

Notes:

1. The stratification lines represent the approximate boundaries between material types and the transition may be gradual.
2. For an explanation of the penetration resistance values see the first page of Appendix A.
3. A 140-lb safety hammer was used to advance the sampler. The hammer was raised using a rope and cathead.
4. PP = Pocket Penetrometer (undrained shear strength), TX = Triaxial Compression Test (peak deviator stress).

File Name: G:\ENGINEER\GINTWAPRO\JECTS\1484-002.GPJ Report Template: FUGRO Output Date: 9/24/02



1000 Broadway
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California 94607

EXPLORATORY BORING LOG

AGGREGATE STORAGE FACILITY, PORT OF RICHMOND
Richmond, California

PROJECT NO.

DATE

BORING
NO.

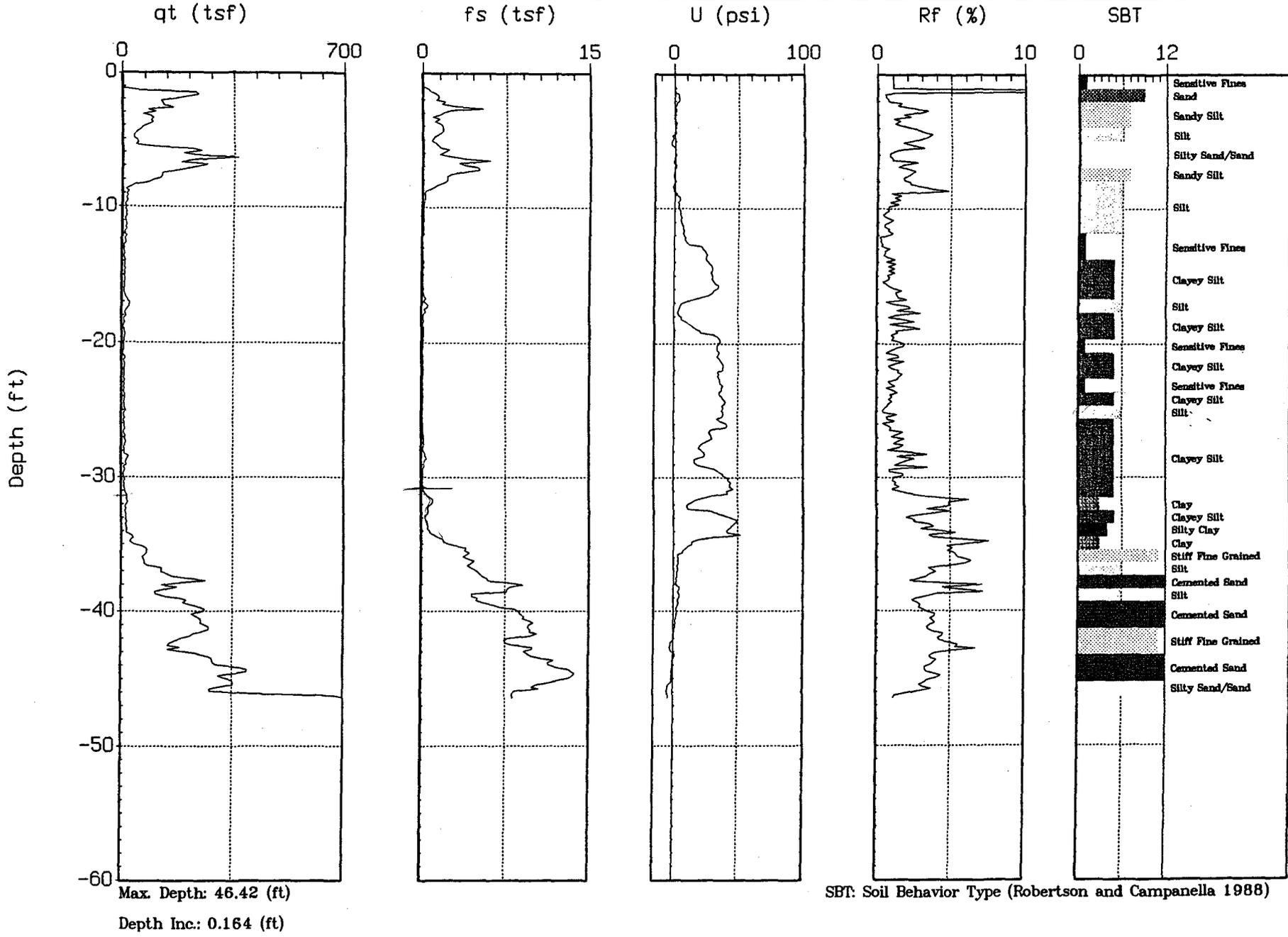
B-2



FUGRO

Site : PASHA
Location : CPT-01

Geologist : M. STANLEY
Date : 08:22:02 08:33

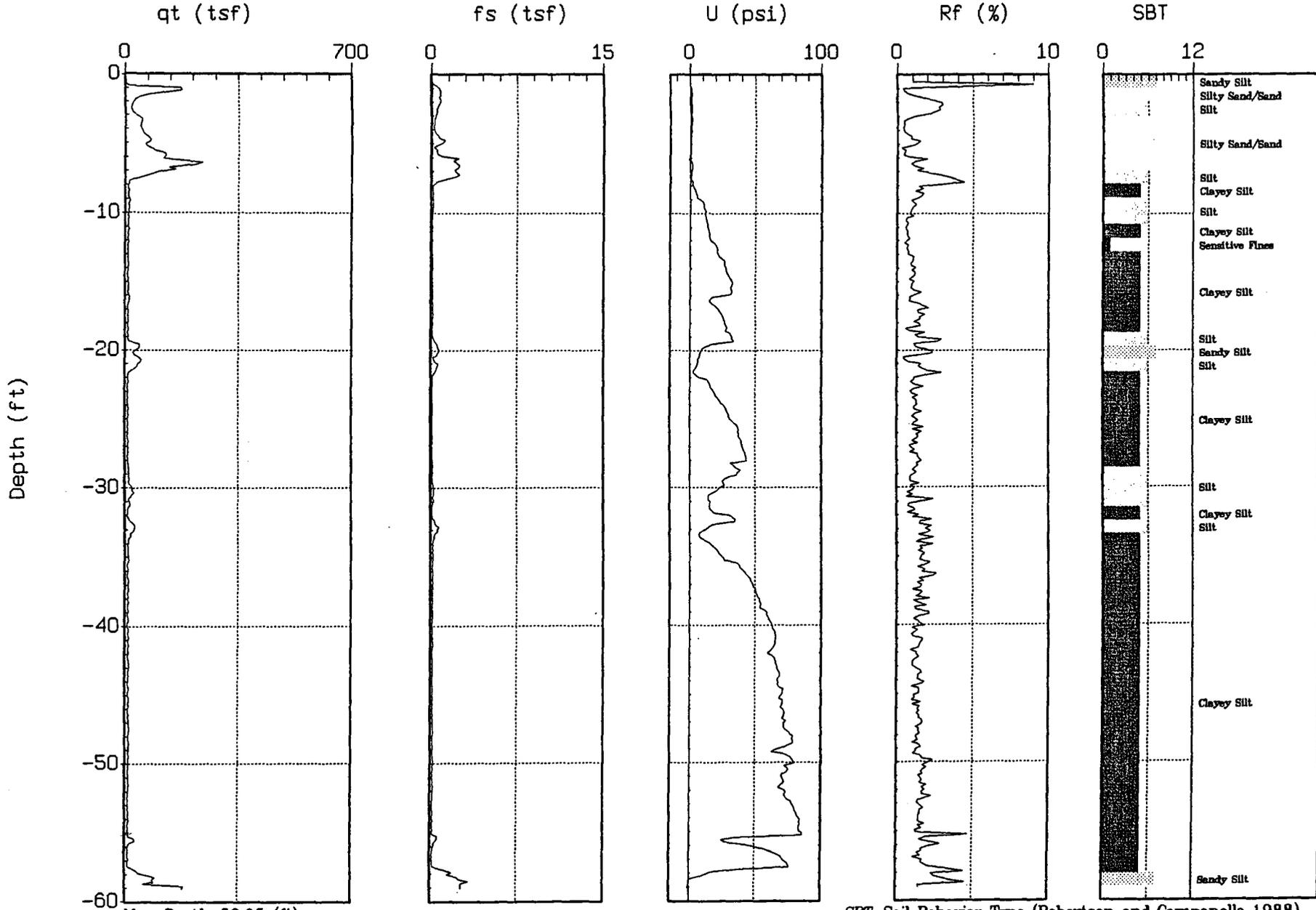




FUGRO

Site : PASHA
Location : CPT-02

Geologist : M. STANLEY
Date : 08:22:02 10:24



Max. Depth: 59.05 (ft)

Depth Inc.: 0.164 (ft)

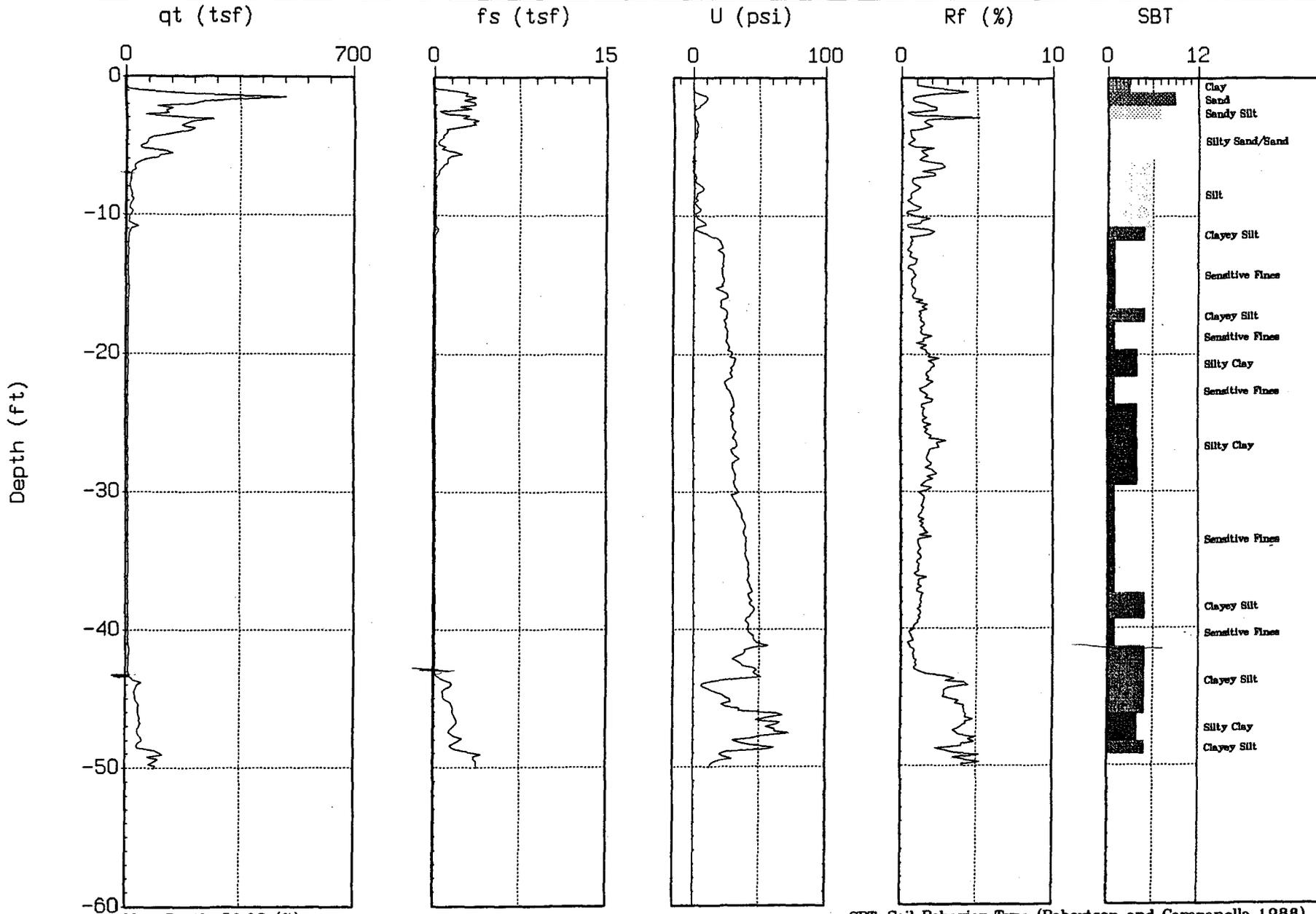
SBT: Soil Behavior Type (Robertson and Campanella 1988)



FUGRO

Site : PASHA
Location : CPT-03

Geologist : M. STANLEY
Date : 08:22:02 11:48



- Clay
- Sand
- Sandy Silt
- Silty Sand/Sand
- Silt
- Clayey Silt
- Sensitive Fines
- Clayey Silt
- Sensitive Fines
- Silty Clay
- Sensitive Fines
- Silty Clay
- Sensitive Fines
- Clayey Silt
- Sensitive Fines
- Clayey Silt
- Silty Clay
- Clayey Silt

Max. Depth: 50.03 (ft)

Depth Inc: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)

DRILL RIG	Failing 750, Rotary		SURFACE ELEVATION	11.2 Feet		LOGGED BY	JCH		
DEPTH TO GROUND WATER	Not Encountered		BORING DIAMETER	5-inch		DATE DRILLED	8/26/02		
DESCRIPTION AND CLASSIFICATION			DEPTH	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT(%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)	OTHER TESTS
DESCRIPTION AND REMARKS	CONSIST	SOIL TYPE	(FEET)						
PAVEMENT: 2 inches Asphalt Concrete over 8 inches Aggregate Baserock FILL: GRAVEL (GC), light brown, fine to medium, subangular, sandy (fine- to medium- grained), trace clay, damp grading some cobbles (up to 5 inches) at 6 feet grading coarse gravel and rock fragments at 8½ feet	Medium Dense				22				
	Loose		5		8				
			10		11				
BAY MUD: CLAY (CH), gray, silty, trace shell fragments, wet grading with shells at 18½ feet grading trace shells at 23½ feet	Very Soft		15		2	28	93		PP = 250 tsf
			20		300 psi				PP = 500 psf
			25		2	53	70		
					125 psi				

File Name: G:\ENGINEERING\PROJECTS\1484-002.GPJ Report Template: FIGRO Output Date: 9/2/02



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California 94607

EXPLORATORY BORING LOG		
AGGREGATE STORAGE FACILITY, PORT OF RICHMOND Richmond, California		
PROJECT NO.	DATE	BORING NO.
1484.002	August 2002	B-1

DRILL RIG	Failing 750, Rotary	SURFACE ELEVATION	11.2 Feet	LOGGED BY	JCH
DEPTH TO GROUND WATER	Not Encountered	BORING DIAMETER	5-inch	DATE DRILLED	8/26/02

DESCRIPTION AND CLASSIFICATION			DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT(%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)	OTHER TESTS
DESCRIPTION AND REMARKS	CONSIST	SOIL TYPE							
SAND (SM), gray, silty, wet	Loose								
BAY MUD: CLAY (CH), gray, silty, wet	Very Soft				3				PP = 2,500 psf PP = 1,500 psf
grading some brown organics at 36 feet	Soft		35		5	95	46		PP = 1,500 psf
			40		5	67	60		PP = 1,000 psf
			45		6	69	59		PP = 1,000 psf
			50						
CLAY (CL), greenish gray, sandy (fine-grained), wet	Very Stiff		55		34	28	98		PP = 6,000 psf

Bottom of Boring = 55 feet

Notes:

1. The stratification lines represent the approximate boundaries between material types and the transition may be gradual.
2. For an explanation of the penetration resistance values see the first page of Appendix A.
3. A 140-lb safety hammer was used to advance the sampler. The hammer was raised using a rope and cathead.
4. PP = Pocket Penetrometer (undrained shear strength).

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Ste. 200, Oakland
California 94607

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EXPLORATORY BORING LOG		
AGGREGATE STORAGE FACILITY, PORT OF RICHMOND Richmond, California		
PROJECT NO.	DATE	BORING NO.
1484.002	August 2002	B-1

DRILL RIG	Failing 750, Rotary	SURFACE ELEVATION	12.5 Feet	LOGGED BY	JCH
DEPTH TO GROUND WATER	Not Encountered	BORING DIAMETER	5-inch	DATE DRILLED	8/26/02

DESCRIPTION AND CLASSIFICATION		DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT(%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)	OTHER TESTS
DESCRIPTION AND REMARKS	CONSIST							
PAVEMENT: 3 inches Asphalt Concrete over 3 inches Aggregate Baserock FILL: GRAVEL (GC), brown, fine to coarse, subrounded to subangular, some clay, damp, some sand (fine- to coarse-grained), damp	Loose	0-5		14	10	121		
SILT (ML), greenish gray, sandy (fine-grained), trace clay, wet	Firm	5-10		8			Passing #200 Sieve = 91%	
BAY MUD: CLAY (CH), dark gray, silty, wet	Very Soft	10-15		2	55	68	PP = 400 psf	
Six-inch lense of some shells and gravel (medium, subrounded) at 18 feet grading trace to some organics at 18½ feet		15-20		2				
		20-25		100 psi	61	67	Consolidation Test (see figure B-1) TX = 984 psf PP = 400 psf	
grading sandy (fine- grained), with shells at 29 feet	Soft	25-29		5	30	93	PP = 400 psf	

File Name: G:\ENGINEERING\PROJECTS\1484-002.GPJ Report Template: FUGRO Output Date: 8/24/02



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EXPLORATORY BORING LOG

AGGREGATE STORAGE FACILITY, PORT OF RICHMOND
Richmond, California

PROJECT NO.
1484.002

DATE
August 2002

BORING NO. **B-2**

DRILL RIG	Failing 750, Rotary	SURFACE ELEVATION	12.5 Feet	LOGGED BY	JCH
DEPTH TO GROUND WATER	Not Encountered	BORING DIAMETER	5-inch	DATE DRILLED	8/26/02

DESCRIPTION AND CLASSIFICATION			DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT(%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)	OTHER TESTS
DESCRIPTION AND REMARKS	CONSIST	SOIL TYPE							
BAY MUD: CLAY (CH), dark gray, sandy (fine-grained), with shells, wet grading trace sand, silty at 32 feet	Soft		35		120 psi	72	60		TX = 801 psf PP = 800 psf
			40		4	83	51		PP = 1,000 psi
			45						
GRAVEL (GC), greenish gray, fine to coarse, angular, some clay, wet BEDROCK	Dense		50		50/5"				

Bottom of Boring = 50½ feet

Notes:

1. The stratification lines represent the approximate boundaries between material types and the transition may be gradual.
2. For an explanation of the penetration resistance values see the first page of Appendix A.
3. A 140-lb safety hammer was used to advance the sampler. The hammer was raised using a rope and cathead.
4. PP = Pocket Penetrometer (undrained shear strength), TX = Triaxial Compression Test (peak deviator stress).

File Name: G:\ENGINEERING\INT\PROJECTS\1484-002.GPJ Report Template: FUGRO Output Date: 8/24/02



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California 94607

EXPLORATORY BORING LOG

AGGREGATE STORAGE FACILITY, PORT OF RICHMOND
Richmond, California

PROJECT NO.	DATE	BORING NO.
1484.002	August 2002	

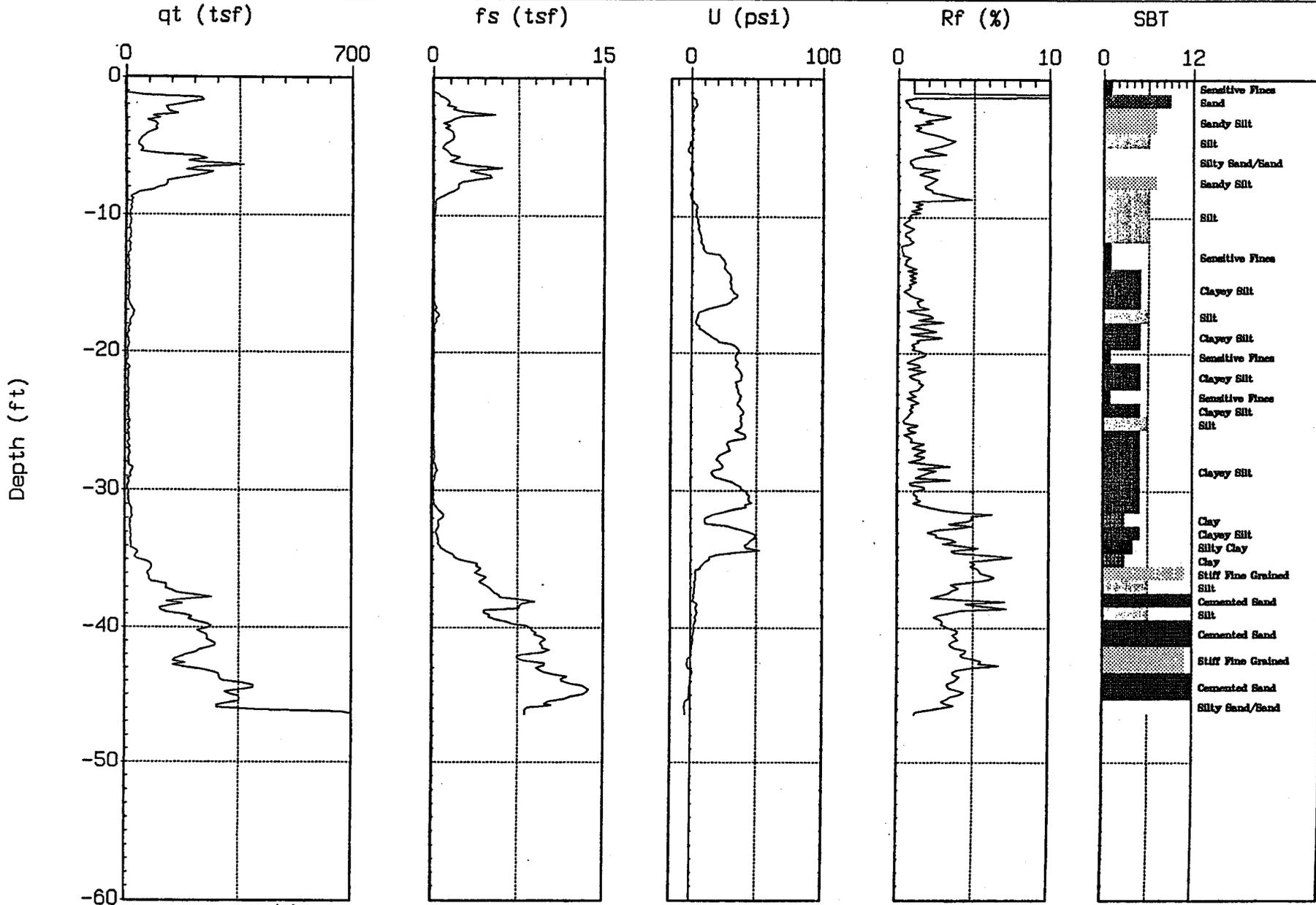
B-2



FUGRO

Site : PASHA
Location : CPT-01

Geologist : M. STANLEY
Date : 08:22:02 08:33



Max. Depth: 46.42 (ft)

Depth Inc.: 0.164 (ft)

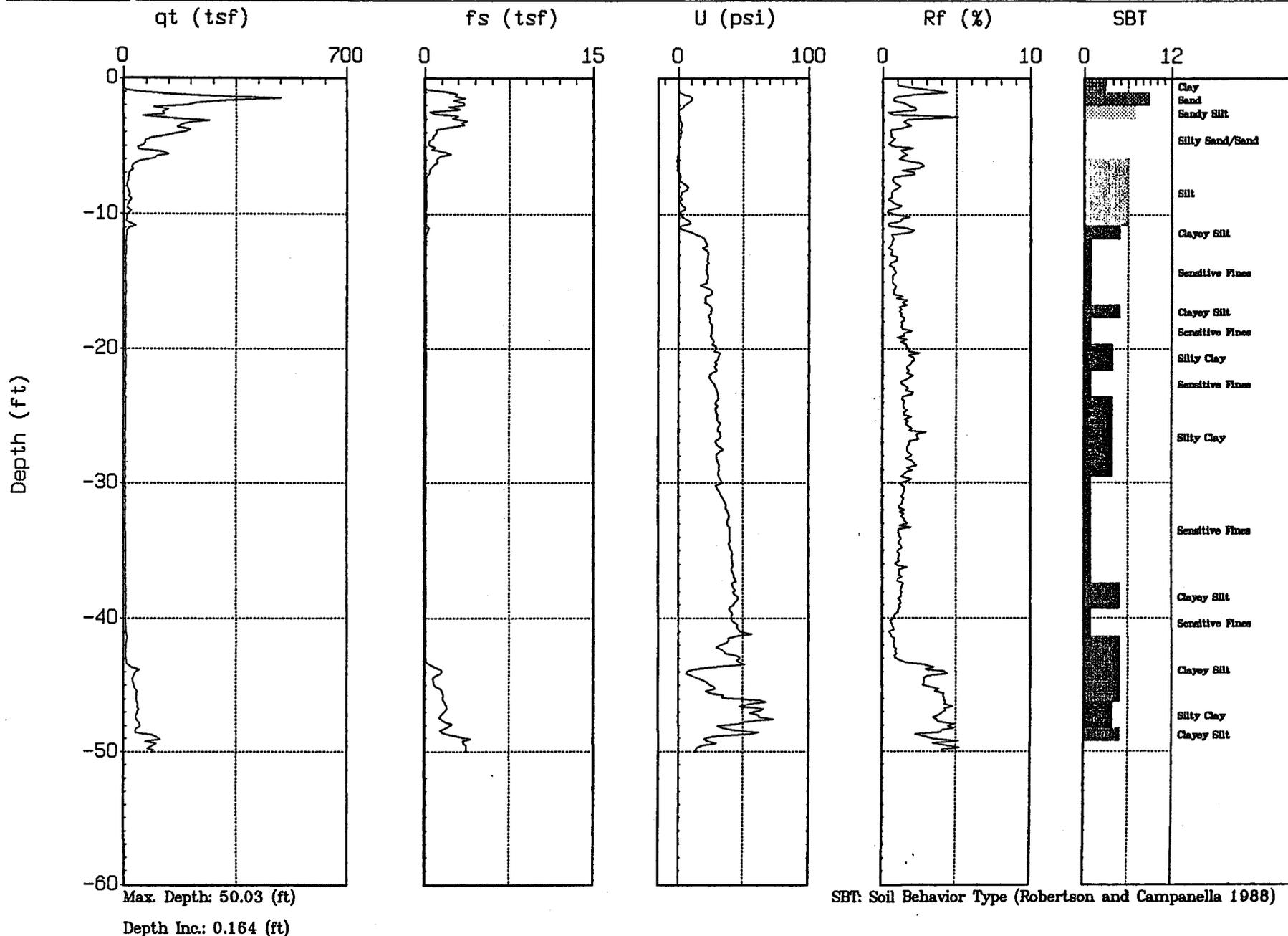
SBT: Soil Behavior Type (Robertson and Campanella 1988)



FUGRO

Site : PASHA
Location : CPT-03

Geologist : M. STANLEY
Date : 08:22:02 11:48



SBT: Soil Behavior Type (Robertson and Campanella 1988)

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psf	LOCATION: Hopper (160 feet west of wharf edge and 142 feet south of the north wharf edge) SURFACE EL: ft +/- (rel. MSL datum)	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u , ksf	OTHER TESTS
					MATERIAL DESCRIPTION							
0		1		(43)	Asphalt Concrete (AC), 2 inches							
5		2		(30)	Sandy GRAVEL (GW): medium dense, brown, moist, fine to coarse (gravel to 3 inches), angular (rock fragments), fine- to coarse-grained sand, trace silt (FILL)							MA
10		3		(26)								
15		4		26	CLAY (CL): firm, light brown mixed with gray, moist to wet, with fine- to medium-grained sand (BAY MUD)							
20		5		(9)								
21		6			some shells below 21 feet	100	26				1.6 P 0.5 P	
25		7		(6)			54		46	25	0.8 P	
30		8		80 psi	Silty CLAY (CH): soft to firm, gray, wet, some shell fragments	88	35					
35		9		(17)								
40		10				92	30				0.6 P 2.5 P	
41		11		8	some shell fragments below 21 feet							

BORING DEPTH: 101.5 ft
 DEPTH TO WATER: Not Encountered
 BACKFILL: Neat Cement
 COMPLETION DATE: January 23, 2003
 NOTES: 1. Terms and symbols defined on Plate A-1.

Continued

DRILLING METHOD: 5.25-in. dia. Rotary Wash
 HAMMER TYPE: Rope and Cathead
 RIG TYPE: Falling 1500
 DRILLED BY: Pitcher, Ralph & Larry
 LOGGED BY: J. Hagen

LOG OF BORING NO. B-3

Hanson Aggregates
 Richmond, California



DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psf	LOCATION: Hopper (160 feet west of wharf edge and 142 feet south of the north wharf edge) SURFACE EL: ft +/- (rel. MSL datum)	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u , ksf	OTHER TESTS
					MATERIAL DESCRIPTION							
		12		(14)		63	62				2.0 P	
50		13		(40)	grades to sandy, greenish-gray							
		14			Clayey SAND (SC); medium dense, bluish-gray, wet, fine- to coarse-grained, high plasticity fines	108	21	43			1.5 P	
55					- logged cuttings from 57 to 100 feet							
60												
65												
70												
75												
80												
85												

BORING DEPTH: 101.5 ft
 DEPTH TO WATER: Not Encountered
 BACKFILL: Neat Cement
 COMPLETION DATE: January 23, 2003
 NOTES: 1. Terms and symbols defined on Plate A-1.

Continued

DRILLING METHOD: 5.25-in. dia. Rotary Wash
 HAMMER TYPE: Rope and Cathead
 RIG TYPE: Falling 1500
 DRILLED BY: Pitcher, Ralph & Larry
 LOGGED BY: J. Hagen

LOG OF BORING NO. B-3
 Hanson Aggregates
 Richmond, California



DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psf	LOCATION: Hopper (160 feet west of wharf edge and 142 feet south of the north wharf edge)	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u , ksf	OTHER TESTS
					SURFACE EL: ft +/- (rel. MSL datum)							
95												
100		15 16		(25)		73	50				1.8 P 2.0 P	
105												
110												
115												
120												
125												
130												

BORING DEPTH: 101.5 ft
 DEPTH TO WATER: Not Encountered
 BACKFILL: Neat Cement
 COMPLETION DATE: January 23, 2003
 NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 5.25-in. dia. Rotary Wash
 HAMMER TYPE: Rope and Cathead
 RIG TYPE: Falling 1500
 DRILLED BY: Pitcher, Ralph & Larry
 LOGGED BY: J. Hagen

LOG OF BORING NO. B-3
 Hanson Aggregates
 Richmond, California



DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psf	LOCATION: Proposed column support #3 (about 175 feet west of Hopper) SURFACE EL: ft +/- (rel. MSL datum)	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S _u , ksf	OTHER TESTS
					MATERIAL DESCRIPTION							
0 - 3	[Hatched]	1	(64)		Asphalt Concrete (AC), 3 inches							MA
3 - 5	[Hatched]	2	(36)		GRAVEL (GP): dense to very dense, brown, damp, fine to coarse, gravel to 3 inches, some sand (fine- to coarse-grained), trace clay (FILL)							
5 - 10	[Vertical Lines]				Sandy SILT (ML): stiff, dark gray, wet, fine-grained (BAY MUD)							
10 - 12	[Vertical Lines]	3	(18)									
12 - 14	[Vertical Lines]	4	(24)								3.0 P 5.5 P	
14 - 16	[Vertical Lines]	5	(6)		CLAY (CH): soft to firm, dark gray, moist to wet, trace silt							
16 - 18	[Vertical Lines]	6									0.2 P	
18 - 20	[Vertical Lines]	7		70 psf	grading silty, some shells at 20 feet	86	38					
20 - 22	[Vertical Lines]	8										
22 - 24	[Vertical Lines]	9	(8)		grading trace shell fragments	76	47				0.6 P	
24 - 26	[Vertical Lines]											
26 - 28	[Vertical Lines]	10	(7)									
28 - 30	[Vertical Lines]											
30 - 32	[Vertical Lines]	11										
32 - 34	[Vertical Lines]	12	(11)		Silty CLAY (CL-ML): stiff, dark gray, moist to wet, with sand (fine-grained), trace shell fragments	91	31				1.6 P 1.8 P	
34 - 36	[Vertical Lines]											
36 - 38	[Vertical Lines]	13										
38 - 40	[Vertical Lines]	14	(9)		Silty CLAY (CH): firm to stiff, gray, moist to wet, some fine-grained sand, some brown organics - decreasing sand and silt content with depth	49	86				1.6 P 1.8 P	

Continued

BORING DEPTH: 83.0 ft
 DEPTH TO WATER: Not Encountered
 BACKFILL: Neat Cement
 COMPLETION DATE: January 24, 2003
 NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 5.25-in. dia. Rotary Wash
 HAMMER TYPE: Rope and Cathead
 RIG TYPE: Falling 1500
 DRILLED BY: Pitcher, Ralph & Larry
 LOGGED BY: J. Hagen

LOG OF BORING NO. B-4
 Hanson Aggregates
 Richmond, California



DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psf	LOCATION: Proposed column support #3 (about 175 feet west of Hopper) SURFACE EL: ft +/- (rel. MSL datum)	MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u , ksf	OTHER TESTS
48		15		(16)			50	85				1.5 P	
50		17		(14)			61	65				0.8 P	
55						- logged cuttings from 55 to 80 feet							
82		19	X	50/6"		Sandy GRAVEL (GP): very dense, brown, moist, fine to coarse, coarse-grained sand							

BORING DEPTH: 83.0 ft
 DEPTH TO WATER: Not Encountered
 BACKFILL: Neat Cement
 COMPLETION DATE: January 24, 2003
 NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 5.25-in. dia. Rotary Wash
 HAMMER TYPE: Rope and Cathead
 RIG TYPE: Failing 1500
 DRILLED BY: Pitcher, Ralph & Larry
 LOGGED BY: J. Hagen

LOG OF BORING NO. B-4
 Hanson Aggregates
 Richmond, California



DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psf	LOCATION: East retaining wall (about 820 feet west of Hopper) SURFACE EL: ft +/- (rel. MSL datum)	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u , ksf	OTHER TESTS
					MATERIAL DESCRIPTION							
		1		(50/6")	Asphalt Concrete (1 inch) Clayey GRAVEL (GC): very dense, brown, moist, fine to coarse (FILL)							
5				50/3"	SANDSTONE: hard to very hard, gray, fresh to slightly weathered, fine-grained sand							
10												
15												

BORING DEPTH: 5.5 ft
 DEPTH TO WATER: Not Encountered
 BACKFILL: Neat Cement
 COMPLETION DATE: January 24, 2003
 NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 5.25-in. dia. Rotary Wash
 HAMMER TYPE: Rope and Cathead
 RIG TYPE: Falling 1500
 DRILLED BY: Pitcher, Ralph & Larry
 LOGGED BY: J. Hagen

LOG OF BORING NO. B-5
 Hanson Aggregates
 Richmond, California



DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psf	LOCATION: Edge of parking lot, next to dredge spoils (about 1020 feet west of Hopper) SURFACE EL: ft +/- (rel. MSL datum)	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S _u , ksf	OTHER TESTS
5				(83/10")	Asphalt Concrete (AC), 1 inch Clayey GRAVEL (GC): very dense, brown, damp, fine to coarse, some clay (FILL)							
				50/3"	SANDSTONE: hard to very hard, gray, fresh to slightly weathered, fine-grained sand							
10												
15												

BORING DEPTH: 4.0 ft
 DEPTH TO WATER: Not Encountered
 BACKFILL: Neat Cement
 COMPLETION DATE: January 24, 2003
 NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 5.25-in. dia. Rotary Wash
 HAMMER TYPE: Rope and Cathead
 RIG TYPE: Failing 1500
 DRILLED BY: Pitcher, Ralph & Larry
 LOGGED BY: J. Hagen

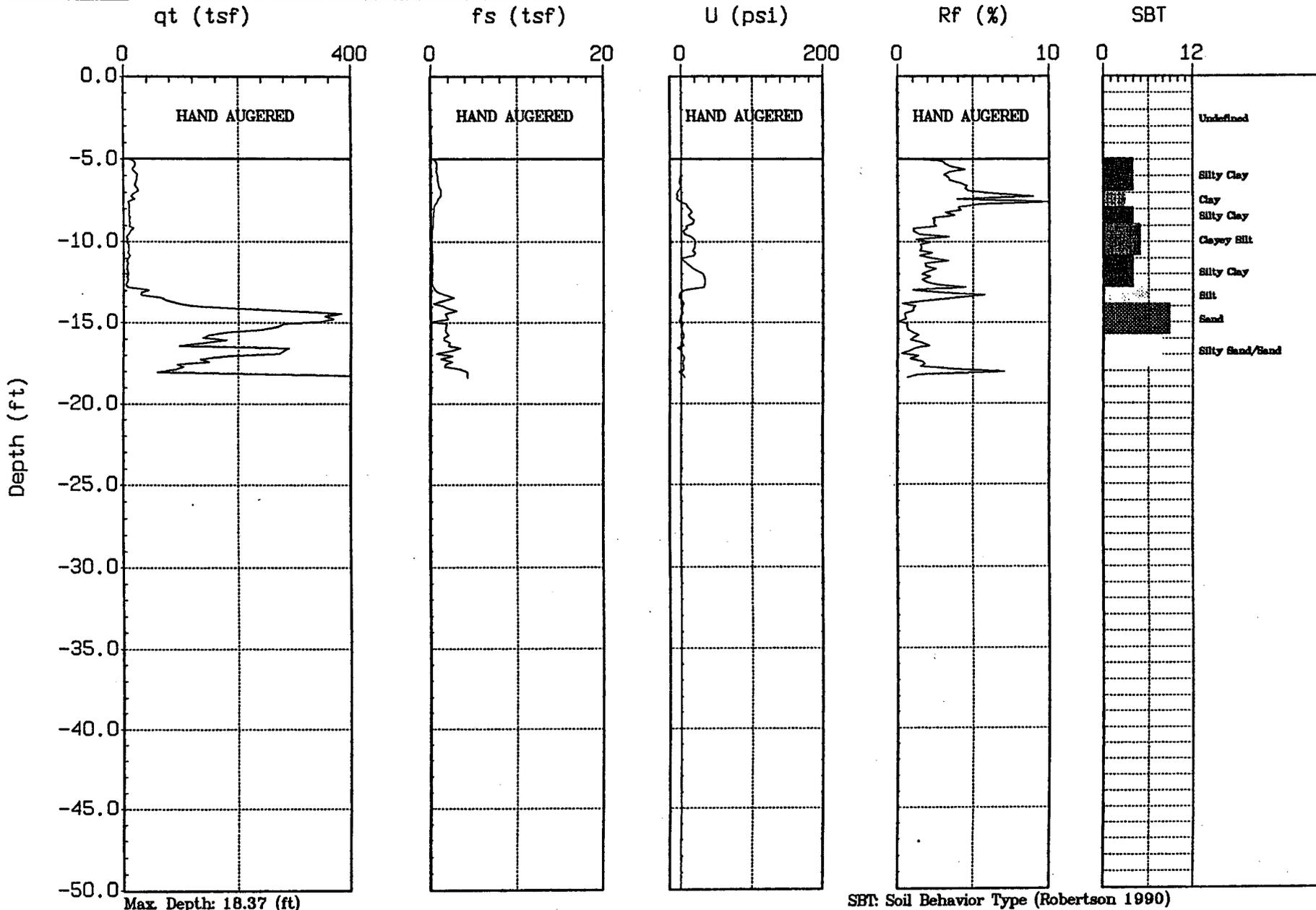
LOG OF BORING NO. B-6
 Hanson Aggregates
 Richmond, California



FUGRO

Site : PT. POTRERO
Location : CPT-01

Engineer : J. HAGEN
Date : 01:22:03 07:56

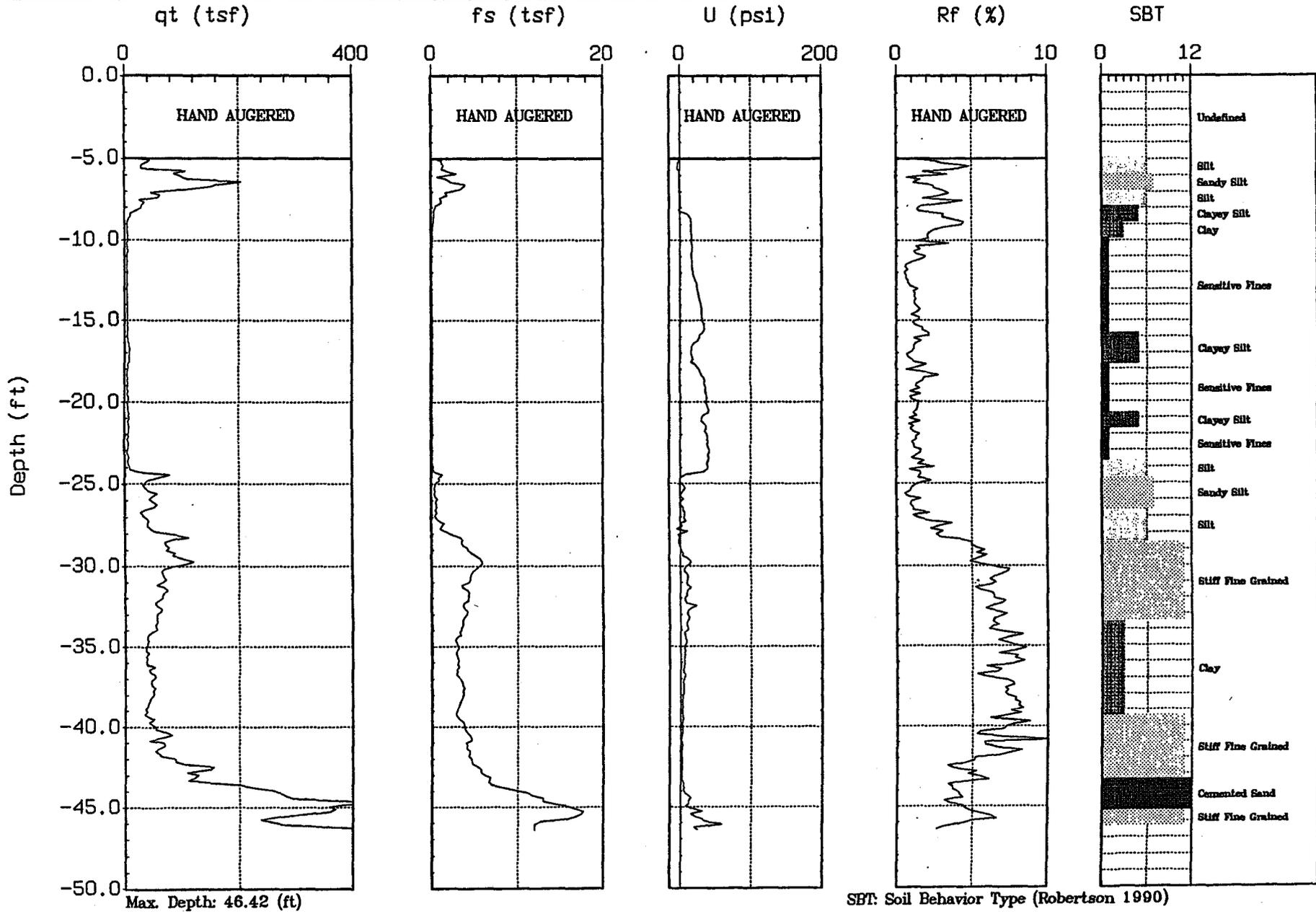




FUGRO

Site : PT. POTRERO
Location : CPT-03

Engineer : J. HAGEN
Date : 01:22:03 09:46



Max. Depth: 46.42 (ft)
Depth Inc.: 0.164 (ft)

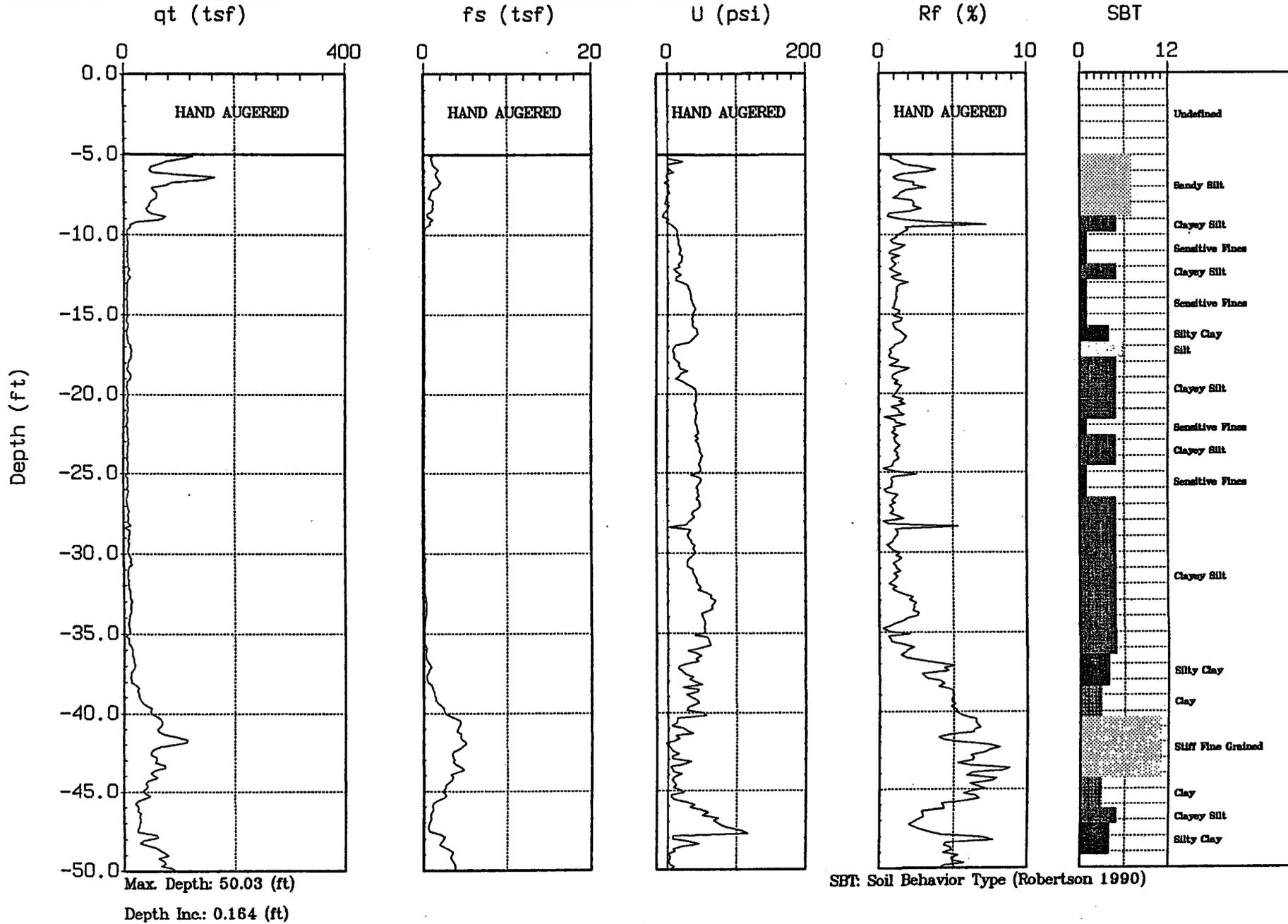
SBT: Soil Behavior Type (Robertson 1990)



FUGRO

Site : PT. POTRERO
Location : CPT-04

Engineer : J. HAGEN
Date : 01:22:03 11:21

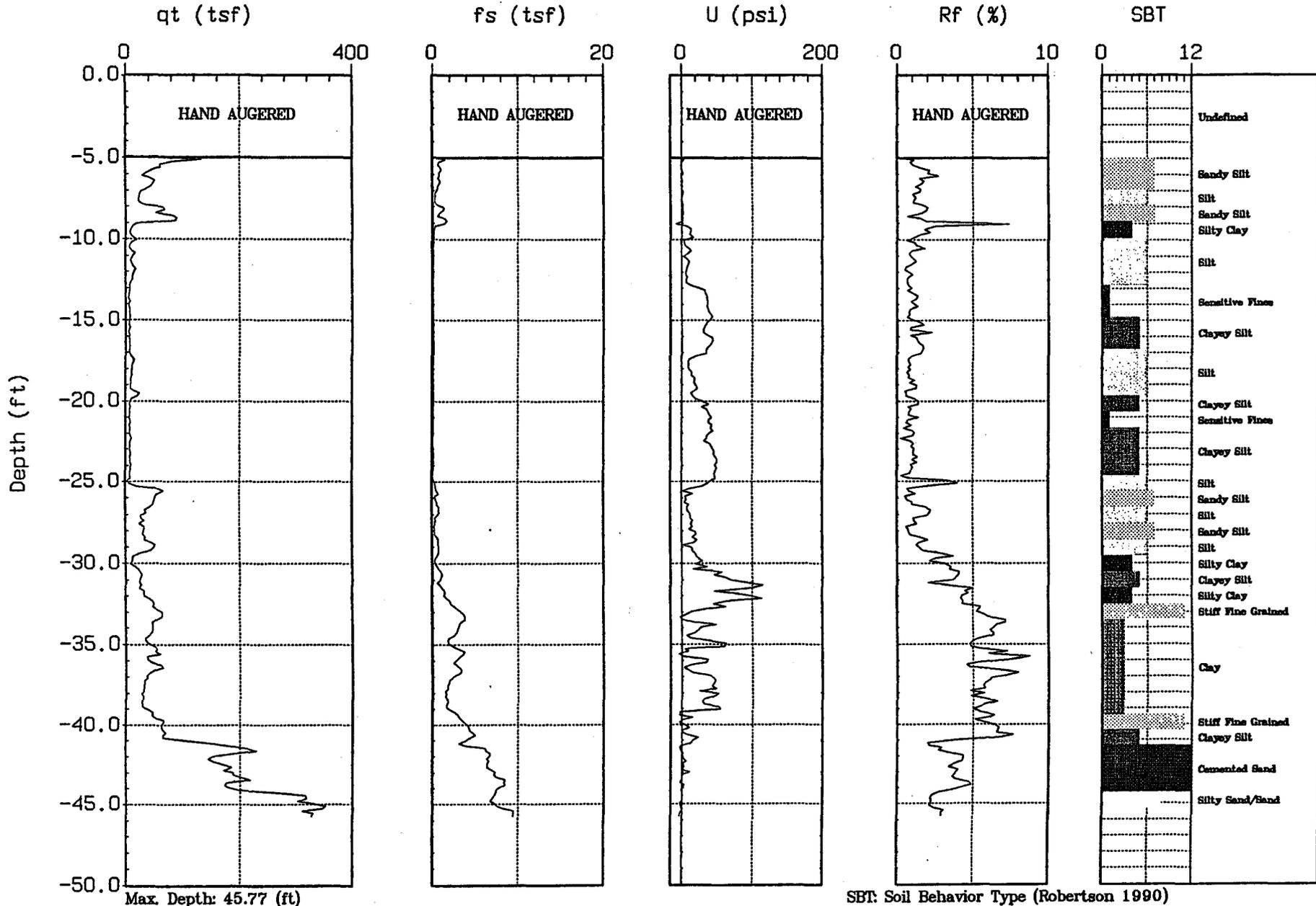




FUGRO

Site : PT. POTRERO
Location : CPT-05

Engineer : J. HAGEN
Date : 01:22:03 12:25



Max. Depth: 45.77 (ft)
Depth Inc.: 0.164 (ft)

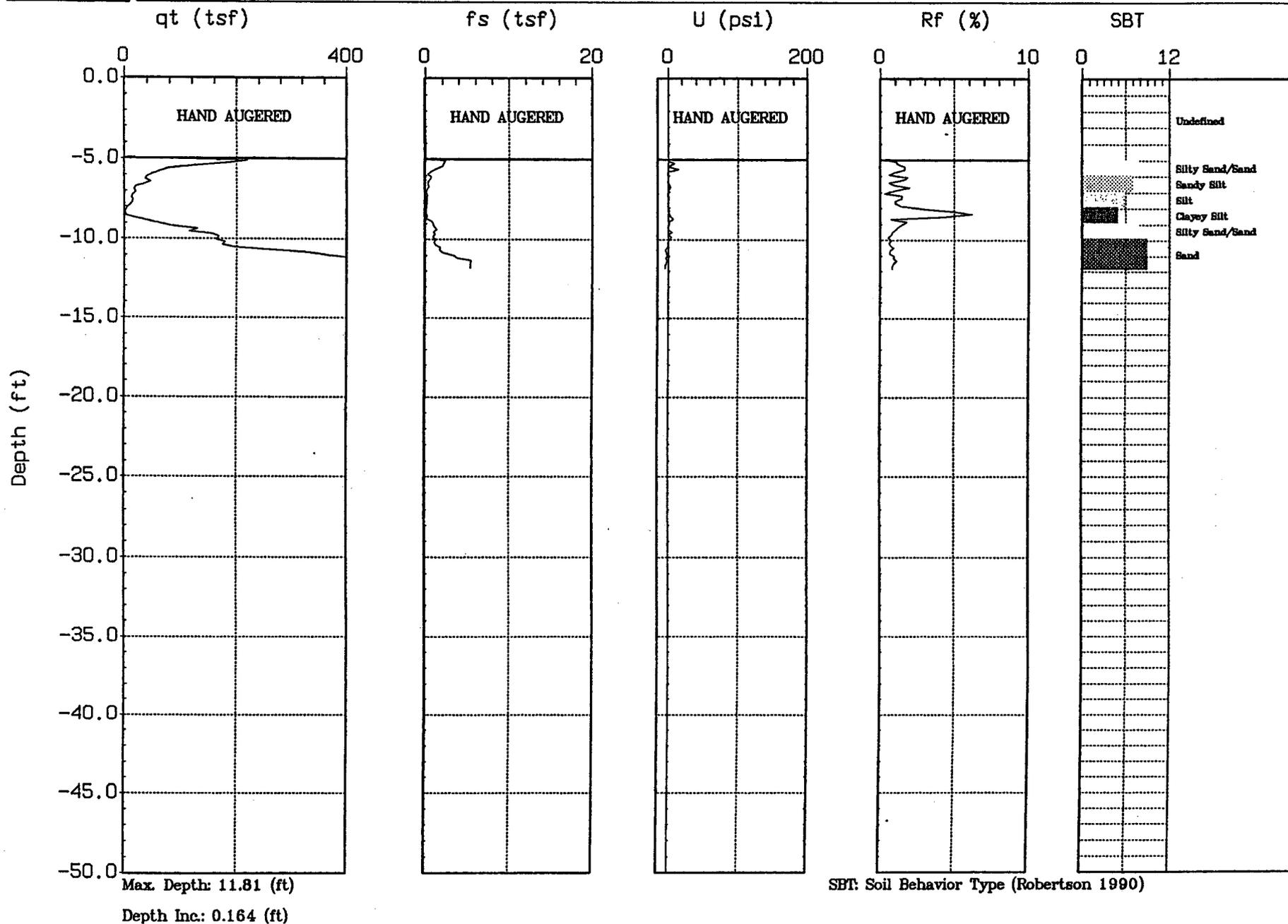
SBT: Soil Behavior Type (Robertson 1990)

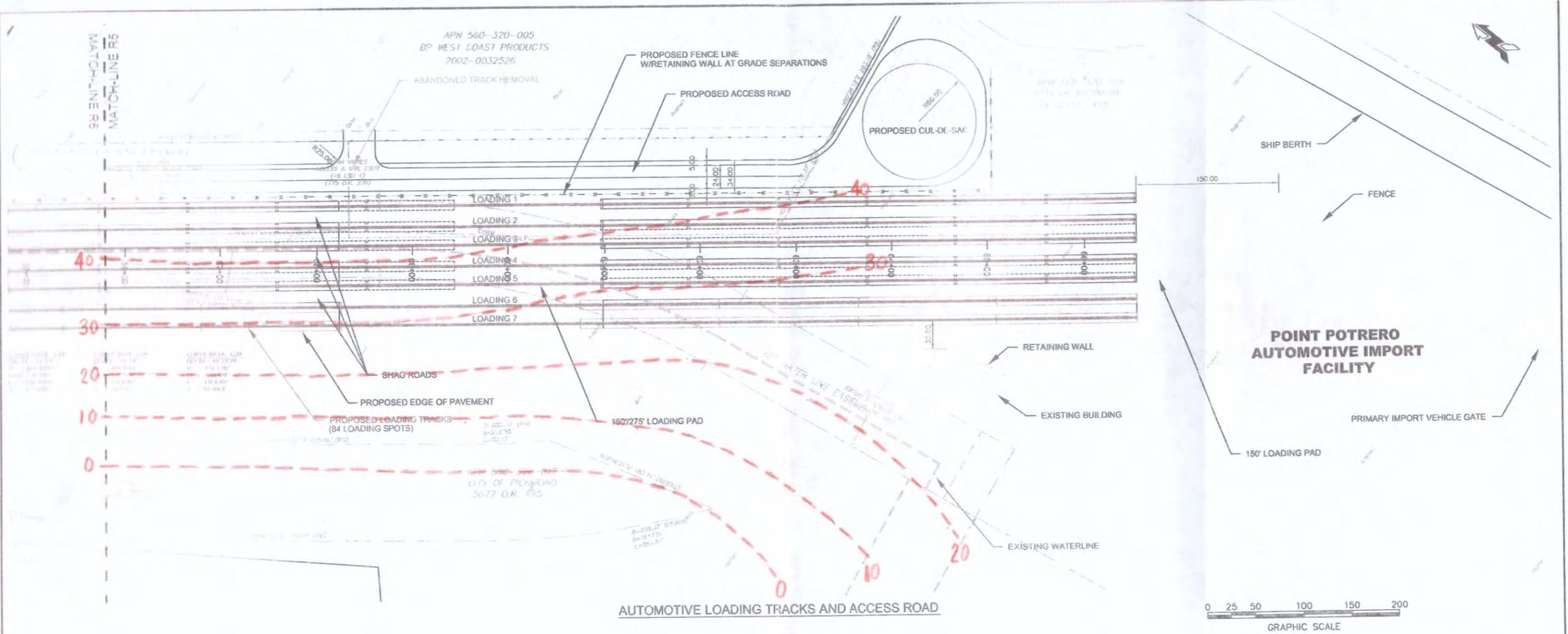


FUGRO

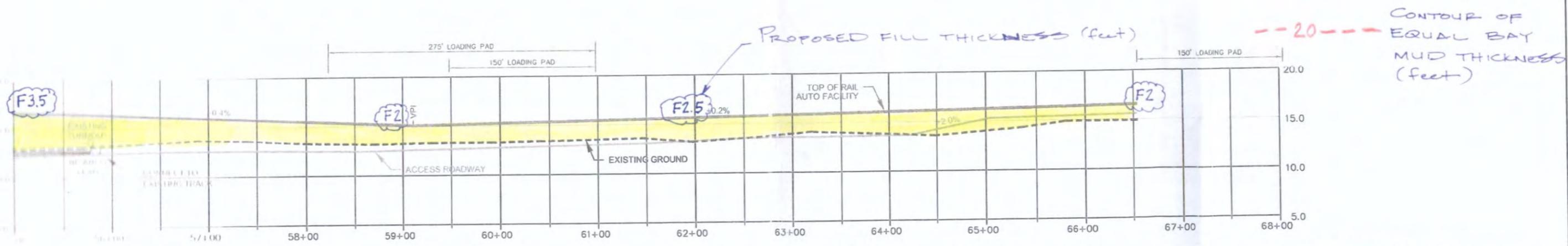
Site : PT. POTRERO
Location : CPT-06

Engineer : J. HAGEN
Date : 01:22:03 13:44





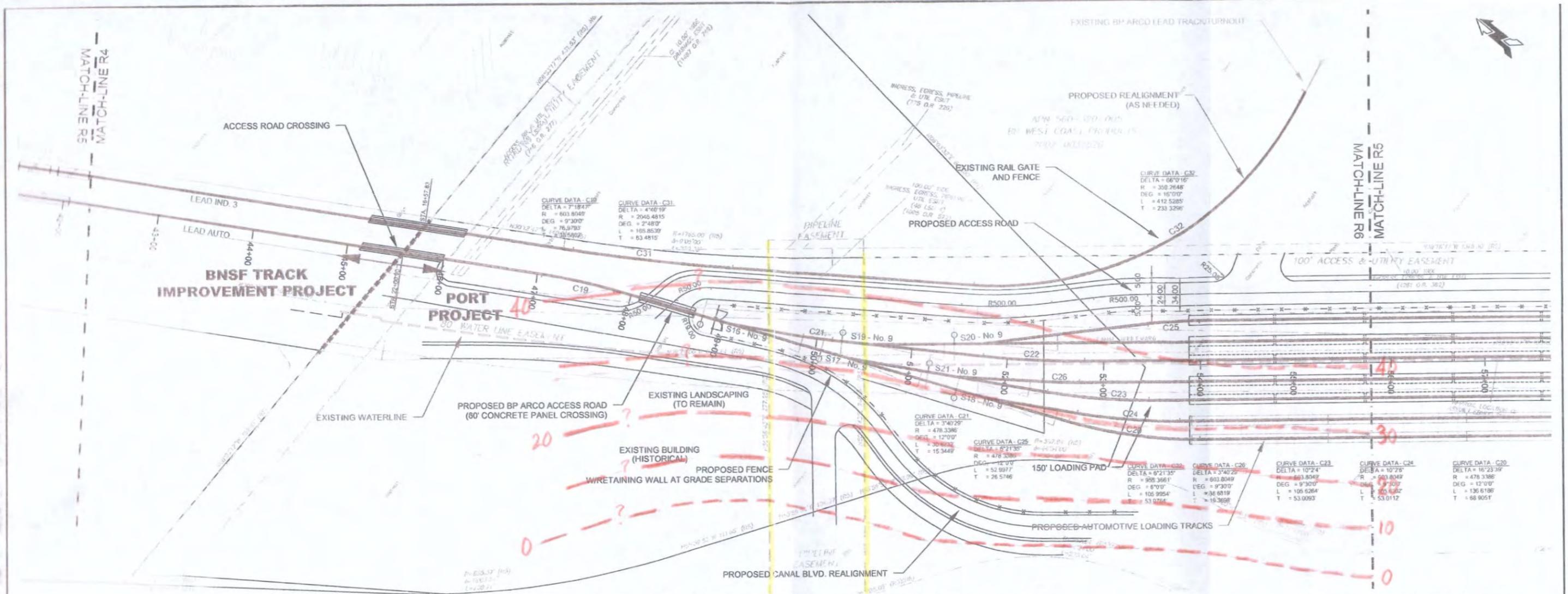
AUTOMOTIVE LOADING TRACKS AND ACCESS ROAD



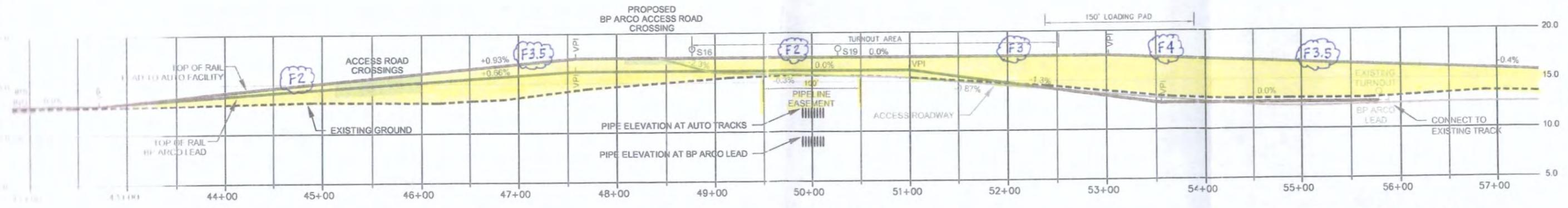
PROFILE - LOADING TRACK 3
 (1 HORIZONTAL UNIT = 10 VERTICAL UNITS)

FOR REVIEW
 R6 - AUTOMOTIVE LOADING TRACKS
 RAIL EXPANSION PROJECT
 PORT OF RICHMOND, CALIFORNIA
 July 2008





AUTOMOTIVE LOADING TRACKS, ACCESS ROAD AND BP ARCO FACILITY LEAD TRACK



PROFILE - LOADING TRACK 3 AND INDUSTRY LEAD
(1 HORIZONTAL UNIT = 10 VERTICAL UNITS)

FOR REVIEW
R5 - AUTO AND INDUSTRIAL LEAD TRACKS
RAIL EXPANSION PROJECT
PORT OF RICHMOND, CALIFORNIA
July 2008





CORNERSTONE EARTH GROUP

BORING NUMBER EB-1

PAGE 1 OF 1

DATE STARTED 11/6/08 DATE COMPLETED 11/6/08

DRILLING CONTRACTOR Exploration Geoservices, Inc.

DRILLING METHOD Mobile B-60, 8 inch Hollow-Stem Auger

LOGGED BY JLF

NOTES _____

PROJECT NAME Honda Port of Entry

PROJECT NUMBER 281-1-3

PROJECT LOCATION Richmond, CA

GROUND ELEVATION 15 FT +/- BORING DEPTH 20 ft.

LATITUDE _____ LONGITUDE _____

GROUND WATER LEVELS:

▽ AT TIME OF DRILLING Not Encountered

▼ AT END OF DRILLING Not Encountered

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ELEVATION (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	UNDRAINED SHEAR STRENGTH, ksf									
										1.0	2.0	3.0	4.0	5.0					
14.8	0		3 inches asphalt concrete over 6 inches aggregate base																
14.3			Clayey Gravel with Sand (GC) [Fill] dense to loose, moist, light brown	67	MC														
	5		Sandy Lean Clay (CL) [Fill] medium stiff, wet, light gray with olive and brown mottles	15	MC-2	106	9												
9.5			Silty Sand (SM) very loose, wet, dark gray, some shell fragments	28	MC-3B	59	64												
6.5			Fat Clay with Sand (CH) [Bay Mud] soft, wet, dark gray, fine sand, some shell fragments, high plasticity	6	MC-4		24		38										
2.5				5	MC-5	93	32		80										
	15				ST-6	67	56												
-5.0	20		Bottom of Boring at 20.0 feet.																
	25																		
	30																		
	35																		

CORNERSTONE EARTH GROUP - CORNERSTONE.GDT - 1/15/08 09:21 - P:\DRAFTING\GINT FILES\281-1-3.GPJ



CORNERSTONE EARTH GROUP

BORING NUMBER EB-2

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DATE STARTED 11/6/08 DATE COMPLETED 11/6/08
 DRILLING CONTRACTOR Exploration Geoservices, Inc.
 DRILLING METHOD Mobile B-60, 8 inch Hollow-Stem Auger
 LOGGED BY JLF
 NOTES _____

PROJECT NAME Honda Port of Entry
 PROJECT NUMBER 281-1-3
 PROJECT LOCATION Richmond, CA
 GROUND ELEVATION 15 FT +/- BORING DEPTH 15 ft.
 LATITUDE _____ LONGITUDE _____
 GROUND WATER LEVELS:
 ▽ AT TIME OF DRILLING Not Encountered
 ▼ AT END OF DRILLING Not Encountered

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ELEVATION (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	UNDRAINED SHEAR STRENGTH, ksf										
										○ HAND PENETROMETER	△ TORVANE	● UNCONFINED COMPRESSION	▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL	1.0	2.0	3.0	4.0	5.0		
14.8	0		1/2 inch asphalt concrete																	
			Clayey Gravel with Sand (GC) [Fill] medium dense to loose, moist, light brown to dark gray (petroleum odor)	25	MC															
	5		Fat Clay (CH) [Bay Mud] soft, wet, dark gray, trace fine sand, high plasticity	11	MC-2A	97	7													
9.5				4	MC-3B	69	47		91											
	10			2	NR															
0.0	15		Bottom of Boring at 15.0 feet.	5	MC-4	61	62		96											

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CORNERSTONE EARTH GROUP

BORING NUMBER EB-3

PAGE 1 OF 1

DATE STARTED 11/6/08 DATE COMPLETED 11/6/08
 DRILLING CONTRACTOR Exploration Geoservices, Inc.
 DRILLING METHOD Mobile B-60, 8 inch Hollow-Stem Auger
 LOGGED BY JLF
 NOTES _____

PROJECT NAME Honda Port of Entry
 PROJECT NUMBER 281-1-3
 PROJECT LOCATION Richmond, CA
 GROUND ELEVATION 16 FT +/- BORING DEPTH 13.5 ft.
 LATITUDE _____ LONGITUDE _____
 GROUND WATER LEVELS:
 ▽ AT TIME OF DRILLING Not Encountered
 ▽ AT END OF DRILLING Not Encountered

ELEVATION (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION	N-Value (Uncorrected) Blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	UNDRAINED SHEAR STRENGTH, ksf										
										○ HAND PENETROMETER	△ TORVANE	● UNCONFINED COMPRESSION	▲ UNCONSOLIDATED-UNDRAINED TRIAXIAL	1.0	2.0	3.0	4.0	5.0		
16.0	0		6 inches asphalt concrete																	
15.5	0		Clayey Gravel with Sand (GC) [Fill] medium dense to very dense, moist, light brown	24	MC-1B															
	5		some cobbles	11	MC															
	5			50	MC-3		12													
8.5	8.5		Fat Clay (CH) [Bay Mud] very soft, wet, gray, high plasticity	6	MC-4	74	43													
	10																			
	2.5		Bottom of Boring at 13.5 feet.																	

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CORNERSTONE EARTH GROUP

BORING NUMBER EB-4

PAGE 1 OF 2

PROJECT NAME Honda Port of Entry

PROJECT NUMBER 281-1-3

PROJECT LOCATION Richmond, CA

DATE STARTED 11/6/08 DATE COMPLETED 11/6/08

GROUND ELEVATION 14.5 FT +/- BORING DEPTH 40 ft.

DRILLING CONTRACTOR Exploration Geoservices, Inc.

LATITUDE _____ LONGITUDE _____

DRILLING METHOD Mobile B-60, 8 inch Hollow-Stem Auger

GROUND WATER LEVELS:

LOGGED BY JLF

▽ AT TIME OF DRILLING Not Encountered

NOTES _____

▽ AT END OF DRILLING Not Encountered

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ELEVATION (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	UNDRAINED SHEAR STRENGTH, ksf
14.5	0		6 inches asphalt concrete							
14.0			Clayey Sand (SC) [Fill]							
			medium dense, wet, dark gray, subrounded	15	MC-1A					
12.5			Clayey Gravel with Sand (GC) [Fill]							
			medium dense, moist, light brown	8	MC-2A	109	15			
8.5			Gravelly Lean Clay (CL) [Fill]							
			soft, moist, dark gray with olive and brown mottles	12	MC-3	110	17			
6.0			Fat Clay (CH) [Bay Mud]							
			very soft, wet, dark gray with olive mottles, high plasticity	5	MC-4	59	70		99	
				4	MC-5	72	47			
					ST-5	70	52			
					ST-6	49	90			

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CORNERSTONE EARTH GROUP

BORING NUMBER EB-4

PAGE 2 OF 2

PROJECT NAME Honda Port of Entry

PROJECT NUMBER 281-1-3

PROJECT LOCATION Richmond, CA

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ELEVATION (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION	N-Value (Uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	UNDRAINED SHEAR STRENGTH, ksf									
										1.0	2.0	3.0	4.0	5.0					
-20.5	35		Fat Clay (CH) [Bay Mud] very soft, wet, dark gray with olive mottles, high plasticity																
-25.5	40		Bottom of Boring at 40.0 feet.	8	SPT-7		77												
	45																		
	50																		
	55																		
	60																		
	65																		
	70																		
	75																		

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CORNERSTONE EARTH GROUP

BORING NUMBER EB-5

PAGE 1 OF 1

PROJECT NAME Honda Port of Entry
 PROJECT NUMBER 281-1-3
 PROJECT LOCATION Richmond, CA
 GROUND ELEVATION 17 FT +/- BORING DEPTH 4 ft.
 LATITUDE _____ LONGITUDE _____
 GROUND WATER LEVELS:
 ▽ AT TIME OF DRILLING Not Encountered
 ▽ AT END OF DRILLING Not Encountered

DATE STARTED 11/6/08 DATE COMPLETED 11/6/08
 DRILLING CONTRACTOR Exploration Geoservices, Inc.
 DRILLING METHOD Mobile B-60, 8 inch Hollow-Stem Auger
 LOGGED BY JLF

NOTES

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ELEVATION (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION	N-Value (uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	UNDRAINED SHEAR STRENGTH, ksf									
										1.0	2.0	3.0	4.0	5.0					
17.0	0		9 inches asphalt concrete																
16.3			Clayey Gravel with Sand (GC) [Fill]	50	MC														
14.8			very dense, dry to moist, light brown Sandstone / Shale [Franciscan formation]	6"															
12.8			gray, hard, moderately strong	50	NR														
				1"															
	5		Bottom of Boring at 4.0 feet.	50	NR														
	1"			1"															

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CORNERSTONE EARTH GROUP

BORING NUMBER EB-6

PAGE 1 OF 1

DATE STARTED 11/6/08 DATE COMPLETED 11/6/08

DRILLING CONTRACTOR Exploration Geoservices, Inc.

DRILLING METHOD Mobile B-60, 8 inch Hollow-Stem Auger

LOGGED BY JLF

NOTES _____

PROJECT NAME Honda Port of Entry

PROJECT NUMBER 281-1-3

PROJECT LOCATION Richmond, CA

GROUND ELEVATION 15 FT +/- BORING DEPTH 10 ft.

LATITUDE _____ LONGITUDE _____

GROUND WATER LEVELS:

▽ AT TIME OF DRILLING Not Encountered

▼ AT END OF DRILLING Not Encountered

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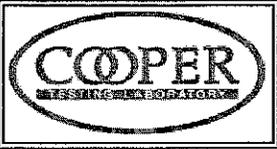
ELEVATION (ft)	DEPTH (ft)	SYMBOL	DESCRIPTION	N-Value (Uncorrected) blows per foot	SAMPLES TYPE AND NUMBER	DRY UNIT WEIGHT PCF	NATURAL MOISTURE CONTENT, %	PLASTICITY INDEX, %	PERCENT PASSING NO. 200 SIEVE	UNDRAINED SHEAR STRENGTH, ksf									
										1.0	2.0	3.0	4.0	5.0					
15.0	0		9 inches asphalt concrete																
14.3			Clayey Gravel with Sand (GC) [Fill] medium dense, moist, light brown	38	MC-1B	85	7												
11.0			Poorly Graded Sand (SP) [Fill] medium dense, moist, light gray and brown mottled	15	MC-2B		12												
10.0	5		Silty Sand (SM) very loose, wet, dark gray, some shell fragments	6	MC-3B		26		47										
8.0			Sandy Lean Clay (CL) [Bay Mud Crust] soft, wet, dark gray, some shell fragments, moderate plasticity	6	MC-4	80	33		51										
5.0	10		Bottom of Boring at 10.0 feet.																

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APPENDIX B

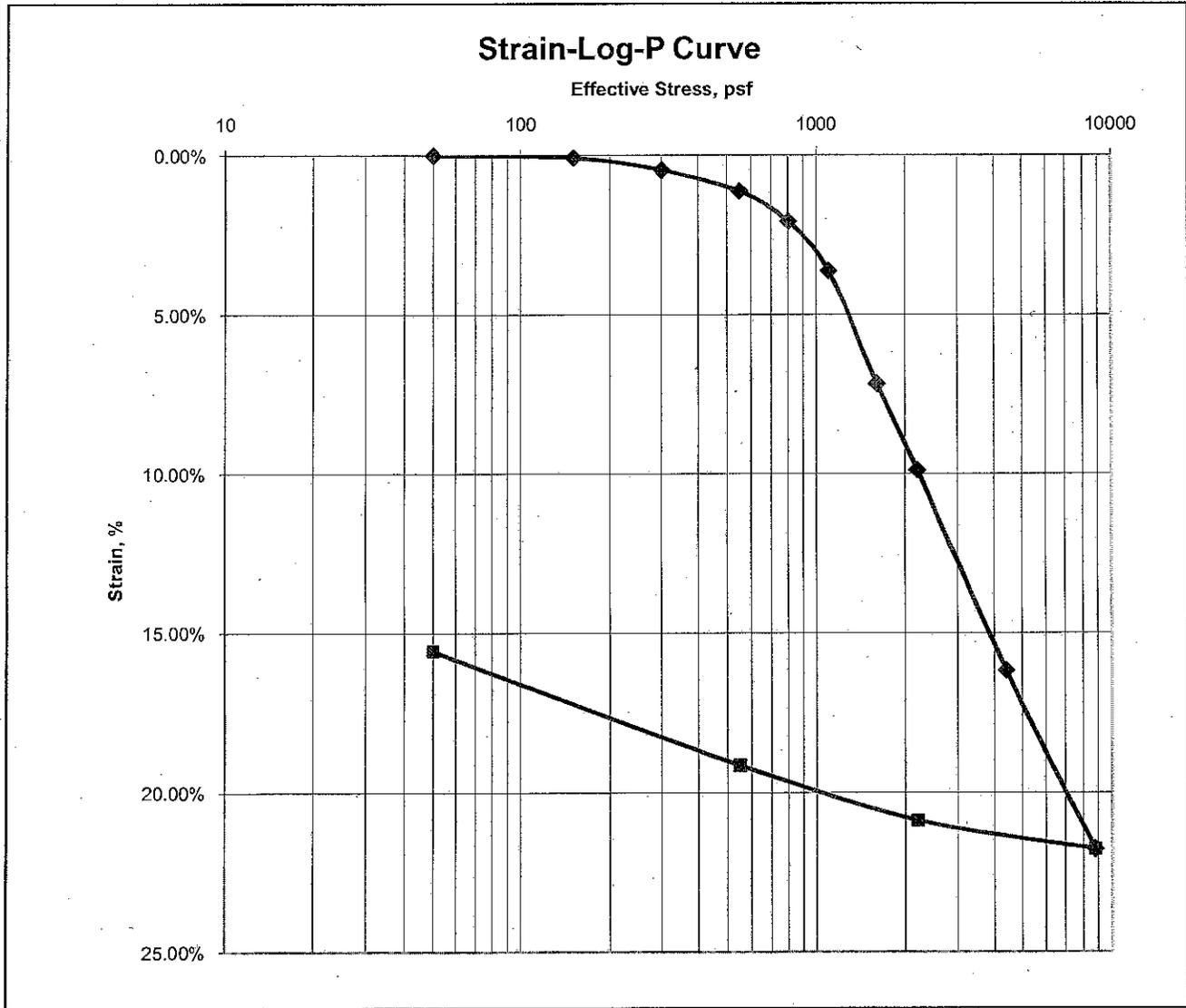
HISTORICAL LABORATORY TEST DATA



Consolidation Test

ASTM D2435

Job No.:	640-113	Boring:	EB-1	Run By:	MD
Client:	Cornerstone Earth Group	Sample:	6	Reduced:	PJ
Project:	Honda Rail Expansion - 281-1-1	Depth, ft.:	17.5	Checked:	PJ/DC
Soil Type:	Gray CLAY w/ shell fragments & pockets of Silt & Sand			Date:	11/21/2008



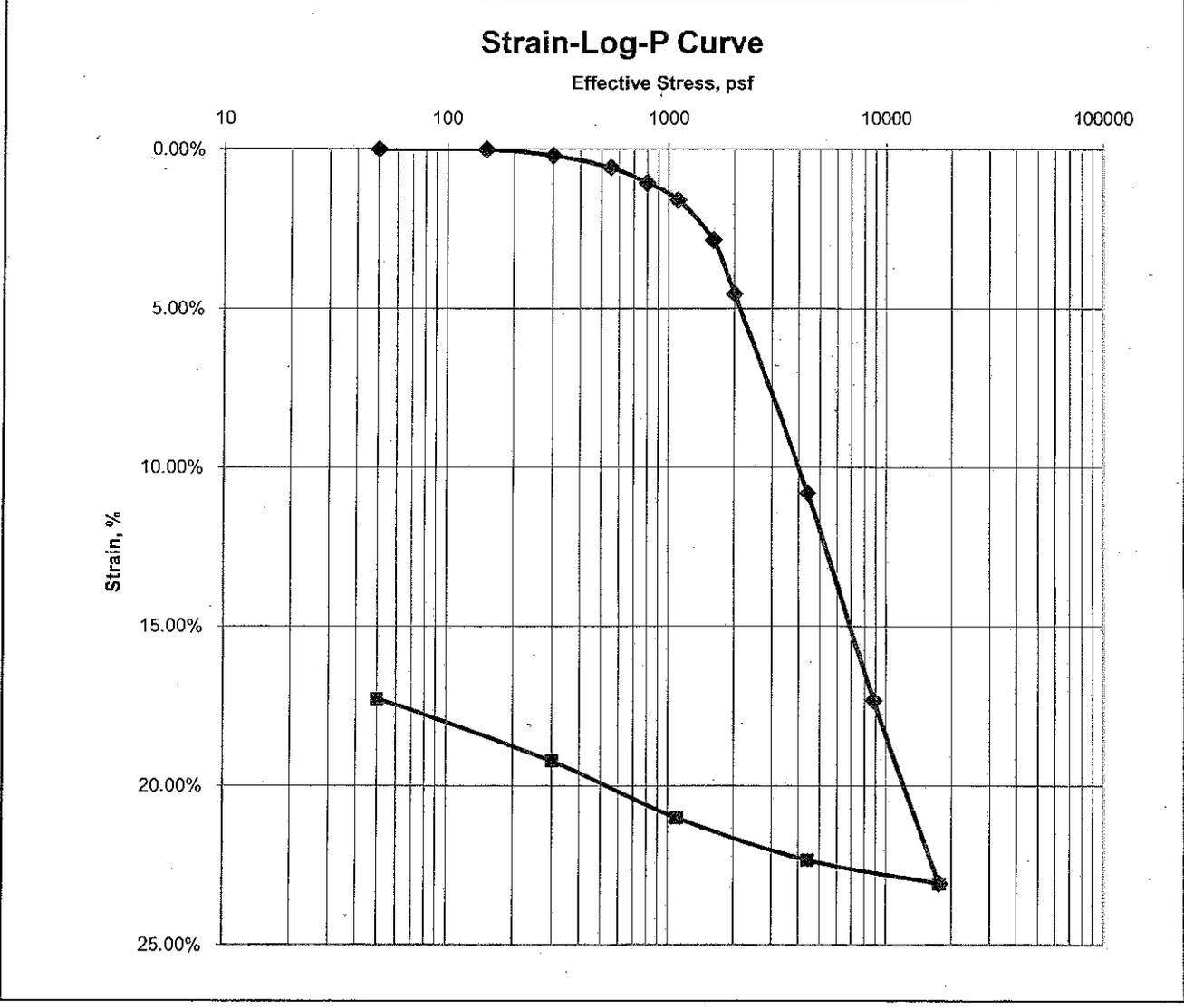
Ass. Gs =	2.7	Initial	Final	Remarks:
Moisture %:		55.7	41.6	
Dry Density, pcf:		67.1	79.4	
Void Ratio:		1.510	1.122	
% Saturation:		99.5	100	



Consolidation Test

ASTM D2435

Job No.: <u>640-113</u>	Boring: <u>EB-4</u>	Run By: <u>MD</u>
Client: <u>Cornerstone Earth Group</u>	Sample: <u>5</u>	Reduced: <u>PJ</u>
Project: <u>Honda Rail Expansion - 281-1-1</u>	Depth, ft.: <u>22.5</u>	Checked: <u>PJ/DC</u>
Soil Type: <u>Gray CLAY, trace organics & shell fragments (strong petrol odor)(Silty)</u>	Date: <u>11/21/2008</u>	



Ass. Gs =	2.7	Initial	Final
Moisture %:	52.3	36.8	
Dry Density, pcf:	69.8	84.6	
Void Ratio:	1.415	0.992	
% Saturation:	99.7	100	

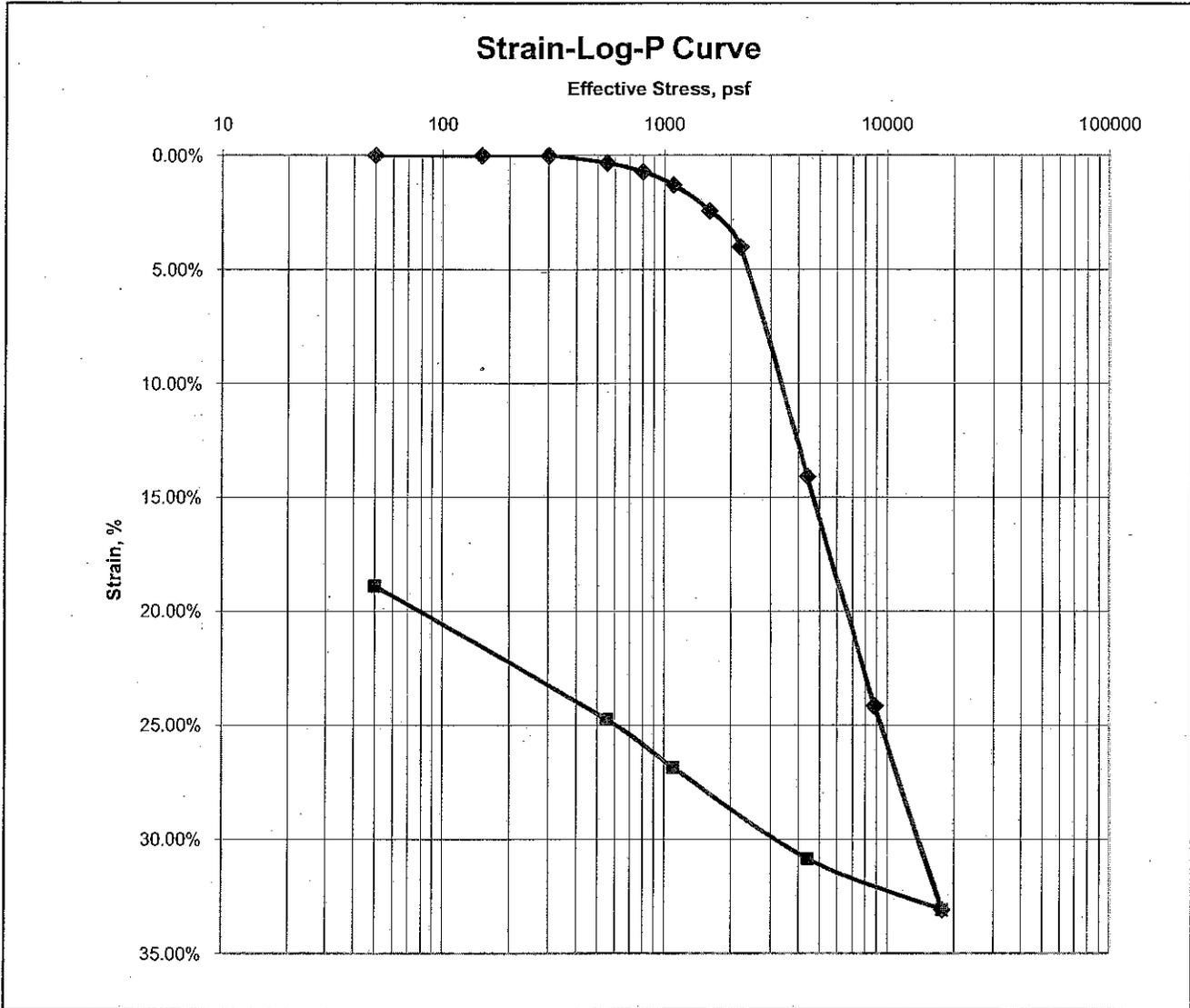
Remarks:



Consolidation Test

ASTM D2435

Job No.:	640-113	Boring:	EB-4	Run By:	MD
Client:	Comerstone Earth Group	Sample:	6	Reduced:	PJ
Project:	Honda Rail Expansion - 281-1-1	Depth, ft.:	32.5	Checked:	PJ/DC
Soil Type:	Gray CLAY w/ organics, trace shell fragments (strong petrol odor)			Date:	11/21/2008



Ass. Gs =	2.7	Initial	Final
Moisture %:		89.9	66.7
Dry Density, pcf:		48.9	60.2
Void Ratio:		2.444	1.799
% Saturation:		99.3	100

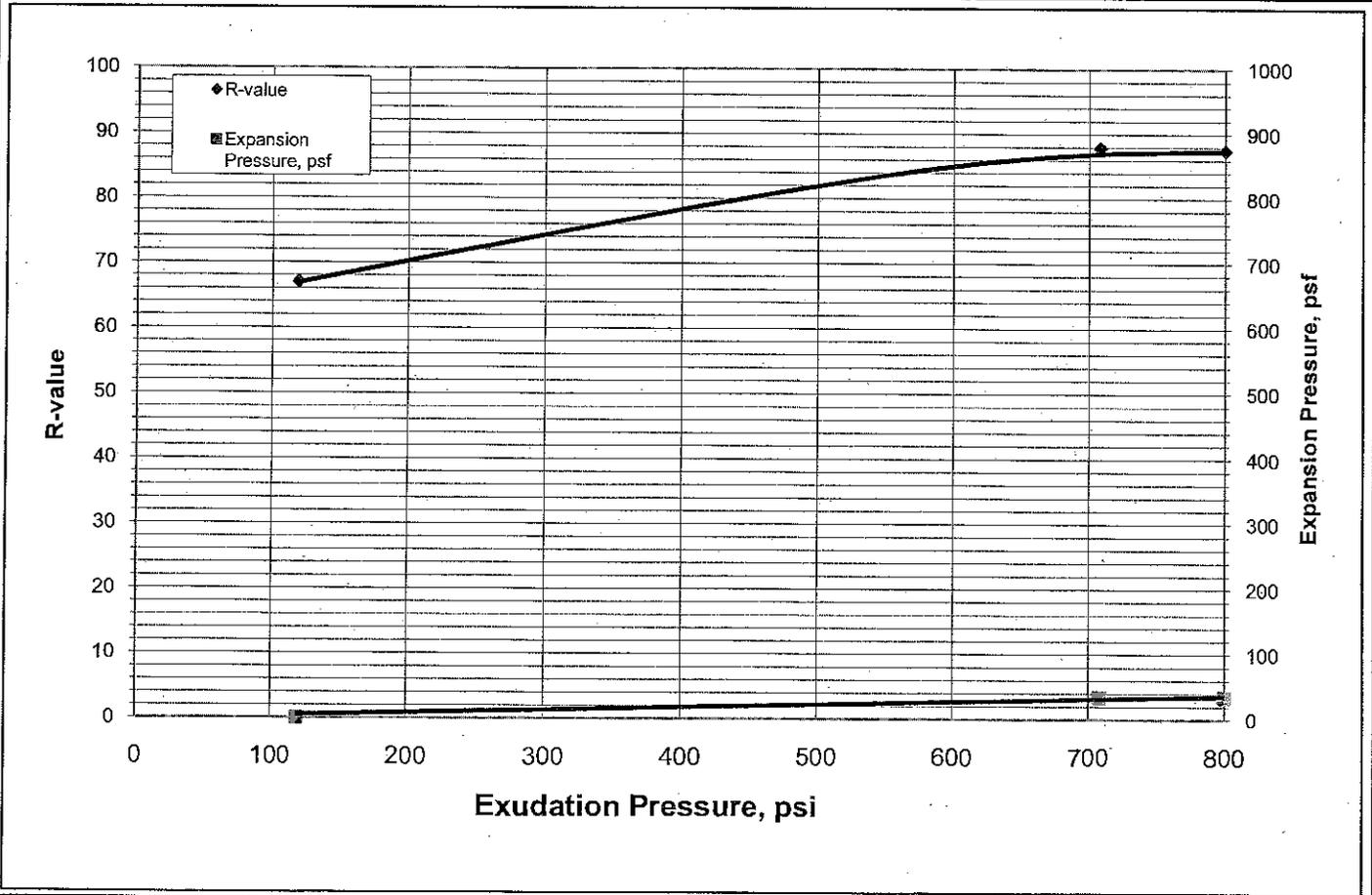
Remarks:



R-value Test Report (Caltrans 301)

Job No.:	640-113	Date:	11/13/08	Initial Moisture,	1.8%
Client:	Cornerstone Earth Group	Tested	MD	R-value by	
Project:	Honda Rail Expansion - 281-1-1	Reduced	RU	Stabilometer	74
Sample	EB-3 & 5	Checked	DC	Expansion	20 psf
Soil Type: Gray GRAVEL w/ Sand				Pressure	

Specimen Number	A	B	C	D	Remarks:
Exudation Pressure, psi	119	800	708		
Prepared Weight, grams	1300	1300	1300		
Final Water Added, grams/cc	70	47	55		
Weight of Soil & Mold, grams	3266	3221	3279		
Weight of Mold, grams	2079	2099	2085		
Height After Compaction, in.	2.46	2.42	2.51		
Moisture Content, %	7.3	5.5	6.1		
Dry Density, pcf	136.2	133.1	135.7		
Expansion Pressure, psf	0.0	34.4	34.4		
Stabilometer @ 1000					
Stabilometer @ 2000	35	8	10		
Turns Displacement	4.37	6.47	5.22		
R-value	67	87	88		

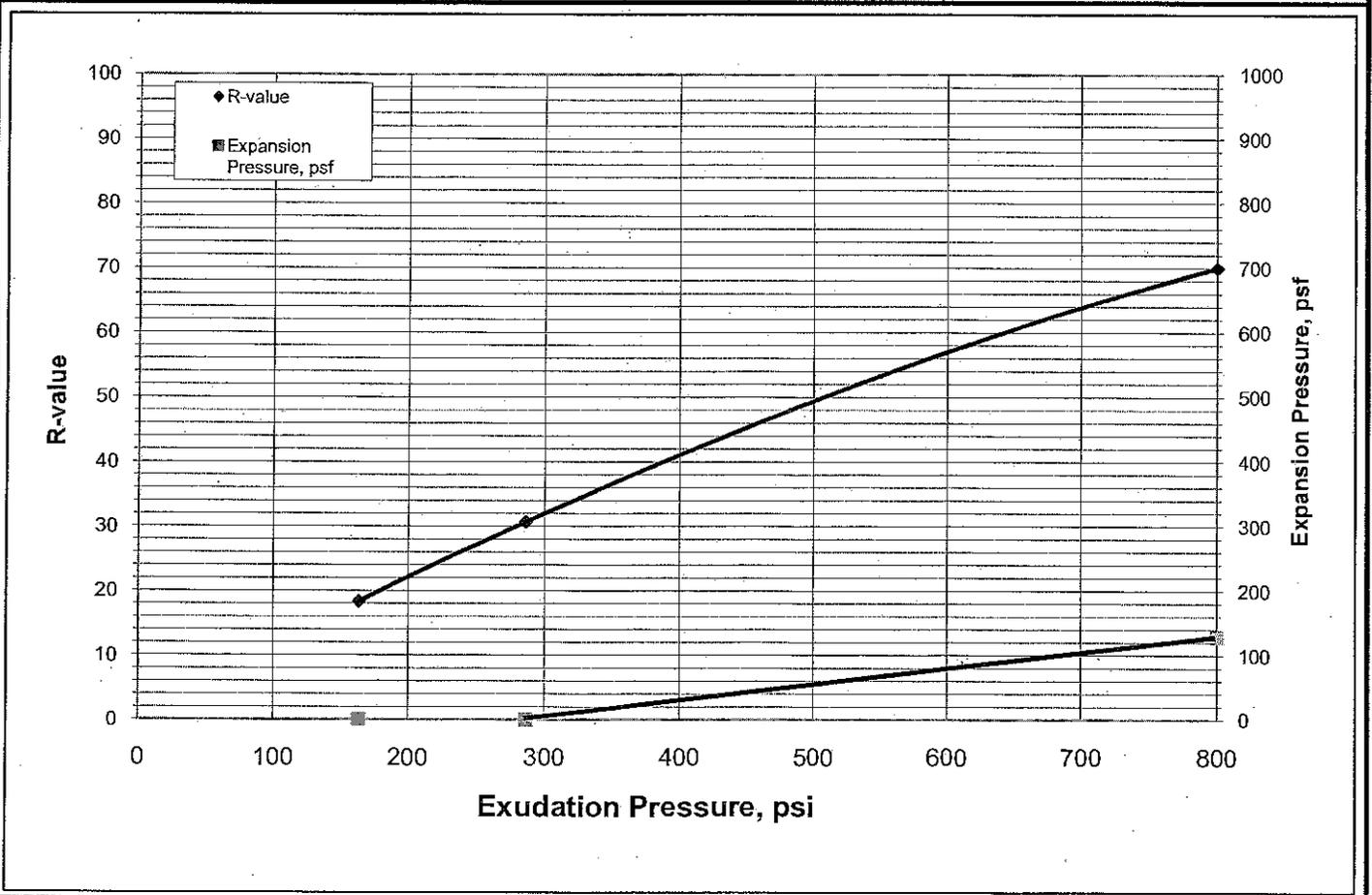




R-value Test Report (Caltrans 301)

Job No.:	640-113	Date:	11/14/08	Initial Moisture,	2.2%
Client:	Cornerstone Earth Group	Tested	MD	R-value by	32
Project:	Honda Rail Expansion - 281-1-1	Reduced	RU	Stabilometer	
Sample	EB-6	Checked	DC	Expansion	5 psf
Soil Type: Brown Clayey SAND w/ Gravel				Pressure	

Specimen Number	A	B	C	D	Remarks:
Exudation Pressure, psi	286	800	163		
Prepared Weight, grams	1300	1300	1300		
Final Water Added, grams/cc	72	57	79		
Weight of Soil & Mold, grams	3315	3283	3308		
Weight of Mold, grams	2104	2099	2079		
Height After Compaction, in.	2.47	2.46	2.54		
Moisture Content, %	7.9	6.7	8.4		
Dry Density, pcf	137.6	136.6	135.2		
Expansion Pressure, psf	0.0	129.0	0.0		
Stabilometer @ 1000					
Stabilometer @ 2000	96	32	120		
Turns Displacement	3.67	4.24	3.83		
R-value	31	70	18		



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