DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET No.	TOTAL SHEETS
04	Ala	80	0.0/0.5	1	15

STATE OF CALIFORNIA

DEPARTMENT OF TRANSPORTATION

PROJECT PLANS FOR CONSTRUCTION

ADJACENT TO STATE HIGHWAY

IN ALAMEDA COUNTY
IN OAKLAND
AT 2.9 km WEST OF SAN FRANCISCO-OAKLAND TOLL PLAZA

To be supplemented by Standard Plans dated July, 1999

Caltrans Metric

INDEX OF SHEETS

Sheet No.	Description
1	Title and Location Map
2	Electrical Plan
3	Seal Haul Out Site

STRUCTURES

4-15	San Francisco-Oakland Bay Bridge Br. No. 33-25 East Span Seismic Safety Project

THE STANDARD PLANS LIST APPLICABLE TO THIS CONTRACT IS INCLUDED IN THE NOTICE TO CONTRACTORS AND SPECIAL PROVISIONS BOOK.

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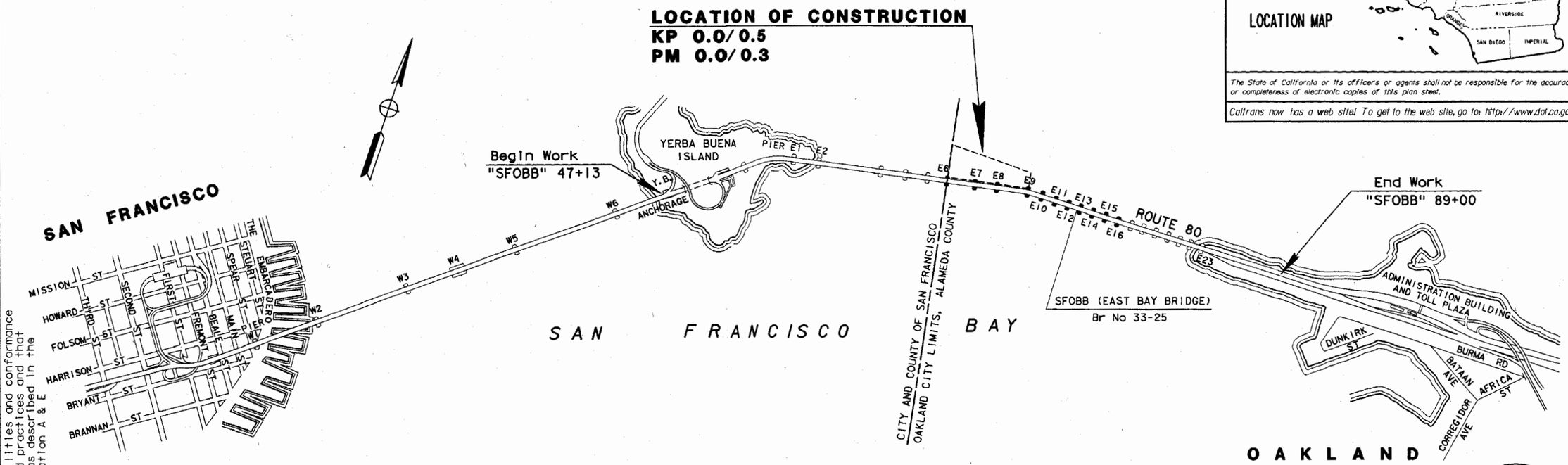
Caltrans now has a web site! To get to the web site, go to: http://www.dot.ca.gov



NO SCALE

Plans Approval Date

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

PROJECT ENGINEER	DESIGN OVERSIGHT APPROVAL	REGISTRATION NO.	DATE
A. R. DOVER	PRINTED NAME P. CHONGCHAIKIT SIGNATURE	C54015	7/99

Approved as to Impact on State facilities and conformance with applicable State standards and practices and that technical oversight was performed as described in the California Department of Transportation A & E Consultant Services Manual.

A JOINT VENTURE OF
FUGRO / EARTH MECHANICS
770 EDGEWATER DRIVE, SUITE 848
OAKLAND, CALIFORNIA 94621

CH2M HILL
1111 BROADWAY, SUITE 1200
OAKLAND, CALIFORNIA 94607

Contract No. **04-012084**

LAST REVISION 07-07-99

DATE PLOTTED => 25-May-2000
TIME PLOTTED => 06:06

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

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80

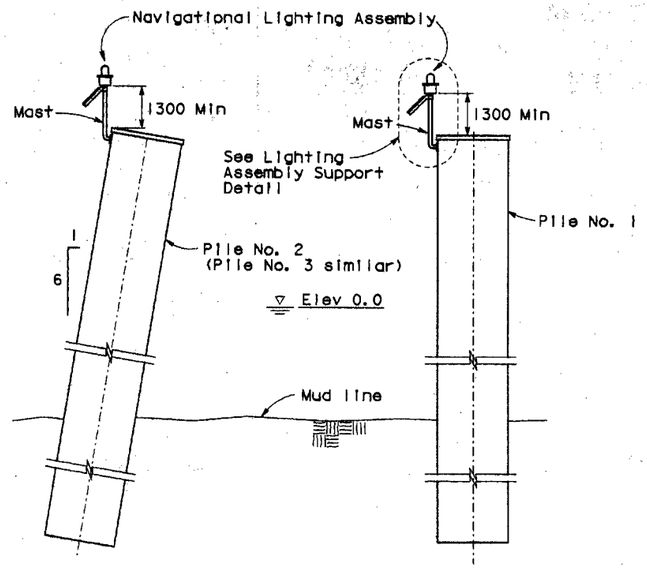
USERNAME => trtome
DGN FILE => 04-012081*0001_25060605

CU 04251

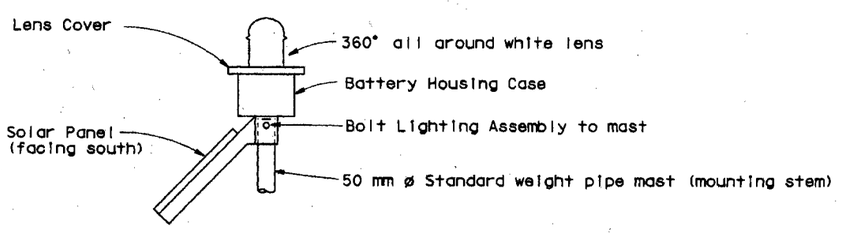
EA 012081

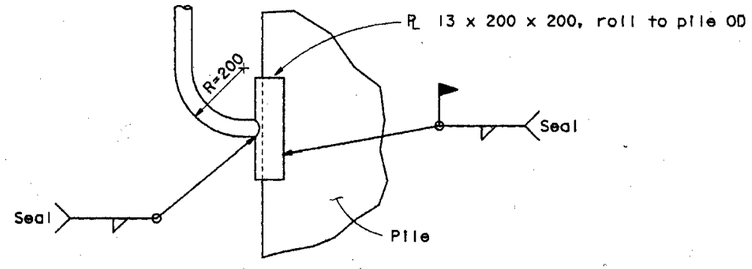
NOTES:

1. Provide and Install Navigational Lighting Assembly at each of 3 piles.
2. Adjust Solar Panels in accordance with manufacturers recommendations.



ELEVATION
No scale





LIGHTING ASSEMBLY AND SUPPORT DETAIL
No scale

All dimensions are shown in millimeters, except as noted.

NOTE: CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL

NAVIGATIONAL LIGHTING SYSTEM
PILE INSTALLATIION DEMONSTRATION PROJECT
No scale

E-1

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION
Caltrans

DESIGN OVERSIGHT: BEHZARD GOLEMOHAMMADI
CALCULATED/DESIGNED BY
CHECKED BY
DATE REVISED BY
DATE REVISED

LAST REVISION 06-28-99
DATE PLOTTED => 23-May-2000
TIME PLOTTED => 17:52

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80

USERNAME => trtome
DGN FILE => 04-012081*0002_23125138

CU 04251

EA 012081

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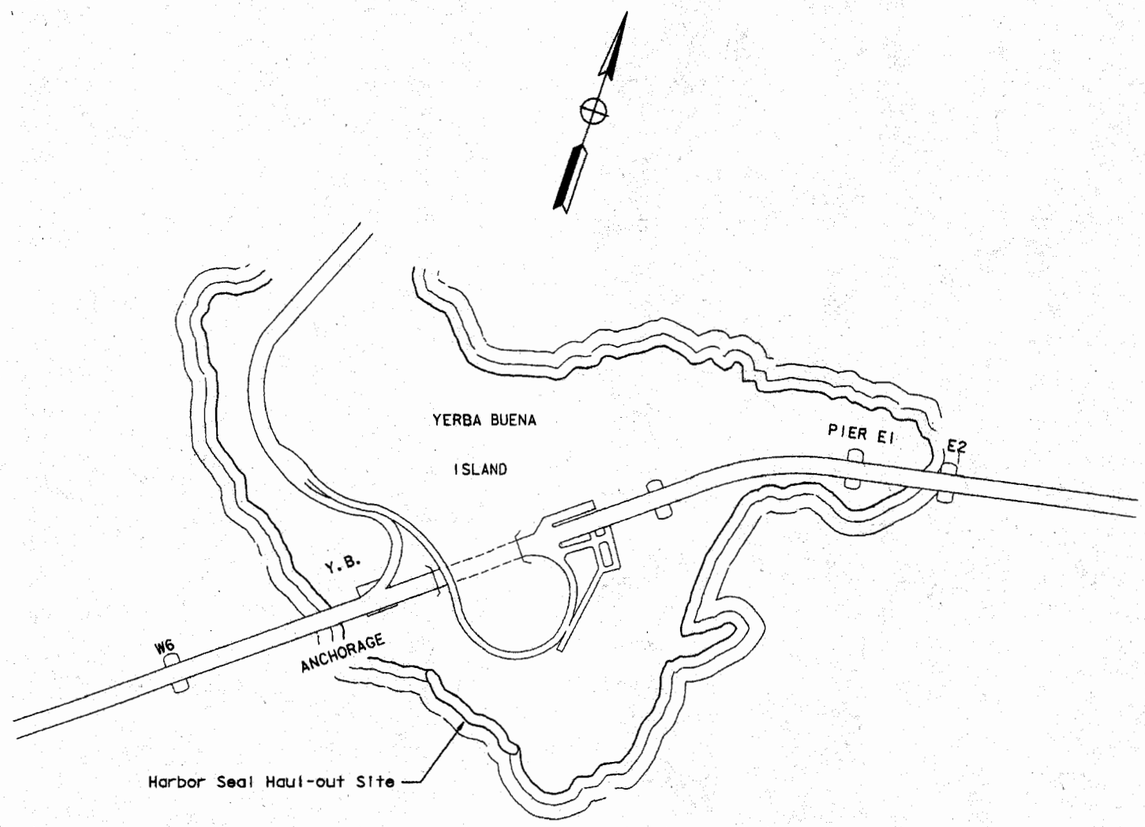


OBSERVATION/INVESTIGATION LOCATION PLAN

All dimensions are shown in millimeters, except as noted.

ENVIRONMENTAL OBSERVATION/INVESTIGATION LOCATION

No Scale

STATE OF CALIFORNIA - DEPARTMENT OF TRANSPORTATION

Caltrans

DESIGN OVERSIGHT

POCHANA CHONGCHAIKIT

CALCULATED/DESIGNED BY

CHECKED BY

DATE REVISED BY

DATE REVISED

FOR REDUCED PLANS ORIGINAL SCALE IS IN MILLIMETERS 0 20 40 60 80

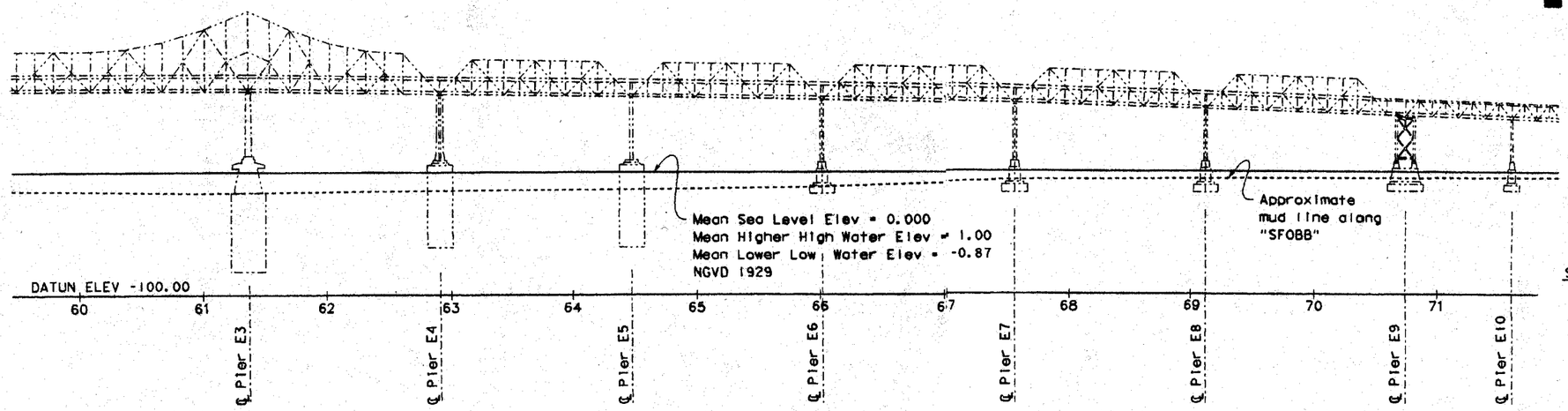
USERNAME => trtome
DGN FILE => 04-012081*0003_24134147

CU 04251

EA 012081

LAST BOX 04-210

DATE PLOTTED => 24-May-2000
TIME PLOTTED => 13:47



DEVELOPED ELEVATION
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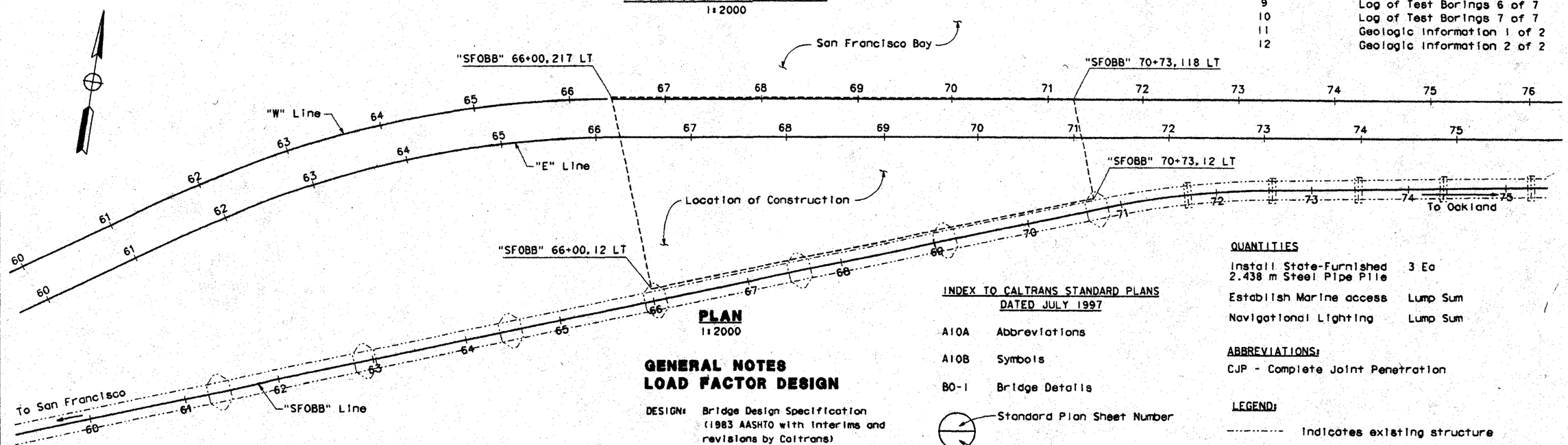

PLAN
1:2000

GENERAL NOTES
LOAD FACTOR DESIGN

DESIGN: Bridge Design Specification (1983 AASHTO with interims and revisions by Caltrans)

STEEL PILES AND PLATE: AASHTO M270, fy=345 MPa (ASTM A709, GR50)

INDEX TO CALTRANS STANDARD PLANS
DATED JULY 1997

A10A	Abbreviations
A10B	Symbols
B0-1	Bridge Details

Standard Plan Sheet Number
Detail Number

QUANTITIES

Install State-Furnished 2.438 m Steel Pipe Pile	3 Ea
Establish Marine access	Lump Sum
Navigational Lighting	Lump Sum

ABBREVIATIONS:
CJP - Complete Joint Penetration

LEGEND:
--------- Indicates existing structure

NOTES:
1. For pile data, see "Foundation Plan" sheet.
All dimensions are shown in meters, except as noted.

NOTE: CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL

Caltrans Metric

CH2M HILL
1111 BROADWAY, SUITE 1200
OAKLAND, CALIFORNIA 94607

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INDEX TO PLANS

Sheet No.	Title
1	General Plan
2	Foundation Plan
3	Pile Details
4	Log of Test Borings 1 of 7
5	Log of Test Borings 2 of 7
6	Log of Test Borings 3 of 7
7	Log of Test Borings 4 of 7
8	Log of Test Borings 5 of 7
9	Log of Test Borings 6 of 7
10	Log of Test Borings 7 of 7
11	Geologic Information 1 of 2
12	Geologic Information 2 of 2

DESIGN OVERSIGHT 8/10/99	DESIGN	BY J. ALDRICH	CHECKED BY A. DOVER	LOAD FACTOR DESIGN	LIVE LOADING: HS20-44 AND ALTERNATIVE AND PERMIT DESIGN LOAD		
SPECIFICATION OVERSIGHT 8-10-99	DETAILS	BY R. VILLEGAS II	CHECKED BY J. ALDRICH	LAYOUT	BY J. ALDRICH	CHECKED A. DOVER	
SIGN OFF DATE	QUANTITIES	BY A. DOVER	CHECKED BY R. STEVENS	SPECIFICATIONS	BY J. ALDRICH	PLANS AND SPECS CHECKED J. ALDRICH	

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

ANTHONY R. DOVER
PROJECT ENGINEER

CU 04251
EA 012081

BRIDGE NO. 33-25
POST MM 0.0/0.5
POST MILE 0.0/0.3

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

PILE INSTALLATIION DEMONSTRATION PROJECT

GENERAL PLAN

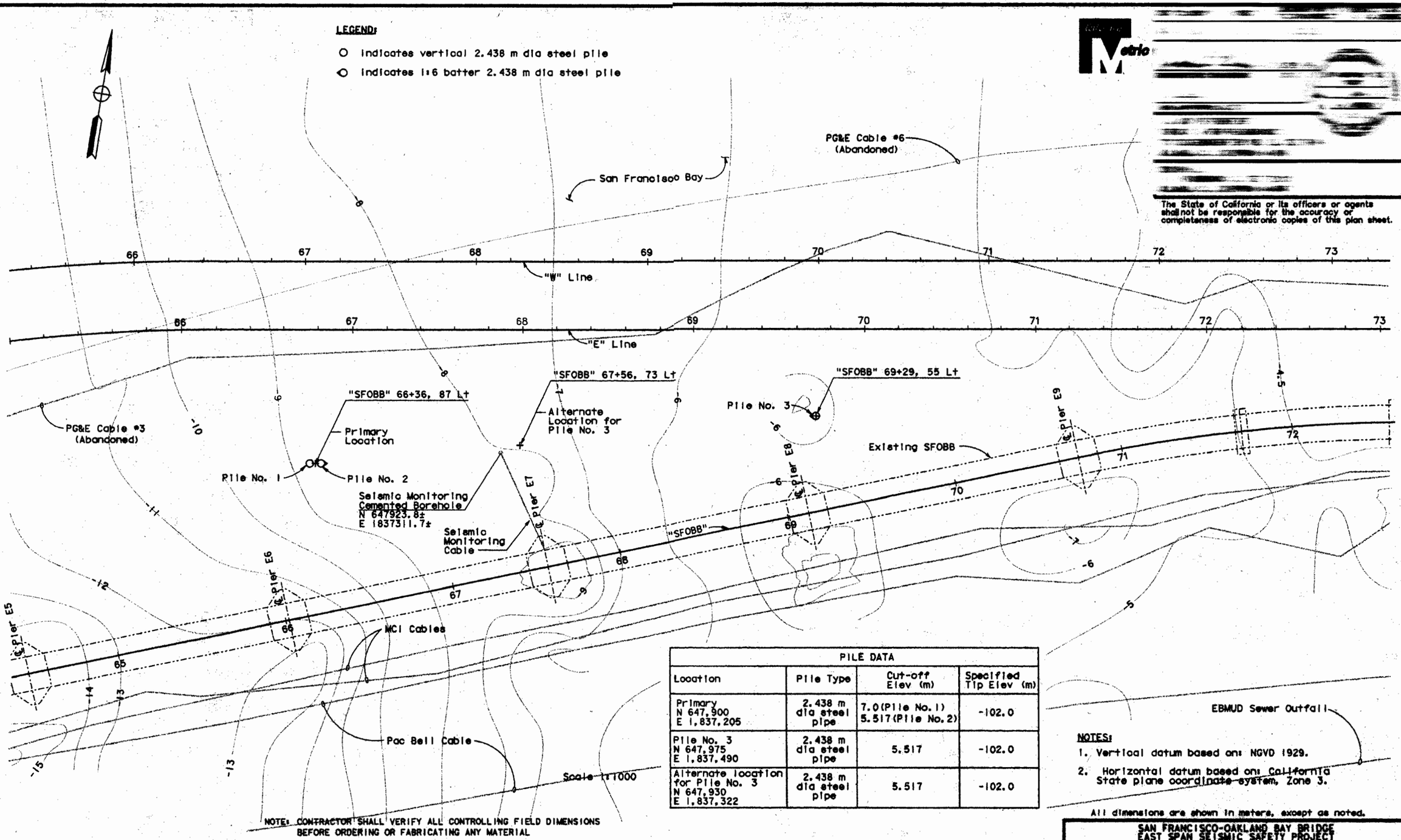
DISREGARD PRINTS BEARING EARLIER REVISION DATES → 8/5/99

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET 1 OF 12

bdgdot.dgn 05-AUG-1999

LEGEND:

- ○ indicates vertical 2.438 m dia steel pile
- ◁○ indicates 1:6 batter 2.438 m dia steel pile



PILE DATA			
Location	Pile Type	Cut-off Elev (m)	Specified Tip Elev (m)
Primary N 647,900 E 1,837,205	2.438 m dia steel pipe	7.0 (Pile No. 1) 5.517 (Pile No. 2)	-102.0
Pile No. 3 N 647,975 E 1,837,490	2.438 m dia steel pipe	5.517	-102.0
Alternate location for Pile No. 3 N 647,930 E 1,837,322	2.438 m dia steel pipe	5.517	-102.0

NOTES:

1. Vertical datum based on: NGVD 1929.
2. Horizontal datum based on: California State plane coordinate system, Zone 3.

All dimensions are shown in meters, except as noted.

NOTE: CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL

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5/18/99

JUAN F. CARPIO
REGISTERED ENGINEER
CIVIL
SIGN OFF DATE 5/1/00

BATHYMETRY AS OF: 1/98	DRAWN	BY R. VILLEGAS	DESIGN	BY J. ALDRICH	REVIEWED	A. DOVER			
SURVEYED BY FUGRO WEST, INC.	TRACED	BY —	DETAILS	BY R. VILLEGAS II	REVIEWED	J. ALDRICH			
FIELD CHECKED BY	CHECKED	BY J. CAROTHERS	QUANTITIES	BY A. DOVER	REVIEWED	R. STEVENS			

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

ANTHONY R. DOVER
PROJECT ENGINEER

CU 04251
EA 012081

BRIDGE NO. 33-25
POST km 0.0/0.5
POST MILE 0.0/0.3

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

PILE INSTALLATIION DEMONSTRATION PROJECT

FOUNDATION PLAN

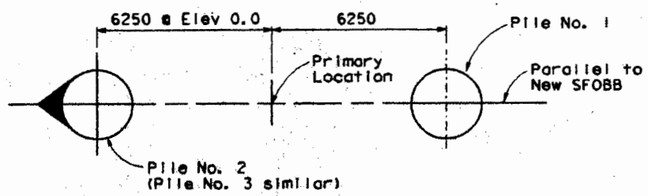
DISREGARD PRINTS BEARING EARLIER REVISION DATES → 4/14/00

REVISION DATES (PRELIMINARY STAGE ONLY) | | | | | | 2 | 12

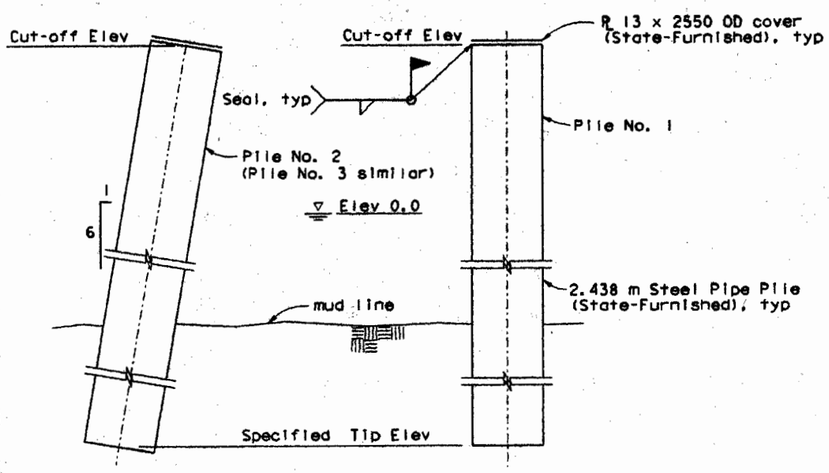
br33-25fdplan.tif

LEGEND

○ Denotes 1:6 batter pile



PARTIAL PLAN
No scale



ELEVATION
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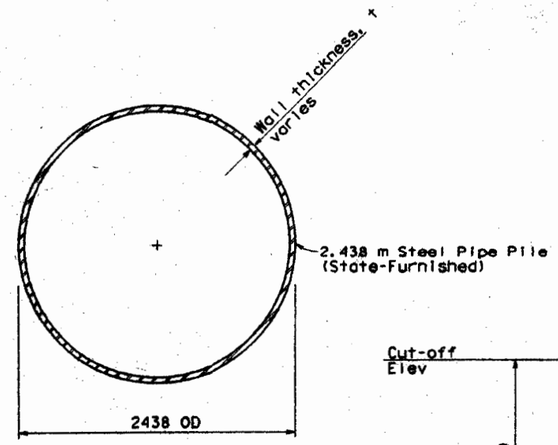

SECTION X-X
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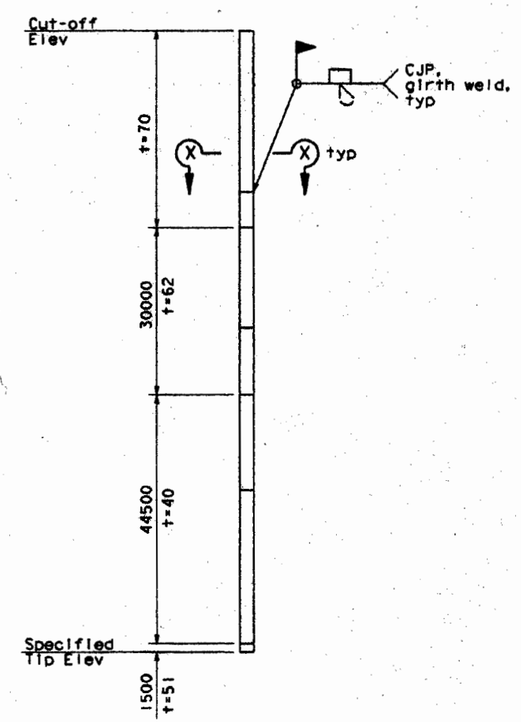
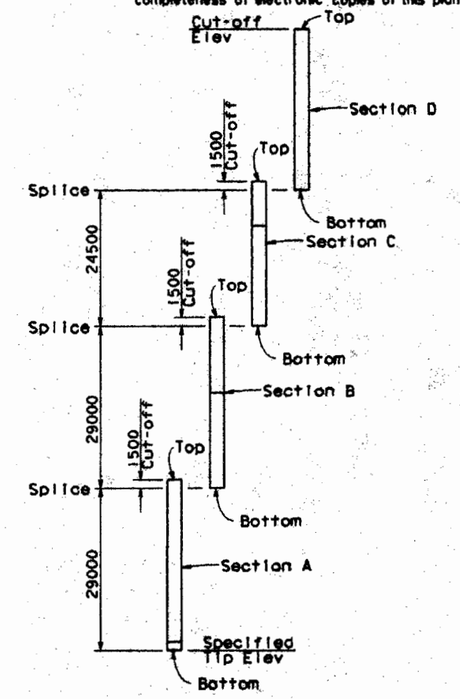


COMPLETED PILE



4 STATE-FURNISHED SECTIONS

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2.438 m STEEL PIPE PILE (STATE-FURNISHED)
No scale

PILE NOTES:

1. Piles will be state furnished in 4 sections each with lengths and wall thickness shown.
2. Pile sections shall be CJP weld spliced with the pile in a vertical or nearly vertical (battered) alignment.

All dimensions are shown in millimeters, except as noted.

NOTE: CONTRACTOR SHALL VERIFY ALL CONTROLLING FIELD DIMENSIONS BEFORE ORDERING OR FABRICATING ANY MATERIAL

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

PILE INSTALLATION DEMONSTRATION PROJECT

PILE DETAILS

JUAN F. CARPIO, DESIGN OVERSIGHT	DESIGN: J. ALDRICH	CHECKED: A. DOVER	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
SIGN OFF DATE	DETAILS: R. VILLEGAS II	CHECKED: J. ALDRICH	
	QUANTITIES: A. DOVER	CHECKED: R. STEVENS	

ANTHONY R. DOVER, PROJECT ENGINEER

BRIDGE NO. 33-25 | POST km 0.0/0.5 | POST MILE 0.0/0.3

CU 04251
EA 012081

ORIGINAL SCALE IN MILLIMETERS FOR REDUCED PLANS 0 10 20 30 40 50 60 70 80 90 100

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 6/21/99

REVISION DATES (PRELIMINARY STAGE ONLY) SHEET 3 OF 12

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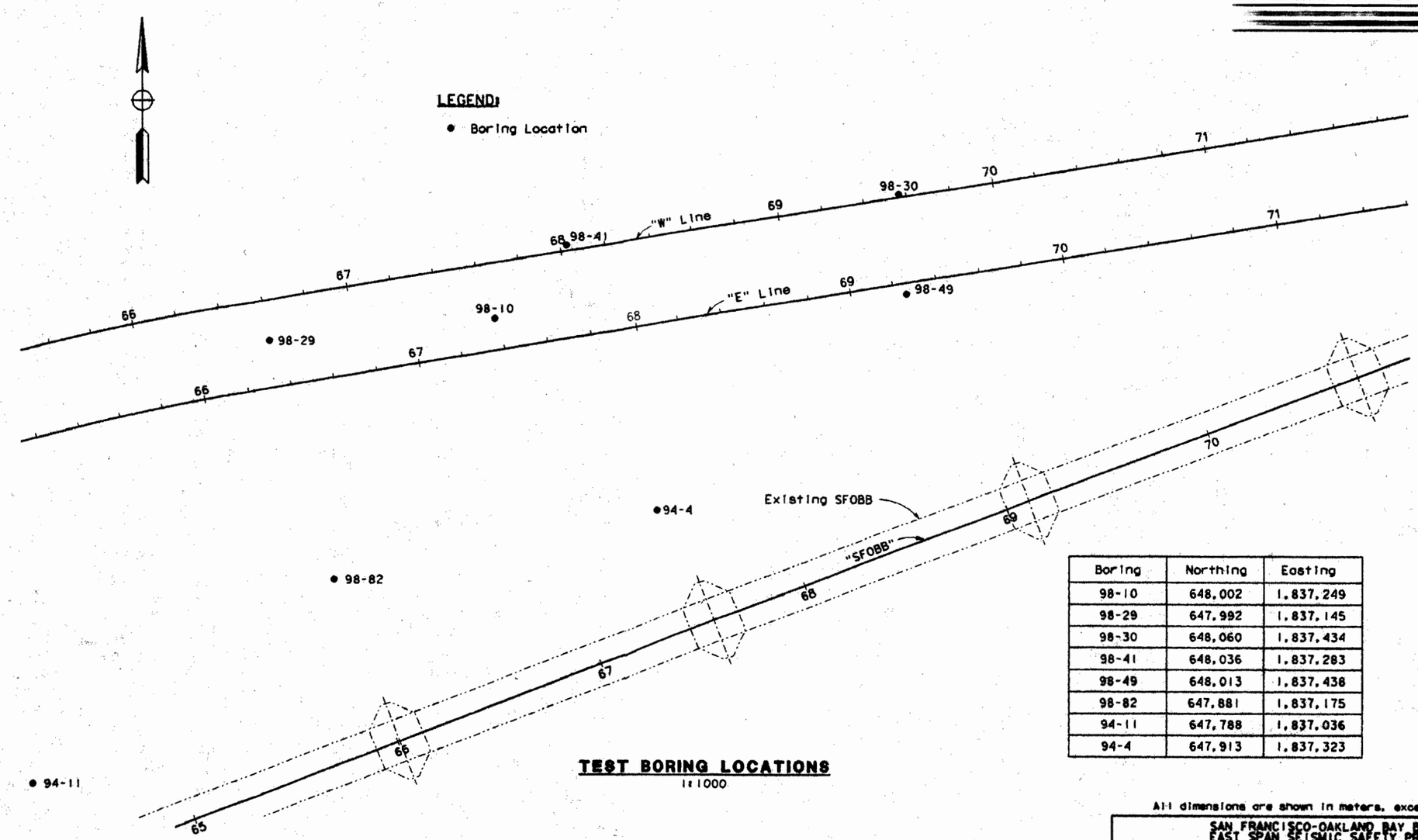


Boring	Northing	Easting
98-10	648,002	1,837,249
98-29	647,992	1,837,145
98-30	648,060	1,837,434
98-41	648,036	1,837,283
98-49	648,013	1,837,438
98-82	647,881	1,837,175
94-11	647,788	1,837,036
94-4	647,913	1,837,323

TEST BORING LOCATIONS

1:1000

All dimensions are shown in meters, except as noted.

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

PILE INSTALLATION DEMONSTRATION PROJECT

LOG OF TEST BORINGS 1 OF 7

JUAN F. CARPIO — CALTRANS DESIGN OVERSIGHT

DRAWN BY: R. VILLEGAS II
CHECKED BY: J. ALDRICH

J. CHACKO/M. ZUEGER — FIELD INVESTIGATOR
DATE 3/24/99

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

ANTHONY R. DOVER — PROJECT ENGINEER

BRIDGE NO. 33-25
POST km 0.0/0.5
POST MILE 0.0/0.3

CU 04251
EA 012081

FOR REDUCED PLANS ORIGINAL SCALE IN MILLIMETERS 0 10 20 30 40 50

DISREGARD PRINTS BEARING
EARLIER REVISION DATES → 6/21/99
REVISION DATES (PRELIMINARY STAGE ONLY)
SHEET 4 OF 12

br33-25804of12.tif

SOIL AND ROCK TYPES

- Well graded GRAVEL (GW)
- Poorly graded GRAVEL (GP)
- GRAVEL with sand (GP or GW)
- GRAVEL with clay (GP or GW)
- Clayey GRAVEL (GC)
- GRAVEL with silt (GP or GW)
- Silty GRAVEL (GM)
- Well graded SAND (SW)
- Poorly graded SAND (SP)
- SAND with gravel (SP or SW)
- SAND with clay (SP-SC)
- Clayey SAND (SC)
- Silty SAND (SM)
- SAND with silt (SP-SM)
- Fat CLAY (CH)
- Sandy fat CLAY (CH)
- Lean CLAY (CL)
- Sandy lean CLAY (CL)
- Silty CLAY (CL-ML)
- Elastic SILT (MH)
- SILT (ML)
- Sandy SILT (ML)
- Clayey silt (ML/CL)
- Highly plastic ORGANICS (CH)
- Low plasticity ORGANICS (OL)
- SANDSTONE (Rk)
- SILTSTONE (Rk)
- CLAYSTONE (Rk)
- Interbedded Rock Strata (Rk)
- CONGLOMERATE (Rk)

SAMPLERS

- 76mm-OD, 72mm-ID Thin Walled Tube
- 76mm-OD, 69mm-ID Modified California Liner
- 67mm-OD, 64mm-ID* Thin Walled Drivate Tube
- 51mm-OD, 35mm-ID SPT Split Spoon Sampler
- 63.5mm-OD, 54mm-ID Offshore Liner
- Rock Core (Inset symbol represents recovery (%))

* A variable-OD, 54-mm-ID tapered driven tube was used to sample coarse sand, gravel and rock

TUBE AND OFFSHORE LINER SAMPLERS

WOH — Offshore Liner sample advanced with the weight of an 80 kg hammer.

PUSH or SAVE — Pushed thin-walled 76mm-OD-tube.

15/60cm — Number of blows required to produce the indicated penetration using a 54mm-ID-tube sampler. The sampler was driven with an 80 kg downhole hammer dropped approximately 1.5 m.

STANDARD PENETRATION TEST AND MODIFIED CALIFORNIA LINER SAMPLERS

Samplers were driven with a 63.5 kg above deck hammer dropped approximately 760 mm.

20 — Number of blows to produce 30 cm of penetration after the initial 15 cm of seating.

8/22cm — Number of blows required to produce the indicated penetration after an initial 15 cm seating.

Re/50cm — 50 blows produced the indicated penetration during the initial 15 cm interval.

Note: In rock coring interval recovery(%)-RQD are shown in the Blow Count column.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- PERCENT PASSING #200 SIEVE
- WATER CONTENT (%)
- SUBMERGED UNIT WEIGHT
- THEORETICAL SUBMERGED UNIT WEIGHT

PLASTIC LIMIT LIQUID LIMIT

- EQUIVALENT SPT BLOW COUNT
- ROCK QUALITY DESIGNATION (RQD)
- ROCK RECOVERY PERCENT
- ROCK CORING RATE

STRENGTH TESTS

- POCKET PENETROMETER
- TORVANE
- REMOTE VANE
- MINIATURE VANE (& RESIDUAL VANE)
- UNCONSOLIDATED UNDRAINED TRIAXIAL
- SWEDISH FALL CONE
- UNCONFINED COMPRESSION (SOIL)
- (Open symbols indicate remolded tests)
- Soil: Strength Exceeds Capacity of Measuring Device
- Rock: Sample broke along discontinuity; Intact sample would have greater strength
- Shear Strength Interpreted from CPT Tip Resistance
- POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- UNCONFINED COMPRESSION (ROCK)
- FRACTURE DENSITY (ROCK)

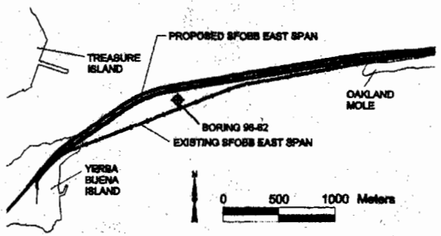
STRENGTH OF COHESIVE SOILS

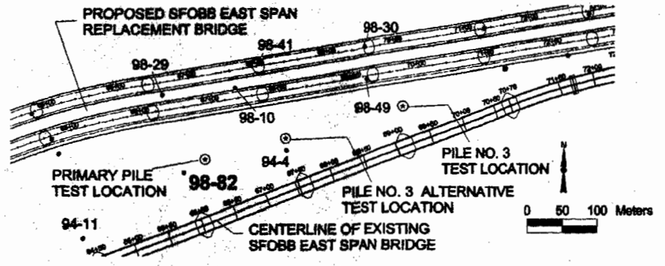
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

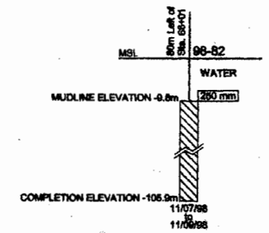
DENSITY OF GRANULAR SOILS

Descriptive Term	Relative Density (%)*
Very Loose	less than 15
Loose	15 to 35
Medium Dense	35 to 65
Dense	65 to 85
Very Dense	greater than 85

*Estimated from sampler driving record and CPT tip resistance.







BORING 98-82

Coordinates: E1837175 N647881
CA State Plane Zone 3, NAD83, Meters

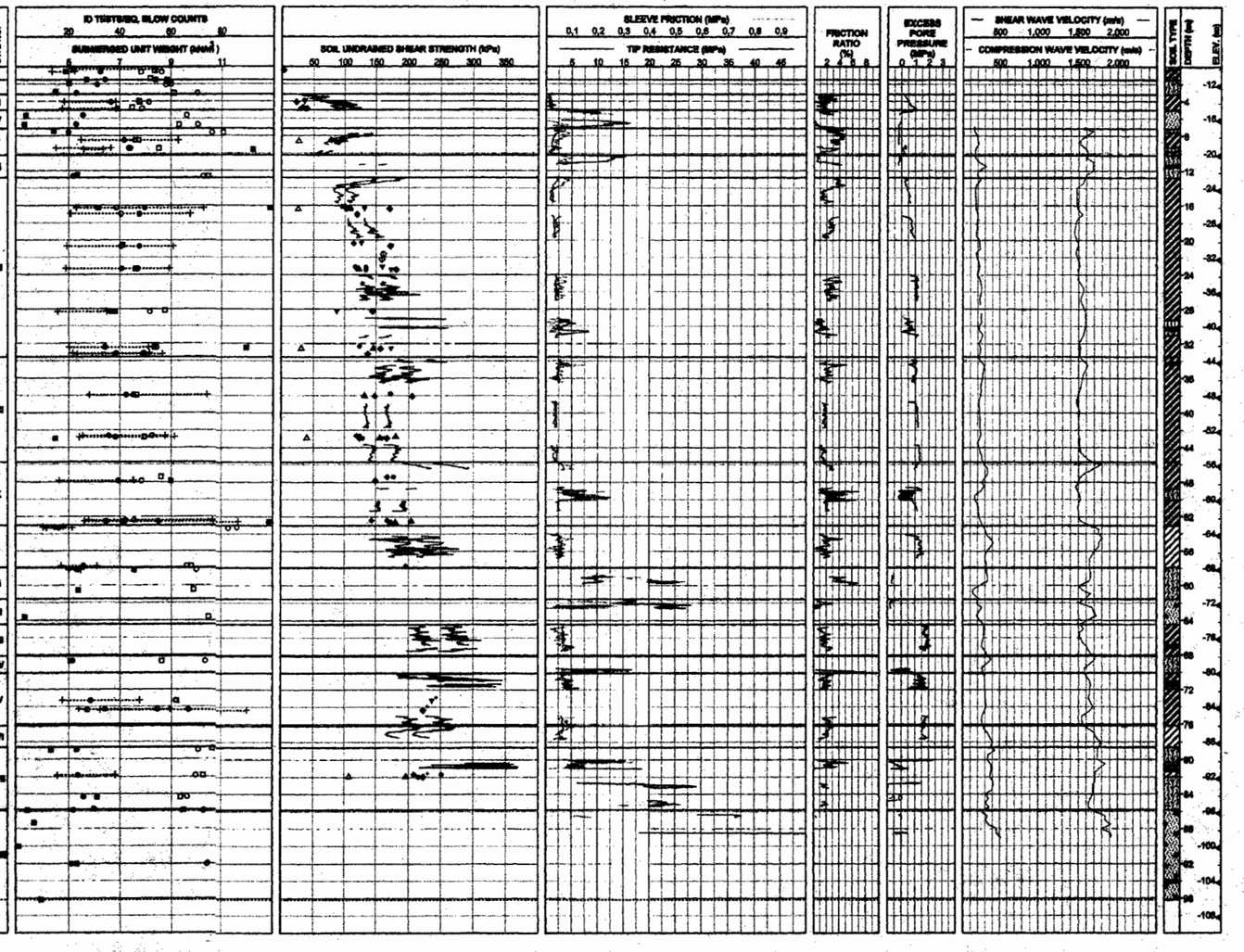
MATERIAL DESCRIPTION

MUDLINE ELEVATION: -9.8m (MSL)

Description	Elev. (m)
Fat CLAY (CH), very soft, olive gray	(1.5m)
Silty Fine SAND (SM), medium dense, dark gray	(3.2m)
Fat CLAY (CH), firm to stiff, olive gray	(5.0m)
Fine SAND (SP), dense, dark gray	(7.2m)
Fat CLAY (CH), stiff to very stiff, olive gray -with silty sand to 7.6m	(10.2m)
Silty Fine SAND (SM), dense, greenish gray -fat clay layer, 11.3m to 11.8m	(12.8m)
Fat CLAY (CH), very stiff, dark greenish gray	
-with silt seams, 24.1m to 27.1m	
-interlayered sand and clay, at 28.0m	
-silt with clay layers, 29.3m to 30.5m -silty sand layer, 30.5m to 31.1m	(33.5m)
Fat CLAY (CH), very stiff to hard, greenish gray -silt layer, 34.1m to 34.4m -with gas blisters, slickensides, and a few dark gray pockets, at 37.8m	
-with slickensides, and a few organic pockets, at 42.7m	(45.7m)
Fat CLAY (CH), very stiff to hard, dark greenish gray -with many silty fine sand partings, and seams, at 47.5m -silty sand with many clay partings and seams, 48.8m to 50.0m	
-with many organic pockets and partings, below 52.1m	(53.0m)
-Lean CLAY (CL), hard, greenish gray -sandy clay at 53.0m	(57.9m)
Silty Fine SAND (SM), dense, olive gray -with clay layers	(61.6m)
Fine to Medium SAND with coarse sand and fine gravel (SP), dense, dark gray	(64.5m)
Fat CLAY (CH), hard -silt layer, 66.8m to 67.1m	(66.1m)
Silty Fine SAND (SM), dense, dark gray -with clay pockets and seams, at 68.3m	(70.1m)
Fat CLAY (CH), hard, gray to dark gray -interlayered with silt to 73.5m -with many dark brown organic pockets, 73.2m to 74.4m	(76.2m)
Lean CLAY (CL), hard	(78.6m)
Silty Fine SAND (SM), very dense, dark gray -with many silt pockets and seams, at 78.8m -clay with sand layers, 80.3m to 81.1m -hard lean clay layer with a few silt pockets and dislocated pockets, 81.4m to 82.0m	(85.8m)
Fine to coarse SAND with gravel (SP), very dense, gray -with silt at 87.3m -fine gravel at 90.1m -silty fine sand with fine gravel, at 92.0m -hard clay layer, 93.9m to 94.2m -fine gravel with silt and sand, at 98.0m	

TOTAL DEPTH: 98.2m BACKFILLED WITH: Cement Grout

Note: Refer to multi-page logs presented in Volume 2 of the Final Marine Site Characterization Report for detailed soil descriptions.



JUAN F. GARPIO, Design Engineer	DRAWN BY: SACHIN DESHPANDE	C.LOVATO/M.ZUEGER, FIELD INVESTIGATOR, DATE 08/24/99	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
	CHECKED BY: J.CHACKO		

ANTHONY R. DOVER, PROJECT ENGINEER

BRIDGE NO. 33-25 | km POST 0.0/0.5 | POST MILE 0.0/0.3

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN PILE TEST PROGRAM

LOG OF TEST BORINGS 2 OF 7

ORIGINAL SCALE IN CENTIMETER FOR REDUCED PLANS 0 1 2 3 4 5 6 7 8 9 10

CU 04251
EA 012061

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) 10/14/99

SHEET 6 OF 12

br33-25#05of12.tif

SOIL AND ROCK TYPES

- Well graded GRAVEL (GW)
- Poorly graded GRAVEL (GP)
- GRAVEL with sand (GP or GW)
- GRAVEL with clay (GP or GW)
- Clayey GRAVEL (GC)
- GRAVEL with silt (GP or GW)
- Silty GRAVEL (GM)
- Well graded SAND (SW)
- Poorly graded SAND (SP)
- SAND with gravel (SP or SW)
- SAND with clay (SP-SC)
- Clayey SAND (SC)
- Silty SAND (SM)
- SAND with silt (SP-SM)
- Fat CLAY (CH)
- Sandy fat CLAY (CH)
- Lean CLAY (CL)
- Sandy lean CLAY (CL)
- Silty CLAY (CL-ML)
- Elastic SILT (MH)
- SILT (ML)
- Sandy SILT (ML)
- Clayey silt (ML/CL)
- Highly plastic ORGANICS (OH)
- Low plasticity ORGANICS (OL)
- SANDSTONE (Rx)
- SILTSTONE (Rx)
- CLAYSTONE (Rx)
- Interbedded Rock Strata (Rx)
- CONGLOMERATE (Rx)

SAMPLERS

- 76mm-OD, 72mm-ID Thin Walled Tube
- 76mm-OD, 60mm-ID Modified California Liner
- 57mm-OD, 54mm-ID* Thin Walled Driven Tube
- 51mm-OD, 38mm-ID SPT Split Spoon Sampler
- 63.5mm-OD, 54mm-ID Offshore Liner
- Rock Core (inset symbol represents recovery (%))

* A variable-OD, 54-mm-ID tapered driven tube was used to sample dense sand, gravel and rock

TUBE AND OFFSHORE LINER SAMPLERS

WOH — Offshore Liner sample advanced with the weight of an 80 kg hammer.

PUSH or SAVE — Pushed thin-walled 76mm-OD-tube.

15/60cm — Number of blows required to produce the indicated penetration using a 54mm-ID-tube sampler. The sampler was driven with an 80 kg downhole hammer dropped approximately 1.8 m.

STANDARD PENETRATION TEST AND MODIFIED CALIFORNIA LINER SAMPLERS

Samplers were driven with a 63.5 kg above deck hammer dropped approximately 760 mm.

20 — Number of blows to produce 30 cm of penetration after the initial 15 cm of seating.

65/23cm — Number of blows required to produce the indicated penetration after an initial 15 cm seating.

Ref/8cm — 50 blows produced the indicated penetration during the initial 15 cm interval.

Note: In rock using interval recovery(%)-RQD are shown in the Blow Count column.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- PERCENT PASSING #200 SIEVE
- WATER CONTENT (%)
- SUBMERGED UNIT WEIGHT
- THEORETICAL SUBMERGED UNIT WEIGHT

PLASTIC LIMIT +——+ LIQUID LIMIT

- EQUIVALENT SPT BLOW COUNT
- ROCK QUALITY DESIGNATION (RQD)
- ROCK RECOVERY PERCENT
- ROCK CORING RATE

STRENGTH TESTS

- POCKET PENETROMETER
- TORVANE
- REMOTE VANE
- MINIATURE VANE (● RESIDUAL VANE)
- UNCONSOLIDATED UNDRAINED TRIAXIAL
- SWEDISH FALL CONE
- UNCONFINED COMPRESSION (SOIL)
- (Open symbols indicate remolded tests)
- Soil: Strength Exceeds Capacity of Measuring Device. Rock: Sample broke along discontinuity; intact sample would have greater strength
- Shear Strength Interpreted from CPT Tip Resistance
- POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- UNCONFINED COMPRESSION (ROCK)
- FRACTURE DENSITY (ROCK)

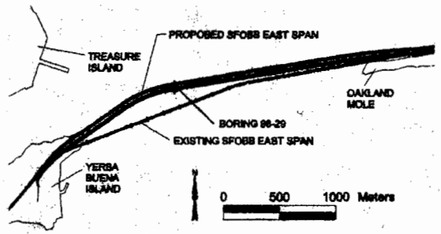
STRENGTH OF COHESIVE SOILS

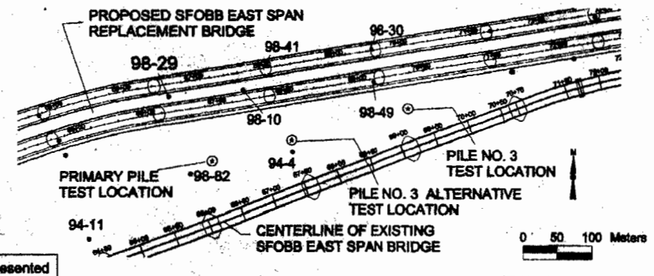
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

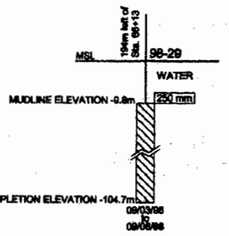
DENSITY OF GRANULAR SOILS

Descriptive Term	Relative Density (%)*
Very Loose	less than 15
Loose	15 to 35
Medium Dense	35 to 65
Dense	65 to 85
Very Dense	greater than 85

*Estimated from sampler driving record and CPT tip resistance.







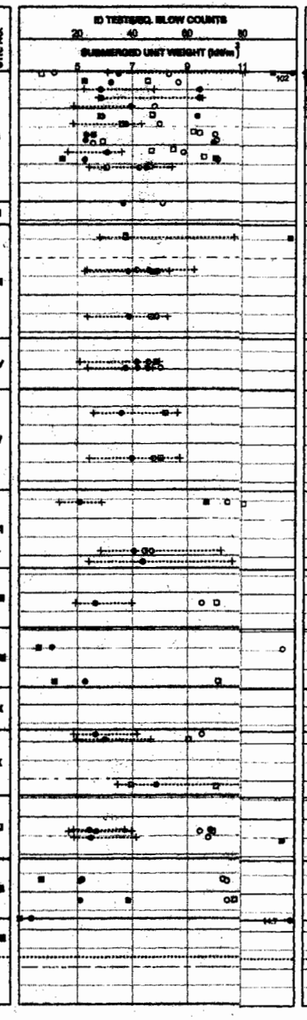
Metric

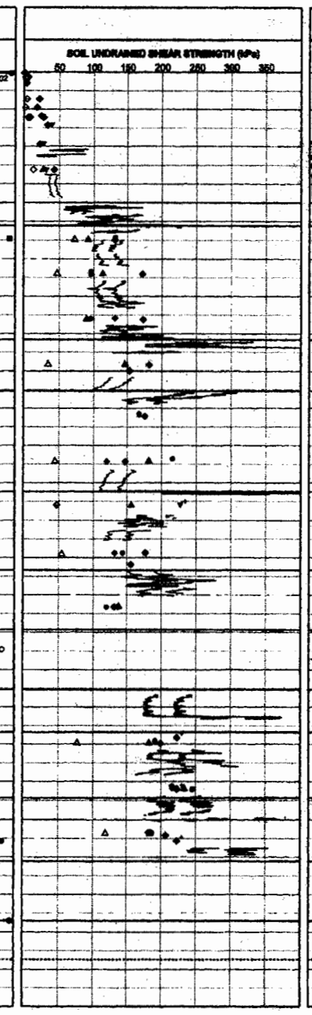
Note: Refer to multi-page logs presented in Volume 2 of the Final Marine Site Characterization Report for detailed soil descriptions.

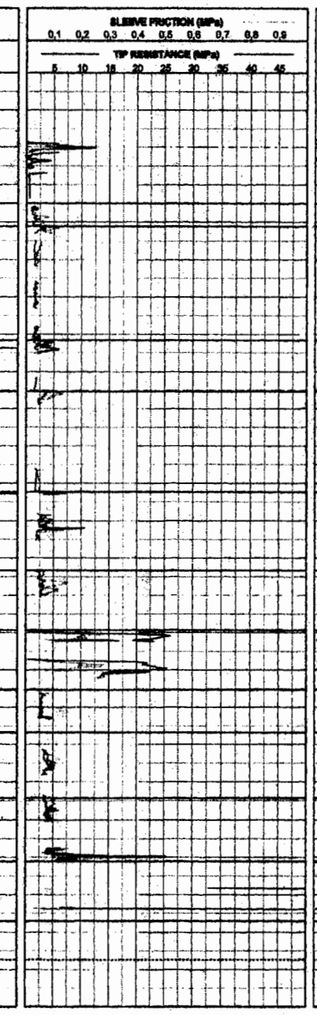
BORING 98-29

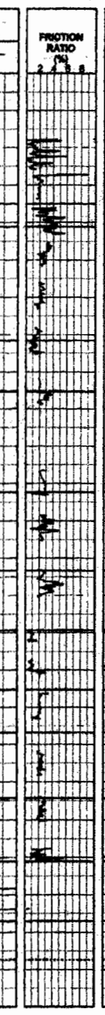
Coordinates: E1837145 N647992
CA State Plane Zone 3, NAD83, Meters

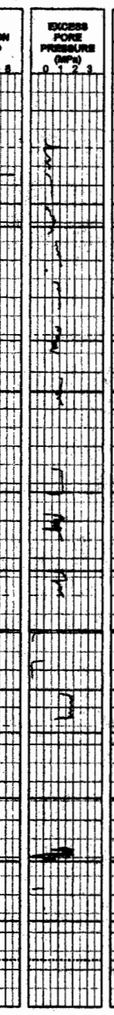
Elev. (m)	Depth (m)	Soil Type	Blow Count	Sampler	Material Description	Str. No.
					MUDLINE ELEVATION: -9.8m (MSL)	
-12			WOH		Fat CLAY (CH), soft to firm, dark gray	
	4		WOH		-with shells and shell fragments	
-16			WOH		-very soft, dark gray clay, to 0.6m	
	8		WOH		-with many sand seams and pockets to 0.8m	
-20			WOH		-very loose, olive gray, silty fine sand layer, with many clay pockets, 0.9m to 1.2m	I
	12		WOH		-with many shell fragments below 2.7m	
-24			30/30cm		-with sand pockets, 3.7m to 4.7m	
	16		30/30cm		-interbedded clay and sand, 6.4m to 7.0m	
-28			PUSH		-sand layer, 7.5m to 8.2m	
	20		SAVE		-sand layer, 8.5m to 8.8m (14.0m)	
-32					-silty sand layer with clay pockets, 9.1m to 9.7m	II
	24				Fat CLAY (CH), stiff to very stiff, olive gray to gray (16.6m)	
-36			PUSH		Fat CLAY (CH), very stiff, gray	
	28				-with a silt layer at 16.8m	
-40			PUSH		-greenish gray, and with a few silt pockets, slickensides and gas blisters, at 17.7m	III
	32				-with a few shell fragments and silt pockets, at 21.3m	
-44			PUSH			
	36				-greenish gray with silty sand pockets, a few shell fragments, and mica flakes, at 28.2m (28.7m)	
-48			PUSH/ SAVE		Fat CLAY (CH), very stiff, gray	
	40				-silt with clay layers to 29.9m	IV
-52					-with sandy silt pockets and partings, and shell fragments, 30.8m to 32.0m (34.1m)	
	44		PUSH		Fat CLAY (CH), very stiff to hard, gray	
-56					-greenish gray with silt pockets and partings, at 36.6m	V
	48		PUSH			
-60					-with a few silt pockets at 41.1m	
	52				-with organic stains and organic pockets, below 41.1m (46.0m)	
-64			30/40cm		Fat CLAY (CH), very stiff, gray	
	56				-very stiff to hard sandy lean clay with many silt seams, to 48.8m	
-68					-with a sand layer at 45.1m	VI
	60				with silty sand pockets and seams, at 46.3m	
-72			PUSH/ SAVE		-sand layer, 46.8m to 49.1m	
	64				(53.3m)	
-76					Lean CLAY (CL), very stiff to hard, greenish gray	
	68		30/40cm			VII
-80					-with a few silt pockets and partings, gas blisters, and organic stains, at 57.2m (59.7m)	
	72		30/15cm		Fine to Coarse SAND with silt (SW-SM), dense, gray	
-84					-with gravel at 61.7m	VIII
	76		30/30cm		-silty fine sand below 64.2m (66.1m)	
-88					-with clay pockets, partings and seams, at 65.2m	
	80				Lean CLAY (CL), very stiff to hard, olive gray	
-92			MP SAVE/ PUSH		-with a sand layer at 69.2m (70.7m)	IX
	84				Lean CLAY (CL), hard, olive gray	
-96					-with silt partings and pockets, to 71.8m	
	88				-with silty sand pockets and partings, at 71.8m	X
-100			PUSH			
	92				-with wood fragments and organic pockets, at 76.5m (77.7m)	
-104					Lean CLAY (CL), hard, gray	
	96		PUSH/ SAVE			XI
-108					-with silt pockets and a few shell fragments, at 81.4m	
	100				-interlayered sand and clay, below 82.9m (84.4m)	
			30/30cm		Fine to Medium SAND with silt (SP-SM), dense to very dense, gray	
					-with a clay layer at 86.7m	XII
			30/25cm		-with a lean clay layer at 86.8m (90.8m)	
			30/5cm		Fine GRAVEL (GP), very dense, dark gray	
					-sand layer, 91.4m to 92.4m	XIII
			50/5cm		dense to very dense, fine to coarse sand, at 94.8m	
					TOTAL DEPTH: 94.8m BACKFILLED WITH: Cement Grout	

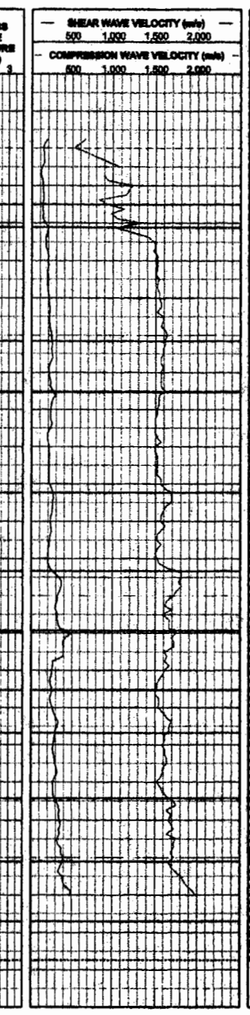


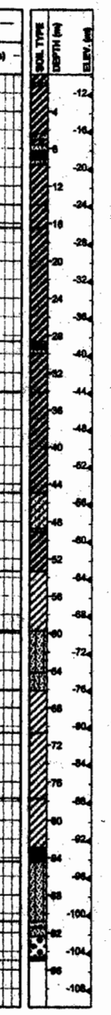












JUAN F. CARPIO, DESIGN OVERSIGHT	DRAWN BY: SACHIN DESHPANDE	J.CHACKO/M.ZUEGER/P.ROBBINS, FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
	CHECKED BY: J.CHACKO	DATE: 06/24/99	

ANTHONY R. DOVER, PROJECT ENGINEER

ORIGINAL SCALE IN CENTIMETERS FOR REDUCED PLANS 0 1 2 3 4 5 6 7 8 9 10

CU 04251
EA 012081

BRIDGE NO.	km POST	POST MILE
33-25	0.0/0.5	0.0/0.3

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN PILE TEST PROGRAM

LOG OF TEST BORINGS 3 OF 7

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 07/99

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 6 OF 12

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SOIL AND ROCK TYPES

- Well graded GRAVEL (GW)
- Poorly graded GRAVEL (GP)
- GRAVEL with sand (GP or GW)
- GRAVEL with clay (GP or GW)
- Clayey GRAVEL (GC)
- GRAVEL with silt (GP or GW)
- Silty GRAVEL (GM)
- Well graded SAND (SW)
- Poorly graded SAND (SP)
- SAND with gravel (SP or SW)
- SAND with clay (SP-SC)
- Clayey SAND (SC)
- Silty SAND (SM)
- SAND with silt (SP-SM)
- Fat CLAY (CH)
- Sandy fat CLAY (CH)
- Lean CLAY (CL)
- Sandy lean CLAY (CL)
- Silty CLAY (CL-ML)
- Elastic SILT (MH)
- SILT (ML)
- Sandy SILT (ML)
- Clayey silt (ML/CL)
- Highly plastic ORGANICS (OH)
- Low plasticity ORGANICS (OL)
- SANDSTONE (Rx)
- SILTSTONE (Rx)
- CLAYSTONE (Rx)
- Interbedded Rock Strata (Rx)
- CONGLOMERATE (Rx)

SAMPLERS

- 76mm-OD, 72mm-ID Thin Walled Tube
- 76mm-OD, 69mm-ID Modified California Liner
- 57mm-OD, 54mm-ID* Thin Walled Driven Tube
- 51mm-OD, 35mm-ID SPT Split Spoon Sampler
- 63.5mm-OD, 54mm-ID Offshore Liner
- Rock Core (inset symbol represents recovery (%)

* A variable-OD, 54-mm-ID tapered driven tube was used to sample coarse sand, gravel and rock

TUBE AND OFFSHORE LINER SAMPLERS

WOH	Offshore Liner sample advanced with the weight of an 80 kg hammer.
PUSH or SAVE	Pushed thin-walled 76mm-OD tube
15/90cm	Number of blows required to produce the indicated penetration using a 54mm-ID-tube sampler. The sampler was driven with an 80 kg downhole hammer dropped approximately 1.5 m.

STANDARD PENETRATION TEST AND MODIFIED CALIFORNIA LINER SAMPLERS

Samplers were driven with a 63.5 kg above dock hammer dropped approximately 760 mm.

20	Number of blows to produce 30 cm of penetration after the initial 15 cm of seating.
66/28cm	Number of blows required to produce the indicated penetration after an initial 15 cm seating.
Ref/5cm	50 blows produced the indicated penetration during the initial 15 cm interval.

Note: In rock coring interval recovery(%)-RQD are shown in the Blow Count column.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- PERCENT PASSING #200 SIEVE
- WATER CONTENT (%)
- SUBMERGED UNIT WEIGHT
- THEORETICAL SUBMERGED UNIT WEIGHT

PLASTIC LIMIT LIQUID LIMIT

- EQUIVALENT SPT BLOW COUNT
- ROCK QUALITY DESIGNATION (RQD)
- ROCK RECOVERY PERCENT
- ROCK CORING RATE

STRENGTH TESTS

- POCKET PENETROMETER
- TORVANE
- REMOTE VANE
- MINIATURE VANE (● RESIDUAL VANE)
- UNCONSOLIDATED UNDRAINED TRIAXIAL
- SWEDISH FALL CONE
- UNCONFINED COMPRESSION (SOIL)
- △△ (Open symbols indicate remolded tests)
- Soil: Strength Exceeds Capacity of Measuring Device
- Rock: Sample broke along discontinuity; intact sample would have greater strength
- Shear Strength Interpreted from CPT Tip Resistance
- POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- UNCONFINED COMPRESSION (ROCK)
- FRACTURE DENSITY (ROCK)

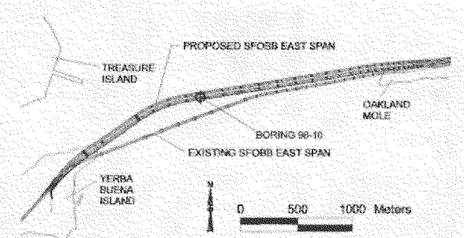
STRENGTH OF COHESIVE SOILS

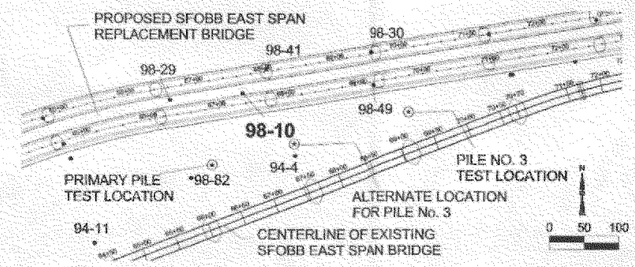
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

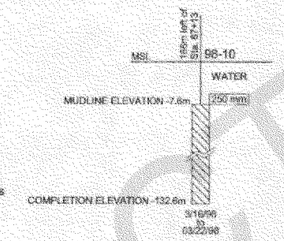
DENSITY OF GRANULAR SOILS

Descriptive Term	Relative Density (%)*
Very Loose	less than 15
Loose	15 to 35
Medium Dense	35 to 65
Dense	65 to 85
Very Dense	greater than 85

*Estimated from sampler driving record and CPT tip resistance.







Metric

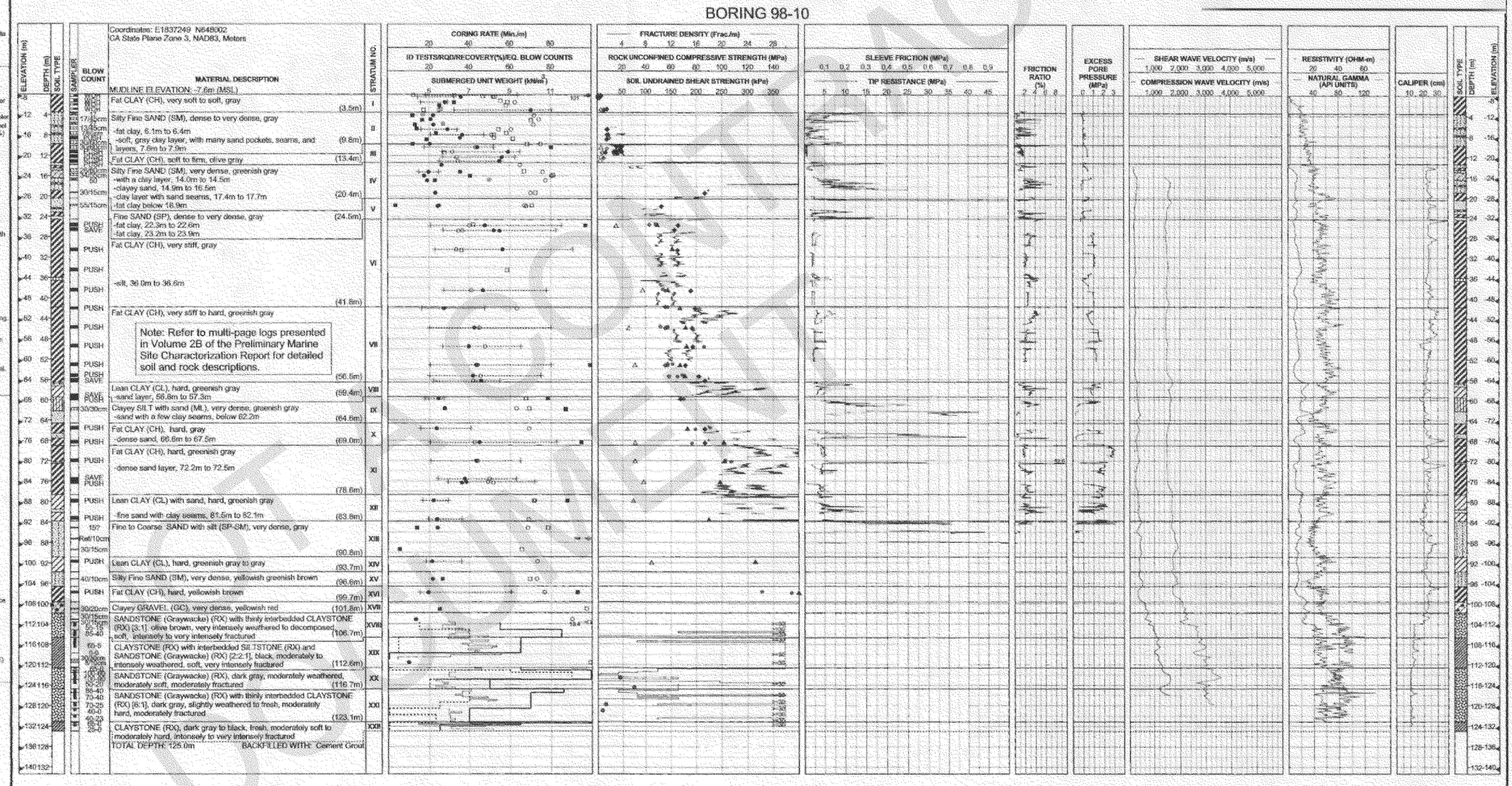
BORING 98-10

Coordinates: E1837249 N648002
CA State Plane Zone 3, NAD83, Meters

MUDLINE ELEVATION: -7.6m (MSL)

Blow Count	Material Description	Stratum No.
8/9/9	Fat CLAY (CH), very soft to soft, gray (3.5m)	I
17/45cm, 13/45cm, 9/45cm, 9/45cm, 7/45cm, 7/45cm	Silty Fine SAND (SM), dense to very dense, gray -fat clay, 6.1m to 6.4m -soft, gray clay layer, with many sand pockets, seams, and layers, 7.6m to 7.9m (9.8m)	II
50	Fat CLAY (CH), soft to firm, olive gray (13.4m)	III
22/5cm, 50/5cm, 50	Silty Fine SAND (SM), very dense, greenish gray -with a clay layer, 14.0m to 14.5m -clayey sand, 14.9m to 16.5m -clay layer with sand seams, 17.4m to 17.7m -fat clay below 18.9m (20.4m)	IV
30/15cm, 55/15cm		V
PUSH, SAVE	Fine SAND (SP), dense to very dense, gray -fat clay, 22.3m to 22.6m -fat clay, 23.2m to 23.9m (24.5m)	
PUSH	Fat CLAY (CH), very stiff, gray	VI
PUSH	-silt, 36.0m to 36.6m	
PUSH	(41.8m)	
PUSH	Fat CLAY (CH), very stiff to hard, greenish gray	VII
PUSH	Note: Refer to multi-page logs presented in Volume 2B of the Preliminary Marine Site Characterization Report for detailed soil and rock descriptions.	
PUSH, SAVE	(56.6m)	
SAVE, PUSH	Lean CLAY (CL), hard, greenish gray -sand layer, 58.8m to 57.3m (69.4m)	VIII
30/30cm	Clayey SILT with sand (ML), very dense, greenish gray -sand with a few clay seams, below 62.2m (64.6m)	IX
PUSH	Fat CLAY (CH), hard, gray -dense sand, 66.6m to 67.5m (69.0m)	X
PUSH	Fat CLAY (CH), hard, greenish gray -dense sand layer, 72.2m to 72.5m	XI
SAVE, PUSH	(78.6m)	
PUSH	Lean CLAY (CL) with sand, hard, greenish gray -fine sand with clay seams, 81.5m to 82.1m (83.6m)	XII
157	Fine to Coarse SAND with silt (SP-SM), very dense, gray	XIII
Ref/10cm, 30/15cm	(90.8m)	
PUSH	Lean CLAY (CL), hard, greenish gray to gray (93.7m)	XIV
40/10cm	Silty Fine SAND (SM), very dense, yellowish greenish brown (96.6m)	XV
PUSH	Fat CLAY (CH), hard, yellowish brown (99.7m)	XVI
30/20cm	Clayey GRAVEL (GC), very dense, yellowish red (101.8m)	XVII
30/15cm, 30/15cm, 50-15, 50-40	SANDSTONE (Graywacke) (RX) with thinly interbedded CLAYSTONE (RX) [3:1], olive brown, very intensely weathered to decomposed, soft, intensely to very intensely fractured (106.7m)	XVIII
65-5, 0-0, 30/0cm, 0/0cm, 0-0, 0-0, 53-20, 85-40, 70-40, 70-25, 40-0, 40-23, 85-0, 22-0	CLAYSTONE (RX) with interbedded SILTSTONE (RX) and SANDSTONE (Graywacke) (RX) [2:2:1], black, moderately to intensely weathered, soft, very intensely fractured (112.6m)	XIX
	SANDSTONE (Graywacke) (RX), dark gray, moderately weathered, moderately soft, moderately fractured (116.7m)	XX
	SANDSTONE (Graywacke) (RX) with thinly interbedded CLAYSTONE (RX) [6:1], dark gray, slightly weathered to fresh, moderately hard, moderately fractured (123.1m)	XXI
	CLAYSTONE (RX), dark gray to black, fresh, moderately soft to moderately hard, intensely to very intensely fractured	XXII

TOTAL DEPTH: 125.0m BACKFILLED WITH: Cement Grout



JUAN F. CARPIO DESIGN OVERSEER	DRAWN BY: SACHIN DESHPANDE CHECKED BY: J.CHACKO	J.CHACKO/M.ZUEGER M. SEBESTA/C. LOVATO FIELD INVESTIGATOR DATE: 06/24/99	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	ANTHONY R. DOVER PROJECT ENGINEER	BRIDGE NO. 33-25 km POST 0.0/0.5 POST MILE 0.0/0.3	SAN FRANCISCO OAKLAND BAY BRIDGE EAST SPAN PILE TEST PROGRAM LOG OF TEST BORINGS 4 OF 7		

ORIGINAL SCALE IN CENTIMETERS FOR REDUCED PLANS 0 1 2 3 4 5 6 7 8 9 10

CU 04251
EA 012081

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 05/14/99

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET 7 | OF 12

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SOIL AND ROCK TYPES

Well graded GRAVEL (GW)	Sandy fat CLAY (CH)
Poorly graded GRAVEL (GP)	Lean CLAY (CL)
GRAVEL with sand (GP or GW)	Sandy lean CLAY (CL)
GRAVEL with clay (GP or GW)	Silty CLAY (CL-ML)
Clayey GRAVEL (GC)	Elastic SILT (MH)
GRAVEL with silt (GP or GW)	SILT (ML)
Silty GRAVEL (GM)	Sandy SILT (ML)
Well graded SAND (SW)	Clayey silt (ML/CL)
Poorly graded SAND (SP)	Highly plastic ORGANICS (OH)
SAND with gravel (SP or SW)	Low plasticity ORGANICS (OL)
SAND with clay (SP-SC)	SANDSTONE (Rx)
Clayey SAND (SC)	SILTSTONE (Rx)
Silty SAND (SM)	CLAYSTONE (Rx)
SAND with silt (SP-SM)	Interbedded Rock Strata (Rx)
Fat CLAY (CH)	CONGLOMERATE (Rx)

SAMPLERS

76mm-OD, 72mm-ID Thin Walled Tube	76mm-OD, 60mm-ID Modified California Liner
57mm-OD, 54mm-ID* Thin Walled Driven Tube	51mm-OD, 35mm-ID SPT Split Spoon Sampler
63.5mm-OD, 54mm-ID Offshore Liner	Rock Core (inset symbol represents recovery (%))

* A variable-OD, 54-mm-ID tapered driven tube was used to sample coarse sand, gravel and rock

TUBE AND OFFSHORE LINER SAMPLERS

WOH	Offshore Liner sample advanced with the weight of an 80 kg hammer.
PUSH or SAVE	Pushed thin-walled 76mm-OD-tube.
15/60cm	Number of blows required to produce the indicated penetration using a 54mm-ID-tube sampler. The sampler was driven with an 80 kg downhole hammer dropped approximately 1.5 m.

STANDARD PENETRATION TEST AND MODIFIED CALIFORNIA LINER SAMPLERS

Samplers were driven with a 63.5 kg above deck hammer dropped approximately 760 mm.

20	Number of blows to produce 30 cm of penetration after the initial 15 cm of seating.
86/28cm	Number of blows required to produce the indicated penetration after an initial 15 cm seating.
Ref/8cm	50 blows produced the indicated penetration during the initial 15 cm interval.

Note: In rock coring interval recovery(%)-RQD are shown in the Blow Count column.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ SUBMERGED UNIT WEIGHT
- ○ THEORETICAL SUBMERGED UNIT WEIGHT
- PLASTIC LIMIT LIQUID LIMIT +·········+
- EQUIVALENT SPT BLOW COUNT
- ···· ROCK QUALITY DESIGNATION (RQD)
- ROCK RECOVERY PERCENT
- ROCK CORING RATE

STRENGTH TESTS

- POCKET PENETROMETER
- TORVANE
- REMOTE VANE
- MINIATURE VANE (RESIDUAL VANE)
- ▲ UNCONSOLIDATED UNDRAINED TRIAXIAL
- ▼ SWEDISH FALL CONE
- UNCONFINED COMPRESSION (SOIL)
- ◇△ (Open symbols indicate remolded tests)
- \+ Soil: Strength Exceeds Capacity of Measuring Device
  Rock: Sample broke along discontinuity; intact sample would have greater strength
- Shear Strength Interpreted from CPT Tip Resistance
- POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- FRACTURE DENSITY (ROCK)

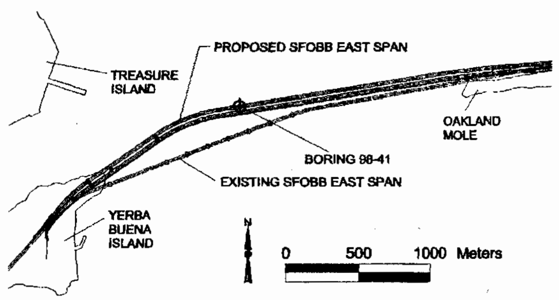
STRENGTH OF COHESIVE SOILS

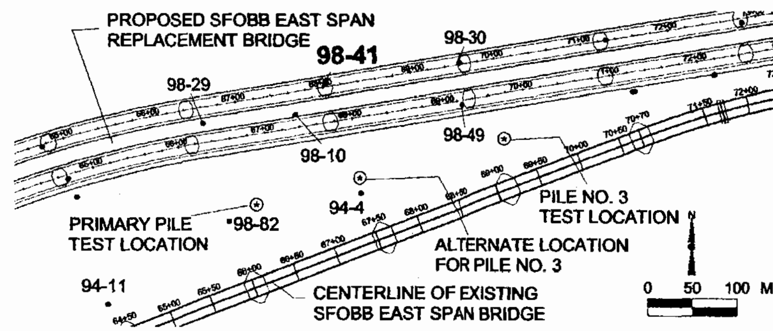
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

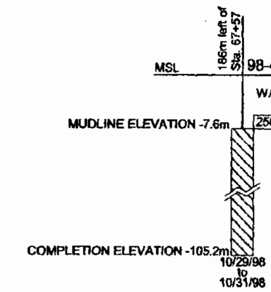
DENSITY OF GRANULAR SOILS

Descriptive Term	Relative Density (%)*
Very Loose	less than 15
Loose	15 to 35
Medium Dense	35 to 65
Dense	65 to 85
Very Dense	greater than 85

*Estimated from sampler driving record and CPT tip resistance.







Metric

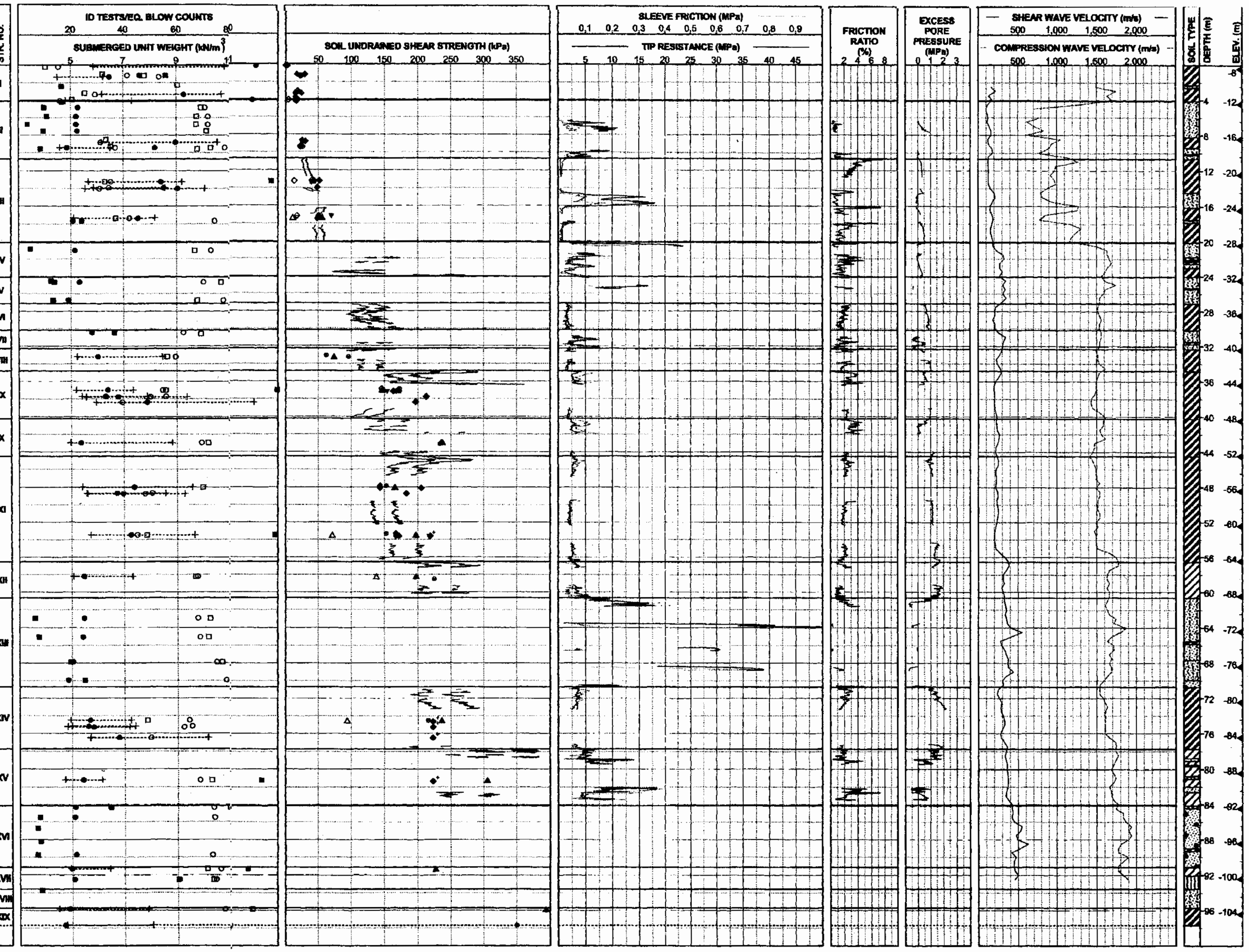
BORING 98-41

Coordinates: E1837283 N648036
CA State Plane Zone 3, NAD83, Meters

MUDLINE ELEVATION: -7.6m (MSL)

BLOW COUNT	MATERIAL DESCRIPTION	STR. NO.
WOH, WOH, 13/30cm, 2/30cm, 9/30cm	Fat CLAY (CH), soft to firm, dark olive gray -medium dense, silty fine sand layer, with clay pockets, 2.3m to 2.6m (4.1m)	I
20/30cm, 21/30cm, 26/30cm, 30/25cm, 7/30cm, 30/30cm	Fine SAND with silt (SP-SM), dense, olive gray -firm, dark olive gray fat clay with many shells and shell fragments, 8.2m to 9.4m (10.7m) -medium dense, silty fine sand, 9.4m to 10.5m -with clay at 10.1m	II
PUSH SAVE, PUSH	Fat CLAY (CH), firm to stiff, olive gray -with organic pockets and gas blisters, at 13.1m -with a sand seam and shell fragments, at 13.4m -dense, silty fine sand, 14.5m to 16.2m -with shell fragments at 17.5m (20.1m)	III
30/30cm	-olive gray fine sand, with clay pockets and seams, 17.5m to 17.8m Fine SAND with silt (SP-SM), dense to very dense, dark gray -with a few organic pockets and a few clay partings, at 20.9m	IV
30/30cm	-interlayered sand and clay, 21.8m to 24.1m (24.1m)	V
30/25cm	Silty Fine SAND (SM), dense, dark gray -with a clay layer at 25.3m -with a few clay pockets and partings, at 26.7m (27.1m)	VI
PUSH	Fat CLAY (CH), very stiff, greenish gray (30.2m)	VII
PUSH	Silty Fine SAND (SM), medium dense to dense, dark olive gray (32.3m) -very stiff clay layer with sand seams, 31.5m to 31.8m	VIII
	Fat CLAY (CH), very stiff, olive gray to dark gray (34.8m)	
PUSH SAVE SAVE	Fat CLAY (CH), very stiff to hard, olive gray (40.2m)	IX
PUSH	Fat CLAY (CH), very stiff, greenish gray -slickensided, with fine gravel and a few shell fragments, at 43.0m (44.5m)	X
PUSH SAVE, PUSH	Fat CLAY (CH), very stiff to hard, olive gray -with silt pockets and seams and sand pockets and seams, at 47.9m -with sand pockets at 48.5m -with organic pockets at 53.3m (56.5m)	XI
PUSH	Lean CLAY (CL), hard, gray -with calcareous nodules and silt pockets, at 58.2m (60.7m)	XII
30/15cm, 30/15cm, 30/20cm, 30/20cm	Fine SAND with silt (SP-SM), dense to very dense, dark olive gray to gray -with many clay seams to 63.1m - with medium sand at 64.9m -clay layer, 65.5m to 65.8m -silty sand below 67.7m (70.7m) -with a clay layer at 69.8m -with medium and coarse sand and fine gravel, below 70.0m	XIII
PUSH SAVE SAVE	Fat CLAY (CH), hard, greenish gray -with silt pockets and seams, a few organic pockets, and desiccated pockets, at 74.4m (77.7m) - with silty fine sand seams and silt pockets and seams at 75.0m -with organic pockets at 76.2m	XIV
PUSH	Lean CLAY (CL), hard, greenish gray -dense sand layer, 78.8m to 79.1m -with a sand layer at 79.6m (84.1m) -sandy silt layer, 80.8m to 81.1m -dense sand with clay seams and layers, 82.0m to 82.6m	XV
30/25cm, 30/15cm, 30/15cm, 30/15cm, 30/15cm, 30/20cm	Fine to Medium SAND with fine gravel and silt (SP-SM), very dense, gray -hard clay layer, 89.0m to 89.3m (91.1m)	XVI
30/15cm, 30/10cm	Lean CLAY (CL), hard, greenish gray -sandy silt below 92.0m (93.6m)	XVII
30/15cm	Fine to Coarse SAND with silt and fine gravel (SW-SM), very dense, olive gray to gray (95.7m)	XVIII
30/15cm	Fat CLAY (CH), hard, yellowish brown	XIX

TOTAL DEPTH: 97.7m BACKFILLED WITH: Cement Grout



JUAN F. CARPIO DESIGN OVERSIGHT	DRAWN BY	SACHIN DESHPANDE	R.HOWARD/ C.LOVATO M.ZUEGER FIELD INVESTIGATOR DATE 06/24/99	PREPARED FOR THE **STATE OF CALIFORNIA** **DEPARTMENT OF TRANSPORTATION**	ANTHONY R. DOVER PROJECT ENGINEER	BRIDGE NO. 33-25 km POST 0.0/0.5
	CHECKED BY	J.CHACKO		ORIGINAL SCALE IN CENTIMETERS FOR REDUCED PLANS 0 1 2 3 4 5 6 7 8 9 10	CU 04251 EA 012081	POST MILE 0.0/0.3

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN PILE TEST PROGRAM

LOG OF TEST BORINGS 5 OF 7

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 05/14/99

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 8 OF 12

br33-25#08of12.tif

SOIL AND ROCK TYPES

- Well graded GRAVEL (GW)
- Poorly graded GRAVEL (GP)
- GRAVEL with sand (GP or GW)
- GRAVEL with clay (GP or GW)
- Clayey GRAVEL (GC)
- GRAVEL with silt (GP or GW)
- Silty GRAVEL (GM)
- Well graded SAND (SW)
- Poorly graded SAND (SP)
- SAND with gravel (SP or SW)
- SAND with clay (SP-SC)
- Clayey SAND (SC)
- Silty SAND (SM)
- SAND with silt (SP-SM)
- Fat CLAY (CH)
- Sandy fat CLAY (CH)
- Lean CLAY (CL)
- Sandy lean CLAY (CL)
- Silty CLAY (CL-ML)
- Elastic SILT (MH)
- SILT (ML)
- Sandy SILT (ML)
- Clayey silt (ML/CL)
- Highly plastic ORGANICS (OH)
- Low plasticity ORGANICS (OL)
- SANDSTONE (Rx)
- SILTSTONE (Rx)
- CLAYSTONE (Rx)
- Interbedded Rock Strata (Rx)
- CONGLOMERATE (Rx)

SAMPLERS

- 76mm-OD, 72mm-ID Thin Walled Tube
- 57mm-OD, 54mm-ID* Thin Walled Driven Tube
- 63.5mm-OD, 54mm-ID Offshore Liner
- 76mm-OD, 60mm-ID Modified California Liner
- 51mm-OD, 35mm-ID SPT Split Spoon Sampler
- Rock Core (Inset symbol represents recovery (%))

* A variable-OD, 54-mm-ID tapered driven tube was used to sample coarse sand, gravel and rock

TUBE AND OFFSHORE LINER SAMPLERS

WOH	Offshore Liner sample advanced with the weight of an 80 kg hammer.
PUSH or SAVE	Pushed thin-walled 76mm-OD-tube.
15/60cm	Number of blows required to produce the indicated penetration using a 54mm-ID-tube sampler. The sampler was driven with an 80 kg downhole hammer dropped approximately 1.5 m.

STANDARD PENETRATION TEST AND MODIFIED CALIFORNIA LINER SAMPLERS

Samplers were driven with a 63.5 kg above deck hammer dropped approximately 760 mm.

20	Number of blows to produce 30 cm of penetration after the initial 15 cm of seating.
86/28cm	Number of blows required to produce the indicated penetration after an initial 15 cm seating.
Ref/8cm	50 blows produced the indicated penetration during the initial 15 cm interval.

Note: In rock coring interval recovery(%)-RQD are shown in the Blow Count column.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ SUBMERGED UNIT WEIGHT
- ○ THEORETICAL SUBMERGED UNIT WEIGHT
- PLASTIC LIMIT + ····· + LIQUID LIMIT
- ⊙ EQUIVALENT SPT BLOW COUNT
- ---- ROCK QUALITY DESIGNATION (RQD)
- ▬ ROCK RECOVERY PERCENT
- — ROCK CORING RATE

STRENGTH TESTS

- ● POCKET PENETROMETER
- ◆ TORVANE
- ◇ REMOTE VANE
- ◆ MINIATURE VANE (◎ RESIDUAL VANE)
- ▲ UNCONSOLIDATED UNDRAINED TRIAXIAL
- ▼ SWEDISH FALL CONE
- ⊠ UNCONFINED COMPRESSION (SOIL)
- ◇△ (Open symbols indicate remolded tests)
- + Soil: Strength Exceeds Capacity of Measuring Device. Rock: Sample broke along discontinuity; Intact sample would have greater strength
- Shear Strength Interpreted from CPT Tip Resistance
- ● POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- ◎ POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- — FRACTURE DENSITY (ROCK)

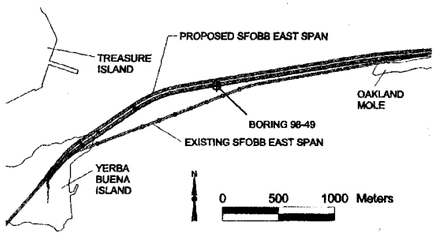
STRENGTH OF COHESIVE SOILS

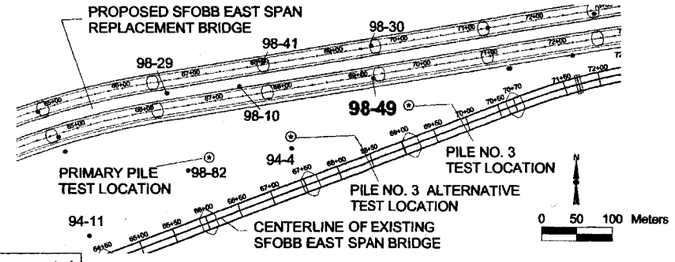
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

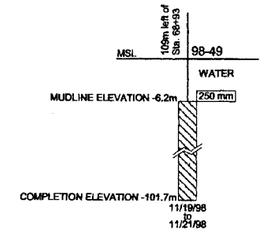
DENSITY OF GRANULAR SOILS

Descriptive Term	Relative Density (%)*
Very Loose	less than 15
Loose	15 to 35
Medium Dense	35 to 65
Dense	65 to 85
Very Dense	greater than 85

*Estimated from sampler driving record and CPT tip resistance.







Note: Refer to multi-page logs presented in Volume 2 of the Final Marine Site Characterization Report for detailed soil descriptions.

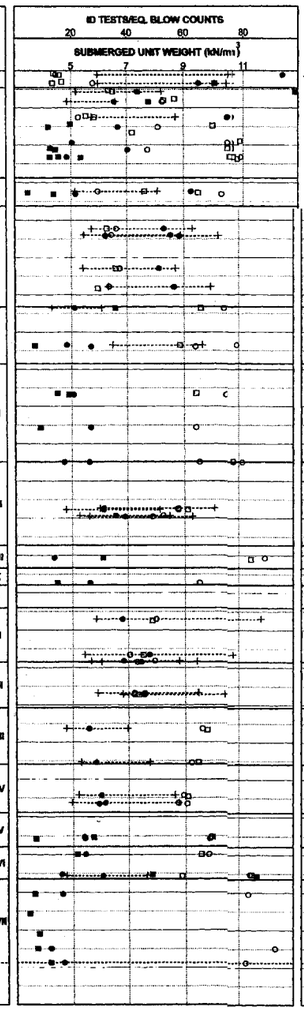
BORING 98-49

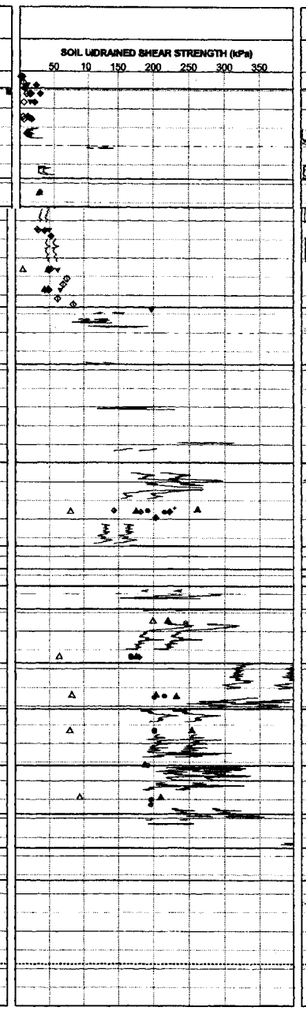
Coordinates: E1837438 N648013
CA State Plane Zone 3, NAD83, Meters

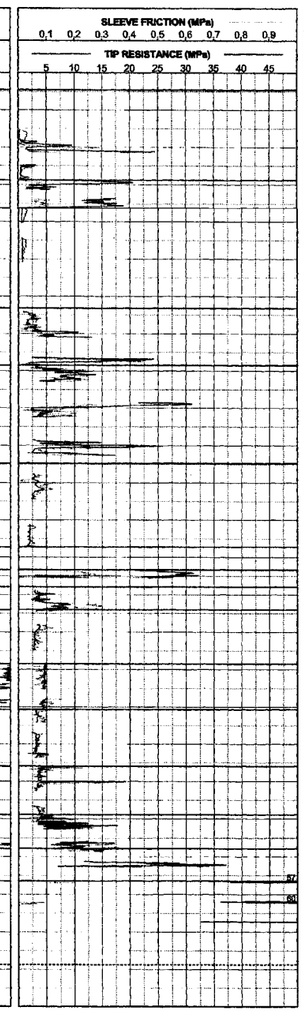
MUDLINE ELEVATION: -6.2m (MSL)

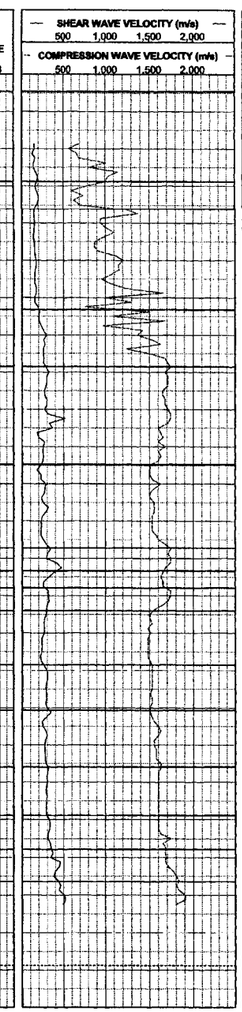
Blow Count	Material Description	Depth (m)	Strat. No.
WOH, WOH, WOH, WOH, NR	Fat CLAY (CH), very soft, dark gray -with sand, silt pockets and shell fragments, at 1.2m	(1.8m)	I
10/60cm, 15/45cm, 15/45cm, 30/30cm, 30/30cm, 30/20cm, 30/35cm	Fat CLAY (CH), soft to firm, olive gray -interlayered silty fine sand and fat clay below 5.2m -dense to very dense sand, 7.3m to 9.9m	(11.5m)	II
PUSH	Fine SAND (SP), dense, gray -interlayered sand and clay, to 13.0m -clay with sand pockets and calcareous nodules, at 12.8m	(14.5m)	III
PUSH, SAVE, PUSH, PUSH, PUSH	Fat CLAY (CH), firm to stiff, olive gray -with organic pockets at 16.8m -with gas blisters, shell fragments and mica, at 21.0m -with a few gas blisters at 23.2m	(25.3m)	IV
PUSH, PUSH	Interlayered Silty Fine SAND (SP), SILT (ML) and CLAY (CH) -sand with large clay pockets, at 29.6m	(31.4m)	V
PUSH, PUSH, 30/15cm	Silty Fine SAND (SM), dense, gray -clay to 31.7m -with many clay pockets, partings and seams, at 34.7m -clay layer, 36.0m to 36.3m -with clay layers, 36.9m to 38.1m -fine sand with silt, below 38.1m -clay layer, 39.8m to 39.9m -clay layer, 40.2m to 40.8m -with large clay pockets and seams, at 41.8m	(41.9m)	VI
PUSH, SAVE	Fat CLAY (CH), very stiff to hard, dark greenish gray -with shell fragments, gas blisters, and a few desiccated pockets, at 46.9m	(50.9m)	VII
PUSH	Clayey SAND (SC), dense, greenish gray -dessicated at 52.1m	(53.3m)	VIII
50/10cm	Silty Fine SAND (SM), dense to very dense, greenish gray	(55.2m)	IX
PUSH	Silty Fine SAND (SM), very dense, gray -clay layer, 55.2m to 55.8m -clay layer, 56.1m to 56.5m	(57.6m)	X
PUSH, SAVE	Fat CLAY (CH), hard, dark greenish gray -with mica and slickensides, at 58.8m -with slickensides and a few shell fragments, at 62.5m	(63.4m)	XI
PUSH	Fat CLAY (CH), hard, gray -with silt pockets and partings, and slickensides, at 66.8m	(68.3m)	XII
PUSH, PUSH	Lean CLAY (CL), hard, gray -with silt pockets and desiccated brown pockets, at 70.4m -with a silty fine sand layer at 73.0m -with a few silty fine sand seams, silt pockets and partings, and organic pockets, at 74.1m	(74.4m)	XIII
PUSH, SAVE	Fat CLAY (CH), hard, gray -sand layer, 76.0m to 76.2m -with silt pockets and partings, and a few silty fine sand seams, at 77.7m	(79.6m)	XIV
PUSH, 30/20cm	Interlayered Silty Fine SAND (SM), and Hard Lean CLAY (CL), dark greenish gray	(83.1m)	XV
PUSH, 30/10cm, 50/15cm, 50/15cm, 50/10cm	Silty Fine SAND (SM), very dense, gray -with coarse sand and trace gravel -clay layer, 84.9m to 85.1m -interlayered clay and fine to coarse sand, at 86.0m Fine to Coarse SAND (SW-SM) with silt and gravel, dense to very dense, gray -fine to medium sand at 90.2m -fine to coarse gravel with silt and sand, at 92.4m	(88.6m)	XVI, XVII

TOTAL DEPTH: 95.5m — BACKFILLED WITH: Cement Grout









JUAN F. CARPIO, DESIGN OVERSIGHT	DRAWN BY: SACHIN DESHPANDE	R.HOWARD/P.ROBBINS, FIELD INVESTIGATOR	ANTHONY R. DOVER, PROJECT ENGINEER
	CHECKED BY: J.CHACKO	DATE: 06/24/99	

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

ORIGINAL SCALE IN CENTIMETERS FOR REDUCED PLANS: 0 1 2 3 4 5 6 7 8 9 10

CU 04251
EA 012081

BRIDGE NO.	km POST	POST MILE
33-25	0.0/0.5	0.0/0.3

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN PILE TEST PROGRAM

LOG OF TEST BORINGS 6 OF 7

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 06/14/99

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET 9 | OF 12

br33-25#09of12.tif

SOIL AND ROCK TYPES

- Well graded GRAVEL (GW)
- Poorly graded GRAVEL (GP)
- GRAVEL with sand (GP or GW)
- GRAVEL with clay (GP or GW)
- Clayey GRAVEL (GC)
- GRAVEL with silt (GP or GW)
- Silty GRAVEL (GM)
- Well graded SAND (SW)
- Poorly graded SAND (SP)
- SAND with gravel (SP or SW)
- SAND with clay (SP-SC)
- Clayey SAND (SC)
- Silty SAND (SM)
- SAND with silt (SP-SM)
- Fat CLAY (CH)
- Sandy fat CLAY (CH)
- Lean CLAY (CL)
- Sandy lean CLAY (CL)
- Silty CLAY (CL-ML)
- Elastic SILT (MH)
- SILT (ML)
- Sandy SILT (ML)
- Clayey silt (ML/CL)
- Highly plastic ORGANICS (OH)
- Low plasticity ORGANICS (OL)
- SANDSTONE (Rx)
- SILTSTONE (Rx)
- CLAYSTONE (Rx)
- Interbedded Rock Strata (Rx)
- CONGLOMERATE (Rx)

SAMPLERS

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- 76mm-OD, 60mm-ID Modified California Liner
- 57mm-OD, 54mm-ID* Thin Walled Driven Tube
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STANDARD PENETRATION TEST AND MODIFIED CALIFORNIA LINER SAMPLERS

Samplers were driven with a 63.5 kg above deck hammer dropped approximately 760 mm.

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Note: In rock coring interval recovery(%)-RQD are shown in the Blow Count column.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- PERCENT PASSING #200 SIEVE
- WATER CONTENT (%)
- SUBMERGED UNIT WEIGHT
- THEORETICAL SUBMERGED UNIT WEIGHT
- PLASTIC LIMIT LIQUID LIMIT
- EQUIVALENT SPT BLOW COUNT
- ROCK QUALITY DESIGNATION (RQD)
- ROCK RECOVERY PERCENT
- ROCK CORING RATE

STRENGTH TESTS

- POCKET PENETROMETER
- TORVANE
- REMOTE VANE
- MINIATURE VANE (● RESIDUAL VANE)
- UNCONSOLIDATED UNDRAINED TRIAXIAL
- SWEDISH FALL CONE
- UNCONFINED COMPRESSION (SOIL)
- (Open symbols indicate remolded tests)
- \+ Soil: Strength Exceeds Capacity of Measuring Device; Rock: Sample broke along discontinuity; Intact sample would have greater strength
- Shear Strength Interpreted from CPT Tip Resistance
- POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
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- FRACTURE DENSITY (ROCK)

STRENGTH OF COHESIVE SOILS

Consistency	Undrained Shear Strength kPa
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Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
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Hard	greater than 200

DENSITY OF GRANULAR SOILS

Descriptive Term	Relative Density (%)*
Very Loose	less than 15
Loose	15 to 35
Medium Dense	35 to 65
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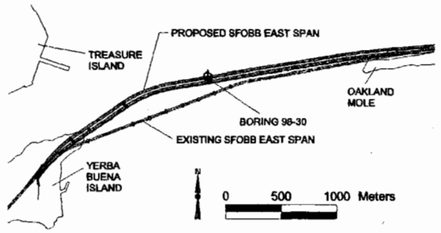
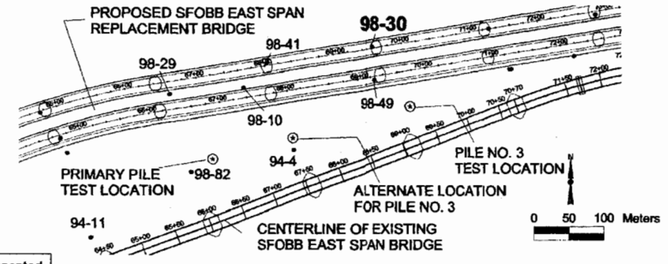
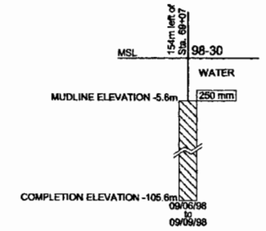
*Estimated from sampler driving record and CPT tip resistance.







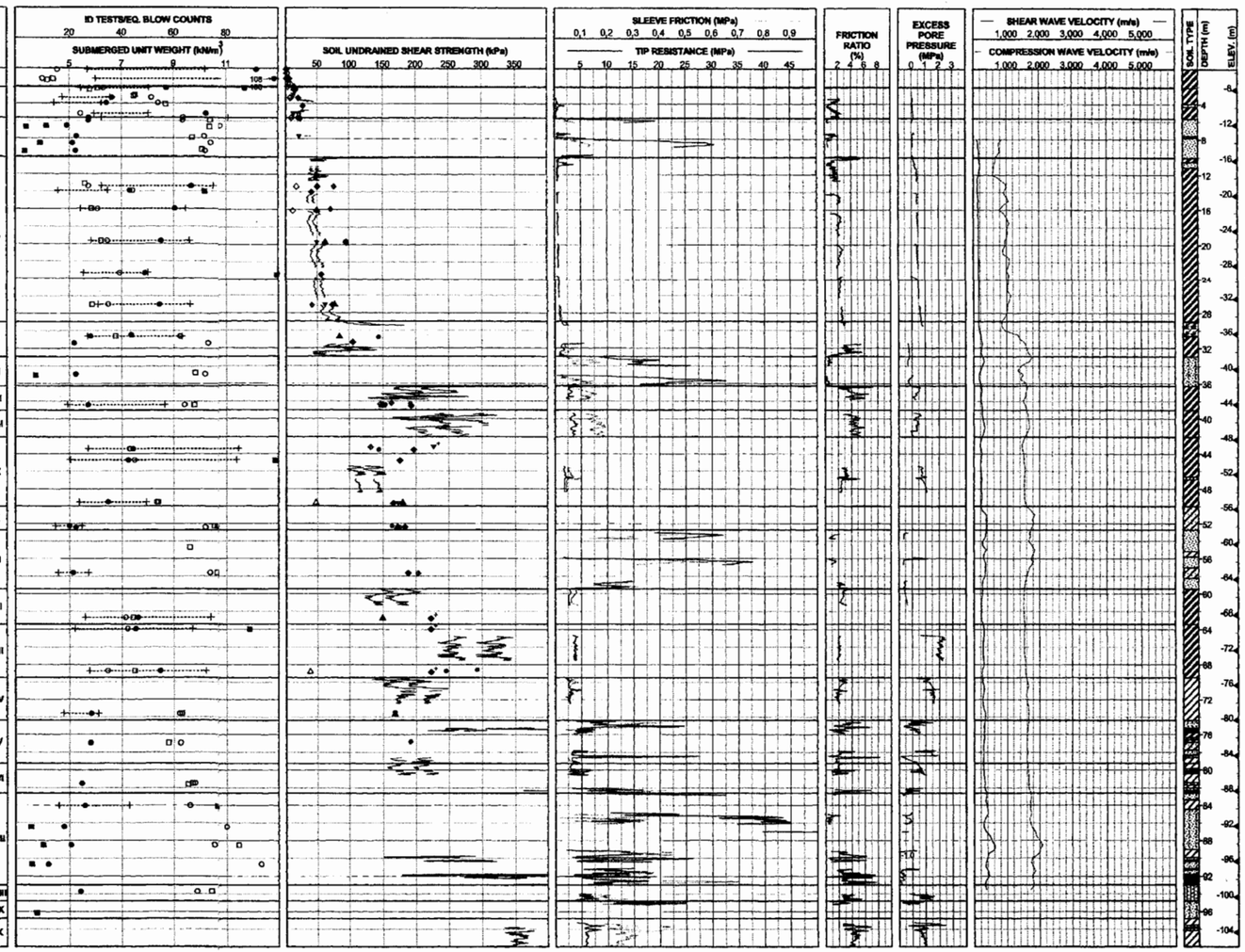
Note: Refer to multi-page logs presented in Volume 2 of the Final Marine Site Characterization Report for detailed soil descriptions.

BORING 98-30

Coordinates: E1837434 N648060
CA State Plane Zone 3, NAD83, Meters

BLOW COUNT	MATERIAL DESCRIPTION	STR. NO.
	MUDLINE ELEVATION: -5.6m (MSL)	
WOH	Fat CLAY (CH), very soft, olive gray (2.1m)	I
WOH WOH WOH 15/60cm 8/60cm 30/45cm 30/30cm 30/60cm 30/30cm 30/25cm	Fat CLAY (CH), soft, olive gray -clay with fine sand, 4.3m to 5.0m (5.6m)	II
	Fine SAND (SP), very dense, gray -with medium sand -with shell fragments, 5.9m to 6.7m -with clay pockets and seams, 7.3m to 7.8m -with a clay layer, at 7.7m -with silt and shells, at 8.5m (10.1m)	III
PUSH SAVE PUSH	Fat CLAY (CH), firm to stiff, olive gray -with shell fragments -sand layer, 10.5m to 11.1m -with many shells, at 13.1m	IV
PUSH	-with many silt and sand pockets, at 13.7m -with silt pockets and gas blisters, at 15.8m	
SAVE		
PUSH	-with gas blisters, at 26.8m (29.0m)	
PUSH SAVE	Fat CLAY (CH), stiff to very stiff, greenish gray -dislocated and with organic pockets -organic clay to 30.6m (32.9m)	V
30/60cm	Fine SAND with silt (SP-SM), very dense, olive gray -with medium sand -with shell fragments and fine gravel, at 34.7m (36.3m)	VI
PUSH	Fat CLAY (CH), very stiff to hard, greenish gray -with calcareous nodules at 38.4m (39.0m)	VII
PUSH SAVE	Fat CLAY (CH), hard, greenish gray -with sand partings, and seams, 39.6m to 42.1m (42.1m)	VIII
	Fat CLAY (CH), very stiff to hard, greenish gray -with slickensides, at 43.3m -with a silt layer at 46.8m	IX
PUSH	-with a few silt pockets, at 49.4m (50.0m)	
PUSH	Sandy Lean CLAY (CL), very stiff, greenish gray -with silty sand pockets and a few roots, below 51.5m (52.7m)	X
30/15cm 51/40cm	Fine SAND (SP), dense to very dense, greenish gray -clay layer, 55.2m to 55.8m -sandy clay layer, 57.0m to 58.2m (59.4m)	XI
	Fat CLAY (CH), hard, greenish gray	XII
PUSH SAVE	Fat CLAY (CH), hard, greenish gray -with silt pockets and partings	XIII
PUSH	-with sandy silt pockets and partings, at 68.6m (69.5m)	
	Lean CLAY (CL), hard, greenish gray -with a silt seam, at 70.9m	XIV
PUSH	-with organic pockets, silt pockets and partings, at 73.5m (74.4m)	
PUSH	Interlayered Silty Fine SAND (SM), dense, and Fat CLAY (CH), hard, dark greenish gray (79.2m)	XV
30/25cm	Lean CLAY (CL), hard, greenish gray -with silt seams, 79.9m to 80.5m -silty sand with clay layers, below 81.4m (82.6m)	XVI
SAVE 30/20cm 30/20cm 30/15cm	Fine to Medium SAND (SP-SM) with silt, very dense, gray -greenish gray, lean clay with sand, 83.4m to 84.4m -with a trace of coarse sand, below 86.3m -with gravel below 88.4m -with clay seams and layers, below 89.0m -fine to coarse gravel with silt and sand, at 90.5m (93.0m)	XVII
PUSH	Sandy SILT (ML), hard, brownish yellow -with clay pockets and seams (94.8m)	XVIII
30/15cm	Medium SAND (SP-SM) with silt, very dense, dark brown (96.8m)	XIX
	Lean CLAY (CL), hard, brown	XX

TOTAL DEPTH: 100.0m BACKFILLED WITH: Cement Grout



JUAN F. CARPIO DESIGN OVERSIGHT	DRAWN BY SACHIN DESHPANDE	J.CHACKO/M.ZUEGER FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	ANTHONY R. DOVER PROJECT ENGINEER	BRIDGE NO. 33-25 km POST 0.0/0.5	SAN FRANCISCO OAKLAND BAY BRIDGE EAST SPAN PILE TEST PROGRAM	
	CHECKED BY J.CHACKO	DATE 06/24/99			POST MILE 0.0/0.3	LOG OF TEST BORINGS 7 OF 7	
			ORIGINAL SCALE IN CENTIMETERS FOR REDUCED PLANS 0 1 2 3 4 5 6 7 8 9 10	CU 04251 EA 012061		DISREGARD PRINTS BEARING EARLIER REVISION DATES →	REVISION DATES (PRELIMINARY STAGE ONLY) 09/14/99 — SHEET 10 OF 12

br33-25#10of12.tif

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	80	0.0/0.5	14	15

NOTE: Data presented on this sheet was digitized from the plan size Log of Test Boring sheets provided by Caltrans. Data were converted to Metric units. As per Caltrans direction, field descriptions on original LOTBs have not been modified to reflect subsequent laboratory test results.

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

8-9-99
TO ACCOMPANY PLANS DATED

SOIL AND ROCK TYPES

Well graded GRAVEL (GW); Poorly graded GRAVEL (GP); GRAVEL with sand (GP or GW); GRAVEL with clay (GP or GW); Clayey GRAVEL (GC); GRAVEL with silt (GP or GW); Silty GRAVEL (GM); Well graded SAND (SW); Poorly graded SAND (SP); SAND with gravel (SP or SW); SAND with clay (SP-SC); Clayey SAND (SC); Silty SAND (SM); SAND with silt (SP-SM); Fat CLAY (CH); Sandy fat CLAY (CH); Lean CLAY (CL); Sandy lean CLAY (CL); Silty CLAY (CL-ML); Elastic SILT (MH); SILT (ML); Sandy SILT (ML); Clayey silt (ML/CL); Highly plastic ORGANICS (OH); Low plasticity ORGANICS (OL); SANDSTONE (Rx); SILTSTONE (Rx); CLAYSTONE (Rx); Interbedded Rock Strata (Rx); CONGLOMERATE (Rx)

SAMPLERS

76mm-OD, 72mm-ID Thin Walled Tube; 57mm-OD, 54mm-ID* Thin Walled Driven Tube; 63.5mm-OD, 54mm-ID Offshore Liner; 76mm-OD, 60mm-ID Modified California Liner; 51mm-OD, 35mm-ID SPT Split Spoon Sampler; Rock Core (Inset symbol represents recovery (%)

* A variable-OD, 54-mm-ID tapered driven tube was used to sample coarse sand, gravel and rock.

TUBE AND OFFSHORE LINER SAMPLERS

WOH	Offshore Liner sample advanced with the weight of an 80 kg hammer.
PUSH or SAVE	Pushed thin-walled 76mm-OD-tube.
15/60cm	Number of blows required to produce the indicated penetration using a 54mm-ID-tube sampler. The sampler was driven with an 80 kg downhole hammer dropped approximately 1.5 m.

STANDARD PENETRATION TEST AND MODIFIED CALIFORNIA LINER SAMPLERS

Samplers were driven with a 63.5 kg above deck hammer dropped approximately 760 mm.

20	Number of blows to produce 30 cm of penetration after the initial 15 cm of seating.
86/28cm	Number of blows required to produce the indicated penetration after an initial 15 cm seating.
Ref/8cm	50 blows produced the indicated penetration during the initial 15 cm interval.

Note: In rock coring interval recovery(%)-RQD are shown in the Blow Count column.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ SUBMERGED UNIT WEIGHT
- ○ THEORETICAL SUBMERGED UNIT WEIGHT

PLASTIC LIMIT + ... + LIQUID LIMIT

- ⊗ EQUIVALENT SPT BLOW COUNT

STRENGTH TESTS

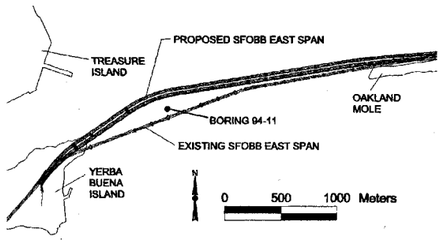
- ● POCKET PENETROMETER
- ◆ TORVANE
- ◇ REMOTE VANE
- ◆ MINIATURE VANE (⊗ RESIDUAL VANE)
- ▲ UNCONSOLIDATED UNDRAINED TRIAXIAL
- ▼ SWEDISH FALL CONE
- ⊟ UNCONFINED COMPRESSION (SOIL)
- ◇△ (Open symbols indicate remolded tests)
- \+ Soil: Strength Exceeds Capacity of Measuring Device
  Rock: Sample broke along discontinuity; Intact sample would have greater strength

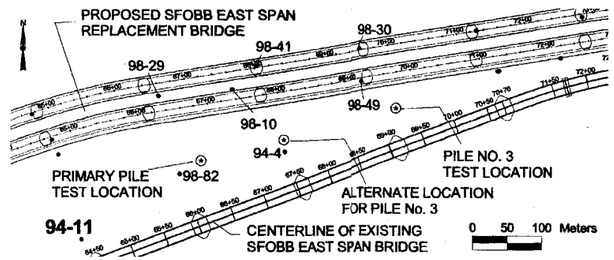
CONSISTENCY CLASSIFICATION FOR SOILS

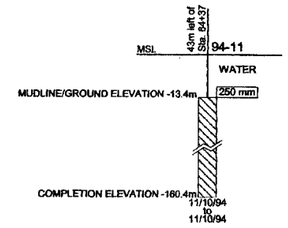
Penetration Index (Blows / 0.3m)	Granular	Cohesive
0-4	Very Loose	Very Soft
5-9	Loose	Soft
10-19	Slightly Compact	Stiff
20-34	Compact	Very Stiff
35-69	Dense	Hard
>70	Very Dense	Very Hard

Notes:

1. Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis







BORING 94-11

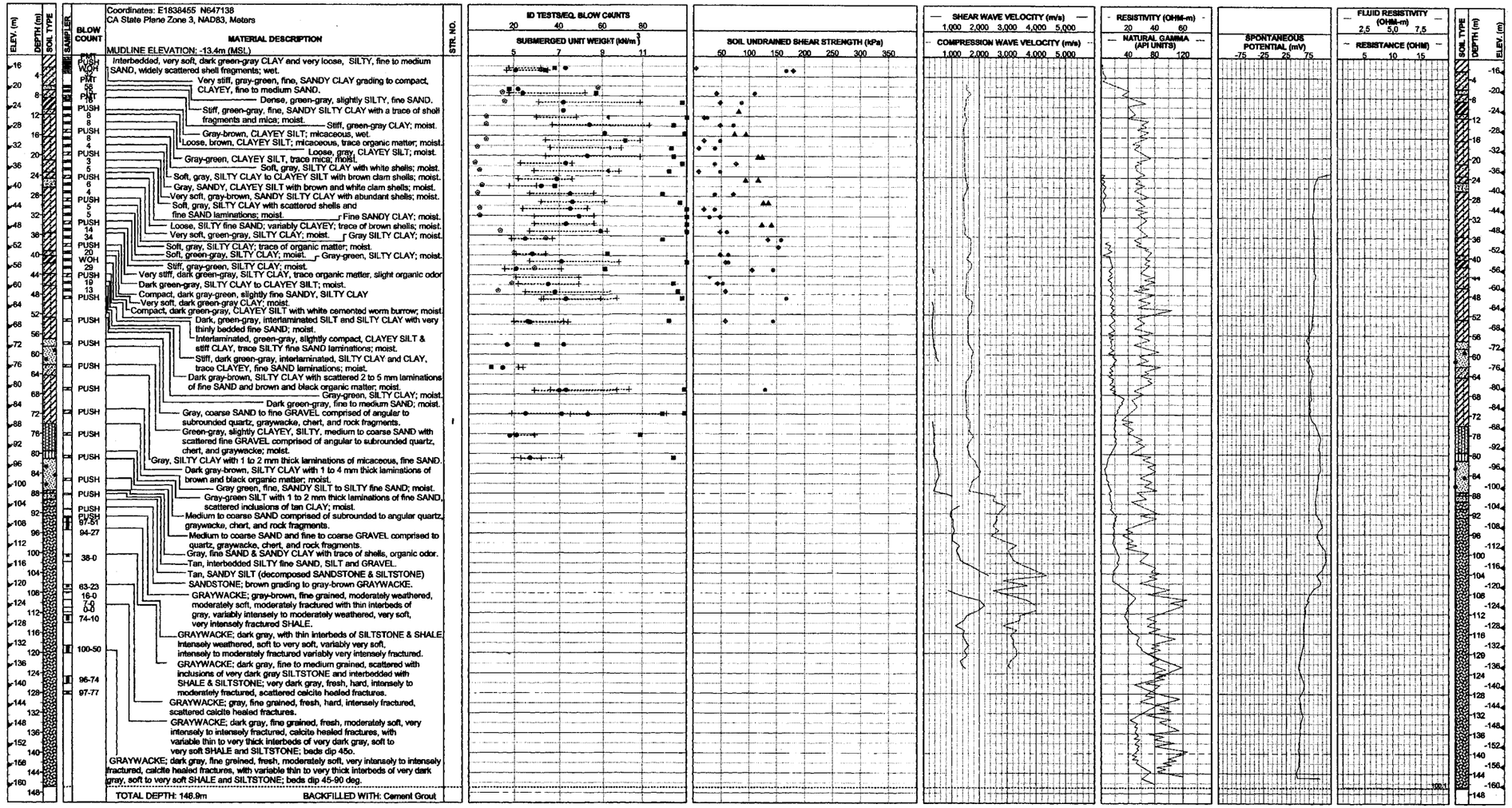
Coordinates: E1838455 N647138
CA State Plane Zone 3, NAD83, Meters

MUDLINE ELEVATION: -13.4m (MSL)

MATERIAL DESCRIPTION

Interbedded, very soft, dark green-gray CLAY and very loose, SILTY, fine to medium SAND, widely scattered shell fragments; wet.
Very stiff, gray-green, fine, SANDY CLAY grading to compact, CLAYEY, fine to medium SAND.
Dense, green-gray, slightly SILTY, fine SAND.
Stiff, green-gray, fine, SANDY SILTY CLAY with a trace of shell fragments and mica; moist.
Stiff, green-gray CLAY; moist.
Gray-brown, CLAYEY SILT; micaceous, wet.
Loose, brown, CLAYEY SILT; micaceous, trace organic matter; moist.
Loose, gray, CLAYEY SILT; moist.
Gray-green, CLAYEY SILT, trace mica, micas.
Soft, gray, SILTY CLAY with white shells; moist.
Soft, gray, SILTY CLAY to CLAYEY SILT with brown clam shells; moist.
Gray, SANDY, CLAYEY SILT with brown and white clam shells; moist.
Very soft, gray-brown, SANDY SILTY CLAY with abundant shells; moist.
Soft, gray, SILTY CLAY with scattered shells and fine SAND laminations; moist.
Fine SANDY CLAY; moist.
Loose, SILTY fine SAND; variably CLAYEY; trace of brown shells; moist.
Very soft, green-gray, SILTY CLAY; moist.
Gray SILTY CLAY; moist.
Soft, gray, SILTY CLAY; trace of organic matter; moist.
Soft, green-gray, SILTY CLAY; moist.
Gray-green, SILTY CLAY; moist.
Stiff, gray-green, SILTY CLAY; moist.
Very stiff, dark green-gray, SILTY CLAY, trace organic matter, slight organic odor
Dark green-gray, SILTY CLAY to CLAYEY SILT; moist.
Compact, dark gray-green, slightly fine SANDY, SILTY CLAY
Very soft, dark green-gray CLAY; moist.
Compact, dark green-gray, CLAYEY SILT with white cemented worm burrow; moist.
Dark, green-gray, interlaminated SILT and SILTY CLAY with very thinly bedded fine SAND; moist.
Interlaminated, green-gray, slightly compact, CLAYEY SILT & stiff CLAY, trace SILTY fine SAND laminations; moist.
Stiff, dark green-gray, interlaminated, SILTY CLAY and CLAY, trace CLAYEY, fine SAND laminations; moist.
Dark gray-brown, SILTY CLAY with scattered 2 to 5 mm laminations of fine SAND and brown and black organic matter; moist.
Gray-green, SILTY CLAY; moist.
Dark green-gray, fine to medium SAND; moist.
Gray, coarse SAND to fine GRAVEL comprised of angular to subrounded quartz, graywacke, chert, and rock fragments.
Green-gray, slightly CLAYEY, SILTY, medium to coarse SAND with scattered fine GRAVEL comprised of angular to subrounded quartz, chert, and graywacke; moist.
Gray, SILTY CLAY with 1 to 2 mm thick laminations of micaceous, fine SAND.
Dark gray-brown, SILTY CLAY with 1 to 4 mm thick laminations of brown and black organic matter; moist.
Gray green, fine, SANDY SILT to SILTY fine SAND; moist.
Gray-green SILT with 1 to 2 mm thick laminations of fine SAND, scattered inclusions of tan CLAY; moist.
Medium to coarse SAND comprised of subrounded to angular quartz, graywacke, chert, and rock fragments.
Medium to coarse SAND and fine to coarse GRAVEL comprised to quartz, graywacke, chert, and rock fragments.
Gray, fine SAND & SANDY CLAY with trace of shells, organic odor.
Tan, interbedded SILTY fine SAND, SILT and GRAVEL.
Tan, SANDY SILT (decomposed SANDSTONE & SILTSTONE)
SANDSTONE; brown grading to gray-brown GRAYWACKE.
GRAYWACKE; gray-brown, fine grained, moderately weathered, moderately soft, moderately fractured with thin interbeds of gray, variably intensely to moderately weathered, very soft, very intensely fractured SHALE.
GRAYWACKE; dark gray, with thin interbeds of SILTSTONE & SHALE intensely weathered, soft to very soft, variably very soft, intensely to moderately fractured variably very intensely fractured.
GRAYWACKE; dark gray, fine to medium grained, scattered with inclusions of very dark gray SILTSTONE and interbedded with SHALE & SILTSTONE; very dark gray, fresh, hard, intensely to moderately fractured, scattered calcite healed fractures.
GRAYWACKE; gray, fine grained, fresh, hard, intensely fractured, scattered calcite healed fractures.
GRAYWACKE; dark gray, fine grained, fresh, moderately soft, very intensely to intensely fractured, calcite healed fractures, with variable thin to very thick interbeds of very dark gray, soft to very soft SHALE and SILTSTONE; beds dip 45o.
GRAYWACKE; dark gray, fine grained, fresh, moderately soft, very intensely to intensely fractured, calcite healed fractures, with variable thin to very thick interbeds of very dark gray, soft to very soft SHALE and SILTSTONE; beds dip 45-90 deg.

TOTAL DEPTH: 146.9m BACKFILLED WITH: Cement Grout



JUAN F. CARPIO, DESIGN OVERSIGHT	DRAWN BY	SACHIN DESHPANDE	K. AMARU, J. BOWMAN, L. JENSEN, H. VALENCIA, G. WILCOX, FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	ANTHONY R. DOVER, PROJECT ENGINEER	BRIDGE NO. 33-25 / KM POST 0.0/0.5	SAN FRANCISCO OAKLAND BAY BRIDGE EAST SPAN PILE TEST PROGRAM
	CHECKED BY	J. THORNE	DATE 06/24/99			POST MILE 0.0/0.3	GEOLOGIC INFORMATION 1 of 2

ORIGINAL SCALE IN CENTIMETERS FOR REDUCED PLANS 0 1 2 3 4 5 6 7 8 9 10

CU 04251
EA 012081

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) 06/14/99

SHEET 11 OF 12

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	Ala	80	0.0/0.5	15	15

NOTE: Data presented on this sheet was digitized from the plan size Log of Test Boring sheets provided by Caltrans. Data were converted to Metric units. As per Caltrans direction, field descriptions on original LOTBs have not been modified to reflect subsequent laboratory test results.

The State of California or its officers or agents shall not be responsible for the accuracy or completeness of electronic copies of this plan sheet.

8-9-99
TO ACCOMPANY PLANS DATED

SOIL AND ROCK TYPES

- Well graded GRAVEL (GW)
- Poorly graded GRAVEL (GP)
- GRAVEL with sand (GP or GW)
- GRAVEL with clay (GP or GW)
- Clayey GRAVEL (GC)
- GRAVEL with silt (GP or GW)
- Silty GRAVEL (GM)
- Well graded SAND (SW)
- Poorly graded SAND (SP)
- SAND with gravel (SP or SW)
- SAND with clay (SP-SC)
- Clayey SAND (SC)
- Silty SAND (SM)
- SAND with silt (SP-SM)
- Fat CLAY (CH)
- Sandy fat CLAY (CH)
- Lean CLAY (CL)
- Sandy lean CLAY (CL)
- Silty CLAY (CL-ML)
- Elastic SILT (MH)
- SILT (ML)
- Sandy SILT (ML)
- Clayey silt (ML/CL)
- Highly plastic ORGANICS (OH)
- Low plasticity ORGANICS (OL)
- SANDSTONE (Rx)
- SILTSTONE (Rx)
- CLAYSTONE (Rx)
- Interbedded Rock Strata (Rx)
- CONGLOMERATE (Rx)

SAMPLERS

- 76mm-OD, 72mm-ID Thin Walled Tube
- 76mm-OD, 60mm-ID Modified California Liner
- 57mm-OD, 54mm-ID* Thin Walled Driven Tube
- 51mm-OD, 35mm-ID SPT Split Spoon Sampler
- Christensen Sampler
- Rock Core (Inset symbol represents recovery (%))

* A variable-OD, 54-mm-ID tapered driven tube was used to sample coarse sand, gravel and rock.

TUBE AND OFFSHORE LINER SAMPLERS

WOH	Offshore Liner sample advanced with the weight of an 80 kg hammer.
PUSH or SAVE	Pushed thin-walled 76mm-OD-tube.
15/60cm	Number of blows required to produce the indicated penetration using a 54mm-ID-tube sampler. The sampler was driven with an 80 kg downhole hammer dropped approximately 1.5 m.

STANDARD PENETRATION TEST AND MODIFIED CALIFORNIA LINER SAMPLERS

Samplers were driven with a 63.5 kg above deck hammer dropped approximately 760 mm.

20	Number of blows to produce 30 cm of penetration after the initial 15 cm of seating.
86/28cm	Number of blows required to produce the indicated penetration after an initial 15 cm seating.
Refl6cm	50 blows produced the indicated penetration during the initial 15 cm interval.

Note: In rock coring interval recovery(%)-RQD are shown in the Blow Count column.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ SUBMERGED UNIT WEIGHT
- ○ THEORETICAL SUBMERGED UNIT WEIGHT
- PLASTIC LIMIT — LIQUID LIMIT
- ⊗ EQUIVALENT SPT BLOW COUNT

STRENGTH TESTS

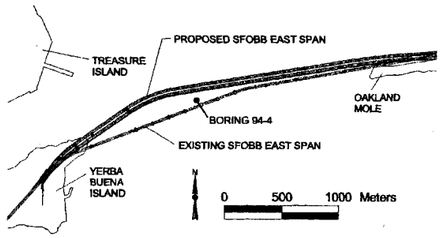
- ● POCKET PENETROMETER
- ◆ TORVANE
- ◇ REMOTE VANE
- ◆ MINIATURE VANE (◐ RESIDUAL VANE)
- ▲ UNCONSOLIDATED UNDRAINED TRIAXIAL
- ▼ SWEDISH FALL CONE
- ⊠ UNCONFINED COMPRESSION (SOIL)
- ◇△ (Open symbols indicate remolded tests)
- + Soil: Strength Exceeds Capacity of Measuring Device
  Rock: Sample broke along discontinuity; intact sample would have greater strength

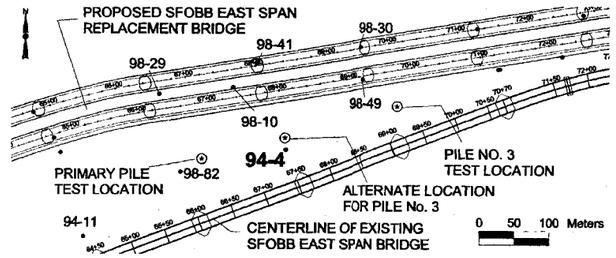
CONSISTENCY CLASSIFICATION FOR SOILS

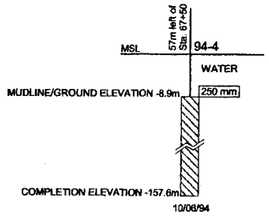
Penetration Index (Blows / 0.3m)	Granular	Cohesive
0-4	Very Loose	Very Soft
5-9	Loose	Soft
10-19	Slightly Compact	Stiff
20-34	Compact	Very Stiff
35-69	Dense	Hard
>70	Very Dense	Very Hard

Notes:

1. Classification of earth material as shown on this sheet is based upon field inspection and is not to be construed to imply mechanical analysis
2. A strong motion accelerometer was installed at bottom of hole. This device is being monitored by the Earth Sciences Division of Lawrence Livermore National Laboratory, University of California, Livermore, P.O.Box 808, L-208, Livermore, CA 94551.







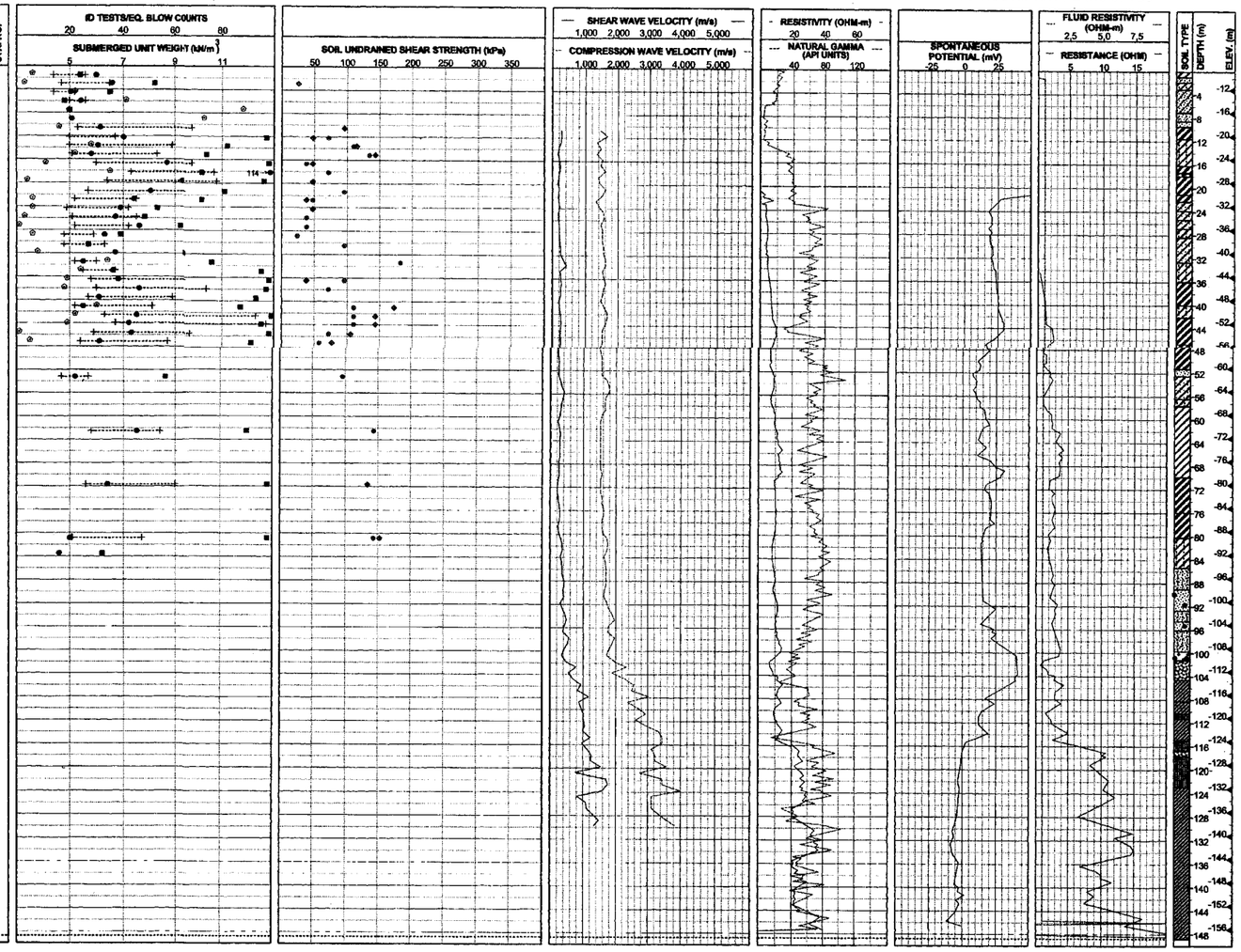
BORING 94-4

Coordinates: E1836346 N647551
CA State Plane Zone 3, NAD83, Meters

MUDLINE ELEVATION: -8.9m (MSL)

BLOW COUNT	MATERIAL DESCRIPTION
WOH	Dark, gray CLAY with scattered shells; wet.
3	Loose, gray-green, SILTY fine to medium SAND with scattered, very thin shell beds.
22	Very loose, dark green-gray, slightly CLAYEY SILT with SILTY fine SAND laminations.
41	Compact, dark gray, slightly CLAYEY, fine SAND grading to olive-green,
88	CLAYEY fine SAND; wet.
73	Dense, olive-green, fine SAND with CLAYEY fine SAND laminations; wet.
16	
PUSH	Very dense, olive-brown, slightly SILTY, fine SAND; moist.
28	Very dense, brown, fine SAND; moist.
22	Stiff, gray-green CLAY; moist.
11	Gray-green, SILTY CLAY; moist.
35	Very stiff, gray-green, SILTY CLAY; moist.
4	Very stiff, dark green-gray, SILTY CLAY; moist.
PUSH	Stiff, dark green-gray CLAY with 10-20% brown fibrous organic matter; moist.
6	Hard, brown, organic CLAY & PEAT; moist.
6	Very soft, green-gray CLAY to SILTY CLAY; moist.
3	Green-gray CLAY to SILTY CLAY with 5-20% 3-6 mm pink shells
1	Soft, green-gray, fine SANDY CLAY to SILTY CLAY with fine SAND laminations, pink shell fragments scattered throughout; moist.
6	Very soft, green-gray, fine SANDY CLAY with scattered pink shell fragments; moist.
PUSH	Very soft, green-gray, SILTY CLAY with fine SAND laminations; moist.
8	Soft, gray-green, fine SANDY CLAY to CLAYEY fine SAND, abundant shell fragments (to 10 mm); moist.
34	Gray-green, fine SANDY CLAY to CLAYEY fine SAND, 20-35% 2-10 mm shell fragments; moist.
24	Soft, gray-green, fine SANDY, SILTY CLAY, 20-35% 2-10 mm shell fragments; moist.
19	Hard, gray-green, SILTY CLAY to CLAYEY SILT; moist.
18	Very stiff, dark gray, SILTY CLAY to CLAYEY SILT; wet.
PUSH	Stiff, green-gray mottled with black, SILTY CLAY; moist.
30	Stiff, green-gray, SILTY CLAY with 20-25% decomposed organic matter & trace of slightly oxidized organic matter; moist.
22	Very stiff, green-gray, SILTY CLAY with fine SAND laminations.
19	Very stiff, green-gray mottled light brown and black CLAY; moist.
1	Stiff, green-gray mottled olive CLAY, trace of SILT; moist.
5	Stiff, green-gray CLAY; moist.
PUSH	Soft, dark green-gray CLAY; moist, with laminations to very thin beds of SILTY fine SAND; wet.
	Green-gray, fine SAND.
PUSH	Interbedded, dark green-gray, fine SANDY SILTY CLAY and slightly CLAYEY SILTY fine SAND; moist.
	Dark gray-green, CLAYEY SILT.
	Gray-green, SILTY CLAY to CLAY.
PUSH	Dark, green-gray, SILTY CLAY to CLAYEY SILT; moist.
	Dark, green-gray CLAY with abundant brown, organic matter; moist.
	Dark green-gray CLAY.
	Dark, green-gray, SILTY CLAY; moist.
	Dark, gray-green, SILTY fine SAND; moist.
PUSH	Coarse SAND and fine GRAVEL.
	Dark, gray-green, SILTY fine SAND.
	SAND and GRAVEL.
	SILT and SAND.
	Light yellow-brown, fine to coarse GRAVEL ranging from subrounded to subangular, 90% sandstone, 5% chert & quartz; 5% metamorphic, trace of brown, slightly CLAYEY SILT & fine SAND matrix; moist.
20-0	GRAYWACKE; green-gray, slightly weathered, soft, moderately fractured, with calcite healed fractures and scattered SHALE fragments.
100-32	SHALE; black, moderately weathered, locally intensely weathered to dark green-gray, CLAYEY SILT; very soft, very intensely fractured to sheared.
94-0	SHALE with GRAYWACKE interbeds.
	SHALEY SILTSTONE; very dark gray to gray-green, moderately weathered, soft to moderately soft, intensely fractured & brecciated, fractures healed with calcite.
60-28	SHALE; very dark gray, moderately weathered, very soft, sheared and healed with slightly CLAYEY SILT.
	SHALE with thin interbeds of GRAYWACKE and SILTSTONE.
78-0	Black SILTSTONE interbedded with SHALE.
	GRAYWACKE; green-gray, moderately weathered, moderately soft, moderately to slightly fractured; fractures randomly healed with calcite.
	SILTSTONE; dark gray, SHALEY; up to 5% siliceous, moderately weathered, predominantly very soft, very intensely fractured and healed with CLAYEY SILT.
0-0	SHALE; dark gray, moderately to slightly weathered, very soft, highly sheared, variably scattered with moderately thick beds of dark gray to green gray, slightly weathered, moderately soft, GRAYWACKE with fractures, randomly healed with calcite.

TOTAL DEPTH: 148.7m BACKFILLED WITH: Cement Grout



JUAN F. CARPIO DESIGN OVERSIGHT	DRAWN BY	SACHIN DESHPANDE	K. AMARU, J. BOWMAN, L. JENSEN, H. VALENCIA, G. WILCOX FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	ANTHONY R. DOVER PROJECT ENGINEER	BRIDGE NO. 33-25 KM POST 0.0/0.5	SAN FRANCISCO OAKLAND BAY BRIDGE EAST SPAN PILE TEST PROGRAM
	CHECKED BY	J. THORNE	DATE 06/24/99				GEOLOGIC INFORMATION 2 of 2

ORIGINAL SCALE IN CENTIMETERS FOR REDUCED PLANS 0 1 2 3 4 5 6 7 8 9 10

CU 04251
EA 012081

POST MILE 0.0/0.3

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 09/14/99

REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 12 OF 12

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