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)
- PAVEMENT

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

STANDARD PENETRATION TEST (SPT) AND MODIFIED CALIFORNIA (MC) LINER SAMPLERS

Samplers were driven with a 63.5 kg 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.

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.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ SUBMERGED UNIT WEIGHT (KN/m³)
- ○ THEORETICAL SUBMERGED UNIT WEIGHT (KN/m³)

PLASTIC LIMIT + ····· + LIQUID LIMIT

- ⊛ EQUIVALENT SPT BLOW COUNT = (MC BLOWCOUNT/1.6) OR SPT BLOWCOUNT
- ···· 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)
- Shear Strength Interpreted from CPT Tip Resistance (Nk = 12-15)
- ⊕ POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- ⦶ POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- ┼ Soil: Strength Exceeds Capacity of Measuring Device
  Rock: Sample broke along discontinuity; Intact sample would have greater strength
- —— FRACTURE DENSITY (ROCK)

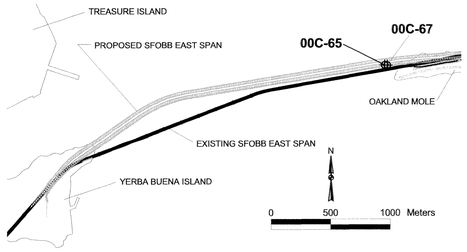
STRENGTH OF COHESIVE SOILS

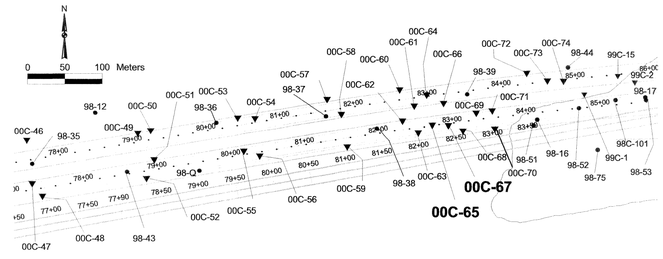
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

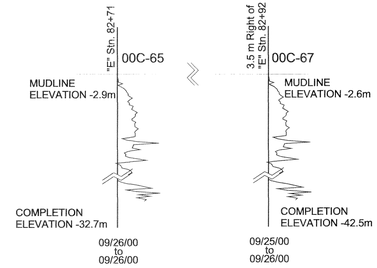
DENSITY OF GRANULAR SOILS

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

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF, Ala	80	13.9/14.3, 0.0/1.6	975	978

GEOTECHNICAL PROFESSIONAL

6-4-01
PLANS APPROVAL DATE

T.W.McNEILAN No. 0583 Exp. 12/31/00 Geotechnical

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 848,
Oakland, CA 94621
(510) 633-5100

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

NOTES:

1. Pore pressures are relative to hydrostatic pressure at the mudline.
2. Breaks in the data are due to pauses in the sounding during installation of casing.

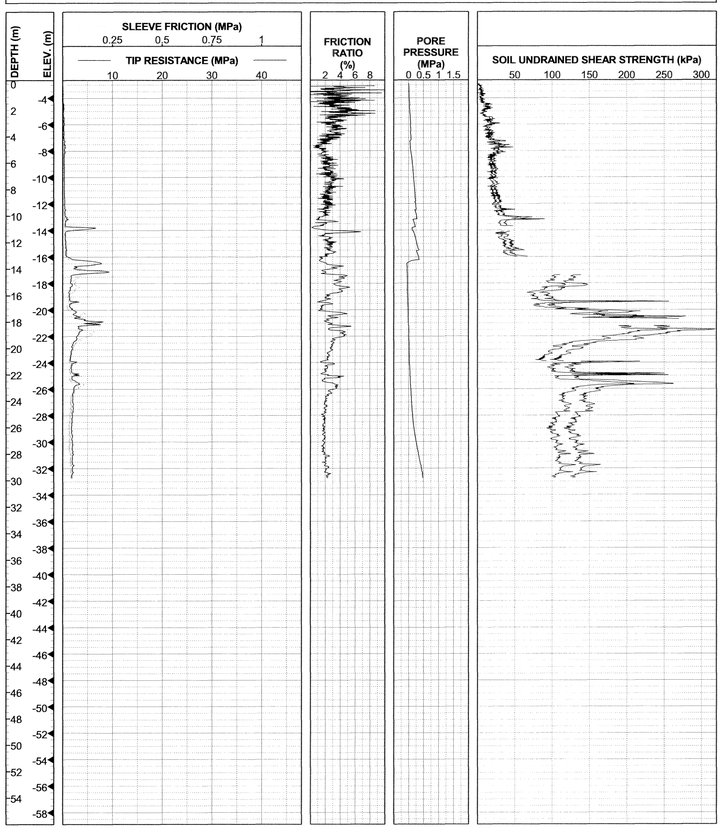
6-9-14
PLAN APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

CPT FH00C065 (00C-65)

COORDINATES: E1838765 N648233
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -2.9m (MSL)
START DATE: 09/26/00

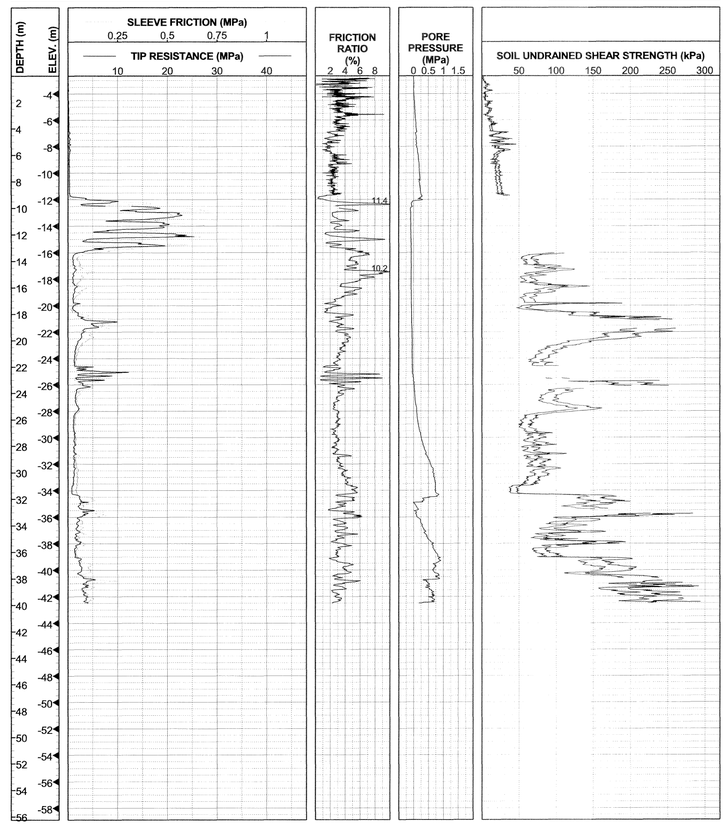
STATION: "E" Stn. 82+71
COMPLETION ELEVATION: -32.7m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



CPT FH00C067 (00C-67)

COORDINATES: E1838787 N648232
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -2.6m (MSL)
START DATE: 09/25/00

STATION: 3.5 m Right of "E" Stn. 82+92
COMPLETION ELEVATION: -42.5m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9, 0.0/1.2	101	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO.44 OF 47

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — Sheet 79 of 120

To Accompany Plans Dated 7-22-13

REID BUELL, DESIGN OVERSIGHT	DRAWN BY	S.DESHPANDE	PR/RH, FIELD INVESTIGATOR
Reid Buell 11/17/00	CHECKED BY	J.CHACKO	DATE 11/17/00

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

T.W.McNEILAN, PROJECT ENGINEER

BRIDGE NO. 34-0006R/L
KM POST 2.1
POST MILE 0

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

CU 04
EA 012021

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

LOG OF TEST BORINGS 44 OF 47

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 11/17/00

REVISION DATES (PRELIMINARY STAGE ONLY) — SHEET 543 — OF

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF, Ala	80	13.9/14.3, 0.0/1.6	976	978

GEOTECHNICAL PROFESSIONAL

6-4-01
PLANS APPROVAL DATE

T.W.McNEILAN
No. 0583
Exp. 12/31/00
Geotechnical

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 848,
Oakland, CA 94621
(510) 633-5100

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NOTES:

1. Pore pressures are relative to hydrostatic pressure at the mudline.
2. Breaks in the data are due to pauses in the sounding during installation of casing.

6-9-14
PLAN APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
SABA MOHAN
No. C63519
Exp. 09-30-14
CIVIL
STATE OF CALIFORNIA

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)
- PAVEMENT

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

STANDARD PENETRATION TEST (SPT) AND MODIFIED CALIFORNIA (MC) LINER SAMPLERS

Samplers were driven with a 63.5 kg 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.

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.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- PERCENT PASSING #200 SIEVE
- WATER CONTENT (%)
- SUBMERGED UNIT WEIGHT (KN/m³)
- THEORETICAL SUBMERGED UNIT WEIGHT (KN/m³)
- PLASTIC LIMIT LIQUID LIMIT
- EQUIVALENT SPT BLOW COUNT = (MC BLOWCOUNT/1.6) OR SPT BLOWCOUNT
- 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)
- Shear Strength Interpreted from CPT Tip Resistance (Nk = 12-15)
- POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- UNCONFINED COMPRESSION (ROCK)
- Soil: Strength Exceeds Capacity of Measuring Device; Rock: Sample broke along discontinuity; Intact sample would have greater strength
- FRACTURE DENSITY (ROCK)

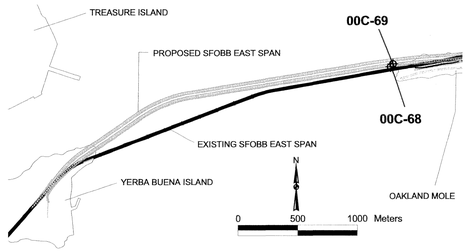
STRENGTH OF COHESIVE SOILS

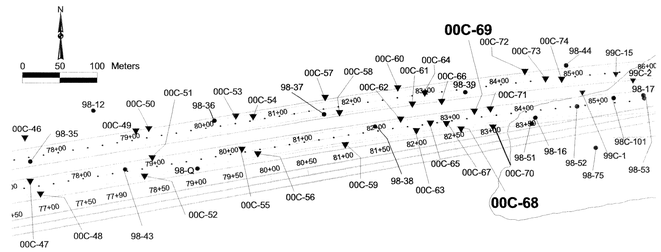
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

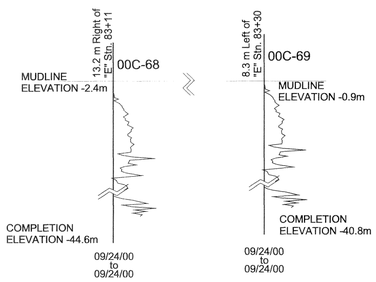
DENSITY OF GRANULAR SOILS

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.



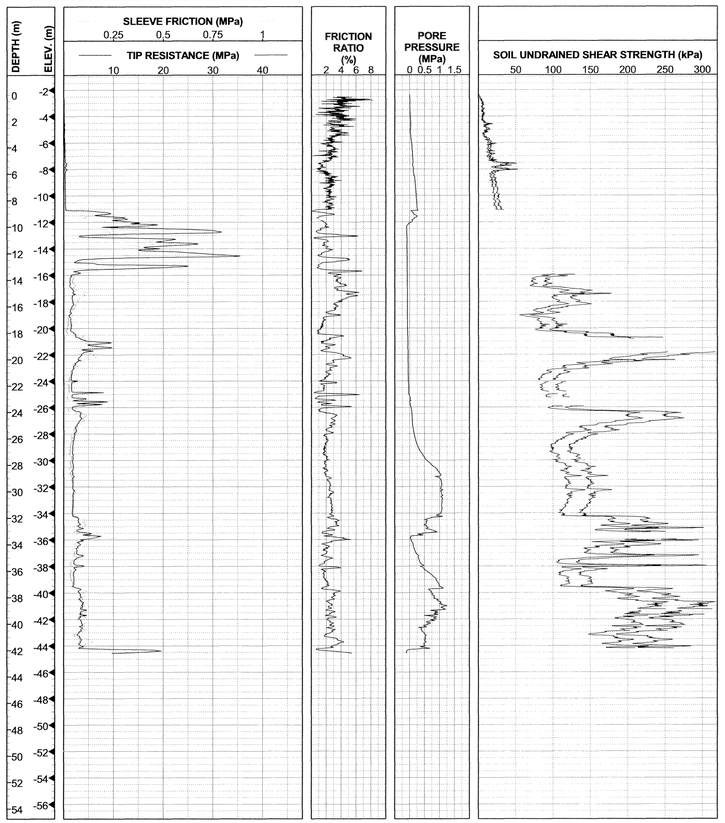




CPT FH00C068 (00C-68)

COORDINATES: E1838806 N648225
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -2.4m (MSL)
START DATE: 09/24/00

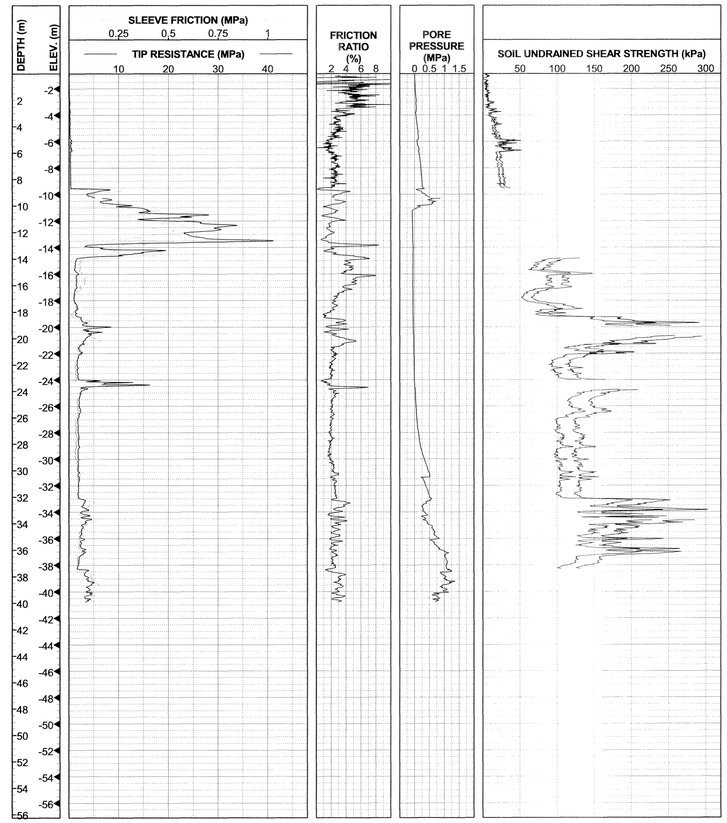
STATION: 13.2 m Right of "E" Stn. 83+11
COMPLETION ELEVATION: -44.6m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



CPT FH00C069 (00C-69)

COORDINATES: E1838824 N648249
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -0.9m (MSL)
START DATE: 09/24/00

STATION: 8.3 m Left of "E" Stn. 83+30
COMPLETION ELEVATION: -40.8m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9, 0.0/1.2	102	142

PROFESSIONAL ENGINEER — DATE: 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO.45 OF 47

UNIT: 3593 — CONTRACT No. 04-013521 — BRIDGE No. 33-0025
PROJECT NUMBER & PHASE: 0412000608,1
Sheet 80 of 120

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

To Accompany Plans Dated 7-22-13

REID BUELL, DESIGN OVERSIGHT	DRAWN BY: S.DESHPANDE	PR/RH, FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
11/17/00	CHECKED BY: J.CHACKO	DATE 11/17/00	

T.W.McNEILAN, PROJECT ENGINEER

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

CU 04
EA 012021

BRIDGE NO.	KM POST	POST MILE
34-0006R/L	2.1	0

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

LOG OF TEST BORINGS 45 OF 47

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 11/17/00

REVISION DATES (PRELIMINARY STAGE ONLY) — SHEET 544 — OF

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)
- PAVEMENT

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
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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.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ SUBMERGED UNIT WEIGHT (KN/m³)
- ○ THEORETICAL SUBMERGED UNIT WEIGHT (KN/m³)
- PLASTIC LIMIT + ····· + LIQUID LIMIT
- ⊙ EQUIVALENT SPT BLOW COUNT = (MC BLOWCOUNT/1.6) OR SPT BLOWCOUNT
- ---- 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)
- Shear Strength Interpreted from CPT Tip Resistance (Nk = 12-15)
- ⊚ POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- ⊙ POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- ┼ Soil: Strength Exceeds Capacity of Measuring Device
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- —— FRACTURE DENSITY (ROCK)

STRENGTH OF COHESIVE SOILS

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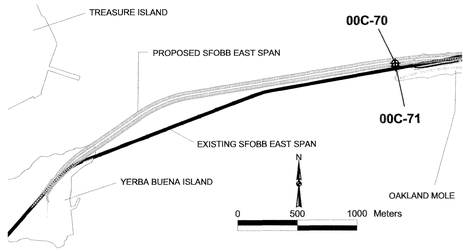
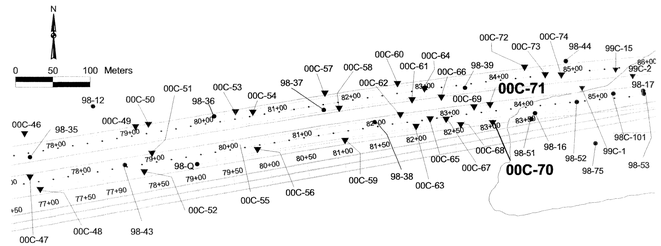
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

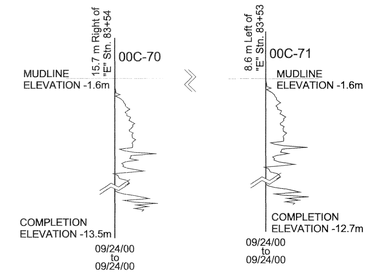
DENSITY OF GRANULAR SOILS

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.







DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF, Ala	80	13.9/14.3, 0.0/1.6	977	978

GEOTECHNICAL PROFESSIONAL

6-4-01
PLANS APPROVAL DATE

T.W.McNEILAN
No. 0583
Exp. 12/31/00
Geotechnical

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 848,
Oakland, CA 94621
(510) 633-5100

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NOTES:

1. Pore pressures are relative to hydrostatic pressure at the mudline.
2. Breaks in the data are due to pauses in the sounding during installation of casing.

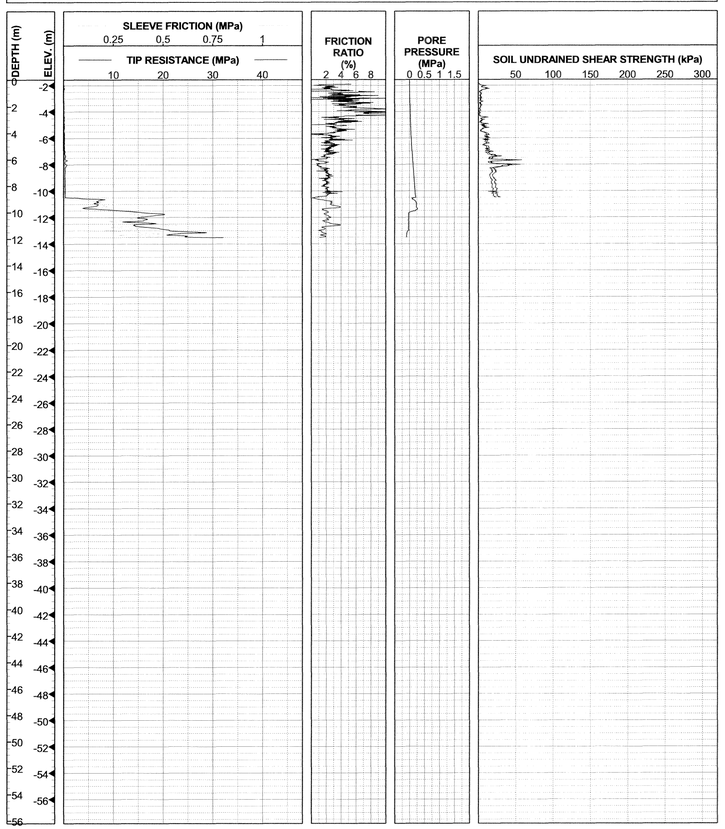
6-9-14
PLAN APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
SABA MOHAN
No. C63519
Exp. 09-30-14
CIVIL
STATE OF CALIFORNIA

CPT FH00C070 (00C-70)

COORDINATES: E1838849 N648228
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -1.6m (MSL)
START DATE: 09/24/00

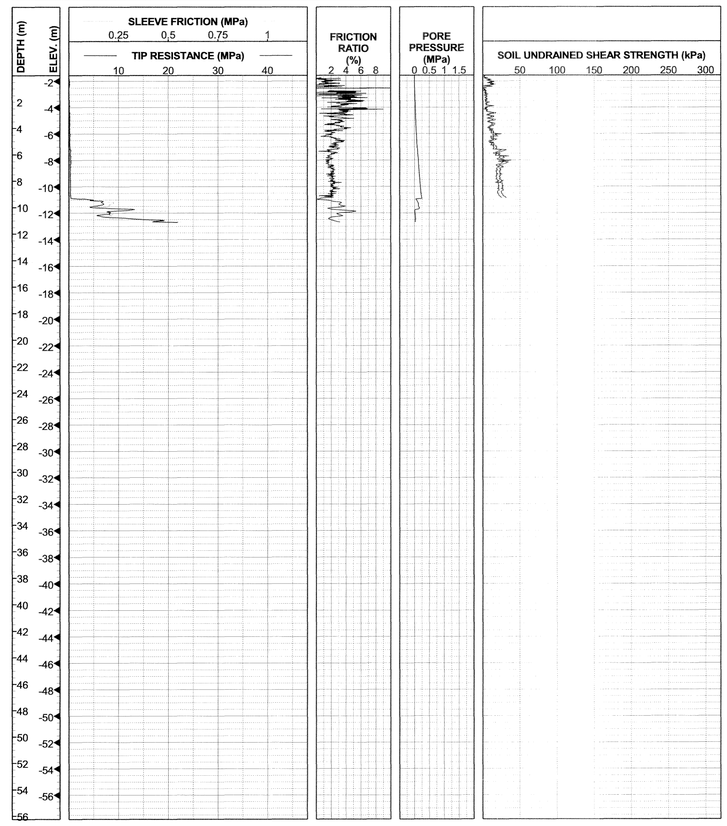
STATION: 15.7 m Right of "E" Stn. 83+54
COMPLETION ELEVATION: -13.5m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



CPT FH00C071 (00C-71)

COORDINATES: E1838846 N648252
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -1.6m (MSL)
START DATE: 09/24/00

STATION: 8.6 m Left of "E" Stn. 83+53
COMPLETION ELEVATION: -12.7m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9,0.0/1.2	103	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO.46 OF 47

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — Sheet 81 of 120

To accompany plans dated 7-22-13

REID BUELL, DESIGN OVERSIGHT	DRAWN BY	S.DESHPANDE	P.ROBINS, FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	T.W.McNEILAN, PROJECT ENGINEER	BRIDGE NO. 34-0006R/L
	CHECKED BY	J.CHACKO	DATE 11/17/00			KM POST 2.1
						POST MILE 0

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

CU 04
EA 012021

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

LOG OF TEST BORINGS 46 OF 47

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 11/17/00

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET 545 | OF

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF, Ala	80	13.9/14.3, 0.0/1.6	978	978

GEOTECHNICAL PROFESSIONAL

6-4-01
PLANS APPROVAL DATE

T.W.McNEILAN
No. 0583
Exp. 12/31/00
Geotechnical

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 848,
Oakland, CA 94621
(510) 633-5100

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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)
- PAVEMENT

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

STANDARD PENETRATION TEST (SPT) AND MODIFIED CALIFORNIA (MC) LINER SAMPLERS

Samplers were driven with a 63.5 kg 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.

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.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ SUBMERGED UNIT WEIGHT (KN/m³)
- ○ THEORETICAL SUBMERGED UNIT WEIGHT (KN/m³)
- PLASTIC LIMIT + LIQUID LIMIT +
- EQUIVALENT SPT BLOW COUNT = (MC BLOWCOUNT/1.6) OR SPT BLOWCOUNT
- 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)
- Shear Strength Interpreted from CPT Tip Resistance (Nk = 12-15)
- POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- UNCONFINED COMPRESSION (ROCK)
- Soil: Strength Exceeds Capacity of Measuring Device
  Rock: Sample broke along discontinuity; Intact sample would have greater strength
- FRACTURE DENSITY (ROCK)

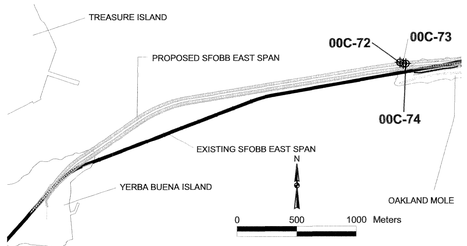
STRENGTH OF COHESIVE SOILS

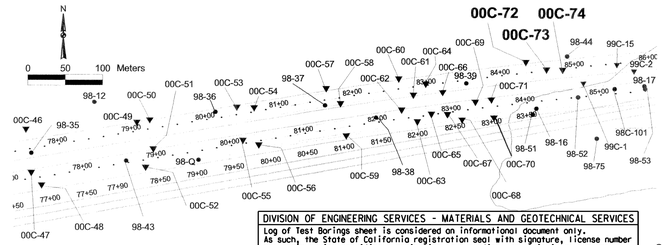
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

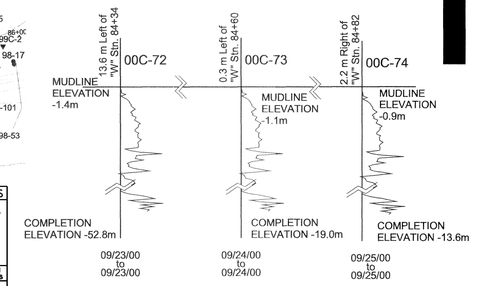
DENSITY OF GRANULAR SOILS

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

NOTES:

1. Pore pressures are relative to hydrostatic pressure at the mudline.
2. Breaks in the data are due to pauses in the sounding during installation of casing.

6-9-14
PLAN APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
SABA MOHAN
No. C63519
Exp. 09-30-14
CIVIL
STATE OF CALIFORNIA

To accompany plans dated 7-22-13

DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9,0.0/1.2	104	142

S. Mohan — 01-16-13
PROFESSIONAL ENGINEER — DATE

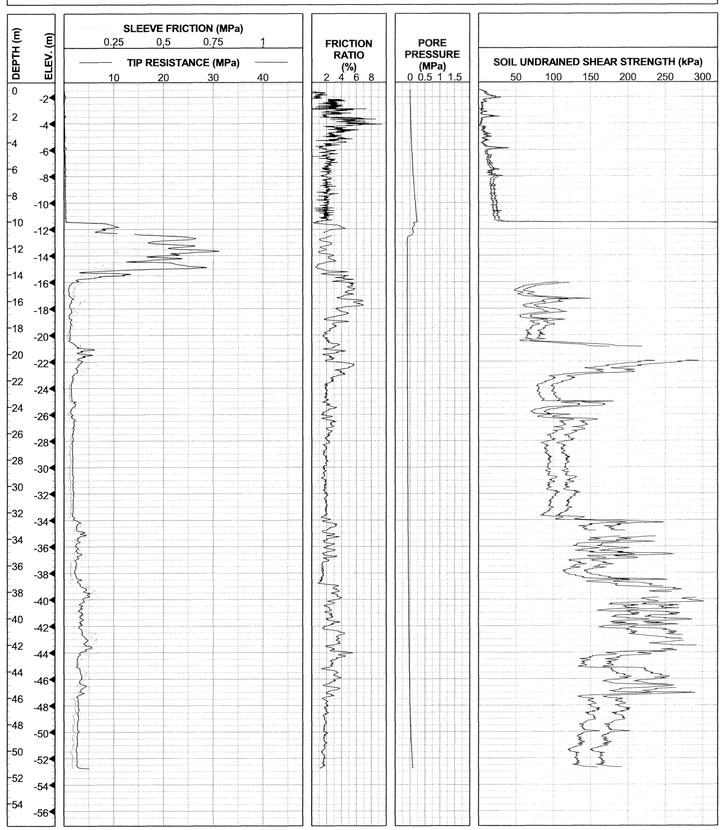
SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO.47 OF 47

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025
NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA	Sheet 82	of 120

CPT FH00C072 (00C-72)

COORDINATES: E1838892 N648302
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -1.4m (MSL)
START DATE: 09/23/00

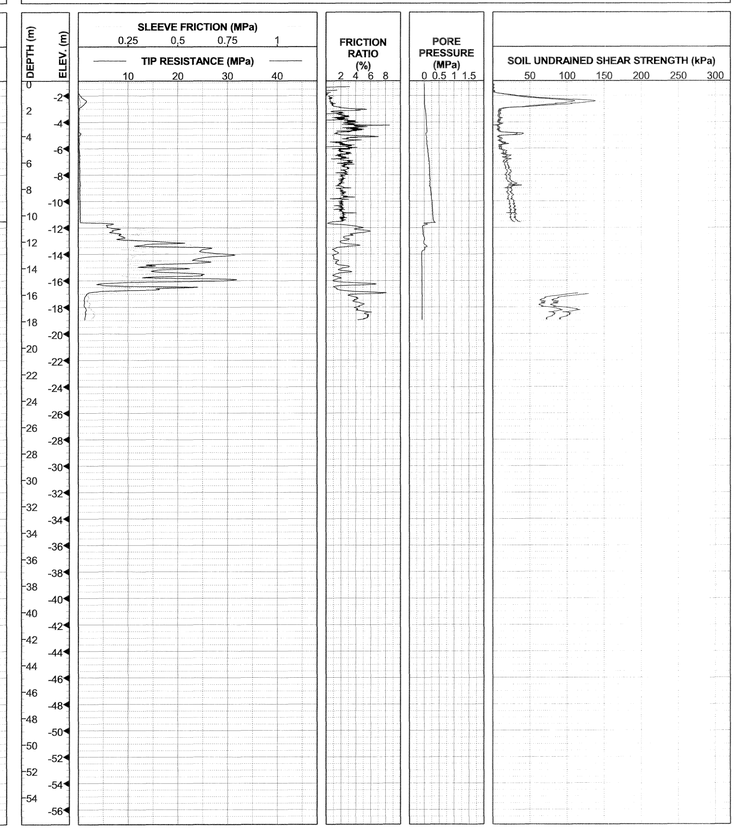
STATION: 13.6 m Left of "W" Stn. 84+34
COMPLETION ELEVATION: -52.8m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



CPT FH00C073 (00C-73)

COORDINATES: E1838919 N648292
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -1.1m (MSL)
START DATE: 09/24/00

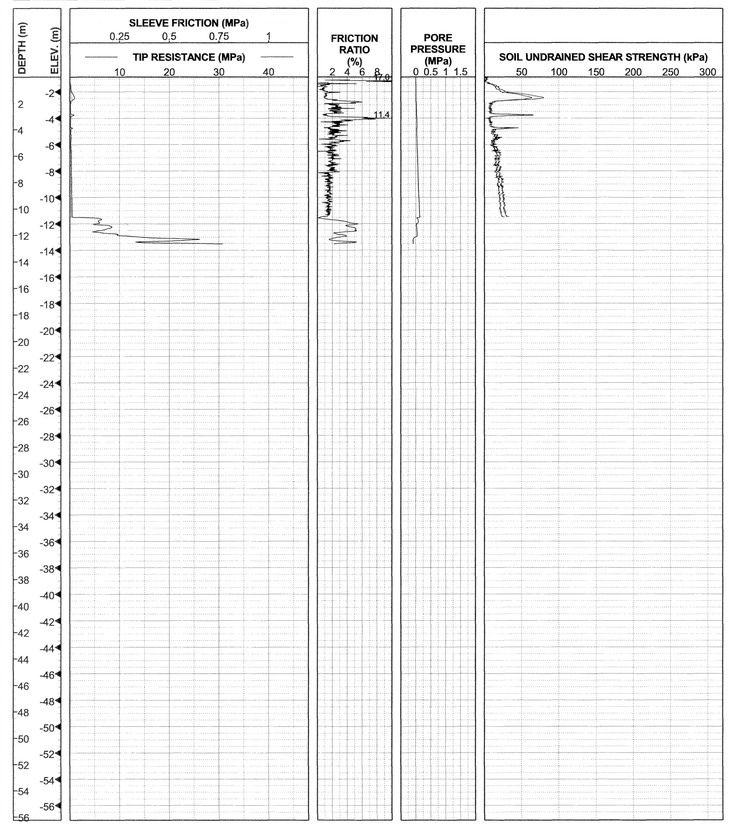
STATION: 0.3 m Left of "W" Stn. 84+60
COMPLETION ELEVATION: -19.0m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



CPT FH00C074 (00C-74)

COORDINATES: E1838941 N648292
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -0.9m (MSL)
START DATE: 09/25/00

STATION: 2.2 m Right of "W" Stn. 84+82
COMPLETION ELEVATION: -13.6m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



REID BUELL, DESIGN OVERSIGHT (Reid Buell 11/17/00)	DRAWN BY S.DESHPANDE	P.ROBINS, FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	T.W.McNEILAN, PROJECT ENGINEER	BRIDGE NO. 34-0006R/L
	CHECKED BY J.CHACKO	DATE 11/14/00			KM POST 2.1
			ORIGINAL SCALE IN CENTIMETERS FOR REDUCED PLANS 0 1 2 3 4 5 6 7 8 9 10	CU 04 EA 012021	POST MILE 0

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

LOG OF TEST BORINGS 47 OF 47

DISREGARD PRINTS BEARING EARLIER REVISION DATES → 11/17/00

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET 546 | OF

33-0025-r-lotb47of47.tif

j:\caltrans\explorations\marine\lotb\mainspan\100%_superstructure_update\sh722_99-153_00-154lotb.odb

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)	PAVEMENT

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

STANDARD PENETRATION TEST (SPT) AND MODIFIED CALIFORNIA (MC) LINER SAMPLERS

Samplers were driven with a 63.5 kg 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.

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.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- PERCENT PASSING #200 SIEVE
- WATER CONTENT (%)
- TOTAL UNIT WEIGHT (kN/m³)
- THEORETICAL TOTAL UNIT WEIGHT (kN/m³)
- PLASTIC LIMIT LIQUID LIMIT
- EQUIVALENT SPT BLOW COUNT = (MC BLOWCOUNT/1.6) OR SPT BLOWCOUNT
- 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)
- Shear Strength Interpreted from CPT Tip Resistance (Nk = 12-15)
- POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- UNCONFINED COMPRESSION (ROCK)
- Soil: Strength Exceeds Capacity of Measuring Device; Rock: Sample broke along discontinuity; Intact sample would have greater strength
- FRACTURE DENSITY (ROCK)

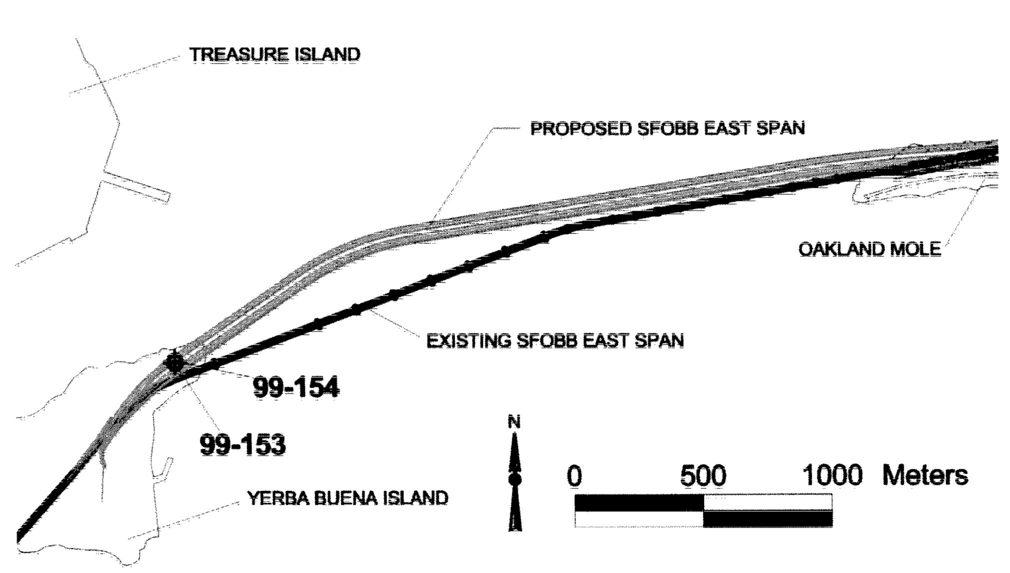
STRENGTH OF COHESIVE SOILS

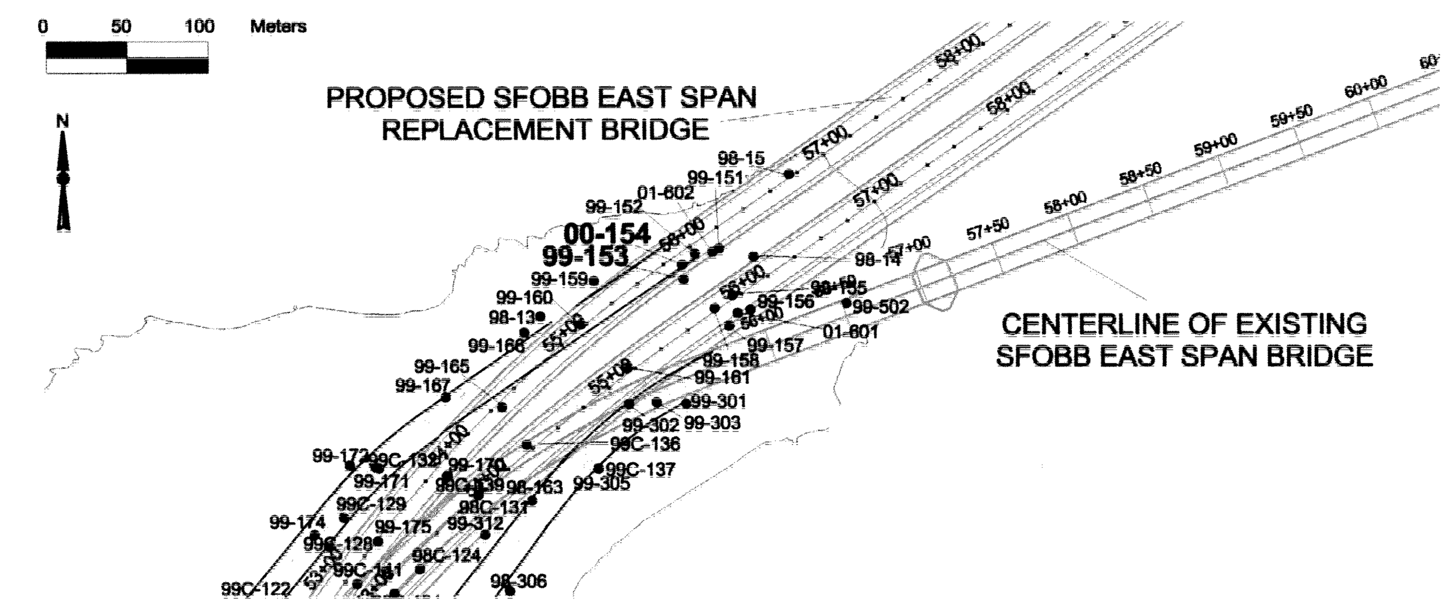
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

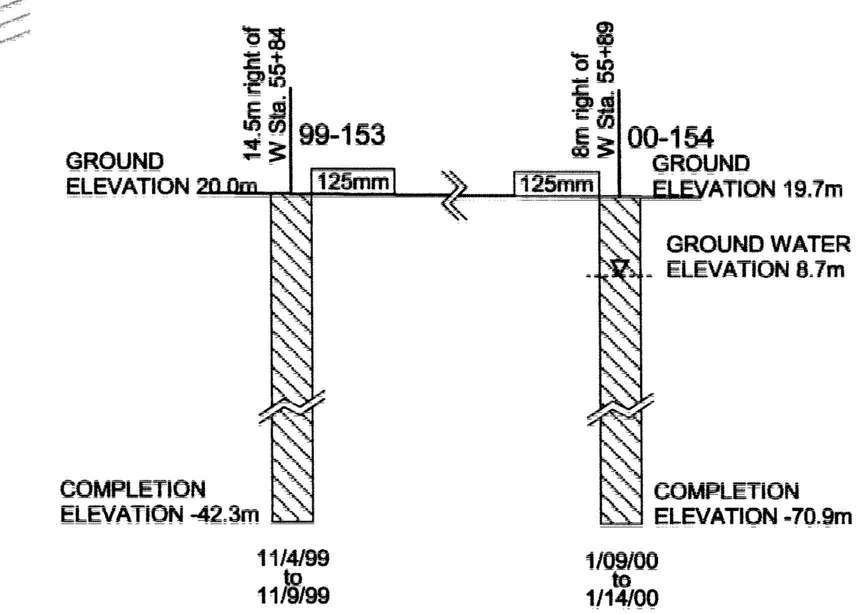
DENSITY OF GRANULAR SOILS

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

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1167	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER MIKE KAPUSKAR No. GE 2564 Exp. 12-31-06 GEOTECHNICAL STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS, A JOINT VENTURE.
7700, Edgewater Dr., Ste. 846,
Oakland, CA 94621
(510) 562-8833, FAX (510) 562-8858

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BORING 99-153

COORDINATES: E1836216 N647489
CA State Plane Zone 3, NAD83, Meters
GROUND ELEVATION: 20.0m (MSL)
START DATE: 11/4/99

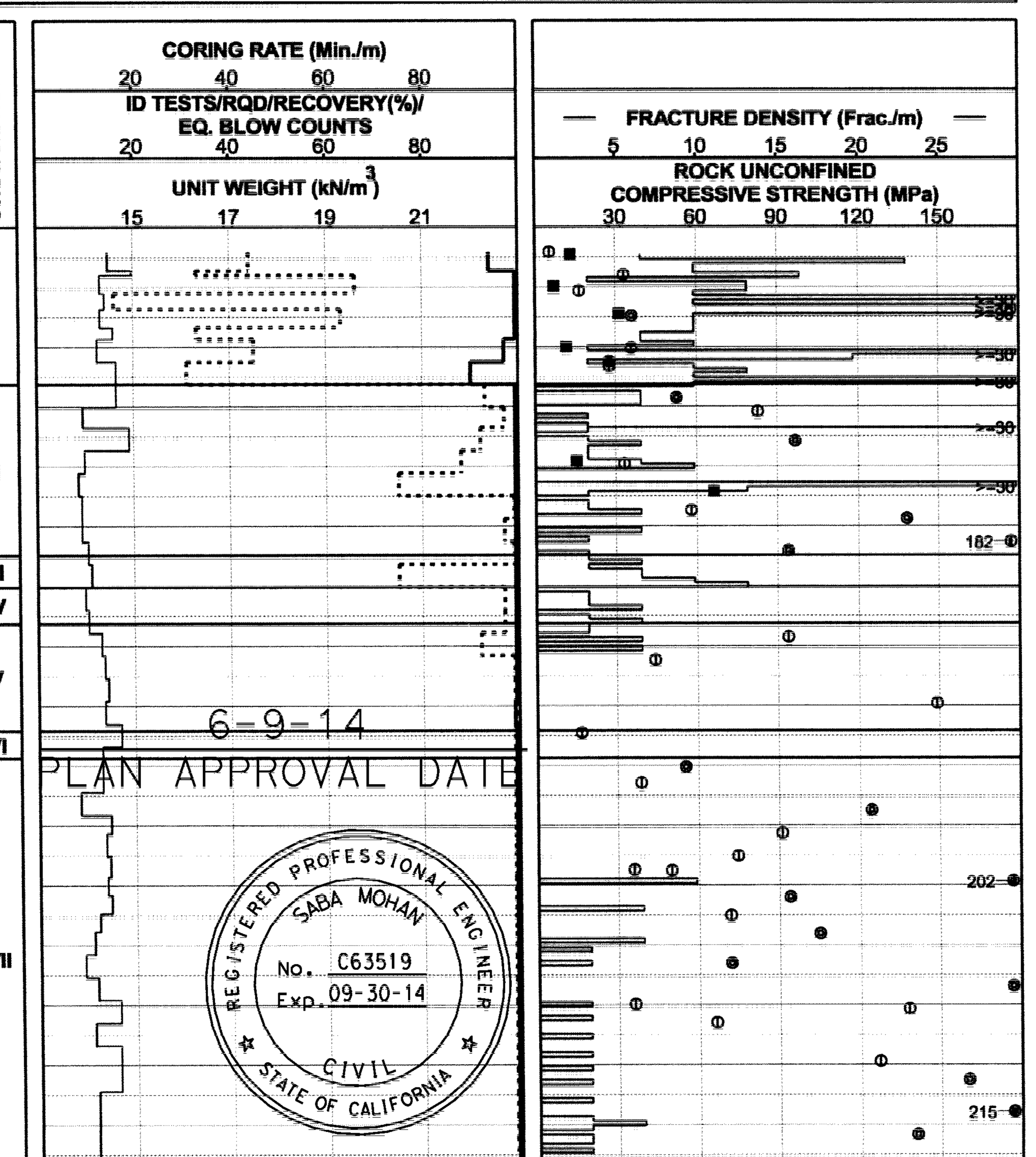
STATION: 14.5m right of W Sta. 55+84
COMPLETION ELEVATION: -42.3m (MSL)
END DATE: 11/9/99

DEPTH (m) / ELEVATION (m): 4 / 16, 8 / 12, 12 / 8, 16 / 4, 20 / 0, 24 / -4, 28 / -8, 32 / -12, 36 / -16, 40 / -20, 44 / -24, 48 / -28, 52 / -32, 56 / -36, 60 / -40, 64 / -44, 68 / -48, 72 / -52, 76 / -56, 80 / -60, 84 / -64, 88 / -68, 92 / -72, 96 / -76

BLOW COUNT: 94-44, 100-33, 100-66, 100-16, 100-63, 100-33, 97-45, 90-31, 100-93, 100-97, 100-92, 100-88, 100-75, 100-99, 100-97, 100-99, 100-75, 100-97, 100-97, 100-92, 100-99, 100-99, 99-100, 100-99

MATERIAL DESCRIPTION	STRATUM NO.
GROUND ELEVATION: 20.0m (MSL) (0.0m)	
FRANCISCAN FORMATION (JKf) SANDSTONE (Graywacke) (Rx), dark yellowish brown, moderately weathered, moderately soft to moderately hard, fine to medium grained, moderately fractured -slightly weathered below 7.5m (10.5m)	I
SANDSTONE (Graywacke) (Rx), dark yellowish brown, fresh, very hard, fine to medium grained, slightly fractured -claystone with interbedded sandstone, 11.3m to 11.4m -fractures dipping 30 degrees, at 11.4m (21.9m)	II
CLAYSTONE (Rx), black, fresh, hard, laminated, slightly fractured, with minor sandstone and siltstone interbeds (24.1m)	III
SILTSTONE (Rx), dark gray, fresh, very hard, slightly fractured (26.5m)	IV
SANDSTONE (Graywacke) (Rx), light gray, fresh, hard, slightly fractured (33.7m)	V
SILTSTONE (Rx), dark gray, hard, fresh (35.5m)	VI
SANDSTONE (Rx), light gray, very hard, fresh -healed fracture zone, near vertical, 36.3m to 37.1m -healed fractures are very thin to moderately thin with calcite filling, below 39.3m -very slightly to slightly fractured, thin to very thin, slightly rough to smooth and with calcite filling, below 43.3m -thin fracture, slickensided, at 43.5m -healed fracture zone, 43.6m to 43.7m -with claystone clasts below 47.4m -bedding dipping 20 degrees, at 51.2m -thick, calcite filled, healed fracture, dipping 70 degrees, at 57.8m -fracture, slickensided, dipping 55 degrees, at 61.6m	VII
TOTAL DEPTH: 62.3m BACKFILLED WITH: Cement Grout	

Note:
Refer to multi-page logs presented in the YBI Site Characterization Report for detailed soil descriptions



6-9-14
PLAN APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9,0.0/1.2	105	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 1

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — Sheet 83 of 120

To accompany plans dated 7-22-13

BORING 00-154

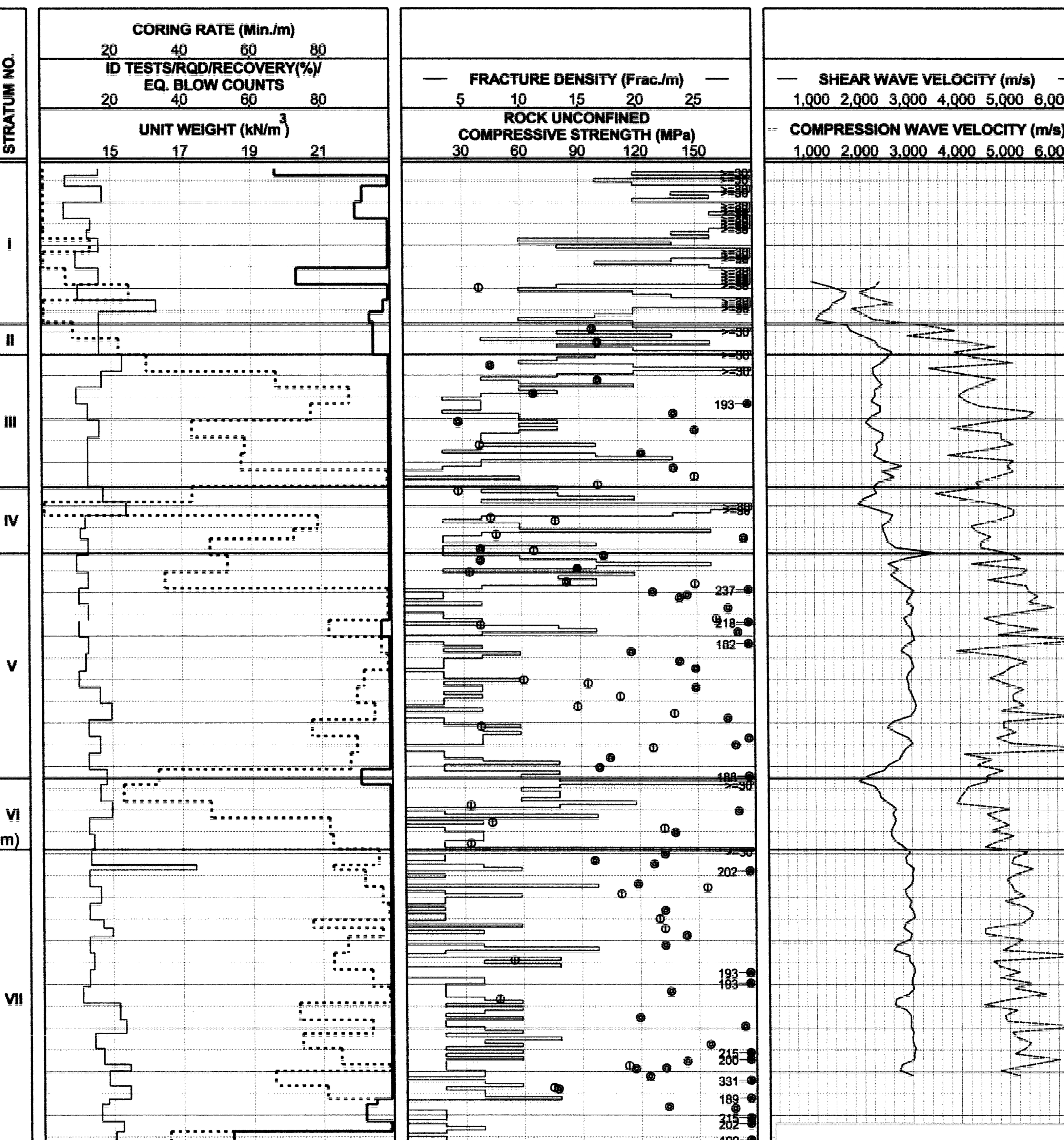
COORDINATES: E1836215 N647498
CA State Plane Zone 3, NAD83, Meters
GROUND ELEVATION: 19.7m (MSL)
START DATE: 01/09/00

STATION: 8m right of W Sta. 55+89
COMPLETION ELEVATION: -70.9m (MSL)
END DATE: 01/14/00

DEPTH (m) / ELEVATION (m): 0 / 20, 4 / 16, 8 / 12, 12 / 8, 16 / 4, 20 / 0, 24 / -4, 28 / -8, 32 / -12, 36 / -16, 40 / -20, 44 / -24, 48 / -28, 52 / -32, 56 / -36, 60 / -40, 64 / -44, 68 / -48, 72 / -52, 76 / -56, 80 / -60, 84 / -64, 88 / -68, 92 / -72, 96 / -76

BLOW COUNT: 67-0, 100-0, 92-0, 90-0, 100-0, 100-0, 100-14, 100-0, 73-7, 100-25, 98-0, 94-0, 95-9, 95-22, 100-30, 100-67, 100-88, 100-77, 100-43, 100-58, 100-57, 100-99, 100-43, 100-0, 100-79, 100-72, 100-48, 100-53, 100-35, 100-99, 100-99, 97-82, 100-97, 100-99, 100-92, 100-90, 100-95, 100-77, 100-90, 100-88, 91-33, 100-23, 100-48, 100-82, 100-83, 100-96, 100-83, 100-92, 100-97, 100-99, 100-77, 100-97, 100-87, 100-83, 100-94, 100-99, 100-73, 100-94, 100-74, 100-85, 100-99, 100-66, 100-81, 95-95, 92-82, 100-99, 54-36, 100-99

MATERIAL DESCRIPTION	STRATUM NO.
GROUND ELEVATION: 19.7m (MSL) (0.0m)	
FRANCISCAN FORMATION (JKf) SANDSTONE (Graywacke) (Rx), yellowish brown, moderately weathered, hard, moderately to well indurated -siltstone, yellowish brown, 1.4m to 1.6m -interbedded claystone, siltstone and sandstone, 4.1m to 4.5m ▽(11.0m) -claystone, laminated, dipping 65 to 70 degrees, dark brownish gray, intensely fractured, 7.8m to 8.2m (14.9m)	I
SANDSTONE (Graywacke) (Rx), yellowish bronw, slightly weathered, hard, well indurated (17.7m)	II
SANDSTONE (Graywacke) (Rx), yellowish brown, fresh, hard, moderately to well indurated -interbedded claystone and sandstone, dipping 85 degrees, 19.4m to 19.9m -interbedded siltstone and sandstone, thinly bedded dipping 55 to 70 degrees, 27.7m to 27.9m (29.9m)	III
CLAYSTONE (Rx), SANDSTONE (Rx), and SILTSTONE (Rx) [4:3:2], fresh, very hard, dipping 55 to 60 degrees -claystone: black, laminated to moderately bedded (36.0m) -sandstone: gray, laminated to thickly bedded -siltstone: dark gray, laminated to thinly bedded	IV
SANDSTONE (Graywacke) (Rx), gray, fresh, very hard, well indurated -percentage of black, coarse claystone fragments increased, 37.4m to 37.7m -moderately to slightly fractured, dipping 30 to 40 degrees, below 39.3m -interbedded claystone and siltstone, dipping 70 degrees, 52.2m to 52.6m (56.7m) -claystone, below 54.4m -intensely to moderately fractured below 55.9m	V
CLAYSTONE (Rx), SANDSTONE (Rx), and SILTSTONE (Rx) [2:2:1], fresh, very hard dipping 50 to 65 degrees (63.3m)	VI
SANDSTONE (Graywacke) (Rx), gray, fresh, very hard, well indurated -fine to medium grained with few black, coarse claystone fragments, slightly fractured -fractures with very thin calcite filling, smooth to moderately rough surfaces -interbedded siltstone, claystone, and sandstone, dipping 50 to 70 degrees, moderately fractured, 67.1m to 68.2m -percentage of black, coarse claystone fragments increased, some aligned at 55 degrees, 69.5m to 70.1m -moderately fractured with rounded and angular fragments of claystone, up to 6cm, 75.9m to 76.7m -slickensided fracture, dipping 40 degrees, with polished surface, at 82.4m	VII
TOTAL DEPTH: 90.6m BACKFILLED WITH: Cement Grout	



Note:
Refer to multi-page logs presented in the YBI Site Characterization Report for detailed soil descriptions

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SABA MOHAN GEOTECHNICAL DESIGN OVERSIGHT	DRAWN BY	C.CACERES	B.SCHELL, S. SICILIANO FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR PROJECT ENGINEER	BRIDGE NO. 34-0006 L/R	SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)
	CHECKED BY	M. KAPUSKAR	DATE SEE ABOVE			KM POST 13.2/13.9	LOG OF TEST BORINGS NO. 1
				ORIGINAL SCALE IN CENTIMETERS FOR REDUCED PLANS 0 1 2 3 4 5 6 7 8 9 10	CU 04 EA 0120F1	POST MILE 8.2/8.7	DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) SHEET 750 OF

33-0025-s-lotb01_722.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)
- PAVEMENT

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

STANDARD PENETRATION TEST (SPT) AND MODIFIED CALIFORNIA (MC) LINER SAMPLERS

Samplers were driven with a 63.5 kg 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.

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.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ TOTAL UNIT WEIGHT (kN/m³)
- ○ THEORETICAL TOTAL UNIT WEIGHT (kN/m³)
- PLASTIC LIMIT + LIQUID LIMIT +
- ⊗ EQUIVALENT SPT BLOW COUNT = (MC BLOWCOUNT/1.6) OR SPT BLOWCOUNT
- ···· 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)
- Shear Strength Interpreted from CPT Tip Resistance (Nk = 12-15)
- ● POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- ◐ POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- ┼ Soil: Strength Exceeds Capacity of Measuring Device
  Rock: Sample broke along discontinuity; Intact sample would have greater strength
- —— FRACTURE DENSITY (ROCK)

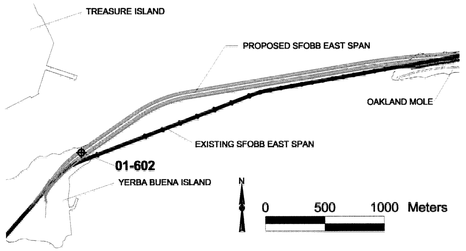
STRENGTH OF COHESIVE SOILS

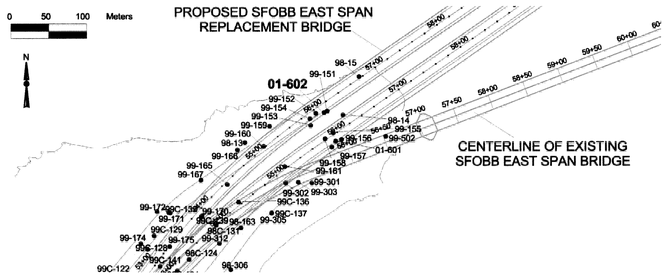
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

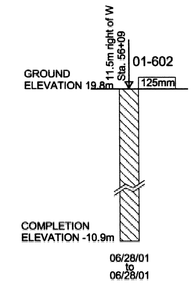
DENSITY OF GRANULAR SOILS

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.







DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1168	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER MIKE KAPUSKAR No. GE 2564 Exp. 12-31-06 GEOTECHNICAL STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 846,
Oakland, CA 94621
(510) 562-8833, FAX (510) 562-8858

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6-9-14
PLAN APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

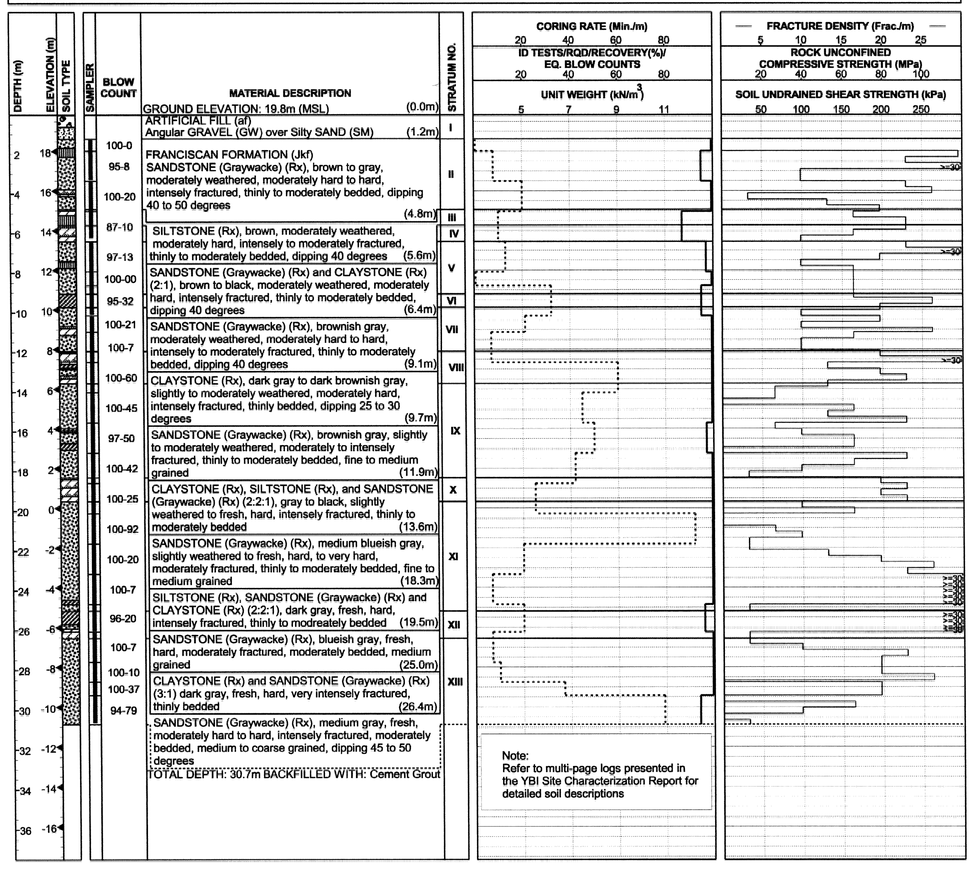
BORING 01-602

COORDINATES: E1836234 N647506
CA State Plane Zone 3, NAD83, Meters
GROUND ELEVATION: 19.8m (MSL)
START DATE: 06/28/01

STATION: 11.5m right of W Sta. 56+09
COMPLETION ELEVATION: -10.9m (MSL)
END DATE: 06/28/01

BLOW COUNT	MATERIAL DESCRIPTION	STRATUM NO.
	GROUND ELEVATION: 19.8m (MSL) (0.0m)	
100-0	ARTIFICIAL FILL (af) Angular GRAVEL (GW) over Silty SAND (SM) (1.2m)	I
95-8	FRANCISCAN FORMATION (Jkf) SANDSTONE (Graywacke) (Rx), brown to gray, moderately weathered, moderately hard to hard, intensely fractured, thinly to moderately bedded, dipping 40 to 50 degrees (4.8m)	II
100-20		III
87-10	SILTSTONE (Rx), brown, moderately weathered, moderately hard, intensely to moderately fractured, thinly to moderately bedded, dipping 40 degrees (5.6m)	IV
97-13		
100-00	SANDSTONE (Graywacke) (Rx) and CLAYSTONE (Rx) (2:1), brown to black, moderately weathered, moderately hard, intensely fractured, thinly to moderately bedded, dipping 40 degrees (6.4m)	V
95-32		VI
100-21	SANDSTONE (Graywacke) (Rx), brownish gray, moderately weathered, moderately hard to hard, intensely to moderately fractured, thinly to moderately bedded, dipping 40 degrees (9.1m)	VII
100-7		VIII
100-60	CLAYSTONE (Rx), dark gray to dark brownish gray, slightly to moderately weathered, moderately hard, intensely fractured, thinly bedded, dipping 25 to 30 degrees (9.7m)	IX
100-45		
97-50	SANDSTONE (Graywacke) (Rx), brownish gray, slightly to moderately weathered, moderately to intensely fractured, thinly to moderately bedded, fine to medium grained (11.9m)	
100-42		
100-25	CLAYSTONE (Rx), SILTSTONE (Rx), and SANDSTONE (Graywacke) (Rx) (2:2:1), gray to black, slightly weathered to fresh, hard, intensely fractured, thinly to moderately bedded (13.6m)	X
100-92		XI
100-20	SANDSTONE (Graywacke) (Rx), medium blueish gray, slightly weathered to fresh, hard, to very hard, moderately fractured, thinly to moderately bedded, fine to medium grained (18.3m)	
100-7	SILTSTONE (Rx), SANDSTONE (Graywacke) (Rx) and CLAYSTONE (Rx) (2:2:1), dark gray, fresh, hard, intensely fractured, thinly to modreately bedded (19.5m)	XII
96-20		
100-7	SANDSTONE (Graywacke) (Rx), blueish gray, fresh, hard, moderately fractured, moderately bedded, medium grained (25.0m)	XIII
100-10	CLAYSTONE (Rx) and SANDSTONE (Graywacke) (Rx) (3:1) dark gray, fresh, hard, very intensely fractured, thinly bedded (26.4m)	
100-37		
94-79	SANDSTONE (Graywacke) (Rx), medium gray, fresh, moderately hard to hard, intensely fractured, moderately bedded, medium to coarse grained, dipping 45 to 50 degrees (30.7m)	

TOTAL DEPTH: 30.7m BACKFILLED WITH: Cement Grout



DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

Log of Test Borings sheet is considered an informational document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. It does not attest to the accuracy or validity of the information contained in the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.

DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9,0.0/1.2	106	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 2

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — Sheet 84 of 120

To accompany plans dated 7-22-13

SABA MOHAN, GEOTECHNICAL DESIGN OVERSIGHT	DRAWN BY: A. PALOMARES	B. SCHELL, FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
	CHECKED BY: A. BROUGHTON	DATE: SEE ABOVE	

M. KAPUSKAR, PROJECT ENGINEER

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

CU 04
EA 0120F1

BRIDGE NO.	KM POST	POST MILE
34-0006 L/R	13.2/13.9	8.2/8.7

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 2

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) — SHEET 751 OF

33-0025-s-lotb02_723.tif

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1169	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER MIKE KAPUSKAR No. GE 2564 Exp. 12-31-06 GEOTECHNICAL STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 846,
Oakland, CA 94621
(510) 562-8833, FAX (510) 562- 8858

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Metric

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)
- PAVEMENT

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

STANDARD PENETRATION TEST (SPT) AND MODIFIED CALIFORNIA (MC) LINER SAMPLERS

Samplers were driven with a 63.5 kg 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.

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.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ TOTAL UNIT WEIGHT (kN/m³)
- ○ THEORETICAL TOTAL UNIT WEIGHT (kN/m³)
- PLASTIC LIMIT + LIQUID LIMIT +
- ⊗ EQUIVALENT SPT BLOW COUNT = (MC BLOWCOUNT/1.6) OR SPT BLOWCOUNT
- 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)
- Shear Strength Interpreted from CPT Tip Resistance (Nk = 12-15)
- POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- UNCONFINED COMPRESSION (ROCK)
- + Soil: Strength Exceeds Capacity of Measuring Device
  Rock: Sample broke along discontinuity; Intact sample would have greater strength
- FRACTURE DENSITY (ROCK)

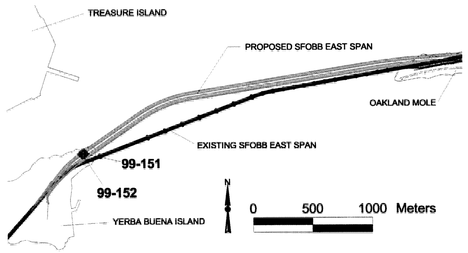
STRENGTH OF COHESIVE SOILS

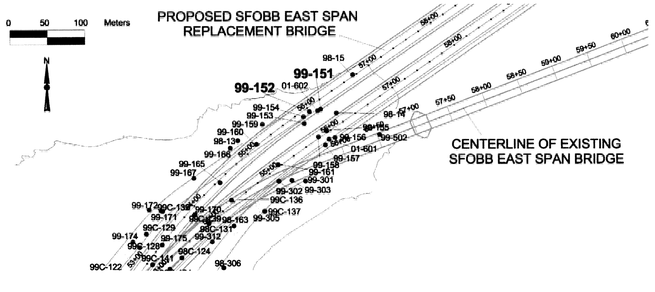
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

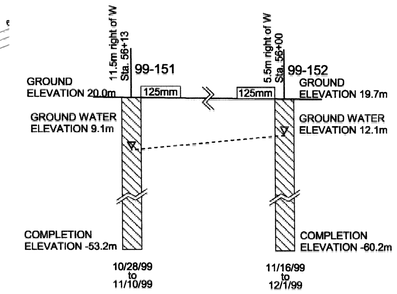
DENSITY OF GRANULAR SOILS

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.







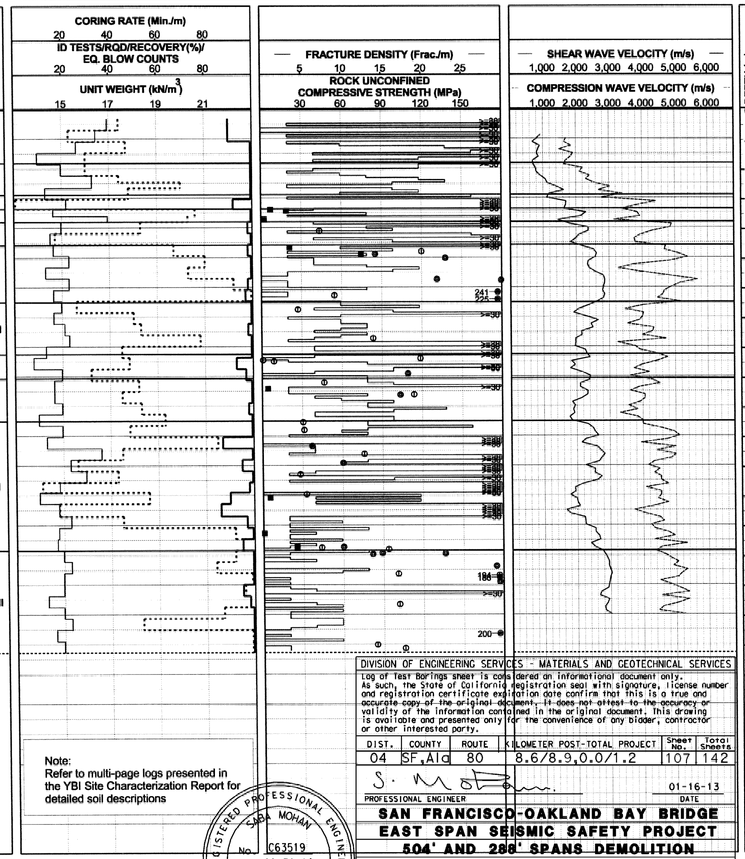
BORING 99-151

COORDINATES: E1836238 N647508
CA State Plane Zone 3, NAD83, Meters
GROUND ELEVATION: 20.0m (MSL)
START DATE: 10/28/99

STATION: 11.5m right of W Sta. 56+13
COMPLETION ELEVATION: -53.2m (MSL)
END DATE: 11/10/99

BLOW COUNT	MATERIAL DESCRIPTION	STRATUM NO.
	GROUND ELEVATION: 20.0m (MSL) (0.2m)	
90-44	ARTIFICIAL FILL (af)	I
90-23	FRANCISCAN FORMATION (JKf)	
100-47	SANDSTONE (Graywacke) (Rx), yellowish brown, intensely weathered, moderately hard (7.3m)	II
100-30		
100-44	SANDSTONE (Graywacke) (Rx), yellowish brown, moderately weathered, moderately hard (11.6m) (10.9m)	III
100-70		
100-48		
92-0	CLAYSTONE (Rx), SILTSTONE (Rx), and SANDSTONE (Graywacke) (Rx) [1:1:0.5], slightly to moderately weathered, hard (13.5m)	IV
100-76		
100-73		V
98-53		VI
100-17		
98-67	CLAYSTONE (Rx), SILTSTONE (Rx), and SANDSTONE (Graywacke) (Rx) [1:1:0.5], fresh, hard (18.4m) (15.2m)	
100-80		
100-73		
98-92	SANDSTONE (Graywacke) (Rx), light gray, fresh, hard -interbedded siltstone and claystone, dipping 30 degrees, 21.0m to 21.2m (26.1m)	VII
97-100		
100-26		
100-50	CLAYSTONE (Rx), SILTSTONE (Rx), and SANDSTONE (Graywacke) (Rx) [2:1:1], fresh, hard, intensely to moderately fractured (33.1m)	VIII
98-53		
100-78		
100-45		
93-48	SANDSTONE (Graywacke) (Rx), light gray, fresh, hard, fine to medium grained (36.3m)	IX
97-32		
100-52	SANDSTONE (Graywacke) (Rx), CLAYSTONE (Rx), SILTSTONE (Rx) [10:4:1], fresh, hard (42.1m)	X
100-45		
98-53		
100-63		
100-48	SANDSTONE (Graywacke) (Rx), light gray, fresh, very hard -claystone, intensely fractured, 44.2m to 45.1m	XI
87-85		
100-45		
95-26		
100-43		
98-11		
90-56	-interbedded claystone and siltstone, moderately soft to very hard, laminated to thickly bedded, very intensely to moderately fractured, 53.2m to 54.7m (59.4m)	
86-18		
97-45	-vertical fracture zone, well developed slickensides, 54.9m to 55.5m	
100-92		
95-95	-sandstone, 56.4m to 56.8m	
100-92		
100-84		
100-99	SANDSTONE (Graywacke) (Rx), light gray, fresh, very hard -interbedded siltstone and claystone [1:1], dipping 50 degrees, 65.1m to 65.5m	XII
95-96		
98-98		
100-87		
100-53		
100-99		
100-99		

TOTAL DEPTH: 73.2m BACKFILLED WITH: Cement Grout



Note:
Refer to multi-page logs presented in the YBI Site Characterization Report for detailed soil descriptions

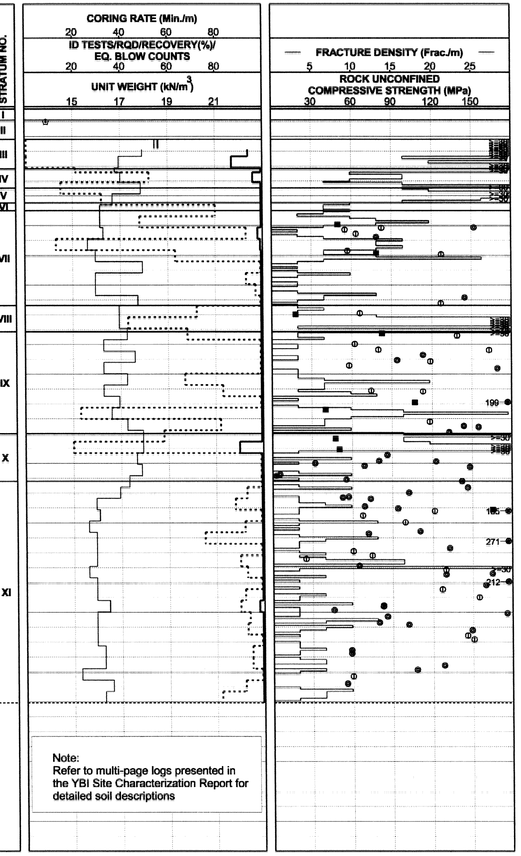
BORING 99-152

COORDINATES: E1836223 N647505
CA State Plane Zone 3, NAD83, Meters
GROUND ELEVATION: 19.7m (MSL)
START DATE: 11/16/99

STATION: 5.5m right of W Sta. 56+00
COMPLETION ELEVATION: -60.2m (MSL)
END DATE: 12/1/99

BLOW COUNT	MATERIAL DESCRIPTION	STRATUM NO.
	GROUND ELEVATION: 19.7m (MSL) (0.0m)	
9	ARTIFICIAL FILL (af) (1.5m)	I
56-0	SEDIMENTARY DEPOSITS (Qa)	
94-0	Silty Fine SAND (SM), medium loose, brown, dry to slightly moist, with small pieces of rock fragments (4.1m) (7.6m)	II
87-0		
100-21	FRANCISCAN FORMATION (JKf)	
96-52		
100-15	CLAYSTONE (Rx), SILTSTONE (Rx), and SANDSTONE (Graywacke) (Rx) [5:4:2], intensely weathered, soft to moderately soft, intensely fractured (8.1m)	III
100-32		IV
100-80		V
100-48		VI
98-93	CLAYSTONE (Rx), SILTSTONE (Rx), and SANDSTONE (Graywacke) (Rx) [5:4:2], moderately weathered, moderately hard to hard, intensely fractured (10.7m)	
99-13		
100-63		VII
100-99	CLAYSTONE (Rx), SILTSTONE (Rx), and SANDSTONE (Graywacke) (Rx) [5:4:2], slightly weathered, moderately hard to hard, intensely fractured (12.6m)	
100-93		
100-97		
100-99		
100-72	CLAYSTONE (Rx), SILTSTONE (Rx), and SANDSTONE (Graywacke) (Rx) [5:4:2], fresh, moderately hard to hard, moderately fractured (13.7m)	VIII
100-43		
100-68		
100-99	SANDSTONE (Graywacke) (RX), fresh, gray, very hard, fine to medium grained (26.5m)	IX
100-99		
100-67	CLAYSTONE (Rx), SANDSTONE (Graywacke) (Rx), and SILTSTONE (Rx) [9:4:2], fresh, hard to very hard, slightly to moderately fractured (30.0m)	
100-83		
100-99		
100-23		
100-82	SANDSTONE (Graywacke) (RX) gray, fresh, very hard, slightly fractured, fine to medium grained (43.7m)	
100-58		
90-20	SANDSTONE (Graywacke) (Rx), SILTSTONE (Rx), and CLAYSTONE (Rx) [3:2:2], fresh, moderately hard to very hard (50.1m)	X
100-99		
100-99		
100-99		
100-93	SANDSTONE (Graywacke) (RX), light gray, fresh, very hard, slightly fractured, very thin filling, smooth to moderately rough -interbedded claystone and siltstone, bedding dipping 30 to 50 degrees, 53.2m to 53.6m	XI
100-88		
100-99		
100-92		
100-75		
100-99		
100-90		
100-93		
100-99		
100-92		
98-90	-gradational contact, siltstone, with abundant calcite filled fractures, 65.2m to 65.6m	
100-94		
100-93		
100-99		
100-95		
100-95		
100-99		
100-92		
100-82	-moderately fractured, very thin, slightly rough to smooth, dipping 40 to 60 degrees, below 78.3m	

TOTAL DEPTH: 79.9m BACKFILLED WITH: Cement Grout



Note:
Refer to multi-page logs presented in the YBI Site Characterization Report for detailed soil descriptions

DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

Log of Test Borings sheet is considered an informational document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. It does not attest to the accuracy or validity of the information contained in the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.

DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9,0.0/1.2	107	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 3

UNIT: 3593 — CONTRACT No. 04-013521 — BRIDGE No. 33-0025
PROJECT NUMBER & PHASE: 0412000608,1
NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — Sheet 85 of 120

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

6-9-14
PLAN APPROVAL DATE

To accompany plans dated 7-22-13

SABA MOHAN — GEOTECHNICAL DESIGN OVERSIGHT
DRAWN BY C. CACERES
CHECKED BY S. SICILIANO
B. SCHELL — FIELD INVESTIGATOR — DATE SEE ABOVE

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

M. KAPUSKAR — PROJECT ENGINEER

BRIDGE NO. 34-0006 L/R
KM POST 13.2/13.9
POST MILE 8.2/8.7
CU 04
EA 0120F1

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

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 3

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) SHEET 752 OF

33-0025-s-lotb03_724.tif

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1170	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER MIKE KAPUSKAR No. GE 2564 Exp. 12-31-06 GEOTECHNICAL STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 646,
Oakland, CA 94621
(510) 562-8833, FAX (510) 562-8858

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

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)
- PAVEMENT

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

STANDARD PENETRATION TEST (SPT) AND MODIFIED CALIFORNIA (MC) LINER SAMPLERS

Samplers were driven with a 63.5 kg 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.

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.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ TOTAL UNIT WEIGHT (kN/m³)
- ○ THEORETICAL TOTAL UNIT WEIGHT (kN/m³)
- PLASTIC LIMIT + LIQUID LIMIT +
- ⊕ EQUIVALENT SPT BLOW COUNT = (MC BLOWCOUNT/1.6) OR SPT BLOWCOUNT
- ---- 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)
- Shear Strength Interpreted from CPT Tip Resistance (Nk = 12-15)
- ● POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- ⊕ POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- + Soil: Strength Exceeds Capacity of Measuring Device
  Rock: Sample broke along discontinuity; Intact sample would have greater strength
- —— FRACTURE DENSITY (ROCK)

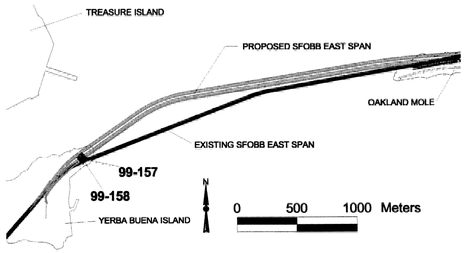
STRENGTH OF COHESIVE SOILS

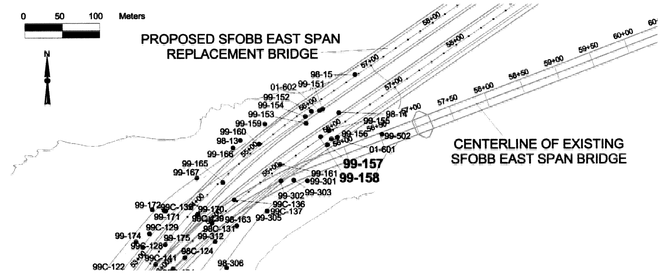
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

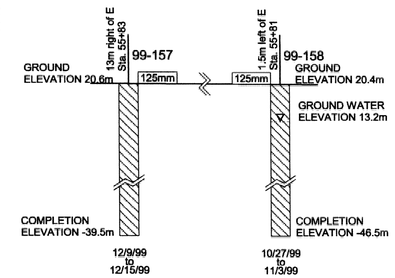
DENSITY OF GRANULAR SOILS

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

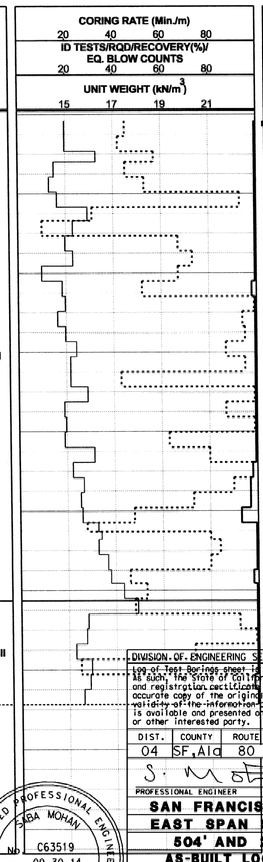
BORING 99-157

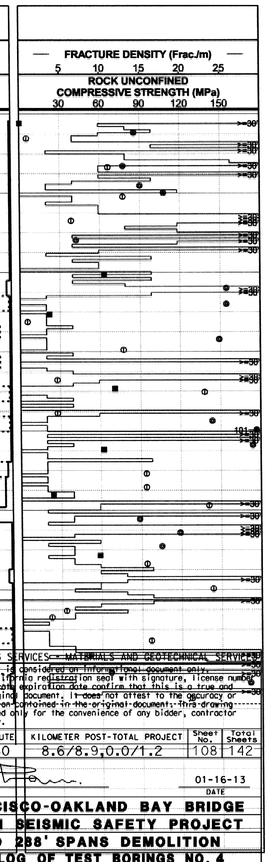
COORDINATES: E1836244 N647460
CA State Plane Zone 3, NAD83, Meters
GROUND ELEVATION: 20.6m (MSL)
START DATE: 12/9/99

STATION: 13m right of E Sta. 55+83
COMPLETION ELEVATION: -39.5m (MSL)
END DATE: 12/15/99

BLOW COUNT	MATERIAL DESCRIPTION	STRATUM NO.
	GROUND ELEVATION: 20.6m (MSL) (0.0m)	
	ARTIFICIAL FILL (af) PAVEMENT, Asphalt concrete and aggregate base (0.2m)	I
100-45		
100-42	FRANCISCAN FORMATION (JKf)	
100-57	SANDSTONE (Graywacke) (Rx), SILTSTONE(Rx), and	
100-45	CLAYSTONE (Rx) [5:3:2], moderately to slightly	
100-53	weathered, soft to hard, well indurated	
100-93		
100-31		
100-10	-sandstone with claystone fragments, 11.3m to 11.6m	
100-67	-no iron oxidation below 11.3m	
100-73	-interbedded claystone, siltstone, and sandstone [7:3:1],	
100-67	11.9m to 16.9m	
98-52		
100-100	-sandstone, 17.9m to 18.9m	
100-94	-interbedded siltstone, fine sandstone, and claystone,	
100-95	18.9m to 19.1m	
100-87	-very hard, slightly fractured, below 18.9m	
100-95	-sandstone, 24.3m to 25.1m	II
100-43		
100-100	-sandstone, fresh, very slightly fractured, 28.2m to 30.0m	
100-87		
100-100		
100-63		
100-80	-siltstone, with claystone rip-ups and soft sediment	
98-98	deformation, 34.3m to 34.6m	
97-90		
97-73		
93-48	-no claystone clasts and deformation, below 39.6m	
100-28		
100-80	-claystone, very intensely fractured, 42.3m to 42.8m	
100-84	-sandstone, with claystone beds and clasts, soft	
100-80	sediment deformation, at 42.8m	
98-46		
100-53	(49.6m)	
100-48	SANDSTONE (Graywacke) (Rx), gray, fresh, very hard,	
100-92	very well indurated, fine grained	
100-100	-slightly fractured, with moderately to slightly rough	
100-73	surfaces, below 50.9m	
100-25	-moderately to intensely fractured, below 53.9m	III
98-95		
100-68	-with siltstone interbeds, dipping 50 degrees, 57.3m to 57.6m	
	TOTAL DEPTH: 60.0m BACKFILLED WITH: Cement Grout	

Note:
Refer to multi-page logs presented in the YBI Site Characterization Report for detailed soil descriptions





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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Alc	80	8.6/8.9,0.0/1.2	108	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 4

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — Sheet 86 of 120

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

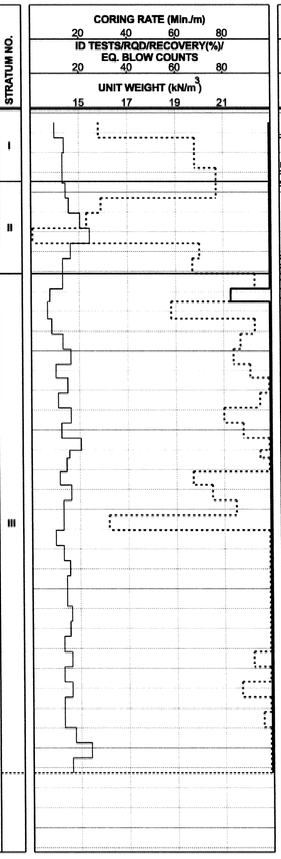
6-9-14
PLAN APPROVAL DATE

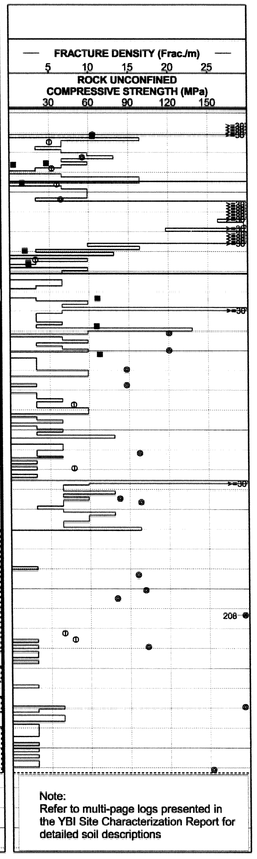
BORING 99-158

COORDINATES: E1836235 N647471
CA State Plane Zone 3, NAD83, Meters
GROUND ELEVATION: 20.4m (MSL)
START DATE: 10/27/99

STATION: 1.5m left of E Sta. 55+81
COMPLETION ELEVATION: -46.5m (MSL)
END DATE: 11/3/99

BLOW COUNT	MATERIAL DESCRIPTION	STRATUM NO.
	GROUND ELEVATION: 20.4m (MSL) (0.0m)	
	FRANCISCAN FORMATION (JKf)	
100-28	SANDSTONE (Graywacke) (Rx), light gray, slightly	
100-68	weathered, hard, fine grained, moderately fractured	
100-68	11/3/99	
100-77	(7.3m) ▽(7.2m)	I
100-77	SANDSTONE (Graywacke) (Rx) and SILTSTONE (Rx)	
100-29	[1:1] light gray and black, fresh, hard and moderately	
100-23	hard, thinly bedded, dipping 40 to 45 degrees, slightly	
100-0	fractured -sandstone, light gray, 9.0m to 9.6m	
100-70	-very intensely fractured zone, 9.5m to 9.7m	
100-67	(16.6m)	II
100-93	SANDSTONE (Graywacke) (Rx), light gray, fresh, hard,	
83-83	fine grained, very slightly fractured	
100-58	-interbedded with siltstone, black, thinly bedded,	
100-93	moderately spaced, dipping 40 to 45 degrees,	
100-87	moderately fractured, 19.2m to 20.4m	
100-84	-hard to very hard and slightly fractured, below 20.4m	
100-91	-siltstone, black, dipping 40 degrees, at 23.3m	
100-100		
100-95	-interbedded with siltstone, black, thinly bedded, thinly	
100-80	spaced, 28.2m to 28.5m	
100-88	-intensely fractured zone at 30.0m	
100-100	-interbedded with siltstone, black, laminated, 30.8m to	
100-95	31.4m	
100-100	-siltstone, black, dipping 50 degrees, 31.7m to 32.2m	
100-67	-siltstone, black, dipping 40 to 45 degrees, 35.1m to	
100-75	35.4m	
100-85	-interbedded with siltstone, black, thinly to moderately	
100-32	bedded, dipping 60 to 65 degrees, 37.0m to 37.5m	
100-100	-intensely fractured zone at 37.5m	III
100-100	-fracture, clean, dipping 70 degrees, at 40.2m	
100-100	-fracture, thin, with calcite filling, dipping 80 degrees at	
100-100	42.4m	
100-100	-unfractured, below 42.7m	
100-100	-with siltstone clasts, to 4mm diameter, below 47.2m	
100-100		
100-100		
100-100	-very slightly fractured, below 52.7m	
100-92		
100-100	-open fracture, dipping 55 degrees, at 55.2m	
100-87	-angular siltstone clast, 50mm diameter, at 54.3m	
100-100		
100-100		
100-100	-healed fracture, 12mm thick, with calcite filling, dipping	
100-100	60 degrees, at 61.1m	
100-100	-near horizontal fracture, at 62.0m	
100-100	-fracture, 50mm thick, with calcite filling, dipping 70	
	degrees at 65.2m	
	TOTAL DEPTH: 66.9m BACKFILLED WITH: Cement Grout	





Note:
Refer to multi-page logs presented in the YBI Site Characterization Report for detailed soil descriptions

To accompany plans dated 7-22-13

SABA MOHAN, GEOTECHNICAL DESIGN OVERSIGHT	DRAWN BY: J.PALMER	B.SCHELL, S. SICILIANO, FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
	CHECKED BY: M. KAPUSKAR, S. SICILIANO	DATE: SEE ABOVE	M. KAPUSKAR, PROJECT ENGINEER

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

CU 04
EA 0120F1

BRIDGE NO. 34-0006 L/R
KM POST 13.2/13.9
POST MILE 8.2/8.7

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 4

DISREGARD PRINTS BEARING EARLIER REVISION DATES →
REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 753 OF

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)
- PAVEMENT

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

STANDARD PENETRATION TEST (SPT) AND MODIFIED CALIFORNIA (MC) LINER SAMPLERS

Samplers were driven with a 63.5 kg 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.

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.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ TOTAL UNIT WEIGHT (kN/m³)
- ○ THEORETICAL TOTAL UNIT WEIGHT (kN/m³)
- PLASTIC LIMIT + LIQUID LIMIT +
- ⊗ EQUIVALENT SPT BLOW COUNT = (MC BLOWCOUNT/1.6) OR SPT BLOWCOUNT
- ---- 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)
- Shear Strength Interpreted from CPT Tip Resistance (Nk = 12-15)
- ● POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- ⊕ POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- + Soil: Strength Exceeds Capacity of Measuring Device
  Rock: Sample broke along discontinuity; Intact sample would have greater strength
- —— FRACTURE DENSITY (ROCK)

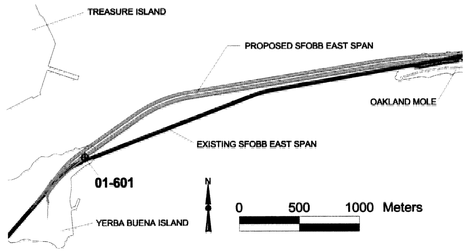
STRENGTH OF COHESIVE SOILS

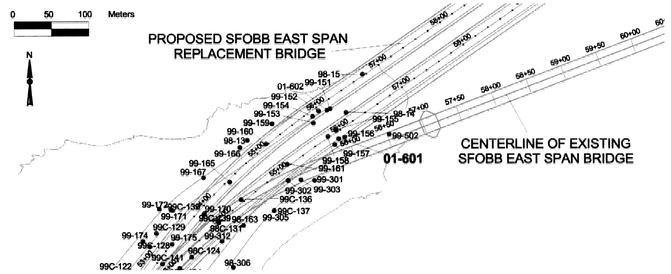
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

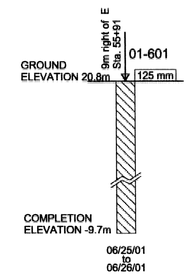
DENSITY OF GRANULAR SOILS

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.





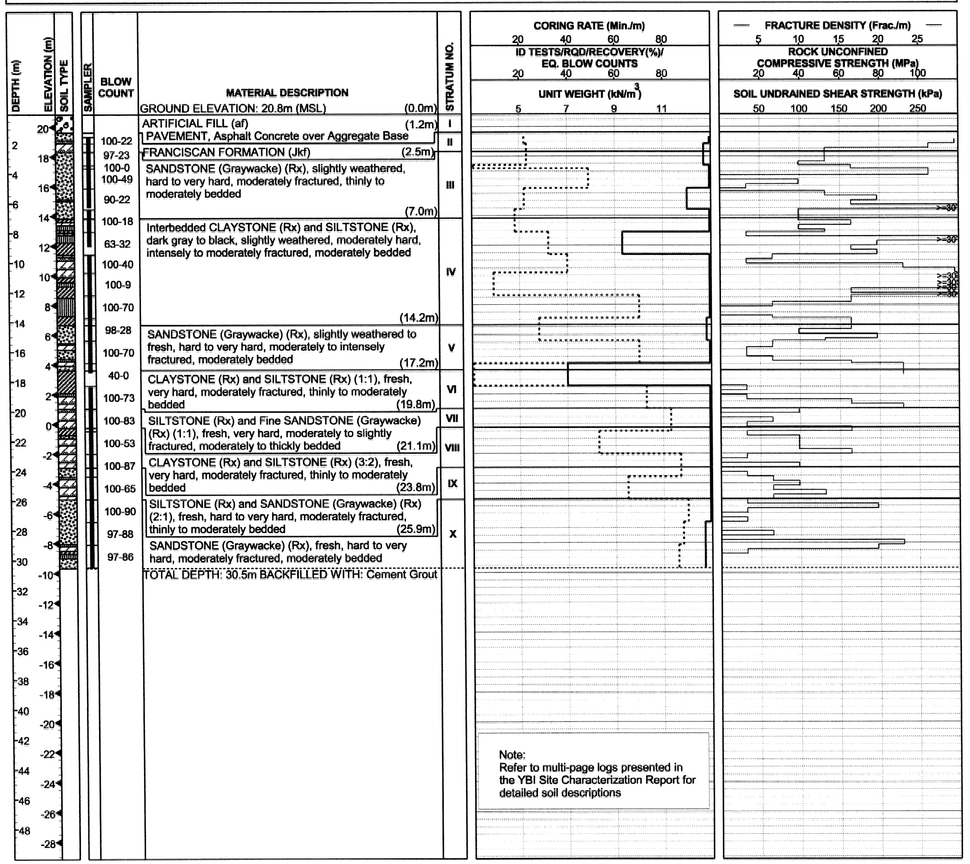


BORING 01-601

COORDINATES: E1836249 N647468
CA State Plane Zone 3, NAD83, Meters
GROUND ELEVATION: 20.8m (MSL)
START DATE: 06/25/01

STATION: 9m right of E Sta. 55+91
COMPLETION ELEVATION: -9.7m (MSL)
END DATE: 06/26/01

MATERIAL DESCRIPTION	STRATUM NO.
GROUND ELEVATION: 20.8m (MSL) (0.0m)	
ARTIFICIAL FILL (af) (1.2m)	I
PAVEMENT, Asphalt Concrete over Aggregate Base	II
FRANCISCAN FORMATION (Jkf) (2.5m)	
SANDSTONE (Graywacke) (Rx), slightly weathered, hard to very hard, moderately fractured, thinly to moderately bedded (7.0m)	III
Interbedded CLAYSTONE (Rx) and SILTSTONE (Rx), dark gray to black, slightly weathered, moderately hard, intensely to moderately fractured, moderately bedded (14.2m)	IV
SANDSTONE (Graywacke) (Rx), slightly weathered to fresh, hard to very hard, moderately to intensely fractured, moderately bedded (17.2m)	V
CLAYSTONE (Rx) and SILTSTONE (Rx) (1:1), fresh, very hard, moderately fractured, thinly to moderately bedded (19.8m)	VI
SILTSTONE (Rx) and Fine SANDSTONE (Graywacke) (Rx) (1:1), fresh, very hard, moderately to slightly fractured, moderately to thickly bedded (21.1m)	VII
CLAYSTONE (Rx) and SILTSTONE (Rx) (3:2), fresh, very hard, moderately fractured, thinly to moderately bedded (23.8m)	VIII
SILTSTONE (Rx) and SANDSTONE (Graywacke) (Rx) (2:1), fresh, hard to very hard, moderately fractured, thinly to moderately bedded (25.9m)	IX
SANDSTONE (Graywacke) (Rx), fresh, hard to very hard, moderately fractured, moderately bedded	X
TOTAL DEPTH: 30.5m BACKFILLED WITH: Cement Grout	



DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	117	204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER MIKE KAPUSKAR No. GE 2564 Exp. 12-31-06 GEOTECHNICAL STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 646,
Oakland, CA 94621
(510) 562-8833, FAX (510) 562-8858

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6-9-14
PLAN APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

Log of Test Borings sheet is considered an informational document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. It does not attest to the accuracy or validity of the information contained in the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.

DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9,0.0/1.2	109	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 5

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025
NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA	Sheet 87	of 120

To accompany plans dated 7-22-13

SABA MOHAN — GEOTECHNICAL DESIGN OVERSIGHT	DRAWN BY	A. PALOMARES	B. SCHELL — FIELD INVESTIGATOR
	CHECKED BY	S. SICILIANO	DATE SEE ABOVE

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

M. KAPUSKAR — PROJECT ENGINEER

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

CU 04 EA 0120F1

BRIDGE NO.	KM POST	POST MILE
34-0006 L/R	13.2/13.9	8.2/8.7

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 5

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) SHEET 754 OF

33-0025-s-lotb05_726.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)
- PAVEMENT

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

STANDARD PENETRATION TEST (SPT) AND MODIFIED CALIFORNIA (MC) LINER SAMPLERS

Samplers were driven with a 63.5 kg 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.

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.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ TOTAL UNIT WEIGHT (kN/m³)
- ○ THEORETICAL TOTAL UNIT WEIGHT (kN/m³)
- PLASTIC LIMIT LIQUID LIMIT
- EQUIVALENT SPT BLOW COUNT = (MC BLOWCOUNT/1.6) OR SPT BLOWCOUNT
- 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)
- Shear Strength Interpreted from CPT Tip Resistance (Nk = 12-15)
- POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- UNCONFINED COMPRESSION (ROCK)
- Soil: Strength Exceeds Capacity of Measuring Device
  Rock: Sample broke along discontinuity; Intact sample would have greater strength
- FRACTURE DENSITY (ROCK)

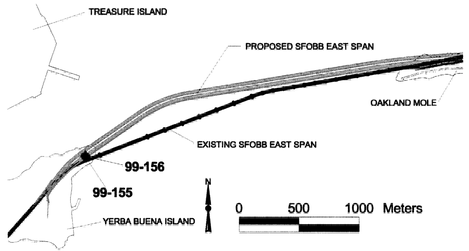
STRENGTH OF COHESIVE SOILS

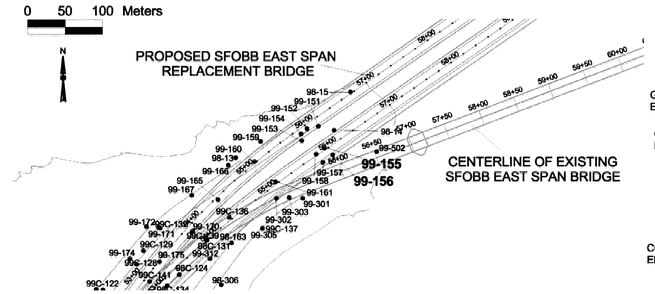
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

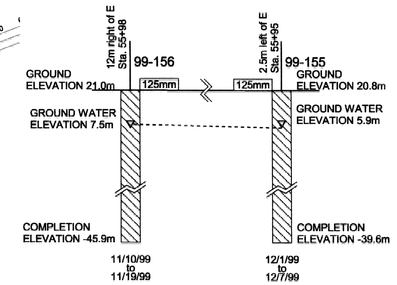
DENSITY OF GRANULAR SOILS

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

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1172	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER MIKE KAPUSKAR No. GE 2564 Exp. 12-31-06 GEOTECHNICAL STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 846,
Oakland, CA 94621
(510) 562-8833, FAX (510) 562-8858

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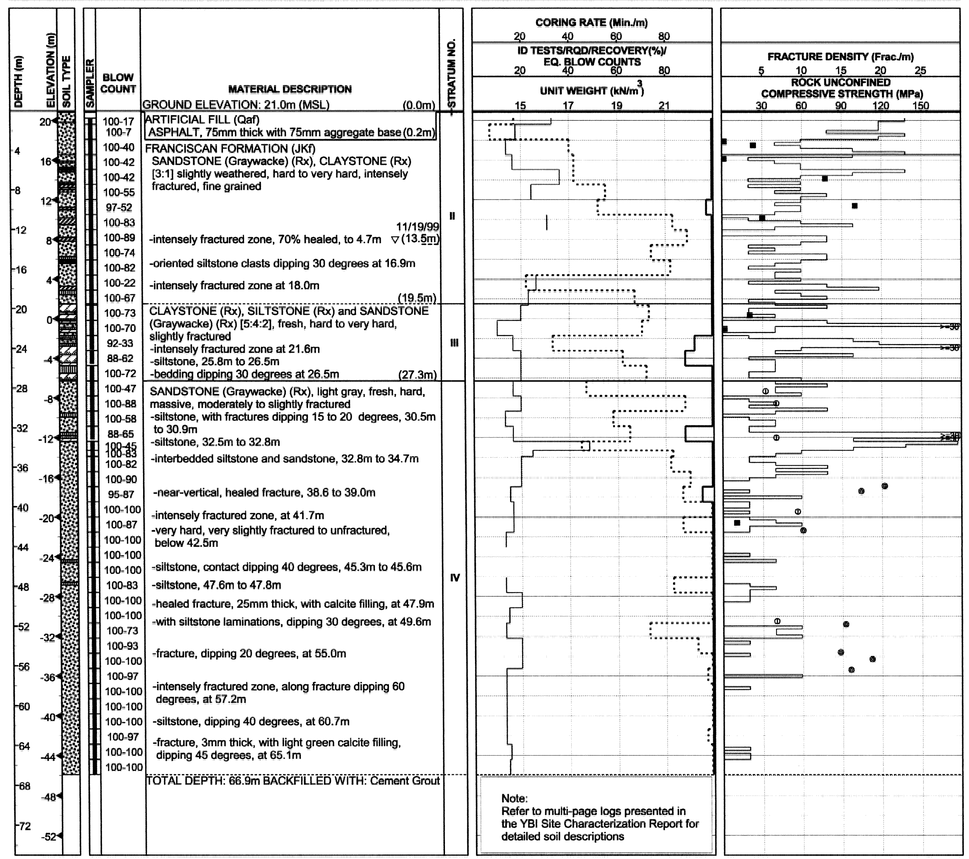
BORING 99-156

COORDINATES: E1836257 N647470
CA State Plane Zone 3, NAD83, Meters
GROUND ELEVATION: 21.0m (MSL)
START DATE: 11/10/99

STATION: 12m right of E Sta. 55+98
COMPLETION ELEVATION: -45.9m (MSL)
END DATE: 11/19/99

BLOW COUNT	MATERIAL DESCRIPTION	STRATUM NO.
	GROUND ELEVATION: 21.0m (MSL) (0.0m)	
100-17, 100-7	ARTIFICIAL FILL (Qaf) ASPHALT, 75mm thick with 75mm aggregate base (0.2m)	I
100-40, 100-42, 100-42, 100-55, 97-52, 100-83	FRANCISCAN FORMATION (JKf) SANDSTONE (Graywacke) (Rx), CLAYSTONE (Rx) [3:1] slightly weathered, hard to very hard, intensely fractured, fine grained; 11/19/99	II
100-89	-intensely fractured zone, 70% healed, to 4.7m ▽(13.5m)	II
100-74, 100-82	-oriented siltstone clasts dipping 30 degrees at 16.9m	II
100-22	-intensely fractured zone at 18.0m (19.5m)	II
100-67, 100-73, 100-70, 92-33, 88-62, 100-72	CLAYSTONE (Rx), SILTSTONE (Rx) and SANDSTONE (Graywacke) (Rx) [5:4:2], fresh, hard to very hard, slightly fractured; -intensely fractured zone at 21.6m; -siltstone, 25.8m to 26.5m; -bedding dipping 30 degrees at 26.5m (27.3m)	III
100-47, 100-88, 100-58, 88-65, 100-45, 100-83, 100-82, 100-90, 95-87, 100-100, 100-87, 100-100, 100-100, 100-100, 100-83, 100-100, 100-100, 100-73, 100-93, 100-100, 100-97, 100-100, 100-100, 100-100	SANDSTONE (Graywacke) (Rx), light gray, fresh, hard, massive, moderately to slightly fractured; -siltstone, with fractures dipping 15 to 20 degrees, 30.5m to 30.9m; -siltstone, 32.5m to 32.8m; -interbedded siltstone and sandstone, 32.8m to 34.7m; -near-vertical, healed fracture, 38.6 to 39.0m; -intensely fractured zone, at 41.7m; -very hard, very slightly fractured to unfractured, below 42.5m; -siltstone, contact dipping 40 degrees, 45.3m to 45.6m; -siltstone, 47.6m to 47.8m; -healed fracture, 25mm thick, with calcite filling, at 47.9m; -with siltstone laminations, dipping 30 degrees, at 49.6m; -fracture, dipping 20 degrees, at 55.0m; -intensely fractured zone, along fracture dipping 60 degrees, at 57.2m; -siltstone, dipping 40 degrees, at 60.7m; -fracture, 3mm thick, with light green calcite filling, dipping 45 degrees, at 65.1m	IV
	TOTAL DEPTH: 66.9m BACKFILLED WITH: Cement Grout	



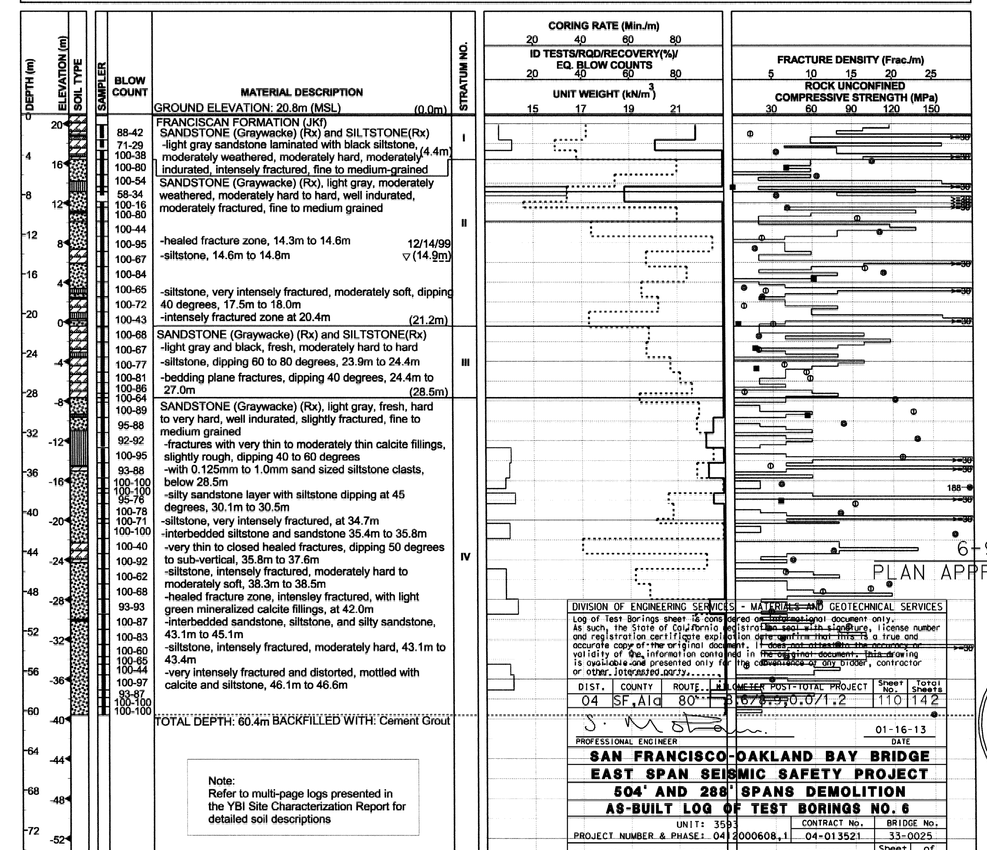
Note:
Refer to multi-page logs presented in the YBI Site Characterization Report for detailed soil descriptions

BORING 99-155

COORDINATES: E1836246 N647479
CA State Plane Zone 3, NAD83, Meters
GROUND ELEVATION: 20.8m (MSL)
START DATE: 12/1/99

STATION: 2.5m left of E Sta. 55+95
COMPLETION ELEVATION: -39.6m (MSL)
END DATE: 12/7/99

BLOW COUNT	MATERIAL DESCRIPTION	STRATUM NO.
	GROUND ELEVATION: 20.8m (MSL) (0.0m)	
88-42, 71-29, 100-38, 100-80	FRANCISCAN FORMATION (JKf) SANDSTONE (Graywacke) (Rx) and SILTSTONE(Rx) -light gray sandstone laminated with black siltstone, moderately weathered, moderately hard, moderately indurated, intensely fractured, fine to medium-grained (4.4m)	I
100-54, 58-34, 100-16, 100-80	SANDSTONE (Graywacke) (Rx), light gray, moderately weathered, moderately hard to hard, well indurated, moderately fractured, fine to medium grained	II
100-44, 100-95, 100-67	-healed fracture zone, 14.3m to 14.6m; -siltstone, 14.6m to 14.8m; 12/14/99 ▽(14.9m)	II
100-84, 100-65, 100-72, 100-43	-siltstone, very intensely fractured, moderately soft, dipping 40 degrees, 17.5m to 18.0m; -intensely fractured zone at 20.4m (21.2m)	II
100-68, 100-67, 100-77, 100-81, 100-86, 100-64	SANDSTONE (Graywacke) (Rx) and SILTSTONE(Rx) -light gray and black, fresh, moderately hard to hard; -siltstone, dipping 60 to 80 degrees, 23.9m to 24.4m; -bedding plane fractures, dipping 40 degrees, 24.4m to 27.0m (28.5m)	III
100-89, 95-88, 92-92, 100-95, 93-88, 100-100, 100-100, 95-76, 100-78, 100-71, 100-100, 100-40, 100-92, 100-62, 100-68, 93-93, 100-87, 100-60, 100-83, 100-65, 100-44, 100-97, 93-87, 100-100, 100-100	SANDSTONE (Graywacke) (Rx), light gray, fresh, hard to very hard, well indurated, slightly fractured, fine to medium grained; -fractures with very thin to moderately thin calcite fillings, slightly rough, dipping 40 to 60 degrees; -with 0.125mm to 1.0mm sand sized siltstone clasts, below 28.5m; -silty sandstone layer with siltstone dipping at 45 degrees, 30.1m to 30.5m; -siltstone, very intensely fractured, at 34.7m; -interbedded siltstone and sandstone 35.4m to 35.8m; -very thin to closed healed fractures, dipping 50 degrees to sub-vertical, 35.8m to 37.6m; -siltstone, intensely fractured, moderately hard to moderately soft, 38.3m to 38.5m; -healed fracture zone, intensley fractured, with light green mineralized calcite fillings, at 42.0m; -interbedded sandstone, siltstone, and silty sandstone, 43.1m to 45.1m; -siltstone, intensely fractured, moderately hard, 43.1m to 43.4m; -very intensely fractured and distorted, mottled with calcite and siltstone, 46.1m to 46.6m	IV
	TOTAL DEPTH: 60.4m BACKFILLED WITH: Cement Grout	



Note:
Refer to multi-page logs presented in the YBI Site Characterization Report for detailed soil descriptions

6-9-14
PLAN APPROVAL DATE

DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES
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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total sheets
04	SF, Ala	80	13.2/13.9	110	142

PROFESSIONAL ENGINEER — 01-16-13 DATE

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 6

UNIT: 3593 | CONTRACT No. 04-013521 | BRIDGE No. 33-0025
PROJECT NUMBER & PHASE: 04 2000608 1

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — Sheet 88 of 120

To accompany plans dated 7-22-13

SABA MOHAN, GEOTECHNICAL DESIGN OVERSIGHT	DRAWN BY C.CACERES	B. SCHELL, S. SICILIANO, E. CHASE, FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR, PROJECT ENGINEER	BRIDGE NO. 34-0006 L/R
	CHECKED BY M. KAPUSKAR	DATE SEE ABOVE			KM POST 13.2/13.9
				CU 04 EA 0120F1	POST MILE 8.2/8.7

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

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 6

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET 755 | OF

33-0025-s-lotb06_727.tif

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1173	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER MIKE KAPUSKAR No. GE 2564 Exp. 12-31-06 GEOTECHNICAL STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 846,
Oakland, CA 94621
(510) 562- 8833, FAX (510) 562- 8858

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6-9-14
PLAN APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

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)
- PAVEMENT

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

STANDARD PENETRATION TEST (SPT) AND MODIFIED CALIFORNIA (MC) LINER SAMPLERS

Samplers were driven with a 63.5 kg 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.

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.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ TOTAL UNIT WEIGHT (KN/m³)
- ○ THEORETICAL TOTAL UNIT WEIGHT (KN/m³)
- PLASTIC LIMIT + LIQUID LIMIT +
- EQUIVALENT SPT BLOW COUNT = (MC BLOWCOUNT/1.6) OR SPT BLOWCOUNT
- ---- 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)
- Shear Strength Interpreted from CPT Tip Resistance (Nk = 12-15)
- POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- UNCONFINED COMPRESSION (ROCK)
- + Soil: Strength Exceeds Capacity of Measuring Device
  Rock: Sample broke along discontinuity; Intact sample would have greater strength
- — FRACTURE DENSITY (ROCK)

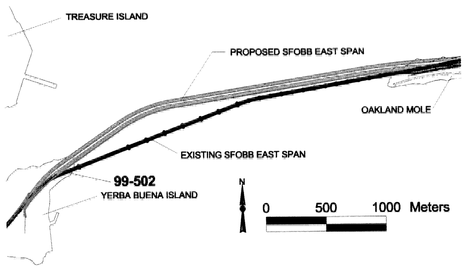
STRENGTH OF COHESIVE SOILS

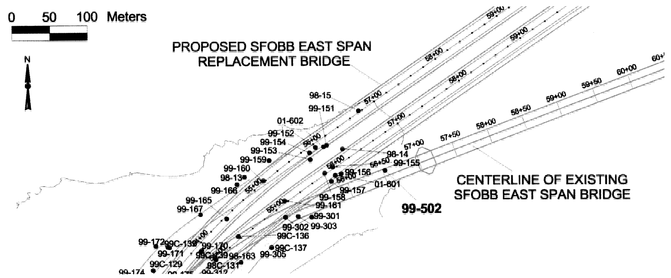
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

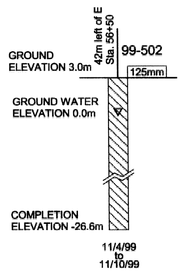
DENSITY OF GRANULAR SOILS

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.





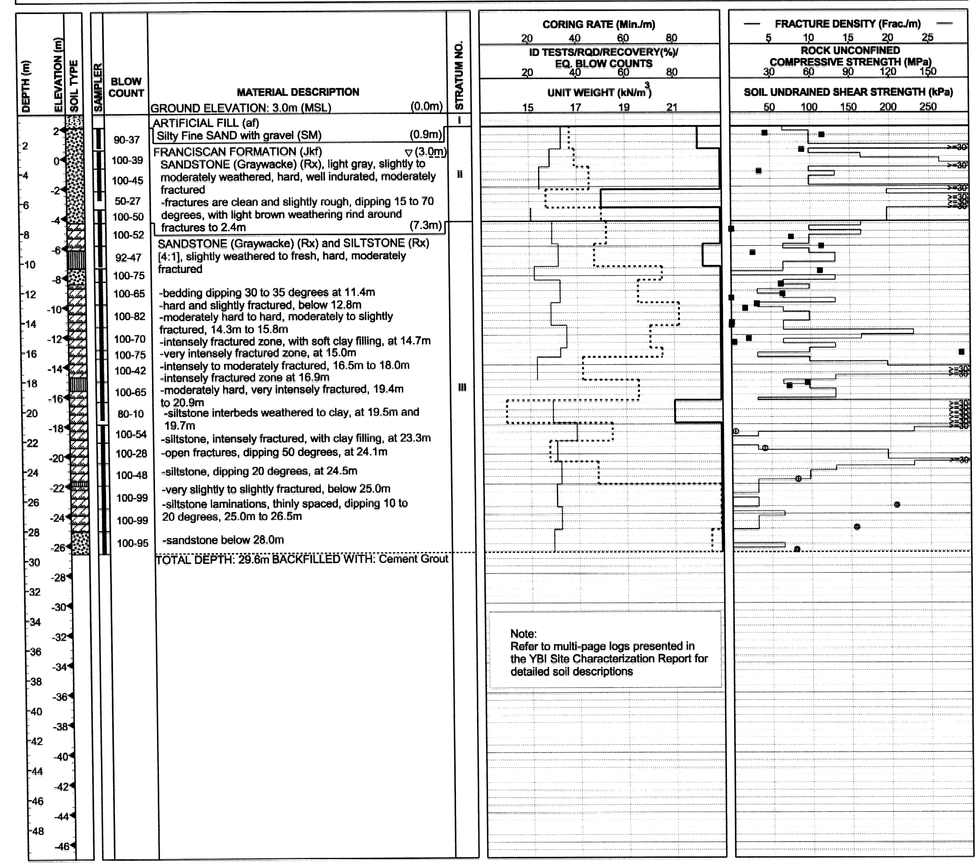


BORING 99-502

COORDINATES: E1836316 N647474
CA State Plane Zone 3, NAD83, Meters
GROUND ELEVATION: 3.0m (MSL)
START DATE: 11/4/99

STATION: 42m left of E Bound Sta. 56+50
COMPLETION ELEVATION: -26.6m (MSL)
END DATE: 11/10/99

BLOW COUNT	MATERIAL DESCRIPTION	STRATUM NO.
	GROUND ELEVATION: 3.0m (MSL) (0.0m)	
90-37	ARTIFICIAL FILL (af) Silty Fine SAND with gravel (SM) (0.9m)	I
100-39 100-45 50-27 100-50 100-52	FRANCISCAN FORMATION (Jkf) ▽ (3.0m) SANDSTONE (Graywacke) (Rx), light gray, slightly to moderately weathered, hard, well indurated, moderately fractured -fractures are clean and slightly rough, dipping 15 to 70 degrees, with light brown weathering rind around fractures to 2.4m (7.3m)	II
92-47 100-75 100-65 100-82 100-70 100-75 100-42 100-65 80-10 100-54 100-28 100-48 100-99 100-99 100-95	SANDSTONE (Graywacke) (Rx) and SILTSTONE (Rx) [4:1], slightly weathered to fresh, hard, moderately fractured -bedding dipping 30 to 35 degrees at 11.4m -hard and slightly fractured, below 12.8m -moderately hard to hard, moderately to slightly fractured, 14.3m to 15.8m -intensely fractured zone, with soft clay filling, at 14.7m -very intensely fractured zone, at 15.0m -intensely to moderately fractured, 16.5m to 18.0m -intensely fractured zone at 16.9m -moderately hard, very intensely fractured, 19.4m to 20.9m -siltstone interbeds weathered to clay, at 19.5m and 19.7m -siltstone, intensely fractured, with clay filling, at 23.3m -open fractures, dipping 50 degrees, at 24.1m -siltstone, dipping 20 degrees, at 24.5m -very slightly to slightly fractured, below 25.0m -siltstone laminations, thinly spaced, dipping 10 to 20 degrees, 25.0m to 26.5m -sandstone below 28.0m	III
	TOTAL DEPTH: 29.6m BACKFILLED WITH: Cement Grout	



Note:
Refer to multi-page logs presented in the YBI Site Characterization Report for detailed soil descriptions

DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9,0.071.2	111	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 7

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — Sheet 89 of 120

To accompany plans dated 7-22-13

SABA MOHAN GEOTECHNICAL DESIGN OVERSIGHT	DRAWN BY F. BAEZ CHECKED BY R. HOWARD	S. SICILIANO FIELD INVESTIGATOR DATE SEE ABOVE	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR PROJECT ENGINEER	BRIDGE NO. 34-0006L/R KM POST 13.2/13.9 POST MILE 8.2/8.7

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

CU 04
EA 0120F1

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 7

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) SHEET 756 OF

33-0025-s-lotb07_728.tif

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1174	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER MIKE KAPUSKAR No. GE 2564 Exp. 12-31-06 GEOTECHNICAL STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 946,
Oakland, CA 94621
(510) 562-8833, FAX (510) 562-8858

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6-9-14
PLAN APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

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)
- PAVEMENT

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

STANDARD PENETRATION TEST (SPT) AND MODIFIED CALIFORNIA (MC) LINER SAMPLERS

Samplers were driven with a 63.5 kg 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.

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.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- PERCENT PASSING #200 SIEVE
- WATER CONTENT (%)
- TOTAL UNIT WEIGHT (kN/m³)
- THEORETICAL TOTAL UNIT WEIGHT (kN/m³)
- PLASTIC LIMIT LIQUID LIMIT
- EQUIVALENT SPT BLOW COUNT = (MC BLOWCOUNT/1.6) OR SPT BLOWCOUNT
- 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)
- Shear Strength Interpreted from CPT Tip Resistance (Nk = 12-15)
- POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- UNCONFINED COMPRESSION (ROCK)
- Soil: Strength Exceeds Capacity of Measuring Device
  Rock: Sample broke along discontinuity; Intact sample would have greater strength
- FRACTURE DENSITY (ROCK)

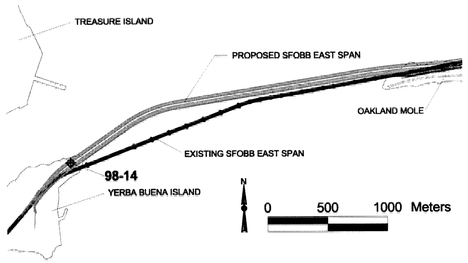
STRENGTH OF COHESIVE SOILS

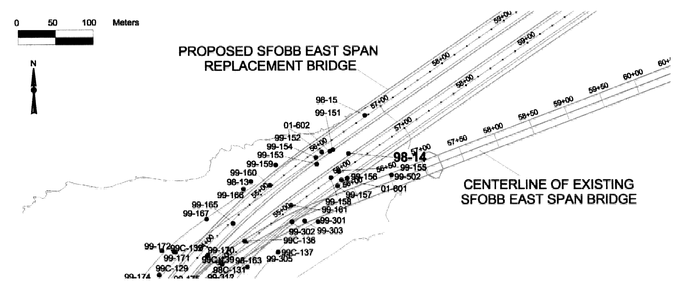
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

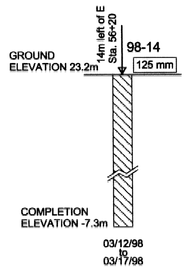
DENSITY OF GRANULAR SOILS

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.





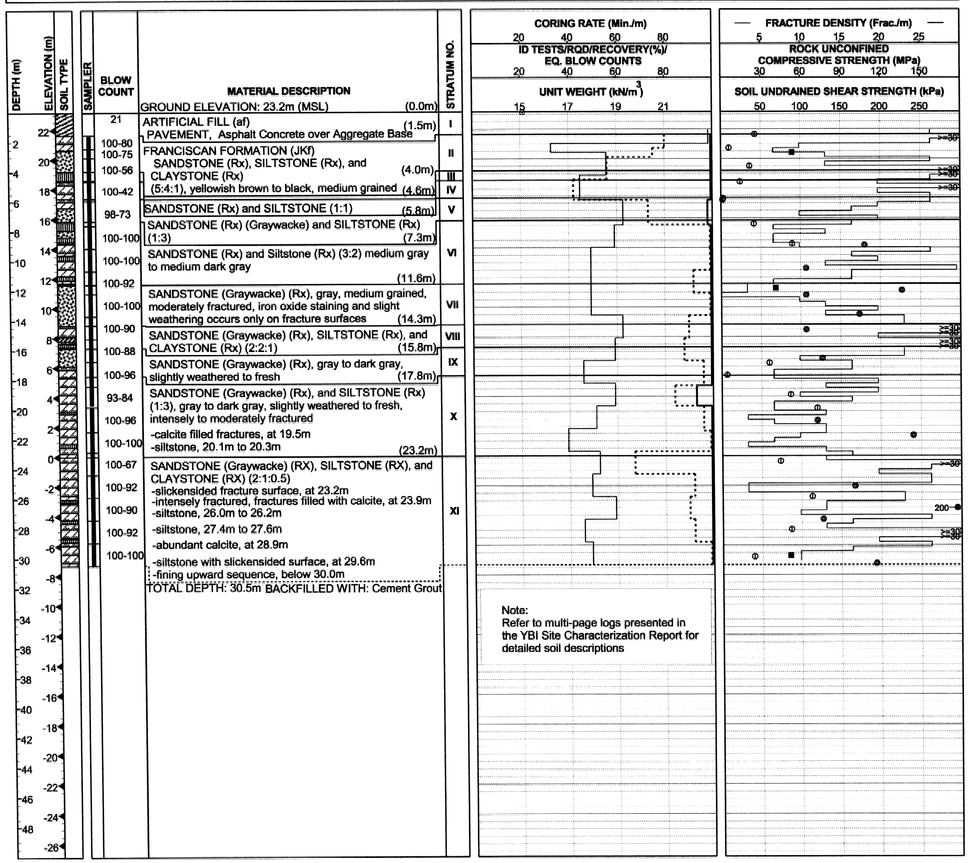


BORING 98-14

COORDINATES: E1836259 N647503
CA State Plane Zone 3, NAD83, Meters
GROUND ELEVATION: 23.2m (MSL)
START DATE: 03/12/98

STATION: 14m left of E Sta. 56+20
COMPLETION ELEVATION: -7.3m (MSL)
END DATE: 03/17/98

BLOW COUNT	MATERIAL DESCRIPTION	STRATUM NO.
	GROUND ELEVATION: 23.2m (MSL) (0.0m)	
21	ARTIFICIAL FILL (af) (1.5m)	I
	PAVEMENT, Asphalt Concrete over Aggregate Base	
100-80	FRANCISCAN FORMATION (JKf)	II
100-75	SANDSTONE (Rx), SILTSTONE (Rx), and	
100-56	CLAYSTONE (Rx) (4.0m)	III
100-42	(5:4:1), yellowish brown to black, medium grained (4.6m)	IV
98-73	SANDSTONE (Rx) and SILTSTONE (1:1) (5.8m)	V
100-100	SANDSTONE (Rx) (Graywacke) and SILTSTONE (Rx) (1:3) (7.3m)	
100-100	SANDSTONE (Rx) and Siltstone (Rx) (3:2) medium gray to medium dark gray (11.6m)	VI
100-92		
100-100	SANDSTONE (Graywacke) (Rx), gray, medium grained, moderately fractured, iron oxide staining and slight weathering occurs only on fracture surfaces (14.3m)	VII
100-90	SANDSTONE (Graywacke) (Rx), SILTSTONE (Rx), and	VIII
100-88	CLAYSTONE (Rx) (2:2:1) (15.8m)	
100-96	SANDSTONE (Graywacke) (Rx), gray to dark gray, slightly weathered to fresh (17.8m)	IX
93-84	SANDSTONE (Graywacke) (Rx), and SILTSTONE (Rx) (1:3), gray to dark gray, slightly weathered to fresh, intensely to moderately fractured	X
100-96	-calcite filled fractures, at 19.5m	
100-100	-siltstone, 20.1m to 20.3m (23.2m)	
100-67	SANDSTONE (Graywacke) (RX), SILTSTONE (RX), and CLAYSTONE (RX) (2:1:0.5)	XI
100-92	-slickensided fracture surface, at 23.2m	
100-90	-intensely fractured, fractures filled with calcite, at 23.9m	
	-siltstone, 26.0m to 26.2m	
100-92	-siltstone, 27.4m to 27.6m	
	-abundant calcite, at 28.9m	
100-100	-siltstone with slickensided surface, at 29.6m	
	-fining upward sequence, below 30.0m	
	TOTAL DEPTH: 30.5m BACKFILLED WITH: Cement Grout	



Note:
Refer to multi-page logs presented in the YBI Site Characterization Report for detailed soil descriptions

DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9,0.0/1.2	112	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 8

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025
NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA	Sheet 90	of 120

To accompany plans dated 7-22-13

SABA MOHAN — GEOTECHNICAL DESIGN OVERSIGHT	DRAWN BY F. BAEZ	S. BRATHWHITE — FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	M. KAPUSKAR — PROJECT ENGINEER	BRIDGE NO. 34-0006L/R
	CHECKED BY R. HOWARD	DATE SEE ABOVE			KM POST 13.2/13.9
			ORIGINAL SCALE IN CENTIMETERS FOR REDUCED PLANS 0 1 2 3 4 5 6 7 8 9 10	CU 04 EA 0120F1	POST MILE 8.2/8.7

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 8

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) SHEET 757 OF

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1175	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04

PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER MIKE KAPUSKAR No. GE 2564 Exp. 12-31-06 GEOTECHNICAL STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 846,
Oakland, CA 94621
(510) 562- 8833, FAX (510) 562- 8858

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6-9-14
PLAN APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

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)
- PAVEMENT

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

STANDARD PENETRATION TEST (SPT) AND MODIFIED CALIFORNIA (MC) LINER SAMPLERS

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

20	Number of blows to produce 30 cm of penetration after the initial 15 cm of seating.
88/28cm	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.

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.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ TOTAL UNIT WEIGHT (kN/m³)
- ○ THEORETICAL TOTAL UNIT WEIGHT (kN/m³)
- PLASTIC LIMIT + LIQUID LIMIT +
- ⊛ EQUIVALENT SPT BLOW COUNT = (MC BLOWCOUNT/1.6) OR SPT BLOWCOUNT
- 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)
- Shear Strength Interpreted from CPT Tip Resistance (Nk = 12-15)
- ⊕ POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- ⊕ POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- + Soil: Strength Exceeds Capacity of Measuring Device
  Rock: Sample broke along discontinuity;
  Intact sample would have greater strength
- FRACTURE DENSITY (ROCK)

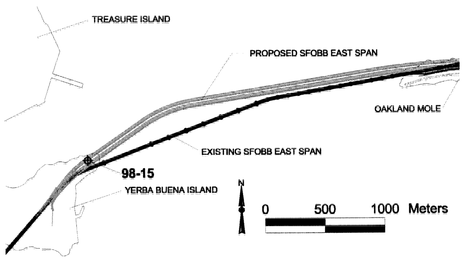
STRENGTH OF COHESIVE SOILS

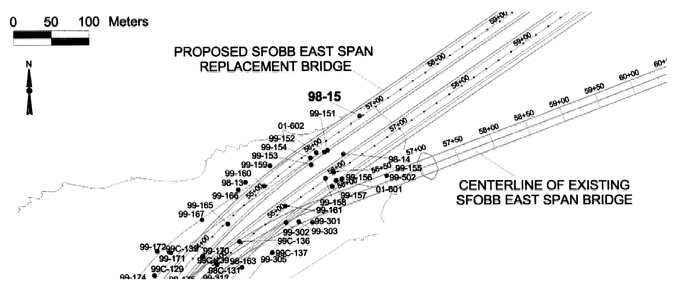
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

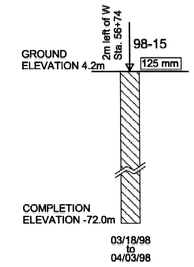
DENSITY OF GRANULAR SOILS

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.





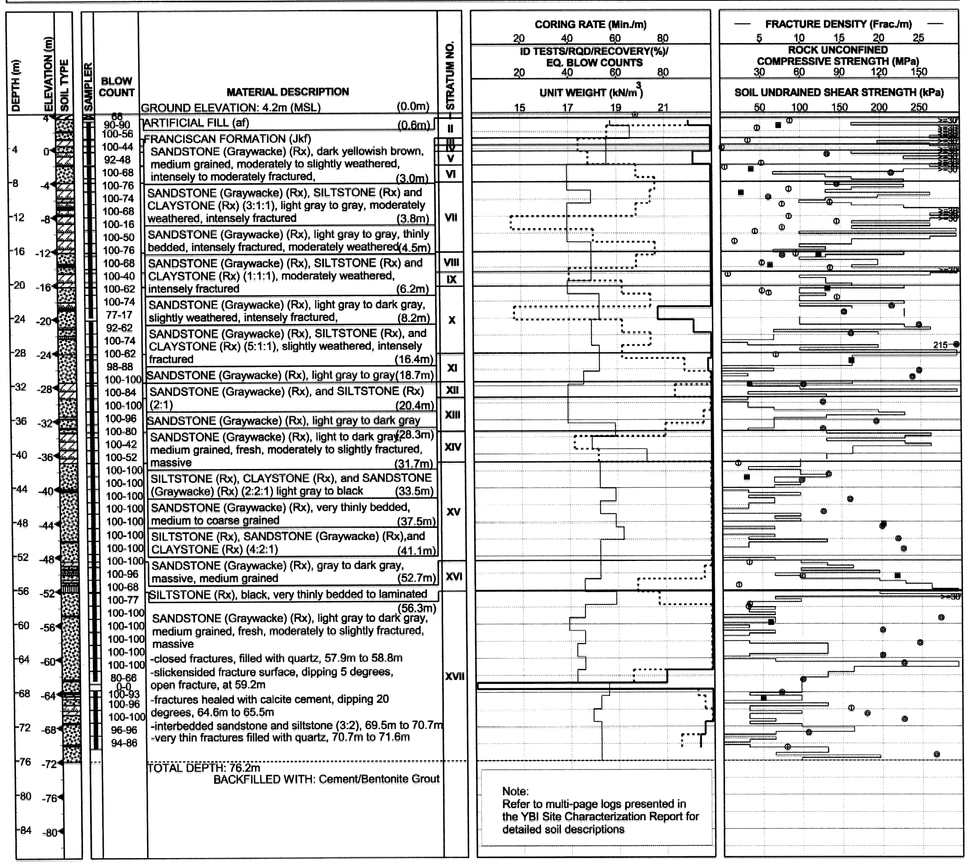


BORING 98-15

COORDINATES: E1836281 N647554
CA State Plane Zone 3, NAD83, Meters
GROUND ELEVATION: 4.2m (MSL)
START DATE: 03/18/98

STATION: 2m left of W Sta. 56+74
COMPLETION ELEVATION: -72.0m (MSL)
END DATE: 04/03/98

BLOW COUNT	MATERIAL DESCRIPTION	STRATUM NO.
	GROUND ELEVATION: 4.2m (MSL) (0.0m)	
88 90-90 100-56	ARTIFICIAL FILL (af) (0.6m)	II
	FRANCISCAN FORMATION (Jkf)	
100-44	SANDSTONE (Graywacke) (Rx), dark yellowish brown, medium grained, moderately to slightly weathered, intensely to moderately fractured, (3.0m)	III
92-48		IV
100-68		V
100-76		VI
100-74 100-68 100-16	SANDSTONE (Graywacke) (Rx), SILTSTONE (Rx) and CLAYSTONE (Rx) (3:1:1), light gray to gray, moderately weathered, intensely fractured (3.8m)	VII
100-50 100-76	SANDSTONE (Graywacke) (Rx), light gray to gray, thinly bedded, intensely fractured, moderately weathered (4.5m)	
100-68 100-40	SANDSTONE (Graywacke) (Rx), SILTSTONE (Rx) and CLAYSTONE (Rx) (1:1:1), moderately weathered, intensely fractured (6.2m)	VIII
100-62		IX
100-74 77-17 92-62	SANDSTONE (Graywacke) (Rx), light gray to dark gray, slightly weathered, intensely fractured, (8.2m)	X
100-74 100-62 98-88	SANDSTONE (Graywacke) (Rx), SILTSTONE (Rx), and CLAYSTONE (Rx) (5:1:1), slightly weathered, intensely fractured (16.4m)	
100-100	SANDSTONE (Graywacke) (Rx), light gray to gray (18.7m)	XI
100-84 100-100	SANDSTONE (Graywacke) (Rx), and SILTSTONE (Rx) (2:1) (20.4m)	XII
100-96	SANDSTONE (Graywacke) (Rx), light gray to dark gray (28.3m)	XIII
100-80 100-42 100-52 100-100	SANDSTONE (Graywacke) (Rx), light to dark gray, medium grained, fresh, moderately to slightly fractured, massive (31.7m)	XIV
100-100 100-100 100-100	SILTSTONE (Rx), CLAYSTONE (Rx), and SANDSTONE (Graywacke) (Rx) (2:2:1) light gray to black (33.5m)	
100-100 100-100 100-100	SANDSTONE (Graywacke) (Rx), very thinly bedded, medium to coarse grained (37.5m)	XV
100-100 100-100 100-100	SILTSTONE (Rx), SANDSTONE (Graywacke) (Rx), and CLAYSTONE (Rx) (4:2:1) (41.1m)	
100-96 100-68	SANDSTONE (Graywacke) (Rx), gray to dark gray, massive, medium grained (52.7m)	XVI
100-77	SILTSTONE (Rx), black, very thinly bedded to laminated (56.3m)	
100-100 100-100 100-100 100-100 100-100 80-66 0-0 100-93 100-96 100-100 96-96 94-86	SANDSTONE (Graywacke) (Rx), light gray to dark gray, medium grained, fresh, moderately to slightly fractured, massive -closed fractures, filled with quartz, 57.9m to 58.8m -slickensided fracture surface, dipping 5 degrees, open fracture, at 59.2m -fractures healed with calcite cement, dipping 20 degrees, 64.6m to 65.5m -interbedded sandstone and siltstone (3:2), 69.5m to 70.7m -very thin fractures filled with quartz, 70.7m to 71.6m	XVII
	TOTAL DEPTH: 76.2m BACKFILLED WITH: Cement/Bentonite Grout	



Note:
Refer to multi-page logs presented in the YBI Site Characterization Report for detailed soil descriptions

DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

Log of Test Borings sheet is considered an informational document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. It does not attest to the accuracy or validity of the information contained in the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.

DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9, 0.0/1.2	113	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 9

UNIT: 3593 — CONTRACT No. 04-013521 — BRIDGE No. 33-0025
PROJECT NUMBER & PHASE: 0412000608.1
NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — Sheet 91 of 120

To Accompany Plans Dated 7-22-13

SABA MOHAN GEOTECHNICAL DESIGN OVERSIGHT	DRAWN BY	F. BAEZ	
	CHECKED BY	R. HOWARD	

S. BRATHWHITE
FIELD INVESTIGATOR
DATE SEE ABOVE

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

M. KAPUSKAR
PROJECT ENGINEER

BRIDGE NO. 34-0006L/R
KM POST 13.2/13.9
POST MILE 8.2/8.7

CU 04
EA 0120F1

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

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 9

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) — SHEET 758 OF

33-0025-s-lotb09_730.tif

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1176	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/06 Geotechnical STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 646,
Oakland, CA 94621
(510) 562- 8833, FAX (510) 562- 8858

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6-9-14
PLAN APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

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)
- PAVEMENT

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

STANDARD PENETRATION TEST (SPT) AND MODIFIED CALIFORNIA (MC) LINER SAMPLERS

Samplers were driven with a 63.5 kg 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.

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.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ SUBMERGED UNIT WEIGHT (kN/m³)
- ○ THEORETICAL SUBMERGED UNIT WEIGHT (kN/m³)
- PLASTIC LIMIT + LIQUID LIMIT +
- ⊗ EQUIVALENT SPT BLOW COUNT = (MC BLOWCOUNT/1.8) OR SPT BLOWCOUNT
- 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)
- Shear Strength Interpreted from CPT Tip Resistance (Nk = 12-15)
- POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- + Soil: Strength Exceeds Capacity of Measuring Device Rock: Sample broke along discontinuity; Intact sample would have greater strength
- FRACTURE DENSITY (ROCK)

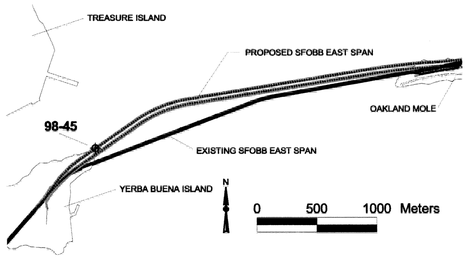
STRENGTH OF COHESIVE SOILS

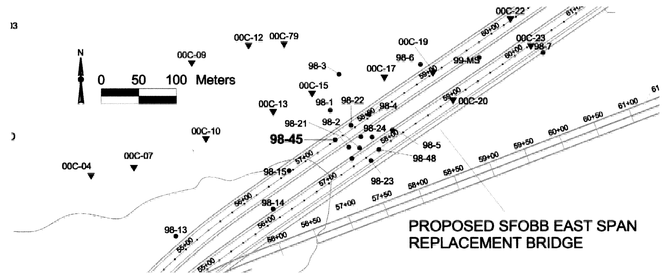
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

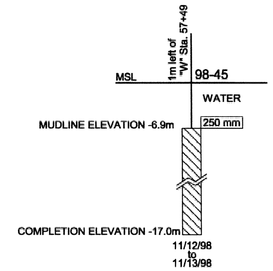
DENSITY OF GRANULAR SOILS

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.



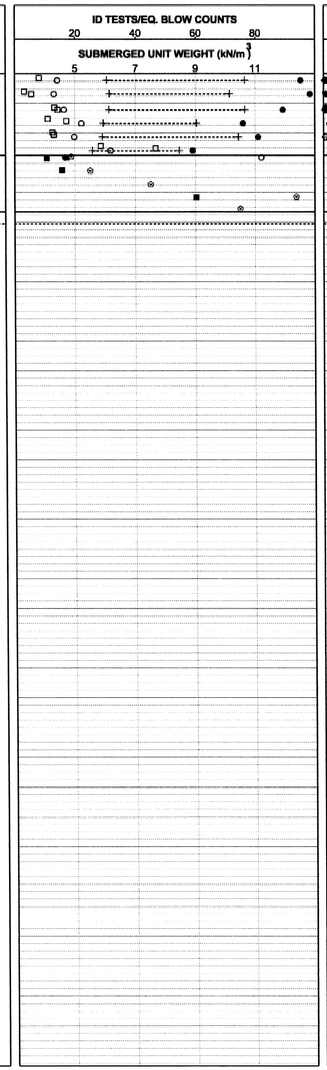


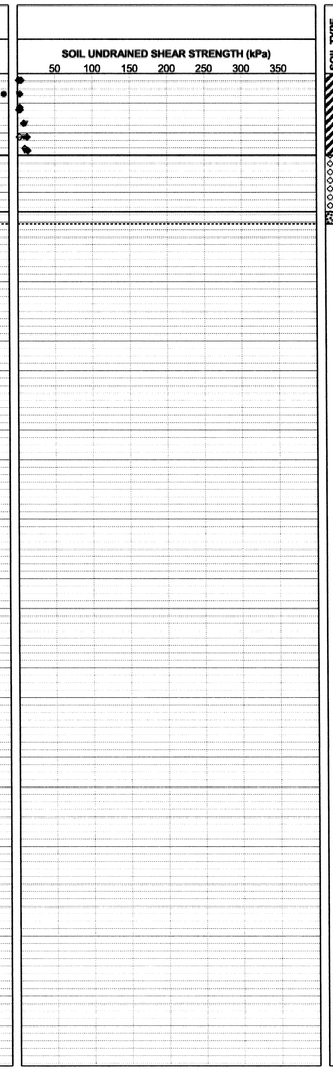


BORING 98-45

Coordinates: E1836342 N647595
CA State Plane Zone 3, NAD83, Meters

ELEV. (m)	DEPTH (m)	SOIL TYPE	SAMPLER	BLOW COUNT	MATERIAL DESCRIPTION	STR. NO.
					MUDLINE ELEVATION: -6.9m (MSL)	
-8	2			WOH	Fat CLAY (CH), very soft to soft, dark gray to olive gray	
-10	4			WOH	-with silt and organics pockets	
-12				WOH	-with an organic odor at 0.3m	I
				WOH		
				WOH	-with mica, at 4.0m	
				WOH	-with sand pockets at 4.9m (5.5m)	
-14	6			30/30cm	ROCK FRAGMENTS with clay and sand, gray	
-16	8			30/25cm	-subrounded to subangular gravel sized rock fragments of	
				48/20cm	sandstone and siltstone, origin uncertain, possibly intensely	II
				50/10cm	weathered rock (9.3m)	
-18	10			50/15cm	-with shell fragments and elongated gravel, at 5.8m	III
				NR	-moderate yellowish brown at 7.3m	
-20	12				ROCK (Rx)	
-22	14				TOTAL DEPTH: 10.1m BACKFILLED WITH: Cement Grout	
-24	16					
-26	18					
-28	20					
-30	22					
-32	24					
-34	26					
-36	28					
-38	30					
-40	32					
-42	34					
-44	36					
-46	38					
-48	40					
-50	42					
-52	44					
-54	46					
-56	48					
-58	50					
-60	52					
-62	54					
-64	56					
-66	58					
-68	60					
-70	62					
-72	64					
	66					





DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9, 0.0/1.2	114	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 10

UNIT: 3593	CONTRACT No.	BRIDGE No.	
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025	
NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA		Sheet 92	of 120

To Accompany Plans Dated 7-22-13

SABA MOHAN, GEOTECHNICAL DESIGN OVERSIGHT	DRAWN BY: S.DESHPANDE	J.CHACKO, FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	T.W.McNEILAN, PROJECT ENGINEER	BRIDGE NO. 34-0006L/R
	CHECKED BY: T. MCADAM	DATE SEE ABOVE			KM POST 13.2/13.9
			ORIGINAL SCALE IN CENTIMETERS FOR REDUCED PLANS 0 1 2 3 4 5 6 7 8 9 10	CU 04 EA 0120F1	POST MILE 8.2/8.7

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 10

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET 759 | OF

33-0025-s-lotb10_731.tif

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1177	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/06 Geotechnical STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr. Ste. 846,
Oakland, CA 94621
(510) 562- 8833, FAX (510) 562- 8858

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Metric

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
- 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 (kN/m³)
- ○ THEORETICAL SUBMERGED UNIT WEIGHT (kN/m³)
- 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 (Nk=12-15)
- POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- FRACTURE DENSITY (ROCK)

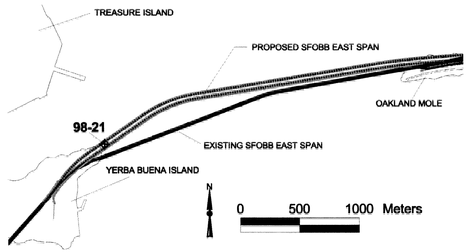
STRENGTH OF COHESIVE SOILS

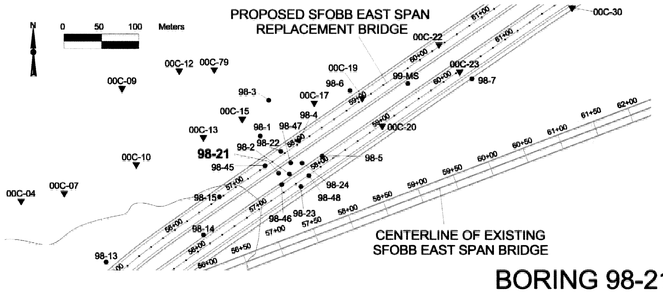
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

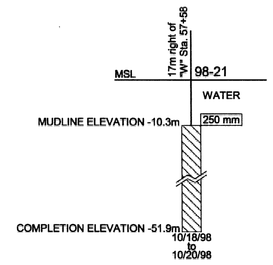
DENSITY OF GRANULAR SOILS

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 98-21

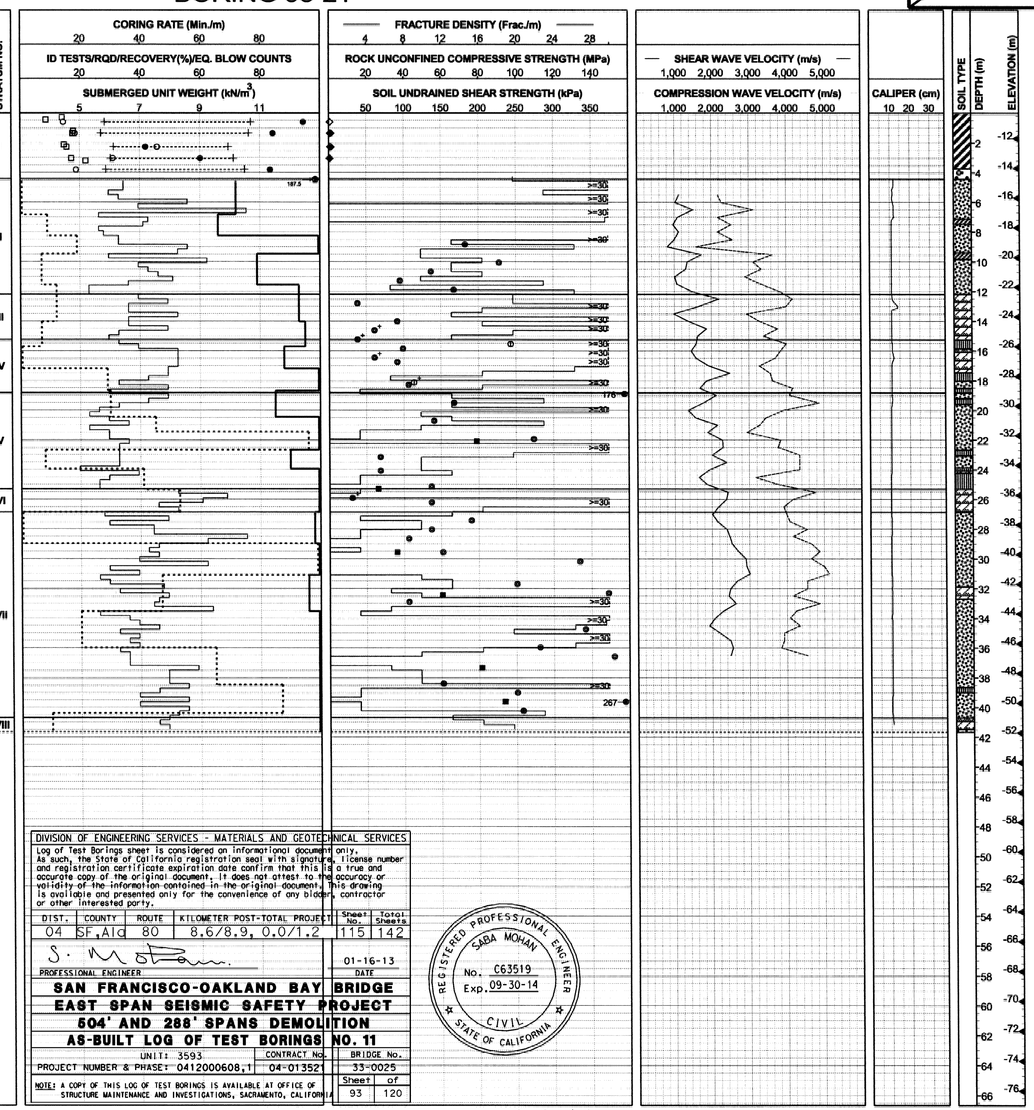
Coordinates: E1836360 N647585
CA State Plane Zone 3, NAD83, Meters

MUDLINE ELEVATION: -10.3m (MSL)

Elevation (m)	Blow Count	Material Description	Stratum No.
	WOH, WOH, WOH, WOH, WOH, 60/5cm, 50/5cm	FAT CLAY (CH), dark olive gray to dark gray, very soft (4.4m)	I
		-subangular, moderate yellowish brown, sandstone gravel, below 4.3m	
	72-0, 66-9, 100-19, 79-7	SANDSTONE (Graywacke) (Rx) with interbedded SILTSTONE (Rx), [10:1], moderate to dark yellowish brown, intensely to moderately weathered, moderately soft, poorly indurated, fine to coarse grained, moderately fractured (12.2m) -moderately weathered, subrounded to rounded coarse sandstone/conglomerate bed, at 6.8m -claystone interbed, slightly weathered, 9.4m to 9.8m -slightly weathered, moderately to intensely fractured sandstone, below 9.8m	II
	93-12, 95-7	SANDSTONE (Graywacke) (Rx), interbedded with SILTSTONE (Rx), [5:1], olive gray, slightly weathered, hard, intensely fractured to very intensely fractured (15.2m)	III
	88-0, 100-29	SILTSTONE (Rx), dark gray, fresh, hard, thinly bedded, very intensely to intensely fractured with clean, smooth to slightly rough fracture surfaces	IV
	85-30, 100-45, 100-96	-very intensely sheared with interbedded sandstone, 17.1m to 17.5m -fractures with 25mm to 50mm spacing, dipping 30 to 40 degrees, with smooth, clean surfaces, 17.5m to 18.1m -sandstone, medium dark gray, fresh, hard, well indurated, moderately bedded, moderately fractured, 18.0m to 18.5m (18.8m)	V
	90-8, 100-41, 100-53, 98-0, 100-99	SANDSTONE (Graywacke) (Rx) with interbedded SILTSTONE (Rx), [10:1], moderate to dark yellowish brown, intensely to moderately weathered, moderately soft, poorly indurated, fine to coarse grained, moderately fractured (25.3m) -siltstone interbed, dipping 30 degrees, 19.2m to 19.6m -90mm thick siltstone interbed, very intensely fractured, 22.7m to 23.1m -siltstone interbed, slightly fractured, bedding dipping 35 degrees, 23.9m to 24.1m -siltstone interbed, dipping at 35 degrees, 24.2m to 24.8m (26.9m)	VI
		Interbedded SANDSTONE (Graywacke) (Rx) and SILTSTONE (Rx)	
	96-47, 100-20, 100-65, 100-87, 100-10	SANDSTONE (Graywacke) (Rx), medium dark gray, fresh, hard, moderately indurated, fine to coarse grained, thickly bedded, intensely to moderately fractured with slightly rough, clean to very thinly coated surfaces -sandstone with interbedded siltstone, 31.9m to 38.6m -60mm thick, very intensely fractured zone, with moderately rough, calcite/quartz filled fractures, at 33.0m -very intensely fractured zone with numerous, closely spaced, healed, 8mm thick, calcite filled fractures, 33.9m to 34.2m -very thickly bedded, moderately to slightly fractured, at 36.9m -dark gray, hard, intensely to very intensely fractured, siltstone interbed with numerous, healed, 3mm thick, calcite filled fractures, 38.7m to 39.0m (40.7m)	VII
		SILTSTONE (Rx) with interbedded SANDSTONE (Graywacke) (Rx) [3:1] -sandstone below 41.5m	VIII

TOTAL DEPTH: 41.6m BACKFILLED WITH: Cement Grout

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



DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

Log of Test Borings sheet is considered an informational document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. It does not attest to the accuracy or validity of the information contained in the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.

DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9, 0.0/1.2	115	142

PROFESSIONAL ENGINEER — DATE 01-16-13

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 11

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025
NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA		Sheet 93 of 120

To Accompany Plans Dated 7-22-13

6-9-14
PLAN APPROVAL DATE

SABA MOHAN
GEOTECHNICAL DESIGN OVERSIGHT

DRAWN BY: SACHIN DESHPANDE
CHECKED BY: J.CHACKO

C. PRENTICE/J. BIANCHIN
FIELD INVESTIGATOR
DATE SEE ABOVE

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

T.W.McNEILAN
PROJECT ENGINEER

BRIDGE NO. 34-0006L/R
KM POST 13.2/13.9
POST MILE 8.2/8.7

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 11

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

CU 04
EA 0120F1

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET 760 | OF

33-0025-s-lotb11_732.tif

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

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1178	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/06 Geotechnical STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 846,
Oakland, CA 94621
(510) 562- 8833, FAX (510) 562- 8858

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Metric

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 (kN/m³)
- ○ THEORETICAL SUBMERGED UNIT WEIGHT (kN/m³)
- 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 (Nk=12-15)
- ● POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- ◐ POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- — FRACTURE DENSITY (ROCK)

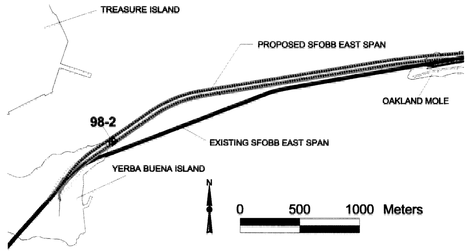
STRENGTH OF COHESIVE SOILS

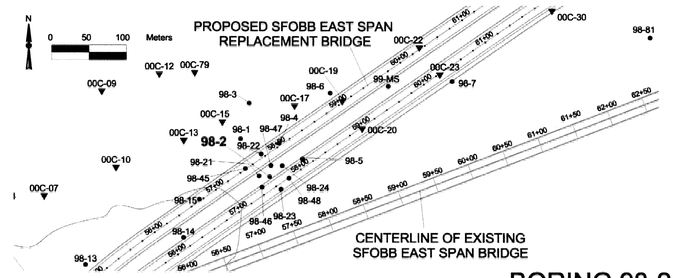
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

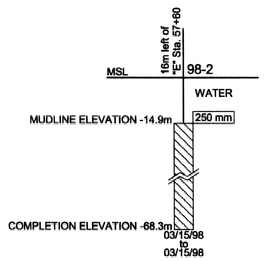
DENSITY OF GRANULAR SOILS

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.







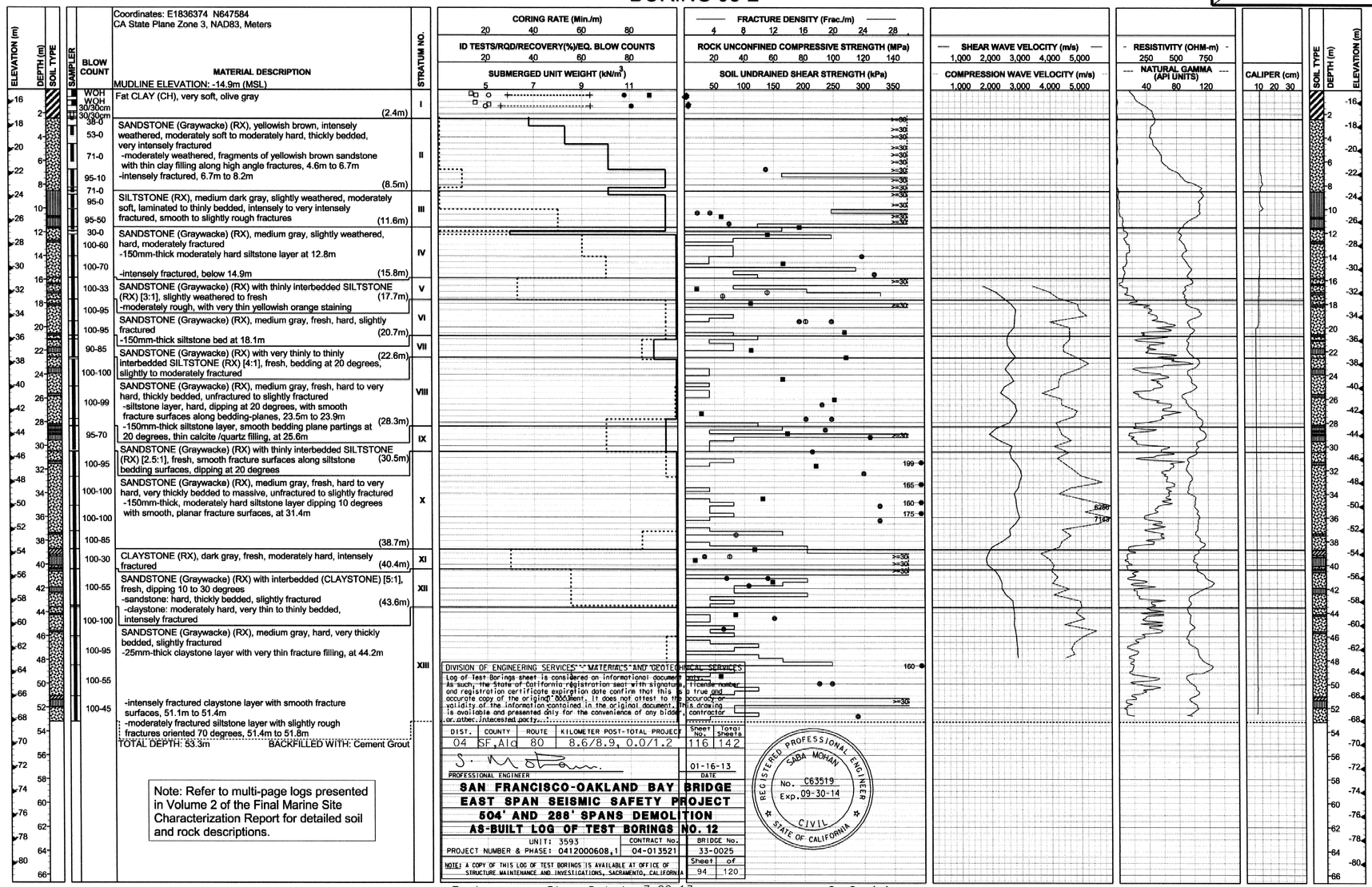
BORING 98-2

Coordinates: E1836374 N647584
CA State Plane Zone 3, NAD83, Meters

BLOW COUNT	MATERIAL DESCRIPTION (MUDLINE ELEVATION: -14.9m (MSL))	STRATUM NO.
WOH WOH 30/30cm	Fat CLAY (CH), very soft, olive gray (2.4m)	I
38-0 53-0 71-0 95-10	SANDSTONE (Graywacke) (RX), yellowish brown, intensely weathered, moderately soft to moderately hard, thickly bedded, very intensely fractured -moderately weathered, fragments of yellowish brown sandstone with thin clay filling along high angle fractures, 4.6m to 6.7m -intensely fractured, 6.7m to 8.2m (8.5m)	II
71-0 95-0 95-50	SILTSTONE (RX), medium dark gray, slightly weathered, moderately soft, laminated to thinly bedded, intensely to very intensely fractured, smooth to slightly rough fractures (11.6m)	III
30-0 100-60 100-70	SANDSTONE (Graywacke) (RX), medium gray, slightly weathered, hard, moderately fractured -150mm-thick moderately hard siltstone layer at 12.8m -intensely fractured, below 14.9m (15.8m)	IV
100-33 100-95	SANDSTONE (Graywacke) (RX) with thinly interbedded SILTSTONE (RX) [3:1], slightly weathered to fresh -moderately rough, with very thin yellowish orange staining (17.7m)	V
100-95	SANDSTONE (Graywacke) (RX), medium gray, fresh, hard, slightly fractured -150mm-thick siltstone bed at 18.1m (20.7m)	VI
90-85	SANDSTONE (Graywacke) (RX) with very thinly to thinly interbedded SILTSTONE (RX) [4:1], fresh, bedding at 20 degrees, slightly to moderately fractured (22.6m)	VII
100-100 100-99 95-70	SANDSTONE (Graywacke) (RX), medium gray, fresh, hard to very hard, thickly bedded, unfractured to slightly fractured -siltstone layer, hard, dipping at 20 degrees, with smooth fracture surfaces along bedding-planes, 23.5m to 23.9m -150mm-thick siltstone layer, smooth bedding plane partings at 20 degrees, thin calcite /quartz filling, at 25.6m (28.3m)	VIII
100-95	SANDSTONE (Graywacke) (RX) with thinly interbedded SILTSTONE (RX) [2.5:1], fresh, smooth fracture surfaces along siltstone bedding surfaces, dipping at 20 degrees (30.5m)	IX
100-100 100-100 100-85	SANDSTONE (Graywacke) (RX), medium gray, fresh, hard to very hard, very thickly bedded to massive, unfractured to slightly fractured -150mm-thick, moderately hard siltstone layer dipping 10 degrees with smooth, planar fracture surfaces, at 31.4m (38.7m)	X
100-30	CLAYSTONE (RX), dark gray, fresh, moderately hard, intensely fractured (40.4m)	XI
100-55	SANDSTONE (Graywacke) (RX) with interbedded (CLAYSTONE) [5:1], fresh, dipping 10 to 30 degrees -sandstone: hard, thickly bedded, slightly fractured -claystone: moderately hard, very thin to thinly bedded, intensely fractured (43.6m)	XII
100-100 100-95 100-55 100-45	SANDSTONE (Graywacke) (RX), medium gray, hard, very thickly bedded, slightly fractured -25mm-thick claystone layer with very thin fracture filling, at 44.2m -intensely fractured claystone layer with smooth fracture surfaces, 51.1m to 51.4m -moderately fractured siltstone layer with slightly rough fractures oriented 70 degrees, 51.4m to 51.8m	XIII

TOTAL DEPTH: 53.3m BACKFILLED WITH: Cement Grout

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



DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ald	80	8.6/8.9, 0.0/1.2	116	142

PROFESSIONAL ENGINEER — DATE 01-16-13

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 12

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — Sheet 94 of 120

To Accompany Plans Dated 7-22-13

6-9-14
PLAN APPROVAL DATE

SABA MOHAN — GEOTECHNICAL DESIGN OVERSIGHT

DRAWN BY: SACHIN DESHPANDE
CHECKED BY: J.CHACKO

C. PRENTICE/ F. ARNOLD — FIELD INVESTIGATOR
DATE SEE ABOVE

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

T.W.McNEILAN — PROJECT ENGINEER

BRIDGE NO. 34-0006L/R
KM POST 13.2/13.9
POST MILE 8.2/8.7

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

CU 04
EA 0120F1

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 12

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) — SHEET 761 OF

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1179	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/06 Geotechnical STATE OF CALIFORNIA

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FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 846,
Oakland, CA 94621
(510) 562- 8833, FAX (510) 562- 8858

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Metric

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
- 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 (kN/m³)
- ○ THEORETICAL SUBMERGED UNIT WEIGHT (kN/m³)
- 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 (Nk=12-15)
- ● POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- ⊙ POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- —— FRACTURE DENSITY (ROCK)

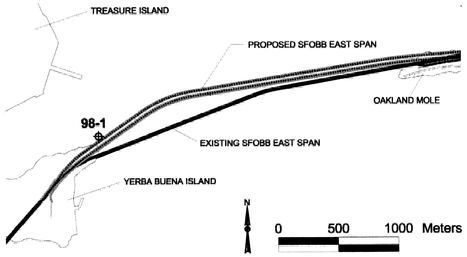
STRENGTH OF COHESIVE SOILS

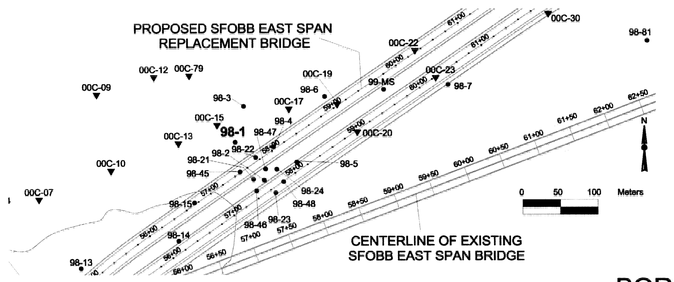
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

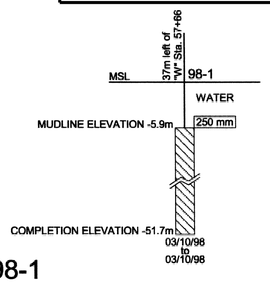
DENSITY OF GRANULAR SOILS

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.





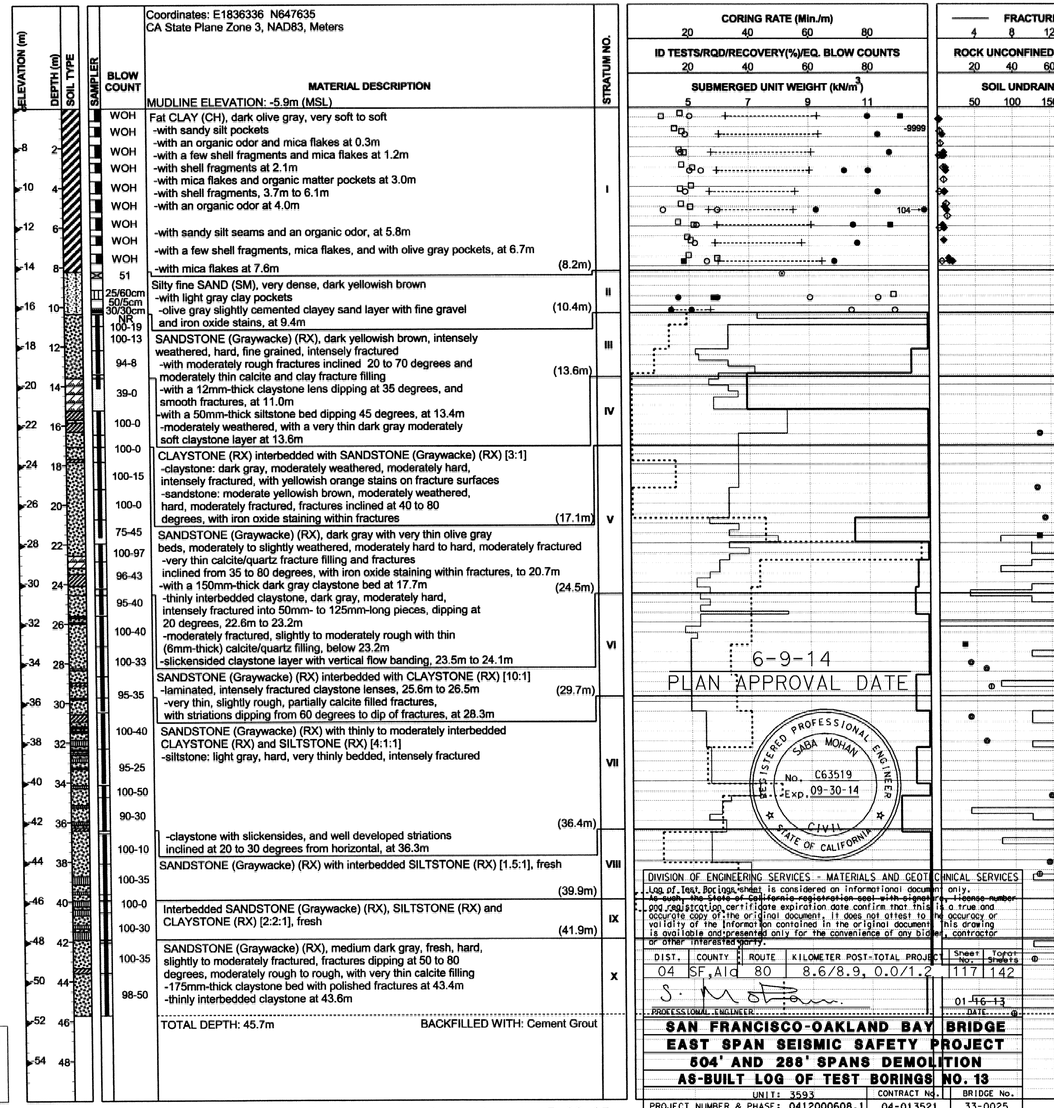


BORING 98-1

Coordinates: E1836336 N647635
CA State Plane Zone 3, NAD83, Meters

MUDLINE ELEVATION: -5.9m (MSL)

Material Description	Stratum No.
Fat CLAY (CH), dark olive gray, very soft to soft -with sandy silt pockets -with an organic odor and mica flakes at 0.3m -with a few shell fragments and mica flakes at 1.2m -with shell fragments at 2.1m -with mica flakes and organic matter pockets at 3.0m -with shell fragments, 3.7m to 6.1m -with an organic odor at 4.0m -with sandy silt seams and an organic odor, at 5.8m -with a few shell fragments, mica flakes, and with olive gray pockets, at 6.7m -with mica flakes at 7.6m (8.2m)	I
Silty fine SAND (SM), very dense, dark yellowish brown -with light gray clay pockets -olive gray slightly cemented clayey sand layer with fine gravel and iron oxide stains, at 9.4m (10.4m)	II
SANDSTONE (Graywacke) (RX), dark yellowish brown, intensely weathered, hard, fine grained, intensely fractured -with moderately rough fractures inclined 20 to 70 degrees and moderately thin calcite and clay fracture filling -with a 12mm-thick claystone lens dipping at 35 degrees, and smooth fractures, at 11.0m (13.6m)	III
-with a 50mm-thick siltstone bed dipping 45 degrees, at 13.4m -moderately weathered, with a very thin dark gray moderately soft claystone layer at 13.6m	IV
CLAYSTONE (RX) interbedded with SANDSTONE (Graywacke) (RX) [3:1] -claystone: dark gray, moderately weathered, moderately hard, intensely fractured, with yellowish orange stains on fracture surfaces -sandstone: moderate yellowish brown, moderately weathered, hard, moderately fractured, fractures inclined at 40 to 80 degrees, with iron oxide staining within fractures (17.1m)	V
SANDSTONE (Graywacke) (RX), dark gray with very thin olive gray beds, moderately to slightly weathered, moderately hard to hard, moderately fractured -very thin calcite/quartz fracture filling and fractures inclined from 35 to 80 degrees, with iron oxide staining within fractures, to 20.7m -with a 150mm-thick dark gray claystone bed at 17.7m (24.5m)	
-thinly interbedded claystone, dark gray, moderately hard, intensely fractured into 50mm- to 125mm-long pieces, dipping at 20 degrees, 22.6m to 23.2m -moderately fractured, slightly to moderately rough with thin (6mm-thick) calcite/quartz filling, below 23.2m -slickensided claystone layer with vertical flow banding, 23.5m to 24.1m	VI
SANDSTONE (Graywacke) (RX) interbedded with CLAYSTONE (RX) [10:1] -laminated, intensely fractured claystone lenses, 25.6m to 26.5m -very thin, slightly rough, partially calcite filled fractures, with striations dipping from 60 degrees to dip of fractures, at 28.3m (29.7m)	
SANDSTONE (Graywacke) (RX) with thinly to moderately interbedded CLAYSTONE (RX) and SILTSTONE (RX) [4:1:1] -siltstone: light gray, hard, very thinly bedded, intensely fractured (36.4m)	VII
-claystone with slickensides, and well developed striations inclined at 20 to 30 degrees from horizontal, at 36.3m	VIII
SANDSTONE (Graywacke) (RX) with interbedded SILTSTONE (RX) [1.5:1], fresh (39.9m)	
Interbedded SANDSTONE (Graywacke) (RX), SILTSTONE (RX) and CLAYSTONE (RX) [2:2:1], fresh (41.9m)	IX
SANDSTONE (Graywacke) (RX), medium dark gray, fresh, hard, slightly to moderately fractured, fractures dipping at 50 to 80 degrees, moderately rough to rough, with very thin calcite filling -175mm-thick claystone bed with polished fractures at 43.4m -thinly interbedded claystone at 43.6m	X
TOTAL DEPTH: 45.7m — BACKFILLED WITH: Cement Grout	



DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES
Log of Test Borings shall be considered an informational document only. As such, the State of California registration seal with signature, license number, and registration certificate expiration date confirm that this is a true and accurate copy of the original document. It does not attest to the accuracy or validity of the information contained in the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.

DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ald	80	8.6/8.9, 0.0/1.2	117	142

PROFESSIONAL ENGINEER — DATE 01-~~16~~-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 13

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — Sheet 95 of 120

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

To Accompany Plans Dated 7-22-13

SABA MOHAN — GEOTECHNICAL DESIGN OVERSIGHT

DRAWN BY: SACHIN DESHPANDE
CHECKED BY: J.CHACKO

J.CHACKO/M.ZUEGER — FIELD INVESTIGATOR
DATE: SEE ABOVE

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

T.W.McNEILAN — PROJECT ENGINEER

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

CU 04
EA 0120F1

BRIDGE NO. 34-0006L/R
KM POST 13.2/13.9
POST MILE 8.2/8.7

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 13

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 762 OF

33-0025-s-lotb13_734.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, 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 (kN/m³)
- ○ THEORETICAL SUBMERGED UNIT WEIGHT (kN/m³)
- 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 (Nk=12-15)
- ● POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- ⊕ POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- —— FRACTURE DENSITY (ROCK)

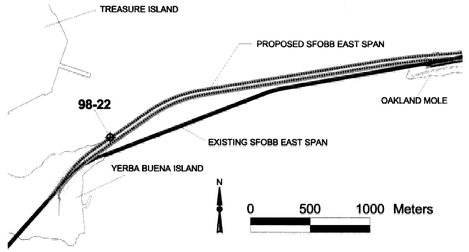
STRENGTH OF COHESIVE SOILS

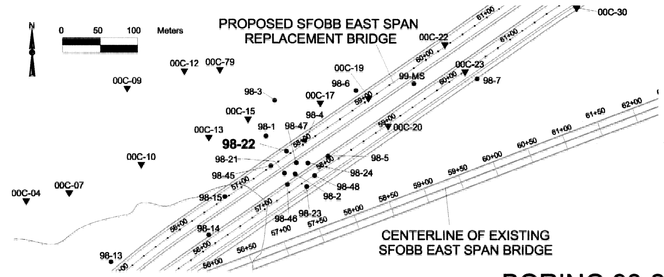
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

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.





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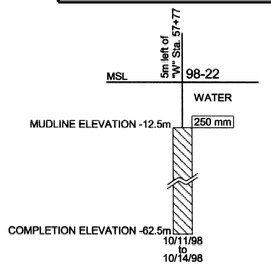


DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1180	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/06 Geotechnical STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 846,
Oakland, CA 94621
(510) 562- 8833, FAX (510) 562- 8858

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.

BORING 98-22

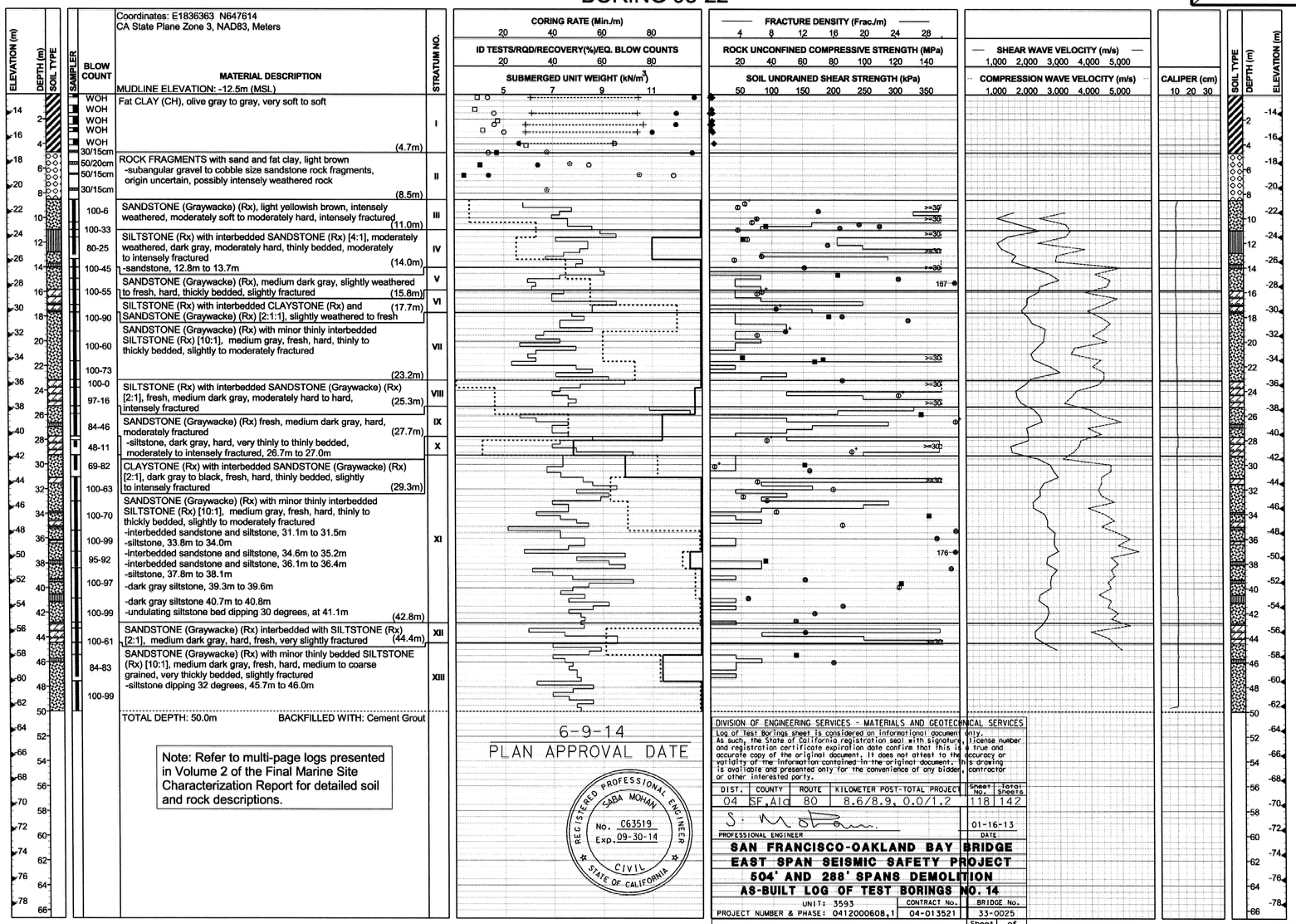
Coordinates: E1836363 N647614
CA State Plane Zone 3, NAD83, Meters

MUDLINE ELEVATION: -12.5m (MSL)

Blow Count	Material Description	Stratum No.
WOH, WOH, WOH, WOH, WOH	Fat CLAY (CH), olive gray to gray, very soft to soft (4.7m)	I
30/15cm, 50/20cm, 50/15cm, 30/15cm	ROCK FRAGMENTS with sand and fat clay, light brown -subangular gravel to cobble size sandstone rock fragments, origin uncertain, possibly intensely weathered rock (8.5m)	II
100-6, 100-33	SANDSTONE (Graywacke) (Rx), light yellowish brown, intensely weathered, moderately soft to moderately hard, intensely fractured (11.0m)	III
80-25, 100-45	SILTSTONE (Rx) with interbedded SANDSTONE (Rx) [4:1], moderately weathered, dark gray, moderately hard, thinly bedded, moderately to intensely fractured (14.0m) -sandstone, 12.8m to 13.7m	IV
100-55	SANDSTONE (Graywacke) (Rx), medium dark gray, slightly weathered to fresh, hard, thickly bedded, slightly fractured (15.8m)	V
100-90	SILTSTONE (Rx) with interbedded CLAYSTONE (Rx) and SANDSTONE (Graywacke) (Rx) [2:1:1], slightly weathered to fresh (17.7m)	VI
100-60, 100-73	SANDSTONE (Graywacke) (Rx) with minor thinly interbedded SILTSTONE (Rx) [10:1], medium gray, fresh, hard, thinly to thickly bedded, slightly to moderately fractured (23.2m)	VII
100-0, 97-16	SILTSTONE (Rx) with interbedded SANDSTONE (Graywacke) (Rx) [2:1], fresh, medium dark gray, moderately hard to hard, intensely fractured (25.3m)	VIII
84-46	SANDSTONE (Graywacke) (Rx) fresh, medium dark gray, hard, moderately fractured (27.7m)	IX
48-11	-siltstone, dark gray, hard, very thinly to thinly bedded, moderately to intensely fractured, 26.7m to 27.0m	X
69-82, 100-63	CLAYSTONE (Rx) with interbedded SANDSTONE (Graywacke) (Rx) [2:1], dark gray to black, fresh, hard, thinly bedded, slightly to intensely fractured (29.3m)	XI
100-70, 100-99, 95-92, 100-97, 100-99	SANDSTONE (Graywacke) (Rx) with minor thinly interbedded SILTSTONE (Rx) [10:1], medium gray, fresh, hard, thinly to thickly bedded, slightly to moderately fractured -interbedded sandstone and siltstone, 31.1m to 31.5m -siltstone, 33.8m to 34.0m -interbedded sandstone and siltstone, 34.6m to 35.2m -interbedded sandstone and siltstone, 36.1m to 36.4m -siltstone, 37.8m to 38.1m -dark gray siltstone, 39.3m to 39.6m -dark gray siltstone 40.7m to 40.8m -undulating siltstone bed dipping 30 degrees, at 41.1m (42.8m)	
100-61	SANDSTONE (Graywacke) (Rx) interbedded with SILTSTONE (Rx) [2:1], medium dark gray, hard, fresh, very slightly fractured (44.4m)	XII
84-83, 100-99	SANDSTONE (Graywacke) (Rx) with minor thinly bedded SILTSTONE (Rx) [10:1], medium dark gray, fresh, hard, medium to coarse grained, very thickly bedded, slightly fractured -siltstone dipping 32 degrees, 45.7m to 46.0m	XIII

TOTAL DEPTH: 50.0m BACKFILLED WITH: Cement Grout

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



6-9-14
PLAN APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES
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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,ALA	80	8.6/8.9, 0.0/1.2	118	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 14

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025
		Sheet 96 of 120

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

To Accompany Plans Dated 7-22-13

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 14

SABA MOHAN — GEOTECHNICAL DESIGN OVERSIGHT
DRAWN BY SACHIN DESHPANDE
CHECKED BY J.CHACKO
J.CHACKO/M.ZUEGER — FIELD INVESTIGATOR
DATE SEE ABOVE

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

T.W.McNEILAN — PROJECT ENGINEER

BRIDGE NO. 34-0006L/R
KM POST 13.2/13.9
POST MILE 8.2/8.7

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

CU 04
EA 0120F1

DISREGARD PRINTS BEARING EARLIER REVISION DATES
REVISION DATES (PRELIMINARY STAGE ONLY)
SHEET 763 OF

33-0025-s-lotb14_735.tif

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1181	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/06 Geotechnical STATE OF CALIFORNIA

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Metric

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 (kN/m³)
- ○ THEORETICAL SUBMERGED UNIT WEIGHT (kN/m³)
- 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 (Nk=12-15)
- ● POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- ⊕ POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- — FRACTURE DENSITY (ROCK)

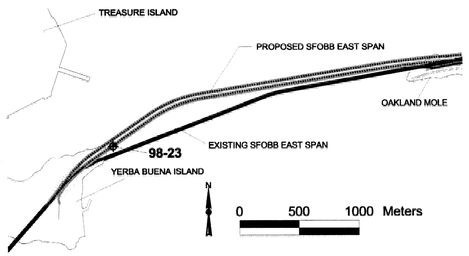
STRENGTH OF COHESIVE SOILS

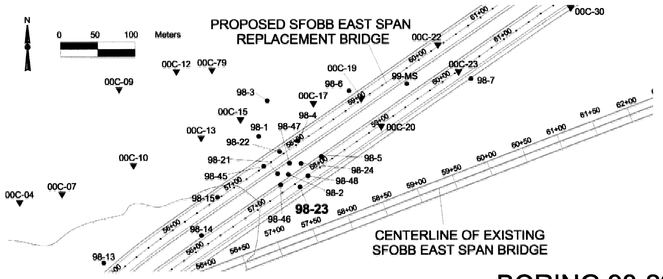
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

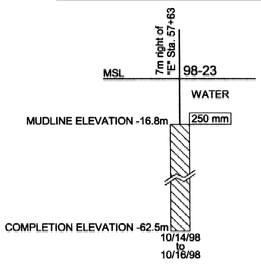
DENSITY OF GRANULAR SOILS

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.







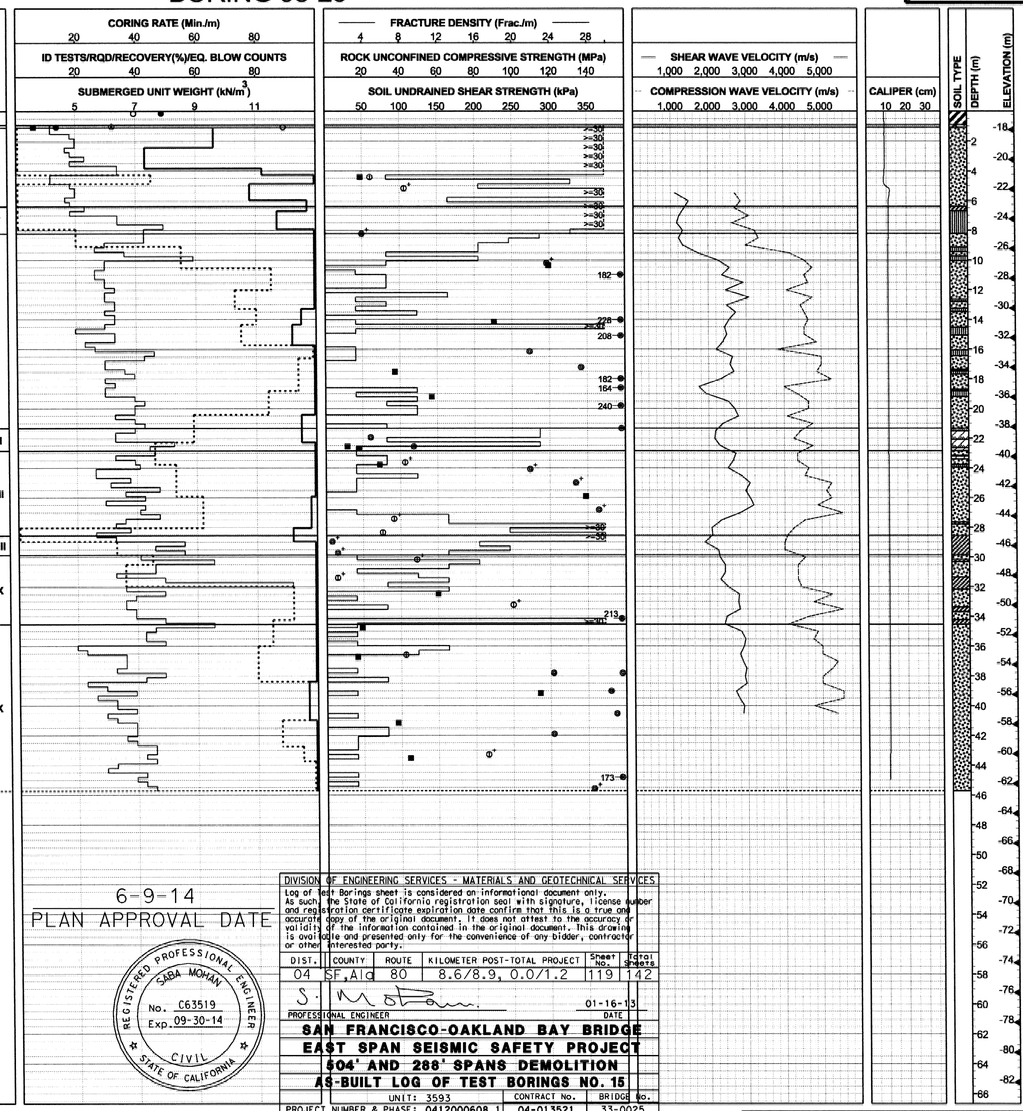
BORING 98-23

Coordinates: E1836389 N647567
CA State Plane Zone 3, NAD83, Meters

ELEVATION (m)	BLOW COUNT	MATERIAL DESCRIPTION	STRATUM NO.
		MUDLINE ELEVATION: -16.8m (MSL)	
	WOH	Fat CLAY (CH), gray, very soft (0.9m)	I
	30/20cm		
	66-0	Fine GRAVEL (GP-GM) with silt, clay, sand, and coarse gravel, gray to olive gray (1.1m)	II
	43-0		
	82-0	SANDSTONE (Graywacke) (Rx), olive gray, moderately to intensely weathered, moderately hard	III
	100-45		
	78-0	(6.4m)	
	97-0	SILTSTONE (Rx) dark greenish gray, moderately to intensely weathered, moderately soft to moderately hard, poorly indurated, very thinly bedded, bedding dips 30 degrees, intensely fractured (8.2m)	IV
	87-0		
	100-20		
	100-55	SANDSTONE (Graywacke) (Rx) with interbedded SILTSTONE (Rx) [10:1] -slightly to moderately rough fractures, slightly undulating, with very thin, dark yellowish brown iron oxide staining along 30, 60, and 80 degree fractures, and few healed fractures, below 9.1m -fine grained gravel (pebbly sandstone) interbed at 13.5m	V
	100-85		
	100-73		
	95-80		
	92-75		
	100-99	-siltstone, 16.1m to 16.5m	
	100-94	-60mm thick, intensely fractured, claystone interbed, at 17.4m -siltstone with bedding dipping 25 degrees, 17.5m to 17.7m -fresh, hard, thinly bedded claystone, with bedding dipping 20 degrees, 18.7m to 18.8m (21.3m)	
	100-84		
	95-59	-thinly bedded siltstone, dipping 20 degrees, 18.8m to 19.2m -iron oxide staining on steeply dipping (>60 degree) fractures, at 19.2m	VI
	100-46	SANDSTONE (Graywacke) (Rx) interbedded with SILTSTONE (Rx) [1:1] -sandstone: medium dark gray, fresh, hard, moderately indurated, fine to medium grained (22.9m)	VII
	100-53		
	98-62	SANDSTONE (Graywacke) (Rx), moderate dark gray, fresh, hard -interbedded siltstone and sandstone, 23.2m to 23.4m -siltstone, dipping 20 degrees, pyrite mineralization along fracture plane, 23.8m to 24.0m (28.6m)	
	92-0		VIII
	100-33	-numerous vertical and near vertical healed, very thin (1mm), calcite/quartz filled fractures, 24.0m to 25.6m	
	100-45		
	100-36	-dark gray, fresh, moderately hard claystone, 27.6m to 27.8m	
	100-92	CLAYSTONE (Rx), dark gray, fresh -very thinly bedded to laminated, bedding dipping 25 degrees, intensely fractured with smooth to slightly rough fracture planes, very thin calcite/quartz infilling (29.9m)	IX
	100-85		
	100-80	SANDSTONE (Graywacke) (Rx) with interbedded CLAYSTONE (Rx) [2:1] -sandstone: medium dark gray, fresh, hard, moderately indurated, fine to medium grained with scattered coarse grains, thinly bedded, slightly fractured -claystone, intensely fractured, 33.4m to 33.7m -claystone with bedding dipping 20 degrees, below 34.2m (34.5m)	X
	97-97		
	100-88	SANDSTONE (Graywacke) (Rx), medium dark gray, fresh, hard to very hard -moderately fractured with 60 degree to vertical fractures, at 35.2m -60mm thick, siltstone interbed, with bedding dipping 20 degrees, at 35.2m -moderately fractured, with slightly rough, calcite/quartz filled fractures, generally dipping 20 degrees, at 40.7m	
	100-95		
	100-99		

TOTAL DEPTH: 45.7m BACKFILLED WITH: Cement Grout

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



6-9-14
PLAN APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9, 0.0/1.2	119	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 15

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025
NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA		Sheet 97 of 120

To Accompany Plans Dated 7-22-13

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 15

SABA MOHAN, GEOTECHNICAL DESIGN OVERSIGHT	DRAWN BY: SACHIN DESHPANDE	C. PRENTICE/ J. BIANCHIN, FIELD INVESTIGATOR	T.W.McNEILAN, PROJECT ENGINEER
	CHECKED BY: J.CHACKO	DATE: SEE ABOVE	

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 04
EA 0120F1

BRIDGE NO.	KM POST	POST MILE
34-0006L/R	13.2/13.9	8.2/8.7

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 764 OF

33-0025-s-lotb15_736.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 (kN/m³)
- ○ THEORETICAL SUBMERGED UNIT WEIGHT (kN/m³)
- 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 (Nk=12-15)
- POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- UNCONFINED COMPRESSION (ROCK)
- FRACTURE DENSITY (ROCK)

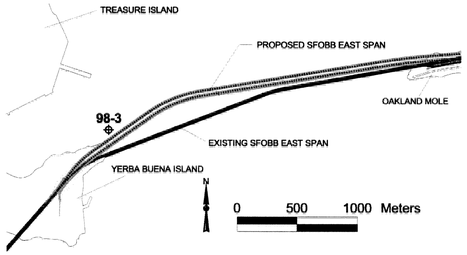
STRENGTH OF COHESIVE SOILS

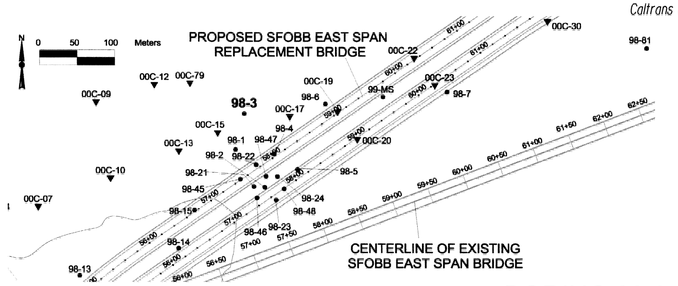
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

DENSITY OF GRANULAR SOILS

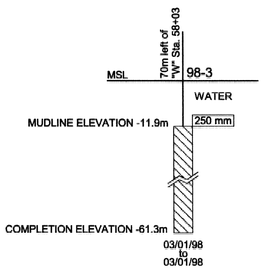
Descriptive Term	Relative Density (%)*
Very Loose	less than 15
Loose	15 to 35
Medium Dense	35 to 65
Dense	65 to 85
Very Dense	greater than 85

*Estimated from sampler driving record and CPT tip resistance.





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



Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1182	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/06 Geotechnical STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 846,
Oakland, CA 94621
(510) 562- 8833, FAX (510) 562- 8858

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.

BORING 98-3

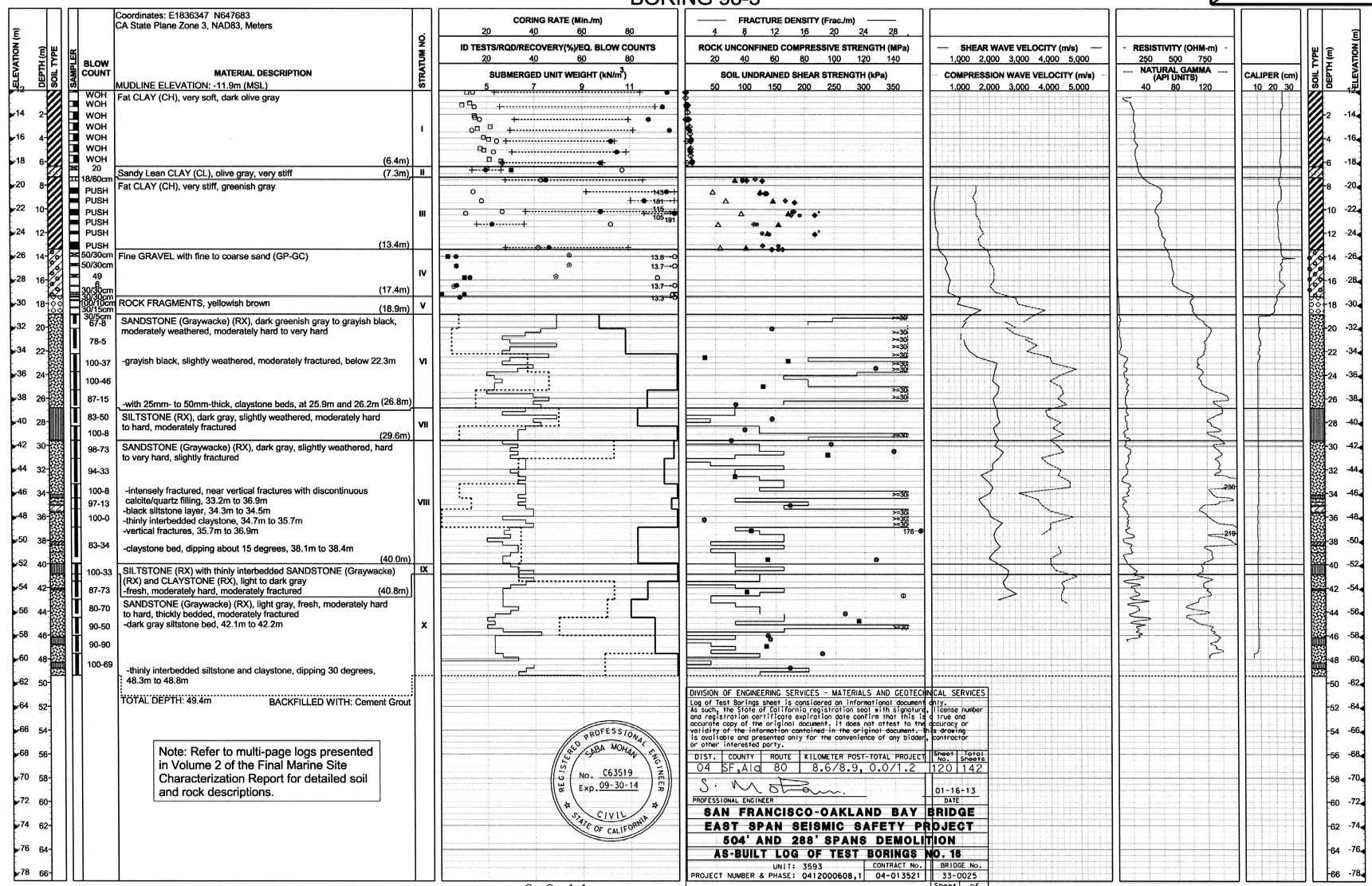
Coordinates: E1836347 N647683
CA State Plane Zone 3, NAD83, Meters

MUDLINE ELEVATION: -11.9m (MSL)

Material Description	Stratum No.
Fat CLAY (CH), very soft, dark olive gray (6.4m)	I
Sandy Lean CLAY (CL), olive gray, very stiff (7.3m)	II
Fat CLAY (CH), very stiff, greenish gray (13.4m)	III
Fine GRAVEL with fine to coarse sand (GP-GC) (17.4m)	IV
ROCK FRAGMENTS, yellowish brown (18.9m)	V
SANDSTONE (Graywacke) (RX), dark greenish gray to grayish black, moderately weathered, moderately hard to very hard	VI
-grayish black, slightly weathered, moderately fractured, below 22.3m	
-with 25mm- to 50mm-thick, claystone beds, at 25.9m and 26.2m (26.8m)	
SILTSTONE (RX), dark gray, slightly weathered, moderately hard to hard, moderately fractured (29.6m)	VII
SANDSTONE (Graywacke) (RX), dark gray, slightly weathered, hard to very hard, slightly fractured	VIII
-intensely fractured, near vertical fractures with discontinuous calcite/quartz filling, 33.2m to 36.9m	
-black siltstone layer, 34.3m to 34.5m	
-thinly interbedded claystone, 34.7m to 35.7m	
-vertical fractures, 35.7m to 36.9m	
-claystone bed, dipping about 15 degrees, 38.1m to 38.4m (40.0m)	
SILTSTONE (RX) with thinly interbedded SANDSTONE (Graywacke) (RX) and CLAYSTONE (RX), light to dark gray	IX
-fresh, moderately hard, moderately fractured (40.8m)	
SANDSTONE (Graywacke) (RX), light gray, fresh, moderately hard to hard, thickly bedded, moderately fractured	X
-dark gray siltstone bed, 42.1m to 42.2m	
-thinly interbedded siltstone and claystone, dipping 30 degrees, 48.3m to 48.8m	

TOTAL DEPTH: 49.4m BACKFILLED WITH: Cement Grout

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



6-9-14
PLAN APPROVAL DATE

DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9, 0.0/1.2	120	142

PROFESSIONAL ENGINEER — DATE 01-16-13

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 16

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — Sheet 98 of 120

To Accompany Plans Dated 7-22-13

SABA MOHAN — GEOTECHNICAL DESIGN OVERSIGHT

DRAWN BY: SACHIN DESHPANDE
CHECKED BY: J.CHACKO

C. PRENTICE/ C. LOVATO — FIELD INVESTIGATOR
DATE SEE ABOVE

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

T.W.McNEILAN — PROJECT ENGINEER

BRIDGE NO. 34-0006L/R
KM POST 13.2/13.9
POST MILE 8.2/8.7

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

CU 04
EA 0120F1

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 16

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SHEET 765 OF

33-0025-s-lotb16_737.tif

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
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PLANS APPROVAL DATE

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FUGRO-EARTH MECHANICS,
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- 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)
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- 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

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PUSH or SAVE	Pushed thin-walled 76mm-OD-tube.
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- ● WATER CONTENT (%)
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- ○ THEORETICAL SUBMERGED UNIT WEIGHT (kN/m³)
- 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 (φ 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 (Nk=12-15)
- ● POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- ⊕ POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- FRACTURE DENSITY (ROCK)

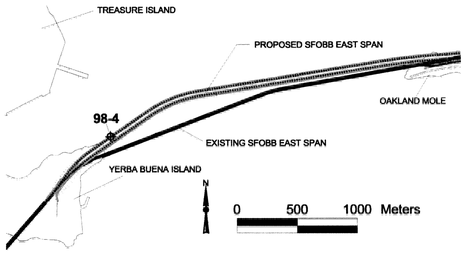
STRENGTH OF COHESIVE SOILS

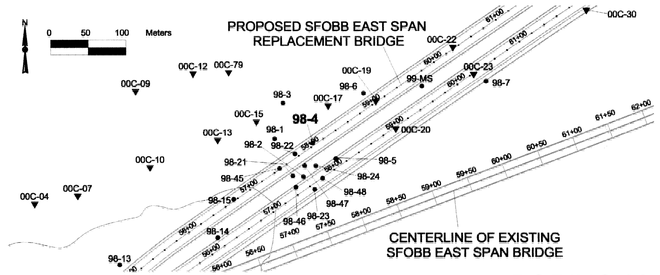
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

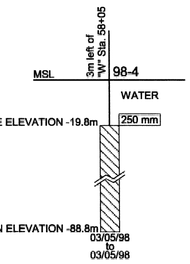
DENSITY OF GRANULAR SOILS

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 98-4

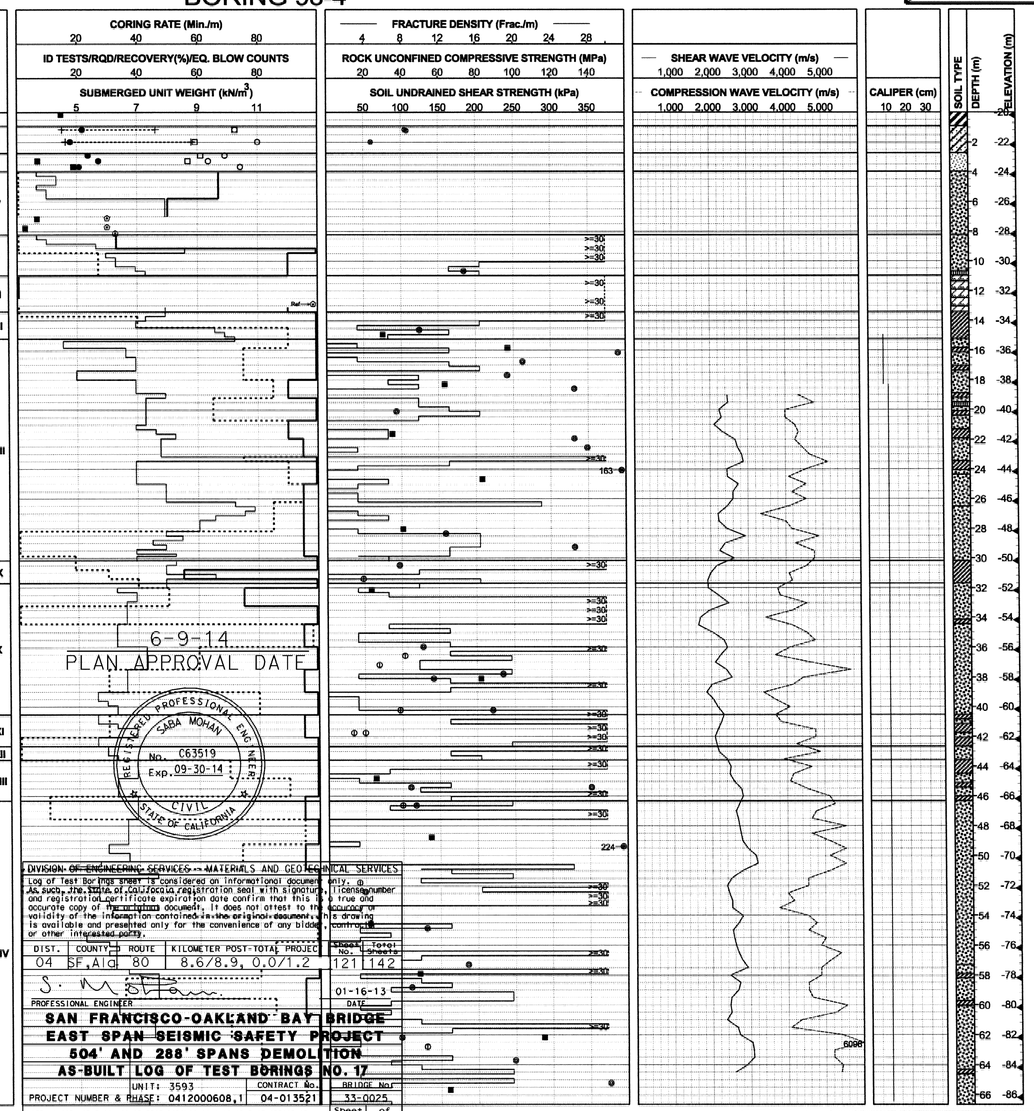
Coordinates: E1836387 N647629
CA State Plane Zone 3, NAD83, Meters

MUDLINE ELEVATION: -19.8m (MSL)

Elevation (m)	Depth (m)	Blow Count	Stratum No.	Material Description
		25/60cm, 17/45cm	I	Fat CLAY with gravel (CH), very soft, dark olive gray (0.9m)
		25/45cm	II	Sandy fat CLAY with gravel (CH), very stiff, olive gray (2.7m)
		21/45cm, 17/45cm, 30/45cm	III	SAND (SP), dense to very dense, dark gray (4.0m)
		67-0, 67-0, 50-0, 50-0, 30, 30, 30/30cm	IV	SANDSTONE (Graywacke) (Rx)/rock fragments, origin uncertain, olive gray (8.2m)
		33-0, 100-0, 90-27	V	SANDSTONE (Graywacke) (RX), moderate yellowish brown, intensely weathered, soft to moderately hard, thickly to very thickly bedded, fine to medium grained, moderately to well sorted, subangular to subrounded (11.0m)
		0-0	VI	-moderately weathered, moderately fractured, below 9.4m
		Ref/10cm, 90-0, 100-0, 100-40	VII	Interbedded SILTSTONE (RX), CLAYSTONE (RX),and SANDSTONE (Graywacke) (RX), medium to dark gray, moderately weathered, moderately soft, thinly to thickly bedded, very intensely fractured (13.4m)
		100-90, 100-75		CLAYSTONE (RX) with thinly interbedded SANDSTONE (Graywacke) (RX) [5:1], moderately to slightly weathered, moderately to intensely fractured, with thin clay infilling along fractures (15.2m)
		90-85, 100-65, 90-90, 95-95, 100-75, 100-90, 95-95, 95-85, 95-0	VIII	SANDSTONE (Graywacke) (RX) with thinly interbedded CLAYSTONE (RX) [4:1], medium to dark gray, slightly weathered, moderately hard to hard, thinly to thickly bedded, moderately to slightly fractured -slightly weathered, moderately hard siltstone, 19.5m to 19.8m -medium gray fresh sandstone below 19.8m -claystone grading to siltstone, 20.1m to 20.4m -claystone bed dipping 25 degrees, 23.3m to 23.8m -150mm-thick, intensely fractured claystone bed dipping 20 degrees, at 26.4m (30.2m)
		100-19, 55-30, 100-40	IX	CLAYSTONE (RX), dark gray to black, slightly weathered, moderately hard, intensely to very intensely fractured (31.7m)
		75-50, 100-0, 95-98, 100-60, 95-30, 100-80	X	SANDSTONE (Graywacke) (RX), dark gray, slightly weathered to fresh, hard, massive, moderately fractured, with a few thin interbedded siltstone and claystone layers -interbedded claystone, dipping 20 degrees, dark gray, moderately hard, intensely fractured, 34.0m to 34.4m (40.5m)
		95-30, 100-0	XI	CLAYSTONE (RX) with interbedded SANDSTONE (Graywacke) (RX) [3:1], fresh, intensely fractured
		100-70	XII	-claystone: dark gray, moderately hard, thinly interbedded to laminated, smooth, polished bedding plane surfaces (42.7m)
		100-90	XIII	SANDSTONE (Graywacke) (RX), moderate dark gray, fresh, hard, moderately fractured (43.6m)
		95-10	XIV	CLAYSTONE (RX) interbedded with SANDSTONE (Graywacke) (RX) [1:1], fresh (46.3m)
		100-95, 95-74, 100-0, 100-58, 100-99, 100-85, 100-80, 95-35, 95-85, 100-70, 100-80, 100-95, 100-95		SANDSTONE (Graywacke) (RX), moderately dark gray, fresh to slightly weathered, hard to very hard, fine grained, moderately to intensely fractured -intensely to very intensely fractured zone -intensely to very intensely fractured sandstone, with thinly interbedded claystone and calcite-filled fractures inclined 30, 50, 60, and 80 degrees, 50.6m to 53.0m -dark gray, hard, moderately to intensely fractured claystone bed, 57.8m to 58.2m -intensely fractured, 58.1m to 61.6m -intensely to moderately fractured, 58.2m to 59.6m -dark gray claystone layer, 59.8m to 59.9m

TOTAL DEPTH: 69.0m

BACKFILLED WITH: Cement Grout



6-9-14
PLAN APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
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PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 17

UNIT: 3593 — CONTRACT No. 04-013521 — BRIDGE No. 33-0025

PROJECT NUMBER & PHASE: 0412000608, 1

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

Sheet 99 of 120

To Accompany Plans Dated 7-22-13

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

SABA MOHAN, GEOTECHNICAL DESIGN OVERSIGHT	DRAWN BY: SACHIN DESHPANDE	C. PRENTICE/C. LOVATO, FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
	CHECKED BY: J.CHACKO	DATE: SEE ABOVE	

T.W.McNEILAN, PROJECT ENGINEER

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

CU 04
EA 0120F1

BRIDGE NO.	KM POST	POST MILE
34-0006L/R	13.2/13.9	8.2/8.7

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 17

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) — SHEET 766 OF

33-0025-s-lotb17_738.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)
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- SAND with clay (SP-SC)
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- Fat CLAY (CH)
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- 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 (kN/m³)
- ○ THEORETICAL SUBMERGED UNIT WEIGHT (kN/m³)
- 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 (Nk=12-15)
- ● POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- ⊕ POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- —— FRACTURE DENSITY (ROCK)

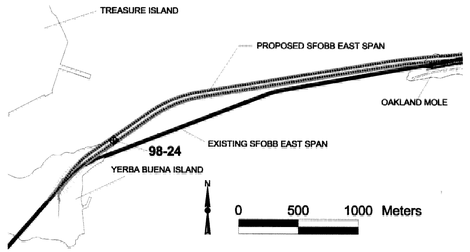
STRENGTH OF COHESIVE SOILS

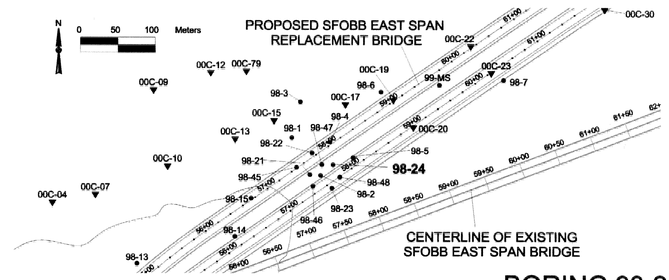
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

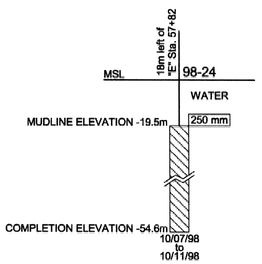
DENSITY OF GRANULAR SOILS

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.







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

Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1184	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/06 Geotechnical STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 846,
Oakland, CA 94621
(510) 562- 8833, FAX (510) 562- 8858

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.

BORING 98-24

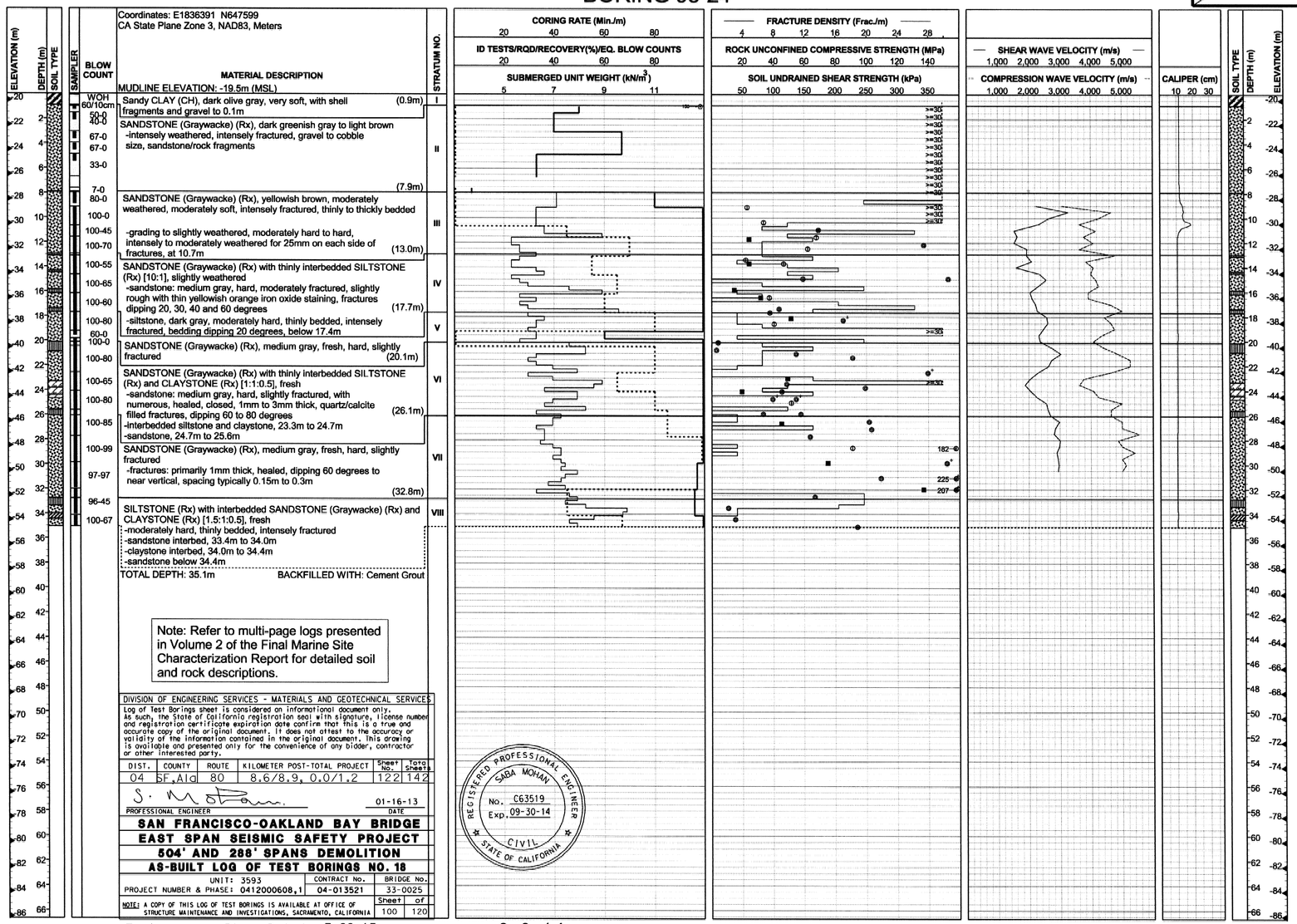
Coordinates: E1836391 N647599
CA State Plane Zone 3, NAD83, Meters

MUDLINE ELEVATION: -19.5m (MSL)

BLOW COUNT	MATERIAL DESCRIPTION	STRATUM NO.
WOH / 60/10cm	Sandy CLAY (CH), dark olive gray, very soft, with shell fragments and gravel to 0.1m (0.9m)	I
50-0 / 40-0 / 67-0 / 67-0 / 33-0	SANDSTONE (Graywacke) (Rx), dark greenish gray to light brown -intensely weathered, intensely fractured, gravel to cobble size, sandstone/rock fragments (7.9m)	II
7-0 / 80-0 / 100-0 / 100-45 / 100-70	SANDSTONE (Graywacke) (Rx), yellowish brown, moderately weathered, moderately soft, intensely fractured, thinly to thickly bedded -grading to slightly weathered, moderately hard to hard, intensely to moderately weathered for 25mm on each side of fractures, at 10.7m (13.0m)	III
100-55 / 100-65 / 100-60	SANDSTONE (Graywacke) (Rx) with thinly interbedded SILTSTONE (Rx) [10:1], slightly weathered -sandstone: medium gray, hard, moderately fractured, slightly rough with thin yellowish orange iron oxide staining, fractures dipping 20, 30, 40 and 60 degrees (17.7m)	IV
100-80 / 60-0	-siltstone, dark gray, moderately hard, thinly bedded, intensely fractured, bedding dipping 20 degrees, below 17.4m	V
100-0 / 100-80	SANDSTONE (Graywacke) (Rx), medium gray, fresh, hard, slightly fractured (20.1m)	VI
100-65 / 100-80	SANDSTONE (Graywacke) (Rx) with thinly interbedded SILTSTONE (Rx) and CLAYSTONE (Rx) [1:1:0.5], fresh -sandstone: medium gray, hard, slightly fractured, with numerous, healed, closed, 1mm to 3mm thick, quartz/calcite filled fractures, dipping 60 to 80 degrees (26.1m)	VI
100-85	-interbedded siltstone and claystone, 23.3m to 24.7m -sandstone, 24.7m to 25.6m	
100-99 / 97-97	SANDSTONE (Graywacke) (Rx), medium gray, fresh, hard, slightly fractured -fractures: primarily 1mm thick, healed, dipping 60 degrees to near vertical, spacing typically 0.15m to 0.3m (32.8m)	VII
96-45 / 100-67	SILTSTONE (Rx) with interbedded SANDSTONE (Graywacke) (Rx) and CLAYSTONE (Rx) [1.5:1:0.5], fresh -moderately hard, thinly bedded, intensely fractured -sandstone interbed, 33.4m to 34.0m -claystone interbed, 34.0m to 34.4m -sandstone below 34.4m	VIII

TOTAL DEPTH: 35.1m BACKFILLED WITH: Cement Grout

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



DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

Log of Test Borings sheet is considered an informational document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. It does not attest to the accuracy or validity of the information contained in the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.

DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9, 0.0/1.2	122	142

PROFESSIONAL ENGINEER — DATE 01-16-13

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 18

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — Sheet 100 of 120

To Accompany Plans Dated 7-22-13

6-9-14
PLAN APPROVAL DATE

SABA MOHAN, GEOTECHNICAL DESIGN OVERSIGHT	DRAWN BY: SACHIN DESHPANDE	J.CHACKO, C. PRENTICE, J. PALMER, J. BIANCHIN, FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
	CHECKED BY: J.CHACKO	DATE: SEE ABOVE	

T.W.McNEILAN, PROJECT ENGINEER

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

CU 04
EA 0120F1

BRIDGE NO. 34-0006L/R
KM POST 13.2/13.9
POST MILE 8.2/8.7

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 18

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 767 OF

33-0025-s-lotb18_739.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 (kN/m^3)
- ○ THEORETICAL SUBMERGED UNIT WEIGHT (kN/m^3)
- 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 (Nk = 12-15)
- POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- FRACTURE DENSITY (ROCK)

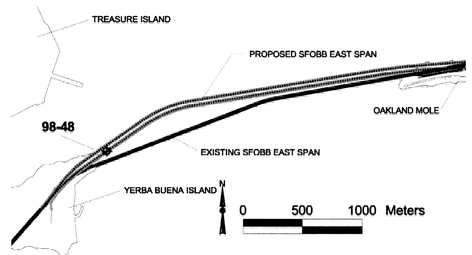
STRENGTH OF COHESIVE SOILS

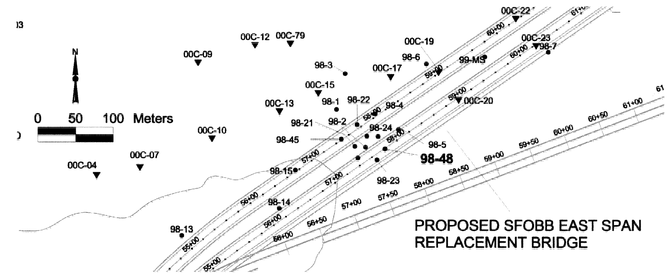
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

DENSITY OF GRANULAR SOILS

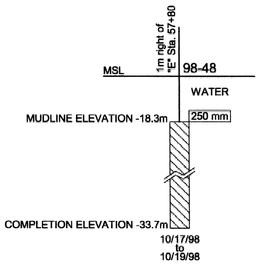
Descriptive Term	Relative Density (%)*
Very Loose	less than 15
Loose	15 to 35
Medium Dense	35 to 65
Dense	65 to 85
Very Dense	greater than 85

*Estimated from sampler driving record and CPT tip resistance.





PROPOSED SFOBB EAST SPAN REPLACEMENT BRIDGE



DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1185	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/06 Geotechnical STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 846,
Oakland, CA 94621
(510) 562- 8833, FAX (510) 562- 8858

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Metric

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

6-9-14
PLAN APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

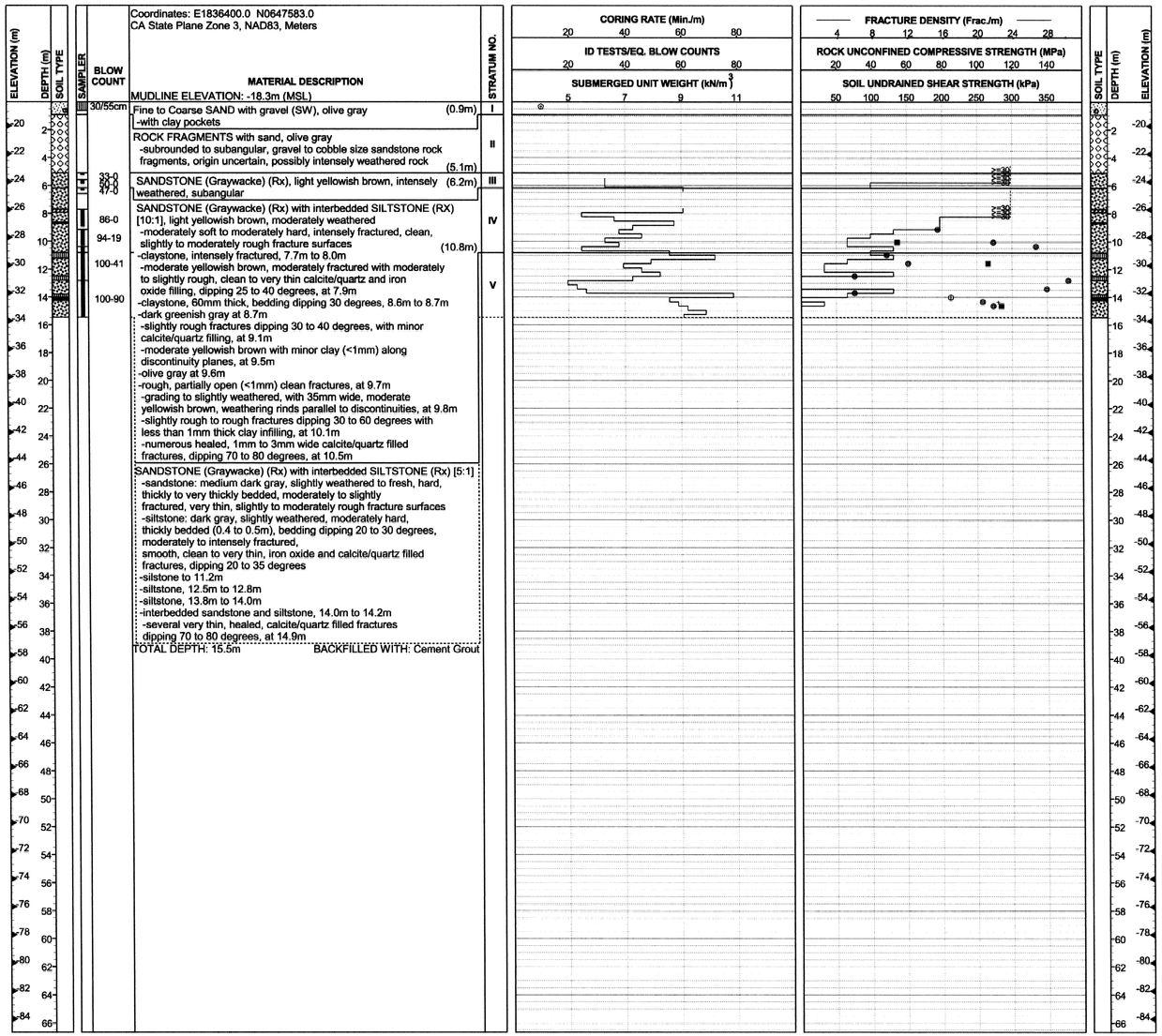
BORING 98-48

Coordinates: E1836400.0 N0647583.0
CA State Plane Zone 3, NAD83, Meters

MUDLINE ELEVATION: -18.3m (MSL)

Material Description	Stratum No.
Fine to Coarse SAND with gravel (SW), olive gray (0.9m)	I
-with clay pockets	
ROCK FRAGMENTS with sand, olive gray -subrounded to subangular, gravel to cobble size sandstone rock fragments, origin uncertain, possibly intensely weathered rock (5.1m)	II
SANDSTONE (Graywacke) (Rx), light yellowish brown, intensely weathered, subangular (6.2m)	III
SANDSTONE (Graywacke) (Rx) with interbedded SILTSTONE (RX) [10:1], light yellowish brown, moderately weathered -moderately soft to moderately hard, intensely fractured, clean, slightly to moderately rough fracture surfaces (10.8m)	IV
-claystone, intensely fractured, 7.7m to 8.0m -moderate yellowish brown, moderately fractured with moderately to slightly rough, clean to very thin calcite/quartz and iron oxide filling, dipping 25 to 40 degrees, at 7.9m -claystone, 60mm thick, bedding dipping 30 degrees, 8.6m to 8.7m -dark greenish gray at 8.7m -slightly rough fractures dipping 30 to 40 degrees, with minor calcite/quartz filling, at 9.1m -moderate yellowish brown with minor clay (<1mm) along discontinuity planes, at 9.5m -olive gray at 9.6m -rough, partially open (<1mm) clean fractures, at 9.7m -grading to slightly weathered, with 35mm wide, moderate yellowish brown, weathering rinds parallel to discontinuities, at 9.8m -slightly rough to rough fractures dipping 30 to 60 degrees with less than 1mm thick clay infilling, at 10.1m -numerous healed, 1mm to 3mm wide calcite/quartz filled fractures, dipping 70 to 80 degrees, at 10.5m	V
SANDSTONE (Graywacke) (Rx) with interbedded SILTSTONE (Rx) [5:1] -sandstone: medium dark gray, slightly weathered to fresh, hard, thickly to very thickly bedded, moderately to slightly fractured, very thin, slightly to moderately rough fracture surfaces -siltstone: dark gray, slightly weathered, moderately hard, thickly bedded (0.4 to 0.5m), bedding dipping 20 to 30 degrees, moderately to intensely fractured, smooth, clean to very thin, iron oxide and calcite/quartz filled fractures, dipping 20 to 35 degrees -siltstone to 11.2m -siltstone, 12.5m to 12.8m -siltstone, 13.8m to 14.0m -interbedded sandstone and siltstone, 14.0m to 14.2m -several very thin, healed, calcite/quartz filled fractures dipping 70 to 80 degrees, at 14.9m	

TOTAL DEPTH: 15.5m BACKFILLED WITH: Cement Grout



DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES
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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9,0.0/1.2	123	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 19

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — Sheet 101 of 120

To accompany plans dated 7-22-13

SABA MOHAN — GEOTECHNICAL DESIGN OVERSIGHT	DRAWN BY: SACHIN DESHPANDE	C. PRENTICE, J. BIANCHIN — FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
	CHECKED BY: T. MCADAM	DATE: SEE ABOVE	

T.W.McNEILAN — PROJECT ENGINEER

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

CU 04
EA 0120F1

BRIDGE NO.	KM POST	POST MILE
34-0006L/R	13.2/13.9	8.2/8.7

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 19

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) SHEET 768 OF

33-0025-s-lotb19_740.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)
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- 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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- 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 (kN/m³)
- THEORETICAL SUBMERGED UNIT WEIGHT (kN/m³)
- PLASTIC LIMIT LIQUID LIMIT
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- (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 (Nk=12-15)
- POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- UNCONFINED COMPRESSION (ROCK)
- FRACTURE DENSITY (ROCK)

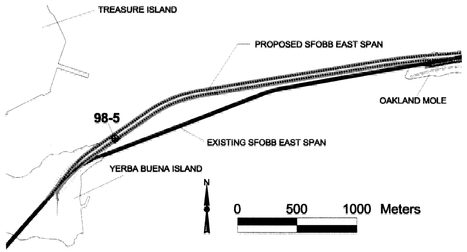
STRENGTH OF COHESIVE SOILS

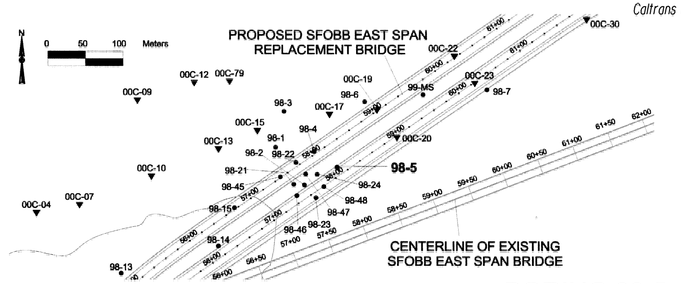
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

DENSITY OF GRANULAR SOILS

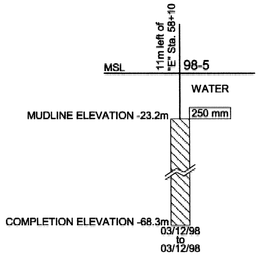
Descriptive Term	Relative Density (%)*
Very Loose	less than 15
Loose	15 to 35
Medium Dense	35 to 65
Dense	65 to 85
Very Dense	greater than 85

*Estimated from sampler driving record and CPT tip resistance.





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



Metric

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1186	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/06 Geotechnical STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 846,
Oakland, CA 94621
(510) 562- 8833, FAX (510) 562- 8858

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.

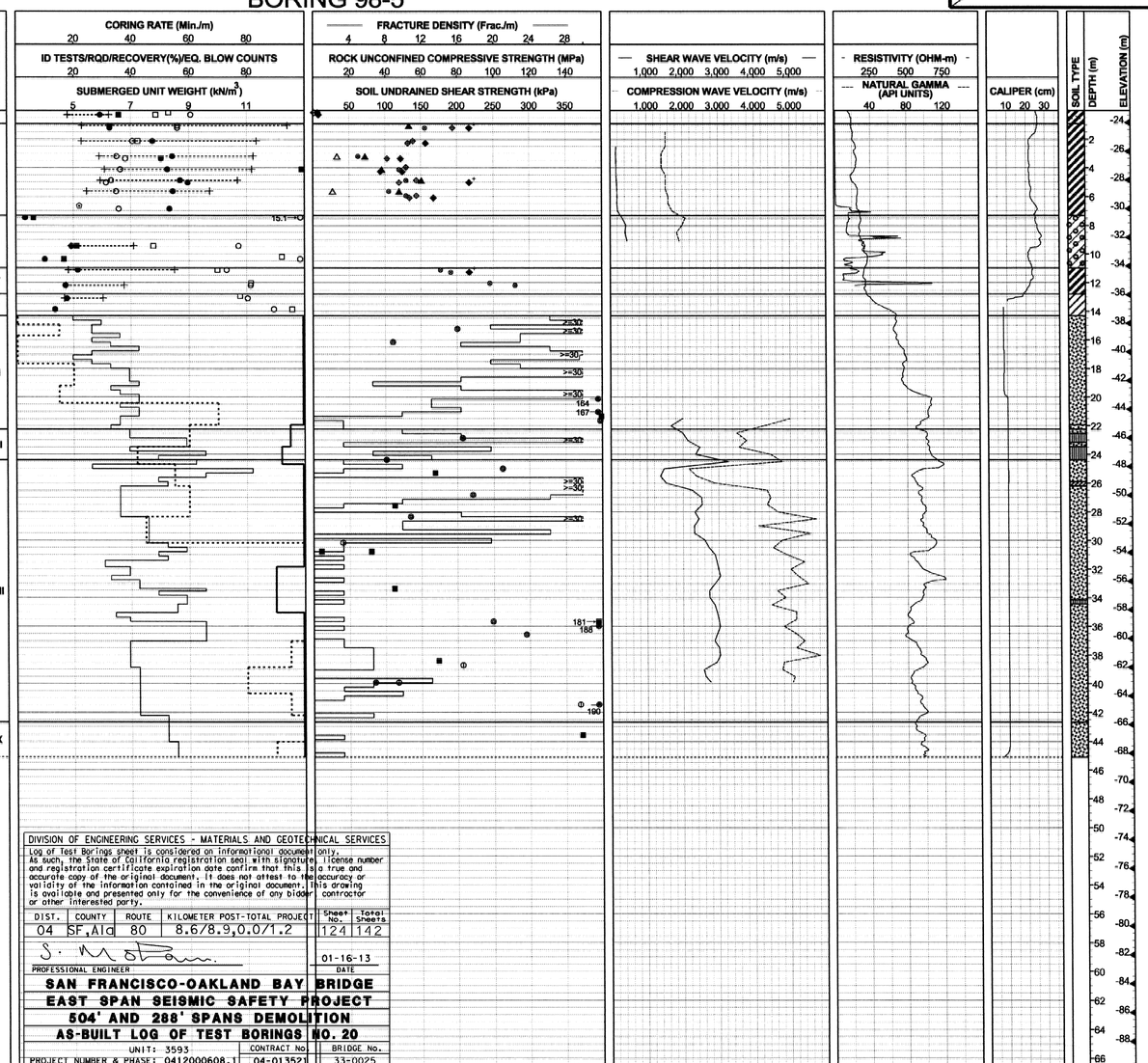
BORING 98-5

Coordinates: E1836418 N647608
CA State Plane Zone 3, NAD83, Meters

Blow Count	Material Description	Stratum No.
	MUDLINE ELEVATION: -23.2m (MSL)	
WOH / 15/45cm	Sandy Fat CLAY (CH), very soft, olive gray, with shell fragments (0.9m)	I
12/45cm, 16/60cm, 28/60cm, PUSH, PUSH, 22	Fat CLAY (CH), very stiff to hard, olive green -with shell fragments and mica -with sand pockets to 2.4m -with silt pockets below 2.7m -with silt partings at 5.5m (7.3m)	II
50/25cm, 47/30cm, 60/30cm, 30/30cm	Coarse GRAVEL with clay (GP-GC) to Clayey Coarse GRAVEL (GC), hard, olive green (11.0m)	III
19/30cm, 30/30cm	Lean to Fat CLAY (CH), hard, olive brown (12.8m)	IV
30/25cm, 30/15cm	Lean CLAY (CL), hard , moderate yellowish brown (14.3m)	V
30/5cm, 100-0, 100-15, 100-0, 100-0, 100-20, 100-15, 100-70, 95-60	SANDSTONE (Graywacke)(RX), moderate brown, soft, intensely fractured into 2- to 4-inch-long pieces -yellowish brown, intensely weathered to moderately weathered, moderately hard, 14.6m to 19.5m -moderately weathered, 18.0m to 18.9m -very intensely fractured, 18.3m to 18.6m -medium dark gray, moderately to slightly weathered, moderately hard to hard, 19.5m to 20.4m -slightly weathered, moderately to slightly fractured, below 20.4m (22.3m) -with a 150mm-thick claystone bed dipping 20 degrees, at 21.9m	VI
92-42, 100-55	SILTSTONE (RX) thinly interbedded with CLAYSTONE (RX) and SANDSTONE (Graywacke)(RX) dark gray, slightly weathered, moderately hard to hard, moderately fractured (24.4m) -polished fractures (bedding plane) surfaces in siltstone and claystone	VII
100-60, 100-45, 100-100, 90-90, 90-90, 100-100, 100-100, 100-95, 100-80, 100-95	SANDSTONE (Graywacke) (RX), dark gray, fresh, hard, slightly to moderately fractured -very intensely fractured claystone bed, 25.9m to 26.2m -moderately fractured with intensely fractured intervals, 20, 50, and 60 degrees, slightly to moderately rough, clean to thin patchy calcite/quartz filling, 26.2m to 30.2m -50mm-thick claystone bed dipping at 25 degrees, at 34.3m (42.7m)	VIII
100-100, 100-90	SANDSTONE (RX), medium dark gray, slightly weathered, hard, very slightly to slightly fractured	IX

TOTAL DEPTH: 45.1m BACKFILLED WITH: Cement Grout

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



SABA MOHAN
REGISTERED PROFESSIONAL ENGINEER No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

6-9-14
PLAN APPROVAL DATE

DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

Log of Test Borings sheet is considered an informational document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. It does not attest to the accuracy or validity of the information contained in the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.

DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9,0.0/1.2	124	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 20

UNIT: 3593 CONTRACT No. BRIDGE No. 33-0025
PROJECT NUMBER & PHASE: 0412000608,1 04-013521
NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA
Sheet 102 of 120

To accompany plans dated 7-22-13

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 20

SABA MOHAN, GEOTECHNICAL DESIGN OVERSIGHT	DRAWN BY: SACHIN DESHPANDE	C. PRENTICE/ C. LOVATO, FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
	CHECKED BY: J.CHACKO	DATE: SEE ABOVE	

T.W.McNEILAN, PROJECT ENGINEER

BRIDGE NO. 34-0006L/R
KM POST 13.2/13.9
POST MILE 8.2/8.7

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

CU 04
EA 0120F1

DISREGARD PRINTS BEARING EARLIER REVISION DATES →
REVISION DATES (PRELIMINARY STAGE ONLY)
SHEET 769 OF

33-0025-s-lotb20_741.tif

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

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1187	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/06 Geotechnical STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 846,
Oakland, CA 94621
(510) 562- 8833, FAX (510) 562- 8858

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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
- 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 (kN/m³)
- THEORETICAL SUBMERGED UNIT WEIGHT (kN/m³)
- 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 (Nk=12-15)
- POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- UNCONFINED COMPRESSION (ROCK)
- FRACTURE DENSITY (ROCK)

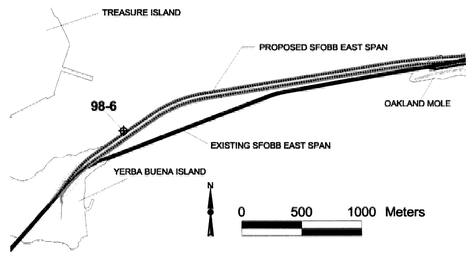
STRENGTH OF COHESIVE SOILS

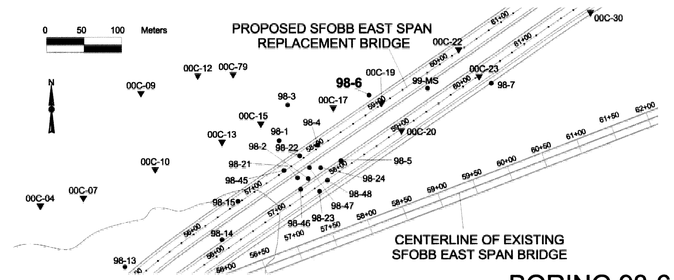
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

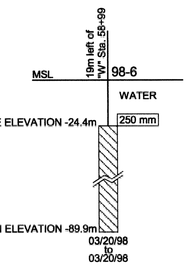
DENSITY OF GRANULAR SOILS

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.







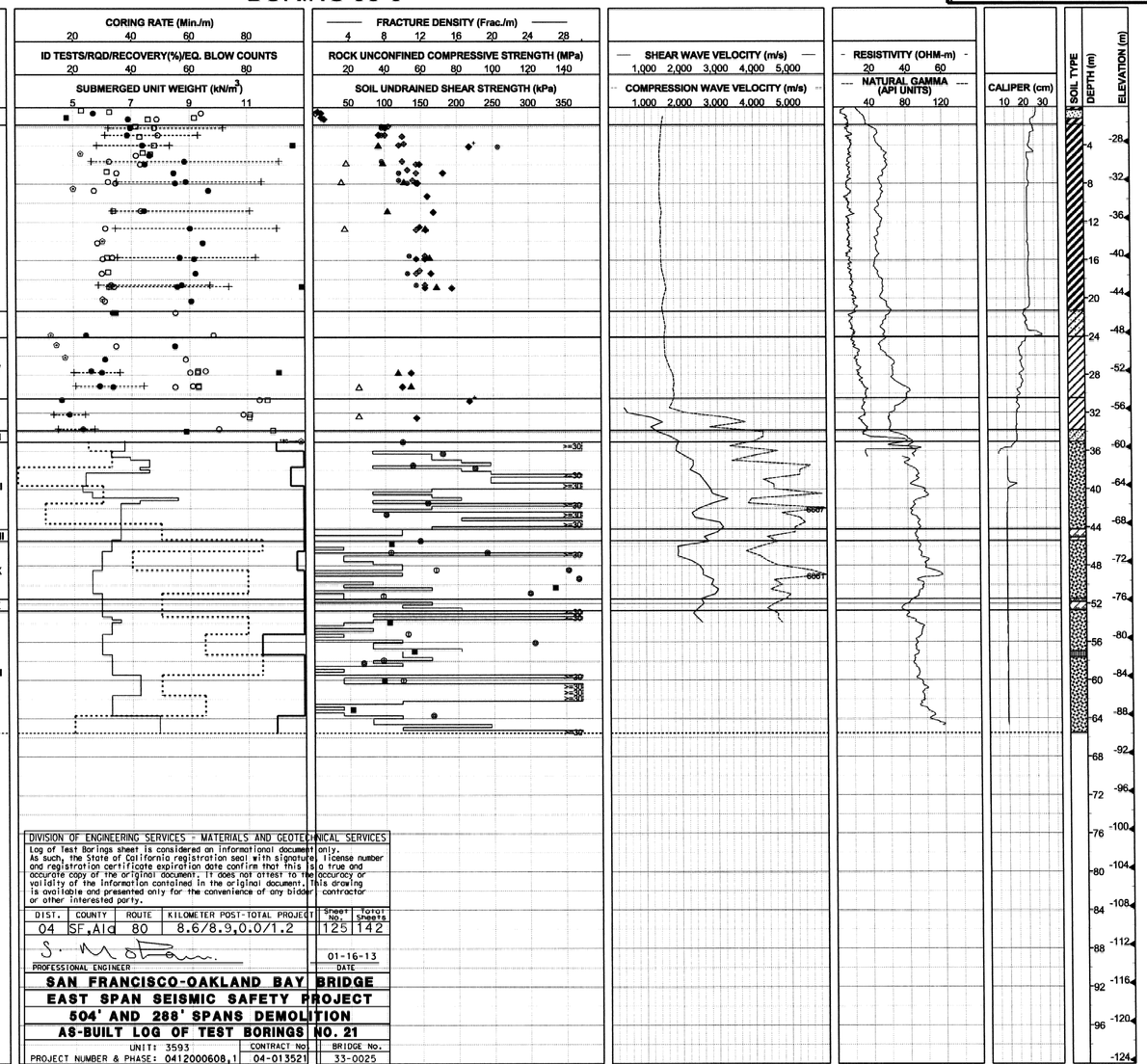
BORING 98-6

Coordinates: E1836455 N647696
CA State Plane Zone 3, NAD83, Meters

MUDLINE ELEVATION: -24.4m (MSL)

Blow Count	Material Description	Stratum No.
WOH, WOH	Fat CLAY (CH), very soft, olive gray (1.8m)	I
5/30cm, 8/30cm, 22/45cm, 36	-with organic matter pockets at 0.2m -sand layer with clay pockets and shell fragments, 0.3m to 1.1m -with sand pockets and shell fragments, at 1.2m	II
PUSH, PUSH, PUSH, 20, PUSH, PUSH, 30, PUSH, PUSH, PUSH, 30, PUSH	Fat CLAY (CH), greenish gray to olive gray, stiff to hard -with a few silt partings and seams, at 2.1m -with silt partings at 3.0m -greenish gray, 3.7m to 6.1m -with cemented sand pockets, 3.7m to 5.2m -with sand pockets at 4.9m -with shell fragments, 7.3m to 15.8m -with silt partings at 7.6m -with silt partings at 17.1m -with silt partings and shell fragments, at 20.1m (21.3m)	
12, 14, 17	Sandy Lean CLAY with gravel (CL), stiff to very stiff, grayish green -with many shell fragments and rounded gravel to 20mm-diameter -with sand pockets and a few shell fragments, at 23.8m (24.1m)	III
15/35cm, 30/50cm	Lean CLAY (CL), very stiff, grayish green -with many shell fragments (30.5m)	IV
30/25cm, 30/45cm, 30/50cm	Lean CLAY (CL), very stiff, dark gray to olive gray (33.8m)	V
30/5cm	Clayey SAND (SC), grayish green (35.1m)	VI
90-25, 100-33, 95-0, 100-30, 100-10	SANDSTONE-Graywacke (RX), moderate yellowish brown, moderately weathered, moderately hard, thickly to very thickly bedded, intensely fractured, fractures in sets inclined at 20, 50, 60, and 70-80 degrees (44.2m)	VII
100-50, 100-85, 97-40	SANDSTONE moderately to thinly interbedded with SILTSTONE (RX) [3:1], slightly weathered, moderately to intensely fractured, moderately spaced fractures, moderately thin fractures, slightly rough (45.4m)	VIII
100-80	SANDSTONE-Graywacke (RX), medium dark gray, slightly weathered to fresh, hard, thickly bedded, with closed, tight calcite filled fractures, moderately thin to thin, slightly rough (51.5m)	IX
100-50, 100-80, 85-65	SANDSTONE (RX) interbedded with SILTSTONE (RX)[2:1], slightly weathered, moderately to intensely fractured, moderately spaced, clean, slightly rough, with yellowish brown stains and large patches of calcite (52.7m)	X
100-85, 100-50, 100-65, 90-20	SANDSTONE-Graywacke (RX), medium dark gray, slightly weathered, hard, thickly bedded, unfractured to slightly fractured, widely spaced, clean, moderately to slightly rough, with a few closed, tight, calcite and quartz filled fractures -with laminated, dark gray, moderately hard to hard, intensely fractured siltstone, 56.8m to 57.5m -with thin quartz and calcite filled fractures dipping at 30 to 80 degrees, below 57.5m	XI

TOTAL DEPTH: 65.5m BACKFILLED WITH: Cement Grout



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

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

6-9-14
PLAN APPROVAL DATE

DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES
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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9,0.0/1.2	125	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 21

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — Sheet 103 of 120

To accompany plans dated 7-22-13

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 21

SABA MOHAN, GEOTECHNICAL DESIGN OVERSIGHT	DRAWN BY: SACHIN DESHPANDE	C. PRENTICE, K. NESSLER, C. LOVATO, R. PETERS, FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
	CHECKED BY: J.CHACKO	DATE: SEE ABOVE	

T.W.McNEILAN, PROJECT ENGINEER

BRIDGE NO. 34-0006L/R
KM POST 13.2/13.9
POST MILE 8.2/8.7

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

CU 04
EA 0120F1

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET 770 | OF

33-0025-s-lotb21_742.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)
- PAVEMENT

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

STANDARD PENETRATION TEST (SPT) AND MODIFIED CALIFORNIA (MC) LINER SAMPLERS

Samplers were driven with a 63.5 kg 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.

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.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ SUBMERGED UNIT WEIGHT (kN/m³)
- ○ THEORETICAL SUBMERGED UNIT WEIGHT (kN/m³)
- PLASTIC LIMIT + LIQUID LIMIT +
- ⊗ EQUIVALENT SPT BLOW COUNT = (MC BLOWCOUNT/1.6) OR SPT BLOWCOUNT
- •••• 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)
- Shear Strength Interpreted from CPT Tip Resistance (Nk = 12-15)
- ● POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- ◐ POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- ┼ Soil: Strength Exceeds Capacity of Measuring Device
  Rock: Sample broke along discontinuity; Intact sample would have greater strength
- ▬ FRACTURE DENSITY (ROCK)

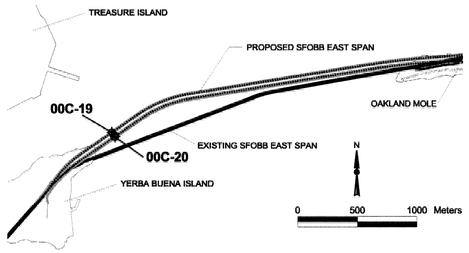
STRENGTH OF COHESIVE SOILS

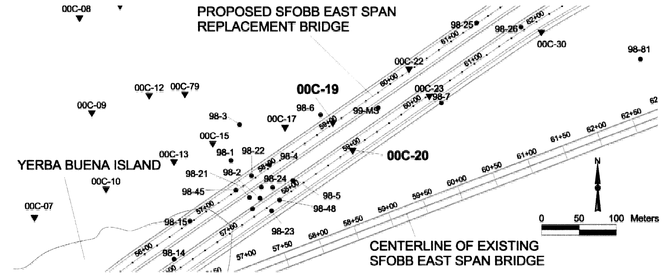
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

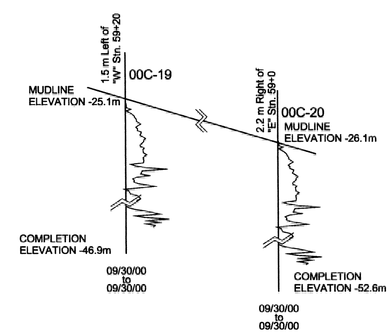
DENSITY OF GRANULAR SOILS

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.







DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1188	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — T.W. McNeilan — No. 0583 — Exp. 12/31/06 — Geotechnical — STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
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Caltrans now has a web site! To get to the web site, go to: http://www.dot.ca.gov

NOTES:

1. Pore pressures are relative to hydrostatic pressure at the mudline.
2. Breaks in the data are due to pauses in the sounding during installation of casing.

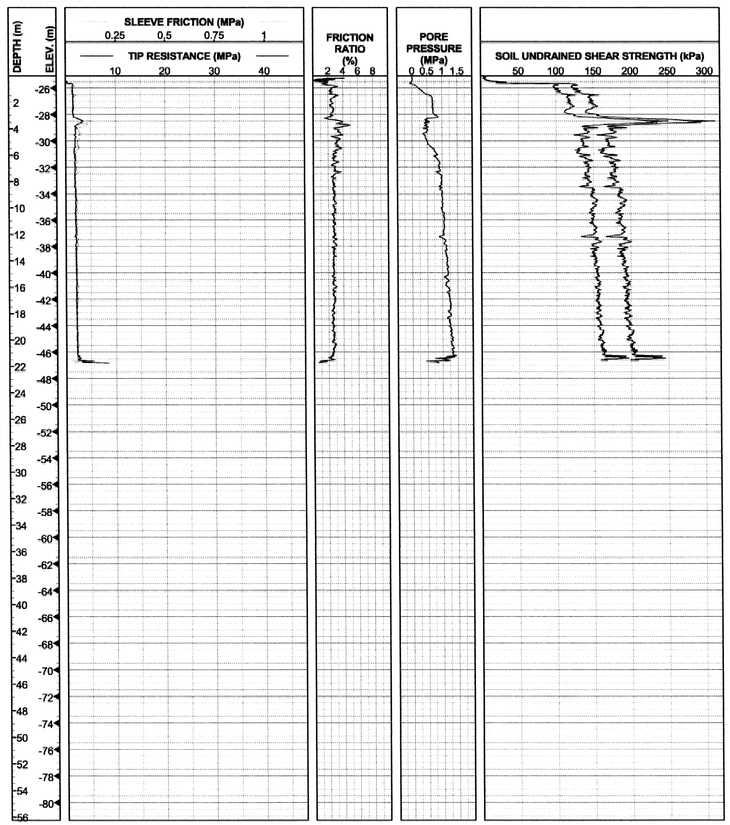
6-9-14
PLAN APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — SABA MOHAN — No. C63519 — Exp. 09-30-14 — CIVIL — STATE OF CALIFORNIA

CPT 00C-19

COORDINATES: E1836472 N647684
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -25.1m (MSL)
START DATE: 09/30/00

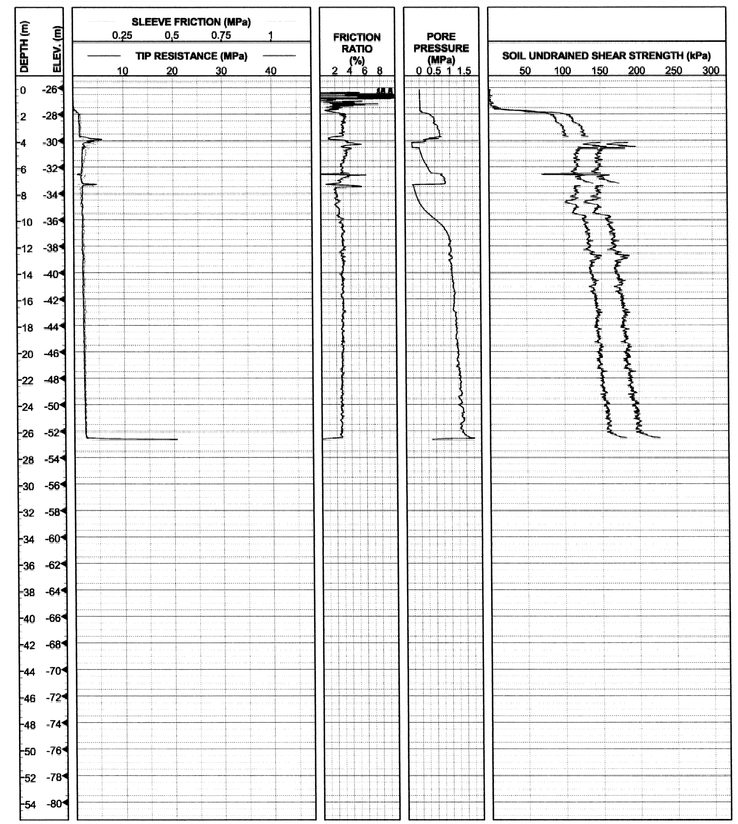
STATION: 1.5 m Left of "W" Stn. 59+20
COMPLETION ELEVATION: -46.9m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



CPT 00C-20

COORDINATES: E1836498 N647647
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -26.1m (MSL)
START DATE: 09/30/00

STATION: 2.2 m Right of "E" Stn. 59+0
COMPLETION ELEVATION: -52.6m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9,0.0/1.2	126	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 22

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — Sheet 104 of 120

To accompany plans dated 7-22-13

SABA MOHAN — GEOTECHNICAL DESIGN OVERSIGHT	DRAWN BY	S.DESHPANDE	P.ROBINS — FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	T.W.McNEILAN — PROJECT ENGINEER
	CHECKED BY	A. BROUGHTON	DATE See above		

BRIDGE NO. 34-0006R/L
KM POST 13.2/13.9
POST MILE 8.2/8.7

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

CU 04
EA 0120F1

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 22

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) — SHEET 771 OF

33-0025-s-lotb22_743.tif

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1189	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER
T.W. McNeilan
No. 0583
Exp. 12/31/06
Geotechnical
STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 846,
Oakland, CA 94621
(510) 562- 8833, FAX (510) 562- 8858

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6-9-14
PLAN APPROVAL DATE

NOTES:

1. Pore pressures are relative to hydrostatic pressure at the mudline.
2. Breaks in the data are due to pauses in the sounding during installation of casing.

REGISTERED PROFESSIONAL ENGINEER
SABA MOHAN
No. C63519
Exp. 09-30-14
CIVIL
STATE OF CALIFORNIA

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)
- PAVEMENT

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

STANDARD PENETRATION TEST (SPT) AND MODIFIED CALIFORNIA (MC) LINER SAMPLERS

Samplers were driven with a 63.5 kg 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.

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.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ SUBMERGED UNIT WEIGHT (kN/m³)
- ○ THEORETICAL SUBMERGED UNIT WEIGHT (kN/m³)
- PLASTIC LIMIT + LIQUID LIMIT +
- ⊗ EQUIVALENT SPT BLOW COUNT = (MC BLOWCOUNT/1.6) OR SPT BLOWCOUNT
- ···· 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)
- Shear Strength Interpreted from CPT Tip Resistance (Nk = 12-15)
- ● POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- ◐ POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- ┼ Soil: Strength Exceeds Capacity of Measuring Device
  Rock: Sample broke along discontinuity; Intact sample would have greater strength
- —— FRACTURE DENSITY (ROCK)

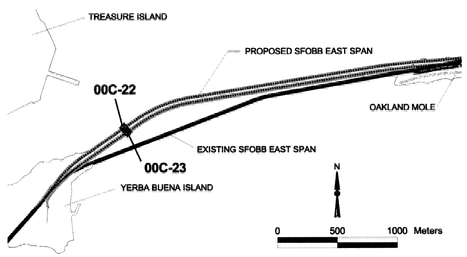
STRENGTH OF COHESIVE SOILS

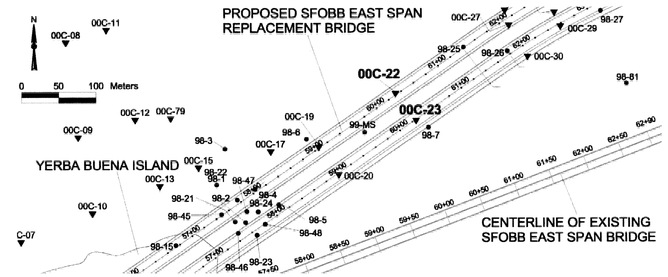
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

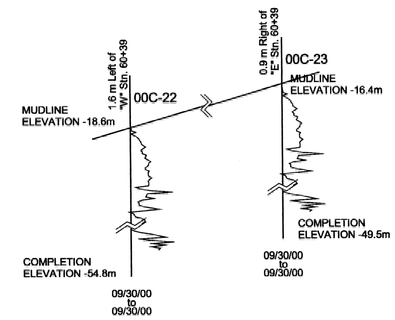
DENSITY OF GRANULAR SOILS

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.



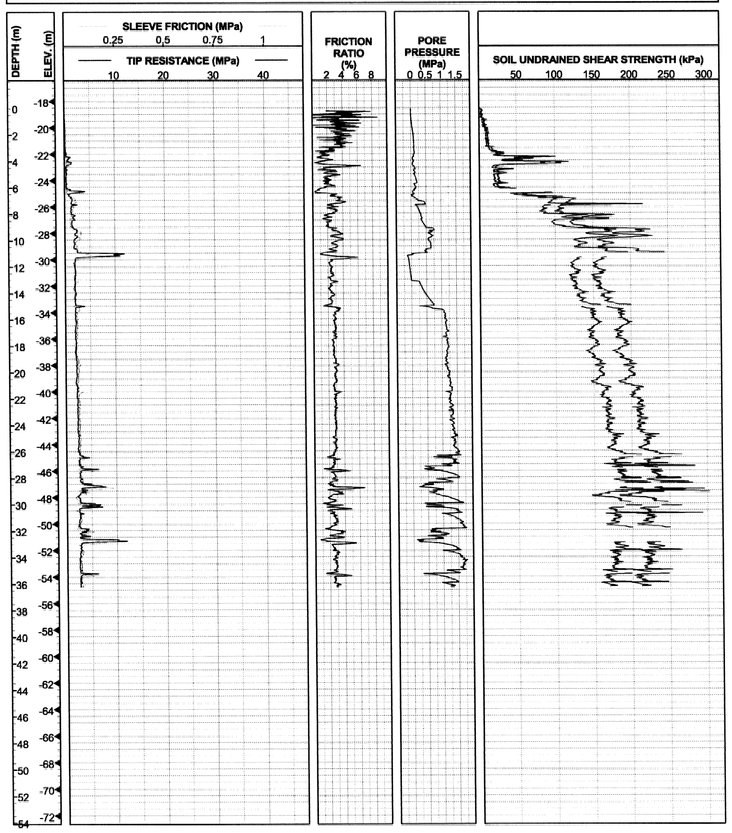




CPT 00C-22

COORDINATES: E1836575 N647756
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -18.6m (MSL)
START DATE: 09/30/00

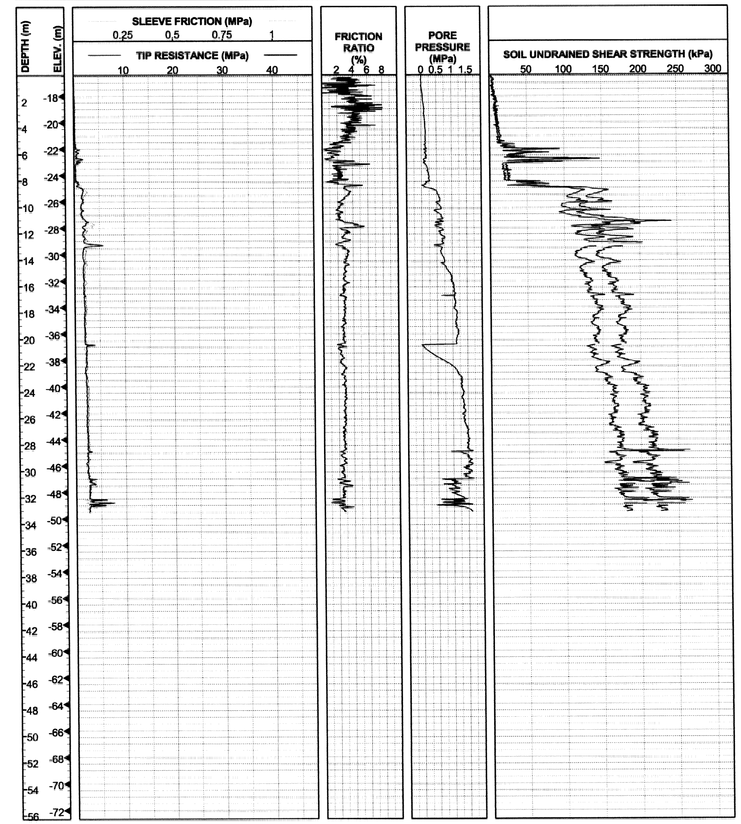
STATION: 1.6 m Left of "W" Stn. 60+39
COMPLETION ELEVATION: -54.8m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



CPT 00C-23

COORDINATES: E1836602 N647720
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -16.4m (MSL)
START DATE: 09/30/00

STATION: 0.9 m Right of "E" Stn. 60+39
COMPLETION ELEVATION: -49.5m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9,0.0/1.2	127	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 23

UNIT: 3593
PROJECT NUMBER & PHASE: 0412000608,1

CONTRACT No.	BRIDGE No.
04-013521	33-0025

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

Sheet	of
105	120

To accompany plans dated 7-22-13

SABA MOHAN
GEOTECHNICAL DESIGN OVERSIGHT

DRAWN BY: S.DESHPANDE
CHECKED BY: A. BROUGHTON

P.ROBINS
FIELD INVESTIGATOR
DATE See above

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

T.W.McNEILAN
PROJECT ENGINEER

BRIDGE NO. 34-0006R/L
KM POST 13.2/13.9
POST MILE 8.2/8.7

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

CU 04
EA 0120F1

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 23

DISREGARD PRINTS BEARING EARLIER REVISION DATES →
REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 772 OF

33-0025-s-lotb23_744.tif

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1190	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/06 Geotechnical STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 846,
Oakland, CA 94621
(510) 562- 8823, FAX (510) 562- 8858

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Metric

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
- 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 (kN/m³)
- ○ THEORETICAL SUBMERGED UNIT WEIGHT (kN/m³)
- 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 (Nk = 12-15)
- ● POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- ⊙ POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- —— FRACTURE DENSITY (ROCK)

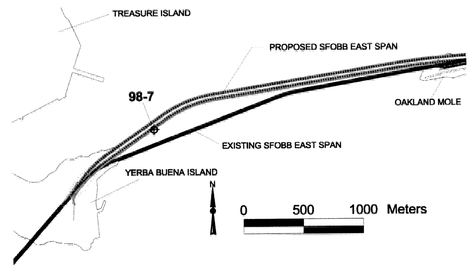
STRENGTH OF COHESIVE SOILS

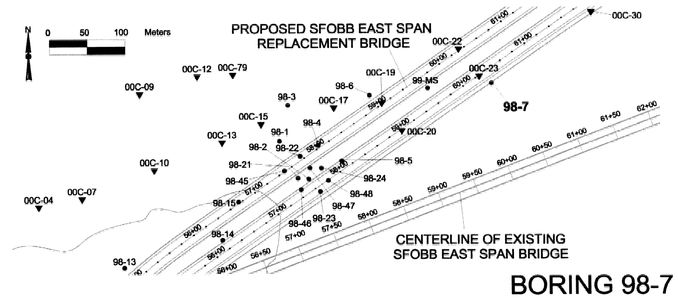
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

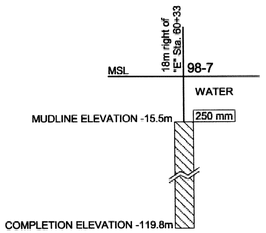
DENSITY OF GRANULAR SOILS

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.







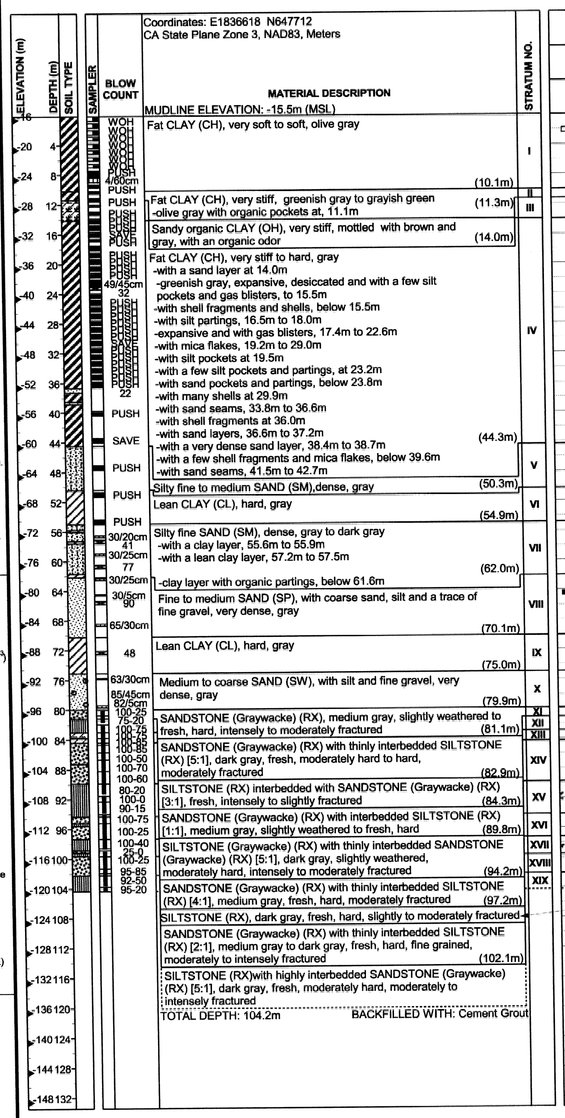
03/11/98

BORING 98-7

Coordinates: E1836618 N647712
CA State Plane Zone 3, NAD83, Meters

Material Description	Stratum No.
MUDLINE ELEVATION: -15.5m (MSL)	
Fat CLAY (CH), very soft to soft, olive gray (10.1m)	I
Fat CLAY (CH), very stiff, greenish gray to grayish green -olive gray with organic pockets at, 11.1m (11.3m)	II
Sandy organic CLAY (OH), very stiff, mottled with brown and gray, with an organic odor (14.0m)	III
Fat CLAY (CH), very stiff to hard, gray -with a sand layer at 14.0m -greenish gray, expansive, desiccated and with a few silt pockets and gas blisters, to 15.5m -with shell fragments and shells, below 15.5m -with silt partings, 16.5m to 18.0m -expansive and with gas blisters, 17.4m to 22.6m -with mica flakes, 19.2m to 29.0m -with silt pockets at 19.5m -with a few silt pockets and partings, at 23.2m -with sand pockets and partings, below 23.8m -with many shells at 29.9m -with sand seams, 33.8m to 36.6m -with shell fragments at 36.0m -with sand layers, 36.6m to 37.2m -with a very dense sand layer, 38.4m to 38.7m -with a few shell fragments and mica flakes, below 39.6m -with sand seams, 41.5m to 42.7m (44.3m)	IV
Silty fine to medium SAND (SM),dense, gray (50.3m)	V
Lean CLAY (CL), hard, gray (54.9m)	VI
Silty fine SAND (SM), dense, gray to dark gray -with a clay layer, 55.6m to 55.9m -with a lean clay layer, 57.2m to 57.5m (62.0m)	VII
-clay layer with organic partings, below 61.6m	
Fine to medium SAND (SP), with coarse sand, silt and a trace of fine gravel, very dense, gray (70.1m)	VIII
Lean CLAY (CL), hard, gray (75.0m)	IX
Medium to coarse SAND (SW), with silt and fine gravel, very dense, gray (79.9m)	X
SANDSTONE (Graywacke) (RX), medium gray, slightly weathered to fresh, hard, intensely to moderately fractured (81.1m)	XI, XII, XIII
SANDSTONE (Graywacke) (RX) with thinly interbedded SILTSTONE (RX) [5:1], dark gray, fresh, moderately hard to hard, moderately fractured (82.9m)	XIV
SILTSTONE (RX) interbedded with SANDSTONE (Graywacke) (RX) [3:1], fresh, intensely to slightly fractured (84.3m)	XV
SANDSTONE (Graywacke) (RX) with interbedded SILTSTONE (RX) [1:1], medium gray, slightly weathered to fresh, hard (89.8m)	XVI
SILTSTONE (Graywacke) (RX) with thinly interbedded SANDSTONE (Graywacke) (RX) [5:1], dark gray, slightly weathered, moderately hard, intensely to moderately fractured (94.2m)	XVII
SANDSTONE (Graywacke) (RX) with thinly interbedded SILTSTONE (RX) [4:1], medium gray, fresh, hard, moderately fractured (97.2m)	XVIII
SILTSTONE (RX), dark gray, fresh, hard, slightly to moderately fractured (99.5m)	XIX
SANDSTONE (Graywacke) (RX) with thinly interbedded SILTSTONE (RX) [2:1], medium gray to dark gray, fresh, hard, fine grained, moderately to intensely fractured (102.1m)	
SILTSTONE (RX)with highly interbedded SANDSTONE (Graywacke) (RX) [5:1], dark gray, fresh, moderately hard, moderately to intensely fractured	

TOTAL DEPTH: 104.2m BACKFILLED WITH: Cement Grout



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

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

6-9-14
PLAN APPROVAL DATE

DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES
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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF, Ala	80	8.6/8.9,0.0/1.2	128	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 24

UNIT: 3593 — CONTRACT No. — BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1 — 04-013521 — 33-0025
NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — Sheet 106 of 120

To accompany plans dated 7-22-13

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 24

SABA MOHAN, GEOTECHNICAL DESIGN OVERSIGHT	DRAWN BY: SACHIN DESHPANDE	J. CHACKO, M. ZUEGER, M. SEBESTA, FIELD INVESTIGATOR	T.W.McNEILAN, PROJECT ENGINEER
	CHECKED BY: A.RIDGWAY	DATE: SEE ABOVE	

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 04
EA 0120F1

BRIDGE NO.	KM POST	POST MILE
34-0006L/R	13.2/13.9	8.2/8.7

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) — SHEET 773 — OF

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1191	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/06 Geotechnical STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 846,
Oakland, CA 94621
(510) 562- 8833, FAX (510) 562- 8858

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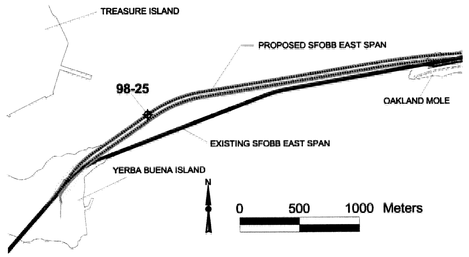
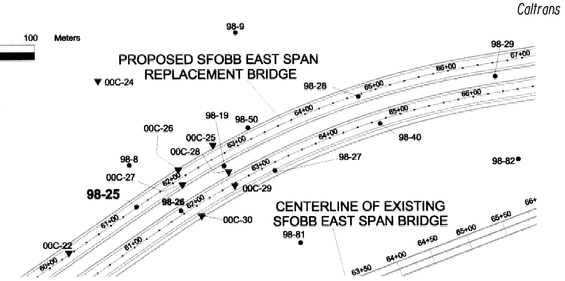
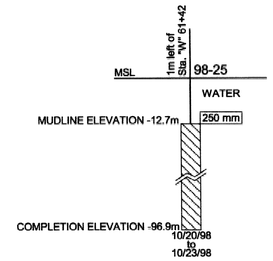
Caltrans now has a web site! To get to the web site, go to: http://www.dot.ca.gov

Metric







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; 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 (kN/m³)
- ○ THEORETICAL SUBMERGED UNIT WEIGHT (kN/m³)
- 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
- Shear Strength Interpreted from CPT Tip Resistance (Nk = 12-15)

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.

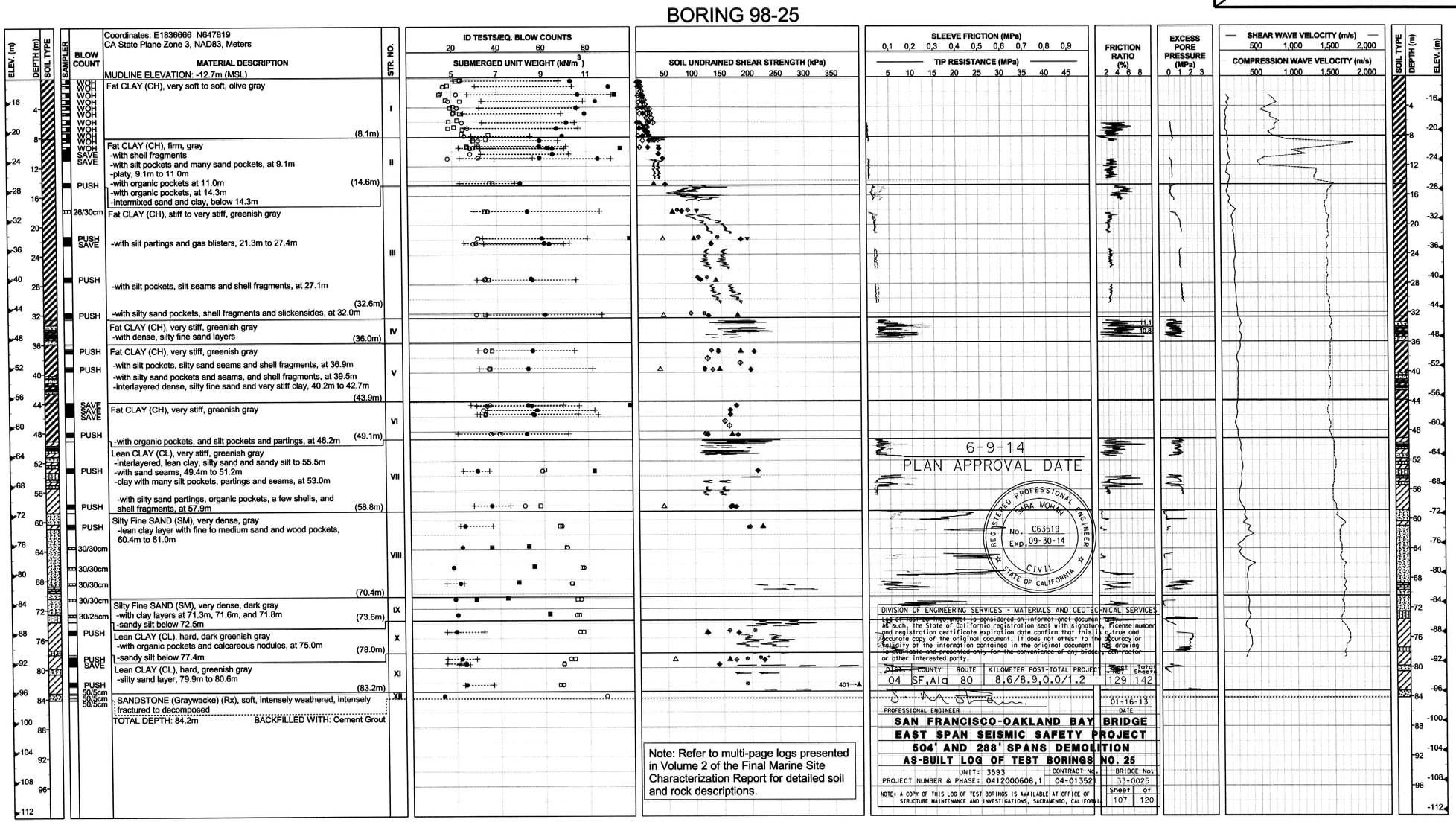
BORING 98-25

Coordinates: E1836666 N647819
CA State Plane Zone 3, NAD83, Meters

MATERIAL DESCRIPTION
MUDLINE ELEVATION: -12.7m (MSL)

BLOW COUNT	MATERIAL DESCRIPTION	STR. NO.
WOH WOH WOH WOH WOH WOH WOH WOH WOH WOH WOH	Fat CLAY (CH), very soft to soft, olive gray (8.1m)	I
SAVE SAVE SAVE PUSH	Fat CLAY (CH), firm, gray -with shell fragments -with silt pockets and many sand pockets, at 9.1m -platy, 9.1m to 11.0m -with organic pockets at 11.0m (14.6m) -with organic pockets, at 14.3m -intermixed sand and clay, below 14.3m	II
26/30cm PUSH SAVE	Fat CLAY (CH), stiff to very stiff, greenish gray -with silt partings and gas blisters, 21.3m to 27.4m	III
PUSH PUSH	-with silt pockets, silt seams and shell fragments, at 27.1m -with silty sand pockets, shell fragments and slickensides, at 32.0m (32.6m)	
	Fat CLAY (CH), very stiff, greenish gray -with dense, silty fine sand layers (36.0m)	IV
PUSH PUSH	Fat CLAY (CH), very stiff, greenish gray -with silt pockets, silty sand seams and shell fragments, at 36.9m -with silty sand pockets and seams, and shell fragments, at 39.5m -interlayered dense, silty fine sand and very stiff clay, 40.2m to 42.7m (43.9m)	V
SAVE SAVE SAVE PUSH	Fat CLAY (CH), very stiff, greenish gray -with organic pockets, and silt pockets and partings, at 48.2m (49.1m)	VI
PUSH PUSH	Lean CLAY (CL), very stiff, greenish gray -interlayered, lean clay, silty sand and sandy silt to 55.5m -with sand seams, 49.4m to 51.2m -clay with many silt pockets, partings and seams, at 53.0m -with silty sand partings, organic pockets, a few shells, and shell fragments, at 57.9m (58.8m)	VII
PUSH 30/30cm 30/30cm 30/30cm 30/30cm	Silty Fine SAND (SM), very dense, gray -lean clay layer with fine to medium sand and wood pockets, 60.4m to 61.0m (70.4m)	VIII
30/25cm	Silty Fine SAND (SM), very dense, dark gray -with clay layers at 71.3m, 71.6m, and 71.8m (73.6m) -sandy silt below 72.5m	IX
PUSH PUSH	Lean CLAY (CL), hard, dark greenish gray -with organic pockets and calcareous nodules, at 75.0m (78.0m) -sandy silt below 77.4m	X
PUSH 50/5cm 50/5cm 50/5cm	Lean CLAY (CL), hard, greenish gray -silty sand layer, 79.9m to 80.6m (83.2m)	XI
	SANDSTONE (Graywacke) (Rx), soft, intensely weathered, intensely fractured to decomposed	XII

TOTAL DEPTH: 84.2m BACKFILLED WITH: Cement Grout



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

6-9-14
PLAN APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

~~Log of Test Borings (LOTB) is considered an informational document.~~ As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. It does not attest to the accuracy or validity of the information contained in the original document. The drawing is available and presented only for the convenience of any bidder, contractor or other interested party.

DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9,0.0/1.2	129	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 25

UNIT: 3593 CONTRACT No. 04-01352 BRIDGE No. 33-0025
PROJECT NUMBER & PHASE: 0412000608,1
Sheet 107 of 120

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA

To accompany plans dated 7-22-13

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 25

SABA MOHAN, GEOTECHNICAL DESIGN OVERSIGHT	DRAWN BY: SACHIN DESHPANDE	P. ROBBINS, C. LAVATO, R. HOWARD, FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
	CHECKED BY: T. MCADAM	DATE: SEE ABOVE	

T.W.McNEILAN, PROJECT ENGINEER

CU 04
EA 0120F1

BRIDGE NO. 34-0006
KM POST 13.2/13.9
POST MILE 8.2/8.7

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

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET 774 | OF

33-0025-s-lotb25_746.tif

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1192	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/06 Geotechnical STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
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7700, Edgewater Dr., Ste. 846,
Oakland, CA 94621
(510) 562- 8833, FAX (510) 562- 8858

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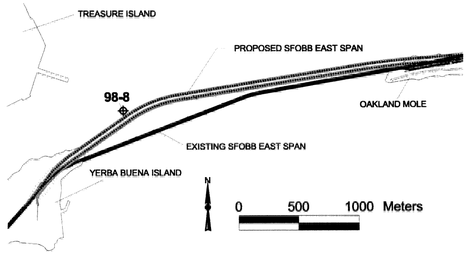
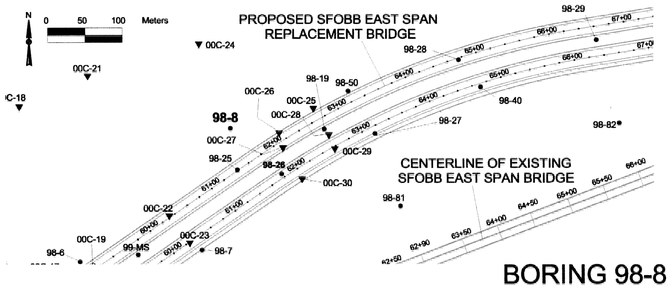
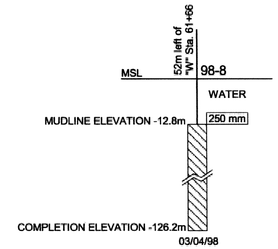
Metric







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
- 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 (kN/m³)
- ○ THEORETICAL SUBMERGED UNIT WEIGHT (kN/m³)
- + 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 (Nk = 12-15)
- ● 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.

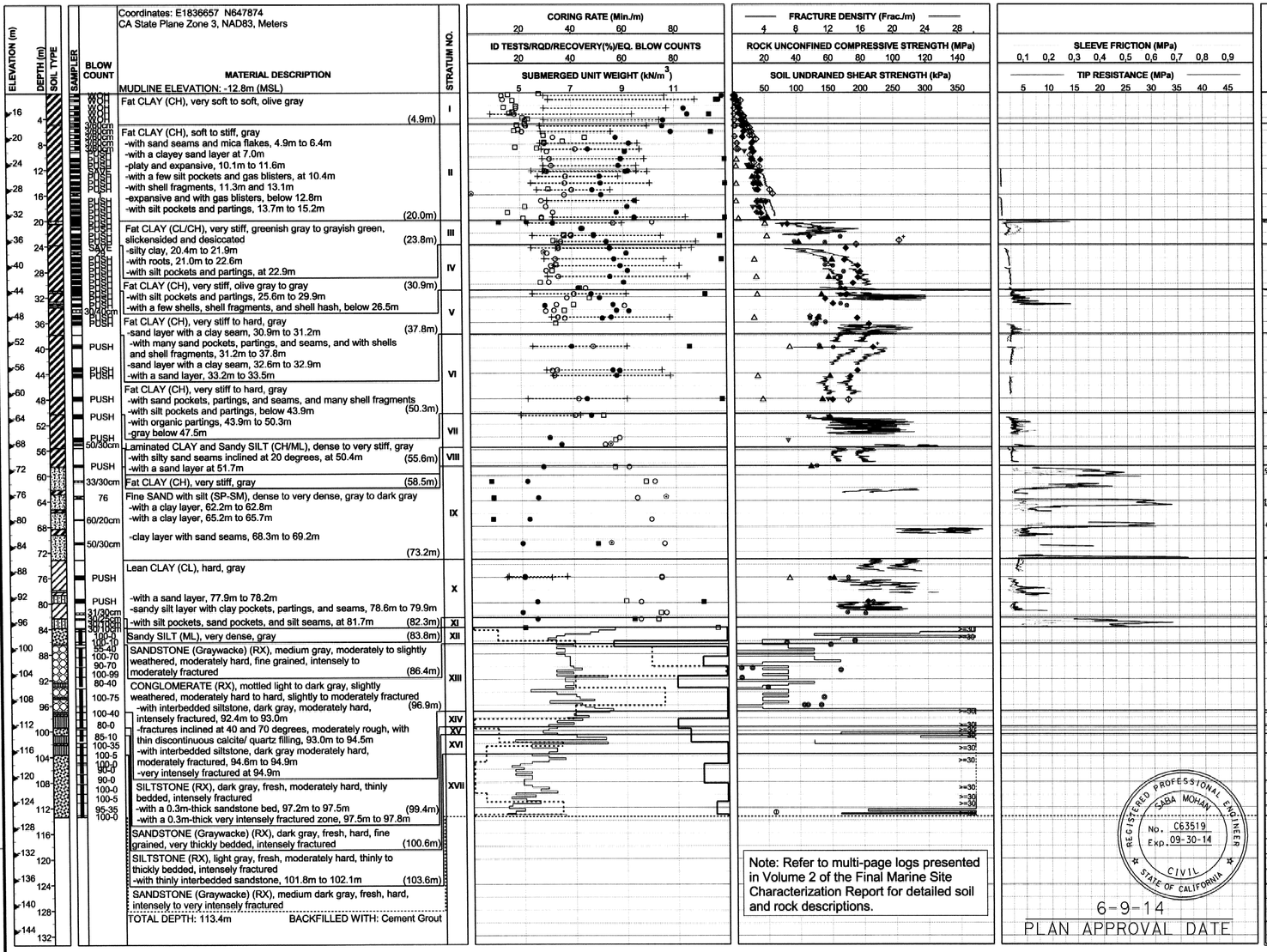
BORING 98-8

Coordinates: E1836657 N647874
CA State Plane Zone 3, NAD83, Meters

MUDLINE ELEVATION: -12.8m (MSL)

Stratum	Description	Depth
I	Fat CLAY (CH), very soft to soft, olive gray	(4.9m)
II	Fat CLAY (CH), soft to stiff, gray -with sand seams and mica flakes, 4.9m to 6.4m -with a clayey sand layer at 7.0m -platy and expansive, 10.1m to 11.6m -with a few silt pockets and gas blisters, at 10.4m -with shell fragments, 11.3m and 13.1m -expansive and with gas blisters, below 12.8m -with silt pockets and partings, 13.7m to 15.2m	(20.0m)
III	Fat CLAY (CL/CH), very stiff, greenish gray to grayish green, slickensided and desiccated	(23.8m)
IV	-silty clay, 20.4m to 21.9m -with roots, 21.0m to 22.6m -with silt pockets and partings, at 22.9m	(30.9m)
V	Fat CLAY (CH), very stiff, olive gray to gray -with silt pockets and partings, 25.6m to 29.9m -with a few shells, shell fragments, and shell hash, below 26.5m	
VI	Fat CLAY (CH), very stiff to hard, gray -sand layer with a clay seam, 30.9m to 31.2m -with many sand pockets, partings, and seams, and with shells and shell fragments, 31.2m to 37.8m -sand layer with a clay seam, 32.6m to 32.9m -with a sand layer, 33.2m to 33.5m	(37.8m)
VII	Fat CLAY (CH), very stiff to hard, gray -with sand pockets, partings, and seams, and many shell fragments -with silt pockets and partings, below 43.9m -with organic partings, 43.9m to 50.3m -gray below 47.5m	(50.3m)
VIII	Laminated CLAY and Sandy SILT (CH/ML), dense to very stiff, gray -with silty sand seams inclined at 20 degrees, at 50.4m -with a sand layer at 51.7m	(55.6m)
IX	Fat CLAY (CH), very stiff, gray Fine SAND with silt (SP-SM), dense to very dense, gray to dark gray -with a clay layer, 62.2m to 62.8m -with a clay layer, 65.2m to 65.7m -clay layer with sand seams, 68.3m to 69.2m	(58.5m) (73.2m)
X	Lean CLAY (CL), hard, gray -with a sand layer, 77.9m to 78.2m -sandy silt layer with clay pockets, partings, and seams, 78.6m to 79.9m	
XI	-with silt pockets, sand pockets, and silt seams, at 81.7m	(82.3m)
XII	Sandy SILT (ML), very dense, gray	(83.8m)
XIII	SANDSTONE (Graywacke) (RX), medium gray, moderately to slightly weathered, moderately hard, fine grained, intensely to moderately fractured	(86.4m)
XIV	CONGLOMERATE (RX), mottled light to dark gray, slightly weathered, moderately hard to hard, slightly to moderately fractured -with interbedded siltstone, dark gray, moderately hard, intensely fractured, 92.4m to 93.0m	(96.9m)
XV	-fractures inclined at 40 and 70 degrees, moderately rough, with thin discontinuous calcite/ quartz filling, 93.0m to 94.5m	
XVI	-with interbedded siltstone, dark gray moderately hard, moderately fractured, 94.6m to 94.9m -very intensely fractured at 94.9m	
XVII	SILTSTONE (RX), dark gray, fresh, moderately hard, thinly bedded, intensely fractured -with a 0.3m-thick sandstone bed, 97.2m to 97.5m -with a 0.3m-thick very intensely fractured zone, 97.5m to 97.8m	(99.4m)
	SANDSTONE (Graywacke) (RX), dark gray, fresh, hard, fine grained, very thickly bedded, intensely fractured	(100.6m)
	SILTSTONE (RX), light gray, fresh, moderately hard, thinly to thickly bedded, intensely fractured -with thinly interbedded sandstone, 101.8m to 102.1m	(103.6m)
	SANDSTONE (Graywacke) (RX), medium dark gray, fresh, hard, intensely to very intensely fractured	

TOTAL DEPTH: 113.4m BACKFILLED WITH: Cement Grout



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

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

6-9-14
PLAN APPROVAL DATE

DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF, Ala	80	8.6/8.9, 0.0/1.2	130	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 26

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 04 2000608, 1	04-013521	33-0025

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — Sheet 108 of 120

To accompany plans dated 7-22-13

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 26

SABA MOHAN, GEOTECHNICAL DESIGN OVERSIGHT	DRAWN BY	SACHIN DESHPANDE	
	CHECKED BY	T. MCADAM	
J.CHACKO, M.ZUEGER, FIELD INVESTIGATOR	DATE	See above	

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

T.W.McNEILAN, PROJECT ENGINEER

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

CU 04
EA 0120F1

BRIDGE NO.	KM POST	POST MILE
34-0006L/R	13.2/13.9	8.2/8.7

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET 775 | OF

33-0025-s-lotb26_747.tif

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DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1193	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/06 Geotechnical STATE OF CALIFORNIA

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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
- 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 (kN/m³)
- ○ THEORETICAL SUBMERGED UNIT WEIGHT (kN/m³)
- 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
- Shear Strength Interpreted from CPT Tip Resistance (Nk = 12-15)

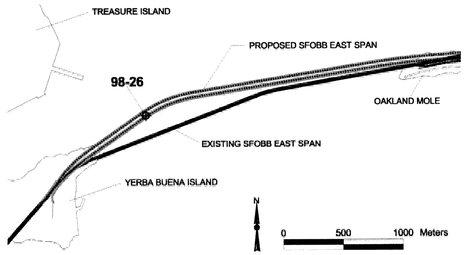
STRENGTH OF COHESIVE SOILS

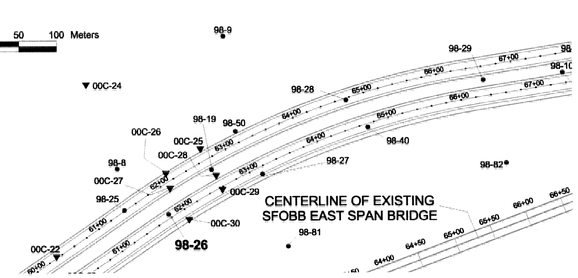
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

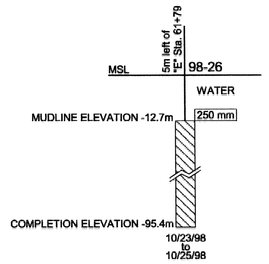
DENSITY OF GRANULAR SOILS

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.







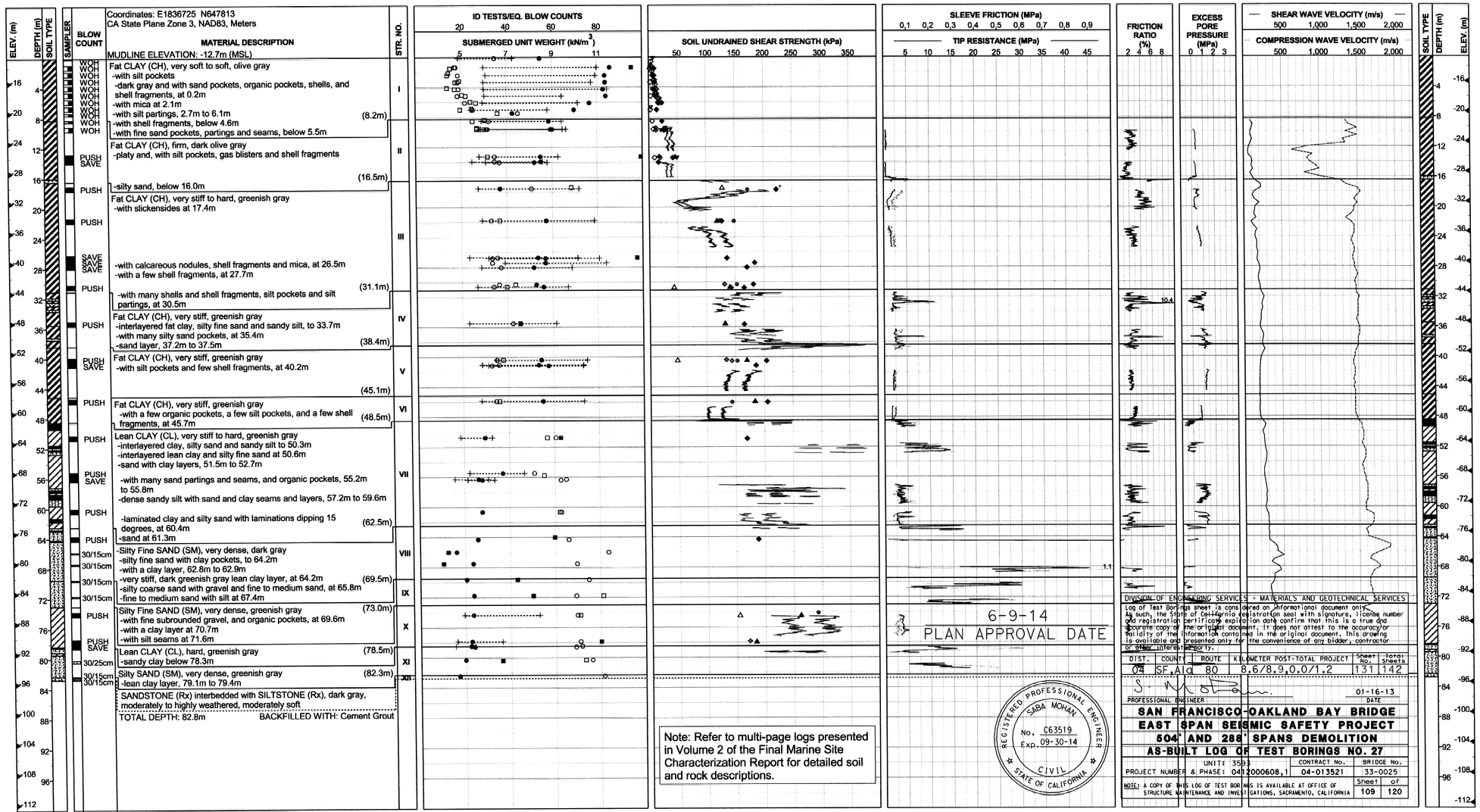
BORING 98-26

Coordinates: E1836725 N647813
CA State Plane Zone 3, NAD83, Meters

MUDLINE ELEVATION: -12.7m (MSL)

BLOW COUNT	MATERIAL DESCRIPTION	STR. NO.
WOH, WOH, WOH, WOH, WOH, WOH, WOH, WOH	Fat CLAY (CH), very soft to soft, olive gray -with silt pockets -dark gray and with sand pockets, organic pockets, shells, and shell fragments, at 0.2m -with mica at 2.1m -with silt partings, 2.7m to 6.1m -with shell fragments, below 4.6m -with fine sand pockets, partings and seams, below 5.5m (8.2m)	I
PUSH, SAVE	Fat CLAY (CH), firm, dark olive gray -platy and, with silt pockets, gas blisters and shell fragments -silty sand, below 16.0m (16.5m)	II
PUSH, PUSH, SAVE, SAVE, SAVE, PUSH	Fat CLAY (CH), very stiff to hard, greenish gray -with slickensides at 17.4m -with calcareous nodules, shell fragments and mica, at 26.5m -with a few shell fragments, at 27.7m -with many shells and shell fragments, silt pockets and silt partings, at 30.5m (31.1m)	III
PUSH	Fat CLAY (CH), very stiff, greenish gray -interlayered fat clay, silty fine sand and sandy silt, to 33.7m -with many silty sand pockets, at 35.4m -sand layer, 37.2m to 37.5m (38.4m)	IV
PUSH, SAVE	Fat CLAY (CH), very stiff, greenish gray -with silt pockets and few shell fragments, at 40.2m (45.1m)	V
PUSH	Fat CLAY (CH), very stiff, greenish gray -with a few organic pockets, a few silt pockets, and a few shell fragments, at 45.7m (48.5m)	VI
PUSH, PUSH, SAVE, PUSH	Lean CLAY (CL), very stiff to hard, greenish gray -interlayered clay, silty sand and sandy silt to 50.3m -interlayered lean clay and silty fine sand at 50.6m -sand with clay layers, 51.5m to 52.7m -with many sand partings and seams, and organic pockets, 55.2m to 55.8m -dense sandy silt with sand and clay seams and layers, 57.2m to 59.6m -laminated clay and silty sand with laminations dipping 15 degrees, at 60.4m -sand at 61.3m (62.5m)	VII
PUSH, 30/15cm, 30/15cm, 30/15cm, 30/15cm	Silty Fine SAND (SM), very dense, dark gray -silty fine sand with clay pockets, to 64.2m -with a clay layer, 62.8m to 62.9m -very stiff, dark greenish gray lean clay layer, at 64.2m -silty coarse sand with gravel and fine to medium sand, at 65.8m -fine to medium sand with silt at 67.4m (69.5m)	VIII
PUSH	Silty Fine SAND (SM), very dense, greenish gray -with fine subrounded gravel, and organic pockets, at 69.6m -with a clay layer at 70.7m -with silt seams at 71.6m (73.0m)	IX
PUSH, SAVE, 30/25cm	Lean CLAY (CL), hard, greenish gray -sandy clay below 78.3m (78.5m)	X
30/15cm, 30/15cm	Silty SAND (SM), very dense, greenish gray -lean clay layer, 79.1m to 79.4m (82.3m)	XI
	SANDSTONE (Rx) interbedded with SILTSTONE (Rx), dark gray, moderately to highly weathered, moderately soft	XII

TOTAL DEPTH: 82.8m BACKFILLED WITH: Cement Grout



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

6-9-14
PLAN APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

Log of Test Borings sheet is considered an informational document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. It does not attest to the accuracy or validity of the information contained in the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.

DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9,0.0/1.2	131	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 27

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025
NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA	Sheet 109	of 120

To accompany plans dated 7-22-13

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 27

SABA MOHAN, GEOTECHNICAL DESIGN OVERSIGHT	DRAWN BY: SACHIN DESHPANDE	P. ROBBINS, C. LAVATO, R. HOWARD, FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
	CHECKED BY: T. MCADAM	DATE: SEE ABOVE	

T.W.McNEILAN, PROJECT ENGINEER

CU 04
EA 0120F1

BRIDGE NO.	KM POST	POST MILE
34-0006L/R	13.2/13.9	8.2/8.7

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

DISREGARD PRINTS BEARING EARLIER REVISION DATES →

REVISION DATES (PRELIMINARY STAGE ONLY) | SHEET 776 | OF

33-0025-s-lotb27_748.tif

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1194	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/06 Geotechnical STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 846,
Oakland, CA 94621
(510) 562- 8835, FAX (510) 562- 8858

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

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)
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- 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)
- PAVEMENT

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
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STANDARD PENETRATION TEST (SPT) AND MODIFIED CALIFORNIA (MC) LINER SAMPLERS

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

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TUBE AND OFFSHORE LINER SAMPLERS

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CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ SUBMERGED UNIT WEIGHT (kN/m³)
- ○ THEORETICAL SUBMERGED UNIT WEIGHT (kN/m³)
- PLASTIC LIMIT + — LIQUID LIMIT +
- ⊗ EQUIVALENT SPT BLOW COUNT = (MC BLOWCOUNT/1.6) OR SPT BLOWCOUNT
- •••• 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)
- Shear Strength Interpreted from CPT Tip Resistance (Nk = 12-15)
- ● POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- ⊕ POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- + Soil: Strength Exceeds Capacity of Measuring Device
  Rock: Sample broke along discontinuity; Intact sample would have greater strength
- —— FRACTURE DENSITY (ROCK)

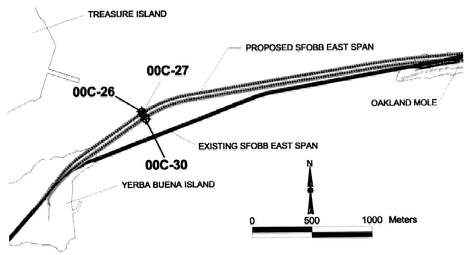
STRENGTH OF COHESIVE SOILS

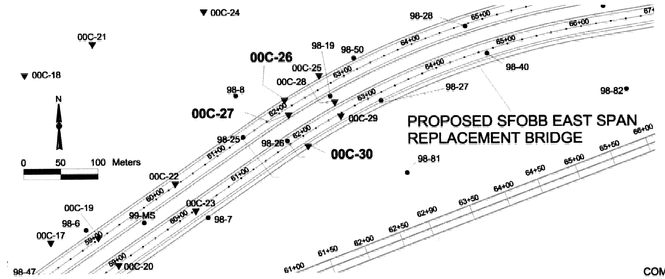
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

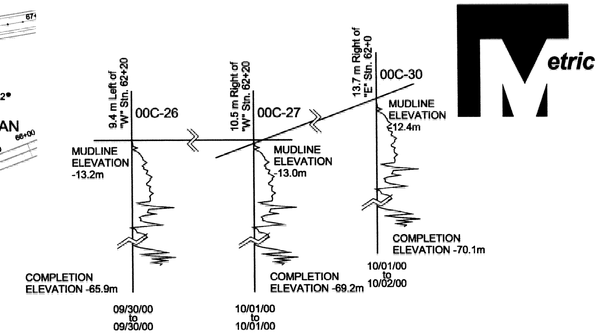
DENSITY OF GRANULAR SOILS

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.







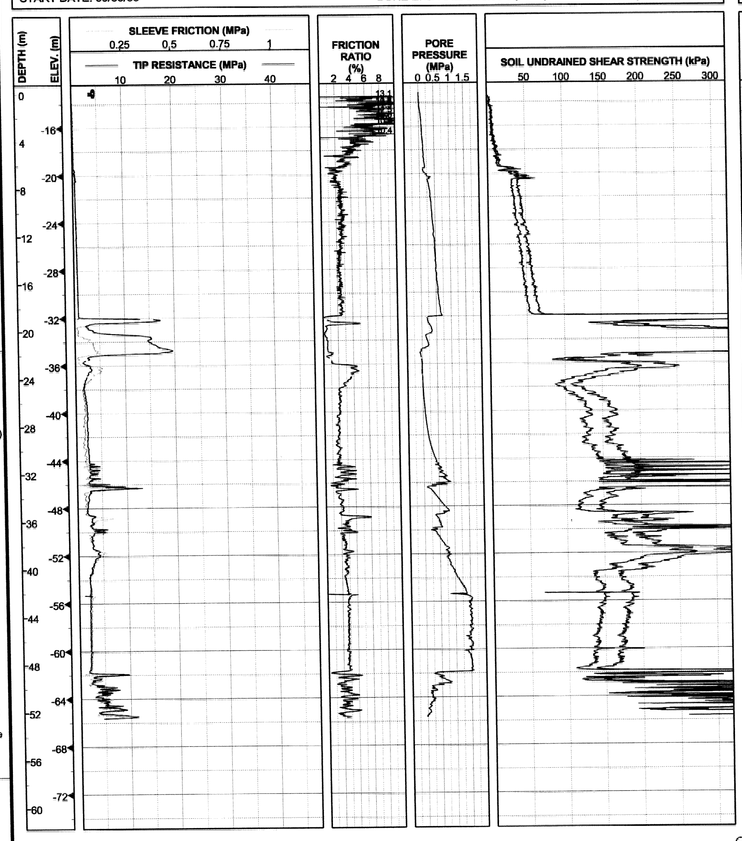
NOTES:

1. Pore pressures are relative to hydrostatic pressure at the mudline.
2. Breaks in the data are due to pauses in the sounding during installation of casing.

CPT 00C-26

COORDINATES: E1836721 N647867
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -13.2m (MSL)
START DATE: 09/30/00

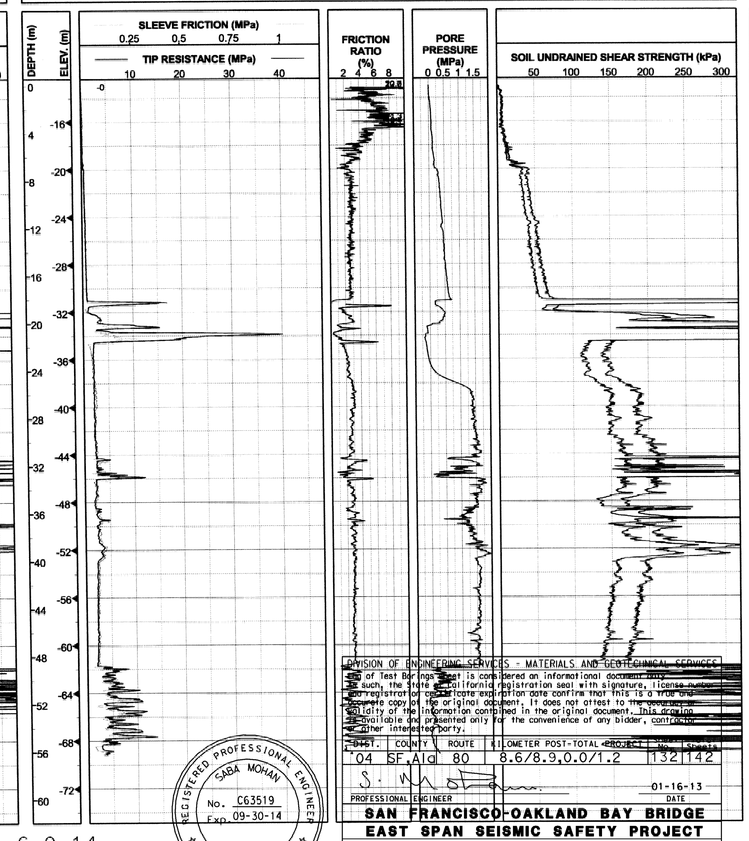
STATION: 9.4 m Left of "W" Stn. 62+20
COMPLETION ELEVATION: -65.9m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



CPT 00C-27

COORDINATES: E1836727 N647847
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -13.0m (MSL)
START DATE: 10/01/00

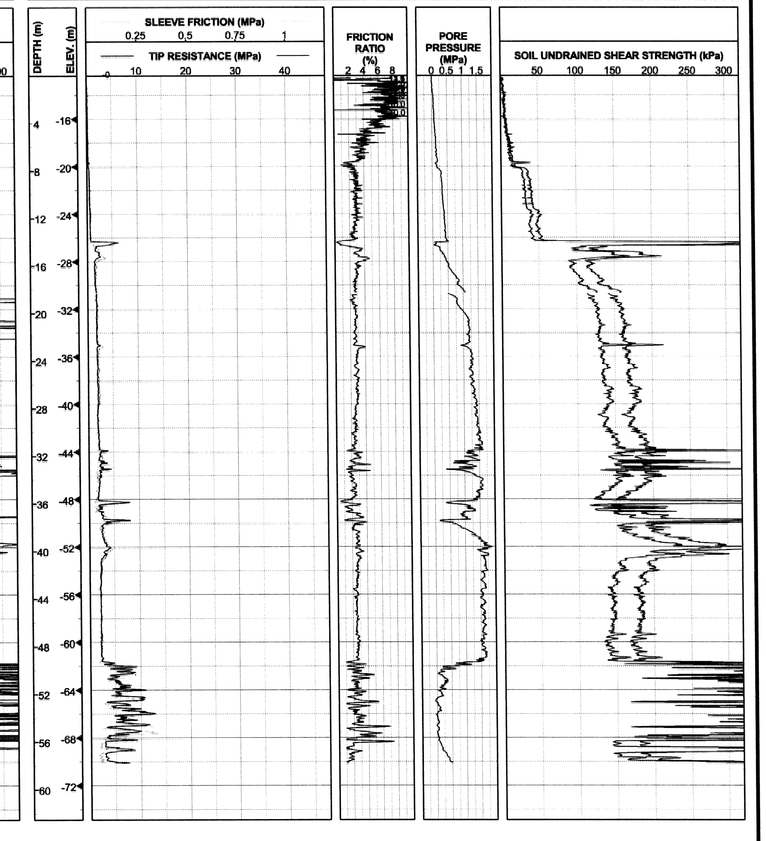
STATION: 10.5 m Right of "W" Stn. 62+20
COMPLETION ELEVATION: -69.2m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



CPT 00C-30

COORDINATES: E1836752 N647805
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -12.4m (MSL)
START DATE: 10/01/00

STATION: 13.7 m Right of "E" Stn. 62+0
COMPLETION ELEVATION: -70.1m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



6-9-14
PLAN APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

To accompany plans dated 7-22-13

DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES
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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Sheets
04	SF,Ala	80	8.6/8.9,0.0/1.2	132	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 28

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025
NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA	Sheet 110	of 120

SABA MOHAN — GEOTECHNICAL DESIGN OVERSIGHT

DRAWN BY S.DESHPANDE
CHECKED BY T. MCADAM

P.ROBINS — FIELD INVESTIGATOR
DATE SEE ABOVE

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

T.W.McNEILAN — PROJECT ENGINEER

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

CU 04
EA 0120F1

BRIDGE NO.	KM POST	POST MILE
34-0006L/R	13.2/13.9	8.2/8.7

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 28

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) SHEET 777 OF

33-0025-s-lotb28_749.tif

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1195	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/06 Geotechnical STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE
7700, Edgewater Dr., Ste. 846,
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(510) 562- 8933, FAX (510) 562- 8858

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- Elastic SILT (MH)
- SILT (ML)
- Sandy SILT (ML)
- Clayey silt (ML/CL)
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- Low plasticity ORGANICS (OL)
- SANDSTONE (Rx)
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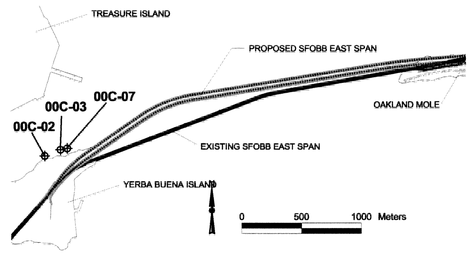
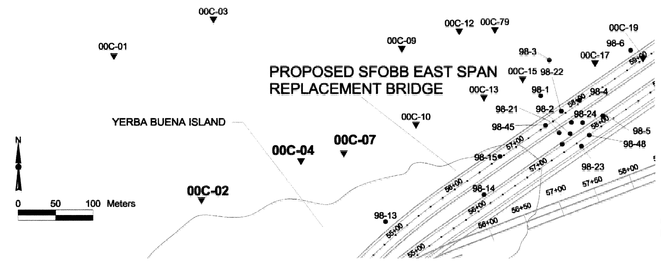
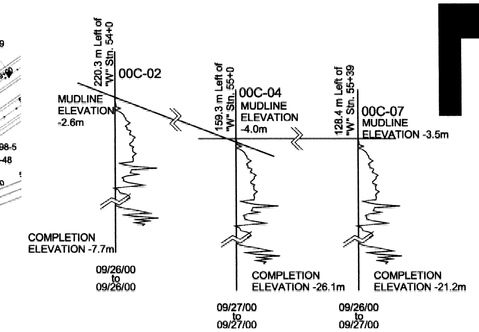
Very Dense	greater than 85

*Estimated from sampler driving record and CPT tip resistance.







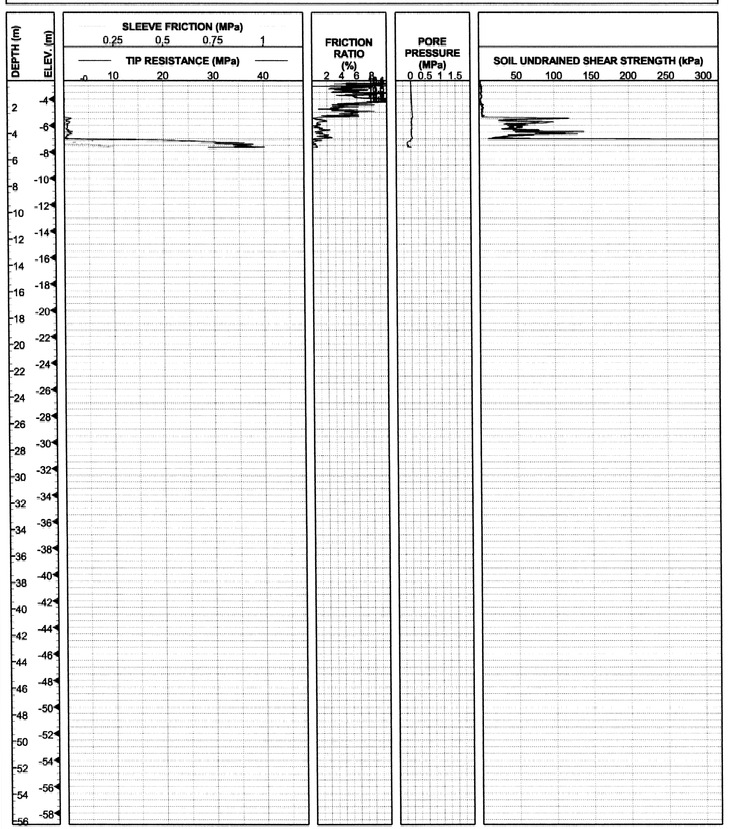
NOTES:

1. Pore pressures are relative to hydrostatic pressure at the mudline.
2. Breaks in the data are due to pauses in the sounding during installation of casing.

CPT 00C-02

COORDINATES: E1835882 N647495
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -2.6m (MSL)
START DATE: 09/26/00

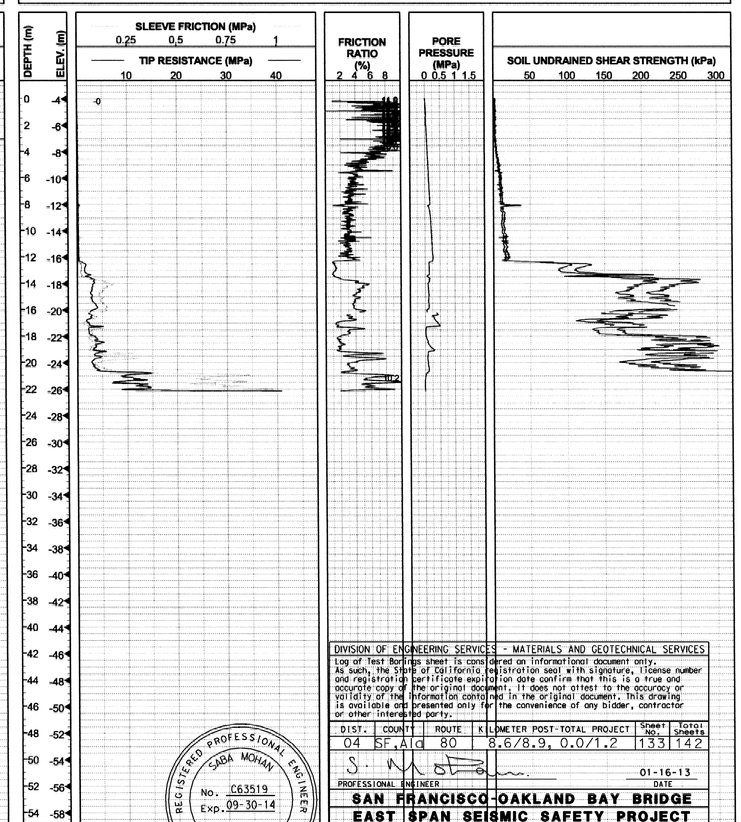
STATION: 220.3 m Left of "W" Stn. 54+0
COMPLETION ELEVATION: -7.7m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



CPT 00C-04

COORDINATES: E1836015 N647547
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -4.0m (MSL)
START DATE: 09/27/00

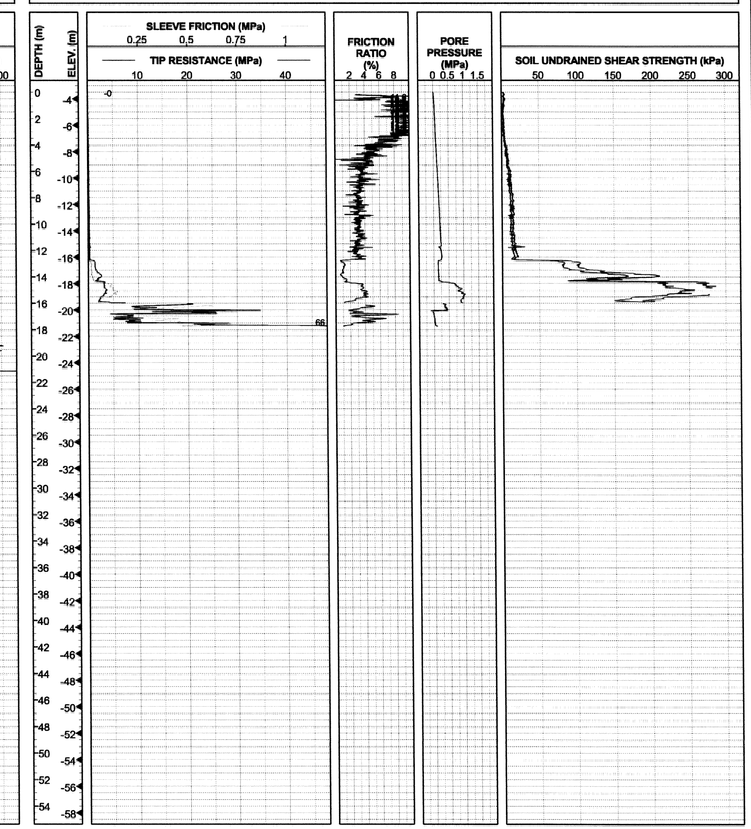
STATION: 159.3 m Left of "W" Stn. 55+0
COMPLETION ELEVATION: -26.1m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



CPT 00C-07

COORDINATES: E1836072 N647557
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -3.5m (MSL)
START DATE: 09/26/00

STATION: 128.4 m Left of "W" Stn. 55+39
COMPLETION ELEVATION: -21.2m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

Log of Test Borings sheet is considered an informational document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. It does not attest to the accuracy or validity of the information contained in the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.

DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9, 0.0/1.2	133	142

PROFESSIONAL ENGINEER — DATE 01-16-13

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 29

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025
NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA	Sheet 111	of 120

To Accompany Plans Dated 7-22-13

6-9-14
PLAN APPROVAL DATE

SABA MOHAN — GEOTECHNICAL DESIGN OVERSIGHT
DRAWN BY S.DESHPANDE
CHECKED BY T. MCADAM
P.ROBINS — FIELD INVESTIGATOR
DATE SEE ABOVE

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

T.W.McNEILAN — PROJECT ENGINEER

BRIDGE NO. 34-0006L/R
KM POST 13.2/13.9
POST MILE 8.2/8.7

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 29

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

CU 04
EA 0120F1

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 778 OF

33-0025-s-lotb29_750.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)
- PAVEMENT

SAMPLERS

- 76mm-OD, 72mm-ID Thin Walled Tube
- 57mm-OD, 54mm-ID* SPT 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

STANDARD PENETRATION TEST (SPT) AND MODIFIED CALIFORNIA (MC) LINER SAMPLERS

Samplers were driven with a 63.5 kg 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.

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.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ SUBMERGED UNIT WEIGHT (kN/m³)
- ○ THEORETICAL SUBMERGED UNIT WEIGHT (kN/m³)
- PLASTIC LIMIT + LIQUID LIMIT +
- ⊗ EQUIVALENT SPT BLOW COUNT = (MC BLOWCOUNT/1.6) OR SPT BLOWCOUNT
- ---- 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)
- Shear Strength Interpreted from CPT Tip Resistance (Nk = 12-15)
- ● POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- ⊗ POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- + Soil: Strength Exceeds Capacity of Measuring Device
  Rock: Sample broke along discontinuity; Intact sample would have greater strength
- —— FRACTURE DENSITY (ROCK)

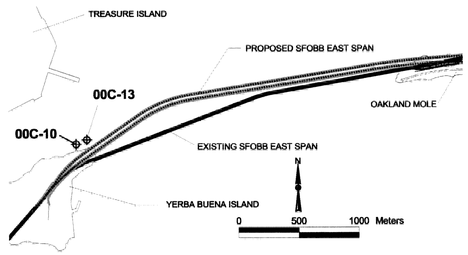
STRENGTH OF COHESIVE SOILS

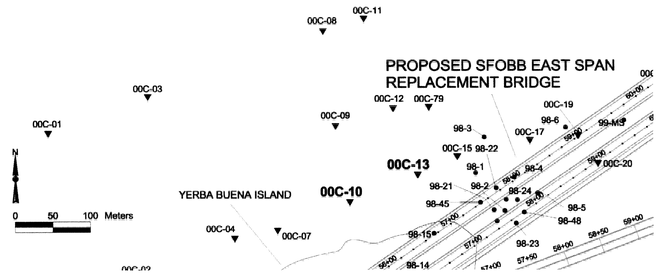
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

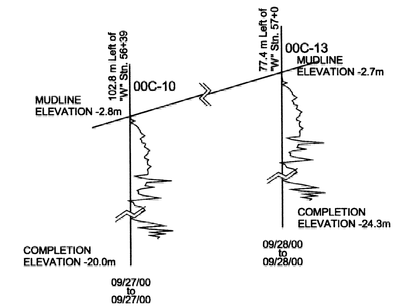
DENSITY OF GRANULAR SOILS

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.



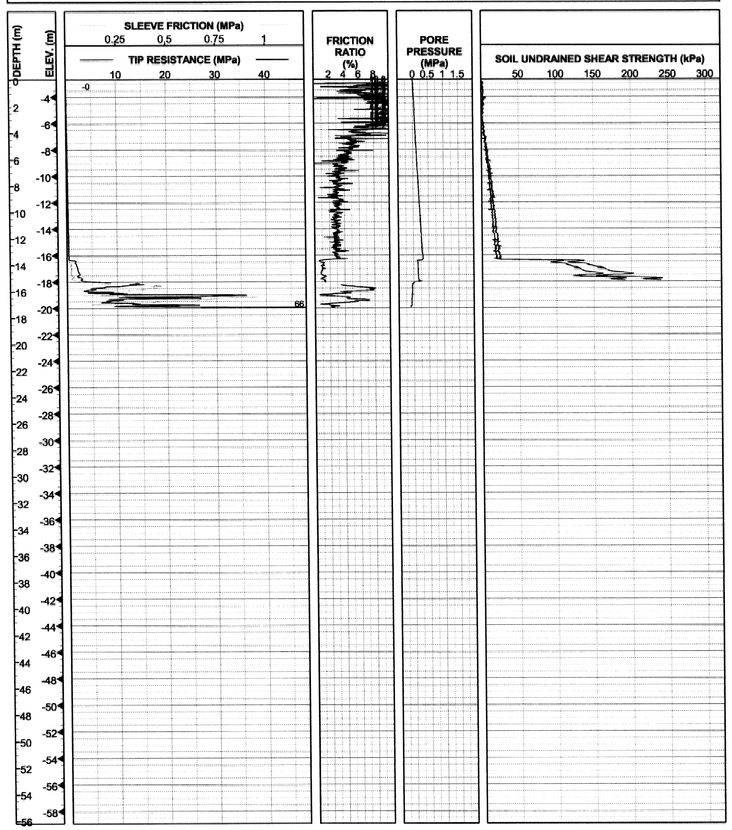




CPT 00C-10

COORDINATES: E1836169 N647596
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -2.8m (MSL)
START DATE: 09/27/00

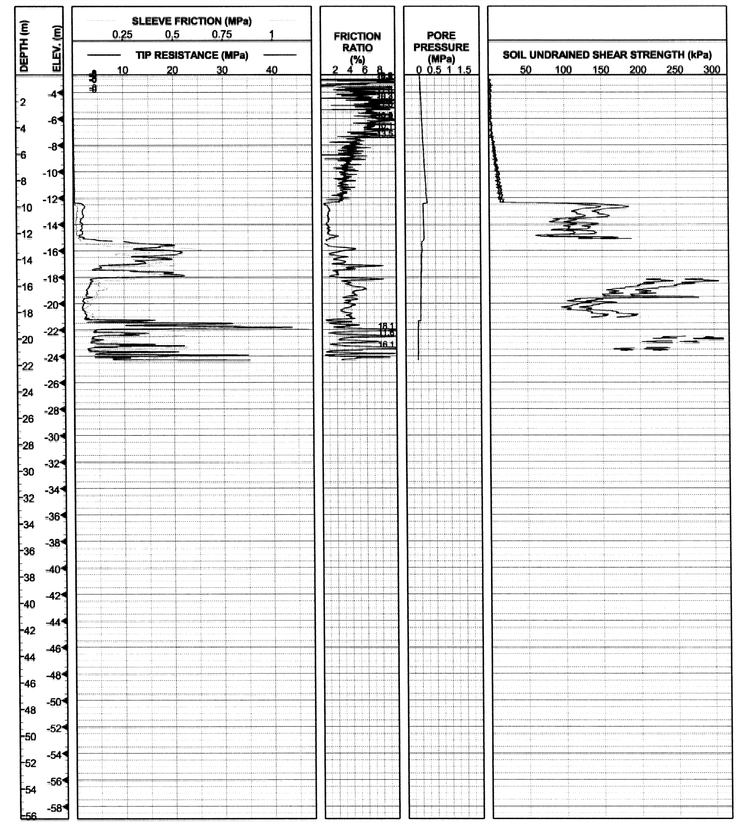
STATION: 102.8 m Left of "W" Stn. 56+39
COMPLETION ELEVATION: -20.0m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



CPT 00C-13

COORDINATES: E1836259 N647632
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -2.7m (MSL)
START DATE: 09/28/00

STATION: 77.4 m Left of "W" Stn. 57+0
COMPLETION ELEVATION: -24.3m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1196	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/06 Geotechnical STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 846,
Oakland, CA 94621
(510) 562- 8833, FAX (510) 562- 8858

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

NOTES:

1. Pore pressures are relative to hydrostatic pressure at the mudline.
2. Breaks in the data are due to pauses in the sounding during installation of casing.

6-9-14
PLAN APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9, 0.0/1.2	134	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 30

	CONTRACT No.	BRIDGE No.
UNIT: 3593		
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — Sheet 112 of 120

To Accompany Plans Dated 7-22-13

SABA MOHAN, GEOTECHNICAL DESIGN OVERSIGHT	DRAWN BY S.DESHPANDE	P.ROBINS, FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	T.W.McNEILAN, PROJECT ENGINEER	BRIDGE NO. 34-0006L/R
	CHECKED BY T. MCADAM	DATE SEE ABOVE			KM POST 13.2/13.9
			ORIGINAL SCALE IN CENTIMETERS FOR REDUCED PLANS 0 1 2 3 4 5 6 7 8 9 10	CU 04 EA 0120F1	POST MILE 8.2/8.7

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 30

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) — SHEET 779 OF

33-0025-s-lotb30_751.tif

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1197	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/06 Geotechnical STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 846,
Oakland, CA 94621
(510) 562- 8833, FAX (510) 562- 8858

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

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)
- PAVEMENT

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

STANDARD PENETRATION TEST (SPT) AND MODIFIED CALIFORNIA (MC) LINER SAMPLERS

Samplers were driven with a 63.5 kg 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.

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.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ SUBMERGED UNIT WEIGHT (kN/m³)
- ○ THEORETICAL SUBMERGED UNIT WEIGHT (kN/m³)
- PLASTIC LIMIT + LIQUID LIMIT +
- ⊗ EQUIVALENT SPT BLOW COUNT = (MC BLOWCOUNT/1.6) OR SPT BLOWCOUNT
- ···· 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)
- Shear Strength Interpreted from CPT Tip Resistance (Nk = 12-15)
- ● POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- ⊕ POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- + Soil: Strength Exceeds Capacity of Measuring Device
  Rock: Sample broke along discontinuity; Intact sample would have greater strength
- —— FRACTURE DENSITY (ROCK)

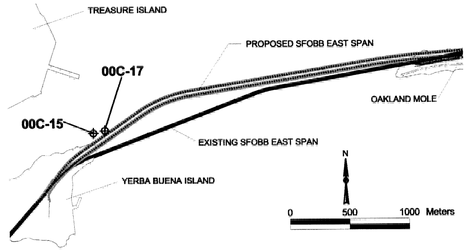
STRENGTH OF COHESIVE SOILS

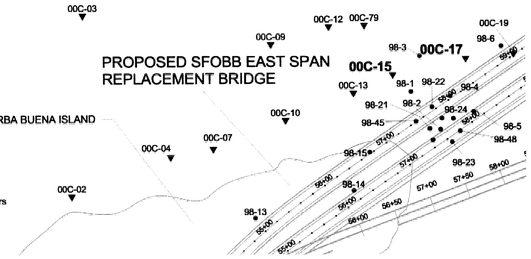
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

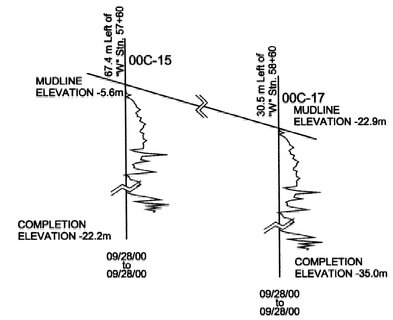
DENSITY OF GRANULAR SOILS

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.







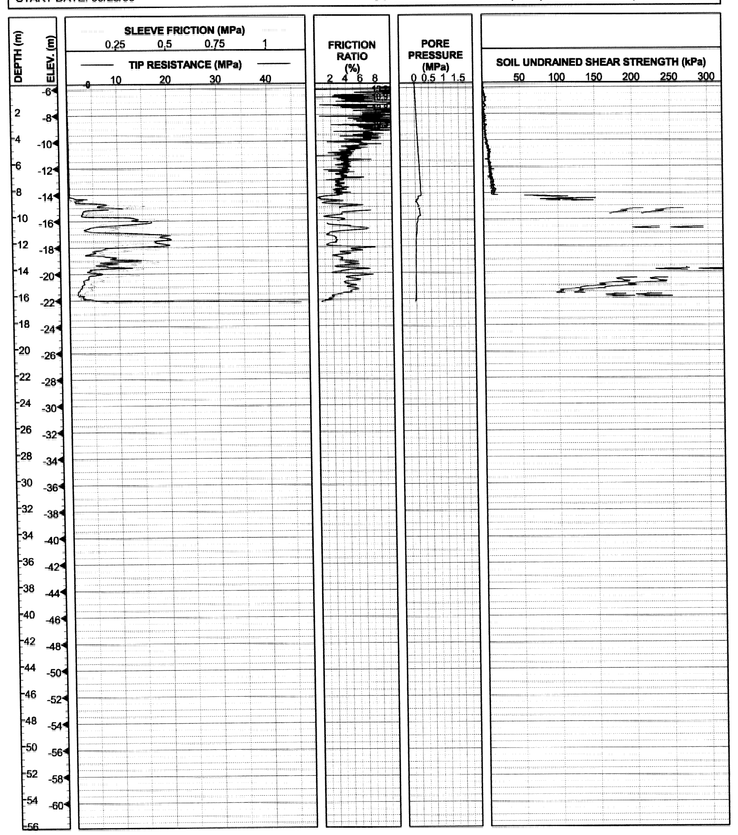
NOTES:

1. Pore pressures are relative to hydrostatic pressure at the mudline.
2. Breaks in the data are due to pauses in the sounding during installation of casing.

CPT 00C-15

COORDINATES: E1836312 N647656
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -5.6m (MSL)
START DATE: 09/28/00

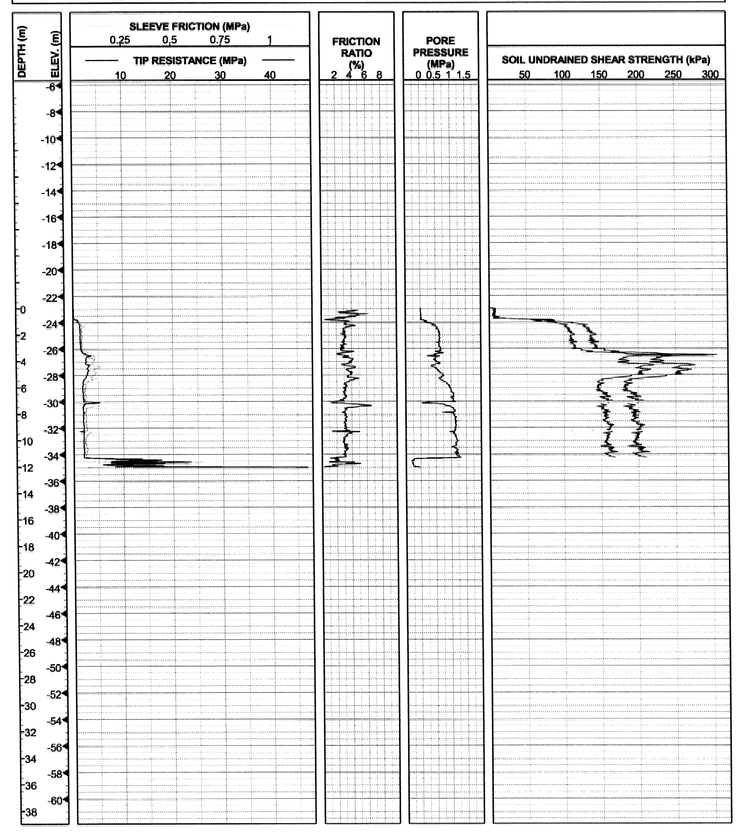
STATION: 67.4 m Left of "W" Stn. 57+60
COMPLETION ELEVATION: -22.2m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



CPT 00C-17

COORDINATES: E1836408 N647678
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -22.9m (MSL)
START DATE: 09/28/00

STATION: 30.5 m Left of "W" Stn. 58+60
COMPLETION ELEVATION: -35.0m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



6-9-14
PLAN APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9, 0.0/1.2	135	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 31

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — Sheet 113 of 120

To Accompany Plans Dated 7-22-13

SABA MOHAN — GEOTECHNICAL DESIGN OVERSIGHT

DRAWN BY: S.DESHPANDE
CHECKED BY: T. MCADAM

P.ROBINS — FIELD INVESTIGATOR
DATE: SEE ABOVE

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

T.W.McNEILAN — PROJECT ENGINEER

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

CU 04
EA 0120F1

BRIDGE NO. 34-0006L/R
KM POST 13.2/13.9
POST MILE 8.2/8.7

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 31

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) — SHEET 780 OF

33-0025-s-lotb31_752.tif

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1198	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/06 Geotechnical STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 846,
Oakland, CA 94621
(510) 562- 8833, FAX (510) 562- 8858

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

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)
- PAVEMENT

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

STANDARD PENETRATION TEST (SPT) AND MODIFIED CALIFORNIA (MC) LINER SAMPLERS

Samplers were driven with a 63.5 kg 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.

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.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ SUBMERGED UNIT WEIGHT (kN/m³)
- ○ THEORETICAL SUBMERGED UNIT WEIGHT (kN/m³)
- PLASTIC LIMIT + LIQUID LIMIT +
- ⊗ EQUIVALENT SPT BLOW COUNT = (MC BLOWCOUNT/1.6) OR SPT BLOWCOUNT
- 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)
- Shear Strength Interpreted from CPT Tip Resistance (Nk = 12-15)
- POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- UNCONFINED COMPRESSION (ROCK)
- \+ Soil: Strength Exceeds Capacity of Measuring Device
  Rock: Sample broke along discontinuity; Intact sample would have greater strength
- FRACTURE DENSITY (ROCK)

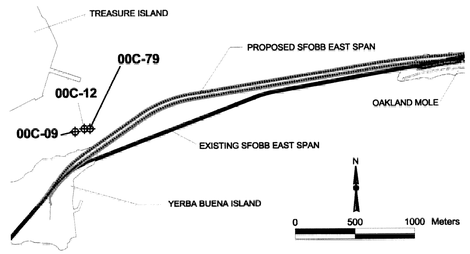
STRENGTH OF COHESIVE SOILS

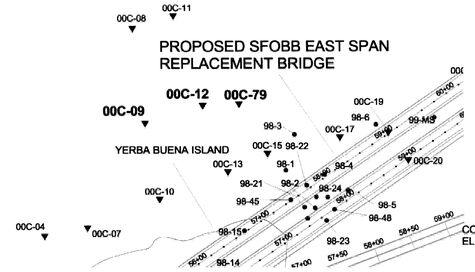
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

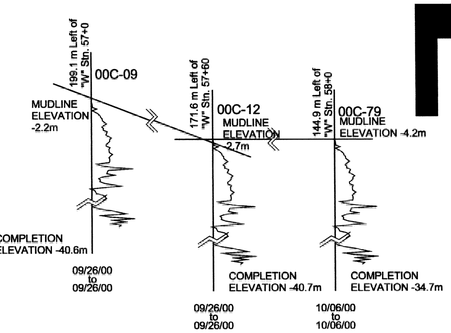
DENSITY OF GRANULAR SOILS

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.







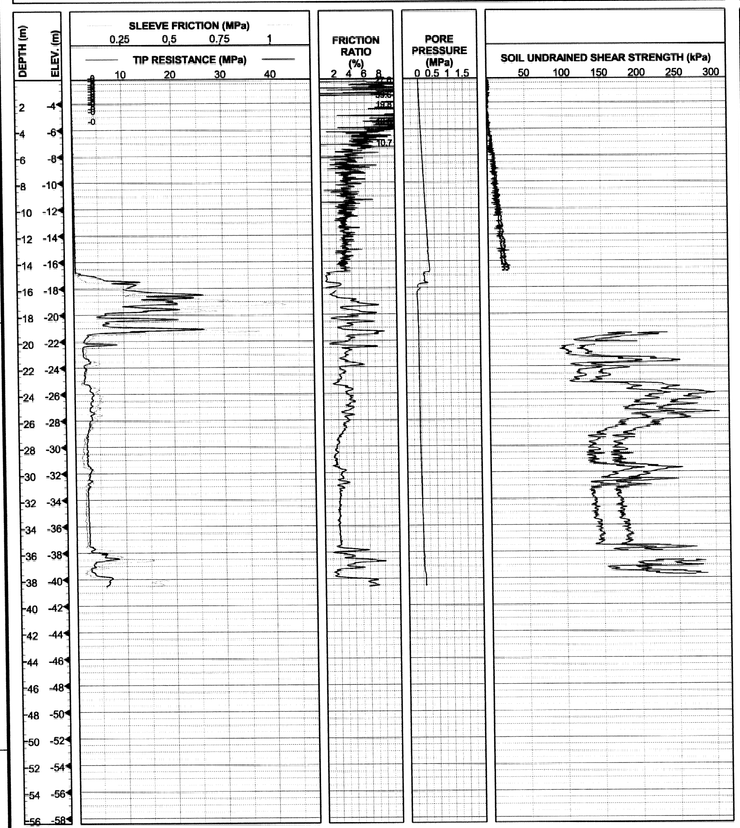
NOTES:

1. Pore pressures are relative to hydrostatic pressure at the mudline.
2. Breaks in the data are due to pauses in the sounding during installation of casing.

CPT 00C-09

COORDINATES: E1836150 N647697
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -2.2m (MSL)
START DATE: 09/26/00

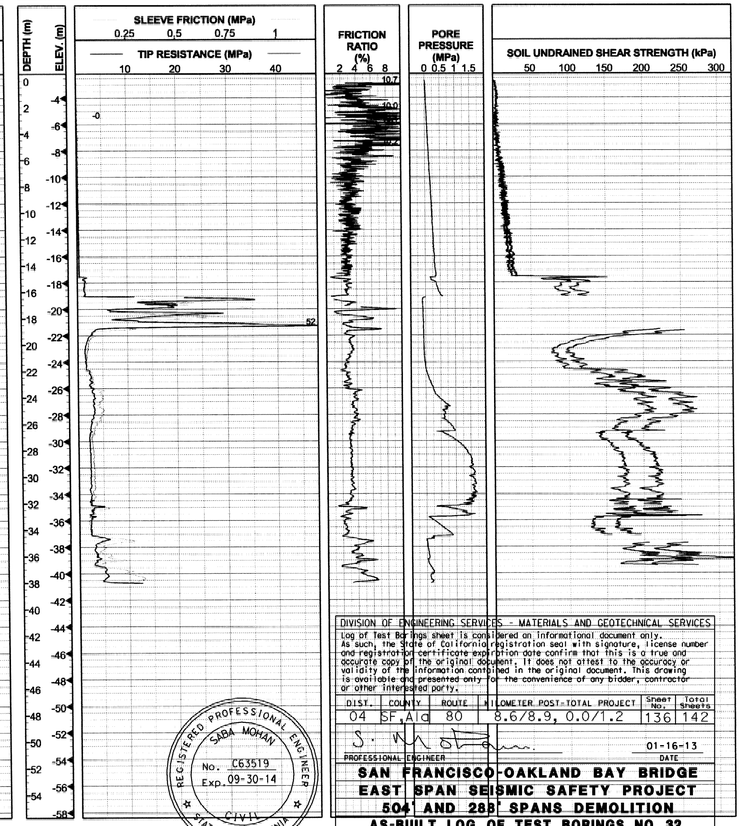
STATION: 199.1 m Left of "W" Stn. 57+0
COMPLETION ELEVATION: -40.6m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



CPT 00C-12

COORDINATES: E1836227 N647721
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -2.7m (MSL)
START DATE: 09/26/00

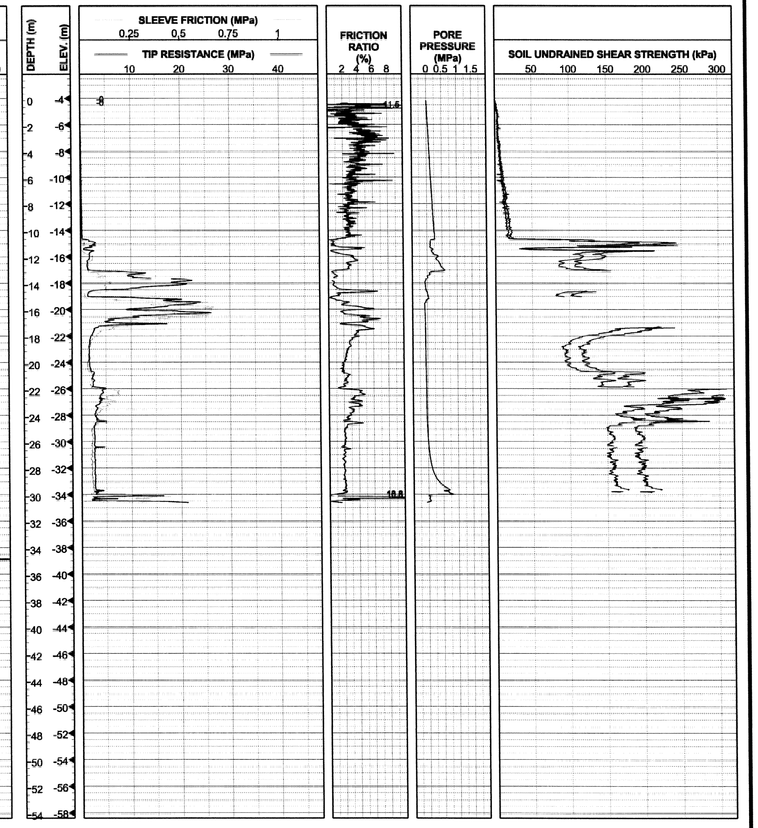
STATION: 171.6 m Left of "W" Stn. 57+60
COMPLETION ELEVATION: -40.7m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



CPT 00C-79

COORDINATES: E1836275 N647723
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -4.2m (MSL)
START DATE: 10/06/00

STATION: 144.9 m Left of "W" Stn. 58+0
COMPLETION ELEVATION: -34.7m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

Log of Test Borings sheet is considered an informational document only. As such, the State of California registration seal with signature, license number and registration certificate expiration date confirm that this is a true and accurate copy of the original document. It does not attest to the accuracy or validity of the information contained in the original document. This drawing is available and presented only for the convenience of any bidder, contractor or other interested party.

DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9, 0.0/1.2	136	142

PROFESSIONAL ENGINEER — DATE 01-16-13

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 283' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 32

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — Sheet 114 of 120

6-9-14
PLAN APPROVAL DATE

To Accompany Plans Dated 7-22-13

SABA MOHAN — GEOTECHNICAL DESIGN OVERSIGHT
DRAWN BY S.DESHPANDE
CHECKED BY T. MCADAM
P.ROBINS — FIELD INVESTIGATOR
DATE SEE ABOVE

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

T.W.McNEILAN — PROJECT ENGINEER

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

CU 04
EA 0120F1

BRIDGE NO. 34-0006L/R
KM POST 13.2/13.9
POST MILE 8.2/8.7

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 32

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) SHEET OF 781

33-0025-s-lotb32_753.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)
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- 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)
- PAVEMENT

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

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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.

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.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ SUBMERGED UNIT WEIGHT (kN/m³)
- ○ THEORETICAL SUBMERGED UNIT WEIGHT (kN/m³)
- PLASTIC LIMIT + LIQUID LIMIT +
- ⊗ EQUIVALENT SPT BLOW COUNT = (MC BLOWCOUNT/1.6) OR SPT BLOWCOUNT
- ROCK QUALITY DESIGNATION (RQD)
- ROCK RECOVERY PERCENT
- ROCK CORING RATE

STRENGTH TESTS

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- UNCONFINED COMPRESSION (SOIL)
- ◇△ (Open symbols indicate remolded tests)
- Shear Strength Interpreted from CPT Tip Resistance (Nk = 12-15)
- POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- UNCONFINED COMPRESSION (ROCK)
- \+ Soil: Strength Exceeds Capacity of Measuring Device; Rock: Sample broke along discontinuity; Intact sample would have greater strength
- 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
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Very Stiff	100 to 200
Hard	greater than 200

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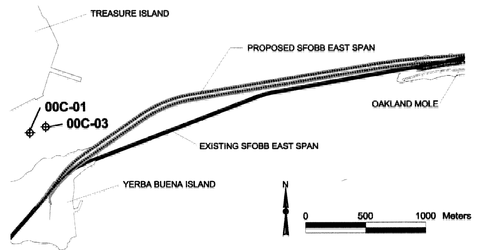
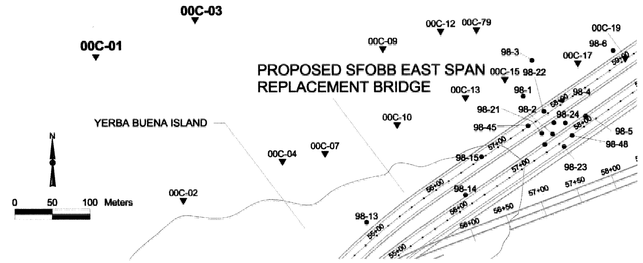
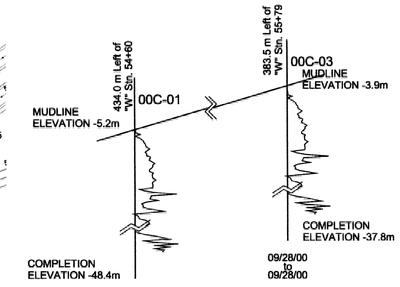
Loose	15 to 35
Medium Dense	35 to 65
Dense	65 to 85
Very Dense	greater than 85

*Estimated from sampler driving record and CPT tip resistance.







DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1199	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/06 Geotechnical STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 846,
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(510) 562- 8833, FAX (510) 562- 8858

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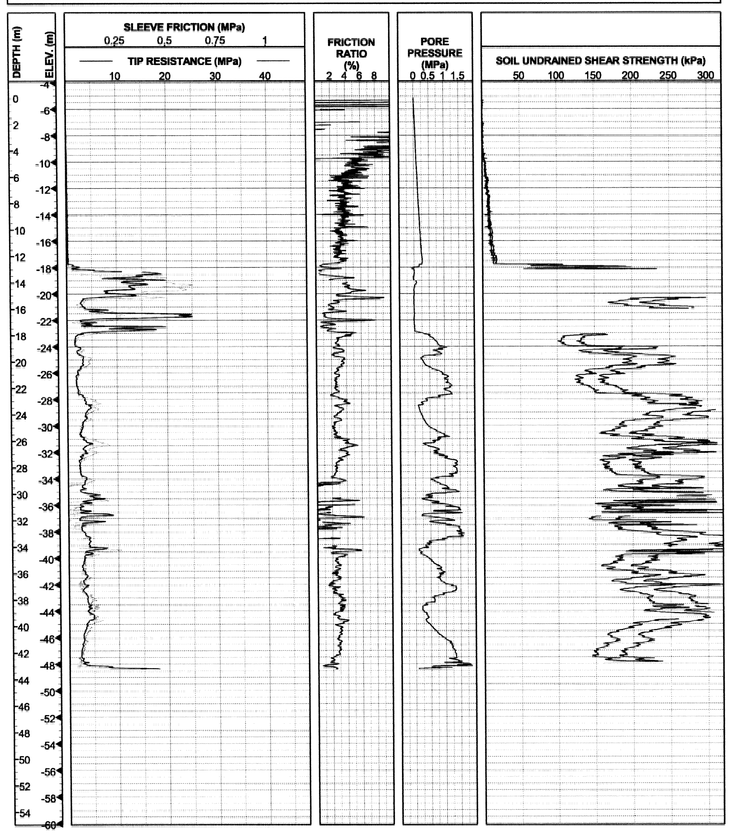
6-9-14
PLAN APPROVAL DATE

NOTES:
1. Pore pressures are relative to hydrostatic pressure at the mudline.
2. Breaks in the data are due to pauses in the sounding during installation of casing.

CPT 00C-01

COORDINATES: E1835767 N647688
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -5.2m (MSL)
START DATE: 09/26/00

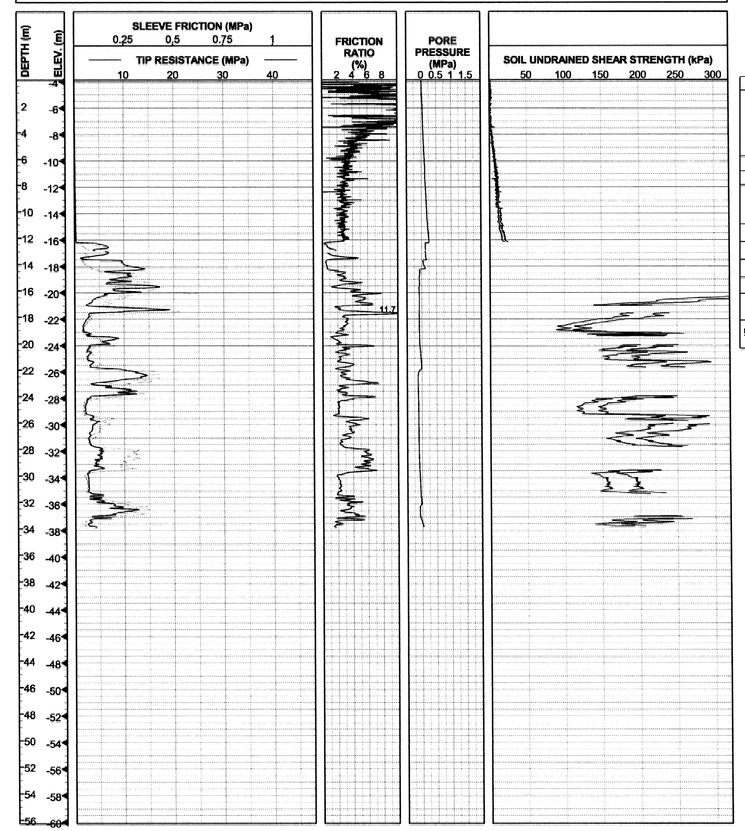
STATION: 434.0 m Left of "W" Stn. 54+60
COMPLETION ELEVATION: -48.4m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



CPT 00C-03

COORDINATES: E1835900 N647737
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -3.9m (MSL)
START DATE: 09/28/00

STATION: 383.5 m Left of "W" Stn. 55+79
COMPLETION ELEVATION: -37.8m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9, 0.0/1.2	137	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 33

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — Sheet 115 of 120

To Accompany Plans Dated 7-22-13

SABA MOHAN — GEOTECHNICAL DESIGN OVERSIGHT
DRAWN BY S.DESHPANDE
CHECKED BY T. MCADAM
P.ROBINS — FIELD INVESTIGATOR — DATE SEE ABOVE

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

T.W.McNEILAN — PROJECT ENGINEER

BRIDGE NO. 34-0006L/R
KM POST 13.2/13.9
POST MILE 8.2/8.7

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

CU 04
EA 0120F1

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 33

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) SHEET 782 OF

33-0025-s-lotb33_754.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)
- PAVEMENT

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

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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.

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.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ SUBMERGED UNIT WEIGHT (kN/m³)
- ○ THEORETICAL SUBMERGED UNIT WEIGHT (kN/m³)
- PLASTIC LIMIT + LIQUID LIMIT +
- ⊗ EQUIVALENT SPT BLOW COUNT = (MC BLOWCOUNT/1.6) OR SPT BLOWCOUNT
- 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)
- Shear Strength Interpreted from CPT Tip Resistance (Nk = 12-15)
- POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- UNCONFINED COMPRESSION (ROCK)
- \+ Soil: Strength Exceeds Capacity of Measuring Device
  Rock: Sample broke along discontinuity; Intact sample would have greater strength
- FRACTURE DENSITY (ROCK)

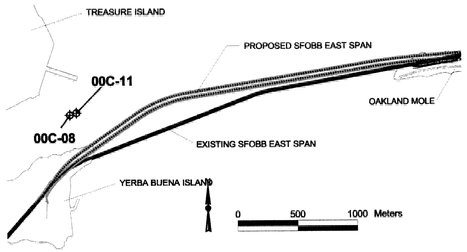
STRENGTH OF COHESIVE SOILS

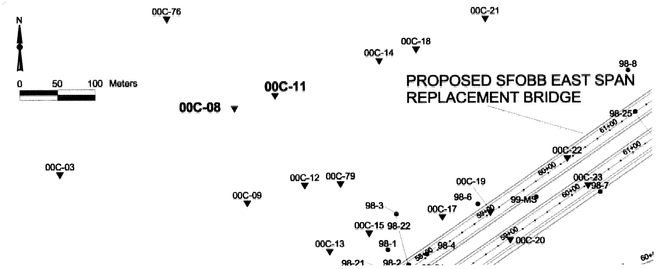
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

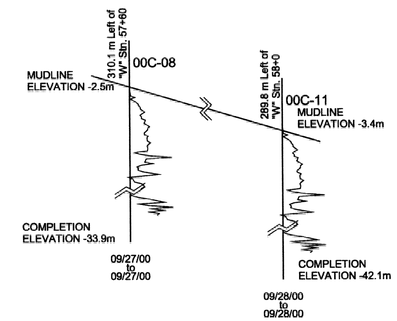
DENSITY OF GRANULAR SOILS

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.







DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1200	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/06 Geotechnical STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 846,
Oakland, CA 94621
(510) 562- 8833, FAX (510) 562- 8858

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

NOTES:

1. Pore pressures are relative to hydrostatic pressure at the mudline.
2. Breaks in the data are due to pauses in the sounding during installation of casing.

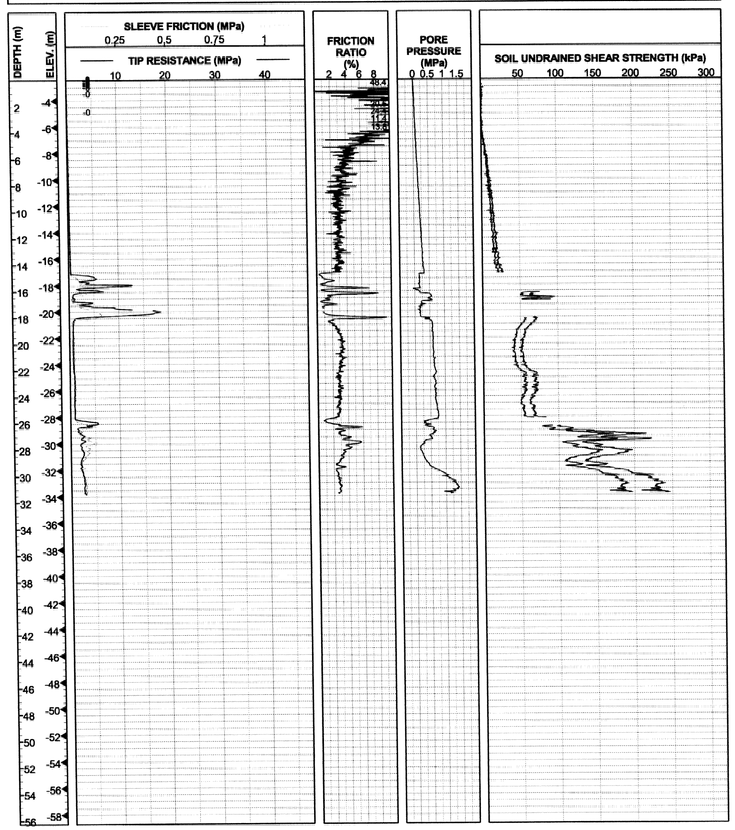
6-9-14
PLAN APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

CPT 00C-08

COORDINATES: E1836135 N647824
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -2.5m (MSL)
START DATE: 09/27/00

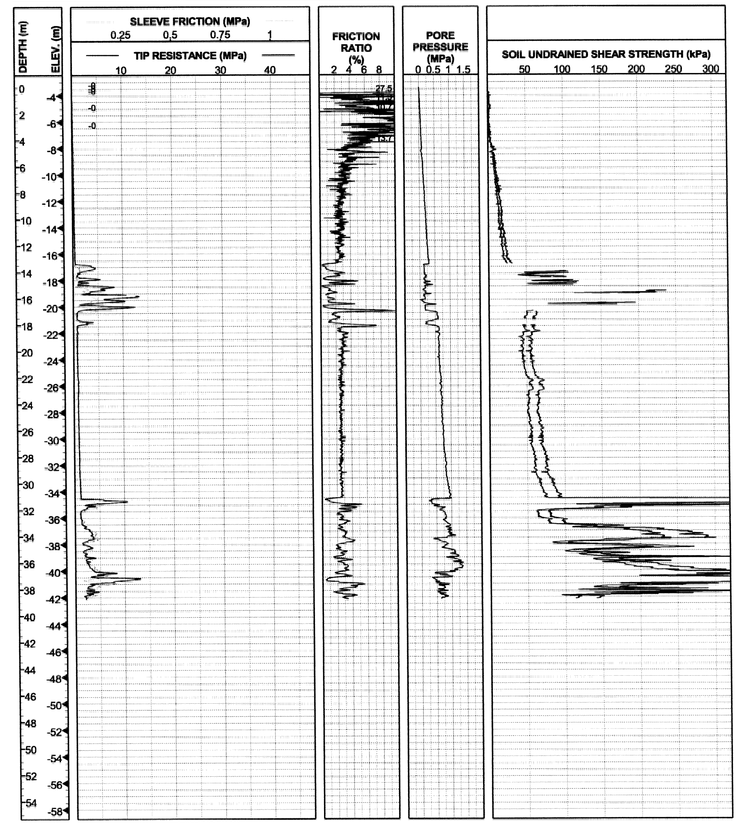
STATION: 310.1 m Left of "W" Stn. 57+60
COMPLETION ELEVATION: -33.9m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



CPT 00C-11

COORDINATES: E1836189 N647841
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -3.4m (MSL)
START DATE: 09/28/00

STATION: 289.8 m Left of "W" Stn. 58+0
COMPLETION ELEVATION: -42.1m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9, 0.0/1.2	138	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 34

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — Sheet 116 of 120

To Accompany Plans Dated 7-22-13

SABA MOHAN, GEOTECHNICAL DESIGN OVERSIGHT	DRAWN BY	S.DESHPANDE	P.ROBINS, FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION	T.W.McNEILAN, PROJECT ENGINEER
	CHECKED BY	T. MCADAM	DATE SEE ABOVE		

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

CU 04
EA 0120F1

BRIDGE NO.	KM POST	POST MILE
34-0006L/R	13.2/13.9	8.2/8.7

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 34

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) — SHEET 783 OF

33-0025-s-lotb34_755.tif

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1201	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — T.W. McNeilan No. 0583 Exp. 12/31/06 Geotechnical — STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 846,
Oakland, CA 94621
(510) 562- 8833, FAX (510) 562- 8858

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NOTES:

1. Pore pressures are relative to hydrostatic pressure at the mudline.
2. Breaks in the data are due to pauses in the sounding during installation of casing.

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)
- PAVEMENT

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

STANDARD PENETRATION TEST (SPT) AND MODIFIED CALIFORNIA (MC) LINER SAMPLERS

Samplers were driven with a 63.5 kg 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.

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.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ SUBMERGED UNIT WEIGHT (kN/m³)
- ○ THEORETICAL SUBMERGED UNIT WEIGHT (kN/m³)
- PLASTIC LIMIT + LIQUID LIMIT +
- ⊗ EQUIVALENT SPT BLOW COUNT = (MC BLOWCOUNT/1.6) OR SPT BLOWCOUNT
- ···· 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)
- Shear Strength Interpreted from CPT Tip Resistance (Nk = 12-15)
- ● POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- ⊕ POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- \+ Soil: Strength Exceeds Capacity of Measuring Device
  Rock: Sample broke along discontinuity; Intact sample would have greater strength
- —— FRACTURE DENSITY (ROCK)

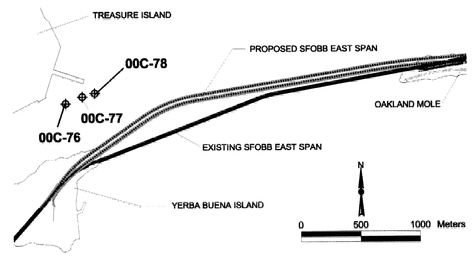
STRENGTH OF COHESIVE SOILS

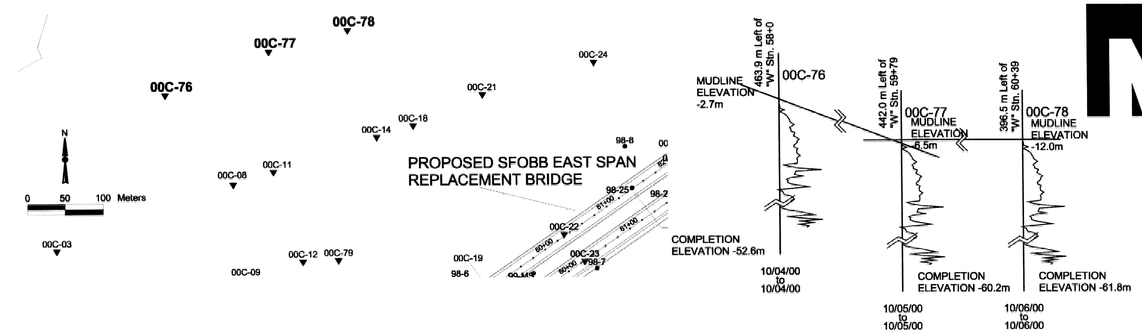
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

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.

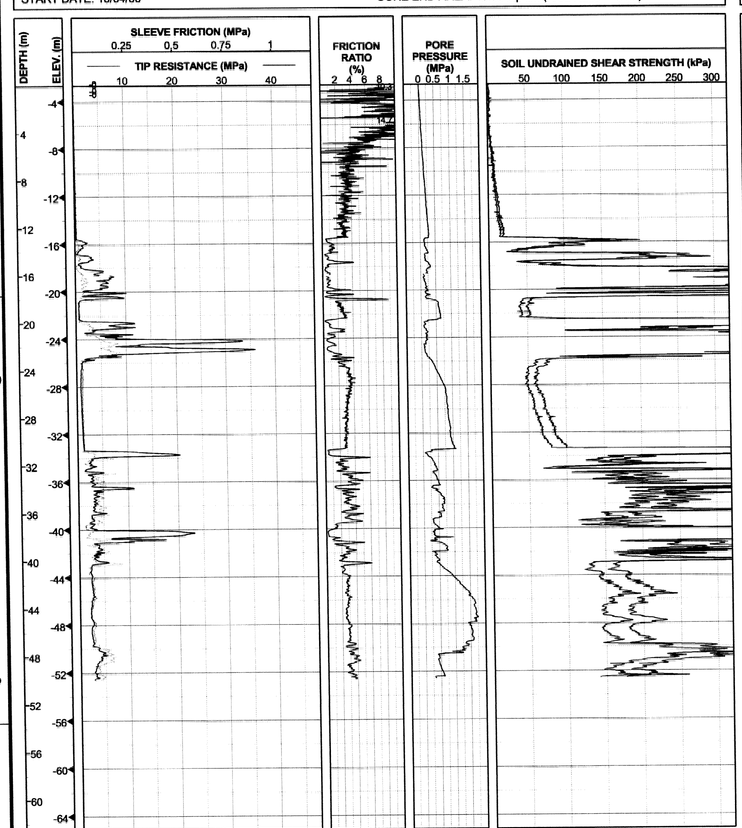




CPT 00C-76

COORDINATES: E1836045 N647944
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -2.7m (MSL)
START DATE: 10/04/00

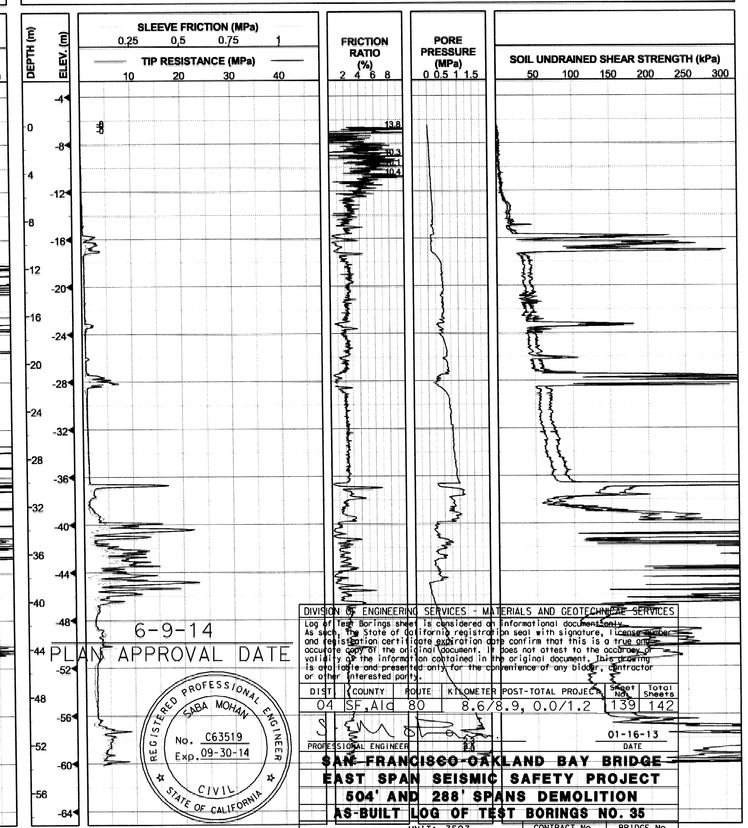
STATION: 463.9 m Left of "W" Stn. 58+0
COMPLETION ELEVATION: -52.6m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



CPT 00C-77

COORDINATES: E1836184 N648002
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -6.5m (MSL)
START DATE: 10/05/00

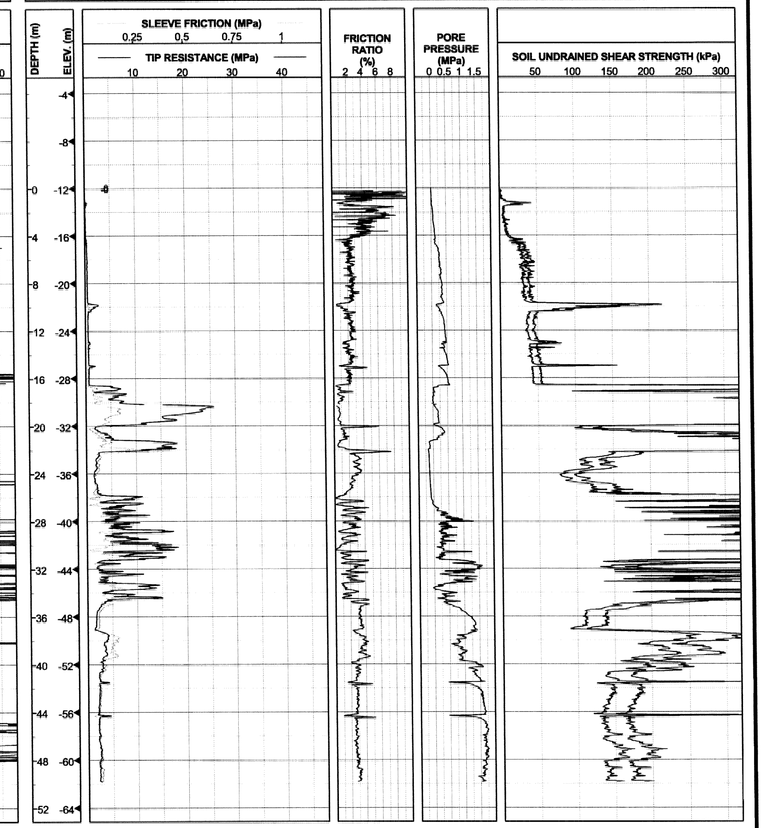
STATION: 442.0 m Left of "W" Stn. 59+79
COMPLETION ELEVATION: -60.2m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



CPT 00C-78

COORDINATES: E1836290 N648030
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -12.0m (MSL)
START DATE: 10/06/00

STATION: 396.5 m Left of "W" Stn. 60+39
COMPLETION ELEVATION: -61.8m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



6-9-14
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER — SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL — STATE OF CALIFORNIA

To Accompany Plans Dated 7-22-13

DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

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DIST	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Alc	80	8.6/8.9, 0.0/1.2	139	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 35

UNIT: 3593 — CONTRACT No. 04-013521 — BRIDGE No. 33-0025
PROJECT NUMBER & PHASE: 0412000608,1
NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — Sheet 117 of 120

SABA MOHAN — GEOTECHNICAL DESIGN OVERSIGHT	DRAWN BY S.DESHPANDE	P.ROBINS — FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
	CHECKED BY T. MCADAM	DATE SEE ABOVE	

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

T.W.McNEILAN — PROJECT ENGINEER

CU 04
EA 0120F1

BRIDGE NO.	KM POST	POST MILE
34-0006L/R	13.2/13.9	8.2/8.7

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 35

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) — SHEET 784 — OF

33-0025-s-lotb35_756.tif

DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1202	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/06 Geotechnical STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 846,
Oakland, CA 94621
(510) 562- 8833, FAX (510) 562- 8858

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NOTES:

1. Pore pressures are relative to hydrostatic pressure at the mudline.
2. Breaks in the data are due to pauses in the sounding during installation of casing.

6-9-14
PLAN APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

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)
- PAVEMENT

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

STANDARD PENETRATION TEST (SPT) AND MODIFIED CALIFORNIA (MC) LINER SAMPLERS

Samplers were driven with a 63.5 kg 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.

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.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ SUBMERGED UNIT WEIGHT (kN/m^3)
- ○ THEORETICAL SUBMERGED UNIT WEIGHT (kN/m^3)
- PLASTIC LIMIT + LIQUID LIMIT +
- ⊗ EQUIVALENT SPT BLOW COUNT = (MC BLOWCOUNT/1.6) OR SPT BLOWCOUNT
- ---- 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)
- Shear Strength Interpreted from CPT Tip Resistance (Nk = 12-15)
- ● POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- ⊕ POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- + Soil: Strength Exceeds Capacity of Measuring Device
  Rock: Sample broke along discontinuity; Intact sample would have greater strength
- — FRACTURE DENSITY (ROCK)

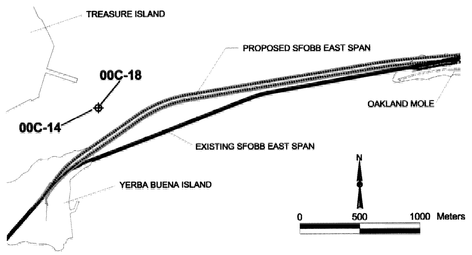
STRENGTH OF COHESIVE SOILS

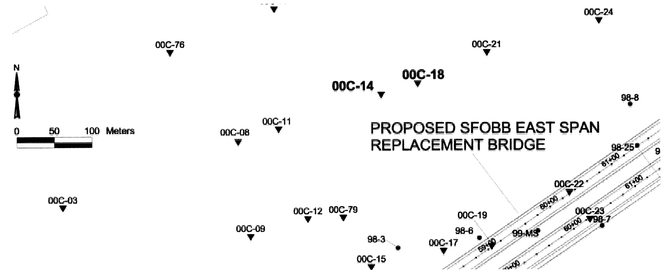
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

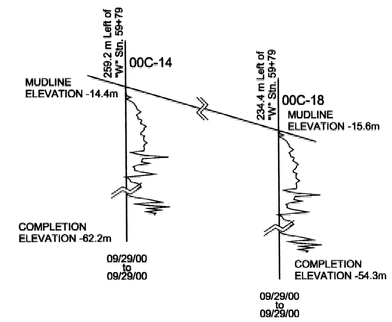
DENSITY OF GRANULAR SOILS

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.



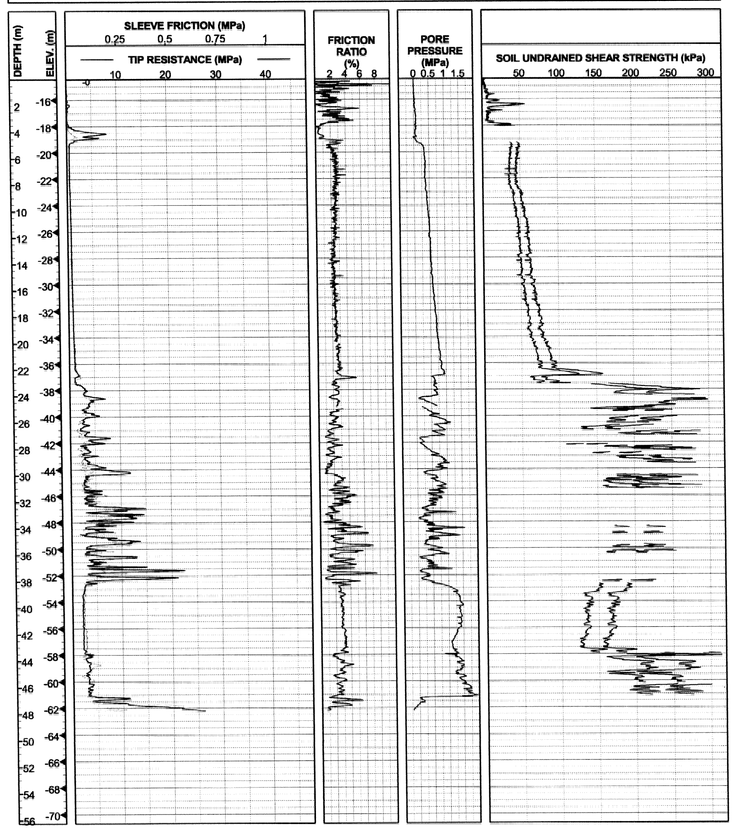




CPT 00C-14

COORDINATES: E1836327 N647887
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -14.4m (MSL)
START DATE: 09/29/00

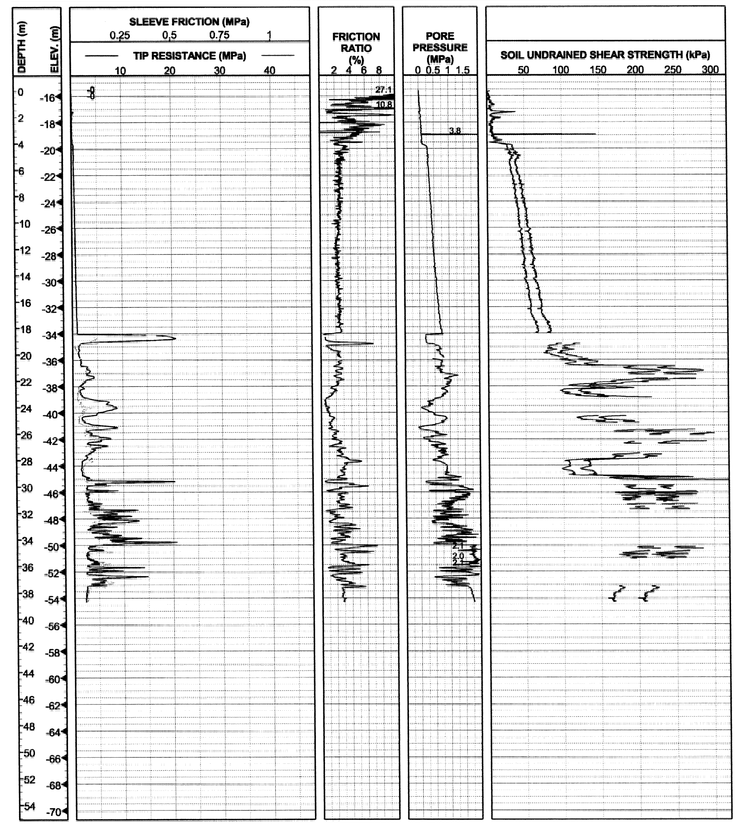
STATION: 259.2 m Left of "W" Stn. 59+79
COMPLETION ELEVATION: -62.2m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



CPT 00C-18

COORDINATES: E1836375 N647902
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -15.6m (MSL)
START DATE: 09/29/00

STATION: 234.4 m Left of "W" Stn. 59+79
COMPLETION ELEVATION: -54.3m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9, 0.0/1.2	140	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 36

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608.1	04-013521	33-0025

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — Sheet 118 of 120

To Accompany Plans Dated 7-22-13

SABA MOHAN — GEOTECHNICAL DESIGN OVERSIGHT	DRAWN BY	S.DESHPANDE	P.ROBINS — FIELD INVESTIGATOR
	CHECKED BY	T. MCADAM	DATE SEE ABOVE

PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION

T.W.McNEILAN — PROJECT ENGINEER

BRIDGE NO.	KM POST	POST MILE
34-0006L/R	13.2/13.9	8.2/8.7

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

CU 04
EA 0120F1

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 36

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) — SHEET 785 OF

33-0025-s-lotb36_757.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)
- PAVEMENT

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

STANDARD PENETRATION TEST (SPT) AND MODIFIED CALIFORNIA (MC) LINER SAMPLERS

Samplers were driven with a 63.5 kg 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.

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.

CLASSIFICATION TESTS BLOW COUNTS AND ROCK QUALITY

- ■ PERCENT PASSING #200 SIEVE
- ● WATER CONTENT (%)
- □ SUBMERGED UNIT WEIGHT (kN/m³)
- ○ THEORETICAL SUBMERGED UNIT WEIGHT (kN/m³)
- PLASTIC LIMIT + LIQUID LIMIT +
- ⊗ EQUIVALENT SPT BLOW COUNT = (MC BLOWCOUNT/1.6) OR SPT BLOWCOUNT
- ---- 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)
- Shear Strength Interpreted from CPT Tip Resistance (Nk = 12-15)
- ● POINT LOAD TEST (ROCK-INTACT SPECIMEN)
- ⊕ POINT LOAD TEST (ROCK-ALONG WEAK PLANE)
- ■ UNCONFINED COMPRESSION (ROCK)
- + Soil: Strength Exceeds Capacity of Measuring Device
  Rock: Sample broke along discontinuity; Intact sample would have greater strength
- —— FRACTURE DENSITY (ROCK)

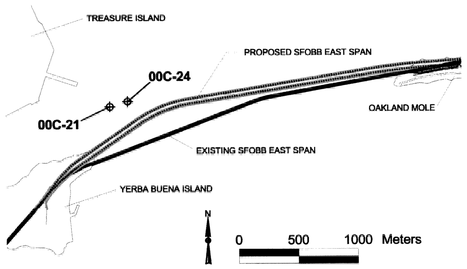
STRENGTH OF COHESIVE SOILS

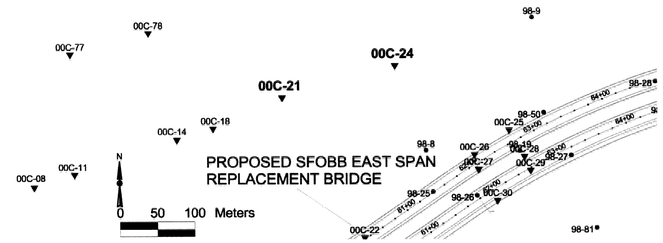
Consistency	Undrained Shear Strength kPa
Very Soft	less than 12
Soft	12 to 25
Firm	25 to 50
Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

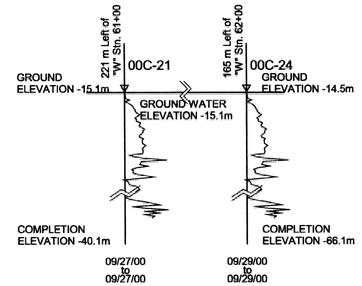
DENSITY OF GRANULAR SOILS

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.







DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1203	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/06 Geotechnical STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 846,
Oakland, CA 94621
(510) 562-8833, FAX (510) 562-8858

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

NOTES:

1. Pore pressures are relative to hydrostatic pressure at the mudline.
2. Breaks in the data are due to pauses in the sounding during installation of casing.

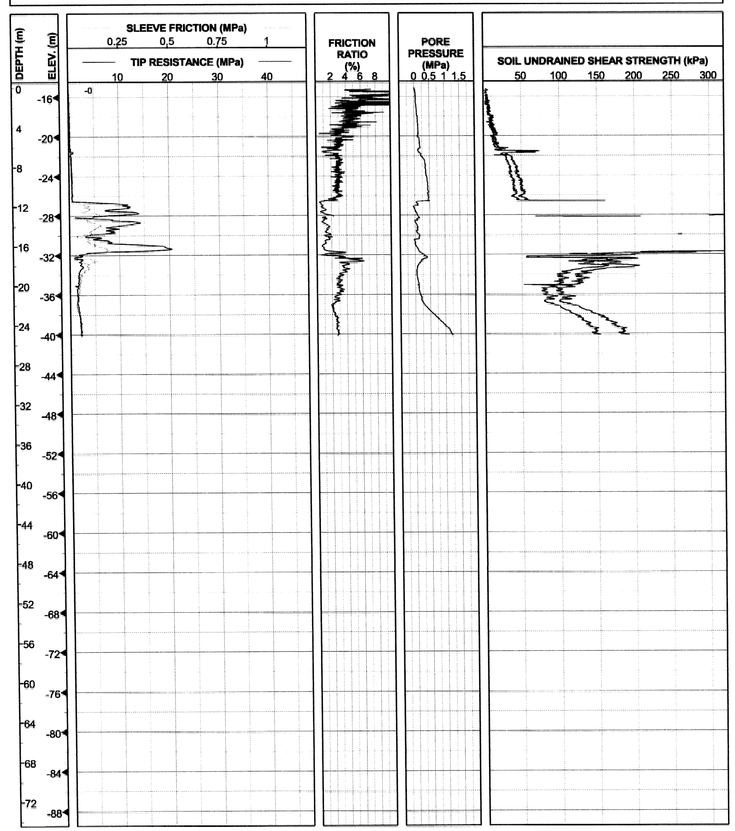
6-9-14
PLAN APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

CPT FH00C021 (00C-21)

COORDINATES: E1836467 N647943
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -15.1m (MSL)
START DATE: 09/27/00

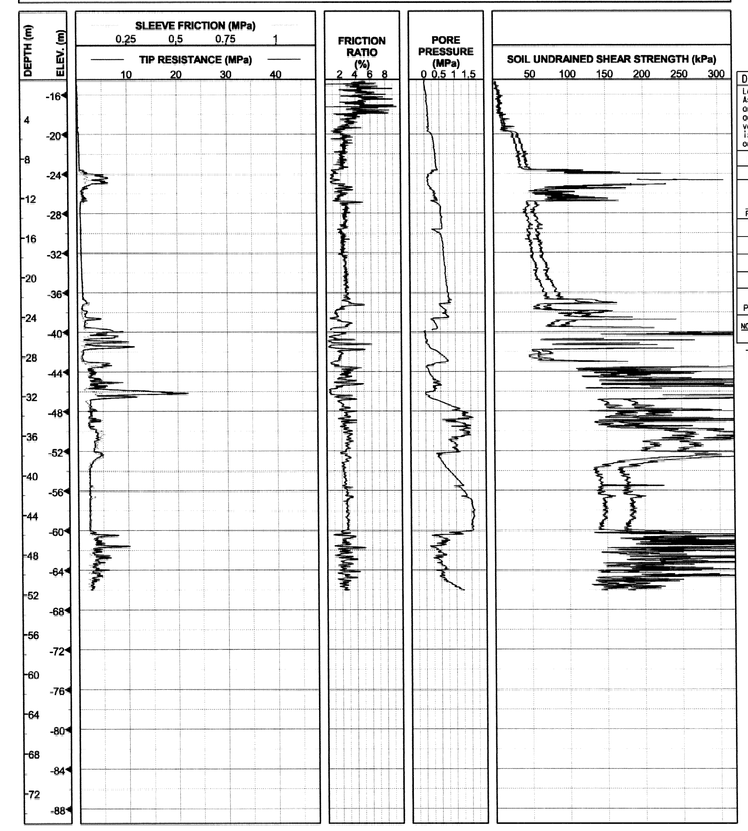
STATION: 221 m Left of "W" Stn. 61+00
COMPLETION ELEVATION: -40.1m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



CPT FH00C024 (00C-24)

COORDINATES: E1836616 N647986
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -14.5m (MSL)
START DATE: 09/29/00

STATION: 165 m Left of "W" Stn. 62+00
COMPLETION ELEVATION: -66.1m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF,Ala	80	8.6/8.9, 0.0/1.2	141	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 37

UNIT: 3593	CONTRACT No.	BRIDGE No.
PROJECT NUMBER & PHASE: 0412000608,1	04-013521	33-0025

NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — Sheet 119 of 120

To Accompany Plans Dated 7-22-13

SABA MOHAN, GEOTECHNICAL DESIGN OVERSIGHT	DRAWN BY: A.W.PALOMARES	R.HOWARD, FIELD INVESTIGATOR	PREPARED FOR THE STATE OF CALIFORNIA DEPARTMENT OF TRANSPORTATION
	CHECKED BY: R.HOWARD	DATE: SEE ABOVE	

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

T.W.McNEILAN, PROJECT ENGINEER

CU 04
EA 0120F1

BRIDGE NO.	KM POST	POST MILE
34-0006L/R	13.2/13.9	8.2/8.7

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 37

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY)

SHEET 786 OF

33-0025-s-lotb37_758.tif

SOIL AND ROCK TYPES

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- 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)
- PAVEMENT

SAMPLERS

- 76mm-OD, 72mm-ID Thin Walled Tube
- 57mm-OD, 54mm-ID* Thin Walled Driven Tube
- 63.5mm-OD, 54mm-ID Offshore Liner
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- ○ THEORETICAL SUBMERGED UNIT WEIGHT (kN/m³)

PLASTIC LIMIT + ····· + LIQUID LIMIT

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- ▼ SWEDISH FALL CONE
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Stiff	50 to 100
Very Stiff	100 to 200
Hard	greater than 200

DENSITY OF GRANULAR SOILS

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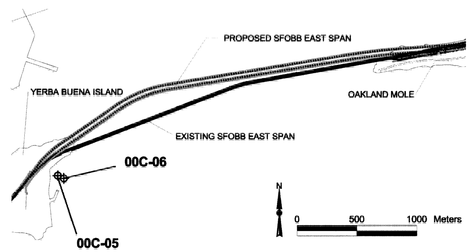
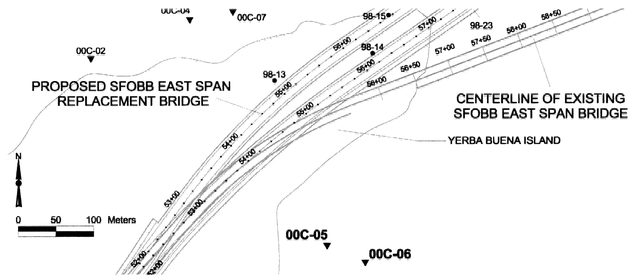
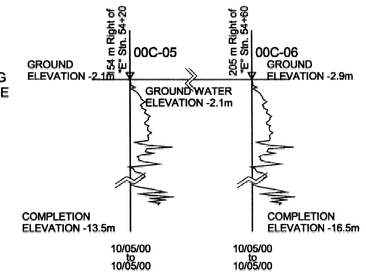
*Estimated from sampler driving record and CPT tip resistance.







DIST	COUNTY	ROUTE	KILOMETER POST TOTAL PROJECT	SHEET NO.	TOTAL SHEETS
04	SF	80	13.2/13.9	1204	1204

REGISTERED GEOTECHNICAL ENGINEER

12-6-04
PLANS APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER T.W. McNeilan No. 0583 Exp. 12/31/06 Geotechnical STATE OF CALIFORNIA

FUGRO-EARTH MECHANICS,
A JOINT VENTURE.
7700, Edgewater Dr., Ste. 846,
Oakland, CA 94621
(510) 562-8833, FAX (510) 562-8858

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NOTES:

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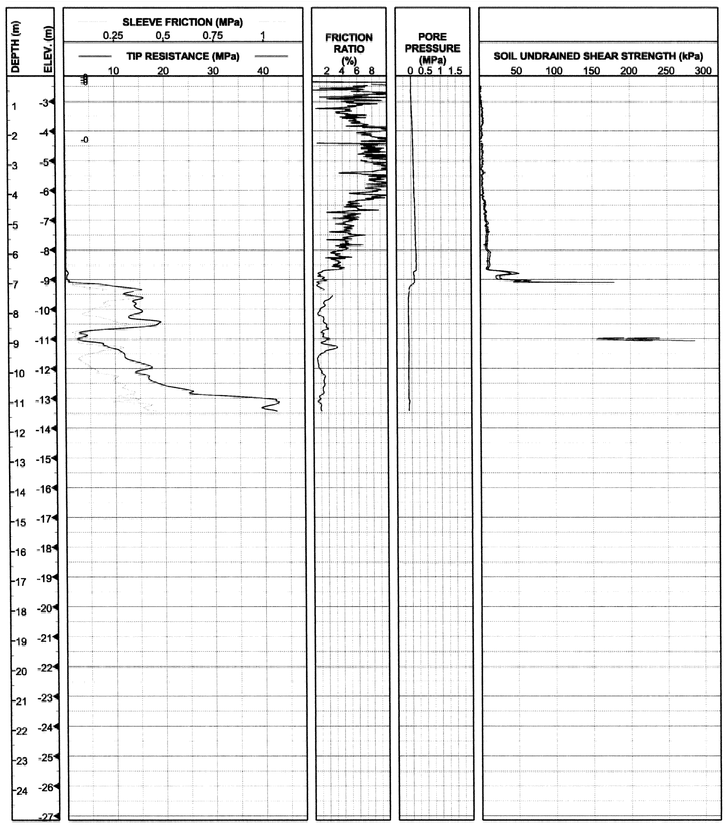
6-9-14
PLAN APPROVAL DATE

REGISTERED PROFESSIONAL ENGINEER SABA MOHAN No. C63519 Exp. 09-30-14 CIVIL STATE OF CALIFORNIA

CPT FH00C005 (00C-05)

COORDINATES: E1836197 N647245
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -2.1m (MSL)
START DATE: 10/05/00

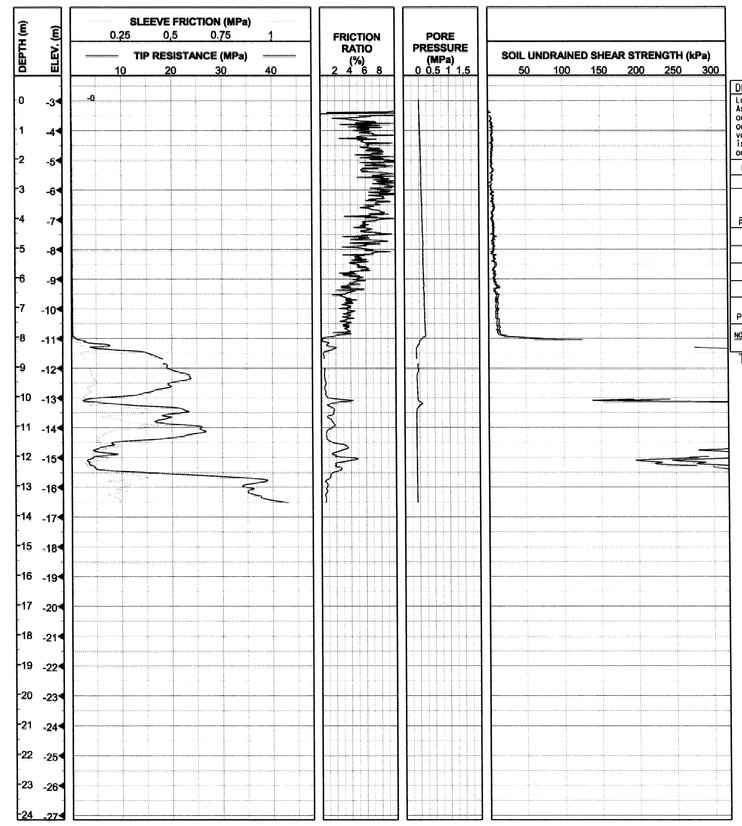
STATION: 154 m Right of "E" Stn. 54+20
COMPLETION ELEVATION: -13.5m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



CPT FH00C006 (00C-06)

COORDINATES: E1836248 N647222
CA State Plane Zone 3, NAD83, meters
MUDLINE ELEVATION: -2.9m (MSL)
START DATE: 10/05/00

STATION: 205 m Right of "E" Stn. 54+60
COMPLETION ELEVATION: -16.5m (MSL)
CONE END AREA: 15.03 sq. cm (Area Ratio = 0.56)



DIVISION OF ENGINEERING SERVICES - MATERIALS AND GEOTECHNICAL SERVICES

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DIST.	COUNTY	ROUTE	KILOMETER POST-TOTAL PROJECT	Sheet No.	Total Sheets
04	SF, Ala	80	8.6/8.9, 0.0/1.2	142	142

PROFESSIONAL ENGINEER — DATE 01-16-13

SAN FRANCISCO-OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT
504' AND 288' SPANS DEMOLITION
AS-BUILT LOG OF TEST BORINGS NO. 38

UNIT: 3593 — CONTRACT No. 04-013521 — BRIDGE No. 33-0025
PROJECT NUMBER & PHASE: 0412000608,1
NOTE: A COPY OF THIS LOG OF TEST BORINGS IS AVAILABLE AT OFFICE OF STRUCTURE MAINTENANCE AND INVESTIGATIONS, SACRAMENTO, CALIFORNIA — Sheet 120 of 120

To Accompany Plans Dated 7-22-13

SABA MOHAN, GEOTECHNICAL DESIGN OVERSIGHT	DRAWN BY	A.W.PALOMARES	A.RIDGEWAY, FIELD INVESTIGATOR
	CHECKED BY	R.HOWARD	DATE SEE ABOVE

PREPARED FOR THE
STATE OF CALIFORNIA
DEPARTMENT OF TRANSPORTATION

T.W.McNEILAN, PROJECT ENGINEER

BRIDGE NO. 34-0006L/R — KM POST 13.2/13.9 — POST MILE 8.2/8.7

CU 04
EA 0120F1

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

SAN FRANCISCO OAKLAND BAY BRIDGE
EAST SPAN SEISMIC SAFETY PROJECT

SELF-ANCHORED SUSPENSION BRIDGE (SUPERSTRUCTURE & TOWER)

LOG OF TEST BORINGS NO. 38

DISREGARD PRINTS BEARING EARLIER REVISION DATES → REVISION DATES (PRELIMINARY STAGE ONLY) — SHEET 787 — OF

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