GEOTECHNICAL SERVICES REPORT
SMITH CANAL CLOSURE STRUCTURE
STOCKTON, CALIFORNIA

APRIL 9, 2008

KLEINFELDER

File No. 92459.G01
April 9, 2008

Mr. David Peterson, P.E.
Peterson Brustad Inc.
1180 Iron Point Road, Suite 260
Folsom, CA 95630

Subject: **Geotechnical Services Report**
Smith Canal Closure Structure
Stockton, California

Dear Mr. Peterson:

Kleinfelder is pleased to present the results of our limited geotechnical engineering services performed for a proposed closure structure on Smith Canal where it empties into the San Joaquin River in Stockton, California. The accompanying report includes background information regarding the anticipated construction, the purpose of our services, and scope of services provided. In addition, discussions regarding our investigative procedures and the site conditions encountered during previous field explorations are presented. Finally, geotechnical conclusions and recommendations are provided for project design and construction. The appendix of the report includes logs of borings and summaries of laboratory tests from previous investigations near the site. We have also included an information sheet published by ASFE. Our firm is a member of ASFE, and we feel this sheet will help you better understand geotechnical engineering reports.

We appreciate the opportunity to provide our services for this project. If you have questions regarding this report or if we may be of further assistance, please contact us.

Sincerely,

KLEINFELDER WEST, INC.

James Wetenkamp
Staff Geologist

Reviewed by

Carl Henderson, Ph.D., C.E. No. 71115
Geotechnical Department Manager

REGISTERED PROFESSIONAL ENGINEER
CARL FRANCISCO HENDERSON
No. 71115
Exp. 6-30-09
CIVIL
STATE OF CALIFORNIA

JAW:lr
4c: Client

KLEINFELDER [illegible] East Myrtle Street, Stockton, CA [illegible]

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GEOTECHNICAL SERVICES REPORT
SMITH CANAL CLOSURE STRUCTURE
STOCKTON, CALIFORNIA

1.0 INTRODUCTION

In this report we present the results of our limited geotechnical engineering services performed for a proposed closure structure on Smith Canal where it empties into the San Joaquin River in Stockton, California. The site location relative to existing streets is shown on Plate 1.

Smith Canal has a small drainage area, so its border levees serve primarily to prevent back-flooding from the Delta, rather than confine upland riverine flows. The Smith Canal levees are highly encroached upon, and certification to FEMA (Federal Emergency Management Agency) standards would require removal of a substantial number of residential structures prior to completing required certification investigations, analyses, and construction of required improvements. A more feasible solution is to construct a closure structure near the mouth of the Canal in order to prevent back-flooding from the Delta.

We understand that design of the proposed structure is currently underway and final structural details are not available as of this writing. On a preliminary basis, we understand two alternatives are proposed for the site – an inflatable dam configuration and a lock and dam configuration. Both will be sized and configured to allow for continued recreational navigation, prevent back-flooding from the Delta, and pass stormwater through to the Delta. We assume that for both alternatives a "double" sheet pile seawall will be constructed along a majority of the alignment leaving a relatively narrow opening for the closure structure that can be closed in the event of high water.

2.0 PURPOSE AND SCOPE OF SERVICES

The purpose of our services was to evaluate existing data regarding the subsurface conditions at various locations near the site in order to develop recommendations related to the geotechnical aspects of project design and construction.

The scope of our services included the following:

- A review of boring logs and laboratory test data from borings drilled near the site
- Evaluation of existing data and an engineering analysis to develop our geotechnical conclusions and recommendations
- Preparation of this report which includes:
  - A description of the proposed project
  - A description of adjacent field and laboratory investigations
  - A description of the surface and subsurface conditions encountered during our previous nearby field investigations
  - Conclusions and recommendations related to the geotechnical aspects of the project design and construction
  - A vicinity map/boring location plan, and

An appendix that includes logs of borings and summaries of laboratory tests from our previous nearby investigations.

3.0 PREVIOUS STUDIES

Kleinfelder has performed several geotechnical investigations in the vicinity of the project site, including the Atherton Island Sewer Extension project and several investigations along the San Joaquin River Deep Water Channel on Rough and Ready Island. A total of fifteen borings ranging in depth from approximately 7 to 86 feet below ground surface and one Cone Penetration Test (CPT) to a depth of approximately 80 feet below ground surface were reviewed for our analysis. A copy of the logs of these borings and the CPT results are included in the appendix of this report.

Laboratory tests performed on the soil samples recovered from these borings included evaluation of natural moisture content and in-place density and percent passing the #200 sieve. Unconfined compressive strengths and undrained shear strengths of select samples were estimated using a pocket penetrometer and Torvane vane shear device, respectively.

4.0 SITE CONDITIONS

4.1 Surface Conditions

The site is situated at the mouth of Smith Canal, west of Atherton Island. Smith Canal into the Deep Water Channel of the San Joaquin River and extends approximately 3 miles east until it reaches American Legion Park in Downtown Stockton. The proposed seawall will be attached on the west to the existing levee adjacent the Stockton Golf and Country Club and on the east to the bar located west of Monte Diablo Avenue.

4.2 Subsurface Conditions

The soils within the channel adjacent Rough and Ready Island consist predominately of 10 to 15 feet of silty clay underlain by silty sand (see borings B-1 and B-2 on Plate 1). The subsurface conditions on Rough and Ready Island consist primarily of soft to stiff silty and sandy clay and loose to medium-dense silty and clayey sand. These soils are underlain by predominately sandy soil at a depth of approximately 40 feet. The CPT results from previous investigations on Rough and Ready Island indicate relatively-soft silt and clay to a depth of 25 feet underlain by stiff to hard silt and clay to a depth of approximately 65 feet. Underlying these soils, the CPT results indicate the presence of dense, sandy soil.

The subsurface conditions on Atherton Island upstream of the project site consist predominately of soft, sandy clay and sandy silt to a depth of about 6 to 14 feet below ground surface. These soils are underlain by very-loose silty sand and relatively "clean" sand and soft sandy silt.

Within the canal at the location of the proposed closure structure, it is likely that several feet of soft, fine-grained soil will be encountered, underlain predominately by dense, coarse-grained soils.

Detailed descriptions of the subsurface conditions encountered during our previous field investigations are presented in the appendix.

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 General

Based on our review, it is our professional opinion that the site should be suitable from a geotechnical standpoint for support of the proposed closure structure provided the recommendations contained herein are incorporated into the project design. Given the site conditions anticipated, we believe conventional sheet piles should provide adequate support for the assumed structural loading. The primary considerations identified from a geotechnical standpoint are structure support, slope stability, seepage and erosion protection. Specific conclusions and recommendations regarding the geotechnical aspects of design and construction are presented in the following sections. It must be noted that preliminary recommendations are based on explorations completed in the vicinity of the proposed canal closure structure. It is highly recommended that field explorations be completed to refine our preliminary analysis and recommendations for final design.

5.2 Seawall

5.2.1 Dredge Line Preparation

During previous studies by our firm for seawall projects, the presence of soft silt and clay sediments have been documented. As an example, dredging was used to remove these soils for a seawall project in the McLeod Lake area. We recommend that if these soft sediments are encountered during the Smith Canal Closure Structure project, they be removed by dredging or dragline.

5.2.2 Backfill Material and Erosion Protection

Where sheet piles are positioned close to the existing water side embankment slopes on the west at the existing levee adjacent Stockton Golf and Country Club and on the east at the bar located west of Monte Diablo Avenue, we anticipate backfill of the seawall will consist of imported sand and gravel placed below the water line. We recommend that this material contain a maximum of 10 percent passing the #200 sieve. The material must be such that placement underwater in a "saturated" condition will provide a stable base on which to mechanically compact engineered fill above the water line.

If the sand and gravel mixture is somewhat unstable near the water surface, a geotextile fabric should be placed over the exposed surface prior to mechanically compacting the upper fill. We recommend that all upper fill soil be mechanically compacted to at least 90 percent of the maximum dry density as determined by the

ASTM D-1557 test procedure at moisture content near optimum. In our opinion, selected materials dredged from the channel, when properly dried, can be used as backfill above the water line. We recommend that rip rap materials be placed at the dredge line in order to reduce erosion potential.

5.2.3 Sheet Pile Bulkhead at Water Side Embankment Slopes

Where sheet piles are positioned close to the existing water side slope embankment slopes, the preliminary recommended depth of embedment for sheet piles is a minimum of 15 feet below the dredge line. This will result in an approximate 50 kip force for 15-foot spacings of tie back anchors. In our preliminary evaluation, we assumed that the groundwater behind the wall will be in equilibrium with mean tide and also assumed a nominal surcharge load of approximately 100 pounds per square foot. If tie rods with deadman anchors are considered for the bulkhead, the tierods should extend beyond the active and passive pressure zones. The preliminary recommended length of tierods is 25 feet at a depth of 5 feet below ground surface.

The assumed earth pressure diagram for the sheet pile bulkhead is presented on Plate 2. The assumed pressure zone diagram and typical diagram for deadman anchors for the sheet pile bulk head is presented on Plate 3.

5.2.4 Sheet Piles Cantilevered Within Canal

Where the proposed "double" sheet pile wall is be driven into water, the preliminary recommended depth of embedment for sheet piles is a minimum of 20 feet. This is based on conservative assumptions of 2,000 pound per foot point load at the top of a free cantilevered sheet pile wall. The assumed pressure diagram for this sheet pile section is presented on Plate 4.

5.2.5 Pile Driving Considerations

It is unknown to our firm at this time the method of pile driving to be used for the proposed sheet pile seawall. The piles may be driven using a falling hammer or vibrating equipment. If sheet piles are to be vibrated into place, adjacent piles should be monitored and held in place, if needed, to ensure that excessive settlement does not occur. Once the method of driving is selected, our firm should be contacted for additional review and comment.

5.3 Soil Corrosion

Kleinfelder is not a corrosion consultant or expert. You may wish to retain a competent corrosion engineer to design corrosion protection systems appropriate for this project.

6.0 ADDITIONAL SERVICES

The review of plans and specifications, field observations, and testing by Kleinfelder is an integral part of the conclusions and recommendations made in this report. If Kleinfelder is not retained for these services, the client agrees to assume Kleinfelder's responsibility for any potential claims that may arise during construction. The actual tests and observations by Kleinfelder during construction will vary depending on type of project and soil conditions. The tests and observations would be additional services provided by our firm. The costs for these services are not included in our current fee arrangements. These services should include but are not limited to the following:

- Continuous observation and testing during site preparation and grading, and placement of Engineered Fill.
- Observation during pile driving operations
- Consultation as required during construction

7.0 LIMITATIONS

1. The conclusions and recommendations of this report are for design purposes for the Smith Canal Closure Structure project as described in the text of this report. The conclusions and recommendations in this report are invalid if:

   - The assumed structural details change
   - The report is used for adjacent or other sites
   - Changes of existing conditions occur between the issuance of this report and construction
   - Any other change is implemented which materially alters the project from that proposed at the time this report was prepared

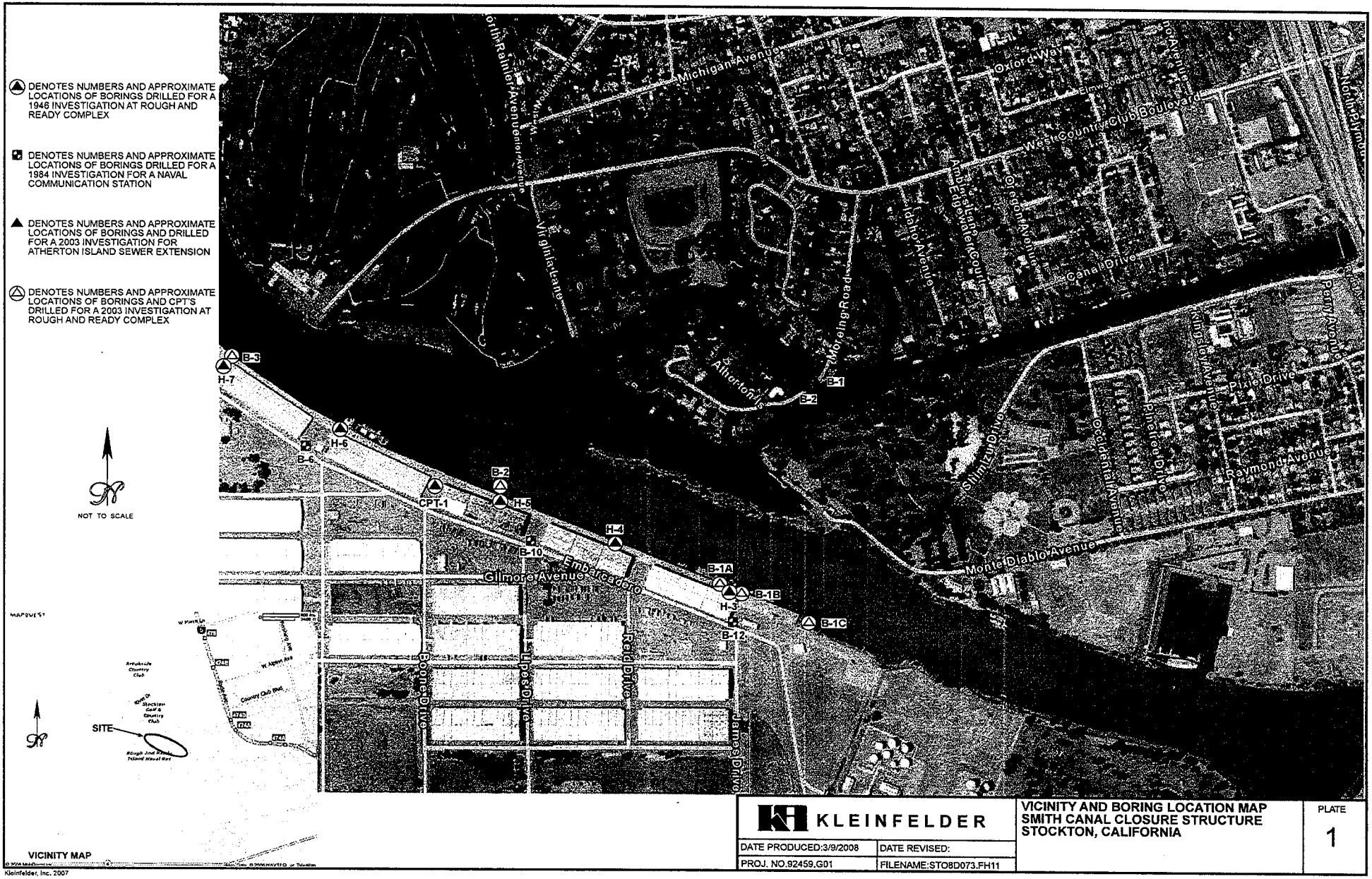
2. The preliminary conclusions and recommendations in this report are based on the borings drilled for previous, adjacent investigations. It is possible that variations in the soil conditions exist at the site which may require a site specific investigation, additional consultation, and possible design revisions. It is highly recommended that additional field explorations be performed at the location of the proposed structure prior to final design.

3. We are not corrosion engineers. A competent corrosion engineer should be retained to design corrosion protection systems appropriate for the project.

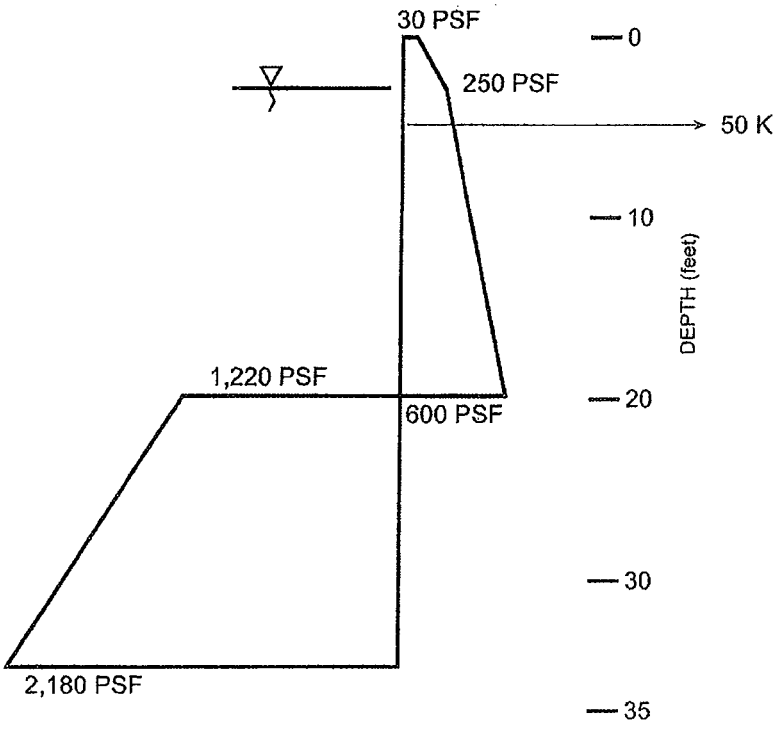
4. This report was prepared in accordance with the generally accepted standard of practice that existed in San Joaquin County at the time the report was written. No warranty, expressed or implied, is made.

5. It is the CLIENT'S responsibility to see that all parties to the project, including the designer, contractor, subcontractor, etc., are made aware of this report in its entirety.

6. This report may be used only by the client and only for the purposes stated within a reasonable time from its issuance, but in no event later than three years from the date of the report. Land use, site conditions (both on- and off-site), or other factors may change over time, and additional work may be required. Based on the intended use of the report, Kleinfelder may require that additional work be performed and that an updated report be issued. Non-compliance with any of these requirements by the client or anyone else, unless specifically agreed to in advance by Kleinfelder in writing, will release Kleinfelder from any liability resulting from the use of this report by any unauthorized party.



KLEINFELDER	VICINITY AND BORING LOCATION MAP SMITH CANAL CLOSURE STRUCTURE STOCKTON, CALIFORNIA	PLATE 1
DATE PRODUCED:3/9/2008	DATE REVISED:	
PROJ. NO.92459.G01	FILENAME:STO8D073.FH11	

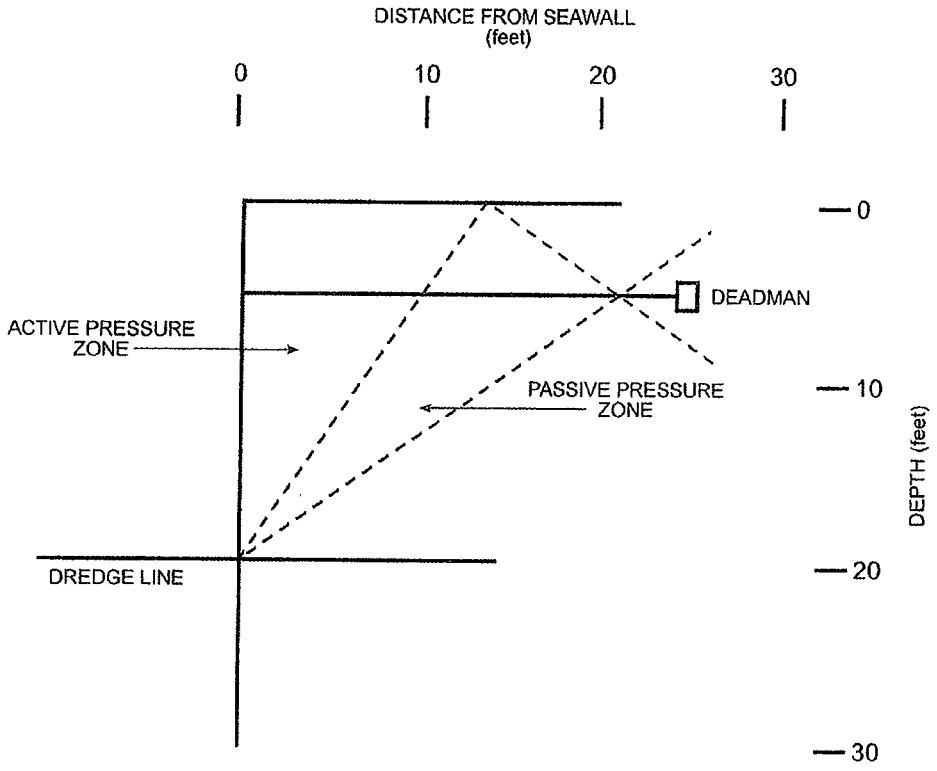


KLEINFELDER

PRESSURE DIAGRAM FOR BULKHEAD
SMITH CANAL CLOSURE STRUCTURE
STOCKTON, CALIFORNIA

PLATE No.
2

DATE PRODUCED:4/9/2008	DATE REVISED:
PROJ. NO.:92459.G01	FILENAME:PRESSUREB.FH11

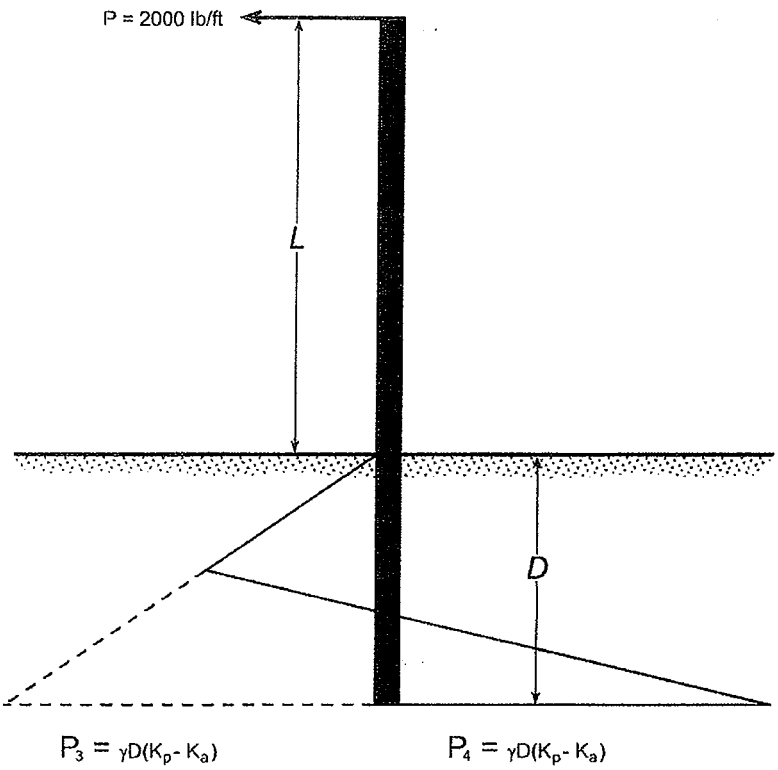


KLEINFELDER

ACTIVE - PASSIVE ZONES FOR BULKHEAD
SMITH CANAL CLOSURE STRUCTURE
STOCKTON, CALIFORNIA

PLATE No.
3

DATE PRODUCED:4/9/2008	DATE REVISED:
PROJ. NO.:92459.G01	FILENAME:ACTIVE.FH11



ASSUME: $K_p - K_a = 2.17$

D = EMBEDMENT IN FEET

L = UNSUPPORTED PILE LENGTH

KLEINFELDER

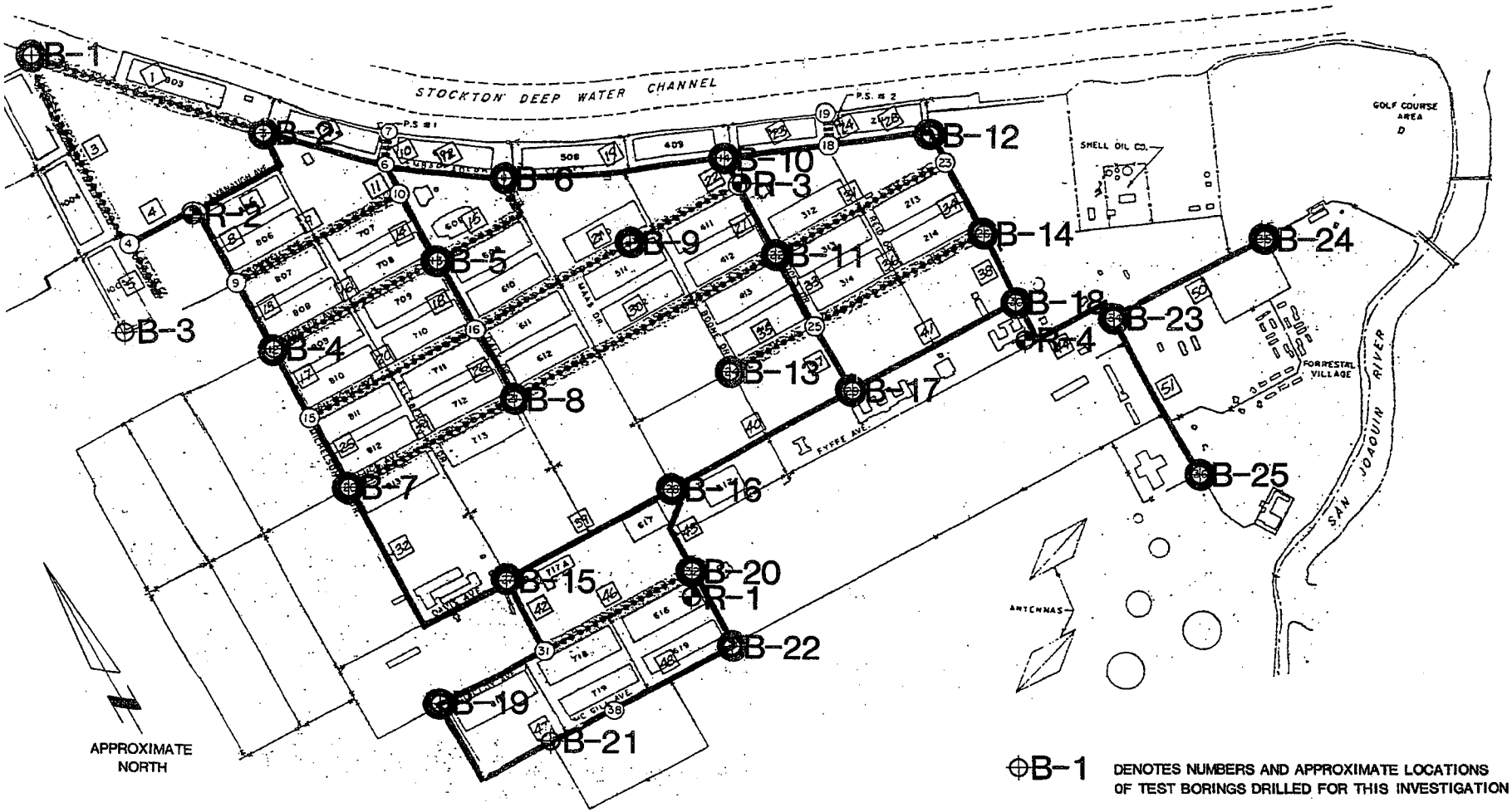
DATE PRODUCED:4/9/2008	DATE REVISED:
PROJ. NO.:92459.G01	FILENAME:PRESSURED.FH11

PRESSURE DIAGRAM FOR "CANTILEVER" PILE SECTION SMITH CANAL CLOSURE STRUCTURE STOCKTON, CALIFORNIA

PLATE No.

4

APPENDIX
BORING LOCATION PLANS AND LOGS OF BORINGS FROM PREVIOUS INVESTIGATIONS NEAR THE SITE



⊕B-1 DENOTES NUMBERS AND APPROXIMATE LOCATIONS OF TEST BORINGS DRILLED FOR THIS INVESTIGATION

⊕R-1 DENOTES NUMBERS AND APPROXIMATE LOCATIONS OF RESISTIVITY TESTS PERFORMED

J.H. KLEINFELDER & ASSOCIATES GEOTECHNICAL CONSULTANTS • MATERIALS TESTING PROJECT NO. S-2707-1	PLOT PLAN PROPOSED FIRE PROTECTION PIPELINE NAVAL COMMUNICATIONS STATION STOCKTON, CA	PLATE 1

Depth In Feet	Torvane Shear (lbs/ft²)	Moisture Content %	Blow/ Ft.	Sample No.	B-5 USCS	DESCRIPTION
0						2½ Asphaltic Concrete.
						8" Aggregate Base.
					ML	Greyish-Green Silt.
		22	26			
3					SC	Greenish Clayey Sand.
		42	17			
					SP	Greenish Fine Sand.
6	800	42	4		CL	Greenish Clay.
						BORING TERMINATED AT 7-FOOT DEPTH.
						NOTES:
						1. Boring Drilled on 11-19-84.
						2. No Caving Noted.
						3. No Free Groundwater Encountered.
0					B-6	
						2½" Asphaltic Concrete.
						7" Aggregate Base.
					SP	Greyish-Greenish Fine Medium Sand.
3		14	19			
					SP	Grey Sand.
6		11	11		SM SP	Grey Sand with/ Clay and Silt Lenses.
						BORING TERMINATED AT 7-FOOT DEPTH.
						NOTES:
						1. Boring Drilled on 11-19-84.
						2. No Caving noted.
						3. No Free Groundwater Encountered.

J.H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

PROJECT NO. S-2707-1

LOG OF BORING NO. 5 & 6

PLATE V

JHK & A FORM R-22

Depth In Feet	Torvane Shear (lbs/ft^2)	Moisture Content %	Blow/ Ft.	Sample No.	B-9 USCS	DESCRIPTION
0						3" Asphaltic Concrete.
						21" Aggregate Base/Very Rocky. (Large)
		43	17		CL	Greyish Silty Clay.
3						
					SM	Greyish Silty Sand.
6		31	5			
						BORING TERMINATED AT 7-FOOT DEPTH.
						NOTES:
						1. Boring Drilled on 11-19-84.
						2. No Caving Noted.
						3. No Free Groundwater Encountered.
0					B-10	
						5" Asphaltic Concrete.
						11" Aggregate Base.
		20	8		CL	Green-Brown Silty Fine Sandy Clay.
3		23	7		CL/SC	Green-Brown Silty Very Sandy Clay/ Clayey Sand.
6	1300	26	11		CL	Green-Brown Very Fine Sandy Clay.
						BORING TERMINATED AT 7-FOOT DEPTH.
						NOTES:
						1. Boring Drilled on 11-19-84.
						2. No Caving Noted.
						3. No Free Groundwater Encountered.

J.H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

PROJECT NO. S-2707-1

LOG OF BORING NO. 9 & 10

PLATE

VII

JHK & A FORM R-22

Depth In Feet	Torvane Shear (lbs/ft^2)	Moisture Content %	Blow/ Ft.	Sample No.	B-11 USCS	DESCRIPTION
0						4" Asphaltic Concrete.
						9" Aggregate Base.
	600	31	10		CL	Greyish Sandy Silty Clay.
3		34	8			
					SP	Greyish Sand.
					CL	Greyish Sandy Clay.
6	1000	46	11			
					CL	Greyish Clay.
						BORING TERMINATED AT 7-FOOT DEPTH.
						NOTES:
						1. Boring Drilled on 11-19-84.
						2. No Caving Noted.
						3. No Free Groundwater Encountered.
0					B-12	
						4½" Asphaltic Concrete.
						7½" Aggregate Base.
		31	10		CL	Greyish Sandy Silty Clay.
					SP	Greyish Sand.
3	1300	34	8		CL	Greyish Sandy Clay.
					CL	Greyish Clay.
6	800	46	11			
						BORING TERMINATED AT 7-FOOT DEPTH.
						NOTES:
						1. Boring Drilled on 11-16-84.
						2. No Caving Noted.
						3. No Free Groundwater Encountered.

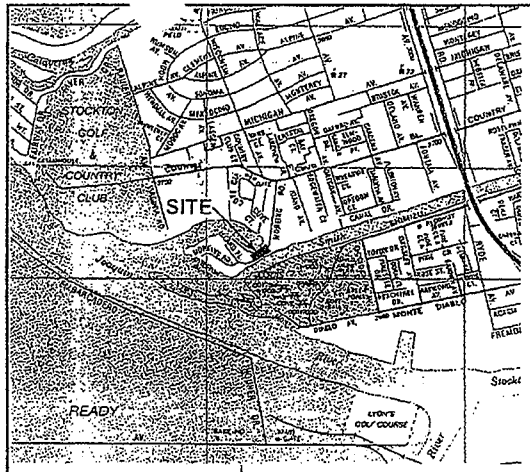
J.H. KLEINFELDER & ASSOCIATES
GEOTECHNICAL CONSULTANTS • MATERIALS TESTING

PROJECT NO. S-2707-1

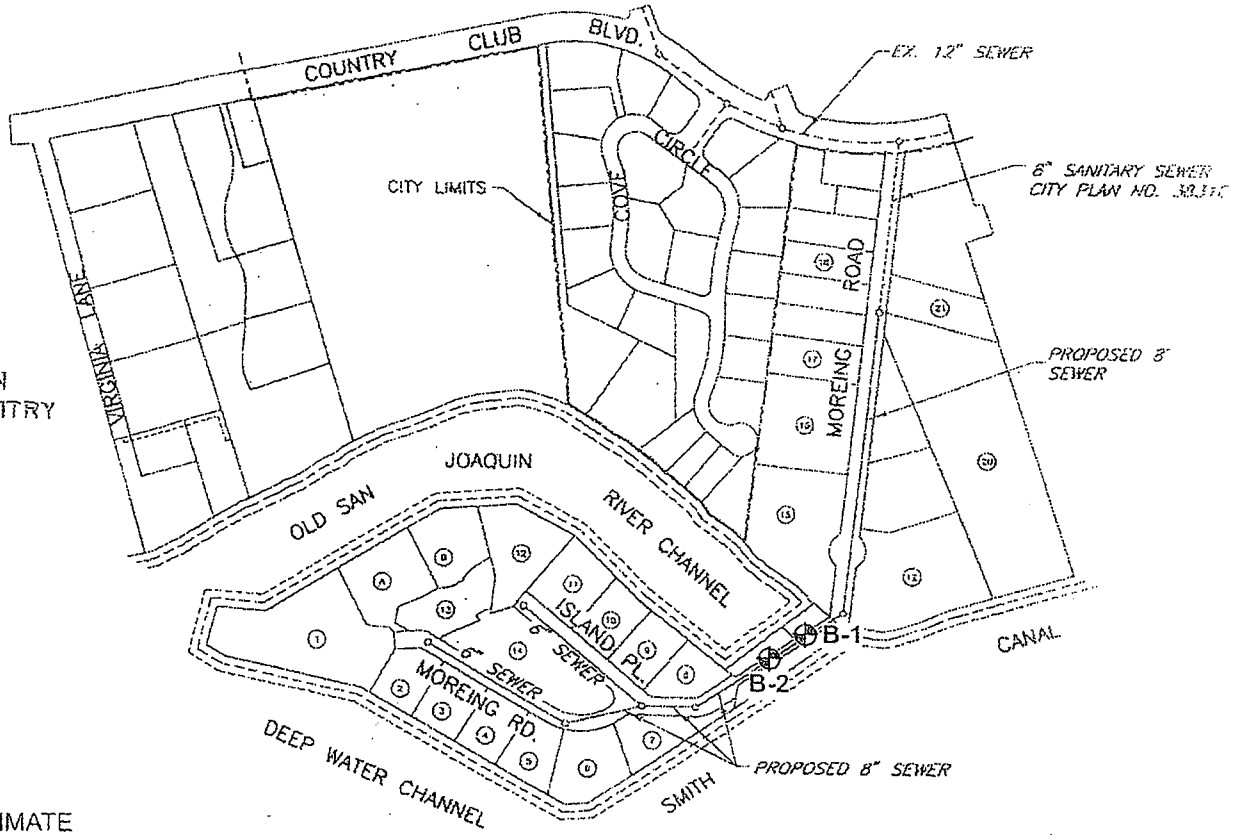
LOG OF BORING NO. 11 & 12

PLATE VIII

JHK & A FORM R-22



STOCKTON GOLF & COUNTRY CLUB



B-1 DENOTES NUMBERS AND APPROXIMATE LOCATIONS OF BORINGS DRILLED FOR THIS INVESTIGATION

NOT TO SCALE

KLEINFELDER

DATE PRODUCED:12/11/2003	DATE REVISED:
PROJ. NO.:20827.G01	FILENAME:STO3D961.FH9

SITE PLAN AND VICINITY MAP
ATHERON ISLAND SEWER EXTENSION
MOREING ROAD
STOCKTON, CALIFORNIA

PLATE No.

1

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			USCS SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS (More than half of material is larger than the #200 sieve)	GRAVELS (More than half of coarse fraction is larger than the #4 sieve)	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
			GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVELS, GRAVEL-SILT-SAND MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SANDS (More than half of coarse fraction is smaller than the #4 sieve)	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
			SP	POORLY-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS, SAND-GRAVEL-SILT MIXTURES
			SC	CLAYEY SANDS, SAND-GRAVEL-CLAY MIXTURES
FINE GRAINED SOILS (More than half of material is smaller than the #200 sieve)	SILTS AND CLAYS (Liquid limit less than 50)		ML	INORGANIC SILTS & VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS, CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS & ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS (Liquid limit greater than 50)		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILT
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS & ORGANIC SILTS OF MEDIUM-TO-HIGH PLASTICITY
LOAMS				UNDER USDA SOIL CLASSIFICATION SYSTEM, SOIL OF APPROXIMATELY EQUAL SAND/SILT/CLAY

KLEINFELDER

Drafted By: GDG
Date: 4/1/2003
Project No.: 20827.G01
File Number: STO2G115

UNIFIED SOIL CLASSIFICATION SYSTEM
ATHERTON ISLAND SEWER EXTENSION
MOREING ROAD
STOCKTON, CALIFORNIA

PLATE
A-1

K:\A-USCS STO2G115.GPJ 4/1/03

LOG SYMBOLS

	BULK / BAG SAMPLE	-4	PERCENT FINER THAN THE NO. 4 SIEVE (ASTM Test Method C 136)
	MODIFIED CALIFORNIA SAMPLER (2-1/2 inch outside diameter)	-200	PERCENT FINER THAN THE NO. 200 SIEVE (ASTM Test Method C 117)
	CALIFORNIA SAMPLER (3 inch outside diameter)	LL	LIQUID LIMIT (ASTM Test Method D 4318)
	STANDARD PENETRATION SPLIT SPOON SAMPLER (2 inch outside diameter)	PI	PLASTICITY INDEX (ASTM Test Method D 4318)
	CONTINUOUS CORE	EI	EXPANSION INDEX (UBC STANDARD 29-2)
	ROCK CORE	COL	COLLAPSE POTENTIAL
	WATER LEVEL (level where first encountered)	UC	UNCONFINED COMPRESSION (ASTM Test Method D 2166)
	WATER LEVEL (level after completion)		
	SEEPAGE	MC	MOISTURE CONTENT (ASTM Test Method D 2216)

GENERAL NOTES

1. *Lines separating strata on the logs represent approximate boundaries only. Actual transitions may be gradual.*

2. *No warranty is provided as to the continuity of soil conditions between individual sample locations.*

3. *Logs represent general soil conditions observed at the point of exploration on the date indicated.*

4. *In general, Unified Soil Classification System designations presented on the logs were evaluated by visual methods only. Therefore, actual designations (based on laboratory tests) may vary.*

KLEINFELDER

Drafted By: GDG
Date: 4/1/2003
Project No.: 20827.G01
File Number: STO2G115

LOG KEY

ATHERTON ISLAND SEWER EXTENSION
MOREING ROAD
STOCKTON, CALIFORNIA

PLATE

A-2

KA-LOG_KEY STO2G115.GPJ 4/1/03

Surface Conditions: Moreing Road - AC pavement - west side of Road

Date Completed: 9/19/2002

Logged By: PD

Groundwater: Groundwater encountered at a depth of approximately 6 feet below existing site grade.

Total Depth: 21.5 feet

Depth (feet)	FIELD: Sample Type	FIELD: Sample No.	FIELD: Blows/ft	FIELD: Pen (tsf)	LABORATORY: Dry Density (pcf) / Moisture Content (%)	LABORATORY: Liquid Limit / Plasticity Index	LABORATORY: Passing #4 Sieve (%) / Passing #200 Sieve (%)	LABORATORY: Other Tests	Lithography	DESCRIPTION Approximate elevation feet
										.75" AC
										(CL) GRAVELLY SANDY CLAY - Moist, fine grained (hand augered to 5')
5		1-5-1	0/8"	<0.5	78 / 38					(CL) SANDY CLAY - Blue gray, very moist, very soft, fine grained
10		1-10-1	3	0.5	87 / 37					(ML) SANDY SILT - Blue gray, very moist, soft fine grained
15		1-15-1	5							(SP) SAND - Blue gray, wet, very loose, slightly silty, fine grained
20		1-20-1	3							
										Boring completed at a depth of 21.5 feet below existing site grade .
25										

KLEINFELDER

LOG OF BORING B-1
ATHERTON ISLAND SEWER EXTENSION
MOREING ROAD
STOCKTON, CALIFORNIA

PLATE
1 of 1
A-3

Drafted By: GDG
Date: 12/10/2003
Project No.: 20827.G01
File Number: STO2G115

STO2G115.GPJ 12/10/03

Surface Conditions: Moreing Road - AC pavement - west side of Road

Date Completed: 9/19/2002

Logged By: PD

Groundwater: Groundwater encountered at a depth of approximately 6 feet below existing site grade.

Total Depth: 21.5 feet

Depth (feet)	FIELD: Sample Type	Sample No.	Blows/ft	Pen (tsf)	LABORATORY: Dry Density (pcf)	Moisture Content (%)	Liquid Limit	Plasticity Index	Passing #4 Sieve (%)	Passing #200 Sieve (%)	Other Tests	Lithography	DESCRIPTION / Approximate elevation feet
													2" AC Pavement
													(CL) SANDY CLAY - Brown, moist to very moist, soft, fine grained
5		2-5-1	6							24			
													(SM) SILTY SAND - Brown, wet, very loose, medium to coarse grained
													Blue gray
10		2-10-1	4		98	31				37			
15		2-15-1	3										
													(ML) SANDY SILT - Blue gray, wet, soft, fine grained
20		2-20-1	5										
													Boring completed at a depth of 21.5 feet below existing site grade.
25													

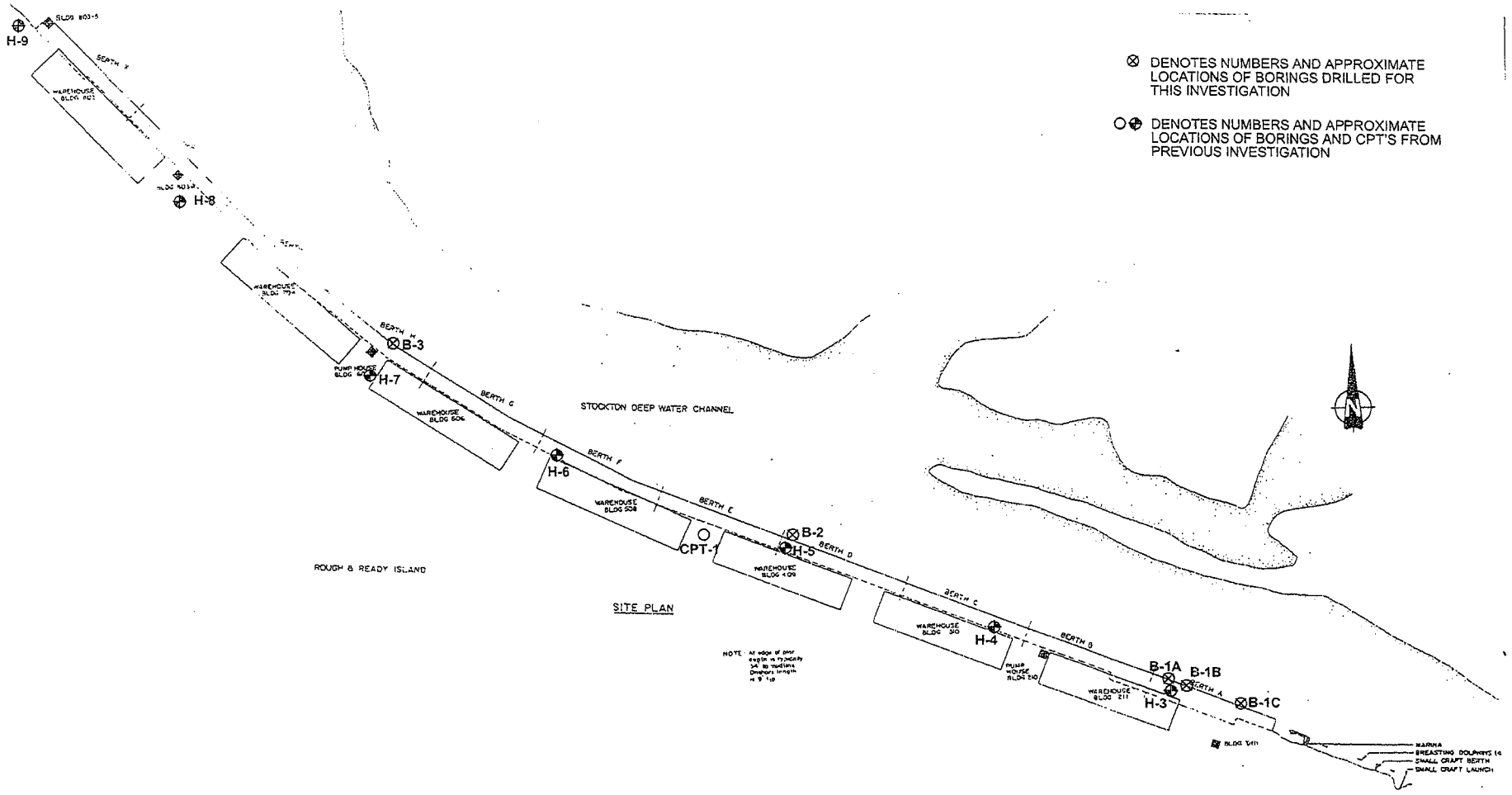
KLEINFELDER

Drafted By: GDG
Date: 4/1/2003
Project No.: 20827.G01
File Number: STO2G115

LOG OF BORING B-2
ATHERTON ISLAND SEWER EXTENSION
MOREING ROAD
STOCKTON, CALIFORNIA

PLATE
1 of 1
A-4

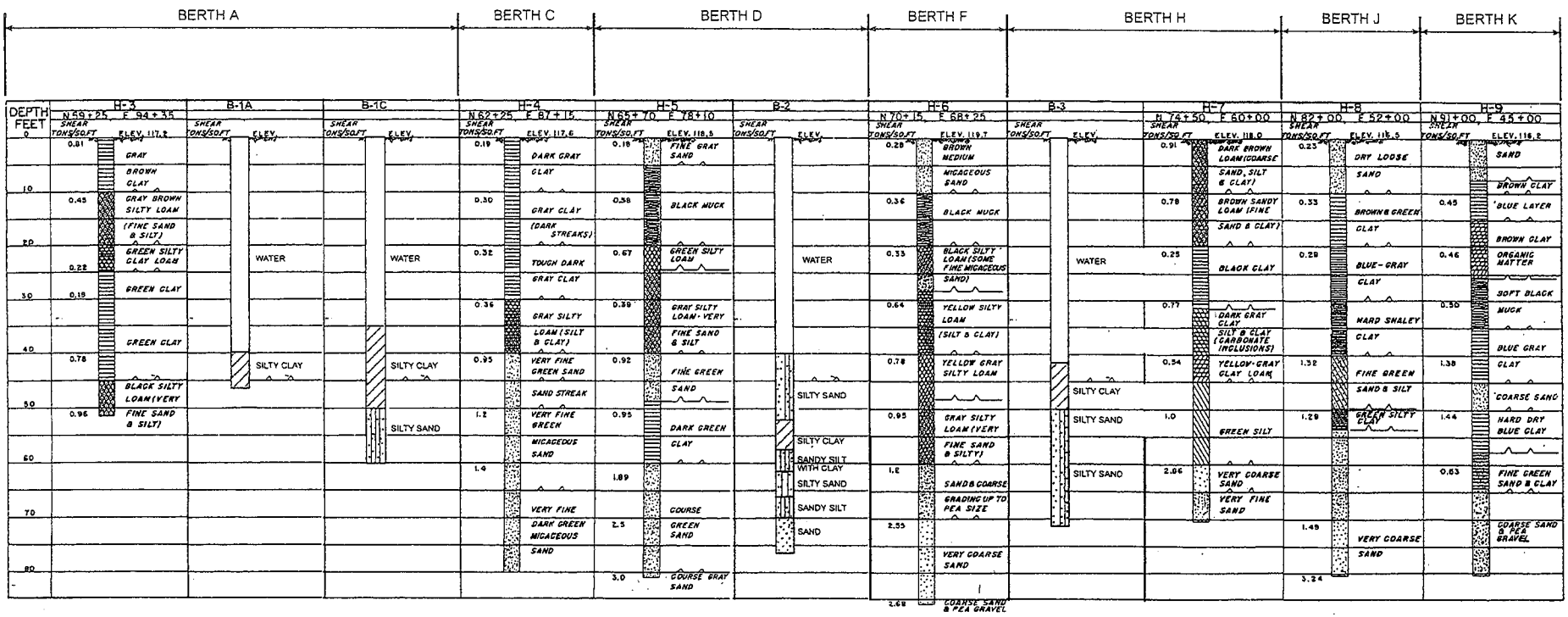
KA_:\001 STO2G115.GPJ 4/1/03



SITE PLAN

FROM: "UNDERWATER FACILITIES INSPECTIONS AND ASSESSMENTS AT NAVAL COMMUNICATION, STOCKTON, CA.". APRIL 1988 BY J. AGI & ASSOCIATES, SEATTLE WA.

KLEINFELDER		LOCATION OF TEST BORING (1946) CPT-1 (2002) & NEW BORINGS OFF WHARF ROUGH & READY ISLAND (WEST COMPLEX) WHARF EVALUATION	PLATE A-3
DATE PRODUCED:3/4/2003	DATE REVISED:		
PROJ. NO.:26266.G01	FILENAME:STO2D244.FH9		



KLEINFELDER

DATE PRODUCED:3/4/2003	DATE REVISED:
PROJ. NO.:26266.G01	FILENAME:STO3D164.FH9

CONDITIONS ALONG WHARF
ROUGH & READY ISLAND (WEST COMPLEX)
WHARF EVALUATION

PLATE
A-4

Surface Conditions: Edge of concrete deck

Groundwater: Water @10' below deck.

Date Completed: 1/27/2003

Logged By: REL

Total Depth: 46.5 feet

Depth (feet)	FIELD: Sample Type	FIELD: Sample No.	FIELD: Blows/ft	FIELD: Pen (tsf)	LABORATORY: Dry Density (pcf) / Moisture Content (%)	LABORATORY: Liquid Limit / Plasticity Index	LABORATORY: Passing #4 Sieve (%) / Passing #200 Sieve (%)	LABORATORY: Other Tests	Lithography	DESCRIPTION / Approximate elevation feet
										Air to 10', water to 40'
5										
10										
15										
20										
25										

KLEINFELDER

Drafted By: GDG
Date: 3/4/2003

Project No.: 26266.G01
File Number: STO3G056

LOG OF BORING B-1A
ROUGH & READY ISLAND (WEST COMPLEX)
WHARF EVALUATION

PLATE
1 of 2
A-5

KA_2001 STO3G056.GPJ 3/4/03

Depth (feet)	FIELD: Sample Type	FIELD: Sample No.	FIELD: Blows/ft	FIELD: Pen (tsf)	LABORATORY: Dry Density (pcf) / Moisture Content (%)	LABORATORY: Liquid Limit / Plasticity Index	LABORATORY: Passing #4 Sieve (%) / Passing #200 Sieve (%)	LABORATORY: Other Tests	Lithography	DESCRIPTION Approximate elevation feet
30										
35										
40										(CL) SILTY CLAY - Dark gray-brown, wet, very soft, moderate plasticity
		1A-43-1	3	0.0						
45										Augers tangled in steel cables
		1A-45-1	11	0.5						
										Boring completed at a depth of 46.5 feet below existing site grade .
50										
55										
60										

KLEINFELDER

LOG OF BORING B-1A
ROUGH & READY ISLAND (WEST COMPLEX)
WHARF EVALUATION

PLATE
2 of 2
A-5

Drafted By: GDG
Date: 3/4/2003
Project No.: 26266.G01
File Number: STO3G056

KA_2001 STO3G056.GPJ 3/4/03

Surface Conditions: Edge of concrete deck

Groundwater: Water @ 10'.

Date Completed: 1/28/2003

Logged By: YP

Total Depth: 60 feet

Depth (feet)	FIELD: Sample Type	FIELD: Sample No.	FIELD: Blows/ft	FIELD: Pen (tsf)	LABORATORY: Dry Density (pcf) / Moisture Content (%)	LABORATORY: Liquid Limit / Plasticity Index	LABORATORY: Passing #4 Sieve (%) / Passing #200 Sieve (%)	LABORATORY: Other Tests	Lithography	DESCRIPTION Approximate elevation feet
										Air to 10', water to 35'
5										
10										
15										
20										
25										
30										

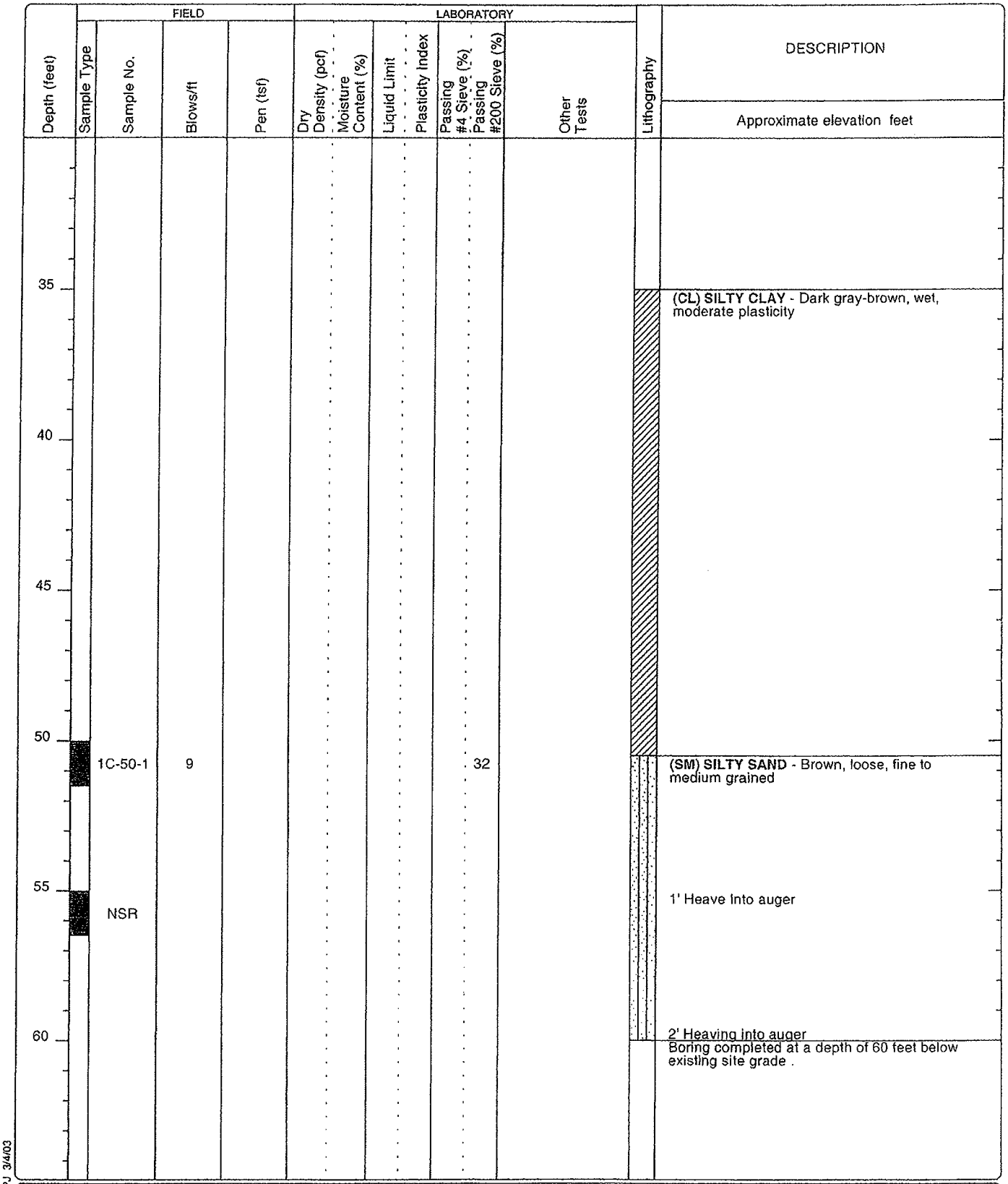
KLEINFELDER

Drafted By: GDG
Date: 3/4/2003
Project No.: 26266.G01
File Number: STO3G056

LOG OF BORING B-1C
ROUGH & READY ISLAND (WEST COMPLEX)
WHARF EVALUATION

PLATE
1 of 2
A-6

KA_2001 STO3G056.GPJ 3/4/03



KLEINFELDER

LOG OF BORING B-1C
ROUGH & READY ISLAND (WEST COMPLEX)
WHARF EVALUATION

PLATE
2 of 2
A-6

Drafted By: GDG
Date: 3/4/2003
Project No.: 26266.G01
File Number: STO3G056

KA_2001 STO3G056.GPJ 3/4/03

Surface Conditions: Edge of concrete deck

Groundwater: Water @ 10'.

Date Completed: 1/27/2003

Logged By: REL

Total Depth: 76.5 feet

Depth (feet)	FIELD: Sample Type	FIELD: Sample No.	FIELD: Blows/ft	FIELD: Pen (tsf)	LABORATORY: Dry Density (pcf) / Moisture Content (%)	LABORATORY: Liquid Limit / Plasticity Index	LABORATORY: Passing #4 Sieve (%) / Passing #200 Sieve (%)	LABORATORY: Other Tests	Lithography	DESCRIPTION / Approximate elevation feet
										Air to 10', water to 42'
5										
10										
15										
20										
25										

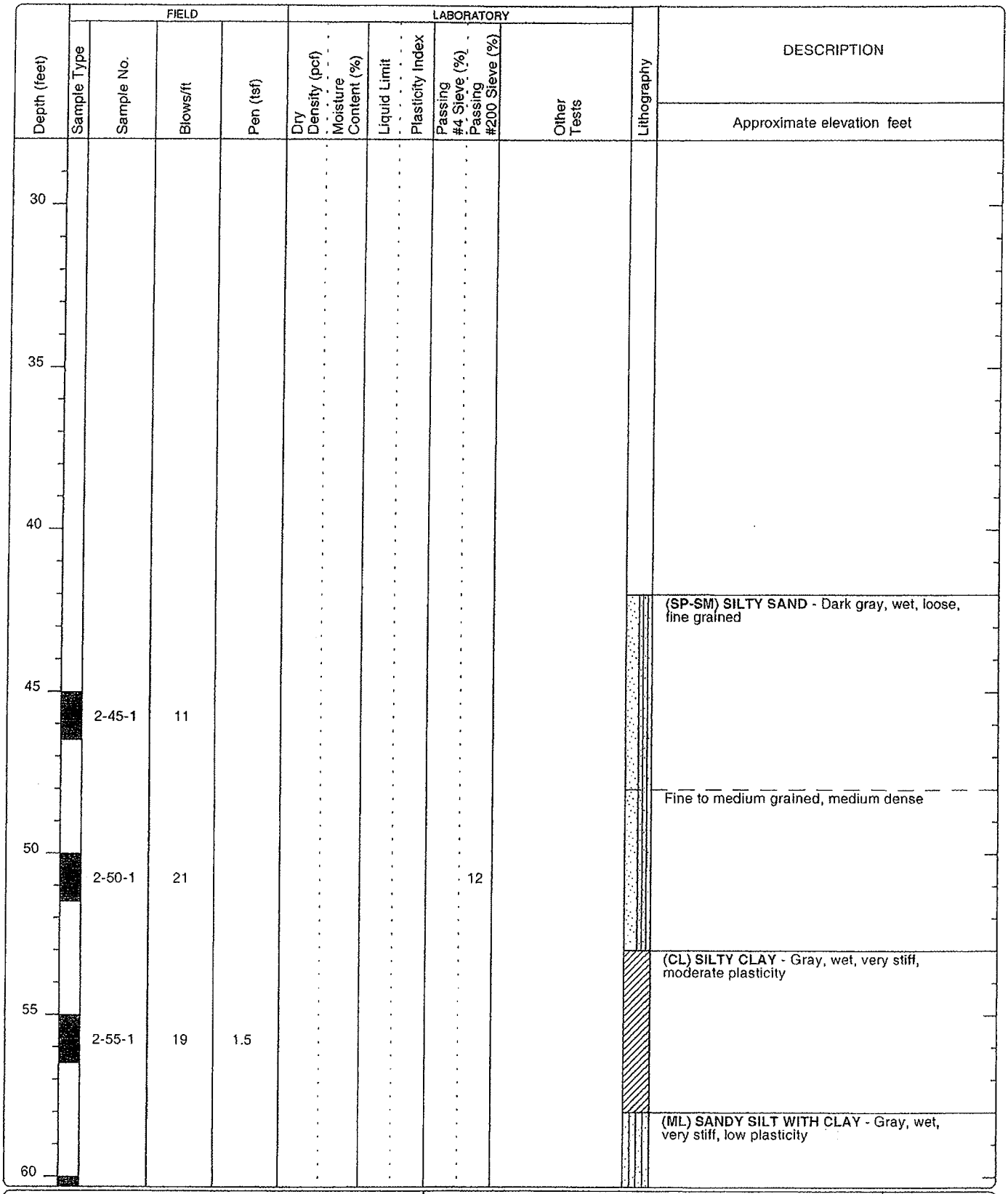
KLEINFELDER

Drafted By: GDG
Date: 3/4/2003
Project No.: 26266.G01
File Number: STO3G056

LOG OF BORING B-2
ROUGH & READY ISLAND (WEST COMPLEX)
WHARF EVALUATION

PLATE
1 of 3
A-7

KA_2001 STO3G056.GPJ 3/4/03



KLEINFELDER

Drafted By: GDG
Date: 3/4/2003
Project No.: 26266.G01
File Number: STO3G056

LOG OF BORING B-2
ROUGH & READY ISLAND (WEST COMPLEX)
WHARF EVALUATION

PLATE
2 of 3
A-7

KA_2001 STO3G056.GPJ 3/4/03

Depth (feet)	FIELD: Sample Type	FIELD: Sample No.	FIELD: Blows/ft	FIELD: Pen (tsf)	LABORATORY: Dry Density (pcf) / Moisture Content (%)	LABORATORY: Liquid Limit / Plasticity Index	LABORATORY: Passing #4 Sieve (%) / Passing #200 Sieve (%)	LABORATORY: Other Tests	Lithography	DESCRIPTION Approximate elevation feet
		2-60-1	23							
65		2-65-1	13							(SM) **SILTY SAND** - Gray, wet, medium dense, fine grained
										(ML) **SANDY SILT** - Gray to gray-brown, wet
70										(SP) **SAND** - Gray, wet
75		2-75-1	30/3"							
										Boring completed at a depth of 76.5 feet below existing site grade .
80										
85										
90										

KLEINFELDER

Drafted By: GDG
Date: 3/4/2003

Project No.: 26266.G01
File Number: STO3G056

LOG OF BORING B-2
ROUGH & READY ISLAND (WEST COMPLEX)
WHARF EVALUATION

PLATE
3 of 3
A-7

KA_2001 STO3G056.GPJ 3/4/03

Surface Conditions: Edge of concrete deck

Groundwater: Water @ 13'.

Date Completed: 1/28/2003

Logged By: YP

Total Depth: 71.5 feet

Depth (feet)	FIELD: Sample Type	FIELD: Sample No.	FIELD: Blows/ft	FIELD: Pen (tsf)	LABORATORY: Dry Density (pcf) / Moisture Content (%)	LABORATORY: Liquid Limit / Plasticity Index	LABORATORY: Passing #4 Sieve (%) / Passing #200 Sieve (%)	LABORATORY: Other Tests	Lithography	DESCRIPTION Approximate elevation feet
										Air to 13', water to 50'
5										
10										
15										
20										
25										

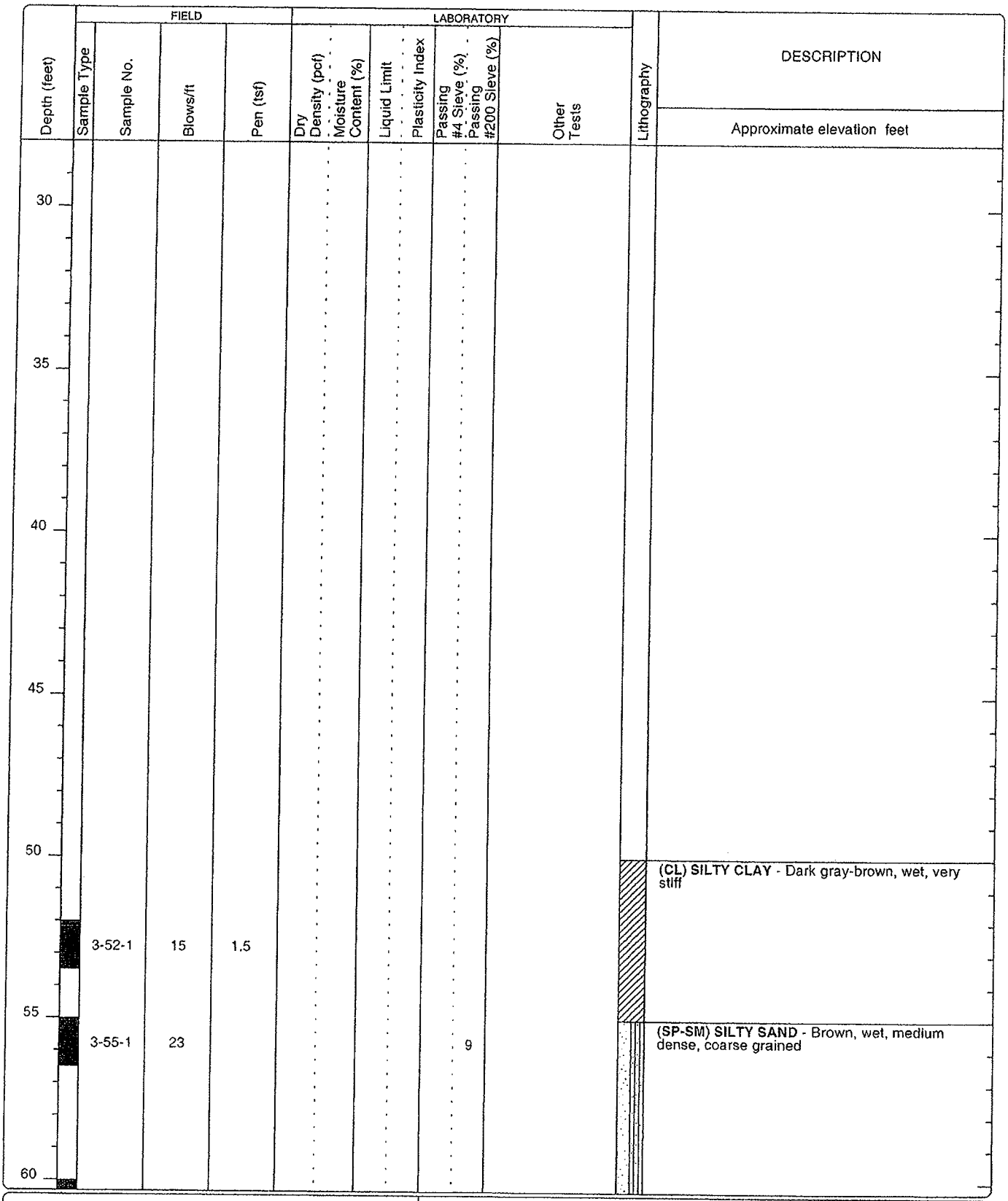
KLEINFELDER

Drafted By: GDG
Date: 3/4/2003
Project No.: 26266.G01
File Number: STO3G056

LOG OF BORING B-3
ROUGH & READY ISLAND (WEST COMPLEX)
WHARF EVALUATION

PLATE
1 of 3
A-8

KA_2001 STO3G056.GPJ 3/4/03



KLEINFELDER

Drafted By: GDG
Date: 3/4/2003
Project No.: 26266.G01
File Number: STO3G056

LOG OF BORING B-3
ROUGH & READY ISLAND (WEST COMPLEX)
WHARF EVALUATION

PLATE
2 of 3
A-8

KA_2001 STO3G056.GPJ 3/4/03

Depth (feet)	Sample Type	Sample No.	Blows/ft	Pen (tsf)	Dry Density (pcf) / Moisture Content (%)	Liquid Limit / Plasticity Index	Passing #4 Sieve (%) / Passing #200 Sieve (%)	Other Tests	Lithography	DESCRIPTION Approximate elevation feet
	FIELD				LABORATORY					
		3-60-1								1' Heave in auger
65		3-65-1					9			1' Heave in auger
70		3-70-1								1.5' Heave in auger
										Boring completed at a depth of 71.5 feet below existing site grade .
75										
80										
85										
90										

KLEINFELDER

Drafted By: GDG
Date: 3/4/2003
Project No.: 26266.G01
File Number: STO3G056

LOG OF BORING B-3
ROUGH & READY ISLAND (WEST COMPLEX)
WHARF EVALUATION

PLATE
3 of 3
A-8

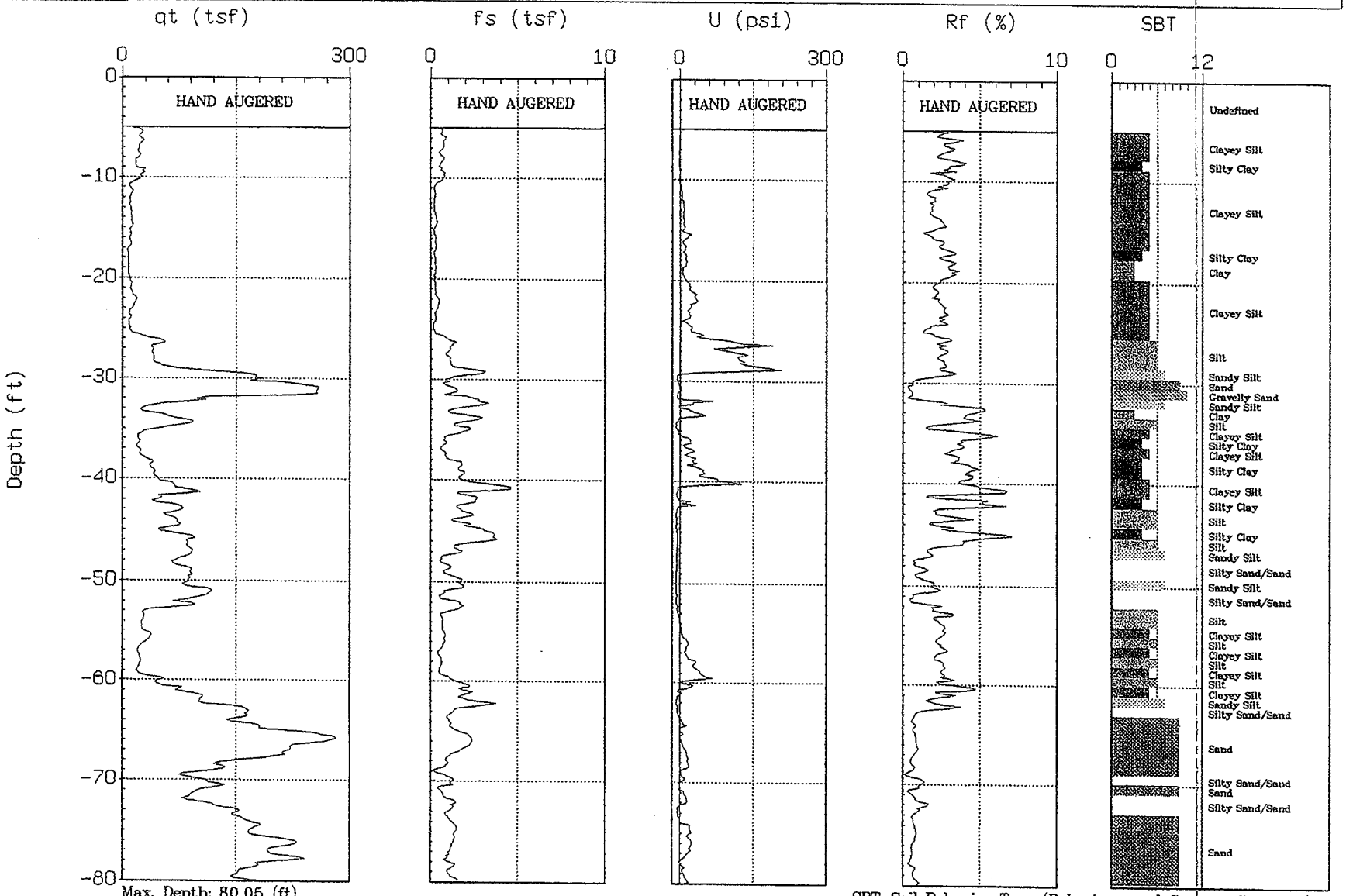
KA 2001 STO3G056.GPJ 3/4/03

GREGG

KLEINFELDER

Site : PORT OF STOCKTON
Location : CPT-01

Engineer : R. HEINZEN
Date : 08:01:02 09:02



Max. Depth: 80.05 (ft)

Depth Inc.: 0.164 (ft)

SBT: Soil Behavior Type (Robertson and Campanella 1988)