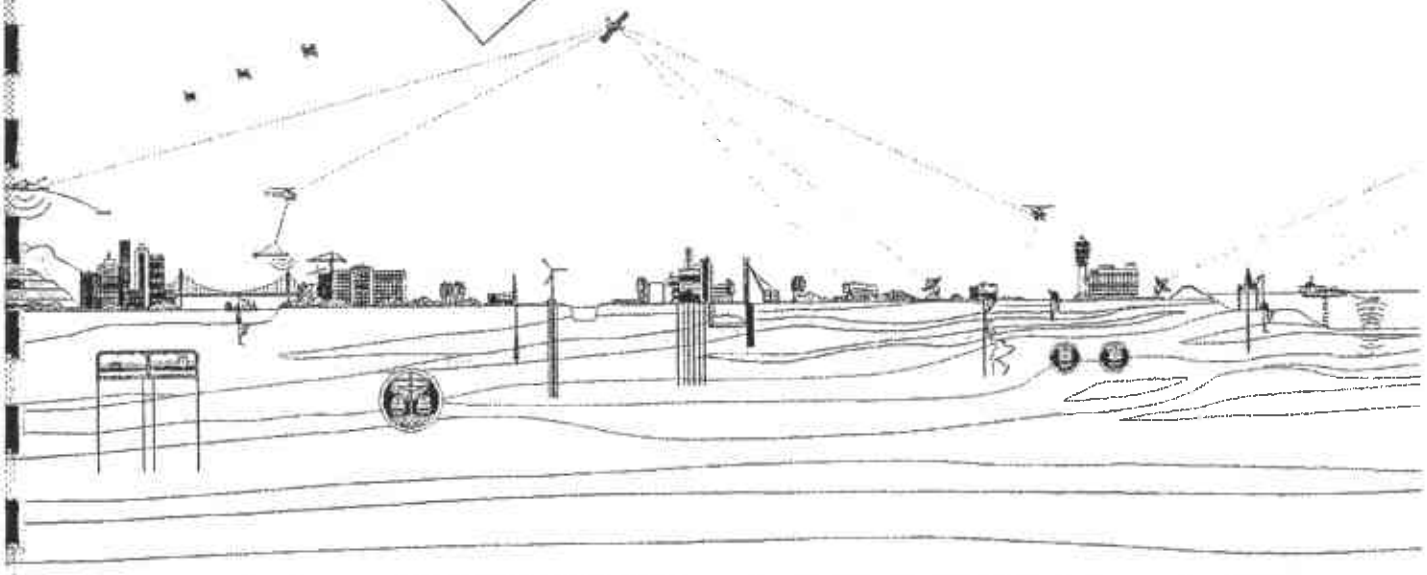
FUGRO WEST, INC.

GEOTECHNICAL STUDY
BERTH 30 YARD RECONSTRUCTION
PORT OF OAKLAND
OAKLAND, CALIFORNIA

Prepared for:
URS/CASH

OCTOBER 2006

Furgo Project No. 1698.004



Project No. 1698.004

Sheet 1 of 1

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	LOCATION: SURFACE EL. 14.0 ft +/- (rel. MLLW datum) MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
					Asphalt Concrete Pavement (AC): 12 inches							
		1		46	Poorly-graded SAND with silt and gravel (SP-SM): dense to very dense, brown, moist, fine grained sand, with clay pockets, trace shells, fine gravel, trace silt (Aggregate Base)			13				
		2		91								
5		3		30	Poorly-graded SAND (SP): medium dense, gray, moist, strong hydrocarbon odor, medium grained sand (Fill)							
					- grades to clayey sand, with cobbles at 6.5'							
10												

BORING DEPTH: 6.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Cuttings
COMPLETION DATE: July 10, 2006
NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Wireline
RIG TYPE: Mobile B-40
DRILLED BY: Exploration Geoservices,
LOGGED BY: KG

LOG OF BORING NO. B-05
Berth 30 Yard Reconstruction
Oakland, California

Project No. 1698.004

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	LOCATION SURFACE EL. 13½ ft +/- (rel. MLLW datum) MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S$_u$, ksf	OTHER TESTS
		1		55	Pavement: 3-inch concrete paver over 11 inches of asphalt concrete (AC)							
		2		16	Well-graded GRAVEL with silt (GW-GM): very dense, gray, moist, fine to coarse grained sand, fine to coarse grained gravel, with recycled asphalt concrete in gravel (Aggregate Base)			8				
5		3 4		11	Silty SAND with gravel (SM): medium dense, grayish brown, moist, with clay pockets, with shells (Fill) - strong hydrocarbon odor, wood at 5.5'			15		1		Bulk at 3.5' R=71
10												

BORING DEPTH: 6.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Cuttings
COMPLETION DATE: July 12, 2006
NOTES: 1. Terms and symbols defined on Plate A-1.

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Wireline
RIG TYPE: Mobile B-40
DRILLED BY: Exploration Geoservices,
LOGGED BY: KG

LOG OF BORING NO. B-09
Berth 30 Yard Reconstruction
Oakland, California

Project No. 1698.004

DEPTH, ft	MATERIAL SYMBOL	SAMPLE NO.	SAMPLER TYPE	SAMPLER BLOW COUNT/ PRESSURE, psi	LOCATION: SURFACE EL: 16.0 ft +/- (rel. MLLW datum) MATERIAL DESCRIPTION	DRY UNIT WEIGHT, pcf	WATER CONTENT, %	% PASSING #200 SIEVE	LIQUID LIMIT, %	PLASTICITY INDEX	UNDRAINED SHEAR STRENGTH, S_u, ksf	OTHER TESTS
					Asphalt Concrete Pavement (AC): 10 inches							
		1		67	Silty SAND with gravel (SM): very dense, brownish gray, moist, fine to coarse grained, fine gravel (Aggregate Base)			13				
		2		34				23				Bulk at 3.5' R=28
5		3		17	Silty GRAVEL with sand (GM): medium dense to dense, yellowish brown, moist, trace fine gravel, fine to coarse grained sand (Fill) - grades to yellowish gray, hydrocarbon odor present between 4.5 and 5.5 feet							
10												

BORING DEPTH: 6.0 ft
DEPTH TO WATER: Not Encountered
BACKFILL: Cuttings
COMPLETION DATE: July 12, 2006
NOTES: 1. Terms and symbols defined on Plate A-1

DRILLING METHOD: 8-in. dia. Hollow Stem Auger
HAMMER TYPE: Wireline
RIG TYPE: Mobile B-40
DRILLED BY: Exploration Geoservices,
LOGGED BY: KG

LOG OF BORING NO. B-36
Berth 30 Yard Reconstruction
Oakland, California

GEOTECHNICAL INVESTIGATION

For
BERTH 30 TERMINAL IMPROVEMENTS
PORT OF OAKLAND
OAKLAND, CALIFORNIA

To
Jordan Woodman Dobson
3664 Grand Avenue
Oakland, California 94610

January, 1992

DRILL RIG	HSA, Rotary Wash	SURFACE ELEVATION	13.5	LOGGED BY	MC
DEPTH TO GROUNDWATER	8.5 feet	BORING DIAMETER	8, 3.5-inch	DATE DRILLED	10/10/91

DESCRIPTION AND CLASSIFICATION			DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)	OTHER TESTS
DESCRIPTION AND REMARKS	CONSIST	SOIL TYPE							
FILL : SAND (SW/SM), gray and tan, fine-grained, gravelly (fine-grained), trace silt	medium dense				13				
FILL : GRAVEL (GP/GM), gray and brown, fine-grained, sandy (fine- to coarse-grained), trace silt	medium dense								
FILL : CLAY (CL), mottled light green and tan, silty, trace sand (fine-grained)	stiff		5		26*				
FILL : GRAVEL (GP/GC), green, fine- to coarse-grained, sandy (fine- to coarse-grained), some clay, moderate hydrocarbon odor	medium dense								
FILL : CLAY (CL), green mottled light brown, silty, some sand (fine- to coarse-grained), trace gravel (fine-grained), slight to moderate hydrocarbon odor	stiff		10		11*	▼			
FILL : SAND (SM), light-brown fine- to coarse-grained, with friable rock fragments, trace clay, slight hydrocarbon odor	medium dense		15		23				
					refusal				
Bottom of Boring = 20 Feet			20						

Notes:
1. The stratification lines represent the approximate boundaries between soil types and the transition may be gradual.
2. For an explanation of penetration resistance values marked with an asterisk (*), see first page Appendix A.
3. Ground water level was measured at 8-1/2 feet at time of drilling.

Kaldveer Associates
Geoscience Consultants
A California Corporation

EXPLORATORY BORING LOG

BERTH 30 TERMINAL IMPROVEMENTS
Oakland, California

PROJECT NO.	DATE	BORING NO
K431-108-996	January 1992	2

DRILL RIG	HSA, Rotary Wash	SURFACE ELEVATION	13.0	LOGGED BY	MC
DEPTH TO GROUNDWATER	9.0 feet	BORING DIAMETER	8, 3.5-inch	DATE DRILLED	10/14/91

DESCRIPTION AND REMARKS	CONSIST	SOIL TYPE	DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)	OTHER TESTS
FILL : SAND (SW/SM), tan and gray, fine- to coarse-grained, gravelly (fine- grained), trace silt	loose				17				
FILL : SAND (SC), tan mottled rust and gray, fine- to coarse-grained, with gravel (fine- to coarse-grained), some clay	medium dense								
FILL : CLAY (CL), light brown, silty, with sand (fine- to coarse-grained), trace gravel (fine-grained)	stiff		5		15*				
FILL : SAND (SP/SM), gray, fine-grained, trace shell fragments, trace silt, slight hydrocarbon odor	loose		10		17*	18	109		
CLAY (CH), dark gray, silty, interbedded with lenses of SAND (SM), fine-grained	very soft		15		2				
(trace shell fragments)			20		push	71	57		LL = 62, PI = 34, Passing #200 Sieve = 100%
			25		push				
SAND (SM), green-gray, fine-grained, trace silt									Passing #200 Sieve = 16%

Kaldveer Associates
Geoscience Consultants
A California Corporation

EXPLORATORY BORING LOG

BERTH 30 TERMINAL IMPROVEMENTS
Oakland, California

PROJECT NO.	DATE	BORING NO
K431-108-996	January 1992	3

DRILL RIG	HSA, Rotary Wash	SURFACE ELEVATION	13.0	LOGGED BY	MC
DEPTH TO GROUNDWATER	9.0 feet	BORING DIAMETER	8, 3.5-inch	DATE DRILLED	10/14/91

DESCRIPTION AND CLASSIFICATION			DEPTH (FEET)	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)	OTHER TESTS
DESCRIPTION AND REMARKS	CONSIST	SOIL TYPE							
SAND (SM), green-gray, fine-grained, trace silt	medium dense								
(grading light brown)	dense		30		43				
			35						
	very dense				61				
			40						
			45						
(grading tan mottled rust, speckled)	dense				32				
			50						

Kaldveer Associates
Geoscience Consultants
A California Corporation

EXPLORATORY BORING LOG

BERTH 30 TERMINAL IMPROVEMENTS
Oakland, California

PROJECT NO.	DATE	BORING NO
K431-108-996	January 1992	3

DRILL RIG	HSA, Rotary Wash	SURFACE ELEVATION	13.0	LOGGED BY	MC
DEPTH TO GROUNDWATER	9.0 feet	BORING DIAMETER	8, 3.5-Inch	DATE DRILLED	10/14/91

DESCRIPTION AND CLASSIFICATION			DEPTH	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)	OTHER TESTS
DESCRIPTION AND REMARKS	CONSIST	SOIL TYPE	(FEET)						
SAND (SM), tan mottled rust, fine-grained, trace silt	dense		55						
			60						
(grading gray-green)	very dense				85				
Bottom of Boring = 64-1/2 Feet									

Notes:
1. The stratification lines represent the approximate boundaries between soil types and the transition may be gradual.
2. For an explanation of penetration resistance values marked with an asterisk (*), see first page Appendix A.
3. Ground water level was measured at 9 feet at time of drilling.
4. LL = Liquid Limit, PI = Plasticity Index

Kaldveer Associates
Geoscience Consultants
A California Corporation

EXPLORATORY BORING LOG

BERTH 30 TERMINAL IMPROVEMENTS
Oakland, California

PROJECT NO.	DATE	BORING NO
K431-108-996	January 1992	3

DRILL RIG	Continuous Flight Auger	SURFACE ELEVATION	13.0	LOGGED BY	MC
DEPTH TO GROUNDWATER	5.5 feet	BORING DIAMETER	4-inch	DATE DRILLED	10/10/91

DESCRIPTION AND CLASSIFICATION			DEPTH	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)	OTHER TESTS
DESCRIPTION AND REMARKS	CONSIST	SOIL TYPE	(FEET)						
FILL : GRAVEL (GP/GM), brown and gray, fine- to coarse-grained, some sand (fine- to coarse-grained), trace silt	medium dense								
FILL : SAND (SM), brown, fine- to coarse-grained, with gravel (fine-grained), some silt	medium dense								
FILL : SAND (SC), tan, fine- to medium-grained, some clay	medium dense				42*				
FILL : SAND (SP/SM), brown, fine-grained, trace shell fragments, trace silt, slight hydrocarbon odor	medium dense		5			▼			
			10						
Bottom of Boring = 10 Feet									

Notes:
1. The stratification lines represent the approximate boundaries between soil types and the transition may be gradual.
2. For an explanation of penetration resistance values marked with an asterisk (*), see first page Appendix A.
3. The ground water level was measured at 5-1/2 feet at the time of drilling.

Kaldveer Associates
Geoscience Consultants
A California Corporation

EXPLORATORY BORING LOG

BERTH 30 TERMINAL IMPROVEMENTS
Oakland, California

PROJECT NO.	DATE	BORING NO
K431-108-996	January 1992	4

DRILL RIG	Continuous Flight Auger	SURFACE ELEVATION	13.0	LOGGED BY	PW
DEPTH TO GROUNDWATER	Not Enc.	BORING DIAMETER	6-inch	DATE DRILLED	10/18/91

DESCRIPTION AND CLASSIFICATION			DEPTH	SAMPLER	PENETRATION RESISTANCE (BLOWS/FT)	WATER CONTENT (%)	DRY DENSITY (PCF)	UNCONFINED COMPRESSIVE STRENGTH (KSF)	OTHER TESTS
DESCRIPTION AND REMARKS	CONSIST	SOIL TYPE	(FEET)						
FILL : GRAVEL (GM), brown, fine-grained, with sand (fine- to coarse-grained), some silt, some clay	dense				50				
FILL : CLAY (CL), gray, silty, with sand (fine-grained), slight hydrocarbon odor	stiff								
FILL : SAND (SM), brown, fine-grained, some silt, some clay	medium dense		5		32*				
FILL: SAND (SM), blue-gray, fine-grained, some silt, trace shells	medium dense								
Bottom of Boring = 6-1/2 Feet									

Notes:
1. The stratification lines represent the approximate boundaries between soil types and the transition may be gradual.
2. For an explanation of penetration resistance values marked with an asterisk (*), see first page Appendix A.
3. Ground water level was not encountered at time of drilling.

Kaldveer Associates
Geoscience Consultants
A California Corporation

EXPLORATORY BORING LOG

BERTH 30 TERMINAL IMPROVEMENTS
Oakland, California

PROJECT NO.	DATE	BORING NO
K431-108-996	January 1992	14

DRAFT REPORT

GEOTECHNICAL ENGINEERING STUDY
7th STREET REALIGNMENT AND CARNATION TERMINAL YARD
PORT OF OAKLAND
Oakland, California

Prepared for

Port of Oakland
530 Water Street
Oakland, California 94607

October 1990

Woodward-Clyde Consultants
500 12th Street, Suite 100, Oakland, California 94607-4014

Project: Port of Oakland
7th Street Realignment and Carnation Terminal Yard

Log of Boring No. WCC-4A

Date Drilled: 9 March 1990
Type of Boring: 4-7/8 - Inch Rotary Wash
Hammer: 140 lb., 30-inch fall

Logged by : W. Hegge
Location: Naval Supply Center, Oakland, California

Depth Ft.	Samples	Blows/Ft	MATERIAL DESCRIPTION	Moisture Content %	Dry Density (pcf)	Uncontined Compressive Strength (psf)
			Surface Elevation: Approx. 12 feet			
			2-inch Asphalt Concrete			
			CLAYEY SANDY GRAVEL (GC) Dense, dry to damp, red-brown to dark-brown, 3-inch minus gravel (Road base)			
	1	29	SILTY CLAYEY SAND (SM-SC) Dense, light-brown, dry to damp, fine-grained with occasional shell fragments			
5	2	16	Medium dense 9% Passing No. 200 Sieve			
			Dark grey, wet			
	3	1	Possible bay mud layer in the sand			
10			Light brown			
	4	25				
15			Abundant shell fragments			
	5	11		24	101	985
			Interlayered SILTY to SANDY CLAY (CH) (Bay Mud) Soft, dark grey-brown, fine to very fine-grained sand and SILTY SAND (SM) Loose, dark grey-brown, fine to very fine-grained			
20	6	0		87	50	793
25						
	7	6		40	85	445
30						

Project No. 90C0023A | Woodward-Clyde Consultants | Figure A-6

Project: Port of Oakland
7th Street Realignment and Carnation Terminal Yard

Log of Boring No. WCC-4A (Continued)

Depth Ft.	Samples	Blows/Ft	MATERIAL DESCRIPTION	Moisture Content %	Dry Density (pcf)	Unconfined Compressive Strength (psf)
			Bay Mud (Continued)			
			Organics, strong petroleum odor			
	6	4		95	46	1438
35			CLAYEY PEAT (PT)			
			Soft, dark brown			
	9	16		192	24	2169
40			SILTY CLAYEY SAND (SM-SC)			
			Very dense, grey-brown, fine to medium-grained			
	10	50				
			Bottom of boring at 43-1/2 feet			
45			Water table not observed at time of drilling			
50						
55						
60						

Project: Port of Oakland
7th Street Realignment and Carnation Terminal Yard

Log of Boring No. WCC-7A

Date Drilled: 12-13 March 1990
Type of Boring: 4-7/8 - Inch Rotary Wash
Hammer: 140 lb., 30-inch fall

Logged by : W. Hegge

Location: Kaiser Yard, Port of Oakland

Depth Ft.	Samples	Blows/Ft	MATERIAL DESCRIPTION	Moisture Content %	Dry Density (pcf)	Unconfined Compressive Strength (psf)
			Surface Elevation: Approx. 12 feet			
			SANDY GRAVEL (GP) Medium dense, light-brown, dry to damp, 3/4-inch minus angular gravel (Road base)			
	1	4	SILTY SAND (SM) Loose, dark-brown, dry to damp, fine-grained sand with occasional 1/4-inch minus rounded gravel			
			SILTY CLAY (CH) Soft, light-brown, damp			
5	2	23	CLAYEY SAND with Gravel (SC) Medium dense, dark-grey, fine-grained sand			
	3	79	SANDY GRAVEL (GP) Medium dense, light-brown, 2-inch minus angular gravel (Railroad ballast), fine grained sand, with large boulders and strong petroleum odor			
10			Dense			
	4	33	Clayey zones 6% Passing No. 200 Sieve			
15			Very dense			
	5	55				
20			Medium dense, grey green			
	6	22				
			CLAYEY SAND (SC) Medium dense, grey-green, fine-grained with lenses of sandy clay			
25			Green-brown			
	7	25				
30			Very dense			

Project No. 90C0023A | Woodward-Clyde Consultants | Figure A-9

Project: Port of Oakland
7th Street Realignment and Carnation Terminal Yard

Log of Boring No. WCC-7A (Continued)

Depth Ft.	Samples	Blows/Ft.	MATERIAL DESCRIPTION	Moisture Content %	Dry Density (pcf)	Unconfined Compressive Strength (psf)
	8	57	CLAYEY SAND (SC) (Continued)			
35			Bottom of boring at 33-1/2 feet			
40						
45						
50						
55						
60						

Project No. 90C0023A | Woodward-Clyde Consultants | Figure A-9b