BULKHEAD FOUNDATION INVESTIGATION
2150-2152 NORTH VALLEY STREET, BERKELEY
SOUTH BANK OF STRAWBERRY CREEK

LAWRENCE B. KARP CONSULTING ENGINEER

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2150-2152 NORTH VALLEY STREET, BERKELEY
SOUTH BANK OF STRAWBERRY CREEK

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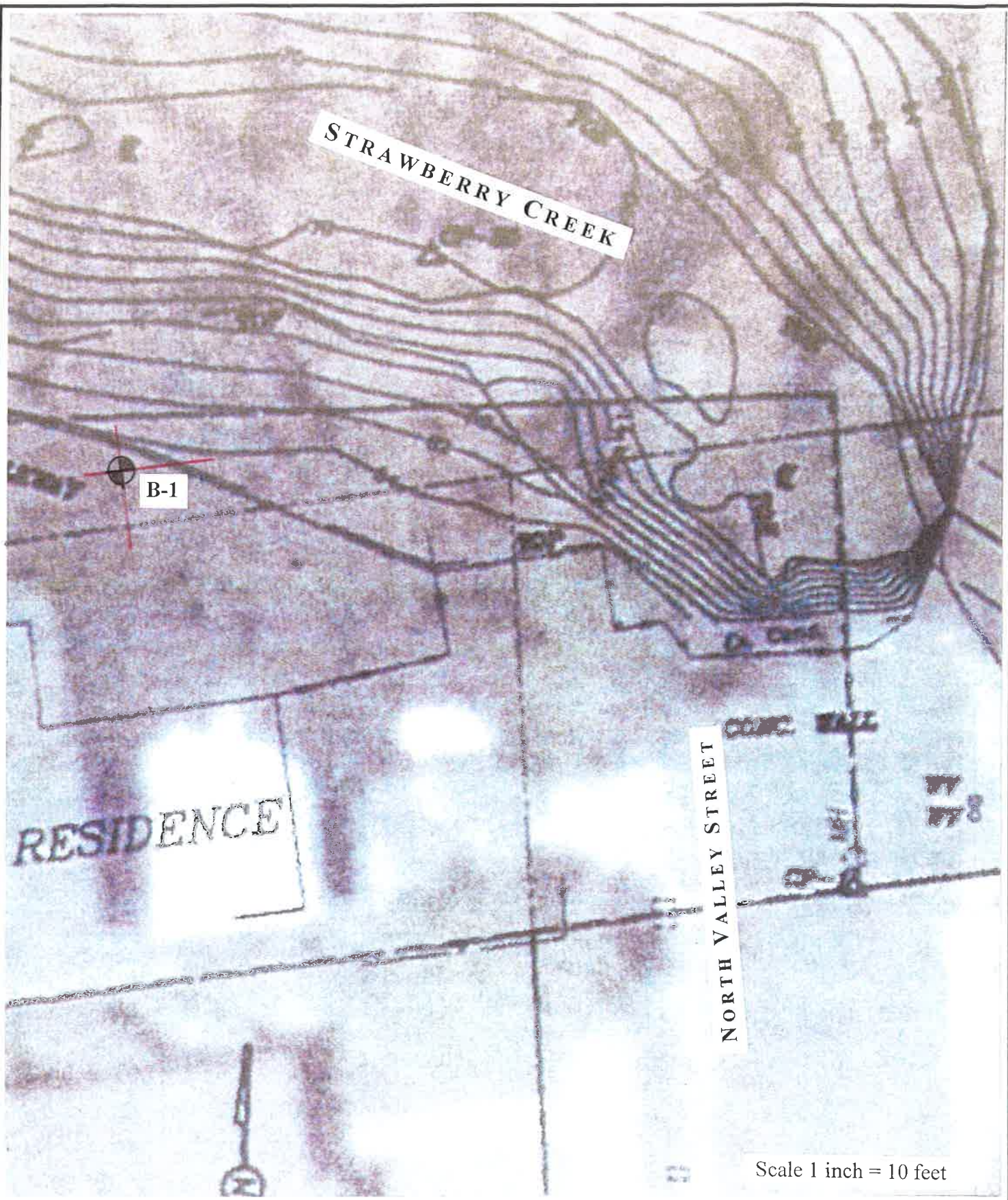

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SITE PLAN

Bulkhead Foundation Investigation
2150-2152 North Valley Street
South Bank of Strawberry Creek, Berkeley

DATE	PROJECT	FIGURE: A
February 2011	**21109**	

PRIMARY DIVISIONS			GROUP	SECONDARY DIVISIONS
COURSE GRAINED SOILS MORE THAN HALF OF MATERIAL IS LARGER THAN 200 SIEVE	GRAVELS MORE THAN HALF OF COARSE FRACTION IS LARGER THAN #4 SIEVE	CLEAN GRAVELS (LESS THAN 5% FINES)	GW	Well graded gravels, gravel-sand mixtures, little or no fines.
			GP	Poorly graded gravels or gravel-sand mixtures, little or no fines.
		GRAVEL WITH FINES	GM	Silty gravels or gravel-sand mixtures, non-plastic fines.
			GC	Clayey gravels, gravel-sand-clay mixtures, plastic fines
	SANDS MORE THAN HALF OF COARSE FRACTION IS SMALLER THAN #4 SIEVE	CLEAN SANDS (LESS THAN 5% FINES)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES	SM	Silty sands, sand-silt mixtures, non-plastic fines.
			SC	Clayey-sands, sand-clay mixtures, plastic fines.
FINE GRAINED SOILS MORE THAN HALF OF MATERIAL IS SMALLER THAN #200 SIEVE	SILTS AND CLAYS LIQUID LIMIT IS LESS THAN 50%		ML	Inorganic silts and very fine sands, rock flour, 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 and organic silty clays of low plasticity.
	SILTS AND CLAYS LIQUID LIMIT IS GREATER THAN 50%		MH	Organic silts, micaceous or diatomaceous fine sandy or silty soils,
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils.

DEFINITION OF TERMS

	U.S. STANDARD SERIES SIEVE				SQUARE SIEVE CLEAR OPENING			
0.002 mm	#200	#40	#10	#4	3/4"	3"	12"	
CLAYS AND SILTS	SAND			GRAVEL		COBBLES	BOULDERS	
	FINE	MEDIUM	COARSE	FINE	COARSE			

GRAIN SIZES

SANDS AND GRAVELS	BLOWS / FOOT [1]
VERY LOOSE	0 - 4
LOOSE	4 - 10
MEDIUM DENSE	10 - 30
DENSE	30 - 50
VERY DENSE	OVER 50

RELATIVE DENSITY

SILTS AND CLAYS	STRENGTH [2]	BLOWS / FOOT [1]
VERY SOFT	0 - 1/4	0 - 2
SOFT	1/4 - 1/2	2 - 4
FIRM	1/2 - 1	4 - 8
STIFF	1 - 2	8 - 16
VERY STIFF	2 - 4	16 - 32
HARD	OVER 4	OVER 32

FIRMNESS

[1] Number of blows (N) of 140 pound hammer falling 30 inches to drive a 2 inch O.D. (1-3/8 inch I.D.) split spoon sampler (ASTM D-1586); Standard Penetration Test (SPT) unless noted otherwise

[2] Unconfined compressive strength in tons/square foot as determined by laboratory testing or approximated by the Standard Penetration Test (ASTM D-1586), Pocket Penetrometer, Torvane, or visual observation.

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KEY TO EXPLORATORY BORING LOGS
Unified Soil Classification System (ASTM D-2487)

Bulkhead Foundation Investigation
2150-2152 North Valley Street

DATE	PROJECT	FIGURE:
August 2006	**206038**	**B**

MACHINERY:	Ofiaro Mobile Rig	SURFACE ELEVATION:	+84	DATE DRILLED:	1/28/11
DEPTH to GROUNDWATER:	27 feet***	SIZE:	4 inch nominal CFA	LOGGED BY:	LBK

DESCRIPTION and CLASSIFICATION / REMARKS		COLOR**	FIRMNESS	SOIL GROUP	DEPTH (Feet)	SAMPLER SYMBOL	PENETRATION RESISTANCE (Blows / Foot)	WATER CONTENT (%)	DRY DENSITY (PCF)	STRENGTH TESTS
CLAY *w/grass & organics (fill)*		(dark brown)	(soft)	CL/CH	0 - 1					
damp										
Stratification lines, if shown, represent the approximate boundaries between soil and rock types; actual transitions are gradual unless noted or otherwise defined					2					
CLAY *w/organics (fill)*	Bag 1	black *mottled* white	firm	CL/CH	3		6			
moist	10YR-2/1 / 10YR-8/1				4					
SAND, clayey *gravel & organics*	B-1-1	(dark brown)	stiff	SC/CL			16*	22.1	88.8	
CLAY, sandy, gravelly *w/roots*	Bag 2	very dark gray	stiff	CL/SC	5					
moist					6		9			
CLAY, sandy, gravelly *moist*	Bag 3	dark brown	stiff	CL/SC	7					
SAND, clayey *lean*	B-1-2	(dark brown)	stiff	SC/CL			17*	19.6	102.9	
moist					8					
SAND, clayey, gravelly *moist*	Bag 4	dark brown	stiff	SC/CL/GC	9		9			
SAND, clayey, gravelly *moist*	Bag 5	dark brown	stiff	SC/CL/GC	10		14*			
	B-1-3				11					
transition					12		11			
CLAY, sandy, gravelly *(oily)* *moist*	Bag 6	very dark gray	stiff	CL/SC/GC	13					
SAND, clayey Clay, sandy *moist*	B-1-4 / Bag 7	(black) very dark grayish brown	very stiff very stiff	SC/CL CL/SC	14		24*	20.8	105.1	
					15		14			
CLAY, slightly sandy *(plastic)*	Bag 8	dark yellowish brown	very stiff	CL/SC	16		29*			
CLAY, slightly sandy *(plastic)*	Bag 9	dark yellowish brown	very stiff	CL/SC	17					
CLAY, slightly sandy *(plastic)*	Bag 10	dark brown	very stiff	CL/SC	18		18			

Blow counts are for final 12 inches of sampler penetration unless noted otherwise

Blow counts adjusted for 70 lb hammer

Passing #200 sieve=48.5%

Liquid Limit=37%
Plastic Limit=22%
Plasticity Index=15%

UC = 2.18 ksf

**California Modified Sampler (multiply by 0.56 for SPT value)*

***Munsell Color: hue-value/chroma*

****Free groundwater encountered at -27 feet (Elevation +57) at time of drilling; creek flow line is at Elevation +67*

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EXPLORATORY BORING LOG

Bulkhead Foundation Investigation
2150-2152 North Valley Street
South Bank of Strawberry Creek, Berkeley

DATE	PROJECT	BORING NO.
February 2011	21109	B-1 (Sheet 1)

MACHINERY:	Ofiaro Mobile Rig	SURFACE ELEVATION:	+84	DATE DRILLED:	1/28/11
DEPTH to GROUNDWATER:	27 feet***	SIZE:	4 inch nominal CFA	LOGGED BY:	LBK

DESCRIPTION and CLASSIFICATION	REMARKS	COLOR**	FIRMNESS	SOIL GROUP	DEPTH (Feet)	SAMPLER SYMBOL	PENETRATION RESISTANCE (Blows / Foot)	WATER CONTENT (%)	DRY DENSITY (PCF)	STRENGTH TESTS
CLAY, *moist*	Bag 11 → 10YR-3/3	dark brown	stiff	CL	19–21					
SAND, clayey *w/claystone*	B-1-6 →	(dark yellowish brown)	hard	SC/CL	22		56*	16.8	112.5	
CLAY, sandy, *moist*	Bag 12 → 10YR-4/4	dark yellowish brown	hard	CL/SC	23					
CLAY, sandy, *moist*	Bag 13 → 10YR-4/4	dark yellowish brown	hard	CL/SC	24		44			
			very stiff		25					
			stiff		26					
CLAY *lean*, *wet*	▽ Bag 14 → 10 YR-3/4	dark yellowish brown	firm	CL	27					
very wet	transition		soft		28					
					29					
CLAY, sandy, *wet*	Bag 15 → 10 YR-4/4	dark yellowish brown	firm	CL/SC	30					
					31					
CLAY, sandy, *moist/wet*	Bag 16 → 10 YR-5/3	brown	stiff	CL/SC	32					
					33		14			
					34					
					35					
					36					
					37					

Blow counts are for final 12 inches of sampler penetration unless noted otherwise

Blow counts adjusted for 70 lb hammer

****Free groundwater encountered at -27 feet (Elevation +57) at time of drilling. Flow line of Creek is at Elevation +67*

**California Modified Sampler (multiply by 0.56 for SPT value)*

Stratification lines, if shown, represent the approximate boundaries between soil and rock types; actual transitions are gradual unless noted or otherwise defined

***Munsell Color: hue-value/chroma*

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EXPLORATORY BORING LOG

Bulkhead Foundation Investigation
2150-2152 North Valley Street
South Bank of Strawberry Creek, Berkeley

DATE	PROJECT	BORING NO.
February 2011	21109	B-1 (Sheet 2)

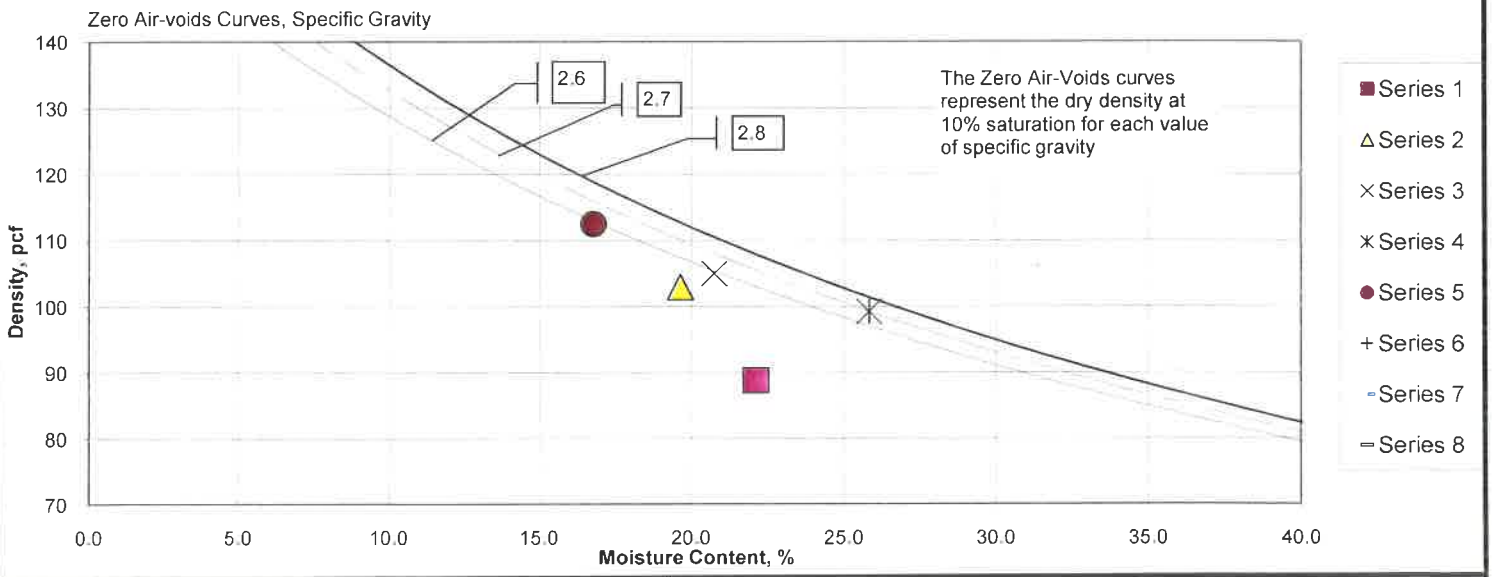
Moisture-Density-Porosity Report
(ASTM D 2937)

CTL Job No:	347-026	Project No. 21109	By: RU
Client:	Geoplex	Date: 02/08/11	
Project Name:	Strawberry Creek	Remarks:	

Boring:	1-1	1-2	1-4	1-5	1-6			
Sample:								
Depth, ft:	3.0	8.0	13.5	16.0	22.0			
Visual Description:	Dark Brown Clayey SAND, trace Gravel & organics	Dark Brown Lean Clayey SAND	Black Clayey SAND	Brown CLAY w/ Sand	Dark Yellowish Brown Clayey SAND w/ Claystone			
Actual G_s								
Assumed G_s	2.70	2.70	2.70	2.70	2.70			
Moisture, %	22.1	19.6	20.8	25.8	16.8			
Wet Unit wt, pcf	108.4	123.1	126.8	124.8	131.4			
Dry Unit wt, pcf	88.8	102.9	105.0	99.2	112.5			
Dry Bulk Dens.ρb, (g/cc)	1.42	1.65	1.68	1.59	1.80			
Saturation, %	66.4	83.0	92.4	99.6	90.8			
Total Porosity, %	47.3	39.0	37.7	41.2	33.3			
Volumetric Water Cont,Θw	31.4	32.4	34.9	41.0	30.2			
Volumetric Air Cont., Θa	15.9	6.6	2.8	0.2	3.1			
Void Ratio	0.90	0.64	0.61	0.70	0.50			
Series	1	2	3	4	5	6	7	8

Note: All reported parameters are from the as-received sample condition unless otherwise noted. If an assumed specific gravity (Gs) was used then the saturation, porosities, and void ratio should be considered approximate.

Moisture-Density



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MOISTURE-DENSITY

Bulkhead Foundation Investigation
2150-2152 North Valley Street
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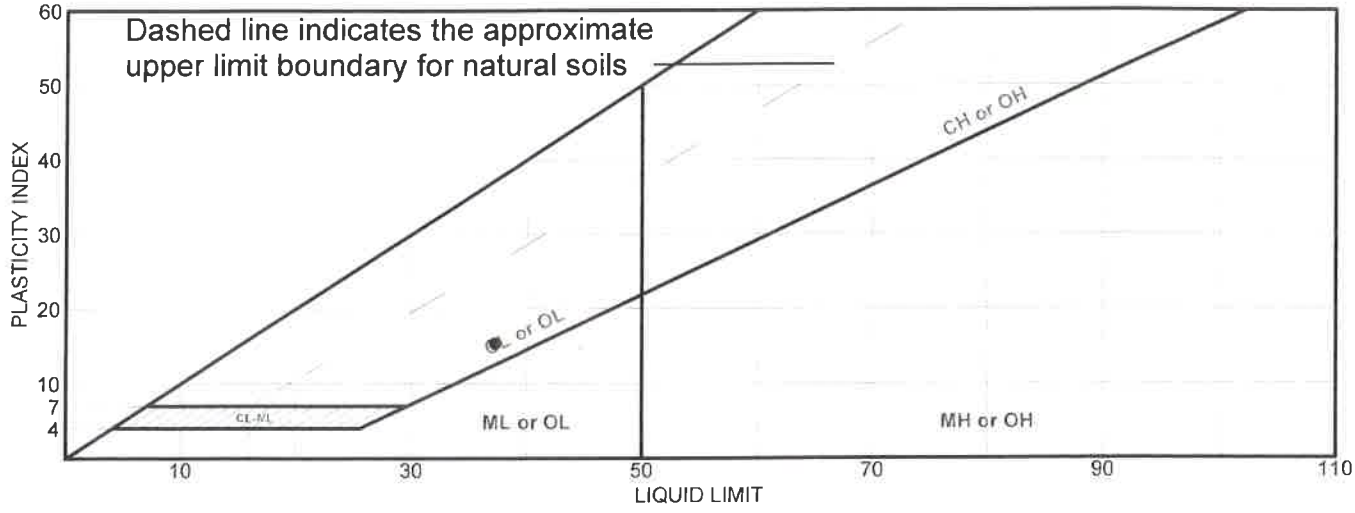
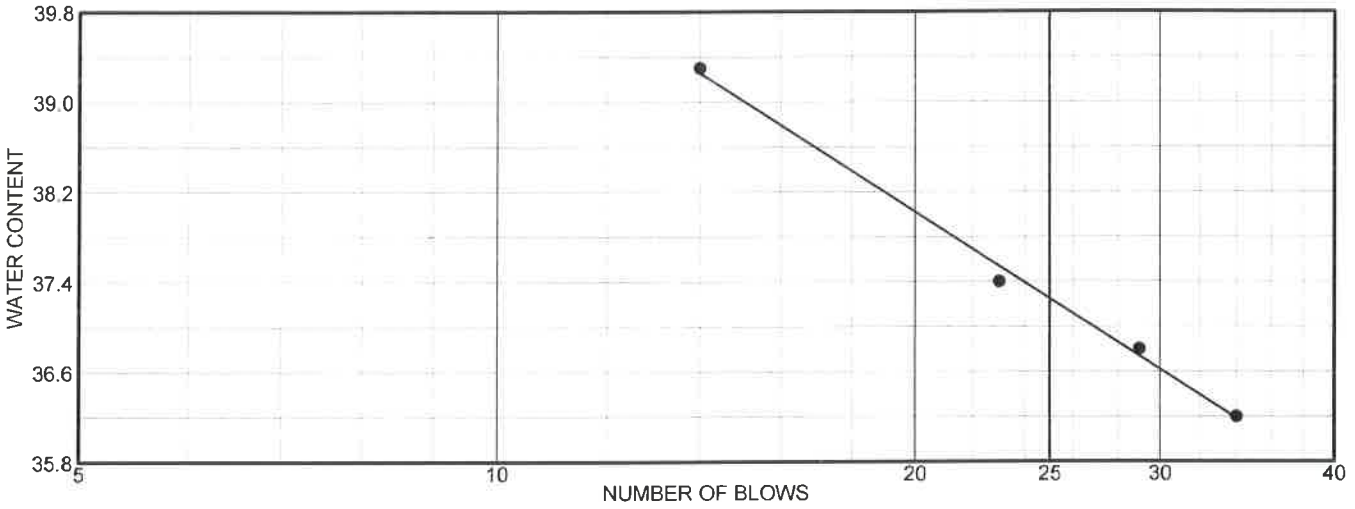
DATE	PROJECT	FIGURE: C
February 2011	21109	

LIQUID AND PLASTIC LIMITS TEST REPORT





	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Dark Brown Lean Clayey SAND	37.2	21.8	15.4	72.0	48.5	SC

Project No. 347-026 **Client:** Geoplex

Project: Strawberry Creek

● **Source:** 1-2 **Elev./Depth:** 8.0'

Remarks:

●

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PLASTICITY

Bulkhead Foundation Investigation
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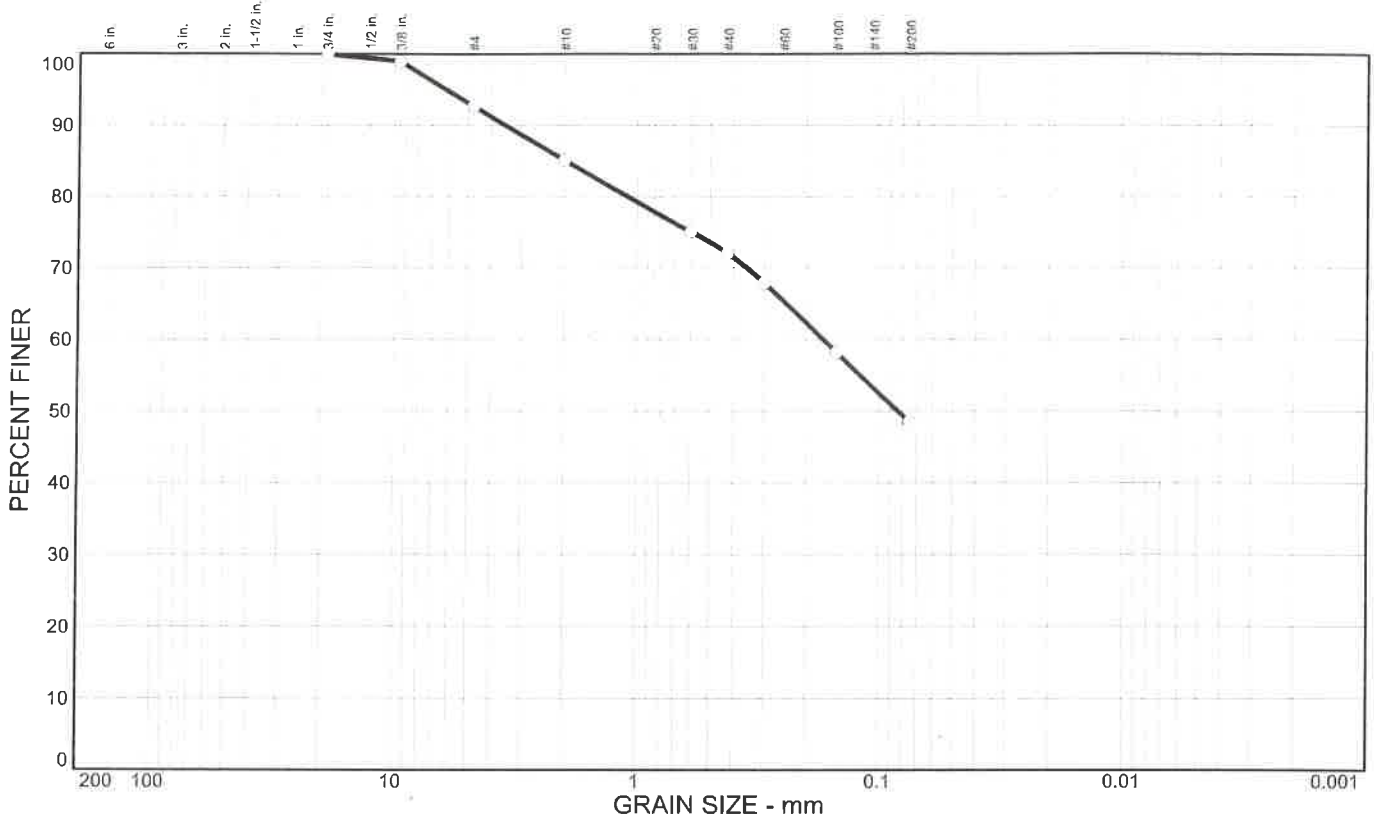
South Bank of Strawberry Creek, Berkeley

DATE	PROJECT	FIGURE:
Februarv 2011	**21109**	**D**

Particle Size Distribution Report



% COBBLES	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
	7.3	44.2	48.5		SC		21.8	37.2

SIEVE inches size	PERCENT FINER			
3/4"	100.0			
3/8"	99.0			
	GRAIN SIZE			
D_{60}	0.170			
D_{30}				
D_{10}				
	COEFFICIENTS			
C_c				
C_u				

SIEVE number size	PERCENT FINER
#4	92.7
#10	85.1
#30	75.0
#40	72.0
#50	67.9
#100	58.2
#200	48.5

SOIL DESCRIPTION

Dark Brown Lean Clayey SAND

REMARKS:

Source: 1-2

Elev./Depth: 8.0'

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GRAIN SIZE

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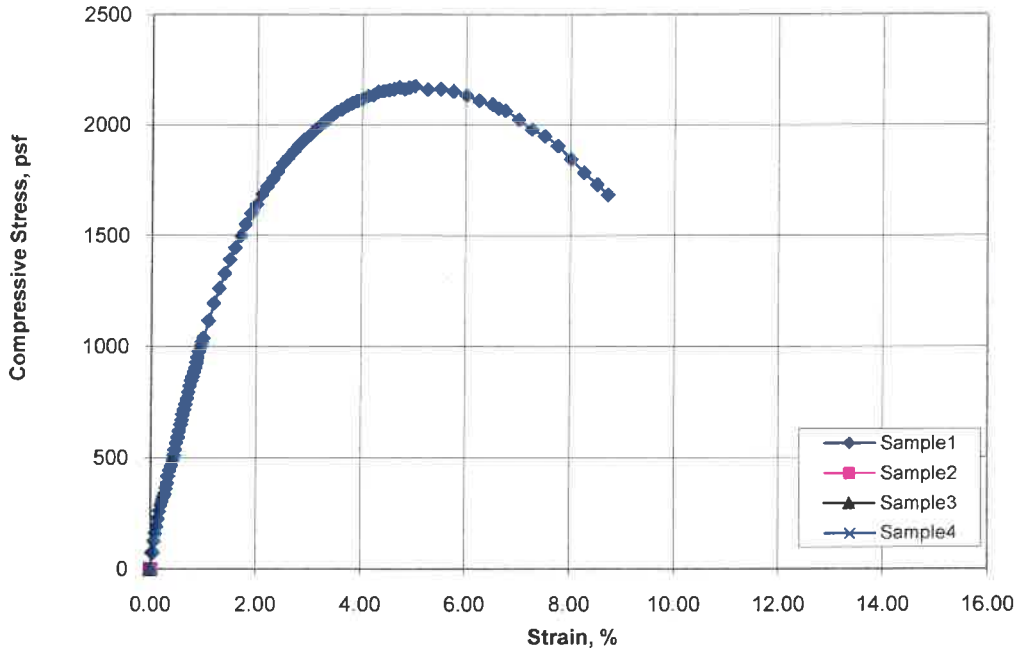
DATE	PROJECT	FIGURE:
February 2011	**21109**	**E**

Unconfined Compressive Strength

ASTM D2166



Sample No.:	1	2	3	4	
Unconfined Compressive Strength, psf	2176				
Unconfined Compressive Strength, psi	15.1				
Undrained Shear Strength, psf	1088				
Failure Strain, %	5.0				
Strain Rate, % per minute	1.0				
Strain Rate, inches/minute	0.05				
Moisture Content, %	20.8				
Dry Density, pcf	105.3				
Saturation, %	93.5				
Void Ratio	0.600				
Specimen Diameter, inches	2.419				
Specimen Height, inches	4.98				
Height to Diameter Ratio	2.1				
Assumed Specific Gravity	2.70				

Sample Location				
	Boring	Sample	Depth, ft.	Soil Description
1	B-1-3		10.5	Brown Clayey SAND w/ organics, trace Gravel
2				
3				
4				

Job No.:	347-026	Type of Sample	Undisturbed
Client:	Geoplex		
Project:	Strawberry Creek	Remarks:	
Date:	2/4/2011 By: MD/RU		

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STRENGTH

Bulkhead Foundation Investigation
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DATE	PROJECT	FIGURE:
Februarv 2011	21109	F