

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\INT\LIBRARY MACTEC\JUNE2011\GLB
 G:\PROJECT_DIRECTORIES\4953\2010\101561_METRO_WESTSIDE_EXTENSION\6.2.3.1 GEOTECHNICAL DESIGN\3.2 ALL FIELD NOTES\GINT LOG\ACE PHASE BORINGS.GPJ 11/29/11

THIS RECORD IS AN INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-13 (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	710+88, feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										05/28/2009	5 inches	281.3 feet
										GROUND-WATER READINGS		
										Ground-water level measured at 27 feet below the ground surface on 6/1/2009 after 4 day hiatus in drilling.		
240		31	0.2	-	-				<input checked="" type="checkbox"/>			(LL=54, PI=28)
235	45			-	-	26			<input checked="" type="checkbox"/>			(Sample not recovered)
230	50	42	0.3	-	-		70		<input checked="" type="checkbox"/>	CL	SANDY LEAN CLAY - hard, wet, gray with brown mottling, trace subrounded and subangular gravel (LL=42, PI=22)	
225	55			-	-	27			<input checked="" type="checkbox"/>			(Sample not recovered)
220	60	71	0.1	-	-		40		<input checked="" type="checkbox"/>	SC	CLAYEY SAND - very dense, wet, brown, fine-grained, trace medium, trace silt, contains carbonate-lined root cracks and carbonate nodules	
	65			-	-	70			<input checked="" type="checkbox"/>			(Sample not recovered)
	70	90		-	-				<input checked="" type="checkbox"/>	CH	FAT CLAY - wet, brown	
	75			-	-	30			<input checked="" type="checkbox"/>	SM	SILTY SAND - very dense, wet, reddish brown, fine to medium-grained, trace clay (NP, NP)	
80				-	-				<input checked="" type="checkbox"/>			(Sample not recovered)

Santa Monica / Century City Station

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DW
 Prepared/Date: NH
 Checked/Date: DLP

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 G:\PROJECT_DIRECTORIES\4953\2010\101561_METRO_WESTSIDE_EXTENSION\6.2.3.1 GEOTECHNICAL DESIGN\3.2 ALL FIELD NOTES\GINT LOG\ACE PHASE BORINGS.GPJ 11/29/11

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ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-13 (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	710+88, feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										05/28/2009	5 inches	281.3 feet
										GROUND-WATER READINGS		
										Ground-water level measured at 27 feet below the ground surface on 6/1/2009 after 4 day hiatus in drilling.		
		54		-	-						CL	LEAN CLAY - hard, wet, brown with gray mottling
	85			19.4	108	67					SM	Increased sand content SILTY SAND - very dense, wet, brown with gray mottling, fine to medium-grained, some slate gravel
	195											
	90	92/9"		-	-						SP	POORLY GRADED SAND with GRAVEL - very dense, wet, brown with gray mottling, fine to medium-grained Gravel and cobbles up to at least 3 inches in size
	190											
	95			10.0	118	100/6"						
	185											
	100			15.9	113	100/9"						
	180											
	105											
	175											
	110											
	170											
	115											
	165											
	120											
										END OF BORING AT 101 FEET NOTES: Ground-water level measured at 27 feet below ground surface on 6/1/2009 after 4 day hiatus in drilling. Boring grouted with a cement-bentonite slurry from the bottom up. "N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches *Number of blows required to drive the Crandall Sampler 12 inches using a 300 pound downhole hammer falling 18 inches **Photo Ionization Detector used for OVA readings Elevation determined from topographic map provided by Parsons-Brinckerhoff, dated August 12, 2009.		

MTA Westside Subway Extension
Los Angeles, California



LOG OF BORING
Project No.: 4953-10-1561 Figure: A-1.14c

Field Tech: DW
Prepared/Date: NH
Checked/Date: DLP

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ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-14
		DRILLING METHOD		BOREHOLE LOCATION						GROUND EL.		
		Rotary Wash		710+94, feet						281 feet		
		DATES DRILLED		HOLE DIAMETER								
		07/14/2009 to 07/15/2009		5 inches								
		GROUND-WATER READINGS										
		Ground-water level not measured.										
280										FILL [af] SANDY LEAN CLAY - moist, brown and gray Becomes dark gray		
	5			14.4	112	8	39	☒	SM	SILTY SAND with GRAVEL - loose, moist, brown, fine to medium-grained, some coarse		
275										QUATERNARY YOUNGER ALLUVIUM [Qal] SANDY LEAN CLAY - stiff, moist, brown, some slate gravel		
	10	12		22.0	-			☒	CL			
270										QUATERNARY OLDER ALLUVIUM [Qalo] SILTY SAND - loose to medium dense, moist, brown, fine to medium-grained, some gravel		
	15			23.4	96	7		☒	SM			
265												
	20	22		17.3	-			☒				
260												
	25			-	-	3		☐		(Sample not recovered)		
255												
	30	5/6"		17.3	-		32	☒				
250												
	35			-	-	8		☐		(Sample not recovered)		
245												
	40											

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
 Prepared/Date: NH
 Checked/Date: DLP

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ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-14 (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 281 feet
										Rotary Wash	710+94, feet	
										DATES DRILLED	HOLE DIAMETER	
										07/14/2009 to 07/15/2009	5 inches	
										GROUND-WATER READINGS		
										Ground-water level not measured.		
240		50/5"		-	-				☒			
										Grades to Gravelly Sand		
										Approximate 2-inch thick Clay layer at 43 feet		
235	45			-	-	50/6"			☒			
										Sample not recovered due to 3-inch cobble in bit		
230	50	38		45.8	-				☒	CH	FAT CLAY - very stiff to hard, moist, brown, some slate gravel, trace fine sand (LL=65, PI=33)	
225	55			18.0	112	18			☒			
220	60	80		24.8	-				☒			
65											No sample due to pressure meter test	
70				14.8	112	35			☒	SM	SILTY SAND with GRAVEL - dense, moist, brown, fine to coarse-grained	
											Thin layer of Lean Clay	
75		50/6"		21.2	-		51		☒	SP	POORLY GRADED SAND with GRAVEL - moist, light brown, fine to coarse-grained	
80										SW	WELL GRADED SAND with GRAVEL - very dense, moist, light brown, fine to coarse-grained Thin layer of Sandy Lean Clay	

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
Prepared/Date: NH
Checked/Date: DLP

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										C & L Drilling / Mayhew 1000		G-14 (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	710+94, feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										07/14/2009 to 07/15/2009	5 inches	281 feet
										GROUND-WATER READINGS		
										Ground-water level not measured.		
				-	-	75		<input checked="" type="checkbox"/>			(Sample not recovered) 6- to 8-inch diameter cobble	
195	85	50/6"		-	-			<input checked="" type="checkbox"/>			Sample not recovered due to large gravel in bit END OF BORING AT 85½ FEET	
										NOTES: Hand augered upper 5 feet to avoid damage to utilities. Pressure meter test performed at 65 feet. Two separate 1-inch diameter ground-water monitoring wells extending to 20 feet and 49 feet, respectively, installed in borehole upon completion of drilling (see well construction diagram for G-14). *Number of blows required to drive the Crandall Sampler 12 inches using a 340 pound downhole hammer falling 18 inches		
190	90											
185	95											
180	100											
175	105											
170	110											
165	115											
160	120											

MTA Westside Subway Extension
Los Angeles, California



LOG OF BORING
Project No.: 4953-10-1561 Figure: A-1.15c

Field Tech: AR
Prepared/Date: NH
Checked/Date: DLP

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ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-16-alt
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	735+35, Lt 175 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										06/05/2009	5 inches	246.3 feet
										GROUND-WATER READINGS		
										Drilling mud bailed on 6/5/2009. Ground-water level measured at 21 feet below the ground surface 15 minutes after removal of drilling mud.		
245										CL-ML	4-inch thick Asphalt Concrete FILL [Aa] - SILTY CLAY - olive gray to blueish gray, some sand	
	5									CL-ML	QUATERNARY OLDER ALLUVIUM [Q_{old}] SILTY CLAY - moist, dark brown, some sand	
240												
	10											
235			0.8	14.8	114	11				CL	LEAN CLAY - stiff to very stiff, moist, olive brown, trace shale fragments	
	15	18	1.1								(LL=30, PI=15)	
230												
	20		0.5	19.9	108	5				SM	▽ SILTY SAND - loose, wet, olive brown, fine, trace clay	
225												
	25	44	1.1				83			ML	SILT with SAND - hard, wet, reddish brown with gray mottling	
220												
	30		0.6	28.7	95	18						
215												
	35	30	2.0				75			CL-ML	SILTY CLAY with SAND - very stiff, wet, reddish brown, contains black organic root fragments, trace sand	
210												
	40									SM	SILTY SAND - very dense, wet, orange brown, fine to medium	

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-16-alt (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	735+35, Lt 175 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										06/05/2009	5 inches	246.3 feet
GROUND-WATER READINGS Drilling mud bailed on 6/5/2009. Ground-water level measured at 21 feet below the ground surface 15 minutes after removal of drilling mud.												
205			0.4	11.6	115	51	15	☒				
45	200	64	0.4				90	☒	CL	Thin layer of Poorly Graded Sand LEAN CLAY - hard, wet, olive		
50									ML	SILT with SAND - hard, wet, orange brown with gray mottling, shale fragments, organic root fragments, some clay		
195				26.7	98	61	85	☒				
55	190	36						☒	CL	LEAN CLAY - hard, wet, gray, trace fine sand and silt (LL=43, PI=24)		
190									ML	SANDY SILT - wet, light brown		
60	185			23.6	100	49		☒	CL	SANDY LEAN CLAY - hard, wet, brown, some fine sandy lenses		
65						52		☐		Sample not recovered		
70		85						☒				
75								☐		Some slate gravel		
80						36		☐		Sample not recovered		

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DW/AR
Prepared/Date: NH
Checked/Date: DLP

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										C & L Drilling / Mayhew 1000		G-16-alt (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	735+35, Lt 175 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										06/05/2009	5 inches	246.3 feet
										GROUND-WATER READINGS		
										Drilling mud bailed on 6/5/2009. Ground-water level measured at 21 feet below the ground surface 15 minutes after removal of drilling mud.		
		63										
	85			13.4	122	40						
	160											
	90											
	155											
	95											
	150											
	100											
	145											
	105											
	140											
	110											
	135											
	115											
	130											
	120											

Tunnel



END OF BORING AT 86 FEET

NOTES:

Bailed drilling mud to 25 feet on 6/5/2009. Ground-water level measured at 21 feet below ground surface about 15 minutes after removal of drilling mud. Boring grouted with a cement-bentonite slurry from the bottom up and patched.

*Number of blows required to drive Crandall Sampler 12 inches using 300 pound downhole hammer falling 18 inches.

Field Tech: DW/AR
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										C & L Drilling / Mayhew 1000		G-20
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	804+25, Rt 300 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										8/21/2009 to 8/24/2009	5 inches	310.2 feet
										GROUND-WATER READINGS		
										Ground-water level not measured.		
												4½-inch thick Asphalt Concrete and 6-inch thick Concrete over 1½-inch thick Base Course and concrete fragments FILL [Af] LEAN CLAY - moist, light to dark brown
	5									CL		QUATERNARY YOUNGER ALLUVIUM [Qall] LEAN CLAY with SAND - stiff to hard, moist, brown, trace gravel (LL=35, PI=15) Sandier Some slate fragments
	10	31		14.1	107	11		☒		CL		
	15			12.2	119	28	19	☒		GM		SILTY GRAVEL - medium dense, moist, brown, fine to coarse
	20	27						☒		CL		QUATERNARY OLDER ALLUVIUM [Qalo] LEAN CLAY - very stiff, moist, brown, some slate fragments Increased clay content
	25			20.4	107	19		☒		SM		SILTY SAND - moist, brown, fine to medium-grained
	30	50/6"						☒		ML		SANDY SILT - very stiff, moist, brown, trace gravel
	35			25.1	95	25	77	☒		SM		SILTY SAND with GRAVEL - very dense, moist, brown
	40							☒		SW		Thin layer of Silt with Sand WELL GRADED SAND with GRAVEL - medium dense, moist, light brown, fine to coarse-grained

Wilshire / UCLA Station

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
 Prepared/Date: NH
 Checked/Date: DLP

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										C & L Drilling / Mayhew 1000		G-20 (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	804+25, Rt 300 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										8/21/2009 to 8/24/2009	5 inches	310.2 feet
										GROUND-WATER READINGS		
										Ground-water level not measured.		
		74						☒		SM		SILTY SAND - very dense, moist, brownish gray, fine-grained
										ML		SANDY SILT - moist, brown, some clay
45				9.8	109	49		☒		SW		WELL GRADED SAND with GRAVEL - dense, moist, brown and gray, fine to coarse-grained
										ML		SILT - very stiff to hard, moist, light brown, alternating with sandier and clayier layers
50		74						☒				(NP, NP)
55				17.9	108	29		☒				
60		90						☒		SM		SILTY SAND - very dense, moist, light brown, fine-grained
										CL		LAKESWOOD FORMATION [Qlw] LEAN CLAY - very stiff to hard, moist, light brown
65				29.6	92	30		☒				Increased sand content
70		47						☒				
75	235			25.9	96	33		☒				
80												

Wilshire / UCLA Station

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
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										C & L Drilling / Mayhew 1000		G-20 (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	804+25, Rt 300 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										8/21/2009 to 8/24/2009	5 inches	310.2 feet
										GROUND-WATER READINGS		
										Ground-water level not measured.		
230		73						☒			Trace gravel (LL=42, PI=19)	
										SM/SP	SILTY SAND and POORLY GRADED SAND - dense, moist, brownish gray, fine to medium-grained, alternating layers	
225	85			20.3	108	34		☒				
										CL	LEAN CLAY - hard, moist, brownish gray	
220	90	49						☒				
										SC	CLAYEY SAND - dense, moist, brownish gray, fine to coarse-grained	
215	95			15.5	107	35		☒				
										SM	SILTY SAND - very dense, moist, fine-grained	
210	100	50/5"						☒				
											END OF BORING AT 101½ FEET	
											NOTES:	
											Hand augered top 6½ feet to avoid damage to utilities. Caving observed at 30 feet on August 24, 2009 after 2 day hiatus in drilling.	
											Two separate 1-inch diameter ground-water monitoring wells extending to 35 feet and 88 feet, respectively, installed in borehole upon completion of drilling (see well construction diagram for G-20).	
											"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches	
											*Number of blows required to drive the Crandall Sampler 12 inches using a 340 pound hammer falling 18 inches	
											**Photo Ionization Detector used for OVA readings	
											Elevation determined from topographic map provided by Parsons-Brinckerhoff, dated August 12, 2009.	

Field Tech: AR
 Prepared/Date: NH
 Checked/Date: DLP

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\INT\LIBRARY MACTEC\JUNE2011.GLB
 G:\PROJECT_DIRECTORIES\4953\2010\101561_METRO_WESTSIDE_EXTENSION\6.2.3.1 GEOTECHNICAL DESIGN\3.2 ALL FIELD NOTES\GINT LOG\ACE PHASE BORINGS.GPJ 11/29/11

THIS RECORD IS AN INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000	DRILLING METHOD	BOREHOLE LOCATION
										Rotary Wash	815+00, Rt 187 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										8/19/2009	5 inches	310 feet
GROUND-WATER READINGS Drilling mud bailed on 8/19/2009. Ground-water level measured at 52 feet below the ground surface 10 minutes after removal of drilling mud.												
												5-inch thick Asphalt Concrete over 4-inch thick Base Course
												QUATERNARY YOUNGER ALLUVIUM [Qall]
												SILTY SAND - medium dense, moist, dark brown, fine to coarse-grained, slightly porous
												Some slate gravel
305	5			19.7	103	20	51	⊗				
300	10	13		-	-			⊙				WELL GRADED SAND with GRAVEL - moist, brown, fine to coarse-grained, some silt
												(Sample not recovered), low blow count due to slough
295	15	48		-	-			⊗				SILTY SAND with GRAVEL - hard, moist, brownish gray, fine to coarse-grained
												Grades to fine to medium, less gravel, brown
290	20	36		-	-			⊗				Coarser
285	25			-	-	50/5"		⊗				WELL GRADED SAND with GRAVEL - medium dense to dense, moist, brownish gray, fine to coarse-grained, some silt
												Increasing gravel, trace silt
280	30	30		-	-		19	⊗				QUATERNARY OLDER ALLUVIUM [Qalo]
												WELL GRADED SAND with GRAVEL - dense, moist, brownish gray
												Alternating with less gravelly layers
275	35			-	-	23		⊙				(Sample not recovered), low blow count due to slough
40												

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
 Prepared/Date: NH
 Checked/Date: DLP

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ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN./TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-23 (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	815+00, Rt 187 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										8/19/2009	5 inches	310 feet
GROUND-WATER READINGS Drilling mud bailed on 8/19/2009. Ground-water level measured at 52 feet below the ground surface 10 minutes after removal of drilling mud.												
		23		-	-				☒	SM	SILTY SAND - medium dense, moist, light brown, fine to medium-grained	
										SW	WELL GRADED SAND with GRAVEL - moist, brownish gray, fine to coarse-grained	
265	45			26.0	95	4			☒	CL	SANDY LEAN CLAY - soft to stiff, moist, light brown	
260	50	10		-	-		56		☒		Brown and gray (LL=33, PI=12)	
											Wet	
	55			24.8	101	8	51		☒	SM	SILTY SAND with GRAVEL - loose, wet, brownish gray, fine-grained	
											Becomes very dense, gray, grades fine to coarse	
	60	76		-	-		21		☒		Less coarse sand	
	65			-	-	53			☒	CL	LEAN CLAY - wet, light brown	
										SW	WELL GRADED SAND with GRAVEL - dense, wet, fine to coarse-grained	
	70	72		-	-				☒	CL-ML	SILTY CLAY - hard, wet, light brown	
											(LL=27, PI=7)	
											Increasing clay	
235	75			19.1	110	47			☒			
	80											

Tunnel

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
 Prepared/Date: NH
 Checked/Date: DLP

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\INT\LIBRARY MACTEC\JUNE2011.GLB
 G:\PROJECT_DIRECTORIES\4953\2010\101561_METRO_WESTSIDE_EXTENSION\6.2.3.1 GEOTECHNICAL DESIGN\3.2 ALL FIELD NOTES\GINT LOG\ACE PHASE BORINGS.GPJ 11/29/11

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ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN./TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000	DRILLING METHOD	BOREHOLE LOCATION
										Rotary Wash	815+00, Rt 187 feet	
										8/19/2009	5 inches	GROUND EL. 310 feet
GROUND-WATER READINGS Drilling mud bailed on 8/19/2009. Ground-water level measured at 52 feet below the ground surface 10 minutes after removal of drilling mud.												
		66		-	-							Brown and gray
225	85			-	-	34						(Sample not recovered)
220	90	63		-	-						SM	SILTY SAND - wet, brown, fine-grained
											CL	LEAN CLAY - hard, wet, brown and gray
215	95			24.1	95	30					SM	SILTY SAND - medium dense, wet, brown, fine-grained
											CL	LEAN CLAY - hard, wet, brownish gray
210	100	46		-	-							END OF BORING AT 101½ FEET
205	105											NOTES: Hand augered upper 5 feet to avoid damage to utilities. Bailed drilling mud to 52.6 feet on 8/19/2009. Ground-water level measured at 52 feet below ground surface about 10 minutes after removal of drilling mud. Boring grouted with a cement-bentonite slurry from the bottom up and patched. "N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches *Number of blows required to drive the Crandall Sampler 12 inches using a 340 pound hammer falling 18 inches **Photo Ionization Detector used for OVA readings Elevation determined from topographic map provided by Parsons-Brinckerhoff, dated August 12, 2009.
200	110											
195	115											
	120											

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ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-24
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	834+75, Lt 37 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										9/3/2009	5 inches	320.3 feet
GROUND-WATER READINGS Drilling mud bailed on 9/3/2009. Ground-water level measured at 69 feet below the ground surface 10 minutes after removal of drilling mud.												
												3-inch thick Asphalt Concrete over 3-inch thick Base Course FILL [af] SILTY SAND - moist, brown, fine-grained, some brick and concrete fragments QUATERNARY OLDER ALLUVIUM [Qal] SILTY SAND - moist, grayish brown, fine to medium-grained, some gravel SANDY SILT - medium stiff, moist, brown, trace slate gravel
	5			12.9	94	8						
	10	45		-	-							
	15			17.2	103	7						
	20	57		-	-		50					
	25			7.3	126	64						
	30	24		-	-							
	35			-	-	42						
	40											

Wilshire/ VA Hospital Station

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
 Prepared/Date: NH
 Checked/Date: DLP

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ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-24 (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	834+75, Lt 37 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										9/3/2009	5 inches	320.3 feet
GROUND-WATER READINGS Drilling mud bailed on 9/3/2009. Ground-water level measured at 69 feet below the ground surface 10 minutes after removal of drilling mud.												
		40		-	-		51	☒		ML	SANDY SILT - hard, moist, brown, some gravel, some clayier lenses	
	45			-	-	75		☒		SW	WELL GRADED SAND with GRAVEL - very dense, moist, brown and gray, trace silt	
	50	50/5"		-	-			☒			Some slate cobbles estimated at 3 to 8 inches in length	
	55			24.5	92	38		☒		CL	SANDY LEAN CLAY - moist, brown, some gravel	
	60									SM	SILTY SAND with GRAVEL - dense, moist, brown, fine to coarse-grained	
	65									CL	LEAN CLAY - moist, brown, trace gravel	
	69			-	-		42	☒		SM	SILTY SAND - dense to very dense, moist, brown, fine to coarse-grained	
	70			13.8	120	39		☒		CL	LEAN CLAY - wet, brown, some gravel	
	75	50/6"		-	-		23	☒		SM	SILTY SAND - medium dense to very dense, wet, brown, fine to coarse-grained, some silt	
	80			18.8	101	22		☒			Some lenses of Poorly Graded Sand	

Wilshire/ VA Hospital Station

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
 Prepared/Date: NH
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ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-24 (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	834+75, Lt 37 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										9/3/2009	5 inches	320.3 feet
										GROUND-WATER READINGS		
										Drilling mud bailed on 9/3/2009. Ground-water level measured at 69 feet below the ground surface 10 minutes after removal of drilling mud.		
240		84/9"		-	-				☒		Thin layer of fine Silty Sand	
										END OF BORING AT 81½ FEET		
										NOTES:		
										Hand augered upper 5 feet to avoid damage to utilities. Bailed drilling mud to 69 feet on 9/3/2009. Ground-water level measured at 69 feet below ground surface about 10 minutes after removal of drilling mud. Boring grouted with a cement-bentonite slurry from the bottom up and patched.		
										"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches		
										*Number of blows required to drive the Crandall Sampler 12 inches using a 340 pound hammer falling 18 inches		
										**Photo Ionization Detector used for OVA readings		
										Elevation determined from topographic map provided by Parsons-Brinckerhoff, dated August 12, 2009.		
235	85											
230	90											
225	95											
220	100											
215	105											
210	110											
205	115											
120												

Field Tech: AR
 Prepared/Date: NH
 Checked/Date: DLP

**Figures A-1.20a through A-1.21k
Logs of Sonic Core Borings (ACE Phase)**

B11SOIL_CRANDALL(NO DECIMAL), 90473_CORE_SONIC_SB-1 AND SB-2.GPJ LAW_CRAN.GDT 12/21/11

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ELEVATION (ft)	DEPTH (ft)	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	SAMPLE LOC.	
						7" of thick Asphaltic Concrete
						Artificial Fill
						QUATERNARY OLDER ALLUVIUM (Q_{alo})
						Clayey Silt (ML) with trace medium to coarse sand grains and sub-angular gray slate fragments, moist
						Less clay content from 3 to 4 ft
	5					Sandy Silt with trace clay and scattered sub-angular slate fragments, moist, red-brown (5 YR)
						Argillic between soil horizon, Clayey to Silty fine Sand (SC-SM) with few medium to coarse grains and trace slate fragments, moist, red-brown (5 YR)
						Grading to Silty Sand (ML), fine grained with few medium to coarse grains, trace clay, moist
						Clayey Sand (SC)
	10					Clayey Silt with slate fragments (ML), moist
						Silty Sand (SM) and Clayey fine Sand (SC), abundant sub-angular to sub-rounded slate and shale rock fragments less than or equal to 1", moist, appears dense, dark yellowish brown (10 YR 3/6) to dark grayish brown (10 YR 4/2), pocket pen: 3.5 ton/ft
						Gradational contact Fine Sandy Silt to Clayey Silt (ML) with discontinuous dark lamellae, abundant carbonate debris/fragments, very dense, olive gray (5 Y 4/2), slightly moist to moist, pocket pen: +4.5 ton/ft
	20					

BORING SB-1

DATE DRILLED: 6/2/10
 EQUIPMENT USED: Sonic Rig
 HOLE DIAMETER (in.): 6" outer casing/4" core diameter
 ELEVATION: **

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DLP/MAE
 Prepared By: LM
 Checked By:

B11SOIL_CRANDALL(NO DECIMAL)_90473_CORE_SONIC_SB-1 AND SB-2.GPJ LAW_CRAN.GDT 12/21/11

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BORING SB-1 (Continued)

DATE DRILLED: 6/2/10
 EQUIPMENT USED: Sonic Rig
 HOLE DIAMETER (in.): 6" outer casing/4" core diameter
 ELEVATION: **

ELEVATION (ft)	DEPTH (ft)	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	SAMPLE LOC.
	25				
	30				
	35				
	40				

Silty fine to medium Sand (SM) to Clayey Sand (SC), with occasional rounded to sub-rounded gray slate rock fragments/gravel less than or equal to 1/2", few shell fragments/debris with lenses of silty sand, olive brown (2.5 YR 4/4) to dark grayish brown (2.5 YR 4/2) and oxidized lenses dark yellowish brown (10 YR 4/6), pocket pen: 4.0 to +4.5 ton/ft

Silty fine to medium Sand (SM) to Clayey Sand (SC), increase in abundance and size of gray slate plus shale rock fragments/gravels, sub-rounded to sub-angular, many elongate and are less than or equal to 2", pocket pen: 4.0 to +4.5 ton/ft

Silty fine Sand (SM) with some sub-rounded slate and shale rock fragments less than or equal to 1/2", but mostly less than 1/4", moist, dense, massive to mottled, dark yellowish brown (10 YR 3/6 to 3/4), pocket pen: 4.0 ton/ft

Very fine Sandy Silt (ML) with scattered sub-rounded carbonate nodules, rock fragments less than or equal to 1/4", moist to very moist, dense, massive to slightly mottled, dark yellowish brown (10 YR 3/6 to 4/6), pocket pen: 3.5 ton/ft

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DLP/MAE
 Prepared By: LM
 Checked By:

B:\SOIL_CRANDALL(NO DECIMAL)_90473_CORE_SONIC_SB-1 AND SB-2.GPJ LAW_CRAN.GDT 12/21/11

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BORING SB-1 (Continued)

DATE DRILLED: 6/2/10
 EQUIPMENT USED: Sonic Rig
 HOLE DIAMETER (in.): 6" outer casing/4" core diameter
 ELEVATION: **

ELEVATION (ft)	DEPTH (ft)	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	SAMPLE LOC.	DESCRIPTION
						Very fine Sandy Silt (ML) with scattered sub-rounded carbonate nodules, rock fragments less than or equal to 1/4", moist to very moist, dense, massive to slightly mottled, dark yellowish brown (10 YR 3/6 to 4/6), pocket pen: 3.5 ton/ft
	45					Silty fine Sand (SM) with occasional sub-rounded slate fragments less than or equal to 1/4", dense, dark brown (10 YR 3/3) to dark yellowish brown (10 YR 4/3), trace clays
						Silty fine to medium Sand with some clays (SM-SC), abundant sub-rounded slate and other granite rock fragments that are less than or equal to 1.5", dense, slightly moist to moist, massive, pocket pen: 4.0 ton/ft
						Saturated zone, groundwater encountered, pocket pen: 0.5 to 3.5 ton/ft
	50					Clayey Silt (ML) with trace fine sand, occasional sub-rounded slate and other rock fragments/gravels that are less than or equal to 1/4", abundant carbonate forams/shell fragments and sub-angular rock fragments that are less than or equal to 1/4", very stiff to hard, moist, mottled to slightly lenticular, clayey silt is dark brown (10 YR 3/3), thin laminae of sandy silt is dark yellowish brown (10 YR 4/4), pocket pen: 3.5 to +4.5 ton/ft
						Increase in Sandy Silt lenticular bedding, dense, increasing sub-rounded to sub-angular gravels, slate and other rock fragments with depth less than or equal to 1", mottled appearance, dark yellowish brown (10 YR 4/4), pocket pen: 4.5 ton/ft
	55					Sandy Silt to Silty Sand (ML/SM), sub-angular to sub-rounded slate and other gravels less than or equal to 1"
						Silty fine Sand to Sandy Silt (ML/SM) with Clayey Silt (ML) and occasional sub-rounded to sub-angular slate, carbonate, and shaley gravels less than or equal to 1/2", moist, stiff, mottled to faintly layered/lenticular (SP-SM), iron-oxide stained and grayish, mostly dark yellowish brown (10 YR 3/4) to olive brown (2.5 Y 4/3), pocket pen: 2.75 to 4.5 ton/ft
	60					

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DLP/MAE
 Prepared By: LM
 Checked By:

B:\SOIL_CRANDALL(NO DECIMAL)_90473_CORE_SONIC_SB-1 AND SB-2.GPJ LAW_CRAN.GDT 12/21/11

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BORING SB-1 (Continued)

DATE DRILLED: 6/2/10
 EQUIPMENT USED: Sonic Rig
 HOLE DIAMETER (in.): 6" outer casing/4" core diameter
 ELEVATION: **

ELEVATION (ft)	DEPTH (ft)	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	SAMPLE LOC.	DESCRIPTION
						Silty fine Sand to Sandy Silt (ML/SM) with Clayey Silt (ML) and occasional sub-rounded to sub-angular slate, carbonate, and shaley gravels less than or equal to 1/2", moist, stiff, mottled to faintly layered/lenticular (SP-SM), iron-oxide stained and grayish, mostly dark yellowish brown (10 YR 3/4) to olive brown (2.5 Y 4/3), pocket pen: 2.75 to 4.5 ton/ft
	65					Silty Sand (SM) with sub-rounded to sub-angular slate and other gravels plus cemented shale gravels that are less than or equal to 1/2", moist, abundant iron-oxide staining and black organics, dark olive brown (2.5 Y 3/3)
						Clayey Silt (ML) to Silty Clay (CL), stiff, moist, mottled to massive, abundant iron-oxide staining where silty, olive brown (2.5 Y 4/4), pocket pen: 2.5 ton/ft Very moist to wet at 67 to 68.5 ft
	70					Thin layer of Silty Sand (SP) with sub-rounded gravels less than or equal to 1/8" Clayey Silt (ML) to Silty Clay (CL), stiff, moist to wet, olive gray (5 Y 4/2) to olive (5 Y 4/3), pocket pen: 3.5 to 4.5 ton/ft
						Silty fine to medium Sand (SM) and sub-rounded to sub-angular slate and other gravels that are less than or equal to 2", iron-oxide staining and mottled throughout, few layers/lens of sandy silt (ML) 70.2 to 71 ft Olive Brown (2.5 Y 4/4) 71 to 72.8 ft Olive (5 Y 4/3) with Fe staining 72.8 to 73.7 ft Olive Brown (2.5 Y 4/4)
						Gradational coarsening up sequence from Sandy Silt (ML) to Silty fine Sand (SM)
	75					Clayey Silt (ML), stiff, moist, olive (5 Y 5/3), pocket pen: 3.0 to 4.2 ton/ft Clayey Silt (ML) to Silty Clay (CL), increase in carbonate debris
						[No recovery from 76 to 76.3 ft] Clayey Silt (CL), very firm, abundant carbonate organics or debris, less than or equal to 1/2", dark gray (5 Y 4/1) to olive gray (5 Y 4/2), massive to slightly mottled, pocket pen: 2.5 to 3.5 ton/ft
	80					Gradational transition into Sandy Silt Sandy Silt (ML) interlayered with Silty fine Sand (SM), olive brown (2.5 Y 4/4)

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DLP/MAE
 Prepared By: LM
 Checked By:

B:\SOIL_CRANDALL(NO DECIMAL)_90473_CORE_SONIC_SB-1 AND SB-2.GPI LAW_CRAN.GDT 12/21/11

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE; REFER TO PLOT PLAN FOR MORE ACCURATE LOCATION INFORMATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

BORING SB-1 (Continued)

DATE DRILLED: 6/2/10
 EQUIPMENT USED: Sonic Rig
 HOLE DIAMETER (in.): 6" outer casing/4" core diameter
 ELEVATION: **

ELEVATION (ft)	DEPTH (ft)	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	SAMPLE LOC.	DESCRIPTION
						Clayey Sand to Silty Sand (SC-SM), abundant sub-angular rock fragments that are less than or equal to 1/2", charcoal fragments, moist, very mottled
						Silty fine Sand interlayered with Sandy Silt (SM) with olive brown (2.5 Y 4/4), moist to very moist
	85					Clayey Sand to Silty Sand (SC-SM), abundant sub-rounded rock fragments less than or equal to 1", olive (5 Y 4/4 to 5/6) to light olive gray (5 Y 6/2), few scattered charcoal fragments, moist, decrease in gravels with depth, pocket pen: 2.5 to 4.0 ton/ft
						Silty fine Sand to Sandy Silt (SM/ML), with trace clays
						Thin layer of Sandy Clay (SC) to Silty Clay (CL) at 88.4 to 88.5 ft
	90					Sandy Clay (SC) to Silty Clay (CL), moist, stiff, abundant organics-carbonate and thin black lamellae, mottled to massive, occasional gray sub-rounded slate rock fragments/gravels that are less than or equal to 1/4", olive (5 Y 4/4 to 4/3), pocket pen: 2.75 to 4.0 ton/ft
						Silty fine to medium Sand (SM) with trace clays, decrease in size and an abundance of sub-rounded to sub-angular slate gravels with depth, mottled, olive brown (2.5 Y 4/3 - 4/4) with iron-oxide staining, pocket pen: +4.5 ton/ft
						Black organic discontinuous lamellae/lenses
	95					Silty fine Sand to fine Sandy Silt (SM/ML), occasional and few sub-rounded slate and other gravels less than or equal to 1/4"
						Silty Sand (SM) to Sand with Silt (SP), moist, massive to vague lenticular layers/beds, occasional rounded to sub-rounded slate and granitic rock fragments that are less than or equal to 1/2", slightly mottled, dark yellowish brown (10 YR 2/2) occasional iron-oxide staining to moderate yellowish brown (10 YR 5/4), pocket pen: 2.5 to 4.25 ton/ft
	100					Fine Sand with Silt (SP-SM), slightly moist

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DLP/MAE
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BORING SB-1 (Continued)

DATE DRILLED: 6/2/10
 EQUIPMENT USED: Sonic Rig
 HOLE DIAMETER (in.): 6" outer casing/4" core diameter
 ELEVATION: **

ELEVATION (ft)	DEPTH (ft)	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	SAMPLE LOC.	DESCRIPTION
						Lens of Sandy Silt (SM), moderate yellowish brown (10 YR 5/4) at 99.6 to 99.7 feet
						SAN PEDRO FORMATION [Osp] Clayey Silt to Silt (ML-CL), very stiff, olive gray (5 Y 4/1-4/2), moist Clayey Silt to Silt (ML-CL), as above, very moist
						Clayey Silt (CL), very stiff to hard, abundant carbonate/organic debris, dark gray (5 Y 4/1), massive, pocket pen: 4.5 ton/ft
105						Gradational contact, slightly mottled Silt with trace clays (ML) grades to fine sandy silt (SM), very stiff, mottled to massive, light olive brown (2.5 Y 5/3) to grayish brown (2.5 Y 5/2), moist Pocket Pen: +4.5 ton/ft
						Silty Clay (CL), massive, abundant carbonate fragments/debris, very moist to moist, dark olive gray (5 Y 3/2) to very dark gray (5 Y 3/1)
						Mottled with lenticular zones of abundant carbonate debris, gray to light gray (5 Y 6/1), pocket pen: +4.0 ton/ft
110						Fine Sandy Clay (CL), mottled, less than or equal to 1/8", rock fines
						Very fine Sandy Clay (SC) to Silty Clay (CL) with abundant carbonate debris, very stiff to hard, abundant carbonate debris, pocket pen: +4.5 ton/ft
						Silty Clay (CL) with abundant carbonate debris, very dense
115						Fine Sandy Silt (ML) to Silty Sand (SM)
						Silty Clay (CL) to Silt (ML)
						Silt (ML) with trace clays, occasional sub-rounded gravels that are less than or equal to 1/4", dark greenish gray (5 GY 4/1) to greenish black (5 G 2/1)
						Sandy Silt to Silty Sand (ML/SM), occasional sub-rounded gravels that are less than or equal to 1/2", mostly massive, probable forams, pocket pen: 4.0 ton/ft
						[No recovery from 118.5 to 119.5 ft]
120						

(CONTINUED ON FOLLOWING FIGURE)

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BORING SB-1 (Continued)

DATE DRILLED: 6/2/10
 EQUIPMENT USED: Sonic Rig
 HOLE DIAMETER (in.): 6" outer casing/4" core diameter
 ELEVATION: **

ELEVATION (ft)	DEPTH (ft)	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	SAMPLE LOC.	Description
						Clayey Silt (ML), very stiff to hard, massive, abundant foram debris, pocket pen: +4.5 ton/ft
						[No recovery from 121.5 to 122.5 ft]
						Clayey Silt (ML), hard, massive, abundant foram debris, pocket pen: +4.5 ton/ft
						Increase in foram debris, occasional sub-rounded gravels that are less than or equal to 1/2"
125						Sandy Silt to Clayey Silt (SM-ML)
						Sandy Silt (SM), pocket pen: 2.75 ton/ft
						Clayey Silt (ML), hard, occasional sub-rounded gravels that are less than or equal to 1/2", some shell or foram debris fragments, pocket pen +4.5 ton/ft
130						Clayey Silt (ML) to Silty Clay (CL), some shell and foram debris fragments, decrease in gravel content, very firm, massive, dark greenish gray (5 G 4/1) to greenish black (5 G 2/1)
						Total Depth 133 ft
135						Notes: No Caving Groundwater at depths indicated on log Grouted from 133 to 1 foot bgs on 06/04/2010 Cement (Rediset) from 1 foot bgs to surface
140						

Field Tech: DLP/MAE
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B11SOIL_CRANDALL(NO DECIMAL), 90473_CORE_SONIC_SB-1 AND SB-2.GPJ LAW_CRAN.GDT 12/21/11

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BORING SB-2

DATE DRILLED: 6/7/10
 EQUIPMENT USED: Sonic Rig
 HOLE DIAMETER (in.): 6" outer casing/4" core diameter
 ELEVATION: **

ELEVATION (ft)	DEPTH (ft)	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	SAMPLE LOC.
					Asphalt
					Base Gravel
					Asphalt
					<u>QUATERNARY OLDER ALLUVIUM [Qalo]</u> Sandy Clay (CL)/Clayey Sand (SC)
	5				
	10				Slough from 10 to 10.3 ft Sandy Clay (CL) to Clayey Silt (ML), mottled, abundant rock fragments that are less than or equal to 1/8", dark gray
	15				Sandy Silt (ML), very fine sand, trace clays, very stiff to hard, mottled, massive, abundant rock fragments/gravel that is less than or equal to 1/4", sub-rounded to angular shale fragments, lenticular to discontinuous vague layers, black manganese coating some clasts, yellowish brown (10 YR 5/4), pocket pen: +4.5 ton/ft
					[No recovery from 16 to 17.6 ft]
					Fine to medium grained Sand (SP), trace silt, occasional rounded to sub-rounded gravel that is less than or equal to 1/2"
					Silt (ML), mottled, dark yellowish brown (10 YR 4/6), very stiff, pocket pen: +4.5 ton/ft
	20				

(CONTINUED ON FOLLOWING FIGURE)

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BORING SB-2 (Continued)

DATE DRILLED: 6/7/10
 EQUIPMENT USED: Sonic Rig
 HOLE DIAMETER (in.): 6" outer casing/4" core diameter
 ELEVATION: **

ELEVATION (ft)	DEPTH (ft)	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	SAMPLE LOC.	DESCRIPTION
						Grades to fine Sandy Silt (ML), yellowish brown (10 YR 5/4), stiff, moist, pocket pen: +4.5 ton/ft
	25					Clayey Silt to Silty Clay (ML/CL), trace very fine sand, very stiff, moist, olive brown (2.5 Y 4/4), pocket pen: +4.5 ton/ft
						Clayey Silt to Clay (ML/CL), very stiff, moist, olive brown (2.5 Y 4/4), pocket pen: +4.5 ton/ft
	30					Clayey Silt to Silt (ML), stiff, mottled to faintly laminated, iron-oxide stained throughout, dark yellowish brown (10 YR 4/4) to light olive brown (2.5 Y 5/4), occasional fine sand to sandy silt within discontinuous lenses, pocket pen: 2.5 to +4.5 ton/ft
	35					
						LAKWOOD FORMATION [Qlw] Silty fine to medium Sand (SM), trace clays, olive brown (2.5 Y 4/4) Fine to medium grained Sand (SP), loose, dry, light yellowish brown (2.5 Y 6/4), thinly bedded, iron-oxide stained and black manganese layers/lenses, very thin layers
	40					

(CONTINUED ON FOLLOWING FIGURE)

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BORING SB-2 (Continued)

DATE DRILLED: 6/7/10
 EQUIPMENT USED: Sonic Rig
 HOLE DIAMETER (in.): 6" outer casing/4" core diameter
 ELEVATION: **

ELEVATION (ft)	DEPTH (ft)	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	SAMPLE LOC.	
						Fine to medium Sand (SP), light yellowish brown (2.5 Y 6/3), few gravels, thinly layered/bedded consisting of alternating iron-oxide and manganese oxide stained layers
	45					Fine to medium Sand with trace Silt (SP-SM) with silty clast nodules, slightly moist, olive (5 Y 4/3)
						Medium to coarse Sand (SP), trace fine grains, loose and dry, iron-oxide stained and black manganese, thin layers/lenses, pale olive (5 Y 6/4)
						[No recovery from 46 to 46.7 ft]
	50					Fine to coarse Sand (SP) with abundant angular to sub-rounded gravel of varying lithologies (granitics and shale) that are less than or equal to 3", some elongate, slightly moist, loose, vague bedding, iron-oxide stained layers
						Fine Sandy Silt to Silty Sand (ML/SM), slightly moist, iron-oxide stained layers
						Angular to sub-rounded gravels Pocket Pen: 2.5 ton/ft
						Fine to medium Sand (SP), slightly moist
	55					Silty, very fine Sand (SM), slightly moist, iron-oxide stained layers of thin beds, very few sub-angular slate fragments/gravels that are less than or equal to 1/8"
						Silty fine Sand (SM), abundant iron-oxide stained zone
						[No recovery from 56 to 56.3 ft]
						Fine Sand to Silty fine Sand (SP-SM), thinly bedded to laminated, iron-oxide stained layers throughout, slightly undulatory beds, dry to slightly moist, occasional rounded to sub-rounded gravels that are less than or equal to 2", light yellowish brown (2.5 Y 6/3) to olive yellow (2.5 Y 6/6)
	60					Fine Sandy Silt (ML), trace fine sand, slightly moist, stiff, pale olive (5 Y 6/4) to pale yellow (5 Y 7/4), thinly bedded, iron-oxide stained and organics/black layers, pocket pen: ~3.0 ton/ft

(CONTINUED ON FOLLOWING FIGURE)

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BORING SB-2 (Continued)

DATE DRILLED: 6/7/10
 EQUIPMENT USED: Sonic Rig
 HOLE DIAMETER (in.): 6" outer casing/4" core diameter
 ELEVATION: **

ELEVATION (ft)	DEPTH (ft)	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	SAMPLE LOC.	DESCRIPTION
						Fine Sandy Silt (ML), pale olive yellow (5 Y 6/4) to pale yellow (5 Y 7/4)
	65					Very fine, Sandy Silt (ML), moist, stiff, mottled olive gray (5 Y 5/2) to iron-oxide stained light olive brown (2.5 Y 5/6), occasional rounded gravel that is less than or equal to 1/2", pocket pen: 2.5 to 4.0 ton/ft
	70					Less iron-oxide staining, increased moisture
	75					Clayey Silt to Silty Clay (ML/CL) with abundant shell or foram debris
	80					Very fine Sandy Silt (ML), moist, stiff, vaguely bedded to massive, olive gray (5 Y 5/2) to iron-oxide stained light olive brown (2.5 Y 5/6), pocket pen: 4.5 ton/ft

(CONTINUED ON FOLLOWING FIGURE)

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BORING SB-2 (Continued)

DATE DRILLED: 6/7/10
 EQUIPMENT USED: Sonic Rig
 HOLE DIAMETER (in.): 6" outer casing/4" core diameter
 ELEVATION: **

ELEVATION (ft)	DEPTH (ft)	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	SAMPLE LOC.	DESCRIPTION
						Fine to medium grained Sand with silt (SP-SM), rounded to sub-angular gravels (slate, andesite, shale) that are less than or equal to 3.5", light olive brown (2.5 Y 5/6)
						Fine to medium Sand (SP), trace silts, some thin undulatory bedding, iron-oxide stained layers, darker silty layers, occasional sub-angular to sub-rounded andesite gravels that are less than or equal to 3", olive brown (2.5 Y 4/4), pocket pen: 2.5-3.5 ton/ft Fragments are ~3", elongated, fractured sub-angular to sub-rounded andesitic gravel
						SAN PEDRO FORMATION [Osp] Silty Clay to Clay (CL), very stiff, trace organic fragments, massive, very dark gray (5Y 3/1) Darker blackish undulatory layer from 84.5 to 84.6 ft Black Clay (CL), very moist, moderately plastic [No recovery from 86 to 86.4 ft] Silty Clay to Clay (CL), very stiff, moist, massive, very dark gray (5 Y 3/1), trace organic fragments, pocket pen: 3.5 to 4.5 ton/ft
	85					
						Fine to medium Sand (SP) with trace silts, occasional organic debris/fragments, minor and few sub-angular to sub-rounded shale and shell gravels that are less than or equal to 1/8", wet, slightly firm, very few rounded gravels that are less than or equal to 1/2", dark yellowish brown (10 YR 4/6-3/6), massive to mottled occasional silty clay (CL) lens
	90					
						Gravelly Silty Sand to Clayey Sand (SC) with shell fragments, andesitic gravels that are less than or equal to 1", angular to sub-angular Silty Clay and Clay (CL) with occasional shell fragments that are less than or equal to 1/4"
	95					
						Fine to medium Sand with Silts and Clay (SP-SC), few silty clay (CL) layers/lenses, moist, slightly firm, massive to slightly bedded, dark yellowish brown (10 YR 3/6), pocket pen: 1.5 to 2.0 ton/ft
						Silty Sand (SM), fine grained with trace medium grains, dark yellowish brown (10 YR 4/6), very moist to wet, saturated at 97 ft (free water) Contains black to olive gray Clayey Silt lenses about 1/2" thick from 98.1 to 98.9 ft, pocket pen: 1.5 to 2.0 ton/ft
	100					Clayey Silt to Silty Clay (ML-CL), moist, slightly firm/stiff, abundant organic debris, reaction with HCl, greenish black (10 Y 2.5/1), pocket pen: 3.5 ton/ft

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DLP/MAE
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BORING SB-2 (Continued)

DATE DRILLED: 6/7/10
 EQUIPMENT USED: Sonic Rig
 HOLE DIAMETER (in.): 6" outer casing/4" core diameter
 ELEVATION: **

ELEVATION (ft)	DEPTH (ft)	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	SAMPLE LOC.	DESCRIPTION
						Fine to medium grained Sand with trace Silt (SP-SM), rounded to sub-angular slate, granite and andesite gravels from 1/4" to 3.5", poorly sorted, slightly moist, gray (N 5/0) Increase in gravel content ~25-30% at 101 to 101.7 feet
						Very fine Sandy Silt (ML), slightly moist, greenish gray (10 Y 5/1)
	105					Silty fine to coarse Sand (SM), rounded to sub-angular slate, granite and andesite gravels that are less than or equal to 3.5", poorly sorted, slightly moist, very dark greenish gray (10 Y 3/1)
						Alternating thin beds and lenses of silty fine to medium coarse grained Sand (SM), fine Sandy Silt, and Clayey Silt (ML), several sub-rounded to sub-angular gravels that are less than or equal to 1.5", abundant shell/foram debris fragments that are less than or equal to 1/16", moist to slightly moist, very dark greenish gray (5 GY 3/1), pocket pen: 4.0 ton/ft
	110					Silty fine to medium Sand (SM) and Sandy Silt (ML) trace clays, abundant sub-rounded to sub-angular gravels and shell/foram debris that are less than or equal to 2.5", very dark greenish gray (10 Y 3/1), slightly moist, pocket pen: 4.0 to 4.5 ton/ft
						Fine Sandy Silt (ML) to Silty Clay (CL), abundant carbonate (shell/foram) debris, moist
	115					Silty Clay (CL), decrease in carbonate debris, very stiff, moist, greenish black (10 Y 2.5/1), pocket pen: 4.5 ton/ft
						[No recovery from 116 to 116.5 ft]
						Clayey Silt (ML), abundant whitish grains that are less than or equal to 1/32", some rounded gravel that are less than or equal to 1/2", very stiff to hard, moist, very dark greenish gray (10 GY 3/1) to greenish black (10 GY 2.5/1), pocket pen: +4.5 ton/ft
						Silty fine Sand (SM), slightly stiff, moist, occasional rounded gravel that is less than or equal to 1/4", greenish black (5 GY 2.5/1), massive, pocket pen: +4.5 ton/ft
						Fine to medium Sand (SP), slightly moist, occasional rounded gravel that is less than or equal to 1/4", dark greenish gray (10 Y 4/1)
	120					

Field Tech: DLP/MAE
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 Checked By:

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	SAMPLE LOC.	
						[No recovery from 120 to 122 ft, dumped in drum inadvertently]
						Slough from 121.3 to 122 ft
						Silty fine Sand (SM), dense, very moist, massive, occasional sub-rounded to sub-angular gravel that is less than or equal to 1/2", greenish black (5 GY 2.5/1)
						Fine Sand (SP), slightly moist, occasional rounded gravel that is less than or equal to 1/4", grey (N 5/0)
	125					Gradational increase in moisture and Silt Silty fine Sand (SM), moist, occasional silt nodule clast that is less than or equal to 1/2", sub-rounded to sub-angular gravel that is less than or equal to 1/2", greenish black (5 GY 2.5/1)
						Silty fine to medium Sand and Clayey Sand (SM-SC) with gravels that are less than or equal to 1.5", sub-rounded to sub-angular, very moist, very dark bluish gray (10B 3/1) to very dark greenish gray (10 Y 3/1), pocket pen: 2.5 to 3.5 ft
						[No recovery from 127 to 136 ft]
	130					
	135					
						Gravelly sand, well cemented with calcite, abundant varying angular to rounded gravels (granitics, mafics, shell fragments) that are less than or equal to 1", gray (N 6/0) to light gray (N 7/0)
						[No recovery from 137 to 141 ft]
	140					

BORING SB-2 (Continued)

DATE DRILLED: 6/7/10
 EQUIPMENT USED: Sonic Rig
 HOLE DIAMETER (in.): 6" outer casing/4" core diameter
 ELEVATION: **

(CONTINUED ON FOLLOWING FIGURE)

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BORING SB-2 (Continued)

DATE DRILLED: 6/7/10
 EQUIPMENT USED: Sonic Rig
 HOLE DIAMETER (in.): 6" outer casing/4" core diameter
 ELEVATION: **

ELEVATION (ft)	DEPTH (ft)	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	SAMPLE LOC.	
						Silty fine to medium Sand (SM) and Sandy Silt (ML), rounded to sub-angular gravels that are less than or equal to 2", some elongate, moist, very dark greenish gray (5 GY 3/1), pocket pen: 2.0 ton/ft
	145					Silty fine to medium Sand (SM), slightly moist to moist, moderately sorted, very dark grey (N 3/0), occasional sub-rounded to sub-angular andesitic gravels that are less than or equal to 1/4", pocket pen: 1.0 ton/ft Increase in sub-rounded to sub-angular andesitic gravels that are less than or equal to 3"
						Silty fine Sand to Sandy Silt (SM/ML), occasional sub-rounded to sub-angular andesitic gravels that are less than or equal to 1/2", moist, dark gray (5 Y 4/1) to very dark gray (5 Y 3/1), pocket pen: 2.5 ton/ft
	150					Sandy Silt (ML), thin layer from 149.9 to 150 feet Saturated zone from 151 to 151.7 ft
						dark gray (N 4/0) to very dark gray (N 3/0)
	155					Fine to medium Sand with Silt (SP-SM), slightly moist, pocket pen: 2.5 to 3.5 ton/ft
						Fine Sandy Silt to Silty Sand (ML/SM), slightly moist, very dark greenish gray (10 Y 3/1), slightly firm, pocket pen: 3.0 ton/ft
						Fine Sandy Silt to Silty Sand (ML/SM), slightly moist, slightly firm, gray (5 Y 6/1 to 5/1)
	160					

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DLP/MAE
 Prepared By: LM
 Checked By:

THIS RECORD IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE; REFER TO PLOT PLAN FOR MORE ACCURATE LOCATION INFORMATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

BORING SB-2 (Continued)

DATE DRILLED: 6/7/10
 EQUIPMENT USED: Sonic Rig
 HOLE DIAMETER (in.): 6" outer casing/4" core diameter
 ELEVATION: **

ELEVATION (ft)	DEPTH (ft)	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	SAMPLE LOC.
165					
170					
175					
180					

Fine Sandy Silt to Silty Sand (ML/SM), slightly moist, very dark greenish gray (10 Y 3/1), slightly firm, pocket pen: 3.0 ton/ft

Very fine Sandy Silt (ML), slightly moist, very dark gray (5 Y 3/1)

As above, moist to wet, stiff, occasional sub-rounded to sub-angular andesitic gravel that is mostly less than or equal to 1/2", pocket pen: 2.5 ton/ft wet from 166.5 to 167.2 ft

Sub-angular andesitic cobble that is ~4" wet from 169.4 to 171 ft

As above with trace clay, moist to wet, stiff, occasional carbonate (shell/foram) debris/fragments that are angular to sub-angular and elongated with depth, less than or equal to 1/32", very thinly bedded/banded discontinuous to lenticular and undulatory, gray (5 Y 3/1) to greenish black (10 Y 2.5/1)

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DLP/MAE
 Prepared By: LM
 Checked By:

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BORING SB-2 (Continued)

DATE DRILLED: 6/7/10
 EQUIPMENT USED: Sonic Rig
 HOLE DIAMETER (in.): 6" outer casing/4" core diameter
 ELEVATION: **

ELEVATION (ft)	DEPTH (ft)	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	SAMPLE LOC.
185					
190					
195					
200					

As above with trace clay, moist to wet, stiff, occasional carbonate (shell/foram) debris/fragments that are angular to sub-angular and elongated with depth, less than or equal to 1/32", very thinly bedded/banded discontinuous to lenticular and undulatory, gray (5 Y 3/1) to greenish black (10 Y 2.5/1)

Silty Clay to Clayey Silt (ML/CL), very stiff, very moist to wet, trace very fine sand within lenticular bedding, very thinly bedded/banded to lenticular and discontinuous, greenish black (10 Y 2.5/1) to very dark greenish gray (10 GY 3/1) and dark gray (N 4/0), occasional carbonate (shell/foram) debris/fragments that are less than or equal to 1/16", pocket pen: 3.5 to +4.5 ton/ft

Silty Clay to Clayey Silt (ML-CL), very stiff, very moist to wet, some very fine sandy silt lenticular to discontinuous bedding, lamellae of manganese, black to dark gray, undulatory, thin bedding/banding, greenish black (10 Y 2.5/1) to dark gray (N 4/0), occasional carbonate shell/foram debris or fragments that are less than or equal to 1/16", pocket pen: 4.0 to +4.5 ton/ft

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DLP/MAE
 Prepared By: LM
 Checked By:

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BORING SB-2 (Continued)

DATE DRILLED: 6/7/10
 EQUIPMENT USED: Sonic Rig
 HOLE DIAMETER (in.): 6" outer casing/4" core diameter
 ELEVATION: **

ELEVATION (ft)	DEPTH (ft)	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	SAMPLE LOC.
205					
210					
215					
220					

Silty Clay to Clayey Silt (ML-CL), very stiff, very moist to wet, some very fine sandy silt lenticular to discontinuous bedding, lamellae of manganese, black to dark gray, undulatory, thin bedding/banding, greenish black (10 Y 2.5/1) to dark gray (N 4/0), occasional carbonate shell/foram debris or fragments that are less than or equal to 1/16", pocket pen: 4.0 to +4.5 ton/ft

Slough from 206 to 206.5 ft

Silty Clay to Clayey Silt (ML-CL), very stiff, very moist to wet, trace very fine sand within thinly bedded/lenticular beds, greenish black (10 Y 2.5/1), occasional carbonate (shell/foram) debris/fragments that are less than or equal to 1/8 to 1/16", pocket pen: +4.5 ton/ft

Silty Clay to Clayey Silt (CL-ML), very stiff, moist to wet, trace very fine sand, thinly bedded to lenticular beds, greenish black (10 Y 2.5/1), occasional carbonate (shell/foram) debris fragment, pocket pen: 3.0 to +4.5 ton/ft

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DLP/MAE
 Prepared By: LM
 Checked By:

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BORING SB-2 (Continued)

DATE DRILLED: 6/7/10
 EQUIPMENT USED: Sonic Rig
 HOLE DIAMETER (in.): 6" outer casing/4" core diameter
 ELEVATION: **

ELEVATION (ft)	DEPTH (ft)	MOISTURE (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	SAMPLE LOC.
225					[Hatched Box]
230					
235					
240					

Silty Clay to Clayey Silt (CL-ML), very stiff, moist to wet, trace very fine sand, thinly bedded to lenticular beds, greenish black (10 Y 2.5/1), occasional carbonate (shell/foram) debris fragment, pocket pen: 3.0 to +4.5 ton/ft

Total Depth 223'

Notes:
 Grouted from 223 feet to 1 foot below ground surface (bgs).
 Rapid set cement from 1 foot bgs to surface.

Field Tech: DLP/MAE
 Prepared By: LM
 Checked By:

**FIGURES A-2.1A THROUGH A-2.80C
LOGS OF ROTARY-WASH BORINGS (PE PHASE)**

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\INT\LIBRARY MACTEC\JUNE2011.GLB
 G:\PROJECT_DIRECTORIES\4953\2010\101561\METRO_WESTSIDE_EXTENSION\6.2.3.1 GEOTECHNICAL DESIGN\3.2 ALL FIELD NOTES\GINT LOG\NEW TEMPLATE - MARCH 14, 2011\4953-101561_(100-119).GPI 10/18/11

THIS RECORD IS AN INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										Fugro / CME 75	DRILLING METHOD	BOREHOLE LOCATION
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										5/12/2011 and 5/13/2011	4-7/8 inches	200 feet
GROUND-WATER READINGS Drilling mud bailed on 5/12/2011. Ground-water level measured at 19 feet below the ground surface on 5/13/2011.												
										12-inch thick Asphalt Concrete over 18-inch thick Base Course FILL [Afl] POORLY GRADED SAND with SILT - moist, olive yellow, fine to medium-grained, some coarse, trace gravel (up to 3/4 inch in size) Becomes siltier Trace gravel (up to 1/2 inch in size) Becomes medium to coarse-grained, some fine LAKEWOOD FORMATION [Qlw] SILTY SAND - medium dense, moist, yellowish brown, fine to medium-grained, some coarse More coarse grained Becomes siltier, interbedded with thin grayish clay layers SANDY LEAN CLAY - moist, olive, some fine sand CLAYEY SAND - loose, moist, fine to medium-grained, some coarse, small clay nodules, gravel (up to 3 inches in size) SANDY SILT - very stiff, moist, dark olive, fine sand, some medium to coarse, some clay Less sand SAN PEDRO FORMATION [Qsp] LEAN CLAY - very stiff, moist, dark olive to olive gray, trace iron oxide stains Becomes greenish gray, siltier Some fine sand		
195	5											
190	10		4.2	16.4	107	17						
185	15	11	3.2	24.6	-		41					
180	20		1.9	20.8	103	15						
175	25	17	4.1	23.3	-		65					
170	30		2.2	20.6	106	25	94					
165	35	23	3.1	30.9	-							
160	40		2.9	22.6	103	35	87					

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: LH
 Prepared/Date: JF 8/9/2011
 Checked/Date: AB/LT 9/23/2011

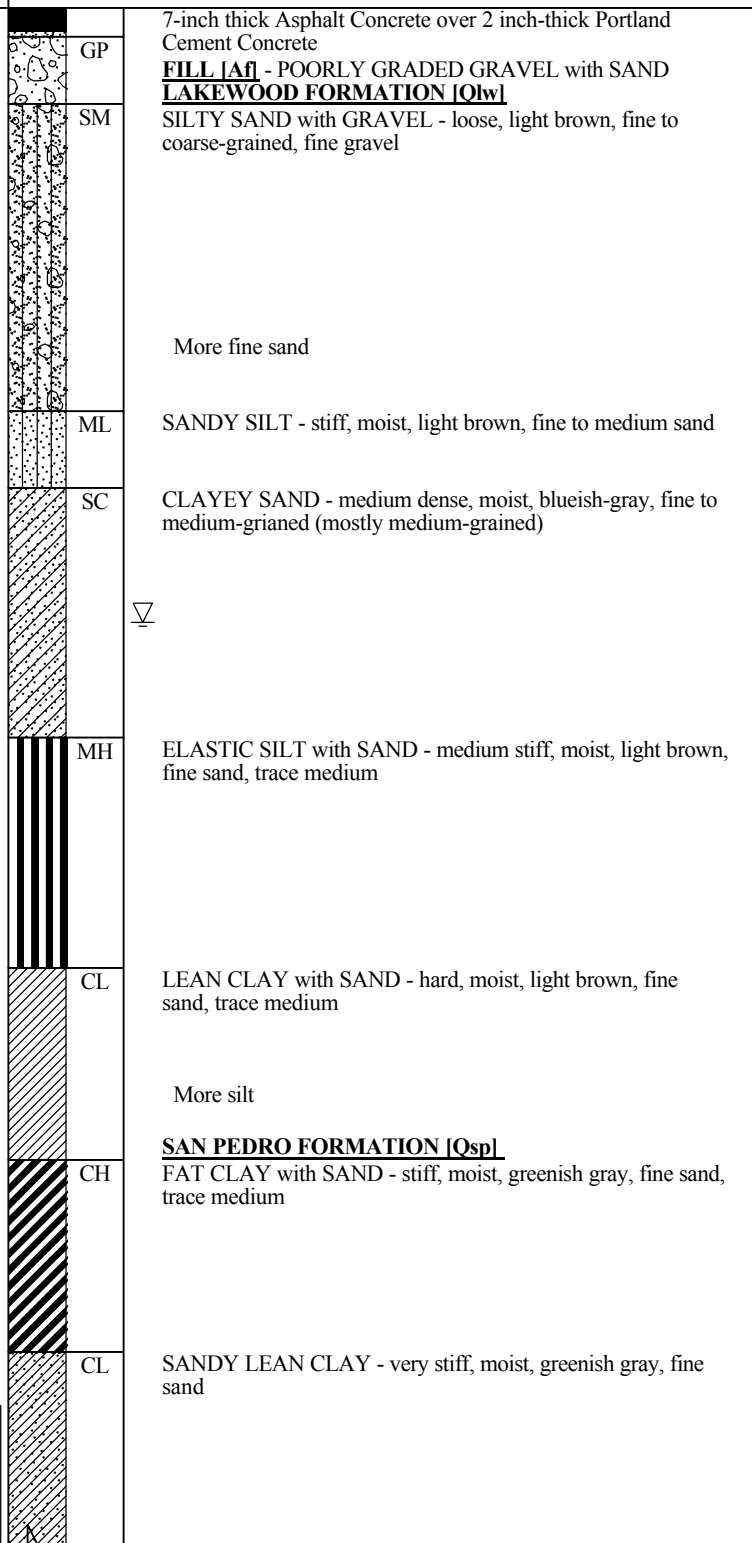
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ELEVATION (ft)		DEPTH (ft)		"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT	BORING NO.	
												Fugro / CME 75	G-101 (Continued)	
												Rotary Wash		Sta 374+10, Lt 25 feet
												5/12/2011 and 5/13/2011		4-7/8 inches
												GROUND-WATER READINGS Drilling mud bailed on 5/12/2011. Ground-water level measured at 19 feet below the ground surface on 5/13/2011.		
115	85			46	0.0	39.0	-					cemented, olive gray to dark olive brown, some light gray sandstone Becomes dark gray, no cementation to weakly cemented		
110	90											END OF BORING AT 85 FEET NOTES: Hand augered upper 8 feet to avoid damage to utilities. Borehole grouted with cement-bentonite slurry and patched with quick set cement. "N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches *Number of blows required to drive the Crandall Sampler 12 inches using a 140 pound automatic hammer falling 30 inches **Photo Ionization Detector used for OVA readings		
105	95													
100	100													
95	105													
90	110													
85	115													
	120													

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 G:\PROJECT_DIRECTORIES\4953\2010\101561\METRO_WESTSIDE_EXTENSION\6.2.3.1 GEOTECHNICAL DESIGN\3.2 ALL FIELD NOTES\GINT LOG\NEW TEMPLATE - MARCH 14, 2011\4953-101561_(100-119).GPJ 10/18/11

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ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-102
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 377+05, Lt 15 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										5/19/2011 and 5/20/2011	4-7/8 inches	200 feet
										GROUND-WATER READINGS		
										Drilling mud bailed. Ground-water level measured at 16 feet below the ground surface.		
195	5											
190	10		0.0	15.4	117	15						
185	15	26	0.0	19.7	-							
180	20			23.0	100	6	77					
175	25	32	0.0	22.9	-							
170	30		0.0	33.2	87	15	77					
35	35	24	0.0	27.5	-		67					
40	40											



(CONTINUED ON FOLLOWING FIGURE)

Field Tech: HTY
 Prepared/Date: JF 8/9/2011
 Checked/Date: LT/PE 9/26/2011

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ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-102 (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 377+05, Lt 15 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										5/19/2011 and 5/20/2011	4-7/8 inches	200 feet
GROUND-WATER READINGS												
Drilling mud bailed. Ground-water level measured at 16 feet below the ground surface.												
				26.6	89	7						
	45	36	0.0	17.6	-		13					
	50		0.0	18.5	106	10	49					
	55	35	0.0	25.6	-							
	140		0.0	25.8	103	20	30					
	135	73	0.0	18.2	-		10					
	130	100	0.0	5.9	-							
	125		0.0	34.2	87	19	96					
	80											

Tunnel

PMT

SC

SM

SP-SM

GW

SP

CLAYEY SAND - dense, wet, greenish gray, fine to coarse-grained, trace fine gravel

SILTY SAND - dense, moist, greenish gray, fine to medium-grained, trace coarse

Becomes wet, greenish gray, some clay

POORLY GRADED SAND with SILT- very dense, wet, gray, fine to medium-grained

WELL GRADED GRAVEL with SAND- very dense, wet, gray, fine to coarse sand

POORLY GRADED SAND - dense, wet, light gray, fine-grained

FERNANDO FORMATION [T]

SILTSTONE - very stiff, moist, olive brown, trace fine sand

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: HTY
 Prepared/Date: JF 8/9/2011
 Checked/Date: LT/PE 9/26/2011

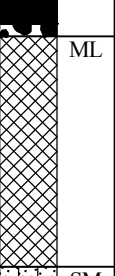
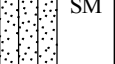
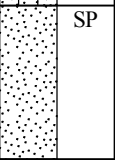
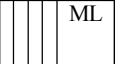
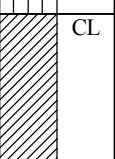

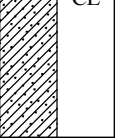

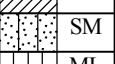


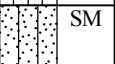


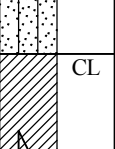
**MTA Westside Subway Extension
 Los Angeles, California**



LOG OF BORING
 Project No.: 4953-10-1561 Figure: A-2.2b

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\INT\LIBRARY MACTEC\JUNE2011.GLB
 G:\PROJECT_DIRECTORIES\4953\2010\101561\METRO_WESTSIDE_EXTENSION\6.2.3.1 GEOTECHNICAL DESIGN\3.2 ALL FIELD NOTES\GINT LOG\NEW TEMPLATE - MARCH 14, 2011\4953-101561_(100-119).GPI 10/18/11

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ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-103
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 388+80, Lt 10 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										3/28/2011 and 3/29/2011	4-7/8 inches	193 feet
										GROUND-WATER READINGS		
										Drilling mud bailed on 3/28/2011. Ground-water level measured at 14 feet below the ground surface on 3/29/2011.		
190	5										8-inch thick Asphalt Concrete over 4-inch thick Base Course FILL [Af] SANDY SILT - moist, brown, fine to medium sand	
185											LAKWOOD FORMATION [Qlw] SILTY SAND - moist, light brown, fine to medium-grained	
180	10		1.3	10.4	111	27		☒			POORLY GRADED SAND - medium dense, moist, light brown, fine to coarse-grained, trace gravel (up to 1/4 inch in size)	
175											▼ SILT - moist, light brown, trace fine sand, some clay	
170	15	11	5.9	25.3	-			☒			SAN PEDRO FORMATION [Qsp] LEAN CLAY - stiff, moist, brownish gray, trace fine sand	
165											Sand content increases with depth	
160	20		1.7	17.8	110	33		☒			SANDY LEAN CLAY - very stiff, moist, light greenish gray, fine sand	
155											LEAN CLAY - stiff, moist, light gray	
150	25	15	6.1	33.8	-			☒			SILTY SAND - medium dense, moist, brown, fine to medium-grained	
145											SILT - stiff, moist, greenish gray, some clay, trace sand	
140	30		3.5	38.4	83	17		☒				
135											SILTY SAND - dense, moist, greenish gray, fine to medium-grained, trace gravel (up to 3/8 inch in size), with alternating layers of Silt	
130	35	33	5.4	18.9	-		33	☒			Becomes medium dense, gray	
125												
120	40	20	5.6	31.1	-			☒			LEAN CLAY - very stiff, moist, greenish gray, trace sand	

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
 Prepared/Date: JF 5/19/2011
 Checked/Date: LT/PE 9/22/2011

MTA Westside Subway Extension
 Los Angeles, California



LOG OF BORING
 Project No.: 4953-10-1561 Figure: A-2.3a

LA METRO PB-TUNNEL_ZONE_S:\70131 GEOTECH\INT\LIBRARY MACTEC\JUNE2011.GLB
 G:\PROJECT_DIRECTORIES\4953\2010\101561\METRO_WESTSIDE_EXTENSION\6.2.3.1 GEOTECHNICAL DESIGN\3.2 ALL FIELD NOTES\GINT LOG\NEW TEMPLATE-MARCH 14, 2011\4953-101561_(100-119).GPJ 10/18/11

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ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-103 (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 388+80, Lt 10 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										3/28/2011 and 3/29/2011	4-7/8 inches	193 feet
										GROUND-WATER READINGS		
										Drilling mud bailed on 3/28/2011. Ground-water level measured at 14 feet below the ground surface on 3/29/2011.		
			1.2	24.1	102	12	54	☒		CL	SANDY LEAN CLAY - stiff, moist, greenish gray, trace gravel (up to 3/8 inch in size)	
	45	41	7.0	23.7	-			☒		SM	SILTY SAND - dense, moist, greenish gray, fine to coarse-grained	
			4.1	14.5	116	33		☒			Becomes medium dense	
	50	28	6.9	19.7	-		28	☒		SC	CLAYEY SAND - medium dense, moist, greenish gray, fine to medium-grained	
			4.7	24.8	99	49	9	☒		SP-SM	POORLY GRADED SAND with SILT - dense, wet, light gray, fine-grained	
	55	56	5.4	24.5	-			☒		SP	POORLY GRADED SAND - very dense, wet, gray, fine-grained	
			3.4	26.1	92	51		☒			Becomes dense	
	60	66	4.1	19.6	-		13	☒		SM	SILTY SAND - very dense, wet, gray, fine-grained, trace gravel (up to 3/4 inch in size)	
	130										Trace silt, trace hydrogen sulfide odor	
	65		3.4	32.0	89	53		☒		SP	POORLY GRADED SAND - dense, wet, gray, fine-grained	
	125	52	3.4	33.1	-			☒			FERNANDO FORMATION [Tf] SILTSTONE - hard, moist, gray, with clay	
	70		5.6	30.4	87	39		☒			With sand	
	120	56	3.7	39.8	-			☒			Trace sand, dark gray	
	75		3.6	30.0	90	32		☒			With fine sand, gray	
	115											
	80	57	3.8	35.4	-			☒				

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
 Prepared/Date: JF 5/19/2011
 Checked/Date: LT/PE 9/22/2011

MTA Westside Subway Extension
 Los Angeles, California



LOG OF BORING
 Project No.: 4953-10-1561 Figure: A-2.3b

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\INT\LIBRARY MACTEC\JUNE2011.GLB
 G:\PROJECT_DIRECTORIES\4953\2010\101561_METRO_WESTSIDE_EXTENSION\6.2.3.1 GEOTECHNICAL DESIGN\3.2 ALL FIELD NOTES\GINT LOG\NEW TEMPLATE - MARCH 14, 2011\4953-101561_(100-119).GPJ 10/24/11

THIS RECORD IS AN INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-104
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 402+70, Lt 25 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										5/2/2011 and 5/3/2011	4-7/8 inches	210 feet
										GROUND-WATER READINGS		
										Ground-water level measured at 34½ feet and 33½ feet below the ground surface in shallow and deep monitoring wells, respectively on 7/29/2011. See last page of this boring for details.		
205	5											5-inch thick Asphalt Concrete over 10-inch thick Portland Cement Concrete
												FILL [Af]
												POORLY GRADED SAND with CLAY - moist, yellowish brown, fine to medium-grained
												LAKWOOD FORMATION [O_{lw}]
												LEAN CLAY with SAND - moist, dark olive gray, some fine sand, trace medium
200	10		0.1	23.7	-	Push	85	☒				Becomes medium to coarse sand
												Becomes moist, olive, some silt (Disturbed sample)
195	15	21/10"	0.0	27.1	-			☒				Becomes very stiff, trace iron oxide stains
190	20		0.1	22.9	95	7		☒				SANDY SILT - medium stiff, moist, olive gray, trace clay
185	25	34	0.1	19.3	-		30	☒				SILTY SAND - dense, olive, fine to medium-grained, trace clay nodules
180	30								PMT			Some coarse sand, trace fine gravel
175	35		0.0	22.1	103	13	90	☒				SAN PEDRO FORMATION [O_{sp}]
												LEAN CLAY - stiff, moist, dark greenish gray, some fine sand, trace medium, moderately cemented, some calcium carbonate nodules
40												

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: LH
 Prepared/Date: JF 6/16/2011
 Checked/Date: LT/PE 9/26/2011

MTA Westside Subway Extension
 Los Angeles, California



LOG OF BORING
 Project No.: 4953-10-1561 Figure: A-2.4a

LA METRO PB-TUNNEL ZONE S-370131 GEOTECHINTWLIBRARY MACTEC JUNE2011.GLB
 G:\PROJECT_DIRECTORIES\4953\2010\101561_METRO_WESTSIDE_EXTENSION\6.2.3.1 GEOTECHNICAL DESIGN\3.2 ALL FIELD NOTES\GINT LOG\NEW TEMPLATE - MARCH 14, 2011\4953-101561_(100-119).GPI 10/24/11

THIS RECORD IS AN INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-104 (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 402+70, Lt 25 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										5/2/2011 and 5/3/2011	4-7/8 inches	210 feet
GROUND-WATER READINGS Ground-water level measured at 34½ feet and 33½ feet below the ground surface in shallow and deep monitoring wells, respectively on 7/29/2011. See last page of this boring for details.												
		70	0.0	15.5	-							Becomes hard, more silty, trace gravel, alternating with layers of Sandy Lean Clay
165	45		0.0	23.3	98	21	74	☒		CL		LEAN CLAY with SAND - very stiff, moist, dark olive gray, fine to medium sand, trace calcium carbonate nodules
160	50											
	55	25	0.0 0.0	24.0 17.9	99 -	15	67	☒ ☒		CL		SANDY LEAN CLAY - stiff, moist, greenish gray, fine to medium sand, trace gravel
	60								PMT			
	65		0.0	17.9	-	23	16	☒		SM		SILTY SAND - medium dense, wet, greenish gray, fine to medium-grained (Disturbed sample)
	70								PMT			
135	75	68		13.3 14.5	112 -	26		☒ ☒				Becomes moist, dark gray, fine to coarse-grained Becomes very dense, with thin layer of Silty Sand, trace fine gravel (up to 3/8 inch in size)
	80											

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: LH
 Prepared/Date: JF 6/16/2011
 Checked/Date: LT/PE 9/26/2011

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINT\LIBRARY MACTEC\JUNE2011.GLB
 G:\PROJECT_DIRECTORIES\49532010\101561_METRO_WESTSIDE_EXTENSION\6.2.3.1 GEOTECHNICAL DESIGN\3.2 ALL FIELD NOTES\GINT LOG\NEW TEMPLATE - MARCH 14, 2011\4953-10-1561_(100-119).GPI 10/24/11

THIS RECORD IS AN INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-104 (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 210 feet
										Rotary Wash	Sta 402+70, Lt 25 feet	
										DATES DRILLED	HOLE DIAMETER	
										5/2/2011 and 5/3/2011	4-7/8 inches	
GROUND-WATER READINGS Ground-water level measured at 34½ feet and 33½ feet below the ground surface in shallow and deep monitoring wells, respectively on 7/29/2011. See last page of this boring for details.												
125	85	63/9"	0.1	10.6 33.2	- -		23	☒	PMT	Trace gravel (up to 1/2 inch in size)		
										GM	SILTY GRAVEL - very dense, moist, dark olive brown to gray, some coarse sand, trace fine to medium, fine to coarse gravel (up to 3/4 inch in size)	
										ML	SANDY SILT - hard, moist, dark olive brown to brownish-gray, fine sand, trace clay	
120	90		0.0	34.7	80	18	94	☒		FERNANDO FORMATION [Tf] SILTSTONE - very stiff, moist, dark olive brown, trace fine sand, trace shell fragments		
115	95	61	0.0	31.3	-			☒		Becomes hard, weakly cemented		
110	100	75		33.0	-			☒		Becomes trace light gray fine-grained sand interbeds weakly to moderately cemented		
105	105									END OF BORING AT 101½ FEET NOTES: Hand augered upper 6½ feet to avoid damage to utilities. Monitoring well was installed on 5/5/2011. See well construction diagram for G-104. "N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches *Number of blows required to drive the Crandall Sampler 12 inches using a 380 pound hammer falling 18 inches **Photo Ionization Detector used for OVA readings Downhole Test: PMT = Pressuremeter		
100	110											
95	115											
120												

MTA Westside Subway Extension
Los Angeles, California



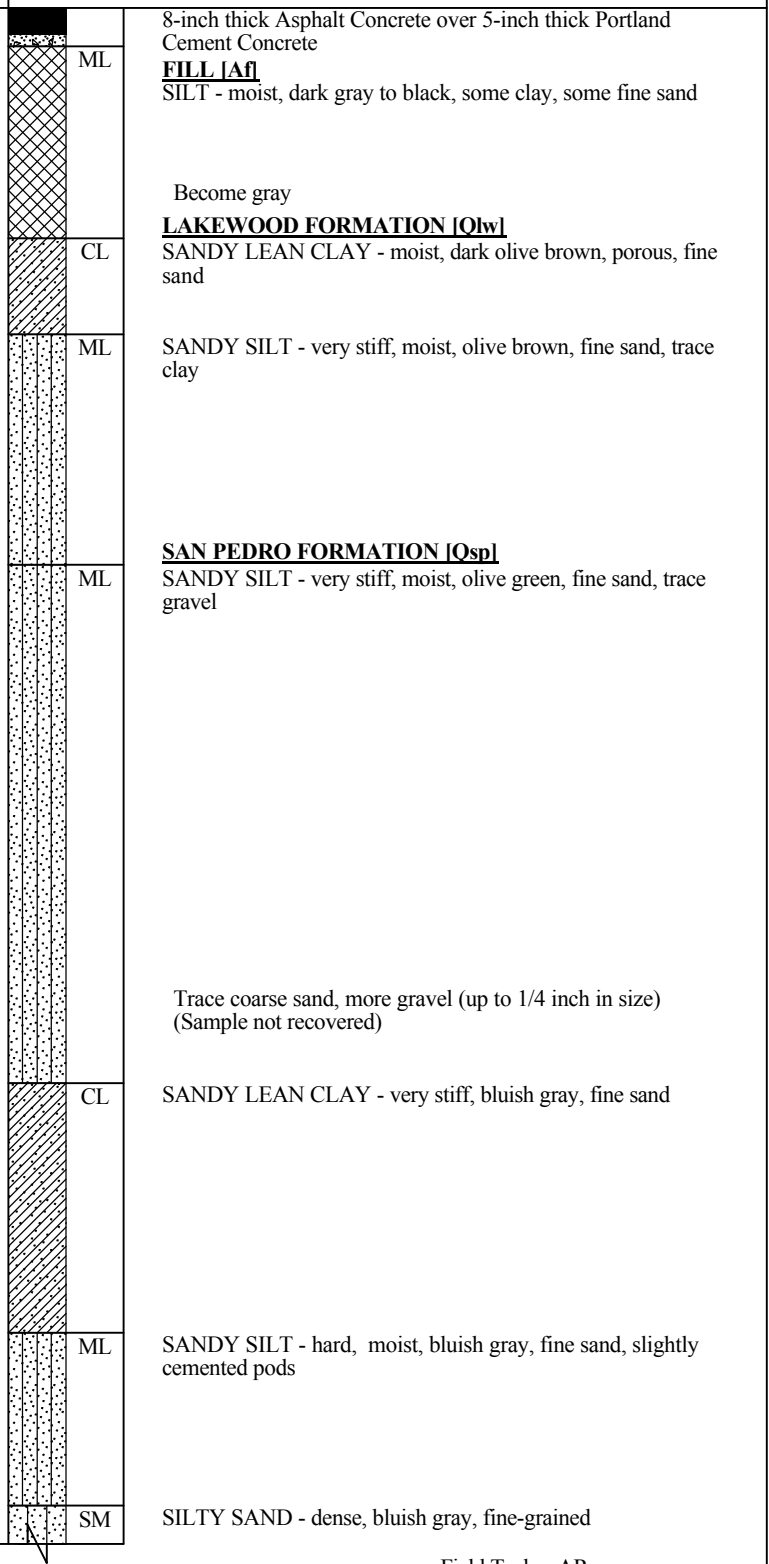
LOG OF BORING
Project No.: 4953-10-1561 Figure: A-2.4c

Field Tech: LH
Prepared/Date: JF 6/16/2011
Checked/Date: LT/PE 9/26/2011

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\INT\LIBRARY MACTEC\JUNE2011\GLB
 G:\PROJECT_DIRECTORIES\4953\2010\101561\METRO_WESTSIDE_EXTENSION\6.2.3.1 GEOTECHNICAL DESIGN\3.2 ALL FIELD NOTES\GINT LOG\NEW TEMPLATE - MARCH 14, 2011\4953-101561_(100-119).GPJ 10/18/11

THIS RECORD IS AN INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-105
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 414+50, Lt 25 feet	
										DATES DRILLED	HOLE DIAMETER	
										4/30/2011	4-7/8 inches	
										GROUND-WATER READINGS		
										Ground-water level not measured.		
200												
	5											
			1.7	15.2	115	12						
195												
	10	25	1.5	21.6	-							
190												
	15		1.7	22.8	100	26						
185												
	20	22	2.8	29.7	-							
180												
	25		2.3	-	-	26						
175												
	30	16	0.5	21.1	-							
170												
	35		2.7	16.9	114	46						
165												
40												



(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
 Prepared/Date: YN 9/8/2011
 Checked/Date: LT/PE 9/7/2011

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\INT\LIBRARY MACTEC\JUNE2011.GLB
 G:\PROJECT_DIRECTORIES\4953\2010\101561\METRO_WESTSIDE_EXTENSION\6.2.3.1 GEOTECHNICAL DESIGN\3.2 ALL FIELD NOTES\GINT LOG\NEW TEMPLATE - MARCH 14, 2011\4953-101561_(100-119).GPI 10/18/11

THIS RECORD IS AN INTERPRETATION OF SURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-105 (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 414+50, Lt 25 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										4/30/2011	4-7/8 inches	202 feet
										GROUND-WATER READINGS		
										Ground-water level not measured.		
160		31	2.3	22.2	-			☒				
45			1.9	24.4	100	44	23	☒				
155										ML	SILT - very stiff, moist, bluish gray, some clay	
50		27	2.7	22.4	-			☒				
150												
55			2.4	20.1	101	37	20	☒		SM	SILTY SAND - dense, moist, bluish gray, fine-grained, some medium	
145											Thin layer of Sandy Silt, trace gravel (up to 1/4 inch in size)	
60		64	2.9	20.7	-		10	☒		SP-SM	POORLY GRADED SAND with SILT - very dense, bluish gray, fine-grained, some medium, trace hydrogen sulfide odor	
65			1.4	26.3	95	89		☒		SM	SILTY SAND - very dense, very moist, bluish gray, fine-grained, some Poorly Graded Sand	
70		79	3.7	20.1	-		12	☒				
75			6.9	37.1	85	59		☒			FERNANDO FORMATION [Tf] SILTSTONE - hard, moist, grayish green, locally bedded, massive, trace fine sand	
80												

Tunnel

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
 Prepared/Date: YN 9/8/2011
 Checked/Date: LT/PE 9/7/2011

LA-METRO-PB-TUNNEL_ZONE_S:\70131-GEOTECH\GINT\LIBRARY_MACTEC\JUNE2011_GLB
 G:\PROJECT_DIRECTORIES\4953\2010\101561_METRO_WESTSIDE_EXTENSION\6.2.3.1-GEOTECHNICAL_DESIGN\3.2-ALL_FIELD_NOTES\GINT_LOGNEWTEMPLATE--MARCH14_2011\4953-101561_(100-119).GPJ 10/18/11

THIS RECORD IS AN INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-106 (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 420+80, Lt 10 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										3/23/2011 - 3/25/2011	4-7/8 inches	205 feet
GROUND-WATER READINGS Drilling mud bailed on 3/24/2011. Ground-water level measured at 22 feet below the ground surface on 3/25/2011.												
			28.6	33.7	85	71/11"	98	☒		Trace sand		
	85	51	5.0	41.9	-			☒		Becomes dark gray		
	90		4.5	47.5	69	59		☒				
	95											
	100											
	105											
	110											
	115											
	120											
										END OF BORING AT 90 FEET NOTES: Hand augered upper 5 feet to avoid damage to utilities. Borehole grouted with cement-bentonite slurry and patched with asphalt concrete. "N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches *Number of blows required to drive the Crandall Sampler 12 inches using a 300 pound hammer falling 18 inches **Photo Ionization Detector used for OVA readings Downhole Test: NV = Noise/Vibration		

MTA Westside Subway Extension
Los Angeles, California



LOG OF BORING
 Project No.: 4953-10-1561 Figure: A-2.6c

Field Tech: AR
 Prepared/Date: JF 5/19/2011
 Checked/Date: LT/PE 9/23/2011

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\INT\LIBRARY MACTEC\JUNE2011\GLB
 G:\PROJECT_DIRECTORIES\4953\2010\101561\METRO_WESTSIDE_EXTENSION\6.2.3.1 GEOTECHNICAL DESIGN\3.2 ALL FIELD NOTES\GINT LOG\NEW TEMPLATE - MARCH 14, 2011\4953-101561_(100-119).GPI 10/18/11

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ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-107
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 428+40, Lt 25 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										4/28/2011 and 4/29/2011	4-7/8 inches	206 feet
GROUND-WATER READINGS												
Drilling mud bailed on 4/28/2011. Ground-water level measured at 24 feet below the ground surface on 4/29/2011.												
205											4-inch thick Asphalt Concrete over 10-inch thick Portland Cement Concrete, No Base Course	
	5										FILL [Afi] SILTY SAND - moist, olive brown, fine to coarse-grained, some coarse gravel	
200											SANDY LEAN CLAY - very stiff, dry, dark brown, fine sand	
	10										More sand	
195			0.0	21.4	105	Push		☒			QUATERNARY OLDER ALLUVIUM [Qalo] SILTY SAND with GRAVEL - medium dense, moist, olive brown, fine to coarse-grained, trace fine gravel	
	15											
190		46	0.0	17.6	-			☒				
	20											
185			0.0	24.4	98	11		☒			Thin layer of Sandy Silt Becomes yellowish-brown, fine to medium-grained	
	25										▼	
180		45	0.0	16.0	-		15	☒			LAKWOOD FORMATION [Qlw] SILTY SAND - dense, wet, olive brown, fine to medium-grained, some coarse	
	30											
175			0.0	27.6	95	10		☒			ELASTIC SILT - stiff, moist, light olive, some fine sand, trace iron oxide stains	
	35	21	0.0	22.0	-		47	☒				
170											SILTY SAND - medium dense, moist, greenish gray, fine-grained, some medium	
	40											

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: LH
 Prepared/Date: JF 6/10/2011
 Checked/Date: LT/PE 9/26/2011

L.A. METRO PB-TUNNEL ZONE S:\70131 GEOTECH\INT\LIBRARY MACTEC\JUNE2011.GLB
 G:\PROJECT_DIRECTORIES\4953\2010\101561\METRO_WESTSIDE_EXTENSION\6.2.3.1 GEOTECHNICAL DESIGN\3.2 ALL FIELD NOTES\GINT LOG\NEW TEMPLATE - MARCH 14, 2011\4953-101561_(100-119).GPI 10/18/11

THIS RECORD IS AN INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-107 (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 428+40, Lt 25 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										4/28/2011 and 4/29/2011	4-7/8 inches	206 feet
GROUND-WATER READINGS Drilling mud bailed on 4/28/2011. Ground-water level measured at 24 feet below the ground surface on 4/29/2011.												
165			0.0	16.5	111	18		☒				Becomes olive green, fine to medium-grained, more silt
	45									ML		SAN PEDRO FORMATION [Qspl] SILT - hard, moist, olive to grayish brown
160		31	0.1	34.4	-			☒				
	50									CH		FAT CLAY - stiff, greenish gray, trace fine sand
155			0.0	25.2	95	12	97	☒				
	55	65	0.1	18.1	-		17	☒		SM		SILTY SAND - very dense, moist, greenish gray, fine-grained, some medium
150												
	60		0.2	21.9	100	33		☒				Becomes dense, olive green, fine-grained, trace medium
145												
	65	75	0.1	20.0	-		21	☒				Fine to coarse-grained
140												
	70		0.0	24.2	95	44		☒				
135												
	75	44		40.2	-		96	☒		ML		SILT - hard, moist, olive gray to dark brown, trace fine sand
130												
	80											

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: LH
 Prepared/Date: JF 6/10/2011
 Checked/Date: LT/PE 9/26/2011

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\INT\LIBRARY MACTEC\JUNE2011\GLB
 G:\PROJECT_DIRECTORIES\4953\2010\101561\METRO_WESTSIDE_EXTENSION\6.2.3.1 GEOTECHNICAL DESIGN\3.2 ALL FIELD NOTES\GINT LOG\NEW TEMPLATE - MARCH 14, 2011\4953-101561_(100-119).GPI 10/18/11

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ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN./TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-108 (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 435+30, Lt 15 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										5/9/2011 and 5/10/2011	4-7/8 inches	201 feet
GROUND-WATER READINGS												
Drilling mud bailed. Ground-water level measured at 21 feet below the ground surface on 5/10/2011.												
160			0.0	25.6	99	17		☒		CL-ML	SILTY CLAY with SAND - very stiff, olive green, trace iron oxide stains	
155	45	25	0.0	30.7	-			☒		CL-ML	SANDY SILTY CLAY - very stiff, very moist, olive green, fine sand	
150	50		0.0	39.3	79	6		☒			Becomes medium stiff, greenish gray	
145	55	60	0.0	34.2	-			☒		SP-SM	POORLY GRADED SAND with SILT - very dense, wet, dark olive green	
140	60		0.0	17.5	101	19		☒			Becomes medium dense, dark olive gray, trace gravel	
135	65	32	0.0	35.0	-			☒		MH	ELASTIC SILT - very stiff to hard, moist, dark olive green, trace fine sand	
130	70		0.0	38.2	81	23	93	☒			Becomes dark greenish gray, some fine sand	
125	75	35	0.0	41.2	-			☒			Becomes dark olive green to olive brown	
80												

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: HTY
 Prepared/Date: JF 6/9/2011
 Checked/Date: LT/PE 9/26/2011

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINT\LIBRARY MACTEC\JUNE2011.GLB
 G:\PROJECT_DIRECTORIES\4953\2010\101561\METRO_WESTSIDE_EXTENSION\6.2.3.1 GEOTECHNICAL DESIGN\3.2 ALL FIELD NOTES\GINT LOG\NEW TEMPLATE - MARCH 14, 2011\4953-101561_(100-119).GPJ 10/18/11

THIS RECORD IS AN INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-108 (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 435+30, Lt 15 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										5/9/2011 and 5/10/2011	4-7/8 inches	201 feet
										GROUND-WATER READINGS		
										Drilling mud bailed. Ground-water level measured at 21 feet below the ground surface on 5/10/2011.		
80			0.0	32.2	83	15		☒		Becomes grayish, some lenses of fine sand END OF BORING AT 121 FEET		
125										NOTES: Hand augered upper 5 feet to avoid damage to utilities. Borehole grouted with cement-bentonite slurry and patched with asphalt concrete. "N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches *Number of blows required to drive the Crandall Sampler 12 inches using a 380 pound hammer falling 18 inches **Photo Ionization Detector used for OVA readings		
75												
130												
70												
135												
65												
140												
60												
145												
55												
150												
50												
155												
45												
160												

Field Tech: HTY
 Prepared/Date: JF 6/9/2011
 Checked/Date: LT/PE 9/26/2011

MTA Westside Subway Extension
Los Angeles, California



LOG OF BORING
 Project No.: 4953-10-1561 Figure: A-2.8d

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ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-109
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 442+30, Lt 45 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										5/9/2011 - 5/11/2011	4-7/8 inches	212 feet
										GROUND-WATER READINGS		
										Ground-water level measured at 28½ feet and 41 feet below the ground surface in shallow and deep monitoring wells, respectively on 7/29/2011. See last page of this boring for details.		
210											8-inch thick Asphalt Concrete over 10-inch thick Portland Cement Concrete and 5-inch thick Base Course	
	5									SM	FILL [af] SILTY SAND - moist, brown, fine to medium-grained	
										SP	LAKEWOOD FORMATION [Qlw] POORLY GRADED SAND - moist, light brown, fine to medium-grained	
205										SW	WELL GRADED SAND with GRAVEL - moist, light brown, fine to coarse-grained	
	10									SM	SILTY SAND - medium dense, moist, light brown, fine to medium-grained	
200			5.6	23.3	96	20				CL	SANDY LEAN CLAY - moist, light brown, thin layer of fine sand	
	15	34	3.8	11.9	-					SP	POORLY GRADED SAND - dense, moist, olive gray, fine to medium-grained, trace coarse, trace gravel (up to 1/4 inch in size)	
195												
	20		1.5	12.6	116	58					Becomes olive yellow, more gravel (up to 3/4 inch in size)	
190												
	25	46	3.4	16.5	-		15			SM	SILTY SAND - dense, moist, brown, medium-grained, trace fine and coarse, trace fine gravel	
185												
	30		3.4	14.2	116	32				SW	WELL GRADED SAND - medium dense, wet, olive gray, fine to coarse-grained, some fine gravel, trace mica	
180										ML	SILT - very stiff, moist, light olive, some clay	
	35	20	4.1	34.5	-						Becomes very moist, trace very fine sand	
175												
40												

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
 Prepared/Date: JF 6/21/2011
 Checked/Date: LT/PE 9/26/2011

MTA Westside Subway Extension
 Los Angeles, California



LOG OF BORING
 Project No.: 4953-10-1561 Figure: A-2.9a

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ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-109 (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 442+30, Lt 45 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										5/9/2011 - 5/11/2011	4-7/8 inches	212 feet
GROUND-WATER READINGS												
Ground-water level measured at 28½ feet and 41 feet below the ground surface in shallow and deep monitoring wells, respectively on 7/29/2011. See last page of this boring for details.												
170			3.7	26.3	94	27		☒	SM	SAN PEDRO FORMATION [Qsp] ▼ SILTY SAND - medium dense, very moist, brownish gray, fine-grained		
45		31	4.7	34.2	-			☒	CL-ML	SILTY CLAY - hard, moist, light olive gray, trace fine sand		
165												
50			4.1	18.0	106	54		☒	SM	SILTY SAND - very dense, wet, olive, fine-grained, some medium		
160												
55		71	4.7	19.5	-		20	☒				
155												
60			3.5	20.5	104	80		☒		Becomes light brownish gray, slight hydrogen sulfide odor		
150												
65		69	3.6	22.7	-		30	☒		Trace medium sand		
145												
70			3.6	36.6	80	49		☒		Trace shell fragments and cobble (up to 4 inches in size)		
140										FERNANDO FORMATION [Tf] SILTSTONE - hard, moist, greenish gray, some fine sand, weakly cemented, dipping 30 degrees		
75		50		45.8	-			☒				
135												
80												

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
 Prepared/Date: JF 6/21/2011
 Checked/Date: LT/PE 9/26/2011

MTA Westside Subway Extension
 Los Angeles, California



LOG OF BORING
 Project No.: 4953-10-1561 Figure: A-2.9b

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 G:\PROJECT_DIRECTORIES\4953\2010\101561\METRO_WESTSIDE_EXTENSION\6.2.3.1 GEOTECHNICAL DESIGN\3.2 ALL FIELD NOTES\GINT LOG\NEW TEMPLATE - MARCH 14, 2011\4953-101561_(100-119).GPI 10/18/11

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ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-109 (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 442+30, Lt 45 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										5/9/2011 - 5/11/2011	4-7/8 inches	212 feet
										GROUND-WATER READINGS		
										Ground-water level measured at 28½ feet and 41 feet below the ground surface in shallow and deep monitoring wells, respectively on 7/29/2011. See last page of this boring for details.		
130			3.6	36.2	85	38		☒				
85		40	4.1	49.4	-			☒				
125												
90			4.1	52.6	73	37	98	☒				
120									PMT			Trace fine sand
95		40		-	-			○				(Sample not recovered)
100			3.4	32.8	88	78		☒				
105		43	2.9	41.6	-			☒				
110			1.5	51.6	69	55	94	☒				Becomes very dark olive gray to dark greenish gray, small sand pockets, light gray
115		65	2.7	32.0	-			☒				Trace calcium carbonate nodules
95									PMT			
120												

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Los Angeles, California



LOG OF BORING
Project No.: 4953-10-1561 Figure: A-2.9c

(CONTINUED ON FOLLOWING FIGURE)

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