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.

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
90	125		2.9	35.6	85	60		⊠	
85	130	41	2.7	31.3	-			☒	
80	135		1.2	37.5	78	58	96	⊠	
75	140	42	4.9	35.6	-			☒	
70	145		5.6	35.0	80	60		⊠	
65	150								
60	155								
55	160								

Trace very fine sand

END OF BORING AT 141 FEET

NOTES:

Hand augered upper 5 feet to avoid damage to utilities. Montoring well was installed on 5/11/2011. See well construction diagram for G-109.

"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: PMT = Pressuremeter

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

MTA Westside Subway Extension
Los Angeles, California

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.9d

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINTW\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\4953-10-1561_(100-119).GPJ 10/18/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		G-110
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 450+30, Lt 20 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
4/28/2011 - 5/2/2011	4-7/8 inches	212 feet

GROUND-WATER READINGS
Drilling mud bailed on 4/29/2011. Ground-water level measured at 31 feet below the ground surface on 5/2/2011.

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	
210	0									7½-inch thick Asphalt Concrete over 5-inch thick Portland Cement Concrete
										ML **FILL [Af]** SANDY SILT - moist, olive, fine sand, some clay, slightly porous
	5		8.5	16.3	113	15				Thin layer of Silty Sand
205										ML **LAKEWOOD FORMATION [Qlw]** SILT - stiff, moist, light brown, slightly porous, some clay
	10	15	7.2	25.7	-					
200										CH FAT CLAY with SAND - stiff, moist, light brown, fine to medium sand
	15		5.2	23.8	96	18				
195										
	20	29	5.9	14.2	-					SW-SM WELL GRADED SAND with SILT - medium dense, moist, olive, fine to medium-grained, some coarse sand, trace gravel (up to 1/4 inch in size)
190										
	25		4.1	10.5	107	36				Becomes olive yellow
185										
	30	48	6.8	13.7	-		11			▼ Becomes dense, more silt, some gravel (up to 1/4 inch in size)
180										
	35		5.4	30.6	90	25				CH FAT CLAY with SAND - very stiff, moist, light brown and blueish gray
175										
	40									

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
Prepared/Date: YN 8/9/2011
Checked/Date: JAG/PE 9/28/2011

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.10a

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINTW\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\4953-10-1561_(100-119).GPJ 10/18/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		**G-110 (Continued)**
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 450+30, Lt 20 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
4/28/2011 - 5/2/2011	4-7/8 inches	212 feet

GROUND-WATER READINGS
Drilling mud bailed on 4/29/2011. Ground-water level measured at 31 feet below the ground surface on 5/2/2011.

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		
170	45	24	7.2	33.0	-			☒			Becomes blueish gray
			6.8	24.8	99	25		⊠		CL	**SAN PEDRO FORMATION [Qsp]** SANDY LEAN CLAY - very stiff, moist, light olive gray, fine to medium sand
165	50	23	6.1	29.8	-			☒			
160										SM	SILTY SAND - moist, blueish gray, fine to medium-grained
										ML	SILT - moist, bluish gray, trace fine sand, some clay
	55		6.1	13.7	-	63	8	⊠		SP-SM	POORLY GRADED SAND with SILT - very dense, olive gray, fine to medium-grained
155	60	52	3.8	18.6	-		9	☒	PMT		
150	65		4.7	15.1	110	57		⊠			Becomes dense, trace shell fragments
145	70	76	4.5	22.3	-			☒	PMT		**FERNANDO FORMATION [Tf]** SILTSTONE - hard, moist, greenish gray, trace fine sand, weakly cemented
140	75		5.2	47.3	72	60	98	⊠			
135	80										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
Prepared/Date: YN 8/9/2011
Checked/Date: JAG/PE 9/28/2011

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.10b

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINTW\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\4953-10-1561_(100-119).GPJ 10/18/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		**G-110 (Continued)**
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 450+30, Lt 20 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
4/28/2011 - 5/2/2011	4-7/8 inches	212 feet

GROUND-WATER READINGS
Drilling mud bailed on 4/29/2011. Ground-water level measured at 31 feet below the ground surface on 5/2/2011.

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
130	85	62	2.9	45.8	-			☒	PMT
	90		3.7	48.6	69	34	95	▩	
	95	37	1.4	34.7	-			☒	
Tunnel	100		7.6	38.8	79	50	99	▩	
	105	38	6.3	45.7	-			☒	
105	110		6.3	33.0	86	46	98	▩	
100	115	31	6.1	37.4	-			☒	
95	120		1.5	40.5	79	51	99	▩	

Becomes grayish green

(½-inch thick cemented layer)

(3 feet thick very hard cemented layer)

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.

Field Tech: AR
Prepared/Date: YN 8/9/2011
Checked/Date: JAG/PE 9/28/2011

(CONTINUED ON FOLLOWING FIGURE)

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.10c

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINTW\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\4953-10-1561_(100-119).GPJ 10/18/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		**G-110 (Continued)**
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 450+30, Lt 20 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
4/28/2011 - 5/2/2011	4-7/8 inches	212 feet

GROUND-WATER READINGS
Drilling mud bailed on 4/29/2011. Ground-water level measured at 31 feet below the ground surface on 5/2/2011.

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
90	125		1.4	37.0	80	69	99	⊠	
85	130		5.6	38.0	82	40		⊠	
80	135		8.5	41.8	78	48		⊠	
75	140								
70	145								
65	150								
60	155								
55	160								

END OF BORING AT 131 FEET

NOTES:

Hand augered upper 5 feet to avoid damage to utilites. 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 140 pound hammer falling 30 inches

**Photo Ionization Detector used for OVA readings

Downhole Test: PMT = Pressuremeter

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.

Field Tech: AR
Prepared/Date: YN 8/9/2011
Checked/Date: JAG/PE 9/28/2011

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LOG OF BORING
Project No.: 4953-10-1561 Figure: A-2.10d

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINTW\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\4953-10-1561_(100-119).GPJ 10/18/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		G-111
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 457+95, Lt 25 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
5/12/2011 and 5/13/2011	4-7/8 inches	195 feet

GROUND-WATER READINGS
Drilling mud bailed on 5/12/2011. Ground-water level measured at 28 feet below ground surface on 5/13/2011.

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		
											6-inch thick Asphalt Concrete over 8-inch thick Portland Cement Concrete and 4-inch thick Base Course
										SM	**FILL [Af]** SILTY SAND - moist, brown, fine to medium-grained, trace coarse
190	5		30	13.6	103	25				ML	**LAKEWOOD FORMATION [Qlw]** SANDY SILT - very stilff, moist, olive yellow to brown, fine sand, trace calcium carbonate nodules
185	10	27		-	-					GW	WELL GRADED GRAVEL - medium dense, moist, gravel (up to 3 inches in size) (Sample not recovered)
										ML	SANDY SILT - hard, light brown, fine sand, trace gravel (up to 3 inches in size)
180	15		15.6	18.7	107	37				SM	SILTY SAND - moist, light grayish brown to light olive, fine-grained
										CL	SANDY LEAN CLAY - very stiff, moist, light brown, fine to medium sand
175	20	16	7.9	20.7	-		52				Trace mica
										ML	SANDY SILT - stiff, moist, light brown, fine sand
170	25		10.2	25.0	93	16					Becomes light olive, trace iron oxide stains
165	30	35	9.5	28.4	-						Becomes hard, olive gray
										SP	POORLY GRADED SAND - dense, wet, light olive, fine to medium-grained, trace coarse sand, trace gravel (up to ½ inch in size)
160	35		10.4	16.4	106	37				ML	**SAN PEDRO FORMATION [Qsp]** SILT - very stiff, moist, greenish gray, some clay
	40										

(CONTINUED ON FOLLOWING FIGURE)

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

MTA Westside Subway Extension
Los Angeles, California

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.11a

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINTW\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\4953-10-1561_(100-119).GPJ 10/18/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		**G-111 (Continued)**
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 457+95, Lt 25 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
5/12/2011 and 5/13/2011	4-7/8 inches	195 feet

GROUND-WATER READINGS
Drilling mud bailed on 5/12/2011. Ground-water level measured at 28 feet below ground surface on 5/13/2011.

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		
		28	>3000	52.0	-			○			(Sample not recovered)
150	45		>3000	25.2	92	27		⊠			More fine sand
145	50	32	3.0	21.3	-		58	⊠		CL	SANDY LEAN CLAY - hard, very moist, greenish gray, fine sand, occasional medium
140	55		3.6	14.3	110	54		⊠		SP-SM	POORLY GRADED SAND with SILT - dense, wet, light gray, fine to medium-grained, trace coarse, slight hydrogen sulfide odor
135	60	47	>3000	15.7	-			⊠			Becomes greenish gray
130	65		3.9	23.3	97	80	9	⊠			Becomes very dense, fine-grained, occasional medium
125	70	53	>3000	21.7	-		15	⊠			Trace fine gravel
120	75		3.6	28.3	90	62		⊠		SM	SILTY SAND - very dense, wet, gray, fine-grained, some medium and coarse, occasional gravel (up to 3/8 inch in size), trace mica
	80										Slight hydrogen sulfide odor

(CONTINUED ON FOLLOWING FIGURE)

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

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.11b

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINTW\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\4953-10-1561_(100-119).GPJ 10/18/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		**G-111 (Continued)**
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 457+95, Lt 25 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
5/12/2011 and 5/13/2011	4-7/8 inches	195 feet

GROUND-WATER READINGS
Drilling mud bailed on 5/12/2011. Ground-water level measured at 28 feet below ground surface on 5/13/2011.

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
		38	>2550	19.3	-		93	☒	
110	85		>2550	17.5	86	26	98	⊠	
105	90	40	>3000	59.8	-			☒	
100	95		>3000	39.4	79	34		⊠	
95	100	35	>3000	46.8	-			☒	
90	105		>1550	34.8	83	35		⊠	
85	110								
80	115								
	120								

ML

SILT - hard, wet, dark gray, trace fine sand, occasional medium, trace clay

FERNANDO FORMATION [Tf]

SILTSTONE - very stiff to hard, moist, dark olive gray to dark greenish gray, occasional fine sand, interbeded with sand layers, trace calcium carbonate nodules, weakly cemented

Becomes dark greenish gray, trace fine sand

END OF BORING AT 106 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

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

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.

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINTW\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\4953-10-1561_(100-119).GPJ 10/18/11

MTA Westside Subway Extension
Los Angeles, California

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.11c

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		G-112
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 473+50, Lt 30 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
5/11/2011 and 5/12/2011	4-7/8 inches	200 feet

GROUND-WATER READINGS
Drilling mud bailed on 5/11/2011. Ground-water level measured at 18 feet below the ground surface on 5/12/2011.

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.

Wilshire / La Brea Station

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	
	5		0.0	15.9	101	15		⊠		6-inch thick Asphalt Concrete over 10-inch thick Portland Cement Concrete, No Base Course
										SM **FILL [Af]** SILTY SAND - moist, light brown, fine-grained, trace medium to coarse
										QUATERNARY YOUNGER ALUVIUM [Qal]
										CL SANDY LEAN CLAY - stiff, moist, light brown and trace olive yellow, medium to coarse sand, trace fine gravel (up to 1/2 inch in size)
	10	35	0.0	16.1	-			⊠		Becomes brown
										LAKEWOOD FORMATION [Qlw]
										SM SILTY SAND - dense, moist, olive brown, fine-grained, trace medium, trace fine gravel (up to 1/2 inch in size)
	15		0.0	20.8	102	7		⊠	PMT	Becomes medium to coarse-grained, more gravel
										▼
	20									CL LEAN CLAY with SAND - very stiff, moist, light gray to light olive, fine to coarse sand, trace fine gravel, some rootlets
	25	22	0.0	29.5	-			⊠		Trace calcium carbonate nodules and iron oxide stains
	30		0.0	25.2	97	18		⊠		ML SANDY SILT - moist, light brown
	35	36	0.0	19.2	-			⊠		SM SILTY SAND - wet, light brown
										CL SANDY LEAN CLAY - moist, light brown, trace gravel (up to ½ inch in size), trace calcium carbonate nodules
										SM SILTY SAND - medium dense, moist, light olive brown, fine to medium-grained, some coarse, trace calcium carbonate nodules, trace iron oxide stains
	40									

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: HTY
Prepared/Date: YN 9/21/2011
Checked/Date: LT/PE 9/26/2011

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.12a

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINTW\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\4953-10-1561_(100-119).GPJ 10/18/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		**G-112 (Continued)**
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 473+50, Lt 30 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
5/11/2011 and 5/12/2011	4-7/8 inches	200 feet

GROUND-WATER READINGS
Drilling mud bailed on 5/11/2011. Ground-water level measured at 18 feet below the ground surface on 5/12/2011.

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		
Wilshire / La Brea Station	45		0.0	21.0	105	11	47	⊠			Trace gravel (up to 3/8 inch in size)
		68	0.0	20.0	-			☒	PMT	CH	**SAN PEDRO FORMATION [Qsp]** FAT CLAY - hard, olive, some fine sand, trace medium to coarse, trace fine gravel (up to 3/4 inch in size), trace mica
	50										
	55		0.3	27.2	97	12		⊠		ML	SANDY SILT - stiff, moist, greeenish gray, fine sand, trace medium, trace calcium carbonate nodules
	60	27	0.0	24.3	-			☒			Becomes very stiff, more sand, some clay
	65		0.0	23.9	100	27	8	⊠	PMT	SP-SM	POORLY GRADED SAND with SILT - medium dense, wet, gray, fine to medium-grained
	70										
	75	76	0.0	20.5	-		9	☒			Becomes very dense, fine-grained, some medium
	80										

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.

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: HTY
Prepared/Date: YN 9/21/2011
Checked/Date: LT/PE 9/26/2011

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Los Angeles, California

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.12b

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DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		**G-112 (Continued)**
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 473+50, Lt 30 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
5/11/2011 and 5/12/2011	4-7/8 inches	200 feet

GROUND-WATER READINGS
Drilling mud bailed on 5/11/2011. Ground-water level measured at 18 feet below the ground surface on 5/12/2011.

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		
			0.0	24.3	99	25		⊠			Gravel (up to 3/4 inch in size)
115	85	72	0.0	25.8	-		23	☒		SM	SILTY SAND - very dense, wet, gray, fine-grained, some medium, occasional gravel
											FERNANDO FORMATION [Tf]
110	90		0.0	28.4	92	12		⊠			SILTSTONE - hard, moist, olive gray, trace fine sand, weakly cemented
105	95	43	0.0	37.6	-			☒			
100	100		0.0	42.8	76	13		⊠			Small pockets of fine sand, gray
95	105	55	0.0	45.8	-			☒			
90	110		0.0	36.7	84	12	95	⊠			
85	115	57	0.0	48.0	-			☒			
	120										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: HTY
Prepared/Date: YN 9/21/2011
Checked/Date: LT/PE 9/26/2011

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.12c

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DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		**G-112 (Continued)**
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 473+50, Lt 30 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
5/11/2011 and 5/12/2011	4-7/8 inches	200 feet

GROUND-WATER READINGS
Drilling mud bailed on 5/11/2011. Ground-water level measured at 18 feet below the ground surface on 5/12/2011.

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
			0.0	57.9	61	16		⊠	
75	125								
70	130								
65	135								
60	140								
55	145								
50	150								
45	155								
	160								

END OF BORING AT 121 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 380 pound hammer falling 18 inches

**Photo Ionization Detector used for OVA readings

Downhole Test: PMT = Pressuremeter

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.

Field Tech: HTY
Prepared/Date: YN 9/21/2011
Checked/Date: LT/PE 9/26/2011

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LOG OF BORING
Project No.: 4953-10-1561 Figure: A-2.12d

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DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
TRI County / CME 75		G-113
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 465+60, Lt 15 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
5/23/2011, 5/24/2011, and 6/2/2011	4-¼ inches	198 feet

GROUND-WATER READINGS

Ground-water level measured at 19 feet below the ground surface on 5/24/2011.

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		
195	5			20.3	-		63			SM	1½-inch thick Asphalt Concrete over 12-inch thick Portland Cement Concrete and 2-inch thick Base Course **FILL [Af]** SILTY SAND - moist, brown, some gravel
										SM	**LAKEWOOD FORMATION [Qlw]** SILTY SAND - moist, reddish brown
190	10			23.1	99	21				CL	SANDY LEAN CLAY - stiff, moist, brown, trace fine sand
185	15	11		23.6	-					CL-ML	SILTY CLAY with SAND - stiff, moist, brown, fine sand
180	20			14.6	-	31	31			CL	LEAN CLAY - stiff, moist, brown, trace fine sand, trace calcium carbonate nodules
175	25	35		14.5	-					SM	SILTY SAND - medium dense, moist, light brown to olive, medium to coarse-grained, trace fine sand
170	30			25.7	106	33				CL	LEAN CLAY with SAND - hard, moist, fine to coarse sand, trace calcium carbonate nodules
165	35	30		31.6	-						Layers of Silty Clay, very stiff, olive, trace fine sand
160	40									ML	SILT with SAND - very stiff, moist, greenish gray, fine sand
											SAN PEDRO FORMATION [Qsp]

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: MH
Prepared/Date: YN 6/21/2011
Checked/Date: HP/PE 9/19/2011

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.13a

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DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
TRI County / CME 75		**G-113 (Continued)**
DRILLING METHOD Rotary Wash	**BOREHOLE LOCATION** Sta 465+60, Lt 15 feet	
DATES DRILLED 5/23/2011, 5/24/2011, and 6/2/2011	**HOLE DIAMETER** 4-¼ inches	**GROUND EL.** 198 feet

GROUND-WATER READINGS
Ground-water level measured at 19 feet below the ground surface on 5/24/2011.

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		
155	45			34.7	-	33	92	⊠		CH	FAT CLAY - very stiff, moist, bluish gray, trace calcium carbonate nodules
											With sand, hard, moist, greenish gray, fine sand
150	50	38		24.0	-			☒			
				26.1	102	49	84	⊠			
145	55									CL-ML	SILTY CLAY - hard, moist, greenish gray, trace sand
		50		24.3	-			☒		SP-SM	POORLY GRADED SAND with SILT - dense, moist, greenish gray, fine to medium-grained
140	60			-	-	97		⊠			Becomes very dense
	65	50/3"		15.9	-			☒			
	70			-	-	50/1"		⊠		SW	WELL GRADED SAND - very dense, moist to wet, greenish gray, fine to coarse-grained, trace fine gravel, trace silt
130	75	50/5"		-	-			☒		SM	SILTY SAND - very dense, moist, greenish gray, fine-grained
	80										

Wilshire / La Brea Station

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: MH
Prepared/Date: YN 6/21/2011
Checked/Date: HP/PE 9/19/2011

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.13b

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DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
TRI County / CME 75		**G-113 (Continued)**
DRILLING METHOD Rotary Wash	**BOREHOLE LOCATION** Sta 465+60, Lt 15 feet	
DATES DRILLED 5/23/2011, 5/24/2011, and 6/2/2011	**HOLE DIAMETER** 4-¼ inches	**GROUND EL.** 198 feet

GROUND-WATER READINGS
Ground-water level measured at 19 feet below the ground surface on 5/24/2011.

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
				17.7	112	50/1"	39	⊠	
115	85	33		47.5	-			☒	
110	90			34.1	85	67	99	⊠	
105	95	86		37.0	-			☒	
100	100								
95	105			41.8	81	70		⊠	
90	110								
85	115								
80	120								

Becomes dark greenish gray, trace coarse gravel

FERNANDO FORMATION [Tf]
CLAYEY SILTSTONE - hard, moist, dark greenish gray

SILTSTONE - hard, moist, dark greenish gray to dark brown

END OF BORING AT 106 FEET

NOTES:

Hand augered upper 10 feet to avoid damage to utilites. 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 140 pound automatic hammer falling 30 inches

**Photo Ionization Detector used for OVA readings

Field Tech: MH
Prepared/Date: YN 6/21/2011
Checked/Date: HP/PE 9/19/2011

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.13c

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DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
Fugro / CME 75		G-114
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 475+12, Lt 10 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
5/9/2011 - 5/11/2011	4-7/8 inches	199 feet

GROUND-WATER READINGS
Drilling mud bailed on 5/10/2011. Ground-water level measured at 29 feet below the ground surface on 5/11/2011.

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.

Wilshire / La Brea Station

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		
										8-inch thick Asphalt Concrete over 12-inch thick Portland Cement Concrete
										FILL [Af]
									CL	SANDY LEAN CLAY - moist, olive brown, medium sand
									SM	SILTY SAND - moist, olive yellow, fine to coarse-grained, trace fine gravel (up to ½ inch in size)
5									SM	**LAKEWOOD FORMATION [Qlw]**
										SILTY SAND - moist, olive yellow, fine-grained, some medium to coarse
		0.0	20.7	101	12				CL	LEAN CLAY - medium stiff, light olive, fine to medium sand
10										Some coarse sand, trace gravel (up to 1/4 inch in size)
									ML	SANDY SILT - moist, olive, fine sand
	10	0.0	25.6	-					SM	SILTY SAND - loose, moist, olive yellow, fine to medium-grained
15										
									CH	FAT CLAY with SAND - stiff, moist, light olive, fine sand, trace medium to coarse, some calcium carbonate nodules
		0.0	24.6	98	20					
20										
	11	0.0	37.7	-					CL-ML	SILTY CLAY - stiff, moist to wet, light olive, trace sand
25										
									SM	▼ SILTY SAND - medium dense, light olive, fine to medium-grained, some coarse, trace gravel (up to ½ inch in size), some clay
			21.1	104	20				CL	SANDY LEAN CLAY - very stiff, moist, light olive to yellowish olive brown, fine sand, some silt
30										
	29		24.4	-						More clay, trace gravel (up to ½ inch in size) Some calcium carbonate nodules
35										
									SC	CLAYEY SAND - medium dense, moist to wet, light olive to olive yellow, fine to medium-grained, some coarse, some clay nodules
			12.4	114	29	22				
40										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: LH
Prepared/Date: YN 8/29/2011
Checked/Date: HP/PE 9/19/2011

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.14a

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DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
Fugro / CME 75		**G-114 (Continued)**
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 475+12, Lt 10 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
5/9/2011 - 5/11/2011	4-7/8 inches	199 feet

GROUND-WATER READINGS
Drilling mud bailed on 5/10/2011. Ground-water level measured at 29 feet below the ground surface on 5/11/2011.

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		
Wilshire / La Brea Station	45	25	0.0	-	-			☒			Becomes yellowish brown to olive brown, more silt and clay, fine-grained, trace gravel (up to 1/4 inch in size)
										CH	SANDY FAT CLAY - very stiff, moist, olive, fine to medium sand, trace gravel (up to 1 inch in size)
			0.0	23.6	99	34		⊠			
	50	29	0.0	-	-		57	☒			Gravel (up to ¼ inch in size)
											Layers of Silty Clay, very stiff, moist, greenish yellowish gray, some fine sand
			0.0	24.4	98	35	70	⊠		CL	**SAN PEDRO FORMATION [Qsp]**
	55	21		22.2	-			☒			SANDY LEAN CLAY - very stiff, moist, greenish-gray, fine sand
											More silt
				30.6	91	28	81	⊠		CH	FAT CLAY with SAND - very stiff, moist, greenish-gray, fine sand, some medium
	60	49	0.0	18.7	-		17	☒		SM	SILTY SAND - dense, wet, greenish-gray, fine to medium-grained
			0.0	-	-	60		⊠			
	65	57	0.0	19.3	-			☒		SP	POORLY GRADED SAND - very dense, wet, greenish-gray, fine to medium-grained
			0.0	11.6	107	90	5	⊠			Trace coarse sand
	70	68	0.0	17.4	-			☒		SP-SM	POORLY GRADED SAND with SILT - very dense, wet, greenish-gray, fine to medium-grained, some coarse
	75			-	-	87		⊠			Becomes fine-grained, more silt
											Becomes fine to coarse-grained, trace gravel (up to ¼ inch in size)
	80	62	0.0	20.3	-			☒		SM	SILTY SAND - very dense, wet, greenish gray, fine-grained, some medium to coarse

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: LH
Prepared/Date: YN 8/29/2011
Checked/Date: HP/PE 9/19/2011

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.14b

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DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
Fugro / CME 75		**G-114 (Continued)**
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 475+12, Lt 10 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
5/9/2011 - 5/11/2011	4-7/8 inches	199 feet

GROUND-WATER READINGS
Drilling mud bailed on 5/10/2011. Ground-water level measured at 29 feet below the ground surface on 5/11/2011.

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	
			0.0	14.2	104	63	13	⊠		Becomes dense, trace gravel (up to 3/4 inch in size)
115	85	58	0.0	23.7	-			⊠		Becomes very dense, more fine sand
				-	-	50/1"		○		**FERNANDO FORMATION [Tf]** CLAYEY SILTSTONE - hard, moist, dark olive brown to olive gray, some fine sand, weakly cemented (Sample not recovered)
110	90	63	0.0	49.3	-			⊠		
			0.0	30.0	89	54	98	⊠		
105	95	44	0.0	35.6	-			⊠		Becomes wet, trace fine sand, no cementation
100	100			35.3	86	60		⊠		Weakly to moderately cemented, alternating thin layers of grayish sand interbedded
		51	0.0	40.4	-			⊠		Becomes olive brown to olive gray, no cementation to weakly cemented
95	105		0.0	38.5	81	38		⊠		Becomes very stiff, weakly cemented
90	110	40	0.0	51.5	-			⊠		SILTSTONE - hard, moist, olive brown to olive gray, weakly cemented
85	115		0.0	31.1	89	63		⊠		Becomes dry to moist, pale olive, moderately to strongly cemented
80	120	38	0.0	36.5	-			⊠		CLAYEY SILTSTONE - hard, moist, olive green, no cementation to weakly cemented, trace fine sand

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.

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: LH
Prepared/Date: YN 8/29/2011
Checked/Date: HP/PE 9/19/2011

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.14c

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINTW\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\4953-10-1561_(100-119).GPJ 10/18/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
Fugro / CME 75		**G-114 (Continued)**
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 475+12, Lt 10 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
5/9/2011 - 5/11/2011	4-7/8 inches	199 feet

GROUND-WATER READINGS
Drilling mud bailed on 5/10/2011. Ground-water level measured at 29 feet below the ground surface on 5/11/2011.

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
75	125								
70	130								
65	135								
60	140								
55	145								
50	150								
45	155								
40	160								

END OF BORING AT 120 FEET

NOTES:

Hand augered upper 6½ 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

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.

Field Tech: LH
Prepared/Date: YN 8/29/2011
Checked/Date: HP/PE 9/19/2011

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LOG OF BORING
Project No.: 4953-10-1561 Figure: A-2.14d

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINTW\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\4953-10-1561_(100-119).GPJ 10/18/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		G-116
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 487+00, Lt 15 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
6/23/2011 and 6/24/2011	4-7/8 inches	197 feet

GROUND-WATER READINGS
Drilling mud bailed on 6/23/2011. Ground-water level measured at 16 feet below the ground surface on 6/24/2011.

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		
195	0										10-inch thick Asphalt Concrete over 10-inch thick Portland Cement Concrete
											FILL [Af]
										CL	SANDY LEAN CLAY - moist, dark gray, fine to medium sand, some coarse, some fine to coarse gravel (up to 1½ inches in size)
190	5										Becomes light brownish yellow to white, trace calcium carbonate nodules
	10		3.2	21.4	101	Push	46	⊠		SM	**LAKEWOOD FORMATION [Qlw]** SILTY SAND - very loose, moist, olive yellow, fine to coarse-grained, trace gravel (up to 1/2 inch in size)
185											Layers of Poorly Graded Sand with Silt, yellowish brown
	15	18	1.5	25.1	-			⊠		ML	SANDY SILT - very stiff, wet, olive green, fine sand, some medium, some clay, some mica
180											▼ Becomes wet
	20		1.2	26.9	96	25		⊠		CL	**SAN PEDRO FORMATION [Qsp]** SANDY LEAN CLAY - very stiff, moist, light olive green, fine sand, iron oxide stains, some calcium carbonate nodules
175											
	25	24	0.0	32.9	-			⊠			More calcium carbonate nodules
170											
	30		0.0	20.6	105	21		⊠		CL	LEAN CLAY with SAND - stiff, moist, light grayish green, fine sand, some calcium carbonate nodules, trace iron oxide stains
165											
	35	11	0.0	35.6	-			⊠		CL-ML	SILTY CLAY - stiff, wet, light greenish gray, more calcium carbonate nodules
160	40										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: LH
Prepared/Date: JF 6/28/2011
Checked/Date: LT/PE 9/23/2011

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.15a

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINTW\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\4953-10-1561_(100-119).GPJ 10/18/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		**G-116 (Continued)**
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 487+00, Lt 15 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
6/23/2011 and 6/24/2011	4-7/8 inches	197 feet

GROUND-WATER READINGS
Drilling mud bailed on 6/23/2011. Ground-water level measured at 16 feet below the ground surface on 6/24/2011.

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		
155	45		0.0	27.1	100	13	40	⊠		GC	CLAYEY GRAVEL with SAND - medium dense, moist, bluish green, coarse-grained, some fine and medium, fine gravel (up to 1/2 inch in size)
150	50	29	0.0	22.9	-		33	☒		SC	CLAYEY SAND with GRAVEL - medium dense, moist, light grayish green, fine to coarse-grained, some coarse, fine gravel (up to 1 inch in size)
145	55		0.0	19.3	112	14	60	⊠		ML	SANDY SILT - stiff, very moist, light greenish gray, fine sand, trace medium
	60	12	0.0	19.1	-		29	☒		SM	SILTY SAND - medium dense, wet, light grayish green, fine-grained, trace medium, trace shell fragments
	65		0.0	25.8	101	32	9	⊠		SP-SM	POORLY GRADED SAND with SILT - dense, wet, light greenish gray, fine-grained, some medium, occasional coarse
Tunnel	70	49	0.0	21.0	-		13	☒		SM	SILTY SAND - dense, wet, light greenish gray, fine to medium-grained, trace coarse
	75		0.0	18.7	107	23		⊠		SP-SM	POORLY GRADED SAND with SILT - medium dense, wet, dark olive gray, fine to coarse-grained
120	80	55	0.0	17.7	-			☒			Becomes very dense, trace gravel (up to 1/2 inch in size)

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: LH
Prepared/Date: JF 6/28/2011
Checked/Date: LT/PE 9/23/2011

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Los Angeles, California

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.15b

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINTW\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\4953-10-1561_(100-119).GPJ 10/18/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		**G-116 (Continued)**
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 487+00, Lt 15 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
6/23/2011 and 6/24/2011	4-7/8 inches	197 feet

GROUND-WATER READINGS
Drilling mud bailed on 6/23/2011. Ground-water level measured at 16 feet below the ground surface on 6/24/2011.

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
115	85		0.0	34.5	91	35	9	⊠	
110	90	50/5"	0.0	16.7	-			☒	
105	95		0.0	-	-	12		○	
100	100	57	0.0	2.3	-		1	☒	
95	105		0.0	11.3	107	29		⊠	
90	110	52	0.0	53.4	-		90	☒	
85	115								
80	120								

Becomes olive gray to gray, fine-grained, occasional medium, some coarse

More coarse sand

Fine to coarse sand, some shell fragments

GP — POORLY GRADED GRAVEL with SAND - very dense, wet, gray, fine rounded to subrounded gravel (up to 1/2 inch in size), some shell fragments, fine to coarse sand

(Sample not recovered)

Gravel (up to 1 inch in size)

FERNANDO FORMATION [Tf]
SILTSTONE - hard, moist, dark olive to grayish green, some fine sand, occasional medium, some mica, some clay

END OF BORING AT 106½ FEET

NOTES:

Hand augered upper 9½ 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

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.

Field Tech: LH
Prepared/Date: JF 6/28/2011
Checked/Date: LT/PE 9/23/2011

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Los Angeles, California

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LOG OF BORING
Project No.: 4953-10-1561 Figure: A-2.15c

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINTW\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\4953-10-1561_(100-119).GPJ 10/18/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		G-118
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 502+15, Lt 20 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
3/22/2011 - 3/24/2011	4-7/8 inches	195 feet

GROUND-WATER READINGS
Ground-water level measured at 38 feet on 3/24/2011.

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		
											6 inches thick Asphalt Concrete over 12 inches thick Portland Cement Concrete, No Base Course
										ML	**FILL [Af]** - SILT - soft, moist, light brown to tan
											QUATERNARY OLDER ALLUVIUM [Qalo]
										CL	SANDY LEAN CLAY - moist, light brown to tan
190	5										
185	10			24.3	98	Push					**SAN PEDRO FORMATION [Qsp]**
										CL	LEAN CLAY - very soft, moist, greenish gray, trace sand, trace calcium carbonate nodules
180	15	23		26.2	-						Becomes very stiff, with sand
175	20			24.4	100	11				SM	SILTY SAND - medium dense, moist, greenish gray, fine to medium-grained, with thin layer of Sandy Silt
170	25	16		25.5	-					ML	SILT with SAND - very stiff, moist, greenish gray, fine sand, with calcium carbonate nodules, some clay
				-	-	27					(Sample not recovered)
165	30										***TAR IMPACTED SOILS***
		63	168	21.3	-		13			SM	SILTY SAND - very dense, moist, dark grayish black, fine to medium-grained, strong sulfuric odor, moderately infused tar (8%)
160	35			10.2	117	54					Thin layer of Sandy Silt, dense, black
		42		13.6	-		59			ML	SANDY SILT - hard, moist, dark gray to black, moderately infused tar (14%)
	40										

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.

(CONTINUED ON FOLLOWING FIGURE)

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

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Los Angeles, California

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.16a

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINTW\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\4953-10-1561_(100-119).GPJ 10/20/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		G-118 (Continued)
DRILLING METHOD Rotary Wash	**BOREHOLE LOCATION** Sta 502+15, Lt 20 feet	
DATES DRILLED 3/22/2011 - 3/24/2011	**HOLE DIAMETER** 4-7/8 inches	**GROUND EL.** 195 feet

GROUND-WATER READINGS
Ground-water level measured at 38 feet on 3/24/2011.

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		
				14.7	101	27	61				Becomes very stiff
		44		18.2	-						Becomes dark grayish black, fine sand, trace gravel
150	45			8.3	115	26					Becomes black
145	50	87/11"	284	7.4	-		27			SM	SILTY SAND - very dense, dark gray to black, fine to medium-grained, trace gravel (up to 3/8 inch in size), saturated with tar
				7.0	109	25	7			SP-SM	POORLY GRADED SAND with SILT - medium dense, moist, black, moderately infused tar (14%)
140	55	80	198	-	-						Becomes very dense
				4.1	119	24					Becomes medium dense
135	60	51	386	6.6	-		13			SM	Becomes very dense, saturated with tar SILTY SAND - very dense, wet, black, saturated with tar (17%)
130	65			8.2	101	29					
		83/11"	360	2.9	-						
125	70			-	-	47					(Sample not recovered) Becomes gravelly
		50	190	8.4	-		28				Becomes dense, dark grayish black, fine-grained, trace gravel (up to 3/8 inch in size), saturated with tar (17%)
120	75			10.2	100	35					Becomes medium dense, fine gravel
	80	51		18.5	-						**FERNANDO FORMATION [Tf]** SILTSTONE - hard, moist, dark brown, with sand, slightly infused tar

(CONTINUED ON FOLLOWING FIGURE)

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

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.16b

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINTW\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\4953-10-1561_(100-119).GPJ 10/20/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		**G-118 (Continued)**
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 502+15, Lt 20 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
3/22/2011 - 3/24/2011	4-7/8 inches	195 feet

GROUND-WATER READINGS
Ground-water level measured at 38 feet on 3/24/2011.

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	
			186	21.7	85	55		⊠		Becomes dark grayish black, moderately infused tar
	85	54	182	20.8	-			⊠		Slightly infused tar
				28.0	75	22		⊠		Becomes stiff, moderately infused tar
Tunnel	90	40	108	21.8	-			⊠		Becomes hard, slightly infused tar
	95			18.6	92	20		⊠		Becomes stiff
		52	99	24.5	-			⊠		Becomes hard
	100		14	25.9	86	21		⊠		Becomes stiff
				26.0	-	29		⊠		
90	105	58	106	23.3	-			⊠		
										END OF BORING AT 105½ FEET
85	110									
80	115									
	120									

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.

NOTES:

Hand augered upper 10 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

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

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Los Angeles, California

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.16c

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINTW\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\4953-10-1561_(100-119).GPJ 10/20/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		G-119
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 505+90, Lt 15 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
4/4/2011 and 4/5/2011	4-7/8 inches	192 feet

GROUND-WATER READINGS
Drilling mud could not be bailed below 22 feet due to presence of heavy tar. Ground-water level not measured.

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		
190	0										8-inch thick Asphalt Concrete over 6-inch thick Portland Cement Concrete and 1-inch thick Base Course
										CL-ML	**QUATERNARY OLDER ALLUVIUM [Qalo]** SILTY CLAY - moist, dark brown, trace fine sand
	5		28	27.2	88	13		⊠		CL	**SAN PEDRO FORMATION [Qsp]** LEAN CLAY - stiff, moist, light brown and light gray, some fine sand
185											Trace cemented silt pods
	10	10	46	26.1	-			☒			
180											Layers of greenish gray, more sand
	15		19	16.5	104	12		⊠			
175											***TAR IMPACTED SOILS*** POORLY GRADED SAND with SILT - dense, moist, black, fine to medium-grained, some coarse, moderately infused tar, layers of Silty Sand
	20	41	20	14.4	-			☒		SP-SM	
170											Saturated with tar
	25		235	3.1	119	57	6	⊠			Trace gravel (up to 1/2 inch in size), moderately infused tar (14%)
165										ML	SILT - hard, moist, greenish gray, slightly infused tar
	30	66	100	12.2	-			☒			Becomes brownish gray
160										SM	SILTY SAND - very dense, moist, black, fine to medium-grained, saturated with tar (17%)
	35		76	39.5	74	17	17	⊠			Becomes medium dense, greenish gray, moderately tar infused (9%)
155											
	40										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
Prepared/Date: JF 6/15/2011
Checked/Date: LT/PE 9/23/2011

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.17a

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINTW\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\4953-10-1561_(100-119).GPJ 10/20/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		**G-119 (Continued)**
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 505+90, Lt 15 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
4/4/2011 and 4/5/2011	4-7/8 inches	192 feet

GROUND-WATER READINGS
Drilling mud could not be bailed below 22 feet due to presence of heavy tar. Ground-water level not measured.

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		
		28	235	11.3	-			☒			Becomes brownish gray
150										SP-SM	POORLY GRADED SAND with SILT - medium dense, moist, black, fine to medium-grained, saturated with tar
	45		422	2.7	111	47		⊠			Becomes dense, decomposed organic fragments
145											Trace gravel (up to ½ inch in size)
	50	52	430	6.6	-		12	☒			Becomes very dense, fine-grained, trace medium to coarse, occasional gravel (up to 3/8 inch in size), saturated with tar (17%)
140											
	55		156	3.0	105	63		⊠			
135											
	60	50	311	7.4	-		8	☒		SP-SM	POORLY GRADED SAND with SILT and GRAVEL - dense, moist, black, fine-grained, some medium to coarse, fine to coarse gravel (up to 1 inch in size), moderately infused tar (15%)
130											
	65		269	6.5	90	70		⊠			Becomes very dense
125											
	70										**FERNANDO FORMATION [Tf]**
		42	312	21.4	-			☒			SILTSTONE - hard, moist, brownish dark gray, slightly infused tar
120											
	75		466	25.6	84	38	72	⊠			Becomes moderately infused tar, fine sand, trace medium
115											
	80										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
Prepared/Date: JF 6/15/2011
Checked/Date: LT/PE 9/23/2011

MTA Westside Subway Extension
Los Angeles, California

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.17b

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINTW\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\4953-10-1561_(100-119).GPJ 10/20/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		**G-119 (Continued)**
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 505+90, Lt 15 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
4/4/2011 and 4/5/2011	4-7/8 inches	192 feet

GROUND-WATER READINGS
Drilling mud could not be bailed below 22 feet due to presence of heavy tar. Ground-water level not measured.

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	
110	85	52	457	21.0	-			☒		Becomes brownish gray
			437	18.8	85	50		⊠		Saturated with tar (18%)
	90	35	311	23.4	-			☒		
Tunnel	95		985	21.1	87	49	78	⊠		Fine sand, some medium
	100	36	312	21.5	-			☒		
85	105		1243	18.0	89	55	68	⊠		Alternating with Sandy Siltstone, fine to medium sand
										END OF BORING AT 106 FEET
80	110									
	115									
75	120									

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.

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

Field Tech: AR
Prepared/Date: JF 6/15/2011
Checked/Date: LT/PE 9/23/2011

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.17c

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINTW\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\4953-10-1561_(100-119).GPJ 10/20/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		G-121
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 516+36, Rt 14 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
5/16/2011 - 5/18/2011	4-7/8 inches	177 feet

GROUND-WATER READINGS
Drilling mud bailed. Ground-water level measured at 14 feet below the ground surface.

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		
175	0										4-inch thick Asphalt Concrete over 7-inch Portland Cement Concrete
										CL	**FILL [Af]** SANDY LEAN CLAY - moist, brown, fine to medium sand, occasional fine gravel
	5		0.0	24.5	90	Push		⊠			More gravel
170											
	10	23	0.0	29.0	-		3	☒		GP	**LAKEWOOD FORMATION [Qlw]** POORLY GRADED GRAVEL with SAND - medium dense, wet, olive brown to bluish gray with light brown mottled, fine, fine to coarse sand, gravel (up to 3/4 inch in size)
165											**SAN PEDRO FORMATION [Qsp]**
	15		0.0	18.0	77	18		⊠		SP-SM	▼ POORLY GRADED SAND with SILT - medium dense, moist, black to dark brown, fine-grained
160										GM	SILTY GRAVEL with SAND - wet, dark reddish brown, fine to coarse sand
	20	24	0.0	13.6	-		59	☒		ML	***TAR IMPACTED SOILS*** SANDY SILT - very stiff, moist, black, fine sand, some medium to coarse, occasional gravel (up to 3/8 inch in size), slightly infused tar
155											
	25		0.0	29.3	84	7		⊠			Becomes medium stiff, wet, dark brown
150										SP-SM	POORLY GRADED SAND with SILT - dense, moist, black, fine to medium-grained, moderately infused tar
	30	33	0.0	12.1	-			☒			
145											
	35		0.0	6.9	101	10	7	⊠			Becomes loose, fine-grained, trace medium
140	40										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: HTY
Prepared/Date: YN 6/20/2011
Checked/Date: LT/RM 9/21/2011

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.18a

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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\4953-10-1561_(120-139).GPJ 10/18/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		**G-121 (Continued)**
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 516+36, Rt 14 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
5/16/2011 - 5/18/2011	4-7/8 inches	177 feet

GROUND-WATER READINGS
Drilling mud bailed. Ground-water level measured at 14 feet below the ground surface.

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		
135	45								PMT	GW	CLAYEY GRAVEL with SAND - very dense, moist, black, fine to coarse gravel, moderately infused tar
		56	0.0	8.0	-			☒			
130	50									SP	POORLY GRADED SAND - dense, moist, dark brown, fine to medium-grained, saturated with tar
		41	0.0	10.2	-			☒			
125	55									GW	WELL GRADED GRAVEL with SAND - wet, black, fine to coarse gravel, saturated with tar
				-	-	13		⊠		SP	POORLY GRADED SAND - medium dense, moist, black, fine to medium-grained, trace gravel, saturated with tar
120	60									GP	POORLY GRADED GRAVEL with SAND - medium dense, wet, black, fine to coarse, fine sand
				-	-	15		⊠			
	65										Becomes fine (up to 3/4 inch in size), coarse sand, some fine to coarse sand
		16	0.0	3.4	-		2	☒			
Tunnel	70									SW-SM	WELL GRADED SAND with SILT and GRAVEL - medium dense, moist, fine to coarse-grained, fine gravel (up to 1/2 inch in size)
		23	0.0	6.8	-		8	☒			
	75									ML	SILT with SAND - hard, moist, dark brown, fine sand, moderately infused tar
		53	0.0	25.5	-			☒			
	80										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: HTY
Prepared/Date: YN 6/20/2011
Checked/Date: LT/RM 9/21/2011

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.18b

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINTW\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\4953-10-1561_(120-139).GPJ 10/18/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		**G-121 (Continued)**
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 516+36, Rt 14 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
5/16/2011 - 5/18/2011	4-7/8 inches	177 feet

GROUND-WATER READINGS
Drilling mud bailed. Ground-water level measured at 14 feet below the ground surface.

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
95	85		0.0	21.5	91	18	77	⊠	
90	90	45	0.0	22.2	-			☒	
85	95		0.0	21.4	-	21		⊠	
80	100	54	0.0	23.5	-		33	☒	
75	105		0.0	14.0	-	17		⊠	
70	110	62	0.0	24.8	-			☒	
65	115		0.0	22.3	88	21		⊠	
60	120								

Becomes very stiff, fine grained, some medium

Becomes hard

Trace gravel

GM — SILTY GRAVEL with SAND - medium dense, wet, dark brown, fine gravel (up to 3/4 inch in size), fine to coarse sand, moderately infused tar, (sample disturbed)

ML — GRAVELLY SILT with SAND - hard, wet, dark brown, fine to coarse sand, fine gravel (up to 3/4 inch in size), slightly infused tar

FERNANDO FORMATION [Tf]
SILTSTONE - very stiff to hard
(Sample disturbed)

More sand

Less sand

END OF BORING AT 111 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 380 pound hammer falling 18 inches

**Photo Ionization Detector used for OVA readings
Downhole Test: PMT = Pressuremeter

Field Tech: HTY
Prepared/Date: YN 6/20/2011
Checked/Date: LT/RM 9/21/2011

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.

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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\4953-10-1561_(120-139).GPJ 10/18/11

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.18c

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		G-123
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 528+40, Lt 20 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
3/16/2011 - 3/18/2011	4-7/8 inches	168 feet

GROUND-WATER READINGS
Drilling mud bailed on 3/18/2011. Ground-water level measured at 32 feet below the ground surface 15 minutes after drilling.

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		
Wilshire / Fairfax Station	5									ML	11-inch thick Asphalt Concrete over 9-inch thick Slurry Backfill and 5-inch thick Base Course **FILL [Af]** SANDY SILT - moist, brown, fine to medium sand
										SM	SILTY SAND with GRAVEL - moist, light brown, fine to coarse-grained **QUATERNARY YOUNGER ALLUVIUM [Qal]**
	10									ML	SILT - moist, light brown, some fine sand, some clay
			4.8	15.9	111	10				SM	SILTY SAND - loose, light brown, fine to medium-grained Some gravel
	15	16	6.3	19.4	-		17			SC	**QUATERNARY OLDER ALLUVIUM [Qalo]** ***TAR IMPACTED SOILS*** CLAYEY SAND - medium dense, moist, brown to grayish brown, fine to medium-grained, trace coarse, slightly infused tar (5%) Becomes greenish gray Less clay
	20		4.7	16.5	109	15			PMT		Becomes greenish gray, some coarse, occasional gravel, some small tar pods
	25									ML	SILT - moist, light brown, some clay, slight hydrogen sulfide odor Becomes greenish gray, 4-inch cobbles
		19	16.7	19.5	-					CL	SANDY LEAN CLAY - very stiff, dark gray to black, fine to medium sand, layers of coarse sand, very light hydrogen sulfide odor, some gravel
	30			-	-	34					(Sample not recovered) Trace gravel (up to 1/4 inch in size) **SAN PEDRO FORMATION [Qsp]**
	35	16	4.5	30.7	-		67			ML	SANDY SILT - very stiff, moist, greenish gray, fine to medium sand, slightly infused tar (4%), trace clay
			7.0	17.2	105	38			PMT	SM	SILTY SAND - dense, moist, dark brown to grayish black, fine-grained, moderately to saturated with tar, heavy hydrogen sulfide odor,
	40										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
Prepared/Date: LH 6/22/2011
Checked/Date: LT/RM 10/1/2011

MTA Westside Subway Extension
Los Angeles, California

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.19a

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DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		**G-123 (Continued)**
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 528+40, Lt 20 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
3/16/2011 - 3/18/2011	4-7/8 inches	168 feet

GROUND-WATER READINGS
Drilling mud bailed on 3/18/2011. Ground-water level measured at 32 feet below the ground surface 15 minutes after drilling.

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.

Wilshire / Fairfax Station

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		
	45	67	46.7	10.0	-			☒			Becomes very dense, black
			76.8	6.4	114	96/9"	8	⊠		SW-SM	WELL GRADED SAND with SILT - very dense, moist, black, fine to coarse-grained, trace gravel (up to 3/4 inch in size), moderately infused tar (10%)
	50	56	135	8.5	-			☒			
			62.4	5.8	109	98/11"		⊠			Less gravel
	55	42	145	9.4	-		15	☒		SM	SILTY SAND - dense, moist, black, fine-grained, trace medium to coarse, trace fine gravel (up to 3/8 inch in size), moderately infused tar (11%)
			201	7.9	105	86/9"		⊠			Becomes very dense
	60	71	147	5.5	-			☒			6-inch layer of gravel
	65		228	5.1	120	75/5"		⊠			Becomes greenish gray, trace gravel (up to 1 inch in size)
100											Becomes black, some gravel, saturated with tar
	70	50/5"	93	2.0	-		6	⊠		SP-SM	POORLY GRADED SAND with SILT - very dense, dry to moist, fine to medium-grained, occasional coarse, saturated with tar (16%)
95			475	5.3	107	75/9"		⊠		SM	SILTY SAND - very dense, dry to moist, black, fine gravel
	75	50/4"	214	3.1	-			☒			
90			153	1.8	113	75/5"		⊠			
	80										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
Prepared/Date: LH 6/22/2011
Checked/Date: LT/RM 10/1/2011

MTA Westside Subway Extension
Los Angeles, California

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.19b

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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\4953-10-1561_(120-139).GPJ 10/18/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		**G-123 (Continued)**
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 528+40, Lt 20 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
3/16/2011 - 3/18/2011	4-7/8 inches	168 feet

GROUND-WATER READINGS
Drilling mud bailed on 3/18/2011. Ground-water level measured at 32 feet below the ground surface 15 minutes after drilling.

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
85	85	89	558	5.9	-				
			117	4.7	109	99/8"			
80	90	74	95.4	6.3	-				
75	95		>3000	20.1	97	45			
70	100	53	2692	14.2	-				
65	105	46	1132	21.2	-				
60	110		2934	16.5	97	48			
55	115								
50	120								

Becomes moist

FERNANDO FORMATION [Tf]
SILTSTONE - hard, moist, dark gray, fine sand, trace fine gravel, moderately infused tar to saturated with tar

No gravel

END OF BORING AT 110 FEET
NOTES:
Hand augered upper 7 feet to avoid damage to utilites.
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: PMT = Pressuremeter

Field Tech: AR
Prepared/Date: LH 6/22/2011
Checked/Date: LT/RM 10/1/2011

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.

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.19c

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		G-124
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 533+75, Lt 25 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
3/17/2011 - 3/21/2011	4-7/8 inches	162 feet

GROUND-WATER READINGS
Drilling mud bailed. Ground-water level measured at 34 feet below the ground surface.

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		
Wilshire / Fairfax Station	5									SM	6-inch thick Asphalt Concrete over 12-inch thick Portland Cement Concrete **FILL [Af]** SILTY SAND with CLAY - moist, brown
										SM	**LAKEWOOD FORMATION [Qlw]** SILTY SAND - moist, orangish brown, fine to medium-grained, trace fine gravel, layers of Clayey Sand
	10										Becomes yellowish brown, fine-grained, trace medium to coarse, trace gravel
			0.0	17.1	108	Push				SC	CLAYEY SAND - very loose, moist, yellowish brown, fine-grained, trace medium to coarse gravel, micaceous
	15	16	0.1	19.7	-		35			SC	**SAN PEDRO FORMATION [Qsp]** ***TAR IMPACTED SOILS*** CLAYEY SAND - medium dense, moist, olive brown to grayish-brown, fine to medium-grained, some coarse-grained, trace iron oxide stains, slightly infused tar (4%)
	20		0.5	23.1	99	11				CH	FAT CLAY - stiff, moist, gray, trace fine sand
	25	34	0.6	19.9	-						Becomes hard, gray to very dark brown, some iron oxide, some calcium carbonate nodules, heavy organic odor
	30		78	23.0	95	21	32			SC	CLAYEY SAND - medium dense to dense, wet, gray to very dark brown, fine to medium-grained, occasional coarse, moderately infused tar (10%)
	35	42	76	13.6	-				NV		Strong organinc odor
	40										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DW
Prepared/Date: JF 3/29/2011
Checked/Date: RH/LT 10/1/2011

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.20a

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINTW\LIBRARY MACTEC JUNE2011.GLB
G:\PROJECT_DIRECTORIES\4953\2010\10156l_METRO_WESTSIDE_EXTENSION\6.2.3.1 GEOTECHNICAL DESIGN\3.2 ALL FIELD NOTES\GINT LOG\NEW TEMPLATE - MARCH 14, 2011\4953-10-1561_(120-139).GPJ 10/18/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		**G-124 (Continued)**
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 533+75, Lt 25 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
3/17/2011 - 3/21/2011	4-7/8 inches	162 feet

GROUND-WATER READINGS
Drilling mud bailed. Ground-water level measured at 34 feet below the ground surface.

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		
Wilshire / Fairfax Station			60	-	-	15		○			Becomes dark brown, some tar, (sample not recovered)
	45									SM	SILTY SAND - very dense, moist, dark brown, fine-grained, some medium, occasional coarse, moderately infused tar (7%)
		52	262	11.7	-		14	⊠			
	50		402	-	-	40		⊠			Becomes dense
	55	97	366	5.1	-			⊠	NV	SP-SM	POORLY GRADED SAND with SILT - dense to very dense, moist, black to dark brown, fine-grained, some gravel
	60		489	6.1	113	33	9	⊠	NV		Becomes very dark brown, fine to medium-grained, trace coarse, some gravel (up to 3/4 inch in size), moderatly infused tar (13%)
100	65										
95			382	8.2	106	28		⊠			Becomes medium dense, black, fine-grained
90	70										
	75		467	5.6	114	40		⊠			Becomes dense
85											
	80										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DW
Prepared/Date: JF 3/29/2011
Checked/Date: RH/LT 10/1/2011

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.20b

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINTW\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\4953-10-1561_(120-139).GPJ 10/18/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		**G-124 (Continued)**
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 533+75, Lt 25 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
3/17/2011 - 3/21/2011	4-7/8 inches	162 feet

GROUND-WATER READINGS
Drilling mud bailed. Ground-water level measured at 34 feet below the ground surface.

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		
80	85	97/9"	482	5.2	-		10	⊠		SW-SM	WELL GRADED SAND with SILT - very dense, moist, fine to coarse-grained, fine gravel (up to 1 inch in size), moderately infused tar (12%)
75	90		565	3.4	121	70		⊠		SM	SILTY SAND - very dense, moist, very dark brown to black, fine grained, moderately infused tar
70	95	88		5.1	-			⊠			
65	100			8.2	106	48		⊠			Becomes black to dark brown
60	105	51		25.4	-			⊠		ML	SANDY SILT - hard, moist, olive gray, fine sand, slightly infused tar (<5%)
55	110			-	-	85		○			(Sample not recovered)
50	115										END OF BORING AT 106 FEET
45	120										

NOTES:

Hand augered upper 10 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 380 pound hammer falling 18 inches

**Photo Ionization Detector used for OVA readings

Downhole Test: NV = Noise/Vibration

Field Tech: DW
Prepared/Date: JF 3/29/2011
Checked/Date: RH/LT 10/1/2011

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.

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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\4953-10-1561_(120-139).GPJ 10/18/11

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.20c

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		G-125
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 550+50, Lt 20 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
4/6/2011 - 4/8/2011	4-7/8 inches	146 feet

GROUND-WATER READINGS
Drilling mud bailed on 4/7/2011. Ground-water level measured at 49 feet below the ground surface on 4/8/2011.

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		
145											8-inch thick Asphalt Concrete over 5-inch thick Portland Cement Concrete and 12-inch thick Base Course
											QUATERNARY YOUNGER ALLUVIUM [Qal]
										ML	SILT - moist, trace fine sand, some clay
140	5		0.0	14.5	112	12		⊠		ML	SANDY SILT - stiff, moist, brown, fine to medium sand
	10									ML	SILT - very stiff, moist, light brown, some fine sand, some clay
135		22	0.1	19.0	-			☒			**LAKEWOOD FORMATION [Qlw]**
										SM	SILTY SAND - loose, moist, light brown, fine to medium-grained
130	15		0.3	18.4	104	12		⊠			Becomes olive brown, fine-grained, trace iron oxide stains
125	20	24	0.0	20.1	-			☒			Becomes medium dense, brown to olive brown
120	25		0.5	15.4	107	33	19	⊠			Occasional medium sand
											SAN PEDRO FORMATION [Qsp]
										ML	SANDY SILT - very stiff, moist, olive brown
115	30	18	3.4	36.6	-			☒			
										SM	SILTY SAND - moist, bluish gray, fine to medium-grained
110	35		0.7	27.3	94	37		⊠		SP	POORLY GRADED SAND - dense, moist, bluish gray, fine to medium-grained
		24	2.9	22.8	-			☒		ML	SILT - very stiff, moist, bluish gray, fine to medium sand, some clay
	40										

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.

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
Prepared/Date: JF 6/10/2011
Checked/Date: LT 9/22/2011

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.21a

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINTW\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\4953-10-1561_(120-139).GPJ 10/18/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		**G-125 (Continued)**
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 550+50, Lt 20 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
4/6/2011 - 4/8/2011	4-7/8 inches	146 feet

GROUND-WATER READINGS
Drilling mud bailed on 4/7/2011. Ground-water level measured at 49 feet below the ground surface on 4/8/2011.

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		
105			3.8	14.1	115	21		⊠			Becomes greenish gray, trace gravel (up to 1/8 inch in size)
	45	36	4.9	19.1	-			⊠		SM	SILTY SAND - dense, moist, bluish gray, fine to coarse-grained, layers of Silt
100			5.9	19.5	107	23	61	⊠		ML	SANDY SILT - very stiff to hard, moist, greenish gray, fine to medium sand, trace coarse sand, occasional gravel (up to 3/8 inch in size), layers of Sandy Lean Clay
	50	40	8.3	18.6	-			⊠			▼
95			8.1	22.6	99	34		⊠			
	55	32	8.3	24.1	-			⊠			
			8.6	16.2	112	62	15	⊠		SM	SILTY SAND - very dense, greenish gray, fine to medium-grained, occasional coarse, some fine gravel (up to 3/4 inch in size), trace hydrogen sulfide odor
	60	42	8.4	23.3	-			⊠		MH	ELASTIC SILT - hard, wet, greenish gray, some fine sand, trace medium to coarse sand, some clay, trace hydrogen sulfide odor
	65		8.4	28.4	96	37	90	⊠			
		66	8.3	19.6	-			⊠		SP	POORLY GRADED SAND - dense to very dense, moist, bluish gray, fine to medium-grained
	70		8.2	24.7	103	53		⊠			Becomes greenish gray
	75	83	8.1	15.6	-			⊠			
70			8.3	27.8	96	95	14	⊠		SM	SILTY SAND with GRAVEL - very dense, moist, gray, fine-grained, some medium to coarse, fine gravel (up to 3/4 inch in size)
	80										

Tunnel

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
Prepared/Date: JF 6/10/2011
Checked/Date: LT 9/22/2011

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.21b

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINTW\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\4953-10-1561_(120-139).GPJ 10/18/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		**G-125 (Continued)**
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 550+50, Lt 20 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
4/6/2011 - 4/8/2011	4-7/8 inches	146 feet

GROUND-WATER READINGS
Drilling mud bailed on 4/7/2011. Ground-water level measured at 49 feet below the ground surface on 4/8/2011.

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		
65		50/4"	7.6	15.7	-			☒		SP	POORLY GRADED SAND - very dense, moist, bluish gray
			10.5	18.3	99	75/6"		⊠			Trace gravel (up to ½ inch in size), trace hydrogen sulfide odor
60	85	74	13.0	16.0	-			☒			
	90		10.1	25.5	93	80/11"	15	⊠		SM	SILTY SAND - very dense, wet, dark gray, fine-grained
55		62	9.2	25.8	-			☒			
	95									ML	SILT with SAND - moist, greenish gray
50			8.7	23.0	94	66		⊠		SP-SM	POORLY GRADED SAND with SILT - very dense, dark gray, fine-grained
	100	34	7.9	27.1	-			☒		ML	SILT with SAND - hard, wet, greenish gray, some clay
45										SM	SILTY SAND - dense, moist, greenish gray, fine to medium-grained, trace gravel, trace cobble (up to 6 inches in size)
	105		8.9	19.5	107	50		⊠			Thin layer of Silt, some clay
40										SP	POORLY GRADED SAND - very dense, moist, greenish gray, fine-grained, trace hydrogen sulfide odor
	110	52/6"	7.8	16.0	-			☒			Becomes gray, fine to medium-grained
35											
	115		9.3	19.0	103	75/5"		⊠		SP	POORLY GRADED SAND with GRAVEL - very dense, wet, greenish gray, fine to medium-grained, trace hydrogen sulfide odor, gravel (up to 1/4 inch in size)
30											
	120	50/5"	9.4	22.3	-			☒			

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR
Prepared/Date: JF 6/10/2011
Checked/Date: LT 9/22/2011

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.21c

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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\4953-10-1561_(120-139).GPJ 10/18/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		**G-125 (Continued)**
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 550+50, Lt 20 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
4/6/2011 - 4/8/2011	4-7/8 inches	146 feet

GROUND-WATER READINGS
Drilling mud bailed on 4/7/2011. Ground-water level measured at 49 feet below the ground surface on 4/8/2011.

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
25	125							☒	
20	130								
15	135								
10	140								
5	145								
0	150								
-5	155								
-10	160								

END OF BORING AT 120 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

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.

Field Tech: AR
Prepared/Date: JF 6/10/2011
Checked/Date: LT 9/22/2011

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LOG OF BORING
Project No.: 4953-10-1561 Figure: A-2.21d

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINTW\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\4953-10-1561_(120-139).GPJ 10/18/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		G-126
DRILLING METHOD	**BOREHOLE LOCATION**	
Rotary Wash	Sta 556+85, Lt 10 feet	
DATES DRILLED	**HOLE DIAMETER**	**GROUND EL.**
4/4/2011-4/7/2011	4-7/8 inches	143 feet

GROUND-WATER READINGS
Ground-water level encountered at 31 feet below ground surface.

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		
140	0										4-inch thick Asphalt Concrete over 12-inch thick Portland Cement Concrete, No Base Course
										CL	**FILL [Af]** CLAY and SAND - moist, dark brown to dark gray, with gravel (Sand - possible utility backfill)
135	5										**QUATERNARY YOUNGER ALLUVIUM [Qal]**
										CL	LEAN CLAY - very soft, moist, light brown
130	10			30.2	88	Push		⊠			
125	15	8		25.3	-			☒			Becomes medium stiff, brown, thin layer of fine Silty Sand
120	20			30.6	89	6		⊠			Trace sand
115	25	13		27.4	-			☒			Becomes stiff, thin layers of Sandy Lean Clay
											SAN PEDRO FORMATION [Qsp]
										MH	ELASTIC SILT - stiff, moist, greenish gray, trace fine sand
110	30			30.0	90	9		⊠			▽
105	35	15		31.8	-			☒			Becomes very stiff, wet, trace calcium carbonate nodules
	40										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DW
Prepared/Date: JF 5/18/2011
Checked/Date: LT/PE 9/22/2011

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LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.22a

LA METRO PB-TUNNEL ZONE S:\70131 GEOTECH\GINTW\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\4953-10-1561_(120-139).GPJ 10/18/11

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
C & L Drilling / Mayhew 1000		G-126 (Continued)
DRILLING METHOD Rotary Wash	**BOREHOLE LOCATION** Sta 556+85, Lt 10 feet	
DATES DRILLED 4/4/2011-4/7/2011	**HOLE DIAMETER** 4-7/8 inches	**GROUND EL.** 143 feet

GROUND-WATER READINGS
Ground-water level encountered at 31 feet below ground surface.

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			
				23.6	101	10		⊠				Alternating with layers of Poorly Graded Gravel
100	45	30		20.5	-		42	☒			SC	CLAYEY SAND - dense, wet, light gray to gray, fine-grained, trace gravel, calcium carbonate nodules
95	50			21.0	-	21		⊠				Cobbles (up to 3 inches in size)
90	55	44		29.1	94			☒			SM	SILTY SAND - dense, wet, gray, fine-grained
	60			34.9	92	43		⊠				Becomes greenish gray
Tunnel	65	49		29.2	-		55	☒			ML	SANDY SILT - hard, wet, gray, fine sand
	70			25.9	98	79		⊠			SP	POORLY GRADED SAND - very dense, wet, gray, fine-grained, trace silt, micaceous
65	75	36		28.3	-		45	☒			SM	SILTY SAND - dense, wet, greenish gray, fine-grained, thin layer of Lean Clay
	80											

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DW
Prepared/Date: JF 5/18/2011
Checked/Date: LT/PE 9/22/2011

MTA Westside Subway Extension
Los Angeles, California

amec

LOG OF BORING

Project No.: 4953-10-1561 Figure: A-2.22b

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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\4953-10-1561_(120-139).GPJ 10/18/11