



# WESTSIDE SUBWAY EXTENSION PROJECT

## Century City Area Fault Investigation Report

Volume 2 of 2

Appendix C—Logs of Borings  
Appendix D—Geovision Reports



November 2011 (Rev 1)

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## APPENDIX C—Logs of Borings

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Logs of Prior Borings [Rev 1](#)

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## APPENDIX C-1 LOGS OF BORINGS – CURRENT FAULT INVESTIGATION

Amec, Current Fault Investigation

Rotary Wash Borings:

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Hollow-stem Auger Borings:

T1-B1, T1-B2, T1-B3, T1-B4, T1-B5, T1-B7, and T1-B8

T2-B1, T2-B2, T2-B3, T2-B5, T2-B6, T2-B7, T2-B8, T2-B9, and T2-B10

T2E-B1, T2E-B4, T2E-B5, T2E-B7, T2E-B8, T2E-B9, and T2E-B10

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T4-B1, T4-B2, T4-B3, T4-B4, T4-B6, T4-B7, T4-B8, T4-B9, and T4-B10

T7-B1, T7-B2, T7-B3, T7-B4, and T7-B5

T8-B1, T8-B3, T8-B4, T8-B5, and T8-B6

















ELEVATION (ft)	DEPTH (ft)	ROCK CORE						MATERIAL DESCRIPTION
		BOX #	RUN #	% RECOVERY	SAMPLE LOCATION	SOIL GRAPHIC	SOIL TYPE	

1 2 3 4 5 6 7 8





**COLUMN DESCRIPTIONS**

- 1 **ELEVATION:** Elevation, in feet (ft), referenced to mean sea level (MSL).
- 2 **DEPTH:** Distance (in feet) below ground surface
- 3 **BOX #:** Recovered core box number.
- 4 **RUN #:** Individual coring interval number.
- 5 **RECOVERY:** Percentage of recovered core from the coring interval; calculated as length of recovered core divided by length of run.
- 6 **SAMPLE LOCATION:** Estimated depth of recovered core sample.
- 7 **SOIL GRAPHIC:** Graphical illustration of standardized soil type.
- 8 **SOIL TYPE:** Soil type label, based on the Unified Soil Classification System (USCS). No laboratory testing was performed as part of this investigation to confirm soil classifications.

**TYPICAL MATERIAL GRAPHIC SYMBOLS**

 Clay	 Sandy Clay	 Clay with Gravel	 Silt
 Sandy Silt	 Silt with Gravel	 Well Graded Sand	 Poorly Graded Sand
 Clayey Sand	 Clayey Sand with Gravel	 Silty Sand	 Silty Sand with Gravel
 Sand with Gravel	 Clayey Gravel	 Silty Gravel	 Well Graded Gravel

**OTHER GRAPHIC SYMBOLS**

-  Groundwater encountered during drilling
-  Groundwater measured during drilling
-  Approximate contact line between soil types and/or sub-units
-  Approximate contact line between geologic units

MACTEC CORE KEY; File: KEY.GPJ; 10/14/2011

<p>This log is a reasonable interpretation of subsurface conditions at the time of exploration and at the exploration location. Subsurface conditions may differ at different times and locations outside of the exploration. Depths of strata are approximate.</p>	<h2 style="margin: 0;">Key to Log of Core Boring</h2> <p style="margin: 0;">Sheet 1 of 1</p>
<p><b>MTA Westside Subway Extension</b>  <b>Los Angeles, California</b>  <b>Project No. 4953-10-1561</b></p>	
<p><b>Figure A-1</b></p>	

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)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T1-B1</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/21/11	8 inches	282 feet
						GROUNDWATER READINGS		
						Encountered at 47 feet during drilling.		
						Asphaltic Concrete		
						<b>FILL [Af]</b> Clayey Silt and Silty Clay, variable fine to coarse sand and gravel, gravel 2-25%, up to 1 inch; color variable, mainly dark yellowish brown (10YR 4/4) to dark grayish brown (10YR 4/2); appears very moist and stiff to very stiff; occasional very dark brown (10YR 2/2), organic-rich layers Hand augered to 5-feet		
						<b>NOTE:</b> Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed descriptions of clasts		
280								
	5							
		1	1	100				
275								
	10							
		1	2	100				
270								
	15							
							At 15.0 to 15.5' and 18.0 to 19.7': Organic-rich layer, 20-30% gravel	
							At 16.6': Small piece of glass	
265								
		1	3	100				
260								
	20							

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: YN/WL/MW 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

METRO SOIL CORE S:\70131\_GEOTECH\GINTW\Fault\_Investigation\_WSE\_Library\_AMEC\_October2011\_(2).GIR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL\_FIELD\_NOTES\GINT LOGS\101561-TRANSECT 1.GPI 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T1-B1</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/21/11	8 inches	282 feet
						GROUNDWATER READINGS		
						Encountered at 47 feet during drilling.		
260		2	4	100	ML/CL	Af Continued		
					ML	At 22.3': Asphalt fragment <b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Sandy Silt, trace to some clay, trace coarse sand (Jsm and Tm); brown (7.5YR 4/4); appears very moist and stiff; lower contact is narrowly gradational At 23.6': Possible detrital charcoal, sample obtained		
25					SM	Silty Sand with Gravel, fine grained, clasts 15-20% up to 1 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); brown (7.5YR 4/4); appears moist and dense		
255		2	5	90	ML	Clayey to Sandy Silt, variable coarse sand and fine gravel (Jsm and Tm), clasts 2-10%, up to 3/4 inch; dark brown (7.5YR 3/3); appears very moist and stiff to very stiff; poorly sorted, lower contact is gradational  At 28.0 to 28.1': Silty Sand bed, fine grained At 28.1 to 29.3': Gravel increases to 15-30%, up to 3/4 inch (Jsm and Tm)		
30					GC	Clayey Gravel, clasts 50-70% up to 2 inches, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); matrix is fine to coarse clayey sand; color variable, mainly dark brown (7.5YR 3/4); appears very moist and dense; lower contact is sharp, erosional		
250		2	6	100	SC	At 32.5 to 33.1': Grades to Clayey Sand with Gravel, fine to coarse grained		
					GC			
					CL-ML	Silty Clay and Clayey Silt, variable fine sand, trace coarse sand (Jsm and Tm); dark brown (7.5YR 3/4); appears moist and very stiff to hard; lower contact occurs between runs		
35					ML	Sandy Silt, trace to some clay; brown (7.5YR 4/4) to dark yellowish brown (10YR 4/6); appears moist to very moist and medium stiff to stiff; lower contact is sharp		
245		3	7	94	GM	Silty Gravel, clasts 60-70%, up to 3/4 inch, mainly subrounded slate (Jsm), shale (Tm) and sandstone (Tm); matrix is fine to coarse silty sand; color variable; appears moist and dense; lower contact is sharp  At 38.3 to 38.7': Clayey to Sandy Silt; brown (7.5YR 4/4); appears very moist and stiff		
40								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
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 Checked/Date: MW/MF 10/13/2011

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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 1.GPI 10/14/11

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					DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
					Martini Drilling / CME 75		<b>T1-B1 (Continued)</b>
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	DRILLING METHOD	BOREHOLE LOCATION	
					Hollow Stem Auger	See Plate 3	<b>GROUND EL.</b> 282 feet
					<b>DATES DRILLED</b> 5/21/11	<b>HOLE DIAMETER</b> 8 inches	
					<b>GROUNDWATER READINGS</b> Encountered at 47 feet during drilling.		
					GM	<b>Qfo Continued</b> At 40.0 to 40.8': Matrix becomes fine to coarse grained, well graded sand	
240		3	8	100	SM/ML & CL	<b>ESTUARINE DEPOSITS [Qe]</b> Alternating beds of very fine Silty Sand/Sandy Silt and Silty Clay; rare (<1%) coarse sand; brown (7.5YR 4/4); appears very moist and stiff; lower contact is sharp  At 43.6 to 43.8': Silty Sand, fine to coarse grained; appears moist and dense; upper and lower contacts are sharp	
45					SM/ML	Silty Sand and Sandy Silt, very fine grained, trace to some clay; brown (7.5YR 4/3); appears very moist and medium stiff/dense; lower contact is gradational	
235		3	9	98	SM	At 47': Groundwater encountered during drilling	
					SM/CL	At 47.2 to 47.6': Silty Sand, fine grained, micaceous	
					ML/GM	At 47.6 to 48.2': Alternating beds of very fine Silty Sand as above, and Clay, appears soft and wet	
					GM	At 48.2 to 49.1': Alternating beds of Clayey Silt and Silty Gravel; appears wet and soft; gradational transition to unit below	
50						<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Silty Gravel, clasts 50-60%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), some shale (Tm), matrix is fine to coarse silty sand; very dark gray (7.5YR 3/1); appears very moist to wet and dense; lower contact is sharp, erosional	
230		4	10	100	CL/ML	Silty Clay and Clayey Silt, variable fine sand, trace coarse sand (Jsm and Tm); brown (7.5YR 4/4); appears wet and soft; lower contact is gradational	
					CL/ML	Clayey Silt and Silty Clay, variable fine to coarse sand and fine gravel, clasts 5-20%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); dark brown (7.5YR 3/3); appears very moist and stiff to very stiff; lower contact is gradational	
55						At 55.7 to 56.3': Increasing sand, gradational transition to unit below	
225		4	11	100	GC	<b>OLDER FLUVIAL DEPOSITS [Qfofl]</b> Clayey Gravel, clasts 50 to 60%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm), matrix is fine clayey sand; dark brown (7.5YR 3/2); appears very moist and dense; lower contact is sharp, erosional	
					SM	Silty Sand, fine to medium grained, trace to some clay, trace fine gravel, color variable; appears very moist and dense	
					SC	At 58.6 to 58.8': Gravel increases to 30-40% At 58.8 to 60.0': Grades to Clayey Sand, trace fine gravel	
60							

(CONTINUED ON FOLLOWING FIGURE)

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






ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T1-B1</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/21/11	8 inches	282 feet
						GROUNDWATER READINGS		
						Encountered at 47 feet during drilling.		
220		4	12	90	GP	<b>Qfofl Continued</b> At 60.0 to 61.7': Gravel 70%; clast-supported, up to 2 inches, mainly subangular slate (Jsm) with some subangular to subrounded shale (Tm) and sandstone (Tm), lower contact is sharp, erosional		
65					SM	<b>LAKWOOD FORMATION [Qlw]</b> Silty Sand, fine to medium grained, color variable, mainly light yellowish brown (2.5Y 6/4) to yellowish brown (10YR 5/8); appears moist and dense, abundant laminations defined by variable oxidation		
215		5	13	86	SP-SM	Poorly Graded Sand with Silt, fine to medium grained; light yellowish brown (2.5Y 6/4) to yellowish brown (10YR 5/8); appears wet and dense  At 67.5 to 68.3': Becomes fine grained, color is grayish brown (2.5Y 5/2)  At 68.3 to 72.0': Color becomes light yellowish brown (2.5Y 6/3); occasional manganese oxide staining  At 69.2 to 69.4': Clayey Silty Gravel, clasts 50 to 60%, up to 1/2-inch, mainly subangular granitic rock, matrix is fine to coarse grained, clayey, silty sand; yellow (2.5Y 8/6) to reddish yellow (7.5YR 7/8)		
70					SM	At 71.5 to 72.0': Becomes gravelly, clasts 15-20%, up to 3/4 inch, mainly subrounded slate and quartzite Silty Sand, fine to medium grained; highly oxidized, color variable, mainly strong brown (7.5YR 5/8) to yellowish red (5YR 4/6); appears wet and dense; abundant laminations defined by variable oxidation; lower contact occur between runs  At 73.2 to 73.3': Manganese oxide-rich bed; subangular slate (Jsm); color is dark gray (7.5YR 4/1) At 73.3 to 73.4': Clayey, Silty Sand, fine grained; yellow (2.5Y 8/6) to brownish yellow (10YR 6/8) At 73.4 to 74.0': Clayey, Silty Sand with Gravel, fine grained, clasts 25-35%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm) At 74.0 to 75.0': No recovery		
210		5	14	80	SM/SC			
75					SM	Silty Sand, fine grained; highly oxidized; strongly mottled, strong brown (7.5 YR 5/8) to light olive brown (2.5Y 5/3); appears wet and dense; slightly micaceous, well sorted  At 76.6 to 78.0': Oxidation decreases with depth At 77.1 to 77.3': Trace fine gravel (Jsm)  At 78.0': Color becomes light brownish gray (2.5Y 6/2) with faint strong brown (7.5YR 5/6) mottling; slightly micaceous		
205		5	15	100				
80								

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T1-B1</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/21/11	8 inches	282 feet
						GROUNDWATER READINGS		
						Encountered at 47 feet during drilling.		
						 SM <b>Qlw Continued</b> Silty Sand, very fine grained, lightly mottled, yellowish brown (10YR 5/8) to grayish brown (10YR 5/2); appears wet and dense; micaceous		
	200	6	16	66		 SM/CL Silty Sand and Silty Clay interbedded laminae, very fine grained; color variable, mainly grayish brown (10YR 5/2) to yellowish brown (10YR 5/6), to strong brown (7.5 YR 4/6); appears wet and dense/stiff; micaceous, typical bed and lamination thickness 1/4 inch to 2 inches; lower contact is sharp At 82.6 to 82.7': Oxidized Clay/Silt bed <b>SAN PEDRO FORMATION [Qsp]</b> Silty Sand; very fine grained, greenish gray (10BG 5/1); appears wet and dense; slightly micaceous At 83.3' to 90.0': No recovery		
	85							
	195	6	17	0				
	90					 SM Silty Sand, very fine grained, trace coarse sand and fine gravel (Jsm); dark greenish gray (10 BG 4/1); appears wet and dense; occasional laminations		
	190	6	18	34		 GM Silty Gravel, clasts 50 to 60%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), some quartzite; matrix is fine to coarse silty sand; dark greenish gray (10Y 4/1); appears wet and dense; depth of lower contact uncertain due to poor recovery At 91.7' to 95.0': No recovery		
	95							
	185	6	19	80		 SM Silty Sand, very fine grained, trace coarse sand (Jsm and Tm); greenish gray (10BG 5/1); appears wet and dense  GP At 95.7 to 96.3' and 98.2 to 98.5': Gravel, clasts 50 to 60%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), some granitic rock  SM At 99.0 to 100.0': No recovery		
	100							

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: YN/WL/MW 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T1-B1e

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T1-B1 (Continued)
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/21/11	8 inches	282 feet
						GROUNDWATER READINGS		
						Encountered at 47 feet during drilling.		
180						END OF BORING AT 100 FEET		
105						NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched. -Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than ¼ inch). -Beds are generally massive unless otherwise noted.		
175								
110								
170								
115								
165								
120								

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						DRILLING METHOD	BOREHOLE LOCATION	T1-B2
						Jet Drilling/Tri Country / CME 75	Hollow Stem Auger	See Plate 3
						2/14/11-2/15/11 and 6/30/11-7/1/11	HOLE DIAMETER	8 inches
						GROUNDWATER READINGS Encountered at 36½ feet during drilling.		
						12 inches of asphaltic concrete over 8 inches of base		
						Hand augered to 6 feet		
						<b>FILL [Af]</b> Clayey to Sandy Silt, variable coarse sand and fine gravel, gravel 0-10%, up to ½ inch; dark yellowish brown (10YR 3/4); appears damp to moist and very stiff; trace asphalt and other fill debris		
						NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed description of clasts		
		1	1	100				
	5							
		1	2	60				At 10.0': Color change to very dark grayish brown (10YR 3/2)
								At 12.0 to 14.0': No recovery
		1	3	100				At 14.8': Glass fragments
		1	4	100				
								<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Sandy Silt, trace to some clay, trace coarse sand and fine gravel (Jsm and Tm); dark yellowish brown (10YR 3/4); appears damp and very stiff; lower contact is gradational
	20							

(CONTINUED ON FOLLOWING FIGURE)

Geologist: LH/MF  
 Prepared/Date: YN/WL/MW 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

METRO SOIL CORE S:\70131\_GEOTECH\GINTW\Fault\_Investigation\_WSE\_Library\_AMEC\_October2011\_(2).GIR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL\_FIELD\_NOTES\GINT LOGS\101561-TRANSECT 1.GPI 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T1-B2 (Continued)
						Hollow Stem Auger	See Plate 3	
						<b>DATES DRILLED</b> 2/14/11-2/15/11 and 6/30/11-7/1/11	<b>HOLE DIAMETER</b> 8 inches	<b>GROUND EL.</b> 278 feet
						<b>GROUNDWATER READINGS</b> Encountered at 36½ feet during drilling.		
		2	5	92	ML	<b>Qfo Continued</b> At 20.5': Charcoal fragment, sample obtained At 21.0': Gravel content increases to 5 to 10%		
255					SM	Silty Sand, fine grained, some coarse sand and gravel, clasts 10 to 15%, up to 1½ inches; mainly subangular slate (Jsm) with lesser subrounded shale and sandstone (Tm); dark yellowish brown (10YR 3/6); appears damp and dense; lower contact is sharp		
25					CL	At 25.0 to 25.6': Silty Clay; dark yellowish brown, appears moist and very stiff		
		2	6	40	SM	At 25.6': Silty Sand, fine grained, variable coarse sand and fine gravel, clasts 5 to 20%, up to ½ inch (Jsm and Tm); brown (10YR 5/3); appears dry/damp At 26.0 to 29.0': No recovery		
250					SM/ML	Silty Sand and Sandy Silt, fine grained, some coarse sand and fine gravel, clasts 5 to 15%, up to ½ inch; mainly subangular, slate (Jsm) with lesser subrounded shale and sandstone (Tm); dark yellowish brown (10YR 3/4); appears moist and dense/very stiff; lower contact is gradational		
30		2	7	100	ML	Clayey to Sandy Silt, some coarse sand and gravel, clasts 5 to 15%, up to ¾ inch; mainly subangular to subrounded, slate (Jsm) with lesser subrounded shale and sandstone (Tm); dark yellowish brown (10YR 3/6); appears moist and very stiff; lower contact is sharp		
245		2	8	72		At 35.0': Coarse sand and gravel content decreases to trace		
35		2	9	100		At 36.5' Groundwater encountered during drilling		
		3	10	63	SM	<b>ESTUARINE DEPOSITS [Qe]</b> Silty Sand, fine grained, trace coarse sand (Jsm and Tm); faintly mottled, dark grayish brown (2.5Y 4/2) to dark yellowish brown (10YR 3/6); appears wet; lower contact is sharp		
240						At 38.5 to 40.0': No recovery		
40								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: LH/MF  
 Prepared/Date: YN/WL/MW 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T1-B2b

METRO SOIL CORE S:\70131 GEOTECH\GINTW\Fault\_Investigation\_WSE\_Library\_AMEC OCTOBER2011 (2).GIR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 1.GPI 10/14/11

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




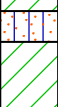


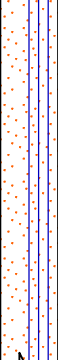
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T1-B2 (Continued)
						Hollow Stem Auger	See Plate 3	
						2/14/11-2/15/11 and 6/30/11-7/1/11	HOLE DIAMETER 8 inches	GROUND EL. 278 feet
						<b>GROUNDWATER READINGS</b> Encountered at 36½ feet during drilling.		
235		3	11	88	SM	<b>Qe Continued</b> At 40.0 to 40.8': Becomes coarser, fine to medium grained, trace coarse sand and fine gravel (Jsm and Tm) At 40.8 to 41.2': Grades to Silty Sand, fine grained, strongly mottled At 41.2 to 41.6': Sand with Gravel, fine to coarse grained, gravel 20 to 30%, up to ½ inch (Jsm and Tm); dark brown (10YR 3/3), appears wet; lower contact is sharp		
					SP			
					SM/ML	Silty Sand/Sandy Silt, fine grained, trace coarse sand and fine gravel (Jsm and Tm); faintly mottled, dark grayish brown (2.5Y 4/2) to dark brown (7.5YR 3/3); appears wet and dense/very stiff; well sorted; lower contact is gradational		
45		3	12	100	SM	Silty Sand, fine grained, trace coarse sand and fine gravel (Jsm and Tm); brown (7.5Y 4/4), appears wet and dense; well sorted; lower contact is narrowly gradational		
					GW	<b>OLDER FLUVIAL DEPOSITS [Qfofl]</b> Well Graded Gravel with Silt and Sand, soil matrix is fine to coarse sand, clasts 60 to 70%, up to 1½ inch, mainly Jsm and Tm, some granitic rock; dark yellowish brown (10YR 3/4); appears wet; lower contact occurs between runs		
230		3	14	80	SP	Poorly Graded Sand, fine grained; brown (10YR 4/3); appears wet and dense		
					SW	Well Graded Sand with Gravel, fine to coarse grained, clasts 15 to 25%, up to ½ inch, mainly Jsm and Tm, some quartzite, gravel content increases with depth; dark olive brown (2.5Y 3/3); appears wet and dense; lower contact occurs between runs		
50					SW	At 50.0 to 51.5': Well Graded Sand, fine to medium grained, coarsens with depth; brown (10YR 4/3); appears wet and dense		
						At 53.0 to 55.0': No recovery		
225		4	15	60				
					SP	Poorly Graded Sand, fine to medium grained, coarsens with depth; brown (10YR 4/3); appears wet and dense; lower contact is erosional, appears to dip about 15 degrees		
55					ML/CL	<b>LAKWOOD FORMATION [Qlw]</b> Clayey to Sandy Silt, trace to some fine sand, trace coarse sand (Jsm and Tm); dark yellowish brown (10YR 4/4), trace magnesium oxide specks (<1/8 inch); appears very moist and very stiff; lower contact is sharp		
220		4	16	50		At 57.5 to 60.0': No recovery		
60								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: LH/MF  
 Prepared/Date: YN/WL/MW 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

METRO SOIL CORE S:\70131 GEOTECH\GINTW\FALT\_INVESTIGATION\_WSE\_LIBRARY\_AMEC OCTOBER2011 (2).GIR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 1.GPI 10/14/11

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T1-B2 (Continued)
						Jet Drilling/Tri Country / CME 75		
						Hollow Stem Auger	See Plate 3	
						<b>DATES DRILLED</b> 2/14/11-2/15/11 and 6/30/11-7/1/11	<b>HOLE DIAMETER</b> 8 inches	<b>GROUND EL.</b> 278 feet
						<b>GROUNDWATER READINGS</b> Encountered at 36½ feet during drilling.		
215		4	17	80		<b>Qlw Continued</b> <b>Marker Bed M<sub>H</sub></b> Silty Clay and Clay; trace to some fine sand; dark grayish brown (2.5Y 4/2); appears very moist and very stiff; some vertically-oriented, prismatic manganese flecks (5 to 20%, up to 1/16 inch x ¼ inch); lower contact is gradational At 61.5 to 62.0': Becomes mottled, dark yellowish brown (10YR 4/3) to dark grayish brown (2.5Y 4/2) At 62.0': Becomes very dark grayish brown (2.5Y 3/2), trace calcium carbonate nodules up to 1 inch		
65						<b>Marker Bed M<sub>G</sub> / Carbonate-rich Bed [Qlw]</b> Silty Clay with extensive calcium carbonate development, calcium carbonate 70 to 90%, occurs as powdery deposits and clusters of subangular, 1/8 inch to ¼ inch concretions; silty clay is very dark grayish brown (2.5Y 3/2), calcium carbonate powdered deposits are white (10YR 9.5/1), calcium carbonate concretions are white (10YR 8/1); appears moist to very moist and very stiff to very hard (concretions); lower contact is narrowly gradational At 64.0 to 65.0': No recovery At 65.0': Appears very moist to wet and medium stiff to very hard		
210		4	18	94				
70						At 68.7 to 69.1': Grades to Sandy Silt, trace calcium carbonate; grayish brown (2.5Y 5/2); appears moist and hard At 69.1 to 70.3': Calcium carbonate content decreases and becomes more variable, 10 to 30%		
205		5	19	100		Silty Clay and Clay, trace to some fine sand; mottled, light olive brown (2.5Y 5/3) to dark yellowish brown (2.5Y 4/6); very moist; very stiff; 5-15% calcium carbonate, occurs as dispersed deposits and small (<¼ inch) nodules and vertically oriented prisms At 71.3': ¾ inch thick layer with concentrated calcium carbonate deposits and small (<¼ inch) concretions  At 73.0 to 74.5': Little or no calcium carbonate		
75						Poorly Graded Sand with Silt, fine to medium grained, trace coarse sand and fine gravel (Jsm); light olive brown (2.5Y 5/4); appears wet; lower contact is sharp		
200		5	20	100		At 79.0 to 80.0': Marker Bed M <sub>C</sub> - Grades to fine to coarse, poorly graded sand, 5 to 10% fine gravel (Jsm)		
80								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: LH/MF  
 Prepared/Date: YN/WL/MW 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T1-B2 (Continued)
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED 2/14/11-2/15/11 and 6/30/11-7/1/11	HOLE DIAMETER 8 inches	GROUND EL. 278 feet
						GROUNDWATER READINGS Encountered at 36½ feet during drilling.		
195		5	21	90	SP/SM	<b>Qlw Continued</b>  At 81.0 to 82.4': Becomes strongly mottled, light olive brown (2.5Y 5/4) to yellowish brown (10YR 5/8); appears wet and dense; trace concretionary iron oxide laminations At 81.4': ½ inch thick, subhorizontal, concretionary iron oxide lamination		
85						Silty Sand, fine grained, trace coarse sand and fine gravel (Jsm and quartzite); light olive brown (2.5Y 5/4) to yellowish brown (10YR 5/8) to strong brown (7.5YR 5/8); distinct laminations defined by variable oxidation		
190		6	22	25	SM	<b>SAN PEDRO FORMATION [Qsp]</b> ilty Sand, very fine grained; very dark greenish gray (5GY 3/1)  At 86.3 to 90.0': No recovery		
90		6	23	10	SM	At 90.3 to 92.5': No recovery		
185		6	24	70	SM	At 92.5': Oxidizes upon contact with open air		
95						At 95.0 to 96.5': Silty Sand, fine to coarse grained, some gravel beds, clasts 15 to 20%, up to ¾ inch, mainly subrounded slate (Jsm) and granitic rock		
180		6	25	25		At 96.5 to 100.0': No recovery, cemented zone		
100								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: LH/MF  
 Prepared/Date: YN/WL/MW 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

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









**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T1-B2e



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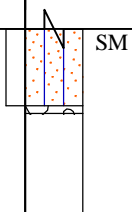
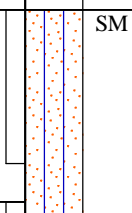
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T1-B2 (Continued)
						Jet Drilling/Tri Country / CME 75	Hollow Stem Auger	See Plate 3
						2/14/11-2/15/11 and 6/30/11-7/1/11	HOLE DIAMETER	8 inches
						GROUNDWATER READINGS Encountered at 36½ feet during drilling.		
		6	26	20		Qsp continued At 100.5 to 102.5': No recovery		
175		6	27	27		At 102.5': Poorly Graded Sand, fine to very fine grained; dark greenish gray (5GY 4/1), sand becomes cemented near lower contact		
105		7	28	40		Clay; black (5Y 2.5/1); appears moist and stiff to very stiff; trace calcium carbonate and subrounded gravel (up to 1½ inch), thinly bedded to laminated with organic-rich sediments		
		7	29	100		At 105.6': Bivalve shell, clay becomes calcium carbonate-rich with some calcium carbonate gravel and sand At 106.0 to 107.5': No recovery		
170		7	30	20		107.5': Silty Sand, fine to medium grained; greenish black (10Y 2.5/1); appears moist and dense		
110		7	31	35		At 111.0 to 115.0': No recovery		
165						At 115.0 to 116.7': Some calcium carbonate; some coarse gravel, up to 2½ inches		
115						At 116.7 to 120.0': No recovery		
160								
120								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: LH/MF  
 Prepared/Date: YN/WL/MW 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T1-B2 (Continued)
						Hollow Stem Auger	See Plate 3	
						2/14/11-2/15/11 and 6/30/11-7/1/11	HOLE DIAMETER 8 inches	GROUND EL. 278 feet
						GROUNDWATER READINGS Encountered at 36½ feet during drilling.		
		7	32	40		<b>Qsp Continued</b>  At 121': Some gravel and cobbles, no recovery to 122.5'		
155		7	33	80		At 124.0 to 124.5': Silt content increasing, interbedded fine to coarse gravel layers At 124.5 to 126.0': Sandy Silt interbeds		
125						At 126.0 to 130.0': No recovery		
150		7	34	20				
130						END OF BORING AT 130 FEET		
						NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched.  -Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than ¼ inch). -Beds are generally massive unless otherwise noted.		
145								
135								
140								

Geologist: LH/MF  
 Prepared/Date: YN/WL/MW 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

METRO SOIL CORE S:\70131 GEOTECH\GINTW\Fault\_Investigation\_WSE\_Library\_AMEC\_October2011\_02.GLR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 1.GPI 10/14/11

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T1-B3</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/7/11 and 6/22/11-6/24/11	8 inches	278 feet
						GROUNDWATER READINGS		
						Encountered at 34-feet and measured at 17.6 feet during drilling.		
						8 inches of asphaltic concrete over 3 inches of base		
						Hand augered to 6 feet		
						<b>FILL [Af]</b>		
						Clayey to Sandy Silt, variable coarse sand and fine gravel, clasts 0-10%, up to 3/4-inch; dark yellowish brown (10YR 3/4); appears damp to moist and very stiff		
						NOTE:		
						Jsm = Santa Monica Slate		
						Tm = Modelo Formation		
						See end of log for more detailed description of clasts		
275	5							
270		1	1	100				
						GP		At 9.0' to 9.5': Gravelly layer, clasts 30-40%, up to 1 inch
						ML		
								At 11.0 to 14.0': No recovery
265		1	2	25				
								At 14.0' to 14.5': Decomposed organics, strong organic odor
						ML		<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b>
								Sandy Silt, trace to some clay, trace coarse sand and fine gravel (Jsm and Tsm); dark yellowish brown (10YR 3/4); appears moist and very stiff; lower contact is narrowly gradational
						SM		At 16.0 to 17.5': Silty Sand with Gravel, fine grained, gravel 15-20%, up to 1/2 inch, mainly subangular shale (Jsm) and subrounded quartzite and shale (Tm)
260		1	4	100		ML		▼ At 17.6': Groundwater measured during drilling
						SM		Silty Sand with variable gravel, fine-grained, gravel 5-25%, up to 3/4 inch, mainly angular to subangular shale (Jsm) and subrounded shale (Tm) and quartzite; dark yellowish brown (10YR 4/6); appears dry to damp and dense; lower contact appears sharp
20								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF/MW  
 Prepared/Date: YN/WL/AR 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

MTA Westside Subway Extension  
 Los Angeles, California



**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T1-B3a

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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 1.GPI 10/14/11

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T1-B3 (Continued)
						Jet Drilling / CME 75		
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/7/11 and 6/22/11-6/24/11	8 inches	278 feet
						GROUNDWATER READINGS		
						Encountered at 34-feet and measured at 17.6 feet during drilling.		
		2	5	80	SM	<b>Qfo Continued</b> At 20.0 to 21.0' and 23.8 to 24.4': Soil matrix grades to fine to coarse sand with silt; yellowish brown (10YR 5/4); gravel as above		
255		2	6	100	ML	At 22.7 to 23.5': Clayey to Sandy Silt, trace coarse sand; dark yellowish brown (10YR 4/4); appears moist and stiff		
					SM	At 24.4 to 25.2': Occasional Sandy Silt lenses		
25		2	7	68	GW	Well Graded Gravel with Sand, gravel 60-70%, up to 1 inch; mainly subangular slate (Jsm) and subangular to subrounded shale (Tm) and quartzite, matrix is fine to coarse, well graded sand; brown (10YR 5/3); appears dry to damp; lower contact is erosional, appears to dip about 10 degrees		
250		2	8	68	ML	Sandy Silt with Clay, trace coarse sand; dark yellowish brown (10YR 4/6); appears very moist and very stiff; lower contact occurs between runs		
30		2	9	100	ML/ CL	Clayey Silt and Silty Clay, trace to some fine sand, trace coarse sand and fine gravel (Jsm and Tm); dark brown (10YR 3/3); appears very moist and stiff to very stiff; lower contact occurs between runs		
245		2	10	100		At 34': Groundwater encountered during drilling		
35		3	11	96	ML	Sandy to Clayey Silt, trace coarse sand and fine gravel (Jsm and Tm); lightly mottled, color variable, mainly brown (10YR 5/3) to strong brown (7.5YR 4/6); appears very moist to wet and stiff; lower contact is gradational At 34.0 to 34.5': Gravelly bed, clasts 10-20%, up to 3/4-inch, mainly subangular slate (Jsm) and subrounded shale (Tm)		
240		3	12	100	ML	ESTUARINE DEPOSITS [Qe] Sandy Silt, trace to some clay, trace coarse sand; brown (10YR 5/3) with light brownish gray (10YR 6/2) mottling; appears very moist to wet and stiff; well sorted; lower contact is gradational		
40								

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T1-B3 (Continued)
						Jet Drilling / CME 75		
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/7/11 and 6/22/11-6/24/11	8 inches	278 feet
						GROUNDWATER READINGS		
						Encountered at 34-feet and measured at 17.6 feet during drilling.		
		3	13	100	ML	<b>Qfo Continued</b>		
						At 42.0 to 43.2': Mottling more distinct, dark grayish brown (10YR 4/2) to brown (7.5YR 4/4)		
235		3	14	100	SM	Silty Sand, fine grained; mottled, grayish brown (2.5Y 5/2) to strong brown (7.5YR 4/6); appears wet and dense; well sorted; lower contact appears narrowly gradational (not intact)		
	45				ML	At 44.6 to 45.0': Grades to Sandy Silt with Clay		
		3	15	80	SM	At 45.0 to 45.4': Little or no mottling, grayish brown (10YR 5/4)		
					GW	<b>OLDER FLUVIAL DEPOSITS [Qfofl]</b>		
						Well Graded Gravel with Sand; gravel 60-70%, up to 1½-inch; mainly subangular to subrounded slate (Jsm), some subrounded shale and fine sandstone (Tm), quartzite and granitic rock, some portions possibly clast-supported; soil matrix is fine to coarse sand; very dark grayish brown (10YR 3/2); appears wet and dense; abundant manganese oxide staining; lower contact occurs between runs		
230		3	16	80		At 48.5 to 49.5': Soil matrix grades to clayey sand, fine to coarse grained		
	50					At 51.5 to 52.5': Poorly Graded Sand; fine to medium grained, yellowish brown (10YR 5/4)		
		4	17	80	SP			
					GW			
225		4	18	72				
	55					At 55.3 to 56.5': No recovery		
		4	19	52				
					ML/ CL	<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b>		
						Silty Clay and Clayey Silt, trace to some fine grained sand, trace coarse grained sand and fine gravel (Jsm and Tm), occasional clay beds; brown (7.5YR 4/4); appears very moist and very stiff		
220		4	20	100	ML	At 58.0 to 58.8': Grades to Sandy Silt with Clay		
					ML/ CL	At 59.0 to 60.0': Lightly mottled, brown (7.5YR 4/4) to yellowish brown (10YR 5/4)		
60								

(CONTINUED ON FOLLOWING FIGURE)

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MTA Westside Subway Extension  
 Los Angeles, California



LOG OF BORING

Project No.: 4953-10-1561 Figure: T1-B3c

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T1-B3 (Continued)
						Jet Drilling / CME 75		
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/7/11 and 6/22/11-6/24/11	8 inches	278 feet
						GROUNDWATER READINGS		
						Encountered at 34-feet and measured at 17.6 feet during drilling.		
		4	21	100		ML/ CL	Qef Continued	
215		4	22	100		ML/ CL	ESTUARINE DEPOSITS [Qe] Silty Clay and Clayey Silt, variable fine to coarse sand; trace fine gravel (Jsm and Tm); brown (7.5YR 4/4); appears very moist and very stiff; lower contact is gradational	
65						CL/ CH	At 64.0 to 67.0': Becomes more clayey, mainly clay to silty clay, sand decreases	
210		5	23	100		ML/ CL	At 67.0 to 68.0': Faint subhorizontal laminations  At 68.0 to 71.0': Coarse sand and gravel content increasing with depth	
70						GC- GM	OLDER ALLUVIAL FAN / FLUVIAL DEPOSITS [Qfofl] Silty, Clayey Gravel, gravel 50-60%, up to 1½ inches, mainly angular to subangular slate (Jsm), some shale, brick-red sandstone (Tm), and quartzite; matrix is fine to coarse silty, clayey sand; dark yellowish brown (10YR 4/4); appears wet and dense; lower contact appears gradational	
205		5	24	88		SC- SM	At 75.0 to 76.0 Gravel decreases, grades to Silty, Clayey Sand with Gravel	
75		5	25	80		ML	ESTUARINE DEPOSITS [Qe] Clayey to Sandy Silt, trace coarse sand; lightly mottled, color variable, mainly yellowish brown (10YR 5/4) with brown (7.5YR 4/4) mottles and laminations; appears very moist and very stiff; lower contact is erosional; appears to dip about 15 degrees	
200							At 78.0 to 80.0': No recovery	
80								

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T1-B3 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/7/11 and 6/22/11-6/24/11	8 inches	278 feet
						GROUNDWATER READINGS		
						Encountered at 34-feet and measured at 17.6 feet during drilling.		
195		1	1	100	SM/ML	<b>Qe Continued</b> Silty Sand to Sandy Silt, fine grained; light olive brown (2.5Y 5/4), mottled oxidation; appears moist and medium dense At 80.2': Gravelly layer (1 inch thick); very dark grayish brown (2.5Y 3/2); clasts mainly subangular slate (Jsm), trace brick-red sandstone clast  At 82.6 to 83.7': Interbedded clayey silt (2-6 inches thick); lower contact is narrowly gradational  At 83.9 to 84.2': Sand with Gravel; clasts mainly angular slate (Jsm), subangular shale (Tm), and sandstone (Tm); appears very moist Clayey Silt; olive (5Y 4/3), trace manganese staining, mottled oxidation; appears moist and stiff  At 86.3': Sharp contact with sand layer (1 inch thick), fine grained, trace fine gravel  At 88.5': Silty Sand layer (3 inches thick), some clay, trace fine gravel; dark grayish brown (2.5Y 3/2); appears moist and stiff; trace manganese staining, slight mottled oxidation At 89.6': Color change to olive (5Y 4/3), becomes sandy with depth		
190		1	2	100	ML			
90		1	3	100	SM	<b>OLDER FLUVIAL FAN DEPOSITS [Qfof]</b> Silty Sand with some clay, coarsens downward, increasing gravel, clasts 10-30%, up to 1/2 inch, mainly slate (Jsm) and sandstone (Tm); appears very moist to wet; lower contact is narrowly gradational		
185					SW	Well Graded Sand with Gravel, clasts 15-30%, up to 3/4 inch, mainly angular to subangular  At 94.6': Cobble, granitic  At 95.8 to 96.5': Clasts mainly angular to subangular, granitic rock and slate (Jsm), trace shale and sandstone (Tm) and quartzite; appears very moist to wet and dense		
180		2	4	90	GM	Silty Gravel, clasts 50-60%, up to 1 inch, mainly subangular slate (Jsm), shale and sandstone (Tm); matrix is fine to coarse silty sand; dark brown (10YR 3/3); appears very moist and dense		

(CONTINUED ON FOLLOWING FIGURE)

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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 1.GPI 10/14/11

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T1-B3</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 278 feet
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						3/7/11 and 6/22/11-6/24/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 34-feet and measured at 17.6 feet during drilling.		
175		2	5	36	SP ML	<b>Qfofl Continued</b>  Clayey Silt; olive (5Y 4/3); some fine sand At 101.8-105': No recovery		
105		2	6	94	SM/ ML	<b>BASAL OLDER ALLUVIAL FAN UNIT [Qfob]</b> At 105': Silty Sand to Sandy Silt, fine grained; olive (5Y 5/4); appears moist and dense; trace fine gravel; poorly sorted  At 106.6': Thin Clay bed; appears to dip approximately 15 degrees  At 108.2': Increasing gravel At 108.5 to 111.9': Sandy Silt, varying amount of clay and fine sand, sand content increasing with depth, lower contact is gradational		
110		3	7	100	ML	At 110.4-112.4': Calcium carbonate nodules and trace manganese staining		
165		3	8	100	SM	Silty Sand, fine grained, some silt, trace clay, trace coarse sand and fine gravel (Jsm and Tm); dark yellowish brown (10YR 4/4) to yellowish brown (10YR 5/3); appears moist and dense, trace calcium carbonate nodules; lower contact is gradational		
115								
160								
120					CL-	At 118.9': Thin Clay bed, appears near horizontal  Silty Clay; dark grayish brown (2.5Y 4/2); appears moist and very stiff;		

(CONTINUED ON FOLLOWING FIGURE)

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					DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
					Jet Drilling / CME 75		<b>T1-B3</b> (Continued)
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING METHOD	
						Hollow Stem Auger	See Plate 3
						DATES DRILLED	HOLE DIAMETER
						3/7/11 and 6/22/11-6/24/11	8 inches
						GROUNDWATER READINGS	
						Encountered at 34-feet and measured at 17.6 feet during drilling.	
						ML CL ML	<b>Qfob Continued</b> trace calcium carbonate nodules; lower contact is sharp
155		3	9	100		ML	Sandy Silt, fine grained; olive (5Y 4/3); appears moist and stiff; approximate dip 5 degrees for upper contact
125						CL	At 123.4 to 123.9': Fault, approximate dip is 60 degrees, approximate 7 inches of offset; reverse displacement; upper contact has parallel shearing in clay, waxy warped surfaces <b>BASAL ESTUARINE UNIT [Qeb]</b> Clay; dark gray (5Y 4/1); appear moist and stiff, trace calcium carbonate nodules; lower contact is sharp
150		4	10	100		ML	At 127.1 to 127.9': Bedding appears to dip approximately 15 degrees Clayey Silt; dark gray (5Y 4/1); appears moist and medium stiff
						CL	At 127.9 to 129.7': Becomes Clay, sheared zones; punky texture, waxy parting surfaces; varying siltiness
130							At 129.7 to 131.0': Clay with varying silt content; dark gray (5Y 4/1); trace calcium carbonate nodules
							At 131.0 to 131.6': Clay becomes softer; appears wet, punky texture, waxy parting surfaces, possible shearing; some calcium carbonate
145		4	11	100			At 132.8 to 134.8': Carbonate-rich bed, calcium carbonate 30-40%, broken up concretionary fragments; appears wet
						SP	At 134.2': Poorly Graded Sand; dark grayish green (5Y 4/2); fine grained; calcium carbonate-rich
135						CL	At 134.8': Clay; dark olive gray (5Y 3/2); appears moist and very stiff; calcium carbonate 30-50%, some fine irregular oxidized pockets At 135.6': Calcium carbonate decreases to 10-20%
140		4	12	100			At 139.1 to 140.0': Concretionary layer
140							

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T1-B3</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Hollow Stem Auger	See Plate 3	278 feet
						DATES DRILLED	HOLE DIAMETER	
						3/7/11 and 6/22/11-6/24/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 34-feet and measured at 17.6 feet during drilling.		
						<p><b>Qeb Continued</b> At 140-141.0': No sampling</p> <p>At 142.5 to 142.8': Poorly Graded Sand; fine grained</p> <p>At 145.0 to 147.0': Clay appears sheared punky texture with waxy parting surfaces; black (5Y 2.5/2); appears damp and stiff</p> <p>At 147.0': soft, possibly sheared, zone, (1/2-inch thick)</p> <p>At 147.5 to 148.5': Some Silty Sand interbeds (gradational transition to unit below)</p> <p>At 148.5 to 150.0': No recovery</p>		
								<p><b>SAN PEDRO FORMATION [Qsp]</b> Poorly Graded Sand, fine to medium grained; black (N 2.51); appears wet and dense At 150.5': Becomes gravelly At 150.9 to 155.0': No recovery</p>
								<p>Poorly Graded Sand with Gravel; fine to medium grained, subangular fine to coarse granitic clasts, and subrounded to subangular slate (Jsm) At 155.9 to 156.1': Poorly Graded Sand, some silt, very fine grained At 156.1 to 156.3': Poorly Graded Sand with Gravel bed, fine to coarse, subangular to angular granitic and slate (Jsm) gravel; appears wet and medium dense At 156.3 to 156.8': Poorly Graded Sand; fine to medium grained; appears wet and medium dense At 156.8 to 160.0': No recovery</p>

(CONTINUED ON FOLLOWING FIGURE)

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T1-B3h

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT	BORING NO.							
						Jet Drilling / CME 75	<b>T1-B3</b> (Continued)							
						<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 50%;">DRILLING METHOD</th> <th style="width: 50%;">BOREHOLE LOCATION</th> </tr> <tr> <td>Hollow Stem Auger</td> <td>See Plate 3</td> </tr> <tr> <th style="width: 50%;">DATES DRILLED</th> <th style="width: 50%;">HOLE DIAMETER</th> </tr> <tr> <td>3/7/11 and 6/22/11-6/24/11</td> <td>8 inches</td> </tr> </table>		DRILLING METHOD	BOREHOLE LOCATION	Hollow Stem Auger	See Plate 3	DATES DRILLED	HOLE DIAMETER	3/7/11 and 6/22/11-6/24/11
DRILLING METHOD	BOREHOLE LOCATION													
Hollow Stem Auger	See Plate 3													
DATES DRILLED	HOLE DIAMETER													
3/7/11 and 6/22/11-6/24/11	8 inches													
						<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <th style="width: 100%;">GROUNDWATER READINGS</th> </tr> <tr> <td>Encountered at 34-feet and measured at 17.6 feet during drilling.</td> </tr> </table>	GROUNDWATER READINGS	Encountered at 34-feet and measured at 17.6 feet during drilling.	GROUND EL. 278 feet					
GROUNDWATER READINGS														
Encountered at 34-feet and measured at 17.6 feet during drilling.														
115						<p>END OF BORING AT 160 FEET</p> <p>NOTES:                      Boring backfilled with cement/bentonite grout from bottom up and patched.</p> <ul style="list-style-type: none"> <li>-Munsell colors listed in order of predominance (most predominant color first).</li> <li>-Where observed, contacts and bedding appear subhorizontal unless otherwise noted.</li> <li>-Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted.</li> <li>-Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted.</li> <li>-The term "clasts" herein describes gravel-size rock fragments (larger than 1/4 inch).</li> <li>-Beds are generally massive unless otherwise noted.</li> </ul> <p>Boring extended from 84-feet to 160-feet on 6/22/11-6/24/11. offset from original boring location approximately less than 1-foot, north east.</p>								
165														
110														
170														
105														
175														
100														
180														

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T1-B4
						Jet Drilling / CME 75		
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/24/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Encountered perched groundwater at 5 feet and 9 feet, groundwater at 24½ feet during drilling		
275	5	1	1	33		18 inches of Concrete Hand augered to 6 feet Grab samples collected at 3' and 5.5' <b>FILL [Af]</b> Silty Clay to Clayey Silt, variable sand, trace coarse sand and gravel (Jsm and Tm); very dark grayish brown (10YR 3/2); appears very moist  NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed description of clasts  At 5.0': Appears wet, free water (perched groundwater)		
						Silty Clay with Sand, trace coarse sand and fine gravel (Jsm and Tm); brown (7.5YR 4/2); appears very moist and stiff  At 7.0 to 9.0': No recovery		
270	10	1	2	36		At 9': Possible perched groundwater encountered during drilling Depth of contact uncertain due to poor recovery <b>OLDER ALLUVIAL FAN DEPOSITS [Qf/Qfo]</b> Sandy to Clayey Silt, trace coarse sand and fine gravel (Jsm and Tm); dark yellowish brown (10YR 4/4); appears moist and stiff; lower contact occurs between runs  At 10.7 to 14.0': No recovery		
265	15	1	3	80		At 14.0 to 14.5': Grades to Silty Sand/Sandy Silt, fine grained At 14.5 to 16.5': Gravel increases, clasts up to 10%, up to 3/4 inch, mainly angular to subangular slate (Jsm) with lesser subangular shale and sandstone (Tm)		
		1	4	40		At 16.5 to 17.0': Grades to fine Silty Sand/Sandy Silt, fine grained  At 17.5 to 19.0': No recovery		
	20	1	5	60		<b>OLDER FLUVIAL DEPOSITS [Qfofl]</b> Poorly Graded Sand with Gravel, fine to coarse grained, clasts 30-50%, up to 1 inch, mainly subangular to subrounded slate, with some subrounded shale, sandstone (Tm),		

(CONTINUED ON FOLLOWING FIGURE)

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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL\_FIELD\_NOTES\GINT LOGS\101561-TRANSECT 1.GPI 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T1-B4</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 280 feet
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						3/24/11	8 inches	
						GROUNDWATER READINGS		
						Encountered perched groundwater at 5 feet and 9 feet, groundwater at 24½ feet during drilling		
		1	5	60		SP	quartzite and granitic rock; brown (10YR 4/3); appears moist and medium dense; lower contact is sharp <b>Qfoff Continued</b> At 20.5 to 21.5': No recovery	
		1	6	88		SP	At 21.5 to 23.0': Gravel decreases to 10-20%	
						SM	At 23.0 to 24.5': Grades to fine Silty Sand	
255	25	1	7	100		ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> At 24.5': Groundwater encountered during drilling Sandy to Clayey Silt, variable coarse sand and gravel, clasts 5-25%, up to 3/4-inch, mainly subangular slate (Jsm), with some shale and sandstone (Tm); brown (10YR 4/3); appears wet and medium stiff; lower contact is gradational	
						CL	At 26.0 to 26.5': Grades to Silty Clay with Gravel	
		2	8	100		SP	At 26.5 to 27.0': Poorly Graded Sand, fine to medium grained, lower contact is sharp, erosional	
						SM	Silty Sand, fine grained; dark yellowish brown (10YR 4/4); appears wet and medium dense; lower contact is sharp; erosional At 29.5 to 31.5.0': No recovery	
250	30	2	9	20				
		2	10	96				
						SW	<b>OLDER FLUVIAL / ALLUVIAL FAN DEPOSITS [Qfoff / Qfo]</b> At 33.0 to 33.8': Grades to Well Graded Sand with fine Gravel, fine-coarse grained; clasts 15-20%, up to 1/2-inch, mainly subrounded slate (Jsm) and shale (Tm), coarse sand grains generally well rounded	
						SM/ML	Silty Sand and Sandy Silt, fine grained; brown (10YR 4/3); appears wet and medium dense/stiff; upper 3 inches below upper contact is clayey, lower contact is sharp At 34.0 to 35.3': Grades to fine Silty Sand	
245	35	2	11	96			At 35.3 to 36.5': Oxidized; dark yellowish brown (10YR 4/6), sub-horizontal laminations	
						SM	At 36.5' to 37.0': Grades to Silty Sand, fine grained At 37.0 to 38.5': Some irregular strong brown (7.5YR 4/6) mottling	
		2	12	100		SM/ML SC	At 38.5 to 39.0': Clayey Sand with Gravel, clasts 15-30%, mainly subangular slate (Jsm), some shale (Tm) and quartzite	
		2	13	100		SM/ML SW-SM	Well Graded Sand with Silt, fine to medium grained; grayish brown (2.5Y 5/2); appears wet and medium dense, lower contact is sharp, erosional	

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T1-B4 (Continued)
						Jet Drilling / CME 75		
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/24/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Encountered perched groundwater at 5 feet and 9 feet, groundwater at 24½ feet during drilling		
		2	13	88	SW-SM ML	<b>Qfofl / Qfo Continued</b> At 40.5': Organic rich bed, (½-inch thick) At 40.5 to 42.3': Soft Clayey to Sandy Silt bed		
		2	14	100	SW-SM ML	Sandy to Clayey Silt with Gravel; clasts 15-25%, up to ¾-inch, mainly subangular slate (Jsm), some shale (Tm); dark brown (10YR 3/3) with some dark yellowish brown (10YR 4/6) mottling At 43.5': Clay bed (1-inch thick); very dark gray (10YR 3/1); appears wet and soft; very sharp, subhorizontal upper and lower contacts At 44.4 to 44.8': Grades to Sandy to Clayey Silt with Gravel, clasts 15-25%, up to 1 inch; mainly subangular to subrounded slate (Jsm)		
235	45	3	15	100	CL/ ML	<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b> Silty Clay and Clayey Silt, variable fine sand, trace coarse sand (Jsm and Tm); dark grayish brown with variable dark yellowish brown (10YR 4/6) mottling; appears very moist and very stiff; lower contact occurs between runs At 46.0 to 46.5': Sand increases, color variable, more reddish than above		
		3	16	100	SM/ SC	Clayey to Silty Sand, some gravel, fine to coarse grained, clasts 5-15%, up to ¾-inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); brown (10YR 4/3); appears wet and dense; lower contact is sharp, erosional		
					ML	Sandy to Clayey Silt, trace coarse sand (Jsm); mottled, grayish brown (10YR 5/2) to brown (7.5Y 4/4); appears very moist and stiff, trace manganese oxide staining; lower contact indistinct At 48.4 to 48.6': Becomes oxidized, strong brown (7.5YR 4/6)		
230	50	3	17	100		At 50.8': Grades to Silty Clay to Clayey Silt		
					CL	Clay, rare (<1%) coarse sand (Jsm and Tm); dark gray (10YR 4/1) to brown (7.5YR 4/2); appears very moist and very stiff; some manganese oxide staining; occasional sandy lenses or pockets; lower contact is sharp		
		3	18	100		At 54.0 to 54.6': Color becomes very dark gray (10YR 3/1) to dark brown (7.5YR 3/3)		
225	55				CL/ ML	Silty Clay to Clayey Silt, variable fine sand, trace coarse sand (Jsm and Tm); strongly mottled, dark grayish brown (10YR 4/2) to dark yellowish brown (10YR 4/4) to brown (10YR 4/4); appears very moist and very stiff to hard; variable subhorizontal laminations; rare (<1%) manganese oxide flecks; occasional sandy lenses or pockets; lower contact is gradational		
		3	19	70		At 57.5 to 59.0': No recovery		
60								

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T1-B4 (Continued)
						Jet Drilling / CME 75	Hollow Stem Auger	See Plate 3
						3/24/11	HOLE DIAMETER	8 inches
						GROUNDWATER READINGS		
						Encountered perched groundwater at 5 feet and 9 feet, groundwater at 24½ feet during drilling		
		4	20	92		CL/ML	<b>Qe Continued</b> Silty Clay to Clayey Silt, variable fine sand, trace coarse sand (Jsm and Tm); strongly mottled, dark grayish brown (10YR 4/2) to dark yellowish brown (10YR 4/4) to brown (10YR 4/4); appears very moist and very stiff to hard; variable subhorizontal laminations; rare (<1%) manganese oxide flecks; occasional sandy lenses or pockets; lower contact is gradational	
215	65	4	21	36		ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt, trace coarse sand (Jsm and Tm); variable mottling, strong brown (7.5YR 4/4) to grayish brown (10YR 4/2); appears wet and medium stiff; lower contact is narrowly gradational At 65.8 to 69.0': No recovery	
210	70	4	22	84		SM	Silty Sand, fine grained, trace to some coarse sand, trace fine gravel (Jsm and Tm); brown (7.5YR 4/4); appears wet and dense	
		4	23	68				
205	75						END OF BORING AT 74 FEET	
							NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched.  -Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than 1/4 inch). -Beds are generally massive unless otherwise noted.	
80								

Geologist: DB/MF  
 Prepared/Date: WL/YN/AR 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

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




**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T1-B4d

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		
						DRILLING METHOD	BOREHOLE LOCATION	<b>T1-B5</b>
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						4/5/11	8 inches	277 feet
						GROUNDWATER READINGS		
						Encountered at 10 feet during drilling.		
275						Hand augered to 6 feet		
	5					NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed description of clasts		
270		1	1	100		CL/ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Silty Clay to Clayey Silt, variable fine sand, trace coarse sand and fine gravel (Jsm and Tm); dark brown (10YR 3/3); appears very moist and stiff to very stiff; lower contact is gradational	
						ML	Clayey to Sandy Silt, trace to some coarse sand and fine gravel, clasts 2-10%, up to 1/2 inch, mainly subangular slate (Jsm) and subrounded shale (Tm) and sandstone (Tm), some brick-red sandstone; brown (10YR 4/3); appears very moist and stiff	
	10					SM/ML	 At 10': Groundwater encountered during drilling At 10.3 to 13.1': Grades to Sandy Silt and fine Silty Sand, appears wet and medium stiff/medium dense; gravel decreases to <5%	
265		1	2	83		SM/ML	At 13.0 to 13.8': Grades to fine Silty Sand to Sandy Silt with Gravel, clasts 40-50%, up to 3/4 inch, mainly subangular slate (Jsm), some subrounded shale and sandstone (Tm)	
	15	1	3	40		SW	<b>OLDER FLUVIAL DEPOSITS [Qfofl]</b> Well Graded Sand with Gravel; fine to coarse grained, clasts 30-50%, up to 1 inch, mainly subrounded slate (Jsm), some subrounded shale and sandstone (Tm), occasional quartzite also observed; color variable; appears very moist to wet and medium dense; occasionally grades to fine to coarse silty sand matrix; lower contact is sharp; erosional At 15.0 to 16.5': No recovery	
260		1	4	44			At 17.6 to 19.0': No recovery	
	20					SP	At 19.0 to 19.8': Grades to Poorly Graded Sand, grades to fine to medium grained, trace fine gravel	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: LM/YN/AR 10/13/2011  
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**MTA Westside Subway Extension**  
 Los Angeles, California



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T1-B5a



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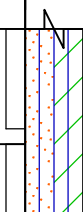
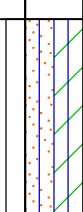
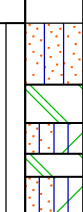
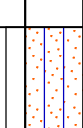
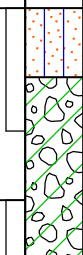
					DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
					Jet Drilling / CME 75		<b>T1-B5</b> (Continued)
					DRILLING METHOD	BOREHOLE LOCATION	
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DATES DRILLED	GROUND EL.
						Hollow Stem Auger	See Plate 3
						4/5/11	277 feet
					GROUNDWATER READINGS		
					Encountered at 10 feet during drilling.		
		1	5	52	SW	<b>Qfofl Continued</b> At 20.3 to 21.5': No recovery	
255		1	6	84	SP-SM SW	At 22.8 to 23.3': Distinct fine Sand with Silt bed; dark yellowish brown (10YR 4/4); bordered above and below by 1/2-inch, subhorizontal, silty clay beds, appears soft and wet	
25		2	7	40	SW		
250		2	8	72	ML	<b>ESTUARINE DEPOSITS [Qe]</b> Sandy Silt, trace to some clay, rare (<1%) coarse sand; brown (7.5YR 4/4) with variable pale brown (10YR 6/3) mottles and laminations; appears very moist and stiff; well sorted; lower contact is gradational	
30		2	9	88		At 30.1 to 31.2': Numerous well defined, subhorizontal laminations	
245		2	10	96	ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt, trace to some coarse sand (up to 10%, mainly Jsm and Tm), trace fine gravel (Jsm and Tm); dark yellowish brown (10YR 4/4) with variable pale brown (10YR 6/3) mottles; appears very moist and stiff; poorly sorted; lower contact occurs between runs	
35		2	11	100		At 35.0 to 35.4' and 35.4 to 36.7': Distinct subhorizontal laminations, slightly sandier	
240		2	12	88		At 37.8 to 39.7': Coarsens downward, coarse sand increases to 15-30%, fine gravel 5-10%, up to 3/4 inch	
40							

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: LM/YN/AR 10/13/2011  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T1-B5 (Continued)
						Jet Drilling / CME 75		
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						4/5/11	8 inches	277 feet
						GROUNDWATER READINGS		
						Encountered at 10 feet during drilling.		
235		2	13	92		ML	<b>Qfo Continued</b>	
							At 41.3 to 42.5': Gravel increases, 10-20%, up to 3/4 inch	
		3	14	40			At 42.5 to 44.0': No recovery	
							Depth of contact uncertain due to poor recovery	
45						ML	<b>ESTUARINE DEPOSITS [Qe]</b>	
							Clayey to Sandy Silt, trace coarse sand, rare (<1%) fine gravel (Jsm and Tm); brown (7.5YR 4/4) with variable grayish brown (10YR 5/2) mottles; appears very moist and stiff, lower contact occurs between runs	
230		3	15	66			At 44.7 to 44.9': Subhorizontal, grayish brown laminations	
							At 47.1 to 47.3': Fine Silty Sand bed, subhorizontal, sharp contacts	
							At 47.3 to 49.0': No recovery	
50						CL/ CH ML	At 49.8 to 50.3': Clay, strong brown (7.5YR 5/6) to grayish brown (10YR 5/2)	
							At 50.7 to 51.0': Clay; reddish brown (5YR 5/4), trace manganese oxide flecks	
		3	16	50			At 51.0 to 51.1': Oxidized, subhorizontal silty sand bed	
225							At 51.5 to 54.0': No recovery	
55		3	17	56		SM	Silty Sand, fine grained, trace coarse sand; brown (10YR 5/3) with occasional yellowish brown (10YR 5/6) mottling or laminations; appears very moist and dense; occasional faint subhorizontal laminations; well sorted; lower contact occurs between runs	
							At 55.4 to 56.5': No recovery	
220		4	18	64		GC	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b>	
							Clayey Gravel, clasts 50-60%, up to 1 inch, mainly subrounded slate (Jsm), shale (Tm) and sandstone (Tm), some subrounded quartzite, matrix is sandy clay and clayey sand; color generally is very dark grayish brown (10YR 3/2); appears wet and dense; lower contact appears narrowly gradational	
60								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: LM/YN/AR 10/13/2011  
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MTA Westside Subway Extension  
 Los Angeles, California



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T1-B5c

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T1-B5 (Continued)
						Jet Drilling / CME 75		
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						4/5/11	8 inches	277 feet
						GROUNDWATER READINGS		
						Encountered at 10 feet during drilling.		
		4	19	68	GC	<b>Qfo Continued</b>		
215		4	20	64	ML/ CL	Silty Clay to Clayey Silt, variable fine sand, trace to some coarse sand (Jsm and Tm); mottled, strong brown (7.5YR 5/6) to grayish brown (10YR 5/2); appears very moist to wet and very stiff; lower contact is gradational		
65		4	21	100	ML	Clayey to Sandy Silt, trace to some coarse sand and fine gravel (Jsm and Tm); mottled, yellowish brown (10YR 5/6) to brown (7.5YR 4/4) to grayish brown (10YR 5/2); appears very moist to wet and very stiff; lower contact is sharp		
210		4	22	100	CL/ ML	<b>OLDER ALLUVIAL FAN/ESTUARINE DEPOSITS [Qfo/Qe]</b> Silty Clay to Clayey Silt; trace to some coarse sand, and fine gravel (Jsm and Tm); mottled, yellowish brown (10YR 5/6) to brown (7.5YR 4/4); appears very moist and very stiff; lower contact is gradational		
70		4	23	72	GM	At 69.7 to 70.0': Gravel increases, gradational transition to unit below Silty Gravel, clasts 60-70%, up to 3/4 inch, mainly slate (Jsm), shale (Tm), sandstone (Tm) and quartzite; matrix is fine to coarse silty sand with clay; very dark grayish brown (10YR 3/2); appears wet and dense; lower contact is sharp, erosional		
205					SM	At 71.5 to 72.4': Gravel decreases to 30-50% (Silty Sand with Gravel)		
		4	24	100	ML	Sandy to Clayey Silt, trace coarse sand; mottled, color variable; appears very moist and very stiff; some manganese oxide staining		
						END OF BORING AT 74 FEET		
75						NOTES:  Boring backfilled with cement/bentonite grout from bottom up and patched.  -Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than 1/4 inch). -Beds are generally massive unless otherwise noted.		
200								
80								

Geologist: DB/MF  
 Prepared/Date: LM/YN/AR 10/13/2011  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Rotary Wash	See Plate 3	<b>T1-B6</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						4/18/11	8 inches	278 feet
						GROUNDWATER READINGS		
						Encountered at 54 feet during drilling.		
						Grass at the surface Hand augered to 6 feet <b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Silt; dark yellowish brown (10YR 4/6); appears moist and soft  NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed descriptions of clasts		
	5					At 6.0 to 8.0': No recovery		
		1	1	0				
	270					At 8.0 to 13.0': No recovery		
		1	2	8				
	10							
	265					<b>FLUVIAL DEPOSITS [Qfoff]</b> Well Graded Sand with Gravel; fine to coarse grained, clasts 15-50%, up to 1/3 inch; mainly subangular to subrounded slate (Jsm), sandstone (Tm) and quartzite; color variable, appears moist and dense At 14.2 to 15.5': No recovery		
	15					At 16.0 to 16.4': Grades to fine Silty Sand with Gravel		
		1	3	48				
						At 16.9 to 18.0': No recovery		
		1	4	56				
	260					At 18.4 to 20.5': No recovery		
		1	5	16				
	20							

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: LM/YN/AR 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

METRO SOIL CORE S:\70131 GEOTECH\GINTW\Fault\_Investigation\_WSE\_Library\_AMEC OCTOBER2011 (2).GLR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 1.GPI 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Gregg's Drilling / Mobile 8 - B-53		<b>T1-B6</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Rotary Wash	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						4/18/11	8 inches	278 feet
						GROUNDWATER READINGS		
						Encountered at 54 feet during drilling.		
						<b>Qfofl Continued</b>		
		1	6	60		At 20.5 to 20.9': Grades to fine Silty Sand with Clay At 20.9 to 21.0': Clay bed (1 inch thick) At 21.0 to 21.4': Gradational zone At 21.4 to 22.0': Silty Gravel, clasts 60-70%, up to 1 inch, mainly subangular to subrounded slate (Jsm), some very strong meta-basalt; soil matrix is fine to coarse silty sand At 22.0 to 23.0': No recovery		
255		1	7	80		<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Silty Sand and Sandy Silt, very fine grained; dark grayish brown (10YR 4/2); appears very moist and dense/stiff; occasional clay/silt beds; lower contact occurs between runs  At 23.8 to 27.2': Variable gravel (5-30%), mainly subangular slate (Jsm), clasts up to 2 inches at 23.8 to 24.0'		
	25	1	8	60				
250		1	9	56		At 28.0 to 28.2': Silty Clay, mottled, reddish brown (5YR 4/3) to gray (10YR 5/1) At 28.2 to 29.1': Silty Gravel, clasts 60-70%, up to 1 inch, mainly subangular to subrounded slate (Jsm), some very strong meta-basalt; soil matrix is fine to coarse silty sand		
	30					<b>OLDER ALLUVIAL FAN / ESTUARINE DEPOSITS [Qfo / Qe]</b> Clay and Silty Clay, occasional oxidized silt/sand lenses or pockets, trace coarse sand and fine gravel (Jsm and Tm); mottled, grayish brown (10YR 5/2) to reddish brown (5YR 4/4); appears very moist and very stiff; trace manganese oxide staining  At 32.2 to 32.5': Becomes gravelly  At 33.3 to 33.5': Grades to Clayey to Sandy Silt		
245		2	11	100		At 34.4 to 34.9': Grades to fine Silty Sand At 34.9 to 36.0': Grades to Clayey to Sandy Silt  At 36.4 to 36.5': Silty Sand, fine grained, lower contact is sharp At 36.5 to 38.0': Sandy Silt, lower contact is sharp		
	35					At 38.0 to 39.0': Occasional Clayey Silt interbeds		
240						<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Silty Sand and Sandy Silt, fine grained, variable coarse sand and fine gravel, clasts 1-15%, up to 1/2 inch; mainly subangular slate (Jsm), some subangular to subrounded		
	40							

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: LM/YN/AR 10/13/2011  
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METRO SOIL CORE S:\70131 GEOTECH\GINTW\Fault\_Investigation\_WSE\_Library\_AMEC OCTOBER2011 (2).GIR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 1.GPI 10/14/11

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Gregg's Drilling / Mobile 8 - B-53		<b>T1-B6</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Rotary Wash	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						4/18/11	8 inches	278 feet
						GROUNDWATER READINGS		
						Encountered at 54 feet during drilling.		
235		2	12	100	SW SM SW SM/ML	<b>Qfo Continued</b> shale and quartzite also observed; dark grayish brown (2.5Y 4/2); appears very moist and dense; lower contact appears gradational At 39.4 to 39.7', 40.0 to 40.2', and 40.7 to 41.7': Well Graded Sand with Gravel, fine to coarse grained, clasts 20-50%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), some subrounded shale and sandstone (Tm) also observed		
45		2	13	100	CL/CH ML ML	<b>ESTUARINE DEPOSITS - Carbonate Rich [Qe]</b> Clay, trace fine to coarse sand; light brownish gray (2.5Y 6/2), appears very moist and very stiff; abundant (5-10%) fine, iron-oxide stained root structures; calcium carbonate filaments and small nodules (up to 1/8 inch) increase with depth, total calcium carbonate 5% at 43', 20% at 45' At 45.2 to 45.8': Sandy Silt with Clay; brown (10YR 4/3); appears very moist and stiff Sandy to Clayey Silt, trace coarse sand (Jsm and Tm); white (2.5Y 9/1) to pale yellow (2.5Y 8/2); appears very moist and very stiff; extensive calcium carbonate development, calcium carbonate occurs mainly as dispersed replacement of parent material and cemented nodules up to 1/4 inch, total calcium carbonate 70-90%; lower contact occurs between runs		
230					ML	At 48.0 to 53.0': Becomes gravelly, clasts 15-30%, up to 1/2 inch, mainly subangular slate (Jsm), some shale and sandstone (Tm) also observed; coarsens with depth At 49.5 to 53.0': No recovery		
50		3	14	30				
225		3	15	96	SM SM ML	<b>FLUVIAL DEPOSITS [Qfoff]</b> Silty Sand with Gravel, fine to coarse grained, clasts 15-50%, up to 3/4-inch; mainly subangular to subrounded slate (Jsm), some subrounded shale (Tm), sandstone (Tm) and quartzite also observed; color variable, generally dark yellowish brown (10YR 4/4); appears wet and dense; lower contact is sharp, erosional At 53.2 to 53.5' and 54.5 to 55.1': Grades to Silty Sand, fine to medium-grained At 54': Groundwater encountered during drilling		
55								
220		3	16	96		At 58.4 to 58.8': Sandy Silt with variable coarse sand At 58.8': Clay bed (1/2-inch thick), appears wet and soft At 58.8 to 59.0': Calcium carbonate-rich sandy to clayey silt bed, total calcium carbonate 70-90%, contact appears sharp At 59.0-59.5': Clayey Silt with Sand, dark greenish gray (5GY 4/1), some calcium carbonate nodules up to 1/4 inch, total calcium carbonate 10-25%		
60						<b>OLDER ALLUVIAL FAN DEPOSITS (Qfo)</b>		

(CONTINUED ON FOLLOWING FIGURE)

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 Checked/Date: MW/MF 10/13/2011

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Gregg's Drilling / Mobile 8 - B-53		<b>T1-B6 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Rotary Wash	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						4/18/11	8 inches	278 feet
						GROUNDWATER READINGS		
						Encountered at 54 feet during drilling.		
215		3	17	52	ML	<b>Qfo Continued</b> Clayey to Sandy Silt, variable coarse sand and fine gravel, gravel 2-15%, up to 3/4 inch; mainly subangular slate (Jsm), some subangular to subrounded shale and sandstone (Tm) also observed; mottled, color variable, mainly grayish brown (10YR 5/2) to strong brown (7.5YR 4/6); appears very moist and very stiff; lower contact is sharp At 60.6 to 63.0': No recovery		
65		3	18	100	ML	At 65.0 to 66.0': Up to 20% Calcium carbonate, occurs as "marbled" texture  At 66.0 to 66.5': Gravel increases to 25 to 35%, matrix becomes clayey sand At 66.0': Color becomes brown (7.5YR 4/3), up to 5% calcium carbonate filaments		
210					SC			
					ML			
70		4	19	100		At 68.0 to 68.4': Gravel increases to 25-35%, abundant brick red sandstone (Tm)  At 69.0': Becomes mottled, dark grayish brown (10YR 4/2) to brown 7.5YR 4/4), trace calcium carbonate filaments		
205					SM SW	At 70.7 to 70.8': Color becomes yellowish brown (10YR 5/6) At 70.8 to 71.4': Clayey Silt, light brownish gray (2.5Y 6/2), up to 15% calcium carbonate cemented nodules up to 1/4-inch At 71.4 to 71.7': Fine Silty Sand At 71.7': Clay bed, (3/4-inch thick), appears wet and soft		
					ML SW	<b>OLDER FLUVIAL DEPOSITS [Qfofl]</b> Well-Graded Sand with Gravel; fine to coarse grained, clasts 15-20%, up to 3/4 inch, mainly subangular slate (Jsm), some subrounded to rounded shale (Tm), sandstone (Tm) and quartzite also observed; color variable, generally grayish brown (2.5Y 5/2); appears wet and dense, lower contact is sharp At 73.2 to 73.5': Clayey to Sandy Silt, micaceous, mottled, color variable At 73.6 to 78.0': No recovery		
75		4	20	12		At 78.0 to 103.0': No sampling		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: LM/YN/AR 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

METRO SOIL CORE S:\70131 GEOTECH\GINTW\Fault\_Investigation\_WSE\_Library\_AMEC OCTOBER2011 (2).GLR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 1.GPI 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Gregg's Drilling / Mobile 8 - B-53		<b>T1-B6</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Rotary Wash	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						4/18/11	8 inches	278 feet
						GROUNDWATER READINGS		
						Encountered at 54 feet during drilling.		
195						No sampling continued		
85								
190								
90								
185								
95								
180								
100								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: LM/YN/AR 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

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



**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T1-B6e



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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 1.GPI 10/14/11

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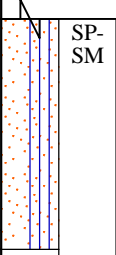
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Rotary Wash	See Plate 3	<b>T1-B6 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						4/18/11	8 inches	278 feet
						GROUNDWATER READINGS		
						Encountered at 54 feet during drilling.		
						No sampling continued		
175						CL/ CH	<b>BASAL ESTUARINE UNIT(?) [Qeb]</b> Clay; very dark greenish gray (5GY 3/1); appears very moist and very stiff; up to 15% calcium carbonate filaments; upper portion of core is disturbed, classification somewhat uncertain due to limited core sample (possible San Pedro Formation clay?)	
105		3	21	100			At 105.5 to 106.3': Becomes black (N 2.5); micaceous, some decayed organics, little or no calcium carbonate	
170						SM/ ML	<b>SAN PEDRO FORMATION [Qsp]</b> Silty Sand to Sandy Silt, fine grained, trace clay, coarse sand and fine gravel increase with depth; black (N 2.5); appears very moist and very stiff; At 107.2 to 107.7': Some decayed organics, partially intact decayed roots	
170						SC/ SM	At 107.7 to 108.0': Grades to Clayey Silty Sand, fine to medium grained At 108.0 to 118.0': No sampling	
110								
165								
115								
160						SP- SM	Silty Sand, fine grained; medium gray, no matching munsell color, closest match is dark gray, (N 4/1); appears wet and dense; occasionally grades to fine silty sand	
120								

Geologist: DB/MF  
 Prepared/Date: LM/YN/AR 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Gregg's Drilling / Mobile 8 - B-53		<b>T1-B6</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 278 feet
						Rotary Wash	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						4/18/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 54 feet during drilling.		
155		4	22	95		<b>Qsp Continued</b> At 120.1': Organic-rich bed (1/2-inch thick); black (N2.5) At 120.1 to 120.8': Trace small shell fragments up to 1/2 inch  At 123.0 to 148.0': No sampling		
125								
150								
130								
145								
135								
140								
140								

(CONTINUED ON FOLLOWING FIGURE)

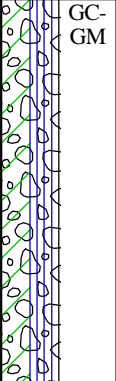
Geologist: DB/MF  
 Prepared/Date: LM/YN/AR 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T1-B6g

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Gregg's Drilling / Mobile 8 - B-53		<b>T1-B6</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 278 feet
						Rotary Wash	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						4/18/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 54 feet during drilling.		
135						No sampling continued		
145								
130		5	23	100		Silty Clayey Gravel, clasts 50-70%, most up to 1 inch, maximum 2 inches, mainly angular slate (Jsm), some quartzite, meta-basalt and white igneous/metamorphic rock also observed; very dark gray (N 3/1); appears wet and dense; abundant coarse sand-size quartz grains		
150						END OF BORING AT 153 FEET		
125								
155						NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched. -Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than 1/4 inch). -Beds are generally massive unless otherwise noted.		
120								
160								

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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 1.GPI 10/14/11

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	
						Jet Drilling / CME 75		<b>T1-B7</b>
						Hollow Stem Auger	See Plate 3	
						<b>DATES DRILLED</b> 4/4/11 - 4/5/11	<b>HOLE DIAMETER</b> 8 inches	<b>GROUND EL.</b> 281 feet
						<b>GROUNDWATER READINGS</b> Encountered at 10 feet during drilling.		
280						Surface is Grass		
						NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed description of clasts		
	5					ML	<b>FILL [Af]</b> Clayey to Sandy Silt, trace coarse sand and fine gravel; very dark grayish brown (10YR 3/2); appears very moist and stiff; abundant dispersed organics	
		1	1	92		ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt, trace coarse sand and fine gravel; dark yellowish brown (10YR 4/4); appears very moist and soft to medium stiff; lower contact appears sharp	
						SM/ML	Silty Sand and Sandy Silt, fine grained, rare (<1%) coarse sand and fine gravel (Jsm and Tm); dark yellowish brown (10YR 3/4); appears wet and medium dense; lower contact appears sharp, erosional At 6.5 to 6.7' and 7.4 to 7.7': Silty Sand bed, fine grained	
							At 8.4 to 9.0': Silty Sand with Gravel, fine to coarse grained, clasts 15 to 20%, up to 1½ inches, mainly subangular to subrounded slate (Jsm), some subrounded, tan to brick-red sandstone (Tm) also observed; color variable, appears wet and medium dense, lower contact occurs between runs	
	10						▽ At 10.0': Perched groundwater encountered during drilling	
		1	2	48			At 11.4 to 14.0': No recovery	
	15							
		1	3	50		SW	<b>OLDER FLUVIAL DEPOSITS [Qfoff]</b> Well Graded Sand with variable Gravel, fine to coarse grained, clasts generally 10 to 30%, up to 1 inch, mainly subrounded slate (Jsm), some subrounded shale (Tm) and quartzite also observed, occasional slightly silty to silty beds; color variable, generally dark grayish brown (10YR 4/2); appears wet and medium dense; lower contact occurs between runs At 16.0 to 16.5': Gravel content is 40 to 50% At 16.5 to 19': No recovery	
						SP	At 19.0 to 19.7': Grades to fine to medium, Poorly Graded Sand, gravel decreases to trace	
	20					SW		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: LM/YN/MW 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

METRO SOIL CORE S:\70131 GEOTECH\GINT\W\F\T\_INVESTIGATION\_WSE\_LIBRARY\_AMEC OCTOBER2011 (2).GIR  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T1-B7 (Continued)
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						4/4/11 - 4/5/11	8 inches	281 feet
						GROUNDWATER READINGS		
						Encountered at 10 feet during drilling.		
260		1	4	80		SW	Qfofl Continued	
							At 21.5 to 24.0': No Recovery	
		1	5	0				
25						SW	At 25.5 to 29.0': No recovery	
255		1	6	30				
						SW	At 31.2 to 31.5': Grades to Clayey, Silty Sand with Gravel	
30		2	7	80		SP	At 31.5 to 32.5': Grades to Poorly Graded Sand, fine to medium grained, trace gravel	
250						SW	At 34.0 to 34.5': Grades to Poorly Graded Sand, fine to medium grained, trace gravel	
		2	8	92		SP	At 36.5 to 37.3': Grades to Poorly Graded Sand, fine medium grained, trace gravel	
						SW		
35		2	9	56				
245						SP		
						SW		
		2	10	88				
40								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: LM/YN/MW 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

MTA Westside Subway Extension  
 Los Angeles, California



LOG OF BORING  
 Project No.: 4953-10-1561 Figure: T1-B7b

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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL\_FIELD\_NOTES\GINT LOGS\101561-TRANSECT 1.GPI 10/14/11

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






					DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
					Jet Drilling / CME 75		<b>T1-B7</b> (Continued)
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING METHOD	
						Hollow Stem Auger	See Plate 3
						DATES DRILLED	HOLE DIAMETER
						4/4/11 - 4/5/11	8 inches
						GROUNDWATER READINGS	
						Encountered at 10 feet during drilling.	
240		2	11	80	SW	<b>Qfofl Continued</b>	
					SC/ CL	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b>	
					CL/ CH	Clayey Sand to Sandy Clay, trace coarse sand to fine gravel; very dark grayish brown (10YR 4/2); appears wet and medium stiff/medium dense; abundant dispersed organics; calcium carbonate nodules up to 1/4 inch increase with depth	
		2	12	80	SM	Clay, trace coarse sand (Jsm and Tm); mottled, olive gray (5Y 5/2) to yellowish brown (10YR 5/6); appears very moist and stiff	
					CL	Silty Sand, fine to medium grained, trace fine gravel (Jsm and Tm); dark grayish brown (10YR 4/2); appears wet and medium dense; poorly to moderately sorted; lower contacts generally appear sharp	
45					SP/ SM	At 43.2 to 44.0' and 44.8 to 47.8': Silty Clay, variable fine to coarse sand and fine gravel (Jsm and Tm); olive gray (5Y 4/2); appears very moist and stiff; some calcium carbonate nodules and filaments, total calcium carbonate 0 to 10%; occasional clayey sand beds; occasional oxidized dark yellowish brown (10YR 5/6) laminations, generally poorly sorted	
235					CL		
		2	13	84			
					SM		
		3	14	88			
50					CL	At 49.9 to 50.2': Color is dark greenish gray (10Y 4/1)	
230		3	15	100		<b>BASAL ESTUARINE UNIT (Qeb)</b>	
					CL/ CH	Silty Clay with variable Sand; color generally dark gray (5Y 4/1), some dark yellowish brown (10YR 5/6) mottles in upper 4 inches; trace calcium carbonate filaments and nodules up to 1/8 inch; appears very moist and stiff	
		3	16	100		Clay and Silty Clay, variable fine sand, trace coarse sand and fine gravel (Jsm and Tm); greenish black (5GY 2.5/1); appears very moist and stiff to very stiff; some dispersed organics; occasional more gravelly beds (up to 10%), trace calcium carbonate filaments and fine nodules; lower contact is gradational	
						At 50.9-51.0': Silty Sand bed	
55							
225		3	17	66		At 55.8 to 56.2': Grades to fine to medium Clayey, Silty Sand	
						At 56.2 to 59.0': Color becomes very dark greenish gray (5GY 3/1); 5 to 15% calcium carbonates nodules, up to 1/4 inch, some fine oxidized pockets	
60					SM	<b>SAN PEDRO FORMATION (Qsp)</b>	
						Silty Sand/Sandy Silt, fine grained, some gravel, clast 5 to 15%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm); dark gray (N 4/1); appears wet and dense;	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: LM/YN/MW 10/13/2011  
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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 1.GPI 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T1-B7 (Continued)
						Jet Drilling / CME 75		
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						4/4/11 - 4/5/11	8 inches	281 feet
						GROUNDWATER READINGS		
						Encountered at 10 feet during drilling.		
220		3	19	40		SM	lower contact <b>Qsp Continued</b> occurs between runs At 61.0-64.0': No recovery	
65		4	20	60		SM	Silty Sand, fine grained; medium gray (no matching munsell color), appears wet and dense; uniform grain size; lower contact is sharp  At 65.5 to 66.5': No recovery	
215		4	21	80		CL/ CH	Clay to Silty Clay, occasional rare (<1%) coarse sand and fine gravel (Jsm and Tm); greenish black (5GY 2.5/1); appears very moist and very stiff; dispersed organics; occasional micaceous beds; occasional slightly sandy beds or pockets  At 69.0 to 73.5': Trace calcium carbonate filaments	
70		4	22	100			At 71.5 to 72.5': Possible shearing, abundant waxy parting surfaces	
210		4	23	100		ML	At 73.7 to 74.0': Sandy Silt bed, grades downward into clay	
75							END OF BORING AT 74 FEET	
205							NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched.  -Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than 1/4 inch). -Beds are generally massive unless otherwise noted.	
80								

Geologist: DB/MF  
 Prepared/Date: LM/YN/MW 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

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



**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T1-B7d

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)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T1-B8</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/27/11	8 inches	277 feet
						GROUNDWATER READINGS		
						Measured at 39 feet during drilling.		
						18 inch thick Asphaltic Concrete		
						Hand augered to 6 feet		
275					ML	<b>FILL [Af]</b> Clayey to Sandy Silt, variable coarse sand and fine gravel, clasts 0-10% up to 1½ inches, (mainly Jsm and Tm); color variable, mainly dark yellowish brown (10YR 3/2); appears moist to very moist and very stiff; trace asphalt and other fine debris		
	5					NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed descriptions of clasts		
270		1	1	100				
	10							
265		1	2	100				
	15							
260		1	3	90	ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Sandy Silt, trace to some clay, trace coarse sand and fine gravel (Jsm and Tm); dark yellowish brown (10YR 3/4); appears damp to moist and very stiff; lower contact occurs between runs At 17.0 to 17.3' and 18.6 to 19.2': Gravel increase to 20-25%, up to 3/4 inch, some brick-red sandstone (Tm)		
20								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: DR/YN/MW 10/13/2011  
 Checked/Date: MW/MF 10/13/2011



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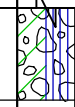
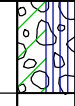
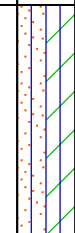
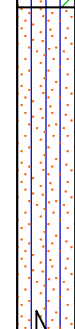
					DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
					Martini Drilling / CME 75		<b>T1-B8</b> (Continued)
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING METHOD	
						Hollow Stem Auger	See Plate 3
						DATES DRILLED	HOLE DIAMETER
						5/27/11	8 inches
						GROUNDWATER READINGS	
						Measured at 39 feet during drilling.	
255		2	4	46	SM ML SM	<b>OLDER FLUVIAL / ALLUVIAL FAN DEPOSITS [Qfoff/Qfo]</b> Silty Sand with Gravel, fine to coarse grained, clasts 20 to 50%, up to 1½ inch; mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm), some quartzite also observed; pale brown (10YR 6/3); appears damp and dense; lower contact is sharp, erosional At 21.1 to 21.6': Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); dark yellowish brown (10YR 4/4); appears moist and stiff At 22.3 to 25.0': No Recovery	
250	25	2	5	80	SM SM SM	At 26.8 to 28.9': Grades to fine Silty Sand with Gravel; clasts 15 to 25%, up to ¾ inch; dark yellowish brown (10YR 3/4); appears moist and dense	
245	30	2	6	90	ML	Clayey Silt, variable fine sand, trace coarse sand and fine gravel (Jsm and Tm); dark brown (10YR 3/3); appears very moist and stiff; poorly sorted, lower contact is narrowly gradational	
240	35	3	7	80	GM	<b>OLDER FLUVIAL DEPOSITS [Qfoff]</b> Silty Gravel, clasts 50-70%, up to 2 inches; mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); matrix is fine to coarse silty sand; color variable, generally dark brown (10YR 3/3); appears wet and dense; lower contact occurs between runs  At 37.5 to 37.6': Clayey Silt bed  ▽ At 39': Groundwater measured during drilling	
40							

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: DR/YN/MW 10/13/2011  
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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 1.GPI 10/14/11

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T1-B8</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/27/11	8 inches	277 feet
						GROUNDWATER READINGS		
						Measured at 39 feet during drilling.		
235		3	8	24		GC-GM	<b>OLDER ALLUVIAL FAN DEPOSITS (Qfo)</b> Silty, Clayey Gravel, clasts 50 to 60%, up to 1 inch, subangular slate (Jsm), shale (Tm) and sandstone (Tm); matrix is fine to coarse silty, clayey sand; color variable; appears wet and dense; poorly sorted; lower contact occur between runs At 40.3 to 41.2': Matrix grades to Clayey, Silty Sand At 41.2 to 45.0': No recovery	
45								At 46.2 to 50': No recovery
230		3	9	24		GC-GM		
50								
225		3	10	100		ML	<b>ESTUARINE DEPOSITS [Qe]</b> Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); mottled, yellowish brown (10YR 5/6) to grayish brown (2.5Y 5/2); appears very moist and very stiff; trace manganese oxide flecks; lower contact is narrowly gradational  At 53.2 to 53.5': Some faint Silty Clay laminations	
55								
220		4	11	100		ML	<b>LAKWOOD FORMATION [Qlw]</b> Sandy Silt; mottled, yellowish brown (10YR 5/6) to grayish brown (2.5Y 5/2), appears moist and stiff; well sorted; highly weathered; lower contact is gradational	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: DR/YN/MW 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T1-B8</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 277 feet
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						5/27/11	8 inches	
						GROUNDWATER READINGS		
						Measured at 39 feet during drilling.		
215		4	12	100	ML	<b>Q<sub>lw</sub> Continued</b> Sandy Silt with Clay; olive brown (2.5Y 4/4); appears very moist and very stiff; 5-10% manganese oxide flecks; highly weathered  At 61.6 to 62.3': Color becomes brown (7.5YR 4/4)		
65					CL/ CH	<b>Marker Bed M<sub>H</sub></b> - Clay; dark gray (5Y 4/1); appears very moist and very stiff to hard; abundant manganese oxide flecks and staining; trace calcium carbonate nodules up to ¼ inch At 62.3 to 62.8': 20 to 30% cemented manganese oxide nodules up to ¾ inch		
210		4	13	100	CL	<b>Marker Bed M<sub>C</sub> - Carbonate Soil Horizon</b> - Clay and Silty Clay; olive brown (2.5Y 4/4) to white (10YR 8/1); appears moist and very stiff; extensive calcium carbonate development, calcium carbonate occurs as dispersed deposits and cemented nodules up to 1 inch, total calcium carbonate 70 to 90%; lower contact is gradational  At 69.1 to 71.2': Calcium carbonate decreases to about 30 to 50%		
70								
205		5	14	100	SM	Silty Sand, very fine grained; light brownish gray (2.5Y 6/2); appears very moist and dense; calcium carbonate occurs as dispersed deposits and cemented nodules up to ¾ inch, total calcium carbonate 25 to 50%  At 72.6 to 72.7': Calcium carbonate >80%, cemented concretions up to 1½ inches		
75					CL- CH	Clay; olive gray (5Y 4/2), occasional strong brown (7.5YR 5/8) mottling; appears moist to very moist and very stiff to hard; variable (0-10%) manganese oxide flecks; lower contact is gradational At 72.8 to 73.1': Calcium carbonate-rich bed, calcium carbonate occurs as dispersed deposits and concretions up to 1 inch, total calcium carbonate 60-70% At 73.4 to 73.7': Highly oxidized bed; strong brown (7.5YR 5/8) predominant  At 75.0 to 75.5': Color becomes dark grayish brown (10YR 4/2); some strong brown (7.5YR 4/6) mottling		
200		5	15	100	ML	At 76.3 to 76.8': Grades to Clayey to Sandy Silt		
					CL	At 76.9 to 77.9': Silty Clay, dark greenish gray (10Y 3/1) to olive gray (10YR 5/2); appears moist and very stiff; some waxy parting surfaces At 77.5': soft/sheared clay seam, seam is wavy, subhorizontal to 10 degrees At 77.9 to 78.6': Increasing sand; gradational transition to unit below		
80					SP- SM	Poorly Graded Sand with Silt, fine grained; greenish gray (10GY 5/1); appears wet and dense At 80.0 to 81.2': Grades to fine to medium Poorly Graded Sand; light greenish gray (10YR 7/1)		

(CONTINUED ON FOLLOWING FIGURE)

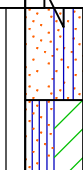


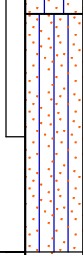
Geologist: ME/MF  
 Prepared/Date: DR/YN/MW 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T1-B8d

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T1-B8</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/27/11	8 inches	277 feet
						GROUNDWATER READINGS		
						Measured at 39 feet during drilling.		
195		5	16	44		SM-SC	<b>Qlw Continued</b>  At 81.2 to 82.2': Increasing silt and clay content, grades to fine to medium grained, clayey, silty sand; dark greenish gray (10GY 4/1)  At 82.2 to 85.0': No recovery	
85		5	17	20		SP-SM	At 85.3 to 86.0': <b>Marker Bed M<sub>c</sub></b> - Grades to fine Poorly Graded Sand; light brownish gray (2.5Y 6/2); trace to some (2 to 10%) fine rounded gravel At 86.0': 3/2 inch rounded quartzite clast At 86.0 to 90.0': No recovery	
190		5	17	20		SM	Silty Sand, fine grained; olive gray (5Y 5/2); appears wet and dense; slightly micaceous; lower contact is narrowly gradational  At 91.0 to 91.9': Becomes oxidized, mottled, light yellowish brown (2.5Y 6/4) to yellowish red (5Y 4/6)	
90		6	18	70		SM/ML	<b>SAN PEDRO FORMATION (Q<sub>sp</sub>)</b> Silty Sand and Sandy Silt; very fine grained, dark greenish gray (5GY 4/1) with strong brown (7.5YR 4/6) mottling; appears wet and medium stiff; micaceous  At 95.0 to 100.0': No recovery	
185		6	18	70				
95		6	19	0				
180		6	19	0				
100								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: DR/YN/MW 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

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					DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.	
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	Martini Drilling / CME 75		
						DRILLING METHOD		BOREHOLE LOCATION
						Hollow Stem Auger		See Plate 3
						DATES DRILLED		HOLE DIAMETER
		5/27/11		8 inches		GROUND EL. 277 feet		
GROUNDWATER READINGS								
Measured at 39 feet during drilling.								
175	6	20	30		SM/ML	<p><b>Qsp Continued</b>            At 100.2 to 100.6': Grades to Clayey Silt; dark greenish gray (10Y 4/1) with strong brown (7.5YR 4/6) mottling; appears very moist and stiff</p> <p>At 101.5 to 110.0': No recovery</p>		
170	6	21	0					
110					SP-SM	Poorly Graded Sand with Silt; fine grained, very dark gray (2.5Y 3/1); appears wet and dense; slightly micaceous; lower contact is sharp, dips approximately 5 degrees		
165					CL-CH	<b>Marker Bed M<sub>F</sub></b> - Clay, black (2.5Y 2.5/1); appears moist and very stiff; high organic content in upper 6 inches; lower contact is gradational		
165	6	22	56		SM-SC	Clayey, Silty Sand, fine grained, variable coarse sand and fine gravel, clasts 5-20%, up to 1/2 inch, mainly granitic rock and slate; black (2.5Y 2.5/1); appears very moist and dense; lower contact is gradational		
115					SM-SC	At 112.8 to 115.0': No recovery		
160	6	23	84		SM	<p>At 116.0 to 117.7': Gradational lightening of color, grades to dark gray (N 4); becomes moderately cemented (calcium carbonate)</p> <p>At 117.3 to 117.7': Decreasing coarse sand and gravel, gradational change to unit below</p> <p>At 117.7 to 120.7': Silty Sand, fine grained; greenish gray (N 5/1) to dark gray (N 4); appears damp and dense; well cemented (calcium carbonate), fractured into 2 to 3 inch fragments in core sample</p>		
120								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: DR/YN/MW 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

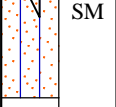
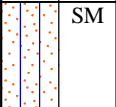
THIS RECORD IS AN INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T1-B8 (Continued)
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/27/11	8 inches	277 feet
						GROUNDWATER READINGS		
						Measured at 39 feet during drilling.		
155		7	24	38		<b>Qsp Continued</b> At 120.7 to 121.9': Gravel increases to 20 to 35%, most up to 1 inch, maximum 2 inches At 121.9' - 125.0': No recovery		
125		7	25	22		At 126.1' - 130.0': No recovery		
130		7	26	40		At 130.9 to 131.0': Well cemented bed (calcium carbonate), numerous subrounded slate clasts Silty Sand, fine, trace coarse sand and fine gravel (Jsm and granitic rock); very dark gray (N 3/1); appears wet and dense; well sorted; lower contact occurs between runs At 132.0 to 135.0': No recovery		
135		7	27	20		Sandy Silt; black (N 2.5/1); appears wet and stiff; lower contact occurs between runs At 135.7 to 135.9': Becomes gravelly, clasts 20-30%, up to 1 inch (Jsp) At 136.0 to 140.0': No recovery		
140								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: DR/YN/MW 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T1-B8 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/27/11	8 inches	277 feet
						GROUNDWATER READINGS		
						Measured at 39 feet during drilling.		
135		7	28	30		<b>Qsp Continued</b> Silty Sand, fine, trace coarse sand and fine gravel (Jsm and granitic rock); very dark gray (N 3/1); appears wet and dense; well sorted At 140.8 to 141.3': Becomes well cemented, fractured in 1 to 2-inch fragments At 141.3' - 145.0': No recovery		
145								
130		7	29	36		At 146.9' - 150.0': No recovery		
150						END OF BORING AT 150 FEET		
125						NOTES:  Boring backfilled with cement/bentonite grout from bottom up and patched.  -Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than 1/4 inch). -Beds are generally massive unless otherwise noted.		
155								
120								
160								

Geologist: ME/MF  
 Prepared/Date: DR/YN/MW 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL\_FIELD\_NOTES\GINT LOGS\101561-TRANSECT 2.GPI 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2-B1</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/18/11	8 inches	289 feet
						GROUNDWATER READINGS		
						Encountered at 20 feet during drilling		
						18 inches of asphalt concrete over 12 inches of base Hand augered to 5 feet  NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed description of clasts  <b>FILL [Af]</b> Clayey to Sandy Silt, variable gravel, clasts 5 to 30%, up to 1 inch; dark brown (10YR 3/3); appears moist and very stiff; scattered asphalt and concrete fragments		
285	5	1	1	100	ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Sandy Silt, trace to some clay, variable gravel, clasts 2 to 20%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), shale (Tm), and sandstone (Tm), some quartzite; dark brown (10YR3/3); appears moist and stiff to very hard; poorly sorted; occasionally grades to very fine silty sand or clayey silt; lower contact is gradational  At 10.5 to 13.7': Color becomes dark yellowish brown (10YR 3/4); appears moist and stiff to very stiff  At 11.8 to 12.3': Grades to very fine Silty Sand  At 13.7 to 15.0': Grades to Clayey Silt with Sand, trace coarse sand and gravel; very dark grayish brown (10YR 3/2); appears moist and hard  At 15.0 to 17.2': Silty Sand to Sandy Silt, very fine grained, trace coarse sand and gravel (Jsm and Tm); yellowish brown (10YR 5/4) with occasional strong brown (7.5YR 5/6) mottles; appears moist and stiff/dense		
280	10	1	2	100	SM ML ML			
275	15	1	3	86	ML	Clayey to Sandy Silt with Gravel, clasts 15 to 25%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm), some brick-red sandstone; brown (7.5YR 4/4); appears moist and very stiff; poorly sorted; occasionally grades to clayey, silty sand with gravel; coarsens with depth; lower contact is gradational  ∇ At 20': Groundwater encountered during drilling		
270								
20								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: YN/WL 10/13/2011  
 Checked/Date: MW/MF 10/13/2011



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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)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2-B1 (Continued)
						Martini Drilling / CME 75	Hollow-Stem Auger	See Plate 3
						DATES DRILLED	5/18/11	HOLE DIAMETER
							8 inches	GROUND EL.
								289 feet
						GROUNDWATER READINGS		
						Encountered at 20 feet during drilling		
		2	4	100		ML	<b>Qfo continued</b>	
							At 20.0 to 23.9': Appears wet and soft	
							At 21.8 to 23.9': Gravel decreases to 5 to 10%	
265	25					CL	<b>ESTUARINE DEPOSITS [Qe]</b>	
							Silty Clay; brown (7.5YR 4/4); appears wet and medium stiff, some varve-like bedding, lower contact is gradational	
		2	5	100		ML	Sandy to Clayey Silt, trace coarse sand and fine gravel (Jsm and Tm); strongly mottled, dark greenish gray (5GY 4/1) to brown (7.5YR 4/4); appears wet and medium stiff; lower contact is narrow and gradational	
						ML/CL	Silty Clay and Clayey Silt, variable fine sand, trace coarse sand and fine gravel (Jsm and Tm); mottled, dark greenish gray (5GY 4/1) to brown (7.5YR 4/4); appears very moist to wet and medium stiff; lower contact is gradational	
260	30					CL/SC	At 29.2 to 30.0': Alternating beds of Silty Clay and Silty Clayey Sand	
		2	6	100		CL	Silty Clay, variable fine sand, trace coarse sand; mottled, gray (10YR 5/1) to reddish brown (5YR 5/4); appears very moist and medium stiff; abundant (10 to 30%); manganese oxide flecks and staining; oxidized (reddish brown) pockets; lower contact is gradational	
							At 31.4 to 32.3': Silty Clay interbedded with fine Silty Sand beds; clay appears wet and soft	
255	35					SC	At 32.9 to 33.3': Clayey Sand, fine to coarse grained, appears wet and dense; lower contact is sharp, appears to dip approximately 15 degrees	
						CL	At 33.3 to 34.5': Abundant oxidized, dark reddish brown (5YR 3/4) silt and sandy silt pockets and laminations	
							At 34.5 to 35.0': Color becomes dark grayish brown (10YR 4/2), abundant magnesium oxide	
		3	7	100		ML	Clayey to Sandy Silt, variable coarse sand and fine gravel, clasts 2 to 15%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); strongly mottled, dark gray (5Y 4/1) to strong brown (7.5YR 4/6); appears very moist and stiff; occasionally grades to silty clay; some oxidized laminations; lower contact is sharp	
							At 35.0 - 37.5': Gravelly, some varve-like bedding	
							At 37.8 - 38.0': Trace gravel, prominent varve-like bedding	
250						CL	At 38.4 to 40.4': Sandy Clay, variable gravel, clasts 5 to 25%, up to 1/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm), some quartzite, and brick red sandstone; color variable; appears very moist and very stiff	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: YN/WL 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

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



**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T2-B1b

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)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2-B1 (Continued)
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/18/11	8 inches	289 feet
						GROUNDWATER READINGS		
						Encountered at 20 feet during drilling		
		3	8	100		ML	<p><b>Qe continued</b></p> <p>At 40.4 to 43.6': Up to 5% manganese oxide flecks and staining; gravel decreases to 2-5%; occasional silty clay beds, some varve-like bedding and gravelly interbedding</p>	
245	45						CL-ML	<p>At 43.6 to 44.0': Gravel increases to 30 to 40%</p> <p>At 44.0 to 45.4' and 45.8 to 46.2': Grades to Silty Clay and Clayey Silt, trace coarse sand (Jsm and Tm); abundant oxidized laminations</p>
		4	9	100		ML	<p>At 45.4 to 45.8': Clayey to Silty Sand with Gravel, clasts 15 to 20%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); some brick-red sandstone (Tm)</p>	
240	50					CL/ML	<p>Silty Clay and Clayey Silt, variable fine sand, trace coarse sand and fine gravel (Jsm and Tm); mottled, dark gray (10YR 4/1) to strong brown (7.5YR 4/6); appears very moist and very stiff; 2 to 5% calcium carbonate filaments and uncemented nodules up to 1/8 inch; punky texture, lower contact is narrowly gradational</p>	
		4	10	100		ML	<p>At 51.3 to 52.4': Calcium carbonate increases to 5 to 15%, some cemented nodules up to 1/4 inch</p>	
235	55					ML	<p>Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); mottled, dark grayish brown (2.5Y 5/2) to strong brown (7.5YR 5/6); appears very moist and stiff; lower contact is narrowly gradational</p>	
		4	11	100		CL	<p>Silty Clay, trace coarse sand and fine gravel (Jsm and Tm); strongly mottled, dark gray (10YR 4/1) to strong brown (7.5 YR 4/6); appears moist and very stiff; prominent oxidized laminations and varve-like bedding; trace calcium carbonate filaments</p>	
230	60						<p>At 58.8 to 60.2': Increasing sand and gravel; gradational transition to fan deposits below</p>	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: YN/WL 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

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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)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2-B1</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/18/11	8 inches	289 feet
						GROUNDWATER READINGS		
						Encountered at 20 feet during drilling		
225	65	4	12	100	ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Silty Silt, variable coarse sand and fine gravel; clasts 2 to 15%, up to 3/4 inch; mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm), some granitic rock; strong brown (7.5YR 4/6); appears very moist and stiff to very stiff; poorly sorted; minor fracturing infilled with calcium carbonate and silty silt; lower contact is gradational		
220	70	5	13	100	SM/ML	Silty Sand and Silty Silt, fine grained, trace clay, variable coarse sand and gravel, clasts 2 to 15%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); brown (7.5YR 4/3); poorly sorted; contact is narrowly gradational		
215	75	5	14	100	ML	Clayey Silt, variable fine sand, trace coarse sand and fine gravel (Jsm and Tm); brown (7.5YR 4/4); appears very moist and soft to medium stiff; lower contact is narrowly gradational At 70.5 to 70.8': Gravel increases to 10 to 15%  At 71.9 to 72.1': Grades to Silty Silt		
					SM	At 72.6 to 73.1': Silty Sand with Gravel, fine grained, clasts 15 to 20%, up to 1/2 inch (Jsm and Tm); brown (7.5YR 4/4); appears wet and dense		
					SW	<b>OLDER FLUVIAL DEPOSITS [Qfof]</b> Well Graded Sand with Gravel, fine to coarse grained, clasts 15 to 30%, up to 1 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); color variable, generally brown (7.5YR 4/3); appears wet and dense; lower contact is sharp and erosional		
					CL/SM/SW	At 74.6 to 75.0': Alternating beds of Silty Clay and fine Silty Sand; clay appears wet and soft At 75.0 to 75.8': Gravel decreases to 5%		
					SW	At 75.8 to 77.0': Gravel increases with depth, 10 to 50% up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); some quartzite (Jsm) and granitic rock		
210	80	5	15	96	CL	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Silty Clay, trace coarse sand and fine gravel (Jsm); dark brown (7.5YR 4/3); appears moist and very stiff; lower contact is narrowly gradational, some distinct banded bedding		
					SC-SM	At 79.2 to 80.0': Clayey to Silty Sand, fine grained, trace coarse sand and fine gravel; strong brown (7.5YR 4/4); appears very moist and dense		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: YN/WL 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

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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)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT	BORING NO.			
						Martini Drilling / CME 75	<b>T2-B1</b> (Continued)			
						<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"><b>DRILLING METHOD</b> Hollow-Stem Auger</td> <td style="width: 50%;"><b>BOREHOLE LOCATION</b> See Plate 3</td> </tr> <tr> <td><b>DATES DRILLED</b> 5/18/11</td> <td><b>HOLE DIAMETER</b> 8 inches</td> </tr> </table>		<b>DRILLING METHOD</b> Hollow-Stem Auger	<b>BOREHOLE LOCATION</b> See Plate 3	<b>DATES DRILLED</b> 5/18/11
<b>DRILLING METHOD</b> Hollow-Stem Auger	<b>BOREHOLE LOCATION</b> See Plate 3									
<b>DATES DRILLED</b> 5/18/11	<b>HOLE DIAMETER</b> 8 inches									
						<b>GROUNDWATER READINGS</b> Encountered at 20 feet during drilling	<b>GROUND EL.</b> 289 feet			
205	85					<p>END OF BORING AT 80 FEET</p> <p>NOTES:            Boring backfilled with cement/bentonite grout from bottom up and patched.</p> <ul style="list-style-type: none"> <li>-Munsell colors listed in order of predominance (most predominant color first).</li> <li>-Where observed, contacts and bedding appear subhorizontal unless otherwise noted.</li> <li>-Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted.</li> <li>-Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted.</li> <li>-The term "clasts" herein describes gravel-size rock fragments (larger than ¼ inch).</li> <li>-Beds are generally massive unless otherwise noted.</li> </ul>				
200	90									
195	95									
190										
100										

Geologist: ME/MF  
 Prepared/Date: YN/WL 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T2-B1e

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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)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2-B2
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/17/11 - 5/20/11	8 inches	288 feet
						GROUNDWATER READINGS		
						Measured at 29 feet during drilling		
						8 inches of asphalt concrete over 13 inches of concrete with Geofabric base		
						Hand augered to 6 feet		
						<b>FILL [Af]</b> Silty Clay to Clayey Silt, variable coarse sand, trace gravel (Jsm and Tm); dark grayish brown (10YR 4/2); appears very moist and stiff to very stiff; occasional silty clay layers; lower contact occurs between runs  NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed descriptions of clasts		
	5					At 6.0' to 9.0': No recovery		
		1	1	0		Depth of contact uncertain due to poor recovery		
						<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Sandy to Clayey Silt, trace coarse sand and fine gravel (Jsm and Tm); very dark grayish brown (10YR 3/2); appears moist to very moist At 9.6-12.5': No recovery		
	10	1	2	17				
						Silty Sand to Sandy Silt, fine grained, variable clay, variable fine gravel, clasts 2 to 15%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); mottled, brown (10YR 4/3) to strong brown (7.5YR 4/6); appears moist and stiff to very stiff; lower contact occurs between runs		
	275	1	3	40				
						Sandy Clay, variable coarse sand, trace fine gravel (Jsm and Tm); very dark grayish brown; appears moist and very stiff to hard At 15.5 to 15.8': Sandy Silt with Clay, trace fine gravel (Jsm and Tm); mottled, strong brown (7.5YR 4/6) to grayish brown (10YR 5/2); appears moist and very stiff; lower contact occurs between runs At 15.7 to 19': No recovery		
	15	1	4	100				
						Sandy to Clayey Silt, variable coarse sand, trace fine gravel (Jsm and Tm); mottled, reddish brown (5YR 4/3) to grayish brown (10YR 5/2); appears very moist to wet and soft to medium stiff; lower contact is gradational		
	270	1	5	18				
	20							

(CONTINUED ON FOLLOWING FIGURE)

Geologist: BF/MF  
 Prepared/Date: YN/WL 10/10/2011  
 Checked/Date: MW/MF 10/11/2011

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



**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T2-B2a

METRO SOIL CORE S:\70131\_GEOTECH\GINTW\FULT\_INVESTIGATION\_WSE\_LIBRARY\_AMEC\_OCTOBER2011\_02\_GLR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL\_FIELD\_NOTES\GINT LOGS\101561-TRANSECT 2.GPI 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T2-B2</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 288 feet
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						5/17/11 - 5/20/11	8 inches	
						GROUNDWATER READINGS		
						Measured at 29 feet during drilling		
		1	6	80		<b>Qfo Continued</b>		
		1	7	92		At 21.5 to 22.4': Grades to fine, Clayey to Silty Sand, trace coarse sand; appears very moist to wet and dense		
265								
25		1	8	54		Clayey to Silty Sand, fine to coarse grained, some gravel, clasts 5 to 10%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); brown (7.5YR 4/4); appears wet and dense		
260						<b>ESTUARINE DEPOSITS [Qe]</b> Alternating beds of Silty Clay and fine Silty Sand, brown (7.5YR 4/4); appears wet and soft/medium dense At 26.7-29': No recovery		
						▼ At 29': Groundwater measured during drilling		
	30	2	9	100		At 29.0 to 29.4': Silty Sand to Sandy Silt; very fine grained, brown (7.5YR 4/4); appears very moist to wet and stiff; micaceous; lower contact is sharp, erosional Alternating beds of Clay and fine Silty Sand; mottled, dark grayish brown (10YR 4/2) to strong brown (7.5YR 4/6); appears wet and soft/medium dense; clay contains variable manganese oxide flecks and oxidized, fine silt pockets (strong brown); clay/sand contacts are sharp		
						At 31.0' to 31.8': Silty Clay, dark grayish brown (10YR 4/2), manganese oxide specks, some organics		
255		2	10	100		Silty Clay and Clayey Silt, variable fine to coarse sand, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); mottled, dark grayish brown (10YR 4/2) to strong brown (7.5YR 4/6); appears very moist to wet and medium stiff to stiff; abundant (10 to 30%) manganese oxide flecks and staining; strong brown color occurs mainly as fine, irregular pockets; "punk" texture; occasional oxidized fine silty sand lenses or pockets; lower contact occurs between runs		
	35	2	11	70		Alternating beds of Silty Clay and fine Silty Sand/ Sandy Silt; mottled dark grayish brown (10YR 4/2) to strong brown (7.5YR 5/6); appears wet and soft/medium dense; lower contact is sharp		
	250					Clay, rare (<1%) coarse sand (Jsm and Tm); mottled, color variable, mainly brown (7.5YR 4/3) to dark gray (7.5YR 4/1); appears very moist and stiff to very stiff; 5 to 15% manganese oxide flecks and staining; lower contact is narrowly gradational At 37.5 to 39.0': No recovery		
40								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: BF/MF  
 Prepared/Date: YN/WL 10/10/2011  
 Checked/Date: MW/MF 10/11/2011

METRO SOIL CORE S:\70131\_GEOTECH\GINTW\Fault\_Investigation\_WSE\_Library\_AMEC\_October2011\_(2).GLR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL\_FIELD\_NOTES\GINT LOGS\101561-TRANSECT 2.GPI 10/14/11

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2-B2 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/17/11 - 5/20/11	8 inches	288 feet
						GROUNDWATER READINGS		
						Measured at 29 feet during drilling		
						<b>Qe Continued</b>		
		2	12	100		ML/ CL	Silty Clay and Clayey Silt, variable fine to coarse sand, trace fine gravel (Jsm and Tm); mottled, strong brown (7.5YR 4/6) to dark gray (7.5YR 4/1); appears very moist and very stiff; prominent varve-like bedding	
245						ML	At 43.4 to 44.8': Sand increases, grades to Clayey to Sandy Silt; trace fine gravel	
45						ML/ CL		
		3	13	100		ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt; variable coarse sand and fine gravel, clasts 5 to 20%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), some shale (Tm) and sandstone (Tm); reddish brown (5YR 4/4) with variable brown (7.5YR 4/3) mottling; appears very moist and stiff; poorly sorted; lower contact is narrowly gradational	
240							At 49.0 to 50.3': Becomes more clayey, gravel 2 to 5%; brown (10YR 4/3) with occasional strong brown (7.5YR 5/6) mottling	
50						CL	Silty Clay with Gravel, abundant coarse sand, clasts 15 to 30%, up to 1 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm), some brick-red sandstone; color variable, mainly brown (10YR 4/3); appears very moist to wet and medium stiff to stiff; poorly sorted; occasionally grades to clayey sand/sandy clay with gravel; lower contact is gradational	
235							At 52.6 to 54.0': No recovery	
55						CL	At 55.2 to 61.0': Appears very moist, very stiff	
230							At 57.0 to 59.0': No recovery	
60						CL		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: BF/MF  
 Prepared/Date: YN/WL 10/10/2011  
 Checked/Date: MW/MF 10/11/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T2-B2c

METRO SOIL CORE S:\70131 GEOTECH\GINTW\Fault\_Investigation\_WSE\_Library\_AMEC OCTOBER2011 (2).GIR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 2.GPI 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2-B2 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/17/11 - 5/20/11	8 inches	288 feet
						GROUNDWATER READINGS		
						Measured at 29 feet during drilling		
225		4	16	72	ML CL/CH	<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b> Clayey to Sandy Silt, coarse sand and fine gravel decrease with depth to trace, brown (10YR 4/3) to strong brown (7.5YR 4/6), appears moist and stiff, prominent varve-like bedding Clay, trace coarse sand (Jsm and Tm); mottled, strong brown (7.5YR 4/6) to very dark gray (10YR 3/1) to grayish brown (2.5YR 5/2); appears very moist and stiff to very stiff  At 61.0 to 62.7': Prominent varve-like bedding At 61.8 to 62.0': Gravel increases to 15 to 20%, 10 to 15% calcium carbonate filaments At 62.6 to 64.0': No recovery  At 64.0 to 65.5': Color variable mainly brown (7.5YR 4/3) with strong brown (7.5YR 5/6) mottling, speckled texture  At 65.0. to 65.5': Occasional highly oxidized yellowish red (5YR 4/6) silt pockets up to 1/4-inch  At 66.5 to 67.0': Grades to Clayey Sand, fine grained, gravel increases with depth from 2 to 15% (Jsm and Tm) At 67.0' to 68.0': Varve-like bedding  A 68.0 to 69.0': No recovery  At 69.0 to 69.5': Clayey to Silty Sand, fine grained, brown (7.5YR 5/4); appears wet and dense At 69.6 to 70.4': Color becomes dark grayish brown (10YR 4/2)  At 70.4 to 70.8' and 74.0 to 78.8': Strongly mottled, grayish brown (2.5Y 5/2) to strong brown (7.5YR 4/6); appears very moist and very stiff At 70.8 to 74': No recovery		
220		4	17	80	SC CL/CH			
70		4	18	36	SC/SM CL/CH			
215								
75		5	19	94	CL/CH ML CL/CH	At 76.8 to 77.5': Up to 5% calcium carbonate filaments and cemented nodules up to 1/8 inch At 77.5 to 78.4': Grades to Sandy to Clayey Silt		
210								
80						END OF BORING AT 79 FEET		
						NOTES:		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: BF/MF  
 Prepared/Date: YN/WL 10/10/2011  
 Checked/Date: MW/MF 10/11/2011

MTA Westside Subway Extension  
 Los Angeles, California



LOG OF BORING

Project No.: 4953-10-1561 Figure: T2-B2d



METRO SOIL CORE S:\70131 GEOTECH\GINT\W\FULT\_INVESTIGATION\_WSE\_LIBRARY\_AMEC OCTOBER2011 (2).GLR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 2.GPI 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT	BORING NO.			
						Jet Drilling / CME 75	<b>T2-B2</b> (Continued)			
						<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"><b>DRILLING METHOD</b> Hollow-Stem Auger</td> <td style="width: 50%;"><b>BOREHOLE LOCATION</b> See Plate 3</td> </tr> <tr> <td><b>DATES DRILLED</b> 5/17/11 - 5/20/11</td> <td><b>HOLE DIAMETER</b> 8 inches</td> </tr> </table>		<b>DRILLING METHOD</b> Hollow-Stem Auger	<b>BOREHOLE LOCATION</b> See Plate 3	<b>DATES DRILLED</b> 5/17/11 - 5/20/11
<b>DRILLING METHOD</b> Hollow-Stem Auger	<b>BOREHOLE LOCATION</b> See Plate 3									
<b>DATES DRILLED</b> 5/17/11 - 5/20/11	<b>HOLE DIAMETER</b> 8 inches									
						<b>GROUNDWATER READINGS</b> Measured at 29 feet during drilling	<b>GROUND EL.</b> 288 feet			
205						<p>Boring backfilled with cement/bentonite grout from bottom up and patched.</p> <ul style="list-style-type: none"> <li>-Munsell colors listed in order of predominance (most predominant color first).</li> <li>-Where observed, contacts and bedding appear subhorizontal unless otherwise noted.</li> <li>-Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted.</li> <li>-Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted.</li> <li>-The term "clasts" herein describes gravel-size rock fragments (larger than 1/4 inch).</li> <li>-Beds are generally massive unless otherwise noted.</li> </ul>				
	85									
200										
195										
190										
100										

Geologist: BF/MF  
 Prepared/Date: YN/WL 10/10/2011  
 Checked/Date: MW/MF 10/11/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T2-B2e

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2-B3</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/17/11	8 inches	283 feet
						GROUNDWATER READINGS		
						Encountered at 40 feet during drilling		
						18 inches asphalt concrete over 6 inches of base		
						Hand augered to 5 feet		
						<b>FILL [Af]</b> Sandy Silty Clay, fine grained		
						NOTE: Jsm= Santa Monica Slate Tm = Modelo Formation See end of log for more detailed descriptions		
						<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Silty Clay and Clayey Silt, variable fine to coarse sand and gravel, clasts 5 to 15%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm), some brick-red sandstone, dark brown (7.5YR 3/2); appears very moist and medium stiff to stiff; poorly sorted; lower contact is gradational		
		1	1	94		At 8.4': Color becomes very dark brown (7.5YR 2.5/2)		
						Sandy to Clayey Silt, variable coarse sand, trace fine gravel (Jsm and Tm), some brick-red sandstone, very dark brown (7.5YR 2.5/2); appears very moist and stiff; poorly sorted; lower contact is gradational		
		1	2	100				
						Clayey to Sandy Silt, variable coarse sand and gravel, clasts 5 to 20%, up to 1 inch,		
		1	3	100				

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: YN/WL 10/10/2011  
 Checked/Date: MW/MF 10/11/2011

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2-B3</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 283 feet
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						5/17/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 40 feet during drilling		
260		2	4	100	ML	<b>Qfo Continued</b> mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm), some brick-red sandstone; dark brown (10YR 3/3); appears very moist and medium stiff to stiff; occasionally grades to silty clay; lower contact is narrowly gradational		
25					CL/ CH	<b>ESTUARINE DEPOSITS [Qe]</b> Clay and Silty Clay, rare (<1%) coarse sand; mottled, dark grayish brown (10YR 4/2) to yellowish red (5YR 5/6); appears very moist and very stiff, prominent varve-like bedding; lower contact is gradational		
255		2	5	100	CL/ ML	At 25.0 to 28.2': Silty Clay and Clayey Silt, trace coarse sand and gravel; variable varve-like bedding		
30					CL/ CH	At 29.3 to 30.0': Occasional slate (Jsm) clasts up to 1 inch		
					ML	At 30.2 to 31.6': Grades to Clayey Silt, trace coarse sand and fine gravel (Jsm and Tm)		
250		2	6	100	ML	Clayey to Sandy Silt, variable coarse sand and fine gravel, clasts 2 to 15%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); highly oxidized mottling, brown (7.5YR 4/4) to yellowish red (5YR 5/6); appears moist and very stiff; lower contact occurs between runs		
35					ML	Sandy Silt, trace coarse sand (Jsm and Tm); brown (7.5YR 4/4); appears moist to very moist and stiff; generally well sorted; lower contact is narrowly gradational; occasional varve-like bedding		
245		3	7	100		At 38.1 to 39.9': Trace to some clay, variable gravel, clasts 2 to 15%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm)		
40						At 40.0': Groundwater encountered during drilling		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: YN/WL 10/10/2011  
 Checked/Date: MW/MF 10/11/2011

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2-B3</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						5/17/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 40 feet during drilling		
						SP/SM	<b>Qe Continued</b> Poorly Graded Sand with Silt, fine grained; brown (7.5YR 4/4); appears very moist to wet; lower contact is sharp, erosional, appears to dip 10 degrees	
						ML	At 41.3 to 43.9': Clayey Silt with Sand, trace coarse sand and fine gravel (Jsm and Tm); brown (7.5YR 4/4)	
						SW	At 41.9 to 42.6': Well graded Sand with Gravel, fine to coarse grained, clasts 15 to 20%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); dark brown (7.5YR 3/3); lower contact is sharp, erosional	
						ML	At 42.6 to 43.0': Clayey Silt with Sand, trace coarse sand and fine gravel (Jsm and Tm); brown (7.5YR 4/4)	
						CL	Clay, trace coarse sand and fine gravel (Jsm and Tm); mottled, brown (7.5YR 5/2) to strong brown (7.5YR 4/4); appears very moist and very stiff; trace manganese oxide staining; lower contact is narrowly gradational	
						ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt, variable coarse sand and gravel, clasts 5 to 20%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); appears very moist and very stiff; poorly sorted; occasionally grades to sandy clay; lower contact is gradational	
							At 49.0 to 50.0': No recovery	
							At 50.0 to 50.7': Increasing gravel, gradational transition to unit below	
						GC	Clayey Gravel, clasts 50 to 70%, up to 1 1/2 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); matrix is fine to coarse clayey sand; brown (7.5YR 4/4); appears wet and dense; matrix occasionally grades to sandy clay; lower contact is sharp, erosional	
						ML	Sandy to Clayey Silt, trace coarse sand and fine gravel (Jsm and Tm), some brick red sandstone; brown (7.5YR 4/4); appears very moist to wet and soft to stiff	
						GM	At 56.0 to 56.6': Silty Gravel, clasts 50 to 60%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); brown (7.5YR 4/4); appears wet and dense	
						ML	<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b> Alternating thin beds and laminations of Clayey Silt and Sandy Silt, color variable; appears very moist and stiff; bedding contacts sharp	
						CL		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: YN/WL 10/10/2011  
 Checked/Date: MW/MF 10/11/2011

METRO SOIL CORE S:\70131 GEOTECH\GINTW\FULT\_INVESTIGATION\_WSE\_LIBRARY\AMEC OCTOBER2011 (2).GIR  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2-B3 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/17/11	8 inches	283 feet
						GROUNDWATER READINGS		
						Encountered at 40 feet during drilling		
		4	12	100		ML	Clayey Silt to Silty Clay, trace coarse sand, dark grayish brown (10YR 4/2), appears moist and very stiff, 5 to 15% calcium carbonate filaments and nodules <b>Qef Continued</b>	
220						CL	Clay and Silty Clay, trace coarse sand and fine gravel (Jsm and Tm); highly oxidized, mottled, reddish brown (5YR 4/4) to dark gray (10YR 4/1); appears moist and very stiff to hard; trace calcium carbonate filaments	
65							At 65.0 to 65.8': Increasing sand, gradational transition to unit below	
		5	13	100		ML	<b>ESTUARINE DEPOSITS [Qe]</b> Clayey to Sandy Silt, variable coarse sand and fine gravel, clasts 2 to 15%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm), some quartzite; mottled, strong brown (10YR 5/6) to gray (2.5Y 5/1); appears very moist and very stiff; trace manganese oxide flecks and calcium filaments, occasional calcium carbonate-cemented nodules up to 1/8 inch; lower contact is gradational At 67.0 to 69.1': Calcium carbonate increases to 5 to 15%	
215						CL	At 68.6 to 68.9': Calcium carbonate-rich bed, cemented and uncemented nodules up to 1 inch, total calcium carbonate 50 to 60% At 69.1 to 70.0': Grades to Silty Clay with variable coarse sand and gravel (Jsm and Tm)	
70						SM/ML	At 70.0 to 72.4': Silty Sand to Sandy Silt with Gravel, fine grained, clasts 15 to 30%, up to 1 inch, mainly subangular and subrounded slate (Jsm), shale (Tm) and sandstone (Tm); trace clay; dark grayish brown (10YR 4/2); appears very moist and dense/stiff	
		5	14	100		ML		
210						CL/ML	At 73.7 to 74.9': Grades to Silty Clay and Clayey Silt, trace coarse sand; highly oxidized, mottled, reddish brown (5YR 4/4) to dark grayish brown (10YR 4/2); appears moist and very stiff; some varve-like bedding; 10 to 20% calcium carbonate filaments	
75						ML		
						SM	At 76.5 to 77.0': Grades to fine Silty Sand	
		5	15	100		ML	At 77.0 to 79.0': Calcium carbonate filaments increase to 5 to 10%, little or no cemented nodules	
205						CL/ML	At 79.0 to 80.0': Grades to Silty Clay and Clayey Silt, trace coarse sand; highly oxidized, mottled reddish brown (5YR 4/4) to dark grayish brown (10YR 4/2); appears moist and very stiff; variable (5 to 30%) calcium carbonate filaments	
80								

Geologist: ME/MF  
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(CONTINUED ON FOLLOWING FIGURE)

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 G:\PROJECT\_DIRECTORIES\49532\010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 2.GPI 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT	BORING NO.			
						Martini Drilling / CME 75	<b>T2-B3</b> (Continued)			
						<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;"><b>DRILLING METHOD</b> Hollow-Stem Auger</td> <td style="width: 50%;"><b>BOREHOLE LOCATION</b> See Plate 3</td> </tr> <tr> <td><b>DATES DRILLED</b> 5/17/11</td> <td><b>HOLE DIAMETER</b> 8 inches</td> </tr> </table>		<b>DRILLING METHOD</b> Hollow-Stem Auger	<b>BOREHOLE LOCATION</b> See Plate 3	<b>DATES DRILLED</b> 5/17/11
<b>DRILLING METHOD</b> Hollow-Stem Auger	<b>BOREHOLE LOCATION</b> See Plate 3									
<b>DATES DRILLED</b> 5/17/11	<b>HOLE DIAMETER</b> 8 inches									
						<b>GROUNDWATER READINGS</b> Encountered at 40 feet during drilling	<b>GROUND EL.</b> 283 feet			
200						<p>END OF BORING AT 80 FEET</p> <p>NOTES:            Boring backfilled with cement/bentonite grout from bottom up and patched.</p> <ul style="list-style-type: none"> <li>-Munsell colors listed in order of predominance (most predominant color first).</li> <li>-Where observed, contacts and bedding appear subhorizontal unless otherwise noted.</li> <li>-Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted.</li> <li>-Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted.</li> <li>-The term "clasts" herein describes gravel-size rock fragments (larger than ¼ inch).</li> <li>-Beds are generally massive unless otherwise noted.</li> </ul>				
85										
195										
90										
190										
95										
185										
100										

Geologist: ME/MF  
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**MTA Westside Subway Extension**  
 Los Angeles, California



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T2-B3e

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2-B4</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/14/11 - 5/16/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Measured at 20 feet during drilling		
275	5					<p>Grass at surface Hand augered to 6 feet <b>FILL [Af]</b> Silty Clay and Clayey to Sandy Silt, variable gravel, 2-15%, up to 3/4 inch; color variable, mainly dark brown (7.5 4R 3/3); generally appears very moist</p> <p>NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed descriptions of clasts</p>		
270	10	1	1	85		<p>At 6.0 to 7.0': Very fine Silty Sand with Gravel; appears moist and medium dense</p>		
265	15	1	2	70		<p><b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); brown (10YR 4/3); appears very moist and stiff; poorly sorted; lower contact is gradational</p> <p>At 12.0 to 13.0': Coarse sand and gravel increase with depth, maximum gravel size is 1 inch, gradational transition to unit below</p>		
						<p>Well Graded Gravel, clasts 50 to 60%, up to 1 inch, mainly subangular slate (Jsm), shale (Tm) and sandstone (Tm), matrix is fine to coarse, well graded sand; brown (10YR 4/3); appears damp and medium dense; lower contact occurs between runs</p> <p>At 13.5 to 15.0': No recovery</p>		
		1	3	70		<p>Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); brown (10YR 4/3); appears very moist and medium stiff to stiff; poorly sorted; lower contact is narrowly gradational</p>		
						<p>At 17.6 to 18.0': Grades to fine to coarse Silty Sand with Gravel, clasts 25 to 50%, up to 1 1/2 inches, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm)</p> <p>At 18.0 to 18.5': Grades to fine Silty Sand to Sandy Silt</p> <p>At 18.5 to 20.0': No recovery</p>		

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2-B4 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/14/11 - 5/16/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Measured at 20 feet during drilling		
		2	4	96	ML	<b>Qfo Continued</b> At 20': Groundwater measured during drilling		
		2	5	30	SC/ SM	Silty, Clayey Sand, fine grained, variable coarse sand and gravel, clasts 5 to 25%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); brown (7.5YR 4/4); appears wet and medium dense; occasional silty sand and sandy clay beds; lower contact is sharp		
255	25				SW	Well Graded Sand with Gravel, clasts 25 to 50%, up to 1 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm), one granitic clast also observed; color variable; appears wet and medium dense; lower contact is sharp  At 26.0': Gravel decreases to 5-20% At 26.5 to 30.0': No recovery		
250	30	2	6	100	ML	Sandy to Clayey Silt, variable gravel, clasts 5-20%, most up to 3/4 inch, maximum 1 1/2 inches mainly shale (Tm), slate (Jsm) and sandstone (Tm); brown (7.5YR 4/4); appears wet and soft; poorly sorted; lower contact is sharp		
245	35	3	7	90	GM	<b>OLDER FLUVIAL DEPOSITS [Qfoff]</b> Silty Gravel, clasts 60 to 70%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm), matrix is fine to coarse silty sand; color variable; appears wet and dense; lower contact occurs between runs At 34.2 to 34.9': Sandy Silt with Clay; mottled, dark grayish brown (10YR 4/2) to strong brown (7.5YR 4/6); appears wet and soft At 34.5 to 35.0': Fault, approximate dip 40 to 45 degrees, planar surface, very fine sand below, sandy silt above, sandy silt above has near horizontal bedding At 34.9 to 35.5': Clayey Silt with Sand; mottled; dark grayish brown (10YR 4/2) to strong brown (7.5YR 4/6); appears wet and soft At 35.5 to 36.3': Fine to coarse Well Graded Sand; variable gravel, clasts 5 to 30%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm) At 36.2 to 38.0': Matrix becomes lightly oxidized, dark reddish brown (2.5YR 3/4)  At 38.0 to 38.7': Clayey to Sandy Silt; grayish brown (10YR 5/2) with strong brown (7.5YR 4/6) mottles; strong brown (7.5YR 4/6) lamination at base of bed (1/2 inch) At 38.7 to 39.5': Matrix becomes fine to coarse Well Graded Sand; color variable		
40					ML			
					GW			

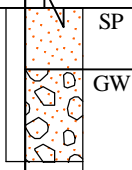
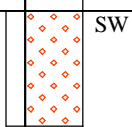
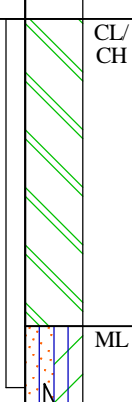
(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2-B4 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 280 feet
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						5/14/11 - 5/16/11	8 inches	
						GROUNDWATER READINGS		
						Measured at 20 feet during drilling		
235	45	3	8	40		<b>Qfofl Continued</b> At 40.0 to 40.8': Fine to medium Poorly Graded Sand; brown (10YR 4/4) At 40.8 to 42': Matrix is fine to coarse well graded sand; color is variable, upper contact is sharp, appears to dip approximately 30 degrees At 41.6 to 42.0': Highly oxidized, dark reddish brown (2.5YR 3/4) At 42.0 to 45.0': No recovery		
230	50	3	9	30		Well Graded Sand, fine to coarse grained; variable gravel, clasts 5 to 35%, up to 1½ inches, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); color variable; appears wet and dense; some silt pockets or rip up clasts up to 1½ inches At 46.5 to 50.0': No recovery  At 50.0 to 55.0': No recovery		
225	55	3	10	0		Contact may be at about 47' based on CPT signature		
		3	11	96		<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b> Clay, trace coarse sand and fine gravel (Jsm and Tm); mottled, brown (7.5YR 4/2) to very dark gray (2.5Y 3/1) to strong brown (7.5YR 4/4); appears moist and very stiff to hard; strong brown color occurs mainly as fine, irregular pockets; lower contact is gradational  At 57.0 to 59.0': Brown color increases, very dark gray color and strong brown pockets decrease  At 59.0 - 60.0': Grades to Clayey to Sandy Silt; brown (7.5YR 4/2) with dark gray (2.5Y 4/1) mottling		

(CONTINUED ON FOLLOWING FIGURE)

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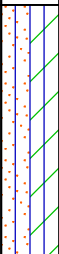
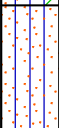
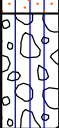

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2-B4 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						5/14/11 - 5/16/11	8 inches	
						GROUNDWATER READINGS		
						Measured at 20 feet during drilling		
215	65	4	12	100		CL/CH	<b>Qef Continued</b> At 60.0 - 63.8': Trace manganese oxide flecks; brown (7.5YR 4/2) with occasional dark gray (2.5Y 4/1) mottling	
						ML	At 61.0 - 61.4': Grades to Clayey to Sandy Silt	
						CL/CH		
						ML	At 63.8 - 65.0': Clayey to Sandy Silt; variable coarse sand and gravel; clasts 2-15%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); brown (10YR 4/4); appears very moist and very stiff; coarsens with depth, grades to unit below	
210	70	4	13	52		GM	<b>OLDER ALLUVIAL FAN / FLUVIAL DEPOSITS [Qfo/Qfofl]</b> Silty Gravel, clasts 50-70%, up to 2 inches, mainly subangular to subrounded slate (Jsm), sandstone (Tm), quartzite (Jsm) and granitic rock, matrix is fine to coarse silty sand; color variable; mainly very dark grayish brown (10YR 3/2); appears wet and dense; lower contact is sharp	
						SG	At 65.9 to 66.4': Grades to fine to coarse Silty Sand with Gravel	
						GM	At 67.0 to 67.6': Clayey to Sandy Silt, trace coarse sand; brown (7.5YR 4/4); appears wet and soft to medium stiff	
						ML	At 67.6 to 70.0': No recovery	
205	75	4	14	64		SW	Well Graded Sand, fine to medium grained; variable gravel, clasts 5-20%, brown (7.5YR 5/4); appears wet and dense; lower contact is gradational	
						GC/GM	Clayey, Silty Gravel, clasts 50-60%, up to 2 inches, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); appears wet and dense; lower contact occurs between runs	
							At 71.5 to 71.8': Gravel increases to 15-25%	
							At 72.5 to 73.0': Color becomes dark brown (7.5YR 3/4), gravel increases to 5-10%, some varve-like bedding	
							At 73.2 to 75.0': No recovery	
80		4	15	44		SM/ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Silty Sand and Sandy Silt, fine grained; variable clay, trace coarse sand and gravel (Jsm and Tm); brown (7.5YR 4/3) with occasional grayish brown (10YR 5/2) mottling; appears wet and dense/stiff; poorly sorted; lower contact occurs between runs	
							At 76.1 to 76.5': Increasing Silt and Gravel	
							At 77.2 to 80.0': No recovery	

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2-B4 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						5/14/11 - 5/16/11	8 inches	
						GROUNDWATER READINGS		
						Measured at 20 feet during drilling		
195	85	4	16	34	 SW  GM-GC	<p><b>Qfo Continued</b> Well Graded Sand, fine to coarse grained, trace fine gravel (Jsm and Tm); color variable, generally brown (10YR 4/3); appears wet and dense; lower contact occurs between runs; depth of upper contact uncertain due to poor recovery</p> <p>At 81.3 to 81.7': Clayey, Silty Gravel, clasts 60 to 70%, up to 1 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); some brick-red sandstone observed; matrix is fine to coarse clayey silty sand; brown (7.5YR 4/4); appears wet and dense</p> <p>At 81.7 to 85.0': No recovery</p> <p>Depth at contact uncertain due to poor recovery</p>		
190	90	5	17	70	 CL  GM	<p>Silty Clay, variable fine sand, trace coarse sand and fine gravel (Jsm and Tm); mottled, dark brown (7.5YR 3/2) to reddish brown (5YR 4/4); appears very moist and very stiff; poorly sorted; lower contact occurs between runs</p> <p>At 86.0 to 87.0': Increasing sand and gravel contact</p> <p>At 87.0 to 88.5': Gravel 15 to 20%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); some granitic rock and brick-red sandstone also observed</p> <p>At 88.5 to 90.0': No recovery</p>		
185	95	5	18	90	 ML  ML	<p>Sandy to Clayey Silt, variable fine gravel, clasts 5 to 15%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); some brick-red sandstone observed; brown (7.5YR 4/4); appears very moist to wet and stiff to very stiff; poorly sorted, becomes generally finer with depth; lower contact is gradational</p> <p>At 93.3 to 95.9': Grades to Sandy Silt, trace clay</p> <p>At 94.0': Clay layer (1 inch thick), planar contact, appears to dip 45 degrees, portion of clay is infill of possible fracture below, near vertical, extends 3 inches into lower unit, pinches out below</p> <p>At 95.9 to 96.7': Grades to fine Silty Sand to Sandy Silt</p>		
100		5	19	90	 GM  CL/ML	<p>Silty Gravel, clasts 60 to 70%, up to 1 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); color variable; appears wet and dense; lower contact is gradational</p> <p><b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b> Alternating beds of Sandy Silt and Silty Clay; brown (7.5YR 4/4) to reddish brown (5YR 4/4); appears wet and soft to medium stiff; lower contact is narrowly gradational</p>		

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2-B4 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/14/11 - 5/16/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Measured at 20 feet during drilling		
175	105	6	20	100	CL/CH	<b>Qef Continued</b> Clay, rare (1%) coarse sand (Jsm and Tm); brown (10YR 4/3); appears very moist and very stiff; trace manganese oxide flecks; 5-10% calcium carbonate filaments; lower contact is gradational  At 102.7 to 104.0': Color becomes very dark grayish brown (10YR 3/2); calcium carbonate decreases to <2%  At 104.0 to 105.2': Becomes mottled, dark grayish brown (10YR 4/2) to strong brown (7.5YR 4/6)  At 105.2 to 105.7': Increasing sand and gravel, gradational transition to unit below		
170	110	6	21	100	ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Sandy to Clayey Silt, variable coarse sand and gravel, clasts 2-20%, up to 3/4-inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); mottled, strong brown (10YR 5/6) to grayish brown (2.5Y 5/2); appears very moist and very stiff; trace manganese oxide flecks and staining; 2-10% calcium carbonate filaments, lower contact is narrowly gradational  At 109.4 to 109.6': Gravel increases to 30-40%		
165	115	6	22	96	GC/GM	Silty, Clayey Gravel, clasts 50-70%, up to 1 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); some quartzite and granitic rock also observed; matrix is fine to coarse silty, clayey sand; color variable; appears very moist to wet and dense; matrix occasionally grades to sandy clay  At 112.2 to 112.4': Grades to Well Graded Gravel, well graded sand matrix		
					GW ML	Sandy Silt, variable fine gravel, clast 5-15%, up to 1/2" (Jsm+Tm); color variable, appears wet and dense; lower contact is gradational		
165	115	7	23	100	CL/ML	<b>ESTUARINE DEPOSITS [Qe]</b> Silty Clay and Clayey Silt; strongly mottled, brown (7.5YR 4/4) to grayish brown (10YR 5/2); appears very moist and stiff to very stiff; occasional sandy silt beds; bedding contacts generally sharp; lower contact is gradational  At 116.0 to 117.4': Grades to Clayey to Sandy Silt; variable gravel, clasts 2-15%, up to 1/2-inch (Jsm and Tm)  At 117.4 to 118.5': Trace calcium carbonate filaments  At 119.2 to 119.4': Silty Sand bed, fine grained; brown (7.5YR 4/4); sharp contacts		
120					SM CL			

(CONTINUED ON FOLLOWING FIGURE)

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 Prepared/Date: YN/WL 10/10/2011  
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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)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2-B4 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/14/11 - 5/16/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Measured at 20 feet during drilling		
155	125	7	24	100	CL/ML	<b>Qe Continued</b> Clay and Silty Clay, variable coarse sand, trace fine gravel; olive gray (5Y 4/2) with variable strong brown (7.5YR 4/6) mottling; appears very moist and very stiff; mottling occur mainly as fine, irregular pockets; 2-5% manganese oxide flecks; lower contact is gradational		
					SM	<b>BASAL ALLUVIAL FAN / BASAL ESTUARINE UNIT [Qfob / Qeb]</b> Silty Sand, fine grained, interbedded with silty clay; color variable, mainly olive gray (5Y 4/2) with variable oxidation; appears very moist and dense/stiff; lower contact is gradational At 121.9 to 122.1': Calcium carbonate-rich bed, some cemented, irregular nodules up to 1 1/2 inches At 123.0 to 123.9': Silty Clay bed, trace cemented calcium carbonate nodules up to 1/4 inch; variable manganese oxide flecks (5 to 20%) At 123.9 to 124.8': Calcium carbonate-rich bed, 50 to 70% dispersed calcium carbonate and cemented nodules up to 1/2 inch At 124.8 to 128.0': Color becomes dark olive gray (5Y 3/2) with brown (7.5YR 4/4) irregular fine pockets, 10 to 15% calcium carbonate pockets and cemental nodules up to 1/4 inch; trace manganese oxide flecks; mainly silty clay		
		7	25	100	CL	At 128.0 to 130.6': Color becomes grayish brown (2.5Y 5/2) with yellowish brown (10YR 5/6) mottles  At 129.0 to 130.6': Sand content increases with depth, gradational transition to unit below		
150	130				SM	<b>BASAL ALLUVIAL FAN UNIT [Qeb]</b> Silty Sand and Sandy Silt, very fine grained, variable clay, trace coarse sand (Jsm and Tm); mottled, yellowish brown (10YR 5/4) to grayish brown (2.5Y 5/2); appears very moist and very stiff; faulted lower contact described below at 133.5' At 130.6 to 131.8': Calcium carbonate filaments and nodules increase with depth At 131.8 to 133.0': Calcium carbonate-rich bed, 60-70% dispersed calcium carbonate and cemented nodules up to 1/8 inch  At 133.0 to 134.1': Calcium carbonate decreases to 10-20%		
		8	26	100	SM/ML	At 134.0 to 134.8': Fault, shear zone approximately 1 1/2 inches wide, parallel shears, dips approximately 60 to 70 degrees; Qeb above, Qfob below At 134.1 to 134.4': Cemental bed, up to 70% calcium carbonate cemented nodules up to 1-inch Contact is faulted		
145	135				CL/ML	<b>BASAL ESTUARINE UNIT [Qeb]</b> Silty Clay and Clayey Silt, trace coarse sand; dark gray (5Y 4/1) with occasional brown (7.5YR 4/4) mottles; appears very moist and very stiff to hard; 5-15% calcium carbonate filaments; clay is soft, crumbly possible shearing; lower contact is narrowly gradational At 136.4 to 137.2': Abundant (70%), dispersed calcium carbonate, color becomes lighter, no matching Munsell color At 137.2 to 138.0': Mottled, dark gray (2.5Y 4/1) to brown (7.5YR 4/4), irregular pockets of calcium-carbonate cemented nodules up to 1/4 inch, total calcium carbonate 10-60% At 138 to 140': Color variable; mainly brown (7.5YR 4/2)		
		8	27	98				
140								

(CONTINUED ON FOLLOWING FIGURE)

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 Prepared/Date: YN/WL 10/10/2011  
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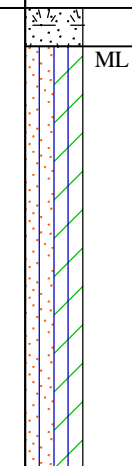
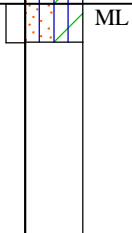
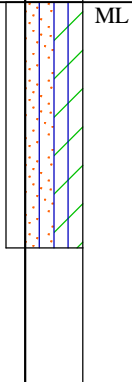


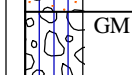
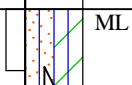
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2-B4 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/14/11 - 5/16/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Measured at 20 feet during drilling		
135	145	8	28	100	CL	<p><b>Qeb Continued</b>                      Clay and Silty Clay, trace coarse sand; generally dark gray (2.5Y 4/1) to (7.5YR 4/1) with variable brown (7.5YR 4/4) mottling; appears very moist and very stiff; 2-10% calcium carbonate filaments and cemented nodules up to 1/8 inch; trace manganese oxide flecks and staining; lower contact is sharp</p> <p>At 142.0 to 142.2', 142.9 to 143.1' and 143.4 to 143.5': Silty Sand beds, very fine grained</p> <p>At 143.5': Color becomes very dark greenish gray (5GY 3/1); occasional diffuse, irregular, oxidized strong brown (7.5YR 4/4) pockets; 5-10% calcium carbonate filaments and cemented nodules up to 1/8 inch</p> <p>At 145.5 to 145.7': Abundant dispersed calcium carbonate and cemented nodules, total calcium carbonate 50-60%</p>		
130	150	9	29	90	SM/ML	<p><b>SAN PEDRO FORMATION [Qsp]</b>                      Silty Sand and Sandy Silt, very fine grained; greenish gray (10Y 5/1); appears very moist to wet and stiff; trace calcium carbonate filaments</p> <p>At 149.0': Clay increases, some decayed organics, very dark gray (N3); possible detrital charcoal at 149.2'</p>		
125	155					<p>END OF BORING AT 150 FEET</p> <p>NOTES:                      Boring backfilled with cement/bentonite grout from bottom up and patched.</p> <ul style="list-style-type: none"> <li>-Munsell colors listed in order of predominance (most predominant color first).</li> <li>-Where observed, contacts and bedding appear subhorizontal unless otherwise noted.</li> <li>-Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted.</li> <li>-Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted.</li> <li>-The term "clasts" herein describes gravel-size rock fragments (larger than 1/4 inch).</li> <li>-Beds are generally massive unless otherwise noted.</li> </ul>		
160								

Geologist: ME/MF  
 Prepared/Date: YN/WL 10/10/2011  
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






ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		
						DRILLING METHOD	BOREHOLE LOCATION	<b>T2-B5</b>
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/16/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Measured at 20.9 feet and encountered at 17 feet during drilling		
275	5					Grass surface Hand augered to 6 feet <b>FILL [Af]</b> Sandy to Clayey Silt; trace coarse sand and fine gravel (Jsm and Tm); very dark grayish brown (10YR 3/2); appears very moist and stiff; lower contact occurs between runs  NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed description of clasts		
		1	1	17		<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt, trace coarse sand and fine gravel; brown (10YR 4/3); appears very moist and very stiff; poorly sorted; lower contact occurs between runs At 6.5 to 9.0': No recovery		
270	10	1	2	64		At 12.2 to 14.0': No recovery		
265	15	1	3	64	  	At 14.3 to 15.0': Silty Sand, fine to coarse grained At 15.0 to 16.0': Gravel increases to 10 to 20% (Jsm and Tm) At 16.0 to 17.2': Silty Gravel, clasts 50 to 60%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); color variable; appears very moist and dense ∇ At 17.0': Becomes wet (groundwater encountered) At 17.2 to 19.0': No recovery		
	20					Sandy to Clayey Silt, trace coarse sand and fine gravel (Jsm and Tm); brown (7.5YR 4/4); appears wet and soft to medium stiff; lower contact is sharp At 19.7 to 20.0': Silty Gravel, clasts 50 to 60%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); color variable; appears wet and dense		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: BF/MF  
 Prepared/Date: YN/WL 10/10/2011  
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					DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
					Jet Drilling / CME 75		<b>T2-B5</b> (Continued)
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING METHOD	
						Hollow-Stem Auger	See Plate 3
						DATES DRILLED	HOLE DIAMETER
						5/16/11	8 inches
						GROUNDWATER READINGS	
						Measured at 20.9 feet and encountered at 17 feet during drilling	
		1	4	16		<b>Qfo Continued</b> At 20.0 to 24.0': No recovery At 20.9' Groundwater measured during drilling	
255	25					SP	Poorly Graded Sand, fine to medium grained; color variable, generally brown (10YR 5/3); appears wet and dense; lower contact occurs between runs At 24.6 to 24.8': Grades to fine to coarse Well Graded Sand At 24.8 to 29.0': No recovery
		1	5	16			
250	30					SM	Silty Sand with Gravel, fine grained, clasts 15 to 20%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); dark grayish brown (10YR 4/2); appears wet and dense; lower contact is gradational
		1	6	100		CL/ML	At 29.6 to 29.9': Grades to Silty Sand with Gravel, fine to coarse grained, clasts 25 to 35%, up to 3/4 inch
						ML	Silty Clay to Clayey Silt, variable fine sand, trace coarse sand and fine gravel (Jsm and Tm); brown (7.5YR 4/2); appears wet and soft; poorly sorted, lower contact occurs between runs
		1	7	88			At 31.0 to 31.4': Becomes medium stiff, some fine oxidized, dark brown (7.5YR 3/4) pockets
						ML	<b>ESTUARINE DEPOSITS [Qe]</b>
						CL	Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); mottled, grayish brown (10YR 5/2) to dark brown (7.5YR 3/4); appears wet to medium stiff; well sorted; lower contact is sharp
245	35						At 34.0 to 35.5': Color becomes dark grayish brown (10YR 4/2) with occasional dark brown mottling
		2	8	50			At 34.2 to 34.5': Gravel increases to 30 to 40%, up to 1 1/2 inches
						CL	Clay, trace coarse sand and rare (<1%) fine gravel (Jsm and Tm); brown (10YR 4/3) with occasional strong brown (7.5YR 5/6) mottling; appears very moist and stiff; trace manganese oxide staining; one brick-red sandstone clast; varved-like bedding; lower contact is gradational
							At 36.5 to 39.0': No recovery
40						CL	

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2-B5 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/16/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Measured at 20.9 feet and encountered at 17 feet during drilling		
		2	9	56	CL	<b>Q<sub>e</sub> Continued</b> At 40.0 to 41.6': Becomes strongly mottled, brown (10YR 4/3) to strong brown (7.5YR 4/6); strong brown mottling occurs mainly as irregular pockets  At 41.8 to 44.0': No recovery		
235	45				CL	At 44.0 to 44.6': Color becomes dark grayish brown (10YR 4/2), 5-10% manganese oxide flecks		
					CL/ML	<b>Marker Bed M<sub>6</sub></b> Silty Clay; very dark grayish brown (10YR 3/2), occasional strong brown (7.5YR 4/6) to dark reddish brown (5YR 3/4) mottling; appears very moist and stiff; possible weak soil development		
		2	10	84	CL	<b>ESTUARINE DEPOSITS - FINE GRAINED [Q<sub>ef</sub>] / Marker Bed M<sub>F</sub></b> Clay; color is variable, highly oxidized, mainly dark reddish brown (5YR 3/3) to dark brown (7.5YR 3/2) to dark gray (10YR 4/1); appears very moist and stiff; variable varve-like bedding with silt and sandy silt beds; possible variable soil development  At 49.0 to 51.2': Becomes brown (7.5YR 4/3) with occasional dark gray (10YR 4/1) mottling; appears very stiff		
230	50					At 51.2 to 54.0': Becomes strongly mottled, brown (7.5YR 4/3) to gray (10YR 5/1) to strong brown (7.5YR 4/6); very stiff		
		3	11	92				
					CL/ML	Silty Clay and Clayey Silt, trace coarse sand and rare (<1%) fine gravel (J <sub>sm</sub> and T <sub>m</sub> ); brown (7.5YR 4/3) with occasional grayish brown (10YR 4/2) mottling; appears very moist to wet and soft to medium stiff; variable varve-like bedding with silt and sandy silt beds; lower contact is gradational		
225	55	3	12	94				
					SM/ML	At 57.6 to 57.9': Fine Silty Sand to Sandy Silt, appears wet and soft and medium dense		
					CL	At 57.9 to 58.6': Clay; trace coarse sand and fine gravel (J <sub>sm</sub> and T <sub>m</sub> ); brown; appears very moist and very stiff		
					CL/ML			
					ML	<b>ESTUARINE DEPOSITS [Q<sub>e</sub>]</b> Clayey to Sandy Silt, variable coarse sand, trace fine gravel (J <sub>sm</sub> and T <sub>m</sub> ); brown		
60								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: BF/MF  
 Prepared/Date: YN/WL 10/10/2011  
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**MTA Westside Subway Extension**  
 Los Angeles, California

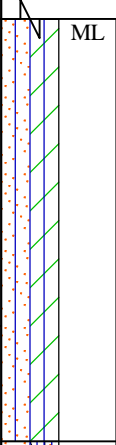
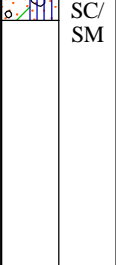
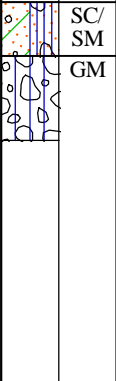
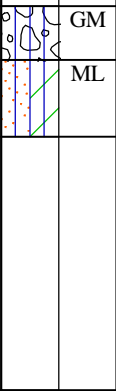


**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T2-B5c

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2-B5 (Continued)
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/16/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Measured at 20.9 feet and encountered at 17 feet during drilling		
215	65	3	13	100		ML	<b>Qe Continued</b> (7.5YR 5/4) with occasional grayish, brown (10YR 5/2) mottling; appears very moist and stiff to very stiff  At 61.7 to 65.0': Coarsens with depth, becomes sandy silt with clay, coarse grained sand and fine gravel increase  At 63.2 to 65.5': Color becomes dark yellowish brown (10YR 4/4)  64.5 to 65.5': Variable varve-like bedding	
		4	14	36		SC/ SM	<b>OLDER FLUVIAL DEPOSITS [Qfof]</b> Silty, Clayey Sand with Gravel, fine grained, clasts 25 to 35%, up to 3/4 inch; mainly subangular to subrounded slate (Jsm), some shale (Tm) and sandstone (Tm) also observed; appears wet and medium dense; lower contact is gradational At 65.8 to 69.0': No recovery	
210	70	4	15	36		GM	Silty Gravel, clasts 50 to 60%, up to 3/4 inch, mainly subangular to surrounded slate (Jsm), shale (Tm) and sandstone (Tm); color is variable; appears wet and dense; lower contact is sharp At 70.8 to 74.0': No recovery	
205	75	4	16	34		GM ML	Sandy to Clayey Silt, trace coarse sand; dark reddish brown (5YR 3/3); appears wet and soft At 75.7 to 79.0': No recovery	
							END OF BORING AT 79 FEET	
							NOTES:	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: BF/MF  
 Prepared/Date: YN/WL 10/10/2011  
 Checked/Date: MW/MF 10/11/2011

METRO SOIL CORE S:\70131 GEOTECH\GINT\W\F\FAULT\_INVESTIGATION\_WSE\_LIBRARY\_AMEC OCTOBER2011 (2).GLR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 2.GPI 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T2-B5</b> (Continued)
						<b>DRILLING METHOD</b> Hollow-Stem Auger	<b>BOREHOLE LOCATION</b> See Plate 3	
						<b>DATES DRILLED</b> 5/16/11	<b>HOLE DIAMETER</b> 8 inches	<b>GROUND EL.</b> 280 feet
						<b>GROUNDWATER READINGS</b> Measured at 20.9 feet and encountered at 17 feet during drilling		
195	85					<p>Boring backfilled with cement/bentonite grout from bottom up and patched.</p> <ul style="list-style-type: none"> <li>-Munsell colors listed in order of predominance (most predominant color first).</li> <li>-Where observed, contacts and bedding appear subhorizontal unless otherwise noted.</li> <li>-Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted.</li> <li>-Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted.</li> <li>-The term "clasts" herein describes gravel-size rock fragments (larger than ¼ inch).</li> <li>-Beds are generally massive unless otherwise noted.</li> </ul>		
190	90							
185	95							
100								

Geologist: BF/MF  
 Prepared/Date: YN/WL 10/10/2011  
 Checked/Date: MW/MF 10/11/2011

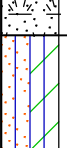


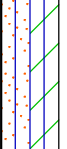

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 Los Angeles, California



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T2-B5e

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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)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		
						DRILLING METHOD	BOREHOLE LOCATION	<b>T2-B6</b>
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/14/11 - 6/14/11	8 inches	281 feet
						GROUNDWATER READINGS		
						Purched groundwater encountered at 16½ feet during drilling		
280						ML	Grass surface <b>FILL [Af]</b> Sandy to Clayey Silt, variable gravel; variable color, mainly dark brown (7.5YR 3/2) to brown (10YR 4/3); moist to very moist and stiff to very stiff; occasional fine Silty Sand layers  Hand augered to 6 feet Grab samples collected at 2' and 4'  NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed description of clasts	
275	5	1	1	17		ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Sandy to Clayey Silt, trace coarse sand and gravel (Jsm and Tm); brown (7.5YR 4/4); appears very moist and stiff to very stiff; poorly sorted; lower contact occurs between runs At 6.5 to 9.0': No recovery	
270	10	1	2	16		ML	At 9.8 to 14.0': No recovery	
265	15	1	3	84		ML	At 16.5': Groundwater encountered during drilling  At 16.5 to 17.8': Becomes wet; soft; gravel increases to 10 to 20%, mainly subangular to subrounded slate (Jsm), shale (Tm), and sandstone (Tm)  At 17.8 to 19.0': No recovery	
20		1	4	52		GC	Clayey Gravel, clasts 50 to 60%, up to ¾ inch, mainly subangular to subrounded slate (Jsm), shale (Tm), and sandstone (Tm); matrix is Clayey Sand/Sandy Clay; brown (7.5YR 4/3); appears wet and medium dense; lower contact occurs between runs	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: BF/MF  
 Prepared/Date: YN/WL 10/10/2011  
 Checked/Date: MW/MF 10/11/2011

METRO SOIL CORE S:\70131\_GEOTECH\GINTW\Fault\_Investigation\_WSE\_Library\_AMEC\_October2011\_(2).GIR  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2-B6 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/14/11 - 6/14/11	8 inches	281 feet
						GROUNDWATER READINGS		
						Purched groundwater encountered at 16½ feet during drilling		
260		1	5	20			At 19.5 to 21.5': No recovery <b>Qfo Continued</b>	
						GP/GM	At 21.5 to 21.9': Matrix becomes fine to coarse Silty Sand; dark yellowish brown (10YR 4/4); appears wet and dense; poor recovery At 21.9 to 24.0': No recovery	
		1	6	16				
						CL	At 24.0': Sandy Clay, trace gravel, brown (10YR 4/3); appears wet and stiff At 24.3 to 26.5': No recovery	
25		1	7	10				
255							At 26.5 to 29.0': No recovery	
		1	8	0				
						CL-SM	<b>ESTUARINE DEPOSITS [Qe]</b> Alternating beds of Silty Clay and fine Silty Sand; trace to some coarse sand and fine gravel (Jsm and Tm); clay is light brownish gray (2.5Y 6/2), sand is reddish brown (5YR 4/4); appears wet and soft/medium dense; lower contact occurs between runs	
30		1	9	40			At 31.0 to 34.0': No recovery	
250						CL/CH	Clay, rare (<1% coarse sand); dark grayish-brown (10YR 4/2); appears very moist and stiff to very stiff; occasional oxidized pockets, strong brown (7.5YR 4/6); distinct texture At 34.0 to 34.4': Clayey to Sandy Silt; mottled, grayish brown (10YR 5/2) to strong brown (7.5YR 5/6); appears wet and soft; micaceous	
35		1	10	98				
245							At 37.3 to 39.6': occasional micaceous Sandy Silt interbeds; appears wet and soft	
						CL		
40								

(CONTINUED ON FOLLOWING FIGURE)

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MTA Westside Subway Extension  
 Los Angeles, California



**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T2-B6b

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.

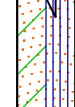
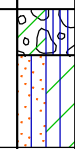
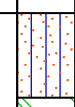
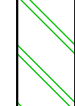
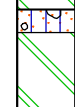
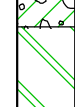
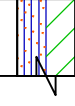
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T2-B6</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/14/11 - 6/14/11	8 inches	281 feet
						GROUNDWATER READINGS		
						Purched groundwater encountered at 16½ feet during drilling		
240		2	11	100	ML	<b>Marker Bed M<sub>G</sub></b> Silty Clay; dark brown (7.5YR 3/2) with highly oxidized, dark reddish brown (5YR 3/4) mottling; appears very moist and stiff; trace manganese-oxide flecks; possible weak soil development; lower contact is gradational		
45					CL/ CH	<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]/Marker M<sub>F</sub></b> Clay; grayish brown (2.5Y 5/2) with strong brown (7.5YR 4/6) mottles, strong brown color generally increases with depth, becomes predominant, coarse sand increases to 1 to 5% (Jsm and Tm), generally homogeneous and massive to thickly-bedded, occasional varve-like bedding; lower contact is gradational		
235		2	12	84			At 46.0 to 47.5': Appears very moist to wet and medium stiff	
50					ML	<b>Marker M<sub>F</sub> Continued</b> Clayey to Sandy Silt, trace coarse sand; brown (7.5YR 4/4) with occasional grayish brown (2.5Y 5/2) mottling; appears homogeneous; lower contact is narrowly gradational		
230		2	13	100				
55					CL/ CH	<b>Marker M<sub>F</sub> Continued</b> Clay and Silty Clay, rare (<1%) coarse sand; brown (7.5YR 4/4); appears wet and soft; variable varve-like bedding; lower contact occurs between runs		
225		3	14	82			At 57.0 to 59.0': Coarsens with depth, gradational transition to unit below	
60					SC/ SM	<b>ESTUARINE DEPOSITS [Qe]</b> Silty, Clayey Sand, fine grained, trace coarse sand and fine gravel (Jsm and Tm); yellowish brown (10YR 5/4); appears wet and dense; lower contact occurs between		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: BF/MF  
 Prepared/Date: YN/WL 10/10/2011  
 Checked/Date: MW/MF 10/11/2011

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2-B6 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/14/11 - 6/14/11	8 inches	281 feet
						GROUNDWATER READINGS		
						Purched groundwater encountered at 16½ feet during drilling		
220		3	15	50		SC/ SM	runs Qe continued	
							At 61.5 to 64': No recovery	
65		3	16	36		GM/ GC ML	Clayey Silty Gravel, clasts 60 to 70%, up to ¾ inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); brown (7.5YR 4/4); appears wet and dense	
215							Sandy to Clayey Silt, trace coarse sand and fine gravel (Jsm and Tm); brown (7.5YR 4/4); appears very moist to wet and medium stiff to stiff; occasional more gravelly beds with up to 20% fine gravel; variable varve-like bedding; lower contact is narrowly gradational	
							At 65.4 to 65.8': Grades to Clay, 5 to 10% calcium carbonate filaments	
							At 65.8 to 69.0': No recovery	
70		3	17	100		SM/ ML	At 69.0 to 70.1': Silty Sand and Sandy Silt, fine grained, some gravel, clasts 5 to 10%, up to ½ inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); well sorted	
210						CL/ CH	Clay and Silty Clay, trace coarse sand and fine gravel; reddish brown (5YR 5/4) with occasional gray (10YR 5/1) mottling; appears very moist to wet and soft to stiff; occasional sandy beds	
							At 70.5': Becomes brown (7.5YR 4/4)	
						SM	At 71.7 to 72.0': Fine to medium Silty Sand with Gravel, clasts 15 to 25%, up to 1 inch (Jsm and Tm)	
							At 73.2 to 74.4': Grades to Clayey to Sandy Silt, trace coarse sand and gravel; brown (10YR 4/3); appears wet and medium stiff	
							At 74.0 to 74.4': Gravel increases to 20 to 25% (Jsm and Tm)	
							At 74.4': Becomes mottled, brown (10YR 4/3) to gray (10YR 5/1) to reddish brown (5YR 4/4)	
75		4	18	54		SM- CL/ ML		
205							At 76.7 to 79.0': No recovery	
80						SM- CL/ ML	At 79.0 to 80.0': Alternating beds of very fine Silty Sand and Silty Clay/ Clayey Silt; slightly mottled, dark grayish brown (10YR 4/2) to yellowish brown (10YR 5/6); appears wet and dense/stiff; lower contact is sharp	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: BF/MF  
 Prepared/Date: YN/WL 10/10/2011  
 Checked/Date: MW/MF 10/11/2011

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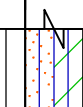
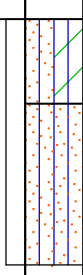
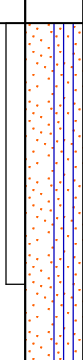





LOG OF BORING

Project No.: 4953-10-1561 Figure: T2-B6d

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2-B6 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/14/11 - 6/14/11	8 inches	281 feet
						GROUNDWATER READINGS		
						Purched groundwater encountered at 16½ feet during drilling		
200		4	19	42		ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); color variable, appears very moist and stiff; poorly sorted; lower contact is sharp  At 81.1 to 84.0': No recovery	
85		4	20	64		SM/ML	Silty Sand and Sandy Silt, very fine grained, mottled, grayish brown (10YR 5/2) to strong brown (7.5Y 5/6); appears wet and dense/stiff; moderately to poorly sorted, coarsens with depth; lower contact occurs between runs  At 87.2 to 89.0': No recovery	
195						SP-SM	Poorly Graded Sand with Silt, fine to medium grained, brown (10YR 5/3); appears wet and dense; lower contact is narrowly gradational	
90		5	21	68		SM	Silty Sand with trace gravel (Jsm and Tm), fine to coarse grained, varying color, generally dark grayish brown (10YR 4/2); appears wet and dense	
190						SG	<b>FLUVIAL DEPOSITS [Qfofl]</b> At 94.5 to 95.0': Increasing gravel, grades to fine to coarse grained, Well-Graded Sand with Gravel, clasts 40 to 50%, up to ¾ inch; mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm)	
95		5	22	68		GM	Silty Gravel; clasts 60 to 70% (up to ¾ inch); mainly subangular slate (Jsm); matrix is fine silty sand and sandy silt; appears wet and dense; lower contact occurs between runs  At 95.7 to 100.0': No recovery	
185		5	23	0				
100								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: BF/MF  
 Prepared/Date: YN/WL 10/10/2011  
 Checked/Date: MW/MF 10/11/2011

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



**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T2-B6e



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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2-B6 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/14/11 - 6/14/11	8 inches	281 feet
						GROUNDWATER READINGS		
						Purched groundwater encountered at 16½ feet during drilling		
180		5	24	0			<b>Qfofl Continued</b> At 100.0 to 104.0': No recovery	
105							Depth at contact uncertain due to poor recovery <b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b> Silty Clay and Clayey Silt; light olive brown (2.5Y 5/3) with strong brown (7.5YR 4/6) mottling; appears very moist and stiff; strong brown mottling occurs mainly as fine, irregular pockets (up to ¼ inch), some varve-like bedding At 105.1 to 106.2': Grades to Clay, variable 5 to 20% manganese oxide flecks	
175		5	25	50		CL/ML CL SM	At 106.2 to 106.5': Silty Sand, fine grained; varying color, lightly calcium carbonate-cemented At 106.5 to 109.5': No recovery	
110						SM	At 109.0 to 109.5': Becomes dark grayish brown (10YR 4/2) with strong brown (7.5YR 4/6) pockets At 109.5 to 114.0': No recovery	
170		6	26	10				
115						CL/ML	Silty Clay to Clayey Silt as above At 114.5 to 116.5': Increasing sand, gravel, and calcium carbonate, gradational transition to unit below	
165		6	27	74		ML	<b>BASAL ALLUVIAL FAN UNIT [Qfob]</b> Clayey Silt, variable fine to coarse grained sand, trace gravel (Jsm and Tm); color, variable, mainly light olive brown (2.Y 5/3) to light gray (2.5Y 7/2); appears very moist and stiff; variable but generally abundant (10-40%) calcium carbonate, occurs as dispersed deposits and cemented nodules (up to 1/2 inch); occasional grades to sandy silt; lower contact is sharp	
120								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: BF/MF  
 Prepared/Date: YN/WL 10/10/2011  
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METRO SOIL CORE S:\70131\_GEO TECH\GINTW\Fault\_Investigation\_WSE\_Library\_AMEC OCTOBER2011 (2).GLR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL\_FIELD\_NOTES\GINT LOGS\101561-TRANSECT 2.GPI 10/14/11

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T2-B6</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/14/11 - 6/14/11	8 inches	281 feet
						GROUNDWATER READINGS		
						Purched groundwater encountered at 16½ feet during drilling		
160		6	28	94	ML	<b>Qfob Continued</b>  At 121.0 to 123.0': Some varve-like bedding		
					SM-SC	At 123.0 to 125.4': Increasing sand, grades to fine to coarse Clayey, Silty Sand, trace fine gravel		
125					ML	At 125.5 to 129.8': Becomes mottled, yellowish brown (10YR 5/4) to gray (2.5Y 6/1); calcium carbonate decreases to <5%, occasional varve-like bedding		
155		7	29	76	SM-SC	At 127.3 to 127.8': Grades to fine Clayey, Silty Sand At 127.8 to 129.0': No recovery		
					CL/CH	At 129.1': Oxidized, strong brown (7.5YR 4/6) silt bed at contact <b>BASAL ESTUARINE UNIT [Qeb]</b> Clay; dark grayish brown (2.5Y 4/2) with strong brown (7.5YR 4/6) mottling; appears moist and hard; trace calcium carbonate filaments; strong mottling occurs as fine irregular pockets (up to 1/8 inch); lower contact is narrowly gradational		
130		7	30	100		At 133.2 to 135.8': Calcium carbonate increases to 15 to 30%, occurs mainly as irregular, vertically-oriented nodules		
150						At 135.8 to 139.0': Becomes dark gray (10YR 4/1) with dark brown (7.5YR 3/4) mottled fine pockets; calcium carbonate decreases to 10 to 15%, occurs mainly as filaments and irregular, uncemented nodules		
135		7	31	98		At 138.0 to 139.0': Oxidized strong brown pockets decrease, some pockets of cemented calcium carbonate		
145					ML	Clayey Silt, variable fine to coarse grained sand and fine gravel, clasts 2 to 20% (up to ¾ inch), mainly subangular slate (Jsm); mottled, gray (2.5Y 5/1) to strong brown (7.5YR 4/6); appears very moist and very stiff; variable dispersed calcium carbonate; lower contact is narrowly gradational		
140								

(CONTINUED ON FOLLOWING FIGURE)

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 Prepared/Date: YN/WL 10/10/2011  
 Checked/Date: MW/MF 10/11/2011

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**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T2-B6g

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T2-B6</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 281 feet
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						5/14/11 - 6/14/11	8 inches	
						GROUNDWATER READINGS		
						Purched groundwater encountered at 16½ feet during drilling		
140		8	32	66		CL	<b>Qeb Continued</b> Clay, mottled dark gray (10YR 4/1) to strong brown (7.5YR 4/6); appears moist and hard; strong brown mottling occurs mainly as fine, irregular pockets (up to ¼ inch); 10 to 15% calcium carbonate, occurs as filaments and cemented nodules (up to ½ inch); lower contact occurs between runs At 141.3 to 141.9': Becomes sandy, calcium carbonate increases to 60 to 70%, occurs as dispersed deposits, filaments, and cemented nodules up to ¼ inch At 141.9 to 142.0': Grades to fine to coarse Silty Sand, slightly calcium carbonate cemented At 142.0 to 144.0': No recovery	
145						ML	At 144.0 to 144.5': Grades to Clayey Silt	
135		8	33	70		CL	At 144.5 to 145.4': Becomes dark gray (5Y 4/1); little or no oxidized pockets At 144.5 to 154.3': Varying (2-20%) calcium carbonate, occurs as filaments and cemented nodules (up to 1/8 inch) At 145.4 to 147.3': Becomes dark gray (2.5Y 4/1), no oxidized pockets	
150							At 147.5 to 149.0': No recovery	
130		8	34	84		CL	At 149.0 to 154.3': Becomes mottled, very dark gray (2.5Y 3/1) to brown (7.5YR 4/4), brown mottling occur mainly as fine, irregular pockets (up to 1/8 inch)	
155						ML/ CL	<b>SAN PEDRO FORMATION [Qsp]</b> Clayey Silt and Silty Clay; dark greenish gray (5GY 4/1); appears moist and hard; 30 to 40% calcium carbonate filaments and cemented nodules (up to 1/8 inch) At 154.8 to 155.6': Grades to Sandy Silt; micaceous	
125		9	35	96			Silty Clay and Clayey Silt; black (N 2.5); appears moist and hard; rare <1% coarse sand and calcium carbonate filaments; organic-rich; lower contact is narrowly gradational At 156.6 and 157.0': Sample breaks along planar features, which dip approximately 50 degrees, shearing indicated by slicken-sides plunging in dip direction +/-10 degrees At 157.0 to 160.8': Becomes black (N 2.5) to dark greenish gray (10GY 3/10)	
160							At 159.0 to 159.5': Becomes black (N 2.5); punky texture with abundant waxy parting surfaces; possible shearing	

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2-B6 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/14/11 - 6/14/11	8 inches	281 feet
						GROUNDWATER READINGS		
						Purched groundwater encountered at 16½ feet during drilling		
120		9	36	64		<b>Qsp Continued</b> Sandy to Clayey Silt; very dark greenish gray (5G 3/1); appears moist and very stiff; micaceous; lower contact is gradational 159.5': Planar surface, dips approximately 10 degrees, some slicken sides plunge subparallel to dip direction, indicate likely shearing At 161.0 to 161.7': Increasing sand, gradational transition to unit below Silty Sand, no matching munsell color, dark gray (N 4) is closest match; appears wet and dense; fine to medium grained At 162.2 to 164.0': No recovery		
165						Poorly Graded Sand, fine to medium grained, dark gray (N 4); appears wet and dense; uniform grain size At 164.7 to 165.1': Clayey Silt with Sand; dark gray (2.5Y 4/1); appears wet and soft At 165.7 to 169.0': No recovery		
115		9	37	32		Well Graded Sand with Gravel, fine to coarse grained, clasts 15 to 40% (up to 1½ inches); mainly subangular granitic rock and meta-basalt At 170.3 to 174.0': No recovery		
170		10	38	24				
110		10	39	100		Clay; dark gray (2.5Y 4/1) with strong brown (7.5YR 4/6) mottling; appears moist and hard; strong brown mottling occurs mainly as fine, irregular pockets (up to 1/8 inch); 2 to 10% calcium carbonates filaments At 175 to 176.5': Clay appears wet and soft, possible shear zone At 177.8 to 178.4': Calcium carbonate increases to 10 to 15%, occurs as filaments and vertically oriented, cemented and uncemented nodules		
175						END OF BORING AT 179 FEET NOTES:		
105								
180								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: BF/MF  
 Prepared/Date: YN/WL 10/10/2011  
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**MTA Westside Subway Extension**  
 Los Angeles, California



**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T2-B6i

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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL\_FIELD\_NOTES\GINT LOGS\101561-TRANSECT 2.GPI 10/14/11

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2-B6 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/14/11 - 6/14/11	8 inches	281 feet
						GROUNDWATER READINGS		
						Purched groundwater encountered at 16½ feet during drilling		
100						Boring backfilled with cement/bentonite grout from bottom up and patched.  -Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than ¼ inch). -Beds are generally massive unless otherwise noted.		
185						Boring deepened from 79 to 179 on 6/13 to 6/14/11. Location of deepened boring offset south-east approximately 7 feet from original boring location.		
95								
190								
90								
195								
85								
200								

Geologist: BF/MF  
 Prepared/Date: YN/WL 10/10/2011  
 Checked/Date: MW/MF 10/11/2011

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**Los Angeles, California**



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T2-B6j

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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL\_FIELD\_NOTES\GINT LOGS\101561-TRANSECT 2.GPI 10/14/11

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.	
						Jet Drilling / CME 75		<b>T2-B7</b>	
						DRILLING METHOD	BOREHOLE LOCATION		
						Hollow-Stem Auger	See Plate 3		
						DATES DRILLED	HOLE DIAMETER	GROUND EL.	
						5/12/11	8 inches	280 feet	
						GROUNDWATER READINGS			
						Measured at 33 feet and encountered at 49½ feet during drilling			
						Grass surface			
						SM	<b>FILL [Af]</b> Silty Sand and Gravel, fine to medium grained; dark grayish brown (10YR 4/2); appears very moist and dense		
275	5					ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt, trace to some coarse sand and gravel; brown (7.5R 4/4); appears very moist and very stiff  NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed description of clasts  At 6.0 to 6.5': Gravel increases to 20-25%, up to 1 inch		
		1	1	90		SM	At 6.9 to 8.0': Fine Silty Sand with Gravel, clasts 30-40%, up to 3/4 inch; dark grayish brown (10YR 4/2); appears dry to damp and loose to medium dense		
						SM/SC	Clayey, Silty Sand, fine grained, trace coarse sand and gravel; brown (7.5YR 4/4); appears very moist and dense		
270	10					CL/ML	Silty Clay and Clayey Silt, variable fine to coarse sand, trace fine gravel (Jsm and Tm); brown (7.5YR 4/4); appears very moist and stiff to very stiff; poorly sorted; occasionally grades to sandy clay; lower contact occurs between runs  At 11.4 to 11.6': Grades to Clayey Sand		
		1	2	100			At 12.8 to 13.4': Becomes less silty; mottled, brown (10YR 4/3) to gray (10YR 5/1) to strong brown (7.5YR 4/6)		
						ML	<b>ESTUARINE / OLDER ALLUVIAL FAN DEPOSITS [Qe/Qfo]</b> Sandy to Clayey Silt, trace coarse sand; dark yellowish brown (10YR 4/4); appears very moist and soft to medium stiff; well sorted, faint varve-like bedding; lower contact occurs between runs  At 15.5 to 16.2': Grades to Silty Clay; mottled, dark grayish brown (10YR 4/2) to reddish brown (5YR 4/4); mottling occurs mainly as fine irregular, oxidized pockets At 16.2 to 16.5'; 20-30% fine gravel (Jsm and Tm) At 16.5 to 19.0': No recovery		
265	15						At 15.5 to 16.2': Grades to Silty Clay; mottled, dark grayish brown (10YR 4/2) to reddish brown (5YR 4/4); mottling occurs mainly as fine irregular, oxidized pockets At 16.2 to 16.5'; 20-30% fine gravel (Jsm and Tm) At 16.5 to 19.0': No recovery		
		1	3	50			At 16.5 to 19.0': No recovery		
						ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Sandy to Clayey Silt with Gravel, clasts 15-25%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); mottled, brown (10YR 4/3)		
20									

(CONTINUED ON FOLLOWING FIGURE)

Geologist: BR/MF  
Prepared/Date: YN/WL 10/10/2011  
Checked/Date: MW/MF 10/11/2011

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**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T2-B7a

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2-B7 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/12/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Measured at 33 feet and encountered at 49½ feet during drilling		
		2	4	78		<b>Qfo Continued</b> to strong brown (7.5YR 4/6); appears very moist and stiff to very stiff; poorly sorted, lower contact is gradational At 21.0 to 21.5': Gravel increases to 25-35%		
		2	5	60		At 24.0 to 24.5': Sand increases, gravel increases to 30-40%, up to 1½ inches Clayey, Silty Sand, fine grained, variable coarse sand and gravel, clasts 5-20%, up to 1 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); mottled brown (7.5YR 4/4) to grayish brown (2.5Y 5/2); appears very moist and medium stiff; lower contact is gradational		
		2	6	100		Sandy to Clayey Silt, trace coarse sand (Jsm and Tm); brown (7.5YR 4/4) with occasional gray (2.5Y 5/1) mottling; appears very moist and medium stiff, trace manganese oxide flecks; lower contact is gradational At 27.0 to 29.0': No recovery		
		2	6	100		<b>ESTUARINE DEPOSITS [Qe]</b> Silty Sand, very fine to fine grained; strong brown (7.5YR 4/6); appears very moist and dense; well sorted; lower contact is gradational		
		2	6	100		Silty Clay and Clayey Silt, strong brown (7.5YR 4/6); appears very moist and stiff; lower contact is gradational; manganese oxide flecks vary from about 2-10%, rare (<1%) coarse sand		
		2	6	100		Clay, rare coarse sand (Jsm and Tm); dark gray (2.5Y 4/1); appears moist and very stiff to hard; lower contact is narrowly gradational At 33': Groundwater measured during drilling		
		2	6	100		At 34.0 to 34.9': Grades to Silty Clay and Clayey Silt; variable fine sand, trace coarse sand, mottled, brown (10YR 4/3) to strong brown (7.5YR 5/8); appears very moist to wet and medium stiff		
		3	7	84		<b>Marker Bed M<sub>G</sub></b> Silty Clay, trace coarse sand; mottled, dark gray (5YR 4/1) to very dark reddish brown (5YR 3/1); appears very moist to wet and medium stiff; trace manganese oxide flecks; possible weak soil development; lower contact is gradational		
		3	7	84		<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef] / Marker M<sub>F</sub></b> Clay, trace coarse sand (Jsm and Tm); mottled, gray (7.5YR 5/1) to reddish brown (5YR 4/4) to brown (7.5YR 4/4); appears very moist and very stiff, trace manganese oxide flecks; generally homogeneous and massive to thickly bedded; lower contact is gradational At 36.6 to 38.0': Varve-like bedding		
						At 39.0 to 40.0': No sampling		

(CONTINUED ON FOLLOWING FIGURE)

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 Prepared/Date: YN/WL 10/10/2011  
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					DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
					Jet Drilling / CME 75		<b>T2-B7</b> (Continued)
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	GROUND EL.	
						280 feet	
					<b>DRILLING METHOD</b> Hollow-Stem Auger		<b>BOREHOLE LOCATION</b> See Plate 3
					<b>DATES DRILLED</b> 5/12/11		<b>HOLE DIAMETER</b> 8 inches
					<b>GROUNDWATER READINGS</b> Measured at 33 feet and encountered at 49½ feet during drilling		
		3	8	78	CL	<b>Qef Continued</b>	
235	45	3	9	100	CL/ CH	<b>Marker M<sub>F</sub> Continued</b> At 43.9 to 44.0': No recovery Clay and Silty Clay, trace coarse sand (Jsm and Tm); mottled, gray (7.5YR 5/1) to reddish brown (5YR 4/4); appears very moist to wet and soft to medium stiff; generally homogeneous and massive, lower contact is gradational At 45.0 to 49.5': Color becomes brown (7.5YR 5/4) with occasional gray brown (10YR 5/2) mottling  At 47.0 to 49.0': Variable fine sand, trace to some coarse sand (Jsm and Tm); appears very moist and very stiff  At 49.0 to 49.5': Appears very moist to wet and soft to medium stiff At 49.5': Groundwater encountered during drilling	
230	50	4	10	62	ML	Clayey to Sandy Silt, trace coarse sand and gravel (Jsm and Tm); appears very moist to wet and soft to medium stiff; occasional clay or silty clay beds; lower contact is narrowly gradational  At 52.1 to 54.0': No recovery	
225	55	4	11	40	GC/ GM	<b>OLDER ALLUVIAL FAN / FLUVIAL DEPOSITS [Qfo / Qfofl]</b> Silty, Clayey Gravel, clasts 50-60%, up to 1 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); matrix is generally fine to coarse silty, clayey sand, occasionally sandy clay; color is variable, appears wet and dense; lower contact is sharp, erosional At 56.0 to 59.0': No recovery	
60					GC/ GM		

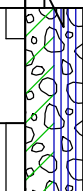
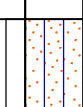
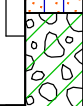

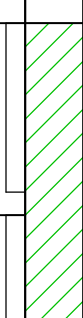




(CONTINUED ON FOLLOWING FIGURE)

Geologist: BR/MF  
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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL\_FIELD\_NOTES\GINT LOGS\101561-TRANSECT 2.GPI 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2-B7 (Continued)
						Jet Drilling / CME 75	Hollow-Stem Auger	See Plate 3
						DATES DRILLED	5/12/11	HOLE DIAMETER
							8 inches	GROUND EL.
								280 feet
						GROUNDWATER READINGS		
						Measured at 33 feet and encountered at 49½ feet during drilling		
		4	12	56		GC/ GM	<b>Qfofl Continued</b>	
		4	13	36			At 62.4 to 64.0': No recovery	
215	65	4	14	64		SM	At 64.3 to 65.3': Grades to Silty Sand, fine to medium grained, with 5-20% gravel (Jsm and Tm)	
		4	15	40		GC/ GM		
		4	15	40		SM	At 66.9 to 67.5': Grades to Silty Sand, fine to coarse grained, with 10-25% gravel (Jsm and Tm)	
		4	15	40			At 67.5 to 69.0': No recovery	
210	70	4	16	88		CL	<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b> Clay and Silty Clay, variable fine sand, trace coarse sand; color variable, mainly brown (10YR 4/3); appears very moist and stiff to very stiff; variable (2-10%) manganese oxide flecks; lower contact is narrowly gradational	
		4	17	96			At 70.6 to 71.1': Color becomes reddish brown (5YR 4/3)	
						ML	Sandy to Clayey Silt, trace coarse sand and fine gravel (Jsm and Tm); mottled, grayish brown (10YR 5/2) to strong brown (7.5YR 4/6); appears very moist and stiff to very stiff; variable varve-like bedding; abundant magnesium oxide	
						ML/ SM	At 74.0 to 74.8': Clayey Silt and Silty Sand, thinly interbedded; appears very moist to wet and medium stiff	
205	75					ML		
		5	18	64			<b>OLDER OLLUVIAL FAN DEPOSITS [Qfo]</b> Sandy to Clayey Silt, some gravel, clasts 10-15%, up to 3/4 inch (Jsm and Tm); dark grayish brown (10YR 4/2); appears very moist and very stiff	
							At 77.2 to 79.0': No recovery	
							END OF BORING AT 79 FEET	
	80							

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2-B7 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/12/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Measured at 33 feet and encountered at 49½ feet during drilling		
195	85					NOTES: -Boring backfilled with cement/bentonite grout from bottom up and patched. -Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than ¼ inch). -Beds are generally massive unless otherwise noted.		
190	90							
185	95							
100								

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2-B8
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/10/11-5/12/11 and 6/9/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Measured at 35.8 feet during drilling		
						Grass surface		
						ML	<b>FILL [Af]</b> Sandy to Clayey Silt with gravel, clasts 15-20%, up to 3/4 inch; very dark grayish brown; appears moist and dense; some asphalt fragments  NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed description of clasts	
275	5					ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt, trace coarse sand and gravel (Jsm and Tm); dark yellowish brown (10YR 4/4); appears moist and very stiff; poorly sorted; lower contact is sharp	
		1	1	93		CL/ML	At 6.4 to 6.8': Silty Gravel, clasts 50-60% up to 1/2 inch, mainly subangular to subrounded slate (Jsm) and shale (Tm), color variable Silty Clay to Clayey Silt, variable fine sand, trace coarse sand and fine gravel (Jsm and Tm); brown (7.5YR 4/3); appears moist and very stiff; poorly sorted lower contact occurs between runs	
270	10					SM/ML	Silty Sand to Sandy Silt, very fine grained, trace coarse sand (Jsm and Tm); brown (10YR 4/3); appears very moist and medium stiff; lower contact is sharp	
		1	2	40		GM	<b>OLDER ALLUVIAL FAN/FLUVIAL DEPOSITS [Qfo/Qfofl]</b> Silty Gravel, clasts 60-70%, up to 3/4-inch, mainly subangular to subrounded slate (Jsm), shale (Tm), sandstone (Tm); some meta-basalt also observed; matrix is fine to coarse silty sand; color variable; appears damp and dense; lower contact occurs between runs At 11.0 to 14.0': No recovery	
265	15					GM	At 14.0': Gravel becomes coarse, one mafic igneous clast (up to 1 1/2 inch) observed At 14.3 to 16.5': No recovery	
		1	3	10			At 16.5 to 19.0': No recovery	
		1	4	0				
20						ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Sandy to Clayey Silt with Gravel, clasts 15-20%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); dark brown (7.5YR 3/4);	

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2-B8 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/10/11-5/12/11 and 6/9/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Measured at 35.8 feet during drilling		
		1	5	10			appears moist and very stiff to hard; poorly sorted; lower contact occurs between runs <b>Qfo Continued</b> At 19.3 to 24.0': No recovery	
		1	6	0				
255	25					SM	Silty Sand, fine grained, variable clay, variable coarse sand and fine gravel; clasts 5-15%, up to 1/2 inch (Jsm and Tm); mottled, grayish brown (10YR 5/2) to strong brown (7.5YR 5/6); appears moist and very stiff; poorly sorted; lower contact occurs between runs At 24.0 to 29.0': Recovered only 3" of core sample, also recovered 6" from standard pin sample driven from 24.0' to 25.5'	
		1	7	10			At 29.0 to 31.5': No recovery	
250	30						At 31.5 to 34.0': Poor to No recovery	
		1	8	0			Depth of contact uncertain due to poor recovery	
		1	9	6			At 35.8': Groundwater measured during drilling	
245	35					ML/ CL	<b>Marker Bed M<sub>G</sub></b> - Clayey Silt to Silty Clay, trace coarse sand; mottled, very dark gray (5YR 3/1) to dark reddish brown (5YR 3/4); appears very moist and stiff; some manganese oxide flecks; some decayed organics; possible weak soil development; lower contact is gradational	
		1	10	100			<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef] / Marker M<sub>F</sub></b> Clayey Sand to Sandy Clay, fine to coarse grained, trace fine gravel (Jsm and Tm); mottled, gray (7.5YR 5/1) to reddish brown (5YR 5/4); appears very moist and very stiff to dense; trace manganese oxide flecks; lower contact is gradational	
		1	11	100			<b>Marker M<sub>F</sub> Continued</b> - Clay, rare (<1%) coarse sand; mottled, grayish brown (10YR 5/2) to reddish brown (5YR 4/4) to brown (7.5YR 4/4); appears very moist and very stiff; generally homogeneous and massive to thickly bedded, occasional varve-like bedding; lower contact is gradational	
							At 39.0 to 43.0': Becomes very moist to wet, medium stiff to stiff, trace manganese oxide flecks, occasional silty clay beds and slightly sandy beds	

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2-B8 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/10/11-5/12/11 and 6/9/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Measured at 35.8 feet during drilling		
		2	12	100	CL	Qef Continued		
					CL/ML CL	At 43.0 to 43.6': Grades to Silty Clay to Clayey Silt, variable fine sand		
235	45				ML/CL	<b>Marker M<sub>F</sub> Continued</b> - Clayey Silt and Silty Clay, variable fine sand, trace coarse sand and fine gravel (Jsm and Tm); brown (7.5YR 4/4); appears very moist to wet and soft; lower contact is sharp		
		2	13	70	SM	<b>Marker M<sub>F</sub> Continued</b> - Silty Sand, fine grained, trace fine gravel (Jsm and Tm); brown (7.5YR 4/4); appears wet and medium dense; well sorted, lower contact is sharp		
					CL	At 45.5 to 45.7': 10-20% gravel, up to 3/4 inch, mainly subrounded slate (Jsm) and shale (Tm)		
						<b>Marker M<sub>F</sub> Continued</b> - Clay and Silty Clay, trace coarse sand; mottled, brown (7.5YR 4/4) to grayish brown (2.5Y 5/2); appears very moist and very stiff; occasional varve-like bedding; trace manganese oxide flecks; lower contact is gradational		
						At 47.5 to 49': No recovery		
230	50				ML	At 50.5 to 50.8': Increasing sand and gravel, gradational transition to bed below <b>ESTUARINE DEPOSITS / OLDER ALLUVIAL FAN DEPOSITS [Qe/Qfo]</b>		
		2	14	100		Clayey to Sandy Silt; variable coarse sand and gravel, clasts 2-15%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); appears very moist and stiff to very stiff; moderately well sorted; lower contact is gradational		
225	55				CL/ML	At 55.3 to 55.5': Gravel increases to 25%, organic-rich bed		
		3	15	80		Silty Clay and Clayey Silt, variable coarse sand, trace fine gravel (Jsm and Tm); grayish brown (2.5Y 5/2) with strong brown (7.5YR 5/6) mottling; appears very moist and stiff; mottling is mainly oxidized, pockets up to 3/4 inch, lower contact is gradational		
						At 58.0 to 59.0': Becomes less oxidized, some varve-like bedding		
						At 58.0 to 59.0': No recovery		
					ML	At 59.0 to 60.0': Grades to Clayey to Sandy Silt with Gravel, clasts 15-20%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm)		

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2-B8 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/10/11-5/12/11 and 6/9/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Measured at 35.8 feet during drilling		
215	65	3	16	80	ML CL	<b>Qe/Qfo Continued</b> At 60.0 to 60.9': Silty Sand with Gravel (Jsm), fine to coarse grained, clasts 15-25%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); color generally dark grayish brown (10YR 4/2); appears wet and dense <b>ESTUARINE DEPOSITS [Qe]</b> Clay, trace coarse sand; dark grayish brown (10YR 4/2); appears very moist and stiff; occasional silty clay beds, prominent varve-like bedding; lower contact is narrowly gradational At 60.9 to 61.1': Increasing clay, gradational transition to clay bed, appears wet and soft/loose At 61.1 to 61.4': Organic-rich zone At 63.0 to 64.0': No recovery At 64.0': Becomes very moist and very stiff, color is brown (7.5R 4/2) with strong brown mottling, mottling generally occurs as oxidized pockets		
210	70	3	17	90	CL/ ML	<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b> Silty Clay to Clayey Silt, trace coarse sand; mottled, grayish brown (10YR 5/2) to strong brown (7.5YR 4/6); appears very moist to wet and medium stiff; variable varve-like bedding; lower contact is gradational  At 67.1 to 67.6': Grades to Sandy to Clayey Silt, trace coarse sand At 67.6 to 69.0': Prominent varve-like bedding  At 69.0 to 70.3': Mottled, dark gray (7.5YR 4/1) to dark reddish brown (5YR 3/4), mottling generally occurs oxidized pockets  At 70.3 to 72.5': Increasing sand and gravel, gradational transition to fan deposits below		
205	75	4	18	72	ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Sandy to Clayey Silt; variable coarse sand and fine gravel; clasts 15-30%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm), mottled gray (10YR 4/1) to brown (10YR 4/3) to strong brown (7.5YR 4/6); appears very moist and very stiff; coarsens with depth, grades to fan deposits below  At 76.5 to 79.0': No recovery		
80		4	19	50	CL	At 79.0 to 79.8': Grades to Silty Clay, trace coarse sand and fine gravel (Jsm and Tm)		

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T2-B8</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						5/10/11-5/12/11 and 6/9/11	8 inches	
						GROUNDWATER READINGS		
						Measured at 35.8 feet during drilling		
		5	20	100		ML	<b>Qfo Continued</b>	
							At 81.2 to 81.4': Grades to fine Silty Sand	
						SW	Well Graded Sand with Gravel, fine to coarse grained, clasts 20-30%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm), one granitic clast also observed; color variable, generally dark brown (7.5YR 3/4), appears wet and dense, lower contact is sharp	
						SM	At 83.6 to 84.1': Grades to very fine Silty Sand	
						ML	At 84.5 to 85.0': Clayey to Sandy Silt, mottled, brown (7.5YR 4/4), appears wet and very stiff	
195	85					SW		
		5	21	100		CL/ CH	Clay, rare (<1%) coarse sand; lightly mottled, reddish brown (5YR 4/4) to dark grayish brown (10YR 4/2); appears very moist to very stiff; variable (2-15%) manganese flecks, lower contact is narrowly gradational At 85.6 to 86.0': Irregular sandy silt pockets	
						SM	Silty Sand with Gravel, fine grained, clasts 20-30%, up to 1 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm), dark yellowish brown (10YR 4/4), appears very moist to dense, lower contact is gradational	
190	90					ML	Sandy to Clayey Silt with Gravel, variable coarse sand, clasts 20-30%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); mottled, strong brown (7.5YR 5/8) to grayish brown (10YR 5/2), appears very moist to very stiff; poorly sorted; lower contact is gradational	
		6	22	100		GM- GC ML	At 93.8 to 94.2': Grades to Clayey, Silty Gravel, clasts 60-70%, up to 1 1/2 inch, mainly subangular to subrounded slate (Jsm), some shale (Tm) and sandstone (Tm) also observed, matrix is sandy silt with clay; color variable, appears wet and dense	
185	95						At 95.8 to 98.3': Gravel increases to 30-40%, up to 1 inch; color becomes grayish brown (2.5Y 5/2); appears wet and stiff, matrix occasionally grades to fine clayey to silty sand	
		6	23	100		GM	<b>FLUVIAL DEPOSITS [Qfoff]</b> Silty Gravel, clasts 50-60%, up to 2 inches, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm), some quartzite also observed, color variable, generally dark grayish brown (10YR 4/2); appears wet and dense; lower contact occurs between runs	
100								

(CONTINUED ON FOLLOWING FIGURE)

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MTA Westside Subway Extension  
 Los Angeles, California



**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T2-B8e

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2-B8 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/10/11-5/12/11 and 6/9/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Measured at 35.8 feet during drilling		
		6	24	16	GM	<b>Qfofl Continued</b>  At 100.8 to 105.0': No recovery		
175	105	7	25	90	SW	Well Graded Sand with Gravel, fine to coarse grained, clasts 30-50%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); color variable, mainly dark grayish brown (10YR 4/2); appears wet and dense; lower contact is sharp, erosional At 105.0 to 105.3', 106.1'-106.5' and 107.0'-107.3': Clay; mottled, mainly light brownish gray (10YR 6/2) to brown (7.5YR 5/4) to reddish brown (10YR 4/4); appears wet and soft; variable mica, occasional sandy zones, pockets or laminations; upper and lower contacts are sharp At 107.3 to 107.6': Silty Clay; dark brown (10YR 3/3); appears very moist and stiff At 107.6 to 108.0': Sandy to Clayey Silt, trace coarse sand (Jsm and Tm); color variable, mainly brown (7.5YR 4/3); appears wet and medium stiff		
170	110	7	26	70		At 111.0 to 112.6': Gravel decreases to 5-10%, up to 1/2 inch		
165	115	7	27	100	CL/CH	<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b> Clay, rare (<1%) coarse sand (Jsm and Tm); dark gray (10YR 4/1); appears moist and very stiff to hard; variable (2-20%) oxidized, strong brown (7.5YR 4/6), irregular pockets up to 1/4 inch; variable (2-15%) manganese oxide flecks, variable varve-like bedding At 113.5 to 115.0': No recovery At 115.0 to 115.5': 15-20% Manganese-oxide stained zones up to 3/4 inch At 115.5 to 116.1': Some oxidized silt and sandy silt pockets up to 1 inch		
120						At 119.0 to 119.5': Oxidized pockets increase (25-35%), elongated vertical orientation		

(CONTINUED ON FOLLOWING FIGURE)

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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)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T2-B8</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						5/10/11-5/12/11 and 6/9/11	8 inches	
						GROUNDWATER READINGS		
						Measured at 35.8 feet during drilling		
155	125	8	28	100	ML SC/SM CL/ML	<b>BASAL ALLUVIAL FAN / BASAL ESTUARINE UNIT [Qfob/Qeb]</b> Clayey to Sandy Silt, variable coarse sand, trace fine gravel (Jsm and Tm); grayish brown (10YR 5/2) to light gray (10YR 7/2); appears very moist and very stiff; abundant calcium carbonate, occurs as dispersed deposits and cemented nodules up to 1/2 inch, total calcium carbonate about 50% at 119.9', decreasing with depth to 15% at 122.2'; lower contact is gradational At 121.4 to 122.3': Increasing sand, grades to fine to coarse Clayey, Silty Sand, trace gravel Silty Clay and Clayey Silt, rare (<1%) coarse sand (Jsm and Tm); mottled, very dark grayish brown (10YR 3/2) to strong brown (7.5YR 4/6), strong brown mottling occurs mainly as irregular, oxidized pockets, variable (2-15%) calcium carbonate, occurs as cemented and uncemented nodules up to 1/2 inch; lower contact is gradational		
		8	29	100	ML	Sandy to Clayey Silt, trace coarse sand (Jsm and Tm); mottled, dark grayish brown (10YR 4/2) to strong brown (7.5YR 4/6); appears moist to very moist and very stiff to hard; 5-10% calcium carbonate, occurs as dispersed deposits and cemented nodules up to 1/8 inch, lower contact is gradational  At 127.5 to 129.7': Generally coarsens with depth, becomes more poorly sorted, gradational transition to unit below		
150	130	8	30	100	SC-SM SG SC/SM	<b>BASAL ALLUVIAL FAN UNIT [Qfob]</b> Clayey, Silty Sand, fine grained, trace coarse grained sand and fine gravel (Jsm and Tm); light yellowish brown (2.5Y 6/3); appears very moist and dense; poorly sorted; trace dispersed calcium carbonate; lower contact is gradational At 130.9 to 131.6': Gravel increases to 30-40%, up to 2 inches, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm) At 131.6 to 132.8': Abundant (20-30%) dispersed calcium carbonate, color becomes light gray (2.5Y 7/2)		
145	135	9	31	80	ML	Sandy Silt with Clay, variable coarse sand, trace fine gravel (Jsm and Tm); mottled, light yellowish brown (2.5Y 6/3) to grayish brown (10YR 4/3); appears very moist and very stiff; 5-15% calcium carbonate, occurs as dispersed deposits and cemented nodules up to 1/8 inch; lower contact is sharp  At 135.0 to 140.8': Mottled, color variable, mainly light yellowish brown (2.5Y 6/3) to yellowish brown (10YR 5/4); appears very moist and very stiff; occasionally grades to very fine Clayey, Silty Sand At 135.0 to 136.5': Calcium carbonate decreases with depth, 10-15% at 135.0', little or no calcium carbonate below 136.5'		
						At 139.0 to 140.0': No recovery		

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2-B8 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/10/11-5/12/11 and 6/9/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Measured at 35.8 feet during drilling		
		9	32	100	ML	<b>Qfob Continued</b>  At 140.8': Poorly Graded Sand bed, 1 inch thick, fine to medium grained At 140.8' to 143.8': Alternating beds of Silty Clay and very fine Sandy Silt; lightly mottled, grayish brown (2.5Y 5/2) to strong brown (7.5YR 5/6); appears very moist and very stiff to dense; lower contact is sharp		
135	145	9	33	100	CL/ CH	<b>BASAL ESTUARINE UNIT [Qeb]</b> Clay, rare (<1%) coarse sand (Jsm and Tm), greenish gray (10Y 5/1), appears moist and hard, trace calcium carbonate, lower contact is narrowly gradational At 144.6 to 147.7': Calcium carbonate increases to 30-40%, occurs as dispersed deposits and cemented and uncemented nodules up to 1/4 inch		
130	150	10	34	60	ML/ CL	Clayey Silt and Silty Clay, trace coarse sand; dark grayish brown (10YR 4/2); appears moist and very stiff to hard; 5-15% calcium carbonate, occurs as irregular, uncemented pockets At 148.6 to 151.4': Irregular calcium carbonate pockets increase to 15-20%; color becomes dark gray (2.5Y 4/1)  At 150.0 to 151.4': Appears very moist and medium stiff  At 151.4 to 152.1': Calcium carbonate decreases to less than 5%, color is dark gray (2.5Y 4/1) At 152.1 to 153.0': Sample appears disturbed, appears wet and soft, 10-20% cemented calcium carbonate nodules, generally up to 1/2 inch, one 2 inch calcium carbonate nodule At 153.0 to 155.0': No recovery		
125	155	10	35	100	CL/ ML	Silty Clay and Clayey Silt; lightly mottled, dark gray (10YR 4/1) to brown (7.5YR 4/4); appears moist and very stiff; trace calcium carbonate filaments and cemented nodules up to 1/4 inch; abundant fine, irregular oxidized pockets, lower contact is gradational  At 159.3 to 161.7': Color becomes very dark greenish gray, calcium carbonate increases to 5-10%, trace fine, oxidized, strong brown (7.5YR 4/6) pockets up to 1/8		
160								

(CONTINUED ON FOLLOWING FIGURE)

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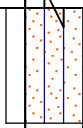
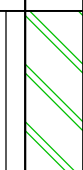
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T2-B8</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/10/11-5/12/11 and 6/9/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Measured at 35.8 feet during drilling		
						CL/ML	inch	
							<b>Qeb Continued</b>	
							At 160 to 165': Appears sheared and broken up; some waxy parting surface	
		10	36	100		ML	<b>SAN PEDRO FORMATION [Qsp]</b>	
							Clayey Silt, variable fine sand, trace coarse sand (Jsp and Tm); dark gray (N 4); appears moist and very stiff to hard; trace calcium carbonate nodules up to 1/8 inch, lower contact is gradational	
							At 162.8': Trace bivalve shell fragments	
115	165						At 164.6 to 165.0': Increasing sand, gradational transition to unit below	
						SP/SM	Poorly Graded Sand with Silt, fine grained; dark gray (2.5Y 4/1) to very dark gray (2.5Y 3/1); appears very moist to dense; lower contact is narrowly gradational	
						SP	At 165.8 to 166.8': Grades to fine to medium Poorly Graded Sand	
		11	37	100		SP/SM		
						CL/ML	Silty Clay and Clayey Silt; black (2.5Y 2.5/1) with variable gray (10YR 5/1); appears moist and hard; gray color occurs mainly as varve-like bedding; appears organic rich; lower contact is narrowly gradational	
							At 167.3': Trace bivalve shell fragments at sand/clay contact	
110	170							
		11	38	100			At 170.9 to 171.0': Poorly Graded Sand with Silt, fine grained, dark gray (2.5Y 4/1)	
							At 171.0' to 172.7': Abundant varve-like bedding defined by colors described above and apparent organic content	
						SM	At 172.0 to 172.3': Organic-rich bed, two decayed roots observed	
							At 172.7 to 173.1': Organic-rich bed, abundant black decayed organics	
						SP	Silty Sand, fine grained; dark gray (2.5Y 4/1); appears moist and dense; irregular black, vertically oriented, organic-rich structures extend down to 173.4' from unit above	
105	175						Poorly Graded Sand, fine grained; gray (2.5Y 5/1); appears moist and dense	
		11	39	90		SP/SM	At 176.7 to 177.4': Some gravel, clasts, 5-15%, up to 1½ inch, mainly subrounded meta-basalt and slate	
							At 177.4 to 180.0': Grades to Poorly Graded Sand with Silt, very fine grained; light gray (N 7); appears damp and dense	

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T2-B8</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 280 feet
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						5/10/11-5/12/11 and 6/9/11	8 inches	
						GROUNDWATER READINGS		
						Measured at 35.8 feet during drilling		
		12	40	30		<b>Qsp Continued</b> Silty Sand with Gravel, fine to medium grained, clasts 30-50%, up to 1 inch, mainly subrounded, meta-basalt and slate; dark gray (2.5Y 4/1); appears wet and dense; trace mica  A 181.5 to 185.0': No recovery		
95	185					Clay; very dark gray (2.5Y 3/1); appears very moist and stiff; slightly micaceous; trace dispersed calcium carbonate filaments  At 187.2 to 190.0': No recovery		
90	190					END OF BORING AT 190 FEET		
						NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched.  -Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than 1/4 inch). -Beds are generally massive unless otherwise noted.		
85	195					Boring extended from 79' to 190' on 6/9/2011 offset from original boring location approximately 1 foot south east.		
200								

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T2-B9</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/9/11	8 inches	278 feet
						GROUNDWATER READINGS		
						Encountered at 50½ feet during drilling		
275					SM	Grass Surface Hand augered to 6 feet <b>FILL [Af]</b> Silty Sand with Gravel, fine grained, clasts 20-35%, up to 3/4 inch; dark grayish brown (10YR 4/2); appears moist and dense		
	5				CL/ML	<b>NOTE:</b> Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed description of clasts <b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Silty Clay to Clayey Silt, variable gravel, clasts 5-20%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); dark brown (7.5YR 3/3); appears very moist and very stiff; poorly sorted; lower contact is narrowly gradational		
		1	1	100	SM	Silty Sand, fine grained, trace coarse sand and fine gravel (Jsm and Tm); brown (10YR 4/3); appears moist and dense; lower contact is sharp		
270					SC	Clayey Sand with Gravel, clasts 25-35%, up to 1 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); some brick-red sandstone; color variable; appears very moist and dense At 7.8 to 8.4': Increasing clay, decreasing gravel; gradational transition to bed below		
	10		2	80	ML	Clayey to Sandy Silt, variable coarse sand and gravel, clasts 2-20%, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); brown (7.5YR 4/4); appears very moist and stiff		
265					SC	Clayey Sand with Gravel, fine to coarse grained, clasts 25-35%, up to 1/2 inch; mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); appears very moist and dense; lower contact is sharp At 13.0 to 14.0': No recovery		
	15		3	100	CL/ML	<b>ESTUARINE DEPOSITS [Qe]</b> Silty Clay to Clayey Silt, variable fine to coarse sand, trace fine gravel (Jsm and Tm); brown (10YR 4/3); appears very moist and stiff, some varve-like bedding; lower contact occurs between runs		
260						At 19.0': Becomes lightly mottled, brown (10YR 5/3) to strong brown (7.5YR 5/6)		
	20				SM	At 19.5 to 19.9': Fine to coarse Silty Sand		

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T2-B9</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 278 feet
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						5/9/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 50½ feet during drilling		
		1	4	100		SM	<b>Qe Continued</b>	
255		2	5	100		ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt, variable gravel, clasts 5-15%, up to 1 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm), some quartzite and granitic rock also observed; brown (7.5YR 4/4); appears very moist and stiff; lower contact is narrowly gradational At 23.0': Becomes mottled, strong brown (7.5YR 4/6) to brown (10YR 4/3)  At 25.7 to 26.0': Gravel increases  At 26.0 to 27.3': Grades to fine to medium Silty Sand, trace coarse sand and fine gravel  At 28.0 to 29.0': No recovery  At 29.0 to 29.6': Gravel increases to 20-30%	
250		2	6	80		SM		
						ML		
30		2	7	100			<b>ESTUARINE DEPOSITS [Qe]</b> Clayey to Sandy Silt, trace coarse sand and fine gravel; brown 10YR 4/3; appears very moist to wet and soft to medium stiff At 30.0 to 32.0': Occasional varve-like bedding  At 32.0 to 32.5': Color becomes brown (10YR 4/3)  At 33.5 to 34.2': Becomes, dark reddish brown (5YR 3/3), trace manganese oxide	
35		3	8	100		CL/ML	<b>Marker Bed M<sub>G</sub></b> - Silty Clay to Clayey Silt, variable fine sand, trace coarse sand and fine gravel (Jsm and Tm); mottled, grayish brown (10YR 5/2) to strong brown (7.5YR 4/6); appears very moist and stiff; trace manganese oxide flecks; possible weak soil development; lower contact is gradational	
240							<b>ESTUARINE DEPOSITS [Qe] / Marker M<sub>F</sub></b> Silty Clay to Clayey Silt, variable fine sand, trace coarse sand and fine gravel (Jsm and Tm); yellowish red (5YR 4/6) to brown (10YR 4/3); appears very moist and stiff; generally homogeneous and massive to thickly bedded At 38.5 to 44.6': Sand and gravel increase, clasts 5-20%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm)  At 39.5 to 44.6': Appears very moist to wet and soft to medium stiff	
40								

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T2-B9</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 278 feet
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						5/9/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 50½ feet during drilling		
235	45	3	9	100	CL/ML	<b>Qe Continued</b>  At 42.7 to 44.6': Some brick-red sandstone, occasional granitic clasts observed		
230	50	3	10	86	CL/CH	<b>Marker M<sub>f</sub> Continued</b> - Clay, rare (< 1%) coarse sand; brown (10YR 4/4); appears very moist and stiff; generally homogeneous and massive; lower contact is narrowly gradational  At 49.0' - 50.2': Grades to Silty Clay and Clayey Silt; some grayish brown (10YR 5/2) mottling, increasing sand		
225	55	3	11	100	ML	∇ At 50.5': Groundwater encountered during drilling  <b>ESTUARINE DEPOSITS [Qe]</b> Clayey to Sandy Silt; variable coarse sand and gravel occurring in distinct beds as noted below, clasts 2-15% up to 1/2-inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); lightly mottled, grayish brown (10YR 5/2) to strong brown (7.5YR 4/6); appears very moist to wet and medium stiff to stiff; generally well sorted, trace manganese oxide flecks; lower contact is narrowly gradational		
220		4	11	100	CL/CH/ML	At 53.0 to 53.5': Gravel increases to 20-25%, up to 3/4-inch At 53.5 to 54.0': Grades to Clay At 54.6 to 54.7': Gravel increases to 20-25%		
					SM	At 54.7 to 55.0': Fine to medium Silty Sand		
					CL/CH	At 55.0 to 56.0': Grades to Clay		
		4	12	100	ML	At 57.1 to 57.5': Gravel increases to 25-30%  At 59.0 to 60.0': No sampling		

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2-B9 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/9/11	8 inches	278 feet
						GROUNDWATER READINGS		
						Encountered at 50½ feet during drilling		
215		4	13	63		<b>Qe Continued</b> At 60.0 to 60.8': Fine Silty to Clayey Sand, 5-10% gravel (Jsm and Tm) At 60.8 to 62.0': Interbedded clay and silt, trace coarse sand and gravel (Jsm and Tm), prominent varve-like bedding  At 62.5 to 64.0': No recovery  At 64.0 to 65.5': No recovery  At 65.5 to 66.7': Alternating Silty Sand and Clayey Silt beds / laminations, some manganese oxide staining		
210		4	14	70		<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b> Clay, rare (< 1%) coarse sand, dark grayish brown (2.5Y 4/2); appears very moist to wet and medium stiff to stiff, abundant (up to 20%) manganese oxide flecks and staining; occasional strong brown mottling; lower contact is gradational  At 69.0 to 70.1': Becomes soft to medium stiff		
205		5	15	100		Silty Clay to Clayey Silt, trace coarse sand; mottled, grayish brown (10YR 5/2) to strong brown (7.5YR 4/6); appears very moist and very stiff; occasional oxidized sandy silt pockets / lenses  At 73.2 to 74.0': Color becomes very dark grayish brown (10YR 3/2) to dark brown (7.5YR 3/4) At 74.5 to 75.0': Appears very moist to wet and soft At 76.0 to 76.7': Appears very moist to wet and soft		
200		5	16	80		At 76.7 to 77.5': Up to 5% manganese oxide flecks At 77.5 to 78.0': 5-10% gravel (Jsm and Tm)  At 78.0 to 79.0': No recovery		
80						END OF BORING AT 79 FEET  NOTES:		

(CONTINUED ON FOLLOWING FIGURE)

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 Checked/Date: MW/MF 10/11/2011



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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2-B9 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/9/11	8 inches	278 feet
						GROUNDWATER READINGS		
						Encountered at 50½ feet during drilling		
195						Boring backfilled with cement/bentonite grout from bottom up and patched.		
85						<ul style="list-style-type: none"> <li>-Munsell colors listed in order of predominance (most predominant color first).</li> <li>-Where observed, contacts and bedding appear subhorizontal unless otherwise noted.</li> <li>-Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted.</li> <li>-Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted.</li> <li>-The term "clasts" herein describes gravel-size rock fragments (larger than ¼ inch).</li> <li>-Beds are generally massive unless otherwise noted.</li> </ul>		
190								
90								
185								
95								
180								
100								

Geologist: BR/MF  
 Prepared/Date: YN/WL 10/10/2011  
 Checked/Date: MW/MF 10/11/2011

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					DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.		
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	Jet Drilling / CME 75		<b>T2-B10</b>	
						DRILLING METHOD			BOREHOLE LOCATION
						Hollow-Stem Auger		See Plate 3	
						DATES DRILLED		HOLE DIAMETER	GROUND EL.
						5/20/11		8 inches	278 feet
					GROUNDWATER READINGS				
					Not recorded				
						14 inches of concrete over 12 inches of base Hand augered to 6 feet NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed description of clasts			
	275					<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt, variable coarse sand and gravel clasts 5-20%, up to 1/2-inch; mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); dark brown (10YR 3/3); appears moist and stiff to very stiff; lower contact is gradational			
	5					At 6.5': Gravel decreases to <5%			
	270	1	1	100		<b>ESTUARINE DEPOSITS [Qe]</b> Silty Clay and Clayey Silt, trace coarse sand (Jsm and Tm); dark brown (7.5YR 3/3); appears moist and stiff; lower contact is gradational			
	10					At 9.5 to 10.0': No sampling  At 11.0 to 14.0': No recovery			
	265	1	2	38		Clayey to Sandy Silt, trace coarse sand (Jsm and Tm); lightly mottled, gray brown (10YR 5/2) to strong brown (7.5YR 4/6); appears very moist to wet and soft; lower contact is gradational			
	15	1	3	80		Silty Clay and Clayey Silt, trace coarse sand (Jsm and Tm); mottled, gray (2.5Y 5/1) to strong brown (7.5YR 4/6); appears very moist and stiff			
	260	1	4	60		At 18.0 to 19.0': No recovery			
	20					Clayey to Silty Sand, very fine grained, trace coarse sand (Jsm and Tm); highly oxidized, mottled, reddish brown (5YR 4/4) to dark gray (7.5YR 4/1); appears very moist and dense; lower contact is gradational			

(CONTINUED ON FOLLOWING FIGURE)

Geologist: BF/MF  
 Prepared/Date: YN/WL 10/10/2011  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T2-B10</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 278 feet
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						5/20/11	8 inches	
						GROUNDWATER READINGS		
						Not recorded		
		1	5	76		<b>Qfo Continued</b> At 20.0': Grades to Clayey to Sandy Silt		
						At 22.3 to 24.0': No recovery		
255		1	6	32				
	25					Very fine Silty Sand and Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); dark yellowish brown (10YR 3/4); appears very moist and stiff; lower contact is gradational		
		1	7	40		At 25.0 to 26.5': No recovery		
	250	2	8	76		Clayey to Sandy Silt, variable coarse sand and gravel, clasts 2 to 15%, up to 1 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm), some brick red sandstone (Tm); appears moist and stiff to hard; poorly sorted; lower contact is narrowly gradational		
						At 30.2 to 31.5': Gravel increases to 20 to 25%, abundant coarse sand		
	30					At 31.2 to 34.0': No recovery		
		2	9	44				
245								
	35	2	10	52		<b>ESTUARINE DEPOSITS [Qe] / Marker Bed M<sub>G</sub></b> Silty Clay and Clayey Silt, trace coarse sand and fine gravel (Jsm and Tm); dark brown (7.5YR 3/4); appears moist and very stiff; possible weak soil development; lower contact occurs between runs		
						At 36.0 to 36.6': Gravel increases to 5 to 10%		
						At 36.6 to 39.0': No recovery		
	240					Depth of contact uncertain due to poor recovery		
	40					<b>Marker M<sub>F</sub></b> - Sandy Clay, trace fine gravel; dark yellowish brown (10YR 4/4); appears very moist to wet and soft to medium stiff; lower contact is gradational		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: BF/MF  
 Prepared/Date: YN/WL 10/10/2011  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2-B10 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/20/11	8 inches	278 feet
						GROUNDWATER READINGS		
						Not recorded		
		2	11	96		ML	<b>Qe Continued</b> At 39.6 to 41.2': Grades to Sandy to Clayey Silt, trace coarse sand (Jsm and Tm); brown (7.5YR 4/4); appears very moist and medium stiff; lower contact is narrowly gradational	
						CL/CH	<b>Marker M<sub>F</sub> Continued</b> - Clay, trace coarse sand (Jsm and Tm); brown (7.5YR 4/4) with occasional grayish brown (10YR 5/2) mottling; appears moist and very stiff; generally homogeneous and massive lower contact is gradational	
		3	12	100		ML	At 41.5 to 41.8': Appears very moist to wet and soft to stiff	
						ML	At 42.5 to 43.0': Sand content increases	
						ML	At 43.0 to 43.4': Grades to Clayey to Sandy Silt	
235						ML	Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); mottled, reddish brown (5YR 4/4) to strong brown (7.5YR 4/4); appears wet and soft; lower contact is gradational	
		3	13	62		GM	At 46.0 to 46.9': Increasing sand and gravel, gradational transition to unit below	
						SW	Silty Gravel, clasts 60 to 70%, up to 1 inch; mainly subangular to subrounded slate (Jsm), shale (Tm), and sandstone (Tm); color varies; appears wet and dense; lower contact occurs between runs	
230						SW	At 47.1 to 49.0': No recovery	
		3	14	34		SW	Well Graded Sand, fine to coarse grained, trace fine gravel (Jsm and Tm); color variable, generally dark grayish brown (10YR 4/2); appears wet and dense; lower contact occurs between runs	
						SW	At 50.7 to 54.0': No recovery	
225						ML	Depth of contact uncertain due to poor recovery	
		3	15	100		ML	<b>ESTUARINE DEPOSITS [Qe]</b> Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); brown (7.5YR 4/4); appears wet and soft	
						CL	At 55.3 to 55.7': Grades to Silty Clay, some varve-like bedding	
						ML	Silty Clay, trace coarse sand (Jsm and Tm); mottled, brown (7.5YR 5/3) to grayish brown (10YR 5/2); appears wet and soft	
		3	16	80		CL	At 57.2 to 57.5': and 58.1 to 58.3': Fine to coarse Silty Sand beds, contacts are sharp	
220						ML	At 58.2 to 58.3': Abundant manganese oxide staining	
						ML	Clayey to Sandy Silt, trace coarse sand, lightly mottled, brown (7.5YR 5/3) to grayish brown (10YR 5/2); appears very moist and stiff; variable manganese oxide staining; prominent varve-like bedding	
60						ML		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: BF/MF  
 Prepared/Date: YN/WL 10/10/2011  
 Checked/Date: MW/MF 10/11/2011

MTA Westside Subway Extension  
 Los Angeles, California



LOG OF BORING

Project No.: 4953-10-1561 Figure: T2-B10c

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2-B10 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/20/11	8 inches	278 feet
						GROUNDWATER READINGS		
						Not recorded		
215		4	17	38	ML	<b>Qe Continued</b> occasional fine silty sand beds, lower contact occurs between runs  At 60.9 to 64.0': No Recovery		
65		4	18	60	ML	Clayey to Sandy Silt with Gravel; clasts 15 to 30%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); mottled, brown (10YR 4/3) to strong brown (7.5YR 4/6); appears very moist to wet and very stiff; lower contact is narrowly gradational  At 65.5 to 66.5': No recovery		
210		4	19	60	SC/ SM ML	At 66.5 to 66.9': Clayey Silty Sand At 66.9 to 67.9': Distinct laminations defined by variable oxidation		
70		4	20	90	CL/ CH	<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b> Clay, trace coarse sand; mottled, dark reddish brown (5YR 3/3) to dark gray (7.5YR 4/1); appears moist and very stiff; rare (<1%) calcium carbonate filaments  At 68.0 to 69.0': No recovery  At 70.5 to 71.6': Increasing sand and fine gravel, gradational transition to unit below		
205		4	21	68	ML	Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); brown (7.5YR 4/4); appears very moist to wet and stiff to very stiff; generally moderately to well sorted; rare (<1%) calcium carbonate filaments; occasionally grades to Silty Clay, occasional more gravelly beds  At 74.0 to 74.5': Calcium carbonate increases to 5 to 10%		
75						At 77.5 to 79.0': No recovery		
200						END OF BORING AT 79 FEET		
80						NOTES:		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: BF/MF  
 Prepared/Date: YN/WL 10/10/2011  
 Checked/Date: MW/MF 10/11/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T2-B10d

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2-B10 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/20/11	8 inches	278 feet
						GROUNDWATER READINGS		
						Not recorded		
195						Boring backfilled with cement/bentonite grout from bottom up and patched.		
85						<ul style="list-style-type: none"> <li>-Munsell colors listed in order of predominance (most predominant color first).</li> <li>-Where observed, contacts and bedding appear subhorizontal unless otherwise noted.</li> <li>-Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted.</li> <li>-Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted.</li> <li>-The term "clasts" herein describes gravel-size rock fragments (larger than ¼ inch).</li> <li>-Beds are generally massive unless otherwise noted.</li> </ul>		
190								
90								
185								
95								
180								
100								

Geologist: BF/MF  
 Prepared/Date: YN/WL 10/10/2011  
 Checked/Date: MW/MF 10/11/2011



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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2E-B1
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/3/2011 - 6/7/2011	8 inches	278 feet
						GROUNDWATER READINGS		
						Measured at 42.3 feet during drilling		
							Surface is grass Hand augered to 6 feet <b>FILL [Af]</b> Clayey Silty Sand with Gravel, fine grained, clasts 30 to 40%, up to 1 inch; dark grayish brown (10YR 4/2); appears very moist  At 2.5': 8 inch concrete rubble fragment	
275	5						<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Silty, Clayey Sand with Gravel, fine to coarse grained; clasts 20 to 30%, up to 1 inch; mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); appears very moist and dense; poorly sorted; lower contact is sharp	
270		1	1	100			Silty Clay and Clayey Silt, variable fine to coarse sand and fine gravel; clasts 1 to 20%, up to 3/4 inch; mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); brown (10YR 4/3); appears very moist and very stiff; poorly sorted; lower contact is narrowly gradational	
	10						At 10.5 to 10.7' and 10.9 to 11.5': Fine Clayey Sand; dark brown (7.5YR 3/4); appears very moist and dense	
265		1	2	100			<b>ESTUARINE DEPOSIT (Qe)</b> Clay, trace coarse sand (Jsm and Tm); mottled, dark gray (10YR 4/1) to brown (7.5YR 4/3); appears very moist and stiff; lower contact is gradational  At 12.5 to 14.0': Trace gravel (Jsm and Tm); color becomes dark brown (10YR 3/3)	
	15						At 14.0 to 14.8': Alternating beds of fine Silty Sand, dark yellowish brown (10YR 3/4) and Silty Clay	
260		1	3	44			At 16.2 to 19.0': No recovery	
20								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: YN/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011

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					DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
					Jet Drilling / CME 75		<b>T2E-B1</b> (Continued)
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	DRILLING METHOD	BOREHOLE LOCATION	
					Hollow-Stem Auger	See Plate 3	
					DATES DRILLED	HOLE DIAMETER	GROUND EL.
					6/3/2011 - 6/7/2011	8 inches	278 feet
					GROUNDWATER READINGS		
					Measured at 42.3 feet during drilling		
255		1	4	46	ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt, variable coarse sand, trace fine gravel (Jsm and Tm); dark brown (7.5YR 3/4); appears very moist and very stiff; poorly sorted; lower contact occurs between runs At 21.3 to 24.0': No recovery  At 24.0 to 25.7': Coarse sand and gravel decrease; some varve-like bedding  At 25.7 to 28.5': No recovery	
250	25	2	5	38	ML	At 28.5 to 31.5': Gravel increases to 10 to 15%, up to 3/4 inch; mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm)	
30		2	6	100	ML	Silty Clay, trace coarse sand and fine gravel (Jsm and Tm); dark yellowish brown (10YR 3/4); appears very moist and stiff, lower contact is sharp	
245		2	7	100	ML	Clayey to Sandy Silt with Gravel, clasts 15 to 20%, up to 1/2 inch; mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); very dark grayish brown (10YR 3/2); appears very moist and stiff At 32.4 to 33.7': Some strong brown (7.5YR 5/6) mottling	
35		2	8	100	CL/ML	<b>ESTUARINE DEPOSITS [Qe] / Marker Bed M<sub>G</sub></b> Silty Clay and Clayey Silt, variable fine sand, trace coarse sand and fine gravel (Jsm and Tm); dark brown (7.5YR 3/3) with reddish brown (5YR 4/4) mottling; appears moist and very moist and very stiff; possible weak soil development; lower contact is gradational  At 37.0 to 38.2': Becomes highly oxidized dark reddish brown (5YR 3/4)  At 38.2 to 38.8': Increasing sand and fine gravel, gradational transition to bed below	
240					CL	<b>Marker M<sub>F</sub></b> Sandy Clay, variable fine gravel, clasts 2 to 20%, up to 1/2 inch; mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); dark brown (7.5YR 3/3); appears very moist and stiff; lower contact is gradational	
40							

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: YN/PK 10/14/2011  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2E-B1 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/3/2011 - 6/7/2011	8 inches	278 feet
						GROUNDWATER READINGS		
						Measured at 42.3 feet during drilling		
235		3	9	68	CL	<p><b>Qe Continued - Marker M<sub>F</sub></b>            Clay, trace coarse sand; dark brown (7.5YR 3/4); appears very moist and stiff to very stiff; variable varve-like bedding; lower contact occurs between runs</p> <p>At 41.2 to 42.5': Increasing fine sand content; becomes lightly mottled, brown (7.5YR 4/4) to reddish brown (5YR 4/4)</p> <p>▽ At 42.3': Groundwater measured during drilling            At 42.4 to 44.0': No recovery</p> <p>At 44.0 to 45.0': No sampling</p> <p>At 45.0 to 46.8': Becomes reddish brown (5YR 5/4) with grayish brown (10YR 5/2) mottling; 2 to 5% manganese oxide flecks</p> <p>At 47.0 to 47.6': Increasing sand, fine to coarse grained, trace gravel            At 47.6 to 49.0': No recovery</p>		
230		3	10	65	ML	<p>Clayey to Sandy Silt, variable fine gravel, clasts 2 to 15%, up to ½ inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); mottled, light brownish gray (10YR 6/2) to yellowish brown (10YR 5/4); appears very moist and soft to medium stiff; occasional interbeds of silty clay and fine silty sand; lower contact occurs between runs</p> <p>At 51.5 to 54.0': No recovery</p>		
50		3	11	50	ML	<p>Alternating beds of Silty Clay and fine Silty Sand/Sandy Silt; trace coarse sand (Jsm and Tm); mottled, grayish brown (10YR 5/2) to reddish brown (5YR 4/4); appears wet and soft to medium dense; silty clay beds typically 3 to 6 inches thick, sand/silt beds typically 1 to 2 inches thick; lower contact is narrowly gradational</p>		
55		4	12	68	SC-SM	<p>At 56.1 to 56.9': Fine to coarse Clayey to Silty Sand with Gravel; clasts 15 to 20%, up to ¾ inch; mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); brown (7.5YR 4/4); appears wet and dense; upper and lower contacts are sharp</p> <p>At 57.4 to 59.0': No recovery</p>		
220					CL/ML &			
60					CL/ML &			

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: YN/PK 10/14/2011  
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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)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2E-B1 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/3/2011 - 6/7/2011	8 inches	278 feet
						GROUNDWATER READINGS		
						Measured at 42.3 feet during drilling		
215		4	13	54	SC-SM CL/CH	<b>Qe Continued</b> At 60.7 to 61': Grades to fine to coarse Silty, Clayey Sand; grayish brown (10YR 5/2); appears wet and dense At 60.8 to 60.9': Becomes dark reddish brown (5YR 3/2), fine silty sand bed Clay, trace coarse sand (Jsm and Tm); dark grayish brown (10YR 4/2); appears moist and very stiff, lower contact is gradational At 61.2 to 61.7': Abundant (40 to 50%) manganese oxide flecks and staining; prominent varve-like bedding At 61.7 to 64.0': No recovery  At 64.0 to 64.5': Abundant manganese oxide-rich laminae and irregular pockets, total manganese oxide 40 to 60% At 64.5 to 64.9': Increasing fine to coarse sand At 64.9 to 65.3': Fine to coarse Clayey Sand; grayish brown (10YR 5/2); appears wet and dense At 65.8 to 66.3': Increasing fine to coarse Sand; calcium carbonate occurs as dispersed deposits and cemented, irregular nodules up to 1/2 inch, total calcium carbonate 15 to 30%		
210		4	14	76	CL-CH	<b>ESTUARINE DEPOSITS - FINE GRAINED (Qef)</b> Clay and Silty Clay, variable coarse sand (Jsm and Tm); strongly mottled, dark grayish brown (10YR 4/2) to strong brown (7.5YR 4/6); appears moist and very stiff to hard; abundant fine, irregular, oxidized pockets; trace calcium carbonate filaments; lower contact is gradational At 67.8 to 69.0': No recovery		
205		5	15	76	ML	At 71.7 to 72.8': Increasing sand content, grades to Clayey to Sandy Silt, trace coarse sand (Jsm and Tm)  At 72.8 to 74.0': No recovery		
200		5	16	76	CL-CH	Clay and Silty Clay, variable fine sand, trace coarse sand and fine gravel (Jsm and Tm); brown (7.5YR 4/4); appears moist and very stiff to hard; occasional grayish brown (10YR 5/2) mottling and laminae; lower contact is gradational  At 77.8 to 79.0': No recovery		
80					ML/CL	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey Silt and Silty Clay, variable fine to coarse sand and fine gravel, clasts 2 to 5%, up to 1/2 inch (Jsm and Tm); color variable, mainly brown (7.5YR 4/4); appears moist		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: YN/PK 10/14/2011  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2E-B1 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/3/2011 - 6/7/2011	8 inches	278 feet
						GROUNDWATER READINGS		
						Measured at 42.3 feet during drilling		
195		5	17	48		ML/CL	<b>Qfo Continued</b> and very stiff, occasional silty sand and clayey sand beds  At 81.4 to 84.0': No recovery	
85		5	18	50		SM	At 84.0 to 84.3': Fine Silty Sand; dark brown (7.5YR 3/4); appears wet and dense, lower contact is sharp At 84.6 to 84.7' and 85.1 to 85.3': Fine to coarse Silty Sand; brown (7.5YR 4/4); appears wet and dense; upper and lower contacts are sharp  At 85.8 to 86.5': 5 to 10% calcium carbonate filaments  At 86.5 to 89.0': No recovery	
190						ML/CL		
90		6	19	78		CL-CH	At 89.0 to 91.3': Clayey and Silty Clay, trace coarse sand, rare (<1%) fine gravel; occasional reddish brown (5YR 4/3) mottling; trace calcium carbonate filaments	
185		6	20	28		ML/CL	Sandy to Clayey Silt, variable fine to coarse sand, trace fine gravel (Jsm and Tm); strongly mottled, dark grayish brown (10YR 4/2) to strong brown (7.5YR 5/8); appears very moist and very stiff; trace calcium carbonate filaments  At 93.0 to 94.0': No recovery  At 94.0 to 95.2': Increasing coarse sand and fine gravel, clasts 10 to 20%, up to 1/2 inch At 94.7 to 95.4': Mottling becomes light, predominantly dark grayish brown (10YR 4/2); gravel increases to 5 to 10% At 95.4 to 104.0': Recovered only limited slough	
180								
100								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: YN/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011

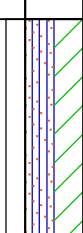
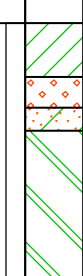
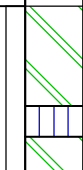

**MTA Westside Subway Extension**  
**Los Angeles, California**



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T2E-B1e

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T2E-B1 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Hollow-Stem Auger	See Plate 3	278 feet
						DATES DRILLED	HOLE DIAMETER	
						6/3/2011 - 6/7/2011	8 inches	
						GROUNDWATER READINGS		
						Measured at 42.3 feet during drilling		
175		6	21	0		<b>Qe Continued</b>		
105		6	22	57		CL/ SM	<b>ESTUARINE DEPOSITS [Qe]</b> Alternating beds of Clay and fine Silty Sand; rare (<1%) coarse sand and fine gravel (Jsm and Tm); mottled, color variable, mainly brown (10YR 4/3) with grayish brown (2.5Y 5/2) and strong brown (7.5YR 4/6) mottling; appears very moist and very stiff/dense; scattered manganese oxide flecks	
170							At 106.9 to 109.0': No recovery	
110		6	23	70		CL SW SC CL/ CH	At 109.0 to 109.7': Clay bed; appears wet and soft At 109.7 to 110.1': Well Graded Sand, fine to coarse grained; appears wet and dense At 110.1 to 110.4': Increasing clay, gradational transitional from fine to coarse sand bed above to unit below Clay; mottled, grayish brown (2.5Y 5/2) to brown (7.5YR 4/4); appears very moist and stiff to very stiff; occasional 1 inch thick beds with up to 10% manganese oxide flecks; occasional sandy silt laminae and varve-like bedding; lower contact occurs between runs	
165							At 112.5 to 114.0': No recovery	
115		7	24	46		ML CL/ CH	At 114.7 to 114.9': Clay bed, strongly mottled, brownish yellow (10YR 6/6) to gray (10YR 5/1), 3/4 inch thick band with 40 to 50% manganese oxide at center of bed At 114.9 to 115.3' and 115.7 to 116.3': Color becomes very dark grayish brown (2.5Y 3/2); trace calcium carbonate filaments At 115.3 to 115.7': Clayey Silt; dark brown (10YR 3/3) At 116.3 to 119.0': No recovery	
160								
120						ML	Sandy to Clayey Silt, trace coarse sand (Jsm and Tm); brown (10YR 4/3); appears very moist and very stiff; variable (2 to 15%) calcium carbonate filaments and uncemented nodules, up to 1/4 inch; lower contact is sharp	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: YN/PK 10/14/2011  
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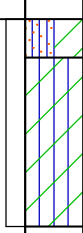
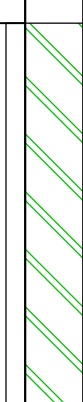

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T2E-B1 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 278 feet
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						6/3/2011 - 6/7/2011	8 inches	
						GROUNDWATER READINGS		
						Measured at 42.3 feet during drilling		
						ML	<b>Qe Continued</b>	
155		7	25	94		CL/ML	Silty Clay and Clayey Silt, variable fine to coarse sand and fine gravel, clasts 5 to 30%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); some brick-red sandstone; color variable, mainly dark grayish brown (10YR 4/2); appears very moist and very stiff; variable calcium carbonate, occurs as dispersed deposits and diffuse, non-cemented nodules up to 1/2 inch, total calcium carbonate generally 5 to 15%; lower contact is narrowly gradational	
						CL	At 121.1 to 121.4': Calcium carbonate-rich bed, mainly dispersed, up to 40%; color generally gray (2.5Y 6/1)	
							<b>ESTUARINE DEPOSITS - FINE GRAINED (Qef)</b>	
125							Clay; mottled, very dark grayish brown (10YR 3/2) to highly oxidized dark reddish brown (5YR 3/3); appears very moist and very stiff; trace calcium carbonate filaments; lower contact is gradational	
							At 122.8 to 123.8': 15 to 20% fine calcium carbonate filaments, scattered or in clusters	
		7	26	56		CL	Silty Clay, variable fine to coarse sand, trace fine gravel (Jsm and Tm); dark grayish brown (10YR 4/2) with strong brown (7.5YR 4/6) mottling; appears very moist and very stiff; lower contact is gradational	
150							At 126.8 to 129.0': No recovery	
							At 129.0 to 130.5': Coarse sand decreases to trace, little to no fine gravel	
130							At 130.5 to 130.9': Increasing sand and calcium carbonate filaments, gradational transition to unit below	
		8	27	92		ML	<b>BASAL ALLUVIAL FAN/BASAL ESTUARINE UNIT [Qfob/Qeb]</b>	
145							Sandy to Clayey Silt, trace coarse sand and fine gravel (Jsm and Tm); grayish brown (10YR 5/2) to light gray (10YR 7/2); appears very moist and very stiff; poorly sorted; 20 to 40% calcium carbonate, occurs as dispersed deposits and uncemented nodules up to 1/4 inch; lower contact is gradational	
							At 129.5 to 133.0': Fine, irregular oxidized strong brown (7.5YR 4/6) pockets increase with depth	
						SM/ML	At 133.0 to 133.6': Grades to fine Silty Sand and Sandy Silt; light yellowish brown (10YR 6/4)	
						ML		
135						CL	Clay and Silty Clay, variable fine sand, trace coarse sand (Jsm and Tm); color variable, mainly olive gray (5Y 5/2); appears very moist and very stiff; 5 to 10% cemented and uncemented calcium carbonate nodules up to 1/4 inch; lower contact is narrowly gradational	
						ML	<b>BASAL ALLUVIAL FAN UNIT (Qfob)</b>	
140		8	28	32			Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); grayish brown (10YR 5/2); appears moist to very moist and very stiff; variable (2 to 15%) cemented and uncemented calcium carbonate nodules	
							At 135.6 to 139.0': No recovery	
							At 139 to 140.5': No sampling	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: YN/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T2E-B1</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Hollow-Stem Auger	See Plate 3	278 feet
						DATES DRILLED	HOLE DIAMETER	
						6/3/2011 - 6/7/2011	8 inches	
						GROUNDWATER READINGS		
						Measured at 42.3 feet during drilling		
						<p><b>Qfob Continued</b> At 140.5 to 144.0': No recovery</p>		
135		N/A	29	0				
145		8	30	54		<p>CL/ SM ML</p> <p>At 144.0 to 144.5': Alternating beds of Silty Clay and fine Silty Sand; dark grayish brown (10YR 4/2); appears very moist to wet and stiff to dense; lower contact is sharp At 144.5 to 146.7': Increasing clay, gradational transition to unit below At 144.8 to 146.0': Cemented calcium carbonate nodules, up to 1/2 inch, increase with depth, &lt; 5% at 144.8' to 25 to 20% at 146.0'</p> <p>At 146.7 to 149.0': No recovery</p>		
130								
150		9	31	100		<p><b>BASAL ESTUARINE UNIT [Qeb]</b> Clay, rare (&lt;1%) coarse sand; dark greenish gray (5GY 4/1); appears moist and very stiff to hard; lower contact is narrowly gradational At 149.0 to 149.4': 15 to 20% cemented calcium carbonate nodules up to 1/2 inch At 149.4 to 150.3': Calcium carbonate nodules decrease to &lt;5% At 150.3 to 153.8': Increasing fine, irregular, oxidized pockets, up to 20 to 35%</p> <p>At 153.8 to 154.9': Increasing fine sand, trace coarse sand (Jsm and Tm); oxidized pockets up to 50%, calcium carbonate nodules decrease to 5 to 10%</p> <p>At 154.9 to 155.4': Indistinct laminae, defined by variable color, calcium carbonate less than 5%</p> <p>Clayey, Silty Sand, fine grained; dark grayish brown (10YR 4/2); appears very moist and dense; lower contact not encountered At 155.8 to 159.0': No recovery</p>		
125								
155		9	32	36		<p>SM- SC</p>		
120								
160						<p>END OF BORING AT 159 FEET</p> <p>NOTES:</p>		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
Prepared/Date: YN/PK 10/14/2011  
Checked/Date: MW/MF 10/14/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: T2E-B1h

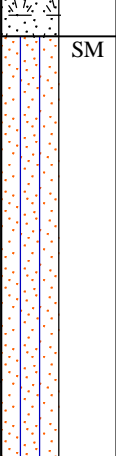
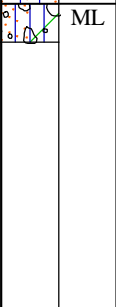
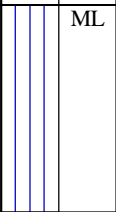
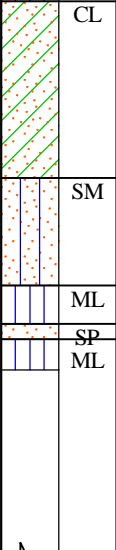
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2E-B1 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED 6/3/2011 - 6/7/2011	HOLE DIAMETER 8 inches	GROUND EL. 278 feet
						GROUNDWATER READINGS Measured at 42.3 feet during drilling		
115						Boring backfilled with cement/bentonite grout from bottom up and patched.		
165						<ul style="list-style-type: none"> <li>-Munsell colors listed in order of predominance (most predominant color first).</li> <li>-Where observed, contacts and bedding appear subhorizontal unless otherwise noted.</li> <li>-Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted.</li> <li>-Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted.</li> <li>-The term "clasts" herein describes gravel-size rock fragments (larger than 1/4 inch).</li> <li>-Beds are generally massive unless otherwise noted.</li> </ul>		
110								
170								
105								
175								
100								
180								

Geologist: DB/MF  
 Prepared/Date: YN/PK 10/14/2011  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / Tri County / CME 85 / D120		<b>T2E-B2</b>
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 276 feet
						Hollow-Stem Auger / Mud Rotary	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						7/5/11 - 7/7/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 46 feet during drilling and measured at 72 feet after 24-hrs.		
275						 SM Grass Surface <b>FILL [Af]</b> Silty Sand, fine grained, trace medium grained; olive yellow; appears damp to moist; trace roots  At 2.0': Some gravel up to ¾ inch  At 4.0': Fine to medium sand, some coarse sand, some clay, some fine gravel (up to ¼ inch); olive brown to yellow brown; appears moist		
270	5	1	1	30		 ML <b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt with Gravel, fine to medium sand, fine to coarse gravel, 10 to 25%, mainly subangular to angular, shale (Tm), sandstone (Tm) and slate (Jsm), and mafic; very dark grayish brown (2.5Y 3/2); appears moist and dense At 6.5 to 10.0': No recovery		
265	10	1	2	90		 ML Clayey Silt with some sand, fine sand; dark yellowish brown (10YR 3/6); appears moist and very stiff to hard; faint mottling  At 12.7': Becomes Sandy Clay, increasing gravel, mainly subangular slate (Jsm)		
260	15	1	3	50		 SM At 15.0 to 16.4': Sample disturbed, appears wet Silty Sand, some gravel, grades from fine to medium, increasing gravel to 16.0'  Appears wet and dense At 16.4': Becomes Silt At 16.9': Becomes Poorly Graded Sand, fine to medium grained <b>ESTUARINE DEPOSITS (Qe)</b> Clayey Silt; dark grayish brown (10YR 4/2) to strong brown (7.5YR 4/6), appears moist and stiff, trace coarse sand and fine gravel; variable varve-like bedding At 17.5 to 20.0': No recovery		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: LH/MW/MF  
 Prepared/Date: WL/PK 10/14/2011  
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METRO SOIL CORE S:\70131 GEOTECH\GINT\W\Fault\_Investigation\_WSE\_Library\_AMEC OCTOBER2011 (2).GLR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 2E.GPJ 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / Tri County / CME 85 / D120		<b>T2E-B2</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Hollow-Stem Auger / Mud Rotary	See Plate 3	276 feet
						DATES DRILLED	HOLE DIAMETER	
						7/5/11 - 7/7/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 46 feet during drilling and measured at 72 feet after 24-hrs.		
255		2	4	100		<b>Qe Continued</b> Sandy Silt; mottled, dark yellowish brown (10YR 4/6) to strong brown (7.5YR 4/6); appears moist and very stiff; trace gravel; fine, indistinct thin oxidation layering, variable varve-like bedding texture  At 26.5': Color becomes olive (5Y 4/3) to strong brown (7.5YR 4/6), some varve-like bedding  At 28.5 to 30.0': No recovery		
250		2	5	70				
30		2	6	80		<b>Marker Bed M<sub>G</sub></b> - Clayey to Sandy Silt, reddish brown (5YR 4/4); appears moist and hard; 5 to 10% gravel, mainly fine sandstone (Tm) and slate (Jsm); indistinct laminated oxidation; possible weak soil development  <b>Marker M<sub>F</sub></b> At 33.1': Carbonate layer (laminae), trace angular granitic rock up to 1 inch Clay and Silty Clay, variable coarse sand, trace fine gravel, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); mottled brown (7.5YR 4/4) to dark gray (10YR 4/1) to reddish brown (5YR 4/3); variable near horizontal laminae At 34.0 to 35.0': No recovery  At 35.5 to 36.5': Prominant varve-like bedding  At 38.5 to 40.0': No recovery		
245		2	7	70				
240								
40								

(CONTINUED ON FOLLOWING FIGURE)



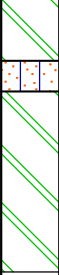
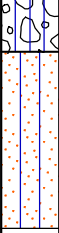
Geologist: LH/MW/MF  
 Prepared/Date: WL/PK 10/14/2011  
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**MTA Westside Subway Extension**  
 Los Angeles, California



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T2E-B2b

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)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / Tri County / CME 85 / D120		<b>T2E-B2</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Hollow-Stem Auger / Mud Rotary	See Plate 3	276 feet
						DATES DRILLED	HOLE DIAMETER	
						7/5/11 - 7/7/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 46 feet during drilling and measured at 72 feet after 24-hrs.		
235		3	8	70		CL/CH	<b>Marker M<sub>F</sub> Continued</b>  At 41.0 to 42.5': Olive brown (2.5Y 4/6) laminae  At 41.5': Increasing gravel to 10%, fine gravel and coarse sand, trace brick-red sandstone  At 42.5 to 47.0': Less mottled, mainly dark brown (7.5YR 3/4)  At 43.5 to 45.0': No recovery  At 46.0': Groundwater encountered during drilling	
45	230	3	9	100			At 50.0 to 53.0': Variable varve-like bedding, less coarse sand and fine gravel  At 51.0' to 51.4': Silty Sand bed, fine grained, lower contact is sharp  At 53.8 to 55.0': No recovery  Lower contact is narrowly gradational  At 55.0 to 55.7': Silty Gravel, silty sand matrix, fine to coarse gravel, mainly subangular to subrounded slate (Jsm), some shale (Tm) and sandstone (Tm) also observed (disturbed sample).	
50	225	3	10	75		SM CL/CH	<b>ESTUARINE DEPOSITS (Qe)</b> Sandy to Clayey Silt, fine grained sand; mottled, yellowish brown (10YR 5/6) to light olive brown (2.5Y 5/4); thin interbeds of clayey sand, varve-like bedding, generally coarsening with depth  At 58.0 to 60.0': No recovery	
225	220	3	11	60		GM ML/SM		
60								

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / Tri County / CME 85 / D120		<b>T2E-B2</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Hollow-Stem Auger / Mud Rotary	See Plate 3	276 feet
						DATES DRILLED	HOLE DIAMETER	
						7/5/11 - 7/7/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 46 feet during drilling and measured at 72 feet after 24-hrs.		
215		4	12	60		<b>Qe Continued</b> At 60.0': Sample appears wet At 60.5' to 60.9': Silty Sand with Gravel bed  At 61.5 to 62.3': Silty Sand with gravelly interbeds, fine to medium; dark brown (10YR 3/3)  Clayey Silt, thinly interbedded with Silty Sand (3 to 6 inch thick beds); silt is olive (5Y 4/4) and sand is dark yellowish brown (10YR 3/6)  At 63.0 to 65.0': No recovery		
210		4	13	50		At 67.5 to 70.0': No recovery		
205		4	14	100		<b>ESTUARINE DEPOSITS - FINE GRAINED (Qef)</b> Clayey Silt with occasional fine silty sand interbeds; silt is olive (5Y 4/4), sand is dark yellowish brown (10YR 3/6) At 72': Groundwater measured after 24 hours		
200		4	15	100		Silty Sand with interbedded Silt to Clay (2 inch thick); olive (5Y 4/3); appears wet and dense/stiff; lower contact is sharp  Silty Clay to Clayey Silt; olive gray (5Y 5/2) with strong brown (7.5YR 4/6) mottling; appears moist and stiff; some calcium carbonate nodules and filaments  At 77.9 to 78.5': Some sand and fine gravel; angular to subangular sandstone (Tm), shale (Tm), and granitics, lower contact is narrowly gradational  At 78.8': Becomes sandy with oxidized mottling		

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / Tri County / CME 85 / D120		<b>T2E-B2</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Hollow-Stem Auger / Mud Rotary	See Plate 3	276 feet
						DATES DRILLED	HOLE DIAMETER	
						7/5/11 - 7/7/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 46 feet during drilling and measured at 72 feet after 24-hrs.		
195		5	16	70	SM	<b>Qef Continued</b> At 80.0 to 81.0': Some coarse gravel, mainly shale (Tm) and slate (Jsm)		
					ML	Clayey Silt, trace coarse sand and fine gravel; indistinct laminae, oxidized lenses; dark yellowish brown (10YR 4/6); appears moist and stiff		
						At 83.0': Calcium carbonate-cemented sand/gravel bed (< 1/2 inch)		
						At 83.5 to 85.0': No recovery		
85								
190		5	17	90	GM/GC	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Silty to Clayey Gravel, clasts mainly shale (Tm), slate (Tsm) and granitic rock, trace brick-red sandstone; color variable; appears very moist, lower contact occurs between runs		
						At 89.5': Concretionary calcium carbonate-cemented sand bed (broken during sampling)		
90					SM	Silty Sand, some clay; olive brown (2.5Y 4/4) with dark yellowish brown (10YR 4/6) mottling; appears very moist and medium dense; trace gravel, mainly slate (Jsm) and shale (Tm), becomes coarser with depth near lower contact, lower contact is sharp		
185		5	18	60	ML	At 92.2': Clayey Silt with trace to some sand		
					SC	At 92.5': Gravel bed (2 inches thick), Clayey Sand below		
						At 93.0' to 95.0': No recovery		
						Depth of contact uncertain due to poor recovery		
95					ML	<b>ESTUARINE DEPOSITS/OLDER ALLUVIAL FAN DEPOSITS [Qe/Qof]</b> Clayey to Sandy Silt; very dark grayish brown (2.5Y 3/2); appears moist and stiff; trace fine gravel and carbonate nodules, trace oxidized fine sand and silt pockets, some faint varve-like bedding		
180		5	19	100				
						<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b>		
100								

(CONTINUED ON FOLLOWING FIGURE)

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MTA Westside Subway Extension  
 Los Angeles, California



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T2E-B2e

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / Tri County / CME 85 / D120		<b>T2E-B2 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Hollow-Stem Auger / Mud Rotary	See Plate 3	276 feet
						DATES DRILLED	HOLE DIAMETER	
						7/5/11 - 7/7/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 46 feet during drilling and measured at 72 feet after 24-hrs.		
175		6	20	100	ML	<b>Qfo Continued</b> Clayey to Sandy Silt; very dark grayish brown (2.5Y 3/2); appears moist and stiff; some coarse sand and fine gravel; mainly subrounded granitic rock and subangular slate (Jsm) and shale (Tm); thickly bedded, poorly sorted  At 104 to 104.3': Discrete clayey laminae At 104': Clayey Silt, trace fine gravel, thinly bedded to laminated, some very fine sand, sandier beds oxidized; lower contact is gradational At 104.2': Thin calcium carbonate bed		
170		6	21	80	SM/ ML	At 105.9': Trace brick-red sandstone <b>ESTUARINE DEPOSITS [Qe]</b> Silty Sand/Sandy Silt, very fine grained; olive (5Y 4/3); appears very moist and dense/stiff  At 107.5': Thinly interbedded (2 inch to 6 inch) Sandy Silt and fine to medium grained Silty Sand		
165		6	22	100				
160		7	24	100		At 111.0 to 112.0': Grades to Clayey to Sandy Silt  At 112.0 to 115.0': No recovery		
155		7	25	80	GP	At 115.0': Alternating beds of Clayey Silt and fine Silty Sand/Sandy Silt, distinct laminae and varve-like bedding  Poorly Graded Gravel; color variable; gray brown; abundant subangular to angular slate (Jsm) and shale (Tm), some subrounded to subangular granitic rock; gravel fine to coarse, up to 1 inch		

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / Tri County / CME 85 / D120		<b>T2E-B2</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Hollow-Stem Auger / Mud Rotary	See Plate 3	276 feet
						DATES DRILLED	HOLE DIAMETER	
						7/5/11 - 7/7/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 46 feet during drilling and measured at 72 feet after 24-hrs.		
155		7	26	100		SM/ML	<b>Qe Continued</b> Silty Sand to Sandy Silt, olive (5Y 4/4), very fine sand, thinly interbedded, well sorted; trace clay	
		7	27	100		ML	At 122.5 to 124.2': Grades to Clayey Silt	
125						SM/ML	At 124.2': Silty Sand and Sandy Silt, thinly interbedded	
150		7	28	100		ML	Clayey Silt, olive gray (5Y 4/2); trace fine gravel (5%), mainly sandstone (Tm), some manganese oxide splotches At 127.5': Gravel increases to 10 to 15%; mainly slate (Jsm), shale (Tm) and sandstone (Tm)	
		7	29	70		ML	At 128.6': Sandy Silt, olive brown (2.5Y 4/4), variable clay, trace gravel, mainly sandstone (Tm) and slate (Jsm); lower contact is gradational	
145		7	30	40		SM	At 130.8': Silty Sand, very fine grained, some silt At 131.0 to 132.5': No recovery	
						ML	At 132.5': Becomes clayey and gravelly, clasts 10% to 50%, mainly slate (Jsm)	
135		7	31	100		ML	<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b> Clayey Silt; dark grayish brown (2.5Y 4/2); trace to some fine to coarse sand, trace fine gravel, indistinct silty to sandy oxidized pockets;	
140						GM	At 136.5': Becomes hard	
		8	32	80		GM		
140		8	33	100		GM	At 139.5 to 139.9': Silty Gravel bed; color variable; fine silty sand matrix; gravel mainly sub-angular slate (Jsm), some shale (Tm) and sandstone (Tm), lower contact is sharp	

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / Tri County / CME 85 / D120		<b>T2E-B2 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Hollow-Stem Auger / Mud Rotary	See Plate 3	276 feet
						DATES DRILLED	HOLE DIAMETER	
						7/5/11 - 7/7/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 46 feet during drilling and measured at 72 feet after 24-hrs.		
135						ML	<b>BASAL ALLUVIAL FAN UNIT [Qfob]</b> Sandy Silt; olive gray (5Y 5/2); variable coarse sand and fine gravel (Jsm and Tm); poorly sorted	
		8	34	100		SM	At 142.3': Grades to Silty Sand; abundant calcium carbonate; pale olive (5Y 6/3)	
145						SM	At 144.3 and 144.8': Silty Sand beds, 2 to 4 inches thick, trace subrounded granitic rock and angular slate (Jsm) and shale (Tm)	
130						ML	At 145.1': Less calcium carbonate, trace to some nodules Clayey to Sandy Silt; olive gray (5Y 5/2); appears moist and stiff, variable coarse sand, thinly bedded	
150		8	35	70		SM	Silty Sand, very fine to fine grained, coarsening downward to fine to coarse with trace gravel; light olive brown (2.5Y 5/4); appears very moist and dense; poorly sorted	
							At 149.5 to 151.0': No recovery	
125						ML/ SM	Clayey to Sandy Silt, trace coarse sand and fine gravel, olive gray (5Y 5/2), indistinct oxidation splotches; thin gradational to irregular bedding, appears very moist and stiff to medium dense	
155		8	36	70			At 154.5 to 156.0': No recovery	
120						ML/ CL	<b>BASAL ESTUARINE UNIT [Qeb]</b> Clayey Silt to Silty Clay; dark grayish olive (10Y 4/2); appears moist and very stiff; trace calcium carbonate nodules	
		9	37	60			At 157.3': Clayey Silt; olive gray (5Y 4/2); some calcium carbonate filaments	
							At 157.5 to 158.5': No recovery	
							At 158.5': Calcium carbonate becomes abundant, vertical veins, possible fracturing	
160		9	38	100			At 159.6': Calcium carbonate becomes less, some filaments, trace nodules	

(CONTINUED ON FOLLOWING FIGURE)


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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T2E-B2h

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / Tri County / CME 85 / D120		<b>T2E-B2</b> (Continued)
		DRILLING METHOD		BOREHOLE LOCATION		DATES DRILLED		GROUND EL.
		Hollow-Stem Auger / Mud Rotary		See Plate 3		7/5/11 - 7/7/11		276 feet
		GROUNDWATER READINGS		Encountered at 46 feet during drilling and measured at 72 feet after 24-hrs.				
115							<b>Qeb Continued</b>	
							END OF BORING AT 161 FEET	
							NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched.  -Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than ¼ inch). -Beds are generally massive unless otherwise noted.	

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling and C&L Drilling / Mayhew 1000		<b>T2E-B3</b>
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 273 feet
						Hollow Stem Auger / Rotary Wash	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						6/3/11 - 6/8/11 and 6/29/11-6/30/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 49 feet during drilling; dry at 196 feet		
						Surface is grass Hand augered to 5 feet <b>FILL [Af]</b> Sandy Silt to Clayey Silt with Gravel  NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed descriptions of clasts		
	5				ML	<b>YOUNGER/OLDER ALLUVIAL FAN DEPOSITS [Qf/Qfo]</b> Clayey Silt, variable fine sand, trace coarse sand and fine gravel (Jsm and Tm); dark brown (7.5YR 3/2); appears very moist and medium stiff; poorly sorted, lower contact is indistinct		
	265	1	1	100	ML CL	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt, trace coarse sand and fine gravel; dark brown (7.5YR 3/4); appears very moist and medium stiff; lower contact is narrowly gradational At 7.4 to 8.7': Silty Clay, variable coarse sand, trace fine gravel (Jsm and Tm); dark brown (10YR 3/3); appears moist to very moist and stiff to very stiff  At 8.7 to 10.0': Grades to Silty Clay/Clayey Silt, variable coarse sand, trace fine gravel (Jsm and Tm); dark yellowish brown (10YR 4/4); appears moist and very stiff  At 10.0 to 13.7': Becomes brown (10YR 4/3) At 10.0 to 12.5': Crumbly/ punky texture		
	260	1	2	100	CL-CH	Clay, rare (<1%) coarse sand (Jsm and Tm); lightly mottled, very dark grayish brown (10YR 3/2) to strong brown (7.5YR 4/6); appears moist and hard; some fine root structures; lower contact is gradational  At 15.0 to 15.7': Increasing silt and sand content, crumbly/punky texture; gradational transition to bed below		
	255	1	3	100	ML	Clayey to Sandy Silt, variable gravel, clasts 5 to 20%, up to ¾ inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); dark grayish brown (10YR 4/2); appears very moist and very stiff; poorly sorted, becomes generally coarser with depth; lower contact is gradational  At 18.8 to 19.0': Grades to Silty Clay		

(CONTINUED ON FOLLOWING FIGURE)

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METRO SOIL CORE S:\70131\_GEOTECH\GINTW\Fault\_Investigation\_WSE\_Library\_AMEC\_October2011\_(2).GLR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL\_FIELD\_NOTES\GINT LOGS\101561-TRANSECT 2E.GPJ 10/14/11  
 THIS RECORD IS AN INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

					DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
					Martini Drilling and C&L Drilling / Mayhew 1000		<b>T2E-B3</b> (Continued)
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	DRILLING METHOD	BOREHOLE LOCATION	
					Hollow Stem Auger / Rotary Wash	See Plate 3	
					DATES DRILLED	HOLE DIAMETER	GROUND EL.
					6/3/11 - 6/8/11 and 6/29/11-6/30/11	8 inches	273 feet
					GROUNDWATER READINGS		
					Encountered at 49 feet during drilling; dry at 196 feet		
					SAMPLE LOC.		
250		2	4	100	SM-SC ML/CL	<b>Qfo Continued</b> At 20.0 to 21.2': Clayey, Silty Sand with Gravel, fine to coarse grained, clasts 20 to 35%, up to 1 inch; mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); some quartzite; color variable, generally yellowish brown (10YR 5/6); appears moist and very stiff; lower contact is gradational <b>ESTUARINE DEPOSITS [Qe]</b> Clayey Silt and Silty Clay, trace to some fine sand, rare (<1%) coarse sand; strongly mottled, gray (10YR 5/1) to strong brown (7.5YR 5/6); appears moist and very stiff; variable varve-like bedding; lower contact is gradational  At 23.5 to 24.3': Laminae defined by variable silt content	
245		2	5	100	ML CL	Sandy to Clayey Silt, trace coarse sand and fine gravel (Jsm and Tm); mottled, dark grayish brown (10YR 4/2) to strong brown (7.5YR 5/6); appears moist and stiff to very stiff; variable, varve-like bedding; lower contact is narrowly gradational  At 28.6 to 30.0': Grades to Silty Clay, trace coarse sand (Jsm and Tm); mottled, grayish brown (2.5Y 5/2) to strong brown (7.5YR 5/8); appears moist and very stiff  At 29.5 to 30.0': Oxidized strong brown (7.5YR 4/6) Sandy Silt laminations	
240		2	6	100	ML	At 33.0 to 35.0': Occasional varve-like Silty Clay interbeds, trace manganese oxide flecks  At 35.2 to 36.8': Increasing silt and sand content, predominantly sandy silt, trace clay, well sorted	
235		3	7	96	CL/ML ML	Silty Clay and Clayey Silt, rare (<1%) coarse sand (Jsm and Tm); dark grayish brown (10YR 4/2); appears very moist and medium stiff; lower contact is sharp  At 37.7 to 39.0': Grades to Clay; appears moist and very stiff to hard	
40					ML	<b>Marker Bed M<sub>E</sub></b> - Clayey Silt, trace coarse sand (Jsm and Tm); mottled reddish brown (5YR 4/4) to dark grayish brown (10YR 4/2); appears very moist and very stiff; possible weak soil development	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling and C&L Drilling / Mayhew 1000		<b>T2E-B3 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Hollow Stem Auger / Rotary Wash	See Plate 3	273 feet
						DATES DRILLED	HOLE DIAMETER	
						6/3/11 - 6/8/11 and 6/29/11-6/30/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 49 feet during drilling; dry at 196 feet		
						ML	<b>Marker Bed M<sub>e</sub> Continued</b> At 40.0 to 41.2': Increasing sand and fine gravel (Jsm and Tm); mottled, dark gray (10YR 4/1) to strong brown (7.5YR 4/6); grades to fan deposits below	
230		3	8	100		GC	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey Gravel, clasts 50 to 60%, up to 1 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm), some granitic rock also observed; varying color; appears very moist and dense; lower contact is gradational At 42.5 to 43.0': Gravel decreases, gradational transition to unit below	
	45					ML	Clayey to Sandy Silt with Gravel, clasts 15-25%, up to ½ inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm), some brick-red sandstone; brown (7.5YR 4/4) with occasional gray (10YR 5/1) mottling; appears moist and very stiff to hard; lower contact is narrowly gradational	
						CL	At 44.5 to 45.3': Grades to Silty Clay; some distinct gray (10YR 5/1) laminations	
						ML	Sandy Silt, trace to some clay; trace coarse sand and fine gravel (Jsm and Tm); strong brown (7.5YR 4/6), occasional gray (10YR 5/1) mottling; appears very moist and stiff; lower contact is narrowly gradational	
225		3	9	100		GM	<b>FLUVIAL DEPOSITS [Qfio]</b> Silty Gravel, clasts 50 to 60%, up to 1½ inch, mainly subangular to subrounded slate (Jsm) shale (Tm) and sandstone (Tm); matrix is fine to coarse silty sand; color variable, generally brown (7.5YR 4/4); appears wet and dense; lower contact is sharp, erosional At 48.3 to 49.1': Alternating beds of Silty Clay and Sandy Silt; brown (7.5YR 4/4); appears very moist to wet and soft to medium stiff; upper and lower contacts are sharp At 49': Groundwater encountered during drilling	
						CL		
						ML		
	50					GM	At 50.0 to 51.2': Grades to Silty Sand with Gravel, fine to coarse grained; clasts 30 to 40%, up to ¾ inch	
						SM		
						GM		
220		4	10	100		SM	Silty Sand with Gravel, fine grained, clasts 15 to 25%, up to ¾ inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); brown (7.5YR 4/3); appears wet and dense; numerous silty clay interbeds as noted below; lower contact is narrowly gradational At 52.2 to 52.5', 52.7 to 52.9', 54.0' to 54.2' and 54.6 to 54.8': Silty Clay interbeds; brown (7.5YR 4/4); appear very moist and medium stiff; generally sharp contacts	
	55							
						CL/ML	<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b> Silty Clay and Clayey Silt, variable fine sand, trace coarse sand; mottled, grayish brown (2.5Y 5/2) to strong brown (7.5YR 4/6); appears moist and very stiff; well sorted; occasional scattered manganese oxide flecks; occasionally grades to sandy silt; lower contact is gradational	
215		4	11	100				
	60							

(CONTINUED ON FOLLOWING FIGURE)

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**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T2E-B3c

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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 2E.GPJ 10/14/11  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling and C&L Drilling / Mayhew 1000		<b>T2E-B3 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Hollow Stem Auger / Rotary Wash	See Plate 3	273 feet
						DATES DRILLED	HOLE DIAMETER	
						6/3/11 - 6/8/11 and 6/29/11-6/30/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 49 feet during drilling; dry at 196 feet		
						CL/ML	<b>Qef Continued</b>	
210		4	12	100		ML	Sandy to Clayey Silt, trace coarse sand (Jsm and Tm); grayish brown (2.5Y 5/2) with occasional strong brown (7.5YR 4/6) mottling; appears moist to very moist and very stiff; occasional scattered manganese oxide flecks; lower contact is gradational	
65						ML	<b>ESTUARINE DEPOSITS (Qe)</b>	
		5	13	100		SM	Sandy to Clayey Silt, trace coarse sand (Jsm and Tm); grayish brown (2.5Y 5/2) with strong brown (7.5YR 4/1) mottling; appears very moist and very stiff; occasional silty sand interbeds as noted below	
205						ML	At 65.9 to 66.1': Silty Sand with Gravel, clasts 20 to 25%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm), and sandstone (Tm)	
						SM	At 67.6 to 67.9': Grades to fine Silty Sand	
						SM	At 68.8 to 68.9': Fine to coarse Silty Sand	
70						CL/ML	Silty Clay and Clayey Silt, rare (<1%) coarse sand (Jsm and Tm); mottled, grayish brown (10YR 5/2) to reddish brown (5YR 4/3) to red (2.5YR 5/6); appears moist to very moist and stiff to very stiff; occasional sandy silt pockets/lenses	
200		5	14	100		ML	At 73.5 to 73.9': Increasing sand, gradational transition to silty sand unit below	
						ML	At 73.9 to 74.7': Sandy Silt, trace coarse sand (Jsm and Tm); dark yellowish brown (10YR 4/4); appears wet and stiff; slightly micaceous	
75						CL/ML	At 75.0 to 76.4': Occasional oxidized, strong brown (7.5YR 5/6) pockets and varve-like bedding	
		5	15	56		CL-CH	Clay, rare (<1%) coarse sand (Jsm and Tm); grayish brown (10YR 5/2) with variable strong brown (7.5YR 4/6) mottling; appears moist and very stiff; prominent varve-like bedding; 5 to 15% manganese oxide flecks and staining; lower contact is sharp	
195						SM	At 77.1 to 77.5': Occasional oxidized reddish brown (5YR 4/4), fine pockets up to 1/4 inch	
							Silty Sand, fine to coarse grained, trace fine gravel (Jsm and Tm); color variable, abundant white/light colored sand grains; appears very moist to wet and dense; occasional 1/4 inch dark gray (10YR 4/1) clay laminations; lower contact occurs between runs	
80							At 77.8' to 80.0': No Recovery	

(CONTINUED ON FOLLOWING FIGURE)

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**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T2E-B3d

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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 2E.GPJ 10/14/11

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling and C&L Drilling / Mayhew 1000		<b>T2E-B3 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Hollow Stem Auger / Rotary Wash	See Plate 3	273 feet
						DATES DRILLED	HOLE DIAMETER	
						6/3/11 - 6/8/11 and 6/29/11-6/30/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 49 feet during drilling; dry at 196 feet		
190		6	16	74	SM	<b>Qe Contined</b> Silty Sand, fine grained, dark yellowish brown (10YR 4/4); appears wet and dense; lower contact is sharp, erosional At 81.0 to 81.6': Grades to fine to coarse Silty Sand		
					CL/CH	Clay, trace coarse sand (Jsm and Tm); dark grayish brown (10YR 4/2); appears very moist to wet and soft to medium stiff; lower contact is narrowly gradational		
					ML	Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); light brownish gray (10YR 6/2); appears very moist to wet and stiff to very stiff		
						At 83.7 to 85.0': No recovery		
85					ML/CL	At 85.0 to 86.5': Clayey Silt and Silty Clay; trace coarse sand; mottled, dark grayish brown (10YR 4/2) to strong brown (7.5YR 4/6); appears moist and very stiff		
					ML	Sandy to Clayey Silt with Gravel, clasts 15 to 25%, up to 1 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm), some brick-red sandstone; appears very moist to wet and very stiff; lower contact is narrowly gradational		
185		6	17	100		At 88.1': one 3 inch slate clast		
					SC/SM	At 88.6 to 90.0': Increasing sand and gravel, grades to Clayey to Silty Sand with Gravel, fine to coarse grained, clasts 30 to 50%, up to 1½ inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm)		
90					ML			
					CL	Silty Clay, variable very fine sand, trace coarse sand and fine gravel (Jsm and Tm); lightly mottled, brown (7.5YR 4/4) to reddish brown (5YR 4/4); appears moist and very stiff to hard; occasional very fine silty sand pockets and laminations		
180		6	18	100	ML/CL	At 92.4 to 95.5': Silty Clay described above alternates with Clayey to Sandy Silt, trace coarse sand (Jsm and Tm); brown (7.5YR 4/4); trace calcium carbonate filaments		
						At 93.1 to 93.5': 10 to 15% calcium carbonate filaments and uncemented nodules up to ¼ inch		
95						At 95.0 to 95.5': Appears wet and soft		
					GW	At 95.5 to 96.4': Well Graded Gravel, clasts 50 to 70%, up to 1½ inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm), some granitic rock and quartzite (Jsm)		
					ML/CL	Clayey Silt and Silty Clay, variable fine sand, trace coarse sand and fine gravel (Jsm and Tm), some brick-red sandstone; brown (7.5YR 4/4); appears very moist and very stiff; lower contact is gradational		
175		7	19	100				
					ML	Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm), some brick-red sandstone; brown (7.5YR 4/4); appears very moist and very stiff to hard; occasional silty clay beds; occasional scattered manganese oxide flecks; lower contact is gradational		
100								

(CONTINUED ON FOLLOWING FIGURE)

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 Prepared/Date: YN/PK 10/14/2011  
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**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T2E-B3e

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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 2E.GPJ 10/14/11

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling and C&L Drilling / Mayhew 1000		<b>T2E-B3 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Hollow Stem Auger / Rotary Wash	See Plate 3	273 feet
						DATES DRILLED	HOLE DIAMETER	
						6/3/11 - 6/8/11 and 6/29/11-6/30/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 49 feet during drilling; dry at 196 feet		
170		7	20	100	ML	<b>Qe Continued</b>  At 100.8 to 102.1': Gravel increases to 10 to 15%, up to ¾ inch  At 103.0 to 103.1': Fine Silty Sand bed		
105					CL	<b>Marker Bed M<sub>p</sub></b> - Silty Clay, trace coarse sand (Jsm and Tm); dark gray (10YR 4/1); appears moist and hard; trace calcium carbonate filaments; coarsens downward; distinct color and texture		
165		7	21	100	CL/ML	At 106.3 to 107.5': Increasing silt and sand content, grades to Silty Clay and Clayey Silt with variable fine sand		
165					ML	Clayey to Sandy Silt; color variable, generally dark gray (10YR 4/1) with strong brown (7.5YR 4/6) mottling; appears moist and hard		
110					SC/SM	At 109.0': Clayey to Silty Sand with Gravel, fine to coarse, clasts 15 to 20%, up to ½ inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); brown (10YR 4/3); appears wet and dense; lower contact is sharp, erosional		
110					CL	Clay and Silty Clay, trace coarse sand (Jsm and Tm); mottled, very dark gray (10YR 3/1) to strong brown (7.5YR 4/4); appears very moist and very stiff to hard; oxidized strong brown sandy silt pockets increase with depth; trace calcium carbonate filaments; lower contact is gradational		
160		8	22	100	ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt; variable fine gravel; clasts 5 to 20%, up to ½ inch; mainly subangular to subrounded silt (Jsm), shale (Tm) and sandstone (Tm); mottled, dark grayish brown (2.5Y 4/2) to strong brown (7.5YR 5/6); appears very moist and very stiff to hard; poorly sorted; lower contact is narrowly gradational		
155					GM	At 116.2 to 116.8': Gravel increases to 40 to 50 %, most up to ¾ inch, some 3 inch shale clasts, mainly subangular shale (Tm) and slate (Jsm)		
155		8	23	100	ML	At 117.2 to 119.1': Color becomes brown (10YR 5/3); occasional manganese oxide-stained zones and laminations, trace calcium carbonate filaments		
120					ML/CL	<b>ESTUARINE DEPOSITS [Qe]</b> Alternating beds of Sandy Silt and Silty Clay; trace coarse sand and fine gravel (Jsm and Tm); mottled, brown (10YR 4/3) to yellowish brown (10YR 5/6) to gray (2.5Y		

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling and C&L Drilling / Mayhew 1000		<b>T2E-B3 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Hollow Stem Auger / Rotary Wash	See Plate 3	273 feet
						DATES DRILLED	HOLE DIAMETER	
						6/3/11 - 6/8/11 and 6/29/11-6/30/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 49 feet during drilling; dry at 196 feet		
						ML/CL	5/1; appears very moist and very stiff; contacts generally sharp	
						SM	At 122.4 to 122.8': Fine Silty Sand bed, varying color	
						ML/CL		
						SM	At 123.8 to 124.1': Fine to coarse Silty Sand with Gravel, varying color	
						ML/CL		
						GM	<b>Marker Bed M<sub>C</sub></b> - Silty Gravel, clasts 60 to 70%, up to 1½ inches; mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); dark brown (10YR 3/3); appears wet and dense; lower contact occurs between runs	
							At 126.3' 130.0': No recovery	
						CL-CH	Clay, mottled, color variable, mainly dark grayish brown (10YR 4/2) to strong brown (7.5YR 4/6); appears moist and hard; variable (1-10%) manganese oxide flecks	
						CL-CH	At 130.5 to 130.9': Faint manganese oxide-rich laminations	
						CL-CH	Clay, trace coarse sand (Jsm and Tm); brown (7.5YR 4/3); appears very moist and very stiff to hard; lower contact is gradational	
							At 130.9 to 131.5': Oxidized yellowish red (5YR 4/6), fine pockets (< ¼ inch)	
						CL-CH	At 133.2': Fine Silty Sand bed, ½ inch thick	
							At 133.5 to 134.3': Interbeds of fine Silty Sand, 1 to 2 inches thick	
						CL-CH	At 135.0 to 137.0': <b>Marker Bed M<sub>B</sub></b> - Clay and Silty Clay, variable fine sand, trace to some coarse sand and fine gravel (Jsm and Tm); dark gray (10YR 4/1); appears moist and very stiff to hard; distinct color and texture; lower contact is narrowly gradational	
							At 137.0 to 138.5': Trace oxidized, strong brown (7.5YR 4/6), fine silt pockets (<¼ inch); color becomes more variable	
						SC/SM	Clayey, Silty Sand with Gravel; fine to coarse grained, clasts 20 to 50%, up to 1 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); brown (10YR 4/3); appears wet and dense; lower contact occurs between runs	

(CONTINUED ON FOLLOWING FIGURE)

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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)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling and C&L Drilling / Mayhew 1000		<b>T2E-B3 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Hollow Stem Auger / Rotary Wash	See Plate 3	273 feet
						DATES DRILLED	HOLE DIAMETER	
						6/3/11 - 6/8/11 and 6/29/11-6/30/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 49 feet during drilling; dry at 196 feet		
130		9	28	80	SC/SM	<b>Qe Continued</b> At 140.0 to 140.2' and 141.3 to 141.4': Silty Clay interbeds  At 141.2 to 141.5': Clay, trace coarse sand and fine gravel (Jsm and Tm); dark gray (10YR 4/1); appears very moist and stiff  At 142.8 to 143.6': Alternating beds of Silty Clay and fine Silty Sand, generally sharp contacts		
145					ML/CL	<b>Marker Bed M<sub>A</sub></b> - Silty Clay and Clayey Silt, trace coarse sand and fine gravel (Jsm and Tm); mottled, very dark grayish brown (10YR 3/2) to strong brown (7.5YR 5/6); appears moist and hard; possible weak soil development; lower contact occurs between runs At 144.0 to 145.0': No recovery		
125		10	29	100	ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt, variable coarse sand and fine gravel, clasts 2 to 20%, up to ¾ inch; mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); mottled, strong brown (7.5YR 4/6) to dark grayish brown (10YR 4/2); appears very moist and very stiff; lower contact is gradational  At 148.3 to 148.5': Gravel increases to 25 to 35%		
150					GW	At 150.0 to 150.5': Well Graded Gravel, clasts 50 to 60%, up to 1 inch; mainly slate (Jsm), some sandstone (Tm) also observed; varying color, generally very dark grayish brown (10YR 3/2); lower contact is sharp, erosional		
120		10	30	98	CL	At 152.0 to 152.3': Grades to Silty Clay; trace manganese oxide flecks At 152.3 to 153.5': Predominately Clayey Silt, gravel decreases to <2%		
155					ML	<b>BASAL ALLUVIAL FAN UNIT/BASAL ESTUARINE UNIT [Qfob/Qeb]</b> Clayey to Sandy Silt, variable coarse sand and fine gravel, clasts 5 to 20%, up to ¾ inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); grayish brown (2.5Y 5/2) with occasional strong brown (7.5YR 5/6) mottling; appears very moist and very stiff; poorly sorted; variable calcium carbonate filaments and uncemented nodules up to ¼ inch, total calcium carbonate 5 to 20%; lower contact is gradational At 155.0 to 157.0': Increasing coarse sand and gravel; abundant calcium carbonate and fine, irregular oxidized pockets  At 157.0 to 158.8': Becomes more strongly mottled, light brownish gray (2.5Y 6/2) to strong brown (7.5YR 4/6)  At 158.8 to 160.6': Fine to coarse Silty Sand; more oxidized, predominantly strong brown (7.5YR 4/6) with some light brownish gray (2.5Y 6/2)		
160		10	31	100				

(CONTINUED ON FOLLOWING FIGURE)

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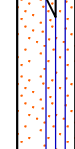
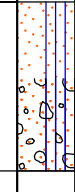
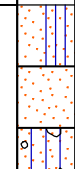
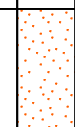

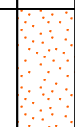
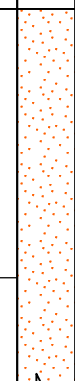
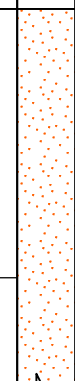
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling and C&L Drilling / Mayhew 1000		<b>T2E-B3 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Hollow Stem Auger / Rotary Wash	See Plate 3	273 feet
						DATES DRILLED	HOLE DIAMETER	
						6/3/11 - 6/8/11 and 6/29/11-6/30/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 49 feet during drilling; dry at 196 feet		
110		11	32	100		ML	<b>Qfob/Qeb Continued</b>	
						SM	Silty Sand, fine to coarse grained, trace fine gravel (Jsm and Tm); color variable, generally yellowish brown (10YR 5/4); appears very moist to wet and dense; lower contact is sharp	
						SM/CL	Alternating beds of Silty Clay and fine Silty Sand, trace coarse sand (Jsm and Tm); mottled, grayish brown (2.5Y 5/2) to strong brown (7.5YR 5/6); appears very moist to wet and stiff/dense; lower contact is sharp, erosional	
165		11	33	100		CL	<b>BASAL ESTUARINE UNIT [Qeb]</b> Silty Clay; strongly mottled, dark gray (5Y 4/1) to dark grayish brown (10YR 4/2) to light gray (5Y 7/1); appears moist to very moist and very stiff to hard; abundant (20 to 50%) dispersed calcium carbonate deposits and irregular nodules up to ½ inch; lower contact is gradational At 164.7 to 165.3': Color is dark greenish gray (10Y 4/1); calcium carbonate less than 5%  At 168.3 to 170.8': Increase oxidation, mottled as above, dark grayish brown dominant color; calcium carbonate occurs mainly as irregular, steeply dipping stringers; trace manganese oxide flecks	
170		11	34	100		CL/CH	At 170.8 to 171.0': Grades to Sandy Silt; brown (10YR 4/3); slightly micaceous Clay and Silty Clay; very dark gray (10YR 3/1) with strong brown (7.5YR 4/4) mottling; appears moist and hard; strong brown mottling occurs mainly as fine, irregular pockets, 5 to 10% calcium filaments and irregular uncemented nodules up to ¼ inch; lower contact is gradational  At 174.8 to 175.6': Increasing sand	
175		12	35	56		SP-SM	<b>SAN PEDRO FORMATION [Qsp]</b> Poorly Graded Sand with Silt; fine to medium grained, dark gray (10YR 4/1); appears wet and dense; lower contact occurs between runs At 175.6 to 175.7': Well cemented bed at top of unit  At 177.0 to 177.8': Grades to fine to medium Silty Sand  At 177.8' to 180.0': No recovery	

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling and C&L Drilling / Mayhew 1000		<b>T2E-B3</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Hollow Stem Auger / Rotary Wash	See Plate 3	273 feet
						DATES DRILLED	HOLE DIAMETER	
						6/3/11 - 6/8/11 and 6/29/11-6/30/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 49 feet during drilling; dry at 196 feet		
90	12	36	40			SP-SM	<b>Qsp Continued</b> At 180.0 to 181.6': Becomes grayish brown (10YR 5/2)  At 181.6 to 182.0': Becomes greenish gray (5GY 5/1) At 182.0' to 185.0': No recovery	
185							At 186.0 to 186.9': Becomes gravelly, clasts 15 to 20%, up to 1/2 inch, mainly subrounded slate (Jsm), one quartzite (Jsm) clast also observed  At 187.0' to 190.0': No recovery	
85	12	37	44				At 190.8 to 191.6': Coarsens downward, grades to fine to medium Poorly Graded Sand, little to no silt  At 191.6 to 192.2': Fine to medium Silty Sand with Gravel; clasts 30 to 40%, up to 1 inch, mainly subrounded slate (Jsm), some quartzite (Jsm) also observed At 192.2' to 195.0': No recovery	
190						SP	Poorly Graded Sand, fine grained, light gray (2.5Y 7/1); appears damp and dense; well sorted At 195.5 to 197.0': Scattered subrounded gravel up to 1 1/2 inches, observed clasts are shale (Tm), sandstone (Tm), quartzite, and porphyritic volcanic rock, no slate observed	
80	12	38	44			SM		
195						SP		
75	12	39	70					
200								

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT Martini Drilling and C&L Drilling / Mayhew 1000	BORING NO. <b>T2E-B3</b> (Continued)
						<b>DRILLING METHOD</b> Hollow Stem Auger / Rotary Wash <b>BOREHOLE LOCATION</b> See Plate 3 <b>DATES DRILLED</b> 6/3/11 - 6/8/11 and 6/29/11-6/30/11 <b>HOLE DIAMETER</b> 8 inches <b>GROUNDWATER READINGS</b> Encountered at 49 feet during drilling; dry at 196 feet <b>GROUND EL.</b> 273 feet	
70						END OF BORING AT 200 FEET  NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched.  -Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than ¼ inch). -Beds are generally massive unless otherwise noted.  Boring redrilled to 210-feet on 6/29/2011. Location of deepened boring offset NW approximately 7 feet from original boring location.	
205							
65							
210							
60							
215							
55							
220							

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2E-B4</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/29/11-6/30/11	8 inches	275 feet
						GROUNDWATER READINGS		
						Encountered at 37 feet during drilling		
						18 inches of asphaltic concrete Hand augered to 5 feet		
						ML	<b>FILL [Af]</b> Sandy Silt to Clayey Silt with Gravel	
							NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed descriptions of clasts	
270	5					ML	At 5.0': 1½ inch thick asphaltic concrete fragment <b>YOUNGER/OLDER ALLUVIAL FAN DEPOSITS [Qf/Qfo]</b> Clayey Silt, some fine sand, trace fine gravel; more clay with depth; very dark grayish brown (10YR 3/2); appears damp to dry and stiff	
		1	1	100		ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Sandy to Clayey Silt, trace fine to coarse sand and gravel, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); dark yellowish brown (10YR 3/4); appears damp and stiff to very stiff	
265	10						At 14.0': Becomes dark yellowish brown (10YR 4/6); variable gravel (5 to 15%)	
		1	2	100			At 14.2 to 14.6': Silty Sand with Gravel, fine to coarse grained sand and gravel, clasts mainly shale (Tm), up to 1 inch	
260	15					SM ML		
		1	3	100			At 18.4 to 19.6': Grades to Clayey Silt, less sand than above, more oxidized	
						SM	At 19.6 to 20.7': Silty Sand, some fine to medium gravel, mainly subangular to	

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2E-B4</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 275 feet
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						6/29/11-6/30/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 37 feet during drilling		
		2	4	96		SM	<b>Qfo Continued</b> subrounded slate (Jsm), shale (Tm) and sandstone (Tm); appears dry and dense	
						GM	Silty Gravel, clasts mainly subangular to angular slate (Jsm), granitic rock, and sandstones (Tm); matrix is fine to coarse silty sand; color is variable; lower contact is sharp	
						ML	Silt to Clayey Silt; brown (10YR 4/3), frequently interbedded with thin, very fine sand beds; coarsening with depth to fine to coarse oxidized sandy layers, bedding appears subhorizontal; appears moist and stiff to medium dense	
250	25					SM	Silty Sand, fine to medium grained, 5% fine gravel, mainly subangular slate (Jsm) and granitic rock; strong brown (7.5YR 4/6); lower contact is sharp, erosional and irregular	
		2	5	100		ML	<b>ESTUARINE DEPOSITS [Qe]</b> Clayey Silt; olive brown (2.5Y 4/4) with oxidized sandy layers; appears moist and stiff; prominent varve-like bedding	
245	30						At 31.4 to 32.9': Becomes thinly bedded to laminated with oxidized sand	
		2	6	100			At 32.9': Sandy beds become interfingering irregular lenses; clayey silt becomes very stiff	
240	35					ML	Clayey to Sandy Silt with variable fine sand; some mottling and laminations, dark yellowish brown (10YR 4/4) and olive gray (5Y 4/2); occasional very fine grained silt, sand beds/zones; appears moist and firm; lower contact is sharp	
		3	7	100			▽ At 37.0': Groundwater encountered during drilling	
						SM	Silty Sand, very fine to fine grained; dark yellowish brown (10YR 4/4); appears very moist	

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2E-B4 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/29/11-6/30/11	8 inches	275 feet
						GROUNDWATER READINGS		
						Encountered at 37 feet during drilling		
						SM	<b>Qe Continued</b>	
							At 40.6 to 41.0': Silty and becomes fine to coarse, 5% fine gravel, angular to subangular; appears very moist to wet and dense	
							At 41.0 to 41.1': Becomes more silty and fine grained	
		3	8	100		ML	Clayey Silt; olive brown (2.5Y 4/4); appears wet, trace fine sand, scattered oxidized nodules, trace manganese oxidized flecks	
						SM	Silty Sand bed, fine to coarse grained, some gravel (5 to 10%), similar to above; lower contact is sharp, subhorizontal	
							At 43.6 to 44.4': Grades to silt, light olive brown (2.5Y 5/4) to sand; lower contact is sharp, irregular and erosional	
230	45					ML	Silt, similar to above, clayey near upper contact and coarser downward to sandy, trace gravel, mainly shale (Tm)	
		3	9	100		ML	Clayey Silt; olive brown (2.5Y 4/4); appears wet; trace fine sand, scattered oxidized nodules, trace manganese flecks, lower contact is sharp and irregular	
						SM	Silty Sand, very fine to medium grained; mottled, olive brown (2.5Y 4/4) to dark yellowish brown (10YR 4/4); lower contact is irregular and erosional	
		4	10	100		CL	Silty Clay; very dark brown (7.5YR 2.5/3), mottled dark brown (7.5YR 3/3) oxidation within very fine silty sand/sandy silt pockets; lower contact is gradational	
						ML	Sandy to Clayey Silt; mottled, dark grayish brown (2.5Y 4/2) with more oxidized dark yellowish brown (10YR 3/4); coarsening with depth to fine silty sand, trace to some clay; lower contact is gradational	
225	50						Color becomes dark yellowish brown (10YR 3/4)	
		4	11	100		SM/ML	Silty Sand/Sandy Silt, very fine grained, variable clay, trace coarse sand and gravel (Jsm and Tm); dark yellowish brown (10YR 4/4 - 3/4); appears wet and dense; generally well sorted, gradational variation of silt and clay within the bed	
220	55							
60								

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2E-B4 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/29/11-6/30/11	8 inches	275 feet
						GROUNDWATER READINGS		
						Encountered at 37 feet during drilling		
210	65	4	12	100	SM	<b>Qe Continued</b> At 60.0 to 67.0': As above, sandy silt more common, less very fine silty sand  At 63.3': Silty Clay bed, (1 inch thick); dark yellowish brown (10YR 4/4); appears to dip approximately 25 degrees; contacts are sharp		
		4	13	100	ML	Silt with interbeds varying from sand to clayey silt (approximately 2 to 4 inches thick); light olive brown (2.5Y 5/4); varve like bedding		
205	70				SP-SM	Poorly Graded Sand with Silt, fine grained, coarsening downward to fine to medium, trace coarse gravel (up to 1½ inches) at upper contact; dark yellowish brown (10YR 4/4)		
		5	14	48	GP	<b>OLDER ALLUVIAL FAN/ESTUARINE DEPOSITS [Qfo/Qe]</b> Poorly Graded Gravel, clasts mainly subangular slate (Jsm), some shale (Tm), and others; fine to coarse grained At 72.4 to 75.0': No recovery		
200	75				SC	Clayey to Sandy Silt; olive (5Y 5/4); appears very moist and dense; thin to laminated oxidation; clayey to silty sand interbedding		
		5	15	100	ML	At 77.0 to 80.0': Grades to Sandy Silt with prominent laminations and varve-like bedding		

(CONTINUED ON FOLLOWING FIGURE)

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 Checked/Date: MW/MF 10/14/2011

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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 2E.GPJ 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2E-B4</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/29/11-6/30/11	8 inches	275 feet
						GROUNDWATER READINGS		
						Encountered at 37 feet during drilling		
190	85	6	16	80		<b>Qfo/Qe continued</b> At 80.0 to 80.6': Poorly Graded Sand with Silt, very fine grained; dark yellowish brown (10YR 4/4); appears wet and dense At 80.6 to 81.4': Poorly Graded Sand with Gravel, fine to medium grained; appears wet; clasts mainly angular to subangular slate (Jsm) and granitic rock with some shale (Tm) and other At 81.4 to 82.6': Sand becomes fine to coarse; lower contact is sharp  Sandy Silt, very fine sand, variable clay; thin to laminated oxidation bedding; yellowish brown (10YR 5/6) to light olive brown (2.5Y 5/3); appears wet and stiff; lower contact is narrowly gradational  At 84.0 to 85.0': No recovery  At 85.3 to 85.9': Silty Sand, fine grained		
		6	17	86		Well Graded Gravel, fine to coarse grained, angular to subangular, slate (Jsm), some sandstone (Tm) and shale (Tm); matrix is fine to coarse well graded sand; color is variable; lower contact is sharp, approximate dip 10 to 15 degrees		
185	90	6	18	92		<b>ESTUARINE DEPOSITS [Qe]</b> Sandy Silt, very fine grained; trace clay, clay increasing with depth, grades to clayey silt; olive (5Y 4/3); appears very moist and stiff; variable laminations and varve-like bedding  At 93.2 to 94.0': Fine Silty Sand interbeds		
180	95	7	19	100		At 95.7': Thin carbonate Sand beds, (1/4 inch thick) Interbedded Clayey Silt and Sandy Silt some Sandy Clay; olive gray (5Y 4/2); appears very moist and stiff; typical bed thickness 1 inch  At 97.7': Carbonates-rich clayey layer, (1 inch thick)  At 98.2': Carbonate-rich sandy layer, (1 1/2 inches thick) Silty Clay; olive gray (5Y 4/2) to strong brown (7.5YR 4/6); appears moist and very stiff; trace (2% to 5%) carbonate nodules, silty oxidized lenses create mottled coloring		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MW/MF  
 Prepared/Date: MW/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T2E-B4e



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)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2E-B4 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Hollow Stem Auger	See Plate 3	275 feet
						DATES DRILLED	HOLE DIAMETER	
						6/29/11-6/30/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 37 feet during drilling		
		7	20	100		CL ML	<b>Qe Continued</b> At 100.6 to 103.8': Becomes less clayey with depth, grades to Clayey Silt, lower contact is gradational	
170	105					ML	At 103.8': Gravelly bed (1 inch thick) Clayey Silt with Sand, some fine to medium grained, trace gravel (up to 3 inches), mainly subrounded shale (Tm), granitic rock and some slate (Jsm)	
						SM	At 105.0 to 105.9': Silty Sand, some gravel	
		7	21	100		ML	At 105.9 to 107.6': Less gravel, grades from Silty Sand to Sandy Silt	
						SP	At 107.6 to 108.0': Poorly Graded Sand, fine to medium grained, some fine gravel, mainly subangular slate (Jsm) and shale (Tm); dark yellowish brown (10YR 4/4)	
165	110					SM/ ML	Silty Sand, very fine grained, to Sandy Silt, variable clay; dark yellowish brown (10YR 4/6); appears moist and dense to stiff; generally well sorted; lower contact is gradational	
		8	22	100		SM	At 111.4 to 113.1': Coarsens to fine to medium Silty Sand, trace gravel (up to 2½ inches)	
160	115					SM/ ML		
		8	23	100				
	120							

(CONTINUED ON FOLLOWING FIGURE)

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 Prepared/Date: MW/PK 10/14/2011  
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METRO SOIL CORE S:\70131 GEOTECH\GINTW\Fault\_Investigation\_WSE\_Library\_AMEC OCTOBER2011 (2).GIR  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2E-B4</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/29/11-6/30/11	8 inches	275 feet
						GROUNDWATER READINGS		
						Encountered at 37 feet during drilling		
		8	24	100		<b>Qe Continued</b> At 120.0 to 121.3': Becomes olive brown (2.5Y 4/4)		
						At 121.3 to 123.3': Grades to Clayey Silt, appears moist and stiff		
						At 123.3': Grades to Sandy Silt, sand is fine grained		
150	125					<b>Marker Bed M<sub>p</sub></b> - Clayey Silt, very dark grayish brown (10YR 3/2) with strong brown (7.5YR 4/6) mottling; appears moist and stiff; distinct color and texture		
		9	25	100		Sandy Silt with variable clay, sand is fine grained, trace coarse sand and gravel; dark yellowish brown (10YR 4/4); appears moist and stiff; generally well sorted		
						At 128.9': Irregular bed (4 inches thick) with calcium carbonate gravel and angular granitic gravel (up to 1 inch)		
145	130					At 130.6 to 131.6': Silt with abundant fine gravels, possibly shearing, trace to some coarse sands, shears appear to dip 50 degrees		
		9	26	100		At 133.0 to 133.6': Faint varve-like bedding At 133.6 to 134.0' and 134.3 to 134.5': Fine to coarse silty sand beds with gravel, contact at 134.5' is erosional		
140	135					Clayey Silt, trace coarse sand and gravel; dark yellowish brown, appears moist and stiff At 135.0 to 136.0' and 139.0 to 140.0': Varve-like bedding		
		9	27	100		At 137 to 138.3': Soft zone, possible shearing; appears moist to very moist		

(CONTINUED ON FOLLOWING FIGURE)

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T2E-B4g

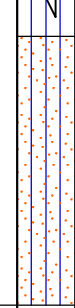
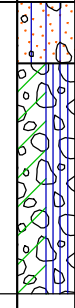
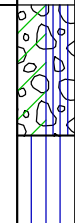
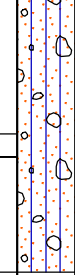
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2E-B4</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/29/11-6/30/11	8 inches	275 feet
						GROUNDWATER READINGS		
						Encountered at 37 feet during drilling		
130	145	10	28	86		<p><b>Marker Bed M<sub>c</sub></b> Silty Gravel, clasts mainly subangular slate (Jsm), up to 1 inch, matrix is fine to coarse silt, sand; color is variable (poor sample recovery)</p> <p>Silt, thinly bedded Clayey to Sandy, trace gravel, mainly shale (Tm) and slate (Jsm)</p> <p>At 143.2 to 143.8': Thin Gravel and Poorly Graded Sand interbeds; fine sand, fine to coarse gravel</p> <p>At 144.3 to 146.4': Thin Gravel and Poorly Graded Sand interbeds, fine to coarse sand and gravel; gravel up to 1½ inches; mainly shale (Tm), sandstone (Tm), slate (Jsm) and granitic rock</p>		
125	150	10	29	70		<p>Silty Clay, laminated to thinly bedded; olive (5Y 5/3); appears damp; lower contact is sharp, appears to dip in 15 degrees</p> <p>At 148.3': Fine to medium, Poorly Graded Sand bed (3 inches thick)</p> <p>At 148.3 to 150.0': No recovery</p>		
120	155	10	30	60		<p>At 150.4 to 150.6': Silty Gravel bed, gravel up to 2 inches</p> <p><b>Marker Bed M<sub>B</sub></b> - Sandy Clay, trace to some fine gravel, clasts 5 to 20%, up to ½ inch; trace brick-red sandstone, mainly angular to subangular sandstone (Tm), granitic rock and slate (Tsm); dark olive gray (5Y 3/2); coarsening downward; distinct color and texture</p> <p>At 152.3': Gravel bed (similar to above)</p> <p>Silty Clay to Clayey Silt, trace coarse sand and fine gravel (Jsm and Tm); olive (5Y 4/3); appears moist and stiff</p> <p>At 152.9 to 155.0': No recovery</p>		
115	160	11	31	60		<p>At 157.0 to 157.9': Silty Sand, fine grained; olive brown (2.5Y 4/6); becomes gravelly</p> <p>At 157.9 to 161.2': Gravel bed, angular to subangular slate (Tsm), granitics and mafic, fine to coarse (up to 1 inch)</p> <p>At 158.2 to 158.8': Clayey Silt, coarsening to Clayey fine Sand</p> <p>At 158.8': Clayey Silt; dark grayish brown (2.5Y 4/2); trace gravel; mainly shale (Tm) and sandstone (Tm); faint varve-like bedding</p>		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MW/MF  
 Prepared/Date: MW/PK 10/14/2011  
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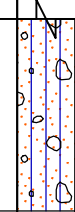

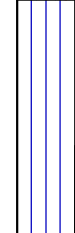
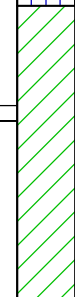

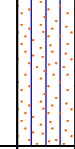
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2E-B4 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 275 feet
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						6/29/11-6/30/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 37 feet during drilling		
110	165	11	32	80		ML	<p><b>Qe Continued</b></p> <p>At 160.5': Becomes Sandy</p> <p>At 161.9 to 162.1': Sandy Gravel bed, fine to coarse grained, mainly subangular slate (Jsm), clayey silt matrix</p> <p>At 162.1 to 164.1': Silt, thinly bedded to laminated with clayey and sandy layers, olive brown (2.5Y 4/4); appears moist and stiff, trace brick-red sandstone (Tm) and slate (Jsm)</p> <p>At 164.0 to 165.0': No recovery</p>	
105	170	11	33	76		GM-GC	<p><b>FLUVIAL DEPOSISTS [Qfofl]</b></p> <p>Clayey, Silty Gravel, clasts 50 to 70%, up to 1½ inches, mainly subangular to angular shale (Tm) and slate (Jsm), trace brick-red sandstone; matrix is variable, generally fine to coarse clayey or silty sand, occasional clayey silt; color is variable; appears moist and dense</p> <p>At 168.8 to 170.0': No recovery</p>	
100	175	12	34	94		ML	<p>At 171.7 to 172.9': Silt; laminated with clayey to very fine sandy beds</p>	
						SM	<p>Silty Sand with Gravel, fine to coarse grained, clasts 15 to 50%, up to 1 inch, mainly angular to subangular shale (Tm) and slate (Jsm)</p> <p>At 176.5 to 180.0': No recovery</p>	
180		12	35	30				

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2E-B4 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 275 feet
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						6/29/11-6/30/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 37 feet during drilling		
		12	36	50		SM	<b>Qfofl Continued</b>	
							At 182.5 to 185.0': No recovery	
90	185					SM	At 185.0 to 185.4': Silty Sand, fine to medium grained; olive (5Y 4/3)	
		13	37	96		ML	<b>BASAL ESTUARINE UNIT [Qeb]</b> Clayey Silt; dark olive gray (5Y 3/2); appears moist and stiff, trace pockets of oxidized silt and very fine sand, some clay laminations	
							At 187.3 to 188.5': Laminae become wavy At 187.3 to 188.5': Very fine Silty Sand laminae, calcium carbonate rich; olive (5Y 4/3); lower contact is sharp	
85	190					CL	Clayey to Silty Clay; olive gray (5Y 4/2); some calcium carbonate filaments and fine oxidized pockets; appears moist and stiff	
		13	38	100		ML	Sandy Silt with some Clay; calcium carbonate infill, irregular near- verticle veins, dark olive gray (5Y 3/2); appears moist and stiff	
							At 190.6 to 192.4': Color becomes dark olive gray (5Y 3/2)	
80	195					ML	At 195.0 to 200.0': No recovery	
		13	39	0				

(CONTINUED ON FOLLOWING FIGURE)

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						Martini Drilling / CME 75		<b>T2E-B4</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/29/11-6/30/11	8 inches	275 feet
						GROUNDWATER READINGS		
						Encountered at 37 feet during drilling		
						END OF BORING AT 200 FEET		
						NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched.  -Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than ¼ inch). -Beds are generally massive unless otherwise noted.		
70	205							
65	210							
60	215							
220								

Geologist: ME/MW/MF  
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						Martini Drilling / CME 75		<b>T2E-B5</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						7/5/11 - 7/7/11	8 inches	270 feet
						GROUNDWATER READINGS		
						Measured at 92.5 feet after 15 hours		
						Asphaltic concrete Hand augered to 5 feet		
					SM	<b>FILL [Af]</b> Silty Sand, fine to medium grained; appears moist		
						NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed descriptions of clasts		
265	5					ML	<b>YOUNGER/OLDER ALLUVIAL FAN DEPOSITS [Qf/Qfo]</b> Clayey Silt, trace sand and gravel; very dark grayish brown (10YR 3/2); appears dry and hard; lower contact is gradational	
		1	1	100				
260	10					SM	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Silty Sand, fine to medium grained, trace fine gravel; dark yellowish brown (10YR 4/6); appears dry and dense; poorly sorted; lower contact is narrowly gradational At 10.0 to 12.1': Trace gravel, coarsens up to 1 inch, mainly angular to subangular, slate (Jsm) and shale (Tm)	
		1	2	88				
255	15					ML	Clayey Silt with Sand, fine to coarse grained; dark yellowish brown (10YR 4/4); appears dry and hard; poorly sorted	
		1	3	100				
							Clayey Silt, trace coarse sand and gravel (Jsm and Tm); dark yellowish brown (10YR 4/4); appears dry to damp and hard; poorly sorted; lower contact is gradational	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: AR/MW/MF  
 Prepared/Date: WL/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011

METRO SOIL CORE S:\70131\_GEO\GINT\W\F\AULT\_INVESTIGATION\_WSE\_LIBRARY\_AMEC\_OCTOBER2011\_(2).GLR  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2E-B5 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 270 feet
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						7/5/11 - 7/7/11	8 inches	
						GROUNDWATER READINGS		
						Measured at 92.5 feet after 15 hours		
		2	4	100		ML	<b>Qfo continued</b>	
						SM	Silty Sand, fine grained, trace clay, trace coarse sand and fine gravel; dark yellowish brown (10YR 4/4); appears dry and dense; poorly sorted	
							At 21.8 to 22.5': Gravel increases to 15 to 30%, mainly sandstone (Tm), slate (Jsm), granitic rock, and others; poorly sorted	
						ML	Clayey Silt with some fine sand; trace coarse sand and fine gravel (Jsm and Tm)	
						SM	At 24.3 to 25.0': Silty Sand, fine grained, trace gravel; appears dry and dense	
245	25					ML	Sandy Silt, very fine grained, trace clay; light olive brown (2.5Y 5/6); appears damp and stiff	
		2	5	100		ML	At 26.9 to 27.3': Gravelly bed, fine to coarse grained, mainly subangular shale (Tm), granitic rock, and others	
						ML/SP	At 27.3 to 29.2': Silt becomes thickly interbedded with very fine sand, sandy beds are oxidized	
						GP	At 29.2 to 29.7': Gravelly bed, fine to coarse grained rock, mainly subangular granitic rock, lesser slate (Jsm), and shale (Tm)	
240	30					ML	<b>ESTUARINE DEPOSITS [Qe]</b> Interbedded Clayey Silt and Sandy Silt; dark reddish brown (5YR 3/4); appears damp and stiff	
		2	6	100		ML/SM	Interbedded Clayey Silt and Silty Sand, thinly bedded to laminated, some varve-like bedding; sandy layers more oxidized, dark yellowish brown (10YR 3/4), clayey silt is olive gray (5Y4/3); appears damp and stiff; lower contact is sharp	
							At 34.3 to 35.0': Some varve-like bedding	
							At 35.0': Appears moist	
235	35							
		3	7	100		SP	At 37.7 to 38.6': Poorly Graded Sand with gravel bed, fine to medium sand and gravel	
							Clayey Silt, thickly bedded, some interfingering sandy lenses; mottled dark grayish brown (10YR 4/2) to brown (7.5YR 4/4); appears moist and stiff; lower contact is narrowly gradational	
40								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: AR/MW/MF  
 Prepared/Date: WL/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T2E-B5b



METRO SOIL CORE S:\70131 GEOTECH\GINTW\Fault\_Investigation\_WSE\_Library\_AMEC OCTOBER2011 (2).GIR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 2E.GPJ 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2E-B5</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						7/5/11 - 7/7/11	8 inches	270 feet
						GROUNDWATER READINGS		
						Measured at 92.5 feet after 15 hours		
						ML	<b>Qe continued</b> At 40.5 - 42.2': Trace manganese flecks	
		3	8	100		SC/ CL	Clayey Sand and Sandy Clay; color is variable; appears moist and stiff; lower contact is sharp	
225	45					ML	Clayey Silt; olive (5Y 4/3) spotted to blotchy oxidation; appears moist and stiff	
						SM	Silty Sand, fine grained; dark yellowish brown (10YR 3/4); appears moist and dense	
		3	9	93		SP	At 47.2 to 48.1': Fine to medium grained, Poorly Graded Sand with some thin Gravel beds; lower contact is sharp	
						ML	Clayey Silt, some lenses of silty very fine sand; dark yellowish brown (10YR 4/4); appears moist and stiff	
220	50						At 50.0 to 51.2': Becomes olive (5Y 4/3) with strong brown (7.5YR 4/6) mottling; trace fine gravel	
		4	10	100			Clayey to Sandy Silt, some very fine to fine grained silty sand thinly interbedded; trace manganese flecks; oxidized splotchy color, olive brown (2.5Y 4/3) to strong brown (7.5YR 4/6)	
215	55						At 57.2 to 58.0': Color becomes very dark grayish brown (10YR 3/2)	
		4	11	100			At 58.0 to 59.5': Color becomes light olive brown (2.5Y 5/4) with yellowish brown (10YR 5/6) mottling; increase coarse sand and fine gravel	
60								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: AR/MW/MF  
 Prepared/Date: WL/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011

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



**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T2E-B5c

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)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2E-B5 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						7/5/11 - 7/7/11	8 inches	270 feet
						GROUNDWATER READINGS		
						Measured at 92.5 feet after 15 hours		
		4	12	100		ML	At 59.5 to 61.3': Grades to Clayey to Silty Silt with some fine gravel (5-10%); dark brown (10YR 3/3); appears damp and hard <b>Qe continued</b>	
						SM/ML	Silty Sand and Silty Silt, fine grained, trace fine to coarse gravel (Jsm and Tm); dark yellowish brown (10YR 3/6); appears moist and dense/stiff; lower contact is narrowly gradational	
						ML	Clayey Silt; olive brown (2.5Y 4/6); appears moist and stiff	
205	65					SM	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Silty Sand, very fine grained, some gravel increasing with depth; color variable; appears moist and dense	
						GM	At 65.6 to 66.3': Silty Gravel bed, clasts mainly angular slate (Jsm) and subangular granitic rock, up to 1 1/2 inches	
						SP	At 66.3 to 66.8': Poorly Graded Sand, some gravel, up to 1 inch	
		5	13	100		ML	At 66.8': Clayey Silt with some fine sand, trace gravel; olive brown (2.5Y 4/3); appears moist and stiff	
200	70					SM	Silty Sand with Gravel, clasts mainly subangular to subrounded slate (Jsm) and granitic rock, up to 2 inches	
						SM	Silty Sand, very fine grained, trace fine gravel; yellowish brown (10YR 5/4)	
		5	14	85		GM	Silty Gravel, clasts up to 1 1/2 inches, matrix is fine to coarse silty sand; color is variable	
195	75						At 75.0 - 80.0': No recovery	
		5	15	0				
80								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: AR/MW/MF  
 Prepared/Date: WL/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011

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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL\_FIELD\_NOTES\GINT LOGS\101561-TRANSECT 2E.GPJ 10/14/11

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2E-B5 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						7/5/11 - 7/7/11	8 inches	270 feet
						GROUNDWATER READINGS		
						Measured at 92.5 feet after 15 hours		
185	85	6	16	86	CL	<b>ESTUARINE DEPOSITS [Qe]</b> Clay; olive (5Y 4/3), indistinct oxidized thin silty interfingering; lower contact is narrowly gradational		
					ML	Sandy Silt, fine grained, some clay; olive (5Y 4/3) with splotchy oxidation; well sorted; becomes sandier with depth		
					SM	At 83.0 to 84.0': Grades to fine Silty Sand		
					GM	Silty Gravel, clasts mainly angular slate (Jsm) and subrounded shale and sandstone (Tm); color variable; lower contact is narrowly gradational		
					SM	Silty Sand, very fine grained, thinly interbedded with fine to medium sand, trace to some gravel; dark yellowish brown (10YR 4/4); appears moist and dense		
		6	17	75	CL	Clay, thinly interbedded sandy clay and clayey silt; indistinct varve-like bedding; generally olive (5Y 4/3); sandier beds are oxidized		
					SM	Sandy Silt, variable clay; olive (5Y 4/3) with strong brown (7.5YR 4/6) mottling; appears moist and dense; prominent varve-like bedding At 88.5 to 90.0': No recovery		
180	90				CL/ML	Clayey Silt to Silty Clay, trace gravel; mottled, dark yellowish brown (10YR 4/6) and strong brown (7.5YR 4/6)		
					SM/SC	Clayey, Silty Sand with Gravel, clasts up to 1 inch, mainly angular slate (Jsm) and shale (Tm)		
		6	18	85	GM	At 92.1': Silty Gravel, clasts up to 3 inches; mainly subrounded granitic rock; matrix is fine to coarse silty sand At 92.5': Groundwater measured after 15 hours		
					SP	Silty Sand, very fine; dark yellowish brown (10YR 4/6) to dark grayish brown (10YR 4/2); appears very moist; fine to medium sand, fine gravel 1 to 2%; well sorted		
175	95				SP/SM	At 95.0 to 97.0': Grades to fine to medium, Poorly Graded Sand with Silt		
		7	19	40		At 97.0 to 100.0': No recovery		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: AR/MW/MF  
 Prepared/Date: WL/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T2E-B5e

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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL\_FIELD\_NOTES\GINT\_LOGS\101561-TRANSECT 2E.GPJ 10/14/11  
 THIS RECORD IS AN INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2E-B5 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 270 feet
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						7/5/11 - 7/7/11	8 inches	
						GROUNDWATER READINGS		
						Measured at 92.5 feet after 15 hours		
165	105	7	20	60		<p><b>Qe Continued</b>            At 100.0': Silt, interfingering thin lenses of very fine sand and clay beds; olive gray (5Y 5/2) to olive (5Y 5/3); appears moist and stiff; micaceous            At 100.8 to 102.0': Prominent varve-like bedding</p> <p>At 102.0 to 102.6': Silty Clay bed; very dark grayish brown (2.5Y 3/2); appears moist and very stiff to hard            At 102.6 to 103.0': Grades to Silty Sand, very fine to fine grained, trace coarse sand and fine gravel; well oxidized; dark yellowish brown (10YR 4/6); thinly bedded            At 103.0 to 105.0': No recovery</p>		
165	105	7	21	76		<p><b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b>            Clayey Silt; dark gray (5Y 4/1); appears moist and stiff; trace calcium carbonate filaments            At 105.0 to 106.2': Calcium carbonate increases to 15 to 20%</p> <p>At 106.9 to 108.8': Thin interfingering very fine sand lenses; mottled yellowish brown (10YR 5/8) to olive gray (5Y 5/2); trace calcium carbonate nodules</p> <p>At 108.8 to 110.0': No recovery</p>		
160	110	8	22	100		<p>Silty Clay and Clayey Silt; very dark grayish brown (10YR 3/2) with strong brown (7.5YR 4/6) mottling; appears very moist and stiff; prominent varve-like bedding; some oxidized sand-silt pockets; trace calcium carbonate nodules and manganese flecks</p> <p>At 114.0 to 116.2': Becomes blotchy with oxidized fine sandy pockets</p>		
155	115	8	23	93		<p><b>ESTUARINE DEPOSITS [Qe]</b>            Silty Sand and Sandy Silt, variable clay, trace to some gravel, up to 1.5-inch, mainly shale (Tm) and sandstone (Tm); dark yellowish brown (10YR 4/4)            At 117.0': Silty Sand, fine grained, trace gravel up to 1 inch; dark brown (10YR 3/3)</p> <p>At 118.6': Gravelly bed (1 inch thick); similar make-up as above</p> <p>Clayey Silt, trace gravel, variable fine sand; dark yellowish brown (10YR 3/4); well sorted</p>		
120						Geologist: AR/MW/MF Prepared/Date: WL/PK 10/14/2011 Checked/Date: MW/MF 10/14/2011		

(CONTINUED ON FOLLOWING FIGURE)

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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL\_FIELD\_NOTES\GINT\_LOGS\101561-TRANSECT 2E.GPJ 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2E-B5</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						7/5/11 - 7/7/11	8 inches	270 feet
						GROUNDWATER READINGS		
						Measured at 92.5 feet after 15 hours		
		8	24	100	ML	<b>Qe Continued</b>		
					GP	At 122.4 to 123.2': Gravel layer composed almost entirely of shale (Tm)		
					ML	Sandy Silt, fine grained, trace to some clay, trace fine gravel; dark yellowish brown (10YR 4/4); appears moist and stiff; generally massive; well sorted		
145	125							
		9	25	93				
140	130				ML	Silt, fine sand lenses, some clay; dark yellowish brown (10YR 3/4); lower contact is sharp		
		10	26	91		At 130.9': Clayey Silt, trace fine gravel; very dark grayish brown (2.5Y 3/2); appears moist and very stiff; trace fine calcium carbonate nodules; generally massive; well sorted		
					SP	At 134.0': Silty Sand, fine to coarse grained, some fine gravel; dark grayish brown (2.5Y 4/2); appears moist and dense		
135	135					At 135.0 to 136.3': Becomes fine grained		
		10	27	100	ML	Clayey Silt; olive brown (2.5Y 4/3); appears moist and hard		
						At 138.2 to 139.0': Becomes very dark brown (7.5YR 2.5/3); oxidation splotches		
						<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt variable gravel, (5 to 15%), mainly sandstone (Tm) and slate (Jsm), trace brick red sand stone; color variable; appears moist and hard; poorly sorted		
140								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: AR/MW/MF  
 Prepared/Date: WL/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011

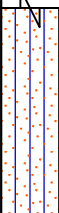
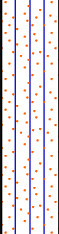


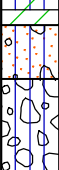
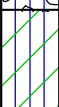
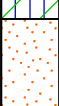


**MTA Westside Subway Extension**  
 Los Angeles, California



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T2E-B5g

METRO SOIL CORE S:\70131\_GEOTECH\GINTW\Fault\_Investigation\_WSE\_Library\_AMEC\_October2011\_(2).GLR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL\_FIELD\_NOTES\GINT LOGS\101561-TRANSECT 2E.GPJ 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2E-B5 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						7/5/11 - 7/7/11	8 inches	270 feet
						GROUNDWATER READINGS		
						Measured at 92.5 feet after 15 hours		
		10	28	100		ML	<b>Qfo Continued</b>	
							At 141.7 to 142.4': Fracture infilled with calcium carbonate	
125	145						At 145.0 to 148.1': Becomes mottled dark yellowish brown (10YR 4/4) to olive gray (5Y 4/2); gravel decreases to trace	
		11	29	62		ML	At 148.1 to 150.0': No recovery	
							At 150.0 to 150.6': Clay; dark brown (10YR 3/3); appears moist and stiff	
120	150					ML	At 150.6 to 151.3': Becomes Clayey Silt with some sand	
						SM	At 151.3 to 151.5': Clay bed	
		11	30	97		GM	At 151.5 to 152.2': Silty Sand, grades to Silty Sand with Gravel	
						ML	Silty Gravel, clasts mainly subangular slate (Jsm) and shale (Tm), up to 1 inch; color variable; matrix is fine to coarse silty sand; lower contact is sharp	
						ML	Clayey Silt becomes sandier with depth; color variable; appears moist and hard; faint varve-like bedding	
115	155					SP	Poorly Graded Sand with Silt; appears wet; (disturbed sample)	
		11	31	38		SP	At 156.8': Becomes gravelly, clasts mainly granitic rock, shale (Tm), and slate (Jsm); some calcium carbonate nodules	
							At 156.9 to 160.0': No recovery	
	160							

(CONTINUED ON FOLLOWING FIGURE)

Geologist: AR/MW/MF  
 Prepared/Date: WL/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011

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



**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T2E-B5h

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)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2E-B5 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 270 feet
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						7/5/11 - 7/7/11	8 inches	
						GROUNDWATER READINGS		
						Measured at 92.5 feet after 15 hours		
105	165	12	32	100	ML	<b>ESTUARINE DEPOSITS [Qe]</b> At 160.0 to 160.5': Very fine Silty Sand, thinly interbedded; light yellowish brown (10YR 6/4) Clayey Silt; mottled, light olive brown (2.5Y 5/3 to 5/6); appears moist and very stiff  At 161.6 to 161.9': Silty Sand, very fine to medium grained  At 162.4': Silty Sand bed, very fine to medium (1 inch thick) Clayey Silt with very fine sand; trace fine gravels and oxidized sandy pockets; trace calcium carbonate nodules to veins; very dark grayish brown (2.5Y 3/2)		
100	170	12	33	76	ML	At 165.1 to 165.6': Silty Sand with some gravel, fine sand, and gravel  Sandy to Clayey Silt, trace gravel (3-5%), mainly angular to subangular shale (Tm), sandstone (Tm), and slate (Jsm); olive gray (5Y 4/2); appears moist and hard  At 167.3 to 168.7': Silt becomes discretely interbedded, thin very fine sandy silt and clayey silt beds; dark olive brown (2.5Y 3/3)  At 168.7': Becomes gravelly, clasts up to 2 inches, mainly slate (Jsm) and granitic rock At 168.8 to 170.0': No recovery		
95	175	12	34	93	GP	<b>OLDER FLUVIAL DEPOSITS [Qfoff]</b> Silty Gravel, clasts up to 2 inches, mainly angular slate, some subangular shale (Tm), granitic rock, and sandstone (Tm), matrix is fine to coarse silty sand; trace interbedded fine sand layers (1 to 3 inches thick); color variable; appears wet and dense  At 175.0 to 180.0': Recover only slough (sand and gravel)		
180		13	35	0				

(CONTINUED ON FOLLOWING FIGURE)

Geologist: AR/MW/MF  
 Prepared/Date: WL/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2E-B5</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						7/5/11 - 7/7/11	8 inches	270 feet
						GROUNDWATER READINGS		
						Measured at 92.5 feet after 15 hours		
85	185	13	36	100	CL	<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b> Silty Clay; very dark grayish brown (10YR 3/2); appears moist and hard; discrete small oxidized pockets, and some manganese stains; trace fine gravel  At 182.0 to 183.3': 5% fine gravel  At 185.0 to 186.5': Sandy Clay; olive (5Y 5/3); appears moist and hard; trace gravel; becomes sandier with depth		
80	190	13	37	100	SM/ML	<b>BASAL ALLUVIAL FAN UNIT [Qfob]</b> Silty Sand and Sandy Silt, some calcium carbonate veins & nodules; trace to some fine gravel, mainly subangular slate (Jsm) and sandstone (Tm), trace oxidized nodules and manganese flecks; poorly sorted		
75	195	14	38	86	ML	At 192.2 to 193.0': Grades to Clayey Silt; color becomes grayish olive (10Y 5/2)		
					SM			
					ML	At 195.0 to 195.7': Silty Sand, very fine to fine, trace gravel, mainly angular slate (Jsm), and granitic rock; appears moist; lower contact is sharp Clayey Silt with some fine sand; grayish brown (2.5Y 5/2); thin interbeds of oxidized fine sand, trace gravel, mainly slate (Jsm) and sandstone (Tm); beds have sharp contacts		
200		14	39	100	CL	<b>BASAL ESTUARINE UNIT? [Qeb?]</b> Silty Clay; dark gray (5Y 4/1); appears damp and hard; classification uncertain due to limited sample		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: AR/MW/MF  
 Prepared/Date: WL/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011



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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2E-B5 (Continued)
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						7/5/11 - 7/7/11	8 inches	270 feet
						GROUNDWATER READINGS		
						Measured at 92.5 feet after 15 hours		
						END OF BORING AT 200 FEET		
						NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched.  -Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than ¼ inch). -Beds are generally massive unless otherwise noted.		

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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL\_FIELD\_NOTES\GINT LOGS\101561-TRANSECT 2E.GPJ 10/14/11

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2E-B7
						Tri Country Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/8/11 - 6/28/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Encountered at 44 feet during drilling		
							9 inches of asphaltic concrete Hand augered to 6 feet	
							<b>FILL [Af]</b> Silty Sand, trace fine gravel up to 3/4 inch; very dark grayish brown (10YR 3/2); appears moist	
							NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed description of clasts	
275	5					ML	<b>YOUNGER/OLDER ALLUVIAL FAN DEPOSITS [Qf/Qfo]</b> Sandy to Clayey Silt, variable gravel, clasts 2 to 15%, up to 3/4 inch; mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); very dark grayish brown (10YR 3/2); appears moist and hard; lower contact is gradational	
		1	1	48			Grades to Silty Clay At 7.9 to 10.0': No recovery	
270	10					CL	<b>ESTUARINE DEPOSITS [Qe]</b> Clay and Silty Clay, rare (<1%) coarse sand (Jsm and Tm); brown (10YR 4/3); appears moist and hard; lower contact is gradational	
		1	3	80			At 12.6 to 14.0': 5 to 10% calcium carbonate filaments At 13.5 to 14.0': Increasing fine sand, gradational transition to unit below At 14.0 to 15.0': No recovery	
265	15					ML	Sandy to Clayey Silt, trace coarse sand and fine gravel (Jsm and Tm); brown (7.5YR 4/4); appears moist; moderately well sorted; lower contact occurs between runs	
		1	3	48			At 17.4 to 20.0': No recovery	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: LH/MF/MW  
 Prepared/Date: YN/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011

MTA Westside Subway Extension  
 Los Angeles, California



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T2E-B7a

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Tri Country Drilling / CME 75		<b>T2E-B7 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 280 feet
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						6/8/11 - 6/28/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 44 feet during drilling		
255	25	2	4	60		<b>FLUVIAL DEPOSITS [Qfoff]</b> Gravel, clasts 50 to 60%, up to 1½ inches, mainly subangular to subrounded slate (Jsm), some shale (Tm) and sandstone (Tm) also observed; matrix is fine to coarse silty sand; color is variable, generally dark grayish brown (10YR 4/2); appears damp and dense; lower contact occurs between runs  At 23.0 to 25.0': No recovery  Silty Gravel as above		
250	30	2	5	68		<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Sandy to Clayey Silt, trace fine gravel (Jsm and Tm); brown (10YR 4/3); appears very moist and stiff to very stiff; poorly sorted; lower contact occurs between runs  At 28.8 to 29.7': Grades to Silty Clay, some strong brown (7.5YR 4/6) mottling		
245	35	2	6	90		Silty Sand, trace to some clay, fine grained, trace coarse sand and fine gravel (Jsm and Tm); brown (7.5YR 4/4); appears very moist and dense; lower contact occurs between runs  At 30.9 to 31.4': Increasing clay  Silty Clay; dark yellowish brown (10YR 4/4)		
245	35	2	7	60		At 32.5 to 32.8': Increasing soil and gravel  At 32.8 to 33.0': Grades to Clayey, Silty Sand with Gravel, clasts 15 to 20%, up to 1½ inches, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); color variable; appears very moist and dense; poorly sorted  At 33.0 to 35.0': No recovery		
245	35	3	8	90		<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b> Clay, trace coarse sand (Jsm and Tm); mottled, dark grayish brown (10YR 4/2) to strong brown (7.5YR 5/6); appears very moist and stiff to very stiff; occasional sandy lenses and beds, varve like bedding, scattered manganese oxide flecks  At 37.7 to 37.9': Grades to Sandy Silt  At 38.6 to 39.6': Color becomes olive brown (2.5Y 4/3) with occasional strong brown (7.5YR 4/6) mottling  At 39.2 to 39.3' and 39.6 to 39.7': Clayey, Silty Sand beds, fine grained; olive brown (2.5Y 4/3); appears very moist and dense		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: LH/MF/MW  
 Prepared/Date: YN/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011

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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 2E.GPJ 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2E-B7 (Continued)
						Tri Country Drilling / CME 75	Hollow-Stem Auger	See Plate 3
						DATES DRILLED	6/8/11 - 6/28/11	HOLE DIAMETER
							8 inches	GROUND EL.
								280 feet
						GROUNDWATER READINGS		
						Encountered at 44 feet during drilling		
						CL	Qef Continued	
							At 41.0 to 41.5': Increasing Sand and Gravel, gradational transition to unit below	
		3	9	100		ML	Clayey to Sandy Silt with variable Gravel; clasts generally 5 to 30%, up to 1½ inches, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); mottled, dark grayish brown (10YR 4/2) to strong brown (7.5YR 5/6); appears very moist and stiff to very stiff; lower contact is narrowly gradational	
							At 41.9 to 42.1': Gravelly bed, clasts 60 to 70%, up to 1 inch	
							At 43.2 to 45.2': Gravel decreases to less than 5%, up to ½ inch	
							At 44.0': Groundwater encountered during drilling	
235	45					CL/ML	Silty Clay and Clayey Silt, trace coarse sand (Jsm and Tm); strongly mottled, dark brown (7.5YR 3/4) to dark grayish brown (2.5Y 4/2); scattered manganese oxide flecks	
		3	10	100				
						CL/CH	At 48.3 to 50.2': Grades to Clay; appears moist and very stiff to hard	
230	50					CL-ML	At 50.2 to 51.5': Fine Silty Sand beds; alternate with clay described above	
		4	11	100		CL	Clay, trace coarse sand and fine gravel (Jsm and Tm), some brick-red sandstone; color variable, mainly brown (10YR 4/3) to dark gray (2.5Y 4/1); appears moist and very stiff to hard; occasional varve-like sandy silt beds/laminations; lower contact is narrowly gradational	
							At 53.4 to 54.2': Some gray (2.5Y 5/1) laminations and varve-like bedding	
						CL/ML	Contact based mainly on nearby CPT signatures and other borings	
225	55						<b>ESTUARINE DEPOSITS [Qe]</b>	
							Silty Clay and Clayey Silt; trace coarse sand (Jsm and Tm); brown (10YR 4/3) with variable dark gray (2.5Y 4/1) mottling; appears very moist and stiff; slightly micaceous; lower contact is narrowly gradational	
							At 55.7 to 56.4': Some reddish brown (5YR 4/3) mottling	
		4	12	100		CL	Clay, trace coarse sand (Jsm and Tm); lightly mottled, dark gray (10YR 4/1) to strong brown (7.5YR 4/6); appears very moist and stiff to very stiff; occasional irregular, oxidized, fine sand lenses and pockets; lower contact occurs between runs	
60								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: LH/MF/MW  
 Prepared/Date: YN/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011

MTA Westside Subway Extension  
 Los Angeles, California



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T2E-B7c

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Tri Country Drilling / CME 75		<b>T2E-B7</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Hollow-Stem Auger	See Plate 3	280 feet
						DATES DRILLED	HOLE DIAMETER	
						6/8/11 - 6/28/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 44 feet during drilling		
		4	13	100		SM+/ CL/ ML	<b>Qe Continued</b> Alternating beds of fine to coarse Silty Sand and heterogenous Silty Clay to Clayey Silt with variable sand; color is variable, appears wet and dense and soft to medium stiff; typical bed thickness is 3 to 6 inches; contacts between beds are generally sharp, lower contact is sharp	
						CL/ CH	Clay, variable fine to coarse sand (Jsm and Tm); dark gray (10YR 4/1); appears very moist and very stiff; lower contact is gradational	
						ML/ CL	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey Silt and Silty Clay, trace coarse sand and fine gravel (Jsm and Tm); faintly mottled, dark reddish brown (5YR 3/3) to very dark gray (7.5YR 3/1); appears moist and hard; coarsens with depth, grades to coarser bed below	
215	65					ML/ CL	Clayey Silt and Silty Clay; variable fine to coarse sand, gravel 5 to 10%, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); mottling becomes stronger, brown (7.5YR 4/4) to dark gray (10YR 4/1); appears moist and hard; poorly sorted; lower contact is gradational	
		5	14	100				
						GM	At 68.7: Silty Gravel, clasts 50 to 60%, up to ¾ inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm), some quartzite also observed; matrix is fine to coarse silty sand	
210	70					ML/ CL		
		5	15	100				
						ML/ CL	Clayey Silt and Silty Clay with Gravel, clasts 25 to 35%, up to 1 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); color variable, mainly dark grayish brown (10YR 4/1); appears moist and hard; lower contact is narrowly gradational	
205	75					ML	Sandy to Clayey Silt with Gravel, clasts 15 to 20%, up to ¾ inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); strongly mottled, light brownish gray (2.5Y 6/2) to strong brown (7.5YR 4/6); appears very moist and stiff; poorly sorted, lower contact is gradational At 76.2 to 76.7: Color becomes brown (7.5YR 4/3)	
		5	16	100			At 77.8 to 78.5: Increasing clay, gradational transition to unit below	
						CL	<b>ESTUARINE DEPOSITS [Qe]</b> Clay, rare (<1%), coarse sand (Jsm and Tm); lightly mottled, dark reddish brown (5YR 3/3) to very dark gray (10YR 3/1); appears moist and hard At 79.0 to 79.8: Prominant varve-like bedding	
80								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: LH/MF/MW  
 Prepared/Date: YN/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011

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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 2E.GPJ 10/14/11

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2E-B7 (Continued)
						Tri Country Drilling / CME 75	Hollow-Stem Auger	See Plate 3
						DATES DRILLED	6/8/11 - 6/28/11	HOLE DIAMETER
							8 inches	GROUND EL.
						GROUNDWATER READINGS	Encountered at 44 feet during drilling	
195	85					<p><b>Qe Continued</b></p> <p>At 80.0 to 90.0': No sampling - barrel stuck in auger</p>		
190	90	6	17	46		<p><b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b></p> <p>Clayey, Silty Gravel, clasts 50 to 60%, up to 1 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); matrix is fine to coarse clayey, silty sand; color variable, generally very dark grayish brown, (10YR 3/2); appears wet and dense; lower contact is sharp</p> <p>Silty Sand and Sandy Silt, very fine grained; brown (10YR 4/3); appears very moist and stiff; slightly micaceous; lower contact is gradational</p> <p>Silty Sand with Gravel, fine to coarse grained, clasts 15 to 20%, up to 1/2 inch, mainly subangular slate (Jsm), shale (Tm) and sandstone (Tm), some brick-red sandstone; color highly variable; appears moist and dense</p> <p>At 91.4 to 92.2': Some distinct thin (1/8 to 1/4 inch) laminations defined by variable color and mafic content; lightly to moderately cemented</p> <p>At 92.3 to 95.0': No recovery</p>		
185	95	6	18	54		<p>At 97.7 to 100.0': No recovery</p>		
100								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: LH/MF/MW  
 Prepared/Date: YN/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011

MTA Westside Subway Extension  
 Los Angeles, California

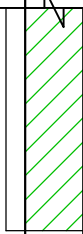
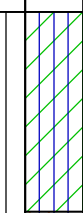
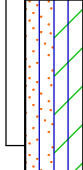
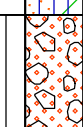

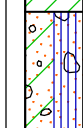


**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T2E-B7e

METRO SOIL CORE S:\70131\_GEOTECH\GINT\W\FULT\_INVESTIGATION\_WSE\_LIBRARY\_AMEC\_OCTOBER2011\_(2).GLR  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2E-B7 (Continued)
						Hollow-Stem Auger	See Plate 3	
						6/8/11 - 6/28/11	HOLE DIAMETER 8 inches	GROUND EL. 280 feet
						GROUNDWATER READINGS Encountered at 44 feet during drilling		
175	105	6	19	58		CL	<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b> Clay; mottled, olive brown (2.5Y 4/3); appears very moist and very stiff; lower contact occurs between runs  At 101.0 to 102.9': Increasing fine Sand and Silt, some oxidized strong brown (7.5YR 4/6) pockets and varve-like bedding  At 102.9 to 105.0': No recovery	
		6	20	90		CL	Silty Clay, variable fine sand, trace coarse sand and gravel (Jsm and Tm); mottled, strong brown (7.5YR 4/6) to dark grayish brown (10YR 4/2); appears very moist and stiff; lower contact is sharp  At 106.5 to 106.6': Becomes dark reddish brown (5YR 3/3)	
170	110					ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Sandy to Clayey Silt; trace coarse sand and fine gravel (Jsm and Tm); mottled, dark yellowish brown (10YR 4/4) to grayish brown (2.5Y 5/2); appears very moist to wet and stiff; poorly sorted; lower contact occurs between runs	
		6	21	32		SW	Well Graded Sand with Gravel, fine to coarse grained, clasts 30 to 40%, up to 1 1/2 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); some granitic rock and quartzite also observed; color is variable, generally dark grayish brown (10YR 4/2); appears wet and dense; lower contact occurs between runs  At 111.6 to 115.0': No recovery	
165	115					CL	Clay, trace coarse sand and fine gravel (Jsm and Tm); dark grayish brown (10YR 4/2); appears very moist and stiff; lower contact is gradational	
		7	22	52		SM-SC	Clayey, Silty Sand with Gravel, sand is fine to coarse grained, clasts 20 to 35%, up to 1/2 inch, mainly subangular slate (Jsm), shale (Tm) and sandstone (Tm); color variable, generally dark grayish brown (2.5Y 4/2); appears moist and dense; lightly to moderately cemented  At 117.6 to 120.0': No recovery	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: LH/MF/MW  
 Prepared/Date: YN/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T2E-B7f

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Tri Country Drilling / CME 75		<b>T2E-B7 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 280 feet
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						6/8/11 - 6/28/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 44 feet during drilling		
155	125	7	23	84	CL	<b>ESTUARINE DEPOSITS [Qe]</b> Clay; dark grayish brown (10YR 4/2); appears very moist and stiff; lower contact is narrowly gradational At 120.0 to 120.3' and 120.9 to 121.2': Silty Clayey Sand beds, fine to coarse grained; appears wet and dense; coarse sand includes abundant granitic rock fragments		
					CL/ML	Alternating beds of Clay and Clayey Silt; clay is very dark grayish brown (10YR 3/2), clayey silt is strong brown (7.5YR 4/6); appears very moist and stiff to very stiff, clay contains variable manganese oxide flecks; clayey silt is micaceous; typical bed thickness 2 to 4 inches		
					ML	Sandy Silt; dark grayish brown (2.5Y 4/2); appears moist and very stiff; lower contact occurs between runs At 124.3 to 124.5': Some coarse sand and gravel, clasts 5-10% (Jsm and Tm) At 125.0 to 125.5': Increasing clay, grades to Clayey to Sandy Silt		
		8	24	98	CL	Sandy Clay; very dark grayish brown (2.5Y 3/3), mottled sandier zones oxidized; appears moist and very stiff; lower contact is gradational		
150	130				SM	At 128.1 to 128.5': Silty Sand with Gravel, clasts up to 1 inch in diameter, lower contact is gradational		
					SM	Silty Sand, fine to medium grained, trace subangular to subrounded gravel; dark grayish brown (2.5Y 4/2); appears moist and moderately dense; some clayey mottling; lower contact is sharp At 129.2': Fine to medium Silty Sand with Gravel, subangular, up to 1 inch, mainly slate (Jsm) At 129.5 to 130.5': No recovery		
					SM	At 130.5': Continue Silty Sand with Gravel; lower contact is sharp		
					SC	Clayey Sand, fine to medium grained; dark grayish brown (2.5Y 4/2); appears moist and moderately dense; lower contact is sharp		
		8	25	92	CL	Clay to Silty Clay; very dark grayish brown (2.5Y 4/2), fine to medium grained; appears moist and very stiff, lower contact occurs between runs		
145	135				ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Sandy to Clayey Silt, trace subangular to subrounded gravel; very dark brown (7.5YR 2.5/2); appears moist and very stiff At 137.8 to 138.1': Clayey clastic layer, subangular slate (Jsm), shale (Tm) and sandstone (Tm), up to 1 inch At 138.1': Sand, fine to medium grained, some silt and clay, trace coarse grained, up to 1/2 inch At 138.8 to 140.0: No recovery		
140		8	26	76				

(CONTINUED ON FOLLOWING FIGURE)

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						DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Tri Country Drilling / CME 75		<b>T2E-B7 (Continued)</b>
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	<b>GROUND EL.</b> 280 feet
						<b>DATES DRILLED</b> 6/8/11 - 6/28/11	<b>HOLE DIAMETER</b> 8 inches	
						<b>GROUNDWATER READINGS</b> Encountered at 44 feet during drilling		
135	145	9	27	70	SM SM	<b>Qfo Continued</b> At 140.0 to 140.6': Silty Sand with Gravel, clasts mainly angular slate (Jsm), up to 2 inches; olive gray (5Y 4/2); appears very moist and loose to medium dense; lower contact is sharp Silty Sand, fine to medium grained, some clay, trace coarse gravel, up to 2 inches; very dark brown (7.5YR 2.5/2); appears moist and dense  At 143.5': Concretionary zone (1 to 2 inches thick), moderately cemented sand below At 143.5 to 145.0': No recovery		
130	150	9	28	88	SM	At 148.0 to 148.3': Silty Sand with Gravel, fine to medium grained with some coarse, angular to subangular gravel, up to 1/2 inch At 148.3': Silty Sand, fine grained; very dark brown (7.5YR 2.5/2); appears moist and medium dense, lower contact occurs between runs		
125	155	9	29	76	ML	<b>ESTUARINE DEPOSITS [Qe]</b> Sandy Silt; dark brown (10YR 3/3); some clay; appears moist and stiff; trace gravel  At 151.5': Increasing clay to Clay and Clayey Silt; dark gray (10YR 4/1)  At 153.8 to 155.0': No recovery		
125	155	1	1	94	ML	Clayey Silt and Silty Clay; olive gray (5Y 4/2); varying fine grained sand; thin indistinct beds of dark color and oxidized sand lenses  At 156.4 to 157.9': Interbedded Clayey Silt layers (2 inches thick); dark gray (5Y 4/1)  At 157.8': Silty Sand layer (1/2 inch thick); fine to coarse grained; trace calcium carbonate nodules		
160					ML	Clayey Silt; dark gray (5Y 4/1); trace small calcium carbonate nodules; lower contact occurs between runs		

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Tri Country Drilling / CME 75		<b>T2E-B7 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Hollow-Stem Auger	See Plate 3	280 feet
						DATES DRILLED	HOLE DIAMETER	
						6/8/11 - 6/28/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 44 feet during drilling		
115	165	1	2	100	ML	<b>Qe Continued</b> Clayey Silt; very dark grayish brown (2.5Y 3/2); thin indistinct oxidized sandy layers; trace to some fine to coarse gravel, mainly angular to subangular slate (Jsm), shale (Tm), sandstone (Tm), and other; appears moist and stiff; some varve-like bedding  At 163.9 to 165.3': Becomes clayier; appears moist and very stiff		
		1	3	100	GM	<b>OLDER ALLUVIAL FAN/ESTUARINE DEPOSITS [Qfo/Qe]</b> Silty Gravel; mainly subrounded granitic and slate clasts; trace shale (Tm); silty sand matrix; appears very moist and medium dense; lower contact is sharp		
					SM	Silty Sand, very fine to fine grained; mottled, mostly dark grayish brown (2.5Y 4/2); appears very moist and medium dense, lower contact is sharp		
					GP	Gravelly layer (2 inches thick); mainly angular shale (Tm) and slate (Jsm), some subangular, granitic rock, fine to coarse grained; lower contact is sharp		
					ML	Sandy to Clayey Silt, indistinct varve-like bedding  At 169.2 to 170.0': Increasing fine to coarse gravel to 10%		
110	170	2	4	40	GP	At 171.7 to 172.0': Fine to coarse Gravel layer, mainly subrounded to angular granitic rock, slate (Jsm) and shale (Tm) At 172.0 to 175.0': No recovery		
105	175	2	5	40	SM	Silty Sand, fine to coarse grained; dark brown (7.5YR 3/3); appears wet  At 176.1': Clayey Silt layer, (1½ inches thick)  At 177.0 to 180.0': No recovery		
	180							

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Tri Country Drilling / CME 75		<b>T2E-B7 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/8/11 - 6/28/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Encountered at 44 feet during drilling		
		2	6	100	ML	<b>Qfo/Qe Continued</b> Clayey Silt; olive brown (2.5Y 4/6); appears moist and stiff; lower contact is gradational		
					ML	Clayey to Sandy Silt with gravel; fine to medium grained, coarsens downward; dark yellowish brown (2.5Y 4/4)		
					SM		Silty Sand with Gravel; fine to coarse gravel, mainly angular to subangular granitic rock, slate (Jsm) and shale (Tm); lower contact is sharp; approximate dip 15 degrees	
					ML	Clayey Silt; vary dark grayish brown (2.5Y 3/2); appears moist and stiff; lower contact is gradational		
95	185					At 184.1': Trace coarse, angular shale (Tm) and slate (Jsm) gravel		
		2	7	76	SM	At 185.0': Grades to clayey to sandy silt with gravel, coarsens downward		
						At 186.8': Increasing gravel		
					ML	At 187.7': Sand with Gravel layer (2 inches thick) Sandy Silt with some gravel; appears moist and stiff		
						At 188.8 to 190.0': No recovery		
90	190							
		3	8	100	ML	Clayey to Sandy Silt; olive brown (2.5Y 4/3)		
					ML	At 192.5 to 193.4': Clayey Silt; dark grayish brown (10YR 4/2)		
					SP	At 193.4 to 194.4': Fine to medium sand with trace gravel; mainly slate (Jsm), sandstone (Tm), and shale (Tm), and other, trace brick-red sandstone		
85	195							
		3	9	100	GM	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Silty Gravel, fine to coarse grained, mainly angular slate (Jsm), some shale (Tm) and granitic rock; dark olive brown (2.5Y 3/3); appears wet and loose; disturbed sample; lower contact is sharp		
					ML	Silt; appears wet and stiff		
					SM	Silty Sand with Gravel; olive gray (5Y 4/2)		
					SM	Silty Sand, trace to some fine gravel; olive gray (5Y 4/2); appears very moist and medium dense		
					ML	Sandy Silt with some Clay and trace gravel; dark olive gray (5Y 3/2); coarsens downward		
					SW			

(CONTINUED ON FOLLOWING FIGURE)

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MTA Westside Subway Extension  
 Los Angeles, California



**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T2E-B7j

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2E-B7 (Continued)
						Tri Country Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/8/11 - 6/28/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Encountered at 44 feet during drilling		
75	205					<p><b>Qfo Continued</b>                      Well Graded Sand; fine to coarse grained; some gravel, mainly shale (Tm), sandstone (Tm) and slate (Jsm); fine to medium grained, subangular                      END OF BORING AT 200 FEET</p> <p>NOTES:                      Boring backfilled with cement/bentonite grout from bottom up and patched.</p> <ul style="list-style-type: none"> <li>-Munsell colors listed in order of predominance (most predominant color first).</li> <li>-Where observed, contacts and bedding appear subhorizontal unless otherwise noted.</li> <li>-Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted.</li> <li>-Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted.</li> <li>-The term "clasts" herein describes gravel-size rock fragments (larger than 1/4 inch).</li> <li>-Beds are generally massive unless otherwise noted.</li> </ul> <p>Boring deepened from 155 to 200 on 6/27 to 6/28/11. Location of deepened boring offset south-east approximately 1-foot from original boring location.</p>		
70	210							
65	215							
	220							

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2E-B8</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/4/11	8 inches	269 feet
						GROUNDWATER READINGS		
						Encountered at 34.6 feet during drilling		
						18 inches of asphaltic concrete Hand augered to 5 feet		
						SM	<b>FILL [Af]</b> Clayey to Sandy Silt, dark brown (10YR 3/3)	
							NOTE: Jsm = Santa Monica Slate Tm = Modelo formation See end of log for more detailed descriptions of clasts	
265	5					ML	<b>YOUNGER/OLDER ALLUVIAL FAN DEPOSITS [Qf/Qfo]</b> Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); dark brown (10YR 3/3); appears very moist and medium stiff; lower contact is gradational	
260	10	1	1	100		CL/ ML	Silty Clay and Clayey Silt, trace coarse sand and fine gravel (Jsm and Tm); very dark grayish brown (10YR 3/2); appears moist and very stiff; lower contact is gradational  At 8.8 to 12.8': Trace calcium carbonate filaments and fine nodules up to 1/8 inch	
255	15	1	2	90		ML	<b>ESTUARINE DEPOSITS [Qe]</b> Clayey to Sandy Silt, rare (<1%) coarse sand (Jsm and Tm); brown (7.5YR 4/3); appears moist and very stiff; well sorted; trace very fine (<1/32 inch) calcium carbonate filaments; lower contact is gradational	
250	20	1	3	90		SM/ ML	Silty Sand and Sandy Silt, very fine grained; rare (<1%) coarse sand (Jsm and Tm); yellowish brown (10YR 5/4); appears moist and stiff/dense; well sorted; lower contact is narrowly gradational	
						SM	Silty Sand with Gravel, fine grained, clasts 20 to 40%, up to 3/4 inch, mainly subangular	

(CONTINUED ON FOLLOWING FIGURE)

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					DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
					Martini Drilling / CME 75		<b>T2E-B8</b> (Continued)
					DRILLING METHOD	BOREHOLE LOCATION	
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DATES DRILLED	GROUND EL.
						Hollow-Stem Auger	See Plate 3
						6/4/11	269 feet
						GROUNDWATER READINGS	
						Encountered at 34.6 feet during drilling	
		2	4	96	SM	<p><b>Qe Continued</b> to subrounded slate (Jsm), some subangular granitic rock also observed; brown (7.5YR 4/4); appears moist and dense</p> <p>At 21.3 to 22.0' and 22.4 to 22.7': Grades to Silty Sand to Sandy Silt, very fine grained, trace coarse sand and fine gravel (Jsm and Tm); well sorted</p>	
245	25				GM	<p><b>FLUVIAL DEPOSITS [Qfoff]</b> Silty Gravel, clasts (50 to 70%), up to 1½ inches, mainly subangular to subrounded slate (Jsm) with some granitic rock, sandstone (Tm) and shale (Tm); matrix is fine to coarse silty sand; brown (10YR 5/3); appears damp and dense; upper contact is sharp, lower contact is gradational</p>	
		2	5	96			
240	30				SP-SM	<p>At 27.9 to 29.0': Poorly Graded Sand with Gravel and Silt, fine grained; clasts 15 to 25%, up to 1 inch; mainly subangular to subangular slate (Jsm) with some granitic rock, sandstone (Tm) and shale (Tm); brown (10YR 5/3); appears damp to dense; upper contact is sharp, lower contact is gradational</p>	
					GM	<p>At 30.0 to 31.7': Gravel becomes coarser, maximum size 2½ inches</p>	
		2	6	90			
						<p>At 32.4': Becomes wet</p>	
235	35					<p>▽ Groundwater encountered during drilling</p>	
		3	7	84			
230							
40							

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2E-B8</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/4/11	8 inches	269 feet
						GROUNDWATER READINGS		
						Encountered at 34.6 feet during drilling		
		3	8	100		GM	<b>Qfofl Continued</b> Silty Gravel as above	
225	45					CL/ ML	<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b> Clayey Silt and Silty Clay, variable fine sand, trace coarse sand and fine gravel (Jsm and Tm); mottled, grayish brown (10YR 5/2) to strong brown (7.5YR 4/4); appears very moist and stiff to very stiff; occasional scattered manganese oxide flecks and staining; lower contact is gradational	
220		3	9	96		ML	Clayey to Sandy Silt, trace coarse sand (Jsm and Tm), strongly mottled, gray (2.5Y 5/1) to reddish brown (2.5YR 4/3); appears wet and stiff; variable manganese oxide staining and flecks (0 to 15%); lower contact occurs between runs	
215	50	4	10	100		CL	Clay and Silty Clay, trace coarse sand and fine gravel (Jsm and Tm); brown (7.5 YR 4/3) with variable dark gray (2.5Y 4/1) mottling; appears moist and very stiff to hard; some vertically oriented dark gray mottled zones; lower contact is sharp  At 52.1 to 52.4': Becomes dark gray (2.5Y 4/1)  At 53.7 to 54.0': Gravel increases to 20 to 25%, up to 3/4 inch	
210	55					GM	At 55.2 to 55.5': Becomes wet and soft Silty Gravel, clasts, 50 to 60%, up to 1 1/2 inches; mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); matrix is fine to coarse silty sand, color is variable, generally dark brown (7.5YR 3/4); appears wet and dense; lower contact is sharp	
60		4	11	96		CL/ ML	Silty Clay and Clayey Silt, trace coarse sand (Jsm and Tm); brown (7.5YR 4/4); appears very moist to wet and soft to stiff; occasional manganese oxide flecks; lower contact occurs between runs At 57.6 to 57.8', 58.3 to 58.6', and 59.3 to 59.5': Fine Silty Sand beds	

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2E-B8 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Hollow-Stem Auger	See Plate 3	269 feet
						DATES DRILLED	HOLE DIAMETER	
						6/4/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 34.6 feet during drilling		
205	65	4	12	40		<p><b>Qe Continued</b>                      At 60.0 to 60.7': Silty Gravel clasts 70%+, up to ¾ inch, appears clast-supported, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); appears wet and dense, lower contact is sharp                      At 60.7 to 62.0': Silty Clay and Clayey Silt as above                       At 62.0 to 65.0': No recovery</p>		
200	70	5	13	100		<p><b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b>                      Silty Clay and Clayey Silt, variable fine to coarse sand and fine gravel; clasts, 2 to 15%, up to ½ inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); brown (7.5 YR 4/4), with occasional grayish brown (10YR 5/2) mottling; appears moist to very moist and very stiff; lower contact is gradational</p>		
195	75	5	14	100		<p>Clayey to Sandy Silt, variable coarse sand and fine gravel, clasts 5 to 25%, up to ¾ inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); brown (7.5YR 4/4) with dark grayish brown (2.5Y 4/2) mottling; appears very moist and very stiff; lower contact is gradational</p>		
190	80	5	15	100		<p>Clayey Gravel, clasts 50 to 60.4% up to 1 inch, mainly suangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); matrix is fine to coarse clayey sand; brown (7.5YR 4/4); appears wet and dense</p>		

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T2E-B8</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/4/11	8 inches	269 feet
						GROUNDWATER READINGS		
						Encountered at 34.6 feet during drilling		
						GC	<b>Qfo Continued</b>	
		6	16	100		CL/ML	<b>ESTUARINE DEPOSITS [Qe]</b> Clayey Silt and Silty Clay, variable fine sand, trace coarse sand (Jsm and Tm); brown (7.5YR 4/3) with grayish brown (2.5Y 5/2) mottling; appears moist and very stiff to hard; lower contact is narrowly gradational	
185	85					CL	Clay, trace coarse sand (Jsm and Tm); mottled, dark reddish brown (5YR 3/4) to dark gray (7.5YR 4/1); appears moist and hard; lower contact is gradational	
		6	17	100		CL/ML	Silty Clay and Clayey Silt, rare (<1%) coarse sand (Jsm and Tm); dark brown (7.5YR 3/4); appears moist and very stiff; lower contact is narrowly gradational	
180	90					ML	Clayey to Sandy Silt, variable coarse sand, trace fine gravel (Jsm and Tm); brown (7.5YR 4/4); appears very moist and very stiff; well sorted; occasionally grades to Silty Clay; occasional fine silty, clayey sand pockets; lower contact is narrowly gradational	
		6	18	96			At 92.2 to 93.6': Gravel increases to 10 to 30%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); gradational transition to unit below	
175	95					GM	<b>OLDER FLUVIAL DEPOSITS [Qfofl]</b> Silty Gravel, clasts 50 to 60%, up to 1 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); matrix is fine to coarse silty sand; color is variable, generally brown (10YR 4/3); appears wet and dense	
		7	19	72		SM	At 96.1 to 98.7': Grades to Silty Sand with Gravel, fine to coarse grained, clasts 20 to 40%, up to 1 inch	
170							At 98.6 to 100.0': No recovery	
100								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: WL/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2E-B8 (Continued)
						Martini Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/4/11	8 inches	269 feet
						GROUNDWATER READINGS		
						Encountered at 34.6 feet during drilling		
		N/A	20	0		<p><b>Qfo/Qfo<sub>n</sub> Continued</b>                      At 100.0 to 105.0': Recovered only slough</p>		
165						<p>END OF BORING AT 105 FEET</p> <p>NOTES:                      Boring backfilled with cement/bentonite grout from bottom up and patched.</p> <ul style="list-style-type: none"> <li>-Munsell colors listed in order of predominance (most predominant color first).</li> <li>-Where observed, contacts and bedding appear subhorizontal unless otherwise noted.</li> <li>-Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted.</li> <li>-Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted.</li> <li>-The term "clasts" herein describes gravel-size rock fragments (larger than ¼ inch).</li> <li>-Beds are generally massive unless otherwise noted.</li> </ul>		
105								
160								
110								
155								
115								
150								
120								

Geologist: ME/MF  
 Prepared/Date: WL/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T2E-B9</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/4/2011 - 6/30/2011	8 inches	270 feet
						GROUNDWATER READINGS		
						Encountered at 38 feet.		
							11 inches of asphaltic concrete over 3 inches of base	
						SM/ML	<b>FILL [Af]</b> Silty Sand and Sandy Silt, very fine grained, trace coarse sand and fine gravel (Jsm and Tm)  NOTE: Jsm = Santa Monica Slate Tm = Modelo formation See end of log for more detailed descriptions of clasts	
265	5	1	1	42		ML	<b>YOUNGER / OLDER ALLUVIAL FAN DEPOSITS [Qf/Qfo]</b> Clayey Silt, variable fine sand, trace coarse sand and fine gravel (Jsm and Tm); very dark grayish brown (10YR 3/2); appears moist  At 6.1 to 9.0': No recovery	
260	10	1	2	100		CL	Clay and Silty Clay, trace coarse sand (Jsm and Tm); very dark grayish brown (10YR 3/2); appears moist and very stiff to hard; lower contact is gradational  At 11.7 to 12.6': Trace calcium carbonate filaments and uncemented nodules up to 1/8 inch	
255	15	1	3	30		ML	<b>ESTUARINE DEPOSITS [Qe]</b> Clayey to Sandy Silt; dark yellowish brown (10YR 4/6); appears damp to moist and very stiff to hard; faint brown (10YR 4/3) laminations, rare (<1%) coarse sand and fine gravel (Jsm and Tm); well sorted; lower contact is gradational  At 15.5 to 19.0': No recovery	
20	20					SM	At 19.0 to 20.0': Silty Sand with Gravel, fine to coarse grained, clasts 20 to 30% up to 1 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); dark yellowish brown (10YR 4/4); appears moist and dense	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: LH/MF  
 Prepared/Date: WL/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2E-B9 (Continued)
						Jet Drilling / CME 75	See Plate 3	
						Hollow-Stem Auger	8 inches	GROUND EL. 270 feet
						DATES DRILLED 6/4/2011 - 6/30/2011	HOLE DIAMETER	
						GROUNDWATER READINGS Encountered at 38 feet.		
245	25	1	4	100			<b>Qe Continued</b> At 20.0 to 21.5': No recovery	
					ML		Clayey to Sandy Silt as above	
		1	5	16			At 22.3 to 24.0': No recovery	
							At 24.5' to 27.7': Predominantly Sandy Silt, trace to some clay	
		2	6	100			At 26.5 to 31.5': Becomes very moist and medium stiff	
		2	7	80			At 29.5 to 31.5': Color becomes dark brown (10YR 3/3)	
240	30	2	8	100				
		2	9	48		CL	Silty Clay, rare (<1%) coarse sand and fine gravel (Jsm and Tm); dark grayish brown (10YR 4/2); appears very moist to wet and soft; variable manganese oxide staining; lower contact occurs between runs	
							At 32.7 to 34.0': No Recovery	
235	35	2	10	72			At 35.2 to 35.8': Color becomes dark gray (2.5Y 4/1), slightly micaceous	
		2	11	36		SM- SC CL	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey, Silty Sand, fine grained; dark grayish brown (10YR 4/2); appears wet and medium dense	
							At 36.9 to 37.4': Silty Clay with Sand, sand decreases with depth; dark grayish brown (10YR 4/2); appears wet and soft	
							At 37.4 to 39.0': No recovery	
						SP	Poorly Graded Sand, fine to medium grained; color variable, generally very dark grayish brown (2.5Y 3/2); appears wet and dense; coarse sand content increasing with depth; lower contact is gradational	
40								

(CONTINUED ON FOLLOWING FIGURE)






Geologist: LH/MF  
 Prepared/Date: WL/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T2E-B9b

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)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2E-B9 (Continued)
						Jet Drilling / CME 75	See Plate 3	
						Hollow-Stem Auger	8 inches	GROUND EL. 270 feet
						DATES DRILLED 6/4/2011 - 6/30/2011		
						GROUNDWATER READINGS Encountered at 38 feet.		
		2	12	100		SP	Qfo Continued	
						CL/ML	Silty Clay, variable fine sand, trace coarse sand (Jsm and Tm), dark gray (10YR 4/1), appears wet and soft; poorly sorted	
		2	13	56			At 42.7 to 42.9': Becomes gravelly, clasts 30 to 40%, up to 1½ inches, mainly subangular slate (Jsm) At 42.9 to 44.0': No recovery	
225	45					GM	Silty Gravel, clast 60 to 70%, up to 1 inch, mainly slate (Jsm), matrix is fine silty sand, very dark grayish brown (10YR 3/2), appears wet and dense, lower contact is sharp, erosional	
						CL/ML	<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b> Clay to Silty Clay, variable fine sand, trace coarse sand and fine gravel (Jsm and Tm); strongly mottled, grayish brown (10YR 5/2) to strong brown (7.5YR 5/6), appears very moist and stiff; occasional sandy silt pockets; lower contact is narrowly gradational	
		3	14	40			At 46.0 to 49.0': No recovery	
						CL/CH	At 49.0 to 52.0': Becomes mottled, grayish brown (10YR 5/2) to reddish brown (5YR 4/4); occasional manganese oxide flecks and staining	
220	50							
		3	15	100			At 54.5 to 55.5': Occasional reddish brown (5YR 4/4), mottling	
215	55							
		3	16	100			At 59.0 to 61.9': Appears very moist to wet and soft to medium stiff; variable fine to coarse sand	
60								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: LH/MF  
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 Checked/Date: MW/MF 10/14/2011

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2E-B9 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/4/2011 - 6/30/2011	8 inches	270 feet
						GROUNDWATER READINGS		
						Encountered at 38 feet.		
						CL/CH	Qef Continued	
		4	17	60			<b>ESTUARINE DEPOSITS [Qe]</b> Clay; mottled, brown (7.5YR 4/4) to dark grayish brown (10YR 4/2); appears moist and very stiff to hard; occasional gravelly or sandy beds as noted above; lower contact is gradational At 61.1 to 61.9': Becomes gravelly, clasts 25 to 35%, up to 1-inch, mainly subrounded slate (Jsm), shale (Tm) and sandstone (Tm) At 61.9 to 62.3': Some oxidized, strong brown (7.5YR 4/6) silt laminations At 62.0 to 64.0': No recovery  At 64.0 to 64.8': Appears wet and medium stiff  At 64.8 to 65.3': Grades to Sandy Clay	
205	65	4	18	80		CL	Silty Clay and Sandy Clay, variable fine to coarse sand, trace fine gravel (Jsm and Tm); color variable; very dark grayish brown (10YR 3/2); occasional dark reddish brown (5YR 3/4) mottling; appears wet and soft to medium stiff, lower contact occurs between runs  At 67.9 to 68.1': Becomes very moist and very stiff At 68.0 to 69.0': No recovery	
200	70	4	19	100		SC	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey Sand with gravel, fine to coarse grained, clasts 15 to 20%, up to 3/4 inch; mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); color variable; appears wet and dense At 69.9 to 70.3': Silty Clay, dark reddish brown (5YR 3/3); appears wet and soft Clayey Silt and Silty Clay, variable fine to coarse sand and gravel, clasts 5 to 20%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); brown (7.5YR 4/4); appears very moist and very stiff; poorly sorted; occasional less gravelly (2-5%) beds; occasional dark reddish brown (5YR 3/4) mottling, lower contact is narrowly gradational At 71.5 to 73.0': Appears wet and soft to medium stiff	
195	75	5	20	100		CL/ML	At 74.0 to 77.7': Becomes brown (7.5YR 4/4); appears very moist to wet and medium stiff  At 77.7 to 80.2': Becomes reddish brown (5YR 4/4); appears very moist to wet and stiff	
80								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: LH/MF  
 Prepared/Date: WL/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011

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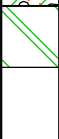


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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T2E-B9</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Hollow-Stem Auger	See Plate 3	270 feet
						DATES DRILLED	HOLE DIAMETER	
						6/4/2011 - 6/30/2011	8 inches	
						GROUNDWATER READINGS		
						Encountered at 38 feet.		
		5	21	100		<b>Qfo Continued</b> At 80.2 to 83.0': Becomes reddish brown (5YR 4/4) to dark grayish brown (10YR 4/2) mottles; appears very moist to wet and medium stiff to stiff  At 83.0 to 83.8': Gravel increases to 25 to 30%		
185	85	5	22	100		<b>ESTUARINE DEPOSITS [Qe]</b> Silty Clay and Clayey Silt, variable fine sand, trace coarse sand and fine gravel (Jsm and Tm); brown (7.5YR 4/4) with occasional grayish brown (2.5Y 5/2) mottling; appears very moist and very stiff; lower contact is narrowly gradational  At 85.4 to 85.0': Gravel increases to 5 to 10%  At 86.3 to 89.0': Trace manganese oxide flecks At 86.5 to 86.3': Some grayish brown laminations		
180	90	6	23	64		Clay, rare (<1%) coarse sand (Jsm and Tm); brown (7.5YR 4/4); appears moist and very stiff to hard; variable varve-like bedding; lower contact occurs between runs		
						At 91.8 to 92.2': Grades to Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm) At 92.2 to 94.0': No recovery		
175	95	6	24	38		At 94.0 to 95.1': Sandy Silt, variable clay, trace coarse sand and fine gravel (Jsm and Tm); brown (7.5YR 4/4); appears very moist and stiff; micaceous  At 95.9 to 99.0': No recovery		
						<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clay and Silty Clay, variable fine to coarse sand; brown (7.5YR 5/4); appears very moist to wet and medium stiff; poorly sorted; occasional clayey silt and sandy silt		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: LH/MF  
 Prepared/Date: WL/PK 10/14/2011  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2E-B9 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/4/2011 - 6/30/2011	8 inches	270 feet
						GROUNDWATER READINGS		
						Encountered at 38 feet.		
		6	25	70		CL	beds; <b>Qfo Continued</b> occasional strong brown (7.5YR 4/6) or grayish brown (10YR 5/2) mottling At 101.1 to 102.2': Trace manganese oxide flecks	
						CL	Sandy Clay with Gravel, clasts, 20 to 30%, up to 2 inches, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); mottled, color variable; appears wet and medium stiff; lower contact is sharp At 125.0 to 104.0': No recovery	
165	105	7	26	24			At 104.7 to 105.2': Clay; mottled, light brownish gray (10YR 6/2); appears very moist and stiff; trace manganese oxide flecks At 105.2 to 109': No recovery	
160	110					CL/ CH	<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b> Clay, strongly mottled, grayish brown (2.5Y 5/2) to strong brown (7.5YR 4/6), occasional reddish brown (5YR 4/4) mottles; appears moist and stiff to very stiff; lower contact is gradational At 110.5 to 111.2': Prominent varve-like bedding	
		7	27	80		CL	At 111.2 to 112.2': Clay described above alternates with Sandy Silt beds; slightly micaceous; appears very moist and medium stiff to stiff	
						CL/ CH	At 113.0 to 114.0': No recovery  At 115.0 to 115.8': Distinct laminations defined by color	
155	115	7	28	38			At 115.8 to 115.9': Clayey Sand bed, fine to coarse grained At 115.9 to 119.0': No recovery	
						ML	At 119.0 to 119.5': Sandy Silt to Clayey Silt interbeds At 119.8 to 120.2': Distinct laminations defined by color	

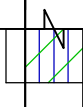






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					DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
					Jet Drilling / CME 75		<b>T2E-B9</b> (Continued)
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	GROUNDWATER READINGS	
						Encountered at 38 feet.	GROUND EL. 270 feet
		8	29	34	 ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey Silt with sand and gravel increasing with depth; mottled, grayish brown (2.5Y 5/2) to strong brown (7.5YR 4/6); appears moist and stiff At 120.7 to 124.0': No recovery	
145	125	8	30	34	 SW	Well Graded Sand, fine to coarse grained, trace fine gravel (Jsm and Tm); light brownish gray (2.5Y 6/2); appears wet and dense  At 125.7 to 129.0': No recovery	
140	130	8	31	0		At 129.0 to 134.0': Recovered only slough	
135	135	8	32	60	 SM-  SC  CL/  CH	At 134 to 134.3': Clayey Silty Sand with Gravel, fine to coarse grained; clasts 20 to 30%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm); brown (7.5YR 4/4); appears wet and dense; lower contact is sharp <b>ESTUARINE DEPOSITS - FINE GRAINED [Qe/Qef]</b> Clay, very dark grayish brown (10YR 3/2); appears very moist and very stiff; variable (5 to 20%) manganese oxide flecks; lower contact is narrowly gradational Clay, rare (<1%) coarse sand (Jsm and Tm); strongly mottled, very dark gray (10YR 3/1) to strong brown (7.5YR 4/6); appears moist and very stiff to hard; variable varve-like bedding; strong brown mottling occurs as coarse, irregular pockets and diffuse zones; trace manganese oxide flecks; lower contact is gradational At 137.0 to 139': No recovery	
140					 CL	At 139 to 141.5': Color becomes dark gray (10YR 4/1) with strong brown (7.5YR 5/6) mottling; trace coarse sand and fine gravel (Jsm and Tm)	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: LH/MF  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T2E-B9</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 270 feet
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						6/4/2011 - 6/30/2011	8 inches	
						GROUNDWATER READINGS		
						Encountered at 38 feet.		
		8	33	74		CL	<b>Qef Continued</b>  At 141.5 to 142.1': Increasing fine to coarse sand and fine gravel, clasts 5 to 10%, up to 1/2 inch (Jsm and Tm)  At 142.3 to 142.7' and 144.0-145.4': Color becomes dark brown (7.5YR 3/2) with dark gray (10YR 4/1) mottling  At 142.7 to 144.0': No recovery	
125	145	8	34	100		CL/ CH	Clay, very dark gray (10YR 3/1); appears very moist and very stiff; calcium carbonate occurs as irregular, steeply dipping stringers and pockets, total calcium carbonate about 10%; lower contact is gradational	
						CL/ CH	Clay and Silty Clay, rare (<1%) coarse sand (Jsm and Tm); dark brown (7.5YR 3/3); appears very moist and stiff to very stiff; trace calcium carbonate filaments and stringers	
120	150					CL/ CH	Top 12 inches of sample disturbed Clay, dark brown (7.5YR 3/2), appears wet and soft, lower contact is narrowly gradational	
		1	1	50		SM	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Silty Sand with Gravel, trace to some clay, clasts 15 to 20%, up to 1 inch, mainly sandstone and shale (Tm) and slate (Jsm), subangular; dark yellowish brown (10YR 3/6) to (10YR 4/4); appears moist and dense; poorly sorted; lower contact occurs between runs  At 151.5 to 154.0': No recovery	
115	155	1	2	70		ML	Clayey Silt, variable fine to medium sand, trace gravel, occasional more gravelly beds; dark yellowish brown (10YR 4/4); appears very moist to wet and firm	
						SM	At 155.8 to 156.2': Silty Sand, trace gravel	
						ML	At 157.3': Trace calcium carbonate At 157.5 to 159.0': No recovery	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: LH/MF  
 Prepared/Date: WL/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011

METRO SOIL CORE S:\70131 GEOTECH\GINTW\Fault\_Investigation\_WSE\_Library\_AMEC OCTOBER2011 (2).GJR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 2E.GPJ 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T2E-B9</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/4/2011 - 6/30/2011	8 inches	270 feet
						GROUNDWATER READINGS		
						Encountered at 38 feet.		
		1	3	94		ML	<b>Qe Continued</b>  At 160.8': Sand layer (1½ inch thick) At 160.8 to 164.0': Gravel decreases, deposits generally finer  At 162.4': Color change to dark brown (10YR 1/2); silt becomes sandy, very fine sand, trace clay; lower contact occurs between runs At 163.0': Trace calcium carbonate  At 164.0 to 165.0': Clayey Silt; olive gray (5Y 4/2); appears moist and stiff, trace to some fine gravel, granitic rock, shale (Tm), sandstone (Tm), and slate (Jsm); poorly sorted	
105	165	2	4	80		ML	<b>ESTUARINE DEPOSITS [Qe]</b> Sandy Silt, trace clay; dark grayish brown (2.5Y 4/2); well sorted  Clayey Silt; olive brown (2.5Y 4/3); indistinct laminations of oxidized siltier beds  At 168.0 to 169.0': No recovery	
100	170	2	5	88		SM-ML	At 169.5 to 171.7': Distinct wavy laminations and thin beds of oxidized, fine Silty Sand At 170.3': Decomposing wood fragment  At 172.5 to 172.8': Silty Clay bed, olive brown (2.5Y 4/3) At 173.1 to 175.0': Becomes Sandy Silt with some Clay and trace fine gravel, lower contact occurs between runs	
95	175	2	6	20		CL ML	175.0 to 179.0': No recovery	
	180					ML	<b>OLDER ALLUVIAL FAN / ESTUARINE DEPOSITS [Qfo/Qe]</b> Clayey Silt with Gravel, clasts 30 to 40%, up to 2 inches, mainly subangular slate (Jsm) and shale (Tm); lower contact is sharp	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: LH/MF  
 Prepared/Date: WL/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T2E-B9i

METRO SOIL CORE S:\70131\_GEOTECH\GINTW\Fault\_Investigation\_WSE\_Library\_AMEC\_October2011\_(2).GLR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL\_FIELD\_NOTES\GINT LOGS\101561-TRANSECT 2E.GPJ 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2E-B9 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/4/2011 - 6/30/2011	8 inches	270 feet
						GROUNDWATER READINGS		
						Encountered at 38 feet.		
		2	7	80	ML ML	<b>Qfo/Qe Continued</b> At 180.7': Silt bed (1/3 inch thick); dark reddish brown (5YR 2.5/2) Clayey to Sandy Silt; olive brown (2.5Y 4/4); appears wet and firm to stiff, thin sand and clay interbeds; sandier beds are dark reddish brown (5YR 4/3); occasional beds with trace fine gravel  At 183.0 to 184.0': No recovery		
85	185	3	8	70	SP	At 186.4': Coarse gravelly layer, mainly slate (Jsm) and shale (Tm)  At 187.1 to 187.5': Grades to fine Sand At 187.4': Sand becomes fine to coarse grained, lower contact occurs between runs At 187.5 to 189.0': No recovery		
80	190	3	9	88	ML CL	Clayey to Sandy Silt, coarsening downward to sand  At 189.7 to 189.9': Appears very moist to wet and stiff to dense, lower contact is sharp, subhorizontal At 189.9 to 191.2': Clay; olive brown (2.5Y 4/3); appears very moist and stiff		
75	195	3	10	42	ML SP SM SP SM	Clayey Silt, olive brown (2.5Y 4/3), appears very moist and stiff; trace gravel (2%), mainly shale (Tm), sandstone (Tm), and slate (Jsm) At 191.2 to 191.7': Fracture infilled with calcium carbonate  At 195.0 to 195.8': Poorly Graded Sand, some Clay and Silt, fine to medium grained, some coarse, trace gravels, fine shale (Tm), sandstone (Tm) and slate (Jsm) At 195.8 to 196.1': Silty Sand, very fine grained; olive brown (2.5Y 4/4); appears very moist and dense At 196.1 to 199.0 No recovery		
200						END OF BORING AT 199 FEET  NOTES:		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: LH/MF  
 Prepared/Date: WL/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011

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



**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T2E-B9j

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T2E-B9 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/4/2011 - 6/30/2011	8 inches	270 feet
						GROUNDWATER READINGS		
						Encountered at 38 feet.		
65	205					Boring backfilled with cement/bentonite grout from bottom up and patched.  -Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than 1/4 inch). -Beds are generally massive unless otherwise noted.  Boring deepened from 149 to 199 on 6/28 to 6/30/11. Location of deepened boring offset south-east approximately 1 foot from original boring location		
60	210							
55	215							
220								

Geologist: LH/MF  
 Prepared/Date: WL/PK 10/14/2011  
 Checked/Date: MW/MF 10/14/2011

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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 3.GPI 10/14/11

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	
						Jet Drilling / CME 75		<b>T3-B1</b>
						Hollow Stem Auger	See Plate 3	
						<b>DATES DRILLED</b> 2/25/11 - 2/28/11	<b>HOLE DIAMETER</b> 8 inches	<b>GROUND EL.</b> 271 feet
						<b>GROUNDWATER READINGS</b> Encountered at 39 feet during drilling		
270						6 inches of asphaltic concrete Hand augered to 6 feet <b>FILL [Af]</b> Sandy Clay, brown, some fine to medium sand; appears damp and very stiff		
	5							
265		1	1	0				At 6.0 to 9.0': No recovery; poor recovery in shoe of sampler only
260	10	1	2	93		ML Sandy Silt, trace to some clay, trace to some coarse sand and fine gravel, clasts 2 to 15%, up to 1/2 inch; dark yellowish brown (10YR 4/4); appears moist and very stiff		
255	15	1	3	100		ML <b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt, trace to some coarse sand and fine gravel, clasts 2 to 15%, up to 3/4 inch, mainly slate (Jsm) and shale (Tm), some basalt, granitic rock, and quartzite also observed; dark brown (10YR 3/3) to brown (10YR 4/3); appears damp to moist and hard; lower contact is gradational At 14.5 to 16.0': Gravel content increases to 10 to 20%		
20						ML Clayey Silt with Sand, trace fine gravel (Jsm and Tm); color variable, mainly brown (7.5YR 5/4); appears moist and very stiff/dense		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: WL/AR 10/13/2011  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	
						Jet Drilling / CME 75		<b>T3-B1</b> (Continued)
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						2/25/11 - 2/28/11	8 inches	271 feet
						GROUNDWATER READINGS		
						Encountered at 39 feet during drilling		
						<b>Qfo Continued</b>		
						<b>LAKEWOOD FORMATION [Qlw]</b>		
						Poorly Graded Sand with Silt, very fine to fine grained, trace coarse sand (mainly Jsm and quartzite); light yellowish brown (2.5Y 6/4); appears damp and dense; lower contact occurs between runs		
						At 24.0 to 24.4': Becomes gravelly, clasts 10 to 15%, up to 1/2 inch (mainly Jsm and Tm), variable, some subhorizontal laminations		
						At 24.4 to 24.8': <b>Marker Bed M<sub>E</sub></b> Manganese oxide-rich bed, very dark gray (10YR 3/1)		
						At 24.8 to 26.5': Color change to yellowish brown (10YR 5/6)		
						SM		
						GM		
						SM		
						SM		
						SM		
						SM		
						SM		
						SM/ML		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
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**MTA Westside Subway Extension**  
**Los Angeles, California**



**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T3-B1b

METRO SOIL CORE S:\70131\_GEO TECH\GINT\W\F\AULT\_INVESTIGATION\_WSE\_LIBRARY\_AMEC OCTOBER2011 (2).GLR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 3.GPI 10/14/11

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					DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
					Jet Drilling / CME 75		<b>T3-B1</b> (Continued)
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING METHOD	
						Hollow Stem Auger	See Plate 3
					DATES DRILLED	HOLE DIAMETER	GROUND EL.
					2/25/11 - 2/28/11	8 inches	271 feet
					GROUNDWATER READINGS		
					Encountered at 39 feet during drilling		
230		3	11	100		SM/ML	<b>Qlw Continued</b>  At 40.8 to 41.0': Strongly oxidized layer (10YR 5/8)
		3	12	100		SM	Silty Sand, very fine to fine grained; strongly mottled, light gray (2.5 Y 4/2) to strong brown (7.5YR 5/8); appears wet and dense; lower contact occurs between runs  At 43.8 to 44.0': Becomes very lightly cemented, some fine oxidized laminations
45		3	13	80			
225		3	14	100		SM/ML	Silty Sand and Sandy Silt, fine grained; strongly mottled/oxidized, strong brown (7.5YR 5/8) to light yellowish brown (2.5Y 6/4); appears very moist and dense/stiff; some wavy laminations; lower contact is sharp  At 48.5 to 49.0': Mottling becomes less strong At 49.0 to 51.4': Small (<1/16 inch) manganese oxide flecks
50		4	15	100		SM	At 51.3': <b>Marker Bed M<sub>C</sub></b> - Silt/Clay bed (1 1/2 inches thick); dark yellowish brown (10YR 4/6) Silty Sand, fine grained; greenish gray (5GY 5/1); appears very moist and dense/stiff; generally massive and well sorted; occasionally grades to sandy silt; lower contact is sharp and strongly oxidized, appears to dip 15 degrees
55		4	16	100			
215						ML	At 58.7 to 60.0': <b>Marker Bed M<sub>B</sub></b> - Becomes finer, mainly Sandy Silt, trace calcium carbonate stringers and bivalve shell fragments, shells up to 5%, maximum size 1/2 inch
60							

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: WL/AR 10/13/2011  
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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL\_FIELD\_NOTES\GINT LOGS\101561-TRANSECT 3.GPI 10/14/11

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T3-B1</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						2/25/11 - 2/28/11	8 inches	271 feet
						GROUNDWATER READINGS		
						Encountered at 39 feet during drilling		
210		4	17	100		SM	<b>Qlw Continued</b>	
							At 60.7 to 61.0': Indistinct, subhorizontal, wavy laminations with some oxidation	
							At 61.0': Appears very moist to wet, some clay	
							At 61.6': Oxidized bed (1/2 inch thick), dips approximately 15 degrees	
		5	18	93		ML	Silt and Sandy Silt; very dark gray; appears very moist to wet and medium stiff; trace manganese-oxide flecks; lower contact is sharp	
65						SM	At 64.0 to 65.0': <b>Marker Bed M<sub>A</sub></b> - Silty Sand with Gravel, fine grained, clasts 15 to 25%, up to 1 1/2 inch, mainly basalt and slate (Jsm); dark gray (10YR 4/1); appears very moist to wet	
205						ML	<b>SAN PEDRO FORMATION [Qsp]</b>	
							Sandy Silt, trace to some clay, occasional sand laminations; very dark gray (2.5Y 3/1); appears very moist and stiff; lower contact is gradational	
							At 65.3': Sand lamination, appears to dip 10 degrees	
							At 65.8': Detrital charcoal (sample collected)	
		5	19	100			At 66.5': Root fragment (sample collected)	
						SM	Silty Sand, fine grained; gray (N6); appears damp and dense; well cemented (calcium carbonate); abundant bivalve shell fragments and casts, shell fragments up to 10%, most <1/4 inch, one intact half-shell is 3/4 inch	
70							Refusal at 69.0' on cemented layer	
200							END OF BORING AT 69 FEET	
							NOTES:	
							Boring backfilled with cement/bentonite grout from bottom up and patched.	
							-Munsell colors listed in order of predominance (most predominant color first).	
							-Where observed, contacts and bedding appear subhorizontal unless otherwise noted.	
							-Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted.	
							-Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted.	
							-The term "clasts" herein describes gravel-size rock fragments (larger than 1/4 inch).	

Geologist: DB/MF  
 Prepared/Date: WL/AR 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

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



**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T3-B1d

METRO SOIL CORE S:\70131 GEOTECH\GINTW\FULT\_INVESTIGATION\_WSE\_LIBRARY\_AMEC OCTOBER2011 (2).GLR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 3.GPI 10/14/11

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		
						DRILLING METHOD	BOREHOLE LOCATION	<b>T3-B2</b>
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/1/11	8 inches	272 feet
						GROUNDWATER READINGS		
						Encountered at 62 feet during drilling		
270						Hand augered to 6 feet		
	5					NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed description of clasts		
265		1	1	93		CL	<b>FILL [Af]</b> Silty Clay, trace coarse sand and fine gravel (Jsm and Tm); dark yellowish brown (10YR 4/4); appears moist and very stiff At 7': Becomes more sandy/gravelly	
						SM/ ML	<b>LAKWOOD FORMATION [Qlw]</b> Silty Sand to Sandy Silt, very fine grained; light yellowish brown (2.5Y 6/3); appears dry and dense to very stiff	
						ML	At 8.5 to 9.0': Grades to Sandy Silt, becomes lightly cemented/cohesive	
260		1	2	80		SM	Silty Sand, very fine grained, pale brown (2.5Y 7/4), generally massive, well sorted; with rare yellowish brown (10YR 5/8) mottling; appears dry and dense; lower contact is gradational; upper contact occurs between runs	
255	15	1	3	80		SM	<b>Marker Bed M<sub>F</sub></b> - Silty Sand, fine to medium grained; lightly mottled, pale brown (2.5Y 7/4) to yellowish brown (10YR 5/8); appears dry and dense; abundant bivalve shell fragments, shells 10 to 20%, up to 1/2 inch; lower contact occurs between runs	
20						SP/ SM	Poorly Graded Sand with Silt, fine to medium grained, trace coarse sand; generally brownish yellow (10YR 6/6), occasional strong brown (7.5YR 5/8), mottled; appears dry and dense; lower contact occurs between runs	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: WL/AR 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

METRO SOIL CORE S:\70131 GEOTECH\GINTW\FULT\_INVESTIGATION\_WSE\_LIBRARY\_AMEC OCTOBER2011 (2).GLR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 3.GPI 10/14/11

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					DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	Jet Drilling / CME 75	
						DRILLING METHOD	BOREHOLE LOCATION
						Hollow Stem Auger	See Plate 3
						DATES DRILLED	HOLE DIAMETER
						3/1/11	8 inches
						GROUNDWATER READINGS	
						Encountered at 62 feet during drilling	
250		2	4	60		SP/SM	<b>Q<sub>lw</sub> Continued</b> At 20.0 to 20.2': Manganese oxide-rich bed, very dark gray (10YR 3/1)  At 21.7 to 22.1': Grades to fine Silty Sand; pale brown (10YR 7/3)
25		2	5	100		SM	At 24.5 to 25.0': <b>Marker Bed M<sub>E</sub></b> - Manganese oxide-rich bed; very dark gray (10YR 3/1)
						SP	At 25.0 to 25.7': Coarse sand and gravel increase, gravel 5 to 10%, up to 1/2 inch, mainly slate (T <sub>m</sub> ), slate (J <sub>sm</sub> ) and quartzite
						SM	At 25.7 to 26.3': Becomes heavily oxidized, strong brown (7.5YR 5/8)
245		2	6	100		SP-SM	Poorly Graded Sand with Silt, fine to coarse grained, trace fine gravel (J <sub>sm</sub> and T <sub>m</sub> ); lightly mottled; yellowish brown (10YR 5/8) to yellow (2.5Y 7/6); appears dry to damp and dense; lower contact occurs between runs
							At 27.8 to 28.2': Gravel increases, 10 to 15%, up to 1/2 inch, mainly slate (J <sub>sm</sub> ) and quartzite
30		2	7	100		SP-SM	Poorly Graded Sand with Silt, fine to medium, some fine gravel, clasts 10 to 15%, up to 1/2 inch, mainly subangular slate (J <sub>sm</sub> ); strongly oxidized/mottled, yellow (10YR 7/6) to strong brown (7.5YR 5/8); appears damp and dense; moderately to well cemented; lower contact appears sharp to narrowly gradational (not intact)
						GM	<b>Marker Bed M<sub>D</sub></b>
						SM	Silty Gravel, clasts 60 to 75%, most <3/4 inch, maximum 2 inches, mainly subrounded to subangular slate (J <sub>sm</sub> ), shale (T <sub>m</sub> ), quartzite and basalt; soil matrix is fine to medium silty sand; brownish yellow (10YR 6/6); appears dry and dense
240		2	8	100		GM	At 30.8 to 31.3': Silty Sand, fine to medium grained; pale brown (2.5Y 7/4), some oxidized yellowish brown (10YR 6/6) laminations
							At 31.5': Gravel decreases to about 50%, color is pale brown (2.5Y 7/4)
						SM	At 33.0 to 34.0': Fine Silty Sand, pale brown (2.5Y 8/3); appears dry
35		2	9	40		GM	At 35.0 to 36.5': No recovery
235		2	10	100		SM	Silty Sand; very fine grained, pale brown (2.5Y 8/4); appears dry and dense; some cemented zones/lenses
							At 37.1 to 37.4': Oxidized gravel lenses with subangular slate (J <sub>sm</sub> ), subrounded shale (T <sub>m</sub> ) and quartzite clasts up to 2 inches
							At 37.4 to 38.0': Color changes to pale brown (2.5Y 7/3)
						SP-SM	At 38.0 to 38.9': Grades to Poorly Graded Sand with Silt, fine grained; very pale brown (10YR 7/4)
40						SM	Silty Sand, very fine grained, occasional sandy silt lenses; variable mottling, light gray (2.5Y 7/2) to brownish yellow (10YR 6/8) to strong brown (7.5YR 5/8); mottling occurs as irregular zones or sub-horizontal laminations; appears damp and dense; generally massive and well sorted; lower contact is sharp, wavy

(CONTINUED ON FOLLOWING FIGURE)

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METRO SOIL CORE S:\70131\_GEO TECH\GINT\W\FULT\_INVESTIGATION\_WSE\_LIBRARY\_AMEC OCTOBER2011 (2).GLR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 3.GPI 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T3-B2 (Continued)
						Jet Drilling / CME 75		
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/1/11	8 inches	272 feet
						GROUNDWATER READINGS		
						Encountered at 62 feet during drilling		
		3	11	100		SM	At 38.9 to 40.2': Slightly cemented <b>Qlw Continued</b>	
	230	3	12	100			At 42.5 to 42.8': Clayey Silt; mottled, brown (10YR 4/3) to strong brown (7.5YR 5/8); appears moist and stiff	
	45	3	13	100			At 44.5 to 48.5': Variable irregular, sub-horizontal oxidized laminations	
	225	3	14	100			At 47.5 to 48.5': Appears moist	
	50	4	15	100		SM/ ML	At 49.0 to 50.4': Grades to fine Silty Sand to Sandy Silt; trace manganese oxide-rich flecks and laminations	
	220					SM	At 50.5': <b>Marker Bed M<sub>c</sub></b> - Clay bed (1½ inches thick); dark yellowish brown (10YR 4/6); upper and lower contacts sharp, wavy, subhorizontal	
							Silty Sand, very fine grained, occasionally grades to Sandy Silt; lightly mottled, yellowish brown (10YR 5/6) to light gray (5Y 7/2); appears moist and dense; variable subhorizontal laminations; lower contact appears sharp (not intact)	
		4	16	100			At 52.5 to 54.0': Appears damp, yellow (10YR 7/6) to yellowish brown (10YR 5/6)	
	55							
	215	4	17	70				
	60					ML	At 58.8 to 59.6': <b>Marker Bed M<sub>B</sub></b> - Trace calcium carbonate filaments and bivalve shell fragments, shells <5%, up to 1/8 inch	
							At 59.0 to 62.5': Becomes finer (mainly Sandy Silt)	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: WL/AR 10/13/2011  
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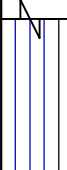




**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T3-B2c

METRO SOIL CORE S:\70131 GEOTECH\GINTW\Fault\_Investigation\_WSE\_Library\_AMEC OCTOBER2011 (2).GIR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 3.GPI 10/14/11

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T3-B2 (Continued)
						Jet Drilling / CME 75	Hollow Stem Auger	See Plate 3
						DATES DRILLED	3/1/11	HOLE DIAMETER
							8 inches	GROUND EL.
								272 feet
						GROUNDWATER READINGS		
						Encountered at 62 feet during drilling		
210		4	18	80		ML	<b>Qlw Continued</b>  ∇ At 62': Groundwater encountered during drilling Silt and Sandy Silt; light olive brown (2.5Y 5/3); appears very moist and very stiff; lower contact occurs between runs  At 62.8': Silt bed (1 inch thick); strongly oxidized, subhorizontal At 63.2 to 63.4': Oxidized fracture dips about 50 degrees	
65						SM/ ML	<b>Marker Bed M<sub>A</sub></b> - Silty Sand and Sandy Silt with Gravel, fine grained; clasts 15 to 20%, up to 2 inches, mainly rounded sandstone (Tm), quartzite, mafic igneous rock, and subangular slate (Jsm); gray (2.5Y 5/1); appears very moist to wet and dense/stiff; lower contact occurs between runs At 65.0 to 69.0': No recovery	
205		5	19	20			Depth of contact uncertain due to poor recovery <b>SAN PEDRO FORMATION [Qsp]</b> Poorly Graded Sand; fine to medium grained, trace gravel (Jsm) and silt nodules; gray (2.5Y 6/1); appears very moist to wet and dense At 70.0 to 74.0': No recovery	
70						SP	Depth of contact uncertain due to poor recovery <b>SAN PEDRO FORMATION [Qsp]</b> Poorly Graded Sand; fine to medium grained, trace gravel (Jsm) and silt nodules; gray (2.5Y 6/1); appears very moist to wet and dense At 70.0 to 74.0': No recovery	
200		5	20	20			END OF BORING AT 74 FEET  NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched.  -Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than ¼ inch). -Beds are generally massive unless otherwise noted.	
75								
195								
80								

Geologist: DB/MF  
 Prepared/Date: WL/AR 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

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**Los Angeles, California**



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T3-B2d

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Gregg's Drilling / B53 Modelo		<b>T3-B3</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Rotary Wash	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						4/11/11	8 inches	275.6 feet
						GROUNDWATER READINGS		
						Not Recorded		
275						10½ inches of Asphaltic Concrete over 6 inches of base Hand augered to 6 feet <b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Sandy to Clayey Silt, trace to some coarse sand and fine gravel (Jsm and Tm); dark yellowish brown (10YR 5/6); appears very moist NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed descriptions of clasts Moisture, and colors described are affected by rotary was fluids		
270	5	1	1	100	ML	<b>ESTUARINE DEPOSITS [Qe]</b> Sandy Silt, trace clay, trace coarse sand (Jsm and Tm); yellowish brown (10YR 5/6); appears moist and very stiff; well sorted; trace roots structures with open voids and manganese-oxide, some fine pores (<1/32 inch)		
265	10	1	2	100	ML	At 10.2 to 11.1': Appears damp; brownish yellow (10YR 6/6) At 11.1 to 12.5': Becomes mottled, color variable, mainly brown (7.5YR) to light yellowish brown (10YR 6/4), abundant bioturbation (root structures), some with manganese-oxide or iron-oxide staining, abundant black, decayed root remnants, fine pores (<1/32 inch)		
260	15	1	3	80	CL-ML	<b>Paleosol - Marker Bed M<sub>G</sub></b> - Clayey Silt to Silty Clay, trace to some sand; mottled, brown (7.5YR 4/3) to dark grayish brown (10YR 4/2) to reddish brown (5YR 4/3); appears damp to moist and very stiff; moderate ped development with subangular blocky structure, some clay films; some fine, random and vertically oriented root structures		
					SM/ML	<b>LAKESWOOD FORMATION [Qlw]</b> Silty Sand to Sandy Silt, fine grained, trace clay; mottled, light yellowish brown (2.5Y 6/3) to dark yellowish brown (10YR 4/6); appears wet and dense/stiff; well sorted At 19.0 to 23.0': No recovery		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: WL/AR 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

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**Los Angeles, California**



**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T3-B3a

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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)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Gregg's Drilling / B53 Modelo		<b>T3-B3</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Rotary Wash	See Plate 3	275.6 feet
						DATES DRILLED	HOLE DIAMETER	
						4/11/11	8 inches	
						GROUNDWATER READINGS		
						Not Recorded		
255		1	4	20		<b>Q<sub>lw</sub> Continued</b>		
	25					SM/ML	Silty Sand, very fine grained; mottled, light yellowish brown (2.5Y 6/3) to strong brown (7.5YR 5/8); appears very moist and dense; trace bivalve shell fragments and calcium carbonate filaments, shells up to ¼ inch, lower contact occurs between runs	
250		1	5	76		SM	At 25.6 to 26.3': <b>Marker Bed M<sub>F</sub></b> - Shell bed, abundant shell fragments, shells 25 to 35%, up to ½ inch At 26.3 to 26.8': Shells decrease to less than 5%; some calcium carbonate cementation of soil matrix At 26.8 to 28.0': No recovery	
	30					SP-SM	Poorly Graded Sand with Silt, fine to medium grained; strongly mottled brown (2.5Y 5/4) to yellowish brown (10YR 5/8); appears very moist and dense; variable manganese oxide staining, lower contact occurs between runs	
245		2	6	80		SP-SM	At 31.4 to 32.0': <b>Marker Bed M<sub>E</sub></b> - Manganese oxide-rich bed At 32.0 to 33.0': No recovery	
	35					SP-SM	At 33.8 to 34.2': Distinct subhorizontal laminations	
240		2	7	80		SP-SM	At 35.0 to 37.0': Mottling less distinct, less oxidized, pale brown (2.5Y 7/3) to gray (10YR 5/1) At 37.0 to 38.0': No recovery	
	40					GM	<b>Marker Bed M<sub>D</sub></b> - Silty Gravel with Sand, clasts 50 to 70%, up to 1 inch, mainly subangular to subrounded slate (Jsm), shale (Tm), sandstone (Tm), quartzite and metabasalt; soil matrix is fine to coarse silty sand; color highly variable, abundant iron-oxide and manganese-oxide staining; appears wet and dense; matrix occasional grades to fine to coarse well graded sand with silt; lower contact occurs between runs At 38.0 to 38.5': Gravel becomes coarser, some clasts up to 1½ inches	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: WL/AR 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T3-B3b

METRO SOIL CORE S:\70131 GEOTECH\GINTW\Fault\_Investigation\_WSE\_Library\_AMEC\_October2011 (2).GLR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 3.GPI 10/14/11

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Gregg's Drilling / B53 Modelo		<b>T3-B3</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Rotary Wash	See Plate 3	275.6 feet
						DATES DRILLED	HOLE DIAMETER	
						4/11/11	8 inches	
						GROUNDWATER READINGS		
						Not Recorded		
235		2	8	80	GM	<b>Qlw Continued</b>  At 41.5 to 42.0': Gravel becomes coarse; some clasts up to 2 inches At 42.0 to 43.0': No recovery		
45	230	3	9	73	SM	Silty Sand, very fine to fine grained, rare (<1%) coarse sand and fine gravel (Jsm and Tm); occasionally grades to fine Poorly Graded Sand with Silt; light yellowish brown (2.5Y 6/4); appears very moist and dense; well sorted; lower contact is gradational At 43.0 to 43.4': Highly oxidized, irregular brown (7.5YR 4/4) mottling  At 44.7 to 45.1': Irregular strong brown (7.5YR 5/8) mottling  At 46.0 to 48.0': No sampling / no recovery / hard drilling  At 48.0 to 53.0': No recovery		
		0	0					
50	225	0	0					
		3	10	100	SP	At 53.0 to 53.2': Granitic clast, full width of core, likely cobble (>3")  At 53.7 to 54.5': Strong brown (7.5YR 5/8) mottling		
55	220				SM	Silty Sand, fine grained; mottled, yellowish brown (10YR 5/6) to grayish brown (10YR 5/2); appears very moist and dense; well sorted; lower contact is gradational		
		3	11	100	SM	Silty Sand, very fine grained; strongly mottled, grayish brown (2.5Y 5/2) to strong brown (7.5YR 5/6); appears very moist and dense/stiff; well sorted; micaceous; lower contact is sharp At 58.0 to 58.2': <b>Marker Bed M<sub>c</sub></b> - Clay bed, (2 inches thick); dark grayish brown (10YR 4/2); appears very moist and very stiff; lower contact is narrowly gradational  At 59.0': Strong brown color becomes dominant, less dark grayish brown		
60								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: WL/AR 10/13/2011  
 Checked/Date: MW/MF 10/13/2011



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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Gregg's Drilling / B53 Modelo		<b>T3-B3</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Rotary Wash	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						4/11/11	8 inches	275.6 feet
						GROUNDWATER READINGS		
						Not Recorded		
215		3	12	100	SM	<b>Q<sub>lw</sub> Continued</b>		
						At 62.5 to 63.0': Some manganese oxide flecks		
	65					At 64.7': Becomes lightly mottled, yellowish brown (10YR 5/4) to gray (10YR 6/1)		
210		4	13	100	SM/ML	Silty Sand and Sandy Silt, sand very fine grained; strongly mottled, yellowish brown (10YR 5/8) to gray (10YR 6/1); appears moist and dense; variable calcium carbonate filaments and very small bivalve(?) shell fragments, shells <1/16 inch, total calcium carbonate 2 to 15%; lower contact is sharp		
						At 68.2 to 68.4': <b>Marker Bed M<sub>b</sub></b> - Very hard, well cemented (calcium carbonate) bed, numerous bivalve shells in lower 1/2 inch of bed, shell fragments up to 1/2 inch, total calcium carbonate up to 40%		
205		4	14	100	SM	At 71.1': Becomes dark gray (5Y 4/1); trace soft, deteriorated, bivalve shell fragments, shells up to 1/4 inch, total calcium carbonate <2%		
						At 71.7 and 72.4': Detrital charcoal		
						At 72.4 to 72.7': Strongly oxidized, irregular laminations, variable color, most developed oxidation color is yellowish red (5YR 4/6)		
						<b>SAN PEDRO FORMATION (Q<sub>sp</sub>)</b>		
						Silty Sand, fine-grained, trace coarse sand and fine gravel (J <sub>sm</sub> and T <sub>m</sub> ); gray (2.5Y 5/1); appears very moist and dense; lower contact is sharp		
200		4	15	100	SM	At 74.7': Quartzite clast, 2 inches in size, subrounded		
						At 74.9 to 75.5': Poorly Graded Sand with Silt, fine grained, light gray (2.5Y 7/1)		
					CL/CH	At 76.2': Clay; black (5Y 2.5/1); appears moist and hard; some 1 1/2 inch partially cemented nodules; upper 1 inch is dark olive gray (5Y 3/2); exhibits waxy parting surfaces		
						END OF BORING AT 78 FEET		
						NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched.		
						-Munsell colors listed in order of predominance (most predominant color first).		
80								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: WL/AR 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT Gregg's Drilling / B53 Modelo	BORING NO. <b>T3-B3</b> (Continued)
						<b>DRILLING METHOD</b> Rotary Wash <b>BOREHOLE LOCATION</b> See Plate 3 <b>DATES DRILLED</b> 4/11/11 <b>HOLE DIAMETER</b> 8 inches <b>GROUND EL.</b> 275.6 feet <b>GROUNDWATER READINGS</b> Not Recorded	
195							
	85						
190							
	90						
185							
	95						
180							
100							

-Where observed, contacts and bedding appear subhorizontal unless otherwise noted.  
 -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted.  
 -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted.  
 -The term "clasts" herein describes gravel-size rock fragments (larger than ¼ inch).  
 -Beds are generally massive unless otherwise noted.

Geologist: DB/MF  
 Prepared/Date: WL/AR 10/13/2011  
 Checked/Date: MW/MF 10/13/2011



METRO SOIL CORE S:\70131\_GEOTECH\GINT\W\FULT\_INVESTIGATION\_WSE\_LIBRARY\_AMEC OCTOBER2011 (2).GIR  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		
						DRILLING METHOD	BOREHOLE LOCATION	<b>T3-B4</b>
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/4/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Not encountered during drilling		
275	5					Asphaltic concrete over base Hand augered to 6 feet NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed description of clasts		
		1	1	0		No recovery from 6 to 9'		
270	10	1	2	100		<b>OLDER ALLUVIAL DEPOSITS [Qfo]</b> Clayey to Sandy Silt, trace to some coarse sand and fine gravel; dark grayish brown (10YR 4/2); appears damp and stiff		
						<b>ESTUARINE DEPOSITS [Qe]</b> Silty Sand and Sandy Silt, fine grained, trace to some clay, trace coarse sand and fine gravel (Jsm and Tm); light yellowish brown (10YR 6/4); appears dry and hard/dense; well sorted; lower contact occurs between runs		
						At 11.3 to 12.6': Grades to fine Silty Sand		
		1	3	100		Sandy Silt, trace to some clay, trace coarse sand and fine gravel (Jsm and Tm); yellowish brown (10YR 5/4); appears dry and hard; well sorted; lower contact is erosional At 12.6 to 13.2': Some irregular strongly oxidized mottling, yellowish red (5YR 5/8)		
265	15					At 14.0 to 15.0': Abundant bioturbation (fine vertical root structures +/- burrows), some with open voids up to 1/8 inch, some with strongly oxidized, yellowish red (5YR 5/8) staining or infill; some fine spherical pores (<1/32 inch)		
		1	4	100		At 15.0 to 20.2': Abundant bioturbation (vertical and random root structures +/- burrows), up to 1/16 inch diameter, most are open voids, some with black manganese-oxide staining, some fine spherical pores (<1/32 inch); general color is brown (7.5YR 5/4), some gray (10YR 6/1) mottling/staining, especially around root structures		
260	20							

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: WL/AR 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T3-B4a

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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL\_FIELD\_NOTES\GINT LOGS\101561-TRANSECT\_3.GPI 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T3-B4</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/4/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Not encountered during drilling		
		1	5	100	CL-ML	<b>Paleosol - Marker Bed M<sub>G</sub></b> - Clayey Silt to Silty Clay, trace to some sand; mottled, brown (7.5YR 4/4) to reddish brown (5YR 4/4) to dark grayish brown (10YR 4/2); appears damp to moist and very stiff; moderate ped development with subangular blocky structure, some clay films; lower contact is gradational  At 23.0 to 24.5': Weathering zone, gradational transition to Lakewood Formation below		
255	25	2	6	84	SM/ML	<b>LAKESWOOD FORMATION [Q<sub>lw</sub>]</b> Silty Sand and Sandy Silt, fine grained sand; lightly mottled, brownish yellow (10YR 6/6) to light gray (2.5Y 7/2); appears dry to damp and very stiff/dense; well sorted; variable bioturbation (irregular root structures) up to 1/16 inch diameter, most with iron or manganese oxide infill/staining, some open voids, some fine spherical pores (<1/16 inch), lower contact occurs between runs At 25.5 to 29.0': Color change to pale brown (2.5Y 7/4) with slight to moderate yellow (10YR 7/8) mottling  At 29.0 to 29.8': Color becomes yellow (10YR 7/6)  At 30.5 to 31.0': Some indistinct oxidized laminations defined by variable oxidation		
250	30	2	7	100	SM	Silty Sand, fine grained; slightly mottled, pale brown (2.5Y 8/3) to yellow (10YR 7/8); appears dry to damp and dense; lower contact is gradational At 32.2 to 33.0': <b>Marker Bed M<sub>E</sub></b> - Abundant shell fragments (primarily bivalves) and calcium carbonate flecks, shells 10 to 20%, most <¼ inch, max ¾ inch		
		2	8	100	SP-SM	Poorly Graded Sand with Silt, fine to medium grained; lightly mottled, pale brown (2.5Y 8/3) to yellow (10YR 7/8); appears dry and dense; lower contact occurs between runs At 34.0 to 35.0': Trace shell fragments up to ¼ inch		
245	35	2	9	100		At 38.0 to 38.5': Trace shell fragments up to ¼ inch  At 38.8 to 39.0': Some dispersed manganese-oxide At 39.0 to 41.5': No recovery		
		2	10	100				
40								

(CONTINUED ON FOLLOWING FIGURE)

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 Prepared/Date: WL/AR 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T3-B4 (Continued)
						Jet Drilling / CME 75	Hollow Stem Auger	See Plate 3
						DATES DRILLED	BOREHOLE LOCATION	GROUND EL.
						3/4/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Not encountered during drilling		
		0	0			Qlw Continued		
		3	11	100	SM	Silty Sand, fine grained, trace coarse sand and fine gravel (Jsm and Tm); yellowish brown (10YR 5/4); appears dry and dense; lower contact is narrowly gradational		
		3	12	100	SP	At 42.0 to 42.5': <b>Marker Bed M<sub>E</sub></b> - Manganese oxide-rich bed; irregular, wavy, laminae; dark grayish brown (10YR 4/2) to light yellowish brown (2.5Y 6/4); appears damp and dense		
		3	13	60	GM	Poorly Graded Sand, fine to medium grained, trace to some coarse sand and gravel (Jsm and Tm); variable mottling, white (2.5Y 8/1) to strong brown (7.5Y 5/8); appears dry to damp and dense; lower contact occurs between runs		
		3	14	40	SM	At 43.5 to 43.7': Sub-horizontal, strongly oxidized layer		
		3	15	98		At 43.7 to 44.0': Mafic/magnesium oxide-stained sand laminations common		
		4	16	100		At 44.0 to 46.0': Alternating beds of sand similar to above and gravel similar to below, 4 to 6 inches typical thickness, gradational transition to unit below		
		4	17	57		<b>Marker Bed M<sub>D</sub></b> - Silty Gravel with Sand; clasts 50 to 70%, up to 2½ inches, mainly rounded to subrounded meta-basalt, quartzite and slate (Jsp), some sandstone (Tm); soil matrix is fine to coarse silty sand; light yellowish brown (10YR 5/4); appears dry to damp and dense; lower contact appears sharp		
						At 47.5 to 48.0': Soil matrix grades to Sandy Silt		
						At 48.0 to 49.0': No recovery		
						Silty Sand, fine, trace to some coarse sand and fine gravel clasts 2 to 10%, up to ½ inch (Jsm); pale brown (2.5Y 7/3); appears dry to damp and dense; well sorted; lower contact is 2 inch clay bed at 63.0'		
						At 50.0 to 51.5': No recovery		
						At 52.5 to 53.5': Becomes gravelly, clasts 20 to 40%, up to 1½ inches, mainly meta-basalt, quartzite and slate (Jsm)		
						At 55.5 to 59.5': Becomes damp, slightly mottled, light gray (2.5Y 7/1) to brownish yellow (10YR 6/6)		
						At 55.5 to 56.0': Becomes gravelly, clasts 30 to 40%, up to ¾ inch; mainly subrounded slate, meta-basalt and quartzite		
						At 56.5 to 58.0': Variable oxidized laminations		
						At 57.5 to 59.0': No recovery		
						At 59.5 to 60.5': Becomes moist to very moist, slightly mottled, light olive brown (2.5Y 5/6) to yellowish brown (10YR 5/8) to gray (2.5Y 6/1)		

(CONTINUED ON FOLLOWING FIGURE)

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 Checked/Date: MW/MF 10/13/2011

MTA Westside Subway Extension  
 Los Angeles, California



LOG OF BORING  
 Project No.: 4953-10-1561 Figure: T3-B4c

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T3-B4 (Continued)
						Jet Drilling / CME 75		
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/4/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Not encountered during drilling		
		4	18	100		SM	<b>Qlw Continued</b> At 60.5 to 63.0': Oxidized iron laminations common, generally subhorizontal	
		4	19	100		CL SM/ ML	At 63.0 to 63.2': <b>Marker Bed M<sub>c</sub></b> - Clay bed, (2 inches thick); dark grayish brown (10YR 4/2); appears moist and very stiff; upper and lower contacts are sharp, wavy, subhorizontal	
215	65	4	20	100			Silty Sand and Sandy Silt, very fine grained; slightly mottled, light olive brown (2.5Y 5/4) to yellow (2.5Y 7/6); appears dry and dense/very stiff; well sorted	
		4	21	100			At 63.2 to 63.5': Very fine Silty Sand; pale brown (2.5Y 7/3); appears dry and dense	
							At 64.8 to 68.1': Becomes moist; yellowish brown (10YR 5/6) to pale brown (10YR 6/3); uniform subhorizontal oxidized laminations	
							At 68.1': Appears dry to damp, color yellow (10YR 7/6) to pale brown (2.5Y 8/3) to reddish yellow (7.5YR 6/6)	
210	70	5	22	100		SM	Silty Sand, fine grained, mottled, yellowish brown (10YR 5/6) to gray (2.5Y 5/1); appears moist and dense; variable subhorizontal, oxidized laminations; lower contact is gradational	
							At 71.5 to 74.0': Mottling and laminations absent to infrequent, color light yellowish brown (10YR 7/4)	
		5	23	100		ML	At 73.5': <b>Marker Bed M<sub>b</sub></b> - Sandy Silt; pale brown (2.5Y 7/4); appears damp and very stiff; abundant bivalve shells and shell fragments, shells 10 to 25%, up to ¾ inch, at least one intact bivalve shell, ½ inch	
205	75						END OF BORING AT 74 FEET	
							NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched.  -Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than ¼ inch). -Beds are generally massive unless otherwise noted.	
	80							

Geologist: DB/MF  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		
						DRILLING METHOD	BOREHOLE LOCATION	<b>T3-B5</b>
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/9/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Not encountered during drilling		
						Hand augered to 6 feet		
						NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed description of clasts		
275	5							
		1	1	100		ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Sandy to Clayey Silt, trace coarse sand (Jsm and Tm), dark brown (7.5YR 3/4); appears dry to damp and hard; lower contact is gradational	
						ML	<b>ESTUARINE DEPOSITS [Qe]</b> Sandy Silt, trace to some clay, trace coarse sand and fine gravel (Jsm and Tm), occasional clayey silt beds; yellowish brown (10YR 5/4); appears dry and hard; well sorted; lower contact is narrowly gradational	
270	10					SM	At 9.0 to 10.4': Silty Sand, very fine grained, trace coarse sand (Jsm and Tm); yellowish brown (10YR 5/6); appears dry and dense; upper and lower contacts are narrowly gradational	
		1	2	70		ML		
							At 12.5 to 14.0': No recovery	
265	15					SM	At 14.0 to 14.8': Silty Sand; very fine grained, trace coarse sand and fine gravel (Jsm and Tm); yellowish brown (10YR 5/6); appears dry and dense; upper and lower contacts are narrowly gradational	
		1	3	92		ML	At 14.8 to 17.5': Becomes dark yellowish brown (10YR 4/4); appears damp	
							At 17.5 to 22.5': Becomes mottled, generally brown (7.5YR 4/4) with gray (2.5Y 6/1); appears dry to damp; some bioturbation (vertical and random root structures, +/- burrows), gray staining common around root structures, occasional subhorizontal laminations	
20								

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T3-B5 (Continued)
						Jet Drilling / CME 75		
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/9/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Not encountered during drilling		
		2	4	86	ML	Qe Continued		
					ML	Paleosol - Marker Bed M <sub>G</sub> - Clayey Silt, trace to some sand; lightly mottled, dark grayish brown (10YR 4/2) to reddish brown (5YR 5/4); appears damp and hard; some faint subhorizontal laminations; weak ped development, some clay films; lower contact appears gradational (not intact)		
255	25					At 25.5 to 26.4': Appears damp to moist and very stiff		
		2	5	92	ML	At 26.4 to 27.5': Weathering zone, gradational transition to Lakewood Formation below		
					SM/ ML	LAKEWOOD FORMATION [Q <sub>lw</sub> ] Silty Sand and Sandy Silt; very fine-grained, mottled, pale brown (2.5Y 8/3) to yellow (10YR 7/8); appears dry to damp and dense/very stiff; well sorted; occasional subhorizontal oxidized laminations; lower contact occurs between runs		
250	30	2	6	86				
					SM	Silty Sand, fine grained, trace coarse sand; brownish yellow (10YR 6/6) with occasional light gray (2.5Y 7/2) mottling; appears dry and dense; well sorted; occasional light gray, subhorizontal laminations, lower contact appears narrowly gradational (not intact)		
245	35	3	7	40		At 35.0 to 36.5': No recovery  Note: Marker Bed M <sub>F</sub> not observed. (shell bed). Possibly occurs in non-recovery zone above based on stratigraphic position in other borings.		
		3	8	80	SP- SM	Poorly Graded Sand with Silt; fine grained, very pale brown (10YR 7/4); appears dry and dense; lower contact appears narrowly gradational (not intact)		
40								

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T3-B5 (Continued)
						Jet Drilling / CME 75		
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/9/11	8 inches	280 feet
						GROUNDWATER READINGS		
						Not encountered during drilling		
		3	9	68			<b>Q<sub>lw</sub> Continued</b>	
							Poorly Graded Sand with Silt, fine-grained; pale brown (2.5Y 8/2) to yellow (10YR 7/8); appears dry and dense; variable subhorizontal laminations; lower contact appears sharp	
		3	10	72			At 41.8 to 42.0': Manganese oxide-rich bed; pale brown (2.5Y 7/4) to dark gray (10YR 4/1)	
							At 42.5 to 43.0': <b>Marker Bed M<sub>E</sub></b> - Manganese oxide-rich laminations alternate with oxidized laminations; light yellowish brown (2.5Y 6/3) to dark yellowish brown (10YR 4/6) to pale brown (2.5Y 8/3)	
							At 43.5 to 44.0': Distinct lenses defined by variable oxidation	
235	45	3	11	60			<b>Marker Bed M<sub>D</sub></b> - Silty Sand, fine grained, trace to some clay, variable coarse sand and fine gravel, clasts 2 to 20%, moist <1/2 inch, maximum 1 1/2 inches, mainly subangular slate (Jsp) and subrounded quartzite, meta-basalt and shale (Tm); brown (10YR 5/3); appear dry and stiff; lower contact occurs between runs	
						At 45.5 to 46.5': No recovery		
		3	12	60		At 47.5 to 48.0': Subhorizontal laminations		
						At 48.0 to 49.0': No recovery		
230	50	4	13	60		<b>SM</b> Silty Sand with Gravel, very fine grained, clasts 15 to 35%, up to 2 inches, mainly subangular slate (Jsm) and subrounded quartzite, meta-basalt and shale (Tm); yellow (10YR 7/6); appears dry and dense		
						At 50.5 to 51.5': No recovery		
		4	14	68		At 52.0 to 52.5': Soil matrix becomes Sandy Silt; light gray (10YR 7/2)		
						At 52.5 to 54.0': Becomes mottled, very pale brown (10YR 7/3) to yellow (10YR 7/6)		
225	55					Refusal at 54.0' on gravel/cobbles  END OF BORING AT 54 FEET		
						NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched.		
						-Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than 1/4 inch). -Beds are generally massive unless otherwise noted.		
60								

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	
						Jet Drilling / CME 75		<b>T3-B6</b>
						Hollow Stem Auger	See Plate 3	
						<b>DATES DRILLED</b> 3/11/11 and 6/21/11	<b>HOLE DIAMETER</b> 8 inches	<b>GROUND EL.</b> 275 feet
						<b>GROUNDWATER READINGS</b> Encountered at 24 feet during drilling		
							9 inches of asphaltic concrete over 3 inches of base Grab sample collected at 2' and 4'  Hand augered to 6 feet <b>FILL [Af]</b> Silty Sand with Gravel, fine-grained, 15 to 25%, up to ¾ inch, dark brown (10YR 3/3); appears damp	
						ML	<b>ESTUARINE DEPOSITS [Qe]</b> Clayey Silt with fine Sand, trace to some coarse sand and fine gravel, mainly subangular slate (Jsm) and subrounded shale (Tm); dark yellowish brown (10YR 4/4); appears very moist	
270	5					CL/ CH	Clay, trace coarse sand (Jsm); brown (7.5YR 4/2); appears moist and very stiff; lower contact gradational	
		1	1	100		ML	Clayey Silt, trace to some fine sand, trace coarse sand and gravel (Jsm and Tm); mottled, brown (7.5YR 4/3) to strong brown (7.5YR 4/6) to gray (2.5Y 6/1); appears damp and hard; lower contact is narrowly gradational	
265	10	1	2	100		CL/ ML	Silty Clay to Clayey Silt, trace to some fine sand, trace coarse sand and fine gravel (Jsm and Tm); lightly mottled (7.5YR 3/2) to strong brown (7.5YR 4/6); appears damp and hard; coarsens gradually with depth; lower contact is gradational  <b>NOTE:</b> JSM = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed descriptions of clasts	
260	15	1	3	100		ML	<b>OLDER ALLUVIAL FAN/ESTUARINE DEPOSITS [Qfo/Qe]</b> Sandy to Clayey Silt, trace to some coarse sand and gravel, clasts 5 to 20%, up to ¾ inch, mainly subangular slate (Jsm) and subrounded shale and fine sandstone (Tm); appears damp and hard; coarsens with depth, lower contact is gradational	
						ML	At 18.4 to 18.6': Gravelly bed, gravel 25 to 40%, up to ¾ inch, mainly subrounded fine sandstone (Tm), some subangular slate (Jsm) At 19.0 to 20.4': Gravel content decreases to <5%, gradational transition to unit below	

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T3-B6</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/11/11 and 6/21/11	8 inches	275 feet
						GROUNDWATER READINGS		
						Encountered at 24 feet during drilling		
						<b>Qfo/Qe Continued</b>		
						<b>ESTUARINE DEPOSITS [Qe]</b>		
						Sandy to Clayey Silt, trace coarse sand (Jsm and Tm); lightly mottled, generally brown (7.5YR 4/3) to strong brown (7.5YR 4/6), with occasional gray (10YR 5/1); appears moist and very stiff; well sorted; occasional root structures or other bioturbation with gray staining		
						ML		
		2	4	100		SC	At 22.7 to 23.1': Clayey Sand with Gravel; fine to coarse grained, clasts 30 to 40%, up to ¼ inch, mainly subangular shale (Jsp) and subrounded fine sandstone (Tm)	
						ML	Sandy Silt with Clay, trace coarse sand (Jsm and Tm); mottled, brown (7.5YR 4/3) to dark grayish brown (10YR 4/2); appears wet and soft to medium stiff; some manganese oxide staining	
250	25						At 24': Groundwater encountered during drilling	
						SM	Silty Sand, fine grained, trace to some clay, dark yellowish brown (10YR 4/4); appears wet and medium dense; trace manganese oxide staining; well sorted; lower contact occurs between runs	
		2	5	64			At 26.7 to 27.2': Coarse Sand and Gravel content increases, gravel 10 to 20%, up to ½ inch, mainly subangular slate (Jsm) and subrounded quartzite and fine sandstone (Tm); lower contact occurs between runs	
							At 27.2 to 29.0': No recovery	
							Contact depth uncertain due to poor recovery	
245	30					SC	Clayey Sand with Gravel, fine to coarse grained, gravel 30 to 40%, up to 1 inch, mainly angular to subangular slate (Jsm), and subangular to subrounded fine sandstone (Tm) and quartzite	
						CL	At 30.5 to 31.0': Silty Clay; lightly mottled, dark grayish brown (10YR 4/2) to dark yellowish brown (10YR 4/6); appears wet and soft; upper and lower contacts are sharp	
		2	6	64		SM	At 31.0 to 31.6': Silty Sand, fine-grained; lightly mottled, brown (10YR 4/3) to strong brown (7.5YR 5/6); appears wet and medium dense; lower contact appears erosional	
						ML	Sandy to Clayey Silt, trace coarse sand and fine gravel (Jsm and Tm); strongly mottled, gray (2.5Y 6/1) to yellow (2.5Y 7/6) to strong brown (7.5YR 5/8); appears very moist and very stiff; occasional manganese oxide staining; lower contact is gradational	
							At 32.2 to 34.0': No recovery	
							At 34.0 to 37.0': Distinct varve-like bedding	
240	35	2	7	64				
		3	8	100				
							At 39.5 to 40.0': Slightly finer, mainly clayey silt, gradational transition to beds below	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MW/MF  
 Prepared/Date: WL/AR 10/13/2011  
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					DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
					Jet Drilling / CME 75		<b>T3-B6</b> (Continued)
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING METHOD	
						Hollow Stem Auger	See Plate 3
					DATES DRILLED	HOLE DIAMETER	GROUND EL.
					3/11/11 and 6/21/11	8 inches	275 feet
					GROUNDWATER READINGS		
					Encountered at 24 feet during drilling		
		3	9	100		ML/CL	<b>Qe Continued</b> Clayey Silt and Silty Clay, variable fine sand, occasionally grades to sandy silt, trace coarse sand and fine gravel (Jsm and Tm); mottled, strongly oxidized reddish brown (5YR 4/4) to strong brown (7.5YR 5/6); appears moist and stiff; occasional manganese oxide staining; possible weak soil development; lower contact is gradational
		3	10	100			
230	45	3	11	66		SM/ML	Silty Silt to Sandy Silt, fine grained, trace to some clay; mottled, dark yellowish brown (10YR 4/6) to light yellowish brown (2.5Y 6/3); appears very moist and medium dense/medium stiff; well sorted; variable subhorizontal bedding, some oxidized laminations and varve-like bedding; some manganese oxide staining; lower contact occurs between runs
225	50	4	12	100		SP-SM	Poorly Graded Sand with Silt, fine to medium grained; dark yellowish brown (10YR 3/4); appears wet and dense; lower contact is sharp, erosional, black, manganese oxide stained sand layer (1/2 inch thick) at contact
		4	13	88		CL	<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b> - (possible sag pond deposits?) Silty Clay, variable fine to coarse sand; strongly mottled; grayish brown (2.5Y 5/2) to strong brown (7.5YR 5/8) to very dark gray (7.5Y 3/1); appears very moist to wet and stiff; numerous subhorizontal laminations exhibit above colors, very dark gray layers appear organic rich, also possible black manganese oxide staining, lower contact occurs between runs
		4	14	100		CL	At 51.5 to 52.3': Poorly Graded Sand with Silt bed, similar to bed at 49.0 to 49.9', up to 1 inch of black manganese oxide-stained sand at lower contact, contact erosional, appears to dip 10 to 15°
220	55	4	15	100		CL	Clay, variable silt and fine sand; trace coarse sand; strongly mottled, dark yellowish brown (10YR 3/4) to gray (N5) to brown (7.5YR 4/4); appears very moist and very stiff; occasional manganese oxide flecks
							At 59.0 to 59.3': Calcium carbonate occurs as filaments and uncemented nodules up to 3/4 inch, calcretions up to 1/2 inch, total calcium carbonate up to about 15% of soil mass At 59.3 to 64.0': Trace widely scattered calcium carbonate filaments

(CONTINUED ON FOLLOWING FIGURE)

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
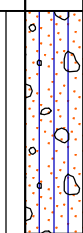

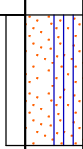
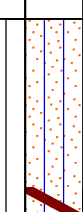

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T3-B6 (Continued)
						Jet Drilling / CME 75		
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/11/11 and 6/21/11	8 inches	275 feet
						GROUNDWATER READINGS		
						Encountered at 24 feet during drilling		
210	65	5	16	100	CL	<p><b>Qe Continued</b></p> <p>At 61.0 to 63.5': Mottling becomes less distinct</p> <p>At 63.5 to 64.0': Evenly spaced, oxidized laminations</p> <p>At 64.3 to 65.7': Strongly mottled, reddish brown (5YR 4/3) to brown (7.5YR 5/4), abundant manganese-oxide in flecks or irregular concentrations</p> <p>At 65.7 to 74.0': Variable colors and strength of mottling, colors mainly brown (7.5YR 4/4) to very dark grayish brown (10YR 3/2) to grayish brown (10YR 5/2) to reddish brown (5YR 4/4)</p>		
205	70	5	17	100				
200	75	5	18	100				
200	75	6	1	94	SP-SM	<p><b>LAKWOOD FORMATION [Qlw]</b></p> <p>Poorly Graded Sand with Silt, fine to medium grained; light olive brown (2.5Y 4/6); appears very moist to wet and dense; slight oxidized mottling</p>		
80						At 74 to 75': No sampling		

(CONTINUED ON FOLLOWING FIGURE)

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					DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
					Jet Drilling / CME 75		<b>T3-B6</b> (Continued)
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	DRILLING METHOD	BOREHOLE LOCATION	
					Hollow Stem Auger	See Plate 3	
					DATES DRILLED	HOLE DIAMETER	GROUND EL.
					3/11/11 and 6/21/11	8 inches	275 feet
GROUNDWATER READINGS							
Encountered at 24 feet during drilling							
		6	2	22		SP	<b>Qlw Continued</b> At 80 to 81.1': Thin layering of oxidized laminae, depth of lower contact uncertain due to poor recovery  At 81.1 to 85': No recovery
190	85	6	3	78		SM	Silty Sand with Gravel, fine to coarse grained, clasts 30 to 50%, up to 1 inch; mainly subrounded granitic rock, quartzite and slate; color is variable; appears wet and dense; lower contact is sharp
185	90					SP-SM	Silty Sand, fine grained, trace fine gravel; pale brown (2.5Y 7/3); appears wet and dense; well sorted At 88.1 to 88.4': Possible fault, dips approximately 60 to 65 degrees, gravel above, fine sand below, parallel lineations; bedding, dips 15 degrees below fault and near horizontal above fault At 88.9 to 90.0': No recovery
180	95	7	4	34		SM	At 90.0 to 91.7': Alternating beds (2 to 6 inch thick), defined by variable oxidation  At 91.7 to 95': No recovery
		7	5	65		SM	Silty Sand, very fine grained; variable color, generally light olive brown (2.5Y 5/4); appears wet and dense; indistinct fracturing from 95.7' to 96.5'  At 96.7': Becomes oxidized, dark yellowish brown (10YR 4/6) At 97.4': Possible fault, clay gouge zone (1 inch thick), sand above, silty sand below, apparent dip approximately 30 to 40 degrees At 97.6 to 99': No recovery
						SM	<b>SAN PEDRO FORMATION [Qsp]</b> At 99 to 102': Silty Sand, very fine to fine grained; dark grayish green (5GY 4/2); appears wet and dense (Disturbed sample)

(CONTINUED ON FOLLOWING FIGURE)

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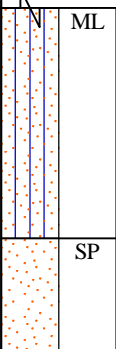
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T3-B6 (Continued)
						Jet Drilling / CME 75		
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/11/11 and 6/21/11	8 inches	275 feet
						GROUNDWATER READINGS		
						Encountered at 24 feet during drilling		
						SM	<b>Qsp Continued</b> At 100.4': Fracture, dips approximately 55 degrees	
		7	6	86		SM-ML ML	At 101.4': Grades to Sandy Silt and Silty Sand, very fine grained; very dark grayish green (5Y 3/2) At 102.2 to 102.4': Trace shell fragments At 102.7 to 105.9': Near vertical fracture, infilled with silt and sand from above and calcium carbonate	
170	105						104.5 to 106': Shell fragments	
		7	7	100		CL	Clay; very dark gray (5Y 3/1) to black (5Y 2.5/1); some waxy surfaces and slickensides, appears sheared along lineations sub-parallel to fault above At 106.4 to 107.2': Fault, dips approximately 70 degrees; gouge zone, 1 inch wide, infilled with very fine silty sand	
165	110						At 109.5 to 111.0': Clay; very dark gray (10Y 3/1); bedding is thin to laminated, approximate apparent dip 25 to 35 degrees; sub-parallel, sheared, waxy parting surfaces	
		7	8	100		CL/ML SM	At 111': Increasing silt At 111.6 to 111.7': Broken up calcium carbonate concretion At 111.7 to 113.0': Silty Sand, fine grained; greenish black (5GY 2.5/1); appears very moist and dense	
						ML	At 113.0 to 113.5': Grades to Clayey Silt, micaceous	
						SP	At 113.5 to 115.5': Grades to Poorly Graded Sand, fine to medium grained, with some coarse sand; lower contact is sharp	
160	115							
		7	9	100		ML	Clayey Silt; very dark greenish gray (10Y 3/1); appears very moist and very stiff; lower contact is sharp At 116.0 to 118.5': Some indistinct fracturing; some calcium carbonate nodules, shell fragments and fine gravel	
							At 118.5': Sand layer (1 inch thick) At 119.5': Broken up concretion (2 inches thick) At 119.5 to 123.0': Color becomes dark greenish gray (5GY 4/3)	

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T3-B6 (Continued)
						Jet Drilling / CME 75		
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/11/11 and 6/21/11	8 inches	275 feet
						GROUNDWATER READINGS		
						Encountered at 24 feet during drilling		
		8	10	100		<b>Qsp Continued</b> At 120 to 120.6': Grades to Sandy Silt At 120.6': Some fine gravel and sand		
						Sand, fine to medium grained; very dark greenish gray (5G 2.5/3/1); appears wet and dense		
						END OF BORING AT 124½ FEET		
						NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched.  -Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than ¼ inch). -Beds are generally massive unless otherwise noted.		
						Boring extended from 75 to 124½ feet on 6/20/2011. Offset from original boring location approximately 1-foot north east.		
150	125							
145	130							
140	135							
140								

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					DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
					Jet Drilling / CME 75		<b>T3-B7</b>
					DRILLING METHOD	BOREHOLE LOCATION	
					Hollow Stem Auger	See Plate 3	
					DATES DRILLED	HOLE DIAMETER	GROUND EL.
					3/17/2011	8 inches	271 feet
					GROUNDWATER READINGS		
					Encountered at 23 feet during drilling		
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.		
270						9 inches of asphaltic concrete over 3 inches base  Hand augered to 6 feet <b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey Silt, variable fine sand, trace coarse sand and fine gravel (Jsm and Tm); dark brown (7.5YR 3/4); appears very moist and medium stiff; poorly sorted; lower contact occurs between runs At 2.0': Minor dispersed organics  NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed descriptions of clasts	
265	5	1	1	67		Silty Clay, trace to some fine sand, trace coarse sand and fine gravel (Jsm and Tm); very dark grayish brown (10YR 3/2); appears moist to very moist and very stiff; poorly sorted; lower contact is narrowly gradational	
260	10	1	2	100		<b>ESTUARINE DEPOSITS [Qe]</b> Clayey to Sandy Silt; mottled, light olive brown (2.5Y 5/3) to dark yellowish brown (10YR 4/6); appears very moist and very stiff; lower contact is narrowly gradational	
255	15	1	3	56		Sandy Silt, trace to some clay, trace coarse sand (Jsm and Tm); mottled, light olive brown (2.5Y 5/3) to dark yellowish brown (10YR 4/6); appears moist and stiff; occasional clayey silt beds; variable varve-like bedding; lower contact occurs between runs  At 16.8 to 19.0': No recovery	
20	20						

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T3-B7 (Continued)
						Jet Drilling / CME 75		
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/17/2011	8 inches	271 feet
						GROUNDWATER READINGS		
						Encountered at 23 feet during drilling		
250		2	4	100		ML	<b>Qe Continued</b> Clayey Silt with variable sand, trace coarse sand and fine gravel (Jsm and Tm); mottled, grayish brown (2.5Y 5/2) to brown (7.5YR 4/4); appears very moist to wet and soft; appears poorly consolidated; variable varve-like bedding; lower contact occurs between runs  ∇ At 23': Groundwater encountered during drilling At 23.3 to 23.6' and 24.0 to 24.9': Silty Sand, fine grained, some coarse sand and gravel, gravel 5 to 15%, up to 1/2 inch, mainly subangular slate (Jsm); dark yellowish brown (10YR 3/6); appears very moist to wet and medium dense	
25						SM		
						ML		
						SM		
245		2	5	36		ML	At 25.8 to 29.0': No recovery	
							Depth of contact uncertain due to poor recovery	
30		2	6	100		SP-SM	Poorly Graded Sand with Silt, fine grained; dark yellowish brown (10YR 4/4); appears very moist to wet, and medium dense; well sorted; occasional silt beds as noted below, silt beds exhibit prominent varve-like bedding; lower contact is gradational At 30.3 to 31.0': Becomes siltier, some coarse sand and gravel, gravel 5 to 15%, up to 1/2 inch, mainly subangular slate (Jsm)	
240						ML	At 31.0 to 31.5', 33.2 to 34.0', and 36.0 to 36.5': Clayey to Sandy Silt; mottled, grayish brown (2.5Y 5/2) to brown (7.5YR 4/4); appears very moist and stiff; upper contacts are sharp, erosional; some manganese oxide staining at 43.2 to 44.0'	
		2	7	100		SP/SM		
						ML		
35		2	8	100		SP	At 34.0 to 35.3': Grades to fine to medium grained, trace coarse sand (Jsm)	
235						ML	At 35.3 to 36.0' and 37.3 to 38.0': Gradational zones (grades from sand to clayey silt)	
		2	9	100		SP/SM		
						ML		
						CL/ML	Clayey Silt to Silty Clay with variable fine sand, trace coarse sand (Jsm and brick-red Tm sandstone); mottled, with variable colors, mainly brown (7.5YR 4/4) to yellowish brown (10YR 5/4) to gray (10YR 5/1); appears very moist and medium stiff to stiff; occasional faint varve-like bedding; lower contact is gradational At 39.8 to 40.2': Color primarily dark gray (10YR 3/1), possible dispersed organics	

(CONTINUED ON FOLLOWING FIGURE)

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



**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T3-B7b

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T3-B7 (Continued)
						Jet Drilling / CME 75		
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/17/2011	8 inches	271 feet
						GROUNDWATER READINGS		
						Encountered at 23 feet during drilling		
230		3	10	100		CL/ML	<b>Qe Continued</b> At 40.7': Possible detrital charcoal, sample collected At 40.7 to 50.2': Some irregular, subhorizontal laminations	
		3	11	100				
45		3	12	100		SP	Poorly Graded Sand, fine grained; brown (7.5YR 4/4); appears very moist and medium dense; lower contact is sharp, erosional	
225								
		3	13	100		SP/SM	At 46.5 to 48.7': Grades to Poorly Graded Sand with Silt, fine grained	
50		3	14	100		CL/CH	Clay and Silty Clay, variable fine to coarse sand, coarse sand mainly slate (Jsm) with some brick-red sandstone (Tm); variable mottling and colors, mainly brown (7.5YR 4/2 and 7.5YR 4/4) to gray (10YR 5/1); appears very moist and stiff; occasional indistinct laminations	
220								
						ML	At 51.0 to 52.2': Sandy to Clayey Silt, trace coarse sand and gravel (Jsm and Tm); mottled, brown (7.5YR 4/4) to dark gray (7.5YR 4/1); appears very moist and very stiff	
		4	15	100		CL/CH	At 52.5': Small root, sample collected	
55							At 54.5 to 55.8': Sand generally increases with depth, gradational transition to unit below	
215		4	16	100		CL/SC	<b>OLDER ALLUVIAL FAN/ESTUARINE DEPOSITS [Qfo/Qe]</b> Sandy Clay to Clayey Sand with Gravel, clasts 25 to 50%, most < 1/2 inch, maximum 1 1/2 inches, mainly subangular slate (Jsm) with some subrounded shale (Tm) and granitic rock; brown (7.5YR 4/2); appears very moist and medium stiff to stiff; lower contact occurs between runs	
							At 58.0 to 59.0': Becomes less gravelly (<10%), appears moist and very stiff	
60						ML	<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b> Sandy Silt, trace clay; mottled, gray (10YR 6/1) to yellowish brown (10YR 5/8); appears moist and stiff to very stiff; trace calcium carbonate filaments and manganese	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: WL/AR 10/13/2011  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T3-B7 (Continued)
						Jet Drilling / CME 75		
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/17/2011	8 inches	271 feet
						GROUNDWATER READINGS		
						Encountered at 23 feet during drilling		
210		4	17	100	ML	oxide staining; lower contact occurs between runs		
					CL	<b>Qef Continued</b>		
					ML	At 60.1': Sand bed (1 inch thick); subhorizontal, upper-contact is narrowly gradational, lower contact is sharp		
						At 60.5 to 61.5': Clay content increases, sand decreases (gradational zone)		
						At 61.5 to 63.0': Clay and Silty Clay, trace coarse sand and fine gravel (Jsm and Tm); mottled, brown (7.5YR 4/4) to dark gray (10YR 4/1); appears very moist and very stiff		
						At 63.0 to 64.0': Trace coarse sand and fine gravel (Jsm and Tm)		
						At 64.0 to 66.0': No sampling		
65		0	0	0				
205					CL	At 66.0 to 66.5': Silty Clay with Sand; mottled, brown (7.5YR 4/4) to dark gray (10YR 4/1); appears very moist and very stiff		
					ML	At 66.5 to 69.0': Recovered only slough		
		5	18	20		Contact uncertain due to poor recovery		
					CL	Clay; yellowish brown (10YR 5/4); appears very moist and soft; some calcium carbonate flecks and uncemented nodules, contact below is sharp, subhorizontal		
70					CL	Clay, trace coarse sand and fine gravel (Jsm and Tm); dark brown (7.5YR 3/2); appears very moist and stiff; appears to have high organic content; lower contact is narrowly gradational		
200		5	19	100		At 70.3 to 72.0': Organics decrease (minimal), trace fine gravel (Jsm and Tm)		
					ML	<b>ESTUARINE DEPOSITS [Qe]</b>		
						At 72.0 to 72.3': Gravelly bed, gravel 20 to 30%, up to 1/2 inch, mainly slate (Jsm), shale and sandstone (Tm)		
						Sandy to Clayey Silt, trace coarse sand and fine gravel (Jsm and Tm); brown (7.5YR 4/4) to gray (2.5Y 5/1); appears very moist and very stiff		
						END OF BORING AT 74 FEET		
75						NOTES:		
						Boring backfilled with cement/bentonite grout from bottom up and patched.		
195						-Munsell colors listed in order of predominance (most predominant color first).		
						-Where observed, contacts and bedding appear subhorizontal unless otherwise noted.		
						-Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted.		
						-Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted.		
						-The term "clasts" herein describes gravel-size rock fragments (larger than 1/4 inch).		
						-Beds are generally massive unless otherwise noted.		
80								

Geologist: DB/MF  
 Prepared/Date: WL/AR 10/13/2011  
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**MTA Westside Subway Extension**  
**Los Angeles, California**



**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T3-B7d

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					DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
					Jet Drilling / CME 75		<b>T3-B9</b>
					DRILLING METHOD	BOREHOLE LOCATION	
					Hollow Stem Auger		See Plate 3
					DATES DRILLED	HOLE DIAMETER	GROUND EL.
					3/15/2011		8 inches
					GROUNDWATER READINGS		
					Not Recorded		
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.		
295					SM	6 inches of asphaltic concrete over 3 inches of base Hand augered to 6 feet  <b>FILL [Af]</b> Silty Sand, fine grained, trace fine gravel, trace clay; brown (10YR 4/3); appears moist and dense  Grab samples collected at 2', 3.5', and 5'  NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed descriptions of clasts	
290	5	1	1	83	ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Sandy Silt, trace to some clay; trace coarse sand and fine gravel (Jsm); brown (7.5YR 4/4); appears very moist and medium stiff; poorly sorted; lower contact is narrowly gradational	
285	10	1	2	84	SM/ML	Silty Sand and Sandy Silt, very fine grained, trace to some coarse sand and fine gravel, gravel 0 to 15%, up to 1/2 inch, mainly angular to subangular slate (Jsm) with some subrounded shale and brick-red sandstone (Tm); strong brown (7.5YR 5/6); appears dry to damp and dense/hard; lower contact is sharp	
280	15	1	3	94	SM	At 11.3 to 11.5': Silty Sand, fine to coarse-grained; color variable Silty Sand with Gravel, fine to coarse-grained, trace to some clay, gravel content variable, generally 15 to 50%, up to 1 inch, mainly angular to subangular slate (Jsm) and subrounded shale and fine brick-red sandstone (Tm), some rounded quartzite; dark brown (7.5YR 3/4); appears very moist and dense; occasionally grades to clayey sand with gravel; lower contact is gradational	
					ML	Sandy Silt, trace to some clay, trace coarse sand and fine gravel (Jsm and Tm); strong brown (7.5YR 4/6); appears very moist and stiff; lower contact occurs between runs	
	20				ML/GP	At 19.0 to 20.0': Sandy Silt alternates with 2 to 3 inch thick gravelly beds, gravel up to 50%, up to 3/4 inch, mainly subangular slate (Jsp), some shale and sandstone (Tm); lower contact of upper gravel bed at 19.3' appears to dip approximately 30 degrees	

(CONTINUED ON FOLLOWING FIGURE)

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 Prepared/Date: WL/AR 10/13/2011  
 Checked/Date: MW/MF 10/13/2011

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.	
						DRILLING METHOD	BOREHOLE LOCATION	T3-B9 (Continued)	
						Jet Drilling / CME 75			
						Hollow Stem Auger	See Plate 3		
						3/15/2011	HOLE DIAMETER 8 inches	GROUND EL. 296 feet	
						GROUNDWATER READINGS Not Recorded			
275		2	4	86			<b>ESTUARINE DEPOSITS [Qe]</b> Clayey to Sandy Silt, rare (<1%) coarse sand (Jsm and Tm); olive brown (2.5Y 4/3); appears moist and very stiff, trace manganese oxide staining; lower contact is gradational  At 24.5 to 26.0': Becomes less clayey; color change to light olive brown (2.5Y 5/3); gradational transition to bed below		
25									
270		2	5	100				<b>Sandy Silt with variable Clay, rare (&lt;1%) coarse sand (Jsm and Tm); mottled, strong brown (7.5YR 4/6) to gray (2.5Y 6/1); appears very moist and medium stiff to stiff; occasional subhorizontal laminations, lower contact is gradational</b>  At 29.0 to 32.0': Distinct varve-like bedding  At 32.0 to 35.0': Coarsens downward, gradational transition to fan deposits below	
30									
265		2	6	92					
35									
260		3	7	100			<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Sandy to Clayey Silt, trace to some gravel, clasts up to 15%, up to ¾ inch, mainly subangular slate (Jsm), some subrounded shale and brick-red sandstone (Tm) also observed; dark brown (7.5YR 3/4); appears very moist and stiff; poorly sorted At 36.0': Color becomes brown (7.5YR 4/4)  At 39.0 to 39.5': Becomes more gravelly, clasts 20 to 30%, up to 1 inch		
40									

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: WL/AR 10/13/2011  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T3-B9 (Continued)
						Jet Drilling / CME 75		
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/15/2011	8 inches	296 feet
						GROUNDWATER READINGS		
						Not Recorded		
255		3	8	68		ML	<b>Qfo Continued</b>	
							At 42.4 to 44.0': No recovery	
	45	3	9	100		CL-ML	At 44.0 to 44.8': Becomes lightly mottled, brown (7.5YR 5/4) to reddish brown (5YR 4/4); possible weak soil development	
							At 44.8 to 45.6': Gradational transition to Estuarine Deposits below	
250						ML	<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b>	
							Clay and Silty Clay; dark brown (7.5YR 3/4) to yellowish brown (10YR 4/6); appears very moist and stiff	
		3	10	100			At 46.5 to 49.0': Becomes slightly mottled, brown (10YR 4/3) to yellowish brown (10YR 4/6) to light brownish gray (2.5Y 6/2); appears moist to very moist and very stiff; trace calcium carbonate filaments	
50		4	11	100		CL/CH	Clayey Silt and Silty Clay, variable fine sand, trace coarse sand and fine gravel; mottled, grayish brown (10YR 5/2) to strong brown (7.5YR 5/6); appears very moist and stiff to very stiff; trace calcium carbonate filaments and manganese oxide staining; occasional thin sandy silt beds and laminations; lower contact is gradational	
245						ML	At 51.8 to 54.0': Clayey to Sandy Silt, trace coarse sand (Jsm and Tm); mainly grayish brown (2.5Y 5/2) with strong brown (7.5YR 5/8) mottling; appears moist and very stiff; trace manganese oxide staining, trace to some (up to 15%) calcium carbonate filaments and small (<1/8 inch) uncemented nodules	
55						CL/CH	At 54.0 to 57.5': Appears very moist to wet and soft to medium stiff	
240		4	13	100		ML	At 57.5 to 59.0': Grades to Clayey to Sandy Silt; trace coarse sand and fine gravel; appears moist to very moist and very stiff	
60						CL/CH	At 59.0 to 60.0': Abundant manganese oxide staining, color is mainly dark brown (7.5YR 3/3) to dark yellowish brown (7.5YR 4/4)	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: WL/AR 10/13/2011  
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**MTA Westside Subway Extension**  
**Los Angeles, California**



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T3-B9c

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T3-B9 (Continued)
						Jet Drilling / CME 75		
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/15/2011	8 inches	296 feet
						GROUNDWATER READINGS		
						Not Recorded		
235		5	14	100		CL/ CH	Qef Continued	
65							At 64.0 to 67.3': Sandy Silt, laminations more common, variable varve-like bedding	
230		5	15	100				
						CL	ESTUARINE DEPOSITS [Qe]	
							Clay, trace to some fine to coarse sand; brown (10YR 5/3); appears wet and soft to medium stiff; occasional more sandy beds	
70							At 68.5': Becomes slightly mottled, brown (10YR 5/3) to grayish brown (10YR 5/2) to strong brown (7.5YR 4/4)	
225		5	16	72			At 70.0 to 73.0': Occasional 2 to 3 inch thick interbeds of Sandy Clay/Clayey Sand	
							At 73.0 to 74.0 Distinct varve-like bedding	
75							END OF BORING AT 74 FEET	
220							NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched.	
80							-Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than ¼ inch). -Beds are generally massive unless otherwise noted.	

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 Prepared/Date: WL/AR 10/13/2011  
 Checked/Date: MW/MF 10/13/2011



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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		
						DRILLING METHOD	BOREHOLE LOCATION	<b>T4-B1</b>
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/19/11	8 inches	265 feet
						GROUNDWATER READINGS		
						Encountered at 47-ft during drilling		
						8 inches of asphaltic concrete over 4 inches of base		
						Hand augered to 6 feet		
						<b>FILL [Af]</b> Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); brown (10YR 4/3); appears moist and stiff to very stiff  NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed descriptions of clasts At 4.0 to 8.5': Becomes dark brown (10YR 3/3)		
260	5					At 6.0 to 7.0': Becomes gravelly		
		1	1	100	ML	<b>YOUNGER/OLDER ALLUVIAL FAN DEPOSITS [Qf/Qfo]</b> Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); brown (10YR 4/3); appears moist and stiff; poorly sorted; lower contact is gradational  At 8.5': Becomes lightly mottled, color variable, mainly dark grayish brown (10YR 4/2) to light brownish yellow (10YR 6/4)		
255	10	1	2	86	ML	<b>ESTUARINE DEPOSITS [Qe]</b> Sandy Silt, trace to some clay; lightly mottled, grayish brown (2.5Y 5/2) to brown (7.5YR 5/4); appears moist and stiff; well sorted; lower contact is narrowly gradational		
						Sandy to Clayey Silt, trace coarse sand (Jsm and Tm); light olive brown (2.5Y 5/3) with variable strong brown (7.5YR 5/6) mottling; appears moist and very stiff; well sorted; some faint laminations; some calcium carbonate filaments, total calcium carbonate is about 5 to 15%		
250	15	1	3	76	ML	At 16.0': Calcium carbonate decreases to trace, becomes more clayey  At 17.8 to 19.0': No recovery  At 19.0 to 21.0': Becomes strongly mottled, yellowish brown (10YR 5/8) to gray (10YR 6/1)		
20	20							

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: WL/YN/AR 10/10/2011  
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					DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
					Jet Drilling / CME 75		<b>T4-B1</b> (Continued)
					DRILLING METHOD	BOREHOLE LOCATION	
					Hollow-Stem Auger	See Plate 3	
					DATES DRILLED	HOLE DIAMETER	GROUND EL.
					3/19/11	8 inches	265 feet
					GROUNDWATER READINGS		
					Encountered at 47-ft during drilling		
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.		
		2	4	100		<b>Qe Continued</b>	
		2	5	100		At 22.0 to 25.0': Trace coarse sand and fine gravel (Jsm and Tm), occasional subangular slate (Jsm) up to 1 inch; strongly mottled, strong brown (7.5YR 5/8) to gray (10YR 6/1); variable faint laminations (Possible Poorly Developed Paleosol)	
240	25	2	6	100		<b>Marker Bed M<sub>c</sub></b> - Silty Clay to Clayey Silt, trace to some fine sand, trace coarse sand and fine gravel (Jsm and Tm); dark brown (7.5YR 3/4) with occasional light brownish gray (10YR 6/2) mottling, appears very moist and very stiff; generally poorly sorted; grades downward into fan deposits below, possible poorly developed paleosol	
		3	7	100		<b>FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); color variable; generally brown (10YR 4/3), some subhorizontal, strong brown (7.5YR 5/6) to gray (10YR 5/1) laminations in upper 6 inches of bed; generally poorly sorted; appears very moist and stiff; lower contact is narrowly gradational	
235	30					Silty Sand and Sandy Silt, very fine grained, trace to some clay, trace coarse sand and fine gravel (Jsm and Tm); dark yellowish brown (10YR 3/6); appears very moist and dense/stiff; lower contact occurs between runs	
		3	8	52		At 31.6 to 34.0': No recovery	
230	35	3	9	92		At 34.0 to 34.8': Fine to coarse, Clayey Silty Sand with Gravel, clasts 15-20%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm) and shale (Tm); dark brown (10YR 3/3); appears moist and dense	
		3	10	100		<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b> Clayey Silt and Silty Clay, fine grained, trace to some fine sand, mottled, yellowish brown (10YR 5/4) to strong brown (10YR 5/8); appears very moist and very stiff; moderately well sorted; variable manganese oxide staining, slightly micaceous; lower contact is gradational	
						At 38.7 to 39.3': Becomes more sandy, abundant manganese oxide staining	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: WL/YN/AR 10/10/2011  
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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)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T4-B1 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						3/19/11	HOLE DIAMETER 8 inches	GROUND EL. 265 feet
						GROUNDWATER READINGS Encountered at 47-ft during drilling		
		3	11	100	ML	<b>Qef Continued</b> Silty Silt with Clay, rare coarse sand and fine gravel (Jsm and Tm); brown (10YR 5/3) with variable brown (7.5YR 4/4) to yellowish brown (10YR 5/6) mottling; appears very moist and very stiff; some subhorizontal laminations; lower contact is gradational		
		3	12	100	SM	<b>ESTUARINE DEPOSITS [Qe]</b> Silty Sand with Gravel, fine grained, gravel 15-20%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), some subrounded shale (Tm) and granitic rock also observed; color variable; appears very moist and dense		
					ML	Clayey to Silty Silt, trace coarse sand and fine gravel (Jsm and Tm); brown with variable yellowish brown (10YR 5/6) mottling; appears very moist and very stiff; some varve-like bedding; lower contact is gradational		
220	45	4	13	42		At 44.7 to 44.9' and 45.6 to 45.8': Silty Sand with Gravel, fine grained, contacts are sharp to narrowly gradational, sub-horizontal At 45.3 to 45.6' and 45.8 to 46.1': Silty Clay, trace coarse sand, contacts are narrowly gradational to sharp; sub-horizontal ∇ At 46.1 to 49.0': No recovery At 47': Groundwater encountered during drilling		
215	50	4	14	20	SP-SM	At 49.0 to 49.5': Poorly Graded Sand with Silt, fine to medium grained, trace coarse sand (Jsm and Tm); dark yellowish brown (10YR 4/4); appears wet and dense; depth of contacts uncertain due to poor recovery At 49.5 to 51.5': No recovery		
		4	15	100	ML			
					CL	Silty Clay, trace coarse sand (Jsm and Tm); grayish brown (2.5Y 4/2) with variable light yellowish brown (10YR 6/4) mottling; appears moist to very moist and very stiff; variable varve-like bedding; lower contact occurs between runs		
210	55	4	16	100		At 54.0 to 55.2': Clay alternates with numerous subhorizontal Silt and fine Silty Sand laminations, generally light yellowish brown (10YR 6/4) to dark yellowish brown (10YR 4/6) At 55.2 to 57.0': Some (5-10%) calcium carbonate filaments		
		4	17	100	CL	<b>ESTUARINE DEPOSITS-FINE GRAINED [Qef]</b> Silty Clay, trace coarse sand (Jsm); grayish brown with variable faint mottling; appears moist to very moist and stiff; variable varve-like bedding At 57.0 to 59.0': Variable sub-horizontal Silt and Sand laminations and irregular pockets		
60								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: WL/YN/AR 10/10/2011  
 Checked/Date: MW/MF 10/10/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T4-B1c

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)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T4-B1 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/19/11	8 inches	265 feet
						GROUNDWATER READINGS		
						Encountered at 47-ft during drilling		
		4	18	100	CL	<b>Qef Continued</b> Silty Clay, trace coarse sand and fine gravel (Jsm and Tm), including some brick-red sandstone; clay generally dark grayish brown (10YR 4/2); silt is strong brown (7.5YR 4/6); appears very moist and stiff; irregular, oxidized silt pockets and/or lenses; lower contact is gradational At 60.5 to 61.8': Calcium carbonate filaments increase with depth, near 5%  At 62.0 to 67.0': Coarsens with depth, oxidized silt increases, calcium carbonate occurs as filaments and nodules up to 1/4 inch, total calcium carbonate about 5-15%; coarse sand and fine gravel increase slightly, occasional rare gravelly beds  At 64.0 to 64.2': Gravel increases to about 10-15%, fine grained, mainly shale and fine sandstone (Tm)		
		5	19	100	ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Sandy to Clayey Silt, trace coarse sand and fine gravel (Jsm and Tm), rare (<1%) gravel up to 1 inch; light yellowish brown (10YR 6/4); appears moist and hard, trace calcium carbonate filaments  At 69.0 to 74.0': Becomes very moist, very stiff, mottled, brown (7.5YR 4/4) to dark grayish brown (10YR 4/2)  At 71.5 to 74.0': Gravel increases to about 5-10%, up to 1/2 inch, mainly subangular to subrounded shale and fine sandstone (Tm) and slate (Jsm), some brick red sandstone (Tm); trace calcium carbonate filaments and nodules up to 1/8-inch		
		5	20	100		END OF BORING AT 74 FEET  NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched.  -Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than 1/4 inch). -Beds are generally massive unless otherwise noted.		

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T4-B2</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/5/11	8 inches	263 feet
						GROUNDWATER READINGS		
						Encountered at 39.5-ft during drilling		
						Asphaltic concrete over base Hand augered to 6 feet		
						NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed descriptions of clasts		
260	5							
255		1	1	100		SC	No sampling to 8.0' <b>FILL [Af]</b> Clayey Sand, fine to coarse grained, some gravel, 10-15%, up to 1/2 inch; very dark grayish brown (10YR 3/2); appears very moist and medium dense	
10						ML/ CL	<b>ESTUARINE DEPOSITS [Qe]</b> Silty Clay and Clayey Silt, trace to some fine sand, trace coarse sand (Jsm and Tm); mottled, dark grayish brown (10YR 4/2) to strong brown (7.5YR 4/6); appears very moist and stiff; variable oxidized silt laminations; well sorted; lower contact is narrowly gradational	
250						CL	At 12.1 to 13.0': Clay, dark grayish brown (10YR 4/2)	
15		1	2	100		ML	Sandy to Clayey Silt; trace coarse sand and fine gravel (Jsm and Tm); dark gray (10YR 4/1) with occasional strong brown (7.5YR 4/6) mottling; appears moist to very moist and stiff; variable varve-like bedding and oxidized laminations; lower contact is narrowly gradational	
245						CL	At 17.5 to 18.0': Grades to Silty Clay	
						ML		
						SM	At 19.0 to 19.7': Grades to Silty Sand with Clay, becomes more sandy with depth, transition to gravel bed below, gravel 50-60%, up to 3/4 inch	
20						GM	At 19.7 to 20.5': Silty Gravel with Sand, mainly subangular to subrounded slate (Jsm),	

(CONTINUED ON FOLLOWING FIGURE)

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 Checked/Date: MW/MF 10/10/2011

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T4-B2</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Hollow-Stem Auger	See Plate 3	263 feet
						DATES DRILLED	HOLE DIAMETER	
						3/5/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 39.5-ft during drilling		
240		1	3	100	GM SM	<b>Qalo Continued</b> subrounded shale (Tm) and quartzite; soil matrix is fine to coarse silty sand with clay; very dark grayish brown (10YR 3/2); appears moist and dense; lower contact is erosional At 20.5 to 21.3': Color becomes dark yellowish brown (10YR 4/4) At 21.0': Thin (1/8 inch) oxidized silt lamination, approximate dip 10 degrees At 21.2 to 23.0': Becomes mottled, dark brown (10YR 3/3) to strong brown (7.5YR 4/6); some evenly spaced, subhorizontal laminations  At 23.0 to 26.1': Mottled gray (10YR 5/1) to dark yellowish brown (10YR 4/4)		
235		2	4	100	CL/ ML	<b>Marker Bed M<sub>E</sub></b> Silty Clay to Clayey Silt, trace to some fine sand, trace coarse sand and fine gravel (Jsm and Tm); dark brown (7.5YR 3/4) with occasional gray (10YR 5/1) mottling and laminations; appears moist and very stiff; possible weak soil development; lower contact occurs between runs		
30		2	5	80	ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt; trace coarse sand and fine gravel; brown (7.5YR 4/3); appears moist and very stiff; poorly sorted; lower contact occurs between runs  At 32.0 to 33.0': No recovery		
230		2	6	60	SC/ SM ML	Clayey to Silty Sand with Gravel, fine to coarse grained, clasts 15-25%, up to 2 inches, mainly subangular to subrounded slate (Jsm); shale (Tm) and brick-red fine sandstone (Tm); dark brown (10YR 3/3); appears moist and dense; lower contact is gradational  At 35.5 to 36.0': Sandy Silt with variable clay, trace coarse sand and fine gravel (Jsm and Tm); brown (7.5YR 4/3); appears very moist and stiff At 36.0 to 38.0': No recovery		
225		3	7	88	SM	Silty Sand, fine to coarse grained, trace clay, trace fine gravel (Jsm and Tm); brown (7.5YR 4/4); appears very moist to wet and dense; lower contact occurs between runs  At 39.5': Groundwater encountered during drilling		

(CONTINUED ON FOLLOWING FIGURE)

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 Prepared/Date: WL/YN/AR 10/10/2011  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T4-B2 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/5/11	8 inches	263 feet
						GROUNDWATER READINGS		
						Encountered at 39.5-ft during drilling		
						<p><b>Qfo Continued</b>            Silty Sand as above, increasing gravel</p> <p>At 40.9 - 43.0': No recovery</p>		
		3	8	16	SM			
	220							
		3	9	20	SM	<p>At 43.6 - 46.0': No recovery</p>		
	45							
		N/A	10	0		<p>At 46.0 to 50.0': No recovery</p>		
	215							
		3	11	33	SM	<p>At 50.0 to 51.0': Appears wet, more gravelly, gravel 15-20%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm) and shale (Tm), recovery possibly slough</p> <p>At 51.0 - 53.0': No recovery</p>		
	50							
		3	12	40	SM	<p>At 52.0': About 15' of material heaved up into auger. Auger redrilled from about 37' to 53.0', no sampling at 52.0 to 53.0'</p> <p>At 53.0 to 65.5': No reliable intact sample obtained. Material recovered consists of fine to coarse Silty Sand with variable clay and gravel; likely drill slough/disturbed material below 53.0'</p>		
	210							
	55							
	205							
						<p>At 58.0 to 59.0': Recovered only slough/disturbed material</p>		
	60					<p>At 59.0 - 63.0': No recovery</p>		

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T4-B2 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						3/5/11	8 inches	263 feet
						GROUNDWATER READINGS		
						Encountered at 39.5-ft during drilling		
		3	13	20		<p><b>Qfo Continued</b></p> <p>At 63.0 to 64.0': Recovered only slough/disturbed material</p> <p>At 64.0 - 65.5': No recovery</p> <p>At 65.5 to 72.0': No recovery</p>		
200								
	65	3	14	40	SM			
		N/A	15	0				
195		N/A	16	0				
	70	N/A	17	0				
						<p>END OF BORING AT 72 FEET</p> <p>NOTES:                      Boring backfilled with cement/bentonite grout from bottom up and patched.</p> <ul style="list-style-type: none"> <li>-Munsell colors listed in order of predominance (most predominant color first).</li> <li>-Where observed, contacts and bedding appear subhorizontal unless otherwise noted.</li> <li>-Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted.</li> <li>-Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted.</li> <li>-The term "clasts" herein describes gravel-size rock fragments (larger than 1/4 inch).</li> <li>-Beds are generally massive unless otherwise noted.</li> </ul>		
190								
	75							
185								
80								

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		
						DRILLING METHOD	BOREHOLE LOCATION	<b>T4-B3</b>
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						4/20/11 - 4/22/11	8 inches	260 feet
						GROUNDWATER READINGS		
						Encountered at 46-ft during drilling		
						SM	Hand augered to 6 feet Grab sample collected at 2' <b>FILL [Af]</b> Silty Sand with Gravel, fine to coarse grained	
						CL	NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more descriptions of clasts <b>YOUNGER/OLDER ALLUVIAL FAN DEPOSITS [Qf/Qfo]</b> Clay and Silty Clay, trace coarse sand (Jsm and Tm); brown (10YR 4/3); appears wet and medium stiff	
255	5					CL/ SC	Sandy Clay and Clayey Sand with Gravel, clasts 15-20%, up to 1/2 inch, mainly subangular slate (Jsm), sandstone (Tm) and shale (Tm); dark brown (10YR 3/3); appears moist and stiff/medium dense; poorly sorted; lower contact appears narrowly gradational	
		1	1	100		ML	<b>ESTUARINE DEPOSITS [Qe]</b> Clayey Silt, variable fine sand; lightly mottled, grayish brown (10YR 5/2) to strong brown (7.5Y 4/6); appears very moist and medium stiff; lower contact is gradational	
						SM	At 9.0 to 9.5': Color becomes grayish brown (10YR 5/2) to brownish yellow (10YR 6/8); trace coarse sand (Jsm and Tm)	
250	10					ML	At 9.5 to 9.9': Silty Sand, fine grained; lightly mottled, grayish brown (10YR 6/2) to strong brown (7.5YR 5/8)	
		1	2	100		SM	At 9.9 to 10.5': Sandy to Clayey Silt with Gravel, clasts 15-20%, up to 3/4 inch, mainly subangular slate (Jsm) and shale (Tm); dark grayish brown (10YR 4/2)	
						CL	At 10.5 to 10.8': Silty Sand, fine grained; strong brown (7.5YR 4/6) Clay and Silty Clay, trace coarse sand (Jsm and Tm); lightly mottled, grayish brown (2.5Y 5/2) to light yellowish brown (2.5Y 6/3) to yellowish brown (10YR 5/8); appears moist and very stiff; some varve-like bedding; lower contact is narrowly gradational	
						ML	Clayey to Sandy Silt, rare (<1%) coarse sand (Jsm and Tm); lightly mottled, grayish brown (10YR 5/2) to light yellowish brown (2.5Y 6/3); appears moist and very stiff; lower contact is gradational	
245	15						Clayey to Sandy Silt, rare (<1%) coarse sand (Jsm and Tm); strongly mottled, brown (10YR 5/3) to strong brown (7.5Y 5/8); appears moist and very stiff to hard; variable (0-10%) manganese oxide flecks; prominent varve-like bedding; lower contact is gradational	
		1	3	100				
20								

(CONTINUED ON FOLLOWING FIGURE)

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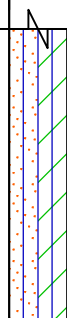
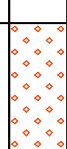
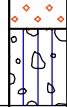






ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T4-B3</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 260 feet
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						4/20/11 - 4/22/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 46-ft during drilling		
235	25	2	4	100	ML	<b>Qe Continued</b> Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); lightly mottled, brown (10YR 5/3) to strong brown (7.5YR 5/8); appears moist and very stiff; prominent varve-like bedding; lower contact is sharp  At 21.5 to 22.5': Gravel increases, 15-20%, up to 1 1/2 inches  At 22.0 to 22.1': Fine Silty Sand bed, strong brown (7.5YR 4/6)  At 23.5 to 25.5': Trace manganese oxide flecks, up to 1/8 inch		
		2	5	100	ML	<b>Marker Bed M<sub>E</sub></b> - Clayey Silt, trace to some fine sand, trace coarse sand (Jsm and Tm); mottled, dark reddish brown (5YR 3/4) to yellowish red (5YR 4/6) to brown (7.5YR 5/2); appears very moist and stiff; lower contact is gradational; possible weak soil development  At 27.1 to 27.5': Gradational transition to fan deposits below		
230	30	2	6	24	ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt, trace to some coarse sand and fine gravel, clasts 2-15%, up to 1/2 inch, mainly subangular slate (Jsm), shale (Tm) and sandstone (Tm); strongly mottled, color variable, mainly strong brown (7.5YR 5/6) to brown (7.5YR 4/4); appears moist and very stiff to hard; generally poorly sorted; occasional fine grained beds with varve-like bedding; lower contact occurs between runs  At 30.2 to 34.0': No Recovery		
225	35	3	7	90	SC ML	At 34.0 to 34.4': Clayey Sand with Gravel, fine to coarse grained; clasts 20-30%, up to 1/2 inch, mainly subrounded slate (Jsm), shale (Tm) and sandstone (Tm), some brick-red sandstone; color variable, generally dark brown (7.5YR 3/3); appears very moist to wet and dense; lower contact is sharp, erosional Sandy to Clayey Silt, trace to some coarse sand and gravel; clasts 2-10%, up to 1/2 inch, mainly subrounded slate (Jsm), shale (Tm) and sandstone (Tm); brown (7.5YR 4/4) with variable grayish brown (10YR 5/2) mottles; appears very moist and stiff; poorly sorted; lower contact occurs between runs At 36.3 to 36.8': Fine grained bed with varve-like bedding		
					SM	At 38.2 to 39.0': Grades to fine Silty Sand with Gravel, variable clay, gravel 20-30%, up to 1 inch, mainly subrounded slate (Jsm)		
40					ML	<b>ESTUARINE DEPOSITS [Qe]</b> Clayey to Sandy Silt; trace coarse sand and gravel (Jsm and Tm); color variable, mainly brown (7.5YR 4/4) to grayish brown (10YR 5/2); appears very moist and stiff;		

(CONTINUED ON FOLLOWING FIGURE)

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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)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T4-B3 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						4/20/11 - 4/22/11	8 inches	260 feet
						GROUNDWATER READINGS		
						Encountered at 46-ft during drilling		
215	45	3	8	100		ML	generally well sorted; variable varve-like bedding and laminations; lower contact occurs between runs <b>Qe Continued</b> At 39.0 to 42.5': Trace manganese oxide flecks up to 1/16 inch  At 42.5 to 44.0': Variable (5-20%) manganese oxide flecks and nodules up to 1/4 inch  At 44.0 to 48.0': Becomes grayish brown (10YR 5/2) with strong brown (7.5YR 5/6) mottling At 44.0 to 46.5': Only slough recovered	
		3	9	50			At 46': Groundwater encountered during drilling At 46.5 to 49.0': No recovery	
210	50					SW	Depth of contact uncertain due to poor recovery <b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Well Graded Sand, fine to coarse grained, variable gravel, clasts 0-20%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); color variable, generally brown (10YR 4/3); appears wet and dense; lower contact is sharp, erosional At 49.3 to 49.5': Sandy Silt bed	
		4	10	60		ML	Sandy to Clayey Silt with Gravel, clasts 25-50%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), sandstone (Tm), shale (Tm) and quartzite; brown (7.5YR 4/4) appears very moist and stiff At 51.0 to 51.5': Several quartzite clasts up to 3/4 inch At 52.0 to 54.0': No recovery	
205	55					CL	At 54.4 to 54.9': Grades to Silty Sand, fine-medium grained	
		4	11	100		ML	At 54.9 to 55.2': Grades to Silty Sand with distinct laminations; brown (7.5YR) to grayish brown (10YR 5/2), very fine grained	
						ML	<b>ESTUARINE DEPOSITS [Qe]</b> At 55.2 to 55.6': Clay, strong brown (7.5YR 4/6) with some grayish brown (10YR 5/2) mottles, 1/2 inch thick manganese oxide staining at base of bed	
						CL/ CH	At 55.6 to 56.4': Clasts include brick-red sandstone (Tm) Clay and Silty Clay, trace coarse sand (Jsm and Tm); mottled strong brown (7.5YR 5/6) to grayish brown (2.5YR 5/2); appears very moist and stiff to very stiff; variable varve-like bedding and laminations; lower contact is narrowly gradational	
		4	12	100			At 58.0 to 60.0': Shear/Fault zone; numerous steep, irregular, shears, dip 60 to 80 degrees At 58.5 to 58.7': Distinct laminations	
							At 59.2 to 60.2': Subhorizontal lenses and irregular pockets of highly oxidized silt; dark reddish brown (5YR 3/4)	

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T4-B3</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 260 feet
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						4/20/11 - 4/22/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 46-ft during drilling		
		4	13	100	CL	<b>Qe Continued</b> At 60.2 to 60.6': Color becomes dark grayish brown (10YR 4/2), 5-10% calcium carbonate filaments up to 1/16 inch		
					ML	At 61.2 to 61.7': Grades to Clayey to Sandy Silt		
					CL	At 61.7 to 62.6': Color becomes dark grayish brown (10YR 4/2), 10-20% calcium carbonate filaments up to 1/16 inch		
					ML	At 63.0 to 63.4': Grades to Sandy to clayey Silt, mottled, color variable		
					CL	At 63.4 to 64.0': Distinct varve like bedding		
195	65					At 64.3': 1/2 inch Sandy Silt bed At 64.5 to 65.5': 10-20% calcium carbonate filaments up to 1/8 inch At 64.8': 1/2 inch Silty Sand bed		
		5	14	100	SM/ ML CL	At 65.5 to 65.9': Silty Sand to Sandy Silt, very fine grained, distinct laminations, lower contact is sharp, appears erosional Clay, dark grayish brown (10YR 4/2); appears very moist and very stiff to hard; 10-25% calcium carbonate filaments and uncemented, irregular nodules up to 1/4-inch; lower contact is gradational		
					CL	Clay and Silty Clay, rare (<1%) coarse sand (Jsm and Tm); dark grayish brown (10YR 4/2) with variable strong brown (7.5YR 5/8) mottling; appears very moist and very stiff to hard; variable (2-15%) calcium carbonate filaments and cemented nodules up to 1/4-inch; occasional sandy beds; lower contact is gradational		
190	70	5	15	100	CL/ ML	Silty Clay and Clayey Silt, variable fine sand, trace coarse sand (Jsm and Tm); strongly mottled, dark grayish brown (10YR 4/2) to strong brown (7.5YR 5/8); thickly bedded; appears very moist and very stiff to hard; trace calcium carbonate filaments and cemented calcium carbonate nodules up to 1/8-inch; lower contact is narrowly gradational		
185	75	5	16	100	CL/ CH	<b>ESTUARINE DEPOSITS-FINE GRAINED [Qef]</b> Clay and Silty Clay, trace coarse sand (Jsm and Tm); brown (7.5YR 4/4) with occasional dark grayish brown (10YR 4/2) mottles; appears very moist and hard; rare calcium carbonate filaments up to 1/16-inch; generally thickly bedded; lower contact is gradational		
					SM/ ML	At 77.5 to 78.3': Grades to fine Silty Sand/Sandy Silt		
					CL			
					ML	At 79.4': Possible detrital charcoal, sample collected At 79.5 to 82.0': Grades to Clayey to Sandy Silt; trace coarse sand (Jsm and Tm)		

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T4-B3 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						4/20/11 - 4/22/11	8 inches	260 feet
						GROUNDWATER READINGS		
						Encountered at 46-ft during drilling		
		6	17	68	ML	Qef Continued		
					CL/ CH	Clay and Silty Clay as above At 82.4 to 84.0': No recovery		
175	85					At 84.0 to 86.0': Calcium carbonate filaments increase to 5-10%, up to 1/8 inch		
		6	18	100		At 86.0': Color becomes dark grayish brown, occasional highly oxidized strong brown (7.5YR 5/6), irregular pockets up to 1/2 inch; variable (2-15%) calcium carbonate filaments up to 1/4-inch		
170	90					At 89.0 to 90.5': Calcium carbonate increases, 15-20% calcium carbonate filaments and cemented nodules up to 1/4 inch		
		6	19	72	ML	<b>ESTUARINE DEPOSITS [Qe]</b> Clayey to Sandy Silt, variable coarse sand and gravel, clasts 5-25%, up to 3/4 inch, mainly subangular silt (Jsm), sandstone (Tm) and shale (Tm); strongly mottled, color variable, mainly strong brown (7.5YR 5/8) to dark grayish brown (10YR 4/2); appears very moist and very stiff to hard; variable (2-20%) calcium carbonate filaments and cemented nodules up to 1/4 inch At 92.0 to 95.0': Scattered chalk clasts and sediment pockets At 92.6 to 94.0': No recovery		
165	95					At 95.0 to 95.5': manganese oxide flecks and staining, 5-15%		
		7	20	100		Clay and Silty Clay, rare (<1%) coarse sand (Jsm and Tm); strongly mottled, color variable, mainly strong brown (7.5YR 4/6) to dark grayish brown (10YR 4/2); appears very moist and very stiff to hard; occasional sandy beds; prominent varve-like bedding; lower contact is narrowly gradational		
		7	21	40	SM	At 99.0 to 99.7': Silty Sand, fine-medium grained, dark brown (7.5YR 3/4)		
					CL			

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T4-B3 (Continued)
						Jet Drilling / CME 75	See Plate 3	
						Hollow-Stem Auger	8 inches	GROUND EL. 260 feet
						DATES DRILLED 4/20/11 - 4/22/11		
						GROUNDWATER READINGS Encountered at 46-ft during drilling		
		7	21	64	CL	<p><b>Qe Continued</b></p> <p>At 101.4 to 101.9': Becomes gravelly, clasts 25-35%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), sandstone (Tm) and shale</p> <p>At 102.6 to 104.0': No recovery</p>		
155	105	7	22	68	SM CL/ SM CL	<p>At 104.5 to 105.5': Silty Sand, fine grained; mottled, yellowish brown (10YR 5/4) to grayish brown (10YR 5/2); some laminations and varve-like bedding</p> <p>At 105.5 to 106.1': Alternating laminations Clay and fine Silty Sand; colors similar to silty sand bed above</p> <p>At 106.7 to 107.5': Occasional Silt laminations and pockets</p> <p>At 107.4 to 114.0': No recovery</p>		
150	110	8	23	0				
145	115	8	24	80	ML CL/ ML	<p>Sandy to Clayey Silt, rare (&lt;1%) coarse sand (Jsm and Tm); grayish brown (2.5Y 5/2) with variable brownish yellow (10YR 6/6) mottling; appears very moist and very stiff to hard; lower contact is sharp</p> <p>At 114.0 to 114.3': Gravelly bed, clasts 20-35%, up to 3/4 inch, mainly subrounded slate (Jsm) and sandstone (Tm)</p> <p>At 115.5': Silty Sand bed, fine grained; 1/2 inch thick; light brownish gray (10YR 6/2)</p> <p><b>ESTUARINE DEPOSITS-FINE GRAINED [Qef]</b></p> <p>Silty Clay and Clayey Silt, variable fine sand, trace coarse sand (Jsm and Tm); mottled, grayish brown (2.5Y 5/2) to strong brown (7.5YR 5/6); appears very moist and very stiff to hard; varve like bedding; occasional beds with rare (&lt;1%) calcium carbonate filaments</p> <p>At 118.0 to 119.0': No recovery</p>		
120								

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T4-B3 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						4/20/11 - 4/22/11	HOLE DIAMETER 8 inches	GROUND EL. 260 feet
						GROUNDWATER READINGS Encountered at 46-ft during drilling		
						Qef Continued		
		8	25	100			At 123.0 to 124.7': Color becomes dark brown (7.5YR 3/2) to brown (7.5YR 4/4); distinct laminations, trace manganese oxide flecks	
135	125	8	26	28			OLDER ALLUVIAL FAN/ESTUARINE DEPOSITS [Qfo/Qe] Sandy Clay to Clayey Sand with Gravel; clasts 25-30%, up to 1/2 inch, mainly subangular slate (Jsm) and sandstone (Tm); color variable At 125.6 to 129.0': No recovery	
130	130	9	27	66			At 129.0 to 129.5': Clayey Sand to Sandy Clay with Gravel, clasts 25-35%, up to 1 inch, mainly subrounded slate (Jsm) and sandstone (Tm) Silty Clay and Clayey Silt, variable fine sand, trace coarse sand and fine gravel (Jsm and Tm); mottled dark grayish brown (2.5Y 4/2) to reddish yellow (7.5YR 6/6); appears very moist and very stiff to hard; trace manganese oxide flecks; well sorted; lower contact is gradational  At 132.3 to 134.0': No recovery	
125	135	9	28	88			At 134.0 to 134.0': Sand increases, gradational transition to unit below  Sandy to Clayey Silt, abundant coarse sand and trace fine gravel (Jsm and Tm); mottled light olive brown (2.5Y 5/3) to strong brown (7.5YR 5/6); appears moist to very moist and very stiff to hard; poorly sorted; 10-20% calcium carbonate filaments and fine cemented and uncemented nodules up to 1/4-inch; lower contact is missing/disturbed in core  At 137.9 to 138.4': Sandy Silt; mottled, light yellowish brown (2.5Y 6/3) to reddish yellow (7.5YR 6/6); appears moist and very stiff, rare (<1%) coarse sand (Jsm and Tm)	
							END OF BORING AT 139 FEET	
							NOTES:	

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT	BORING NO.								
						Jet Drilling / CME 75	<b>T4-B3</b> (Continued)								
						<table border="1"> <tr> <th>DRILLING METHOD</th> <th>BOREHOLE LOCATION</th> </tr> <tr> <td>Hollow-Stem Auger</td> <td>See Plate 3</td> </tr> <tr> <th>DATES DRILLED</th> <th>HOLE DIAMETER</th> </tr> <tr> <td>4/20/11 - 4/22/11</td> <td>8 inches</td> </tr> </table>		DRILLING METHOD	BOREHOLE LOCATION	Hollow-Stem Auger	See Plate 3	DATES DRILLED	HOLE DIAMETER	4/20/11 - 4/22/11	8 inches
DRILLING METHOD	BOREHOLE LOCATION														
Hollow-Stem Auger	See Plate 3														
DATES DRILLED	HOLE DIAMETER														
4/20/11 - 4/22/11	8 inches														
						<table border="1"> <tr> <th>GROUNDWATER READINGS</th> </tr> <tr> <td>Encountered at 46-ft during drilling</td> </tr> </table>	GROUNDWATER READINGS	Encountered at 46-ft during drilling							
GROUNDWATER READINGS															
Encountered at 46-ft during drilling															
115	145					<p>Boring backfilled with cement/bentonite grout from bottom up and patched.</p> <ul style="list-style-type: none"> <li>-Munsell colors listed in order of predominance (most predominant color first).</li> <li>-Where observed, contacts and bedding appear subhorizontal unless otherwise noted.</li> <li>-Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted.</li> <li>-Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted.</li> <li>-The term "clasts" herein describes gravel-size rock fragments (larger than 1/4 inch).</li> <li>-Beds are generally massive unless otherwise noted.</li> </ul>									
110	150														
105	155														
160															

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T4-B4</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						2/4/11	8 inches	259 feet
						GROUNDWATER READINGS		
						Encountered at 33.5-ft during drilling		
							Hand augered top 6 feet	
						SM	<b>YOUNGER/OLDER ALLUVIAL FAN DEPOSITS [Qf/Qfo]</b> Silty Sand, fine grained, trace fine gravel (Jsm and Tm); dark yellowish brown (10YR 4/6); appears damp and medium dense; lower contact is gradational	
255	5					SM/ML	Silty Sand and Sandy Silt, fine grained, trace coarse sand and fine gravel (Jsm and Tm), trace clay; dark yellowish brown (10YR 3/6); appears damp to moist and dense/very stiff; lower contact is gradational	
							NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed description of clasts	
250	10	1	1	100		ML	Clayey Silt with fine Sand, trace coarse sand (Jsm and Tm); very dark grayish brown (2.5Y 3/2); appears damp and hard; trace calcium carbonate flecks; lower contact occurs between runs	
						ML	Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); very dark grayish brown (2.5Y 3/2); appears moist and very stiff; lower contact gradational	
245	15	1	2	100		ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm), trace to some clay; slightly mottled, olive brown (2.5Y 4/3) to dark yellowish brown (10YR 4/6); appears damp to moist and very stiff; trace calcium carbonate flecks; poorly sorted; lower contact gradational	
							At 14.0 to 15.0': Mottling becomes strong	
							At 15.0 to 15.5': Gravelly lense, Jsm fragments to 1-inch	
							<b>ESTUARINE DEPOSITS [Qe]</b> Sandy Silt with Clay; olive brown (2.5Y 4/3) to dark yellowish brown (10YR 4/6); appears moist and very stiff; lower contact is gradational	
							At 16.3 to 16.7': Grades to Silty Sand to Sandy Silt, fine grained	
							At 17.2 to 17.6': Grades to Clayey Silt	
240	20	1	3	100		ML	Clayey Silt; mottled, dark grayish brown (2.5Y 4/2) to dark yellowish brown (10YR 4/6); appears damp to moist and hard; generally thickly bedded, occasional sandy silt lenses; lower contact narrowly gradational	
							@ 19.0 to 20.0': Waxy parting surfaces, possible shearing	

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T4-B4 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						2/4/11	8 inches	259 feet
						GROUNDWATER READINGS		
						Encountered at 33.5-ft during drilling		
235	25	2	4	100		ML	<b>Qe Continued</b> At 20.0 to 27.2': Trace coarse sand and fine gravel (Jsm and Tm)  At 23.0 to 24.0': Some waxy parting surfaces, possible shearing	
230	30	2	5	100		ML/SM	At 27.2 to 28.0': Sandy Silt to Silty Sand, fine grained; mottled, light olive brown (2.5Y 5/3) to dark yellowish brown (10YR 4/4); appears moist and dense/very stiff; upper and lower contacts are sharp	
						ML	At 28.0 to 33.5': Occasional indistinct varve like bedding	
225	35	2	6	100			∇ At 33.5 ft: Ground water encountered during drilling	
							<b>Marker Bed M<sub>C</sub></b> Clayey to Sandy Silt, trace coarse sand and fine gravel, clasts mainly subangular to subrounded slate (Jsm) with lesser subrounded shale and sandstone (Tm); slightly mottled, brown (10YR 4/3) to dark yellowish brown (10YR 4/4); appears very moist to wet and very stiff; possible weak soil development; lower contact is gradational	
220		3	7	100		ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo] - Marker Bed M<sub>B</sub></b> Clayey to Sandy Silt, trace coarse sand and gravel (Jsm and Tm); mottled, dark yellowish brown (10YR 4/4) to dark brown (7.5YR 3/3) to olive brown (2.5Y 4/3); appears very moist and very stiff; becomes coarser with depth; lower contact gradational At 38.0 to 38.5': Dark brown (7.5YR 3/3) becomes predominant color	
40						ML/CL	At 39.0 to 42.0': Coarse sand and fine gravel increasing with depth; clasts mainly angular to subangular, slate (Jsm) with lesser rounded to subrounded, shale (Tm), rare quartzite and other rock types; poorly sorted	
						Geologist: DB/MF		
						Prepared/Date: WL/YN/MW 10/11/2011		
						Checked/Date: MW/MF 10/11/2011		
(CONTINUED ON FOLLOWING FIGURE)								
<b>MTA Westside Subway Extension</b> <b>Los Angeles, California</b>								<b>LOG OF BORING</b> Project No.: 4953-10-1561 Figure: T4-B4b

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T4-B4 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						2/4/11	8 inches	259 feet
						GROUNDWATER READINGS		
						Encountered at 33.5-ft during drilling		
						Qfo Continued		
						At 42.0 to 43.0': Gradational transition to unit below		
215	45	3	8	100	GM	<b>FLUVIAL DEPOSITS [Qfo]</b> Silty Gravel, clasts 50-70%, up to 2 inches, mainly subangular to subrounded slate (Jsm) with lesser rounded to subrounded shale and sandstone (Tm), soil matrix is fine to coarse silty sand, trace to some clay; variable color, generally brown (10YR 4/3) to dark yellowish brown (10YR 4/6); ; appears wet		
210		3	9	100				
50					SW/SM	Well Graded Sand with Silt, fine to coarse grained, dark yellowish brown (10YR 4/4); appears wet; lower contact narrowly gradational		
					SM	Silty Sand with Gravel, fine to coarse grained, clasts 20-40%, up to 2 inches, mainly subangular to subrounded slate (Jsm) with lesser subrounded shale and sandstone (Tm); brown (10YR 4/3); appears wet; lower contact sharp, erosional		
205		4	10	100				
					ML/CL	<b>ESTUARINE DEPOSITS [Qe]</b> Clayey Silt, trace to some fine to coarse grained; coarse sand mainly subangular to subrounded, slate (Jsm) with lesser subrounded shale and sandstone (Tm); mottled, brown (10YR 4/3) to dark grayish brown (10YR 4/2) to dark yellowish brown (10YR 4/6); appears very moist and very stiff; lower contact is gradational		
55					ML	Clayey to Sandy Silt, trace coarse sand and fine gravel; coarse sand and gravel mainly subangular to subrounded slate (Jsm) with lesser subrounded shale and sandstone (Tm); mottled, brown (10 YR 4/3) to dark yellowish brown (10 YR 4/6); appears very moist and very stiff; lower contact is gradational		
200		4	11	80				
					GM	Silty Gravel, gravel 50-70%, up to 2 inches; gravel mainly subangular to subrounded slate (Jsm) with lesser subrounded shale and sandstone (Tm); soil matrix is fine to coarse silty sand, trace to some clay; brown (10YR 4/3); appears wet; lower contact is sharp, erosional		
60								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: WL/YN/MW 10/11/2011  
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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL\_FIELD\_NOTES\GINT LOGS\101561-TRANSECT 4-GPI 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T4-B4 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						2/4/11	8 inches	259 feet
						GROUNDWATER READINGS		
						Encountered at 33.5-ft during drilling		
		4	12	100		SM/ ML	<b>Qe Continued</b> Silty Sand to Sandy Silt, fine grained; dark yellowish brown (10YR 4/4); appears wet and dense/stiff; well sorted; lower contact is gradational  At 62.5 to 63.6': Some Clayey Silt lenses (gradational zone)	
195	65					CL/ ML	Silty Clay to Clayey Silt, trace to some fine to coarse sand (Jsm and Tm); lightly mottled, brown (10YR 4/3) to dark yellowish brown (10YR 4/4); uppermost 3/4 inch is brown (7.5YR 4/2) clay; appears very moist and very stiff  At 64.8 to 65.1': Silty Sand beds, fine grained; olive brown (2.5Y 4/3); appears very moist At 65.0 to 65.5': Thin layer of Silty Sand, fine grained; dark yellowish brown (10YR 3/4); appears wet  At 67.2 to 67.6': Subhorizontal oxidized Silt laminations alternating with Silty Clay  At 68.3': Oxidized Silty Sand pocket, fine to coarse grained, 2 inches thick  At 69.0 to 70.0': No recovery	
190	70	5	13	80		SM/ ML CL/ ML	At 70.0 to 70.4': Silty Sand and Sandy Silt; dark yellowish brown (10YR 4/4); appears wet and dense/stiff	
		5	14	100		ML	At 72.6 to 73.5': Sandy Silt; mottled, brown (10 YR 4/3) to dark yellowish brown (10YR 4/6); appears wet and medium stiff	
185						SM/ ML	At 73.4 to 73.5': Subhorizontal oxidized Silt lamination  At 74.3 to 75': Silty Sand to Sandy Silt layer, thin; slightly mottled, dark grayish brown (10YR 4/2) to dark yellowish brown (10YR 4/4); appears wet and dense/stiff	
75							END OF BORING AT 75 FEET  NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched.  -Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than ¼ inch). -Beds are generally massive unless otherwise noted.	
180							Geologist: DB/MF Prepared/Date: WL/YN/MW 10/11/2011 Checked/Date: MW/MF 10/11/2011	
80							MTA Westside Subway Extension Los Angeles, California	



# LOG OF BORING

Project No.: 4953-10-1561 Figure: T4-B4d

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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 4-GPI 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	
						Gregg's Drilling / CME 75		<b>T4-B5</b>
						Mud Rotary	See Plate 3	
						1/26/11	HOLE DIAMETER 5-3/8 inches	GROUND EL. 258 feet
						<b>GROUNDWATER READINGS</b> Encountered at 14-ft during drilling		
						6 inches of asphaltic concrete over 8 inches of concrete Hand augered to 10 feet		
						<b>YOUNGER/OLDER ALLUVIAL FAN DEPOSITS [Qf/Qfo]</b> Clayey Silt, very dark grayish brown (10YR 3/2); fine to medium sand, some coarse sand		
						NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed descriptions		
						Silty Sand with Clay, dark yellowish brown (10YR 4/4); fine to medium sand, some coarse		
						<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt, grayish brown (2.5Y 5/2); appears very moist and stiff; lower contact is sharp		
						Clayey Silt with Sand, fine grained, trace coarse sand (Jsm and Tm); very dark grayish brown (10YR 3/2); appears moist and very stiff; poorly sorted; lower contact is gradational		
		1	1	88		Clay, trace fine to coarse sand; (Jsm and Tm); very dark grayish brown (2.5Y 3/2); appears moist to very moist and stiff; lower contact is gradational		
						At 14': Groundwater encountered during drilling		
						Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm)*; olive brown (2.5Y 4/3); appears damp and hard; lower contact occurs between runs		
						Clayey Silt with Sand, very dark grayish brown (2.5Y 3/2); appears wet and soft to medium stiff; lower contact is gradational		
		1	2	96		Clayey to Sandy Silt, coarse sand and fine gravel (Jsm and Tm), increasing with depth; olive brown (2.5Y 4/3) to dark yellowish brown (10YR 3/4); appears wet and soft to medium stiff; lower contact is sharp, wavy		
						At 18.3 to 18.7': Silty Sand, fine grained; dark yellowish brown (10YR 3/4); appears moist and dense		
						At 19.5 to 20.0': Silty Sand, fine grained; olive brown (2.5Y 4/4); appears wet,		

(CONTINUED ON FOLLOWING FIGURE)

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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)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	<b>T4-B5</b> (Continued)
						Mud Rotary	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						1/26/11	5-3/8 inches	258 feet
						GROUNDWATER READINGS		
						Encountered at 14-ft during drilling		
						ML	<b>Qfo Continued</b> lower contact is sharp	
						SM	At 21.3 to 21.9': Silty Sand; fine to medium grained; dark yellowish brown (10YR 4/6); appears moist; upper contact is gradational, lower contact is sharp	
						ML		
							<b>ESTUARINE DEPOSITS [Qe]</b> Clayey Silt, trace to some fine to coarse sand (Jsm and Tm), occasional silty clay lenses, dark grayish brown (2.5Y 4/2); appears very moist to wet and stiff to very stiff; lower contact is gradational	
							At 22.7 to 30.0': Trace calcium carbonate flecks	
							At 27.0': Becomes mottled; very dark grayish brown (2.5Y 3/2) to olive brown (2.5Y 4/4)	
						SM	At 28.2 to 28.5': Silty Sand; trace gravel	
						ML	At 29.0 to 30.0': No recovery	
							At 30.0': Mottling becomes stronger; very dark grayish brown (2.5Y 3/2) to dark yellowish brown (10YR 4/4)	
							At 31.8': Possible charcoal fragment, sampled collected	
							At 33.0 to 35.0': Alternating layers of Clayey to Sandy Silt; trace coarse sand and fine gravel (Jsm and Tm); slightly mottled, brown (10YR 4/3) to dark yellowish brown (10YR 4/4); appears wet and stiff; contacts are gradational	
						CL	Silty Clay; trace fine to coarse sand; lightly mottled, dark grayish brown (2.5Y 4/2) to dark yellowish brown (10YR 4/4); appears wet and stiff	
						ML/ CL	Clayey Silt to Silty Clay, trace coarse sand and fine gravel (Jsm and Tm); mottled, dark grayish brown (2.5Y 4/2) to olive brown (2.5Y 4/4); appears very moist to wet and stiff to very stiff; occasional oxidized pockets or lenses; lower contact occurs between runs	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: PR/MF  
 Prepared/Date: WL/YN/MW 10/11/2011  
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**MTA Westside Subway Extension**  
**Los Angeles, California**



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T4-B5b

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)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	<b>T4-B5 (Continued)</b>
						Mud Rotary	See Plate 3	
						1/26/11	HOLE DIAMETER 5-3/8 inches	GROUND EL. 258 feet
						GROUNDWATER READINGS Encountered at 14-ft during drilling		
						ML/ CL	<b>Qe Continued</b>	
215		3	7	96		ML	<b>Marker Bed M<sub>C</sub></b> Clayey Silt with Sand; mottled, very dark grayish brown (10YR 3/2) to dark yellowish brown (10YR 3/4); appears very moist and stiff; possible weak soil development; lower contact is gradational	
45						ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo] - Marker Bed M<sub>B</sub></b> Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); dark grayish brown (2.5Y 4/2) to dark yellowish brown (10YR 4/6); appears very moist to wet and very stiff; poorly sorted, generally coarsens with depth; lower contact is gradational	
210		3	8	98			At 48.3': Becomes gravelly, 25-35%, up to 3/4 inch; gravel mainly angular to subangular, slate (Jsm) with lesser rounded to subrounded, shale (Tm), rare quartzite and other rock types	
50						GM	<b>FLUVIAL DEPOSITS [Qfo]</b> Silty Gravel, clasts 50-70%, up to 1½ inches, mainly subangular to subrounded slate (Jsm) with lesser subrounded shale and sandstone (Tm); soil matrix is fine to coarse silty sand with trace clay; dark brown (10 YR 3/3); appears wet; lower contact is sharp, erosional	
205		3	9	96				
55								
200		4	10	100				
60								

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	<b>T4-B5 (Continued)</b>
						Mud Rotary	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						1/26/11	5-3/8 inches	258 feet
						GROUNDWATER READINGS		
						Encountered at 14-ft during drilling		
195		4	11	90	GM	Qflo Continued		
65					ML	ESTUARINE DEPOSITS [Qe] Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); occasional silty clay lenses; mottled, dark grayish brown (10YR 4/2) to dark yellowish brown (10YR 3/6); appears very moist to wet and very stiff; numerous oxidized pockets; lower contact is gradational		
190		4	12	100		At 73.0': Slight color change, mottled, olive brown (2.5Y 4/3) to dark yellowish brown (10YR 4/6)		
70						At 73': Mottling decreases to slightly mottled		
185		5	13	100				
75					SW/ SM	Well Graded Sand with Silt, fine to coarse grained, some gravel, 10-15%, up to 3/4 inch; gravel mainly subangular slate (Jsm) with lesser subrounded shale and sandstone (Tm); dark yellowish brown (10 YR 4/4); appears wet and dense END OF BORING AT 75 FEET		
180						NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched.		
80						<ul style="list-style-type: none"> <li>-Munsell colors listed in order of predominance (most predominant color first).</li> <li>-Where observed, contacts and bedding appear subhorizontal unless otherwise noted.</li> <li>-Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted.</li> <li>-Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted.</li> <li>-The term "clasts" herein describes gravel-size rock fragments (larger than 1/4 inch).</li> <li>-Beds are generally massive unless otherwise noted.</li> </ul>		

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 Prepared/Date: WL/YN/MW 10/11/2011  
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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 4-GPI 10/14/11

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	
						Jet Drilling / CME 75		<b>T4-B6</b>
						Hollow-Stem Auger	See Plate 3	
						<b>DATES DRILLED</b> 1/26/11 - 1/27 11	<b>HOLE DIAMETER</b> 8 inches	<b>GROUND EL.</b> 257 feet
						<b>GROUNDWATER READINGS</b> Encountered at 34-ft during drilling		
255				0		6 inches of asphaltic concrete over 6 inches of concrete Hand augered to 6 feet <b>YOUNGER / OLDER ALLUVIAL FAN DEPOSITS [Qf/Qfo]</b> Clayey Silt, trace to some fine sand and coarse sand (Jsm and Tm); brown (10YR 4/3); appears damp to moist and hard; lower contact occurs between runs  NOTE: Jsm = Santa Monica Shale Tm = Modelo Formation See end of log for more detailed clast descriptions		
250		1	1	100	ML	Clayey Silt, trace coarse sand and fine gravel (Jsm); dark grayish brown (10YR 4/2); appears damp to moist and hard; poorly sorted; trace dispersed calcium carbonate; lower contact is gradational		
245		1	2	80		<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey Silt with fine Sand, trace coarse sand and fine gravel (Jsm and Tm); brown (10YR 4/3); appears damp and hard; poorly sorted; sand and gravel content increases with depth; lower contact is gradational At 10.0 to 13.0': Color grades to dark yellowish brown (10YR 4/4)		
240		1	3	90	GC/GM	Clayey, Silty Gravel, clasts 50-60%, up to 2 inches, mainly subangular slate (Jsm) with lesser subrounded, shale (Tm), some quartzite and other rock types; soil matrix is clayey silt with sand; brown (10YR 4/3); appears damp and hard; lower contact narrowly gradational At 14.0 to 15.0': No recovery		
235					ML	Sandy to Clayey Silt, variable coarse sand and fine gravel (Jsm); brown (10YR 4/3); appears damp and hard; lower contact is narrowly gradational		
230					SM	<b>FLUVIAL DEPOSITS [Qfoff]</b> Silty Sand with fine Gravel, clasts 25-40%, mostly 1/4 inch to 1/2 inch, mainly angular to subangular slate (Jsm); yellowish brown (10YR 5/4); appears damp; lower content is narrowly gradational		
225					GM	Silty Gravel with Sand, gravel 50-70%, up to 1 inch; mainly subangular slate (Jsm) with lesser subrounded shale (Tm), some quartzite and other rock types; soil matrix is fine to coarse silty sand; yellowish brown (10YR 5/4); appears damp; lower contact is sharp, erosional		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: WL/YN/MW 10/11/2011  
 Checked/Date: MW/MF 10/11/2011

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T4-B6 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						1/26/11 - 1/27 11	8 inches	257 feet
						GROUNDWATER READINGS		
						Encountered at 34-ft during drilling		
235		2	4	30	GM	<b>Qfofl Continued</b>  At 21.5 to 25.0': No recovery		
25						At 25.0 to 26.3': Becomes moist to very moist At 26.3': Possible minor perched groundwater on contact		
230		2	5	46	ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt, mottled dark grayish brown (10YR 4/2) to dark yellowish brown (10YR 4/4); appears very moist and stiff; poorly sorted; lower contact is gradational At 27.3 to 30.0': No recovery		
30						Silty Clay, trace coarse sand and fine gravel (Jsm and Tm); lightly mottled, dark grayish brown (10YR 4/2) to brown (10YR 4/3); appears very moist and stiff to very stiff; poorly sorted; lower contact is gradational		
225		2	6	46	CL	At 32.3 to 35.0': No recovery  ▽ At 34': Groundwater encountered during drilling		
35					SM	<b>FLUVIAL DEPOSITS [Qfofl]</b> Silty Sand with Gravel, fine to coarse grained, clasts 25-40%, up to 3/4 inch, mainly subangular slate (Jsm) with lesser subrounded shale (Tm); dark yellowish brown (10YR 3/4); appears wet; lower contact occurs between runs		
220		2	7	44	GM	At 36.5 to 37.2': Silty Gravel, clasts 50-70%, up to 3/4 inch, mainly subangular slate (Jsm) with lesser subrounded shale (Tm); soil matrix is fine to coarse silty sand; dark yellowish brown (10YR 3/4); appears wet and dense At 37.2 to 41.0': No recovery		
40								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: WL/YN/MW 10/11/2011  
 Checked/Date: MW/MF 10/11/2011

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)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T4-B6 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						1/26/11 - 1/27 11	8 inches	257 feet
						GROUNDWATER READINGS		
						Encountered at 34-ft during drilling		
		2	8	100		SM	Qfofl Continued	
215		3	9	90		ML	ESTUARINE DEPOSITS [Qe] Clayey Silt with Sand, trace coarse sand and fine gravel; (Jsm and Tm); dark yellowish brown (10YR 3/4); appears very moist to wet and very stiff; lower contact is sharp	
45						CL/ CH	Clay and Silty Clay, trace coarse sand and fine gravel (Jsm and Tm), occasional sand pockets; mottled, dark grayish brown (10YR 4/2) to dark yellowish brown (10YR 3/6); appears very moist and very stiff; lower contact is gradational	
210		3	10	100		ML	Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); mottled brown (10YR 4/3) to dark yellowish brown (10YR 3/6); appears very moist to wet and very stiff; moderately well sorted, occasional silty sand beds; lower contact is gradational	
50						CL/ CH	Marker Bed M <sub>C</sub> Clay and Silty Clay, trace coarse sand (Jsm and Tm); mottled, very dark brown (10 YR 2/2) to dark yellowish brown (10 YR 3/6); appears very moist and very stiff; possible weak soil development; lower contact is gradational  At 53.0 to 54.2': Prominent varve-like bedding	
205		3	11	100		ML/ CL	OLDER ALLUVIAL FAN DEPOSITS [Qfo] Silty Clay and Clayey Silt, trace coarse sand (Jsm and Tm); dark yellowish brown (10 YR 4/4); appears very moist and medium stiff to stiff; lower contact is gradational	
55						ML	Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); lightly mottled, dark yellowish brown (10YR 4/4) to dark grayish brown (10YR 4/2); appears very moist to wet and stiff to very stiff; generally moderately to poorly sorted, occasional silty clay layers and gravelly layers; lower contact is sharp  At 58.2 to 60.0': No recovery	
200		4	12	66				
60								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: WL/YN/MW 10/11/2011  
 Checked/Date: MW/MF 10/11/2011

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T4-B6 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						1/26/11 - 1/27 11	8 inches	257 feet
						GROUNDWATER READINGS		
						Encountered at 34-ft during drilling		
195		4	13	100	ML	<p><b>Qfo Continued</b></p> <p>At 61.2 to 61.4': Silty Sand bed</p>		
65								
190		4	14	100		<p>At 65.8 to 69.0': More gravelly (15% fine gravel), coarse sand and gravel mainly angular to subangular slate (Jsm), with lesser rounded to subrounded shale (Tm), some quartzite and other rock types</p>		
70					GM	<p><b>FLUVIAL DEPOSITS [Qfoff]</b></p> <p>Silty Gravel, clasts 50-70%, up to 2 inches, mainly subangular to subrounded slate (Jsm) with lesser subrounded shale and sandstone (Tm); soil matrix is fine to coarse silty sand with occasional clayey lenses; dark olive brown (2.5Y 3/3); appears wet and dense</p>		
185		5	15	92				
75						<p>END OF BORING AT 75 FEET</p> <p>NOTES:                      Boring backfilled with cement/bentonite grout from bottom up and patched.</p> <ul style="list-style-type: none"> <li>-Munsell colors listed in order of predominance (most predominant color first).</li> <li>-Where observed, contacts and bedding appear subhorizontal unless otherwise noted.</li> <li>-Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted.</li> <li>-Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted.</li> <li>-The term "clasts" herein describes gravel-size rock fragments (larger than ¼ inch).</li> <li>-Beds are generally massive unless otherwise noted.</li> </ul>		
180								
80								

Geologist: DB/MF  
 Prepared/Date: WL/YN/MW 10/11/2011  
 Checked/Date: MW/MF 10/11/2011

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T4-B7</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						1/31/11	8 inches	257 feet
						GROUNDWATER READINGS		
						Encountered at 33-ft during drilling		
						6 inches of asphaltic concrete over 6 inches of concrete Hand augered top 6 feet <b>YOUNGER / OLDER ALLUVIAL FAN DEPOSITS [Qf/Qfo]</b> Clayey Silt, trace to some fine sand; brown (10YR 4/3); appears moist and very stiff  NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed description of clasts		
						ML	Clayey Silt, trace to some fine sand, trace coarse sand and fine gravel (Jsm); very dark grayish brown (10YR 3/2); appears moist and very stiff; trace dispersed calcium carbonate, occasional concentrated zones with up to 30% calcium carbonate; lower contact is gradational	
		1	1	100		ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey Silt with fine Sand, trace coarse sand and fine gravel (Jsm and Tm); dark yellowish brown (10YR 4/4); appears damp and hard; sand and gravel content generally increases with depth; lower contact occurs between runs	
							At 13.5 to 15.0': No recovery	
		1	2	70		SM	Silty Sand with Gravel, very fine grained, gravel 20-30%, up to 1 inch; mainly subangular slate (Jsm) with lesser subrounded shale (Tm); yellowish brown (10YR 5/4); appears damp and dense; lower contact is gradational  At 16.0 to 17.5': No recovery	
		1	3	40			Silty Sand, fine grained, trace coarse sand and fine gravel (Jsm and Tm); yellowish brown (10YR 5/4); appears damp and dense; lower contact occurs between runs  At 19.2' - 19.6': Sandy Silt layer	
		1	4	72				

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: WL/YN/MW 10/11/2011  
 Checked/Date: MW/MF 10/11/2011

METRO SOIL CORE S:\70131\_GEOTECH\GINTW\FULT\_INVESIGATION\_WSE\_LIBRARY\_AMEC OCTOBER2011 (2).GLR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL\_FIELD\_NOTES\GINT LOGS\101561-TRANSECT 4-GPI 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T4-B7 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						1/31/11	8 inches	257 feet
						GROUNDWATER READINGS		
						Encountered at 33-ft during drilling		
235		2	5	100	SM	<b>Qfo Continued</b>  At 20.8 to 21.4': Gravel increases, 20-30%, up to 1½ inches; mainly subangular to subrounded slate (Jsm) with lesser subrounded shale and sandstone (Tm)		
		2	6	76		At 23.0 to 25.0': Gravel decreases, 10-15%, up to ¾ inch, appears moist; dark yellowish brown (10YR 4/4)		
25						At 25.0 to 28.5': Gravel decreases to trace		
230		2	7	70		At 27.0': Appears very moist, dark yellowish brown (10YR 3/4)		
						At 28.5 to 30.0': No recovery At 30.0': Possible minor perched groundwater encountered		
30		2	8	88	ML	Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); very dark grayish brown (2.5Y 3/2); appears very moist and soft to medium stiff; lower contact is sharp		
225						At 31.6': Grades to Clay, appears stiff		
						▽ At 33.0': Groundwater encountered during drilling		
		2	9	100	CL	Sandy Clay, trace fine gravel (Jsm and Tm); very dark grayish brown (2.5Y 3/2); appears wet and medium stiff, lower contact is gradational		
					ML	Sandy Silt with Clay, trace fine gravel (Jsm and Tm); very dark grayish brown (2.5Y 3/2); appears wet and stiff; poorly sorted; lower contact is gradational		
35					CL	Silty Clay, trace coarse sand (Jsm and Tm); dark brown (7.5YR 3/2); appears wet and soft to medium stiff; lower contact is gradational		
220		3	10	78	ML	Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); slight intermittent mottling, very dark grayish brown (2.5Y 3/2) with intermittent olive brown (10YR 4/3); appears very moist to wet and very stiff; poorly sorted; lower contact occurs between runs		
40						At 38.9 to 40.0': No recovery		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: WL/YN/MW 10/11/2011  
 Checked/Date: MW/MF 10/11/2011

METRO SOIL CORE S:\70131\_GEO TECH\GINTW\Fault\_Investigation\_WSE\_Library\_AMEC OCTOBER2011 (2).GPR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 4.GPI 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T4-B7</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Hollow-Stem Auger	See Plate 3	257 feet
						DATES DRILLED	HOLE DIAMETER	
						1/31/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 33-ft during drilling		
215		3	11	80	GM/GC ML	<b>Qfo Continued</b> At 40.0' to 41.6': Silty to Clayey Gravel with Sand, gravel 50-60%, up to 1-inch; gravel mainly subangular slate (Jsm) with lesser subrounded shale and sandstone (Tm); soil matrix is variable clay, silt and fine to coarse sand; very dark grayish brown (2.5Y 3/2); appears wet; lower contact is sharp; erosional Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); slight intermittent mottling, very dark grayish brown (2.5Y 3/2) with intermittent olive brown (10YR 4/3); appears very moist to wet and very stiff; poorly sorted At 41.0 to 41.6' and 43.4 to 43.8': Becomes oxidized, dark yellowish brown (10 YR 3/4)  At 44.0 to 45.0': No recovery		
45		3	12	100	CL/CH	<b>ESTUARINE DEPOSITS [Qe]</b> <b>Marker Bed M<sub>p</sub></b> - Clay and Silty Clay trace coarse sand (Jsm and Tm); mottled, very dark brown (10YR 2/2) to dark yellowish brown (10YR 3/6); appears very moist and very stiff; lower contact is gradational  At 47.8 to 48.8': prominent varve like bedding		
50		4	13	100	ML	<b>ESTUARINE DEPOSITS [Qe]</b> Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); intermittent light mottling, dark grayish brown (10YR 4/2) with sparse dark yellowish brown (10YR 4/4); appears very moist to wet and stiff to very stiff; occasional silty clay layers; lower contact is gradational  At 52.8 to 53.6': Becomes gravelly, 30-40%, up to 2 inch; gravel mainly subangular to subrounded slate (Jsm) with lesser subrounded shale and sandstone (Tm)  At 53.6 to 59.0': Less gravel, trace coarse sand, occasioal faint laminations and varve like bedding		
55		4	14	100	ML/CL	Clayey Silt and Silty Clay, trace coarse sand (Jsm); mottled, very dark grayish brown (10YR 3/2) to dark yellowish brown (10YR 3/4) to brown (7.5YR 4/4); appears very moist and stiff to very stiff; lower contact is gradational		
200								
60								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: WL/YN/MW 10/11/2011  
 Checked/Date: MW/MF 10/11/2011

METRO SOIL CORE S:\70131\_GEOTECH\GINTW\Fault\_Investigation\_WSE\_Library\_AMEC\_October2011\_(2).GLR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL\_FIELD\_NOTES\GINT LOGS\101561-TRANSECT 4.GPI 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T4-B7</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						1/31/11	8 inches	257 feet
						GROUNDWATER READINGS		
						Encountered at 33-ft during drilling		
195		4	15	100	ML/CL	<b>Qe Continued</b> At 60.4': Possible charcoal fragments, sample collected		
65					ML/CL	<b>Marker Bed M<sub>c</sub></b> Clayey Silt and Silty Clay, trace coarse sand (Jsm); color variable, mainly very dark grayish brown (10YR 3/2) with some dark reddish brown (5YR 3/4); appears very moist and stiff; possible weak soil development; lower contact is gradational		
190		5	16	100	ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]/Marker Bed M<sub>A</sub></b> Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); strongly mottled, dark yellowish brown (10YR 4/4) to dark grayish brown (2.5Y 4/2); appears very moist and very stiff		
70					ML	Clayey to Sandy Silt, variable gravel, clasts 10-15%; up to 3/4-inch; mainly subangular to subrounded slate (Jsm) with lesser subrounded shale and sandstone (Tm); colors as above, appears very moist and very stiff		
185		5	17	100		At 72.5 to 75.0': Slight color change, mottled, dark grayish brown (2.5Y 4/2) to dark yellowish brown (10YR 4/4); coarse sand and gravel decrease to trace		
75						END OF BORING AT 75 FEET		
180						NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched.  -Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than 1/4 inch). -Beds are generally massive unless otherwise noted.		
80								

Geologist: DB/MF  
 Prepared/Date: WL/YN/MW 10/11/2011  
 Checked/Date: MW/MF 10/11/2011





METRO SOIL CORE S:\70131 GEOTECH\GINTW\Fault\_Investigation\_WSE\_Library\_AMEC\_October2011\_2\GLR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 4-GPI 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T4-B8
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						2/2/11 - 2/3/11	8 inches	256 feet
						GROUNDWATER READINGS		
						Encountered at 37-ft during drilling		
255						Asphaltic concrete over concrete		
						Hand augered to 6 feet		
						<b>YOUNGER / OLDER ALLUVIAL FAN DEPOSITS [Qf/Qfo]</b>		
						Clayey Silt, trace to some fine sand; brown (10YR 4/3); appears damp to moist and very stiff		
						NOTE:		
						Jsm = Santa Monica Slate		
						Tm = Modelo Formation		
						See end of log for more detailed description of clasts		
250	5	1	1	88		At 6.0 to 6.5': Grades to Sandy Silt with Clay		
						Clayey Silt, trace to some fine sand; trace coarse sand and gravel (Jsm and Tm); dark grayish brown (10YR 4/2); appears damp to moist and hard; trace dispersed calcium carbonate, some concentrated zones with up to 20% calcium carbonate deposits; lower contact occurs between runs		
245	10	1	2	100		<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b>		
						Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); dark yellowish brown (10YR 4/4); appears damp and hard; sand content increases with depth; lower contact is gradational		
240	15					Silty Sand with Gravel, fine, trace to some coarse sand, occasional sandy silt lenses, gravel 15-30%, up to 1 1/2 inch; mainly subangular slate (Jsm) with lesser subrounded shale and sandstone (Tm); appears damp and dense; lower contact is sharp		
						At 15.8 to 16.8': Grades to fine Silty Sand to Sandy Silt with variable coarse sand and fine gravel, clasts 0-20%, up to 3/4 inch (Jsm and Tm)		
20	20	1	3	88		<b>OLDER FLUVIAL/ALLUVIAL FAN DEPOSITS [Qfof/Qfo]</b>		
						Silty Gravel, clasts 50-70%, up to 2 inches; mainly subangular to subrounded slate (Jsm) with lesser subrounded shale and sandstone (Tm); soil matrix is fine to coarse silty sand with trace clay; dark grayish brown (2.5Y 4/2); appears damp and dense; lower contact occurs between runs		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: WL/YN/MW 10/11/2011  
 Checked/Date: MW/MF 10/11/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T4-B8a

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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)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T4-B8 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						2/2/11 - 2/3/11	8 inches	256 feet
						GROUNDWATER READINGS		
						Encountered at 37-ft during drilling		
235		2	4	88	GM	<b>Qfo/Qfofl Continued</b>		
		2	5	96	SM/ML	At 22.8 to 24.0': Grades to fine Silty Sand to Sandy Silt; trace fine gravel (Jsm); dark yellowish brown (10YR 3/6); appears moist		
25					GM	At 25.5 to 26.5': Soil matrix becomes dark yellowish brown (10YR 4/4)		
230		2	6	84	SM/ML	At 26.5 to 27.2': Grades to fine Silty Sand to Sandy Silt; trace fine gravel (Jsm); dark yellowish brown (10YR 3/6); appears moist		
					GM			
		2	7	88	SM	At 29.4 to 30.0': Silty Sand, fine to medium grained, trace fine gravel (Jsm); dark yellowish brown (10YR 3/4); appears very moist		
30					GM	At 30': Becomes very moist; soil matrix becomes very dark grayish brown (2.5Y 3/2)		
225		2	8	50		At 32.5 to 35.0': No recovery		
35					SM	Silty Sand with Gravel, fine to coarse grained, clasts 20-40%, up to 3/4 inch; gravel mainly subangular to subrounded slate (Jsm); very dark grayish brown (2.5Y 3/2); appears wet and dense; occasional more clayey beds; lower contact is gradational		
220		3	9	100	ML	At 36.5 to 37.5': Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm); dark grayish brown (2.5Y 4/2); appears wet; medium stiff		
					SM	At 37': Groundwater encountered during drilling		
		3	10	100		At 38.6 to 38.9': Silty Clay lens, dark grayish brown (2.5Y 4/2); appears wet and medium stiff		
40								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: WL/YN/MW 10/11/2011  
 Checked/Date: MW/MF 10/11/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T4-B8b

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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL\_FIELD\_NOTES\GINT LOGS\101561-TRANSECT 4-GPI 10/14/11


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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		<b>T4-B8</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						2/2/11 - 2/3/11	8 inches	256 feet
						GROUNDWATER READINGS		
						Encountered at 37-ft during drilling		
215		3	11	80	SP SM	<b>Qfo/Qfofl Continued</b> At 40.0 to 40.8': Poorly Graded Sand, fine to medium grained; yellowish brown (10YR 5/4); appears wet		
		3	12	100	ML SM	At 42.8 to 44.0': Clayey Silt; trace fine to coarse sand; (Jsm and Tm); mottled, very dark grayish brown (2.5Y 3/2) to dark brown (7.5YR 3/3); appears very moist and medium stiff		
						At 44.0 to 44.6': Gradational zone		
45						Silty Sand, fine to coarse grained, trace fine gravel (Jsm and Tm); very dark grayish brown (10YR 2/3); appears wet and dense; lower contact is sharp		
210		3	13	100		At 46.3 to 46.5': Clayey to Sandy Silt lenses; brown (10YR 4/3); appears wet and medium stiff		
						At 47.3 to 47.6': Clayey to Sandy Silt lenses; brown (10YR 4/3); appears wet and medium stiff		
		3	14	100	ML/ SM	At 48.5 to 50.0': Sandy Silt to Silty Sand, thinly bedded to laminated, bedding subhorizontal; silt is dark grayish brown (2.5Y 4/2), sand is dark olive brown (2.5Y 3/3); appears wet and medium stiff/medium dense		
50					SM			
205		4	15	100	ML SM	At 51.6 to 52.3': Grades to Sandy Silt with Gravel; trace clay; clasts 20-35%, up to 1/2 inch; mainly subangular to subrounded slate (Jsm) with lesser subrounded shale and sandstone (Tm); very dark grayish brown (2.5Y 3/2); appears wet and very stiff		
						Silty Sand, fine, trace coarse sand (Jsm and Tm), some silt nodules up to 1 inch; dark grayish brown (2.5Y 4/2); appears wet; lower contact is gradational		
		4	16	100				
55								
200					GM	Silty Gravel, clasts 50-70%, up to 2 inches; gravel mainly subangular to subrounded slate (Jsm) with lesser subrounded shale and sandstone (Tm); some quartzite and meta-volcanic clasts; matrix is fine to coarse silty sand; very dark brown (10YR 2/2); appears wet; lower contact is gradational		
						At 55.4 to 55.7': Soil matrix grades to sandy silt with clay		
		4	17	100	CL/ ML	At 57.2 to 57.7': Gradational zone		
						<b>ESTUARINE DEPOSITS [Qe]</b> Silty Clay to Clayey Silt, lightly mottled, very dark grayish brown (2.5Y 3/2) to dark olive brown (2.5Y 3/3); appears very moist and very stiff; faint varve-like bedding		
60						At 59.8 to 60.0': Silty Sand lenses, fine grained; olive brown (2.5Y 4/3); appears wet		

(CONTINUED ON FOLLOWING FIGURE)

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 Prepared/Date: WL/YN/MW 10/11/2011  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T4-B8 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						2/2/11 - 2/3/11	8 inches	256 feet
						GROUNDWATER READINGS		
						Encountered at 37-ft during drilling		
195				0		<b>Qe Continued</b> At 60.0 to 65.0': No Recovery		
65						CL	Silty Clay and Clayey Silt, trace coarse sand (Jsm and Tm); lightly mottled, very dark grayish brown (2.5Y 3/2) to dark yellowish brown (10YR 4/6); appears very moist and very stiff	
190		5	18	100			<b>Marker Bed M<sub>c</sub></b> Silty Clay and Clayey Silt, trace coarse sand (Jsm and Tm); very dark gray (2.5Y 3/1) to dark reddish brown (5YR 3/4); appears very moist and very stiff; grades downward into alluvial fan deposits below possible weak soil development At 66.8 to 71.4': Oxidized bed	
70						ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]-Marker Bed M<sub>A</sub></b> Sandy to Clayey Silt, trace coarse sand and fine gravel (Jsm and Tm); lightly mottled, dark grayish brown (2.5Y 4/2) to dark yellowish brown (10YR 3/6); appears very moist to wet and very stiff	
185		5	19	86		SM	Silty Sand with Gravel, fine to coarse grained, clasts 15-25%, up to 1½ inch; mainly subangular to subrounded slate (Jsm) with lesser subrounded shale and sandstone (Tm); dark yellowish brown (10YR 3/6); appears wet and dense	
75							END OF BORING AT 75 FEET	
180							NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched.	
80							-Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than ¼ inch). -Beds are generally massive unless otherwise noted.	
						Geologist: DB/MF Prepared/Date: WL/YN/MW 10/11/2011 Checked/Date: MW/MF 10/11/2011		
MTA Westside Subway Extension Los Angeles, California								<b>LOG OF BORING</b> Project No.: 4953-10-1561 Figure: T4-B8d

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T4-B9</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/4/11 - 5/6/11	8 inches	259 feet
						GROUNDWATER READINGS		
						Encountered at 35-ft during drilling		
255	5					Hand augered to 5 feet		
						No sampling upper 5 feet		
						NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed descriptions of clasts		
250		1	1	100	ML	<b>YOUNGER/OLDER ALLUVIAL FAN DEPOSITS [Qf/Qfo]</b> Clayey Silt, trace to some fine sand, trace coarse sand and gravel (Jsm and Tm); dark yellowish brown (10YR 3/4); appears moist and very stiff; poorly sorted; rare (<1%) calcium carbonate filaments; occasional more sandy beds; lower contact is narrowly gradational  At 7.0': Becomes very dark grayish brown (10YR 3/2)		
245	10	1	2	90	ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt, variable gravel, clasts 5-25%, up to 1 inch, mainly subangular to subrounded slate (Jsm) and shale (Tm); dark yellowish brown (10YR 3/4), appears moist and very stiff; poorly sorted; lower contact occurs between runs  At 13.0 to 13.5': Grades to Sandy Silt, trace gravel		
240	15	1	3	80	ML	Silty Sand and Sandy Silt, trace to some clay, trace to some sand and fine gravel, clasts 5-15%, up to 3/4 inch (Jsm and Tm); dark yellowish brown (10YR 3/4); appears moist and dense; occasional fine Silty Sand beds  At 19.0 to 20.0': No recovery		

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T4-B9</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/4/11 - 5/6/11	8 inches	259 feet
						GROUNDWATER READINGS		
						Encountered at 35-ft during drilling		
		2	4	90		<b>Qfo Continued</b> Silty Sand, very fine, trace to some coarse sand and fine gravel, clasts 2-10%, up to 1/2 inch (Jsm and Tm); dark yellowish brown (10YR 4/4); appears moist and dense; lower contact is sharp  At 23.2': Grades to Sandy Silt  At 24.5 to 25.0': Silty Sand with Gravel, fine to coarse grained, clasts 20-30%, up to 1 inch, mainly subrounded slate (Jsm) and shale (Tm)		
235	25					SM		
						ML		
		2	5	96		SM/ML	Silty Sand and Sandy Silt, very fine grained, trace to some clay, rare (<1%) coarse sand; dark brown (10YR 3/3); appears very moist and stiff/dense	
230	30					ML	Clayey to Sandy Silt, variable (0-20%) gravel, clasts mainly subrounded slate (Jsm) and shale (Tm); dark gray (10YR 4/1) with reddish brown (5YR 4/4) mottles; appears very moist and medium stiff  At 31.1 to 31.4': Grades to fine to coarse Clayey Sand with Gravel, clasts 20-30%, up to 3/4 inch, mainly subrounded slate (Jsm) and shale (Tm)	
		2	6	100		CL/SC	At 33.8 to 35.0': Grades to Sandy Clay to Clayey Sand with Gravel, clasts 20-50%, up to 1 inch, mainly subangular to subrounded (Jsm), shale (Tm) and sandstone (Tm); some brick-red sandstone, coarsens downward into gravel bed below At 35': Groundwater encountered during drilling	
225	35					GC/GM	Clayey to Silty Gravel, clasts 50-70%, up to 2 inches, mainly subangular slate (Jsm), some subrounded sandstone (Tm) and shale (Tm) also observed; matrix is fine to coarse clayey, silty sand; color variable, mainly dark brown (7.5YR 3/2); appears wet and dense, lower contact occurs between runs	
		3	7	63			At 38.2 to 40.0': No recovery	
220								
40								

(CONTINUED ON FOLLOWING FIGURE)

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T4-B9b

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T4-B9 (Continued)
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/4/11 - 5/6/11	8 inches	259 feet
						GROUNDWATER READINGS		
						Encountered at 35-ft during drilling		
215	45	3	8	90	SW GC/ GM	<b>OLDER FLUVIAL DEPOSITS [Qfof]</b> At 40.0 to 40.7': Grades to Well Graded Sand with Gravel, fine to coarse grained, clasts 15-25%, up to 1/2 inch, mainly subrounded slate (Jsm); coarse sand is mainly subrounded to rounded slate (Jsm), shale (Tm) and sandstone At 40.7 to 45.0': Some subrounded quartzite and metabasalt(?) observed		
210	50	3	9	100	CL/ ML	<b>ESTUARINE DEPOSITS [Qe] - Marker Bed M<sub>p</sub></b> Clayey Silt and Silty Clay, trace to some fine sand, trace coarse sand (Jsm and Tm); mottled, strong brown (7.5YR 4/6) to gray (10YR 5/1) to dark brown (7.5YR 3/3); appears very moist and very stiff to hard; variable varve-like bedding; lower contact is sharp  At 49.3 to 50.0': Sand increases, some oxidized laminations		
205	55	4	10	56	ML	Sandy Silt, variable clay, trace to some coarse sand and fine gravel, clasts 2-15%, up to 1/2 inch, mainly subangular slate (Jsm), some subangular shale (Tm) also observed; lightly mottled, color variable, mainly dark gray (10YR 4/1) to brown (7.5YR 4/4); appears very moist and very stiff; occasionally grades to clayey silt; some varve-like bedding; lower contact is narrowly gradational  At 52.8 to 55.0': No recovery		
200	60	4	11	100	CL/ ML ML CL/ ML	Clayey Silt and Silty Clay, variable fine sand, trace coarse sand (Jsm and Tm); dark gray (2.5Y 4/1) with variable strong brown (7.5YR 4/6) mottling; appears very moist and very stiff; occasional small oxidized pockets; trace manganese oxide flecks; variable varve-like bedding; lower contact is gradational  At 57.8': Likely detrital charcoal, sample collected At 58.1 to 58.4': Sandy Silt bed, micaceous, trace manganese oxide flecks and staining At 58.4 to 60.0': Distinct oxidized strong brown laminations common		

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T4-B9</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/4/11 - 5/6/11	8 inches	259 feet
						GROUNDWATER READINGS		
						Encountered at 35-ft during drilling		
195	65	4	12	70	CL/ML	<b>Qe Continued</b> At 60.0': Becomes strongly mottled, dark gray (2.5Y 4/1) to strong brown (7.5YR 4/6; trace manganese oxide  At 61.5': possible detrital charcoal, collected sample  At 63.5 to 65.0': No recovery  At 66.1 to 66.8': Distinct oxidized Sandy Silt laminations  At 66.8': <b>Marker Bed M<sub>c</sub></b> - Clayey to Sandy Silt, trace coarse sand (Jsm and Tm); very dark gray (5Y 3/1) with dark reddish brown (5YR 3/4) mottling; appears very moist and very stiff; possible weak soil development; lower contact is gradational  At 69.0 to 70.4': Gradational transition to unit below		
190	70	5	13	100	ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo] - Marker Bed M<sub>A</sub></b> Clayey to Sandy Silt, trace to some coarse sand and fine gravel (Jsm and Tm); clasts 2-15%, up to 1/2-inch; lightly mottled, dark yellowish brown (10YR 4/4) to dark gray (10YR 4/1); appears very moist and very stiff; lower contact occurs between runs  At 72.6 to 73.1': Grades to Clayey Sand with Gravel; clasts 15-20%, up to 1/2-inch, mainly subangular slate (Jsm) and shale (Tm); appears wet and dense  At 74.0 to 75.0': No recovery		
185	75	5	14	80	ML	Fine Clayey Sand with Gravel; clasts 15-20%, up to 1/2-inch, mainly subangular slate (Jsm) and shale (Tm); dark gray (10YR 4/1); appears very moist and dense At 75.6 to 77.2': Grades to Clayey Silt to Silty Clay, brown (7.5YR 4/4) with highly oxidized, reddish brown (5YR 4/4) stained root structures and variable strong brown (7.5YR 5/8) mottling		
180	80	5	15	100	SM/ML	At 77.2 to 78.1': Silty Sand and Sandy Silt, very fine grained; lightly mottled, grayish brown (10YR 5/2) to dark yellowish brown (10YR 4/6), occasional strong brown (7.5YR 5/8) staining around fine root structures At 78.1 to 80.0': Grades to Sandy to Clayey Silt		

(CONTINUED ON FOLLOWING FIGURE)

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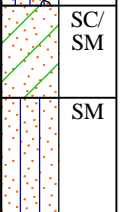
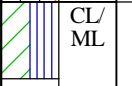
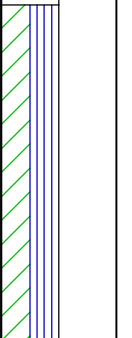
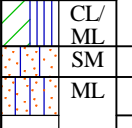
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T4-B9 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 259 feet
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						5/4/11 - 5/6/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 35-ft during drilling		
175	85	6	16	100	CL ML	<p><b>Qfo Continued</b>                      At 80.0 to 80.8': Clay, trace coarse sand (Jsm and Tm); brown (10YR 4/3) with strong brown (10YR 4/6) mottles                      Clayey to Sandy Silt, variable coarse sand, trace fine gravel (Jsm and Tm); strongly mottled, strong brown (7.5YR 4/6) with grayish brown (10YR 5/2) mottling; appears moist and very stiff to hard; moderately to poorly sorted; lower contact occurs between runs</p> <p>At 84.1 to 84.6': Gravel increases to 10-20%, up to 3/4 inch, mainly subangular slate (Jsm)</p> <p>At 85.0 to 90.0': No sampling</p>		
170	90	N/A	N/A	0		<p>Depth of contact uncertain due to poor recovery</p> <p><b>OLDER FLUVIAL DEPOSITS [Qfofl]</b>                      Well Graded Gravel, clasts 60-70%, up to 1 inch, mainly subangular slate (Jsm), some quartzite and brick-red sandstone also observed, quartzite up to 10%; matrix is fine to coarse sand; color variable, lower contact is 1 inch thick, lightly cemented bed with abundant manganese oxide staining</p>		
165	95	6	17	90	GW SM	<p>Silty Sand, fine grained; mottled, light brown (7.5YR 6/4) to reddish yellow (7.5YR 6/8); appears moist and dense, lower contact occurs between runs                      At 94.7 to 95.0': Becomes gravelly, clasts 30-40%, up to 3/4 inch, mainly subangular slate (Jsm), some quartzite and sandstone (Tm) also observed                      At 95.0 to 100.0': No sampling</p>		
160		N/A	N/A	0				
100								

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T4-B9</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/4/11 - 5/6/11	8 inches	259 feet
						GROUNDWATER READINGS		
						Encountered at 35-ft during drilling		
		6	18	80		<b>Qfo/Qfofl Continued</b> Well Graded Sand, fine-coarse grained; color variable, generally yellowish brown (10YR 5/4); abundant white or tan shale sand grains At 100.5 to 101.3': Silty Clay, trace coarse sand (Jsm); very dark grayish brown (10YR 3/2); appears very moist and very stiff; organic-rich At 100.8 to 101.2': Increasing Gravel At 101.3 to 101.4': Well Graded Gravel bed, clasts 60-70%, up to 3/4 inch; highly variable, subangular slate (Jsm), shale (Tm), quartzite, sandstone (Tm), and granitic rock observed; matrix is fine to coarse sand; color variable, generally yellowish brown (10YR 5/4); appears wet and dense At 101.4 to 101.7': Oxidized Sandy Silt bed At 101.9 to 102.3': Gravel decreases, gradational transition to bed below At 102.3 to 103.1': Silty Sand to Sandy Silt, fine grained, trace coarse sand; dark yellowish brown (10YR 4/4) to light yellowish brown (2.5Y 6/4); some laminations At 103.1 to 107.5': Clayey Silty Sand with Gravel; fine to coarse, clasts 25-40%, up to 3/4 inch, mainly slate (Jsm), shale (Tm) and quartzite; sharp lower contact At 103.5 to 104.0': Silty Sand; fine grained, pale brown (2.5Y 7/3), abundant siltstone rip-up clasts At 104.0 to 104.2': Silty Sand, fine grained; heavily oxidized, strong brown (7.5YR 5/8)		
155		7	19	68		<b>ESTUARINE DEPOSITS [Qe]</b> Silty Clay and Clayey silt; variable fine sand, rare (<1%) to trace coarse sand (Jsm and Tm); grayish brown (2.5Y 5/2); appears very moist and very stiff; variable varve-like bedding; occasional oxidized silt or sandy silt beds; brownish yellow (10YR 6/6) to yellowish red (5YR 5/6), most significant silt beds noted below At 105.2 to 105.4': Oxidized Sandy Silt bed At 106.0 to 110.0': No recovery  At 110.0 to 110.4': Oxidized Sandy Silt		
105		7	20	20				
150		7	21	100		At 114.4 to 116.8': Grades to Sandy Clay, variable fine gravel, clasts 5-20%, up to 1/2 inch, mainly subangular slate (Jsm), shale (Tm) sandstone (Tm) and quartzite		
110		7	22	66		Silty Sand, fine to coarse grained, color variable; mainly strong brown (7.5YR 5/6); appears wet and dense; lower contact is sharp Sandy Silt; brown (10YR 5/3); appears wet and medium stiff, micaceous, lower contact occurs between runs, depth of contact uncertain due to poor recovery At 118.3 to 120.0': No recovery		
145								
115								
140								
120								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MF  
 Prepared/Date: WL/YN/MW 10/11/2011  
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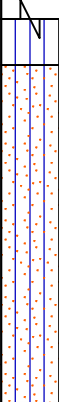

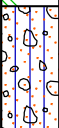
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T4-B9 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
						Hollow-Stem Auger	See Plate 3	259 feet
						DATES DRILLED	HOLE DIAMETER	
						5/4/11 - 5/6/11	8 inches	
						GROUNDWATER READINGS		
						Encountered at 35-ft during drilling		
135		8	23	70	SM CL/ML	<p><b>Qe Continued</b>                      Silty Sand with Gravel, fine-coarse, clasts 20-35%, up to 1 inch, mainly slate (Jsm), some shale (Tm), sandstone (Tm) and quartzite also observed; color variable; appears wet and dense lower contact is sharp, erosional, oxidized                      At 120.6': Silt/Clay pocket</p> <p>Alternating beds of Silty Clay and Sandy Silt; trace coarse sand; color variable, clay generally dark gray (10YR 4/1) with strong brown (7.5YR 5/8) mottling; sandy silt generally very pale brown (10YR 7/3) with occasional brownish yellow (10YR 6/8) mottling; appears moist and very stiff; trace manganese oxide flecks, sandy silt beds; lower contact occurs between runs; typical bed thickness is 2 to 5 inches                      At 122.0 to 122.1': Fine Silty Sand bed                      At 123.5 to 125.0': No recovery</p>		
125		8	24	76	CL CL/ML CL	<p>At 125.0 to 125.6': Grades to Sandy Clay, brown (10YR 4/3)</p> <p>At 125.6 to 127.0': Sandy Silt beds became highly oxidized, strong brown (7.5YR 5/6), micaceous</p> <p>At 127.0 to 128.9': Predominately Silty Clay with occasional 1 to 2 inches sandy silt beds</p> <p>At 128.8 to 135.0': No recovery</p>		
130		8	25	0	ML	<p>Depth of contact uncertain due to poor recovery</p> <p><b>ESTUARINE DEPOSITS - FINE GRAINED [Qe]</b>                      Clayey Silt, trace to some fine sand, trace coarse sand (Tm), little or no slate, black (5Y 2.5/1); appears moist and very stiff to hard; 2-5% very fine (&lt;1/32-inch), evenly dispersed calcium carbonate filaments; appears organic-rich                      At 135.0 to 136.0': Clayey Silt is very moist to wet, soft to medium stiff                      At 135.2 to 135.3': Fine Silty Sand bed                      At 136.2': Likely Charcoal, collected sample</p>		
135		8	26	100		<p>At 139.5 to 140.6': Calcium carbonate increases to 10-15%, filaments and cemented nodules up to 1/8-inch</p>		
120								
140								

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T4-B9</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/4/11 - 5/6/11	8 inches	259 feet
						GROUNDWATER READINGS		
						Encountered at 35-ft during drilling		
115		9	27	90		ML	<b>Qef Continued</b>	
							Sandy Silt, trace to some clay; very dark gray (10YR 3/1) with variable olive brown (2.5Y 4/3) mottling; appears very moist and very stiff; 5-15% calcium carbonate filaments and cemented nodules up to 1/8 inch; appears organic-rich; lower contact occurs between runs	
							At 142.5': Color becomes dark gray (2.5Y 4/1) with dark yellowish brown (10YR 4/4) mottling	
145						CL/ CH	At 144.5 to 145.0': Increasing coarse Sand and fine Gravel content, clasts 2-10%; up to 1/2 inch; mainly shale and sandstone (Tm), little or no slate	
							Clay and Silty Clay; mottled, very dark gray (2.5Y 3/1) to dark yellowish brown (10YR 3/4); appears very moist and very stiff; 10-15% calcium carbonate filaments and cemented nodules up to 1/8 inch, occasional zones with up to 25% calcium carbonate; lower contact is narrowly gradational	
110		9	28	80		ML	Sandy to Clayey Silt with Gravel; clasts 15-25%, up to 3/4 inch, mainly subangular slate (Jsm) and subrounded shale (Tm) and sandstone (Tm); dark yellowish brown (10YR 4/4) with strong brown (7.5YR 4/6) mottling; appears very moist and stiff; variable calcium carbonate, some pockets up to 1 inch with dispersed calcium carbonate within soil matrix	
							At 149.0 to 150.0': No recovery	
150							END OF BORING AT 150 FEET	
							NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched.	
							-Munsell colors listed in order of predominance (most predominant color first).	
							-Where observed, contacts and bedding appear subhorizontal unless otherwise noted.	
							-Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted.	
							-Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted.	
							-The term "clasts" herein describes gravel-size rock fragments (larger than 1/4 inch).	
							-Beds are generally massive unless otherwise noted.	
							Boring deepened from 100-ft to 150-ft on 5/5/11 to 5/6/11. Location of deepened boring offset from original boring location.	

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T4-B10</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/16/11 - 6/20/11	8 inches	280 feet
						GROUNDWATER READINGS		
						8 inches of reinforced concrete		
						ML	Hand augered to 6 feet <b>FILL [Af]</b> Sandy Silt, brown	
						SC	At 3': Clayey Sand, fine to medium grained, brown, appears moist	
						NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed descriptions of clasts		
		1	1	100		CL- ML/ SC	At 6': Mottled Clayey Silt and Clayey Sand, fine grained, olive brown, appears moist and soft to loose; sand and gravel at lower contact	
						ML	<b>ESTUARINE DEPOSITS [Qe]</b> Clayey to Sandy Silt, trace fine subangular gravel; olive gray (5Y 4/2); appears moist and stiff; discrete oxidized with interfingering laminae; lower contact occurs between runs	
						SP	(Sample disturbed) Poorly Graded Sand with Gravel, fine to medium grained, subangular to subrounded	
		1	2	100		SP	(Sample less disturbed) More fines less gravel; lower contact is gradational	
						ML	Silty Sand grading to Clayey Silt; fine grained, trace sand; olive brown (2.5Y 4/3); thin oxidized lenses/laminae; lower contact occurs between runs	
						SP	(Sample disturbed) Sand with Gravel, fine to very fine grained; angular clay clasts	
							At 16': (Sample less disturbed) Silty Sand, fine grained, 5% angular gravel	
		1	3	100		CL- ML	Clayey Silt with some fine sand and gravel (2-5%); dark yellowish brown (10YR 3/4); appears moist and very stiff; some varve-like bedding	

(CONTINUED ON FOLLOWING FIGURE)

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T4-B10a

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T4-B10 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/16/11 - 6/20/11	8 inches	280 feet
						GROUNDWATER READINGS		
255	25	2	4	100	ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> At 20': (Disturbed Sample) Sandy Silt with some Clay and Gravel		
					SM	At 21.1 to 21.8': Increasing Gravel and Sand, grades to Silty Sand with Gravel; lower contact is gradational		
					SM	At 21.8': Silty Sand, fine to medium grained, some clay, trace fine gravel; dark yellowish brown (10YR 4/6); appears moist and moderately dense; lower contact is gradational		
					ML	At 22.5': (less disturbed) Clayey Silt, trace gravel and sand; thin oxidized layers/lenses; lower contact is sharp		
						At 23.5': Gravel and Sand bed (2 inches thick), fine to coarse grained, angular to rounded, thin fine sandy layers interfingering		
						At 24': Silt, manganese stained splotches, increasing fine sand with depth, lower contact is gradational		
250	30	2	5	100	CL-ML	At 25': (disturbed sample) Increasing Clay, dark reddish brown (5YR 3/4) mottling; depth of contact uncertain due to poor recovery		
					SC	At 26': Clayey Sand with Gravel, clayey matrix, clasts are angular and fine grained, mostly slate and granitic; lower contact is narrowly gradational; (less disturbed)		
					ML	Silt, some very fine sand and trace clay; olive brown (2.5Y 4/4) increasing clay, grades to Silty Clay with depth, trace gravel; thin oxidized layers interfingering; lower contact is gradational		
					SC	Clayey Sand, fine grained, some fine gravel; appears moist and medium dense; lower contact occurs between runs At 30.0-32.0': Disturbed sample		
245	35	2	6	100	SM	Silty Sand, fine grained, trace fine gravel; mottled coloring dark yellowish brown (10YR 4/6); thin oxidized layers interfingering; lower contact is narrowly gradational		
					ML	Clayey Silt, trace fine to coarse gravel, fine sand, thin fine sandy interbedded		
						At 33.7-34.0': Sand with Gravel bed, fine to coarse grained gravel, fine to medium grained sand; depth of contact uncertain due to poor recovery		
		3	7	76	SW	<b>OLDER FLUVIAL FAN DEPOSITS [Qfofl]</b> Well Graded Sand with Gravel, fine to medium sand, fine to coarse gravel, angular to subangular		
						Well Graded Sand, fine to medium grained; olive brown (2.5Y 4/4); lower contact is sharp		
					ML	Clayey Silt with Gravel; olive brown (2.5Y 4/6)		
					SP/SC	At 38.4': Clayey Sand to Sand; lower contact is gradational At 38.6 to 40.0': No recovery		

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T4-B10</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/16/11 - 6/20/11	8 inches	280 feet
						GROUNDWATER READINGS		
						<p><b>Qfoff continued</b> Poor to no recovery (slough)</p> <p>At 41.3 to 45': No recovery</p>		
235	45	3	8	26		<p><b>ESTUARINE DEPOSITS [Qe]</b> Clayey Sand grades to Clayey Silt; olive brown (2.5Y 4/4); thin oxidized interfingering layers; increasing clay with depth</p>		
		3	9	100		ML	At 46.5-46.8': Thin fine Silty Sand interbeds	
						SM	Clay, very dark grayish brown (2.5Y 3/2); some silt, trace fine sand; trace calcium carbonate concretion nodules, gravel size	
						CL	At 48.5-48.7': Thin carbonate layers, near horizontal zones of calcium carbonate concretion Clay, very dark grayish brown (2.5Y 3/2); abundant fine shell fragments and calcium carbonate nodules	
230	50						At 50-52.5': Sample disturbed	
		4	10	100		SM	Silty Sand, very fine to fine grained, trace gravel, trace calcium carbonate nodules	
						ML	Clayey Silt, some fine sand; dark grayish brown (10YR 4/2); appears moist and stiff; thin oxidized interfingering layers; trace calcium carbonate nodules; lower contact is gradational; increasing clay with depth	
						CL	Clay bed	
225	55	4	11	100		ML	Clayey Silt, some fine sand; dark brown (7.5YR 3/4); near verticle calcium carbonate vein; increasing sand to Sandy Silt with trace coarse gravel; 2 to 5% up to 1 inch in diameter, angular slate and subrounded granitics	
						SP	Poorly Graded Sand, fine to medium grained; appears moist and medium dense	
						ML	Silt to Clayey Silt; appears moist and stiff; thin oxidized interbeds; trace fine sand	
60								

(CONTINUED ON FOLLOWING FIGURE)

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T4-B10c

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T4-B10</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/16/11 - 6/20/11	8 inches	280 feet
						GROUNDWATER READINGS		
						ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b>	
							At 61.2-62.3': Trace gravel increasing sand grades to Sandy Silt; near vertical calcium carbonate filaments	
		4	12	100			Clayey Silt, some fine to coarse gravel; dark yellowish brown (10YR 4/4); trace calcium carbonate nodules; appears very moist and soft; lower contact occurs between runs	
215	65					SM	Silty Sand, fine to coarse grained; dark yellowish brown (10YR 3/4); appears moist and medium dense; fine to coarse gravel; angular to subangular	
		5	13	100		SM	Increasing Silt, fine grained sand; dark yellowish brown (10YR 3/4); appears moist and medium dense, trace clay; lower contact is gradational	
							At 67.5-68.0': Increasing Sand, fine to medium grained; trace gravel	
210	70					ML	<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b>	
		5	14	100			Clayey Silt, trace fine to medium grained gravel; dark yellowish brown (10YR 3/4); appears moist and stiff; well sorted, generally massive; trace calcium carbonate nodules; trace manganese oxide staining	
							At 73': Color changes to very dark grayish brown (2.5Y 3/2)	
							At 74': Color changes to dark olive gray (5Y 3/2); clayey, trace calcium carbonate filaments	
205	75							
		5	15	100		CL	Clay; black (5Y 2.5/2); punky texture with waxy parting surfaces (possible shearing); appears moist and soft; splotchy oxidation	
							At 78.6': Abundant calcium carbonate nodules; lower contact occurs between runs	
80								

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T4-B10</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/16/11 - 6/20/11	8 inches	280 feet
						GROUNDWATER READINGS		
		6	16	100		SC	<b>ESTUARINE DEPOSITS [Qe]</b> At 80-81': Disturbed sample Clayey Sand, fine grained, some fine to medium gravel; dark grayish brown (2.5Y 4/2); appears moist and dense; well sorted	
						ML	Increasing Silt to Clayey Silt; dark grayish brown (2.5Y 4/2); lower contact is narrowly gradational	
195	85					SC	At 84.8': Grades to Clayey fine Sand	
		6	17	100			At 85.7': Grades to Clayey Silt, some very fine sand; dark yellowish brown (10Y 3/6); varying amount of sand and clay	
						SW	Sand with Gravel, fine to coarse grained, fine to coarse gravel; subangular to angular; lower contact is gradational	
190	90					ML	Clayey Silt; appears moist and soft to medium stiff; very dark grayish brown (2.5Y 3/2)	
		6	18	44		SW	At 91-92.2': Increasing Sand and Gravel, fine to coarse grained; subrounded; lower contact occurs between runs; (sample disturbed)	
							At 92.2-95': No recovery	
185	95					ML	Clayey Silt; olive brown (2.5Y 4/4); thin interbedded clay; very dark grayish brown (2.5Y 3/2); lower contact is gradational	
		7	19	100		SM	At 97.4-97.8': Grades to Silty Sand, fine to medium grained; dark grayish brown (2.5Y 4/2); appears moist and medium dense; slight oxidation mottling; lower contact is gradational	
						ML	At 97.8': Silt; lower contact is gradational	
						SM	Silty Sand, lower contact is gradational	

(CONTINUED ON FOLLOWING FIGURE)

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						Martini Drilling / CME 75		<b>T4-B10</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/16/11 - 6/20/11	8 inches	280 feet
<b>GROUNDWATER READINGS</b>								
		7	20	100		SP	<b>Qe Continued</b> At 100-100.8': Thin Clay interbeds  At 100.8': Trace fine gravel, subrounded; lower contact is gradational	
						SW	Well Graded Sand with Gravel, fine to coarse grained; angular to subangular; very dark grayish brown (2.5Y 3/2)	
						ML	Clayey Silt, trace fine gravel; dark gray (5Y 4/1); appears moist and stiff; lower contact occurs between runs	
175	105	7	21	100		SC	Clayey Sand, fine to medium grained; dark grayish brown (2.5Y 4/2); trace calcium carbonate nodules, decrease quantity with depth; lower contact is narrowly gradational	
						ML	Clayey Silt; dark grayish brown (2.5Y 3/2); some fine sand and variable clay; appears moist and stiff; slightly splotchy oxidation; lower contact is narrowly gradational	
170	110	8	22	100				
165	115	8	23	100		SM	<b>BASAL ALLUVIAL FAN UNIT [Qfob]</b> Silty Sand to Sandy Silt; fine grained, trace coarse, some clay, coarse sand and gravel increasing with depth; olive brown (2.5Y 4/3); trace calcium carbonate nodules; appears moist and medium dense; poorly sorted  At 116.9': Calcium carbonate becomes more abundant	
						ML		

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T4-B10</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/16/11 - 6/20/11	8 inches	280 feet
						GROUNDWATER READINGS		
155	125	8	24	100	ML	<b>BASAL ALLUVIAL UNIT [Qfob]</b> At 119.7: Clayey Silt with some fine Sand; light yellowish brown (2.5Y 6/3); trace to some calcium carbonate nodules; appears moist and stiff; poorly sorted; lower contact is gradational  At 121.9: Fine Silty Sand; lower contact is narrowly gradational  At 123.0: Fine Silty Sand; dark greenish gray (5GY 4/1); lower contact is sharp		
150	130	9	25	100	SM	At 126.6: Silty fine Sand; dark grayish olive (10Y-5GY 4/2); variable gravel, fine to coarse ; trace silt and clay, occasional clayey silt interbeds		
					SP	Poorly Graded Sand, fine to medium grained; very dark greenish gray (5GY 3/1); appears moist and loose to medium dense; lower contact is sharp		
		9	26	100	CL	<b>BASAL ESTUARINE UNIT [Qeb]</b> Silty Clay; dark greenish gray (5GY 4/1); lower contact is gradational  At 131.8: Some calcium carbonate nodules; gravel 1/2-inch in diameter, mostly sandstone		
					SM	At 132.8-133.2: Grades to fine Silty Sand		
145	135				ML	Clayey Silt; abundant calcium carbonate veins and nodules; dark olive gray (5Y 3/2); appears moist and soft; varying amounts of fine sand and clay; some fine oxidized pockets  At 134.2: Increases consistency to very stiff to hard  At 135.6-137.5: Abundant coarse gravel  At 137.5: Fine, irregular, oxidized pockets		

(CONTINUED ON FOLLOWING FIGURE)

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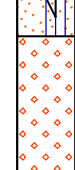

THIS RECORD IS AN INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T4-B10</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/16/11 - 6/20/11	8 inches	280 feet
						GROUNDWATER READINGS		
135	145	10	28	100	ML	<b>Qeb Continued</b> Varying fine sand; abundant calcium carbonate; lower contact is sharp  At 145.5': Becomes olive gray (5Y 4/2), abundant calcium carbonate, some fine irregular oxidized pockets  At 148.0 to 149.0': Highly oxidized, sharp contact with unit below		
130	150	10	29	100	CL	<b>SAN PEDRO FORMATION [Qsp]</b> At 149-149.3': Clay bed, black (5Y 2.5/1); organic-rich; lower contact is sharp At 149.3-149.4': Sand bed; very dark gray (5Y 3/1); appears dense; lower contact is sharp At 149.4-149.85': Clay bed; olive gray (5Y 4/2); appears moist and very stiff; lower contact is sharp Poorly Graded Sand with Silt, grades from fine to medium grained; very dark gray (5Y 3/1); appears very moist to moist and medium dense; trace subangular gravel; lower contact occurs between runs At 150.0 to 152.0': Poorly Graded Sand with Silt,		
125	155	10	30	100	SP-SM	At 152.8': Becomes fine grained; light olive gray (5Y 6/2)		
120	160	11	31	86				

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T4-B10 (Continued)
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/16/11 - 6/20/11	8 inches	280 feet
						GROUNDWATER READINGS		
						<p><b>Qsp Continued</b></p> <p>At 160.5': Grades to Well Graded Sand, fine to coarse grained</p> <p>At 162.3-165.0': No recovery</p>		
115	165	11	32	46		<p>Poorly Graded Sand with Gravel; clasts mostly subrounded to subangular granitic rock and slate; smaller gravel is subrounded; lower contact occurs between runs</p> <p>At 166-170': No recovery</p>		
110	170	11	33	20		<p>Clayey Silt; dark olive gray (5Y 3/2); trace small shell fragments; interbedded sandy silt beds</p> <p>At 143.6-175': No recovery</p>		
105	175					<p>END OF BORING AT 175 FEET</p> <p>NOTES:                      Boring backfilled with cement/bentonite grout from bottom up and patched.</p> <ul style="list-style-type: none"> <li>-Munsell colors listed in order of predominance (most predominant color first).</li> <li>-Where observed, contacts and bedding appear subhorizontal unless otherwise noted.</li> <li>-Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted.</li> <li>-Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted.</li> <li>-The term "clasts" herein describes gravel-size rock fragments (larger than 1/4 inch).</li> <li>-Beds are generally massive unless otherwise noted.</li> </ul>		
	180							

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T7-B1</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/9/11 - 5/10/11	8-inch	259 feet
						GROUNDWATER READINGS		
						Encountered at 45-ft during drilling		
						7 inches of asphaltic concrete over 18 inches of base		
						Hand augered to 5.5 feet		
						ML	<b>FILL [Af]</b> Sandy Silt with some clay and fine gravel; dark yellowish brown (10YR 3/4); appears moist and dense  NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed clast descriptions	
255	5					SM	Silty Sand, fine grained, some gravel, clasts 5 to 15%, up to 3/4 inches, mainly subangular to subrounded slate (Jsm), sandstone (Tm) and shale, some brick-red sandstone (Tm); dark brown (10YR 3/3); appears moist and medium dense; lower contact is sharp	
		1	1	66		ML	At 7.1 to 7.5': Silty Sand with Gravel, appears dry and loose, clasts mainly subangular to subrounded slate (Jsm) and shale (Tm), granitic clasts also observed <b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Sandy to Clayey Silt, variable gravel, clasts 2 to 10%, up to 3/4 inches, mainly subangular to subrounded slate (Jsm) and shale (Tm), some brick-red sandstone (Tm); dark yellowish brown (10YR 5/4); appears moist and very stiff; poorly sorted, lower contact occurs between runs At 8.6 to 10.0': No recovery	
250	10					ML/CL	Clayey Silt to Silty Clay; dark grayish brown (2.5Y 4/2); appears very moist and stiff; punky texture with waxy parting surfaces  At 11.5 to 12.8': Increasing sand and mottling; gradational transition to unit below	
		1	2	100		SM	<b>OLDER FLUVIAL DEPOSITS [Qfo]</b> Silty Sand with Gravel, fine to coarse grained, clasts 30 to 50%, up to 1/2 inch, mainly subangular slate (Jsm), some sandstone (Tm), shale (Tm) and quartzite also observed; color variable, generally yellowish brown (10YR 5/4); appears moist and dense; lower contact is sharp, erosional	
245	15					CL	At 14.4 to 15.2': Silty Clay, variable sand, dark grayish brown (2.5Y 4/2) with strong brown (7.5YR 4/6) mottling ; appears very moist and very stiff	
						SM	At 15.2 to 15.9': Silty Sand with Gravel; fine grained, clasts as above; dark yellowish brown (10YR 4/4) At 15.9': Appears very moist, oxidized strong brown (7.5YR 4/6)	
240		1	3	100			At 19.2 to 19.6': Silty Sand, fine grained; brown (7.5YR 4/4)	
20								

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T7-B1</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/9/11 - 5/10/11	8-inch	259 feet
						GROUNDWATER READINGS		
						Encountered at 45-ft during drilling		
						SM	<b>Qfofl Continued</b>	
		2	4	100		CL	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b>	
						ML	At 22.0 to 22.6': Clay, variable coarse sand and gravel (Jsm and Tm); dark grayish brown (2.5Y 4/2)	
						CL/ML	At 22.6 to 23.2': Clayey to Sandy Silt with Gravel, clasts 5 to 20%, up to 1 inch, mainly subrounded slate (Jsm), shale (Tm) and sandstone (Tm)	
235	25					ML	Silty Clay to Clayey Silt, trace coarse sand and gravel (Jsm and Tm); mottled, grayish brown (10YR 5/2) to strong brown (7.5 YR 5/8); appears moist to very moist; lower contact is gradational	
							At 24.6 to 25.2': 5 to 15% calcium carbonate filaments and nodules up to 1/2 inch	
							At 25.8 to 27.0': Increasing sand and gravel; gradational transition to gravel unit below	
		2	5	100		GM/GC	At 27.0 to 28.0': Clayey Silty Gravel, clasts 60 to 70%, up to 1 1/2 inch, mainly subangular shale (Tm), some subangular slate (Jsm) and minor quartzite; color variable	
						CL/ML	<b>ESTUARINE DEPOSITS [Qe]</b>	
230	30						Silty Clay to Clayey Silt, trace coarse sand, grayish brown (10YR 5/2); appears moist to very moist; lower contact is gradational	
							At 30.0 to 30.7': Becomes mottled, brown (7.5YR 4/4) to dark grayish brown (10YR 4/2)	
							At 30.7 to 34.4': Alternating beds of Silty Clay to Clayey Silt and Sandy to Clayey Silt with variable gravel, clasts in coarser beds 5 to 15%, up to 3/4 inch, mainly subangular slate (Jsm), some shale (Tm); color variable, mottled, generally dark grayish brown (10YR 4/2) to brown (7.5YR 4/3)	
225	35	2	6	100		ML	At 35.0 to 35.8': Sand increases with depth, grades to Sandy to Clayey Silt; appears very moist and medium stiff, gradational transition to unit below	
						ML	Clayey to Sandy Silt; mottled, grayish brown (2.5Y) to strong brown (7.5YR 5/8); appears very moist and stiff to very stiff; well sorted; lower contact is gradational	
		3	7	100		SM	At 37.6 to 38.5': Silty Sand, fine grained; abundant manganese oxide staining, becomes coarser with depth, grades to fine to medium Silty Sand	
220						ML	At 38.6 to 40.0': Variable coarse sand, trace fine gravel, abundant manganese oxide staining, some irregular manganese oxide-rich laminations	

(CONTINUED ON FOLLOWING FIGURE)

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T7-B1b

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T7-B1</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 259 feet
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						5/9/11 - 5/10/11	8-inch	
						GROUNDWATER READINGS		
						Encountered at 45-ft during drilling		
						<p><b>Qe Continued</b> At 40.3 to 40.7': Grades to fine Silty Sand</p> <p>At 41.6 to 43.0': Variable manganese oxide staining</p>		
215	45	3	8	100		SM	At 43.8 to 45.0': Clay increases, mainly Clayey Silt, coarse sand (Jsm and Tm) increases with depth	
						ML	<p>At 45': Groundwater encountered during drilling</p> <p>At 45.0 to 45.7': Sand increases, gradational transition to unit below</p>	
						SM	Silty Sand, trace to some gravel, fine to coarse grained, clasts 2 to 15%, up to 3/4 inch, mainly subrounded slate (Jsm) and shale (Tm); color variable; appears wet and dense	
						SW	At 46.3 to 46.7': Some silt nodules	
						SW	At 47.3 to 47.8': Grades to fine to coarse, Well Graded Sand	
						ML	At 47.8 to 48.2': Clayey Silt, upper contact is irregular (erosional)	
210	50	4	9	96		SM		
						ML	Clayey to Sandy Silt, variable coarse sand and gravel, clasts 5 to 20%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm) shale (Tm) and sandstone (Tm); color variable, mainly brown (10YR 4/3) with strong brown (7.5YR 4/6); appears very moist and stiff	
						SM	At 51.5 to 52.6': Silty Sand, fine to medium grained, variable gravel, clasts 5 to 10%, up to 1/2 inch, mainly slate (Jsm) and shale (Tm), heavily oxidized at base of bed	
						ML	At 52.5 to 53.8': Gravel decreases to trace, some manganese oxide-rich lenses	
205	55	4	10	100		ML	Clayey to Sandy Silt, trace coarse sand; grayish brown (10YR 5/2) with variable strong brown (7.5YR 4/6) mottling; appears very moist and very stiff; variable manganese oxide stains; 5 to 15% calcium carbonate filaments and cemented nodules	
						CL/ML	<b>Marker Bed M<sub>E</sub></b> - Silty Clay to Clayey Silt, trace to some fine sand, trace coarse sand; very dark grayish brown (10YR 3/2) with strong brown (7.5YR 4/6) mottling; appears moist and very stiff; some calcium carbonate filaments and cemented nodules (5 to 10%), up to 1/4 inch, some fine, irregular oxidized pockets; distinct color and texture	
200		4	11	100		ML		
						ML	Clayey to Sandy Silt, variable coarse sand and gravel, clasts 5 to 20%, up to 3/4 inch	
60								

(CONTINUED ON FOLLOWING FIGURE)

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						Martini Drilling / CME 75		<b>T7-B1</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 259 feet
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						5/9/11 - 5/10/11	8-inch	
						GROUNDWATER READINGS		
						Encountered at 45-ft during drilling		
195	65	4	12	96	ML	<p><b>Qe Continued</b>            mainly subangular to subrounded slate (Jsm), shale (Tm), and sandstone (Tm); strongly mottled, brown (7.5YR 4/4) to gray brown (10YR 5/2); appears moist and very stiff</p> <p>At 61.8 to 65.0': Grades to Clayey Silt            At 61.8 to 62.7': 10 to 15% calcium carbonate filaments and nodules, variable fine, irregular oxidized pockets            At 62.7': Calcium carbonate and oxidized pockets decrease to trace</p>		
190	70	5	13	100	ML	<p>Clayey to Sandy Silt, variable coarse sand and gravel, clasts 5 to 15%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm), and sandstone (Tm); strongly mottled, brown (7.5YR 4/4) to grayish brown (10YR 5/2); appears moist and very stiff</p> <p>At 67.0 to 68.5': Increasing manganese oxide staining</p> <p>At 68.5 to 71.5': Abundant manganese oxide flecks and staining, total manganese oxide 10 to 20%</p> <p>At 69.3 to 70.1': Grades to Silty Clay to Clayey Silt</p>		
185	75	5	14	100	ML	<p>At 71.8 to 73.0': Gravel increases to 20 to 30%, numerous shale and sandstone clasts up to 1 inch</p> <p>At 73.0 to 75.3': Color becomes grayish brown (2.5Y 6/1) to yellowish brown (10YR 5/8)            At 73.0 to 77.5': Coarse sand and gravel decreases to less than 5%</p>		
180		5	15	100	CL	<p>At 78.3 to 80.0': Grades to Silty Clay            At 78.3 to 78.5': Distinct fine mottling, color variable, mainly gray (2.5Y 6/1) to yellow (10YR 7/6), spotted texture</p>		

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T7-B1</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/9/11 - 5/10/11	8-inch	259 feet
						GROUNDWATER READINGS		
						Encountered at 45-ft during drilling		
		6	16	100		SM/ML	<b>Qe Continued</b> Silty Sand and Sandy Silt, fine grained, variable clay, variable gravel, clasts 2 to 20%, up to 3/4 inch, mainly subangular slate (Jsm) and shale (Tm); lightly mottled, brown (10YR 4/4) to grayish brown (10YR 5/2); appears very moist and very stiff/dense; coarsens downward, grades to gravel bed below	
175	85					GM	At 83.9 to 85.6': <b>Marker Bed Mc</b> - Silty Gravel, clasts 50 to 60%, up to 1 inch, mainly subangular to subrounded slate (Jsm), some subrounded shale (Tm), sandstone (Tm) and granitic rock; color variable, appears damp and dense	
		6	17	100		SM/ML	At 85.6 to 88.3': Gravel less than 5%, up to 1/2 inch; thinly bedded, some varve like bedding	
170						SM	At 88.3 to 89.4': Grades to fine to medium Silty Sand, gravel 15 to 20%	
90						CL	Clay and Silty Clay, variable fine sand, trace coarse sand (Jsm and Tm); mottled, dark grayish brown (10YR 4/2) to strong brown (10YR 4/6); appears very moist and very stiff	
		6	18	100			At 90.8 to 92.6': 5 to 15% calcium carbonate filaments and nodules up to 1/8 inch At 91.0 to 92.6': Up to 5% manganese oxide flecks and staining	
165	95					ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt, trace to some coarse sand and gravel, clasts 2 to 10%, up to 1/2 inch, mainly subrounded slate (Jsm), some subrounded shale (Tm), and sandstone (Tm); lightly mottled, brown (7.5YR 4/3) to dark grayish brown (10YR 4/2); appears very moist and very stiff; poorly sorted; lower contact is gradational	
							At 95.0 to 96.5': Gravel increases to 10 to 20%, some brick-red sandstone At 95.0 to 100.3': Mainly dark grayish brown (10YR 4/2) with variable brown (7.5YR 4/3) mottling	
		7	19	100		SM	At 96.5 to 97.6': Grades to fine Silty Sand with Clay, gravel 20 to 30%, some brick-red sandstone	
160						ML	At 97.6 to 100.3': Gravel increases to 40 to 50%	
100								

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T7-B1</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/9/11 - 5/10/11	8-inch	259 feet
						GROUNDWATER READINGS		
						Encountered at 45-ft during drilling		
155	105	7	20	100	ML	<b>Qfo Continued</b> At 100.3 to 101.2': Clayey Silt, trace coarse sand; mottled, light yellowish brown (10YR 6/3) with reddish yellow (7.5YR 6/6)		
					SC/CL	<b>BASAL ALLUVIAL FAN UNIT [Qfob]</b> Clayey Sand and Sandy Clay, trace to some coarse sand and fine gravel (Jsm and Tm); color variable, generally light gray (2.5Y 7/2); appears very moist and very stiff/dense; abundant calcium carbonate, occurs as cemented nodules up to ¼ inch and dispersed within soil mass, total calcium carbonate 50 to 70%		
					SC	At 102.3 to 103.5': Grades to Clayey Sand; fine to coarse, yellowish brown (10YR 5/4), calcium carbonate decreases to 15 to 20%		
					SM	At 103.5 to 104.3': Grades to fine to medium Silty Sand with Clay, gravel 5 to 10%, up to ½ inch (Jsm and Tm); yellowish brown (10YR 5/4)		
					ML	Clayey to Sandy Silt, trace coarse sand (Jsm and Tm); light olive brown (2.5Y) with yellowish brown (10YR 5/6) mottling; appears very moist and very stiff/hard; lower contact is narrowly gradational		
150	110	7	21	100	CL/CH	<b>BASAL ESTUARINE UNIT [Qeb]</b> Clay; dark gray (2.5Y 4/1); appears very moist and very stiff to hard; trace calcium carbonate filaments up to 1/16 inch  At 108.0 to 108.8': Color becomes dark gray (5Y 4/1), calcium carbonate filaments increase to 10 to 15%  At 108.8 to 110.3': Color becomes dark grayish brown (2.5Y 4/2), 5 to 15%, cemented nodules up to ½ inch		
					SM	At 110.3 to 111.0': Becomes mottled, dark grayish brown (2.5Y 4/2) with brown (7.5YR 4/4) mottling; some fine, irregular oxidized pockets; calcium carbonate increases with depth, 5% manganese oxide flecks At 111.0 to 112.1': Calcium carbonate 50 to 70%, occurs mainly as dispersed material with soil mass		
145	115	8	22	100	SP/SM	At 112.1 to 113.0': Grades to Silty Sand, fine grained, 40 to 70% dispersed calcium carbonate  At 113.0 to 113.6': Silty Sand, 20 to 30% cemented calcium carbonate nodules up to ¾ inch, dispersed calcium carbonate, total calcium carbonate 60 to 70% <b>SAN PEDRO FORMATION [Qsp]</b> Poorly Graded Sand with Silt; fine grained, brown (10YR 4/3); appears damp and dense; well sorted At 113.6 to 114.8': Weathered zone, faint gray (10YR 5/1) mottling, 10 to 15% diffuse calcium carbonate nodules, up to ½ inch		
140		8	23	98	GM	At 118.8 to 119.4': Becomes slightly cemented At 119.4 to 120.2': Silty Gravel, clasts 50 to 60%, up to 1½ inch, mainly subangular to subrounded slate (Jsm), some shale (Tm), sandstone (Tm), matrix is fine to coarse, moderately cemented, silty sand; color is variable		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: DR/WL/MW 10/10/2011  
 Checked/Date: MW/MF 10/14/2011

METRO SOIL CORE S:\70131 GEOTECH\GINT\W\FULT\_INVESTIGATION\_WSE\_LIBRARY\_AMEC OCTOBER2011 (2).GJR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 7.GPJ 10/14/11

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					DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
					Martini Drilling / CME 75		<b>T7-B1</b> (Continued)
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING METHOD	
					Hollow Stem Auger		See Plate 3
					DATES DRILLED		GROUND EL.
					5/9/11 - 5/10/11		259 feet
					GROUNDWATER READINGS		
					Encountered at 45-ft during drilling		
		8	24	82	GM	<b>Qsp Continued</b> Silty Gravel, clasts 50 to 60%, most up to 1½ inches, maximum 3 inches; mainly subrounded slate (Jsm), quartzite, sandstone (Tm) and granitic rock, 2 quartzite clasts >2 inches; matrix is fine to coarse silty sand, generally light olive brown (2.5Y 5/3); appears moist and dense; lower contact is sharp, erosional	
135					SM	Silty Sand; fine grained, light olive gray (5Y 6/2); appears moist and dense; well sorted; occasional dark yellowish brown (10YR 4/4) mottling	
125		9	25	60	SP-SM	Poorly Graded Sand with Silt, very fine grained; light gray (2.5Y 7/1); appears moist and dense; well sorted; lower contact is gradational  At 126.5 to 127.2': Scattered rounded clasts, up to 2.5 inches; appear to be mainly granitic rock, quartzite and mafic igneous/metamorphic rock  At 128.0 to 130.0': No recovery	
130						At 132.7 to 135.0': No recovery	
130		9	26	54	SP-SM	At 135.5 to 136.0': Scattered, well rounded clasts up to ¾ inch, mainly slate (Jsm) At 136.0 to 136.8': Oxidized irregular laminations and lenses, brownish yellow (10YR 6/6) At 136.8 to 137.2': Very thin (<1/16 inch) black laminations (manganese oxide)	
125					SM	Silty Sand; very fine grained, gray (N 6/1); appears moist and dense, well sorted  At 138.5 to 139.5': Trace manganese oxide flecks	
135		9	27	90			
120							
140							

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: DR/WL/MW 10/10/2011  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T7-B1</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 259 feet
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						5/9/11 - 5/10/11	8-inch	
						GROUNDWATER READINGS		
						Encountered at 45-ft during drilling		
115						END OF BORING AT 140 FEET		
145						NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched.		
110						-Munsell colors listed in order of predominance (most predominant color first).		
150						-Where observed, contacts and bedding appear subhorizontal unless otherwise noted.		
105						-Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted.		
155						-Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted.		
100						-The term "clasts" herein describes gravel-size rock fragments (larger than 1/4 inch).		
160						-Beds are generally massive unless otherwise noted.		

Geologist: ME/MF  
 Prepared/Date: DR/WL/MW 10/10/2011  
 Checked/Date: MW/MF 10/14/2011

MTA Westside Subway Extension  
 Los Angeles, California



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T7-B1h

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T7-B2</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/11/11-5/13/11 and 6/13/11-6/14/11	8-inch	266 feet
						GROUNDWATER READINGS		
						Encountered at 41-ft during drilling		
265						7 inches of asphaltic concrete over base Hand augered to 6 feet		
	5					<b>YOUNGER/OLDER ALLUVIAL FAN DEPOSITS [Qf/Qfo]</b> Clayey Silt to Silty Clay, variable fine sand, trace coarse sand and gravel; dark brown (10YR 3/3); appears very moist to wet and soft; some dispersed organics		
		1	1	100		NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed clast descriptions		
260						Clayey to Sandy Silt, variable coarse sand and gravel, clasts 5 to 15%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), some shale (Tm) and sandstone (Tm) also observed; very dark brown (10YR 2/2); appears very moist to wet and soft; some dispersed organics; lower contact is sharp		
	10					<b>ESTUARINE DEPOSITS [Qe]</b> Clayey Silt to Silty Clay, trace coarse sand (Jsm and Tm); mottled, grayish brown (2.5Y 5/2) to strong brown (7.5 YR 4/6); appears very moist and very stiff; lower contact occurs between runs		
255						Clayey Silt to Silty Clay; dark grayish brown (2.5Y 4/2); appears very moist and stiff; some punky texture with waxy parting surfaces		
		1	2	100		At 12.0 to 12.8': Alternating beds of Silty Clay and fine to coarse Silty, Clayey Sand		
						At 12.8 to 13.9': Silty Sand with Gravel, fine to coarse grained, clasts 30 to 40%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm), some quartzite also observed; color variable; appears very moist to wet and dense		
						At 13.9 to 15.0': Clay and Silty Clay, trace coarse sand; mottled, dark gray (10YR 4/1) to strong brown (7.5 YR 4/6); appears very moist and very stiff; lower contact occurs between runs		
250						Clayey to Sandy Silt, trace coarse sand and fine gravel; mottled, dark gray (10YR 4/1) to strong brown (7.5YR 4/6); appears very moist and medium stiff to stiff, lower contact is narrowly gradational		
						At 16.0 to 17.0': Coarsens with depth, grades to fine Silty Sand		
		1	3	100		Clay and Silty Clay, rare coarse sand (Jsm and Tm); dark grayish brown (2.5Y 4/2); appears very moist and very stiff; lower contact is narrowly gradational		
20								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: YN/WL/MW 10/10/2011  
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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 7.GPI 10/14/11

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T7-B2 (Continued)
						Hollow Stem Auger	See Plate 3	
						<b>DATES DRILLED</b> 5/11/11-5/13/11 and 6/13/11-6/14/11	<b>HOLE DIAMETER</b> 8-inch	<b>GROUND EL.</b> 266 feet
						<b>GROUNDWATER READINGS</b> Encountered at 41-ft during drilling		
245		2	4	100	CL	<b>Qe Continued</b>  At 20.8 to 22.0': Grades to Silty Clay/Clayey Silt with sand		
					CL/ML			
					CL/ML	Silty Clay to Clayey Silt; trace coarse sand (Jsm and Tm); mottled, grayish brown (2.5Y 5/2) to strong brown (7.5YR 4/6); appears moist and very stiff; some varve like bedding and irregular oxidized pockets; lower contact is gradational		
25						At 24.7 to 25.0': Sand and gravel increase, lower contact is gradational		
240		2	5	94	SM	At 25.0 to 25.8': Silty Sand, fine to coarse grained, trace fine gravel (Jsm and Tm); dark yellowish brown (10YR 4/4); appears very moist and dense		
					CL/ML	At 25.8 to 26.7': Increasing clay, decreasing sand; some varve-like bedding; gradational transition to beds below		
						At 27.6 to 29.5': Frequent oxidized Sandy Silt thin beds and laminations		
30						At 29.5 to 30.3': Color becomes dark gray (10YR 4/1)		
235		2	6	100	ML	<b>Marker Bed M<sub>r</sub></b> - Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); dark gray (10YR 4/1); appears very moist and stiff; indistinct varve-like bedding texture		
						At 32.0 to 32.6': Gravel increases to 20 to 25%		
					CL/ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Silty Clay and Clayey Silt, variable coarse sand, trace fine gravel (Jsm and Tm); strong brown (7.5YR 4/4) with occasional dark grayish brown mottling; appears moist and very stiff to hard; poorly sorted; generally coarsens with depth, lower contact is sharp		
35						At 35.3 to 36.3': Grades to Sandy Silt with Clay		
230		3	7	86	ML	At 36.3 to 37.5': Grades to Clayey to Sandy Silt		
40					GM	<b>FLUVIAL DEPOSITS [Qfoff]</b> Silty Gravel, clasts 60 to 70%, up to 1 inch, mainly subangular to subrounded slate (Jsm), shale (Tm), and sandstone (Tm), some quartzite (Jsm) and brick-red sandstone (Tm) also observed, matrix is fine to coarse silty sand; color variable; appears very moist and dense; matrix occasionally grades to fine to coarse well graded sand or		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: YN/WL/MW 10/10/2011  
 Checked/Date: MW/MF 10/14/2011

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



**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T7-B2b

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T7-B2 (Continued)
						Martini Drilling / CME 75	Hollow Stem Auger	See Plate 3
						5/11/11-5/13/11 and 6/13/11-6/14/11	8-inch	GROUND EL. 266 feet
						<b>GROUNDWATER READINGS</b>		
						Encountered at 41-ft during drilling		
225		3	8	72		clayey to sandy silt; lower contact is sharp, erosional <b>Qfofl Continued</b> At 40.4': Becomes wet At 41': Groundwater encountered during drilling  At 42.0': Large slate clast, >3½ inches, full width of sampler At 42.5 to 43.6': Grades to Clayey Silty Sand with Gravel, fine to coarse grained, clasts 30 to 50%, up to 1 inch At 43.6 to 45.0': No recovery		
45		3	9	66		At 48.0': 2 inches slate clast At 48.3 to 50.0': No recovery		
50		4	10	16		<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b> Clayey to Sandy Silt, variable coarse sand, trace fine gravel (Jsm and Tm); dark yellowish brown (10YR 4/4); appears very moist to wet and medium stiff At 50.8' to 55.0': No recovery		
55		4	11	100		Clay and Silty Clay, variable fine sand, rare (<1%) coarse sand (Jsm and Tm); brown (10YR 5/3) with strong brown (7.5YR 5/6) mottling; appears very moist and very stiff; mottling is primarily in fine, irregular pockets, up to 5% manganese oxide flecks and staining; lower contact is gradational At 55.0 to 55.4': Manganese oxide-rich laminations  At 57.0 to 57.6': Oxidized mottling, brown (7.5YR 4/4); manganese oxide increases to 10 to 15%  <b>ESTUARINE DEPOSITS [Qe]</b> Clayey Sand to Sandy Clay, variable gravel, clasts 5 to 20%, up to ½ inch (Jsm and Tm); color variable, appears wet and dense/stiff  At 58.8 to 59.5': Silty Sand, fine grained, trace clay; mottled, grayish brown (10YR 5/2) to strong brown (7.5YR 4/6); appears wet and dense At 59.5 to 60.0': Silty Gravel, clasts 50 to 60%, up to 1 inch (Jsm and Tm); color variable; appears wet and dense		
210						Geologist: ME/MF Prepared/Date: YN/WL/MW 10/10/2011 Checked/Date: MW/MF 10/14/2011		

(CONTINUED ON FOLLOWING FIGURE)



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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T7-B2</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/11/11-5/13/11 and 6/13/11-6/14/11	8-inch	266 feet
						GROUNDWATER READINGS		
						Encountered at 41-ft during drilling		
205		4	12	80	ML SM ML	<b>Qe Continued</b> Sandy Silt and Clayey Silt, trace coarse sand and fine gravel (Jsm and Tm); mottled, grayish brown (10YR 5/2) to brown (7.5YR 4/4); appears wet and stiff; occasional more sandy/gravelly beds, lower contact is narrowly gradational At 60.3 to 60.7': Grades to fine Silty Sand At 61.5 to 61.8': Gravel increases to 10 to 15%  At 63.0 to 64.0': Gravel increases to 15 to 20%, becomes stiff to very stiff  At 64.0' to 65.0': No recovery		
200		4	13	94	ML SM GM ML	At 65.8 to 66.0': Fine Silty Sand At 66.0 to 66.4': Silty Gravel, clasts 50 to 60%, up to 3/4 inch (Jsm and Tm); color variable, appears wet and dense		
70					CL/ CH	Clay, trace coarse sand and fine gravel (Jsm and Tm); olive brown (2.5Y 4/3) with occasional strong brown (7.5YR 4/6) pockets; appears very moist and stiff to very stiff; trace manganese oxide flecks, occasional oxidized beds typically 1/2 to 2 inches thick At 68.0 to 68.5': 1/2 inch, oxidized silt laminations, yellowish red (5YR 4/6) At 69.2 to 69.8': Some organic-rich laminations		
195		5	14	92	CL/ SM SP/ SM CL SW CL/ SM	At 70.0 to 71.7': Alternating Silty Clay and Silty Sand beds; sand, fine to medium grained, color variable; silty sand beds oxidized; appears wet and soft/medium dense  At 71.7 to 72.4': Fine to medium Sand with Silt; oxidized, brown (7.5YR 4/4)  At 72.4 to 72.7': Silty, organic-rich bed, very dark grayish brown (2.5Y 3/2) At 72.7 to 73.7': Clay, dark grayish brown (10YR 4/2) At 72.8': Fine Silty Sand bed (1/2 inch thick); light olive brown (2.5Y 5/3) At 73.5': Carbonate-rich lamination (1/2 inch thick), 80 to 90% calcium carbonate At 73.8 to 74.0': Fine to coarse Well Graded Sand; color variable, abundant rounded shale grains At 74.0 to 74.7': Alternating Silty Clay and Silty Sand beds as at 70.0 to 71.7'		
190		5	15	98	CL/ ML SM	Silty Clay to Clayey Silt, variable fine sand, trace coarse sand and gravel, color variable, mainly olive brown (2.5Y 4/3); appears very moist and very stiff; occasional sandy silt beds; variable calcium carbonate nodules; thinly bedded At 75.0 to 75.5': Silty Sand bed, fine grained; light brownish gray (2.5YR 6/2)  At 76.4 to 76.9': 1/2 inch laminations with 90%+ calcium carbonate  At 77.2 to 77.4': 90%+ Calcium carbonate, some cemented nodules up to 1/2 inch		
80					ML	<b>Marker Bed M<sub>E</sub></b> - Sandy to Clayey Silt, trace coarse sand (Jsm and Tm); grayish brown (2.5Y 5/2) with strong brown (7.5YR 4/6) mottling; appears very moist and very stiff; 5 to 10% calcium carbonate filaments and cemented nodules up to 1/8 inch, calcium carbonate has preferred vertical orientation; some fine, irregular oxidized pockets; distinct color and texture		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: YN/WL/MW 10/10/2011  
 Checked/Date: MW/MF 10/14/2011

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.	
						Martini Drilling / CME 75		<b>T7-B2</b> (Continued)	
						DRILLING METHOD	BOREHOLE LOCATION		
						Hollow Stem Auger	See Plate 3		
						DATES DRILLED	HOLE DIAMETER	GROUND EL.	
						5/11/11-5/13/11 and 6/13/11-6/14/11	8-inch	266 feet	
						GROUNDWATER READINGS			
						Encountered at 41-ft during drilling			
185		5	16	100		<b>Qe Continued</b> At 80.5 to 83.1': Color becomes very dark grayish brown (10YR 3/2) to dark brown (7.5 YR 3/4), mottled  At 82.7 to 83.1': Gravel increases to 5 to 15%  At 85.0 to 95.8': Color becomes variable mainly brown (7.5YR 4/4) with grayish brown (2.5Y 5/2) mottling, trace calcium carbonate filaments  At 92.0': Calcium carbonate filaments decrease to less than 1%  At 95.0 to 95.8': Grades to fine Silty Sand to Sandy Silt, no calcium carbonate  At 95.8': Becomes yellowish brown (10YR 5/4) with gray (10YR 6/1) mottling; appears damp to moist and very stiff to hard  At 97.6 to 98.3': Grades to fine to medium Silty Sand  <b>Marker Bed M<sub>D</sub></b> - Clayey Silt to Silty Clay, variable fine sand, trace coarse sand (Jsm and Tm); dark grayish brown (10YR 4/2); appears moist to very moist and stiff to very stiff; rare (<1%) calcium carbonate filaments; distinct color and texture; lower contact occurs between runs			
85						ML			
180		6	17	100					
90									
175		6	18	100					
95									
170		6	19	100					
100									

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: YN/WL/MW 10/10/2011  
 Checked/Date: MW/MF 10/14/2011

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



**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T7-B2e

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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)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T7-B2</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/11/11-5/13/11 and 6/13/11-6/14/11	8-inch	266 feet
						GROUNDWATER READINGS		
						Encountered at 41-ft during drilling		
165		7	20	70		<b>Qe Continued</b> At 100.0 to 100.6': Grades to Clayey to Sandy Silt  At 101.0 to 101.2': Grades to fine Silty Sand Clayey Silt; dark grayish brown (10YR 4/2) with strong brown (7.5YR 4/6) mottling; appears moist and very stiff to hard; 5 to 10% calcium carbonate filaments  At 103.0 to 103.5': Color becomes dark brown (7.5YR 3/2) with subtle reddish brown (5YR 4/4) mottling; appears moist and very stiff to hard At 103.5 to 105.0': No recovery		
160		7	21	100		<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt, variable coarse sand, trace fine gravel (Jsm and Tm); dark grayish brown (10YR 4/2) with dark yellowish brown (10YR 4/6) mottling; appears very moist and very stiff; trace calcium carbonate filaments; poorly sorted; lower contact is narrowly gradational  At 107.4 to 108.3': Gravel increases to 15 to 25%, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm)  At 108.3 to 111.0': Gravel 5 to 15%, 5 to 10% calcium carbonate filaments and nodules up to 1/8 inch		
155		7	22	100		At 111.0 to 111.6': Grades to fine to coarse Clayey Sand with Gravel, fine to coarse, clasts 20 to 25%, up to 1/2 inch (Jsm and Tm)  <b>ESTUARINE DEPOSITS [Qe]</b> Silty Clay/Clayey Silt; dark grayish brown (2.5Y 4/2) with strong brown (7.5YR 4/6) mottles; appears moist and very stiff to hard, lower contact is gradational  At 113.9 to 114.0': Calcium carbonate-rich lamination, 60 to 70% dispersed calcium carbonate and cemented nodules up to 1/8 inch At 114.0 to 114.4': Gravel increases to 15 to 25% At 114.5 to 115.6': Color becomes variable, mainly very dark brown (10YR 3/2) with strong brown (7.5YR 5/6) mottling, occasional subrounded clasts (Jsm and Tm) up to 1 inch  At 116.7 to 118.0': Sandy Silt, appears very moist to wet		
150		8	23	94		<b>OLDER ALLUVIAL FAN/ESTUARINE DEPOSITS [Qfo/Qe]</b> Silty Gravel, clasts 50 to 60%, up to 1 inch, mainly subangular to subrounded slate (Jsm), shale (Tm), and sandstone (Tm), some quartzite also observed; matrix is fine to coarse silty sand; color variable, generally dark brown (7.5 YR 3/2); appears wet and dense; lower contact is gradational At 118.6 to 119.2': Grades to Sandy Clay with Gravel, clasts 25 to 35%, up to 3/4 inch		
120						Geologist: ME/MF Prepared/Date: YN/WL/MW 10/10/2011 Checked/Date: MW/MF 10/14/2011		

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T7-B2</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						5/11/11-5/13/11 and 6/13/11-6/14/11	8-inch	
						GROUNDWATER READINGS		
						Encountered at 41-ft during drilling		
145		8	24	96	ML CL/ SM	<b>ESTUARINE DEPOSITS [Qe]</b> Sandy to Clayey Silt, trace coarse sand (Jsm and Tm); light olive brown (2.5Y 5/3) with faint, light brown (7.5YR 6/4) mottling; appears very moist and medium stiff to stiff; occasional manganese oxide flecks At 120.5 to 122.4': Alternating Silty Clay and fine Silty Sand beds, color variable, appears very moist to wet and soft/medium dense		
					CL/ ML	Silty Clay and Clayey Silt, rare (<1%) coarse sand (Jsm and Tm); strongly mottled, color variable, mainly dark grayish brown (10YR 4/2) with strong brown (7.5YR 4/6), appears moist and very stiff to hard; trace manganese oxide flecks; some varve-like bedding; lower contact is gradational		
125		8	25	100	ML	Clayey to Sandy Silt; variable coarse sand, trace fine gravel (Jsm and Tm); dark gray (7.5YR 4/1) with strong brown (7.5YR 4/6) mottling; appears moist to very moist and very stiff, mottling occurs mainly as small, irregular, oxidized pockets (<¼ inch); scattered calcium carbonate filaments (<1% overall)  At 127.0 to 130.0': Becomes finer grained, less coarse sand and gravel  At 128.0 to 128.5': Distinct laminations  At 129.0 to 130.0': Coarsens downward, gradational transition to bed below  At 130.0 to 133.4': Grades to fine Clayey, Silty Sand, gravel increases with depth (Jsm and Tm), clasts 2 to 15%, up to ¾ inch		
140								
135		9	26	94	CL/ ML	<b>Marker Bed M<sub>A</sub></b> - Clayey Silt/Silty Clay, trace coarse sand (Jsm and Tm); olive brown (2.5Y 4/3) with strong brown (7.5YR 4/6) mottling; appears moist and hard; variable small, irregular, oxidized, pockets up to ¼ inch; possible weak soil development; lower contact is gradational		
130					SM/ ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Silty Sand to Sandy Silt, very fine grained, trace coarse sand and fine gravel (Jsm and Tm); grayish brown (10YR 5/2); appears wet and dense/stiff; lower contact is gradational At 135.8 to 136.1': Well graded sand bed (1 inch thick), fine to coarse grained		
140		9	27	100	SW	Well Graded Sand with Gravel, fine to coarse grained, clasts 20 to 40%, up to ½ inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); color variable, mainly dark grayish brown (10YR 4/2); appears wet and dense; lower contact occurs between runs		

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T7-B2 (Continued)
						Martini Drilling / CME 75	Hollow Stem Auger	See Plate 3
						DATES DRILLED	5/11/11-5/13/11 and 6/13/11-6/14/11	HOLE DIAMETER 8-inch
						GROUNDWATER READINGS	Encountered at 41-ft during drilling	
125		10	28	100	ML		<b>Qfo continued</b> Sandy to Clayey Silt, trace coarse sand (Jsm and Tm); brown (10YR 4/3); appears moist to very stiff; poorly sorted, generally coarsens with depth; lower contact is gradational  At 141.8 to 145.0': Gravel increases to 5 to 15%	
145					SM		At 145 to 145.8': Grades to Silty Sand, very fine grained, trace gravel	
120					ML		At 145.5 to 147.0': Gradational transition to unit below	
		10	29	100	SM/ML		<b>BASAL ALLUVIAL FAN UNIT [Qfob]</b> Silty Sand to Sandy Silt, fine grained, variable clay, trace gravel (Jsm and Tm); yellowish brown (10YR 5/2); appears moist and dense/very stiff; 5 to 20% calcium carbonate, occurs as dispersed deposits and filaments At 147.2': Some quartzite to clasts up to 1 inch	
					SM/SC		At 148.7 to 150.0': Fine to coarse Clayey, Silty Sand with Gravel, clasts 15 to 25%, up to 1 1/2 inch; mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); color variable; appears moist and dense	
150							At 150 to 151': No sample	
115		10	30	100	SM/ML		At 151.0 to 152.5': Color variable, mainly gray (2.5Y 5/1) to brown (7.5YR 4/4)	
					SM-SC		At 152.5 to 153.2' and 153.8 to 154.3': Grades to fine to coarse Clayey, Silty Sand with Gravel, clasts 15 to 25%, up to 3/4 inch; mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm)	
					SM			
					SM/SC			
					SM			
155					CL-ML		<b>BASAL ESTUARINE UNIT [Qeb]</b> Silty Clay to Clayey Silt, variable fine sand, trace coarse sand (Jsm and Tm); grayish brown (2.5Y 5/2) with oxidized, strong brown (7.5YR 4/6) pockets; appears moist and very stiff; lower contact is sharp	
110		11	31	100	CL		At 156.9 to 157.0': Well Graded Sand, fine to medium grained At 157.0': Contact is sharp, erosional, appears to dip 15 degrees Silty Clay, rare (<1%) coarse sand (Jsm); dark greenish gray (10Y 4/1); appears moist and hard, lower contact is gradational	
							At 158.4 to 159.7': Variable (10 to 40%) calcium carbonate occurs as filaments and cemented and uncemented nodules; color becomes greenish gray (10Y 5/1)	
160							At 159.7 to 162.4': Calcium carbonate 15 to 30%, occurs mainly as vertically oriented	

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T7-B2 (Continued)
						Hollow Stem Auger	See Plate 3	
						<b>DATES DRILLED</b> 5/11/11-5/13/11 and 6/13/11-6/14/11	<b>HOLE DIAMETER</b> 8-inch	<b>GROUND EL.</b> 266 feet
						<b>GROUNDWATER READINGS</b> Encountered at 41-ft during drilling		
105		11	32	100	CL	<b>Qeb Continued</b> uncemented nodules/filaments, some cemented nodules up to 1/4 inch; some irregular, oxidized, strong brown (7.5YR 4/6) pockets up to 1/8 inch in size  At 162.4 to 162.9': Calcium carbonate 60 to 70%, occurs mainly as dispersed deposits, increasing sand content, gradational transition to unit below		
165					SC/SM	Clayey to Silty Sand, fine grained; greenish gray (10Y 4/1); appears very moist and dense; 20 to 30% calcium carbonate, occurs mainly as irregular, vertically oriented pockets of dispersed calcium carbonate; oxidizes upon exposure to air  At 164.5 to 165.5': Decreasing silt and clay content, gradational transition to unit below, calcium carbonate rich zone, numerous irregular, calcium carbonate cemented soil nodules up to 2 inches		
100		11	33	40	SP-SM	<b>SAN PEDRO FORMATION [Qsp]</b> Poorly Graded Sand with Silt, fine grained; light brownish gray (10YR 6/2); appears moist and dense  At 166.5 to 167.0': Some calcium carbonate-cemented soil nodules up to 2 inches  At 167.0 to 170.0': No recovery		
170						At 170.0 to 172.0': Alternating beds with variable oxidation and manganese oxide; typically 1 to 6 inches thick		
95		11	34	50		At 172.5 to 175.0': No recovery		
175						At 175.0 to 176.6': Becomes pale olive (5Y 6/2) with faint oxidized mottling		
90		12	35	44		At 176.6 to 177.2': Becomes gravelly, clasts 40 to 50%, up to 2 inches, mainly quartzite and fine grained igneous rock  At 177.2 to 180': No recovery		
180								

(CONTINUED ON FOLLOWING FIGURE)

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					DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
					Martini Drilling / CME 75		<b>T7-B2</b> (Continued)
					DRILLING METHOD	BOREHOLE LOCATION	
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DATES DRILLED	GROUND EL.
						5/11/11-5/13/11 and 6/13/11-6/14/11	266 feet
<b>GROUNDWATER READINGS</b> Encountered at 41-ft during drilling							
85		12	36	36		<b>Qsp Continued</b> Poorly Graded Sand with Gravel, fine grained, clasts 40 to 50% up to 1½ inch, mainly subrounded slate and meta-basalt; light gray (2.5Y 7/1); appears damp and dense; lower contact is narrowly gradational Silty Sand, very fine grained; gray (2.5Y 6/1); appears damp and dense At 181.1 to 181.8': Becomes gravelly, clasts 10 to 30%; mostly ¾ to 1½ inch, limited fine gravel, mainly subrounded quartzite and slate At 181.8 to 185': No recovery	
185		12	37	56		At 186.5 to 187.5': Trace gravel, mostly ¾ to 1 inch; mainly quartzite At 187.8 to 190': No recovery At 190 to 191': No sampling	
190		5	38	93		Silty Sand with Gravel, fine grained, clasts 15 to 20%, up to 2 inches, mainly subrounded slate (Jsm), some subrounded granitic rock, meta-basalt and sandstone (Tm); light brownish gray (2.5Y 6/2); appears damp and dense Silty Sand, fine grained; gray (2.5Y 6/1); appears damp to moist; slightly micaceous; well sorted, lower contact occurs between runs	
195		5	39	100		Silty Sand, fine grained; dark gray (5Y 4/1); appears moist and dense; well sorted At 196 to 196.5': Irregular iron oxide stringers, possible fracture staining At 197.1 to 197.8': Faint laminations defined by variable oxidation At 197.8 to 198.3': Fine to medium grained At 198.3 to 200': Very fine grained; very dark gray (5Y 3/1), slightly micaceous	
200							

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T7-B2</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/11/11-5/13/11 and 6/13/11-6/14/11	8-inch	266 feet
						GROUNDWATER READINGS		
						Encountered at 41-ft during drilling		
65						END OF BORING AT 200 FEET		
						NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched.  -Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than 1/4 inch). -Beds are generally massive unless otherwise noted.		
205								
60								
210								
55								
215								
50								
220								

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T7-B2k



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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T7-B3</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/26/11	8-inch	270 feet
						GROUNDWATER READINGS		
						Encountered at 56-ft during drilling		
						CL	Hand Augered to 5 feet	
							<b>FILL [Af]</b> Silty Clay  NOTE: Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed descriptions of clasts At 2.0 to 2.5': Asphalt fragments with soil At 2.5 to 5.0': Sandy to Clayey Silt; dark brown (7.5YR 3/3); appears moist and stiff; some asphalt fragments up to 3/4 inch	
265	5					CL/CH	<b>YOUNGER/OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clay, trace coarse sand (Jsm and Tm); very dark gray (7.5YR 3/1) with occasional strong brown (7.5YR 4/6) mottling; appears moist and very stiff to hard; lower contact is gradational	
		1	1	100		ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt; trace coarse sand and fine gravel (Jsm and Tm); mottled, brown (10YR 4/3) to dark gray (10YR 4/1) to strong brown (7.5YR 4/6); appears moist and very stiff to hard; poorly sorted, lower contact occurs between runs  At 9.6 to 10.0': Faint oxidized laminations, defined by variable color	
260	10					ML	Sandy to Clayey Silt, trace coarse sand (Jsm); dark yellowish brown (10YR 4/3); appears moist and stiff; poorly sorted, lower contact is sharp	
		1	2	96		SM	At 12.2 to 12.8': Grades to fine to coarse Silty Sand with 5 to 10% fine gravel (Jsm and Tm)	
						ML	At 12.8 to 14.5': Grades to Clayey Silt with variable fine sand, trace coarse sand (Jsm and Tm)	
						SM	At 14.5 to 16.1': Fine to coarse Silty Sand with 5 to 10% fine gravel (Jsm and Tm)	
255	15					ML	<b>ESTUARINE DEPOSITS [Qe]</b> Sandy Silt, trace to some Clay; trace coarse sand (Jsm); brown (10YR 4/3) with occasional strong brown (7.5YR 4/6) mottling; appears moist and stiff; prominent varve-like bedding and laminations  Sandy to Clayey Silt, trace coarse sand (Jsm and Tm); mottled dark grayish brown (10YR 4/2) to strong brown (7.5YR 4/6); appears very moist and stiff; lower contact is gradational	
	20	1	3	94				

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T7-B3 (Continued)
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/26/11	8-inch	270 feet
						GROUNDWATER READINGS		
						Encountered at 56-ft during drilling		
		2	4	100		ML	<b>Qe Continued</b> At 20.0 to 22.4': Becomes very moist, medium stiff	
						CL	Silty Clay; trace coarse sand (Jsm and Tm); mottled, dark grayish brown (10YR 4/2) to strong brown (7.5YR 5/6); appears moist and very stiff to hard; strong brown mottling occurs mainly as irregular pockets; lower contact occurs between runs	
245	25					ML	Clayey Silt, trace coarse sand (Jsm and Tm); dark grayish brown (10YR 4/2) with occasional strong brown (7.5YR 4/6) mottling; appears moist and very stiff; lower contact is gradational	
		2	5	100		ML	Sandy to Clayey Silt, trace coarse sand (Jsm and Tm); grayish brown (2.5Y 5/2) to strong brown (7.5YR 5/8); appears very moist and stiff, lower contact is gradational	
							At 28.1 to 29.8': Varve-like bedding	
							At 29.7': 1/2 inch gravelly bed	
240	30						At 30.0 to 33.3': Sand content increases, predominantly sandy silt	
		2	6	100			At 31.6 to 32.0': Color becomes dark brown (7.5YR 3/4)	
						CL/ML	<b>Marker Bed M<sub>F</sub></b> - Silty Clay and Clayey Silt, variable fine sand, trace coarse sand (Jsm and Tm); dark grayish brown (2.5Y 4/2); appears very moist and stiff to very stiff; trace manganese oxide flecks; possible weak soil development; lower contact is gradational	
235	35						At 35.0 to 36.2': Increasing sand, gradational transition unit below	
		3	7	100		SM-SC	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Silty Sand with Gravel, fine grained, clasts 20 to 40%, up to 1 1/2 inches, mainly subangular to subrounded slate (Jsm), some shale (Tm) and sandstone (Tm) also observed, some brick-red sandstone (Tm); brown (7.5YR 4/4); appears moist and dense; lower contact is gradational	
						ML	Clayey to Sandy Silt with Gravel; clasts 15 to 25%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); strong brown (7.5YR 4/4); appears moist and very stiff; occasional gray (2.5Y 5/1) laminations; generally poorly sorted, lower contact is narrowly gradational	
40								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: DR/WL/MW 10/10/2011  
 Checked/Date: MW/MF 10/14/2011

MTA Westside Subway Extension  
 Los Angeles, California



**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T7-B3b

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)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T7-B3</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/26/11	8-inch	270 feet
						GROUNDWATER READINGS		
						Encountered at 56-ft during drilling		
		3	8	100	ML	<b>Qfo Continued</b>		
					ML/CL	At 40.8 to 42.6': Grades to Clayey Silt and Silty Clay, trace coarse sand (Jsm and Tm); dark reddish brown (5YR 3/3) with grayish brown (2.5Y 5/2) mottles; appears moist and stiff to very stiff		
					ML			
225	45				CL	Silty Clay, trace coarse sand and fine gravel (Jsm and Tm), some brick-red sandstone; brown (7.5YR 5/6) to strong brown (7.5YR 5/6) to gray (10YR 5/1); appears very moist and very stiff; lower contact is gradational		
		3	9	84	ML	Sandy Silt with Gravel, trace to some clay, clasts 15 to 25%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); brown (7.5YR 4/4); appears very moist and stiff; poorly sorted; lower contact is sharp		
						At 46.7 to 48.4': Gravel decreases to <5%		
					GC	At 48.4 to 48.6': Silty Clay; reddish brown (5YR 4/4)		
220	50					<b>FLUVIAL DEPOSITS [Qfoff]</b>		
						Clayey Gravel, clasts 50 to 60%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); matrix is fine to coarse clayey sand; color variable, generally very dark grayish brown (10YR 3/2); appears wet and dense; lower contact is sharp, erosional		
		4	10	30		At 51.1': 1/2 inch organic-rich Silty Clay bed		
						At 51.5 to 55.0': No recovery		
215	55				GM-GP	At 55.0 to 57.9': Matrix becomes fine to coarse Silty Sand, trace to some clay		
		4	11	90		At 56': Groundwater encountered during drilling		
					CL/CH	<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b>		
						Clay, rare (<1%) coarse sand (Jsm and Tm); mottled, gray brown (2.5Y 5/2) to strong brown (7.5YR 5/6); appears very moist and very stiff; abundant (10 to 15%) manganese oxide flecks; prominent varve-like bedding; lower contact occurs between runs		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: DR/WL/MW 10/10/2011  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T7-B3 (Continued)</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/26/11	8-inch	270 feet
						GROUNDWATER READINGS		
						Encountered at 56-ft during drilling		
205	65	4	12	100	ML	<b>ESTUARINE DEPOSITS [Qe]</b> Sandy to Clayey Silt with Gravel, clasts 15 to 30%, up to 1½ inches, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); color variable, mainly brown (10YR 4/3) to strong brown (7.5YR 4/6); appears very moist and stiff; poorly sorted, occasionally grades to very fine silty sand  At 61.8 to 62.1': Grades to Silty Clay		
					ML	At 62.6 to 62.7': Fine to medium Sand bed Clayey to Sandy Silt, variable sand; variable color, mainly brown (10YR 4/3) and strong brown (7.5YR 4/6); prominent varve-like bedding texture; occasional silty sand beds		
		5	13	100	CL	At 67.5 to 68.6': Distinct laminations defined by variable oxidation  At 68.6 to 70.6': Clay and Silty Clay; trace coarse sand (Jsm and Tm); mottled, grayish brown (10YR 5/2) to reddish brown (5YR 4/4); appears very moist and very stiff		
200	70				SM	At 70.6 to 71.2': Fine to coarse Silty Sand; brown (7.5YR 4/4); appears wet and dense		
					ML			
		5	14	100	SM	Silty Sand, fine to coarse grained, variable gravel, clasts 0 to 15%, up to 1 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); dark yellowish brown (10YR 4/4); appears wet and dense; occasional sandy silt and clayey silt interbeds; lower contact is sharp		
195	75				CL/ML	Silty Clay and Clayey Silt, rare (<1%) coarse sand; dark gray (2.5Y 4/1); appears moist and very stiff; variable (2 to 10%) manganese oxide flecks and staining; variable organic content  At 76.7 to 80.0': Occasional 1 to 2 inch thick, fine Silty Sand and Sandy Silt interbeds; prominent varve-like bedding  At 78.3 to 80.0': Uncemented calcium carbonate nodules, 5 to 10%, up to ¼ inch  At 79.4 to 79.5': Fine Silty Sand bed; light brownish gray (2.5Y 6/2)		
80		5	15	100				

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T7-B3</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 270 feet
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						5/26/11	8-inch	
						GROUNDWATER READINGS		
						Encountered at 56-ft during drilling		
185	85					END OF BORING AT 80 FEET		
180	90					NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched.		
175	95					-Munsell colors listed in order of predominance (most predominant color first).		
						-Where observed, contacts and bedding appear subhorizontal unless otherwise noted.		
						-Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted.		
						-Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted.		
						-The term "clasts" herein describes gravel-size rock fragments (larger than 1/4 inch).		
						-Beds are generally massive unless otherwise noted.		
100								

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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL\_FIELD\_NOTES\GINT LOGS\101561-TRANSECT 7.GPI 10/14/11

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	
						Jet Drilling / CME 75	See Plate 3	<b>T7-B4</b>
						Hollow Stem Auger		
						6/1/11	8-inch	GROUND EL. 274 feet
						<b>GROUNDWATER READINGS</b> Encountered at 49-ft during drilling		
						18 inches of asphaltic concrete over 6 inches of base  Hand augered to 6 feet		
						ML	<b>YOUNGER/OLDER ALLUVIAL FAN DEPOSITS [Qf/Qfo]</b> Clayey to Sandy Silt, variable coarse sand, trace fine gravel (Jsm and Tm); very dark grayish brown (10YR 3/2); appears very moist and stiff; occasionally grades to silty clay; lower contact is gradational  NOTE:  Jsm = Santa Monica Slate Tm = Modelo Formation See end of log for more detailed descriptions of clasts	
270	5	1	1	100		ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt, variable coarse sand, trace to some fine gravel (Jsm and Tm); dark brown (10YR 3/2); appears moist and stiff  At 8.3 to 8.8': Increasing coarse sand and fine gravel content; gradational transition to unit below	
265	10					SM-SC	Clayey to Silty Sand, fine grained, variable coarse sand and fine gravel, clasts 5 to 20%, up to 1/2 inch, mainly subrounded shale (Tm) and sandstone (Tm), some slate (Jsm); brown (7.5YR 4/4); appears moist and dense; lower contact is narrowly gradational	
		1	2	78		CL	At 9.9 to 10.2': Gravel increases to 20 to 30%, up to 1/2 inch	
						ML	Clay, trace coarse sand (Jsm and Tm); very dark grayish brown (10YR 3/2); appears moist and very stiff to hard; lower contact is gradational	
							Clayey to Sandy Silt, variable coarse sand, trace fine gravel (Jsm and Tm); brown (10YR 4/4); appears moist and very stiff to hard; poorly sorted, lower contact is narrowly gradational	
260	15					SM	At 12.5 to 12.8': Silty Sand with Gravel; fine to coarse grained, clasts 15 to 20%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); dark brown (7.5YR 3/3); appears moist and dense; lower contact is sharp  At 12.9 to 14.0': No recovery  At 14.0': Becomes very moist	
		1	3	54			Silty Sand, fine to coarse grained, variable gravel, clasts 5 to 25%, most up to 1/2 inch, maximum 1 1/2 inches; mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); brown (7.5YR 4/4); appears very moist and dense; poorly sorted, lower contact is gradational  At 16.7 to 19.0': No recovery	
255								
250								
20								

(CONTINUED ON FOLLOWING FIGURE)

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 Prepared/Date: DR/WL/MW 10/10/2011  
 Checked/Date: MW/MF 10/14/2011

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



**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T7-B4a

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T7-B4 (Continued)
						Jet Drilling / CME 75	Hollow Stem Auger	See Plate 3
						DATES DRILLED	BOREHOLE LOCATION	GROUND EL.
						6/1/11	See Plate 3	274 feet
						GROUNDWATER READINGS		
						Encountered at 49-ft during drilling		
		2	4	82	ML	<b>Qfo Continued</b> <b>Marker Bed M<sub>G</sub></b> - Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); mottled, dark brown (7.5YR 3/4) to gray (7.5YR 4/1) with some reddish brown (5YR 3/3); appears moist and very stiff; possible weak soil development; lower contact is gradational <b>ESTUARINE DEPOSITS [Qe]</b> Clayey to Sandy Silt, trace coarse sand and fine gravel (Jsm and Tm); mottled dark brown (7.5YR 3/4); appears moist and very stiff; generally moderately to well sorted; lower contact is narrowly gradational At 22.2 to 23.1: Grades to Silty Clay At 23.1 to 24.0': No recovery		
250	25	2	5	94	ML	At 24.0 to 25.8': Mottled, dark reddish brown (5YR 3/3) to dark gray (7.5YR 4/1)  At 25.8 to 30.9': Mottled, strong brown (7.5YR 5/6) to grayish brown (10YR 5/2)		
245	30	2	6	90	SM	At 30.3 to 30.9' and 31.8 to 32.4': Grades to fine Silty Sand, gravel increases to 5 to 15% (Jsm and Tm)		
					ML	At 30.0 to 31.5': Faint varve-like bedding		
					SM			
					ML/CL	Clayey Silt and Silty Clay; mottled, brown (7.5YR 4/3) to light brownish gray (10YR 6/2); appears moist to very moist and stiff; trace manganese oxide flecks; prominent varve-like bedding texture; lower contact occurs between runs		
240	35				SM	At 34.0 to 34.5': Fine Silty Sand; gradational lower contact		
					SP	Poorly Graded Sand with Gravel, fine grained, clasts 15 to 20%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); brown (7.5YR 5/4); appears moist and dense; lower contact is sharp		
		3	7	76	ML	<b>Marker Bed M<sub>F</sub></b> - Clayey Silt, variable fine sand, trace coarse sand (Jsm and Tm); dark grayish brown (2.5YR 4/2) to brown (7.5YR 4/2) with occasional strong brown (7.5YR 4/6) mottling; appears very moist and very stiff; distinct color and texture; possible weak soil development; lower contact occurs between runs  At 37.8 to 39.0': No recovery		
235	40				SM-SC	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Silty Sand, fine grained, variable coarse sand, trace fine gravel (Jsm and Tm); dark yellowish brown (10YR 4/4); appears moist and dense; lower contact is		

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T7-B4 (Continued)
						Jet Drilling / CME 75		
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/1/11	8-inch	274 feet
						GROUNDWATER READINGS		
						Encountered at 49-ft during drilling		
		3	8	100	CL	narrowly gradational <b>Qfo Continued</b> At 40.4 to 41.2': Sandy Clay with Gravel, clasts 30 to 40%, up to 1 inch; mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); color variable, mainly brown (10YR 4/3) to strong brown (7.5YR 4/6); appears moist and hard; lower contact is gradational At 41.2 to 43.0': Gravel content 30 to 40%; strong brown (7.5YR 5/6)		
					ML	Clayey Silt, variable fine sand, trace coarse sand and fine gravel; brown (7.5YR 5/4); appears moist and very stiff to hard; poorly sorted; lower contact occurs between runs  At 44.0 to 45.5': No sampling  At 45.5 to 46.2': Appears very moist and stiff, gravel increases to 10 to 15%, up to 1 inch At 46.2 to 49.0': No recovery		
230	45							
		3	9	20				
225	50	3	10	48	GM	At 49': Groundwater encountered during drilling <b>OLDER FLUVIAL DEPOSITS [Qfoff]</b> Silty Gravel, clasts 50 to 60%, up to 1½ inches, mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm), some quartzite (Jsm) also observed; matrix is fine to coarse silty sand; very dark grayish brown (10YR 3/2); appears wet and dense At 50.2 to 51.5': No recovery		
		3	11	40				
220	55	3	12	28				
		4	13	68	GM-GC	At 56.7 to 60.0': Matrix becomes fine to coarse Clayey, Silty Sand		
215								
60								

(CONTINUED ON FOLLOWING FIGURE)

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 Prepared/Date: DR/WL/MW 10/10/2011  
 Checked/Date: MW/MF 10/14/2011



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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T7-B4 (Continued)
						Jet Drilling / CME 75	Hollow Stem Auger	See Plate 3
						DATES DRILLED	6/1/11	HOLE DIAMETER
						8-inch		GROUND EL.
						274 feet		
						GROUNDWATER READINGS		
						Encountered at 49-ft during drilling		
		4	14	90		CL/CH	<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b> Clay and Silty Clay, trace coarse sand (Jsm and Tm); mottled, brown (10YR 5/3) to reddish brown (5YR 4/4); appears very moist and stiff to very stiff; trace manganese oxide flecks; prominent varve-like bedding, lower contact is gradational  At 61.6 to 62.8': Increasing silt and sand content; mottled, brown (10YR 5/3) to strong brown (7.5YR 5/6); variable varve-like bedding, gradational transition to unit below	
210	65					ML	Sandy to Clayey Silt, trace coarse sand and fine gravel (Jsm and Tm); mottled, brown (10YR 5/3) to strong brown (7.5YR 5/6); appears very moist and very stiff; lower contact is gradational  At 64.0 to 65.5': Grayish brown (10YR 5/2) to reddish brown (5Y 5/4), occasional faint laminations defined by variable color/oxidation	
205	70	4	15	100		ML	<b>ESTUARINE DEPOSITS [Qe]</b> Sandy to Clayey Silt, trace coarse sand and fine gravel (Jsm and Tm); color variable, mainly brown (10YR 5/3) to strong brown (7.5YR 5/6); appears very moist and very stiff; lower contact is gradational, occasional silty clay beds  At 66.9 to 72.7': Prominent varve-like bedding, occasional oxidized sandy silt laminations	
200	75	5	16	100		CL/ML	Silty Clay and Clayey Silt, variable fine sand, trace coarse sand and fine gravel (Jsm and Tm); mottled, brown (10YR 5/3) to strong brown (7.5YR 5/6); appears very moist and stiff to very stiff; prominent varve-like bedding; lower contact occurs between runs	
						SM-SC	Clayey to Silty Sand with Gravel, fine grained, clasts 15 to 20%, up to 1/2 inch; mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); grayish brown (10YR 5/2) with occasional strong brown (7.5YR 5/6) mottling; appears very moist to wet and dense; lower contact is sharp  At 74.0 to 74.3': Strongly oxidized, strong brown (7.5YR 5/6) predominant At 74.3 to 74.6': Silty Clay bed; appears very moist and soft to medium stiff	
		5	17	100		CL/CH	Clay, trace coarse sand (Jsm and Tm); dark grayish brown (10YR 4/2); appears very moist and stiff to very stiff; trace manganese oxide flecks; prominent varve like bedding texture  At 76.6': 1/2 inch thick fine Silty Sand bed  At 77.4 to 78.0': Some oxidized, yellowish red (5YR 4/6), irregular pockets  At 78.6 to 78.7': Fine Silty Sand to Sandy Silt bed	
195							END OF BORING AT 79 FEET	
80							NOTES:	

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T7-B4 (Continued)
						Jet Drilling / CME 75		
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						6/1/11	8-inch	274 feet
						GROUNDWATER READINGS		
						Encountered at 49-ft during drilling		
190	85					Boring backfilled with cement/bentonite grout from bottom up and patched.		
185	90					-Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than 1/4 inch). -Beds are generally massive unless otherwise noted.		
180	95							
175								
100								

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 Checked/Date: MW/MF 10/14/2011



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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T7-B5</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/23/11	8-inch	275 feet
						GROUNDWATER READINGS		
						Measured at 52-ft during drilling		
270	5				CL	Surface is grass Hand augered to 5 feet  <b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Silty Clay, trace coarse sand (Jsm and Tm); dark brown (7.5YR 3/4); appears very moist and stiff  NOTE: Jsm = Santa Monica Shale Tm = Modelo Formation See end of log for more detailed clast descriptions		
265	10	1	1	100	ML	Clayey to Sandy Silt, trace coarse sand; very dark grayish brown (10YR 3/2); appears moist and stiff to very stiff; lower contact is gradational  At 7.0 to 7.8': Punky texture  At 7.8 to 8.5': Grades to Sandy Silt, trace clay  At 8.5 to 8.8': Silty Gravel; clasts 60 to 70%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm), and sandstone (Tm); matrix is fine silty sand At 8.8 to 11.2': Color becomes brown (7.5YR 4/4) At 9.5': 1 inch brick-red sandstone clast		
260	15	1	2	94	SW	Well Graded Sand with Gravel; fine to coarse grained, clasts 30 to 50%, up to 1 1/2 inches; mainly subangular to subrounded slate (Jsm), shale (Tm), and sandstone (Tm); dark brown (7.5YR 3/4); appears very moist and dense  At 12.6 to 13.1': Fine Silty Sand		
260	15				SM			
260	15				SW			
260	15				SM/ML	<b>OLDER ALLUVIAL FAN/ESTUARINE DEPOSITS [Qfo/Qe]</b> Alternating beds of Silty fine Sand and Clayey Silt; dark yellowish brown (10YR 3/4); appears very moist and stiff to dense; lower contact occurs between runs		
260	15	1	3	100	ML	Sandy Silt, trace to some clay; brown (7.5YR 4/4); appears very moist and stiff		
260	15				ML	<b>Marker Bed M<sub>c</sub></b> - Clayey to Sandy Silt; mottled, dark reddish brown (5YR 3/3) to dark gray (7.5YR 4/1); appears moist and stiff; lightly cemented; some fine pores; distinct color and texture; possible weak soil development; lower contact is gradational		

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: DR/WL/MW 10/10/2011  
 Checked/Date: MW/MF 10/14/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T7-B5a

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 G:\PROJECT\_DIRECTORIES\4953\2010\101561\_METRO\_WESTSIDE\_EXTENSION\6.2.3.2\_FAULT\_HAZARD\_INVESTIGATION\3.2\_ALL\_FIELD\_NOTES\GINT\_LOGS\101561-TRANSECT 7.GPI 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T7-B5</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/23/11	8-inch	275 feet
						GROUNDWATER READINGS		
						Measured at 52-ft during drilling		
						ML	<b>Qe Continued</b>	
		2	4	100		ML	<b>ESTUARINE DEPOSITS [Qe]</b> Sandy to Clayey Silt; dark gray (7.5YR 4/1) to brown (7.5YR 4/4); appears moist and stiff; 5 to 10% calcium carbonate filaments and cemented nodules up to ¼ inch; lower contact is gradational  At 23.8 to 25.0': Clayey Silt to Silty Clay; trace coarse sand (Jsm and Tm); mottled, dark reddish brown (5YR 3/3) to dark reddish yellow (5YR 4/1); appears moist and hard; trace calcium carbonate filaments and cemented nodules up to 1/8 inch; possible weak soil development	
250	25					ML/CL		
						ML		
		2	5	100		ML	Sandy to Clayey Silt, variable coarse sand and gravel, clasts 2 to 10%, up to ½ inch, mainly subangular to subrounded slate (Jsm), shale (Tm), and sandstone (Tm); mottled, grayish brown (2.5Y 5/2) to strong brown (7.5YR 5/6); appears very moist and very stiff; trace calcium filaments; some oxidized laminations and varve-like bedding; lower contact occurs between runs	
245	30					ML	Sandy Silt, trace to some clay, trace coarse sand (Jsm and Tm); mottled, color variable, mainly grayish brown (10YR 5/2) to brown (7.5YR 5/4), occasionally reddish brown (5YR 4/4); appears very moist and stiff; lower contact occurs between runs  At 30.0 to 31.2': Some lightly cemented zones  At 31.8 to 32.9': Grades to fine Silty Sand, 5 to 10% gravel, up to ½ inch (Jsm and Tm), 1 granitic clast observed  At 33.0 to 35.0': Some indistinct varve-like bedding  At 34.2 to 35.0': Becomes very stiff, trace manganese oxide flecks and staining	
240	35					SW	Well Graded Sand with Gravel, fine to coarse grained, clasts 20 to 30%, up to ½ inch; mainly subangular to subrounded slate (Jsm), shale (Tm), and sandstone (Tm); some quartzite and granitic rock also observed; color variable, generally yellowish brown (10YR 5/4); appears moist and dense; lower contact is sharp, erosional  At 35.6 to 35.7': Grades to fine Silty Sand; well sorted	
		3	7	100		SM	37.7 to 38.4': Grades to fine Silty Sand; well sorted; sharp lower contact	
						CL/CH	<b>Marker Bed M<sub>F</sub></b> - Clay to Silty Clay, trace coarse sand (Jsm); dark grayish brown (10YR 4/2); appears moist and very stiff; fine oxidized strong brown (7.5YR 4/6) pockets/specks, generally less than 1/8 inch; possible weak soil development; lower contact occurs between runs	
40								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: DR/WL/MW 10/10/2011  
 Checked/Date: MW/MF 10/14/2011

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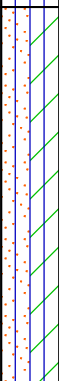



ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T7-B5</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 275 feet
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						5/23/11	8-inch	
						GROUNDWATER READINGS		
						Measured at 52-ft during drilling		
						ML	<b>Marker Bed M<sub>F</sub> continued</b> Clayey Silt, variable fine sand, trace coarse sand (Jsm and Tm); dark reddish brown (5YR 3/3); appears moist and stiff; core sample broken up; lower contact is gradational	
		3	8	100		ML	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey to Sandy Silt, variable coarse sand and fine gravel, clasts 2 to 20%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), shale (Tm), and sandstone (Tm); strong brown (7.5YR 4/6); appears moist and very stiff to hard; poorly sorted; lower contact is sharp  At 43.8 to 45.0': Clayey Silt predominant  At 45.0 to 46.8': Increasing sand, Sandy Silt predominant	
230	45							
		4	9	100			At 47.7 to 48.5': Gravel increases to 20 to 30%	
						GM	<b>OLDER FLUVIAL DEPOSITS [Qfoff]</b> Silty Gravel; clasts 70%+, up to 2 inches, mainly angular to subangular slate (Jsm), some shale (Tm) and sandstone (Tm) also observed; appears to be clast-supported, matrix is fine to coarse silty sand; color is variable, appears moist and dense; lower contact is gradational	
225	50					SM-SC	Clayey, Silty Sand with Gravel, fine to coarse grained, clasts 20 to 50%, up to 1 inch, mainly subangular to subrounded slate (Jsm), shale (Tm), and sandstone (Tm); dark brown (7.5YR 3/4); appears wet and dense; lower contact is narrowly gradational	
		4	10	100			At 52': Groundwater measured during drilling	
						ML/CL	<b>OLDER ALLUVIAL FAN DEPOSITS [Qfo]</b> Clayey Silt and Silty Clay, variable fine to coarse sand and fine gravel, clasts 5 to 20%, up to 1/2 inch, mainly subangular to subrounded slate (Jsm), shale (Tm), and sandstone (Tm); brown (7.5YR 4/4); appears very moist and very stiff; lower contact is gradational	
220	55					SC	At 54.6 to 55.3' and 55.7 to 56.0': Color becomes reddish brown (5YR 4/3) At 55.3 to 55.7': Clayey Sand with Gravel, fine to coarse grained, clasts 30 to 40%, up to 1/2 inch (Jsm and Tm) At 56.0 to 60.0': Poor to no recovery, slough only	
		4	11	20				
60								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: DR/WL/MW 10/10/2011  
 Checked/Date: MW/MF 10/14/2011

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T7-B5</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						5/23/11	8-inch	
						GROUNDWATER READINGS		
						Measured at 52-ft during drilling		
210	65	4	12	100		ML	<b>ESTUARINE DEPOSITS - FINE GRAINED (Qef)</b> Sandy to Clayey Silt, variable coarse sand, trace fine gravel (Jsm and Tm); dark brown (7.5YR 3/4); appears very moist and stiff; generally well sorted; lower contact is narrowly gradational  At 61.7 to 61.8 and 62.3 to 62.4': Fine to coarse Silty Sand beds At 61.8 to 62.3': Very fine Silty Sand to Sandy Silt  At 64.0 to 65.0': Trace manganese oxide flecks  At 65.0 to 65.9': Manganese oxide flecks and staining increase 10 to 20%	
205	70	5	13	100		ML	<b>ESTUARINE DEPOSITS [Qe]</b> Clayey to Sandy Silt, variable coarse sand and fine gravel, clasts 1 to 10%, up to 3/4 inch; mainly subangular to subrounded slate (Jsm), shale (Tm) and sandstone (Tm); mottled, grayish brown (10YR 5/2) to strong brown (7.5YR 4/6); appears very moist to wet and medium stiff to stiff; lower contact is gradational  At 68.3 to 70.8': Some laminations defined by variable oxidation	
200	75	5	14	74		SW	Well Graded Sand with Gravel, fine to coarse grained, clasts 30 to 40%, up to 3/4 inch, mainly subangular to subrounded slate (Jsm), shale (Tm), and sandstone (Tm); dark yellowish brown (10YR 4/4); appears wet and dense	
						ML/ CL	At 72.9 to 73.7': Clayey Silt and Silty Clay, variable fine to coarse sand, trace fine gravel (Jsm and Tm); mottled, grayish brown (10YR 5/2) to strong brown (7.5YR 4/6) At 73.7 to 75.0': No recovery	
						SW	At 75.0 to 76.7': Gravel decreases to less than 5%  At 77.5 to 80.0': No recovery	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: DR/WL/MW 10/10/2011  
 Checked/Date: MW/MF 10/14/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: T7-B5d

METRO SOIL CORE S:\70131 GEOTECH\GINT\W\Fault\_Investigation\_WSE\_Library\_AMEC OCTOBER2011 (2).GLR  
 G:\PROJECT\_DIRECTORIES\49532\010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 7.GPI 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT	BORING NO.							
						Martini Drilling / CME 75	<b>T7-B5</b> (Continued)							
						<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 50%;">DRILLING METHOD</td> <td style="width: 50%;">BOREHOLE LOCATION</td> </tr> <tr> <td>Hollow Stem Auger</td> <td>See Plate 3</td> </tr> <tr> <td>DATES DRILLED</td> <td>HOLE DIAMETER</td> </tr> <tr> <td>5/23/11</td> <td>8-inch</td> </tr> </table>		DRILLING METHOD	BOREHOLE LOCATION	Hollow Stem Auger	See Plate 3	DATES DRILLED	HOLE DIAMETER	5/23/11
DRILLING METHOD	BOREHOLE LOCATION													
Hollow Stem Auger	See Plate 3													
DATES DRILLED	HOLE DIAMETER													
5/23/11	8-inch													
						GROUNDWATER READINGS	GROUND EL.							
						Measured at 52-ft during drilling	275 feet							
190	85					END OF BORING AT 80 FEET  NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched.  -Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than 1/4 inch). -Beds are generally massive unless otherwise noted.								
185	90													
180	95													
100														
						Geologist: ME/MF Prepared/Date: DR/WL/MW 10/10/2011 Checked/Date: MW/MF 10/14/2011								
<b>MTA Westside Subway Extension</b> <b>Los Angeles, California</b>														
						<b>LOG OF BORING</b> Project No.: 4953-10-1561 Figure: T7-B5e								

METRO SOIL CORE S:\70131 GEOTECH\GINT\W\F\AULT\_INVESTIGATION\_WSE\_LIBRARY\_AMEC OCTOBER2011 (2).GLR  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / CME 75		
						DRILLING METHOD	BOREHOLE LOCATION	<b>T8-B1</b>
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/24/11 - 5/28/11	8 inches	300 feet
						GROUNDWATER READINGS		
						Measured at 65-ft after 24-hrs		
							10 inches asphaltic concrete over 10 inches base Hand augered to 7 feet NOTE: Jsm = Santa Monica Slate Tm = Modelo formation See end of log for more detailed descriptions of clasts <b>FILL [Af]</b> Sandy Gravel, some cobble	
						GP		
						ML	Sandy Silt, some gravel and cobbles; yellowish brown; appears moist	
						CL	Clay; brown	
295	5						Sandy Clay, trace gravel, subangular, 1/2 inch; dark yellowish brown; appears moist and stiff	
		1	1	100			At 8.0 to 9.0': Clay with some fine to medium sand	
						SC/SM	Clayey to Silty Sand, fine to medium grained, trace gravel; dark yellowish brown	
290	10							
		1	2	94				
						CL	Clay bed; very dark brown; appears moist and soft to stiff	
						SC/SM		
285	15							
		1	3	50			At 16.5 to 19.0': No recovery	
						CL	At 19.0': Clay, mottled with Sand and Silt, abundant fine to coarse gravel; very dark gray and very dark brown; sample is broken up	
280	20							

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MW/MF  
 Prepared/Date: WL/PK 10/13/2011  
 Checked/Date: MF/MW 10/13/2011



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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T8-B1 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/24/11 - 5/28/11	8 inches	300 feet
						GROUNDWATER READINGS		
						Measured at 65-ft after 24-hrs		
						CL	Af Continued	
		2	4	84		CL	ESTUARINE DEPOSITS - FINE GRAINED [Qef] Clay; olive brown (2.5Y 4/3); appears moist and very stiff; lenses of fine yellow brown sand and thin reddish brown and grayish brown layering, varve like bedding; lower contact is sharp	
275	25					SM	Silty Sand, fine to medium grained, some angular gravel, 1/4 inch; dark brown (7.5YR 3/3); appears damp to moist and medium dense	
		2	5	60		CL	<b>Marker Bed M<sub>E</sub></b> - Clay, trace coarse sand; very dark grayish brown (10YR 3/2); appears moist and stiff; some thin interfingering layers/lenses of fine yellow sand At 26.8': increasing Silt and Sand, olive (5Y 4/3) At 27.0 to 29.0': No recovery	
270	30						Clay, trace dispersed calcium carbonate; weak carbonate soil horizon?; lower contact is gradational  At 30.0' to 30.9': Gradational transition to Lakewood Formation below	
		2	6	38		SM	<b>LAKWOOD FORMATION [Qlw]</b> Silty Sand; very fine grained, light yellowish brown (2.5Y 6/3); appears moist and dense; well sorted; lower contact occurs between runs At 30.9 to 34.0': No recovery	
265	35	2	7	44		SP-SM	Poorly Graded Sand with Silt, fine grained; olive yellow (2.5Y 6/6); appears damp and dense; lower contact is narrowly gradational  At 35.1 to 36.5': No recovery	
		2	8	44		SP	At 37.0': Increasing moisture and oxidation  At 37.6 to 39.0': No recovery	
40								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MW/MF  
 Prepared/Date: WL/PK 10/13/2011  
 Checked/Date: MF/MW 10/13/2011

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						Jet Drilling / CME 75		<b>T8-B1</b> (Continued)
						DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 300 feet
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	
						5/24/11 - 5/28/11	8 inches	
						GROUNDWATER READINGS		
						Measured at 65-ft after 24-hrs		
		2	9	64		SP	<b>Q<sub>lw</sub> Continued</b>	
						CL	Clay; light olive gray (2.5Y 6/2); appears damp and hard; thinly layered; lower contact occurs between runs At 40.6 to 41.5': No recovery	
		2	10	100		CL	At 41.5 to 43.3'; Clay; dark grayish brown (2.5Y 4/2); small splotches of oxidization, punky texture with waxy parting surfaces; appears damp and soft; zones with more silt, oxidized thin wavy clay layers at lower contact, lower contact is sharp	
						ML	Silt; very dark brown (10YR 2/2) to dark brown (10YR 3/3) and light yellowish brown (2.5Y 6/4), lower contact is sharp	
						SC	Clayey Sand, fine to medium grained; olive (5Y 5/3); appears moist and dense, lower contact is narrowly gradational	
255	45					CL	Clay; olive brown (2.5Y 4/3) small oxidization splotches, crumbles when broken, waxy parting surfaces; some sand and silt, lower contact is sharp	
		3	12	52		SM	Silty Sand, fine grained; brownish yellow (10YR 6/8) and very pale brown (10YR 7/3); appears damp to moist and dense At 46.6': Clastic layer, Clayey Sand matrix, subrounded to subangular gravel, some near horizontal imbrication of elongated slate (Jsm) clasts At 46.6 to 49.0': No recovery	
						SM	<b>Marker Bed M<sub>C</sub></b> - Sand with Gravel, fine to medium grained, clasts 10 to 20 %, up to 1 inch, mainly subsangular to subrounded slate (Jsm), quartzite and granitic rock; color variable; appears moist and dense; lower contact occurs between runs	
250	50					SP	At 49.4': Clastic layer (2-inch thick) At 49.6 to 50.3': Sand, fine grained; brownish yellow (10YR 6/8); thinly bedded, near horizontal bedding At 50.3 to 54.0': No recovery	
		3	13	26				
						SM	Silty Sand, very fine to fine grained; olive (5Y 5/3); appears moist and dense; trace oxidation mottling; poorly recovery (sample not intact); lower contact is sharp	
245	55	3	14	72				
		3	15	68				
							Sand, fine to medium grained; dark greenish gray (5GY 4/1)	

(CONTINUED ON FOLLOWING FIGURE)

Geologist: DB/MW/MF  
 Prepared/Date: WL/PK 10/13/2011  
 Checked/Date: MF/MW 10/13/2011

MTA Westside Subway Extension  
 Los Angeles, California

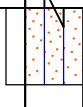
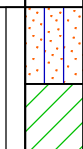
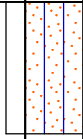
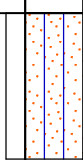


**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T8-B1c

METRO SOIL CORE S:\70131 GEOTECH\GINT\W\FULT\_INVESTIGATION\_WSE\_LIBRARY\_AMEC OCTOBER2011 (2).GLR  
 G:\PROJECT\_DIRECTORIES\4953\2010\101561\METRO\_WESTSIDE\_EXTENSION\6.2.3.2 FAULT HAZARD INVESTIGATION\3.2 ALL FIELD NOTES\GINT LOGS\101561-TRANSECT 8.GPI 10/14/11

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

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T8-B1 (Continued)
						Jet Drilling / CME 75		
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/24/11 - 5/28/11	8 inches	300 feet
						GROUNDWATER READINGS		
						Measured at 65-ft after 24-hrs		
		4	16	80		SM	<b>Qlw Continued</b> At 60': Silty Sand continued  At 61.0 to 61.5': No recovery	
		4	17	76		CL	Clay; light brown yellow(10YR 6/6), thinly bedded, lower contact is sharp  At 63.4 to 65.0': No Recovery	
235	65						At 65.0': Groundwater measured after 24 hours <b>SAN PEDRO FORMATION [Qsp]</b> Silty Sand, very fine grained, some clay; olive (5Y 4/3); appears very moist and dense At 65.5': <b>Marker Bed M<sub>B</sub></b> - Oxidized Clay/Silt bed (½ inch thick) At 65.6': Becomes gray (5Y 6/1), very fine grained	
		4	18	43		SM	At 66.7' to 69.0': No recovery	
							<b>SAN PEDRO FORMATION [Qsp]</b> Silty Sand, very fine to fine grained; grayish olive (10Y 5/2); appears very moist and dense At 69.0' to 69.5': <b>Marker Bed M<sub>A</sub></b> - Gravelly bed, clasts 15 to 30%, up to 1 inch, mainly subrounded slate (Jsm) and quartzite	
230	70	4	19	38		SM	At 70.9 to 74.0': No Recovery	
							END OF BORING AT 74 FEET	
225	75						NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched.  -Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than ¼ inch). -Beds are generally massive unless otherwise noted.	
	80							

Geologist: DB/MW/MF  
 Prepared/Date: WL/PK 10/13/2011  
 Checked/Date: MF/MW 10/13/2011



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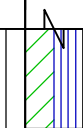
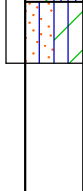
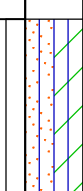

ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / Tri Country / CME 75		<b>T8-B2</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger / Mud Rotary	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/23/11 - 5/24/11 & 6/29/11	8 inches	296 feet
						GROUNDWATER READINGS		
						Not encountered during drilling		
295						12 inches of asphaltic concrete over 18 inches of base		
						NOTE: Jsm = Santa Monica Slate Tm = Modelo formation See end of log for more detailed descriptions of clasts		
						Grab samples taken at 2' and 4'		
						SW	<b>FILL [Af]</b> Sand with Gravel, fine to coarse; olive gray, appears wet	
						CL	At 3.5': Clay; brown	
290	5					CL	Silty Clay, trace coarse sand; brown (10YR 4/4); appears very moist and stiff	
		1	1	76			At 8.0 to 8.3': Becomes dark brown (5YR 3/4)	
							At 9.0 to 11.3': Occasional Sandy beds	
285	10					ML	Grades to Sandy to Clayey Silt	
		1	2	72		ML-CL	Silty Clay and Clayey Silt, variable fine to coarse sand, trace fine gravel; brown (10YR 4/3) to black (7.5YR 2.5/1); appears moist to very moist and very stiff to hard; alternating organic rich (black) and non-organic (brown) layers	
							At 12.6 to 14.0': No recovery	
280	15						At 19.0 to 21.3': Sand and fine gravel content increases	
		1	3	80				
20	20							

(CONTINUED ON FOLLOWING FIGURE)

Geologist: BF/MF  
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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T8-B2 (Continued)
						Hollow-Stem Auger / Mud Rotary	See Plate 3	
						DATES DRILLED 5/23/11 - 5/24/11 & 6/29/11	HOLE DIAMETER 8 inches	GROUND EL. 296 feet
						GROUNDWATER READINGS Not encountered during drilling		
275		2	4	62		ML-CL	Af Continued	
270		2	5	46		ML	<b>ESTUARINE DEPOSITS - FINE GRAINED [Qef]</b> Sandy to Clayey Silt, trace coarse sand (Jsm and Tm); brown (10YR 4/3); appears very moist and stiff; lower contact is sharp At 22.1 to 24.0': No recovery  At 24.0 to 26.2': Variable varve-like bedding, brown (10Y 4/3) to strong brown (7.5YR 5/6)  At 26.3 to 29.0': No recovery  At 29.0 to 33.4': Variable color and mottling, mainly grayish brown (2.5Y 5/2) to reddish brown (5YR 5/4) to yellowish brown (10YR 5/6); some faint laminations and varve-like bedding	
265		2	6	100		ML-CL	<b>Marker Bed M<sub>E</sub></b> - Clayey Silt and Silty Clay, trace coarse sand (Jsm and Tm); mottled, dark gray (10YR 4/1) to light brown (10YR 4/2) to reddish brown (5YR 5/3); appears moist and very stiff; lower contact is sharp	
260		3	7	32		SM	At 35.4 to 35.6': Appears to be upper part of gradational transition to Lakewood Formation below At 35.0 to 35.6': Trace dispersed calcium carbonate; possible weak carbonate soil horizon At 35.6 to 39.0': No recovery  Depth of contact uncertain due to poor recovery <b>LAKWOOD FORMATION [Qlw]</b> Silty Sand, fine grained; pale brown (2.5Y 7/3); appears dry and dense; well sorted;	
40								

(CONTINUED ON FOLLOWING FIGURE)

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					DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
					Jet Drilling / Tri Country / CME 75		<b>T8-B2</b> (Continued)
ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	DRILLING METHOD	BOREHOLE LOCATION	
					Hollow-Stem Auger / Mud Rotary		See Plate 3
					DATES DRILLED		GROUND EL.
					5/23/11 - 5/24/11 & 6/29/11		296 feet
					GROUNDWATER READINGS		
					Not encountered during drilling		
255		3	8	30		SM	lower contact occurs between runs At 39.6 to 40.1': Distinct laminations defined by varying manganese oxide content and oxidation <b>Qlw Continued</b> At 40.5 to 44.0': No recovery
45		3	9	92		SC/ SM CL	Clayey to Silty Sand, fine grained, trace coarse sand; varying color and oxidation, generally yellowish brown (10YR 5/6) to strong brown (7.5YR 4/6); appears moist and dense At 44.5 to 45.3': Grades to Sandy Clay, some oxidized laminations At 45.3': ¼ inch very dark gray (7.4YR 3/1) clay bed At 45.8 to 46.8': Becomes yellowish brown (10YR 5/4)
250		3	10	40		SM	Silty Sand; fine grained, yellowish brown (10YR 5/8) to brown (10YR 4/3); appears dry to damp and dense; distinct laminations defined by color and manganese oxide content At 47.5 to 49.0': No recovery
50		3	11	48		SM	<b>Marker Bed M<sub>C</sub></b> - Silty Sand with Gravel, very fine grained, clasts 15 to 20%, up to ½ inch, mainly subrounded slate (Jsm), quartzite and granitic rock; brown (10YR 4/3) to dark gray (10YR 4/1); appears dry to damp and dense; lower contact occurs between runs At 50.2 to 51.5': No recovery
245		3	12	12		SM	Silty Sand, fine grained, trace clay; dark grayish brown (10YR 4/2) to dark yellowish brown (10YR 4/6); appears very moist and dense At 51.8 to 54.0': No recovery
55		3	13	64		SM/ ML SM	Silty Sand to Sandy Silt, fine grained; dark grayish brown (10YR 4/2); very moist; stiff; lower contact is indistinct Silty Sand, fine grained; pale brown (2.5Y 7/4) to brownish yellow (10YR 6/8); appears moist and dense; well sorted; lower contact is gradational At 54.5 to 54.9': Trace gravel, mainly slate (Jsm), one 1½ inch rounded granitic rock clast observed At 55.1 to 55.5': Grades to very fine grained Silty Sand and Sandy Silt
240		3	14	64		SM	At 59.0 to 61.8': Becomes strongly mottled; gray (2.5Y 6/1) to strong brown (7.5YR 5/8); appears very moist
60							

(CONTINUED ON FOLLOWING FIGURE)

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						DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Jet Drilling / Tri Country / CME 75		<b>T8-B2</b> (Continued)
						DRILLING METHOD Hollow-Stem Auger / Mud Rotary	BOREHOLE LOCATION See Plate 3	
						DATES DRILLED 5/23/11 - 5/24/11 & 6/29/11	HOLE DIAMETER 8 inches	GROUND EL. 296 feet
						GROUNDWATER READINGS Not encountered during drilling		
235		4	15	80		<b>Qlw Continued</b>		
		4	16	68		At 61.8': Becomes mottled, light yellowish brown (2.5Y 6/3) to brownish yellow (10YR 6/6); appears wet		
						At 63.2 to 64.0': No recovery		
						At 64.0 to 65.0': No sampling		
65						At 65.0 to 69.0': Recovered only slough		
230		4	17	0				
						<b>SAN PEDRO FORMATION [Qsp]</b>		
70		4	18	92		At 69.0': <b>Marker M<sub>B</sub></b> - Oxidized Clay/Silt bed (1 inch thick) Silty Sand, very fine grained; greenish gray (10GY 5/1); appears wet and dense; slightly micaceous; scattered fine, irregular, oxidized pockets; lower contact is narrowly gradational		
225						At 71.4 to 71.8': <b>Marker M<sub>A</sub></b> - 20 to 30% gravel, up to 1 inch, mainly subrounded slate (Jsm) and granitic rock		
		4	19	29		Poorly Graded Sand with Silt, fine grained; gray (5Y 5/1); appears wet and dense		
						At 72.2 to 74.0': No recovery		
						END OF BORING AT 74 FEET		
75						NOTES: Boring backfilled with cement/bentonite grout from bottom up and patched.		
220						-Munsell colors listed in order of predominance (most predominant color first). -Where observed, contacts and bedding appear subhorizontal unless otherwise noted. -Non-recovery intervals are assumed to occur at the bottom of run unless otherwise noted. -Santa Monica Slate (Jsm) clasts are generally very dark gray, subangular to subrounded slate unless otherwise noted. Modelo Formation (Tm) clasts are generally white to pale yellow to tan, subangular to subrounded shale and sandstone unless otherwise noted. -The term "clasts" herein describes gravel-size rock fragments (larger than ¼ inch). -Beds are generally massive unless otherwise noted.		
80								

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						Martini Drilling / CME 75		<b>T8-B3</b>
						DRILLING METHOD	BOREHOLE LOCATION	
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/25/11	8 inches	292 feet
						GROUNDWATER READINGS		
						Not encountered during drilling		
						16 inches of asphaltic concrete over 32 inches of subbase sand		
290								
	5					CL/ ML	<b>FILL [Af]</b> Silty Clay and Clayey Silt, variable fine to coarse grained, trace gravel; varying color, mainly dark grayish brown (10YR 4/2); appears moist to very moist and very stiff; occasional more gravelly layers with up to 20% gravel	
285		1	1	100				
	10						At 9.6': Brick fragment, 2 inches	
280		1	2	100				
	15							
275		1	3	100				
20								

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T8-B3 (Continued)
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/25/11	8 inches	292 feet
						GROUNDWATER READINGS Not encountered during drilling		
270		2	4	100		CL/ ML	Af Continued	
25								
265		2	5	100				
30								
260		2	6	100		CL- CH	<b>Marker Bed M<sub>e</sub></b> - Clay, rare (<1%) coarse grained sand; lightly mottled, dark grayish brown (10YR 4/2) to dark yellowish brown (10YR 4/6); appears moist and very stiff to hard; lower contact is sharp	
35						ML	<b>Marker Bed M<sub>d</sub> - Carbonate Soil Horizon</b> - Silt (calcium carbonate); white (N 9.5); appears damp and hard; 95% of bed composed of silt-size calcium carbonate deposits; moderately to well cemented; lower contact is narrowly gradational	
255		3	7	90		SM	<b>LAKWOOD FORMATION [Qlw]</b> Silty Sand, fine grained; olive gray (5Y 5/2) with occasional yellowish brown (10YR 5/8) mottling and laminations; appears very moist and dense; well sorted; lower contact is gradational  At 38.6 to 40.5': Becomes pale brown (2.5Y 3/3) with occasional dark yellowish brown (10YR 5/8) mottling and laminations; appears damp and dense	
40								

(CONTINUED ON FOLLOWING FIGURE)

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ELEVATION (ft)	DEPTH (ft)	BOX #	RUN #	% RECOVERY	SAMPLE LOC.	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
						DRILLING METHOD	BOREHOLE LOCATION	T8-B3 (Continued)
						Hollow-Stem Auger	See Plate 3	
						DATES DRILLED	HOLE DIAMETER	GROUND EL.
						5/25/11	8 inches	292 feet
						GROUNDWATER READINGS		
						Not encountered during drilling		
250		3	8	84		<b>Q<sub>lw</sub> Continued</b>		
					SP-SM	Poorly Graded Sand with Silt, fine grained; lightly mottled, varying color; generally pale brown (2.5Y 8/3) to yellow (10YR 7/6); appears damp and dense		
45					SM-SC	At 43.5 to 44.2': Clayey Silty Sand, fine grained; varying color, generally light yellowish brown (2.5Y 6/4) to brownish yellow (10YR 6/8); appears moist and dense		
245		3	9	86	SP-SM	At 46.5 to 49.0': Becomes fine to medium grained, trace coarse grained and fine gravel (Jsm)		
50						At 50.0 to 53.4': Appears moist; occasional laminations defined by oxidation and manganese oxide content		
240		4	10	76		At 53.6': Subangular meta-basalt clasts, up to 3 inches At 53.8 to 55.0': No recovery		
55					SM	<b>Marker Bed M<sub>c</sub></b> - Silty Sand with Gravel, fine grained, clasts 15 to 20%, up to 1 inch, mainly subrounded slate (Jsm), quartzite (Jsm) and granitic rock; strong brown (7.5YR 4/6); appears moist and dense; lower contact is narrowly gradational At 55.3 to 56.1': Grades to fine Silty Sand; light yellowish brown (2.5Y 6/4) At 56.1 to 57.0': Varying color, mainly yellowish brown (10YR 5/6)		
235		4	11	48	SM & ML	Silty Sand and Sandy Silt, very fine grained; light yellowish brown (2.5Y 6/4); appears moist and dense; well sorted; lower contact is narrowly gradational At 57.4 to 60.0': No recovery		
60								

(CONTINUED ON FOLLOWING FIGURE)

Geologist: ME/MF  
 Prepared/Date: WL/PK 10/13/2011  
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MTA Westside Subway Extension  
 Los Angeles, California



**LOG OF BORING**

Project No.: 4953-10-1561 Figure: T8-B3c