

Los Angeles County  
Metropolitan Transportation Authority

# Westside Purple Line Extension Project, Section 2 Contract C1120

## Geotechnical Data Report–Tunnel Reaches 4 and 5

Issued for Solicitation September 1, 2015  
Amendment 8: February 2, 2016



  
U.S. Department  
of Transportation  
Federal Transit  
Administration





# SUMMARY OF REVISIONS TO THE SEPTEMBER 1, 2015 GDR

Chapter	Revisions	Page Nos.
1.0	Correction to use GDR and EDR abbreviations instead of full names	1-1
	Added a note to state the September 2015 GDR is superseded	1-1
1.1	Correction to include Adv. PE phase investigation	1-1
	Added a note to state environmental contamination is discussed in separate EDR	1-2
1.2	Provided clarification that apart from Amec reports, Leighton reports were reviewed, but no specific research to find reports by other consultants was performed	1-2
1.3	Revision to include Adv. PE phase investigations	1-3
2.1	Changed the date of reference plans from June to December 2015	2-1
2.2	Revisions to improve sentence structure	2-1
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3.0	Revision to include abbreviations for GDR	3-1
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3.1.5	Correction to state the depth to San Pedro is greater than 180 ft	3-2
	Correction to state San Pedro thickness is greater than 150 ft	3-2
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## 1.0 INTRODUCTION

This geotechnical data report (GDR) has been prepared for Tunnel Reaches 4 and 5 **within Section 2 of the proposed Westside Purple Line Extension project (WPLE)** as part of the Advanced Preliminary Engineering (Adv. PE) phase for the Los Angeles County Metropolitan Transportation Authority (Metro). ~~The proposed reaches are part of Section 2 of the proposed Westside Purple Line Extension project (WPLE) project.~~ This report is one of the following six data reports being prepared for the stations and tunnel reaches which together comprise Section 2 of the project:

1. ~~Geotechnical Data Report (GDR),~~ Wilshire/Rodeo Station
2. ~~Geotechnical Data Report (GDR),~~ Century City Constellation Station
3. ~~Geotechnical Data Report (GDR),~~ Tunnel Reaches 4 and 5 (this report)
4. Environmental Data Report (EDR), Wilshire/Rodeo Station
5. ~~Environmental Data Report (EDR),~~ Century City Constellation Station
6. ~~Environmental Data Report (EDR),~~ **EDR**, Tunnel Reaches 4 and 5

This report is prepared based on the results of investigations performed by Amec Foster Wheeler and its predecessor companies AMEC and MACTEC during the Advanced Conceptual Engineering (ACE) and Preliminary Engineering (PE) phases of the project and other prior investigations. The results of the ACE and PE phase investigations were previously presented in a Geotechnical and Environmental Report (Metro, 2011).

Amec Foster Wheeler recently completed Adv. PE phase investigations in the City of Angeles (i.e., in the Century City district of Los Angeles). ~~Additional~~ **The results of ACE, PE and available Adv. PE investigations were presented in a GDR dated September 2015 (Metro, 2015). Subsequently, additional** geotechnical and environmental investigations along Reaches 4 and 5 ~~are planned~~ **were performed** within the City of Beverly Hills. ~~Although~~ **This GDR presents all the geotechnical investigations data obtained from the WPLE and prior investigations provide sufficient geotechnical data, it is noted that** ~~ACE through Adv. PE phases and supersedes the subsurface gas and environmental data is currently sparse.~~ **September 2015 GDR.**

### 1.1 Objectives and Scope of Work

The objectives of the geotechnical and environmental investigations were to evaluate subsurface soil, groundwater, subsurface gas, and man-made environmental contamination, for planning, design and construction of the proposed Tunnel Reaches 4 and 5; the results of the man-made **or natural** environmental contamination investigation are presented separately in the EDR.

Amec Foster Wheeler is the primary geotechnical consultant to the Parsons Brinckerhoff Team (PB Team), Metro's design consultant. Amec Foster Wheeler's predecessor companies AMEC and MACTEC provided geotechnical and environmental services associated with the Alternatives Analysis (AA), ACE, and PE phases of the project in support of preparation of a Final Environmental Impact Statement/Environmental Impact Report (FEIS/EIR).

Amec Foster Wheeler's scope of work consisted of reviewing the subsurface data from the ACE, **PE** and **Adv. PE** phases along with other relevant available data and to provide:

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- Evaluation of static physical characteristics of the soil and groundwater conditions;
- Evaluation of subsurface gas conditions;
- Evaluation of man-made environmental contamination; **(included in a separate EDR);**
- Evaluation of corrosion potential of soils;
- Evaluation of the geologic and seismic hazards for the tunnel reaches; and
- Computation of peak ground acceleration (PGA) and peak ground velocity (PGV) for seismic design of the tunnels.

This GDR presents the results of the field explorations and laboratory testing for all but the environmental testing, and the results of the geologic and seismic hazards evaluation for Tunnel Reaches 4 and 5. Based on the data contained in the GDR, a Geotechnical Design Memorandum (GDM) and a Geotechnical Baseline Report (GBR) have been prepared to include interpretation of the field and laboratory data, parameters for design and construction, and a discussion of the environmental conditions anticipated along Tunnel Reaches 4 and 5. The EDR presents the results of the environmental explorations performed to evaluate man-made environmental contamination and its assessment. The GDR, GDM, GBR, and EDR reports for the stations are submitted separately.

## 1.2 Other Available Data

Amec Foster Wheeler's and predecessor companies (AMEC, MACTEC, Law/Crandall and LeRoy Crandall and Associates) performed numerous geotechnical investigations along Wilshire Boulevard and many along Constellation Boulevard. A fault investigation performed by Leighton (2012a and 2012b) at Beverly Hills High School was also reviewed and data utilized in preparing this GDR. The relevant reports prepared by AMEC's predecessor companies and ~~other consultants~~ **by Leighton** are listed in Section 6, Bibliography. **A specific research to find investigations by other consultants near the project alignment was not performed.**

The locations of the borings from prior investigations that are relevant to Tunnel Reaches 4 and 5 are shown on Plate 1, Exploration Plan and Profile. Logs of prior borings are presented in Appendix A. Groundwater monitoring well installation diagrams from previously installed wells are shown in Appendix B. Logs of prior Cone Penetration Tests (CPTs) are presented in Appendix C, and Laboratory test and in-situ field test results from prior borings are presented in Appendix D.

In addition to the project-specific documents referenced above, we have reviewed applicable geologic and environmental references in the literature in preparing this GDR. These documents are also cited within the text and full references are provided in Section 6, Bibliography.

## 1.3 Limitations

The professional services have been performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable geotechnical consultants practicing in this or similar localities. No other warranty, expressed or implied, is made as to the information included in this GDR. This GDR has been prepared for Metro and its design consultants and contractors to be used solely for the evaluation for Tunnel Reaches 4 and 5 planned as part of the proposed WPLE project. The GDR has not

been prepared for use by other parties, and may not contain sufficient information for the purpose of other parties or other uses.

In developing this GDR, Amec Foster Wheeler (PB team member) relied on subsurface information obtained **in the Adv. PE phase and** by its predecessor companies AMEC and MACTEC in the AA, ACE, and PE phase studies and its other predecessor companies, Law/Crandall and LeRoy Crandall and Associates, as well as subsurface information obtained by other firms. Subsurface conditions are, by their nature, uncertain and may vary from those encountered at the locations where visual inspections, borings, surveys, or other explorations were made.





## 2.0 PROJECT DESCRIPTION

### 2.1 Tunnel Description

A general plan and profile of Tunnel Reaches 4 and 5 is presented on Plate 1, Exploration Plan and Profile. The proposed tunnel configuration for the subway consists of dual 18-foot-10 inch diameter tunnels of the same size at the same depth, separated horizontally by about 20 feet. For the purpose of this report, the excavated tunnel bore diameter was considered to be 22 feet. Tunnels will be constructed in a side-by-side configuration using either a slurry-shield tunnel boring machine (Slurry TBM) or earth pressure balance tunnel boring machine (EPB TBM).

Tunnel Reach 4 is the portion of the tunnel alignment between the proposed Tail Tracks in Section 1 (just west of the Wilshire/La Cienega Station) and the **proposed** Wilshire/Rodeo Station. Tunnel Reach 5 is the portion of the tunnel alignment between the proposed Wilshire/Rodeo and Century City Constellation Stations. Based on the current plans dated ~~June~~**December** 2015, the tunnels in Reaches 4 and 5 are about 1.09 and 1.10 miles long, respectively, as shown on

Figure 2-1 and Plate 1. The depth to tunnel invert varies from 65 to 110 feet below ground surface (bgs) in Tunnel Reach 4 and from 80 to 135 feet bgs in Tunnel Reach 5.

In addition, tunnel cross passages are typically spaced at about 800 feet along the tunnel alignment. Excavations of cross passages are typically performed using “conventional” methods (i.e. without the use of a tunnel boring machine).

### 2.2 Existing Site Conditions

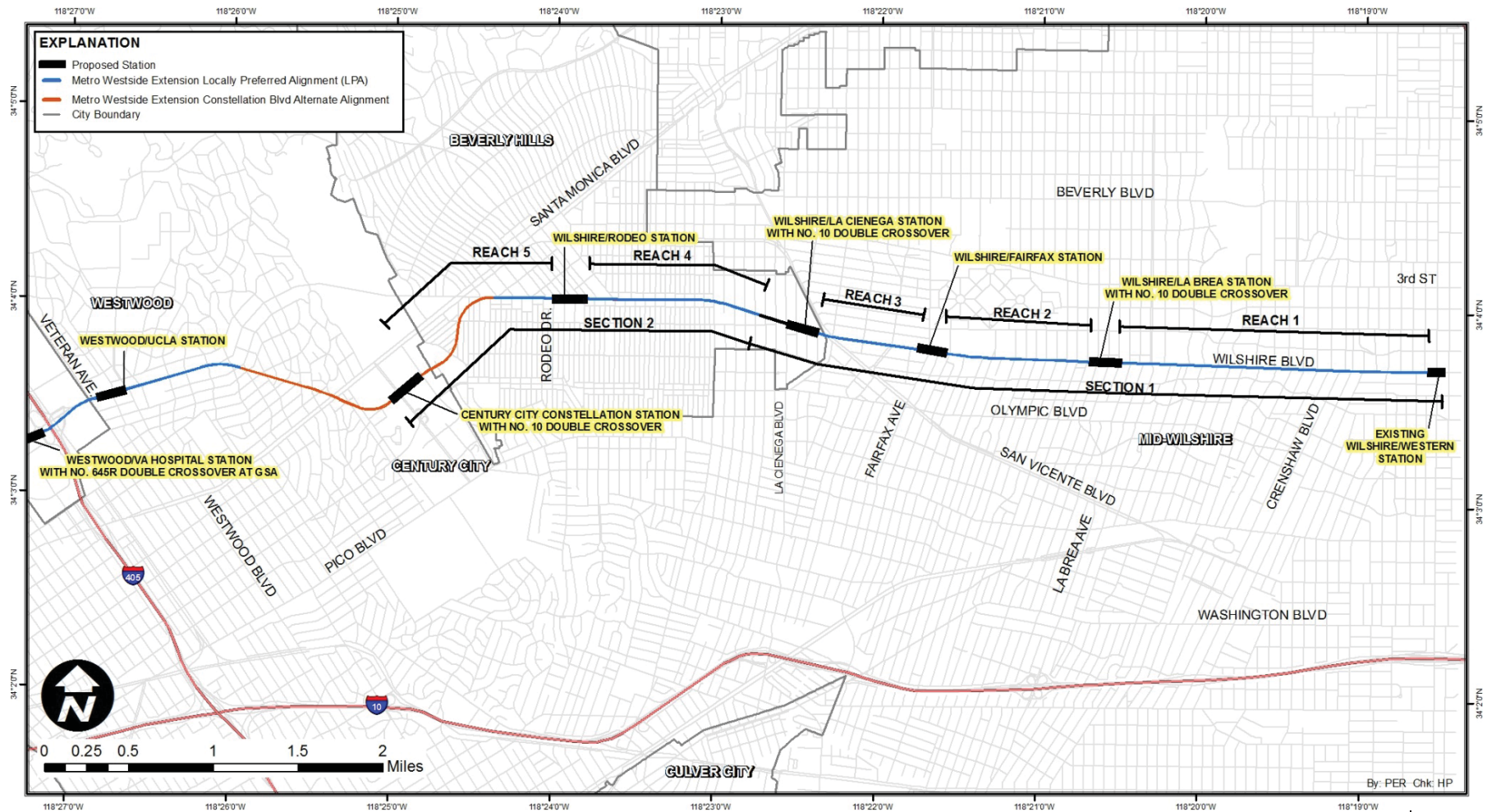
Like most of the subway alignment, Tunnel Reaches 4 and 5 are located within an area with a likelihood for methane. ~~Although the~~**The** tunnel alignment is almost entirely within the City of Beverly Hills, which does not have a formal methane zone map, nevertheless, the City of Los Angeles has designated “Methane Zones” within the ~~City Limits~~ of the City of Los Angeles at the west end of Tunnel Reach 5, and immediately east of the eastern end of Tunnel Reach 4, as shown on the 2004 “Methane and Methane Buffer Zone” map published by City of Los Angeles, Department of Public Works. Considering that oil fields underlie a broad geographic area and do not necessarily end at the City boundaries, the 2004 City of Los Angeles “Methane and Methane Buffer Zone” map was modified to include the City of Beverly Hills to be ~~in~~**within** the methane zone (see Figure 2-2).

The tunnel alignment in Reach 4 and the eastern portion of Reach 5 are underlain at depth by the southern portion of the San Vicente Oil Field according to Map Sheet 117 of the State of California Department of Conservation, Division of Oil and Gas Geothermal Resources (DOGGR, 2006). This map sheet indicates that the western portion of Reach 5 is underlain at depth by the Beverly Hills Oil Field. The nearest oil wells as shown on the DOGGR Online Mapping System (DOMS 2015) are less than 200 feet from the tunnel alignment in Reaches 4 and 5. Additional details pertaining to oil wells are presented in Section 4.3.

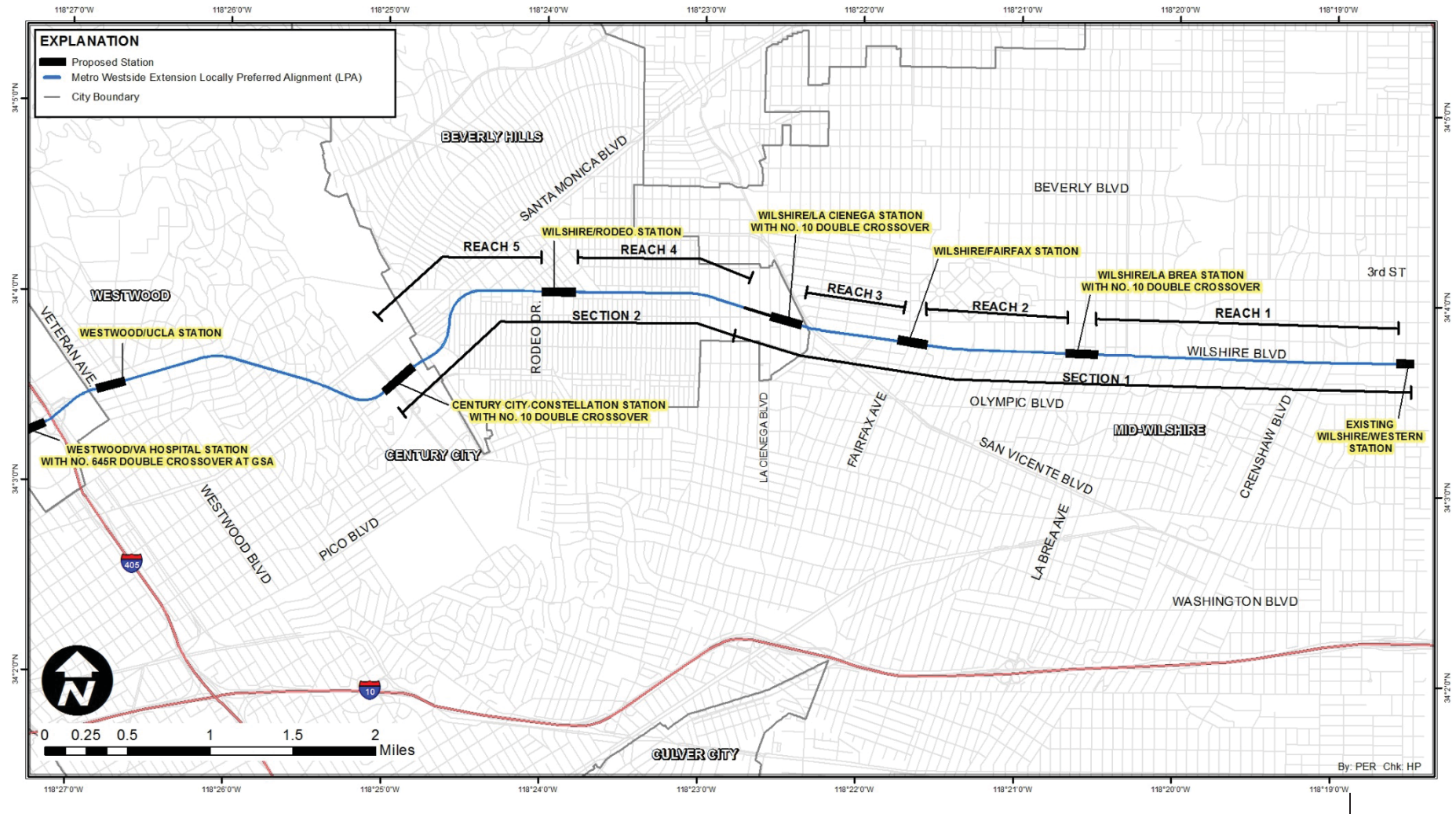
Based on project-specific utility plans, numerous underground utilities are located within the upper 10 to 20 feet of the ground surface.

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Figure 2-1: Tunnel Reaches 4 and 5 Tunnel Alignment



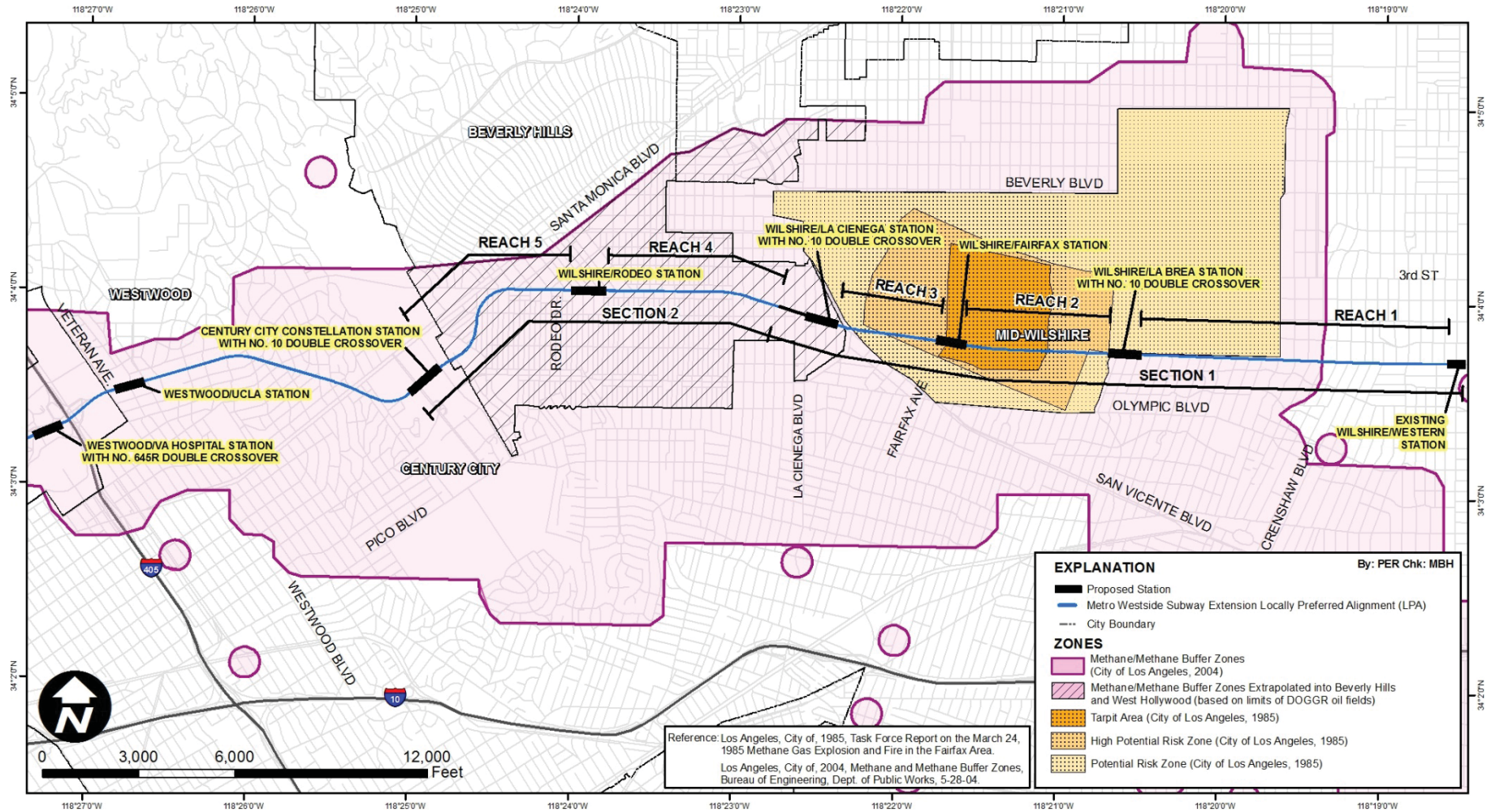
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Figure 2-2: Methane Hazard Zone Map



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## 3.0 PROJECT GEOLOGY

A general overview of the geologic setting for the entire WPLE project was described in the ~~Geotechnical Data Report (GDR)~~ for the Century City Constellation Station (Metro, 2015). The following sections provide the stratigraphic conditions, geologic structure, and groundwater conditions as encountered along Reaches 4 and 5 of the tunnel alignment. The geologic and seismic hazards such as fault rupture, tectonic deformation, liquefaction, subsurface gases and abandoned/undocumented oil wells are also discussed.

### 3.1 Stratigraphy

The geologic units that will be encountered in the tunnel excavation are older alluvial deposits, late Pleistocene Lakewood Formation, and the mid-Pleistocene age San Pedro Formation. The areal distribution of geologic units and major Quaternary faults in close proximity to Reaches 4 and 5 of the alignment are shown on Figure 3-1. The current interpretation of the subsurface contacts between the geologic units is shown on Plate 1. The general lithologic compositions of the geologic units that are shown in Plate 1 are presented in the following sections. A more detailed stratigraphic description is presented in the borings logs included in Appendix A.

#### 3.1.1 Artificial Fill (Regional geologic map and Profile symbol: af)

Artificial fill, ranging from approximately 2 to 12 feet thick, is present along the tunnel alignment in Reaches 4 and 5. As encountered in the borings, it consists of silty sand with variable gravel content, clayey sand, and sandy clay. The geologic profiles presented in Plate 1 show the symbol af to indicate the artificial fill.

#### 3.1.2 Younger Alluvium (Regional geologic map symbols: Qyf and Qf; Profile symbol: Qal)

Alluvial sediments of probable Holocene age sediments along the tunnel alignment form the surficial cover along with artificial fills. Where encountered in exploratory borings along Wilshire Boulevard, the Younger Alluvium consisted of brown and dark brown poorly consolidated, interlayered silts and clays, with some silty to clayey sands, well graded sands, and minor sandy gravel layers. The thickness of the young alluvial deposits is estimated to range from less than 10 feet to about 30 feet. The geologic profiles presented in Plate 1 shows the symbol Qal to indicate the younger alluvial deposits.

#### 3.1.3 Older Alluvium (Regional geologic map symbol: Qof; Profile symbol: Qalo)

The older alluvial deposits consist of sediments deposited by former streams and sheet flow that flowed across the La Brea Plain during late Pleistocene time. These deposits, derived mainly from the Santa Monica Mountains to the north, thicken to the south and west. They include channel and overbank deposits, alluvial fan deposits, and debris/mud flow deposits. Their composition ranges from brown and gray, medium dense to dense sands and gravels in stream channel deposits to predominant gray and brown to olive gray, medium stiff to hard silts and clays and gravelly silts and clays in the fan and overbank deposits. Although local channels with abundant gravel and occasional cobbles are present, boulders were not encountered in the borings drilled along the tunnel alignment. The Older Alluvium depositionally overlies marine and non-marine deposits of the mid-Pleistocene-age San Pedro Formation, except along the western 1,500-foot portion of Reach 5 where it overlies the Lakewood Formation. The thickness of the older alluvial deposits is estimated to range from about 10 to

~~130~~**greater than 180** feet. The geologic profile presented in Plate 1 uses the symbol Qal to indicate the older alluvial deposits.

#### 3.1.4 Lakewood Formation (Profile symbol: Qlw)

The marine and non-marine deposits of the late Pleistocene-age Lakewood Formation underlie the older alluvium deposits in Reach 5 from about Sta. 685+00 to Sta. 705+00 and the planned Century City Constellation Station to the west of Reach 5. The Lakewood Formation, as encountered in the borings, generally consists of interbedded yellow and brown to light to medium gray silty sands and poorly graded sands, with subordinate layers of silts, clays, and clayey sand layers. Although layers of gravel and gravelly zones were encountered in some of the borings, no boulders or cobbles were encountered in borings that penetrated the Lakewood Formation as part of this investigation. The Lakewood Formation is generally dense where granular and very stiff to hard where consisting primarily of silts and clays.

The thickness of the Lakewood Formation is estimated to range from less than 10 feet to about 40 feet thick. The geologic profile presented in Plate 1 uses the symbol Qlw to indicate the Lakewood Formation.

#### 3.1.5 San Pedro Formation (Regional geologic map and profile symbol: Qsp)

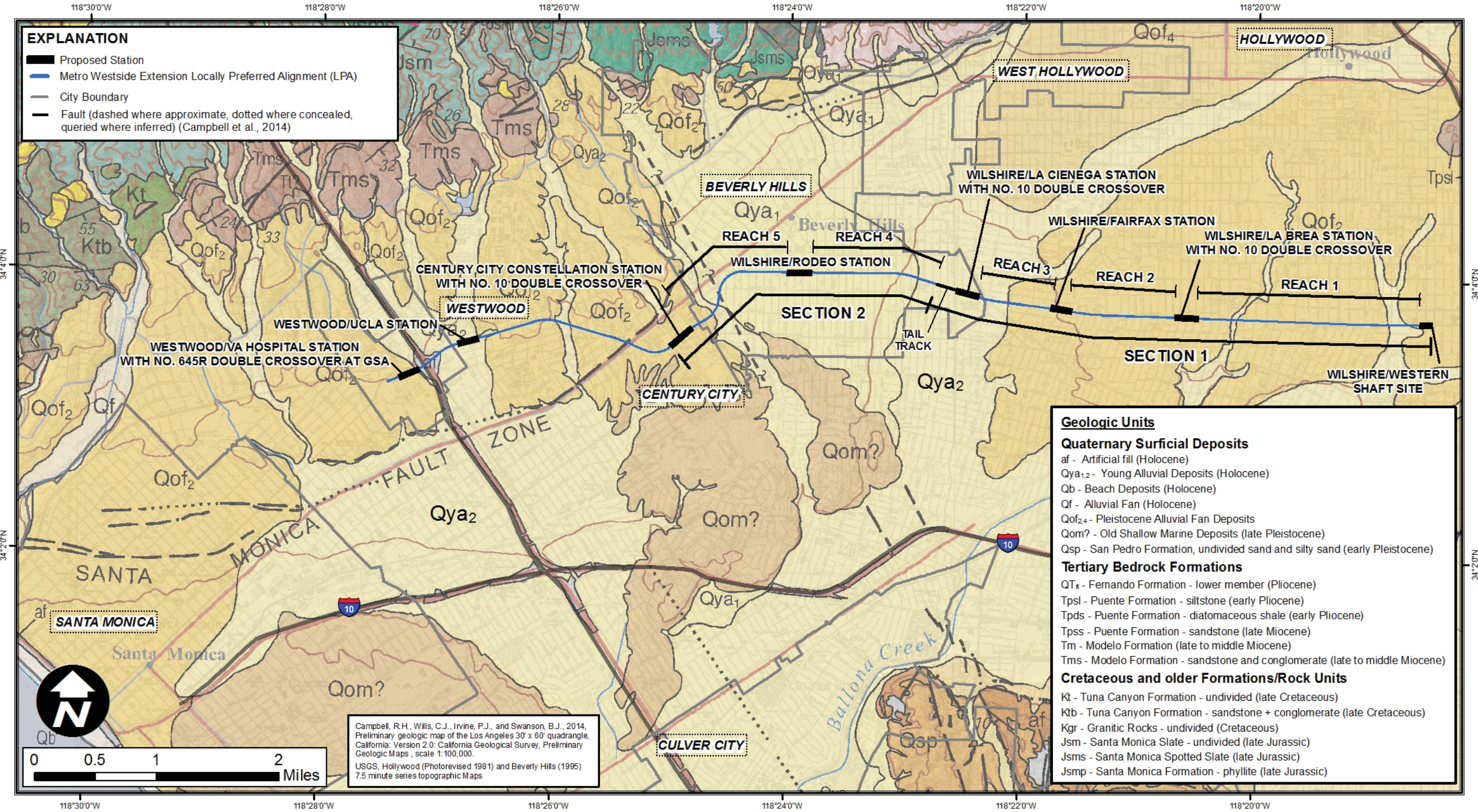
Primarily marine deposits of the early to mid-Pleistocene age San Pedro Formation unconformably underlie the Lakewood Formation, Older and Younger Alluvium at depths ranging from approximately 20 to ~~160 feet bgs.~~**greater than an estimated 180 feet bgs. The top of the formation lies below the bottom depth of the current and prior borings between approximate Station 665+00 and 680+00 (from Peck Drive westward to Spalding Drive).** Where encountered in current and prior borings, these materials consisted primarily of light to dark greenish-gray and bluish-gray, fine-grained dense sand and silty sand with interbeds of fine- to coarse-grained sand with variable gravel, stiff to hard silt layers, and stiff to hard clay layers.

Localized zones of concretions, carbonate nodules, well-cemented zones, and marine shell fragments were encountered in some borings. Concretionary zones are typically lensoidal, discontinuous, and medium strong to strong, whereas cemented zones are typically more laterally continuous, and medium strong to strong. Localized zones of gravels and cobbles were encountered in reaches to the east of Reach 4 within the formation. No boulders were encountered in the borings that penetrated the San Pedro Formation in Reaches 4 and 5.

The thickness of the San Pedro ~~formation~~**Formation** is estimated to be greater than ~~100~~**150** feet. The geologic profile presented in Plate 1 uses the symbol Qsp to indicate the San Pedro Formation.

Figure 3-1: Regional Geologic Map





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## 3.2 Corrosion Potential of Soils

To evaluate the potential for deleterious effects of the on-site soils on structural concrete and steel and on metal piping, chemical testing was performed on selected soil samples. Based on the corrosion test results, the on-site soils are considered to be severely corrosive to ferrous metals, aggressive to copper, and sulfate attack on concrete is considered to be low to moderate. A **2015** corrosion mitigation report prepared by HDR Engineering, Inc. along with the corrosion test results is included in Appendix D of this GDR.

## 3.3 Groundwater

Reaches 4 and 5 of the tunnel alignment lie within the Central Basin hydrogeologic region of the coastal plain of Los Angeles County, which extends from the eastern end of the WPLE alignment to about the western city limits of Beverly Hills. Groundwater in the Central Basin occurs within several aquifers of the Lakewood and San Pedro Formations. The aquifers consist generally of permeable sands and gravels separated by semi-permeable to impermeable sandy clay to clay. The relatively shallow groundwater within the Young and/or Older Alluvium has been reported as semi-perched (California Department of Water Resources, 1961) or perched (Converse Ward Davis Dixon et al., 1981).

Groundwater level depths measured in observation wells, overnight readings measured in borings, and depths measured during drilling of borings in ACE, PE and Adv. PE phase explorations as well as prior borings are presented on Plate 1. ~~Four~~**Several** dual-level groundwater monitoring wells and ~~two~~ gas monitoring wells with screened standpipes were installed along Reaches 4 and 5 during the ACE, PE, and Adv. PE phase explorations as shown below in Table 3-1. This table presents a summary of the well depths, screen intervals, and water level measurements collected at several dates over the course of the explorations.

~~The three wells shown in Table 3-1 to be within Reach 5 are located in the western portion of Reach 5: two are located on the Beverly Hills High School Campus and the third is located about 100 feet east of the Century City Constellation Station.~~

A comparison of the groundwater level measurements in **several of** the shallow and deeper screened intervals suggests that the groundwater encountered in the shallow screened zones is probably perched **or semi-perched** groundwater. ~~The presence of relatively shallow perched groundwater is also suggested by the limited data from the well located in Reach 4 at the -~~

Table 3-1: Groundwater Data in Monitoring Wells

Location	Well ID	Total Well Depth (feet bgs)	Screen Intervals (feet bgs)	Date of Measurement	Depth to Water (feet bgs)
Reach 4	M-17	91	85 to 90	8/18/2009	26.7
				5/18/2011	24.2
				12/7/2014	26.4
Reach 4	M-402	125.5	50 to 55	10/28/2015	21.8
				10/29/2015	20.5
				11/11/2015	20.3
			100 to 105	10/28/2015	22.3
				10/29/2015	26.8
				11/11/2015	26.8
Reach 4	G-405/M-403	116	40 to 45	10/23/2015	43.0
				10/31/2015	43.0
				11/11/2015	42.7
			105 to 110	10/22/2015	31.5
				10/31/2015	30.8
				11/11/2015	30.9
Wilshire/Rodeo Station	E-126A/M-404	130	77 to 87	10/26/2015	57.8
				10/27/2015	56.4
				10/28/2015	56.4
				11/12/2015	56.5
			100 to 105	10/27/2015	56.9
				10/28/2015	56.9
				11/12/2015	56.9
Wilshire/Rodeo Station	G-408/P-306	165	65 to 105	9/29/2015	56.0
				9/30/2015	61.5
				10/31/2015	61.5
				11/7/2015	61.4
Wilshire/Rodeo Station	OB-307	132	40 to 50	9/22/2015	Dry
				9/29/2015	Dry
				11/1/2015	Dry
			80 to 90	9/22/2015	62.1
				9/29/2015	62.6
				9/30/2015	62.8
				11/1/2015	62.5
				11/14/2015	62.6
			118 to 128	9/22/2015	64.2
				9/29/2015	64.1

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Table 3-1: (Continued): Groundwater Data in Monitoring Wells (Continued)

Location	Well ID	Total Well Depth (feet bgs)	Screen Intervals (feet bgs)	Date of Measurement	Depth to Water (feet bgs)
Wilshire/Rodeo Station	OB-307	132	118 to 128	9/30/2015	63.8
				11/1/2015	63.8
				11/14/2015	63.9
Wilshire/Rodeo Station	OB-308	131	61 to 71	9/22/2015	58.8
				9/29/2015	58.3
				11/1/2015	58.0
			88 to 98	9/22/2015	63.3
				9/29/2015	64.3
				11/1/2015	63.1
				11/14/2015	63.2
			108 to 118	9/22/2015	62.4
				9/29/2015	61.1
				11/1/2015	61.1
				11/14/2015	61.2
Wilshire/Rodeo Station	E-126B/M-405	135	42 to 47	10/24/2015	46.9
				10/28/2015	45.8
				10/31/2015	46.9
				11/14/2015	45.8
			85 to 95	10/24/2015	62.8
				10/28/2015	62.7
				10/31/2015	62.6
				11/14/2015	62.7
Wilshire/Rodeo Station	G-11	91.5	27.5 to 32.5	8/21/2009	32.1
				5/26/2011	Dry
				11/12/2015	Dry
			55 to 60	8/21/2009	57.0
				5/26/2011	53.5
				11/12/2015	Dry
Reach 5	G-139	111.5	25 to 50	7/29/2011	36.3
				11/11/2015	38.7
				11/13/2015	31.0
			75 to 80	7/29/2011	42.2
				11/11/2015	44.7
				11/13/2015	44.7

Table 3-1 (Continued): Groundwater Data in Monitoring Wells

Reach 5	G-165	150	15 to 43	4/22/2011	26.0
			55 to 105	4/22/2011	64.5
	G-166	150	20 to 50	4/22/2011	43.0
			60 to 125	4/22/2011	64.5
Reach 5	G-410/ M-406	137	40 to 45	11/23/2015	38.3
			115 to 135	11/17/2015	44.2
				11/23/2015	44.0
Reach 5	G-412/ E-132A/ M-407	100	50-60	4/9/2015	59.8
				5/13/2015	59.8
				5/28/2015	59.9
			80-90	4/9/2015	Dry
				5/13/2015	Dry
				5/28/2015	Dry
bgs = below ground surface					

### 3.4 Geologic/Seismic Hazards

#### 3.4.1 Faults

The numerous faults in Southern California include active, potentially active, and inactive faults. The criteria for these designations were developed by the California Geological Survey (CGS, previously the California Division of Mines and Geology) for the Alquist-Priolo Earthquake Fault Zoning Program (Hart, 1999). By definition, an active fault is one that has had displacement within Holocene time (about the last 11,000 years). A potentially active fault is a fault that has demonstrated displacement within Quaternary time (last 1.6 million years), but not Holocene time. Inactive faults have not demonstrated displacement in the last 1.6 million years. A list of the active faults within approximately 60 miles of Reaches 4 and 5 are presented in Table 3-2 and Table 3-3, respectively. A more detailed description of the active faults listed in Table 3-2 and Table 3-3, along with the potentially active and inactive faults was presented in the GDR for the Century City Constellation Station. The tunnel alignment in Reaches 4 and 5 does not intersect a currently established Alquist-Priolo Earthquake Fault Zone (AP Zone) delineated by the State Geologist for surface fault rupture hazards. However, two faults that may potentially impact the alignment are described in the following section.

#### Newport-Inglewood Fault Zone and Northern Extension of the Newport Inglewood Structural Zone

The CGS shows the Newport-Inglewood Fault zone on the Fault Activity Map of California (Jennings and Bryant, 2010) extending northwest from the Newport Beach offshore area to Beverly Hills. The fault zone is reflected at the surface by a northwest-trending alignment of young anticlinal hills and mesas formed by the folding and faulting of a thick sequence of Pleistocene-age sediments and Tertiary-age sedimentary rocks (Barrows, 1974). However, the geomorphologic expression of the fault zone from Ballona Creek northwest into Beverly Hills is neither well defined, nor well understood.

A north-northwest-trending topographic lineament near the eastern margin of the Cheviot Hills area was identified by Dolan and Sieh (1992) and Dolan et al. (1997; 2000a) as a possible location for the northern extension of the Newport-Inglewood Fault. The lineament is a pronounced topographic boundary between uplifted and highly dissected older sedimentary units to the west and a gently sloping, younger alluvial plain in Beverly Hills to the east. The lineament exhibits a semi-continuous series of east-facing topographic scarps. These scarps have been eroded and modified by the south-flowing drainage emanating from Benedict Canyon. The location of this topographic lineament is approximately 0.2 miles east of the Century City Constellation Station site.

The approximate trace of the Newport-Inglewood Fault from the Ballona Creek area northwest into Beverly Hills (referred to the Northern Extension by Dolan and Sieh, 1992) has been shown at slightly different locations by the CGS (Campbell et al., 2014, Bedrossian et al., 2012, and Jennings and Bryant, 2010) and the U.S. Geological Survey (2006, 2005) indicating some uncertainty in its location. Based on data presented in the USGS/CGS (2006) Quaternary Fault and Fold Database for the United States, the Century City Constellation Station is approximately 0.3 miles west of the Newport-Inglewood Fault. Only scant geotechnical studies have been conducted in the vicinity of the fault traces shown on the above cited geologic maps. Thus, the fault trace locations shown on the maps are approximate possible locations of the Newport-Inglewood Fault. ~~As part of continued geotechnical studies, subsurface exploration is planned where the tunnel alignment in Reach 5 possibly intersects the fault.~~

The CGS (2010) classified the recency of movement on the northern extension of the Newport Inglewood Fault as Holocene in age. The CGS has not currently established an Alquist-Priolo Earthquake Fault Zone (AP Zone) around the northern extension of the Newport Inglewood Fault in the City of Beverly Hills. The northern end of the current AP Zone for the Newport-Inglewood Fault is located south of the Santa Monica (Interstate 10) Freeway.

In 1933, the southern Los Angeles Basin section of the Newport-Inglewood fault zone ruptured to produce the M6.4 Long Beach earthquake (Hauksson and Gross, 1991). Fault-plane solutions for 39 small earthquakes (between 1977 and 1985) show mostly strike-slip faulting with some reverse faulting along the north segment (north of Dominguez Hills) and some normal faulting along the south segment (south of Dominguez Hills to Newport Beach) (Hauksson, 1987). Investigations by Law/Crandall (1993) in the Huntington Beach area indicate that the North Branch segment of the Newport-Inglewood fault zone offsets Holocene-age alluvial deposits in the vicinity of the Santa Ana River.

### Santa Monica Fault

The 25-mile-long Santa Monica fault zone extends westward from the western edge of Beverly Hills across West Los Angeles and Santa Monica to Pacific Palisades where it trends offshore and parallels the Malibu coast to near Point Dume (Dolan and Sieh, 1992; Dolan et al., 1995; 2000a). The fault zone exhibits both reverse and left-lateral components of slip (Dolan and Sieh, 1992; Dolan et al., 1997; 2000a). The fault zone may extend eastward as the Hollywood Fault through a  $\frac{3}{4}$ -mile-wide left-step, or tear fault, which may coincide with the northern extension of the Newport Inglewood fault zone (Dolan and Sieh, 1992; Dolan et al., 1997; 2000a). The Santa Monica fault zone and Hollywood fault zones are part of a much longer system of oblique left-lateral/reverse faults forming the southern boundary of the Transverse Ranges that extend eastward for more than 150 miles through the northern part of the Los Angeles metropolitan region and to the west offshore (Dolan et al., 2000a).

The Santa Monica fault system is related to the Pliocene-Quaternary structural development of the Santa Monica Mountains. Prior to the late Miocene, the Santa Monica Fault was a normal fault that was

reactivated as a reverse fault beginning in the Pliocene (Tsutsumi et al., 2001). In the Century City area, Tsutsumi et al. (2001) interpreted the Santa Monica fault zone to consist of three southern strands and one northern strand with only the northern strand being currently active. Other recent studies (Ziony et al., 1985; Hummon et al., 1992; Dolan and Pratt, 1997; Dolan et al., 2000a) indicate that the northern segment of the Santa Monica fault zone is active and offsets or deforms Holocene sediments.

Dolan et al. (2000a) conducted the most detailed studies of the state of activity of the Santa Monica fault zone in the West Los Angeles area. Their study area was located on the grounds of the Veterans Administration (VA) property just west of the San Diego Freeway, about 1,000 feet south of the proposed Westwood/VA Hospital Station. Trenches revealed a complex zone of faulting that showed evidence for both contractional folding and reverse slip above a north-dipping thrust strand, as well as faulting on dozens of near-vertical, left-lateral strike-slip fault strands that merge downward with the main strand at a depth of 100 to 150 feet (Dolan and Pratt, 1997; Pratt et al., 1998). The total width of this complicated zone of faulting was more than 300 feet.

Radiocarbon dating based on carbon from offset layers indicated definitive evidence for surface rupture on some of these faults between 10,000 and 17,000 years ago, as well as probable evidence for surface rupture on another strike-slip strand between approximately 1,000 and 3,000 years ago (Dolan et al., 2000a). This was cited to be consistent with evidence for slip on the main strand in the most recent earthquake approximately 1,000 to 3,000 years before present (Dolan et al., 2000a).

The location of fault traces within the Santa Monica Fault zone in the Century City area is complex. The Preliminary Geologic Map of the Los Angeles Quadrangle (Campbell et al., 2014) and the Quaternary Fault and Fold Database for the United States (USGS/CGS, 2006) indicate the location of the Santa Monica Fault zone is near Santa Monica Boulevard, about 0.3 miles northwest of the planned Century City Constellation Station.

The location of the Santa Monica Fault zone in the Century City area was investigated as part of the study of tunnel alignment and station locations in Century City and was shown on maps presented in the Century City Area Fault Investigation Report (Metro, 2011). The closest fault trace to the Century City Constellation Station that was identified in the Century City Area Fault Investigation (Metro, 2011) is an east-west trending fault, located approximately 900 feet north of the Century City Constellation Station, and which is probably related to the Santa Monica fault zone. A summary of the main findings of the Century City Area Fault Investigation is presented in Section 6.0 of the Metro Report (2011).

The age of the most recent rupture of the fault trace located approximately 900 feet north of the Century City Constellation Station was undetermined (Metro, 2011). Leighton Consulting (2012) excavated a northerly trending trench on the Beverly Hills High School Campus across an approximate eastward projection of this fault. Leighton (2012) concluded that the fault trace exposed in the northerly trending trench has not ruptured in at least 100,000 years. ~~As part of continued geotechnical studies, subsurface exploration is planned where the tunnel alignment in Reach 5 possibly intersects the fault.~~

### 3.4.2 Fault Rupture

Based on the available geologic data and our prior and current investigations, the northern extension of the Newport-Inglewood Fault and an eastern extension of the Santa Monica Fault possibly crosses the Reach 5 alignment. ~~As part of continued geotechnical studies, subsurface exploration is planned where the tunnel alignment in Reach 5 possibly intersects traces of these faults.~~ Reaches 4 and 5 do not cross a

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currently established Alquist-Priolo Earthquake Fault Zone (AP Zone) delineated by the State Geologist for surface fault rupture hazards.

**Table 3-2: Major Named Faults Considered to be Active in Southern California  
(within 60 miles of Reach 4)**

Fault (in increasing distance)	Maximum Magnitude			Slip Rate (mm/yr.)	Distance From Alignment (miles) <sup>^</sup>	Direction From Site
Compton Thrust	7.6	(a)	BT	0.9	**	**
Newport-Inglewood (Northern Extension)	7.1	(a)	SS	1.0	1.0	WSW
Santa Monica	6.6	(a)	RO	1.0	1.1	W
Hollywood	6.4	(a)	RO	0.9	1.4	NW
Compton Thrust	7.6	(a)	BT	0.6	2.6	NE
Puente Hills Thrust	7.1	(a)	BT	0.9	3.0*	ESE
Anacapa-Dume	7.5	(a)	RO	0.4	5.4	WSW
Upper Elysian Park Thrust	6.4	(a)	BT	1.9	5.6*	ENE
Raymond	6.5	(a)	RO	2.0	7.1	ENE
Northridge Thrust	7.0	(a)	BT	1.5	9.5*	N
Verduqo	6.9	(a)	RO	0.4	9.7	NNE
Palos Verdes Hills	7.3	(a)	SS	3.0	14	WSW
Sierra Madre (San Fernando)	6.7	(a)	RO	2.0	14	NNE
Malibu Coast	6.7	(a)	RO	0.3	15	W
Sierra Madre	7.2	(a)	RO	2.0	15	NE
Santa Susana	6.7	(a)	RO	6.0	17	NNW
San Gabriel	7.2	(a)	SS	0.4	18	NNE
Simi-Santa Rosa	7.0	(a)	RO	0.7	19	NNW
Whittier	6.8	(a)	RO	2.5	19	ESE
Clamshell-Sawpit	6.5	(a)	RO	0.4	21	ENE
Holser	6.5	(a)	RO	0.4	25	NNW
San Jose	6.4	(a)	RO	0.4	28	E
Oak Ridge	7.0	(a)	RO	3.0	30	NNW
San Cayetano	7.0	(a)	RO	6.0	30	NW
San Andreas (Mojave South Section)	7.4	(a)	SS	29.0	36	NE
San Joaquin Thrust	6.6	(a)	BT	0.6	36*	SE
Chino-Central Avenue	6.7	(a)	RO	1.0	39	ESE
Cucamonga	6.9	(a)	RO	1.5	41	E
Elsinore (Glen Ivy Section)	6.8	(a)	SS	5.0	43	ESE
Santa Ynez	7.1	(a)	SS	2.0	45	NNW
San Andreas (SB North Section)	7.5	(a)	SS	19.0	47	N
San Jacinto (SB Section)	6.7	(a)	SS	6.0	52	ENE
<p>(a) Cao et al., 2003; Field et al., 2013, ^Distances from USGS/CGS (2006)  *Distances to blind thrusts are from surface projections; blind thrust faults do not extend to the ground surface and therefore do not have ground surface rupture hazard  ** Site is within surface projection of blind thrust fault; vertical distance from ground surface at site to fault plane at depth is approximately 8 miles  SS-Strike Slip, NO-Normal Oblique, RO-Reverse Oblique, BT-Blind Thrust  N-North, S-South, E-East, W-West, NW-Northwest, NE-Northeast, SE-Southeast, SW- Southwest</p>						

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Table 3-3: Major Named Faults Considered to be Active in Southern California  
(within 60 miles of Reach 5)

Fault (in increasing distance)	Maximum Magnitude			Slip Rate (mm/yr.)	Distance From Site (miles)	Direction From Site
Newport-Inglewood (Northern Extension)	7.1	(a)	SS	1.0	0.0	na
Compton Thrust	7.6	(a)	BT	0.9	**	**
Santa Monica	6.6	(a)	RO	1.0	0.3	NW
Hollywood	6.4	(a)	RO	0.9	1.3	NW
Puente Hills Thrust	7.1	(a)	BT	0.9	4.3*	ESE
Anacapa-Dume	7.5	(a)	RO	0.4	4.3	WSW
Upper Elysian Park Thrust	6.4	(a)	BT	1.9	6.7*	ENE
Raymond	6.5	(a)	RO	2.0	8.3	ENE
Northridge Thrust	7.0	(a)	BT	1.5	9.4*	N
Verdugo	6.9	(a)	RO	0.4	10	NNE
Palos Verdes Hills	7.3	(a)	SS	3.0	12	WSW
Malibu Coast	6.7	(a)	RO	0.3	14	W
Sierra Madre	7.2	(a)	RO	2.0	15	NE
Sierra Madre (San Fernando)	6.7	(a)	RO	2.0	15	NNE
Santa Susana	6.7	(a)	RO	6.0	17	NNW
San Gabriel	7.2	(a)	SS	0.4	18	NNE
Simi-Santa Rosa	7.0	(a)	RO	0.7	19	NNW
Whittier	6.8	(a)	RO	2.5	20	ESE
Clamshell-Sawpit	6.5	(a)	RO	0.4	22	ENE
Holser	6.5	(a)	RO	0.4	25	NNW
San Jose	6.4	(a)	RO	0.4	30	E
Oak Ridge	7.0	(a)	RO	3.0	30	NNW
San Cayetano	7.0	(a)	RO	6.0	30	NW
San Andreas (Mojave South Section)	7.4	(a)	SS	29.0	36	NE
San Joaquin Thrust	6.6	(a)	BT	0.6	37**	SE
Chino-Central Avenue	6.7	(a)	RO	1.0	40	ESE
Cucamonga	6.9	(a)	RO	1.5	42	E
Elsinore (Glen Ivy Section)	6.8	(a)	SS	5.0	44	ESE
Santa Ynez	7.1	(a)	SS	2.0	44	NNW
San Andreas (SB North Section)	7.5	(a)	SS	19.0	47	N
San Jacinto (SB Section)	6.7	(a)	SS	6.0	53	ENE
(a) Cao et al., 2003; Field et al (2013), Distances from USGS/CGS (2006) *Distances to blind thrusts are from surface projections; blind thrust faults do not extend to the ground surface and therefore do not have ground surface rupture hazard. ** Site is within surface projection of blind thrust fault; vertical distance from ground surface at site to fault plane at depth is approximately 8 miles SS-Strike Slip, NO-Normal Oblique, RO-Reverse Oblique, BT-Blind Thrust N-North, S-South, E-East, W-West, NW-Northwest, NE-Northeast, SE-Southeast, SW- Southwest SS-Strike Slip, NO-Normal Oblique, RO-Reverse Oblique, BT-Blind Thrust; na – not applicable						

### 3.4.3 Historic Earthquakes and Seismicity

A partial list of historic earthquakes, including the magnitude of the earthquake and the distance of the epicenter, is included in Table 3-4. Note that historic earthquakes with magnitudes greater than 5.5 only

are shown in the table. The list of the historic earthquakes is limited to the known earthquakes within 60 miles of the Reach 4 and 5 tunnel alignment.

**Table 3-4: List of Historic Earthquakes with Magnitude greater than 5.5  
(Within last 150 years and within 60 miles of Reaches 4 and 5)**

Earthquakes (Oldest to Youngest)	Date of Earthquake	Magnitude	Closest Distance to Epicenter (Miles)	Direction to Epicenter
Long Beach	March 11, 1933	6.4	39	SE
San Fernando	February 9, 1971	6.6	24	NNW
Whittier Narrows	October 1, 1987	5.9	16	E
Sierra Madre	June 28, 1991	5.8	25	NE
Northridge	January 17, 1994	6.7	14	NW

Note: SE-Southeast, NNW-North Northwest, E-East, NE-Northeast, NW-Northwest

Although the alignment may be subjected to strong ground shaking in the event of an earthquake, this hazard is common in southern California and the effects of ground shaking can be mitigated by proper engineering design and construction in conformance with current design criteria and construction practices.

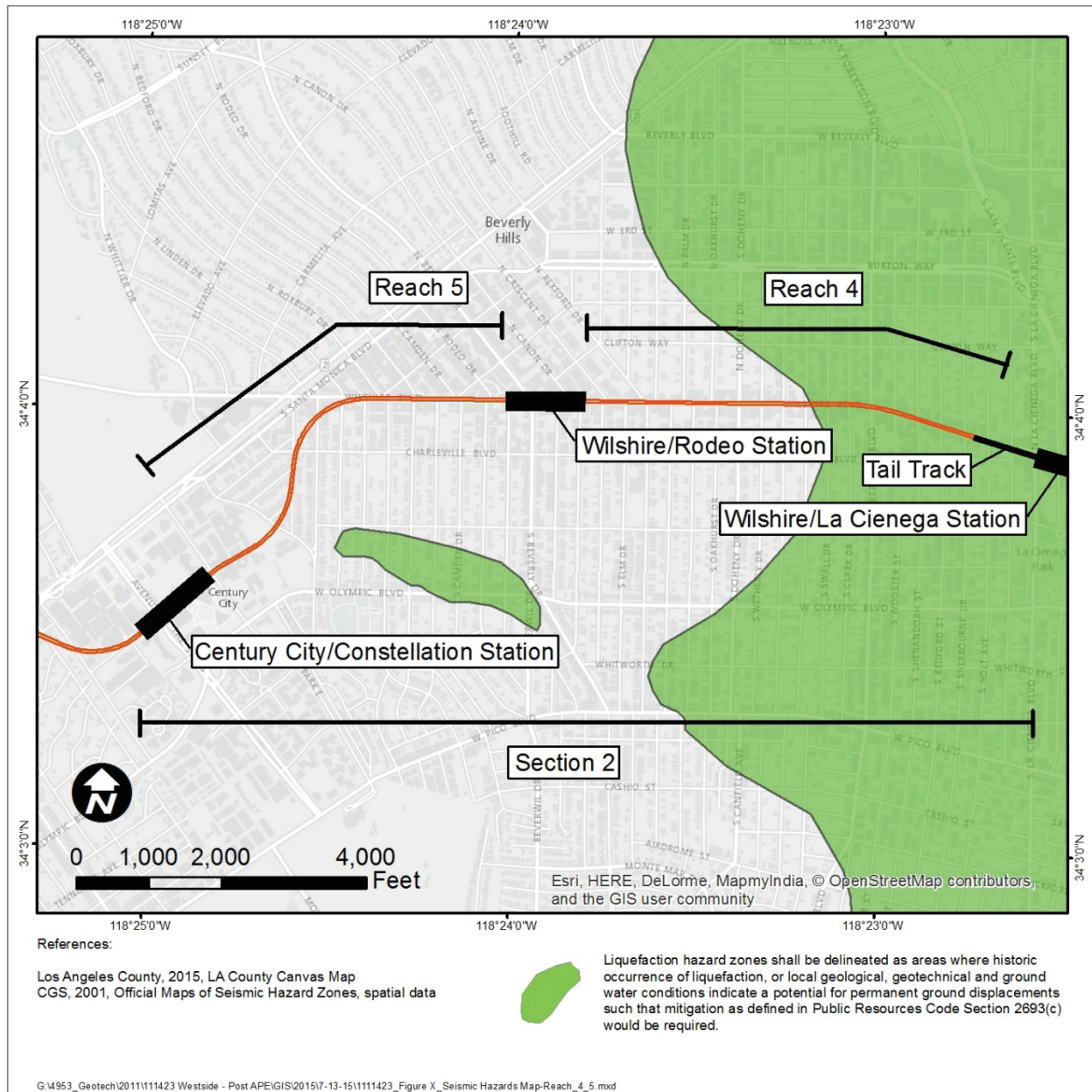
#### 3.4.4 Liquefaction

According to the California Geological Survey (CDMG, 1998) and the City of Beverly Hills General Plan Update Technical Background Report (2005), the eastern 4,000-foot (3/4 mile) portion of the tunnel alignment in Reach 4 is located within an area identified as having a potential for liquefaction due to the presence of young alluvial sediments and shallow historic groundwater levels.

**Figure 3-2** shows the site location relative to the state-designated potential liquefaction hazard zone. However, the geologic units anticipated at the tunnel depths are the lower portion of the older alluvial deposits and the mid-Pleistocene-age San Pedro Formation, which are relatively dense and stiff and are not susceptible to liquefaction. Therefore, the potential for liquefaction at tunnel depths along the tunnel alignments in Reaches 4 and 5 are considered to be low.



Figure 3-2: Liquefaction Hazard Map



### 3.4.5 Tsunamis, Inundation, Seiches, and Flooding

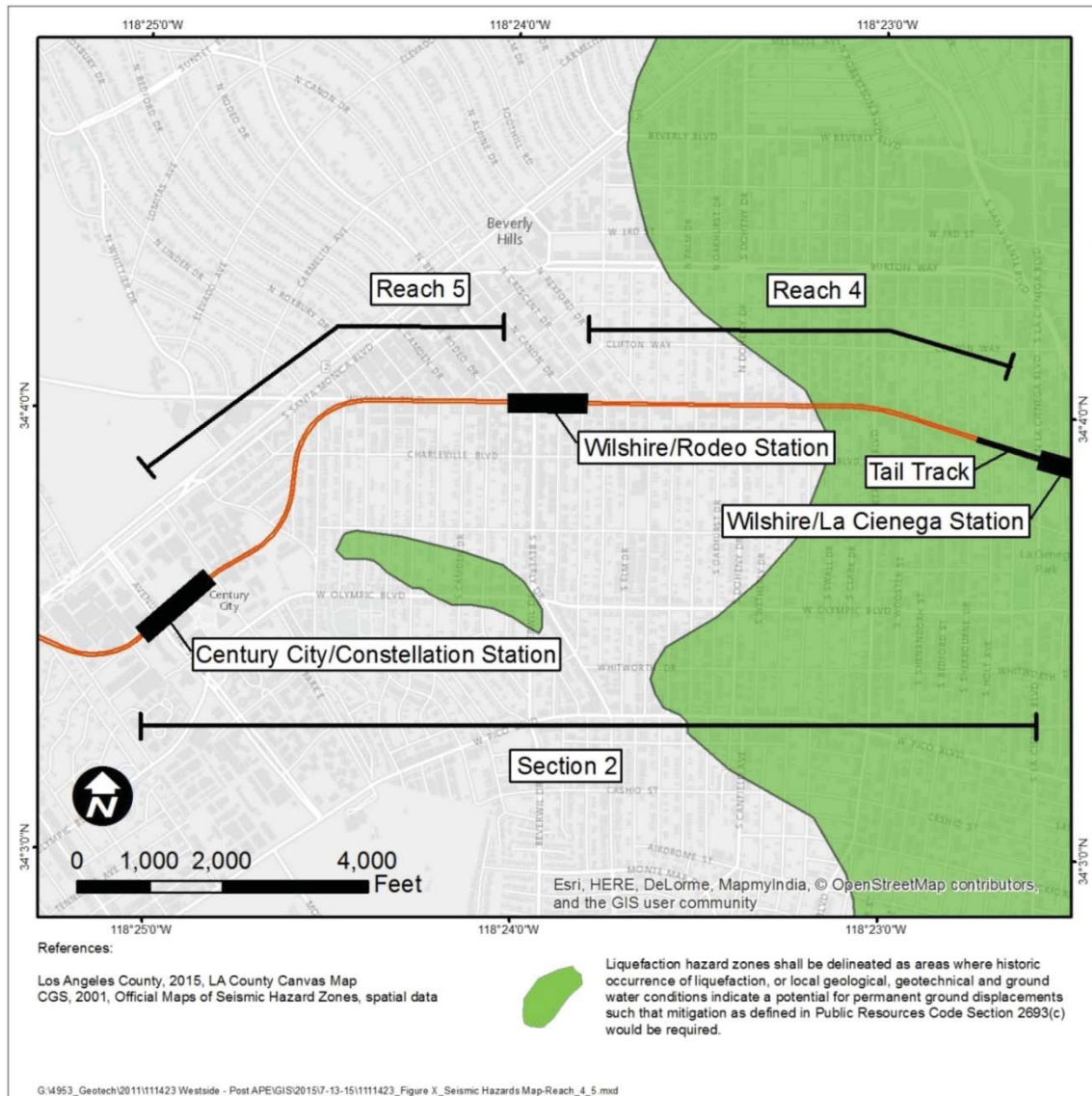
Reaches 4 and 5 are not located in a coastal area. The elevations along the alignment range from approximately 140 to 290 feet above mean sea level. Therefore, tsunamis (seismic sea waves) are not considered a significant hazard at the site.

Reaches 4 and 5 are located downstream of both the Hollywood and the Lower Franklin Canyon Reservoirs. According to the Safety Element of Los Angeles County Draft Version General Plan (2014), Los Angeles County Technical Appendix to the Safety Element of the General Plan (1990), and the City of Beverly Hills General Plan Update Technical Background Report (2005), Reaches 4 and 5 are located within a potential inundation area by an earthquake-induced dam failures or seiches (wave oscillations

in an enclosed or semi-enclosed body of water) due to the location relative to the Hollywood and the Lower Franklin Canyon Reservoirs. As stated in reports by the California Geological Survey, catastrophic failure of a major dam as a result of a scenario earthquake is regarded as unlikely. Current design and construction practices and ongoing programs of review, modification, or total reconstruction of existing dams are intended to ensure that all dams are capable of withstanding the maximum credible earthquake (MCE) for the site. Therefore, the potential for inundation along the alignment as a result of an earthquake-induced dam failure is considered low.

According to the California Department of Public Works (FEMA map, 2008) the site is not located within 100-year and 500-year flood plains. However, the City of Beverly Hills General Plan Update Technical Background Report (2005) indicates that the area along Wilshire Boulevard from Stanley Avenue to the eastern city boundary is a “flood area”. Since the completion of the upgrade to the Holly Hills Unit 7 Drainage system, the continued susceptibility of this area to flooding is being reassessed (City of Beverly Hills, 2005).

Figure 3-2: Liquefaction Hazard Map



### 3.4.6 Gases, Oil Wells, and Subsidence

The tunnel alignments in Reach 4 and in the eastern portion of Reach 5 are underlain at depth by the southern portion of the San Vicente Oil Field according to Map Sheet 117 of the State of California Department of Conservation, Division of Oil and Gas Geothermal Resources (DOGGR, 2006). This map sheet indicates that the western portion of Reach 5 is underlain at depth by the Beverly Hills Oil Field.

The nearest oil wells to the alignment are in Reach 5, as shown on the DOGGR Online Mapping System (DOMS, 2015). Chevron U.S.A. Inc. Well No. Rodeo 107 is the nearest mapped oil well to the Reach 5 alignment and is shown approximately 75 feet southeast of the alignment at the City boundary between Beverly Hills and Los Angeles, just west of Beverly Hills High School, per the DOMS. The next nearest well to the Reach 5 alignment shown on the DOMS is Chevron U.S.A. Inc. Wolfskill Well No. 23, located approximately 150 feet northwest of the intersection of Constellation Boulevard and Century Park East.

It is noted, however, that the locations of oil wells shown on DOGGR maps are approximate and could vary by up to 200 feet. Additional details pertaining to oil wells are presented in Section 4.3.

Based on the oil field locations beneath Reaches 4 and 5, there is the potential of encountering methane. Therefore, subsurface gas investigations were performed as part of the overall geotechnical and environment study for the WPLE project. The results of the investigations that are applicable for Reaches 4 and 5 are presented in Section 4.2. ~~Additional subsurface gas explorations are planned in the Adv. PE phase investigation.~~

Regional ground subsidence of relatively minor magnitude has been reported in the areas of the Beverly Hills, Salt Lake, and San Vicente Oil Fields (U.S. Geological Survey, 2003, Hill et al., 1979, Erickson, 1976). The subsidence may be due to on-going tectonic processes in combination with petroleum and groundwater extraction (Erickson, 1976). Oil, natural gas, and groundwater have been extracted from the West Beverly Hills Oil Field for greater than 100 years. Oil production is active in the western portion of the field at Beverly Hills High School and in the eastern portion of the field at well sites adjacent to Pico Boulevard.

Surveys performed by the City of Los Angeles Bureau of Engineering (LABOE) in the Beverly Hills to Hollywood area indicate elevation changes for the period between 1955 and 1970 of approximately 0.20 to 0.30 feet in the area of Reaches 4 and 5, as shown in an elevation change contour map (Hill et al., 1979). The differential subsidence in the area of Reaches 4 and 5 (for the 15 year period) based on interpolation of elevation contour data was approximately 0.05 feet vertical elevation change over a horizontal distance of 1,000 feet. More recent data collected between 1993 and 1998 by Satellite Interferometric Synthetic Aperture (InSAR) methods indicates subsidence of up to a maximum of 2.2 inches in the Beverly Hills Oil Field in the five year monitoring period (U.S. Geological Survey, 2003).



## 4.0 FIELD EXPLORATIONS

Tunnel Reaches 4 and 5 alignment was explored with geotechnical and environmental explorations as part of the overall investigation for the WPLE project during the ACE, PE, and Adv. PE phases. A more detailed description of the methodology for the field explorations is presented in Appendix A of the GDR for Century City Constellation Station.

### 4.1 Geotechnical Explorations

Geotechnical explorations along Reaches 4 and 5 alignment consisted of ~~25~~**28** rotary wash borings, ~~15~~ hollow-stem auger boring, 3 sonic core borings, **8 continuous core borings**, 9 cone penetration test soundings with seismic measurements at ~~1 location~~**3 locations**, in-situ pressuremeter tests at ~~3~~**in 5** borings and installation of groundwater monitoring wells at **48** locations.

The geotechnical explorations and depths explored in these boreholes are presented on Plate 1. In addition, relevant explorations from prior investigations that are located along the reaches are also shown on Plate 1. The logs of ~~rotary wash borings and sonic core borings~~ are presented in Appendix A and the logs of CPTs are presented in Appendix C. **For continuous core borings, field logs are presented at this time; the laboratory review of the cores is currently being performed as part of on-going geologic evaluations for Reach 5.** The groundwater monitoring well construction diagrams are presented in Appendix B. It is noted that the stationing shown on the boring logs reflects the tunnel alignment and stationing considered at the time of investigation (ACE, PE or Adv. PE phase) and may differ from the current alignment and stationing shown on Plate 1.

#### 4.1.1 Field Testing

##### 4.1.1.1 Pressuremeter Testing

Pressuremeter tests were performed in the borings drilled along the tunnel alignment in Reaches 4 and 5 during the PE phase to determine the Menard modulus ( $[E_m]$ , Briaud, 2005) and at-rest lateral earth pressure coefficient ( $K_o$ ) of the subsurface soil. Pressuremeter tests in Reaches 4 and 5 alignment were performed in ~~three~~**five** borings at depths ranging from 54 to ~~84~~**133** feet bgs; in addition, pressuremeter tests were performed in ~~four~~**five** borings drilled at the proposed Wilshire/La Cienega Station, Wilshire/Rodeo Station and Century City Constellation Station which are considered applicable for Reaches 4 and 5. A more detailed description of the pressuremeter test procedure is presented in Appendix A of the GDR for Century City Constellation Station.

An average total unit weight of 120 pounds per cubic foot (pcf) for soil was used in estimating the Menard Modulus ( $E_m$ ), unloading modulus ( $E_u$ ) and horizontal stress coefficient (also referred to as at-rest earth pressure coefficient,  $K_o$ ). The results of the pressuremeter tests are presented in Table 4-1. The pressuremeter test reports are presented in Appendix G.

Table 4-1: Pressuremeter Test Results

Boring No.	Test Depth (ft.)	ASTM Soil Classification	Geologic Formation	At-Rest Lateral Earth Pressure Coefficient, $K_0$	Menard Modulus, $E_m$ (ksf)	Unload Modulus, $E_u$ (ksf)
G-131*	33	Lean Clay (CL)	San Pedro (Qsp)	0.62	225	-
	43	Sandy Silt (ML)	San Pedro (Qsp)	0.79	270	-
G-144**	23	Fat Clay (CH)	Older Alluvium (Qalo)	0.68	410	1,100
	53	Lean Clay with Sand (CL)	Older Alluvium (Qalo)	0.45	360	-
	63	Lean Clay with Sand (CL)	Older Alluvium (Qalo)	0.57	810	-
G-150	54	Lean Clay with Sand (CL)	Older Alluvium (Qalo)	0.51	290	-
	64	Clayey Sand (SC)	Older Alluvium (Qalo)	0.72	1,085	-
	85	Fat Clay (CH)	Older Alluvium (Qalo)	0.36	580	-
G-162	74.5	Clayey Sand with Gravel (SC)	Older Alluvium (Qalo)	0.55	720	2,405
	84.5	Lean Clay with Sand (CL)	Older Alluvium (Qalo)	0.56	1,475	6,520
G-166	72	Elastic Silt (MH)	Lakewood (Qlw)	0.54	895	2,190
G-408**	13	Lean Clay with Sand (CL)	Older Alluvium (Qalo)	0.66	160	435
	28	Sandy Lean Clay (CL)	Older Alluvium (Qalo)	0.69	320	1,315
	48	Clayey Sand (SC)	Older Alluvium (Qalo)	0.49	600	2,510
	70	Silty Clay (CL-ML)	Older Alluvium (Qalo)	0.57	780	2,345
G-409	93	Silty Sand with Gravel (SM)	Older Alluvium (Qalo)	0.52	740	765
	103	Sandy Lean Clay (CL)	Older Alluvium (Qalo)	0.33	740	1,350
	123	Sandy Lean Clay (CL)	Older Alluvium (Qalo)	0.33	1,160	3,485
	133	Clayey Sand/Silty Sand (SC-SM)	Older Alluvium (Qalo)	0.38	2,050	8,340
G-411	82	Clayey Sand (SC)	Older Alluvium (Qalo)	0.44	1,125	1,340
	105	Poorly Graded Sand with Silt (SP-SM)	Lakewood Formation (Qlw)	0.50	3,015	2,460
G-413***	27.5	Sandy Lean Clay (CL)	Older Alluvium (Qalo)	0.59	380	755
	47.5	Silty Sand (SM)	Older Alluvium (Qalo)	0.91	820	-
	67.5	Silty Sand (SM)/Sandy Sit (ML)	Older Alluvium (Qalo)	0.69	1,045	-
	83	Silty Sand with Gravel (SM)	San Pedro (Qsp)	0.71	1,610	-
G-415***	23	Silty/Clayey Sand (SC-SM)	Artificial Fill (Af)	-	205	-
	43	Sandy Lean Clay (CL)	Older Alluvium (Qalo)	-	125	245
	63	Sandy Lean Clay (CL)	Older Alluvium (Qalo)	0.63	450	1,485
	78	Silty Sand (SM)	San Pedro (Qsp)	0.66	1,250	2,035

\* Borings outside Reach 4, but located at nearby Wilshire/La Cienega Station

\*\* Borings outside Reaches 4 and 5, but located at nearby Wilshire/Rodeo Station

\*\*\* Borings outside Reach 5, but located at nearby Century City Constellation Station

"- "indicates either a  $K_0$  value could not be reliably estimated from the test data or an unload-reload cycle was not performed during the test

## 4.2 Subsurface Gas Explorations

As stated earlier, the tunnel alignment in Reach 4 and the eastern portion of Reach 5 are underlain at depth by the southern portion of the San Vicente Oil Field according to Map Sheet 117 (DOGGR, 2006). This map sheet indicates that the western portion of Reach 5 is underlain at depth by the Beverly Hills Oil Field. Methane can be expected along the tunnel alignment in Reaches 4 and 5 but gas concentrations in this area may not be as high as the Fairfax District and the Century City area. Therefore, subsurface gas investigation in the ACE and PE phases was focused on those areas and

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~~subsurface gas wells were not installed along Reaches 4 and 5. It is planned to install five gas monitoring wells in the Adv. PE phase.~~

**Subsurface gas investigation along Reaches 4 and 5 consisted of installation of eight gas monitoring wells in the ACE, PE and Adv. PE phases.** The gas wells will consist of vapor probes and standpipes at multiple depths to evaluate concentrations of methane and hydrogen sulfide and gas pressures at various depths. **In addition, two groundwater monitoring wells (G-165 and G-166A/B) were installed within the Beverly Hills High School campus, but at the current time, these wells were not accessible for monitoring of gases and groundwater depths.**

~~At this time, subsurface gas data is available from two wells (M-17 and G-412/M-407/E-132A). Monitoring well M-17 is located at the Wilshire/La Cienega station in Section 1; Monitoring well G-412/M-407/E-132A is located near the Century City Constellation station at the western terminus of Reach 5.~~

Each of the monitoring wells typically consisted of two to four nested soil gas probes and/or one or two PVC standpipes installed in a boring. The PVC standpipes were one to two inches in diameter. The probes and standpipes were installed at depths ranging from 15 to ~~90~~**135** feet bgs. This configuration provided a means of measuring soil gas concentrations and pressures within the vadose zone, as well as concentrations of gases dissolved in groundwater at greater depths. The standpipes allowed relatively large quantities of groundwater to be purged prior to sample collection, as well as collection of large-volume water samples for analysis.

The following types of sampling and monitoring were conducted in the wells:

- Gas concentrations were measured in the field within the standpipes and gas probes using hand-held detectors (Landtec GEM 2000+ and RKI Eagle II Gas monitors). The gas pressure in the probe or standpipe was also measured along with the barometric pressure.
- Confirmatory gas samples were collected in Tedlar bags (bags constructed of clear Tedlar® film) for analysis at a State-certified laboratory.
- The groundwater levels in the standpipes were measured.
- **Groundwater samples were collected for analysis of dissolved gases, hydrocarbons, metals, VOCs and SVOCs (results reported in Table 3-7 of the EDR).**
- **Large volume (on the order of 4 to 5 liters) groundwater samples were collected in Tedlar bags for extraction and analysis of the dissolved gases.**

The depths at which the vapor probes and standpipes were installed in the ACE, PE and Adv. PE phase wells along the Reaches 4 and 5 alignment and details of the monitoring phase are presented in Table 4-2 below. The number of monitoring events and the year of monitoring phase is also listed in the table.

Table 4-2: Details of Vapor Probes/Standpipes in ACE and Adv. PE Phase Wells

Boring/ Monitoring Well No.	Vapor Probe Depth (ft. bgs)	Standpipe Screen Intervals (ft. bgs)	Measurement/Sampling Year (number of monitoring events)	Monitoring Phase
M-17	15, 25, 65, 90	85-90	2009 (1 event), 2011 (1 event), 2012 (2 events), 2014 (1 event)	ACE, PE, Adv. PE
M-402	23, 72, 89	50-55, 100-105	2015 (2 events)	Adv. PE
G-405/M-403	38, 90, 100	40-45, 105-110	2015 (2 events)	Adv. PE
G-407	38, 50, 75	-	2015 (2 events)	Adv. PE
G-139	-	25-50, 75-80	2015 (1 event)	Adv. PE
E-126A/M-404	30, 40, 50	77-87, 100-105	2015 (1 event)	Adv. PE
G-410/M-406	20, 77, 103	40-45, 115-135	2015 (1 event)	Adv. PE
G-412/M-407/E-132A	65, 70, 75	50-60, 80-90	2015 (3 events)	Adv. PE

~~Five sets of readings (1 event each~~ Notes:

"-" indicates geotechnical borings in ~~2009-2010~~ which either gas probes or standpipes were not installed

Groundwater wells G-165 and ~~2011~~, G-166A/B are within Beverly Hills High School campus limits and ~~2 event~~ were not accessible for monitoring

~~The gas measurement in 2012, and 1 event in 2015) were collected in prior ACE phase well M-17, and~~  
~~are presented in Table 4-3. The 2015 gas measurements in PE and Adv. PE phase well G-412/M-407/E-~~  
~~132A wells are presented in Table 4-4. Also presented in the tables are the test results of laboratory~~  
~~analysis of gas samples. A bar graph of the gas measurements in a profile view are shown on Plate 3. The~~  
~~bar chart values shown on Plate 3 represents the maximum values of the field and laboratory data~~  
~~recorded at any given depth for each well.~~

The boring logs and well construction diagrams of the gas wells are presented in Appendices A and B, respectively. A detailed description of the well installation and sampling procedures of monitoring wells, and field and laboratory analysis of the samples are discussed in Appendix A of the GDR for Century City Constellation Station.



Table 4-3: Field and Lab Gas Data in ACE Phase Well-M-17

Well No.	Location	Sample Probe/Well Depth (ft)	Probe Color	Depth to Water (ft) <sup>1</sup>	Sampling Date	Probe Pressure (inches of H <sub>2</sub> O) <sup>2</sup>	Methane (CH <sub>4</sub> ) (%) <sup>3</sup>	Methane (CH <sub>4</sub> ) (%) <sup>3</sup>	Hydrogen Sulfide (H <sub>2</sub> S) (ppm) <sup>4</sup>	Hydrogen Sulfide (H <sub>2</sub> S) (ppm) <sup>4</sup>	Notes
							Field	Laboratory	Field	Laboratory	
Data collected in 2009											
M-17	Wilshire Blvd. between South Stanley Dr. and South Ledoux Dr.	15	G		8/18/09 to 8/20/09	0.0	ND	0.041	ND	NA	Above water
		25	R			0.0	ND	NA	ND	NA	In water
		65	B			0.2	ND	NA	ND	NA	In water
		90	Y			0.2	ND	NA	ND	NA	In water
		85 to 90	Standpipe	26.7		na	na	na	na	na	
Data collected in 2011											
M-17	Wilshire Blvd. between South Stanley Dr. and South Ledoux Dr.	15	G		5/18/2011	0.0	<u>5.8</u>	NA	0.000	NA	Above water
		25	R			0.0	0.0	NA	0.000	NA	In water
		65	B			0.0	0.0	NA	0.000	NA	In water
		90	Y			<u>1.6</u>	0.0	NA	0.000	NA	In water
		85 to 90	Standpipe	24.2		na	na	na	na	na	In water
Data collected in 2012											
M-17	Wilshire Blvd. between South Stanley Dr. and South Ledoux Dr.	15	G		3/30/2012 and 5/23/2012	0.0/0.0	<u>6.30/3.50</u>	0.254/0.195	<u>4.0/4.0</u>	ND / ND	
		25	R			0.0/0.0	0.0/0.0	NA / NA	0.0/0.0	NA / NA	
		65	B			0.0/NA	0.0/NA	NA / NA	0.0/NA	NA / NA	
		90	Y			0.0/0.0	0.0/0.0	NA / NA	0.0/0.0	NA / NA	
		85 to 90	Standpipe	24.2		0.0/ <u>0.6</u>	0.0/0.0	NA / NA	0.0/0.0	NA / NA	
Data collected in 2014											
M-17	Wilshire Blvd. between South Stanley Dr. and South Ledoux Dr.	15	G		12/7/2014	0.0	<u>4.4/5.2</u>	0.054	ND	0.55	
		25	R			0.0	0.5	NA	ND	NA	
		65	B			0.0	0.4	NA	ND	NA	
		90	Y			0.07	0.4	NA	ND	NA	
		85 to 90	Standpipe	26.4		na	na	na	na	na	No correct quick connect valve not provided
Explanations:											
M-17 was installed by Amec Foster Wheeler's predecessor company MACTEC in 2009; M-17 was located in November 2015, however, well cover was missing and the well was filled with asphalt possibly from pavement overlays											
Probe Tube Color: G – green; R – red; B – blue; Y – yellow											
" H <sub>2</sub> O – Water pressure in probe; CH <sub>4</sub> – Methane; H <sub>2</sub> S – Hydrogen Sulfide; ppm – parts per million											
<sup>1</sup> Depth to water measured in 1" or 2" PVC pipe screened at indicated depth.											
<sup>2</sup> Probe pressure readings > 0.5 inch of water underlined and italicized											
<sup>3</sup> CH <sub>4</sub> readings >1.25% (25% LEL) underlined and italicized											
<sup>4</sup> H <sub>2</sub> S readings >5ppm underlined and italicized											
"xx/yy" indicates two readings taken—first on 3/30/12 and second on 5/23/12 (or) on the same day if only one date noted											
ND = Not detected (below lab equipment reporting limit)											
NA = Not analyzed or measured											
na = not applicable (quick connects necessary to obtain gas readings were not installed in standpipes in Well M-17 prior to 2012)											



Table 4-4: Field and Lab Gas Data in Adv. PE Phase Well M-407 Wells

Well No.	Location	Well Dia (in)	Bottom of Well (ft)	Screen Depth (ft)	Probe Color	Sample Probe (ft)	Sampling Date	Depth to Water (ft) <sup>1</sup>	Probe Pressure (inches water) <sup>2</sup>	Barometric Pressure (inches Hg)	Gas Concentrations								Notes
											CH <sub>4</sub> (%) <sup>3</sup>		H <sub>2</sub> S (ppm) <sup>4</sup>		CO <sub>2</sub> (%)		O <sub>2</sub> (%)		
											Field	Lab	Field	Lab	Field	Lab	Field	Lab	
M-402	Wilshire Blvd. & East of S. Willaman Dr.				G	23	10/29/2015		No flow	No flow	NA	NA	NA	NA	NA	NA	NA	NA	No flow, no sample
							11/11/2015		-1.0	30.06	0.1	NA	NA	NA	6.7	NA	8.3	NA	Flow stopped after ~5 mins; no sample possible
					R	72	10/29/2015		No flow	No flow	NA	NA	NA	NA	NA	NA	NA	NA	No flow, no sample
							11/11/2015		0.1	30.06	0.0	NA	NA	NA	3.6	NA	15.1	NA	Flow stopped after ~5 mins; no sample possible
					B	89	10/29/2015		No flow	No flow	NA	NA	NA	NA	NA	NA	NA	NA	No flow, no sample
							11/11/2015		-0.4	30.06	0.0	NA	NA	NA	2.7	NA	18.9	NA	Flow stopped after ~5 mins; no sample possible
		2	55	50-55		Standpipe	10/29/2015	20.5	<u>2.6</u>	29.6	0.0	ND	0.0	ND	0.0	0.087	19.7	22.0	-
							11/11/2015	20.3	-0.8	30.06	0.0	ND	0.0	ND	0.0	0.054	20.6	22	
		2	105	100-105		Standpipe	10/29/2015	26.8	<u>2.2</u>	29.6	0.0	ND	0.0	ND	0.0	0.047	20.7	22.0	
							11/11/2015	26.8	-1.2	30.06	0.0	ND	0.0	ND	0.0	0.054	20.9	22	
G-405/ M-403	Wilshire Blvd. & West of S. La Peer Dr.				G	38	10/23/2015		-3.5	29.75	0.1	ND	1.0	ND	0.7	0.97	16.1	21.0	
							11/11/2015		0.1	29.93	0.0	ND	0.0	ND	2.7	2.7	16.5	17	
					R	90	10/23/2015		-12	29.75	0.0	NA	1.0	NA	0.1	NA	19.9	NA	
							11/11/2015		-0.1	29.93	0.1	NA	0.0	NA	0.8	NA	19.7	NA	
					B	100	10/23/2015		-0.9	29.75	0.0	NA	2.0	NA	0.2	NA	13.6	NA	
							11/11/2015		-0.2	29.93	0.1	NA	0.0	NA	0.8	NA	17.8	NA	
		2	45	40-45		Standpipe	10/28/2015	43	0.0	29.75	0.0	0.0023	2.0	ND	0.0	0.56	20.3	20.0	
							11/11/2015	42.7	0.1	29.98	0.0	ND	0.0	ND	0.2	0.34	19.8	21	
		2	110	105-110		Standpipe	10/28/2015	30.8	0.05	29.75	0.0	ND	1.0	ND	0.0	0.060	20.4	22.0	
							11/11/2015	30.9	-1.0	29.98	0.0	ND	0.0	ND	0.0	0.066	20.8	22	
E-126A /M-404	Wilshire Blvd. & East of Cannon Dr.				G	30	10/27/2015		0	29.73	0	0.001	0	ND	2.9	2.9	17.4	19	
							10/28/2015		NA	NA	NA	ND	NA	ND	NA	3.0	NA	19	Field readings collected on the previous day
							11/12/2015		0.05	29.75	0.0	ND	0.0	ND	2.7	2.9	16.3	18	
					R	40	10/27/2015		0	29.69	0	ND	0	ND	1.7	1.8	16.6	18	
							10/28/2015		NA	NA	NA	ND	NA	ND	NA	1.8	NA	18	Field readings collected on the previous day
							11/12/2015		0.1	29.75	0.0	ND	0	ND	2.2	2.3	15.9	18	
					B	50	10/27/2015		0	29.69	0	ND	0	ND	1.6	1.6	16.6	18	
							10/28/2015		NA	NA	NA	ND	NA	ND	NA	1.8	NA	18	Field readings collected on the previous day
							11/12/2015		0.1	29.75	0.1	ND	0	ND	1.9	2.1	16.0	18	
		2	87	87		Standpipe	10/27/2015	56.4	0	29.67	0	ND	0	ND	0.4	0.49	19.6	20	
							10/28/2015	56.4	0.0	29.67	0.0	ND	0	ND	0.0	0.068	20.8	22	
							11/12/2015	56.5	0.12	29.75	0.0	ND	0.0	ND	0.6	0.78	19.0	20	
		2	105	105		Standpipe	10/27/2015	56.9	-0.8	29.67	0	ND	0	ND	0	0.063	20.7	22	
10/28/2015	56.9						0.0	29.67	0.0	ND	0	ND	0.0	0.065	20.8	22			
11/10/2015	56.9						0.18	29.75	0.0	ND	0.0	ND	0.0	0.065	19.4	22			
G-407	Wilshire Blvd. & West of Rexford Dr.				G	38	10/29/2015		0.05	29.47	0.0	ND	0.0	ND	0.6	0.27	13.4	20	
							11/11/2015		0.06	29.86	0.0	ND	0.0	ND	0.8	0.92	13.3	14	
					R	50	10/29/2015		No flow	No flow	NA	NA	NA	NA	NA	NA	NA	NA	No flow
					B	75	10/29/2015		No flow	No flow	NA	NA	NA	NA	NA	NA	NA	NA	No flow
G-139	Wilshire Blvd. & West of S. Almont Dr.		50	25-50		Standpipe	11/11/2015	44.7	0	29.94	0.0	ND	0.0	ND	3.0	2.9	1	19	

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			80	75-80		Standpipe	11/11/2015	38.7	0	29.94	0.0	ND	0.0	ND	0.1	0.11	20.8	22	
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Table 4-4 (Continued): Field and Lab Gas Data in Adv. PE Phase Wells

Well No.	Location	Well Dia (in)	Bottom of Well (ft)	Screen Depth (ft)	Probe Color	Sample Probe (ft)	Sampling Date	Depth to Water (ft) <sup>1</sup>	Probe Pressure (inches water) <sup>2</sup>	Barometric Pressure (inches Hg)	Gas Concentrations								Notes
											CH <sub>4</sub> (%) <sup>3</sup>		H <sub>2</sub> S (ppm) <sup>4</sup>		CO <sub>2</sub> (%)		O <sub>2</sub> (%)		
											Field	Lab	Field	Lab	Field	Lab	Field	Lab	
G-410/ M-406	S. Spalding Dr. & S. of Wilshire Blvd.					20	11/23/2015		<u>0.72</u>	29.59	0.0	0.0033	0.0	ND	0.9	0.99	10.8	12.0	
						77	11/23/2015		0.16	29.59	0.0	NA	0.0	NA	0.5	NA	19.7	NA	
						103	11/23/2015		0.04	29.59	0.0	NA	0.0	NA	0.0	NA	20.5	NA	
		2	45	40-45		Standpipe	11/23/2015	38.3	0.02	29.59	0.0	ND	0.0	ND	0.2	0.051	20.7	22.0	
		2	135	115-135		Standpipe	11/23/2015	44	-1.8	29.59	0.0	ND	0.0	ND	0.2	0.044	20.8	22.0	
G-412/ M-407/ E-132A	Corner of Century Park E. & Constellation Blvd				G	65		4/8/2015	-0.4	29.70	<u>28.1</u>	<u>14</u>	0	<0.20	8.9	8.4	0.2	1.7	
								5/13/2015	-0.75	29.68	<u>24.1</u>	NA	0	NA	9.4	NA	0.1	NA	
								5/28/2015	-0.25	29.65	<u>22.1</u>	NA	0	NA	7.9	NA	2.5	NA	
					R	70		4/8/2015	-0.4	29.72	<u>33.3</u>	<u>15</u>	0	<0.20	8.8	8.4	0.2	1.8	
								5/13/2015	-0.75	29.68	<u>27.1</u>	NA	0	NA	9.3	NA	0	NA	
								5/28/2015	-0.2	29.65	<u>15.1</u>	NA	0	NA	5.9	NA	4.4	NA	
					B	75		4/8/2015	-0.6	29.73	<u>52.6</u>	<u>23</u>	0	<0.20	8.6	8.3	0.1	1.6	
								5/13/2015	-0.8	29.68	<u>80.2</u>	<u>43</u>	0	<0.20	8.6	7.8	0.2	1.9	
								5/28/2015	-0.15	29.95	<u>90.4</u>	NA	0	NA	7.5	NA	2.1	NA	
		2	60	50 to 60		Standpipe	4/8/2015	59.8	-0.7	29.72	<u>3.3</u>	<u>3.2</u>	0	<0.20	0.4	0.45	15.4	16.0	2" of water
							5/13/2015	59.8	-0.65	29.68	<u>90.8</u>	<u>36</u>	0	<0.20	7.4	6.9	1.8	2.9	2" of water
							5/28/2015	59.9	-0.25	29.65	<u>19.8</u>	<u>10</u>	0	<0.20	7.4	6.9	3.6	5.1	< 2" of water, methane peaked @ 90% during purging
		2	90	80 to 90		Standpipe	4/8/2015	Dry	-0.8	29.72	<u>61.8</u>	<u>22</u>	0	<20	2.9	2.9	11.3	12.0	well dry
							5/13/2015	Dry	-0.7	29.68	<u>87.2</u>	NA	0	NA	6.8	NA	4	NA	well dry
							5/28/2015	Dry	+0.1	29.65	<u>89.9</u>	<u>35</u>	0	<0.20	5.9	5.6	4.2	7.4	well dry

Explanation:

<sup>1</sup>Depth to water measured in 2" PVC pipe screened at indicated depth  
<sup>2</sup>Readings >0.5 inch of water underlined and italicized; negative values indicates vacuum relative to the atmospheric pressure  
<sup>3</sup>Readings >1.25% (= 25% LEL) of methane underlined and italicized  
<sup>4</sup>Readings >5ppm of H<sub>2</sub>S underlined and italicized

CH<sub>4</sub> = Methane  
CO<sub>2</sub> = Carbon Dioxide  
O<sub>2</sub> = Oxygen  
H<sub>2</sub>S = Hydrogen Sulfide

B=Blue  
R= Red  
G = Green  
Y=Yellow

ND = Not detected (below lab equipment reporting limit: 0.2 ppmv for hydrogen sulfide and 0.001% for methane)  
NA = Not analyzed or measured  
na = not applicable  
"ppm" stands for parts per million

"pen" indicates either field measurement are not reported yet or lab test results are pending



Field: Used Landtec GEM 2000+ for field measurements, detection limit for methane is 0.1% or 1,000 ppm



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Table 4-5: 2015 Lab Dissolved Gas Test Data in Water Samples Collected from Monitoring Wells (Adv. PE Phase)

Monitoring Well Location		Date Sampled	Screen Interval (ft, btoc)	Depth to Water (ft)	Water Volume Extracted from Well (cm3)	Gas Volume Extracted from Sample (cm3)	Methane Gas Concentration (%)	Methane Volume Extracted (cm3)	Methane Mass Extracted (mg)	Methane Dissolved Concentration (mg/L)	Relative Methane Saturation (%)	H2S Gas Concentration (ppm)	H2S Volume Extracted (cm3)	H2S Dissolved Concentration (mg/L)	Relative H2S Saturation (%)	CO2 Gas Concentration (%)	CO2 Volume Extracted (cm3)	CO2 Mass Extracted (mg)	CO2 Dissolved Concentration (mg/L)	Relative CO2 Saturation (%)	O2 Gas Concentration (%)		
G-139	Standpipe	11/13/2015	75-80	80	2,294	5.00	0.00	0.00	0.00	0.00	<0.01	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	<0.01		20.00	
M-402	Standpipe	10/29/2015	50-55	55	4,330	30.00	0.00	0.00	0.00	0.00	<0.01	0.00	0.00	0.00	0.00	0.00	0.90	0.27	0.53	0.12	0.01		11.10
		11/13/2015			4,048	30.00	0.00	0.00	0.00	0.00	<0.01	0.00	0.00	0.00	0.00	0.90	0.27	0.53	0.13	0.01		16.20	
		10/29/2015	100-105	105	3,776	51.00	0.00	0.00	0.00	0.00	<0.01	0.00	0.00	0.00	0.00	0.00	1.20	0.61	1.20	0.32	0.02		10.40
		11/13/2015			3,706	26.00	0.00	0.00	0.00	0.00	<0.01	0.00	0.00	0.00	0.00	0.60	0.16	0.31	0.08	<0.01		17.20	
G-405/ M-403	Standpipe	10/23/2015	105-110	110	4,376	45.00	0.00	0.00	0.00	0.00	<0.01	0.00	0.00	0.00	0.00	0.40	0.18	0.35	0.08	<0.01		13.80	
		11/13/2015			3,698	21.00	0.00	0.00	0.00	0.00	<0.01	0.00	0.00	0.00	0.00	0.40	0.08	0.16	0.04	<0.01		18.20	
E-126A/ M-404	Standpipe	10/27/2015	77-87	87	3,740	19.00	0.00	0.00	0.00	0.00	<0.01	0.00	0.00	0.00	0.00	0.80	0.15	0.30	0.08	<0.01		18.30	
		10/28/2015			3,826	20.00	0.00	0.00	0.00	0.00	<0.01	0.00	0.00	0.00	0.00	0.40	0.08	0.16	0.04	<0.01		18.60	
		11/12/2015			3,787	15.00	0.00	0.00	0.00	0.00	<0.01	0.00	0.00	0.00	0.00	0.40	0.06	0.12	0.03	<0.01		19.80	
		10/27/2015	100-105	105	4,202	51.00	0.00	0.00	0.00	0.00	<0.01	0.00	0.00	0.00	0.00	2.10	1.07	2.10	0.50	0.03		12.40	
		10/28/2015			3,678	40.00	0.00	0.00	0.00	0.00	<0.01	0.00	0.00	0.00	0.00	2.00	0.80	1.57	0.43	0.03		12.80	
		11/12/2015			3,181	40.00	0.00	0.00	0.00	0.00	<0.01	0.00	0.00	0.00	0.00	1.50	0.60	1.18	0.37	0.02		16.00	
G-410/ M-406	Standpipe	11/23/2015	115-135	135	3,762	55.00	0.00	0.00	0.00	0.00	<0.01	0.00	0.00	0.00	0.00	0.80	0.44	0.86	0.22	0.01		11.20	
<p>Notes:</p> <p>btoc – below top of casing in feet</p> <p>cm³ = cubic centimeters</p> <p>mg = milligrams</p> <p>mg/L = milligrams per liter</p> <p>H<sub>2</sub>S = hydrogen sulfide</p> <p>CO<sub>2</sub>= carbon dioxide</p> <p>O<sub>2</sub> = oxygen</p> <p>ppm = parts per million</p> <p>Analysis performed by GeoKinetics using an infrared gas analyzer. Also, see Table 3-7 of the EDR for results of dissolved gases, hydrocarbons, metals, VOCs and SVOCs conducted using RSK175 and SM-4500 analytical test methods.</p>																							



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#### 4.2.1 Summary of Field Measurements

A summary of the field measurements collected in monitoring wells installed along the tunnel alignments in Reaches 4 and 5 and in the vicinity are presented in the following sections:

##### 4.2.1.1 Gas Pressures

The highest recorded gas pressure in probes and standpipes installed along Reaches 4 and 5 ~~near the Wilshire/La Cienega Station was 12.6 and 0.72 inches of equivalent water height. The, respectively. For comparisons purposes, the~~ highest recorded gas pressure in monitoring wells installed ~~at in the Century City Constellation and Wilshire/La Cienega Stations was 0.1~~ **vicinity of the nearby stations planned in Section 1 and 2.1 inches of equivalent water height, respectively. Section 2 of the WPLE project are presented below:**

- **Wilshire/La Cienega Station: 2.1 inches of equivalent water height**
- **Wilshire/Rodeo Station: 0.1 inches of equivalent water height**
- **Century City Constellation Station: 0.55 inches of equivalent water height**

##### 4.2.1.2 Methane

The highest recorded methane concentration in probes and standpipes installed along Reaches 4 and 5 ~~near the Century City Constellation Station was 6.3 and 90.8 percent. The, respectively. In most of the probes and standpipes installed along Reaches 4 and 5, methane concentration was 0.1 percent or less. For comparisons purposes, the~~ highest methane concentration in monitoring wells installed ~~at the Century City Constellation and in the vicinity of the nearby stations planned in Section 1 and 2 of the WPLE project are presented below:~~

- ~~Wilshire/La Cienega Stations was 96.3 and Station: 39.8 percent, respectively.~~
- **Wilshire/Rodeo Station: 0.0 percent**
- **Century City Constellation Station: 96.3 percent**

##### 4.2.1.3 Hydrogen Sulfide

The highest recorded hydrogen sulfide concentration in probes and standpipes installed along Reaches 4 and 5 ~~near the Wilshire/La Cienega Station was 4 parts per million (ppm). The) and <0.1 ppm, respectively. For comparisons purposes, the~~ highest recorded hydrogen sulfide concentration in monitoring wells installed ~~at in the vicinity of the nearby stations planned in Section 1 and 2 of the WPLE project are presented below:~~

- **Wilshire/La Cienega Station: 4 ppm**
- **Wilshire/Rodeo Station: 0.0 ppm**
- ~~Century City Constellation and Wilshire/La Cienega Stations was Station: 330 and 4 ppm, respectively.~~

### 4.3 Oil Well Surveys

As stated earlier, the nearest oil wells to the alignment are in Reach 5, as shown on the DOGGR Online Mapping System (DOMS, 2015). Chevron U.S.A. Inc. Rodeo Well No. 107 is the nearest mapped oil well to the Reach 5 alignment and is shown approximately 75 feet southeast of the alignment at the City boundary between Beverly Hills and Los Angeles, just west of Beverly Hills High School (DOMS, 2015). The next nearest well to the Reach 5 alignment is Chevron U.S.A. Inc. Wolfskill Well No. 23, located approximately 150 feet northwest of the intersection of Constellation Boulevard and Century Park East. According to DOGGR, the locations of oil wells shown on DOGGR maps are approximate and could vary by up to 200 feet. The following table provides additional details regarding the oil wells that are mapped by DOGGR within Reaches 4 and 5.

Table 4-6: Summary of Oil Wells

Oil Well APN.	Operated By	Location Shown on Plate 1	Status of Oil Well per DOGGR Data
03701069 #107	Chevron U.S.A.	About 75 feet southeast from the alignment and about 300 feet east-northeast of the west end of Reach 5	No well data details or abandonment records available. Status noted as "plugged" on DOGGR database online.
03701104 #23	Chevron U.S.A.	About 150 feet northwest from intersection of Constellation Boulevard and Century Park East at the west end of Reach 5	No well data details or abandonment records available. Status noted as "plugged" on DOGGR database online.

The copies of the oil well records obtained from DOGGR that provide information pertaining to ownership, latitude and longitude for well locations are presented in Appendix F.

Amec Foster Wheeler's predecessor company AMEC performed oil well surveys in PE phase to locate Wolfskill No. 23 and Rodeo No. 107 and presented the results in PE phase geotechnical and environmental report (Metro, 2011). AMEC retained GeoVision to perform oil well surveys within the tennis courts at Beverly Hills High School (BHHS) to **attempt to** locate Rodeo 107 and at the lacrosse field at BHHS and the 1950 Century Park East property to **attempt to** locate Wolfskill 23. **-A summary of the surveys are presented below.**

#### 4.3.1 Beverly Hills High School (Lacrosse Fields and Tennis Courts)

In the lacrosse field area, during the visual observations of the ground surface, and the geophysical survey performed, there was no conclusive evidence that Wolfskill 23 was located in that field; near-surface metallic objects that were found during scanning are not likely related to oil wells. Four large magnetic anomalies (A1 through A4) were present in the data that may be related to steel-cased abandoned oil wells (or its infrastructure) or other buried metallic debris. Two of the anomalies (A1 and A2) may be related to a pipe segment or previous building infrastructure. Three (A1, A2 and A3) are located on or near the grass lacrosse field, which is surrounded by a metallic chain-link fence and a block retaining wall. The other anomaly (A4) is located southeast of the lacrosse field, in a small area adjacent to an asphalt road with utility vaults, chain-link fencing, reinforced concrete, a building and a retaining wall. ~~Anomalies A2, A3 and A4 (of the GeoVision report attached in Appendix F) may be related to abandoned oil wells, infrastructure, or other buried metallic debris.~~ **Regardless, the closest anomaly, A2, is at least 80 feet south of the tunnel alignment. Accordingly, further investigation may be conducted as discussed in the summary. 1950 Century Park East to attempt to locate the well.**

### 4.3.2 1950 Century Park East

The geophysical survey at the at-grade parking garage at 1950 Century Park East included part of the alley east of the structure, and part of the asphalt road west of the structure. No well-like anomalies were interpreted at the building parking garage from the geophysical data. However, steel reinforcement in the concrete of the structure caused some interference. One version of the DOGGR maps indicate the abandoned Wolfskill 23 well is within the footprint of the garage, but the more recent version of the DOGGR maps do not show the Wolfskill 23 well within the limits of the parking garage. Accordingly, further investigation may be conducted as discussed in the summary. This could provide the location, nature, and characteristics of anomalies which, if determined to be an abandoned oil well, will need to be safely accommodated according to DOGGR regulations.

### 4.3.3 Summary

Based upon the results of the study, the Wolfskill 23 well and Rodeo No. 107 well are in the vicinity of the Reach 5 alignment. Based on geophysical surveys at potential locations, no definitive indications of abandoned oil wells or associated infrastructure could be located at the Wolfskill 23 and Rodeo 107 study areas and associated surveyed areas. Additional investigation of oil wells is recommended: **to attempt to locate these two wells.**

## 4.4 Phase II Environmental Site Assessment

Within the Reach 4 and 5, four explorations (E-123, E-124, E-125, and E-127) in the PE phase and ~~one exploration~~ **two explorations (E-132A/M-407, G-412/M-407/E-132A)** in the Adv. PE phase were performed using direct-push CPT sampling and/or hollow-stem auger drilling equipment. The exploration locations were selected based on the findings of previous preliminary (FEIS/EIR) environmental site assessment reports that identified suspect sources of environmental concern with the highest likelihood to impact the station. **In addition, environmental samples were collected in seven of the geotechnical borings drilled during the Adv. PE phase along the tunnel reaches to provide analytical test data in between areas of the suspect sources.**

Each exploration location was initially marked as close as possible to the suspect source of concern (e.g., dry cleaning, LUST site, former oil exploration site) while staying within the public street area under which the proposed station is being considered. A summary of the suspect sources at the exploration locations is presented in ~~Table 4-6~~ **Table 4-7**. The locations of the ~~environmental~~ explorations are shown on Plate 1, Exploration Plan.

**Table 4-7: Summary of Suspect Sources at Phase II Environmental Explorations**

Location	No.	Suspect Source
Reach 4	E-123	Closed Leaking Underground Storage Tank (LUST) with residual groundwater contamination (8567 Wilshire)
	E-124	Two dry cleaning facilities on both sides of street (8621 and 8624 Wilshire)
	M-402	Two dry cleaning facilities on both sides of street (8621 and 8624 Wilshire)
	G-405 / M-403	Former LUST and dry cleaning facilities (9055 and 9045 Wilshire)
	E-125	Former LUST and dry cleaning facilities (9055 and 9045 Wilshire)
	G-406	Former LUST and dry cleaning facilities (9055 and 9045 Wilshire)
	G-407	Former dry cleaning facility located at Reeves and Wilshire Boulevard



Location	No.	Suspect Source
Reach 5	G-409	Open LUST case (9815 Wilshire)
	E-127	Open LUST case (9815 Wilshire)
	G-410 / M-406	Open LUST case (9815 Wilshire)
	G-411	Former Oil Exploration Activities
	E-132A/M-407	Former oil explorations (Century City area) Oil Exploration Activities
	G-412/M-407/E-132A	Former Oil Exploration Activities

Additional details of the field explorations including soil and groundwater sampling procedures, analytical laboratory test results, findings and conclusions are presented in the EDR (Metro, ~~2015~~**2016**).

## 5.0 LABORATORY TESTING

### 5.1 Geotechnical Exploration Testing

Laboratory tests were performed on selected samples obtained from the geotechnical borings drilled during the ACE, PE and Adv. PE Phase to aid in the classification of the soils and to determine the pertinent engineering properties of the soil. A list of the laboratory tests performed on the samples is presented in Table 5-1. A more detailed description of the laboratory test procedures is presented in Appendix D of the Geotechnical Data Report (GDR) for the Century City Constellation Station.

Table 5-1: Geotechnical Laboratory Tests

Laboratory Test	Laboratory	ASTM Designation (or) other	ACE Phase	PE Phase	Adv. PE Phase
Field Moisture Content	AMEC/AP Engineering	D 2216	X	X	X
Field Dry Density	AMEC/AP Engineering	D 2937	X	X	X
Sieve Analysis	AMEC/AP Engineering	D 422	X	X	X
Passing No. 200 Sieve	AMEC/AP Engineering	D 1140	X	X	X
Atterberg Limits	AMEC/AP Engineering	D 4318	X	X	X
Direct Shear	AMEC/AP Engineering	D 3080	X	X	X
Specific Gravity	AMEC/AP Engineering	C 127/128	X	X	X
Triaxial Unconsolidated-Drained	AP Engineering	D 4767	NA	NA	X
Consolidation/Hydroconsolidation	AMEC/AP Engineering	D 2435	X	X	X
Expansion/Collapse	AMEC/AP Engineering	D 2435	X	X	X
Corrosion	AP Engineering	Caltrans method	X	X	X
Abrasion	Tonon USA	NTNU-SINTEF	NA	NA	X

NA – not analyzed or tested

\*only one exploration along the reaches performed to date; additional borings are planned in Adv. PE phase

The laboratory test results of the PE and Adv. PE phase investigations are presented in Appendix D. Relevant laboratory test results from prior investigations are also included in Appendix D. A summary of the ACE, PE and Adv. PE phase investigations test results in a tabular form is presented in Table 5-2 for Reach 4 and in Table 5-3 for Reach 5; the laboratory results of relevant prior investigations are presented in Table 5-4.

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Table 5-2: Summary of Geotechnical Laboratory Test Results in Reach 4 (ACE, PE and Adv. Phase)

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated- Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)					Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
G-9	5.5	CR	CH	Qal	9	27.4	93				75	30	45											1,700	16		
	10.5	SPT	SM	Qal	26					32																	
	15.5	CR	CL	Qal	6	23.1	103																	1,000	22		
	20.5	SPT	CL	Qalo	37					60	40	19	21														
	25.5	CR	CL	Qalo	10	22.2	105																				
	30.5	SPT	CL	Qalo	16						38	20	18			7.8	61	21	1,500								
	35.5	CR	ML	Qalo	11	25.1	101																	1,400	25		
	40.5	SPT	ML	Qalo	30					71																	
	45.5	CR	ML	Qalo	10	21.9	100																				
	50.5	SPT	ML	Qalo	42																						
	55.5	CR	ML	Qalo	15	32.5	89																	3,400	4		
	60.5	SPT	CL	Qalo	43						39	21	18			8.0	69	34	1,200								
	65.5	CR	CL	Qalo	12	30.1	95													0.245142	0.054031	0.72					
	70.5	SPT	SC	Qalo	50/5"																						
	75.5	CR	CL	Qalo	32	Sample not recovered																					
	80.5	SPT	SC	Qalo	29					39																	
G-10	85.5	CR	SM	Qalo	34	24.3	93																				
	90.5	SPT	CL-ML	Qalo	22																						
	6.5	CR	CL	Qal	5	13.6	97																				
	10.5	CR	CL	Qal	7	16.9	105				30	17	13														
	15.5	SPT	CL	Qalo	39						38	19	19														
	20.5	CR	CL	Qalo	14	19.1	108																				
	25.5	SPT	CL	Qalo	35	Sample not recovered																					
	30.5	CR	SC	Qalo	25	9.5	122																				
	35.5	SPT	SC	Qalo	76			82		20						8.1	97	12	2,960								
	40.5	CR	SC	Qalo	38	10.6	112																				
	45.5	SPT	SC	Qalo	50/4"	Sample not recovered																					
	50.5	CR	SC	Qalo	19	18.0	108	98		42	28	19	9														
	55.5	SPT	SM	Qalo	27			95		50																	
	60.5	CR	CL	Qalo	22	24.3	101																				

Table 5-2: Summary of Geotechnical Laboratory Test Results in Reach 4 (ACE, PE and Adv. Phase) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated- Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)					Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
G-10	65.5	SPT	CL	Qalo	35					86						8.0	46	6	1,260								
	70.5	CR	CL	Qalo	41	16.1	110				40	20	21														
	75.5	SPT	CL	Qalo	44																						
	80.5	CR	CL	Qalo	25	16.2	113																				
G-133	5.5	CR	CL	Qal	Push	20.5	101															0.66					
	10.5	SPT	CL	Qal	14	20.2																					
	15.5	CR	CL	Qalo	11	18.8	107															0.57					
	20.5	SPT	CL	Qalo	9/10"	22.9																					
	25.5	CR	CL	Qsp	9	26.2	95															0.77					
	30.5	SPT	CL	Qsp	18	23.0																					
	35.5	CR	ML	Qsp	13	25.8	96															0.75					
	38.5	SPT	CL	Qsp	16	36.6																					
	41.5	CR	CL	Qsp	13	25.9	100							0.03								0.68					
	44.5	SPT	MH	Qsp	16	35.1																					
	47.5	CR	MH	Qsp	16	32.0	88				72	35	37									0.88					
	50.5	SPT	MH	Qsp	28	28.1		0	2	98	65	33	32			7.7	48	56	960								
	53.5	CR	CL	Qsp	27	28.6	93								2.76							0.85		1,200	18		
	56.5	SPT	CL	Qsp	21	33.0																					
	59.5	CR	ML	Qsp	23	25.3	100	0	20	80												0.68					
	62.5	SPT	CL	Qsp	20	28.5										8.0	33	65	1,760								
	65.5	CR	CL	Qsp	18	23.0	104				38	22	16									0.61		600	31		
	68.5	SPT	SM	Qsp	46	14.2		19	53	28					2.66												
	71.5	CR	CL	Qsp	20	21.6	104															0.61					
	74.5	SPT	ML	Qsp	27	23.4		1	42	57						8.0	186	37	1,080								
	77.5	CR	ML	Qsp	24	21.4	107				36	25	11									0.57		500	29		
	80.5	SPT	SM	Qsp	52	15.6																					
	83.5	CR	SC	Qsp	56	12.6	120	4	76	20												0.39					
	86.5	SPT	SM	Qsp	34					34																	
	89.5	CR	SM	Qsp	25	21.4	99							0.09								0.68					
	92.5	SPT	SM	Qsp	29	17.1																					



Table 5-2: Summary of Geotechnical Laboratory Test Results in Reach 4 (ACE, PE and Adv. Phase) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Yield Strength)		Triaxial Consolidated- Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)					Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
G-133	95.5	CR	ML	Qsp	18	26.6	93															0.81					
	100.5	CR	SW	Qsp	30																						
	105.5	CR	SM	Qsp	45	22.5	99															0.68					
	110.5	CR	SW	Qsp	36	10.8	118															0.41					
G-134	5.5	CR	ML	Qal	Push	21.6	99															0.70					
	10.5	SPT	CL	Qal	9	30.6																					
	15.5	NR	CL	Qal	4																						
	20.5	SPT	CL	Qalo	17	23.2																					
	25.5	CR	SP/SC	Qalo	13	14.6	109															0.53					
	30.5	SPT	SC/CL	Qalo	16	18.6																					
	35.5	CR	ML	Qalo	13	33.5	91			66				0.06								0.85		0	33		
	40.5	SPT	CL	Qalo	13	23.6																					
	45.5	CR	ML	Qalo	12	27.7	99	0	22	78				0.05								0.70		700	21		
	50.5	SPT	ML	Qalo	41	20.0									2.63												
	55.5	CR	ML	Qalo	16	23.8	101	0	28	72				0.02							0.033020	0.66					
	60.5	SPT	CL	Qalo	20	32.4		0	6	94						8.0	53	60	800								
	65.5	CR	CL	Qalo	28	32.9	91								2.69						0.033018	0.85		1,000	15		
	76.5	SPT	CL	Qalo	22	21.5		0	32	68						8.1	31	31	1,840								
	80.5	SPT	CL	Qalo	23																						
	86	SPT	CL	Qalo	30	19.0				55																	
	90.5	SPT	SC	Qalo	49	20.0																					
	95.5	CR	SM	Qalo	32	14.7	118	4	63	33				0.03								0.40					
	100.5	SPT	SP	Qsp	50/2"	13.7																					
	105.5	CR	SM/ML	Qsp	13	21.6	102															0.63					
	110.5	SPT	ML	Qsp	62	29.6																					
G-135	9.5	CR	CH	Qal	7	22.7	97				65	27	38									0.74					
	14	SPT	CH/SC	Qalo	8	24.3																					
	19.5	CR	SC	Qalo	10	18.8	107	6	75	19												0.56					
	24	SPT	CL/SC	Qalo	13	18.8																					
	29.5	CR	CL-ML	Qalo	19	15.9	113																				

Table 5-2: Summary of Geotechnical Laboratory Test Results in Reach 4 (ACE, PE and Adv. Phase) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Peak strength)		Triaxial Consolidated- Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)					Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
G-135	34	SPT	SC	Qalo	18	17.4				59																	
	39.5	CR	CL	Qalo	16	28.1	95				45	19	26								0.77						
	44	SPT	SC	Qalo	22	17.6				45																	
	47.5	CR	CL	Qalo	22	24.8	99														0.70						
	50	SPT	MH	Qalo	20	39.5					66	36	30														
	53.5	CR	MH	Qalo	28	37.9	81														1.04						
	56	SPT	MH	Qalo	18	34.6		0	10	90	54	30	24														
	59.5	CR	CH	Qalo	25	35.1	87														0.93						
	62	SPT	CH	Qalo	23	34.0										7.7	50	33	1,120								
	65.5	CR	CH	Qalo	26	26.4	94	0	17	83	57	29	28		2.75							0.83		1,400	16		
	68	SPT	CH	Qalo	24	18.8																					
	71.5	CR	CH	Qalo	26	19.0	109															0.54					
	74	SPT	CH	Qalo	33	24.6		0	18	82	51	17	34														
	77.5	NR	CH	Qalo	25																						
	80	CR	CL	Qalo	32	18.3																					
	83.5	CR	CL	Qalo	33	19.7	107	0	50	50	37	21	16									0.57		450	29		
	86	SPT	CL	Qalo	29	18.2										8.1	35	13	2,800								
	89.5	CR	SW	Qalo	40	14.0	114								2.70							0.47					
	92	SPT	SM	Qalo	42	11.3		16	71	13						7.8	62	23	4,400								
	95.5	CR	SM	Qsp	79/11"	21.0	106															0.57		0	32		
	98	SPT	SM	Qsp	34	16.8		0	67	33					2.75												
	101.5	CR	SM	Qsp	65	28.1	95							0.02								0.75					
	104	SPT	SM	Qsp	38	33.3																					
	107.5	CR	SM	Qsp	52	29.5	93															0.79					
	110	SPT	MH	Qsp	31	34.9		0	1	99	66	36	30														
	113.5	CR SPT	MH	Qsp	52	27.1	95								2.72							0.79					
	119		MH	Qsp	28	38.4					80	37	43														
G-136	10.5	CR	CL-ML	Qal	Push	25.6	96																				
	15.5	SPT	CL	Qal	23	18.3				53																	
	20.5	CR	CL	Qal	7	12.4	120														0.40						

Table 5-2: Summary of Geotechnical Laboratory Test Results in Reach 4 (ACE, PE and Adv. Phase) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated- Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)					Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
G-136	25.5	SPT	CL	Qal	9/10"	24.0					35	16	19														
	30.5	CR	CL	Qalo	8	19.2	104															0.61					
	35.5	SPT	SC	Qalo	33/8"	13.0		6	71	23																	
	40.5	CR	CL-ML	Qalo	10	21.2	102																				
	45.5	SPT	SC-SM	Qalo	54	18.4				48																	
	50.5	CR	ML	Qalo	10	26.3	97																	1,200	18		
	55.5	SPT	CL	Qalo	16	32.2					43	19	24														
	60.5	CR	CL	Qalo	20	34.6	86																0.96				
	65.5	SPT	CH	Qalo	28/10"	32.8		0	3	97	71	24	47		2.87	7.4	157	27	960								
	70.5	CR	CH	Qalo	20	30.1	91														0.033018	0.85		900	15		
	75.5	SPT	CL	Qalo	20	30.4		1	16	83	43	15	28														
	80.5	CR	CL	Qalo	13	24.2	101																0.66				
	85.5	SPT	CL	Qalo	20	21.1					35	14	21														
	90.5	CR	SC	Qalo	52	13.9	117	8	52	40					2.65								0.42				
	95.5	SPT	CL	Qalo	28	21.0		0	29	71																	
	100.5	CR	ML	Qalo	20	20.8	101	0	55	45															0	35	
	105.5	SPT	SM	Qalo	60	27.3									2.59	7.8	82	23	3,440								
	110.5	CR	SM	Qalo	20	16.6	108																0.54				
	115.5	SPT	SM	Qalo	51	24.0																					
	120.5	CR	ML	Qalo	23	26.8	95																0.77				
G-137	12.5	CR	CL	Qal	9	20.6	97																0.73				
	14	SPT	CL	Qalo	12	16.9																					
	19.5	CR	CL	Qalo	20	16.9	110																0.53				
	24	SPT	CL	Qalo	11	18.5																					
	30.5	NR	CL	Qalo	11																						
	39	SPT	CL	Qalo	15	16.4				57																	
	44.5	CR	SC	Qalo	17	20.4	101																0.65				
	49	SPT	SC	Qalo	14	17.5		4	47	48	32	17	15														
	52.5	CR	SM	Qalo	18	18.8	104																0.60				
	55	SPT	SM	Qalo	20	21.5																					

Table 5-2: Summary of Geotechnical Laboratory Test Results in Reach 4 (ACE, PE and Adv. Phase) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated- Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)					Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
G-137	58.5	CR	SM	Qalo	30	18.0	112	0	62	38												0.49					
	61	SPT	CL	Qalo	14	26.2										8.3	41	20	1,680								
	64.5	CR	CH	Qalo	34	18.5	102	0	30	70	57	28	29									0.63					
	67	SPT	CH	Qalo	33	33.1																					
	70.5	CR	CH	Qalo	26	30.2	92	0	8	92	69	21	48		2.70							0.83		2,000	16		
	73	SPT	CH	Qalo	25	25.5										8.5	31	16	1,120								
	76.5	CR	CL	Qalo	25	22.8	99				32	18	14									0.70					
	79	SPT	CL	Qalo	32	23.4																					
	82.5	CR	CL	Qalo	30	17.2	105	0	33	67	32	17	15		2.76							0.64		2,350	18		
	85	SPT	CL	Qalo	27	21.4										8.4	22	3	1,800								
	88.5	NR	SC	Qalo	28																						
	91	SPT	SC	Qalo	34	12.6		15	58	27	29	19	10		2.64												
	94.5	CR	SM	Qsp	38	14.2	117	7	66	27												0.42		1,300	29		
	97	SPT	SC	Qsp	30	13.4				40																	
	100.5	CR	CH	Qsp	27	23.2	102	0	14	86	58	19	39									0.65					
	103	SPT	CH	Qsp	26	21.4										8.2	18	3	1,440								
	106.5	CR	CH	Qsp	23	26.2	93															0.80					
	109	SPT	CH	Qsp	18	44.1		0	3	97	84	27	56														
114.5	CR	CL	Qsp	27	35.2	85															0.97						
119	SPT	CL-ML	Qsp	16	31.6																						
G-138	5.5	CR	SW	Qal	28	3.9	110															0.51					
	10.5	SPT	ML	Qal	9	24.4																					
	15.5	CR	CL	Qalo	49	11.0	123															0.37					
	20.5	SPT	CL	Qalo	37	15.3																					
	25.5	CR	CL	Qalo	25	14.9	109															0.53					
	30.5	SPT	SC	Qalo	30	13.8		3	53	44	33	16	17														
	35.5	NR	GW	Qalo	10																						
	40.5	SPT	CL	Qalo	21	22.1																					
	45.5	CR	SM	Qalo	41	10.1	117															0.43					
	50.5	SPT	CL	Qalo	28	22.9																					

Table 5-2: Summary of Geotechnical Laboratory Test Results in Reach 4 (ACE, PE and Adv. Phase) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated-Undrained (Peak Strength)		
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)					Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)	
G-138	55.5	CR	CL	Qalo	26	24.6	99				37	18	19									0.70						
	60.5	SPT	CH	Qalo	25	31.4																						
	65.5	CR	CH	Qalo	46	30.0	92	0	18	82	63	22	41								0.83			1,000	20			
	70.5	SPT	CL	Qalo	23	16.6										8.3	8	3	1,560									
	75.5	CR	CL	Qalo	33	32.3	89	0	32	68	47	21	26		2.74							0.92			1,300	20		
	80.5	SPT	CL	Qalo	36	20.1										8.2	18	3	1,800									
	85.5	CR	CL	Qalo	58	14.6	114	2	40	58	36	13	23		2.98							0.63						
	90.5	SPT	CL	Qalo	49	13.5																						
	95.5	CR	SM	Qalo	78	14.1	115	2	70	28					2.68							0.45			700	34		
	100.5	SPT	CL	Qsp	81	23.8		0	28	72	38	18	20															
	105.5	CR	ML	Qsp	55	32.9	90	2	7	91												0.86						
	110.5	NR	ML	Qsp	38																							
	115.5	CR	CH	Qsp	32	38.6	83															1.02						
G-139	5.5	CR	SM	Qal	19	8.5	104															0.60						
	10.5	SPT	CL	Qalo	29	14.1																						
	15.5	CR	CL	Qalo	28	13.4	121															0.38						
	20	SPT	CL	Qalo	36	10.9																						
	25.5	CR	SM	Qalo	19	14.2	112															0.49						
	30.5	SPT	CL	Qalo	46	12.0																						
	35.5	CR	SW-SM	Qalo	40	10.0	125																					
	40.5	SPT	SW-SM	Qalo	32	12.6																						
	45.5	CR	SW-SM	Qalo	33	15.3	116							0.06														
	50.5	SPT	SM	Qalo	64	11.7		6	63	31					2.74													
	55.5	CR	CL	Qsp	35	23.1	101	0	14	86	41	15	26		2.83							0.75			650	23		
	60.5	SPT	CL	Qsp	21	22.9										7.6	17	5	1,800									
	65.5	CR	CL	Qsp	24	26.7	100				47	18	29									0.67						
	70.5	SPT	CL	Qsp	39	18.3										7.7	14	3	1,880									
	75.5	CR	SC	Qsp	44	14.0	114	5	57	38	30	15	15		2.83							0.55			400	30		
	80.5	SPT	SC	Qsp	39	18.8										7.9	36	10	1,920									
	85.5	CR	SC	Qsp	37	13.1	112	2	50	48	35	16	19		2.82							0.57			1,050	27		



Table 5-2: Summary of Geotechnical Laboratory Test Results in Reach 4 (ACE, PE and Adv. Phase) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated-Undrained (Peak Strength)		
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)					Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)	
G-139	90.5	SPT	SC	Qsp	30	27.0																						
	95.5	CR	SM	Qsp	58	18.7	114	0	70	30				0.17								0.46						
	100.5	SPT	CL	Qsp	28	23.8					47	16	31															
	105.5	CR	ML	Qsp	46	27.5	96															0.75						
	110.5	SPT	ML	Qsp	93	26.1																						
G-140	5.5	CR	SC	Qal	Push	10.6	119															0.40						
	8.5	SPT	SC	Qal	24	15.2				48																		
	11.5	CR	SC	Qal	19	12.9	117															0.42						
	14.5	SPT	SC	Qal	22	18.9																						
	20.5	CR	SC	Qal	9	15.7	98															0.70						
	25.5	SPT	CL	Qal	14	23.2																						
	30.5	CR	ML	Qal	12	14.6	108															0.55						
	35.5	SPT	SP	Qalo	54	13.6																						
	40.5	CR	SP	Qalo	24	24.5	96															0.74						
	45.5	SPT	SM	Qsp	19	15.6																						
	50.5	CR	SM	Qsp	21	18.1	111		64	36												0.50						
	53.5	SPT	CL	Qsp	23	28.0																						
	56.5	CR	ML	Qsp	12	22.5	104							0.11								0.61			1,000	17		
	59.5	SPT	CL	Qsp	26	27.5									2.65	7.9	87	26	1,280									
	62.5	CR	CL	Qsp	22	23.8	102	0	52	48	47	24	23								0.023014	0.65						
	65.5	SPT	CL	Qsp	38	16.8																						
	68.5	CR	CL	Qsp	14	19.0	108	9	20	71	32	20	12								0.011007	0.55			450	31		
	71.5	SPT	CL	Qsp	47	15.5										8.0	130	22	2,360									
	74.5	CR	SC	Qsp	25	14.4	117			40	33	22	11	0.08									0.42					
	77.5	SPT	SM	Qsp	71	14.7		3	79	18					2.68													
	80.5	CR	SM	Qsp	22	23.2	103	0	64	36	NP	NP	NP										0.62			0	35	
	83.5	SPT	SM	Qsp	76	15.5																						
	86.5	CR	SP	Qsp	39	19.5	109							0.01									0.53					

Table 5-2: Summary of Geotechnical Laboratory Test Results in Reach 4 (ACE, PE and Adv. Phase) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated- Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)					Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
G-140	89.5	SPT	CL	Qsp	29	25.6		0	25	75	42	25	17														
	92.5	CR	CL	Qsp	20	17.6	111														0.51						
	95.5	SPT	SM	Qsp	69	22.6		0	47	53	NP	NP	NP														
	98.5	CR	SM	Qsp	36	20.1	107							-0.09							0.56		0	37			
	101.5	SPT	SM	Qsp	77/10"	25.5																					
	104.5	CR	SM	Qsp	20	26.0	94														0.77						
G-141	5.5	CR	SM	Qal	Push	11.4	116																				
	10.5	CR	SC	Qalo	13	13.5	118																				
	15.5	SPT	ML	Qalo	13	18.7																					
	20.5	CR	GW-GM	Qalo	15	6.1	105	65	29	6																	
	25.5	SPT	ML	Qalo	16	29.0																					
	30.5	CR	CL-ML	Qalo	6	21.9	107																				
	35.5	SPT	SM	Qalo	46	8.1																					
	40.5	CR	SM	Qalo	16	22.0	90																0	42			
	45.5	SPT	SM	Qalo	41	14.0		10	56	34					2.66												
	50.5	CR	ML	Qsp	17	22.4	102	0	31	69				0.05													
	55.5	SPT	CL	Qsp	31	18.9										7.4	132	13	1,280								
	60.5	CR	CL	Qsp	14	20.8	104	0	28	72	38	23	15		2.62									1,000	25		
	65.5	SPT	CL	Qsp	32	22.4										7.8	48	6	1,320								
	70.5	CR	CL	Qsp	18	25.1	105	0	36	64	35	22	13											2,950	14		
	75.5	SPT	CL	Qsp	53	20.1																					
	80.5	CR	CL	Qsp	24	21.5	100	0	26	74	37	20	17			8.0	132	38	1,120								
	85.5	SPT	CL-ML	Qsp	50	21.1																					
	90.5	CR	CL	Qsp	49	20.5	105																				
	95.5	SPT	ML	Qsp	59	22.4																					
	100.5	CR	ML	Qsp	73	25.8	95																				
	105.5	SPT	ML	Qsp	54	27.4																					

Table 5-2: Summary of Geotechnical Laboratory Test Results in Reach 4 (ACE, PE and Adv. Phase) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Modified Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated-Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)	Cce	Cre			Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
S-108	53	CORE	SM	Qalo		14.0		7	59	34																	
	56.5	CORE	CL-ML	Qalo		25.7																					
	59	CORE	CL-ML	Qalo		26.4								2.68													
	63.5	CORE	MH	Qalo		22.4		1	14	85	55	33	22			8.2	27	48	1,040								
	69.5	CORE	MH	Qalo		21.4																					
	73	CORE	MH	Qalo		25.2		0	19	81	63	35	28														
	76	CORE	MH	Qalo		24.6										8.0	24	43	1,560								
	78.5	CORE	CH	Qalo		16.8		0	29	71	50	27	23														
	81.5	CORE	CH	Qalo		14.9																					
	82.5	CORE	CL	Qalo		17.3		0	34	66	47	24	23			8.0	14	38	1,560								
	86.5	CORE	SC	Qalo		9.5		25	51	24																	
	90	CORE	SC	Qalo		10.9																					
	91.5	CORE	SM	Qalo		10.7		22	51	27	NP	NP	NP														
	93.5	CORE	GW-GM	Qalo		7.8		48	45	7					2.72												
	96	CORE	GW-GM/CL	Qalo/Qsp		14.3																					
	97.5	CORE	ML	Qsp		22.7		3	28	69	NP	NP	NP			8.0	11	39	1,800								
	105	CORE	CL-ML	Qsp		29.0																					
	106.5	CORE	CL-ML	Qsp		32.5																					

Table 5-2: Summary of Geotechnical Laboratory Test Results in Reach 4 (ACE, PE and Adv. Phase) – Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Modified Compression Index		Void Ratio	Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated-Undrained (Peak Strength)		
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)	Cce	Cre			Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)	
M-402	5.5	CR	CL	Af	15	25.5	97															0.73						
	10	SPT	CL	Af	8	28.2																						
	15.5	CR	ML	Qal	8	22.9	103															0.64						
	20	SPT	ML	Qal	7	17.5																						
	25.5	CR	ML	Qalo	14	18.4	110															0.53						
	30	SPT	ML	Qalo	9	20.7																						
	35.5	CR	CL	Qalo	22	19.3	109															0.54						
	40	SPT	CL	Qalo	9	25.4																						
	45.5	CR	ML	Qalo	23	26.8	95															0.77						
	50	SPT	SM	Qalo	27	22.7																						
	55.5	CR	CL	Qsp	21	29.6	92															0.83						
	60	SPT	CH	Qsp	14	23.8					51	17	34															
	65.5	CR	CH	Qsp	11	23.6	97															0.73			350	29		
	70	SPT	CH/SM	Qsp	56	17.6			5	41	54						7.6	29	58	1949								
	73.5	CR	SM	Qsp	9	19.9	108															0.56						
	76	SPT	CL	Qsp	16	17.9											7.8	39	62	1540								
	79.5	CR	CL	Qsp	21	17.6	110		0	29	71	32	12	20	0.47						0.089	0.016	0.53					
	82	SPT	CL	Qsp	14	23.3																						
	85.5	CR	CL	Qsp	15	19.5	108		0	37	63	32	15	17								0.56			100	33		
	88	SPT	CL/SM	Qsp	42	7.3																		13*				
	91	SPT	CL/SM	Qsp	26	22.7																		13*				
	94.5	CR	CL/SM	Qsp	22	10.1	126															0.34			1500	30		
	97	SPT	SC	Qsp	20	19.9			1	67	32	38	16	22														
	100	SPT	SC	Qsp	40	18.4			0	58	42						7.8	70	111	2062								
	103.5	CR	CL/SP-SM	Qsp	41	14.6	122															0.38		8.5*				
	106	SPT	CL/SM	Qsp	65	15.7																	8.5*					
	109.5	CR	SM	Qsp	27	13.2	117		3	75	22											0.43			850	34		
	114	SPT	CL	Qsp	20	19.9			0	28	72	31	20	11			7.6	110	119	1635								
	119.5	CR	CL	Qsp	43	18.1	113								0.06						0.065	0.010	0.49					
	124	SPT	CL	Qsp	23	30.3																						
E-126A/M-404	5.5	CR	CL	Qal	10	17.6	95															0.78			150	29		
	10	SPT	CL	Qalo	14	18.4																						

Table 5-2: Summary of Geotechnical Laboratory Test Results in Reach 4 (ACE, PE and Adv. Phase) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Modified Compression Index		Void Ratio	Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated-Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)	C <sub>ce</sub>	C <sub>re</sub>			Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
E-126A/M-404	15.5	CR	CL	Qalo	33	18.1	108															0.55					
	20	SPT	CL	Qalo	25	14.0																					
	25.5	CR	CL/SM	Qalo	25	15.3	107									7.6	36	54	1554			0.58					
	30	SPT	SM	Qalo	33	11.6																					
	35.5	CR	CL	Qalo	17	22.6	99	1	24	75	37	17	20	0.62		8.2	45	180	1286	0.115	0.014	0.70		350	27		
	40	SPT	SM	Qalo	31	9.0		9	64	27																	
	45.5	CR	SW-SM	Qalo	39	3.4		2	84	14													37.5*				
	50	SPT	SW-SM	Qalo	32	0.6																	37.5*				
	55.5	CR	SM/CL	Qalo	52	19.9	108	0	27	73						7.5	56	66	1467			0.56				1400	33.0
	60	SPT	CL	Qalo	22	16.7																					
	65.5	CR	CL	Qalo	20	23.9	101	0	11	89	49	16	33	0.03		7.7	44	90	811	0.089	0.019	0.67		400	25		
	70	SPT	CL	Qalo	23	17.3																					
	75.5	CR	SC/SM	Qalo	30	14.4	121	10	58	32												0.39				1300	31.0
	80	SPT	SC/SM	Qalo	35	-																					
	85.5	CR	SM	Qalo	47	11.6	108	19	65	16												0.55		800	30		
	90	SPT	SM	Qalo	49	8.3																					
	95.5	CR	CL	Qalo	49	17.7	114															0.48				600	34.0
	100	SPT	SC	Qalo	80/11"	11.2				38	27	14	13														
	105.5	CR	CL	Qalo	69	19.2	109															0.55					
	110	SPT	CL	Qsp	28	19.8																					
	115.5	CR	SC/CL	Qsp	61	15.0	116															0.45					
	120	SPT	SC/CL	Qsp	44	17.0																					
	125.5	CR	CL	Qsp	76	15.9	112				33	14	19	0.32						0.088	0.010	0.50					
	130	SPT	CL	Qsp	66	11.0																					
G-405/M-403	5.5	CR	SP-SM	Qal	19	4.1	121															0.39					
	10	SPT	SM	Qal	5	9.8				48																	
	15.5	CR	CL	Qalo	43	12.4	118															0.43					
	20	SPT	CL	Qalo	26	14.4																					
	25.5	CR	CL	Qalo	26	11.8	118															0.43					
	30	SPT	CL/SC	Qalo	17	7.4																					
	35.5	CR	SM	Qalo	43	4.8	115														0.47						



Table 5-2: Summary of Geotechnical Laboratory Test Results in Reach 4 (ACE, PE and Adv. Phase) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Modified Compression Index		Void Ratio	Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated- Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)	Cce	Cre			Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
G-405/M-403	40.5	SPT	SW-SM	Qalo	29	5.6				12																	
	45.5	CR	SM	Qalo	22	15.8	111				18											0.52					
	50.5	SPT	CL	Qalo	10	24.3																					
	55.5	CR	CL	Qalo	16	-																					
	60.5	SPT	CL	Qalo	12	23.4																					
	65.5	CR	CL	Qalo	25	23.1	100				82											0.68					
	70.5	SPT	CL	Qalo	32	19.0																					
	75.5	CR	CH	Qalo	19	23.4	100	0	14	86	52	17	35			8.0	28	59	932			0.68		650	24		
	80.5	SPT	SC/CL	Qalo	25	14.6																					
	83.5	CR	SC	Qalo	28	15.6	114	3	51	46	28	15	13									0.48		950	34		
	86.5	SPT	CL	Qalo	25	15.2										7.7	46	65	1314								
	89.5	SPT	SC	Qsp	21	12.4		7	52	41																	
	92.5	CR	CL	Qsp	35	20.9	107	0	34	66	38	14	24	0.70						0.081	0.019	0.55		550	31		
	95.5	SPT	CL	Qsp	26	21.1																					
	98.5	CR	SW-SM	Qsp	54	18.8	110															0.54	9*				
	100.5	SPT	SW-SM	Qsp	38	20.6																		9*			
	104.5	CR	ML	Qsp	27	25.6	95				72	33	25	8								0.77					
	107.5	SPT	ML/CL	Qsp	26	34.2										7.9*	32*	68*	1238*								
	110.5	CR	CL	Qsp	16	28.8	94	0	7	93	48	19	29	0.99		7.9*	32*	68*	1238*	0.135	0.025	0.77		450	26		
	113.5	SPT	SP	Qsp	42	16.6		0	99	1																	
G-406	5.5	CR	SM/CL	Qal	35	11.4	124															0.36					
	10.5	SPT	CL	Qal	22	11.9																					
	15.5	CR	SC/CL	Qal	24	9.2	120															0.41					
	20.5	SPT	CL/SC	Qal	14	17.6																					
	25.5	CR	SM	Qalo	16	8.4	114															0.48					
	30.5	SPT	SM/SC	Qalo	16	11.3																					
	35.5	CR	SW-SM	Qalo	34	5.9	122															0.38					
	40.5	SPT	SP-SM	Qalo	41	10.8																					
	45.5	CR	CL/SM	Qalo	43	15.5	116															0.45					
	50.5	SPT	SM/ML	Qalo/Qsp	20	23.3																					
	55.5	CR	CL	Qsp	33	22.1	98	0	29	71	31	17	14									0.72		250	27		

Table 5-2: Summary of Geotechnical Laboratory Test Results in Reach 4 (ACE, PE and Adv. Phase) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Modified Compression Index		Void Ratio	Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated-Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)	C <sub>ce</sub>	C <sub>re</sub>			Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
G-406	60.5	SPT	CL	Qsp	21	24.4																					
	65.5	CR	CL	Qsp	46	18.3	112	0	21	79	41	13	28	1.32		8.0	56	34	1193	0.094	0.021	0.51					
	70.5	SPT	CH	Qsp	29	20.1																					
	75.5	SPT	SM	Qsp	82	16.5																					
	78	CR	SM	Qsp	86	12.3	107	20	58	22						7.9	181	40	2886			0.57		750	34		
	80.5	SPT	SM	Qsp	58	9.9				19													25*				
	83	CR	SM	Qsp	45	12.0	116															0.45					
	85.5	SPT	CL	Qsp	36	18.0					33	16	17														
	88	CR	SM	Qsp	55	18.2	111	0	54	46												0.52					
	90.5	SPT	SC	Qsp	54	13.5				46													25*				
	93	CR	CL	Qsp	43	21.5	102	0	14	86	49	14	35			7.8	415	56	1051			0.65		1350	26		
	95.5	SPT	CL	Qsp	37	18.7																					
	100.5	CR	SM	Qsp	83	19.2	101	8	54	38												0.67		750	32		
	105.5	SPT	SM	Qsp	74	20.0					NP	NP	NP														
	110.5	CR	ML	Qsp	47	29.6	94							0.48		6.4	3228	56	476	0.135	0.025	0.80					
	115.5	SPT	CL	Qsp	20	37.4																					
	130.5	NR	CL	Qsp	57	-																					
G-407	5.5	NR	CL-ML	Qal	15	-																					
	10.5	SPT	CL/SC	Qalo	25	10.3																					
	15.5	CR	CL/SC	Qalo	26	-																					
	20.5	SPT	SM/SC	Qalo	11	11.5																					
	25.5	CR	SP-SM	Qalo	33	6.0	128															0.32					
	30.5	SPT	CL	Qalo	10	18.1																					
	35.5	CR	SM	Qalo	24	-		38	39	23																	
	38.5	SPT	SC/SM	Qalo	9	17.7																					
	41.5	CR	CL	Qalo	25	-					37	17	20														
	44.5	SPT	SC/CL	Qalo	12	23.0										7.5	40	35	2730								
	47.5	CR	CL	Qsp	21	23.2	102	0	18	82	35	16	19	0.33						0.108	0.020	0.65					
	50.5	SPT	CL	Qsp	17	22.3																					
	53.5	CR	CL	Qsp	19	23.9	100	0	23	77	38	15	23	0.16						0.130	0.017	0.68		300	28		
	56.5	SPT	CL	Qsp	12	22.4										7.7	47	35	1001								
	59.5	SPT	CL/SC	Qsp	11	17.5																					

Table 5-2: Summary of Geotechnical Laboratory Test Results in Reach 4 (ACE, PE and Adv. Phase) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Modified Compression Index		Void Ratio	Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated-Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)	Cce	Cre			Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
G-407	62.5	CR	SC	Qsp	44	13.4	112	4	56	40												0.50		650	31		
	65.5	SPT	SC	Qsp	36	16.8										7.3	145	41	1130								
	68.5	NR	SW-SM	Qsp	55	-																					
	71.5	SPT	SM	Qsp	72	-																13.5*					
	74.5	CR	SM	Qsp	63	14.5	110	11	74	15				-0.03						0.075	0.008	0.55		350	36		
	77.5	SPT	SC	Qsp	39	-																13.5*					
	80.5	CR	SM	Qsp	38	-		4	69	27																	
	85.5	SPT	ML	Qsp	51	17.9																					
	90.5	CR	SC/SM	Qsp	30	-																					
<div>CR      Crandall Sampler</div> <div>NR      No Recovery</div> <div>CORE    Continuous core sample</div> <div>SPT      Standard Penetration Test Sampler</div> <div>"Gravel"    Particle size greater than No. 4 sieve</div> <div>"Sand"      Particle size less than No. 4 sieve but greater than No. 200 sieve</div> <div>"Fines"     Particle size less than No. 200 Sieve</div> <div>NP        Non-plastic</div> <div>Quaternary Younger Alluvium – Qal, Quaternary Older Alluvium – Qalo, Lakewood – Qlw, San Pedro – Qsp</div> <div>* Indicates that a composite sample was used for NTNU Soil Abrasion Test</div> <div>^For Expansion/Collapse Test : "-" indicates expansion of the sample upon saturation, otherwise collapse</div>																											

Table 5-3: Summary of Geotechnical Laboratory Test Results in Reach 5 (ACE, PE and Adv. Phase) –Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated- Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)					Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
G-145	10.5	CR	CL	Qal	push	18.8	104	1	15	84	47	17	30									0.61					
	15.5	SPT	CH	Qal	10	13.6																					
	20.5	CR	GP-GC	Qal	5	18.6	111															0.50					
	25.5	SPT	CL	Qalo	22	16.2		3	38	59	33	15	18														
	30.5	NR	CL	Qalo	7																						
	31.5	SPT	CL	Qalo	10	16.8										7.7	12	8	1,680								
	35.5	SPT	SM	Qalo	33	12.9		5	53	42																	
	40.5	NR	SM	Qalo	4																						
	41.5	SPT	SM	Qalo	8	5.6		15	65	20																	
	45.5	SPT	CL	Qalo	19	16.0																					
	50.5	NR	CL	Qalo	4																						
	51.5	SPT	CL	Qalo	25	19.5		6	21	73	39	15	24														
	55.5	NR	CL	Qalo	18																						
	60.5	NR	CL	Qalo	16																						
	61.5	SPT	CL	Qalo	15	17.4										7.8	57	13	1,840								
	65.5	CR	CL	Qalo	20	14.8	111	1	38	61	30	15	15									0.51					
	70.5	CR	CL	Qalo	10																						
	71.5	SPT	CL	Qalo	18	20.4		1	29	70	39	15	24														
	75.5	NR	CL	Qalo	28																						
	80.5	CR	SM	Qalo	69	5.5	115	20	64	16												0.45		150	39		
	85.5	SPT	SM	Qalo	74/11"	17.5																					
	90.5	CR	SP-SM	Qalo	30	19.2	105															0.59		250	30		
	95.5	SPT	SM	Qalo	60	10.5										7.8	50	15	2,840								
	100.5	CR	SM	Qsp	17	20.5	101	1	49	50												0.65		1,250	24		
	105.5	SPT	SM	Qsp	67	19.0																					
	110.5	CR	CL	Qsp	27	3.5	112	1	21	78	40	14	26									0.50					
	115.5	SPT	CL	Qsp	37	22.5										8.3	122	10	1,000								
	120.5	CR	CL	Qsp	26	15.7	118															0.41					
G-146	5.5	CR	CL-ML	Qal	10	20.1	96															0.74					
	10.5	SPT	CL-ML	Qalo	13	22.4																					
	15.5	NR	CL-ML	Qalo	10																						
	17.5	CR	CL	Qalo	21																						

Table 5-3: Summary of Geotechnical Laboratory Test Results in Reach 5 (ACE, PE and Adv. Phase) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated-Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)					Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
G-146	20.5	SPT	CL	Qalo	32	16.0																					
	25.5	CR	CL	Qalo	20	16.4	115														0.76						
	30.5	SPT	SP-SM	Qalo	30	16.5																					
	35.5	CR	SP	Qalo	44	13.1	116																				
	40.5	SPT	SM	Qalo	16	19.1																					
	45.5	CR	ML	Qalo	22	12.4	118														0.43						
	48.5	SPT	ML	Qalo	20	16.7		3	39	58																	
	51.5	CR	CL-ML	Qalo	13	21.5	101																				
	54.5	SPT	CL	Qalo	23	17.1																					
	57.5	CR	CL	Qalo	27	17.0	111	6	30	64	33	18	15						0.095 063	0.017 011	0.51						
	60.5	SPT	ML	Qalo	17	21.3																					
	63.5	CR	CL	Qalo	24	19.0	107														0.57		700	29			
	66.5	SPT	CL	Qalo	23	29.6										7.3	134	19	1,120								
	69.5	CR	CL	Qalo	19	24.0	101	0	10	90	42	18	24						0.183 110	0.033 020	0.66						
	72.5	SPT	ML	Qalo	36	15.7																					
	75.5	CR	ML	Qalo	34	20.3	108														0.55		1,400	25			
	78.5	SPT	ML	Qalo	25	16.7										7.0	94	11	1,840								
	81.5	CR	CL	Qalo	33	17.7	112	0	25	75	43	22	21						0.102 068	0.025 017	0.50						
	84.5	SPT	CL	Qalo	49	22.4																					
	87.5	CR	CL	Qalo	28	24.7	99														0.70		2,650	10			
	90.5	SPT	SM	Qalo	75	11.2		13	70	17																	
	94.5	CR	SM	Qalo	63	13.7	116														0.44						
	99.5	SPT	SW-SM	Qalo	53/6"	14.4																					
	104.5	CR	SW-SM	Qalo	80/6"	9.4	129																				
G-147	5.5	CR	SM	Qal	12																						
	10.5	SPT	CL	Qal	16	18.8																					
	15.5	CR	SM	Qalo	23	15.7	104													0.60							
	20.5	SPT	CL	Qalo	28	11.1																					
	25.5	CR	CL	Qalo	23	20.4	106													0.59							
	30.5	SPT	GM	Qalo	35	6.3																					



Table 5-3: Summary of Geotechnical Laboratory Test Results in Reach 5 (ACE, PE and Adv. Phase) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated- Undrained (Peak Strength)		
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)					Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)	
G-147	35.5	CR	CL	Qalo	22	20.4	100															0.67						
	40.5	SPT	CL-ML	Qalo	15	23.7																						
	45.5	CR	CL-ML	Qalo	38	15.9	112																					
	50.5	SPT	SM	Qalo	94/8"	10.2																						
	55.5	CR	CL	Qalo	32	18.5	108															0.56						
	60.5	SPT	CL	Qalo	23	25.7																						
	65.5	CR	CL	Qalo	63	13.3	114															0.47						
	70.5	SPT	SM	Qalo	90	9.3		15	63	22																		
	75.5	CR	CL	Qalo	50	15.8	113	1	40	59	38	16	22							0.085057	0.022015	0.49		3,350	16			
	80.5	SPT	CL	Qalo	45	18.0		0	35	65	31	18	13		2.66													
	85.5	CR	SM	Qalo	65	18.0	113							0.11														
	90.5	SPT	SM	Qalo	50/3"	7.5		20	55	25																		
	95.5	CR	SM	Qalo	42	14.1	119	18	63	19					2.60										1,300	28		
	100.5	SPT	SM	Qalo	50/4"	8.1		12	69	20																		
	105.5	CR	CL	Qalo	78	17.6	114															0.47						
	110.5	SPT	CL	Qalo	43	16.9																						
	115.5	CR	ML	Qalo	55	26.0	99	1	18	81	48	28	20												0	28		
	120.5	SPT	ML	Qalo	45	18.0																						
G-148	5.5	CR	ML	Qal	12	23.3	97															0.73						
	10.5	SPT	CL	Qal	10/10"	25.2					45	17	28															
	15.5	NR	CL	Qal	28																							
	16.5	CR	CL	Qal	13	16.9	114															0.47						
	20.5	SPT	CL	Qalo	21	18.5		0	18	82	39	16	23															
	25.5	CR	CL	Qalo	20	21.7	107															0.57						
	30.5	SPT	SP-SM	Qalo	25	12.8																						
	35.5	CR	ML	Qalo	24	6.5	124	3	35	62												0.35						
	40.5	SPT	CL	Qalo	12	20.8					33	15	18															
	45.5	CR	SM	Qalo	32	15.6	119	21	39	40												0.41						
	50.5	SPT	CL	Qalo	14	19.2																						
	55.5	CR	CL	Qalo	22	19.4	111															0.51						

Table 5-3: Summary of Geotechnical Laboratory Test Results in Reach 5 (ACE, PE and Adv. Phase) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated- Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)					Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
G-148	60.5	SPT	CH	Qalo	19	29.4				54	18	36															
	65.5	CR	SC	Qalo	44	14.9	117														0.42						
	70.5	SPT	SC	Qalo	40	19.5		6	49	45	31	22	9														
	75.5	CR	CL	Qalo	40	14.7		2	34	64	32	17	15														
	80.5	SPT	SM	Qalo	66	11.4										8.0	65	18	1,680								
	85.5	CR	SM	Qalo	57	13.1	113	6	66	28				0.12	2.81							0.55		600	31		
	90.5	SPT	CL	Qalo	32	13.5										7.7	68	17	1,920								
	95.5	CR	SM	Qalo	40	8.5	119	6	68	26	NP	NP	NP		2.75							0.44		500	35		
	100.5	SPT	CL	Qalo	31	19.5		2	33	65	37	22	15		2.79	7.8	43	5	1,160								
	105.5	CR	CL	Qalo	56	11.7	120	2	69	29				0.11								0.40		450	38		
	110.5	SPT	CL	Qalo	33	23.6																					
	115.5	CR	CL	Qalo	34	19.4	108	0	37	63	44	16	28									0.55					
	120.5	SPT	CL	Qalo	44	14.0										7.7	66	3	1,440								
	125.5	CR	CL	Qalo	64	16.7	110	0	32	68					2.82							0.60		200	31		
	130.5	SPT	CL	Qalo	44	24.0																					
	135.5	CR	CL	Qalo	44	18.7	111															0.51					
	140.5	SPT	CL	Qalo	56			5	41	54	38	14	24														
G-149	6.5	CR	ML	Qal	19	14.8	108															0.55					
	10.5	SPT	SM	Qal	21	12.3																					
	15.5	CR	ML	Qal	5	18.7	97															0.73					
	20.5	SPT	SM	Qal	12	18.6				39																	
	25.5	CR	SM	Qal	14	9.4	106															0.57					
	30.5	SPT	CL	Qalo	37	17.4																					
	35.5	CR	ML	Qalo	14	27.4	93															0.81					
	40.5	SPT	ML	Qalo	13	23.6																					
	45.5	CR	ML/SM	Qalo	29	20.8	107															0.57					
	48	CR	ML	Qalo	22	18.1	106															0.58					
	50.5	SPT	ML	Qalo	21	14.9																					
	53	CR	ML	Qalo	28	20.9	105			62												0.60					

Table 5-3: Summary of Geotechnical Laboratory Test Results in Reach 5 (ACE, PE and Adv. Phase) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear Peak Strength		Triaxial Consolidated- Undrained (Peak Strength)		
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)					Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)	
G-149	55.5	SPT	CL	Qalo	28	24.0				37	21	16			7.7	78	14	920										
	58	CR	SM	Qalo	40	16.4	114	17	48	35											0.47			3,100	11			
	60.5	SPT	ML/SM	Qalo	93	12.9								2.66														
	63.5	CR	SM	Qalo	81	12.6	122	10	58	32				0.06							0.37							
	65.5	SPT	CL	Qalo	23	22.2			14	86	46	24	22		2.59													
	68	NR	CL	Qalo	45																							
	70.5	SPT	CL	Qalo	24	23.9																						
	73.5	CR	SM	Qalo	39	24.4	101	2	49	49				0.03							0.65			750	27			
	75.5	SPT	CL	Qalo	27	28.4					36	20	16			7.8	89	14	880									
	78	CR	CL	Qalo	40	25.9	97								2.59							0.73			300	23		
	80.5	SPT	CL	Qalo	43	15.4		2	46	52																		
	83.5	CR	CL	Qalo	43	17.6	110	2	42	56				0.02								0.53						
	85.5	SPT	SC/SM	Qalo	88	13.5																						
	88	CR	SM	Qalo	50/6"	15.8	110															0.52						
	90.5	SPT	ML	Qalo	32	28.0																						
	93	CR	ML	Qalo	46	19.3	100															0.68						
	95.5	SPT	ML	Qalo	34	31.4																						
	98	CR	SM	Qalo	70/10"	24.0	101															0.65						
	100.5	SPT	SM	Qalo	62	17.9																						
	105.5	CR	SM	Qalo	73/10"	24.0	101															0.65						
	110.5	SPT	SM	Qalo	92/10"	12.0																						
G-150	5.5	CR	CL	Qal	Push	21.3	102															0.65						
	10.5	NR	CL	Qal	7																							
	15.5	CR	ML	Qal	8	21.0	98															0.71						
	20.5	SPT	GP	Qal	7	10.8																						
	25.5	CR	CL	Qalo	28	14.9	117	4	42	54												0.44						
	30.5	SPT	CL	Qalo	19	31.7																						
	35.5	CR	SP/SC	Qalo	20	16.2	109															0.53						
	40.5	SPT	SC	Qalo	20	18.1		5	60	35																		
	45.5	CR	CL	Qalo	26	21.6	106															0.58						

Table 5-3: Summary of Geotechnical Laboratory Test Results in Reach 5 (ACE, PE and Adv. Phase) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated- Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)					Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
G-150	50.5	SPT	CL	Qalo	20	23.9		0	25	75	43	21	22		2.53	7.9	86	18	920								
	60.5	CR	SC	Qalo	28	18.4	110	7	52	41	37	20	17									0.52		0	33		
	70.5	CR	SM	Qalo	53	14.8	113	3	73	24				0.04								0.47					
	75.5	CR	CH	Qalo	27	23.7	102	0	22	78	54	27	27			8.0	64	15	800	0.122 074	0.040 024	0.65					
	90.5	CR	SM	Qalo	27	29.5	93	0	74	26												0.79		600	28		
	95.5	SPT	SM	Qalo	66	18.3									2.60												
	100.5	CR	SM	Qalo	35	19.7	103							0.05								0.62					
	105.5	CR	SP	Qalo	45	18.4																					
	110.5	CR	CL	Qalo	75	22.5	103															0.63					
G-161	6.5	CR	CL	FILLaf	Push	15.3	109															0.54					
	10.5	SPT	CL	Qal	10	25.4																					
	15.5	NR	SM	Qal	18																						
	20.5	SPT	CL	Qal	5	23.5																					
	25.5	CR	CL	Qal	4	24.6	94				35	24	11									0.79					
	30.5	SPT	SM/ML	Qal	10	27.3																					
	35.5	NR	SM	Qalo	30																						
	40.5	SPT	SM	Qalo	25	18.0				19																	
	45.5	NR	SM	Qalo	30																						
	50.5	SPT	SM	Qalo	62	10.8		38	45	17	31	23	8														
	55.5	CR	ML/SP	Qalo	11	28.0	93							0.20								0.79					
	60.5	SPT	ML	Qalo	50	16.9					39	26	13														
	65.5	CR	CL	Qalo	28	23.0	102													0.150 092	0.033 020	0.63					
	70.5	SPT	CL	Qalo	38	17.9									2.65	7.8	82	9	1,400								
	75.5	CR	CL	Qalo	30	24.1	102	0	20	80	39	23	16									0.65		500	28		
	80.5	SPT	CL-CH	Qalo	24	32.1																					
	85.5	CR	CL	Qalo	31	17.6	111	0	34	66	34	18	16	-0.03	2.65					0.092 062	0.025 017	0.49					
	90.5	SPT	CL	Qalo	39	28.2																					
	95.5	CR	SP/SC	Qalo	36	22.7	106	3	54	43					2.65							0.56		1,300	28		
	100.5	SPT	CL	Qalo	46	14.7		1	33	66																	

Table 5-3: Summary of Geotechnical Laboratory Test Results in Reach 5 (ACE, PE and Adv. Phase) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated- Undrained (Peak Strength)		
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)					Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)	
G-161	105.5	CR	CL	Qalo	45	15.3	114														0.47							
	110.5	SPT	CL	Qalo	33	26.3										7.7	36	6	1,120									
	115.5	CR	SC	Qalo	45	12.8	124														0.34							
	120.5	SPT	SP	Qalo	59	22.2																						
G-162	5.5	CR	CL-CH	Qal	Push	23.3	101																					
	10.5	CR	ML	Qal	5	18.0	104														0.61							
	15.5	SPT	ML	Qal	4	22.2																						
	20.5	CR	CL	Qal	5	27.1	91				33	21	12	0.07							0.85							
	25.5	SPT	CL	Qal	Push	30.8																						
	30.5	NR	CL	Qalo	12																							
	35.5	SPT	CL	Qalo	12	21.7																						
	40.5	NR	CL	Qalo	65																							
	45.5	SPT	SC	Qalo	38	7.8																						
	50.5	NR	SC	Qalo	51																							
	55.5	SPT	SC	Qalo	40	13.9		14	59	27																		
	60.5	SPT	CL	Qalo	30	19.8		2	36	62					2.65	7.7	79	15	1,000									
	70.5	CR	SC	Qalo	80/10"	11.6	114	40	46	14											0.46			0	44			
	80.5	CR	CL	Qalo	32	19.8	109														0.54							
	87.5	SPT	SC-SM	Qalo	92/9"	16.0		19	47	34	29	22	7		2.57													
	90.5	CR	CH	Qalo	45	19.8	108													0.403 066	0.028 018	0.55			3,450	12		
	93.5	SPT	CH	Qalo	30	20.2		0	23	77	56	26	30			7.6	30	23	1,120									
	96.5	CR	CH	Qalo	29	19.2	113															0.49						
	99.5	SPT	CL	Qalo	40	20.1				58																		
	103.5	CR	CL-CH	Qalo	35	20.3	106																					
	105.5	NR	CL-CH	Qalo	45																							
	110.5	CR	CL-CH	Qalo	73/9"	26.2	99																					
	115.5	CR	SP	Qalo	36	10.8	122															0.37						
	120.5	CR	SP	Qalo	68	15.5	113															0.47						
G-164	6.5	CR	CL	FILL	12	12.5	116														0.45							
	10.5	SPT	CL	Qal	10	19.4																						



Table 5-3: Summary of Geotechnical Laboratory Test Results in Reach 5 (ACE, PE and Adv. Phase) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated- Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)					Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
G-164	15.5	CR	CL	Qal	8	13.4	104				29	18	11									0.61					
	20.5	NR	CL	Qal	13																						
	25.5	CR	ML	Qalo	18	16.1	105	0	25	75												0.60					
	30.5	SPT	ML	Qalo	10	21.9				59						7.5	62	29	1,720								
	33.5	CR	ML	Qalo	9	32.0	90	0	11	89	36	27	9							0.187 100	0.030 016	0.87		500	25		
	36.5	SPT	SM	Qalo	17	18.7		5	67	28					2.64												
	39.5	CR	SM	Qalo	24	22.6	103							0.02								0.62					
	42.5	SPT	SM	Qalo	54	11.4		31	54	15																	
	48.5	CR	GW-GM	Qalo	57	10.3	119	49	41	10				0.07	2.68							0.41					
	51.5	SPT	CH	Qalo	29	26.7		0	9	91	50	27	23														
	54.5	CR	CH	Qlw	16	27.6	97				61	29	32			7.4	26	37	600	0.078 045	0.045 026	0.73		500	26		
	57.5	SPT	CH	Qlw	27	21.2		0	45	55																	
	60.5	CR	SM	Qlw	70	12.6	109	0	80	20				0.14								0.53					
	63.5	SPT	SP	Qlw	50/6"	17.6									2.61												
	66.5	CR	SP	Qlw	90	19.5	107			12										0.040 026	0.006 004	0.56		0	31		
	69.5	SPT	SM	Qlw	50/5"	20.1		0	88	12																	
	72.5	CR	SP	Qlw	75	20.1	105							0.06								0.59					
	75.5	SPT	SP	Qlw	50/4"	17.3				18						7.8	61	20	3,200								
	78.5	CR	SP	Qlw	75	19.4	100															0.67					
	81.5	NR	SP	Qlw	50/2"																						
	85.5	CR	SP	Qlw	80	18.2	101															0.65					
	90.5	SPT	SM	Qlw	93/11"	24.0		0	78	22																	
	95.5	CR	SP	Qsp	78	23.8	98															0.70					
	100.5	SPT	SP	Qsp	95/10"	31.5																					
	105.5	CR	SM	Qsp	75	16.6	102															0.63					
	110.5	SPT	SM	Qsp	87	24.7																					
	115.5	CR	SM	Qsp	100	17.6	111															0.50					
	120.5	SPT	CL	Qsp	61	22.0																					
	125.5	CR	SP-SM	Qsp	125	17.6	96																				

Table 5-3: Summary of Geotechnical Laboratory Test Results in Reach 5 (ACE, PE and Adv. Phase) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated-Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)					Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
G-164	130.5	SPT	SP	Qsp	50/4"	16.1																					
	135.5	CR	SP	Qsp	100	10.0	118														0.41						
	140.5	SPT	SP	Qsp	50/4"	16.9																					
	145.5	CR	SM	Qsp	100/5"	12.5	116														0.44						
	150.5	SPT	SM	Qsp	50/5"	14.0																					
G-165	10.5	CR	SM	Qalo	Push	16.8	109															0.53					
	13.5	SPT	CL	Qalo	9	24.2																					
	16.5	CR	SC/SP	Qalo	10	22.7	101	2	49	49												0.65					
	19.5	SPT	SC	Qalo	11	22.1																					
	22.5	CR	CL	Qalo	12	17.6	106															0.58					
	25.5	SPT	SC	Qalo	23	13.1		11	41	48	39	20	19														
	28.5	CR	SC	Qalo	26	18.4	112												0.124 083	0.019 013	0.49						
	31.5	SPT	SC	Qalo	20	15.6																					
	34.5	CR	SC	Qalo	12	21.1	101															0.65					
	37.5	SPT	SM/CL	Qalo	15	25.4																					
	40.5	CR	SC	Qalo	16	19.6	97															0.72					
	43.5	SPT	CL	Qalo	17	24.8		0	24	76																	
	46.5	CR	CL/SM	Qalo	15	28.9	95															0.77					
	49.5	SPT	CL	Qalo	41	18.4																					
	52.5	CR	CL	Qalo	30	18.9	105															0.60					
	55.5	SPT	CL	Qalo	36/10"	17.3		1	41	58																	
	58.5	CR	CL	Qalo	24	21.0	101															0.66					
	61.5	SPT	CL	Qalo	17	31.4																					
	64.5	CR	CL	Qalo	18	19.4	97															0.73					
	67.5	SPT	CL	Qalo	28	25.5		0	23	77	42	25	17			7.7	9	172	600								
	70.5	CR	CL	Qalo	26	37.5	82								2.69					0.096 047	0.045 022	1.05					
	73.5	SPT	CL/SM	Qlw	68/11"	16.4																					
	76.5	CR	SM	Qlw	50/6"	14.5	105															0.59					
	79.5	SPT	SM	Qlw	95/11"	16.9		0	85	15																	
	82.5	CR	SM	Qlw	80	19.1	94								2.67							0.77			600	31	

Table 5-3: Summary of Geotechnical Laboratory Test Results in Reach 5 (ACE, PE and Adv. Phase) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated- Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)					Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
G-165	85.5	SPT	SM/CL	Qlw	90/11"	23.9																					
	88.5	CR	SM	Qlw	79/10"	18.2	100													0.083050	0.008005	0.67					
	91.5	SPT	SM	Qlw	88/10"	20.7		0	72	28																	
	94.5	CR	SM	Qlw	56	23.8	99															0.68		0	33		
	97.5	SPT	SM	Qlw	97/11"	15.9																					
	100.5	CR	SM	Qlw	75/10"	14.1	108															0.54					
	103.5	SPT	SM	Qlw	63	24.3		0	68	32																	
	106.5	CR	SM	Qlw	42/10"	22.6	99							2.63								0.66		600	33		
	109.5	SPT	SC	Qlw	91	26.1										7.8	53	432	680								
	112.5	NR	SC	Qlw	50/3"																						
	115.5	SPT	SP	Qsp	50/10"	20.2																					
	118.5	CR	SP	Qsp	60/10"	18.8	106															0.57					
	120.5	SPT	MH	Qsp	59	27.2		0	14	86	51	30	21														
	125.5	NR	SP	Qsp	50/10"	17.5																					
	130.5	SPT	SP	Qsp	50/5"	14.9																					
	135.5	CR	SP	Qsp	50/1"	13.5	97															0.72					
	140.5	CR	SP	Qsp	50/5"	18.6	94															0.77					
145.5	CR	SP	Qsp	50/5"	13.3	116															0.44						
150.5	CR	SP	Qsp	50/5"	18.9	95															0.75						
G-166A/B	10.5	CR	SW	Qalo	49	9.3	118															0.41					
	13.5	SPT	SM	Qalo	32	8.7		15	65	20																	
	16.5	CR	SM	Qalo	32	7.4	114															0.46					
	19.5	SPT	CL/SM	Qalo	54	20.9																					
	22.5	CR	SM	Qalo	65/11"	6.8	112															0.49					
	25.5	SPT	CL	Qalo	33	12.8		0	25	75																	
	28.5	CR	CL	Qalo	70	11.0	84															1.00					
	31.5	SPT	CL	Qalo	49	10.9					38	13	25														
	34.5	CR	CL	Qalo	82	10.4	118															0.42					
	37.5	SPT	CL	Qalo	29	22.6																					

Table 5-3: Summary of Geotechnical Laboratory Test Results in Reach 5 (ACE, PE and Adv. Phase) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated-Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)					Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
G-166A/B	40.5	CR	CL	Qalo	21	22.2	98	3	63	34										0.130 076	0.043 025	0.71					
	43.5	SPT	CL	Qalo	18	29.9																					
	46.5	CR	CL	Qalo	20	20.5	108															0.55					
	49.5	SPT	CL	Qalo	37	19.9																					
	52.5	CR	CL	Qalo	46	19.8	107	0	13	87	46	18	28		2.61							0.52		3,100	15		
	57.5	SPT	CL	Qalo	30	25.0										6.5	79	23	1,040								
	62.5	CR	CH	Qalo	34	22.0	101	0	23	77	55	28	27		2.61							0.61					
	65.5	CR	MH	Qalo	12	56.7	66															1.51					
	68.5	SPT	MH	Qalo	30	31.9		0	1	99	82	43	39														
	73.5	CR	SP	Qlw	60	18.2	97															0.72					
	79.5	SPT	SP	Qlw	95	16.0																					
	85.5	CR	SM	Qsp	75/6"	23.0	89	0	84	16					2.62					0.079 043	0.013 007	0.84					
	90.5	SPT	SP-SM	Qsp	50/6"	21.7																					
	95.5	CR	SP	Qsp	75/6"	13.3	92															0.83		0	36		
	100.5	SPT	SM	Qsp	99/10"	20.6		0	51	49																	
	105.5	CR	SM	Qsp	80/10"	20.8	103	0	51	49	NP	NP	NP									0.62					
	110	SPT	SP	Qsp	50/6"	17.8																					
	115.5	CR	SC	Qsp	47	12.8	123	0	54	46	24	13	11		2.72							0.38		2,000	30		
	120	SPT	SP	Qsp	50/5"	12.2																					
	125.5	NR	SW	Qsp	100/3"																						
	130.5	SPT	SP	Qsp	50/4"	18.9																					
	135.5	CR	SP	Qsp	75/6"	15.7	96															0.74					
	140.5	SPT	SM	Qsp	50/5"	20.9		3	63	34																	
	145.5	CR	SP	Qsp	75/6"	20.5	88															0.89					
	150.5	SPT	SP	Qsp	50/4"	17.9																					

Table 5-3: Summary of Geotechnical Laboratory Test Results in Reach 5 (ACE, PE and Adv. Phase) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Modified Compression Index		Void Ratio	Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated-Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)	Cce	Cre			Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
G-409	5.5	CR	CL	Qal	14	16.8	97														0.74						
	10.5	SPT	CL-ML	Qal	12	15.6			66																		
	15.5	CR	CL-ML	Qal	18	15.4	102														0.65						
	20.5	SPT	CL-ML	Qal	12	16.3																					
	25.5	CR	SC/CL	Qalo	21	13.6	120														0.41						
	30.5	SPT	CL	Qalo	17	21.4																					
	35.5	CR	SM	Qalo	61	10.8	122														0.38						
	40.5	SPT	CL	Qalo	21	22.1				42	15	27															
	45.5	CR	CL	Qalo	18	21.0	100														0.69						
	50.5	SPT	CL	Qalo	19	15.9																					
	55.5	CR	CL	Qalo	24	18.6	108														0.55						
	60.5	SPT	CL	Qalo	24	17.4																					
	65.5	CR	SC/SM	Qalo	62	14.9	121														0.39						
	70.5	SPT	CL	Qalo	13	22.0																27					
	75.5	CR	CL/SC	Qalo	39	21.9	105				35	16	19								0.60						
	80.5	SPT	CL	Qalo	27	25.8																					
	85.5	CR	CL	Qalo	56	12.5	123														0.37						
	90.5	SPT	SM	Qalo	55	19.2		16	41	43																	
	95.5	CR	CL	Qalo	15	17.7	102														0.65						
	100.5	SPT	CL	Qalo	29	25.4																					
	105.5	CR	SM	Qalo	49	19.9	104	0	57	43	NP	NP	NP	0.02						0.065	0.009	0.58		350	32		
	108	SPT	SP-SM	Qalo	42	-																					
	111.5	CR	SM	Qalo	48	20.0																	27				
	114.5	SPT	CL	Qalo	40	21.4					33	14	19			7.6	87	36	1461								
	117.5	CR	ML/SM	Qalo	52	21.9	103	0	47	53											0.64			350	31		
	120.5	SPT	SP/CL	Qalo	56	21.5		0	43	57	28	15	13			8.0	86	23	1924								
	125.5	NR	CL	Qalo	58	-																					
	130.5	SPT	SC	Qalo	64	12.9		9	57	34	28	16	12			7.6	80	29	1176								



Table 5-3: Summary of Geotechnical Laboratory Test Results in Reach 5 (ACE, PE and Adv. Phase) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Modified Compression Index		Void Ratio	Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated-Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)	C <sub>ce</sub>	C <sub>re</sub>			Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
G-409	150.5	CR	CH	Qalo	35	20.8	103														0.64						
	155.5	SPT	CH	Qalo	33	26.1																					
G-410/M-406	6.5	CR	CL	Qal	11	15.9	100														0.69						
	10.5	SPT	CL	Qal	16	12.3																					
	15.5	CR	CL	Qal	25	11.4	108														0.57						
	20.5	SPT	SC/CL	Qal	10	16.6				56																	
	25.5	CR	CL	Qalo	23	15.4	114														0.48						
	30.5	SPT	CL	Qalo	22	17.6																					
	35.5	CR	CL	Qalo	24	15.6	115														0.46						
	40.5	SPT	SM	Qalo	10	24.8																					
	45.5	CR	CL	Qalo	12	27.8	97														0.74						
	50.5	SPT	CL	Qalo	11	20.3																					
	55.5	CR	SM	Qalo	20	17.8	111														0.52						
	60.5	SPT	CL	Qalo	29	15.7																					
	65.5	CR	CL	Qalo	19	20.1	106														0.60						
	70.5	SPT	CL	Qalo	15	25.2																					
	75.5	CR	CL/SM	Qalo	34	23.0	102														0.64						
	80.5	SPT	CL	Qalo	33	14.4																					
	85.5	CR	CL	Qalo	40	18.4	110														0.53						
	90.5	SPT	SW-SM	Qalo	30	14.7																					
	95.5	CR	CL	Qalo	42	16.3	115														0.46						
	100.5	SPT	SC	Qalo	52	12.1																					
	103.5	CR	SC	Qalo	64	12.2	116														0.45						
	106.5	SPT	CL	Qalo	22	29.3										7.3	58	210	1774								
	110.5	SPT	CL	Qalo	20	26.4		0	18	82	39	19	20														
	113.5	CR	SM	Qalo	59	21.1	102	1	60	39											0.65		900	30			
	116.5	SPT	SC	Qalo	44	17.9		2	56	42						8.2	50	180	2447				29*				
	120.5	SPT	SW-SM	Qalo	67	13.4																					
	123.5	CR	SM	Qalo	73	14.8	115	2	83	15						7.5	57	240	5508			0.47					
	126.5	SPT	SM/CL	Qalo	50/3"	9.3																					
	130.5	SPT	SM	Qalo	50/6"	13.5		0	69	31																	

Table 5-3: Summary of Geotechnical Laboratory Test Results in Reach 5 (ACE, PE and Adv. Phase) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Modified Compression Index		Void Ratio	Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated-Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)	C <sub>ce</sub>	C <sub>re</sub>			Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
G-410/M-406	133.5	NR	SM	Qalo	56																	33					
	136.5	SPT	SM	Qalo	80	10.1																					
	139.5	CR	CL	Qalo	52	13.3	118	2	43	55	35	14	21	0.27					0.123	0.012	0.43		500	29			
	144.5	SPT	CL	Qalo	23	22.0										7.8	49	243	1107								
	149.5	CR	CL	Qalo	44	21.3	107	4	29	67	45	15	30	0.74					0.199	0.027	0.57		1350	28			
	154.5	SPT	CL	Qalo	45	20.9																					
	159.5	CR	CL	Qalo	38	24.4	97														0.73						
	164.5	SPT	CL	Qalo	40	16.6				81	33	15	18														
	169.5	CR	CL	Qalo	24	22.9	103														0.64						
G-411	5.5	CR	CL	Qal	23	21.1	103														0.64						
	10.5	SPT	CL	Qal	18	14.2																					
	60.5	CR	CL	Qalo	30	24.9	102														0.66						
	65.5	SPT	SM/SC	Qalo	81	12.0																					
	68.5	CR	SM/SC	Qalo	92	13.0	114	5	70	25				0.23					0.065	0.013	0.48		100	32			
	73.5	NR	SP-SM	Qalo	55																						
	76.5	CR	CL	Qalo	41	18.6	113	0	33	67						7.8	47	42	1262			0.49					
	79.5	SPT	ML	Qalo	72	17.6				79	NP	NP	NP			7.6	39	39	2778								
	84.5	CR	SP-SM	Qalo	64	15.4	110	7	69	24				-0.05					0.042	0.007	0.54		300	33			
	87.5	SPT	SC/SM	Qalo	50/5"	7.6																					
	90.5	SPT	SM	Qlw	50/5"	12.0				23												28*					
	93.5	CR	SM	Qlw	93	18.4	104									7.5	40	34	2214			0.62		700	32		
	96.5	SPT	SP-SM	Qlw	50/4"	12.7																28*					
	99.5	CR	SP-SM	Qlw	92	21.5	103	5	79	16				0.01					0.038	0.007	0.63						
	102.5	SPT	SP-SM	Qlw	60/6"																						
	109.5	CR	SM	Qlw	94	18.2	104	0	78	22						7.6	44	29	2558			0.62		300	32		
	114.5	SPT	SM	Qlw	50/5"	15.6																28*					
	119.5	CR	SP-SM	Qlw	50	8.4	121														0.39						
	124.5	SPT	SM	Qlw	50/6"	14.2				37																	
	129.5	CR	SP-SM	Qlw	83	18.2	109														0.55						
	134.5	SPT	SM	Qlw	50/6"	18.6																					

Table 5-3: Summary of Geotechnical Laboratory Test Results in Reach 5 (ACE, PE and Adv. Phase) – Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Modified Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated-Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)	C <sub>ce</sub>	C <sub>re</sub>			Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
G-412 /E-132A /M-407	35.5	CR	CH	Qalo	-	17.6	111															0.52					
	40.5	SPT	CH	Qalo	17	20.7	-																				
	43	CR	CH	Qalo	-	18.2	108	0	8	92	60	17	43									0.56				2100	22
	45.5	SPT	SC/CL	Qalo	22	15.4	-																				
	48	CR	SC/CL	Qlw	-	16.5	111	0	49	51	34	8	26									0.51		600	29		
	50.5	SPT	SP-SM	Qlw	50/6"	4.6	-																				
	53	CR	SP-SM	Qlw	-	5.0	105															0.61					
	55.5	SPT	SP-SM	Qlw	66	5.1	-																				
	58	CR	SW-SM	Qlw	-	5.8	93	0	88	12												0.80		450	30		
	60.5	SPT	SW-SM	Qlw	50/6"	2.9	-																				
	63	CR	SW	Qlw	-	1.1	-																				
	65.5	SPT	SP-SM	Qlw	92	1.2	-																				
	68	CR	SM	Qsp	-	-	-	0	73	27				-1.38	2.65												
	70.5	SPT	SM	Qsp	70	13.6	-																				
	73	CR	SM	Qsp	-	19.0	106															0.58	44*				
	75.5	SPT	ML	Qsp	39	25.4	-	0	16	84					2.77								29*				
	78	CR	SP-SM	Qsp	-	5.4	98															0.72					
	80.5	SPT	SP-SM	Qsp	67	10.1	-								2.66												
	83	CR	SP-SM	Qsp	-	4.1	99	0	90	10				-0.21						0.079	0.007	0.71	29*				
	85.5	SPT	SM	Qsp	55	11.1	-																				
	88	CR	SM	Qsp	-	17.0	103			45												0.64		750	32		
	90.5	SPT	SP-SM	Qsp	81	4.5	-	0	90	10																	
	93	NR	SP	Qsp	-	-	-																				
	95	SPT	SM	Qsp	50/6"	3.0	-	14	64	22																	
	99	SPT	SM	Qsp	50/1"	4.4	-																				
S-109	10-11	CORE	CL	Qal	-	22.3	-				47	16	31														
	15-16	CORE	CL	Qal	-	17.2	-																				
	18-19	CORE	CL	Qal	-	20.1	-																				
	22-23	CORE	CL	Qal	-	12.6	-	2	47	51	31	13	18														
	30-31	CORE	CL/CL-ML	Qal	-	21.5	-																				
	33-34	CORE	SM	Qalo	-	8.4	-	17	52	31																	
	36-37	CORE	SM	Qalo	-	5.2	-																				
	41-42	CORE	SM	Qalo	-	3.9	-	18	54	28																	
	42.5-43.5	CORE	SP	Qalo	-	4.5	-								2.78												
	45-46	CORE	SM	Qalo	-	9.2	-	16	50	34																	
	51-52	CORE	CL	Qalo	-	17.7	-				35	14	21														
	53-54	CORE	CL-ML	Qalo	-	24.4	-								2.79	7.1	49	9	1200								
	56-57	CORE	CL	Qalo	-	16.4	-	8	35	57	38	14	24														
	58-59	CORE	CL	Qalo	-	15.3	-																				

Table 5-3: Summary of Geotechnical Laboratory Test Results in Reach 5 (ACE, PE and Adv. Phase) – Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Modified Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Peak Strength)		Triaxial Consolidated- Undrained (Peak Strength)	
S-109	61-62	CORE	CL	Qalo	-	19.2	-																				
	62-63	CORE	CL	Qalo	-	18.1	-	5	42	53	35	17	18		2.74												
	65-66	CORE	CL	Qalo	-	24.0	-									7.0	84	17	1160								
	68-69	CORE	CL	Qalo	-	24.9	-																				
	74-75	CORE	CL	Qalo	-	16.6	-																				
	77-78	CORE	CL	Qalo	-	13.6	-	3	56	41	30	16	14			7.2	56	12	2520								
	80-81	CORE	SC	Qalo	-	-	-																				
	82-83	CORE	SC	Qalo	-	16.7	-																				
	86-87	CORE	ML	Qalo	-	11.8	-	10	44	46					2.75												
	88.5-89.5	CORE	SM	Qalo	-	20.7	-	3	16	81	37	21	16														
	92-93	CORE	CL	Qalo	-	18.7	-									4.0	79	20	2400								
	96-97	CORE	CL	Qalo	-	9.8	-	7	57	36																	
	97-98	CORE	SM	Qalo	-	9.1	-																				
	101-102	CORE	CL	Qsp	-	23.3	-				39	16	23														
	106-107	CORE	CL	Qsp	-	16.9	-																				
	112-113	CORE	CL	Qsp	-	21.6	-				38	16	22														
	119-120	CORE	CL	Qsp	-	13.1	-																				
S-111	38.5	CORE	SM	Qalo		12.7		19	65	16																	
	41.5	CORE	SM	Qalo		8.4		34	46	20					2.65												
	45.5	CORE	GP-GC	Qalo		8.2		45	43	12	36	19	17														
	49.5	CORE	GC-GM	Qalo		8.5		54	33	13																	
	52.5	CORE	CL	Qlw		22.7		0	11	89	47	26	21		2.67	7.6	39	45	760								
	59.5	CORE	SM	Qlw		5.0		0	84	16																	
	65.5	CORE	SP-SM	Qlw		15.8																					
	70.5	CORE	SP-SM	Qlw		16.9		0	90	10																	
	75	CORE	SM	Qlw		13.3																					
	79	CORE	GP-GM	Qlw		8.2		51	38	11																	
	81.5	CORE	SM	Qlw		19.6									2.63	7.9	50	32	3,280								
	83.5	CORE	SM	Qlw		21.6		0	86	14																	
	86.5	CORE	SM	Qlw		15.6																					
	88.5	CORE	SM	Qlw		17.1		1	86	13																	
	94.5	CORE	SP-SM	Qlw		22.1																					
CR	Crandall Sampler																										
NR	No Recovery																										
CORE	Continuous core sample																										
SPT	Standard Penetration Test Sampler																										
"Gravel"	Particle size greater than No. 4 sieve																										
"Sand"	Particle size less than No. 4 sieve but greater than No. 200 sieve																										
"Fines"	Particle size less than No. 200 Sieve																										
NP	Non-plastic																										
Af – Artificial Fill, Quaternary Younger Alluvium – Qal, Quaternary Older Alluvium – Qalo, Lakewood – Qlw, San Pedro – Qsp																											
* Indicates that a composite sample was used for NTNU Soil Abrasion Test																											
^For Expansion/Collapse Test : “-” indicates expansion of the sample upon saturation, otherwise collapse																											
“pen” indicates test results pending																											
GR	Crandall Sampler																										
SPT	Standard Penetration Test Sampler																										

CR \_\_\_\_\_ Crandall Sampler \_\_\_\_\_  
SPT \_\_\_\_\_ Standard Penetration Test Sampler \_\_\_\_\_  
"Gravel" \_\_\_\_\_ Particle size greater than No. 4 sieve \_\_\_\_\_  
"Sand" \_\_\_\_\_ Particle size less than No. 4 sieve but greater than No. 200 sieve \_\_\_\_\_  
"Fines" \_\_\_\_\_ Particle size less than No. 200 Sieve \_\_\_\_\_  
NP \_\_\_\_\_ Non plastic \_\_\_\_\_  
Quaternary Younger Alluvium – Qal, Quaternary Older Alluvium – Qalo, Lakewood – Qlw, San Pedro – Qsp  
\* Indicates that a composite sample was used for NTNU Soil Abrasion Test  
^ For Expansion/Collapse Test : " " indicates expansion of the sample upon saturation, otherwise collapse

Table 5-4: Summary of Geotechnical Laboratory Test Results in Reaches 4 and 5 (Prior Projects)

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Yield Strength)		Triaxial Consolidated- Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)	Cc	Cr			Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
M 61276-B5	1	CR	GP	Qal		18.4	101																				
	4	CR	CL	Qal		22.0	96																				
	7	CR	CL	Qal		20.9	102																				
	10	CR	CL	Qal		19.9	106																				
	15	CR	CL	Qalo		16.3	115																				
	20	CR	CL	Qalo		17.0	112																				
	30	CR	SM	Qalo		11.8	106																				
	35	CR	ML	Qalo		15.9	113																				
	40	CR	SW	Qalo		8.2	98																				
	45	CR	SW	Qalo		6.4	103																				
	50	CR	CL	Qalo		18.1	110																				
M 62217-B1	1	CR	ML	Qal		19.1	96																				
	4	CR	CL	Qal		21.0	97																				
	7	CR	CL	Qal		23.0	94																				
	10	CR	CL	Qal		25.8	96																				
	15	CR	CL	Qal		25.5	93																				
	20	CR	CL	Qalo		15.6	109																				



	25	CR	CL	Qalo		22.3	101																				
	30	CR	SC	Qalo		17.7	108																				
	35	CR	SC	Qalo		25.1	101																				
	40	CR	SC	Qalo		16.7	104																				
	45	CR	ML	Qalo		25.1	94																				
	50	CR	SM	Qalo		33.7	88																				
	55	CR	CL	Qalo		30.5	89																				
	60	CR	CL	Qalo		24.1	96																				
	65	CR	CL	Qalo		24.3	99																				
	70	CR	CL	Qalo		35.6	87																				
	74	CR	CL	Qalo		20.6	102																				
M 62464-B1	1	CR	SM	Fillaf		13.0	92																				
	4	CR	ML	Qal		16.4	84																				

Table 5-4: Summary of Geotechnical Laboratory Test Results in Reaches 4 and 5 (Prior Projects) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Yield Strength)		Triaxial Consolidated-Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)	Cc	Cr			Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
M 62464-B1	7	CR	CL	Qal		17.1	105																				
	10	CR	SC	Qal		14.8	107																				
	15	CR	SC	Qalo		14.4	114																				
	20	CR	SM	Qalo		12.9	104																				
	25	CR	SW	Qalo		5.7	129																				
	30	CR	SW	Qalo		3.2	111																				
	31	CR	ML	Qalo		38.5	91																				
	34	CR	SC	Qalo		12.0	117																				
	37	CR	SM	Qalo		16.7	107																				
	40	CR	SW	Qalo		14.5	118																				
	43	CR	ML	Qalo		15.7	108																				
	48	CR	ML	Qsp		20.2	105																				
	53	CR	ML	Qsp		13.3	116																				
	59	CR	ML	Qsp		19.8	111																				
M 62464-B2	3	CR	ML	Fill		17.3	88																				
	6	CR	ML	Qal		19.6	101																				
	9	CR	SC	Qalo		10.0	124																				
	14	CR	SC	Qalo		14.2	117																				
	19	CR	ML	Qalo		11.1	104																				
	24	CR	SW	Qalo		4.3	117																				
	27	CR	SM	Qalo		16.7	105																				
	30	CR	ML	Qalo		6.9	119																				
	35	CR	SM	Qalo		11.3	113																				
	40	CR	SM	Qsp		18.0	103																				
	45	CR	ML	Qsp		19.3	107																				
	50	CR	ML	Qsp		20.7	105																				
	55	CR	ML	Qsp		13.5	118																				
	60	CR	ML	Qsp		15.3	113																				
M 64390-B3	1	CR	ML	Fill		14.0	112																				
	4	CR	ML	Fill		12.8	121																				

Table 5-4: Summary of Geotechnical Laboratory Test Results in Reaches 4 and 5 (Prior Projects) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Yield Strength)		Triaxial Consolidated-Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)	Cc	Cr			Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
M 64390-B3	7	CR	CL	Qal		8.2	108																				
	10	CR	CL	Qal		8.0	123																				
	13	CR	CL	Qal		16.4	109																				
	16	CR	CL	Qal		9.2	116																				
	19	CR	SM	Qalo		4.2	124																				
	22	CR	SM	Qalo		13.7	111																				
	25	CR	SM	Qalo		10.3	115																				
	28	CR	SM	Qalo		3.4	129																				
	31	CR	SM	Qalo		9.9	113																				
	33	CR	SM	Qalo		5.8	116																				
	35	CR	SM	Qalo		6.5	109																				
	37	CR	SM	Qalo		14.1	114																				
	39	CR	SM	Qalo		14.8	113																				
	44	CR	SM	Qsp		23.2	102																				
	49	CR	ML	Qsp		21.2	106																				
	54	CR	ML	Qsp		17.0	113																				
	59	CR	ML	Qsp		20.7	110																				
	64	CR	ML	Qsp		17.8	111																				
	69	CR	ML	Qsp		19.9	108																				
	74	CR	ML	Qsp		20.0	108																				
M 64390-B4	1	CR	CL	Fillaf		17.1	117																				
	4	CR	CL	Qal		13.4	121																				
	7	CR	CL	Qal		6.6	122																				
	10	CR	CL	Qal		6.9	127																				
	13	CR	CL	Qal		9.5	108																				
	16	CR	SC	Qal		3.8	116																				
	19	CR	SC	Qal		6.5	110																				
	22	CR	SC	Qal		5.2	118																				
	25	CR	ML	Qal		8.1	107																				

Table 5-4: Summary of Geotechnical Laboratory Test Results in Reaches 4 and 5 (Prior Projects) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Yield Strength)		Triaxial Consolidated- Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)	Cc	Cr			Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
M 64390-B4	27	CR	ML	Qal		15.7	105																				
	29	CR	ML	Qal		13.9	110																				
	31	CR	ML	Qal		13.2	116																				
	34	CR	ML	Qalo		9.4	119																				
	39	CR	SM	Qalo		13.7	119																				
	44	CR	SM	Qsp		15.4	116																				
	49	CR	ML	Qsp		17.2	111																				
	54	CR	ML	Qsp		21.4	106																				
	59	CR	ML	Qsp		19.8	109																				
	64	CR	ML	Qsp		16.1	113																				
	69	CR	ML	Qsp		20.6	110																				
	74	CR	ML	Qsp		18.1	111																				
	79	CR	ML	Qsp		21.2	108																				
	84	CR	ML	Qsp		23.1	101																				
M A-62348-B3	3	CR	ML	Fillaf		16.7	99																				
	6	CR	SM	Qal		9.9	90																				
	9	CR	SM	Qal		8.6	93																				
	12	CR	ML	Qalo		22.3	93																				
	15	CR	CL	Qalo		16.9	107																				
	18	CR	CL	Qalo		16.7	113																				
	21	CR	SC	Qalo		13.6	116																				
	24	CR	CL	Qalo		15.5	113																				
	27	CR	SM	Qalo		14.7	107																				
	30	CR	CL	Qalo		12.8	117																				
	33	CR	SW	Qalo		12.2	119																				
	34.5	CR	SW	Qalo		13.0	116																				
	39	CR	SW	Qalo		13.1	119																				
	44	CR	SW	Qalo		11.9	122																				
	49	CR	SM	Qalo		16.7	109																				
	54	CR	SM	Qalo		26.3	97																				

Table 5-4: Summary of Geotechnical Laboratory Test Results in Reaches 4 and 5 (Prior Projects) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Yield Strength)		Triaxial Consolidated-Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)	Cc	Cr			Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
M A-62348-B3	59	CR	CL	Qalo		29.4	94																				
	64	CR	CL	Qalo		21.9	103																				
	69	CR	CL	Qalo		24.0	100																				
	74	CR	CL	Qalo		23.8	101																				
M A-69236-B1	1.5	CR	ML	Qal		13.9	98																				
	3.5	CR	ML	Qal		13.9	94																				
	5.5	CR	SC	Qal		10.5	102																				
	7.5	CR	SC	Qal		6.8	106																				
	10.5	CR	CL-ML	Qal		13.4	112																				
	14.5	CR	CL-ML	Qal		15.5	110																				
	19.5	CR	SM	Qalo		15.5	107																				
	25.5	CR	ML	Qalo		6.0	115																				
	29.5	CR	SM	Qalo		8.9	95																				
	34.5	CR	SW	Qalo		5.1	121																				
	39.5	CR	SM	Qalo		8.2	104																				
M A-69300-B1	2.5	CR	CL	Qal		13.6	114																				
	5.5	CR	CL	Qal		13.3	117																				
	8.5	CR	CL	Qal		12.8	122																				
	11.5	CR	CL	Qalo		14.6	115																				
	13.5	CR	CL	Qalo		17.3	111																				
	15.5	CR	CL	Qalo		10.5	119																				
	17.5	CR	CL	Qalo		22.5	104																				
	20.5	CR	CL	Qalo		10.0	116																				
	25.5	CR	SW	Qalo		16.0	112																				
	30.5	CR	SW	Qalo		6.6	110																				
	35.5	CR	SW	Qalo		5.2	105																				
	40.5	CR	ML	Qalo		26.1	101																				
	45.5	CR	SP	Qsp		14.7	117																				
	49.5	CR	SM	Qsp		16.4	114																				



Table 5-4: Summary of Geotechnical Laboratory Test Results in Reaches 4 and 5 (Prior Projects) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Yield Strength)		Triaxial Consolidated- Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)	Cc	Cr			Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
M A-69303-B6	4	CR	ML	Qal		8.0	107																				
	8	CR	ML	Qal		25.1	94																				
	12	CR	ML	Qalo		19.3	98																				
	16	CR	ML	Qalo		10.6	108																				
	20	CR	CL-ML	Qalo		15.1	107																				
	24	CR	SM	Qalo		7.8	123																				
	28	CR	CL	Qalo		14.7	118																				
	32	CR	ML	Qalo		21.2	102																				
	36	CR	ML	Qalo		10.0	118																				
	40	CR	ML	Qalo		27.7	93																				
	42	CR	ML	Qalo		25.4	101																				
	44	CR	ML	Qalo		19.6	112																				
	46	CR	CL-ML	Qalo		20.9	108																				
	49	CR	ML	Qalo		18.9	112																				
	54	CR	ML	Qalo		23.2	104																				
	59	CR	ML	Qalo		19.9	109																				
	64	CR	CL-ML	Qalo		20.1	109																				
	69	CR	CL-ML	Qalo		22.7	104																				
	74	CR	CL-ML	Qalo		18.1	110																				
	79	CR	CL-ML	Qalo		19.4	111																				
M A-70075-B6	1	CR	CL-ML	Qal		18.4	106																				
	5	CR	ML	Qal		12.9	103																				
	8	CR	ML	Qal		22.8	100																				
	11	CR	CL-ML	Qal		18.3	105																				
	15	CR	SM	Qalo		10.1	110																				
	17	CR	CL-ML	Qalo		20.0	106																				
	20	CR	CL-ML	Qalo		16.2	113																				
	23	CR	CL-ML	Qalo		26.0	93																				
	26	CR	CL-ML	Qalo		18.1	102																				
	29	CR	CL-ML	Qalo		16.8	108																				



Table 5-4: Summary of Geotechnical Laboratory Test Results in Reaches 4 and 5 (Prior Projects) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Yield Strength)		Triaxial Consolidated- Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)	Cc	Cr			Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
M A-70075-B6	33	CR	SM	Qalo		22.8	101																				
	38	CR	ML	Qalo		18.6	104																				
	42	CR	CL	Qalo		20.3	104																				
	46	CR	CL	Qalo		15.1	109																				
	50	CR	CL	Qalo		12.5	122																				
	53	CR	CL	Qalo		18.0	112																				
	58	CR	CL	Qalo		17.7	112																				
	63	CR	CL	Qalo		14.4	120																				
	68	CR	ML	Qalo		13.3	122																				
	73	CR	ML	Qalo																							
	79	CR	CL	Qalo		13.5	121																				
M A-70076-B3	3	CR	ML	Qal																							
	6	CR	ML	Qal																							
	9	CR	ML	Qal																							
	12	CR	SM	Qal																							
	15	CR	SM	Qal																							
	17	CR	SM	Qal																							
	19	CR	SM	Qal																							
	21	CR	SM	Qal																							
	24	CR	CL-ML	Qalo																							
	29	CR	CL-ML	Qalo																							
	34	CR	SM	Qalo																							
	39	CR	CL-ML	Qalo																							
	44	CR	CL-ML	Qalo																							
	49	CR	ML	Qalo																							
	54	CR	CL-ML	Qalo																							
	59	CR	CL-ML	Qalo																							
	64	CR	SC	Qalo																							
	69	CR	SC	Qalo																							

Table 5-4: Summary of Geotechnical Laboratory Test Results in Reaches 4 and 5 (Prior Projects) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Yield Strength)		Triaxial Consolidated-Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)	Cc	Cr			Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
M A-70076-B3	74	CR	SC	Qalo																							
	79	CR	CL-ML	Qalo																							
M AEF-87428-B6	3.5	CR	CL-ML	Qal		16.2	111																				
	7.5	CR	CL-ML	Qal		22.6	99																				
	11.5	CR	CL-ML	Qal		25.2	97																				
	15.5	CR	ML	Qal		17.9	108																				
	19.5	CR	ML	Qal		17.5	109																				
	23.5	CR	ML	Qal		20.2	97																				
	27.5	CR	SM	Qalo		14.2	115																				
	31.5	CR	CL-ML	Qalo		20.3	110																				
	35.5	CR	CL-ML	Qalo		16.6	117																				
	39.5	CR	SW	Qalo		10.7	118																				
	43.5	CR	SW	Qalo		19.8	110																				
	47.5	CR	CL-ML	Qalo		33.7	89																				
	50.5	CR	SW	Qalo		15.0	119																				
	53.5	CR	CL-ML	Qalo		22.4	107																				
	56.5	CR	CL-ML	Qalo		13.6	125																				
	59.5	CR	CL-ML	Qalo		22.4	107																				
	64.5	CR	CL	Qalo		26.8	104																				
	69.5	CR	CL-ML	Qalo		24.3	102																				
	74.5	CR	CL-ML	Qalo		14.9	121																				
	79.5	CR	CL	Qalo		13.9	125																				
	84.5	CR	CL	Qalo		16.8	117																				
M A-80025-B1	2.5	CR	ML	Qal		20.3	99																				
	6.5	CR	CL-ML	Qal		25.1	97																				
	10.5	CR	CL-ML	Qal		28.1	93																				
	14.5	CR	CL	Qal		22.4	103																				
	19	CR	SM	Qalo		15.2	116																				
	22.5	CR	CL-ML	Qalo		23.5	101																				
	22	CR	CL-ML	Qalo		28.7	94																				

Table 5-4: Summary of Geotechnical Laboratory Test Results in Reaches 4 and 5 (Prior Projects) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Yield Strength)		Triaxial Consolidated-Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)	Cc	Cr			Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
M A-80025-B1	30.5	CR	CL-ML	Qalo		21.6	105																				
	34	CR	ML	Qalo		24.0	101																				
	37	CR	ML	Qalo		21.2	105																				
	39.5	CR	CL-ML	Qalo		22.6	104																				
	44.5	CR	SW	Qalo		15.5	116																				
	49.5	CR	ML	Qalo		27.7	96																				
	54.5	CR	ML	Qalo		24.8	100																				
	59.5	CR	CL-ML	Qalo		31.8	91																				
	64.5	CR	CL-ML	Qalo		28.6	94																				
	69.5	CR	CL-ML	Qalo		21.7	104																				
	74.5	CR	CL	Qalo		24.3	100																				
M A-80025-B2	3.5	CR	ML	Qal		26.0	94																				
	7.5	CR	CL-ML	Qal		25.4	97																				
	11.5	CR	CL-ML	Qal		28.0	94																				
	15.5	CR	CL	Qal		19.3	109																				
	19.5	CR	SM	Qalo		16.4	113																				
	23.5	CR	CL-ML	Qalo		22.8	103																				
	27.5	CR	CL	Qalo		20.8	106																				
	31.5	CR	CL	Qalo		18.0	113																				
	34.5	CR	ML	Qalo		17.0	114																				
	37.5	CR	ML	Qalo		16.8	114																				
	40.5	CR	CL-ML	Qalo		23.9	102																				
	45.5	CR	ML	Qalo		26.6	99																				
	50.5	CR	ML	Qalo		25.4	99																				
	55.5	CR	CL-ML	Qalo		28.6	95																				
	60.5	CR	CL-ML	Qalo		28.6	95																				
	65.5	CR	CL-ML	Qalo		31.3	92																				
	70.5	CR	CL-ML	Qalo		30.4	93																				
	75.5	CR	CL-ML	Qalo		27.0	95																				

Table 5-4: Summary of Geotechnical Laboratory Test Results in Reaches 4 and 5 (Prior Projects) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Yield Strength)		Triaxial Consolidated-Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)	Cc	Cr			Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
M A-80025-B4	2.5	CR	ML	Qal		12.4	100																				
	6.5	CR	CL-ML	Qal		24.3	98																				
	10.5	CR	CL-ML	Qal		25.1	97																				
	14.5	CR	CL	Qal		17.6	113																				
	18.5	CR	CL	Qalo		20.0	107																				
	22.5	CR	CL-ML	Qalo		22.9	103																				
	26.5	CR	CL-ML	Qalo		20.5	107																				
	29.5	CR	CL-ML	Qalo		13.0	121																				
	32.5	CR	SM	Qalo		16.0	115																				
	35.5	CR	ML	Qalo		20.2	109																				
	38.5	CR	ML	Qalo		23.9	102																				
	43.5	CR	ML	Qalo		28.0	96																				
	48.5	CR	ML	Qalo		27.9	93																				
	53.5	CR	ML	Qalo		41.7	79																				
	58.5	CR	CL-ML	Qalo		30.4	87																				
	63.5	CR	CL-ML	Qalo		29.0	95																				
	68.5	CR	CL-ML	Qalo		27.6	97																				
M A-82144-B2	73.5	CR	SW	Qalo		18.4	112																				
	3.5	CR	CL-ML	Qal		20.2	99																				
	8.5	CR	CL-ML	Qal		16.6	110																				
	13.5	CR	CL	Qal		16.5	115																				
	18.5	CR	CL	Qalo		15.1	118																				
	23.5	CR	SM	Qalo		23.6	103																				
	27.5	CR	SW	Qalo		13.1	108																				
	31.5	CR	SW	Qalo		11.6	123																				
	35.5	CR	CL	Qalo		19.4	109																				
	39.5	CR	CL	Qalo		12.4	121																				
	44.5	CR	CL-ML	Qalo		27.7	97																				
	49.5	CR	CL-ML	Qalo		24.6	103																				
	54.5	CR	CL-ML	Qalo		23.6	104																				

Table 5-4: Summary of Geotechnical Laboratory Test Results in Reaches 4 and 5 (Prior Projects) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Yield Strength)		Triaxial Consolidated-Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)	Cc	Cr			Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
M A-82144-B2	59.5	CR	CL-ML	Qalo		24.0	102																				
	64.5	CR	CL	Qalo		16.1	118																				
	69.5	CR	SM	Qalo		24.3	104																				
M A-86396-B6	4.5	CR	ML	Fillaf		9.1	123																				
	8.5	CR	SM	Qal		11.1	119																				
	12.5	CR	ML	Qal		13.9	112																				
	16.5	CR	CL	Qal		16.8	118																				
	20.5	CR	CL	Qalo		17.8	113																				
	24.5	CR	CL	Qalo		17.3	115																				
	28.5	CR	SM	Qalo		10.5	120																				
	32.5	CR	SM	Qalo		7.2	136																				
	36.5	CR	SW	Qalo		8.2	133																				
	40.5	CR	SW	Qalo		12.4	127																				
	43.5	CR	SC	Qalo		14.4	128																				
	46.5	CR	SM	Qalo		20.3	111																				
	49.5	CR	SM	Qalo		19.7	112																				
	52.5	CR	CL-ML	Qalo		27.8	98																				
	60.5	CR	CL-ML	Qalo		24.5	104																				
	65.5	CR	CL-ML	Qalo		28.1	97																				
	71.5	CR	CL-ML	Qalo		22.1	107																				
	75.5	CR	CL	Qalo		27.5	99																				
M A-87015-B3-A	1.5	CR	CL-ML	Qal		18.6	104																				
	4.5	CR	CL-ML	Qal		15.9	998																				
	7.5	CR	CL-ML	Qal		15.1	101																				
	10.5	CR	CL	Qal		11.4	128																				
	13.5	CR	CL	Qal		16.0	117																				
	16.5	CR	SM	Qal		10.1	131																				
	19.5	CR	CL-ML	Qalo		18.9	114																				
	22.5	CR	SM	Qalo		6.8	124																				
	25.5	CR	SM	Qalo		13.6	123																				
	28.5	CR	SW	Qalo		10.9	117																				

Table 5-4: Summary of Geotechnical Laboratory Test Results in Reaches 4 and 5 (Prior Projects) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Yield Strength)		Triaxial Consolidated-Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)	Cc	Cr			Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
M A-87015-B3-A	31.5	CR	SW	Qalo		6.4	123																				
	34.5	CR	CL	Qalo		14.0	120																				
	37.5	CR	ML	Qalo		18.6	111																				
	40.5	CR	SM	Qalo		10.8	123																				
	43.5	CR	CL	Qalo		27.6	98																				
	46.5	CR	CL-ML	Qalo		26.6	100																				
	49.5	CR	CL-ML	Qalo		21.4	106																				
	52.5	CR	ML	Qalo		17.0	114																				
	55.5	CR	CL-ML	Qalo		21.0	108																				
	58.5	CR	CL-ML	Qalo		23.9	105																				
	61.5	CR	CL-ML	Qalo		22.6	105																				
	64.5	CR	CL-ML	Qalo		17.1	118																				
	72.5	CR	CL	Qalo		18.8	112																				
	77.5	CR	CL	Qalo		21.6	109																				
	82.5	CR	CL	Qsp		19.3	112																				
	87.5	CR	SM	Qsp		13.9	125																				
	92.5	CR	CL-ML	Qsp		26.5	98																				
	97.5	CR	CL-ML	Qsp		19.3	112																				
M A-87429-B1	1.5	CR	CL-ML	Fill/Haf		17.2	102																				
	4.5	CR	CL	Qal		10.6	101																				
	9	CR	SC	Qal		7.1	98																				
	12.5	CR	CL-ML	Qalo		11.7	120																				
	16.5	CR	CL	Qalo		12.0	109																				
	20.5	CR	SM	Qalo		16.2	111																				
	24.5	CR	SW	Qalo		7.2	131																				
	28.5	CR	SW	Qalo		8.3	111																				
	32.5	CR	SW	Qalo		7.7	112																				
	36.5	CR	SM	Qalo		19.4	88																				
	39.5	CR	SM	Qalo		11.3	104																				
	42.5	CR	SW	Qalo		8.0	109																				
	45.5	CR	SW	Qsp		12.0	99																				
	48.5	CR	CL-ML	Qsp		22.3	106																				
M ADE-86397-B7	1.5	CR	CL-ML	Fill/Haf		17.1	110																				
	5.5	CR	CL-ML	Qal		10.9	113																				
	10.5	CR	SM	Qal		17.4	115																				
	15.5	CR	SM	Qalo		11.0	103																				
	20.5	CR	SM	Qalo		4.6	117																				



Table 5-4: Summary of Geotechnical Laboratory Test Results in Reaches 4 and 5 (Prior Projects) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Yield Strength)		Triaxial Consolidated-Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)	Cc	Cr			Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
M ADE-86397-B7	25.5	CR	SM	Qalo		6.8	115																				
	30.5	CR	ML	Qalo		18.7	92																				
	35.5	CR	SC	Qalo		6.7	111																				
	40.5	CR	SM	Qalo		18.5	105																				
	45.5	CR	SM	Qsp		11.1	117																				
	49.5	CR	SM	Qsp		11.1	116																				
	54.5	CR	CL	Qsp		24.2	102																				
M ADE-86398-B4	1.5	CR	CL-ML	Fill		1.7	119																				
	5.5	CR	CL	Qal		18.6	94																				
	10.5	CR	CL	Qalo		16.1	117																				
	15.5	CR	CL	Qalo		12.4	104																				
	20.5	CR	ML	Qalo		18.2	108																				
	25.5	CR	SW	Qalo		6.2	107																				
	30.5	CR	SW	Qalo		7.6	113																				
	35.5	CR	SW	Qalo		6.5	113																				
M ADE-86398-B5	40.5	CR	CL	Qalo		15.9	115																				
	3.5	CR	CL-ML	Qal		17.2	104																				
	6.5	CR	CL-ML	Qal		21.2	76																				
	9.5	CR	CL-ML	Qal		17.8	109																				
	12.5	CR	CL-ML	Qal		16.3	103																				
	15.5	CR	CL	Qalo		12.0	121																				
	18.5	CR	CL	Qalo		13.7	116																				
	21.5	CR	CL	Qalo		12.9	120																				
	24.5	CR	CL	Qalo		21.2	104																				
	27.5	CR	SC	Qalo		26.8	100																				
	30.5	CR	CL	Qalo		20.2	106																				
	33.5	CR	CL-ML	Qalo		28.1	99																				
	36.5	CR	CL	Qalo		25.6	101																				
	39.5	CR	CL	Qalo		15.5	117																				
	42.5	CR	CL	Qalo		15.0	115																				
	45.5	CR	CL	Qalo		21.3	110																				
	48.5	CR	CL-ML	Qalo		21.7	103																				
	51.5	CR	CL-ML	Qalo		23.7	102																				
	54.5	CR	SM	Qalo		20.5	112																				
	59.5	CR	CL	Qsp		19.3	112																				
	64.5	CR	CL	Qsp		15.3	118																				

Table 5-4: Summary of Geotechnical Laboratory Test Results in Reaches 4 and 5 (Prior Projects) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Yield Strength)		Triaxial Consolidated- Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)	Cc	Cr			Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
M ADE-86398-B5	69.5	CR	CL-ML	Qsp		27.7	99																				
	74.5	CR	CL	Qsp		20.7	109																				
M ADE-87197-B2	2.5	CR	CL-ML	Qal		19.2	89																				
	6.5	CR	CL-ML	Qal		18.0	109																				
	10.5	CR	CL-ML	Qal		25.0	95																				
	14.5	CR	CL-ML	Qalo		22.6	103																				
	18.5	CR	CL-ML	Qalo		16.0	106																				
	22.5	CR	SM	Qalo		15.3	111																				
	26.5	CR	SP	Qalo		4.6	103																				
	30.5	CR	SW	Qalo		4.9	116																				
	33.5	CR	SW	Qalo		5.3	113																				
	36.5	CR	SW	Qalo		6.5	112																				
	39.5	CR	SM	Qalo		17.2	101																				
	44.5	CR	SW	Qalo		7.1	119																				
	49.5	CR	SW	Qalo		13.5	124																				
	54.5	CR	CL-ML	Qalo		22.6	106																				
	59.5	CR	CL-ML	Qalo		19.8	116																				
	64.5	CR	CL-ML	Qalo		22.1	107																				
	69.5	CR	CL-ML	Qalo		25.6	101																				
	74.5	CR	CL-ML	Qalo		22.1	108																				
M AF-87020-B1	1.5	CR	CL-ML	Fillaf		14.1	117																				
	5.5	CR	CL	Qal		10.1	127																				
	9.5	CR	ML	Qal		10.9	118																				
	13.5	CR	ML	Qal		12.0	114																				
	17.5	CR	ML	Qalo		16.5	112																				
	21.5	CR	SM	Qalo		5.6	129																				
	25.5	CR	CL	Qalo		24.4	103																				
	29.5	CR	CL	Qalo		16.3	109																				
	33.5	CR	CL	Qalo		12.1	119																				
	37.5	CR	SM	Qalo		7.8	122																				
	41.5	CR	SM	Qalo		6.1	112																				
M L89380.ADEB-B2	45.5	CR	SM	Qsp		7.0	111																				
	49.5	CR	SM	Qsp		12.5	114																				
	3.5	CR	ML	Qal		14.6	92																				
	8.5	CR	CL-ML	Qal		22.6	97																				
	13.5	CR	CL-ML	Qalo		20.3	103																				
	18.5	CR	CL-ML	Qalo		14.7	117																				

Table 5-4: Summary of Geotechnical Laboratory Test Results in Reaches 4 and 5 (Prior Projects) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Yield Strength)		Triaxial Consolidated-Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)	Cc	Cr			Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
M L89380.ADEB-B2	23.5	CR	CL-ML	Qalo		14.6	120																				
	28.5	CR	ML	Qalo		16.1	113																				
	33.5	CR	CL	Qalo		12.7	120																				
	38.5	CR	SM	Qalo		13.4	115																				
	43.5	CR	ML	Qalo		19.2	109																				
	48.5	CR	CL-ML	Qalo		22.3	107																				
	53.5	CR	ML	Qalo		16.8	114																				
	58.5	CR	ML	Qalo		19.4	114																				
	61.5	CR	CL-ML	Qalo		22.4	105																				
	67.5	CR	ML	Qalo		15.1	120																				
	70.5	CR	ML	Qalo		25.9	100																				
	74.5	CR	CL	Qalo		15.1	119																				
	79.5	CR	ML	Qalo		16.0	117																				
	84.5	CR	SM	Qalo		12.6	122																				
	89.5	CR	ML	Qalo		21.5	108																				
	96.5	CR	SM	Qalo		21.1	108																				
	105.5	CR	CL-ML	Qalo		20.5	109																				
	113.5	CR	CL-ML	Qalo		21.5	106																				
	120.5	CR	ML	Qalo		17.6	117																				
M L89380.ADEB-B3	2.5	CR	ML	Fillaf		17.2	99																				
	5.5	CR	ML	Qal		19.2	93																				
	8.5	CR	CL-ML	Qal		23.7	97																				
	11.5	CR	CL	Qalo		18.9	106																				
	14.5	CR	SM	Qalo		12.2	116																				
	17.5	CR	CL	Qalo		19.5	110																				
	20.5	CR	CL-ML	Qalo		22.6	104																				
	24.5	CR	CL-ML	Qalo		17.8	111																				
	28.5	CR	ML	Qalo		15.9	97																				
	32.5	CR	ML	Qalo		16.9	112																				
	36.5	CR	CL-ML	Qalo		21.7	103																				
	40.5	CR	CL	Qalo		14.5	117																				
	44.5	CR	CL	Qalo		16.7	114																				
	48.5	CR	CL	Qalo		23.0	102																				
	52.5	CR	CL	Qalo		16.9	115																				
	56.5	CR	SP	Qalo		15.1	115																				
	60.5	CR	CL	Qalo		19.6	109																				
	63.5	CR	CL-ML	Qalo		24.2	102																				

Table 5-4: Summary of Geotechnical Laboratory Test Results in Reaches 4 and 5 (Prior Projects) - Continued

Boring No.	Sample Depth (ft)	Sample Type	USCS Group Symbol	Geologic Formation	Field Blow Count (blows/ft)	Moisture Content (%)	Dry Density (pcf)	Grain Size			Atterberg Limits			Expansion /Collapse (%)	Specific Gravity	Corrosion				Compression Index		Void Ratio	NTNU Soil Abrasion Index	Direct Shear (Yield Strength)		Triaxial Consolidated- Undrained (Peak Strength)	
								Gravel (%)	Sand (%)	Fines (%)	LL (%)	PL (%)	PI (%)			pH	Sulfate (ppm)	Chloride (ppm)	Minimum Resistivity (ohm-cm)	Cc	Cr			Cohesion (psf)	Friction Angle (deg)	Cohesion (psf)	Friction Angle (deg)
M L89380.ADEB-B3	66.5	CR	CL	Qalo		17.3	114																				
	69.5	CR	CL	Qalo		19.5	109																				
	74.5	CR	CL	Qalo		16.0	116																				
	79.5	CR	CL	Qalo		12.7	124																				
	84.5	CR	CL	Qalo		17.4	111																				
	89.5	CR	SP	Qalo		20.4	107																				
	94.5	CR	CL	Qalo		12.2	117																				
	99.5	CR	CL-ML	Qalo		25.5	101																				
	104.5	CR	SP	Qalo		11.4	118																				
	109.5	CR	SP	Qalo		10.2	130																				
	114.5	CR	CL	Qalo		14.6	122																				
	119.5	CR	SM	Qalo		19.9	113																				
	124.5	CR	SM	Qsp		15.5	118																				
	129.5	CR	SP	Qsp		14.7	121																				
M L91078.ADEO-B1	2.5	CR	CL-ML	Qal		25.8	78																				
	5.5	SPT	CL-ML	Qal	3																						
	9.5	CR	CL-ML	Qal		19.8	105																				
	12.5	SPT	ML	Qalo	8																						
	16.5	CR	ML	Qalo		21.2	102																				
	19.5	SPT	CL-ML	Qalo	23																						
	23.5	CR	CL	Qalo		18.3	111																				
	26.5	SPT	CL	Qalo	30																						
	30.5	CR	CL	Qalo		12.1	102																				
	33.5	SPT	CL	Qalo	85																						
	44.5	CR	SW	Qalo		9.1	128																				
	50.5	CR	CL-ML	Qalo		22.8	106																				
	53.5	SPT	CL-ML	Qalo	29																						
	59.5	CR	CL-ML	Qalo		18.3	112																				
	62.5	SPT	CL-ML	Qalo	23																						
	66.5	CR	CL-ML	Qalo		24.0	102																				
	69.5	CR	CL-ML	Qalo		17.5	112																				
	76.5	CR	CL	Qalo		18.4	113																				
	83.5	CR	CL	Qalo		25.0	101																				
	90.5	CR	CL	Qalo		20.5	108																				
CR      Crandall Sampler SPT      Standard Penetration Test Sampler "Gravel"      Particle size greater than No. 4 sieve "Sand"      Particle size less than No. 4 sieve but greater than No. 200 sieve "Fines"      Particle size less than No. 200 Sieve NP      Non-plastic Af – Artificial Fill, Quaternary Younger Alluvium – Qal, Quaternary Older Alluvium – Qalo, Lakewood – Qlw, San Pedro – Qsp, Fernando – Ff Note : see Appendix D for laboratory test results (not all of the lab results from prior investigations are summarized in the tables)																											

## 5.2 Subsurface Gas Testing

The samples of gas collected from gas monitoring wells in Tedlar bags were analyzed at a state-certified laboratory for hydrogen sulfide, methane, longer-chain hydrocarbons (e.g. butane, propane, etc.), and fixed gases using standard EPA testing procedures. The laboratory test results of the samples obtained from the ACE, PE and Adv. PE phase wells are presented in Table 4-3 and Table 4-4. The laboratory analytical reports for gas testing are included in Appendix E.

### 5.2.1 Summary of Lab Measurements

- The highest measured methane level in samples analyzed from probes/standpipes along Tunnel Reaches 4 and 5 was ~~43 percent~~ **0.254% and 43%, respectively.**
- The highest measured hydrogen sulfide in samples analyzed from probes/standpipes along Tunnel Reaches 4 and 5 was 0.55 ppm **and non-detect, respectively.**
- **Based on the testing performed by Geokinetics, the recorded dissolved methane and hydrogen sulfide concentrations in the 14 groundwater samples collected from five wells along Reaches 4 and 5 was non-detect. However, based on the test results reported in Table 3-7 of the EDR, the dissolved methane concentration was 78 micrograms/liter in groundwater at well G-405/M-403 installed along Reach 4; along Reach 5, the dissolved methane gas concentration in groundwater was non-detect. The dissolved hydrogen sulfide concentration in groundwater was 2.3 milligrams/liter in well G-139 installed along Reach 4; along Reach 5, the dissolved methane gas concentration in groundwater was 0.040 milligrams/liter in well G-410/M-406.**

## 5.3 Phase II Environmental Testing

The soil and groundwater samples collected from the borings were transported under standard chain-of-custody protocol and delivered to a state-certified lab for testing. Depending on the suspect source near ~~which~~ **where** a boring was drilled, the soil and groundwater samples were analyzed for one or more of the following constituents:

- ~~Total petroleum hydrocarbons as gasoline/diesel/oil (TPH-g/d/o) by EPA Method 8015B~~
- Volatile organic compounds ~~and~~ **including** fuel oxygenates (VOCs+Oxy) by EPA ~~Environmental Protection Agency (EPA)~~ **Method 8260B;**
- ~~Polynuclear aromatic hydrocarbons (PAHs)~~ **Semi volatile organic compounds (SVOCs)** by EPA Method 8270C;
- **Total petroleum hydrocarbons as oil and grease (TPH) by EPA Method 1664**
- **Total petroleum hydrocarbons as gasoline/diesel/oil (TPH-g/d/o) by EPA Method 8015B; and**
- Title 22 metals by EPA Methods 6010B/7471A.

**In addition, grab groundwater samples collected from monitoring wells were analyzed for the following:**

- **VOCs including fuel oxygenates by EPA Method 8260B**
- **SVOCs by EPA Method 8270C;**

- **Total Sulfides and Hydrogen Sulfides by SM 4500-S=D,**
- **Dissolved Gases (Methane by RSK175),**
- **TPH as oil and grease by EPA Method 1664**
- **TPH-g/d/o by EPA Method 8015B; and**
- **Title 22 metals by EPA Methods 6010B/7471A.**

Soil samples collected from the soil cutting drums for waste characterization were analyzed for the following:

- **VOCs including fuel oxygenates by EPA Method 8260B;**
- **TPH-g/d/o by EPA Method 8015B;**
- **Title 22 metals by EPA Methods 6010B/7471A.**

The summary of the laboratory test results are presented in the EDR dated ~~August 2015~~ **January 2016** (Metro, ~~2015~~ **2016**).



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## APPENDIX A    BORING LOGS

### Appendix A

Figure A-1.0: Unified Soil Classification System

Figure A-1.1: Logs of Geotechnical Borings (ACE Phase)

Figure A-1.2: Logs of Geotechnical Borings (PE Phase)

Figure A-1.3: Logs of Geotechnical Borings (Adv. PE Phase)

Figure A-1.4: Logs of Geotechnical Borings (Prior Projects)

Figure A-1.5: Schematic Diagram of Crandall Sampler

Figure A-2.1: Logs of Subsurface Gas Borings (ACE and PE Phases)

**Figure A-2.2: Logs of Subsurface Gas Borings (Adv. PE Phase)**

Figure A-3.1: Logs of Phase II Environmental Assessment Explorations (PE Phase)



KEY TO SYMBOLS AND DESCRIPTIONS
FOR GEOTECHNICAL EXPLORATION LOGS

MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES		Undisturbed Sample		Auger Cuttings		Correlation of Penetration Resistance with Relative Density and Consistency (continued)																							
COARSE GRAINED SOILS (More than 50% of material is LARGER than No. 200 sieve size)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size)	CLEAN GRAVELS (Little or no fines)	GW	Well graded gravels, gravel - sand mixtures, little or no fines.		X	Split Spoon Sample		Bulk Sample	<b><u>CRANDALL Sampler (300-lb hammer, 18-inch drop)<sup>2</sup></u></b>																							
			GP	Poorly graded gravels or grave - sand mixtures, little or no fines.			Rock Core							Crandall Sampler																			
		GRAVELS WITH FINES (Appreciable amount of fines)	GM	Silty gravels, gravel - sand - silt mixtures.		Dilatometer	Noise/Vibration		PMT	Pressuremeter		SAND & GRAVEL		SILT & CLAY																			
			GC	Clayey gravels, gravel - sand - clay mixtures.						No Recovery		No. of Blows	Relative Density	No. of Blows	Consistency																		
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 Sieve Size)	CLEAN SANDS (Little or no fines)	SW	Well graded sands, gravelly sands, little or no fines.		Water Table at time of drilling	Correlation of Penetration Resistance with Relative Density and Consistency		Water Table after drilling	<b><u>CRANDALL Sampler (340-lb hammer, 18-inch drop)<sup>3</sup></u></b>																							
			SP	Poorly graded sands or gravelly sands, little or no fines.																													
		SANDS WITH FINES (Appreciable amount of fines)	SM	Silty sands, sand - silt mixtures		<b><u>SPT Sampler (140-lb hammer, 30-inch drop)</u></b>				<b><u>CRANDALL Sampler (380-lb hammer, 18-inch drop)<sup>4</sup></u></b>																							
			SC	Clayey sands, sand - clay mixtures.		SAND & GRAVEL		SILT & CLAY						SAND & GRAVEL		SILT & CLAY																	
	FINE GRAINED SOILS (More than 50% of material is SMALLER than No. 200 sieve size)	SILTS AND CLAYS (Liquid limit LESS than 50)	ML	Inorganic silts and very fine sands, rock flour, silty of clayey fine sands or clayey silts and with slight plasticity.		0 - 4	Very Loose	0 - 1	Very Soft	0 - 5	Very Loose	0 - 1	Very Soft																				
				Inorganic lays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.		5 - 10	Loose	2 - 4	Soft	6 - 11	Loose	2 - 5	Soft																				
CL			Inorganic silts and organic silty clays of low plasticity.		11 - 30	Medium Dense	5 - 8	Medium Stiff	12 - 32	Medium Dense	6 - 9	Medium Stiff																					
					31 - 50	Dense	9 - 15	Stiff	33 - 53	Dense	10 - 16	Stiff																					
OL					Over 50	Very Dense	16 - 30	Very Stiff	Over 53	Very Dense	17 - 32	Very Stiff																					
SILTS AND CLAYS (Liquid limit GREATER than 50)		MH	Inorganic silts, micaceous or diatomaceous fine sandy or silty soils, elastic silts.		<b><u>CRANDALL Sampler (140-lb hammer, 30-inch drop)<sup>1</sup></u></b>				<b><u>CRANDALL Sampler (380-lb hammer, 18-inch drop)<sup>4</sup></u></b>																								
					SAND & GRAVEL		SILT & CLAY		SAND & GRAVEL		SILT & CLAY																						
		CH	Inorganic clays of high plasticity, fat clays		No. of Blows	Relative Density	No. of Blows	Consistency	No. of Blows	Relative Density	No. of Blows	Consistency																					
					0 - 7	Very Loose	0 - 2	Very Soft	0 - 4	Very Loose	0 - 1	Very Soft																					
		TAR IMPACTED SOILS				8 - 16	Loose	3 - 7	Soft	5 - 10	Loose	2 - 4	Soft																				
BOUNDARY CLASSIFICATIONS: Soils possessing characteristics of two groups are designated by combinations of group symbols.						17 - 47	Medium Dense	8 - 13	Medium Stiff	11 - 29	Medium Dense	5 - 8	Medium Stiff																				
<table><tr><td rowspan="3">SILT OR CLAY</td><td colspan="3">SAND</td><td colspan="2">GRAVEL</td><td rowspan="3">Cobbles</td><td rowspan="3">Boulders</td></tr><tr><td>Fine</td><td>Medium</td><td>Coarse</td><td>Fine</td><td>Coarse</td></tr><tr><td>No.200</td><td>No.40</td><td>No.10</td><td>No.4</td><td>3/4"</td><td>3"</td><td>12"</td></tr></table> <p>U.S. STANDARD SIEVE SIZE</p> <p><u>Reference:</u> The Unified Soil Classification System, Corps of Engineers, U.S. Army Technical Memorandum No. 3-357, Vol. 1, March, 1953 (Revised April, 1960)</p>						SILT OR CLAY	SAND			GRAVEL		Cobbles	Boulders	Fine	Medium	Coarse	Fine	Coarse	No.200	No.40	No.10	No.4	3/4"	3"	12"	48 - 77	Dense	14 - 23	Stiff	30- 47	Dense	9 - 14	Stiff
							SILT OR CLAY	SAND			GRAVEL			Cobbles	Boulders																		
								Fine	Medium	Coarse	Fine					Coarse																	
						No.200		No.40	No.10	No.4	3/4"	3"	12"																				
						Over 77	Very Dense	25 - 47	Very Stiff	Over 47	Very Dense	15 - 29	Very Stiff																				
		Over 47	Hard			Over 29	Hard																										
<b>NOTES:</b>  <sup>1</sup> For sampling performed by Tri-County and Fugro Rigs in 2011, C&L Rigs in 2012 and 2015, and Martini Rigs in 2015 <sup>2</sup> For sampling performed by C & L Rig #1 <sup>3</sup> For sampling performed by C & L Rig #2 prior to 3/8/2011 <sup>4</sup> For sampling performed by C & L Rig #2 after 3/8/2011																																	

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 140 feet
										Rotary Wash	580+25, Lt 62 feet	
										07/12/2009	5 inches	
<b>GROUNDWATER READINGS</b> Drilling mud bailed on 7/12/2009. Ground-water level measured at 24 feet below the ground surface 15 minutes after removal of drilling mud.												
135	5			25.2	96	15		☒			4-inch thick Asphalt Concrete over 6-inch thick Concrete <b>FILL [Aft]</b> LEAN CLAY - moist, brown and gray	
130	10	47		21.0	-			☒			<b>QUATERNARY YOUNGER ALLUVIUM [Qall]</b> LEAN CLAY - stiff to hard, moist, brown	
125	15			21.5	101	14		☒			<b>QUATERNARY OLDER ALLUVIUM [Qalo]</b> LEAN CLAY - stiff to hard, moist, light olive gray, siltier, (postulated contact)	
120	20	15		26.3	-			☒				
115	25			27.4	91	9		☒			ML SANDY SILT - stiff, wet, brown	
110	30	22		31.9	-		73	☒			CL LEAN CLAY - wet, brown and gray  (LL=48, PI=24)	
105	35			37.4	81	24		☒			CH <b>SAN PEDRO FORMATION [Qspl]</b> FAT CLAY with SAND - very stiff to hard, wet, gray  (LL=65, PI=36)	
40												

(CONTINUED ON FOLLOWING FIGURE)

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

MTA Westside Subway Extension  
 Los Angeles, California



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.1.1a



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.
								C & L Drilling / Mayhew 1000		<b>G-8</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	580+25, Lt 62 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								07/12/2009	5 inches	140 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 7/12/2009. Ground-water level measured at 24 feet below the ground surface 15 minutes after removal of drilling mud.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN/TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
		24		34.5	-			☒		
95	45			28.7	94	34		☒		
90	50	65		28.1	-			☒		CL
85	55			17.4	113	25		☒		
80	60	50/6"		15.0	-			☒		ML
75	65			16.6	111	56		☒		
70	70	45		34.7	-			☒		
65	75			30.0	89	25		☒		
80										

LEAN CLAY - very stiff to hard, wet, green and gray (LL=40, PI=18)

Increased gravel, less clay content

SANDY SILT - hard, wet, greenish gray, some clay

(CONTINUED ON FOLLOWING FIGURE)

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

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.1.1b

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.
								C & L Drilling / Mayhew 1000		<b>G-8</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	580+25, Lt 62 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								07/12/2009	5 inches	140 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 7/12/2009. Ground-water level measured at 24 feet below the ground surface 15 minutes after removal of drilling mud.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
		38		37.6	-			<input checked="" type="checkbox"/>		
55	85									
50	90									
45	95									
40	100									
35	105									
30	110									
25	115									
	120									

END OF BORING AT 81½ FEET

NOTES:

Hand augered upper 5 feet to avoid utilities. Drilling mud bailed on 7/12/2009. Ground-water level measured at 24 feet below ground surface about 15 minutes after removal of drilling mud. Boring grouted with a cement-bentonite slurry from the bottom up and patched.

"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches

\*Number of blows required to drive the Crandall Sampler 12 inches using a 340 pound hammer falling 18 inches

\*\*Photo Ionization Detector used for OVA readings

Elevation determined from topographic map provided by Parsons-Brinckerhoff, dated August 12, 2009.

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

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.1.1c

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 MAY BE GRADUAL.

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 144.7 feet
										Rotary Wash	586+37, Lt 40 feet	
										06/28/2009	5 inches	
<b>GROUNDWATER READINGS</b> Drilling mud bailed on 6/28/2009. Ground-water level measured at 21 feet below the ground surface 15 minutes after removal of drilling mud.												
140	5			27.4	93	9		☒			4-inch thick Asphalt Concrete over 8-inch thick Concrete and Base Course <b>QUATERNARY YOUNGER ALLUVIUM [Q<sub>all</sub>]</b> FAT CLAY - stiff, moist, dark gray, slightly porous (LL=75, PI=45)	
135	10	26		-	-		32	☒			Light brownish gray	
130	15			23.1	103	6		☒			SILTY SAND - medium dense, moist, light brown, fine to coarse-grained, some clay, some gravel	
125	20	37		-	-		60	☒			SANDY LEAN CLAY - medium stiff, moist, light brown with red mottling  Bluish gray (LL=40, PI=21)	
120	25			22.2	105	10		☒			<b>QUATERNARY OLDER ALLUVIUM [Q<sub>old</sub>]</b> SILTY SAND - dense, wet, bluish gray, some gravel	
115	30	16		-	-			☒			LEAN CLAY - stiff, wet, bluish gray, alternating with sandier seams  Light brown  (LL=38, PI=18)	
110	35			25.1	101	11		☒			SANDY SILT - stiff to hard, wet, brown	
105	40							☒			Increased clay content	

(CONTINUED ON FOLLOWING FIGURE)

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

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.1.2a

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										DRILLING METHOD	BOREHOLE LOCATION	G-9 (Continued)
										Rotary Wash	586+37, Lt 40 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										06/28/2009	5 inches	144.7 feet
GROUNDWATER READINGS Drilling mud bailed on 6/28/2009. Ground-water level measured at 21 feet below the ground surface 15 minutes after removal of drilling mud.												
100	45	30		-	-		71	☒				
				21.9	100	10		☒				
95	50	42		-	-			☒				
90	55			32.5	89	15		☒				
85	60	43		-	-			☒				
80	65			-	-	12		☒				
75	70	50/5"		-	-			☒				
70	75			-	-	32		☒				
65	80											

**SAN PEDRO FORMATION [Qsp]**  
SILT - very stiff, wet, greenish gray, some clay

LEAN CLAY - stiff, wet, greenish gray (LL=39, PI=18)

CLAYEY SAND - very dense, wet, greenish gray, fine to coarse-grained, some small gravel

SANDY LEAN CLAY - hard, wet, brownish gray, some slate gravel

(Sample not recovered)

Alternating with sandier lenses

(CONTINUED ON FOLLOWING FIGURE)



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

MTA Westside Subway Extension  
 Los Angeles, California



LOG OF BORING  
 Project No.: 4953-10-1561 Figure: A-1.1.2b

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		<b>G-9</b> (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	586+37, Lt 40 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										06/28/2009	5 inches	144.7 feet
										GROUNDWATER READINGS		
										Drilling mud bailed on 6/28/2009. Ground-water level measured at 21 feet below the ground surface 15 minutes after removal of drilling mud.		
60	85	29		-	-		39	☒		 Thin layer of Silty Sand SILTY CLAY - very stiff, wet, brown and gray		
				24.3	93	34		☒				
55	90	22		-	-			☒		 END OF BORING AT 91½ FEET  NOTES:  Bailed drilling mud to 27 feet on 6/28/2009. Ground-water level measured at 21 feet below ground surface about 15 minutes after removal of drilling mud. Seepage observed at 15 feet. Boring grouted with a cement-bentonite slurry from the bottom up and patched.  "N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches  *Number of blows required to drive the Crandall Sampler 12 inches using a 340 pound hammer falling 18 inches  **Photo Ionization Detector used for OVA readings  Elevation determined from topographic map provided by Parsons-Brinckerhoff, dated August 12, 2009.		
50	95											
45	100											
40	105											
35	110											
30	115											
25	120											

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

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.1.2c

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.
										C & L Drilling / Mayhew 1000		G-10
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash		608+80, Lt 25 feet
										DATES DRILLED		GROUND EL.
										06/18/2009		173.5 feet
										HOLE DIAMETER		
										5 inches		
										GROUNDWATER READINGS		
										Drilling mud bailed on 6/18/2009. Ground-water level measured at 41 feet below the ground surface 10 minutes after removal of drilling mud.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS			
170	5			13.6	97	5		☒		SM	6-inch thick Asphalt Concrete over 7-inch thick Concrete	
165	10			16.9	105	7		☒		CL	<b>FILL [Aft]</b> SILTY SAND with GRAVEL - moist, brown, fine to coarse-grained	
160	15	39		-	-			☒		CL	<b>QUATERNARY YOUNGER ALLUVIUM [Qal]</b> SANDY LEAN CLAY - medium stiff to hard, moist, brown, trace slate gravel (LL=30, PI=13)	
155	20			19.1	108	14		☒		CL	<b>QUATERNARY OLDER ALLUVIUM [Qalo]</b> SANDY LEAN CLAY - moist, brown, (postulated contact) (LL=38, PI=19)	
150	25	35		-	-			☒		SC	(Sample not recovered)	
145	30			9.5	122	25		☒			CLAYEY SAND with GRAVEL - medium dense to very dense, moist, brown, fine to coarse-grained	
140	35	76		-	-		19	☒				
135	40											

(CONTINUED ON FOLLOWING FIGURE)

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

MTA Westside Subway Extension  
 Los Angeles, California



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.1.3a

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.
								C & L Drilling / Mayhew 1000		<b>G-10</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	608+80, Lt 25 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								06/18/2009	5 inches	173.5 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 6/18/2009. Ground-water level measured at 41 feet below the ground surface 10 minutes after removal of drilling mud.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
130	45	50/4"		10.6	112	38		☒		Wet
125	50			-	-			☐		Sample not recovered 6-inch diameter cobble
120	55	27		18.0	108	19	42	☒		Less gravel (LL=28, PI=9)
115	60			-	-		50	☒	SM	SILTY SAND - medium dense, wet, brown, fine to coarse-grained
110	65	35		24.3	101	22		☒	CL	Thin layer of Lean Clay
105	70			-	-		86	☒		LEAN CLAY - very stiff to hard, wet, gray
100	75	44		16.1	110	41		☒		Some slate gravel (LL=40, PI=21)
95				-	-			☒		
80										

(CONTINUED ON FOLLOWING FIGURE)

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

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.1.3b



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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		<b>G-10</b> (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	608+80, Lt 25 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										06/18/2009	5 inches	173.5 feet
										GROUNDWATER READINGS		
										Drilling mud bailed on 6/18/2009. Ground-water level measured at 41 feet below the ground surface 10 minutes after removal of drilling mud.		
				16.2	113	25				END OF BORING AT 81 FEET		
										NOTES:		
										Hand augered upper 6 feet to avoid damage to utilities. Bailed drilling mud to 42 feet on 6/18/2009. Ground-water level measured at 41 feet below ground surface about 10 minutes after removal of drilling mud. Boring grouted with a cement-bentonite slurry from the bottom up and patched.		
										"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches		
										*Number of blows required to drive the Crandall Sampler 12 inches using a 340 pound hammer falling 18 inches		
										**Photo Ionization Detector used for OVA readings		
										Elevation determined from topographic map provided by Parsons-Brinckerhoff, dated August 12, 2009.		

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.1.3c

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

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.
								C & L Drilling / Mayhew 1000		G-11
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	640+20, Lt 31 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								06/15/2009	5 inches	220.5 feet
								GROUNDWATER READINGS		
								Seepage observed at 30 feet on 6/15/2009.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
220										12-inch thick Asphalt Concrete
									SM	<b>FILL [A<sub>fi</sub>]</b> SILTY SAND - moist, brown and gray, fine to medium-grained Thin layer of Gravelly Sand, possibly side of utility trench
215	5			19.8	100	6	65		ML	<b>QUATERNARY YOUNGER ALLUVIUM [Q<sub>all</sub>]</b> SILT with SAND - medium stiff to stiff, moist, light brown, some clay
210	10	14		-	-					
205	15			20.5	105	14			CL	<b>QUATERNARY OLDER ALLUVIUM [Q<sub>alo</sub>]</b> SANDY LEAN CLAY - stiff to hard, moist, light brown, some slate gravel
200	20	44		-	-					(LL=40, PI=21)
195	25			8.6	125	42			SM	SILTY SAND with GRAVEL - dense, moist, brown, fine to coarse-grained  Trace gravel
190	30	11		-	-		77		ML	SILT with SAND - stiff, moist, brown, some clay
185	35			7.6	128	26			SM	SILTY SAND with GRAVEL - medium dense to very dense, moist, brown, fine to coarse-grained, granitic and slate gravels, up to 1" in dia, subrounded to subangular, trace clay
40										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
Prepared/Date: NH  
Checked/Date: DLP 01/07/2016

MTA Westside Subway Extension  
Los Angeles, California

amec foster wheeler

LOG OF BORING  
Project No.: 4953-10-1561 Figure: A-1.1.4a

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.
								C & L Drilling / Mayhew 1000		<b>G-11</b> <b>(Continued)</b>
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	640+20, Lt 31 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								06/15/2009	5 inches	220.5 feet
								GROUNDWATER READINGS		
								Seepage observed at 30 feet on 6/15/2009.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
180		64		-	-		24	☒	SC	CLAYEY SAND with GRAVEL, very dense, fine to coarse sand, estimated 30-35% subrounded to subangular gravels, up to 1" in dia
	45								ML	SANDY SILT, medium stiff, fine sand
175				17.4	101	15		☒		
	50	51		-	-			☒	SM-SC	SILTY to CLAYEY SAND, very dense, dark yellowish brown, fine to coarse sand, trace fine gravel up to 1/4" in dia
170									ML	SILT, medium stiff, olive brown with dark yellowish brown mottles, trace clay
165	55			26.9	99	16		☒	SM-SC	SILTY to CLAYEY SAND, brown, fine to medium
	60	61		-	-			☒		6-inch diameter cobble lenses of poorly graded sand with silt, fine to medium-grained, trace coarse sand
160									CL	LEAN CLAY - stiff to hard, moist, olive gray with dark yellow brown mottles
155	65			26.7	97	14		☒		
	70	36		-	-			☒		
150									CL	LEAN CLAY with SAND, very stiff to hard, dark brown to reddish brown, fine to medium sand
145	75			19.5	109	25		☒		
80										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
Prepared/Date: NH  
Checked/Date: DLP 01/07/2016

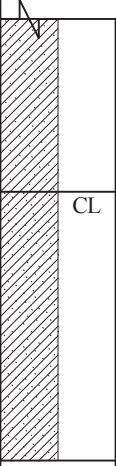
MTA Westside Subway Extension  
Los Angeles, California

amec foster wheeler

**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.1.4b

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.
								C & L Drilling / Mayhew 1000		G-11 (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	640+20, Lt 31 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								06/15/2009	5 inches	220.5 feet
								GROUNDWATER READINGS		
								Seepage observed at 30 feet on 6/15/2009.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
140		74		-	-			<input checked="" type="checkbox"/>		
135	85			14.4	117	32		<input checked="" type="checkbox"/>		
130	90	55		-	-			<input checked="" type="checkbox"/>		
125	95									
120	100									
115	105									
110	110									
105	115									
120										



SANDY LEAN CLAY - hard, moist, dark greenish gray, fine to coarse sand, trace subangular gravel up to 1/4" in dia

END OF BORING AT 91½ FEET

NOTES:

Hand augered upper 5 feet to avoid damage to utilities.  
Seepage observed at 30 feet on 6/15/2009. Drill mud level dropped overnight to 29 feet.  
Two separate 1-inch diameter ground-water monitoring wells extending to 32.5 feet and 60 feet, respectively, installed in borehole upon completion of drilling (see well construction diagram for G-11).

"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches

\*Number of blows required to drive the Crandall Sampler 12 inches using a 340 pound hammer falling 18 inches

\*\*Photo Ionization Detector used for OVA readings

Elevation determined from topographic map provided by Parsons-Brinckerhoff, dated August 12, 2009.

Field Tech: AR  
Prepared/Date: NH  
Checked/Date: DLP 01/07/2016

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

										DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-133
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING METHOD	BOREHOLE LOCATION	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										3/14/2011 - 3/16/2011	4-7/8 inches	144 feet
										GROUNDWATER READINGS		
										Drilling mud bailed on 3/15/2011. Ground-water level measured at 33 feet below the ground surface on 3/16/2011.		
140   <												

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DW  
Prepared/Date: JF 3/29/2011  
Checked/Date: 9/26/2011

# MTA Westside Subway Extension Los Angeles, California



# LOG OF BORING

Project No.: 4953-10-1561 Figure: A-1.2.1a

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.
								C & L Drilling / Mayhew 1000		<b>G-133</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 584+80, Lt 15 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								3/14/2011 - 3/16/2011	4-7/8 inches	144 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 3/15/2011. Ground-water level measured at 33 feet below the ground surface on 3/16/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
100			0.2	25.9	100	13				Alternating with layers of Silty Sand, gray
45	16	0.0	35.1	-					MH	ELASTIC SILT - very stiff, moist to wet, gray, trace fine sand
95			0.0	32.0	88	16				Some iron oxide stains
50	28	0.0	28.1	-			98			
90			0.0	28.6	93	27			CL	LEAN CLAY - very stiff, moist to wet, bluish gray, trace fine gravel
55	21	0.0	33.0	-						Alternating with layers of Silty Sand, brown
85			0.0	25.3	100	23	80		ML	SILT with SAND - very stiff, moist, brown, micaceous
60									CL	SANDY LEAN CLAY - very stiff, moist, light brown to light gray
80	20		28.5	-						Becomes gray, fine to medium sand
65				23.0	104	18			SM	SILTY SAND with GRAVEL - dense, moist, gray, fine to medium-grained, gravel (up to 1½ inches in size)
75	46	0.2	14.2	-			28			
70			0.0	21.6	104	20			CL	SANDY LEAN CLAY - very stiff, moist, gray to bluish gray, fine sand
70	27	0.0	23.4	-			57		ML	SANDY SILT - very stiff, moist, gray to bluish gray, fine sand, trace gravel (up to 3/8 inch in size)
65			0.0	21.4	107	24				
80									SM	

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DW  
Prepared/Date: JF 3/29/2011  
Checked/Date: 9/26/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.1b



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.
								C & L Drilling / Mayhew 1000		<b>G-133</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 584+80, Lt 15 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								3/14/2011 - 3/16/2011	4-7/8 inches	144 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 3/15/2011. Ground-water level measured at 33 feet below the ground surface on 3/16/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
		52	0.1	15.6	-					SILTY SAND - very dense, moist, gray to bluish gray, fine to coarse-grained, alternating thin layer of Sandy Silt
	60		0.0	12.6	120	56	20			CLAYEY SAND - very dense, moist to wet, gray, fine to coarse-grained, trace gravel (up to 3/8 inch in size)
	85	34	0.1	-	-		34			SILTY SAND - dense, moist, gray, fine to coarse-grained, with thin layers of Lean Clay
	55		0.0	21.4	99	25				Becomes medium dense, fine-grained, with thin layer of Silt
	90	29	0.0	17.1	-					Alternating with layers of Lean Clay, very stiff
	50									
	95		0.0	26.6	93	18				SILT - very stiff, moist, dark gray, micaceous, trace clay
	45									
	100			-	-	30				WELL GRADED SAND - dense, moist, gray, fine to medium-grained, trace coarse
	40									
	105			22.5	99	45				SILTY SAND - dense, moist to wet, gray, fine-grained, micaceous
	35									
	110			10.8	118	36				WELL GRADED SAND - dense, moist to wet, gray, fine to coarse-grained
	30									END OF BORING AT 111 FEET
	115									NOTES: Borehole grouted with cement-bentonite slurry and patched with asphalt concrete.
	25									"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches
										*Number of blows required to drive the Crandall Sampler 12 inches using a 380 pound hammer falling 18 inches
	120									**Photo Ionization Detector used for OVA readings

Field Tech: DW  
 Prepared/Date: JF 3/29/2011  
 Checked/Date: 9/26/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.1c



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.
								C & L Drilling / Mayhew 1000		<b>G-134</b>
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 590+40, Lt 27 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								3/29/2011, 3/30/2011, 4/8/2011	4-7/8 inches	148 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 4/8/2011. Ground-water level measured at 31 feet below the ground surface 30 minutes after bailing of drilling mud.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
145	5		0.0	21.6	99	Push				6-inch thick Asphalt Concrete over 12-inch thick Portland Cement Concrete, No Base Course <b>QUATERNARY YOUNGER ALLUVIUM [Qal]</b> SANDY SILT - very soft, moist, brownish gray, with slate gravel  Trace sand, dark olive brown LEAN CLAY - stiff, moist, dark gray, trace sand
140	10	9	0.1	30.6	-					
135	15			-	-	4				Becomes soft, (sample not recovered)
130	20	17	0.2	23.2	-					<b>QUATERNARY OLDER ALLUVIUM [Qol]</b> SANDY LEAN CLAY - very stiff, moist, gray, fine to medium sand
125	25		1.2	14.6	109	13				POORLY GRADED SAND - medium dense, moist, gray and brown, fine to medium-grained, trace fine gravel CLAYEY SAND - medium dense, moist, gray and brown, fine to medium-grained
120	30	16	0.5	18.6	-					Becomes brown, fine-grained SANDY LEAN CLAY - very stiff, moist, brown
115	35		0.5	33.5	91	13	66			SANDY SILT - stiff, moist, brown  Alternating with layers of Silty Sand, brown, fine to medium-grained
110	40									LEAN CLAY - stiff, moist, dark olive brown, trace sand

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DW  
 Prepared/Date: JF 5/18/2011  
 Checked/Date: 9/27/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.2a

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.
								C & L Drilling / Mayhew 1000		<b>G-134</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 590+40, Lt 27 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								3/29/2011, 3/30/2011, 4/8/2011	4-7/8 inches	148 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 4/8/2011. Ground-water level measured at 31 feet below the ground surface 30 minutes after bailing of drilling mud.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
105		13	6.0	23.6	-			☒		
45			0.1	27.7	99	12	78	☒		ML
100										
50		41	0.2	20.0	-			☒	NV	
95										
55			0.1	23.8	101	16	72	☒		CL
90										
60		20	0.0	32.4	-		94	☒	NV	
85										
65			0.0	32.9	91	28		☒		
80										
70									NV	
75										
75		22	0.0	-	-	21		☒		
70				21.5	-		68	☒		
80										

SILT with SAND - stiff, moist, brown, fine sand, alternating with layers of Silty Sand

Becomes very stiff, gray  
LEAN CLAY - very stiff, moist, gray, trace sand

Becomes greenish gray

Becomes gray, trace sand

(Sample not recovered)

Alternating with layers of Sandy Lean Clay, light green, trace calcium carbonate nodules

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DW  
Prepared/Date: JF 5/18/2011  
Checked/Date: 9/27/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.2b

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.
								C & L Drilling / Mayhew 1000		<b>G-134</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 590+40, Lt 27 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								3/29/2011, 3/30/2011, 4/8/2011	4-7/8 inches	148 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 4/8/2011. Ground-water level measured at 31 feet below the ground surface 30 minutes after bailing of drilling mud.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
65			0.0	-	-	23		☒		Becomes brown and olive brown, fine to medium sand
85		30	0.0	19.0	-		55	☒		Fine sand
90		49	0.3	20.0	-			☒	SC	CLAYEY SAND - dense, moist, olive brown, fine to medium-grained, alternating with layers of Sandy Lean Clay
95			0.6	14.7	118	32	33	☒	SM	SILTY SAND - dense, moist, brown, fine to medium-grained, some coarse, trace gravel (up to 3/8 inch in size)
100		50/2"	1.4	13.7	-			☒	SP	<b>SAN PEDRO FORMATION [Qsp]</b> POORLY GRADED SAND - very dense, moist, olive brown, fine to coarse-grained
105			0.6	21.6	102	13		☒	SM	SILTY SAND - moist, gray, fine to medium-grained, alternating with layers of Sandy Silt
110		62	0.0	29.6	-			☒	ML	SILT - stiff, moist, gray, trace fine sand
115										Becomes hard
120										END OF BORING AT 111½ FEET NOTES: Hand augered upper 5 feet to avoid damage to utilities. Borehole grouted with cement-bentonite slurry and patched with asphalt concrete.  "N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches *Number of blows required to drive the Crandall Sampler 12 inches using a 380 pound hammer falling 18 inches  **Photo Ionization Detector used for OVA readings Downhole Test: NV = Noise/Vibration

Field Tech: DW  
Prepared/Date: JF 5/18/2011  
Checked/Date: 9/27/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.2c

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.
								Fugro / CME 75		<b>G-135</b>
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 594+60, Rt 5 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								5/19/2011 and 5/20/2011	4-7/8 inches	153 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 5/19/2011. Ground-water level measured at 15 feet below the ground surface on 5/20/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
150	5									7-inch thick Asphalt Concrete over 8-inch thick Portland Cement Concrete
										<b>FILL [Afi]</b> CLAYEY SAND - moist, olive brown, fine to medium-grained, some coarse, some gravel (up to 1 inch in size), trace roots
145	10		1.2	22.7	97	7				<b>QUATERNARY YOUNGER ALUVIUM [Qal]</b> SANDY FAT CLAY - soft, moist, dark olive brown, fine sand, trace gravel (up to 1/2 inch in size)
140	15	8	2.1	24.3	-					▼ Becomes medium stiff <b>QUATERNARY OLDER ALLUVIUM [Qalo]</b> CLAYEY SAND - loose, moist, olive to olive yellow, fine to coarse-grained, trace gravel (up to 1/2 inch in size), trace iron oxide stains
135	20		0.9	18.8	107	10	19			
130	25	13	0.3	18.8	-					SANDY LEAN CLAY - stiff, moist, dark olive, fine to medium sand, trace gravel (up to 1/2 inch in size)
125	30		1.3	15.9	113	19				CLAYEY SAND with GRAVEL - medium dense, moist, olive, fine to coarse-grained, fine slate gravel (up to 3/4 inch in size), trace iron oxide stains
120	35	18	2.2	17.4	-		59			SILTY CLAY - stiff, moist, olive brown, fine to coarse sand, trace gravel (up to 1/4 inch in size)
115										CLAYEY SAND - medium dense, moist, olive yellow, fine to coarse-grained, trace gravel (up to 1/4 inch in size)
110										LEAN CLAY with SAND - stiff, moist, olive, fine sand, some coarse, trace gravel (up to 1/4 inch in size)
105										
100										
95										
90										
85										
80										
75										
70										
65										
60										
55										
50										
45										
40			0.5	28.1	95	16				

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: LH  
 Prepared/Date: YN 6/27/2011  
 Checked/Date: 9/22/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.3a

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.
								Fugro / CME 75		<b>G-135</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 594+60, Rt 5 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								5/19/2011 and 5/20/2011	4-7/8 inches	153 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 5/19/2011. Ground-water level measured at 15 feet below the ground surface on 5/20/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
110	45	22	0.3	17.6	-		45			SC
										CLAYEY SAND - medium dense, moist, olive brown, fine to coarse-grained, some gravel (up to 1/2 inch in size)
105			1.1	24.8	99	22				CL
										SANDY LEAN CLAY - stiff, moist, olive, fine sand, some silt, trace manganese stains
50		20	1.2	39.5	-					ML
										SANDY SILT - moist, olive, fine sand
100			0.0	37.9	81	28				MH
										ELASTIC SILT - very stiff, moist, light olive to olive, trace fine sand, trace magnesium stains
55		18	1.1	34.6	-		90			
										Becomes olive, some fine sand
95										
60			1.3	35.1	87	25				CH
										FAT CLAY with SAND - very stiff to hard, moist, gray, fine sand, some silt, trace iron oxide and magnesium stains
90		23	2.2	34.0	-					
										Trace calcium carbonate nodules
65			1.8	26.4	94	26	83			
										Becomes olive brown, more fine sand, some medium to coarse
85		24	0.9	18.8	-					
										Becomes light olive gray to olive
70										Trace gravel (up to 1/4 inch in size)
			0.0	19.0	109	26				Becomes yellowish brown, some calcium carbonate nodules
80										
		33	0.0	24.6	-		82			Some iron oxide stains
										Becomes light gray
75			0.0	-	-	25				Trace gravel (up to 1/2 inch in size), (sample not recovered)
80										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: LH  
Prepared/Date: YN 6/27/2011  
Checked/Date: 9/22/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.3b

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.
								Fugro / CME 75		<b>G-135</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 594+60, Rt 5 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								5/19/2011 and 5/20/2011	4-7/8 inches	153 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 5/19/2011. Ground-water level measured at 15 feet below the ground surface on 5/20/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
70			0.3	18.3	-	32				CL
			0.0	19.7	107	33	50			
85		29	0.0	18.2	-					
65			0.0	14.0	114	40				SW
90			0.0	11.3	-		13			SM
60		42	0.0	21.0	106	79/11"				SM
95			0.0	16.8	-		33			
55		34	0.0	28.1	95	65				
100			0.0	33.3	-					
50		38	0.0	29.5	93	52				
105			0.0	34.9	-		99			MH
45			0.0	27.1	95	52				
110		31	0.0	38.4	-					
40			0.0							
115										
35		28	0.0							
120										

SANDY LEAN CLAY - very stiff, moist, olive to light gray, fine to medium sand, trace coarse

WELL GRADED SAND with GRAVEL - medium dense, wet, yellowish brown, fine-grained, fine gravel (up to 3/4 inch in size)

SILTY SAND with GRAVEL - dense, wet, yellowish brown, fine to coarse-grained, fine to coarse gravel (up to 1 inch in size)

**SAN PEDRO FORMATION [Osp]**  
SILTY SAND - very dense, moist, olive, fine-grained, micaceous

Becomes dense

ELASTIC SILT - hard, moist, greenish gray, trace fine sand, trace magnesium stains

Becomes dark greenish gray  
Becomes very stiff

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: LH  
Prepared/Date: YN 6/27/2011  
Checked/Date: 9/22/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.3c



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.
								Fugro / CME 75		<b>G-135</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 594+60, Rt 5 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								5/19/2011 and 5/20/2011	4-7/8 inches	153 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 5/19/2011. Ground-water level measured at 15 feet below the ground surface on 5/20/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
30	125									<p>END OF BORING AT 120 FEET</p> <p>NOTES:</p> <p>Hand augered upper 9 feet to avoid damage to utilities. Borehole grouted with cement-bentonite slurry and patched with asphalt concrete.</p> <p>"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches</p> <p>*Number of blows required to drive the Crandall Sampler 12 inches using a 140 pound automatic hammer falling 30 inches</p> <p>**Photo Ionization Detector used for OVA readings</p>
25	130									
20	135									
15	140									
10	145									
5	150									
0	155									
-5										
-10										
-15										
-20										
-25										
-30										
-35										
-40										
-45										
-50										
-55										
-60										
-65										
-70										
-75										
-80										
-85										
-90										
-95										
-100										
-105										
-110										
-115										
-120										
-125										
-130										
-135										
-140										
-145										
-150										
-155										
-160										
MTA Westside Subway Extension Los Angeles, California								amec		LOG OF BORING Project No.: 4953-10-1561 Figure: A-1.2.3d

Field Tech: LH  
Prepared/Date: YN 6/27/2011  
Checked/Date: 9/22/2011



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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OWA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-136
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 597+30, Lt 10 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										4/25/2011 and 4/26/2011	4-7/8 inches	159 feet
										GROUNDWATER READINGS		
										Drilling mud bailed on 4/25/2011. Ground-water level measured at 24½ feet below the ground surface.		
155	5									6-inch thick Asphalt Concrete over 12-inch thick Concrete, no Base Course		
										<b>FILL [Aft]</b> CLAYEY SAND - moist, dark brown, fine to medium-grained		
150	10		0.1	25.6	96	Push		☒		<b>QUATERNARY YOUNGER ALLUVIUM [Qal]</b> SILTY CLAY - very soft, moist, olive brown, trace fine sand		
145	15	23	0.0	18.3	-		53	☒		SANDY LEAN CLAY - very stiff, moist, olive brown, fine to coarse sand, trace gravel (up to 1/8 inch in size), trace iron oxide stains		
140	20		0.0	12.4	120	7		☒		Becomes medium stiff, fine to medium sand, some gravel (up to 3/4 inch in size)		
135	25	9/10"	0.0	24.0	-			☒		▼ LEAN CLAY - stiff, moist, olive brown, trace gravel (up to 1/8 inch in size), some iron oxide stains		
130	30		0.0	19.2	104	8		☒		<b>QUATERNARY OLDER ALLUVIUM [Qol]</b> LEAN CLAY with SAND - medium stiff, olive brown and brown, fine sand, trace iron oxide stains		
125	35	33/8"	0.0	13.0	-		23	☒		CLAYEY SAND - dense, moist, brown, fine to coarse-grained, trace fine gravel (up to 1/2 inch in size)		
120	40											

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: LH  
Prepared/Date: YN 6/20/2011  
Checked/Date: 9/22/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.4a

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.
								C & L Drilling / Mayhew 1000		<b>G-136</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 597+30, Lt 10 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								4/25/2011 and 4/26/2011	4-7/8 inches	159 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 4/25/2011. Ground-water level measured at 24½ feet below the ground surface.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
115	45	54	0.0	18.4	-		48			CL-ML SANDY SILTY CLAY - stiff, moist, olive brown, fine sand, trace coarse, trace iron oxide stains
110	50		0.0	26.3	97	10			ML	SILT - moist, brown, some fine sand
105	55	16	0.0	32.2	-				SC-SM	SILTY CLAYEY SAND - very dense, moist, brown, fine to medium-grained, some small clay nodules
100	60		0.0	34.6	86	20			ML	SILT with SAND - stiff, moist, brown, some clay
95	65	28/10"	0.0	32.8	-		97		CL	LEAN CLAY - very stiff, moist, olive brown, trace fine sand, trace iron oxide stains
90	70		0.0	30.1	91	20			CH	FAT CLAY - hard, moist, gray, trace fine to medium sand, trace calcium carbonate nodules
85	75	20	0.0	30.4	-		84		CL	LEAN CLAY with SAND - very stiff, moist, gray, fine to coarse sand, occasional gravel (up to 3/8 inch in size), some calcium carbonate nodules
80	80									

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: LH  
Prepared/Date: YN 6/20/2011  
Checked/Date: 9/22/2011

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



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.4b

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.
								C & L Drilling / Mayhew 1000		<b>G-136</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 597+30, Lt 10 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								4/25/2011 and 4/26/2011	4-7/8 inches	159 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 4/25/2011. Ground-water level measured at 24½ feet below the ground surface.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
			0.0	24.2	101	13		☒		CL
										CL
75	85	20	0.0	21.1	-			☒		
										SC
70	90		0.0	13.9	117	52	40	☒		
										CL
65	95	28	0.0	21.0	-		71	☒		
										SP-SM
60	100		0.2	20.8	101	20	45	☒		SM
55	105	60	0.1	27.3	-			☒		
50	110		0.1	16.6	108	20		☒		
45	115	51	0.1	24.0	-			☒		
										ML
40	120									

SANDY LEAN CLAY - stiff, moist, olive brown, fine sand, trace calcium carbonate nodules, trace iron oxide stains

LEAN CLAY - very stiff, moist, olive gray, trace fine sand

CLAYEY SAND - very dense, moist, dark olive brown to olive gray, fine to coarse-grained, some fine gravel (up to 1/2 inch in size), heavy iron oxide stains

**SAN PEDRO FORMATION [Qsp]**  
LEAN CLAY with SAND - very stiff, moist, olive brown, fine sand, trace medium, trace manganese stains

POORLY GRADED SAND with SILT - moist to wet, brown, fine-grained, trace mica

SILTY SAND - medium dense to very dense, moist, olive, fine-grained, occasional medium, some clay, trace manganese stains

Becomes, olive to olive brown, trace mica

SANDY SILT - very stiff, moist, gray, fine sand

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: LH  
Prepared/Date: YN 6/20/2011  
Checked/Date: 9/22/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.4c

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										DRILLING METHOD	BOREHOLE LOCATION	G-136 (Continued)
										Rotary Wash	Sta 597+30, Lt 10 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										4/25/2011 and 4/26/2011	4-7/8 inches	159 feet
										GROUNDWATER READINGS		
										Drilling mud bailed on 4/25/2011. Ground-water level measured at 24½ feet below the ground surface.		
										END OF BORING AT 121 FEET		
										NOTES:		
										Hand augered upper 9 feet to avoid damage to utilities. Borehole grouted with cement bentonite and patched with quick set cement.		
										"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches		
										*Number of blows required to drive the Crandall Sampler 12 inches using a 380 pound hammer falling 18 inches		
										**Photo Ionization Detector used for OVA readings.		

MTA Westside Subway Extension  
Los Angeles, California



LOG OF BORING  
Project No.: 4953-10-1561 Figure: A-1.2.4d

Field Tech: LH  
Prepared/Date: YN 6/20/2011  
Checked/Date: 9/22/2011

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.

								DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
								Fugro / CME 75		G-137
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 600+80, Lt 33 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								5/23/2011 and 5/24/2011	4-7/8 inches	164 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 5/23/2011. Ground-water level measured at 32½ feet below the ground surface on 5/24/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
160	5									8-inch Asphalt Concrete over 13-inch thick Portland Cement Concrete
									SM	<b>FILL [Afl]</b> SILTY SAND - moist, olive brown, fine to medium-grained, trace gravel (up to ½ inch in size)
155	10									Becomes yellowish brown, trace gravel (up to 1 inch in size)
										Becomes olive yellow, more slate gravel
										Some small silt nodules, trace roots
150	15	12	0.5	16.9	-	9			CL	<b>QUATERNARY YOUNGER ALLUVIUM [Qal]</b> SANDY LEAN CLAY - medium stiff, moist, olive brown, fine to medium sand, trace gravel (up to 1/4 inch in size)
										Becomes stiff, more sand, some coarse, some silt
145	20		1.2	16.9	110	20			CL	<b>QUATERNARY OLDER ALLUVIUM [Qalo]</b> SANDY LEAN CLAY - stiff, moist, olive brown, fine to coarse sand, trace gravel (up to 1/4 inch in size)
140	25	11	0.9	18.5	-					Becomes olive to dark olive, fine to medium sand, trace coarse, some silt
135	30			-	-	11				Becomes medium stiff, (sample not recovered)
130	35									▼
125	40	15	1.6	16.4	-		57			Becomes hard, fine to coarse sand, trace gravel (up to 3/4 inch in size)

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: LH  
Prepared/Date: YN 9/9/2011  
Checked/Date: 9/26/2011

MTA Westside Subway Extension  
Los Angeles, California



LOG OF BORING  
Project No.: 4953-10-1561 Figure: A-1.2.5a

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 MAY BE GRADUAL.

								DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
								Fugro / CME 75		<b>G-137</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 600+80, Lt 33 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								5/23/2011 and 5/24/2011	4-7/8 inches	164 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 5/23/2011. Ground-water level measured at 32½ feet below the ground surface on 5/24/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
120	45		0.0	20.4	101	17				SC CLAYEY SAND - medium dense, moist, olive brown, fine to medium-grained, trace coarse, trace gravel (up to ½ inch in size)
115	50	14	0.0	17.5	-		48			Fine to coarse-grained, trace fine gravel (up to 3/8-inch in size), small silt nodules
110	55		0.0	18.8	104	18				SM SILTY SAND - medium dense, moist, dark olive, fine to medium-grained, trace coarse-grained, trace gravel (up to ½ inch in size)
105	60		0.0	18.0	112	30	38			Becomes yellowish brown, fine-grained, some medium, trace coarse, trace mica
100	65	14	0.0	26.2	-					CL SANDY LEAN CLAY - stiff, moist, olive, fine sand, trace medium to coarse, thin layers of silt interbedded, trace gravel (up to 1/4 inch in size)
95	70		0.0	18.5	102	34	70			SM SILTY SAND - moist, light gray, fine to medium-grained
90	75	33	0.0	33.1	-					CH SANDY FAT CLAY - very stiff, moist, light gray, fine sand, trace medium
85	80		0.0	30.2	92	26	92			Becomes hard, light gray to greenish-gray, some medium sand, trace calcium carbonate nodules
		25	0.0	25.5	-					CH FAT CLAY - very stiff, moist, light gray, some fine to medium sand, moderately cemented, trace calcium carbonate nodules
			0.0	22.8	99	25				More fine sand, more calcium carbonate nodules
		32	0.0	23.4	-					CL SANDY LEAN CLAY - very stiff, moist, olive, fine sand, some calcium carbonate nodules, thin silt layers interbedded
										Becomes hard, more calcium carbonate nodules

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: LH  
 Prepared/Date: YN 9/9/2011  
 Checked/Date: 9/26/2011

MTA Westside Subway Extension  
 Los Angeles, California



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.5b



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.
								Fugro / CME 75		<b>G-137</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 600+80, Lt 33 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								5/23/2011 and 5/24/2011	4-7/8 inches	164 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 5/23/2011. Ground-water level measured at 32½ feet below the ground surface on 5/24/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
										More sand, weakly cemented
			0.0	17.2	105	30	67	☒		Becomes very stiff, fine to medium sand, trace mica
80	85	27	0.0	21.4	-			☒		Less fine sand
			0.0	-	-	28		☐	SC	CLAYEY SAND with GRAVEL - medium dense, moist, olive, fine to coarse-grained, fine gravel (up to 1/2- inch in size) (Sample not recovered)
75	90	34	0.0	12.6	-		26	☒		Becomes dense
			0.0	14.2	117	38	27	☒	SM	SILTY SAND - medium dense, moist, olive yellow, fine to coarse-grained, trace gravel (up to 1/2-inch in size), no cementation to moderately cemented, trace mica
70	95	30	0.0	13.4	-		40	☒	SC	CLAYEY SAND - medium dense, moist, fine to coarse-grained, trace fine gravel
65	100		0.0	23.2	102	27	86	☒	CH	<b>SAN PEDRO FORMATION [Osp]</b> FAT CLAY - stiff to very stiff, moist, olive brown, some fine sand, trace medium, some calcium carbonate nodules, trace magnesium stains, moderately cemented
		26	0.0	21.4	-			☒		More calcium carbonate nodules
60	105		0.0	26.2	93	23		☒		
		18	0.0	44.1	-		97	☒		More silt, trace fine sand
55	110									
			0.0	35.2	85	27		☒	CL	SANDY LEAN CLAY - very stiff, moist, olive brown, fine sand, trace calcium carbonate nodules, trace shell fragments and organics
50	115									
		16	0.0	31.6	-			☒	CL-ML	SILTY CLAY - very stiff, moist, dark greenish-gray, some fine sand, trace shell, no cementation to weakly cemented, trace calcium carbonate nodules
45	120									

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: LH  
 Prepared/Date: YN 9/9/2011  
 Checked/Date: 9/26/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.5c



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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										DRILLING METHOD	BOREHOLE LOCATION	<b>G-137 (Continued)</b>
										Rotary Wash	Sta 600+80, Lt 33 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										5/23/2011 and 5/24/2011	4-7/8 inches	164 feet
<b>GROUNDWATER READINGS</b> Drilling mud bailed on 5/23/2011. Ground-water level measured at 32½ feet below the ground surface on 5/24/2011.												
										END OF BORING AT 120 FEET		
										NOTES:		
										Hand augered upper 12 feet to avoid damage to utilities. Borehole grouted with cement-bentonite slurry and patched with asphalt concrete.		
										"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches		
										*Number of blows required to drive the Crandall Sampler 12 inches using a 140 pound automatic hammer falling 30 inches		
										**Photo Ionization Detector used for OVA readings		

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

DRILLING COMPANY/DRILLING EQUIPMENT										BORING NO.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	Tri County / CME 75		
										DRILLING METHOD	BOREHOLE LOCATION	G-138
										DATES DRILLED	HOLE DIAMETER	
										GROUNDWATER READINGS		
										Drilling mud bailed on 5/19/2011. Ground-water level measured at 31 feet below the ground surface on 5/20/2011.		
165	5		0.5	3.9	110	28		☒		4-inch thick Asphalt Concrete over 8-inch thick Portland Cement Concrete and 6-inch thick Base Course <u>QUATERNARY YOUNGER ALLUVIUM [Q<sub>all</sub>]</u> SANDY SILT - moist, dark brown, fine sand		
160	10	9	1.4	24.4	-			☒		WELL GRADED SAND with GRAVEL - medium dense, moist, brown, coarse-grained, coarse gravel  SILT with SAND - stiff, moist, brown, fine sand		
155	15		1.7	11.0	123	49		☒		<u>QUATERNARY OLDER ALLUVIUM [Q<sub>alo</sub>]</u> LEAN CLAY with GRAVEL - hard, moist, dark brown, some slate gravel		
150	20	37	1.0	15.3	-			☒				
145	25		0.5	14.9	109	25		☒		Becomes very stiff, trace coarse sand		
140	30	30	1.7	13.8	-		44	☒		CLAYEY SAND - medium dense, moist, dark orangish brown, fine to coarse-grained, occasional gravel (up to 3/8 inch in size)  ▼		
135	35		2.2	-	-	10		☐		WELL GRADED GRAVEL with SAND - loose, moist, dark gray, coarse-grained (Sample not recovered)		
130	40									SANDY LEAN CLAY - very stiff, moist, orangish brown, fine sand		

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: JHD  
Prepared/Date: YN 9/9/2011  
Checked/Date: 9/26/2011

MTA Westside Subway Extension  
Los Angeles, California

**amec**

**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.6a

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.
								Tri County / CME 75		<b>G-138</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 603+80, Lt 25 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								5/19/2011 and 5/20/2011	4-¼ inches	168 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 5/19/2011. Ground-water level measured at 31 feet below the ground surface on 5/20/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
125		21	1.4	22.1	-			☒		
45			1.0	10.1	117	41		☒	SM	SILTY SAND with GRAVEL - medium dense, moist, dark brown, coarse-grained
120										
50		28	0.5	22.9	-			☒	CL	LEAN CLAY with GRAVEL - very stiff, wet, olive brown, coarse gravel
115										
55			0.7	24.6	99	26		☒	CL	SANDY LEAN CLAY - very stiff, moist, olive brown, fine sand
110										
60		25	0.6	31.4	-			☒	CH	FAT CLAY with SAND - very stiff, moist, olive gray, fine to medium sand, trace fine
105										
65			0.0	30.0	92	46	82	☒		
100									CL	SANDY LEAN CLAY - very stiff, moist, olive gray, fine to medium sand
70		23	0.4	16.6	-			☒		
95										
75			0.2	32.3	89	33	68	☒		
90										
80										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: JHD  
Prepared/Date: YN 9/9/2011  
Checked/Date: 9/26/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.6b

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.
								Tri County / CME 75		<b>G-138</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 603+80, Lt 25 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								5/19/2011 and 5/20/2011	4-¼ inches	168 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 5/19/2011. Ground-water level measured at 31 feet below the ground surface on 5/20/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
85		36	0.5	20.1	-			☒		Becomes hard
85			0.5	14.6	114	58	58	☒		Trace slate gravel Fine to coarse, some fine gravel (up to 1/2 inch in size)
90		49	0.7	13.5	-			☒	CL	SANDY LEAN CLAY with GRAVEL - hard, moist, brownish gray
95			0.5	14.1	115	78	28	☒	SM	SILTY SAND - very dense, moist, orangish brown, fine to coarse-grained, trace fine gravel (up to 3/8 inch in size)
100		81	0.8	23.8	-		72	☒	CL	<b>SAN PEDRO FORMATION [Qsp]</b> LEAN CLAY with SAND- hard, moist, olive brown, fine to medium sand, trace coarse
105			1.1	32.9	90	55	91	☒	ML	SILT - hard, moist, olive brown, some fine to coarse sand, occasional gravel (up to 3/8 inch in size)
110		38	0.5	-	-			☐		(Sample not recovered)
115			0.9	38.6	83	32		☒	CH	FAT CLAY - very stiff, moist, dark gray
120										END OF BORING AT 116 FEET
										NOTES: Hand augered upper 5½ feet to avoid damage to utilities. Borehole grouted with cement-bentonite slurry and patched with asphalt concrete.

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: JHD  
 Prepared/Date: YN 9/9/2011  
 Checked/Date: 9/26/2011

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**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.6c

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.
										Tri County / CME 75		<b>G-138</b> <b>(Continued)</b>
										DRILLING METHOD	BOREHOLE LOCATION	
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	Rotary Wash	Sta 603+80, Lt 25 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										5/19/2011 and 5/20/2011	4-¼ inches	168 feet
										GROUNDWATER READINGS		
										Drilling mud bailed on 5/19/2011. Ground-water level measured at 31 feet below the ground surface on 5/20/2011.		
										<p>"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches</p> <p>*Number of blows required to drive the Crandall Sampler 12 inches using a 140 pound automatic hammer falling 30 inches</p> <p>**Photo Ionization Detector used for OVA readings</p>		
45												
125												
40												
130												
35												
135												
30												
140												
25												
145												
20												
150												
155												
10												
160												

Field Tech: JHD  
Prepared/Date: YN 9/9/2011  
Checked/Date: 9/26/2011

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Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.6d

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		
										DRILLING METHOD	BOREHOLE LOCATION	GROUND EL.
										Rotary Wash	Sta 611+70, Lt 22 feet	
										DATES DRILLED	HOLE DIAMETER	
										5/6/2011, 5/19/2011, and 5/20/2011	4-7/8 inches	177 feet
										GROUNDWATER READINGS		
										Ground-water level measured at 36½ feet and 42 feet below the ground surface in shallow and deep monitoring wells, respectively on 7/29/11. See last page of this boring for details.		
175										10-inch thick Asphalt Concrete over 5-inch thick Portland Cement Concrete and 4-inch thick Base Course  <b>QUATERNARY YOUNGER ALUVIUM [Qal]</b> SILTY SAND - medium dense, moist, brown, fine to medium-grained, abundant fine to medium gravel  Some slate gravel		
5			8.7	8.5	104	19		☒				
170										<b>QUATERNARY OLDER ALUVIUM [Qol]</b> SANDY LEAN CLAY - very stiff, moist, reddish brown, fine to medium sand, some coarse, trace gravel  More sand		
10		29	4.7	14.1	-			☒				
165										Becomes hard  SILTY SAND - medium dense, moist, brown, fine to coarse-grained, trace gravel, alternating sandy silt lenses  Becomes reddish brown, fine to medium-grained, trace gravel, trace clay		
15			6.6	13.4	121	28		☒				
160										SANDY LEAN CLAY with GRAVEL - hard, moist, brown, fine to coarse sand  WELL GRADED SAND with SILT and GRAVEL - dense, moist, brown, fine to coarse sand		
20		36	6.7	10.9	-			☒				
155												
25			3.9	14.2	112	19		☒				
150												
30		46	4.3	12.0	-			☒				
145												
35			4.3	10.0	125	40		☒				
140												
40												

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
Prepared/Date: YN 6/14/2011  
Checked/Date: 9/23/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.7a

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.
										C & L Drilling / Mayhew 1000		<b>G-139</b> <b>(Continued)</b>
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash		Sta 611+70, Lt 22 feet
										DATES DRILLED		GROUND EL.
										5/6/2011, 5/19/2011, and 5/20/2011		177 feet
										HOLE DIAMETER		
										4-7/8 inches		
GROUNDWATER READINGS												
Ground-water level measured at 36½ feet and 42 feet below the ground surface in shallow and deep monitoring wells, respectively on 7/29/11. See last page of this boring for details.												
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS			
135		32	4.3	12.6	-			☒			Becomes orangish brown, fine to coarse sand, trace gravel	
45			4.5	15.3	116	33		☒			Becomes medium dense, more gravel, more silt	
130												
50		64	5.1	11.7	-		31	☒		SM	SILTY SAND - very dense, moist, olive brown, fine to medium-grained, occasional gravel (up to 1/2 inch in size)	
125												
55			5.7	23.1	101	35	86	☒		CL	<b><u>SAN PEDRO FORMATION [Qsp]</u></b> LEAN CLAY - very stiff, moist, olive brown	
120												
60		21	4.3	22.9	-			☒				
115												
65			4.7	26.7	100	24		☒			Some silty clay seams	
110												
70		39	4.2	18.3	-			☒			Becomes hard, some white mottling, possible calcium carbonate nodules	
105												
75			4.4	14.0	114	44	38	☒		SC	CLAYEY SAND - dense, moist, bluish gray, fine to medium-grained, fine gravel (up to 3/4 inch in size)	
100											Slightly more clay	
80												

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
 Prepared/Date: YN 6/14/2011  
 Checked/Date: 9/23/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.7b



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.	
C & L Drilling / Mayhew 1000									G-139 (Continued)	
DRILLING METHOD				BOREHOLE LOCATION						
Rotary Wash				Sta 611+70, Lt 22 feet						
DATES DRILLED				HOLE DIAMETER				GROUND EL.		
5/6/2011, 5/19/2011, and 5/20/2011				4-7/8 inches				177 feet		
GROUNDWATER READINGS										
Ground-water level measured at 36½ feet and 42 feet below the ground surface in shallow and deep monitoring wells, respectively on 7/29/11. See last page of this boring for details.										
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
95		39	3.8	18.8	-			☒		Some fine gravel
85			3.3	13.1	112	37	48	☒		Becomes bluish gray and green with black silt spots, trace gravel (up to 3/8 inch in size)
90										
90		30	4.1	27.0	-			☒		Becomes medium dense, olive green
85										
95			4.7	18.7	114	58	30	☒	SM	SILTY SAND - dense, moist, olive green, fine to medium-grained, some gravel
80										Layers of Poorly Graded Sand with Silt
100		28		23.8	-			☒	CL	LEAN CLAY - very stiff, moist, brown, trace fine sand
75										
105				27.5	96	46		☒	ML	SANDY SILT - hard, moist, olive green, fine sand
70										Layers of Poorly Graded Sand with Silt
110		93		26.1	-			☒		
65										END OF BORING AT 111½ FEET
115										NOTES: Hand augered upper 5 feet to avoid damage to utilities. Monitoring well was installed on 5/20/2011. See well construction diagram for G-139.
60										"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches
										*Number of blows required to drive the Crandall Sampler 12 inches using a 300 pound hammer falling 18 inches
										**Photo Ionization Detector used for OVA readings
120										

Field Tech: AR  
Prepared/Date: YN 6/14/2011  
Checked/Date: 9/23/2011

MTA Westside Subway Extension  
Los Angeles, California

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LOG OF BORING  
Project No.: 4953-10-1561 Figure: A-1.2.7c

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								DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
								C & L Drilling / Mayhew 1000		G-140
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 615+00, Lt 2 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								3/25/2011 - 3/30/2011	4-7/8 inches	181 feet
								GROUNDWATER READINGS		
								Ground-water level measured at 56 feet below ground surface on 3/29/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
180										4-inch thick Asphalt Concrete over 9-inch thick Portland Cement Concrete, No Base Course
										<b>FILL [Aft]</b> - POORLY GRADED SAND - moist, brown, trace gravel and silt
										<b>QUATERNARY YOUNGER ALLUVIUM [Qal]</b>
										SANDY SILT - moist, brown
	5									CLAYEY SAND - medium dense, moist, dark brown, fine-grained, trace fine gravel
175			0.4	10.6	119	Push				
		24	0.2	15.2	-		48			Becomes reddish brown
170	10									Becomes brown
			0.0	12.9	117	19				
165	15	22	0.0	18.9	-					Alternating with layers of Sandy Lean Clay
160	20		1.7	15.7	98	9				Becomes loose, fine to medium-grained
										LEAN CLAY - stiff, moist, brown, trace sand
155	25	14	0.0	23.2	-					
										SANDY SILT - stiff, moist, brown, fine to medium sand, thin layers of Silty Sand
150	30		0.0	14.6	108	12				
										<b>QUATERNARY OLDER ALLUVIUM [Qalo]</b>
145	35	54	0.6	13.6	-					POORLY GRADED SAND with GRAVEL - very dense, moist, brown, fine to medium-grained, some coarse, gravel (up to 1/4 inch in size)
										Alternating with layers of Silty Sand
140	40									

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DW  
Prepared/Date: JF 5/13/2011  
Checked/Date: 9/26/2011

MTA Westside Subway Extension  
Los Angeles, California

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LOG OF BORING  
Project No.: 4953-10-1561 Figure: A-1.2.8a

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								DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
								C & L Drilling / Mayhew 1000		<b>G-140</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 615+00, Lt 2 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								3/25/2011 - 3/30/2011	4-7/8 inches	181 feet
								GROUNDWATER READINGS		
								Ground-water level measured at 56 feet below ground surface on 3/29/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
140			0.8	24.5	96	24				Becomes medium dense, gravel up to (3/4 inch in size)
									SM	<b>SAN PEDRO FORMATION [Qsp]</b> SILTY SAND - medium dense, moist, dark gray, fine to medium-grained, with some clay
45	135	19	0.7	15.6	-					
										Thin layer of Sandy Silt, gray
50	130		0.0	18.1	111	21	36			Trace gravel (up to 3/8 inch in size)
		23	0.0	28.0	-				CL	LEAN CLAY - very stiff, moist, dark gray
55	125		0.0	22.5	104	12			ML	SANDY SILT - stiff, moist to wet, gray
		26	0.0	27.5	-				CL	LEAN CLAY - very stiff, moist, greenish gray
60	120		0.0	23.8	102	22				Trace fine to medium sand
		38	0.0	16.8	-				CL	SANDY LEAN CLAY - hard, moist, greenish gray, fine to medium sand
			0.0	19.0	108	14	71			Alternating with layers of Lean Clay with Sand, stiff, trace gravel (up to 1/2 inch in size)
65	115		0.0	15.5	-					Becomes dark gray
		47	0.0	14.4	117	25	40		SC	CLAYEY SAND - medium dense, moist, greenish gray, fine to medium-grained
70	110		0.2	14.7	-				SM	SILTY SAND - very dense, moist, greenish gray, fine-grained, trace gravel (up to 1/2 inch in size)
		71	0.0				18			
75	105									
80										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DW  
Prepared/Date: JF 5/13/2011  
Checked/Date: 9/26/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.8b

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.

[illegible]









Field Tech: DW  
Prepared/Date: JF 5/13/2011  
Checked/Date: 9/26/2011

# MTA Westside Subway Extension Los Angeles, California



# LOG OF BORING

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.
								C & L Drilling / Mayhew 1000		<b>G-141</b>
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 621+70, Lt 11 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								5/6/2011 - 5/23/2011	4-7/8 inches	195 feet
								GROUNDWATER READINGS		
								Drilling mud bailed. Ground-water level measured at 46 feet below the ground surface.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
190	5		0.0	11.4	116	Push				<div>  SP-SM   SM </div> <p>4-inch thick Asphalt Concrete over 10-inch thick Portland Cement Concrete, No Base Course  <b>FILL [Aft]</b> - POORLY GRADED SAND with SILT - moist, olive yellow, fine to medium-grained, some coarse, trace fine to coarse gravel (up to 3/4 inch in size)  <b>QUATERNARY YOUNGER ALUVIUM [Oall]</b>            SILTY SAND - moist, brown, fine to medium-grained, some fine to coarse gravel (up to 1 inch in size), trace clay</p>
185	10		0.0	13.5	118	13				<div>  SC </div> <p><b>QUATERNARY OLDER ALUVIUM [Oalo]</b>            CLAYEY SAND - medium dense, moist, brown, fine to coarse-grained, fine to coarse angular gravel (up to 1 inch in size)</p>
180	15	13	0.0	18.7	-					<div>  ML </div> <p>SANDY SILT - stiff, moist, brown, fine to medium sand, some clay</p>
175	20		0.0	6.1	105	15	6			<div>  GW-GM </div> <p>WELL GRADED GRAVEL with SILT and SAND - medium dense, moist to wet, dark brown, fine gravel (up to 3/4 inch in size), fine to coarse sand</p>
170	25	16	0.0	29.0	-		68			<div>  ML </div> <p>SANDY SILT - very stiff, moist, brown, fine sand, trace clay</p>
165	30		0.0	21.9	107	6				<div>  CL-ML </div> <p>SILTY CLAY with SAND - medium stiff, moist, brown, fine sand</p>
160	35	46	0.0	8.1	-		19			<div>  SM </div> <p>More sand            SILTY SAND - medium dense to dense, moist to wet, brown, fine to coarse-grained, some fine subrounded to subangular gravel (up to 1/2 inch in size)</p>

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: LH/AR  
 Prepared/Date: WL 6/13/2011  
 Checked/Date: 10/2/2011

MTA Westside Subway Extension  
 Los Angeles, California



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.9a

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.
								C & L Drilling / Mayhew 1000		<b>G-141</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 621+70, Lt 11 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								5/6/2011 - 5/23/2011	4-7/8 inches	195 feet
								GROUNDWATER READINGS		
								Drilling mud bailed. Ground-water level measured at 46 feet below the ground surface.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
150	45		0.0	22.0	90	16		☒		Layers of Clayey Sand seems interbedded
		41	0.0	14.0	-		34	☒		<p>Becomes moist, orange brown, fine to medium-grained, some coarse, some gravel</p> <p>▽ Becomes wet, yellowish brown, some fine gravel (up to 3/4 inch in size), some iron oxide stains, trace small clay nodules</p>
145	50		0.0	22.4	102	17	69	☒	ML	SANDY SILT - very stiff, moist, olive brown, fine sand, some mica
									ML	<b>SAN PEDRO FORMATION [Qsp]</b> SANDY SILT - very stiff, moist to wet, olive brown, fine sand, some medium, trace iron oxide stains
140	55	31	0.0	18.9	-			☒	CL	SANDY LEAN CLAY - hard, moist, greenish gray to bluish gray, some calcium carbonate nodules, trace subrounded fine gravel (up to 1/2 inch in size)
135	60		0.0	20.8	104	14	72	☒	CL	LEAN CLAY with SAND- stiff to hard, moist to wet, bluish gray to dark bluish gray, fine sand, some medium
130	65	32	0.0	22.4	-			☒		Becomes olive gray, more calcium carbonate nodules
125	70		0.0	25.1	105	18	64	☒	CL	SANDY LEAN CLAY - very stiff to hard, moist, olive gray, fine sand, some medium
120	75	53		20.1	-			☒		Becomes olive green, some layers of Silty Sand
									CL	LEAN CLAY with SAND- very stiff, moist, bluish gray, fine sand, some medium
80										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: LH/AR  
Prepared/Date: WL 6/13/2011  
Checked/Date: 10/2/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.9b



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.		
										C & L Drilling / Mayhew 1000		<b>G-141</b> <b>(Continued)</b>		
										DRILLING METHOD	BOREHOLE LOCATION			
										Rotary Wash	Sta 621+70, Lt 11 feet			
										DATES DRILLED	HOLE DIAMETER	GROUND EL.		
										5/6/2011 - 5/23/2011	4-7/8 inches	195 feet		
										GROUNDWATER READINGS				
										Drilling mud bailed. Ground-water level measured at 46 feet below the ground surface.				
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS					
				21.5	100	24	74	☒						
110	85	50		21.1	-			☒			CL-ML		SILTY CLAY with SAND - hard, moist, bluish gray, fine sand	
105	90			20.5	105	49		☒			CL		SANDY LEAN CLAY - hard, moist, bluish gray, fine sand	
100	95	59		22.4	-			☒			ML		SANDY SILT - hard, moist to wet, bluish gray, fine sand	
95	100			25.8	95	73		☒						
90	105	54		27.4	-			☒					Becomes bluish gray to olive green	
													END OF BORING AT 106½ FEET	
													NOTES:	
85	110												Hand augered upper 5 feet due to utilities. Borehole grouted with cement-bentonite slurry and patched with asphalt concrete.	
													"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches	
80	115												*Number of blows required to drive the Crandall Sampler 12 inches using a 380 pound hammer falling 18 inches	
													**Photo Ionization Detector used for OVA readings	

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



LOG OF BORING  
Project No.: 4953-10-1561 Figure: A-1.2.9c

Field Tech: LH/AR  
Prepared/Date: WL 6/13/2011  
Checked/Date: 10/2/2011



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

								DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
								Tri County Drilling / CME 75		<b>G-142</b>
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 628+70, Lt 11 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								5/9/2011 - 5/11/2011	4-¼ inches	209 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 5/10/2011. Ground-water level measured at 32 feet below the ground surface on 5/11/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
205	5		2.2	18.4	104	11				<div>  ML                 </div> <p>7-inch thick Asphalt Concrete over 5-inch thick Portland Cement Concrete, 4-inch thick Base Course  <b>QUATERNARY YOUNGER ALLUVIUM [Qal]</b>                      SANDY SILT - moist, brown, fine sand</p>
200	10	18	0.5	16.6	-					<div>  SM                 </div> <p>SILTY SAND - loose, moist, brown, fine to medium-grained, trace clay, trace fine gravel</p>
195	15		0.0	10.1	111	31				<div>  CL                 </div> <p><b>QUATERNARY OLDER ALLUVIUM [Qalo]</b>                      SANDY LEAN CLAY - very stiff, moist, brown, fine sand</p>
190	20	15		18.0	-					<div>  SM                 </div> <p>SILTY SAND - medium dense, moist, orangish brown, fine to medium-grained, trace clay, trace fine gravel</p>
185	25		1.1	12.7	120	26				<div>  SW                 </div> <p>WELL GRADED SAND with GRAVEL - medium dense, moist, brownish gray, fine to coarse-grained, coarse slate gravel</p>
180	30	41	1.4	10.1	-		17			<div>  SM                 </div> <p>Becomes dark greenish gray, sandier seams</p>
175	35			13.9	110	34				<div>  SP                 </div> <p>SILTY SAND with GRAVEL - dense, very moist, fine to coarse-grained, fine gravel (up to 1/2 inch in size)</p>
170	40									<div>  CL                 </div> <p>POORLY GRADED SAND - medium dense, very moist, brown, fine to medium-grained, alternating Well Graded Sand, some fine gravel</p>
										<div>  CL                 </div> <p><b>SAN PEDRO FORMATION [Qsp]</b>                      LEAN CLAY with GRAVEL - moist, dark greenish gray</p>

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: JHD  
 Prepared/Date: WL 6/28/2011  
 Checked/Date: 10/6/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.10a

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.
								Tri County Drilling / CME 75		<b>G-142</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 628+70, Lt 11 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								5/9/2011 - 5/11/2011	4-1/4 inches	209 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 5/10/2011. Ground-water level measured at 32 feet below the ground surface on 5/11/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
165	45	17	0.5	29.9	-			☒		CL
										LEAN CLAY - very stiff, very moist, dark bluish gray, trace gravel
										Less gravel
160	50		0.0	26.3	102	21	88	☒		MH
										ELASTIC SILT - stiff, moist, dark greenish gray, some fine to medium sand
155	55	13	2.4	26.9	-			☒		
										Becomes greenish gray to bluish gray
										More fine gravel
150	60		2.3	18.7	109	44	29	☒		SM
										SILTY SAND with GRAVEL - medium dense, moist, dark greenish gray, fine to coarse-grained, fine gravel (up to 3/4 inch in size)
145	65	23	2.9	19.2	-			☒		
										Some clay, trace gravel
140	70		2.0	25.2	99	33	73	☒		CL
										LEAN CLAY with SAND - very stiff, moist, dark greenish gray to bluish gray, fine sand, trace medium
135	75	57	2.9	19.2	-			☒		CL
										LEAN CLAY with GRAVEL - hard, moist, dark gray, coarse gravel
										Less gravel
130	80			14.8	116	43		☒		
										Becomes very stiff, some gravel
										Shale interbedded

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: JHD  
 Prepared/Date: WL 6/28/2011  
 Checked/Date: 10/6/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.10b

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								DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
								Tri County Drilling / CME 75		<b>G-142</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 628+70, Lt 11 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								5/9/2011 - 5/11/2011	4-¼ inches	209 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 5/10/2011. Ground-water level measured at 32 feet below the ground surface on 5/11/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
125	85	35	2.9	19.1	-		66	☒	CL	SANDY LEAN CLAY - hard, moist, dark gray, fine to coarse sand, some shale interbedded, trace fine gravel (up to 3/4 inch in size)
120	90		2.3	6.0	122	51		☒	ML	SANDY SILT with GRAVEL - hard, moist, dark greenish gray, gravel (up to 1/4 inch in size), trace clay
115	95	27	3.5	29.0	-			☒	CL	SANDY LEAN CLAY - very stiff, moist, dark greenish gray
110	100		2.9	24.5	-	46		☒		Trace coarse gravel
105	105									Some silt
100	110									END OF BORING AT 96 FEET
95	115									NOTES:
90	120									Hand augered upper 5 feet to avoid damage to utilities. Borehole grouted with cement-bentonite slurry and patched with asphalt concrete.
										"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches
										*Number of blows required to drive the Crandall Sampler 12 inches using a 140 pound automatic hammer falling 30 inches
										**Photo Ionization Detector used for OVA readings

MTA Westside Subway Extension  
Los Angeles, California



Field Tech: JHD  
Prepared/Date: WL 6/28/2011  
Checked/Date: 10/6/2011  
**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.10c

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										Tri County Drilling / CME 75		G-143
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 635+40, Lt 16 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										5/12/2011 - 5/13/2011	4-¼ inches	216 feet
										GROUNDWATER READINGS		
										Drilling mud bailed on 5/12/2011. Ground-water level measured at 35 feet below the ground surface on 5/13/2011.		
215										10-inch thick Asphalt Concrete over 5-inch thick Portland Cement Concrete and 3-inch thick Base Course		
									ML	<u>QUATERNARY YOUNGER ALLUVIUM [Qal]</u> SANDY SILT - moist, brown, fine sand		
210	5		3.2	18.0	102	12		☒	CH	FAT CLAY - medium stiff, moist, brown		
									CL	LEAN CLAY - very stiff, moist, orangish brown, trace shale fragments		
205	10	23	5.3	17.9	-			☒				
200	15		4.7	12.5	122	27		☒	SC	CLAYEY SAND - medium dense, brown with greenish gray mottling, fine to medium-grained, abundant shale fragments, layers of Clayey Sand		
									CL	<u>QUATERNARY OLDER ALLUVIUM [Qol]</u> LEAN CLAY with GRAVEL - hard, moist, brown, trace shale		
195	20	32	3.8	14.8	-			☒		More small shale fragments		
190	25		2.9	10.6	119	27		☒	SM	SILTY SAND - medium dense, moist, brown with dark gray mottling, fine to medium-grained, some gravel, some clay		
185	30	55	3.2	14.2	-			☒		Becomes very dense, very moist, dark brown, medium-grained, abundant shale fragments		
180	35		4.4	10.5	110	34	16	☒	SM	▼ SILTY SAND with GRAVEL - medium dense, moist, brownish gray, fine to coarse-grained, fine to coarse gravel (up to 1 inch in size)		
40												

(CONTINUED ON FOLLOWING FIGURE)

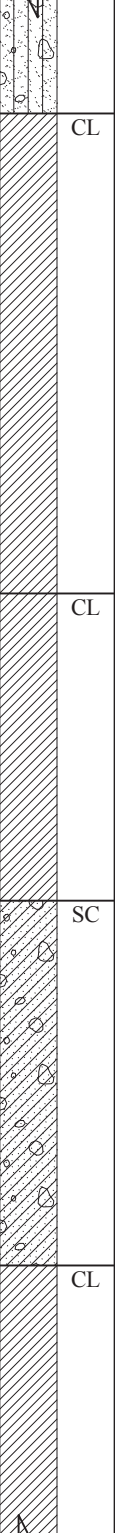
Field Tech: JHD  
 Prepared/Date: YN 6/9/2011  
 Checked/Date: 9/27/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.11a

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.
								Tri County Drilling / CME 75		<b>G-143</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 635+40, Lt 16 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								5/12/2011 - 5/13/2011	4-¼ inches	216 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 5/12/2011. Ground-water level measured at 35 feet below the ground surface on 5/13/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
175		41	5.6	13.1	-			☒		 <p>Becomes dense, more shale fragments, layer of Well Graded Sand</p> <p>LEAN CLAY - stiff, moist, dark olive brown, trace coarse gravel</p>
170	45		5.3	22.6	102	23		☒		
165	50	19	6.2	18.8	-			☒		Becomes very stiff, olive brown, trace shale fragments, thin layer of silt
160	55		5.9	22.1	102	22	72	☒		LEAN CLAY with SAND - stiff, moist, brown, some fine sand, occasional medium
155	60	19	5.5	22.9	-			☒		Becomes very stiff, dark brown, trace coarse shale fragments
150	65		4.7	14.4	120	45	25	☒		CLAYEY SAND with GRAVEL - medium dense, moist, dark brown, brown and olive brown mottling, fine to coarse-grained, fine gravel (up to 3/4 inch in size)
145	70	42	3.2	14.2	-		29	☒		Becomes dense, dark olive brown
140	75		3.8	16.7	115	42		☒		LEAN CLAY - very stiff, moist, dark brown, trace shale fragments
80										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: JHD  
Prepared/Date: YN 6/9/2011  
Checked/Date: 9/27/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.11b

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.
										Tri County Drilling / CME 75		<b>G-143</b> <b>(Continued)</b>
										DRILLING METHOD	BOREHOLE LOCATION	
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	Rotary Wash	Sta 635+40, Lt 16 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										5/12/2011 - 5/13/2011	4-¼ inches	216 feet
GROUNDWATER READINGS												
Drilling mud bailed on 5/12/2011. Ground-water level measured at 35 feet below the ground surface on 5/13/2011.												
135		28	3.6	17.8	-			☒	 ML  SM	SANDY SILT - very stiff, moist, olive brown, trace clay, trace shale fragments		
85										<b>SAN PEDRO FORMATION [Qsp]</b> SILTY SAND - very dense, dry, greenish gray, fine to coarse-grained, occasional fine gravel (up to 3/8 inch in size)		
130			2.9	10.8	111	80	34	☒		Becomes dark gray, thin layer of gravel		
90										END OF BORING AT 91½ FEET		
125		50/4"	3.2	11.6	-			☒		NOTES:		
										Hand augered upper 5½ feet to avoid damage to utilities. Borehole grouted with cement-bentonite slurry and patched with asphalt concrete.		
95										"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches		
120										*Number of blows required to drive the Crandall Sampler 12 inches using a 140 pound automatic hammer falling 30 inches		
100										**Photo Ionization Detector used for OVA readings		
115												
105												
110												
105												
110												
105												
115												
100												
120												

Field Tech: JHD  
Prepared/Date: YN 6/9/2011  
Checked/Date: 9/27/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.11c



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.
								C & L Drilling / Mayhew 1000		<b>G-145</b>
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 648+40, Lt 50 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								4/14/2011 - 4/15/2011	4-7/8 inches	231 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 4/15/2011. Ground-water level measured at 71 feet below the ground surface on 4/18/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
230										4 1/2-inch thick Asphalt Concrete over 12-inch thick Portland Cement Concrete
	5									<b>FILL [Aft]</b> SILTY SAND with GRAVEL - moist, brown
225										
	10									<b>QUATERNARY YOUNGER ALLUVIUM [Qal]</b> LEAN CLAY with SAND - very soft, moist, olive grayish brown, fine to medium sand
220			0.5	18.8	104	Push	84	☒		Trace gravel (up to 3/8 inch in size)
	15									
215		10	0.4	13.6	-			☒		<b>FAT CLAY</b> with SAND - stiff, moist, brown, fine to coarse sand, trace gravel (up to 1/2 inch in size)
	20									<b>POORLY GRADED GRAVEL</b> - loose, moist, brown
210			0.0	18.6	111	5		☒		<b>POORLY GRADED GRAVEL</b> with CLAY - loose, moist, brown, fine to coarse sand
	25									<b>QUATERNARY OLDER ALLUVIUM [Qalo]</b> SANDY LEAN CLAY - very stiff, moist, brown, fine to coarse sand
205		22		16.2	-		59	☒		Trace gravel (up to 1/2 inch in size)
	30									(Sample not recovered)
200		10		16.8	-	7		☒		Becomes stiff, trace gravel
	35									
195		33		12.9	-		42	☒		<b>SILTY SAND</b> - dense, moist, light olive brown, fine to medium-grained, some coarse, some fine gravel (up to 1/2 inch in size)
40										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DW  
Prepared/Date: YN 6/20/2011  
Checked/Date: 9/19/2011

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



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.12a



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.
								C & L Drilling / Mayhew 1000		<b>G-145</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 648+40, Lt 50 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								4/14/2011 - 4/15/2011	4-7/8 inches	231 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 4/15/2011. Ground-water level measured at 71 feet below the ground surface on 4/18/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
190		8		-	-	4	20			(Sample not recovered)
				5.6	-					
45									SP-SM	POORLY GRADED SAND - loose, moist, brown, fine to coarse-grained, thin layers of Sandy Silt, trace fine gravel (up to 1/2 inch in size)
185		19		16.0	-				CL	SANDY LEAN CLAY - very stiff, moist, brown, some fine gravel
50									NV	
180		25		19.5	-	4	73		CL	(Sample not recovered) LEAN CLAY with SAND - very stiff, moist, brown, some fine gravel (up to 3/4 inch in size)
55										
175		18		-	-					(Sample not recovered)
60									NV	
170		15		17.4	-	16				(Sample not recovered) Becomes stiff, with fine gravel
65									CL	SANDY LEAN CLAY - very stiff, moist, brown, trace clay, trace gravel (up to 1/2 inch in size)
165				14.8	111	20	61			
70									NV	
160		18		20.4	-	10	70			▼ (Sample not recovered)
75										
155		28		-	-					(Sample not recovered)
80										

(CONTINUED ON FOLLOWING FIGURE)



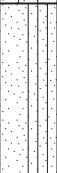






Field Tech: DW  
Prepared/Date: YN 6/20/2011  
Checked/Date: 9/19/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.12b

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.	
										C & L Drilling / Mayhew 1000		G-145 (Continued)	
										DRILLING METHOD	BOREHOLE LOCATION		
										Rotary Wash		Sta 648+40, Lt 50 feet	
										DATES DRILLED		HOLE DIAMETER	GROUND EL.
										4/14/2011 - 4/15/2011		4-7/8 inches	231 feet
										GROUNDWATER READINGS			
										Drilling mud bailed on 4/15/2011. Ground-water level measured at 71 feet below the ground surface on 4/18/2011.			
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS				
150				5.5	115	69	16	☒			SM	SILTY SAND with GRAVEL - very dense, moist, brown, fine to coarse-grained, gravel (up to 1/2 inch in size)	
85		74/11"		17.5	-			☒			SM	SILTY SAND - very dense, moist, light brownish gray, fine to medium-grained, iron oxide stains, trace gravel (up to 3/4 inch in size), trace clay	
145													
90				19.2	105	30		☒			SP-SM	POORLY GRADED SAND with SILT and GRAVEL - medium dense to dense, moist, light brownish gray, fine to coarse-grained, gravel (up to 1/4 inch in size)	
140													
95		60		10.5	-			☒			SM	SILTY SAND with GRAVEL - very dense, moist, olive yellow, fine to medium-grained, slate gravel (up to 1 1/2 inch in size)	
135													
100				20.5	101	17	50	☒			SM	<u>SAN PEDRO FORMATION [Qsp]</u> SILTY SAND - medium dense, moist, olive, fine sand, trace gravel (up to 3/8 inch in size)	
130												Thin layer of Sandy Silt	
105		67		19.0	-			☒			SM	SILTY SAND - very dense, brown, fine-grained, iron oxide stains, trace gravel	
125											SP	POORLY GRADED SAND - very dense, moist, brown, fine to medium-grained	
110											CL	LEAN CLAY with SAND - very stiff, moist, gray to light brown, trace gravel (up to 3/8 inch in size)	
120				3.5	112	27	78	☒					
115		37		22.5	-			☒			CL	SANDY LEAN CLAY - hard, moist, gray, fine sand, some medium	
115													
120													

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DW  
 Prepared/Date: YN 6/20/2011  
 Checked/Date: 9/19/2011

MTA Westside Subway Extension  
 Los Angeles, California



LOG OF BORING  
 Project No.: 4953-10-1561 Figure: A-1.2.12c

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.
										C & L Drilling / Mayhew 1000		<b>G-145</b> <b>(Continued)</b>
										DRILLING METHOD	BOREHOLE LOCATION	
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	Rotary Wash	Sta 648+40, Lt 50 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										4/14/2011 - 4/15/2011	4-7/8 inches	231 feet
GROUNDWATER READINGS												
Drilling mud bailed on 4/15/2011. Ground-water level measured at 71 feet below the ground surface on 4/18/2011.												
110				15.7	118	26		☒		SC	SANDY LEAN CLAY - very stiff, moist, gray, fine to medium sand, trace fine gravel	
											END OF BORING AT 121 FEET	
											NOTES:	
											Hand augered upper 8 feet to avoid damage to utilities. Borehole grouted with cement-bentonite slurry and patched with quick set cement.	
											"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches	
											*Number of blows required to drive the Crandall Sampler 12 inches using a 380 pound hammer falling 18 inches	
											**Photo Ionization Detector used for OVA readings	
											Downhole Test: NV = Noise/Vibration	
125												
105												
130												
100												
135												
95												
140												
90												
145												
85												
150												
80												
155												
75												
160												

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.12d

Field Tech: DW  
Prepared/Date: YN 6/20/2011  
Checked/Date: 9/19/2011

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.

								DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
								C & L Drilling / Mayhew 1000		<b>G-146</b>
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 652+80, Lt 20 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								4/21/2011 and 5/5/2011	4-7/8 inches	239 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 4/21/2011. Ground-water level measured at 32 feet below the ground surface on 5/5/2011 (after two weeks).		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
235	5		2.8	20.1	96	10				<p>9-inch thick Asphalt Concrete over 5-inch thick Portland Cement Concrete and 3-inch thick Base Course</p> <p><b>QUATERNARY YOUNGER ALLUVIUM [Qall]</b> SANDY SILT - moist, light brown, fine sand</p>
									ML	
									SM	SILTY SAND - moist, light brown, fine to medium-grained, trace slate gravel
230	10	13	2.1	22.4	-				CL-ML	<p>SANDY SILTY CLAY - medium stiff, moist, brown, fine sand, trace coarse, rootlets (up to 1/4 inch in size)</p> <p>Trace gravel</p> <p><b>QUATERNARY OLDER ALLUVIUM [Qold]</b> SILTY CLAY - stiff, moist, dark olive, some fine sand, trace slate gravel</p>
									CL-ML	
225	15			-	-	10				(Sample not recovered)
			2.9			21				
220	20	32	3.2	16.0	-				CL	<p>SANDY LEAN CLAY - very stiff, moist, brown, fine sand, trace coarse, trace calcium carbonate nodules, trace magnesium nodules</p> <p>Becomes hard. dark olive, fine to medium sand, trace gravel</p>
215	25		0.3	16.4	115	20				Becomes very stiff, olive brown to brown, fine sand, trace medium
210	30	30	1.0	16.5	-				SM	SILTY SAND - medium dense, moist, brown, fine to medium-grained, some coarse, trace gravel
									SP-SM	<p>POORLY GRADED SAND with SILT - medium dense, moist, brown, fine to coarse-grained, trace gravel</p> <p>Some slate fragments (up to 3 inches in size)</p>
205	35		3.4	13.1	116	44				
									SP	<p>POORLY GRADED SAND - dense, moist, brown to yellowish brown, fine to coarse-grained, fine to coarse gravel (up to 1 inch in size), trace clay, trace mica</p> <p>Alternating with thin layers of Silt</p>
200	40									

(CONTINUED ON FOLLOWING FIGURE)

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

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



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.13a

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.
								C & L Drilling / Mayhew 1000		<b>G-146</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 652+80, Lt 20 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								4/21/2011 and 5/5/2011	4-7/8 inches	239 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 4/21/2011. Ground-water level measured at 32 feet below the ground surface on 5/5/2011 (after two weeks).		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
195	45	16	0.0	19.1	-			☒	SM	SILTY SAND - medium dense, moist, brown, fine to medium-grained, trace coarse
190	50	20	3.2	16.7	-		58	☒	ML	SANDY SILT - very stiff, moist, dark olive, fine to coarse sand, trace fine gravel (up to 3/8 inch in size)
185	55	23	0.5	17.1	-			☒	CL-ML	SILTY CLAY - stiff, moist, dark brown, some fine sand, trace medium to coarse, trace fine gravel (up to 1/4 inch in size)
180	60		2.7	17.0	111	27	64	☒	CL	SANDY LEAN CLAY - very stiff, moist, olive brown, fine sand, trace medium and coarse, trace fine gravel (up to 1/4 inch in size)
175	65	17	0.5	21.3	-			☒	ML	More sand, slate gravel (up to 1/2 inch in size)
170	70		2.9	19.0	107	24		☒	CL	Thin layer of Silty Sand, olive brown, fine to medium-grained
165	75	36	7.9	15.7	-			☒	ML	SILT - very stiff, wet, dark olive, trace fine sand, some clay
160	80	25	7.9	16.7	-			☒	CL	SANDY LEAN CLAY - very stiff, moist, dark brown to olive brown, fine sand
			9.2	20.3	108	34		☒	ML	Thin layers of Silt and Sandy Silt
										LEAN CLAY - very stiff, moist, olive brown, trace fine sand
										SANDY SILT - hard, moist, dark olive, very fine to fine sand, trace fine gravel (up to 1/2 inch in size)
										Becomes very stiff, trace fine to coarse gravel (up to 3/4 inch in size)
										Becomes olive yellow to dark olive, some clay

(CONTINUED ON FOLLOWING FIGURE)

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

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



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.13b

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.
								C & L Drilling / Mayhew 1000		<b>G-146</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 652+80, Lt 20 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								4/21/2011 and 5/5/2011	4-7/8 inches	239 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 4/21/2011. Ground-water level measured at 32 feet below the ground surface on 5/5/2011 (after two weeks).		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
155	85	49	7.2	17.7	112	33	75			CL
			5.4	22.4	-					
150	90		5.7	24.7	99	28				
		75	6.1	11.2	-		17			SM
145	95		5.6	13.7	116	63				ML
										SM
140	100	53/6"	5.9	14.4	-					SW-SM
135	105		5.4	9.4	129	80/6"				
130	110									
125	115									
120	120									

LEAN CLAY with SAND - very stiff, moist, olive yellow to dark olive, fine sand

Becomes hard, trace fine gravel (up to 1/2 inch in size)

Coarse gravel (up to 3 inches in size)

Some medium sand and fine gravel (up to 1/4 inch in size)

Thin layer of Sandy Silt, brown, fine sand

SILTY SAND - very dense, moist, dark olive brown, fine to coarse-grained, trace fine gravel (up to 1/2 inch in size)

SILT - moist, brown, trace gravel

SILTY SAND with GRAVEL - very dense, moist, brown, fine-grained

WELL GRADED SAND with SILT and GRAVEL - very dense, moist to wet, olive brown, fine to coarse-grained, fine gravel (up to 1/2 inch in size), alternating with layer of Poorly Graded Sand

Becomes dark olive to dark olive yellow, more clay, fine gravel (up to 3/4 inch in size)

END OF BORING AT 105 FEET

NOTES:

Hand augered upper 5 feet due to utilities. Borehole grouted with cement bentonite slurry and patched with asphalt concrete.

"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches

\*Number of blows required to drive the Crandall Sampler 12 inches using a 300 pound hammer falling 18 inches

\*\*Photo Ionization Detector used for OVA readings

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

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.13c



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.
								Tri Country Drilling / CME 75		<b>G-147</b>
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 659+52, Lt 45 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								5/16/2011 - 5/18/2011	4-¼ inches	246 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 5/17/2011. Ground-water level measured at 46 feet on 5/18/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
245										6-inch thick Asphalt Concrete over 10-inch thick Portland Cement Concrete, No Base Course
	5									<b>QUATERNARY YOUNGER ALUVIUM [Qall]</b> SANDY SILT - moist, dark brown, fine sand
240			0.0	-	-	12				Thin layers of Lean Clay
	10									SILTY SAND - loose, dark brown, fine to medium-grained, slightly porous
235		16	0.4	18.8	-					LEAN CLAY - very stiff, moist, dark brown, trace gravel
	15									<b>QUATERNARY OLDER ALUVIUM [Qalo]</b> SILTY SAND with GRAVEL - medium dense, moist, orange brown to brown, fine to medium-grained
230			0.2	15.7	104	23				
	20	28	0.5	11.1	-					SANDY LEAN CLAY - very stiff, moist, dark orangish brown, fine to medium sand
225										
	25		1.0	20.4	106	23				
220										SILTY GRAVEL with SAND - dense, moist, brownish gray, shale gravel, some quartz gravel, fine to coarse sand
	30	35	1.1	6.3	-					
215										
	35		1.4	20.4	100	22				GRAVELLY LEAN CLAY - stiff, moist, dark brown, some coarse shale gravel
210										
	40									

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: JHD  
 Prepared/Date: YN 6/13/2011  
 Checked/Date: 10/2/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.14a



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.
								Tri Country Drilling / CME 75		<b>G-147</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 659+52, Lt 45 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								5/16/2011 - 5/18/2011	4-¼ inches	246 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 5/17/2011. Ground-water level measured at 46 feet on 5/18/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
205		15	1.4	23.7	-			☒	CL-ML	SILTY CLAY - stiff to very stiff, moist, dark orangish brown
45										
200			1.4	15.9	112	38		☒		
50									SM	SILTY SAND with GRAVEL - very dense, moist, orangish brown, some shale and quartz gravel
195		94/8"	1.1	10.2	-			☒		
55									CL	LEAN CLAY with GRAVEL - very stiff, moist, dark orangish brown, coarse gravel
190			1.6	18.5	108	32		☒		
60		23	2.1	25.7	-			☒		
185										
65			1.6	13.3	114	63		☒		Becomes hard
180										
									SM	SILTY SAND - very dense, moist, orangish brown, fine to coarse-grained, some fine gravel (up to 3/8 inch in size)
70		90	0.6	9.3	-		22	☒		
175										
									CL	SANDY LEAN CLAY - hard, moist, dark orangish brown, fine to medium sand, trace coarse, trace fine gravel (up to 3/8 inch in size)
75			0.2	15.8	113	50	59	☒		
170										
80										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: JHD  
Prepared/Date: YN 6/13/2011  
Checked/Date: 10/2/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.14b

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.
								Tri Country Drilling / CME 75		<b>G-147</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 659+52, Lt 45 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								5/16/2011 - 5/18/2011	4-¼ inches	246 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 5/17/2011. Ground-water level measured at 46 feet on 5/18/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
165		45	0.4	18.0	-		65	☒		
	85								SM	SILTY SAND - dense, moist, orangish brown, fine to coarse-grained
160			0.5	18.0	113	65	25	☒		
	90								SM	SILTY SAND with GRAVEL - very dense, moist, dark gray, fine to coarse-grained, fine gravel (up to 1/2 inch in size)
155		50/3"	1.1	7.5	-		25	☒		Becomes medium dense, very moist, dark orangish brown
	95									
150			0.6	14.1	119	42	19	☒		
	100								SM	SILTY SAND - very dense, moist, dark orangish brown, fine to coarse-grained, fine gravel (up to 1/2 inch in size)
145		50/4"	0.5	8.1	-		20	☒		
	105								GW	WELL GRADED GRAVEL - dense, moist, dark gray, coarse gravel
140			0.2	17.6	114	78		☒	CL	SANDY LEAN CLAY - hard, moist, dark orangish brown, some coarse gravel
	110									
135		43	0.0	16.9	-			☒		Trace gravel
	115									
130				26.0	99	55	81	☒	ML	SILT with SAND - hard, very moist, dark brown
	120									

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: JHD  
 Prepared/Date: YN 6/13/2011  
 Checked/Date: 10/2/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.14c

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.
										Tri Country Drilling / CME 75		<b>G-147 (Continued)</b>
										<b>DRILLING METHOD</b> Rotary Wash	<b>BOREHOLE LOCATION</b> Sta 659+52, Lt 45 feet	
										<b>DATES DRILLED</b> 5/16/2011 - 5/18/2011	<b>HOLE DIAMETER</b> 4-¼ inches	<b>GROUND EL.</b> 246 feet
										<b>GROUNDWATER READINGS</b> Drilling mud bailed on 5/17/2011. Ground-water level measured at 46 feet on 5/18/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS			
125		45		18.0	-			☒				
125												
120												
130												
115												
135												
110												
140												
105												
145												
100												
150												
95												
155												
90												
160												

END OF BORING AT 121½ FEET

NOTES:

Hand augered upper 5½ feet to avoid damage to utilities. Borehole grouted with cement-bentonite slurry and patched with asphalt concrete.

"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches

\*Number of blows required to drive the Crandall Sampler 12 inches using a 140 pound automatic hammer falling 30 inches

\*\*Photo Ionization Detector used for OVA readings

Field Tech: JHD  
Prepared/Date: YN 6/13/2011  
Checked/Date: 10/2/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.14d

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-148
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 664+00, Lt 15 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										5/16/2011 - 5/18/2011	4-7/8 inches	252 feet
										GROUNDWATER READINGS		
										Drilling mud bailed on 5/16/2011. Ground-water level measured at 41 feet below the ground surface on 5/17/2011.		
250										6-inch Asphalt Concrete over 8-inch thick Portland Cement Concrete, 5-inch thick Base Course		
	5									<b>QUATERNARY YOUNGER ALLUVIUM [Qal]</b> SANDY SILT - medium stiff, moist, brown, fine sand, slightly porous		
245			1.5	23.3	97	12		☒		Becomes dark brown, trace clay		
	10									LEAN CLAY - stiff, moist, brown		
240		10/10"	1.2	25.2	-			☒				
	15									(Sample not recovered)		
235			1.7	16.9	114	13		☒		Becomes very stiff		
	20									<b>QUATERNARY OLDER ALLUVIUM [Qol]</b> LEAN CLAY with SAND - very stiff, moist, olive brown, fine to medium sand		
230		21	3.6	18.5	-		82	☒				
	25									Trace slate gravel		
225			5.9	21.7	107	20		☒				
	30									POORLY GRADED SAND with SILT and GRAVEL - medium dense, moist, brown, fine to medium-grained		
220		25	4.7	12.8	-			☒				
	35									SANDY SILT - very stiff, moist, light brown, fine to medium sand, some coarse, some gravel		
215			4.1	6.5	124	24	62	☒				
	40									Becomes stiff, brown, fine sand, some clay		

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
Prepared/Date: YN 6/14/2011  
Checked/Date: 9/26/2011

MTA Westside Subway Extension  
Los Angeles, California



LOG OF BORING  
Project No.: 4953-10-1561 Figure: A-1.2.15a

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.
								C & L Drilling / Mayhew 1000		<b>G-148</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 664+00, Lt 15 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								5/16/2011 - 5/18/2011	4-7/8 inches	252 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 5/16/2011. Ground-water level measured at 41 feet below the ground surface on 5/17/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
210		12	5.2	20.8	-			☒	CL	LEAN CLAY - stiff, very moist, brown
205	45		5.9	15.6	119	32	40	☒	SM	SILTY SAND with GRAVEL - medium dense, moist, orangish brown, trace gravel
200	50	14	6.2	19.2	-			☒	CL	LEAN CLAY - stiff, very moist, brown
195	55		6.1	19.4	111	22		☒	CL	SANDY LEAN CLAY - very stiff, very moist, reddish brown
190	60	19	6.7	29.4	-			☒	CH	FAT CLAY - very stiff, very moist, brown
185	65		6.9	14.9	117	44		☒	SC	CLAYEY SAND - dense, moist, olive yellow to olive, fine to medium-grained, some coarse, some gravel (up to 1/2-inch in size)
180	70	40	7.1	19.5	-		45	☒		Alternating thin fine to medium-grained layers, very dense
175	75		5.4	14.7	-	40	64	☒	CL	SANDY LEAN CLAY - hard, moist, brownish orange, fine to coarse sand, some gravel
80										Becomes more sandy with trace silt

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
 Prepared/Date: YN 6/14/2011  
 Checked/Date: 9/26/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.15b

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.
								C & L Drilling / Mayhew 1000		<b>G-148</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 664+00, Lt 15 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								5/16/2011 - 5/18/2011	4-7/8 inches	252 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 5/16/2011. Ground-water level measured at 41 feet below the ground surface on 5/17/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
170		66	5.9	11.4	-					SM
85			4.3	13.1	113	57	28			
165										CL
90		32	4.7	13.5	-					SM
160										CL
95			4.9	8.5	119	40	26			SM
155										
100		31	4.4	19.5	-		65			CL
150										
105			5.1	11.7	120	56	29			
145										
110		33	5.7	23.6	-					
140										
115			5.1	19.4	108	34	63			
135										
120										

SILTY SAND - very dense, moist, brown, fine-grained, trace clay

Becomes dense, very moist to wet, orangish brown, fine to medium-grained, some coarse, trace clay and gravel

SANDY LEAN CLAY - moist, brown, fine to coarse sand

SILTY SAND - very moist to wet, fine to medium grained

SANDY LEAN CLAY - hard, moist, brown, fine to coarse sand, trace gravel

SILTY SAND - dense, moist, brown, fine to coarse-grained, some gravel  
Large slate gravel and small cobble

SANDY LEAN CLAY - hard, moist, brown, fine to coarse sand

Layers of Clayey Sand, fine to coarse

Becomes very stiff

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
Prepared/Date: YN 6/14/2011  
Checked/Date: 9/26/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.15c



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.
								C & L Drilling / Mayhew 1000		<b>G-148</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 664+00, Lt 15 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								5/16/2011 - 5/18/2011	4-7/8 inches	252 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 5/16/2011. Ground-water level measured at 41 feet below the ground surface on 5/17/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
130		44	5.8	14.0	-					
125			2.3	16.7	110	64	68			ML
125										CL
130		44	2.5	24.0	-					
120										
135			3.1	18.7	111	44				
115										
140		56	5.4	-	-		54			
110										
145										
105										
150										
100										
155										
95										
160										

SANDY SILT - hard, moist, brown, fine to coarse sand, some gravel

SANDY LEAN CLAY - hard, moist, light brown

Becomes more silty

Mottled brown and gray, some cemented clay layers

END OF BORING AT 141½ FEET

NOTES:

Hand augered upper 5 feet to avoid damage to utilities. Borehole grouted with cement-bentonite slurry and patched with asphalt concrete.

"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches

\*Number of blows required to drive the Crandall Sampler 12 inches using a 300 pound hammer falling 18 inches

\*\*Photo Ionization Detector used for OVA readings

Field Tech: AR  
Prepared/Date: YN 6/14/2011  
Checked/Date: 9/26/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.15d

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-149
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 670+60, Lt 5 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										2/2/2011 - 2/5/2011	4-7/8 inches	258 feet
										GROUNDWATER READINGS		
										Drilling mud bailed on 2/4/2011. Ground-water level measured at 33 feet below the ground surface on 2/5/2011.		
255	5									10-inch thick Asphalt Concrete over 6-inch thick Portland Cement Concrete and 4-inch thick Base Course		
										ML		
										ML		
250			1.9	14.8	108	19				<b>FILL [Aft]</b> SANDY SILT - moist, brown, trace gravel		
										<b>QUATERNARY YOUNGER ALLUVIUM [Oall]</b> SILT with SAND - very stiff, moist, dark olive brown, fine to medium sand, some clay		
245	10	21	1.2	12.3	-					SM		
										SILTY SAND with GRAVEL - medium dense, moist, gray, fine to medium-grained, some coarse, slate gravel (up to 1 inch in size)		
240	15		1.7	18.7	97	5				ML		
										SILT with SAND - soft, moist, olive brown, very fine sand, trace gravel, some clay		
235	20	12	4.3	18.6	-		39			SM		
										SILTY SAND - medium dense, moist, light brown and gray, fine-grained, trace gravel (up to 1 inch in size)		
230	25		1.4	9.4	106	14						
										Becomes brown, fine to medium-grained, with thin layers of Sandy Silt		
225	30	37	3.2	17.4	-					CL		
										<b>QUATERNARY OLDER ALLUVIUM [Oalo]</b> SANDY LEAN CLAY - hard, moist, brown to gray, fine to coarse sand, slate gravel (up to 3/4 inch in size)		
220	35		2.1	27.4	93	14				ML		
										SILT with SAND - stiff, moist, olive brown to gray, with thin layers of fine sand, some clay		

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
 Prepared/Date: JF 3/31/2011  
 Checked/Date: 9/19/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.16a

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		<b>G-149</b> (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 670+60, Lt 5 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										2/2/2011 - 2/5/2011	4-7/8 inches	258 feet
GROUNDWATER READINGS												
Drilling mud bailed on 2/4/2011. Ground-water level measured at 33 feet below the ground surface on 2/5/2011.												
215	45	13	2.3	23.6	-			☒			Gray to brown, trace fine sand, trace iron oxide stains	
210	50		1.9	20.8	107	29		☒			Becomes olive gray	
			4.3	18.1	106	22		☒		SM	SILTY SAND - medium dense, wet, brown, fine to coarse-grained, trace gravel (up to 1/4 inch in size)	
										ML	SANDY SILT - very stiff, moist, olive gray, very fine sand, trace gravel	
205	55	21	0.7	14.9	-			☒		ML	SILT with SAND - very stiff, moist, olive gray, trace gravel (up to 1/4 inch in size), some clay	
			2.3	20.9	105	28	62	☒			Iron oxide stains	
200	60	28	7.5	24.0	-			☒		CL	LEAN CLAY - very stiff, moist, reddish brown to gray, with thin layer of sand	
			1.4	16.4	114	40	35	☒		SM	SILTY SAND with GRAVEL - dense, wet, brown and gray, fine-grained, gravel (up to 3/4 inch in size)	
195	65	93	5.8	12.9	-			☒		ML	SANDY SILT with GRAVEL - hard, moist, olive gray, fine sand, some coarse, gravel (up to 1/2 inch in size)	
			2.1	12.6	122	81	32	☒		SM	SILTY SAND - very dense, moist, brown, fine to coarse-grained, trace gravel (up to 1/2 inch in size), trace clay	
190	70	23	1.7	22.2	-		86	☒		CL	LEAN CLAY - very stiff, moist, dark brown, trace sand, trace gravel (up to 3/8 inch in size)	
			-	-	-	45		☐			(Sample not recovered)	
185	75	24	1.2	23.9	-			☒			Dark brown to gray	
			2.1	24.4	101	39	49	☒		SM	SILTY SAND - dense, moist, brown, trace gravel (up to 3/8 inch in size), some clay	
180		27	1.5	28.4	-			☒		CL	LEAN CLAY - very stiff to hard, moist, dark brown to gray	
			2.7	25.9	97	40		☒				

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
 Prepared/Date: JF 3/31/2011  
 Checked/Date: 9/19/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.16b

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.
									C & L Drilling / Mayhew 1000		<b>G-149</b> (Continued)
									DRILLING METHOD	BOREHOLE LOCATION	
									Rotary Wash	Sta 670+60, Lt 5 feet	
									DATES DRILLED	HOLE DIAMETER	GROUND EL.
									2/2/2011 - 2/5/2011	4-7/8 inches	258 feet
									GROUNDWATER READINGS		
									Drilling mud bailed on 2/4/2011. Ground-water level measured at 33 feet below the ground surface on 2/5/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS		
175		43	1.9	15.4	-		52	☒			Becomes Sandy Lean Clay, gravel (up to 3/8 inch in size)
85				17.6	110	43	56	☒			
170		88	2.9	13.5	-			☒		SC	CLAYEY SAND with GRAVEL - very dense, brown, gravel (up to 1 inch in size)
90				15.8	110	50		☒		SM	SILTY SAND - very dense, moist, brown, fine to coarse-grained, with gravel
165			1.4	19.3	100	46		☒			Thin layers of Clay
95		32	2.7	28.0	-			☒		ML	SILT - hard, moist, brown to gray, with thin layers of sand, some clay
160											Thin layer of Silty Sand, brown, fine to medium-grained
100			1.3	24.0	101	70		☒		SM	Thin layer of Lean Clay, dark brown
155											Becomes dark brown
110		62	1.5	17.9	-			☒		SM	SILTY SAND with GRAVEL - very dense, wet, brown, fine to coarse-grained, gravel (up to 1/4 inch in size)
145											SILTY SAND - very dense, wet, brown, fine to medium-grained, trace gravel (up to 1 inch in size)
140											Becomes fine-grained
120			0.9	24.0	101	73		☒			Coarse gravel layer
		92/10"	1.2	12.0	-			☒			Becomes fine to coarse-grained, trace gravel (up to 1/2 inch in size)
											END OF BORING AT 111½ FEET
											NOTES: Hand augered upper 5 feet due to utilities. Borehole grouted with cement-bentonite slurry and patched with asphalt concrete.
											"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches
											*Number of blows required to drive the Crandall Sampler 12 inches using a 300 pound hammer falling 18 inches
											**Photo Ionization Detector used for OVA readings

Field Tech: AR  
Prepared/Date: JF 3/31/2011  
Checked/Date: 9/19/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.16c

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.	
										C & L Drilling / Mayhew 1000		G-150	
										DRILLING METHOD	BOREHOLE LOCATION		
										Rotary Wash		Sta 674+70, Lt 15 feet	
										DATES DRILLED		HOLE DIAMETER	GROUND EL.
										1/31/2011 - 2/2/2011		4-7/8 inches	265 feet
										GROUNDWATER READINGS			
										Drilling mud bailed on 2/2/2011. Ground-water level measured at 22 feet below the ground surface 30 minutes after bailing of drilling mud.			
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS				
											4-inch thick Asphalt Concrete over 12-inch thick Portland Cement Concrete		
											FILL [Afi] - POORLY GRADED SAND with GRAVEL		
											QUATERNARY YOUNGER ALLUVIUM [Qal]		
											SANDY SILT - moist, gray		
260	5		0.0	21.3	102	Push					LEAN CLAY - very soft, moist, dark brown		
255	10	7		-	-						Becomes medium stiff, (Sample not recovered)		
250	15		0.0	21.0	98	8					SILT with SAND - medium stiff, moist, brown		
245	20	7	0.0	10.8	-						POORLY GRADED GRAVEL - loose, moist, slate gravel fragments (up to 3/4 inch in size), with sand		
											QUATERNARY OLDER ALLUVIUM [Qalo]		
											SANDY LEAN CLAY - very stiff, moist, reddish brown, trace gravel (up to 1/4 inch in size), iron oxide stains		
240	25		0.0	14.9	117	28	54				Trace gravel (up to 3/8 inch in size)		
235	30	19	0.0	31.7	-						LEAN CLAY - very stiff, moist, dark brown		
230	35		0.0	16.2	109	20					POORLY GRADED SAND - medium dense, moist, brown, fine to coarse-grained, trace fine gravel		
											CLAYEY SAND - medium dense, moist, brown		
40													

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DW  
 Prepared/Date: JF 3/31/2011  
 Checked/Date: 9/19/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.17a

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.
								C & L Drilling / Mayhew 1000		<b>G-150</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 674+70, Lt 15 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								1/31/2011 - 2/2/2011	4-7/8 inches	265 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 2/2/2011. Ground-water level measured at 22 feet below the ground surface 30 minutes after bailing of drilling mud.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
		20	0.0	18.1	-		35	☒		Becomes gray to brown, fine to coarse-grained, trace fine gravel (up to 3/8 inch in size)
220	45		0.0	21.6	106	26		☒	CL	LEAN CLAY - very stiff, moist, olive brown, trace sand, trace gravel (up to 1/4 inch in size)
215	50	20	0.0	23.9	-		75	☒	SM	SILTY SAND with GRAVEL - medium dense, moist, gray to brown, fine to coarse-grained
									CL	LEAN CLAY with SAND - very stiff, moist, gray
210	55								PMT	
205	60		0.0	18.4	110	28	41	☒	SC	CLAYEY SAND - medium dense, moist, brown to grayish brown, trace slate gravel (up to 1-1/2 inches in size)
200	65								PMT	Trace gravel (up to 1/2 inch in size)
195	70		0.3	14.8	113	53	24	☒	SM	SILTY SAND - very dense, moist, brown, fine to medium-grained, some coarse, trace gravel
										Trace gravel (up to 3/8 inch in size)
190	75		0.0	23.7	102	27	78	☒	CH	SANDY FAT CLAY - very stiff, moist, dark brown and gray
80										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DW  
Prepared/Date: JF 3/31/2011  
Checked/Date: 9/19/2011

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



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.17b



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.
								C & L Drilling / Mayhew 1000		<b>G-150</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 674+70, Lt 15 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								1/31/2011 - 2/2/2011	4-7/8 inches	265 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 2/2/2011. Ground-water level measured at 22 feet below the ground surface 30 minutes after bailing of drilling mud.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
180	85								PMT	
										SM
										SILTY SAND - medium dense, wet, gray to brown, fine to medium-grained
175	90		0.3	29.5	93	27	26	☒		
170	95	66	0.0	18.3	-			☒		Becomes very dense, brown
165	100		0.0	19.7	103	35		☒	SM	SILTY SAND with GRAVEL - dense, moist, brown, fine to coarse-grained, gravel (up to 1/4 inch in size)
160	105		0.0	18.4	-	45		☒	SP	POORLY GRADED SAND - dense, wet, gray to brown, fine to medium-grained, some coarse sand (Sample disturbed)
155	110		0.1	22.5	103	75		☒	CL	SANDY LEAN CLAY - hard, moist, brown
150	115									END OF BORING AT 111 FEET NOTES: Hand augered upper 5 feet to avoid damage to utilities. Borehole grouted with cement-bentonite slurry and patched with asphalt concrete.  "N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches  *Number of blows required to drive the Crandall Sampler 12 inches using a 340 pound hammer falling 18 inches  **Photo Ionization Detector used for OVA readings Downhole Test: PMT = Pressuremeter
120										

Field Tech: DW  
 Prepared/Date: JF 3/31/2011  
 Checked/Date: 9/19/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.17c

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.
								C & L Drilling / Mayhew 1000		<b>G-161</b>
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 681+50, Rt 20 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								2/3/2011 - 2/4/2011	4-7/8 inches	258 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 2/4/2011. Ground-water level measured at 29 feet below the ground surface 30 minutes after bailing of drilling mud.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
255	5									4-inch thick Asphalt Concrete over 12-inch thick Portland Cement Concrete and 2-inch thick Base Course
										<b>FILL [Aft]</b> CLAYEY SAND - moist, gray
250			0.0	15.3	109	Push				SANDY LEAN CLAY - moist, dark brown, trace brick fragments
										<b>QUATERNARY YOUNGER ALLUVIUM [Qal]</b> LEAN CLAY - very soft, moist, gray
245	10	10	0.0	25.4	-					Becomes stiff, dark olive brown
240	15		0.2	-	-	18				SILTY SAND with GRAVEL - medium dense, moist, olive brown, fine to medium-grained, gravel (up to 1/4 inch in size), some clay, sample disturbed
235	20	5	0.1	23.5	-					LEAN CLAY with SAND - soft, moist, olive brown
230	25		0.0	24.6	94	4				
225	30	10	0.0	27.3	-					SANDY SILT - stiff, moist to wet, olive gray
										<b>QUATERNARY OLDER ALLUVIUM [Qalo]</b> SILTY SAND - loose, wet, gray, fine-grained
220	35			-	-	30				Becomes medium dense, some gravel (Sample not recovered)
215	40									

(CONTINUED ON FOLLOWING FIGURE)

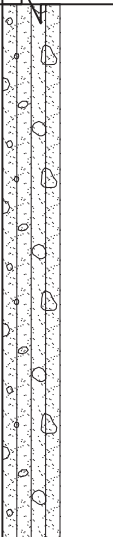
Field Tech: DW  
 Prepared/Date: JF 3/31/2011  
 Checked/Date: 9/20/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.18a

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.
C & L Drilling / Mayhew 1000										G-161 (Continued)
DRILLING METHOD					BOREHOLE LOCATION					
Rotary Wash					Sta 681+50, Rt 20 feet					
DATES DRILLED					HOLE DIAMETER					GROUND EL.
2/3/2011 - 2/4/2011					4-7/8 inches					258 feet
GROUNDWATER READINGS										
Drilling mud bailed on 2/4/2011. Ground-water level measured at 29 feet below the ground surface 30 minutes after bailing of drilling mud.										
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
215	45	25	0.0	18.0	-		19	☒		
210	50			-	-	30		☐		
										(Sample not recovered)
205	55	62	0.2	10.8	-		17	☒		
										Becomes very dense, dark gray, gravel (up to 1 inch in size)
200	60		0.0	28.0	93	11		☒		
										SP
										POORLY GRADED SAND - medium dense, moist, brown, fine to medium-grained
										ML
										SILT - stiff, moist, brown, trace sand
195	65	50	0.0	16.9	-			☒		
										SC
										CLAYEY SAND - moist, olive brown, fine-grained
										ML
										SILT - hard, moist, olive brown to olive gray
190	70		0.1	23.0	102	28		☒		
										SM
										SILTY SAND - wet, olive gray
										CL
										LEAN CLAY - very stiff, moist, olive gray, trace sand
185	75	38	0.0	17.9	-			☒		
										Becomes hard, gray, trace gravel (up to 1/4 inch in size)
180			0.0	24.1	102	30	80	☒		
										CL
										LEAN CLAY with SAND - very stiff, moist, gray, fine sand

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DW  
 Prepared/Date: JF 3/31/2011  
 Checked/Date: 9/20/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.18b

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		<b>G-161</b> (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 681+50, Rt 20 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										2/3/2011 - 2/4/2011	4-7/8 inches	258 feet
<b>GROUNDWATER READINGS</b> Drilling mud bailed on 2/4/2011. Ground-water level measured at 29 feet below the ground surface 30 minutes after bailing of drilling mud.												
175		24	0.0	32.1	-			☒		CL/CH	LEAN to FAT CLAY - very stiff, moist, olive gray	
85			0.0	17.6	111	31	66	☒		CL	SANDY LEAN CLAY - very stiff, moist, olive brown to olive grayish brown	
170												
90		39	0.0	28.2	-			☒		CL	LEAN CLAY - hard, moist, olive brown to olive gray, trace iron oxide stains	
165												
95			0.1	22.7	106	36	43	☒		SP	POORLY GRADED SAND - dense, moist, brown, fine to medium-grained	
160										SC	CLAYEY SAND - dense, moist, gray, trace gravel (up to 1/2 inch in size)	
100		46	0.0	14.7	-		66	☒		CL	SANDY LEAN CLAY - hard, moist, reddish brown and some olive gray, trace gravel (up to 3/8 inch in size)	
155												
105			0.0	15.3	114	45		☒			Alternating with layers of Lean Clay with Sand, olive brown	
150												
110		33	0.0	26.3	-			☒			Becomes olive gray and some reddish blue, trace sand	
145												
115			0.0	12.8	124	45		☒		SC	CLAYEY SAND with GRAVEL - dense, moist, olive brown to reddish brown, medium to coarse-grained, gravel (up to 1/4 inch in size)	
140												
120												

(CONTINUED ON FOLLOWING FIGURE)


Field Tech: DW  
 Prepared/Date: JF 3/31/2011  
 Checked/Date: 9/20/2011

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




**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.18c

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.
										C & L Drilling / Mayhew 1000		<b>G-161</b> (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 681+50, Rt 20 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										2/3/2011 - 2/4/2011	4-7/8 inches	258 feet
										GROUNDWATER READINGS		
										Drilling mud bailed on 2/4/2011. Ground-water level measured at 29 feet below the ground surface 30 minutes after bailing of drilling mud.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS			
135		59	0.1	22.2	-			☒	<div> SP</div> <div>POORLY GRADED SAND with GRAVEL - very dense, moist, gray, gravel (up to 1/2 inch in size), thin layer of Lean Clay</div> <div>END OF BORING AT 121½ FEET</div> <div>NOTES:</div> <div>Hand augered upper 6 feet to avoid damage to utilities. Borehole grouted with cement-bentonite slurry and patched with asphalt concrete.</div> <div>"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches</div> <div>*Number of blows required to drive the Crandall Sampler 12 inches using a 340 pound hammer falling 18 inches</div> <div>**Photo Ionization Detector used for OVA readings</div>			
125												
130												
130												
125												
135												
120												
140												
115												
145												
110												
150												
105												
155												
100												
160												

Field Tech: DW  
Prepared/Date: JF 3/31/2011  
Checked/Date: 9/20/2011

MTA Westside Subway Extension  
Los Angeles, California



LOG OF BORING  
Project No.: 4953-10-1561Figure: A-1.2.18d

Field Tech: DW  
Prepared/Date: JF 3/31/2011  
Checked/Date: 9/20/2011

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 MAY BE GRADUAL.

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		G-162
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 685+60, Lt 20 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										1/26/2011 - 1/28/2011	4-7/8 inches	251 feet
										GROUNDWATER READINGS		
										Drilling mud bailed on 1/28/2011. Ground-water level measured at 24 feet below the ground surface 30 minutes after bailing of drilling mud.		
250										4-inch thick Asphalt Concrete over 12-inch thick Portland Cement Concrete and 3-inch thick Base Course		
										SC		
										CL		
5										FILL [af] - CLAYEY SAND - moist, brown, with fine gravel		
										QUATERNARY YOUNGER ALLUVIUM [Qal]		
										SANDY LEAN CLAY - moist, brown		
245			0.0	23.3	101	Push				CL/CH		
										LEAN to FAT CLAY - very soft, moist, olive brown, trace fine sand		
										ML		
										SANDY SILT - soft, moist, olive brownish gray, trace slate gravel (up to 1/4 inch in size)		
10			0.0	18.0	104	5						
240												
15		4	0.1	22.2	-					Becomes olive brown		
235												
20			0.2	27.1	91	5				CL		
230										SANDY LEAN CLAY - soft, moist, olive brown, trace fine sand, trace gravel (up to 1/4 inch in size)		
										Becomes wet		
25												
225		Push	0.0	30.8	-					Becomes very soft, trace sand, trace gravel (up to 1/4 inch in size)		
30												
220				-	-	12				CL		
										QUATERNARY OLDER ALLUVIUM [Qol]		
										SANDY LEAN CLAY - stiff, moist, olive brown, trace fine sand, trace gravel (up to 1/4 inch in size) (Sample not recovered)		
35												
215		12	0.0	21.7	-					Trace gravel (up to 1/2 inch in size)		
40												

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DW  
 Prepared/Date: JF 3/28/2011  
 Checked/Date: 9/20/2011

MTA Westside Subway Extension  
 Los Angeles, California



LOG OF BORING  
 Project No.: 4953-10-1561 Figure: A-1.2.19a



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.
								C & L Drilling / Mayhew 1000		<b>G-162</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 685+60, Lt 20 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								1/26/2011 - 1/28/2011	4-7/8 inches	251 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 1/28/2011. Ground-water level measured at 24 feet below the ground surface 30 minutes after bailing of drilling mud.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
210			0.0	-	-	65		<input checked="" type="checkbox"/>		(Sample not recovered) Becomes hard, more gravel
205	45	38	0.0	7.8	-			<input checked="" type="checkbox"/>	SC	CLAYEY SAND with GRAVEL - dense, moist, olive brown, gravel (up to 1/2 inch in size)
200	50			-	-	51		<input checked="" type="checkbox"/>		(Sample not recovered)
195	55	40	0.0	13.9	-		27	<input checked="" type="checkbox"/>	SC	CLAYEY SAND - dense, wet, olive brown, fine to coarse-grained, gravel (up to 3/4 inch in size)
190	60	30	0.0	19.8	-		62	<input checked="" type="checkbox"/>	CL	SANDY LEAN CLAY - very stiff, moist, olive brown, trace gravel (up to 3/8 inch in size)
185	65									
180	70		0.0	11.6	114	80/10"	14	<input checked="" type="checkbox"/>	SC	CLAYEY SAND with GRAVEL - very dense, wet, olive brown, fine to coarse grained, gravel (up to 3/4 inch in size), iron oxide stains
175	75									
80										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DW  
Prepared/Date: JF 3/28/2011  
Checked/Date: 9/20/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.19b

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.
								C & L Drilling / Mayhew 1000		<b>G-162</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 685+60, Lt 20 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								1/26/2011 - 1/28/2011	4-7/8 inches	251 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 1/28/2011. Ground-water level measured at 24 feet below the ground surface 30 minutes after bailing of drilling mud.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
170			0.0	19.8	109	32				CL
										LEAN CLAY with SAND - very stiff, moist, olive brown, trace gravel (up to 1/2 inch in size), trace iron oxide stains
85										
165		92/9"	0.0	16.0	-		34			SC-SM
										SILTY, CLAYEY SAND with GRAVEL - very dense, moist, olive brown, fine to coarse-grained, abundant slate gravel (up to 3/4 inch in size)
90										CH
160			0.0	19.8	108	45				FAT CLAY with SAND - hard, moist, olive gray, fine sand, trace fine gravel
		30	0.0	20.2	-		77			Becomes very stiff, olive brown to olive gray
95										
155			0.1	19.2	113	29				
100		40	0.0	20.1	-		58			CL
150										SANDY LEAN CLAY - hard, moist, olive gray, trace gravel (up to 1/4 inch in size)
			0.0	20.3	106	35				CL/CH
105										LEAN to FAT CLAY - hard, moist, olive gray, trace sand
145				-	-	45				(Sample not recovered)
110										
140			0.0	26.2	99	73/9"				With calcium carbonate nodules
115										
135			0.0	10.8	122	36				SP
										POORLY GRADED SAND - medium dense, moist, brown, fine to medium-grained, trace coarse
120										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DW  
Prepared/Date: JF 3/28/2011  
Checked/Date: 9/20/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.19c

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.	
								C & L Drilling / Mayhew 1000		<b>G-162</b> (Continued)	
								DRILLING METHOD	BOREHOLE LOCATION		
								Rotary Wash	Sta 685+60, Lt 20 feet		
								DATES DRILLED	HOLE DIAMETER	GROUND EL.	
								1/26/2011 - 1/28/2011	4-7/8 inches	251 feet	
								GROUNDWATER READINGS			
								Drilling mud bailed on 1/28/2011. Ground-water level measured at 24 feet below the ground surface 30 minutes after bailing of drilling mud.			
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS		
130			0.0	15.5	113	68		☒		Becomes very dense, trace gravel (up to 1/4 inch in size)	
										END OF BORING AT 121 FEET	
										NOTES:	
										Hand augered upper 5 feet to avoid damage to utilities. Borehole grouted with cement-bentonite slurry and patched with asphalt concrete.	
										"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches	
										*Number of blows required to drive the Crandall Sampler 12 inches using a 340 pound hammer falling 18 inches	
										**Photo Ionization Detector used for OVA readings	
										Downhole Test: PMT = Pressuremeter	
125											
125											
130											
120											
135											
115											
140											
110											
145											
105											
150											
100											
155											
95											
160											

Field Tech: DW  
 Prepared/Date: JF 3/28/2011  
 Checked/Date: 9/20/2011

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.

								DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
								C & L Drilling / Mayhew 1000		G-164
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 692+60, Rt 5 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								1/26/2011 - 1/28/2011	4-7/8 inches	249 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 1/27/2011. Ground-water level measured at 38 feet below the ground surface on 1/28/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
245	5									5-inch thick Asphalt Concrete over 8-inch thick Base Course
									CL	<b>FILL [A<sub>sf</sub>]</b> SANDY LEAN CLAY - moist, dark brown and gray, trace slate gravel (up to 1-1/4 inches in size)
240	10		0.0	12.5	116	12			CL	<b>QUATERNARY YOUNGER ALLUVIUM [Q<sub>al</sub>]</b> SANDY LEAN CLAY - stiff, dark reddish brown, trace gravel (up to 1/4 inch in size)
235	15	10	0.0	19.4	-					Thin layer of Silty Sand
230	20		0.0	13.4	104	8				Becomes medium stiff, moist, olive brown
225	25	13		-	-					Increase in sand content (Sample not recovered)
220	30		0.3	16.1	105	18	75		ML	<b>QUATERNARY OLDER ALLUVIUM [Q<sub>al</sub>]</b> SILT with SAND - stiff, moist, olive brown
215	35	10	0.0	21.9	-		59			Becomes dark olive brown, some clay
210	40		0.1	32.0	90	9	89		ML	SILT - medium stiff, moist, dark olive brown, trace fine sand
		17	0.0	18.7	-		28		SM	SILTY SAND - medium dense, moist, gray, fine to medium-grained, trace gravel (up to 3/8 inch in size)
			0.0	22.6	103	24			SP	POORLY GRADED SAND - medium dense, wet, gray, fine to medium-grained, trace iron oxide stains
									SM	

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
Prepared/Date: JF 3/28/2011  
Checked/Date: 9/20/2011

MTA Westside Subway Extension  
Los Angeles, California



LOG OF BORING  
Project No.: 4953-10-1561 Figure: A-1.2.20a

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.
								C & L Drilling / Mayhew 1000		<b>G-164</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 692+60, Rt 5 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								1/26/2011 - 1/28/2011	4-7/8 inches	249 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 1/27/2011. Ground-water level measured at 38 feet below the ground surface on 1/28/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
205	45	54	0.0	11.4	-	15				SILTY SAND with GRAVEL - medium dense, wet, gray, fine to medium-grained, with silt seams, trace iron oxide stains
									NV	Becomes very dense, fine to coarse-grained, gravel (up to 3/4 inch in size)
200	50		0.0	10.3	119	57	10			SILTY SAND - dense, wet, brownish gray, fine to medium-grained, some coarse sand, trace slate gravel, with 4-inch cobble
									SM	
									GW-GM	POORLY GRADED GRAVEL with SILT and SAND - dense, wet, gray, fine to coarse-grained, gravel (up to 1 inch in size)
195	55	29	0.1	26.7	-	91				SANDY FAT CLAY - very stiff, moist, olive green, fine sand, trace iron oxide stains
									CH	
									NV	<b>LAKEWOOD FORMATION [Olv]</b> SANDY FAT CLAY - stiff, moist, olive brown and gray, trace slate gravel
190	60	27	1.0	21.2	-	55				Becomes olive gray and greenish gray, calcium carbonate nodules
									CH	
									SM	SILTY SAND - very dense, moist, light brown, fine to medium-grained
185	65	50/6"	1.5	17.6	-					POORLY GRADED SAND - very dense, wet, light greenish gray, fine to coarse-grained
									SP	
									NV	Some coarse sand
180	70	50/5"	1.1	20.1	-	12				SILTY SAND - very dense, wet, light greenish yellow and gray, fine to medium-grained
									SM	
175	75		1.6	20.1	105	75				POORLY GRADED SAND - very dense, wet, yellowish brown, fine to medium-grained
									SP	
170	80	50/4"	0.9	17.3	-	18				Becomes yellowish brown and gray, with coarse sand, with gravel up to (1/2 inch in size)
										Becomes yellowish gray
			1.0	19.4	100	75				

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
 Prepared/Date: JF 3/28/2011  
 Checked/Date: 9/20/2011

MTA Westside Subway Extension  
 Los Angeles, California



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.20b

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.
								C & L Drilling / Mayhew 1000		<b>G-164</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 692+60, Rt 5 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								1/26/2011 - 1/28/2011	4-7/8 inches	249 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 1/27/2011. Ground-water level measured at 38 feet below the ground surface on 1/28/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN/TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
165	85	50/2"		-	-					(Sample not recovered) 4-inch to 6-inch thick cobble layer
160	90		1.2	18.2	101	80				Becomes olive gray, fine to medium-grained, iron oxide stains
155	95	93/11"	1.3	24.0	-		22		SM	SILTY SAND - very dense, wet, olive gray, fine to medium-grained, iron oxide stains
150	100		1.5	23.8	98	78			SP	<b>SAN PEDRO FORMATION [Qsp]</b> POORLY GRADED SAND - very dense, wet, olive gray, fine to medium-grained, trace silt
145	105	95/10"	1.9	31.5	-				ML	Becomes dark gray, fine-grained, trace shell fragments
140	110		1.1	16.6	102	75			SM	SANDY SILT - hard, moist, dark gray, with clay
135	115	87	0.9	24.7	-					SILTY SAND - very dense, wet, dark gray, fine-grained, trace shell fragments
130	120		0.9	17.6	111	100			ML	Trace gravel, trace shell fragments
										SANDY SILT - hard, moist, blueish gray, trace shell fragments, with clay

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
Prepared/Date: JF 3/28/2011  
Checked/Date: 9/20/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.20c



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.
								C & L Drilling / Mayhew 1000		<b>G-164</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 692+60, Rt 5 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								1/26/2011 - 1/28/2011	4-7/8 inches	249 feet
								GROUNDWATER READINGS		
								Drilling mud bailed on 1/27/2011. Ground-water level measured at 38 feet below the ground surface on 1/28/2011.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
125		61	0.8	22.0	-					CL
125			0.9	17.6	96	125				SP-SM
130		50/4"	0.6	16.1	-					SP
135			1.0	10.0	118	100				
140		50/4"	0.8	16.9	-					
145			0.8	12.5	116	100/5"				SM
150		50/5"	0.7	14.0	-					
155										
160										

LEAN CLAY with SAND - hard, moist, blueish gray

POORLY GRADED SAND with SILT - very dense, moist, blueish gray, fine to medium-grained, trace gravel, organic odor

POORLY GRADED SAND - very dense, moist, blueish gray, fine to medium-grained

Increase in gravel content

Trace organic odor

SILTY SAND - very dense, wet, dark gray, fine to meduim-grained, some coarse, trace gravel, organic odor

Trace gravel (up to 1/4 inch in size)

END OF BORING AT 150½ FEET  
NOTES:  
Hand augered upper 6 feet to avoid damage to utilities.  
Borehole grouted with cement-bentonite slurry and patched with asphalt concrete

"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches

\*Number of blows required to drive the Crandall Sampler 12 inches using a 300 pound hammer falling 18 inches

\*\*Photo Ionization Detector used for OVA readings

Downhole Test: NV = Noise/Vibration

Field Tech: AR  
Prepared/Date: JF 3/28/2011  
Checked/Date: 9/20/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.20d

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.
								C & L Drilling / Mayhew 1000		<b>G-165</b>
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 698+10, Rt 30 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								3/5/2011 and 3/19/2011	4-7/8 inches	281 feet
								GROUNDWATER READINGS		
								Ground-water level measured at 26 feet and 64½ feet below the ground surface in shallow and deep monitoring wells, respectively on 4/22/2011. See last page of this boring for details.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
280										SP
	5									
275										SM
	10									
270			0.3	16.8	109	Push				
		9	0.1	24.2	-					CL
	15									SP
265			0.1	22.7	101	10	49			
										SC
	20	11	0.2	22.1	-					
260										CL
			0.1	17.6	106	12				
	25									SC
255		23	0.0	13.1	-		48			
			0.0	18.4	112	26				
	30									
250		20	0.0	15.6	-					
			0.1	21.1	101	12				
	35									
245										SM
		15	0.1	25.4	-					CL
	40									

4-inch thick Asphalt Concrete, No Base Course  
**FILL [af]**  
 POORLY GRADED SAND - moist, fine to medium-grained, with silt and clay, trace gravel (up to 1½ inches in size)

**QUATERNARY OLDER ALLUVIUM [Qalo]**  
 SILTY SAND - moist, brown, fine to coarse-grained, trace fine gravel

LEAN CLAY - stiff, moist, light brown

POORLY GRADED SAND - loose, moist, brown, fine to coarse-grained

CLAYEY SAND - loose, moist, brown, fine-grained, trace gravel (up to 3/8 inch in size)

Thin layer of Sandy Silt

SANDY LEAN CLAY - stiff, moist, reddish brown, trace gravel (up to 1/4 inch in size)

Trace sand

CLAYEY SAND - medium dense, moist, brown, fine to medium-grained, trace gravel (up to 1/2 inch in size)

Thin layer of Silty Sand

SILTY SAND - medium dense, moist, brown, fine to medium-grained

LEAN CLAY - stiff, moist, brown

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DW  
 Prepared/Date: JF 5/11/2011  
 Checked/Date: 9/20/2011

MTA Westside Subway Extension  
 Los Angeles, California



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.21a

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L Drilling / Mayhew 1000		<b>G-165</b> (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 698+10, Rt 30 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										3/5/2011 and 3/19/2011	4-7/8 inches	281 feet
<b>GROUNDWATER READINGS</b> Ground-water level measured at 26 feet and 64½ feet below the ground surface in shallow and deep monitoring wells, respectively on 4/22/2011. See last page of this boring for details.												
240			0.1	19.6	97	16		⊗		SC	CLAYEY SAND - medium dense, moist, brown and gray, fine-grained	
	45	17	0.0	24.8	-		76	⊗		CL	LEAN CLAY with SAND - very stiff, moist, brown, trace gravel (up to 3/8 inch in size)	
235			0.0	28.9	95	15		⊗		SM	SILTY SAND - medium dense, moist, brown, fine to medium-grained	
	50	41	0.0	18.4	-			⊗		CL	LEAN CLAY - hard, moist, brown	
230			0.0	18.9	105	30		⊗			Trace fine sand	
	55						58	⊗	NV		Alternating with layers of Sandy Lean Clay, trace gravel (up to 3/8 inch in size)	
225		36/10"	0.0	17.3	-			⊗		SM	SILTY SAND - dense, moist, brown, fine-grained	
	60		0.0	21.0	101	24		⊗		CL	LEAN CLAY - very stiff, moist, light brown, with fine sand	
220		17	0.1	31.4	-			⊗			With calcium carbonate nodules and iron oxide stains	
	65		0.0	19.4	97	18		⊗	NV			
215		28	0.0	25.5	-		77	⊗			With sand	
	70		0.1	37.5	82	26		⊗			Becomes olive gray to olive brown, trace iron oxide stains Becomes hard	
210		68/11"	0.0	16.4	-			⊗	NV		<b>LAKEWOOD FORMATION [Qlw]</b> SILTY SAND - very dense, moist, gray, fine-grained	
	75		0.2	14.5	105	50/6"		⊗		SM	Becomes light brown and gray	
205								⊗				
80		95/11"		16.9	-		15	⊗				

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DW  
 Prepared/Date: JF 5/11/2011  
 Checked/Date: 9/20/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.21b

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.
								C & L Drilling / Mayhew 1000		<b>G-165</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 698+10, Rt 30 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								3/5/2011 and 3/19/2011	4-7/8 inches	281 feet
								GROUNDWATER READINGS		
								Ground-water level measured at 26 feet and 64½ feet below the ground surface in shallow and deep monitoring wells, respectively on 4/22/2011. See last page of this boring for details.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
200			0.1	19.1	94	80				
85		90/11"	0.2	23.9	-					
195			0.2	18.2	100	79/10"				
90		88/10"	1.1	20.7	-		28			
190			1.2	23.8	99	56				
185		97/11"	0.6	15.9	-					
100			0.4	14.1	108	75/10"				
180		63	0.1	24.3	-		32			
105			0.1	22.6	99	42/10"				
175			0.0	26.1	-					
110		91		-	-	50/3"				
170										
115		50/10"	0.3	20.2	-					
165			0.0	18.8	106	60/10"				
120										

Becomes yellowish brown, trace medium sand, trace silt

Becomes dark gray, fine to coarse-grained  
LEAN CLAY - hard, moist, greenish gray, trace fine sand

SILTY SAND - very dense, moist, olive brown to gray, fine to medium-grained

Becomes greenish gray to gray, trace iron oxide stains

Becomes yellowish brown

Trace coarse sand

Brown to olive brown, fine-grained

Becomes dense

CLAYEY SAND - very dense, moist, brown to olive brown, fine-grained

**SAN PEDRO FORMATION [Osp]**

(Sample not recovered)

POORLY GRADED SAND - very dense, moist, gray, fine-grained

Trace coarse sand

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DW  
Prepared/Date: JF 5/11/2011  
Checked/Date: 9/20/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.21c

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.	
C & L Drilling / Mayhew 1000										G-165 (Continued)	
DRILLING METHOD					BOREHOLE LOCATION						
Rotary Wash					Sta 698+10, Rt 30 feet						
DATES DRILLED					HOLE DIAMETER					GROUND EL.	
3/5/2011 and 3/19/2011					4-7/8 inches					281 feet	
GROUNDWATER READINGS											
Ground-water level measured at 26 feet and 64½ feet below the ground surface in shallow and deep monitoring wells, respectively on 4/22/2011. See last page of this boring for details.											
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS		
160		59	0.0	27.2	-		86	☒		MH	ELASTIC SILT - hard, moist, gray
										SP	POORLY GRADED SAND - very dense, moist, gray, fine to medium-grained
125			0.0	17.5	-	50/10"		☐			(Sample not recovered)
155											With gravel
130		50/5"	0.1	14.9	-			☒			Trace fine gravel, trace organic odor
150											
135			4.6	13.5	97	50/1"		☒			Fine to coarse-grained, trace gravel (up to 1/2 inch in size)
145											
140			3.4	18.6	94	50/5"		☒			
140											
145			0.5	13.3	116	50/5"		☒			
135											
150		0.4	18.9	95	50/5"			☒			
130											
155											
125											
160											
										END OF BORING AT 150½ FEET NOTES: Hand augered upper 8 feet to avoid damage to utilities. Monitoring well was installed on 4/22/2011. See well construction diagram for G-165.  "N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches  *Number of blows required to drive the Crandall Sampler 12 inches using a 340 pound hammer falling 18 inches  **Photo Ionization Detector used for OVA readings  Downhole Test: NV = Noise/Vibration	
										Field Tech: DW Prepared/Date: JF 5/11/2011 Checked/Date: 9/20/2011	
MTA Westside Subway Extension Los Angeles, California										amec	LOG OF BORING Project No.: 4953-10-1561Figure: A-1.2.21d

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.
								C & L Drilling / Mayhew 1000		<b>G-166A/B</b>
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 700+30, Rt 25 and 60 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								3/5/2011, 3/19/2011, 4/18/2011 - 4/20/2011	4-7/8 inches	290 feet
								GROUNDWATER READINGS		
								Ground-water level measured at 43 feet and 64½ feet below the ground surface in shallow and deep monitoring wells, respectively on 4/22/2011. See last page of this boring for details.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
285	5									CL
										FILL [af] LEAN CLAY - moist, light brown and gray, trace gravel, trace brick fragments
280	10									SM
										SILTY SAND - moist, brown and gray, fine to coarse-grained, with slate gravel
275	15	32	4.0	8.7	-		20			SW
										QUATERNARY OLDER ALLUVIUM [Qalo] WELL GRADED SAND with GRAVEL - dense, moist, brown, fine to coarse-grained, trace silt, gravel (up to 1/4 inch in size)
270	20									SM
										SILTY SAND - dense, moist, brown, fine to medium-grained, some gravel (up to 3/4 inch in size)
265	25		3.2	7.4	114	32				
										Becomes medium dense, some gravel (up to 1 inch in size)
260	30	54	3.2	20.9	-					CL
										LEAN CLAY - hard, moist, light brown, trace gravel (up to 1/4 inch in size)
255	35									SM
										SILTY SAND - very dense, moist, reddish brown, fine to medium-grained, trace gravel (up to 1/8 inch in size)
250	40		4.5	6.8	112	65/11"				
										CL
245	45									
										LEAN CLAY with SAND - hard, moist, brown, fine to coarse sand, trace gravel (up to 3/8 inch in size)
240	50	33	4.3	12.8	-		75			
										Becomes dark reddish brown
235	55		2.9	11.0	84	70				
										CL
230	60	49	5.1	10.9	-					
										SANDY LEAN CLAY - hard, moist, brown, fine to medium sand
225	65									
										Trace gravel (up to 1/4 inch in size), thin layer of Sandy Silt
220	70		4.7	10.4	118	82				
										Thin layer of Silty Sand, olive brown
215	75	29	3.4	22.6	-					
										CL
210	80									
										LEAN CLAY - very stiff, moist, olive brown

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
 Prepared/Date: JF 5/11/2011  
 Checked/Date: 9/20/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.22a



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.
								C & L Drilling / Mayhew 1000		<b>G-166A/B</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 700+30, Rt 25 and 60 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								3/5/2011, 3/19/2011, 4/18/2011 - 4/20/2011	4-7/8 inches	290 feet
								GROUNDWATER READINGS		
								Ground-water level measured at 43 feet and 64½ feet below the ground surface in shallow and deep monitoring wells, respectively on 4/22/2011. See last page of this boring for details.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
245	45	18	4.5	29.9	-	21		☒		Trace sand, trace iron oxide stains
			4.7	20.5	108	20		☒		Becomes olive gray, trace iron oxide stains
240	50	37	4.7	19.9	-			☒		Becomes hard
				19.8	107	46	87	☒		Becomes dark olive brown
235	55								NV	
		30		25.0	-			☒		Becomes very stiff, olive brown
230	60									
				22.0	101	34	77	☒		FAT CLAY with SAND - very stiff, moist, light gray and brown, very fine sand, calcium carbonate nodules
225	65			56.7	66	12		☒	NV	ELASTIC SILT - stiff, moist, light gray, calcium carbonate nodules
		30		31.9	-		99	☒		Becomes very stiff, light olive gray
220	70								PMT	Thin layer of Lean to Fat Clay, gray
				18.2	97	60		☒		
215	75								NV	<b>LAKEWOOD FORMATION [Olw]</b> POORLY GRADED SAND - dense, wet, light brown, fine to medium-grained, trace gravel (up to 3/4 inch in size)
80		95	6.3	16.0	-			☒		

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
 Prepared/Date: JF 5/11/2011  
 Checked/Date: 9/20/2011

MTA Westside Subway Extension  
 Los Angeles, California



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.22b

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.
								C & L Drilling / Mayhew 1000		<b>G-166A/B</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 700+30, Rt 25 and 60 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								3/5/2011, 3/19/2011, 4/18/2011 - 4/20/2011	4-7/8 inches	290 feet
								GROUNDWATER READINGS		
								Ground-water level measured at 43 feet and 64½ feet below the ground surface in shallow and deep monitoring wells, respectively on 4/22/2011. See last page of this boring for details.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
205	85			23.0	89	75/6"	16	☒		<p>Becomes very dense, some coarse sand, trace silt, trace gravel</p> <p><b>SAN PEDRO FORMATION [Qsp]</b> SILTY SAND - very dense, moist, gray, very fine-grained</p>
200	90	50/6"	5.4	21.7	-			☒		<p>POORLY GRADED SAND with SILT - very dense, moist, light gray, fine-grained</p>
195	95		4.9	13.3	92	75/6"		☒		<p>SANDY SILT - hard, moist, light greenish gray</p> <p>POORLY GRADED SAND - very dense, moist, light gray, fine to medium-grained</p>
190	100	99/10"	9.5	20.6	-		49	☒		<p>SILTY SAND - very dense, moist, greenish gray, fine to medium-grained</p> <p>Becomes fine-grained</p>
185	105		6.7	20.8	103	80/10"	49	☒		<p>Becomes light brown</p>
180	110	50/6"	4.5	17.8	-			☒		<p>POORLY GRADED SAND - very dense, moist, gray, fine to medium-grained</p>
175	115		4.5	12.8	123	47	45	☒		<p>CLAYEY SAND - dense, moist, dark grayish green, fine to medium-grained</p>
										<p>POORLY GRADED SAND - very dense, moist, greenish gray, fine to coarse-grained, with gravel</p>

(CONTINUED ON FOLLOWING FIGURE)







Field Tech: AR  
Prepared/Date: JF 5/11/2011  
Checked/Date: 9/20/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.22c

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.
								C & L Drilling / Mayhew 1000		<b>G-166A/B</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 700+30, Rt 25 and 60 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								3/5/2011, 3/19/2011, 4/18/2011 - 4/20/2011	4-7/8 inches	290 feet
								GROUNDWATER READINGS		
								Ground-water level measured at 43 feet and 64½ feet below the ground surface in shallow and deep monitoring wells, respectively on 4/22/2011. See last page of this boring for details.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
165	125	50/5"	4.7	12.2	-			☒		 <p>Becomes blueish gray, fine-grained</p>
			4.1	-	-	100/3"		☐		 SW <p>WELL GRADED SAND - very dense, wet, gray, fine to coarse-grained, with gravel 6-inch to 8-inch thick cobble layer</p> <p>(Sample not recovered)</p>
160	130	50/4"	1.9	18.9	-			☒		 SP <p>POORLY GRADED SAND - very dense, wet, light gray, fine-grained</p>
155	135		3.9	15.7	96	75/6"		☒		 <p>Becomes gray, moist</p> <p>Trace gravel</p>
150	140	50/5"	3.6	20.9	-		34	☒		 SM <p>SILTY SAND - very dense, moist, gray, fine-grained, trace gravel (up to 3/8 inch in size)</p>
145	145		3.0	20.5	88	75/6"		☒		 SP <p>POORLY GRADED SAND - very dense, moist, gray, fine-grained</p>
140	150	50/4"	4.1	17.9	-			☒		<p>END OF BORING AT 151 FEET</p> <p>NOTES: Hand augered upper 5 feet to avoid damage to utilities. Boring G-166A was terminated at 74 feet and backfilled. Boring G-166B was sampled between 74 feet and 151 feet. Monitoring well was installed on 4/20/2011. See well construction diagram for G-166.</p> <p>"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches *Number of blows required to drive the Crandall Sampler 12 inches using a 300 pound hammer falling 18 inches **Photo Ionization Detector used for OVA readings Downhole Tests: PMT = Pressuremeter, NV = Noise/Vibration</p> <p>Field Tech: AR Prepared/Date: JF 5/11/2011 Checked/Date: 9/20/2011</p>
135	155									
160										

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.22d

**amec**

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.
								Boart Longyear / 600T Trusonic Drilling Rig		<b>S-108</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Sonic Coring	606+90, Lt 24 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								3/28/11 and 3/29/11	6 inches	172 feet
								GROUNDWATER READINGS		
								Ground-water level not measured.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
150										ML
25										SC
145										
30										SM
140										
35										
135										
40										

CLAYEY SAND with GRAVEL - dense, moist, brown (10YR 4/3), fine to coarse grained, subangular to subrounded (up to 1 inch in size), layers of Sandy Clay with Gravel

SILTY SAND with GRAVEL - dense, moist, brown (10YR 4/3), fine to coarse grained, subangular to subrounded gravel (up to 1 inch in size), some clay

Becomes gray (10YR 5/1)

Becomes wet

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: RS  
Prepared/Date: YN/WL 9/30/2011  
Checked/Date: 9/30/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.23b

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DRILLING COMPANY/DRILLING EQUIPMENT										BORING NO.	
Boart Longyear / 600T Trusonic Drilling Rig										S-108 (Continued)	
DRILLING METHOD					BOREHOLE LOCATION						
Sonic Coring					606+90, Lt 24 feet					GROUND EL. 172 feet	
DATES DRILLED					HOLE DIAMETER						
3/28/11 and 3/29/11					6 inches						
GROUNDWATER READINGS											
Ground-water level not measured.											
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS		
130									SM	1 inch layer of Sandy Silt	
45									CL	LEAN CLAY - medium stiff, wet, mottled, dark grayish brown (10YR 4/2) to strong brown (7.5YR 4/1), trace coarse sand, some silt	
125											
50											
120				14.0			33		SM	SILTY SAND - medium dense to dense, wet, brown (10YR 4/3), fine to coarse grained, some gravel (up to 3/8 inch in size), trace clay, occasional Silt and Clay lenses	
55									CL-ML	SILTY CLAY - soft to medium stiff, wet, dark brown (10YR 3/3), occasional sandy lenses	
115				25.7						Layer of Sandy Silt, trace Clay	
										Becomes very dark grayish brown (10YR 3/2), some dispersed organics	
										Becomes stiff to very stiff	
60				26.4						Abundant calcium carbonate nodules, cemented hard	

Field Tech: RS  
Prepared/Date: YN/WL 9/30/2011  
Checked/Date: 9/30/2011

(CONTINUED ON FOLLOWING FIGURE)

MTA Westside Subway Extension  
Los Angeles, California

amec

LOG OF BORING  
Project No.: 4953-10-1561Figure: A-1.2.23c

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: RS  
 Prepared/Date: YN/WL 9/30/2011  
 Checked/Date: 9/30/2011

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**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.23c



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								DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
								Boart Longyear / 600T Trusonic Drilling Rig		<b>S-108</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Sonic Coring	606+90, Lt 24 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								3/28/11 and 3/29/11	6 inches	172 feet
								GROUNDWATER READINGS		
								Ground-water level not measured.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
110				22.4			85			CL-ML Some oxidized subhorizontal laminations
65										MH ELASTIC SILT - very stiff, wet, olive gray (5Y 5/2), some fine to coarse sand, occasional gravel (up to 3/8 inch in size), some calcium carbonate nodules, dispersed, cemented and uncemented
105										More dispersed calcium carbonate nodules
70				21.4						Becomes wet, dark grayish brown (10YR 4/2) with some dark yellowish brown mottling (10YR 4/6), some calcium carbonate nodules cemented and uncemented
100				25.2			81			More calcium carbonate nodules (up to about 1/2 inch in size), cemented
75				24.6						Layers of Elastic Silt with Sand, some calcium carbonate nodule dispersed cemented and uncemented (up to 1/2 inch in size)
95				16.8			71			Becomes brown (10YR 4/3)
80										Some concentrated calcium carbonate nodules (up to 3/4 inch in size) FAT CLAY with SAND - stiff, moist, brown (10YR 4/3), fine to coarse sand, occasional gravel (up to 3/8 inch in size) CH

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: RS  
Prepared/Date: YN/WL 9/30/2011  
Checked/Date: 9/30/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.23d

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								DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
								Boart Longyear / 600T Trusonic Drilling Rig		<b>S-108</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Sonic Coring	606+90, Lt 24 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								3/28/11 and 3/29/11	6 inches	172 feet
								GROUNDWATER READINGS		
								Ground-water level not measured.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
90				14.9			66		CH	More sand, some calcium carbonate nodule
				17.3					CL	SANDY LEAN CLAY - medium stiff, wet, fine to medium sand, trace gravel (up to 3/8 inch in size), alternating pockets of fine to coarse grained sand
85				9.5			24		SC	CLAYEY SAND with GRAVEL - dense, wet, varying colors, fine to coarse grained, fine to coarse gravel (up to 1 inch in size)
85										Gravel becomes more rounded
				10.9						Some silt and clay lenses
90										More gravel (up to 1½ inch in size)
				10.7			27		SM	SILTY SAND with GRAVEL - dense, moist, olive brown, fine to coarse grained, fine to coarse gravel (up to 1½ inches in size)
80				7.8			7		GW-GM	WELL GRADED GRAVEL with SILT - dense, moist, olive brown, fine to coarse sand, fine to coarse gravel (up to 2 inches in size)
										Some clay
95				14.3					CL	Cemented calcium carbonate nodules, pockets of gravel <b>SAN PEDRO FORMATION [Qsp]</b>
75				22.7			69		ML	SANDY LEAN CLAY - very stiff to hard, wet, light olive brown (2.5Y 5/3), gravel (up to ½ inch in size), abundant calcium carbonate, dispersed nodules and cement, partially cemented, layers of Clayey Sand with Gravel SANDY SILT - stiff to very stiff, wet, olive brown (2.5Y 4/3), varying dark yellowish brown (10YR 4/6) mottling, fine sand, some medium to coarse, trace gravel (up to 3/4 inch in size), occasional micaceous, some very fine Sandy Silt lenses
100										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: RS  
Prepared/Date: YN/WL 9/30/2011  
Checked/Date: 9/30/2011

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amec

LOG OF BORING  
Project No.: 4953-10-1561 Figure: A-1.2.23e

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.	
										Boart Longyear / 600T Trusonic Drilling Rig		<b>S-108</b> <b>(Continued)</b>	
										DRILLING METHOD	BOREHOLE LOCATION		
										Sonic Coring	606+90, Lt 24 feet		
										DATES DRILLED	HOLE DIAMETER	GROUND EL.	
										3/28/11 and 3/29/11	6 inches	172 feet	
										GROUNDWATER READINGS			
										Ground-water level not measured.			
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS				
70   <													

Field Tech: RS  
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Checked/Date: 9/30/2011

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**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.23f

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										Boart Longyear / 600T Trusonic Drilling Rig		S-109
										DRILLING METHOD	BOREHOLE LOCATION	
										Sonic Coring	647+82, Lt 49 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										2/20/2011 - 4/21/2011	6 inches	231 feet
										GROUNDWATER READINGS		
										Ground-water level not measured.		
230										10-inch thick Asphalt Concrete over 6-inch thick Portland Cement Concrete		
											ML	<b>FILL [Af]</b> SILT - moist, dark brown, some clay
5												
225												
											CL	<b>QUATERNARY YOUNGER ALLUVIUM [Oa]</b> LEAN CLAY - medium stiff, moist, dark brown (7.5YR 3/4), trace fine grained, small calcium carbonate nodules
												Some root fragments
10				22.3								
220												Trace fine to coarse gravel, angular
												Fine to coarse sand, fine to coarse gravel
15				17.3								Layers of Silty Sand
215											CL	SANDY LEAN CLAY - hard, moist, dark brown (7.5YR 3/4), trace fine to coarse sand, trace fine to coarse gravel, calcium carbonate nodule
				20.1								
20												

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: RS  
Prepared/Date: YN/WL 9/24/2011  
Checked/Date: 9/24/2011

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**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.24a

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.
								Boart Longyear / 600T Trusonic Drilling Rig		<b>S-109</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Sonic Coring	647+82, Lt 49 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								2/20/2011 - 4/21/2011	6 inches	231 feet
								GROUNDWATER READINGS		
								Ground-water level not measured.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
210				12.6			51			CL
										More sand and gravel, small pockets of Clayey Sand with Gravel
25										
205										No Core Recovery from 27 to 29.5 feet
30				21.5						CL
										SANDY LEAN CLAY - medium stiff, moist, dark brown (7.5YR 3/4), fine to medium sand, trace fine gravel
200										CL-ML
										SILTY CLAY with SAND - medium stiff, moist, dark brown, fine sand, trace fine and coarse gravel
				8.4			31			CL-ML
										<b>QUATERNARY OLDER ALLUVIUM [Oalo]</b> SILTY CLAY with SAND - medium stiff, moist, dark brown, fine sand, trace fine and coarse gravel
										SM
										SILTY SAND with GRAVEL - dense, moist, strong brown, fine to coarse grained, fine to coarse gravel (up to 1 inch in size), subrounded
35										Becomes reddish gray (5YR 5/2)
195				5.2						Becomes gray (5YR 6/1)
										No core recovery from 37.0 to 38.5 feet
										SM
										Becomes reddish brown (5YR 4/3)
40										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: RS  
Prepared/Date: YN/WL 9/24/2011  
Checked/Date: 9/24/2011

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**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.24b

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.	
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	Boart Longyear / 600T Trusonic Drilling Rig		S-109 (Continued)	
										DRILLING METHOD	BOREHOLE LOCATION		
										DATES DRILLED	HOLE DIAMETER	GROUND EL. 231 feet	
										2/20/2011 - 4/21/2011	6 inches		
GROUNDWATER READINGS													
Ground-water level not measured.													
190  													

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: RS  
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Checked/Date: 9/24/2011

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LOG OF BORING  
Project No.: 4953-10-1561 Figure: A-1.2.24c



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.
								Boart Longyear / 600T Trusonic Drilling Rig		<b>S-109</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Sonic Coring	647+82, Lt 49 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								2/20/2011 - 4/21/2011	6 inches	231 feet
								GROUNDWATER READINGS		
								Ground-water level not measured.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
170				19.2			53			CL
				18.1						
65				24.0						
165										
				24.9						
70										
160										
				16.6						
75										
155							41			SC
				13.6						
80										

CL

Alternating with layers of Sandy Silt with Gravel

Becomes dark brown, trace fine to medium sand, occasional fine to coarse gravel

Layers of Sandy Silt with Gravel

Cobble (up to 4 inches in size)

Becomes dark brown, trace fine to coarse sand

Becomes brown (10YR 4/3) and varying colors (white, yellowish, orange, red, gray, black), fine gravel, subrounded

Becomes dark reddish brown (5YR 4/3)

Occasional gravel (up to 1 inch in size)

CLAYEY SAND - very dense, moist, brown (10YR 4/3) and varying colors, fine to coarse grained, fine to coarse gravel (up to 3 inches in size), subrounded

SC

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: RS  
Prepared/Date: YN/WL 9/24/2011  
Checked/Date: 9/24/2011

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**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.24d

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.			
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	Boart Longyear / 600T Trusonic Drilling Rig		S-109 (Continued)			
										DRILLING METHOD	BOREHOLE LOCATION				
										DATES DRILLED	HOLE DIAMETER	GROUND EL.			
										2/20/2011 - 4/21/2011		6 inches		231 feet	
										GROUNDWATER READINGS					
150				16.7						SC					
										ML	SANDY SILT - very stiff to hard, moist, brown (7.5YR 4/3), fine to medium sand, trace fine gravel				
85										SM	SILTY SAND - moist, brown (10YR 4/3), trace fine to coarse grained, some fine gravel, (up to ½ inch in size), some Sandy Silt seams				
145				11.8			46				Becomes olive brown (2.5YR 4/3), large slate gravel				
				20.7			81			CL	LEAN CLAY with SAND - hard, moist, brown (10YR 4/3), fine to medium grained, trace coarse, trace fine gravel (up to 3/8 inch in size)				
90											No core recovery from 89.6 to 92 feet				
140				18.7							More Sand				
95										SM	SILTY SAND - dense, moist, olive brown (2.5YR 4/3), fine to coarse grained, some fine gravel (up to ½ inch in size)				
135				9.8			36				Becomes dark greenish gray (5G 3/1), trace fine to medium gravel				
				9.1											
100										CL-ML	SAN PEDRO FORMATION [Qsp] SILTY CLAY - hard, moist, dark greenish gray, trace fine sand, occasional fine gravel				

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: RS  
Prepared/Date: YN/WL 9/24/2011  
Checked/Date: 9/24/2011

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**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.24e

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.	
Boart Longyear / 600T Trusonic Drilling Rig										S-109 (Continued)	
DRILLING METHOD					BOREHOLE LOCATION						
Sonic Coring					647+82, Lt 49 feet					GROUND EL. 231 feet	
DATES DRILLED					HOLE DIAMETER						
2/20/2011 - 4/21/2011					6 inches						
GROUNDWATER READINGS											
Ground-water level not measured.											
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS		
130				23.3						CL-ML	Becomes very dark greenish gray
				21.7						CL	LEAN CLAY - stiff, moist, dark greenish gray
											Becomes dark greenish gray more sand between 102 to 102.3 feet
105											
125											
											More silt, trace fine to coarse gravel
110											
120											More sand and gravel
											Less sand and gravel, fine to coarse grained, fine gravel
115											
115											More sand and gravel, occasional large subround to round gravel

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: RS  
 Prepared/Date: YN/WL 9/24/2011  
 Checked/Date: 9/24/2011

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 Los Angeles, California



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.24f

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

[illegible]

Field Tech: RS  
Prepared/Date: YN/WL 9/24/2011  
Checked/Date: 9/24/2011

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# LOG OF BORING

Project No.: 4953-10-1561 Figure: A-1.2.24g

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										Boart Longyear / 600T Trusonic drill rig		S-111
										DRILLING METHOD	BOREHOLE LOCATION	
										Sonic Coring	692+57, Rt 16 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										2/14/2011 - 2/18/2011	6 inches	249 feet
										GROUNDWATER READINGS		
										Ground-water level not measured.		
										12-inch thick Asphalt Concrete		
										<b>FILL [Aft]</b> SILT to SILTY CLAY with GRAVEL - moist, dark brown to gray (7.5YR 3/3 to 7.5Y 6/1), slate gravel (up to 1 inch in size)		
245	5									No core recovery from 7½ to 11'		
240	10									<b>QUATERNARY YOUNGER ALLUVIUM [Oall]</b> SILTY CLAY - stiff, very moist, dark brown to dark yellowish brown (7.5YR 3/3 to 10YR 3/4), trace to some coarse sand, some subangular to subrounded slate gravel (up to ½ inch in size), layer of Silt		
235	15									SILT - moist, dark yellowish brown (10YR 3/4), fine sand and trace to some clay, some slate gravel (up to 1½ inches in size), few shale fragments, alternating with layers of Sandy Silt		
230	20									No core recovery from 17 to 20'		

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DL  
Prepared/Date: PK/WL 10/1/2011  
Checked/Date: 10/2/2011

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Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.25a

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										Boart Longyear / 600T Trusonic drill rig		<b>S-111</b> (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Sonic Coring	692+57, Rt 16 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										2/14/2011 - 2/18/2011	6 inches	249 feet
										GROUNDWATER READINGS		
										Ground-water level not measured.		
225	25									ML	Becomes dark yellowish brown (10YR 3/4), fine sand and trace gravel, subrounded to well rounded slate gravel (up to ¾ inch in size)	
										SM	SILTY SAND - moist, dark yellowish brown, fine to medium-grained, some gravel, subrounded to well rounded (up to 1 inch in size)	
										ML	<b>QUATERNARY OLDER ALLUVIUM [Q<sub>alo</sub>]</b> SILT with SAND - moist, dark yellowish brown (10YR 3/4), fine sand, trace subrounded to well rounded gravel (up to 1-inch in size)	
											Some clay	
											No core recovery from 27' to 27.9'	
220	30									ML	SANDY SILT - moist, dark yellowish brown (10YR 3/4), fine grained, trace clay, occasional slate gravel (up to 2 inches in size), disturbed, alternating with layers of Silty Sand	
										ML	SILT - moist, dark yellowish brown, fine sand, some shale fragments, some clay	
											More clay	
											Lenses of Silty Sand, moist, dark olive brown (2.5YR 3/3), massive	
215	35											
										SM	SILTY SAND with GRAVEL - moist, dark olive green (5Y 3/3), fine to medium grained, slate gravel, subround to suboval (up to 1½ inches in size), 3 to 4-inch thick, occasional interbedded Sandy Silt	
210	40						16				Becomes wet, fine to coarse grained, gravel (up to ¾ inch in size)	

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DL  
Prepared/Date: PK/WL 10/1/2011  
Checked/Date: 10/2/2011

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**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.25b



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.
								Boart Longyear / 600T Trusonic drill rig		<b>S-111</b> (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Sonic Coring	692+57, Rt 16 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								2/14/2011 - 2/18/2011	6 inches	249 feet
								GROUNDWATER READINGS		
								Ground-water level not measured.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
205	45			8.4			20			SM Becomes fine to medium grained, trace gravel (up to ½ inch in size)  Becomes fine to coarse sand, more gravel  GP-GC POORLY GRADED GRAVEL with CLAY and SAND - dense, wet, dark olive gray (5Y 3/2), medium to coarse sand, some fine, gravel (up to 1 inch in size), alternating with Clayey Sand and Silty Sand
200	50			8.5			13			SM SILTY SAND with GRAVEL - dense, wet, fine to coarse shale gravel, trace clay, some quartz, iron  GC-GM SILTY CLAYEY GRAVEL with SAND - wet, dark olive gray (5Y 3/2), fine to coarse sand, subrounded to well rounded slate gravel (up to 3 inches in size), cobbles (up to 3½ inches in size)  SW WELL GRADED SAND with GRAVEL - wet, dark olive gray, gravel (up to ½ inch in size)  GC-GM SILTY CLAYEY GRAVEL with SAND - dense, wet, very dark grayish brown (10YR 3/2), fine to coarse sand, slate gravel (up to 1 inch in size), some sandstone
195	55			22.7			89			CL LEAN CLAY - moist, olive brown (2.5Y 4/3), some fine sand  CL-ML SILTY CLAY - hard, moist, grayish brown (2.5Y 5/2), fine sand, some clay Becomes very moist, trace wood and charcoal fragments
190				5.0			16			SC <b>LAKEWOOD FORMATION [Oltw]</b> CLAYEY SAND - dense, moist, olive (5Y 5/3), fine grained  SM SILTY SAND - dense, moist, olive (5Y 5/4), fine grained, some medium, layers of Poorly Graded Sand with Silt Becomes light olive (5Y 6/3)

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DL  
 Prepared/Date: PK/WL 10/1/2011  
 Checked/Date: 10/2/2011

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**Los Angeles, California**



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.25c

(CONTINUED ON FOLLOWING FIGURE)

## LOG OF BORING

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.			
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS			
									DRILLING METHOD		BOREHOLE LOCATION	
									DATES DRILLED		HOLE DIAMETER	
									GROUNDWATER READINGS			
									Boart Longyear / 600T Trusonic drill rig	S-111 (Continued)		
									Sonic Coring	692+57, Rt 16 feet		
									2/14/2011 - 2/18/2011	6 inches		
									Ground-water level not measured.			
165   <												

(CONTINUED ON FOLLOWING FIGURE)

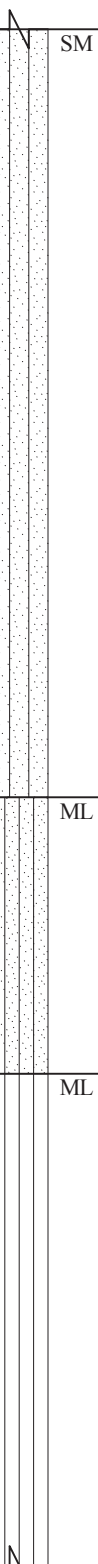
Field Tech: DL  
 Prepared/Date: PK/WL 10/1/2011  
 Checked/Date: 10/2/2011

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



**LOG OF BORING**  
 Project No.: 4953-10-1561 Figure: A-1.2.25e

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										Boart Longyear / 600T Trusonic drill rig		<b>S-111</b> (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Sonic Coring	692+57, Rt 16 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										2/14/2011 - 2/18/2011	6 inches	249 feet
										GROUNDWATER READINGS		
										Ground-water level not measured.		
145										 <p>SM</p> <p>Alternating with layers of Sandy Silt, wet, very dark gray, fine to very fine grained</p> <p>3-inch cemented zone containing gastropods, very dark gray (5Y 3/1), calcium carbonate nodules, small wood fragment, gastropod shells (up to ½ inch in size)</p>		
105												
										<p>Less gastropod shells</p> <p>3-inch thick carbonate cemented zone</p> <p>2-inch by 3-inch carbonate cemented zone, some silt</p> <p>Becomes wet, very dark gray (5Y 3/1), trace to few shell fragments (gastropods, bivalves), occasional subrounded rock fragments</p>		
140										<p>3-inch thick cementation with gastropod fragments</p> <p>ML</p> <p>SANDY SILT - wet, dark gray, very fine to fine sand, trace scattered shell fragments, some intact gastropods</p>		
110												
										<p>Trace clay</p> <p>3-inch thick carbonate concretion</p> <p>Volcanic rock fragments, gravel concretionary clast containing sublong slate fragments (up to ½ inch in size), shell fragments</p>		
135										<p>ML</p> <p>SILT - hard, moist, very dark gray (5Y 3/1), trace coarse sand, some granitic rock fragments, some clay</p>		
115												
										<p>Becomes greenish black, ½ inch granite clasts</p>		
130										<p>Layers of Sandy Silt with Clay, very stiff to hard, fine to coarse sand</p>		
120												

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DL  
Prepared/Date: PK/WL 10/1/2011  
Checked/Date: 10/2/2011

MTA Westside Subway Extension  
Los Angeles, California



**LOG OF BORING**  
Project No.: 4953-10-1561 Figure: A-1.2.25f

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: DL  
Prepared/Date: PK/WL 10/1/2011  
Checked/Date: 10/2/2011

**amec**

# LOG OF BORING

Project No.: 4953-10-1561Figure: A-1.2.25g

**amec**



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 / CME-75		<b>G-405/ M-403</b>
								DRILLING METHOD	BOREHOLE LOCATION	
								Hollow-Stem Auger	Sta 608+96, Lt 34.7 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								10/13/2015 - 10/16/2015	8"	173.5 feet
								GROUNDWATER READINGS		
								Groundwater encountered at 44.8' during initial drilling. See monitoring data in GDR.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
170	5		0.1	4.1	121	19				9.5-inch thick Asphalt Concrete over 6-inch Concrete
										<b>YOUNGER ALLUVIUM [Qal]</b>
										SILTY SAND - light brownish orange, moist, fine to medium sand
										POORLY GRADED SAND with SILT and GRAVEL - medium dense, light brownish gray, moist, fine to coarse, subrounded to subangular gravel up to 1/2" in dia, interbedded with layers of well graded sand with silt and gravel
165	10	5	0.1	9.8			48		SM	SILTY SAND - loose, dark yellowish brown, moist, fine to medium sand, trace gravel to 1" in dia
160									ML/CL	CLAYEY SILT - medium stiff, brown, moist, fine sand
155	15		0.1	12.4	118	43			CL	<b>OLDER ALLUVIUM [Qalo]</b>
										SANDY LEAN CLAY with GRAVEL - very stiff, brown to reddish brown, moist, fine to coarse sand, approximately 15-20% subrounded to subangular gravel up to 1.5" in dia, PP>4.5 tsf
150	20	26	0.1	14.4					CL	SANDY LEAN CLAY - very stiff, brown, moist, fine to coarse sand, trace slate gravel up to 1/2" in dia, PP>4.5 tsf
145	25		0.1	11.8	118	26			SC	CLAYEY SAND - medium dense, reddish brown to brown, moist, fine to coarse sand, subrounded to angular trace gravels to 1/2" in dia, PP>4.5 tsf
140	30	17	0	7.4					CL/SC	SANDY LEAN CLAY/CLAYEY SAND - stiff/medium dense, brown, moist, fine to coarse sand, subrounded to angular slate and some granitic gravels to 1" in dia
135	35		0	4.8	115	43			SP-SM	POORLY GRADED SAND with SILT AND GRAVEL - medium dense, brown, moist, fine to coarse sand, few to little subrounded to subangular gravel up to 1/2" in dia
40										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
Prepared/Date: KO 10/26/2015  
Checked/Date: DP 12/07/2015

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

**amec foster wheeler**

**LOG OF BORING**  
Project No.: 4953-11-1423 Figure: A-1.3.1a

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										DRILLING METHOD	BOREHOLE LOCATION	G-405/ M-403 (Continued)
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										10/13/2015 - 10/16/2015	8"	173.5 feet
GROUNDWATER READINGS Groundwater encountered at 44.8' during initial drilling. See monitoring data in GDR.												
130	45	29	0.1	5.6			12	☒	SW-SM	WELL GRADED SAND with SILT - medium dense, brown, moist, fine to coarse sand, subrounded to subangular gravel up to 1" in dia, predominately slate		
125	50	10	0.1	24.3				☒	SM	SILTY SAND with GRAVEL - medium dense, dark yellowish brown, wet, fine to coarse sand, few to little subrounded to subangular gravel up to 3/4" in dia		
120	55		0.1			16		☒	CL	SANDY LEAN CLAY - stiff, olive gray with zones of dark yellowish brown, moist, fine to coarse sand, trace fine gravels to 3/8" in dia, subrounded to angular		
115	60	12	0	23.4				☒	CL	LEAN CLAY with SAND (in sample shoe) - very dark grayish brown, moist (No Recovery)		
110	65		0.1	23.1	100	25	82	☒		stiff to very stiff, very dark grayish brown, moist, fine to medium sand with few thin layers of silty sand, fine to medium sand		
105	70	32	22.8	19.0				☒		light olive brown, wet, very thin lenses of silty sand, fine grained, trace gravel, PP=3.0 tsf		
100	75		0.7	23.4	100	19	86	☒	CH	hard, dark greenish gray mottles of dark yellowish brown, moist, fine to medium sand, subangular to angular gravels to 1/2" in dia (approximate 10 to 15%)		
95									SC/CL	FAT CLAY - stiff, olive gray to dark grayish olive, moist, fine to medium sand, PP=3.75 tsf (LL=52, PI=35)		
80										CLAYEY SAND grading to SANDY LEAN CLAY - very stiff, olive and dark yellowish brown, moist, fine to coarse sand		

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
Prepared/Date: KO 10/26/2015  
Checked/Date: DP 12/07/2015

MTA Westside Subway Extension  
Los Angeles, California

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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-1.3.1b

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 / CME-75		<b>G-405/ M-403 (Continued)</b>
								DRILLING METHOD	BOREHOLE LOCATION	
								Hollow-Stem Auger	Sta 608+96, Lt 34.7 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								10/13/2015 - 10/16/2015	8"	173.5 feet
								GROUNDWATER READINGS		
								Groundwater encountered at 44.8' during initial drilling. See monitoring data in GDR.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
90		25	0.1	14.6						medium dense, olive and dark yellowish brown
85			0.1	15.6	114	28	46			CLAYEY SAND - medium dense, brown to gray, moist, fine to coarse sand, trace fine gravel, PP>4.5 tsf, (LL=28, PI=13)
85		25	0.1	15.2						SANDY LEAN CLAY - very stiff, olive, moist, fine to coarse sand, trace subrounded to subangular gravels to 1/2", slate, quartzite and granitic
90		21	0	12.4			41			CLAYEY SAND - medium dense, olive brown, moist, fine to coarse sand, trace subrounded to angular fine gravels to 1" in dia
80			0	20.9	107	35	66			SANDY LEAN CLAY - very stiff, olive with dark yellowish brown mottles, moist, fine to medium sand, gravel up to 1" in dia, subrounded to subangular, PP>4.5 tsf (LL=38, PI=24)
95		26	0.1	21.1						<b>SAN PEDRO FORMATION [Qsp]</b> SANDY LEAN CLAY - very stiff, greenish gray, moist, fine to medium sand
75			0.6	18.8	110	54				very stiff, very thin lenses of silty to clayey sand, trace fine gravels to 1/4" in dia, PP=3.5 tsf
100		38	0.2	20.6						WELL GRADED SAND with SILT and GRAVEL - dense, light greenish gray, moist, fine to coarse sand, trace gravel (NEED TO CONFIRM THIS IS NOT CLAY SAMPLE)
70										CLAYEY SAND - medium dense, olive gray, moist, fine to coarse sand
105			0.2	25.6	95	27	72			SILT with SAND - dark grayish brown and olive brown mottles, moist, fine sand, PP=4.25 tsf, (LL=33, PI=8), grades to clayey silt
65		26	0.3	34.2						LEAN CLAY with SAND - moist, fine sand, some very thin layers or lenses of silty sand
110			0.2	28.8	94	16	93			very stiff, olive gray and olive brown mottles, PP=2.25 tsf, (LL=48, PI=29)
60		42	0	16.6			1			POORLY GRADED SAND - dense, olive gray, brown, moist to wet, fine to medium sand
115										END OF BORING AT 116 FEET
55										NOTES: Boring terminated at 116 ft due to heaving sand within the auger string. Hand augered upper 5 feet to avoid damage to utilities. Borehole backfilled with hydrated bentonite chips with sand
120										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
Prepared/Date: KO 10/26/2015  
Checked/Date: DP 12/07/2015

MTA Westside Subway Extension  
Los Angeles, California

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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-1.3.1c

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS
50	125								
45	130								
40	135								
35	140								
30	145								
25	150								
20	155								
15									
160									

DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
Martini Drilling / CME-75		<b>G-405/ M-403 (Continued)</b>
DRILLING METHOD	BOREHOLE LOCATION	
Hollow-Stem Auger	Sta 608+96, Lt 34.7 feet	
DATES DRILLED	HOLE DIAMETER	GROUND EL.
10/13/2015 - 10/16/2015	8"	173.5 feet

**GROUNDWATER READINGS**  
Groundwater encountered at 44.8' during initial drilling. See monitoring data in GDR.

filter opposite well screened zones per well construction schedule.

Two monitoring wells and three vapor probes were installed. Vapor probes installed at 38.5', 90.5', and 100.5'. Groundwater monitoring wells screened at intervals 40' to 45' and 105' to 110'. Refer to GDR for Well Construction Details.

"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches.  
\*Number of blows required to drive the Crandall Sampler 12 inches using a 140 pound hammer falling 30 inches.  
Hammer Energy Transfer Ratio (ERi) = 70% (Calibrated 04/09/2015)

\*\*Photo Ionization Detector used for OVA readings.

^Average dry density for sample when multiple density test performed on different rings for different lab tests.

Field Tech: AR  
Prepared/Date: KO 10/26/2015  
Checked/Date: DP 12/07/2015

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										DRILLING METHOD	BOREHOLE LOCATION	GROUND EL. 182 feet
										Rotary Wash	Sta 615+90, Lt 57.4 feet	
										DATES DRILLED	HOLE DIAMETER	
										9/10/2015 - 9/16/2015	4 7/8"	
										GROUNDWATER READINGS		
										Overnight groundwater measured at 28.0'.		
180										6-inch thick Asphalt Concrete over 9-inch thick Concrete over 6-inch thick Base Coarse <b>YOUNGER ALLUVIUM [Qall]</b> SILTY SAND with some layers of SANDY LEAN CLAY - medium dense/very stiff, brown, moist, low plasticity, fine to coarse sand, trace gravel		
5												
175			0	11.4	124	25		☒			PP>4.5tsf	
10		22	0	11.9				☒			LEAN CLAY - very stiff, brown, moist, low to medium plasticity, trace fine sand, some tree roots	
170												
15			0.2	9.2	120	24		☒			SANDY LEAN CLAY/ CLAYEY SAND- very stiff, brown with mottles of yellowish brown, moist, fine to medium sand, PP>4.5 tsf	
165											SILTY SAND with GRAVEL- brown, moist, fine to coarse sand	
20		14	0	17.6				☒			SANDY LEAN CLAY/ CLAYEY SAND- stiff, grayish brown, moist, low to medium plasticity, fine to medium sand	
160											brown, moist, alternating with layers of more or less sand	
25			0.3	8.4	114	16		☒			<b>OLDER ALLUVIUM [Qalo]</b> SILTY SAND with GRAVEL - medium dense, grayish brown, moist, fine to coarse sand, flat gravels	
155											▼ inferred perched groundwater more difficult drilling at 29' (inferred gravelly zone)	
30		16	0	11.3				☒			CLAYEY SAND - medium dense, brown, moist, low to medium plasticity fines, fine to medium sand, trace gravel size up to 3/4" in dia	
150											WELL GRADED SAND with SILT and GRAVEL - brown, moist, fine to coarse sand	
35			0.6	5.9	122	34		☒			SILTY SAND - medium dense, brown, moist, fine to medium sand, trace clay lenses	
145												
40												

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
Prepared/Date: KO 10/12/2015  
Checked/Date: DP 12/08/2015

MTA Westside Subway Extension  
Los Angeles, California

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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-1.3.2a



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.
								C & L / Mayhew-1000		<b>G-406</b> <b>(Continued)</b>
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 615+90, Lt 57.4 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								9/10/2015 - 9/16/2015	4 7/8"	182 feet
								GROUNDWATER READINGS		
								Overnight groundwater measured at 28.0'.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
140		41	0	10.7				☒	SP-SM	POORLY GRADED SAND with SILT and GRAVEL - dense, light brown, moist, fine to coarse sand
45			0	15.5	116	43		☒	CL	LEAN CLAY with SAND - very stiff, dark olive brown, moist, medium plasticity, fine sand, PP=3.5 tsf
135									SM	SILTY SAND - very dark gray to olive gray, moist to wet, fine to coarse sand, trace gravel up to 1/2" in dia
50		20	0.5	23.3				☒	ML	saturated at contact <b>SAN PEDRO FORMATION [Qsp]</b> SANDY SILT - very stiff, dark greenish gray, moist, low plasticity, fine sand
130									CL	LEAN CLAY with SAND - hard, dark olive gray, moist, non plastic, fine sand, PP>4.5 tsf (LL=31, PI=14)
55			0	22.1	98	33	71	☒	CL	LEAN CLAY - very stiff, dark olive gray, moist, PP=2.5 tsf
125		21	0.1	24.4				☒	CL	LEAN CLAY with SAND - hard, dark olive gray with white mottles, moist, medium plasticity, fine sand (LL=41, PI=28)
60			0.4	18.3	112	46	79	☒	CH	FAT CLAY with SAND - gray, moist to wet
120		29	0.1	20.1				☒	SM	gray, moist to wet
65									SM	SILTY SAND with GRAVEL- very dense, dark greenish gray, moist to wet, fine to coarse sand
115		82	0.1	16.5				☒		wet, fine to medium sand, trace fine gravel, trace clay lenses
70			0.1	12.3	107	86	22	☒		
110										
75										
105										
80										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
 Prepared/Date: KO 10/12/2015  
 Checked/Date: DP 12/08/2015

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

amec foster wheeler

**LOG OF BORING**  
 Project No.: 4953-11-1423 Figure: A-1.3.2b



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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L / Mayhew-1000		G-406 (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 615+90, Lt 57.4 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										9/10/2015 - 9/16/2015	4 7/8"	182 feet
										GROUNDWATER READINGS		
										Overnight groundwater measured at 28.0'.		
100		58	0.1	9.9			19	☒	SM	SILTY SAND with GRAVEL - very dense, medium gray, moist, fine to coarse sand		
			0.1	12.0	116	45		☒		increase in silt content		
85		36	0.2	18.0				☒	CL	SANDY LEAN CLAY - hard, dark greenish gray, moist, medium plasticity, trace to few gravel (LL=33, PI=17)		
95			-	18.2	111	55	46	☒	SM	SILTY SAND - dense, greenish gray, moist to wet, fine to medium sand, trace coarse sand		
90		54	-	13.5			46	☒	SC	CLAYEY SAND - dense, greenish gray, moist, low to medium plasticity, fine sand		
90			-	21.5	102	43	86	☒	CL	LEAN CLAY - hard, greenish gray, moist, medium plasticity, few to little fine sand (LL=49, PI=35), PP>4.5tsf		
95		37	-	18.7				☒		grades sandier		
100			-	19.2	101	83	38	☒	SM	SILTY SAND - very dense, medium gray, wet, fine to coarse sand, few gravel up to 1" in dia		
80												
105		74	-	20.0				☒	SC	CLAYEY SAND - very dense, greenish gray, moist, fine sand, trace gravel size up to 3/4" in dia (LL=NP, PI=NP)		
75												
110			-	29.6	94	47		☒	ML	SILT with SAND - hard, greenish gray, moist, non to low plasticity, fine sand, 1" thick wood fragment, PP>4.5 tsf		
70												
115		20	-	37.4				☒	CL	SANDY LEAN CLAY - very stiff, greenish gray, moist, fine sand, low to medium plasticity		
65												
120												

(CONTINUED ON FOLLOWING FIGURE)



Field Tech: AR  
Prepared/Date: KO 10/12/2015  
Checked/Date: DP 12/08/2015

MTA Westside Subway Extension  
Los Angeles, California

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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-1.3.2c

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.
								C & L / Mayhew-1000		<b>G-406</b> <b>(Continued)</b>
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 615+90, Lt 57.4 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								9/10/2015 - 9/16/2015	4 7/8"	182 feet
								GROUNDWATER READINGS		
								Overnight groundwater measured at 28.0'.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
60										 <p>SANDY LEAN CLAY (continued from previous page)</p> <p>(No Recovery) END OF BORING AT 131 FEET NOTES: Hand augered upper 5 feet to avoid damage to utilities. Borehole backfilled with cement-bentonite grout. Pavement patched with rapid set concrete colored with black oxide.</p> <p>"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches *Number of blows required to drive the Crandall Sampler 12 inches using a 140 pound hammer falling 30 inches. Hammer Energy Transfer Ratio (ERi) = 70% (Calibrated 04/09/2015)</p> <p>**Photo Ionization Detector used for OVA readings.</p> <p>NP= Non plastic</p>
125										
55										
130			-			57				
50										
135										
45										
140										
40										
145										
35										
150										
30										
155										
25										
160										

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										Martini Drilling / CME-75		G-407
										DRILLING METHOD	BOREHOLE LOCATION	
										Hollow-Stem Auger	Sta 631+47, Lt 20.5 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										10/7/2015 - 10/8/2015	8"	212 feet
										GROUNDWATER READINGS		
										Groundwater encountered at 41' during initial drilling.		
210										10-inch thick Asphalt Concrete over 8-inch Concrete		
	5		1.0			15		☐		<b>ARTIFICIAL FILL [Af]</b>		
205										CL-ML		
										CL-ML		
										CL-ML		
										SILTY CLAY - dark brown to brown, moist, fine sand		
										<b>YOUNGER ALLUVIUM [Qal]</b>		
										SILTY CLAY - stiff, light brown, moist, fine sand		
200		25	0	10.3				☒		<b>OLDER ALLUVIUM [Qalo]</b>		
	10									CL/SC		
										SANDY LEAN CLAY grades to CLAYEY SAND- very stiff to medium dense, brown to dark brown, moist, fine to coarse sand, trace subangular gravel up to 3/4" in dia		
195			0			26		☒		reddish brown, approximately 5% gravel up to 1/2" in dia, PP>4.5 tsf		
	15									SM		
										SILTY SAND - medium dense, brown, moist, fine to medium sand, trace subangular gravel up to 1" in dia		
190		11	0.2	11.5				☒		SC/SM		
	20									CLAYEY SAND/SILTY SAND - brown, fine to coarse		
										SM		
										SILTY SAND - dark brown to brown, moist, fine to coarse sand		
185			0.1	6.0	128	33		☒		SP-SM		
	25									POORLY GRADED SAND with SILT and GRAVEL - medium dense, reddish brown, moist, fine to coarse sand		
										slate gravel up to 3/4" in dia		
180		10	0.1	18.1				☒		CL		
	30									SANDY LEAN CLAY - medium stiff, dark brown, moist, fine to medium sand, trace subrounded to subangular gravel up to 1/2" in dia, interbedded with thin layers of clayey sand		
										SM		
175			0			24	23	☒		SILTY SAND with GRAVEL - medium dense, yellowish brown to dark brown, moist, fine to coarse sand, subrounded to subangular gravel up to 2" in dia, trace clay content		
	35									SC/SM		
		9	192.1	17.7				☒		CLAYEY SAND/SILTY SAND - loose, very dark greenish gray, wet, fine to coarse sand, moderate to strong petroleum odor		
40												

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
Prepared/Date: KO 10/15/2015  
Checked/Date: DP 12/08/2015

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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-2.3a

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										Martini Drilling / CME-75		G-407 (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Hollow-Stem Auger	Sta 631+47, Lt 20.5 feet	GROUND EL.
										DATES DRILLED	HOLE DIAMETER	212 feet
										10/7/2015 - 10/8/2015	8"	
										GROUNDWATER READINGS		
										Groundwater encountered at 41' during initial drilling.		
170			0			25		☒	CL	LEAN CLAY with SAND - stiff to very stiff, olive gray, moist to wet, fine to coarse sand, trace iron oxide stains, trace gravel up to 1/2" in dia, interbedded with layers of well graded sand with clay, PP=1.9 tsf, groundwater seepage at approximately 40.5' (LL=37, PI=20)		
45		12	0.1	23.0				☒	SC/CL			
165			-	23.2	102	21	82	☒	CL	<b>SAN PEDRO FORMATION [Qsp]</b>		
50		17	0	22.3				☒	CL	LEAN CLAY with SAND - stiff to very stiff, very dark greenish gray, moist, fine to medium sand, slightly micaceous, PP=2.75 tsf (LL=35, PI=19)		
160			4.7	23.9	100	19	77	☒	CL	LEAN CLAY - very stiff, dark greenish gray, moist, trace fine to medium sand		
55										LEAN CLAY with SAND - very stiff, dark greenish gray, moist to wet, fine sand, PP=3.7 tsf (LL=38, PI=23)		
155		12	0	22.4				☒		stiff, trace fine gravel up to 1/4"		
60		11	0	17.5				☒		grades slightly sandier		
150			0	13.4	112	44	40	☒	SC	CLAYEY SAND - medium dense, dark greenish gray, moist to wet, fine to coarse sand, trace fine gravel up to 3/8" in dia		
65		36	0	16.8				☒		dense, wet, slight water seepage, lenses of silty to clayey sand		
145			0			55		☐	SW-SM	WELL GRADED SAND with SILT and GRAVEL - dense, greenish gray, wet, moist, fine to coarse sand		
70										SILTY SAND - very dense, very dark greenish gray, moist, fine to coarse sand, trace fine gravel up to 1" in dia		
140		72	0					☒	SM			
75			0	14.5	110	63	15	☒		dense, lenses of poorly graded sand with silt, fine to coarse sand		
135		39	0					☒	SC	CLAYEY SAND with GRAVEL - dense, moist, fine to coarse sand, fine gravel up to 3/4" in dia, subrounded to subangular, slate and granitic fragments		
80												

(CONTINUED ON FOLLOWING FIGURE)

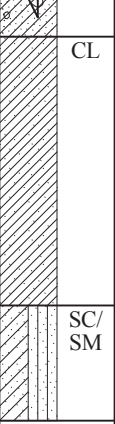
Field Tech: AR  
Prepared/Date: KO 10/15/2015  
Checked/Date: DP 12/08/2015

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Los Angeles, California

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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-2.3b

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 / CME-75		<b>G-407</b> <b>(Continued)</b>
								DRILLING METHOD	BOREHOLE LOCATION	
								Hollow-Stem Auger	Sta 631+47, Lt 20.5 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								10/7/2015 - 10/8/2015	8"	212 feet
								GROUNDWATER READINGS		
								Groundwater encountered at 41' during initial drilling.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
130			0			38	27	☒		 <p>SILTY SAND (continued from previous) - medium dense, fine to coarse sand, trace gravel LEAN CLAY with SAND - hard, greenish gray, moist, fine to medium sand, PP&gt;4.5 tsf</p>
85		51	0.1	17.9				☒		
125										
90			0.1			30		☒		<p>lenses of silty sand, dense, very dark greenish gray, moist, trace gravel up to 3/4" in dia</p> <p>CLAYEY SAND/SILTY SAND - dense, very dark greenish gray, moist, with lenses of sandy lean clay PP&gt;4.5 tsf</p>
120										<p>END OF BORING AT 91 FEET</p> <p>NOTES: Hand augered upper 5 feet to avoid damage to utilities. Borehole backfilled with hydrated bentonite chips with sand filter opposite well screened zones per well construction schedule.</p> <p>Vapor probes installed at 38', 50', and 75'. Refer to GDR for Well Construction Details.</p> <p>"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches *Number of blows required to drive the Crandall Sampler 12 inches using a 140 pound hammer falling 30 inches. Hammer Energy Transfer Ratio (ERi) = 70% (Calibrated 04/09/2015)</p> <p>**Photo Ionization Detector used for OVA readings.</p> <p>^Average dry density for sample when multiple density test performed on different rings for different lab tests.</p>
95										
120										

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										C & L / Mayhew-1000		G-408/ P-306
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 641+89, Lt 22.8 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										9/19/2015 - 9/21/2015	4 7/8"	222.6 feet
										GROUNDWATER READINGS		
										Not measured during drilling. See monitoring data in GDR.		
220	5		0	18.3	97	11				8-inches thick Asphalt Concrete over 12-inch thick Concrete		
										<b>YOUNGER ALLUVIUM [Oa1]</b>		
										SILTY CLAY - medium stiff, olive brown, moist, fine sand, low plasticity grades slightly sandier		
215										grades clayier		
	10	11	0.1	28.4						LEAN CLAY with SAND - stiff, medium brown to dark brown, moist, fine to coarse sand, low to medium plasticity, PP=1.5 tsf		
210										<b>OLDER ALLUVIUM [Oa1o]</b>		
										LEAN CLAY with SAND - medium brown to dark brown, moist, fine to coarse sand, low to medium plasticity		
	15		0.2	17.1	115	30	76			hard, trace gravel up to 0.375" in dia, (LL=47, PI=32)		
205												
	20	34	0	16.8						SANDY LEAN CLAY - very stiff to hard, medium brown to dark brown, moist, fine to coarse sand, low to medium plasticity		
200												
	25		0.3	14.2	115	23				grades slightly sandier, trace fine gravel, (LL=31, PI=17)		
195										few gravel, light to medium brown		
	30	16	0.2	14.3			64			SILT with SAND - stiff, brown, moist, fine sand, non plastic		
190												
	35		0	21.2	102	16				SILTY SAND - medium dense, light brown, moist, fine to coarse sand, trace gravel up to 0.5" in dia		
185												
40												

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
Prepared/Date: KO 10/12/2015  
Checked/Date: DP 12/08/2015

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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-1.3.4a



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.
										C & L / Mayhew-1000		G-408/ P-306 (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Rotary Wash	Sta 641+89, Lt 22.8 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										9/19/2015 - 9/21/2015	4 7/8"	222.6 feet
										GROUNDWATER READINGS		
										Not measured during drilling. See monitoring data in GDR.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS			
		21	0.1	17.9			36	☒			SILTY SAND (continued from previous)	
180								☒				
45			0.1	15.8	118	23	59	☒		CL	SANDY LEAN CLAY - very stiff, brown, moist, fine to coarse sand, low to medium plasticity, trace gravel up to 0.375" in dia, PP=2.75 tsf	
175									PMT			
50								☒		SC	CLAYEY SAND - dense, brown, moist, fine sand, trace fine gravel	
170		37	0	17.8				☒				
55										ML	SILT - very stiff, grayish brown, moist to wet, few to little fine sand, non plastic	
165			0.1	24.7	100	25	87	☒			grades sandier	
60										SM	SILTY SAND - dense, brown, moist to wet, fine to coarse sand, trace gravel up to 0.75"	
160		35	0.3	19.8			49	☒				
65										SW-SC	WELL GRADED SAND with CLAY and GRAVEL - medium dense, brownish gray, moist to wet, fine to coarse sand, gravel size up to 1" in dia	
155			0.4	19.7	104	41		☒		CL-ML	SILTY CLAY - very stiff, light brown, moist, trace fine sand, low plasticity	
70		16	0.1	29.7				☒				
150									PMT			
75										CL	SANDY LEAN CLAY - stiff, reddish brown, moist, low to medium plasticity, fine to coarse sand, trace fine gavel, PP=1.75 tsf	
145			0.1	16.2	111	25	56	☒			(LL=34, PI=21)	
80												

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
Prepared/Date: KO 10/12/2015  
Checked/Date: DP 12/08/2015

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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-1.3.4b

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										DRILLING METHOD	BOREHOLE LOCATION	G-408/ P-306 (Continued)
										Rotary Wash	Sta 641+89, Lt 22.8 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										9/19/2015 - 9/21/2015	4 7/8"	222.6 feet
GROUNDWATER READINGS												
Not measured during drilling. See monitoring data in GDR.												
140		48	0.1	12.8				☒				SANDY LEAN CLAY (continued from previous) hard, yellowish brown to strong brown, moist, trace gravel
85												slightly more gravel
135			0	16.7	117	45	65	☒				light brown, lenses of clayey sand, PP>4.5 tsf
90		44	0.1	18.2				☒			SM	SILTY SAND - dense, light to medium brown, moist to wet, fine sand
130											CL	SANDY LEAN CLAY with GRAVEL - hard, dark yellowish brown to strong brown, moist to wet, fine to coarse sand, gravel size up to 3/4" in dia
95			0.1	16.2	111	31		☒				(LL=32, PI=18), PP>4.5 tsf
125												grades sandier, bluish gray
100		58	0.1					☒				brownish gray
120											SC	CALAYEY SAND - dense, brown, moist, fine to coarse sand
105			0.2	9.9	120	82	24	☒			SM	SILTY SAND with GRAVEL - very dense, dark yellowish brown with red mottles, moist to wet, fine to coarse sand, gravel size up to 3/4" in dia, subrounded to subangular
115												
110		46	0.2	25.5			74	☒			CL	LEAN CLAY with SAND - hard, dark olive brown and dark yellowish brown mottled, moist to wet, low plasticity, fine to medium sand
110												
115			0	12.7	117	80		☒			SM	SILTY SAND with GRAVEL- very dense, dark yellowish brown to dark brown, moist to wet, fine to coarse sand, fine gravels up to 1/2" in dia, predominantly slate gravel, subrounded to sunangular (LL=NP, PI=NP)
105												
120												

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
Prepared/Date: KO 10/12/2015  
Checked/Date: DP 12/08/2015

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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-1.3.4c

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										DRILLING METHOD	BOREHOLE LOCATION	G-408/ P-306 (Continued)
										Rotary Wash	Sta 641+89, Lt 22.8 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										9/19/2015 - 9/21/2015	4 7/8"	222.6 feet
GROUNDWATER READINGS										Not measured during drilling. See monitoring data in GDR.		
		92	0.1	15.8			33	☒	SM	SILTY SAND - very dense, strong brown, wet, fine to coarse sand, trace to little fine gravel, trace clay		
									SM	<b>SAN PEDRO FORMATION [Osp]</b> SILTY SAND - very dense, dark greenish gray, wet, fine to coarse sand, trace to little fine gravel		
100										lenses of clayey sand		
125			0.3	12.6	121	71		☒				
95												
130		26	0.1	24.1				☒	CL	LEAN CLAY with SAND - very stiff, dark greenish gray, moist, low to medium plasticity, fine to medium sand, slightly micaceous, trace organics		
90												
135			0.1	14.1	115	75		☒	SC/ SM	CLAYEY SAND/SILTY SAND- very dense, dark greenish gray, moist to wet, fine sand, trace fine gravel up to 1/2" in dia		
85												
140									ML	SANDY SILT - hard, greenish gray, moist to wet, fine sand, trace fine gravel, , PP>4.5 tsf		
80		50/3"	0.1	13.5			33	☒	SM	SILTY SAND - very dense, greenish gray, moist to wet, trace to few fine gravel		
145												
75			0.3	19.6	109	59		☒	CL- ML	SILTY CLAY - hard, greenish gray, moist to wet, low plasticity, PP>4.5 tsf		
150												
70		73	0	13.7				☒		moist, , PP>4.5 tsf		
155										grades sandier, few fine to coarse gravel (inferred from cuttings)		
65										very fine sand		
160												

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
Prepared/Date: KO 10/12/2015  
Checked/Date: DP 12/08/2015

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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-1.3.4d

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.
								C & L / Mayhew-1000		<b>G-408/ P-306 (Continued)</b>
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 641+89, Lt 22.8 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								9/19/2015 - 9/21/2015	4 7/8"	222.6 feet
								GROUNDWATER READINGS		
								Not measured during drilling. See monitoring data in GDR.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
60	165									SILTY CLAY (continued from previous)
55	170									
50	175									
45	180									
40	185									
35	190									
30	195									
25										
200										

END OF BORING AT 165 FEET  
NOTES:  
Hand augered upper 5 feet to avoid damage to utilities.  
Borehole backfilled with bentonite-cement grout.  
Pavement patched with rapid set concrete colored with black oxide.

Groundwater monitoring wells installed with screen interval at 65'-105'. Refer to GDR for Well Construction Details.

"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches  
\*Number of blows required to drive the Crandall Sampler 12 inches using a 140 pound hammer falling 30 inches.  
Hammer Energy Transfer Ratio (ERi) = 76% (Calibrated 03/18/2014)

\*\*Photo Ionization Detector used for OVA readings.

^Average dry density for sample when multiple density test performed on different rings for different lab tests.

NP=Non plastic  
PMT=Pressuremeter test

Field Tech: AR  
Prepared/Date: KO 10/12/2015  
Checked/Date: DP 12/08/2015

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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-1.3.4e

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										DRILLING METHOD	BOREHOLE LOCATION	G-409
										Rotary Wash	Sta 669+62, Lt 17.8 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										9/22/2015 - 9/25/2015	4 7/8"	257.8 feet
GROUNDWATER READINGS										Overnight groundwater measured at 28.0'.		
255	5									6-inch thick Asphalt Concrete over 9-inch Concrete		
										<b>YOUNGER ALLUVIUM [Oal]</b>		
										SILTY SAND/SANDY SILT - stiff, brown, moist, fine to medium sand,		
										grades siltier		
250			-	16.8	97	14				CL		
										SANDY LEAN CLAY - brown, moist, low to medium plasticity, trace fine sand, PP>4.0 tsf		
245	10	12	-	15.6			66			CL-ML		
										SILTY CLAY - stiff, dark yellowish brown, moist, trace to little fine sand		
240	15		-	15.4	102	18				CL-ML		
										SILTY CLAY - dark yellow brown, moist, low plasticity, trace fine sand, PP>4.5 tsf		
235	20	12	-	16.3						stiff		
230	25		-	13.6	120	21				SC/CL		
										CLAYEY SAND/SANDY LEAN CLAY - very stiff to hard, medium dense, dark yellow brown, moist to wet, low to medium plasticity, fine to medium sand, PP=3.9 tsf clean sand lens		
225	30	17	-	21.4						CL		
										SANDY LEAN CLAY - very stiff, dark grayish brown to dark yellowish brown, moist, low to medium plasticity, fine to medium sand, PP=2.5 tsf		
220	35		-	10.8	122	61				SM		
										SILTY SAND - dense, dark yellow brown to strong brown, moist, fine to coarse sand, trace gravel up to 1/2" in dia, predominantly slate, subrounded to subangular		
215	40									CL		
										LEAN CLAY with SAND - very stiff, dark yellow brown to dark brown, moist, low to medium plasticity, fine sand, trace fine gravel up to 1/4" in dia, PP=3.0 tsf		

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
Prepared/Date: KO 10/14/2015  
Checked/Date: DP 12/08/2015

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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-1.3.5a

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.
								C & L / Mayhew-1000		G-409 (Continued)
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 669+62, Lt 17.8 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								9/22/2015 - 9/25/2015	4 7/8"	257.8 feet
								GROUNDWATER READINGS		
								Overnight groundwater measured at 28.0'.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
215	45	21	-	22.1				☒		LEAN CLAY with SAND (continued from previous) (LL=42, PI=27)
210	50	19	-	15.9				☒		stiff, olive brown, slightly sandier, fine to medium sand, trace organic fragments
205	55		-	18.6	108	24		☒		very stiff, some fine gravel up to 3/4" in dia
200	60	24	-	17.4				☒		molted dark yellow brown and dark grayish brown, moist to wet, PP>4.0 tsf
195	65		-	14.9	121	62		☒		stiff, moist, fine to medium sand, trace fine gravel to 3/4" in dia, subrounded to angular
190	70	13	-	22.0				☒		CLAYEY SAND/SILTY SAND - dense, brown, moist, low plasticity fines, fine to coarse sand, trace fine gravel up to 1/2", subrounded to subangular
185	75		-	21.9	105	39		☒		LEAN CLAY - stiff, dark brown, moist to wet, low to medium plasticity, trace fine sand
180										very stiff, moist, PP=3.25 tsf (LL=35, PI=19) CLAYEY SAND - dark yellowish brown, moist, low to medium plasticity fines, fine to coarse sand
80										

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-1.3.5b



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.
								C & L / Mayhew-1000		<b>G-409</b> <b>(Continued)</b>
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 669+62, Lt 17.8 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								9/22/2015 - 9/25/2015	4 7/8"	257.8 feet
								GROUNDWATER READINGS		
								Overnight groundwater measured at 28.0'.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
175		27	-	25.8				☒		CL
85			-	12.5	123	56		☒		CL
170										
90		55	-	19.2			43	☒		SM
165									PMT	
95			-	17.7	102	15		☒		CL
160										
100		29	0	25.4				☒		CL
155									PMT	
105			0	19.9	104	49	43	☒		SM
150		42	0					☒		SP-SM
110			-	20.0		48		☒		SM
145										
115		40	-	21.4				☒		CL
140			-	21.9	103	52	53	☒		ML
120										

LEAN CLAY with SAND - very stiff, brown with dark brown mottles, moist, low to medium plasticity, fine sand, thin lenses of sandy lean clay

SANDY LEAN CLAY - hard, brown, moist, low to medium plasticity, fine to coarse sand, fine gravels, size up to 1 1/4" in dia, subangular to angular slate fragments, PP>4.0 tsf

SILTY SAND with GRAVEL - very dense, dark yellowish brown, moist, fine to coarse sand, fine gravel up to 3/4" in dia

some lenses of sandy lean clay  
less gravel

SANDY LEAN CLAY - stiff, moist to wet, olive brown, low to medium plasticity, fine sand, PP=1.75 tsf

LEAN CLAY with SAND - stiff, mottled grayish brown and dark yellow brown, medium plasticity, lenses of sandy clay/clayey sand, PP=1.5 tsf

SILTY SAND - dense, moist, dark yellowish brown, fine to medium sand, lenses of clayey sand, olive gray  
(LL=NP, PI=NP)

POORLY GRADED SAND with SILT - dense, light brown, wet, fine sand

SILTY SAND - dense, yellowish brown, moist to wet, fine sand, interbedded with lenses of sandy lean clay

LEAN CLAY with SAND - very stiff, brown, moist, low to medium plasticity, fine sand, thin layers of clayey sand, olive gray, PP=2.5 tsf  
(LL=33, PI=19)

SANDY SILT, dense, dark yellowish brown to strong brown, moist to wet, fine sand, grades to SILTY SAND

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
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**LOG OF BORING**  
Project No.: 4953-11-1423 Figure: A-1.3.5c

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.
								C & L / Mayhew-1000		<b>G-409</b> <b>(Continued)</b>
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 669+62, Lt 17.8 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								9/22/2015 - 9/25/2015	4 7/8"	257.8 feet
								GROUNDWATER READINGS		
								Overnight groundwater measured at 28.0'.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
135		55	0	21.5			57	☒	PMT	CL
										SANDY LEAN CLAY - hard, dark yellowish brown, moist, fine to medium sand, (LL=28, PI=13)
125			-			58		☒		(No recovery)
130										grades clayier, stiff drilling
130		64	0	12.9			34	☒	PMT	SC
										CLAYEY SAND - very dense, brown to dark brown, moist to wet, fine to coarse sand, few fine gravel up to 3/4" in dia, some lenses of sandy lean clay (LL=28, PI=12)
125										
135			-	12.6	126	100		☒		SM
										SILTY SAND - very dense, strong to yellowish red brown, moist to wet, fine to coarse sand, few gravel up to 1/4" in dia
120		74	-	11.2			26	☒		SC/CL
										CLAYEY SAND/SANDY LEAN CLAY - very dense, hard, light olive brown and grayish brown, moist, fine to coarse sand, trace gravel up to 3/8" in dia, low to medium plasticity fines
140			-	18.1	108	49		☒		SC
										CLAYEY SAND - very dense, olive brown, moist, fine to medium sand, trace fine gravel to 3/8" in dia, lenses of silty sand
115										CL
										LEAN CLAY with SAND - hard, dark olive brown, moist, low to medium plasticity, fine sand, PP>4.5 tsf (LL=40, PI=27)
145		32	-	24.7				☒		
										very stiff, mottled dark olive brown and very dark grayish brown, PP=3.0 tsf
110										
150			-	20.8	103	35		☒		CH
										FAT CLAY with SAND - very stiff, dark brown, moist, high plasticity, fine to medium sand, PP>4.5 tsf
105										
155		33	-	26.1				☒		
										very dark grayish brown, little fine to coarse sand content,
100										SILTY SAND with GRAVEL - light brown, moist, fine to medium sand
160										SM
										SILTY SAND - light brown, moist, fine to medium sand, trace gravel

(CONTINUED ON FOLLOWING FIGURE)

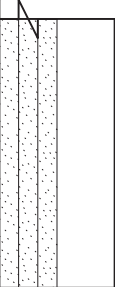
Field Tech: AR  
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**LOG OF BORING**  
Project No.: 4953-11-1423 Figure: A-1.3.5d

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										DRILLING METHOD	BOREHOLE LOCATION	G-409 (Continued)
										Rotary Wash	Sta 669+62, Lt 17.8 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										9/22/2015 - 9/25/2015	4 7/8"	257.8 feet
GROUNDWATER READINGS										Overnight groundwater measured at 28.0'.		
95												
165												
90										END OF BORING AT 167 FEET NOTES: Hand augered upper 5 feet to avoid damage to utilities. Borehole backfilled with bentonite-cement grout. Pavement patched with rapid set concrete colored with black oxide.		
170										"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches *Number of blows required to drive the Crandall Sampler 12 inches using a 140 pound hammer falling 30 inches. Hammer Energy Transfer Ratio (ERi) = 76% (Calibrated 03/18/2014)		
85										**Photo Ionization Detector used for OVA readings.		
175										^Average dry density for sample when multiple density test performed on different rings for different lab tests.		
80										NP=Non plastic PMT=Pressuremeter test		
180												
75												
185												
70												
190												
65												
195												
60												
200												

Field Tech: AR  
Prepared/Date: KO 10/14/2015  
Checked/Date: DP 12/08/2015

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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-1.3.5e

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 / CME-75		G-410/ M-406
								DRILLING METHOD	BOREHOLE LOCATION	
								Hollow-Stem Auger	Sta 675+88, Rt 0.9 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								11/11/2015 - 11/13/2015	8"	261 feet
								GROUNDWATER READINGS		
								Groundwater seepage encountered at 38' during initial drilling. See monitoring data in GDR.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
260										3 1/2-inch thick Asphalt Concrete over 4-inch Concrete <b>ARTIFICIAL FILL [Af]</b> SILTY SAND - moist, light brown, fine to medium sand, trace gravel, with lenses of clayey silt
	5									<b>YOUNGER ALLUVIUM [Oal]</b> SANDY SILT - medium stiff, moist, medium brown, fine to coarse sand, trace 1/8" rootlets
255			0	15.9	100	11				
	10	16	0	12.3						LEAN CLAY with SAND - very stiff, dark grayish brown, moist, fine sand, PP>4.5 tsf
250										with lenses of clayey sand, fine to medium sand
	15		0	11.4	108	25				trace fine gravel up to 1/8" in dia, dark yellowish brown
245										CLAYEY SAND grades to SANDY LEAN CLAY - stiff, brown, moist, fine to medium sand, with lenses of silty sand
	20	10	0	16.6			56			<b>OLDER ALLUVIUM [Oalo]</b> SANDY LEAN CLAY - stiff to very stiff, moist, dark brown to reddish brown with mottles of dark olive gray, fine to coarse sand, few to little fine gravel, up to 3/4" in dia, subangular, PP>4.5 tsf
240										
	25		0	15.4	114	23				alternating with sandier seams
235										with olive gray streaking, PP>4.5 tsf
	30	22	0	17.6						Groundwater seepage from 38' to 39' SANDY SILT - brown, moist to wet, fine sand
230										
	35		0	15.6	115	24				
225										
	40									

(CONTINUED ON FOLLOWING FIGURE)

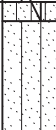









Field Tech: AR  
Prepared/Date: KC 11/24/2015  
Checked/Date: DP 1/07/2016

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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-1.3.6a

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.
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	Martini Drilling / CME-75		G-410/ M-406 (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										Hollow-Stem Auger	Sta 675+88, Rt 0.9 feet	
										11/11/2015 - 11/13/2015	8"	261 feet
GROUNDWATER READINGS												
Groundwater seepage encountered at 38' during initial drilling. See monitoring data in GDR.												
220		10	0	24.8				☒			SM	SILTY SAND - loose, brown, wet, fine to medium sand
	45										CL	LEAN CLAY - medium stiff, moist, olive gray, trace fine to coarse sand
215			0	27.8	97	12		☒				PP=2.1 tsf
	50										CL	LEAN CLAY with SAND - stiff, brown to olive gray, moist, fine to coarse sand
210		11	0	20.3				☒				
	55										SM	SILTY SAND - brown, wet, fine to coarse sand
205			0	17.8	111	20		☒			CL	LEAN CLAY with SAND - stiff, brown, moist, fine to coarse sand, PP=2.6 tsf
	60										CL	SANDY LEAN CLAY - very stiff, brown, moist, fine to coarse sand, trace fine gravel
200		29	0	15.7				☒				
	65		0	20.1	106	19		☒			CL	PP>4.5 tsf LEAN CLAY with SAND - stiff, gray with brown mottles, moist, fine to medium sand, with lenses of saturated brown silty sand
195												
	70	15	0	25.2				☒			CL	SANDY LEAN CLAY - very stiff, gray with brown mottles, moist, fine sand
	75		0	23.0	102	34		☒				PP=4.5 tsf
185											SM	SILTY SAND - medium dense, brown, moist, fine to medium sand
80												

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
Prepared/Date: KC 11/24/2015  
Checked/Date: DP 1/07/2016

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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-1.3.6b



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 / CME-75		<b>G-410/ M-406 (Continued)</b>
										<b>DRILLING METHOD</b> Hollow-Stem Auger	<b>BOREHOLE LOCATION</b> Sta 675+88, Rt 0.9 feet	
										<b>DATES DRILLED</b> 11/11/2015 - 11/13/2015	<b>HOLE DIAMETER</b> 8"	<b>GROUND EL.</b> 261 feet
										<b>GROUNDWATER READINGS</b> Groundwater seepage encountered at 38' during initial drilling. See monitoring data in GDR.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS			
180		33	0	14.4				☒		CL	SANDY LEAN CLAY - very stiff to hard, brown, moist, fine to coarse sand, trace subrounded fine gravel	
85	175		0	18.4	110	40		☒			PP>4.5 tsf	
170	90	30	0	14.7				☒		SW-SM CL	WELL GRADED SAND with SILT and GRAVEL- medium dense, grayish brown, wet, fine to coarse sand SANDY LEAN CLAY - very stiff to hard, reddish brown, moist, fine to coarse sand, trace to few subrounded to subangular fine gravel	
165	95		0	16.3	115	42		☒			reddish brown, PP>4.5 tsf	
160	100	52	0	12.1				☒		SC	CLAYEY SAND with GRAVEL - dense to very dense, brown, wet, fine to coarse sand, subrounded to subangular gravel, up to 3/4" in dia, predominantly slate, some shale and quartzite gravel	
105			0	12.2	116	64		☒			alternantes with lenses of poorly graded sand with trace silt, fine to coarse sand, trace gravel	
155		22	0	29.3				☒		CL	LEAN CLAY with SAND - very stiff, light olive brown, moist, fine to medium sand, thin lenses of silty sand, dark yellow brown	
150	110	20	0	26.4			82	☒				
			0	21.1	102	59	39	☒		SM	SILTY SAND - dense, olive brown and dark yellow brown mottles, wet, fine to coarse sand	
145		44	0	17.9			42	☒		SC	CLAYEY SAND - dense, dark yellow brown, moist to wet, fine to coarse sand, trace fine gravel up to 1/4" in dia	
120												

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
Prepared/Date: KC 11/24/2015  
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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-1.3.6c



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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										Martini Drilling / CME-75		G-410/ M-406 (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Hollow-Stem Auger	Sta 675+88, Rt 0.9 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										11/11/2015 - 11/13/2015	8"	261 feet
<b>GROUNDWATER READINGS</b> Groundwater seepage encountered at 38' during initial drilling. See monitoring data in GDR.												
140		67	0							SW-SM	WELL GRADED SAND with SILT - very dense, olive brown to dark grayish brown, wet, fine to coarse sand CLAYEY SAND - dense, brown, moist, fine to coarse sand	
										SC		
			0	14.8	115	73	15			SM	SILTY SAND - dense to very dense, brown, wet, fine to coarse sand, trace gravel up to 3/4" subrounded to subangular gravel increased gravel content, up to 1" in dia	
125												
135		50/3"	0.1	9.3							SANDY LEAN CLAY - hard, dark yellow brown, fine sand	
										CL		
										SM	SILTY SAND - very dense to dense, brown to olive brown, moist, fine sand, with some clayey sand lenses, trace gravel	
130		50/6"	0	13.5			31					
130			-			56					(No Recovery)	
										CL		
125		80	0	10.1						SM	SILTY SAND - very dense, olive brown, moist to wet, fine to coarse sand, trace gravel less than 1/2" in dia, subangular	
										SC		
140			0	13.3	118	52	55			CL	CLAYEY SAND - dark grayish brown, moist, fine to coarse sand, few to little gravel SANDY LEAN CLAY - very stiff to hard, dark grayish brown, moist, fine to coarse sand, few subrounded to subangular gravel up to 3/4" in dia	
120										CL		
										CL	LEAN CLAY with SAND, very stiff, very dark grayish brown, fine to medium sand	
145		23	-	22.0								
115										CL	SANDY LEAN CLAY, hard, vary dark grayish brown, moist, fine to medium sand, PP=2.9 tsf	
150			-	21.3	107	44	67					
110											trace gravel, subangular to angular, siltstone fragments, up to 3/4" in dia	
155		45	-	20.9						CL		
105											LEAN CLAY - very stiff, dark brown, moist, trace fine to medium sand	
										CL		
160			-	24.4	97	38						

(CONTINUED ON FOLLOWING FIGURE)



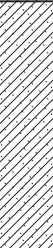

Field Tech: AR  
Prepared/Date: KC 11/24/2015  
Checked/Date: DP 1/07/2016

MTA Westside Subway Extension  
Los Angeles, California

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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-1.3.6d

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 / CME-75		G-410/ M-406 (Continued)
										DRILLING METHOD	BOREHOLE LOCATION	
										Hollow-Stem Auger	Sta 675+88, Rt 0.9 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										11/11/2015 - 11/13/2015	8"	261 feet
										GROUNDWATER READINGS		
										Groundwater seepage encountered at 38' during initial drilling. See monitoring data in GDR.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS			
100											hard, grayish brown, fine to coarse sand, traces of decomposed gravel	
165	40	-	16.6				81				CL	LEAN CLAY with SAND, hard, brown to very dark brown, fine to coarse sand, trace fine subangular gravel (slates to 1/2" in dia)
170			-	22.9	103	24					stiff to very stiff, PP>4.5 tsf END OF BORING AT 170 FEET NOTES: Hand augered upper 5 feet to avoid damage to utilities. Borehole backfilled with hydrated bentonite chips with sand filter opposite well screened zones per well construction schedule.	
175										Vapor probes installed at 20', 77', and 103'. Groundwater monitoring wells screened at intervals 40' to 45' and 115' to 135'. Refer to GDR for Well Construction Details.		
180										"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches *Number of blows required to drive the Crandall Sampler 12 inches using a 140 pound hammer falling 30 inches. Hammer Energy Transfer Ratio (ERi) = 70% (Calibrated 04/09/2015)		
185										**Photo Ionization Detector used for OVA readings.		
190												
195												
200												

Field Tech: AR  
Prepared/Date: KC 11/24/2015  
Checked/Date: DP 1/07/2016

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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-1.3.6e

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										DRILLING METHOD	BOREHOLE LOCATION	G-411
										Rotary Wash	Sta 687+92, Lt 65.0 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										9/29/2015 - 9/30/2015	4 7/8"	249 feet
										GROUNDWATER READINGS		
										Overnight groundwater measured at 36.5'.		
245	5		0	21.1	103	23				2-inch thick Asphalt Concrete over 8-inch Concrete <b>ARTIFICIAL FILL [Af]</b> SANDY SILT - medium brown, moist, fine sand <b>YOUNGER ALLUVIUM [Qal]</b> SANDY SILT - light brown, moist, fine to medium sand, some clay		
240	10	18	0.1	14.2						LEAN CLAY with SAND - stiff, dark grayish brown, moist, fine to medium sand, trace gravel up to 1/2" in dia, sunangular to angular   grades sandier, very stiff, fine sand  fine to medium sand		
235	15											
230	20									<b>OLDER ALLUVIUM [Qalo]</b>  SILTY SAND/POORLY GRADED SAND with GRAVEL (No samples collected, stratigraphy from 11.5' to 60' based on observation of auger cuttings during drilling)		
225	25									stiff drilling		
220	30											
215	35											
210	40											

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
Prepared/Date: KO 10/15/2015  
Checked/Date: DP 12/08/2015

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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-1.3.7a

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.
								C & L / Mayhew-1000		<b>G-411</b> <b>(Continued)</b>
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 687+92, Lt 65.0 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								9/29/2015 - 9/30/2015	4 7/8"	249 feet
								GROUNDWATER READINGS		
								Overnight groundwater measured at 36.5'.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
205	45								SM/SP	SILTY SAND/POORLY GRADED SAND (No samples collected, stratigraphy from 11.5' to 60' based on observation of auger cuttings during drilling)
200	50								CL-ML	SILTY CLAY - light to medium brown, moist, fine sand (No samples collected, stratigraphy from 11.5' to 60' based on observation of auger cuttings during drilling)
195	55									
190	60		0	24.9	102	30		☒	CL	LEAN CLAY grades to LEAN SANDY CLAY - very stiff to hard, dark grayish brown and dark yellow brown, moist, low to medium plasticity, fine to medium sand, trace gravel up to 1/4" in dia, PP=4.5 tsf
185	65	81	0	12.0				☒	SM/SC	SILTY SAND with GRAVEL grades to CLAYEY SAND- very dense, brown, wet, fine to coarse sand, subangular gravel up to 3/4" in dia, subrounded to subangular
180	70		0.3	13.0	114	92	25	☒	SM/SC	SILTY SAND grades to CLAYEY SAND- very dense, dark brown, wet, fine to coarse sand, trace gravel up to 1/2" in dia
175	75	55	0					☒	CL	SANDY LEAN CLAY - brown, moist, fine sand
									SP-SM	POORLY GRADED SAND with SILT - very dense, light brown, fine to coarse sand, few gravel (No Recovery)
									SC	CLAYEY SAND - medium dense, dark yellowish brown, moist, fine sand
			0.1	18.6	113	41	67	☒	CL	SANDY CLAY - hard, dark gray brown, moist, fine to medium sand, trace organics
170	80	72	0	17.6			79	☒	ML	SILT with SAND - hard, yellowish brown, moist, fine to medium sand, thin lenses of sandy lean clay (LL=NP, PI=NP)

PMT

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
Prepared/Date: KO 10/15/2015  
Checked/Date: DP 12/08/2015

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**LOG OF BORING**  
Project No.: 4953-11-1423 Figure: A-1.3.7b

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										DRILLING METHOD	BOREHOLE LOCATION	G-411 (Continued)
										Rotary Wash	Sta 687+92, Lt 65.0 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										9/29/2015 - 9/30/2015	4 7/8"	249 feet
GROUNDWATER READINGS												
Overnight groundwater measured at 36.5'.												
165	85		0	15.4	110	64	24	⊗	PMT	SC	CLAYEY SAND - yellowish brown, moist, fine to coarse sand, alternating with sandier/clayier layers	
								⊗		SP-SM	POORLY GRADED SAND with SILT - dense, brown, wet, fine to coarse sand, few gravel	
160		50/5"	0	7.6				⊗		SC/SM	SILTY SAND with GRAVEL/CLAYEY SAND with GRAVEL - very dense, dark yellow brown, moist to wet, fine to coarse sand (predominantly fine), subangular gravel up to 1" in dia	
155	90	50/5"	0	12.0			23	⊗		SM	SILTY SAND - very dense, light olive brown, wet, fine sand	
150			0	18.4	104	93		⊗				
145	95	50/4"	0	12.7				⊗		SP-SM	POORLY GRADED SAND with SILT grading to SILTY SAND - very dense, light olive brown, moist to wet, fine sand	
140			0	21.5	103	92	16	⊗		SM	SILTY SAND - very dense, light olive brown and yellow brown mottles, fine sand	
135	100	60/6"	0					⊗		SP-SM	POORLY GRADED SAND with SILT - very dense, wet, fine sand	
130								⊗	PMT			
125	105									SM	SILTY SAND - very dense, olive, wet, fine to medium sand (predominantly fine)	
120	110	50/5"	0	18.2	104	94	22	⊗				
115								⊗				
110	115	50/5"	0	15.6				⊗				
105								⊗		SP-SM	POORLY GRADED SAND with SILT and GRAVEL - very dense, light brown, wet, fine to coarse sand, subrounded to subangular gravel up to 1" in dia	
100	120		0	8.4	121	50		⊗				

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
Prepared/Date: KO 10/15/2015  
Checked/Date: DP 12/08/2015

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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-1.3.7c



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.
								C & L / Mayhew-1000		<b>G-411</b> <b>(Continued)</b>
								DRILLING METHOD	BOREHOLE LOCATION	
								Rotary Wash	Sta 687+92, Lt 65.0 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								9/29/2015 - 9/30/2015	4 7/8"	249 feet
								GROUNDWATER READINGS		
								Overnight groundwater measured at 36.5'.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
125	125	50/6"	0	14.2			37			POORLY GRADED SAND with SILT and GRAVEL (continued from previous)
120	130		0	18.2	109	83			SM	SILTY SAND - very dense, pale olive to olive yellow, wet, fine sand, slightly micaceous
115	135	50/6"	0	18.6					SP-SM	POORLY GRADED SAND with SILT, very dense, light yellow brown to pale olive, fine to medium sand, trace fine gravel subrounded to 3/8", grades to silty sand
110	140								SM	SILTY SAND, very dense, light olive brown with yellowish brown mottles, wet, fine sand
105	145									END OF BORING AT 135 FEET
100	150									NOTES:
95	155									Hand augered upper 5 feet to avoid damage to utilities.
90	160									Borehole backfilled with bentonite-cement grout.
										Pavement patched with rapid set concrete colored with black oxide.
										"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches
										*Number of blows required to drive the Crandall Sampler 12 inches using a 140 pound hammer falling 30 inches.
										Hammer Energy Transfer Ratio (ERi) = 70% (Calibrated 04/09/2015)
										**Photo Ionization Detector used for OVA readings.
										^Average dry density for sample when multiple density test performed on different rings for different lab tests.
										NP=Non plastic
										PMT=Pressuremeter test

Field Tech: AR  
Prepared/Date: KO 10/15/2015  
Checked/Date: DP 12/08/2015

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**LOG OF BORING**  
Project No.: 4953-11-1423 Figure: A-1.3.7d



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 / CME-75		G-412/M-407 /E-132A
								DRILLING METHOD	BOREHOLE LOCATION	
								Hollow-Stem Auger	Sta 703+84, Lt 95 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								3/9/2015 - 3/11/2015	9"	281.7 feet
								GROUNDWATER READINGS		
								Groundwater not encountered to 100 feet during drilling. See monitoring data in GDR.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
280										8-inch thick Asphalt Concrete over 6-inch Base Coarse <b>ARTIFICIAL FILL [Af]</b> Sandy LEAN CLAY with GRAVEL - moist, brown, fine to coarse grained sand
275	5			17.1	108	21				grades increased gravel content
270	10	13		14.9	-		58			<b>QUATERNARY OLDER ALLUVIUM [Qalo]</b> Sandy LEAN CLAY - stiff to very stiff, moist, brown to dark brown, predominantly fine to medium grained sand, trace coarse grained sand, trace gravel
265	15			14.6	115	17	78			(LL=43, PI=31)
260	20	20		12.5	-					trace subangular to angular slate and shale gravel (up to 1" in size)
255	25			25.0	99	28	97			FAT CLAY - very stiff, moist, mottled olive brown and grayish brown, trace fine grained sand (LL=71, PI=53)
250	30	19		18.7	-					dark grayish brown with brown mottles, trace medium to coarse sand, trace gravel (up to 1/4" in size)
245	35			17.6	111	27				olive gray to olive yellow, trace fine sand, trace iron-oxide stains

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
Prepared/Date: KC 5/26/2015  
Checked/Date: DP 5/26/2015

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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-1.3.8a

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										DRILLING METHOD	BOREHOLE LOCATION	G-412/M-407 /E-132A (Continued)
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										3/9/2015 - 3/11/2015	9"	281.7 feet
GROUNDWATER READINGS Groundwater not encountered to 100 feet during drilling. See monitoring data in GDR.												
240		17		20.7	-							pale olive to olive yellow, trace iron-oxide stains
				18.2	108	33	92					(LL=60, PI=43)
235	45	22		15.4	-							<b>LAKEWOOD FORMATION [Qlw]</b> CLAYEY SAND grades to Sandy LEAN CLAY - medium dense/very stiff, moist, olive gray, fine to medium grained sand
				18.0	111	27	51					light gray to pale yellow (LL=34, PI=26)
230	50	50/6"	2.3	4.6	-							POORLY GRADED SAND with SILT - very dense, moist, light gray, fine grained sand
				5.0	105	80						pale yellow to pale olive, grades to fine to medium grained sand
225	55	66	1.6	5.1	-							WELL GRADED SAND with SILT - very dense, moist, pale yellow to pale olive, fine to medium grained sand,
				5.8	93	79	12					
220	60	50/6"		2.9	-							WELL GRADED SAND with GRAVEL - very dense, moist, pale yellow to grayish yellow green, fine to coarse grained sand, gravel up to 3/4"
				1.1	-	50/6"						<b>SAN PEDRO FORMATION [Osp]</b> POORLY GRADED SAND with SILT - very dense, moist, grayish yellow green, fine to medium grained sand, trace gravel (up to 3/4" in size)
215	65	92		1.2	-							SILTY SAND - very dense, moist, grayish yellow green, fine grained sand, slightly micaceous
				7.9	86^	69	27					
210	70	70		13.6	-							pale olive to dusty yellow green, some thin lenses of fine to coarse grained sand, trace slate gravel (up to 1/4" in size)
				19.0	106	85/9"						SILT with SAND - hard, moist, pale olive to dusty yellow green, fine to medium grained sand, iron oxide mottles
205	75	39		25.4	-		84					POORLY GRADED SAND with SILT - very dense, moist, pale olive, fine to medium grained sand, iron-oxide mottles
				5.4	98	84/10"						
80												

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: AR  
Prepared/Date: KC 5/26/2015  
Checked/Date: DP 5/26/2015

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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-1.3.8b

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										DRILLING METHOD	BOREHOLE LOCATION	G-412/M-407 /E-132A (Continued)
										Hollow-Stem Auger	Sta 703+84, Lt 95 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										3/9/2015 - 3/11/2015	9"	281.7 feet
GROUNDWATER READINGS												
Groundwater not encountered to 100 feet during drilling. See monitoring data in GDR.												
		67		10.1	-							pale olive to pale yellow, lenses of silty sand
				4.1	99	81/11"	10					
	85	55		11.1	-						SM	SILTY SAND - very dense, moist, pale olive, fine to medium grained sand
	195			17.0	103	64	45					increased moisture content
	90	81		4.5	-		10				SP-SM	POORLY GRADED SAND with SILT- very dense, moist, dark greenish gray, fine to medium grained sand
	190			-	-	50/2"					SP	POORLY GRADED SAND with GRAVEL - very dense, no sample recovered, coarse drilling with estimated 40% gravel and some cobbles within auger cuttings (No Recovery)
	95	50/6"		3.0	-		22				SM	SILTY SAND - very dense, moist, dark greenish gray, sand is fine to medium grained, trace lenses of cemented sand or sandstone fragments, trace slate gravel
	185											
		50/1"		4.4	-							with shell fragments
	100											END OF BORING AT 100 FEET
	180											NOTES: Hand augered upper 6 feet to avoid damage to utilities. Borehole backfilled with bentonite, clean sand, and sand/gravel/cement slurry per well construction schedule. Pavement patched with rapid set concrete colored with black oxide.
	105											Groundwater monitoring wells installed with screen intervals at 50'-60' and 80'-90'. Vapor probes installed at 65', 70', and 75'. Refer to GDR for Well Construction Details.
	175											"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches *Number of blows required to drive the Crandall Sampler 12 inches using a 140 pound hammer falling 30 inches Hammer Energy Transfer Ratio (ERi) = 70% (Calibrated 04/09/2015)
	110											**Photo Ionization Detector used for OVA readings
	170											^Average dry density for sample when multiple density tests performed on different rings for different tests.
	115											
	165											
	120											

Field Tech: AR  
Prepared/Date: KC 5/26/2015  
Checked/Date: DP 5/26/2015

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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-1.3.8c

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										DRILLING METHOD	BOREHOLE LOCATION	OB-307
										Hollow-Stem Auger	Sta 642+13, Lt 20.9 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										9/10/2015 - 9/11/2015	8"	222 feet
GROUNDWATER READINGS Groundwater encountered at 62' during initial drilling. See monitoring data in GDR.												
220										8-inch thick ASPHALT over 12-inch CONCRETE		
	5									<b>ARTIFICIAL FILL [Af]</b>		
										SILTY SAND - dark gray brown, moist, fine to medium sand		
215			-	21.1	99	14				<b>YOUNGER ALLUVIUM [Oa1]</b>		
										SANDY FAT CLAY - very stiff, yellow brown to olive brown, moist, high plasticity, fine sand, some CaCO <sub>3</sub> stringers, PP=2.25 tsf (LL=51, PI=34)		
210	10	17	-	20.6						<b>OLDER ALLUVIUM [Oa0]</b>		
										LEAN CLAY with SAND - hard, yellow brown to olive brown, moist, low to medium plasticity, fine sand, less CaCO <sub>3</sub>		
205	15	20	-	17.6						PP>4.5 tsf		
										spotty manganese stains, some CaCO <sub>3</sub> nodules, PP=4.0 tsf		
200	20	19	-	13.7						SANDY LEAN CLAY - hard, yellow brown to olive brown, moist, low to medium plasticity, fine to coarse sand, trace fine gravels		
										more sand, fine to coarse sand, trace fine gravels		
195	25		-	14.2	118	25	50			fine sand, PP>4.0 tsf		
										PP>4.5 tsf (LL=30, PI=17)		
190	30	15	-	13.4						SILTY CLAY - stiff, olive brown, moist, fine to medium sand		
										POORLY GRADED SAND with SILT and GRAVEL - medium dense, grayish brown, moist, fine to coarse sand, gravel size up to 1" in dia		
185	35	10	-	13.6						SANDY LEAN CLAY - stiff, olive brown, moist, low plasticity, fine sand, some medium sand, some clay, trace to some fine gravel, subangular to subrounded, gravel size up to 1/2" in dia		
										SILTY SAND with GRAVEL - medium dense, brown, moist, fine sand, subangular, gravel size up to 1" in dia		
40	26	-	-	13.1								

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: LH  
Prepared/Date: KO 9/24/2015  
Checked/Date: DP 12/10/2015

MTA Westside Subway Extension  
Los Angeles, California

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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-1.3.9a

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 / CME-75		<b>OB-307</b> <b>(Continued)</b>
								DRILLING METHOD	BOREHOLE LOCATION	
								Hollow-Stem Auger	Sta 642+13, Lt 20.9 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								9/10/2015 - 9/11/2015	8"	222 feet
								GROUNDWATER READINGS		
								Groundwater encountered at 62' during initial drilling. See monitoring data in GDR.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
180			-	12.3	95	22	51			SILTY SAND with GRAVEL (continued from previous page)
45		21	-	15.6						SANDY SILT - very stiff, olive brown, moist, fine to medium sand, trace fine to coarse gravel, subangular to subrounded, gravel size to 3/4" in dia, finer and less gravel toward bottom of the sampler. less sand and gravel in cuttings
175			-	4.7	105	39	16			SANDY SILT with CLAY - very stiff, olive brown, moist, fine sand, trace fine gravel, gravel size up to 1/4" in dia
50			-	27.4						SILTY SAND - medium dense, olive brown, moist, coarse to medium sand, some coarse to fine gravel, gravel size up to 3/4" in dia
170		16	-	18.6	106	32				LEAN CLAY - very stiff, brown, moist, some fine sand, trace fine slate gavel, PP=2.25 tsf
55			-	17.2						hard, low to medium plasticity, trace fine sand, PP>4.5 tsf (LL=37, PI=23)
165		18	-	19.5	111	26				PP>4.5 tsf
60			-	22.7			65			very stiff, medium plasticity, PP=3.5 tsf
160		17	-	29.0	94	43	72			LEAN CLAY with SAND - very stiff, brown, moist, low plasticity, fine to medium sand, trace fine gravel
65			-	20.9						soft, trace fine gravel, PP=0.25 tsf
155			-	-	-	60/10"				LEAN CLAY - very stiff, olive brown, moist, trace fine sand, PP=2.5 tsf
70		15	-	17.8						PP=3.75 tsf (LL=36, PI=23)
150			-	-	-	70				
75		20	-							
145			-							
80			-							

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: LH  
Prepared/Date: KO 9/24/2015  
Checked/Date: DP 12/10/2015

**MTA Westside Subway Extension**  
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**LOG OF BORING**  
Project No.: 4953-11-1423 Figure: A-1.3.9b



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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										DRILLING METHOD	BOREHOLE LOCATION	OB-307 (Continued)
										Hollow-Stem Auger	Sta 642+13, Lt 20.9 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										9/10/2015 - 9/11/2015	8"	222 feet
GROUNDWATER READINGS Groundwater encountered at 62' during initial drilling. See monitoring data in GDR.												
140		50/6"	-	15.7								LEAN CLAY (continued from previous page), hard, olive some fine sand, thin layers of medium sand
											SC	CLAYEY SAND - dense, brown, moist, fine to medium sand, trace fine gravel, size up to 1/4" in dia
85			-	14.9	120	74					CL	SANDY LEAN CLAY - hard, moist, olive brown, fine sand, PP>4.0 tsf
135											SC	CLAYEY SAND - medium dense, brown, moist, fine to medium sand, trace fine gravels.
		25	-	18.7			68				CL	SANDY LEAN CLAY - very stiff, olive, moist, fine to medium sand, PP=2.25 to 2.8 tsf
90			-	17.5	109	62						(LL=39, PI=25)
130											SC	CLAYEY SAND with GRAVEL - very dense, greenish gray, moist, fine to coarse sand, fine gravel up to 3/4", some small clay nodules
		73	-	15.7			28					
95											CL	SANDY LEAN CLAY - dense/very stiff, bluish gray, moist, medium to high plasticity, fine to medium sand, PP=3.5 tsf
125			-	15.1	122	75						
100		54	-	14.0								very dense/hard, brown, low plasticity, increase in sand content
120			-	15.5	113	69/11"	44				SC	CLAYEY SAND, very dense, olive brown, moist, fine to medium sand, trace gravel up to 1/4" in dia PP>4.5 tsf
105											CL	SANDY LEAN CLAY, hard, olive brown, moist, fine to medium sand, trace fine gravel PP=3.3 tsf
115		71	-	14.5								
			-	16.4	114	35						very stiff, grayish brown to olive brown, trace fine gravels up to 1/2" in dia, moderate plasticity, PP=1.5 tsf
110		38	-	21.1			57					hard, olive brown, increase in sand content, trace gravel up to 3/4" in dia, moderate FeOx staining, PP=2.0 tsf
											ML	SILT with SAND - hard, greenish to bluish gray, fine sand, some nodules of cemented clay
115			-	16.4	113	66/10"						
											ML	SANDY SILT with CLAY - moist, olive gray to olive, fine to coarse sand, some fine to coarse subangular gravel up to 3/4" in diameter
105		38	-	13.9							CL-ML	<b>SAN PEDRO FORMATION [Qsp]</b> SILTY CLAY with SAND - hard, dark greenish gray, moist, fine sand, trace coarse gravel, size up to 1.5" in dia, subrounded to subangular
120												

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: LH  
Prepared/Date: KO 9/24/2015  
Checked/Date: DP 12/10/2015

MTA Westside Subway Extension  
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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-1.3.9c



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 / CME-75		<b>OB-307</b> <b>(Continued)</b>
								DRILLING METHOD	BOREHOLE LOCATION	
								Hollow-Stem Auger	Sta 642+13, Lt 20.9 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								9/10/2015 - 9/11/2015	8"	222 feet
								GROUNDWATER READINGS		
								Groundwater encountered at 62' during initial drilling. See monitoring data in GDR.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
100			-	13.0	122	80				SILTY CLAY with SAND (continued from previous) hard, more silty, cemented nodules and fine sand, some fine to coarse gravel up to 3/4" in dia, PP>4.5 tsf
		69	-	15.3			39			CLAYEY SAND/SANDY LEAN CLAY - very dense/hard, bluish gray, moist to wet, fine to medium sand
125										
95			-	15.7	115	71				LEAN CLAY with SAND - hard, bluish gray, moist to wet, low to medium plasticity, fine sand, PP=3.5 tsf
130		36	-	17.0						
90										
135										
85										
140										
80										
145										
75										
150										
70										
155										
65										
160										

END OF BORING AT 130.5 FEET

NOTES:  
Hand augered upper 6 feet to avoid damage to utilities.  
Borehole backfilled with hydrated bentonite chips with sand filter opposite well screened zones per well construction schedule.

Groundwater monitoring wells installed with screen intervals at 40'-50', 80' to 90' and 118'-128'. Refer to GDR for Well Construction Details.

"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches  
\*Number of blows required to drive the Crandall Sampler 12 inches using a 140 pound hammer falling 30 inches.  
Hammer Energy Transfer Ratio (ERi) = 70% (Calibrated 04/09/2015)

\*\*Photo Ionization Detector used for OVA readings.

^Average dry density for sample when multiple density test performed on different rings for different lab tests.

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD. PEN. TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										DRILLING METHOD	BOREHOLE LOCATION	OB-308
										Hollow-Stem Auger	Sta 642+80, Lt 19 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										9/16/2015 - 9/17/2015	8"	223 feet
GROUNDWATER READINGS Groundwater encountered at 61' during initial drilling. See monitoring data in GDR.												
										10-inch thick ASPHALT over 11-inch thick CONCRETE		
										<b>ARTIFICIAL FILL [Af]</b>		
										SILTY SAND - loose, dark gray brown, moist, fine to medium sand		
										<b>YOUNGER ALLUVIUM [Oal]</b>		
										CLAYEY SAND - loose, brown to olive brown, moist, fine to coarse sand, trace gravel size up to 1" in dia		
										(LL=35, PI=22)		
										SILT - olive brown, moist, fine sand, some clay and small CaCO <sub>3</sub> nodules		
										<b>OLDER ALLUVIUM [Oalo]</b>		
										LEAN CLAY with SAND - stiff, brown, moist, low to medium plasticity, fine sand, some carbonate CaCO <sub>3</sub> stringers, PP>4.5 tsf		
										very stiff, low plasticity		
										fine to coarse sand, trace subrounded to subangular fine gravel, PP>4.5 tsf		
										CLAYEY SAND with GRAVEL - dense, olive brown, moist, low plasticity fines, fine to coarse sand, fine gravel up to 3/4" in dia, few CaCO <sub>3</sub> nodules		
										SILTY SAND - medium dense, yellow brown, moist, fine sand		
										LEAN CLAY with SAND - stiff, yellow brown, medium plasticity (LL=33, PI=16)		
										CLAYEY SAND - dense, olive brown, moist, fine to coarse sand, trace subrounded to subangular gravel, size up to 3/4" in dia		
										WELL GRADED SAND with SILT and GRAVEL - medium dense to dense, brown, moist, fine to coarse sand, fine to coarse subangular gravel up to 1" in dia, slight rig chatter at 37'		

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: LH  
Prepared/Date: KO 10/12/2015  
Checked/Date: DP 12/09/2015

MTA Westside Subway Extension  
Los Angeles, California

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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-1.3.10a

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 / CME-75		<b>OB-308</b> <b>(Continued)</b>
								DRILLING METHOD	BOREHOLE LOCATION	
								Hollow-Stem Auger	Sta 642+80, Lt 19 feet	
								DATES DRILLED	HOLE DIAMETER	GROUND EL.
								9/16/2015 - 9/17/2015	8"	223 feet
								GROUNDWATER READINGS		
								Groundwater encountered at 61' during initial drilling. See monitoring data in GDR.		
ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	
180			-	4.3	102	41	10	☒		
45		41	-	5.1	-			☒		SM SILTY SAND - dense, olive brown, moist, low plasticity fines, fine to medium sand, trace fine gravel up to 3/4" in dia
175			-	-	-	30		☒		ML SILT with SAND - hard, olive brown to brown, moist, fine sand, trace subangular to subrounded fine gravel up to 1/2" in dia, some clay content
170			-	20.2	-			☒		CL LEAN CLAY - stiff, olive brown, moist, low to medium plasticity, trace fine sand, some CaCO <sub>3</sub> stringers, PP=3.0 tsf
55		13	-	18.2	109	16		☒		CL stiff, moist to wet
165			-	19.6	-		53	☒		CL SANDY LEAN CLAY - very stiff, moist to wet, yellowish olive to olive brown, fine to coarse sand, trace fine gravel up to 1/4" in dia, some thin lenses of fine to medium sand, (LL=32, PI=18)
65		26	-	20.1	-	53		☒		CL moist, olive brown to brown, small nodules with pink pigmentation, PP=3.0 tsf
155			-	17.7	-			☒		CL LEAN CLAY with SAND - hard, olive brown, moist, fine to medium sand, subrounded to subangular gravel size up to 1/2" in dia, PP>4.5 tsf
70			-					☒		CL LEAN CLAY - hard, brown, trace fine to medium sand, PP>4.5 tsf (LL=34, PI=20)
150		20	-					☒		CL
75								☒		CL
145								☒		CL
80								☒		CL

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: LH  
Prepared/Date: KO 10/12/2015  
Checked/Date: DP 12/09/2015

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Los Angeles, California

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**LOG OF BORING**  
Project No.: 4953-11-1423 Figure: A-1.3.10b

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										DRILLING METHOD	BOREHOLE LOCATION	OB-308 (Continued)
										Hollow-Stem Auger	Sta 642+80, Lt 19 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										9/16/2015 - 9/17/2015	8"	223 feet
GROUNDWATER READINGS Groundwater encountered at 61' during initial drilling. See monitoring data in GDR.												
140			-	15.0	117	52		☒				LEAN CLAY thin lenses of clayey sand (LL=34, PI=20)
85		50	-	16.0	-			☒			SC	CLAYEY SAND with GRAVEL - dense, dark olive to olive brown, moist, fine to medium sand, subangular to subrounded gravel up to 1" in dia, some thin layers or lenses of sandy clay
135											ML	SILT - olive to brown, moist, trace fine sand
90			-	11.6	127	88/10"	14	☒			SM	SILTY SAND WITH GRAVEL - very dense, olive brown, moist to wet, fine to coarse sand, subrounded to subangular gravel up to 1"  thin layer of slate gravel
130											SC	CLAYEY SAND with GRAVEL- very dense, dark olive gray, fine to coarse sand, fine to coarse gravel up to 1" in dia, subangular to angular
95		38	-	12.7	-		40	☒			CL	LEAN CLAY with SAND - very stiff, dark yellow brown, moist, low to medium plasticity, fine sand, trace fine gravels up to 3/4" in dia, PP=3.75 tsf
125			-	17.2	111	33		☒				hard, very dark grayish brown, some fine to coarse sand, trace fine gravels up to 1/2" in dia, PP>4.5 tsf mottled yellow brown and olive brown
100											SC	CLAYEY SAND with GRAVEL - very dense, olive, moist, fine to coarse sand, fine to coarse gravel up to 1" in dia, subrounded to subangular  (LL=26, PI=10)
105		53	-	10.1	-		35	☒			CL	SANDY LEAN CLAY - very stiff, dark brown, wet, low plasticity, very fine sand, PP=1.25 tsf
115			-	21.9	108	38	62	☒				difficult drilling
110											CL-ML	SILTY CLAY - hard, olive gray, moist, some fine sand
115		27	-	18.8	-			☒			CL-ML	<u>SAN PEDRO FORMATION [Qsp]</u> SILTY CLAY with SAND - very stiff, dark greenish gray, moist, fine to coarse sand, few fine to coarse gravel, some CaCO3 stringers and MnO2 nodules
105												
120												

(CONTINUED ON FOLLOWING FIGURE)

Field Tech: LH  
Prepared/Date: KO 10/12/2015  
Checked/Date: DP 12/09/2015

MTA Westside Subway Extension  
Los Angeles, California

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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-1.3.10c

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

ELEVATION (ft)	DEPTH (ft)	"N" VALUE STD.PEN.TEST	OVA (ppm)**	MOISTURE CONTENT (% of dry wt.)	DRY DENSITY (pcf)	BLOW COUNT* (blows/ft)	PERCENT PASSING No. 200 SIEVE	SAMPLE LOC.	DOWNHOLE TESTS	DRILLING COMPANY/DRILLING EQUIPMENT		BORING NO.
										DRILLING METHOD	BOREHOLE LOCATION	OB-308 (Continued)
										Hollow-Stem Auger	Sta 642+80, Lt 19 feet	
										DATES DRILLED	HOLE DIAMETER	GROUND EL.
										9/16/2015 - 9/17/2015	8"	223 feet
GROUNDWATER READINGS												
Groundwater encountered at 61' during initial drilling. See monitoring data in GDR.												
100			-	16.8	111	47	53	☒				non to low plasticity, coarse sand, trace gravel
125		40	-	15.9	-			☒				thin layer of clayey sand, greenish gray, fine to medium grained
95										CL-ML		SILTY CLAY - hard, greenish gray, moist, trace fine sand, CaCO3 stringers
130			-	15.2	115	48		☒		CL		SANDY LEAN CLAY - hard, dark greenish gray, moist, low plasticity, fine to coarse sand, some CaCO3 stringers, PP=4.0 tsf
135												END OF BORING AT 131 FEET
90												NOTES: Hand augered upper 6 feet to avoid damage to utilities. Borehole backfilled with hydrated bentonite chips with sand filter opposite well screened zones per well construction schedule.
140												Groundwater monitoring wells installed with screen intervals at 61'-71', 83'-93', and 103'-113'. Refer to GDR for Well Construction Details.
85												"N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches *Number of blows required to drive the Crandall Sampler 12 inches using a 140 pound hammer falling 30 inches. Hammer Energy Transfer Ratio (ERi) = 70% (Calibrated 04/09/2015)
145												**Photo Ionization Detector used for OVA readings.
80												^Average dry density for sample when multiple density test performed on different rings for different lab tests.
150												
75												
155												
70												
160												

Field Tech: LH  
Prepared/Date: KO 10/12/2015  
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LOG OF BORING  
Project No.: 4953-11-1423 Figure: A-1.3.10d

**Westside Purple Line Extension**  
**Locations of Reach 5 Continuous Core Borings**

**Job No. 4953-11-1423**

<b>Name</b>	<b>POINT_X</b>	<b>POINT_Y</b>	<b>Longitude</b>	<b>Latitude</b>	<b>Total Depth (ft.)</b>
T9B1	6437387.347	1845200.232	-118.4103307	34.06200382	110
T9B2	6437496.226	1845190.847	-118.4099711	34.06197925	110
T9B2A	6437499.792	1845231.49	-118.4099599	34.06209097	115
T9B3	6437498.641	1845268.463	-118.4099642	34.06219255	130
T9B4	6437500.089	1845355.424	-118.4099606	34.06243152	130
T9B5	6437500.156	1845445.447	-118.4099615	34.06267889	126
T9B6	6437502.64	1845539.961	-118.4099546	34.06293863	130
T9B7	6437499.681	1845623.396	-118.4099655	34.06316787	145
T9B8	6437506.585	1845709.748	-118.4099439	34.06340522	150
T9B9	6437500.06	1845815.858	-118.4099668	34.06369672	155
T9B10	6437504.417	1845908.815	-118.4099537	34.0639522	165
T9B11	6437507.142	1846013.459	-118.4099461	34.06423978	170
T9B12	6437505.246	1846088.747	-118.4099534	34.06444664	185
T9B13	6437504.903	1846184.342	-118.4099558	34.06470931	185.4
T9B14	6437606.379	1846303.851	-118.4096224	34.06503884	200
T9B15	6437743.102	1846308.385	-118.409171	34.06505283	160.4
T9B16	6437838.281	1846390.723	-118.4088579	34.06528015	185
T9B17	6437838.956	1846540.306	-118.4088576	34.06569118	200
T9B18	6437844.837	1846713.816	-118.4088406	34.06616803	200
T9B19	6437847.487	1846804.638	-118.408833	34.06641762	245

**Explanation:**

T9BX - Continuous Core Boring

T9CX - CPT

**Figure A-1.3.11**



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES			Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches	Strength			
0							ASPH	0 to 0.6" ASPHALT						900-0915 TC
1							BASE	0.6 to 1.0' GRAVEL B/F BASE						0915-1015 SETUP & UTILTY CLEAR
2								1.0' to 5.0' FILL SILTY SAND WITH GRAVELS (SLATE)						1020-1025 CORE THRU ASPHALT
3							af	5.1 to 5.7' (af)						1030-1045 HAND AUGER 1.0 = 6.0'
4														2/1035
5														- HAND SPACES TO TOP OF HOLE READING
6														- CORO H2S = 0.0
7														LEL = 0 O2 = 20.9
8														@ 1200 CO = 0 H2S = 0.0
9														LEL = 0 O2 = 20.9
10														1208
11														
12														
13														

DATE(S) DRILLED: 09-12 & 09-13-15  
 DRILL METHOD: CONTINUOUS DRYCORE  
 DRILL EQUIPMENT: CME  
 DRILL CONTRACTOR: MARTIN DRILLING  
 BIT SIZE / TYPE: 8"  $\Phi$  / HQ3  
 HOLE COMPLETION:

LOGGED BY: M. ESPINOZA  
 CHECKED BY:  
 HOLE INCLINATION: 90°  
 GROUND ELEVATION:  
 TOTAL DRILLED DEPTH: 110.0'  
 GROUNDWATER LEVEL:  $\pm$  47.0'

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T9-B1

Sheet 1 of 8

Westside Purple Line Extension - Section 2  
 Beverly Hills, California  
 Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.11a

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
13							SV							
14	2	1					ML	@ 14.0' (ML) SILT WITH ARGILL SAND & COARSE GRASS (SLATE)						
15							SP	@ 15.0' SP-SM WITH GRAVELS $\leq 1.5"$ $\phi$					1213 1216	
16			4.5				SM							
17	3		5.0				GW	@ 16.5' ABNDT. SLATE GRAVELS WITH SP-SM. GRAY BLUE GW						
18							SP							
19							SM							
20	2						ML	@ 19.5 to 20.8' R 3 & R4					1218 1224	
21							GW							
22	4		4.4				SP	@ 21.6 SP WITH SILT IN SAND OCCASIONAL SLATE GRAVEL. $\leq 1.0"$ $\phi$ SUB ANGULAR TO SUB ROUND. YELLOWISH BROWN (10YR 5/4)						
23			5.0											
24														
25								@ 25.0' (AS ABOVE) INCREASE SILT WITH DEPTH & DARKER BROWN DARK YELLOWISH BROWN (10YR 3/4) @ 27.5'					1226 1232	
26														
27	5	3	5.0				SP							
28			5.0				SM							
29														

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## Log of Soil/Core Boring T9-B1

Sheet 2 of 8

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.11b

Depth, feet	SOIL/ROCK CORE						MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number		Type Number	Blows per 6 inches				
29	5	3	100										
30							SILT & SAND WITH OCC. GRAVEL SP-SM (AS ABOVE)					1233 1239	
31													
32	6		5.0 5.0										
33													
34													
35												1241 1246	
36							@ 36.0' V. FINE SAND TRACE SILT OCCASIONAL COARSE GRAIN TO V. F. GRAVEL.						
37	7		5.0 5.0										
38		4											
39							@ 39.0' SP-SM						
40							SW @ 40.0' SW V. F. SAND. SP @ 40.4' SP					1248 1256	
41													
42			5.0 5.0				@ 41.3' SP-SM ALTERNATING THIN LAYERS. LAMINATED GRAYISH TO ORANGE.						
43	8						@ 42.3' COARSE GR SAND (SP) - 42.5'						
44													CHATTER @ 44.0'
45												1258	

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

# Log of Soil/Core Boring T9-B1

Sheet 3 of 8

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.11c

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES			Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches	Strength			
45							SP							
46							SP							
47	9		4.5 5.0				SL	@ 46.5' GRADES INTO SP						
48							GW	@ 47.0 SC COARSE SAND WITH GRAVEL WET (G/H2O ?)						
49							GW	@ 47.5 GRAVEL WITH SP GRAYISH BLUE						
50							NCR	NCR @ 49.5' TO 50.0' @ 50.0' TO 50.2'					1306 1320	
51							GW	(AS ABOVE) GRAYISH BLUE						
52	10		4.8 5.0											
53														
54														MINOR CHATTER @ ± 53.0'
55							SP	@ 55.0' MED GR. SAND GRADES INTO COARSE GR. SAND & GRAVELS AT BASAL CONTACT					1323 1334	
56														
57	11		5.0 5.0				GW	@ 57.0' 60°-70° CONTACT DIP V.F. G. SAND WITH SILT TAN TO GRAY (LAKWOOD PM) ? GRADES INTO FINE GR. SAND "BEACH" SANDS. ORANGE BROWN TO GRAY BROWN. (SP) (SW)						
58							SP							
59							SW							
60														
61	12						NUP	NUP @ 60.0' TO 61.5'					1337 1350	

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## Log of Soil/Core Boring T9-B1

Sheet 4 of 8

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

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Figure  
A-13.11d

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES			Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches	Strength			
61							NCR	NCR 66.0' to 61.5'						
62	12	6	3.5 5.0					SP-SW AS ABOVE GRADES INTO MED TO COARSE GR. SAND WITH DEPTH. GRAY TO ORANGE WELL GRADED						
63							SP SW							
64														
65							NCR	NCR 65.0' to 67.0'					1353 1406	
66														
67	13		3.0 5.0					67.0 SP-SW AS ABOVE WELL GRADED.						
68							SP SW	68.0' LAMINATED WITH SUBHORIZONTAL SILTY F. V. GR. SAND LAYERS. OCCASIONAL GRAVEL (SLATE)						
69														
70	7						NCR	NCR 70.0' to 71.0'					1409 1417	
71														
72	14		4.0 5.0				SP SW	71.0' WELL GRADED MED TO COARSE GR. SAND						
73							SL + GW	72.0' (SC) WITH CARBONATES (GW) SILT OCCASIONALLY CLAY LAYERS.						
74														
75							NCR	NCR 75.0' to 77.7'					1418 1430	
76	15	8	2.3 5.0											
77														

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

# Log of Soil/Core Boring T9-B1

Sheet 5 of 8

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.11e



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES			Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type	Number	Blows per 6 inches	Strength		
77														
78	15		2.3 5.0				SW	@ 77.7' SW WELL GRADED SAND						
79														
80	8						SP NCR	@ 79.6' V. FINE GR SAND & SILT LAMINATED. NCR @ 80'-80.5'					1434 1507	1445-1505 DROPPED SAMPLER IN HOLE TRY FISHING OUT
81							SP	ALTERNATES BETWEEN V. FINE GR. & TO MED GR. SAND SP WITH SOME SILT LAMINATE						
82			4.5 5.0											
83	16													
84														
85							NCR	NCR @ 85.0' to 86.5'					1508 1520	
86														
87			3.5 5.0				SP	SP (AS ABOVE) V. FINE TO F. SAND SOME SILT. ORANGE LAMINATE						
88	17													
89		9												
90							NCR	NCR 90.0' to 91.7'					1523 1015	END OF 09-12 START 09-13 #830 TAIL GATE 0900-0915 T.C. 0920-1000 SOUND BOARDS & SETUP 1000 - BACK WIND TOP OF HOLE READING 1010 425:0.0 1020 02:20.9
91			3.3 5.0											
92	18						SP	@ 91.7' SP (AS ABOVE) V. FINE GR SAND TO F. GR. SAND WITH SOME SILT.						
93														

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T9-B1

Sheet 6 of 8

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.11.f



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
93														
94	18	9	3.3 5.0				SP							
95							NCR	NCR @ 95.0' to 96.2'					1016 1032	
96														
97			3.8 5.0				SP	@ 96.2' SP (AS ABOVE) v. fine to fine gr SAND with some silt ORANGE BROWN to GRAY WITH FeOx. LAMINATE.						
98	19													
99								@ 99.6' (same photo as...) v. fine gr. to fine gr. SAND (SP) with some silt						
100	10							GREENISH BLACK GLEY (10GY 2.5/1) SMALL FRAGMENTS OCCASIONALLY of SILICA or CALCITE NODULE @ 1/2" Ø					1034 1050	
101							SP							
102			4.3 5.0				NCR	NCR 102.2' to 102.9' "WASH OUT"						
103	20													
104							SP							
105							NCR	NCR 105.0' to 105.7'					1052 1100	
106								@ 105.7' (SP) AS ABOVE fine SAND WITH SOME SILT ABUNDANT SHELL FRAGMENTS						
107	21		4.3 5.0				SP							
108														
109														

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# Log of Soil/Core Boring T9-B1

Sheet 7 of 8

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.11g

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES			Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches	Strength			
109							sb							
110													1108	
111								TOTAL DEPTH 110.0'						1115-1210 PULLED OUT AUGERS
112								GH20 @ ± 47.0' (DURING DEPTHING)						1210-1320 B/F & CEMENT CAP HOLES
113								@ ± 49.0' (AFTER AUGERS PULLED)						
114														
115														
116														
117														
118														
119														
120														
121														
122														
123														
124														
125														

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T9-B1

Sheet 8 of 8

**Westside Purple Line Extension - Section 2**  
**Beverly Hills, California**  
**Project No. 4953-11-1423**

amec foster wheeler



**Figure**  
**A-1.3.11h**



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	RQD, %	Frac. Dwg. Number			Type	Number				
0								ASP: 0 - 4" ASPHALT CONC. 4" - 10" CONCRETE						0820-0845 TG 0900-0915 TC 0915-0930 SB 0920-0930 RIG 0930-0940 C/H ASP CONC. 0945-0950 HA 10" x 6.0" 0952-0955 0-50'
1								11" to 6.5'						
2								Fine, silty, DARK BROWN CLAYEY SILTY FINE GR. SAND WITH ROCK FRAGMENTS						
3								2f						
4														
5														
6														
7								EL 6.5' Qal young alluvium SANDY SILT TO CLAYEY SILTY FINE GR SAND, SOME MOD. GR AND GRAVELS $\leq 2.0"$ $\phi$						0755  @ 1000 Co: 0 H <sub>2</sub> S: 0.0 LE: 0 O <sub>2</sub> : 20.9
8								Qal SP - SL						
9														
10								(SP-SM) trace clays some LOOSE SANDS & FINE GRAVEL $\leq 1.0"$ $\phi$ YELLOWISH BROWN (10YR 5/4)						0955 1002
11								SP - SM						
12														
13														

DATE(S) DRILLED: 10-12 &amp; 10-14-15

DRILL METHOD: CONT. DAY CORE

DRILL EQUIPMENT: CME 75

DRILL CONTRACTOR: MARTINI DRILLING

BIT SIZE / TYPE: 8"  $\phi$  / H93

HOLE COMPLETION:

LOGGED BY: MA ESPINOZA

CHECKED BY:

HOLE INCLINATION: 90°

GROUND ELEVATION:

TOTAL DRILLED DEPTH: 110.0 ft + 6.5

GROUNDWATER LEVEL: ?

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

Log of Soil/Core Boring 79B2

Sheet 1 of 8

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.12a

Depth, feet	SOIL/ROCK CORE						MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number		Type Number	Blows per 6 inches				
13													
14	2						SP -SM						
15												1003 1009	
16			4.8										
17			5.0				SP -GW						
18	3												
19													
20	2						NCR 19.8' to 20.0'					1018 1018	
21							SP-SM SILTY FINE GR SAND TO SANDY SILT, TRAC CLAYS AND SOME GRAVELS $\leq 1/4"$ Ø						
22			2.8										
23	4		5.0				NCR 22.8' to 25.0'						
24													
25							SP-SM (AS ABOVE) INCLUDE GRAVELS ABUNDANCE & SIZE $\leq 1.5"$ Ø					1019 1024	
26							SP -SM						
27	5	3	5.0										
28													
29													

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## Log of Soil/Core Boring T9B2

Sheet 2 of 8

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.12b



Depth, feet	SOIL/ROCK CORE						MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number		Type Number	Blows per 6 inches				
29													
30		3					SP SM					1025 1032	
31			5.0 5.0										
32							SP @ 31.8' v. fine-gr SAND (SP) TRACE SILTS						
33	6						ML @ 32.5' to 32.8' SILT (ML)						
34							SP SM						
35							SP @ 34.6' SP-GW GRAVELS & SANDS, SOME SILTS SP @ 35.0' (SP)					1036 1045	TIGHT HARD DRILLING @ 34.0' ADDED WATER DOWN AFTER 1045
36			4.8				SC @ 35.8' to 36.2' CLAYEY GRAVELY SAND (SC)						
37	7		5.0				SP						
38							GW @ 37.5' GRAVELS SP @ 38.0' GW @ 38.2' (SC) AS ABOVE						
39							SP @ 38.5' to 39.2' SANDY GRAVELS GW						
40	4						SP NCR 39.8' to 40.0' SANDY GRAVELS, OCCASIONAL fine SANDY LAYERS ≤ 3" THICK					1046 1055	
41							SP						
42	8		5.0 5.0				GW						
43													
44													
45												1059	

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# Log of Soil/Core Boring T9B2

Sheet 3 of 8

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.12c

Depth, feet	SOIL/ROCK CORE						MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number		Type	Number				
45													
46												1166	Q 1100 C=1.0 H <sub>2</sub> S=0.0 L <sub>02</sub> :0 C <sub>2</sub> :21.0
47	9		5.0 5.0										
48													
49							248.6' SP-SM TO SP-SC SILTY fm-gr SAND WITH CLAYEY fm-gr SAND MOTTLED OLIVE (SY 4/4) SOME FeOx WHERE SANDIER						minia CHATTER at 48.0'
50	5											1108 1117	
51			5.0 5.0										
52	10						CS 2.0' GRADES INTO WELL GRADED SANDS (SP) fm-grained						
53													
54													
55							fm-gr SAND (SP) WITH SOME SC TO SM OCCASIONALLY					1119 1129	
56			5.0 5.0										
57													
58	11												
59													
60	6											1130 1142	
61	12		4.0 5.0										

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## Log of Soil/Core Boring T9B2

Sheet 4 of 8

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.12d



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
61														
62							SP	fin gr SAND (SP)						
63	12	6	4.0 5.0					@ 62.5' INCREASE FLOW STRAINING.						
64							NCR	NCR 64.0' to 65.0'						
65							SP	fin-gr SAND (AS ABOVE) FLOX WHERE SANDIER LAMINATED / BEDDING SUBHORIZONTAL					1143 1156	
66														
67			2.5 5.0											
68	13						NCR	NCR 67.0 to 70.0'						
69														
70		7					SP	SP (AS ABOVE) SOME PEBBLES ≤ 1.0" Ø					1158 1213	
71			3.0 3.0											
72	14						SC -GW	@ 71.6' (SC-GW) CLAYEY SILTY SAND & GRAVELS ≤ 1.5" Ø					CHATTER @ 72-73'	
73							SP	@ 73.0' fin-med gr. SAND (SP) SOME SILT?					1215 1227	
74	15		2.0 2.0				SP -GW	@ 74.5' SANDS AND COBBLES						
75							SP	med-gr SAND (SP)					1228 1240	
76	16	8					SP -GW	+ 25" CONTACT @ 76.4' BASAL GRAVELS & COARSE SANDS @ 76.4' @ 76.4' INTERMEDIATE fin COARSE SANDS & GRAVELS (SP-GW)					@ 7230 Co:0 H2S:0.0 L62:0 O2:20.9	
77														

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## Log of Soil/Core Boring 79B2

Sheet 5 of 8

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.12e

Depth, feet	SOIL/ROCK CORE						MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number		Type Number	Blows per 6 inches				
77													
78	16		4.2 5.0				SP -SM c 77.2' (SP-SM) INTERMEDIATE LAYERS c 77 TRAC CLAYS(?)						
79							NCR 79.2' TO 80.0'						
80													
81							SP -SM INTERMEDIATE (SP-SM) LAYERS (AS ABOVE) BUT MOSTLY SP					1244 1253	
82			2.0 5.0										
83	17						NCR 82.0' TO 85.0'						
84													
85	8						V. fi. to fine-grained (SP) WITH SOME SILTS MOTTLED TO SL. LAMINATED					1254 1308	
86							SP						
87	18		3.0 5.0										
88							NCR						
89													
90							SP (AS ABOVE)					1310 1325	
91	19		2.5 2.5				SP -SM c 91.2' mottled SL. LAMINATED (SP-SM) TO (SP)						
92	9						SP					1326 1340	
93	20												

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T9B2

Sheet 6 of 8

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.12f



Depth, feet	SOIL/ROCK CORE						MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number		Type Number	Blows per 6 inches				
93													
94	20		2.3 2.5				SP fin-gr well sorted sand (SP) silty FeOx laminations & occasional subrounded pebbles $\leq 1/8"$ Ø NUR NUR 94.3' to 95.0'						
95	9						SP (AS ABOVE)					1341 1256	
96	21		2.0 2.0										
97							SP-SM ALTERNATING LAYERS (SP) fin-gr sand with some pebbles $\leq 1/2"$ Ø @ ± 97.0'					1357 1416	
98													
99	22		2.0 3.0				NUR NUR 99.0' to 100.0'						
100													
101	23		2.5 2.5				DARK YELLOWISH BROWN (10YR 4/4) silty fin-gr sand (SP)					1416 1430	
102							@ 102.0' SANDPEDRO FM. fin-gr sand (SP) WITH TRALE SOME FOSSIL SHELLS & FRAGMENTS					1432 1444	
103	24		2.5 2.5				GLY 1 (10GY 2.5/1) GREENISH BLACK						
104		10											
105							fin-gr sand (AS ABOVE)					1445 1458	
106	25		4.8 5.0										
107													
108													
109													

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T982

Sheet 7 of 8

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.12g

Depth, feet	SOIL/ROCK CORE						MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number		Type Number	Blows per 6 inches				
109													
110	25						SP NCR NCR 109.8' to 110.0'						1459 WFO 10-14-15 0845-0900 TG 0900-0915 TL 0915-0945 SB 0945-1030 AVGMS TH10 1030-1100 GROUT 2/F 1100-1120 SITE CLEANUP & BENCH PATCH
111							TD. 110.0 ft bgs						
112													
113													
114													
115													
116													
117													
118													
119													
120													
121													
122													
123													
124													
125													

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T9B2

Sheet 8 of 8

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423


amec foster wheeler 

Figure  
A-1.3.12h

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
0								0 to 4" ASPHALT						1125-1128 ASP + CONCRETE
1								4" to 10" CONCRETE						1130-1135 4A 0-6.5'
2								10" to 6.0' Fill of, clayey Silty sand with rock fragments DARK BROWN						1145-1135 BLIND DRILL 0.0' to 70.0'
3							af							1150 Co: 0 1425.0'D LL: 0 02:20.9
4														
5														
6														
7							sal							
8														
9														
10														
11														
12														
13														

DATE(S) DRILLED: 10-14 &amp; 10-15-15

DRILL METHOD: DRY WIND. CORE

DRILL EQUIPMENT: CME 75

DRILL CONTRACTOR: MARTINI DRILLING

BIT SIZE / TYPE: 8" / HQ3

HOLE COMPLETION:

LOGGED BY: M.A. ESPINOZA

CHECKED BY:

HOLE INCLINATION: 90°

GROUND ELEVATION:

TOTAL DRILLED DEPTH: 115.0'

GROUNDWATER LEVEL: 72.0'

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

Log of Soil/Core Boring T9B2A

Sheet 1 of 8

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.13a



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES			Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches	Strength			
13														
14														
15														
16														
17														
18														
19														
20														
21														
22														
23														
24														
25														
26														
27														
28														
29														

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## Log of Soil/Core Boring T932A

Sheet 2 of 8

**Westside Purple Line Extension - Section 2**  
**Beverly Hills, California**  
**Project No. 4953-11-1423**

amec foster wheeler



**Figure**  
**A-1.3.13b**



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES			Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type	Number	Blows per 6 inches	Strength		
29														
30														
31														
32														
33														
34														
35														
36														
37														
38														
39														
40														
41														
42														
43														
44														
45														

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring <sup>19B2A</sup>

Sheet 3 of 8

**Westside Purple Line Extension - Section 2**  
**Beverly Hills, California**  
**Project No. 4953-11-1423**

amec foster wheeler



**Figure**  
**A-1.3.13c**

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
45														CORRECTION @ ± 45-46'
46														
47														
48														
49														
50														
51														
52														
53														
54														
55														
56														
57														
58														
59														
60														
61														

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T9824

Sheet 4 of 8

**Westside Purple Line Extension - Section 2**  
**Beverly Hills, California**  
**Project No. 4953-11-1423**

amec foster wheeler



**Figure**  
**A-1.3.13d**

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES			Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches					
61															
62															
63															
64															
65															
66															
67															
68															
69															
70								SP @ 70.0' R-gr SAND (SP) TRACE SILTS							
71								SC OCCASIONAL LAMINATE @ 70.3' to 70.8' CLAYEY SAND TO SANDY CLAY VERY DARK GRAYISH BROWN						1254	
72			3.2 5.0					(SP) LIGHT OLIVE BROWN (2.5Y 5/6) (10YR 3/2)	SP						CH <sub>2</sub> O? @ ± 72.0'
73	1		(64)					@ 73.0' SANDY GRAVELS (GW)	GW						
74								NLR 73.2' to 75.0'	NLR						
75	1							@ 75.0' R- to COARSE SAND AND GRAVELS	SP GW					1256 1313	CHANCE ± 74.0'
76	2		3.0 3.0					@ 75.6' to 75.7' (ML)	ML SP GW						
77															

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## Log of Soil/Core Boring T982A

Sheet 5 of 8

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.13e



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES			Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches					
77	2		100				SP	@ 72.2' L to v. L-gr SAND							
78	1						SP							1314	
79	3		2.0				SP	@ 78.6' ALTERNATING							
			2.0				SM	v. L-gr SAND (SP) AND							
			100					SANDY SILT							
80								@ 79.8' PEBBLES $\leq 2.0"$ $\phi$						1324	
								$\pm$ GRAVELS. INCREASE TO						1324	
								COBBLES $\leq 180.0'$							
81			3.3				ML	@ 80.6' to 82.8' CLAYEY SILT							
	4		5.0				CL	TO SILTY CLAY WITH SOME							
								SANDY LAYERS. OCCASIONAL							
82			100					PEBBLE $\leq 1/2"$ $\phi$							
83							SP	@ 82.8' L-gr SAND (SP) MOTTLED							
84							NCR	NCR @ 83.3' TO 85.0'							CHANGED RODS @ 82.0'
85	2							@ 85.0' v. L to L-gr SAND (SP)						1342	
							SP	WITH TRACE SILTS, LAMINATED						1357	
86	5		2.5					FROM WHERE SANDIER							
87			5.0												
88			50				NCR	NCR 87.5' TO 90.0'							
89															
90								@ 90.0' v. L-gr SAND TO L-gr SAND						1358	
			2.5				SP	(SP) TRACE SILTS. AS ABOVE						1413	
91	6		2.5					SL. MOTTLED, SL. LAMINATED							
92			100												
93	7 3													1413	
														1427	

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## Log of Soil/Core Boring T982A

Sheet 6 of 8

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.13f

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
93														
94	7		2.0 2.5				SP	Q 92.5' v. f. - gr SAND TO SILTY SAND (?)						
95							NCR	NCR 94.5' to 95.0'					1428	END 10-14-15
96	8	3	2.0 2.5				SP	SILTY f. - gr SAND (SP) AS ABOVE					0942	START TA. 10-15-15
97							NCR	NCR 97.0' to 97.5'						
98			2.5 2.5				SP	SILTY TO f. - gr SAND (SP) AS ABOVE					0943 1000	@ 0945 CO. 0 H <sub>2</sub> S: 0.0 LE. 0 O <sub>2</sub> : 20.9
99	9													
100													1001 1016	
101	10		2.5 2.5				SP	SILTY f. - gr SAND NOTED TO SL. LAMINATED. OCCASIONAL PEBBLE $\frac{1}{2}$ " $\phi$ OLIVE BROWN (2.5' 4/3-4/4) TO DARK YELLOWISH BROWN (10' R 4/4-4/6)					1016 1031	
102														
103														
104	11		2.0 2.5				SP	C 103.6' SAN PEDRO EM v. f. - gr SAND GREENISH BLACK (SGY-10GY 2.5/1) NCR 104.5' to 105.0'					1032 1046	
105														
106	4							SILTY f. - gr SAND (SP) WITH FOSSIL SHELLS AND FRAGMENTS.						
107	12		4.8 5.0				SP							
108														
109								Q 108.0' to 108.3' HARD, V. STRONG GRANDS(?)						

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## Log of Soil/Core Boring T932A

Sheet 7 of 8

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.13g

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
109	12													
110								NCR NCR 109.8' TO 110.0'					1047 1102	
111								SILT FINE-GRAINED SAND (SP) AS ABOVE WITH FOSSIL SHELL FRAGMENTS						
112	13	5	3.4 5.0											
113								NCR NCR 113.4' TO 115.0'						
114														
115								TD 115.0'					1103	1120-1220 TRIP ARROWS 1225-1315 GLASS BIF + CONCRETE PATCH 1315-1340 CLEAN UP SITE 1315-1340 S.B. & 1 DRAWING + 1 DRAWING T9B3 1340-1415 TC
116														
117														
118														
119														
120														
121														
122														
123														
124														
125														

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T9B2A

Sheet 8 of 8

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.13h



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
0								5" of AC Paving						Drilling start @ 0945
1								Fill?						Hand Auger to 6'
2								Sandy Silt - F-m, same course, dark brown						
3														
4														
5								(1' overlap between hand auger and run 1)						
6							NR	Run 1 start @ 5'						start R1 @ 1005
7							NR							
8														
9														
10														
11								Broken piece of AC paving stuck in shoe.						End R1 @ 1010
12							NR	-Low Recovery-						
13														

DATE(S) DRILLED: 10-14-15  
 DRILL METHOD: Dry Core, NR  
 DRILL EQUIPMENT: CME 75  
 DRILL CONTRACTOR: ABC Drilling  
 BIT SIZE / TYPE: NR  
 HOLE COMPLETION: 10-15-15

LOGGED BY: P. Ramo  
 CHECKED BY:  
 HOLE INCLINATION: 90°  
 GROUND ELEVATION:  
 TOTAL DRILLED DEPTH: 130'  
 GROUNDWATER LEVEL: No cap est.

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

### Log of Soil/Core Boring 19-B3

Sheet 1 of 9

Westside Purple Line Extension - Section 2  
 Beverly Hills, California  
 Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.14a

Depth, feet	SOIL/ROCK CORE						MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number		Type Number	Blows per 6 inches				
13													
14							NR						
15							sandy silt, hard - R3 no Recovery - - Possibly rock blocking shoe - Hammered + cleared shoe						End R2 @ 1015
16													
17	3	1	0/5.0				NR						
18													
19													
20													End R3 @ 1020
21							NR						
22	4	1	1.0/5.0										
23							@ 23' Hard Sandy Silt, Dark brown						
24							@ 24' Loose Silty Sand, brown F-M.						
25							(Adjusted Rod and switched to 2.5' run)						End R4 @ 1030
26													
27	5	1	1.0/5.0										
28													
29													

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T9-B3

Sheet 2 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.14b

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
29														
30							NR	Sandy Silt / Silty Sand slate gravel to 1/4"						End R5 @ 1034
31	6		2.2 2.5											
32							NR							End R6 @ 1037
33														
34	7		2.4 2.5											
35														End R7 1045
36							NR	Sandy Silt / Silty Sand F-M, same coarse, slate gravel to 1.5" (trace)						
37	8		3.4 5.0											
38														
39														
40							NR							End R8 @ 1050
41								@41' Sand - F-M, same coarse						
42	9		4.0 5.0					@42' sandy Silt-fine,						
43								@43' Sand - F-M						
44														
45														End R9 @ 1057

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

### Log of Soil/Core Boring T9-B3

Sheet 3 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.14c



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
45														
46														
47	10	2	3.7 5.0											
48														
49														
50								NR ↓ @ 45'						
51								Silty Sand - medist, F-m, trace coarse, trace gravel to 1/8" melted olive/brown.						End R10 1110
52	11	2	5.0 5.0											
53								@ 50'						
54								Clayey sand / Silty sand						
55								@ 54' gravelly - slate gravel to 1/8"						
56								Clayey silt / silt - F-m,						End R11 1120
57	12		35.0 5.0											
58														
59								Silty sand / sandy silt - F-m						
60														End R12 @ 1130
61	13	3	4.0 5.0					NR						

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## Log of Soil/Core Boring T9-B3

Sheet 4 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.14d

FIELD LOG

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
61														
62	13	3	4.6 5.0											
63														
64														
65							NR							End R13 @ 1140
66														
67	14	3	4.3 5.0											
68														
69														
70														End R14 @ 1147
71							NR							
72	15	4	2.0 5.0											
73								(Slushy top) Sand - mostly medium, moist, friable						
74														
75								Start 2.5' Runs @ R17						End R15 @ 1155
76	16	4	2.4 5.0				NR							
77														

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## Log of Soil/Core Boring T9-133

Sheet 5 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.14e

FIELD LOG

Depth, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
77							NR							End R15 @ 1205
78	16	4	2.4 5.0					Poorly Graded Sand - medium sand, <u>wet</u> , loose						
79														
80														End R16 @ 1220
81	17	4	2.5 2.5					Sand - medium, <u>wet</u> , stained/ mottled						
82														
83							↑ (same)							End R17 @ 1235
84	18	4	2.5 2.5											
85								Gravelly zone - slate gravel, m-c sand, orange stained, <u>wet</u>						End R18 @ 1245
86	19	4	2.5 2.5					Sand - f-m, <u>wet</u> , slate gravel to 1/4", (Jsm gravel?)						
87								Sand with gravel - f-m with coarse, slate gravel to 1/2", <u>wet</u>						
88							NR							End R19 @ 1302
89	20	4	1.6 2.5					Sand - f-m, <u>wet</u> , orange stained and banded						
90														End R20 @ 1310
91	21	5	2.8 5.0				NR							
92														
93								Sand - f-m, <u>wet</u>						

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T9-B3

Sheet 6 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.14f



FIELD LOG

Depth, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
93														
94	21	5	2.8 5.0											End R21 @ 1325
95														
96							NR							
97	22	5	2.8 5.0					Coarsely Sand - f-c, gravel to 1.5", (subrounded gravel)						End R22 @ 1335
98														
99								Sand - slightly cemented, f-m, rounded, steined layering (subhoriz.), rare gravel to 1/4"						
100														
101							NR							End R23 @ 1340
102	23	5	2.8 5.0											
103														
104														
105								(wet sands)						
106														
107	24	5	1.3 5.0				NR							
108														
109														

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

Log of Soil/Core Boring T9-B3

Sheet 7 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.14g

FIELD LOG

Depth, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
109								Sand - fm, mottled, <u>wet</u>						
110														End R24 @ 1418
111														
112	25	4	2.4 5.0											
113														
114								Qslo Qsp San Pedro formation						
115							NR							End R25 @ 1430
116								Qsp - fine sand, shells, moist to wet, dark gray						
117	26	6	4.5 5.0											
118														
119														
120														End R26 @ 1445
121							NR							
122	27	6	2.4 5.0											
123								Qsp - fine sand, moist to wet, dark gray						
124														
125								Abundant shells						End R27 @ 1510

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

Log of Soil/Core Boring T9-B3

Sheet 8 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.14h

FIELD LOG

Depth, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
125														
126							NR							
127	20	6	2.3 5.0											
128								Qsp - (same)						
129														
130														End RJB @ 1030
131								TD @ 130'						
132								No groundwater established Perched groundwater ~ 70'						Corroding started on 10-15-15 @ 0910
133								Temporary patch placed on 10-14-15 for grouting on 10-15-15						
134								- used ~ 4 drums of cement/bentonite slurry - cement patched hole and dyed black						
135								Swept and cleaned site as best as possible. Minimal water used to prevent entering storm drain.						
136														
137														
138														
139														
140														
141														

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T9-B3

Sheet 9 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.14i



FIELD LOG

Depth, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
77							NR							End R15 @ 1205
78	16	4	2.4 5.0					Poorly Graded Sand - medium sand, <u>wet</u> , loose						
79														
80														End R16 @ 1200
81	17	4	2.5 2.5					Sand - medium, <u>wet</u> , stained/ mottled						
82			(100)											End R17 @ 1235
83								↑ (same)						
84	18	4	2.5 2.5											
85			(100)					Gravelly zone - slate gravel, m-c sand, orange stained, <u>wet</u>						End R18 @ 1245
86	19	4	2.5 2.5					Sand - f-m, <u>wet</u> , slate gravel to 1/4", (Is m gravel?)						
87			(100)					Sand with gravel - f-m with coarse, slate gravel to 1/2", <u>wet</u>						End R19 @ 1300
88							NR	NR 87.5' - 88.4'						
89	20	4	1.6 2.5					Sand - f-m, <u>wet</u> , orange stained and banded						
90			(64)											End R20 @ 1310
91			(56)					NR 90.0' - 92.2'						
92	21	5	2.8 5.0				NR							
93								Sand - f-m, <u>wet</u>						

FIELD LOG

Depth, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES			Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Frac. Dwg. Number			Type	Number	Blows per 6 inches				
93															
94	21	5	2.8 5.0												
95								NR 95.0' - 97.2'							End R21 @ 1325
96							NR								
97	22	5	2.8 5.0												
98			(56)					Gravelly Sand - f-c, gravel to 1.5" (subrounded gravel)							
99															
100								Sand - slightly cemented, f-m, banded, stained layering (subhoriz.), rare gravel to 1/4"							End R22 @ 1335
101							NR	NR 100.0' - 102.2'							
102	23	5	2.8 5.0												
103			(56)												
104															
105								(wet sands)							End R23 @ 1340
106			(26)					NR 105.0' - 108.7'							
107	24	5	1.3 5.0				NR								
108															
109															

Depth, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES			Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Frac. Dwg. Number			Type	Number	Blows per 6 inches	Strength		
109								Sand - fm, mottled, <u>wet</u>						
110								NR 110.0' - 112.6'						End R24 @ 1418
111							NR							
112	25	6	2.4 5.0											
113			48											
114								Q <sub>elo</sub> Q <sub>sp</sub> San Pedro Formation						End R25 @ 1430
115							NR	NR 115.0' - 115.5'						
116								Q <sub>sp</sub> - fine sand, shells, moist to wet, dark gray						
117	26	6	4.5 5.0											
118			90											
119														
120								NR 120.0' - 122.6'						End R26 @ 1445
121			46				NR							
122	27	6	2.4 5.0											
123								Q <sub>sp</sub> - fine sand, moist to wet, dark gray						
124														
125							Abundant shells							End R27 @ 1510

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## Log of Soil/Core Boring TA-B3

Sheet 8 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.141



Depth, feet	ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fractures per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
125								PR 125.0' - 127.7'						
126							NR							
127	206		2.3 5.0											
128			46					Qsp - (same)						
129														
130														End RJB @ 1030
131								TD @ 130'						
132								No groundwater established						Grouting started on 10-15-15 @ 0910
133								Perched groundwater ~ 70'						
134								Temporary patch placed on 10-14-15 for grouting on 10-15-15						
135								- used ~ 4 drums of cement/bentonite slurry						
136								- cement patched hole and dyed black						
137								Swept and cleaned site as best as possible. Minimal water used to prevent entering storm drain.						
138														
139														
140														
141														

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T9-B3

Sheet 9 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.14m

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES			Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches	Strength			
0							AC	AC Paving - 5"						@ site 0900
1								Hand Auger to 6'						Hand auger @ 1010
2								Fill SP-SM / Clayey Silty Sand						
3														
4														
5							NR	(1' overlap into coring)						Run 1 @ 1030
6								Coring begins at 5'						
7								Qal / Qalo						
8														
9														End R1 @ 1033
10							NR	Qal / Qalo						
11														
12														
13														

DATE(S) DRILLED: 10-9-15 / 10-12-15  
 DRILL METHOD: Dry core, NR  
 DRILL EQUIPMENT: CMR  
 DRILL CONTRACTOR: ABL Liovin, Kenny  
 BIT SIZE / TYPE: NR  
 HOLE COMPLETION: 10-12-15 @ 1130

LOGGED BY: P. Remo  
 CHECKED BY:  
 HOLE INCLINATION: 90°  
 GROUND ELEVATION:  
 TOTAL DRILLED DEPTH: 130'  
 GROUNDWATER LEVEL: Perched zones

QRAE  
 Readings (10-9-15)  
 0930-OK  
 1000-OK  
 1345-OK

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## Log of Soil/Core Boring T9-B4

Sheet 1 of 9

Westside Purple Line Extension - Section 2  
 Beverly Hills, California  
 Project No. 4953-11-1423

amec foster wheeler



Figure  
 A-1.3.15a

Depth, feet	SOIL/ROCK CORE						MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number		Type Number	Blows per 6 inches				
13													
14													
15							NR Qal/Qalo						FW (R2) @ 1037
16													
17	3	1	4.5 5.0										
18													
19													
20							NR Qab?						
21													
22	4	2	4.7 5.0										
23													
24													
25							NR Qalo?						
26													
27	5		4.6 5.0										
28													
29													

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## Log of Soil/Core Boring T9-B4

Sheet 2 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423


amec foster wheeler 

Figure  
A-1.3.15b



FIELD LOG


Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
29														
30							MR							
31														
32			4.6 5.0											
33	6	2												
34														
35							MR							
36														
37	7	3	4.5 5.0											
38														
39														
40														
41	8		5.0 5.0											
42														
43														
44														
45														

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## Log of Soil/Core Boring T9-B4

Sheet 3 of 9

**Westside Purple Line Extension - Section 2**  
**Beverly Hills, California**  
**Project No. 4953-11-1423**

amec foster wheeler 

**Figure**  
**A-1.3.15c**


Depth, feet	SOIL/ROCK CORE						MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number		Type Number	Blows per 6 inches				
45													
46													
47	9	3	2.7 5.0				not core - Perched GW? No core recovery from top of run						
48													
49													
50													
51													
52	10	4	5.0 5.0										
53													
54													
55													
56			5.0 5.0										
57	11												
58													
59													
60	12												
61													

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T9-B4

Sheet 4 of 9

**Westside Purple Line Extension - Section 2**  
**Beverly Hills, California**  
**Project No. 4953-11-1423**

amec foster wheeler 

**Figure**  
**A-1.3.15d**


Depth, feet	SOIL/ROCK CORE							MATERIAL DESCRIPTION	SOIL SAMPLES			Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number	Lithology		Type	Number	Blows per 6 inches				
61															
62															
63	124	5	5.0												
64															(Break) End R12 @ 1140
65							NR	Top No Rec.							
66															
67	13	5	3.7 5.0												
68															
69															
70								Top No Rec. wet core - Perched core?							
71							NR								
72	14	5	2.5 5.0												
73															
74															
75															
76	15		2.6 5.0				NR	wet, sandy							
77															

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## Log of Soil/Core Boring T4-B4

Sheet 5 of 9

**Westside Purple Line Extension - Section 2**  
**Beverly Hills, California**  
**Project No. 4953-11-1423**

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**Figure**  
**A-1.3.15e**



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
77							NR							
78	15		0.6 5.0											
79														
80														
81							NR	Gravelly zone @ 81'						
82								Possible cobble in shoe pulling rod and spoon to checks.						
83	16	5	3.6 5.0					<u>cobble in shoe @ 82'</u> Run will start @ 82' to 85'						
84														
85														
86		6					NR							
87	17		3.7 5.0											
88														
89														
90														
91	18		3.8 5.0				NR							
92														
93														

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T9-134

Sheet 6 of 9

**Westside Purple Line Extension - Section 2**  
**Beverly Hills, California**  
**Project No. 4953-11-1423**

amec foster wheeler



**Figure**  
**A-1.3.15f**

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
93														
94	18	6	3.2 5.0											
95								Sand						
96							NR							
97	19		2.2 5.0											
98														
99								@ R20 switching to 2.5' Runs						
100							NR							
101	20	6	1.6 2.5					Sand						
102														
103							NR							
104	21	6	1.0 2.5											
105							NR	@ R20 switching to 5' runs						Break @ 1345
106	22	6	2.3 2.5											
107														
108	23	7	1.7 2.5				NR							
109														

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## Log of Soil/Core Boring T9-B4

Sheet 7 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423


amec foster wheeler 

Figure  
A-1.3.15g



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES			Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type	Number	Blows per 6 inches				
109	23	7													
110															
111							NR	Q <sub>dl</sub>							
112	24		2.7 5.0												
113							Q <sub>ab</sub>								
114								San Pedro FM @ ~114'							
115							Q <sub>sp</sub>								
116							NR								
117	25	7	2.9 5.0					Q <sub>sp</sub>							
118															
119															
120															End R <sub>25</sub> @ 1430
121	26	8	1.1 5.0					TD @ 120' → To be drilled to 130' on 10-12-15							
122							NR	- Asphalt patched temporarily - to be backfilled and grouted 10-12-15							
123								Stand by time 0910-0930 → car on hole							Start work 10-12-15 @ 0910
124								(4 Drums Used Recovered by Green Clay) → Sample 495311423 T9-B4-B → 10-9-15							@ 0950 bus meter readings OK
125								10' of slough at bottom of hole → 110'							End R <sub>26</sub> @ 1105

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### Log of Soil/Core Boring T9-B4

Sheet 8 of 1

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.15h

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
125														
126								@ 1010 Augers stuck, working to get them free						
127								@ 1020 Augers freed, continue to drill to 130'						
128	57B		2.0 5.0					Run 26 - overnight water made <u>Qsp</u> soggy - low recovery.						
129														
130								@ R27 - Qsp Abundant shells						
131														
132								10-12.15 (1130) TD @ 130'						
133								Finished grouting and back filling @ 1330						
134								used 35 sacks of grout (60 lbs bags)						
135														
136														
137														
138														
139														
140														
141														

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## Log of Soil/Core Boring T9-134

Sheet 9 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.15i



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
0							ASP	0-4" ASPHALT						
1							CONC	4'-10" CONCRETE						
2								10" to 6.0' fill of CLAYEY SILT, AND SANDS WITH GRAVELS, MOTTLED, DARK BROWN						
3							af							
4														
5							NCR	5.0' to 5.5'					1152	
6			4.5					6.0'						
7	1		5.0				SP	SP-SM with some clay						
8							SM	& GRAVELS						
9							GW							
10							GW							
11	2		4.7				NCR	10.0' to 10.3'					1152	
12			5.0					(SP) WITH TRACE SILTS AND SOME GRAVELS $\leq 1/2"$					1159	
13								0.20' SP-SM v. fine to Rgn SANDY SILT & SILTY SAND TRACE CLAYS						

DATE(S) DRILLED: 10-08 &amp; 10-09-15

DRILL METHOD: CONTINUOUS DRY CORE

DRILL EQUIPMENT: CME

DRILL CONTRACTOR: MARTINI DRILLING

BIT SIZE / TYPE: 8" AUGER / HPS

HOLE COMPLETION:

LOGGED BY: M.A. ESPINOZA

CHECKED BY:

HOLE INCLINATION: 90°

GROUND ELEVATION:

TOTAL DRILLED DEPTH: 126.0'

GROUNDWATER LEVEL: ±41'?

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

Log of Soil/Core Boring 1985Sheet 1 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.16a



Depth, feet	SOIL/ROCK CORE						MATERIAL DESCRIPTION	SOIL SAMPLES			Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number		Type	Number	Blows per 6 inches	Strength		
13													
14	2		4.7 5.0										
15							SP fin-gr SAND with SILT					1200 1205	
16							GW GRAVELS $\leq 16.2'$						
17			4.5 5.0				SP						
18	3						SP GW $\leq 17.8'$ fin-gr SAND to MED GR (SP) AND GRAVELS						
19													
20	2						NUR $\leq 19.5'$ to $20.0'$					1206 1212	
21							SP SM fin-gr SAND & SILT to SILTY SAND occasional GRAVEL $\leq 1.0"$ TRACE CLOYS.						
22			5.0 5.0										
23	4												
24													
25												1213 1219	
26													
27	5		5.0 5.0	3									
28							SP SP $\leq 27.5'$ fin to v. fin gr SAND $\leq 28.4'$ med SP TO GRAVELS						CHATTER $\approx 27'$
29													

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T985

Sheet 2 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.16b

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES			Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches	Strength			
29														
30	5						SP GW							
31		3						@ 30.0' fm-g SAND TO COARSE S. GRAVELS, SOME SILT LENSES ← 2.0" SUB ANGULAR					1221 1228	
32			4.0 5.0											
33	6													
34							NCR							CHATTER @ ± 33.0'
35							GW	GRAVELS WITH fm-g SAND TO COARSE S. SOME SILT (GW)					1230 1240	
36			3.8 5.0											
37	7													
38								@ 38.0' QUARTZ/GRANITIC COBBLE						
39							NCR	NCR 38.8' TO 40.0'						
40		4					GW						1242 1249	
41							SP SP GW	@ 41.0' fm-med g SAND (SP) @ 41.2' (SP-GW) ← WET (G1120?)						
42	8						SP-SM	@ 41.8' SP-SM NCR 42.0' TO 45.0'						
43							NCR							
44														
45													1250	

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T985

Sheet 3 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.16c

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
45														
46							SP	fn-gr SAND (SP)						1259
47	9		4.0 5.0				SP -SM	@ 46.6' (SP-SM) WITH SOME GRAVELS $\leq 1/4"$						
48														
49							SP	@ 48.5' fn-gr to med gr (SAND)						
50	5						NCR	NCR @ 49.0' TO 50.0'						
51			4.0 5.0				SP	(SP) AS ABOVE					1300 1309	
52	10						SP -SM	@ 52.0' (SP-SM) SL. MOTTLED & SOME GRAVELS						
53							SP	fn - med gr SAND AND SOME COARSE GR SAND & GRAVELS						
54							NCR	NCR R/O @ 54.0' TO 55.0'						
55							SP -SM -SL	LAKEWOOD FM ? SP-SM-SL CLAYEY SILTY fn-gr SAND TO SILTY fn SAND AND SANDY SILT ALTERNATING LAYERS OLIVE (5Y 4/4)					1310 1318	
56														
57	11		5.0 5.0				ME -CL	@ 57.0' SILT TO CLAYEY SILT						
58							SP -SM	@ 58.0' SILTY SAND MOTTLED SOME GRAVELS						
59														
60	12												1319 1328	
61														

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

# Log of Soil/Core Boring 19 B5

Sheet 4 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.16d



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
61							SP	ALTERNATING SILTY FINE SAND						
62	12	6	5.0				SM	AND SANDY SILT FILL WHERE SANDIER, TRACE CLAY(?)						
63							ML CL	SILT WITH TRACE CLAY(?)						
64							SP	V. FINE-GR SAND TRACE SILT GRADES INTO FINE-GR SAND (SP) WELL SORTED						
65								OCCASIONAL MED. GR SAND + GRAVEL $\leq 1/8"$ LIGHT OLIVE BROWN (2.5Y 5/4)					1329 1341	
66														
67	13		5.0											
68			5.0											
69							SP	269.0' FILL STAINING						
70	7						SM	WHERE MORE SILT? (SP-SM?)					1342 1353	
71	14		5.0											
72			5.0				SP	V. FINE- to FINE-GR SAND (SP) WITH SOME SILTS						
73														
74														
75													1354 1406	
76	15	8												
77														

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T9B5

Sheet 5 of 9

**Westside Purple Line Extension - Section 2**  
**Beverly Hills, California**  
**Project No. 4953-11-1423**

amec foster wheeler



**Figure**  
**A-1.3.16e**

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
77														
78	15		5.0 5.0				SP	278.3' LAMINATED SILTY LAYERS						
79							SP	DARK ORANGE						
80	8						GW	@ 80.0' COBBLES & v. f. gr SAND					1407 1423	
81			0.8 5.0				N C	NCR 80.8' TO 85.0'						CLATTER @ 81.0'
82							R	SAMPLE "WASHED OUT"						
83	16													
84														
85							SP SM	85.0' to 85.6' f. gr SAND SOME SILTY SAND					1424 1439	
86							SP	@ 85.6' TO 86.3' f. gr TO COARSE SAND WITH SILT						
87	17		3.5 5.0				GW SC	@ 86.3' GRADES INTO SC & GRAVELS						
88							SP SM GW	@ 87.5' SP-SM WITH CLAYER GRAVELS TO SILTY SANDY						
89							N C R	NCR 88.5' TO 90.0'						
90													1440 1453	
91	18	9	2.5 5.0				SP	v. f. - f. gr SAND (SP) WITH SILTY SAND TO SANDY SILT LENSES OCCASIONAL MED - GR SAND LAYER						
92														
93							NUR	NUR 92.5' to 95.0'						

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

# Log of Soil/Core Boring T9 B5

Sheet 6 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.16f



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
93														
94	18						N CR							
95								fin-gr SAND SP to MED GR SAND OLIVE BROWN (2.5Y 4/4)						1510 - 1530 SB+4 Drills 1540 - 1600 TC 1454 END OF TH 10-08-15 0929 START 10-09-15 FRI
96			1.5				SP							
97			5.0				SP	C 96.3' DARK YELLOWISH BROWN (10YR 4/6)						
98	19						NUR	NUR C 96.5 to 100.0'						
99														
100		9												
101			1.8				SP	C 100.0' SAND OLIVE BROWN (2.5Y 4/4)						0940 0956
102	20		2.5				SP GW NUR	C 101.2' SANDS & GRAVELS ± 2.0" Ø YELLOWISH BROWN (10YR 4/6)						
103			1.5				SP	fin - MED GR. SAND (SP)						0956 1010
104	21		2.5				NUR	DARK YELLOWISH BROWN SOME COARSE SANDS TO fin GRAVELS C 103.8'						
105														
106	22		3.5				SP	fin-gr SAND (SP) WITH TRACE SILTS (AS ABOVE)						1010 1026
107			3.5											
108		10												
109	23													1027 1044

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

### Log of Soil/Core Boring T9B5

Sheet 7 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.16g

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
109														
110	23	10	2.5 2.5				SP	fn-gr SAND (SP) WITH SOME SILT (AS ABOVE)						
111														
112														
113	24		4.5 5.0					SP (AS ABOVE) OCCASSIONAL GRAVEL $\leq \frac{1}{2}$ "						1045 1100
114														
115								0114.5' LAMINATED BLACK SILTY fn-gr SAND						
116	11						NUR	NUR 115.5' to 116.0'						
117							SP	fn to fn-gr SAND (SP) TRACE SILTS. DARK YELLOWISH BROWN (10YR 4/6-3/4)						1101 1116
118	25		4.5 5.0					C 118.0' SAN PEDRO FM vn-fn-gr SAND (SP) WITH # TRACE SILTS, SOME FOSSIL SHELLS & FRAGMENTS GLY 1 GREENISH BLACK (10GY 2.5/1)						
119							SP							
120														
121							NUR	NUR 120.5' to 121.0'						
122							SP	fn-gr SAND (SP) AS ABOVE OCCASSIONAL SILTS AND FOSSIL SHELLS & FRAGMENTS.						1117 1133
123	26		2.5 5.0											
124	12						NUR	NUR 123.5' to 126.0'						
125														

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# Log of Soil/Core Boring T985

Sheet 8 of 7

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.16h

Depth, feet	SOIL/ROCK CORE						MATERIAL DESCRIPTION	SOIL SAMPLES			Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number		Type	Number	Blows per 6 inches			
125													
126							NUR NUR 123.5' to 126.0'						
127							TD 126.0'						1135 1145-1247 PULL UP NURS
128							G H <sub>2</sub> O ± 39 ft. 693.						WEAR UP & CONCRETE & F
129													1290-1315 1320-1400 PATCH 1445-1520 SB 5 DRAWS 17985 1520-1600 TC
130													
131													
132													
133													
134													
135													
136													
137													
138													
139													
140													
141													

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring 7985

Sheet 9 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.16i



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
0								ASP 0" - 4.0" ASPHALT CONC 4" - 10" CONCRETE						1420-1428 ASPHALT & CONCRETE CHIP
1														1430-1450 HA 10" - 6.0' PATCH ASPHALT
2								Fin of clayey silty sand & sandy clay with rock fragments $\leq 2.0"$ dark brown						1450-1500 SB
3														1500-1530 TL
4														0845-0900 TG 0900-0915 TL 0910-0930 RL 0935-0950 SB
5														
6														
7			5.0 5.0				SP -SM	Q21 fin-gr sandy silt and silty fin-gr sand w/ grains some clay						0952
8	1													
9														
10							NCR SP -SM	Q10.0' to 10.3' NCR						0953 1001
11			4.7 5.0				SC							
12	2						SP -SM	SP-SM (as above) decrease gravel abundance						
13														

DATE(S) DRILLED: 10-06 &amp; 10-07

LOGGED BY: MA. ESPINOZA

DRILL METHOD: CONTINUOUS DRY CORE

CHECKED BY:

DRILL EQUIPMENT: CME

HOLE INCLINATION: 90°

DRILL CONTRACTOR: MARTINI DRILLING

GROUND ELEVATION:

BIT SIZE / TYPE: 8" AUGER / HQ3

TOTAL DRILLED DEPTH: 130.0'

HOLE COMPLETION:

GROUNDWATER LEVEL:  $\pm 39'$ 

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T9B6

Sheet 1 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.17a

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
13														
14	2						SP SM							
15							SP SM	NUR 15.0' to 16.0'					1002 1008	
16			4.0 5.0				SP SM	@ 16.0' AS ABOVE						
17	3						SP GW	@ 17.0' to 17.8' SAND & GRAVEL @ 19.0' to						
18							SP SM							
19							SP GW							
20	2						NUR	NUR @ 20.0' to 21.0'					1009 1015	
21			4.0 5.0				SP GW	SP-GW @ 21.0' to 23.3'						
22	4						SP SM	SP-SM @ 23.0' to 24.5'						
23							SP GW							
24							SP GW	NUR 25.0' to 25.5'					1016 1022	
25			4.5 5.0				SP GW	@ 25.5'						
26							SP	SP @ 26.5' F - MED GR SAND SOME GRAVELS.						
27	53						SP	@ 27.5' MED TO COARSE SP						
28							SP GW	@ 28.2' SP-GW AS ABOVE						
29														

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T986

Sheet 2 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.17b



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
29							SP -GW							
30														
31	3		5.0 5.0				SP -SM	@ 31.5' (SP-SM) Laminar UPWARDS become fin-gr SAND TO COARSE-gr SAND					1023 1029	
32	6						SP -GW	COARSE GR-SAND (SP) WITH INCREASING GRAVELS WITH DEPTH.						
33							GW -SP							
34														
35													1030 1035	
36			5.0 5.0				SP -SM	@ 35.8' (SP-SM) SOME GRAVELS						
37	7													
38							SP -GW	@ 37.6' ±35-40° CONTACT WITH (SP-GW) GRAVELS WET @ ± 39.0'						
39														
40	4													
41			5.0 5.0				SP	@ 40.8' Y. fin gr SAND (SP) LAMINATED FeOx STAINED					1037 1042	
42														
43	8						SP	@ 42.8' fin to med-gr SAND (SP)						
44							SP -GW	@ 43.0' med to COARSE-gr SAND (SP) SOME GRAVELS. ± 3.0" φ						
45													1043	

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

### Log of Soil/Core Boring T9B6

Sheet 3 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.17c

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
45							SP -GW	SANDS & GRAVELS. MED TO COARSE-gr SAND					1052	
46			1.0				NCR	NCR @ 46.0' to 50.0'						
47	9		5.0					Rock Blocked - PF BIT						
48														
49														
50	5							NCR NCR 50.0' to 53.5'					1053 1101	
51			1.5											
52			5.0											
53	10													
54							SP -SM	@ 53.5 SP-SM TRACE CLAY						
55							SP -GW	@ 54.5' fm - COARSE SANDS & GRAVELS.					1102 1110	
56							NCR	NCR 55.0' to 58.0'						
57														
58	11		2.0				SP	fm to med-gr SAND GRADES INTO LOOSE SP & GRAVELS WITH DEPTH						
59			5.0											
60							SP -GW	@ 60.0' LAKEWOOD FM					1112 1121	
61	12						SP -SM	SP-SM						

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T9B6

Sheet 4 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.17d



Depth, feet	SOIL/ROCK CORE						MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number		Type Number	Blows per 6 inches				
61													
62	12	5	5.0				ALTERNATING SP-SM WITH CLAYEY SILT FINE GR SAND OCCASIONAL COARSE SAND AND GRAVEL $\leq 1/4"$ MOTTLED SL. LAMINATIONS TO LAYERS OLIVE BROWN (2.5Y 4/3)						
63			100				SP SM						
64													
65												1122	
66							(2.5Y 7/2) LIGHT GRAY to PLE YELLOW (2.5Y 7/3) CLG. 4' ABUNDANT CARBONATES WITHIN MOTTLED (SP-SM) TO CLAYEY SILTS (ML) LESS WITHIN FINE GR SANDY LAYERS/LENS. "FeOx" SP					1131	
67	13		5.0				SP SM ML SP						
68			100										
69							SP SM ML						
70	6						SP					1132	
71			5.0									1142	
72	14		5.0				SP GW						
73			100										
74							SP SC(?) GW						
75							SP SC GW					1143	CHATTER at 74.0'
76	15	7	4.8				SP					1200	CHATTER at 77.0'
77			5.0										

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T9B6

Sheet 5 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.17e

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
77								SP MED GR SAND (SP) TO COARSE (SP)						
78	15		4.8 5.0					SP (AS ABOVE) FINE GR SAND LIGHT OLIVE BROWN (2.5Y 5/4)						
79														CHATTER BT 79.0'
80	7							NUR 80.0' to 82.0' SP (AS ABOVE) SL. MOTTLED, SL. LAMINATED FLOX WHERE SANDIER & SILT(?)					1202 1215	
81			3.0 5.0											
82	16													
83								SP						
84														
85								NUR R17 85.0' to 90.0' ALL WASHED OUT!					1216 1231	
86														
87	17		0.0 5.0											
88														
89														
90	8							NUR 90.0' to 93.0'					1233 1250	
91			2.0 5.0					NUR						
92	18													
93														

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T9B6

Sheet 6 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.17f

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
93														
94	18		2.0 5.0				SP	@ 93.0' v. fine-gr to med-gr SAND (SP) WITH TRACE SILTS & SANDY SILT (?) DARK YELLOWISH BROWN (10YR 4/6)						
95							NCR	NCR 95.0' to 98.5'					1252 1307	
96	8		1.5 5.0											
97	19													
98														
99							SP	@ 98.5' SP (AS ABOVE)						
100							SP SM	@ 99.4' GRAVELS AND FINE SANDY SILT TO SILTY SAND					1308 1321	
101							NCR	NCR 100.0' TO 103.0'						
102	20		2.0 5.0											
103							SP	@ 103.0' (SP) <del>fine-gr</del> SAND WITH SOME GRAVELS $\leq 1.0"$ $\phi$ AND SOME SILTS						
104														
105	8												1322 1342	
106			1.7 5.0											
107	21						NCR	NCR 107.0' TO 110.0'						
108														
109														

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T9B6

Sheet 7 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.17g



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
109	21	8					NCR	NCR @ 106.7 TO 110.0'						
110								SAND fine-gr SAND (SP) TRACE SILTS. WELL SORTED					1343 1355	
111	22		2.5 5.0				SP							
112			(50)											
113							NCR	NCR 112.5 TO 115.0'						
114														
115	9						SP	(SP) AS ABOVE					1356 1413	
116			1.5 5.0					NCR NCR @ 116.5' TO 120.0'						
117	23													
118														
119														
120							SP	fine-gr SAND (10YR 4/4 - 4/6) DARK YELLOWISH BROWN					1414 1428	
121	24		2.0 5.0				SP	@ 121.0' SAN PEDRO FM (10GY 2.5/1) GREENISH BLACK						
122								NCR 122.0' TO 125.0'						
123							NCR							
124														
125													1429	

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## Log of Soil/Core Boring T9B6

Sheet 8 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.17h

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
125							SP	(AS ABOVE) OCCASSIONAL FOSSIL SHELLS & FRAGMENTS					1446	
126			2.0 5.0											
127	25	9					NCR	NCR 127.0' to 130.0'						
128														
129														
130								TR : 130.0' ft bgs GH20 C ± 39 ft bgs					1447	- 145.5 1450 TRIP OUT STEMS RODS 1455-1520 CLEAN UP & PATCH ASPHALT 1515-1540 SB & 4 DRUMS 1540-1600 TC
131														
132														
133														
134														
135														
136														
137														
138														
139														
140														
141														

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## Log of Soil/Core Boring T9B6

Sheet 9 of 9

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.17i

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
0								0 - 4" ASPHALT		10-02-15				1205-1208
								4" - 10" CONCRETE						ASPHALT/CONCRETE
1								10" to 6.0' Fill of BROWN						1210-1225 WA
								CLAYEY SILT AND SANDY SILT						1225-1245 12" - 6.0'
2								WITH GRAVEL / ROCK FRAGMENTS						ASPHALT COLD
								MOIST, FIRM						PAVEMENT
										10-05-15				CLEAN UP
3														0845-0900 TG
														900-0910 TC
														0910-0940 Rig
														0930-0945 SB
														0945-0950
														REAM 0-5.0'
4														
5								NCR 5.0' to 6.5'						
6														0953
								YOUNG MEDIUM @ > 1						
								6.5' MOTTLED CLAYEY SILTY						
7			3.5					SAND WITH ARNDT GRAVEL						
			5.0					± 1/2" SUBANGULAR						
8			70											
9														
10								fine sand and silt, some						0954
								clay & some gravel ± 1.0"						1000
11			5.0											
			5.0											
12														
13														

DATE(S) DRILLED: 10-02 &amp; 10-05 &amp; 10-06-15

DRILL METHOD: CONT. DRY CORE

DRILL EQUIPMENT: CME

DRILL CONTRACTOR: MARTINI DRILLING

BIT SIZE / TYPE: 8"φ / 4Q3

HOLE COMPLETION:

LOGGED BY: MA. ESPINOZA

CHECKED BY:

HOLE INCLINATION: 90°

GROUND ELEVATION:

TOTAL DRILLED DEPTH: 145.0'

GROUNDWATER LEVEL: ± 35.0'

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## Log of Soil/Core Boring T9-B7

Sheet 1 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.18a



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type	Number	Blows per 6 inches			
13														
14	2	1												
15							SP GW	@ 14.8' fm - med gr sand (SP-GW) with GRAVELS $\leq 1.0"$ 14.8' to 16.5'					1001 1010	
16														
17			3.5 5.0				SL	16.5' to 19.0' CLAYEY SILTY SAND WITH GRAVELS $\leq 2.0"$						
18	3		(70)											
19							SP SM	@ 19.0' SP-SM						
20	2						SC	CLAYEY SILTY SAND (SL) to (SP-SM) with GRAVELS					1011 1018	
21							SP SM							
22			5.0 5.0											
23	4		(100)				SP SM	@ 22.5' (SP-SM) v. fm to fm gr SAND WITH SILT & SANDY SILT SOME CLAY & OCCASIONAL GRAVEL						
24														
25														
26			5.0 5.0				GW	@ 26.0' to 26.2' GRAVELY SILTY SAND					1019 1026	
27	5	3	(100)				SP SM	@ 26.2' SP-SM ALTERNATING THIN LAYERS. SL LAMINATED SOME CLAYS, OCCASIONAL COARSE SAND TO fm GRAVEL						
28														
29														

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## Log of Soil/Core Boring T9-B7

Sheet 2 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.18b

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type	Number				
29														
30	5	3					SP						1025	
31							SM						1039	
32			5.6											
33	6		5.0											
34							SP	33.5' to 34.0' med-gr SAND (SP)						
35							SP	WITH TRACE SILT + MED						
36							SM							
37							SP	to 35.7'						
38							SP	34.7' med-coarse SAND SP					1040	
39							GW	WITH ABNDT GRAVELS, WET					1049	
40								(G420?)						
41							SP	35.7' v.f. to med-gr SAND (SP)						
42			5.0					WITH TRACE SILTS						
43	7													
44							SP							
45														
46							SP	38.0' GRADATIONAL INTO						
47							SM	SP-SM						
48							SP	38.5' SP-SM WITH CLAY						
49														
50							GW	39.0' SP WITH TRACE SILTS						
51	4						SP	39.7' MED-COARSE-gr SAND					1050	1030-1200
52								NCR 40.0' TO 40.4'					1104	SOUTH GUY
53							SP							JOSH?
54														M.B. HOSSEIN
55							SP	40.4' GW-SP						1100-1200
56							SP	40.5' (SP) v.f. gr SAND						F.B.H. REP.
57			4.6				SM	GRADES INTO SP-SM LATER IN LG						
58	8		5.0											
59							SP	42.5 v.f. gr SAND (SP)						
60														
61							SP	43.3 to 44.2' v.f. to MED-SP						
62								SAND						
63							SP	44.2 SP-SM						
64							SM							
65													1105	

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## Log of Soil/Core Boring T9-B7

Sheet 3 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.18c



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type	Number	Blows per 6 inches			
45														
46							SP - SM	BECOMES MOTTLED @ 45.7'					1116	
47	9		5.0					@ 46.8' to 47.0' INCREASE COARSE GRAIN SIZE TO FINE GRRAVELS.						
48			5.0				SP - SM							
49			(100)				SP - SM	@ 47.8' to 48.0' (SP) FINE SAND						
50							SP - SM - SC	OCCASIONAL CLAYER SILTY SAND LAYERS					1117 1126	
51														
52			5.0											
53	10		5.0				GW - SP - GW	@ 52.0' GRAVEL LAYER @ 52.6' to 53.5' SP MED-FINE SAND WITH GRAVELS						
54			(100)				SC - SP - SM	@ 53.5' SILTY CLAYEY SAND & GRAVELS, POORLY SORTED SC-SP-SM						
55							SM - NUR	NUR 55.0' to 56.8'					1127 1136	
56														
57			3.2					@ 56.8' FINE SAND SOME MED-FINE SAND AND SOME SILT & GRAVELS = 1/2" Ø POORLY SORTED						
58	11		5.0				SP							
59			(64)											
60								@ 59.7' SP-SM						
61	12		5.0				SP - SM - SP	@ 60.0' to 63.1' (SP) V-FINE GR TO MED FINE SAND SOME COARSE & GRAVELS					1137 1150	

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### Log of Soil/Core Boring T9-B7

Sheet 4 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.18d

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
61							SP							
62	12	6	100				SP SM ML	61.8 to 62.5 occasional SP-SM & ML LAYERS						
63							SP							
64							SP SM ML	63.1' SP-SM to ML OLIVE (SY 4/3-4/4)						
65													1151	
66			5.0 5.0				SP	65.2' v. fine-gr SAND (SP) WITH TRACE SILT & SOME L. GRAVELS ± 1/4" φ					1204	
67	13		100											
68							ML	62.4' MOTTLED SILT (ML) SAND v. fine-gr SAND OCCASIONAL						
69														
70		7					SP	v. fine-gr SAND SOME SILT & COARSE SANDS.					1205 1221	
71	14													
72			5.0 5.0				SP SM	72.0' GRADES INTO SP-SM						
73			100				SP ML	72.2' CRUST(?) ZONE PERMISSIVE CALICHE(?) GRAYISH WHITE SILT & SANDS MOTTLED & OCCASIONAL GRAVEL						
74														
75			3.2 5.0				NUP	NUP 75.0' to 76.8'					1222 1235	
76	15	8	64											
77														

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

### Log of Soil/Core Boring 79-87

Sheet 5 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.18e

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
77														
78	15		(64)				SP	@ 76.8' to 78.5' Fine-gr SAND WELL SORTED						
79							SP SM ML	@ 78.5' MOTTLED SP-SM TO ML, CALICHE OCCASIONAL GRAVEL $\leq 1/4"$ $\phi$						
80	8						SP	@ 79.5' SP WITH TRACED SILT GRAVELS TO PEBBLES & TIP.					1236 1251	CHATTER @ 79.0'  CHATTER @ 80.0'
81								COBBLES @ 80.8' BLOCKED OFF SAMPLER NCR @ 81.0' to 85.0						
82	16		1.0 5.0											
83			(20)											
84														
85	8							NCR 85.0' to 88.0' "WASHED OUT SAMPLE"					1252 1307	
86														
87	17		2.0 5.0											
88			(40)					C 88.0' to 90.0' Fin gr SAND (SP) SOME SILT OCCASIONAL GRAVEL @ 89.0' $\leq 1/4"$ $\phi$						
89							SP							
90								NCR 90.0' to 92.0'					1308 1325	
91			3.0 5.0											
92	18		(60)					@ 92.0' Fin-gr SAND, SOME SILT ABOUT PEBBLES, ROUNDED TO SUBROUND						
93														

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## Log of Soil/Core Boring T9-B7

Sheet 6 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.18f



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type	Number	Blows per 6 inches			
93														
94	18	8					SP	SLIGHTLY LAMINATED FeOx STAINING SLIGHTLY MOTTLED.						
95							NUR	NUR 95.0' to 97.5'					1326 1347	
96			2.5											
97			5.0											
98	19		(50)				SP	97.5' (SP) fn-gr SAND, SOME GRAVELS $\leq 1/4"$ SL. LAMINATED TO SL. MOTTLED, TRACE SILT						
99														
100	9						NUR	NUR 100.0' to 102.5'					1349 1409	
101			2.5											
102	20		(50)				SP	102.5' (AS ABOVE) SP						1430-1500 CLEAN UP & PATCH ASPHALT
103								103.0' GRADING INTO fn-gr to COARSE-GRA SAND AND GRAVELS $\leq 2.0"$ $\phi$ WITH TRACE SILT, MOTTLED						1500-1530 SB + 4 DRUMS 1530-1600 TC
104														
105							NUR	NUR 105.0' to 108.2'					1410 0941	END 10-05-15 0830-0845 TG 0900-0915 TC 0915-0933 SB 0915-0930 RIG T987 0935 60:0 H <sub>2</sub> S 0.0 60:0 O <sub>2</sub> 20.9
106			1.8											
107	21		5.0											
108			(36)				SP	108.2' to 109.0' MED-gr SAND (SP) SOME GRAVELS						
109														

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## Log of Soil/Core Boring T9-27

Sheet 7 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.18g

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
109	21	9						SP-SM 109.0 to fin-gr SANDY SILT, OCCASIONAL GRAVEL, SUBROUND. OLIVE MOTTLED						
110								NUR 110.0' to 111.0' (SY 4/3)					0942 0958	
111			4.0											
112	22		6.0					SP 111.0' to 112.0' (SP) med to COARSE-gr SANDS olive (SY 4/3)						
113			(80)					SP 112.0' fin to med-gr SANDS, SOME SILTS, SOME COARSE SP GRAINS & PEBBLES ≤ 1.0" Ø						
114														
115	10							NUR 115.0' to 117.5'					0959 1018	CHAPTER 2 ± 114.0'
116			2.5											
117	23		5.0											
118			(50)					SP 117.5' (SP) fin-med gr SAND SOME COARSE						
119								SP-SM 118.5 to 119.0' (SP-SM) SOME CARBONATE, CALCARE TRACE CLAYS						
120	10							SP 119.0' Large SAND SP NUR 120.0' to 123.0'					1020 1044	
121			2.0											
122			5.0											
123	24		(40)					SP 123.0' fin-gr SAND (SP) TRACE SILTS, DARK YELLOWISH BROWN (10YR 4/6) TO YELLOWISH BROWN (10YR 5/6)					1045	
124														
125														

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T9-B7

Sheet 8 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.18h



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
125								NCR 125.0' to 128.5'					1105	
126	25													
127			1.5 5.0											
128			(30)											
129								C 128.5' to 129.8' fn-gr SAND YELLOWISH BROWN (10YR 5/6)						
130	11							SAN PEDRO FM. C 129.8' to 130.0' fn-gr SAND to fn-gr GREENISH BLACK (10GY 2.5/1) GREY TRACE SILTS. NCR 130.0' to 133.5'					1105 1125	
131			1.5 5.0											
132	26													
133			(30)											
134								C 133.5' (SP) (AS ABOVE) WITH OCCASIONAL FOSSIL SHELLS AND FRAGMENTS						
135								NCR 135.0 to 138.3'					1126 1149	
136			1.7 5.0											
137	27		(34)											
138														
139								C 138.3' SP (AS ABOVE) INCREASE SHELL FRAGMENTS						
140													1150 1208	
141	28 11													

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## Log of Soil/Core Boring T9-B7

Sheet 9 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.18i

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
141														
142	28	11	2.5 5.0					NUR NUR 140.0' to 142.5'						
143			50				SP	@ 142.5' SP (AS ABOVE) ABNDF SMALL FRAGMENTS						
144														
145								TD: 145.0'						1209
146								GH20 @ ± 35.0 ft. bgs						1230 - 1330 PULL RIGERS
147														1335 - 1354 GROUT B/F
148														1335 - 1415 SITE CLEAN UP CONC. PATCH
149														1415 - 1435 SB 2 DRUMS
150														
151														
152														
153														
154														
155														
156														
157														

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T1-B7

Sheet 10 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.18j

Depth, feet	SOIL/ROCK CORE					Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number		Type	Number				
0													
1							ASPHALT 0 - 4" CONCRETE 4" to 10" #2" to 6.0' Full of dark brown silty clayey and sandy silt with R.F. fragments						0830-0845 TG 0900-0915 TC 0915-0930 SB 0930-0950 RIG SET 0950-0955 ASPHALT 0-12" 0956-1018 HA 12" to 7.0'
2													
3													
4													
5													
6													
7			5.0 5.0				SP silty brown sand few gravels						1024
8													
9													
10													
11													
12			1.5 5.0				NUR 10.0' to 13.5'						1025 1030
13													

DATE(S) DRILLED: 09-25 &amp; 09-28, 15

DRILL METHOD: DRY CONT. CORE

DRILL EQUIPMENT: CME

DRILL CONTRACTOR: MARTINI DRILLING

BIT SIZE / TYPE: 8" / HQ3

HOLE COMPLETION:

LOGGED BY: M. ESPINOZA

CHECKED BY:

HOLE INCLINATION: 90°

GROUND ELEVATION:

TOTAL DRILLED DEPTH: 150.0'

GROUNDWATER LEVEL: ± 35'

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## Log of Soil/Core Boring T9-88

Sheet 1 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.19a

Depth, feet	SOIL/ROCK CORE						MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number		Type Number	Blows per 6 inches				
13													
14	2						SP -SC "SLATE" → ≤ 4.5" Ø COBBLE GRAVELLY SP-SM some clay						
15		1					@ 15.5' (SP) GRADES INTO fine to med SANDS					1031 1037	
16	3		2.5 2.5				SP @ 16.7' SP-SM WITH GRAVELS						
17							SP -SM						
18							SP @ 17.5' GRADES INTO fine SANDS WITH trace SILT (SP)					1038 1041	
19	4		2.5 2.5				SP -SM GRADES INTO @ 18.5' SP-SM trace CLAYS						
20												1042 1050	
21	2												
22	5		5.0 5.0				SP @ 21.8' to 22.4' INCREASE fine SAND (SP)						
23							SP -GW @ 22.9' GRAVELS AND fine to MEDIUM SANDS, SOME SILT SP-GW						
24							SP -SM @ 23.4' SP-SM & CLAYEY SILTY SAND. ALTERNATING LAYERS GRADATIONAL CHANGES						
25							SP -SM -SC					1051 1058	
26													
27	6	3	5.0 5.0				SP -SM -SC						
28													
29													

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## Log of Soil/Core Boring T9-B8

Sheet 2 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.19b



Depth, feet	SOIL/ROCK CORE					Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number		Type Number	Blows per 6 inches				
29	6												
30		3					@ 30.0' (SP) Fin-gr Sand WITH TRACE SILT BECOMES WET (GH <sub>2</sub> O?)					1058 1105	
31													
32			5.0 5.0										
33	7						@ 32.5' GRADES INTO SP-SM LAMINATED & MOTTLED FE OR & GRAYISH GREEN TRACE CLAY						
34													
35							WET @ 35' GH <sub>2</sub> O?					1106 1113	
36							@ 36.0' (SP) WITH TRACE SILT Fin-gr. Sand OLIVE (SY 4/3) WET						
37	8		5.0 5.0										
38													
39							@ 38.4 Fin-gr to med GR SAND SOME COARSE GRAINIS & GRAVELS WITH DEPTH						
40		4					DARK YELLOWISH BROWN 10TR 4/4-4/6					1114 1135	
41							YELLOWISH BROWN 10TR 5/6 40.0' to 42.5'						
42			2.5 5.0										
43	9						@ 42.5 to 43.5' (SP) AS ABOVE						
44							@ 43.5' GRAVELS AND MED GR. SAND SP-GW						
45							@ 44.7' (SP-SC) POORLY GRADED						

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## Log of Soil/Core Boring T9-B8

Sheet 3 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.19c



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
45								SP-SM WITH SC					1149	
46							SP -SM	ALTERNATING LAYERS & OCCASIONAL GRAVELS. $\leq 1.0'$ MOTTLED. DARK YELLOWISH BROWN						
47			5.0				SP -SC	(10SR 4/4)						
48														
49														
50		5					NCR	50.0' to 50.5'					1149 1158	
51			4.5				SP -SC	50.8' (AS ABOVE) SP-SC						
52			5.0				SP -SM	ALTERNATING SP-SM						
53	11						SP -SP	52.5' GRAVELS & SAND WITH SILT						
54							SP -SM	53.0' SP-SM TRACE CLAY & SEVERAL GRAVELS.						
55													1159 1214	
56							SP -SM	SP-SM (AS ABOVE) SOME TRACE SILT & OCCASIONAL GRAVEL						
57	12		5.0				SP -SC	57.4' to 57.7' SP						
58			5.0				SP -SC	57.7' SC to 58.2						
59							SP -SM							
60		6					NCR NCR	60.0' to 60.2'					1215 1223	
61	13													

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## Log of Soil/Core Boring T9-B8

Sheet 4 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.19d

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES			Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches	Strength			
61							SP -SM	NCR 60.0' to 60.2'						
62	13	6	4.8 5.0				SP	@ 60.2' SP-SM (AS ABOVE) @ 60.6 SP R-gr SAND to 61.0'						
63							SP -GW	@ 61.0' SP WITH GRAVELS R-gr to coarse sands some silty layers						
64														
65							SP	@ 64.5' SP & SP-SM (?) R-gr SAND LAMINATED GRADES INTO SP-SM					1225 1235	
66			5.0 5.0											
67	14						SP -GW	@ 66.5' SP WITH GRAVELS						
68							SP -SM	@ 67.0' SP-SM WITH GRAVELS & some SP-SC layers GRADATIONAL & POORLY SORTED						
69							SP -SC							
70	7												1236 1245	
71														
72	15		5.0 5.0											
73							SP	@ 72.0' INCREASE SANDS. & GRAVELS $\leq \frac{1}{2}$ " GRADATIONAL						
74														
75							SC -ML	@ 74.0' CLAYEY R-SAND & CLAYEY SILT					1246 1304	
76	16	8	5.0 5.0											
77							SP	@ 76.7 INCREASE R-gr SAND GRADES INTO SP WITH SILT						

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## Log of Soil/Core Boring T9-B8

Sheet 5 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.19e

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES			Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches	Strength			
77							SP							
78	16		5.0 5.0				SP-SC ML	@ 78.3' ALTERNATING SP-SM in SP-SC & ML						
79							ML	@ 78.7' ML WITH SOME SAND						
80	8							CAVITY @ 79.1' TRACE CLAY(?)					1305 1315	
81														
82	17		5.0 5.0				SP SM ML	@ 82.0' SP-SM LAYERS WITHIN ML DECREASE CAVITY						
83							ML	@ 83.0' ML WITH CAVITY TRACE CLAY(?)						
84							ML							
85							SP	@ 84.5' SP "BENCH" SAND SOME SOME SILT MED. GR.					1316 1327	
86														
87			2.0 5.0				COBBLE	@ 86.8' COBBLE ≤ 6.0" BLOCKED OFF BIT						
88	18						N C R	NUR 87.0' TO 90.0'						
89														
90	9						SP -GW	SANDS & GRAVELS fin to coarse gr SANDS.					1328 1344	CHATTER @ ± 90'-91'
91			1.0 5.0				NUR	NUR 91.0' TO 95.0'						
92	19													
93														

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## Log of Soil/Core Boring 79-88

Sheet 6 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.19f



Depth, feet	SOIL/ROCK CORE						MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number		Type Number	Blows per 6 inches				
93													
94	19						NCR 91.0' to 95.0'						
95		9					fi-gr sand (SP)					1345 1401	
96							SP						
97			5.0				@ 96.5' COARSE SAND (SP)						
98	20		5.0				@ 97.0' SP-SM WITH GRAVELS						
99							@ 98.3' INCREASE SANDS & GRAVELS ≤ 1/2"						
100							@ 99.0' COARSE SANDS POORLY SORTED						
							@ 99.4' fi-gr sand with some silt						
101			4.8				olive SY (5/6)					1402 1419	
102	21		5.0				NCR 100.0' to 100.2' WASH OUT						
103							@ 102.2' some GRAVELS & CHANGELOR. OLIVE (SY 4/3-4/4)						
104							@ 102.3' v. fine gr sand with some silt.						
105		10					NCR 105.0' to 108.0'						1438-1515 LOCATION UP 5 PLATE/CAP ASPHALT 1500-1535 B & S 1530- TC. END 09-25-15 1420 1030
106													0845-0900 TG 0900-0915 TC 0915-0945 BH NO TIK/TOE. TE. B/C NO SIGNS. CAR PARKED BUT FOULLED UP WORK 0930-0945 SB 0945-1025 SET UP RIG
107	22		2.0										
108			5.0				@ 108.0 to 110.0 fi-gr sand (SP) WITH TRACE SILT & occasional rounded pebbles ≤ 1/2"						
109							SP						

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## Log of Soil/Core Boring T9-B8

Sheet 7 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.19g

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
109	22	10												
110							NCR	NCR 110.0' to 111.2'					1031 1050	
111														
112	23		38 50				SP	@ 111.2' (AS ABOVE) SP @ 111.6' calcareous / whitish gray mottling with granules & clays poorly sorted fine grained @ 113.0 (SP) fn - coarse sand & some granules						
113							GW							
114							SP							
115	11												1051 1112	
116								"HARD" @ 116.3' DID NOT SAMPLE FROM 116.0' to 120.0'						
117	24		1.3 5.0				NCR	NCR R						
118														
119														
120							NCR	NCR 120.0' to 123.0'					1115 1134	
121														
122	11		2.0 5.0											
123	25							@ 123.0' fn - med gr sand (SP) some silt & some rounded pebbles < 1.5"						
124							SP							
125													1136	

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## Log of Soil/Core Boring T9-38

Sheet 8 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.19h



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
125								NCR @ 125.0' to 127.5'					1201	
126														
127	26	11	2.5 5.0					@ 127.5' (SP) fin to coarse G. SANDS PEBBLES $\leq 1.0"$ SI. POORLY SORTED to fining upwards, OLIVE BROWN (2.5Y 4/3)						
128														
129														
130								NCR @ 130.0' to 132.8'					1203 1224	
131														
132	27		2.2 5.0					@ 132.8' fin. med. gr SAND (SP) GRADES into fin. gr SAND @ 133.9' TRAZESILT DARK YELLOWISH BROWN (10YR 3/4 to 4/6)						
133														
134														
135	12							NCR @ 135.0' to 137.8'					1226 1248	
136														
137	28		2.2 5.0					@ 137.8' SAN PEDRO fm fin to med. gr SAND (SP) some SILT & FEW SMALL FRAGMENT FOSSILS.						
138														
139														
140	29							NCR 140.0' to 141.0'					1250 1315	
141														

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## Log of Soil/Core Boring T9B8

Sheet 9 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.19i

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
141														
142	29	12	4.0 5.0				SP	141.0' to 145.0' A-MED GR. SAND, TRACE SILTS. SOME SHELL FRAGMENT FOSSILS. (AS ABOVE)						
143														
144														
145							NUR	NUR 145.0' to 147.0'					1317 1341	1345. CAR FAMILY PULL OUT 1350-1509 PULL AUGERS 1510-1600 CLASH UP & GROUT BLF 1525-1555 SB & 2 DRUMS 1555-1630 TC
146			3.0 5.0											
147	30	13					SP	@ 147.0' (AS ABOVE) (SP) A-GR SAND, TRACE SILTS & SOME SMALL FOSSIL FRAGMENTS.						
148														
149														
150								TD: 150.0' SH 20 ± 35.0'					1342	
151														
152														
153														
154														
155														
156														
157														

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## Log of Soil/Core Boring 79-88

Sheet 10 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-13.19j



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
0							AL	0-2" ASPHALT, 2" to 6" CONCRETE					083-0845 TAILGATE	
							AL	6" FILL AL					0800-0930 T.C.	
1							AL	0-4.8' FILL. SANDY SILTY WITH CLAY & OCC. GRAVEL. BROWN MUDST.					0930-1020 SOUND BOARDS	
2													930-11 & UTILITY	
3													1055-1050 DRILL RIG SETUP.	
4													1050-1059 ASPHALT & BASE	
5													1101-1110 HARD AVERAGE 2.0 TO 6.0'	
6							SP	0-4.8' Q21 SANDY SILT. TO SILTY SANDS WITH OCC. GRAVELS & COARSE GRAIN. ORANGE BROWN.					1110-1200 H2S:0.0 LE:1.0 O2:20.9	
7			5.0				SM						1122	
8	1		5.0											
9														
10	1												1123	
11			3.0				SP	SILTY FINE GR TO COARSE GR SAND WITH GRAVELS SP					1130	
12	2		5.0											
13							SC	@ 12.3. MED TO COARSE SAND @ 12.8. CLAY SAND						

DATE(S) DRILLED: 09-16 & 09-17 & 09-18-15  
 DRILL METHOD: CONTINUOUS DRY CORE  
 DRILL EQUIPMENT: CME  
 DRILL CONTRACTOR: MARTINI DRILLING  
 BIT SIZE / TYPE: 8" Ø / HQ3  
 HOLE COMPLETION:

LOGGED BY: M. ESPINOZA  
 CHECKED BY:  
 HOLE INCLINATION: 90°  
 GROUND ELEVATION:  
 TOTAL DRILLED DEPTH: 155.0'  
 GROUNDWATER LEVEL: ± 33.0'

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## Log of Soil/Core Boring T9-B9

Sheet 1 of 10

Westside Purple Line Extension - Section 2  
 Beverly Hills, California  
 Project No. 4953-11-1423

amec foster wheeler



Figure  
 A-1.3.20a

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type	Number	Blows per 6 inches			
13														
14	2	1					NCR	NCR @ 13.0' TO 15.0'						
15													1131	
16			2.0 3.0				SP + GW	SILTY MED TO COARSE SANDS AND GRAVELS. TRAIL CLAY @ 4.0" Ø					1138	
17														
18	3		2.0 2.0				SP GW	@ 19.0' (AS ABOVE) SP + GW					1139 1145	
19	4													
20													1146	
21	5		2.0 2.0										1152	
22	2						SP-SM NCR	@ 21.8' SILTY SAND NCR 22.0' TO 23.0'						
23			2.0 3.0				SP GW							
24	6													
25													1153	
26			5.0 5.0				SP SM	SILTY FR TO MED GR. SAND LAKEWOOD? GRANITE BROWN WITH LAMINATE					1205	
27	7	3												
28														
29														

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T9-B9

Sheet 2 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.20b

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
29														
30	7						SP SM	SP-SM (AS ABOVE) OLIVE BROWN					1207 1214	
31														
32	3		5.0 5.0											
33	8													
34							SP + GW	@ 33.2' MED TO COARSE SAND, SOME GRAVELS (WET)						
35													1216 1228	
36	9		2.5 2.5				SP SM	@ 36.0' Fin to MED SAND, some silt						
37							SP GW	@ 37.0' MED TO COARSE SAND & GRAVELS					1230 1240	
38	4													
39	10		2.5 2.5											
40								@ 40.0' (AS ABOVE)					1241 1249	
41	11		4.5 2.5											
42								MED + COARSE GR SP- WITH GRAVELS					1251 1258	oil hole @ 42'
43			1.0 2.5				SP-SM	@ 43.2' SP-SM						
44	12						NUR	NUR @ 43.5 TO 45.0'						
45													1300	

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## Log of Soil/Core Boring T9-B9

Sheet 3 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.20c



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr Drill Rate, ft/hr	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
45							NCR	NCR @ 45.0' to 46.0'					1307	
46	13						SP	46.0' to 48.2' MED TO COARSE						
47			4.0				SW	SANDS WITH SOME SILT						
			5.0					& GRAVELS.						
48								BASAL GRAVEL CONTACT						
								48.2' SP-SM ORANGE BROWN						
								WITH CLAY						
49							SP	LAKELAND FM (?) IN						
	5						SM	fin gr. sand WITH OCCASIONAL						
							+ CL	COARSE GRAIN & GRAVEL.						
50								1/8" Ø					1308	
							NCR	NCR @ 50.0' to 50.6'					1317	
51			4.4					50.6' (AS ABOVE)						
			5.0											
52														
53	14						SP							
							SM							
							+ CL							
54														
55													1318	
													1330	
56														
57			5.0											
			5.0				SP	57.4' to 57.7' MED TO COARSE						
58	15							GR SAND WITH GRAVELS						
							SP	57.7' SP-SM + CL (AS ABOVE)						
59	6						SM							
							+ CL							
60			5.0										1331	
	16		5.0										1345	
61														

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## Log of Soil/Core Boring T9-B9

Sheet 4 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.20d

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type	Number	Blows per 6 inches			
61														
62	16	6	5.0				SP SM + ML	ALTERNATING SP-SM WITH CLAYS TO SP OR SM OR ML (AS ABOVE)						
63			5.0											
64														
65													1348 1358	
66														
67	17		5.0											
68			5.0											
69							SP	68.1' SP WITH GRAVELS SOME SILT						
70	7						NCR	NCR @ 70.0' to 71.2'					1359 1411	
71			3.8											
72			5.0				SP + GW	@ 71.2' MED TO COARSE SAND & GRAVELS SP + GW						
73	18						SP SM	@ 72.8' SP-SM WITH SOME GRAVELS INCREASING WITH DEPTH. mostly @ 74.0'					1428 TO 1429 ADDITIONAL NUMBER BELOW 2 FT. BEG. TO CAP. 1430-1500 CAP HOLE & SITE CLEANUP DENISE MARTINI	
74							SP SM + GW							
75													1414 END OF 09-16-15 1115	
76	19	8	5.0					AS ABOVE SP-SM & GRAVEL LAYERS @ 76.0' GRAVELS					0930-1040 HOURS PARKED @ TR 1040-1055 SOIL+CORE 1055-11 RIG SET	
77														

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## Log of Soil/Core Boring 79.B9

Sheet 5 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.20e

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type	Number	Blows per 6 inches			
77							SP-SM	"BASS" GRAVELS @ CONTACT.						
78	19		5.0 5.0				ML SL	@ 77.5' SILTY CLAYEY FINE SAND SOME/OCCL. GRAVELS $\leq 1/2"$ FIRM, SL. MOIST OLIVE BROWN (2.5T 413)						
79								BECOMES MOTTLED WITH FeOx & LAMALLAE						
80	8												1117 1129	
81								@ 81.7' INCREASE CLAYEY SAND						
82	20		5.0 5.0				SL CL	OLIVE (SY 4/4) SLIGHTLY MOTTLED WITH FeOx						
83														
84														
85													1130 1140	
86														
87			5.0 5.0											
88	21						CL	@ 87.5' CALCITE & MOTTLED WITHIN SL-CL THROUGH RUN END						
89														
90	9						SL CL	@ 89.4' "GROUND UP" CRUSHED ZONIC TO 89.5'					1141 1152	
91	22		5.0 5.0				SL ML	ALTERNATING CLAYEY WITH SANDIER LAYERS.						
92														
93								@ 92.3 SP-SM WITH OCCASIONAL WB ROUNDED GRAVELS $\approx 1.0"$ (NO CALCITE)						

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# Log of Soil/Core Boring T9-B9

Sheet 6 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.20f

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES			Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type	Number	Blows per 6 inches	Strength		
93														
94	22	9	100				SC OL ML	@ 93.8' CALICHE AND SILTY CLAY/ FINE SAND MOTTLED						
95								GRADATIONAL INTO SP POORLY SORTED fm-gr SAND, SOME SILT & OCCASIONAL SUBROUNDED GRAVEL $\leq 10"$ $\phi$					1154 1205	
96							SP	MOTTLED, FROX @ 96.2 TO 96.5' PALE CLAYISH MOTTLED						
97	23		5.0 5.0											
98														
99														
100		10											1207 1223	
101							SC-CL	@ 100.9 TO 101.1 CLAYEY SAND SC-CL						
102			5.0 5.0				SP	@ 101.1 SP (AS ABOVE)						
103	24						GW	@ 102.8' GRAVELS						
104							SP GVT	@ 103.0' DIMINISH UPWARDS FROM fm-gr (SP) SAND TO SANDY GRAVELS $\leq 2.0"$ $\phi$ SUBROUNDED						
105													1225 1243	
106								GRAVELS $\leq 4.0"$ @ 106.0' NCR 106.2 TO 110.0'						
107	25	11					NCR							
108														
109														

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## Log of Soil/Core Boring T9.B9

Sheet 7 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

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Figure  
A-1.3.20g

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type	Number	Blows per 6 inches			
109	25						NUR	NUR @ 106.2 to 110.0'						
110							NUR	NUR 110.0' to 113.0'					1245 1300	
111	11							"WASH. OUT SANDS"						
112	26													
113							SP	@ 113.0' SILTY SAND (SP)						
114							GW	@ 114.0' GRAVELS (GW)						
115							SP	@ 114.1' SP-SM MOTTLED FLUX					1301	
							SM	SUB-HORIZONTAL LAMINAE					1317	
								SILTY SAND TO SANDY SILT						
116							NUR	NUR 115.0' to 118.5'						
117	27													
118														
119							SP	118.5' (SP) LIGHT OLIVE BROWN (2.5Y 5/6)						JEFF -
							SM	FINING UPWARDS						"TIGHT
								FROM SP-SM TO MED-GREEN SAND						DRILLING"
								POORLY SORTED WITH SOME SILT						
120	11						SP	& GRAVELS @ 119.5 OLIVE (5Y 5/3)					1318	
								± 1.5" Ø					1339	
							NUR	NUR @ 120.0' to 121.2'						
121														
122	28						SP	@ 121.2' COARSE SANDS & GRAVELS						
							GW	SOME SILTY FINE SAND?						
								GRAVELS ± 3.0" Ø						
123							SP	@ 122.5' to 122.7' POORLY SORTED SP						
							SP							
							GW							
124							SP	@ 124.0' MED-GA TO COARSE GR.						
								SAND, FINING UPWARD						
125							SP-SM	@ 124.8' SP-SM					1340	

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## Log of Soil/Core Boring T9-B9

Sheet 8 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.20h



Depth, feet	SOIL/ROCK CORE						MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number		Type Number	Blows per 6 inches				
125							NCR NCR 125.0' TO 127.5'					1402	
126			2.5 5.0										
127	29												
128							SP @ 127.5' (SP) POORLY SORTED SANDS MED - TO COARSE GR.						1630-1745 "NO PFG" CALL INTO BM. 1415-1430 PUSHT ADJER TO 132.0' 1430-1500 LEAN UO 1500-1625 S. BOARDS 1525-1600 T.C. 1404 EX 10 OF 09-17-15
129							@ 129.5 SP-SM AND GRAVELS ≤ 2.0"Ø						
130	12						SP-SM NCR 130.0' TO 135.0' ONLY RETAINED GRAVELS FROM TIP "WASH OUT"						
131													0845-0900 TG 0900-0915 TL 0905-0930 SAND 0935-0955 BAK. 0950-0955 REMOVE 0945 CO.0 H.S. 0.0 LET.0 02:20.9
132			0										
133	30												
134													
135							NCR NCR 135.0' TO 138.3'					1002 1021	
136													
137	31												
138			1.7 5.0				@ 138.3' SP-SM Lgr SANDS ORANGE BROWN						
139	12												
140			1.2 5.0				@ 140.0' SAN PEDRO FM. SILTY Lgr SAND GLYCI (10GY 2.5/1) GREENISH BLACK					1022 1046	
141	32												

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## Log of Soil/Core Boring T9-B9

Sheet 9 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.20i

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
141														
142	32		1.2 5.0				NCR	NCR 141.2' to 145.0'						
143														
144														
145	12						SP -SM	SP-SM WITH SMALL FOSSIL FRAGMENTS GREY / GREENISH BLACK (LOG 2.5/1)					1047 1111	
146			1.5 5.0											
147	33						NCR	NCR @ 146.0' to 150.0'						
148														
149														
150							SP -SM	SP-SM WITH SMALL FRAGMENTS (AS ABOVE)					1114 1136	
151			2.0 5.0											
152	34						NCR	NCR @ 152.0' to 155.0'						1140-1144 TRIP OUT STEMS
153														1150-1310 AUGERS 1318-1345 SCOUT B/L 1348-1415 CHIPS & CEMENT UP TO 1.5' 1430-1455 SOUND B/L
154														1440-1510 TC 1500-1530 SIGN NO PROG WE 0.18 MPD STRIKE
155													1138	
156								TOTAL DEPTH 155.0' ft. LGS						
157														

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## Log of Soil/Core Boring T9-B9

Sheet 10 of 10

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.20j

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES			Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches	Strength			
0								ASPH 6" - 6" ASPHALT 6" - 10" CONCRETE 10" TO 6.5' FILL AT CLAYEY SILTY SAND TO SANDY CLAY DARK BROWN. 2 GRAVELS	MAPS PARKED @ PROPOSED T9-B10 SO WAY TO T9-B10 & CURED BH P.E. CANNOT LOCATE OWNER OR INFO.				0830 - 0900 T.G. 0900 - 0945 T.G. 0945 - 1000 SB. 1000 - 1020 RIG 1020 - 1030 SETUP + CONC. 0-6" ASPHALT 1030 - 1043 H.A. 6" TO 6.0'	
1														
2														
3														
4														
5														
6			4.5 5.0					6.5 to (SP-SM) SILTY REG SAND SOME SUB ANGULAR TO SUB ANGULAR GRAVELS. TRACE CLAY. SL. MOIST, SL. FIRM DARK YELLOWISH BROWN (10YR 3/6)						1054
7	1													
8			90											
9							SP - SM							
10	1							NUR 10.0' TO 13.5'						1055 1104
11			1.5 5.0											
12	2		30											
13														

DATE(S) DRILLED: 09-21, 22, 24-15

DRILL METHOD: DRY CORE

DRILL EQUIPMENT:

DRILL CONTRACTOR: MARTINI DRILLING

BIT SIZE / TYPE: 8" / H43

HOLE COMPLETION:

LOGGED BY: M. ESPINOZA

CHECKED BY:

HOLE INCLINATION: 90°

GROUND ELEVATION:

TOTAL DRILLED DEPTH: 165.0'

GROUNDWATER LEVEL: ± 33'

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## Log of Soil/Core Boring T9-B10

Sheet 1 of 11

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.21a

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
13								NCR NCR 10.0' TO 13.5'						
14	2		(30)					SP - SM (AS ABOVE) INCREASE COARSE GR SAND & GRAVEL						
15	1							NCR NCR 15.0' TO 15.3'						
16	3		(88)					SP - SM @ 15.5' GRAVELLY TO COARSE GR. SAND WITH SILT LOOSE CLAY SC - SP					1105 1113	
17			2.2 2.5											
18			2.5 2.5					GRADES INTO SP - SM WITH OCCASIONAL SUBROUNDED GRAVELS $\leq 1.0"$					1114 1118	
19	4		(100)					SP - SM LIGHT OLIVE BROWN (2.5Y 5/3 - 5/4)						
20	2		(100)										1119 1126	
21	5		2.0 2.0											
22								@ 22.0' TO 22.5' V. F. to F. GR SAND					1126 1134	
23			(100)					GRADES INTO SP - SM @ 22.5' GRADES INTO CLAYEY SILTY FA - GR SAND WITH OCCASIONAL SUBANGULAR GRAVELS $\leq 1/2"$						
24	6		3.0 3.0					@ 23.0'						
25								CONTINUES (AS ABOVE)					1135 1142	
26								SP - SC & SP - SM ALTERNATING LAYERS SUB-HORIZ LAMINAE FC OF STAINING & SOME MOTTLING						
27	73		5.0 5.0											
28			(100)											
29														

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## Log of Soil/Core Boring T9-B10

Sheet 2 of 11

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.21b

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
29	7													
30		3					SP -SC	SP-SC & SP-SM (AS ABOVE) DARK GRAYISH BROWN (2.5Y 4/2)					1143 1151	
31								SOME COARSE SAND TO RN-GRAVELS ≤ 1/2" Ø						
32	8		5.0 5.0				SP -SM							
33			(100)					WET @ ± 33.0'						
34								@ 34.5' SC WITH GRAVELS ≤ 1/2" Ø						
35							SC NCR	YELLOWISH RED (5YR 4/6) "BURIED PALEOSOL" (?)					1153 1203	
36							SP -SC	35.0' TO 35.2' POORLY SORTED RN-gr TO COARSE GA SAND & GRAVELS WITH SILT & SOME CLAYEY SAND LAYERS SC						MINOR CHATTER @ ± 36.0'
37			4.8 5.0											
38	9		(96)											
39														
40	4						NCR	NCR 40.0' to 40.5'					1204 1213	
41							SC -SP -GN	SC & SP WITH GRAVELS ≤ 4.0" Ø SOME SILTY SANDY LATHES ARE FCK WITH SOME CLAYEY RN-gr SAND						MINOR CHATTER @ ± 41.0'
42			4.5 5.0					@ 42.7 CLAYEY SILTY RN-gr SAND TO FCK SC-SP						
43	10		(90)				SC -SP -SC -SP -GN	43.2'						
44														
45													1214	

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## Log of Soil/Core Boring T9.010

Sheet 3 of 11

Westside Purple Line Extension - Section 2

Beverly Hills, California

Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.21c



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
45								NUR NUR 45.0' TO 45.7'					1228	
46								45.7' SP MED TO COARSE GRAVLS GRADES FINING UP						
47	11		4.3 5.0					47.9' SP-SM & SC WITH GRAVELS MOTTLED GRAY, BLACK & FROX						
48														
49								49.3' INCREASE SP-SM WITH SOME GRAVELS ± 10' 10"						
50								DECREASE GRAVELS WITH DEPTH					1229 1239	
51								FROX LAMELLAE, GRAY AND GRAY MOTTLED						
52	12		5.0 5.0					YELLOWISH BROWN (10YR 5/4-5/6) & GRAYISH BROWN (10YR 5/2)						
53														
54														
55													1240 1251	
56								55.9' INCREASE CLAYEY SAND TO CLAYEY SILTY SAND						
57	13		5.0 5.0											
58														
59								58.5' SP-SM						
60								59.5' SP-SM WITH GRAVELS					1253 1303	
61	14													

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T9-B10

Sheet 4 of 11

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.21d

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
61														
62	146		5.0				SP SM SC	MOTTLED SP-SM-SC SILTY CLAYEY FINE-GV SAND WITH ABUNDANT GRAVELS ≤ 1.0" Ø						
63			5.0											
64			100				SP GW	663.6' SP-GW INCREASE ENJOYERS SLATE, SUBANGULAR ≤ 2.0" Ø						MINOR CHATTER R±62.5 TO 63.0'
65							SP GW	664.0' SP Rn to COARSE SANDS WITH SILT & GRAVELS ≤ 2.0" Ø					1304 1317	CHATTER R±65.0'
66														
67			5.0				SP SM SP-GW	666.0' SILTY FINE SAND (SP-SM) MOTTLED & FEOX & GRAY LAMINATE. SOME CLAY						
68	15		5.0				SP SM	667.5' to 67.2' SP-GW						
69							SP SM							
70	7							SP-SM & SP-SC CLAYEY SILTY FINE SAND ALTERNATING LAYERS WITH OCCASIONAL GRAVEL ≤ 1/8" Ø MOTTLED & SLIGHTLY LAMINATED.					1320 1334	
71			5.0				SP SM							
72			5.0				SP SM SC							
73	16		100											
74														
75							SP SM SC							
76	17	8	5.0				SP SM GW	676.0' to 76.5' GRAVELS in SP-SM POORLY SORTED					1335 1348	
77			100											

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## Log of Soil/Core Boring T9-B10

Sheet 5 of 11

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.21e

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	RQD, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
77														
78	17		5.0 5.0				SP -GW	@ 77.0' TO 78.8' GRAVELLY SP-SM WITH TRACE CLAY POORLY SORTED						
79			(100)				SP -SM	@ 78.8' SP-SM WITH OCCASIONAL GRAVELS. LAMINATED FR OX						
80	8												1351 1405	
81							SP -GW	@ 80.5' TO 81.5' GRAVELS. SP-GW						
82	18		5.0 5.0				SP	@ 82.0' POORLY SORTED (SP) SAND GRADING INTO (FINING UP) MEDIUM COARSE SANDS & GRAVELS WITH SOME SILT						KELOE MATTY 714.901.7270 #14-1420 AUGERS TO -2.0ft bgs TO PLATE & CAP w/ TONS ASPHALT
83			(100)				SP-SM	@ 83.5' TO 83.7' SP-SM						1440-1500 S.B.
84							SP	@ 83.7' POORLY SORTED FIN. MED G.S. SAND WITH SOME GRAVELS & TRAIL SILT (SP)						1420. 1445 CLEAN 1445-1455 ASPHALT 1500 DEMOB RIG 1500-1530 CAMES. 1406 END OF C9.21
85														1019 START 09-22 0830-0845 TG 0900-0920 T.C. 0920-1005 S.D CORE RIG + CPT T9-B10, T9-C13 C12 0925-1010 R16 SETUP CORE 1010-1045 CPT CORE T9-B10, T9-C13 C12
86														
87	19		3.0 5.0				SP -SM ML	@ 86.0' SILTY CLAYEY FIN. GR. SAND TO SILT (ML) GRADATION @ ± 86.3' OLIVE (SY 4/4)						
88			(60)				NK	NCR 87.5' TO 89.5' GROUNDUP. SLOUGH PACKED INTO SAMPLER.						@ 1015 60.0 H2S:0.0 LEL:0 02:20.9
89														
90	9						ML NCR	NCR @ 90.0' TO 90.5'						1020 1048
91			4.5 5.0				SP	@ 90.5' OF						
92	20		(90)				SP -SM -ML	@ 91.0' SP-SM GRADING & ATTENUATES INTO SILT (ML) CLAYEY SILTY V. FIN. GR. SAND AND SILT LAYERS						
93														

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## Log of Soil/Core Boring T9-B10

Sheet 6 of 11

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.21f



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type	Number	Blows per 6 inches			
93							SP							
94	20	9	4.5 5.0 (90)				SP - SM ML							
95							C	(AS ABOVE) ML ALTERNATING WITH LAYERS OF SILTY CLAYEY FINE SANDS.					1049 1106	
96							SP - SM - SC	SP-SM-SC MOTTLED & LAMINATED OCCASIONAL SUBANGULAR AND SUBROUNDED COARSE SAND TO GRAVEL APPROX 1/4" Ø OLIVE BROWN (2.5Y 4/3)						
97	21		5.0 5.0											
98			(100)											
99														
100		10												
101			5.0 5.0					C 100.3' (SP) V. FINE TO FINE SAND WITH SOME SILT DARK YELLOWISH BROWN (10YR 4/4 - 4/6)					1107 1123	
102														
103	22		(100)				ML SP-SM - SC	C 102.0' (ML) SILT ALTERNATING LAYERS OF CLAYEY SILTY FINE SAND SP-SM-SC						
104							ML SP-SM - SC	C 103.2' to 103.4' SAND (SP)						
105														
106			4.0 5.0				SP	C 105.3' GRADES INTO SILTY FINE SAND (SP) & OCCASIONAL GRAVELS, WHICH INCREASE WITH DEPTH.					1124 1140	
107	23	11	(80)											
108														
109							SC - GW	C 108.5' CLAYEY SILTY SANDS AND GRAVELS. POORLY SORTED.						

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# Log of Soil/Core Boring T9-B10

Sheet 7 of 11

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.21g

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type	Number	Blows per 6 inches			
109														
23							NUR	NUR @ 109 - 110.0'						
110								SP + GW/ WITH SOME SILT					1141 1159	
111							SP + GW/							
112			3.0 5.0											
24								@ 113.0' BIT BLOCKED BY COBBLE 4.5" Ø						
113			6.0				NUR	NUR 113.0' to 115.0'						
114														
115							NUR	NUR 115.0' to 118.5'					1200 1226	
116								WASHED OUT SANDS(?)						
117			1.5 5.0											
25														
118			8.0											
119							SP	V. fine to fine-gr SAND (SP) WITH SOME SILT, OCCASIONAL GRAVEL & 1/2" Ø						
120							NUR	DARK YELLOWISH BROWN (10YR 4/4 - 4/6)					1227 1249	
121								120.0' to 121.0'						
122			4.0 5.0				SP	SANDS AS ABOVE. ALTERNATING DARK YELLOWISH BROWN & OLIVE <del>SAND</del> (5Y 4/4)						1250-1310 L.A. COUNTY HEALTH DEPT'N SITE - VINCENT GRAVELS
123	26	12												
124								GRAVELS @ 124.0' ROUNDED ≤ 2.0"						
125													1252	

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# Log of Soil/Core Boring T9-B10

Sheet 8 of 11

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.21h



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
125								NCR 125.0' to 128.0'					1313	
126														
127	27	12	2.0 5.0											
128								SP @ 128.0' to 129.6' SP (AS ABOVE)						
129														
130								@ 129.6' CLAYEY SILTY GRAVELY SANDS V. FINE, CALICHE MOTTLED(?) CONCRETE(?) (SC-SP)					1319 1342	
131			4.0					NCR 130.0' to 131.0'						
132	28		5.0					@ 131.0' MED TO COARSE SAND (SP) & GRAVELS, OLIVE						
133														
134								@ 133.5' SILTY FINE GR SAND SP-SM AND GRADES INTO SC-SP-SM - GWL WITH DEPTH						
135								NCR 135.0' to 136.3'					1344 1407	
136														1415 - CLEAN UP & ASPHALT PATCH
137		13	3.7 5.0					@ 136.3' F to MED-GR SAND (SP) WITH TRACE SILTS. OCCASIONAL SUB-ANGULAR & SUB-ROUND GRAVELS ≤ 1/2"						
138	29							@ 139.0' COARSE SANDS & GRAVELS						
139								@ 139.9 SP-SM						
140								SP-SM					1409 0954	DNID OF (P) 092215
141	30		1.2 5.0					NCR 140						0900-0915 TC. 0915-0945 RIG 0945-0954 CPT GETUP 0954-0940 SB.

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# Log of Soil/Core Boring 79-B10

Sheet 9 of 11

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.21i

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
141														
142	30		1.2 5.0				NCR							
143														
144							SP	c 143.8 TO 144.8 Fm. to med. gr SAND SOME COARSE SANDS. POORLY SORTED (SP)						
145							SP-SM	c 144.8' SP-SM					0955 1020	
146	13						NCR	NCR 145.0' to 148.5'						
147	31		1.5 5.0											
148														
149							SP	c 148.5 Fm. COARSE SANDS WITH GRAVELS $\leq \frac{1}{2}$ " $\phi$						
150								c 149.0' SP Fm. to med. GR SAND AND SOME SILT. OCCASIONAL COARSE SAND.					1022 1043	
151							NCR	NCR 150.0' to 152.5'						
152	32													
153								c 152.5' SANDY Fm. (SP) Fm. gr. SAND WITH TRACE SILTS OCCASIONAL COARSE SAND AND SUBROUNDED GRAVEL $\leq \frac{1}{10}$ " $\phi$						
154							SP	GREENISH BLANK (GLX 1064 2.5/1)					1045 1106	
155			3.3 5.0				NCR	NCR c 155.0' to 156.7'						
156	33	14												
157														

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## Log of Soil/Core Boring 79-8/0

Sheet 10 of 11

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.21j

Depth, feet	SOIL/ROCK CORE						MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number		Type Number	Blows per 6 inches				
157													
158	33	14	33	5.0			2156.7' Fz-gr. SAND (SP) WITH SOME SILT (AS ABOVE)						
159													
160							NCR 2160.0' to 162.5'					1107 1130	
161													
162	34		2.5	5.0			2162.5' SP AS ABOVE						1145-1258 PULL OUT AUGERS & STEMS
163							Fz-gr SAND WITH SOME SILT AND OCCASIONAL FOSSIL/SHELL FRAGMENTS.						1304-14 CLEAN UP & GRout & CEMENT CUTO 0-12"
164							2164.5' HARD/STRONG SAND CEMENTED						
165							TD. 165.0'					1132	
166							G420 @ ± 33.0' ?						
167													
168													
169													
170													
171													
172													
173													

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## Log of Soil/Core Boring T9-B10

Sheet 11 of 11

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.21k

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type	Number	Blows per 6 inches			
0							Asp	0-4" ASPHALT						
							concr	4"-10" CONCRETE						
1								10" to 6.0' Fin DARK BROWN clayey SILTY SAND with GRAVELS						
2							2A							
3														
4														
5													1053	
6														
7	1		5.0 5.0				SP -SM	6.0' Qal YOUNG ALLUVIAL BROWN SILTY fn. SAND TO SANDY SILT few GRAVELS & CLAY & TRAC CLAYS						
8			100											
9														
10													654 1102	
11	1		5.0 5.0											
12	2						SP -GME	11.0' INCREASED COMPACT SANDS & GRAVELS.						
13							SP -GME							

DATE(S) DRILLED: 09/29, 30, 10/01, 10/02/15

DRILL METHOD: CONTINUOUS DRY CORE

DRILL EQUIPMENT: CME

DRILL CONTRACTOR: MARTINE DRILLING

BIT SIZE / TYPE: 8"φ / H03

HOLE COMPLETION:

LOGGED BY: M. ESPINOZA

CHECKED BY:

HOLE INCLINATION: 90°

GROUND ELEVATION:

TOTAL DRILLED DEPTH: 170.0'

GROUNDWATER LEVEL: ± 34.0'

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## Log of Soil/Core Boring T9-B11

Sheet 1 of 11

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.22a

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
13								SP @ 12.5' to 13.9' silty sand (SP)						
14	1		100											
15							SP SM						1103 1112	
16														
17			5.0 5.0				SP GW	@ 16.5 INCREASE COARSE SANDS & GRAVELS						
18	3		100					SP WITH SILT						
19							SP	@ 18.0' SP GRADATION						
20	2						SP SM	@ 19.0' SP-SM					1113 1120	
21								ALTERNATING SP-SM TO SP fin-gr SANDS. OCCASIONAL GRAVELS & 1/4" & COARSE GRAVEL SAND						
22			5.0 5.0				SP							
23	4		100											
24														
25								SP (AS ABOVE) v. fin gr to fin-gr SANDS SOME SILT & COARSE GRAVELS					1121 1129	
26														
27	5		5.0 5.0											
28	3		100				SP-SM SP SP SM	@ 27.8' ML OR SP-SM TO 28.0 28.0' to 28.2' SP GRAVELS & SP-SM						
29														

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring 79-B11

Sheet 2 of 11

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.22b



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
29	5						SP - SM	@ 29.5' SP, fm-med SANDS						
30		3						ALTERNATING SP & fine-gr to fine to med to coarse SANDS, TRACE SILTS					1130 1142	
31			4.8				SP							
32			5.0											
33	6							@ 33.4' GRAVELS & COARSE SANDS -						
34							GW - SP	WET @ 34.0'						
35							NCR	NCR 34.8' to 35.0'					1143 1155	CHATTERING @ 34.0'
36							SP - GW	(SP) MED GR TO COARSE GR SANDS & GRAVELS, TRACE SILT						
37			4.2 5.0											
38	7						SP-SM	SP-SM @ 37.8' to 38.2'						
39							GW - NCR	NCR @ 39.2' to 40.0'						
40	4							fm to COARSE SANDS AND GRAVELS THROUGHOUT TRACE SILT					1156 1208	
41							SP - GW							
42	8		5.0 5.0											
43			100											
44														
45													209	

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## Log of Soil/Core Boring T9 B11

Sheet 3 of 11

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.22c

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
45							SP	fine gr SAND TO MED GR SAND (SP)					1228	AMANDA ? @ 1.1215
46			2.2 5.0											
47	9						SW NCR	247.0' GRAVELS NCR 47.2' to 50.0'						
48														
49														
50	5						SP SM	ALTERNATING (SP-SM) & mostly SP					1232 1245	
51			5.0 5.0											
52	10		(10.0)				SP	@ 52.0' to 52.8' med. GR SAND						
53								@ 52.8' SP-SM						
54							SP SM							
55								SP-SM AS ABOVE LAMINATED					1246 1254	
56								@ 56.0' SANDS (SP) fining upward. fi-gr to COARSE GR. SAND & SOME GRAVEL LAYERS LAMINATED WITH SILT IS PRESENT IN SOME LAYERS						
57	11		4.5 5.0				SP							
58														
59														
60	6						NCR	NCR 59.5' to 60.0'					1255 1305	
61	12		4.0 5.0				NCR	NCR 60.0' to 60.2'						

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## Log of Soil/Core Boring T9-B11

Sheet 4 of 11

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.22d

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES			Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches	Strength			
61														
62	12	6	4.6 5.4				SP	MED TO COARSE SP TO 62.8'						
63							SP	@ 62.8' v. fine to med-gr SAND WITH SILT & SILTY SAND TO SILT LAYERS SP-SM						
64							SP SM	@ 63.6 COARSENING UP TO MED SAND @ 64.7' SILT ML						
65							ML							
66							CL	(ML) (CL) SILT & CLAYEY SILT WITH OCCASIONAL (SP-SM) & CLAYEY SILT MED-GR SAND (SM)					1306 1317 OVERHEATED CPT RIG BREAK DOWN 1305-1420	
67	13		5.0 5.0											
68			100											
69														
70	7						SP SM	fine SAND WITH SILT AND SANDY SILT					1318 1329	
71														
72	14		5.0 5.0				ML	@ 72.8' (ML)						
73			100				SP SM							
74							SP	@ 74.0' (SP) Lr to MED-GR SAND						
75			100				SP SM	ALTERNATING (SP-SM) TO (ML)					1330 1342	
76	15	8	5.0 5.0				ML	@ 76.0' INCREASE SILTS (ML)						
77														

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

# Log of Soil/Core Boring T9-311

Sheet 5 of 11

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.22e



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES			Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type	Number	Blows per 6 inches	Strength		
77							SP							
78	15		5.0 5.0				SP GW	@ 78.0' SP WITH SOME SILT & GRAVELS						
79														
80	8						ML	@ 80.0' to 80.2' (ML) SILT					1344 1355	
81			5.0 5.0				SP SM	@ 80.2' GRAVELLY SAND WITH SOME SILTY LAYERS TO SANDY SILT						
82														
83	16						SP GW	@ 82.2' SANDY GRAVELLY						
84														
85								@ 83.2' FINE GR SAND WITH SOME SILT & GRAVELS.						
86								SANDS (SP) WITH SANDY SILTY THIN LAYERS.					1358 1412	
87	17		5.0 5.0				ML	@ 86.5' to 87.5' SILT WITH SOME SANDY SILT & CLAY						
88	9							@ 87.5'						
89							SP	SP SANDS WITH GRAVELS & SOME SILT						
90														
91	18		4.4 5.0				ML	@ 91.0' SILT WITH SP-SM THIN LAYERS						
92							SP SM	silty fine-gr SAND to fine-gr. SAND & SOME GRAVELS AT 94.2'						
93														

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## Log of Soil/Core Boring T9. B11

Sheet 6 of 11

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.22f

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES			Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches	Strength			
93							ML							
94	19	9					SP -SM							
95							NCR	NCR @ 94.3' to 95.0'					1016	
								95.0' to 95.8'					1032	
							SP	MED GR SAND & GRAVELS						
96							SP -SM	@ 95.8' SP-SM-SC & GRAVELS POORLY SORTED						
97	19		5.0				SP -GW	@ 96.5' SP-GW MED TO COARSE GR SAND & GRAVELS						
98			5.0				SP	@ 98.0' SP WITH SOME SILT						
99							SP -GW	@ 98.6' SANDS & GRAVELS ≤ 2.0" φ						
100	10						NCR	NCR 100.0' to 101.5'					1033	1050-1053
101													1115	HEAVE & NON AVG 8 STUCK POUND W/ HAMMER TO LOOSEN PULLED UP & DUMPED SLOWLY
102	20		3.5				SP	@ 101.5' MED TO COARSE SAND (SP) AND "BASIC" GRAVELS ≤ 1.0" φ						
103			5.0											
104							ML	@ 103.2' SILT <del>AND</del> TO VERY FINE SANDY SILT WITH TRACE CLAYS OLIVE (SY 4/3) LAMINATED LAYERING TO SLIGHTLY MOTLED						
105								@ 105.0' to 107.5'					1116	
106							SP -SM	SP-SM MOTLED OLIVE (SY 4/3) AND SLIGHT LAMINATION					1133	
107	21	11												
108							ML -CL	@ 107.5' ML TO CL VERY DARK INCREASE CLAYS WITH DEPTH GRAYISH BROWN (SY 3/2)						
109														

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T9-B11

Sheet 7 of 11

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.22g



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
109	21		5.0 5.0				ML -CL							
110		11					SP -SM	@ 110.0' to 114.2' SP-SM WITH ALTERNATING ZONES/ LAYERS (THIN) ML MOTTLED CLWP. (GY4/3) & FeOx staining where saturated.					1134 1150	
111														
112			5.0 5.0											
113			(100)					C 112.8' CALICHE MOTTLED to 113.3' @ 114.0' (SP) R. g SAND C 114.2' ML-CL (AS ABOVE)						
114							SP -ML -CL							
115													1152 1209	
116			5.0 5.0				SP -SM	@ 115.6' (SP-SM) R. g. - sandy SILT & SOME COARSE GRAINS.					1210-1320 HEAD CHAIN BRAKE, REPLACE & FIX	
117	22		(100)				ML -CL	@ 117.0' (ML-CL) MOTTLED & CALICHE SOME R. g. - sandy silty layers.					1336	
118														
119														ETE 1345 T9-C11 & NA T9-C10 T9-C9
120	12						SP						1337 1358	
121							SP -SM	@ 120.5' to 122.5' (SP-SM) ALTERNATING LAYERS FeOx where SATUR						
122	23		5.0 5.0											
123			(100)				ML -CL	@ 122.5' (ML-CL) with some SP-SM & SP THIN LAYERS & ABUNDANT CALICHE, DECREASES @ ABOUT 123.0'						
124														
125													1359	

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CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE  
CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY  
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Log of Soil/Core Boring T9-B11

Sheet 8 of 11

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.22h

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES			Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type	Number	Blows per 6 inches	Strength		
125							ML	ML - CL AS ABOVE IN INTERLAYERED WITH SP-SM & SC						1424
126							CL	CLAYE SILTY FINE GR SAND. MOTTLED & LOC W/ HTRC SANDIER						
127	24		5.0 5.0				SC							
128							SP-SM							
129														
130	13						SP	GRADES WITH SP-SM & SP WITH GRAINS						1428
131							SP							END OF 04-30-15
132	25		5.0 5.0				SP	SP 2.2 CLAYE MOTTLED WITH SP						STATION 10-01-15
133							SP	GRADES WITH SP 2.2 CLAYE MOTTLED WITH SP						0846-0900 TG
134								SP 2.2 CLAYE MOTTLED WITH SP						0900-0915 TC
135								SP 2.2 CLAYE MOTTLED WITH SP						0915-0930 CAT 1
136								SP 2.2 CLAYE MOTTLED WITH SP						0930-0956 SB CAT 1
137	26		1.0 5.0					SP 2.2 CLAYE MOTTLED WITH SP						CAT 2
138								SP 2.2 CLAYE MOTTLED WITH SP						CAT 2
139	14							SP 2.2 CLAYE MOTTLED WITH SP						0930-1100 GED 15/11
140	27		2.5 5.0					SP 2.2 CLAYE MOTTLED WITH SP						SET 3
141								SP 2.2 CLAYE MOTTLED WITH SP						

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## Log of Soil/Core Boring T9-B11

Sheet 9 of 11

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.22i

Depth, feet	SOIL/ROCK CORE					Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES			Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number		Type	Number	Blows per 6 inches	Strength		
141							NCR 140.0' to 142.5'						
142													
143	27		2.5 5.0				@ 142.5' SP fin to med-gr SAND LIGHT OLIVE BROWN (2.5Y 5/3) WELL SORTED. SOME SILT?						
144													
145	14						NCR 145.0' to 148.5'					1106 1132	
146							NCR						
147	28		1.5 5.0										
148													
149							SP @ 148.5' fin to coarse SANDS GRAVELS.						
150							SP @ 148.8 fin-gr SAND (SA) WITH TRACE SILTS GREENISH GRAY (4.5Y 5/6Y 5/1)					1134 1159	
151	29		1.3 5.0				NCR 150.0' to 153.7'						
152	14												
153													
154							SP @ 153.7 (SP) SANDS and GW (GW) GRAVELS POORLY SORTED LIGHT OLIVE BROWN (2.5Y 5/3 = 5/4)					1201 1224	
155							NCR 155.0' to 157.7'						
156	30		2.3 5.0										
157													

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## Log of Soil/Core Boring 79-B11

Sheet 10 of 11

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.22j



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
157							NCR	SAMPED FM (?)						
158	30	14					SP	@ 157.7 MED TO COARSE SAND (SP) AND OCCASIONAL GRAVEL <u>ROUNDED</u> SOME SILTY SAND						
159								DARK GREENISH GRAY (GLY 1 10 Y 4/1)						
160							GW SP	ABUNDANT GRAVELS @ 159.7' NCR 160.0' to 162.2'					1225 1244	1
161			2.8 5.0											
162	31						SP	@ 162.2' M-MED-GR SAND (SP) SOME COARSE SAND and GRAVELS $\leq 1/2"$						
163								DARK GREENISH GRAY (GLY 1 10 Y 4/1)						
164								@ 164.8' COBBLES AND GRAVEL						
165	15						GW NCR	NCR 165.0' to 167.5'					1245 1310	
166	32													
167			2.5 5.0											
168							SP	@ 167.5' to 170.0' M to MED-GR SAND (SP) SOME COARSE SANDS WITH DEPTH OCCASIONAL GRAVEL $\leq 1/2"$						1330-1415 CLEAN UP & HOT ASPHALT PATCH TOP 1430-1500 SB 1445-1530 TL & 2 DRUMS
169														
170								TD 170.0'					1312	END 10-01-15
171													START 10-02-15	0855-0900 TG 0900-0920 TL 0915-0930 RIC 0945-0950 SB 1216, CPT, CHAPER 0945-1110 PULL TUBES 1115-1200 GRIND BJT & CLEAN UP & CONC. PATCH
172														
173														

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## Log of Soil/Core Boring T9-B11

Sheet 11 of 11

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.22k

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
0							ASPH	0-4" ASPHALT						0830-0845 TQ
							CONC	4"-10" CONCRETE						0900-0915 TC
1								10" TO 6.0' Fill, SF.						0915- GFC/15.0
								DARK BROWN TO BROWN						0935-0950 SB
2								SILTY CLAY WITH SOME						0955-1005 R12
								SAND AND ROCK FRAGMENTS						SET UP
3							sf							1012-1014 ASPHALT
4														CONC CHIP
5														1015-1025 HA
														10" - 6.0'
6								6.0'						1032
7			5.0				Qal	CLAYEY SILTY SAND TO SANDY						1035
			5.0				sp	SILT OCCASIONALLY IN GRAVEL						60.0 15:10.0
8							sm	SILT MOTTLED TO SL. LAYERED						62.0 02:20.9
							bl	DARK YELLOWISH BROWN (10R 4/4-3/4)						
9														
10								(AS ABOVE) SP-SM & SL						1038
								SOME GRAVELS $\leq \frac{1}{2}" \phi$						1041
11			5.0											
12			5.0											
							SP							
13							TGW							

DATE(S) DRILLED: 10-16 &amp; 10-19 &amp; 20-15

DRILL METHOD: DRY CONTINUOUS CORE

DRILL EQUIPMENT: CME 75

DRILL CONTRACTOR: MARTIN DRILLING

BIT SIZE / TYPE: 8" Ø / HQ3

HOLE COMPLETION:

LOGGED BY: WA ESPM102A

CHECKED BY:

HOLE INCLINATION: 90°

GROUND ELEVATION:

TOTAL DRILLED DEPTH: 185.0'

GROUNDWATER LEVEL:

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## Log of Soil/Core Boring T9B12

Sheet 1 of 12

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.23a



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES			Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches	Strength			
13							SP -GW							
14	2	1	100				SP -SW	@ 14.2' Finer, sandy silt grades into fine-grained with some gravel $\leq \frac{1}{2}" \phi$ @ 15.2, trace silts					$\frac{1042}{1053}$	
15							SP							
16			48				SP							
17			50				SC	@ 17.0' (SC) with gravels poorly sorted						
18	3		96				SP -GW	@ 17.4' gravels & sand (SP-GW)						
19							SC -SP	@ 18.6' clayey silty sand with some gravels to v.f. sand						
20	2						NCR SC -SP	NCR @ 19.8' to 20.0'					$\frac{1054}{1704}$	
21							ML	@ 20.4' silt to v.f. sandy silt with occasional gravel $\leq \frac{1}{2}" \phi$						
22	4		38											
23			50											
24			76				SP-GW	@ 23.4' grades into silty sand & gravel SP-GW						
25							NCR	NCR @ 23.8' to 25.0'						
26							SP	fine gr sand to fine-gr sand (SP) with gravels $\leq \frac{1}{4}" \phi$					$\frac{1105}{1111}$	
27	53		50				SC	@ 25.8' grades into clayey silty v.f. to fine-gr sand SC with occasional gravel $\leq \frac{1}{4}" \phi$ very dark grayish brown (2.5Y 3/2) to dark olive brown (2.5Y 3/2)						
28			50											
29			100											

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## Log of Soil/Core Boring T9B12

Sheet 2 of 12

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.23b

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
29														
30	5							SP SA					11/2 1121	
31	3		4.8 5.0					230.6' GRAPES INTO (SC) CLAYEY SILTY SAND OCCASIONAL GRAVEL ≤ 1/2" Ø SUBANGULAR OCCASIONAL SANDIER LAYERS						
32							SC							
33	6		(96)											
34														
35								WET @ 35.0' (GH20?)					1122 1130	
36			2.5 5.0					SP GW						
37	7		(50)					236.0' SANDS & GRAVELS WITH SOME CLAYS & SILT						
38							NCR	NCR 37.5' to 40.0'						
39														
40	4							NCR ENTIRE R8 @ 40.0' to 45.0'					1131 1143	
41							NCR							
42	8		(0)											
43														
44														
45													1143	

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## Log of Soil/Core Boring T9B12

Sheet 3 of 12

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.23c

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
45							SP	@ 45.0' fin-med-gr SAND					1152	
46							SP	@ 45.5' ALTERNATING LAYERS						
47	9	4	5.0				SP	OF SPSSM. SILTY V-fine SAND						
			5.0				SM	TO SANDY SILT.						
48							SP	@ 47.5' INCREASE SANDS TO SP						
49							SL	@ 48.2' (SL) CLAYEY SILTY SAND						
50							SP	@ 48.8' GRAVELLY SAND TO						
							GW	SAND & GRAVELS TO					1152	
								COBBLES					1203	
51														
52	10		5.0					"SOUR"? GRAVEL BASEL CONTACT $\pm 30-40^\circ$						
53			5.0					@ 52.6' (SP) fin-gr SAND WITH						
								SOME SILT OLIVE (SY 4/3-4/4)						
								& SOME FINE STAINING						
54							SP							
55								@ 55.0' fin-gr SAND (SP) AS ABOVE					1204	
								SLIGHT INCREASE IN SILTS					1215	
56								AND GRAVELS AT 58.0' AND						
57	11		5.0					59.4'						
			5.0											
58							SP							
							GW							
59														
60							SP							
							GW							
61	12	6	4.5										1216	
			5.0										1227	

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## Log of Soil/Core Boring T9B12

Sheet 4 of 12

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.23d



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
61							SP	fin. to coarse gr. sand & basal						
							- GW	GRAVELS (fining upwards)						
62			4.5				SP	@ 61.9' silty fin-gr sand to						
12			5.0				- SM	sandy silt - trace clays						
63								and occasional gravel						
								$\leq 1/2"$ $\phi$						
64							SC	clayey silty sand with						
							- GW	GRAVELS						
								near 64.5' to 65.0'						
65	6						SP	fin. gr. to coarse sands & fin-gravel					1228	
								at base					1243	
66							SP	CONTACT $\pm 30 - 40^\circ$						
			4.5				- SM	fin. sandy silt to silty fin sand						
67			5.0					and some pebbles $\leq 1.0"$ $\phi$						
13							SP	starting at 67.0'						
							- SM							
68							+ GW	@ 67.0' expands into fin-gr sandy						
							SP	silt to silty fin-gr sand						
							- SM	@ 68.7' contact subhorizontal						
69							ML	San Pedro fm(?) greenish black						
								near 69.5' to 70.0' (10Y to 10GY 2.5/1)						
70								@ 70.0' (ML) as above					1244	
													1257	
71							ML							
			4.8					@ 71.9' to 72.2' FAULT(?) ZONE						
72	14		5.0				SC	CLAYEY TO SILTY fin-gr sand and						
							- SP	GRAVELS. FR & CH OK						
73							- SM	GREENISH GRAY (10GY 5/1)						
								& LIGHT OLIVE BROWN (2.5Y 5/6)						
74								"HARD" GRAVELS						
								@ 72.2' MOTTLED CLAYEY SILTY fin-gr sand						
								to silty sand to sandy silt						
								NCR 74.8' to 75.0'						
75	7						SC						1258	
							- SP						1312	
							- SM							
76	15		4.5				- SP	GRAVELS						
			5.0				- SM							
								GRAVELS						
77							GP							

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## Log of Soil/Core Boring T9B12

Sheet 5 of 12

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.23e

Depth, feet	SOIL/ROCK CORE						MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number		Type Number	Blows per 6 inches				
77													
78	15	7	(90)				SP → DARK GREENISH GRAY (10Y 4/1) SP ± 70-80° CONTACT OLIVE BROWN (2.5Y 4/3) GRAVEL TO COBBLE @ 77.9'						
79							SP → ALTERNATING SILTY FINE SAND TO SANDY SILT WITH SOME GRANULES SOME CLAY						
80												1313 327	
81			5.0				SP → 280.5' FINE SAND WITH TRACE SILTS						
82	16		5.0				SP → 281.2' SILTY FINE SAND TO SANDY SILT ALTERNATING LAYERS 282.0' SILT & CLAY WITH TRACE SP-SM THIN LAYERS INCREASE CLAYS WITH DEPTH VERY DARK GRAYISH BROWN (2.5Y 3/2) AND VERY DARK GREENISH GRAY (10Y 3/1) LAYERS						
83			(100)										
84							ML CL						
85	8											1328 342	
86													
87	17		5.0 5.0				SP → 287.0' FINE SAND, TRACE SILT 287.5' GRADES INTO ALTERNATING LAYERS OF SP-SM.						
88			(100)										
89							SM → SOME GRAVELS @ 88.8' TO 88.9' ML → 289.2' ML TO CL WITH SOME SANDIER TO SILTY SAND LAYERS. OLIVE (5Y 4/3) AND OLIVE BROWN (2.5Y 4/3)						
90												1343 1402	
91	18	9	5.0 5.0				ML CL						
92													
93													

THIS LOG IS A REASONABLE INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND AT OTHER TIMES MAY DIFFER. INTERFACES BETWEEN STRATA ARE APPROXIMATE. TRANSITIONS BETWEEN STRATA MAY BE GRADUAL.

## Log of Soil/Core Boring T9812

Sheet 6 of 12

Westside Purple Line Extension - Section 2  
Beverly Hills, California  
Project No. 4953-11-1423

amec foster wheeler



Figure  
A-1.3.23f



Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches				
93														
94	17		100				ML CL	CLAYEY SILT TO SILTY CLAY (ML-CL) WITH OCCASIONAL SP-SM LAYERS						
95	9												1403 1416	
96														
97	19		5.0 5.0					297.7' (SP-SM) WITH CLAY SILTY SANDS TO SANDY SILT						
98			100				SP SM	MOTTLED OCCASIONAL PEBBLE OR GRAVEL $\leq 1/2"$						
99														
100													1414 1481	
101														
102	20		5.0 5.0				ML CL SP-SM	ALTERNATING ML-CL & SP-SM LAYERS FROM $\pm 101.5'$						
103			100				ML CL SP-SM							1445-1525 CLEAN SILENT 3 MIN. RATED 1450-1545 SB 4 DRUMS 1545-1600 TC
104							ML CL							
105							SP SM							10-16-15 1432 END OF FRI 1037 1045-0900 TQ 0900-0915 TC 0900-1020 5 LBS. PAPERED IN MARK ZONE - SITED 4, SILT AND SOME BEFORE 1010-1030 RIN SETUP 0915-1020 SB
106							ML CL	CLAYEY SILT TO SILTY CLAY AND OCCASIONAL V.F.G. SANDY SILT MOTTLED						
107	21		5.0 5.0					DARK GREENISH GRAY (SGY 4/1) AND OLIVE BROWN (2.5Y 4/3-4/4)						
108			100											
109														

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## Log of Soil/Core Boring T9812

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Westside Purple Line Extension - Section 2  
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Figure  
A-1.3.23g

Depth, feet	SOIL/ROCK CORE						Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES			Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number			Type Number	Blows per 6 inches					
109	21	10					ML								
110							CL	2109.0' GRADES INTO SANDIER CLAYEY SILTY SAND						1038 1102	
111							ML	2111.0' CLAYEY SILT TO SILTY CLAY.							WHITE BMM OBSERVED ASH/CLAY IF WE CAN NOT MAKE NOISE.
112	22		5.0				CL								
113			5.0				SC	2113.2' GRADES INTO (SC) 2114.0' SILTY FINE SAND OCCASIONAL GRAVEL $\leq \frac{1}{4}" \phi$							
114							SP								
115	11													1104 1120	
116															
117	23		5.0				GW	2117.0' GRAVELS $\leq \frac{1}{2}" \phi$							
118			5.0				SP	2117.3' V. FINE SAND							
119							ML	2117.6' SILTY CLAYEY CLAYEY SILT							
120							CL	2118.0' V. FINE SAND WITH SOME SILT							
121							SP	2118.4' SILTY FINE SAND & SANDY SILT							
122	24		5.0				SP	2119.0' SILTY CLAY TO CLAY							
123			5.0				ML	2119.6' CLAYEY SILTY V. FINE SAND.							
124							CL	ALTERNATING THIN LAYERS OF SILTY CLAY TO CLAY TO SILT TO SILTY FINE SAND TO SANDY SILT TO V. FINE SAND BUT PREDOMINANTLY CLAYEY SILT TO SILTY CLAY SL. MOTTLED TO SL. SUBHORIZONTAL LAYERS.					1121 1140		
125															1142

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## Log of Soil/Core Boring J9812

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Westside Purple Line Extension - Section 2  
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Figure  
A-1.3.23h



Depth, feet	SOIL/ROCK CORE						MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number		Type Number	Blows per 6 inches				
125													
126							ALTERNATING ML-CL TO SP-SM TO SL (AS ABOVE) OCCASIONAL GRAVELS $\leq 1/4"$					1200	
127			5.0				OLIVE GRAY (SY 4/2) TO DARK OLIVE GRAY (SY 3/2) AND DARK GREENISH GRAY SILT (SY 4/1) WITH FEW WHITE SANDS						ABUNDANT MUD RETURN
128	25	12	100				SL INCREASE SANDS WITH DEPTH						
129													
130												1205	
131							@ 130.0' SILTY FINE SAND (SP-SM) WITH SOME GRAVELS AND SP WITH GRAVELS $\leq 1/2"$ TRACE CLAYS.					1222	
132	26		100										
133													
134							GRAVELLED SILTY FINE SAND						
135	13											1225	
136												1248	
137	27		100				SILTY FINE SAND WITH OCCASIONAL GRAVELS TO SANDY SILT LAYERS SL MOTTLED.						ABUNDANT MUD RETURN
138													
139													
140	28	14					@ 139.4' to 139.7' CLAYY SILT TO SILTY CLAY					1254	
141												1313	

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## Log of Soil/Core Boring T9B12

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Westside Purple Line Extension - Section 2  
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Figure  
A-1.3.23i

Depth, feet	SOIL/ROCK CORE					Lithology	MATERIAL DESCRIPTION	SOIL SAMPLES		Strength	Cementation	Drill Time, 24-hr [Drill Rate, ft/hr]	FIELD NOTES
	Run No.	Box No.	Recovery, %	Fracture per Foot	R Q D, %	Frac. Dwg. Number		Type Number	Blows per 6 inches				
141													
142							ALTERNATING SILTY FINE SAND AND SANDY SILT WITH TRACE CLAYS SOME GRAVELS.						
28			5.0										
143			5.0										
			(100)										
144							INCREASE GRAVELS @ ± 143.0' to 144.5'						
145		14					ALTERNATION SP-SM AND ML-CL LAYERS AND SOME SL CLAY-SILTY FINE SAND LAYERS. MOTTLED (AS ABOVE) OCASIONAL GRAVELS ≤ 1/4" φ					1314 1333	
146			5.0										
147			5.0										
29			(100)										
148													
149													
150							SILT FINE SAND AND SANDY SILT WITH SOME GRAVELS ≤ 1/2" φ					1336 1355	
151			5.0										
152	30		5.0				FINE SAND WITH SILT @ 152.2' INCREASE GRAVEL ABUNDANCE AND SIZE ≤ 2.0" φ						
153			(100)										
154							SP @ 153.4 to 153.9' MED TO COARSE SAND @ 153.9' FINE SAND GRADUALLY INTX MED TO COARSE @ 154.5'					1357 1419	
155	15						@ 155.0' L to med-gr Sand (SP) @ 156.5' GRAVELS INTX MED-GR SAND						± 155 to 157 HEAVY SANDS
156	31		3.0 5.0										
157													

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## Log of Soil/Core Boring T9812

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Figure  
A-1.3.23j