POORLY GRADED SAND - wet, black, fine, strong hydrocarbon odor, asphaltic

Oily

SILTY SAND - wet

POORLY GRADED SAND - wet, fine to medium, asphaltic

(Continued on following figure)
Soil logged from cuttings only.  
Hand augered top 5 feet due to utilities.  
Ground water encountered at 35 feet.  
Installed 2 2-inch diameter groundwater monitoring wells extending to 65 feet and 100 feet, respectively. See well construction diagram for M-11.
4-inch thick Asphalt Concrete over 10-inch thick Concrete

FILL - CLAYEY SANDY SILT - moist, dark brown, no odor

CLAYEY SILT - moist, dark brown, trace fine sand, no odor

SILT - moist, dark brown, trace fine sand and clay, no odor

LEAN CLAY - moist, brown, medium plasticity, no odor

Olive

Black, siltier, trace asphaltic sand, weak hydrocarbon odor

CLAYEY SILT - moist, black, strong hydrocarbon odor
BORING M-12  (Continued)

DATE DRILLED:  June 12, 2009
EQUIPMENT USED:  Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION:  159 *
LATITUDE: 34.06318°  LONGITUDE: -118.36329

POORLY GRADED SAND - wet, black, fine, oily, strong hydrocarbon odor, asphaltic

Increasing medium sand

This record 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 Boring

MTA Westside Subway Extension
Los Angeles, California

LOG OF BORING
Project: 4953-10-1561  Figure: B-1.12b
**BORING M-12 (Continued)**

- **DATE DRILLED:** June 12, 2009
- **EQUIPMENT USED:** Hollow Stem Auger
- **HOLE DIAMETER (in.):** 8
- **ELEVATION:** 159 *
- **LATITUDE:** 34.06318°  **LONGITUDE:** -118.36329

---

### NOTES:

- Soil logged from cuttings only.
- Hand augered top 5 feet due to utilities.
- Ground water encountered at 50 feet.
- Installed nested soil vapor probes at 15 feet (green), 35 feet (red), 65 feet (blue), and 100 feet (yellow). See well construction diagram for M-12.

---

### LOG OF BORING

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**END OF BORING AT 101 FEET**

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Field Tech: PK
Prepared By: NH
Checked By:
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6-inch thick Asphalt Concrete and 8-inch thick Concrete over 12-inch thick Base Course

**SANDY SILT** - moist, gray and olive

**SILTY SAND** - moist, light brown to brown, very fine

Gray, less clay, natural organic odor

**SANDY SILT** - moist, gray, very fine grained sand

**SILTY SAND** - moist, gray, very fine

(Continued on following figure)
**BORING M-13 (Continued)**

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**DATE DRILLED:** August 3, 2009  
**EQUIPMENT USED:** Hollow Stem Auger  
**HOLE DIAMETER (in.):** 8  
**ELEVATION:** 155 *  
**LATITUDE:** 34.06333 °  
**LONGITUDE:** -118.36503

---

**NOTES:**

Soil logged from cuttings only.  
Hand augered top 6 feet due to utilities.  
Encountered high levels (>160 ppm) of hydrogen sulfide at 60 feet. Drilled stopped, called fire department. Left augers in hole and placed concrete patch on top of hole. Returned on August 13, 2009. Tip of augers had dark, fine Poorly Graded Sand.
**BORING M-14**

**DATE DRILLED:** June 16, 2009  
**EQUIPMENT USED:** Hollow Stem Auger  
**HOLE DIAMETER (in.):** 8  
**ELEVATION:** 147 *  
**LATITUDE:** 34.06367 °  
**LONGITUDE:** -118.36717

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- **CL**  
  - LEAN CLAY - moist, medium plasticity, some fine sand
  - Less plasticity

- **ML**  
  - SANDY SILT - moist, coarse grained sand
  - Green, some tar

- **SM**  
  - SILTY SAND - moist, dark green, some tar

*(CONTINUED ON FOLLOWING FIGURE)*

---

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

---

**LOG OF BORING**  
Project: 4953-10-1561  
Figure: B-1.14a
BORING M-14  (Continued)

DATE DRILLED:  June 16, 2009
EQUIPMENT USED:  Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION:  147 *
LATITUDE:  34.06367 °  LONGITUDE: -118.36717

This record 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.

Field Tech:  EMR
Prepared By:  NH
Checked By:

MTA Westside Subway Extension
Los Angeles, California

LOG OF BORING
Project: 4953-10-1561  Figure: B-1.14b
DATE DRILLED: June 16, 2009
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION: 147 *
LATITUDE: 34.06367°  LONGITUDE: -118.36717

POORLY GRADED SAND - wet, green

END OF BORING AT 100 FEET

NOTES:
Soil logged from cuttings only.
Hand augered top 5 feet due to utilities.
Installed nested soil vapor probes at 15 feet (green), 25 feet (red), 65 feet (blue), and 100 feet (yellow). See well construction diagram for M-14.
BORING M-15

DATE DRILLED: June 17, 2009
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION: 144 *

9-inch thick Asphalt Concrete
FILL - SANDY SILT - moist, brown, trace clay, no odor

CLAYEY SILT - moist, dark yellowish brown, some fine sand, low plasticity, no odor

END OF BORING AT 10 FEET

NOTES:
Soil logged from cuttings only.
Boring terminated at 10 feet due to sewer break.
**BORING M-15-alt**

**DATE DRILLED:** July 3, 2009  
**EQUIPMENT USED:** Hollow Stem Auger  
**HOLE DIAMETER (in.):** 8  
**ELEVATION:** 144 ft  
**LATITUDE:** 34.06418°  
**LONGITUDE:** -118.36937

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8-inch thick Asphalt Concrete
FILL - SILTY CLAY - moist, black, trace fine sand, no odor
FILL - CLAYEY SILT - moist, dark yellowish brown, some fine sand, no odor
Brick fragment
FILL - SILTY SAND - moist, fine to medium, trace gravel
WELL GRADED SAND - moist, dark yellowish brown, fine to coarse, some gravel, rock fragments, no odor
CLAYEY SILT - moist, olive brown, trace fine sand, no odor
SILTY SAND - moist, dark yellowish brown, fine to medium
CLAYEY SILT - moist, some fine sand
SILTY SAND - moist, dark yellowish brown, fine to medium, no odor
CLAYEY SILT - moist, dark olive brown, trace fine sand, no odor
SANDY SILT - moist, olive, no odor
SILT - moist, dark greenish gray, trace clay, trace fine sand, no odor

*(CONTINUED ON FOLLOWING FIGURE)*
BORING M-15-alt (Continued)

DATE DRILLED: July 3, 2009
EQUIPMENT USED: Hollow Stem Auger
HOLE DIAMETER (in.): 8
ELEVATION: 144 *
LATITUDE: 34.06418 °  LONGITUDE: -118.36937

Sandier

Wet

CLAYEY SILT - wet, dark olive gray, trace fine sand, no odor

Field Tech: PK
Prepared By: NH
Checked By:

(CONTINUED ON FOLLOWING FIGURE)
### BORING M-15-alt (Continued)

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<tr>
<td>ML</td>
<td>SANDY SILT - wet, dark greenish gray</td>
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<tr>
<td>SM</td>
<td>SILTY SAND - wet, dark greenish gray, no odor</td>
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**DATE DRILLED:** July 3, 2009  
**EQUIPMENT USED:** Hollow Stem Auger  
**HOLE DIAMETER (in.):** 8  
**ELEVATION:** 144 *  
**LATITUDE:** 34.06418 °  
**LONGITUDE:** -118.36937

---

End of Boring at 101 Feet

Soil logged from cuttings only.  
Ground water encountered at 45 feet.  
Installed nested soil vapor probes at 15 feet (green), 25 feet (red), 65 feet (blue), and 100 feet (yellow).
**BORING M-16**

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8-inch thick Asphalt Concrete

**FILL - SILTY CLAY** - moist, black, trace fine sand, no odor

**FILL - CLAYEY SILT** - moist, dark yellowish brown, some fine sand, no odor

Brick fragment

**FILL - SILTY SAND** - moist, fine to medium, trace gravel

**WELL GRADED SAND** - moist, dark yellowish brown, fine to coarse, some gravel, rock fragments, no odor

**CLAYEY SILT** - moist, olive brown, trace fine sand, no odor

**SILTY SAND** - moist, dark yellowish brown, fine to medium

**CLAYEY SILT** - moist, some fine sand

**SILTY SAND** - moist, dark yellowish brown, fine to medium, no odor

**CLAYEY SILT** - moist, dark olive brown, trace fine sand, no odor

**SILTY SAND** - moist, dark yellowish brown, fine to medium

**CLAYEY SILT** - moist, dark olive brown, trace fine sand, no odor

**SANDY SILT** - moist, olive, no odor

**SILT** - moist, dark greenish gray, trace clay, trace fine sand, no odor

---

*This record 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 BORING**

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

**PROJECT:** 4953-10-1561  
**FIGURE:** B-1.17a

Date Drilled: June 18, 2009

Equipment Used: Hollow Stem Auger

Elevation: 142 *

Latitude: 34.06386°  Longitude: -118.37115°
ELEVATION (ft) | DEPTH (ft)  
---|---

**BORING M-16 (Continued)**

**DATE DRILLED:** June 18, 2009  
**EQUIPMENT USED:** Hollow Stem Auger  
**HOLE DIAMETER (in.):** 8  
**ELEVATION:** 142 *  
**LATITUDE:** 34.06386 °  
**LONGITUDE:** -118.37115

---

**SANDIER**

| 
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| 
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| 
| 

**WET**

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| 
| 
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| 
| 

---

**CLAYEY SILT** - wet, dark olive gray, trace fine sand, no odor

---

Field Tech: PK  
Prepared By: NH  
Checked By: 

(continued on following figure)
Date Drilled: June 18, 2009
Equipment Used: Hollow Stem Auger
Hole Diameter (in.): 8
Elevation: 142 *
Latitude: 34.06386 ° Longitude: -118.37115

ML  Sandy Silt - wet, dark greenish gray

SM  Silty Sand - wet, dark greenish gray, no odor

End of Boring at 101 Feet

Notes:
Soil logged from cuttings only.
Ground water encountered at 45 feet.
Installed nested soil vapor probes at 15 feet (green), 25 feet (red), 65 feet (blue), and 100 feet (yellow). See well construction diagram for M-16.
ML

4-inch thick Asphalt Concrete and 8-inch thick Concrete over 6-inch thick Base Course

CLAYEY SILT - moist, black, no odor

CLAYEY SANDY SILT - slightly moist, dark gray, fine grained sand, no odor

CLAYEY SILT - moist, dark olive gray, trace fine sand, strong hydrocarbon odor

SILT - wet, dark yellowish brown, trace clay, some fine sand, no odor

CLAYEY SILT - wet, olive brown, no odor

(THIS RECORD 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.)

FIELD TECH: PK
PREPARED BY: NH
CHECKED BY: 

MTA Westside Subway Extension
Los Angeles, California

LOG OF BORING
Project: 4953-10-1561
Figure: B-1.18a
### BORING M-17 (Continued)

**DATE DRILLED:** June 28, 2009  
**EQUIPMENT USED:** Hollow Stem Auger  
**HOLE DIAMETER (in.):** 8

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**ELEVATION:** 140 *  
**LATITUDE:** 34.06548°  
**LONGITUDE:** -118.37795

- **ML** - SILT - wet, olive, some clay, weak hydrocarbon odor
- **ML** - Dark greenish gray
- **ML** - SANDY SILT - wet, dark greenish gray, fine grained sand, no odor

*(CONTINUED ON FOLLOWING FIGURE)*
LEAN CLAY - wet, dark greenish gray

END OF BORING AT 91 FEET

NOTES:
Soil logged from cuttings only.
Ground water encountered at 25 feet.
Installed nested soil vapor probes at 15 feet (green), 25 feet (red), 65 feet (blue), and 90 feet (yellow). See well construction diagram for M-17.
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**BORING M-18**

**DATE DRILLED:** June 19, 2009  
**EQUIPMENT USED:** Hollow Stem Auger  
**HOLE DIAMETER (in.):** 8  
**ELEVATION:** 279'  
**LATITUDE:** 34.06265°  
**LONGITUDE:** -118.41658°

**FILL**

- **WELL GRADED SAND - moist, fine to coarse**

- **SILTY SAND - moist, fine**

---

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

**LOG OF BORING**  
Project: 4953-10-1561  
Figure: B-1.19a
Date Drilled: June 19, 2009
Equipment Used: Hollow Stem Auger
Hole Diameter (in.): 8
Elevation: 279 *
Latitude: 34.06265°, Longitude: -118.41658

MTA Westside Subway Extension
Los Angeles, California

Field Tech: EMR
Prepared By: NH
Checked By:
**BORING M-18 (Continued)**

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**DATE DRILLED:** June 19, 2009  
**EQUIPMENT USED:** Hollow Stem Auger  
**HOLE DIAMETER (in.):** 8  
**ELEVATION:** 279 *  
**LATITUDE:** 34.06265 °  
**LONGITUDE:** -118.41658

**NOTES:**
- Soil logged from cuttings only.
- Hand augered top 5 feet due to utilities.
- Installed nested soil vapor probes at 15 feet (green), 25 feet (red), 65 feet (blue), and 100 feet (yellow). See well construction diagram for M-18.

**End of Boring at 100 Feet**
**BORING M-19**

**DATE DRILLED:** June 9, 2009  
**EQUIPMENT USED:** Hollow Stem Auger  
**HOLE DIAMETER (in.):** 8  
**ELEVATION:** 280 *  
**LATITUDE:** 34.05894 °  
**LONGITUDE:** -118.41602

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- **5-inch thick Asphalt Concrete over 25-inch thick Base Course**
- **FILL - CLAYEY SILT** - moist, dark yellowish brown, some fine sand, no odor
- **SILTY CLAY** - moist, dark brown, medium plasticity, no odor
- **Dark grayish brown**
- **LEAN CLAY** - moist, dark grayish brown, trace fine sand, no odor
- **Dark brown**
- **SILTY SAND** - moist, brown, fine, no odor

*(CONTINUED ON FOLLOWING FIGURE)*

---

**LOG OF BORING**  
**Project:** 4953-10-1561  
**Figure:** B-1.20a
POORLY GRADED SAND - moist, reddish brown, fine, trace silt, no odor

SILTY SAND - moist, dark reddish brown, no odor

Interbedded clay lenses

SANDY SILT - moist, dark brown, no odor

Shell fragments

END OF BORING AT 71 FEET

NOTES:

Soil logged from cuttings only.
Hand augered top 5 feet due to utilities.
Ground water not encountered at time of drilling.
Installed nested soil vapor probes at 15 feet (red), 40 feet (blue), and 70 feet (yellow). See well construction diagram for M-19.
FIGURES B-2.1A THROUGH B-2.19C
LOGS OF HOLLOW-STEM AUGER BORINGS (PE PHASE)
### BORING M-101

**DATE DRILLED:** 6/29/2011 - 6/30/2011  
**EQUIPMENT USED:** CME-75 HT, Martini Drilling  
**HOLE DIAMETER (in.):** 11.3  
**ELEVATION:** **

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**CLAYEY SILT (cl-ml) - (10YR, 2/2)** very dark brown, slightly moist, some tan colored caliche nodules present

**NATIVE**

**SILTY CLAY (cl) - (10YR, 6/2)** light brownish gray, slightly moist, abundant caliche nodules

**SILT (ml) - (10YR, 4/3)** brown, slightly moist, some oxidation staining, micaceous, crumbles easily

**SILTY CLAY (cl) - (10YR, 4/4)** dark yellowish brown, slightly moist, oxidation staining, caliche nodules present, micaceous

**SILTY CLAY (cl) - (10YR, 3/3)** dark brown, slightly moist, caliche nodules present, micaceous

**CLAYEY SILT (cl-ml) - (GLEY1, 3/10GY)** very dark greenish gray, slightly moist, some caliche nodules present, micaceous

**SILTY CLAY (cl) - (GLEY1, 3/10GY)** very dark greenish gray, slightly moist, caliche nodules present, micaceous

---

**FIELD GEO:** RM  
**PREPARED BY:** KP
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SILTY CLAY (cl) - (GLEY1, 4/5GY) dark greenish gray
Becomes saturated at 41 feet, mottled with abundant caliche nodules

CLAYEY SAND (sc) - (GLEY1, 3/5GY) very dark greenish gray, wet, fine to medium grained, micaceous

CLAYEY SILT to SILTY CLAY (cl-ml) - (GLEY1, 3/10Y) very dark greenish gray, moist to wet, one/single caliche nodule present, micaceous

SILT with SAND (ml-sm) - (GLEY1, 3/5GY) very dark greenish gray, wet, fine grained, micaceous, sulfuric odor (not registering on meter)

FINE to MEDIUM SAND (sp) - (GLEY1, 3/5GY) very dark greenish gray, wet, slightly micaceous, sulfuric odor (not registering on meter)

Same as above

Same as above

Same as above

Field Geol: RM
Prepared By: KP

MTA Westside Subway Extension
Los Angeles, California

LOAD OF BORING
Project: 4953-10-1561
Figure: B-2.1b
Same as above

NOTES:
Total depth = 81 feet bgs
Groundwater encountered at approximately 41 feet bgs
Hand augered to 6 feet bgs
The boring was initially drilled with 8-inch O.D. augers and later reamed with 11.25-inch O.D. augers.
Soil samples collected using an SPT sampler.
After reaming, a well was installed. See well construction diagram for details.

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<th>DEPTH (ft)</th>
<th>&quot;N&quot; VALUE</th>
<th>MOISTURE (% dry wt.)</th>
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<tr>
<td>Depth (ft)</td>
<td>Clayey Silty Sand (sm) - (10YR, 5/3) brown, slightly moist, fine to medium grained, mottled with beige caliche stringers</td>
<td>0.83 feet of Asphalt</td>
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<td>CLAYEY SILTY SAND (sm) - (10YR, 5/3) brown, slightly moist, fine to medium grained, mottled with beige caliche stringers</td>
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<tr>
<td>10</td>
<td>Same as above, also mottled with beige caliche nodules</td>
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<td>15</td>
<td>FINE SAND (sp) - (10YR, 4/2) dark grayish brown, saturated, micaceous</td>
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<tr>
<td>20</td>
<td>SILTY CLAY (cl-ml) - (10YR, 5/3) brown, slightly moist, caliche nodules present, some oxidation staining, rootlets present at 16.5 feet</td>
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<tr>
<td>25</td>
<td>Becomes mottled with beige caliche stringers and nodules, no rootlets present</td>
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<tr>
<td>30</td>
<td>Becomes very moist at 25.5 feet, possible water zone</td>
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<td>35</td>
<td>Becomes saturated from the addition of water</td>
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MTA Westside Subway Extension
Los Angeles, California

(Continued on following figure)
### LOG OF BORING (Continued)

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**NOTES:**
- Total depth = 66 feet bgs
- Groundwater encountered at approximately 25 feet bgs
- Punch augered with 8-inch O.D. auger
- Sandstone was encountered at 5 feet bgs
- The boring was initially drilled with 8-inch O.D. auger and later hand augered with 12-inch O.D. auger
- Hand augered to 5 feet bgs
- Total depth = 66 feet bgs
- Groundwater encountered at approximately 25 feet bgs
- Punch augered with 8-inch O.D. auger
- Sandstone was encountered at 5 feet bgs
- The boring was initially drilled with 8-inch O.D. auger and later hand augered with 12-inch O.D. auger
- Hand augered to 5 feet bgs

**FIELD GEOL:** RM
**PREPARED BY:** KP

---

**CLAY (cl) - (GLEY 2, 4/10) dark greenish gray, wet from the addition of water, jelly-bean sized caliche nodules present**

**CLAYEY SILT (ml) - (GLEY 2, 4/10) dark greenish gray, very hard, cracked**

**SILT (ml) - (GLEY 2, 4/10) dark greenish gray, very hard, wet, fine grained, white rootlets present**

**CLAY (cl) - dark greenish gray, hard, wet, trace of silt**

**SANDY CLAY with SAND (cl) - (GLEY 2, 4/10) dark greenish gray, wet, fine grained, white rootlets present**

---

**NOTES:**
- Total depth = 66 feet bgs
- Groundwater encountered at approximately 25 feet bgs
- Punch augered with 8-inch O.D. auger
- Sandstone was encountered at 5 feet bgs
- The boring was initially drilled with 8-inch O.D. auger and later hand augered with 12-inch O.D. auger
- Hand augered to 5 feet bgs
- Total depth = 66 feet bgs
- Groundwater encountered at approximately 25 feet bgs
- Punch augered with 8-inch O.D. auger
- Sandstone was encountered at 5 feet bgs
- The boring was initially drilled with 8-inch O.D. auger and later hand augered with 12-inch O.D. auger
- Hand augered to 5 feet bgs

---

**EQUIPMENT USED:**
- **HOLE DIAMETER (in.):**
- **ELEVATION:** **20110258**

**DATE DRILLED:** 3/2/2011 - 3/31/2011
**CME-75, Jet Drilling**

---

**B2SOIL_AMEC_PID  G:\PROJECT_DIRECTORIES\4953\2010\101561_METRO_WESTSIDE_EXTENSION\6.2.3.5_SUBSURFACE_GAS\3.2_ALL_FIELD_NOTES\LIBRARY_MACTEC_OCT11.GLB**

---

**THIS RECORD 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.**

---

**BORING M-102 (Continued)**
**BOARING M-103**

**DATE DRILLED:** 4/4/2011 - 4/7/2011

**EQUIPMENT USED:** CME-75, Jet Drilling

**HOLE DIAMETER (in.):** 10.5

**ELEVATION:** **

---

**0.5 feet of Asphalt**

**CLAYEY Silt (ml) - (10YR, 7/3)** very pale brown, slightly moist, some oxidation staining, micaceous, only 0.5 foot recovered

**Becomes (10YR, 4/3) brown**

**Fine Sand (sp) - (10YR, 4/4)** dark yellowish brown, slightly moist, oxidation staining, micaceous

**SAN PEDRO FORMATION (Qsp)**

**Sandy Clay to Silty Clay (cl) - (GLEY2, 4/5BG)** dark greenish gray, mottled with light gray caliche nodules and clayey zones, 0.5 feet of clayey sand at 15 feet

**Increased moisture**

**Clayey Sand (sc) - (GLEY2, 4/5BG)** dark greenish gray, moist, caliche nodules present

Groundwater encountered at 25-30 feet

**Fine to Medium Sand (sp) - (GLEY1, 3/10GY)** very dark greenish gray, wet, some clay

**Silty Clay to Clayey Silt (cl-ml) - (GLEY1, 4/5GY)** dark greenish gray, wet, mottled with caliche nodules

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(Continued on following figure)

Field Geol: RM

Prepared By: KP
### BORING M-103 (Continued)

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**CLAYEY SILT (ml) - (GLEY1, 4/5GY)** dark greenish gray, very moist, some caliche stringers and nodules present.
0.5 feet of sandy clay mottled with dark brown silt and caliche nodules at 41 feet.

**TAR IMPACTED SOILS**

**CLAYEY TAR SAND (sp) - (10YR, 2/1)** black to brownish black, wet, fine grained, strong tar odor, sticky, tar pods present.

**TAR SAND - black, odor, super saturated with tar**

Becomes very sticky.

Same as above, H2S release/odor.

No recovery.

Same as above.

Same as above.

**NOTES:**
- Total depth = 75 feet bgs
- Groundwater at 25-30 feet bgs
- Hand augered to 5 feet bgs
- The boring was initially drilled with 8-inch O.D. augers and later reamed with 10.5-inch O.D. augers.

**DATE DRILLED:** 4/4/2011 - 4/7/2011
**EQUIPMENT USED:** CME-75, Jet Drilling
**HOLE DIAMETER (in.):** 10.5
**ELEVATION:** **

**LOG OF BORING**

**Field Geol:** RM
**Prepared By:** KP

MTA Westside Subway Extension
Los Angeles, California

(Continued on following figure)
Soil samples collected using an SPT sampler. After reaming, a well was installed. See well construction diagram for details.
1.5 feet of Asphalt

SILTY SAND (sm)

FINE SAND (sp) - (10YR, 6/4) light yellowish brown

FINE SAND to SILTY SAND (sm) - (10YR, 5/3) brown

SAN FERNANDO FORMATION (Tf)

SILT (ml) - (10YR, 4/3) brown, slightly moist, some oxidation staining, micaceous, trace of hairline rootlets

CLAYEY SILT (ml) - (10YR, 5/6) yellowish brown, slightly moist, oxidation staining, mottled with beige and dark brown silt, caliche nodules present

Becomes (GLEY1, 4/5G) dark greenish gray at 15.5 feet, lightly mottled with caliche nodules and lighter gray silt

Groundwater encountered at 19.3 feet

SANDY SILT with CLAY (ml) - (GLEY1, 4/5G) dark greenish gray to (GLEY1, 2.5/10GY) greenish black, slightly moist, sulfuric odor, mottled with green silt and caliche nodules, some dark brown tar staining

CLAYEY SILT (ml) - (10YR, 2/1) black, slightly moist

Becomes sandier, gravel fragments present

TAR IMPACTED SOILS

FINE to MEDIUM TAR SAND (sp) - (10YR, 2.5/1) black, dry, cemented, micaceous, trace of coarse grained, tar infused

CLAYEY SILT (ml) - (GLEY1, 3/5G) very dark greenish gray, dry to slightly moist, mottled with tar pod, caliche nodules present

(Continued on following figure)
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<th>&quot;N&quot; VALUE</th>
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<td>50/5&quot;</td>
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</tr>
<tr>
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<td></td>
<td>50/6&quot;</td>
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</tr>
<tr>
<td>70</td>
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<td>75</td>
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<td>80</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**CLAYEY PETROLIFEROUS SILT (ml)** - black, slightly moist, tar odor, some mottling with beige colored silt

**TAR SAND to CLAYEY TAR SAND (sp-sm)** - black, odor, sticky, pure tar in sampler

**TAR SAND (sp-sm)** - black, odor, sticky, almost pure tar

Same as above

Same as above, 2-inch zone of possible shale and/or granite fragments present

Same as above, very thin bone fragments present

NOTES:
- Total depth = 66 feet bgs
- Groundwater not encountered at time of drilling
- Groundwater measured at 19.3 feet bgs on 4/27/2011
- Hand augered to 6 feet bgs
- The boring was initially drilled with 8-inch O.D. augers and later reamed with 10.5-inch O.D. augers.
- Soil samples collected using an SPT sampler.
- After reaming, a well was installed. See well construction diagram for details.
### LOG OF BORING

**BORING M-105**

**EQUIPMENT USED:** CME-75 HT, Martini Drilling  
**HOLE DIAMETER (in.):** 11.3  
**ELEVATION:** **

<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>&quot;N&quot; VALUE</th>
<th>MOISTURE (% of dry wt.)</th>
<th>PID</th>
<th>BLOW COUNT* (blows/ft)</th>
<th>SAMPLE LOC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>1/6&quot;</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>0.0</td>
<td>1/6&quot;</td>
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<tr>
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<tr>
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<td>0.0</td>
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<tr>
<td>5</td>
<td>0.5 feet of Asphalt</td>
<td></td>
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</tr>
<tr>
<td>5</td>
<td>0.67 feet of Concrete</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>7.85</td>
<td>Groundwater encountered at 7.85 feet</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>CLAYEY SILT to SILTY CLAY with SAND (cl-ml) - greenish black</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>SANDY CLAY (cl) - (10YR, 2/1) black, slightly moist</td>
<td></td>
<td></td>
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<tr>
<td>15</td>
<td>CLAYEY SILT to SILTY CLAY with SAND (cl-ml) - (10YR, 4/3) brown, slightly moist, some mottling present</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>CLAYEY SILT with SAND (ml) - (10YR, 5/4) yellowish brown, slightly moist, some oxidation staining, some mottling present</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>20</td>
<td>TAR IMPACTED SOIL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>TAR SAND (sp) - black, saturated in tar, odor, sticky</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>30</td>
<td>Same as above</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>CLAYEY PETROLIFEROUS SILT (ml) - black, tar pods present</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>SILT (ml) - greenish black, mottled, tar pods present</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>40</td>
<td>Becomes black</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

(Continued on following figure)
MTA Westside Subway Extension
Los Angeles, California

BORING M-105 (Continued)

EQUIPMENT USED: CME-75 HT, Martini Drilling
HOLE DIAMETER (in.): 11.3
ELEVATION: **

**NOTES:**
Total depth = 76.5 feet bgs
Groundwater not encountered at time of drilling
Groundwater measured at 7.85 feet bgs
Hand augered to 6 feet bgs
The boring was initially drilled with 8-inch O.D. augers and later reamed with 10.5-inch O.D. augers.

11.3 66

30.2 61

30.6 84

55

25

M-105   (Continued)

(BORING M-105 (Continued))

FIELD GEOLOG: RM
PREPARED BY: KP

B2SOIL_AMEC_PID  G:\PROJECT_DIRECTORIES\4953\2010\101561_METRO_WESTSIDE_EXTENSION\6.2.3.5 SUBSURFACE GAS\3.2 ALL FIELD NOTES\LIBRARY MACTEC OCT11.GLB
G:\PROJECT_DIRECTORIES\4953\2010\101561_METRO_WESTSIDE_EXTENSION\6.2.3.5 SUBSURFACE GAS\3.2 ALL FIELD NOTES\4953-10-1561_NEUHAUS_OCT 21 2011.GPJ 11/29/11
Soil samples collected using an SPT sampler. After reaming, a well was installed. See well construction diagram for details.

### LOG OF BORING

**BORING M-105**

(Continued)

<table>
<thead>
<tr>
<th>SAMPLE LOC.</th>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>&quot;N&quot; VALUE</td>
<td>PID</td>
</tr>
<tr>
<td></td>
<td>STD.PEN.TEST</td>
<td>MOISTURE (% of dry wt.)</td>
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</table>

**B2SOIL_AMEC_PID**

G:\PROJECT_DIRECTORIES\4953\2010\101561\METRO WESTSIDE EXTENSION\6.2.3.5 SUBSURFACE GAS\3.2 ALL FIELD NOTES\LIBRARY MACTEC OCT 11 GLB

---

**Mitigating statement:**

This record 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.

---

**Figure:** B-2.5c

**Project:** 4953-10-1561

**Equipment Used:**

- CME-75 Ht, Martini Drilling

---

**Note:**

After reaming, a well was installed. See well construction diagram for details.
### Boring M-106

<table>
<thead>
<tr>
<th></th>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>5</strong></td>
<td><strong>30</strong></td>
<td>CL</td>
<td>Silt (ml) - (GLEY1, 5/2) grayish green, medium stiff, moist, trace of clay, sulfuric odor</td>
<td>ML</td>
<td><strong>30</strong></td>
<td></td>
</tr>
<tr>
<td><strong>10</strong></td>
<td></td>
<td></td>
<td></td>
<td>CL/ML</td>
<td><strong>25</strong></td>
<td></td>
</tr>
<tr>
<td><strong>15</strong></td>
<td><strong>25</strong></td>
<td>CL</td>
<td>CLAYEY SILT (cl-ml) - (5Y, 3/2) dark olive gray, very stiff, slightly moist, hydrocarbon odor</td>
<td>ML</td>
<td><strong>25</strong></td>
<td></td>
</tr>
<tr>
<td><strong>20</strong></td>
<td></td>
<td></td>
<td>TAR IMPACTED SOIL</td>
<td>Silt (ml) - (5Y, 3/2) dark olive gray, very stiff, slightly moist, some clay, strong odor</td>
<td>ML</td>
<td><strong>20</strong></td>
</tr>
<tr>
<td><strong>25</strong></td>
<td><strong>15</strong></td>
<td></td>
<td></td>
<td>Silt (ml) - (5Y, 2.5/1) very black, stiff, moist, some clay, trace of fine sand, strong odor, asphalt at 20.5 feet</td>
<td>ML</td>
<td><strong>15</strong></td>
</tr>
<tr>
<td><strong>30</strong></td>
<td></td>
<td></td>
<td></td>
<td>Becomes more clayey</td>
<td>SP</td>
<td><strong>17</strong></td>
</tr>
<tr>
<td><strong>35</strong></td>
<td><strong>29</strong></td>
<td></td>
<td>Groundwater encountered at 34 feet</td>
<td>TAR SAND (sp-sm) - (5Y, 2.5/1) fine grained, black, medium dense, damp to wet, some silt, strong odor, liquid tar</td>
<td>SP</td>
<td><strong>35</strong></td>
</tr>
</tbody>
</table>

*This record 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.*

**Figure:** B-2.6a

**Project:** 4953-10-1561  
Los Angeles, California
<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>&quot;N&quot; VALUE</th>
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</thead>
<tbody>
<tr>
<td>45</td>
<td>62</td>
</tr>
<tr>
<td>50</td>
<td>65</td>
</tr>
<tr>
<td>55</td>
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<td>60</td>
<td>54</td>
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<tr>
<td>65</td>
<td>26</td>
</tr>
<tr>
<td>70</td>
<td>24</td>
</tr>
<tr>
<td>75</td>
<td>26</td>
</tr>
</tbody>
</table>

**MOISTURE** (% of dry wt.)

<table>
<thead>
<tr>
<th>SAMPLE LOC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML</td>
</tr>
<tr>
<td>ML</td>
</tr>
<tr>
<td>CL/ML</td>
</tr>
</tbody>
</table>

**BLOW COUNT** (blows/ft)

<table>
<thead>
<tr>
<th>SAMPLE LOC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>ML</td>
</tr>
<tr>
<td>ML</td>
</tr>
<tr>
<td>CL/ML</td>
</tr>
</tbody>
</table>

- Becomes very dense
- Becomes saturated
- Becomes less dense, finer grained sand
- Becomes very dense, fine grained, some medium grained sand
- SAN FERNANDO FORMATION (Tf)
  - SILT (ml) - (5Y, 2.5/1) black, hard, wet, some fine sand, strong hydrocarbon/tar odor
  - Becomes very stiff, less tar present
- CLAYEY SILT (cl-ml) - (5Y, 2.5/1) black, stiff, moist, strong odor, tar infused (moderate streaks)
  - Same as above

**NOTES:**
- Total depth = 75 feet bgs
- Groundwater measured at 34 feet bgs
- Static water level measured at 18 feet bgs
- Hand augered to 5 feet bgs
- The boring was initially drilled with 8-inch O.D. augers and later reamed with 10.5-inch O.D. augers.

**EQUIPMENT USED:** CME-75 HT, Martini Drilling
**HOLE DIAMETER (in.):** 11.3
**ELEVATION:** **

MTA Westside Subway Extension
Los Angeles, California

(CONTINUED ON FOLLOWING FIGURE)
Soil samples collected using an SPT sampler. After reaming, a well was installed. See well construction diagram for details.
### TAR IMPACTED SOILS

- **PETROLIFEROUS SILT with CLAY (ml)** - greenish brownish black, slightly moist, mottled with tar pods/blebs

- **TAR SAND (sp)** - (10YR, 2/2) very dark brown, slightly moist, fine to medium grained, gooey

- **PETROLIFEROUS SILT with CLAY (ml)** - (10YR, 2/2) very dark brown, slightly moist, hydrocarbon odor

- **Slightly PETROLIFEROUS SILT (ml)** - lighter green, dry, mottled

---

**0.58 feet of Asphalt**

**0.67 feet of Concrete**

---

**LOG OF BORING**

- **EQUIPMENT USED:** CME-75 HT, Martini Drilling
- **HOLE DIAMETER (in.):** 11.3
- **ELEVATION:** **

---

**MTA Westside Subway Extension**

Los Angeles, California

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**BASEMENT M-107**

| ELEVATION (ft) | DEPTH (ft) | "N" VALUE STD. PEN. TEST | MOISTURE (% of dry wt.) | PID | BLOW COUNT* (blows/ft) | SAMPLE LOC.
|----------------|------------|--------------------------|-------------------------|-----|------------------------|------------------
| 40             |            |                          |                         |     |                        |                  |
| 35             |            |                          |                         |     |                        |                  |
| 30             |            |                          |                         |     |                        |                  |
| 25             |            |                          |                         |     |                        |                  |
| 20             |            |                          |                         |     |                        |                  |
| 15             |            |                          |                         |     |                        |                  |
| 10             |            |                          |                         |     |                        |                  |
| 5              |            |                          |                         |     |                        |                  |
| 0              |            |                          |                         |     |                        |                  |

---

**FIELD GEOLOGIST:** RM

**Prepared By:** KP

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**B2SOIL_AMEC_PID  G:\PROJECT_DIRECTORIES\4953\2010\101561_METRO_WESTSIDE_EXTENSION\6.2.3.5 SUBSURFACE GAS\3.2 ALL FIELD NOTES\LIBRARY MACTEC OCT11.GLB**

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**MTA Westside Subway Extension**

Los Angeles, California

---

**LOG OF BORING**

- **Project:** 4953-10-1561
- **Figure:** B-2.7a

---

**THIS RECORD 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.**

---

**FIELD GEOLOGIST:** RM

**Prepared By:** KP

---

**B2SOIL_AMEC_PID  G:\PROJECT_DIRECTORIES\4953\2010\101561_METRO_WESTSIDE_EXTENSION\6.2.3.5 SUBSURFACE GAS\3.2 ALL FIELD NOTES\LIBRARY MACTEC OCT11.GLB**

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---

**MTA Westside Subway Extension**

Los Angeles, California

---

**LOG OF BORING**

- **Project:** 4953-10-1561
- **Figure:** B-2.7a

---

**THIS RECORD 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.**

---

**FIELD GEOLOGIST:** RM

**Prepared By:** KP

---

**B2SOIL_AMEC_PID  G:\PROJECT_DIRECTORIES\4953\2010\101561_METRO_WESTSIDE_EXTENSION\6.2.3.5 SUBSURFACE GAS\3.2 ALL FIELD NOTES\LIBRARY MACTEC OCT11.GLB**

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---

**MTA Westside Subway Extension**

Los Angeles, California

---

**LOG OF BORING**

- **Project:** 4953-10-1561
- **Figure:** B-2.7a

---

**THIS RECORD 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.**

---

**FIELD GEOLOGIST:** RM

**Prepared By:** KP
<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>&quot;N&quot; VALUE STD. PEN. TEST</th>
<th>MOISTURE (% of dry wt.)</th>
<th>PID</th>
<th>BLOW COUNT* (blows/ft)</th>
<th>SAMPLE LOC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>45</td>
<td>0.0</td>
<td>76</td>
<td></td>
<td>SP/SM</td>
<td>PETROLIFEROUS SILT (ml) - (10YR, 2/2) very dark brown, slightly moist</td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>0.0</td>
<td>49</td>
<td></td>
<td></td>
<td>TAR SAND (sp) - (San Pedro Formation?)</td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>0.0</td>
<td>63</td>
<td></td>
<td></td>
<td>TAR SAND (sp-sm) - (10YR, 2/2) very dark brown, fine to medium grained, trace of coarse grained</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>89/11&quot;</td>
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<td></td>
<td>Same as above</td>
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</tr>
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<tr>
<td>70</td>
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<tr>
<td>75</td>
<td>0.0</td>
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<tr>
<td>80</td>
<td></td>
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</tr>
</tbody>
</table>

Becomes fine to coarse grained with gravel layer at 60.5 feet, gooey, clay layers present

Becomes fine to coarse grained with gravel, gooey

PETROLIFEROUS SILT with CLAY (ml) - (10YR, 2/2) very dark brown, slightly moist, slightly greenish tint, some fissile, possible San Fernando Formation?

PETROLIFEROUS SILT (ml) - (10YR, 2/2) very dark brown, slightly moist, hydrocarbon odor

Field Geol: RM
Prepared By: KP

B2SOIL_AMEC_PID  G:\PROJECT_DIRECTORIES\4953\2010\101561_METRO_WESTSIDE_EXTENSION\6.2.3.5_SUBSURFACE_GAS\3.2_ALL_FIELD NOTES\LIBRARY_MACTEC_OCT11.GLB

G:\PROJECT_DIRECTORIES\4953\2010\101561_METRO_WESTSIDE_EXTENSION\6.2.3.5_SUBSURFACE_GAS\3.2_ALL_FIELD NOTES\4953-10-1561_NEUHAUS_OCT 21 2011.GPJ  11/29/11

MTA Westside Subway Extension
Los Angeles, California

LOG OF BORING
Project: 4953-10-1561  Figure: B-2.7b
**BORING M-107 (Continued)**

<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>&quot;N&quot; VALUE/STANDARD PENETRATION TEST</th>
<th>MOISTURE (% of dry wt.)</th>
<th>BLOW COUNT* (blows/ft)</th>
<th>SAMPLE LOC.</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Same as above</td>
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<td>46</td>
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<td>Same as above</td>
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<td>Same as above</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Same as above</td>
</tr>
<tr>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.0</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Becomes moist, looks more black, hydrocarbon odor</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>31</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Becomes clayey, possible transition to Repetto Formation</td>
</tr>
</tbody>
</table>

**NOTES:**
- Total depth = 106.5 feet bgs
- Groundwater apparently not encountered
- Hand augered to 6 feet bgs
- The boring was initially drilled with 8-inch O.D. augers and later reamed with 10.5-inch O.D. augers.
- Soil samples collected using an SPT sampler.
- After reaming, a well was installed. See well construction diagram for details.

Field Geol: RM  
Prepared By: KP
BORING M-108

EQUIPMENT USED: CME-75, Martini Drilling
HOLE DIAMETER (in.): 11.3
ELEVATION: **

0.58 feet of Asphalt
0.75 feet of Base, fine to coarse grained
0.58 feet of Base, coarse gravel up to 2” in diameter, some cobble sized

CLAYEY SILT (cl-ml) - (GLEY1 2.5/N) black, stiff, moist, no odor

Becomes more clayey

CLAYEY SILT (cl-ml) - (GLEY1, 3/2) very dark greenish gray, stiff, moist, weak sulfuric odor

Becomes (2.5/1) black, strong hydrocarbon odor

CLAYEY SILT (cl-ml) - (5Y, 2.5/1) black, very stiff, moist, some asphaltic sand, strong odor

TAR IMPACTED SOILS, SAN PEDRO FORMATION (Qsp)
SILTY SAND (sm) - (5Y, 2.5/1) black, damp, fine grained, asphaltic tar sand

SILT (ml) - (GLEY1, 3/N) very dark gray, very stiff, moist, strong odor

CLAYEY SILT (cl-ml) - (5Y, 2.5/1) black, stiff, moist, strong odor

Becomes (GLEY1, 3/N) very dark greenish gray

FINE TAR SAND (sp) - (5Y, 2.5/1) black, medium dense, damp to wet, some silt, fine grained, strong odor

(Continued on following figure)
**MN WESTSIDE EXTENSION**

- **SUBSURFACE GAS**
- **ALL FIELD NOTES**

**LIBRARY MACTEC OCT11**

---

**LOG OF BORING**

- **B2SOIL AMEC PID**
- **G:\PROJECT_DIRECTORIES\4953\2010\101561\METRO\WESTSIDE_EXTENSION\6.2.3.5 SUBSURFACE GAS\3.2 ALL FIELD NOTES\LIBRARY MACTEC OCT11**

---

THIS RECORD 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.

---

**NOTES:**

- Total depth = 71 feet bgs, refusal
- Groundwater measured at 35 feet bgs
- Hand augered to 5 feet bgs
- Reamed with 8-inch O.D. augers and later reamed with 11.25-inch O.D. augers
- Soil samples collected using an SPT sampler
- After reaming, a nested well was installed. See well construction diagram for details

---

**SILTSTONE (ml)** - dark greenish-gray, strongly indurated

- **CLAYEY SILT (cl-ml)** - dark greenish-gray, strongly indurated

- **PETROLIFEROUS SILT (ml)** - (5Y, 2.5/1) black, hard, dank, strong odor

---

**FILED GEOG:** PK & RM

**PREPARED BY:** KP

---

**DATE DRILLED:** 5/2/2011 - 5/3/2011

**EQUIPMENT USED:** CME-5, Martin Drilling

**HOLE DIAMETER (in.):** 11.3

**ELEVATION (ft):**

---

**ELEVATION (ft)**

---

**MOISTURE (% of dry wt.)**

---

**"N" VALUE**

---

**STD. PEN. TEST**

---

**BLOW COUNT* (blows/ft)**

---

**SAMPLE LOC:**

---

**BORING M-108 (Continued)**

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---
### BORING M-109 (Continued)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>45</td>
<td>0.0</td>
<td>34</td>
<td>Same as above</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>50</td>
<td>0.0</td>
<td>41</td>
<td>Same as above</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>55</td>
<td>0.0</td>
<td>68</td>
<td>Broken shale fragments present at 51 feet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>0.0</td>
<td>87/10.5</td>
<td>Same as above, no shale fragments present</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65</td>
<td>0.0</td>
<td>64</td>
<td>PETROLIFEROUS SILT (ml) to SILTY SAND (sm) - (10YR, 2/2) very dark brown, fine grained sand</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>0.0</td>
<td>55</td>
<td>TAR SAND (sp) - (10YR, 2/2) very dark brown, fine to medium grained</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>75</td>
<td>0.0</td>
<td>27</td>
<td>PETROLIFEROUS SILT (ml) - (10YR, 2/2) very dark brown, slightly moist, wood chip/fragment at 66 feet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>0.0</td>
<td>38</td>
<td>Same as above, tar pods present</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Field Geol: RM  
Prepared By: KP

THIS RECORD 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 SMOOTH.

MTA Westside Subway Extension
Los Angeles, California

LOG OF BORING
Project: 4953-10-1561  
Figure: B-2.9b
### BORING M-109 (Continued)

<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>&quot;N&quot; VALUE</th>
<th>MOISTURE (% of dry wt.)</th>
<th>PID</th>
<th>BLOW COUNT* (blows/ft)</th>
<th>SAMPLE LOC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>85</td>
<td>0.0</td>
<td>31</td>
<td>ML</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>0.0</td>
<td>32</td>
<td>CLAYEY PETROLIFEROUS SILT (ml) - (10YR, 2/2) very dark brown, slightly moist, tar pods present</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>95</td>
<td>0.0</td>
<td>27</td>
<td>Same as above</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>0.0</td>
<td>29</td>
<td>Same as above, no tar pods present (not noted)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>105</td>
<td>0.0</td>
<td>25</td>
<td>Same as above</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTES:**
- Total depth = 101.5 feet bgs
- Groundwater apparently not encountered
- Hand augered to 6 feet bgs
- Backfilled with hydrated bentonite chips
- Groundwater sample taken using disposable PVC casing and bailer.

---

**DATE DRILLED:** 5/10/2011 - 5/12/2011  
**EQUIPMENT USED:** CME-75, Martini Drilling  
**HOLE DIAMETER (in.):** 8.5  
**ELEVATION:** **

---

MTA Westside Subway Extension  
Los Angeles, California  

---

Field Geol: RM  
Prepared By: KP  

---

LOG OF BORING  
Project: 4953-10-1561  
Figure: B-2.9c
<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>&quot;N&quot; VALUE STANDARD PENETRATION TEST</th>
<th>MOISTURE (%) OF DRY ML</th>
<th>PID</th>
<th>BLOW COUNT* (blows/ft)</th>
<th>SAMPLE LOC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>5</td>
<td>0.42 feet of Asphalt</td>
<td></td>
<td></td>
<td>5</td>
<td>SM</td>
</tr>
<tr>
<td>0.0</td>
<td>10</td>
<td>0.5 feet of Concrete</td>
<td></td>
<td></td>
<td>10</td>
<td>ML</td>
</tr>
<tr>
<td>0.0</td>
<td>15</td>
<td>SILTY SAND (sm) - (10YR, 3/3) dark brown, moist, fine to coarse grained, gravel size fragments present</td>
<td>0.0, 5</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0</td>
<td>20</td>
<td>SILTY SAND (sm) - (10YR, 3/3) dark brown, moist, fine grained, some coarse grained, some oxidation staining</td>
<td>0.0, 10</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0</td>
<td>25</td>
<td>Becomes SANDY SILT to SILT (ml) at 10.75 feet</td>
<td>0.0, 21</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0</td>
<td>30</td>
<td>SILT with SAND (ml) - (10YR, 4/3) brown, slightly moist, black organic pods present</td>
<td>0.0, 14</td>
<td>14</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0</td>
<td>35</td>
<td>SANDY SILT with CLAY (ml) - (10YR, 3/2) very dark grayish brown mottled with greenish silt and dark brown silt, moist, fine to coarse sand, caliche nodules present</td>
<td>0.0, 36</td>
<td>36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0</td>
<td>40</td>
<td>CLAYEY SILT with SAND (ml) - (10YR, 3/2) very dark grayish brown and (GLEY, 4/5G) dark greenish gray, moist, mottled, caliche nodules present, tar pods present</td>
<td>0.0, 29</td>
<td>29</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>CLAYEY SILT with SAND (ml) - (10YR, 2/2) very dark brown, moist, fine to medium sand, some coarse sand, tar color, tar odor, tar pods present, sticky, some mottled with greenish silt, rock fragments present</td>
<td>0.0, 36</td>
<td>36</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SAN PEDRO FORMATION (Qsp)**

- CLAYEY SILT (ml) - (GLEY1, 2.5/10GY) greenish black, slightly moist, strong tar odor, mottled with greenish silt
<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>&quot;N&quot; VALUE STD. PEN. TEST</th>
<th>MOISTURE (% of dry wt.)</th>
<th>PID</th>
<th>BLOW COUNT* (blows/ft)</th>
<th>SAMPLE LOC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>52</td>
<td>0.0</td>
<td>38</td>
<td>Same as above</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>47</td>
<td>0.0</td>
<td>42</td>
<td>Same as above</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>0.0</td>
<td>48</td>
<td>TAR IMPACTED SOILS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>0.0</td>
<td>48</td>
<td>TAR SAND (sp) - (10YR, 2/1) black, saturated in tar, fine to medium grained, tar odor, sticky</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>0.0</td>
<td>48</td>
<td>Driller noted gravel layer at 52 feet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>0.0</td>
<td>48</td>
<td>Increased strong odor, gravel fragments present</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>0.0</td>
<td>48</td>
<td>Same as above, no gravel fragments present</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>0.0</td>
<td>48</td>
<td>Same as above</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>0.0</td>
<td>48</td>
<td>CLAYEY SILT with SAND (ml) - (10YR, 3/1) very dark gray, moist, mottled with greenish silt, strong odor, tar pods present</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>52</td>
<td>0.0</td>
<td>48</td>
<td>TAR SAND (sp) - (10YR, 2/1) black, fine to medium grained</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

MTA Westside Subway Extension
Los Angeles, California

LOG OF BORING
Project: 4953-10-1561
Figure: B-2.10b
<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>&quot;N&quot; VALUE</th>
<th>MOISTURE (dry wt.)</th>
<th>PID</th>
<th>BLOW COUNT* (blows/ft)</th>
<th>SAMPLE LOC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>50/5&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Same as above</td>
</tr>
</tbody>
</table>

**NOTES:**
- Total depth = 81 feet bgs
- Hand augered to 6 feet bgs
- The boring was initially drilled with 8-inch O.D. augers and later reamed with 11.25-inch O.D. augers.
- Soil samples collected using an SPT sampler.
- After reaming, a nested well was installed. See well construction diagram for details.
<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>&quot;N&quot;* VALUE</th>
<th>STD. PEN. TEST</th>
<th>MOISTURE (%)</th>
<th>DRY WT</th>
<th>PID</th>
<th>BLOW COUNT* (blows/ft)</th>
<th>SAMPLE LOC.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0</td>
<td>0.67</td>
<td>feet</td>
<td>Concrete</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>7</td>
<td>0.0</td>
<td>12</td>
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<td></td>
</tr>
<tr>
<td>15</td>
<td>7</td>
<td>0.0</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>6</td>
<td>0.0</td>
<td>12</td>
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</tr>
<tr>
<td>25</td>
<td>17</td>
<td>0.0</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>18</td>
<td>0.0</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>0.0</td>
<td>14</td>
<td>14</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

0.67 feet of Concrete

SILT with SAND (ml/sm) - (10YR, 4/6) dark yellowish brown, moist, fine to medium sand, some oxidation staining

CLAYEY SILT (ml) - (10YR, 3/3) dark brown, very moist, oxidation staining, mottled, black organic pods present

SAN PEDRO FORMATION (Qsp)
SILT with SAND (ml/sm) - (10YR, 3/3) dark brown, wet (saturated at 20 to 21 feet), fine to medium sand, some black organic pods present

TAR IMPACTED SOILS

TAR SAND (sp) - (10YR, 2/1) black, fine to coarse grained, mottled with greenish silt, white gravel sized grains, very sticky, very tary

SILT (ml) - (10YR, 3/1) very dark gray mottled with (GLEY1, 4/5G) dark greenish gray, some gravel sized fragments, tar odor

SILT (ml) - (GLEY1, 2.5/N) black, very moist, slightly mottled with greenish silt, tar odor, micaceous (muscovite)
2" fine sand layer at 30.5 feet

CLAYEY SILT (ml) - (GLEY1, 2.5/10Y) greenish black, moist, micaceous (muscovite)
### BORING M-111 (Continued)

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>ELEVATION (ft)</th>
<th>&quot;N&quot; VALUE</th>
<th>MOISTURE (% of dry wt.)</th>
<th>PID</th>
<th>BLOW COUNT* (blows/ft)</th>
<th>SAMPLE LOC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>56.9</td>
<td>0.0</td>
<td>56.9</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CLAYEY PETROLIFEROUS SILT (ml) - (GLEY1, 2.5/10Y)**
- Greenish black, moist, tar pods present, micaceous (muscovite)
- 2" layer of cemented sand with pebbles at 40.5 feet

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>ELEVATION (ft)</th>
<th>&quot;N&quot; VALUE</th>
<th>MOISTURE (% of dry wt.)</th>
<th>PID</th>
<th>BLOW COUNT* (blows/ft)</th>
<th>SAMPLE LOC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>16</td>
<td>0.0</td>
<td>16</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CLAYEY SILT (ml) - (GLEY1, 2.5/10Y)**
- Greenish black, moist, micaceous (muscovite)

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>ELEVATION (ft)</th>
<th>&quot;N&quot; VALUE</th>
<th>MOISTURE (% of dry wt.)</th>
<th>PID</th>
<th>BLOW COUNT* (blows/ft)</th>
<th>SAMPLE LOC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>12</td>
<td>0.0</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CLAYEY SILT (ml) - (GLEY1, 2.5/10Y)**
- Greenish black, moist, some black organic pods present, micaceous (muscovite)

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>ELEVATION (ft)</th>
<th>&quot;N&quot; VALUE</th>
<th>MOISTURE (% of dry wt.)</th>
<th>PID</th>
<th>BLOW COUNT* (blows/ft)</th>
<th>SAMPLE LOC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>39</td>
<td>0.0</td>
<td>39</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**PETROLIFEROUS SILT (ml) to SANDY SILT (ml/sm)** with pebble layer

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>ELEVATION (ft)</th>
<th>&quot;N&quot; VALUE</th>
<th>MOISTURE (% of dry wt.)</th>
<th>PID</th>
<th>BLOW COUNT* (blows/ft)</th>
<th>SAMPLE LOC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td>43</td>
<td>3.1</td>
<td>43</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TAR SAND (sp) - (10YR, 2/1)**
- Black, moist to saturated, sticky
- Fine to medium grained, some coarse grained, odor, sticky
- Same as above, no coarse sand present

<table>
<thead>
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<th>PID</th>
<th>BLOW COUNT* (blows/ft)</th>
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**TAR SAND (sp) - (10YR, 2/1)**
- Black, fine to medium grained, gravel sized fragments present, odor, sticky, very heavy tar

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**TAR SAND (sp) - (10YR, 2/1)**
- Black, fine to medium grained, odor, sticky, heavy tar

---

**MTA Westside Subway Extension**

Los Angeles, California

LOG OF BORING

Project: 4953-10-1561  Figure: B-2.11b

Field Geol: RM
Prepared By: KP
### BORING M-111 (Continued)

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**NOTES:**
- Total depth = 81.5 feet bgs
- Groundwater encountered at 20-21.5 feet bgs
- Hand augered to 6 feet bgs
- The boring was initially drilled with 6-inch O.D. augers and later reamed with 11.25-inch O.D. augers.
- Soil samples collected using an SPT sampler.
- After reaming, a nested well was installed. See well construction diagram for details.

---

**Log of Boring**

**DATE DRILLED:** 5/18/2011 - 5/19/2011
**EQUIPMENT USED:** CME-75 HT, Martini Drilling
**HOLE DIAMETER (in.):** 11.3
**ELEVATION:** **

---

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

---

**AMEC**

**Project:** 4953-10-1561  
**Figure:** B-2.11c
## Sample Description

1.25 feet of Asphalt

**SILTY SAND (sm)** - (10YR, 4/6) dark yellowish brown, slightly moist, fine to medium grained, trace subrounded gravel fragments up to 2-cm in diameter, micaceous

**CLAYEY SILT (ml)** - (10YR, 4/3) brown, slightly moist, some oxidation staining, micaceous, gradational contact at 15 feet

**FINE to MEDIUM SAND (sp)** - (10YR, 4/3) brown

**CLAYEY SILT (ml) with SAND (cl-ml)** - (10YR, 4/6) dark yellowish brown, slightly moist, mottled with black silt, strong tar odor

**CLAYEY SAND (sc)**

**CLAYEY SILT (ml)** - (10YR, 2/2) brown

**CLAYEY SILT (ml) with SAND (cl-ml)** - (10YR, 2/2) brownish black, slightly moist, strong tar odor

**SAN PEDRO FORMATION (Qsp)**

**SILTY TAR SAND (sm)** - (10YR, 2/2) brownish black, slightly moist, fine grained, strong odor

**PETROLIFEROUS SILT with SAND (ml)** - (10YR, 2/2) brownish black, moist, strong odor

Groundwater encountered

### LOG OF BORING

<table>
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<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
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<th>BLOW COUNT* (blows/ft)</th>
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</table>

*Note: PID represents Standard Penetration Test (SPT) values. BLOW COUNT* indicates the number of blows per foot of penetration.*

---

MTA Westside Subway Extension  
Los Angeles, California

---

Field Geol: RM  
Prepared By: KP

---

LOG OF BORING  
Project: 4953-10-1561  
Figure: B-2.12a
<table>
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</table>

**PETROLIFEROUS SILT (ml) - (10YR, 2/2) brownish black, moist to wet, some greenish silt mottled with petroliferous silt, strong tar odor, sticky**

**TAR IMPACTED SOILS**

**TAR SAND (sp) - (10YR, 2/2) black, slightly moist, fine to medium grained, strong odor, sticky**

Same as above

Becomes very moist to wet, very strong tar odor, some broken gravel fragments present

Same as above

Becomes moist

**TAR SAND (sp) - (10YR, 2/2) black, heavy tar, strong sulfuric odor, sticky**
No recovery due to high levels of methane escaping through the boring hole

NOTES:
Total depth = 80 feet bgs
Groundwater encountered at 35 feet bgs
Hand augered to 8 feet bgs
The boring was initially drilled with 6-inch O.D. augers and later reamed with 11.25-inch O.D. augers.
Soil samples collected using an SPT sampler.
After reaming, a nested well was installed. See well construction diagram for details.
This record 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.

MTA Westside Subway Extension
Los Angeles, California

LOG OF BORING
Project: 4953-10-1561   Figure: B-2.13a

Field Geol:  RM
Prepared By:  KP

BORING M-113

EQUIPMENT USED:  CME-75 HT, Martini Drilling
HOLE DIAMETER (ft):  11.3
ELEVATION:  **

0.42 feet of Asphalt
0.54 feet of Concrete
Silty Sand with Clay (sm)

Silty Sand with Clay (sm) - (10YR, 4/3) brown, slightly moist, fine to medium grained, gravel fragments present, some oxidation staining

San Pedro Formation (Qsp)

Clayey Silt (ml) - (2.5Y, 4/2) dark grayish brown, slightly moist, trace coarse sand, some oxidation staining

Clayey Silt (ml) - (Gley1, 3/10GY) very dark greenish gray, moist, trace sand, some black organic material present

Clayey Silt (ml) - (Gley1, 3/10GY) very dark greenish gray, slightly moist

Becomes mottled with greenish silt

Clayey Silt with Sand (ml) - (Gley1, 2.5/5GY) greenish black, slightly moist, tar pods present, very strong odor, sticky

Field Geol:  RM
Prepared By:  KP

B2SOIL_AMEC_PID  G:\PROJECT_DIRECTORIES\4953\2010\101561_MINTRO_WESTSIDE_EXTENSION\6.2.3.5_SUBSURFACE_GAS\3.2_ALL_FIELD_NOTES\LIBRARY_MACTEC_OCT11.GLB
G:\PROJECT_DIRECTORIES\4953\2010\101561_MINTRO_WESTSIDE_EXTENSION\6.2.3.5_SUBSURFACE_GAS\3.2_ALL_FIELD_NOTES\4953-10-1561_NEUHAUS_OCT 21 2011.GPJ  11/29/11
### TAR IMPACTED SOILS

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<tr>
<th>Depth (ft)</th>
<th>Moisture (%)</th>
<th>Blow Count (blows/ft)</th>
<th>Sample Loc.</th>
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<tr>
<td>80</td>
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<td>SP</td>
</tr>
</tbody>
</table>

- **CLAYEY SILT (ml)** - (GLEY1, 2.5/5GY) greenish black, slightly moist, tar pods present
- **TAR SAND (sp)** - (10YR, 2/2) black, saturated in tar, fine to medium grained, strong odor, sticky
  - Same as above
  - Same as above, gravel fragments present
  - **TAR SAND (sp)** - (10YR, 2/2) black, saturated in tar, fine to medium grained, strong odor, heavy tar
  - **TAR SAND (sp)** - (10YR, 2/2) black, saturated in tar, fine to medium grained
  - Same as above
- **SILT (ml)** - (GLEY1) tar pods present
- **TAR SAND (sp)** - (10YR, 2/2) black, saturated in tar, fine to medium grained, heavy tar
**BORING M-113 (Continued)**

<table>
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<tr>
<th>DEPTH (ft)</th>
<th>&quot;N&quot; VALUE STD. PEN. TEST</th>
<th>MOISTURE (dry wt.)</th>
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</table>

**NOTES:**
- Total depth = 81.5 feet bgs
- Hand augered to 6 feet bgs
- The boring was initially drilled with 6-inch O.D. augers and later reamed with 11.25-inch O.D. augers.
- Soil samples collected using an SPT sampler.
- After reaming, a nested well was installed. See well construction diagram for details.

**MOISTURE** (% of dry wt.)

<table>
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<th>ELEVATION (ft)</th>
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<td>110</td>
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<tr>
<td>115</td>
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<tr>
<td>120</td>
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**EQUIPMENT USED:** CME-75 HT, Martini Drilling
**HOLE DIAMETER (in.):** 11.3
**ELEVATION:** **

**TAR SAND (sp) - (10YR, 2/2)** black, saturated, fine to medium grained

Field Geol: RM
Prepared By: KP
<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
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**Date Drilled:** 6/20/2011 - 6/21/2011  
**Equipment Used:** CME-75 HT, Martini Drilling  
**Hole Diameter (in.):** 11.3  
**Elevation:** **

- **0.5 feet of Asphalt**  
- **0.67 feet of Concrete**  
- **CLAYEY SILT with SAND (ml) - (10YR, 3/3) dark brown, slightly moist**  
- **CLAYEY SILT (ml) - (10YR, 4/3) brown, slightly moist, slight oxidation staining, micaceous**  
- **SILTY SAND (sm) - (10YR, 4/2) dark grayish brown, slightly moist, fine grained, oxidation staining, micaceous, crumbles easily**  
- **CLAYEY SILT (ml) - (10YR, 4/2) dark grayish brown, slightly moist, oxidation staining, some caliche nodules present, micaceous**  
- **Same as above**  
- **Same as above, no caliche nodules noted**  
- **SAN PEDRO FORMATION (Qsp)**  
  **CLAYEY SILT with SAND (ml) - (10YR, 4/2) dark grayish brown, slightly moist, fine sand, some oxidation staining, some caliche nodules present, micaceous**

(Continued on following figure)
### BORING M-114 (Continued)

**CLAYEY SILT (ml) - (GLEY1, 3/10GY)** very dark greenish gray, slightly moist, micaceous

**TAR IMPACTED SOILS**

**FINE to MEDIUM SAND (sp) - (10YR, 2/2)** very dark brown, slightly moist, sticky with tar, strong tar odor

**TAR SAND (sp) - (10YR, 2/1)** black to dark brownish black, slightly moist, fine to medium grained, strong tar odor, strong sulfuric odor

Becomes sticky, no sulfuric odor noted, some green silt fragments at 61 feet

Same as above

**TAR IMPACTED SOILS**

**TAR SAND (sp) - (10YR, 2/1)** black, dry to wet, fine grained, strong tar odor, sticky

Becomes dry

Becomes wet (again) at 76.5 feet, strong sulfuric odor

---

**LOG OF BORING**

- **DATE DRILLED:** 6/20/2011 - 6/21/2011
- **EQUIPMENT USED:** CME-75 HT, Martini Drilling
- **HOLE DIAMETER (in.):** 11.3
- **ELEVATION:** **

<table>
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<th>DEPTH (ft)</th>
<th>MOISTURE (% of dry wt.)</th>
<th>BLOW COUNT* (blows/ft)</th>
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**FIELD GEOLOGIST:** RM

**PREPARED BY:** KP

MTA Westside Subway Extension
Los Angeles, California
CLAYEY SILT (ml) - (GLEY1, 4/10GY) dark greenish gray, slightly moist (pen is dry), micaceous, strong sulfuric odor

NOTES:
Total depth = 81.5 feet bgs
Hand augered to 6 feet bgs
The boring was initially drilled with 6-inch O.D. augers and later reamed with 11.25-inch O.D. augers.
Soil samples collected using an SPT sampler.
After reaming, a nested well was installed. See well construction diagram for details.

<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>&quot;N&quot; VALUE</th>
<th>MOISTURE (% of dry wt.)</th>
<th>BLOW COUNT* (blows/ft)</th>
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BORING M-114 (Continued)

EQUIPMENT USED: CME-75 HT, Martini Drilling
HOLE DIAMETER (in.): 11.3
ELEVATION: **
### LOG OF BORING

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

**BORING M-115**

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<td>0.5 feet of Asphalt</td>
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<tr>
<td>0.67</td>
<td>0.67</td>
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<td>0.67 feet of Concrete</td>
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<td>15</td>
<td>SP</td>
<td>SILTY CLAY (cl) - (10YR, 4/3) brown, slightly moist, mottled with caliche nodules up to 0.5-inches long</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>20</td>
<td></td>
<td>FINE SAND with SILT (sp) - (10YR, 4/2) dark grayish brown, slightly moist, micaceous</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>25</td>
<td></td>
<td>FINE SAND (sp) - (10YR, 4/2) dark grayish brown, slightly moist, micaceous</td>
<td></td>
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<tr>
<td>30</td>
<td>30</td>
<td>CL/ML</td>
<td>SAN PEDRO FORMATION (Qsp)</td>
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<tr>
<td>35</td>
<td>35</td>
<td>CL</td>
<td>CLAYEY SILT (cl-ml) - (10YR, 4/1) dark gray, slightly moist, micaceous</td>
<td></td>
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<tr>
<td>40</td>
<td>40</td>
<td>CL/ML</td>
<td>SILTY CLAY (cl) - (GLEY1, 3/10Y) very dark greenish gray, slightly moist</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>FINE SAND (sp) - (GLEY1, 3/10Y) very dark greenish gray, slightly moist</td>
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<td></td>
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</table>

(Continued on following figure)

---

**FIELD GEOl:** RM  
**Prepared By:** KP

**DATE DRILLED:** 6/13/2011 - 6/14/2011  
**EQUIPMENT USED:** Marl M-12, Gregg Drilling  
**HOLE DIAMETER (in.):** 10.5  
**ELEVATION:** **

---

Figure: B-2.15a
<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>&quot;N&quot; VALUE</th>
<th>MOISTURE (% of dry wt.)</th>
<th>PID</th>
<th>BLOW COUNT* (blows/ft)</th>
<th>SAMPLE LOC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>28</td>
<td></td>
<td>CLAYEY SILT (cl-ml) - (GLEY1, 3/5GY) very dark greenish gray, slightly moist, caliche nodules present</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>33</td>
<td></td>
<td>Same as above</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td></td>
<td>Becomes dry, mottled with caliche</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td></td>
<td>CLAYEY SILT (cl-ml) - (GLEY1, 2.5/10Y) greenish black, very moist, micaceous</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>55</td>
<td></td>
<td>FINE to COARSE SAND (sp) - (GLEY1, 2.5/10Y) greenish black, wet, micaceous, subrounded rock fragments up to 1-inch long present Groundwater at 55.5 feet</td>
<td></td>
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</tr>
<tr>
<td>29</td>
<td></td>
<td>CLAYEY SILT (cl-ml) - (GLEY1, 2.5/10Y) greenish black, wet</td>
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<tr>
<td>60</td>
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<td>FINE to COARSE SAND (sp) - (GLEY1, 2.5/10Y) greenish black, wet, micaceous</td>
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<tr>
<td>36</td>
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<td>CLAYEY SILT (cl-ml) - (GLEY1, 3/10Y) very dark greenish gray, dry, caliche nodules present</td>
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<tr>
<td>70</td>
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<td>SILTY SAND (sm) to FINE SAND (sp) - (GLEY1, 4/10Y) dark greenish gray, very moist, fine grained</td>
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<td>20</td>
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<td>FINE to MEDIUM SAND (sp) - (GLEY1, 4/10Y) dark greenish gray, wet, strong sulfurous odor</td>
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<tr>
<td>34</td>
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NOTES:
- Total depth = 75 feet bgs
- Groundwater encountered at 55.5 feet bgs
- Hand augered to 6 feet bgs
- The boring was initially drilled with 6-inch O.D. augers and later reamed with 10.5-inch O.D. augers.
Soil samples collected using an SPT sampler. After reaming, a nested well was installed. See well construction diagram for details.

### BORING M-115 (Continued)

**DATE DRILLED:** 6/13/2011 - 6/14/2011  
**EQUIPMENT USED:** Marl M-12, Gregg Drilling  
**HOLE DIAMETER (in.):** 10.5  
**ELEVATION:** **

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Field Geol: RM  
Prepared By: KP
### LOG OF BORING

**BORING M-116**

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<td>6.6</td>
<td>22</td>
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<tr>
<td>10.0</td>
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**DATE DRILLED:** 6/8/2011 - 6/10/2011  
**EQUIPMENT USED:** CME-95, Gregg Drilling  
**HOLE DIAMETER (in.):** 10.5  
**ELEVATION:** 21 feet

- **0.33 feet of Asphalt**
- **0.67 feet of Concrete**
- **CLAYEY SILT (cl-ml) - (2.5/1) black, medium stiff, moist, no odor**
- **Becomes (7.5YR, 4/3) brown, very stiff**
- **SANDY SILT (ml) - (10YR, 4/6) dark yellowish brown, medium stiff, moist**
- **SILTY CLAY (cl-ml) - (10YR, 3/6) dark yellowish brown, hard, moist (to very moist at 21 feet), medium plasticity**
- **CLAYEY SILT (cl-ml) - (5Y, 6/2) light olive gray, very stiff, moist, some coarse sand**
- **Becomes olive in color, no sand present**
- **SAN PEDRO FORMATION (Qsp)**
- **SILTY CLAY (cl) - GLEY1, 4/1) dark greenish gray, stiff, moist, medium plasticity, no odor**

(continued on following figure)

**Figure:** B-2.16a

---

MTA Westside Subway Extension  
Los Angeles, California

**Field Geol:** PK & RM  
**Prepared By:** KP

---

<table>
<thead>
<tr>
<th>MOISTURE (% of dry wt.)</th>
<th>PIDS</th>
<th>BLOW COUNT* (blows/ft)</th>
<th>SAMPLE LOC.</th>
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<td>CL/ML</td>
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<tr>
<td>CL</td>
<td>CL/ML</td>
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<td>CL/ML</td>
</tr>
</tbody>
</table>

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**MTA Westside Subway Extension**  
Los Angeles, California  
**Project:** 4953-10-1561  
**Figure:** B-2.16a
<table>
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<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>&quot;N&quot; VALUE</th>
<th>MOISTURE (% of dry wt.)</th>
<th>PID</th>
<th>BLOW COUNT* (blows/ft)</th>
<th>SAMPLE LOC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>22</td>
<td>CL/ML</td>
<td>Same as above, trace of coarse sand</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>0.0</td>
<td>50</td>
<td>ML</td>
<td>CLAYEY SILT (cl-ml) - (GLEY1, 3/1) greenish gray, hard, moist</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0</td>
<td>15</td>
<td>ML</td>
<td>SILT (ml) - (GLEY1, 5/1) greenish gray, hard, moist, some fine sand, mottled</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0</td>
<td>52</td>
<td>ML</td>
<td>CLAYEY SILT (cl-ml) - (GLEY1, 4/1) dark greenish gray, stiff, damp to very moist, no odor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0</td>
<td>76</td>
<td>ML</td>
<td>Saturated at 52 feet</td>
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<td></td>
</tr>
<tr>
<td>0.0</td>
<td>51</td>
<td>SP</td>
<td>SILTY SAND (sm) - (GLEY 4) dark greenish gray, very dense, wet, fine grained</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0</td>
<td>67</td>
<td>SP</td>
<td>Silt (ml) - (GLEY1, 4/1) dark greenish gray, very dense, wet, some fine sand</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0</td>
<td>42</td>
<td>CL/ML</td>
<td>Same as above, clay present at bottom of sampler</td>
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<tr>
<td>0.0</td>
<td>67</td>
<td>CL/ML</td>
<td>1.5-inch rock fragment present at 66 feet</td>
<td></td>
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</tr>
</tbody>
</table>

**This record 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.**

**Date Drilled:** 6/8/2011 - 6/10/2011  
**Equipment Used:** CME-95, Gregg Drilling  
**Hole Diameter (in.):** 10.5  
**Elevation:** **

**LOG OF BORING**  
MTA Westside Subway Extension  
Los Angeles, California  
Project: 4953-10-1561  
Figure: B-2.16b
CLAYEY SILT (cl-ml) - (GLEY1, 4/1) dark greenish gray, hard, damp to moist, some coarse sand, mottled at 80.5 feet

NOTES:

Total depth = 81 feet bgs
Groundwater encountered at 52 feet bgs
Hand augered to 5 feet bgs
The boring was initially drilled with 8-inch O.D. augers and later reamed with 10.5-inch O.D. augers.
Soil samples collected using an SPT sampler.
After reaming, a nested well was installed. See well construction diagram for details.

ELEVATION (ft)

DEPTH (ft)

"N" VALUE
STD.PEN.TEST

MOISTURE
 (% of dry wt.)

PID

BLOW COUNT*
 (blows/ft)

SAMPLE LOC.

DATE DRILLED:

EQUIPMENT USED:
CME-95, Gregg Drilling

HOLE DIAMETER (in.):
10.5

ELEVATION:
85
90
95
100
105
110
115
120

FIELD GEO.: PK & RM

PREPARED BY: KP

B2SOIL_AMEC_PID  G:\PROJECT DIRECTORIES\4953\2010\101561_METRO\WESTSIDE_EXTENSION\6.2.3.5 Subsurface Gas\3.2 All Field Notes\Library MACTEC OCT 11.GLB

B2SOIL_AMEC_PID  G:\PROJECT DIRECTORIES\4953\2010\101561_METRO\WESTSIDE_EXTENSION\6.2.3.5 Subsurface Gas\3.2 All Field Notes\4953-10-1561_NEUHAUS_OCT 21 2011.GPJ  11/29/11

MTA Westside Subway Extension
Los Angeles, California

Project: 4953-10-1561

LOG OF BORING (Continued)

Figure: B-2.16c

M-116 (Continued)
<table>
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<th>PID</th>
<th>BLOW COUNT*</th>
<th>SAMPLE LOC.</th>
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</tbody>
</table>

0.5 feet of Asphalt FILL
Silty Sand with Asphalt (sm) - asphalt and gravel fragments present
Silty Sand with gravel (sm) - (10YR, 3/3) dark brown, slightly moist, some asphalt fragments present, silty zone at top of sampler
Native Alluvium (Qal)
Silt (ml) - (10YR, 3/2) dark brown, slightly moist, mottled, oxidation staining
Same as above, with caliche nodules present
Becomes more dense
Sandy Silt to Silt (sm/ml) - (10YR, 4/4) dark yellowish brown, slightly moist, fine sand, mottled with oxidation staining
Lakewood Formation (Qlw)
Silt (ml) - (2.5Y, 4/3) olive brown, wet, trace of sand, mottled with oxidation staining, micaceous

Date Drilled: 1/18/2011 - 1/20/2011
Equipment Used: CME-75, Jet Drilling
Hole Diameter (in.): 10
Elevation: **

Field Geol: RM
Prepared By: KP

MTA Westside Subway Extension
Los Angeles, California

LOG OF BORING
Project: 4953-10-1561 Figure: B-2.17a
### BORING M-119 (Continued)

**DATE DRILLED:** 1/18/2011 - 1/20/2011  
**EQUIPMENT USED:** CME-75, Jet Drilling  
**HOLE DIAMETER (in.):** 10  
**ELEVATION:** **

**NOTES:**  
Total depth = 76 feet bgs  
Groundwater encountered at 35 feet bgs  
Hand augered to 6.5 feet bgs  
The boring was drilled with 10-inch O.D. augers and later reamed with 11.25-inch O.D. augers.

<table>
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</table>

**Field Geol:** RM  
**Prepared By:** KP

- **FINE SAND to SILTY FINE SAND (sp) - (GLEY1, 4/5GY) dark greenish gray, wet, micaceous**
- **SILTY SAND with GRAVEL (sp) - greenish gray, mottled with rounded gravel and broken shale fragments, orthoclase, mottled with reddish brown silt, possible Basil scour zone**
- **FINE SAND (sp) - (GLEY1 4/10GY) dark greenish gray, wet, some gravel fragments, micaceous**
- **FINE SAND (sp) - (GLEY1, 4/10Y) dark greenish gray, wet**

This record 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.
Boring M-119 (Continued)

<table>
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</tr>
<tr>
<td>85</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

A nested well was installed. See well construction diagram for details.

Date Drilled: 1/18/2011 - 1/20/2011
Equipment Used: CME-75, Jet Drilling
Hole Diameter (in.): 10
Elevation: **

MTA Westside Subway Extension
Los Angeles, California

Field Geol: RM
Prepared By: KP
## LOG OF BORING

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

### BORING M-122

**Date Drilled:** June 22, 2011  
**Equipment Used:** CME-75 HT, Martini Drilling  
**Hole Diameter:** 11.3"  
**Elevation:** **

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Moisture (% of dry wt.)</th>
<th>N* Value</th>
<th>Std Pen Test</th>
<th>Sample Loc.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>0.0</td>
<td>3</td>
<td>21</td>
<td>SM</td>
</tr>
<tr>
<td>10.0</td>
<td>0.0</td>
<td>3</td>
<td>22</td>
<td>CL</td>
</tr>
<tr>
<td>15.0</td>
<td>0.0</td>
<td>3</td>
<td>23</td>
<td>SP</td>
</tr>
<tr>
<td>20.0</td>
<td>0.0</td>
<td>21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>25.0</td>
<td>0.0</td>
<td>22</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30.0</td>
<td>0.0</td>
<td>23</td>
<td></td>
<td>SM</td>
</tr>
<tr>
<td>35.0</td>
<td>0.0</td>
<td>15</td>
<td></td>
<td>SM/ML</td>
</tr>
</tbody>
</table>

1 foot of Asphalt  

- **Silty Sand (sm)** with broken gravel fragments and fill  
- **Silty Clay (cl)** - (10YR, 3/3) dark brown, slightly moist, soft caliche nodules present, micaceous  
- **Silty Clay (cl)** - (10YR, 3/4) dark yellowish brown, soft, slightly moist, micaceous  
- **Fine Sand (sp)** - (10YR, 3/3) dark brown, slightly moist, 2-inch broken gray shale fragment  
- **Fine to Coarse Sand with Silt (sm/sp)** - (10YR, 3/2) very dark grayish brown, dry, angular to subrounded broken gray shale fragments  
- **Silty Sand (sm)** - (10YR, 3/3) dark brown, dry, fine to coarse grained, angular to subrounded broken gray shale fragments "shale sand"  

*Same as above*

---

**Field Geol:** RM  
**Prepared By:** KP

(continued on following figure)
**BORING M-122 (Continued)**

**DATE DRILLED:**  June 22, 2011  
**EQUIPMENT USED:**  CME-75 HT, Martini Drilling

**HOLE DIAMETER (in.):**  11.3  
**ELEVATION:**  **

<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>&quot;N&quot; VALUE STD PEN TEST</th>
<th>MOISTURE (% of dry wt.)</th>
<th>PID</th>
<th>BLOW COUNT* (blows/ft)</th>
<th>SAMPLE LOC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>11</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0</td>
<td>23</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0</td>
<td>33</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0</td>
<td>68</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.0</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **CLAYEY SILTY SAND (ml/sm) - (10YR, 3/3)** dark brown, dry, fine to medium grained, angular to subrounded broken shale fragments
- **CLAYEY SILT with SAND (ml/sm) - (10YR, 3/3)** dark brown, soft, slightly moist, fine to coarse grained, broken shale fragments
- **SILTY SAND (sm) - (10YR, 3/2)** very dark grayish brown, dry, fine to coarse grained, angular to subrounded broken shale fragments
- **SILT (ml) - (10TR, 3/3)** dark brown
- **SILTY SAND (sm) - (10YR, 3/3)** dark brown, very moist to wet, fine grained, micaceous
- **Groundwater encountered at 58.55 feet**
- **FINE to COARSE SAND (sp) - (10YR, 3/2)** very dark grayish brown, wet, micaceous
- **CLAYEY SILT (ml) - (10YR, 3/3)** dark brown, wet, micaceous
- **SILT (ml)**
- **SILTY SAND (sm) - (10YR, 3/3)** dark brown, wet, fine grained, some coarse grained, angular to subrounded fragmented gravel, micaceous
- **CLAYEY SILT (ml) - (10YR, 3/3)** dark brown, very moist, some oxidation staining, caliche nodules present, micaceous

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MTA Westside Subway Extension  
Los Angeles, California

LOG OF BORING  
Project: 4953-10-1561  
Figure: B-2.18b
SILTY SAND to SANDY SILT (sm) - (10YR, 3/3) dark brown, very moist to wet, fine to medium grained, micaceous

BECOMES WET, FINE GRAINED, SOME OXIDATION STAINING PRESENT

CLAYEY SILT with FINE to MEDIUM SAND (sm/ml) - (10YR, 3/3) dark brown, very moist to wet, some oxidation staining, micaceous

CLAYEY SILT (ml) - (10YR, 4/2) dark grayish brown, very moist to wet, micaceous

Substrate becomes hard to drill from 97 to 99 feet

SILT (ml) - (10YR, 3/3) dark brown, wet, FINE to MEDIUM SAND (sp) - (10YR, 3/3) dark brown, wet, micaceous

NOTES:
Total depth = 101.5 feet bgs
Groundwater encountered at 58.55 feet bgs
Hand augered to 6 feet bgs
The boring was initially drilled with 6-inch O.D. augers and later reamed with 11.25-inch O.D. augers.
Soil samples collected using an SPT sampler.
After reaming, a well was installed. See well construction diagram for details.
### BORING M-124

- **DATE DRILLED:** June 27, 2011 - June 28, 2011
- **EQUIPMENT USED:** CME-75 HT, Martini Drilling
- **HOLE DIAMETER (in.):** 11.3
- **ELEVATION:** **

<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>&quot;N&quot; VALUE Std Pen Test</th>
<th>MOISTURE (% of dry wt)</th>
<th>PID</th>
<th>BLOW COUNT* (blows/ft)</th>
<th>SAMPLE LOC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>28</td>
<td>ML</td>
<td>(approx) 0.5 feet of Asphalt</td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>19</td>
<td>ML</td>
<td>SANDY SILT (ml/sm) - (10YR, 3/4) dark yellowish brown, dry, fine sand</td>
</tr>
<tr>
<td>10</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>31</td>
<td>ML</td>
<td>CLAYEY SILT with SAND (ml) - (10YR, 3/3) dark brown, dry, trace of coarse sand, trace of angular to subrounded broken gray shale fragments less than 1 cm in diameter</td>
</tr>
<tr>
<td>15</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>50</td>
<td>ML</td>
<td>FINE SAND (sp) - (10YR, 3/4) dark yellowish brown, dry, micaceous CLAYEY SILT (ml) - (10YR, 3/6) dark yellowish brown, slightly moist, micaceous, some dark brown to black organic pods present</td>
</tr>
<tr>
<td>20</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>44</td>
<td>ML</td>
<td>CLAYEY SILT with SAND (ml) - (10YR, 3/2) very dark grayish brown, dry to slightly moist, some coarse sand, some angular to subrounded broken shale fragments less than 1 cm in diameter, micaceous</td>
</tr>
<tr>
<td>25</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>50</td>
<td>ML</td>
<td>SILTY SAND with Shale fragments (sm) - (10YR, 3/2) very dark grayish brown, dry, to coarse grained, broken shale fragments up to 1 inch in diameter, micaceous</td>
</tr>
<tr>
<td>30</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>35</td>
<td>ML</td>
<td>Same as above</td>
</tr>
<tr>
<td>35</td>
<td>0</td>
<td>0.0</td>
<td>0.0</td>
<td>35</td>
<td>ML</td>
<td>Same as above</td>
</tr>
</tbody>
</table>
### BORING M-124 (Continued)

<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>&quot;N&quot; VALUE</th>
<th>MOISTURE (%)</th>
<th>PID</th>
<th>BLOW COUNT*</th>
<th>SAMPLE LOC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>13</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>CLAYEY SILT (ml) - (10YR, 4/3) dark yellowish brown, slightly moist, some medium sand, micaceous</td>
</tr>
<tr>
<td>0.0</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FINE SAND (sp) - (10YR, 4/3) brown, slightly moist, micaceous</td>
</tr>
<tr>
<td>0.0</td>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SILT (ml) - (10YR, 4/3) brown, slightly moist, micaceous</td>
</tr>
<tr>
<td>0.0</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FINE SAND to SILTY SAND (sp/sm) - (10YR, 4/2) dark grayish brown, micaceous</td>
</tr>
<tr>
<td>0.0</td>
<td>45</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>FINE SAND (sp) - (10YR, 4/2) dark grayish brown, slightly moist, micaceous 2-inch layer of Silt at 55.5 feet</td>
</tr>
<tr>
<td>0.0</td>
<td>50</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SANDY SILT to SILTY SAND (sm) - (10YR, 4/4) dark yellowish brown, slightly moist, fine sand, micaceous</td>
</tr>
<tr>
<td>0.0</td>
<td>55</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>SILTY SAND with Shale gravel fragments (sm) - (10YR, 3/4) dark yellowish brown, moist, fine to coarse grained, subangular to subrounded shale fragments up to 1 inch in diameter Groundwater encountered at 65.6 feet</td>
</tr>
<tr>
<td>0.0</td>
<td>60</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Becomes wet</td>
</tr>
<tr>
<td>0.0</td>
<td>65</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Same as above</td>
</tr>
</tbody>
</table>

**EQUIPMENT USED:** CME-75 HT, Martini Drilling  
**HOLE DIAMETER (in.):** 11.3  
**ELEVATION:** **

---

MTA Westside Subway Extension  
Los Angeles, California  

LOG OF BORING  
Project: 4953-10-1561  
Figure: B-2.19b
**Boring M-124 (Continued)**

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Elevation</th>
<th>Moisture (%)</th>
<th>PID</th>
<th>Blow Count (blows/ft)</th>
<th>Sample LOC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>16</td>
<td></td>
<td>Silty Clay (cl) - (10YR&lt; 3/6) dark yellowish brown, very moist to wet, micaceous</td>
</tr>
<tr>
<td>85</td>
<td>0.0</td>
<td>0.0</td>
<td>50/4&quot;</td>
<td></td>
<td>Silty Sand with Shale gravel fragments (sm) - (10YR, 3/4) dark yellowish brown, wet, fine to coarse grained, angular to subrounded shale fragments up to 1 inch in diameter</td>
</tr>
<tr>
<td>90</td>
<td>0.0</td>
<td>0.0</td>
<td>41</td>
<td></td>
<td>Sandy Silt (ml/sm) - (10YR, 3/4) dark yellowish brown, wet, fine to coarse sand, trace of gravel fragments</td>
</tr>
<tr>
<td>95</td>
<td>0.0</td>
<td>0.0</td>
<td>32</td>
<td></td>
<td>Silty Clay (cl-ml) - (10YR, 3/6) dark yellowish brown, moist to very moist, micaceous</td>
</tr>
<tr>
<td>100</td>
<td>0.0</td>
<td>0.0</td>
<td>46</td>
<td></td>
<td>Same as above</td>
</tr>
</tbody>
</table>

**Notes:**
- Total depth = 101.5 feet bgs
- Groundwater encountered at 65.6 feet bgs
- Hand augered to 6 feet bgs
- The boring was initially drilled with 6-inch O.D. augers and later reamed with 11.25-inch O.D. augers.
- Soil samples collected using an SPT sampler.
- After reaming, a well was installed. See well construction diagram for details.

---

MTA Westside Subway Extension
Los Angeles, California

**LOG OF BORING**
Project: 4953-10-1561 Figure: B-2.19c
FIGURES B-3.0 THROUGH B-3.24
GAS MONITORING WELL DIAGRAMS (ACE PHASE)
TYPICAL SOIL GAS MONITORING WELL CONSTRUCTION DIAGRAM

A. TOTAL DEPTH OF BORING: 66' 9" GDS
B. DIAMETER OF BORING; DRILLING METHOD: HOLLOW STEM AUGER
C. TOP OF BOX ELEVATION:
D. CASING LENGTH: (A) 45', (B) 65'
   MATERIAL: PVC
E. CASING DIAMETER: 2" (EACH)
F. DEPTH TO TOP OF SCREEN: 40' & 60'
G. PERFORATION LENGTH: 5'
   PERFORATION SIZE: 0.010" SLOTS
H. SUBSURFACE SEAL: 2" CONCRETE
I. SEAL: 2'-14', 15'-24', 25'-39', 40'-59', 60' & 6" (25' GDS)
   MATERIAL: HYDRATED BENTONITE CHIPS
J. GRAVEL PACK: 14'-15', 24'-25', 30'-45', 50'-66' (BGS)
   PACK MATERIAL: # 2/12 SAND
K. 1/4" POLYETHYLENE TUNING

Vertical Scale: 1" = 10'-0"
Horizontal Scale Exaggerated