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**Notes:**
- Hand augered upper 10 feet to avoid damage to utilities.
- Borehole grouted with cement-bentonite slurry and patched with asphalt concrete.

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

*Number of blows required to drive the Crandall Sampler 12 inches using a 380 pound hammer falling 18 inches

**Photo Ionization Detector used for OVA readings

---

**Ground-Water Readings:**
Ground-water level encountered at 31 feet below ground surface.

---

**Drilling Company/Drilling Equipment:**
C & L Drilling / Mayhew 1000

**Rotary Wash:**
Sta 556+85, Lt 10 feet

**Dates Drilled:**

**Hole Diameter:**
4-7/8 inches

**Ground EL.**
143 feet

---

**Log of Boring**

---

MTA Westside Subway Extension
Los Angeles, California
### Ground Water Readings

### Drilling Mud Details
- **Dates Drilled**: 4/11/2011 and 4/12/2011
- **Hole Diameter**: 4-7/8 inches
- **Depth (ft)**: 142
- **Sample Loc.**: Sta 560+95, Rt 5 feet
- **Ground El.**
- **Moisture Content (% of dry wt.)**
- **Percent Passing No. 200 Sieve**
- **Oven Value (ppm)**
- **Blow Count (blows/ft)**
- **Dry Density (pcf)**
- **N Value**

### Downhole Tests
- **C & L Drilling / Mayhew 1000**
- **Rotary Wash**
- **(CONTINUED ON FOLLOWING FIGURE)**

### Boring No.
- **G-127**

### Geotechnical Notes
- Field Tech: DW
- Prepared/Date: LH 5/20/2011
- Checked/Date: LT 9/22/2011
- Project No.: 4953-10-1561

### MTA Westside Subway Extension
- Los Angeles, California

---

**FILL [Aa]**
- CLAYEY SAND - moist, brown to orangish brown, fine to medium-grained
- Becomes brown, layers of Sandy Silt
- Becomes medium stiff, fine sand
- Becomes brown to light olive brown, trace fine sand

**QUATERNARY YOUNGER ALLUVIUM [Qa]**
- SANDY LEAN CLAY - very soft, moist, gray, sandy silt interbedded

**SAN PEDRO FORMATION [Qsp]**
- SANDY SILT - stiff, moist, olive brown to olive gray, fine sand, layers of Silty Sand
- SILTY SAND - medium dense, moist, greenish gray, fine-grained
- SILT - very stiff, moist, greenish gray, interbeds silt and sand, some clay

---

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

**LOG OF BORING**

**Project No.: 4953-10-1561**
**Figure: A-2.23a**
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**SANDY SILT - stiff, moist, olive gray, fine to medium sand, occasional coarse**

Becomes very stiff, olive gray, fine to medium sand, some calcium carbonate nodules

**SILT with SAND - very stiff, moist, greenish gray, fine sand**

**SANDY LEAN CLAY - very stiff, moist, gray, fine sand, occasional medium**

**LEAN CLAY - stiff, moist, olive gray, trace sand**

(Sample not recovered)

**SILTY SAND with GRAVEL - medium dense, moist to wet, gray, fine to coarse-grained, fine to coarse gravel (up to 1 inch in size)**

**SILT with SAND - hard, moist, gray, fine sand, occasional medium to coarse, some clay**

### GROUND-WATER READINGS


---

**C & L Drilling / Mayhew 1000**

**DRILLING METHOD**
Rotary Wash

**BOREHOLE LOCATION**
Sta 560+95, Rt 5 feet

**DATES DRILLED**

**HOLE DIAMETER**
4-7/8 inches

**GROUND EL.**
142 feet

---

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

---

**LOG OF BORING**

**PROJECT NO.: 4953-10-1561**
**FIGURE: A-2.23b**

---

**FIELD TECH: DW**
**PREPARED/DATE: LH 5/20/2011**
**CHECKED/DATE: LT 9/22/2011**
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</table>

**POORLY GRADED SAND** - medium dense, wet, gray, fine grained, trace silt

**SANDY LEAN CLAY** - hard, moist, gray to light gray

**SILTY SAND** - medium dense, moist, greenish gray, fine to coarse-grained, occasional gravel (3/8 inch in size)

**SANDY LEAN CLAY** - very stiff to hard, moist, greenish gray, fine sand

Some calcium carbonate nodules

**SILTY SAND** - medium dense, moist, gray, fine-grained, layers of Sandy Silt

END OF BORING AT 112 FEET

**NOTES:**

Hand augered upper 10 feet to avoid damage to utilities. Borehole grouted with cement bentonite slurry and patched with asphalt concrete.

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

*Number of blows required to drive the Crandall Sampler 12 inches using a 380 pound hammer falling 18 inches

**Photo Ionization Detector used for OVA readings

---

**GROUND-WATER READINGS**


**GROUNDS COMPANY/DRILLING EQUIPMENT**

C & L Drilling / Mayhew 1000

---

**BORING LOCATION**

Sta 560+95, Rt 5 feet

---

**DATES DRILLED**


**HOLE DIAMETER**

4-7/8 inches

**GROUND EL.**

142 feet
**GROUND WATER READINGS**

Ground-water level measured at 26 feet below the ground surface on 5/24/2011.

**LOG OF BORING**

<table>
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<th>DEPTH (ft)</th>
<th>ELEVATION (ft)</th>
<th>% VALUE</th>
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<th>MOISTURE CONTENT (% of dry wt.)</th>
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**DRILLING COMPANY/DRILLING EQUIPMENT**

C & L Drilling / Mayhew 1000

**BORING NO.**

G-128

**DATE DRILLED**


**HOLE DIAMETER**

4-7/8 inches

**GROUND EL.**

141 feet

**GROUND WATER LEVEL**

Ground-water level measured at 26 feet below the ground surface on 5/24/2011.

**CAMBER**

5

10

15

20

25

30

35

40

**MTA Westside Subway Extension**

Los Angeles, California

Field Tech: HTY
Prepared/Date: YN 6/16/2011
Checked/Date: HP/PE 9/19/2011

**LOG OF BORING**

Project No.: 4953-10-1561 Figure: A-2.24a
**LOG OF BORING**

MTA Westside Subway Extension
Los Angeles, California

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**GROUND WATER READINGS**

Ground-water level measured at 26 feet below the ground surface on 5/24/2011.

Becomes greenish gray

Becomes medium dense

SANDY LEAN CLAY - stiff, moist, greenish gray, fine sand, some medium

Becomes hard, trace fine to coarse gravel

Layer of Sandy Silt, stiff, fine to medium sand

POORLY GRADED SAND with SILT - very dense, wet, dark greenish gray

---

**GROUND WATER READINGS**

Ground-water level measured at 26 feet below the ground surface on 5/24/2011.

Becomes greenish gray

Becomes medium dense

SANDY LEAN CLAY - stiff, moist, greenish gray, fine sand, some medium

Becomes hard, trace fine to coarse gravel

Layer of Sandy Silt, stiff, fine to medium sand

POORLY GRADED SAND with SILT - very dense, wet, dark greenish gray
## LOG OF BORING

MTA Westside Subway Extension  
Los Angeles, California

### ELEVATION (ft)

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### Notes:
- **FAT CLAY with SAND** - very stiff, moist, dark greenish gray
- **CLAYEY SAND** - dense, moist, light greenish gray, fine to medium-grained, trace coarse, trace gravel
- **WELL GRADED SAND** - medium dense, moist, dark greenish gray, trace clay
- **SANDY LEAN CLAY** - moist, dark greenish gray, fine sand

**END OF BORING AT 111 FEET**

Notes:
- Hand augered upper 5 feet to avoid damage to utilities. Borehole grouted with cement bentonite 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 Crandall Sampler 12 inches using 380 pound hammer falling 18 inches
- **Photo Ionization Detector used for OVA readings**
- Downhole Test: PMT = Pressurometer

Field Tech: HTY  
Prepared/Date: YN 6/16/2011  
Checked/Date: HP/PE 9/19/2011

---

**GROUND WATER READINGS**

Ground-water level measured at 26 feet below the ground surface on 5/24/2011.
### Ground-Water Readings
Ground-water level measured at 31 feet below the ground surface on 5/17/2011.

<table>
<thead>
<tr>
<th>Sample Loc.</th>
<th>HOLE DIAMETER</th>
<th>GROUND EL.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sta 567+90, Lt 10 feet</td>
<td>4-7/8 inches</td>
<td>139 feet</td>
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### Downhole Tests

<table>
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<tr>
<th>Test</th>
<th>Value</th>
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<tr>
<td>OVA</td>
<td>ppm**</td>
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<tr>
<td>Mois-Content</td>
<td>% of dry wt.</td>
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<tr>
<td>Density</td>
<td>pcf</td>
</tr>
<tr>
<td>Blow Count</td>
<td>No.200 SIEVE</td>
</tr>
</tbody>
</table>

**Note:**
- OVA (ppm**): 28.9
- Moist-Content: 90
- Density: 11
- Blow Count: 84
- No.200 SIEVE: CL

### Subsurface Conditions

- **8-inch thick Asphalt Concrete over 10-inch thick Portland Cement Concrete**
- **FILL [Af]**
- Sandy Lean Clay - moist, light olive yellow, fine to coarse sand, trace gravel (up to ½ inch in size), porous

- More sand

- **SAN PEDRO FORMATION [Qsp]**
- Lean Clay with Sand - stiff, moist, dark olive, trace fine sand, trace medium

- **SAN PEDRO FORMATION [Qsp]**
- Lean Clay with Sand - very stiff, moist, light olive to olive, fine sand

- **FAT CLAY**
- Stiff, moist, olive gray, some fine sand, trace medium, trace calcium carbonate nodules

- **CLAYEY SAND**
- Medium dense, wet, light olive gray to greenish gray, fine to medium-grained, trace coarse, trace shell fragments, trace black manganese stains, trace calcium carbonate nodules
SANDY LEAN CLAY - very stiff, moist, greenish gray, fine sand, some calcium carbonate nodules

SILTY SAND with GRAVEL - very dense, moist to wet, greenish gray, fine to coarse-grained, gravel (up to ½ inch in size)

SANDY LEAN CLAY - very stiff, moist, greenish gray, fine sand, trace calcium carbonate nodules

SILTY SAND - medium dense, wet, fine to medium-grained, trace coarse, trace coarse gravel (up to ½ inch in size)

SILTY SAND with GRAVEL - dense, wet, greenish gray, fine to coarse-grained, some fine to coarse gravel (up to 1½ inches in size)

SILT with SAND - hard, moist, greenish gray, fine sand, trace medium to coarse, some mica

Ground-water level measured at 31 feet below the ground surface on 5/17/2011.
## LOG OF BORING

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

### GROUND WATER READINGS

Ground-water level measured at 31 feet below the ground surface on 5/17/2011.

### SUBURFACE CONDITIONS

**FAT CLAY with SAND - stiff, moist, light greenish gray, fine sand, trace calcium carbonate nodules**

- Becomes very stiff, some fine to medium sand, trace coarse, weakly cemented, some gravel (up to 1/4 inch in size)

**CLAYEY SAND - medium dense, moist, greenish gray, fine to coarse-grained, trace fine to coarse gravel (up to 1/2 inch in size), trace calcium carbonate nodules**

**SANDY LEAN CLAY - very stiff, moist, greenish gray, fine to medium sand, trace silt, trace calcium carbonate nodules**

- Becomes stiff, less calcium carbonate nodules, more clay

**CLAYEY SAND - dense, moist, greenish gray, fine-grained, trace calcium carbonate nodules**

---

**Sample Loc.: Sta 567+90, Lt 10 feet**

**Drilling Method:** Rotary Wash

**Dates Drilled:** 5/16/2011 - 5/18/2011

**Hole Diameter:** 4-7/8 inches

**Ground EL:** 139 feet

---

**Table:**

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>ELEVATION (ft)</th>
<th>% VALUE STP/TEST</th>
<th>OVA (ppm)**</th>
<th>MOISTURE/CONTENT (% of dry wt.)</th>
<th>DRY DENSITY (pcf)</th>
<th>BLOW COUNT (blows/ft)</th>
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---

**This record is an interpretation of subsurface conditions at the exploration location. Latitude and longitude of boring location shown on logs are approximate. Transitions between strata may be gradual.**

---

Field Tech: LH  
Prepared/Date: YN 6/17/2011  
Checked/Date: HP/LT 9/19/2011
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<th>DRY DENSITY (pcf)</th>
<th>BLOW COUNT* (blows/ft)</th>
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**Photo Ionization Detector used for OVA readings

END OF BORING AT 120 FEET

NOTES:

Hand augered upper 7 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

Ground-water level measured at 31 feet below the ground surface on 5/17/2011.

---

MTA Westside Subway Extension
Los Angeles, California

LOG OF BORING
Project No.: 4953-10-1561 Figure: A-2.25d
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</tbody>
</table>

**FILL [Af]**

- 6-inch thick Asphalt Concrete over 12-inch thick Portland Cement Concrete
- CLAYEY SAND - moist, brown, fine to coarse-grained
- FAT CLAY with SAND - moist, brown, fine to coarse sand
- QUATERNARY YOUNGER ALLUVIUM [Qal]
- CLAYEY SAND - very loose, moist, olive brown, fine to medium-grained
- LEAN CLAY - medium stiff, moist, gray to greenish gray, trace fine sand
- SANDY LEAN CLAY - medium stiff, wet, brown, fine to coarse sand, (disturbed sample recovered)
- SILTY SAND - medium dense, moist, brown, fine-grained, layer of Poorly Graded Sand, medium to coarse
- SAN PEDRO FORMATION [Qsp]
- LEAN CLAY - medium stiff, moist, gray, abundant calcium carbonate nodules

BECOMES VERY STIFF, (SAMPLE NOT RECOVERED)

BECOMES STIFF, (SAMPLE NOT RECOVERED)
## Logs of Boring

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

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Elevation (ft)</th>
<th>% Value Std Pen Test</th>
<th>OVA (ppm)</th>
<th>Moisture Content (% of dry wt)</th>
<th>Dry Density (pcf)</th>
<th>Blow Count (Bn 500 Sieve)</th>
<th>Percent Passing No. 200 Sieve</th>
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<th>Downhole Tests</th>
<th>Downhole Tests</th>
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</table>

**Ground-Water Readings:**  
Drilling mud bailed on 4/21/2011. Ground-water level measured at 22 feet below the ground surface on 4/22/2011.

**Subsurface Conditions at Other Locations and at Other Times May Differ. Interfaces Between Strata Are Approximate. Transitions Between Strata May Be Gradual.**

**THIS RECORD IS AN INTERPRETATION OF SUBSURFACE CONDITIONS AT THE EXPLORATION LOCATION. LATITUDE AND LONGITUDE OF BORING LOCATION SHOWN ON LOGS ARE APPROXIMATE.**

Field Tech: LH  
Prepared/Date: JF 6/27/2011  
Checked/Date: LT/PE 9/27/2011

(Continued on following figure)
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</table>

**SILTY SAND** - dense, moist to wet, greenish gray, fine-grained, trace mica

**SILT CLAY** - hard, moist, greenish gray, trace fine sand

Thin layer of Sandy Lean Clay, fine to medium sand

**LEAN CLAY** - hard, moist, light gray, trace fine to medium sand, trace calcium carbonate nodules

(Sample not recovered)

More sand

**SANDY LEAN CLAY** - stiff, moist, greenish gray, fine sand, trace medium

Less sand

Alternating with layers of Lean Clay, trace fine sand, trace calcium carbonate nodules

More sand

**SANDY SILT** - very stiff, moist, greenish gray, fine to medium sand, trace fine gravel, trace clay, thin layer of Silty Sand

**LEAN CLAY with SAND** - very stiff, moist, greenish gray, fine to medium sand, trace calcium carbonate nodules

**SILTY SAND** - dense, moist to wet, gray, fine to medium-grained
**Ground Conditions**

- **Borehole Description:** Thin layer of Silt
- **Ground-Water Level:** Measured at 22 feet below the ground surface on 4/22/2011.

**Notes:**

- Hand augered upper 10 feet to avoid damage to utilities.
- Borehole grouted with cement-bentonite slurry and patched with asphalt concrete.
- "N" Value Standard Penetration Test: Number of blows required to drive the SPT sampler 18 inches using a 140 pound automatic hammer falling 30 inches
- *Number of blows required to drive the Crandall Sampler 12 inches using a 380 pound hammer falling 18 inches
- **Photo Ionization Detector used for OVA readings**

**Logging Details**

- **Dates Drilled:** 4/20/2011 - 4/22/2011
- **Hole Diameter:** 4-7/8 inches
- **Sample Location:** Sta 570+12, Rt 5 feet
- **GROUND WATER READINGS:** Drilling mud bailed on 4/21/2011. Ground-water level measured at 22 feet below the ground surface on 4/22/2011.

**Drilling Company/Drilling Equipment:**

- **C & L Drilling / Meyhew 1000**

**Notes:**

- This record is an interpretation of subsurface conditions at the exploration location. Latitude and longitude of boring location shown on logs are approximate. Interfaces between strata are approximate. Transitions between strata may be gradual.
<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>% VALUE</th>
<th>OVA (ppm)**</th>
<th>MOISTURE CONTENT (% of dry wt.)</th>
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</table>

**OVA (ppm)**

- 8-inch thick Asphalt Concrete over 7-inch thick Portland Cement Concrete and 12-inch thick Base Course
- QUATERNARY YOUNGER ALUVIUM [Qal]
  - SILTY CLAY - stiff, moist, dark gray to black, trace fine sand
- QUATERNARY OLDER ALUVIUM [Qalo]
  - CLAYEY SAND - medium dense, moist, olive brown, fine to coarse-grained, trace fine gravel (up to 3/8 inch in size)
  - WELL GRADED SAND - medium dense, moist, gray, fine to coarse-grained, trace gravel (up to 1/4 inch in size)
- SAN PEDRO FORMATION [Qsp]
  - SILT - stiff, moist, light olive gray, trace fine sand, some tar odor
  - LEAN CLAY - very stiff, moist, olive gray
  - FAT CLAY - stiff, moist, bluish gray, trace shell fragments, some fine sand, trace medium to coarse

**Sample LOC.**

Sta 573+90, Lt 20’ feet

**HOLE DIAMETER**

4-7/8 inches

**GROUND EL.**

138 feet

**DRILLING METHOD**

Rotary Wash

**DATES DRILLED**


**GROUND-WATER READINGS**


**DRILLING COMPANY/DRILLING EQUIPMENT**

C & L Drilling / Mayhew 1000

**BORING NO.**

G-131

**LOG OF BORING**

MTA Westside Subway Extension
Los Angeles, California

Field Tech: AR
Prepared/Date: YN 5/17/2011
Checked/Date: LT/PE 9/22/2011

(Continued on following figure)
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<thead>
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**Sample Loc.**
Sta 573+90, Lt 20' feet

**Hole Diameter**
4-7/8 inches

**Ground EL.**
138 feet

**Ground-Water Readings**

**Sample Interpretation**

- **Sandy Silt** - stiff, moist, greenish gray, fine to medium sand
- **Sandy Lean Clay** - stiff, moist, greenish gray, trace sand
  - Becomes hard, gray, trace calcium carbonate nodules
- **Silty Sand** - medium dense, moist, bluish gray, fine to medium-grained, trace coarse, trace fine gravel (up to 3/8 inch in size)
  - Becomes greenish gray, some clay, fine to medium sand, trace gravel (up to 1/4 inch in size)
- **Clayey Sand with Gravel** - medium dense, moist, greenish gray, fine to medium-grained, gravel (up to 1 inch in size)
  - Becomes gray to black

---

**Log of Boring**

<table>
<thead>
<tr>
<th>MTA Westside Subway Extension</th>
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<tbody>
<tr>
<td>Los Angeles, California</td>
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**Log of Boring (Continued)**

Field Tech: AR
Prepared/Date: YN 5/17/2011
Checked/Date: LT/PE 9/22/2011

---

**Log of Boring**

<table>
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<th>Boring No.</th>
<th>C &amp; L Drilling / Mayhew 1000</th>
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<td>Drilling Method</td>
<td>Rotary Wash</td>
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<tr>
<td>Hole Diameter</td>
<td>4-7/8 inches</td>
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<tr>
<td>Ground EL.</td>
<td>138 feet</td>
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MTA Westside Subway Extension
Los Angeles, California
<table>
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<tr>
<th>ELEVATION (ft)</th>
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<th>45</th>
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<th>20</th>
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<tr>
<td><strong>DENSITY (pcf)</strong></td>
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<td>-</td>
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<td>-</td>
</tr>
<tr>
<td><strong>BLOW COUNT (blows/ft)</strong></td>
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</tbody>
</table>

**GROUND-WATER READINGS**

**SILTY SAND** - very dense, moist, bluish gray, fine to coarse-grained, some fine gravel (up to ¾ inch in size)
Becomes medium dense, some tar odor

**ELASTIC SILT** - very stiff, wet, bluish gray, trace sand
Becomes hard

**SANDY SILT** - hard, moist, gray, fine to medium sand, (disturbed sample)
## LOG OF BORING

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

### DRILLING COMPANY/DRILLING EQUIPMENT
C & L Drilling / Mayhew 1000

### DRILLING METHOD
Rotary Wash

### BOREHOLE LOCATION
Sta 573+90, Lt 20' feet

### DATES DRILLED

### HOLE DIAMETER
4-7/8 inches

### GROUND EL.
138 feet

### GROUND-WATER READINGS

### SAMPLE LOC.
Sta 573+90, Lt 20' feet

### HOLES

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<tr>
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<th>DEPTH (ft)</th>
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<th>OVA (ppm)**</th>
<th>MOISTURE CONTENT (% of dry wt.)</th>
<th>DRY DENSITY (pcf)</th>
<th>BLOW COUNT*</th>
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**END OF BORING AT 121½ FEET**

**NOTES:**

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

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

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

**Photo Ionization Detector used for OVA readings

Downhole Test: PMT = Pressuremeter

**Field Tech:** AR  
**Prepared/Date:** YN 5/17/2011  
**Checked/Date:** LT/PE 9/22/2011
<table>
<thead>
<tr>
<th>Sample Loc.</th>
<th>Moisture Content (% of dry wt.)</th>
<th>No. 200 Sieve Downhole Tests</th>
<th>Dry Density (pcf)</th>
<th>&quot;N&quot; Value Std. Pen. Test</th>
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<tr>
<td>Sta 578+00, Lt 10 feet</td>
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**5-inch thick Asphalt Concrete over 12-inch thick Portland Cement Concrete**

**SITELY CLAY - moist, dark brown to black, expansive**

**SANDY LEAN CLAY - moist, light olive brown, fine to medium sand**

**QUATERNARY YOUNGER ALLUVIUM [Qal]**

**LEAN CLAY - medium stiff to stiff, moist, olive brown, trace sand**

Becomes dark olive brown to brown, trace fine sand, alternating layers of Silty Clay

Becomes olive brown

**QUATERNARY OLDER ALLUVIUM [Qalo]**

**LEAN CLAY with SAND - stiff, moist, olive brown, fine sand, occasional medium**

Becomes very stiff, olive brown, fine sand

**SAN PEDRO FORMATION [Qsp]**

**ELASTIC SILT - stiff, moist, gray, some fine sand, occasional medium, trace calcium carbonate nodules**

Field Tech: LH
Prepared/Date: YN 9/2/2011
Checked/Date: LT/PE 9/26/2011

MTA Westside Subway Extension
Los Angeles, California
**Log of Boring**

**G-132 (Continued)**

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</table>

**Drilling Method:** Rotary Wash

**Dates Drilled:**
- 4/14/2011 and 4/15/2011

**Hole Diameter:** 4-7/8 inches

**Ground El.:** 139 feet

**Ground-Water Readings:**
- Drilling mud bailed on 4/14/2011. Ground-water level measured at 28 feet below the ground surface.

**Borehole Location:**
- Sta 578+00, Lt 10 feet

**Drill Diameter:** 4-7/8 inches

**Dry Density (pcf):**
- 139 feet

**Moisture Content (% of dry wt.):**
- 0.0

**Percent Passing No. 200 Sieve:**
- 0.0

**Borehole Location:**
- G-132

**Log of Boring:**

**MTA Westside Subway Extension**

**Los Angeles, California**

---

This record is an interpretation of subsurface conditions at the exploration location. Latitude and longitude of boring location shown on logs are approximate. Subsurface conditions at other locations and at other times may differ. Interfaces between strata are approximate. Transitions between strata may be gradual.

Field Tech: LH
Prepared/Date: YN 9/2/2011
Checked/Date: LT/PE 9/26/2011

(Continued on following figure)
<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>% VALUE STD. PENETTEST</th>
<th>OVA (ppm)**</th>
<th>MOISTURE-CONTENT (% of dry wt.)</th>
<th>DRY DENSITY (psfc)</th>
<th>BLOW COUNT* (blows/ft)</th>
<th>PERCENT PASSING No.200 SIEVE</th>
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<td>CLAYEY SAND</td>
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</tbody>
</table>

**Sample not recovered**

- Becomes medium to coarse-grained
- Becomes greenish gray, very fine sand
- Becomes light gray, trace calcium carbonate nodules
- Becomes very dense, wet, gray, fine to coarse-grained, some clay, occasional gravel (up to 1/8 inch in size)
- Becomes greenish gray, very fine sand
- Becomes light gray, trace calcium carbonate nodules

END OF BORING AT 111½ 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 300 pound hammer falling 18 inches
- **Photo Ionization Detector used for OVA readings

Field Tech: LH
Prepared/Date: YN 9/2/2011
Checked/Date: LT/PE 9/26/2011

MTA Westside Subway Extension
Los Angeles, California
<table>
<thead>
<tr>
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<th>OVA (ppm)**</th>
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</table>

**NOTE:**
- 6-inch thick Asphalt Concrete over 12-inch thick Portland Cement Concrete
- QUATERNARY YOUNGER ALLUVIUM [Qal]
  - SANDY LEAN CLAY - very soft, moist, dark brownish gray, trace slate gravel
  - Becomes dark gray, trace fine gravel
  - Becomes stiff, light olive brown, fine to medium sand
- QUATERNARY OLDER ALLUVIUM [Qalo]
  - SANDY LEAN CLAY - stiff, moist, light brown, trace calcium carbonate nodules
- SAN PEDRO FORMATION [Qsp]
  - SANDY LEAN CLAY - stiff, moist, gray, fine sand
  - Becomes very stiff, light brown to gray
  - SANDY SILT - stiff, moist to wet, gray, fine sand
  - LEAN CLAY - very stiff, moist, olive brown, trace fine sand, iron oxide stains

G-133

MTA Westside Subway Extension
Los Angeles, California

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

GINT LOG

(continued on following figure)
Alternating with layers of Silty Sand, gray

ELASTIC SILT - very stiff, moist to wet, gray, trace fine sand

Some iron oxide stains

LEAN CLAY - very stiff, moist to wet, bluish gray, trace fine gravel

Alternating with layers of Silty Sand, brown

SILT with SAND - very stiff, moist, brown, micaceous

SANDY LEAN CLAY - very stiff, moist, light brown to light gray

Becomes gray, fine to medium sand

SILTY SAND with GRAVEL - dense, moist, gray, fine to medium-grained, gravel (up to 1½ inches in size)

SANDY LEAN CLAY - very stiff, moist, gray to bluish gray, fine sand

SANDY SILT - very stiff, moist, gray to bluish gray, fine sand, trace gravel (up to 3/8 inch in size)
Silty Sand - very dense, moist, gray to bluish gray, fine to coarse-grained, alternating thin layer of Sandy Silt

CLAYEY SAND - very dense, moist to wet, gray, fine to coarse-grained, trace gravel (up to 3/8 inch in size)

Silty Sand - dense, moist, gray, fine to coarse-grained, with thin layers of Lean Clay

Becomes medium dense, fine-grained, with thin layer of Silt

Alternating with layers of Lean Clay, very stiff

SILT - very stiff, moist, dark gray, micaceous, trace clay

WELL GRADED SAND - dense, moist, gray, fine to medium-grained, trace coarse

Silty Sand - dense, moist to wet, gray, fine-grained, micaceous

WELL GRADED SAND - dense, moist to wet, gray, fine to coarse-grained

NOTES:
Borehole grouted with cement-bentonite slurry and patched with asphalt concrete.

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

*Number of blows required to drive the Crandall Sampler 12 inches using a 380 pound hammer falling 18 inches

**Photo Ionization Detector used for OVA readings

This record is an interpretation of subsurface conditions at the exploration location. Latitude and longitude of boring location shown on logs are approximate. Interfaces between strata are approximate. Transitions between strata may be gradual.

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

MTA Westside Subway Extension
Los Angeles, California
###elog of Boring

**BORING NO.**
G-134

**DRILLING COMPANY/DRILLING EQUIPMENT**
C & L Drilling / Mayhew 1000

**DRILLING METHOD**
Rotary Wash

**BOREHOLE LOCATION**
Sta 590+40, Lt 27 feet

**DATES DRILLED**

**HOLE DIAMETER**
4-7/8 inches

**GROUND EL.**
148 feet

### GROUND-WATER 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.

### Sample Log

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<th>Depth (ft)</th>
<th>Elevation (ft)</th>
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<th>Ova (ppm)**</th>
<th>Moisture Content (% of dry wt.)</th>
<th>Blow Count (blows/ft)</th>
<th>Percent Passing No. 200 Sieve</th>
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**ELEVATION (ft)**

- 145
- 140
- 135
- 130
- 125
- 120
- 115
- 110
- 105
- 100
- 95
- 90
- 85
- 80
- 75
- 70
- 65
- 60
- 55
- 50
- 45
- 40
- 35
- 30
- 25
- 20
- 15
- 10
- 5
- 0

**6-in thick Asphalt Concrete over 12-in thick Portland Cement Concrete, No Base Course**

**QUATERNARY YOUNGER ALLUVIUM [Qal]**
- SANDY SILT - very soft, moist, brownish gray, with slate gravel
  - Trace sand, dark olive brown
  - LEAN CLAY - stiff, moist, dark gray, trace sand
  - Becomes soft, (sample not recovered)

**QUATERNARY OLDER ALLUVIUM [Qalo]**
- SANDY LEAN CLAY - very stiff, moist, gray, fine to medium sand
  - 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
  - Becomes brown, fine-grained
  - SANDY LEAN CLAY - very stiff, moist, brown
  - SANDY SILT - stiff, moist, brown
  - Alternating with layers of Silty Sand, brown, fine to medium-grained
  - LEAN CLAY - stiff, moist, dark olive brown, trace sand

---

**Notes:**
- This record is an interpretation of subsurface conditions at the exploration location. Latitude and longitude of boring location shown on logs are approximate.
- Interfaces between strata are approximate. Transitions between strata may be gradual.

**Dates Drilled:**

**Ground-Water 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.

**Prepared/Date:**
JF 5/18/2011

**Checked/Date:**
LT/PE 9/27/2011

**Project No.:**
4953-10-1561

**MTA Westside Subway Extension**
Los Angeles, California
## LOG OF BORING

### G-134 (Continued)

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**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

(Recovery not recovered)

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

### BOREHOLE LOCATION

- **Sta 590+40, Lt 27 feet**
- **4-7/8 inches**

### GROUND-WATER 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.

### FIELD TECH

- **Field Tech:** DW
- **Prepared/Date:** JF 5/18/2011
- **Checked/Date:** LT/PE 9/27/2011

### MTA Westside Subway Extension

Los Angeles, California

### DRILLING COMPANY/DRILLING EQUIPMENT

**C & L Drilling / Mayhew 1000**

### DRILLING METHOD

- **Rotary Wash**

### DATES DRILLED


### HOLE DIAMETER

- **4-7/8 inches**

### GROUND EL.

- **148 feet**

### GROUND-WATER 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.
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<thead>
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<th>DEPTH (ft)</th>
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**Ground-Water 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.

**Notes**

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

**Log of Boring**

- End of Boring at 111½ feet

- "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

**Prepared/Date:** JF 5/18/2011
**Checked/Date:** LT/PE 9/27/2011

MTA Westside Subway Extension
Los Angeles, California

C & L Drilling / Mayhew 1000

DRILLING COMPANY/DRILLING EQUIPMENT

Rotary Wash

BOREHOLE LOCATION

Sta 590+40, Lt 27 feet

DATES DRILLED


HOLE DIAMETER

4-7/8 inches

GROUND EL.

148 feet

GINT LOG

NEW TEMPLATE - MARCH 14, 2011

10/18/11

Figure: A-2.30c
MTA Westside Subway Extension
Los Angeles, California

This record is an interpretation of subsurface conditions at the exploration location. Latitude and longitude of boring location shown on logs are approximate. Subsurface conditions at other locations and at other times may differ. Interfaces between strata are approximate. Transitions between strata may be gradual.

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

Drilling mud bailed on 5/19/2011. Ground-water level measured at 15 feet below the ground surface on 5/20/2011.

Drilling company/drilling equipment:
Fugro / CME 75

Borehole location:
Sta 594+60, Rt 5 feet

Dates Drilled:
5/19/2011 and 5/20/2011

Hole Diameter:
4-7/8 inches

Ground EL:
153 feet

GROUND WATER READINGS:
Fugro / CME 75

DRILLING METHOD:
Rotary Wash

Dry Density:
22.7

OFA (ppm)**
97

BLOW COUNT* (blows/ft)
7

Percent Passing No. 200 Sieve:

Moisture Content (% of dry wt.):

PERCENT PASSING NO. 200 SIEVE:

2-inch thick Asphalt Concrete over 8-inch thick Portland Cement Concrete

FILL [AI]:

CLAYEY SAND - moist, olive brown, fine to medium-grained, some coarse, some gravel (up to 1 inch in size), trace roots

QUATERNARY YOUNGER ALUVIUM [Qal]
SANDY FAT CLAY - soft, moist, dark olive brown, fine sand, trace gravel (up to ½ inch in size)

Becomes medium stiff:

QUATERNARY OLDER ALUVIUM [Qalo]
CLAYEY SAND - loose, moist, olive yellow, fine to coarse-grained, trace gravel (up to ½ inch in size), trace iron oxide stains

SANDY LEAN CLAY - stiff, moist, dark olive, fine sand, some coarse, trace gravel (up to ½ inch in size)

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

SILTY CLAY - stiff, moist, olive brown, fine to coarse sand, trace gravel (up to 1/4 inch in size)

CLAYEY SAND - medium dense, moist, olive yellow, fine to coarse-grained, trace gravel (up to 1/4 inch in size)

LEAN CLAY with SAND - stiff, moist, olive, fine sand, some coarse, trace gravel (up to 1/4 inch in size)
This record is an interpretation of subsurface conditions at the exploration location. Latitude and longitude of boring location shown on logs are approximate. Subsurface conditions at other locations and at other times may differ. Interfaces between strata are approximate. Transitions between strata may be gradual.

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

MTA Westside Subway Extension
Los Angeles, California

LOG OF BORING
Project No.: 4953-10-1561 Figure: A-2.31b
<table>
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<th>DEPTH (ft)</th>
<th>ELEVATION (ft)</th>
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<th>OVA (ppm)**</th>
<th>MOISTURE CONTENT (% of dry wt.)</th>
<th>DRY DENSITY (pcf)</th>
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** SUNDY 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 [Qsp] **

** 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

---

**GROUND WATER READINGS**

Drilling mud bailed on 5/19/2011. Ground-water level measured at 15 feet below the ground surface on 5/20/2011.

**DRILLING COMPANY/DRILLING EQUIPMENT**

Fugro / CME 75

**DRILLING METHOD**

Rotary Wash

**BOREHOLE LOCATION**

Sta 594+60, Rt 5 feet

**DATES DRILLED**

5/19/2011 and 5/20/2011

**HOLE DIAMETER**

4-7/8 inches

**GROUND EL.**

153 feet

---

MTA Westside Subway Extension
Los Angeles, California

---

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

(Continued on following figure)
### Log of Boring

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<tr>
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<th>DEPTH (ft)</th>
<th>&quot;N&quot; VALUE STD.PEN.TEST</th>
<th>OVA (ppm)**</th>
<th>MOISTURE CONTENT (% of dry wt.)</th>
<th>DRY DENSITY (pcf)</th>
<th>BLOW COUNT* (blows/ft)</th>
<th>PERCENT PASSING No. 200 SIEVE</th>
<th>SAMPLE LOC.</th>
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**This record is an interpretation of subsurface conditions at the exploration location. Latitude and longitude of boring location shown on logs are approximate. Subsurface conditions at other locations and at other times may differ. Interfaces between strata are approximate. Transitions between strata may be gradual.**

**Hand augered upper 9 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.**

**Notes:**
- Hand augered upper 9 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.**

---

**Drilling Method:**
- Rotary Wash

**Dates Drilled:**
- 5/19/2011 and 5/20/2011

**Ground-Water Readings:**
- Drilling mud bailed on 5/19/2011. Ground-water level measured at 15 feet below the ground surface on 5/20/2011.

**Borehole Location:**
- Sta 594+60, Rt 5 feet

**Sample Loc.:**
- Fugro / CME 75

**Ground Diameter:**
- 4-7/8 inches

**Moisture Content:**
- (No data provided)

**Percent Passing:**
- (No data provided)

**Dry Density:**
- (No data provided)

**"N" Value STD.PEN.TEST:**
- (No data provided)

---

**Boring No.:** G-135

**Drilling Company/Drilling Equipment:**
- G-135

---

**Field Tech:** LH

**Prepared/Date:** LH 6/27/2011

**Checked/Date:** HP/LT 9/22/2011

**Project No.:** 4953-10-1561

**Figure:** A-2.31d

**MTA Westside Subway Extension**

Los Angeles, California
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<th>DEPTH (ft)</th>
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<th>DRY DENSITY (g/cc)</th>
<th>BLOW COUNT* (blows/ft)</th>
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**FILL [Af]**

CLAYEY SAND - moist, dark brown, fine to medium-grained

**QUATERNARY YOUNGER ALLUVIUM [Qal]**

Silty Clay - very soft, moist, olive brown, trace fine sand

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

Becomes medium stiff, fine to medium sand, some gravel (up to 3/4 inch in size)

Lean Clay - stiff, moist, olive brown, trace gravel (up to 1/8 inch in size), some iron oxide stains

**QUATERNARY OLDER ALLUVIUM [Qalo]**

Lean Clay with Sand - medium stiff, olive brown and brown, fine sand, trace iron oxide stains

Clayey Sand - dense, moist, brown, fine to coarse-grained, trace fine gravel (up to 1/2 inch in size)

Drilling mud bailed on 4/25/2011. Ground-water level measured at 24½ feet below the ground surface.
<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>%N* VALUE STDPETEST</th>
<th>OVA (ppm)**</th>
<th>MOISTURE-CONTENT (% of dry wt.)</th>
<th>DRY DENSITY (pcf)</th>
<th>BLOW COUNT* (blows/ft)</th>
<th>PERCENT PASSING No.200 SIEVE</th>
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**SANDY SILTY CLAY** - stiff, moist, olive brown, fine sand, trace coarse, trace iron oxide stains

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

**SILTY CLAYEY SAND** - very dense, moist, brown, fine to medium-grained, some small clay nodules

**SILT with SAND** - stiff, moist, brown, some clay

**LEAN CLAY** - very stiff, moist, olive brown, trace fine sand, trace iron oxide stains

Becomes light brownish gray

Becomes greenish gray

**FAT CLAY** - hard, moist, gray, trace fine to medium sand, trace calcium carbonate nodules

Becomes very stiff, olive gray to gray

**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

---

**GROUND WATER READINGS**

Drilling mud bailed on 4/25/2011. Ground-water level measured at 24½ feet below the ground surface.
### ELEVATION (ft)
- 75
- 70
- 65
- 60
- 55
- 50
- 45
- 40

### MOISTURE CONTENT (% of dry wt.)
- 24.2
- 21.1
- 21.0
- 20.8
- 20.7
- 18.5
- 16.6
- 14.0

### DRY DENSITY (pcf)
- 101
- 117
- 108
- 101
- 101
- 95
- 95
- 95

### BLOW COUNT (blows/ft)
- 13
- -
- 71
- 45
- -
- -
- 20

### PERCENT PASSING No. 200 SIEVE
- 0.0
- 0.0
- 0.2
- 0.1
- 0.1
- 0.1

### SAMPLE LOC.
- CL
- CL
- CL
- CL

### DOWNHOLE TESTS
- OVA (ppm)**
- BLOW COUNT*
- DRY DENSITY (pcf)
- "N" VALUE
- STD.PEN.TEST

### DRILLING COMPANY/DRILLING EQUIPMENT
- C & L Drilling / Mayhew 1000

### BOREHOLE LOCATION
- Sta 597+30, Lt 10 feet
- 4-7/8 inches
- 159 feet

### DATES DRILLED

### GROUND-WATER READINGS
- Drilling mud bailed on 4/25/2011. Ground-water level measured at 24½ feet below the ground surface.

### GROUND-WATER READINGS

- **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

**Note:**
- This record is an interpretation of subsurface conditions at the exploration location. Latitude and longitude of boring location shown on logs are approximate. Subsurface conditions at other locations and at other times may differ. Interfaces between strata are approximate. Transitions between strata may be gradual.

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<th>OVA (ppm)**</th>
<th>MOISTURE CONTENT (% of dry wt.)</th>
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**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.

---

End of Boring at 121 feet

MTA Westside Subway Extension
Los Angeles, California

Log of Boring

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

Project No: 4953-10-1561 Figure: A-2.32d
### LOG OF BORING

**DRILLING COMPANY/DRILLING EQUIPMENT**
Fugro / CME 75

**DRILLING METHOD**
Rotary Wash

**BOREHOLE LOCATION**
Sta 600+80, Lt 33 feet

**DATES DRILLED**

**HOLE DIAMETER**
4-7/8 inches

**GROUND EL.**
164 feet

**GROUND-WATER READINGS**

---

**SAMPLE LOC.**
Sta 600+80, Lt 33 feet

**HOLE DIAMETER**
4-7/8 inches

**GROUND EL.**
164 feet

**SAMPLE LOC.**
Sta 600+80, Lt 33 feet

---

**ELEVATION (ft)**

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<th>DRY DENSITY (pcf)</th>
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**SAMPLING METHODS**

- 8-inch Asphalt Concrete over 13-inch thick Portland Cement Concrete
  - FILL [Af]
  - SILTY SAND - moist, olive brown, fine to medium-grained, trace gravel (up to ½ inch in size)
    - Becomes yellowish brown, trace gravel (up to 1 inch in size)
    - Becomes olive yellow, more slate gravel
    - Some small silt nodules, trace roots

- QUATERNARY YOUNGER ALLUVIUM [Qal]
  - 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

- QUATERNARY OLDER ALLUVIUM [Qalo]
  - SANDY LEAN CLAY - stiff, moist, olive brown, fine to coarse sand, trace gravel (up to 1/4 inch in size)
    - Becomes olive to dark olive, fine to medium sand, trace coarse, some silt
    - Becomes medium stiff, (sample not recovered)
    - Becomes hard, fine to coarse sand, trace gravel (up to 3/4 inch in size)

---

**NOTES**

- 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 may be gradual.

---

**Prepared/Date:** YN 9/9/2011  
**Checked/Date:** LT/PE 9/26/2011  
**Field Tech:** LH  
**Project No.:** 4953-10-1561  
**Figure:** A-2.33a

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**MTA Westside Subway Extension**  
Los Angeles, California
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<th>Depth (ft)</th>
<th>Elevation (ft)</th>
<th>NC* Value Std Pen Test</th>
<th>OVA (ppm)**</th>
<th>Moisture Content (% of dry wt.)</th>
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**Elevation (ft)**

- 120
- 115
- 110
- 105
- 100
- 95
- 90
- 85
- 80

**Moisture Content (% of dry wt.)**

- 0.0
- 101
- 17
- 48
- 104
- 18
- 18.8
- 20.4
- 33.1
- 26.2
- 33.1
- 25.5
- 22.8
- 23.4

**Drilling Method**

- Rotary Wash

**Borehole Location**

- Sta 600+80, Lt 33 feet

**Dates Drilled**


**Hole Diameter**

- 4-7/8 inches

**Ground-Water Readings**


**Ground Conditions**

- **Clayey Sand - medium dense, moist, olive brown, fine to medium-grained, trace coarse, trace gravel (up to ½ inch in size)**
- Fine to coarse-grained, trace fine gravel (up to 3/8-inch in size), small silt nodules
- **Silty Sand - medium dense, moist, dark olive, fine to medium-grained, trace coarse-grained, trace gravel (up to ½ inch in size)**
- Becomes yellowish brown, fine-grained, some medium, trace coarse, trace mica
- **Sandy Lean Clay - stiff, moist, olive sand, trace medium to coarse, thin layers of silt interbedded, trace gravel (up to 1/4 inch in size)**
- **Silty Sand - moist, light gray, fine to medium-grained**
- **Sandy Fat Clay - very stiff, moist, light gray, fine sand, trace medium**
- Becomes hard, light gray to greenish-gray, some medium sand, trace calcium carbonate nodules
- **Fat Clay - very stiff, moist, light gray, some fine to medium sand, moderately cemented, trace calcium carbonate nodules**
- More fine sand, more calcium carbonate nodules
- **Sandy Lean Clay - very stiff, moist, olive, fine sand, some calcium carbonate nodules, thin silt layers interbedded**
- Becomes hard, more calcium carbonate nodules
### LOG OF BORING

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

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<th>DEPTH (ft)</th>
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**GROUND-WATER READINGS**

**Borehole Location**
Sta 600+80, Lt 33 feet
Hole Diameter: 4-7/8 inches

**Drillers**
- ridiculously named people

**Dates Drilled**

**Drilling Method**
Rotary Wash

**Drilling Company/Drilling Equipment**
Fugro / CME 75

---

**Sample Description**
- More sand, weakly cemented
- Becomes very stiff, fine to medium sand, trace mica
- Less fine sand
- CLAYEY SAND with GRAVEL - medium dense, moist, olive, fine to coarse-grained, fine gravel (up to 1/2-inch in size)
- (Sample not recovered)
- Becomes dense
- 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
- CLAYEY SAND - medium dense, moist, fine to coarse-grained, trace fine gravel
- SAN PEDRO FORMATION [Qsp]
- FAT CLAY - stiff to very stiff, moist, olive brown, some fine sand, trace medium, some calcium carbonate nodules, trace magnesium stains, moderately cemented
- More calcium carbonate nodules
- More silt, trace fine sand
- SANDY LEAN CLAY - very stiff, moist, olive brown, fine sand, trace calcium carbonate nodules, trace shell fragments and organics
- SILTY CLAY - very stiff, moist, dark greenish-gray, some fine sand, trace shell, no cementation to weakly cemented, trace calcium carbonate nodules

---

**Remarks**
This record is an interpretation of subsurface conditions at the exploration location. Latitude and longitude of boring location shown on logs are approximate. Subsurface conditions at other locations and at other times may differ. Interfaces between strata are approximate. Transitions between strata may be gradual.

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

Project No.: 4953-10-1561 Figure: A-2.33c
NOTE:
- 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.
MTA Westside Subway Extension
Los Angeles, California

LOG OF BORING
Project No.: 4953-10-1561 Figure: A-2.34a

DRILLING COMPANY/DRILLING EQUIPMENT
Tri County / CME 75

DRILLING METHOD
Rotary Wash

BOREHOLE LOCATION
Sta 603+80, Lt 25 feet

DATES DRILLED
5/19/2011 and 5/20/2011

HOLE DIAMETER
4-¼ inches

GROUND EL.
168 feet

GROUND-WATER READINGS
Drilling mud bailed on 5/19/2011. Ground-water level measured at 31 feet below the ground surface on 5/20/2011.

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

QUATERNARY YOUNGER ALLUVIUM [Qal]
SANDY SILT - moist, dark brown, fine sand

SANDY SAND with GRAVEL - medium dense, moist, brown, coarse-grained, coarse gravel

SILT with SAND - stiff, moist, brown, fine sand

QUATERNARY OLDER ALLUVIUM [Qalo]
LEAN CLAY with GRAVEL - hard, moist, dark brown, some slate gravel

Becomes very stiff, trace coarse sand

CLAYEY SAND - medium dense, moist, dark orangish brown, fine to coarse-grained, occasional gravel (up to 3/8 inch in size)

WELL GRADED GRAVEL with SAND - loose, moist, dark gray, coarse-grained

(Sample not recovered)

SANDY LEAN CLAY - very stiff, moist, orangish brown, fine sand

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

(CONTINUED ON FOLLOWING FIGURE)
### Elevation (ft)
- 85
- 80
- 75
- 70
- 65
- 60
- 55
- 50
- 45
- 40
- 35
- 30
- 25
- 20
- 15
- 10
- 5
- 0

### Soil Description
- **SAN PEDRO FORMATION [Qsp]**
  - **LEAN CLAY with SAND** - hard, moist, olive brown, fine to medium sand, trace coarse
  - **SILT** - hard, moist, olive brown, some fine to coarse sand, occasional gravel (up to 3/8 inch in size)
  - **(Sample not recovered)**

- **FAT CLAY** - very stiff, moist, dark gray

- **SANDY LEAN CLAY with GRAVEL** - hard, moist, brownish gray

- **SILTY SAND** - very dense, moist, orangish brown, fine to coarse-grained, trace fine gravel (up to 3/8 inch in size)

- **SAN PEDRO FORMATION [Qsp]**

### Boring Data
- **Borehole Location**
  - Sta 603+80, Lt 25 feet
  - G:138
- **Depth (ft)**
  - 120
  - 115
  - 110
  - 105
  - 100
  - 95
  - 90
  - 85
  - 80
- **Depth of Tunnel**
  - 36

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

---

**MTA Westside Subway Extension**

**Los Angeles, California**
**TRI COUNTY / CME 75**

**DRILLING METHOD**
Rotary Wash

**BOREHOLE LOCATION**
Sta 603+80, Lt 25 feet

**DATES DRILLED**
5/19/2011 and 5/20/2011

**HOLE DIAMETER**
4-¼ inches

**GROUND EL.**
168 feet

**GROUND-WATER READINGS**
Drilling mud bailed on 5/19/2011. Ground-water level measured at 31 feet below the ground surface on 5/20/2011.

---

**LOG OF BORING**

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<th>OVA (ppm)**</th>
<th>MOISTURE CONTENT (% of dry wt.)</th>
<th>DRY DENSITY (pcf)</th>
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<th>PERCENT PASSING No. 200 SIEVE</th>
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*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**
10-inch thick Asphalt Concrete over 5-inch thick Portland Cement Concrete and 4-inch thick Base Course

**QUATERNARY YOUNGER ALUVIUM** [Qyal]

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

Some slate gravel

**QUATERNARY OLDER ALUVIUM** [Qalo]

SANDY LEAN CLAY - very stiff, moist, reddish brown, fine to medium sand, some coarse, trace gravel

More sand

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

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

(CONTINUED ON FOLLOWING FIGURE)
### Ground-Water 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.

### Log of Boring

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<th>Std. Pen. Test</th>
<th>OVA (ppm)**</th>
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- Becomes orangish brown, fine to coarse sand, trace gravel
- Becomes medium dense, more gravel, more silt
- **Silty Sand** - very dense, moist, olive brown, fine to medium-grained, occasional gravel (up to 1/2 inch in size)
- **San Pedro Formation \[Qsp\]**
  - Lean Clay - very stiff, moist, olive brown
  - Some silty clay seams
  - Becomes hard, some white mottling, possible calcium carbonate nodules
- **Clayey Sand** - dense, moist, bluish gray, fine to medium-grained, fine gravel (up to 3/4 inch in size)
- Slightly more clay

---

**G-139 (Continued)**

Field Tech: AR  Prepared/Date: YN  6/14/2011
Checked/Date: AB/PE  9/23/2011
Project No.: 4953-10-1561  Figure: A-2.35b

MTA Westside Subway Extension
Los Angeles, California

LOG OF BORING

C & L Drilling / Mayhew 1000

DRILLING COMPANY/DRILLING EQUIPMENT

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DRILLING METHOD

Rotary Wash

Dates Drilled


Hole Diameter

4-7/8 inches

Ground El.

177 feet

---

Ground-Water 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.
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</table>

Some fine gravel

Becomes bluish gray and green with black silt spots, trace gravel (up to 3/8 inch in size)

Becomes medium dense, olive green

SILTY SAND - dense, moist, olive green, fine to medium-grained, some gravel

Layers of Poorly Graded Sand with Silt

LEAN CLAY - very stiff, moist, brown, trace fine sand

SANDY SILT - hard, moist, olive green, fine sand

Layers of Poorly Graded Sand with Silt

END OF BORING AT 111½ FEET

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.

"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: AB/PE 9/23/2011

MTA Westside Subway Extension
Los Angeles, California
**ELEVATION (ft)**

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**% V* VALUE STD TENTEST**

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

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**DRY DENSITY (pcf)**

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

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**PERCENT PASSING No.200 SIEVE**

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**SAMPLE LOC.**

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**GROUND-WATER READINGS**

Ground-water level measured at 56 feet below ground surface on 3/29/2011.

**GROUND-WATER CONDITIONS**

- **FILL [Af]**: Poorly Graded Sand - moist, brown, trace gravel and silt
- **QUATERNARY YOUNGER ALLUVIUM [Qa]**: Sandy Silt - moist, brown
  - **CLAYEY SAND**: Medium dense, moist, dark brown, fine-grained, trace fine gravel
  - Becomes reddish brown
  - Becomes brown
  - Alternating with layers of Sandy Lean Clay
  - Becomes loose, fine to medium-grained
  - **LEAN CLAY**: Stiff, moist, brown, trace sand
  - **SANDY Silt**: Stiff, moist, brown to medium sand, thin layers of Silty Sand
  - **QUATERNARY OLDER ALLUVIUM [Qalo]**: 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

**DRILLING COMPANY/DRILLING EQUIPMENT**

C & L Drilling / Mayhew 1000

**BOREHOLE LOCATION**

Rotary Wash

**DATES DRILLED**


**HOLE DIAMETER**

4-7/8 inches

**GROUND EL.**

181 feet

**LOG OF BORING**

MTA Westside Subway Extension
Los Angeles, California

(Log continued on following figure)
**LOG OF BORING**

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

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>ELEVATION (ft)</th>
<th>% VALUE STD PENETEST</th>
<th>OVA (ppm)**</th>
<th>MOISTURE-CONTENT (% of dry wt.)</th>
<th>DRY DENSITY (pcf)</th>
<th>BLOW COUNT* (blows/ft)</th>
<th>PERCENT PASSING No. 200 SIEVE</th>
<th>SAMPLE LOC.</th>
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**GROUND-WATER READINGS**  
Ground-water level measured at 56 feet below ground surface on 3/29/2011.

Becomes medium dense, gravel up to (3/4 inch in size)

**SAN PEDRO FORMATION [Qsp]**

- **Silty Sand - medium dense, moist, dark gray, fine to medium-grained, with some clay**

- Thin layer of Sandy Silt, gray

- Trace gravel (up to 3/8 inch in size)

- **Lean Clay - very stiff, moist, dark gray**

- **Sandy Silt - stiff, moist to wet, gray**

- **Lean Clay - very stiff, moist, greenish gray**

- Trace fine to medium sand

- **Sandy Lean Clay - hard, moist, greenish gray, fine to medium sand**

- Alternating with layers of Lean Clay with Sand, stiff, trace gravel (up to 1/2 inch in size)

- Becomes dark gray

- **Clayey Sand - medium dense, moist, greenish gray, fine to medium-grained**

- **Silty Sand - very dense, moist, greenish gray, fine-grained, trace gravel (up to 1/2 inch in size)**

**GINT LOG**

(Continued on following figure)

Field Tech: DW  
Prepared/Date: JF 5/13/2011  
Checked/Date: LT/PE 9/26/2011
### LOG OF BORING

**Location:** MTA Westside Subway Extension  
**City:** Los Angeles, California

<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>N° VALUE STD.PENTEST</th>
<th>OVA (ppm)**</th>
<th>MOISTURE-CONTENT (% of dry wt.)</th>
<th>DRY DENSITY (pcf)</th>
<th>BLOW COUNT* (blows/ft)</th>
<th>PERCENT PASSING No.200 SIEVE</th>
<th>SAMPLE LOC.</th>
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**DATING:** 3/25/2011 - 3/30/2011 

**HOLE DIAMETER:** 4-7/8 inches 

**DRILLING COMPANY/DRILLING EQUIPMENT:** C & L Drilling / Mayhew 1000 

**DRILLING METHOD:** Rotary Wash 

**GROUND EL.:** 181 feet 

**NOTES:** 

- Thin layer of Sandy Silt 
- POORLY GRADED SAND with GRAVEL - dense, moist, greenish gray, fine to medium-grained, gravel (up to 1/2 inch in size) 
- LEAN CLAY with SAND - very stiff, moist, greenish gray and dark gray, fine sand 
- SILTY SAND - very dense, moist, greenish gray, fine-grained 
- Layers of Sandy Silt 
- Becomes dense, with alternating layers of Poorly Graded Sand 

**END OF BORING AT 105 FEET** 

**NOTES:** 

- 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 

---

*Ground-water level measured at 56 feet below ground surface on 3/29/2011.*

---

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

---

MTA Westside Subway Extension  
Los Angeles, California
**ELEVATION (ft)**

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<th>Elevation (ft)</th>
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<td>35</td>
<td>160</td>
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<tr>
<td>40</td>
<td>150</td>
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</table>

**% VALUE**

- 0.0
- 11.4
- 116
- Push

**MOISTURE CONTENT (pct. of dry wt.)**

- 0.0
- 13.5
- 118
- 13

**DRY DENSITY (pcf)**

- 0.0
- 6.1
- 105
- 15
- 6

**BLOW COUNT (blows/ft)**

- 68

**PERCENT PASSING No. 200 SIEVE**

- 19

**SAMPLE LOC.**

Drilling mud bailed. Ground-water level measured at 46 feet below the ground surface.

**GROUND-WATER READINGS**

Ground-water readings measured at 46 feet below the ground surface.

**LOG OF BORING**

- **HOLE DIAMETER**: 4-7/8 inches
- **GROUND EL.**: 195 feet
- **DRILLING COMPANY/DRILLING EQUIPMENT**: C & L Drilling / Mayhew 1000
- **DRILLING METHOD**: Rotary Wash
- **BORING NO.**: G-141
- **DRILLING COMPANY/DRILLING EQUIPMENT**: C & L Drilling / Mayhew 1000
- **DRILLING METHOD**: Rotary Wash
- **HOLE DIAMETER**: 4-7/8 inches
- **GROUND EL.**: 195 feet
- **DRILLING COMPANY/DRILLING EQUIPMENT**: C & L Drilling / Mayhew 1000
- **DRILLING METHOD**: Rotary Wash
- **HOLE DIAMETER**: 4-7/8 inches
- **GROUND EL.**: 195 feet
- **DRILLING COMPANY/DRILLING EQUIPMENT**: C & L Drilling / Mayhew 1000
- **DRILLING METHOD**: Rotary Wash
- **HOLE DIAMETER**: 4-7/8 inches
- **GROUND EL.**: 195 feet
- **DRILLING COMPANY/DRILLING EQUIPMENT**: C & L Drilling / Mayhew 1000
- **DRILLING METHOD**: Rotary Wash
- **HOLE DIAMETER**: 4-7/8 inches
- **GROUND EL.**: 195 feet
- **DRILLING COMPANY/DRILLING EQUIPMENT**: C & L Drilling / Mayhew 1000
- **DRILLING METHOD**: Rotary Wash
- **HOLE DIAMETER**: 4-7/8 inches
- **GROUND EL.**: 195 feet
Layers of Clayey Sand seems interbedded

Becomes moist, orange brown, fine to medium-grained, some coarse, some gravel

\[ \text{Becomes wet, yellowish brown, some fine gravel (up to 3/4 inch in size), some iron oxide stains, trace small clay nodules} \]

SANDY SILT - very stiff, moist, olive brown, fine sand, some mica

SAN PEDRO FORMATION [Qsp]

SANDY SILT - very stiff, moist to wet, olive brown, fine sand, some medium, trace iron oxide stains

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)

LEAN CLAY with SAND- stiff to hard, moist to wet, bluish gray to dark bluish gray, fine sand, some medium

Becomes olive gray, more calcium carbonate nodules

SANDY LEAN CLAY - very stiff to hard, moist, olive gray, fine sand, some medium

Becomes olive green, some layers of Silty Sand

LEAN CLAY with SAND- very stiff, moist, bluish gray, fine sand, some medium
ELEVATION (ft)

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>N' Value Std Pen Test</th>
<th>MOISTURE CONTENT (% of dry wt.)</th>
<th>DRY DENSITY (pcf)</th>
<th>BLOW COUNT* (blows/ft)</th>
<th>PERCENT PASSING No. 200 SIEVE</th>
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MOISTURE CONTENT (% of dry wt.)

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<th>Depth (ft)</th>
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SILTY CLAY with SAND - hard, moist, bluish gray, fine sand

SANDY LEAN CLAY - hard, moist, bluish gray, fine sand

SANDY SILT - hard, moist to wet, bluish gray, fine sand

Ground water level measured at 46 feet below the ground surface.

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 380 pound hammer falling 18 inches

**Photo Ionization Detector used for OVA readings