<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>BOX #</th>
<th>RUN #</th>
<th>% RECOVERY</th>
<th>MOISTURE CONTENT (% of dry wt.)</th>
<th>PERCENT PASSING No. 200 SIEVE</th>
<th>SAMPLE LOC.</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>2</td>
<td>2</td>
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<td>16.4</td>
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<td>3</td>
<td>100</td>
<td>18.9</td>
<td>16.3</td>
<td>ML</td>
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<tr>
<td>35</td>
<td>4</td>
<td>100</td>
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**GROUND-WATER READINGS**
Ground-water level measured at 17½ feet and 48 feet below the ground surface in shallow and deep monitoring wells, respectively on 6/10/2011. See last page of this boring for details.

**SAN PEDRO FORMATION [Qsp]**
SILT with SAND - hard, moist, dark greenish gray, slightly infused tar

**SILTY SAND**
- dense, moist, very dark grayish brown (10YR 3/2), fine to medium grained, slightly infused tar, alternating layers of Sandy Silt

**SANDY SILT**
- hard, moist, dark grayish brown, fine to coarse sand, slightly infused tar
- stiff to very stiff, moist, very dark brown (10YR 2/2), fine to medium sand, trace fine to medium gravel, slightly infused tar

**SILTY SAND**
- hard, moist, greenish gray, fine to medium grained, moderately infused tar (9%)
POORLY GRADED SAND with SILT - dense to very dense, moist, dark brown to very dark brown (10YR 2/2), fine to coarse grained, occasionally gravel (up to 3/8 inch in size), slightly infused tar, increasing tar content with depth

Slightly to moderately infused tar

Saturated with tar, black

SILTY SAND - very dense, moist, black, fine to medium grained, occasionally gravel (up to 3/8 inch in size), saturated with tar (15%)

SILTY GRAVEL with SAND - very dense, moist, dark gray to black, fine to coarse sand, fine to coarse gravel (up to 3 inches in size), slightly infused tar

SILTY SAND - dense to very dense, moist, black, fine grained, saturated with tar

Becomes fine to coarse gravel (up to 2 inches in size)

Becomes fine grained, saturated with tar (17%)
<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>BOX #</th>
<th>RUN #</th>
<th>% RECOVERY</th>
<th>MOISTURE CONTENT (% of dry wt.)</th>
<th>PERCENT PASSING No. 200 SIEVE</th>
</tr>
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<tbody>
<tr>
<td>65</td>
<td>3</td>
<td>11</td>
<td>100</td>
<td>3.9</td>
<td>Occasional fine to coarse gravel, saturated with tar</td>
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</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>3.6</td>
<td>More fine to coarse rounded to sub-rounded gravel</td>
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<td></td>
<td>4.5</td>
<td>No gravel</td>
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<tr>
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<td></td>
<td></td>
<td></td>
<td>18</td>
<td>Fine grained, saturated with tar (19%)</td>
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</tr>
<tr>
<td></td>
<td>4</td>
<td>12</td>
<td>100</td>
<td>9.1</td>
<td>SANDY SILT with GRAVEL - very stiff, moist, black, fine to coarse sand, fine to coarse gravel (up to 3 inches in size), shell fragments</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>4.2</td>
<td>Becomes hard, dark greenish gray (5GY 4/1), dark gray and olive gray spots, some calcium carbonate nodules, slightly infused tar to no tar</td>
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<tr>
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<td>5</td>
<td>13</td>
<td>100</td>
<td>5.1</td>
<td>SILT - hard, moist, dark greenish gray, no tar, layers of Silt with Sand</td>
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<td>WELL GRADED SAND with SILT - dense to very dense, moist, fine to medium grained, occasionally gravel, moderately infused tar (13%)</td>
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<tr>
<td></td>
<td>80</td>
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<td>13</td>
<td>8.5</td>
<td>SILT with SAND - very stiff to hard, moist, dark greenish gray, no tar to slightly infused tar</td>
<td></td>
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<tr>
<td></td>
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<td></td>
<td>4.2</td>
<td>Wood fragments, dark greenish gray, less sand</td>
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<tr>
<td></td>
<td>85</td>
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<td>13</td>
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<td>POORLY GRADED SAND - dense, moist, black, fine to medium grained, saturated with tar</td>
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<td></td>
<td>SILTY SAND - dense to very dense, moist, black, fine grained, trace fine gravel, saturated with tar</td>
<td></td>
</tr>
</tbody>
</table>

**GROUND-WATER READINGS**

Ground-water level measured at 17½ feet and 48 feet below the ground surface in shallow and deep monitoring wells, respectively on 6/10/2011. See last page of this boring for details.
Fine grained, occasional gravel, saturated with tar (18%)

More gravels, fine to coarse gravel

Becomes coarse grained, alternating layers of Poorly Graded Sand

SILT with SAND - very stiff to hard, moist, dark greenish gray (10Y 4/1), fine sand, trace fine gravel, no tar to slightly infused tar

No gravel

Field Tech: RH  
Prepared/Date: HY/WL 9/27/2011  
Checked/Date: LT/PE 9/27/2011

MTA Westside Subway Extension
Los Angeles, California
<table>
<thead>
<tr>
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<th>BOX #</th>
<th>RUN #</th>
<th>% RECOVERY</th>
<th>MOISTURE CONTENT (% of dry wt.)</th>
<th>PERCENT PASSING No.200 SIEVE</th>
<th>SAMPLE LOC.</th>
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<td>ML</td>
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</tbody>
</table>

**GROUND-WATER READINGS**
Ground-water level measured at 17½ feet and 48 feet below the ground surface in shallow and deep monitoring wells, respectively on 6/10/2011. See last page of this boring for details.

Becomes very dark brown, slightly infused tar

Becomes black, moderately infused tar, trace fine gravel

POORLY GRADED SAND with SILT - moist, wet, dark brown, fine grained, some medium to coarse, occasional gravel (up to 3/4 inch in size), moderately infused tar (9%)

FERNANDO FORMATION [Tf]
SILTSTONE - very stiff to hard, moist, dark greenish gray (10Y 4/1), fine sand, moderately infused to saturated with tar, no gravel

Some silt, dark greenish gray, no sand to trace sand, slight infused tar to no tar

Shell fragments

Some fine to coarse grained, slightly infused tar (6%)
<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>ELEVATION (ft)</th>
</tr>
</thead>
<tbody>
<tr>
<td>125</td>
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<td>135</td>
<td>30</td>
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<tr>
<td>140</td>
<td>25</td>
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</table>

**NOTES:**
- Hand augered upper 7 feet to avoid damage to utilities. Monitoring well was installed on 4/29/2011. See well construction diagram for S-106.
- Ground-water level measured at 17½ feet and 48 feet below the ground surface in shallow and deep monitoring wells, respectively on 6/10/2011. See last page of this boring for details.

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

**PERCENT PASSING No. 200 SIEVE**

**GROUND-WATER READINGS**

**BORING NO. (Continued)**

**HOLE DIAMETER** 6 inches

**GROUND-EQUIPMENT**

Boart Longyear / 600T Trusonic Drilling Rig

**DRILLING COMPANY/DRILLING EQUIPMENT**

**DRILLING METHOD** Sonic Coring

**DATES DRILLED** 4/26/11 - 5/2/11

**GROUND-HOLE LOCATION** 532+20, Lt 34 feet

**SAMPLE LOC.**

**S-106**

**NOTES:**
- Consistency description of this log is based on pocket penetrometer test results and visual observations of soil samples.

**REFERENCES:**
- Figure: A-3.6g
- Project No.: 4953-10-1561
- 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.**

**FILE TECH: RH**

**PREPARED/DATED:** HY/WL 9/27/2011

**CHECKED/DATED:** LT/PE 9/27/2011
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<th>Depth (ft)</th>
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<th>Run #</th>
<th>% Recovery</th>
<th>Moisture Content (% of dry wt.)</th>
<th>Percent Passing No. 200 Sieve</th>
<th>Sample Loc.</th>
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<td>CL-ML</td>
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<td>CL-ML</td>
<td>CL-ML</td>
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</tr>
</tbody>
</table>

6-inch thick Asphalt Concrete over 4-inch thick Base Coarse

**Quaternary Younger Alluvium** [Qal]

- **Silt to Silty Clay**: very moist, black, trace fine to medium sand, roots to ¾-inch size
- **Silt**: moist, medium brown (10YR 5/3) to yellowish brown (10YR 5/4), some fine to medium sand, some roots (up to 1 inch in size), some clay
- **Silty Clay with Sand**: medium stiff, moist, dark brown (7.5YR 3/2), fine sand, medium to high plasticity, trace roots and other fibrous material
- **Silty Sand**: medium dense, moist, dark brown 7.5YR 3/3, fine grained, trace fine gravel, layers of Clayey Sand
- **Sandy Silt**: stiff, moist, dark brown (7.5YR 3/3), fine sand, some clay
- Occasional gravel (up to 2 inches in size)
- **Well Graded Sand with Silt and Gravel**: medium dense, moist, strong brown (7.5YR 4/6), fine to coarse grained, fine to coarse gravel
- **Lean Clay**: medium stiff, moist, dark brown (7.5YR 3/3), trace fine sand, medium to high plasticity
  
  Trace roots and fibrous material
  
  Fine to medium sand, trace fine gravel
<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Box #</th>
<th>Run #</th>
<th>% Recovery</th>
<th>Moisture Content (% of dry wt.)</th>
<th>Percent Passing No. 200 Sieve</th>
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<tbody>
<tr>
<td>25</td>
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<td></td>
<td>19.4</td>
<td>45</td>
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<tr>
<td>40</td>
<td>6</td>
<td>100</td>
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<td>35.0</td>
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</table>

**San Pedro Formation [Qsp]**

Lean Clay - hard, moist, gray (5Y 5/1), trace fine sand

Becomes dark to very dark gray (5Y 3/1 to 4/1), trace fine to medium sand, occasional fine gravel

Clayey Sand - dense, moist, very dark gray (5Y 4/1), fine to coarse grained, trace fine gravel (up to 3/8 inch in size), sandier lense

Silty Clay - stiff, moist, olive green, trace fine sand, slightly more plastic

Fat Clay - stiff, moist, very dark gray (5Y 4/1), some fine sand

This record is an interpretation of subsurface conditions at the exploration location. Latitude and longitude of boring location shown on logs are approximate. Interfaces between strata are approximate. Transitions between strata may be gradual.
SANDY LEAN CLAY - stiff, moist, very dark gray (5Y 4/1), some grayish black lenses, fine sand

SILTY SAND - medium dense to dense, moist, gray (2.5Y 5/0), fine to medium grained, trace coarse, trace coarse, trace fine gravel (up to 3/8 inch in size)

CLAYEY SAND - dense, moist, dark greenish gray (5GY 3/1), fine to coarse grained, trace fine gravel (up to 3/8 inch in size)

SILTY SAND - dense, moist, dark greenish gray (5GY 3/1), fine to medium grained, trace coarse, some fine to coarse gravel (up to 1 inch in size)

WELL GRADED SAND with SILT and GRAVEL - loose to medium dense, moist, dark greenish gray, fine to coarse grained, fine to coarse gravel (up to 1 inch in size)

SANDY LEAN CLAY - stiff to very stiff, moist, dark greenish gray, fine to medium sand, trace coarse, occasional gravel (up to 3/8 inch in size)
<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>BOX #</th>
<th>RUN #</th>
<th>% RECOVERY</th>
<th>MOISTURE CONTENT (%)</th>
<th>PERCENT PASSING No. 200 SIEVE</th>
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<tbody>
<tr>
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<td>70</td>
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<td>25.2</td>
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<td>20.9</td>
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<td>100</td>
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<td>16.8</td>
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</tbody>
</table>

**DRILLING COMPANY/DRILLING EQUIPMENT**
Boart Longyear / 600T Trusonic Drilling Rig

**DRILLING METHOD**
Sonic Coring

**BOREHOLE LOCATION**
571+83, Lt 105 feet

**DATES DRILLED**
3/23/11 - 3/25/11

**HOLE DIAMETER**
6 inches

**GROUND EL.**
136 feet

**GROUND-WATER READINGS**
Ground-water level not measured.

**SILTY, CLAYEY SAND** - dense, moist, dark greenish gray, fine to medium grained, trace coarse, trace fine to coarse gravel (up to ¾ inch in size), angular to rounded

**SILTY SAND** - dense, moist, dark greenish gray, fine to medium grained, trace coarse, occasional fine gravel (up to ¾ inch in size)

**SILT** - moist, dark greenish gray, fine sand, no gravel

**Elastic Silt** with Sand - stiff, moist, dark greenish gray, fine to medium sand

**Silty Sand** - dense, moist, dark greenish gray, fine to medium grained, trace coarse, occasional fine gravel (up to 3/8 inch in size)

More Silt and Clay, occasional gravels (up to 2½ inches in size)

MTA Westside Subway Extension
Los Angeles, California

**LOG OF BORING**
Project No.: 4953-10-1561
Figure: A-3.7d

Field Tech: RS
Prepared/Date: YN/WL 9/22/2011
Checked/Date: LT/PE 9/22/2011
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<th>RUN #</th>
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<th>% RECOVERY</th>
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**SANDY LEAN CLAY** - stiff, moist, dark greenish gray, fine to coarse sand

Becomes greenish gray

**SANDY SILT** - stiff, moist, greenish gray (5GY 5/1), fine sand, trace fine to coarse gravel

Trace fine to medium gravel

Cobble (up to 3½ inches in size)

Becomes dark greenish gray

Layer of Silty Sand, fine to coarse gravel

**SILTY SAND** - dense, moist, greenish gray, fine to coarse grained, trace fine to coarse gravel

**SILT with SAND** - very stiff to hard, moist, dark greenish gray (5GY 4/1), fine sand

More sand

---

**LOG OF BORING**

**BORING NO.** S-107 (Continued)

**DRILLING COMPANY/DRILLING EQUIPMENT**

Boart Longyear / 600T Trusonic Drilling Rig

**DRILLING METHOD**

Sonic Coring

**BOREHOLE LOCATION**

571+83, Lt 105 feet

**DATES DRILLED**

3/23/11 - 3/25/11

**HOLE DIAMETER**

6 inches

**GROUND EL.**

136 feet

**GROUND WATER READINGS**

Ground-water level not measured.

---

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

Field Tech: RS
Prepared/Date: YN/WL 9/22/2011
Checked/Date: LT/PE 9/22/2011

MTA Westside Subway Extension
Los Angeles, California

Log of Boring
Project No.: 4953-10-1561  Figure: A-3.7e
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<th>BOX #</th>
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<th>MOISTURE CONTENT (% of dry wt.)</th>
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<td>100</td>
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<td>Becomes very dark greenish gray</td>
<td>Boart Longyear / 600T Trusonic Drilling Rig</td>
<td>571+83, Lt 105 feet</td>
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<td>More sand, fine to coarse</td>
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<td>6 inches</td>
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<td></td>
<td>More Silt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>115</td>
<td>20</td>
<td></td>
<td>22</td>
<td>100</td>
<td></td>
<td></td>
<td>Trace fine to coarse gravel</td>
<td></td>
<td></td>
</tr>
<tr>
<td>120</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Becomes fine grained, trace clay, no gravel</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

GROUNDO-WATER READINGS

Ground-water level not measured.

Alternating layers of Silty Clay, some clayey silts

Becomes very stiff, very dark greenish gray (5GY 3/1)

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: RS
Prepared/Date: YN/WL 9/22/2011
Checked/Date: LT/PE 9/22/2011
SANDY SILT - stiff, moist, very dark greenish gray (5GY 3/1), fine sand, occasional fine gravel (up to ½ inch in size), round

END OF BORING AT 122 FEET

NOTES:

Consistency description on this log is based on pocket penetrometer test results and/or visual observation of soil samples.

Hand augered upper 5 feet to avoid damage to utilities.

Borehole grouted with cement-bentonite slurry and patched with asphalt concrete.
1. 8-inch thick Asphalt Concrete over 4-inch thick Portland Cement Concrete, 4-inch thick Base Coarse

2. Fill - Silty Sand with Gravel - moist, brown, fine to coarse

3. Quaternary Younger Alluvium (Qal)
   - Sandy Lean Clay - medium stiff to hard, moist, brown, trace slate gravel
   - Silty Sand - moist, dark yellowish brown (10YR 4/4), fine grained, some subangular to subrounded gravel (up to 3/4 inch in size)
   - Gravel (up to 1 inch in size)
   - Silt - very stiff, moist, very dark grayish brown (10YR 3/2), trace coarse grained, fine gravel, alternating with layers of Silty Clay
   - Clayey Sand with Gravel - dense to hard, damp to moist, dark brown (10YR 3/2), fine to coarse grained, subangular gravel (up to ½-inch in size), alternating with Sandy Clay with Gravel

4. Quaternary Older Alluvium (Qalo)
   - Sandy Silt - very stiff, moist, brown (10YR 4/3), trace coarse grained, some clay

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.

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

**BORING NO.**  S-108  
(Continued)

<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>BOX #</th>
<th>RUN #</th>
<th>% RECOVERY</th>
<th>% MOISTURE CONTENT (dry wt.)</th>
<th>PERCENT PASSING NO. 200 SIEVE</th>
</tr>
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<tbody>
<tr>
<td>150</td>
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<td>2</td>
<td>2A</td>
<td>100</td>
<td></td>
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</tr>
<tr>
<td>145</td>
<td></td>
<td>3</td>
<td>3A</td>
<td>100</td>
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</tr>
</tbody>
</table>

**DRILLING COMPANY/DRILLING EQUIPMENT**
Boart Longyear / 600T Trusonic Drilling Rig

**DRILLING METHOD**
Sonic Coring

**BOREHOLE LOCATION**
606+90, Lt 24 feet

**DATES DRILLED**
3/28/11 and 3/29/11

**HOLE DIAMETER**
6 inches

**GROUND EL.**
172 feet

**GROUND WATER READINGS**
Ground-water level not measured.

---

**Subsurface Conditions**

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

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

- **Becomes gray (10YR 5/1)**

- **Becomes wet**

---

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

---

MTA Westside Subway Extension  
Los Angeles, California
### Core Log

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>% Recovery</th>
<th>Moisture Content (% of dry wt.)</th>
<th>Percent Passing No. 200 Sieve</th>
</tr>
</thead>
<tbody>
<tr>
<td>130</td>
<td>4A</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>125</td>
<td>5</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>120</td>
<td>1</td>
<td>100</td>
<td>14.0</td>
</tr>
<tr>
<td>55</td>
<td>2</td>
<td>100</td>
<td>25.7</td>
</tr>
<tr>
<td>60</td>
<td>2</td>
<td>100</td>
<td>26.4</td>
</tr>
</tbody>
</table>

**Description of Strata**

- **1 inch layer of Sandy Silt**
  - LEAN CLAY - medium stiff, wet, mottled, dark grayish brown (10YR 4/2) to strong brown (7.5YR 4/1), trace coarse sand, some silt
  - SILTY SAND - medium dense to dense, wet, brown (10YR 4/3), fine to coarse grained, some gravel (up to 3/8 inch in size), trace clay, occasional Silt and Clay lenses
  - SILTY CLAY - soft to medium stiff, wet, dark brown (10YR 3/3), occasional sandy lenses

- Layer of Sandy Silt, trace Clay

- Becomes very dark grayish brown (10YR 3/2), some dispersed organics

- Becomes stiff to very stiff

- Abundant calcium carbonate nodules, cemented hard

**Notes**

- Ground-water level not measured.

**Log Details**

- **Boring No.** S-108
- **Project No.** 4953-10-1561
- **Location** MTA Westside Subway Extension, Los Angeles, California

---

**Table**

<table>
<thead>
<tr>
<th>Run #</th>
<th>Recovery</th>
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<tr>
<td>4A</td>
<td>95</td>
</tr>
<tr>
<td>5</td>
<td>100</td>
</tr>
<tr>
<td>1</td>
<td>100</td>
</tr>
<tr>
<td>2</td>
<td>100</td>
</tr>
</tbody>
</table>
Some oxidized subhorizontal laminations

ELASTIC SILT - very stiff, wet, olive gray (5Y 5/2), some fine to coarse sand, occasional gravel (up to 3/8 inch in size), some calcium carbonate nodules, dispersed, cemented and uncemented

More dispersed calcium carbonate nodules

Becomes wet, dark grayish brown (10YR 4/2) with some dark yellowish brown mottling (10YR 4/6), some calcium carbonate nodules cemented and uncemented

More calcium carbonate nodules (up to about ½ inch in size), cemented

Layers of Elastic Silt with Sand, some calcium carbonate nodule dispersed cemented and uncemented (up to ½ inch in size)

Becomes brown (10YR 4/3)

Some concentrated calcium carbonate nodules (up to ¾ inch in size)

FAT CLAY with SAND - stiff, moist, brown (10YR 4/3), fine to coarse sand, occasional gravel (up to 3/8 inch in size)
More sand, some calcium carbonate nodule

SANDY LEAN CLAY - medium stiff, wet, fine to medium sand, trace gravel (up to 3/8 inch in size), alternating pockets of fine to coarse grained sand

CLAYEY SAND with GRAVEL - dense, wet, varying colors, fine to coarse gravel (up to 1 inch in size)

Gravel becomes more rounded

Some silt and clay lenses

More gravel (up to 1½ inch in size)

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

WELL GRADED GRAVEL with SILT - dense, moist, olive brown, fine to coarse sand, fine to coarse gravel (up to 2 inches in size)

Some clay

Cemented calcium carbonate nodules, pockets of gravel

SAN PEDRO FORMATION [Qsp]

SANDY LEAN CLAY - very stiff to hard, wet, light olive brown (2.5Y 5/3), gravel (up to ½ inch in size), abundant calcium carbonate, dispersed nodules and cement, partially cemented, layers of Clayey Sand with Gravel

SANDY SILT - stiff to very stiff, wet, olive brown (2.5Y 4/3), varying dark yellowish brown (10YR 4/6) mottling, fine sand, some medium to coarse, trace gravel (up to 3/4 inch in size), occasional micaceous, some very fine Sandy Silt lenses

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

MTA Westside Subway Extension
Los Angeles, California

LOG OF BORING

Project No.: 4953-10-1561 Figure: A-3.8e
Trace calcium carbonate nodule, occasional sand lenses

SILTY CLAY - stiff, wet, strongly mottled, olive brown (2.5Y 4/3) to strong brown (7.5Y 4/6)

END OF BORING AT 107 FEET

NOTES:

Consistency description on this log is based on pocket penetrometer test results and/or visual observation of soil samples.

Hand augered upper 8 feet to avoid damage to utilities.

Borehole grouted with cement-bentonite slurry and patched with asphalt concrete.
10-inch thick Asphalt Concrete over 6-inch thick Portland Cement Concrete

FILL [Af]
SILT - moist, dark brown, some clay

QUATERNARY YOUNGER ALLUVIUM [Qal]
LEAN CLAY - medium stiff, moist, dark brown (7.5YR 3/4), trace fine grained, small calcium carbonate nodules

Some root fragments

Trace fine to coarse gravel, angular

Fine to coarse sand, fine to coarse gravel

Layers of Silty Sand

SANDY LEAN CLAY - hard, moist, dark brown (7.5YR 3/4), trace fine to coarse sand, trace fine to coarse gravel, calcium carbonate nodule

Ground-water level not measured.
More sand and gravel, small pockets of Clayey Sand with Gravel

SANDY LEAN CLAY - medium stiff, moist, dark brown (7.5YR 3/4), fine to medium sand, trace fine gravel

SILTY CLAY with SAND - medium stiff, moist, dark brown, fine sand, trace fine and coarse gravel

QUATERNARY OLDER ALLUVIUM [Qalo]

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

Becomes reddish gray (5YR 5/2)

Becomes gray (5YR 6/1)

No core recovery from 37.0 to 38.5 feet

Becomes reddish brown (5YR 4/3)

Fine to coarse sand, fine to coarse subrounded to angular gravel, gray (5Y 5/1)
No core recovery from 42 to 42.5 feet

POORLY GRADED SAND with GRAVEL - medium dense, moist, brown (7.5YR 4/4), fine to coarse grained, fine gravel

Layer of Clayey Silt, trace fine sand

SILTY SAND with GRAVEL - very dense, moist, dark brown (7.5YR 3/4), fine to coarse grained, fine to medium gravel (up to 1 inch in size), angular to subrounded

SILT - hard, moist, dark brown, trace fine sand, trace fine gravel, some clay

More sand and gravel

SILTY SAND - dense, moist, brown (7.5YR 4/2) with some gray bands, fine to coarse grained, trace fine gravel

LEAN CLAY with SAND - hard, moist, dark brown (7.5YR 3/2), fine sand

SILTY CLAY - medium stiff to stiff, moist, dark brown, trace fine sand, occasional fine gravel

SANDY LEAN CLAY - medium stiff, moist, dark brown, fine to coarse sand, trace fine gravel (up to 3/4 inch in size)

Layer of Silt with Gravel, subrounded gravel (up to 1 inch in size), some clay

Trace fine gravel

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

**BOREHOLE LOCATION**
647+82, Lt 49 feet

**HOLE DIAMETER**
6 inches

**GROSS WATER READINGS**
Ground-water level not measured.

**PROJECT NO.: 4953-10-1561**

**THEORY OF BORING**
Alternating with layers of Sandy Silt with Gravel

- **Becomes dark brown, trace fine to medium sand, occasional fine to coarse gravel**
- **Layers of Sandy Silt with Gravel**
  - **Cobble (up to 4 inches in size)**
  - **Becomes dark brown, trace fine to coarse sand**

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

- **Becomes dark reddish brown (5YR 4/3)**
  - **Occasional gravel (up to 1 inch in size)**

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

---

**DRILLING COMPANY/DRILLING EQUIPMENT**
Boart Longyear / 600T Trusonic Drilling Rig

**DRILLING METHOD**
Sonic Coring

**DATES DRILLED**

**GROUND EL.**
231 feet

---

**SESSION NO.**
S-109 (Continued)

**HOLE DIAMETER**
6 inches

**DATE DRILLED**

**GROUND EL.**
231 feet

---

**ENGINEERING COMPANY/ENGINEERING EQUIPMENT**
Boart Longyear / 600T Trusonic Drilling Rig

**DRILLING METHOD**
Sonic Coring

**DATE DRILLED**

**GROUND EL.**
231 feet
<table>
<thead>
<tr>
<th>SAMPLE LOC.</th>
<th>BOX #</th>
<th>% RECOVERY</th>
<th>MOISTURE CONTENT (Vol. %)</th>
<th>SAMPLE PASSING No. 200 SIEVE</th>
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</thead>
<tbody>
<tr>
<td>SC</td>
<td>13</td>
<td>16.7</td>
<td></td>
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</tr>
<tr>
<td>ML</td>
<td>14</td>
<td>11.8</td>
<td>46</td>
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<td>SM</td>
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<tr>
<td>CL-ML</td>
<td>16</td>
<td>9.1</td>
<td>36</td>
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</tr>
</tbody>
</table>

**Ground-Water Readings**

Ground-water level not measured.

**San Pedro Formation [Qsp]**

LEAN CLAY with SAND - hard, moist, brown (10YR 4/3), fine to medium grained, trace coarse, trace fine gravel (up to 3/8 inch in size)

No core recovery from 89.6 to 92 feet

More Sand

SILTY SAND - dense, moist, olive brown (2.5YR 4/3), fine to coarse grained, some fine gravel (up to 1/2 inch in size)

Becomes dark greenish gray (5G 3/1), trace fine to medium gravel

**Sandy Silt** - very stiff to hard, moist, brown (7.5YR 4/3), fine to medium sand, trace fine gravel

SILTY SAND - moist, brown (10YR 4/3), trace fine to coarse grained, some fine gravel, (up to 1/2 inch in size), some Sandy Silt seams

Becomes olive brown (2.5YR 4/3), large slate gravel

LEAN CLAY with SAND - hard, moist, brown (10YR 4/3), fine to medium grained, trace coarse, trace fine gravel (up to 3/8 inch in size)

No core recovery from 89.6 to 92 feet

More Sand

SILTY SAND - dense, moist, olive brown (2.5YR 4/3), fine to coarse grained, some fine gravel (up to 1/2 inch in size)

Becomes dark greenish gray (5G 3/1), trace fine to medium gravel
Becomes very dark greenish gray

LEAN CLAY - stiff, moist, dark greenish gray

Becomes dark greenish gray more sand between 102 to 102.3 feet

More silt, trace fine to coarse gravel

More sand and gravel

Less sand and gravel, fine to coarse grained, fine gravel

More sand and gravel, occasional large subround to round gravel

<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>BOX #</th>
<th>RUN #</th>
<th>% RECOVERY</th>
<th>MOISTURE CONTENT (% of dry wt.)</th>
<th>PERCENT PASSING No. 200 SIEVE</th>
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<tbody>
<tr>
<td>130</td>
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<td>23.3</td>
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<td>4</td>
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<td>21.7</td>
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</tbody>
</table>
**NOTES:**

- Consistency description on this log is based on pocket penetrometer test results and/or visual observation of soil samples.
- Hand augered upper 7 feet to avoid damage to utilities.
- Borehole grouted with cement-bentonite slurry and patched with asphalt concrete.

---

**LOG OF BORING**

<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>BOX #</th>
<th>RUN #</th>
<th>% RECOVERY</th>
<th>MOISTURE CONTENT (% of dry wt.)</th>
<th>PERCENT PASSING No. 200 SIEVE</th>
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</tr>
</tbody>
</table>

**END OF BORING AT 122 FEET**

**NOTES:**

- Consistency description on this log is based on pocket penetrometer test results and/or visual observation of soil samples.
- Hand augered upper 7 feet to avoid damage to utilities.
- Borehole grouted with cement-bentonite slurry and patched with asphalt concrete.
**FILL [Af]**
Silty Sand - moist to wet, brown, fine grained, some gravel and cobble (up to 3 inches in size), layers of Poorly Graded Sand with Silt, some glass debris

**QUATERNARY OLDER ALLUVIUM [Qalo]**
Sandy Silt - wet, very dark brown (10YR 2/2), trace to some subangular gravel, (up to ¾- inch in size), mainly slate shale and siltstone, some dispersed organics, trace clay
At 6 to 8.5': No core recovery

Becomes dark yellowish brown (10YR 3/4), more gravel, fewer organics

Becomes very dark brown (10YR 2/2), trace fine gravel

Becomes dark yellowish brown (10YR 4/6)

Silty Clay - soft to medium stiff, wet, dark yellowish brown (10YR 4/6), trace fine gravel

At 17.0 - 27.0': Samples recovered in bags
Sandy Silt with Gravel - medium stiff, wet, very dark brown (10YR 2/2) to dark yellowish brown (10YR 4/3), subangular shale, slate and sandstone (up to ¾- inch in size), occasional sand lenses

Silty Clay - medium stiff, moist, very dark brown, varying fine sand,
### LOG OF BORING

**Boart Longyear / 600T Trusonic Drilling Rig**

**Sonic Coring**

**DATES DRILLED**

**HOLE DIAMETER**
6 inches

**GROUND EL.**
282 feet

---

**ELEVATION (ft)** | **DEPTH (ft)** | **BOX #** | **RUN #** | **% RECOVERY** | **MOISTURE-CONTENT (dry wt.)** | **PERCENT PASSING No. 200 SIEVE** | **SAMPLE LOC.** | **GROUND-WATER READINGS**
--- | --- | --- | --- | --- | --- | --- | --- | ---
| 260 | 60 | 3 | 90 | trace coarse sand and fine gravel, layers of Silt with Clay
| | 255 | 4 | 100 | SANDY SILT with GRAVEL - stiff, wet, very dark brown, some clay
| | 250 | 5 | 100 | SILTY SAND with GRAVEL - moist, brown to dark grayish brown, fine to coarse grained, mainly subrounded to subangular slate and sandstone gravel (up to 1 inch in size)
| | 245 | 6 | 100 | SILT - very soft, wet, brown (7.5YR 4/3) to very dark grayish brown (10YR 2/2), fine to coarse sand, trace fine gravel, slate and sandstone, poorly consolidated, trace clay
| | | | 22.2 | 59 | SANDY SILT - soft to medium stiff, wet, mottled grayish brown (10YR 5/2) to brown (7.5YR 4/4), fine sand, trace medium to coarse, texture defined by variable oxidation (alternating oxidized and unoxidized)
| | | | 21.3 | | Lenticular sand lense (2-inch thick)

---

**ZONE OF SAND AND GRAVEL**

---

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

Field Tech: PR/MF
Prepared/Date: YN/WL 9/30/2011
Checked/Date: LT/PE 9/30/2011

---

MTA Westside Subway Extension
Los Angeles, California

---

**Figure: A-3.10b**
### LOG OF BORING

**S-110**  (Continued)

<table>
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<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
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<th>RUN #</th>
<th>% RECOVERY</th>
<th>MOISTURE CONTENT (% of dry wt.)</th>
<th>PERCENT PASSING No. 200 SIEVE</th>
<th>SAMPLE LOC.</th>
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</thead>
<tbody>
<tr>
<td>235</td>
<td>45</td>
<td>7</td>
<td>100</td>
<td>17.8</td>
<td>GC-GM</td>
<td></td>
<td>CL</td>
</tr>
<tr>
<td>240</td>
<td>50</td>
<td></td>
<td></td>
<td>9.7</td>
<td>13</td>
<td></td>
<td>SILTY, CLAYEY GRAVEL with SAND - medium dense, wet, dark brown (10YR 3/3), mainly subangular slate, some metabasalt and quartzite, fine to coarse sand, grades to fine to coarse gravels (up to 1 inch in size), lower contact is gradational</td>
</tr>
<tr>
<td>250</td>
<td>55</td>
<td>8</td>
<td>100</td>
<td>38.0</td>
<td>99</td>
<td></td>
<td>LEAN CLAY - stiff, wet, strongly mottled, dark grayish brown (2.5YR 3/4) to brown (7.5YR 4/4), occasional dark reddish brown (5YR 3/4) mottling, subhorizontal, dark brown</td>
</tr>
<tr>
<td>260</td>
<td>60</td>
<td>9</td>
<td>100</td>
<td>20.0</td>
<td>GC</td>
<td></td>
<td>Becomes dark brown, (¼ inch thick), bedding appears subhorizontal</td>
</tr>
<tr>
<td>275</td>
<td>65</td>
<td>10</td>
<td>100</td>
<td></td>
<td>CL</td>
<td></td>
<td>Prominent wavy, subhorizontal laminations, very dark grayish brown (10YR 4/2) to dark reddish brown (5YR 3/2)</td>
</tr>
</tbody>
</table>

Subrounded sandstone clast (1 inch in size)

Occasional fine to medium sand

Mottling becomes less prominent, brown (7.5YR 4/4) with some dark grayish brown (10YR 4/2) mottling

Some wavy, subhorizontal laminations

CLAYEY GRAVEL - loose, wet, brown (7.5YR 4/2), clasts up to 3 inches in size, mainly subangular to subrounded slate

More sand

SANDY LEAN CLAY - very stiff, wet, brown (10YR 4/4), fine sand, trace medium to coarse

### MTA Westside Subway Extension
Los Angeles, California

**DRILLING COMPANY/DRILLING EQUIPMENT**
Boart Longyear / 600T Trusonic Drilling Rig

**DRILLING METHOD**
Sonic Coring

**BOREHOLE LOCATION**
710+7, Lt 78 feet

**DATES DRILLED**

**HOLE DIAMETER**
6 inches

**GROUND EL.**
282 feet

**GROUND-WATER READINGS**
Ground-water level not measured.

---

**LOG OF BORING**

**Prepared/Date:** YN/WL 9/30/2011

**Checked/Date:** LT/PE 9/30/2011
At 61.4’: Some gravel (up to ¾ inch in size) becomes yellowish brown (10YR 5/4)

Layer of Silty Sand, fine to coarse grained, some fine gravel (up to ¾ inch in size), clasts (up to 1 inch in size), mainly subangular slate and subrounded shale and sandstone, Clayey Sand lenses

Silty Sand with Gravel - wet, yellowish brown (6YR 5/4), fine to coarse grained, fine gravel (up to 3/4 inch in size), mainly subangular to subrounded slate, some subrounded shale

More sand
Clasts (up to 3 inches in size), mainly angular to subangular slate, some subangular sandstone, varying colors

Granitic clast, unweathered, subrounded, (2 inches in size)
Becomes very dark grayish brown (10YR 3/2), clasts (up to ¾-inch in size), mainly subangular slate and subangular to subrounded shale and sandstone, matrix is fine to coarse grained sand, some silt

Sandy Silt - stiff, wet, brown (10YR 4/4), trace fine gravel, layers of Clayey Sand

Well Graded Sand with Silt and Gravel - dense, wet, brown (10YR 4/4), fine to coarse grained, fine to coarse gravel (up to 1 inch in size), mainly subrounded slate and shale

Field Tech: PR/MF
Prepared/Date: YN/WL 9/30/2011
Checked/Date: LT/PE 9/30/2011

MTA Westside Subway Extension
Los Angeles, California
SILTY SAND - dense, wet, fine to coarse grained, some fine gravel (up to ½ inch in size)

Sharp contact, erosional, appears to dip 10-20 degrees

SILTY CLAY - very stiff, wet, brown (7.5YR 4/4), some fine sand, trace fine to coarse gravel, alternating layers of Silty Sand and Sandy Silt

Becomes dark yellowish brown (10YR 4/4)
Becomes brown (7.5YR 4/3)
Becomes dark grayish brown (10YR 4/2) mottled with faint brown (7.5YR 4/4), some wavy, subhorizontal laminations

Becomes strongly mottled, dark brown (7.5YR 3/3) to very dark gray (7.5YR 3/3)

SANDY SILT with GRAVEL - very stiff, wet, brown (7.5YR 4/4), clasts (up to ¾-inch in size), mainly angular to subangular slate, subangular shale and sandstone, some subrounded quartzite, some clay

SILTY GRAVEL - dense, wet, dark grayish brown (10YR 5/2), clasts (up to ¼-inch in size), mainly subangular slate, lesser subangular to subrounded shale and sandstone, some subangular granite clasts, trace to some clay

More clay, gradational

Ground-water level not measured.

Drilling Company/Drilling Equipment: Boart Longyear / 600T Trusonic Drilling Rig

Sonic Coring

Hole Diameter: 6 inches

710+7, Lt 78 feet

Ground Water Readings:
Ground-water level not measured.

Boring No.: S-110

Ground EL.: 282 feet

Figure: A-3.10e
### Log of Boring

**Boring No.: S-110 (Continued)**

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Box #</th>
<th>Run #</th>
<th>% Recovery</th>
<th>Moisture Content (% of dry wt.)</th>
<th>Percent Passing No. 200 Sieve</th>
<th>Sample Loc.</th>
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<td>125</td>
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**Drilling Company/Drilling Equipment**

Boart Longyear / 600T Trusonic Drilling Rig

**Borehole Location**

710+7, Lt 78 feet

**Dates Drilled**


**Hole Diameter**

6 inches

**Ground Water Readings**

Ground water level not measured.

**Subsurface Conditions**

- **Silty, Clayey Gravel** - very stiff, wet, very dark gray (2.5YR 3/1), clasts (up to ½-inch in size), mainly subangular to subrounded slate, sandstone, fine to coarse sand, irregular sharp contact, oxidized beds
- **Sandy Silt with Gravel** - stiff, wet, very dark grayish brown (10YR 3/2) to brown (10YR 4/4), clasts (up to ½-inch in size, some to 1 inch), mainly subangular to subrounded slate, some subrounded to rounded sandstone, trace gravel, some clay
- **Silty Clay** - very stiff, wet, dark brown (7.5YR 3/3) to dark gray (2.5YR 4/1), mottled, varying color, trace coarse sand, trace manganese oxide
- **Increasing sand, some fine gravel, some wavy subhorizontal laminations**
- **Sandy Silt with Gravel** - very stiff, moist, brown to dark gray, clasts (up to 1 inch in size), subangular to subrounded slate, subrounded shale and sandstone
- **Layers of Sandy Silty Clay, some brown (7.5YR 4/2) mottling, trace coarse sand, some wavy subhorizontal laminations**
- **More gravel, subhorizontal laminations, fine to coarse**
- **Lean Clay** - very stiff, wet, olive brown (2.5Y 4/3) mottling with strong brown (7.5YR 4/4), trace coarse sand, trace calcium carbonate nodules, occasional sand pockets
- **Calcium carbonate nodules (up to ¼ inch in size), some rounded fine gravel**
- **Sandy Silt with Gravel** - very stiff, wet, olive brown (2.5YR 4/3) and yellowish brown (10YR 5/4) mottling, some coarse sand, fine gravel (up to ¾ inch in size), subangular and subrounded shale and sandstone, calcium carbonate nodules (up to ¼ inch in size)
- **Becomes light yellowish brown (2.5Y 6/3), more fine gravel (up to ½ inch in size, some ¾ inch), subangular slate, fewer shale and sandstone**

**Notes:**

- Project No.: 4953-10-1561
- **MTA Westside Subway Extension**
- Los Angeles, California
- **Figure:** A-3.10f

**Field Tech:** PR/MF

**Prepared/Date:** YN/WL 9/30/2011

**Checked/Date:** LT/PE 9/30/2011

**Ground-Water Readings**

Ground-water level not measured.
Becomes light yellow brown (2.5YR 6/3)

END OF BORING AT 122 FEET

NOTES:

Consistency description on this log is based on pocket penetrometer test results and/or visual observation of soil samples.

Hand augered upper 6 feet to avoid damage to utilities.

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

MTA Westside Subway Extension
Los Angeles, California
**S-111**

**BORING NO.**

**BORING COMPANY/DRILLING EQUIPMENT**
Boart Longyear / 600T Trusonic drill rig

**DRILLING METHOD**
Sonic Coring

**BOREHOLE LOCATION**
692-57, Rt 16 feet

**DATES DRILLED**
2/14/2011 - 2/18/2011

**HOLE DIAMETER**
6 inches

**GROUND EL.**
249 feet

---

**12-inch thick Asphalt Concrete**

**SILT to SILTY CLAY with GRAVEL - moist, dark brown to gray (7.5YR 3/3 to 7.5Y 6/1), slate gravel (up to 1 inch in size)**

No core recovery from 7½ to 11’

---

**QUATERNARY YOUNGER ALLUVIUM [Qal]**

**SILTY CLAY - stiff, very moist, dark brown to dark yellowish brown (7.5YR 3/3 to 10YR 3/4), trace to some coarse sand, some subangular to subrounded slate gravel (up to ½ inch in size), layer of Silt**

**SILT - moist, dark yellowish brown (10YR 3/4), fine sand and trace to some clay, some slate gravel (up to 1½ inches in size), few shale fragments, alternating with layers of Sandy Silt**

No core recovery from 17 to 20’

---

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: DL
Prepared/Date: PK/WL 10/1/2011
Checked/Date: HP/PE 10/2/2011
<table>
<thead>
<tr>
<th>ELEVATION (ft)</th>
<th>DEPTH (ft)</th>
<th>BOX #</th>
<th>RUN #</th>
<th>% RECOVERY</th>
<th>MOISTURE CONTENT (% of dry wt.)</th>
<th>PERCENT PASSING No. 200 SIEVE</th>
<th>SAMPLE LOC.</th>
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<tbody>
<tr>
<td>210</td>
<td>20</td>
<td>4</td>
<td>100</td>
<td>16</td>
<td>Silty Sand with Gravel - moist, dark olive green (5Y 3/3), fine to medium grained, slate gravel, subrounded to suboval (up to 1½ inches in size), 3 to 4-inch thick, occasional interbedded Sandy Silt</td>
<td></td>
<td></td>
</tr>
<tr>
<td>215</td>
<td>35</td>
<td>4</td>
<td>100</td>
<td></td>
<td>Becomes wet, fine to coarse grained, gravel (up to ¼ inch in size)</td>
<td></td>
<td></td>
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<tr>
<td>220</td>
<td>25</td>
<td>3</td>
<td>80</td>
<td></td>
<td>Lenses of Silty Sand, moist, dark brown (2.5YR 3/3), massive</td>
<td></td>
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</tr>
<tr>
<td>225</td>
<td>20</td>
<td>2</td>
<td>70</td>
<td></td>
<td>Some clay</td>
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<td></td>
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**Log of Boring**

**Project No.:** 4053-10-1561  **Figure:** A-3.11b

**MTA Westside Subway Extension**

**Los Angeles, California**

**Boart Longyear / 600T Trusonic drill rig**

**Sonic Coring**

**Dates Drilled:**

2/14/2011 - 2/18/2011

**Hole Diameter:**

6 inches

**Syracuse Company/Drilling Equipment:**

Boart Longyear / 600T Trusonic drill rig

**Drilling Method:**

Sonic Coring

**Ground-Water Readings**

Ground-water level not measured.
Becomes fine to coarse sand, more gravel

POORLY GRADED GRAVEL with CLAY and SAND - dense, wet, dark olive gray (5Y 3/2), medium to coarse sand, some fine, gravel (up to 1 inch in size), alternating with Clayey Sand and Silty Sand

SILTY SAND with GRAVEL - dense, wet, fine to coarse shale gravel, trace clay, some quartz, iron

SILTY CLAYEY GRAVEL with SAND - wet, dark olive gray (5Y 3/2), fine to coarse sand, subrounded to well rounded slate gravel (up to 3 inches in size), cobbles (up to 3½ inches in size)

WELL GRADED SAND with GRAVEL - wet, dark olive gray, gravel (up to ½ inch in size)

SILTY CLAYEY GRAVEL with SAND - dense, wet, very dark grayish brown (10YR 3/2), fine to coarse sand, slate gravel (up to 1 inch in size), some sandstone

LEAN CLAY - moist, olive brown (2.5Y 4/3), some fine sand

SILTY CLAY - hard, moist, grayish brown (2.5Y 5/2), fine sand, some clay

Becomes very moist, trace wood and charcoal fragments

LAKewood FORMATION (Obsl)

CLAYEY SAND - dense, moist, olive (5Y 5/3), fine grained

SILTY SAND - dense, moist, olive (5Y 5/4), fine grained, some medium, layers of Poorly Graded Sand with Silt

Becomes light olive (5Y 6/3)
<table>
<thead>
<tr>
<th>RUN #</th>
<th>BOX #</th>
<th>% RECOVERY</th>
<th>SAMPLE LOC.</th>
<th>DEPTH (ft)</th>
<th>ELEVATION (ft)</th>
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<td>13.3</td>
<td>15.8</td>
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<td>11</td>
<td>1.0</td>
<td>1.0</td>
<td></td>
<td>80</td>
<td></td>
</tr>
</tbody>
</table>

POORLY GRADED SAND with SILT - medium dense, wet, pale olive (5Y 6/2) and mottled pale olive, fine to medium grained. Becomes light olive, (5Y 6/4) becomes wet, 1 inch mottled with iron oxide stains, vague stratification at base.

POORLY GRADED SAND with SILT - dense, wet, pale olive (5Y 6/3) and olive yellow (5Y 6/8), fine grained. No core recovery from 72 to 74'.

POORLY GRADED GRAVEL with SILT and SAND - dense, wet, light brown (2.5Y 5/4), fine to medium grained, trace coarse, some gravels (up to ¾ inch in size), predominantly slate.

POORLY GRADED GRAVEL with SILT and SAND - dense, wet, light brown (2.5Y 5/4), fine to medium grained, trace coarse, some gravels (up to ¾ inch in size), predominantly slate.

POORLY GRADED SAND with SILT - medium dense, wet, pale olive (5Y 6/2), fine grained. Becomes light olive, (5Y 6/4), trace medium grained with iron oxide stains, vague stratification at base.

POORLY GRADED SAND with SILT - medium dense, wet, pale olive (5Y 6/2), fine grained. Becomes light olive, (5Y 6/4), trace medium grained with iron oxide stains, vague stratification at base.

POORLY GRADED SAND with SILT - medium dense, wet, pale olive (5Y 6/2), fine grained. Becomes light olive, (5Y 6/4), trace medium grained with iron oxide stains, vague stratification at base.

POORLY GRADED SAND with SILT - medium dense, wet, pale olive (5Y 6/2), fine grained. Becomes light olive, (5Y 6/4), trace medium grained with iron oxide stains, vague stratification at base.
<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>ELEVATION (ft)</th>
<th>BOX #</th>
<th>RUN #</th>
<th>SAMPLE LOC.</th>
<th>MOISTURE-CONTENT (% of dry wt.)</th>
<th>PERCENT PASSING No. 200 SIEVE</th>
<th>% RECOVERY</th>
<th>DRILLING COMPANY/DRILLING EQUIPMENT</th>
<th>BOREHOLE LOCATION</th>
<th>GROUND-WATER READINGS</th>
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<tbody>
<tr>
<td>85</td>
<td>165</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>15.6</td>
<td>100</td>
<td>Poorly Graded Sand with Silt - wet, olive yellow (2.5Y 6/8), very fine to fine grained, trace subrounded to well rounded trace gravel (up to 1½ inches in size)</td>
<td>692-57, Rt 16 feet</td>
<td>Ground-water level not measured.</td>
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<tr>
<td>85</td>
<td>160</td>
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<td></td>
<td>17.1</td>
<td>100</td>
<td>Silty Sand - wet, light olive brown (5Y 5/4) and dark yellowish brown (10YR 4/6) mottling, fine grained, trace medium, iron oxide</td>
<td></td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>160</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14</td>
<td></td>
<td>Fine to medium grained, dark yellowish brown (10YR 4/6) to dark brown</td>
<td></td>
<td></td>
</tr>
<tr>
<td>90</td>
<td>155</td>
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<td>19.6</td>
<td>100</td>
<td>Becomes dark yellowish brown (10YR 4/6)</td>
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<tr>
<td>95</td>
<td>155</td>
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<td></td>
<td>21.6</td>
<td>14</td>
<td>Alternating with layers of Poorly Graded Sand, fine to medium grained, trace silt, trace gravel (up to ¼ inch in size)</td>
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<tr>
<td>95</td>
<td>150</td>
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<td></td>
<td></td>
<td></td>
<td>15.6</td>
<td>100</td>
<td>Becomes wet, light brownish gray (10YR 6/2), iron oxide dark yellowish brown (10YR 4/6)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>150</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>17.1</td>
<td>100</td>
<td>Poorly Graded Sand with Silt - wet, light brownish gray (10YR 6/2) and dark yellowish brown (10YR 4/6), fine grained, some subrounded to well rounded slate gravel (up to ½ inch in size), quartz, some iron oxide stain</td>
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<td></td>
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<tr>
<td>100</td>
<td>145</td>
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<td></td>
<td></td>
<td></td>
<td>22.1</td>
<td>70</td>
<td>Silty Sand - wet, light brownish gray, fine to very fine grained, iron, some manganese oxide staining, some subparallel subhorizontal dips</td>
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<td>145</td>
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<td>19.6</td>
<td>100</td>
<td>Poorly Graded Sand with Silt - wet, fine to medium grained, predominately fine quartz, iron oxide</td>
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<tr>
<td>105</td>
<td>140</td>
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<td>21.6</td>
<td>14</td>
<td>Interfingering Silty Sand, wet, light olive brown (2.5Y 5/4), very fine to fine grained, some iron oxide (10YR 4/3) Various colors (2.5Y 5/3 to 2.5Y 4/3)</td>
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<td>17.1</td>
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<td>No recovery from 97 to 98½'</td>
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<td>22.1</td>
<td>70</td>
<td>San Pedro Formation [Qsp] Silty Sand - wet, very dark gray (3Y 3/1), fine grained, occasional fossils intact gastropod shells</td>
<td></td>
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</table>

MTA Westside Subway Extension
Los Angeles, California

(Continued on following figure)
Alternating with layers of Sandy Silt, wet, very dark gray, fine to very fine grained

3-inch cemented zone containing gastropods, very dark gray (5Y 3/1), calcium carbonate nodules, small wood fragment, gastropod shells (up to ½ inch in size)

Less gastropod shells

3-inch thick carbonate cemented zone

2-inch by 3-inch carbonate cemented zone, some silt

Becomes wet, very dark gray (5Y 3/1), trace to few shell fragments (gastropods, bivalves), occasional subrounded rock fragments

3-inch thick cementation with gastropod fragments

SANDY SILT - wet, dark gray, very fine to fine sand, trace scattered shell fragments, some intact gastropods

Trace clay

3-inch thick carbonate concretion

Volcanic rock fragments, gravel concretionary clast containing sublong slate fragments (up to ½ inch in size), shell fragments

SILT - hard, moist, very dark gray (5Y 3/1), trace coarse sand, some granitic rock fragments, some clay

Becomes greenish black, ½ inch granite clasts

Layers of Sandy Silt with Clay, very stiff to hard, fine to coarse sand

---

**Ground-Water Readings**

Ground-water level not measured.
Becomes 3 inches clast, subrounded, scattered granitic rock fragments (up to ½ inch in size)

CLAYEY SAND - very dark greenish gray (10Y 1-3/10GY), fine to coarse grained

No core recovery from 124.6 to 127'

POORLY GRADED GRAVEL with SAND and SILT - very dense, moist, dark grayish green (5GY 4/2), fine to medium sand, subangular to well rounded gravel (up to 2 inches in size), locally clast supported

Layers of Poorly Graded Sand, fine grained, trace subrounded to well rounded gravel

Becomes dense, moist, subrounded to well rounded gravel (up to 3 inches in size)

Layers of Silty Sand - moist, (5GY 4/2), fine to medium grained, occasional gravels at base (up to 1 inch in size)

Gravel (up to 1½ inches in size)

No core recovery from 132 to 132.8'

POORLY GRADED SAND with SILT and GRAVEL - moist, grayish green (5GY 5/2), fine grained, fine to coarse gravel (up to 3 inches in size)

SILTY SAND with GRAVEL - moist, greenish gray, fine grained, gravel (up to 1 inch in size)

POORLY GRADED SAND with SILT and GRAVEL - moist, greenish gray (10GY 5/1), gravel (up to ½ inch in size), granite, some slate and quartzite

Becomes medium grained, trace fine gravel (up to ½ inch in size) at base of bed

Becomes light greenish gray (5GY 7/1), trace subrounded to well rounded gravel (up to 1½ inches in size)

Becomes dense, dark greenish gray (10GY 4/1), fine to medium grained

Trace well rounded gravel (up to 1 inch in size)
SILTY SAND with GRAVEL - moist, very dark greenish gray (5G-1 3/1), fine grained, trace subrounded to well rounded gravels (up to 1 inch in size)

POORLY GRADED SAND with SILT - dense, moist, very dark greenish gray (10Y 4/1), fine grained, trace fine gravel

SILTY SAND - wet, very dark greenish gray (5G-1 3/1), very fine to fine grained

Thick bed, massive

Becomes dense, moist, greenish black (10Y 2.5/1), fine grained, few gravel (up to ¾ inch in size), well rounded to rounded

Occasional rounded to well rounded gravels (up to 1 inch in size)

END OF BORING AT 150 FEET

NOTES:

Consistency description on this log is based on pocket penetrometer test results and/or visual observation of soil samples.

Hand augered upper 8½ feet to avoid damage to utilities.

Borehole grouted with cement-bentonite slurry and patched with asphalt concrete.
**LOG OF BORING**

**Boring No.:** S-113

<table>
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<tr>
<th>Elevation (ft)</th>
<th>Depth (ft)</th>
<th>Box #</th>
<th>Run #</th>
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<th>Moisture Content (% of dry wt.)</th>
<th>Percent Passing No. 200 Sieve</th>
<th>Sample Loc.</th>
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</tbody>
</table>

12 inch thick Asphalt Concrete consisting of 2 layers

**Fill [Af]**

Silty Sand - moist, brown, fine to medium grained, trace gravel

**Quaternary Older Alluvium (Qalo)**

Sandy Lean Clay - very stiff, moist, brown to dark brown (7.5YR 4/2), fine sand, some fine gravel

Becomes hard

Less gravel

More sand

More clay

Ground-water level not measured.
<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Elevation (ft)</th>
<th>Soil Type</th>
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<td>275</td>
<td>CL</td>
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<tr>
<td>270</td>
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<td>More sand, trace fine gravel</td>
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<tr>
<td>30</td>
<td></td>
<td>Less sand, occasional gravel</td>
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<tr>
<td>35</td>
<td></td>
<td>More sand, trace fine to coarse gravel</td>
</tr>
<tr>
<td>40</td>
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<td>No gravel</td>
</tr>
</tbody>
</table>

More sand, trace fine gravel
Less sand, occasional gravel
More sand, trace fine to coarse gravel
No gravel
<table>
<thead>
<tr>
<th>DEPTH (ft)</th>
<th>ELEVATION (ft)</th>
<th>BOX #</th>
<th>RUN #</th>
<th>% RECOVERY</th>
<th>PERCENT PASSING No. 200 SIEVE</th>
<th>SAMPLE LOC.</th>
<th>MOISTURE CONTENT (% of dry wt.)</th>
<th>BORING NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>240</td>
<td>-</td>
<td>6</td>
<td>7</td>
<td>67</td>
<td>240</td>
<td>SC</td>
<td>CLAYEY SAND with GRAVEL - medium dense to dense, moist, dark brown to brown (7.5YR 4/3), fine to coarse grained, fine to coarse gravel, alternating layers of Silty Sand</td>
<td></td>
</tr>
<tr>
<td>245</td>
<td>-</td>
<td>5</td>
<td>6</td>
<td>80</td>
<td>245</td>
<td>CL</td>
<td>LEAN CLAY with SAND - very stiff to hard, moist, dark brown (7.5YR 4/3), fine sand, layers of silty clay, trace fine gravel</td>
<td></td>
</tr>
<tr>
<td>250</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td>250</td>
<td>CL</td>
<td>Layers of Silty Clay, trace fine gravel, occasional sand lenses, some red sandstone fragment</td>
<td></td>
</tr>
<tr>
<td>255</td>
<td>-</td>
<td>4</td>
<td>5</td>
<td>100</td>
<td>255</td>
<td>CL</td>
<td>More fine sand</td>
<td></td>
</tr>
<tr>
<td>260</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td>260</td>
<td>SC</td>
<td>Trace fine gravel, trace coarse sand</td>
<td></td>
</tr>
<tr>
<td>265</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td>265</td>
<td>CL</td>
<td>Less sand</td>
<td></td>
</tr>
<tr>
<td>270</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td>270</td>
<td>CL</td>
<td>Trace fine sand</td>
<td></td>
</tr>
<tr>
<td>275</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td>275</td>
<td>CL</td>
<td>Layers of Sandy Clay with Gravel, fine to coarse sand, fine to coarse gravel</td>
<td></td>
</tr>
<tr>
<td>280</td>
<td>-</td>
<td>-</td>
<td></td>
<td></td>
<td>280</td>
<td>CL</td>
<td>Ground-water level not measured.</td>
<td></td>
</tr>
</tbody>
</table>

### LOG OF BORING

**Boart Longyear / 600T Trusonic drill rig**

**Dates Drilled:**
2/25/11 - 2/28/11

**Ground-Water Readings:**
Ground-water level not measured.

**Ground EL:**
297 feet

**Hole Diameter:**
6 inches

**Drilling Method:**
Sonic Coring

**Drilling Company/Drilling Equipment:**
Boart Longyear / 600T Trusonic drill rig

**Borehole Location:**
763+65, Lt 3 feet

**Run #**
S-113

**Sample Loc.**
(Continued on following figure)

**PROJECT NO.:**
4953-10-1561

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

**Figure:** A-3.12c

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**Field Tech:** RM
**Prepared/Date:** PK/WL 9/30/2011
**Checked/Date:** HP/PE 10/2/2011
**SANDY LEAN CLAY** - moist, dark brown, fine to coarse sand, trace fine to coarse gravel

**CLAYEY SAND** - dense, moist, light olive brown (2.5Y 5/3) with small pockets of pale yellow, yellow, black and orange, fine to coarse grained, some fine to coarse gravel (up to 1 inch in size), trace coarse

Becomes brown (7.5YR 5/4)

More gravel between 66 to 67.8 feet

Becomes dark yellowish brown, some fine to coarse gravel

Less gravel, fine grained

**SANDY SILT** - hard, moist, dark yellowish brown, lenses of light olive brown and black, fine grained, some fine to coarse gravel

Trace gravel

---

**GROUND-WATER READINGS**

Ground-water level not measured.
Layer of Clayey Sand, varying colors (red, gray, yellowish brown), fine to coarse sand, some fine gravel (up to ¾ inch in size)

Becomes black, trace fine sand

WELL GRADED SAND with SILT and GRAVEL - loose to medium dense, moist, dark brown (7.5YR 3/2), fine to coarse grained, fine gravel, occasional coarse (up to 1 inch in size)

Layers of Sandy Silt with Clay, dark yellowish brown, lenses of light olive brown fine sand, trace fine to medium gravel of varying colors

CLAYEY SAND - hard, moist, dark yellowish brown (7.5YR 3/3), fine to coarse grained, trace fine gravel (up to ½ inch in size)

POORLY GRADED SAND with SILT - loose to medium dense, moist, brown,