EXHIBIT A-5: SOIL TEST BORING LOGS
**BORING LOG NO. B11**

**PROJECT:** Battery Seawall Rehabilitation  
**CLIENT:** Johnson, Mirmiran & Thompson  
Charleston, SC

**SITE:**  
Murray Drive  
Charleston, South Carolina

**LOCATION:** See Exhibit A-2  
Latitude: 32.772243° Longitude: -79.942068°

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>WATER LEVEL</th>
<th>FIELD TEST RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>3.0</td>
<td>Silty Sand (SM), fine grained, subrounded, light brown, very loose, with shell fragments</td>
</tr>
<tr>
<td>0.5</td>
<td>5.0</td>
<td>Sandy Lean Clay (CL), brown, soft</td>
</tr>
<tr>
<td>0.0</td>
<td>5.5</td>
<td>Sandy Lean Clay (CL), dark gray, soft</td>
</tr>
<tr>
<td>0.0</td>
<td>0.0</td>
<td>Poorly Graded Sand with Silt (SP-SM), fine to medium grained, subrounded, light gray, loose to very loose</td>
</tr>
<tr>
<td>17.0</td>
<td>17.0</td>
<td>Silt (ML), dark gray, soft to very soft</td>
</tr>
<tr>
<td>32.0</td>
<td>32.0</td>
<td>Silty Sand (SM), subrounded, gray, very loose</td>
</tr>
</tbody>
</table>

**WATER LEVEL OBSERVATIONS**  
Water level not determined

**Abandonment Method:**  
Borings backfilled with cement-bentonite grout upon completion.

**Advance Method:**  
Wash Rotary

**Notes:**  
See Exhibit A-3 for description of field procedures.

**Boring Started:** 7/23/2015  
**Boring Completed:** 7/23/2015  
**Drill Rig:** CME-65  
**Driller:** C. Fredykowski  
**Project No.:** EN155074  
**Exhibit:** A-5
# BORING LOG NO. B11

**PROJECT:** Battery Seawall Rehabilitation  
**CLIENT:** Johnson, Mirmiran & Thompson  
**SITE:** Murray Drive  
**LOCATION:** Charleston, South Carolina

<table>
<thead>
<tr>
<th>DEPTH (FT.)</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>FIELD TEST RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>60.0</td>
<td></td>
<td></td>
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<tr>
<td>65.0</td>
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<td>90.0</td>
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<tr>
<td>95.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>100.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SILTY SAND (SM),** subrounded, olive gray, loose to dense, calcareous, non-reactive

**POORLY GRADED SAND (SP),** medium grained, subrounded, gray, medium dense, with phosphate

**SANDY SILT (ML),** olive brown, medium stiff to stiff, moderate cementation, calcareous, reactive- Cooper Marl Formation

---

**Boring Terminated at 100 Feet**

**WATER LEVEL OBSERVATIONS**

Water level not determined

**Abandonment Method:** Borings backfilled with cement-bentonite grout upon completion.

**Advance Method:** Wash Rotary

**Notes:**

See Exhibit A-3 for description of field procedures.

See Appendix B for explanation of symbols and abbreviations.

**Rig/Driller:**

Drill Rig: CME-66  
Driller: C. Fredrychowski

**Project No.:** EN155074  
**Exhibit:** A-5

**Boring Started:** 7/23/2015  
**Boring Completed:** 7/23/2015
**BORING LOG NO. B12**

**PROJECT:** Battery Seawall Rehabilitation  
**SITE:** Murray Drive  
Charleston, South Carolina  

**LOCATION**  
See Exhibit A-2  
Latitude: 32.79661°  
Longitude: -79.934689°

---

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>FIELD TEST RESULTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>5-5-2</td>
<td>N=7</td>
</tr>
<tr>
<td>0.0</td>
<td>1-2-2</td>
<td>N=4</td>
</tr>
<tr>
<td>0.0</td>
<td>WOH/18°</td>
<td>N=0</td>
</tr>
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<td>0.0</td>
<td>WOH/18°</td>
<td>N=0</td>
</tr>
<tr>
<td>0.0</td>
<td>WOH/18°</td>
<td>N=0</td>
</tr>
<tr>
<td>0.0</td>
<td>WOH/18°</td>
<td>N=0</td>
</tr>
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<td>0.0</td>
<td>WOH/18°</td>
<td>N=0</td>
</tr>
<tr>
<td>0.0</td>
<td>WOH/18°</td>
<td>N=0</td>
</tr>
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</table>

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**DEPTH (FT)**

<table>
<thead>
<tr>
<th>0.0</th>
<th>5</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>10</td>
</tr>
<tr>
<td>0.0</td>
<td>15</td>
</tr>
<tr>
<td>0.0</td>
<td>20</td>
</tr>
<tr>
<td>0.0</td>
<td>25</td>
</tr>
<tr>
<td>0.0</td>
<td>30</td>
</tr>
<tr>
<td>0.0</td>
<td>35</td>
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<td>0.0</td>
<td>45</td>
</tr>
<tr>
<td>0.0</td>
<td>50</td>
</tr>
</tbody>
</table>

---

**Stratification lines are approximate. In-situ, the transition may be gradual.**

**Hammer Type:** Automatic

---

**WATER LEVEL OBSERVATIONS**

Water level not determined

---

**Notes:**

---

**Abandonment Method:**
Borings backfilled with cement-bentonite grout upon completion.

---

**Advancement Method:**
Wash Rotary

---

See Exhibit A-3 for description of field procedures.

**See Appendix B for explanation of symbols and abbreviations.**

---

**Boring Started:** 7/24/2015  
**Boring Completed:** 7/24/2015

**Drill Rig:** CME-55  
**Driller:** C. Fredychowski

---

**Project No.:** EN155074  
**Exhibit:** A-5

---

**CLIENT:** Johnson, Mirmiran & Thompson  
Charleston, SC
**BORING LOG NO. B12**

**PROJECT:** Battery Seawall Rehabilitation  
**SITE:** Murray Drive  
Charleston, South Carolina  

**LOCATION**  
See Exhibit A-2  
Latitude: 32.769661°  
Longitude: -79.934669°

<table>
<thead>
<tr>
<th>DEPTH (FT)</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>FIELD TEST RESULTS</th>
</tr>
</thead>
</table>
| 72.0       | **SANDY SILT (ML),** dark gray, very soft to medium stiff (continued) | 1-2-2  
N=4 |
| 75.0       | **SANDY SILT (ML),** olive brown, medium stiff, moderate cementation, calcareous, reactive- Cooper Marl Formation | 1-1-3  
N=4 |

**Boring Terminated at 75 Feet**

Stratification lines are approximate. In-situ, the transition may be gradual.

**Hammer Type:** Automatic

**Advancement Method:** Wash Rotary

**Abandonment Method:** Borings backfilled with cement-bentonite grout upon completion.

**Water level not determined**

See Exhibit A-3 for description of field procedures.

**Notes:**

**Boring Started:** 7/24/2015  
**Boring Completed:** 7/24/2015  
**Drill Rig:** CME-55  
**Driller:** C. Fredrychowski  
**Project No.:** EN155074  
**Exhibit:** A-5
EXHIBIT A-6: TEST PIT LOGS
<table>
<thead>
<tr>
<th>DEPTH</th>
<th>INSTALLATION DETAILS</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>SAMPLE TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4.5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**CONCRETE, 4 inch sidewalk**

**POORLY GRADED SAND WITH SILT (SP-SM),** fine grained, light brown, with concrete and brick debris

*Test Pit Terminated at 4.5 Feet*

Stratification lines are approximate. In-situ, the transition may be gradual.

Hammer Type: NA

<table>
<thead>
<tr>
<th>WATER LEVEL OBSERVATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Groundwater not encountered.</td>
</tr>
</tbody>
</table>

Advancement Method: Mini-excavator

Abandonment Method: Test pit backfilled by City of Charleston

See Exhibit A-3 for description of field procedures.

Notes:

Test Pit Started: 6/24/2015  
Test Pit Completed: 6/24/2015

Excavator: NA  
Operator: NA

Project No.: EN155074  
Exhibit: A-6
### TEST PIT LOG NO. TP @ 04+79

**PROJECT:** Battery Seawall Rehabilitation  
**SITE:** Murray Drive  
Charleston, South Carolina  

**CLIENT:** Johnson, Mirmiran & Thompson  
Charleston, SC  

**LOCATION:** See Exhibit A-2  
Station: 04+79  

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>INSTALLATION DETAILS</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>SAMPLE TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td>CONCRETE, 4 inch sidewalk</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1.0</td>
<td>SILT (ML), dark bluish gray</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.3</td>
<td>SILTY SAND (SM), fine grained, dark bluish gray, with abundant shell</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8.8</td>
<td>Test Pit Terminated at 6.8 Feet</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Stratification lines are approximate. In-situ, the transition may be gradual.  
Hammer Type: NA  

**Advancement Method:**  
Mini-excavator  
Abandonment Method:  
Test pit backfilled by City of Charleston

**Notes:**  
See Exhibit A-3 for description of field procedures.  
See Appendix B for explanation of symbols and abbreviations.  

**WATER LEVEL OBSERVATIONS:**  
Groundwater encountered at 6.8 feet.

**Test Pit Started:** 6/25/2015  
**Test Pit Completed:** 6/25/2015  
**Excavator:** NA  
**Operator:** NA  
**Project No.: EN155074**  
**Exhibit:** A-6
**TEST PIT LOG NO. TP @ 18+26**

<table>
<thead>
<tr>
<th>PROJECT: Battery Seawall Rehabilitation</th>
<th>CLIENT: Johnson, Mirmiran &amp; Thompson Charleston, SC</th>
</tr>
</thead>
<tbody>
<tr>
<td>SITE: Murray Drive Charleston, South Carolina</td>
<td></td>
</tr>
</tbody>
</table>

**LOCATION:** See Exhibit A-2

<table>
<thead>
<tr>
<th>GRAPHIC LOG</th>
<th>INSTALLATION DETAILS</th>
<th>WATER LEVEL OBSERVATIONS</th>
<th>SAMPLE TYPE</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.3</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DEPT**

- **CONCRETE,** 4 inch sidewalk
- **SILTY SAND (SM),** fine grained, brown to light brown
- **SILTY CLAY (CL-ML),** dark bluish gray, with trace shell fragments

**Advancement Method:** Mini-excavator

**Abandonment Method:** Test pit backfilled by City of Charleston

**Stratification lines are approximate. In-situ, the transition may be gradual.**

**Hammer Type:** NA

**Notes:**

- Test Pit Terminated at 6.7 Feet
- Groundwater encountered at 6.7 feet.

**WATER LEVEL OBSERVATIONS**

- Test Pit Started: 6/30/2015
- Test Pit Completed: 6/30/2015
- Excavator: NA
- Operator: NA
- Project No.: EN155074

Exhibit: A-6
# TEST PIT LOG NO. TP @ 40+12

**PROJECT:** Battery Seawall Rehabilitation  
**CLIENT:** Johnson, Mirmiran & Thompson  
Charleston, SC

**SITE:** Murray Drive  
Charleston, South Carolina

<table>
<thead>
<tr>
<th>DEPTH</th>
<th>MATERIAL</th>
<th>DESCRIPTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.3</td>
<td>CONCRETE</td>
<td>4 inch sidewalk</td>
</tr>
<tr>
<td>0.7</td>
<td>POORLY GRADUATED SAND (SP)</td>
<td>fine grained, black</td>
</tr>
<tr>
<td>4.0</td>
<td>SILTY SAND (SM)</td>
<td>fine grained, brown, abundant shell</td>
</tr>
</tbody>
</table>

**Test Pit Terminated at 8 Feet**

Stratification lines are approximate. In-situ, the transition may be gradual.

_Diagram: Terracon_  
1450 5th Street West  
North Charleston, South Carolina

**Advance Method:**
Mini-excavator

**Abandonment Method:**  
Test pit backfilled by City of Charleston

See Exhibit A-3 for description of field procedures.

Notes:  
Test Pit Started: 6/30/2015  
Test Pit Completed: 6/30/2015  
Excavator: NA  
Operator: NA

Project No.: EN155074  
Exhibit: A-6
EXHIBIT A-7: EXISTING CONDITION SKETCHES
TEST PIT @ STATION 00+91

N.T.S.

CONCRETE SEAWALL

12" CONCRETE SLAB

12" SIDEWALK

CORE #1 LOCATION

CORE #2 LOCATION

≈ 65"
TEST PIT @ STATION 18+26

93"

CONCRETE SEA WALL

18"

13.25"

18.5" + 6" + 12" + 14.5" + 15" = 1

4" CONCRETE SIDEWALK

CORE LOCATION

205"

27.5"

TIMBER FORM

TIMBER PLATFORM
TEST PIT @ STATION 40+12

N.T.S.

CONCRETE SEAWALL

18.5" + 6" + 11.5" + 12.5" + 14.75"

4" CONCRETE SIDEWALK

CORE LOCATION

TIMBER PLATFORM
Responsive ■ Resourceful ■ Reliable  Exhibit A-8

Photo 1  Core #1 from Slab encountered at Station 00+91

Photo 2  Core #2 from Slab encountered at Station 00+91
Photo 3  Core from bottom step of wall at Station 04+79

Photo 4  Core from bottom step of wall at Station 18+26
Photo 5  Front Panel Face Core at Station 18+26

Photo 6  Core from bottom step of wall at Station 40+12
Photo 7  Front Panel Face Core at Station 18+26