Appendix A. Soil Exploration and Construction Records

Figure A-1. Site I and II concrete mix design (1 of 4).
Figure A-2. Site I and II concrete mix design (2 of 4).
Figure A-3. Site I and II concrete mix design (3 of 4).
Appendix A. (continued)

Figure A-4. Site I and II concrete mix design (4 of 4).
### Figure A-5. Site I SPT boring log B-1 (1 of 2).

<table>
<thead>
<tr>
<th>Level</th>
<th>SPT Bows</th>
<th>Material Description</th>
<th>Sample</th>
<th>No.</th>
<th>In.</th>
<th>%</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0</td>
<td>8</td>
<td>Dense, Deep</td>
<td></td>
<td>1</td>
<td>18.75</td>
<td></td>
<td>no sample due to damage from repeated core in 8&quot; rubble layer</td>
</tr>
<tr>
<td>1.5</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.0</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5.0</td>
<td>2</td>
<td>Dark brown sand 7/8&quot;</td>
<td></td>
<td>4</td>
<td>18</td>
<td>100</td>
<td>STRATA CHANGE @ 5.0</td>
</tr>
<tr>
<td>4.5</td>
<td>3</td>
<td>Medium brown sand</td>
<td></td>
<td>5</td>
<td>18</td>
<td>30</td>
<td>STRATA CHANGE @ 4.5</td>
</tr>
<tr>
<td>6.0</td>
<td>6</td>
<td>Soft and damp</td>
<td></td>
<td>6</td>
<td>13.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6.0</td>
<td>3</td>
<td>Gravel, 3/16&quot;</td>
<td></td>
<td>7</td>
<td>9.50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.5</td>
<td>1</td>
<td>Same (10.5)</td>
<td></td>
<td>8</td>
<td>6</td>
<td>33</td>
<td></td>
</tr>
<tr>
<td>2.0</td>
<td>2</td>
<td>Same</td>
<td></td>
<td>9</td>
<td>6.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9.0</td>
<td>3</td>
<td>Same</td>
<td></td>
<td>10</td>
<td>6.33</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10.5</td>
<td>3</td>
<td>Shell/mud sand</td>
<td></td>
<td>11</td>
<td>43</td>
<td>25</td>
<td>STRATA CHANGE @ 10.5</td>
</tr>
<tr>
<td>12.0</td>
<td>2</td>
<td>Loose, wet</td>
<td></td>
<td>12</td>
<td>13.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12.0</td>
<td></td>
<td></td>
<td></td>
<td>13</td>
<td>13.75</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13.5</td>
<td></td>
<td></td>
<td></td>
<td>14</td>
<td>13.75</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Continued...)
Figure A-6. Site I SPT boring log B-1 (2 of 2).
Figure A-7. Site I SPT boring log B-2 (1 of 2).
Figure A-8. Site I SPT boring log B-2 (2 of 2).
Figure A-9. Site I CPT sounding CPT-67.
Figure A-10. Site I CPT sounding CPT-68.
Appendix A. (continued)

Figure A-11. Site I CPT sounding Control Shaft location.
Figure A-12. Site I CPT sounding Flat-Jack 1 location.
Figure A-13. Site I CPT sounding Flat-Jack 2 location.
Figure A-14. Site I CPT sounding Sleeve-Port 1 location.
Figure A-15. Site I CPT sounding Sleeve-Port 2 location.
Appendix A. (continued)

Figure A-16. Site I Control Shaft as-built.
Figure A-17. Site I Flat-Jack 1 as-built.
Figure A-18. Site I Flat-Jack 2 as-built.
Figure A-19. Site I Sleeve-Port 1 as-built.
Appendix A. (continued)

Figure A-20. Site I Sleeve-Port 2 as-built.
Figure A-21. Site II SPT boring log B-3 (1 of 2).
Figure A-22. Site II SPT boring log B-3 (2 of 2).
Figure A-23. Site II SPT boring log B-4 (1 of 2).
Figure A-24. Site II SPT boring log B-4 (2 of 2).
Figure A-25. Site II CPT sounding CPT-69.
Figure A-26. Site II Control Shaft as-built.
Figure A-27. Site II Flat-Jack as-built.
Appendix A. (continued)

Figure A-28. Site II Sleeve-Port as-built.
Figure A-29. Site III concrete mix design (1 of 2).
Figure A-30. Site III concrete mix design (2 of 2).
Figure A-31. Site III drilled shaft detail.
Figure A-32. Site III boring S-1 and S-2.
Figure A-33. Site III boring S-3 and S-4.
Figure A-34. Site III boring S1-A.
Figure A-35. Site III boring N-1.
Figure A-36. Site III boring N-2 and N-3.
Figure A-37. Site III boring N-4 and N-5.
Figure A-38. Site III boring N-5A.
Figure A-39. Site II SPT boring log LT-3 location (1 of 4).
Figure A-40. Site III SPT boring log LT-3 location (2 of 4).
Figure A-41. Site III SPT boring log LT-3 location (3of 4).
## Figure A-42. Site III SPT boring log LT-3 location (4 of 4)

<table>
<thead>
<tr>
<th>Depth (ft)</th>
<th>Material Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-13</td>
<td>Same</td>
</tr>
<tr>
<td>12-14</td>
<td>Same</td>
</tr>
<tr>
<td>15-20</td>
<td>Same</td>
</tr>
<tr>
<td>20-22</td>
<td>Same</td>
</tr>
<tr>
<td>22-26</td>
<td>Same</td>
</tr>
<tr>
<td>40-55</td>
<td>Same</td>
</tr>
<tr>
<td>56-60</td>
<td>Same</td>
</tr>
<tr>
<td>71-75</td>
<td>Same</td>
</tr>
<tr>
<td>80-84</td>
<td>Same</td>
</tr>
<tr>
<td>85-90</td>
<td>Same</td>
</tr>
<tr>
<td>91-97</td>
<td>Same</td>
</tr>
<tr>
<td>98-103</td>
<td>Same</td>
</tr>
</tbody>
</table>

E.O.B. @ 103.5'
Figure A-43. Site III LT-3 as-built.
Figure A-44. Site III LT-3 strain gage locations.
Figure A-45. Site III LT-3 inspection log.
**Appendix A. (continued)**

---

**REPORT OF FIELD INSPECTION OF CONCRETE**

**TESTED FOR:** MR. ALEX CASO, P.E.  
**PROJECT:** MONITORING DRILLED SHAFT CONSTRUCTION FOR STATISTICAL TEST  
**LABORATORY:** ECM & ASSOCIATES  
**SITE:** 500 NORTH WESTMORELAND AVENUE  
**DATE:** June 14, 2000  
**OUR REPORT NO.:** 773-000354-11  
**PAGE 1 OF 2**

**FIELD DATA:** Concrete was delivered by TARRACO, mix number MS224324.

<table>
<thead>
<tr>
<th>Time of Day</th>
<th>Temperature</th>
<th>Number</th>
<th>Sample</th>
<th>Hardness</th>
<th>Rejected</th>
<th>Reason</th>
<th>Temperature</th>
<th>Heat</th>
<th>Reject</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.00</td>
<td>22.00</td>
<td>02:29</td>
<td>22</td>
<td>10.0</td>
<td></td>
<td></td>
<td>22.25</td>
<td>95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.00</td>
<td>22.00</td>
<td>02:46</td>
<td>22</td>
<td>10.0</td>
<td></td>
<td></td>
<td>22.25</td>
<td>95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.00</td>
<td>22.00</td>
<td>03:05</td>
<td>22</td>
<td>10.0</td>
<td></td>
<td></td>
<td>22.25</td>
<td>95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.00</td>
<td>22.00</td>
<td>04:17</td>
<td>22</td>
<td>10.0</td>
<td>8 1/4</td>
<td>3.25</td>
<td>94 95</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.00</td>
<td>22.00</td>
<td>05:30</td>
<td>22</td>
<td>10.0</td>
<td></td>
<td></td>
<td>22.25</td>
<td>95</td>
<td></td>
<td></td>
</tr>
<tr>
<td>22.00</td>
<td>22.00</td>
<td>05:41</td>
<td>22</td>
<td>10.0</td>
<td></td>
<td></td>
<td>22.25</td>
<td>95</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**REMARKS:** Observe the placement of 56.4 cubic yards of concrete.

**EVT:** thought truck #994 was rejected, contractor poured 3.55 cubic yards at his own risk.

**TECHNICIAN:** L. GONZA

**RESPECTFULLY SUBMITTED,**  
Professional Service Industries, Inc.

---

**Figure A-46.** Site III LT-3 concrete log (1 of 3).
Figure A-47. Site III LT-3 concrete log (2 of 3).
### CAISSON LT-3
### STATION 26+99.6
### ROYAL PARK BRIDGE

#### CONCRETE QTY

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>1.22</td>
<td>D</td>
</tr>
<tr>
<td>A</td>
<td>1.17</td>
<td>L</td>
</tr>
<tr>
<td>H</td>
<td>27.85</td>
<td>A</td>
</tr>
<tr>
<td>V</td>
<td>32.52</td>
<td>U</td>
</tr>
</tbody>
</table>

*Each M³: 0.85 m³ Vt: 48.03 m³

*Each M³: 0.71 m³

#### CONCRETE SURFACE EQU.

<table>
<thead>
<tr>
<th>Truck #</th>
<th>H THEORECAL</th>
<th>M ACTUAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>38.75</td>
<td>36.27</td>
</tr>
<tr>
<td>2</td>
<td>30.86</td>
<td>31.72</td>
</tr>
<tr>
<td>3</td>
<td>31.36</td>
<td>27.43</td>
</tr>
<tr>
<td>4</td>
<td>28.16</td>
<td>23.43</td>
</tr>
<tr>
<td>5</td>
<td>14.95</td>
<td>18.59</td>
</tr>
<tr>
<td>6</td>
<td>9.42</td>
<td>14.33</td>
</tr>
<tr>
<td>7</td>
<td>5.97</td>
<td>10.30</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>6.55</td>
</tr>
<tr>
<td>9</td>
<td>1.28</td>
<td>2.74</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*ACTUAL U: 56.36 m³
*THEOR U: 48.03
*CORE: FACTOR: 1.18

Figure A-48. Site III LT-3 concrete log (3 of 3).
Figure A-49. Site III LT-3 concrete cylinder break strengths.
As requested, a PSI representative reported to the above referenced project to performasting monitoring at location LT-3.

The following items were noted:

1. At 7:10 a.m. contractor started positioning the outer casing, 3.34 meters in diameter, at the shaft location.

2. At 8:10 a.m. contractor started to drive outer casing in with a vibratory hammer.

3. At 10:00 a.m. outer casing reached 1.45 meters below grade (8.34 meters below bridge deck).

4. At 10:35 a.m. the inner casing was placed (1.34 diameter) to be driven to the same elevation as outer casing.

5. At 1:10 p.m. the inner casing installation was performed (10.90 meters below bridge deck or -4.95 BW elevation).

6. At 2:00 p.m. contractor began to pump out water inside casing prior to drilling operation.

7. At 3:00 p.m. shaft drilling began. PSI representative recorded soil description found from the shaft excavation.

8. At 7:00 p.m. drilling stopped at about depth 15.3 m and both casings' depths were about 9.14 meters below bridge deck.

Inspector: L. Pence
Total Hours: 13.0

Respectfully submitted,

[Signature]

P.A. SHAIKH, T. E.
F.INS. F.L.\F

ct: CLIENT (1)
Appendix A. (continued)

Figure A-51. Site III LT-3 construction details (2 of 5).
Figure A-52. Site III LT-3 construction details (3 of 5).
Figure A-53. Site III LT-3 construction details (4 of 5).
Appendix A. (continued)

All this information is included in attached inspection field report and field inspection of concrete.

Inspector: L. Pence
Total Hours: 14.0

Respectfully submitted,

[Signature]

[Company Name]

[Date]

[Address]

Figure A-54. Site III LT-3 construction details (5 of 5).
Figure A-55. Site II SPT boring log LT-2 location (1 of 4).
<table>
<thead>
<tr>
<th>Depth FT</th>
<th>Material Sample</th>
<th>N Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>15-7-15</td>
<td>Core</td>
<td>25</td>
</tr>
<tr>
<td>3-10-15</td>
<td>Core</td>
<td>1</td>
</tr>
<tr>
<td>16-21-29</td>
<td>Core</td>
<td>2</td>
</tr>
<tr>
<td>22-32</td>
<td>Core</td>
<td>5</td>
</tr>
<tr>
<td>26-30</td>
<td>Core</td>
<td>7</td>
</tr>
<tr>
<td>31-32</td>
<td>Core</td>
<td>6</td>
</tr>
<tr>
<td>38-38</td>
<td>Core</td>
<td>10</td>
</tr>
<tr>
<td>40-45</td>
<td>Core</td>
<td>19</td>
</tr>
<tr>
<td>48-50</td>
<td>Core</td>
<td>37</td>
</tr>
</tbody>
</table>

Figure A-56. Site III SPT boring log LT-2 location (2 of 4).
Figure A-57. Site III SPT boring log LT-2 location (3 of 4).
Appendix A. (continued)

Figure A-58. Site III SPT boring log LT-2 location (4 of 4).
Figure A-59. Site III LT-2 as-built.
Figure A-60. Site III strain gage locations.
Figure A-61. Site III LT-2 strain gage locations.


### Appendix A. (continued)

![Image of an inspection log sheet]

**Figure A-62.** Site III LT-2 inspection log.
Appendix A. (continued)

Figure A-63. Site III LT-2 concrete log (1 of 3).
REPORT OF FIELD INSPECTION OF CONCRETE

TESTED FOR:  MR. ALEX CASO, P.E.
    W.C. DIVERSEY AND ASSOCIATES
    500 NORTH WHITCOMB BLVD
    SUITE 210
    CHICAGO, IL 60610

FACILITY: CONCRETE PRODUCTION FACILITY COMM. 

PROJECT: MONITORING DRILLED SHAFT
    CONCRT FOR STRENGTH TEST

DATE: June 22, 2000

OUR REPORT NO. 772-00054-26

FIELD DATA: Concrete was delivered by VARMAC, mix number 190641.

<table>
<thead>
<tr>
<th>MIX NO.</th>
<th>AGGREGATE TYPE</th>
<th>CEMENT TYPE</th>
<th>TRUCK NUMBER</th>
<th>VOLUME OF CONCRETE</th>
<th>FREE WATER</th>
<th>AIR CONTENT</th>
<th>TEMPERATURE</th>
</tr>
</thead>
<tbody>
<tr>
<td>2342762</td>
<td></td>
<td></td>
<td>06:34 pm</td>
<td>10.0</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

LOCATION: SITE III

LT-2 FROM -2.44 TO CO

THANKS: Observed the placement of 4.5 cubic yards of concrete.

TECHNICIAN: D. FICK

C.E. CLINE (I),

(Delegated by)

[Signature]

Professional Service Industries, Inc. 7800 Central Industrial Drive, Suite 125  St. Peters, MO 63304  Phone 314-842-8004  Fax 314-842-3824
Figure A-65. Site III LT-2 concrete log (3 of 3).
Appendix A. (continued)

![Report of Concrete Compression Test](image)

**Figure A-66.** Site III LT-2 concrete cylinder breaks.

273
Appendix A. (continued)

Figure A-67. Site III LT-2 construction details (1 of 6).
Appendix A. (continued)

INSTRUCTION REPORT

TESTED FOR: MR. ALEX CASO, P.E.
E.C. DRIVER AND ASSOCIATES
500 NORTH WHITMORE HILL
SUITE 700
TAMPA, FL 33609

REMARKS: As requested, a PSI representative reported to the above referenced project to perform oedometer monitoring and soil inspection (for LT-2).

The following items were noted:

1. At 7:00 a.m. shaft drilling began. Excavated soils classification were recorded in inspection field report.
2. Inspection of steel reinforcing was performed according to project #225858-1-52-01 Sheet D-12.
3. At 3:00 p.m. drilling was completed and reached 28.80 meters.
4. At 4:00 p.m. contractor started to clean bottom of shaft and also shampooed the excavated material in order to reuse the mud.
5. Concrete pour is scheduled for tomorrow at 2:00 p.m.

Technician: L. Ramos
Total Hours: 4.0

Respectfully submitted,

PROFESSIONAL SERVICE INDUSTRIES, INC.

[Signature]

Figure A-68. Site III LT-2 construction details (2 of 6).

275
Appendix A. (continued)

Figure A-69. Site III LT-2 construction details (3 of 6).
Figure A-70. Site III LT-2 construction details (4 of 6).
As requested, a PSI representative reported to the above referenced project to perform casing monitoring at location MT-3.

The following was noted:

1. 7:00 a.m. Additional casing was welded overnight, and from 7:00 p.m. to 12:00 p.m. inner casing was pushed down up to -12.50 m elevation, and previous problems with cave-in and mud escape was solved.

   Length of inner casing = 20.33 m
   Length of outer casing = 13.72 m

2. From 12:00 p.m. to 3:00 p.m. contractor cleaned up the bottom of shaft.

3. At 3:00 p.m. steel reinforcing was placed in the shaft, and a 0.25 meter diameter truss was installed.

4. At 4:10 p.m. concrete pouring began, four cylinders were cast and left in a cure box at the job site.

5. At 8:00 p.m. concrete pouring was finished. Actual volume of concrete poured was 40.72 cubic yards. Theoretical volume = 36.22 cubic meters. Grout factor = 1.12.

Technician: L. Fonse
Total Hours: 11.0

Respectfully submitted,

[Signature]

[Name]

[Title]

Figure A-71. Site III LT-2 construction details (5 of 6).
Appendix A. (continued)

Figure A-72. Site III LT-2 construction details (6 of 6).
Appendix B. Grouting Data Reduction

Figure B-1. Site I Flat-Jack 1 grouting displacement vs. time.

Figure B-2. Site I Flat-Jack 1 grouting pressure vs. time.
Figure B-3. Site I Flat-Jack 1 grouting load vs. displacement.

Figure B-4. Site I Flat-Jack 1 grouting area ratio vs. active grout time.
Appendix B. (continued)

Figure B-5. Site I Flat-Jack 2 grouting displacement vs. time.

Figure B-6. Site I Flat-Jack 2 grouting pressure vs. time.
Appendix B. (continued)

Figure B-7. Site I Flat-Jack 2 grouting load vs. time.

Figure B-8. Site I Flat-Jack 2 grouting area ratio vs. active grout time.
Appendix B. (continued)

Figure B-9. Site I Sleeve-Port 1 grouting displacement vs. time.

Figure B-10. Site I Sleeve-Port 1 grouting pressure vs. time.
Appendix B. (continued)

Figure B-11. Site I Sleeve-Port 1 grouting load vs. time.

Figure B-12. Site I Sleeve-Port 1 grouting area ratio vs. active grout time.

285
Figure B-13. Site I Sleeve-Port 2 grouting displacement vs. time.

Figure B-14. Site I Sleeve-Port 2 grouting pressure vs. time.
Appendix B. (continued)

Figure B-15. Site I Sleeve-Port 2 grouting load vs. time.

Figure B-16. Site I Sleeve-Port 2 grouting area ratio vs. active grout time.
Appendix B. (continued)

Figure B-17. Site II Flat-Jack grouting displacement vs. time.

Figure B-18. Site II Flat-Jack grouting pressure vs. time.
Appendix B. (continued)

Figure B-19. Site II Flat-Jack grouting load vs. time.

Figure B-20. Site II Flat-Jack grouting area ratio vs. active grout time.
Appendix B. (continued)

Figure B-21. Site II Sleeve-Port grouting displacement vs. time

Figure B-22. Site II Sleeve-Port grouting pressure vs. time.
Appendix B. (continued)

Figure B-23. Site II Sleeve-Port grouting Load vs. time.

Figure B-24. Site II Sleeve-Port grouting area ratio vs. active grout time.
Figure B-25. Site III LT-3 grouting displacement vs. time.

Figure B-26. Site III LT-3 grouting pressure vs. time.
Appendix B. (continued)

Figure B-27. Site III LT-3 grouting load vs. time.

Figure B-28. Site III LT-3 grouting area ratio vs. active grout time.
Appendix B. (continued)

Figure B-29. Site III LT-2 grouting displacement vs. time.

Figure B-30. Site III LT-2 grouting pressure vs. time.
Appendix B. (continued)

Figure B-31. Site III LT-2 grouting load vs. time.

Figure B-32. Site III LT-2 grouting area ratio vs. active grout time.
Figure C-1. Site I Control shaft load vs. displacement.
Figure C-2. Site I Flat-Jack 1 load vs. displacement.
Figure C-3. Site I Flat-Jack 2 load vs. displacement.
Figure C-4. Site I Sleeve-Port 1 load vs. displacement.
Figure C-5. Site I Sleeve-Port 2 load vs. displacement.
Figure C-6. Site II Control shaft load vs. displacement.
Figure C-7. Site II Control shaft load vs. deflection (large deflection scale).
Appendix C. (continued)

Figure C-8. Site II Flat-Jack load vs. deflection.

End Bearing — Total Capacity
Figure C-9. Site II Sleeve-Port load vs. deflection.
Figure C-10. Site III LT-3 cycle 1 load vs. displacement (control).
Figure C-11. Site III LT-3 cycle 2 (grouted).
Figure C-12. Site III LT-2 cycle 1 (control).
Figure C-13. Site III LT-2 cycle 2 (grouted).