HAM-275-7.02
Slope Stabilization and Repair

Ohio Transportation Engineering Conference

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and

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E. L. Robinson Engineering of Ohio Co.

10/27/2015
Presentation Outline

• History of the Project
• Design
• Construction
• Instrumentation and Monitoring
Constructed 1973
Constructed 1973
1996 Remediation Attempt - Berm
2001 – Drainage Curtain, Culvert Repair
2007 – Remediation Consideration

- Directional drill drainage curtain to ensure drainage
- Defer funds to more critical projects
- Consider a structural repair rather than more drainage
2009 – Design Build

• Structural repair using drilled shafts installed on berm
• Regrade slope

• D/B Team: Kokosing Construction Company and E.L. Robinson Engineering of Ohio Co.
• Low Bidder (1.2 Million)
Inlet locations for the existing 84-inch culvert and the 72-inch culvert. No work is proposed at the culvert inlet locations.

Area of potential impacts, including possible contractor mobilization locations.

Blue line stream conveyed through 84-inch culvert

Blue line stream conveyed through 72-inch culvert
NOTES:
1. MONITORING WELLS M-001-99, M-002-99, M-005-99, M-008-99, M-009-99, M-010-99, ARE NOT SHOWN, SINCE THEY WERE NOT DRILLED IN THIS STUDY AREA.
Movement in Inclinometer
At the berm

HAM-275-7.02
Installation B-4
Sta. 373+00, 150 RL
A-axis in direction of assumed movement
**Date started/finished:** 8-26-09

**SUMMIT TESTING & INSPECTION**
Akron, Ohio

**Hole Number:** B-4

**Line & station:** 374+62.8  **Offset:** 203.0 RT

**Surface elevation:**

**Project:** HAMILTON COUNTY I-74 SLOPE

**Project No.:** G09-8525

**Drill rig:** CME 550 ATV

**Auger size:** 3.5"  **Spoon size:** 2.0"

**Depth to seepage (feet):** N.A.

**Depth to groundwater (feet):** N.A.

**Depth to collapse (feet):** 12.0  **Location:** HAMILTON COUNTY, OHIO

**Hammer weight:** 140 LB  **Hammer drop:** 30.0"

<table>
<thead>
<tr>
<th>Depth (feet)</th>
<th>Number</th>
<th>Sample</th>
<th>Blows/RCD</th>
<th>Recovery (in.)</th>
<th>Loss (in.)</th>
<th>Description of material</th>
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</thead>
<tbody>
<tr>
<td>-0</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>RECENT FILL: Stiff brown to mottled brown/gray PLASTIC SILTY CLAY, trace to little gravel to cobbles, damp Refusal at 6.0 feet, changed to ROTO BIT.</td>
</tr>
<tr>
<td>-7</td>
<td></td>
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<td></td>
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<td>-14</td>
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<tr>
<td>-21</td>
<td>1</td>
<td>22-39-63</td>
<td>13</td>
<td>5</td>
<td></td>
<td>Soft mottled brown/gray HIGHLY WEATHERED SHALE, dry</td>
</tr>
<tr>
<td></td>
<td>2</td>
<td>50/5&quot;</td>
<td>5</td>
<td>13</td>
<td></td>
<td>Soft gray HIGHLY WEATHERED SHALE, dry</td>
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</tbody>
</table>

Boring terminated at 24.0ft.
Sta. 373+45 Section C: Kokosing Survey: Slip plane from Incl. (2H:1V grading)

GSTABL 7

E:\ANALYS=1\STABL--1\SE-G-C-C2.PLT  Run By: Username  7/25/2009  1:50AM

Factor Of Safety Is Calculated By The Modified Bishop Method
Sta. 373+45 Section C: Kokosing Survey: Slip plane from Incl. (2H:1V grading)

<table>
<thead>
<tr>
<th>Soil Desc.</th>
<th>Soil Type</th>
<th>Total Unit Wt.</th>
<th>Saturated Unit Wt.</th>
<th>Cohesion</th>
<th>Friction Angle</th>
<th>Pore Pressure</th>
<th>Piez. Surface</th>
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<tbody>
<tr>
<td>1 SiCl</td>
<td></td>
<td>119.0</td>
<td>121.0</td>
<td>200.0</td>
<td>28.0</td>
<td>0.10</td>
<td>W1</td>
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<tr>
<td>2 Res. Str</td>
<td></td>
<td>119.0</td>
<td>121.0</td>
<td>0.0</td>
<td>16.0</td>
<td>0.00</td>
<td>W1</td>
</tr>
<tr>
<td>3 BR</td>
<td></td>
<td>140.0</td>
<td>142.0</td>
<td>10000.0</td>
<td>45.0</td>
<td>0.00</td>
<td>W1</td>
</tr>
</tbody>
</table>

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Factor Of Safety is Calculated By The Modified Bishop Method
SLOPE/W

STA. 373+45: SECTION C, GRADED GEOMETRY (2:1) WITH DRILLED SHAFT
Benching - Drilled Shafts Location
Drilled Shafts Details

Reinforcement Details

Reinforcement Concentrated on tension side
Repair Plan and Profile
Photo of the roadway
Graded Slope and Drilled Shafts