SHRP2 – NDE Peer Exchange

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Bridge Site Selection

Criterion:
• Three structures
• Decent amount of deck deterioration
• Relatively near each other
• No significant traffic control required

Goals:
• Compare NDE with our typical methods
• Investigate potential for preservation project
Bridge #7
SR Route
163 ft.
4238 sf.
Bridge #14
SR Route
244 ft.
8296 sf.
Bridge #18

SR Route
249ft.
13446 sf.
Gannett Fleming, BDI, and Infrasense

- **Phase I** high-speed scanning surveys to quantify and map concrete deterioration, delamination, patching, and spalling:
  - infrared thermography (IR)
  - ground penetrating radar (GPR)
  - high-resolution video (HRV)

- **Phase II** validation testing:
  - manual chain drag
  - deck acoustic response (SounDAR)
  - chloride penetration testing
  - rebound hammer testing
- **GPR** - results indicate that 17.4%, 14.4%, and 3.6% of Structures 7, 14, and 18, respectively, have a high probability of deterioration at the rebar level.
- **IR** and **HRV** results indicate that 5.2%, 4.6%, and 2.0% of Structures 7, 14, and 18, respectively, are delaminated.
Chloride Ion Penetration - results indicate that Structures 7, 14, and 18 had max chlorides of 4.01, 7.57, and 7.14 lbs./CY, with 33%, 75%, and 67%, having concentrations over 2.0 lbs./CY.
• **Sounding** – Manual chain drag and SounDAR. Results show indications of delamination.
Bridge #18 Results

GPR and IR (Concr. Defects)

SounDAR (Delaminations)

GPR (Concrete Cover)

Impact Hammer (Conc Strength)
## Comparison Table

<table>
<thead>
<tr>
<th>Bridge #</th>
<th>GPR (% Deterioration)</th>
<th>IR - HRV (% Delam)</th>
<th>Sounding (% Delam)</th>
<th>Chlorides (max lbs/CY)</th>
<th>Chlorides (% &gt; 2lb/cy)</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>17.4</td>
<td>5.2</td>
<td>21.1</td>
<td>4.01</td>
<td>33</td>
</tr>
<tr>
<td>14</td>
<td>14.4</td>
<td>4.6</td>
<td>14.4</td>
<td>7.57</td>
<td>75</td>
</tr>
<tr>
<td>18</td>
<td>3.6</td>
<td>2.0</td>
<td>4.4</td>
<td>7.14</td>
<td>67</td>
</tr>
</tbody>
</table>
Final Thoughts

• Main Benefits
  – Reduced impact on traffic
  – Impressive amount of data and visualization

• Immediate Uses
  – Scoping of preservation projects for High Value Bridges or when traffic impact needs minimized

• Long Term Possibilities
  – Asset management decision making
  – Potential for NBI Inspections