Maryland State Highway Administration (MD SHA)
Bridge Management System
Greg Roby, P.E.
Deputy Director
Structure Inspection and Remedial Engineering
Topics

• Organization

• Repair/Preventative Maintenance

• BR/BH Bridge Management (Tour)
MD SHA Owned Bridge Inventory

- 2500 + Bridges
- 3000 + Small Bridges (3’< Span< 20’)
- 90 + Miles of Noise Walls
- 45 + Miles Retaining Walls
- 18 Movable Bridges
- There are 2500 + non SHA Owned bridges in MD. Total MD Bridges = 5000+
Organizational Structure

Office of Structures

Structure Inspection and Remedial Engineering
- Remedial Design Div.
  - 5 Engineering Design Teams
- Structure Inspection and Paint Program Div.
  - 7 SHA Structure Inspection Teams
- New and Major Rehabilitation Design
  - Remedial Construction Div.
    - Construction Inspectors
Repair/Preventative Maintenance Data

- Element Level Inspection Since 1993
- Internally Developed Access Inspection Database Program (Not a PONTIS user)
- Repair/Maintenance Needs are Flagged by Inspectors
  - Set of Policies and Procedures for when issues are to be flagged by the Inspection Team
  - Currently flags are not automatic or programmed
  - Flag types
    - Minor Maintenance
    - Engineering request
  - Each Team is Assigned Structures by Geographical Area
- Engineering Requests are logged into another Database Program “Worklist”
Sample Inspection Report

MARYLAND STATE HIGHWAY ADMINISTRATION BRIDGE INSPECTION REPORT

BRIDGE: 0221700  
INSPECTION DATE: 09/12/2009

WES T NUR BERY ROAD over MD 286  SBR

(60) DECK: 4  
(61) CHANNEL: N  
(62) CULVERT: N  
(72) APPROACH ROADWAY ALIGNMENT: S  
(73) LANE: 810  
(74) TEAM:  
(80) SUPER STRUCTURE: 8  
(81) WATERWAY: N  
(82) SUBSTRUCTURE: 6

INSPECTOR:  
REVIEWER: EV8

HOURS TO INSPECT: 8

PUNCTURES: 0  
PERCENT RUTS?: 0

PLANKING: 80  
POWER WASHING?: No

PATCHING: 25  
ID NUMBER?: Yes

BLOCKING: 0  

LOOKING: WEST  
TOWARD: HAMMONDS FERRY RD

DOT: Yes

DOT COMMENT: 10/04-01, 04-03 WEEKEND

CLEARANCE: 1608

LOCATION: GIRDER 1, LANE 2

CAUTION:

<table>
<thead>
<tr>
<th>ELEMENT</th>
<th>TQ</th>
<th>CS 1</th>
<th>CS 2</th>
<th>CS 3</th>
<th>CS 4</th>
<th>CS 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>001</td>
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<td>F.Y.A.</td>
<td>District</td>
<td>Inaccessible?</td>
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</tr>
<tr>
<td>1) REPAIR TORN AND MISSING FENCE ON THE SOUTH SIDE.</td>
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<td>002</td>
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<td>F.Y.A.</td>
<td>District</td>
<td>Inaccessible?</td>
<td></td>
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</tr>
<tr>
<td>1) ELEMENT 369 IS BEING REQUESTED. THIS HAS BEEN REQUESTED PREVIOUSLY AND CONDITION CONTINUES TO WORSEN.</td>
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<td>003</td>
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<td>F.Y.A.</td>
<td>District</td>
<td>Inaccessible?</td>
<td></td>
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</tr>
<tr>
<td>1) DECK PLANKING MAKES SOME OF STRUCTURE INACCESSIBLE FOR HANDS-ON INSPECTION.</td>
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</tbody>
</table>
Repair/Preventative Maintenance
Data Analysis/Decisions

- All Engineering Requests Get Assigned to Design Team Bridge “Owner”
- Engineering Analysis, Repair History, Future Needs, Priorities, etc. are Done
- Report is Submitted to Design Division Chief for Review and Decision on Needs/Priorities
- Designs are Completed, Plans Prepared, Permits Received, etc. and Project is Assigned for Construction.
Sample Engineering Worklist

![Sample Engineering Worklist Image]

<table>
<thead>
<tr>
<th>Print Construction Assignment</th>
<th>Worklist</th>
<th>Print Worklist</th>
<th>Print Worklist Totals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Job Number: 18044</td>
<td>Design Tracking</td>
<td>Pontis</td>
<td>Construction Tracking</td>
</tr>
<tr>
<td>Structure No: 2103600</td>
<td>Description: MD 68</td>
<td>over CONOCOCHEAGUE CREEK</td>
<td></td>
</tr>
<tr>
<td>District Number: 6</td>
<td>Suspense/Ad Date: 06/08/2010</td>
<td>Status: UC</td>
<td>Completion Date:</td>
</tr>
<tr>
<td>Permit Type: Nontidal</td>
<td>Stream Class:</td>
<td>Contract No: AX744A51</td>
<td></td>
</tr>
<tr>
<td>Permit Restriction Dates:</td>
<td>Thru:</td>
<td>Thru:</td>
<td>Permit Expiration Date:</td>
</tr>
<tr>
<td>Env. Inv. (EI) Required: Yes</td>
<td>EI Sub.: 04/05/2010</td>
<td>EI Rec.:</td>
<td>EI Expiration:</td>
</tr>
<tr>
<td>Engineer's Estimate: $66,000</td>
<td>Final Cost:</td>
<td>FY:</td>
<td>Resp. Req. 0</td>
</tr>
</tbody>
</table>

Work Required:
1. Repair stone masonry bullnose at pier no. 3
2. Repoint stone masonry where needed as determined by the engineer
3. Repair the sidewalk at the northwest and northeast corners
4. Remove vegetation from the tops of the wing walls
5. Remove timber debris from waterway upstream of bridge, to be done by SHA

Remarks:
MMD 04/13/10 Job created per phone conversation with Stan Miner, Bridge Inspector. Job to be done pending an underwater inspection of Pier 3 footer.
WNP, 8/26/10 - Added item 6 to address safety concerns per G.S.R.
### BIRED Construction Worklist

<table>
<thead>
<tr>
<th>Job Number</th>
<th>Print Full Report</th>
<th>Print Short Report</th>
<th>Print Engineer’s Report</th>
</tr>
</thead>
<tbody>
<tr>
<td>18044</td>
<td></td>
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</tr>
</tbody>
</table>

**Team Leader:** WNP  
**Construction Priority:** E  
**Status:** UC  
**District Number:** 6

**Structure No:** 2103600  
**Description:** MD 68 over CONOCOCHEAGUE CREEK

**Permit Type:** NonTid  
**Permit Restr.:** Thru: and Thru:  
**Permit Exp.:**

**Env. Inv. (EI) Required:** Yes  
**EI Sub.:** 04/05/2010  
**EI Exp.:**

**Work Required:**
1. Repair stone masonry bullnose at pier no. 3
2. Repoint stone masonry where needed as determined by the engineer
3. Repair the sidewalk at the northwest and northeast corners
4. Remove vegetation from the tops of the wing walls
5. Remove timber debris from waterway upstream of bridge, to be done by SHA

**Construction Contract:** JP  
**Contract Type:** Multiple Tasks  
**Billing Type:** Lump Sum

**Construction Assign Date:** 05/03/2010  
**Log In Date:** 05/03/2010  
**Assigned To Contractor:** 05/05/2010

**Contractor:** PDI-Sheetz Construction Corp.  
**Contract No.:** AX744A51  
**Charge No.:** AX744A51

**Construction Start Date:** 07/19/2010  
**Construction Complete Date:**

**Final Inspection:**

**Billing Complete Date:**

**Close Out Date:**

**Eng. Est.:** $66,000  
**Contractor. Est.:** $126,726.86  
**Final Cost:**

**Construction Notes:**
Log date: 5/3/2010. Priority E. Assigned to PDI Sheetz, Inspector Fife/Hatch. Contractor Estimate of $85,091.00 for Item #1 ONLY.
Repairs started 7/19/2010. Total estimate $126,726.86 from Steve Kight (PDI). Meeting at job site on 08/20/2010. PDI (Stone mason) will take care of Items 1 and 2 ONLY. Items 3, 4, and 5 will be completed by one of our fixed span crews.
BR/BH Bridge Management (Yearly Bridge Tour) Data

- Yearly Bridge Tour Has Been Conducted for 20 Years
- All Structurally Deficient Bridges That Are Not Within 6 Months of Construction
- Structures Recommended to be Monitored from Previous Year’s Tour (Tour rating of C, D, or E)
- Structures Recommended by Local District Maintenance Offices
- Structures Recommended by Structure Inspection and Remedial Engineering Team Leaders (Bridge Owners)
- All the Information is Inputted into a Tour Database
Yearly Bridge Tour Analysis, Projections, Decisions

- Consistent Evaluation of Structures Across State by the Same Senior Cross Functional Staff (Typically 4)
- Opportunity to Review Condition Information for Accuracy and Consistency
- Evaluated to Decide if Major Rehabilitation is Necessary or is Repair Sufficient
- Structures Receive an Overall Tour Rating and are Prioritized for BR/BH Programs Where Appropriate
- Evaluate What Repairs May Be Necessary to Hold Structure While Waiting for Major Rehabilitation
- Approximately 200 bridges visited each year.
Bridge Tour Ratings

A. Structure is in good condition no work needed.
B. Structure is good condition. May require minor low priority remedial repair. No additional monitoring required.
C. Structure requires monitoring and is kept on tour for following year. Preliminary engineering may be started or additional laboratory testing may be requested. Structure’s receiving this rating may be structurally deficient and in the BH program as a lower priority. In many cases remedial repairs will address the deficiencies.
D. Structure condition is deteriorating. Priority 2 candidate in BR/BH program.
E. Structure is in poor condition. Priority 1 candidate in BR/BH program.
Bridge Tour Priorities

P-1  Advertise for construction within 3 years.

P-2  Advertise for construction within 5 years.

P-3  Project is in program, but is a lower priority for available funding
**MD 47 OVER NORTH BRANCH**

**Structure No.:** 0104300  
**Description:**

**Tour Year:** 2010  
**Tour Date:** 09/09/2010  
**Tour Order:** 11  
**Inspectors:** GCV, GBR, MA, RST

**Recommended By:**  
- TOUR: ✓
- SD: ✓
- BSR: ✓
- SIRE: ✓
- DIST: ✓
- OOS: ✓
- OMT: ✓

### 2010 Submittal Condition Data

<table>
<thead>
<tr>
<th>Structure Condition</th>
<th>Functional Condition</th>
<th>General Info.</th>
<th>ADT</th>
<th>Year Built</th>
<th>Date Inspected</th>
<th>Insp. Freq.</th>
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<tbody>
<tr>
<td>Deck</td>
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<td>Efflorescence</td>
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<tr>
<td>Rust on Steel</td>
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<tr>
<td>BEAMS/SLABS</td>
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<td>Exp. Rebar/Spalls: ✓</td>
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<tr>
<td>Efflorescence</td>
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<tr>
<td>SOFFIT</td>
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<tr>
<td>Rust on SIP</td>
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<tr>
<td>Exp. Rebar/Spalls: ✓</td>
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<td>Efflorescence</td>
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</tbody>
</table>

### Superstructure Condition

- **Deck Ride Quality:**  
- **HMA Overlay:** ✓
- **BEAMS/SLABS:**  
  - Exp. Rebar/Spalls: ✓
  - Efflorescence: ✓
- **Rust on Steel:** ✓
- **Soffit:**  
  - Rust on SIP: ✓
  - Exp. Rebar/Spalls: ✓
  - Efflorescence: ✓
- **Planking:** ✓
- **SIP Forms:** ✓

### Substructure Condition

- **Abutment:** Maj: ✓  
- Mod: ✓  
- Min: ✓  
- None: ✓
- **PIER:** Maj: ✓  
- Mod: ✓  
- Min: ✓  
- None: ✓

### Site Conditions

- **Does bridge need to carry additional approach lanes?** No
- **Does structure need to carry additional shoulder width?** Yes
- **Does RW need to be acquired to rehab/repl. structure?** Yes
- **Are there houses or buildings within the needed RW?** Yes
- **Adjust alignment? Vert.:** Yes  
- **Horiz.:** Yes
- **Utilities:** OH wires both sides MD 47. Small waterline runs under bridge at south

### Tour Record

- **Tour Rating:** D  
- **Program Priority:** P-2  
- **Under Design:** ✓
- **Status/Phase:**
- **New/Replacement:** SE
- **Lead Divisions:**

### Tour Rating/Priority

<table>
<thead>
<tr>
<th>Tour Rating</th>
<th>Program Priority</th>
<th>Under Design</th>
<th>Status/Phase</th>
</tr>
</thead>
<tbody>
<tr>
<td>D</td>
<td>P-2</td>
<td>✓</td>
<td></td>
</tr>
</tbody>
</table>

### Tour Rating and Follow Up

**SIRE Tour Questions:**

Jared,
What is the status of the rating of this bridge for its present condition? Close out Job No. 11742. Note in the remarks that the bridge is going to be replaced by new design and they are actively working on it. The rating of this structure should be done at the same time as Job No. 0104300. Review SIRE Tour Answers.

**Tour Comments/Follow Up:**

Tour rating lowered based on SD super rating. SIRE to perform load rating based on section loss in exterior beams. 3/2/10-Latest inspection lowered Sup rating from 5 to 4 making bridge SD. 8/25/09-GLenn indicates H & H ok. All C to start preliminary work using H & H PE number.

### Follow Up Actions

- **Complete:**
- **Request/Recieve Deck Cores:**
- **Request/Recieve Sub. Cores:**
- **Start H and H:**
- **Start PE/Design:**
- **SIRE to Repair:**
- **SIRE to Evaluate Ratings:**
- **SIRE to Evaluate for Paint:**

**View Tour Report**
There are now only 87 structurally deficient bridges remaining on our system, or 3% of our total number of structures.
MD State Highway Administration
Questions?

Greg Roby, P.E.
Deputy Director
Structure Inspection and Remedial Engineering