The contents of this presentation do not have the force and effect of law and are not meant to bind the public in any way. This presentation is intended only to provide information regarding existing requirements under the law or agency policies.

Contents

- NBIS Rulemaking
  - Critical Findings Database
- Bipartisan Infrastructure Law (BIL)\(^1\)
  - Bridge Formula Program
  - Bridge Investment Program
- Hernando de Soto Bridge (I-40 over the MS River)

\(^1\)BIL enacted as the Infrastructure Investment and Jobs Act (Pub.L. 117-58, Nov. 15, 2021)
### Brief History of the NBIS

- **1968 Federal-Aid Highway Act** provided authority for the first NBIS regulation enacted in 1971.
- **1978 Surface Transportation Assistance Act** extended NBIS to all bridges on public roads and established the National Bridge Inventory.
- **1987 Surface Transportation and Uniform Relocation Assistance Act** provided authority for fracture critical and underwater inspections.
- **1993 revisions** to require follow-up actions and provide for extended intervals.
- **2004 revisions** to update qualification requirements for bridge inspection team leaders and program managers.

### NBIS Rulemaking Update

- NPRM Published November 12, 2019 (84 FR 61494)
- NPRM comment period closed March 13, 2020
- Updates on the NBIS Final Rule are at: [https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=202110&RIN=2125-AF55](https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=202110&RIN=2125-AF55)
**MAP-21 Required Revisions**

- Extended applicability to tribally owned bridges
- Update methodology, training, and qualifications for inspectors
- Update frequency of inspection, considering a risk-based approach
- Establish procedures for reporting and monitoring of critical findings

---

**NPRM Comments**

- 90-day load rating requirement
- 30-day load posting requirement
- Inspection of private bridges
- Reporting of critical findings
- Agreements for delegating functions
- Inspection intervals

---

\(^1\)Pub. L. 112-141, sec. 1111

---

41 States commented
### Proposed 650.311 Inspection Interval

**84 FR 61494, 61513**

#### Method 1: Simplified Risk

<table>
<thead>
<tr>
<th>Routine Interval</th>
<th>Underwater Interval</th>
<th>NSTM Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 months</td>
<td>60 months</td>
<td>24 months</td>
</tr>
<tr>
<td>≤ 12 months (3 criteria)</td>
<td>≤ 36 months (2 criteria)</td>
<td>≤ 12 months (3 criteria)</td>
</tr>
<tr>
<td>&gt; 24 and ≤ 48 months (9 criteria)</td>
<td>72 months (4 criteria)</td>
<td>&gt; 24 and ≤ 48 months (4 criteria)</td>
</tr>
</tbody>
</table>

#### Method 2: Rigorous Risk

<table>
<thead>
<tr>
<th>Routine Interval</th>
<th>Underwater Interval</th>
<th>NSTM Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 12, 24, 48 or ≤ 72 months*</td>
<td>≤ 36, 60 or ≤ 72 months</td>
<td>≤ 12, 24 or ≤ 48 months</td>
</tr>
<tr>
<td>&gt; 48, Service Insp. at 24 months</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Min. 5 criteria, min. 4 damage mode types</td>
<td>Min. 5 criteria, min. 4 damage mode types</td>
<td>Min. 5 criteria, min. 4 damage mode types</td>
</tr>
</tbody>
</table>

---

* >48, Service Insp. at 24 months

---

**Proposed 650.311 Inspection Interval**

84 FR 61494, 61513
Specifications for the National Bridge Inventory

- Proposed Incorporated Reference in the updated NBIS
- Included in Federal Register (FR) docket for comment
- 1450 comments submitted to the FR
- 39 States commented

Status

- Draft Final Rule and Preamble
- Review by USDOT
- Review by OMB
- Publish Final Rule in the Federal Register
- Typically becomes effective 30 days after publication but date is determined during process
- A transition plan will be developed based on the date the new regulation becomes effective.
Critical Findings Database

Bridge CF by Cause

1. Deterioration: 955
2. Scour: 210
3. Flood: 144
4. Collision (bridge hit/impact): 126
5. Overload: 64
6. Erosion: 41
7. Fatigue: 37
8. Fire: 18

Critical Findings Database

Deterioration by Type

1. Timber decay/cracking: 534
2. Steel section loss: 389
3. Concrete spalling/cracking: 311
4. Distortion: 81
Critical Findings Database...an example

- 35 bridges were closed or restricted due to a partial or total collapse since July 1, 2020.
  - 13 from deterioration
  - 11 from scour associated with flooding or storms
  - 5 from impact (collision)
  - 2 from scour
  - 2 from overloads
  - 2 from unknown causes

Critical Findings Database...an example

- 14 bridges were closed due to a total collapse since July 1, 2020.
  - 6 from scour associated with flooding or storms
  - 3 from fire
  - 2 from scour
  - 2 from impact (collision)
  - 1 from Overload
**Bipartisan Infrastructure Law**
**FY2022 – FY2026**

- **Bridge Formula Program**
  - $5.5B/yr ($27.5B) in formula funding \[MI = \$113M/yr (\$563M)\]
  - Advanced Appropriations from the General Fund
  - Replace, rehabilitate, preserve, protect, and construct bridges
  - 15% set-aside for off-system bridges, and sets the Federal share at 100% for funds used on locally owned off-system bridges

---

1 Established in title VIII of division J of the Infrastructure Investment and Jobs Act, Public Law 117-58 (11.15.2021)

---

**Bipartisan Infrastructure Law**
**FY2022 – FY2026**

- **Bridge Investment Program**
  - $2.5B/yr ($12.5B) in discretionary grants
    - Planning Grants
    - Large Project Grants (>\$100M)
      - Up to 50% of project cost
      - Multi-year grant agreements
    - Other than Large Project Grants
      - Up to 80% of project cost
  - Goals include improving safety, reliability, and bridge condition
  - Eligible applicants include States, MPOs(+200k), local governments, transportation authorities, Federal land management agencies, and Tribal governments
  - Implemented through a Notice of Funding Opportunity (NOFO)

---

1 Authorized in section 11118 of title I of the Infrastructure Investment and Jobs Act, Public Law 117-58 (11.15.2021)
I-40 Hernando de Soto Bridge

- Opened to traffic in 1973
- FC tied arch with a truss rib
- A514/A517 steel (USS T1)
- Two 900-ft main spans
- Carries 35,000 vehicles a day
- ARDOT is responsible for inspections
- TDOT is responsible for maintenance and repairs

Tuesday, May 11, 2021, just before 2 p.m

An inspector calls 911:

"I am doing a bridge inspection here on the I-40 Mississippi River bridge. We just found a supercritical find, we need to get people off the bridge immediately......"
Fractured Tie

Typical detail at even numbered joints

Tie Plate Transition

1 3/8"
2 3/16"

Typical detail at even numbered joints

Typical Weld Detail
### I-24 Paducah Bridge (1979)
**I-64 Sherman-Minton Bridge (2011)**

- Tied arches fabricated prior to FCP out of A514/A517 (T1)
- Surface breaking hydrogen cracking
- Subsurface cracks detected using UT
- Extensive repairs resulting in the bridges being closed to traffic for months
- FHWA recommendations

![Image of I-24 Paducah Bridge](Michael Baker Int.)

### Sherman-Minton

- ![Image of Sherman-Minton Bridge](Michael Baker Int.)

IN DOT
Dead Load Dominate

DL: +4575 Kips; LL:+890 / -109

Fracture Surface

TN DOT
Drone Footage, May 2019

Fractography

Figure 61. Lower portion of fracture, color-coded to indicate failure sequence.

Yellow = H Crack
Green = H Crack
Blue = 1st Pop-in
Orange = 2nd Pop-in
Pink = 3rd Pop-in

Figure 62. Upper portion of fracture, color-coded to indicate failure sequence.
UT Results

- 484 butt welds
- 41 rejectable welds
  - 17 additional locations that needed plating
- 8 additional welds that needed coring
- Many others that required surface grinding

Repair

AR DOT

TN DOT
1. State DOTs must:
   a. Review the inspection records of their inventory of bridges to identify fracture critical members that were fabricated with T-1 steel and without a requirement to meet the provisions of an AASHTO fracture control plan first implemented by AASHTO as a Guide Specification in 1978 and adopted as a standard by AASHTO/AWS in 1995.
   b. Document the members identified in paragraph 1(a) in the fracture critical member inspection procedures.
   c. For the fracture critical members identified in paragraph 1(a), ensure that they have been regularly and appropriately inspected in accordance with the National Bridge Inspection Standards (23 CFR Part 650) and that any critical findings have been properly identified and addressed. For these fracture critical members:
      i. An appropriate level of hands-on inspection includes a visual inspection verifying the soundness of all butt welds in tension supplemented by non-destructive testing (NDT) conducted a minimum of 48 hours after original welding for joints up to 2 inches thick, or 72 hours after original welding for joints over 2 inches thick, unless this verification has previously been documented.
      ii. All rejectable indications identified using AASHTO/AWS NDT acceptance criteria during this testing are to be considered critical findings.

2. State DOTs are also required to report an inventory of the structures identified in paragraph 1(a) to the Federal Highway Administration that includes:
   a. The structure number of the bridge,
   b. If completed, the month and year when the soundness of all butt welds in tension were verified using non-destructive testing in accordance with paragraph 1(c)(i),
   c. Whether the verification testing or subsequent inspection identified rejectable indications, and
   d. If rejectable indications were identified, the month and year when follow-up actions were taken to resolve the critical findings identified in paragraph 2(c).
Fern Hollow Bridge

Thank you for your time and attention.

A PRESENTATION FOR
MICHIGAN BRIDGE WEEK
MARCH 15, 2022

JOSEPH L. HARTMANN, PHD, P.E.
DIRECTOR, OFFICE OF BRIDGES AND STRUCTURES