
FHWA Bridge Program Initiatives - Bridge Design and Analysis

2017 RADBUG
Kansas City, KS

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Presentation Outline

- New Administration's Initiatives
- Legislation Implementation
 - MAP-21 (Performance Management)
 - FAST Act
 - NTIS
- Key Steel and Concrete Bridge, Load Rating and Security Products and Initiatives

August 1, 2007

I-35W Bridge Collapse



December 15, 1967

Point Pleasant Bridge (Silver Bridge) Collapse



History of NBIS

- Congressional Order – Secretary shall work with the States to develop a national-level bridge safety inspection program
- Federal-Aid Highway Act of 1968
- Regulation implemented in 1971
 - 1978...Extended to all bridges
 - 1980...NBI added
 - 1987...FC and UW inspection added
 - 1993...Corrective action for Critical Findings
 - 2005...Qualifications for PMs and TLs

President's Infrastructure Initiatives

■ Key Principles

- Make Targeted Federal Investments
 - Encourage Self-Help
 - Align Infrastructure Investment with Entities Best Suited to Provide Sustained and Efficient Investment
 - Leverage the Private Sector
- \$200B to leverage \$800B (\$1T) in local and private investments – details in late summer
 - Regulatory Reform Initiative – reduce unnecessary regulatory obstacles

MAP-21 Implementation

- National Bridge Inspection Standards
- Risk-Based Prioritization
- Critical Findings Database

NBIS Update

- Establish risk-based, data-driven frequency of inspections
- Establish procedures for reporting critical findings and monitoring corrective actions
- Requirement to conduct annual compliance reviews
- Maintain a bridge inspection training program
- Nationally Certified Bridge Inspectors

Risk-Base Data-Driven Intervals

- Building off of the framework from NCHRP 12-82: Reliability-Based Bridge Inspection Practices
- Risk = probability x consequence
- Considering...
 - Extended Interval Criteria
 - Clarification of Requirements for Fracture Critical Members
 - TPF-5(253): Evaluation of Member Level Redundancy in Built-Up Steel Members

Risk-Based Prioritization

- Classify bridges according to serviceability, safety and essentiality.
- Based on that classification, assign each a risk-based priority for preventative maintenance, replacement or rehabilitation.

Risk-Based Prioritization

- The statute is silent on what this prioritization will be used for.
- Concerns...
 - Asset Management
 - Transportation Performance Management

Critical Findings Database

- Update to NBIS will include a statutory requirement to report critical findings and follow up actions
- As a result...
 - Database
 - Data Dictionary
- NTIS...w/i 24 hours with regular updates or as requested.
- Identification of issues/trends...scour?

Performance Management

(<https://www.fhwa.dot.gov/tpm/>)

- Rulemaking published 1/18/17, effective 2/17/17
- Provide the **most efficient investment** of Federal transportation funds
- Refocus on **national transportation goals**
- Increase **accountability and transparency**
- **Improve decision-making** through performance-based planning and programming

§ 490.407 National Performance Management Measures for Assessing Bridge Condition

Bridge Condition Measures - All NHS Bridges

- Percentage of NHS bridges classified as in **Good** condition
- Percentage of NHS bridges classified as in **Poor** condition

Changing the Language of the Federal-Aid Bridge Program

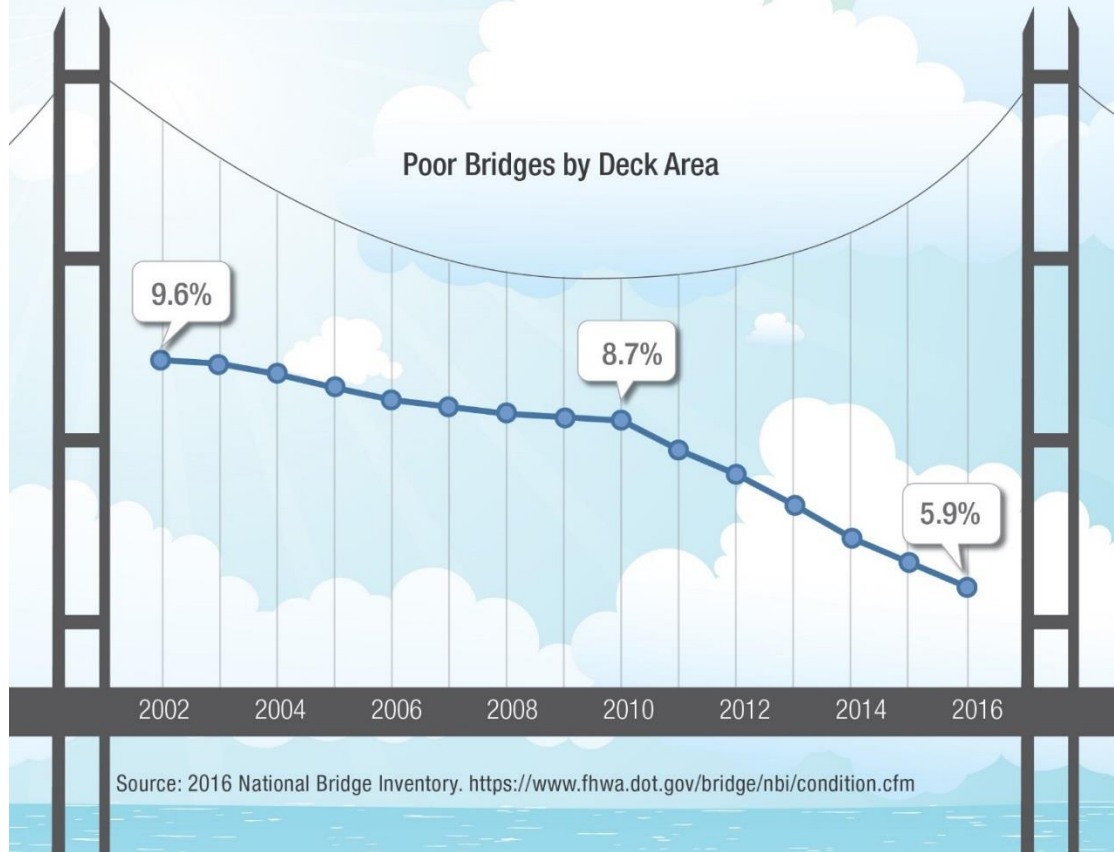
- ~~Sufficiency Rating~~
- ~~Functionally Obsolete~~
- ~~Structurally Deficient~~ → Poor
- Fracture Critical → NBIS Update

Fracture Critical

- 23 CFR 650 (C): A steel member in tension, or with a tension element, whose failure would probably cause a portion of or the entire bridge to collapse.
- Rooted in two bridge failures
- FHWA, AASHTO, AWS
- System Redundant Member
- Internally Redundant Member?

PERCENT OF BRIDGES IN POOR CONDITION IS DECREASING

Surface area of U.S. bridges rated Poor has decreased by 3.7 percentage points since 2002

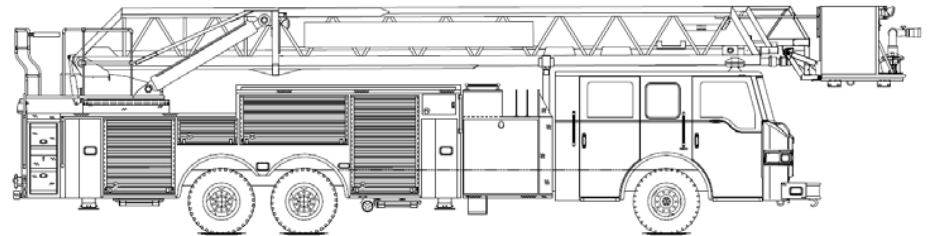


FAST Act Implementation

- Interstate Weight Limits
 - Emergency Vehicles
 - Covered Heavy-Duty Tow and Recovery Vehicles

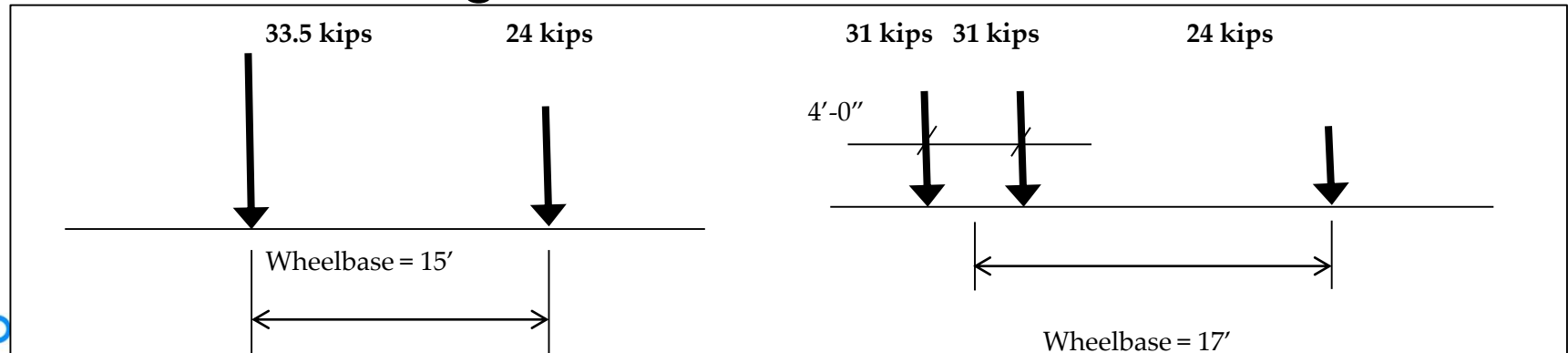
Emergency Vehicles

- Guidance on rating for Emergency Vehicles
 - Configurations
 - Analysis
 - Posting requirements
- Guidance on Signs
- Published Q&As



Load Rating for Emergency Vehicles

- FHWA Memo Published Nov. 3, 2016 (<https://www.fhwa.dot.gov/bridge/loadrating/161103.cfm>)
- Interstate bridges must be load rated and posted, when necessary
- Two EV configurations defined



Load Rating for Emergency Vehicles

- Bridges need to be rated at next inspection unless:
 - ❑ An operating or legal load rating factor for the AASHTO Type 3 vehicle of at least 1.85;
 - ❑ an inventory rating factor for the HS 20 design load of at least 1.0 using the LFR method, or
 - ❑ an inventory rating factor for the HL-93 design load of at least 0.9 using the LRFR method.

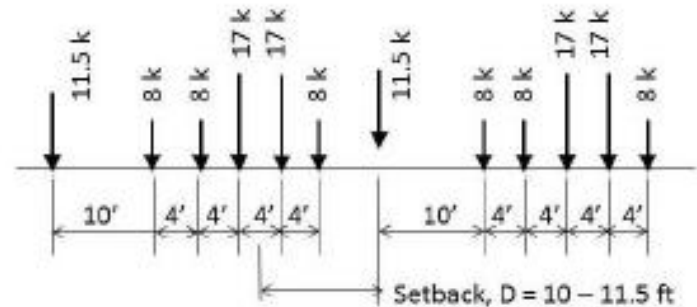
Load Rating for Emergency Vehicles

- If posted is necessary, use the following:

EMERGENCY VEHICLE WEIGHT LIMITS	
SINGLE AXLE	XXT
TANDEM	XXT
GROSS	XXT

- An Action Plan is needed by March 31, 2017

Covered Heavy-Duty Tow and Recovery Vehicles



Covered Heavy-Duty Tow and Recovery Vehicles

- Interstate vehicle weight limits do not apply
- A vehicle that is transporting a disabled vehicle from the place where it became disabled to the nearest appropriate repair facility, and
- Has a gross vehicle weight that is **equal to or exceeds** the gross vehicle weight of the disabled vehicle being transported

National Tunnel Inspection Standards

- Initial Inspections Due, 08.13.2017
- Inspection Data Due, 03.15.2018
- NTIS Assessment Metrics
 - Implemented in 2018
 - Mini-pilot this summer with CO, MA, & MI
 - Seek review/comment from SCOBS
 - Publish in Federal Register

FHWA/NHI Bridge Design and Analysis Courses (www.nhi.fhwa.dot.gov)

- NHI Course 130081: LRFD for Bridge Superstructures (4 day) **
- NHI Course 130092: LRFR for Highway Bridges (4 day)
- NHI Course 130093: LRFD Seismic Analysis and Design of Bridges (4 ½ day) **
- NHI Course 130094: LRFD Seismic Analysis and Design of Tunnels, Walls and other Geotechnical Features (4 day)
- NHI Course 130095: LRFD Design and Analysis of Skewed and Horizontally Curved Steel Bridges (2 ½ or 4 ½ days)
- NHI Course 132082: LRFD for Bridge Substructures (4 day)

New FHWA/NHI Bridge Design and Analysis Courses (www.nhi.fhwa.dot.gov)

- NHI Course 130102: Engineering for Structural Stability in Bridge Construction (2.5-3.5 days)**
- NHI Course 130122: Design and Evaluation of Bridges for Fatigue and Fracture (2 day)
- Bridge Security Design Manual **
- Steel Bridge Design Handbook (updated)**

** Manuals can be found searching www.fhwa.dot.gov/bridges

Load Rating Program Peer Exchanges

■ Northeast States

- CT, MA, ME, NH, NJ, NY, PN, RI and VT
- Aug. 4-6, 2014, Manchester, NH

■ Southeast States

- AL, FL, GA, KY, LA, MS, NC, SC and TN
- Sept. 1-3, 2015, Atlanta, GA

■ Midwest States

- IA, IL, IN, MI, MN, MO, OH and WI
- August 30 - September 1, 2016

■ Mid-Atlantic States +

- AR, DE, DC, KS, MD, PR, WV, VA
- **September 19-21, 2015, Sterling, VA**

■ Two Western State Exchanges **planned in FY18.**

Bridge Design and Analysis

Products near completion

- Design Specifications for Non-composite Box Sections
- Cooperative Agreement with Lehigh
 - Manual for Refined Analysis of Bridges
 - Tubular Member Design for Bridges
 - Reliability in Special Bridge Systems
 - Strengthening of Bridge Members
 - Orthotropic deck details

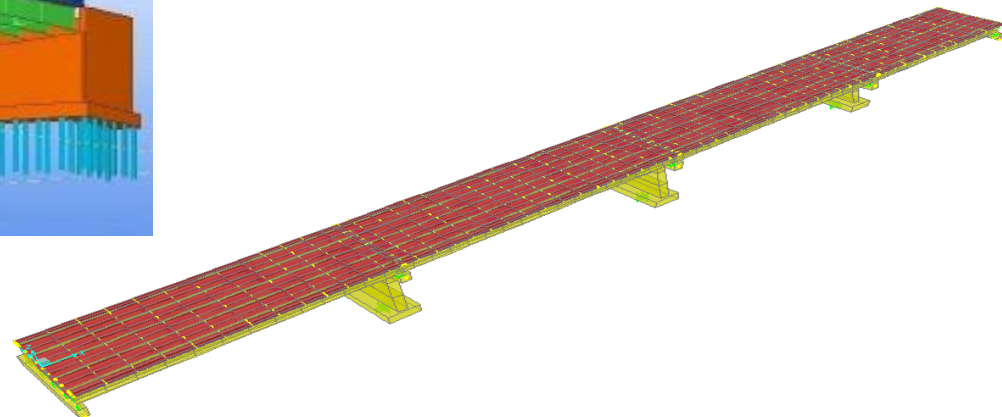
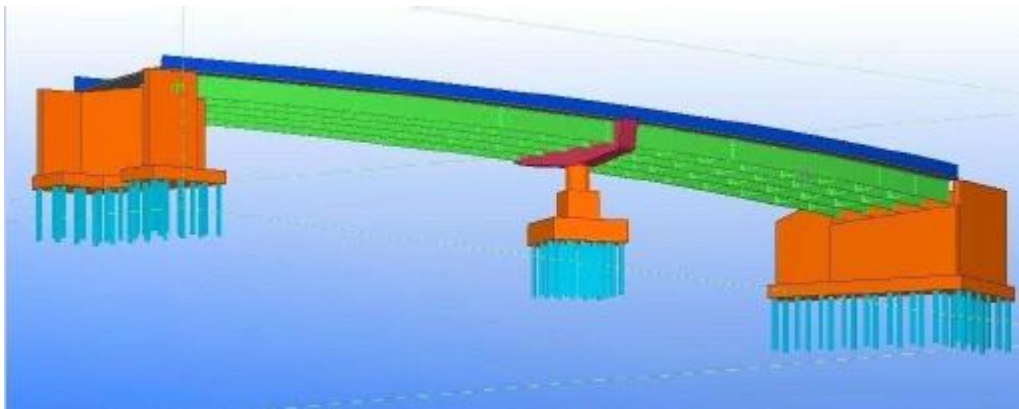
Future Design and Analysis Guidance – Projects Underway

- Bridge Welding Manual
- Bridge Geometry Manual
- Shear Load Rating Guidelines for Concrete Bridges
- Load Rating Guidance for Tunnels and Tunnel Components

Bridge Information Modeling (BrIM):

- Scope and Purpose

- *To facilitate development of bridge industry consensus standards for data description, modeling, and interoperability for integrated design, construction, and lifecycle management of bridges.*



BrIM Work Status

- Two reports published and available online:
 - BrIM Using Open Parametric Objects (CH2M)
 - BrIM Standardization (NIBS)
- Model View Definition (MVD) documentation available for implementation

BrIM Work Status

- Selected for 2017 Strategic Initiative (\$1M dedicated funds)
- Planning to assemble working groups (technical and governance)
- Want to identify demonstration projects



FHWA Bridge Load Rating Webinar Series

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To further support State's efforts in meeting the NBIS's requirements in load rating and FHWA's initiative of implementing the LRFR method, a series of webinars have been planned to provide continued awareness for local, regional, and State transportation agencies.

No. 16: Bridge Load Rating for Overweight Load Permitting – State's Practice (3) (5/19/2015)

No. 17: Federal Bridge Formula Weights and State-Specific Legal Loads (10/21/2015)

No. 18: Load Rating and Posting for State-Specific Legal Loads (1) (2/24/2016)

Recordings are available at

<https://www.fhwa.dot.gov/bridge/loadrating/>

QUESTIONS?