TRB AFF00 Structures Section
Top 2014 Problem Statements

Presented to

AASHTO HSCOBS T-11
Technical Committee for Research

by

Barney T. Martin, Ph.D., P.E.
Chair, TRB Structures Section
btmartin@modjeski.com

June 24, 2014
TRB AFF00, Structures Section
Top 2014 Research Statements


AFF20 ➔ Steel Bridge Analysis Validation Guidelines and Benchmark Problems

AFF30 ➔ Guidelines for Design and Construction of Curved Prestressed Concrete U- and I-Beams
TRB AFF00, Structures Section
Top 2014 Research Statements, cont’d.

AFF50 ➔ Development of Guidelines for Performance Based Seismic Design

AFF70 ➔ Load Rating of Buried Structures
TRB AFF10, General Structures
Top 2014 Statement:

- **GOAL:** Increase the fatigue life of traffic, sign and lighting structures.

- **NEEDED:** Test methods for dampers to facilitate device choice and implementation.

- **PRODUCT:** A evaluation protocol that can be followed to quantify the effectiveness of mitigation devices for specific structures.
TRB AFF10, General Structures
Top 2014 Statement

- **TIMELINESS:** Traffic, Sign and lighting structures are prone to vibration and susceptible to fatigue and failure. Vibration mitigation using a damper is effective and more cost-effective than addressing making designs more robust.

- **FUNDING / PERIOD:** $400,000 / 30 months
TRB AFF10, General Structures
Top 2014 Statement

TRB AFF20, Steel Bridges
Top 2014 Statement
Steel Bridge Analysis – Validation Guidelines and Benchmark Problems

✓ GOAL: Reduce uncertainty, errors and claims, and improve safety of steel bridges by improving on software modeling accuracy

✓ NEEDED: Accurate validation results for complex steel structures

✓ PRODUCT: Provide practicing engineers with data to validate 2D and 3D software modeling techniques used to analyze and design modern steel bridges
TIMELINESS: Increasingly complex bridge geometries (curved and skewed) bring a need to use more sophisticated modeling techniques. NCHRP 12-50 & AASHTO/NSBA G13.1 identified needs for enhanced software validation problems.

FUNDING / PERIOD: $350,000 / 36 months

PRIORITIZED OBJECTIVES: 4: Maintain and Enhance the AASHTO Specifications, 5. Accelerate Bridge Delivery and Construction, 6. Optimize Structural Systems
GOAL: Develop guidelines for fabrication, design and construction of prestressed curved concrete girder bridges.

NEEDED: Guidelines for a concrete alternative to curved steel girders will improve cost effectiveness of these bridges. Guidelines are needed to encourage and promote the use of curved concrete precast, pretensioned girders.

PRODUCT: Research based guidelines for curved precast concrete girders and changes to AASHTO Specifications to promote the use of curved, concrete, pretensioned girders.
TIMELINESS: The concept of the use of curved precast pretensioned concrete beams as an alternate to steel beams is unrecognized by most designers. The cost effectiveness of their use has been demonstrated in several states. The resulting structures would be low-maintenance and less costly than steel.

FUNDING / PERIOD: $500,000 / 36 months

PRIORITIZED OBJECTIVES: 4: Maintain and Enhance the AASHTO Specifications, 6: Optimize Structural Systems
TRB AFF50, Seismic Design of Bridges
Top 2014 Statement
Development of Guidelines for Performance Based Seismic Design

☑️ GOAL: To provide clear, consistent, and nationally accepted guidance for the use of Performance Based Seismic Design.

☑️ NEEDED: Guidance in the specifications to assist owners and designers who wish to consider seismic risk mitigation beyond the single minimum level provided in the current specifications.

☑️ PRODUCT: Recommended modifications to the LRFD Bridge Design Specifications and Seismic Design Guide Specifications, including the enhanced PBSD criteria.
TRB AFF50, Seismic Design of Bridges
Top 2014 Statement Continued
Development of Guidelines for Performance Based Seismic Design

- **TIMELINESS**: Addresses the gap in the Guide Specifications for LRFD Seismic Bridge Design whereby Critical and Essential bridge criteria is not included. Will keep the AASHTO seismic design provisions in step with advancements in other building and infrastructure industries.

- **FUNDING / PERIOD**: $350,000 / 24 months

- **PRIORITIZED OBJECTIVES**: 1: Extending Bridge service Life; 3: Maintain and Enhance a knowledgeable Workforce; 4: Maintain and Advance the AASHTO Specifications; 6: Optimize Structural Systems; 8: Contribute to National Policy
GOAL: Develop transparent, consistent, rigorous, recommendations for AASHTO to use for load rating buried structures; allow for ease of modification by state DOTs. Will also assess inspection requirements to ensure collected data can be used for load rating.

NEEDED: LRFR specifications and guidance for rating buried structures has not kept pace with DOT needs for limit state design and analysis procedures for buried structure types, materials, and conditions.
PRODUCT: Findings report, specification recommendations, spreadsheet/program tools for implementation /adaptable to modification.

TIMELINESS: DOTs continue to struggle with effective rating procedures for buried structures (22% of bridge inventory).

FUNDING / PERIOD: $750,000 / 36 months
PRIORITIZED OBJECTIVES: 1: Extending Service Life; 2: Maintain and Enhance the AASHTO Specifications; 4: Optimizing Structural Systems; 5: Model and manage Information Intelligently
AASHTO/TRB Structures Collaboration Meeting

@ TRB Annual Meeting

January 13, 2015

1:30 p.m.
Thank You

Questions?