TRB AFF00 Structures Section
Top 2019 Problem Statements

Presented to

AASHTO COBS
T-11, Technical Committee for Research

by

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TRB AFF00, Structures Section
Top 2019 Research Statements

AFF10 ➔ Compilation of Agency Approved Exceptions to AASHTO LRFD BDS

AFF20 ➔ Simplified AASHTO LRFD Bridge Design for Routine Steel I-Girder Bridges

AFF30 ➔ Filling ABC Knowledge Gaps – Deck Slabs and Substructure Components

TRB AFF00, Structures Section
Top 2019 Research Statements, cont'd.

AFF40 ➔ Improved guidance for deploying refined modeling, nondestructive evaluation, load testing and long-term monitoring for the structural

AFF50 ➔ Estimating inelastic displacement demands for bridges under seismic forces

AFF60 ➔ No Submission

AFF70 ➔ No Submission

AFF80 ➔ No Submission

TRB AFF10, General Structures Top 2019 Statement:

Compilation of Agency Approved Exceptions to AASHTO LRFD BDS

- ☑ GOAL: The goal of this study is to compile State Highway Agencies (SHA) approved exceptions to the AASHTO LRFD BDS in an organized manner to serve as a resource and idea sharing document for SHAs to utilize when developing structural design solutions for projects.
- ☑ NEEDED: A compilation of the rationale, logic and experience of SHA's for accepting new materials, new technology and new methods of analysis and design not included in the existing AASHTO LRFD BDS.

TRB AFF10, General Structures Top 2019 Statement (cont'd):

Compilation of Agency Approved Exceptions to AASHTO LRFD BDS

- ☑ PRODUCT: A report containing the shared expertise of State Bridge Engineers on the rationale and experience for accepting new materials, new technology and new methods of analysis and design that are either not accounted for or not allowed under the existing AASHTO LRFD BDS. The final product will also provide the AASHTO Committee on Bridges and Structures a road map for where future research is needed to continually improve the AASHTO LRFD BDS.

TRB AFF10, General Structures Top 2019 Statement (cont'd):

Compilation of Agency Approved Exceptions to AASHTO LRFD BDS

- ☑ TIMELINESS: As SHA's continue to be asked to do more with less, learning from others is an efficient and effective approach. State Bridge Engineers need to be able to appropriately respond to inquiries and/or adapt their standards to allow alternative structural solutions being designed and constructed by other SHAs.
- ☑ FUNDING / PERIOD: $250,000 / 18-24 months

TRB AFF10, General Structures Top 2019 Statement (cont'd):

Compilation of Agency Approved Exceptions to AASHTO LRFD BDS

- ☑ STRATEGIC PLAN OBJECTIVES : The results of this research can be used to "Provide Value to Members" and "Provide Innovative Technical and Professional Services," "Maintain and Enhance AASHTO Specifications for Improved Structural Performance," Enhance and Optimize Structural Systems," and "Enhance National Policy."

TRB AFF20, Steel Bridges
Top 2019 Statement:

Simplified AASHTO LRFD Bridge Design for Routine Steel I-Girder Bridges

- ☑ GOAL: Provide a document with guidelines for the simplified design of “routine” steel I-girder bridges
- ☑ NEEDED: A simplification of the effort required to design “simple” steel bridges is accordance with Section 6 of the AASHTO LRFD BDS.
- ☑ PRODUCT: A guide for the design of simple steel bridges illustrating the provisions if Section 6 of the AASHTO LRFD BDS that are either “non-applicable” or “applicable” with supporting commentary. Will include flowcharts and check lists.

TRB AFF20, Steel Bridges
Top 2019 Statement (cont'd):

Simplified AASHTO LRFD Bridge Design for Routine Steel I-Girder Bridges

- ☑ TIMELINESS: Given the long term need to invest billions of dollars into the U.S. transportation infrastructure, means of streamlining design time and effort will result in reduced cost.
- ☑ FUNDING / PERIOD: $100-200k / 12-24 months

TRB AFF20, Steel Bridges
Top 2019 Statement (cont'd):

Simplified AASHTO LRFD Bridge Design for Routine Steel I-Girder Bridges

- ☑ STRATEGIC PLAN OBJECTIVES : The results of this research can be used to "Provide Value to Members" "Extend Bridge Service Life" and "Provide Innovative Technical and Professional Services," "Enhance AASHTO Specifications for Improved Structural Performance," and "Enhance and Optimize Structural Systems".

TRB AFF30, Concrete Bridges – Top 2019 Statement

Filling ABC Knowledge Gaps – Precast full-depth Deck Panels and Precast Substructure Elements

- ☑ GOAL: Fill the knowledge gaps identified in NCHRP 12-102 regarding full-depth deck panels and precast substructure elements.
- ☑ NEEDED: Clear design provisions which will lead to better adoption of precast deck and substructure technologies.
- ☑ PRODUCT: A report leading to design specifications that will be added to the 2018 AASHTO LRFD ABC Guide Specifications.

TRB AFF30, Concrete Bridges Top 2019 Statement (cont'd):

Filling ABC Knowledge Gaps – Precast full-depth Deck Panels and Precast Substructure Elements

- ☑ TIMELINESS: Given the long term plans to invest billions of dollars into the U.S. transportation infrastructure, means of streamlining design time and construction cost will greatly extend the impact of project funding.
- ☑ FUNDING / PERIOD: $300k / 24-36 months
- ☑ STRATEGIC PLAN OBJECTIVES: The results of this research will "Provide Value to Members", "Optimize Structural Systems," "Provide Innovative Technical and Professional Services," and "Enhance AASHTO specifications for Improved Structural Performance."

TRB AFF40, Field Testing and NDE of Transportation Structures
Top 2019 Statement

Refined Modeling, Nondestructive Evaluation, Load Testing, Long-term Monitoring for Structural Assessment

- ☑ GOAL: Improve guidance for deploying recommendations for selecting structural assessment techniques that include refined modeling, nondestructive evaluation, load testing, and monitoring.
- ☑ NEEDED: Improvements to Chapter 8 of the AASHTO MBE and a decision logic to incorporate those improvement into AASHTO Bridge Management Systems such as AASHTO BrM.

TRB AFF40, Field Testing and NDE of Transportation Structures
Top 2019 Statement (cont'd)

Refined Modeling, Nondestructive Evaluation, Load Testing, Long-term Monitoring for Structural Assessment

- ☑ PRODUCT: A report containing guidance to help owners select and deploy the suite of available structural assessment approaches in a more cost-effective and efficient manner.
- ☑ TIMELINESS: Over the last several decades the traditional techniques addressed by current guidance (i.e. diagnostic and proof load testing) have been supplemented by a number of other techniques that offer different trade-offs between accuracy/completeness and cost.

TRB AFF40, Field Testing and NDE of Transportation Structures
Top 2019 Statement (cont'd)

Refined Modeling, Nondestructive Evaluation, Load Testing, Long-term Monitoring for Structural Assessment

- ☑ FUNDING / PERIOD: $500k / 36 months
- ☑ SRATEGIC PLAN OBJECTIVES: The results of this research can be used to "Provide Value to Members", "Provide Innovative Technical and Professional Services" and "Improve Assessment of Bridge Condition."

TRB AFF50, Seismic Design of Bridges
Top 2019 Statement

Estimating Inelastic Displacement Demands for Bridges Under Seismic Forces

- ☑ GOAL: The objective is to develop robust procedures for calculation of inelastic displacement demands in bridges while also providing guidance on how to best model damping in non-linear response history analysis.
- ☑ NEEDED: Design of common bridges using the AASHTO LRFD and Guide Specification methodologies rely on elastic analysis from which inelastic demands are estimated. Inaccurate estimates of demand can result in substantial service interruption and potential bridge collapse if the actual inelastic response is significantly larger than the estimated design response.

TRB AFF50, Seismic Design of Bridges
Top 2019 Statement

Estimating Inelastic Displacement Demands for Bridges Under Seismic Forces

- ☑ PRODUCT: The research conducted as part of this effort will augment the NCHRP 12-106 document on PBSD, by providing essential guidance on the evaluation of bridge inelastic displacement demands, which in turn will result in updates to the guide specifications for seismic bridge design.

TRB AFF50, Seismic Design of Bridges Top 2019 Statement (cont'd)

Estimating Inelastic Displacement Demands for Bridges Under Seismic Forces

- ☑ TIMELINESS: Based upon observations developed during the conduct of NCHRP 12-106, current methods for evaluating displacement demands may be substantially non-conservative, leading to bridges that may sustain much higher displacements (and hence damage) than expected during the design phase.
- ☑ FUNDING / PERIOD: $400,000 / 36 months
- ☑ STRATEGIC PLAN OBJECTIVES: Enhance the AASHTO Specifications, Provide Value to Members, Provide Innovative Technical and Professional Services, Extend Bridge Service Life, Contribute to National Policy

AASHTO/TRB Structures Collaboration Meeting @ TRB Annual Meeting January 14, 2020 1:30 p.m.

Thank You

Questions?