Survey Results & Analysis for

BR-08-02 SURVEY:

Highways Subcommittee on Bridges and Structures (SCOBS)
2008 STATE BRIDGE ENGINEERS’ QUESTIONNAIRE (40 Responses)
1) Does your state allow the use of the LRFD Empirical Deck Design (Section 9.7.2) for the design of concrete deck slabs supported by longitudinal components?

   28  Yes
   12  No
2) For specialized bridges/long span bridges/signature bridges, how does your state review these designs and contract plans?

11 Minimal Review by In-house Staff
13 Detailed Review by In-house Staff
 9 Rely on Independent Peer Review
 6 Other, Describe: **Both a minimal and independent review, both a detailed in-house and an independent peer review, working closely with the design consultant during the projects to establish design criteria with frequent meetings throughout the project to resolve issues, also include a constructability review.**
3) Does your state have procedures in place for the review of construction loads including loads from stockpiled materials and construction equipment?

23 Yes
17 No

If “Yes”, describe those procedures: Specifications, plans notes and Construction Manual outline stockpiling of materials and the use of heavy equipment, Contractor is instructed to follow truck size and weight statutes, Means and methods memos sent to all Contractors and Resident Engineers, Contractors must submit detailed demolition and erections plans with calculations signed and sealed by a Professional Engineer or Structural Engineer.
4) In regard to the status of scour evaluations and Plans of Action (POA) for scour critical bridges:

% of state bridges over waterways with scour evaluations completed
% of local agency bridges over waterways with scour evaluations completed

6.2) Percentage of local agency bridges over waterways with scour evaluations completed

Mean = 73.29
Min = 0.00, Max = 100.00
Median = 97.00
% of state scour critical bridges with POA completed
% of local agency scour critical bridges with POA completed

6.4) Percentage of local agency scour critical bridges with POA completed

Mean = 33.91
Min = 0.00, Max = 100.00
Median = 0.00

0.00 thru 9.99: 20
10.00 thru 19.99: 0
20.00 thru 29.99: 3
30.00 thru 39.99: 0
40.00 thru 49.99: 0
50.00 thru 59.99: 1
60.00 thru 69.99: 0
70.00 thru 79.99: 0
80.00 thru 89.99: 2
90.00 thru 99.99: 1
100.00 thru 109.99: 8
% of state scour critical bridges with POA implemented

Mean = 52.64
Min = 0.00, Max = 100.00
Median = 80.00
% of local agency scour critical bridges with POA implemented

6.6) Percentage of local agency scour critical bridges with POA implemented

Mean = 28.44
Min = 0.00, Max = 100.00
Median = 0.00
5) Is your state requiring that all new bridges designed for local agencies (regardless if federal funds are involved) utilize the LRFD Specifications?

27 Yes
11 No
2 Undecided

If “No”, please list a future date for implementation if one has been established.

No specific date for implementation were given. Many states indicated that they have little control over local bridge projects that are locally funded.
6) Does your state design columns and piers that support a continuous superstructure for TU loads induced by expansion and contraction of the superstructure due to temperature changes?

- **34** Yes
- **5** No

If “Yes”, what temperature range does your state use?

- **14** Equation 3.12.2.3-1 and Table 3.12.2.1-1 using Procedure A
- **5** Equation 3.12.2.3-1 and Figures 3.12.2.2-1, 2, or 3 using Procedure B
- **13** Other, Please describe: **20 – 30 degrees for concrete superstructures and 0 – 120 degrees for steel superstructures, Tmin = -30 and T max = 120**, many states use Equation 3.12.2.3-1 with modifications to the temperature ranges for steel and concrete, a range of – 30 to +130 degrees with an installation temperature of 50 degrees, use historic site specific temperature ranges.

In determining these TU load effects, what pier section properties are used?

- **27** Gross Moment of Inertia with 0.5 load factor
- **2** Cracked Section with 1.0 load factor
- **3** Effective Section with 1.0 load factor (I_{eff} considering material nonlinearity)
7) Does your state design framed piers for in-plane temperature (TU) and shrinkage (SH) effects?
25  Yes
13  No

If “Yes”, what temperature range does your state use?
12  Equation 3.12.2.3-1 and Table 3.12.2.1-1 using Procedure A
  Equation 3.12.2.3-1 and Figures 3.12.2.2-1, 2, or 3 using Procedure B
10  Other, Please describe: **20 – 30 degrees for concrete superstructures and 0 – 120 degrees for steel superstructures, Tmin = -30 and T max = 120, many states use Equation 3.12.2.3-1 with modifications to the temperature ranges for steel and concrete, a range of – 30 to +130 degrees with an installation temperature of 50 degrees, use historic site specific temperature ranges.**

What shrinkage strain does your state use?
**Most states use 0.0002.**

In determining these TU and SH load effects, what pier section properties are used?
22  Gross Moment of Inertia with 0.5 load factor
  1  Cracked Section with 1.0 load factor
  2  Effective Section with 1.0 load factor (I_{eff} considering material nonlinearity)
8) Does your state apply AASHTO LRFD Article 5.8.3.5 (tension caused by shear) to the flexural reinforcement design of pier caps?

27  Yes
13  No
9) In the LRFD specifications, tension field action for shear capacity is allowed near supports for hybrid steel girder design. How does your state rate these hybrid steel girders that are designed using that provision?

Most states responded that they have not used hybrid steel girders designed in LRFD and have not rated these types of bridges with LRFR.

If LRFR is used for that Rating, what software does your state use? Virtis, BRASS, LEAP, Smart Bridge and a few states have developed in-house software.
10) Has your state experienced any brittle failures of steel bridge railing from handling problems or from the results of vehicle impacts?
   - 4 Yes
   - 35 No

Does your state have any toughness testing requirements for these steel railing members?
   - 11 Yes
   - 27 No

If “yes”, what are those toughness requirements?
ASTM E436 requirements or AASHTO T 216 Charpy V-Notch Impact Testing
11) In light of the recent restriction on the use of fast-setting adhesive anchors under sustained tension loads, does your state apply this restriction to bridge mounted sign trusses?

34  Yes

6  No

What acceptance criteria and design codes does your state use for adhesive anchors?

Manufactures submitted pull-out tests requiring 125% of yield, ASTM A58, ASTM E488, ASTM C881, AASHTO M325.
12) Does your state have a TL-3 crash tested steel railing that attaches directly to the top of the deck without a curb?
   4  Yes
   36 No

Does your state have a TL-5 crash tested barrier?
   12 Yes
   28 No
13) Does your state own any railroad bridges?

18 Yes
21 No

If “Yes”, do you perform the inspection of those railroad bridges and inventory them in your structure information system?

14 Yes
9 No
14) What percentage of your state owned bridges have been rated using LRFR?

21  None
19  Less than 10%
0   10% to 25%
0   25% to 50%
0   50% to 75%
0   More than 75%

Of those bridges rated using LRFR, approximately what percentage are new bridges?
Of those bridges rated using LRFR, approximately what percentage are new bridges?
What percentage were existing bridges that were re-rated using LRFR?

Mean = 10.97
Min = 0.00, Max = 100.00
Median = 0.00

87.5 %

0.0 %
0.0 %
0.0 %
3.1 %
0.0 %
0.0 %
3.1 %
6.3 %

0.00 thru 9.99 28
10.00 thru 19.99 0
20.00 thru 29.99 0
30.00 thru 39.99 0
40.00 thru 49.99 0
50.00 thru 59.99 1
60.00 thru 69.99 0
70.00 thru 79.99 0
80.00 thru 89.99 0
90.00 thru 99.99 1
100.00 thru 109.99 2
15) What percentage of your local agency owned bridges have been rated using LRFR?

31 None
7 Less than 10%
0 10% to 25%
0 25% to 50%
0 50% to 75%
0 More than 75%
Of those bridges rated using LRFR, approximately what percentage are new bridges?

Mean = 30.45
Min = 0.00, Max = 100.00
Median = 0.00
What percentage were existing bridges that were re-rated using LRFR?

Mean = 3.77
Min = 0.00, Max = 100.00
Median = 0.00
16) Truss floor systems often govern a load rating based on truck loading. Has your state ever had cases where lane loading on the truss or other long span bridges causes the need for a load restriction?

   6   Yes
   33  No

If “Yes”, what type of load restriction has your state implemented?

Many states post for truck loading only. When bridges are posted many states fear that enforcement of the posting is not being done properly.

Has your state closed bridges in this situation instead of using a load restriction?

   2   Yes
   36  No
17) For existing truss bridges in your state, does your state intend to perform new load ratings, including the analysis of gusset plates, as recommended by FHWA Technical Advisory 5140.29, for future permit/posting decisions and to account for alterations that result in significant changes in stress levels?

39 Yes
0 No

If “Yes”, how long do you anticipate it will be before your state is able to perform this new load rating on all of your state owned truss bridges?

2 0 to 6 months
13 6 months to 1 year
13 1 year to 2 years
10 longer than 2 years

What is the estimated cost of this effort? Many states responded that this estimated cost is unknown at this time, with some states estimating costs in the millions of dollars (up to $20 million).

How long do you anticipate it will be before local agencies are able to perform this new load rating on all of their truss bridges?

1 0 to 6 months
3 6 months to 1 year
4 1 year to 2 years
24 longer than 2 years

What is the estimated cost of this effort? Many states responded that this estimated cost is unknown at this time, with some states estimating costs up to $1 million.
18) Past bridge failures have led to new practices in inspection and ratings such as the Scour Evaluation Program and the Fracture Critical Inspection Program with well defined implementation plans. Should FHWA and AASHTO collectively provide guidance to the states to establish reasonable criteria for the evaluation and rating of existing truss gusset plates in hopes of having states develop a “Plan of Action” for completing this enormous task?

30 Yes
9 No

Comments: “Guidance” is welcomed but “mandates” are not. Guidance should include: initial screening to prioritize needs, examples of analysis including corrosion, and a timeline to screen, inspect, analyze, and evaluate.
19) Has your state experienced any unexpected failures or have concerns with the evaluation and rating of voided precast prestressed concrete deck beams?

7  Yes
33  No
20) In light of potential concerns from loads or environment with prestressed or post-tensioned concrete bridges, should FHWA and AASHTO develop guidance for criteria to evaluate and rate these types of bridges?

23 Yes
15 No

Comments: Once again provide guidance and not mandates. Need to provide live load distribution methods and dead load distribution for concrete barriers. Guidance on screening, inspection, and analysis based on inspection findings would be beneficial.
21) For bridge plans that are designed and signed/sealed by a consultant, does your state also sign/seal those plans?

10 Yes, explain: Many states also just sign (not seal) the consultant plans after review.

30 No
22) For bridge replacement projects basically on the same alignment, does your state utilize a programmatic agreement for environmental clearances?

14  Yes
25  No
23) What tools/methods does your state use to identify and prioritize bridge rehabilitation and replacement projects?

17 Pontis
0 BRIDGIT

22 Other, describe: **Many states use the inspection data from Pontis and NBIS and apply that data to their own internal procedures in programming bridge projects.**
After the meeting in Omaha, the entire survey results will be available with graphic charts on the AASSHTO Subcommittee on Bridges and Structures website:

http://bridges.transportation.org/?siteid=34

Thanks to all of those who supplied questions and to all of those who responded.

A special thanks to AASHTO and Marty Vitale for gathering the data.