AASHTO COMMITTEE ON BRIDGES AND STRUCTURES
ANNUAL STATE BRIDGE ENGINEERS SURVEY (2019)

DESIGN AND DETAILS SURVEY

QUESTION NO.		QUESTION
TOTAL	Design	

Notes:

For questions indicating "check all that apply", percentages posted are relative to the sample size of respondents answering that particular question.

Questions appearing inside of branched groups of questions will have smaller sample sizes than the overall survey.

Sum of percentages for questions which indicate "check all that apply" may not total 100%.

3. D3. Does your Agency allow thermal cutting, use of plasma, laser, or oxygen-acetylene methods for the creation of bolt holes in steel members?
   - 4 (9%) N/A
   - 7 (15%) Yes
   - 35 (76%) No

4. D4. For High Mast Light Tower (HMLT) structures designed to current Specifications, has your Agency found cracking around the hand holes (access holes) at short service life?
   - 3 (7%) N/A
   - 5 (11%) Yes
   - 25 (56%) No
   - 12 (27%) Unknown
   - 1 No response

5. D5. Which corrosion resistant reinforcing does your Agency use (or has your Agency considered for use)? (check all that apply)
   - 28 (61%) Stainless steel
   - 15 (33%) Glass fiber reinforced polymer (GFRP)
   - 7 (15%) Carbon fiber reinforced polymer (CFRP)
   - 20 (44%) ASTM A1035/A1035M Low carbon chromium steel
   - 16 (35%) Other
     - Epoxy-coated **(nine states)**
     - Galvanized (A1094) **(four states)**
     - Titanium alloy
     - Zinc and epoxy dual-coated
     - A1035 low carbon chromium as a research project

6. D6. Which corrosion resistant prestressing strands does your Agency use (or has your Agency considered for use)? (check all that apply)

33 (73%) None
8 (18%) Stainless steel
6 (13%) Carbon fiber reinforced polymer (CFRP)
3 (7%) Other
- Epoxy-coated **(three states)**

1 No response

7. D7. Does your Agency permit the use of Glass Fiber Reinforced Polymer (GFRP) reinforcement in the following applications? (check all that apply)

26 (61%) None
6 (13%) Main reinforcement
5 (11%) Distribution reinforcement
5 (11%) Temperature and shrinkage reinforcement
6 (13%) Concrete barriers
11 24%) Decks on beam-slab bridges
3 (7%) Precast concrete members
3 (7%) Prestressed concrete members
3 (7%) Concrete slab type superstructures
2 (4%) Abutments
4 (9%) Piers
2 (4%) Foundations
7 (15%) Other
- Retaining walls, sidewalks
- Fender systems
- Research projects only
- Top mat deck reinforcing for P/S concrete I-girder bridges
- Abutments/wingwalls as research projects
- Repairs that do not require additional strength
- Deck replacement as research project

8. D8. Has your Agency used internal curing for bridge deck concrete?

14 (30%) **YES**
32 (70%) **NO**

IF ANSWERED NO TO PREVIOUS QUESTION, SKIP TO D13.

IF ANSWERED YES TO PREVIOUS QUESTION, CONTINUE.

9. D9. To what degree has cracking been reduced through the use of internal curing for bridge deck concrete?

0 (0%) N/A
2 (15%) Slightly
3 (23%) Moderately
4 (31%) Significantly
4 (31%) Other
- No formal follow-up testing
- Fewer shrinkage cracks after construction
  - Decks less than 1 year old, long-term cracking performance not yet observed
- IC delayed cracking but did not reduce cracking
- Placements too recent to evaluate

1 No response

10. D10. What type of aggregate does your Agency use for bridge deck concrete that will be internally cured?

0 (0%) N/A
4 (29%) Lightweight sand
9 (64%) Lightweight aggregate
0 (0%) Normal weight sand
1 (7%) Normal weight aggregate
0 (0%) Other

11. D11. What types of admixtures does your Agency use for bridge deck concrete that will be internally cured? (check all that apply)

0 (0%) N/A
12 (92%) Air entraining
10 (77%) Water reducer
6 (46%) High Range Water Reducer
9 (69%) Retarders
1 (8%) Accelerators
3 (23%) Other
- Shrinkage-reducing admixtures **(two states)**
- Agency can supply specification used upon request
- 1 No response

12. D12. Has your Agency conducted any research on the use of internal curing to reduce deck cracking? Please provide link to research and Point of Contact.

- Dave Darwin, daved@ku.edu (Kansas)
- https://docs.lib.purdue.edu/jtrp/1574/ (Indiana)
- https://www.oregon.gov/ODOT/Programs/ResearchDocuments/ODOT%20SPR%20711_InternalCuring.pdf (Oregon)
- https://www.oregon.gov/ODOT/Programs/ResearchDocuments/SPR728_ShrinkageLimits-Final.pdf (Oregon)
- Dr. Jason Ideker (Oregon State University)
- https://www.academia.edu/36428448/Report_on_Internal_Curing_Concrete_Experimental_Specification_ (New York)
- Duane Carpenter, duane.carpenter@dot.ny.gov (New York)
- https://apps.ict.illinois.edu/projects/getfile.asp?id=4980 (Illinois)
- James Krstulovich (University of Illinois)
- https://www.udot.utah.gov/main/uconowner.gf?n=21175803886277777 (Utah)
- Spencer Guthrie, guthrie@byu.edu (Brigham Young University)
- https://pooledfund.org/browse/ Projects TPF-5(392) and TPF-5(336) (Minnesota)
- Paul Rowekamp, paul.rowekamp@state.mn.us (Minnesota)
- http://www.dot.state.oh.us/Divisions/Planning/SPR/Research/reportsandplans/Lists/Final%20Reports%20All/Item/displayifs.aspx?List=47f3581d%2Df21c%2D403b%2D9358%2Dfea0b008772b&ID=553&Web=3bc523de%2Dc756%2D4eeb%2D9b6c%2Df24c0435d45e (Ohio)
- http://www.dot.state.oh.us/Divisions/Planning/SPR/Research/reportsandplans/Reports/2007/Materials/134227-FR.pdf (Ohio)
- Daniel Miller, (Ohio)

END BRANCH

13. D13. Does your Agency utilize bridges with post-tensioning (PT)?

38 (83%) **YES**
8 (17%) **NO**

IF ANSWERED NO TO PREVIOUS QUESTION, SKIP TO D16.
IF ANSWERED YES TO PREVIOUS QUESTION, CONTINUE.

14. D14. How frequently does your Agency use post-tensioning solutions for bridges?

1 (3%) Often
3 (8%) Frequently
12 (32%) Sometimes
22 (58%) Rarely
0 (0%) Never
0 (0%) Other

15. D15. What filler does your Agency use (or is considering for use) in PT tendons? (check all that apply)

2 (4%) No filler
34 (90%) Pre-bagged grouts
3 (11%) Non-bagged grouts
8 (21%) Flexible fillers (wax, grease, etc.)
1 (3%) Other
- ASTM C1107 grout

END BRANCH

16. D16. How does your Agency determine when strut and tie modeling is required for strength and extreme limit states?

16 (36%) By the definition of D-Regions provided in AASHTO LRFD 8th Edition, Article 5.5.1.2 (including the ends of beams).
6 (13%) Only specific elements described by the Agency (hammerheads, pier caps, etc.) require strut and tie models.
1 (2%) Only specific elements described by the Agency (simple beams, standard bent caps, deck slabs, etc.) DO NOT require strut and tie models.
21 (47%) Strut and tie modeling is allowed for specific elements, but is not required.
1 (2%) Other
- Have not implemented strut & tie modeling

1 No response

17. D17. What method does your Agency use to determine forces in deck overhangs with MASH compliant barrier integrally attached?

27 (60%) Yield line analysis described in AASHTO LRFD Section A13.3.1
1 (2%) Finite Element Model
8 (18%) Results from crash testing of MASH barrier
9 (20%) Other
- Design manual requires higher strength at deck overhang.
- Use design impact loads from NCHRP Project 22-20(02) and NCHRP 20-07(395). Design per LRFD Section 13 is overly conservative; for taller rails the required reinforcing will not fit in an 8" deck.
- All of the above
- Yield line AND results from MASH testing
- Yield line AND FEM
- Deck required to match or exceed minimum AASHTO barrier strength
- Agency specified OR yield line
- Combination of options listed. Waiting for clarification on this issue from AASHTO.
- MASH not yet adopted

1 No response

18. D18. What aspects of your Agency's bridge design process do you anticipate the recently released Technical Brief entitled "Hydraulic Considerations for Shallow Abutment Foundations" will change? (check all that apply)

31 (69%) None
2 (4%) Scour Design Flood and/or Scour Design Check Flood Frequencies
4 (9%) Abutment foundations
12 (27%) Scour countermeasures
2 (4%) Bridge lengths
5 (11%) Other
- NMDOT does not allow shallow foundations in channels
- Changes to riprap apron dimensions. Working on determination whether changes are intended to be applied to all structures.
- Abutment scour computations
- Hydraulic office practice
- Still evaluating use. Do not typically use shallow abutment foundations.

1 No response

19. D19. For bridge bearings with anchor bolts embedded in concrete, what anchor bolt installation methods does your Agency permit? (check all that apply)

42 (91%) Anchor bolts preset and cast directly in concrete
29 (63%) Anchor bolts set in drilled holes in the concrete and grouted
30 (65%) Anchor bolts set in anchor bolt wells and grouted.
2 (4%) Other
- Use epoxy in drilled holes rather than grout
- Drilled holes for bearing replacements and field adjustments only.

20. D20. Does your Agency permit the use of restraint mechanisms to resist longitudinal movement at non-integral bridge abutments? (i.e., tiebacks, deadman anchors, geosynthetic soil reinforcing strips, metallic soil reinforcing strips, etc.)

19 (41%) **YES**
27 (59%) **NO**

IF ANSWERED NO TO PREVIOUS QUESTION, SKIP TO D27.

IF ANSWERED YES TO PREVIOUS QUESTION, CONTINUE.

21. D21. What types of restraint mechanisms does your Agency permit for use at non-integral bridge abutments? (check all that apply)

7 (37%) Tiebacks with cables
10 (53%) Tiebacks with rods
9 (47%) Deadman anchors
12 (63%) Geosynthetic Soil Reinforcing Strips (i.e., MSE straps)
13 (68%) Metallic Soil Reinforcing Strips (i.e., MSE straps)
0 (0%) Other

22. D22. When the restraint mechanism consists of tiebacks with cables or rods, are the tiebacks pre-tensioned?
    - 9 (47%) N/A
    - 6 (32%) Yes
    - 4 (21%) No

23. D23. When the restraint mechanism consists of tiebacks with cables or rods, does your Agency require all the tiebacks to be of approximately equal length to maintain equal tension?
    - 10 (53%) N/A
    - 5 (26%) Yes
    - 4 (21%) No

24. D24. If deadman anchors are permitted by your Agency for use at non-integral abutments, what types of anchors are permitted for use? (check all that apply)
    - 10 (53%) N/A
    - 4 (21%) Drilled shafts
    - 5 (26%) Cap beams with piles
    - 4 (21%) Sheet piles
    - 7 (37%) Dead weight of concrete block
    - 1 (5%) Other
        - Sheet piles in temporary applications only

25. D25. Approximately how far back from the abutment does your Agency require the anchors to be placed?
    - 0 (0%) 15 feet
    - 2 (10%) 20 feet
    - 1 (6%) 25 feet or more
    - 2 (10%) Depends upon the abutment height
    - 8 (42%) Behind assumed soil failure plane
    - 6 (32%) Other
        - Depends on abutment height AND behind assumed failure plane **(two states)**
        - N/A, anchors not used **(three states)**

26. D26. Has your Agency researched the effectiveness of various types of restraint mechanisms? (If yes, provide a link and a Point of Contact in the comments below).
    - 0 (0%) Yes
    - 19 (100%) No

    Comments
    - MDOT prohibits the use of MSE soil reinforcements for lateral restraint of abutments. MDOT silent on use of other measures / other measures rarely used.

END BRANCH

27. D27. Is your Agency having any issue providing the required number of shear connectors (between maximum moment and inflection point) for continuous steel structures with short end spans?

8 (19%) N/A
6 (14%) Yes
29 (67%) No
3 No response

28. D28. LRFD 6.7.5.1 requires designers to investigate lateral bracing for the transfer of lateral wind and seismic loads and for the control of elastic deformations during fabrication, erection, and deck placement.

With regard to controlling deformations, for which specific criteria does your Agency require the use of lateral bracing? (check all that apply)

4 (9%) None
35 (80%) By analysis
5 (11%) Span length $\geq$ 200 feet
1 (2%) Temporary cantilever $\geq$ 75 feet
4 (9%) Horizontally curved structures with sharp curves where temporary support is not feasible.
7 (16%) Other
- Span length > 180 feet
- Horizontally curved girders and shallow fascia girders
- All bridges require a lateral bracing system prior to deck placement
- Prefer to use only when necessary. Preference is to increase flange thickness.
- Tie down required for all girder erection except box girders.
- Case by case basis. By analysis for longer bridges.
- By analysis, but try to avoid lateral bracing if possible

2 No response

29. D29. For each type of joint used by your Agency between the approach slab and rigid pavement, rate its effectiveness from 1(Poor) to 5(Highly Effective).

97 (40%) Poured joint sealer, average response = 2.4
64 (26%) Mechanical joint, average response = 1.6
59 (24%) Foam, average response = 1.4
22 (9%) Other, average response = 0.5
5 No response

30. D30. If your Agency allows concrete filled steel tubes to be used for bridge columns and shafts, what are the limitations on the capacity of the steel tube in these applications? (check all that apply)

19 (43%) N/A
10 (23%) Steel tubes **MAY** replace reinforcement
14 (32%) Steel tubes **MAY NOT** replace reinforcement
8 (18%) **MAY** be used in corrosive environment where thickness is increased due to rate of corrosion appropriate for site
1 (2%) **MAY NOT** be used in corrosive environment
5 (11%) Other

- Not presently allowed
- Steel tubes also protected with concrete encasement in corrosive environments
- For concrete-filled driven steel piles used as columns, capacity contribution of concrete ignored.
- Case-by-case basis with multiple factors considered with approval by Engineer of Design
- Use conventional reinforcing within tube and galvanize upper portions or exposed section.

2 No response

CONTINUE

INVENTORY MANAGEMENT SURVEY

QUESTION NO.		QUESTION
TOTAL	INV MGMT	

Notes:

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31. IM3. Regarding the issue of resiliency for climate change adaptation, is your Agency updating policies or practices related to any of the following? (check all that apply)

27 (63%) N/A
9 (21%) Hydrology and Hydraulic models related to design storm frequency
7 (16%) Bridge opening and freeboard to handle design storm
2 (5%) Depth below stream to set footing
2 (5%) Wrapping abutment backfill with geosynthetics to encapsulate (both conventional and integral abutments)
4 (9%) Scour computation/mitigation measures
2 (5%) Riprap design and construction
2 (5%) Pipe sizing and design
6 (14%) Other
- Current policy / practices not ready to address resiliency for climate change adaptation
- Working on updating precipitation statistics to account for climate change
- Working to formalize policy in regard to sea level rise
- VTrans actively pursuing research and monitoring latest science. Will begin to update policy and practice when strong evidence is presented.
- Not updating policy but investigating this issue.
- Conducting precipitation forecasting research and implementation of FHWA HEC-17 guidance

1 No response

32. IM4. Regarding barge impact hits to bridges, which entity is responsible for initiating the closure of a bridge in your state?

1 (2%) United States Coast Guard (USCG)
4 (10%) Local police or Emergency Medical Services (EMS)
26 (62%) Bridge Owner
11 (26%) Other

- All of the above can close structure **(four states)**
- No uniform policy
- No barge traffic **(three states)**
- Can be bridge owner, local police, EMS
- USCG notifies owner, owner evaluates impact and initiates closure when necessary by contacting Department of Public Safety
- Any authorized authority including all of the above

3 No response

33. IM5. Does your Agency have a policy to install protective fence to mitigate suicide attempts?

1 (2%) Yes
43 (98%) No

34. IM6. Does your Agency have a policy to install signage regarding a suicide prevention hotline number?

2 (54%) Yes
42 (95%) No

35. IM7. The AASHTO Manual for Bridge Element Inspection provides bridge owners with comprehensive guidance for element level condition assessment. On which of the following would you like to see more emphasis placed? (check all that apply)

30 (70%) More pictures illustrating the condition states for the elements
11 (26%) More elements, for example, a specific element for longitudinal precast slab/beam type superstructures
20 (47%) More clarifying commentary in regards to element definitions (e.g., steel pile, cased drilled shafts, etc.)
14 (33%) More examples for the Appendix B: Inspection examples
5 (12%) None
12 (28%) Other

- Use of element conditions for predictive modeling
- Use of one element for beam ends and another for expansion joint effectiveness
- New version has many of these updates
- NBE for backwall, wingwall (guidance not to include monolithic wingwalls in the abutment NBE) and pedestals.
- Higher resolution and color photographs
- Separate abutment backwall from abutment NBE
- Re-introduce longitudinal prestressed slab NBE
- Return to past organization
- Guidance on how to handle element conditions when elements are repaired.
- Second edition 2019 currently under review
- Combination material abutments (e.g. timber backwall with steel piles, reinforced concrete cap beams).

1 No response

36. IM8. Automated, online, over legal weight permitting is becoming more common with many Agencies. On which of the following would it be more appropriate for the T-18 Committee to focus?

8 (19%) N/A
18 (42%) More global process (e.g., common routing software, common on-line procedures, etc.)
9 (21%) More design vehicles or "notional permit load" vehicles for design or load rating that could be applied nationwide.
8 (19%) Other
- 2nd and 3rd are both important
- AASHTO Special Committee on Freight should take the lead. This will affect bridges, pavements, fee collection, and enforcement. T-18 can support change from a bridge perspective.
- AASHTO should leave this to individual states
- Anything to discourage legislation allowing greater vehicle weights
- Live load application to bridge models during permit review
- Uniform weight laws among states
- Develop industry standard format for defining vehicle characteristics and permit application data to be accepted in online routing software

1 No response

37. IM9. Vehicles of Animal Husbandry can be much larger or have more concentrated loads than the HL-93 design load. On which of the following would you like to see an emphasis placed?

25 (57%) No emphasis from AASHTO; let individual states address the issue.
6 (14%) A family of new vehicle configurations to be shown in the AASHTO Manual for Bridge Evaluation for potential evaluation.
11 (25%) Commentary or specifications to be developed for unusual axle spacing, tire size, or vehicle width for load distribution for load rating.
2 (4%) Other
- Commentary or specifications for unusual axle spacing, tire size, or vehicle width for load distribution for load rating. Vehicles of animal husbandry generally fit within the limits of normal commercial trucks, however, agricultural vehicles (tractors and implements) are much more variable and routinely exceed the limits of normal truck type load distribution and load effects. It would be beneficial to address these unique vehicles (tractors and implements) in the specifications.
- Add language to commentary, but allow individual states to address issue

38. IM10. If your state uses polymeric (thin) deck overlays, how long are they expected to last?

11 (25%) N/A
0 (0%) 5 years
13 (30%) 10 years
15 (34%) 15 years
1 (2%) 20 years
1 (2%) 25 years or more
3 (7%) Other
- 12-15 years
- 12 years
- Expected to last 15 years, but no data to support expectation

39. IM11. At what deck age or condition rating does your Agency consider decks to be candidates to receive a polymeric (thin) overlay? (check all that apply)

12 (30%) N/A
7 (18%) Immediately after construction
6 (14%) Deck age = 1 – 2 years
6 (14%) Deck age = 3 - 5 years
5 (11%) Deck age = 6 - 10 years
5 (11%) Deck age = 11 - 15 years
5 (11%) Deck age = 16 - 20 years
1 (2%) Maximum of 30 years
4 (9%) Cycle of every 10 years
2 (5%) Cycle of every 15 years
1 (2%) Cycle of every 20 years
5 (11%) National Bridge Inspection Standards (NBIS) deck condition rating of 5
11 (25%) NBIS deck condition rating of 6
7 (16%) NBIS deck condition rating of 7
20 (45%) Other
- Case-by-case basis **(fifteen states)**, and…
  - Typically NBIS condition rating 5-7
  - Address cracking
  - Program funding by age and deterioration
  - Generally combination of age and condition
  - Based upon field inspection measurements
- No longer used for rehab / preservation because of mixed results
- Cycle of every 10 years for post-tensioned decks and cable-stayed bridges

40. **IM12.** **Does your Agency have two girder/truss, floor beam, and continuous non-composite stringer framing system bridges as shown below?**

40 (91%) **YES**
4 (9%) **NO**

IF ANSWERED NO TO PREVIOUS QUESTION, SKIP TO IM14.

IF ANSWERED YES TO PREVIOUS QUESTION, CONTINUE.

41. IM13. If your agency has found that ratings for these types of stringers are consistently low at continuous support locations due to lateral torsional buckling for LRFR rating, how does your Agency handle the rating?

0 (0%) Disregard the rating
3 (8%) Use other specifications (such as AISC, etc.)
6 (15%) Have special, customized rating method
31 (78%) Other

- Use rating method consistent with design philosophy (LFD-LFR, LRFD-LRFR) **(sixteen states)** and…
  - Not typically an issue under this paradigm
  - These are typically older structures and are not rated using LRFR (usually LFR)
  - Structures with these details are rated using LFD and utilize findings from research project -3-5-90/1-1239 "Bracing Effects of Bridge Decks" that accounts for lateral restraint of the top flange from the deck.
  - These are legacy bridges designed using LFD or ASD. We don't rate them LRFR. If we encounter an issue like this with LFD, we will use engineering judgment/experience to make a determination on whether to ignore a lower rating from possible bucking on continuous stringers over the floor beam. It is very uncommon to see this type of buckling on a continuous stringer in a floor system.
- Currently rate bridges in LFR
- No LRFR rating for bridges built before 2010
- Not rating these structures in LRFR
- Not encountering this issue / N/A **(seven states)**
- Accept the LRFR rating
- Rate with BrR or hand calculations
- Research project for this issue
- Use LFR methods and used AISC to calculate Cb due to its simplicity.
- Developing a new method to determine Cb factor for continuous non-composite stringers
- Do not post for the stringer. Weigh the effect of the reduced strength when making replacement and strengthening decisions.
- This has not been an issue, but if it was, we would consider stringers to be partially composite.

4 No response

END BRANCH

42. IM14. For which steel structures does your Agency require in-service bridge inspection to be within arm's reach?

- 9 (21%) All steel structures
- 22 (51%) Fracture critical structures only
- 7 (16%) Agency specific policy for inspection type and frequency of various steel structures
- 5 (11%) Other
  - Fracture critical, interim, or emergency inspection
  - All steel structures where reasonably possible
  - Currently inspect all steel structures at arm-length, but intend to develop agency specific policy for type and frequency.
  - See "Appendix C" of the NYSDOT Bridge Inspection Manual at: https://www.dot.ny.gov/divisions/engineering/structures/manuals/bridge-inspection
  - All fracture critical bridges and condition-basis for non-fracture critical steel bridges
- 1 No response

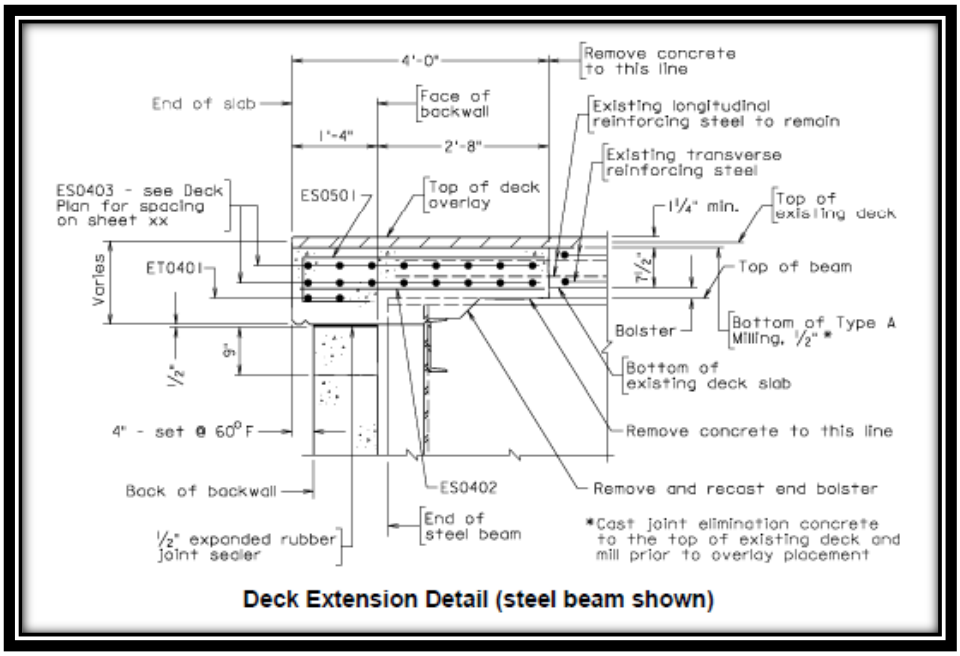
43. IM15. If your Agency eliminates joints on existing bridges through the use of ***full-depth flexible link slabs*** does your Agency have design retrofit guidance and standard drawings or details for the above?

- 25 (52%) N/A
- 6 (14%) Design Retrofit Guidance ONLY
- 0 (0%) Standard Drawings or Details ONLY
- 1 (2%) BOTH Design Retrofit Guidance and Standard Drawings or Details
- 12 (27%) No
- 2 (54%) Other
  - MDOT currently in the process of developing design retrofit guidance and drawings
  - Only used on two pilot projects

44. IM16. If your Agency eliminates joints on existing bridges through the use of ***partial-depth flexible link slabs*** does your Agency have design retrofit guidance and standard drawings or details for the above?

- 25 (57%) N/A
- 0 (0%) Design Retrofit Guidance ONLY
- 1 (2%) Standard Drawings or Details ONLY
- 0 (0%) BOTH Design Retrofit Guidance and Standard Drawings or Details
- 17 (39%) No
- 1 (2%) Other
  - <No additional information given>

45. IM17. If your Agency eliminates joints on existing bridges through ***conversion to deck extensions, or some other similar detail***, does your Agency have design retrofit guidance and standard drawings or details for the above?



Deck Extension Detail (steel beam shown)

13 (30%) N/A
6 (14%) Design Retrofit Guidance ONLY
6 (14%) Standard Drawings or Details ONLY
2 (5%) BOTH Design Retrofit Guidance and Standard Drawings or Details
11 (25%) No
6 (14%) Other

- MDOT revises existing bridges with joints at the abutments (independent backwalls) by providing an approach slab and sleeper slab that moves the expansion off of the bridge. The approach slab spans over the abutment backwall and is detailed in MDOT Bridge Design Guides 6.20.03 A-C on MDOT's website: https://mdotcf.state.mi.us/public/design/englishbridgeguides/
- Semi-integral conversion
- Draft guidance for joint elimination is under review
- Convert to integral. Memo will be issued soon.
- Case-by-case
- Project-specific details

46. IM18. If your Agency uses a multi-objective project scoring formula to select of bridges for rehabilitation or replacement, what are the factors considered? (check all that apply)

7 (16%) N/A
28 (64%) Importance / User impacts (ADT, ADTT, detour length, urban, rural, NHS, functional classification, etc.)
26 (59%) Functionality (weight restrictions, deck width, vertical or horizontal under-clearance, etc.)
24 (55%) Risk (scour, seismic, fatigue prone details, fracture critical, lack of redundancy, etc.)
33 (73%) Condition
14 (32%) Construction Cost
15 (34%) Cost effectiveness
10 (23%) Life Cycle Costs
7 (16%) Other

- Network conditions and performance measures
- Do not use a formula but consider all of the above when selecting and prioritizing bridges for replacement or rehab **(four states)**
- Use BrM-customized decision tree that takes many of these factors into account
- BrM predicted "do nothing" change in Health Index over a fixed period of 15 years
- We don't have a scoring system or formula

47. IM19. What analysis tools/systems is your Agency using to comply with the asset management plan requirements of 23 USC 119(e) and MAP-21?

0 (%) N/A
22 (50%) AASHTO BrM
11 (25%) Agency Developed tool/system
11 (25%) Other

- AASHTO BrM and Agency Developed tool/system **(two states)**
- Agency-developed and Deighton dTIMS
- Bentley Inspect Tech and Deighton dTIMS
- Deighton dTIMS **(three states)**
- Currently using NBIAS for the short term. Evaluations of other systems is underway.
- Bridge Care
- Agency-developed tools and AIMS
- Currently inport data from our inspection and inventory system into spread sheets. Plan on implementing AASHTO BrM in future.

RETURN TO START