Engineering Manual Preamble

This manual provides guidance to administrative, engineering, and technical staff. Engineering practice requires that professionals use a combination of technical skills and judgment in decision making. Engineering judgment is necessary to allow decisions to account for unique site-specific conditions and considerations to provide high quality products, within budget, and to protect the public health, safety, and welfare. This manual provides the general operational guidelines; however, it is understood that adaptation, adjustments, and deviations are sometimes necessary. Innovation is a key foundational element to advance the state of engineering practice and develop more effective and efficient engineering solutions and materials. As such, it is essential that our engineering manuals provide a vehicle to promote, pilot, or implement technologies or practices that provide efficiencies and quality products, while maintaining the safety, health, and welfare of the public. It is expected when making significant or impactful deviations from the technical information from these guidance materials, that reasonable consultations with experts, technical committees, and/or policy setting bodies occur prior to actions within the timeframes allowed. It is also expected that these consultations will eliminate any potential conflicts of interest, perceived or otherwise. MDOT Leadership is committed to a culture of innovation to optimize engineering solutions.

The National Society of Professional Engineers Code of Ethics for Engineering is founded on six fundamental canons. Those canons are provided below.

Engineers, in the fulfillment of their professional duties, shall:

1. Hold paramount the safety, health, and welfare of the public.
2. Perform Services only in areas of their competence.
3. Issue public statement only in an objective and truthful manner.
4. Act for each employer or client as faithful agents or trustees.
5. Avoid deceptive acts.
6. Conduct themselves honorably, reasonably, ethically and lawfully so as to enhance the honor, reputation, and usefulness of the profession.

NBI Inspection Questions

AVERAGING RATINGS:

Question:

Can I get a quick interpretation on BIR #2 Expansion Joints?

Scenario: Concrete surrounding joint is in overall good condition with minor cracks and wear. Joint material is loose, leaking and growing vegetation, etc. over a total length of joints 30%+/-.

MDOT – Bridge Safety Inspection NBI Rating Guidelines

7 – Minor deterioration of surrounding concrete… well describes concrete component of the joint.

4 – Leaking along more than 5% of the seal… well describes seal.

My assumption is that the joint should be rated a 4 due to leakage even though there is little deterioration of the surrounding concrete. Is this correct, or should the numbers be averaged?

Answer:

I would not average ratings. That has never been the intent of the guidelines. I agree with your assumption of using 4. In this case, first look at the element and its purpose. The purpose of the joint is to allow expansion and contraction and to prevent the salts and moisture from leaching through the deck to the superstructure. If the joint is leaking, I would probably code it according to a poor rating because it is not functioning as intended.

HLH FIELD:

Question:

We have been asked to provide a list of HLHs from the last two or three years here in the region. As it turns out we have not kept our own list. So, the question becomes how can we put one together?

The first thing I looked for was the HLH Y/N field in the Ad-Hoc reports system in MIBridgE. It appears that that field was left out for some reason.

Can you please confirm this for us. Also, if it is not there, could you consider that for the next MIBridgE release?

We have also noticed a number of other situations.

1. HLH damage is present and structural. HLH = Y.
2. HLH damage is limited to paint scrapes only. HLH = ? I have been marking No and removing previous Yes when based on paint alone.
3. HLH damage is totally absent yet HLH = Y. Should we change to No if no indication of previous HLH on record? (Previous BSIR, RFA, HLH Damage Rpt.)
4. HLH damage is previous recorded but totally repaired. What should HLH = ?

Reading previous BSIRs for a number of years has shown a lack of consistency and any guidance would be appreciated.

Answer:

I will try to shed some light on your questions.

1. Yes, make sure HLH is coded Y when there is damage.
2. I agree, if it is only paint scrapes then do not code HLH as Y.
3. If there is no HLH damage, then please code HLH as N.
4. We don't have a good solution for this case yet. However, your notes would indicate that a HLH has been repaired.

This is only an interim solution. We have used the HLH form in the past to record damage. We will be adding a "Damage" inspection report to document this more thoroughly in MiBRIDGE. This is part of the bridge file requirement in the AASHTO Manual for Bridge Evaluation. This report would document damage which is more than minor scrapes. This will be used to monitor future hits, and for law suits against those who damage our bridges.

This report would include a section for when repairs are required, and if they have been made. Obviously, this will need to be tied to automatically creating an RFA to track the actions and the repairs completed. These will be tied together to eliminate duplication of effort in the documentation process. We are working on the details and business process to make this as easy as possible to track and enter in MiBRIDGE.

BSIR#5 SIDEWALS or CURBS

Question:

This item is for the evaluation and rating of the surface of sidewalks and curbs on the supported spans only. Rate and code the condition in accordance with the following guidelines. ***The areas below the sidewalk are to be rated with the deck.*** The inspector must note in the comment field if the sidewalk is on only one side of the bridge. Brush blocks are to be rated as part of BSIR Item 4. Refer to MiSIM Section 5.09 for inspection procedures.

What about structures where the 'sidewalk area' is simply part of the deck that has been separated from the roadway by a Type IV railing. There is no poured concrete above the deck to walk on.

1. Should #5 be rated N with comments about deck condition in that area? Or do we give #5 a rating for S.W.? The ***BOLD*** sentence leads to some confusion as it indicates you have to have poured concrete above the deck to have a S.W. rating.

2. What about Core Elements? Do we add a S.W. quantity? How does Pg. 48 for Items 50, 51, 52 apply?

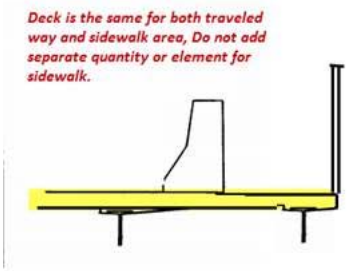
Answer 1:

Good questions, I will try to clarify. The comment for Areas under the sidewalk to be rated as deck was intended for when you have a raised separate sidewalk slab setting on the deck. You cannot see the top surface of the deck, but you can see the bottom, and it was simply a reminder to evaluate this portion of the deck.

1. To keep it simple, if the condition of the sidewalk affects the overall condition of the deck, then please account for the condition of the sidewalk in the deck rating. It would be treated similar to the top surface/bottom surface items. Meaning, that you would Rate and Comment on any defects you find in the sidewalk area, and then summarize them in the deck item. Example for a sidewalk is basically an extension of the deck:
#5 Sidewalk 4 There is approximately 25 SFT of severe spalling in the sidewalk adjacent to the N. Expansion Joint. The south sidewalk has 47 sft of delamination in span 2.

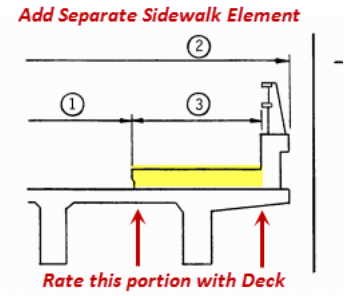
#7 Deck 4 The overall rating of the deck includes several areas of spalling and delamination of the sidewalk and the deck soffit has numerous areas of spalling to steel with exposed rebar.

When the sidewalk does not affect the overall condition of the deck (ie a raised separate slab) then only comment and make a condition rating for the sidewalk.



The sidewalk is not an NBI item and is simply used for safety and management purposes. When the sidewalk area is unsafe for pedestrians then we should add comments.

2. The AASHTO elements should be treated somewhat the same as above. If the sidewalk is an extension of the deck, then included in the overall deck quantity and do not add a separate element. If there is a separate raised slab or a specifically added sidewalk then add as a sidewalk element. Keep in mind the deck quantity must be within 10% of the width out-out (item 52) times the length (Item 49). This is an FHWA check. We currently do not have a “Curb” item but have discussed adding this as a separate element.



Item 50 = Curb or Sidewalk Width. When you add the sidewalk element for the case when there is a raised sidewalk, then use Item 50A (Left) and Item 50B (Right) times item 49 Length to get your sq.ft. of sidewalk.

Item 51 = Curb to Curb – This item is generally used when calculating epoxy overlay and healer sealer quantities. For decks with a small sidewalk you could simply use the Item 52 Out-Out to be close enough.

Item 52 = Out to Out, used for overall calculation of Deck Elements.

Question 2:

So, to write it out…

BSIR #5 Rated N, Comments included with rest of deck items but indicate conditions particular to S.W. area. #5 comments indicate S.W. area is not raised.

SI&A Items 50 A & B show S.W. width, raised or not.

AASHTO Elem NO S.W. item 840

Items 810 or the protective surfaces include the S.W. area of the deck.

Answer 2:

For the case with no raised sidewalk.

BSIR#5 - Almost Correct You can still rate the sidewalk surface area using the 0-9 scale for mainly tripping hazards and safety issues. Treated similarly to BSIR Deck Surface, and BSIR Deck Bottom.

SI&A – Correct; 50 A&B will have values if a sidewalk area is present, (raised or not)

AASHTO Element – Correct, no item 840. Yes include the sidewalk area for Items 810 (Top Surface) 811 (Btm Surface) and add any Protective systems or overlays if they exist. In theory this should already be accounted for if you use the deck Out – Out dimension.

Item 59 Rating

Question:

Case 1. A bridge that was painted say w/I the last 10 years, or was newly painted. May or may not be 10-25% LOS as pitting is visible under the paint, but there's no active corrosion. I would say this could be a 5. Do we need to have load rating to justify this?

Case 2. There's no active corrosion. Stringers rated a 4. Structure was load rated. Based on the condition, you could tell if there's advanced deterioration at the next inspection. I would say this could be raised to a 5.

Case 3. There's active corrosion. In this case, even if there's load rating one year, it may be hard to tell if there's advanced deterioration during the next inspection cycle. I would say this should stay the 3 or 4.

Answer:

Case 1: Yes, a load rating is required to coding the superstructure a 5.

Case 2: If there is no active corrosion and the load rating confirms that the structure may continue to function at design capacity the rating may be raised to a 5.

Case 3: Yes, for this scenario the coding should remain a 4 or 3.

SI&A Item 108

Question:

What is the difference between SI & A Item 108:

1: Monolithic Conc. placed concurrently with deck.

0: None. No additional conc. Thickness or wearing surface.

Given we pour a 9" deck "1" would be 10" of conc. (an additional 1" conc. surface) and "0" would be the regular 9"?

Answer:

0 : None. Example. Many local structures are built with side by side Concrete box beams with no extra wear surface. No deck other than the tops of the box beams.

I thought that when a bridge was designed to have the top portion act as a wearing surface and can be removed for future overlays they we would code this a 1. For decks (such as the example above for box beams with a 6" deck) which do not include a provision for future overlays then we code a 0.

So for MDOT owned structures, I would assume most 9” (newer) decks would be coded a 1 and most 7” (older) decks would be coded a 0.