AASHTO/NSBA Steel Bridge Collaboration

Fall Meeting Minutes - Combined

New Orleans, LA

October 22 – 24

The AASHTO/NSBA Steel Bridge Collaboration is a joint effort between the American Association of State Highway and Transportation Officials (AASHTO) and the National Steel Bridge Alliance (NSBA) with representatives from state departments of transportation, the Federal Highway Administration, academia, and various industry groups related to steel bridge design, fabrication, and inspection. The mission of the Collaboration is to provide a forum where professionals can work together to improve and achieve the quality and value of steel bridges through standardization of design, fabrication, and erection.

Contents

Task Group List

Group Name	Chair	Chair Company	Vice Chair	Vice Chair Company
TG 1 Detailing	Randy Harrison	W&W|AFCO Steel	Gary Wisch	DeLong's, Inc.
TG 2 Fabrication and Repair	Heather Gilmer	Pennoni	Duncan Paterson	Alfred Benesch & Company
TG 4 QC/QA	Jamie Hilton	KTA-Tator, Inc.	Robin Dunlap	High Steel Structures
TG 8 Coatings	Johnnie Miller	KTA-Tator, Inc.	Derrick Castle	Sherwin-Williams
TG 9 Bearings	Michael Culmo	CHA Consulting, Inc.	Ron Watson	RJ Watson, Inc.
TG 10 Erection	Brian Witte	Parsons	Jason Stith	Michael Baker International
TG 11 Design	Brandon Chavel	Michael Baker International	Domenic Coletti	HDR
TG 12 Design for Constructability and Fabrication	Christina Freeman	Florida Department of Transportation	Russell Jeck	Siefert Associates
TG 13 Analysis of Steel Bridges	Deanna Nevling	HDR	Francesco Russo	Russo Structural Services
TG 14 Field Repairs and Retrofits	Kyle Smith	GPI	Nick Haltvick	Minnesota Department of Transportation
TG 15 Data Modeling for Interoperability	Aaron Costin	University of Florida	Grant Schmitz	HDR
TG 16 Orthotropic Deck Panels	Sougata Roy	Consultant	Frank Artmont	Modjeski & Masters, Inc.
TG 17 Steel Castings	Jennifer Pazdon	Cast Connex	Jason Stith	Michael Baker International
TG 18 Duplex Stainless Steel	Jason Provines	Virginia Department of Transportation	Nancy Baddoo	Steel Construction Institute
Main Committee	Ronnie Medlock	High Steel Structures	Christina Freeman	Florida Department of Transportation

Past Meeting Notes

Year	Meeting	Link
2018	Spring	Not Available
	Fall	Meeting Notes
2019	Spring	Meeting Notes
	Fall	Meeting Notes
2020	Spring	Meeting Notes
	Fall	Meeting Notes
2021	Spring	Meeting Notes
	Fall	Meeting Notes
2022	Spring	Meeting Notes
	Fall	Meeting Notes
2023	Spring	Meeting Notes
	Fall	Meeting Notes
2024	Spring	Meeting Notes
	Fall	This Document

AASHTO/NSBA Steel Bridge Collaboration

TG 1 Detailing

Crowne Plaza - French Quarter Hotel
New Orleans
Room Name: Grand Ballroom C

Task Group Mission: This Task Group is specifically responsible for the creation and maintenance of guidelines and best practices for the creation of clear concise design and fabrication drawings.

Task Group Leadership
Chair: Randy Harrison - W&W|AFCO Steel
Vice Chair: Gary Wisch - DeLong's, Inc.
Assigned Notetaker: Vin Bartucca - NSBA

Meeting Agenda: 10/23/2024 (8:00 am - 10:00 am CT)

1. Chairperson's Welcome (8:00 am – 8:10 am)
    a. AISC Antitrust Policy and Meeting Code of Conduct.
    b. Introductions (as needed).
    c. Approval of Previous Meeting Minutes.
2. Review and discuss new example drawings of box and tub girder doors and hatches.
    a. Review G1.4 Comments and discussion of options/recommendations of products to include (must be verified vs. state specifications)
3. Review updated drawings taken from G1.4 that will be combined with G1.2.
    a. Discussion of WashDOT comments regarding shop drawing review
    b. "Example Presentation Sheet" to show multiple pieces per sheet as opposed to one piece per sheet to simplify review.
4. Discussion on future topics – reviewing approval review requirements among them.
    a. D1.1 Approval Requirements
    b. G1.3 & G1.4 Combined drawings and review requested by TG
5. Adjourn

AASHTO/NSBA Steel Bridge Collaboration

TG 2 Fabrication and Repair

Crowne Plaza - French Quarter Hotel
New Orleans
Room Name: Grand Ballroom C

Task Group Mission: This Task Group aims to achieve quality and value in the fabrication of steel bridges through standardization of steel bridge fabrication across the nation.

Task Group Leadership

Chair: Heather Gilmer **-** Pennoni
Vice Chair: Duncan Paterson **-** Alfred Benesch & Company
Assigned Notetaker: Christopher Garrell **-** NSBA

NOTE: All meeting attachments can be found in TG 2 Fabrication and Repair.

Meeting Agenda: 10/22/2024 (1:00 pm - 5:00 pm CT)

1. Chairperson's Welcome (1:00 pm – 1:10 pm)
    a. AISC Antitrust Policy and Meeting Code of Conduct.
    b. Introductions (as needed).
    c. Approval of Previous Meeting Minutes.
    d. **Reminder of documents currently under the task group's scope**

Reminded TG2 that the S2.1 Fabrication specification has been absorbed into the AASHTO Steel Bridge Fabrication Specification. TG2 acts in an advisory role to the AASHTO Steel & Metals Committee. The work of TG2 is then passed to AASHTO for adoption into the AASHTO Fabrication Specification. AASHTO Steel and Metals committee has adopted a "workgroups" approach. One of these was created to act as a point of contact between the two groups specifically for the Fabrication Specification; another for Collaboration documents. G2.2, Resolution of Shop Errors, is still the responsibility of TG2.

2. AASHTO fabrication specification

a. **QST grades:** These grades have been in ASTM A709 for a few years. Their main benefit is to provide higher-strength rolled shapes. Ballot is in process to add them to D1.5. Need corresponding additions to Fab Spec. Proposed changes:

Table 14.2.1-1—Maximum Temperature Limits for Heat Application

ASTM A709 (AASHTO M 270) Grade	Maximum Temperature ° F
36	1200
50, 50S, 50W, HPS 50W	1200
QST 50, QST 50S, QST 65, QST 70	1100
HPS 70W, (Q&T and TMCP)	1100
HPS 100W	1100

15.2–Thermal Stress Relief

D1.5 requirements shall be followed when thermal stress relief is performed.

Thermal stress relief shall be performed when required by contract documents or when approved by the Owner.

AASHTO ASTM A709/A709M (M 270M/M 270) Grades HPS 70W and HPS 100W steels shall be stress relieved only with the approval of the Owner after consultation with the material producers.

15.3–Annealing and Normalizing

Structural members which are indicated in the contract documents to be annealed or normalized shall have finished machining, boring, and straightening done subsequent to heat treatment. Normalizing and annealing (full annealing) shall be as specified in ASTM A941. The temperatures shall be maintained uniformly throughout the furnace during the heating and cooling so that the temperature at no two points on the member will differ by more than 100°F at any one time.

ASTM A709/A709M (AASHTO M 270M/M 270) Grades QST 50, QST 50S, QST 65, QST 70, HPS 70W, and HPS 100W steels shall not be annealed or normalized.

Discussion: Info was provided by Nucor. 1100°F limit is consistent with ASTM A709. Nothing added to 15.2 because of the reference to D1.5. *TG2 agrees to send this to AASHTO*.

b. Scribing/etching of layout marks

Use of plasma for marking layout marks (as opposed to deeper marks like piece marks and match marks). Consensus from previous meetings is that specification language is not practical or needed but “workmanship” commentary should be developed.

TG for workmanship commentary : Michael Diarcangelo (lead, High Steel), Ronnie Medlock (High Steel), Teresa Michalk (TxDOT), Tim McCullough (KTA), Jeremy Rice (Veritas), Michael Wiersch (Stupp)

Depth of marking is not measurable by practical means in a shop. Anything that needs to be permanently legible needs to meet Category B (Article 6.3.2). Layout marks would typically be removed from the material via blasting among other characteristics.

Draft provided by task group (See Attachment A) and discussed at meeting.

TO DO:

Gilmer: look up where in Fab Spec we were planning to put this & provide context to TG.

TG: Make last commentary paragraph more vague with regard to parameters. FDOT parameters were what worked, not parameterized to get the full range of what could work. Contrast with deeper permanent markings.

c. Check assemblies

17.5.3 still mentions first three panels, when this has no longer been the case for non-CNC assembly for a long time.

Task group to revise 17.5.3 to get away from "first three": Ronnie Medlock (High Steel), Hannah Cheng (NJDOT), Mike Wiersch (Stupp), Mike Leonard (MassDOT).

Brad Dillman reviewed the TG's suggested changes for "CNC Drilling" and related discussion. For girders, the commentary is in terms of "as soon as possible" rather than first girders because the first girders might not all be in the same line. Intent is to reflect that girders are not typically fabricated line-by-line. Fabricators do not typically take into account the erection sequence since shop is putting bridge together in no-load condition. Gilmer wondered whether there should be language that would guide a designer or owner to specifying more "complicated" geometry rather than the more mundane. However, this may trigger a full assembly; "check assembly" is a portion of a number of similar connections rather than unique. Proposal as modified during meeting is in Attachment B *and will be sent to AASHTO*. There was a suggestion to add specific language to differentiate between what shop assembly is versus erected; there is some commentary about this in the web flatness proposal but we should look into saying more.

TO DO: Gilmer will look further into differentiation between shop assembly and erected.

d. Web flatness

There are web flatness provisions in D1.5 that are moving to the AASHTO Fab Spec. They have already been published in the Fab Spec and are being balloted for deletion from D1.5. The current limits are based on workmanship & aesthetic. Attachment C has a research-based proposal that was originally presented to D1.5 years ago and died of neglect. Because the provisions are moving, this is now an AASHTO matter. See Attachment C for proposal and rationale. The result is a simpler and more rational approach to web flatness. There were no objections from the fabricators in the room to the flatness tables which were derived from the formula shown. *TG2 agreed to pass this on to AASHTO.*

e. Stamping

At a different meeting, Karl Frank had raised concerns about where low-stress permanent markings are placed. AREMA has provisions not allowing marks within 1" of weld. TG2 felt this was not needed. If it is a significant issue for anyone, they are welcome to submit commentary to TG2. Question was also raised for welder marks, and we may add some commentary about being careful about how deep they're made.

f. Masking slip-critical connections

Masking is not explicitly addressed in S8.1. At an earlier meeting we decided we would add it to the fab spec, but now TG2 felt it should be handled in S8.1. *This has been added to S8.1's new business list.*

g. Tolerances for Split Ts

Split Ts are made from cutting W-sections in half, and the halves often curl from residual stress and need straightening. Should there be a tolerance other than A6 for these? Often used for stiffening and bracing where out of straightness may be more important. The group decided that this is a topic for consideration by TG11. Eric Rau will take the issue up with TG11 and possibly TG12.

h. Measurement of Sweep

Does a girder that will naturally sag into position with gravity when laid over need to be checked in the vertical position? Brad Dillman suggested surveying fabricators to assess whether they would have an issue with adding a requirement for checking sweep in vertical position. (We currently have a requirement for checking camber in no-load position but not for sweep.)

3. G2.2 - Guidelines for Resolution of Steel Bridge Fabrication Errors

a. **Improper preheat**

ad hoc task group: Ronnie Medlock, Jason Gramlick, Todd Niemann, Jeremy Rice, Karl Frank, Justin Ocel, David Stoddard, Jason Provines, Sougata Roy

Outline from task group from a few meetings ago:

The concerns associated with improper preheat are porosity or cracking due to the presence of high hydrogen and high heat affected zone (HAZ) hardness due to rapid cooling. Therefore, the recommended remedy is as follows:

- *Do a visual inspection*
- *Conduct MT*
- *For CJP groove welds, conduct UT*
- *Commentary: Check the HAZ hardness of the suspect area*
    - *Compare with PQR hardness results if they are available, or*
    - *Compare with similar areas that were properly preheated*

TG is not done but provided an interim report of ongoing discussions. One issue is how far off the preheat (or lack thereof) was—it's one thing to miss it by 20°, it's another not to preheat at all. One thought within the TG is that the above remedies would only apply where the difference between required and provided heat was 50°F or less, and that for more than that the weld would need to be replaced. There was also concern that some fabricators might take the remedies as easier than preheat and just do that instead of preheat. Gilmer pointed out that G2.2 is essentially potential ingredients for NCR; it's not a specification that says outright "if you do this then do that". So the fabricator would have to have an NCR submittal for every instance, and eventually this would turn into a recurring issue requiring corrective action.

The conversation evolved to AISC certification of fabrication shops to ensure proper practice and reporting when there are cases improper preheat. AISC is instituting an improved reporting method that might make DOTs more likely to submit concerns. Right now, they are reluctant for potential liability that may result.

TO DO: *Gilmer remind TG of what G2.2 really is.*

b. **Framing members too short**

See Attachment D. Duncan Paterson reviewed the typical issues and possible solutions that do not result in completely re-fabricating the entire connection or piece. *TG to work on the text to include these details: Duncan Paterson, Eric Rau, Brad Dillman, Sammy Elsayed and Jeff Svatora.*

c. **Elements of rolled beams not aligning at a splice—or built-up members after applying depth tolerance**

For built-up girders, misalignment of flanges because of depth tolerances is typically handled with fill plates and is a commonplace situation. While this has been previously obvious, it may need to be added to address transfer of knowledge. This is not technically a nonconformance but is a problem that needs to be addressed in the shop. TG2 agreed this is worth addressing. *TG: Gary Wisch and Mike Leonard*.

d. **General Updates for D1.5 changes, AASHTO Fab Spec, FC terminology, etc.:**

Gilmer had made a first pass through the full document and then sent it to work groups to look at various section. A collection of all sections of the document that have proposed changes or comments was distributed before the meeting. See Attachment E for sections that were discussed during the meeting. *Remainder will be deferred to TG2 conference call. Full collection will be distributed before the call.*

One pervasive issue is “defect”, “error”, “non-conformance” terminology. TG to review and standardize terminology for consistency and proper definition: *Jason Lloyd, Duncan Paterson, and Jon Stratton.*

Discussion turned to whether the background information on nondestructive examination (Section 1.3) should be removed or edited to include only what is relevant to the document itself. Among other issues, under the heading of “NDE”, there is extensive discussion of mill repairs, which are irrelevant to this document. In the spirit of transfer of knowledge, the group wanted to keep some information. The paragraph was deleted except for the last sentence.

The question of what “fully effective” means was raised (Chapter 2 intro, last paragraph) by Eric Rau, but it was determined this is good terminology.

Question was raised over whether fitting another bolt into a pattern (2.1.3.a) is even feasible or if the rcommendation should be deleted. Group determined that it could happen.

Further conversations were captured as direct edits or comment responses by Gilmer in draft of G2.2.

TODO: Gilmer will schedule a follow-up meeting to review comments before end of year. Document target 2026 for release.

1. Adjourn

AASHTO/NSBA Steel Bridge Collaboration

TG 4 QC/QA

Crowne Plaza - French Quarter Hotel
New Orleans
Room Name: Grand Ballroom C

Task Group Mission: This task Group primarily focuses on the requirements for a Fabricator's quality control program, with emphasis on the development and implementation of a quality control plan and minimum requirements for an Owner's quality assurance program. At the same time the group acknowledges the need for a cooperative approach to quality, where the Owner's and Contractor's representatives work together to meet their responsibilities, resulting in the efficient fabrication of steel bridges meeting all contractual requirements.

<u>Task Group Leadership</u>
Chair: Jamie Hilton - KTA-Tator, Inc.
Vice Chair: Robin Dunlap - High Steel Structures
Assigned Notetaker: Jeff Carlson - NSBA

Meeting Summary: 10/23/2024 (3:00 pm - 5:00 pm CT)

1. S4.3 – Specification for Owners Inspection and Inspectors
    a. Jamie shared that this document is not going to be ready to go to AASHTO this year.
    b. The committee continued reviewing TG ballot comments. Jamie went through these comments in the working document.
    c. Jamie needs to clean up section 1.1.
    d. Jon Stratton and Heather Gilmer are going to develop a purpose statement for the scope in section 2.1. A good starting point could be the task group mission.
    e. Outside of this meeting, Jamie felt a small group needs to rework section 3 based on all of the comments. The group consists of: Jamie, Teresa Michalk, Heather, Jon, and Robin Dunlap.
    f. Jamie wants to form a small group to combine 6.4 and 5.3.2. Jon Stratton will take the lead and Teresa and Heather will review.
    g. Jamie will review the document for verification of CWIs and to be consistent about if NDE includes or does not include VT.

h. They ended this part at the start of Heather's comments. Jamie is going to clean things up and then reduce Heather's comments to those which haven't been addressed yet.

2. G4.1 - Steel Bridge Fabrication QA/QC Guidelines
   a. This document has gone through balloting process for comment with AASHTO Steel and Metals committee. There was one comment and it seems like the commenter missed something so Jamie is going to resolve it. Note: Jamie contacted the commenter and resolved the issue. Doc is ready to move forward.
3. G4.2 – Guidelines for the Qualifications of Structural Bolting Inspectors
   a. Start addressing new business from the AASHTO COBS ballot comments. Jamie said that G4.3 was the high priority so this document wasn't addressed in the meeting.
4. New Business/General open discussion
5. Adjourn

AASHTO/NSBA Steel Bridge Collaboration

TG 8 Coatings

Crowne Plaza - French Quarter Hotel
New Orleans
Room Name: Grand Ballroom C

Task Group Mission: This Task Group primarily focuses on the functions, operations, requirements and activities needed to achieve consistent quality in steel bridge coatings. At the same time the group acknowledges the need for a cooperative approach to quality, where the Owner's and Contractor's representatives work together to meet their responsibilities, resulting in efficient steel bridges coatings that meeting all contractual requirements.

Task Group Leadership
Chair: Johnnie Miller - KTA-Tator, Inc.
Vice Chair: Derrick Castle - Sherwin Williams
Assigned Notetaker: Jeff Carlson - NSBA

Meeting Summary: 10/23/2024 (1:00 pm - 3:00 pm CT)

1. Chairperson's Welcome
    a. Approval of Previous Meeting Minutes. Approved without comment
2. Development of new performance-based corrosion protection evaluation process/protocol.
    a. Update on progress with various AASHTO committees.
    b. Problem statement for pooled fund study
    Jeff C. discussed NSBA attempt to coordinate a pooled-fund study with Todd Bennet and Kelly Singer w/AASHTO to develop a new corrosion testing procedure. Ronnie suggested reaching out to N.C. for interest in being the lead state for this effort since it is important to have a lead state to ensure the study gets funded. It was noted that there are other testing protocols besides ASTM D5894, such as ISO 12944. ISO 12944 was shown to highlight it's parameters for testing. Johnnie M. noted that 12944 does not use Open Circuit Potential (OCP) or Electrical Impedence Spectrtoscopy (EIS), which are tests that provide more

objective performance measures than scribe creep. Derrick Castle expanded on the concept of using different tests to measure perfomance and how this might be accomplished. He noted that the old NEPCOAT testing regime tested each coating layer indiviually and collectively as a system, whereas ASTM D5894 only tests the total system. Kristen (Carboline) suggested that there is a lot of data and research out there so there's no need to re-invent a test but to cull together best practices from exisitng test protocols. This led to a discussion on NSBA having funding set aside to conduct a literature review for this prupose. The lliterature review would support the pooled-fund study. Kristen emphasized that current testing (ASTM D5894) limits innovation since it's testing regimen, particularly the testing solution, attacks certain coatings more aggressively than others but does not necessarily represent the typical corrosive environment. Alina (MassDOT) suggested using magnetic induction for measuring coating performance. Jeff shared the QR code survey for those interested in participating in the pooled-fund study. Geoff (WSDOT) expressed concern about the pooled-fund study route and whether NSBA or industry should fund the study to ensure it gets done. This led to a discussion of the previous attempt to do this same pooled-fund study over 10 years ago.

c. Is there any TG8 document that should be a result of this new protocol?
    i. Maybe a usage guide for testing and acceptance parameters.

    Jeff noted that AASHTO would like to have a guide developed for corrosion testing and acceptance parameters. The guide proposal was presented as something TG needs to be aware of as TG8 will be tasked to develop the guide.

3. S8.1 Comments
    a. Discussion of schedule for this document.
        i. Resolve comments (below) and consider a quick ballot.
        Chris and Derrick briefly discussed the balloting process and what will be expected between NSBA and AMPP. AMPP will receive documents for

review; will have either 14 or 28 days to provide review and either accept or reject the document. NSBA will move forward with a document for publication without AMPP co-sponsorship if NSBA accepts but AMPP rejects.

b. Proposed resolutions to S8.1 comments.

  i. Discussion ended at Section 3.4. Resolve the rest of the document, particularly better defining mist coats and how used, particularly for top flanges (concerns with welding sheer studs) and avoiding pinholes in coating over IOZ. All remaining substantive comments beginning with Section 3.4 was discussed and resolved. S8.1 is now ready to be sent to MC and AMPP. Jeff to send Chris the final version and the marked up version for submission.

  ii. Heather discussed the idea of moving the masking section from the fab spec over the S8.1. Discuss this as a group and get a volunteer to write this section. Masking was briefly discussed as needing to be addressed in S8.1 and S8.2. It will be added to outstanding items list to be addressed in the next review cycle for S8.1.

4. Review S8.2

   S8.2 was not reviewed. Johnnie relayed that another virtual meeting will be scheduled to finish reviewing the document prior to the Spring meeting with the intention of having S8.2 ready to be reviewd by TG8 at the Spring meeting.

   a. Update on meeting from working group
   b. Review proposed changes from working group with committee
   c. Discussion of schedule for this document.

5. Review the state of G8.4

Johnnie noted that no progress has been made on G8.4 and that this document will not be addressed until S8.1 and S8.2 are done.

AASHTO/NSBA Steel Bridge Collaboration

TG 9 Bearings

Crowne Plaza - French Quarter Hotel
New Orleans
Room Name: Grand Ballroom D

Task Group Mission: This Task Group is specifically responsible for the creation and maintenance of guidelines and best practices for steel bridge bearings.

Task Group Leadership
Chair: Michael Culmo - CHA Consulting, Inc.
Vice Chair: Ron Watson - RJ Watson, Inc.
Assigned Notetaker: Brandon Chavel - NSBA

Meeting Agenda: 10/22/2024 (3:00 pm - 5:00 pm CCT)

1. Chairperson's Welcome (3:00 pm – 3:10 pm)
   a. AISC Antitrust Policy and Meeting Code of Conduct.
   b. Introductions (as needed).
   c. Approval of Previous Meeting Minutes.
2. Potential future enhancements to the G9.1 document (3:10 pm to 4:00 pm)

New Chapter: Rehabilitation (preservation) and replacement strategies:

There is interest in developing a section on bearing rehab and replacement. Mike will develop an initial draft of an outline for this new section and share it with the TG. At the next meeting, Mike will look for volunteers to write these new sections.

There was discussion amongst the attendees on the use of jacking stiffeners, and the specification of these varies on a state-by-state basis. All agreed that the use of jacking stiffeners should be considered.

HLMR bearing installation

Add text to detail HLMR bearings in such a way that they cannot be installed improperly. The TG discussed this issue, and some have noted they have seen HLMR bearings installed 180 degrees from the proper direction, especially when the grade is pretty flat. The TG agreed we should have some information in the document to identify the proper direction on the bearing; identify the up-station direction.

Section on Deck Joints

Should the TG add Deck Joints to the current G9.1, or develop a new G9.2?

After discussion amongst the TG members, there seems to be a need for something that addresses larger movement joints, and the subsequent detailing of steel girder bridges and the deck. Have a discussion on the deck joints that are embedded in the deck and do not affect the steel girder details, but make the focus on the larger movement joints that affect the steel design, detailing, and fabrication.

Mike will take the outline developed by DS Brown and make adjustments based on the conversations at the TG. Mike will bring this to the next meeting, and look for volunteers to do some writing.

3. Bearing Spreadsheet (4:00 pm to 4:20 pm)

Some in the TG thought there was a need for this, but do not want to take ownership of a design tool. Mike will talk with Chris Garrell and see if AISC/NSBA wants to create a design tool. The TG could also identify the states that have free elastomeric bearing design tools, and link those at the Collaboration website for TG9.

4. Collaboration with the new AASHTO COBS Components Committee (4:20 PM to 4:40 pm)

Mike would like to have a TG volunteer regular attend this committee meeting, and let the COBS committee know what is going on at this TG. The easier way to do this may be to email the COBS Components committee chair regarding what the TG is doing.

5. Potential Bearing research (4:40 PM to 5:00 pm)

Mike asked the TG if research was needed, to show that elastomeric bearing installation for a steel girder bridge could be the same as that for a concrete girder bridge. In most concrete girder bridges, the bearing pad is just set on the bearing seat, and the girder set of the bearing. Why can the same not be done for a steel girder?

Christina Freeman noted that FDOT has completed research on tapered elastomeric bearing pads, that showed some slip. The research noted that if tapered bearing pads are used, they need to be restrained.

6. Adjourn

AASHTO/NSBA Steel Bridge Collaboration

TG 10 Erection

Crowne Plaza - French Quarter Hotel
New Orleans
Room Name: Grand Ballroom D

Task Group Mission: This Task Group develops guidelines and specifications that establish and define the basic, minimum requirements for the transportation, handling and erection of steel bridge components to ensure safe steel erection as well as quality and value in the completed bridge structure.

Task Group Leadership

Chair: Brian Witte **-** Parsons

Vice Chair: Jason Stith **-** Michael Baker International

Assigned Notetaker: Travis Hopper **- NSBA**

Meeting Agenda: 10/23/2024 (1:00 pm - 3:00 pm CT)

1. Chairperson's Welcome (1:00 pm – 1:10 pm)
    a. AISC Antitrust Policy and Meeting Code of Conduct.Done.
    b. Introductions (as needed).Done.
    c. Approval of Previous Meeting Minutes. Approved.
2. Summarize interim meetings of G10.2 development (1:10 pm - 1:30 pm)

Working Title: Behavior of Steel Girders During Erection

The intent of the document is to provide nontechnical personnel (e.g., site staff, entry-level engineers, inspectors, and owners) with guidance about correct/expected behavior during erection.

- Goals as of October 2024:
    - Section 4 (Behavior of Various Bridge Types): first draft complete by end of 2024
    - First draft of entire document ready for editors. Complete by Spring 2025 Collaboration meeting (April 29)
    - Final draft complete by Fall 2025 Collaboration meeting
- Current schedule as of October 2024:
  - End of 2025: final draft ready for TG ballot
  - Summer 2026: ballot passes Collaboration main committee
  - End of 2026: publish as an NSBA document without AASHTO acceptance or submit to AASHTO Steel and Metals subcommittee
  - Summer 2027: pass through AASHTO COBS
  - Fall 20227: final publication by AASHTO
- Current working group schedule. The current frequency of approximately monthly seems to be working for the group.
- Reviewed the current TOC.
- Section 3.11 Structural Analysis vs. Detailing vs. Construction
  - The differences in analysis types
  - How the detailer uses analysis output information (vertical deflections)
  - How the bridge is going to behave in the field.
  - A suggestion was made to add figures to explain each portion, e.g., analysis model deflection, cambered girders, final full dead load position. Could add fake dimensions that match up across figures.

- Article 4.2.2 Bridge Geometry Template. Went through the template showing common geometry information, notes, figures, construction stages, key observations, and notable changes from the previous stage. This template is currently in a separate document and could remain that way or be integrated into the full Word document. There was a discussion about how much or how little dimensional data should be provided (e.g., flange sizes, web/girder depth, span lengths). It was decided to leave as-is for now. There was a suggestion to add a lead-in sheet with abbreviations and a general elevation view figure. There was a comment about adding field splice locations/section length, cross frame spacing, etc., but the consensus was that these items are likely not needed.
- Consistency of figures. It's likely not possible to have consistency for different analysis model figures, but may be possible for 2D drawings and figures. It was suggested to add small plan view figures embedded in each larger 3D model figure that highlights which girders and which stage are shown.

3. Working session on UPCOMING G10.2 guideline document (1:30 pm – 2:50 pm)
    a. Compare Section 4 content showing various bridge type and behavior
        i. Volunteers are encouraged to work in the shared document.
        ii. Volunteer status

4.1.2. Michael DiArcangelo volunteered

4.1.3. Saeed Doust – to provide more details

4.1.4. Matt Volz (not present)

4.3.2. Doug Crampton – upcoming this year

4.3.4. Michael DiArcangelo – to be put in template

4.4.1. Nick Haltvick – to be put in template

4.4.2. Allie Wagner – new but working on it

4.4.4. Brandon Chavel volunteered

4.5.1. Jeff Svatora – to modify to show uplift

4.5.4. Brandon Chavel volunteered

4.6.2. Saeed Doust volunteered

4.6.3. Jeff Svatora – to confirm whether or not it's done

4.6.4. Nick Haltvick – to confirm whether or not he has an example bridge

b. Identify gaps in writing and solicit new volunteers as needed

   i. Section 6 Common Issues and How to Resolve Them

      1. Currently only have content for Bearings article

         a. Bearing stiffeners not aligning with the bearing

      2. Web plumbness/girder layover – Jarret Kasan, Domenic Coletti

      3. Cross frame fit-up – Jarret Kasan, Domenic Coletti

      4. Support conditions in the field vs. no load in the shop – Matt Hellenthal

      5. Uplift at bearings and temporary supports - Josh

      6. Temporary support elevations – Josh Orton

      7. "walking" girders due to thermal effects – Josh Orton

      8. Missing match marks – Bob Cisneros, Michael DiArcangelo

      9. Splices – Bob Cisneros, Michael DiArcangelo

         a. Fit-up

         b. Plates installed at incorrect location

         c. Backward (e.g., left on right side)

      10. Early deck formwork / pouring (don't do) – Eric Rau

      11. Cross frames installation in phased bays – Russell Jeck

c. Solicit ideas for Case Studies

   i. Ford City – Brandon Chavel

   ii. NHI Stability Course case studies – Frank Russo

   iii. Wichita Falls Bridge – Jason Stith, Todd Helwig

   iv. Penn State – Deanna Nevling

4. Open discussion for other topics (2:50 pm – 3:00 pm)

   a. Plan for publishing as an NSBA document alone

      i. Going through AASHTO would gain more exposure with States, who are likely main users.

      ii. Present to Knowledge Management and Workforce Development.

5. Adjourn (2:53 pm)

AASHTO/NSBA Steel Bridge Collaboration

TG 11 Design

Crowne Plaza - French Quarter Hotel
New Orleans
Room Name: Grand Ballroom D

Task Group Mission: This Task Group aims to develop and maintain consensus guidelines to assist with the design of steel bridges and their components.

Task Group Leadership
Chair: Brandon Chavel - NSBA
Vice Chair: Domenic Coletti - HDR
Assigned Notetaker: Christopher Garrell – NSBA

NOTE: All meeting attachments can be found in TG 11 Design.

Meeting Agenda: 10/23/2024 (3:00 pm - 5:00 pm CT)

7. Chairperson's Welcome (3:00 pm – 3:10 pm)
   a. AISC Antitrust Policy and Meeting Code of Conduct.
   b. Introductions (as needed).
   c. Approval of Previous Meeting Minutes.
8. Announcements and Administrative Items (3:10 pm to 3:15 pm)

Reviewed mission and work with other task groups and ongoing document development. Brandon reminded the group about upcoming bridge conferences including the new AREMA Bridge Symposium in February. Committee 15 will also take place at the same time. High Steel and the Lancaster Science Factory host a "Bridge Mania" camp in Lancaster, PA for children in grades 3 through 8. The intent being to get the next generation interested in bridge engineering. Similar places can be found in many cities who can host similar camps.

TODO: Get slides from Brandon.

9. Presentation – Tony Ream (3:15 pm to 3:40 pm)

Additional design considerations for long span steel plate girder designs. Tony provided some lessons learned from the I64 bridge over Kenawha in West Virginia. Brad Dillman suggest use of oversized holes for stacked configuration to account for weld shrinkage. **TODO: Get slides from Tony.**

10. Guidelines for the Design of Cross Frames & Diaphragms (3:45 pm to 4:30 pm)

    a. Discussion on any final items

    Status update on G11.1 Currently waiting on update of AASHTO. Document has received a pre-ballot review. These comments have been reviewed and are being finalized. Additionally, a few figures need to be updated. Culmo suggested a new figure to complement some text.

    Brandon also went over a Design of WTs in Comparison table for eccentrically loaded members from AISC EJ 2010 that might be useful to designers.

    b. Balloting process and comment resolution

    TG Ballot expected sometime in November with resolution of comments in January. Depending on results, the MC ballot would follow. Target is now 2026 COBS.

11. Next item – Phased Construction & Widenings (4:30 pm to 5:00 pm)

    a. Identify major topics to be addressed

    This will be the next work product for this group. In comparison to other possible topics, this had the most significant need. The group suggested the following possible topics for the guide:

    - Future redecking as part of the discussion and not simply new construction.
    - Widening with fewer than 3 girders.
    - Utilities support/maintenance during construction.
    - Temporary loading (dead and live) effects and differential stiffness during construction before closure pour. Consider the effects of different numbers of girders between stages. For example, first stage having 3 and the next have twice as many.
    - Global stability for narrow structures.
    - Use of lean-on bracing between stages.

- Deck design at different stages with a large, cantilevered slab.
- Ponding on top of the deck closure pour
- Verification of existing structure to ensure fit with new components can be accomplished. Use field survey instead of existing drawings.
- Cases where a stage girder might be an exterior girder during a stage and eventually become an interior girder. That girder may need to be designed as an exterior girder.
- Provide possible solutions for cases where fit-up is an issue.
- Ashly Thrall mentioned research at Notre Dame for fitting cross-frames using a new tool during construction. The tool could be useful for widenings.
- G12.1 has some information that covers some of this and should be reviewed. Consider creating a new document with this as the basis or expanding the section of G12.1. G13.1 also has similar information relevant to this topic. Existing documents need to be reviewed for similar information.
- Provide discussion on level of analysis.
- Offsite construction and ABC considerations.
- Installation of precast decks during staged construction.
- Modular expansion joints and how these are installed during staged construction.
- Drainage considerations for temporary stages.
- Partial demolition both super and sub structure.
- Preferred fit conditions for cross-frames.
- Considerations for clear space between adjacent structures for construction activities.

12. Adjourn

AASHTO/NSBA Steel Bridge Collaboration

TG 12 Design for Constructability and Fabrication

Crowne Plaza - French Quarter Hotel
New Orleans
Room Name: Grand Ballroom D

Task Group Mission: This Task Group primarily focuses on addressing the questions that have been and are continually asked concerning the constructability of steel bridges according to the latest practice for steel mills, fabrication, detailing, erection, and design.

Task Group Leadership
Chair: Christina Freeman - Florida Department of Transportation
Vice Chair: Russell Jeck - Siefert Associates LLC
Assigned Notetaker: Anthony Peterson - NSBA

Meeting Agenda: 10/24/2024 (9:00 am - 11:00 am CT)

1. Chairperson's Welcome (9:00 am – 8:10 am) Done
   a. AISC Antitrust Policy and Meeting Code of Conduct. Done
   b. Introductions (as needed). Done
   c. Approval of Previous Meeting Minutes. Done
2. Integral Steel Straddle Bents at the Pittsburgh International Airport Terminal Front Bridge, presented by Ryan Jenkins (9:10 am – 9:40 am)

   Pittsburgh International Airport is executing a $1.57 billion terminal modernization program to update and right-size the airport's facilities. Scheduled to open in 2025, the new airport terminal will host 12-18 million travelers each year. On the front of that terminal will be a new two-level, 1,300-foot bridge. Consisting of 4,400 tons of structural steel, the two-level stacked bridge carries two roadways and spans a third at-grade roadway that serves Commercial traffic such as buses. Beginning with at-grade approach roadways, the main bridge – and two connecting simple spans – were designed to allow the single approach roadway to flow into three stacked roadways along the terminal building. The weaving of roadways and architectural constraints provided by the terminal building resulted in quite a few technical challenges.

   Due to the two-level nature of the structure and the limited vertical clearance because of the fixed height of the terminal floors, shallow, composite box-section trapezoidal girders were used with composite, rectangular, integral steel straddle bents… resulting in many nonredundant steel tension members (NSTMs) and practical difficulties with field splice designs and layouts. On the adjacent approach simple spans, curved-span, composite box-section trapezoidal girders were used, which required end, composite, I-section integral steel straddle bents to facilitate expansion dams.

Ryan Jenkins is a Bridge Engineer and Professional Associate for HDR out of their Pittsburgh office. He has 9 years of experience and 6 years with HDR. He has experience with modeling complex structures, including the Terminal Front Bridge for the Pittsburgh Airport Terminal Modernization Project which he'll be presenting on.

Interior of tub girders have drain holes for moisture drainage.

There is no lighting provided inside the tub girders to facilitate inspection.

Tub girders were used due to aesthetic preference.

Straight tub girders only had partial length interior top lateral bracing. Also, no exterior lateral bracing beteen tubs used.

Horizontally curved tub girders had full length interior top lateral bracing and exterior lateral bracing beteen adjacent tubs.

Superstructure was designed for full vehicular and pedestrian loading simultaneously.

Fatigue in general did not control design. Both finite and infinite fatigue was checked.

3. Update on Guidelines for Steel Bent Caps (G12.2) publishing timeline (9:40 am – 9:50 am)

   Anticipated publishing date is January/February 2025, but it might get pushed back slightly depending on how quickly AASHTO responds/proceeds.

4. Open Discussion (9:50 am – 11:00 am)

   Barny Frankl suggested that we should consider developing a document/guidelines for designing for constructability. Maybe could include checklist of some type and/or examples.

   Russell Jeck suggested that we should consider developing a document/guidelines for bridge deconstruction/demolition. Also, guidelines for deck overhang bracket design/details including oil-canning effect on girder webs.

   Ronnie Medlock suggested that we should consider developing a document/guidelines for constructability of unusual bridge types, including arch and cable stay bridges.

Bill Lally suggested that we should consider developing a document/guidelines for bridge widenings, specifically single-girder widenings, as they can have significant stability concerns.

Bob Cisneros suggested that we should consider developing a document/guidelines for steel bridge geometric tolerances (fabrication & construction). These tolerances can stack on each other, and the designer should be aware of them.

Russ and Devin suggested guidance on available products, such as overhang brackets (including limits, clearance to adjacent structures, design if bearing against web).

Jihshya indicated that required girder fabrication geometry can be affected by bearing spring stiffness and placement of shoring systms.

It was noted that constructability issues are worked-out differently depending on the contract type (Design-Bid-Build, Design-Build, CMGC, etc.). There are advantages with Design-Build contract type regarding this issue.

There is general consensus that some type of guidance document is needed regarding how to resolve bridge plan issues discovered during construction, including how to proactively prevent them in advance and avoid labor-intensive details.

A survey of contractors, DOTs, and engineers might be helpful to collect guidance information and better understand constructability challenges.

Devin provided a list of additional future business ideas after the meeting.

5. Adjourn Ended at 10:44 am

AASHTO/NSBA Steel Bridge Collaboration

TG 13 Analysis of Steel Bridges

Crowne Plaza - French Quarter Hotel
New Orleans
Room Name: Grand Ballroom D

Task Group Mission: This Task Group focus has been the development of guidance on the issues related to steel girder bridge analysis and to educate Engineers so that they can better make decisions for their own projects.

Task Group Leadership
Chair: Deanna Nevling - HDR
Vice Chair: Francesco Russo - Russo Structural Services
Assigned Notetaker: Brandon Chavel – NSBA

NOTE: All meeting attachments can be found in TG 13 Analysis of Steel Bridges.

Meeting Agenda: 10/22/2024 (1:00 pm - 3:00 pm CCT)

13. Chairperson's Welcome (1:00 pm – 1:10 pm)
    a. AISC Antitrust Policy and Meeting Code of Conduct.
    b. Introductions (as needed).
    c. Approval of Previous Meeting Minutes.
14. General Announcements (1:10 pm – 1:25 pm)

Conferences/Research/Publications – Deanna Nevling

Deanna reminded the TG about the following upcoming events:

- TRB Annual Meeting, January 5-9, 2025, Washington DC
- AASHTO Steels and Metals Committee Meeting, April 2-4, 2025, Tampa, FL
- NASCC – The Steel Conference, April 2-4, 2025, Louisville, KY
- WTS International Conference, May 7-9, 2025, Toronto, Ontario
- International Bridge Conference, July 13-16, 2025, Pittsburgh, PA

NSBA Update – Brandon Chavel

Brandon provided an update on NSBA, including upcoming activities, recent publications, and on going projects. The following recent publicatiosn were noted:

- Guide to Navigating Routine Steel Bridge Design (aisc.org/streamlineddesign)
- Bolted Field Splice for Flexural Members (aisc.org/nsba-splice)
- Lean-on Bracing Reference Guide (aisc.org/leanonbracing)
- Uncoated Weathering Steel Reference Guide (aisc.org/uwsguide)
- Single Coat Inorganic Zinc Protection for Steel Bridges (aisc.org/sioz-report)
- Achieving Speed in Steel Bridge Fabrication (aisc.org/fasterbridgefab)

- Guidelines for the Design of Steel RR Bridges for Constructability and Fabrication (aisc.org/rrbridges)

Brandon also discussed the completion of NSBA's Fundamentals of Steel Bridge Engineering course and the lecture powerpoints. These teaching materials are for a professor/lecturer to be able to teach a collegiate level class dedicated to highway steel bridge design. The PPTs are available for free at AISC Education website as a Teaching Aid.

NSBA's Standard Designs for Straight I-Girder Bridges should be completed an published by the end of 2024. These standards include bridge designs for 1, 2, 3, and 4 span steel plate girder bridges.

FHWA Update – Dayi Wang, FHWA Steel Specialist

No update provided.

TRB AKB20 (Steel Bridges Committee) Update – Mike Culmo

Mike provided an overview of the TRB AKB20 Steel Bridges Committee, discussing the overall structure as well as future research needs that the committee has developed. Mike talked about having more collaboration with the AASHTO/NSBA Steel Bridge Collaboration. Mike's presentation is included in the Appendix of these meeting minutes.

AASHTO Bridge Update (T-14 Structural Steel Design) – Tony Ream

Tony noted that the next meetings are as follows:

- Winter AASHTO Steel and Metals Committee Meeting – 1/28/25 – 1/30/25, Tampa, FL
- Committee on Bridges and Structures – 5/31/25 – 6/6/-25

Tony also discussed upcoming changes for the 11th edition which will include: Prying action, Bend radius for diaphragm connection plates, shear lag factor, optional refined panel end shear strength from MBE. Also possible changes for web splices in high moment areas and CVN designation clarification. Tony's presentation is included in the Appendix of these meeting minutes.

15. Streamlining Analysis of Tied Arches," Jeff Svatora (1:25 pm – 1:55 pm)

Jeff presented on the benefits of steel bridge optimization. Jeff showed an example of a tied arch bridge, using static condensation, and could reduce the model analysis matric size by 99%, saving time in the analysis. Jeff then shared how this has been employed in a steel plate girder bridge, saving a significant amount of analysis and post processing time. Complex models can be scaled significantly to run and produce results much faster through this optimization process.

16. G13.2 Guidelines for Steel Truss Bridge Analysis - Current Status (1:55 pm – 2:05 pm)

The TG is currently waiting on final publication comments for this guideline document. The guideline should be published in 2025.

17. Software Validation and Checking Complex Models - Survey results document (2:15 PM to 2:30 PM)

Deanna reviewed the purpose for the survey, and how it was distributed to the bridge engineering community. 326 responses were received. Deanna reviewed some of the high-level survey results.

Volunteers that agreed to review the draft summary document include: Frank Russo, Jeff Svatora, Frank Artmont, Josh Orton, Kyle Smith, Brandon Chavel, Xan Cutcliff.

The TG agreed to develop an NSBA white paper that could be published on the website, and then a short MSC article that would summarize the survey and white paper, and push people to the white paper.

Natalie McCombs will lead the development of an IBC abstract for submission by October 25.

Based on this survey, the TG would like to develop a “standard of care” like document for software vendors..

18. TG13.1 Updates (2:30 pm to 3:00 pm)

TG13.1 section on Buckling and Stability is being reviewed and updated. Deanna briefly discussed what the small group is doing with this section. The group is looking for other volunteers, so please reach out to Deanna if you are interested in participating in this.

19. Adjourn (3:00 pm)

AASHTO/NSBA Steel Bridge Collaboration

TG 14 Field Repairs and Retrofits

Crowne Plaza - French Quarter Hotel
New Orleans
Room Name: Grand Ballroom D

Task Group Mission: This Task Group primarily focuses on providing practical solutions for design and implementation of field repairs and retrofits of existing steel bridges.

Task Group Leadership
Chair: Kyle Smith - GPI
Vice Chair: Nick Haltvick - Minnesota Department of Transportation
Assigned Notetaker: Travis Hopper - NSBA

Meeting Agenda: 10/23/2024 (8:00 am - Noon CT)

1. Chairperson's Welcome (8:00 am – 8:10 am)
   a. AISC Antitrust Policy and Meeting Code of Conduct. Done.
   b. Introductions (as needed). Done.
   c. Approval of Previous Meeting Minutes. Approved.
2. G14.3 Overview (8:10 am - 8:20 am)
   - The intention is to be a companion doc to G14.1 and G14.2.
   - Survey of State DOTs was conducted about 5 years ago that provided example details. The results were used as inspiration for the G14.3 details. TG 14 is not modifying the details, just providing comments, commentary, and context.
   - The approval process was reviewed.
   - An overview of an example final format of the detail sheets was provided (i.e., pages 1 through 5).
   - Cover page.
     - Kyle shared the draft cover page that will be used for each detail, including the Preface and Disclaimer.
     - There was a discussion about giving appropriate credit to the figure owners and the copyright owners.

Action Item: Travis to confirm with AISC Publications.

  - It was suggested to add a sentence to the Disclaimer saying that not all details that are provided are necessarily recommended.
  - Expand "local preference" to be "current national, state, and local preferences".
- Suggestion for the future: an appendix or similar reference that compares various repair options for a given type of damage, e.g., by characteristics such as cost.

3. Discuss G14.3 Detail Sheets and Comments (8:20 am - 11:50 am)

Kyle went over the general format of the repair detail sheets, e.g., title, repair ID, etc.

E01.01 – truss floorbeam strengthening

- Description: Strike "member" at several locations. "Clamped" to be replaced with "supported". See markups.
- Keywords: no comments on suggested additions.
- There is concern that this detail is not a suggested detail. A cover plate may be a better practice. Others thought that it may still be appropriate as a secondary or last resort option.
- Presentation on website: should recommendations be upfront on the website so users are clearly informed? Color coding could be one way to disseminate this.
- Should "bad" details be published? There could still be information gained from looking at poor details, but need to be considerate of Owners that have used "bad" details.
- Collaboration notes (see markups)
  - Provide an additional sub-header for alternate concepts.
  - Cover plate note. Consider moving this note earlier to the description or earlier in the bulleted list. Sentence added about this being a "first choice" alternative.

- WF note. Possibly orient the WF along the length of the existing bottom flange. Could also use other shapes such as angles, channels, bent plates, etc.
- Suggested to reach out to the owner to get more context on this detail before listing comments and recommendations.
- Field welding note to be updated to match similar notes in other details.
- Add note about weld size.
- Level of analysis. Include a question about the analysis when reaching out to the owner.
- Fatigue category at the post to repair plate connection.
- Field bolting. Reference RCSC instead of specifying a torque value.
- Steel grade. Add note about specifying Grade 50 (preferred, higher availability), but allowing Grade 36 if adequate.

- Details
    - Strike bridge name.

IME03.01 – Partial Steel Tub Girder Replacement

- Title. Keep as “tub”.
- Keywords. Add “trapezoidal box girder”.
- Description. Revise to note that repair limits were set at existing field splice locations. See markups.
- Details.
    - Concrete demo and removal notes. Redact notes.
    - Add context description about why the repair was necessary.
    - Suggested to delete the elevation view.
    - Prior to final publication, allow owners the opportunity to redact any identifying information, e.g., bridge name, road names, etc. AISC Publications to be asked about permissions.
- Collaboration Notes.

    - First note about the length of repair. Expand note to include considerations if the limits are not at field splices, i.e., cutting is required. In those cases, NDT and bracing should be considered.
    - Comment about satisfying current AASHTO specs. This should be inferred.
    - Add note about global stability and temporary bracing and shoring.

IME06.01 – Partial girder replacement with temporary support system

- Keywords. See markups.
- Cost Characterization. Add typical notes explaining that the cost is relative to other repair details, not other bases like bridge replacement. Add similar notes for all characterizations.
- Collaboration notes
    - Field welding note revision. See markups.
- References
    - Add sentence about heat straightening references.
- Plan sheets
    - Redact title block information
    - Comment about providing a minimum radius at any cut corners. Add a collaboration note.
    - Comment about longitudinal splice plates, accuracy of cut, and edge distances. Add a collaboration note.
    - Comment about splice plate sizes selected for installation methods. Add a collaboration note about alternative installation methods and procedures.

IME07.01 – Impact damage with localized T-section repair splice

- Title. Strike “impact damage with” to be consistent with other titles not focusing on the cause.
- Details

- Comment about removal limits and effect on temporary support needs. Add a collaboration note.
- Collaboration notes
  - Add note about system effects to be considered during jacking. See markups.
  - Field welding note simplified. See markups. Check that G14.2 is a sufficient reference for field welding. Also check G14.2 and AWS D1.5 to see if there is direction about removing live load prior to making groove welds and if there is direction about removing weld reinforcement.
  - Comment about adapting existing field splice details at the repair location. Rejected.
  - Note about the designer needing to conduct design checks. Move to the cover page in a new General Assumptions / General Notes section.
  - Note about paint. Remove from collaboration notes, potentially add to the General Assumptions / General Notes section.
- Characterizations
  - Cost. Reclassify as Medium.

4. Adjourn (11:58 pm)

AASHTO/NSBA Steel Bridge Collaboration

TG 15 Data Modeling for Interoperability

Crowne Plaza - French Quarter Hotel
New Orleans
Room Name: Grand Ballroom D

Task Group Mission: This Task Group's primary focus is on facilitating the development of bridge industry consensus standards for data description, modeling, and interoperability for integrated design, construction, and lifecycle management of bridges (i.e. BIM).

Task Group Leadership
Chair: Aaron Costin - University of Florida
Vice Chair: Grant Schmitz - HDR
Assigned Notetaker: Vin Bartucca - NSBA

Meeting Agenda: 10/22/2024 (9:00 am - Noon CT)

1. Chairperson's Welcome (9:00 am – 9:10 am)
    a. AISC Antitrust Policy and Meeting Code of Conduct.
    b. Introductions (as needed).
    c. Approval of Previous Meeting Minutes.
2. Announcements (9:10 am - 9:20 am)
    a. Overview of TG
3. Related Efforts Update (9:20 am - 9:30 am)
    a. TPF BIM for Bridges Phase 2
        i. Exchange Prioritization Working Group
            1. Prioritize three exchanges to cover in Phase 2
            2. In-depth review of the Bridge Lifecycle Management Overview Map established in Phase 1
            3. Further investigate the need for subtypes (steel, precast etc)
            4. Requested TG15 join as a strategic partner in Phase 2 (Joining Pool Fund Collaboration efforts)
                a. Confirm with the Main Committee

5. Phase 2 Methodology Report
    a. Develop a detailed methodology for delivering new exchanges in Phase 2
    b. Involved close collaboration with bSI, TPF Members, and Independent Industry consultant

b. TPF BIM for Infrastructure
    i. Using the data dictionary as their starting point
        1. Focusing on Roads, so they will be expanding to their own domain
    ii. Looking into Model as a Legal Document

c. buildingSMART International
    i. Provided an update on how bSI has been heavily involved in the TPF efforts to ensure alignment in the methodology and processes

4. BIM Technology Overview (9:30 am – 10:00 am)
    a. IFC, Process Maps, IDMs, IDS, Data Dictionary
        i. Discussions of terms and explanations for new members
        ii. IDS software - check/audit on Data and Requirements
        iii. Aaron discussed how TG 15 data (excel) has evolved throughout the process and will be incorporated into future efforts
        iv. Overview of the buildingSmart Data Dictionary
            1. https://search.bsdd.buildingsmart.org/uri/aashto/tpfBridge/2
            2. Example Data from the TPF BIM for Bridges

5. TG15 IDM (10:00 am - 10:30 am)
    a. Update
        i. Aaron will add new members to the document SharePoint
        ii. Request DOT/Owner Review of TG15 IDMs Process Map
            1. The Final As-Built is one of the few exchanges left to be defined
    b. Discussion
        i. Iowa ADCMS Bridge Pilot

        1. Focus on testing and implementation of IFC exchange requirements from TPF Phase 1
        2. Currently working with Bentley to incorporate TPF-5(32) Phase 1 requirements into OpenBridge Modeler

6. Data Dictionary (10:30 am - noon)
    a. Overview
        i. TG 15 data has been a major influence the TPF BIM for Bridges
        ii. The Pooled fund in developing a new process for data management and will produce a new standard format
        iii. Our work is being paused until this format is available, so we don't waste time working in the old Excel
    b. Working group
        i. Aaron will notify TG when we can commence work again
    c. Discussion
        i. QA/QC is important to ensure data accuracy
        ii. Aaron proposed to create a sub-task group for QA/QC Review if needed to look into this topic further
            1. Need to find someone to lead this
            2. if not, we will come back to this in the future
7. Adjourn

AASHTO/NSBA Steel Bridge Collaboration

TG 16 Orthotropic Deck Panels

Crowne Plaza - French Quarter Hotel
New Orleans
Room Name: Grand Ballroom C

Task Group Mission:
This Task Group aims to establish cost-effective design, fabrication and construction approaches for Orthotropic Steel Decks (OSD) to facilitate their use for bridges in the United States.

Task Group Leadership
Chair: Sougata Roy - Consultant
Vice Chair: Frank Artmont - Modjeski & Masters, Inc.
Assigned Notetaker: Anthony Peterson - NSBA

Meeting Agenda: 10/22/2024 (9:00 am – Noon CT)

1. Chairperson's Welcome (9:00 am – 9:10 am) Done.
    a. AISC Antitrust Policy and Meeting Code of Conduct. Done.
    b. Introductions (as needed). Done.
    c. Approval of Previous Meeting Minutes. Done.
2. General updates and announcements
    a. Workshop at IBC, 2025? Our proposal was rejected for the 2024 IBC. We are proposing to present again regarding OSD bridges at the 2025 IBC. Looks promising to be accepted this time. Submission is due tomorrow. Presentation focuses on the design, fabrication and installation of OSD's. Post meeting note: The proposal has been submitted on 10/22/24.
    b. Dave Stoddard described the current effort to design and install several small OSD bridges in Iowa. Five 50' long single span bridges with the same width, so all five OSD's would be the same for all five. This is an effort to promote OSD's being used on short span bridges on a routine basis. Still waiting for the FHWA AID grant decision before proceeding further. Tony Peterson suggested that Justin Dahlberg could start looking into OSD design costs and who would complete it now, so things are ready to proceed quickly once the grant is approved.
3. Review of mission statement:

Updated mission statement as follows,

“This Task Group aims to establish cost-effective design, fabrication and construction approaches for Orthotropic Steel Decks (OSD) to facilitate their use for bridges in the United States.”

4. Short Span Orthotropic Update (SSSBA) collaboration update

   See item 2b above. Also, SSSBA has reached out to steel fabricators to probe interest and expertise regarding OSD’s. Response in general was that the fabricatorscontacted are not currently comfortable with producing OSD’s.

5. General update on ongoing projects/research

   Throgs Neck Bridge redecking employing OSD is nearing completion. Samy Elsayed volunteered to share the experience with fabrication and installation of the deck with the committee in a future meeting.

   During this discussion, it was asked if there are OSD fabrication/capabilities in the USA. Some fabricators with the capabilities exist, but they are limited and cannot meet the demand when large OSD projects arise. This is why offshore fabricators have been used on large recent projects.

6. Technical Presentation

   "Improving the Manufacturability of Extended Cut-Out Rib-to-Floor Beam Connections for Orthotropic Steel Decks" – Mr. Ian Hodgson, PE, SE, Lehigh University.

   Ian gave the presentation. Trapizoidal ribs with several different types of cut-outs/welds used at the floorbeam connection. Cut-outs included perpendicular and tangential to the rib web. Weld types include partial penetration and fillet wrap-around. The physical test model appeared to use tangential cut-out and partial joint penetration welds. Current conclusions are the cut-out type tested performed the best. PJP welds also performed the best, but multiple pass fillet welds also looked promising. Weld profile is critical to good performance. Note that all welding was done with manual stick welding, so maintaining quality is essential. Use the EC RFB connection as described in the study. Using a thicker (3/4”} deck is recommended. Open rib type OSD systems were not included in this study, but likely have several economical benefits compared to trapizoidal rib type tested in this study.

7. Review of Committee Revised Goals – Action Items

   a. Targeted presentations (20 minutes each) due date 02/01/24

      i. Owners – Sougata Roy (lead), Terry Logan

         A draft presentation has been developed and is being refined.

      ii. Designers – Frank Artmont (lead), Justin Dahlberg, Keith Greising,

         Sougata Roy and Frank Artmont to provide an update in a future meeting.

iii. Fabricators – Terry Logan (lead), Chris Haberle, Ronnie Medlock

Terry shared a presentation during a previous interim virtual meeting. No update was available during this meeting due to Terry's absence.

Due to lack of attendance from key members, the topic could not be covered in detail during this meeting. Will be addressed in upcoming meetings.

b. MSC Article – Justing Dahlberg (lead), Frank Artmont, Duncan Patterson, Terry, Logan, Ronnie Medlock, Sougata Roy, Tom Murphy – due date 11/30/23
Justin prepared a draft of the article and received review comments from other co-authors. The revised article to be discussed among the group in upcoming virtual meetings

c. Filling the Knowledge Gaps
   i. Rough plans for FHWA optional task, Justing Dahlberg – 12/31/23

   An inquiry was sent out to several steel fabricators asking about their interest and capabilities for fabricating OSD decks. Fabricators responded with a desire for more information regarding designs prior to providing any further input..

   The FHWA AID grant, if awarded, is anticipated to cover all/portion of the OSD design effort in addition to covering the OSD fabrication/installation. The FHWA Level 1 Design Guide optional task to cover design efforts.

8. Discussion on State of Practice Synthesis Document

a. Review sections This is still in the works anticipating a major update by the end of 2024. The major purpose of this document is to be an official Guideline document on the design/fabrication of OSD panels.

Terry Logan has made considerable progress on his portions of the document. However, we are awaiting getting his portions of the document to insert into the master document.

Action Item: Sougata/Frank to contact Terry and get him to share the document with the committee.

Action Item: Ian Hodgson and Corey Greco want to be part of this review committee. Sougata will contact both of them.

b. Monthly virtual meetings schedule

Action Item: One interim virtual meeting in between the in-person collaboration meetings is being held so far. Sougata will schedule additional meetings as required, two are anticipated in the near future.

9. Old business and additional discussion

   Frank Russo suggested that we consider getting someone to talk (at the IBC Conference) about OSD evolution internationally (Europe/Asia) regarding successes/problems/costs. This could be combined with a presenter focusing on domestic use/evolution of OSD bridges. This could be a very useful presentation for all, and help promote more use of OSD bridges in the USA. Most agreed that this is a good idea.

10. Adjourn

Concluded at 11:34 am.

AASHTO/NSBA Steel Bridge Collaboration

TG 18 Duplex Stainless Steel

Crowne Plaza - French Quarter Hotel
New Orleans
Room Name: Grand Ballroom C

Task Group Mission: This Task Group will include experts from the carbon steel and stainless steel communities and will work together to develop standalone material, design, welding, fabrication, and construction guide specifications for using duplex stainless steel for vehicular plate girder bridges. These guide specifications will be largely based on existing duplex stainless steel design and fabrication specifications (such as AISC 370), but will be revised to provide the same formatting and flow as the standards typically used in the steel bridge community, such as AASHTO LRFD or AASHTO/AWS D1.5.

Task Group Leadership
Chair: Jason Provines - Virginia Department of Transportation
Vice Chair: Nancy Baddoo - Steel Construction Institute
Assigned Notetaker: Anthony Peterson - NSBA

Meeting Agenda: 10/23/2024 (10:00 am – 12:00 pm CT)

1. **Chairperson's Welcome (10:00 am – 10:10 am)**
    a. AISC Antitrust Policy and Meeting Code of Conduct.
    b. Introductions (as needed).
    c. Approval of Previous Meeting Minutes.
2. **Review of TG18 Mission and Background (10:10 am – 10:20 am)**

    Jason gave an overview of the mission of TG18, reviewed what duplex stainless steel is, and presented potential applications in which duplex stainless steel could be used in the USA bridge market. TG18 ultimately plans to have a material, design, welding, bolting, fabrication and construction specification for 2205 duplex stainless steel. The material and design specification are first in line to be completed, and both have passed the TG and MC ballot stages. The other specifications (welding, bolting, etc.) will be subsequentally completed. Once all are completed, they will all work together as a complete package for designers/engineers to use.

    Originally, there were no plans to develop a duplex bolting specification. However, during balloting of the design specification, there were discussions about where to include topics such as bolting ordering requirements, dimensional requirements, rotational capacity testing, and lubrication. These topics did not fit well within the design specification, so the decision was made to develop a new specification devoted to duplex stainless steel bolting. This specification will be based on ASTM F3125.

Jason and Nancy have had discussions with several state DOTs to see their potential interest in using duplex stainless steel for bridges. In general, they were interested, especially in locations where their coated steel bridges are subject to de-icing salts and require regular maintenance and in locations where maintenance is extremely difficult, such as over railroads. Some potential obstacles include perceived cost, actual cost, and unknown supply chain.

3. **Review of Balloting (10:10 am - 11:20 am)**

   a. **Review of TG Balloting Process for S18.1 and S18.2**

      The TG18 balloting completed on 8/5/24. The ballots for S18.1 (duplex materials spec) and S18.2 (duplex design spec) both had 100% participation, with approximately 85-90% affirmative votes. S18.1 received 17 comments, and S18.2 received 79 comments. All comments were considered and were incorporated into their respective specification as deemed appropriate.

   b. **Overall Review of MC Balloting Process for S18.1 and S18.2**

      The MC balloting for both documents completed on 10/21/24. Both documents had approximately 90% participation, with approximately 80-85% affirmative votes. S18.1 received 48 comments, and S18.2 received 73 comments. Comments will be incorporated into both document as deemed appropriate, and both documents will be submitted to Chris Garrell no later than 12/1/24.

      There was discussion regarding whether these documents are “S” or “G” documents. The decision was made to leave them as “S” documents since they present requirements, instead of best practices. It was also recommended call them “specifications” instead of “guide specifications” to eliminate confusion whether they are guides or specifications.

      Both documents contain references to future TG18 documents, such as the forthcoming welding spec, bolting spec, etc. This is problematic since these documents have not been balloted or published. References to these documents should be moved to the commentary. Once all of the documents have been published, future editions of these specifications can include references to these other documents within the specifications.

      Jason and Nancy presented an intro to both documents to the AASHTO Steel and Metals Committee in Charlotte, NC on 9/26/24. The committee stated that they wanted guidance on how to repair girder strikes to be included in the family of TG18 documents if duplex was to be used for bridges.

   c. **Discussion of Comments Received for S18.1 During MC Ballot**

      S18.1 refers to ASTM A240 and ASTM A480 for the requirements of 2205. Some information from ASTM A240 and ASTM A480 is repeated within S18.1. The decision was made to remove this replicated information for clarity. If desired, some of this information can be included in commentary to make it more userfriendly, but it need to be removed from specification language. There was discussion about whether S18.1 could only reference ASTM A240 since ASTM A240 refers to ASTM A480. However, the decision was made to keep the dual references to both ASTM A240 and ASTM A480 since this is standard practice within the stainless steel community.

Limiting the thickness to 4” maximum was discussed and determined to be appropriate. Explanation for this limit should be included in the commentary. This limit was included to mirror the thickness limits in ASTM A709. This limit could be increased, provided the plate material can still meet all of the requirements. Andy Personett commented that New Castle Stainless routinely uses plasma to cut 4” thick duplex stainless steel plates.

We should consider incorporating all of the mechanical property requirements into a single table. This would mean having different sections for test methods, but then a separate section would be devoted to the requirements. This table could include the 4” thickness limitation, similar to how ASTM A709 imposes it.

The section on Ordering Requirements has several comments from Heather Gilmer that Jason will be addressing/incorporating.

In the section on Repair of Plate by Welding, remove “manufacturer or supplier” to ensure that no one can do repairs of the plates until they are received by the fabricator.

For ASTM A709, CVN testing is only required for tension members. S18.1 requires CVN testing for all members (tension and compression) due to the need to verify the intermetallic properties of the duplex stainless steel. Need to make this more clear in the commentary.

The decision was made to remove the Buy America Requirements section from S18.1 and move it to the forthcoming fabrication specification. This will mirror how it is specified and discussed for carbon steel bridges. Move the associated commentary to the fabrication spec that discusses that duplex stainless steel is manufactured domestically and internationally.

d. Discussion of Comments Received for S18.2 During MC Ballot

Nancy will add more information about the reliability of the design provisions in S18.2 and how it is the same as for the AASHTO LRFD Bridge Design Specifications.

S18.2 was modeled to follow the same format as the AASHTO LRFD Bridge Specifications and be a supplementary specification.

Many comments on bolting specifications were received. S18.2 was revised to only cover heavy hex bolts/nuts to match the AASHTO LRFD Bridge Design Specifications. S18.2 was also revised to cover a single alloy for duplex bolted fasteners. This was done for simplification. S18.2 had an appendix to cover bolt rotational capacity test requirements, but this will be moved into the forthcoming duplex bolting specifcation.

Comments were received about allowing undermatched fillers in Section 6.13. This was revised to require fillers to have at least matching strengths.

A comment was raised regarding whether the title of the document should be changed to “plate girders” to more accurately reflect the scope of the document. Chris Garrell indicated that the title of a document can be changed in future editions if needed. However, we would prefer a general, consistent title for the document, so it will likely remain as-is.

There were discussions about how to include cost in this specifications. Including specific dollar amounts is not appropriate, but discussions about what should be considered with regard to cost should be included. Cost discussions can be kept vague, but should direct the engineer what to consider.

4. Discussion of S18.3, Welding Spec (11:20 am - 11:50 am)

This specification is still in the process of being developed, but the overall plan is for it to be a supplementary specification to AWS D1.5 with some references to AWS D1.6. This document will point out the differences, additions, deletions, etc. of AWS D1.5. Commentary will be included Also, the commentary will provide explain differences related to welding carbon steel vs. duplex stainless steel.

Discussion was had about whether needle guns are regularly used by fabricators. They are regularly used so reference to needle guns should be kept.

Discussion was had about grinding limits on thermally cut edges. Currently there requirement that all thermally cut edges should be ground 1/8”. This limit comes from AISC 370. This seems like a lot. Jason and Nancy will look into this determine the rationale for why AISC 370 included it. We need to understand if this is a science-based limit. Nearly everyone in the meeting thought 1/8” seems excessive and would increase cost.

If figures from AWS D1.5 are desired, it is recommended that we redraw them to avoid any copyright issues and to ensure that we have a high resolution figure.

Jason plans to send out a draft version of this specification to a small group of TG18 members and friends for an information review/comment stage within the next 1-2 months.

5. Open Discussion (11:50 am – 11:55 am)

Adjourned at 11:55 am

AASHTO/NSBA Steel Bridge Collaboration

MC Main Committee

Crowne Plaza - French Quarter Hotel
New Orleans
Room Name: Grand Ballroom D

Task Group Mission: The Collaboration Main Committee provides oversight and guidance for all Task Groups. A meeting of the Main Committee will take place at the end of each Collaboration meeting.

Task Group Leadership
Chair: Ronnie Medlock - High Steel Structures
Vice Chair: Christina Freeman - Florida Department of Transportation
Assigned Notetaker: Christopher Garrell - NSBA

Meeting Agenda: 10/24/2024 (11:00 am - 1:00 pm CT)

1. Chairperson's Welcome (11:00 am – 11:15 am)
    a. AISC Antitrust Policy and Meeting Code of Conduct.
    b. Introductions (as needed).
    c. Approval of Previous Meeting Minutes.
2. Task Group Reports - Approximately five minutes each (11:15 am – 12:40 pm)
    a. TG 1 - Randy Hasrrison (W&W|AFCO Steel)
        - G1.1 is focus. The group plans on focusing on approval review process (e.g., Iowa practice) going forward accuntign for the new drawing production and modeling technics and processess. It was noted that some states have their review schedule based on drawing count regardless of what is on them.
        - Tub girders are being discussed. Regarding hatchs and door example from states, the group felt that rather than showing details and examples for hatches, we should refer them to commericially available hatches and doors.
        - Discussion originated from Washington DOT about the number of shop drawings they are receiving. In this case from software applications that are outputting details to individial sheet rather than a "gathering sheet". It may be advisable that fabricators/detailers consider consolidating their drawings.

b. TG 2 - Heather Gilmer (Pennoni)

Meeting included discussion of AASHTO Fabrication specification.

- TG2 still works in an advisory role and suggest changes that are then proposed to AASHTO for consideration in future editions.
- Need to add self-quenching and tempering grades; these are going into D1.5.
- Scribing and etching task group is making progress. A draft has been submitted and reviewed.
- Check assembly task group formed to review and provide guidance. Including support conditions.
- Web flatness was moved to fabrication specification and removed from AWS. Research based provision for handling web flatness. Was provided to AWS, however now being considered for the fabrication specification. This work has been provided to AASHTO.
- Low stress stamps and the position of AREMA and their location relative to weld toes. Group did not fee this was necessary.
- Masking of connections was sent to TG8.
- Split tees and A6 tolerances. Given that these are often bracing members, it was thought this belongs in TG11 to decide what limits are best and if A6 is best.
- Camber checked in no-load, but no requirment to set girders back to verticle when checking sweep to ensure that the curve is maintained.
- Need to look at the 5t radius limit

The group also discuss the G2.2 Resolution of Fabrication Errors document.

- New items include preheat; too much versus not enough.
- Also discussed was the case where members are cut too short. Details have been created and supporting text is being developed next.
- Misaligments due to tolerances is another area of interest and a group has been formed to develop language.

- The update of G2.2 is still targetting 2026.

Lastly, existing S2.1 will be archived.

c. TG 4 - Jamie Hilton (KTA-Tator, Inc.)
    - G4.2 was reviewed by the AASHTO Steel and Metals Committee, and we received two comments. They will be addressed, and then the document will be ready for the main AASHTO committee ballot.
    - S4.3 was balloted to the TG4 task group in August, and we received over a hundred comments. Even though the ballot passed, we realized the document is not ready. We have addressed about half of the comments, and still have many more to go. We will continue to address the comments through virtual meetings and will re-ballot the document in the task group before the Spring meeting.

d. TG 8 – Johnnie Miller (KTA-Tator, Inc.)
    - NSBA contected Todd Bennet and Kelly Singer who chair the COMP. Considering a Pooled Fund Study or NCHRP Study to look into alternative coatings evaluation protocols to better reflect realworkd environments and performance evaluation. Looking for more support for DOTs; will send a survey. NSBA has alocated funding that could be used to perform a synthesis study and testing in 2025.
    - Completed review of S8.1 comments received from TG ballot in 2023. Once a cleaned-up version has been created it will be balloted by the Main Committee and shared with both AMPP and AASHTO Steel and Metals Committee.
    - Not much progress on S8.4 at this point.
    - Consider revising the name of the Task Group. This can be taken up as new business.

e. TG 9 - Michael Culmo (CHA Consulting, Inc.)

- Discussed future enhancment of G9.1 Add chapter for preservation and replacment. Mike is drafting that. Add notes on current bearing drawings in existing G9.1 indicating dirction to ensure bevel plate.
- Deck joints were discussed also to reflect the new naming of AASHTO committees. Task Group may change name to include deck joints. Details on steel girder design, fabricaton, detailing and etc. Not a new document on joint but how they specificially relate to steel designs.
- Bearing spreadsheet was discussed and whether there was a need for one. Many consultants have their own.
- The group may consider developing research needs statements for bearings.

f. TG 10 - Brian Witte (Parsons)

TG10 has had several meetings since the spring Collaboration meeting focused on the new G10.2. Right now the document is 120 pages in length. Right now targeting 2027 for balloting by AASHTO with Collaboration ballotting starting in 2025. However, the Task Group is considering whether of not the new document should be an AASHTO documemt of not.

g. TG 11 - Brandon Chavel (NSBA)

- Tony Ream gave presentation on a long span plate girder bridge and challenges it posed.
- Guideline document for cross-frame has received a preliminary review. Comments have been addressed and the document finalized. Targetting November for a TG ballot. Still targetting 2026 for publication.
- The group them discussed the new phased construction and widenings document. A brainstorming session took place to identify key chapters and needs.

h. TG 12 - Christina Freeman (FDOT)

- Ryan Jenkins presentation on Pittsburgh airport front bridge. Topic of steel bent caps in this project with architectual feature and miltilevel complexity.

- G12.2 is still in typesetting. There is some uncertenty regarding the AASHTO publishing schedule which may delay the final posting of the document.

i. TG 13 – Deanna Nevling (HDR)

- Had general updated from NSBA and the AASHTO S/M committee and TRB.
- Had a presentation on streamlining arches and its relationship to complext analysis.
- Software vaidation survey results were discussed. 325 responses were received.
- The group is still being processed with a report being created and an MSC article submitted. Want to develop a checkist for software venders to evaluate their products.
- Outline for buckling and global stability incorporate into G13.1. The group is meeting monthly.

j. TG 14 - Kyle Smith (GPI Construction Engineering)

- Focused on detail sheets for G14.3. Details from 2020 survey are being turned into individial repairs. At this point 16 have been reviewed. Working on presentation and formatting.
- Reviewed five detail sheets during the meeting this week. Intend to ballot these in small batches. These will not be official AASHTO documents and only published as NSBA documents.
- Developing a complementary user guide for the detail sheets and website layout.

k. TG 15 - Aaron Costin (University of Florida)

Most productive meeting to date. The discussion focused on industry and the pooled fund study and how they are advancing on digital exchange. Standards document will be released from pooled fund in the next year. Task Group will then be able to contribute directly.

l. TG 16 - Sougata Roy (Consultant)

- Discussion among intersted groups.
- Presentation by Lehigh looking at weld details that may produce better fategue and cost.
- Submitted proposal for workshop at 2025 IBC which will include international participants to learn more about what may be done outside the US. IBC is in July and abstracts are currently being accepted until October 25. It is likley the abstract submission date will be extended.
- Task Group has three focuses: owners, designers and fabricators.
- Some members were unable to attend this week's meeting, so a follow-up call will be scheduled. An MSC article is being developed. The group is also working on a synthesis document of manufacturable orthotropic deck information; this is still in the works.

m. TG 17 - Jennifer Pazdon (CAST CONNEX)
   - Meeting started with a prsentation from Raymond Monroe - Steel Founders Association.
   - The dicussion then turned to resolving how welding and additive are addressed in AASHTO versis the casting world today. Specifically production welding versus fabrication welding.
   - Transparancy and responsibility are still being discussed.
   - Virtual monthly meetings will continue.

n. TG 18 - Jason Provines (VDOT)
   - Started meeting by reviewing mission and provide backgroud on duplex steel. Considering developing a new stainless steel bolting specification.
   - Most of the meeting was spent reviewing the recent balloting of S18.1 and S18.2. The MC ballot recently closed and the comments received are being reviewed at this time. Also has been presented to and reviewed by AASHTO Steel and Metals Committee. Comments were recived from TxDOT. Guidance on repair of damage needs to be addressed along with considerations for existing design software.

3. Publication Schedule (12:40 pm – 12:45 pm)
    - S4.1 has completed typesetting and is currently in the hands of AASHTO Publishing for final review.
    - There currently is no estimate for when they may start or finish their review. G12.2 and G13.2 are in typesetting at this time and should be completed early next year. Both still have to complete a final review by AASHTO Publishing prior to being posted. At this time, dates provided to TG4, TG12 and TG13 chairs remain unchanged.
    - There are seven documents that have been targetted for 2026. They are G1.2, G4.4, S4.3, S8.1, G11.1, G12.1, and S17.1. AASHTO Steel and Metals committee is only allowing three documents per year. The publishing schedule will need to be revisted and prioritized.
4. Other Business? (12:45 pm – 1:00 pm)
    - Next meeting is in Philadelphia April 29 – May 1.
    - Looking to fix meeting dates for meetings going forward. The group liked the idea of locking meetings to a specifc month and week going forward but had concerns about fitting in with other meetings and holiday calendars. Garrell will create a survey of specific dates for a 2-year window and circulate it among Collaoration leadership.
5. Adjourn

Appendix A - Collaboration Document Status

Document	Status	Year Completed/Targeted	Task Group	Task Group Name	Document Title
G1.3.2002	Released	2002	1	Detailing	Shop Detail Drawing Presentation Guidelines
G1.2.2003	Released	2003	1	Detailing	Design Drawing Presentation Guidelines
G1.4.2006	Released	2006	1	Detailing	Guidelines for Design Details
G1.1.2020	Released	2020	1	Detailing	Shop Drawings Approval Review/Approval Guide
G1.3	Update - In-Progress	Unknown	1	Detailing	Shop Detail Drawing Presentation Guidelines
G1.2	Update - In-Progress	2026	1	Detailing	Design Drawing Presentation Guidelines
S2.1.2018	Archived	2018	2	Fabrication and Repair	Steel Bridge Fabrication Guide Specification
G2.2.2016	Released	2016	2	Fabrication and Repair	Guidelines for Resolution of Steel Bridge Fabrication Errors
G2.2	Update - In-Progress	Unknown	2	Fabrication and Repair	Guidelines for Resolution of Steel Bridge Fabrication Errors
S4.1.2002	Archived	2002	4	QC/QA	Steel Bridge Fabrication QC/QA Guide Specification
G4.4.2006	Released	2006	4	QC/QA	Sample Owners Quality Assurance Manual
G4.1.2019	Released	2019	4	QC/QA	Steel Bridge Fabrication QC/QA Guidelines
G4.1	Passed Main Committee Ballot	2025	4	QC/QA	Steel Bridge Fabrication QC/QA Guidelines
G4.2.2021	Released	2021	4	QC/QA	Guidelines for the Qualification of Structural Bolting Inspectors
G4.2	Passed AASHTO COBS Ballot	2024	4	QC/QA	Guidelines for the Qualification of Structural Bolting Inspectors
G4.4	Update - In-Progress	2026	4	QC/QA	Sample Owners Quality Assurance Manual
S4.3	On Hold	2026	4	QC/QA	Specification for Steel Bridge Third Party Quality Assurance
S8.1.2014	Released	2014	8	Coatings	Guide Specification for Application of Coating Systems
S8.1	Completed Task Group Ballot	2026	8	Coatings	Guide Specification for Application of Coating Systems
S8.2.2017	Released	2017	8	Coatings	Thermal Spray Coating Guide
S8.3	Released	2022	8	Coatings	Galvanizing Guide Specification
G8.4	New - In-Progress	Unknown	8	Coatings	Detailing for Coatings and Weathering Steel
G9.1	Released	2022	9	Bearings	Steel Bridge Bearing Design and Detailing Guidelines
S10.1.2023	Released	2023	10	Erection	Steel Bridge Erection Guide Specification
G10.2	New - In-Progress	2027	10	Erection	Behavior of Steel Bridges during Erection
G11.1	On Hold	2026	11	Design	Guidelines for the Design of Cross-frame and Diaphragm Members
G12.1.2020	Released	2020	12	Design for Constructability and Fabrication	Guidelines to Design for Constructability and Fabrication
G12.1	Update - In-Progress	2026	12	Design for Constructability and Fabrication	Guidelines to Design for Constructability and Fabrication
G12.2	Passed AASHTO COBS Ballot	2024	12	Design for Constructability and Fabrication	Guidelines for Steel Bent Caps
G13.1.2019	Released	2019	13	Analysis of Steel Bridges	Guidelines for Steel Girder Bridge Analysis
G13.2	Passed AASHTO COBS Ballot	2024	13	Analysis of Steel Bridges	Guidelines for the Analysis of Trusses
G14.1.2021	Released	2021	14	Field Repairs and Retrofits	Maintenance Guidelines for Steel Bridges to Address Fatigue Cracking and Details at Risk of Constraint Induced Fracture
G14.2.2023	Released	2023	14	Field Repairs and Retrofits	Guidelines for Field Repairs and Retrofits of Steel Bridges
G14.3	New - In-Progress	NA	14	Field Repairs and Retrofits	Database of Sample Field Repair and Retrofit Details for Steel Bridges
G15.10	On Hold	Unknown	15	Data Modeling for Interoperability	BrIM Process Model Definition for Steel Bridge Erection
G15.1	On Hold	Unknown	15	Data Modeling for Interoperability	Designer/Fabricator Exchange
G16.1	New - In-Progress	Unknown	16	Orthotropic Deck Panels	Guidelines for the Manufacture of Orthotropic Decks and State of Practice
S17.1	New - In-Progress	2026	17	Steel Castings	Guide Specification for Cast Steel Connections
S18.1	Passed Main Committee Ballot	2025	18	Duplex Stainless Steel	Guide Specification for Structural Duplex Stainless Steel Bridge Plate Materials
S18.2	Passed Main Committee Ballot	2025	18	Duplex Stainless Steel	Guide Specification for Design of Structural Duplex Stainless Steel Bridges

Document	Status	Year Completed/Targeted	Task Group	Task Group Name	Document Title
S18.3	New - In-Progress	Unknown	18	Duplex Stainless Steel	Guide Specification for Duplex Stainless Steel - Welding

Appendix B – Member Rosters (2024 – 2025)

TG 1 Detailing

First Name	Last Name	Company	Professional Title	Primary Business Type
Randy	Harrison	W&W|AFCO Steel	Manager Bridge Drafting	Fabricator
Domenic	Coletti	HDR	Principal Professional Associate	Consultant
Brad	Dillman	High Steel Structures	VP of Engineering	Fabricator
Keith	Griesing	Hardesty & Hanover, LLC	Chief Technical Officer	Consultant
Yuying	Hu	MnDOT	Assistant Fabrication Methods Engineer	Bridge Owner
Zane	Keniston	QMC Auditing		Inspection Services
Frank	Kingston	abs Structural Corporation	President	Detailer
Jihshya	Lin	MnDOT	Bridge Evaluation and Fabrication Methods Engineer	Bridge Owner
Eric	Rau	HDR	Senior Bridge Engineer	Consultant
Francesco	Russo	Russo Structural Services	Principal	Consultant
William	Salle	LB Construction		Contractor
Jason	Stith	Michael Baker International	Technical Manager	Consultant
Jonathan	Stratton	Eastern Steel Works, Inc.	Managing Partner	Fabricator
Brian	Watson	HDR	Senior Bridge Engineer	Consultant
Brian	Wolfe	MDTA	Deputy Director of Engineering	Bridge Owner
Gary	Wisch	DeLong's, Inc.	Vice President, Engineering	Fabricator

TG 2 Fabrication and Repair

First Name	Last Name	Company	Professional Title	Primary Business Type
Heather	Gilmer	Pennoni	Senior Engineer	Inspection Services
Art	Bustos	AISC	Certification Program Analyst	Trade Organization
Hannah	Cheng	New Jersey DOT	Project Engineer	Bridge Owner
Robert	Connor	Purdue University	Professor	Academia
Donn	Digamon	Georgia Department of Transportation	Bridge Design Group Leader	Bridge Owner
Brad	Dillman	High Steel Structures	VP of Engineering	Fabricator
Jon	Edwards	DOT Quality Services	Technical Director	Inspection Services
John	Gast	Consultant	Steel Bridge Erection Consultant	Consultant
Jason	Gramlick	California Department of Transportation	Associate Steel Inspector	Bridge Owner
Keith	Griesing	Hardesty & Hanover, LLC	Chief Technical Officer	Consultant
Randy	Harrison	W&W|AFCO Steel	Manager Bridge Drafting	Fabricator
Jamie	Hilton	KTA-Tator, Inc.	Vice President	Inspection Services
Dave	Johnson	Industrial Steel Construction, Inc.	0	Fabricator
Zane	Keniston	QMC Auditing	0	Inspection Services
Jihshya	Lin	MnDOT	Bridge Evaluation and Fabrication Methods Engineer	Bridge Owner
Ronnie	Medlock	High Steel Structures	VP - Technical Services	Fabricator
Teresa	Michalk	Texas DOT Material and Tests Div.	Transportation Engineer	Bridge Owner
Eric	Rau	HDR	Senior Bridge Engineer	Consultant
Sougata	Roy	Consultant	0	Consultant
Phillip	Sauser	UH Services Group	0	Inspection Services
Gerard	Sova	Hardesty & Hanover, LLC	Structural Engineer	Consultant
David	Stoddard	SSAB Americas	Senior Application Engineer	Material Producer
Jonathan	Stratton	Eastern Steel Works, Inc.	Managing Partner	Fabricator
Brad	Streeter	Scougal Rubber Corporation	Quality Manager	Fabricator
Gary	Wisch	DeLong's, Inc.	Vice President, Engineering	Fabricator
Duncan	Paterson	Alfred Benesch & Company	Technical Manager	Consultant

TG 4 QC/QA

First Name	Last Name	Company	Professional Title	Primary Business Type
Jamie	Hilton	KTA-Tator, Inc.	Vice President	Inspection Services
Art	Bustos	AISC	Certification Program Analyst	Trade Organization
Matthew	Conso	KTA-Tator, Inc.	Engineer/Project Management Specialist	Inspection Services
Terry	Cummings	TRC Solutions	Project Manager	Inspection Services
Melissa	Dawson	WSP	Structural Engineer	Consultant
Heather	Gilmer	Pennoni	Senior Engineer	Inspection Services
Chad	Hawkins	Infrastructure Consulting and Engineering	Materials Laboratory Manager	Consultant
Robert	Horwhat	TRC Solutions	Director – Structural Materials Inspection	Inspection Services
Dave	Johnson	Industrial Steel Construction, Inc.		Fabricator
Zane	Keniston	QMC Auditing		Inspection Services
Terry	Logan	Atema, Inc.	VP and Director of Overseas Operations	Inspection Services
Teresa	Michalk	Texas DOT Material and Tests Div.	Transportation Engineer	Bridge Owner
Anna	Petroski	Atema, Inc.	President	Inspection Services
Shawn	Potter	Contech Engineering	Senior Quality Engineer	Fabricator
Jeremy	Rice	Veritas Steel	Process Improvement Coordinator	Fabricator
Phillip	Sauser	UH Services Group		Inspection Services
Jonathan	Stratton	Eastern Steel Works, Inc.	Managing Partner	Fabricator
Brad	Streeter	Scougal Rubber Corporation	Quality Manager	Fabricator
Maury	Tayarani	Pennoni	Senior Engineer	Inspection Services
Gary	Wisch	DeLong's, Inc.	Vice President, Engineering	Fabricator
Robin	Dunlap	High Steel Structures	Quality Control Manager	Fabricator

TG 8 Coatings

First Name	Last Name	Company	Professional Title	Primary Business Type
Peter	Ault	Elzly Technology/KTA Tator		Inspection Services
Caroline	Bennett	University of Kansas	Associate Professor	Academia
Derrick	Castle	Sherwin Williams		Coatings
William	Corbett	KTA-Tator, Inc.	Chief Operating Officer	Consultant
Terry	Cummings	TRC Solutions	Project Manager	Inspection Services
Jon	Edwards	DOT Quality Services	Technical Director	Inspection Services
Heather	Gilmer	Pennoni	Senior Engineer	Inspection Services
Jamie	Hilton	KTA-Tator, Inc.	Vice President	Inspection Services
Zane	Keniston	QMC Auditing		Inspection Services
Kara	Lorenz	High Steel Structures, LLC	Specifications Specialist	Fabricator
Ronnie	Medlock	High Steel Structures	VP - Technical Services	Fabricator
Teresa	Michalk	Texas DOT Material and Tests Div.	Transportation Engineer	Bridge Owner
Shawn	Potter	Contech Engineering	Senior Quality Engineer	Fabricator
David	Stoddard	SSAB Americas	Senior Application Engineer	Material Producer
Brad	Streeter	Scougal Rubber Corporation	Quality Manager	Fabricator
Maury	Tayarani	Pennoni	Senior Engineer	Inspection Services
Gary	Wisch	DeLong's, Inc.	Vice President, Engineering	Fabricator
Johnnie	Miller	KTA-Tator, Inc.	Senior Project Engineer	Inspection Services

TG 9 Bearings

First Name	Last Name	Company	Professional Title	Primary Business Type
Michael	Culmo	CHA Consulting, Inc.	Chief Bridge Engineer	Consultant
Robert	Brantley	STV Incorporated	0	Consultant
Domenic	Coletti	HDR	Principal Professional Associate	Consultant
Zane	Keniston	QMC Auditing	0	Inspection Services
Jihshya	Lin	MnDOT	Bridge Evaluation and Fabrication Methods Engineer	Bridge Owner
Teresa	Michalk	Texas DOT Material and Tests Div.	Transportation Engineer	Bridge Owner
Abbas	Mokhtar-zadeh	Westinghouse, Stone & Webster	0	Contractor
Sougata	Roy	Consultant	0	Consultant
Francesco	Russo	Russo Structural Services	Principal	Consultant
Gerard	Sova	Hardesty & Hanover, LLC	Structural Engineer	Consultant
Brad	Streeter	Scougal Rubber Corporation	Quality Manager	Fabricator
Michael	Sullivan	CME Associates, Inc.	Senior Project Manager	Consultant
Yonghai	Wan	WSP	0	Consultant
Gary	Wisch	DeLong's, Inc.	Vice President, Engineering	Fabricator
Ron	Watson	RJ Watson, Inc.	President	Fabricator

TG 10 Erection

First Name	Last Name	Company	Professional Title	Primary Business Type
Brian	Witte	Parsons	Vice President, Construction Engineering	Contractor
Brandon	Chavel	Michael Baker International	Area Technical Manager - Bridge	Consultant
Brian	Wolfe	MDTA	Deputy Director of Engineering	Bridge Owner
Christina	Freeman	Florida Department of Transportation	Structures Research Engineer	Bridge Owner
David	Fish	Texas Department of Transportation		Bridge Owner
Domenic	Coletti	HDR	Principal Professional Associate	Consultant
Douglas	Whittaker	Michael Baker International		Consultant
Eric	Rau	HDR	Senior Bridge Engineer	Consultant
Francesco	Russo	Russo Structural Services	Principal	Consultant
Gerard	Sova	Hardesty & Hanover, LLC	Structural Engineer	Consultant
Heather	Gilmer	Pennoni	Senior Engineer	Inspection Services
John	Gast	Consultant	Steel Bridge Erection Consultant	Consultant
Joshua	Orton	Brasfield & Gorrie, LLC	Senior Design Engineer	Consultant
Kyle	Smith	GPI	Assistant Vice President / Director of Structural Engineering	Consultant
Maury	Tayarani	Pennoni	Senior Engineer	Inspection Services
Natalie	McCombs	HNTB	Senior Bridge Technical Advisor	Consultant
Nickolas	Haltvick	Minnesota Department of Transportation		Bridge Owner
Ronnie	Medlock	High Steel Structures	VP - Technical Services	Fabricator
Russell	Jeck	Senior Project Manager	Siefert Associates	Contractor
Stephen	Percassi	Genesis Structures, Inc.	Senior Structural Engineer	Consultant
Todd	Helwig	University of Texas at Austin	Professor	Academia
Zane	Keniston	QMC Auditing		Inspection Services
Jason	Stith	Michael Baker International	Technical Manager	Consultant

TG 11 Design

First Name	Last Name	Company	Professional Title	Primary Business Type
Brandon	Chavel	Michael Baker International	Area Technical Manager - Bridge	Consultant
Frank	Artmont	Modjeski & Masters, Inc.	Engineer – Structures	Consultant
Brian	Atkinson	HNTB		Consultant
Shane	Beabes	AECOM	Associate Vice President	Consultant
Allan	Berry	HDR	South Florida Structures Section Manager	Consultant
Travis	Butz	Burgess and Niple	Senior Bridge Engineer	Consultant
Nicholas	Cervo	HDR	Structural Engineer	Consultant
Robert	Connor	Purdue University	Professor	Academia
Brad	Dillman	High Steel Structures	VP of Engineering	Fabricator
Thomas	Eberhardt	HDR	Columbus Bridge Section Manager	Consultant
David	Fish	Texas Department of Transportation		Bridge Owner
Karl	Frank	Consultant	Consultant	Trade Organization
Bernard	Frankl	DOWL		Consultant
Christina	Freeman	Florida Department of Transportation	Structures Research Engineer	Bridge Owner
Keith	Griesing	Hardesty & Hanover, LLC	Chief Technical Officer	Consultant
Todd	Helwig	University of Texas at Austin	Professor	Academia
Srinivasa	Kotha	PGH Wong Engineering, Inc	Bridge Engineer	Consultant
Alex	Lim	Oregon Department of Transportation	Steel Bridge Standards Engineer	Bridge Owner
Natalie	McCombs	HNTB	Senior Bridge Technical Advisor	Consultant
Bryan	Miller	Pennsylvania Department of Transportation		Bridge Owner
Deanna	Nevling	HDR	Senior Bridge Engineer	Consultant
Dusten	Olds	HDR	Senior Bridge Engineer	Consultant
Joshua	Orton	Brasfield & Gorrie, LLC	Senior Design Engineer	Consultant
Stephen	Percassi	Genesis Structures, Inc.	Senior Structural Engineer	Consultant
Taylor	Perkins	Stantec		Consultant
Anthony	Ream	HDR	Senior Bridge Engineer	Consultant
Francesco	Russo	Russo Structural Services	Principal	Consultant

First Name	Last Name	Company	Professional Title	Primary Business Type
Kyle	Smith	GPI	Assistant Vice President / Director of Structural Engineering	Consultant
Gerard	Sova	Hardesty & Hanover, LLC	Structural Engineer	Consultant
Jason	Stith	Michael Baker International	Technical Manager	Consultant
Jeff	Svatora	HDR	Bridge Engineer	Consultant
Brian	Watson	HDR	Senior Bridge Engineer	Consultant
Donald	White	Georgia Tech		Academia
Brian	Wolfe	MDTA	Deputy Director of Engineering	Bridge Owner
Domenic	Coletti	HDR	Principal Professional Associate	Consultant

TG 12 Design for Constructability and Fabrication

First Name	Last Name	Company	Professional Title	Primary Business Type
Christina	Freeman	Florida Department of Transportation	Structures Research Engineer	Bridge Owner
Frank	Artmont	Modjeski & Masters, Inc.	Engineer – Structures	Consultant
Allan	Berry	HDR	South Florida Structures Section Manager	Consultant
Travis	Butz	Burgess and Niple	Senior Bridge Engineer	Consultant
Brandon	Chavel	Michael Baker International	Area Technical Manager - Bridge	Consultant
Bret	Clark	Flatiron	Construction Engineer	Contractor
Domenic	Coletti	HDR	Principal Professional Associate	Consultant
Brad	Dillman	High Steel Structures	VP of Engineering	Fabricator
David	Fish	Texas Department of Transportation		Bridge Owner
Heather	Gilmer	Pennoni	Senior Engineer	Inspection Services
Keith	Griesing	Hardesty & Hanover, LLC	Chief Technical Officer	Consultant
Randy	Harrison	W&W|AFCO Steel	Manager Bridge Drafting	Fabricator
Greg	Hasbrouck	Parsons	Complex Bridge Technical Specialist	Consultant
Todd	Helwig	University of Texas at Austin	Professor	Academia
Frank	Kingston	abs Structural Corporation	President	Detailer
Natalie	McCombs	HNTB	Senior Bridge Technical Advisor	Consultant
Ronnie	Medlock	High Steel Structures	VP - Technical Services	Fabricator
Deanna	Nevling	HDR	Senior Bridge Engineer	Consultant
Dusten	Olds	HDR	Senior Bridge Engineer	Consultant
Duncan	Paterson	Alfred Benesch & Company	Technical Manager	Consultant
Stephen	Percassi	Genesis Structures, Inc.	Senior Structural Engineer	Consultant
Eric	Rau	HDR	Senior Bridge Engineer	Consultant
Anthony	Ream	HDR	Senior Bridge Engineer	Consultant
Francesco	Russo	Russo Structural Services	Principal	Consultant
Grant	Schmitz	HDR	Bridge Engineer	Consultant
Kyle	Smith	GPI	Assistant Vice President / Director of Structural Engineering	Consultant
Gerard	Sova	Hardesty & Hanover, LLC	Structural Engineer	Consultant
Jason	Stith	Michael Baker International	Technical Manager	Consultant
Brian	Watson	HDR	Senior Bridge Engineer	Consultant

First Name	Last Name	Company	Professional Title	Primary Business Type
Donald	White	Georgia Tech		Academia
Brian	Witte	Parsons	Vice President, Construction Engineering	Contractor
Brian	Wolfe	MDTA	Deputy Director of Engineering	Bridge Owner
Russell	Jeck	Senior Project Manager	Siefert Associates	Contractor

TG 13 Analysis of Steel Bridges

First Name	Last Name	Company	Professional Title	Primary Business Type
Deanna	Nevling	HDR	Senior Bridge Engineer	Consultant
Frank	Artmont	Modjeski & Masters, Inc.	Engineer – Structures	Consultant
Zeynep	Bayam	OpenBrIM	Vice President, Strategic Growth	Software
Shane	Beabes	AECOM	Associate Vice President	Consultant
Allan	Berry	HDR	South Florida Structures Section Manager	Consultant
Travis	Butz	Burgess and Niple	Senior Bridge Engineer	Consultant
Nicholas	Cervo	HDR	Structural Engineer	Consultant
Brandon	Chavel	Michael Baker International	Area Technical Manager - Bridge	Consultant
Domenic	Coletti	HDR	Principal Professional Associate	Consultant
Douglas	Crampton	Wiss, Janney, Elstner Associates, Inc.	Associate Principal	Consultant
Thomas	Eberhardt	HDR	Columbus Bridge Section Manager	Consultant
Christina	Freeman	Florida Department of Transportation	Structures Research Engineer	Bridge Owner
Todd	Helwig	University of Texas at Austin	Professor	Academia
Dongzhou	Huang	Atkins	Consulting Engineer	Consultant
Natalie	McCombs	HNTB	Senior Bridge Technical Advisor	Consultant
Dusten	Olds	HDR	Senior Bridge Engineer	Consultant
Joshua	Orton	Brasfield & Gorrie, LLC	Senior Design Engineer	Consultant
Eric	Rau	HDR	Senior Bridge Engineer	Consultant
Anthony	Ream	HDR	Senior Bridge Engineer	Consultant
Kyle	Smith	GPI	Assistant Vice President / Director of Structural Engineering	Consultant
Gerard	Sova	Hardesty & Hanover, LLC	Structural Engineer	Consultant
Jason	Stith	Michael Baker International	Technical Manager	Consultant
Jeff	Svatora	HDR	Bridge Engineer	Consultant
Brian	Wolfe	MDTA	Deputy Director of Engineering	Bridge Owner
Francesco	Russo	Russo Structural Services	Principal	Consultant

TG 14 Field Repairs and Retrofits

First Name	Last Name	Company	Professional Title	Primary Business Type
Travis	Butz	Burgess and Niple	Senior Bridge Engineer	Consultant
Domenic	Coletti	HDR	Principal Professional Associate	Consultant
Robert	Connor	Purdue University	Professor	Academia
Douglas	Crampton	Wiss, Janney, Elstner Associates, Inc.	Associate Principal	Consultant
Christina	Freeman	Florida Department of Transportation	Structures Research Engineer	Bridge Owner
Heather	Gilmer	Pennoni	Senior Engineer	Inspection Services
Nickolas	Haltvick	Minnesota Department of Transportation		Bridge Owner
Hussam	Mahmoud	Colorado State University		Academia
Joshua	Orton	Brasfield & Gorrie, LLC	Senior Design Engineer	Consultant
Phillip	Sauser	UH Services Group		Inspection Services
Kyle	Smith	GPI	Assistant Vice President / Director of Structural Engineering	Consultant
Jonathan	Stratton	Eastern Steel Works, Inc.	Managing Partner	Fabricator
Brian	Wolfe	MDTA	Deputy Director of Engineering	Bridge Owner

TG 15 Data Modeling for Interoperability

First Name	Last Name	Company	Professional Title	Primary Business Type
Jerome	Atchison	abs Structural Corporation	IT	Detailer
Yash	Chowdhury	Hayduk Engineering		Consultant
Colby	Christensen	HDR	Bridges & Structures Digital Delivery Lead	Consultant
Aaron	Costin	University of Florida	Assistant Professor	Academia
Brad	Dillman	High Steel Structures	VP of Engineering	Fabricator
Randy	Harrison	W&W|AFCO Steel	Manager Bridge Drafting	Fabricator
Hanjin	Hu	Michael Baker International		Consultant
Frank	Kingston	abs Structural Corporation	President	Detailer
Ronnie	Medlock	High Steel Structures	VP - Technical Services	Fabricator
Abbas	Mokhtar-zadeh	Westinghouse, Stone & Webster		Contractor
Phillip	Sauser	UH Services Group		Inspection Services
Grant	Schmitz	HDR	Bridge Engineer	Consultant
Jason	Stith	Michael Baker International	Technical Manager	Consultant
Eric	Stone	HNTB	Technologist (Bridge)	Consultant
Jonathan	Stratton	Eastern Steel Works, Inc.	Managing Partner	Fabricator
Cheng	Yu	University of North Texas		Academia

TG 16 Orthotropic Deck Panels

First Name	Last Name	Company	Professional Title	Primary Business Type
Sougata	Roy	Consultant		Consultant
Frederic	Bergeron	Canam Bridges	Senior Structural Engineer	Fabricator
Domenic	Coletti	HDR	Principal Professional Associate	Consultant
William	Collins	University of Kansas		Academia
Karl	Frank	Consultant	Consultant	Trade Organization
Keith	Griesing	Hardesty & Hanover, LLC	Chief Technical Officer	Consultant
Christian	Haberle	Haberle Steel	Vice President	Fabricator
Jamie	Hilton	KTA-Tator, Inc.	Vice President	Inspection Services
Terry	Logan	Atema, Inc.	VP and Director of Overseas Operations	Inspection Services
Ronnie	Medlock	High Steel Structures	VP - Technical Services	Fabricator
Duncan	Paterson	Alfred Benesch & Company	Technical Manager	Consultant
Anna	Petroski	Atema, Inc.	President	Inspection Services
David	Stoddard	SSAB Americas	Senior Application Engineer	Material Producer
Frank	Artmont	Modjeski & Masters, Inc.	Engineer – Structures	Consultant

TG 17 Steel Castings

First Name	Last Name	Company	Professional Title	Primary Business Type
Jennifer	Pazdon	Cast Connex	Vice President	Fabricator
Nicholas	Altebrando	STV Incorporated	National Director of Bridge Engineering	Consultant
Frank	Artmont	Modjeski & Masters, Inc.	Engineer – Structures	Consultant
Domenic	Coletti	HDR	Principal Professional Associate	Consultant
Carlos	de Oliveira	Cast Connex	President	Fabricator
Karl	Frank	Consultant	Consultant	Trade Organization
Heather	Gilmer	Pennoni	Senior Engineer	Inspection Services
Jason	Gramlick	California Department of Transportation	Associate Steel Inspector	Bridge Owner
Keith	Griesing	Hardesty & Hanover, LLC	Chief Technical Officer	Consultant
Greg	Hasbrouck	Parsons	Complex Bridge Technical Specialist	Consultant
Tom	Hickman	Hickman Consulting		Fabricator
Dawn	Lehman	University of Washington		Academia
Ronnie	Medlock	High Steel Structures	VP - Technical Services	Fabricator
Thomas	Murphy	Modjeski and Masters	Vice President / Chief Technical Officer	Consultant
Sougata	Roy	Consultant		Consultant
Jason	Stith	Michael Baker International	Technical Manager	Consultant

TG 18 Duplex Stainless Steel

First Name	Last Name	Company	Professional Title	Primary Business Type
Jason	Provines	Virginia Department of Transportation	Senior Research Scientist	Bridge Owner
Ted	Bush	HDR	Principal Bridge Engineer	Consultant
Brandon	Chavel	Michael Baker International	Area Technical Manager - Bridge	Consultant
Gary	Coates	Nickel Institute	Manager	Trade Organization
Karl	Frank	Consultant	Consultant	Trade Organization
Leroy	Gardner	Imperial College London	Professor	Academia
Stan	Gingrich	Amentum	Director	Consultant
Randy	Harrison	W&W|AFCO Steel	Manager Bridge Drafting	Fabricator
Ronnie	Medlock	High Steel Structures	VP - Technical Services	Fabricator
Justin	Ocel	Federal Highway Administration	Structural Steel Research Program Manager	FHWA
Jennifer	Pazdon	Cast Connex	Vice President	Fabricator
Juan	Sobrino	Pedelta	CEO	Consultant
Nancy	Baddoo	Steel Construction Institute	Associate Director	Trade Organization

Main Committee

First Name	Last Name	Company	Professional Title	Primary Business Type
Ronnie	Medlock	High Steel Structures	VP - Technical Services	Fabricator
Frank	Artmont	Modjeski & Masters, Inc.	Engineer – Structures	Consultant
Brandon	Chavel	Michael Baker International	Area Technical Manager - Bridge	Consultant
Domenic	Coletti	HDR	Principal Professional Associate	Consultant
Aaron	Costin	University of Florida	Assistant Professor	Academia
Michael	Culmo	CHA Consulting, Inc.	Chief Bridge Engineer	Consultant
Brad	Dillman	High Steel Structures	VP of Engineering	Fabricator
Karl	Frank	Consultant	Consultant	Trade Organization
Heather	Gilmer	Pennoni	Senior Engineer	Inspection Services
Randy	Harrison	W&W|AFCO Steel	Manager Bridge Drafting	Fabricator
Jamie	Hilton	KTA-Tator, Inc.	Vice President	Inspection Services
Deanna	Nevling	HDR	Senior Bridge Engineer	Consultant
Duncan	Paterson	Alfred Benesch & Company	Technical Manager	Consultant
Jennifer	Pazdon	Cast Connex	Vice President	Fabricator
Sougata	Roy	Consultant		Consultant
Francesco	Russo	Russo Structural Services	Principal	Consultant
Phillip	Sauser	UH Services Group		Inspection Services
Kyle	Smith	GPI	Assistant Vice President / Director of Structural Engineering	Consultant
Jason	Stith	Michael Baker International	Technical Manager	Consultant
Jonathan	Stratton	Eastern Steel Works, Inc.	Managing Partner	Fabricator
Gary	Wisch	DeLong's, Inc.	Vice President, Engineering	Fabricator
Brian	Witte	Parsons	Vice President, Construction Engineering	Contractor
Brian	Wolfe	MDTA	Deputy Director of Engineering	Bridge Owner
Christina	Freeman	Florida Department of Transportation	Structures Research Engineer	Bridge Owner

Appendix C – Meeting Attachments

TG 2 Fabrication and Repair

Attachment A

TG2 Fabrication & Repair

Outline of commentary for scribing/etching of layout marks

Section	**Commentary**	**Discussion**
Mechanical marking by die stamping and etching (i.e. plasma or pin-dot) is acceptable. Marking with coatings such as zinc or ink is also acceptable.  *Zinc mark lines from CNC process used to locate stiffeners and hole patterns.*  *Etching used to indicate material mark*	Steel is marked during fabrication to facilitate the tracking of individual components, and to layout where each component is located on a member. Typical marking methods include zinc marking, die stamping (often called out as low stress stamping), and etching. Zinc marking is an automated process where zinc powder is heated onto the steel. This process is performed on a CNC machine and used to locate critical locations on the member, such as hole patterns, connections, and stiffeners. Inkjet marking is a similar process that can operate at a quicker speed and replaces the need for zinc. Die stamping, or low stress stamping, is a manual process used to identify the individual components that make up a girder. According to *The Effect of Piece Marking on Fatigue Performance of Bridge Steel*, markings "can safely be used on steel structures without concern for its effect on design fatigue performance." Etching is another automated process used to mark individual components. This process eliminates the need to manually stamp each mark onto the material. Plasma and pin dotting are both typical etching methods. Research from FDOT shows that the plasma table can effectively etch steel when operating at a lower amperage (10-12 amps) and travel speed (75-225 ipm) without affecting fatigue performance. Dot peening marking or pin stamping has also shown to successfully mark steel. Innovative mechanical methods should be validated to show they meet the fatigue category for bridge, prior to their incorporation into a project.	Plasma Etching: Does mill scale thickness have an effect on the amperage and writing speed parameters outlined in the research document?

References

Frank, K. H., Samaras, V., & Helwig, T. A. (2012). The effect of piece marking upon fatigue performance of Bridge Steel.

Florida Department of Transportation Research, & Manuel, M. (2018). Experimental Investigation of the effect of surface markings on the mechanical integrity of weathering bridge steels – Phase III.

Attachment B

Check Assemblies Task Group
21 October 2024

Members: Ronnie Medlock, lead; Hannah Cheng, Brad Dillman, Mike Leonard, Mike Wiersch

17.5.3 – Check Assembly for CNC Drilling	**C17.5.3**	**Discussion**
When the Fabricator elects to use CNC drilling of full-size holes in unassembled pieces in lieu of drilling or reaming in assembly, the following apply: • A check assembly shall be required for each major structural type (i.e., stringers, plate girders, tub girders, or trusses) of each project, unless otherwise designated in the contract documents. • For multi-stringer or multi-girder bridges, the check assembly shall consist of one girder line, without cross members, including the entire length of one unit (i.e., one length girder line from expansion joint through field splices to the next expansion joint). • For trusses, the check assembly shall include~~, and shall consist of at least three contiguous shop sections or, in a truss,~~ all members in at least three contiguous panels but not less than the number of panels associated with three contiguous chord lengths (i.e., length between field splices). • Check assemblies may be progressive if needed ~~for~~due to -length, elevation or other constraints.	~~Check assemblies should be based on the proposed order of erection, joints in bearings, special complex points, and similar considerations. Special complex points could be the portals of skewed trusses, for example.~~ It is best to discover any potential fit-up issues early to facilitate any needed corrections in the shop. For trusses, t~~T~~he check assemblies should be the first sections of ~~each major structural type~~the truss to be fabricated~~, e.g., the first three panels, segments or longitudinal chords; or of the entire first bent, tower face, or rigid frame produced~~. For girder bridges, the check assembly should be performed as soon as possible in the fabrication schedule ~~as it is best to discover any potential fit-up issues early to facilitate any needed corrections in the shop~~. ~~At least one additional check assembly, ideally selected by the Owner, should be performed further along in the process to verify that the accuracy of the CNC procedures and equipment is being maintained. If problems are found by the second check fit, previously completed connections would need be checked to define the extent of the problem and correct errors to the Owner's satisfaction.~~ Note that for ~~Chicago style~~ trusses ~~(i.e.,~~ with cambered lengths and geometric angles (sometimes called "Chicago-style"), thus requiring force-fitting~~)~~, top chords and bottom chords and their respective verticals and diagonals will be assembled separately.	Deleting the first commentary paragraph because it isn't helpful or needed. Making sure it is clear that we mean full-size holes. Clarified structure types Adding clarifying language that it is best to check the first of the work. Doing additional random check assemblies is not usual. Use of progressive assemblies is normal for long bridge units.
Each check assembly, including camber, alignment, accuracy of holes, and fit of milled joints, shall		

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be approved by the Owner before it is dismantled.		
If the check assembly fails in some specific manner to demonstrate that the required accuracy is being obtained, the source of the problem shall be determined and correction shall be determined by a further check assembliesassembly, for which there shall be no additional cost to the Owner. The Fabricator also has the option of reverting to traditional assembly techniques.		

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Attachment C

Attachment C: Web Flatness

old D1.5 proposal for web flatness, modified for Fab Spec

Background:

The flatness requirements for the webs of plate and box girders have been specified in the AASHTO/AWS D1.5 Bridge Welding Code, and since moved to the AASHTO Steel Bridge Fabrication Specification. Section 16.6 of the Bridge Fabrication Specification gives the requirements for web flatness which have different requirements for web with no stiffeners, one-sided and double-sided stiffeners, and for both fascia and interior girders. They are also a function of the transverse stiffener spacing since the smallest panel dimension is used to define the imperfection size. The basis for the existing limits on web flatness and the reason for differentiating between single- and double-sided stiffeners appear to have been based upon workmanship rather than strength requirements.

The allowable variations from flatness are larger for webs with single sided stiffeners, a typical fascia girder condition, than an interior girder with double sided stiffeners. Consequently, the exterior or fascia girder on many bridges has larger allowable larger web distortions than the hidden interior girders.

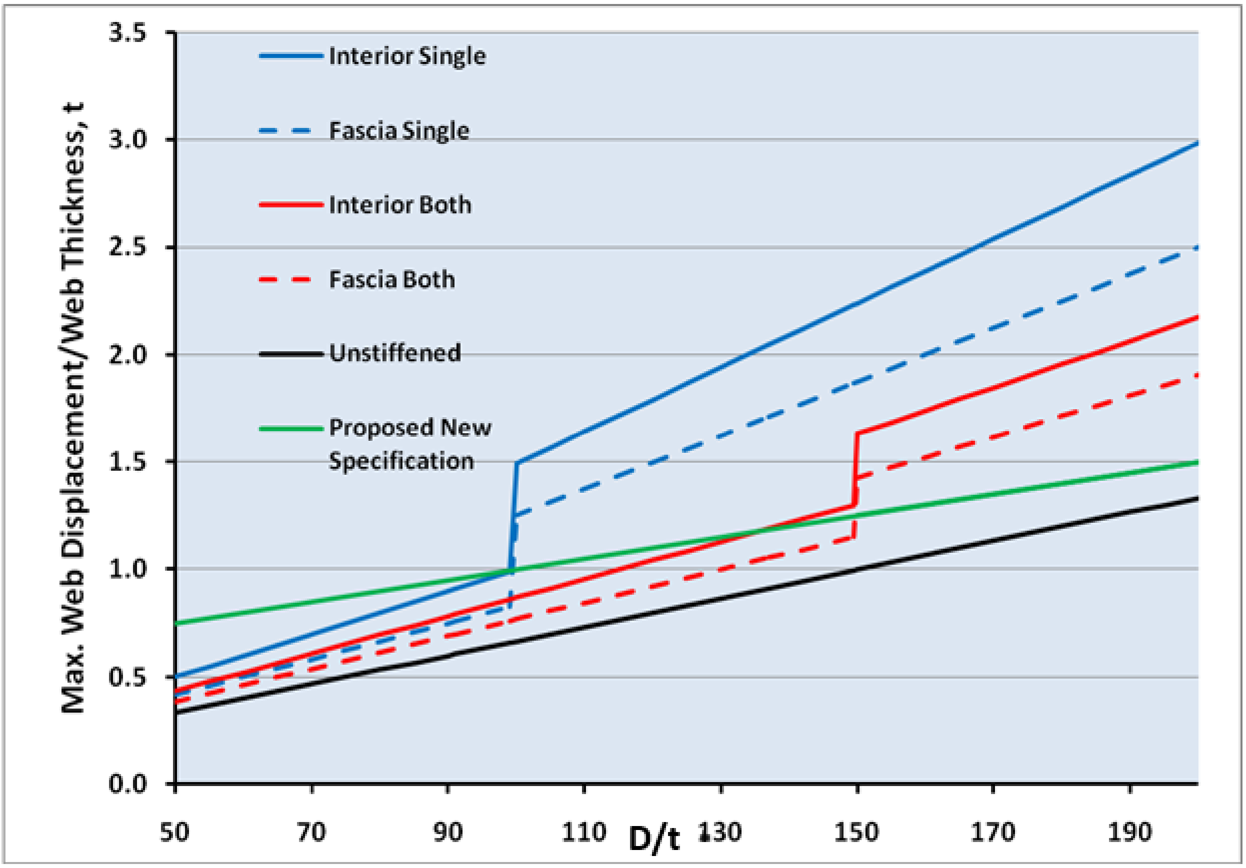
A detailed finite element study of the influence of the web distortion upon girder strength was undertaken by Zhang et al and is documented in References 1 and 2. They developed a web distortion limit based upon strength effects which did not differentiate between the type of stiffener used on the web. Frank et al (Reference 3) simplified the work followed by an independent review of the issue by Kulicki funded by PennDOT. Kulicki suggested a single equation shown below which is the basis of the proposed specification (Reference 4).

$$0.75t\left(1+\frac{D/t-50}{150}\right)$$

The proposed requirements are more stringent than the requirements developed in the research study particular for shallower girders. The provisions are based upon the web slenderness, the depth divided by the web thickness or D/t_w. The web slenderness is the primary variable controlling the web behavior under load.

The figure below compares the proposed specification to the current provisions. The web slenderness is plotted versus the maximum allowable web distortion divided by the web thickness. The normal range of web slenderness for highway bridge girders is from 100 to 130. Girders with web slenderness above 150 must be longitudinally stiffened and girders with web slenderness below 90 are compact and similar to rolled beam beams in their proportions.

Attachment C: Web Flatness



The proposed requirements are compared in this typical range of web slenderness in the table below.

Web Slenderness	Fascia One Sided Stiffener d/80	Interior Girder Double Sided Stiffener d/115	Proposed Specification
100	1.25	0.87	1.00
110	1.38	0.96	1.05
120	1.50	1.04	1.10
130	1.63	1.13	1.15

The values in the table above are the allowed web distortion divided by the web thickness for the four values of web slenderness. The first two columns are for the present specification (“d/80” and “d/115” are ratios of least panel dimension to allowable distortion given in the Specification) and the last column is the proposed specification. The proposed specification allowable distortions are approximately 75% of the presently allowed distortions for a fascia girder and comparable to the distortion allowed for interior girder with double sided stiffeners. The last two tables show the differences in the allowable web distortion for the same two web conditions in a format similar to the existing tables in Appendix C. The values are in inches. If the maximum distortion of the proposed specification is larger than the existing specification the cells are green. If the maximum distortion of the new specification is less the cell is pink. The largest differences are the reduced distortions for deep fascia girders with single sided stiffeners.

Web thicknesses under ½" are unlikely.

Proposed-Current for One Sided Stiffened **Fascia** Webs (in.)																
Web Thickness, in	Web Depth, in															
	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95
0.313	**0.09**	**0.07**	**0.06**	**-0.11**	**-0.14**	**-0.18**	**-0.22**	**-0.26**	**-0.29**	**-0.33**	**-0.37**	**-0.41**	**-0.44**	**-0.48**	**-0.52**	**-0.56**
0.375	**0.12**	**0.10**	**0.09**	**0.07**	**-0.11**	**-0.15**	**-0.19**	**-0.23**	**-0.26**	**-0.30**	**-0.34**	**-0.38**	**-0.41**	**-0.45**	**-0.49**	**-0.53**
0.438	**0.15**	**0.14**	**0.12**	**0.10**	**0.09**	**-0.12**	**-0.16**	**-0.19**	**-0.23**	**-0.27**	**-0.31**	**-0.34**	**-0.38**	**-0.42**	**-0.46**	**-0.49**
0.500	**0.18**	**0.17**	**0.15**	**0.13**	**0.12**	**0.10**	**-0.13**	**-0.16**	**-0.20**	**-0.24**	**-0.28**	**-0.31**	**-0.35**	**-0.39**	**-0.43**	**-0.46**
0.563	**0.21**	**0.20**	**0.18**	**0.16**	**0.15**	**0.13**	**0.11**	**0.10**	**-0.17**	**-0.21**	**-0.24**	**-0.28**	**-0.32**	**-0.36**	**-0.39**	**-0.43**
0.625	**0.25**	**0.23**	**0.21**	**0.20**	**0.18**	**0.16**	**0.15**	**0.13**	**0.11**	**-0.18**	**-0.21**	**-0.25**	**-0.29**	**-0.33**	**-0.36**	**-0.40**
0.688	**0.28**	**0.26**	**0.24**	**0.23**	**0.21**	**0.19**	**0.18**	**0.16**	**0.14**	**0.13**	**-0.18**	**-0.22**	**-0.26**	**-0.29**	**-0.33**	**-0.37**
0.750	**0.31**	**0.29**	**0.28**	**0.26**	**0.24**	**0.23**	**0.21**	**0.19**	**0.18**	**0.16**	**0.14**	**-0.19**	**-0.23**	**-0.26**	**-0.30**	**-0.34**

Proposed-Current for Both Side Stiffened **Interior** Webs (in.)																
Web Thickness, in	Web Depth, in															
	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95
0.313	**0.08**	**0.06**	**0.05**	**0.03**	**0.01**	**-0.01**	**-0.14**	**-0.17**	**-0.20**	**-0.23**	**-0.25**	**-0.28**	**-0.31**	**-0.34**	**-0.37**	**-0.40**
0.375	**0.11**	**0.10**	**0.08**	**0.06**	**0.04**	**0.02**	**0.00**	**-0.02**	**-0.16**	**-0.19**	**-0.22**	**-0.25**	**-0.28**	**-0.31**	**-0.34**	**-0.37**
0.438	**0.14**	**0.13**	**0.11**	**0.09**	**0.07**	**0.05**	**0.03**	**0.02**	**0.00**	**-0.02**	**-0.19**	**-0.22**	**-0.25**	**-0.28**	**-0.31**	**-0.34**
0.500	**0.18**	**0.16**	**0.14**	**0.12**	**0.10**	**0.08**	**0.07**	**0.05**	**0.03**	**0.01**	**-0.01**	**-0.19**	**-0.22**	**-0.25**	**-0.28**	**-0.31**
0.563	**0.21**	**0.19**	**0.17**	**0.15**	**0.13**	**0.11**	**0.10**	**0.08**	**0.06**	**0.04**	**0.02**	**0.00**	**-0.01**	**-0.22**	**-0.25**	**-0.28**
0.625	**0.24**	**0.22**	**0.20**	**0.18**	**0.16**	**0.15**	**0.13**	**0.11**	**0.09**	**0.07**	**0.05**	**0.04**	**0.02**	**0.00**	**-0.02**	**-0.25**
0.688	**0.27**	**0.25**	**0.23**	**0.21**	**0.20**	**0.18**	**0.16**	**0.14**	**0.12**	**0.10**	**0.09**	**0.07**	**0.05**	**0.03**	**0.01**	**-0.01**
0.750	**0.30**	**0.28**	**0.26**	**0.25**	**0.23**	**0.21**	**0.19**	**0.17**	**0.15**	**0.13**	**0.12**	**0.10**	**0.08**	**0.06**	**0.04**	**0.02**

1. Helwig, Todd A.; Herman Reagan. S.; Zhang, Yue; Espinoza, Omar; and Mercan, Bulent, "Fabricated Plate Tolerances for Steel Bridges", World Steel Bridge Symposium, New Orleans, LA, December 4-7, 2007, CD Distribution.

Attachment C: Web Flatness

2. Zhang, Yue; Mercan, Bulent; Herman, Reagan; Camacho, Marco; Zhou, Daping; & Helwig, Todd, “Strength Based Plate Tolerances for Steel Bridge Girders”, Research Report 4638-1, University of Houston, January, 2009.
3. Frank, Karl H.; Connor, Robert J.; and Helwig, Todd A., “Web Flatness Requirements for Bridge Girder Webs”, July 30, 2010
4. Kulicki, John M. , Private Email, 2/28/2011.

Attachment C: Web Flatness

Proposal:

AASHTO LRFD Steel Bridge Fabrication Specification	Commentary

16.6—Web Flatness

A built-up girder web's variation from flatness shall be taken as the maximum offset of the web face from its theoretical location within a given panel. Offsets shall be measured from the actual web face to the theoretical web face location. The "theoretical web face" shall be based on its location at panel boundaries (flanges, stiffeners). A reference line parallel to the theoretical web face may be used for measuring offsets.

~~For a given location, the least panel dimension, d, shall be taken as the lesser of either the web depth between flanges or the longitudinal spacing between transverse components (i.e., stiffeners, connection plates).~~

Variation from flatness of webs having a depth, D, and a thickness, t, ~~in panels bounded by stiffeners or flanges, or both, whose least panel dimension is d~~ shall not exceed the following (all dimensions in in.):

$$\text{maximum variation} = 0.75t\left(1 + \frac{D/t - 50}{150}\right)$$

- ~~Intermediate stiffeners on both sides of web:~~
  - ~~Interior girders —~~

    ~~where $D/t < 150$ — maximum variation = $d/115$~~
    ~~where $D/t \geq 150$ — maximum variation = $d/92$~~
  - ~~Fascia girders —~~

    ~~where $D/t < 150$ — maximum variation = $d/130$~~
    ~~where $D/t \geq 150$ — maximum variation = $d/105$~~
- ~~Intermediate stiffeners on one side only of web:~~
  - ~~Interior girders —~~

    ~~where $D/t < 100$ — maximum variation = $d/100$~~
    ~~where $D/t \geq 100$ — maximum variation = $d/67$~~
  - ~~Fascia girders —~~

    ~~where $D/t < 100$ — maximum variation = $d/120$~~
    ~~where $D/t \geq 100$ — maximum variation = $d/80$~~
- ~~No intermediate stiffeners — maximum variation = $D/150$~~

~~Figure 16.6-1 provides an illustration of the terms for determining the variation from flatness of webs.~~

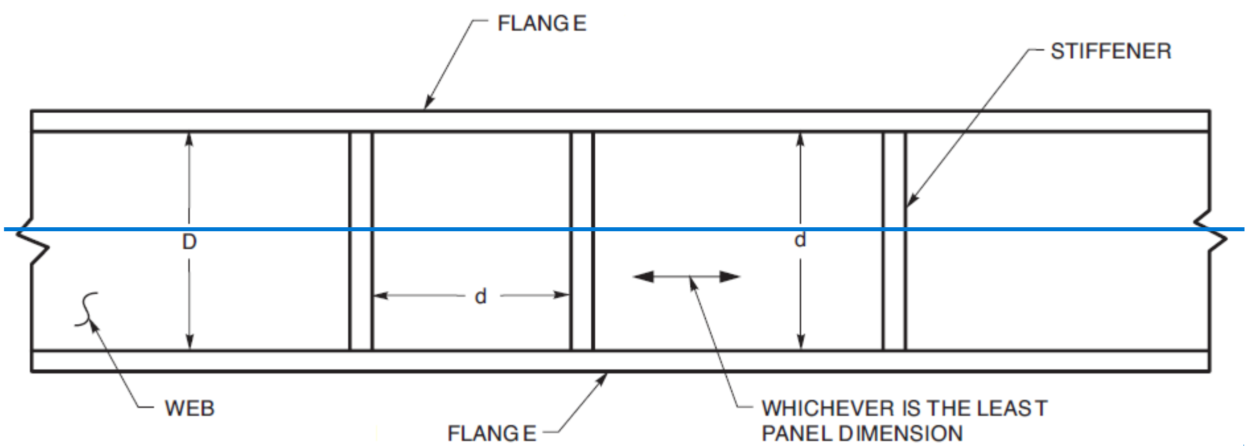
C16.6

The provisions for web flatness are based upon ~~aesthetics and~~ relative freedom from web buckling. A girder web's variation from flatness is evaluated by comparing its actual and theoretical locations. Lack of web flatness is most pronounced on fascia girders that are painted with glossy paints. These provisions do not apply to rolled sections, which do not have the same issues of workmanship and potential buckling. Measurement of web distortion should consider the curvature of the member and deduct the curvature arc from the actual distortion dimension. The flatness of the webs should be checked prior to painting of the girders to allow the fabricator to correct the girder without damaging the paint. The web deflection may change due to stresses introduced into the girders during subsequent handling and loading of the girder after inspection. This is expected behavior. The effect of further web deflection upon girder strength was considered in developing the deflection limits. The additional deflections should not be cause for rejection of the girders.

Figure C16.6-1 illustrates a typical method to determine variations in girder web flatness. Appendix C provides tabulated web flatness tolerance values calculated using the equations specified in Article 16.6, assuming that web depths are in whole-inch increments. Because of rounding, other web depths may give values that are slightly different from those that are calculated using the formulas.

Attachment C: Web Flatness

AASHTO LRFD Steel Bridge Fabrication Specification	Commentary
Web distortion of twice the preceding allowable tolerances shall be permitted when occurring at the end of a girder that has been drilled, or subpunched and reamed either during assembly or to a template for a field bolted splice, provided, when the splice plates are bolted, the web assumes the proper dimensional tolerances.	End panels with bolted splices are permitted twice the maximum out-of-flatness allowed elsewhere in the girder because there is no lateral support along one edge for the relatively thin web while the other three sides of the panel are being welded. The installation of high strength bolts in the web connection tends to straighten the web without the use of excessive force, and without damaging the member or its connections. Although the web ends may have the distortion allowed by this Article when each girder segment is in the web-vertical position, adjacent webs and their splice places are brought into common alignment prior to shop drilling splices. Drilling holes with the webs fully displaced to the allowable tolerances would lock those displacements into the completed structure. For large segment displacements, special field bolting and pinning may be needed to bring webs and splice plates together before routine bolt tightening is performed.
If architectural considerations require tolerances more restrictive than described above, specific reference shall be included in the bid documents.	



~~D = depth of web~~
~~d = least panel dimension~~

~~**Figure 16.6-1—Illustration of Terms for Determining Variation From Flatness of Girder Webs**~~

Attachment C: Web Flatness

AASHTO LRFD Steel Bridge Fabrication Specification	Commentary

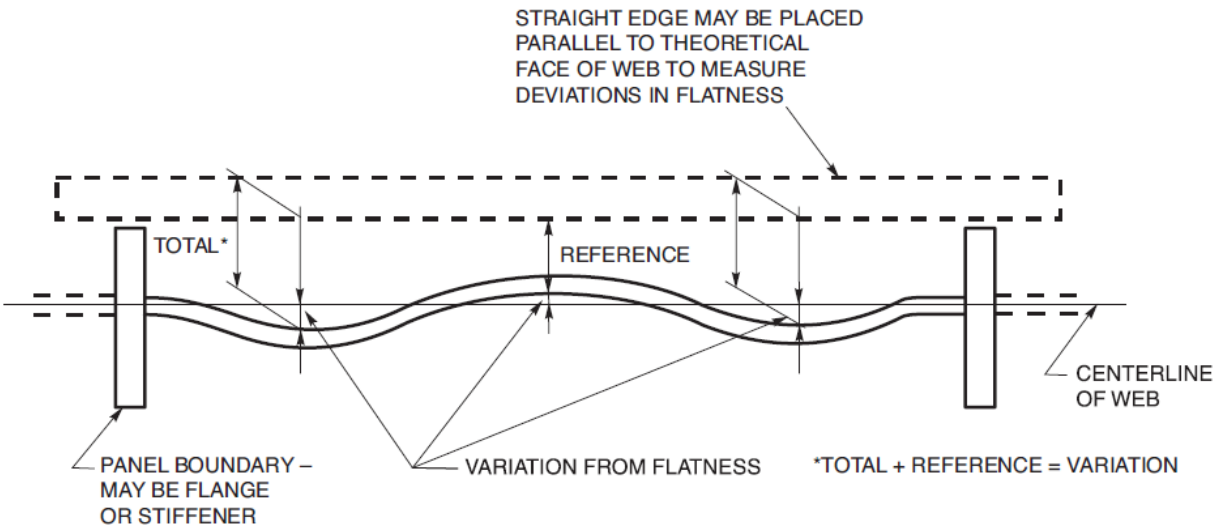


Figure C16.6-1−Typical Method to Determine Variations in Girder Web Flatness

Appendix C (Informational)
Tabulation of Web Flatness Tolerances (Article 16.6)

Web Thickness, in	Web Depth, in																				
	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126	132	138	144
5/16	1/4	5/16	5/16	3/8	3/8	7/16	7/16	1/2	1/2	9/16	9/16	5/8	5/8	11/16	11/16	3/4	3/4	13/16	13/16	7/8	7/8
3/8	5/16	5/16	3/8	3/8	7/16	7/16	1/2	1/2	9/16	9/16	5/8	5/8	11/16	11/16	3/4	3/4	13/16	13/16	7/8	7/8	15/16
7/16	5/16	3/8	3/8	7/16	7/16	1/2	1/2	9/16	9/16	5/8	5/8	11/16	11/16	3/4	3/4	13/16	13/16	7/8	7/8	15/16	15/16
1/2	3/8	3/8	7/16	7/16	1/2	1/2	9/16	9/16	5/8	5/8	11/16	11/16	3/4	3/4	13/16	13/16	7/8	7/8	15/16	15/16	1
9/16	3/8	3/8	7/16	1/2	1/2	9/16	9/16	5/8	5/8	11/16	11/16	3/4	3/4	13/16	13/16	7/8	7/8	15/16	15/16	1	1
5/8	7/16	7/16	1/2	1/2	9/16	9/16	5/8	5/8	11/16	11/16	3/4	3/4	13/16	13/16	7/8	7/8	15/16	15/16	1	1	1-1/16
11/16	7/16	1/2	1/2	9/16	9/16	5/8	5/8	11/16	11/16	3/4	3/4	13/16	13/16	7/8	7/8	15/16	15/16	1	1	1-1/16	1-1/16
3/4	1/2	1/2	9/16	9/16	5/8	5/8	11/16	11/16	3/4	3/4	13/16	13/16	7/8	7/8	15/16	15/16	1	1	1-1/16	1-1/16	1 1/8
13/16	1/2	1/2	9/16	5/8	5/8	11/16	11/16	3/4	3/4	13/16	13/16	7/8	7/8	15/16	15/16	1	1	1-1/16	1-1/16	1-1/8	1-1/8
7/8	9/16	9/16	5/8	5/8	11/16	11/16	3/4	3/4	13/16	13/16	7/8	7/8	15/16	15/16	1	1	1-1/16	1-1/16	1-1/8	1-1/8	1-3/16
15/16	9/16	5/8	5/8	11/16	11/16	3/4	3/4	13/16	13/16	7/8	7/8	15/16	15/16	1	1	1-1/16	1-1/16	1-1/8	1-1/8	1-3/16	1-3/16
1	5/8	5/8	11/16	11/16	3/4	3/4	13/16	13/16	7/8	7/8	15/16	15/16	1	1	1-1/16	1-1/16	1-1/8	1-1/8	1-3/16	1-3/16	1-1/4
1-1/16	5/8	5/8	11/16	3/4	3/4	13/16	13/16	7/8	7/8	15/16	15/16	1	1	1-1/16	1-1/16	1-1/8	1-1/8	1-3/16	1-3/16	1-1/4	1-1/4
1-1/8	11/16	11/16	3/4	3/4	13/16	13/16	7/8	7/8	15/16	15/16	1	1	1-1/16	1-1/16	1-1/8	1-1/8	1-3/16	1-3/16	1-1/4	1-1/4	1-5/16
1-1/4	3/4	3/4	13/16	13/16	7/8	7/8	15/16	15/16	1	1	1-1/16	1-1/16	1-1/8	1 1/8	1-3/16	1-3/16	1-1/4	1-1/4	1-5/16	1-5/16	1 3/8

Note: For actual dimensions not shown, use the next higher value shown.

Attachment A: Web Flatness

Table C-1—Intermediate Stiffeners on Both Sides of Web—Interior Girders															
Thickness of Web, in.	Depth of Web, in.	Least Panel Dimension, in.													
1/2	Less than 75	29	36	43	50	58	65	72	79						
	75 and over	23	29	35	40	46	52	58	63	69	75	81	86	92	98
9/16	Less than 84	29	36	43	50	58	65	72	79	86					
	84 and over	23	29	35	40	46	52	58	63	69	75	81	86	92	98
5/8	Less than 94	29	36	43	50	58	65	72	79	86	93	101			
	94 and over	23	29	35	40	46	52	58	63	69	75	81	86	92	98
11/16	Less than 103	29	36	43	50	58	65	72	79	86	93	101	108		
	103 and over	23	29	35	40	46	52	58	63	69	75	81	86	92	98
3/4	Less than 113	29	36	43	50	58	65	72	79	86	93	101	108	115	
	113 and over	23	29	35	40	46	52	58	63	69	75	81	86	92	98
13/16	Less than 122	29	36	43	50	58	65	72	79	86	93	101	108	115	122
	122 and over	23	29	35	40	46	52	58	63	69	75	81	86	92	98
7/8	Less than 131	29	36	43	50	58	65	72	79	86	93	101	108	115	122
	131 and over	23	29	35	40	46	52	58	63	69	75	81	86	92	98
15/16	Less than 141	29	36	43	50	58	65	72	79	86	93	101	108	115	122
	141 and over	23	29	35	40	46	52	58	63	69	75	81	86	92	98
1	Less than 150	29	36	43	50	58	65	72	79	86	93	101	108	115	122
	150 and over	23	29	35	40	46	52	58	63	69	75	81	86	92	98
1-1/16	Less than 159	29	36	43	50	58	65	72	79	86	93	101	108	115	122
	159 and over	23	29	35	40	46	52	58	63	69	75	81	86	92	98
1-1/4	Less than 188	29	36	43	50	58	65	72	79	86	93	101	108	115	122
	188 and over	23	29	35	40	46	52	58	63	69	75	81	86	92	98
		Maximum Allowable Variation, in.													
		1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	1-1/16

Note: For actual dimensions not shown, use the next higher value shown.

Attachment A: Web Flatness

Table C-2—Intermediate Stiffeners on Both Sides of Web, Fascia Girders															
Thickness of Web, in.	Depth of Web, in.	Least Panel Dimension, in.													
1/2	Less than 75	33	41	49	57	65	73	81							
	75 and over	26	33	39	46	53	59	66	72	79	85	92	98	105	112
9/16	Less than 84	33	41	49	57	65	73	81	85						
	84 and over	26	33	39	46	53	59	66	72	79	85	92	98	105	112
5/8	Less than 94	33	41	49	57	65	73	81	89	98					
	94 and over	26	33	39	46	53	59	66	72	79	85	92	98	105	112
11/16	Less than 103	33	41	49	57	65	73	81	89	98	104				
	103 and over	26	33	39	46	53	59	66	72	79	85	92	98	105	112
3/4	Less than 113	33	41	49	57	65	73	81	89	98	106	114			
	113 and over	26	33	39	46	53	59	66	72	79	85	92	98	105	112
13/16	Less than 122	33	41	49	57	65	73	81	89	98	106	114	122		
	122 and over	26	33	39	46	53	59	66	72	79	85	92	98	105	112
7/8	Less than 131	33	41	49	57	65	73	81	89	98	106	114	122	130	138
	131 and over	26	33	39	46	53	59	66	72	79	85	92	98	105	112
15/16	Less than 141	33	41	49	57	65	73	81	89	98	106	114	122	130	138
	141 and over	26	33	39	46	53	59	66	72	79	85	92	98	105	112
1	Less than 150	33	41	49	57	65	73	81	89	98	106	114	122	130	138
	150 and over	26	33	39	46	53	59	66	72	79	85	92	98	105	112
1-1/16	Less than 159	33	41	49	57	65	73	81	89	98	106	114	122	130	138
	159 and over	26	33	39	46	53	59	66	72	79	85	92	98	105	112
1-1/4	Less than 188	33	41	49	57	65	73	81	89	98	106	114	122	130	138
	188 and over	26	33	39	46	53	59	66	72	79	85	92	98	105	112
		Maximum Allowable Variation, in.													
		1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	1-1/16

Note: For actual dimensions not shown, use the next higher value shown.

Table C-3—Intermediate Stiffeners on One Side of Web Only—Interior Girders															
Thickness of Web, in.	Depth of Web, in.	Least Panel Dimension, in.													
1/2	Less than 50	25	31	38	44	50									
	50 and over	17	21	25	29	34	38	42	46	50	54	59	63	67	71
9/16	Less than 56	25	31	38	44	50	56								
	56 and over	17	21	25	29	34	38	42	46	50	54	59	63	67	71
5/8	Less than 63	25	31	38	44	50	56	63							
	63 and over	17	21	25	29	34	38	42	46	50	54	59	63	67	71
11/16	Less than 69	25	31	38	44	50	56	63	69						
	69 and over	17	21	25	29	34	38	42	46	50	54	59	63	67	71
3/4	Less than 75	25	31	38	44	50	56	63	69	75					
	75 and over	17	21	25	29	34	38	42	46	50	54	59	63	67	71
13/16	Less than 81	25	31	38	44	50	56	63	69	75	81				
	81 and over	17	21	25	29	34	38	42	46	50	54	59	63	67	71
7/8	Less than 88	25	31	38	44	50	56	63	69	75	81	88			
	88 and over	17	21	25	29	34	38	42	46	50	54	59	63	67	71
15/16	Less than 94	25	31	38	44	50	56	63	69	75	81	88	94		
	94 and over	17	21	25	29	34	38	42	46	50	54	59	63	67	71
1	Less than 100	25	31	38	44	50	56	63	69	75	81	88	94	100	
	100 and over	17	21	25	29	34	38	42	46	50	54	59	63	67	71
1-1/16	Less than 106	25	31	38	44	50	56	63	69	75	81	88	94	100	106
	106 and over	17	21	25	29	34	38	42	46	50	54	59	63	67	71
1-1/4	Less than 125	25	31	38	44	50	56	63	69	75	81	88	94	100	106
	125 and over	17	21	25	29	34	38	42	46	50	54	59	63	67	71
		Maximum Allowable Variation, in.													
		1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	1-1/16

Note: For actual dimensions not shown, use the next higher value shown.

Attachment A: Web Flatness

Table C-4–Intermediate Stiffeners on One Side Only of Web, Fascia Girders															
Thickness of Web, in.	Depth of Web, in.	Least Panel Dimension, in.													
1/2	Less than 50	30	38	45	53										
	50 and over	20	25	30	35	40	45	50	55	60	65	70	75	80	85
9/16	Less than 56	30	38	45	53	60									
	56 and over	20	25	30	35	40	45	50	55	60	65	70	75	80	85
5/8	Less than 63	30	38	45	53	60	68								
	63 and over	20	25	30	35	40	45	50	55	60	65	70	75	80	85
11/16	Less than 69	30	38	45	53	60	68	75							
	69 and over	20	25	30	35	40	45	50	55	60	65	70	75	80	85
3/4	Less than 75	30	38	45	53	60	68	75							
	75 and over	20	25	30	35	40	45	50	55	60	65	70	75	80	85
13/16	Less than 81	30	38	45	53	60	68	75	83						
	81 and over	20	25	30	35	40	45	50	55	60	65	70	75	80	85
7/8	Less than 88	30	38	45	53	60	68	75	83	90					
	88 and over	20	25	30	35	40	45	50	55	60	65	70	75	80	85
15/16	Less than 94	30	38	45	53	60	68	75	83	90	98				
	94 and over	20	25	30	35	40	45	50	55	60	65	70	75	80	85
1	Less than 100	30	38	45	53	60	68	75	83	90	98	105			
	100 and over	20	25	30	35	40	45	50	55	60	65	70	75	80	85
1-1/16	Less than 106	30	38	45	53	60	68	75	83	90	98	105	113		
	106 and over	20	25	30	35	40	45	50	55	60	65	70	75	80	85
1-1/4	Less than 125	30	38	45	53	60	68	75	83	90	98	105	113	120	127
	125 and over	20	25	30	35	40	45	50	55	60	65	70	75	80	85
		Maximum Allowable Variation, in.													
		1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	1-1/16

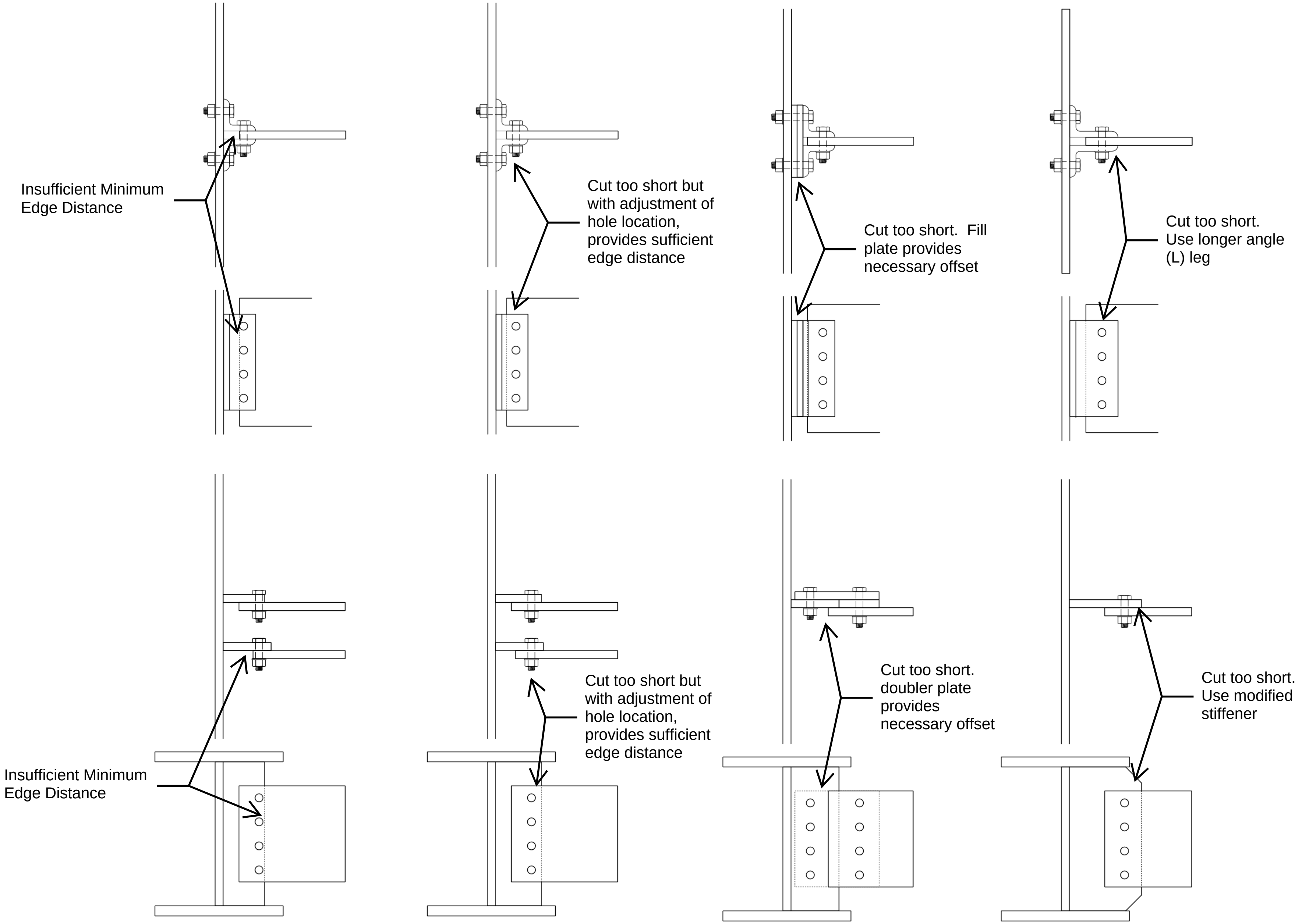
Note: For actual dimensions not shown, use the next higher value shown.

Table C-5–No Intermediate Stiffeners—Interior and Fascia Girders																	
Thickness of Web, in.	Least Panel Dimension, in.																
Any	38	47	56	66	75	84	94	103	113	122	131	141	150	159	169	178	188
	Maximum Allowable Variation, in.																
	1/4	5/16	3/8	7/16	1/2	9/16	5/8	11/16	3/4	13/16	7/8	15/16	1	1-1/16	1-1/8	1-3/16	1-1/4

Note: For actual dimensions not shown, use the next higher value shown.

Attachment D

<u>ISSUE: Framing members are too short</u>



Option 1: Minor offset from design with room to adjust without violating minimum edge distances. Engineering Approval not required

Option 2: Larger offset that violates minimum edge distances with minor adjustments. Engineering Approval required

Option 3: Larger offset that violates minimum edge distances with minor adjustments. Engineering Approval required

Attachment E

Attachment E: Updates to G2.2 (items discussed in Fall 2024 meeting, per comments)

Guidelines for Resolution of Steel Bridge Fabrication ~~Errors~~Nonconformances

G2.2 RECOMMENDATION

G2.2 COMMENTARY

CHAPTER 1

INTRODUCTION

1.1—Guidelines

Fabrication errors in the steel bridge industry are seldom identical, but are often similar. These guidelines are intended to assist engineers, inspectors, and fabricators in categorizing situations and determining the optimal solutions for errors not specifically addressed in the governing contract documents. Fabricators or owners may propose actions suggested herein with adequate background information for evaluation and acceptance. Work must conform to the contract documents with designs usually based upon AASHTO ~~*LRFD Bridge Design Specifications*~~*BDS* ~~or *Standard Specifications for Highway Bridges*~~, and fabrication governed by AASHTO SBFS, the AASHTO/AWS D1.5M/D1.5 *Bridge Welding Code*, and the Owner's specifications. However, some flexibility by the Owner may be required, permitting limited deviations from those documents to avoid unnecessary delays and potentially counterproductive rework. Some suggestions in this document involve the Owner permitting deviations from contract requirements, so the Owner needs to determine if such modifications would make the nonconformance acceptable.

This document covers common fabrication ~~problem~~ nonconformance situations. Coverage of each topic

Commented [HG1]: Comment from Phil Dzikowski on Chapter 5 but could apply more broadly: I didn't see it written anywhere about ensuring that material that is used to add a splice to the member matches the required/specified material specification and grade. I know that seems kind of implied but I would add a blurb at least in the commentary section, unless it's addressed elsewhere in the document and I just missed it.

Commented [HG2R1]: TG2 says no need

Commented [HG3]: TG2 decided a long time ago to change the title from "errors" to "nonconformances. Ch 1 review team made the change shown in the 1st paragraph of the Foreword. Also, for this paragraph, instead of "errors" in the first sentence,

Duncan Patterson recommends "errors, oversights, nonconformances and the like, collectively henceforth referred to as "errors" in this document".

Do we want to make a uniform change to the single term "nonconformances" throughout the document? (Jason Lloyd asks the same question.) Do we then have to define nonconformance to what?

Commented [HG4R3]: Volunteers will review terminology

Attachment E: Updates to G2.2 (items discussed in Fall 2024 meeting, per comments)

G2.2 RECOMMENDATION

begins with a statement of the problem issue, followed by a description of one or more recommended repair resolutions, and concludes with commentary on the issue and recommendations. If several recommendations are made on a single issue, they are presented in the order of preference.

This document does not provide an exhaustive listing of all possible repair options.

1.2—Errors

The term "error" in this document indicates a fabrication problem, not necessarily equivalent to the more specific application of "error" used in contractual language.

Errors covered in this document may include, but are not limited to:

- material or weld discontinuities;
- geometric and fit-up problems;
- dimensional errors for holes, cuts, angles, etc.; and
- substandard materials.

Coating problems are addressed in the appendices to SBC S8.1, *Guide Specification for Application of Coating Systems with Zinc-Rich Primers to Steel Bridges*.

Any deficiency serious enough to cause rejection is a "defect." According to ~~the~~ AASHTO/AWS D1.5~~M/D1.5 "Terms and Definitions" annex~~, a defect is "a discontinuity or discontinuities that by nature or accumulated effect (for example, total crack length) render a part or product unable to meet minimum applicable acceptance standards or specifications. This term designates rejectability." If a fabrication error occurs in a small element, such as a splice plate, unattached connection plate, or cross-frame piece, it is usually most economical to just replace the item if appropriate material is available. For major members, errors may be

G2.2 COMMENTARY

Commented [HG5]: Need to resolve "error" terminology question.

Commented [HG6]: Duncan Paterson comment: Spent time defining error, and then use deficiency.

Hg response: add "defect" and "deficiency" to overall terminology review.

Attachment E: Updates to G2.2 (items discussed in Fall 2024 meeting, per comments)

G2.2 RECOMMENDATION

economically corrected using the methods described in this document.

Deficiencies may be discovered as the material is being handled, during various stages of the fabrication process, or during loading, shipping, and field erection operations. Some deficiencies are often only found after the material is blast cleaned. The surfaces and edges of members and inner perimeter of holes should be inspected for defects during various steps of fabrication.

The repairs suggested in this document are appropriate for occasional errors, but are not intended to allow wholesale changes to plan details. Extensive errors can be cause for rejecting a member.

While minor deficiencies or defects may not require repair, recurring minor items may be indicators of serious procedural or material problems.

Nonconformances are identified and documented as part of the quality control/quality assurance (QC/QA) process. AASHTO SBFS, AASHTO/AWS D1.5~~M/D1.5~~, and SBC Guide ~~Specification S~~G4.1, *Steel Bridge Fabrication QC/QA* ~~*Guide Specification*~~*Guidelines*, provide descriptions of the duties and activities of the fabricator's and the owner's inspectors.

1.3—Nondestructive Examination

~~Based on the requirements of ASTM A6 and AASHTO/AWS D1.5M/D1.5, repairs to base metal and welds may require a formal repair plan approved by the Engineer or they may be performed by the mill using standard, industry-accepted operating procedures. (Mill weld repairs are prohibited for FC material, but the Owner has no control over weld repairs by the mill on non-FC material unless they are prohibited by the contract documents.) For shop welds correcting material defects, the repair process requires NDE, which always includes visual inspection. For material carrying design stresses, NDE may also include MT, PT, UT, RT, or other testing methods to evaluate the defect, its removal, and subsequent repair.~~ For an overview of nondestructive examination in steel bridge fabrication, refer to Clause 6

G2.2 COMMENTARY

Commented [HG7]: Hg: Does this really add anything that people don't already know?
Duncan & Jason comments:

- I'd bet most design engineers don't know this, but some owners probably do. -– JBL
- It's true, and not necessarily common knowledge, notes\ that there are some repairs that a fabricator can do w/o notice, mentions NDE, etc. Therefoer I would suggest worth keeping, if only to offer a preamble to the last sentence.

Hg: can we cut it down?

Commented [HG8R7]: TG2: keep last sentence. Mill repair discussion not relevant.

Attachment E: Updates to G2.2 (items discussed in Fall 2024 meeting, per comments)

in AASHTO/AWS D1.5M/D1.5, Volume 1 of the AWS Welding Handbook, and publications by the American Society for Nondestructive Testing (ASNT).

CHAPTER 2

ERRANT HOLES

During the fabrication of steel bridge members or components, holes are sometimes misplaced and drilled too close to the ends or edges of flanges, webs, or splice plates; to adjacent holes; or to other components. (See Figure 2-1.) These errors can occur because of shifted templates or layout dimension errors and sometimes due to CNC (computer-numerically controlled) equipment programming errors. When errant or mislocated holes are made in a bridge element, the Engineer should be notified and will determine if repair will be permitted or replacement of the steel member is required.

Consult the governing documents for fastener spacing, edge distance, and end distance requirements and for the definitions of standard, oversized, and slotted holes. ~~The AASHTO LRFD Bridge Design Specifications do not distinguish between rolled, thermally cut, and planed edges. It does penalize sheared edges, but those are not generally allowed as final boundaries of load carrying elements. AASHTO Standard Specifications for Highway Bridges provide more conservative minimum for TCEs than for planed or milled edges, so required edge distances can be reduced if the TCEs are planed or milled. LRFD Bridge Design Specifications and Standard Specifications for Highway Bridges and have the same minimum edge distances for rolled beam flanges. Designers should be encouraged to specify edge distances about ¼" [6 mm] greater than the minimum clearances to provide some fabrication tolerance.~~

Attachment E: Updates to G2.2 (items discussed in Fall 2024 meeting, per comments)

G2.2 RECOMMENDATION

If the errant hole location is too close to another hole, bolt installation and tightening might be difficult or impossible, and the bolt may not be fully effective for ensuring load transfer. The clearance requirements for installing high-strength bolts are given in Part 7 of the AISC Steel Construction Manual.

2.1—TOO CLOSE TO ADJACENT HOLE

Error:

A mislocated hole is too close to an adjacent hole.

Repair Recommendation:

1. Evaluate the situation:
   a. Determine whether the resulting hole spacing permits bolt installation in each hole. If bolts can be installed in all holes, determine whether the resulting spacing satisfies ~~the RCSC specifications~~ structural requirements~~so each bolt individually develops a slip-critical connection~~. Use the RCSC specification to calculate reductions in clamping force.
   b. For connections transferring moment and shear, such as web splices, determine whether the potential bolt pattern's section modulus is adequate for the design moment and shear, considering reductions due to missing bolts or substandard spacing. This will not usually be a concern unless multiple bolts near the outside corners are involved.
2. If the calculated capacity based on the preceding evaluation is adequate, then the hole spacing may be accepted "as is." If there is not room to install bolts in all the existing holes, unused holes may need to be covered or closed to address fatigue concerns, to prevent corrosion, or for aesthetics. See Chapter 3.
3. If the calculated capacity is inadequate (in recommended order of preference):

G2.2 COMMENTARY

C2.1

High strength bolted connections in steel bridges are often specified as slip-critical. In this type of connection, the prevention of slip in the service load range is the limit state. Since the load transfer mechanism is friction on the faying surfaces, the design assumption is that the slip resistance provided by the clamping force of each fastener is equal and additive with that of ~~at~~ the other fasteners~~, provided the presumed areas of pressure transfer for the bolts do not overlap~~. See Figure C-3.1 in the RCSC specification. Slip resistance is also affected by the surface condition and hole size, so if any holes become oversize or slotted, the contribution by that bolt is reduced. Therefore, all locations must develop the slip force before a total joint slip can occur at that plane. However, although a slip-critical connection is designed to not slip into bearing under service loads, the connection must also meet the bearing requirements in an overload condition. This results in a final connection that does not slip under service loads, but also performs in bearing under extreme loads.

It is only for the bearing load transfer mechanism that the hole spacing is treated as a direct design parameter. The bearing strength is a function of the hole spacing, so inadequate hole spacing reduces the total bearing strength.

For the friction load transfer mechanism, the clamped areas of the plates in contact around each bolt must provide for friction load transfer. There must be enough room to correctly install the bolt.

Commented [HG9]: Eric Rau comment: unclear what is meant by "fully effective"

Commented [HG10R9]: Now is ok with the term. New business (not this edition)—maybe get into various checks & how they're affected. Also for widening web splice.

Commented [HG15]: Eric Rau comment: I am not sure this is accurate. Source? (related comment on recommendation #1)

Commented [HG16R15]: TG2: delete

Commented [HG11]: Eric Rau comment: I am not sure this is accurate. Source? (related comment on commentary)

Commented [HG12R11]: TG2: delete

Attachment E: Updates to G2.2 (items discussed in Fall 2024 meeting, per comments)

G2.2 RECOMMENDATION

a. Determine whether there is sufficient space within the existing bolt pattern for adding bolts to compensate for the deficiency.

b. Determine whether larger diameter or higher strength bolts could add sufficient capacity, either with the existing connection or with a larger one. ~~Changing bolt size or strength will adversely affect field installation and must be closely coordinated with the erector and clearly noted on erection framing drawings.~~ Do not mix different strength bolts of the same size within a single connection. ~~If there is not room to install bolts in all the existing holes, unused holes may need to be covered or closed to address fatigue concerns, to prevent corrosion, or for aesthetics. See Chapter 3.~~

~~b.~~c. ~~Determine whether larger splice or connection plates with additional bolts could be employed. See Figure 2.2-1. Note that for web splices, increasing the number of vertical rows increases design requirements.~~ See Repair Recommendation 2b in Section 2.2, "Hole Too Close to Free Edge".

~~c.~~d. Determine whether repairing the errant holes by welding and redrilling the hole pattern correctly is appropriate. ~~Weld-repaired holes may be more susceptible to fatigue damage and should not be used in high stress range areas.~~

To restore the hole by welding and re-drilling, see Chapter 3.

~~d. Determine whether larger diameter or higher strength bolts could add sufficient capacity, either with the existing connection or with a larger one. Changing bolt size or strength will adversely affect field installation and must be closely coordinated with the erector and clearly noted on erection framing drawings. Do not mix different strength bolts of the same size within a single connection. If there is not room to install bolts in all the existing holes, unused holes may need to~~

G2.2 COMMENTARY

Changing bolt size or strength will adversely affect field installation and must be closely coordinated with the erector and clearly noted on erection framing drawings.

Commented [HG13]: Does this ever happen?

Commented [HG14R13]: TG2: yes

Commented [HG17]: Moved to 2.2.2b. TG2: delete entirely.

Commented [HG18]: Eric Rau comment: define.... what is "more susceptible"
Hg response: more susceptible than unrepaired base metal? In reality, a properly performed and inspected repair should be no worse than a Cat. B splice, no? Should we delete this?

Commented [HG19R18]: TG2: Delete.

Attachment E: Updates to G2.2 (items discussed in Fall 2024 meeting, per comments)

G2.2 RECOMMENDATION

~~be covered or closed to address fatigue concerns, to prevent corrosion, or for aesthetics. See Chapter 3.~~

4. Relocating the splice or removing and replacing part of the member are last-choice options because of their complexity and potential for defects. ~~Costs of additional material, increased erection labor, engineering to design and verify alternates, fabrication, and NDE should be the Contractor's responsibility.~~

G2.2 COMMENTARY

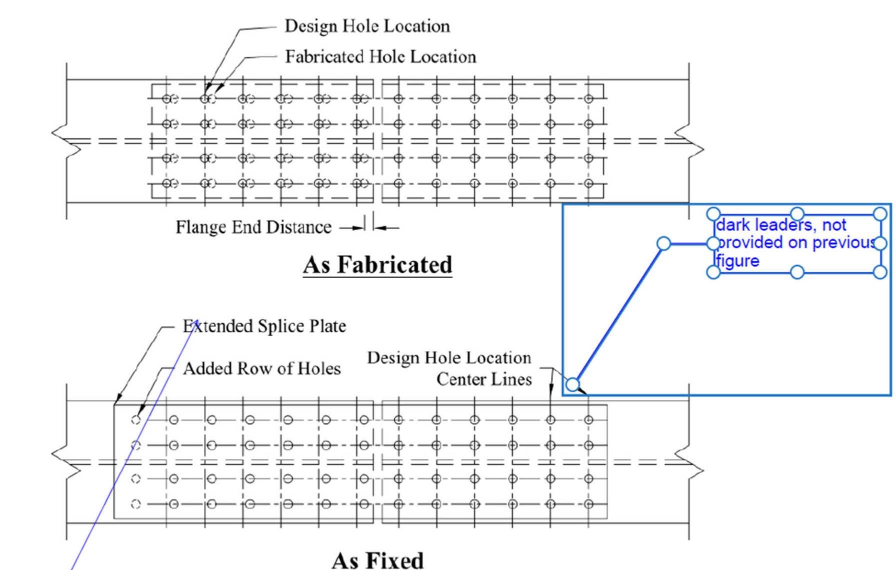


Figure 2.2-1—Too Close to End of Flange

Suggest these figures are moved after the section intro: 2.2—HOLE TOO CLOSE TO FREE EDGE

Commented [HG20]: Eric Rau comment: This seems like item 3e not item 4. And it should probably be "Relocate or replace the connection components" with the rest moved to commentary. Hg response: I can't imagine getting to this point over a mislocated hole. Delete?

Commented [HG21R20]: TG2: Keep. It's last anyway. Maybe commentary about if the whole pattern got shifted.

Commented [HG22]: Eric Rau comments on Figure 2.2-1. Hg response: **You want to see these dark leaders on the other figures?** Move as noted. **I don't understand "extended plate" comment**

Commented [HG23R22]: Rau will think about "extended plate" comment

Attachment E: Updates to G2.2 (items discussed in Fall 2024 meeting, per comments)

G2.2 RECOMMENDATION

2.2—Hole Too Close to Free Edge

Error:

A hole is drilled closer to the free edge than permitted by ~~the applicable design specifications or drawings~~approved shop drawings. ~~A "free edge" is a rolled or thermally cut boundary not welded to another component. This includes the end or side edges of a flange, the end of a web, or any edge of a splice plate.~~

Repair Recommendation:

~~5. If the hole is adjacent to a TCE and bolt placement is based on criteria from the AASHTO *Standard Specifications for Highway Bridges*, for errors up to ⅛" [3 mm], grind the adjacent edge of the plate to approximate a planed finish and allow a smaller clearance than for a TCE.~~

1. If the edge or end distance shown on the shop drawing is more than specified minimums and the as-fabricated edge or end distance meets specified minimums, the hole may be accepted "as is".

~~1.~~2. For errors reducing clearance below ~~AASHTO~~ specified minimums but not breaking the edge, determine whether the contribution of the bolt to the connection's total capacity can be neglected.

   a. If so, the connection may be used as is, but a bolt must still be ~~inserted~~ installed in the errant hole to address fatigue concerns, maintain the sealing pitch, and avoid confusion on future inspections.

   b. If neglecting the bolt makes the connection inadequate, determine whether larger splice or connection plates with additional bolts could be employed. See Figure 2.2-1. ~~follow Repair Recommendation 3 in Section 2.1, "Too Close to Adjacent Hole."~~

G2.2 COMMENTARY

A "free edge" is a rolled or thermally cut boundary not welded to another component. This includes the end or side edges of a flange, the end of a web, or any edge of a splice plate.

Commented [HG24]: Eric Rau comment: shop drawings?
Hg response: yes, in theory they need to be meeting the shop drawings. There are recommendations out in the world for detailing more than the minimum edge distance, so they could violate the shop drawing but still meet the spec. That's still a nonconformance, and we should add that case. See changes here and new #1 below.

Commented [HG25R24]: TG2: edited #1

Attachment E: Updates to G2.2 (items discussed in Fall 2024 meeting, per comments)

G2.2 RECOMMENDATION

~~b.~~c. In the case of an isolated hole, welded restoration in accordance with Chapter 3 and redrilling in the correct location may be appropriate.

~~2.~~3. If the mislocated hole breaks through the edge of one element in the connection, it cannot be ignored, even if the connection has adequate strength without it. If only a very small portion of the hole encroaches into the material, consider grinding 1:10 tapers to the surface if the remaining material will be adequate.

If penetration is significant (more than ½ hole diameter or remaining material will not be adequate), the material must be replaced or repaired. If this occurs in a splice or gusset plate or a bracing member, it should be replaced if possible.

Elements that cannot be replaced (because of material availability or other considerations) need to be either repaired or strengthened. A welded repair may be done in accordance with Clause ~~3.2.3~~5.2.6 of AASHTO/AWS D1.5~~M/D1.5~~ (and Clause 12 for ~~FCMs~~members requiring fracture control practice). See also Chapter 3.

2.3—Hole Too Close to Face of Intersecting Plate

Error:

A hole is drilled through a flange and is too close to the web to allow installation of the bolt without encroaching on the flange-to-web junction (weld, rolled fillet, etc.). If there is a splice plate on the inside face of the flange, an edge distance problem of the type addressed in Section 2.2, "Hole Too Close to Free Edge," may also occur.

Repair Recommendation:

1. If the hole does not cut into the intersecting plate, in order of preference:
   a. Slot the hole transversely to allow the bolt to be installed further away from the web.
   b. Determine whether the connection is adequate with the bolt omitted.

G2.2 COMMENTARY

Attachment E: Updates to G2.2 (items discussed in Fall 2024 meeting, per comments)

G2.2 RECOMMENDATION

i. If the bolt can be omitted, fill the hole in accordance with Chapter 3. Filling the hole addresses fatigue concerns and also prevents confusion in the field.

ii. If the bolt is structurally necessary, consider enlarging the connection by adding bolts. (See Figure 2.3-1.)

2. If aAn errant hole entersing the intersecting plate (e.g., goes through the flange-web fillet and into the web), this may be a significant stress riser in a tensile stress area, and an in-situ welded repair would be very difficult. In this case, consider the following:

   a. At a bolted splice:

      i. For a plate girder, remove flange-to-web fillets sufficiently beyond hole to allow individual repairs of web and flange. This might entail welded repairs to both web and flange or welded repair of the flange and a radiused opening in the web, avoiding adjacent restrained welds.

      ii. Lengthen the flange splice plate to develop the splice beyond the damaged area. The original designed pattern will be beyond the damaged area. Bolts will still be required between the damaged area and the end of the member; observe required minimum bolt spacing.

   b. Not at a bolted splice (e.g., at a bracing connection):

      i. Reinforce the area with external flange plates bridging the area to reduce stress range.

      ii. Provide a bolted flange splice, developed on each side of the hole and neglecting any contribution from the flange at the hole. This conservatism may be justified for an NSTMFCM.

G2.2 COMMENTARY

Attachment E: Updates to G2.2 (items discussed in Fall 2024 meeting, per comments)

G2.2 RECOMMENDATION

If all or a portion of the hole remains and will be visible to the public or may accumulate moisture (bottom flange), or if it is in an area ~~where a Category D fatigue detail is not appropriate~~fatigue is a concern, it should be filled in accordance with Chapter 3.

G2.2 COMMENTARY

2.4—ELONGATED AND OVERSIZED HOLES

Error:

A standard hole is improperly drilled, resulting in an oversized, misshaped, or elongated hole.

Repair Recommendation:

~~Standard and oversized holes are defined in the AASHTO bridge design standards. In main members, i~~Investigate whether the connection can tolerate the reduced capacity of an oversized or slotted hole.

1. For most cases, where the oversize dimension is not severe and is limited to a small portion of the holes at any location, it may be acceptable to leave the hole(s) "as is." If many (or most) of the holes at a connection are oversized, evaluate whether the oversize holes are structurally acceptable, and if so, consider drilling new splice plates to match with core-type bits (to avoid further enlarging existing holes), using the holes in the member as a template. ~~(Reaming or drilling the existing splice plates can lead to alignment problems.) This will not increase design capacity, but will provide a better connection and may justify slightly exceeding overload limitations.~~ A hardened washer or ply must cover any exposed non-standard hole, as required by the RCSC specification.

C2.4

Standard and oversized holes are defined in the AASHTO bridge design standards. See also C2.1.

If the hole size for a standard hole exceeds RCSC tolerances, it should be considered oversize as defined in AASHTO, and the factors for oversize holes should be used.

Commented [HG26]: Eric Rau comment: fatigue considerations should be addressed similarly. this is the first time we introduce Cat. D.
Hg response: delete Cat. D reference but mention it in the intro to Chapter 3; see changes.
Or do we need to talk about Cat. D above everywhere we mention fatigue?

Commented [HG27R26]: Jason Lloyd brings up research showing that it is o?ten Cat. C. Hg says we can revisit i?AASHTO changes the category.

Commented [HG28]: Eric Rau comment: we should identify that structural eval is slip critical and plate failure in commentary
Hg response: see earlier comment along the same lines.

Commented [HG29R28]: TG2: Adding commentary in #2

Attachment E: Updates to G2.2 (items discussed in Fall 2024 meeting, per comments)

G2.2 RECOMMENDATION

2. If ~~there are a number of non-conforming holes at a single splice location and~~ calculations indicate that the design bolts in oversized holes will not be structurally adequate, consider using larger diameter bolts if spacing and edge distances permit, reaming or redrilling the hole to the next standard size if necessary. ~~If the problem is discovered in the field, larger bolts may be provided for just the oversize holes, but if found in the shop, larger bolts should be used for the whole pattern to avoid field confusion. The larger bolts may theoretically provide more strength than the original bolts, but need only meet plan requirements.~~ If spacing will not permit the use of larger diameter bolts, higher strength bolts may be considered, but the same strength bolt should be used for the whole connection. Do not mix different strength bolts of the same size within a single connection. ~~Mixing ASTM A325 bolts in standard holes and A490 bolts in oversize holes within the same connection may require sophisticated review and result in jobsite confusion.~~ Changing bolt size or strength will adversely affect field installation and must be closely coordinated with the erector and clearly noted on erection framing drawings. Document locations of larger bolts, or of connections using higher-strength bolts, with notes on the erection sheets, and mark these locations on the connections themselves clearly for field personnel.

G2.2 COMMENTARY

~~Avoid c~~Changing to ~~specialty~~ a different size bolts and washers for only certain holes in a connection can be problematic since the field bolting crew will have equipment calibrated for a specific size, and the wrong bolts could easily be installed. Replacing the connection with higher-strength bolts has similar problems. Either of these solutions must be carefully coordinated with the erector. Acquiring different bolts ~~may~~ will typically require additional lot testing ~~and approval, significantly delaying field work~~. ~~If necessary, ream or re-drill the hole as necessary and increase the bolt one size (e.g., ¾" to ⅞") at those locations, documenting locations with notes on the erection sheets, and marking the locations of the larger bolt(s) clearly for field personnel. Using this approach in the shop for individual bolt locations has a high potential for field installation errors and is not recommended.~~

Commented [HG31]: TG2: Add commentary about how oversized holes can't be used in bearing connections

Commented [HG30]: GOT THIS FAR IN MEETING

TG 11 Design

Attachment A

AASHTO/NSBA Steel Bridge Collaboration

TG11

Design

1

Agenda

1. Introductions (3:00 to 3:10)
    1. Welcome
    2. AISC Antitrust Policy and Meeting Code of Conduct
    3. Approval of Previous Meeting Minutes
2. Announcements and Administrative Items (3:10 to 3:15)
    1. IBC, NASCC, AREMA Bridge Symposium
3. Presentations (3:15 to 3:45)
    1. Additional Design Considerations for Long Span Plate Girder Bridges (Tony Ream, HDR)
4. Guidelines for the Design of Cross Frames & Diaphragms (3:45 – 4:15)
    1. Last and final items
    2. Balloting process
5. Next item – Phased Construction & Widenings Discussion (4:15 to 5:00)
    1. Identify major topics and develop outline
    2. Quarter year meetings
6. Adjourn

2

AISC Antitrust Policy, Conflict of Interest and Code of Conduct

Please honor AISC's policies regarding antitrust, conflict of interest, and conduct

ANTITRUST

Please remember that discussion among competitors of plans, consensus arrangements, agreements, strategies, and the like may be unlawful if they relate to any of the following:

- Current or future pricing or bidding information;
- Limits on production or product lines;
- Allocating customers or territories;
- Individual company marketing strategies, projections, or assessments; or,
- Establishing a practice of dealing with customers or suppliers.

CONFLICT OF INTEREST

Please consult the meeting Chair and Secretary before participating in this meeting if you are, or an organization with which you are affiliated is:

- Contemplating or currently doing business with AISC;
- Involved in litigation, arbitration, or another form of dispute resolution, the outcome of which could be affected by an action of this group on an issue before it; or,
- Otherwise subject to circumstances that could impair or appear to impair your judgement on an issue before this group.

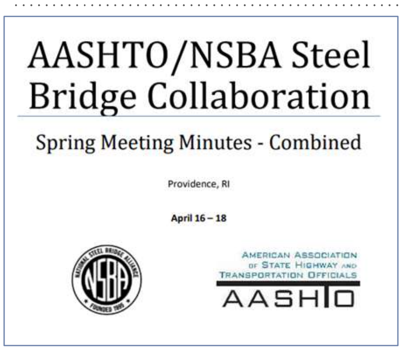
CONDUCT

Please behave appropriately and refrain from discrimination and harassment.

AISC's full policies relating to these matters are available at https://www.aisc.org/about-us/

3

Approval of Previous Meeting Minutes

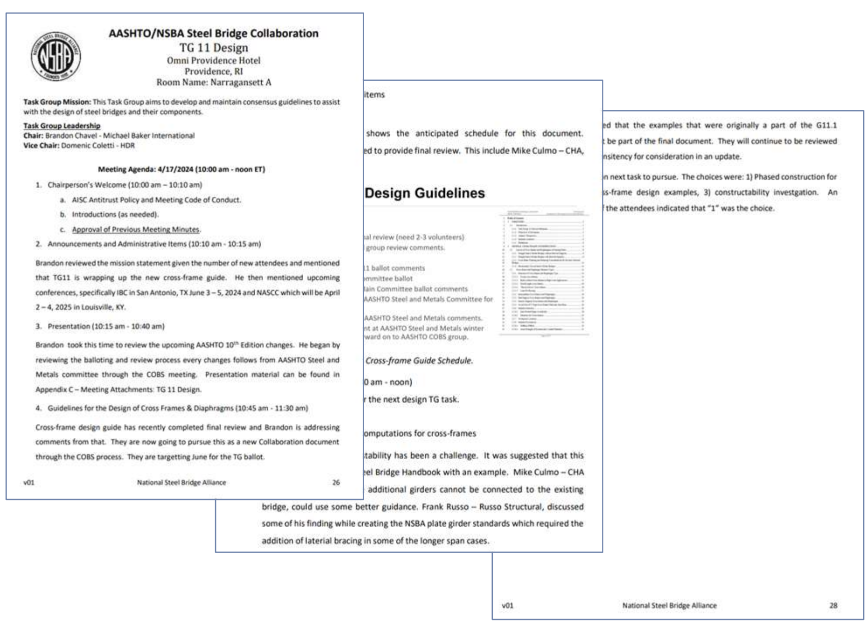


AASHTO/NSBA Steel Bridge Collaboration

Spring Meeting Minutes - Combined

Providence, RI

April 16 – 18



AASHTO/NSBA Steel Bridge Collaboration
TG 11 Design
Omni Providence Hotel
Providence, RI
Room Name: Narragansett A

Task Group Mission: This Task Group aims to develop and maintain consensus guidelines to assist with the design of steel bridges and their components.

Task Group Leadership
Chair: Brandon Chavel - Michael Baker International
Vice Chair: Domenic Coletti - HDR

Meeting Agenda: 4/17/2024 (10:00 am - noon ET)

1. Chairperson's Welcome (10:00 am – 10:10 am)
   a. AISC Antitrust Policy and Meeting Code of Conduct.
   b. Introductions (as needed).
   c. Approval of Previous Meeting Minutes.
2. Announcements and Administrative Items (10:10 am - 10:15 am)

Brandon reviewed the mission statement given the number of new attendees and mentioned that TG11 is wrapping up the new cross-frame guide. He then mentioned upcoming conferences, specifically IBC in San Antonio, TX June 3 – 5, 2024 and NASCC which will be April 2 – 4, 2025 in Louisville, KY.

3. Presentation (10:15 am - 10:40 am)

Brandon took this time to review the upcoming AASHTO 10th Edition changes. He began by reviewing the balloting and review process every changes follows from AASHTO Steel and Metals committee through the COBS meeting. Presentation material can be found in Appendix C – Meeting Attachments: TG 11 Design.

4. Guidelines for the Design of Cross Frames & Diaphragms (10:45 am - 11:30 am)

Cross-frame design guide has recently completed final review and Brandon is addressing comments from that. They are now going to pursue this as a new Collaboration document through the COBS process. They are targetting June for the TG ballot.

v01 National Steel Bridge Alliance 26

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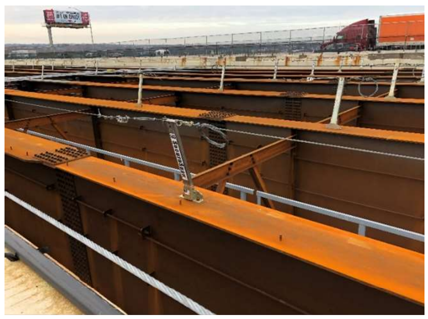
TG11 Mission

- This Task Group aims to develop and maintain consensus guidelines to assist with the design of steel bridges and their components.
  - *Developing Cross-frame design guidelines.*
  - *Joint task group with TG1 and TG12 for steel straddle bents.*



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Announcements

- International Bridge Conference
  - July 13-16, 2025
  - Pittsburgh, PA
  - Call for Abstracts is open until 10/25
  - https://eswp.com/bridge/bridge-home/

6

7

Announcements

- AREMA Railroad Bridge Symposium
  - February 4-6, 2025
  - Forth Worth, TX
  - https://rbs25.arema.org/

  - AREMA Committee 15 meetings will occur as well

8

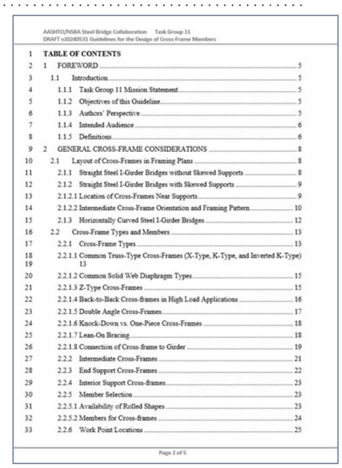
Presentation

Additional Design Considerations for Long Span Steel Plate Girder Bridges – by Tony Ream, HDR

10

Cross-frame Design Guidelines

- Where are we:
- We had one last review, by a small team of reviewers
  - Heather Gilmer
  - Mike Culmo
  - Eric Rau
  - Saeed Doust



AASHTO/NSBA Steel Bridge Collaboration Task Group 11
DRAFT v20240531 Guidelines for the Design of Cross-Frame Members

TABLE OF CONTENTS

Page 2 of 5

- Domenic Coletti reviewed comments and addressed most
- Chavel finalizing outstanding comments; and finishing up 3 figures

11

Timeline

- November/December - TG11 Ballot
- January - Address TG11 ballot comments
- February - Main Committee ballot
- March – Address Main Committee ballot comments
- TBD
  - Send to AASHTO Steel and Metals Committee for review.
  - Address AASHTO Steel and Metals comments.
- September - Present at AASHTO Steel and Metals meeting
  - forward on to AASHTO COBS group at appropriate time.

12

Design of WTs in Compression

- Tables for Eccentrically Loaded WT Shapes in Compression
  - AISC EJ 2010
  - Thank you to Dr. Russo

Table 2 (LRFD)

Horizontal WT Shapes

Available Strength ($\phi_c P_n$) for Compression Loads* with Connection Eccentricity (kips)

F_y = 5

Shape	Span Length (ft)													
	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	22.5	25.0	27.5	30.0	32.5	35.0
WT4×9	40.8	36.3	30.3	23.6	17.7	13.5	10.4							
WT5×11	47.7	45.3	40.6	34.5	28.1	22.1	17.5	14.1						
WT5×13	57.8	54.5	48.3	40.7	33.1	26.0	20.7	16.6	13.4					
WT5×15	70.9	65.2	57.1	47.9	38.8	30.5	24.2	19.5	15.8					
WT6×11	45.1	41.1	33.5	24.4	17.5									
WT6×13	47.5	46.3	43.9	40.0	35.3	30.4	25.5	20.9	17.2	14.2				
WT6×15	61.6	59.6	55.7	49.8	43.2	36.3	29.8	24.3	19.9	16.5				
WT6×17.5	79.2	76.2	70.2	61.9	52.9	43.8	35.5	28.9	23.8	19.7				
WT6×20	87.4	84.1	77.5	67.3	56.9	46.9	37.8	30.7	25.1	20.6				
WT6×22.5	103	99.0	90.2	78.0	65.5	53.6	43.2	35.1	28.7	23.7				
WT6×25	117	111	99.3	86.1	72.5	59.6	48.1	39.1	32.1	26.5				
WT7×11	34.8	33.6	31.0	27.1	22.5	17.7								
WT7×13	47.1	45.3	41.3	35.6	29.1	22.5	17.6							
WT7×15	56.8	55.5	52.9	48.7	43.2	37.1	31.0	25.4	21.0					
WT7×17	68.8	67.0	63.5	57.9	51.0	43.6	36.3	29.7	24.5	20.4				

Table 4 (LRFD)

Horizontal WT Shapes

Reduction Factor for Compression Loads* with Connection Eccentricity

$P_u/(\phi_c P_n)$

F_y = 50 ksi

Shape	Span Length (ft)															
	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	22.5	25.0	27.5	30.0	32.5	35.0	37.5	40.0
WT4×9	0.391	0.392	0.404	0.448	0.515	0.564	0.594									
WT5×11	0.479	0.470	0.470	0.488	0.523	0.573	0.612	0.637								
WT5×13	0.435	0.427	0.432	0.452	0.490	0.542	0.581	0.607	0.621							
WT5×15	0.390	0.396	0.410	0.435	0.478	0.534	0.575	0.603	0.618							
WT6×11	0.539	0.564	0.626	0.713	0.781											
WT6×13	0.582	0.574	0.566	0.564	0.570	0.584	0.605	0.632	0.652	0.663						
WT6×15	0.520	0.512	0.507	0.513	0.529	0.554	0.590	0.623	0.644	0.656						
WT6×17.5	0.463	0.456	0.457	0.471	0.496	0.532	0.578	0.612	0.634	0.647						
WT6×20	0.437	0.423	0.412	0.422	0.441	0.472	0.513	0.543	0.562	0.571						
WT6×22.5	0.403	0.390	0.387	0.401	0.426	0.464	0.508	0.539	0.559	0.569						
WT6×25	0.376	0.373	0.381	0.395	0.420	0.457	0.502	0.534	0.555	0.565						
WT7×11	0.663	0.666	0.678	0.703	0.738	0.779										
WT7×13	0.606	0.610	0.628	0.661	0.706	0.756	0.792									
WT7×15	0.589	0.585	0.582	0.588	0.604	0.628	0.660	0.694	0.717							
WT7×17	0.551	0.546	0.545	0.553	0.571	0.598	0.634	0.670	0.694	0.710						

Therefore, the flange is not slender.

Calculate critical flange local buckling stress (only applicable if noncompact or slender).

For noncompact sections (Equation F9-7),

$$F_{cr} = F_y\left(1.19 - 0.50\left(\frac{b_f}{2t_f}\right)\sqrt{\frac{F_y}{E}}\right)$$

For slender sections (Equation F9-8),

$$F_{cr} = 0.69\frac{E}{\left(\frac{b_f}{2t_f}\right)^2}$$

Calculate the nominal flexural strength (Equation F9-6),

$M_n = F_{cr}S_x$ not applicable

Lateral-torsional buckling:

From Equation F9-4,

$$M_n = M_{cr} = \pi\frac{\sqrt{EI_yGJ}}{L_b}\left[B + \sqrt{\left(1+B^2\right)}\right]$$

From Equation F9-5,

$$B = \pm 2.3\left(\frac{d}{L_b}\right)\sqrt{\frac{I_y}{J}}$$

$$= +2.3\left(\frac{6.83}{25(12)}\right)\sqrt{\left(\frac{22.6}{0.522}\right)}$$

$$= +0.345$$

$$B + \sqrt{\left(1+B^2\right)} = \left[+0.345 + \sqrt{\left(1+\left(+0.345\right)^2\right)}\right]$$

$$= 1.403$$

$$M_n = M_{cr} = \pi\frac{\sqrt{(29,000)(22.6)(11,200)(0.522)}}{25(12)}(1.403)$$

$M_n = 909.0$ k-in.; **does not control**

Design of WT member for combined forces:

Since $I_{yc}/I_y \approx 1.0 > 0.9$, use H2-1.

From Equation H2-1,

$$\frac{f_a}{F_a} + \frac{f_{bw}}{F_{bw}} \le 1.0$$

13

Next Item for the TG

- **Phased Construction & Widenings Guidelines**

- Lets Identify major topics today
  - Brandon and Domenic can develop outline
  - Hold quarterly meetings to request volunteers/assign writing tasks

14

Next Item for the TG

- Let's Identify major topics today
  - Design for future redecking.
  - Maintaining utilities during construction
  - Global stability for long narrow spans
  - Temporary barrier loadings in various phases that may affect
  - Live load on stage 1 side and how that deflection may affect the camber
  - Widening
    - One or two girders and stability issues; insertion of cross-frames
    - Lean on bracing in between the new stage and the existing.
  - Deck design
    - Cantilever at the phase line for regular deck design, and possible crash loads on barrier and carry into the deck
  - Standard cross frames may not work

15

Next Item for the TG

- Let's Identify major topics today
  - If there are more girders on one side than the other, the stiffness will be different and that could affect the girder cambers
  - Possible ponding on the deck in the closure bay
  - Widening
    - Existing bridge using design plans and not the survey information
      - When appropriate to allow field drilling or welding
  - Phased
    - If putting cross frame in, need to design vertical slotted holes large enough to accommodate the differential
  - Some interior girders may be exterior girders for some time and may need to be considered
  - If decks do not match up, how to resolve

16

Next Item for the TG

- Let's Identify major topics today
  - UND cross-frame installation tool research study, and possible use for widening.
  - Randy – two different diagonals in a cross-frame for different stages
  - Lateral sweep of the girders, within tolerance, but how does that affect the bracing lengths
  - Extra concrete haunch for certain phased construction projects
    - Consideration of girder camber tolerances
  - G12.1 – section for deflection due to phased construction
    - Need to review this.
  - Level of analysis for the phased construction
  - Compatible stiffnesses between the stages
  - Can there be live load during the closure pour
  - When is a closure pour needed

17

Next Item for the TG

- Let's Identify major topics today
  - ABC considerations with SPMT moves
  - Any issues with Live load vibration of the reinforcement in the closure pour
  - Installation of precast deck panels and staged construction
  - Expansion joint installation for phased construction
    - Modular expansion joints
  - Use of temporary median barriers, and drainage issues
  - Drainage issues in general during temporary phases
  - Partial demolition when doing a widening and superstructure and substructures
  - Fit condition
    - Consideration of web plumbness
    - Possible need for TDLF for phased construction
  - Clear space between phases that includes temp shoring, excavation, brackets, extended rebar, foundation changes

18

Next Item for the TG

- Let's Identify major topics today
  - Geometry control
    - Alignment changes for the new bridge as compared to the old and how does that affect the temporary space between the bridges
  - In a 3 phase with 2 closure pours and how that may affect the geometry.
  - End cross-frame fit between stages.
  - Interdisciplinary coordination early could eliminate phases.
  - Temporary bearing fixity, what should they be? Different from the final condition?
  - Consider how the bridge deck finishing machine will be supported.
  - Deck placement sequence

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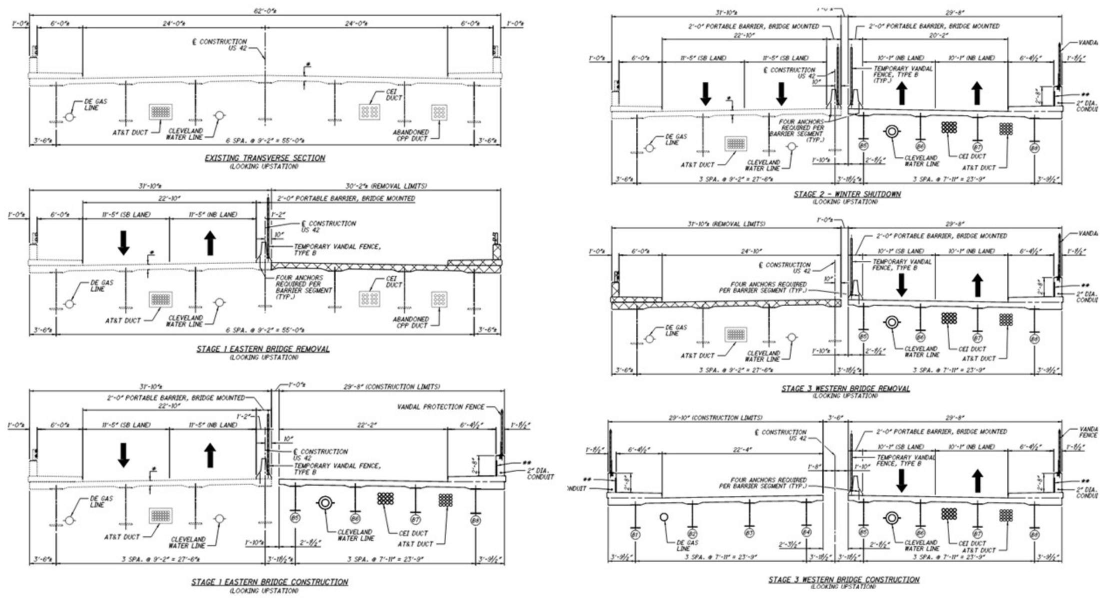
Phased Construction & Widenings



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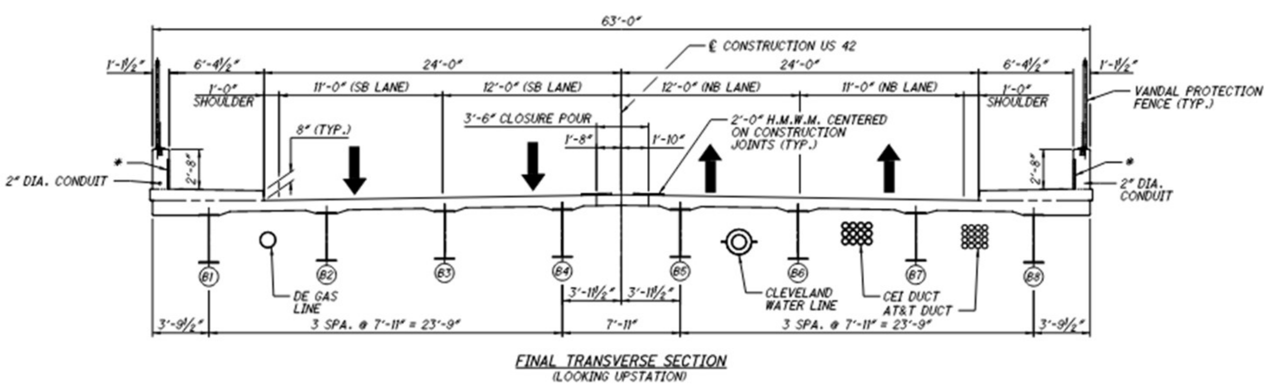
Phased Construction & Widenings



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AASHTO/NSBA Steel Bridge Collaboration

TG11

Design

22

Attachment B

I-64 over Kanawha River

Longest US Steel I-Girder Span

Additional Design Considerations

1

Project Overview

- D/B widening I-64 ~3.8 miles ($224m)
- One of busiest interstates in WV (accidents, backups)
- 4 → 6 lanes
- 8 lanes over bridge between I/Cs (merge lanes)

BRAYMAN-TRUMBULL
A JOINT VENTURE

2



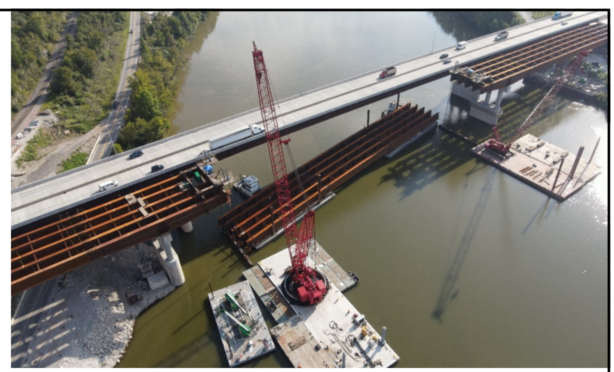
Kanawha River Bridge

- New dual 4-lane structures over Kanawha River
- WB I-64: new superstructure and substructure
- EB I-64: new superstructure, rehabilitate existing piers
- Spans: 380' – 562.5' – 390' (+ jump span)
  Width: (2) 65'-2"
- 185" to 131" web depth, bottom lateral bracing
- (2) 5 Girders
  6816 Tons GR 50W
  2214 Tons GR HPS 70W

3

Project Overview

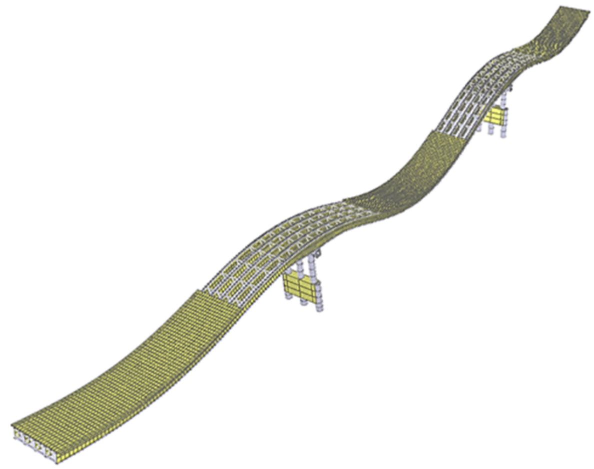
- Strand-jacking center 400' section
- A "conventional steel I-girder" superstructure provided a cost-effective winning solution



4

Complex Analysis

- Straight, square, and parallel
- Line girder?
- NO
- L > 240’ (BDS 4.6.2.2.2)
- L > 500’ (LFD Spec.)
- Full 3D finite element analysis
  - Geometry
  - Staged construction
  - LL influence



5

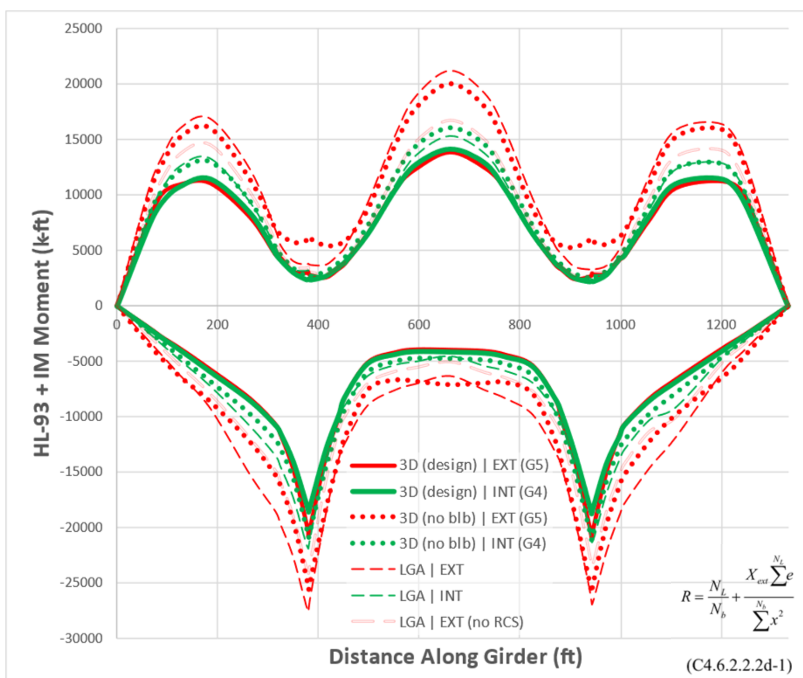
Complex Analysis

3D FEA Benefits

- Line girder – no load sharing
- Cross frames – load sharing
- BLB load sharing & resistance

Requirements

- BLB primary members BDS 6.7.5.1
- Design bracing for forces
- Typical “does-not-control” items



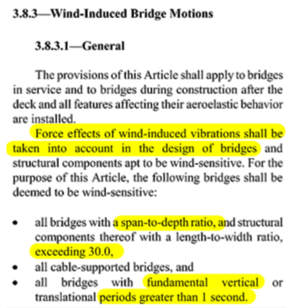
6

Complex Analysis

Wind Stability

AASHTO 3.8.3.1 ▶ SME (RWDI)

1. Climate study
2. FEM → Stiffness, mass, and modal props
3. Desktop assessment: erected steel & final
4. Move TLB to BLB
5. Sectional wind tunnel tests
6. Site-monitoring
7. SME equivalent static loads, apply to model, and verify: Stability, Service (comfort), Strength, Fatigue

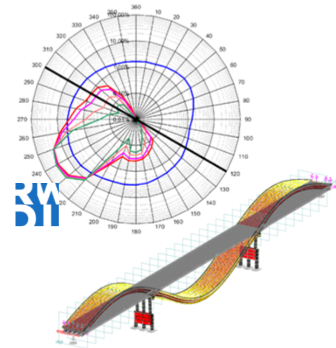

3.8.3—Wind-Induced Bridge Motions

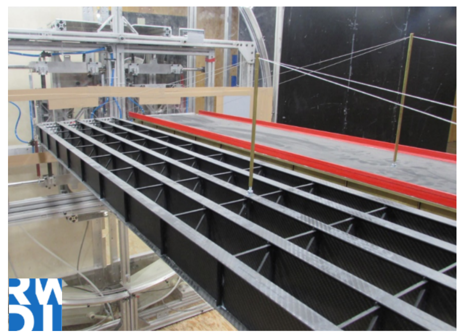
3.8.3.1—General

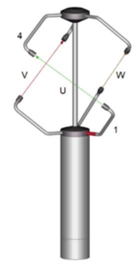
The provisions of this Article shall apply to bridges in service and to bridges during construction after the deck and all features affecting their aeroelastic behavior are installed.

Force effects of wind-induced vibrations shall be taken into account in the design of bridges and structural components apt to be wind-sensitive. For the purpose of this Article, the following bridges shall be deemed to be wind-sensitive:

- all bridges with a span-to-depth ratio, and structural components thereof with a length-to-width ratio, exceeding 30.0,
- all cable-supported bridges, and
- all bridges with fundamental vertical or translational periods greater than 1 second.





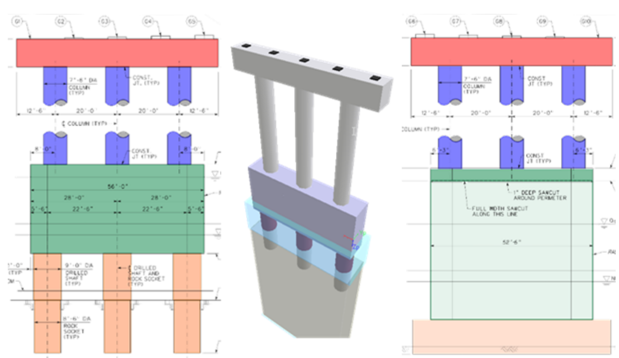


7

Complex Analysis

Inelastic Behavior

- 2 fixed piers = EQ / 2
  Δ(TU + WS + BR) ↓
- Column moments > M_{cr}
- M-Φ analysis (FBMP)
- Secant stiffness ≈ $0.5E_c$
- $k_{WB} \neq k_{EB}$ ∴ 2 analyses



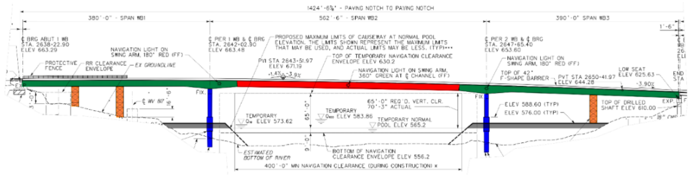
WB Pier EB Pier

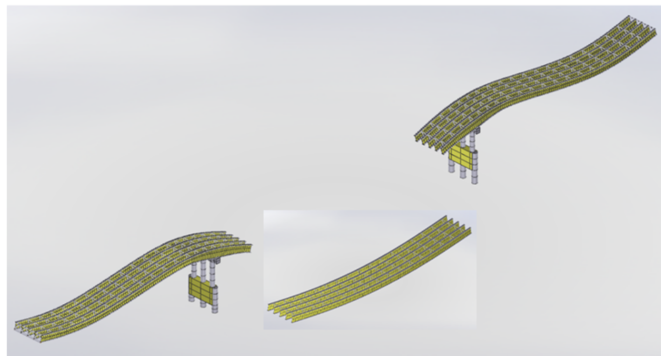
8

Complex Analysis

Preliminary Erection Studies

- Erection analysis by others
- DB - check during pursuit
- Consider strength & stability
- **Back spans**
  - Erect on **FW** towers
  - Jack at **FW towers**
  - Cantilever tip **strand jack**
- **Center lift-in piece**
  - 400' simple span





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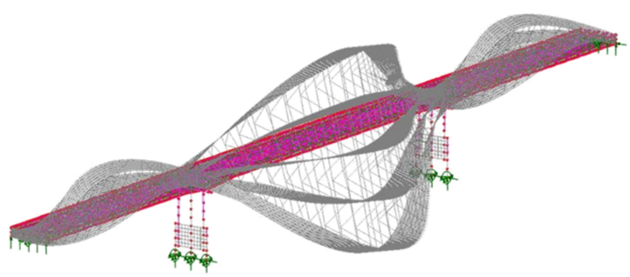
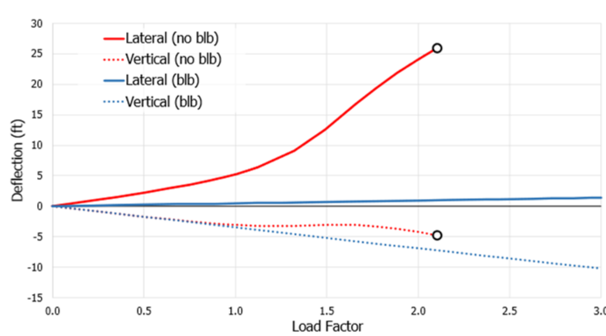
Complex Analysis

Nonlinear Buckling

- Slender noncomposite steel
  Refined model of erected steel
- Eigenvalue buckling
  Second-order elastic NL
  Global imperfection (L/1000)
- BLB / end span / active wind — no BLB / entire deck / inactive wind
- Eigenvalue: Global LF > **4.0**
- NL buckling: Linear **1.5**
  Converge > **3.0**
- NL buckling: Linear **1.0**
  Max **2.1**



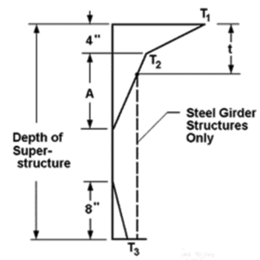


10

Complex Analysis

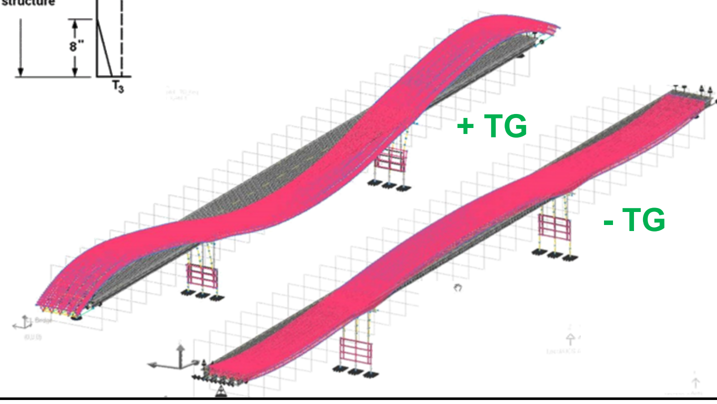
Thermal Gradient, TG

- Not typically considered for steel girders (BDS C3.4.1)
- Deep girders
  Service life design (deck)
- BDS 3.4.1:
  1.0 for SRV w/o LL
  0.5 for SRV w/ LL
- TU+TG + 1.0LL (conservative)
- TG = +41°F or -12.3°F
  TU = +50°F or -100°F
- Girder service checks **OK**
  CF and BLB **OK**



BDS C3.4.1:

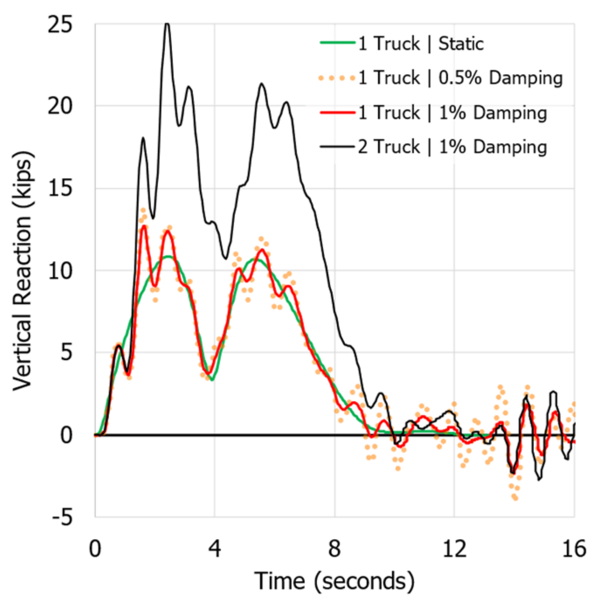
Open girder construction and multiple steel box girders have traditionally, but perhaps not necessarily correctly, been designed without consideration of temperature gradient, i.e., $\gamma_{TG} = 0.0$.



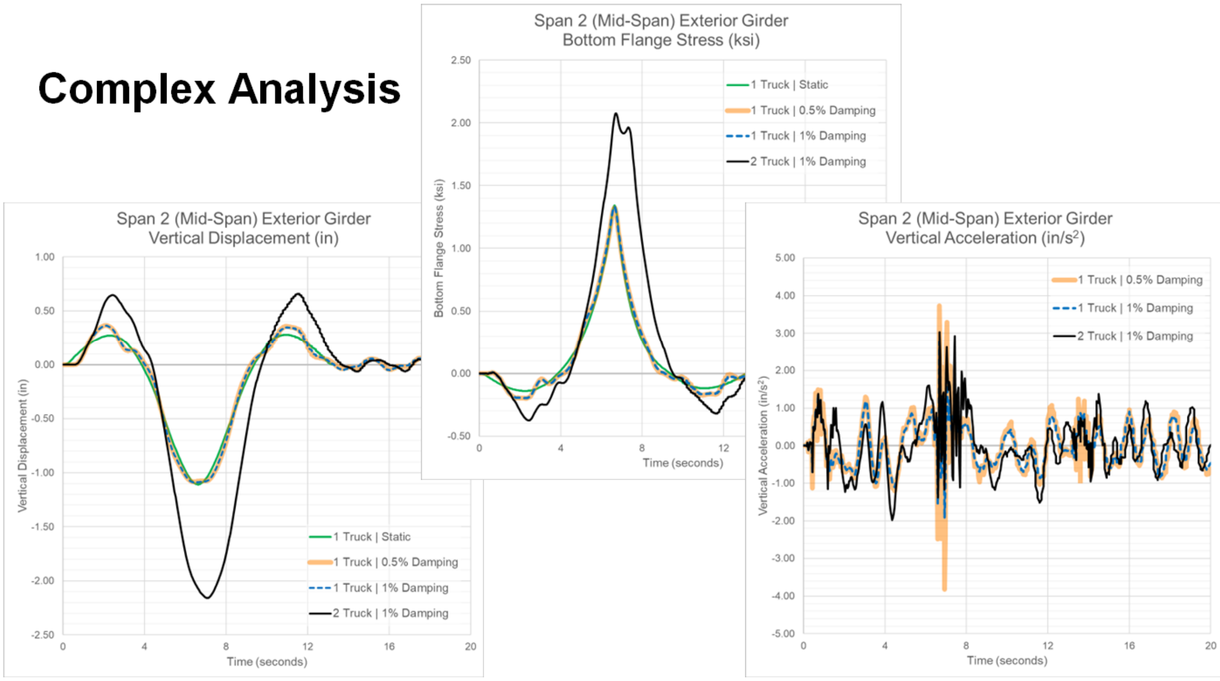
Complex Analysis

Dynamic Live Load Effects

- Long, flexible, "peak-to-peak"
  2 or 3 cycles at 70 mph
- 1 or 2 HL-93 trucks at 70mph
  Spaced at T_v or T_t & T/2
  1% damping (0-2%)
- Check IM, acceleration, F, Δ
- Dynamic increase? **< 1.33**
  Vertical acceleration? **OK**
  Constructive interference? **NO**
  Extra fatigue cycles? **NO**



Complex Analysis



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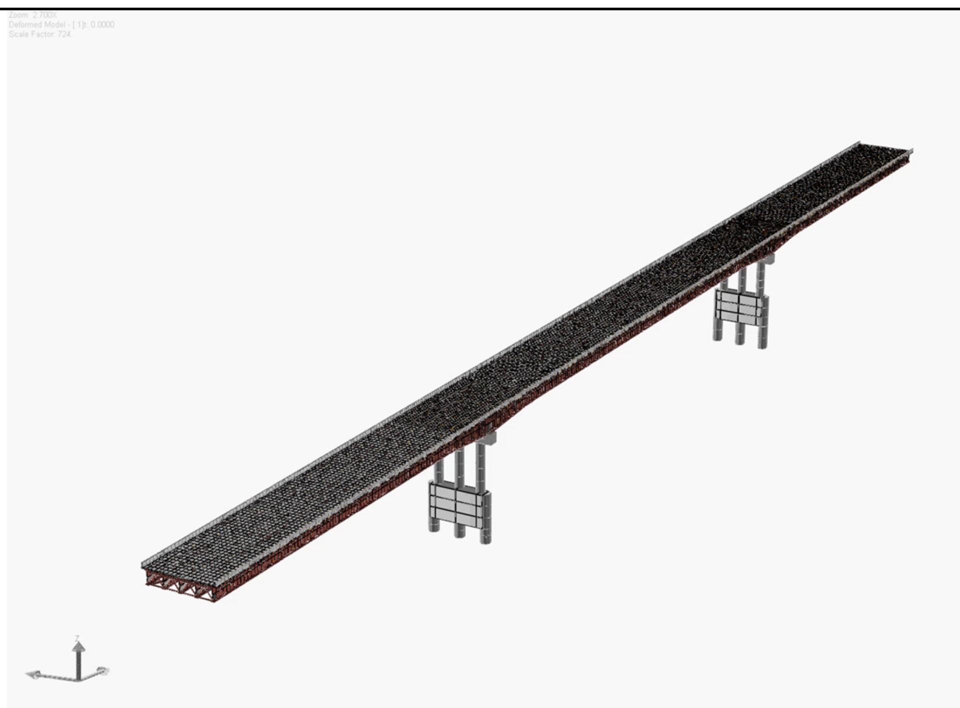

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Questions

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TG 13 Analysis of Steel Bridges

Attachment A

What's New With NSBA

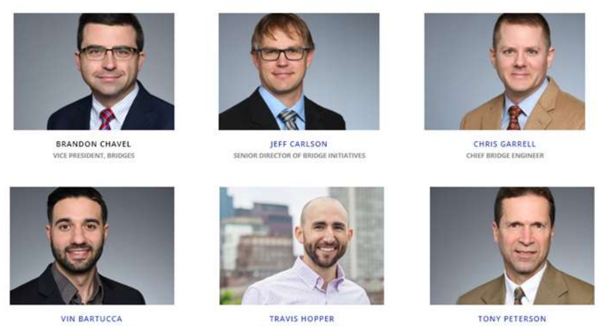
Brandon Chavel, PhD, PE
AISC/NSBA Vice President of Bridges

Smarter.
Stronger.
Steel.

1

Meet the NSBA

- Brandon Chavel
  - Vice President - Bridges
- Jeff Carlson
  - Senior Director of Bridge Initiatives
- Chris Garrell
  - Chief Bridge Engineer
- Steel Bridge Specialists
  - Vin Bartucca
    - Northeastern Market
    - Contractor Engagement
  - Tony Peterson
    - Central Market
    - Railroad Bridges
  - Travis Hopper
    - Steel Solutions Center



Smarter.
Stronger.
Steel.

2

Photo: 2020 Prize Bridge Merit Winner, Major Span – Portageville Bridge Replacement (New York) – Photo Credit: John Kucko

Upcoming Events

3

Continuing Education

NSBA Steel Bridge Forums – 2024 & 2025

- Indiana: October 29, 2024
- Iowa: November 20, 2024
- North Carolina: February 27, 2025
- Ohio: TBD, 2025 Q2
- North & South Dakota: TBD, 2025 Q2
- Others….

aisc.org/nsba/steel-bridge-forum/

4

Registration and Travel Stipends for Owner's

5

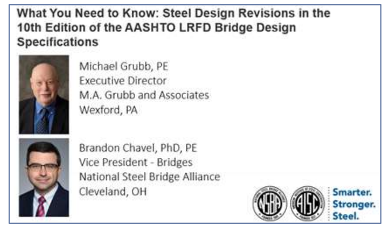
Notable Events at WSBS

- Constructability Design Requirements for Steel I-Girder Bridges Workshop
- Steel Industry Roundtable
- Kentucky Steel Bridge Session
- Fabricator Panel Session
- Movable Bridges
- Tied Arches
- Welding
- Corrosion Protection
- Railroad Bridges

6

Webinars

- What You Need to Know: Steel Design Revisions in the 10th Edition of the AASHTO LRFD Bridge Design Specifications
  - August 22, 2024
  - 1274 registrants…. Over 800 PDHs earned!
  - Will be available - https://learning.aisc.org/

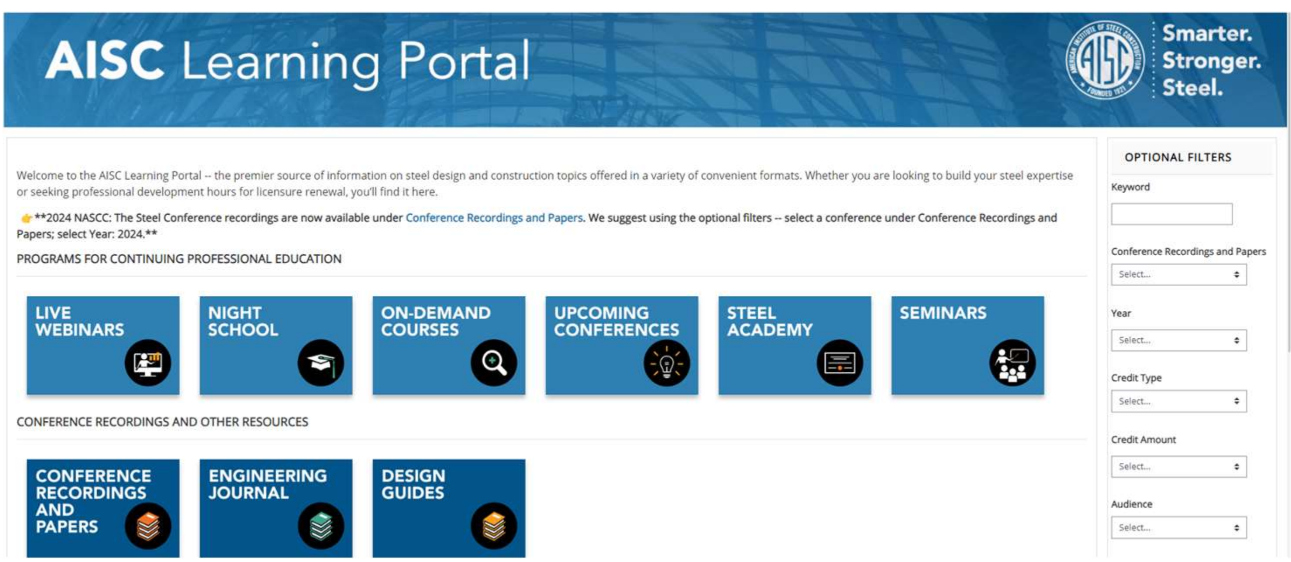


- Next webinar: November 2024
  - Frank Russo – Steel Bridge Design Recommendations including cross-frame stability computations and design standards
  - Free registration for bridge owners

7

Educational Resources

- AISC Learning Portal - https://learning.aisc.org/



8

Photo: 2020 Prize Bridge National Winner, Medium Span – Grand Avenue (Colorado) – Photo Credit: RS&H

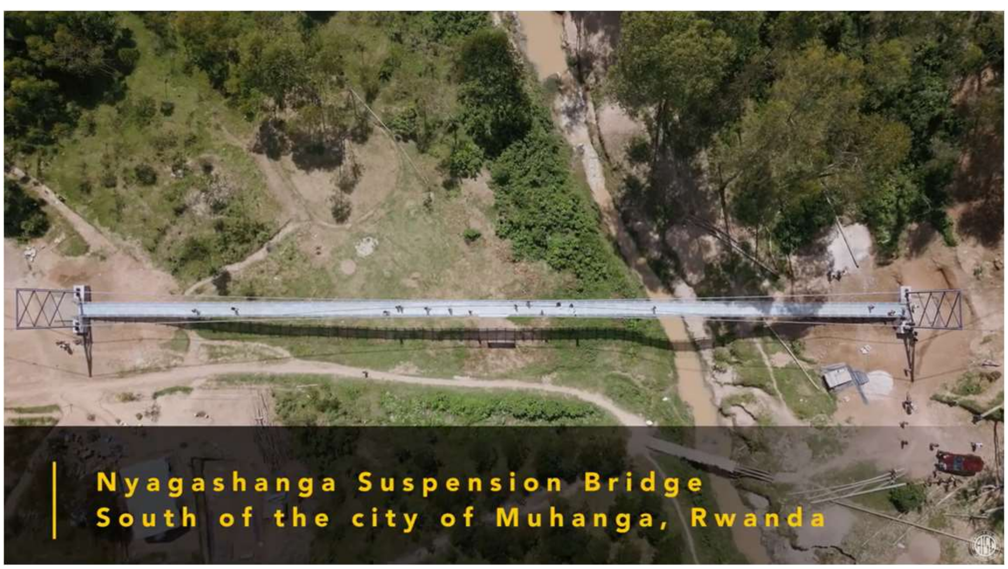
Bridges To Prosperity (B2P)

2024

Smarter.
Stronger.
Steel.

9

Bridges to Prosperity – Rwanda



VIDEO

Smarter.
Stronger.
Steel.

10


Photo: 2024 Prize Bridge Merit Award, Medium Span - Rt. 34B over Salmon Creek Bridge – Photo Credit: NYSDOT

New Resources

Smarter.
Stronger.
Steel.

11

AISC's Need For Speed Initiative

What has been developed?

- Guide to Navigating Routine Steel Bridge Design
  - aisc.org/streamlineddesign
- Bolted Field Splice for Flexural Members
  - aisc.org/nsba-splice
- Lean-on Bracing Reference Guide
  - aisc.org/leanonbracing
- Uncoated Weathering Steel Reference Guide
  - aisc.org/uwsguide
- Single Coat Inorganic Zinc Protection for Steel Bridges
  - aisc.org/sioz-report

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AISC’s Need For Speed Initiative

Achieving Speed in Steel Bridge Fabrication

- **Motivation:**
  - Simplifying design, detailing and fabrication.
  - Delays can stem from ambiguity regarding roles and responsibilities.
- **Objective:**
  - Develop guide to streamline steel bridge projects that represents best practices.
  - Clearly outline roles and responsibilities of stakeholders.
  - Minimize misunderstandings on the project.

Accelerated Steel
Achieving Speed in Steel Bridge Fabrication

NEED FOR SPEED

Smarter. Stronger. Steel.

aisc.org/fasterbridgefab

13

Fundamentals of Steel Bridge Engineering

Problem and Objective

- Many universities
  - do not have faculty with the expertise in highway steel bridge design.
  - do not provide a graduate level class in this area of bridge engineering.
- Develop teaching materials for a collegiate level class dedicated to highway steel bridge design.

Current Status

- Presentations completed
  - Available for free at AISC Education website as a Teaching Aid
- Video recordings for each lecture:
  - Targeting Q1 2025 for public release.

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Fundamentals of Steel Bridge Engineering

Lecture Summary

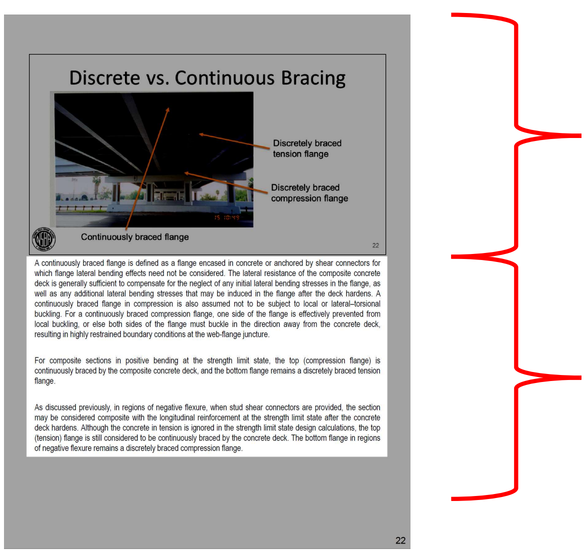
Lecture	Title
1	Introduction to Bridges and Bridge Steels
2	Bridge Planning and Layout
3	Loads
4	Methods of Analysis
5	Shear in Girders
6	Flexure – Fundamental Calculations
7	Flexure – Constructability, Service Limits States and Fatigue and Fracture Limits States

Lecture	Title
8	Flexure - Strength Limit State: Noncomposite Sections and Composite Sections in Negative bending
9	Flexure - Strength Limit State: Composite Sections in Positive Bending and Shear Connectors
10	Flexure – Bracing for Flexure
11	Splices and Connections - General Concepts, Welded Connections, Bolted Connections, and Girder Field Splices
12	Tension and Compression Members
13	Bearings and Joints
14	Bridge Decks

15

Fundamentals of Steel Bridge Engineering

Lecture Format



A continuously braced flange is defined as a flange encased in concrete or anchored by shear connectors for which flange lateral bending effects need not be considered. The lateral resistance of the composite concrete deck is generally sufficient to compensate for the neglect of any initial lateral bending stresses in the flange, as well as any additional lateral bending stresses that may be induced in the flange after the deck hardens. A continuously braced flange in compression is also assumed not to be subject to local or lateral–torsional buckling. For a continuously braced compression flange, one side of the flange is effectively prevented from local buckling, or else both sides of the flange must buckle in the direction away from the concrete deck, resulting in highly restrained boundary conditions at the web-flange juncture.

For composite sections in positive bending at the strength limit state, the top (compression flange) is continuously braced by the composite concrete deck, and the bottom flange remains a discretely braced tension flange.

As discussed previously, in regions of negative flexure, when stud shear connectors are provided, the section may be considered composite with the longitudinal reinforcement at the strength limit state after the concrete deck hardens. Although the concrete in tension is ignored in the strength limit state design calculations, the top (tension) flange is still considered to be continuously braced by the concrete deck. The bottom flange in regions of negative flexure remains a discretely braced compression flange.

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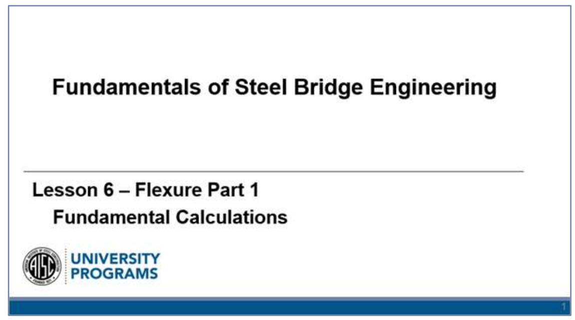
Fundamentals of Steel Bridge Engineering

What is next?

- Recordings
  - Finalize with quizzes for assessments
- Development of an in-person short course
  - 2-to-3-day course
  - Parts 1 and 2

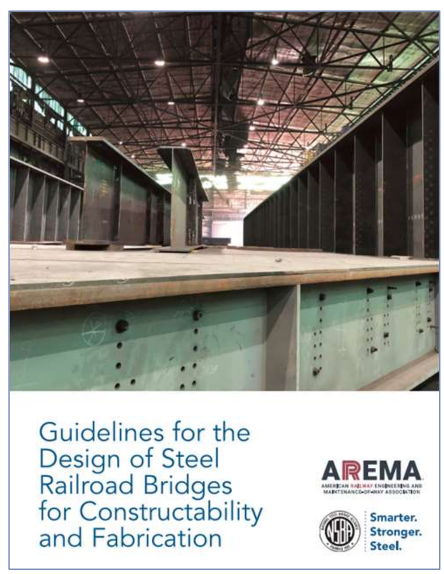


17

AREMA/NSBA Collaboration

Guidelines for the Design of Steel RR Bridges for Constructability and Fabrication

- **Table of Contents:**
  - Chapter 1 – Special Considerations for Railroad Bridges
  - Chapter 2 – General Design & Detailing
  - Chapter 3 – Girders
  - Chapter 4 – Boxes
  - Chapter 5 – Trusses
  - Chapter 6 – Floor Systems, Decks, and Walkways
  - Chapter 7 – Bolts
  - Chapter 8 – Corrosion Protection
  - Chapter 9 – Construction

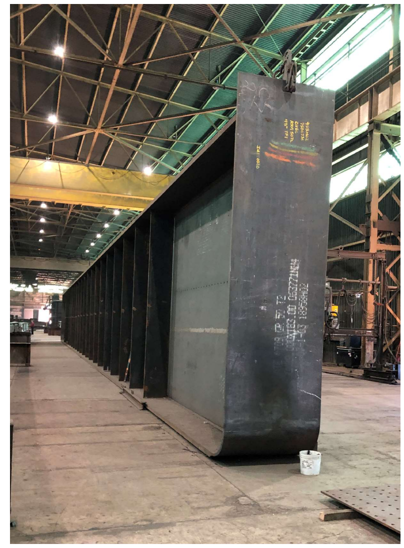


18

AREMA/NSBA Collaboration

Guidelines for the Design of Steel RR Bridges for Constructability and Fabrication

- **Girders:**
  - Stiffeners and connection plates
  - Deep girders
  - Cross-frames and diaphragms
  - Through-girder details
    - Knee Braces



19

AREMA/NSBA Collaboration

Guidelines for the Design of Steel RR Bridges for Constructability and Fabrication

- **Ballasted and Open Deck Through Girders**

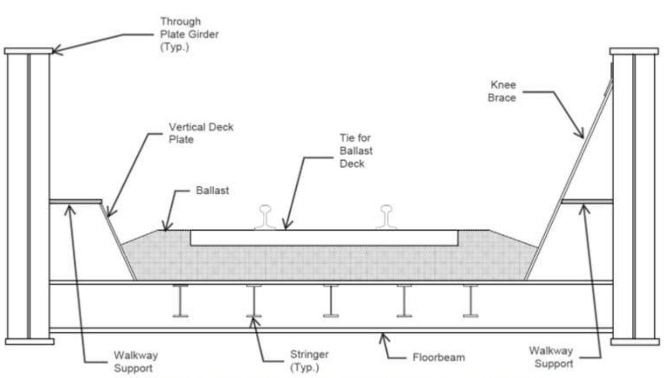


Figure 6.1.2(a) – Through Girders with Ballast Deck and Stringers

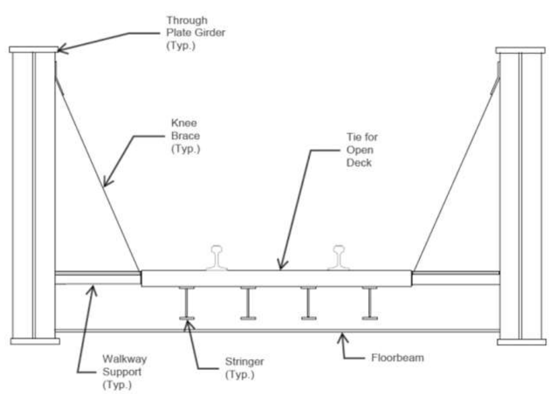


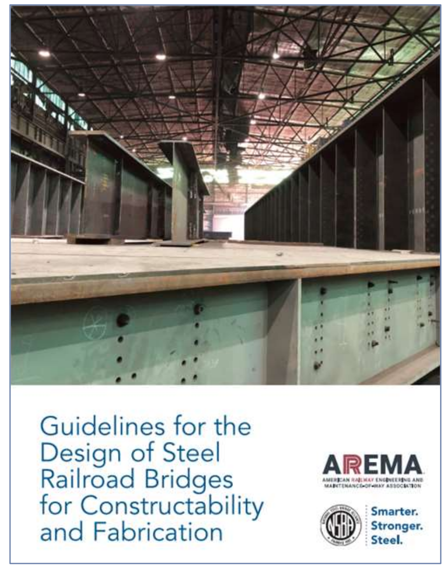
Figure 6.1.1 – Open Deck Through-Girder Bridge

20

AREMA/NSBA Collaboration

Guidelines for the Design of Steel RR Bridges for Constructability and Fabrication

- **Published at NSBA and AREMA websites**
- aisc.org/rrbridges



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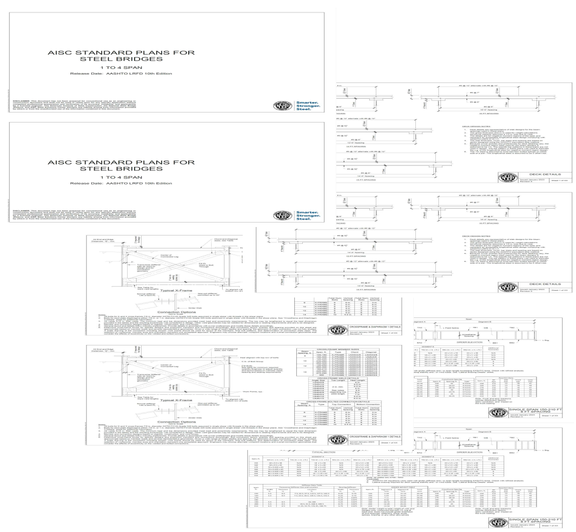
Standard Designs for Straight I-Girder Bridges

AISC's Need for Speed Initiative project – In progress

- **Motivation:**
  - Steel provides great flexibility in design.
  - Engineers are routinely confronted with repetitive design decisions regarding material thickness and sizes for the routine steel I-girder bridges.
- **Objective:**
  - Develop designs for 1, 2, 3, and 4 span arrangements.
  - Optimize and standardize web, flange, stiffener, and field splice plate sizes from typical mill plate widths and thicknesses.
  - Provide cost-efficient diaphragm and cross-frame standards.



22

Thank You

Brandon Chavel, PhD, PE
312.805.2137
chavel@aisc.org
www.aisc.org/nsba/

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23

Attachment B

AKB20 Steel Bridge Committee

NSBA Fall Collaboration Meeting
October 22, 2024

1

1. Introductions
2. Scope of the Committee
3. Committee Leadership
4. Liaisons
5. Paper reviews
    a. Current process, Future process
6. New annual meeting format for 2025
7. Review of current Research Needs statements
8. Ideas for future Research Needs
9. Ideas for synthesis topics
10. Workshops and Webinars
11. AASHTO COBS Strategic Plan (added)

Agenda

2

2

Committee Members

Blaise	Blabac	Gary	Prinz
Brandon	Chavel	Jason	Provines
Hannah	Cheng	Aidan	Provost
William	Collins	Anna	Rakoczy
Robert	Connor	Vasilis	Samaras
Michael	Culmo	Telmo	Sanchez
Leslie	Daugherty	Ryan	Sherman
Brad	Dillman	Samuel	Sherry
Christina	Freeman	Joseph	Strafaci
Antoine	Gergess	Geoffrey	Swett
Travis	Hopper	Dayi	Wang
Shinae	Jang	Matthew	Yarnold
Jennifer	McConnell	Jamie	Farris
Deanna	Nevling	John	Kulicki
Jordan	Nutter	John	Fisher
Duncan	Paterson	Karl	Frank

Committee Scope

This committee is concerned with the total system performance and behavior of steel bridges and their components, with regard to design, construction, assessment, maintenance, and rehabilitation/repair / retrofit.

Committee Leadership

- Chair: Michael P. Culmo, CHA Consulting
- Secretary: Deanna Nevling, HDR
- Committee Research Coordinator: Brandon Chavel, AISC/NSBA

- Sub-Committee: Methods of Analysis of Steel Bridges
  - Brandon Chavel, Chair

Liaisons

Committee Designation	Committee Name	AKB20 Liaison	Email
AASHTO COBS T-2	Bearings & Expansion Devices	Mike Culmo	culmo@cmeengineering.com
AASHTO COBS T-4	Construction	Mike Culmo	culmo@cmeengineering.com
AASHTO COBS T-5	Loads and Load Distribution	Wagdy Wassef	wagdy.wassef@WSP.com
AASHTO COBS T-8	Moveable Bridges	Zheng (Jenny) Fu	ZhengZheng.Fu@LA.GOV
AASHTO COBS T-9	Bridge Preservation	Graham Bettis	graham.bettis@txdot.gov
AASHTO COBS T-11	Research	Will Potter	William.Potter@dot.state.fl.us
AASHTO COBS T-14	Structural Steel Design	Jamie Farris	jamie.farris@txdot.gov
AASHTO COBS T-15	Substructures & Retaining Walls	Jeff Booher	jeff.booher@wyo.gov
AASHTO COBS T-17	Metals Fabrication	Leslie Daugherty	leslie.daugherty@alaska.gov
AASHTO COBS T-19	Software and Technology	Randy Thomas	wrt.email@gmail.com
AASHTO Publications	AASHTO Publications	OPEN	
AASHTO/NSBA	NSBA and AASHTO/NSBA Bridge Collaboration	Brandon Chavel	chavel@aisc.org
AISI	Welding Advisory Group	Dan Snyder	dsnyder@steel.org
AREMA Committee 15	Steel Structures	Anna Rakoczy	arakoczy1@gmail.com
ASCE Steel Bridge Cmte.	ASCE SEI Steel Bridges	Jennifer McConnell	righman@udel.edu
AWS	American Welding Society	Ronnie Medlock	rmedlock@high.net
Mid-Atlantic States SCEF	Mid-Atlantic States Structural Committee for Economical Fabrication	Hannah Chen	xiaohua.cheng@dot.nj.gov
SSRC	Structural Stability Research Council		
TRB AKB00(2)	ABC Subcommittee	Hormoz Seradi	hormoz@seradjengineering.com
TRB AKB10	Innovative Highway Structures and Appurtenances	Matthew Yarnold	myarnold@tamu.edu
TRB AKB50	Seismic Design and Performance of Bridges	Mark Reno	markr@quincyeng.com
TRB AKC20	Project Delivery Methods		
TRB AKC40	Construction of Bridges and Structures	Mark Reno	markr@quincyeng.com
		Mohamadreza Shafieifar	mshaf017@fiu.edu
TRB AKC70	Fabrication and Inspection of Metal Structures	William Collins	william.collins@ku.edu
TRB ACP30	Vehicle-Highway Automation	Somaye Fakharian Qom	sfakh002@fiu.edu
TRB AKT40	Structures Maintenance	Amir Gheitasi	amirgheitasi@gmail.com
TRB AKT40(2)	Bridge Steel Coatings Subcommittee	Pete Ault	pault@elzly.com
TRB AKT40(4)	Corrosion Subcommittee	Hormoz Seradj	hormoz@seradjengineering.com
TRB AKT50	Bridge and Structures Management	Joshua Steelman	joshua.steelman@unl.edu
TRB AKT60	Bridge Preservation	Christina Freeman	christina.freeman@dot.state.fl.us
TRB AR050	Railroad Infrastructure Design & Maintenance	Chiara Rosignoli	chiara.rosignoli@wsp.com
TRB AR060	Rail Transit Infrastruct. Design & Maintenance	Randy Thomas	wrt.email@gmail.com
TXSQC	Texas Steel Quality Council	Alisha Elmore (didn't respond last time)	alisha.elmore@jacobs.com

Paper Reviews

- Major task of the committee
- Papers are submitted in August each year
- The committee looks to have at least 3 reviewers for each paper
- Results of the review
  - Recommendations for presentation at the TRB Annual Meeting
  - Publication in the TRB Research Record
  - Awards
- We reviewed 7 papers assigned to AKB20 this year

CHA 7

Research Needs Statement

- Another major task of this committee is to develop Research Needs Statements
  - First step in the development of a research project
  - 3-5 page document defining the problem that needs to be solved
- We are looking to collaborate with other committees on the development of RNSs.
  - AASHTO COBS
  - NSBA Collaboration
  - AISI

CHA 8

2020-05: Extending AASHTO LRFD Article 6.10.7.1 and Appendix A6 Provisions to Skewed and/or Curved Steel I-Girder Bridges

1

- The objective of this research is to determine if the restrictions can potentially be lifted in determining the nominal flexural resistance at the strength limit state of compact web or noncompact web sections in negative flexure, and composite sections in positive flexure that would otherwise qualify as compact sections, in kinked (chorded) continuous I-girder bridges, horizontally curved I-girder bridges, and straight I-girder bridges with supports skewed more than 20 degrees from normal.
- Submitted by: Michael A. Grubb, P.E., mgrubb@zoominternet.net

2023-01 Live Load Distribution Factors for Straight Steel I-Girder Bridges

2

- The objective of this research is to update and/or confirm the accuracy of the moment and shear LLDFs presented in the AASHTO LRFD BDS for both interior and exterior girders in straight steel I-girder bridges with little or no skew, to facilitate accurate analysis of those types of bridges using simplified Line Girder Analysis methods.
- Submitted by: Domenic Coletti, P.E., Domenic.coletti@hdrinc.com

2020-05: Extending AASHTO LRFD Article 6.10.7.1 and Appendix A6 Provisions to Skewed and/or Curved Steel I-Girder Bridges

3

- The objective of this research is to determine if the restrictions can potentially be lifted in determining the nominal flexural resistance at the strength limit state of compact web or noncompact web sections in negative flexure, and composite sections in positive flexure that would otherwise qualify as compact sections, in kinked (chorded) continuous I-girder bridges, horizontally curved I-girder bridges, and straight I-girder bridges with supports skewed more than 20 degrees from normal.
- Submitted by: Michael A. Grubb, P.E., mgrubb@zoominternet.net

CHA

11

2021-01: Comprehensive Steel Tube Design Provisions

4

- The objective of this research project is to develop full, comprehensive design specifications for applications of steel tubular steel members (and connections) in bridges.
- Submitted by: Richard Sause, Lehigh University

CHA

12

5

2022-06 Investigation of Shear Capacity in Girders with Undersized Transverse Stiffeners

- Previous AASHTO Specifications required that transverse stiffeners be designed to have sufficient flexural rigidity to develop the shear buckling resistance of a steel girder web and an area requirement for the transverse stiffener to develop the post-buckling tension field action resistance (TFA). Current AASHTO specifications require a flexural rigidity criterion must also be met for a web to utilize TFA resistance. Previously designed stiffeners are no longer adequate when the current specifications are applied. The objective of this research is to develop load rating provisions for bridges with undersized transverse stiffeners.

- Submitted By: Michael Culmo, CHA Consulting, Inc.
  mculmo@chacompanies.com

13

6

2019-01: Application of Adhesives in Steel Bridges

- Evaluation of the use of structural adhesives in structural steel connections. The research should evaluate the shear strength of the adhesives, their creep behavior at expected steel temperatures in the bridge, curing of adhesives after joint assembly, and surface finish of the steel required to develop the shear performance. In addition, the long term performance of the adhesives under freeze-thaw conditions and exposure to deicing chemicals needs to be evaluated.
- Submitted by: Karl Frank, karl.frank@engr.utexas.edu

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7

2022-02 Refinement of Seismic Pier Cross-Frame or Diaphragm Design for Continuous Steel Structures

- The objective of this research is determine the resultant forces/stresses in end cross-frame members and connections from testing and forcing bridge columns to deflect and provide a ductile response from top of column plastic hinging.

- Submitted By: Devin Altman, NSBA and Alex Lim, Oregon DOT

alex.k.lim@odot.state.or.us

CHA

8

2022-04 NDE Requirements for Moveable Bridges

- The objective of this research is to develop the non-destructive evaluation and other inspection practices for moveable bridges, including the following:
  1. Practices and criteria for NDE of materials such as casting and their welded connections
  2. Practices for inspection of components with unique geometry, such as curved surfaces, large materials thickness and tight clearances. (Pins have both curved surfaces and the lengths and diameters are often larger than 4”)
  3. Definition of the type of stress in bridge components and the associated appropriate inspection frequency, inspection method and the acceptance criteria
- Submitted By: Ronnie Medlock, High Steel

  RMedlock@high.net

CHA

2024 Ballot Ranking

2024 Ballot Results

Committee Rank	Statement No.	Scores	Statement Description
1	2023-01	829.0	Live Load Distribution Factors for Straight Steel I-Girder Bridges
2	2020-05	816.6	Extending AASHTO LRFD Article 6.10.7.1 and Appendix A6 Provisions to Skewed and/or Curved Steel I-Girder Bridges
3	2022-06	688.0	Investigation of Shear Capacity in Girders with Undersized Transverse Stiffeners
4	2021-01	685.0	Comprehensive Steel Tube Design Provisions for Bridges
5	2019-01	673.4	Application of Adhesives in Steel Bridges
6	2022-02	638.6	Refinement of Seismic Cross Frame Design for Continuous Steel Structures
7	2022-04	603.2	NDE Requirements for Moveable Bridges

Total number of Committee Members	32
Number of ballots	25
Percent	78%

CHA 17

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Workshops and Webinars for 2025

- Workshop for 2025 Annual Meeting
  - I believe we are off this year
  - Scheduled for next year?
- Ideas for workshops
- Ideas for webinars

CHA 18

AASHTO COBs Strategic Plan

Guiding Principal Statement

Collectively leading and serving the bridge community to provide <u>safe</u> bridges and structures that are:

Resilient, Innovative, Sustainable, and Efficient

(RISE)

Goals of COBs

Goal 1: Maintain and Enhance the AASHTO Specifications
Goal 2: Maintain, Enhance, and Grow the Workforce
Goal 3: Assess the Condition of Bridges and Structures
Goal 4: Manage the inventory of Bridges and Structures
Goal 5: Advance Methods for Project Delivery
Goal 6: Strategically Plan and Promote Research
Goal 7: Contribute to National Policy

Strategic Plan Document

Attachment C

Welcome to the AASHTO/NSBA Joint Collaboration Committee Meeting

Task Group 13
Analysis of Steel Structures

2024 Fall Meeting
New Orleans, LA

TG 13 Mission and Documents

The development of guidance on issues related to steel bridge analysis and to educate Engineers so that they can better make decisions for their own project.

Published document:

Guidelines for
Steel Girder Bridge Analysis
G13.1-2019

Currently working on: Guidelines for Steel Truss Bridge Analysis and Software Validation Initiative

Please honor AISC's policies regarding antitrust, conflict of interest, and conduct.

ANTITRUST

Please remember that discussion among competitors of plans, consensus arrangements, agreements, strategies, and the like may be unlawful if they relate to any of the following:

- Current or future pricing or bidding information;
- Limits on production or product lines;
- Allocating customers or territories;
- Individual company marketing strategies, projections, or assessments; or,
- Establishing a practice of dealing with customers or suppliers.

CONFLICT OF INTEREST

Please consult the meeting Chair and Secretary before participating in this meeting if you are, or an organization with which you are affiliated is:

- Contemplating or currently doing business with AISC;
- Involved in litigation, arbitration, or another form of dispute resolution, the outcome of which could be affected by an action of this group on an issue before it; or,
- Otherwise subject to circumstances that could impair or appear to impair your judgment on an issue before this group.

CONDUCT

Please behave appropriately and refrain from discrimination and harassment.

AISC's full policies relating to these matters are available at **www.aisc.org/about-us**.

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TG 13 Introductions

- Chair: Deanna Nevling, HDR Engineering, Inc.
- Vice Chair: Frank Russo, Russo Structural Services
- Secretary: Brandon Chavel, NSBA
- Attendees

Agenda

AASHTO/NSBA Steel Bridge Collaboration

TG 13 Analysis of Steel Bridges

Crowne Plaza - French Quarter Hotel

New Orleans

Room Name: Grand Ballroom D

Task Group Mission: This Task Group focus has been the development of guidance on the issues related to steel girder bridge analysis and to educate Engineers so that they can better make decisions for their own projects.

Task Group Leadership

Chair: Deanna Nevling - HDR

Vice Chair: Francesco Russo - Russo Structural Services

Assigned Notetaker: Brandon Chavel - NSBA

Zoom Information

Meeting Link: https://us02web.zoom.us/meeting/register/tZwrd-Crpz4vHNwAtvD_RBNySpy-9JlxvC9G

Zoom Meeting ID: 886 0939 5568

Meeting Agenda: 10/22/2024 (1:00 pm - 3:00 pm CT)

1. Chairperson's Welcome (1:00 pm – 1:10 pm)
   a. AISC Antitrust Policy and Meeting Code of Conduct.
   b. Introductions (as needed).
   c. Approval of Previous Meeting Minutes.
2. General Announcements (1:10 pm – 1:25 pm)
   a. Conferences/Research/Publications
   b. NSBA Update – Chris Garrell
   c. FHWA Update – Dayi Wang, FHWA Steel Specialist
   d. TRB AKB20 (Steel Bridges Committee) Update – Brandon Chavel
   e. AASHTO Bridge Update (T-14 Structural Steel Design) – Tony Ream
3. "Streamlining Analysis of Tied Arches," Jeff Svatora (1:25 pm – 1:55 pm)

Meeting Minutes – Providence April 16, 2024

- 70 people in attendance
- Meeting minutes from Fall 2023 were reviewed and approved
- Industry updates provided
- “Curved Steel Plate Girders: Analysis Techniques” Chris Duncan and Christopher Fuller
- “Tightly Curved Steel Bridges: Issues and Limitations of Analysis Software” Saeed Doust
- G13.2 – COBs review
- Software validation survey results
- Outstanding items for discussion?

Agenda

AASHTO/NSBA Steel Bridge Collaboration

TG 13 Analysis of Steel Bridges
Crowne Plaza - French Quarter Hotel
New Orleans
Room Name: Grand Ballroom D

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Assigned Notetaker: Brandon Chavel - NSBA

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Meeting Link: https://us02web.zoom.us/meeting/register/tZwrd-Crpz4vHNwAtvD_RBNySpy-9JIxvC9G
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   e. AASHTO Bridge Update (T-14 Structural Steel Design) – Tony Ream
3. "Streamlining Analysis of Tied Arches," Jeff Svatora (1:25 pm – 1:55 pm)

Latest Industry Updates

- TRB Annual Meeting
  January 5 -9| Washington, D.C.

- AASHTO Steel and Metals Committee Meeting
  January 29 -31 in Tampa, FL

- NASCC – The Steel Conference
  April 2 -4| Louisville, KY

- WTS International Conference
  May 7 -9| Toronto, Ontario

- International Bridge Conference
  July 13 -16| Pittsburgh, PA

Latest Industry Updates

- **NSBA – Brandon Chavel**

Latest Industry Updates

- **TRB AKB20 (Steel Bridges Committee)**

Mike Culmo

Latest Industry Updates

- **AASHTO Update – Steel and Metal Technical Committee**

Tony Ream

AASHTO COBS Meeting

- Committee on Bridges and Structures (COBS)
  - 5/31/25 – 6/6/26 | Dallas, TX
  - Second Round of Ballots for 11th Edition (2026)

- Winter AASHTO Steel and Metals Committee Meeting
  - 1/28/25 – 1/30/25 | Tampa, FL
  - Finalize ballots for Dallas

- Coordination with NSBA (Heather?)
- Collaboration Document Review (Chris?)

AASHTO Steel & Metals: 2024 Approved Ballots

- 6.13.2.10.4 – Prying Action
  - Update section to align with AISC (simplified), more efficient (M&M)
- C6.10.10.1 – Shear Connectors
  - Recommend shear studs full-length for skewed bridges (> 20°)
- 6.13.6.1.3 – Box Girder Flange Splices
  - Design flange splice of box girder field splice for reduced capacity ($< F_y$) if governed by compression instead of tension. Limited to $0.75F_y$

AASHTO Steel & Metals: 2024 Approved Ballots

- C6.7.8 – Minimum Inside Bend Radius for Diaphragm Connection Plates
  - Provide table from AASHTO Steel-Bridge Fabrication Specifications with reduced bending radii
- Table 6.8.2.2-1 – Shear Lag Factor, U, for HSS with slotted plate connection
- C6.10.9.3.3 – Optional refined end panel shear strength from MBE

AASHTO Steel & Metals: 2025 Potential Ballots

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  - Update for field splice design of composite girders in areas of high positive moment. Current method assumes resistance from deck but does not check capacity. Treat as noncomposite (extra web bolts).
- 6.6.2.1 – CVN Designations
  - Clarify CVN requirements for NSTM, SRM, and IRM. Portions of primary members with net tensile stress under Strength-I. Excludes cross frames or diaphragms in horizontally curved bridges.
- Miscellaneous fixes and clarifications
- Future Research (in the room?)

Agenda

3. "Streamlining Analysis of Tied Arches," Jeff Svatora (1:25 pm – 1:55 pm)
4. G13.2 Guidelines for Steel Truss Bridge Analysis - Current Status (1:55 pm – 2:05 pm)
5. Software Validation and Checking Complex Models - Survey results document(2:15 pm – 2:30 pm)
6. TG13.1 Updates (2:30 pm to 3:00 pm)

Presentation

"Streamlining Analysis of Tied Arches"

Jeff Svatora – HDR

Agenda

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G13.2 Truss Analysis Document

- Purpose Statement: *The Guidelines for Steel Truss Bridge Analysis provides engineers with guidance on methods of analysis for steel trusses and can be used for analyzing the trusses for design, erection, rehabilitation, or load rating.*
- Waiting on publishing comments
- 2025 publication date

TG 13 Commercial Software Validation

- Topic: Standard of Care for Validation of Commercial Bridge and Transportation Structure Design Software

- TG13 is collaborating with software vendors to develop a software validation standard of care.

- Objective: Identify a standard of care for software user, example, and analysis theory manuals; verification, validation, and QC; technical support; and software upgrade documentation.

TG 13 Commercial Software Validation

- Software User Survey: First step in developing the software validation standard of care

- Survey Purpose: Obtain data from software users regarding their preferences and needs for software user, example, and analysis theory manuals; verification, validation, and QC; technical support; and software upgrade documentation

- Survey Goal: Obtain response data that will be utilized to collaborate with software vendors to develop a standard of care for software validation that would streamline the amount of validation each user is required to perform. The responsibility of the correctness of a design/analysis would still reside with the Engineer of Record, not the software vendor.

TG 13 Commercial Software Validation

- Software vendors participating in small group meetings:
  - AASHTOWare BrR/BrDr
  - Ansys and Civil FEM
  - Bentley
  - Optimate (Descus and Merlin-Dash)
  - Larsa
  - CSI
  - Midas

TG 13 Commercial Software Validation Survey

- 326 responses
- Developing summary of survey results
- Thank you:

  Nick Cervo
  Domenic Coletti
  Alina Davidescu
  Greg Dunn
  Natalie McCombs
  Dusten Olds
  Sofia Puerto
  Jessica Wang

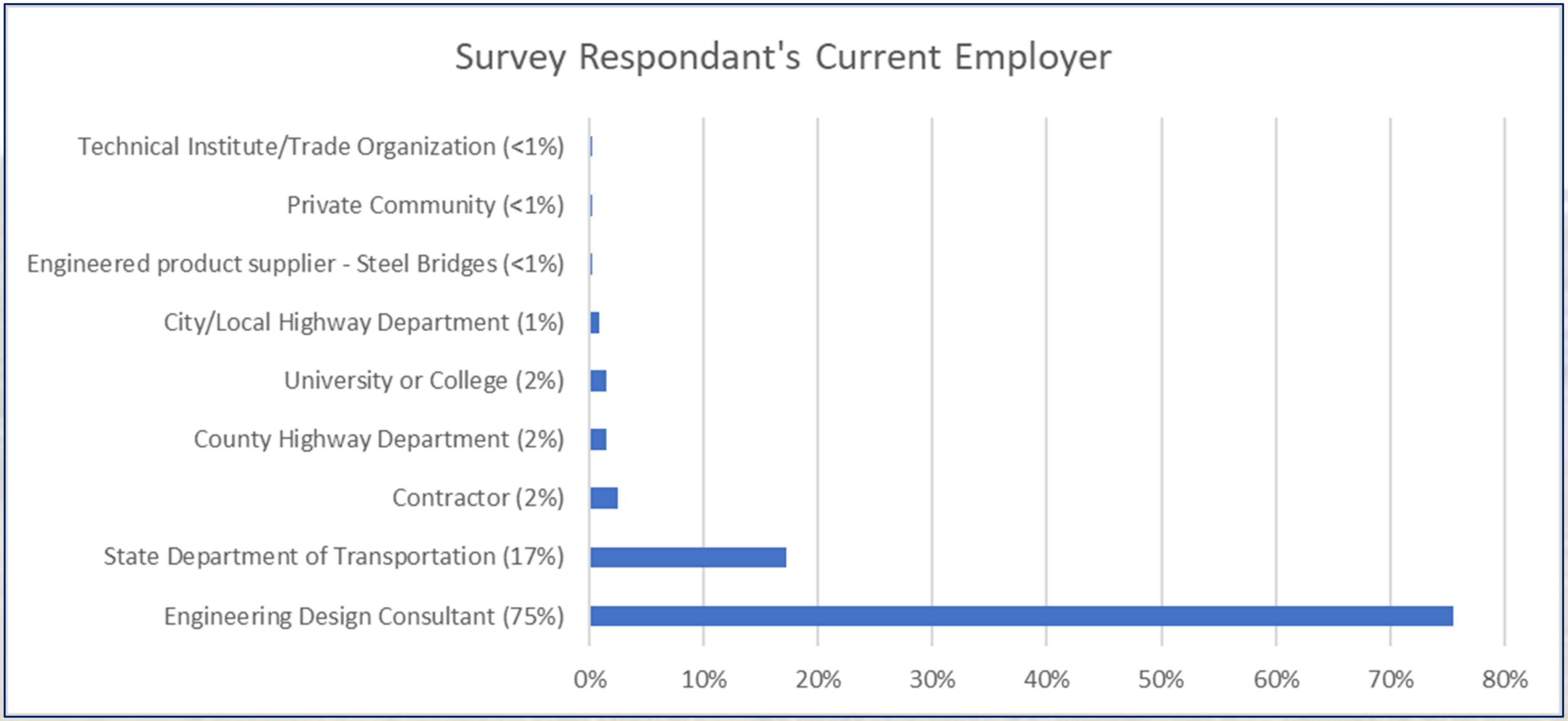
Software Validation Survey Results

- 326 Survey Responses

- Engineering consultant industry contributed most responders (75%), followed by state department of transportation representatives (17%)

Software Validation Survey Results

- 326 Survey Responses



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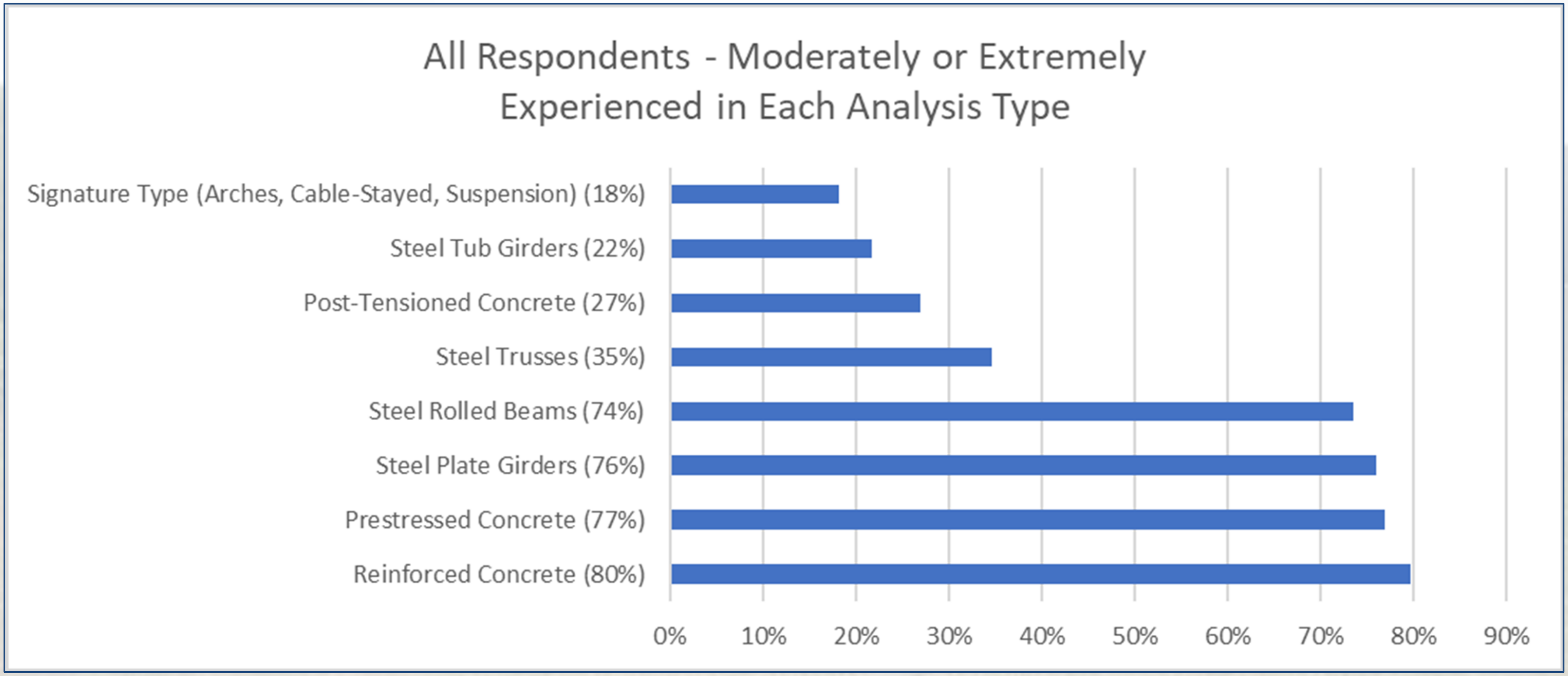
Background Information Survey Results



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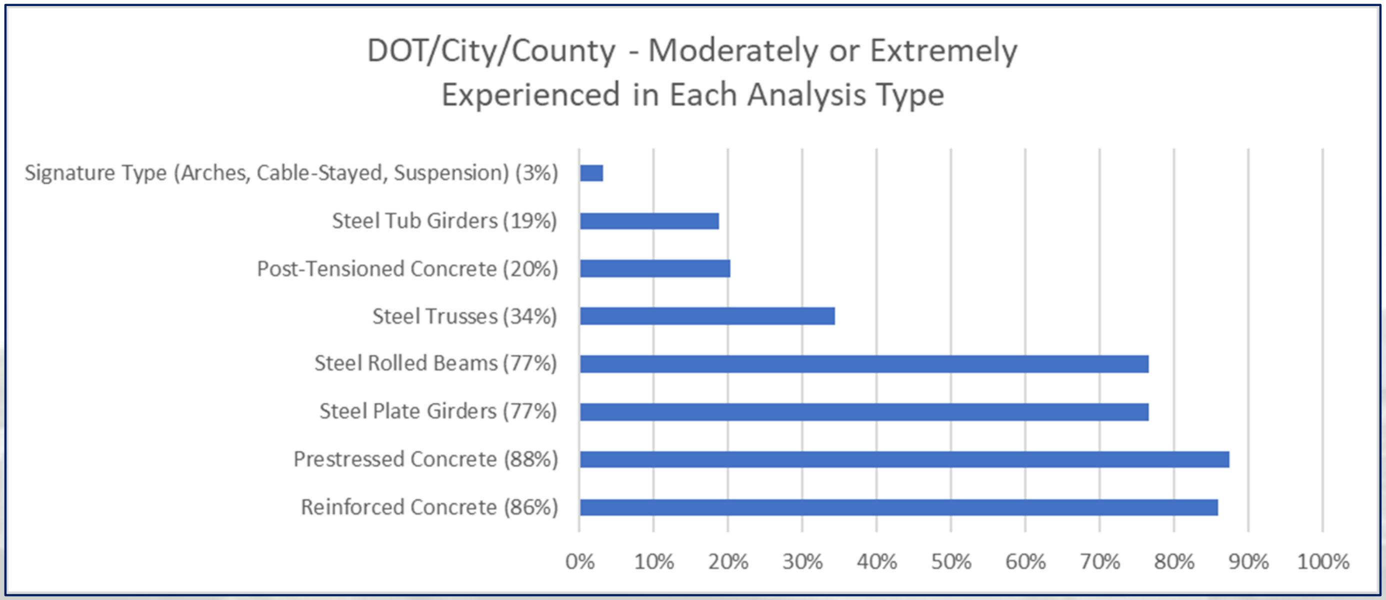
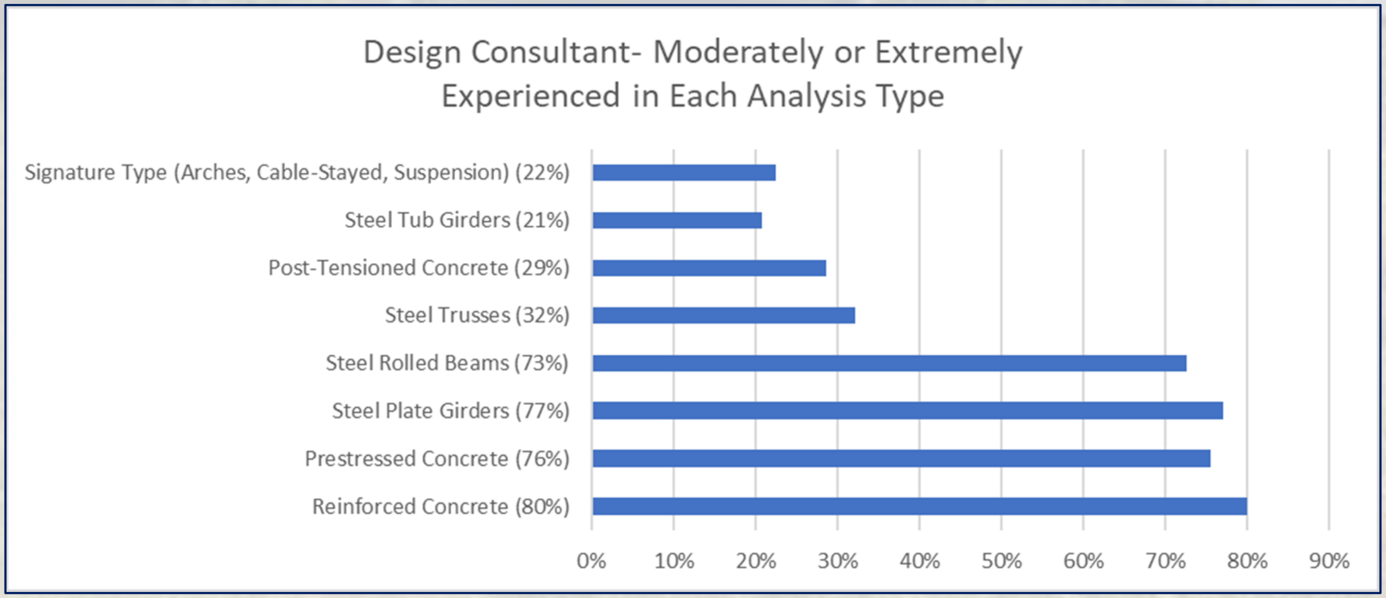




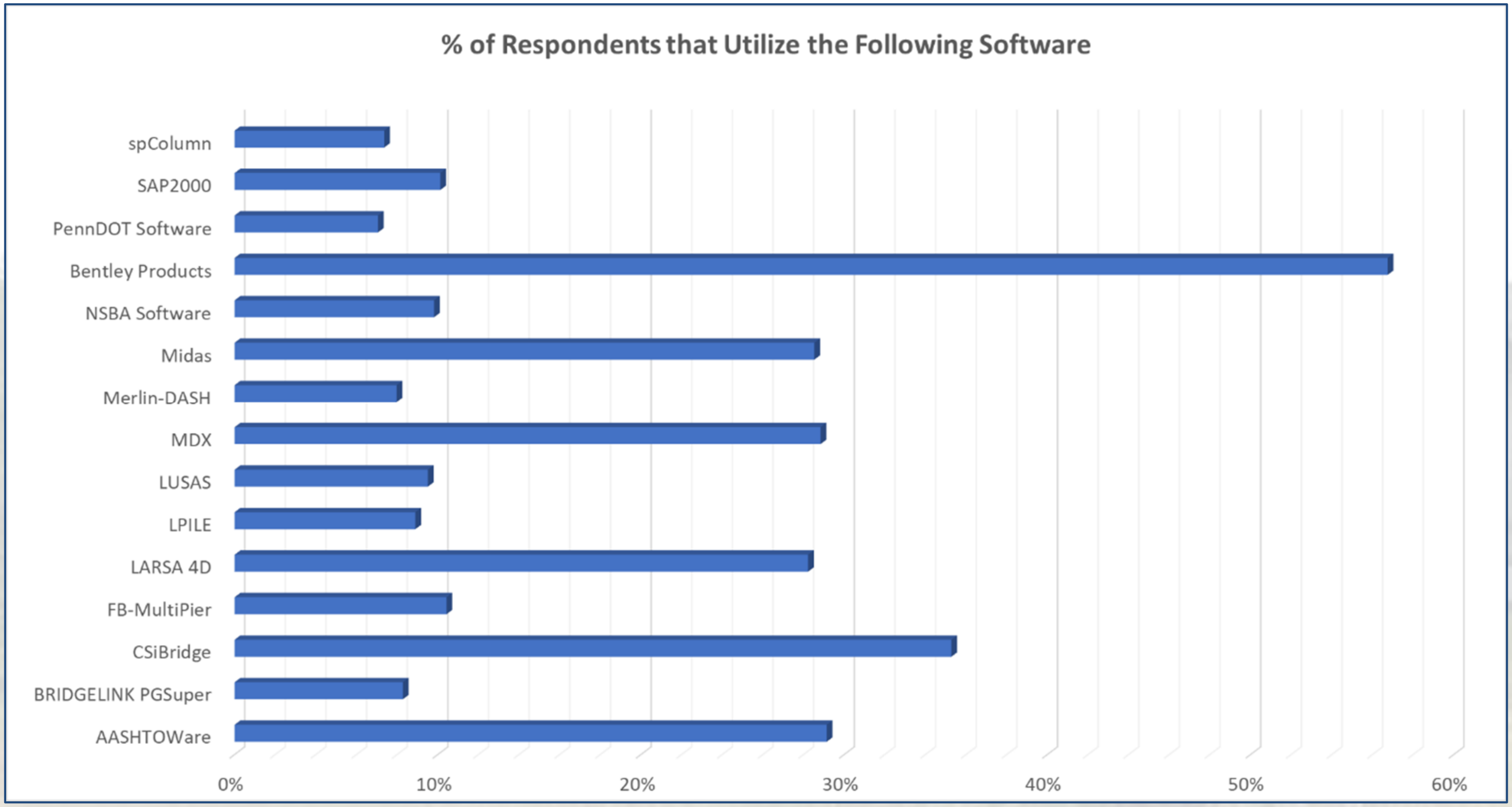
Software Tools Survey Results

- The most popular types of analysis (always + often) used by survey responders are:
  - Spreadsheet (90%)
  - Line girder analysis (70%)
- Often and sometimes the following types of analysis are used:
  - 2D grid analysis (61%)
  - 3D FEM (64%)

Software Tools Survey Results

- List software you use
- 82 different programs listed
- Top responses:
  - Bentley products
  - CSIBridge
  - AASHTOWare
  - MDX
  - Midas
  - Larsa 4D

Software Tools Survey Results



-Top 15 Listed
-Survey permitted respondents to list multiple responses
-Bentley products: LEAP Bridge Concrete, Bridge Steel, CONSPAN, RC-PIER, OpenBridge, STAAD, and LARS.
-NSBA Software: Simon and NSBA Splice.

Product Documentation Survey Results

- Instructional guides, Reference Guides, Troubleshooting guides, Web pages and online guidelines are considered the most important product documentation types

Please rate the importance of the following types of product documentation. >> Instructional Guide	Important	108
	Moderately Important	32
	Not Important	2
	Slightly Important	2
	Very Important	182

Product Documentation Survey Results

- Open ended question
- Total number of responders = 71

  Total number of comments = 84

Comment Category Buckets:

1. Transparency (21 Comments): Documentation is complete and lists limitations/known issues/bugs/etc.
2. Examples (20 Comments): Validation and verification of the software through examples.
3. References (9 Comments): Showing applicable code references like versions, articles, equation numbers, etc. or to showing/linking to industry publications or research that backs up the software's methodology.
4. Reporting (9 Comments: Customizing output, making sure output is complete and not leaving information out, clear labels and making output clear for future reference.
5. Current Version/Consistency (4 Comments): Documentation matched the current version/consistency of the program (terminology, input variable names, GUI, etc.) and referenced old versions for historical tracking.
6. Troubleshooting (5 Comments): Customer service/tech support category (robust search features, easy access to tech support and availability of user forums).
7. API (2 Comments): Good documentation and examples of how to interface with the software through programming.
8. Product Features/Capabilities (14 Comments):Feature/capability rather than commenting on a particular documentation topic.

Training Material Survey Results

- The majority of users have identified the following elements of training material as High Priority: Example analysis problems (84%), multiples examples (67%), replicates of examples and analysis (65%), clear schematics (65%), results of examples (63%). Input and output of published examples are considered to be High to Medium Priority while API examples are considered medium to low priority.

Please rate the importance of the following elements of a training material. >> Multiple examples are provided showing the comprehensive range of program capabilities, analysis types, materials, loading (vehicles, creep, shrinkage, etc.).	High Priority	220
	Low Priority	7
	Medium Priority	96
	Not a Priority	2

Training Material Survey Results

- Open ended question: “Is there anything else not listed above that you think are important elements in training manuals?”
- Most common response: provide numerous, complex, and complete examples that cover a wide range of software capabilities, beyond the simple “beginner” models that are commonly included.
- Other common responses include: (1) listing software limitations, (2) having a “trouble shooting” or “common modeling errors” section, (3) including more information on boundary conditions, (4) having an online manual that is regularly updated, including bug/error descriptions and links to available patches, and (5) having a theory section that explains methodology and ties into the examples.

Technical Support Survey Results

- Users generally found technical support to be helpful at least sometimes or often.
- Users prioritized the value of various features listed in order of highest to lowest value (percentage who ranked as a high priority/medium priority):
  - Thoroughness and accuracy of answers (85% / 15%)
  - Easy to find contact information (75% / 24%)
  - Experienced bridge engineer familiar with AASHTO LRFD BDS on staff (68% / 27%)
  - Updates on how bugs are addressed (46% / 40%)
  - Searchable support site/forums (41% / 32%)
  - Additional resources for nonstandard items not covered in software manual (33% / 52%)
  - User group meetings (8% / 24%)

Software Update Documentation

- Importance of various aspects of software upgrade documentation: responses divided between high and medium priority
- High priority items: reason for the update (57%), the benefits and risks of installing the update (55%), and instructions for using existing settings and user files from the previous version (53%)
- Medium priority items included software and system prerequisites and dependencies for the update (43%) and instructions for installing or deploying the update (41%)

Analysis Results Validation

- Importance of the software vendor providing documentation of their internal verification, validation, or QC activities, users clearly placed a high value on these activities.
- Medium to High Priority vendor supplied items shown below
- 94%: list of known program bugs
- 86%: list of previous bugs and how they were fixed
- 88%: publication of sample input files that address current and new features of the program
- 85%: publication of output from sample problems, highlighting the differences in output between different versions of the program.
- 83% clear links in software documentation and example problem runs to the associated program version

TG 13 Commercial Software Validation Survey

- Modern Steel Construction article (1,500 word count for typical feature articles)
- Other publication options
- Volunteers to review draft summary
- Engage software vendors to review summary
- Small group finalize draft survey – November 2024
- Independent review – December 2024
- Finalize paper summarizing survey results – Jan./Feb. 2025
- Publish article

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TG 13.1 Buckling and Stability Updates

- Reviewing existing text
- Developing outline to expand guidance
- Terminology and definitions
- When do we nee higher order analysis
- When don't we need higher order analysis

TG 13.1 Buckling and Stability Comments

AASHTO is correct. AASHTO requires the out-of-straightness to be included for large deflection analyses, but never says if the approximate method (with K factor) is used, it should be included again.

The resistance equations for columns and beam-columns in the *AASHTO LRFD Bridge Design Specifications* ~~(AASHTO, 2017)~~ are generally based on inputting the maximum ~~second-order~~ internal axial force and moment determined from a second-order structural analysis of the elastic, ideally geometrically perfect, structure. Hence, consideration of geometric imperfections in the structural analysis is not required. This is contrary to the statement in *AASHTO LRFD Bridge Design Specifications* ~~(AASHTO, 2017)~~ Article 4.5.3.2.1, that "The effect of … out-of-straightness of components shall be included in stability analyses and large deflection analyses." For columns or beam-columns that are loaded predominantly in a single plane of bending, no out-of-plane moments are considered in the member strength checks. In this case, the design for overall stability of the members

TG 13.1 Buckling and Stability Comments

How should a designer recognize if an amplifier equation is not applicable?

Note that a first-order elastic analysis (also referred to as geometrically linear analysis or an analysis based on small-deflection theory) combined with moment amplifiers to capture the second-order effects is a second-order load–deflection analysis. The amplifier equations are simply an approximate way of solving for specific types of second-order load–deflection effects. The engineer generally must recognize when a given amplifier equation is applicable to capture the second-order response and when it is not.

TG 13.1 Buckling and Stability Comments

What amplifier is considered significantly larger than 1.1?

Is 1.4 significantly larger?

Research by White et al. (2012) suggests that this global stability amplification equation could be used to identify possible large response amplifications during preliminary construction engineering. White et al. suggest that if AF_G from the amplification equation is less than approximately 1.1, the influence of global second-order effects may be neglected. Furthermore, engineering judgment should be exercised when evaluating second-order effects. Substantial second-order effects during the steel erection may be a concern in some situations; however, particularly during the earliest stages of the steel erection, the steel stresses are small and if the influence of the displacements on fit-up is not a factor, large second-order amplification of the deformations may not present a problem.

On the other hand, if the amplifier is significantly larger than 1.1, this suggests that a structure will exhibit significant nonlinear behavior during the deck placement. In this case, one or more of the steps listed in Article 3.16.3.4.3 can be considered.

Thank You for Attending the AASHTO/NSBA Joint Collaboration Committee Meeting

Task Group 13
Analysis of Steel Structures

2024 Fall Meeting
New Orleans, LA

Attachment D

AASHTO COBS Meeting

- Committee on Bridges and Structures (COBS)
  - 5/31/25 – 6/6/26 | Dallas, TX
  - Second Round of Ballots for 11th Edition (2026)

- Winter AASHTO Steel and Metals Committee Meeting
  - 1/28/25 – 1/30/25 | Tampa, FL
  - Finalize ballots for Dallas

AASHTO Steel & Metals: 2024 Approved Ballots (11th)

- 6.13.2.10.4 – Prying Action
  - Update section to align with AISC (simplified), more efficient (M&M)
- C6.10.10.1 – Shear Connectors
  - Recommend shear studs full-length for skewed bridges (> 20°)
- 6.13.6.1.3 – Box Girder Flange Splices
  - Design flange splice of box girder field splice for reduced capacity ($< F_y$) if governed by compression instead of tension. Limited to $0.75F_y$

AASHTO Steel & Metals: 2024 Approved Ballots (11th)

- C6.7.8 – Minimum Inside Bend Radius for Diaphragm Connection Plates
  - Provide table from AASHTO Steel-Bridge Fabrication Specifications with reduced bending radii
- Table 6.8.2.2-1 – Shear Lag Factor, U, for HSS with slotted plate connection
- C6.10.9.3.3 – Optional refined end panel shear strength from MBE

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