BUREAU OF STRUCTURES

DATE: July 31, 2017
TO: Bridge Manual Users
FROM: DTSD – Bureau of Structures
SUBJECT: **July 2017 Bridge Manual Update**

The Bridge Manual revisions to text and standards are now complete and posted online for this six month cycle. Please see the attached sheets for a list, with brief explanation, of the Text and Standards that were revised. Most corresponding plan insert sheets have also been updated and posted online. (Railing and electrical work insert sheets have not been updated, yet, but should be soon).

Of particular interest in this edition:

- **Chapter 5:** Added 2016 cost data

- **Chapter 13:**
  - Complete update on wind loads per AASHTO 2016 Interims
  - Added Policy Item regarding segmenting of pier caps
  - Compete chapter and example update on Strut-and-Tie Method per AASHTO 2016 Interims.

- **Chapter 30:**
  - 42”SS shall be used on all Interstate structures, and all STH and USH with a design speed exceeding 45 mph. See 30.1 for implementation timeline.
  - MASH 2016 Test Levels (TL) are given. **Note:** Wisconsin does not currently have an open railing meeting MASH TL-3, which is the minimum required for the NHS. This situation should be addressed in the near future.

- **Chapter 32:** Added section for conduit systems

- **Chapter 36 and 45**: Updated culvert rating and reporting requirements. Removed WisDOT Policy Item requiring the active load factor for at-rest load conditions.

- **Standard 17.02:** Removed joint routing and epoxy fill detail as it was not practical in construction and creating more problems than it solved.

- **Standards 24.04 & 24.12:** End steel diaphragms are now detailed to be sloped in order to provide a uniform concrete diaphragm depth. **Note:** This change was noted in the January, 2017 edition but was not included at that time. Sorry for any confusion this may have caused.

- *Revised* **Standard 30.21 – Light Standard and Junction Box for Parapets & *New* Standard 30.22 – Conduit Details and Notes:** Standards provide updated guidance for the design of conduit systems based on current practices and typical applications. Junction boxes should be used at each expansion joint for grounding purposes. Junction boxes are not required at semi-expansion or fixed joints.

- **Updated Special Provisions:**
  - Geosynthetic Reinforced Soil Abutment
  - Temporary Wall Wire Faced Mechanically Stabilized Earth
  - Wall Concrete Panel Mechanically Stabilized Earth
  - Wall Modular Block Gravity
  - Wall Modular Block Gravity Landscape
  - Wall Modular Block Mechanically Stabilized Earth
  - Wall Wire Faced Mechanically Stabilized Earth
  - Prestressed Girders Box Type XX – Inch (contact BOS)

- *New* **Geotechnical Manual:** A new geotechnical manual was released this spring to assist Geotechnical Engineers in the investigation, testing, analyses and reporting of subsurface conditions for WisDOT transportation improvement projects. This manual replaces the current original two-volume Soils Manual, and Geotechnical Bulletin #1. The manual can be found at: http://wisconsindot.gov/Pages/doing-bus/eng-consultants/cnslt-rsrces/default.aspx

Most other changes are fairly minor. Please use the example calculations with care (follow along in AASHTO).

A vertical black bar in the left margin notes all text changes.

The user's feedback regarding the Bridge Manual is important to us as that is where we get many ideas for corrections, clarification and new ideas for enhancement.

July 2017 Bridge Manual Text Update Summary

Chapter	Page Number(s)	Change
2	13	Clarified structure length with "measured along the skew between the inside faces of the exterior walls"
3	3	Text added regarding High Clearance Routes
5	All	2016 cost data added
6	20	Added abbreviation for "shoulder"
	32	Moved FDM reference from section 30.5 to section 6.3.3.7
11	26	Clarified that Table 11.3-1 is based on LRFD [Table 11.5.5.2.3-1]
	27, 47	Clarified the number of piles required for PDA testing and added Static Pile Load Test requirements to Table 11.3-1. Removed Table 11.3-6.
	27, 44, 47	Clarified that the resistance factor for determining the required driving resistance with modified Gates is 0.50, based on department research and past experience as specified in Table 11.3-1. The resistance factor shown in LRFD [Table 11.5.5.2.3-1] is not used by WisDOT for this method.
	27, 35, 42, 44	Updated chapter to refer to "FHWA-modified Gates dynamic pile formula" as "modified Gates" for shorthand.
	49-52	Renumbered tables
12	6	Noted A4 abutments may be discontinued due to their limited usage
	7	Clarified wing usage for high waters
	8	Clarified A5 abutment skew limits
	19-21	Updated Figure 12.7-1. Added note to A4 abutments - "Requires Approval by the BOS". Added A5 abutment limitations.
13	11-16,25	In the AASHTO 2016 Interims, "LRFD [3.8] - Wind Loads", was completely rewritten and required updates to this Chapter's Text
	18-21	Updated Table numbers
	26	Corrected "expansion" to "fixed". Added guidance for longitudinal forces to fixed piers.
	27	Added Policy Item regarding segmenting of pier caps if over 65'
	29-38	In the AASHTO 2016 Interims, "LRFD [5.6.3] - Strut-and-Tie Method", was completely rewritten and required updates to this Chapter's Text
	41	Updated reference to Article number in current AASHTO Specification
13E -1	2	Updated sentence to state that Example is current through AASHTO 2016 Interims
	70	Added concrete density as an influence on the modulus of rupture, fr
	60,78	Added concrete density modification factor to shear resistance, Vc, equation

	73,75,76	Added concrete density modification factor to nominal shear resistance (two-way action), Vn, equation
	3,4,6,9,11-12,16-19,21-25,28-34,37,43-45,47-49,51-52,57-58,63,65,67-68,72-73,75,77	Text additions/corrections for clarity
	12-17,19-21,24,26-28,30-32,34-35,53-54,58-61,64-65	In the AASHTO 2016 Interims, "LRFD [3.8] - Wind Loads", was completely rewritten and required updates to this Example
	41-42,46-51	In the AASHTO 2016 Interims, "LRFD [5.6.3] - Strut-and-Tie Method", was completely rewritten and required updates to this Example

14	8-9	Updated wall numbering system
	127-128	Update the list of available special provisions on the BOS website

30	6,7,10-15,17,18,21	Minor - Reference callouts update
	2	Meet MASH criteria rather than NCHRP 350.
	2	Requirement for using 42"SS parapets in certain locations
	2	Non-standard rails must be approved by BOS
	2	Meet MASH criteria rather than NCHRP 350.
	3	Meet MASH criteria rather than NCHRP 350.
	3	Added "and FHWA" to "WisDOT"
	7	Must meet MASH 2016 for lets after December 31, 2019.
	7	Clarification that state-owned include roadways over IH, USH and STH. NOTE that Wisconsin does not currently have a open rail for TL-3. Minor. Added "the" in front of "designer"
	7	Added maintenance issue due to salt-water runoff in No. 3
	7	Reworked No. 4 to match policy going forward
	7	The No. 1 bridge railing description for utilization updated.
	8	Rating is lower for Parapet "A"
	8	Type "TX" meets MASH criteria rather than NCHRP 350.
	8	Removed "i.e" illustration at the end of item No. 7
	9	Type "H" is TL-3 under MASH
	9	Timber Railing is TL-2 under MASH
	9	M rail is TL-2 under MASH
	10	NY 3/4 are TL-2 under MASH
	11,12,14,15,19	Referring to standards by name rather than number
	13	Declaring tests on aesthetic features are still applicable
	16	Removed figure showing maximum allowable conduit and conduit information. Refer to section 32.6 for conduit information.

	16	Added standard number 30.22
	16	Removed bench mark guidance. Refer to section 6.3.3.7 for bench mark information.
	22	Remove railings that are *italicized*
	22,23	Updated info for railings and parapets

32	7-8	Added section 32.6 for conduit systems to provide further guidance and consistency.

36	4	Updated culvert rating requirements. Refer section 45.8.
	4	Corrected Wis-SPV reference from 45.6 to 45.12.
	4	Removed AASHTO LRFR reference.
	9	Changed horizontal earth pressure (EH) load factor from 1.50 to 1.35 following LRFD [Table 3.4.1-1]
	16	Removed discussion on soil pressure due to self-weight.
	16	Removed WisDOT Policy Item requiring the active load factor for at-rest conditions. Load factors for design and ratings shall follow LRFD [Table 3.4.1-1]
	17	Updated Figure 36.4-1. Removed self-weight soil pressure from figure
	18	Clarified pressure distribution assumptions for bottom slab design
36E -1	9	Changed horizontal earth pressure (EH) load factor from 1.50 to 1.35 following LRFD [Table 3.4.1-1]

37	4	Updated maximum spacing of ramp landings

40	35	Updated Table 40.16-1

45	10	Changed "design" to "designed"
	22	Added Strength II Limits States in Table 45.3-1
	22	Updated Load Factor references in Table 45.3-1
	32,33	Added additional guidance regarding refined analysis
	46	Changed girder flare requiring refined analysis from 0.10 to 0.15
	49-51	Added or updated Wis-SPV ratings requirements
	49	Added reporting ratings for culverts that are not of structure length
	50	Added rating requirements for existing culverts that are not of bridge length
	50-51	Replaced "good" with "fair or better" for culvert conditions

July 2017 Standard Details Update Summary

Chapter 4

- Std 4.01 ■ No revisions.
- Std 4.02 ■ No revisions.
- Std 4.03 ■ No revisions.
- Std 4.04 ■ No revisions.
- Std 4.05 ■ No revisions.

Chapter 7

- Std 7.01 ■ No revisions.
- Std 7.02 ■ No revisions.
- Std 7.03 ■ No revisions.
- Std 7.04 ■ No revisions.
- Std 7.05 ■ No revisions.
- Std 7.06 ■ Corrected bar label for bent bar
- Std 7.07 ■ No revisions.

Chapter 9

- Std 9.01 ■ Removed two abutment wing details. Updated Designer Notes with additional guidance for detailing and quantity purposes.
  ■ Added Designer Note for geotextile limits for abutments

Chapter 11

- Std 11.01 ■ No revisions.

Chapter 12

- Std 12.01 ■ No revisions.
- Std 12.02 ■ No revisions.
- Std 12.03 ■ No revisions.
- Std 12.04 ■ No revisions.
- Std 12.05 ■ Added Designer Note on the limited usage of A4 abutments
- Std 12.06 ■ Added Designer Note on the limited usage of A4 abutments
- Std 12.07 ■ Clarified Designer Notes on high water requirements
- Std 12.08 ■ No revisions.
- Std 12.09 ■ No revisions.
- Std 12.10 ■ Corrected bar mark T406 (TOP) to T506 (TOP) in plan view
- Std 12.11 ■ No revisions.
- Std 12.12 ■ No revisions.
- Std 12.13 ■ No revisions.

Chapter 13

- Std 13.01 ■ No revisions.
- Std 13.02 ■ No revisions.
- Std 13.03 ■ No revisions.
- Std 13.04 ■ No revisions.
- Std 13.05 ■ No revisions.
- Std 13.06 ■ No revisions.
- Std 13.07 ■ No revisions.
- Std 13.08 ■ No revisions.
- Std 13.10 ■ No revisions.
- Std 13.11 ■ No revisions.

Chapter 14

Std 14.02	■ No revisions.
Std 14.03	■ No revisions.
Std 14.04	■ No revisions.
Std 14.05	■ Corrected spelling of word in Alternate MSE Wall detail
Std 14.11	■ No revisions.
Std 14.12	■ No revisions.
Std 14.13	■ No revisions.

Chapter 15

Std 15.01	■ No revisions.
Std 15.02	■ No revisions.
Std 15.03	■ Changed slope shown in Section @ Sidewalk detail

Chapter 17

Std 17.01	■ No revisions.
Std 17.02	■ Clarified protective surface treatment application ■ Removed detail for routing joint and filling with epoxy ■ Clarified Designer Note and Note for termination of v-groove

Chapter 18

Std 18.01	■ No revisions.
Std 18.02	■ Removed reference to std 17.02 for routing joint and filling with epoxy

Chapter 19

Std 19.01	■ Changed reference in Notes for WWF to ASTM A1064
Std 19.02	■ Modified Designer Notes to include span label Updated debonding note and removed "Bond Breaker Detail"
Std 19.03	■ Changed reference in Notes for WWF to ASTM A1064
Std 19.04	■ Modified Designer Notes to include span label
Std 19.11	■ Changed reference in Notes for WWF to ASTM A1064
Std 19.12	■ Modified Designer Notes to include span label
Std 19.13	■ Changed reference in Notes for WWF to ASTM A1064
Std 19.14	■ Modified Designer Notes to include span label
Std 19.15	■ Changed reference in Notes for WWF to ASTM A1064
Std 19.16	■ Modified Designer Notes to include span label
Std 19.17	■ Changed reference in Notes for WWF to ASTM A1064
Std 19.18	■ Modified Designer Notes to include span label
Std 19.19	■ Changed reference in Notes for WWF to ASTM A1064
Std 19.20	■ Modified Designer Notes to include span label
Std 19.31	■ No revisions.
Std 19.32	■ No revisions.
Std 19.33	■ No revisions.
Std 19.34	■ No revisions.
Std 19.35	■ No revisions.
Std 19.36	■ No revisions.
Std 19.37	■ Modified "Part Transverse Section at Diaphragm" to show short slotted holes in angles, rather than long slotted holes
Std 19.38	■ No revisions.
Std 19.50	■ No revisions.
Std 19.51	■ No revisions.

Std 19.52 ■ No revisions.
Std 19.53 ■ No revisions.
Std 19.54 ■ No revisions.
Std 19.55 ■ No revisions.
Std 19.56 ■ No revisions.

Chapter 23

Std 23.01 ■ No revisions.
Std 23.02 ■ No revisions.
Std 23.03 ■ No revisions.

Chapter 24

Std 24.02 ■ No revisions.
Std 24.03 ■ No revisions.
Std 24.04 ■ Updated details and notes with diaphragms sloped to match bottom of deck
■ Clarified bolted alternate and welded alternate requirements
Std 24.06 ■ No revisions.
Std 24.08 ■ No revisions.
Std 24.09 ■ No revisions.
Std 24.10 ■ No revisions.
Std 24.11 ■ Changed notes regarding deck pours
(This change was made in January, 2017 but not noted at that time)
■ Removed reference to std 17.02 for routing joint and filling with epoxy
Std 24.12 ■ Updated diaphragm slopes to match bottom of deck
■ Added bolt diameter for support angle in Notes

Chapter 27

Std 27.02 ■ No revisions.
Std 27.05 ■ No revisions.
Std 27.06 ■ No revisions.
Std 27.07 ■ No revisions.
Std 27.08 ■ No revisions.
Std 27.09 ■ No revisions.
Std 27.10 ■ No revisions.

Chapter 28

Std 28.01 ■ Added note to clarify stud orientation for pedestrian bridges
Std 28.02 ■ No revisions.
Std 28.03 ■ Adjusted 'Anchorage Detail' dimension from 8-1/2" to 8-3/4"
Std 28.04 ■ No revisions.
Std 28.05 ■ No revisions.
Std 28.06 ■ No revisions.
Std 28.07 ■ No revisions.
Std 28.08 ■ No revisions.

Chapter 29

Std 29.01 ■ No revisions.
Std 29.02 ■ No revisions.
Std 29.03 ■ No revisions.

Chapter 30

Std 30.02 ■ No revisions.

	Std 30.04	■ No revisions.
	Std 30.05	■ No revisions.
	Std 30.07	■ Modified parapet thickness and reinforcement requirements
		■ Removed 1'-8" high parapet option
	Std 30.08	■ Modified parapet reinforcement requirements
	Std 30.09	■ No revisions.
	Std 30.10	■ Dimension adjusted in Parapet 'A' view to reflect 1" added parapet thickness
	Std 30.11	■ Dimension adjusted in Parapet 'A' view to reflect 1" added parapet thickness
	Std 30.12	■ No revisions.
	Std 30.13	■ No revisions.
	Std 30.14	■ No revisions.
	Std 30.15	■ Modified parapet thickness and reinforcement requirements
	Std 30.16	■ Removed TL rating - just refers to Bridge Manual 30.2
	Std 30.17	■ No revisions.
	Std 30.18	■ Dimension adjusted in parapet to reflect 1" added parapet thickness
		■ Modified parapet reinforcement requirements
	Std 30.19	■ No revisions.
	Std 30.20	■ No revisions.
REVISED	Std 30.21	■ Updated entire standard and added New Std 30.22 as a continuation.
		■ Updated junction box requirements
NEW	Std 30.22	■ Updated Plan and Elevation details (with and without structural approach slab)
		■ Added conduit fitting recommendations table
		■ Added several expansion fitting details
	Std 30.24	■ No revisions.
	Std 30.25	■ No revisions.
	Std 30.26	■ Removed TL rating - just refers to Bridge Manual 30.2
	Std 30.27	■ Removed TL rating - just refers to Bridge Manual 30.2
	Std 30.28	■ No revisions.
	Std 30.29	■ No revisions.
	Std 30.30	■ Corrected bar label in the Outside Elevation detail
	Std 30.31	■ Corrected bar label in the Outside Elevation detail
	Std 30.32	■ Corrected bar label in the Outside Elevation detail
	Std 30.33	■ No revisions.
	Std 30.34	■ No revisions.
	Std 30.35	■ No revisions.
	Std 30.36	■ No revisions.
	Std 30.37	■ No revisions.

Chapter 36

	Std 36.01	■ No revisions.
	Std 36.02	■ No revisions.
	Std 36.03	■ No revisions.
	Std 36.04	■ No revisions.
	Std 36.05	■ No revisions.
	Std 36.06	■ No revisions.
	Std 36.07	■ No revisions.
	Std 36.08	■ No revisions.
	Std 36.10	■ No revisions.
	Std 36.11	■ No revisions.
	Std 36.12	■ No revisions.
	Std 36.13	■ No revisions.
	Std 36.14	■ No revisions.

Std 36.15 ■ No revisions.
Std 36.16 ■ No revisions.

Chapter 37

Std 37.01 ■ No revisions.
Std 37.02 ■ No revisions.

Chapter 38

Std 38.01 ■ Added note "construction clearance detail should not be included in the plans..."
■ Added note on field tolerances and contingencies for shoring requirements
■ Updated "Limits Before Shoring Required" detail.
■ Added reference to "Guidelines for Temporary Shoring"

Chapter 39

Std 39.02 ■ No revisions.
Std 39.03 ■ No revisions.
Std 39.09 ■ No revisions.
Std 39.10 ■ No revisions.
Std 39.11 ■ No revisions.
Std 39.12 ■ No revisions.
Std 39.13 ■ No revisions.

Chapter 40

Std 40.01 ■ No revisions.
Std 40.02 ■ No revisions.
Std 40.03 ■ No revisions.
Std 40.04 ■ No revisions.
Std 40.05 ■ No revisions.
Std 40.06 ■ No revisions.
Std 40.07 ■ No revisions.
Std 40.08 ■ No revisions.
Std 40.09 ■ No revisions.
Std 40.10 ■ No revisions.
Std 40.11 ■ No revisions.
Std 40.12 ■ No revisions.
Std 40.13 ■ Changed reference in Notes for WWF to ASTM A1064
Std 40.14 ■ No revisions.
Std 40.15 ■ No revisions.
Std 40.16 ■ No revisions.
Std 40.17 ■ Changed reference in Notes for WWF to ASTM A1064
Std 40.18 ■ No revisions.
Std 40.19 ■ Changed reference in Notes for WWF to ASTM A1064
Std 40.20 ■ No revisions.
Std 40.21 ■ No revisions.
Std 40.22 ■ No revisions.
Std 40.23 ■ No revisions.
Std 40.24 ■ No revisions.
Std 40.25 ■ No revisions.
Std 40.26 ■ No revisions.
Std 40.31 ■ Removed reference to std 17.02 for routing joint and filling with epoxy
Std 40.32 ■ No revisions.
Std 40.33 ■ No revisions.