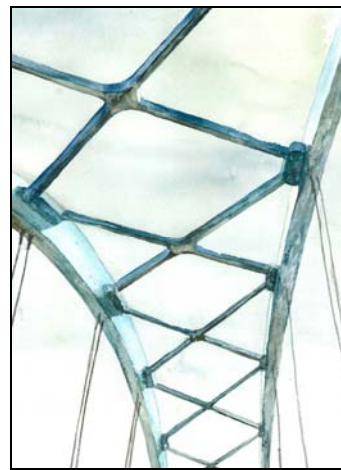




Division of Transportation
System Development
Bureau of Structures
PO Box 7916
Madison, WI 53707-7916



Bridge Manual



Standard Details

DATE: August 20, 2012
TO: Bridge Manual Users
FROM: DTSD – Bureau of Structures
SUBJECT: **July, 2012 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. Corresponding plan insert sheets have also been updated and posted online.

Of particular interest in this edition:

- **New Chapter 7 – Accelerated Bridge Construction:** This new chapter provides an overview of various ABC methods, including: prefabricated bridge elements, geosynthetic reinforced soil (GRS), lateral sliding and self propelled modular transporters (SPMT). This chapter will continue to grow, including standards being available in the future.
- **New Standard 12.10 – Structural Approach Slab for Type A1 Abutments:** To reduce end-of-bridge ride issues, structural approach slabs are to be used on all Interstate and USH bridges. Other locations can be considered with the approval of the Chief Structural Design Engineer.
- **New Standard 12.11 – Structural Approach Slab Details for Type A1 Abutments:** Additional details to go along with Standard 12.10.
- **New Standard 13.07 – Multi-Columned Pier with Rectangular Columns:** Section 13.4.10 described the design assumptions and column requirements for the 400 kip Extreme Event collision load. This standard was created to illustrate the requirements for the AASHTO load, which recently (AASHTO LRFD 6th Edition) increased to 600 kips. An explanation of why the minimum column size and reinforcing decreased as the collision force increased is probably in order! Initially, for the 400 kip load, a certain analysis method, along with other state's requirements, input from FHWA, etc. led us to the guidance in 13.4.10. In time, we understood that we had been conservative; however we also knew that the collision force was likely to increase, which is why the minimum column size and reinforcing did not

decrease at that time. With the change in collision force officially published, a fresh look at this issue with nationally accepted analysis methods was used to arrive at Standard 13.07.

- **New Standard 13.10 – 51-inch Concrete Integral Barrier:** Retrofit concrete barrier between columns. Used as vehicle protection, not structure protection.
- **New Standard 13.11 –Integral Barrier Details:** Additional details to go along with Standard 13.10.
- **New Standard 14.04 – MSE Wall at Abutment:** Details for MSE walls used in conjunction with abutments. First “Designer Note” indicates that MSE walls with abutments are not to be used for the singular purpose of reducing span length.
- **New Standard 14.05 – MSE Wall at Abutment Layout Details:** Details for MSE wall preferred layout when used in conjunction with abutments.
- **Chapter 6** – New Structure Survey Reports (SSR) are available for grade separations, rehabilitations, and stream crossings. A link is provided.
- **Chapter 40** – Section 40.16 Concrete Masonry Anchors for Rehabilitation has been almost completely rewritten. ACI appendix D is being followed (until AASHTO provides guidance).
- AASHTO LRFD 5.4.2.6 and 5.7.3.3.2 changed for modulus of rupture and minimum reinforcement, respectively. The text and examples have been changed to reflect these changes.
- On the plan title block under DESIGN SPEC. it should state AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS. No edition should be given as exact times with regards to software updates, etc. as well as forthcoming changes from AASHTO make an edition less definitive. The date signed by the Chief Structures Design Engineer should provide enough of a timeline.

Most other changes are fairly minor. Please use the example calculations with care (follow along in AASHTO). A couple of mistakes have been pointed out. Unfortunately, due to time/resource issues, the corrections were not made at this time.

If anything in a given chapter was edited, the date for the entire chapter was updated. A vertical black bar in the left margin notes all changes. Previous black bars were not removed from chapters which were not edited in this update.

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.

Editor’s note: I’ve enjoyed working on the Bridge Manual for the past 6 years, but just recently took a position as a structures design supervisor in the Bureau of Structures (not going too far away). Until my replacement is in place, questions/feedback can be directed to:

- Bill Oliva (608) 266-0075
- David Nelson (608) 264-9420

July 2012 Bridge Manual Text Update Summary

<u>Chapter</u>	<u>Page Number(s)</u>	<u>Change</u>
2	3	Updated BOS organizational chart
	8	Slight change as to guidance that the Structures Design gives.
4	6	Added section 4.4 for accent lighting for significant bridges
5	5	Corrected bid item numbers for 5 different rebar groups
6	8	Made changes to reflect new Structure Survey Report
	33	Changed "centerline" to "reference line"
	34	Emphasize the submittal of Pile Driving Reports
	43	Minor edits
	44	Updated extranet link to Bureau of Structures products
7	<i>All NEW</i>	New chapter providing introductory guidance to Accelerated Bridge Construction
8	35	Additional guidance for drop inlets
9	15,16	For painting steel and concrete, the word "approved" was changed to "recommended" for the Federal color numbers listed.
11	15	Clarified pile spacing minimums and maximums. Renumbered spread footing items from 5 & 6 to 1 & 2.
	41	Added 16" CIP piles to table.
	47-50	Added section for economical evaluation of deep foundations for various methods of construction monitoring. Gates, PDA, and CAPWAP are discussed.
12	27	Corrected minimum load factor for temperature and shrinkage to 0.50
	36	Added WisDOT Policy Item for the use of structural approach slabs
13	6	Restricting the use of H-piles on open pile bents. H-piles now require approval of the BOS Development Chief
	9	Minor. Added chapter title to chapter number for consistency.
	20	AASHTO vehicular collision load increased from 400k to 600k
	21	Changes to column size and reinforcement for vehicular collision
	30	"13.7.5" numbering was missing for "Check the Compression Strut Capacity". Following two sections renumbered as a consequence of the change.

13 (con't)	35	Noting that reduced effective area of concrete allowed for pier columns/shafts not requiring a minimum reinforcement as per 13.4.10. Also removed suggestion that armoring piers is sometimes acceptable.
	42	AASHTO vehicular collision load increased from 400k to 600k
13 EX-1	13E1 2	Stated that Example is current thru AASHTO Bridge Design Spec (6th Ed.)
13 EX-1	13E1 65 thru 67	Updated Minimum Reinforcement Criteria
13 EX-2	13E2 2	Stated that Example is current thru AASHTO Bridge Design Spec (6th Ed.)
13 EX-2	13E2 16,17,18,21, 23	Updated Minimum Reinforcement Criteria

14	7	Added Policy Item for protecting retaining walls susceptible to vehicular damage with a roadway barrier. This policy was inadvertently left out when this chapter was rewritten to LRFD.
	69,78	Clarified various types of stability.
14 EX-1	14E1 22,23,25, 26,29	Updated Minimum Reinforcement Criteria
14 EX-1	14E1 3	Minor. Cohesion units changed
14 EX-1	14E1 4	Changed bearing resistance factor, ϕ_{tb} , to 0.55 and simplified sliding resistance factors and assumptions.
14 EX-1	14E1 15	Changed load effects from Service I to Strength I to be consistent with the appropriate limit state.
14 EX-1	14E1 18	Noting that AASHTO eccentricity limits does not follow WisDOT policy.
14 EX-4	14E4 26,27,28, 30,33	Updated Minimum Reinforcement Criteria
14 EX-4	14E4 2	Minor. Figure reference corrected
14 EX-4	14E4 3	Minor. Cohesion units changed
14 EX-4	14E4 20	Removed AASHTO reference
14 EX-4	14E4 21	Corrected transverse bar diameter to 0.875 inches
14 EX-4	14E4 37	Corrected Figure E14-4.9-1 longitudinal reinforcement in footing

17	12,13	Corrected pedestrian bridge LL to 90 psf.
	77	Updated Minimum Reinforcement Criteria

18	19	Added reference to AASHTO Guide for Design of Pedestrian Bridges
	26	Updated Minimum Reinforcement Criteria
	29	Corrected reference to Chapter
18 EX-1	18E1 3	Stated that Example is current thru AASHTO Bridge Design Spec (6th Ed.)
18 EX-1	18E1 19,23,24, 69,70	Updated Minimum Reinforcement Criteria

19	24,25	Updated Minimum Reinforcement Criteria
	42	
19 EX-1	19E1 2	Stated that Example is current thru AASHTO Bridge Design Spec (6th Ed.)
19 EX-1	19E1 34 and 36	Updated Minimum Reinforcement Criteria
19 EX-1	19E1 36	Noted that skew correction factor was not applied to interior girder (example not yet updated to reflect WisDOT policy item)
19 EX-2	19E2 2	Stated that Example is current thru AASHTO Bridge Design Spec (6th Ed.)
19 EX-2	19E2 14 and 18	Updated Minimum Reinforcement Criteria
19 EX-3	19E3 2	Stated that Example is current thru AASHTO Bridge Design Spec (6th Ed.)
19 EX-3	19E3 22 and 23	Updated Minimum Reinforcement Criteria
19 EX-3		Corrected Header numbers used

27	4	Corrected date for AASHTO Construction Spec. and added reference to AASHTO M251
	5	Added reference to Construction Spec.
	7	Updated compressive stress requirement for plain elastomeric pads
	9	Updated criteria for compressive deflection
	10	Corrected date for AASHTO Construction Spec.
	Sect 27.2.1	Removed rotation requirements that were removed from AASHTO LRFD 14.7.6.3.5

27 EX-1	27E1 2	Stated that Example is current thru AASHTO Bridge Design Spec (6th Ed.)
	27E1 5	Added criteria to be met for using Method A
	27E1 8	Updated criteria for compressive deflection
	Sect E27- 1.10	Removed rotation requirements that were removed from AASHTO LRFD 14.7.6.3.5

30	6	Enhanced guidance for clearance on sidewalk for snoop access.
	8	Reference other areas in Bridge Manual for additional guidance.

36	12, 13	Updated Minimum Reinforcement Criteria
	13	Stated maximum rebar spacing for temperature & shrinkage
36 EX-1	36E1 2	Stated that Example is current thru AASHTO Bridge Design Spec (6th Ed.)
36 EX-1	36E1 21,27	Updated Minimum Reinforcement Criteria
36 EX-1	36E1 33	Corrected use of "c" term, which needed to be "a".

37	3	Updated reference to new STSP to include "LRFD"
	5	Protective screening not required to be enclosed. Discuss with the Region screening requirements.
	4	Added guidance for vertical clearance on bridge

38	28	Noted that minimum footing depth below top of rail is 6'-6" only if bedrock is not present.
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40	10	Added section for polymer overlays, including to add 5 psf for DW.
	16,17,19	Changed 400 kip to 600 kip for revised impact load
	28-36	Revisions to Concrete Masonry Anchors
	40-42	Reversed sections 40.19 and 40.20 (put references at end of chapter)

45 EX-2	45E2 11,12	Updated Minimum Reinforcement Criteria
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July 2012 Standard Details Update Summary

Chapter 12

- Std 12.01
 - Moved note with 'star' symbol from Designer's Notes to Legend
 - Moved '+/-' symbol behind 50'-0" (was in front of 50'-0")
 - CL brg to bf abut must be 2'-3" if structural approach slab is used

- Std 12.03
 - Clarified '***' symbol regarding 56SS parapets and wing width.
 - Moved '+/-' symbol behind 50'-0" (was in front of 50'-0")
 - Separated out items into "Legend"

- Std 12.05
 - Added '***' symbol regarding exceptions to 1'-3" wing length.
 - Moved '+/-' symbol behind 50'-0" (was in front of 50'-0")
 - Added horizontal bars to beam seat area to keep max. spacing < 1'-6".

- Std 12.08
 - CL brg to bf abut must be 2'-3" if structural approach slab is used

NEW Std 12.10

- Structural approach slab for Type A1 abutments

NEW Std 12.11

- Structural approach slab details for Type A1 abutments

Chapter 13

- Std 13.01
 - "General Notes" changed to "Designer Notes"
 - Added "...unless otherwise shown" to bar splice note.
 - Added note allowing angled beam seats at designer's discretion.
 - Horizontal #5 U-bars added to ends of cap and detail.
 - Note for keyway on "End View" changed to reflect size of columns associated with this standard.
 - Revised note regarding vehicle collision design.
 - In Section P1, 12-#7 min. replaced with "as per AASHTO 5.7.4.2"
 - Minor: In Section P2 removed the word "use" in front of "#5 bars"
 - Added "3" min./6" max" dimension from top of column to first stirrup
 - Removed "Alternate Section P1" as this is now covered by new std 13.07.

- Std's 13.02
 - "General Notes" changed to "Designer Notes"
- 13.05, 13.06
 - Added "...unless otherwise shown" to bar splice note.
 - Removed ambiguity in note for optional keyed construction joints
 - Added notes for exceptions to when bearing seats should be level.
 - Added note allowing angled beam seats at designer's discretion.

- Std 13.03
 - Added reference to Std 13.01 for applicable designer notes.

- Std 13.04
 - "General Notes" changed to "Designer Notes"
 - Added "All bar splices ...unless otherwise shown" to Designer Notes.
 - Added note allowing angled beam seats at designer's discretion.
 - Added note requiring CIP piles unless approved by BOS.
 - Changed drawings to show CIP piles.
 - Added "or diaph./girder" to note in Sec A-A
 - Maximum single pour is limited to 65 ft.
 - Min. pile spacing = 3', Max. = 8' (min. of 5 piles).
 - Added reference to Std 13.01 for applicable designer notes.

NEW Std 13.07 ■ Multi-columned pier with vehicle collision resistant piers

NEW Std 13.10 ■ 51-inch Concrete Integral Barrier used for vehicle protection

NEW Std 13.11 ■ Additional details for Concrete Integral Barrier

Chapter 14

Std 14.03 ■ Clarified various types of stability and provided greater guidance to design engineers with added "Designer Notes". Showed pay limits on "Typ. Cross Sect. of Retaining Wall".

NEW Std 14.04 ■ Details for MSE wall used in conjunction with an abutment.

NEW Std 14.05 ■ Details for layout of MSE wall used in conjunction with and abutment.

Chapter 17

Std 17.01 ■ Revised "Cross Section Thru Anchored Median"

Std 17.02 ■ Clarified note for what to do when continuity bars are > 60 ft
■ Changed "Legend" to "Designer Notes" and "Plan Notes" to "Notes"
■ Added "3/4" V-GROOVE." to 2nd Designer Notes and Notes.
■ Clarified extent of V-groove on 2nd Designer Notes and Notes.

Chapter 18

Std's 18.01, 18.02 ■ Changed "General Notes" to "Notes"
■ Added "Note" for measuring camber prior to falsework release.
■ Paving notch is 1'-0" x 1'-4" if structural approach slab is used.

Chapter 19

Std's 19.01, 19.03 ■ Changed "General Notes" to "Notes"
■ Removed "for bonding to the slab" from first "Note" (True statement, just not needed).
■ Changed contacting Development Chief to Development Section.
■ Added note describing prestressing strands (now matches insert sheet.)
■ 2nd "Designer Note" allows 0.5" dia. strands in straight patterns if req'd to keep stresses at acceptable levels.

Std's 19.11, 19.13 ■ Changed "General Notes" to "Notes"
■ Removed "for bonding to the slab" from first "Note" (True statement, just not needed).
■ Changed contacting Development Chief to Development Section.
■ Added note describing prestressing strands (now matches insert sheet.)

Std's 19.15
19.17, 19.19 ■ First General Note corrected to read 15" of outside edge to have smooth finish. (Sealer applied to outside 15" changed back last revision, missed beginning of note.)
■ Removed "for bonding to the slab" from first "Note" (True statement, just not needed).
■ Changed "General Notes" to "Notes"
■ Changed contacting Development Chief to Development Section.
■ Added note describing prestressing strands (now matches insert sheet.)

- Std 19.33
 - Clarified symbols regarding dimensions & bars, whether parallel or perpendicular to girders.
 - Paving notch is 1'-0" x 1'-4" if structural approach slab is used.
- Std's 19.34, 19.35
 - Clarified symbols regarding dimensions & bars, whether parallel or perpendicular to girders.
 - Paving notch is 1'-0" x 1'-4" if structural approach slab is used.
 - Removed redundant note at end of "Notes"
Removed 6" min. dimension in "Expansion End" as it is shown better in the "Top View of Diaphragm (Expansion End)"
 - Moved one note from "Notes" and made it a "Designer Note"
- Std 19.38
 - Slotted angle holes shall have one be vertical and one horizontal per pair on a given beam face. To facilitate fit-up.

Chapter 24

- Std 24.02
 - Removed 1/2" fillet weld from table
 - Added note stating tight fit to tension flange to be caulked
- Std 24.12
 - Clarified that diaphragm extends to web of girder.
 - Corrected first note in Legend and changed symbol to match other diaphragm standards.

Chapter 27

- Std 27.05
 - Paving notch is 1'-0" x 1'-4" if structural approach slab is used.
 - Cleaned up other symbols/notes

Chapter 28

- Std 28.01
 - Minor change showing Std 24.12 reference for concrete diaphragms on steel girders.
 - Changed width of extrusion to match models currently available
- Std 28.03
 - Minor change showing Std 24.12 reference for concrete diaphragms on steel girders.
 - Corrected diaphragm on steel girder dimension to 2'-6" (was 2'-0")

Chapter 30

- Std 30.01
 - Removed end post option without 1'-6", 45 degree bend. With and without three beam utilize bent rail end treatment.
- Std 30.11
 - Minor. Changed a couple of parapet references from LF to SS.
 - Changed "General Notes" to "Notes"
 - Clarified that option for straight or bent fence allowed for sidewalks.
- Std 30.13
 - Changed S503 bar length to match bar for LF parapet.
- Std 30.15
 - Separated "Notes" into "Notes" and "Designer Notes"
 - Added note for fence selection guidance.
- Std 30.21
 - Minor. Changed a couple of parapet references from LF to SS, including the title of the standard.
 - Minor. Changed S510 bar length.

Chapter 36

- Std 36.01
 - Added note in Elevation view for undercut, breaker run, etc.
 - Added note in Elevation view to allow saw cut joints in bottom slab.
 - Removed a couple of redundant notes (made other note say "TYP.")

- Std 36.02
 - Separated Notes into Notes (for plan) and Designer Notes
 - Added a Note regarding substitution for breaker run as well as a Designer Note for use of the Note.
 - Added a Note requiring Structure Backfill behind wings
 - Moved max. value of Hw from Notes to Section Thru Wingwalls

- Std 36.03
 - Changed haunch dimensions & angles on inlet nose centerwall

Chapter 37

- Std 37.01
 - Showing straight fence option for pedestrian overpass.
 - Added note for fence selection guidance.

Chapter 38

- Std 38.01
 - Separated Notes into Notes (for plan) and Designer Notes
 - Added 6'-6" min. footing embed below top of rail note (with exception if bedrock)
 - Shoring notes
 - Temporary clearance for UP & BNSF is 21'-6"

Chapter 40

- Std's 40.01, 40.02
 - Re-ordered bid items and added Bid Item Numbers

- Std 40.04
 - Clarified concrete diaphragm size as related to std 24.12