



# WisDOT Bridge Manual

## July 2023 Updates

James Luebke, P.E.  
Policy and Standards Engineer  
August 23, 2023

# Agenda

- Resources
- Chapter and Standard Updates
- Miscellaneous
- In The Works
- Questions and Feedback



# Housekeeping

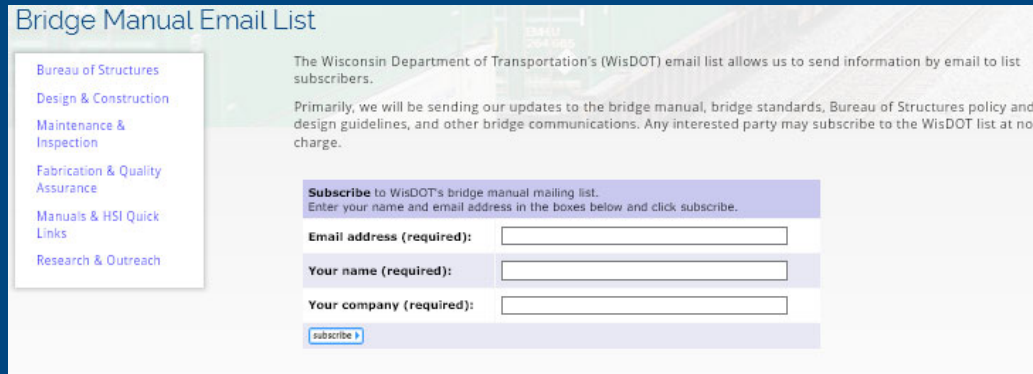
- All participants are muted
- A handout of this webinar is posted on our website (See Update Archives)
- If you have a question, please use the chat feature to submit your question or raise your hand. Questions will be addressed at the end of the webinar.
- Follow-up questions, please send to [James.Luebke@dot.wi.gov](mailto:James.Luebke@dot.wi.gov)



# Resources

<https://wisconsin.gov/Pages/doing-bus/eng-consultants/cnslt-rsrcs/strct/bm-mail-list.aspx>

- Added to email distribution list:



The screenshot shows a web page titled "Bridge Manual Email List". On the left is a navigation menu with links: Bureau of Structures, Design & Construction, Maintenance & Inspection, Fabrication & Quality Assurance, Manuals & HSI Quick Links, and Research & Outreach. The main content area explains that the Wisconsin Department of Transportation's (WisDOT) email list allows sending information by email to subscribers. It states that updates will be sent regarding the bridge manual, standards, policy, and design guidelines. Below this is a subscription form with the following fields: "Email address (required)", "Your name (required)", and "Your company (required)". A "Subscribe" button is located at the bottom of the form.

- Removed from email distribution list:
  - Send an email to [James.Luebke@dot.wi.gov](mailto:James.Luebke@dot.wi.gov)



# Resources

<https://wisconsin.gov/Pages/doing-bus/eng-consultants/cnslt-rsrcs/strct/bridge-manual.aspx>

Or web search “WisDOT Bridge Manual”

### Design Policy Memos

- Bureau of Structures
- Design & Construction**
- Maintenance & Inspection
- Fabrication & Quality Assurance
- Manuals & HSI Quick Links
- Research & Outreach

#### Design & Construction

[Policy Memos](#) | [Bridge Manual](#) | [Special Provisions](#) | [Standard Bridge Design Tool](#) | [Survey Reports & Checklists](#) | [Structure Costs](#) | [Plan Submittal](#) | [Bridge Technical Committee](#) | [Construction Resources](#) | [Contacts](#)

Description	Date
<a href="#">Standard Bridge Design Tool</a>	09/17/21
<a href="#">BOS Contact on Structure Plans</a>	02/11/20
<a href="#">Updates to QA/QC Plan Requirements</a>	06/20/19
<a href="#">MASH Parapet Clarification</a>	09/14/17
<a href="#">On Time Submittal and SSR Training</a>	03/02/16

### Bridge Manual Chapters

- Bureau of Structures
- Design & Construction**
- Maintenance & Inspection
- Fabrication & Quality Assurance
- Manuals & HSI Quick Links
- Research & Outreach

#### Bridge Manual

[Chapters](#) | [Standard Drawings](#) | [Insert Sheets \(C3D\)](#) | [Insert Sheets \(MicroStation\)](#) | [C3D Resources](#) | [MicroStation Resources](#) | [Updates Archive](#)

Updates to the Bridge Manual chapters occur about every six months. [Sign up to receive updates to the Bridge Manual.](#)

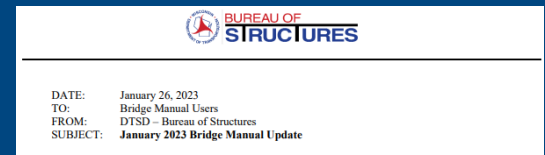
Description	Updated
<a href="#">Chapter 1 - Index</a>	07/20
<a href="#">Chapter 2 - General</a>	01/23



# Resources

- Update Archives
  - Update Memo
  - Bridge Manual Text Update Summary
  - Standard Details Update Summary
  - Standards Tracker \*
  - Update Presentation Slides

\* Missing some 07/23 Standards



**January 2023 Bridge Manual Text Update Summary**

Chapter	Page Number(s)	Change
2	3	Updated Bureau of Structures organization chart
	15	Added text "only one structure number for the site."
6	45	Changed "Subsurface" to "Site"
	47	Changed "Subsurface" to "Site"
	47	Added bullet point 3: "Final Site Investigation Report"
	48	Added Section 6.5.7 - Locally-Funded Projects
	49	Changed "Subsurface Exploration" to "Site Investigation"

**January 2023 Standard Details Update Summary**

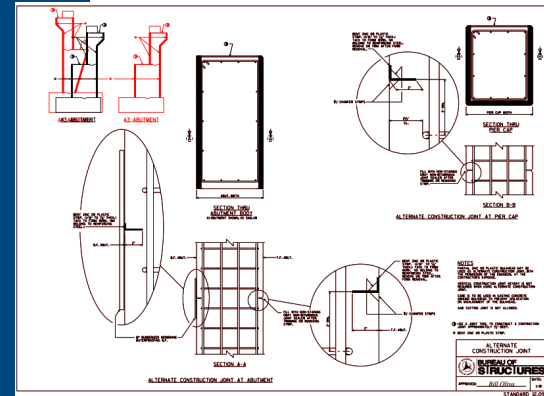
Chapter	Page Number(s)	Change
19	44	Cla req
	19E-4	2
	2	Ch

**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.



# Chapter Update

- Chapter 5 – Updated structure costs
  - 2021 and 2022 Stream Crossings and Grade Separations

- *Expected January 2024:*
  - 2021 and 2022 (additional items)
  - Cost Summary Spreadsheet

Structure Type	No. of Bridges	Total Area (Sq. Ft.)	Total Costs	Super. Only Cost Per Square Foot	Cost per Square Foot
Prestressed Concrete Girders	8	81,829	13,443,218	78.36	164.28
Reinf. Conc. Slabs (Flat)	0	--	--	--	--
Reinf. Conc. Slabs (Haunched)	0	--	--	--	--

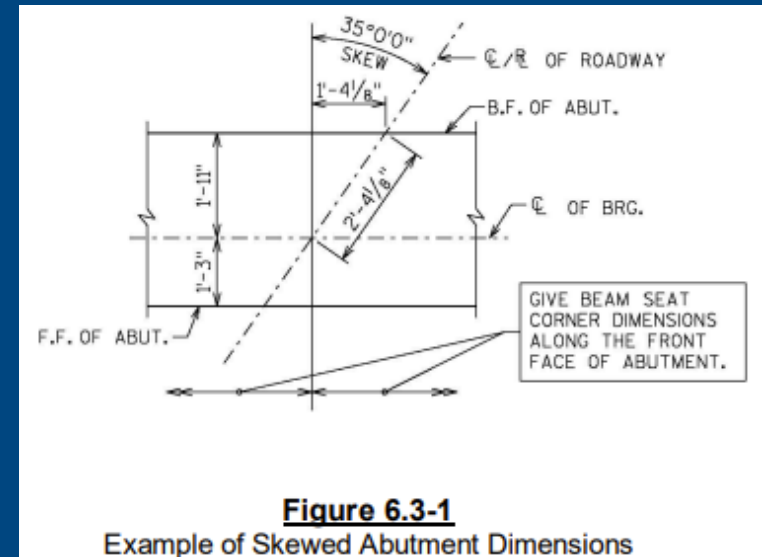
**Table 5.4-19**  
Grade Separation Structures

2019 Year End Structure Cost Summary										
Concrete Flat Slabs - Stream Crossings						On System				
Letting Date	Structure Number	Abut. Type	Pier Type	No Span	Span Length	Area SqFt	Total Cost	Total SqFt Cost	Super Cost	Super SqFt Cost
11/12/2019	B250179	A5		1	45					
11/12/2019	B250187	A5		1	34					
11/12/2019	B280189	A5		1	36	2604	610791.3	234.56	274538	\$105.43
11/12/2019	B280190	A5		1	36	2604	580230.4	222.82	274578	\$105.44
11/12/2019	B540128	A1		1	42					



# Chapter Update

- Chapter 6 – Abutment Beam Seat Dimensions
  - Added F.F. beam seat dims
  - Added Figure 6.3-1 (example)



Give beam seat corner dimensions along the front face of abutment. Show the skew angle. See [Figure 6.3-1](#) for example of skewed abutment dimensions.



# Chapter Update

## • Chapter 6 – Box Culvert Removal

### 6.3.3.8 Removing Structure and Debris Containment

This section provides guidance for selecting the appropriate Removing Structure bid item and determining when to use the “Debris Containment” bid item.

The “Removing Structure (structure)” bid item is most typically used for complete or substantial removals, as described in 6.3.3.8.2, of grade separation structures and box culverts. In addition to this Standard Specification bid item, there are three additional Standard Specification bid items for complete or substantial removal work over waterways: “Removing Structure Over Waterway Remove Debris (structure)”; “Removing Structure Over Waterway Minimal Debris (structure)”; and “Removing Structure Over Waterway Debris Capture (structure)”. If these four Standard Specification bid items do not encapsulate site specific constraints for specialized cases, which should be a rare occurrence, the designer can utilize special provisions to augment the standard spec removal items.

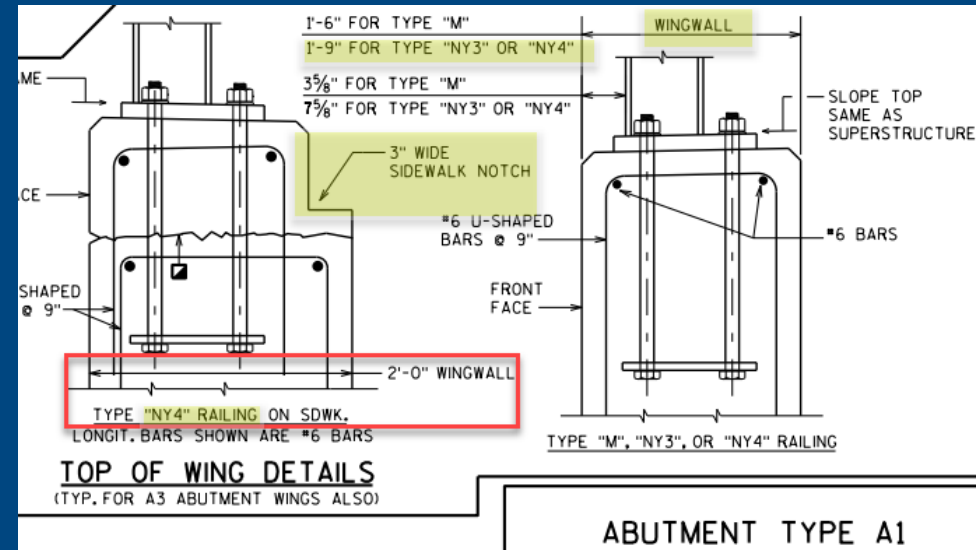
July 2023

6-32



# Standard Update

- Std 12.02 – NY4 on Wings
  - Clarified 2'-0" wingwall width with sidewalks
  - 1'-9" wingwall width otherwise
  - Sidewalk → NY4 Railing



# Chapter Update

- Chapter 14 – Railings On or Behind Walls
  - The railing may be located behind the wall or attached on top of the wall. When attaching the railing to the top of the wall, a reinforced cast-in-place concrete coping is typically required to resist railing loads.



# Chapter Update

- Chapter 14 – Railings On or Behind Walls
  - Dry Cast Blocks (Typically MSE Walls)
    - On Wall (with CIP Coping)
    - Behind Walls



# Chapter Update

- Chapter 14 – Railings On or Behind Walls
  - Wet Cast “Big” Blocks (Typically Gravity Walls)
    - Behind Facing (highly recommended)



# Chapter Update

- Chapter 14 – MSE Wall Differential Settlement
  - ASHTO LRFD C11.10.4.1.1
  - The designer shall select the appropriate wall facing type and details
  - Updated SPV –  $\frac{3}{4}$ " Joint tolerance

## 14.4.7.2.1 Settlement Guidelines

The following table provides guidance for maximum tolerable vertical and total differential Settlement for various retaining wall types where  $\Delta h$  is the total settlement in inches and

Wall Type	Total Settlement $\Delta h$ in inches	Total Differential Settlement $\Delta h1:L$ (in/in)
CIP semi-gravity cantilever walls	1-2	1:500
MSE walls with large pre-cast panel facing (panel front face area >30ft <sup>2</sup> ) <b>3/4" joint width</b>	1-2	<del>1:500</del> 1:200
MSE walls with small pre-cast panel facing (panel front face area <30ft <sup>2</sup> ) <b>3/4" joint width</b>	1-2	<del>1:500</del> 1:100
MSE walls with full-height cast-in-panel facing	1-2	1:500
MSE walls with modular block facing	2-4	1:200
MSE walls with geotextile /welded-wire facing	4-8	1:50-1:60
Modular block gravity walls	1-2	1:300



# Chapter Update

- Chapter 18 – Minimum Slab Depth

- Minimum Depth:

- Continuous Span:  $(S+10)/30$
- Simple Span:  $1.1(S+10)/30$
- Or when the final slab depth satisfies the final design\*

\*For example, when using the Standard Concrete Slab Design Procedure



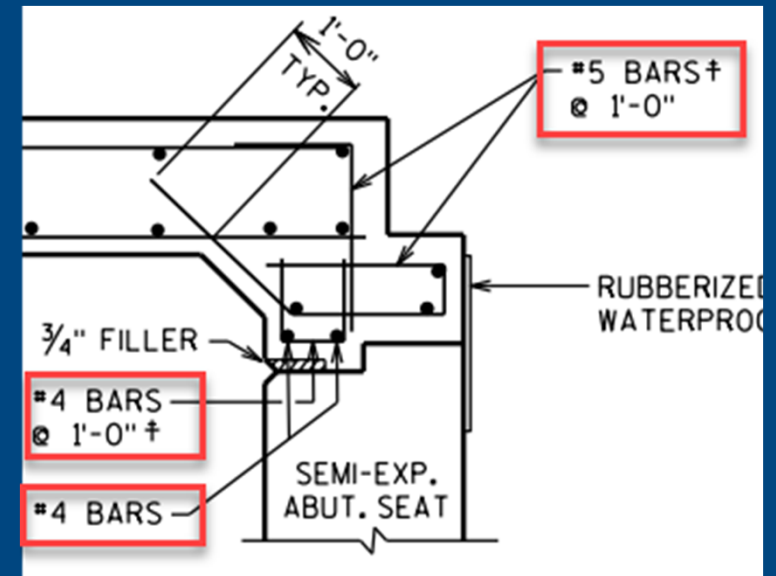


# Standard Update

- Std. 18.01 – Abutment Reinforcement
  - #4 bars @ 1'-0" (Seats)
  - #5 bars @ 1'-0" (Paving notch)
  - (2) #4 bars (Seats)
  - Spacing and orientation note

## LONGITUDINAL SECTION

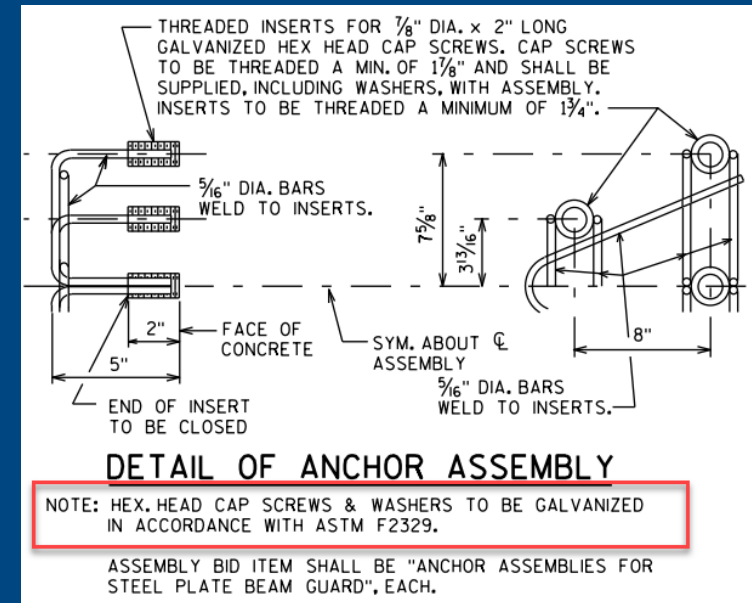
† BARS PLACED PARALLEL TO R.  
SPACING PERPENDICULAR TO R.





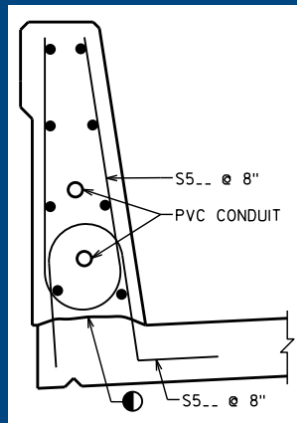
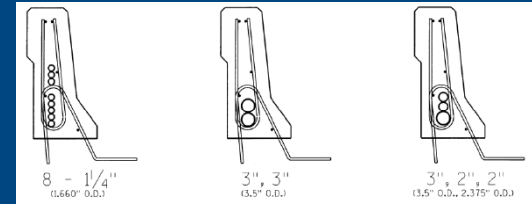
# Standard Update

- Std. 30.07 – Detail of Anchor Assembly
  - Updated Caps and Washers to “ASTM F2329”
- **Insert Sheets (Under Development)**
  - Vertical Face Parapet ‘A’
  - Single Slope Parapets
  - Tool Palette - Block

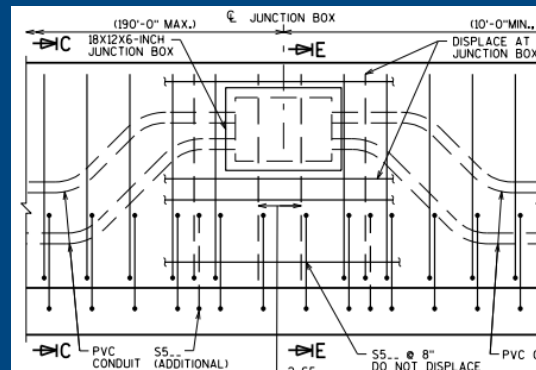


# Chapter Update

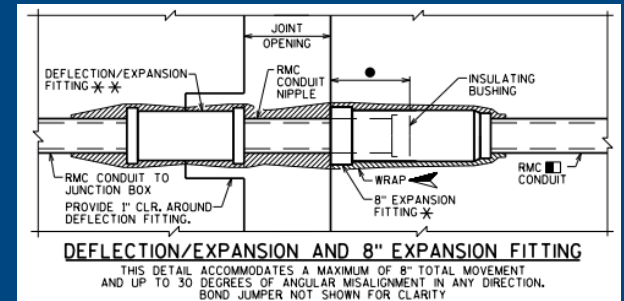
- Chapter 32 – Maximum Allowable Conduit Runs



(2) 2" Conduit Run



Junction Box Coordination

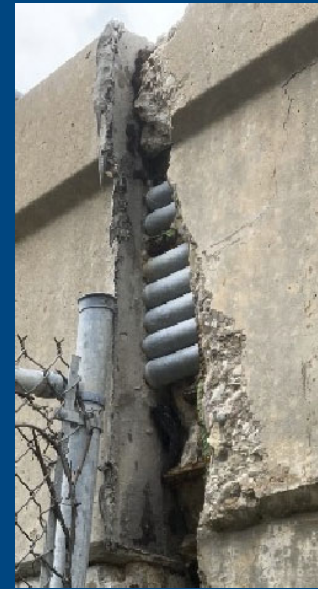
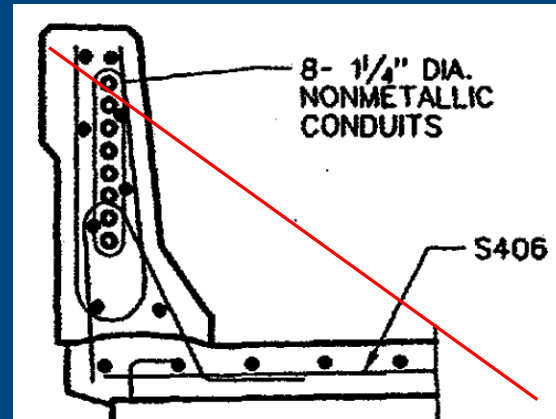
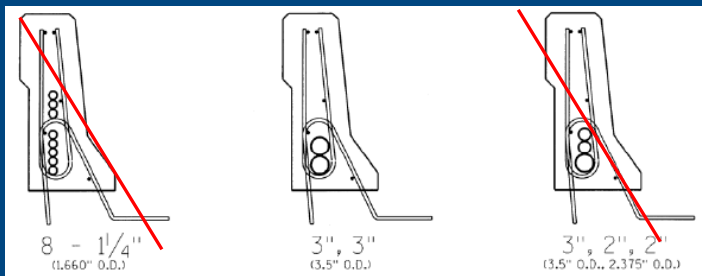


Fittings Coordination

# Chapter Update

- Chapter 32 – Maximum Allowable Conduit Runs
  - July 2017 – Achieved old details
  - July 2017 – Added (2) 3-inch Dia. max

Archived Figure (July 2017)



# Chapter Update

- Chapter 32 – Maximum Allowable Conduit Runs

- July 2023 Updates

- (2) 2-inch diameter maximum with junction boxes
    - (2) 3-inch diameter maximum without junction boxes\*
    - Non-Standard Applications (case-by-case):
      - Adequate concrete cover, bends, etc.
      - Utility specific requirements (bends, max pulls, etc.)
      - Engineering judgement (fittings, crashworthiness, durability, costs, etc.)

\*Junction boxes can only be used with 2-inch diameter conduit. The maximum run of 3-inch conduit is 190 feet and junction boxes are not allowed to accommodate longer runs.



# Chapter Update

- Chapter 32 – Conduit Reminders
  - Non-Standard Applications (case-by-case):
    - Parapet Full → *Consider conduit in sidewalk or median*
    - Large or Unique Joints → *Consider alternatives (e.g. flexible metal conduit)*
    - Preferably, conduit is embedded in concrete for protective and aesthetic reasons
    - Future conduit runs should not be placed unless future services are highly probable



# Chapter Update

- Chapter 39 - LRFD Standardized Overhead Sign Structure Plans
  - Updated Files (minor changes)
  - MicroStation files last updated August 2021 (to be archived)
  - Assigned standard numbers (e.g. Std. 39.01)

OSS Standard Design Drawings		
Description	Drop-in-Sheets (PDF)	Updated
<b>Monotube and 2-Chord Truss</b>		
39.01 - MONOTUBE & 2-CHORD TRUSS CONNECTIONS 1		01/23
39.02 - MONOTUBE & 2-CHORD TRUSS CONNECTIONS 2	mtube_2c_std	01/23
39.03 - MONOTUBE & 2-CHORD TRUSS ELECTRICAL DETAILS		01/23
39.04 - MONOTUBE & 2-CHORD TRUSS FOUNDATIONS		06/23
<b>2-Chord Butterfly</b>		



# Chapter Update

- Chapter 45 – Timber Longitudinal Slab Wheel Load Distribution
  - Based on WHRP Research loading testing timber slabs
  - Addresses disparity between ASR and LRFR methods
- Wheel Distribution =  $-0.1 \times (E_L I_L / E_S I_S \times H_L / H_S) + 5.2$  ft (but not less than 3 feet)

# Chapter Update

- Chapter 45 – Culvert Load Ratings
  - New Bridge-Length Culverts:
    - Option 1: Calculated
      - Ideal
      - Required for Concrete Boxes
    - Option 2: Assigned
      - Requires Stamped Plans or Calculations w/ Design Load & Fill Depth
      - Must be designed for HL93 or HS20





# Chapter Update

- Chapter 45 – Culvert Load Ratings
  - In-Service Culverts –
  - Assigned
    - Stamped plans / calcs on file w/ design live load & design fill depth
    - No significant changes in loading or deterioration that would reduce rating
    - Designed for HL93 using LRFD, HS20 using LFD, or H20\*/HS20 using ASD
      - \* Calculated ratings required if designed for H20 per 1957 (or earlier) AASHTO Specs and < 2' fill depth



# Chapter Update

- Chapter 45 – Culvert Load Ratings
  - In-Service Culverts
  - Calculated
    - Ideal option
    - Required if sufficient information available and Assigned not allowed
    - Exception: not required for fill depths 10' or greater
    - Ignoring Shear or Bottom Slab Flexure is allowable with BOS approval



# Chapter Updates

- Chapter 45 – Culvert Load Ratings
  - In-Service Culverts
  - **Field Evaluation & Documented Engineering Judgment**
    - Only to be used when Assigned or Calculated cannot be used
    - Or if fill depth is 10' or greater
    - Recommended condition-based table for ratings and postings



# Miscellaneous

- Updated BOS Special Provisions:
  - Wall Modular Block Gravity *03/23*
  - Wall Concrete Panel Mechanically Stabilized Earth *05/23*
- Reminder: Civil 3D insert sheets are the most current. MicroStation insert sheets have not been updated since the January 2022.



# In The Works

- WisDOT Lap and development lengths
  - Current - AASHTO 7<sup>th</sup> Ed.
  - Anticipated - AASHTO 10<sup>th</sup> Ed. (skip 8th Ed.)
- Pedestrian Railing (Insert Sheets)
- Additional Retaining Wall Standards (Minor, Gravity, and MSE walls)



# Questions and Feedback

Contact:

James Luebke, P.E.

Policy and Standards Engineer

608-266-5098

[James.Luebke@dot.wi.gov](mailto:James.Luebke@dot.wi.gov)

