WisDOT Bridge Manual

January 2025 Updates

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Policy and Standards Engineer
February 25th, 2025

Agenda

- Resources
- Updates (Chapters, Standards, and Inserts)
- In The Works
- Miscellaneous Updates
- Questions and Feedback

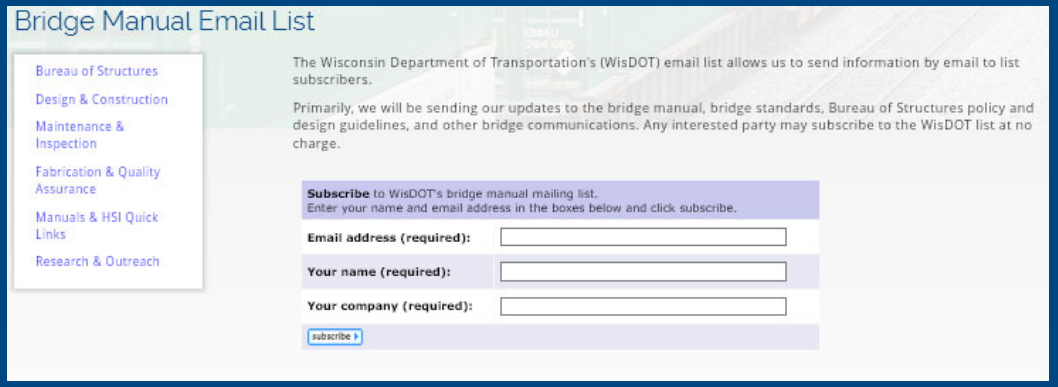
Housekeeping

- 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

Resources

https://wisconsindot.gov/Pages/doing-bus/eng-consultants/cnslt-rsrces/strct/bm-mail-list.aspx

- To be added to the email distribution list:

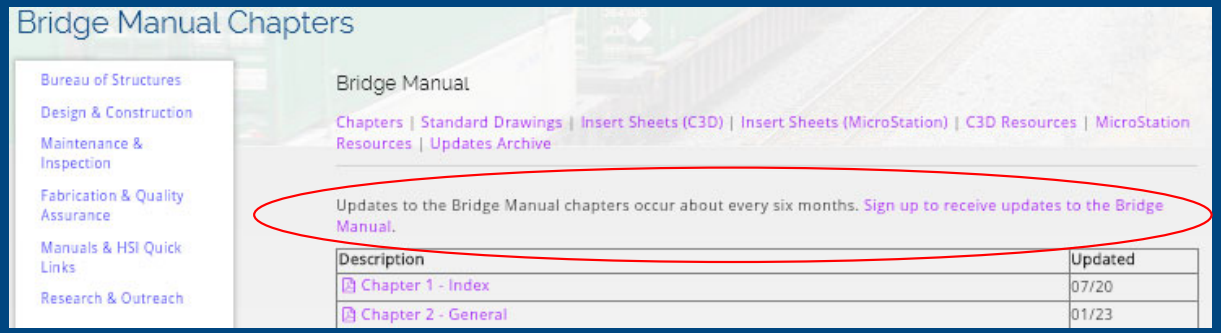


- To be removed from the email distribution list:
  - Send an email to James.Luebke@dot.wi.gov

Resources

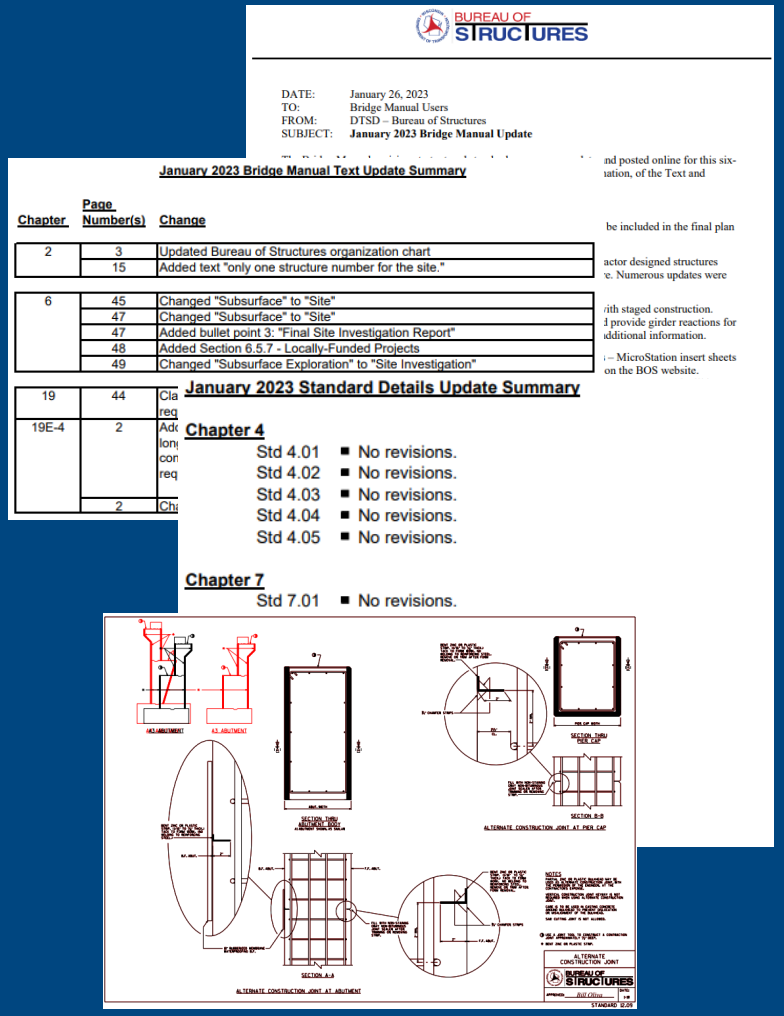
https://wisconsindot.gov/Pages/doing-bus/eng-consultants/cnslt-rsrces/strct/bridge-manual.aspx

Or web search “WisDOT Bridge Manual”



Resources

- Update Archives
  - Update Memo
  - Text Update Summary
  - Standard Details Update Summary
  - Insert Sheet Update Summary *NEW*
  - Standards Tracker
  - Update Presentation Slides



BUREAU OF STRUCTURES

DATE: January 26, 2023
TO: Bridge Manual Users
FROM: DTSD – Bureau of Structures
SUBJECT: **January 2023 Bridge Manual Update**

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"
19	44	Cla req
19E-4	2	Ad lon con req
	2	Ch

January 2023 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.

Chapter Update

- Chapter 6 – Bid Item Updates
  - Excavation for Structures Bridges (Structure)
    - **Lump Sum → Each***
  - Cofferdam (Structure)
    - **Lump Sum → Each***

***Updated in the 2023 Standard Specification**. Bid as Each and as a single unit item for the entire structure. Per FDM 19-5-1: Single unit items are not measured but are typically paid in full when completed. They may include multiple items.

TOTAL ESTIMATED QUANTITIES

BID ITEM NUMBER	BID ITEMS	UNIT	SUPER	S. STRUCT. APPR. SLAB	SOUTH ABUT.	NORTH ABUT.	N. STRUCT. APPR. SLAB	TOTALS
203.0260	REMOVING STRUCTURE OVER WATERWAY MINIMAL DEBRIS B-05	EACH	----	----	----	----	----	1
206.1001	EXCAVATION FOR STRUCTURES BRIDGES B-05	EACH	----	----	----	----	----	1
210.1500	BACKFILL STRUCTURE TYPE A	TON	----	----	435	435	----	870

Chapter Update

- Chapter 9 – Permanent Pavement Markings
  - Types: Paint, Epoxy, Grooved w/ epoxy, and Grooved w/ tape
  - Grooved (0.09 to 0.175 inches deep) acceptable for concrete decks or concrete overlays but prohibited on thin polymer overlays.
  - Refer to Section 646 Std. Spec. and Section 650 CMM

Chapter Update

- Chapter 11 – Clarified Overall Stability Evaluations
  - Use Service I per LRFD [11.6.2.3]-8th Edition, 2017
  - Added Table 11.2-1
    - **Max. Resistance Values (Min. Safety Factors)**

Future works: Investigate current LRFD

- Strength I
- Resistance Factor: 0.75 (for well defined data)
- Load Factors: EV=1.0 (for overall stability), LS=1.75
- Effective FS: >1.33 (more conservative than Service I)

Maximum Resistance Factors (Minimum Safety Factors)		
Slope Configuration	Geotechnical Parameters and Subsurface Stratigraphy Conditions	
	Well Defined	Highly Variable or Based on Limited Information
Slope adjacent to but does not directly support or contain a structural element [2]	**0.75** (1.3)	**0.65** (1.5) [3]
Slope that directly supports or contains a structural element [2]	**0.65** (1.5)	[1]

[1] Contact the Bureau of Technical Services, Geotechnical Engineering Unit
[2] Structural Element: Bridge, retaining wall, critical utility, or other structures with a low tolerance for failure.
[3] For sites with highly variable conditions or limited information that include low strength and/or compressible soils, a lower resistance factor (higher factor of safety) may be applicable. Contact the Bureau of Technical Services, Geotechnical Engineering Unit.

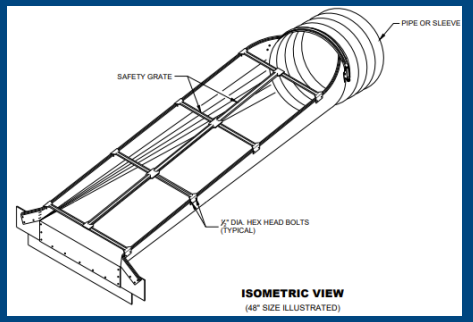
Chapter Update

- Chapter 11 – Downdrag Loads *Under Development*
  - No noted changes to BM Section 11.3.1.17.1
  - AASHTO LRFD (Ninth Edition) ➔ 3.11.8 - Downdrag
    - Force Effects due to **Downdrag, DD** on piles
    - Compute negative skin friction using static analysis procedures
  - AASHTO LRFD (Tenth Edition) ➔ 3.11.8 Drag Load and Downdrag
    - **Drag load, DR** on piles
    - Determine magnitude of Drag Load using the **neutral plane method**

Chapter Update

- Chapter 11 – Downdrag Loads *Under Development*
  - Refer to FHWA GEC 12 (2016) Section 7.3.6.1 for neutral plane method
  - AASHTO LRFD (Tenth Edition) *New*
  - Contact BTS, Geotechnical Engineering Unit

Chapter Update



- Chapter 30 – Traversable Grates
  - FDM 11-45.30.6.1.1 Traversable Grates *(smaller culverts-roadway items)*
    - In general, traversable grates have lower installation and crash costs than other treatments. Traversable grates can have a lower maintenance cost than a barrier system.
    - Do not install traversable grates on cross-drains for navigable waterways.
    - Review hydraulic capacity of cross-drains before installing traversable grates.

Chapter Update

- Chapter 30 – Traversable Grates
  - BOS Preference – No Grates *(large culverts-structure numbers)*:
    - Locate culvert header outside of the clear zone or
    - Use Traffic Railing to shield when culvert header inside clear zone
  - BOS has historically discouraged the use of traversable grates on box culvert inlets due to the potential for clogging and reduction of the hydraulic capacity.
  - Subject to prior approval by the BOS. Coordinate early for design guidance.

Chapter Update

- Chapter 40 – Steel Strength of Anchor in Tension
  - Clarified Specified Minimum Tensile Strength for anchors
  - ACI 318 (17.4) ➔ f_{uta} shall not be taken greater than the smaller of 1.9 fya and 125,000 psi.
  - Example F1554, GR55 (55 ksi yield strength, 75 ksi tensile strength)
    - min($\underline{f_u}$, $1.9f_y$, 125 ksi)
    - min(**$\underline{75\ ksi}$**, 1.9 x 55 ksi=104.5 ksi, 125 ksi) ➔ **$\underline{f_u}$=75 ksi controls**

Chapter Update

- Chapter 40 – Steel Strength of Anchor in Tension

N_{sa} = Nominal steel strength of anchor in tension, **ACI [17.4.1.2]**

= $A_{se,N} f_{uta}$

$A_{se,N}$ = Effective cross-sectional area of anchor in tension (in^2)

f_{uta} = Specified tensile strength of anchor steel (psi)

≤ $1.9 f_{ya}$

≤ 125 ksi

f_{ya} = Specified yield strength of anchor steel (psi)

July 2024

N_{sa} = Nominal steel strength of anchor in tension, **ACI [17.4.1.2]**

= $A_{se,N} f_{uta}$

$A_{se,N}$ = Effective cross-sectional area of anchor in tension (in^2)

f_{ya} = Specified yield strength of anchor steel (ksi)

f_u = Specified minimum tensile strength of anchor steel (ksi)

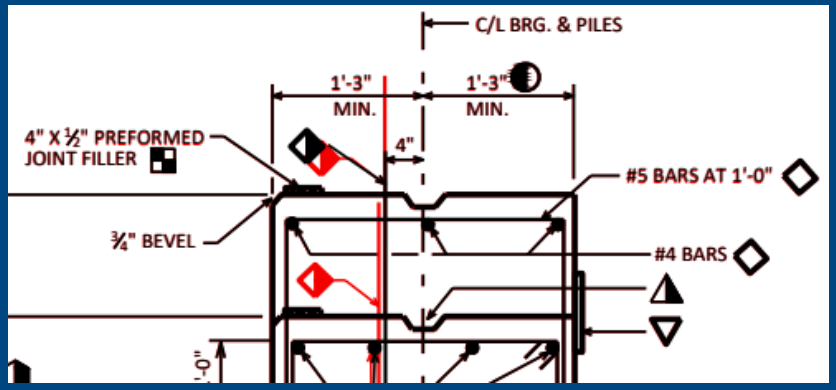
f_{uta} = Specified tensile strength of anchor steel (ksi) and not to exceed $1.9 f_{ya}$ or 125 ksi, **ACI [17.4.1.2]**

= min (f_u, $1.9 f_{ya}$, 125 ksi)

January 2025

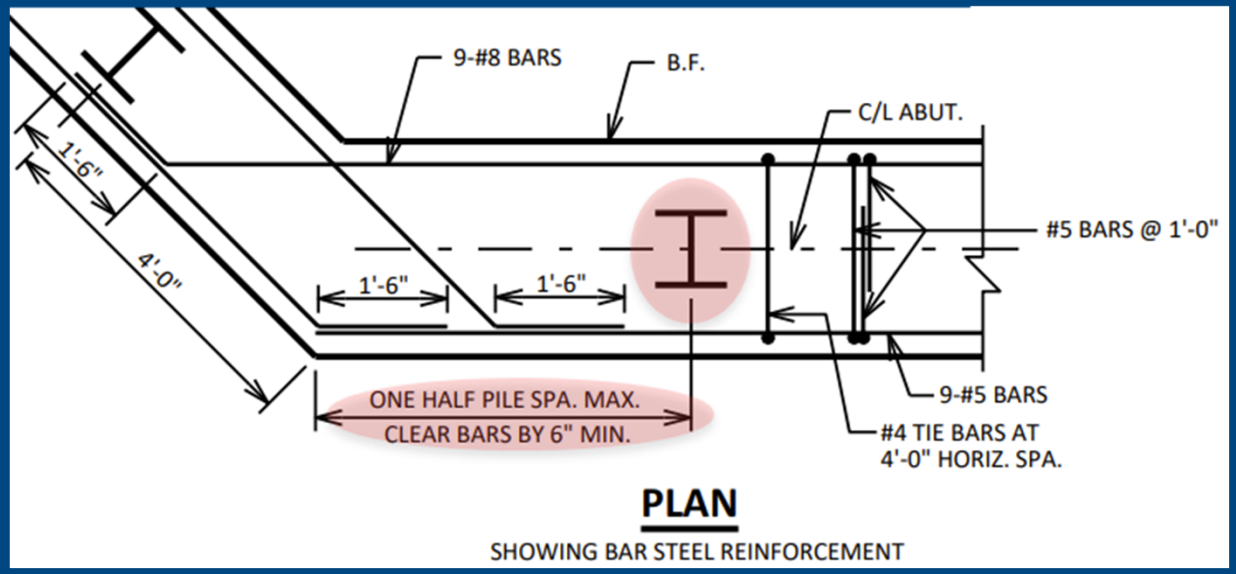
Standard Update

- Standard 12.01 – TYPE A1 With Fixed Seat



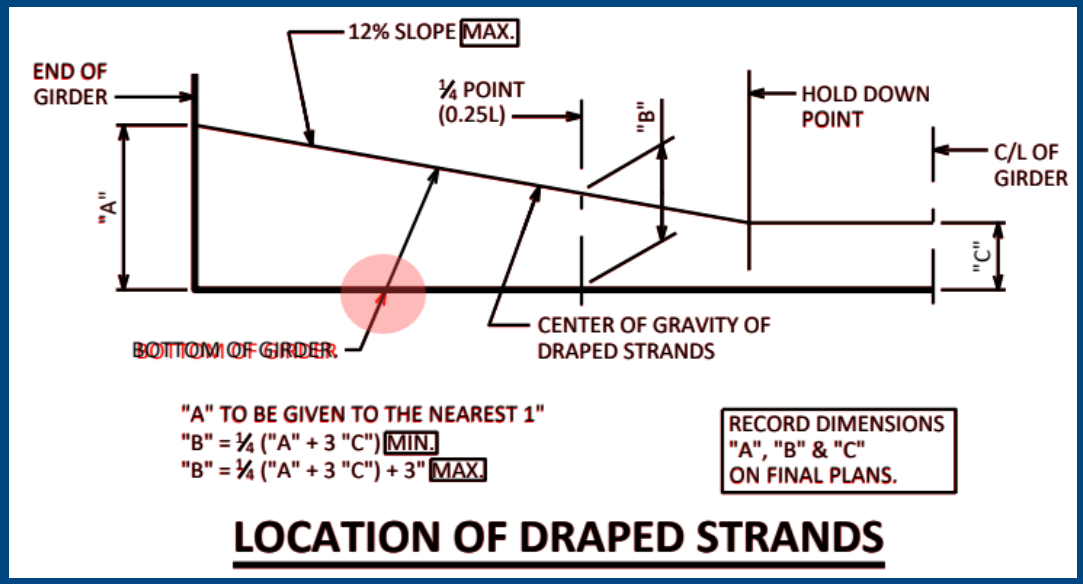
Standard Update

- Standard 12.08 – Clarified pile clearance from bars (6" min.)



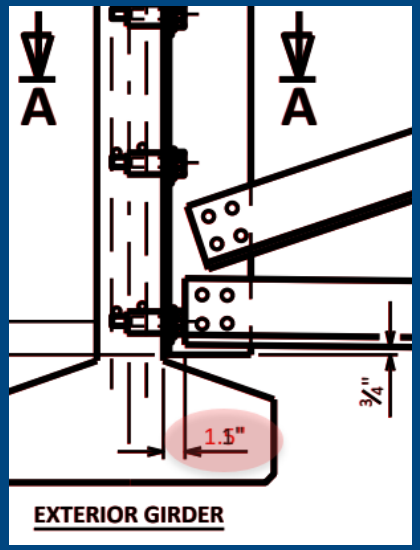
Standard Update

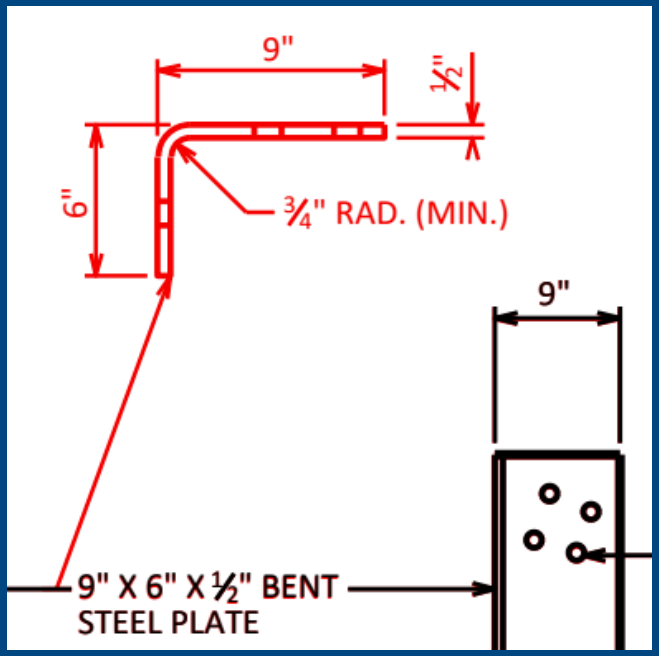
- Standards 19.11, 19.13, & 19.15



Standard Update

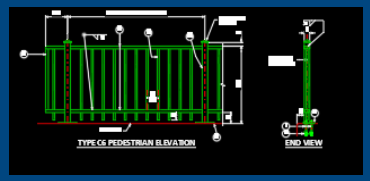
- Standard 19.37 – Diaphragms
  - Changed diaphragm offset from 1" to 1.5"
  - Added bent angle detail



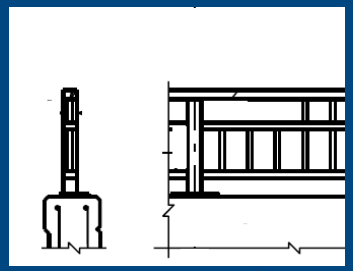


Standard Update

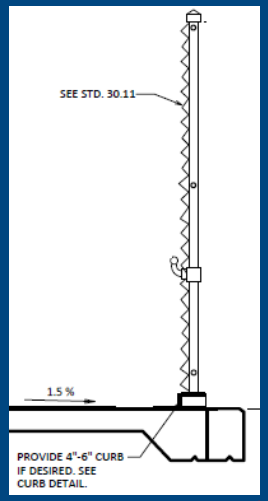
- Standard 30.40 – Pedestrian Railing *New*



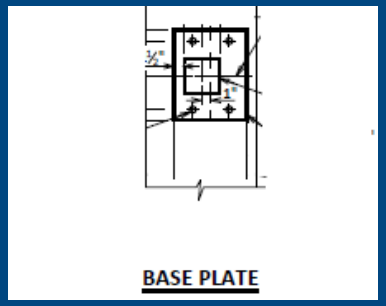
Insert railcomb.dwg (07/24)



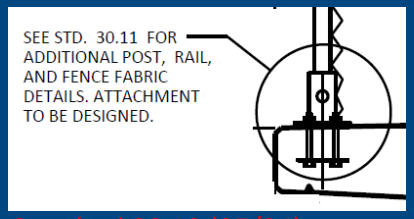
Standard 30.17 (07/24)



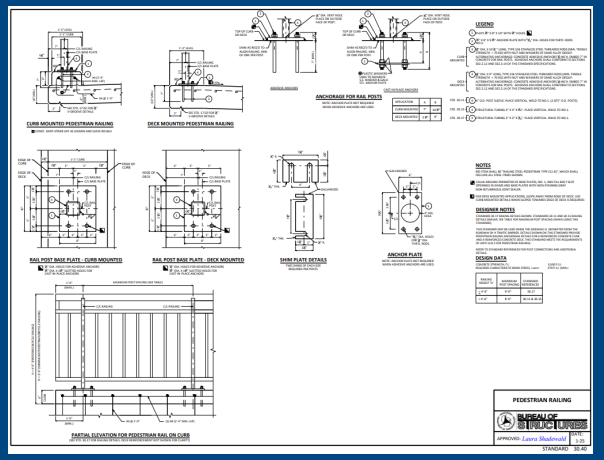
Standard 37.01 (07/24)



Standard 30.15 (07/24)



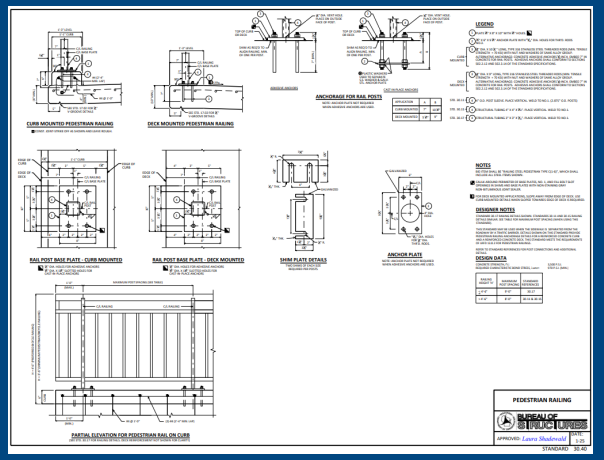
Standard 30.10 (07/24)



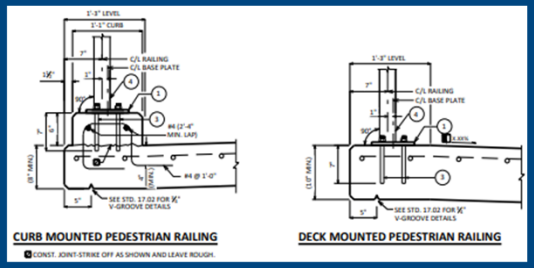
Standard 30.40 (01/25)

Standard Update

- Standard 30.40 – Pedestrian Railing *New*
  - Standardized pedestrian railing
  - LRFD 13.8.2 for pedestrian loading
  - Not Crashworthy – Requires traffic barrier
  - Curb mounted or deck mounted
  - Cast-in-place anchors or adhesive anchors
  - No insert sheet



Standard Update



- Standard 30.40 – Pedestrian Railing *New*
  - Anchorage Details:
    - Curb Mounted
    - Deck/Slab Mounted
  - Applicable Anchorage for Railing or Fence Types:
    - Std. 30.17 - Combination Railings Types ‘C1-C6’ *(shown)*
    - Std. 30.11 – Chain Link Fence *(similar)*
    - Std. 30.15 – Tubular Steel Railing Screening *(similar)*

Standard Update

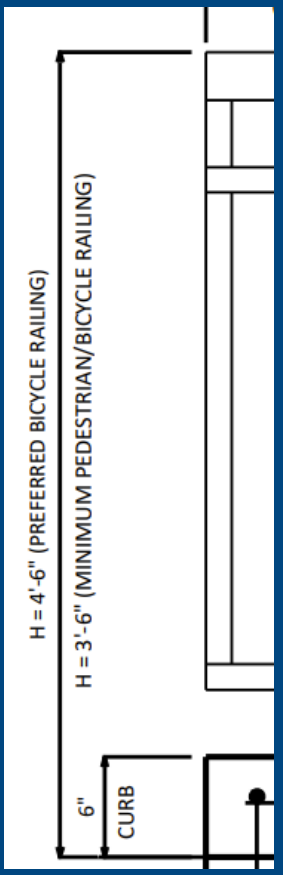
- Standard 30.40 – Pedestrian Railing *New*

  Other Impacts: Std 30.10, 30.11, 30.12,30.15,& 30.17
  - See Standard 30.40 when rail mounted on curb or deck
  - Clarified maximum post spacing
  - Clarified maximum and typical heights
  - Additional Notes (minor)

DESIGNER NOTES

THIS STANDARD MAY BE USED ON STRUCTURES WITH A 45 M.P.H. DESIGN SPEED OR LESS, OR WHEN THE SIDEWALK IS SEPARATED FROM THE ROADWAY BY A PARAPET. 8'-0" MAXIMUM POST SPACING WITH 8'-0" MAXIMUM FENCE FABRIC HEIGHT WHEN MOUNTED ON PARAPET.

SEE STANDARD 30.40 WHEN MOUNTED ON CURB OR DECK.



Standard Update

- Standards 30.11 & 37.02
  - Updated Post Sizes for Chain link fences

FENCE MEMBER SIZE & WEIGHT

STEEL FENCE MEMBER	OUTSIDE DIAMETER (INCHES)	WEIGHT (LB/FT)
RAILS	1.660	2.27
END POST	2.875	5.80
OVERHANG POST	2.875	5.80
LINE POST (ON PARAPET)	2.375	3.65
LINE POST (ON DECK/CURB)	2.875	5.80
POST SLEEVE	4.000	9.12

Standard 30.11

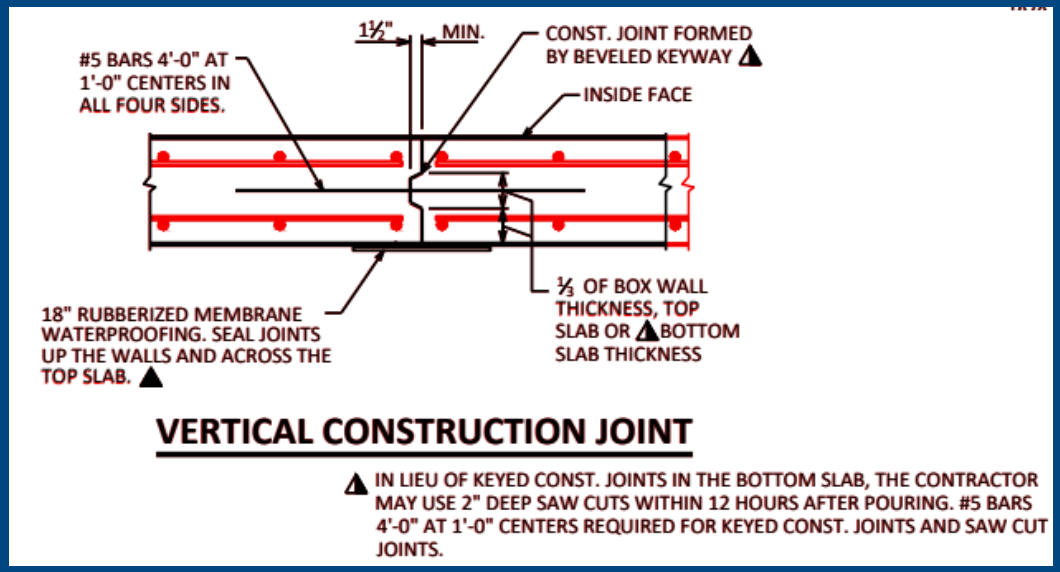
FENCE MEMBER SIZE & WEIGHT

STEEL FENCE MEMBER	OUTSIDE DIAMETER (INCHES)	WEIGHT (LB/FT)
RAILS	1.660	2.27
END POST	2.375	3.65
OVERHANG POST	2.375	3.65
LINE POST	2.375	3.65
HANDRAIL	1.660	2.27
CROSS RAIL SLEEVE	1.900	2.72
HANDRAIL SLEEVE	1.315	1.68
POST SLEEVE	4.000	9.12

Standard 37.02

Standard Update

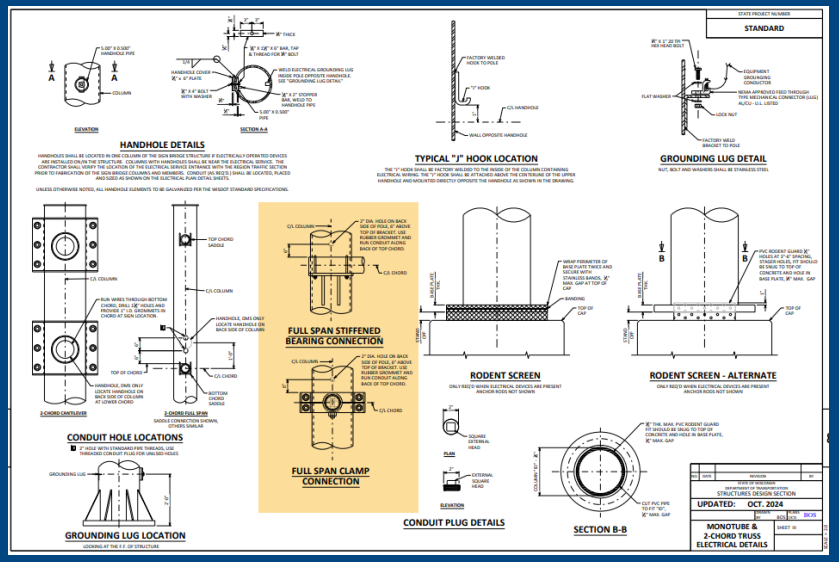
- Standard 36.03 – Box Culvert Details
  - Add reinforcement for clarity



Standard Update

- Overhead Sign Structure - Standard Design Drawings
  - Standard 39.03
    - Full Span Stiffened Bearing Connection
    - Full Span Clamp Connection

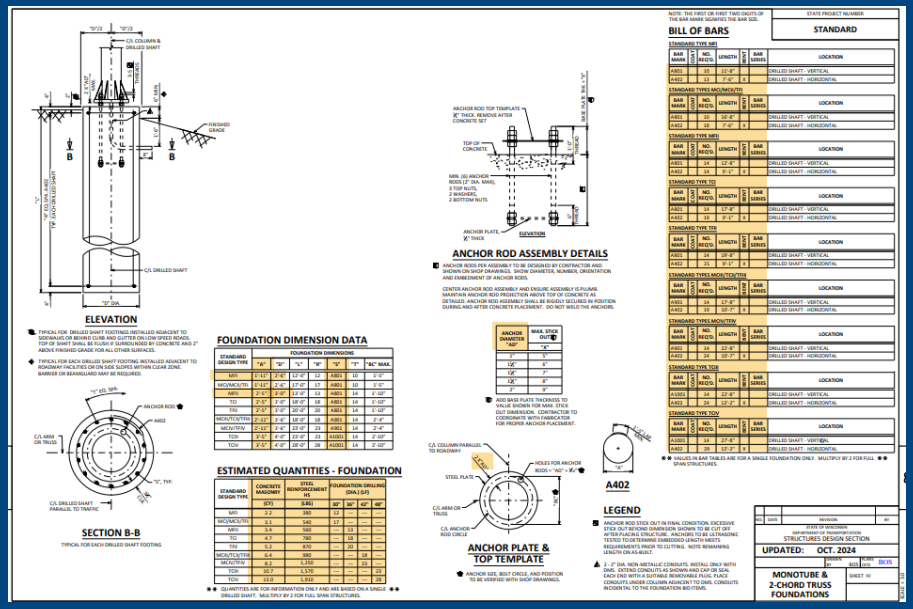
Updated October 2024



Standard Update

- Overhead Sign Structure - Standard Design Drawings
  - Standard 39.04
    - MFI “D” ➔ increase to 2’-6” DIA.
    - MFII “D” ➔ increase to 3’-0” DIA.
    - Updated Bill of Bars
    - Add “A” and “S” to data table
    - Updated Quantities (nearest 0.1 CY)

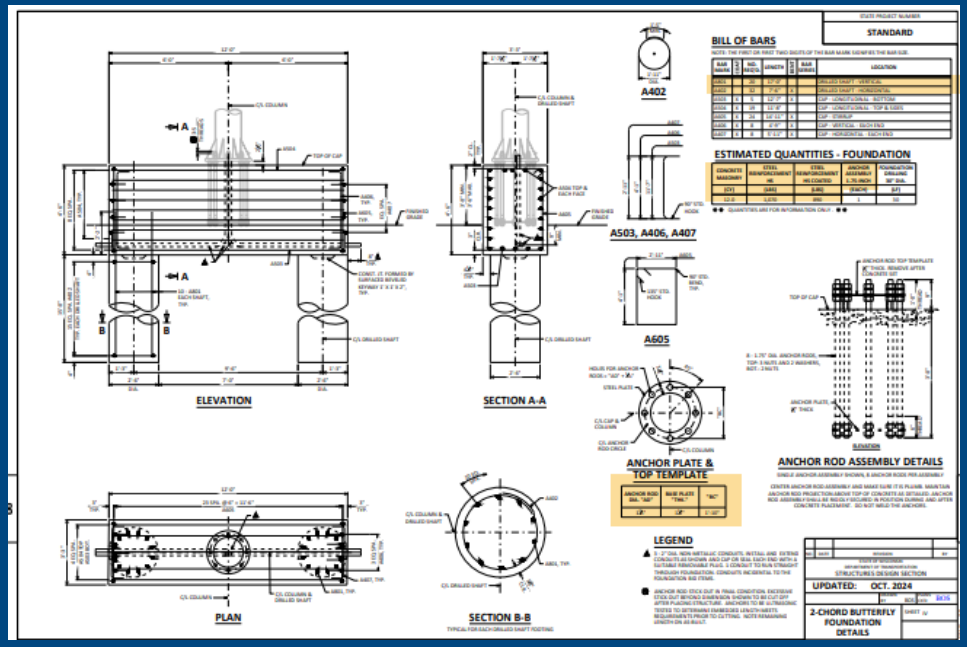
Updated October 2024



Standard Update

- Overhead Sign Structure - Standard Design Drawings
  - Standard 39.14
    - Updated Bill of Bars
    - Corrected Table with 1.75-INCH DIA.
    - Updated Quantities (nearest 0.1 CY)
    - Added Table for “AD”, “THK”, “BC”

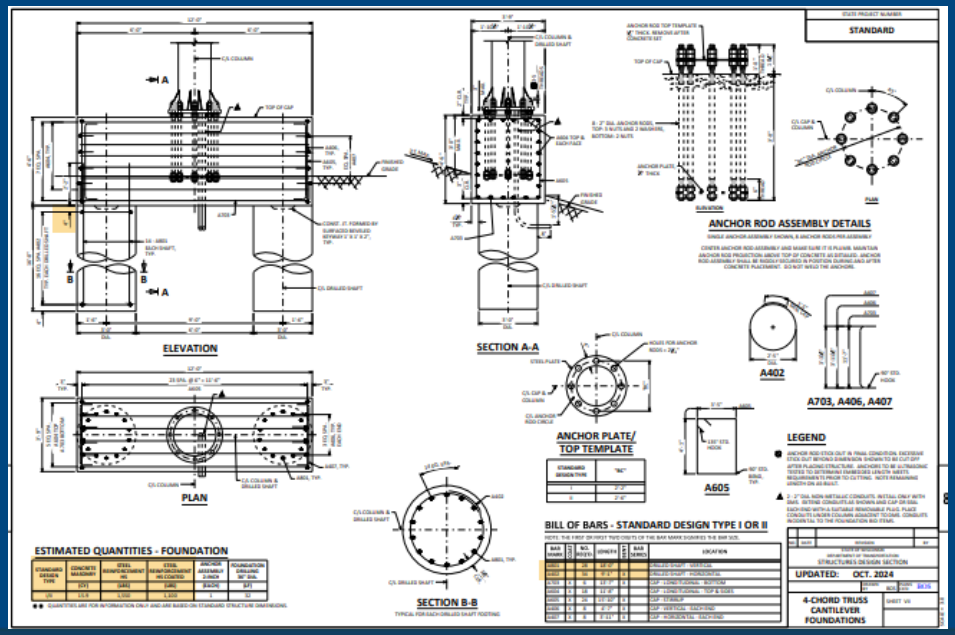
Updated October 2024



Standard Update

- Overhead Sign Structure - Standard Design Drawings
  - Standard 39.27
    - Updated Bill of Bars
    - Updated Quantities (nearest 0.1 CY)
    - Added 4” stirrup dimension

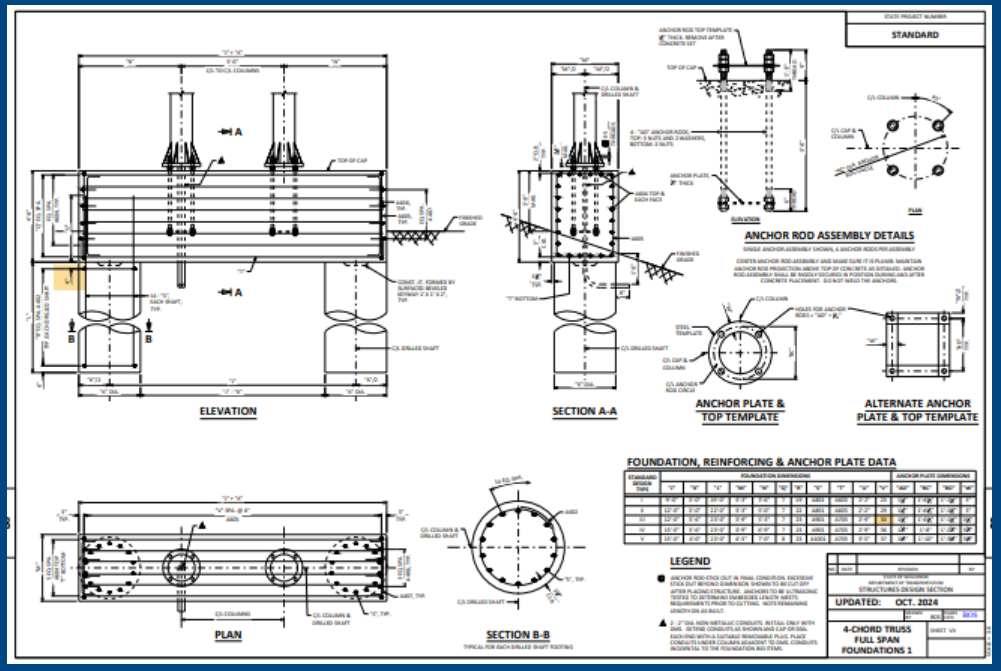
Updated October 2024



Standard Update

- Overhead Sign Structure - Standard Design Drawings
  - Standard 39.37
    - Added 4” stirrup dimension
    - Corrected Type III for "V"

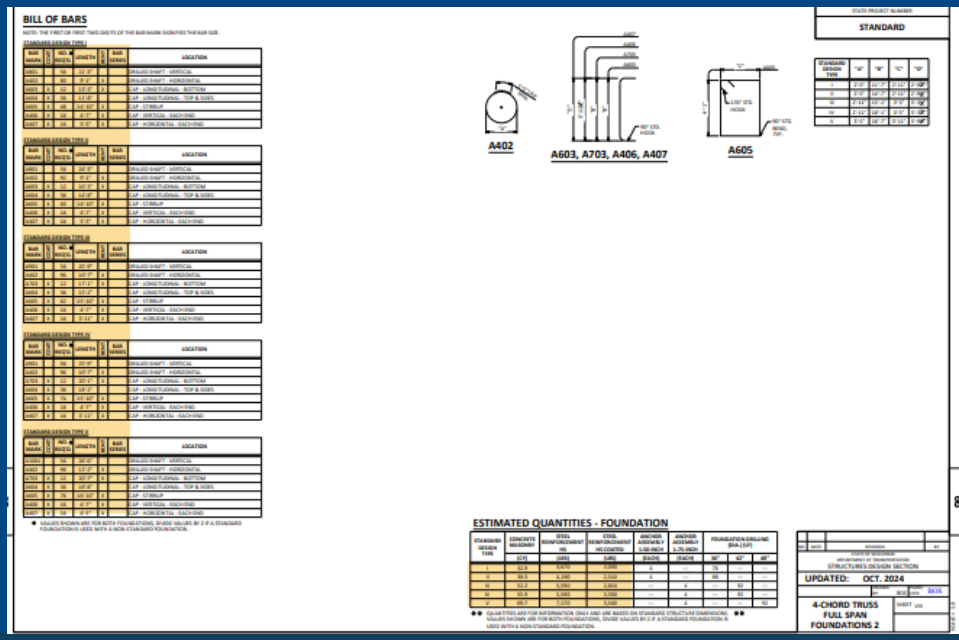
Updated October 2024



Standard Update

- Overhead Sign Structure - Standard Design Drawings
  - Standard 39.38
    - Updated Bill of Bars
    - Updated Quantities (nearest 0.1 CY)

Updated October 2024



Insert Update

New

January 2025 Insert Sheet Update Summary

Chapter 19 - Prestressed Concrete

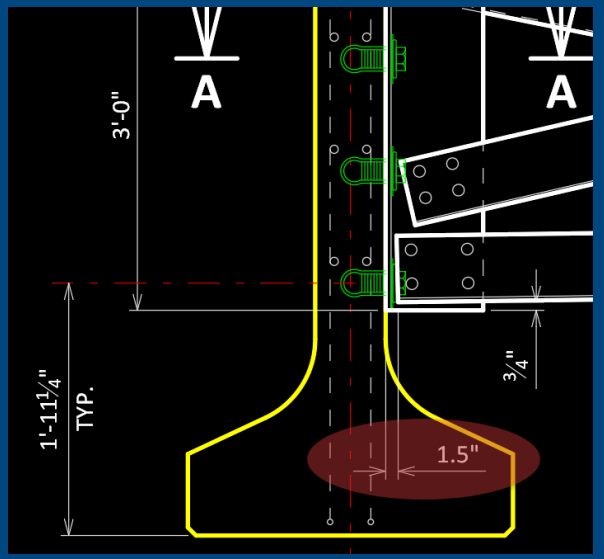
gstdia70.dwg	Changed diaphragm offset from 1" to 1.5" (measured from beam face). Added bent angle detail to "Diaphragm Support" with 3/4" RAD. (min) bend.

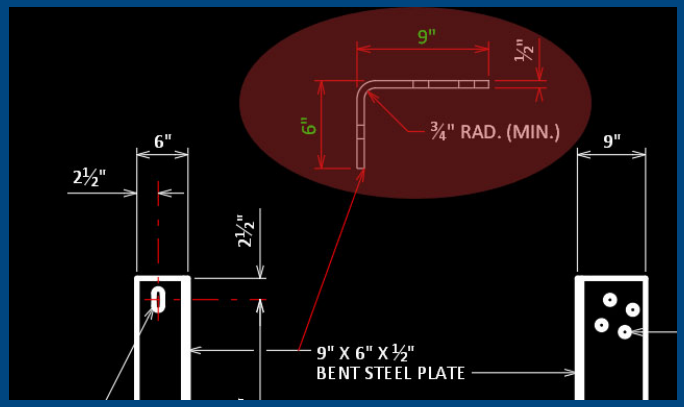
Chapter 30 - Railings

railm.dwg	Corrected W6x25 depth dimension from 9 5/8" to 6 3/8" in "Section Thru Railing On Deck". This error occurred during the July 2022 Civil 3D Insert Sheet conversion.

Insert Update

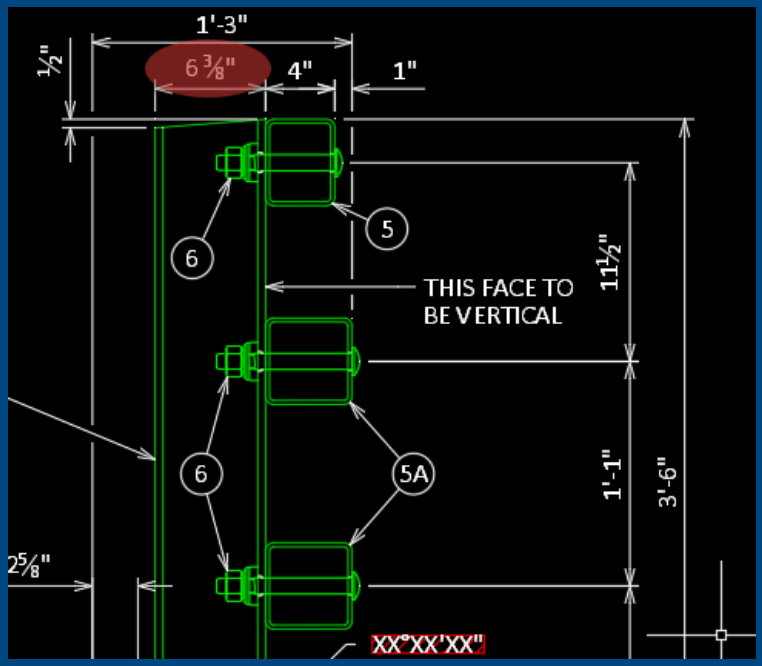
- gstdia70.dwg (Steel Dia. 70" And Greater)
  - Changed diaphragm offset from 1.0" to 1.5" (measured from beam face).
  - Added bent angle detail





Insert Update

- railm.dwg (Tubular Steel Railing, Type “M”)
  - Corrected dimension from 9 5/8" to 6 3/8"



In The Works

- Chapter 11 - Downdrag Loads
- Updated Blocks (Stay tuned)

FOUNDATION DATA (PRE-BORING)

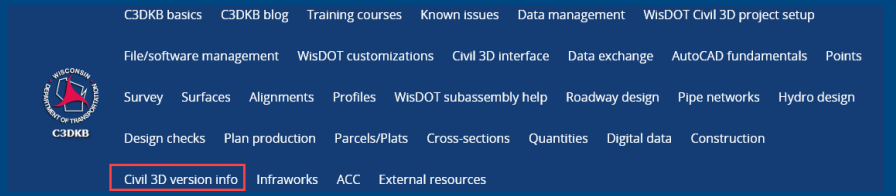
ABUTMENTS TO BE SUPPORTED ON XXXXXX PILING SEATED IN PRE-BORED HOLES CORED XX FEET MINIMUM INTO ROCK. PILE DRIVING IS NOT REQUIRED THE FACTORED AXIAL RESISTANCE OF THE PILES IN COMPRESSION USED FOR DESIGN IS XXX TONS MULTIPLIED BY A RESISTANCE FACTOR OF 0.5.
ESTIMATED XX-'0" LONG.

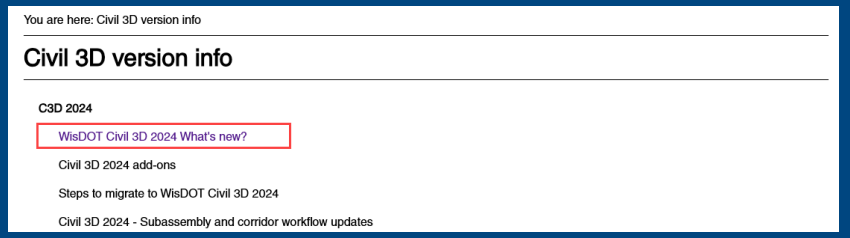
PIERS TO BE SUPPORTED ON XXXXXX PILING SEATED IN PRE-BORED HOLES CORED XX FEET MINIMUM INTO ROCK. PILE DRIVING IS NOT REQUIRED. THE FACTORED AXIAL RESISTANCE OF THE PILES IN COMPRESSION USED FOR DESIGN IS XXX TONS MULTIPLIED BY A RESISTANCE FACTOR OF 0.5.
ESTIMATED XX-'0" LONG.

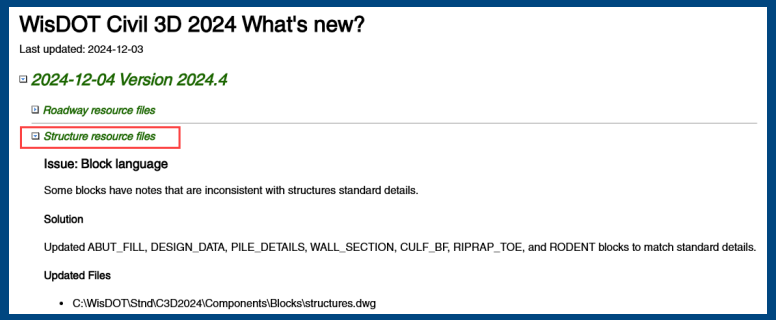
(**DESIGNER NOTES: THESE NOTES SHALL BE MODIFIED BASED ON SITE-SPECIFIC CONDITIONS, AS NEEDED. UNLESS NOTED OTHERWISE, SEATED PILES WILL BE BACKFILLED, WITHIN THE ROCK OR CONSOLIDATED MATERIAL, WITH A CEMENT GROUT ACCORDING TO STD. SPEC. 550.3.9.**)

Civil 3D Updates

- Structure Blocks
  - Past Update: 12/4/24
  - Next Update: February/March 2025
  - c3dkb.dot.wi.gov







Questions and Feedback

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