WisDOT Structural Engineers Symposium

Program Agenda
May 26, 2026

8:00 a.m.	Registration
8:30 a.m.	Administrator's Office Remarks – *DTSD Deputy Secretary Michael Hoelker*
8:40 a.m.	BOS Director's Perspective – *Josh Dietsche*
8:50 a.m.	WisDOT Local Program Updates – *Laura Shadewald*
9:15 a.m.	Standard Specifications Reorganization – *MK Kang (BTS)*
9:30 a.m.	BOS Initiatives/Policy & Standards Updates – *James Luebke*
9:45 p.m.	Inspections/Findings, Structural Reviews, and Load Ratings – *Alex Pence*
10:10 a.m.	Break/Networking (Beverages and Snacks)
10:35 a.m.	Truss Type Selection and Redundancy for the Black Hawk Bridge – *Greg Hasbrouck (Parsons)*
11:10 a.m.	Small Group/Table Discussion – *All*
11:30 a.m.	BOS Staff Panel Discussion – *Josh Dietsche, Laura Shadewald, Dominique Bechle, Max Kulick*
11:50 p.m.	Lunch/Networking
12:50 p.m.	Wisconsin Highway Research Program – *James Luebke*
1:05 p.m.	Two-Tier Retaining Wall System Geo-Structural Design Using FEA – *Ed McCright, Ali Albatal (Jacobs)*
1:40 p.m.	Geotechnical Updates – *Dave Staab*
2:05 p.m.	Scour/Pile Analysis Recommendations and Update – *James Luebke, Andrew Smith, Steve Neary*
2:25 p.m.	Consultant Review Updates – *Max Kulick*
2:35 p.m.	Break/Networking (Beverages and Snacks)
2:55 p.m.	Main Street Bascule Bridge Rehabilitation – *Dan Machamer (Hardesty & Hanover)*
3:30 p.m.	WisDOT Design-Build Updates – *Laura Shadewald*
3:45 p.m.	Interactive Survey and Final Q&A
4:00 p.m.	Adjourn

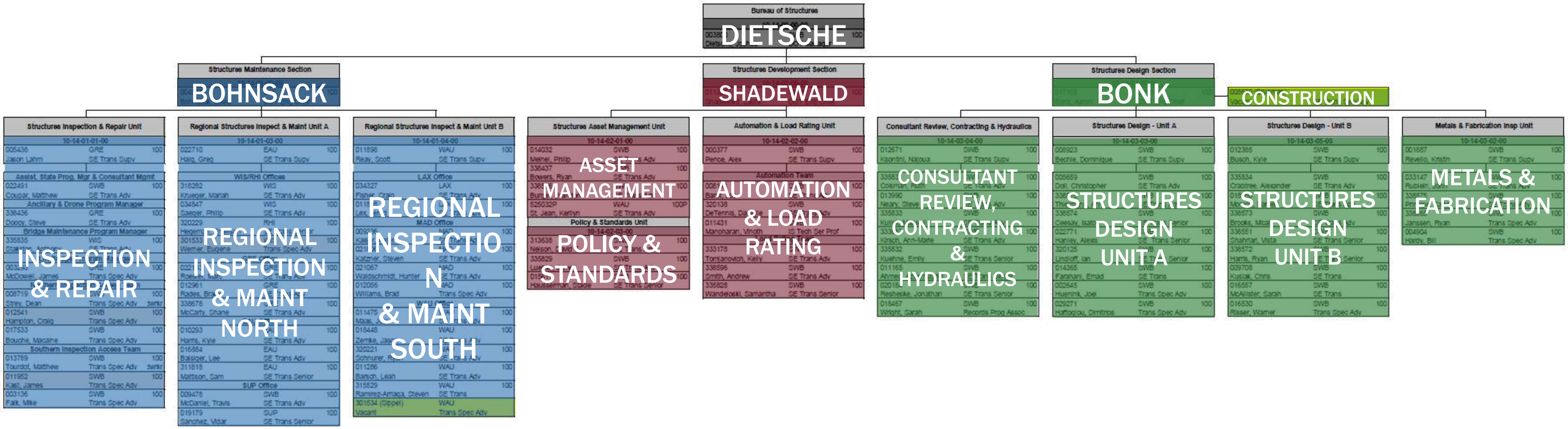
Conference Location: Madison College
1701 Wright Street - Madison, WI 53704

For today's presentations, agenda, and proof of attendance, please visit:

http://wisconsindot.gov/Pages/doing-bus/eng-consultants/cnslt-rsrces/strct/research.aspx

Partnerships | People | Process

Bureau of Structures Org Chart



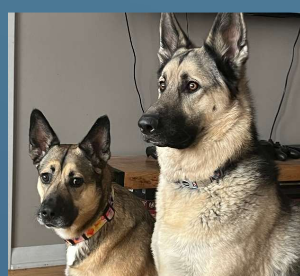
BUREAU OF STRUCTURES

Josh Dietsche, PE

Director

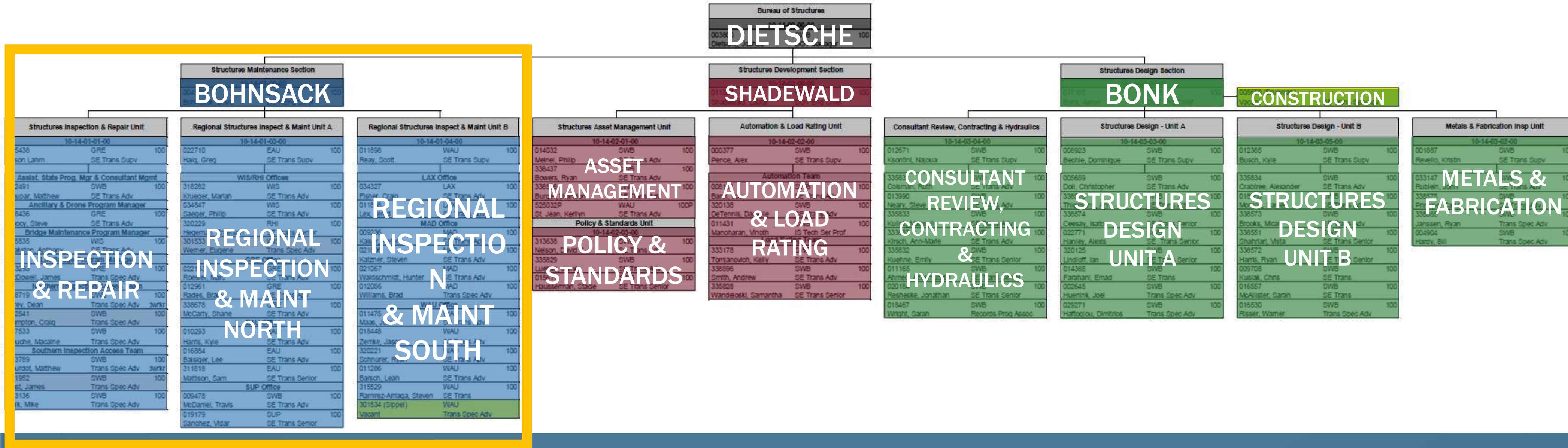
All Units

All Sections



- WisDOT / BOS since 2010
- Education:
  - Wausau East - 1995
  - UW-Madison: B.S. - 2000, M.S. - 2002
- Main Job Responsibilities:
  - Bureau oversight/leadership
- Interests / Expertise:
  - Attending meetings
- Personal / Fun Facts:
  - Married (Chris) with two kids; Greta (18), Gabe (16)...and Bear (2) & Mollie (3)
  - Avid runner, Badger fan, love the outdoors

Bureau of Structures Org Chart



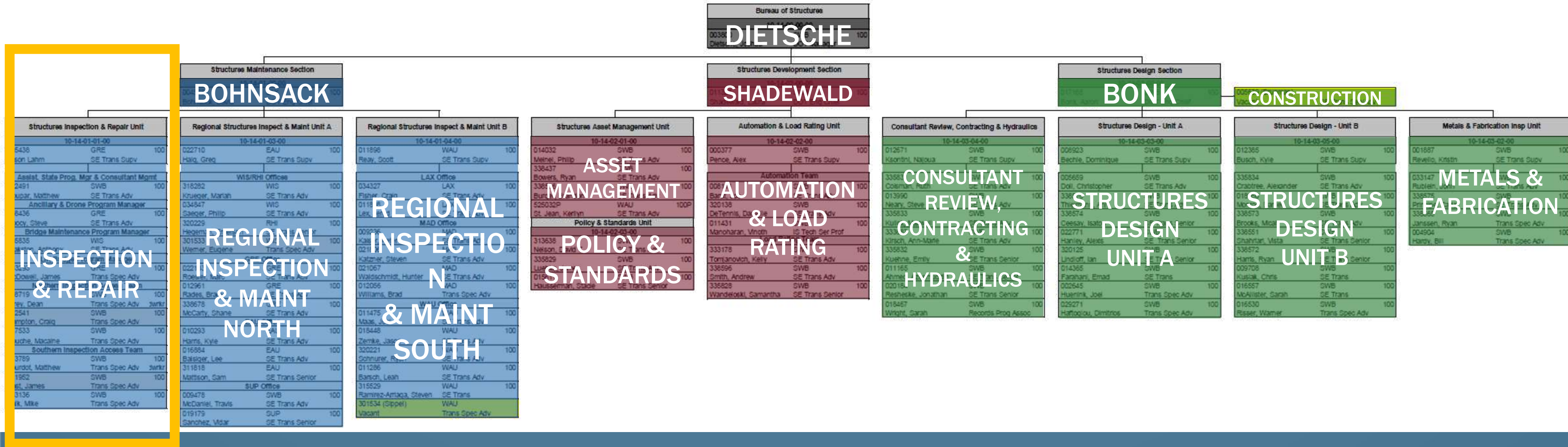
Dave Bohnsack, PE

Maintenance Chief

Maintenance Section

- WisDOT / BOS since 2021 (1994)
- Education:
  - Lena-Winslow HS (1989)
  - BSCE – UW Platteville (1993)
- Main Job Responsibilities:
  - Management of structure inspection, maintenance, operation and related programs
- Interests / Expertise:
  - Bridge inspection, maintenance, and operation.
- Personal / Fun Facts:
  - Sense of humor
  - Enjoy outdoor activities

Bureau of Structures Org Chart




Jason Lahm, PE

Supervisor

Inspection and Repair Unit
Maintenance Section

- WisDOT (2001) / BOS (2021)
- Education:
  - BSCE UW Platteville - 1993
- Main Job Responsibilities:
  - Manage Structure Maintenance, Structure Repairs, Drone Program, Lift Bridge Program, BOS Fleet and Budget
- Interests / Expertise:
  - All my main job responsibilities
- Personal / Fun Facts:
  - Son plays football for the Badgers.
  - I played soccer for UWP
  - I love to lift weights everyday (if possible)
  - I am really interested in technology
  - I am a volunteer firefighter.
  - Wife (Sara married 27 years), Sons (Gavin, 20 and Cody, 13) and daughters (Maya, 18 and Kala, 14)

Matt Coupar, PE

Bridge Inspection Engineer/PM

Inspection and Repair Unit

Maintenance Section

- WisDOT / BOS since 2006
- Education:
  - Southern Illinois University Carbondale
    - B.S./M.S. Civil Engineering (Structural)
- Main Job Responsibilities:
  - Bridge Inspection Program
- Interests / Expertise:
  - Bridge inspection, program improvement, support, bridge design
- Personal / Fun Facts:
  - Married with 1 boy 2 girls (16, 12, 8)
  - Enjoy the outdoors, hiking, camping, working out, coaching, most sports

Steven Doocy, PE

State Ancillary PM

Inspection and Repair Unit

Maintenance Section

- WisDOT (2011) / BOS (2013)
- Education:
  - Milwaukee School of Engineering
  - B.S./M.S. in Structural Engineering
- Main Job Responsibilities:
  - State-wide ancillary structures inspection
  - Drone Inspections
- Interests / Expertise:
  - Drones
  - Bolting
  - Sign Structures
- Personal / Fun Facts:
  - Married with 2 kids

Anthony Stakston, PE

Maintenance Engineer
Inspection and Repair Unit
Maintenance Section

- WisDOT / BOS since 2021 (20
- Education:
  - UW-Madison: B.S. - 2000, M.S. - 2002
- Main Job Responsibilities:
  - State-wide maintenance for structures.
- Interests / Expertise:
  - Structure Maintenance
- Personal / Fun Facts:
  - Minnesota Viking Fan
  - Enjoy hiking, fishing, and outdoors.

Jim McDowell

Trans. Specialist Adv.

Inspection and Repair Unit
Maintenance Section

- WisDOT / BOS since 2022 (1999)
- Education:
  - NWTC 1996
- Main Job Responsibilities:
  - Lift Bridge Program Manager
- Interests / Expertise:
  - Any bridge that moves
  - Fishing, hunting, hiking, snowmobiling, wood working, off-road, snowboarding, cross country skiing
- Personal / Fun Facts:
  - Built a cedar strip canoe during covid 2020
  - Enjoy camping
  - Wife Michelle (married 26yrs) Daughters Hannah (23) Lauren (20) Samantha (16)

- WisDOT / BOS since 2019
- Main Job Responsibilities:
  - Structure Inspection and Repair
- Interests / Expertise:
  - Snooper Inspections
  - Timber Bridge Repair

Dean Strey

Trans. Specialist Adv.

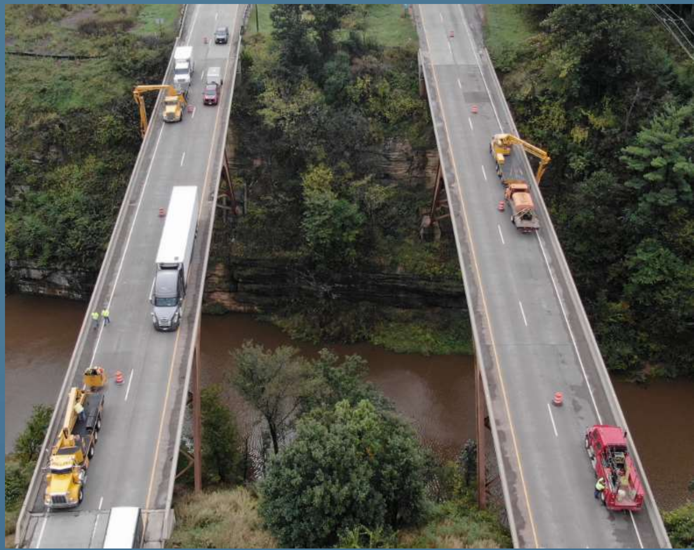
Inspection and Repair Unit

Maintenance Section

Craig Hampton

Trans. Specialist Adv.
Inspection and Repair Unit
Maintenance Section

- WisDOT / BOS since 2000
- Main Job Responsibilities:
  - Structure Inspection and Repair
  - Bridge Maintenance
- Personal / Fun Facts:
  - Enjoys ATV riding



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Macaine Bouche

Trans. Specialist Adv.
Inspection and Repair Unit
Maintenance Section

- WisDOT / BOS since 20xx
- Education:
  - Insert information here
- Main Job Responsibilities:
  - Structure Inspection & Repair
- Interests / Expertise:
  - Insert information here
- Personal / Fun Facts:
  - Insert information here

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Vacant

Trans. Specialist Adv.

Inspection and Repair Unit

Maintenance Section

- WisDOT / BOS since 20xx
- Education:
  - Insert information here
- Main Job Responsibilities:
  - Structure Inspection & Repair
- Interests / Expertise:
  - Insert information here
- Personal / Fun Facts:
  - Insert information here

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Vacant

Trans. Specialist Adv.
Inspection and Repair Unit
Maintenance Section

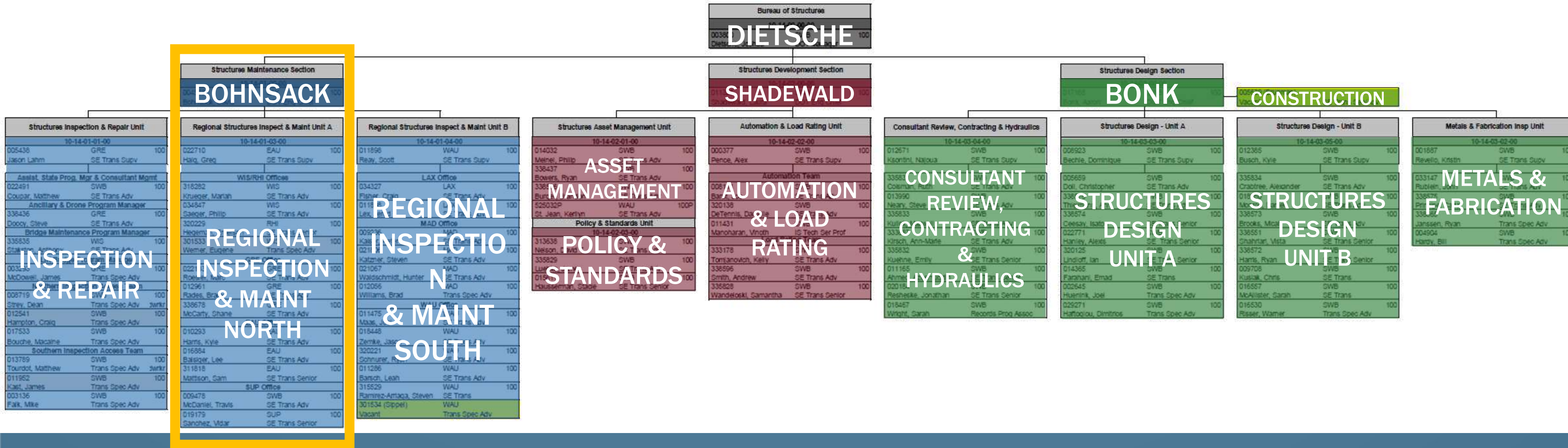
- WisDOT / BOS since 20xx
- Education:
  - Insert information here
- Main Job Responsibilities:
  - Structure Inspection & Repair
- Interests / Expertise:
  - Insert information here
- Personal / Fun Facts:
  - Insert information here

Mark Dent

Trans. Specialist Adv.
Inspection and Repair Unit
Maintenance Section

- WisDOT / BOS since 2009
- Education/Prior Work:
  - Lincoln High School
  - UW Parkside Bridge Inspection Class
- Main Job Responsibilities:
  - Structure Inspection and Repair
- Interests / Expertise:
  - Reach All Operation

Bureau of Structures Org Chart



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Greg Haig, PE

Inspection/Maintenance Supervisor

North Unit

- WisDOT / BOS since 20xx
- Education:
  - Insert information here
- Main Job Responsibilities:
  - Structure Inspection & Repair
- Interests / Expertise:
  - Insert information here
- Personal / Fun Facts:
  - Insert information here

Mariah Krueger, PE

Inspection PM

North Inspection Unit - WIS Maintenance Section

- WisDOT / BOS since 2022 (2015)
- Education:
  - UW-Platteville Civil Engineering (2014)
- Main Job Responsibilities:
  - Oversee region bridge inspection program
  - Perform structure inspections
  - Aid in scoping & project reviews
- Interests / Expertise:
  - Structure inspection
  - Roadway design (prior to BOS)
- Personal / Fun Facts:
  - Enjoy travelling and outdoor activities such as hiking, camping, and hunting
  - Goal to visit all national parks (I have a long way to go)

Philip Saeger, PE

Ancillary Structure PM

North Inspection Unit - WIS Maintenance Section

- WisDOT / BOS since 2022 (201)
- Education:
  - UW-Platteville (2013)
- Main Job Responsibilities:
  - Bridge & Ancillary Inspection/Maintenance
- Interests / Expertise:
  - Structural Maintenance / Inspections (NCR)
- Personal / Fun Facts:
  - Hunting & Fishing
  - Married with 2 boys

Emerson Hegeman

Maintenance Engineer

North Inspection Unit - RHI

Maintenance Section

- WisDOT / BOS since 2022
- Education:
  - UW-Platteville (2019) BS-Civil Engineering
- Main Job Responsibilities:
  - Structure Maintenance and Inspection
- Interests / Expertise:
  - Bridge Maintenance and Inspection
- Personal / Fun Facts:
  - Welder, Class A CDL, Diver, Outdoorsman
  - I have spent time in 36 states and 5 countries

Eugene Werner

Trans. Specialist Adv.

North Inspection Unit – WIS Maintenance Section

- WisDOT / BOS since 2022 (1989)
- Education:
  - Mid-State Technical College
- Main Job Responsibilities:
  - Bridge & Ancillary Inspection/Maintenance
- Interests / Expertise:
  - Watersheds / Structure Maintenance & Inspection
- Personal / Fun Facts:
  - Married (+30 Years) two Boys (mid 20s)
  - Enjoy the outdoors, camping, golf, fishing, hunting, downhill skiing, football fan

- WisDOT / BOS since 2023 (2
- Education:
  - UW-Platteville – Civil Engineering (2010)
- Main Job Responsibilities:
  - Bridge Maintenance and Inspection
- Interests / Expertise:
  - Bridge Maintenance and Inspection
  - Project Construction
- Personal / Fun Facts:
  - Wife (Kristin – Married 14 years), 3 Children (Brielle 12, Connor 10, Eliana 8)
  - Enjoy coaching and watching the kids sporting events. Hunting, family vacations and being outdoors.

Marc Roesler, PE

Maintenance Engineer

North Inspection Unit - GRE

Maintenance Section

Brady Rades, PE

Inspection PM

North Inspection Unit - GRE

Maintenance Section

- WisDOT / BOS since 2022 (2012)
- Education:
  - UW-Madison - Civil Engineering (2008)
- Main Job Responsibilities:
  - Oversee region bridge inspection program
  - Perform structure inspections & assist with maintenance and scoping/project reviews
- Interests / Expertise:
  - Structure inspection & maintenance
- Personal / Fun Facts:
  - Wife (Christina married 13 years) & 4 Children, Preston (9), Landon (7), Dawson (3.5), Zoe (8 months)
  - Enjoy kids' sporting activities, building projects around the house and anything music

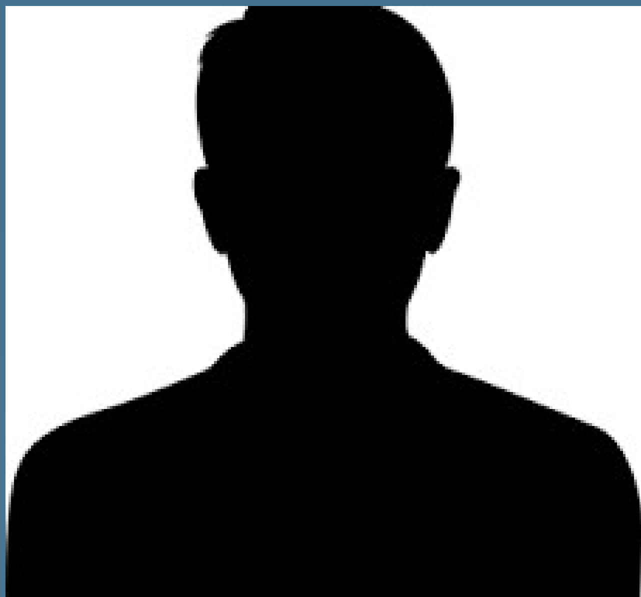
Shane McCarty, PE

Ancillary Structure and Maintenance PM

North Inspection Unit - GRE Maintenance Section

- WisDOT / BOS since 2022 (2016)
- Education:
  - BSCE – UW-Milwaukee (2012)
- Main Job Responsibilities:
  - Structure Inspection, maintenance work
- Interests / Expertise:
  - Structure Maintenance/Inspections
- Personal / Fun Facts:
  - Wife (Jenny married 16 years) 4 boys, Cooper (11), Braylen (9), Caiden (7), Maverick (2)
  - Huge Kentucky Wildcats Basketball and Green Bay Packer fan.
  - Enjoy watching my kids sports events, church events, hunting, camping and golf

WISCONSIN DEPARTMENT OF TRANSPORTATION



Kyle Harris, PE

Inspection PM

North Inspection Unit - EAU

Maintenance Section

- WisDOT / BOS since 2022 (2007)
- Education:
  - Insert here…
- Main Job Responsibilities:
  - Insert here…
- Interests / Expertise:
  - Insert here…
- Personal / Fun Facts:
  - Insert here…

Lee Balsiger, PE

Ancillary Structure and Maintenance PM

North Inspection Unit - EAU
Maintenance Section

- WisDOT / BOS since 2022 (2012)
- Education:
  - UW-Platteville (2008) BS-Civil Engineering
- Main Job Responsibilities:
  - Bridge & Ancillary Inspection/Maintenance
- Interests / Expertise:
  - Structure Maintenance/Inspections
- Personal / Fun Facts:
  - Married (Chelsey), 3 kids (Dakota 13, Brooks 11, Reece 8).

Sam Mattison

Maintenance Engineer

North Inspection Unit - EAU

Maintenance Section

- WisDOT / BOS since 2023 (20[illegible])
- Education:
  - University Wisconsin Oshkosh (BS – Environmental Engineering)
- Main Job Responsibilities:
  - Structure inspection and Maintenance
- Interests / Expertise:
  - Bridge maintenance/ inspection
- Personal / Fun Facts:
  - Enjoy traveling, camping, hiking, fishing, & being outdoors

Travis McDaniel, PE

Inspection PM

North Inspection Unit - SUP

Maintenance Section

- WisDOT / BOS since 2001
- Education:
  - University of Missouri - Columbia
  - B.S. / M.S. in Civil Engineering
- Main Job Responsibilities:
  - Oversight of structures inspection, improvements, maintenance and repair for NW-Superior.
- Interests / Expertise:
  - Inspection Policy and Procedures
  - Maintenance and Repair
- Personal / Fun Facts:
  - Married. No Kids. Two Cats.
  - Unabashed Missouri Tiger and KC Chiefs fan
  - Enjoy traveling, cooking, and playing sports.

Vidar Sanchez, E.I.T.

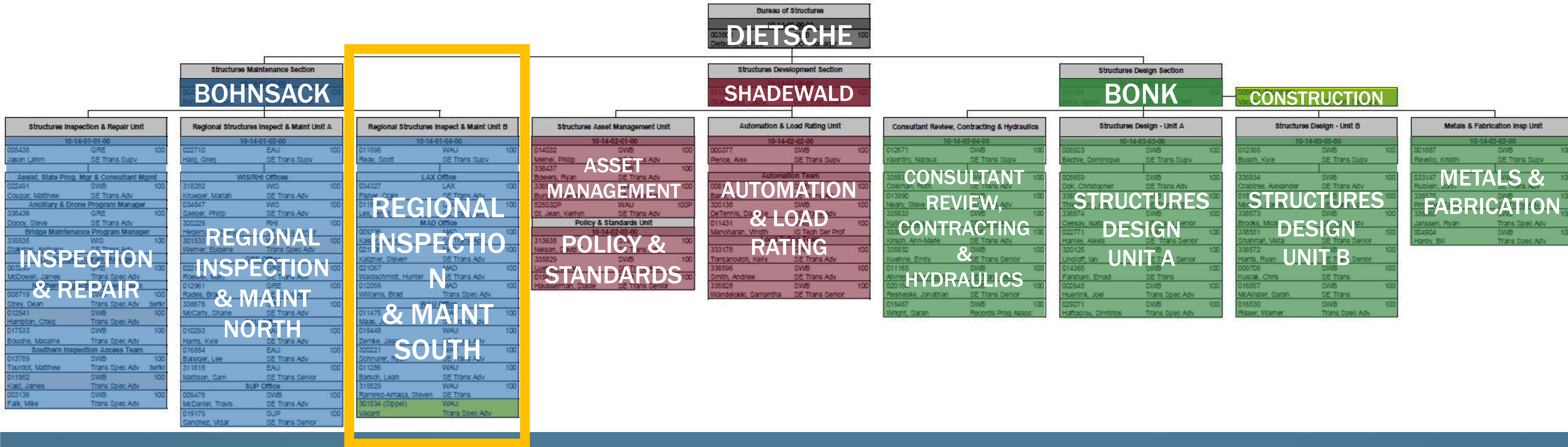
Maintenance Engineer

North Inspection Unit - SUP

Maintenance Section

- WisDOT / BOS since 2023 (2018)
- Education:
  - University of Minnesota Duluth
  - B.S. in Civil Engineering
- Main Job Responsibilities:
  - Perform structure inspections & assist with maintenance
- Interests / Expertise:
  - Bridge Inspections and Maintenance
- Personal / Fun Facts:
  - Transplant to the Midwest
  - Learning to embrace the cold

Bureau of Structures Org Chart



WISCONSIN DEPARTMENT OF TRANSPORTATION

BUREAU OF STRUCTURES

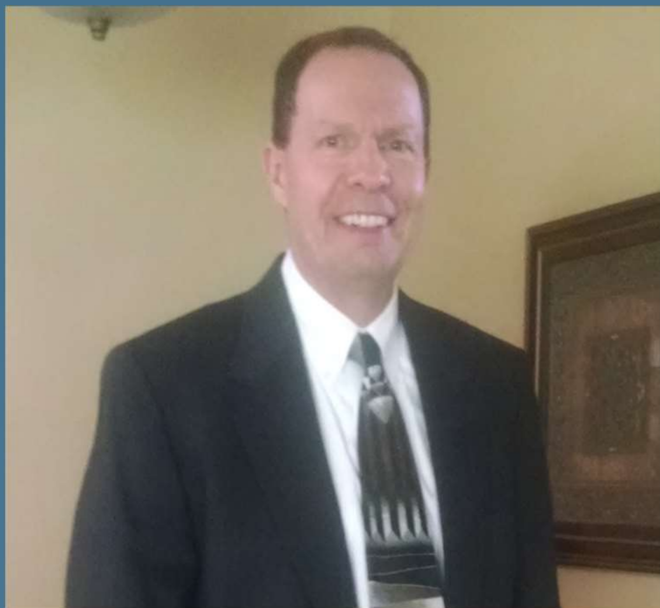
Scott Reay, PE

Supervisor

South Inspection Unit - WAU

Maintenance Section

- WisDOT / BOS since 2022 (2015)
  - NE Region SET in construction 1995/1996
- Education:
  - Michigan Tech - BS/MS - Civil/Structural (1998)
- Main Job Responsibilities:
  - SE Region Bridge and Tunnel Inspection Program Manager
  - Snooper Operator, UAS Pilot
- Interests / Expertise:
  - Inspection technology, data and efficiency
  - Precast/Prestressed Concrete (prior to DOT)
- Personal / Fun Facts:
  - Married with 2 teenage boys, enjoy boating, skiing, building things around the house and sets for school plays



Craig Fisher, PE

Inspection PM

South Inspection Unit - LAX

Maintenance Section

- WisDOT / BOS since 2022 (1998)
- Education:
  - UW-Madison (1989) BS-Civil Engineering
- Main Job Responsibilities:
  - Oversight of structures inspection, improvements, maintenance and repair for SW-La Crosse.
- Interests / Expertise:
  - Inspection methods, quality control
  - Construction, Inspection, & Maintenance
- Personal / Fun Facts:
  - National Park geek
  - Love fishing
  - Studying to become a private pilot

Jered Lex, PE

Maintenance PM

South Inspection Unit - LAX

Maintenance Section

- WisDOT / BOS since 2025 (2017)
- Education:
  - UW-Platteville, BS Civil Engineering (2015)
- Main Job Responsibilities:
  - Structure Inspection & Repair
- Interests / Expertise:
  - Spent last 9 years in PDS
  - Structure inspection/ maintenance
- Personal / Fun Facts:
  - Married with two kids (6 and 4)
  - Enjoy fishing and hunting

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Pete

Inspection PM

South Inspection Unit - MAD

Maintenance Section

- WisDOT / BOS since 20xx
- Education:
  - Insert information here
- Main Job Responsibilities:
  - Structure Inspection & Repair
- Interests / Expertise:
  - Insert information here
- Personal / Fun Facts:
  - Insert information here

Steve Katzner, PE

Inspection PM

South Inspection Unit - MAD

Maintenance Section

- WisDOT / BOS since 2001/2020
- Education:
  - AAS Civil Engineering Technology – Michigan Tech University 1995
  - BSCE Civil Engineering – UW Platteville 2000
- Main Job Responsibilities:
  - Bridge Maintenance Manager
- Interests / Expertise:
  - Field work – on the fly/Jack of all trades
  - Being outdoors for work and play
- Personal / Fun Facts:
  - Only child... but I still didn't do it!
  - Hunter/Biker/Baseball coach
  - I like lifting heavy things
  - Wife is a Consultant
  - 2 kids – one of each (That's plenty)
  - Select-side Rugby player at UW-P

Hunter Waldschmidt, PE

Ancillary Structure PM
South Inspection Unit - MAD
Maintenance Section

- WisDOT / BOS since 2021 (20
- Education:
  - UW-Platteville (2014) BS Civil Engineering
- Main Job Responsibilities:
  - Ancillary Structures Maint./Inspection Program Management
- Interests / Expertise:
  - Drones, Bridge Construction
- Personal / Fun Facts:
  - 2lbs 2oz when I was born. Sure can't tell now.

Brad Williams

Trans. Specialist Adv.
South Inspection Unit - MAD
Maintenance Section

- WisDOT / BOS since 2022 (1998)
- Education:
  - Sparta High School/MATC for Civil Tech
- Main Job Responsibilities:
  - Bridge and Ancillary Inspection
- Interests / Expertise:
  - Golf (interest, little expertise)
- Personal / Fun Facts:
  - Married with children

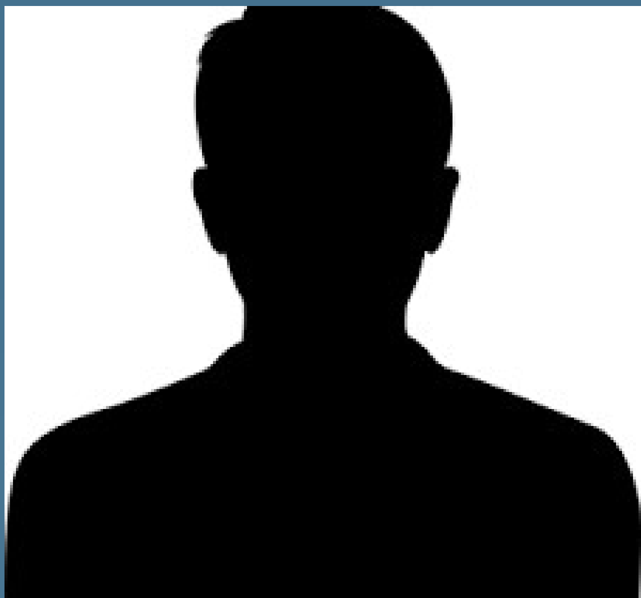
Joel Maas

Inspection PM

South Inspection Unit - WAU

Maintenance Section

- WisDOT / BOS Since 2017
- Education:
  - Carroll University
    - B.S. Applied Physics
  - University of Wisconsin – Milwaukee
    - B.S. Civil Engineering
- Main Job Responsibilities:
  - Inspector, Utility Coordinator
- Interests / Expertise:
  - Rehabilitations
- Personal / Fun Facts:
  - I enjoy my Nintendo Switch, tennis and the Milwaukee Bucks



Jason Zemke, PE

Ancillary Structure PM

South Inspection Unit - WAU

Maintenance Section

- WisDOT / BOS since 2022 (2006)
- Education:
  - Insert here…
- Main Job Responsibilities:
  - Insert here…
- Interests / Expertise:
  - Insert here…
- Personal / Fun Facts:
  - Insert here…

BUREAU OF STRUCTURES

Ryan Schnurer

Maintenance Engineer

South Inspection Unit - WAU

Maintenance Section

- WisDOT / BOS since 2024 (2011)
- Education:
  - B.S. Civil Eng – UW-Milwaukee 2008
- Main Job Responsibilities:
  - Inspection and Maintenance
- Interests / Expertise:
  - Construction – roadway and structure
- Personal / Fun Facts:
  - Married with 3 girls, 1 boy, 1 boy dog
  - Trying to garden – and canning
  - Being a pool boy
  - Cooking
  - Driving girls to dance and other sports

Insert Photo Here

Leah

Title

South Inspection Unit - WAU

Maintenance Section

- WisDOT / BOS since 20xx
- Education:
  - Insert information here
- Main Job Responsibilities:
  - Structure Inspection & Repair
- Interests / Expertise:
  - Insert information here
- Personal / Fun Facts:
  - Insert information here

BUREAU OF STRUCTURES

Insert Photo Here

Steven

Title

South Inspection Unit - WAU

Maintenance Section

- WisDOT / BOS since 20xx
- Education:
  - Insert information here
- Main Job Responsibilities:
  - Structure Inspection & Repair
- Interests / Expertise:
  - Insert information here
- Personal / Fun Facts:
  - Insert information here

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Vacant

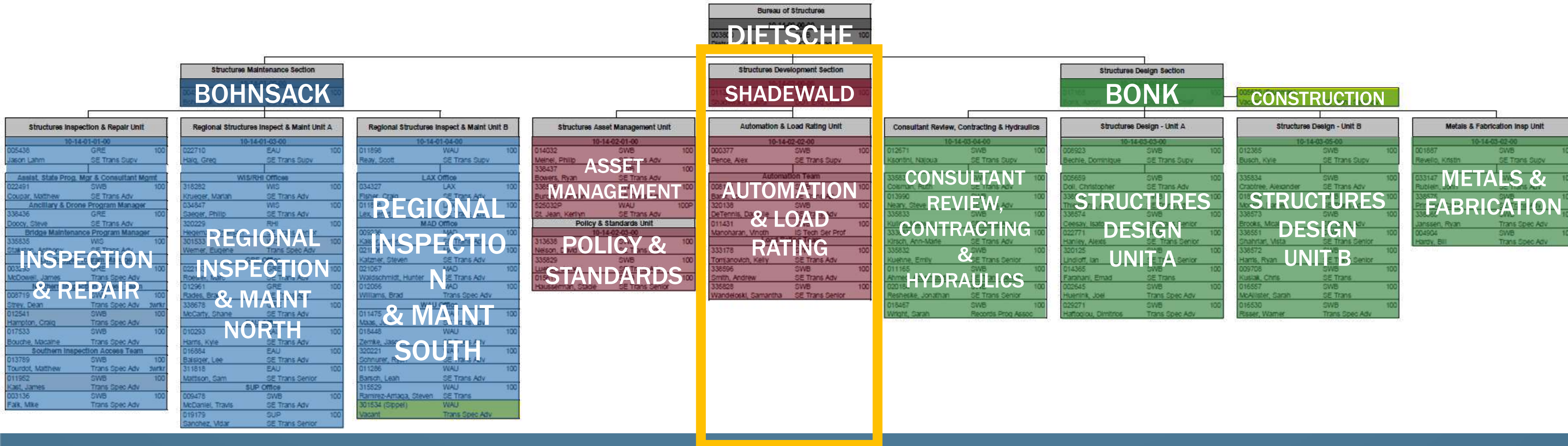
Title

South Inspection Unit - WAU

Maintenance Section

- WisDOT / BOS since 20xx
- Education:
  - Insert information here
- Main Job Responsibilities:
  - Structure Inspection & Repair
- Interests / Expertise:
  - Insert information here
- Personal / Fun Facts:
  - Insert information here

Bureau of Structures Org Chart



BUREAU OF STRUCTURES

Laura Shadewald, PE

Development Chief

Development Section

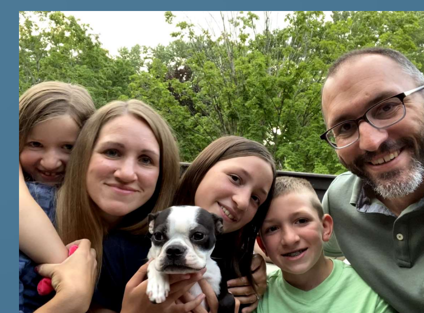
- WisDOT / BOS since 2007
- Education:
  - BSCE UW-Platteville
- Main Job Responsibilities:
  - Coordinate the Development Section (Structures Asset Management, Policy and Standards, Rating and Automation)
- Interests / Expertise:
  - Staff Development, Bridge Preservation & Asset Management, WI Design Build, Mega/Major Projects, Foundation Construction
- Personal / Fun Facts:
  - Married to Jerry, Kids: Aida (21), Greta (19), Lila (16) & Levi (16). I spend a lot of time driving & in the stands watching volleyball, swim & show choir.

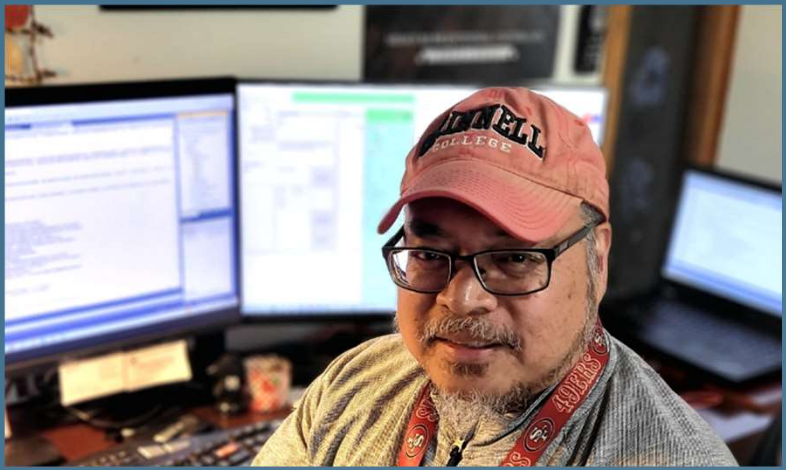
Alex Pence, PE, SE

Supervisor

Automation & Load Rating Unit
Development Section

- WisDOT / BOS since 2012
- Education:
  - University of Illinois
  - B.S. / M.S. in Civil (Structural) Engineering
- Main Job Responsibilities:
  - Oversight of load rating and permitting; complex analysis and damage/deterioration repairs; BOS software and automation tools
- Interests / Expertise:
  - Load Ratings / Postings
  - Structural Analysis Software
- Personal / Fun Facts:
  - Married w/ 3 kids and a dog
  - Enjoy sports, the Bears, hiking, spreadsheets





Joe Barut, PE

Structures Systems Development Engineer

Automation & Load Rating Unit
Development Section

- WisDOT / BOS since 2007
- Education:
  - BS Civil Engineering, University of California, Davis
  - MS Civil Engineering, University of Wisconsin-Madison
  - MS Computer Science, Rensselaer Polytechnic Institute
- Main Job Responsibilities:
  - Develop and maintain the BOS software ecosystem and databases, including the Structures Data Warehouse
  - Develop and maintain in-house custom apps, including:
    - Wisconsin Structures Asset Management System (WiSAMS)
    - Structures Certification Tool (SCT)
    - Wisconsin Oversize Overweight Permitting and Analysis Software System (WOO-Pass)
- Interests / Expertise:
  - 64 Squares/Catalan, Steven Pinker
  - Software architecture and development, Languages
- Personal / Fun Facts:
  - Born in the Philippines like Tim Tebow; Grew up in Northern Cali
  - 49er & Badger Apologist

Danielle De Tennis, PE

Automation Engineer

Automation & Load Rating Unit
Development Section

- WisDOT / BOS since 2010
- Education:
  - Milwaukee School of Engineering
    - B.S. Architectural Engineering
    - M.S. Structural Engineering
- Main Job Responsibilities:
  - Develop software to automate bridge design and assist the other sections in BOS
- Interests / Expertise:
  - Tech Support on BOS Specific Software
  - Excel, Box, MicroStation, Civil 3D
- Personal / Fun Facts:
  - Married with two cats
  - Like to knit

Vinoth Manoharan

IS Technical Services

Automation & Load Rating Unit
Development Section

- WisDOT / BOS since 2021
- Education:
  - UW Madison:
    - B.S. Computer Science,
    - B.S. Math
- Main Job Responsibilities:
  - IT Needs Coordinator
  - Software Developer
- Interests / Expertise:
  - Tech Support, Troubleshooting
- Personal / Fun Facts:
  - Interned here before I became fulltime

Kelly Tomjanovich, PE

Bridge Rating Engineer

Automation & Load Rating Unit
Development Section

- WisDOT / BOS since 2012
- Education:
  - THE Ohio State University
  - B.S./M.S. in Civil Engineering (Structural)
- Main Job Responsibilities:
  - Oversight of state bridge rating program, OSOW permitting, structural reviews
- Interests / Expertise:
  - Bridge rating/analysis
  - SQL programming (writing reports to query data in HSI)
- Personal / Fun Facts:
  - Live in McFarland with husband Joe, pup Cooper (10), and baby Logan (1)

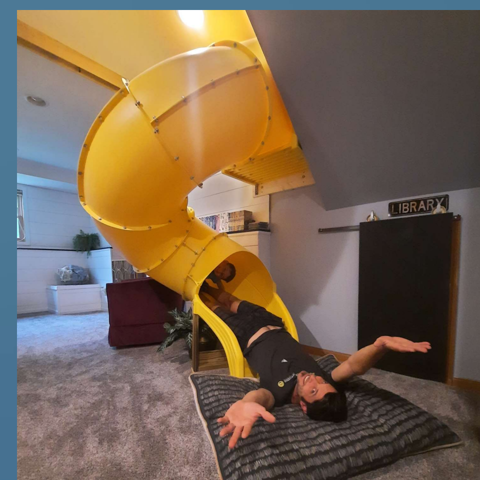
- WisDOT / BOS since 2010
- Education:
  - Marquette University B.S./M.S. Civil Eng
- Main Job Responsibilities:
  - Bridge Load Ratings and Analytical Evaluations
  - Bridge Strengthening and Repair Solutions

Andrew Smith, PE

Complex Structures Engineer

Automation & Load Rating Unit
Development Section

- Interests / Expertise:
  - Finite Element Analysis
  - FRP design
- Personal / Fun Facts:
  - I have a slide in my house



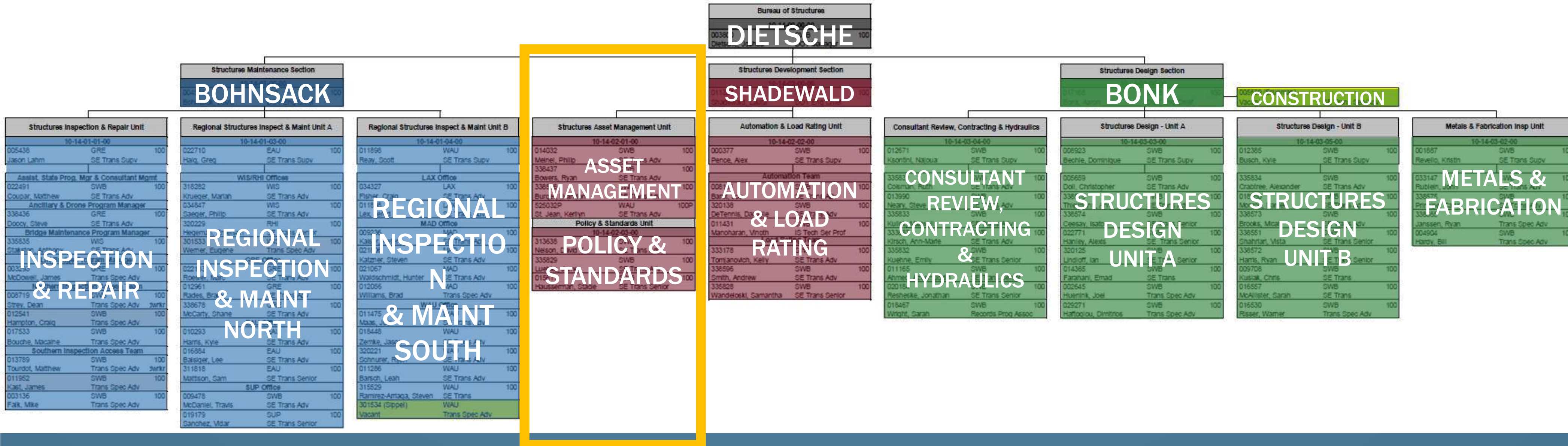
Sam Wandeloski

Bridge Rating Engineer

Automation & Load Rating Unit
Development Section

- WisDOT / BOS since 2021
- Education:
  - UW-Platteville, 2021
- Main Job Responsibilities:
  - Bridge Load Ratings (Local System)
  - OSOW Permit Evaluation
- Interests / Expertise:
  - Rating, Permitting, BrR
- Personal / Fun Facts:
  - ###

Bureau of Structures Org Chart



Philip Meinel, PE

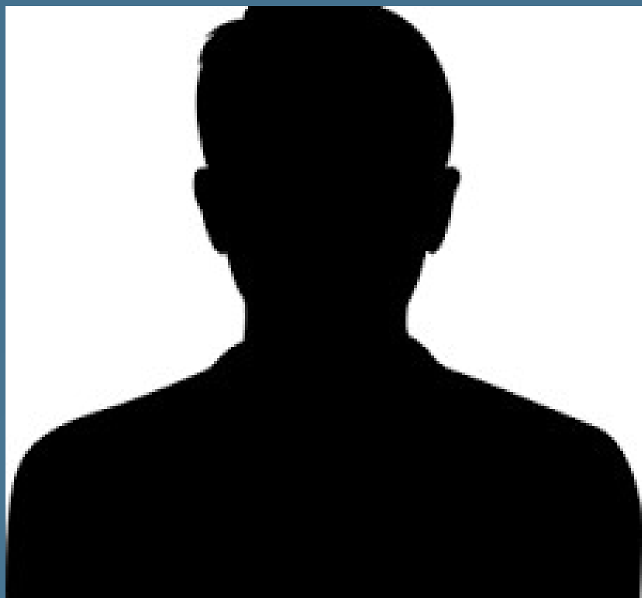
Asset Management Engineer

Structures Management Unit?

Development Section

- WisDOT / BOS since 2012
- Education:
  - BSCE, UW-Platteville, 2008
- Main Job Responsibilities:
  - Bridge Management System development
  - Bridge deck NDE program
- Interests / Expertise:
  - Planning/Scoping/Funding/Data
  - Policy decisions/implementation
  - National research/NDE technology

- Personal / Fun Facts:
  - Married with 4 children (ages 21, 18, 16, 16)
  - Spiritual care visitor at University Hospital
  - Farm house is rated a 4
  - Climbs/removes trees



Ryan Bowers, PE

Asset Management Engineer

Structures Management Unit

Development Section

- WisDOT / BOS since 2016
- Education:
  - BSCE, UW-Platteville
  - MSCE, Iowa State
- Main Job Responsibilities:
  - Bridge Data & Asset Management
- Interests / Expertise:
  - HSIS, WiSAMS
  - Bridge Preservation & Inspection Data
- Personal / Fun Facts:

- WisDOT / BOS since 2007
- Education:
  - BSCE UW- Madison 2002
- Main Job Responsibilities:
  - Bridge Data & Asset Management
- Interests / Expertise:
  - Structures Certification
  - Bridge Preservation & Inspection Data
- Personal / Fun Facts:
  - XC Skiing, Biking, Camping, Canoeing

Brandan Burger, PE

Asset Management Engineer

Structures Management Unit

Development Section

David T. Nelson, PE

Structural Engineer

Policy & Standards Unit
Development Section

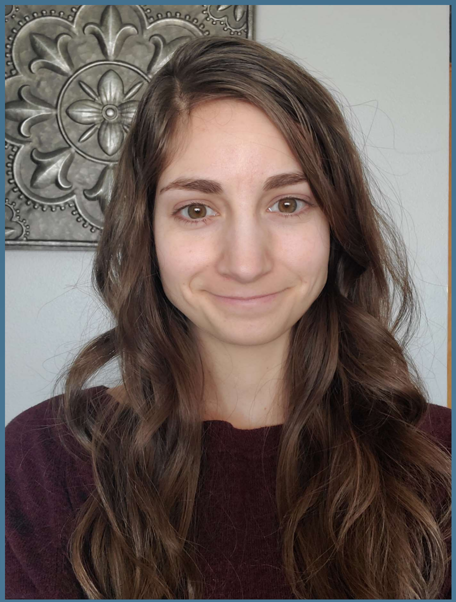
- WisDOT / BOS since 1977
- Education:
  - B.S.C.E. UW-Madison
- Main Job Responsibilities:
  - Maintain Bridge Manual & Standards
  - AASHTO Publication Coordination
- Interests / Expertise:
  - Concrete Structures
  - Barriers and Railings
- Personal / Fun Facts:
  - Enjoy family activities

James Luebke, PE

Structural Engineer

Policy & Standards Unit
Development Section

- WisDOT / BOS since 2010
- Education:
  - UW Milwaukee
  - B.S./M.S. Civil Engineering (Structural)
- Main Job Responsibilities:
  - Maintain the Bridge Manual
- Interests / Expertise:
  - Retaining Walls
  - Accelerated Bridge Construction
- Personal / Fun Facts:
  - Enjoy volunteering on the Ice Age Trail and trail running.
  - 11-year-old active Border Collie (Winnie)



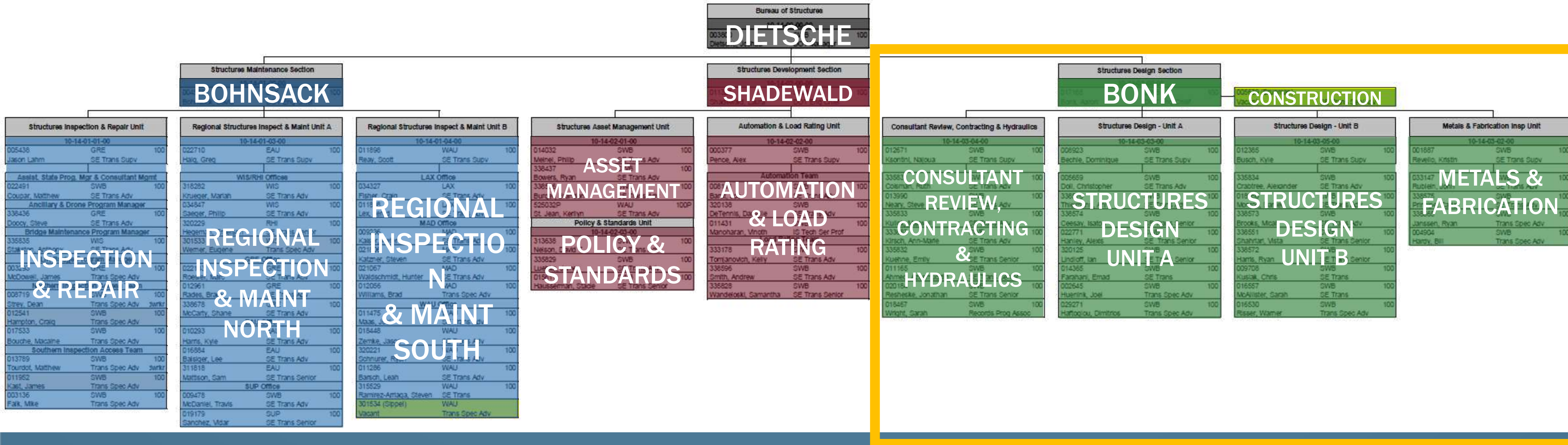
Stacie Hausserman

Structural Engineer

Policy & Standards Unit
Development Section

- WisDOT / BOS since 2016
- Education:
  - BS Civil Engineering – Michigan Technological University
- Main Job Responsibilities:
  - Design, Draft, Check new structures and rehabs
  - NE Region Liaison
- Interests / Expertise:
  - Stream Crossings, finding old plans (microfilm), examples
- Personal / Fun Facts:
  - Married, we have two cats and a dog
  - Enjoy live music, to paint, read, and garden

Bureau of Structures Org Chart



Aaron Bonk, PE

Design Chief

Design Section

- WisDOT / BOS since 2010
- Education:
  - BSCE, UW-Madison
- Main Job Responsibilities:
  - Manage & Coordinate the 4+ Design Units
- Interests / Expertise:
  - Design & Construction, Specifications, Leadership, Diversity/Equity/Inclusion
- Personal / Fun Facts:
  - Engaged to partner (Lua) with 4 kids (Nur-16, Isaiah-13, Theo-9, and Zaia-8)
  - Love to play golf

Insert Photo Here

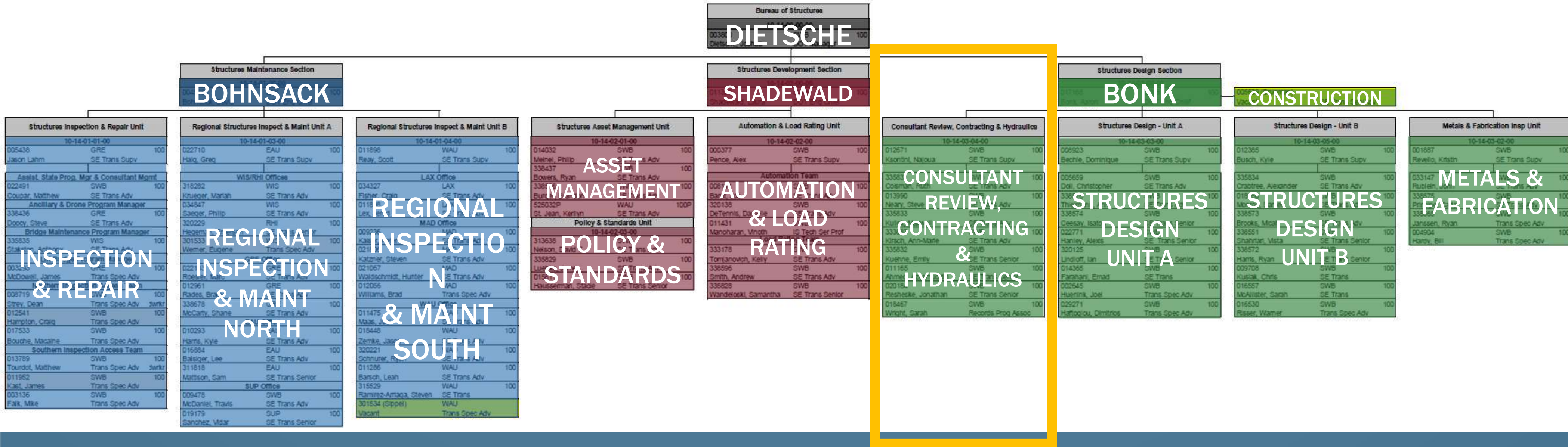
Insert Name

Structures Construction Program Manager

Design Section

- WisDOT / BOS since 20xx
- Education:
  - Insert information here
- Main Job Responsibilities:
  - Structure Inspection & Repair
- Interests / Expertise:
  - Insert information here
- Personal / Fun Facts:
  - Insert information here

Bureau of Structures Org Chart



- WisDOT / BOS since 1999
- Education:
  - BSCE UW - Madison
  - M.S. Civil & Env Engineering, Hydrology & Hydraulics- UW Madison
- Main Job Responsibilities:
  - Supervise the Consultant Review and Hydraulics Unit
  - Interests / Expertise:
    - Mentoring staff
    - Hydrology
- Personal / Fun Facts:

Najoua Ksontini, PE

Supervisor

Consultant Review Unit

Design Section

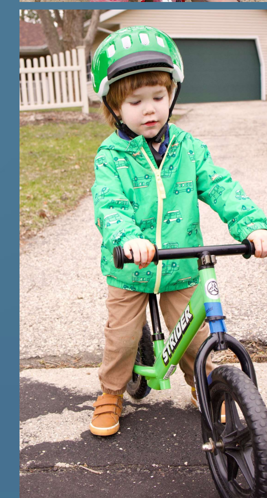
Ruth Coisman, PE

Structural Engineer

Consultant Review Unit

Design Section

- WisDOT / BOS since 2011
- Education:
  - UW-Eau Claire
  - UW-Madison
- Main Job Responsibilities:
  - Consultant Review – Preliminary
- Interests / Expertise:
  - Review all consultant preliminary plans
- Personal / Fun Facts:
  - Married (Grant) with two kids (Margaux & Gabriel)
  - Enjoy cooking & hiking



Steve Neary, PE

H&H Engineer

Consultant Review Unit

Design Section

- WisDOT / BOS since 2014
- Education:
  - B.S. Forestry, B.S. Horticulture – UW Madison (2007)
  - M.S. Civil & Env Engineering, M.S. Water Resources Management - UW Madison (2014)
- Main Job Responsibilities:
  - Hydrology & Hydraulics
  - Preliminary structure design (type/size/location)
  - Scour analysis and countermeasure design
  - Good vibes
- Interests / Expertise:
  - 2D hydraulic modeling
  - Aquatic organism passage
  - Research
- Personal / Fun Facts:
  - I'm growing my hair out

Max Kulick, PE

Structural Engineer

Consultant Review Unit

Design Section

- WisDOT / BOS since 2014
- Education:
  - University of Wisconsin - Platteville
  - B.S. in Civil Engineering (Structural & Geotechnical)
- Main Job Responsibilities:
  - Design, Draft, Design Check & Plans Check Bridges, Culverts & Retaining Walls
  - North Central Region Structures Liaison
- Interests / Expertise:
  - Re-deck design on various girder structures
  - Geotechnical aspects of projects
  - General project coordination and field questions
- Personal / Fun Facts:
  - Live in Mount Horeb with wife (Megan), Daughter (Charlie), Son (Harvey) & Dog (Ruby)
  - Hunt, Fish & Forage wild food

Insert Photo Here

Ann-Marie

H&H Engineer

Consultant Review Unit

Design Section

- WisDOT / BOS since 20xx
- Education:
  - Insert information here
- Main Job Responsibilities:
  - Structure Inspection & Repair
- Interests / Expertise:
  - Insert information here
- Personal / Fun Facts:
  - Insert information here

BUREAU OF STRUCTURES

Emily Kuehne

Structural Engineer

Consultant Review Unit

Design Section

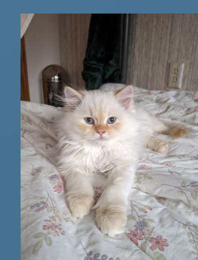
- WisDOT / BOS since 2011
- Education:
  - University of Minnesota
  - BS in Civil Engineering - Structural
- Main Job Responsibilities:
  - review consultant final plans/designs
- Interests / Expertise:
  - SER Liaison, Retaining Walls, Structure Certification
- Personal / Fun Facts:
  - Live in Windsor with husband Jake & our two dogs Jovie (12) and Moose (12)

Azeem Ahmed, PE

H&H Engineer

Consultant Review Unit
Design Section

- WisDOT / BOS since 2025
- Education:
  - B.S. Biosystems Engineering
    - UW-Madison
  - M.S. Engineering Management
    - The George Washington University
- Main Job Responsibilities:
  - Hydrology & Hydraulics
  - Preliminary Structure Design
  - Scour analysis
- Interests / Expertise:
  - Scour Countermeasures
  - 2D modeling
- Personal / Fun Facts:
  - Married; 3 kids
  - Deer hunting



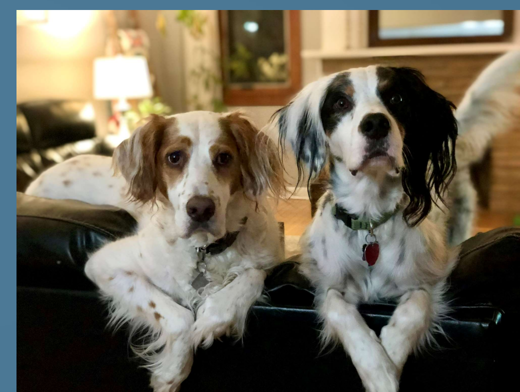
Jon Resheske

Structural Engineer

Consultant Review Unit

Design Section

- WisDOT / BOS
  - Joined BOS in 2011
- Education:
  - UW-Madison
  - BS in Civil & Environmental Engineering
- Main Job Responsibilities:
  - Consultant Bridge Project Engineer
- Interests / Expertise:
  - Southwest Region Liaison
  - USH 51 Corridor Liaison
  - Noise Walls
  - Structure Certification
- Personal / Fun Facts:
  - Married to Britt 8 Years
  - Daughter Freya (2)
  - Have 2 English Setters: Hudson (11) & Dublin (6)
  - Love to Cook
  - Collect Vinyl Records



- WisDOT / BOS since 2021
- Education:
  - AS - Computer Programming
- Main Job Responsibilities:
  - Record Keeping (e-submits, HSIS/ViewBridge, etc.)
  - General Support Activities
- Personal / Fun Facts:
  - Enjoy wilderness canoeing with my husband, John. We've done fly-ins into the Canadian interior and paddled out. No clocks or technology allowed on these trips ;-)
  - Big Badger volleyball fan.
  - 17 years of my career was in IT Automation Security & IT Compliance.

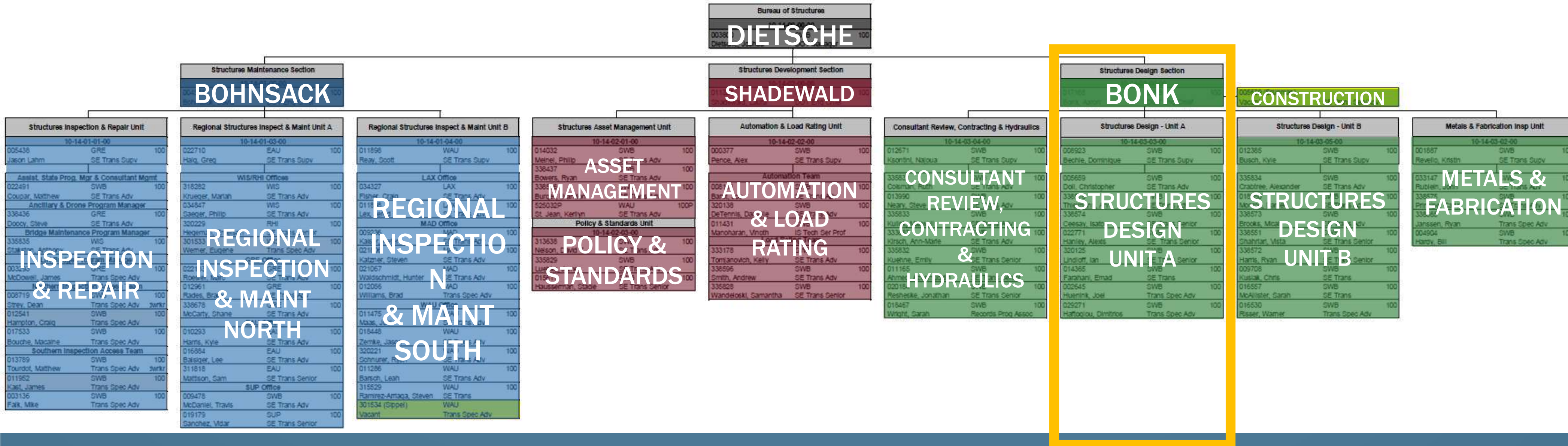
Sarah Wright

Records Program Associate

Consultant Review Unit

Design Section

Bureau of Structures Org Chart



Dominique Bechle, PE

Supervisor

Design Unit "A"

Design Section

- WisDOT / BOS since 2016
- Education:
  - BSCE UW-Madison....Go Badgers!
- Main Job Responsibilities:
  - Supervise the design unit – assign & review work; coordinate with DOT Regions, Consultants and Industry on various questions/topics related to structures
- Interests / Expertise:
  - Structure Design, Staff Development, Design & Detailing Process Improvement
- Personal / Fun Facts:
  - Mom of 2 boys, Oscar (15) and Oliver (13)
  - Identical twin
  - Love cooking, running, live music, and most of all adventuring with my husband and boys!

Chris Doll, PE

Structural Engineer

Design Unit "A"

Design Section

- WisDOT / BOS since 2010
- Education:
  - B.S. Civil Engineering- UW-Madison
- Main Job Responsibilities:
  - Bridge and retaining wall design
- Interests / Expertise:
  - Structural Analysis and Behavior
- Personal / Fun Facts:
  - Married, 2 kids

Ann Thielmann, PE

Structural Engineer

Design Unit "A"

Design Section

- WisDOT / BOS since 2021
- Education:
  - BSCE UW-Madison
- Main Job Responsibilities:
  - Design, Draft, Check new structures and rehabs
  - Liaison for the Mason St/STH 54 bridge
- Interests / Expertise:
  - Stream Crossings, Rehabs
  - Construction Inspection

- Personal / Fun Facts:
  - Live in DeForest w/my husband and two dogs
  - Enjoy baking, golfing, reading and kickball

Isatou Ceesay

Structural Engineer

Design Unit “A"

Design Section

- WisDOT / BOS Since 2020
- Education:
  - National Taipei University of Technology
    - B.S Civil Engineering
  - National Cheng Kung University
    - M.S Structural Engineering
- Main Job Responsibilities:
  - Design, draft, and check structures such as bridges, box culverts, noise barriers, and retaining walls. Provide quantity calculations and cost estimate of all designs.
- Interests / Expertise:
  - Bridge Design
  - Box culverts
- Personal / Fun Facts:
  - Married with 5 kids
  - Enjoy eating out and taking vacations

Lexi Hanley

Structural Engineer

Design Unit "A"

Design Section

- WisDOT / BOS since 2021
- Education:
  - University of Minnesota Duluth
    - B.S. Civil Engineering with structural emphasis
- Main Job Responsibilities:
  - Design, draft, and check plans for new or rehabilitated structures.
- Interests / Expertise:
  - Single span bridges, culverts
- Personal / Fun Facts:
  - Two cats (a Mother Millie and her kitten Minnie)
  - Taken a tour of the White House in Washington D.C.

Ian Lindloff

Structural Engineer

Design Unit “A"

Design Section

- WisDOT / BOS since 2021
- Education:
  - UW – Platteville
    - B.S. Civil Engineering, Structural Emphasis
- Main Job Responsibilities:
  - Design, drafting, and checking of various structures & structure plans
- Interests / Expertise:
  - Bridge Design
- Personal / Fun Facts:
  - Built my own personal PC
  - D&D enthusiast and a "forever DM"

Emad Farahani

Structural Engineer

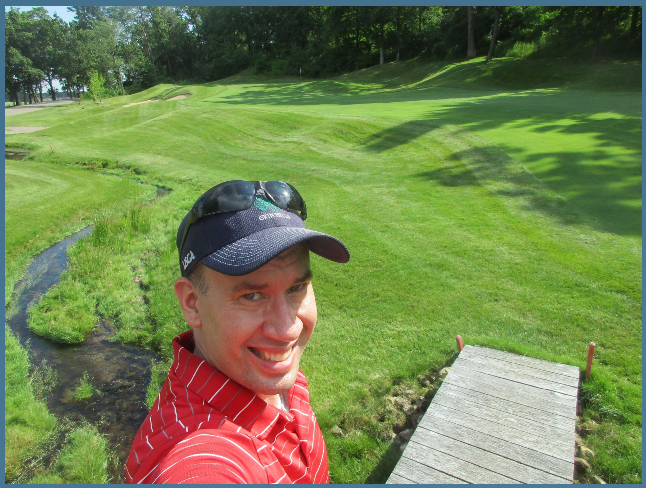
Design Unit "A"

Design Section

- WisDOT / BOS since 2026
- Education:
  - PhD Candidate in Civil Engineering – Structural Engineering
    - Marquette University
  - MSc in Civil Engineering – Earthquake Engineering
    - University of Tehran
- Main Job Responsibilities:
  - Design, draft, and check plans for new or rehabilitated structures
- Interests / Expertise:
  - Structural Analysis and Design!
- Personal / Fun Facts:
  - Enjoy playing the piano, working out, running, and last but not least reading *applied* philosophy!

WISCONSIN DEPARTMENT OF TRANSPORTATION

BUREAU OF STRUCTURES



- WisDOT / BOS since 2000
- Education:
  - UW-Sheboygan – Liberal Arts Summer Courses (1998-99)
  - MATC-Milwaukee – Civil Engineering Technology Associate's Degree (1998-2000)
  - UW-Madison – Engineering Courses (2000-2004)
- Main Job Responsibilities:
  - Drafting & Detailing Structure Plans
- Interests / Expertise:
  - Playing golf, Watching and cheering on my favorite Wisconsin Sports teams and traveling to different neat places in the United States
- Personal / Fun Facts:
  - I helped with the construction of the Brewers stadium when it was being built back in 2000 and I was once in the audience on "The Price is Right" back in 2012.

Joel Huenink

Structural Detailer

Design Unit "A"

Design Section

Dimitrios Haftoglou

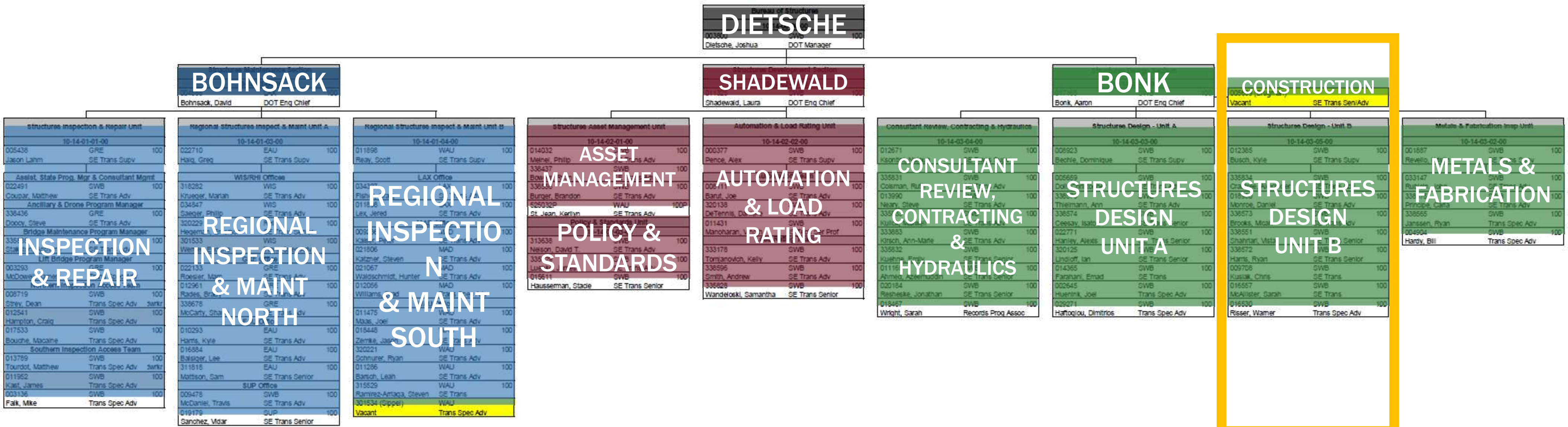
Structural Detailer

Design Unit "A"

Design Section

- WisDOT / BOS since 2023
- Education:
  - Midlands Technical College (SC)
- Main Job Responsibilities:
  - Drafting / Detailing Structure Plans
- Interests / Expertise:
  - Started drafting in 2006, worked on Structural, Roadway, Civil construction plans.
- Personal / Fun Facts:
  - Married to Beth (2005), two kids Henry and Penny. Enjoy Soccer, Golf and College Football.

Bureau of Structures Org Chart



BUREAU OF STRUCTURES

Kyle Busch, PE

Supervisor

Design Unit “B”

Design Section

- WisDOT / BOS since 2023
- Education:
  - BS, UW-Madison
  - MS, University of Texas at Austin
- Main Job Responsibilities:
  - Supervise design unit, review plans and estimates, coordination with DOT Regions and consultants.
  - Interests / Expertise: structural analysis, bridge design, load rating, bridge inspection
- Personal / Fun Facts:
  - Wife (Julia) is also a civil engineer.
  - Son (Isaac) born December 2022.
  - Love to hangout with our dog (Avett), he’s an energetic hound-mix.
  - Enjoy biking, XC skiing, running, hiking

Alex Crabtree, PE

Structural Engineer

Design Unit "B"

Design Section

- WisDOT / BOS since 2010
- Education:
  - Milwaukee School of Engineering
    - B.S. Architectural Engineering
    - M.S. Structural Engineering
- Main Job Responsibilities:
  - Design
- Interests / Expertise:
  - Structure Design, Ancillary structures: Sign structures & Traffic Signals
- Personal / Fun Facts:
  - Married with 2 kids

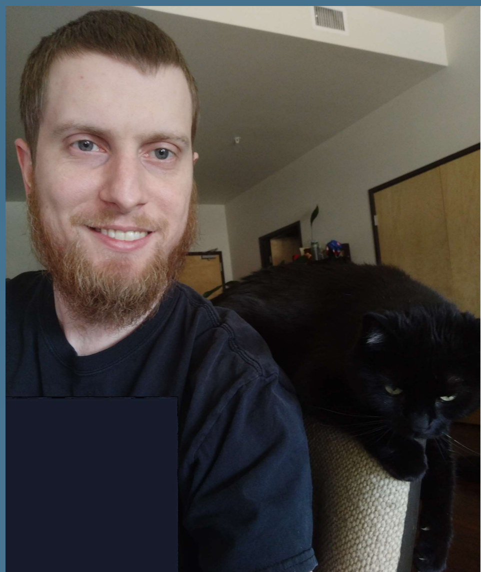
Dan Monroe, PE

Structural Engineer

Design Unit "B"

Design Section

- WisDOT / BOS since 2015
- Education:
  - UW-Platteville
  - B.S. Civil Engineering
- Main Job Responsibilities:
  - Design, Draft, Design Check & Plans Check Bridges, Culverts & Retaining Walls
  - Northwest Region Structures Liaison
- Interests / Expertise:
  - Rehab projects
  - Bridge Design/Retaining Walls
- Personal / Fun Facts:
  - Married, 4 kids
  - Enjoy music and automotive
  - Once tackled a shoplifter at West Towne mall



Micah Brooks, PE

Structural Engineer

Design Unit "B"

Design Section

- WisDOT / BOS since 2014
- Education:
  - UW-La Crosse (B.S. Physics)
  - UW-Madison (B.S. Civil Engineering)
- Main Job Responsibilities:
  - Structure design, plans drafting, QC of same
- Interests / Expertise:
  - Box culverts, sign structures, FRP
- Personal / Fun Facts:
  - Muay Thai enthusiast, cat owner, sci-fi & fantasy aficionado

Vista Shahriari, PE

Structural Engineer

Design Unit “B"

Design Section

- WisDOT / BOS since 2022
- Education:
  - University of Wisconsin – Madison
    - Ph.D. in Structural Engineering (2021)
  - University of Tehran:
    - B.S. in Civil Engineering (2010)
    - M.S. in Structural Engineering (2012)
- Main Job Responsibilities:
  - Designing, Drafting, & Checking
- Interests / Expertise:
  - Structural Design/Analysis
  - Rehabs
  - Research / Learning
- Personal / Fun Facts:
  - Married (Afshin) with 1 kid (Raunika)
  - Enjoy cooking and baking

Ryan Harris, PE, SE

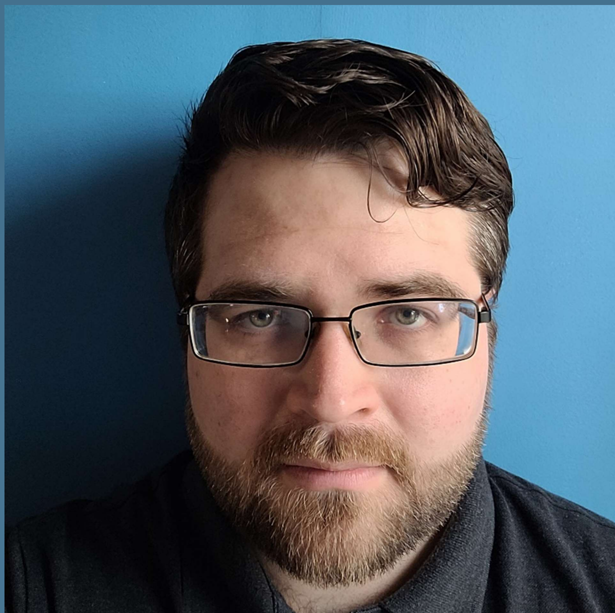
Structural Engineer

Design Unit "B"

Design Section

- WisDOT / BOS since 2021
- Education:
  - UW Milwaukee
  - B.S. Civil Engineering (2021)
  - M.S. Civil-Structural Engineering (2024)
- Main Job Responsibilities:
  - Designing, Drafting, & Checking
- Interests / Expertise:
  - Learning & Teaching
- Personal / Fun Facts:
  - Married, no kids yet

BUREAU OF STRUCTURES



Chris Kusiak

Structural Engineer

Design Unit “B”

Design Section

- WisDOT / BOS since 2023
- Education:
  - UW-Platteville
    B.S. Civil Engineering
  - Purdue University
    M.S. Structural Engineering
- Main Job Responsibilities:
  Designing, drafting and checking new roadway structures and rehab. projects
- Interests / Expertise:
  Bridge design / bridge load rating, machine learning and big data

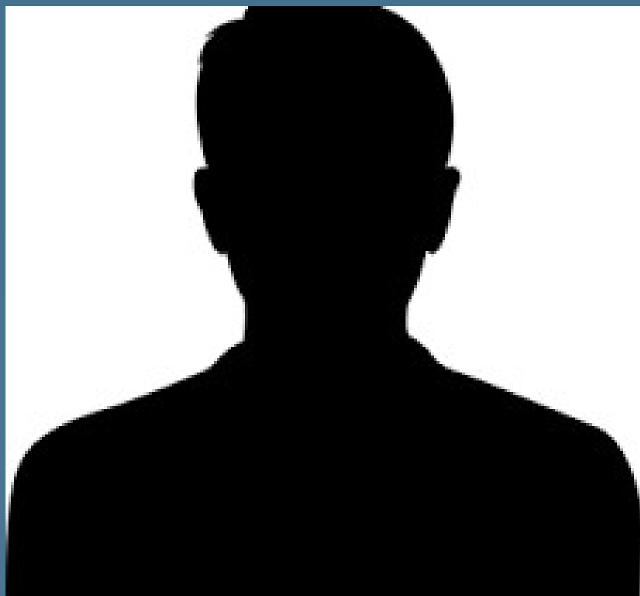
Sarah McAllister

Structural Engineer

Design Unit "B"

Design Section

- WisDOT / BOS since 2025
- Education:
  - UW-Platteville, 2024
    - B.S. Civil Engineering
- Main Job Responsibilities:
  - Designing, drafting, and checking new roadway structure and rehabilitation projects
- Interests / Expertise:
  - Concrete technologies, learning
- Personal / Fun Facts:
  - Getting married in June!
  - Love to be outside with our dog
  - Enjoy cooking and baking
  - Huge fantasy reader
  - Extremely crafty



Warner Risser

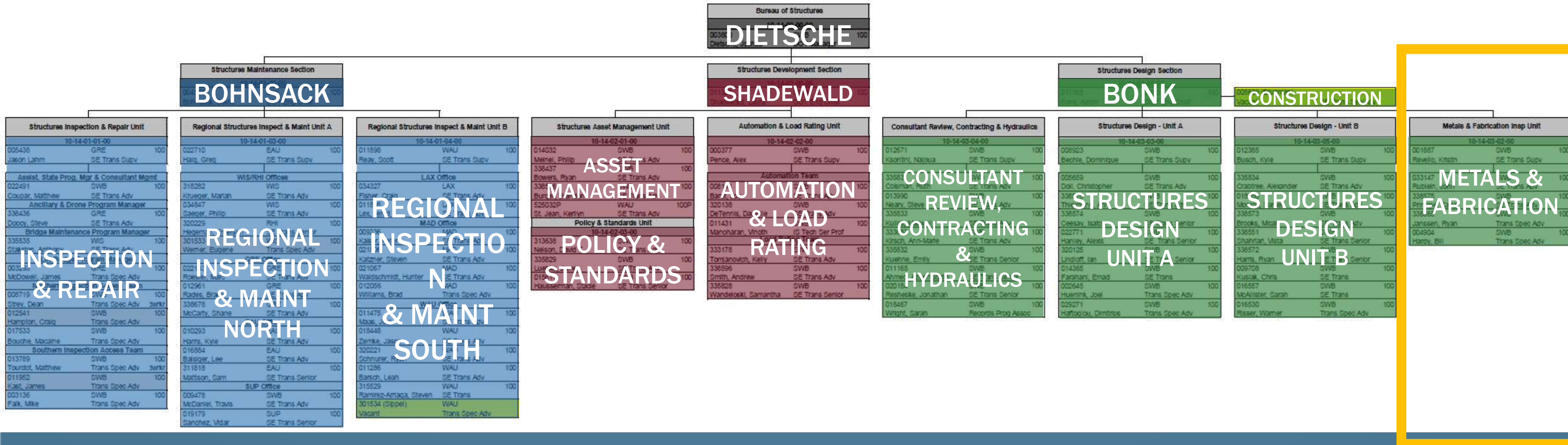
Structural Detailer

Design Unit "B"

Design Section

- WisDOT / BOS since 2000
- Education:
  - Colorado Mountain College-Liberal Arts
  - MATC / Madison-Civil Engineering Technology
- Main Job Responsibilities:
  - Drafting / Detailing Structure Plans
- Interests / Expertise:
  - Expert Draftsman / Interest all things Bryan Adams
  - Typically the draftsman for the Most Complex Bridges
- Personal / Fun Facts:
  - Downhill Skiing, Listening to Music, Playing with guitars
  - Kentucky Derby Horses & Names and watching them race!

Bureau of Structures Org Chart



Kristin Revello, PE

Supervisor

Metals & Fabrication Inspection Unit

Design Section

- WisDOT / BOS since 2000
  - NE Region SET, 1998-1999, Design & Construction
  - NE Region PDS Design & Construction 2000-2001
- Education:
  - UW-Platteville
    - B.S. in Civil Engineering - Structural Emphasis
    - B.S. in Mathematics
- Main Job Responsibilities:
  - Structure fabrication and inspection program oversight
- Interests / Expertise:
  - Fabrication
  - Represent BOS on the WisDOT Prestressed Girder Plant Certification Review Team (CRT)
- Personal / Fun Facts:
  - I volunteer as a Firefighter and Advanced EMT

WISCONSIN DEPARTMENT OF TRANSPORTATION

BUREAU OF STRUCTURES

John Rublein, PE

Structural Engineer

Metals & Fabrication Inspection Unit

Design Section

- WisDOT / BOS since 2022
- Education:
  - BSCE UW-Madison 2001
- Main Job Responsibilities:
  - Concrete shop drawing review
- Interests / Expertise:
  - Bridges, Earth & Water Retaining Structures, Hydraulics, Materials
- Personal / Fun Facts:
  - I enjoy bicycling and music

Carla Principe, PE

Structural Engineer

Metals & Fabrication Inspection Unit

Design Section

- WisDOT / BOS since 2014
- Education:
  - B.S. Civil Engineering – University of Puerto Rico
  - M.S. Civil Engineering – UW Madison
- Main Job Responsibilities:
  - Review shop drawings for steel structures and components, fabrication and inspection procedures, repairs and modifications
  - BOS Fabrication Library management
- Interests / Expertise:
  - Steel bridges, Fabricated Bridge Components, Materials
- Personal / Fun Facts:
  - I enjoy making attempts at rock climbing and biking

Ryan Janssen, CWI

Structures Fab Inspector

Metals & Fabrication Inspection Unit

Design Section

- WisDOT / BOS since 2018
- Education:
  - Weld Inspection Training
  Wisconsin Welding Services Green Bay
- Main Job Responsibilities:
  - Provide Quality Assurance Inspections at fabricators facilities
- Interests / Expertise:
  - Fabrication, Inspection, Welding
- Personal / Fun Facts:
  - Ranching, Hunting, Fishing , Softball

Bill Hardy, CWI

Structures Fab Inspector
Metals & Fabrication Inspection Unit
Design Section

- WisDOT / BOS since 2023
- Education:
  - South Branch Valley Technical Center-Combination Welding (93-94)
  - US Navy-Builder (94-99)
- Main Job Responsibilities:
  - Steel Fab Insp, Welding Inspection, NDT
- Interests / Expertise:
  - Welding, NDT
- Personal / Fun Facts:
  - Four overseas deployments to various Mediterranean and South Pacific islands.

Trans 213, WiSAMS, and the Local Bridge Program

Laura Shadewald

WisDOT Structures Development Chief

Structural Engineers Symposium

May 26, 2026

Why Change Trans 213?

- What is Trans 213?
  - State Statute 84.18
  - Administrative Code – Defines the Local Bridge Program
    - Eligibilty
    - Entitlement
  - Local Bridge Program
    - "…relating to the method of determining eligibility for funding the acceleration of the reconstruction or rehabilitation of seriously deteriorating local bridges."

Why Change Trans 213?

- Aim for “right work, right time” to get as much life out of a bridge as possible
  - “Deficient bridge” requirement makes rehab work very difficult
    - Must be NBI 4 (poor) or less
  - Sufficiency rating is an outdated measure **(eliminated in 2012)**
    - Doesn’t fully capture bridge condition or needed work
    - Data used to calculate is obsolete
  - “10-year rule” is no longer a Federal rule
    - Could make preservation work difficult

Why Change Trans 213?

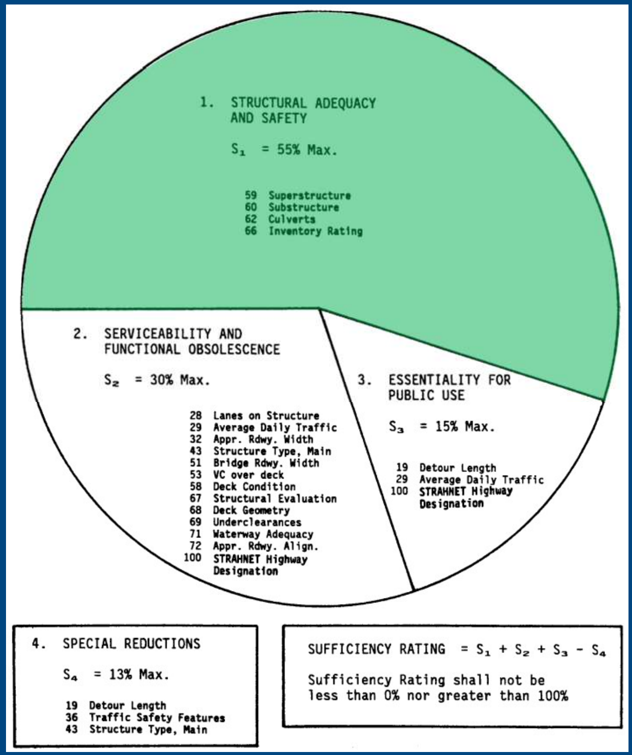
- Rehabilitation vs. Replacement - Trans 213.03 (2)
  - Sufficiency Rating (SR) < 80 = Rehab eligible
  - SR < 50 = Replacement eligible

(2) REPLACEMENT AND REHABILITATION. (a) An eligible local bridge project under sub. (1) may be for replacement of the bridge if the bridge has a current sufficiency rating of less than 50.

(b) An eligible local bridge project under sub. (1) may be for rehabilitation of the bridge if the bridge has a sufficiency rating of 80 or less. An engineering study shall be undertaken and funded independently by the eligible applicant that indicates that any rehabilitation would be cost effective, would extend the life of the bridge by at least 10 years, and would correct all deficiencies. If conditions exist that would prevent the completed improvement from correcting all deficiencies, the department may determine if the proposed project is eligible based on safety and the public interest.

Why Change Trans 213?

- SR is 55% based on NBI condition rating
  - Element ratings <u>not</u> included
- 45% other items
  - # of lanes, roadway width, detour length, etc.
- Essentially a replacement-only program
  - Criteria makes rehab, preservation very difficult
  - For rehab, SR < 80, but also deficient
    - At that point, most rehab options aren’t appropriate



Why Change Trans 213?

- Rehab and preservation in addition to replacement work
  - Understand funding, other considerations don't always allow for the "ideal" treatment
  - Do the best we can – don't want to throw away usable life
    - Car analogy

- Sufficiency Rating-based eligibility criteria sometimes stands in the way of this goal

Overview of the *New** Trans 213

- Goals:
  - Do the right work on the right bridges at the right time
  - Remove barriers for local owners to submit needed bridge work

- Still need to connect Trans 213 to State Statute 84.18
  - 1st eligibility screening

  - "The bridge has observed deficiencies documented in the most recent inspection."

Overview of the *New** Trans 213

- 2nd eligibility screening
  - "The bridge meets the criteria noted in Table 1 or Table 2 below."

		Preservation	Rehabilitation
Deck NBI Rating	9	X	
	8	X	
	7	X	
	6	X	X
	5		X
	4		X
	3		X
	2		X
	1		X
	0		X

		Rehabilitation	Reconstruction
Superstructure, Substructure, or Culvert NBI Rating	9	X	
	8	X	
	7	X	
	6	X	X
	5		X
	4		X
	3		X
	2		X
	1		X
	0		X

Overview of the *New** Trans 213

- 3rd eligibility screening: Bridge Project Scope Eligibility List
  - Bridges on list can be submitted for funding consideration

Structure #	Region	County	Owner	Municipality	Feature On	Feature Under	Deck Area (sf)	Deck NBI	Superstructure NBI	Substructure NBI	Culvert NBI	Proposed Work Concept
B020423	NW	ASHLAND	COUNTY	T-MARENGO	CTH GG	MCCARTHY CREEK	655	5	3	4	N	REPLACE STRUCTURE
B030725	NW	BARRON	COUNTY	C-CHETEK	CTH SS	CHETEK RIVER	4305	5	4	5	N	NO WORK CONCEPT IS PROPOSED.
B040018	NW	BAYFIELD	COUNTY	T-NAMAKAGON	D	NAMEKAGON LAKE	6583	5	6	4	N	NO WORK CONCEPT IS PROPOSED.
B040036	NW	BAYFIELD	TOWN	T-MASON	BIBON RD	WHITE RIVER	2472	6	6	4	N	NO WORK CONCEPT IS PROPOSED.
B040413	NW	BAYFIELD	TOWN	T-BARNES	SOUTH SHORE RD	EAU CLAIRE LAKES	935	5	5	4	N	REPLACE STRUCTURE
B050008	NE	BROWN	COUNTY	T-NEW DENMARK	KB	NESHOTA RIVER	1935	4	4	5	N	REPLACE STRUCTURE
B050026	NE	BROWN	COUNTY	T-HOBART	FF HILLCREST RD	DUCK CREEK	3650	4	8	5	N	CONCRETE OVERLAY

B050008	REPLACE STRUCTURE
B050026	CONCRETE OVERLAY

Overview of the *New** Trans 213

- 3rd eligibility screening: Bridge Project Scope Eligibility List
  - Bridges <u>not</u> on list can be submitted, as long as they meet the 1st & 2nd eligibility screening **AND** with engineering study justifying work
    - Reviewed by WisDOT Bureau of Structures

"If the bridge in question does not appear on the list as replacement-eligible, the local owner may submit an application with a replacement scope, but it shall be accompanied by an engineering study providing justification. The justification should consider the timing of the proposed project, consideration of alternative scopes, safety of the traveling public, maintaining serviceability of the structure, and cost-benefit of the proposed scope versus other viable options."

Overview of the *New** Trans 213

- REVIEW - three-step screening:
  1. Must have observed deficiencies (cracking, rust, etc.)
  2. Bridges condition meets the requirements of the eligibility tables
  3. Bridge has a work action on the bridge project scope eligibility list

  - If a bridge only meeting step 1 and 2, can still submit with an engineering study to justify the work

Bridge Eligibility List: How is it developed?

Current Bridge Asset Management

- To assist with planning and programming bridge work, WisDOT developed the Wisconsin Structures Asset Management System (WiSAMS)
  - WiSAMS is a tool, computer software
  - Developed, maintained by WisDOT engineers
- Idea was to use products off of previous efforts
  - Use bridge inventory data and condition data combined with preservation policy in order to systematically determine bridge preservation, rehabilitation, and replacement needs at a network-level.

Current Bridge Asset Management

Philosophy behind WiSAMS

- Replace Structure
- Replace Superstructure
  - (often defaults to Replace Structure)
- Replace Deck
- Thin Polymer Overlay
- Concrete Overlay

Sequencing

BUREAU OF STRUCTURES

WiSAMS rules

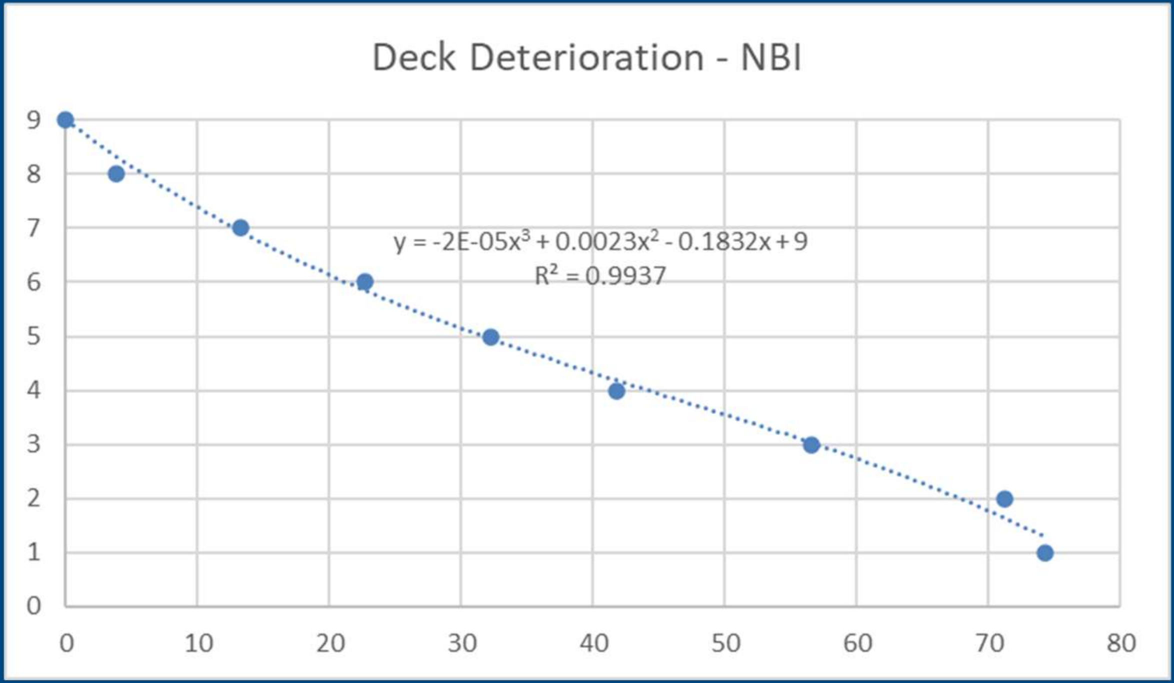
Rules listed in order of evaluation in each year of analysis. See Bridge Manual 41.2.1 for additional explanation of WiSAMS analysis.

Rule ID	Formula	Work Description
1	NSUB <= 3 AND (SCCR = TRUE OR LOADCAP <5 OR NSUP <=3 OR ((NDEC <=3 OR FRCR = TRUE) AND BRIDGEAGE >50))	REPLACE STRUCTURE
3	NSUB < 3.5 AND (Q3OF206 + Q4OF206 + Q3OF228 + Q4OF228)/(QTOF206 + QTOF228) > 0.50 OR (Q4OF206 + Q4OF228)/(QTOF206 + QTOF228) > 0.30	REPLACE STRUCTURE (added for local program only)
10	BRIDGEAGE >50 AND NSUB <4 AND NSUP <=3 AND NDEC <=3	REPLACE STRUCTURE
11	QTOF38 = 0 AND NSUP <3.5 AND NSUB >4.5 AND NDEC <=4 AND (((Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1080PARENT >0.15) OR ((Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1130PARENT >0.15))	REPLACE SUPERSTRUCTURE
59	QTOF38 >0 AND NSUB >4.5 AND (NDEC <=4 AND (((Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1080PARENT >0.20) OR ((Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1130PARENT >0.20)))	REPLACE SUPERSTRUCTURE
12	NSUP <3.5 AND LOADCAP <=4 AND NSUB >4.5	REPLACE SUPERSTRUCTURE
18	SCCR = FALSE AND LOADCAP <=4 AND BRIDGEAGE <=40 AND NDEC <=4 AND (((Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1080PARENT >0.15) OR ((Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1130PARENT >0.15)) AND NSUB >=5	REPLACE SUPERSTRUCTURE
63	ADTON >= 15000 AND (BRIDGEAGE < 75 AND LOADCAP = 5 AND QTOF38 = 0 AND ((Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1080PARENT >0.14 OR (Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1130PARENT >0.14) AND NDEC <=4 AND NSUB >3.5 AND NSUP >3.5) AND ((BRIDGEAGE > 25 AND NSUP >4 AND NSUB >4 AND (((Q3OF8516+Q4OF8516)/QTOF8516) >0.25)))	REPLACE DECK / THIN POLY OVLY / PAINT
37	(BRIDGEAGE < 75 AND LOADCAP = 5 AND QTOF38 = 0 AND ((Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1080PARENT >0.14 OR (Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1130PARENT >0.14) AND NDEC <=4 AND NSUB >3.5 AND NSUP >3.5) AND ((BRIDGEAGE > 25 AND NSUP >4 AND NSUB >4 AND (((Q3OF8516+Q4OF8516)/QTOF8516) >0.25)))	REPLACE DECK / PAINT (COMPLETE)
62	ADTON >= 15000 AND BRIDGEAGE < 75 AND LOADCAP = 5 AND QTOF38 = 0 AND ((Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1080PARENT >0.14 OR (Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1130PARENT >0.14) AND NDEC <=4 AND NSUB >3.5 AND NSUP >3.5	REPLACE DECK / THIN POLYMER OVERLAY
19	BRIDGEAGE < 75 AND LOADCAP = 5 AND QTOF38 = 0 AND ((Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1080PARENT >0.14 OR (Q2OF1080 + Q3OF1080 + Q4OF1080 + Q3OF1130 + Q4OF1130)/QTOF1130PARENT >0.14) AND NDEC <=4 AND NSUB >3.5 AND NSUP >3.5	REPLACE DECK

Current Bridge Asset Management

Projecting future condition using deterioration curves

- Project forward one year, run again
- Project forward two years, run again
- And so on…
- Look at a 6-year window for eligibility



Current Bridge Asset Management

How does WiSAMS work?

Inventory Data
Condition Data
(HSIS)

+

Preservation
Policy
(WisDOT Bridge
Manual Chapter 42)

→

Scope
Eligibility

Current Bridge Asset Management

Run WiSAMS for all local bridges to produce eligibility list

Bridge Project Scope Eligibility List
WisDOT Bureau of Structures
Data from February 2025, *Amended 8/25/2025

If a bridge is not listed below, the inspection data did not support work when this list was generated.

County	Region	StructureId	Owner	Municipality	Service Feature On	Service Feature Under	Last Inspection Date	Inspected NBI	Work Concept	Deck Area	Roadway Area
ASHLAND	5-NW	B020007	COUNTY	T/CHIPPEWA	CTH GG	E FK CHIPPEWA RIVER	8/16/2024	5;7;6	(03) OVERLAY DECK - CONCRETE (Rehab)	2375	2241
ASHLAND	5-NW	B020010	COUNTY	T/SHANAGOLDEN	CTH GG	MOOSE RIVER	8/16/2024	6;6;6	(03) OVERLAY DECK - CONCRETE (Rehab)	1186	1095
ASHLAND	5-NW	B020038	TOWN	T/JACOBS	GEORGE BAY ROAD	E FK CHIPPEWA RIVER	8/16/2024	6;6;5	(03) OVERLAY DECK - CONCRETE (Rehab)	2525	2330
ASHLAND	5-NW	B020066	TOWN	T/PEEKSVILLE	SINK HOLE RD (Dead End)	E FK CHIPPEWA RIVER	8/16/2024	8;8;9	(77) OVERLAY DECK - THIN POLYMER	1391	1260
ASHLAND	5-NW	P020006	TOWN	T/CHIPPEWA	CUT OFF ROAD	BUTTERNUT CREEK	8/16/2024	6;5;5	(03) OVERLAY DECK - CONCRETE (Rehab)	1019	909
BARRON	5-NW	B030002	CITY	C/RICE LAKE	MAIN AVE	RED CEDAR RIVER	8/23/2024	9;9;7	(77) OVERLAY DECK - THIN POLYMER	17889	13988
BARRON	5-NW	B030085	COUNTY	T/CHETEK	M	POKEGAMA FLOWAGE	7/28/2024	5;5;6	(03) OVERLAY DECK - CONCRETE (Rehab)	3190	2645
BARRON	5-NW	B030200	COUNTY	T/DOYLE	CTH NN	SPRING CREEK	4/28/2023	9;9;9	(77) OVERLAY DECK - THIN POLYMER	1316	1215
BARRON	5-NW	B030201	COUNTY	T/SIOUX CREEK	CTH A	SIOUX CREEK	4/28/2023	9;9;9	(77) OVERLAY DECK - THIN POLYMER	1706	1575
BARRON	5-NW	P030019	TOWN	T/STANFOLD	20 1/2 AVE	ENGLE CREEK	5/23/2024	6;7;6	(03) OVERLAY DECK - CONCRETE (Rehab)	1138	1001
BARRON	5-NW	P030037	COUNTY	T/CHETEK	D	CHETEK RIVER	7/28/2024	7;6;5	(03) OVERLAY DECK - CONCRETE (Rehab)	945	891
BARRON	5-NW	P030059	TOWN	T/OAK GROVE	26TH AVE	BRILL RIVER	5/17/2024	7;7;5	(03) OVERLAY DECK - CONCRETE (Rehab)	1514	1483
BARRON	5-NW	P030102	TOWN	T/CLINTON	16TH AVE	HAY RIVER	5/11/2024	5;5;7	(03) OVERLAY DECK - CONCRETE (Rehab)	855	840
BARRON	5-NW	P030104	TOWN	T/CLINTON	15TH AVE	HAY RIVER	5/11/2024	6;6;6	(98) OVERLAY DECK - CONCRETE / PAINT	1051	1022
BARRON	5-NW	P030109	TOWN	T/CLINTON	11TH ST	VERMILLION RIVER	5/8/2024	6;8;8	(03) OVERLAY DECK - CONCRETE (Rehab)	1985	1818
BARRON	5-NW	P030119	TOWN	T/ARLAND	10 1/2 AVE	HAY RIVER	8/18/2024	7;6;6	(98) OVERLAY DECK - CONCRETE / PAINT	2010	1950
BARRON	5-NW	P030125	TOWN	T/CHETEK	9TH AVE	MOOSE EAR CREEK	7/30/2024	6;5;4	(91) REPLACE STRUCTURE	972	948
BARRON	5-NW	P030126	TOWN	T/CHETEK	12TH AVE	MOOSE EAR CREEK	6/24/2024	7;7;5	(03) OVERLAY DECK - CONCRETE (Rehab)	921	900
BARRON	5-NW	P030128	TOWN	T/DOVRE	5 3/4 Avenue	TEN MILE CREEK	8/23/2024	7;7;7	(03) OVERLAY DECK - CONCRETE (Rehab)	1509	1423
BARRON	5-NW	P030129	TOWN	T/DOVRE	5TH AVE	BEAVER CREEK	8/23/2024	7;6;7	(98) OVERLAY DECK - CONCRETE / PAINT	660	508
BARRON	5-NW	P030136	TOWN	T/DALLAS	2 1/2 AVENUE	UPPER PINE CREEK	12/11/2024	4;4;6	(91) REPLACE STRUCTURE	2172	2063
BARRON	5-NW	P030139	TOWN	T/PRAIRIE FARM	1ST AVE	HAY RIVER	8/21/2024	7;7;7	(03) OVERLAY DECK - CONCRETE (Rehab)	3545	3311
BARRON	5-NW	P030142	TOWN	T/VANCE CREEK	4 1/2 AVE	S FK HAY RIVER	6/9/2024	6;8;7	(03) OVERLAY DECK - CONCRETE (Rehab)	1582	1488

Current Bridge Asset Management

WiSAMS depends on good input

- Accurate inspection information is critical!
- Both NBI <u>and</u> element information
- Notes can be very helpful, but don't put information ONLY in notes.
- Photos, Photos, Photos to support the data

2025 Local Program Solicitation

- DRAFT Application Numbers
  - 128 applications
    - 78 replacements
    - 50 rehabilitation
      - 5 TPO

What's my role as a Consultant?

- Quality Inspections
- Locals Familiarity
  - Ensure recommendations align with Bridge Manual Policy
- Reach out to BOS with Questions

Questions?

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Thank you!

Structrual Engineers Symposium

May 26, 2026

Standard Specification ReOrganization - Materials

Myungook (MK) Kang

WisDOT Structural Engineers Symposium

May 26th 2026

Material Specification ReOrganization

- Why are we doing this?
  - Materials specs spread across multiple locations
    - Standard Specification, CMM, APL guidance etc.
    - Materials specs are in x.3 Construction
  - What if all materials specs are consolidated into one chapter?
- Who are doing this?
  - Collaborate with multiple groups - BTS, BOS, Tech Teams

Existing specification

- 505 Steel Reinforcement
  - 505.1 Description
  - 505.2 Materials
    - Bar Steel Reinforcement
    - High Strength Bar Steel Reinforcement
    - Coated High-Strength Bar Steel Reinforcement
    - Welded Steel Wire
    - Dowel and Tie Bars
    - Bar Couplers
  - 505.3 Construction (Stay)
  - 645.4 Measurement (Stay)
  - 645.5 Payment (Stay)

505 Steel Reinforcement

505.1 Description

(1) This section describes furnishing and placing bar steel, high-strength bar steel or coated high-strength bar steel.

505.2 Materials

505.2.1 General

(1) Use deformed reinforcing bars unless the contract specifies otherwise.

(2) Unless the plans show otherwise or the special provisions specify otherwise, use the deformed type for all bar steel, all high-strength bar steel, and all coated high-strength bar steel reinforcement. If plain, round steel reinforcement is specified, conform to ASTM A675, grade 80.

(3) Use fabrication tolerances for straight and bent bars specified in Subsection 4.3, Tolerances, of the American Concrete Institute Committee 315, in the American Concrete Institute Detailing Manual.

(4) Unless the contract specifies otherwise, submit a manufacturer's certified report of test or analysis showing the reinforcement conforms to the specifications to the engineer before incorporating the reinforcement into the work.

505.2.2 Bar Steel Reinforcement

(1) Conform to AASHTO M31, type S or type W.

505.3 Construction

505.3.1 General

Store reinforcement above ground on platforms, skids, or other supports. Protect from mechanical injury and deterioration from exposure. Store epoxy-coated reinforcement on wooden cribbing and handle without dragging or dropping using padded or non-metallic slings.

505.4 Measurement

(1) The department will measure the Bar Steel Reinforcement bid items by the pound acceptably completed. The department will compute the bar weight from the nominal weights for corresponding sizes for deformed bars in AASHTO M31. The department will not measure the following:

505.5 Payment

(1) The department will pay for measured quantities at the contract unit price under the following bid items:

ITEM NUMBER	DESCRIPTION	UNIT
505.0100	Bar Steel Reinforcement Structures	LB
505.0400	Bar Steel Reinforcement HS Structures	LB
505.0600	Bar Steel Reinforcement HS Coated Structures	LB
505.0900-0919	Bar Couplers (size)	EACH

New Specification

- 505 Steel Reinforcement
  - 505.1 Description
  - 505.2 Materials
    - Only with links to materials
  - 505.3 Construction (Stay)
  - 645.4 Measurement (Stay)
  - 645.5 Payment (Stay)

505 Steel Reinforcement

505.1 Description

(1) This section describes furnishing and placing bar steel, high-strength bar steel or coated high-strength bar steel.

505.2 Materials

(1) Provide materials as specified in:

Bar Steel Reinforcement	710.2
Reinforcement Coating	710.3
Welded Steel Wire Fabric Concrete Welded Steel Wire Fabric Concrete Reinforcement	710.4
Dowel Bars and Tie Bars	710.5
Bar Couplers	710.6

505.3 Construction

505.3.1 General

(1) Store reinforcement above ground on platforms, skids, or other supports. Protect from mechanical injury and deterioration from exposure. Store epoxy-coated reinforcement on wooden cribbing and handle without dragging or dropping using padded or non-metallic slings.

(2) Cover epoxy-coated bars in storage, or placed in a bridge deck mat, with an opaque engineer-approved material to prevent cumulative exposure to sunlight for more than 2 months before being embedded in concrete. Include portions of partially embedded bars left exposed between construction stages.

(3) Mark reinforcement to facilitate inspection and checking. Ensure reinforcement is free from detrimental dirt, dust, paint, oil, or other foreign material when placed in the work. The engineer will not reject reinforcement with rust, seams, surface irregularities, or mill scale if the weight, dimensions, cross-sectional areas, and tensile properties of a hand wire-brushed test specimen conform to AASHTO M31.

(4) The contractor may field cut reinforcement by sawing, using abrasive cut-off blades, or flame cutting. Do not flame cut epoxy-coated reinforcement.

505.3.2 Bending

New specification

- 710.1 Prestressed Reinforcement
  - 710.2 Bar Steel Reinforcement
  - 710.3 Reinforcement Coating
  - 710.4 Welded Steel Wire Fabric Concrete Reinforcement
  - 710.5 Dowel Bars and Tie Bars
  - 710.6 Bar Couplers
  - No Construction/Measurement/Payment

710.1 Prestressed Reinforcement

(1) Provide high tensile strength pretensioning conforming to ASTM A416, grade 270. Use high tensile strength, 7-wire strands of the nominal diameter the plans show.

(2) Document quality control testing for high tensile strength pretensioning according to AASHTO T244 at a frequency of one test per heat.

710.2 Bar Steel Reinforcement

710.2.1 General

(1) Use deformed reinforcing bars unless the contract specifies otherwise.

(2) Unless the contract specifies otherwise, use deformed type for all bar steel, high-strength bar steel, and all coated high-strength bar steel reinforcement.

(3) Use fabrication tolerances for straight and bent bars as specified in Subsection 4.3, Tolerances, of the American Concrete Institute Committee 315, in the American Concrete Institute Detailing Manual.

(4) Provide a 5-foot cut sample piece to the engineer for each bar size that exceeds 50,000 pounds on the contract.

(5) Provide bar steel reinforcement conforming to table 710-2.

Table 710-2 Bar Steel Reinforcement Requirements

MATERIAL	TEST METHOD	CONFORMANCE
Bar Steel Reinforcement	AASHTO M31	type S or type W
Bar Steel Reinforcement - Plain, Round	ASTM A675	grade 80
High-strength Bar Steel Reinforcement	AASHTO M31[1], [4] ASTM A706[1]	grade 60, type S or type W grade 60
Coated High-strength Bar Steel Reinforcement[2], [3], [5]	AASHTO M31	grade 60, type S or type W

710.3 Reinforcement Coating

710.3.1 Fusion-bonded Powder

(1) Provide fusion-bonded powder from the APL conforming to ASTM A775 when coating high-strength bar steel reinforcement, tie bars and bar couplers. Apply the coating in a CRSI-certified epoxy coating plant.

710.3.2 Two-part Epoxy Resin (Field Repair)

(1) Provide two-part epoxy resin conforming to ASTM A775 when making field repairs to high-strength bar steel reinforcement, tie bars, and bar couplers. Limit use to the repair of damaged epoxy-coated materials only.

Specification – Bridges

Existing Specifications	New Specification
• 701 General QMP Requirement	• 700 General Materials
• 710 General Concrete QMP	• 706.1 General Concrete Requirement
• 715 QMP Concrete Pavement, Cast-in-Place Barrier and Structure	• 706.3 Concrete Category II (Structures) – for structure only
• 501 Concrete	• 706.1 General Concrete Requirements, • 707 Portland Cement, • 708 Supplementary Cementitious Materials, • 709 Concrete Chemical Admixtures, Concrete Curing Compounds and Materials
• 502 Concrete Bridges	• Various
• 503 Prestressed Concrete Members	• 712.9 Prestressed Concrete Members
• 504 Culverts, Retaining Walls, and End Walls	• 706.3 Concrete Category II (Structures) – *for culverts and retaining walls only* • 706.10 Concrete Category IX(Miscellaneous Concrete) – *for end walls*
• 509 Structure Repair	• 706.6 Concrete Category V (Concrete Bridge Deck Overlay) • 706.7 Concrete Category VI (Concrete Structure Repair) • 706.12 Mortar and Grout(Miscellaneous) – *for grout*

710 Reinforcement

Conform to the following for materials acceptance. Submit project documentation to the engineer prior to placement of the materials, or when the contract requires.

Table 710-1 Reinforcement Acceptance

SPEC	MATERIAL NAME	PRE-PROJECT	PROJECT
Prestressed Reinforcement			
710.1	High Tensile Strength Pretensioning	--	BAC, CRT, QMP, SI
Bar Steel Reinforcement			
710.2	Bar Steel Reinforcement	--	BAC, CRT, DST
	Bar Steel Reinforcement - Plain, Round	--	BAC, CRT, DST
	High-Strength Bar Steel Reinforcement	--	BAC, CRT, DST
	Coated High-Strength Bar Steel Reinforcement	--	BAC, CRT, DST
Reinforcement Coating			
710.3	Fusion-bonded Powder	APL	BAC, MCC, MISC[1]
	Two-part Epoxy Resin (Field)	--	BAC, MCC
	Thermosetting Epoxy (type B)	--	BAC, MCC
Welded Steel Wire Fabric Concrete Reinforcement			
710.4	Welded Steel Wire Fabric	--	BAC, DST, MCC, SI
Dowel Bars and Tie Bars			
710.5	Solid Dowel Bars (grade 40 or 60)	--	BAC, CRT
	Solid Dowel Bars (grade 70-80)	--	BAC, CRT
	Tubular Dowel Bars	--	BAC, CRT
	High Performance Dowel Bars	APL	BAC, CRT
	Tie Bars (grade 40 or 60)	--	BAC, CRT
Bar Couplers			
710.6	Threaded Bar Couplers	--	BAC, CRT[2]
	Alternate Bar Couplers System	--	BAC, DST, MISC[3]

[1] Provide written certification from the resin manufacturer that the coating material is the same formulation and quality as submitted to the department for prequalification testing.

[2] CRT must be based on a minimum of 3 tests, showing the threaded bar coupler capacity.

[3] Provide a copy of the manufacturer's installation instructions.

New Specification

- Summary Table of Material Acceptance

- BAC: Buy America Cert.
- CRT: Certified Report of Test or Analysis
- QMP: Quality Management Program
- DST: Department Sampling and Testing
- MCC: Manufacturers Certificate of Compliance
- SI: Shop Inspection

Changes in Structure Spec

- Structure specific categories of concrete
  - No Class and No Grade
  - Category II, V, VI for structure
  - Mixture Requirement for each category of concrete

TABLE 706-1 CONCRETE, MORTAR, AND GROUT ACCEPTANCE

SPEC	MATERIAL NAME	PRE-PROJECT	PROJECT
	General Concrete Requirements		
706.1.1	Mixing Water	DST	--
706.1.2	Concrete Aggregate Quality	APL, DST	--
706.1.3	Concrete Aggregate Gradations	--	DST, MTR
706.1.4	General Concrete Mixtures	--	DTF
706.1.5	High Early Strength (HES) and Special High Early Strength (SHES) Concrete	--	--
706.1.6	Small Quantities	--	--
706.1.7	Nonconforming Materials, Incentives, and Disincentives	--	--
	Concrete Categories[1]		
706.2	Category I (Pavements)	--	MTR, QMP
706.3	Category II (Structures)	--	MTR, QMP
706.4	Category III (Cast-in Place Barrier)	--	MTR, QMP
706.5	Category IV (Base)	--	MTR, QMP
706.6	Category V (Bridge Deck Overlay)	--	MTR, QMP
706.7	Category VI (Structure Repair)	--	MTR, QMP
706.8	Category VII (Pavement Repair/Replacement and Base Patching)	--	MTR, QMP
706.9	Category VIII (Ancillary)	--	MTR, QMP
706.10	Category IX (Miscellaneous)	--	MCC
	Colored Concrete, Mortar, Grout, and Low-Strength Backfill		
706.11	Colored Concrete	--	MCC, MISC[2], FI/VI
706.12	Hydrated Lime Mortar	--	MCC
	Masonry Cement Mortar	--	MCC
	Pre-packaged Mortar (Utility Mortar)	APL	--
	Neat Cement Bonding Grout	--	MCC, FI/VI
	Grout for Riprap	--	MCC
706.13	Controlled Low-Strength Backfill	--	MISC[3]

Supplementary CMM Guidance

- Develop document as supplementary guidance
  - Help users reference CMM for the new specifications
  - No contractual languages or conflicts against existing CMM

- CMM in WisDOT webpage is official CMM.

- Supplementary CMM Guidance is available for pilot project staff
  - It will be revised after the pilot projects.

AASHTOWare Project (AWP) - Construction and Materials Module

- Why are we doing this?
  - Web-based enterprise system
  - One stop shop for all material tracking and reporting systems
    - MTS, MRS, MIT etc. to AWP-Project
  - How AWP-Materials related to the new specification?
    - Digitize the new spec book into the AWP
    - Allows real-time tracking of compliant materials

Timeline of Implementation

- Three Pilot projects in 2026
- More pilot projects in 2027
- Full implementation
  - 2028 or after 2028

Roadway standards

- Structure and roadway resources
- Roadway standards
- Facilities development manual (FDM)
- Standard detail drawings (SDD)
- Standard specifications (Spec)
- Construction and materials manual (CMM)
- Construction notes
- Contract administration
- Major project documentation

- Facilities development manual (FDM)
- Standard detail drawings (SDD)
- Standard specifications (Spec)
- Construction and materials manual (CMM)
- Manual of test procedures (MOTP)
- Construction notes
- Contract administration
- Major project documentation

2026 Specification Reorganization Pilot Edition

2026 Reorganized Pilot Specification (PDF Download, October 17, 2025)

Related Information

Subscribe to email update service

Disadvantaged Business Enterprise (DBE) Update - 10/29/25

- New Specification in Roadway Standard

Thank You!

Questions?

BOS Initiatives/Policy & Standards Updates - Open Railings

James Luebke

WisDOT Policy and Standards Engineer

WisDOT Structural Engineers Symposium
Madison, WI
5-26-2026

Open Railings

- Overview:
  - Potential Benefits/Realized Challenges
  - Background
  - Case Study
  - Current Policy
  - Design Considerations

Open Railings

- Potential Benefits:
  - Aesthetics
  - Drainage
  - Snow removal
  - Improved sight distance

Open Railings

- Potential Benefits:
  - **Aesthetics**
  - **Drainage**
  - Snow removal
  - Improved sight distance

Open Railings

- Potential Benefits:
  - Aesthetics
  - Drainage
  - **Snow Removal**
  - **Improved Sight Distance**

Open Railings

- Realized Challenges:
  - **Edge Deterioration**
  - Railing Installation
  - Life-Cycle Costs
  - Repairability

Open Railings

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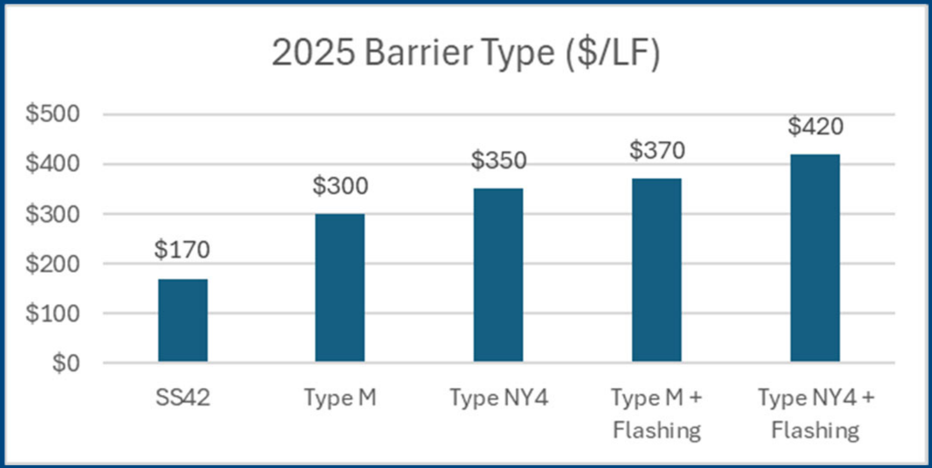


SS Flashing (new to repair): $50/LF to $190/LF (2025)

Open Railings

- Realized Challenges:
  - Edge Deterioration
  - Railing Installation
  - Life-Cycle Costs
  - **Repairability**

Open Railings

- Policy Background:
  - WBM – July 2013 - For all new bridge plans, Traffic Railings placed on structures with a design speed exceeding 45 mph shall be solid concrete parapets.
  - Memo – August 2013 - Use of the open rails will not require pre-approval. However, we strongly encourage to consider the benefits of concrete parapets.
  - WBM – January 2014 - Traffic Railings placed on state-owned and maintained structures (Interstate Highways, United States Highways, State Trunk Highways) with a design speed exceeding 45 mph shall be solid concrete parapets.

Open Railings

- Flashing Background:
  - Used “Skirting” on past projects to protect existing deteriorated edges
  - 2016 – Fall Maintenance Meeting – Discussed ways to protect EOD
  - 2018 - New Standard 17.03 – Edge of Deck Flashing: Details for stainless steel flashing attachment to the edge of existing or new decks with open rails. Use of this detail is at the discretion of the Region’s Bridge Maintenance Engineer.
  - 2022 - Contractors shared concerns about the sequence related to placement of the flashing (after protective surface treatment is applied and limited access after falsework removed).

Bridge Flashing

- Realized Challenges:
  - Only addresses deterioration
  - Adds time and resources
  - Additional railing costs
  - Limits Inspections
  - Some quality issues (maintenance item)
  - Weak Usage Policy – “Contact Region Bridge Maintentance Engineer”
  - Susceptible to high-water damage
  - Unknown long-term effectiveness

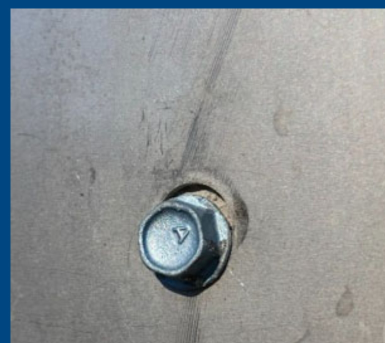
Bridge Flashing

- Advertised

Bridge Flashing

- Advertised

- Reality

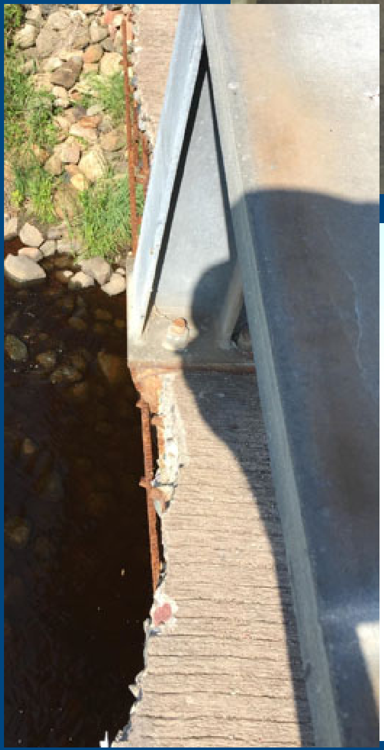


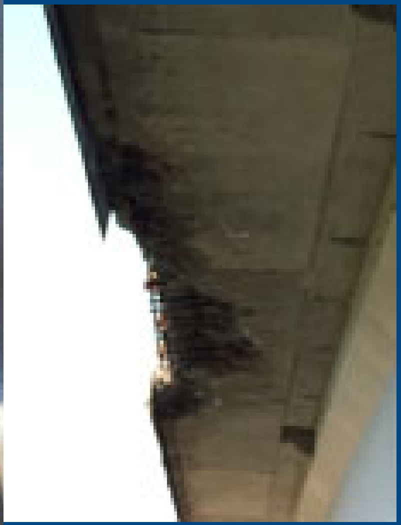
Case Study

- Structure:
  - 1987 – New Bridge with open railings
  - 45” PS Girders, 70-ft structure
  - S.T.H. over Waterway, RDS=60 mph, AADT 2,000
  - 1.1% Longitudinal Slope with 6-ft shoulders

Case Study

- Timeline:
  - 1987 – New Bridge
  - < 2015 – Added Galvanized skirt (flashing)
  - 2015 – Deterioration Noted (CS2 and CS3)





Case Study

- Timeline:
  - 1987 – New Bridge
  - < 2015 – Added Galvanized skirt (flashing)
  - 2015 – Deterioration Noted (CS2 and CS3) (28 yrs)
  - 2019 – New Deck with 42SS Barriers (32 yrs)

Open Railings

- Current Policy:
  - Open railings shall be avoided on all projects
  - Open railings not allowed:
    - On NHS roadways
    - All roadways over state-owned and maintained structures (IH, US, STH)
    - All roadways over railroad crossings
    - On prestressed box girder bridges

Open Railings

- Design Considerations:
  - Open railings shall be avoided on all projects
  - Review drainage conditions for concrete parapet usage
  - Adjust the profile for drainage (0.5% preferred and 0.3% minimum)
  - Add floor drains
  - Use of open railings for snow removal operations is not sufficient justification.

Open Railings

Closing Remarks:

- Based on the realized challenges, does the Client/The Owner want Open Railings?
- Open railings shall be avoided on all projects. In some cases, open railings are not allowed. See WBM Chapter 30.

Thank You

Structural Reviews & Load Ratings

Alex Pence, PE, SE

Supervisor – Automation & Load Ratings

Bureau of Structures

May 26, 2026

Why Load Ratings Matter

Heavier Vehicles on Older Bridges

Posting and Restrictions

Maintenance and Rehab Needs

Issuing OSOW Permits

Load Rating Events

Design	Initial As-Built	Inspection-Triggered	Scoping	Construction
OSOW Evaluation	Regulatory Change	Posting Refinement	Quality Assurance	Software or Methodology Migration

Today's Load Rating Topics

Inspection Findings & Structural Reviews

Load Rating Submittals

Help with Low Load Ratings

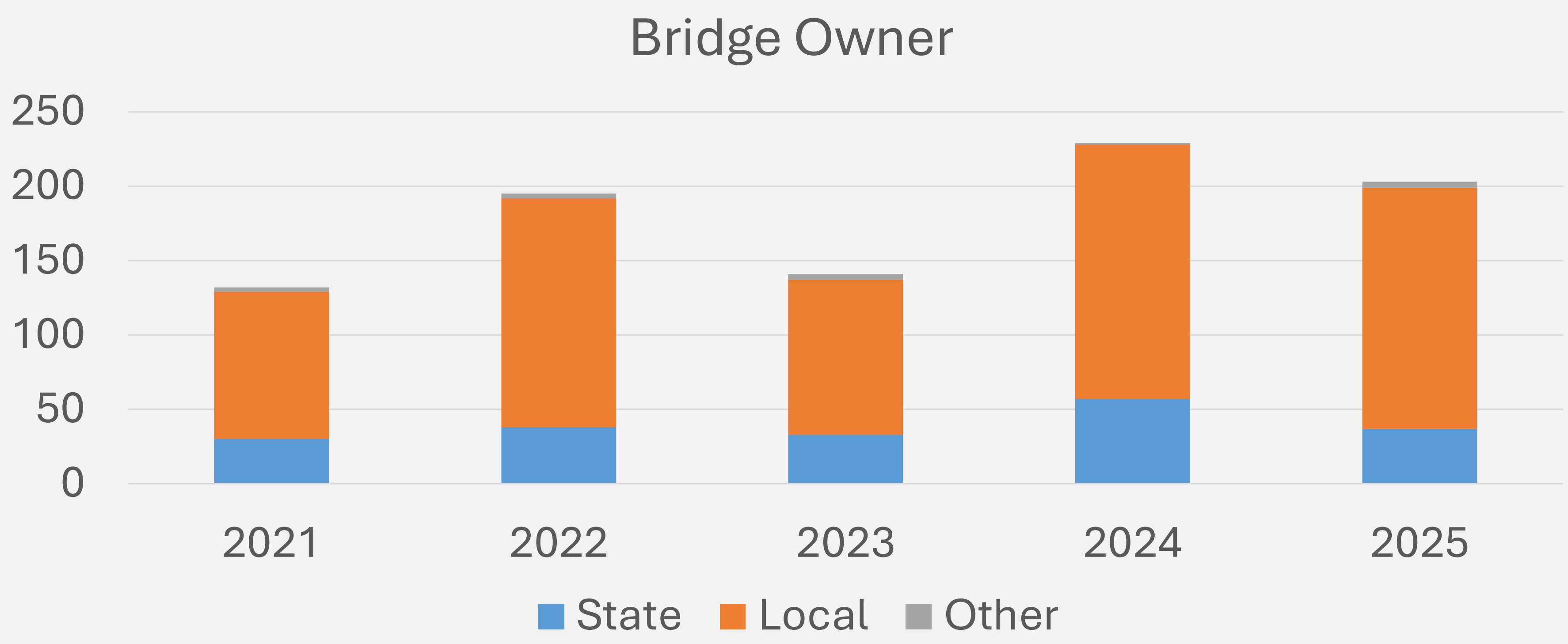
Inspection Findings & Structural Reviews

1

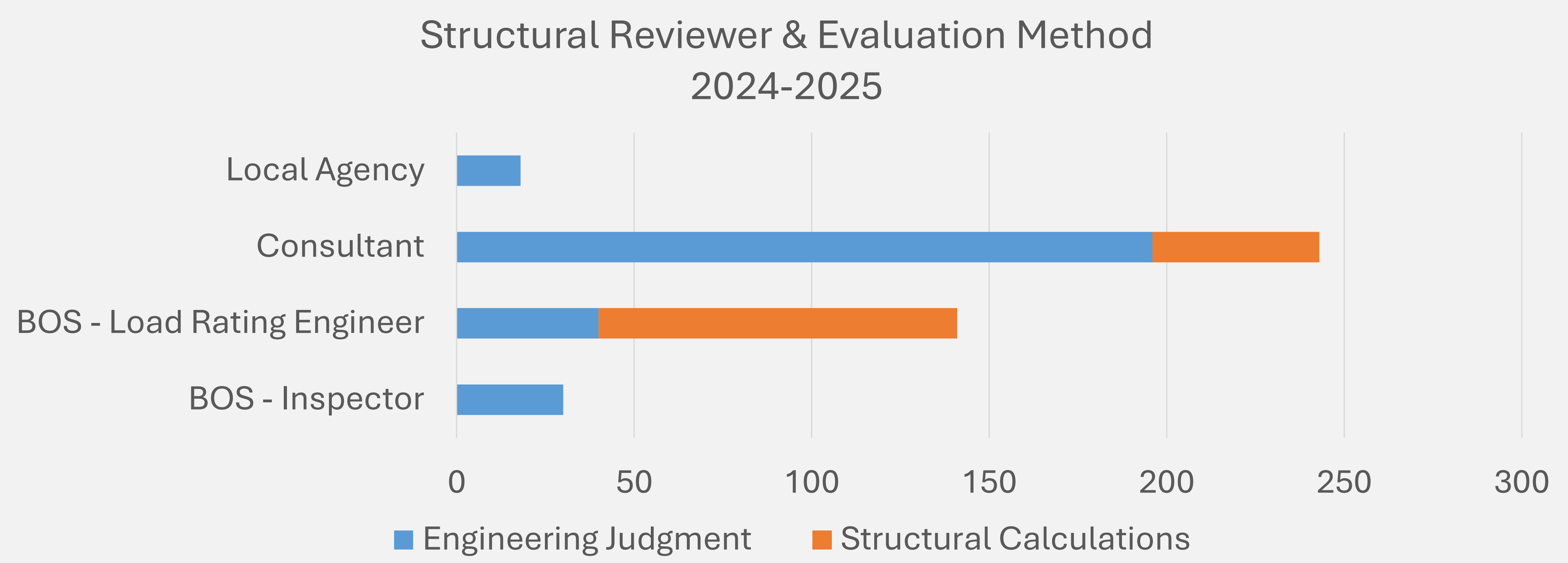
Structural Review Process

- When is a Structural Review required?
  - Load Rating potentially affected
  - CS4 deterioration/damage in primary load carrying members
- Who Performs Structural Review?
  - Inspector (if qualified)
  - Contact WisDOT Load Rating Engineer
  - Contact Consultant Professional Engineer
- Completion Timeline
  - 60 Days from Inspection Date

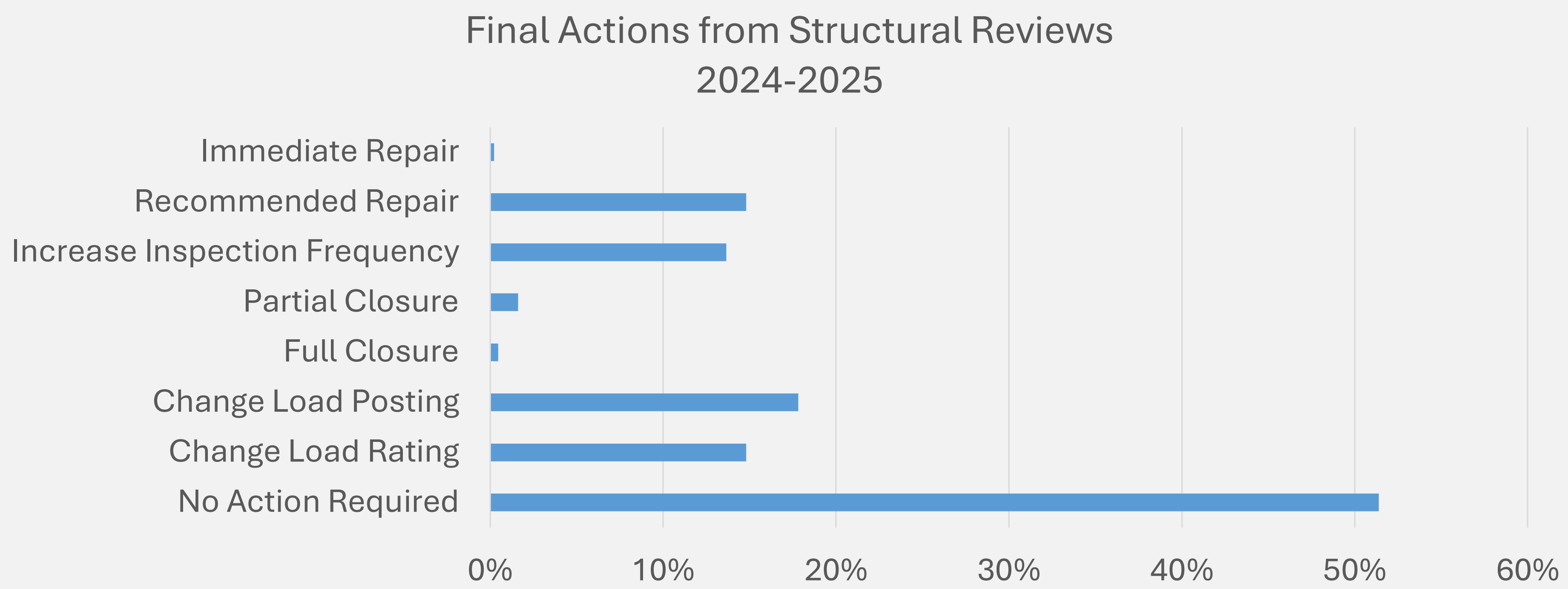
Structural Review Metrics

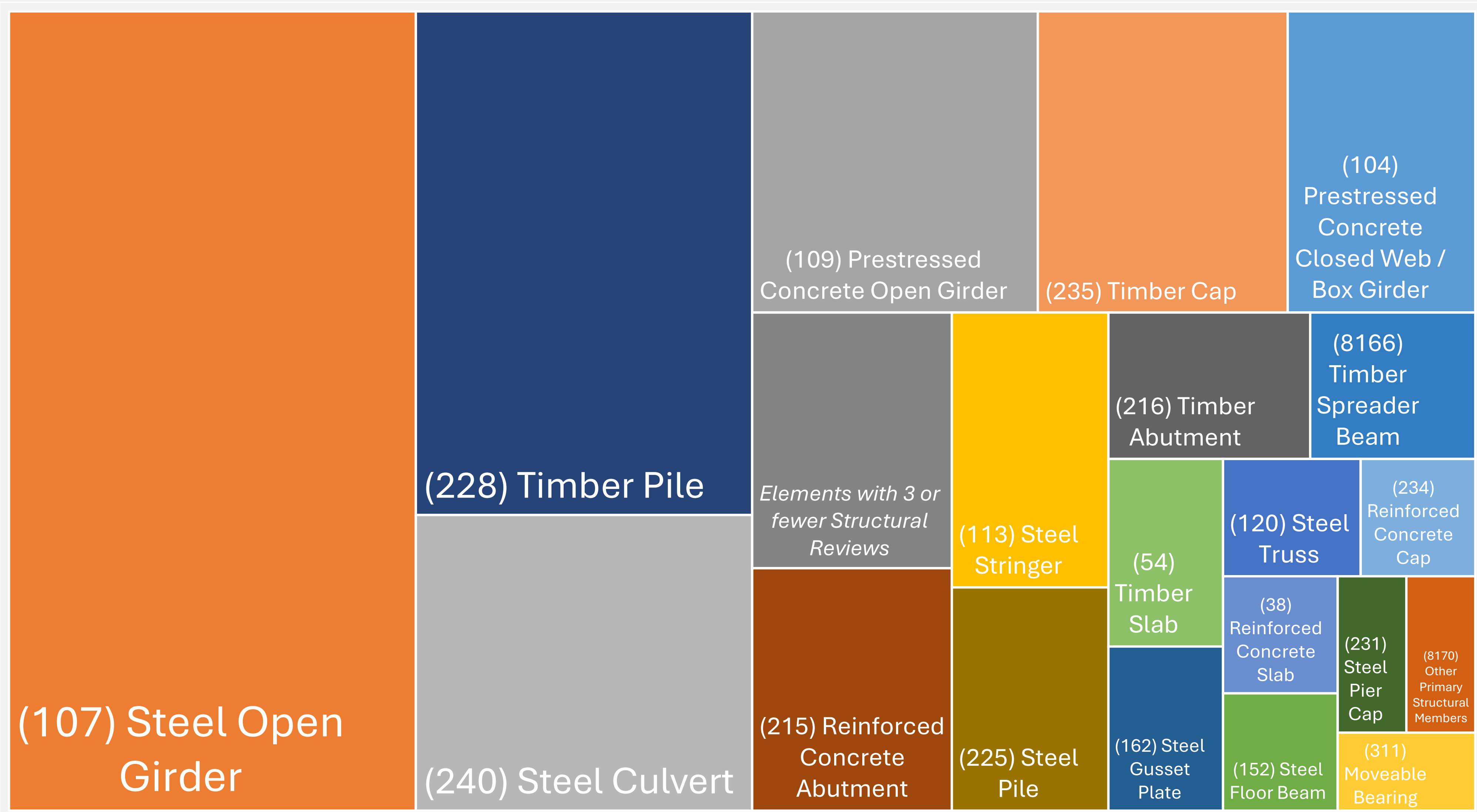


Structural Review Metrics



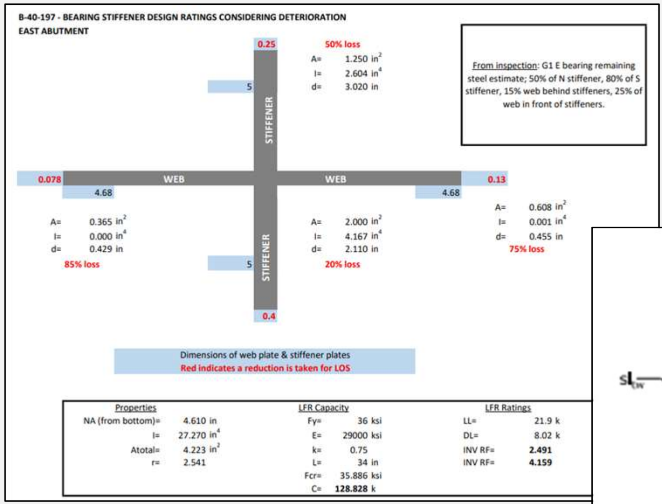
Structural Review Metrics



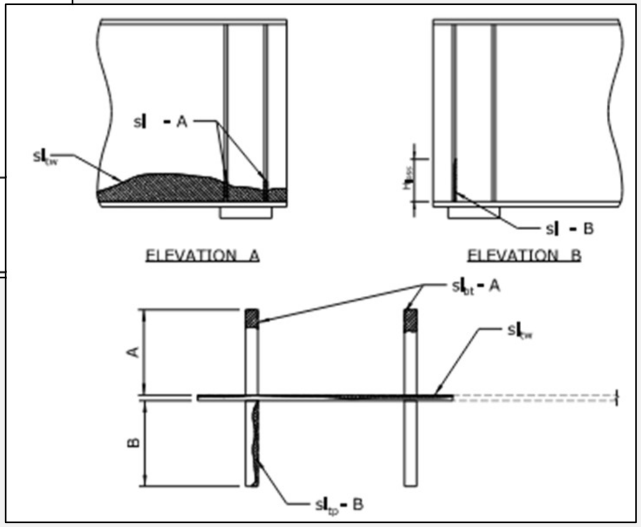

(107) Steel Open Girder
(228) Timber Pile
(240) Steel Culvert
(109) Prestressed Concrete Open Girder
(235) Timber Cap
(104) Prestressed Concrete Closed Web / Box Girder
Elements with 3 or fewer Structural Reviews
(215) Reinforced Concrete Abutment
(113) Steel Stringer
(225) Steel Pile
(216) Timber Abutment
(8166) Timber Spreader Beam
(54) Timber Slab
(162) Steel Gusset Plate
(120) Steel Truss
(234) Reinforced Concrete Cap
(38) Reinforced Concrete Slab
(231) Steel Pier Cap
(8170) Other Primary Structural Members
(152) Steel Floor Beam
(311) Moveable Bearing

Steel Section Loss

Bearing Stiffener Section Loss

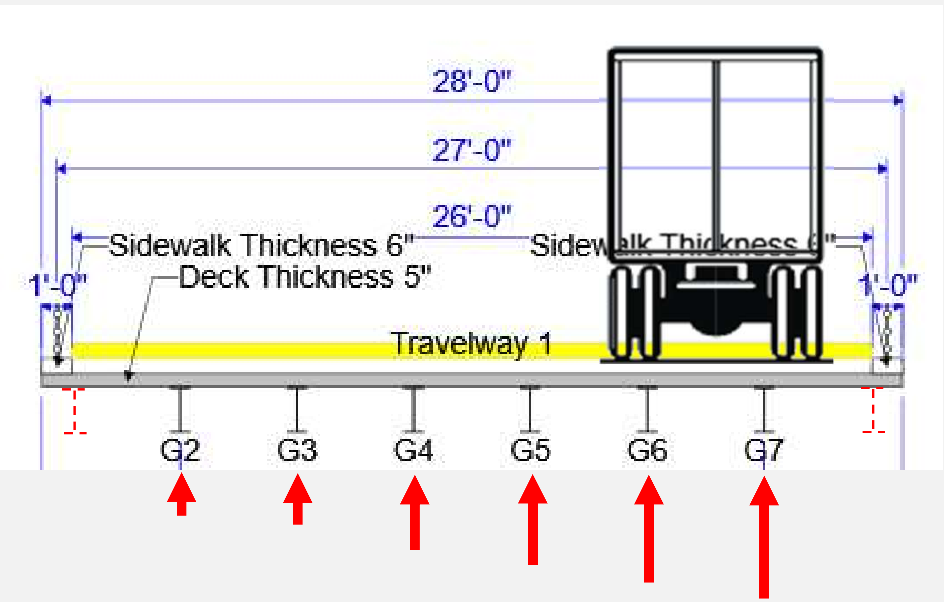


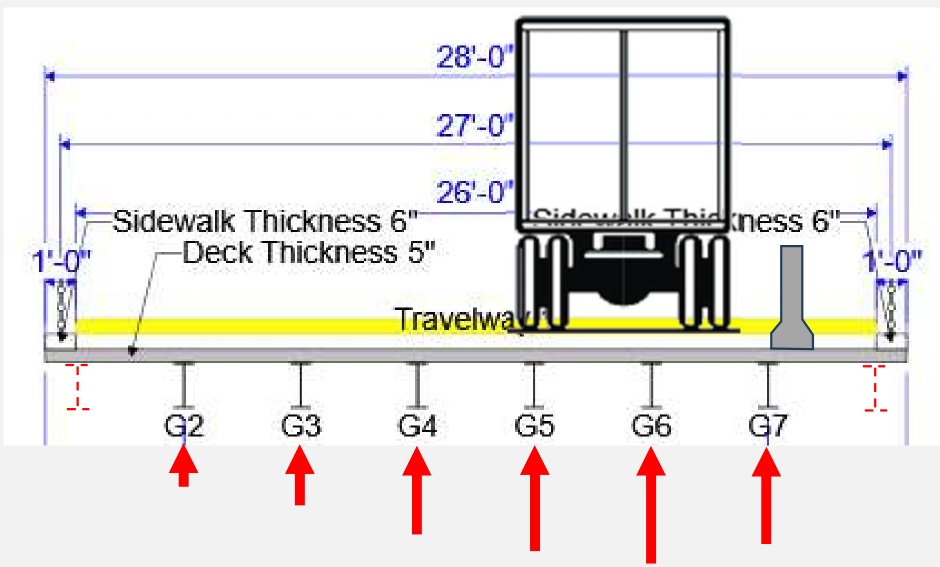
Properties		LFR Capacity		LFR Ratings	
NA (from bottom)=	4.610 in	Fy=	36 ksi	LL=	21.9 k
I=	27.270 in^4	E=	29000 ksi	DL=	8.02 k
Atotal=	4.223 in^2	k=	0.75	INV RF=	**2.491**
r=	2.541	L=	34 in	INV RF=	**4.159**
		Fcr=	35.886 ksi		
		C=	**128.828** k		



Exterior Steel Girders

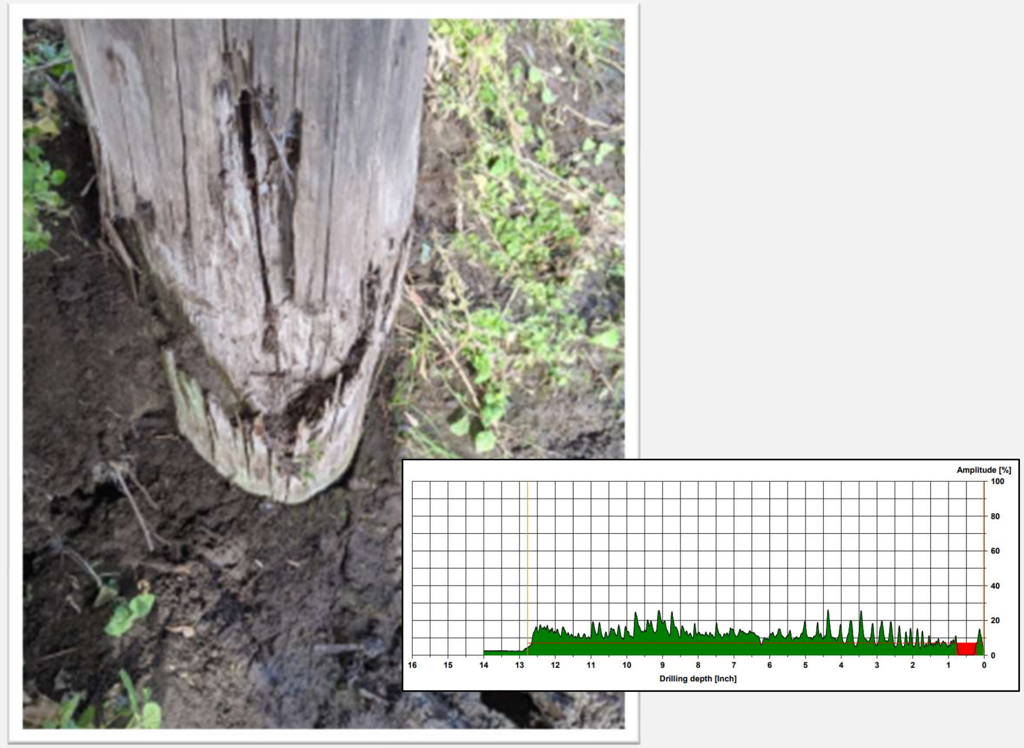
Exterior Steel Girders





Steel Gusset Plates

Timber Decay

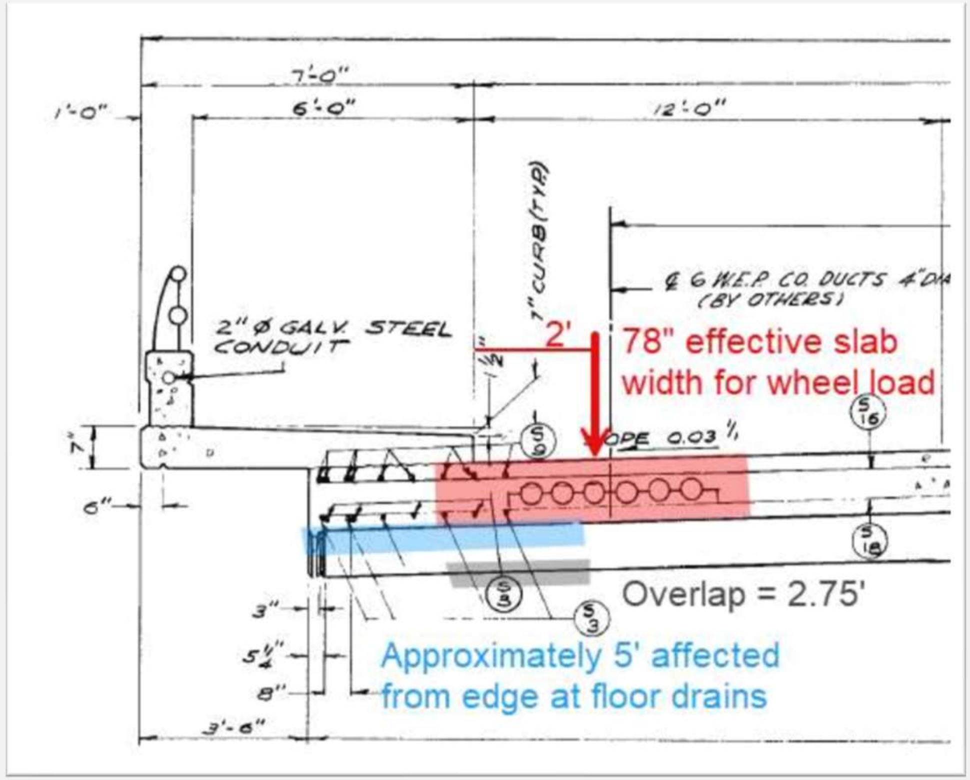


Metal Culverts

Concrete Slab Edges

- Common for Older Bridges w/ Open Rails
- CS4 Spalling on Concrete Slab
  - Not automatic Structural Review
  - When to request one?
- Controversial code application
  - Overly conservative wheel load distribution?
  - Exterior Slab Strip – include in load rating?
  - Travel within striped lanes?
- Shoulder Closure vs. Posting
- Repair Options

Concrete Slab Edges



Concrete Slab Edges

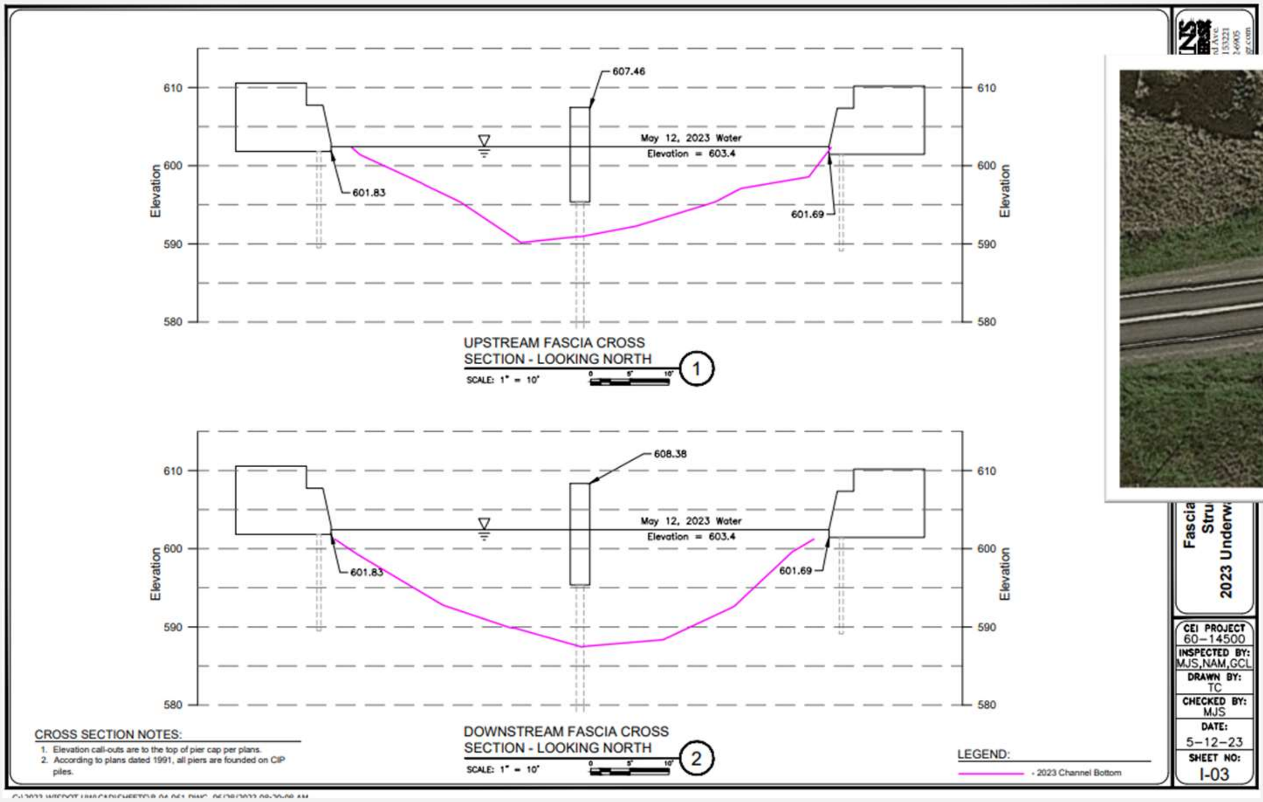
Concrete Spalling & Cracking

Pier Caps

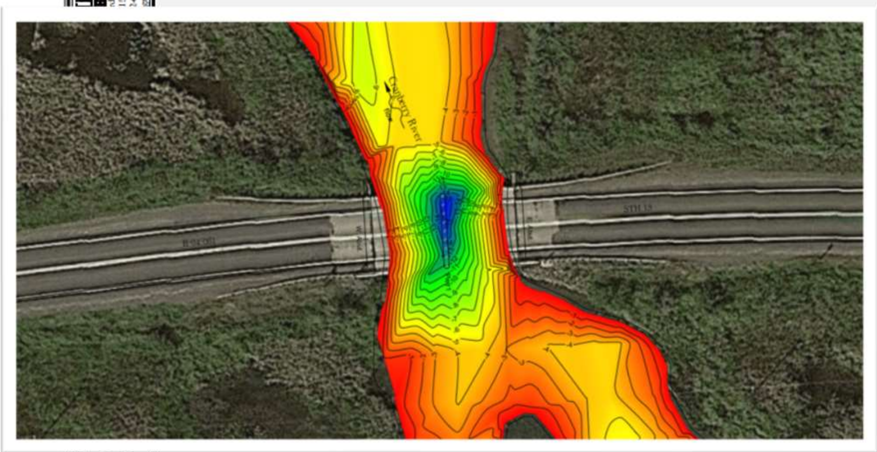
Prestressed Girders

Impact Damage

Scour



607.46
May 12, 2023 Water Elevation = 603.4
601.83
601.69
Elevation
UPSTREAM FASCIA CROSS SECTION - LOOKING NORTH
1
SCALE: 1" = 10'
608.38
DOWNSTREAM FASCIA CROSS SECTION - LOOKING NORTH
2
CROSS SECTION NOTES:
1. Elevation call-outs are to the top of pier cap per plans.
2. According to plans dated 1991, all piers are founded on CIP piles.
LEGEND:
- 2023 Channel Bottom
CEI PROJECT 60-14500
INSPECTED BY: MJS,NAM,GCL
DRAWN BY: TC
CHECKED BY: MJS
DATE: 5-12-23
SHEET NO: I-03



Rerate List

Avg. Annual Tally of Inspection-Triggered Load Rating Reviews

Inspection Trigger	State	Local
Structural Reviews	**50**	**170**
Rerate Box Checked	110	210
SNBI Component Rating Reduction (Super/Sub/Culvert < 5, Deck < 4)	30	170
Initial Inspections	90	130
Combined	**270**	**520**

Load Rating Submittals

2

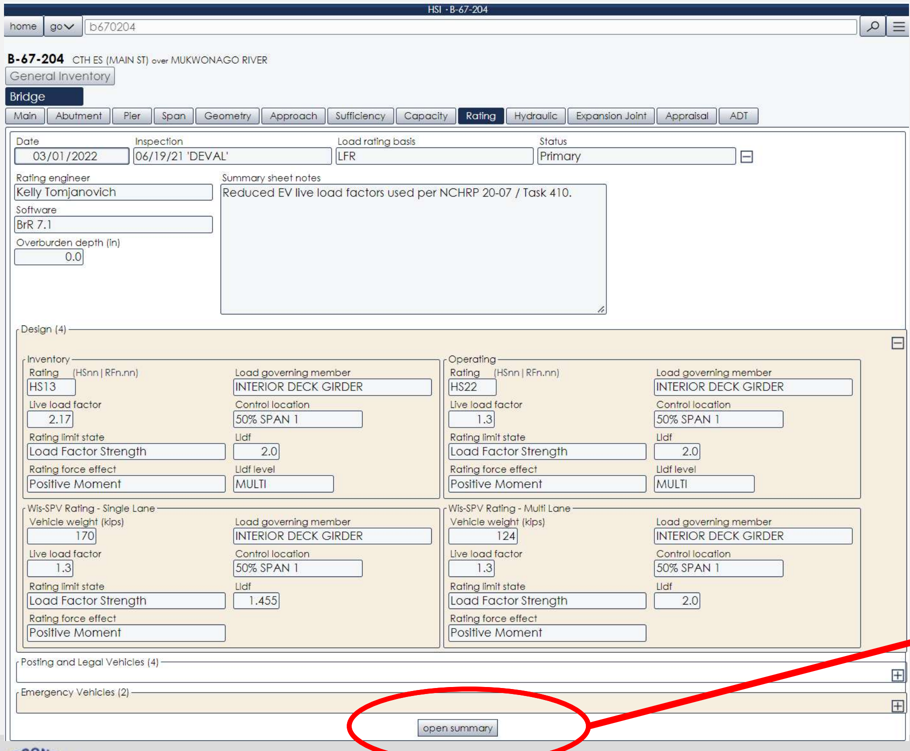
Load Rating Submittal Requirements

Bridge Manual § 45.9

- ☑ Load Rating Calculations
- ☑ Load Rating Summary Forms
  + Refined Analysis Form, if applicable
- ☑ Load Ratings on Plans
- ☑ Computer Software Input Files

Load Rating Summary Form

HSIS Rating Tab



Wisconsin Department of Transportation
Bridge Load Rating Summary

v.07-2020h

Bridge Data

Structure Id: B-67-204	Traffic Count: 5,700
Owner: COUNTY	Truck Traffic %: 0
Municipality: V-Mukwonago(67153)	Overburden Depth (in): 0
Feature On: CTH ES (MAIN ST)	Design Load Rating: HS20
Feature Under: MUKWONAGO RIVER	Inspection Date: 08-Dec-2008

NBI Condition Ratings

Deck:	Superstructure:	Substructure:	Culvert:
6	6	7	N

Spans

#:	Material:	Configuration:	Length (ft)
1	CONCRETE	FLAT SLAB	36

Construction History:

Year:	Work Performed:
1984	NEW STRUCTURE

Load Rating Summary

Load Rating Basis: LFR

	Value:	Load Governing Member:	Rating Force Effect:	LLDF:
Inventory:	HS19	SLAB	Positive Moment	0.16
Operating:	HS32	SLAB	Positive Moment	0.16

Wisconsin Special Permit Vehicles	MVW (kips)	Load Governing Member:	Rating Force Effect:	LLDF
Single lane (w/o FWS):	355	SLAB	Positive Moment	0.08
Multi lane (w/o FWS):	183	SLAB	Positive Moment	0.16

Load Posting Analysis (when required per Wisconsin Bridge Manual, Chapter 45)

Posting Vehicle		GVW (kips):	Rating Factor:	Weight Limit (T):	Load Governing Member:	Rating Force Effect:	LLDF
AASHTO Legal Vehicles	Type 3	50.0	2.09	N/A	SLAB	Positive Moment	0.16
	Type 3S2	72.0	2.17	N/A	SLAB	Positive Moment	0.16
	Type 3-3	80.0	2.26	N/A	SLAB	Positive Moment	0.16
	SU4	54.0	1.75	N/A	SLAB	Positive Moment	0.16
	SU5	62.0	1.65	N/A	SLAB	Positive Moment	0.16
	SU6	69.5	1.49	N/A	SLAB	Positive Moment	0.16
	SU7	77.5	1.41	N/A	SLAB	Positive Moment	0.16
WisDOT Spec.	PUP	98.0	2.63	N/A	SLAB	Positive Moment	0.08
	Semi	98.0	2.7	N/A	SLAB	Positive Moment	0.08
FAST Act EVs	EV2	57.5	1.8	N/A	SLAB	Positive Moment	0.16
	EV3	86.0	1.17	N/A	SLAB	Positive Moment	0.16

Posting for Legal/Specialized Permit Vehicles:	Weight Limits for Emergency Vehicles:

Software and version used: WiBS	Rating Engineer: Travis McDaniel
Additional Remarks:	Date: 01-Jun-2009

BUREAU OF STRUCTURES

Load Rating Summary Form

When do posting / emergency vehicles need to be included?

Vehicles	Inventory	Operating
Emergency Vehicles	HS20 RF < 1.0 HL93 RF < 0.9	---
SHVs	---	HS20 RF < 1.3 HL93 RF < 1.0
Other Posting Vehicles	---	HS20 RF < 1.0 HL93 RF < 1.0

Load Rating Summary Form

- New Form Pending (w/ July 2026 Bridge Manual Updates)
  - Conditional Formatting for Required Posting Vehicle Inclusion
  - Clear Roadway Width
  - Span Continuity
  - Deck Interaction
  - Controlling Location
  - Live Load Factor
  - Live Load Distribution Level (Single / Multi-Lane)
  - Limit State
  - PE License No.

Submittals for Refined Analysis

Refined Analysis Rating Form

In Addition to this form, submit electronic analysis files (eg. .MDX, .bdb)

Analysis File Summary (FILL OUT FOR EACH ANALYSIS FILE SUBMITTED)

Analysis Type:	☐ Grid/Grillage ☐ Plate & Ecc. Beam ☐ 3D FEM ☐ Other (describe below)
Analysis Program:	☐ MDX ☐ AASHTOWare ☐ CSI Bridge ☐ LARSA ☐ Other
Program Version:	
File Name:	
File Description:	Describe the purpose of the file. Example: This file is used for the Wis-SPV rating using single lane distribution.
Analysis Assumptions:	Highlight key assumptions in modeling. (This section may be omitted if submitting MDX or AASHTOWare analysis files. This section may also be omitted if submitting separate document containing analysis assumptions and results). Example of things to include: a description of the finite element model, simplifications made to model, exceptions to original design plans, loads applied, how loads are applied (e.g. equally distributed to all girders), support conditions, composite/non-composite sections.
Summary of Results:	Summarize results. (This section may be omitted if submitting MDX or AASHTOWare analysis files. This section may also be omitted if submitting separate document containing analysis assumptions and results). Provide table of results for service load reactions, moment, shear, and/or stress output for members at 10th points (minimum) for the appropriate load cases. Provide a table of capacities at each 10th point, such that load ratings can be directly computed with appropriate load and/or resistance and impact factors. Provide example or typical calculations.

MBE C6A.3.3

When a refined method of analysis is used, a table of distribution factors for extreme force effects in each span should be provided in the load rating report to aid in future load ratings.

Summary of Results:	Summarize results. (This section may be omitted if submitting MDX or AASHTOWare analysis files. This section may also be omitted if submitting separate document containing analysis assumptions and results). Provide table of results for service load reactions, moment, shear, and/or stress output for members at 10th points (minimum) for the appropriate load cases. Provide a table of capacities at each 10th point, such that load ratings can be directly computed with appropriate load and/or resistance and impact factors. Provide example or typical calculations.

Computer Software

Load Rating Software used by BOS	
Steel Girders / Floor Systems	AASHTOWare BrR, SIMON, MDX
Prestressed Concrete Girders	In-House (WiBS), BrR
Reinforced Concrete Slabs	In-House (WiBS), BrR
Steel Trusses	BrR
Concrete Box Culverts	BrR
Timber Slabs / Girders	BrR
Finite Element Analysis	CSI Bridge, RISA
Other	LEAP/OpenBridge, Mathcad / Excel

Computer Software

- BOS does not require consultants to use specific software
- Allows for independent evaluation and QA/QC
- Software output reports included in calculation package
- Software input files should be submitted

Special Cases

- Mixed Rating Methods
  - Widenings with original portion in LFR, new portion in LRFR
  - Submit multiple Load Rating Summary Forms
  - Report both on plans

- Staged Construction
  - Satisfy load rating requirements for each construction stage
  - Shall be included in calculations submittals
  - No explicit requirements for Load Rating Summary Form or Plans

Help with Low Load Ratings

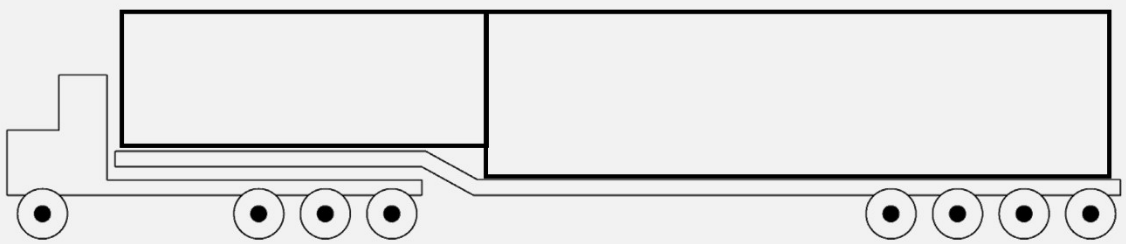
3

Discrepancies vs. Previous Load Ratings

- Investigate discrepancies and ensure proper QC
  - Load rating for minor changes → Independent QA/QC opportunity
- Potential reasons:
  - Software differences
  - Method or policy differences
    - ASR → LFR → LRFR
    - Prestressed Girder Shear
    - Concrete Box Culverts
    - Steel Limit States
    - Design vs. In-Service Analysis
  - Mistakes

Wis-SPV Load Rating Targets

- Wisconsin Bridge Manual Section 45.12
  - Target MVW > 190 kips w/ Single-Lane Loading
    - Plus FWS for new designs
  - Report ratings w/o FWS on Plans and Load Rating Summary Form
  - Consider Interior Girders or Slab Strips only
  - For rehab or in-service bridge ratings, contact BOS if MVW < 190 kips
    - Below 170 kips can restrict annual permits



Low Load Ratings on Good Bridges

- Impacts
  - Legal Weight Limit Restrictions
  - OSOW Freight Restrictions
  - Reduced Service Life
  - Inspection Frequency (Inv RF < 1.0)

- Design Phase
  - Consider refined analysis, alternate methods, or strengthening
  - Reach out to BOS Load Rating Unit to discuss options and scope

Posting Refinement Strategies & Justifications

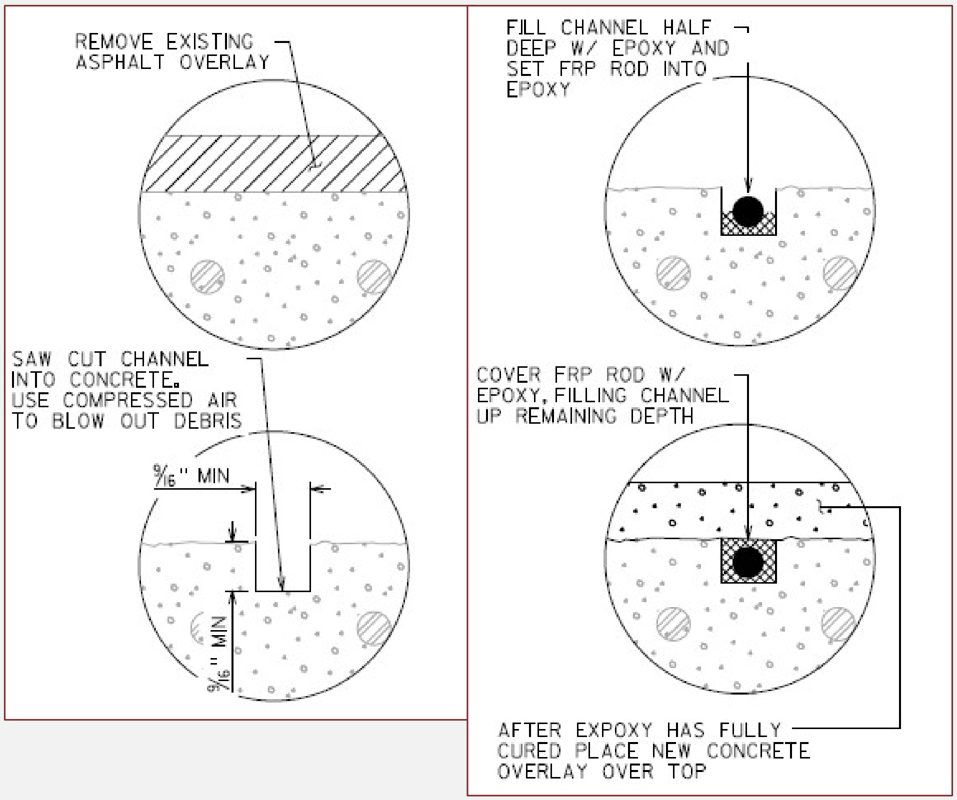
- Unknown Construction Details
- Documented Engineering Judgment to Supplement Calculations
- Limit State Options
- Single-Lane Loading
- Lane Striping and Curbs or Sidewalks
- Live Load Factor Modification (Emergency Vehicles)
- Dynamic Load Allowance Modification
- Refined Analysis

Strengthening

- Also consider cost-effective and practical strengthening methods
  - Overlays
    - NSM stainless steel or FRP rebar can increase negative moment capacity in concrete slabs
  - Redecks
    - PS Girders – additional deck rebar (negative moment), FRP (shear)
    - Steel Girders – add shear studs (deck interaction), cover plates or flange plates
  - Localized Repairs to Address Deterioration
    - Steel girder repairs, timber cap replacements, column/pier jacketing
    - FRP on concrete pier caps for shear or flexure

Steel Girder Retrofits

Concrete Slab – Top Surface Mounted Bars



Substructure Strengthening

When to contact the BOS Load Rating Unit?

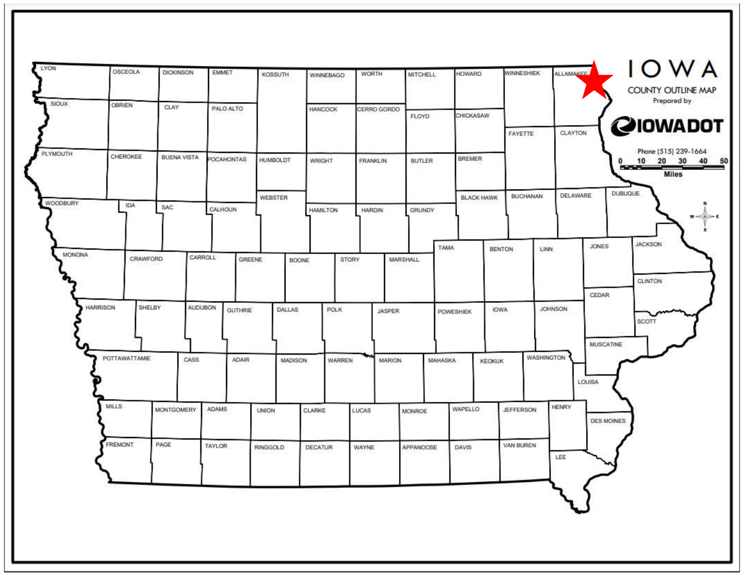
If a deck replacement on an Interstate bridge would result in an Inventory Rating less than HS20 [40.6]
Before expanding scope to include strengthening to improve load ratings [41.6.2]
For approval/clarification when choosing a rating methodology (e.g. rating an LFD/ASD-designed bridge using LRFR) [45.3.2]
When gusset plates, shiplap joints, or pin-and-hanger connections should be load rated [45.3.3.1]
When pier caps show signs of distress (e.g. shear cracks) or other substructure distress [45.3.3.2]
When shop drawings and/or fabrication plans are required for load ratings but unavailable via HSIS [45.3.4.2]
Load ratings based on methods of Engineering Judgment or Load Testing [45.3.10]
When analysis indicated a posting or emergency vehicle weight limit is required [45.3.7.7, 45.9.2, 45.10.1]
When Wis-SPV Load Rating < 190 kips [45.12.2]
To discuss whether to perform refined analysis should be performed; additional documentation is required [45.3.11]
Load rating by placing truck loads only within striped lanes [45.5.1.2]
Low prestressed concrete shear ratings [45.6.1]
When considering moment redistribution or other special analysis assumptions for steel superstructures [45.6.3]
For questions on the use of plastic analysis in steel superstructures [45.6.3]
To determine appropriate level of effort for fatigue evaluation [45.6.3.1]
In-service culverts less than bridge-length (C-numbered) with deterioration warranting load posting consideration [45.8.1]
For consideration of single-lane distribution factors on bridges with multiple lanes [45.10.3.3]

Structural Reviews & Load Ratings

Truss Type Selection and Redundancy for the IA 9 / WI 82 Black Hawk Bridge over the Mississippi River

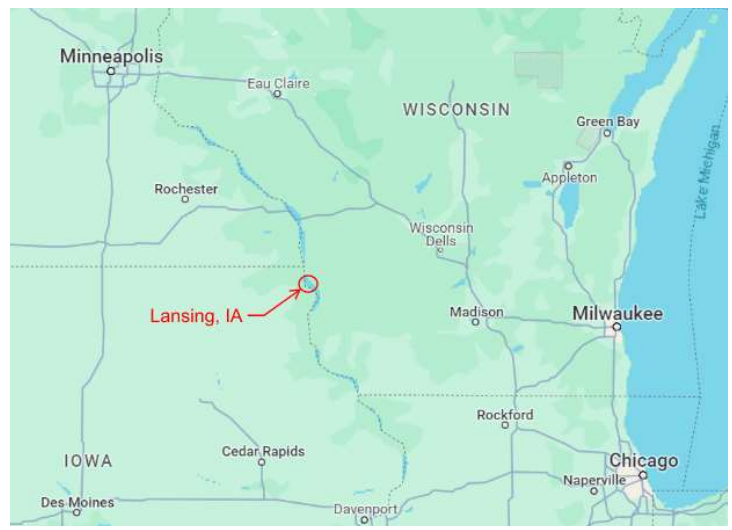
Presenter: Greg Hasbrouck - Parsons

LOCATION MAP

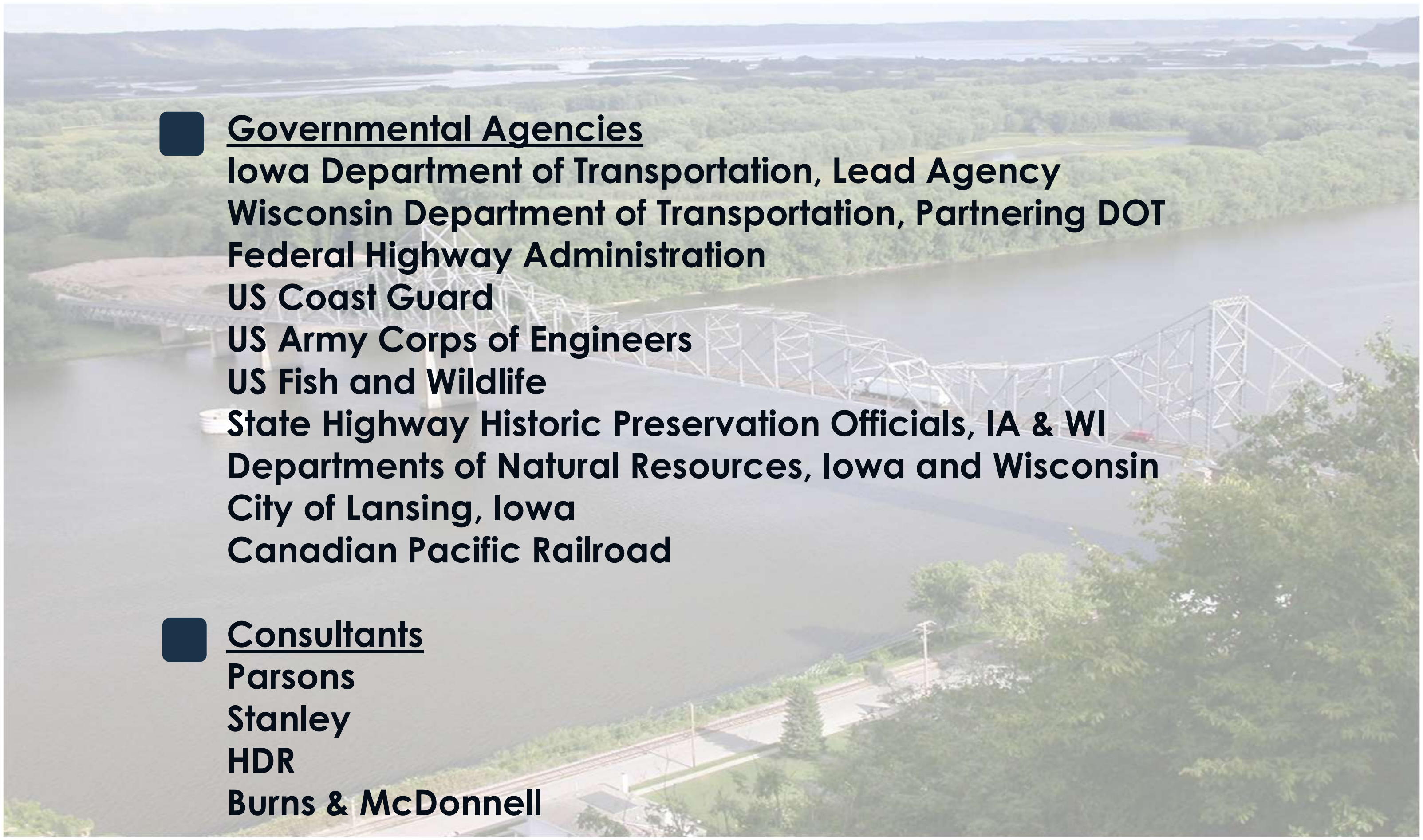


Lansing Iowa is located near the Iowa and Minnesota border along the Mississippi River.

240 miles from Des Moines, IA
110 miles from Madison, WI
240 miles from Chicago, IL
35 miles from La Crosse, WI
35 miles from Prairie du Chien, WI



STAKEHOLDERS



- **<u>Governmental Agencies</u>**
  Iowa Department of Transportation, Lead Agency
  Wisconsin Department of Transportation, Partnering DOT
  Federal Highway Administration
  US Coast Guard
  US Army Corps of Engineers
  US Fish and Wildlife
  State Highway Historic Preservation Officials, IA & WI
  Departments of Natural Resources, Iowa and Wisconsin
  City of Lansing, Iowa
  Canadian Pacific Railroad

- **<u>Consultants</u>**
  Parsons
  Stanley
  HDR
  Burns & McDonnell

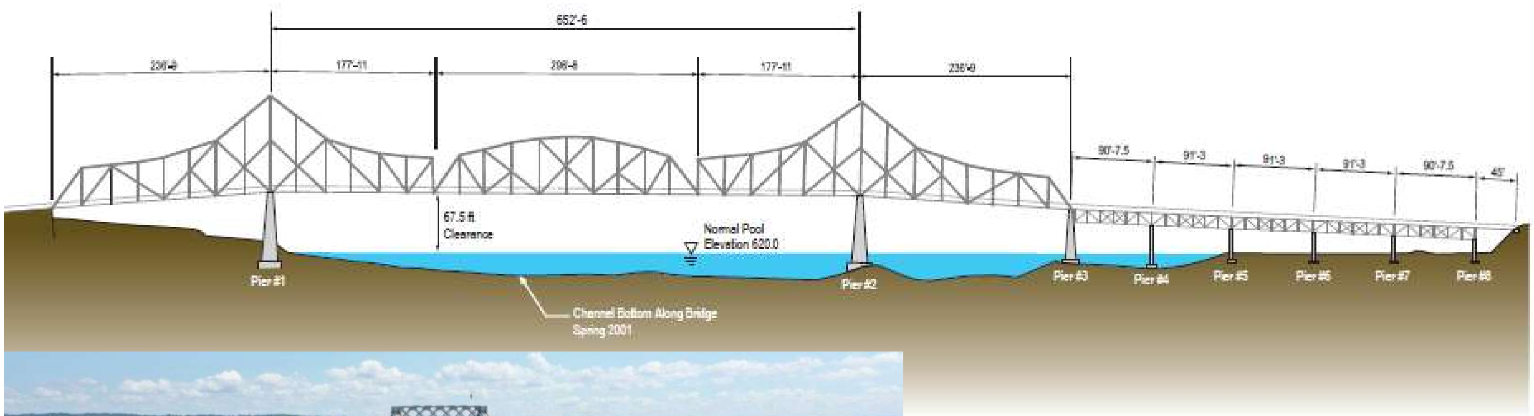
BLACK HAWK BRIDGE, 1931

The IA 9 Black Hawk Bridge was built in 1931 as a 3-span cantilevered steel truss, with drop-in span.

- Navigational channel span is 650 feet
- 67.5 feet above normal water elevation
- Total length of 1,653 feet
- 21-foot-wide travel way and has 18.5 feet of clearance.

The bridge is historic, and the community has adopted its unique character.

EXISTING BRIDGE, DOLPHINS, RAILROAD



Cross Section

EXHIBIT 1-2
Existing Bridge Dimensions

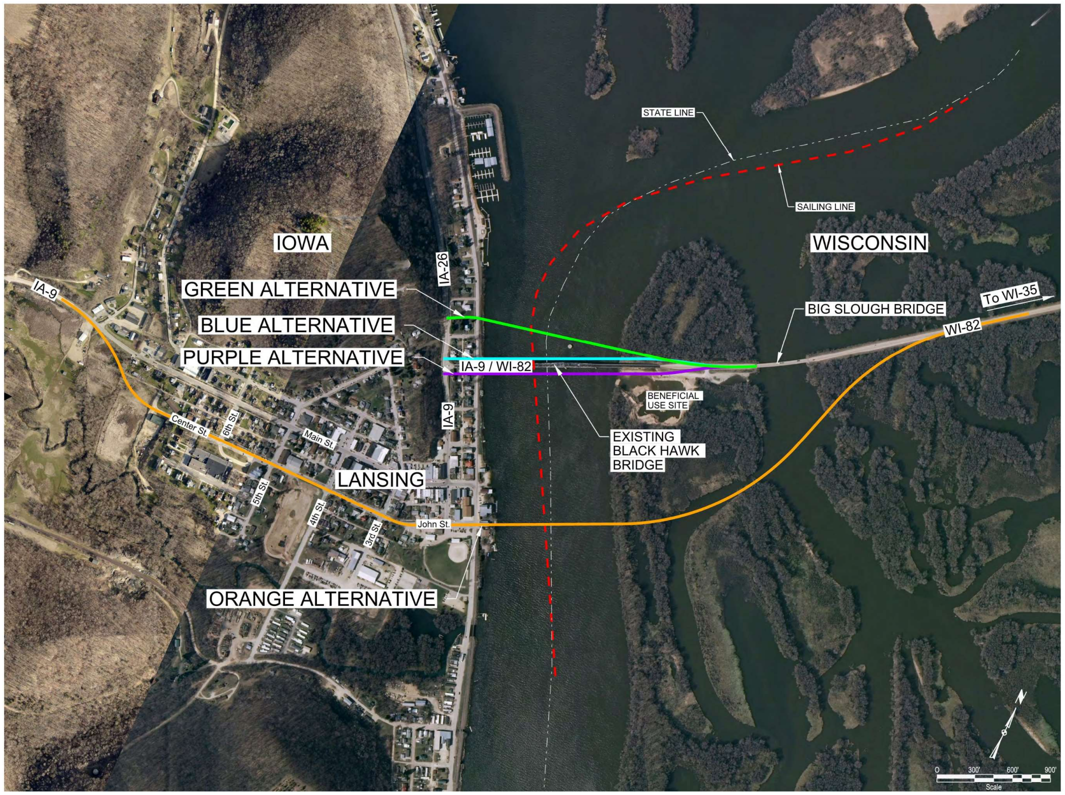
GENERAL OVERVIEW

CROSSING LOCATIONS STUDIED

Build Alternative Crossing Locations

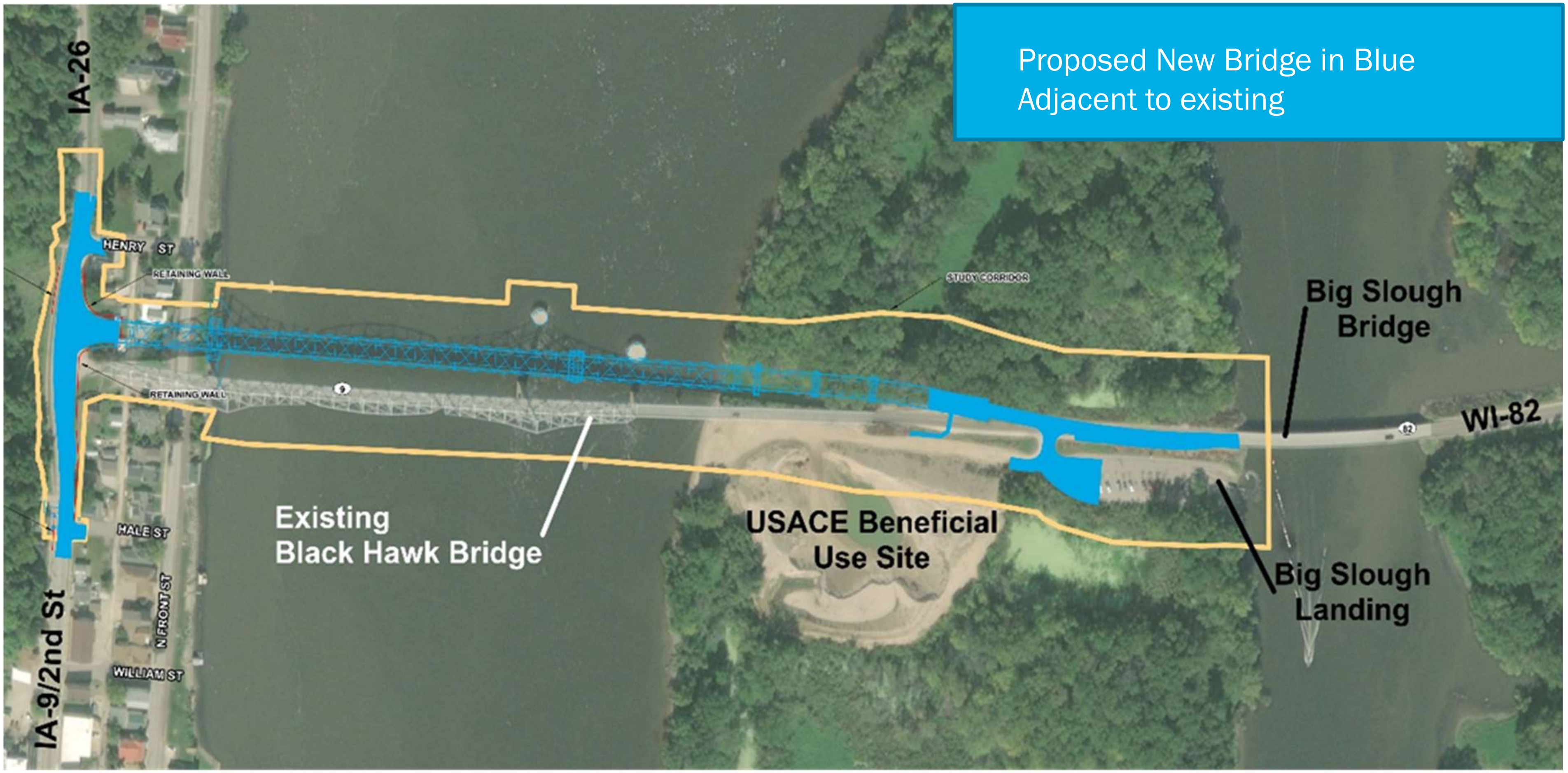
The image at the right depicts the Build Alternative locations currently being analyzed. These are the same locations presented at the first public meeting held for this study in August 2017.

Preliminary layouts of these 4 alternatives and features near them are shown on the large maps in the display area.



Environmental Assessment

SELECTED NEW ALIGNMENT AND SITE FEATURES

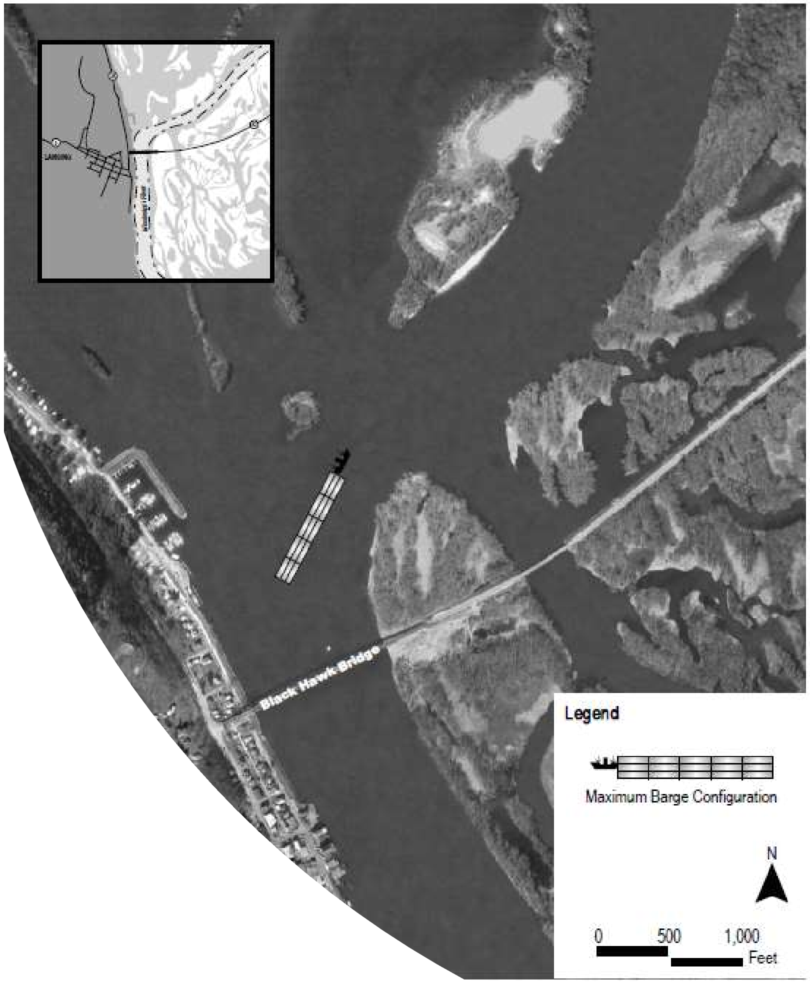


RIVER NAVIGATION CONSIDERATIONS

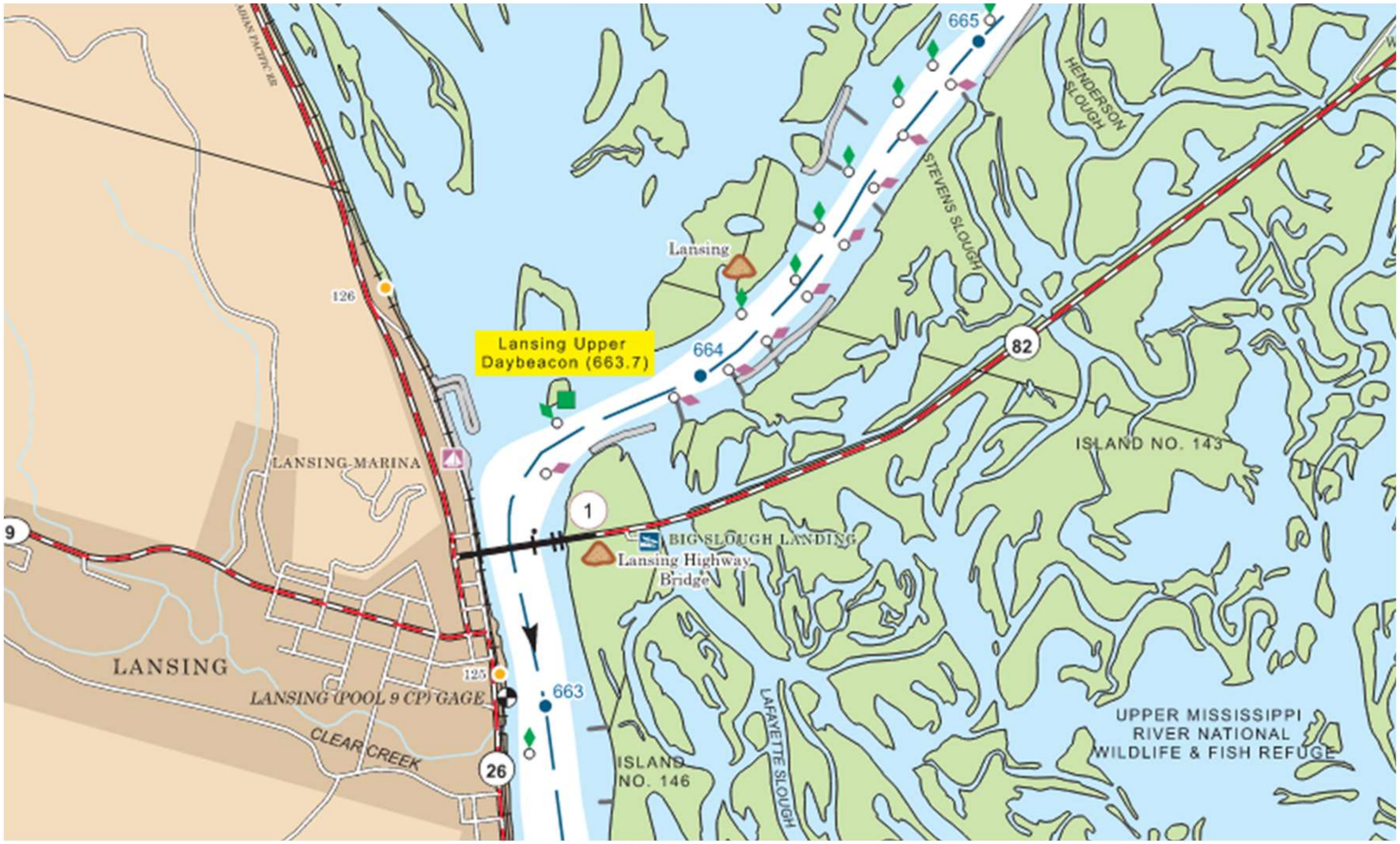
Sharpest Turn on Mississippi River

Simulation of a barge turning the tight corner of the river and through the bridge piers which are 650 feet apart.

Need to determine required length of new span



RIVER NAVIGATION CONSIDERATIONS



RIVER NAVIGATION CONSIDERATIONS

RIVER NAVIGATION STUDY

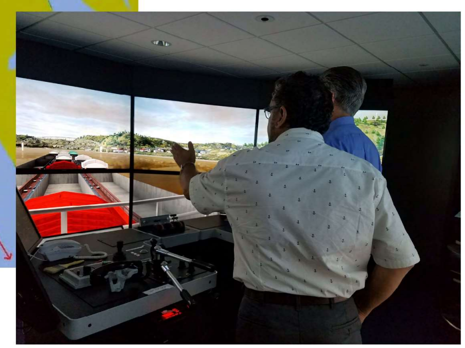
River Navigation Exercise – September 25-27, 2017

The Iowa DOT and US Coast Guard worked with the Seamen's Church Institute in Paducah, Kentucky, to develop simulation models of the 4 crossing locations under consideration. Using the Institute's simulators, Mississippi River barge pilots were invited to "drive" through each crossing under various river conditions to help the study team evaluate issues associated with each crossing, including pier placement.

Example view from a simulator as the barge approaches one of the proposed bridge crossing locations.

At left - Example of a simulation run – each barge course is tracked by the computer as the pilots 'drive' their barge downriver and through the existing bridge location.

Below – pilots discuss approaches to navigating a new crossing location.



Environmental Assessment

BRIDGE TYPE OPTIONS STUDIED

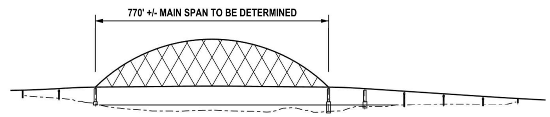
BRIDGE TYPE OPTIONS

These bridge types were initially considered in the *2004 Feasibility Study* and presented at the first public meeting held in August 2017.

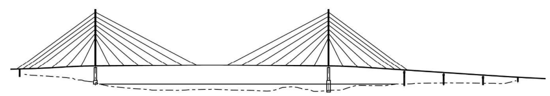
At this location on the river, the bridge span length (opening between 2 piers) required by the US Coast Guard to allow barges to move up and down the navigation channel is +/- 770 feet.

All of these bridge types could accommodate the required span length.

Bridge Type | Cost Range*

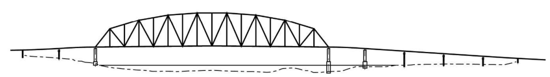


Arch Bridge — $$

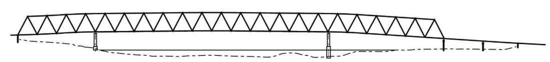


Cable Stay Bridge — $$$$

Because of cost and design issues associated with this bridge type, it is not likely that a cable stay bridge will be carried forward as a feasible option for this crossing.



Simple Span Truss Bridge — $$



Continuous Truss Bridge — $$$

Cost Range - estimated construction cost based on preliminary information, includes new bridge, IA-9/IA-26 improvements, WI-82 improvements, boat ramp access, existing bridge removal, dolphin removal, mobilization, and 15% contingency.

$ = <$60 million $$ = $60 million to $70 million $$$ = $70 million to $80 million $$$$ > $80 million

Environmental Assessment

IOWA DOT

TIED ARCH OPTIONS PRESENTED

1 ARCH
$

2 ARCH
$$

3 ARCH
$$$

$ = $60M - $63M
$$ = $63M - $66M
$$$ = $66M - $70M

These conceptual images illustrate project features that are currently under development and must be further evaluated for engineering viability, economic feasibility, and aesthetics. Finished project features may be different than shown in conceptual views.

Environmental Assessment

SINGLE SPAN TRUSS OPTIONS PRESENTED

1 TRUSS SPAN
$

2 TRUSS SPANS
$$

$ = $60M - $63M
$$ = $63M - $66M
$$$ = $66M - $70M

These conceptual images illustrate project features that are currently under development and must be further evaluated for engineering viability, economic feasibility, and aesthetics. Finished project features may be different than shown in conceptual views.

Environmental Assessment

CONTINUOUS SPAN TRUSS OPTIONS PRESENTED

PARALLEL TRUSS
$$$

PEAKED TRUSS
$$$

$ = $60M - $63M
$$ = $63M - $66M
$$$ = $66M - $70M

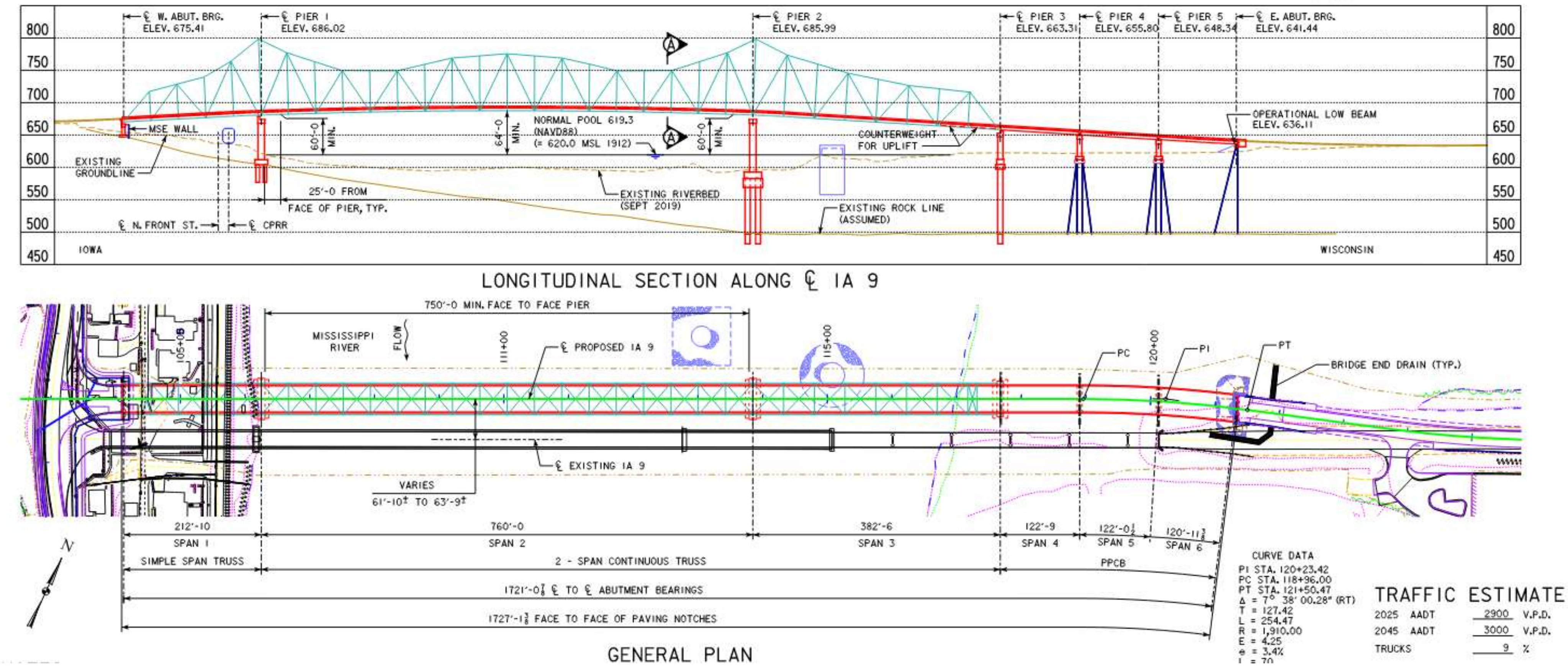
These conceptual images illustrate project features that are currently under development and must be further evaluated for engineering viability, economic feasibility, and aesthetics. Finished project features may be different than shown in conceptual views.

Environmental Assessment

FINAL BRIDGE DESIGN SCHEDULE / PROCESS

- RFP for Final Design – Summer 2020
- Selection of Final Design Consultant – Fall 2020
- Under Contract – Winter 2021
- 30% Design / Design Concurrence – Summer 2021
    - Alternative Truss Design Studies
- 60% Design – Spring 2022
    - Interim Review Submittal
- 100% Unapproved Design – Fall 2022
    - DOT and Peer Review
- Final Plans to Contracts – Spring 2023

SELECTED BRIDGE TYPE TO MEET THE EA



30% DESIGN / DESIGN CONCURRENCE

- Develop Design Criteria and Redundancy Strategies
- Optimize Truss Layout
- Explore Constructability Options
- Develop Plans to 30% Level

- Type, Size & Location Concept – Simple Span & Two Span Continuous Truss with Counterweight and Faux Peak
- Unbalanced Span Arrangement – 213' / 760' / 383'
- Typical balanced truss side span at ~0.6 of main span
- Can we make continuous without permanent uplift?
- Can we optimize layout for steel weight and redundancy?
- How can we efficiently erect the truss?

WICHERT TRUSS OPTION

- Evaluated a Wichert Truss
  - Old continuous truss form creates hinge over pier
  - Solves concerns with pier settlement and uplift
  - Uses quadrilateral section at intermediate piers
- Addresses unique unequal span challenge for this project
  - However, stability during construction was a disadvantage
  - Would affect aesthetic from existing bridge
  - Contractors not familiar with it

30% SPAN CONTINUITY EVALUATION

- Investigated various continuity scenarios
  - TS&L Option – Simple span & Two span continuous
  - Explored unsymmetric drop-in span option but not favorable due to hinges and joints in main span and not redundant

  - Explored various 3 span continuity options with various sequences of construction and load application
- Provide options for construction
  - 3 span continuous allows construction to be built in cantilever out over the main span
  - TS&L design assumed main span float-in

30% SPAN CONTINUITY EVALUATION

- **Option 0 (TS&L)**
  - Erect entire steel superstructure (only Pier 2 cont.)
  - Pour CIP deck concrete for all 3 spans
  - Add SDL and LL
- **Option 1**
  - Erect entire steel superstructure (cont. Pier 1 and 2)
  - Release upper chords at Pier 1 and Pier 2
  - Pour CIP deck concrete for all 3 spans
  - Reconnect upper chords at Pier 1 and Pier 2
  - Add SDL and LL
- **Option 2**
  - Erect entire steel superstructure (cont. Pier 1 and 2)
  - Release upper chords at Pier 1 and Pier 2
  - Pour CIP deck concrete for Span 1 and Span 3
  - Reconnect upper chords at Pier 1 and Pier 2
  - Pour CIP deck concrete for Span 2
  - Add SDL and LL
- **Option 3**
  - Erect entire steel superstructure (cont. Pier 1 and 2)
  - Release upper chords at Pier 1 and Pier 2
  - Pour deck concrete for Span 1, 3 and West 8 Panels of Span 2
  - Reconnect upper chords at Pier 1 and Pier 2
  - Pour CIP deck concrete for East 6 Panels of Span 2
  - Add SDL and LL
- **Option 4**
  - Erect entire steel superstructure (cont. Pier 1 and 2)
  - Release upper chords at Pier 1 and Pier 2
  - Pour CIP deck concrete for Span 1 and Span 3
  - Reconnect upper chords at Pier 2
  - Pour CIP deck concrete for Span 2
  - Reconnect upper chords at Pier 1
  - Add SDL and LL
- **Option 5**
  - Erect entire steel superstructure (cont. Pier 1 and 2)
  - Release upper chords at Pier 1
  - Pour CIP deck concrete for all 3 spans
  - Reconnect upper chords at Pier 1
  - Add SDL and LL

SUPPORT REACTIONS

Minimum Support Reactions (kips)

Support	Option 0	Option 1	Option 2	Option 3	Option 4	Option 5
West Abutment	445	110	-185	35	108	75
Pier 1	2370	3040	3120	2975	2850	2325
Pier 2	4350	3510	3390	3430	3570	4220
Pier 3	-215	640	480	555	465	-175

Notes:
1. Reactions are per truss plane due to envelope of Strength I and Strength IV load combinations under vertical gravity loads (DC, DW, LL+IM) only.

TRUSS WEIGHT

Weight of Truss Members (lbs)

Span	Option 0	Option 1	Option 2	Option 3	Option 4	Option 5
1	556,000	632,000	575,000	564,000	564,000	551,000
2	3,572,000	4,572,000	3,865,000	4,192,000	4,163,000	3,286,000
3	1,052,000	954,000	862,000	862,000	873,000	980,000
TOTAL	5,180,000	6,158,000	5,300,000	5,618,000	5,600,000	4,817,000

Note: Weights are for two truss planes and include the weight of truss members only.

Truss Weight per Unit Area (psf)

Span	Option 0	Option 1	Option 2	Option 3	Option 4	Option 5
1	52	59	54	53	53	52
2	88	113	96	104	103	81
3	55	50	45	45	46	51

Note: Truss weight shown is only for primary truss members. Weight of longitudinal stringers, floor beams, lateral bracing, and other misc. steel is not included.

Steel Weight Estimate From Historic Data (psf)

Span	Simple	Cont.
1	65	55
2	170*	125
3	80	70

Notes: *Estimated from US 60 over Cumberland River Truss Bridge
Includes all structural steel for superstructure

REDUNDANCY STRATEGY

Number of H-Section Tension Members

Member	Option 0	Option 1	Option 2	Option 3	Option 4	Option 5
Upper Chord	11	6	9	9	8	15
Vertical	18	16	17	16	17	19
Diagonal	12	15	14	15	15	12
TOTAL	41	37	40	40	40	46

Number of H-Section Tension Members with Axial Force > 2500 kips

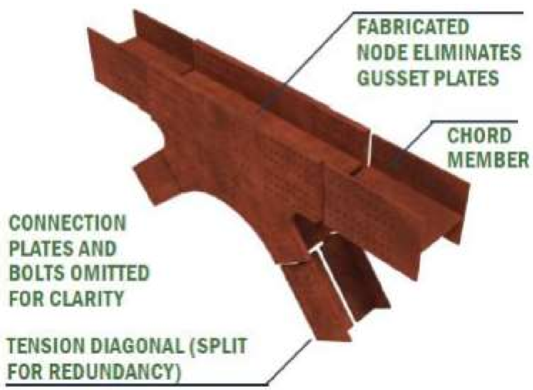
Member	Option 0	Option 1	Option 2	Option 3	Option 4	Option 5
Upper Chord	4	0	0	0	0	4
Vertical	0	0	0	0	0	0
Diagonal	3	4	4	4	3	3
TOTAL	7	4	4	4	3	7

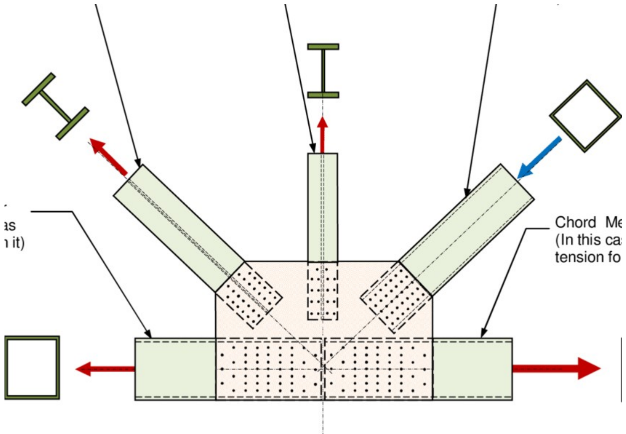
SUMMARY OF SPAN CONTINUITY EVALUATION

Option	Total Truss Weight (lbs)	Weight Ratio Normalized to Option 0	No. of H-Section Members with Tension > 2500 kips	Release/ Reconnect operation at Pier 1	Release/ Reconnect operation at Pier 2	Counter-weight at Abutment	Counter-weight at Pier 3
0	5,180,000	1.00	7	No	No	No	Yes
1	6,158,000	1.19	4	Yes	Yes	No	No
2	5,300,000	1.02	4	Yes	Yes	Yes	No
3	5,618,000	1.08	4	Yes	Yes	No	No
4	5,600,000	1.08	3	Yes	Yes	No	No
5	4,817,000	0.93	7	Yes	No	No	Yes

30% TRUSS GEOMETRY, PANEL LAYOUT & MEMBER TYPE

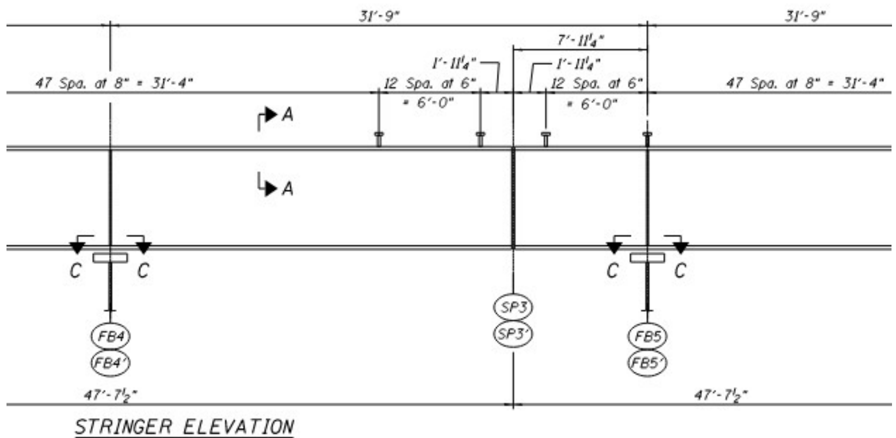
- Constructability, Efficiency, Cost & Aesthetics
- Height was kept similar to TS&L Design
- Optimized panel length from 42' to 55' to Truss Panel Layout and Length
    - Minimize number of truss nodes while optimizing
        - Crane sizes
        - Member weights and lengths
- Explored Nodal Connections vs. Gusset Plates



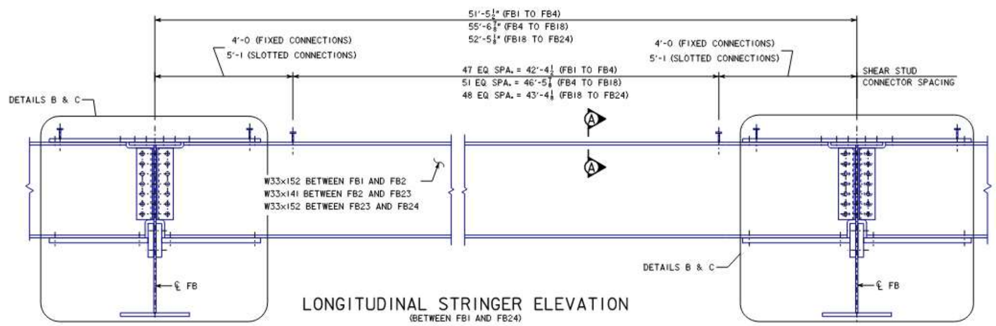


30% FLOOR SYSTEM

- Floor System Configuration
- How floor beams and stringers interact
- Stringers float over floor beams or stringers integral with floor beams?
- Deck integral with stringers or stringers & floor beams

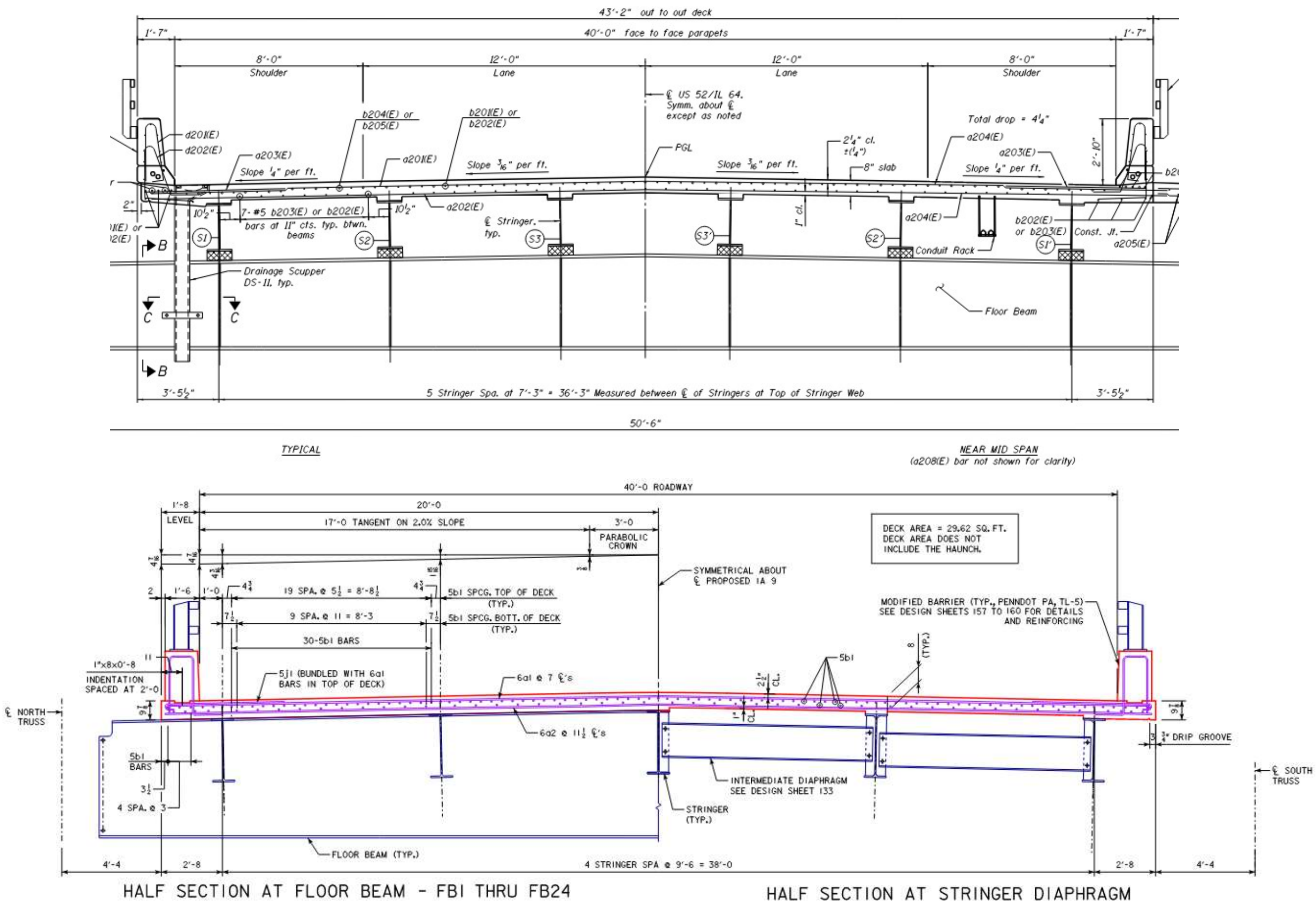


Stringers on top of FBs



Stringers integral with FBs

30% FLOOR SYSTEM

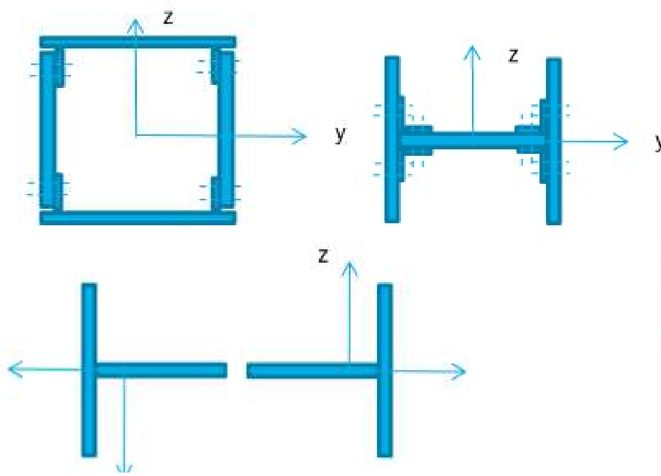


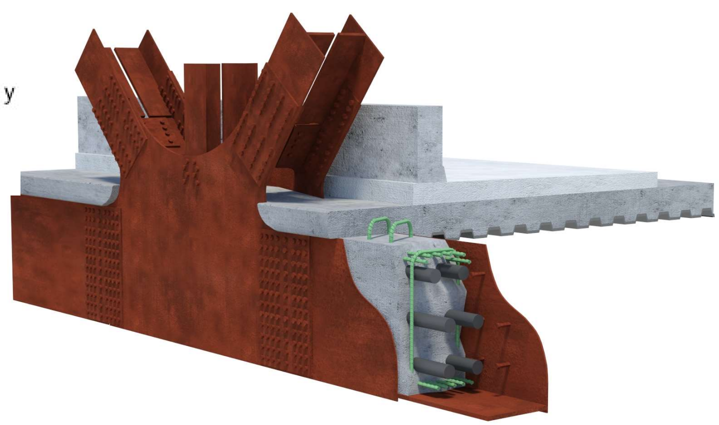
FHWA POLICY AND REDUNDANCY

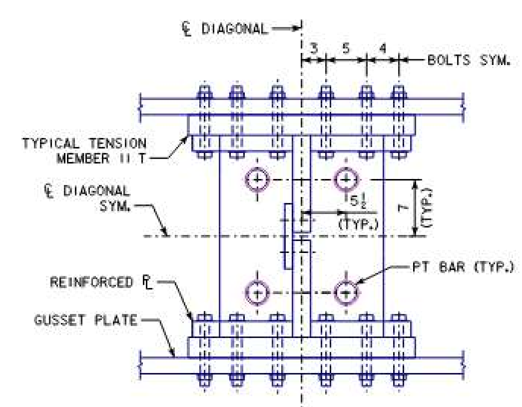
- Fracture Critical Members (FCMs)
  - Fracture of member likely results in collapse of the bridge
  - Require higher steel toughness and fabrication standards
  - Require more frequent inspection (Previously – hands-on every 2 years)
  - 2 girder / truss systems are “Fracture Critical”
  - 3 or more girder systems are redundant
  - Now – Nonredundant Steel Tension Members (NSTMs)
- Internally Redundant Member (IRMs)
  - Bolted built-up members
  - One plate fractures, load still carried by other plates
- System Redundant Member (SRMs)
  - Gains redundancy by redistribution of load laterally through the system
  - Show by complex analysis

30% REDUNDANCY STRATEGIES

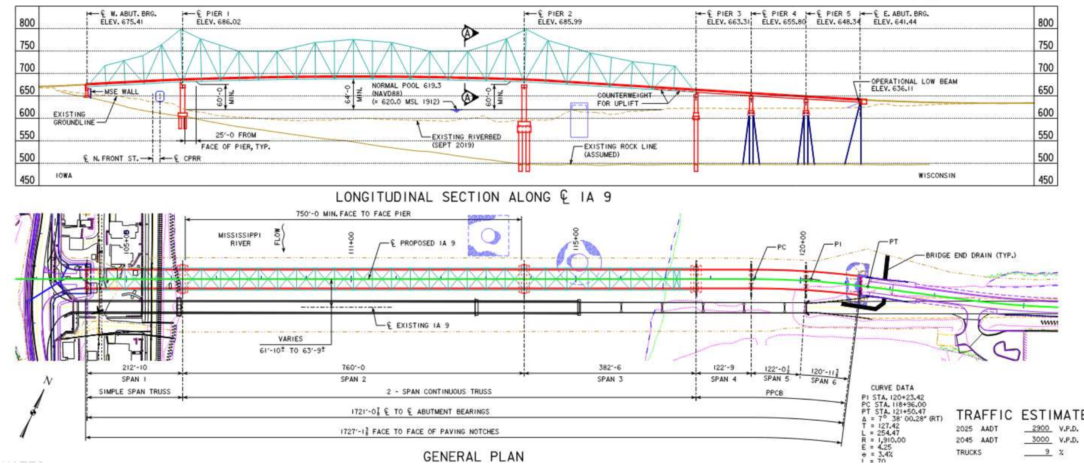
- Internal Member Redundancy – built-up bolted member
- Post-Tensioning Redundancy – external PT
- Post-Tensioned Concrete Member – heavy
- Load Redistribution by redistribution to the other Truss Plane
- Parallel Members for Tension Only Members
- Redundancy for Stress Reversal Members



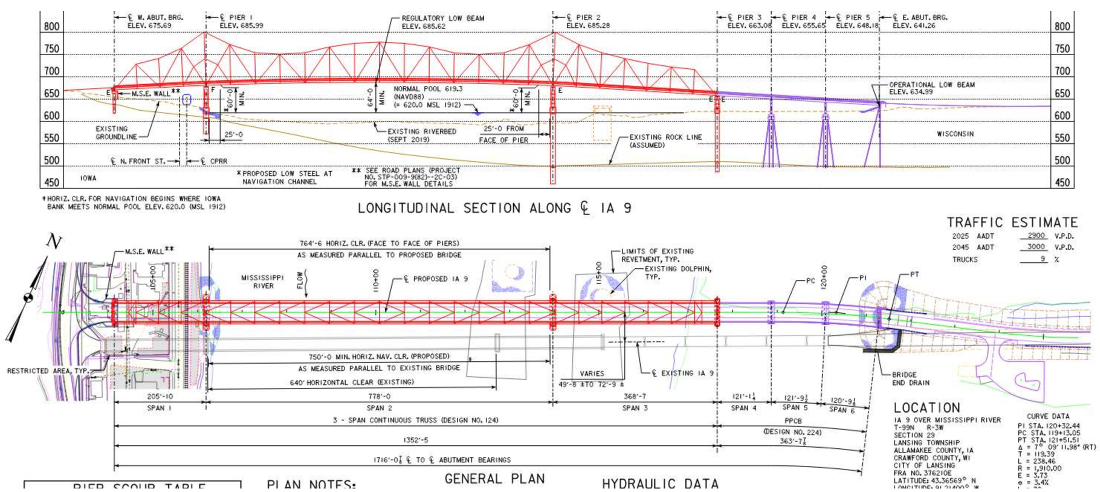




TS&L VS FINAL DESIGN



TS&L



Final

DESIGN STANDARDS

- AASHTO LRFD 9th Edition
- AASHTO IRM Guide Spec
- AASHTO SRM Guide Spec
- AASHTO / AWS D1.5 – Bridge Welding Code
- Iowa DOT Bridge Design Manual

Redundancy I Limit State – At Time of Fracture for SRM

$$(1 + DA_R) * [1.05DC + 1.05DW + 0.85(LL+IM)] \text{ where } IM = 0.00,$$

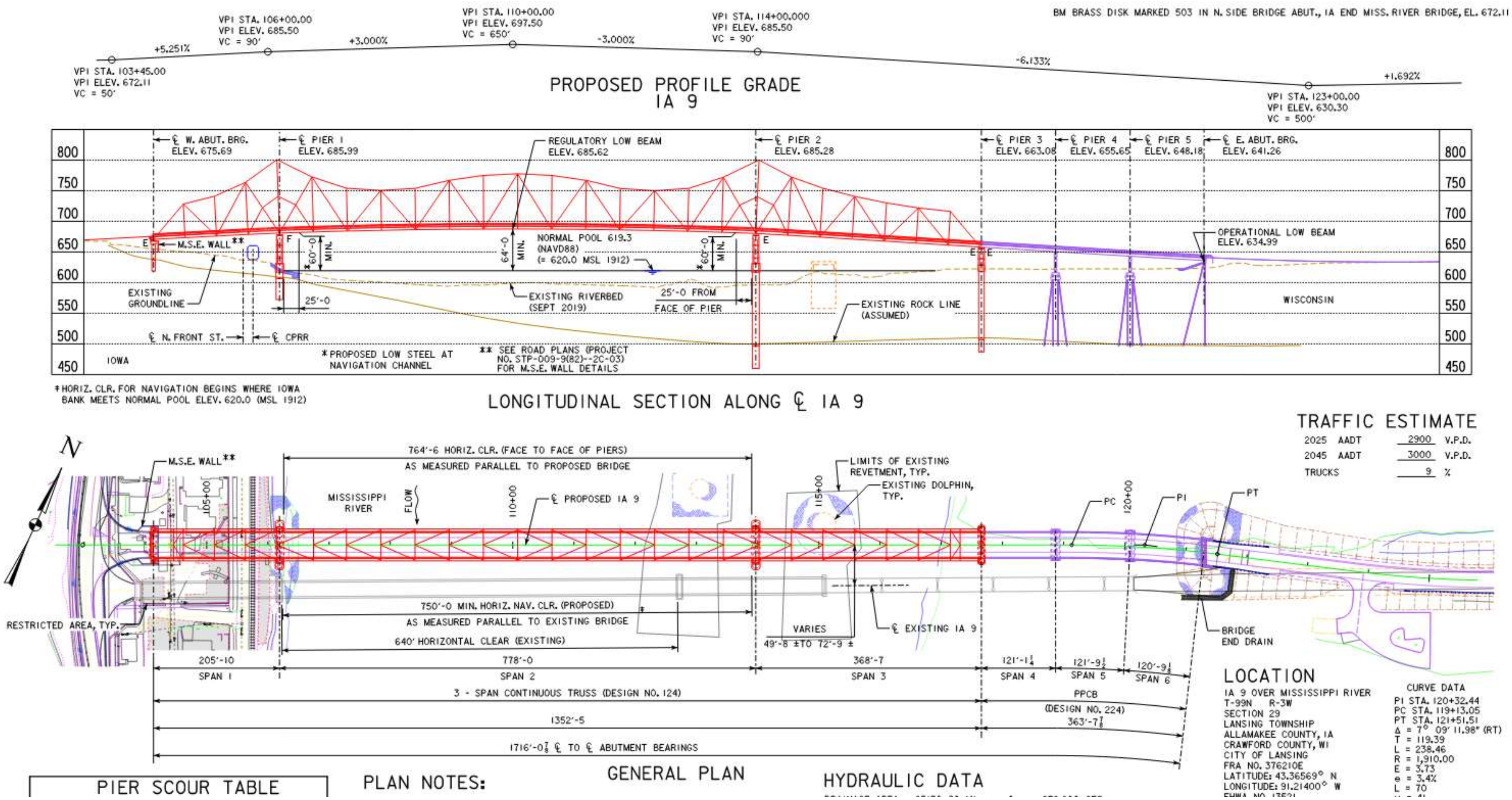
Redundancy II Limit State – After Fracture for SRM & IRM

$$1.05DC + 1.05DW + 1.30(LL+IM) \text{ where } IM = 0.15,$$

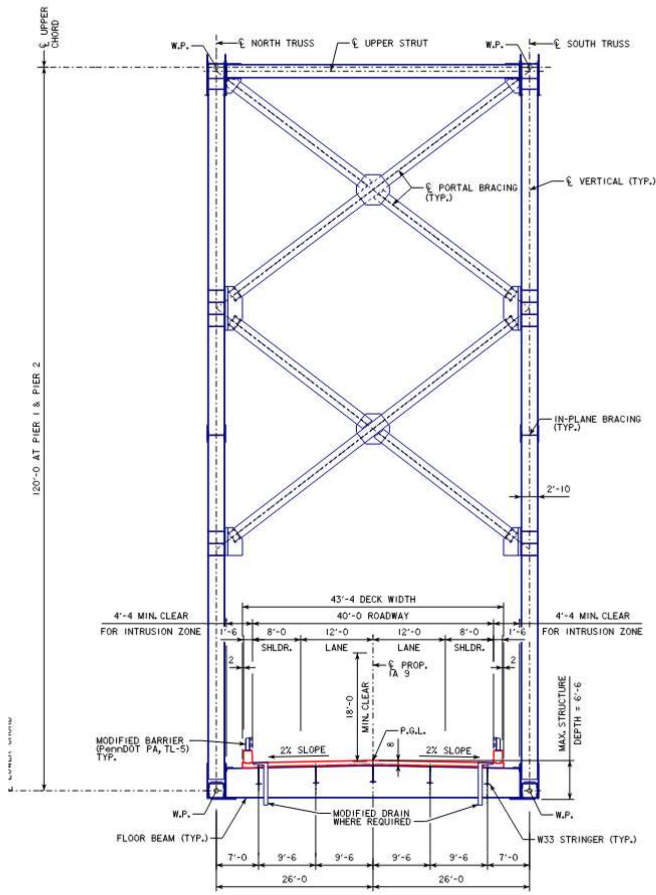
STEEL TRUSS DESIGN SUMMARY

- 206' – 778' – 369' three-span truss
- 40 ft wide roadway
- 52 ft CL to CL truss chords
- Erection Sequence to eliminate uplift on back spans
  - Simple for DL, continuous for LL
  - Relieve top chord continuity over piers for back span deck pours
  - Reconnected after pours
- Truss members
  - Lower chord box section
  - Upper chord and diagonal H-sections
  - Vertical H and parallel T sections
  - 51 ft to 56 ft truss panel / floor beam spacing
  - Floor beams and stringers integral with deck

GENERAL PLAN & ELEVATION

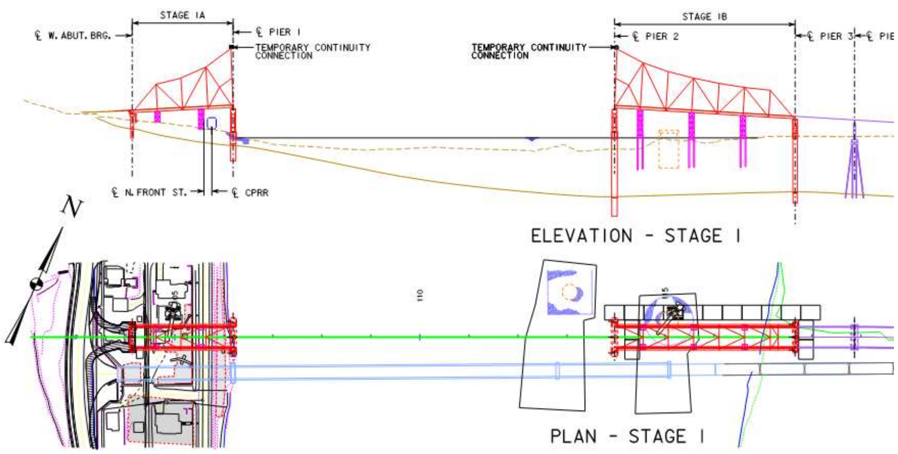


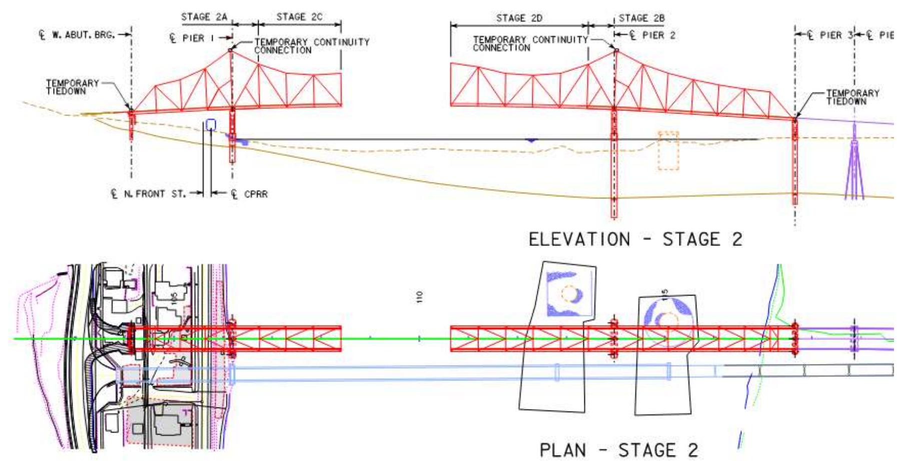
TRUSS SECTION WITH PORTAL BRACING

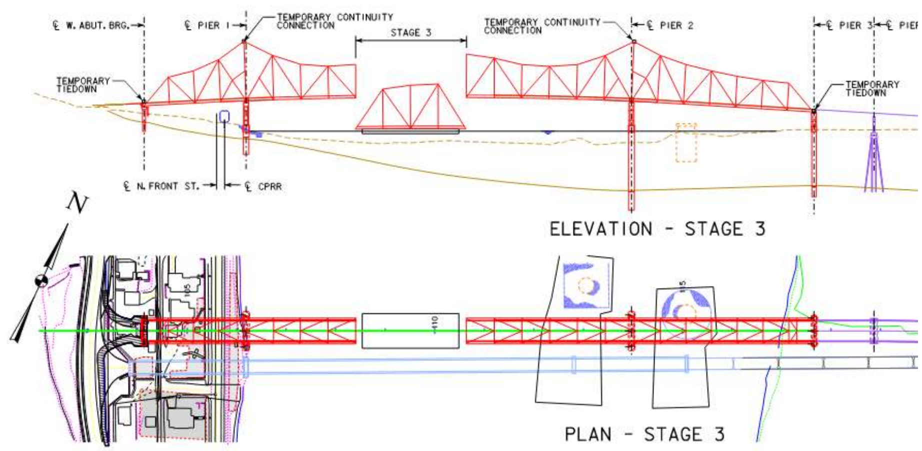


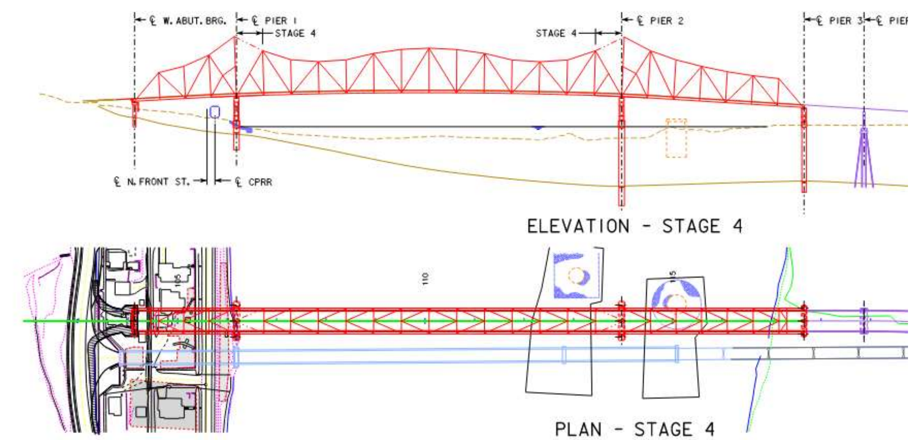
TYPICAL TRUSS SECTION
(LOOKING UPSTATION)
(SECTION AT PIER 1 AND PIER 2 SHOWN)

ERECTION SEQUENCE

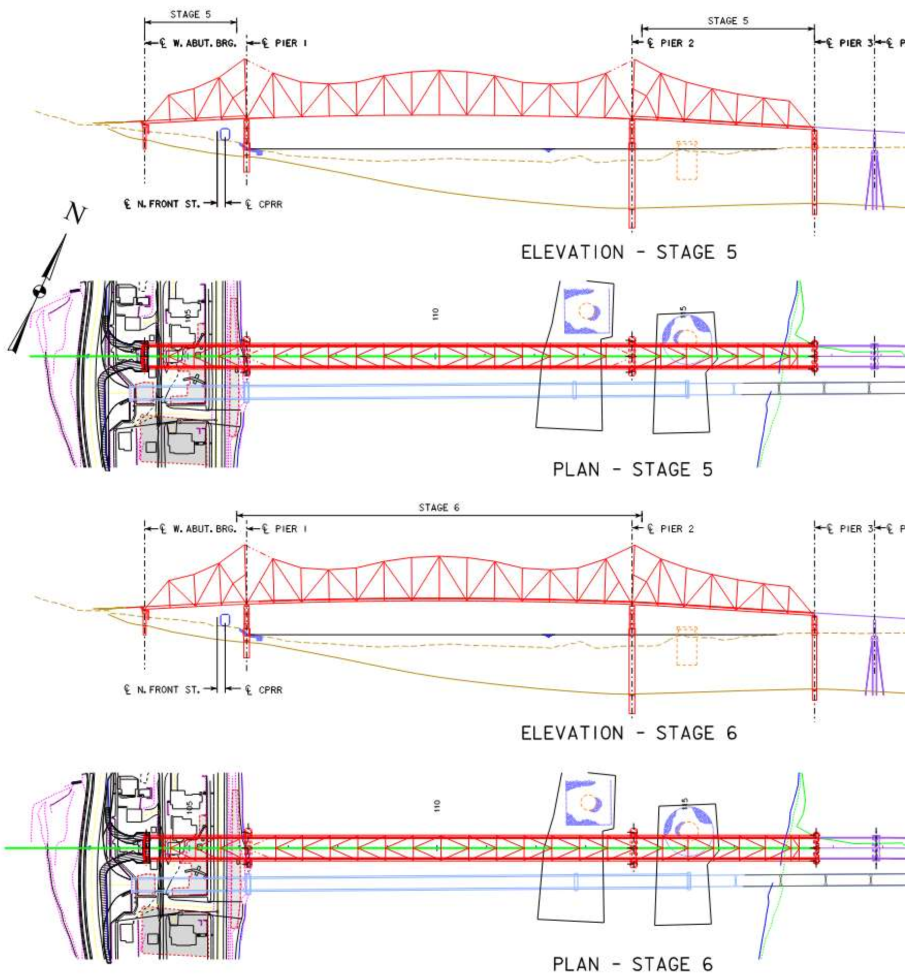


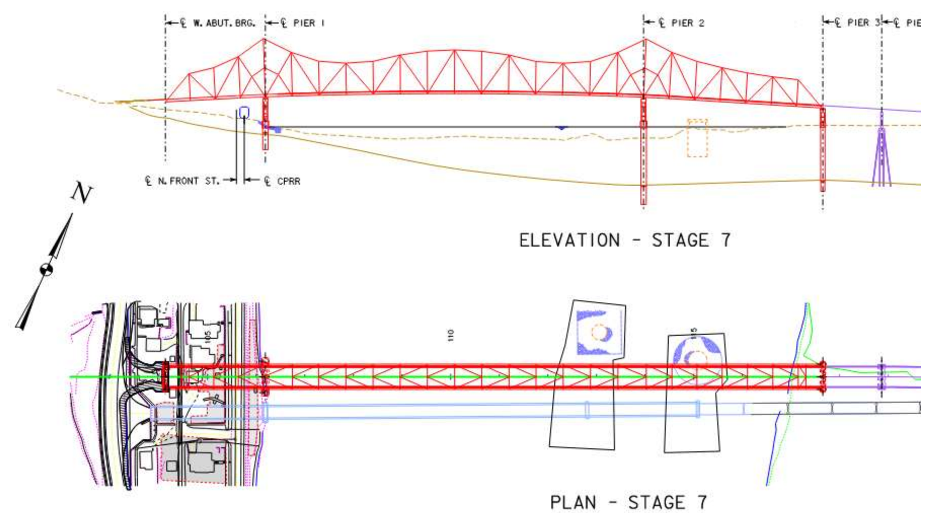






ERECTION SEQUENCE



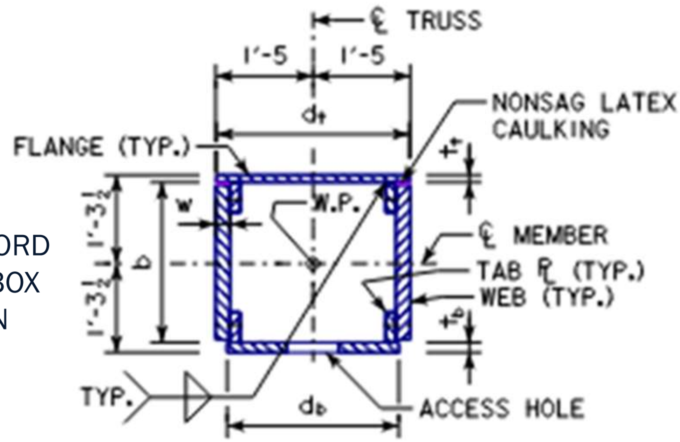


STEEL TRUSS DESIGN SUMMARY

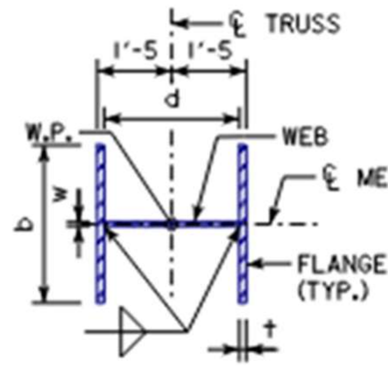
- Portal bracing at ends, piers and main span first diagonal
  - Portal, Upper and In-plane Bracing – I-sections
  - Lower lateral bracing – WT-sections
- Redundancy strategies include
  - Built-up internally redundant tension members (IRMs)
  - Parallel T system redundant tension members (SRMs)
  - Gusset plates – some with redundancy plates (IRMs)
  - Floor beams (SRMs)
- Steel Material
  - All IRMs either HPS70WF or HPS50WF steel
  - All Gussets HPS70W (most HPS70WF)
  - SRMs Grade 50F
  - Other steel Grade 50 or 50(T)

TRUSS MEMBER SECTIONS

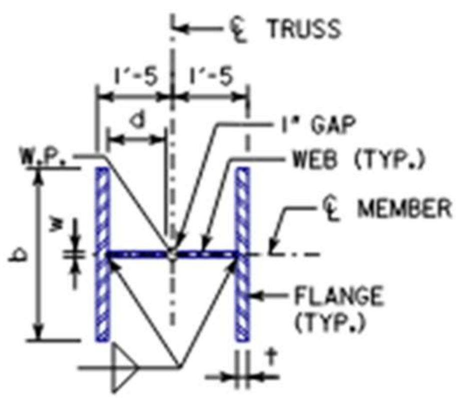
LOWER CHORD BUILT-UP BOX SECTION



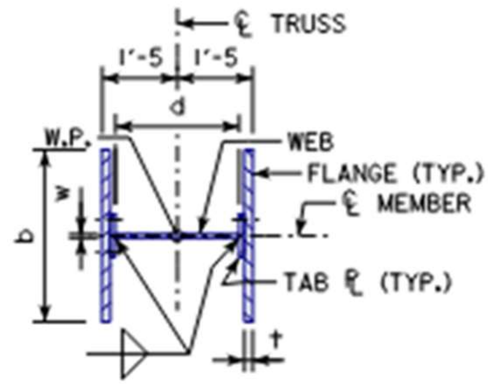
COMPRESSION MEMBER H-SECTION



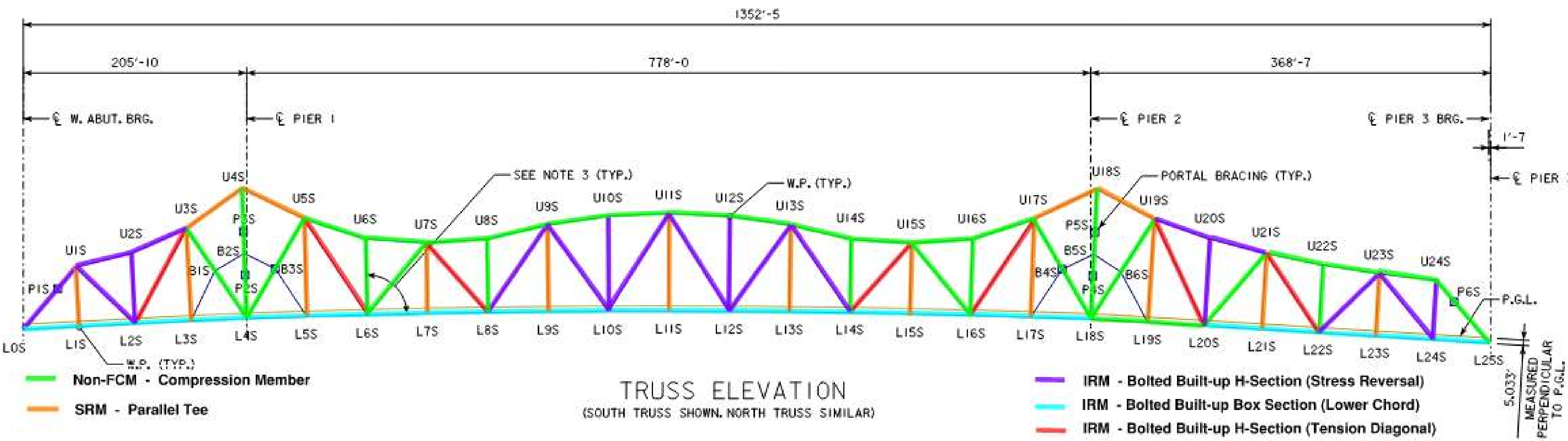
TENSION MEMBER PARALLEL T-SECTION



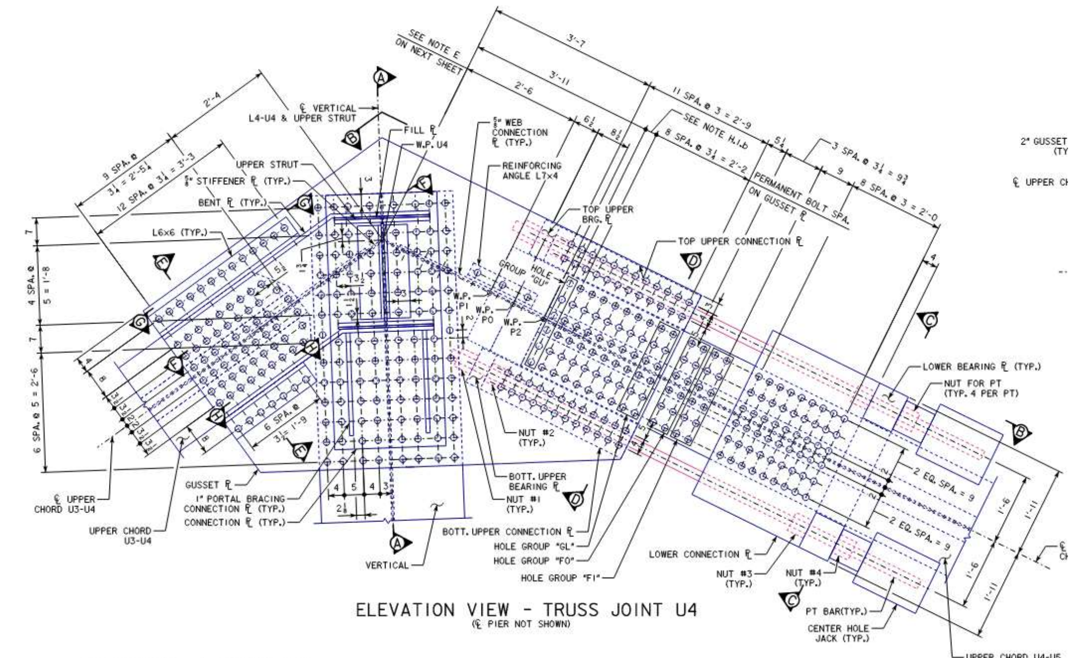
BOLTED BUILT-UP H-SECTION



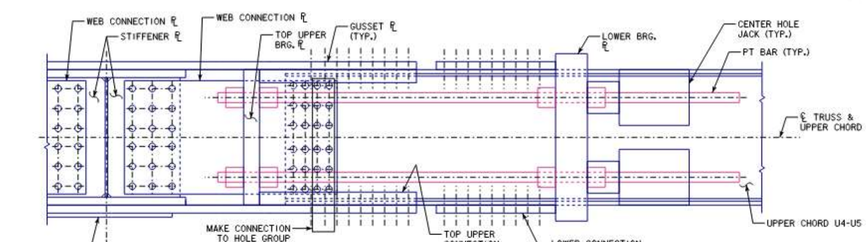
TRUSS MEMBER REDUNDANCY



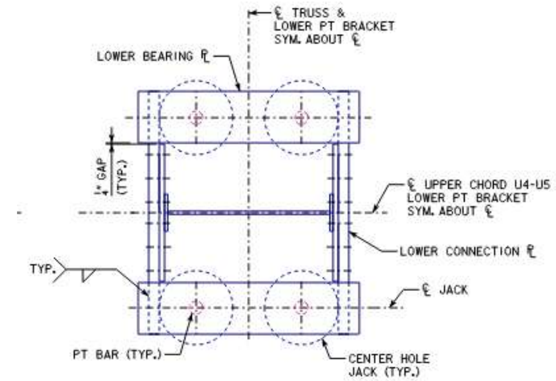
TOP CHORD OVER PIER CONTINUITY RELEASE



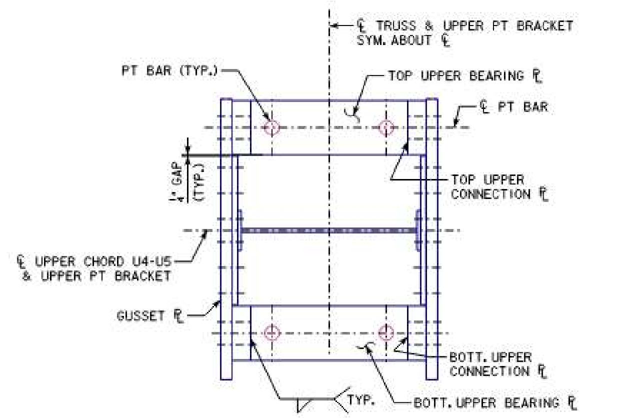
ELEVATION VIEW - TRUSS JOINT U4
(℄ PIER NOT SHOWN)



SECTION B-B
DURING JACKING AT PI POSITION

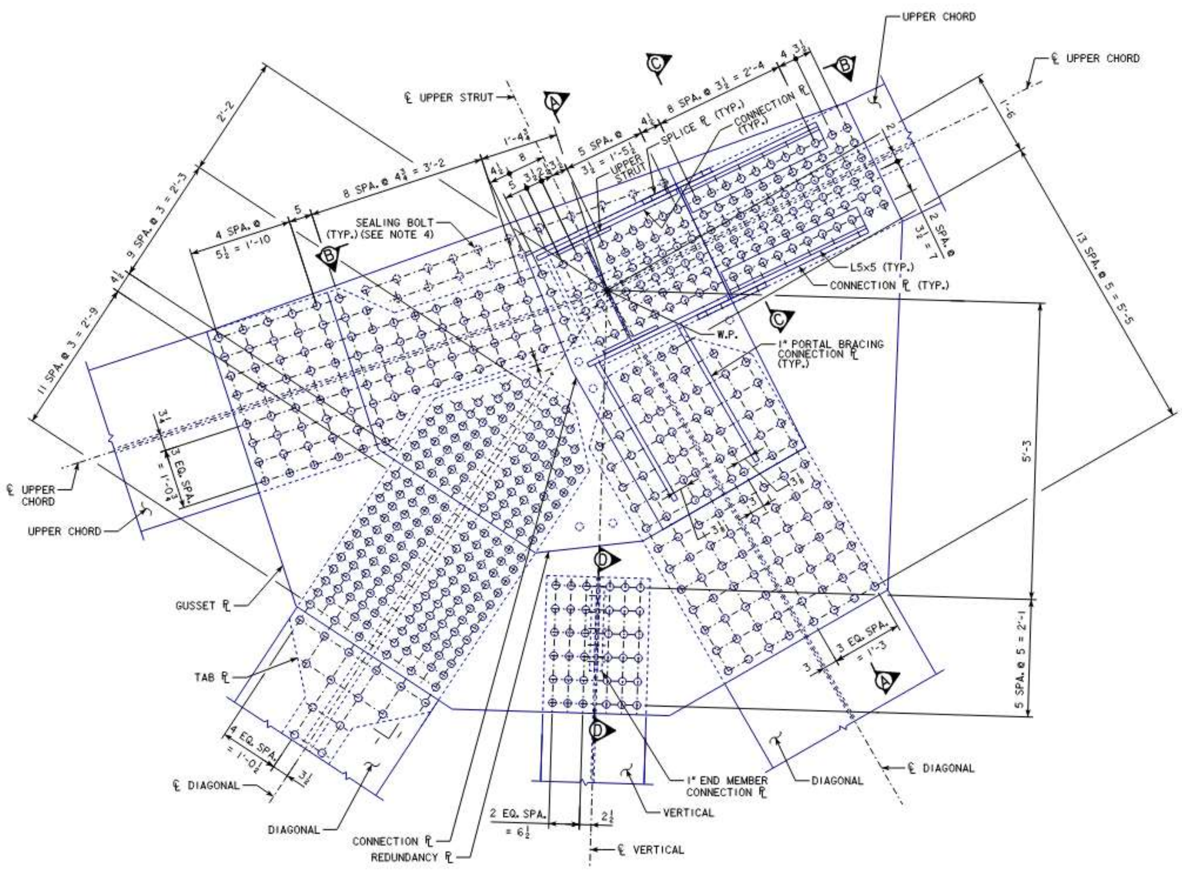


SECTION C-C

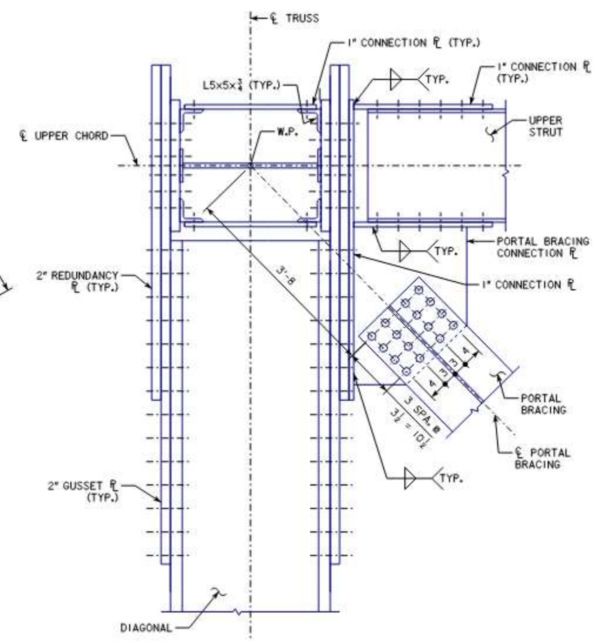


SECTION D-D

HIGH TENSION DIAGONAL TOP GUSSET CONNECTION

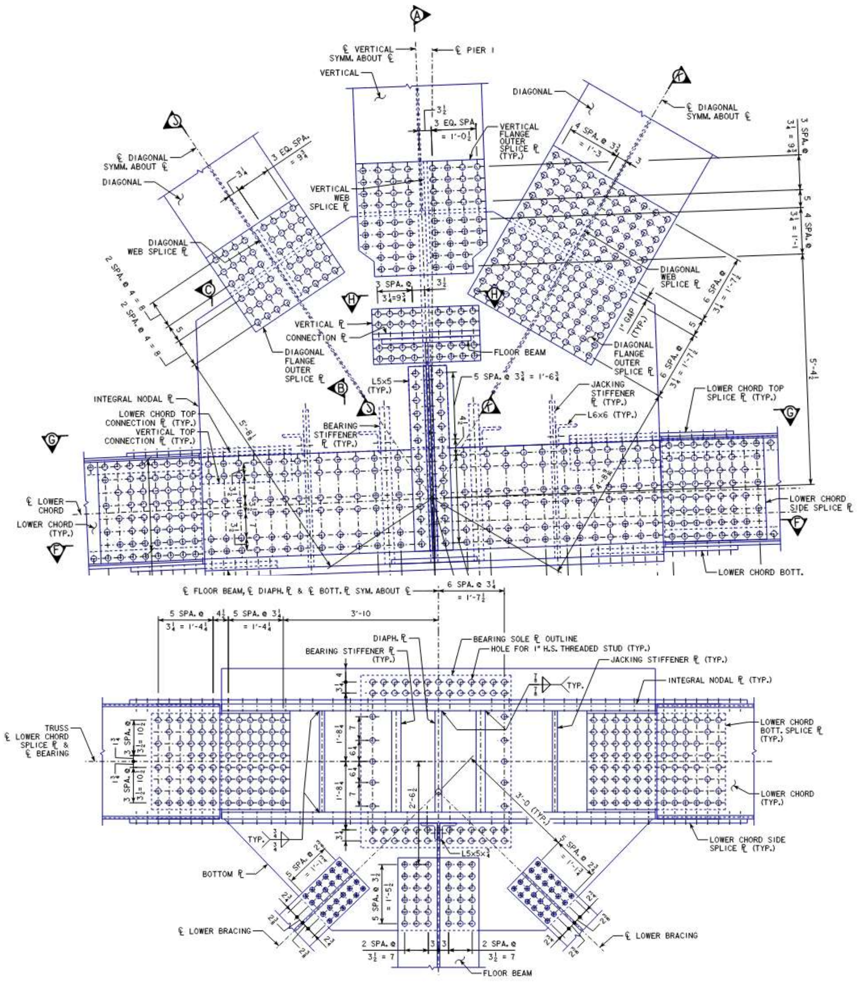


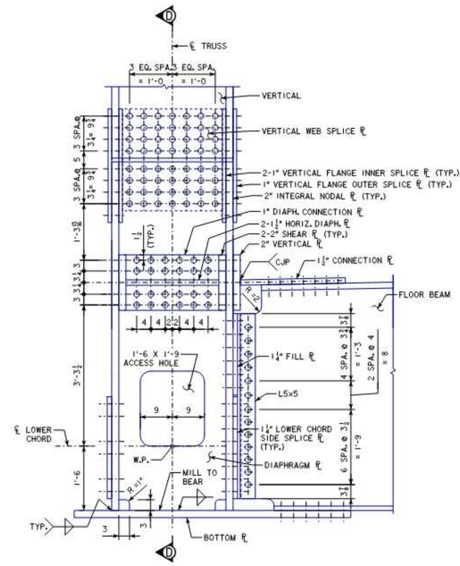
ELEVATION VIEW - TRUSS JOINT U17



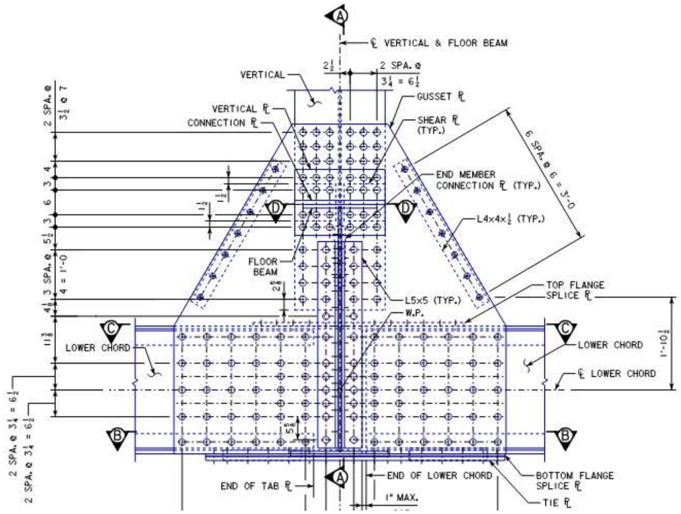
SECTION A-A

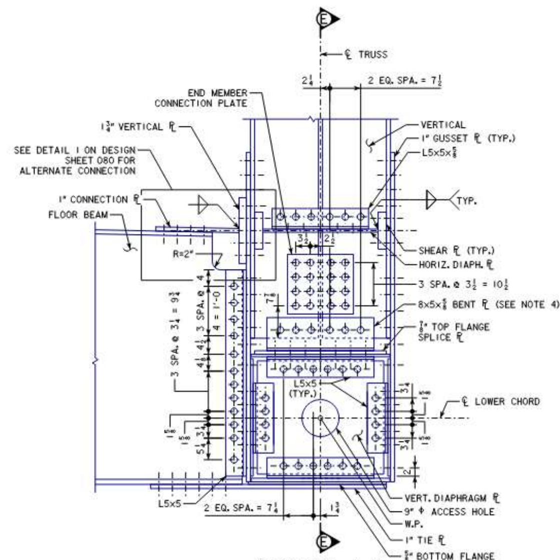
LOWER INTEGRAL JOINT AT PIER 1


SECTION F-F

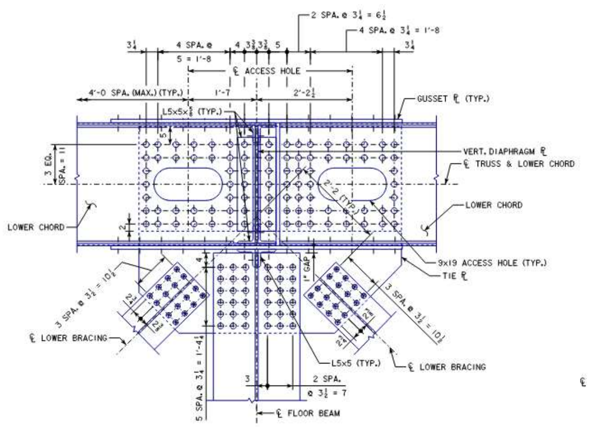

SECTION A-A

LOWER GUSSET WITH VERTICAL ONLY





SECTION A-A

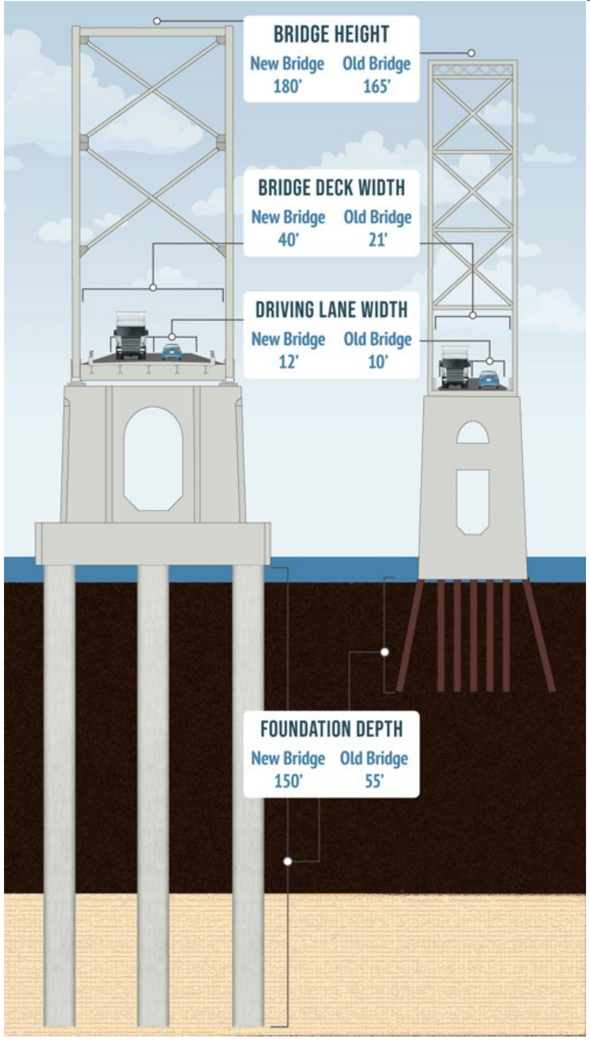


SECTION B-B

STEEL TRUSS ADDITIONAL ITEMS

- Truss fabrication for geometric angles
- Integral node connections at Pier Bearings
- 1” and 7/8” diameter A325 bolts
  - Built-up members use 7/8” along length in shop
  - Main field connections use 1” (except lower lateral)
- Option to use F3148 Torque & Angle bolts in lieu of A325
  - Connections do not take advantage of increased strength
  - No mixing within connections
- Corrosion Protection
  - Truss steel – Duplex Metallizing throughout
  - Stainless steel rebar in deck and barriers

RENDERINGS



BRIDGE HEIGHT
New Bridge 180'
Old Bridge 165'
BRIDGE DECK WIDTH
New Bridge 40'
Old Bridge 21'
DRIVING LANE WIDTH
New Bridge 12'
Old Bridge 10'
FOUNDATION DEPTH
New Bridge 150'
Old Bridge 55'

QUESTIONS?

Wisconsin Highway Research Program

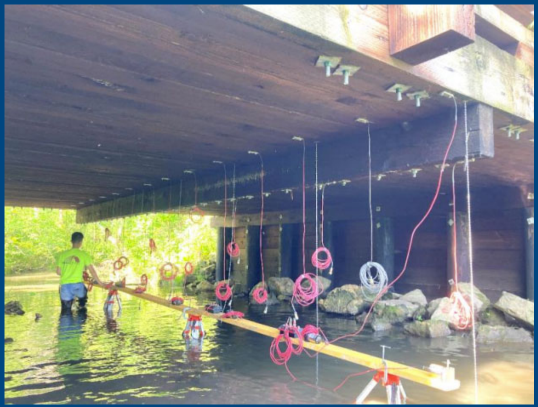
James Luebke

WisDOT Policy and Standards Engineer

WisDOT Structural Engineers Symposium
Madison, WI
5-26-2026

Overview

- What is the WHRP
- Recently Completed Projects
- Active Projects



WHRP

Wisconsin Highway Research Program (WHRP) Overview

- Established in 1998
- Collaboration with the University of Wisconsin - Madison
- Four research areas
  - Flexible Pavements
  - Rigid Pavements
  - Geotechnics
  - Structures
- GOAL: Practical research → implementable results

WHRP

- Better Ways to Design, Build and Reconstruct
- Selected and overseen by WisDOT, Academia, Industry, Consulting Engineers, and the FHWA.
- Structures Area – 1 to 2 projects/Year

WHRP Funding

- WHRP project funding is approximately $1 million annually
- Projects are funded by:
  - 80% FHWA federal funds (SPR, Part B Research), and
  - 20% WisDOT state funds

WHRP Organization

Steering Committee

Technical Oversight Committee (TOC)

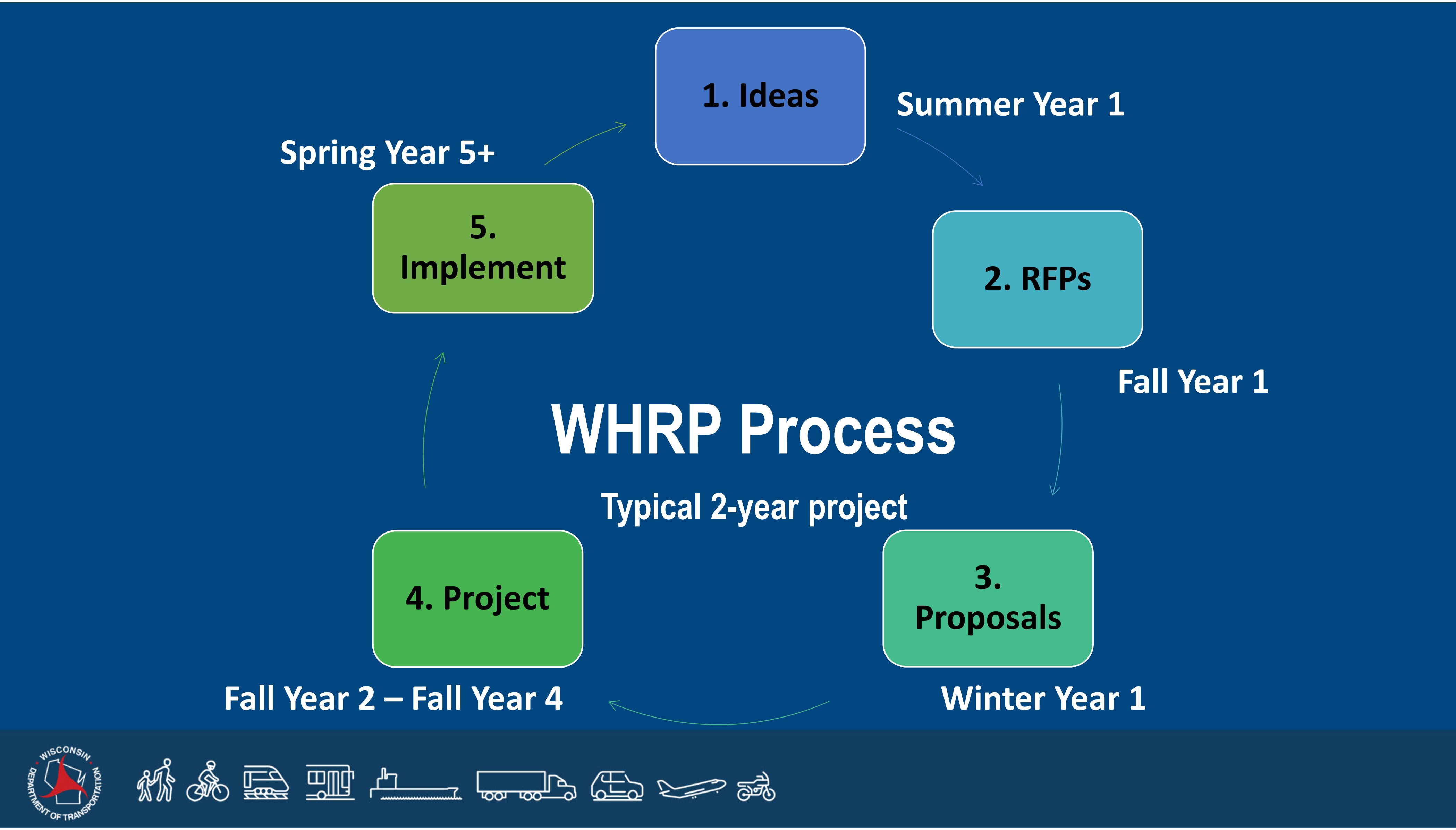
- Structures
- Geotechnics
- Flexible Pavements
- Rigid Pavements

Project Oversight Committee (POC)

Research Project - Research Team

UW Technical Support Staff

WisDOT Research and Library



WHRP Process
Typical 2-year project
1. Ideas
Summer Year 1
2. RFPs
Fall Year 1
3. Proposals
Winter Year 1
4. Project
Fall Year 2 – Fall Year 4
5. Implement
Spring Year 5+
WISCONSIN DEPARTMENT OF TRANSPORTATION

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Wisconsin Highway Research Program (WHRP)

- Research and Library
- **Research**
- Wisconsin Highway Research Program (WHRP)
- Policy and Safety First Research Programs
- Pooled Fund Research
- Materials Management Projects
- Requests for Proposals
- Program Documents and Events
- Find Research Reports
- **Library**
- Archives
- History
- Partners
- Reading Room
- Resources

The Wisconsin Highway Research Program was established in 1998 by the Wisconsin Department of Transportation in collaboration with the University of Wisconsin-Madison to discover better ways to design, build and reconstruct the state's highways. WHRP research projects are selected and overseen by collaborative committees that include WisDOT, academia, industry, consulting engineers and the Federal Highway Administration. Through rigorous testing of innovative materials and methods, WHRP research leads to improved performance and service life of Wisconsin's highways.

WHRP

Strategic Plan

Steering Committee

Technical Oversight Committee member lists

Outreach

Project details, final reports and technical briefs

- Flexible Pavements
- Rigid Pavements
- Structures
- Geotechnics

Having trouble finding a project? Try our search tool.

Wisconsin Highway Research Program contact:
Shari Krueger
608-261-6064
shari.krueger@dot.wi.gov

Website: https://wisconsindot.gov/Pages/about-wisdot/research/whrp.aspx

Structures - Technical Oversight Committee (TOC)

Structures

James Luebke, Chair
WisDOT Bureau of Structures

Joe Balice (non-voting)
Federal Highway Administration

Ruth Coisman
WisDOT Bureau of Structures

Jared Marugg
Kraemer North America

Tadd Owens
CORRE

Dave Pantzlaff
Ayres Associates

Jose Pincheira
University of Wisconsin – Madison

Scott Reay
WisDOT Bureau of Structures

Laura Shadewald
WisDOT Bureau of Structures

Andrew Smith
WisDOT Bureau of Structures

Anthony Stakston
WisDOT Bureau of Structures

Habib Tabatabai
University of Wisconsin – Milwaukee

Baolin Wan
Marquette University

Recently Completed Projects

- Bridge Deck Thermography Verification and Policy
- State of Practice for Specifying and Repairing MSE Walls
- Investigation of MSE Wall Corrosion in Wisconsin (Geotech)

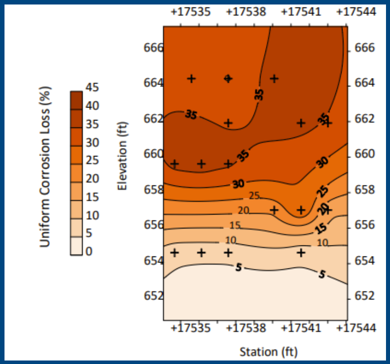
Investigation of MSE Wall Corrosion in WI

Figure: FHWA-HIF-24-002

PI: Geocomp, Inc
PM: Steven Doocy
Completion: 10/2025

Investigation of MSE Wall Corrosion in WI

- Findings/Recommendations:
  - Upper reinforcement rows more exposed to excessive corrosion
  - Pavement condition index (PCI) may be used to evaluate the significance of pavement cracks.



Investigation of MSE Wall Corrosion in WI

- Findings/Recommendations:
  - Pavement cracks and joints - Critical impact of corrosion
  - Moisture and salt intrusion was found as main factors causing excessive corrosion - Use impervious membrane and drainage systems -
  - Regularly maintain pavement surfaces and drainage structures - to prevent moisture and salt intrusion.

State of Practice for Specifying and Repairing MSE Walls

- Objectives:
  - Identify best practices for MSE wall usage
  - Recommendations to maximize MSE wall service life
  - Prepare recommendations for specific retrofit solutions

PI: Applied Research Associates, Inc.
PM: Ruth Coisman
Completion: 2/2026

State of Practice for Specifying and Repairing MSE Walls

- Outcomes:
  - Developed a vulnerability and risk-based framework for inspection and repair
  - Detailed Commentary on WisDOT practices
  - Selected defects, probable causes, and repair strategies for MSE structures.

Element or Structure Vulnerability

Standardized Vulnerability Score Factor				
4 (Severe)	4.0	8.0	12.0	16.0
3 (Poor)	3.0	6.0	9.0	12.0
2 (Fair)	2.0	4.0	6.0	8.0
1 (Good)	1.0	2.0	3.0	4.0
	1 (Good)	2 (Fair)	3 (Poor)	4 (Severe)

Element or Structure Condition State

Categories:
15+: Severe
13 to <15: Very High
9 to <13: High
6 to <9: Moderate
3 to <6: Fair
1 to < 3: Low

Active Projects

- Vertical and Overhead Concrete Patches
- Investigation of Removing Existing Abutment Exp. Joints
- Investigate Wisconsin Bridge Scour in Mobile (Alluvial) Sand-Bed Rivers
- *Evaluation of Exposed Cast-in-Place Concrete Piles in Corrosive Environments in the State of Wisconsin (Pre-Contract)*

Vertical and Overhead Concrete Patches

- Problem Statement:
  - Project-by-project acceptance
  - Rapid Setting APL - Limited to horizontal concrete surface repairs on concrete pavements and bridge decks
  - Rely on the manufacturer's repair recommendations and field engineers' discretion

PI: WJE
PM: Andrew Smith
Completion: ~~10/2025~~ 5/2026

Vertical and Overhead Concrete Patches

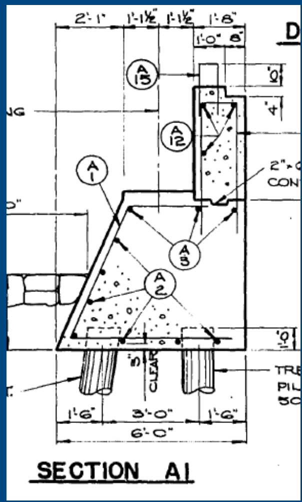
- Objectives:
  - Investigate and provide material selection guidance and repair strategies for concrete surface repairs
  - Investigate the performance of minor to intermediate patch repairs (< 2" deep and located above traffic)

Draft Report: Hand-applied patch in overhead orientation

Draft Report: Form-and-pour in overhead orientation

PI: WJE
PM: Andrew Smith
Completion: ~~10/2025~~ 5/2026

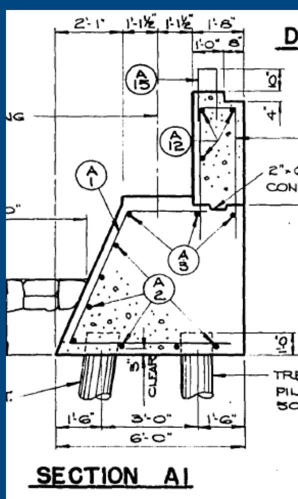
Investigation of Removing Existing Abutment Expansion Joints



- Objectives:
  - Examine WisDOT's practice of removing existing expansion joints at substructures.
  - Define practical limits of substructure conversions.
  - Prepare recommendations for converting substructures.

PI: UW-Milwaukee
PM: Laura Shadewald
Completion: 10/2026

Investigation of Removing Existing Abutment Expansion Joints



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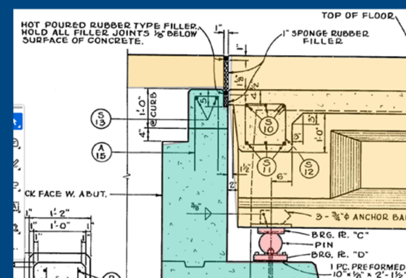
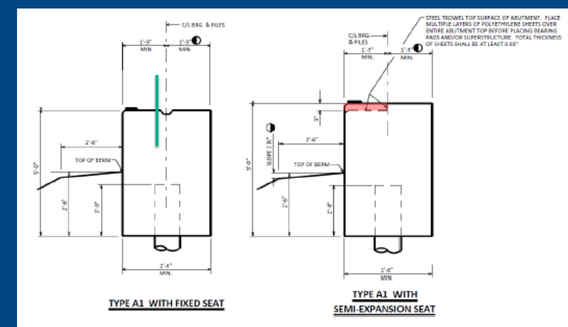




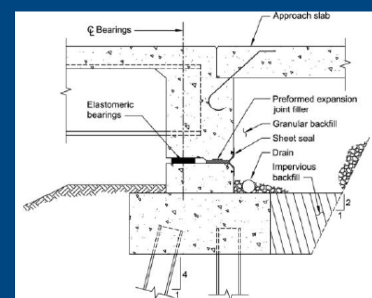
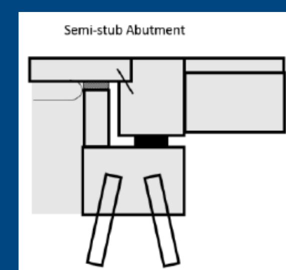


Figure 2. Example of semi-integral bridge [1].



Evaluation of Exposed CIP Piles in Corrosive Environments

- Objectives:
  - Evaluate the structural integrity, and the long-term performance of CIP concrete pile bent piers in Wisconsin's corrosive environments.

PI: TBA
PM: James Luebke
Completion: 10/2028

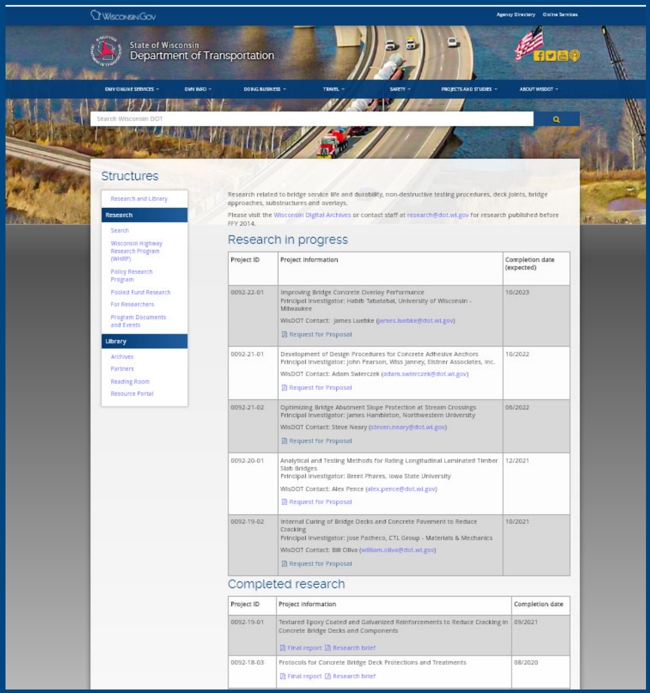
Evaluation of Exposed CIP Piles in Corrosive Environments

- Objectives:
  - Investigate corrosion at the waterline
  - Evaluate longevity at critical sections
  - Develop guidelines for open pile bents

PI: TBA
PM: James Luebke
Completion: 10/2028

WHRP Reports:

- https://wisconsindot.gov/Pages/about-wisdot/research/structures.aspx



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Structures

Research and Library

Research

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- Pooled Fund Research
- For Researchers
- Program Documents and Events

Library

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- Reading Room
- Resource Portal

Research related to bridge service life and durability, non-destructive testing procedures, deck joints, bridge approaches, substructures and overlays.

Please visit the Wisconsin Digital Archives or contact staff at research@dot.wi.gov for research published before FFY 2014.

Research in progress

Project ID	Project information	Completion date (expected)
0092-22-01	Improving Bridge Concrete Overlay Performance Principal Investigator: Habib Tabatabai, University of Wisconsin - Milwaukee WisDOT Contact: James Luebke (james.luebke@dot.wi.gov) Request for Proposal	10/2023
0092-21-01	Development of Design Procedures for Concrete Adhesive Anchors Principal Investigator: John Pearson, Wiss Janney, Elstner Associates, Inc. WisDOT Contact: Adam Swierczek (adam.swierczek@dot.wi.gov) Request for Proposal	10/2022
0092-21-02	Optimizing Bridge Abutment Slope Protection at Stream Crossings Principal Investigator: James Hambleton, Northwestern University WisDOT Contact: Steve Neary (steven.neary@dot.wi.gov) Request for Proposal	06/2022
0092-20-01	Analytical and Testing Methods for Rating Longitudinal Laminated Timber Slab Bridges Principal Investigator: Brent Phares, Iowa State University WisDOT Contact: Alex Pence (alex.pence@dot.wi.gov) Request for Proposal	12/2021
0092-19-02	Internal Curing of Bridge Decks and Concrete Pavement to Reduce Cracking Principal Investigator: Jose Pacheco, CTL Group - Materials & Mechanics WisDOT Contact: Bill Oliva (william.oliva@dot.wi.gov) Request for Proposal	10/2021

Completed research

Project ID	Project information	Completion date
0092-19-01	Textured Epoxy Coated and Galvanized Reinforcements to Reduce Cracking in Concrete Bridge Decks and Components Final report · Research brief	09/2021
0092-18-03	Protocols for Concrete Bridge Deck Protections and Treatments Final report · Research brief	08/2020

Thank You

James Luebke, PE
James.luebke@dot.wi.gov
(608) 266-5098

94 EAST-WEST

I-94 between 70th Street and 16th Street in Milwaukee County

Two-Tier Retaining Wall System Geo-Structural Design

WisDOT Structural Engineers Symposium Presentation

May 26th, 2026

WISCONSIN DEPARTMENT OF TRANSPORTATION

Agenda

94 EAST-WEST

1 Project Location and Overview

2 Retaining Wall Solutions

- Site Geology and History
- Project Context & Key Constraints
- Design Approach and Design Criteria
- Tiered Wall Design
- Quality Assurance and Quality Control
- Key Takeaways & Next Steps

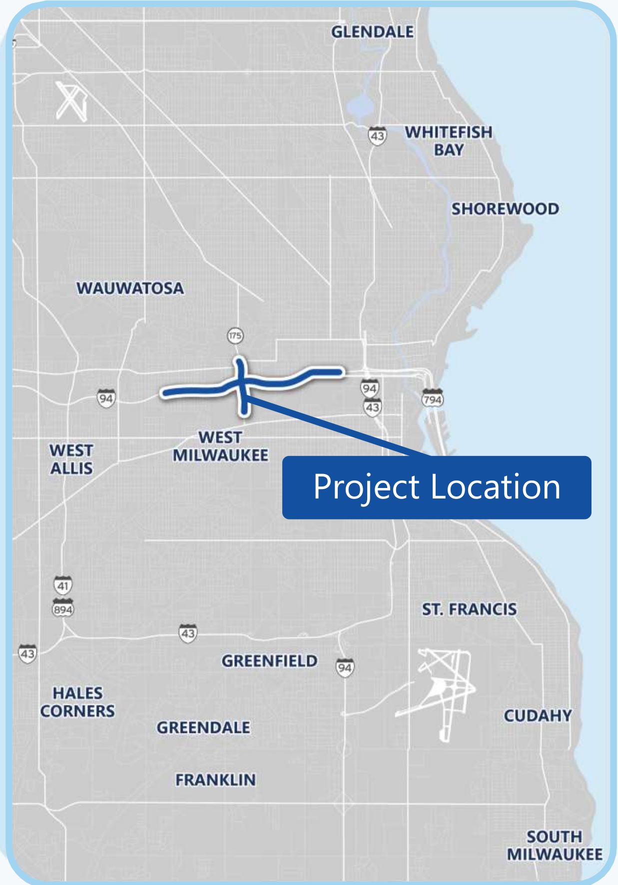
3 Questions

Project Location and Overview

94 EAST-WEST

Project Location and Overview

Located entirely in the City of Milwaukee, with close proximity to cities of Wauwatosa, West Allis, and the Village of West Milwaukee

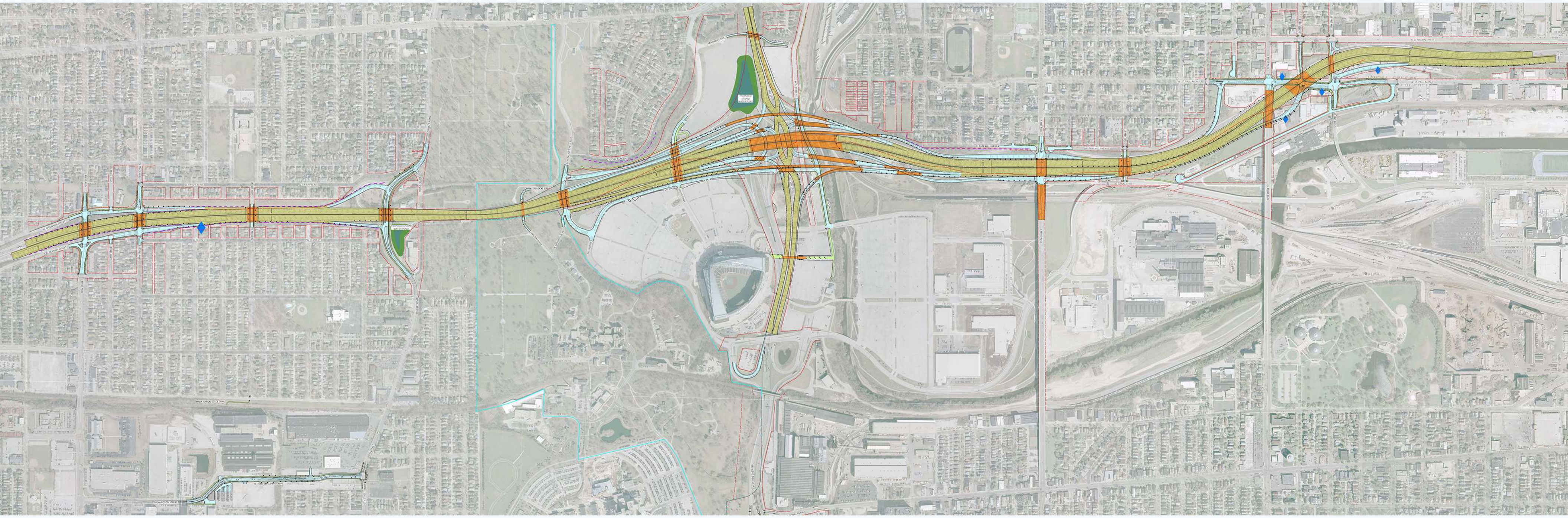


Project Location and Overview

94 EAST-WEST

8-Lanes on I-94 & Service Interchange (DDI) Along WIS 175

West Leg | Stadium Interchange | East Leg



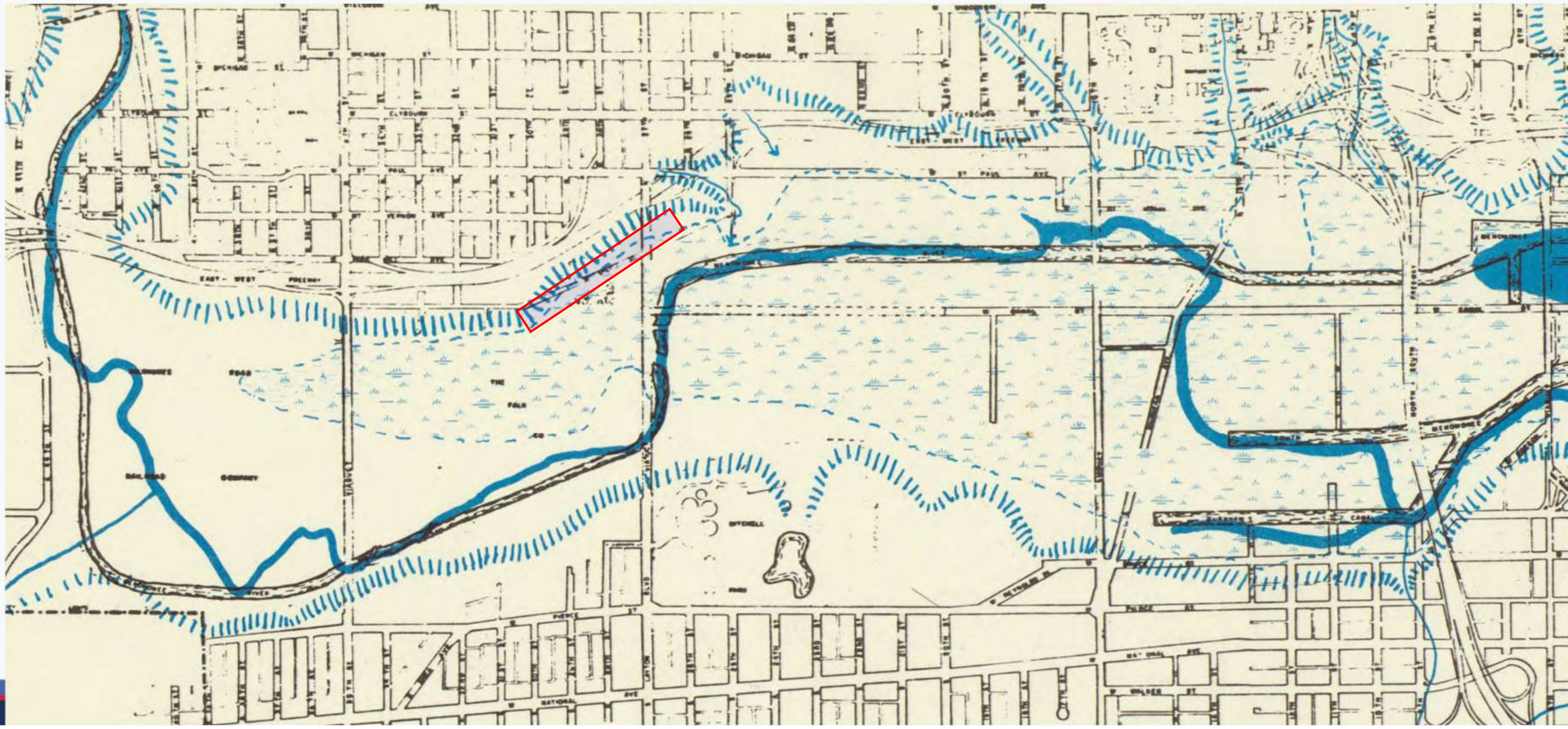
Project Location and Overview - Early East Leg

Project Location and Overview - Early East Leg

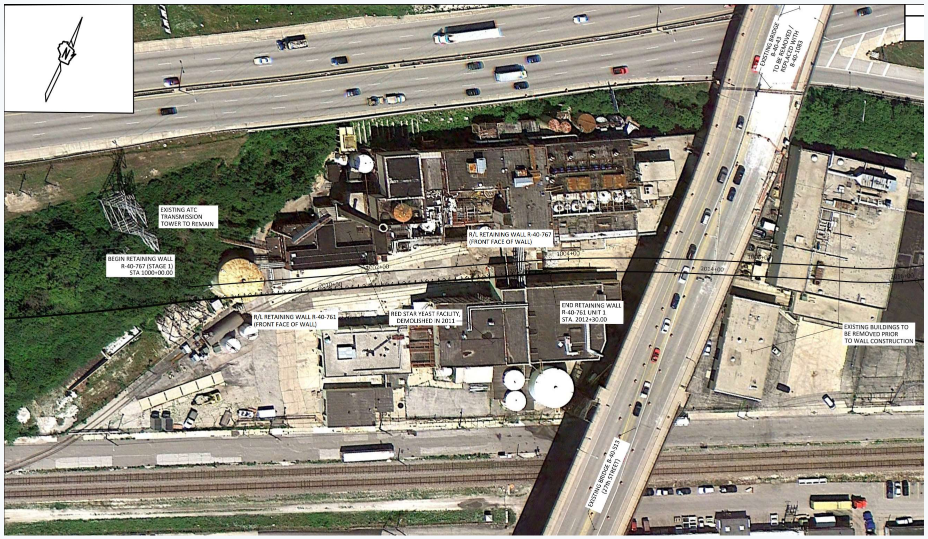
Retaining Wall Solutions

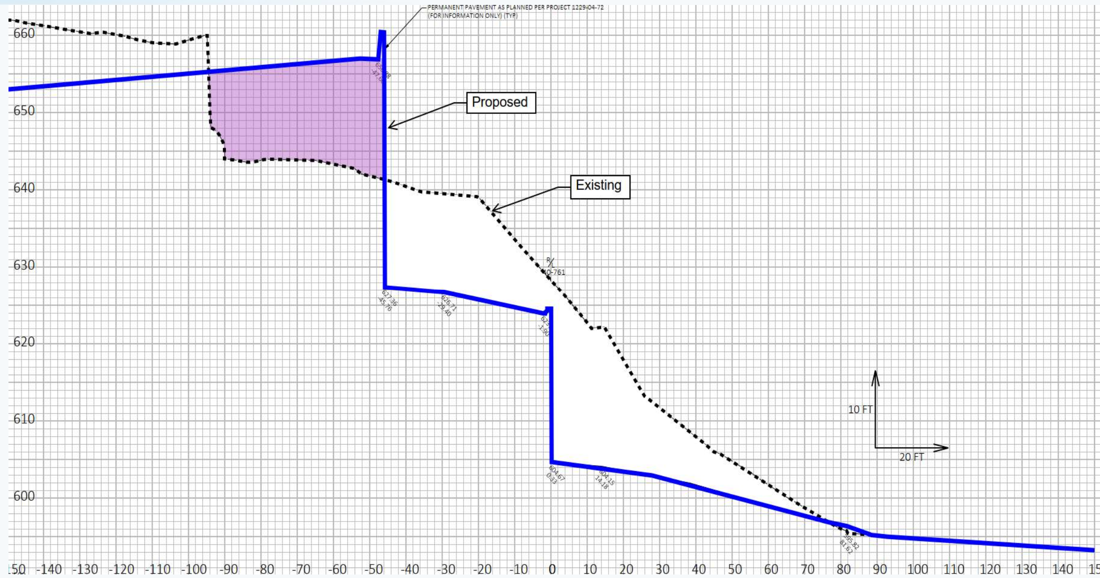
Site Geology and History

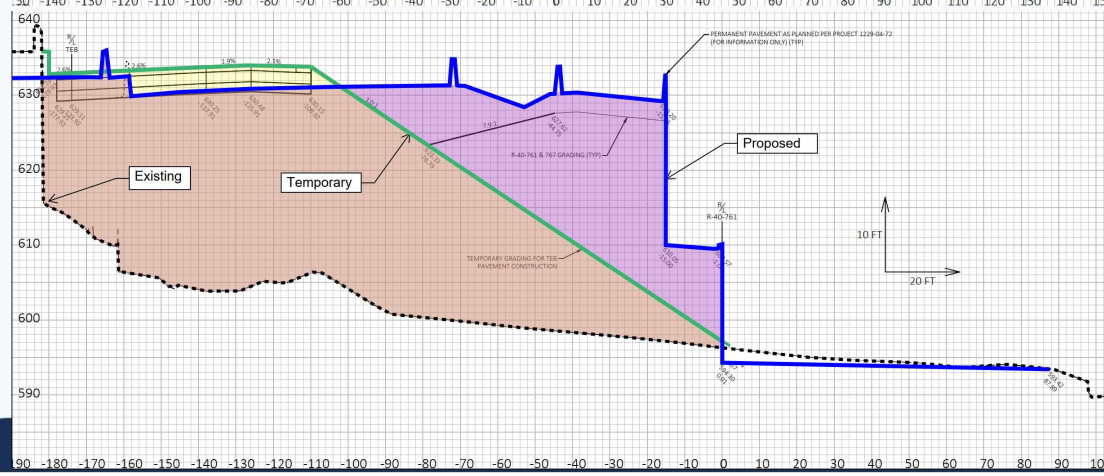
- Wall alignment is near the historic Menomonee River Valley edge (upland/bluff to valley-floor transition).
- 1835 surface-features mapping shows marsh/wetland conditions and marsh edges in the project area.
- Implication: expect soft/organic soils + groundwater influence and rapid lateral variability along the alignment.
- Redevelopment history suggests heterogeneous historic fill over glacial soils, with potential obstructions.
- Design takeaway: plan for non-uniform support/settlement risk and constructability challenge



Project Context & Key Constraints



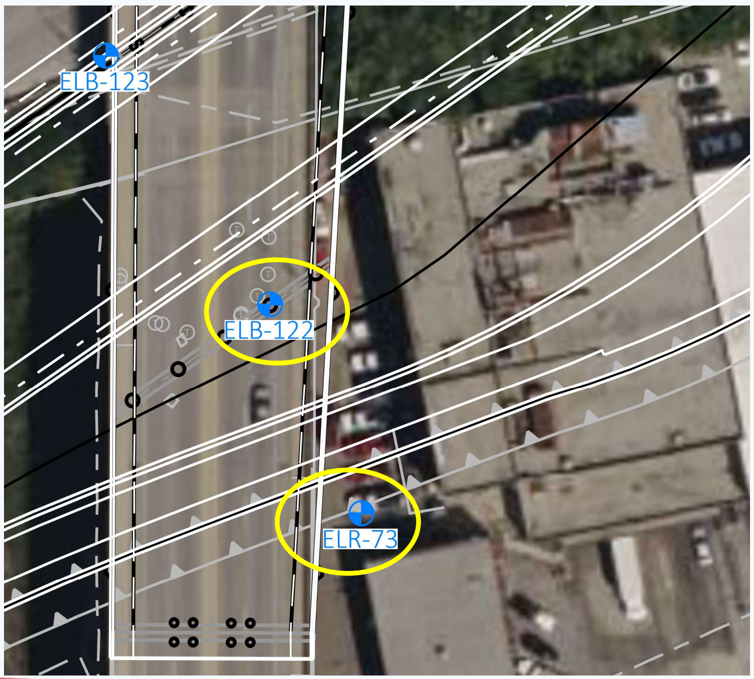


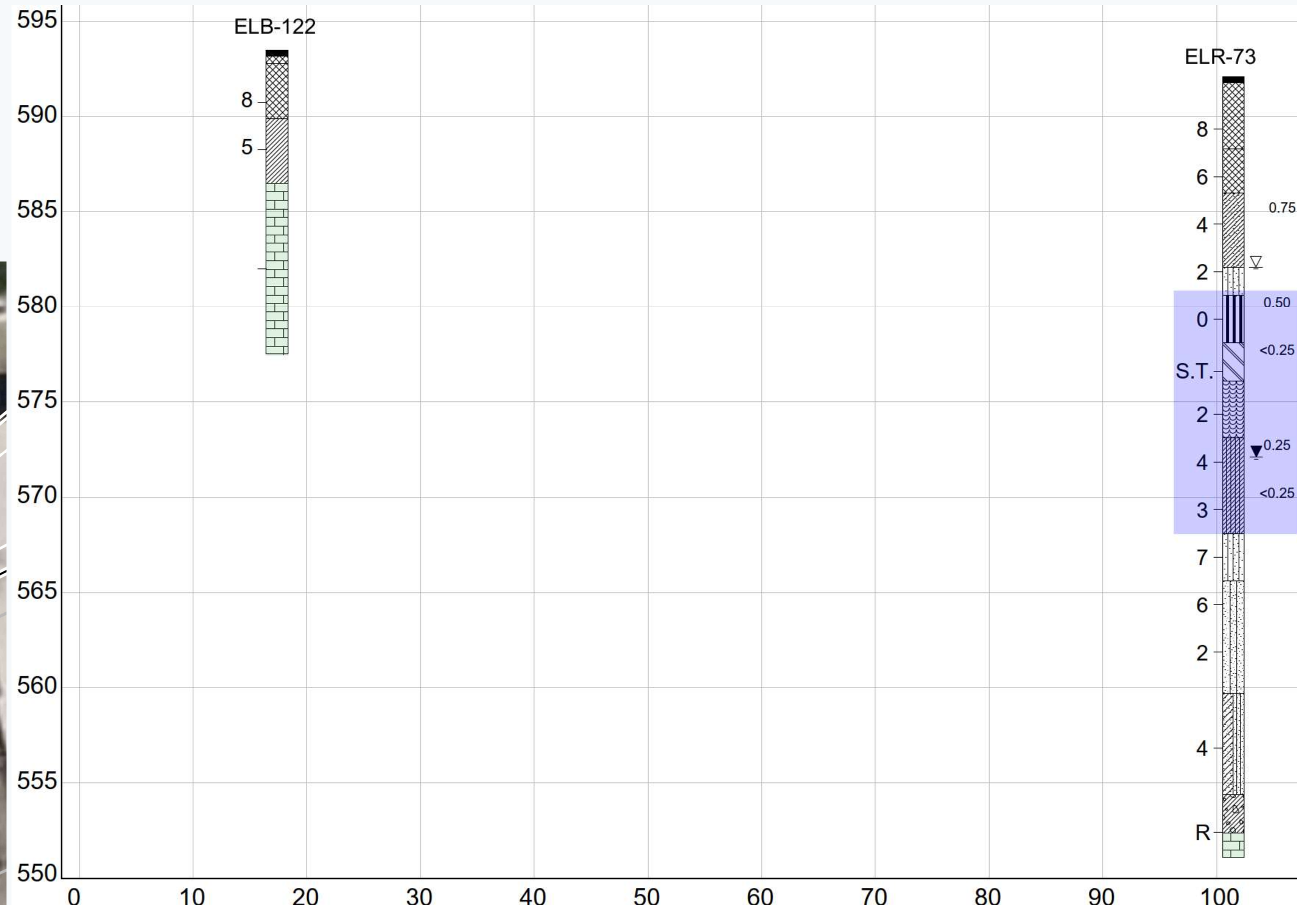


- Tiered wall system enables large grade change (≈60 ft) with limited footprint
- Wall conditions transition from cut to fill
- Temporary conditions versus final conditions change along the alignment
- Steep existing slopes

Project Context & Key Constraints

- Variable soil stratigraphy
- Top of rock varies up to ~50 ft within ~50 ft
- Representative sections + assumptions to estimate rock socket + verification drilling





Design Approach and Design Criteria

Subsurface Profiles & Parameters
Subsurface Investigation Data • Surfer 3D Model

Representative Design Sections Selected
Based on Wall Geometry & Subsurface Model

Global Stability Analysis
Slide2 — Limit Equilibrium Method

External Stability Analysis
MSE Walls: MSEW+ • Cut Wall: FB-MultiPier & Mathcad

Wall Component Design
Tie Backs • Soldier Piles • MSE Wall Reinforcement

Settlement Assessment — Short & Long Term
Settle3 — Multi-Stage Analysis

Finite Element Model (Plaxis 2D)
Upper + Lower Wall Behavior
| Overall Movement

Design Criteria

Settlement
Long-term: ≤ 2 in

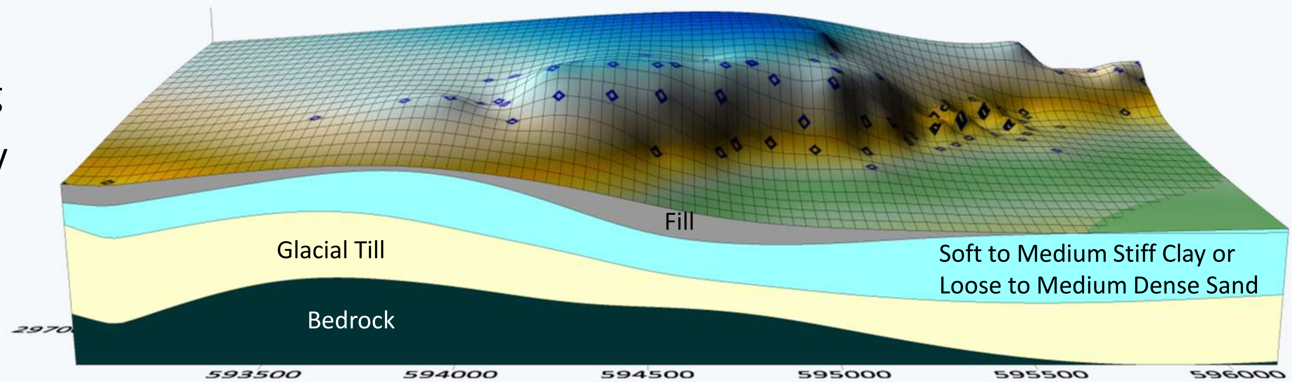
Global Stability Factor of Safety
Drained (long-term):
≥ 1.5 (ϕ = 0.65)

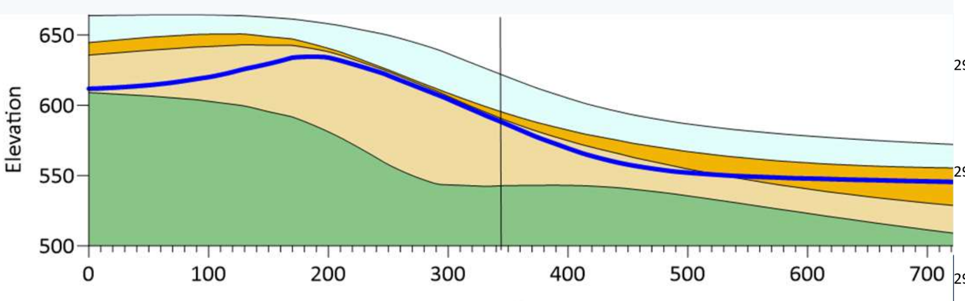
Short-term (including temporary conditions):
≥ 1.33 (ϕ = 0.75)

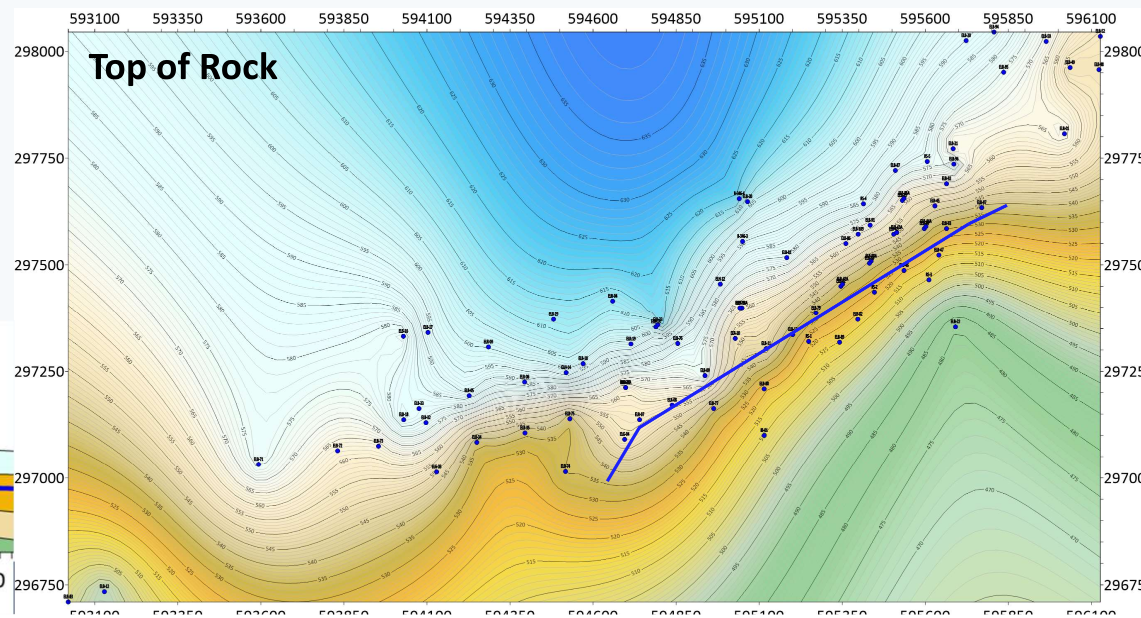
Structural Elements
LRFD Design

Subsurface Stratigraphy Model

- **85 borings (2014–2025)** near alignment; SPT + selective Shelby tubes and rock coring
- Typical stratigraphy: Fill → soft/medium clay + loose sand → glacial till → bedrock
- Weak/compressible materials and organics increase south and east ("valley side") of alignment
- Rock surface highly variable
- Groundwater determined from borings in addition to monitoring wells to estimate longer-term levels

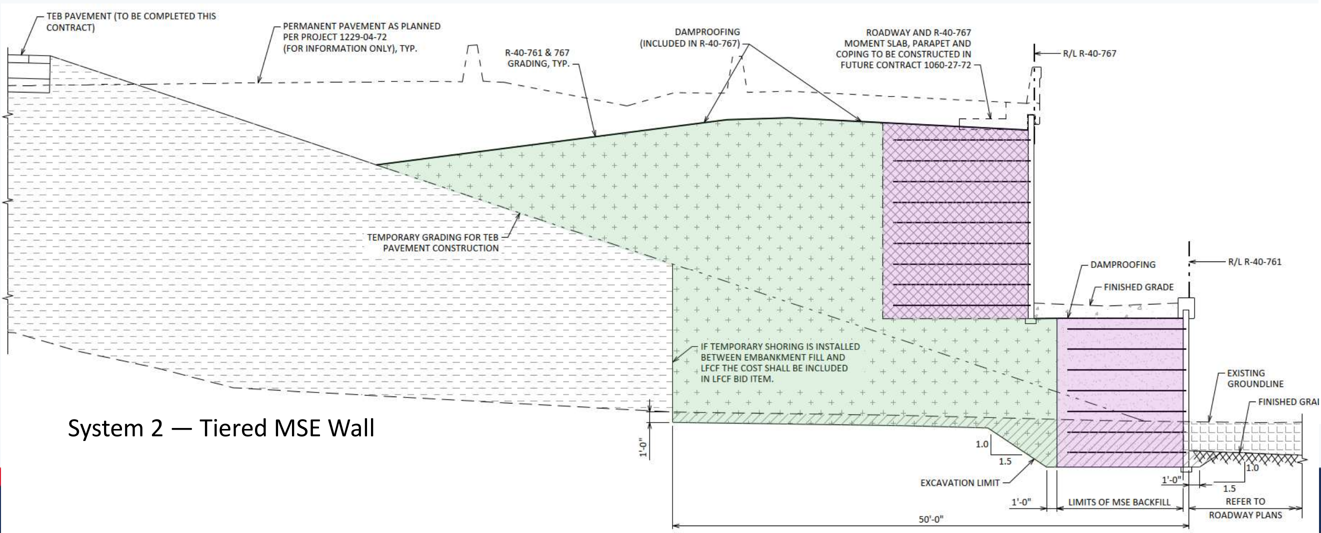




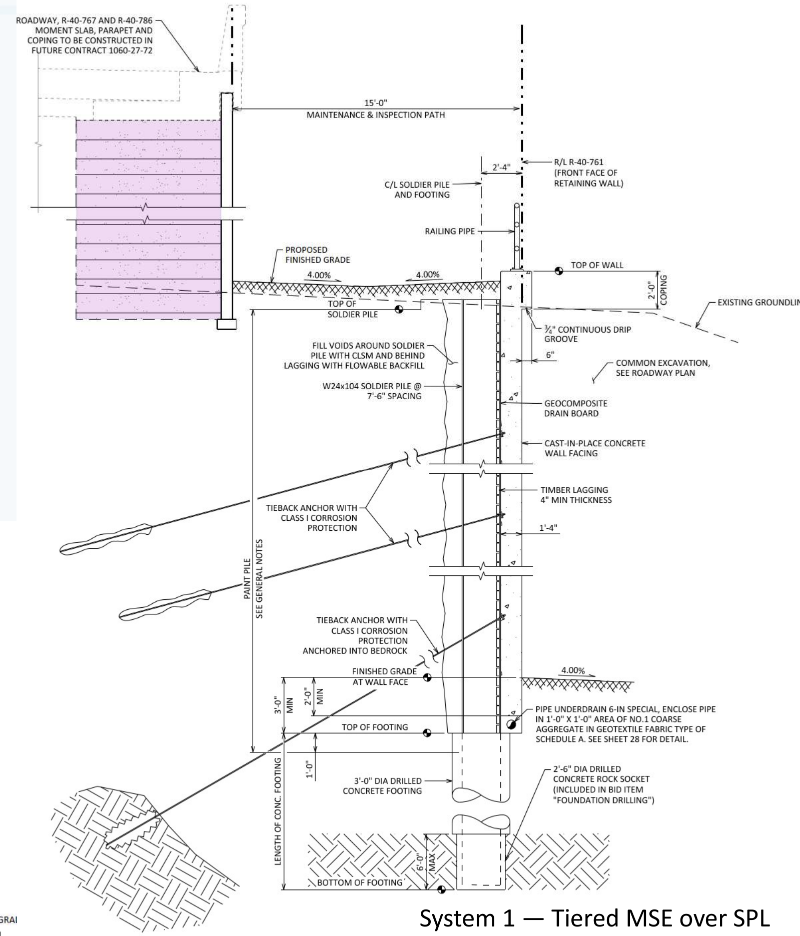


Unique Design Elements – Tiered Walls

- ➢ System 1 — Tiered MSE over SPL (Cut/Fill-Wall)
- ➢ System 2 — Tiered MSE Wall (Fill Wall)
- ➢ Lightweight Foamed Concrete Fill (LFCF)
  - Common purpose: LFCF (≤ 40 pcf) reduces earth pressures and foundation stresses while maintaining constructability.
  - West side (softer soil less prevalent): Use LFCF primarily to reduce the tiebacks load demand, to keep tieback lengths/diameters feasible.
  - East side (softer soil more prevalent): Use LFCF primarily to minimize stress on compressible soils, to mitigate long-term settlement.



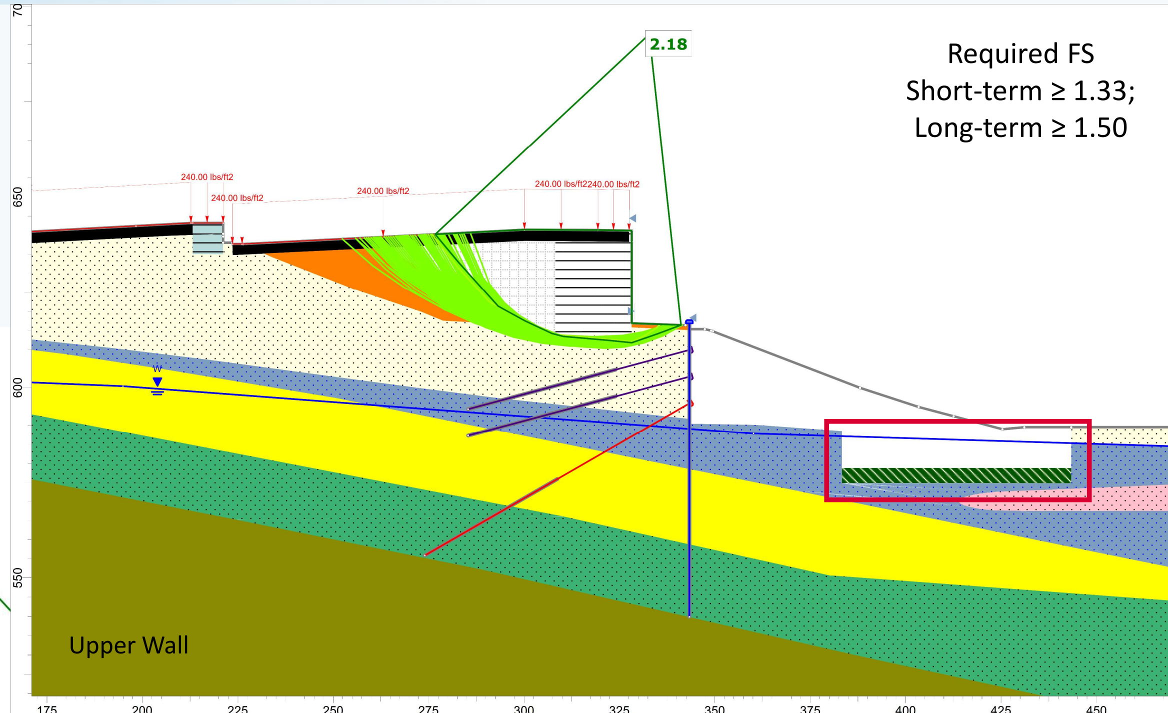
System 2 — Tiered MSE Wall



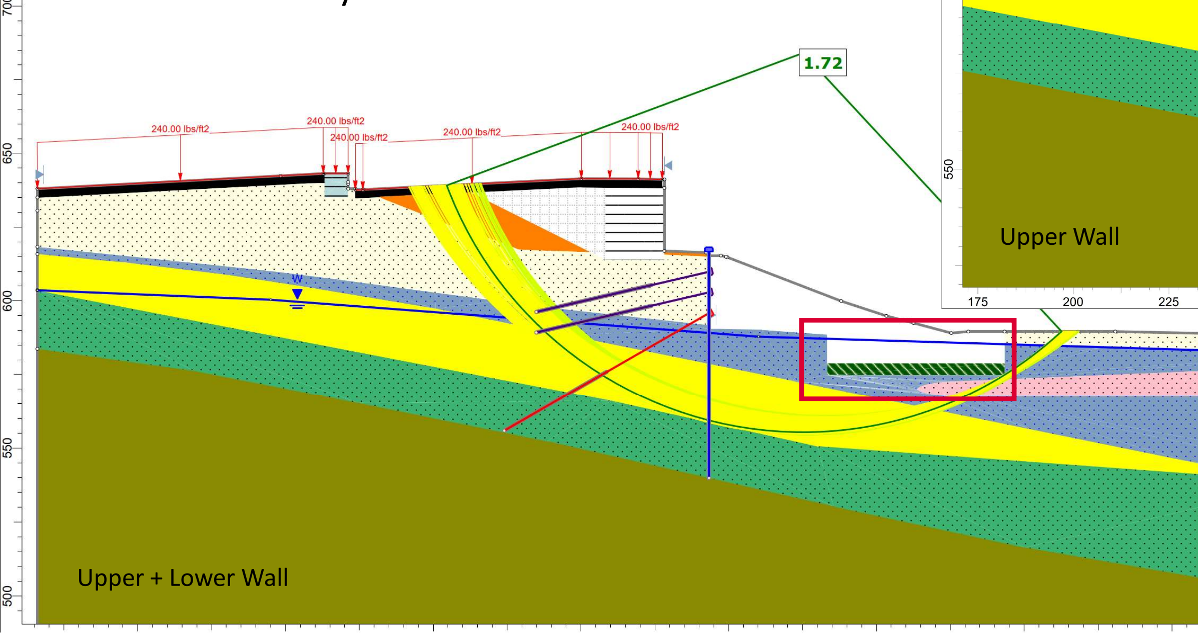
System 1 — Tiered MSE over SPL

Global Stability (Slide2) — Tiered MSE over SPL

- Circular & non-circular slip surfaces
- Evaluated upper wall alone and full tiered system; short + long term conditions
- Considering future anticipated excavations in some areas
- Tieback anchors extended to satisfy the required factor of safety



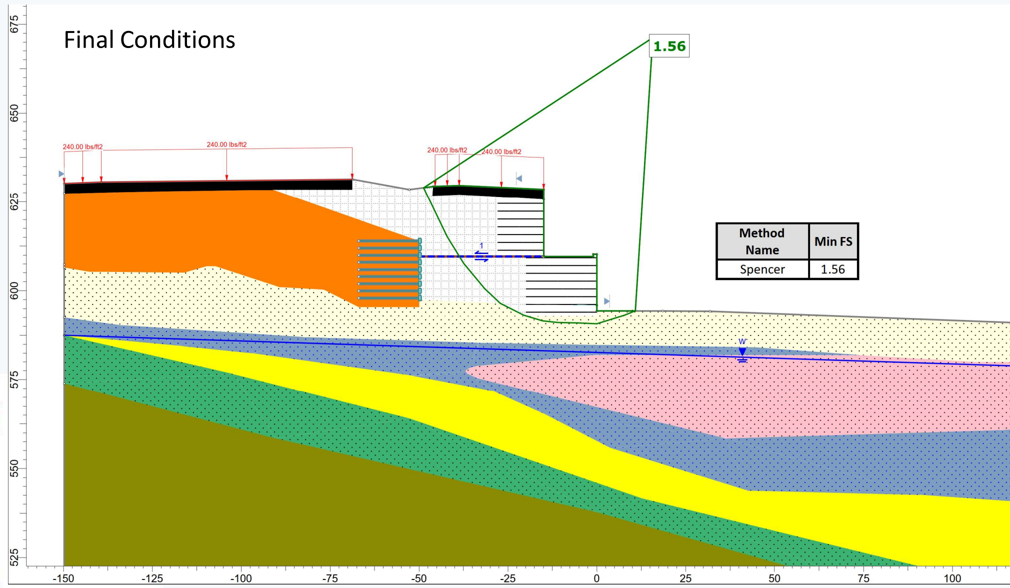
Required FS
Short-term ≥ 1.33;
Long-term ≥ 1.50



Global Stability (Slide2) — Two-tier MSE

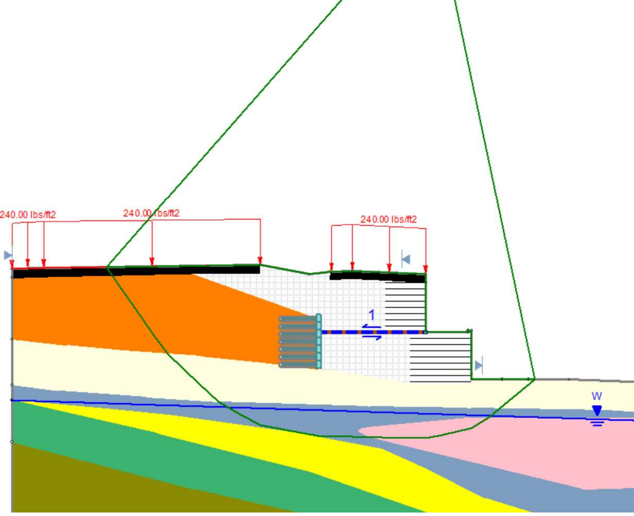
- Circular & non-circular slip surfaces
- Evaluated upper wall alone and full tiered system; short + long term conditions
- Evaluate Temporary and Final Conditions with different alternatives
- LFCF extended to meet the factor of safety
- Interface sensitivity check

Final Conditions

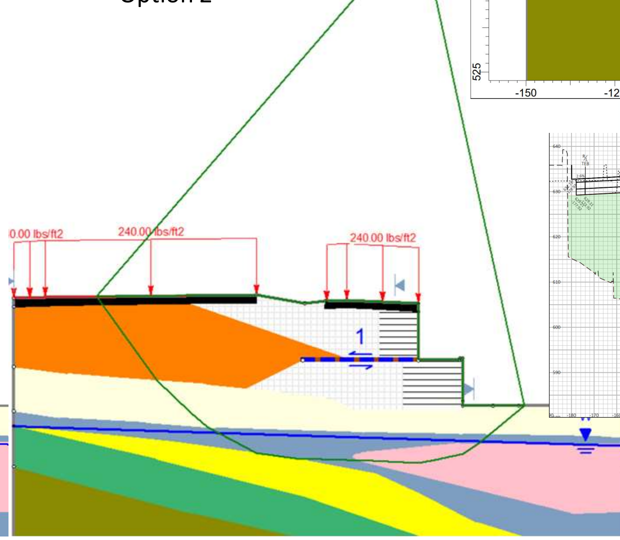


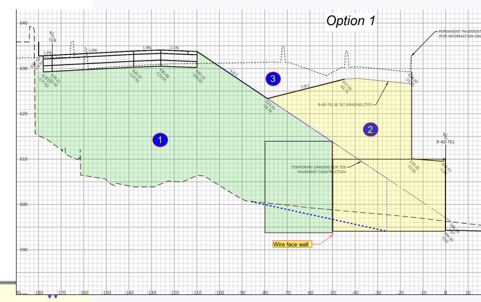
Method Name	Min FS
Spencer	1.56

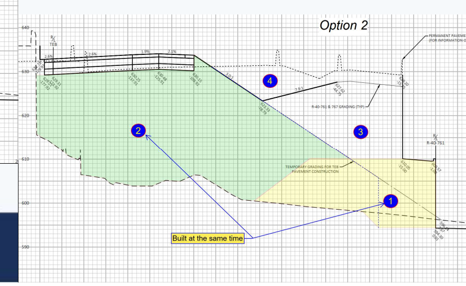
Temporary Conditions
Option 1



Temporary Conditions
Option 2



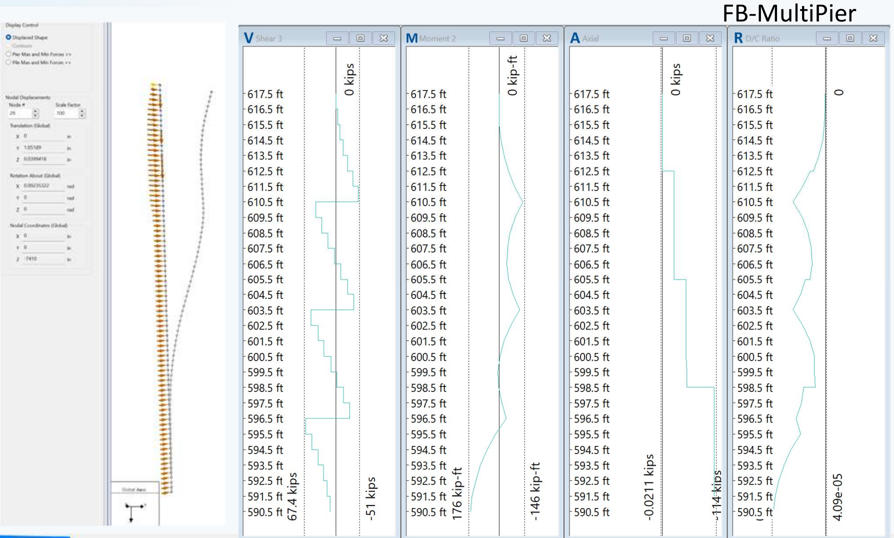


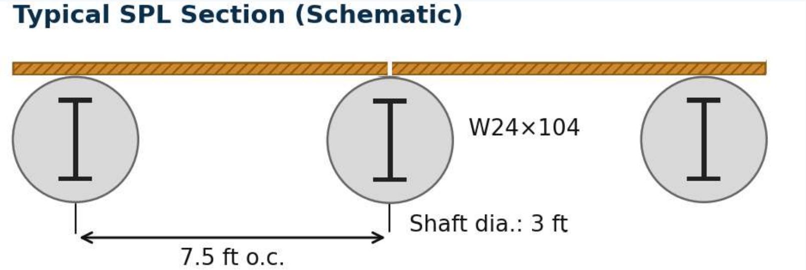


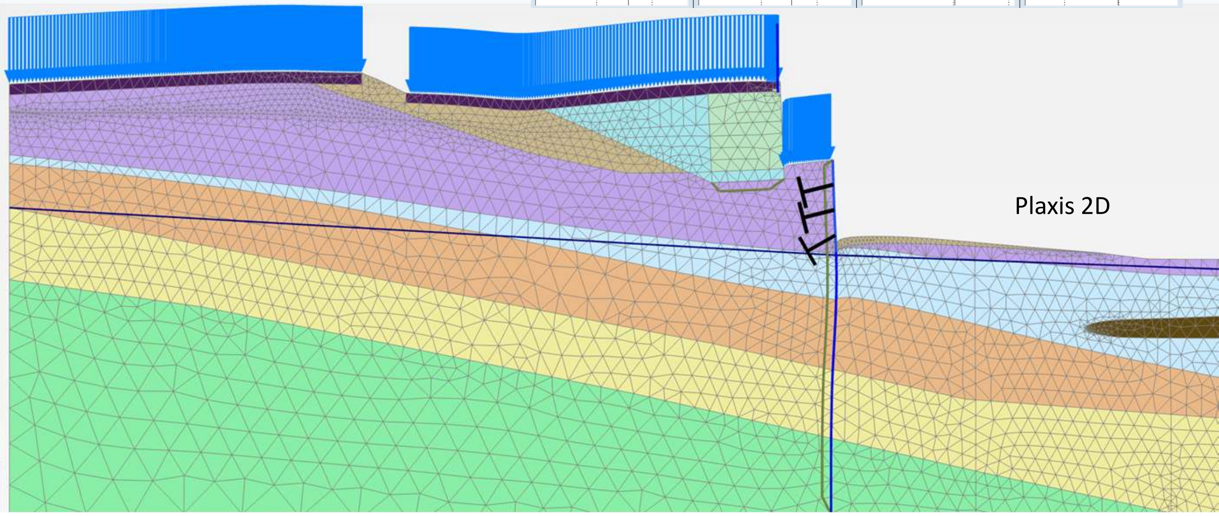
Anchored SPL Wall — Structural & Geotechnical Design

- Analysis methods: FB-MultiPier (p-y) + PLAXIS 2D (staged FEM). p-y for efficiency; FEM for staging & interaction.
- Soldier piles: W24×104, 7.5 ft spacing; 3 ft diameter drilled shafts with rock socket
- Anchors: up to 3 levels; lower level embedded to rock to satisfy the global stability demands
- Key results are the deflection of the walls and load demands were determined to size the different structural elements.
    - Max deflection: ~0.7–2.2 in
    - Max moment: ~680 kip-ft
    - Max anchor load: ~260 kip

FB-MultiPier



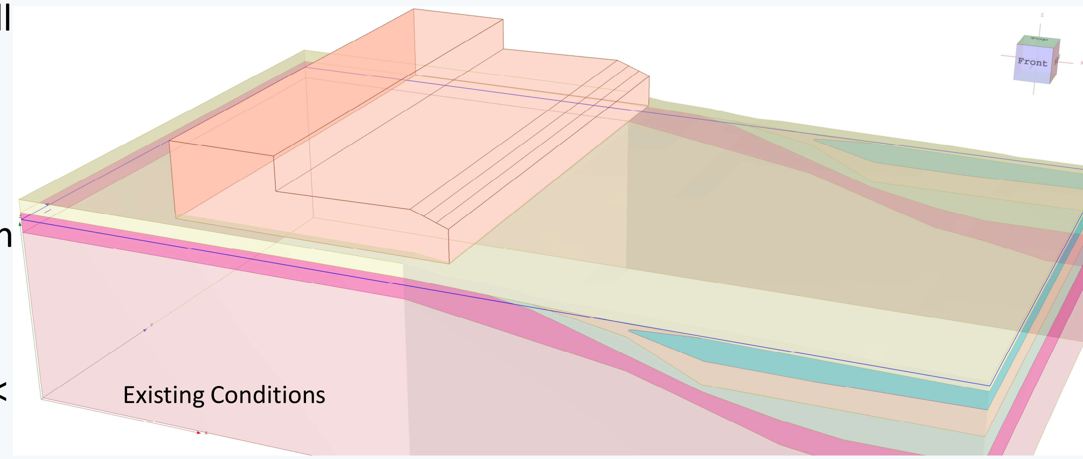


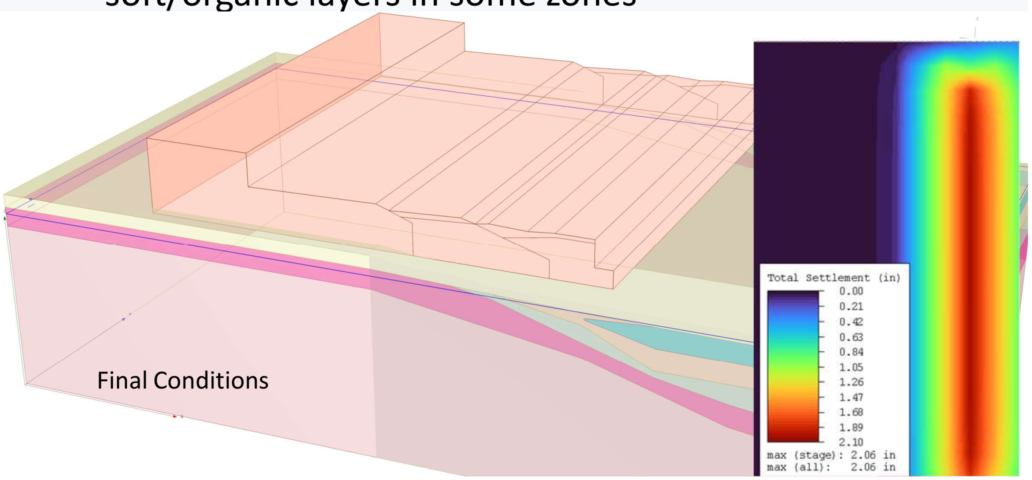


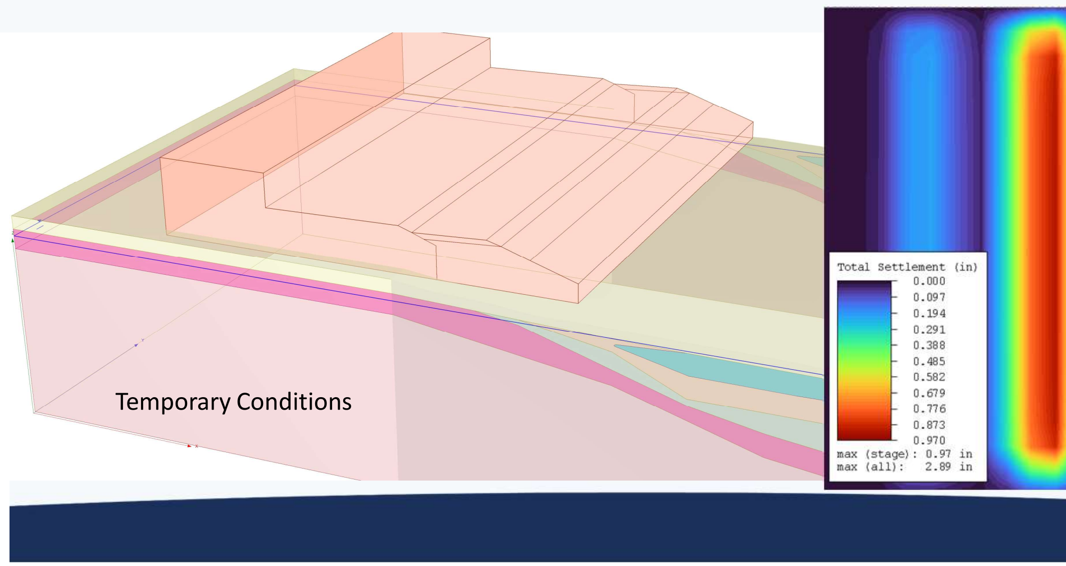
Plaxis 2D

Settlement — Staged Consolidation (Settle3) + LFCF

- Time-dependent consolidation with staged excavation/fill modeled
- LFCF used within reinforced zone and behind the wall to reduce loading
- Predicted post-pavement settlement generally ≤ 2 in with construction staging equivalent to ~1 year 'holding period' before final paving
- Facing performance: total settlement < 4 in, differential < 1/200 (supports precast panel use)
- Monitoring required to confirm performance due to soft/organic layers in some zones

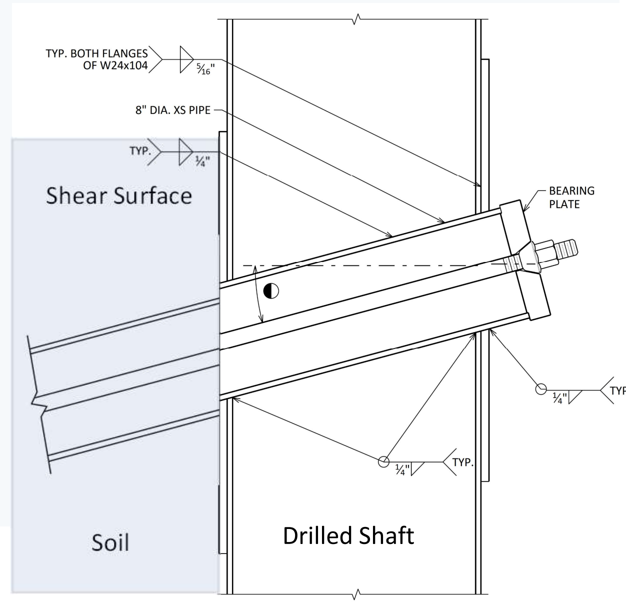


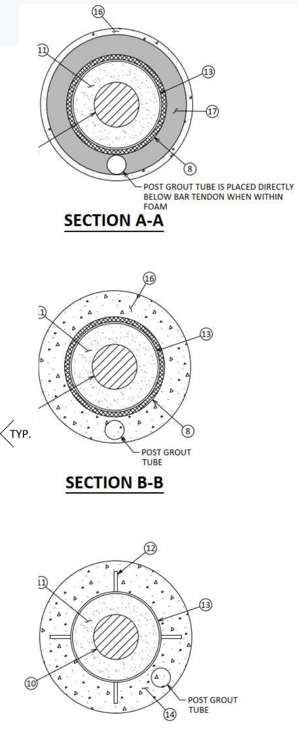


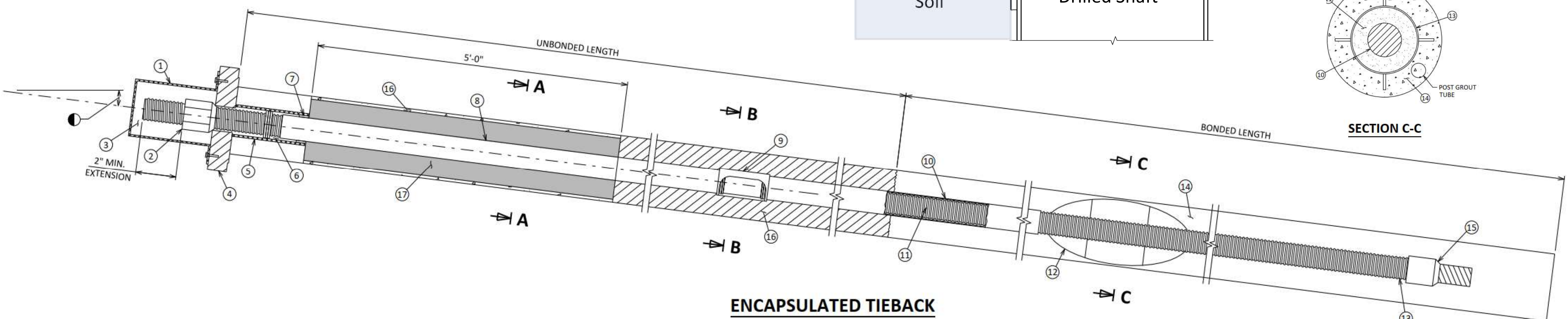


Settlement-Induced Anchor Distress Behind SPL Wall

- Drilled shafts are socketed into rock so no movement anticipated
- Ground settlement may result in shearing the ground anchor
- Provide compressible foam around the third row of anchors to accommodate relative displacement







ENCAPSULATED TIEBACK

(BAR TENDON SHOWN, PRESTRESSED STEEL TENDONS MAY BE USED AS AN ALTERNATE)

Quality Assurance and Quality Control

Preconstruction / Verification

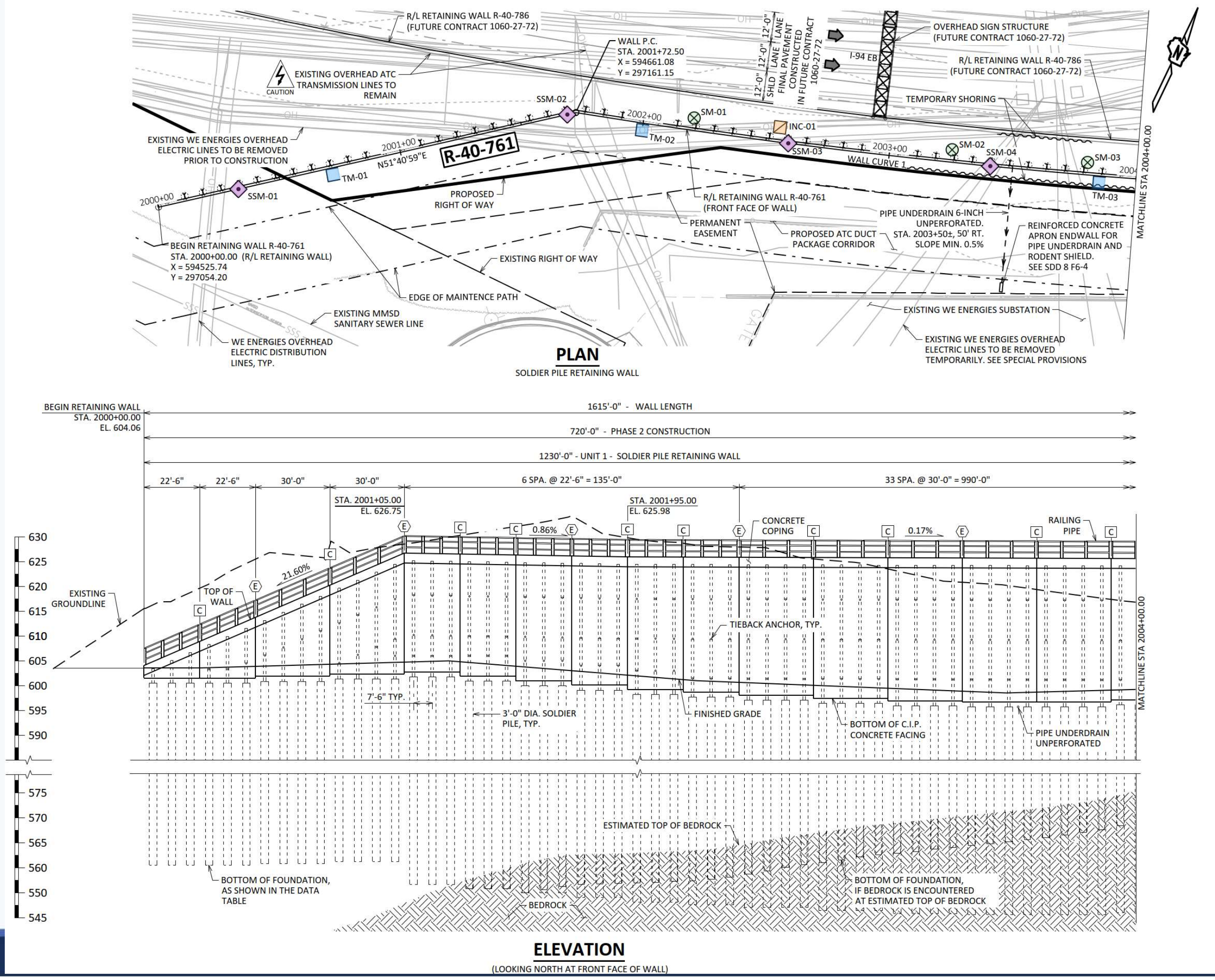
- Estimating top of rock at each drilled shaft location during design.
- Verify **top of rock at each drilled shaft** location to confirm socket/bond zone assumptions.

Construction QA/QC

- **Anchor testing:** proof test all anchors; in addition to WisDOT required performance tests (≥5% of the anchors).

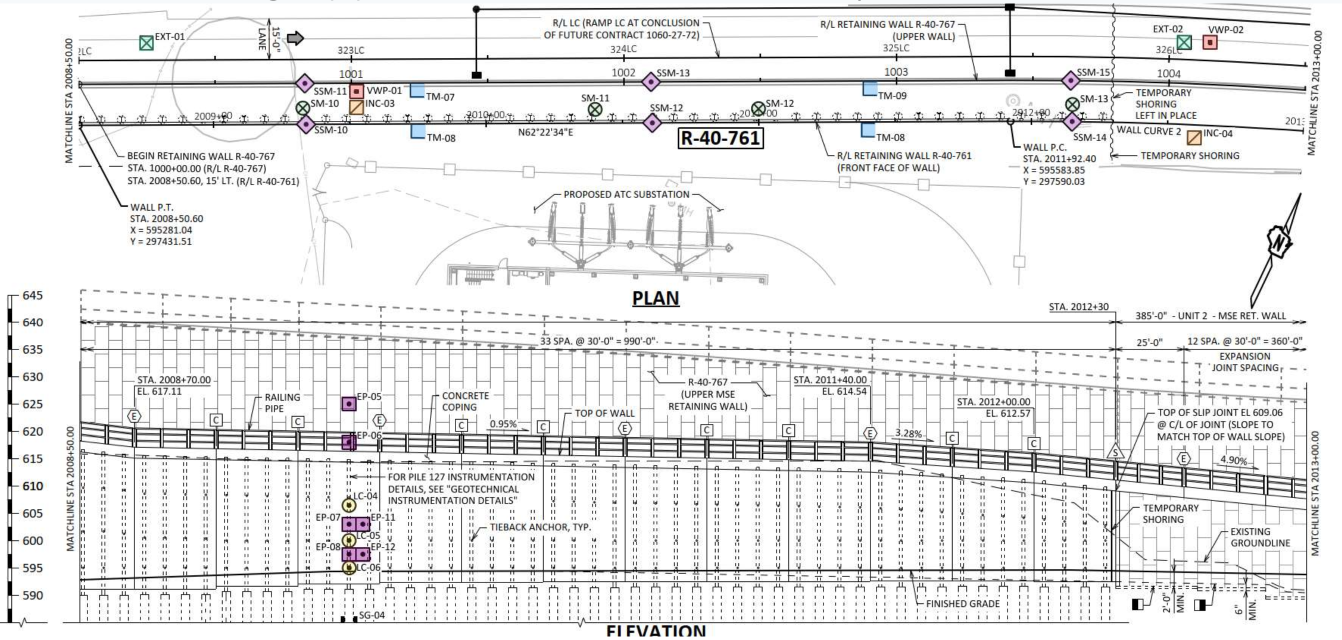
Instrumentation / Long-Term Performance

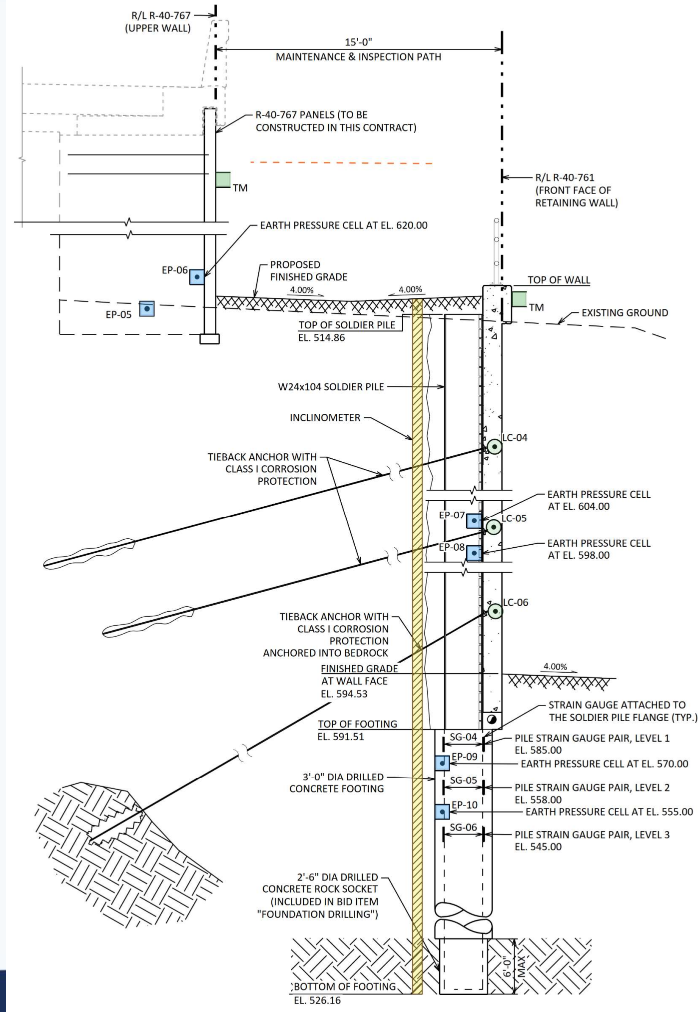
- Monitor wall movements during excavation and staging; track anchor loads.
- Continue long-term monitoring to confirm performance and settlement trends.
- Defined warning and maximum threshold for the instrumentation.



Quality Assurance and Quality Control - Instrumentation

- **Inclinometers (7):** Lateral displacement profile vs. depth (ground & wall).
- **Vibrating Wire Piezometers (4): Pore water pressure (soft soils)**
- **3-Axis Tiltmeters (14):** Wall/facing rotation & direction (early warning).
- **VW Load Cells (Tiebacks) (6):** Track anchor load retention / load change.
- **Earth Pressure Cells (12):** Measure lateral pressures behind wall during staging.
- **Surface Settlement Markers (18):** Vertical settlement (pavement/LFCF/soil).
- **Structure Settlement Markers (24):** Protect adjacent structures/utilities.
- **Strain Gauges (6):** Confirm structural demand/response.





INSTRUMENTATION DETAIL

Key Takeaways & Next Steps

- A **tiered retaining wall system** enabled a ≈**60 ft** grade change within a constrained urban footprint.
- **Lightweight Foamed Concrete Fill (≤ ~40 pcf)** was the critical lever:
  - West: reduced SPL tieback demand (constructability)
  - East: reduced stresses on compressible soils (settlement control)
- A unified **ground model (85 borings)** and **representative sections** ensured consistent inputs across stability, deformation, and settlement tools.
- **Staged analyses** (temporary vs final) governed design decisions, including a **minimum tier offset ~50 ft** to meet performance targets. Settlement target: **≤ 2 in post-pavement** supported via staged consolidation modeling and a waiting period strategy.

Performance Verification

- Risk managed through **3D ground modeling, anchor testing, and instrumentation**, with monitoring planned for **≥ 2 years** post-construction.

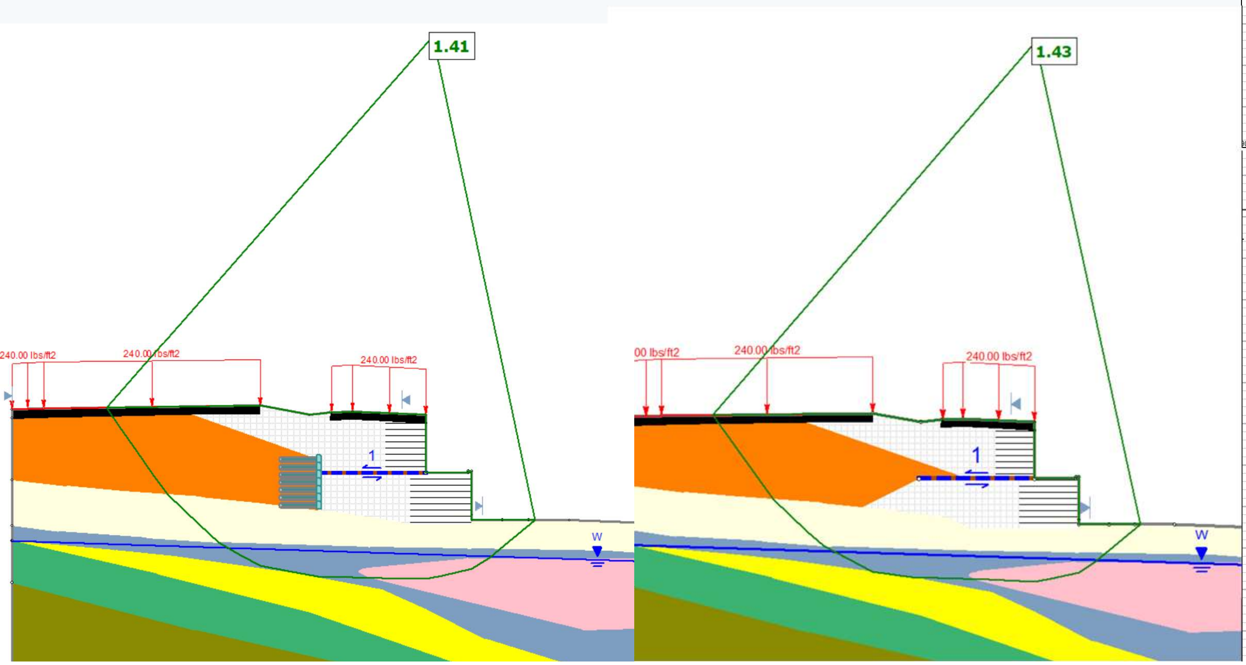
Next Step

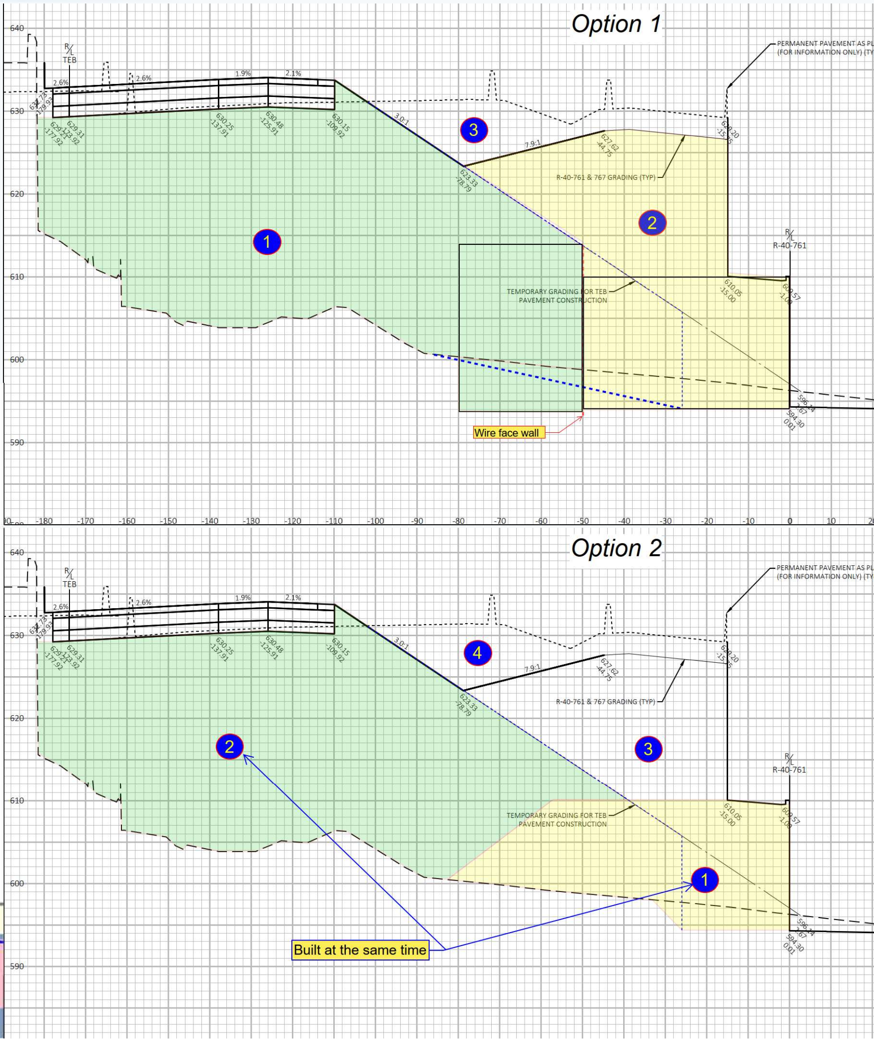
- Collecting data from different instrumentation during and after construction, and compare the analysis versus field data.

Questions/Discussion

Global Stability — Temporary Conditions Alternatives

- Evaluate different temporary conditions alternatives
  - Option 1: Temporary wall + allow settlement time before final LFCF
  - Option 2: Build temp road with final fill (slower, avoids temp wall costs)





2026 Geotechnical Updates

David Staab, PE

Geotechnical Engineering Unit Supervisor

Structural Engineers Symposium
Madison College

May 26, 2026

Geotechnical Engineering Unit
Staff Updates

2024	2026
Dave Staab, Supervisor	Dave Staab, Supervisor
Paulo Florio, Geotech. Eng.	Paulo Florio, Geotech. Eng.
Crystal Goffard, Geotech. Eng.	Crystal Goffard, Geotech. Eng.
Tri Tran, Geotech. Eng.	Tri Tran, Geotech. Eng.
Dan Reid, Geologist (Retired Feb. 2025) →	Jeff Bruesewitz, Geologist
Mark Kray, Lab Technician	Mark Kray, Lab Technician

Geotechnical Data Management

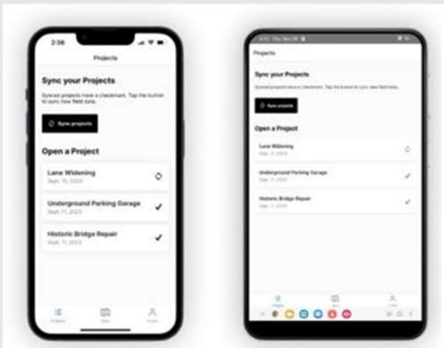
- gINT – industry standard for preparing soil boring logs for 40+ years
- Bentley is “sun-setting” gINT – ~~2026~~ 2028(?)
- About 5 - 6 programs exist to fill this purpose
- WisDOT evaluated 4 programs to replace gINT (2022 - 2024)

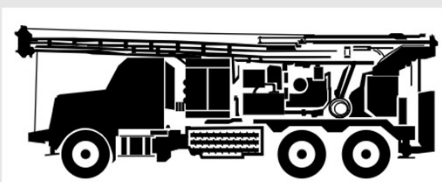
Geotechnical Data Management

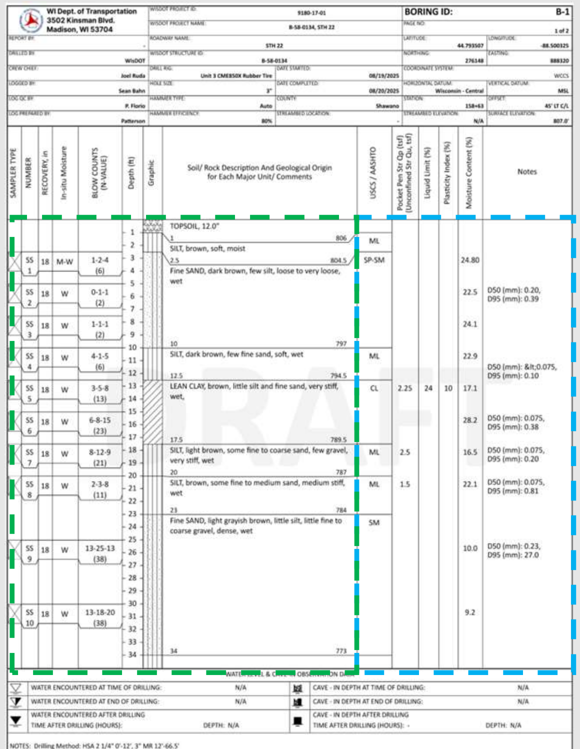
- BoreDM selected
  - Customer service
  - Cost
  - Features
- More user-friendly and powerful than gINT
- Consume and convert gINT files to BoreDM
- Civil 3D compatible
- DiGGS compatible

BOREDM

Field App → Boring Log App ← Geotech Lab App







WI Dept. of Transportation, 3502 Kinsman Blvd., Madison, WI 53704			BORING ID: B-1	
REPORT BY: -	WISDOT PROJECT ID: 9180-17-01		PAGE NO: 1 of 2	
DRILLED BY: WisDOT	WISDOT PROJECT NAME: B-58-0134, STH 22		LATITUDE: 44.793507	LONGITUDE: -88.500325
CREW CHIEF: Joel Ruda	ROADWAY NAME: STH 22		NORTHING: 276148	EASTING: 888320
LOGGED BY: Sean Bahn	WISDOT STRUCTURE ID: B-58-0134		COORDINATE SYSTEM: WCCS	
LOG QC BY: P. Florio	DRILL RIG: Unit 3 CME850X Rubber Tire	DATE STARTED: 08/19/2025	HORIZONTAL DATUM: Wisconsin - Central	VERTICAL DATUM: MSL
LOG PREPARED BY: Patterson	HOLE SIZE: 3"	DATE COMPLETED: 08/20/2025	STATION: 158+63	OFFSET: 45' LT C/L
	HAMMER TYPE: Auto	COUNTY: Shawano	STREAMBED ELEVATION: N/A	SURFACE ELEVATION: 807.0'
	HAMMER EFFICIENCY: 80%	STREAMBED LOCATION: -		

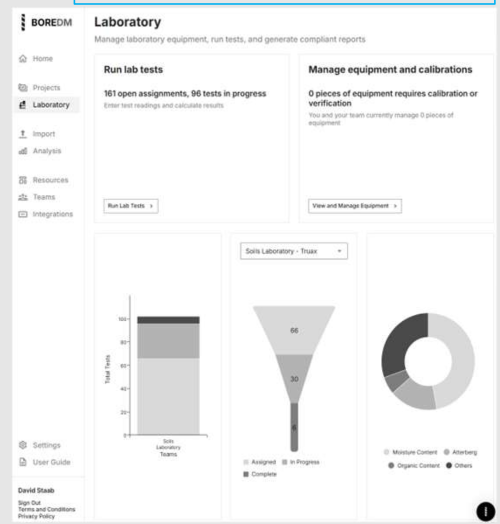
SAMPLER TYPE	NUMBER	RECOVERY, in	In-situ Moisture	BLOW COUNTS (N-VALUE)	Depth (ft)	Graphic	Soil/ Rock Description And Geological Origin for Each Major Unit/ Comments	USCS / AASHTO	Pocket Pen Str Qp (tsf) (Unconfined Str Qu, tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
							TOPSOIL, 12.0" 1 806						
							SILT, brown, soft, moist 2.5 804.5	ML					
SS	1	18	M-W	1-2-4 (6)			Fine SAND, dark brown, few silt, loose to very loose, wet	SP-SM				24.80	
SS	2	18	W	0-1-1 (2)								22.5	D50 (mm): 0.20, D95 (mm): 0.39
SS	3	18	W	1-1-1 (2)			10 797					24.1	
SS	4	18	W	4-1-5 (6)			SILT, dark brown, few fine sand, soft, wet 12.5 794.5	ML				22.9	D50 (mm): <0.075, D95 (mm): 0.10
SS	5	18	W	3-5-8 (13)			LEAN CLAY, brown, little silt and fine sand, very stiff, wet,	CL	2.25	24	10	17.1	
SS	6	18	W	6-8-15 (23)			17.5 789.5					28.2	D50 (mm): 0.075, D95 (mm): 0.38
SS	7	18	W	8-12-9 (21)			SILT, light brown, some fine to coarse sand, few gravel, very stiff, wet 20 787	ML	2.5			16.5	D50 (mm): 0.075, D95 (mm): 0.20
SS	8	18	W	2-3-8 (11)			SILT, brown, some fine to medium sand, medium stiff, wet 23 784	ML	1.5			22.1	D50 (mm): 0.075, D95 (mm): 0.81
							Fine SAND, light grayish brown, little silt, little fine to coarse gravel, dense, wet	SM					
SS	9	18	W	13-25-13 (38)								10.0	D50 (mm): 0.23, D95 (mm): 27.0
SS	10	18	W	13-18-20 (38)			34 773					9.2	

DRAFT

WATER LEVEL & CAVE-IN OBSERVATION DATA

WATER ENCOUNTERED AT TIME OF DRILLING: N/A	CAVE - IN DEPTH AT TIME OF DRILLING: N/A
WATER ENCOUNTERED AT END OF DRILLING: N/A	CAVE - IN DEPTH AT END OF DRILLING: N/A
WATER ENCOUNTERED AFTER DRILLING TIME AFTER DRILLING (HOURS): DEPTH: N/A	CAVE - IN DEPTH AFTER DRILLING TIME AFTER DRILLING (HOURS): - DEPTH: N/A

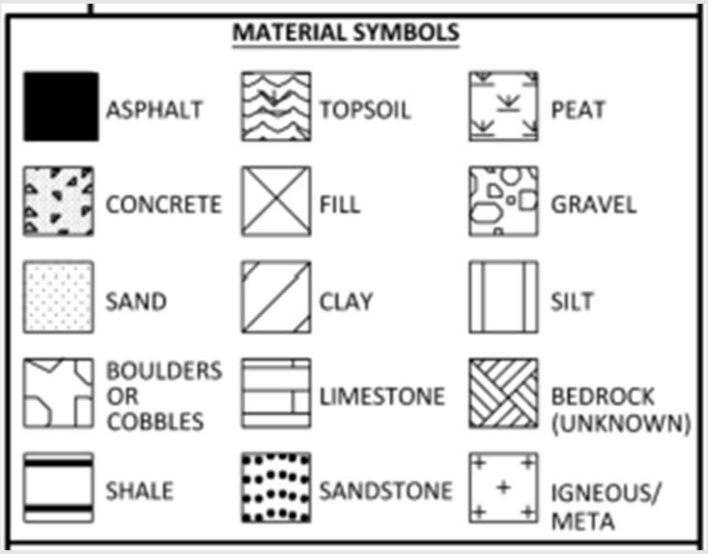
NOTES: Drilling Method: HSA 2 1/4" 0'-12', 3" MR 12'-66.5'



Graphics: BoreDM; Photo: Gilson Co.

Boring Log Updates

- Library Updates
  - Soil classification
  - Symbology



Boring Log Updates

- Boring Log Template Updates
  - Heading Information

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT NUMBER: 6145-01-73		BORING ID: B-2A
	WISDOT PROJECT NAME: R-56-0037		PAGE NO: 1 of 1
REPORT BY: WisDOT	ROADWAY NAME: USH 12	LATITUDE: 43.592755	LONGITUDE: -89.794027
DRILLED BY: WisDOT	WISDOT STRUCTURE ID: R-56-0037	NORTHING: 281892.271000	EASTING: 637077.128000
CREW CHIEF: Sean Bahn	DRILL RIG: Unit 1 CME850XR Tracked	DATE STARTED: 04/14/2026	COORDINATE SYSTEM: WCCS
LOGGED BY: Joel Ruda	HOLE SIZE: 3"	DATE COMPLETED: 04/14/2026	HORIZONTAL DATUM: WCCS Sauk / VERTICAL DATUM: MSL
LOG QC BY: D. Staab	HAMMER TYPE: Auto	COUNTY: Sauk	STATION: 613+62 / OFFSET: 62' Lt C/L
LOG PREPARED BY: E. Patterson	HAMMER EFFICIENCY: 80%	STREAMBED LOCATION: -	STREAMBED ELEVATION: N/A / SURFACE ELEVATION: 883.7'

  - Groundwater and Cave-In Levels

WATER LEVEL & CAVE-IN OBSERVATION DATA			
WATER DEPTH AT TIME OF DRILLING:	2.5'	CAVE - IN DEPTH AT TIME OF DRILLING:	NMR
WATER DEPTH AT END OF DRILLING:	NMR	CAVE - IN DEPTH AT END OF DRILLING:	NMR
WATER ENCOUNTERED AFTER DRILLING TIME AFTER DRILLING (HOURS): 24 hrs	DEPTH: Dry	CAVE - IN DEPTH AFTER DRILLING TIME AFTER DRILLING (HOURS): -	DEPTH: NMR

WI Dept. of Transportation 3502 Kinsman Blvd. Madison, WI 53704	WISDOT PROJECT NUMBER: 6145-01-73		BORING ID: B-2A	
	WISDOT PROJECT NAME: R-56-0037		PAGE NO: 1 of 1	
REPORT BY: WisDOT	ROADWAY NAME: USH 12		LATITUDE: 43.592755	LONGITUDE: -89.794027
DRILLED BY: WisDOT	WISDOT STRUCTURE ID: R-56-0037		NORTHING: 281892.271000	EASTING: 637077.128000
CREW CHIEF: Sean Bahn	DRILL RIG: Unit 1 CME850XR Tracked	DATE STARTED: 04/14/2026	COORDINATE SYSTEM: WCCS	
LOGGED BY: Joel Ruda	HOLE SIZE: 3"	DATE COMPLETED: 04/14/2026	HORIZONTAL DATUM: WCCS Sauk	VERTICAL DATUM: MSL
LOG QC BY: D. Staab	HAMMER TYPE: Auto	COUNTY: Sauk	STATION: 613+62	OFFSET: 62' Lt C/L
LOG PREPARED BY: E. Patterson	HAMMER EFFICIENCY: 80%	STREAMBED LOCATION: -	STREAMBED ELEVATION: N/A	SURFACE ELEVATION: 883.7'

NUMBER	RECOVERY, in	In-situ Moisture	BLOW COUNTS (N-VALUE)	Depth (ft)	Graphic	Soil/ Rock Description And Geological Origin for Each Major Unit/ Comments	USCS / AASHTO	Pocket Pen Str Qp (tsf) (Unconfined Str Qu, tsf)	Liquid Limit (%)	Plasticity Index (%)	Moisture Content (%)	Notes
				1		6.0" TOPSOIL 0.5 883.2						4" SSA to 14.5', set 3" casing at 14.5', NQ2 rock coring to EOB
				2, 3, 4		SILTY fine to medium SAND, light brown, moist to wet, probable perched water at 2.5' 2.5 881.2	SM					
SS 1	1	W	60/2" (60)	5, 6		SANDSTONE, moderately to slightly weathered, white to light brown						
				7								
SS 2	0	D	60/1" (60)	8, 9								
SS 3	0	D	60/1" (60)	10, 11								
				12								
SS 4	0	D	60/1" (60)	13, 14								
SS 5	0	D	60/1" (60)	15, 16		Core Run 1: 14.5'-19.5' Recovery 50" (83%) RQD: 21% UCS 1 (15.5'-15.8'): 4,106 psi UCS 2 (16.5'-16.8'): 2,856 psi						
Core 1	50 (21)			17, 18, 19								
Core 2	58.75 (50)			20, 21, 22, 23, 24		Core Run 2: 19.5'-24.5' Recovery 58.75" (98%) RQD: 50% UCS 3 (21.7'-22.2'): 4,499 psi						
Core 3	60 (86)			25, 26, 27, 28, 29		Core Run 3: 24.5'-29.5' Recovery 60" (100%) RQD: 86% 29.5 854.2						

End of Boring

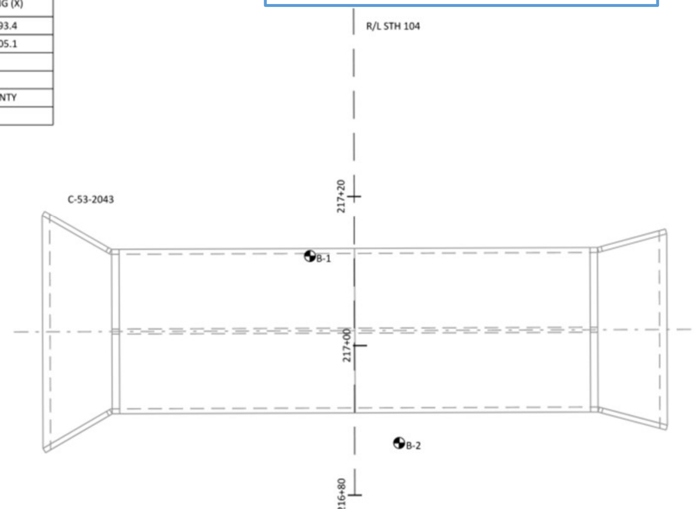
WATER LEVEL & CAVE-IN OBSERVATION DATA

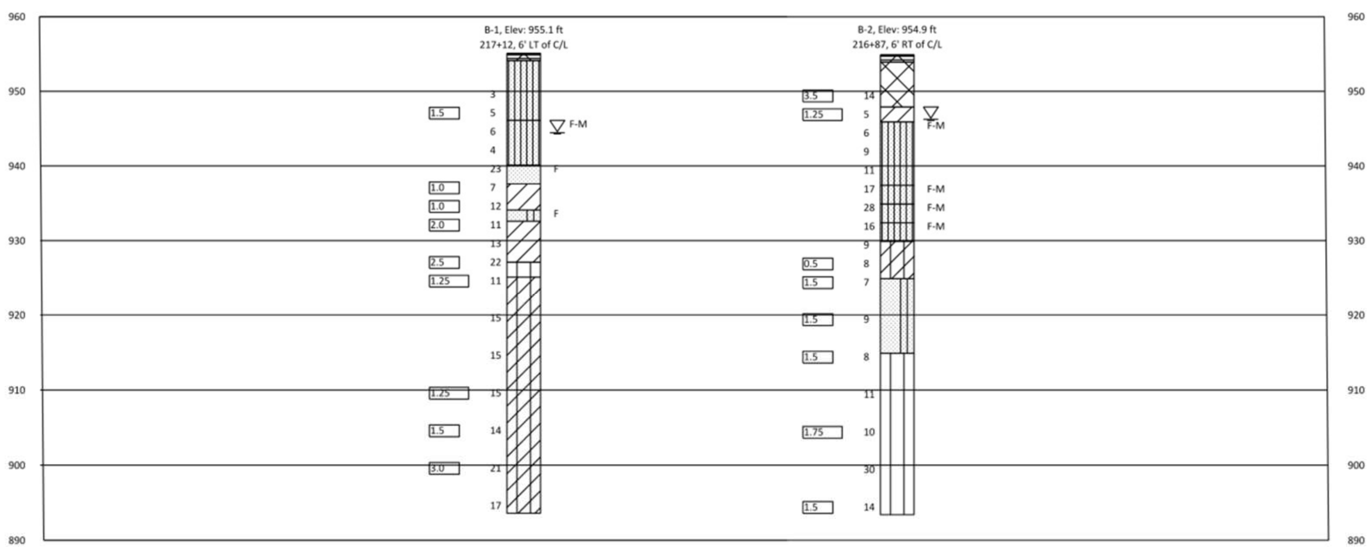
WATER DEPTH AT TIME OF DRILLING:	2.5'	CAVE - IN DEPTH AT TIME OF DRILLING:	NMR
WATER DEPTH AT END OF DRILLING:	NMR	CAVE - IN DEPTH AT END OF DRILLING:	NMR
WATER ENCOUNTERED AFTER DRILLING TIME AFTER DRILLING (HOURS): 24 hrs	DEPTH: Dry	CAVE - IN DEPTH AFTER DRILLING TIME AFTER DRILLING (HOURS): -	DEPTH: NMR

NOTES: 1) Stratification lines between soil types represent the approximate boundary; gradual transition between in-situ soil layers should be expected
2) NE = Not Encountered; NMR = No Measurement Recorded

Box Culvert Example

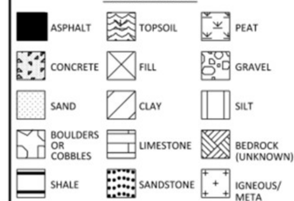
BORING #	DATE COMPLETED	NORTHING (Y)	EASTING (X)
1	12/16/2025	313158.0	400293.4
2	12/16/2025	313114.9	400305.1
BORINGS COMPLETED BY: WISDOT			
REPORT COMPLETED BY: WISDOT			
ALL COORDINATES REFERENCED TO WCCS NAD 83(91)		ROCK COUNTY	
COORDINATES COLLECTED USING NON-SURVEY GRADE EQUIPMENT			



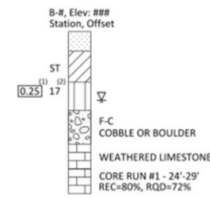


STATE PROJECT NUMBER
5231-00-01

MATERIAL SYMBOLS



LEGEND OF BORING



(1) UNCONFD STRENGTH, AS DETERMINED BY A POCKET PENETROMETER (TSF)

(2) UNLESS OTHERWISE, SPECIFIED THE SPT 'N' VALUE IS BASED ON AASHTO T-206, STANDARD PENETRATION TEST. THE SPT 'N' VALUE PRESENTED HAS NOT BEEN CORRECTED FOR OVERBURDEN PRESSURE OR HAMMER EFFICIENCY.

GROUND WATER ELEVATION

- AT TIME OF DRILLING
- END OF DRILLING
- AFTER DRILLING

ABBREVIATIONS

F-F M-MEDIUM C-COARSE ST-SHELBY TUBE

SUBSURFACE EXPLORATION FOR FOUNDATION DESIGN AND BIDDERS INFORMATION

BORINGS WERE COMPLETED AT POINTS APPROXIMATELY AS INDICATED ON THIS DRAWING TO OBTAIN INFORMATION CONCERNING THE CHARACTER OF SUBSURFACE MATERIALS FOUND AT THE SITE. BECAUSE THE INVESTIGATED DEPTHS ARE LIMITED AND THE AREA OF THE BORINGS IS VERY SMALL IN RELATION TO THE ENTIRE SITE, THE WISCONSIN DEPARTMENT OF TRANSPORTATION DOES NOT WARRANT SIMILAR SUBSURFACE CONDITIONS BELOW, BETWEEN, OR BEYOND THESE BORINGS. VARIATIONS IN SOIL CONDITIONS SHOULD BE EXPECTED AND FLUCTUATIONS IN GROUNDWATER LEVELS MAY OCCUR.

NO.	DATE	REVISION	BY

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION
STRUCTURES DESIGN SECTION

STRUCTURE C-53-2043

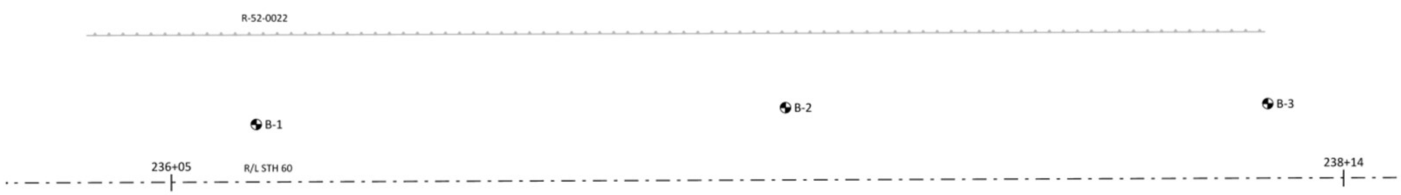
DRAWN BY	EBP	PLANS CK'D

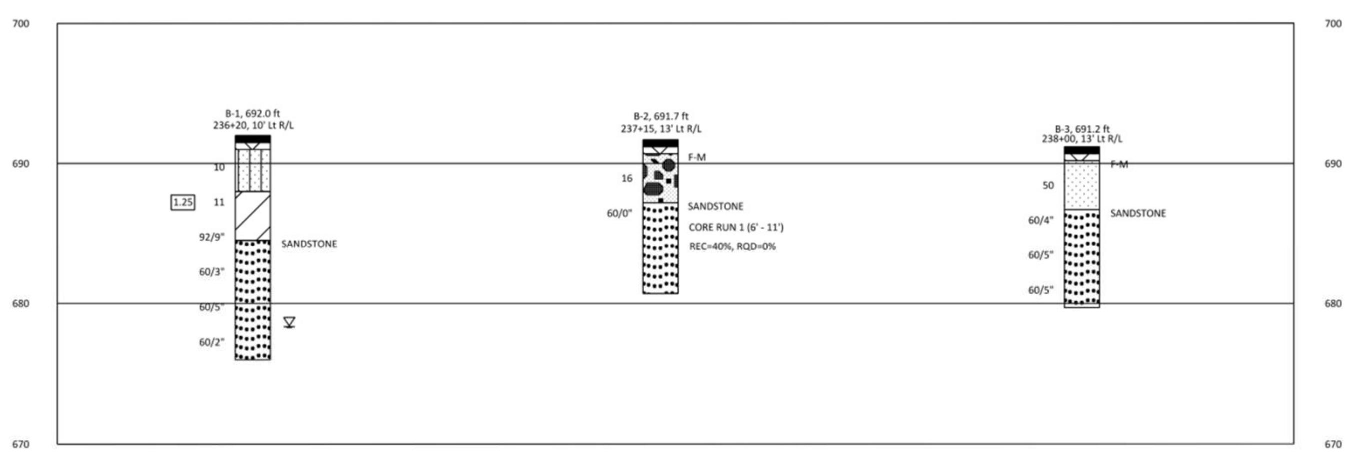
SUBSURFACE EXPLORATION

SHEET

Retaining Wall Example

BORING #	DATE COMPLETED	NORTHING (Y)	EASTING (X)
1	3/10/2026	399701.1	683117.7
2	3/10/2026	399752.3	683197.0
3	3/10/2026	399797.1	683270.2
BORINGS COMPLETED BY: WISDOT			
REPORT COMPLETED BY: WISDOT			
ALL COORDINATES REFERENCED TO WCCS NAD 83(91)		RICHLAND COUNTY	
COORDINATES COLLECTED USING NON-SURVEY GRADE EQUIPMENT			

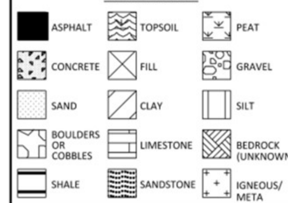




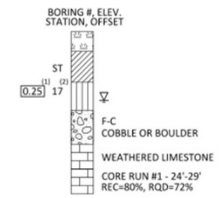
STATE PROJECT NUMBER

5190-07-00

MATERIAL SYMBOLS



LEGEND OF BORING



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NO.	DATE	REVISION	BY

STATE OF WISCONSIN
DEPARTMENT OF TRANSPORTATION
STRUCTURES DESIGN SECTION

STRUCTURE R-52-0022

DRAWN BY EBP | PLANS CK'D

SUBSURFACE EXPLORATION

SHEET ----

Timeline

- WisDOT Implementation
  - Boring Log App – **April 2026**
  - Field App – Expected 2026
  - Lab App – Expected 2026
- Soft rollout
  - Feedback from external partners already using BoreDM
  - Updates (As needed)
  - Later 2026?
- Publish (through BoreDM)
  - Library
  - Template

How can geotechnical data from different boring log programs be handled?

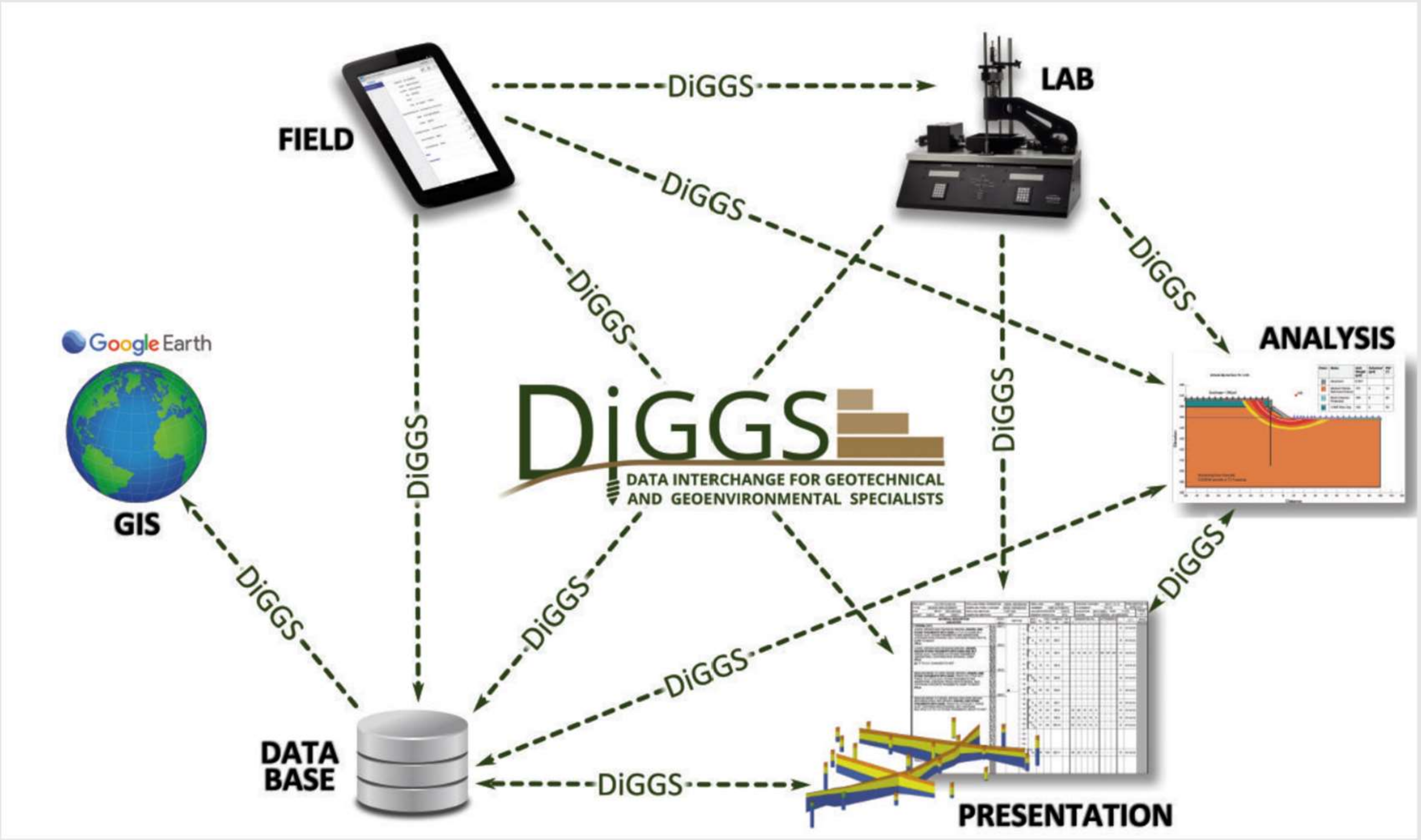
Geotechnical Data Management

ASCE Geo-Institute

- Data transfer protocol for geotechnical data
- BoreDM is DiGGS compatible
- Other programs are working towards DiGGS compatibility
- Ohio DOT has been using DiGGS for 10+ years

Source: ASCE Geo-Institute

Geotechnical Data Management



Bachus, et al., Deep Foundations, May/June 2020

Geotechnical Data Management

Standard Practice for

Digital Interchange of Geotechnical Data

AASHTO Designation: PP 102-20 (2022)[1]

First Published: 2020 **Reviewed but Not Updated: 2022**

Technical Subcommittee: 1b, Geotechnical Exploration, Instrumentation, Stabilization, and Field Testing

4.2. Complete records of all data identified to be recorded and reported by geotechnical standard test procedures, or as specified by the Agency and conducted by the Agency or on the Agency's behalf by contracted geotechnical service providers, shall be transferred to the Agency and by the Agency in a format consistent with the DIGGS schema.

What's required for geotechnical data at this time?

- Continue using the WisDOT gINT template and library
- Discuss with your geotechnical partners
- Stay tuned for more updates

Other Items

- Geotechnical Addenda
  - E-submit updated geotechnical reports

- Document submission (if required by contract)
  - gINT logs – DOTDTSDGeotechnicalgINT@dot.wi.gov
  - SIRs and Lab Work - DOTDTSDGeotechnicalSirLab@dot.wi.gov

Questions?

David Staab, PE
david.staab@dot.wi.gov
608-246-7952

Bridge Scour and Pile Analysis

Steve Neary, James Luebke, Andrew Smith

May 2026 WisDOT Structural Engineers Symposium

Madison, WI

5.26.2026

Overview

- Discussion topics
  - Scour components, total scour depth
  - Evaluating stability in total scoured condition

What is Scour?

- Definition
  - Erosion of streambed or bank material due to flowing water; often considered as being localized
- Types
  - Contraction
  - Local (pier, abutment)
  - Pressure

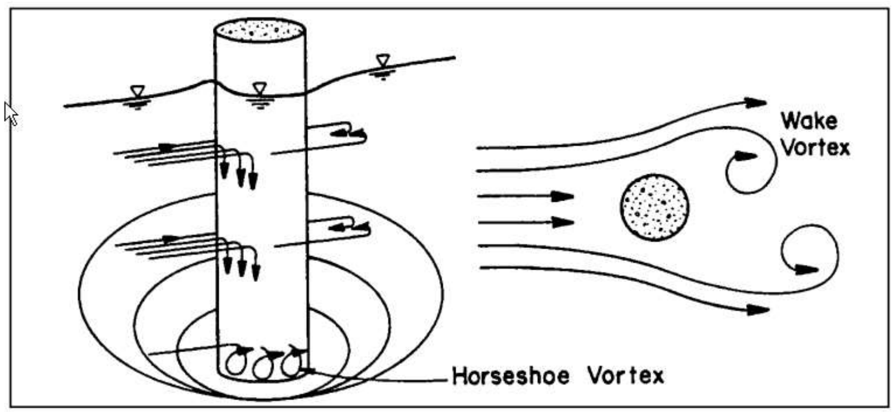


Figure 3.2. Simple schematic representation of scour at a cylindrical pier.

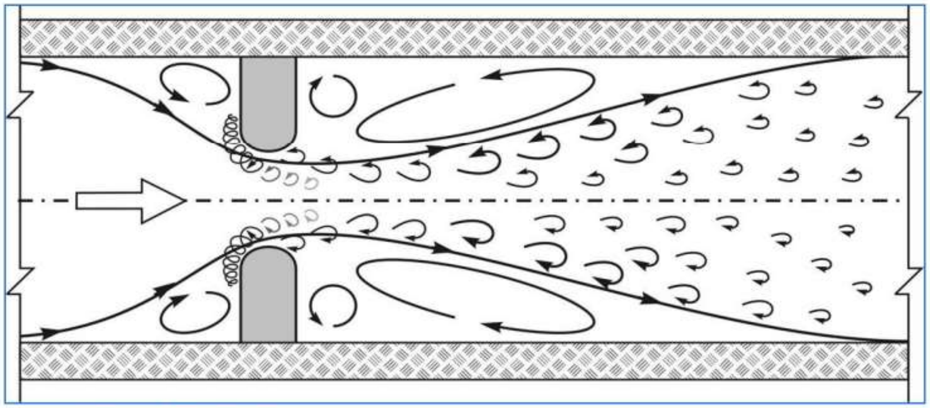


Figure 3.7. Flow structure including macro-turbulence generated by flow around abutments in a narrow main channel (NCHRP 2011b).

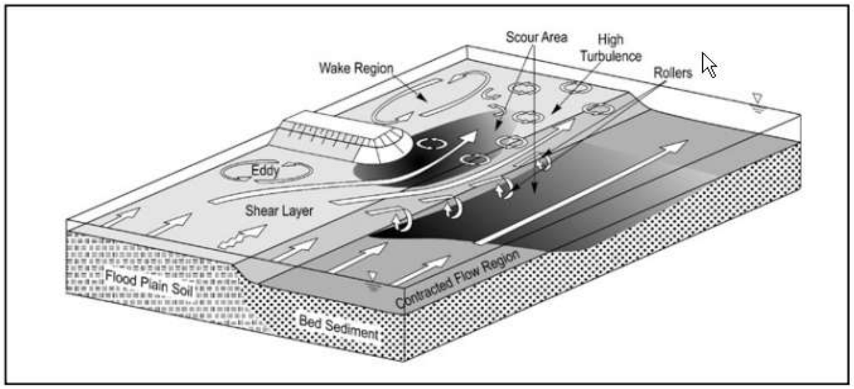
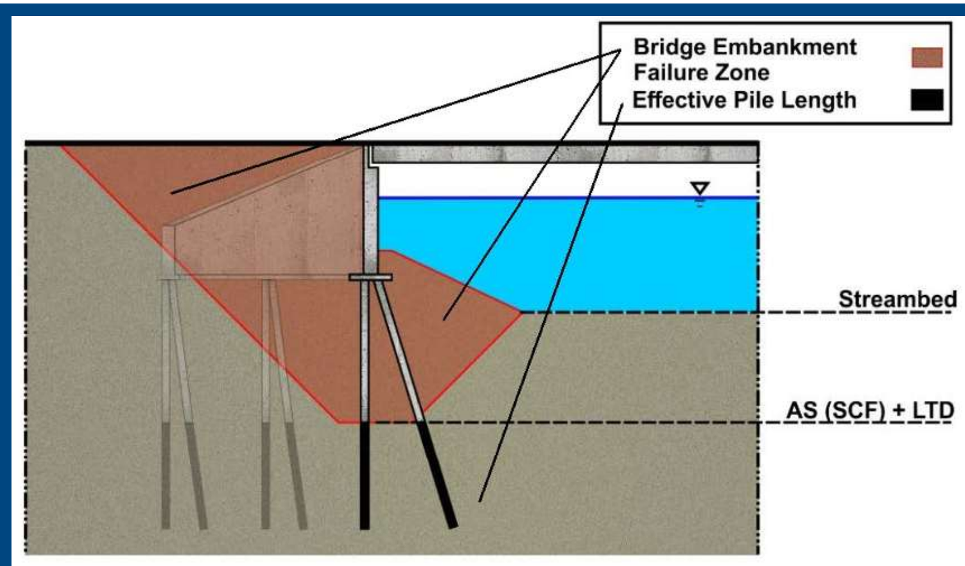


Figure 3.8. Flow structure including macro-turbulence generated by floodplain/main channel flow interaction, flow separation around abutment, and wake region on the floodplain of a compound channel (NCHRP 2011b).

Abutment Scour

- NCHRP 24-20 method
  - Amplified contraction scour
  - Pressure, cohesive – not applicable



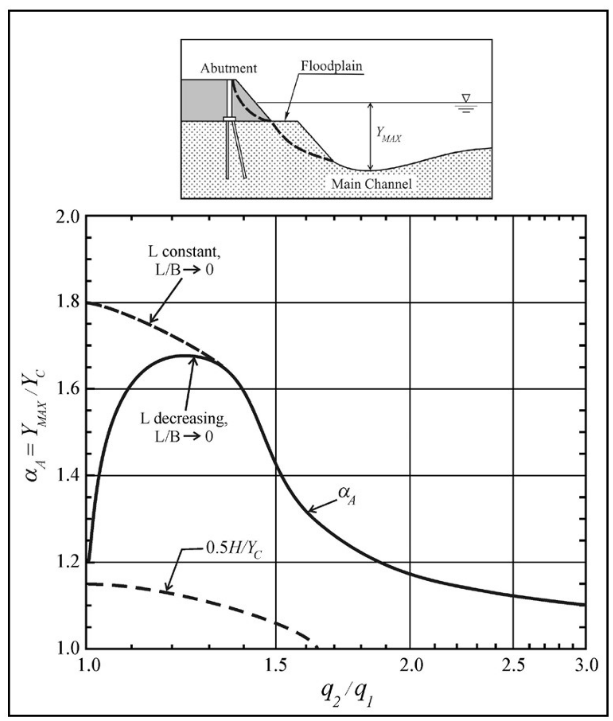
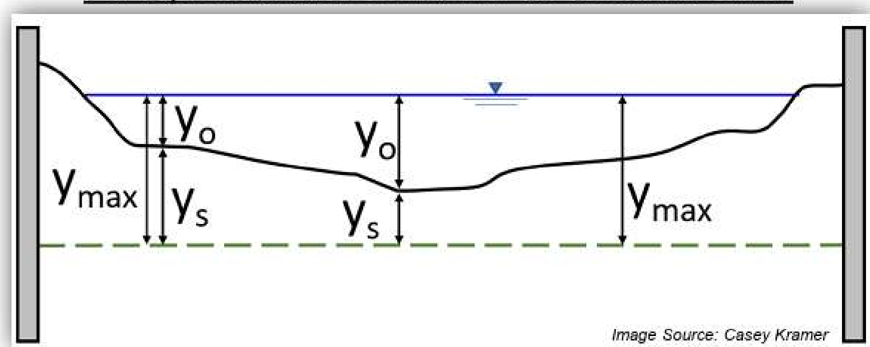


Figure 8.9. Scour amplification factor for spill-through abutments and live-bed conditions (NCHRP 2010b).

For representation of NCHRP 24-20 terms ONLY

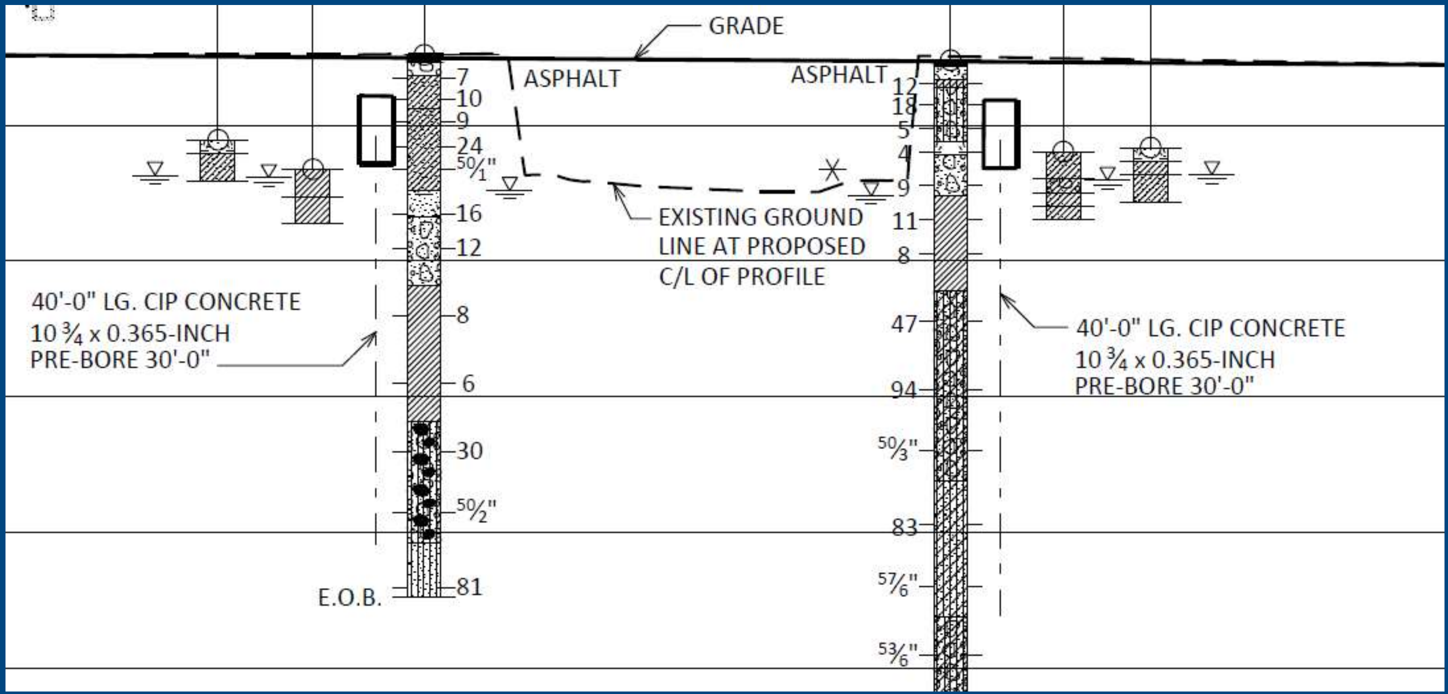


$$y_s = y_{max} - y_o$$

HEC-18 (2012) Eqn. 8.4

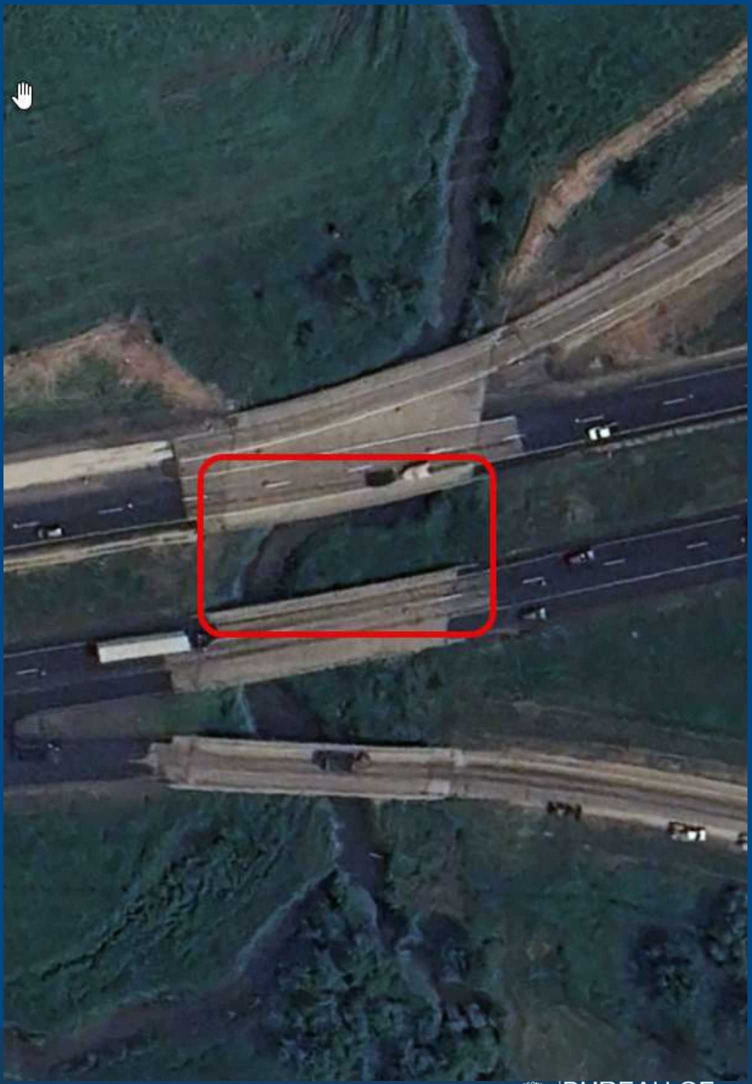
Other Scour Considerations

- Sediment
  - Live bed vs clear water
  - Cohesive
  - Layers
- Results
  - Are they reasonable?
  - Multidisciplinary scour team



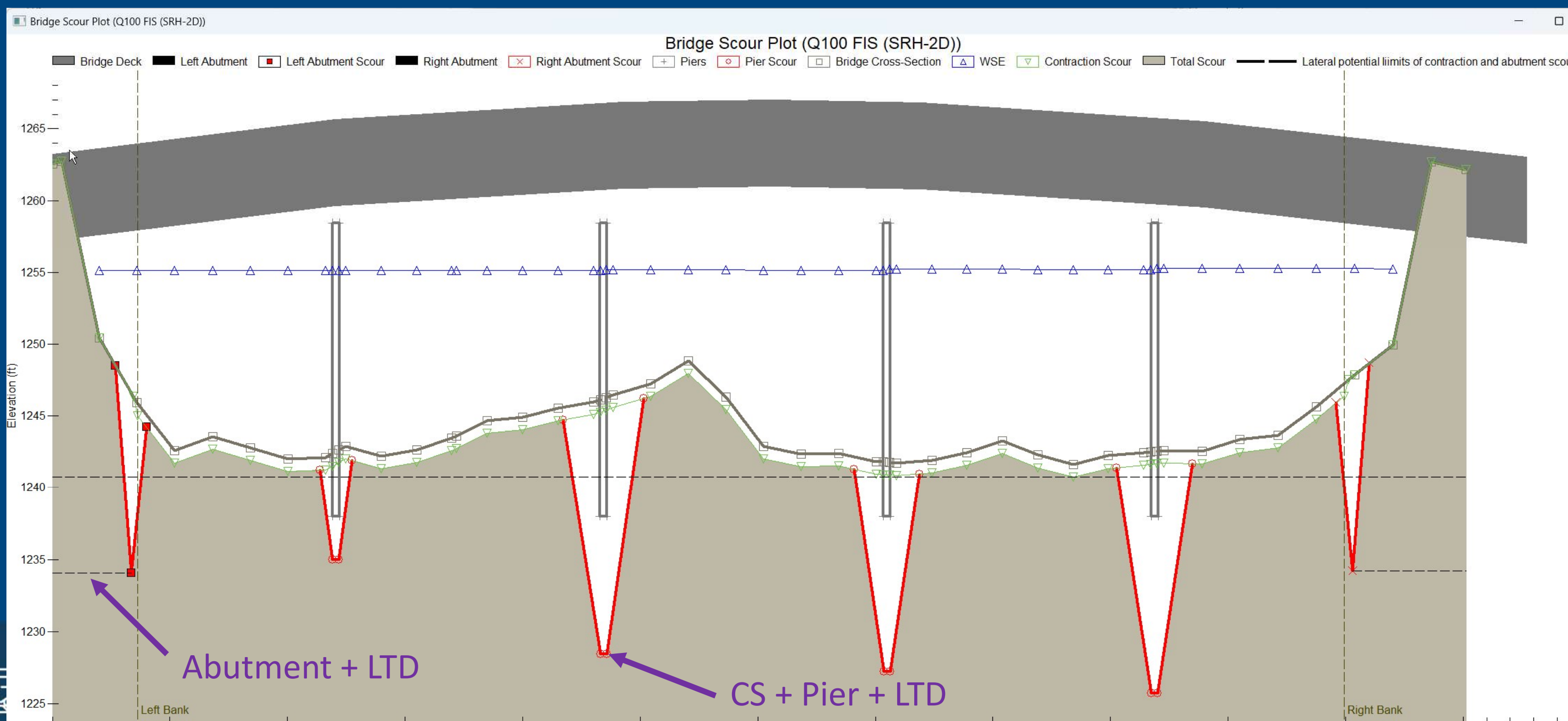
Stream Migration

- Lateral migration
  - UWPs
    - 2013 vs 2023
  - Aerial photos
    - County GIS
    - WI Historic Aerial Imagery Finder
    - Google Earth



Total Scour

- Scour elevation at each substructure
  - Abutment = LTD + Abutment scour
  - Pier = LTD + Contraction + Pier scour



Bridge Scour - Piles

- WisDOT Bridge Manual
  - 8.3.2.7 - All bridges shall be evaluated to determine the vulnerability to scour.

- AASHTO LRFD BDS
  - C2.6.4.4.4 – Change in Foundation Conditions due to Scour

    "Scour is not a force effect per se, but the change in conditions of the substructure may significantly alter the consequences of force effects acting on the structure"

  - 10.7 .1.5 – Pile design shall address the following issues as appropriate:
    - Minimum pile penetration necessary to satisfy the requitements caused by scour.
    - Pile foundation nominal structural resistance (with or without scour).
    - Long-term durability of the pile in service, i.e., corrosion and deterioration.

Bridge Scour - Resources

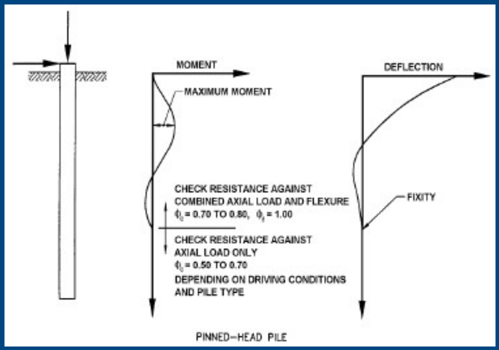
- WisDOT Bridge Manual
  - Chapter 8 – Hydraulics (Load/Condition)
  - Chapter 11 – Foundation Support (Geotech and Structural Resistance)
    - General - Simplified and Non-Simplified Pile Practices
    - Scour - Piling analyzed as unbraced columns
    - Scour - Compensate for the resistance capacity that is lost due to scour.
  - Chapter 12 and 13 – Abutments and Piers (Specific applications: Integral abutments, exposed pile bents)
- AASHTO LRFD BDS
  - 10^{th} Edition scour updates
- Other References:
  - FHWA – HEC-18 - Evaluating Scour at Bridges
  - FHWA – GEC-12 - Design and Construction of Driven Pile Foundations
  - FHWA – GEC-10 – Drilled Shafts: Construction Procedures and Design Methods

Bridge Scour – Pile Design

- **H-Piles**
  - Simplified Practices - Table 11.3-5
    - Axial Load Only - Simplified Practices
      - Fully Supported
      - No Lateral Loads
    - LRFD 6.9.4 - Steel Compression Member
    - ϕ = 0.50 (compression of H-pile and severe H-pile damage) – LRFD 6.5.4.2

Pile Size	Shell Thickness (inches)	Concrete or Steel Area (A_g or A_s) (in^2)	Nominal Resistance (Pn) (tons) (2)(3)(6)	(ϕ)	Maximum Factored Resistance (Pr) (tons) (4)	Modified Gates Driving Criteria: Factored Resistance (Pr) (ϕ = 0.50) (tons)	Modified Gates Driving Criteria: Required Driving Resistance (Rn_{dyn}) (tons) (5)	PDA/CAPWAP Driving Criteria: Factored Resistance (Pr) (ϕ = 0.65) (tons)	PDA/CAPWAP Driving Criteria: Required Driving Resistance (Rn_{dyn}) (tons) (5)
Cast in Place Piles									
10 ¾"	0.219	83.5	99.4	0.75	75	55 [8]	110 [11]	72 [8]	110 [11]
10 ¾"	0.250	82.5	98.2	0.75	74	65 [8]	130 [11]	75 [9]	115
10 ¾"	0.365	78.9	93.8	0.75	70	75 [9]	150	75 [9]	115
10 ¾"	0.500	74.7	88.8	0.75	67	75 [9]	150	75 [9]	115
12 ¾"	0.250	118.0	140.4	0.75	105	80 [8]	160 [11]	104 [8]	160 [11]
12 ¾"	0.375	113.1	134.6	0.75	101	105 [9]	210	104 [9]	160
12 ¾"	0.500	108.4	129.0	0.75	97	105 [9]	210	104 [9]	160
14"	0.250	143.1	170.3	0.75	128	85 [8]	170 [11]	111 [8]	170 [11]
14"	0.375	137.9	164.1	0.75	123	120 [8]	240 [11]	120	185
14"	0.500	132.7	158.0	0.75	118	120 [9]	240	120 [9]	185
16"	0.375	182.6	217.3	0.75	163	145 [8]	290 [11]	159	245
16"	0.500	176.7	210.3	0.75	158	160 [9]	320	159 [9]	245
H-Piles									
10 x 42	NA[1]	12.4	310.0	0.50	155	90	180 [10]	117	180 [10]
12 x 53	NA[1]	15.5	387.5	0.50	194	110	220 [10]	143	220 [10]
14 x 73	NA[1]	21.4	535.0	0.50	268	125	250 [10]	162	250 [10]

  - Non-Simplified Practices
    - Refer to LRFD 6.15 – Piles
      - Axial Compression (LRFD 6.9.4 Non-Composite)
      - Combined Axial load and Flexure (LRFD 6.9.2.2)
      - Flexural Resistance (LRFD 6.12)



Bridge Scour – Pile Design

- **CIP Piles**
  - Simplified Practices - Table 11.3-5
    - Axial Load Only - Simplified Practices
      - Fully Supported
      - No Lateral Loads
    - LRFD 5.6.4 - Concrete Compression Member
    - Neglecting steel shell after driving
    - ϕ = 0.75 (compression concrete) – LRFD 5.5.4.2

Pile Size	Shell Thickness (inches)	Concrete or Steel Area (A_g or A_s) (in²)	Nominal Resistance (Pn) (tons) (2)(3)(6)	(ϕ)	Maximum Factored Resistance (Pr) (tons) (4)	Modified Gates Driving Criteria: Factored Resistance (Pr) (ϕ = 0.50) (tons)	Modified Gates Driving Criteria: Required Driving Resistance (Rn_{dyn}) (tons) (5)	PDA/CAPWAP Driving Criteria: Factored Resistance (Pr) (ϕ = 0.65) (tons)	PDA/CAPWAP Driving Criteria: Required Driving Resistance (Rn_{dyn}) (tons) (5)
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10 ¾"	0.250	82.5	98.2	0.75	74	65 (8)	130 (11)	75 (9)	115
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10 ¾"	0.500	74.7	88.8	0.75	67	75 (9)	150	75 (9)	115
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12 ¾"	0.500	108.4	129.0	0.75	97	105 (9)	210	104 (9)	160
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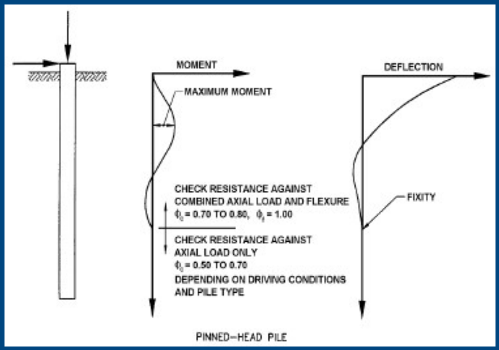
14 x 73	NA (1)	21.4	535.0	0.50	268	125	250 (10)	162	250 (10)

Under WBM Consideration

  - Non-Simplified Practices
    - Refer to LRFD 6.15 – Piles
      - Axial Compression (LRFD 6.9.5 Composite)
      - Combined Axial load and Flexure (LRFD 6.9.2.2)
      - Flexural Resistance (LRFD 6.12)



Bridge Scour – Pile Design

- **CIP Piles** (LRFD 5.6.4 vs LRFD 6.9.5)
  - Simplified Practices - Table 11.3-5
    - Following LRFD 5.6.4 Concrete Member
    - ϕ = 0.75 (compression concrete) – LRFD 5.5.4.2
    - k_c = 0.85

$$P_n = 0.80\begin{bmatrix} k_c f'_c\left(A_g - A_{st} - A_{ps}\right) + f_y A_{st} \\ -A_{ps}\left(f_{pe} - E_p \varepsilon_{cu}\right)\end{bmatrix} \quad (5.6.4.4\text{-}3)$$

  - Non-Simplified Practices
    - Following LRFD 6.9.5 Composite Member
    - ϕ = 0.60 (compression of pipe pile and severe pipe pile damage) – LRFD 6.5.4.2

- If $\lambda \le 2.25$, then:

$$P_n = 0.66^{\lambda} F_e A_s$$

- If $\lambda > 2.25$, then:

$$P_n = \frac{0.88 F_e A_s}{\lambda}$$

$$F_e = F_y + C_1 F_{yr}\left(\frac{A_r}{A_s}\right) + C_2 f'_c\left(\frac{A_c}{A_s}\right) \quad (6.9.5.1\text{-}4)$$

Shell Rebar Concrete

Table 11.3-5

Per LRFD 5.6.4

Factored Axial Resistance*

$P_r = \phi\ 0.80\ k_c\ f'_c\ A_c$

$P_r = 0.51\ f'_c\ A_c$

Per LRFD 6.9.5

Under WBM Consideration

Factored Axial Resistance*

$P_r = \phi\ 0.85\ f'_c\ A_c$

$P_r = 0.51\ f'_c\ A_c$

*Neglecting steel shell and rebar, fully supported

BUREAU OF STRUCTURES

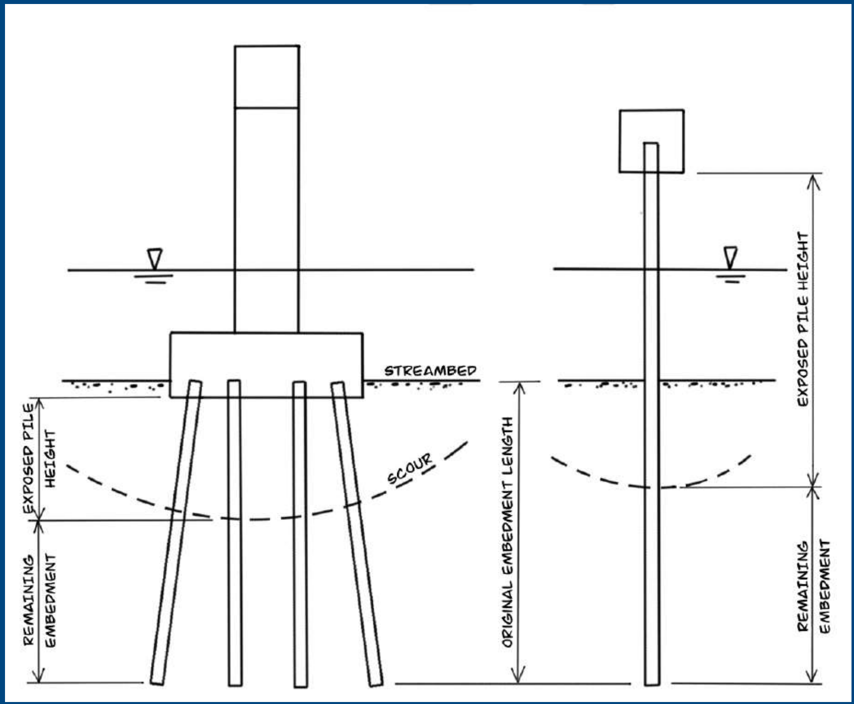
Bridge Scour – Pile Design

- Other Considerations
  - Pile Corrosion Mitigation:
    - Avoidance - Concrete Pile Encasement (Pile Encased Pier)
    - Redundancy/Resistance – Add Longitudinal Reinforcement (Exposed Pile Bent Pier)
    - Protection - Exposed Sections Painted
  - CIP Pile – Composite Action *(WBM guidance Under Consideration)*
    - For Non-Simplified Practices (e.g. Unbraced columns, lateral loads, etc.)
    - Corrosion Mitigation in corrosive and non-corrosive environments
    - Composite Action – LRFD 6.9.5
      - Steel Shell – Design Thickness (TBD)
        - Corrosion - 1/16-inch minimum reduction
        - Material Tolerance – 12.5% reduction

      Typically limited to 50% x nominal shell thickness for in-service evaluations.
    - Composite Action – LRFD 6.9.6 *(Not being considered)*

Scour for Design vs. Scour for Evaluation

- Scour for Design – ability to accommodate
  - LPILE, FEA software, FB-MultiPier
  - Specs that guarantee behavior or anticipate corrosion
- Scour for Evaluation – what is ok?
  - Identify at-risk structures (based on hydraulic analysis)
  - Evaluate in-service scour reported thru inspections
  - Can be robust, but some **simplified/conservative tools are helpful**



Level of Uncertainty in Global Stability

- Initial review – what does the bridge look like?
- Short-fixed bridges – low level of uncertainty
  - Stiff abutments, flexible (braced) piers (pile encased, open pile bents)
  - Small lateral loads
  - Generally, allows larger exposure of piles
- Long-expansion bridges – high level of uncertainty
  - Unbraced substructure elements
  - Significant lateral loads

LRFD BDS 6.15.3

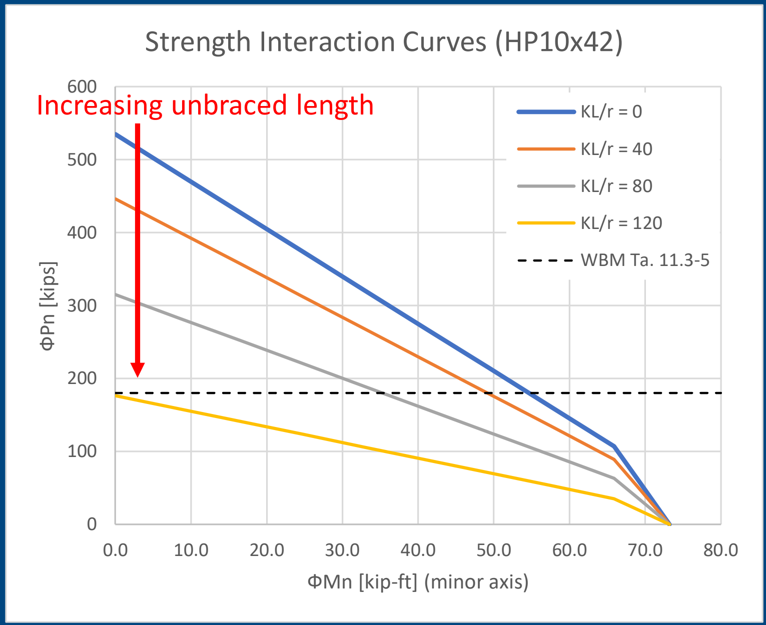
- Interaction 6.15.3.2 → 6.9.2.2
- Buckling 6.15.3.3 → 6.9.4 or 6.9.5
  - In essence scour is compromising our Pr, potentially Mr, and increasing second-order effects

6.15.3.3—Buckling

Instability of piles which extend through water or air shall be accounted for as specified in Article 6.9. Piles which extend through water or air shall be assumed to be fixed at some depth below the ground. Stability shall be determined in accordance with provisions in Article 6.9 for compression members using an equivalent length of the pile equal to the laterally unsupported length, plus an embedded depth to fixity. The depth to fixity shall be determined in accordance with Article 10.7.3.13.4 for battered piles or *P*-Δ analysis for vertical piles.

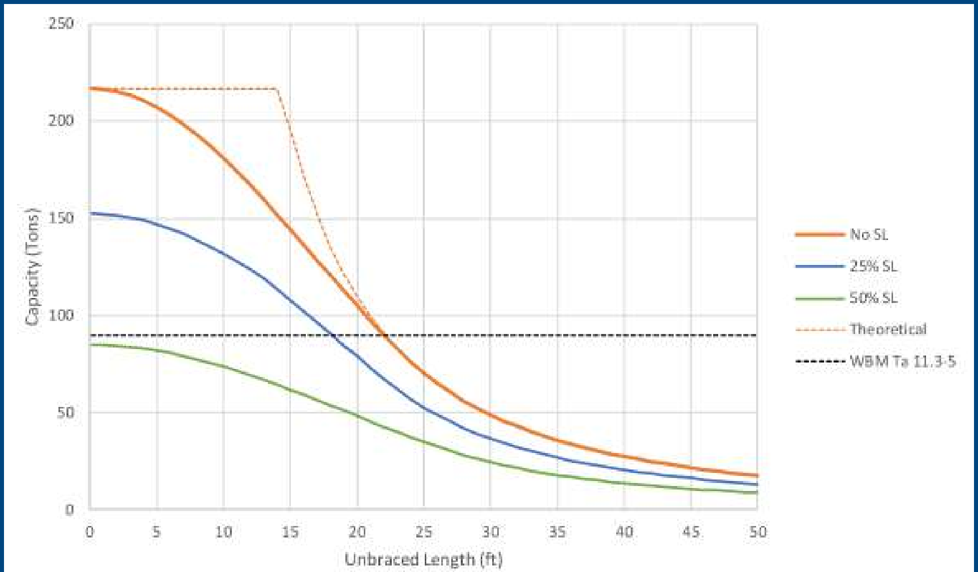
C6.15.3.3

An approximate method acceptable to the Engineer may be used in lieu of a *P*-Δ analysis.



LRFD BDS 6.15.3

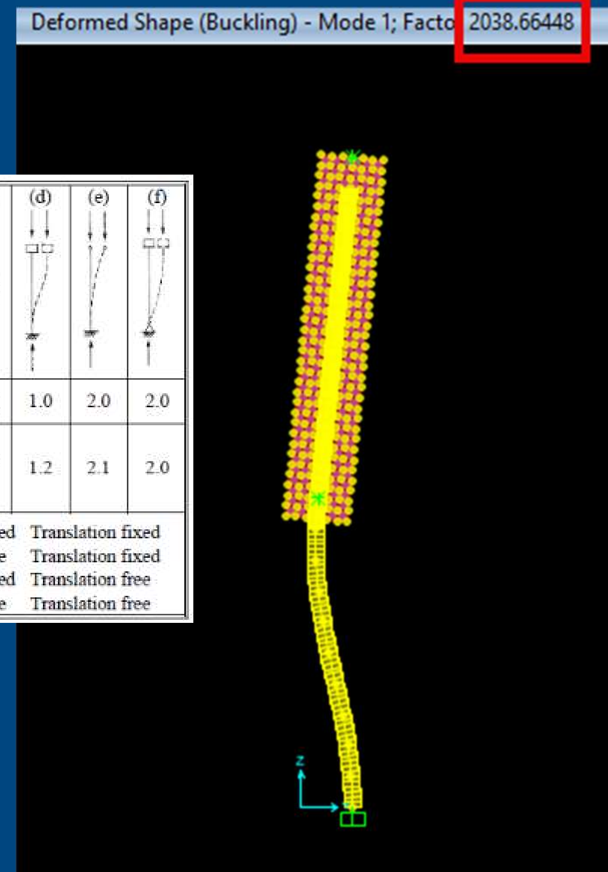
- Drivability Resistance versus Structural Resistance
  - ★Drivability for various reasons controls (i.e. we have some margin in the structural resistance)
- One approach is to relate driven resistance to remaining structural axial resistance – subtracting out or accounting for key considerations (next)



Key Considerations

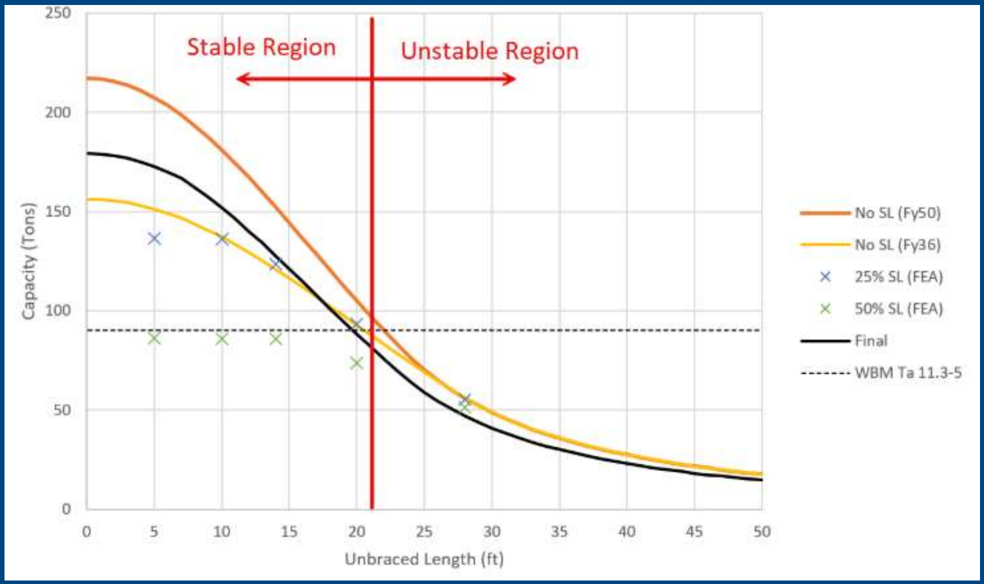
- Remaining embedment
- ★ Lateral Loads – makes a big difference
  - 4% lat ~ 50% reduction in strength (nonlin analysis)
- Section properties
  - Account for SL?
  - Consider Concrete plus portion of steel shell for CIP
- More explicitly stated in 6.15.3.3
  - “effective length” i.e. “K”
    - Use k from table
    - Linear Buckling (Eigenbuckling) Analysis – Fe/Pe directly
  - Depth to Fixity / Point of Fixity
    - P-y software (Lpile)
    - Davisson method
    - 10’

	(a)	(b)	(c)	(d)	(e)	(f)
Buckled shape of column is shown by dashed line						
Theoretical K value	0.5	0.7	1.0	1.0	2.0	2.0
Design value of K when ideal conditions are approximated	0.65	0.80	1.0	1.2	2.1	2.0
End condition code		Rotation fixed Translation fixed Rotation free Translation fixed Rotation fixed Translation free Rotation free Translation free				

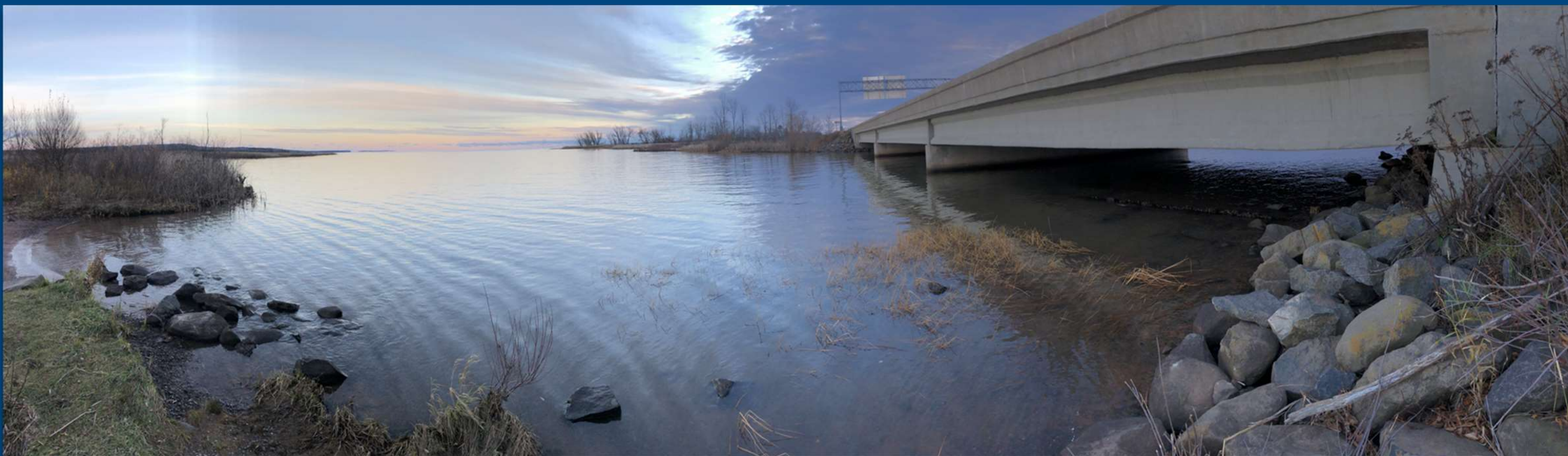


Other Variables

- Section and material properties significant variable in “stable” region
- Unbraced length primary variable in “unstable” region
  - Could consider operating level loads, but shifting line down, doesn’t help much



Questions?



CONSULTANT REVIEW

Max Kulick, P.E.

Final Review Engineer

2026 WisDOT Structural Engineers Symposium

Consultant Review CONTACTS

Supervisor

Najoua Ksontini

Preliminary Review

Ruth Coisman
Program Manager

Ann- Marie Kirsch
Hydraulics Review Engineer

Consultant Partners

Records Coordinator

Sarah Wright

Final Review

Jon Resheske
Program Manager

Emily Kuehne
Review Engineer

Max Kulick
Review Engineer

Consultant Partners

Review Reminders

NON-STANDARD DESIGNS

contact Ruth **ahead** of Preliminary E-Submit if doing something weird

- not following abutment tables
- 3-sided structures/precast
- <0.5% grade [state system]
- high skew
- lack of freeboard
- shallow foundations
- open railing [state system]
- high level aesthetics
- non typical DNR requests

SSR

include relevant project information/justifications (we do look at this)

RATINGS

contact BOS Rating Unit ahead of Preliminary/Final E-Submit for things like:

- using refined analysis
- low ratings
- potential for load posting
- nonconventional designs with special primary members
- different super structure types within same structure number

SCOPE OF WORK

rehabilitation plans should include Scope of Work list in Preliminary and Final plans

Review Reminders

BRIDGE MANUAL
follow bridge manual guidance

PRELIMINARY PLAN COMMENTS
include responses to preliminary plan comments with Final plan submittal

LINEWORK
label utility lines in plans

QA/QC
follow your procedures and do not rely on BOS to catch your errors

BID ITEMS
double check bid item numbers and names
do not include bid item extension numbers on structure plans

THINK LIKE A CONTRACTOR
What information is needed to bid on the work?

"What can we do to make your job easier?" – Consultant

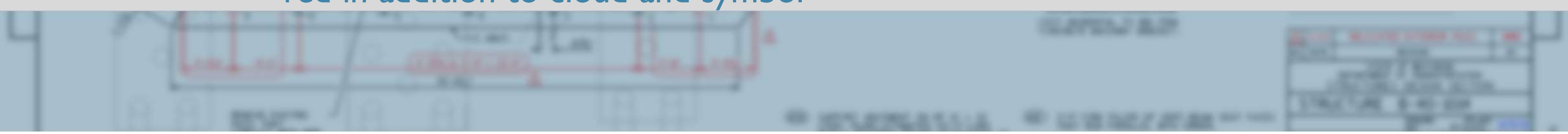
- Include Structure Number in Subject Line of Emails to BOS.
  We track projects by structure number rather than design/construction ID.
- Tell us why you are (re)E-Submitting.
  Add note to 'Comments' box, this helps keep track of incoming submittals.
  Updated Plans for BOS Comments/BPD Comments/DNR/Region/Bid Items


Provide Information About The Submittal. All Fields In This Section Are Required.
Comments
(Max 80 characters)

- Consultant Reviewers
  We work closely with a handful of consultant's that complete reviews for us. When they attend meetings or respond to emails, know that they are representing BOS.

Addenda and Post-Let

- Tell us why you are E-Submitting Addenda/Post-Let
  Ahead of E-Submit send Email to Jon and Najoua to briefly explaining the changes.
  This helps us process and review Addenda/Post-Let Revisions timely.
- Timing
  On-Time Addenda delivery to BPD is no less than 2 weeks before LETTING
  Reach out to BPD and Jon if you are not going to meet that.
- Review FDM 19-22
- Reminders:
  - only include sheets that have changes
  - stamp each sheet
  - linework/text that changed should also be red in addition to cloud and symbol



Thank You!

Questions?

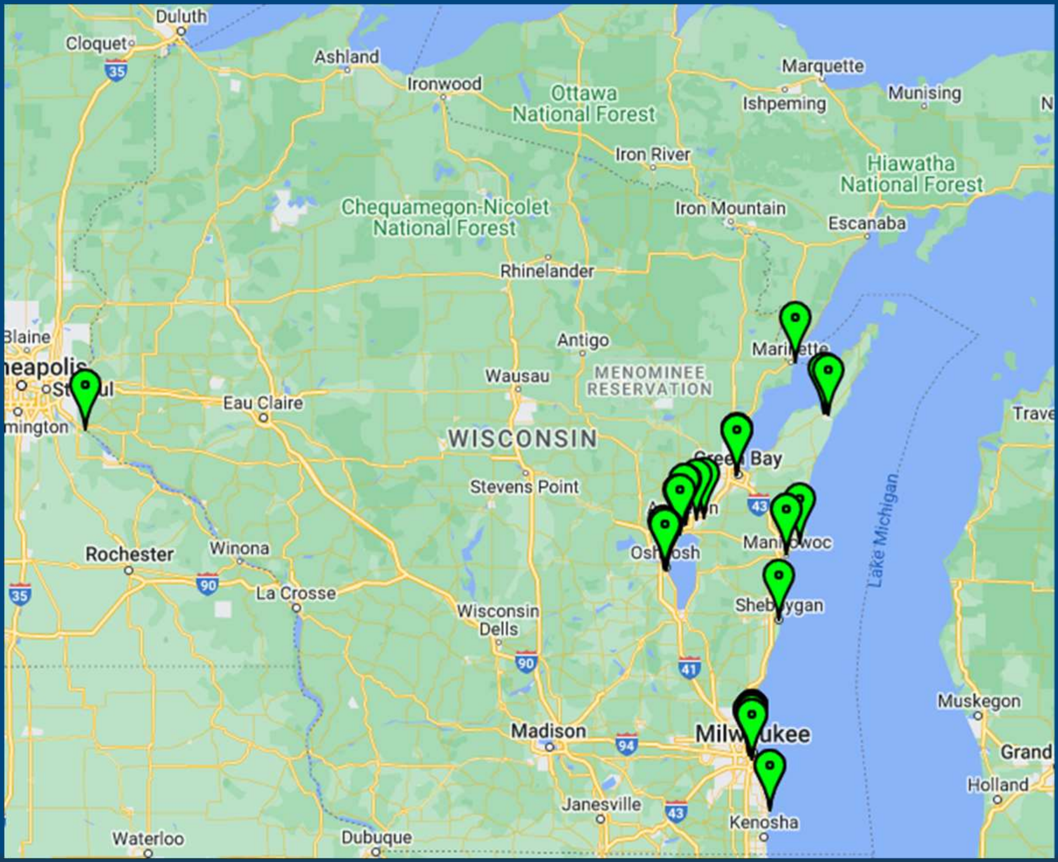
Main Street, City of Oshkosh Fox River Bridge

Dan Machamer
Hardesty & Hanover, LLC.

WisDOT Structural Engineers Symposium

May 26, 2026

Introduction – Movable Bridges in WI



Introduction – Movable Bridges in WI

Types

- Now 44 movable highway bridges in Wisconsin
  - 10 vertical lift
  - 16 trunnion bascule
  - 18 rolling lift bascule
- 21 movable highway bridges in NE Region
  - 15 rolling lift bascule

Project Location

H&H

Project Location

WISCONSIN DEPARTMENT OF TRANSPORTATION

H&H

Main St Bascule Bridge

Double-Leaf Rolling Lift Bascule Span

Rolling Lift Bridges

Overview

- Bascule girder rolls on tracks with curved treads (no trunnion)
- Other differences from trunnion bascules
  - Operating machinery usually on-board (moves with the bridge)
  - Bridge usually driven with a rack and pinion
  - Rear roadway break usually behind pinion
  - Rear locks usually required
  - Center lock usually Scherzer-Style jaw and diaphragm

Rolling Lift Bridges

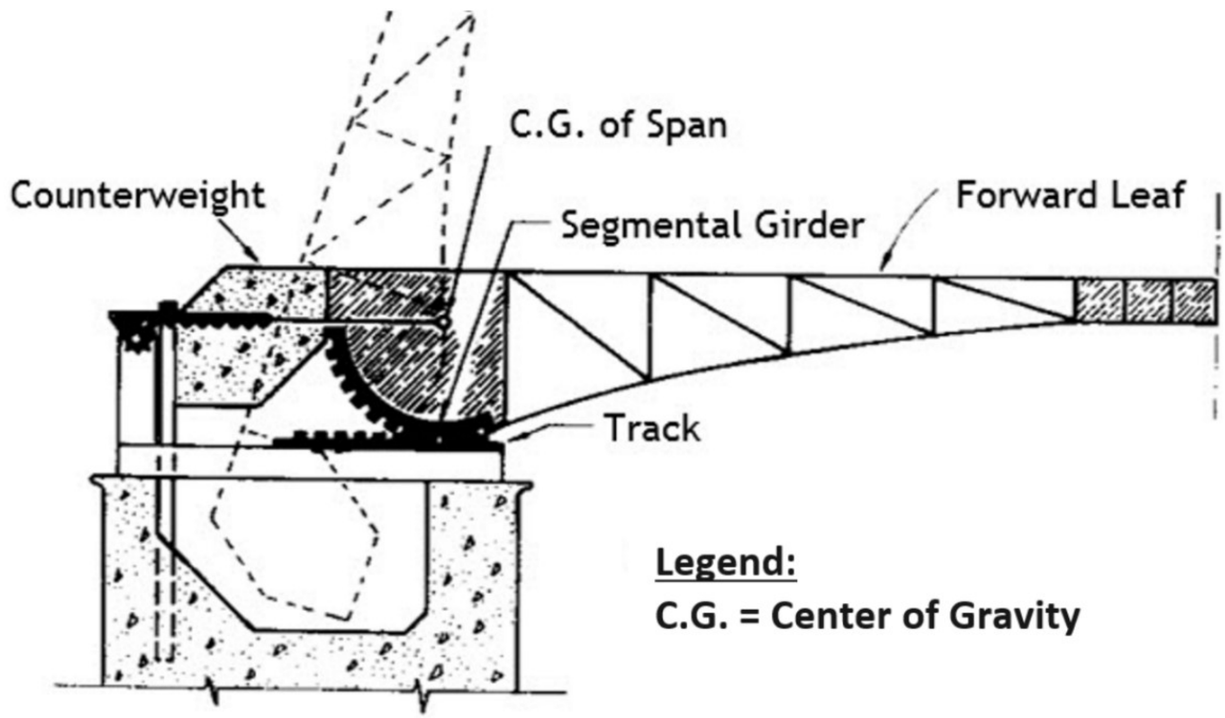
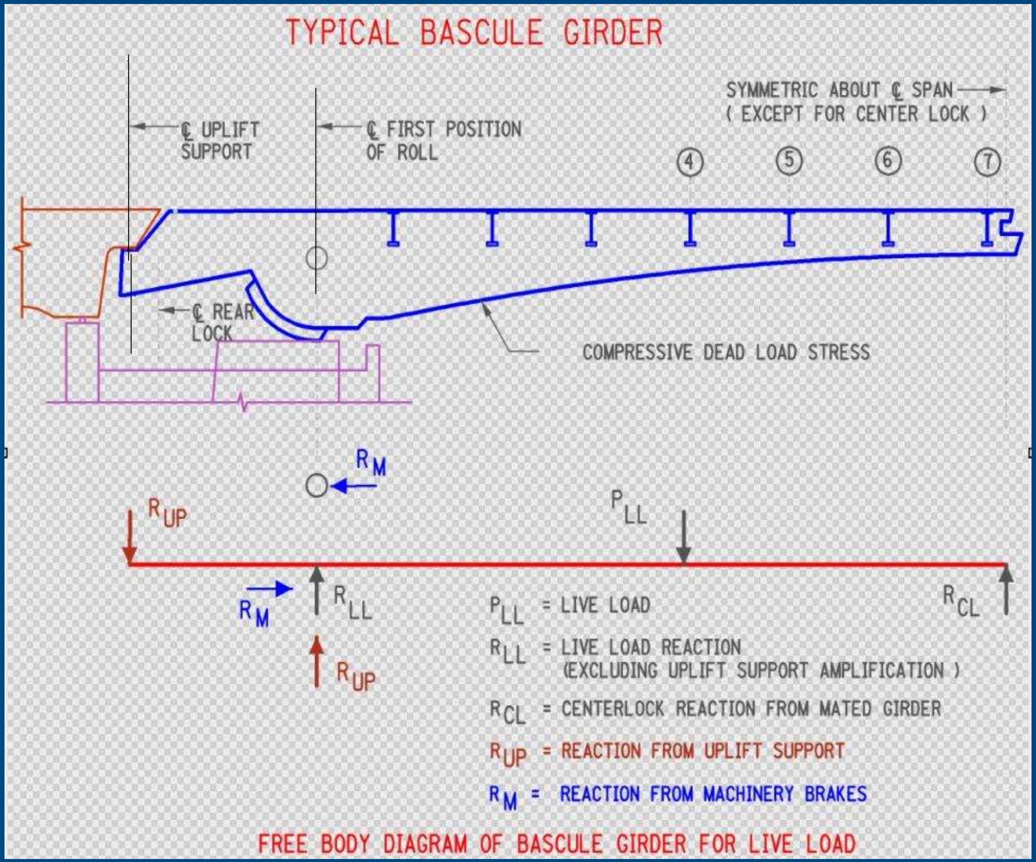
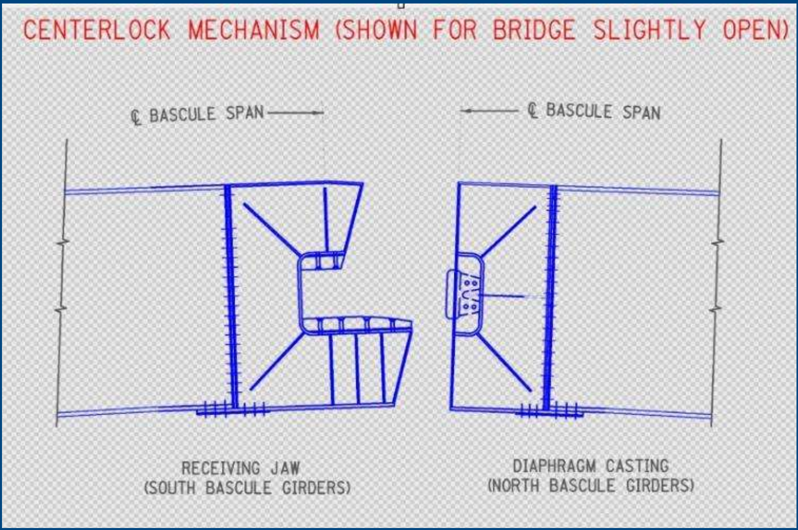


Figure 5.3.8 Rolling Lift Bascule Bridge Schematic

(from FHWA 2023 BIRM)

Rolling Lift Bridges





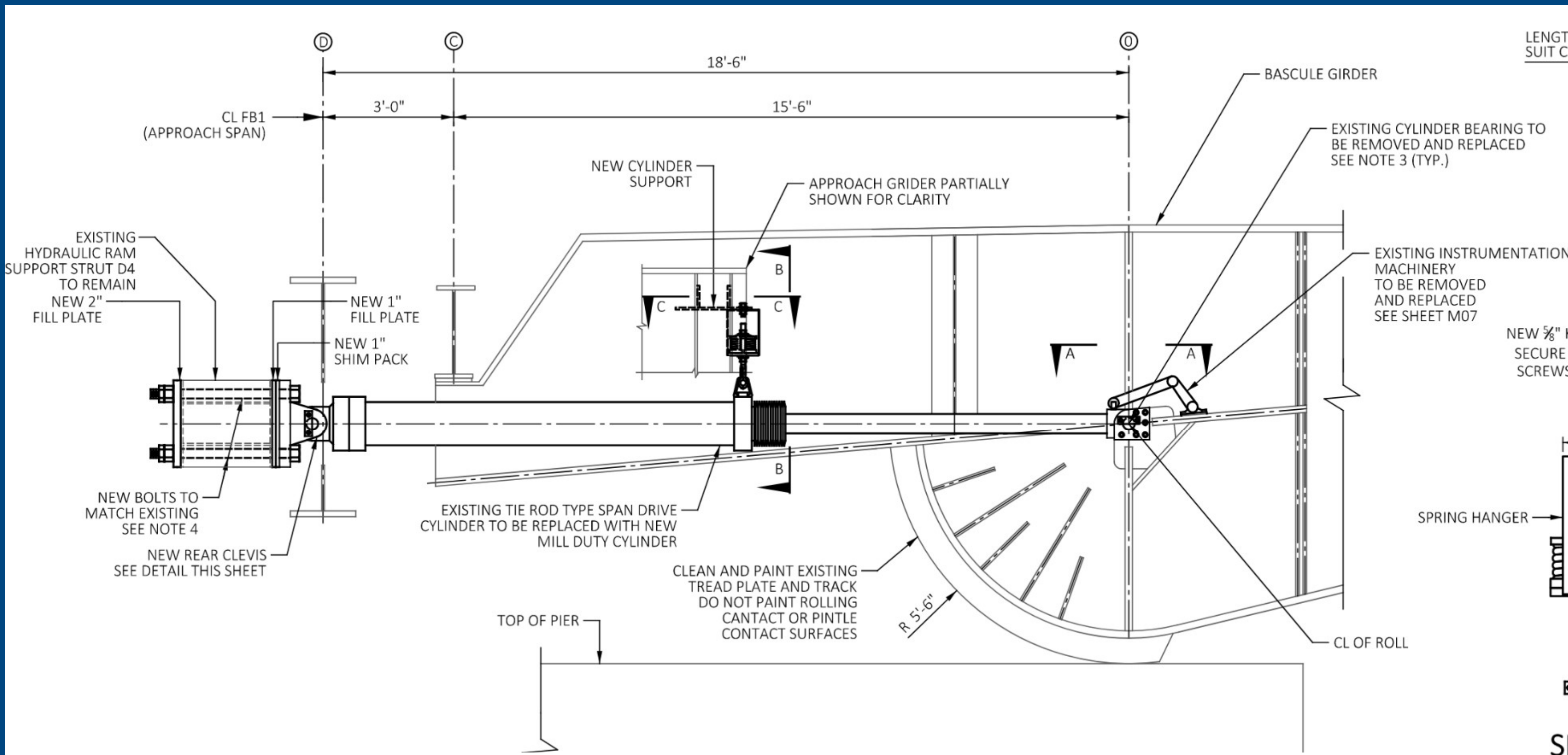
CENTERLOCK

Rolling Lift Bridges

Drive Machinery Types

- Electro-mechanical
  - Electric Motors with Open Gearing and/or Gearboxes
- Hydro-mechanical
  - HPU, Hydraulic Motors with Open Gearing and/or Gearboxes
- Hydraulic cylinders
  - No mechanical gears besides track and tread

Main St Bascule Bridge

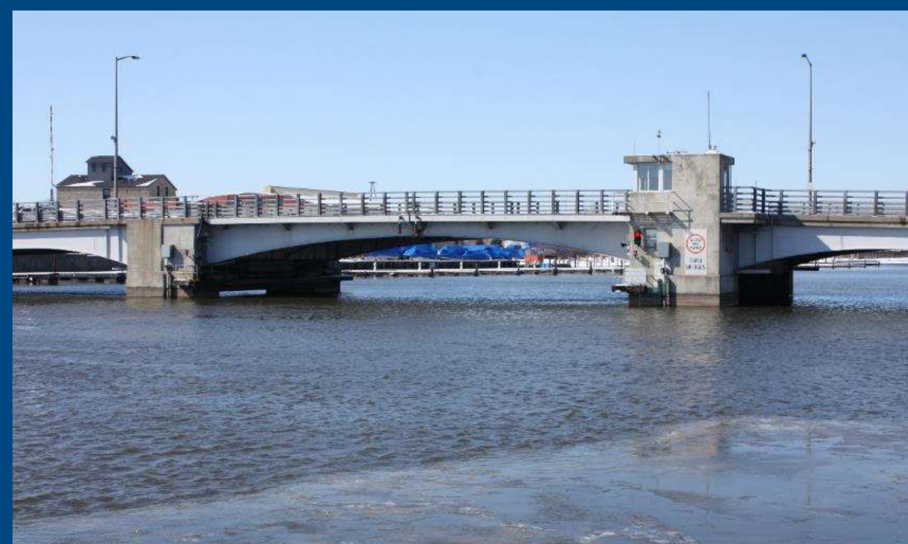


Hydraulic Cylinder Operated

Project Purpose

Preserve the operation of the Main Street Bridge

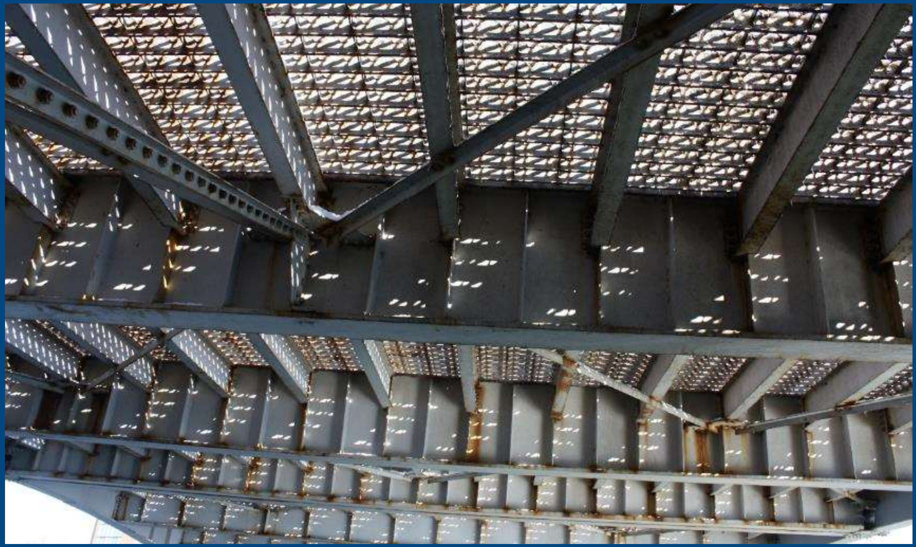
- Structural elements
- Mechanical elements
- Electrical elements



Project Need

Structural Elements

- Corrosion and deterioration of the steel components
- Failure of the paint system
- Open grid deck surface wear
- Concrete deck delamination



Main St Bascule Bridge

Bascule Deck Grating

Center Break

Project Need

Mechanical and Hydraulic Elements

- Hydraulic elements in poor condition (25+ years old)
- Cylinders, piping and hoses in poor condition
- HPU Enclosures congested and worn.
- Components near end of their useful life

Main St Bascule Bridge

HPU

Main St Bascule Bridge

Existing Cylinder

Project Need

Electrical Elements

- Power and control equipment
  - Some items nearing end of service life
  - No power monitoring equipment
- Electric Motors for Hydraulic Power Unit
  - No longer efficient causing fault protection devices to trip

Project Timeline

Project Initiation → Environmental Study → Design → Project Advertised and Let → Construction

2020

2021 - 2022

2023 - 2024

Spring 2025

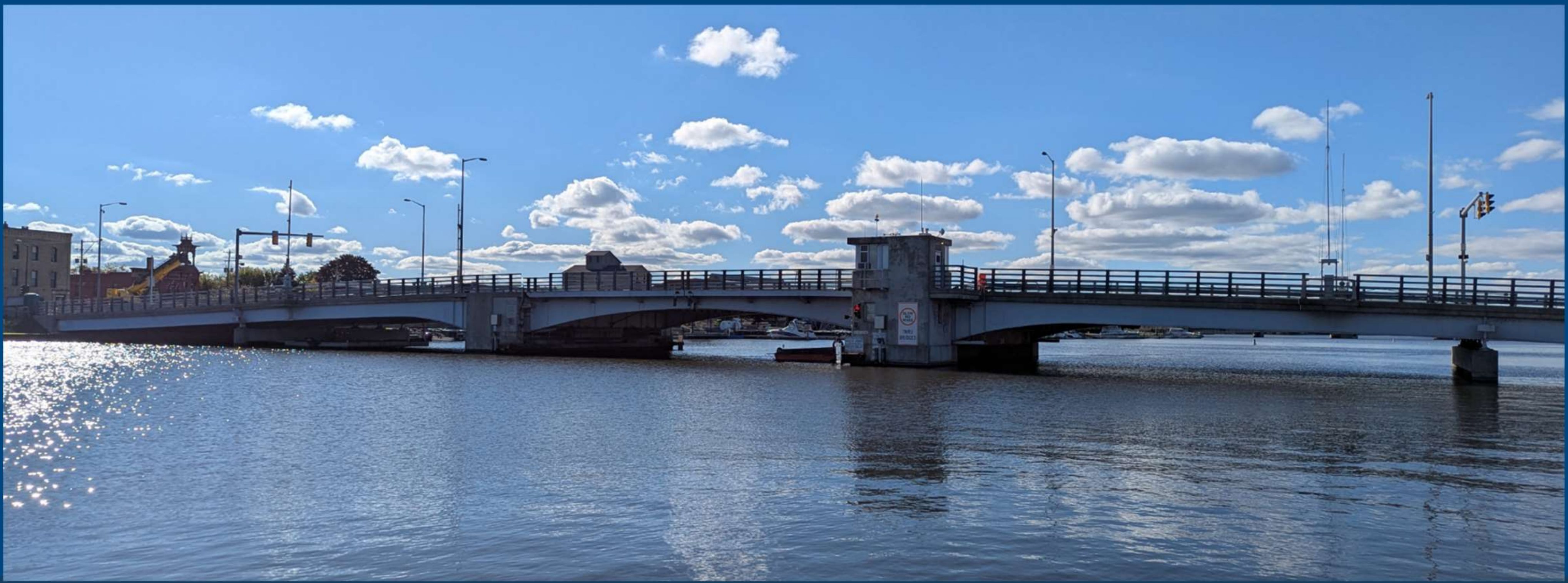
Fall 2025 - Spring 2026

Improvements

Structural Elements

- Replace the deteriorated stringers with new galvanized beams
- Complete abrasive blast cleaning and new full paint system
- New galvanized open steel grid deck
- Scarify the concrete decks and apply concrete overlay
- Replace approach span deck joints
- Repairs to the operator house (windows & roof)

Improvements




Overlay Removal &
Partial Depth Repairs


New Overlay &
Exp Joints


SLOW
NO
WAKE
THRU
BRIDGES

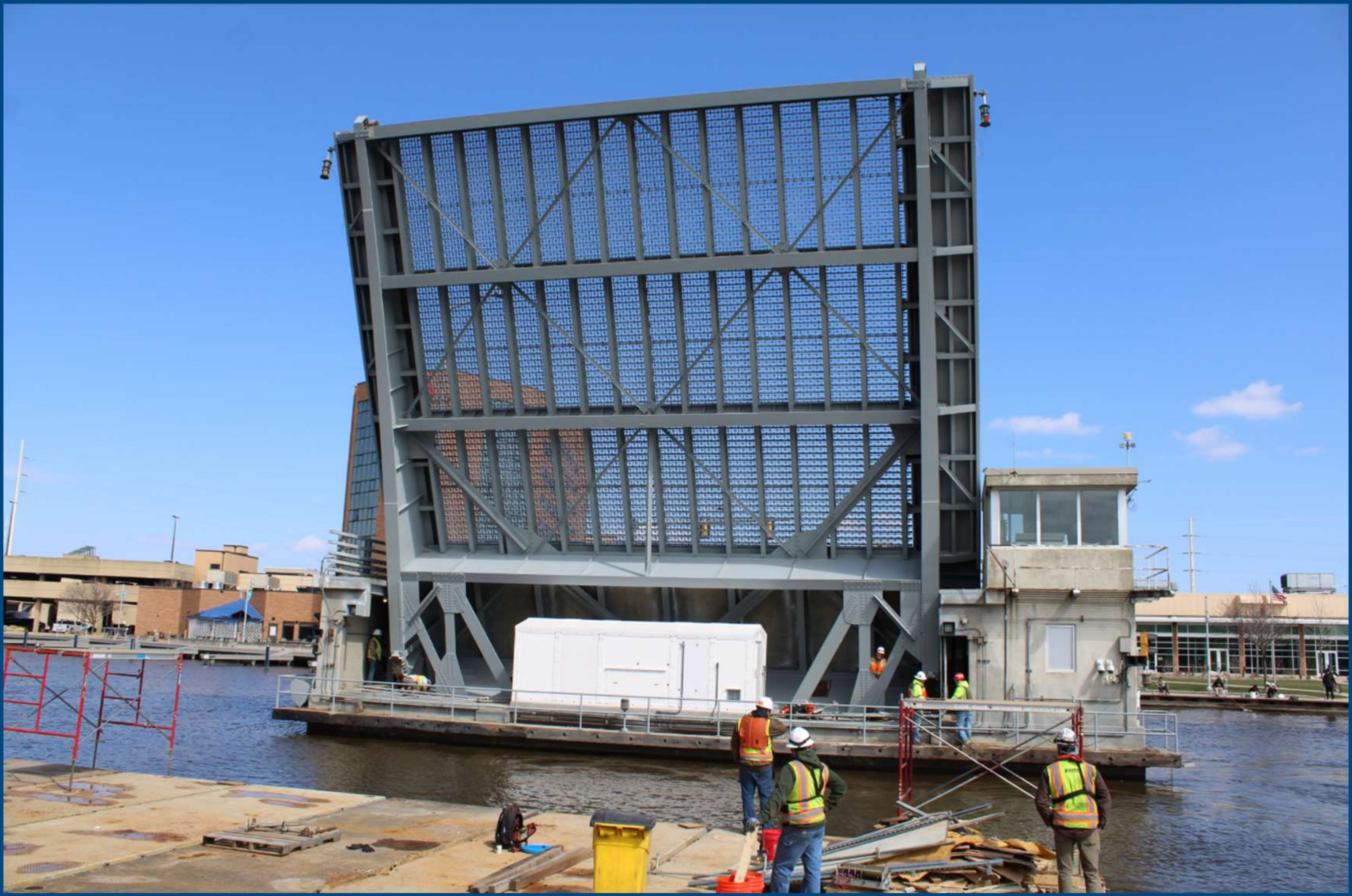

Deck & Stringer Removal
GROVE


Barge Access During Construction


Deck & Stringers Removed

Painting & Containment


New Deck Installed



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Improvements

Mechanical and Hydraulic Elements

- Replace the bridge lifting hydraulic cylinders
- Replace the rear locking hydraulic cylinders
- Replace all hydraulic piping & hoses
- Install hydraulic fluid heating loops
- Replace Hydraulic Power Unit enclosures
- Rebalance the bridge leaves

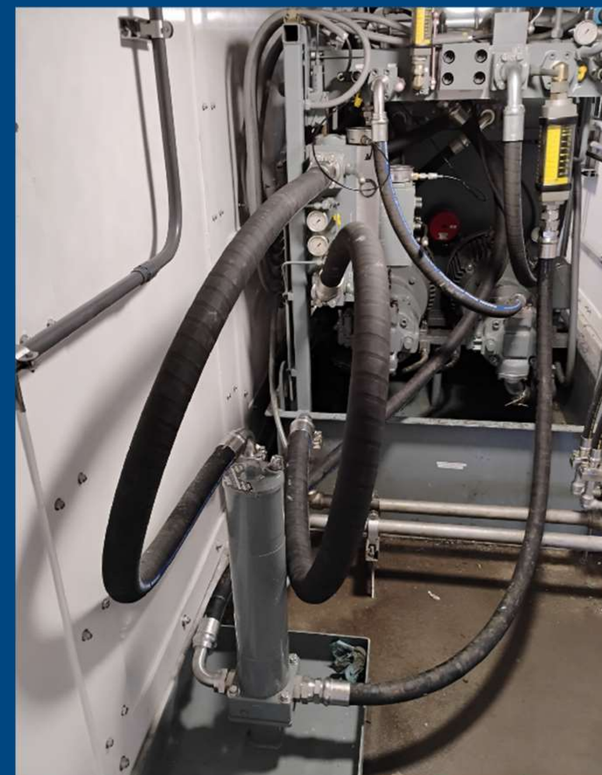
New Cylinder

New HPU Enclosure

Hydraulic Power Unit

New Spring Hanger
Cylinder Support

Kidney Loop

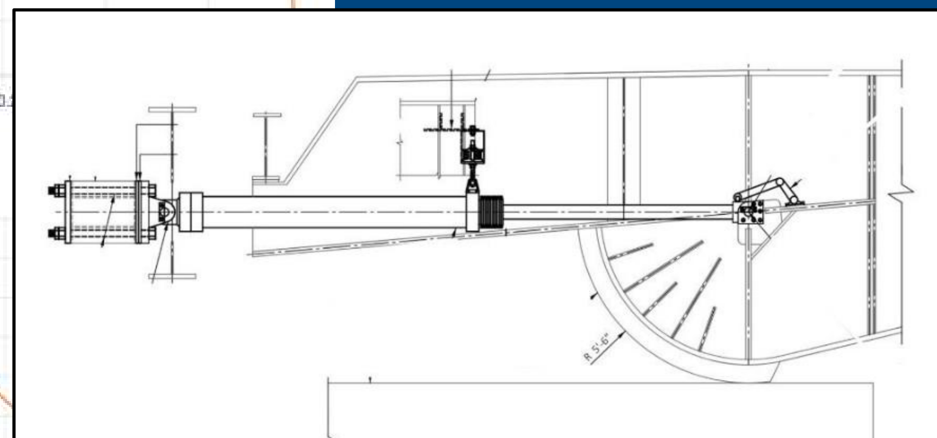


Filter Stand

Span Balance Testing

Balance Adjustments

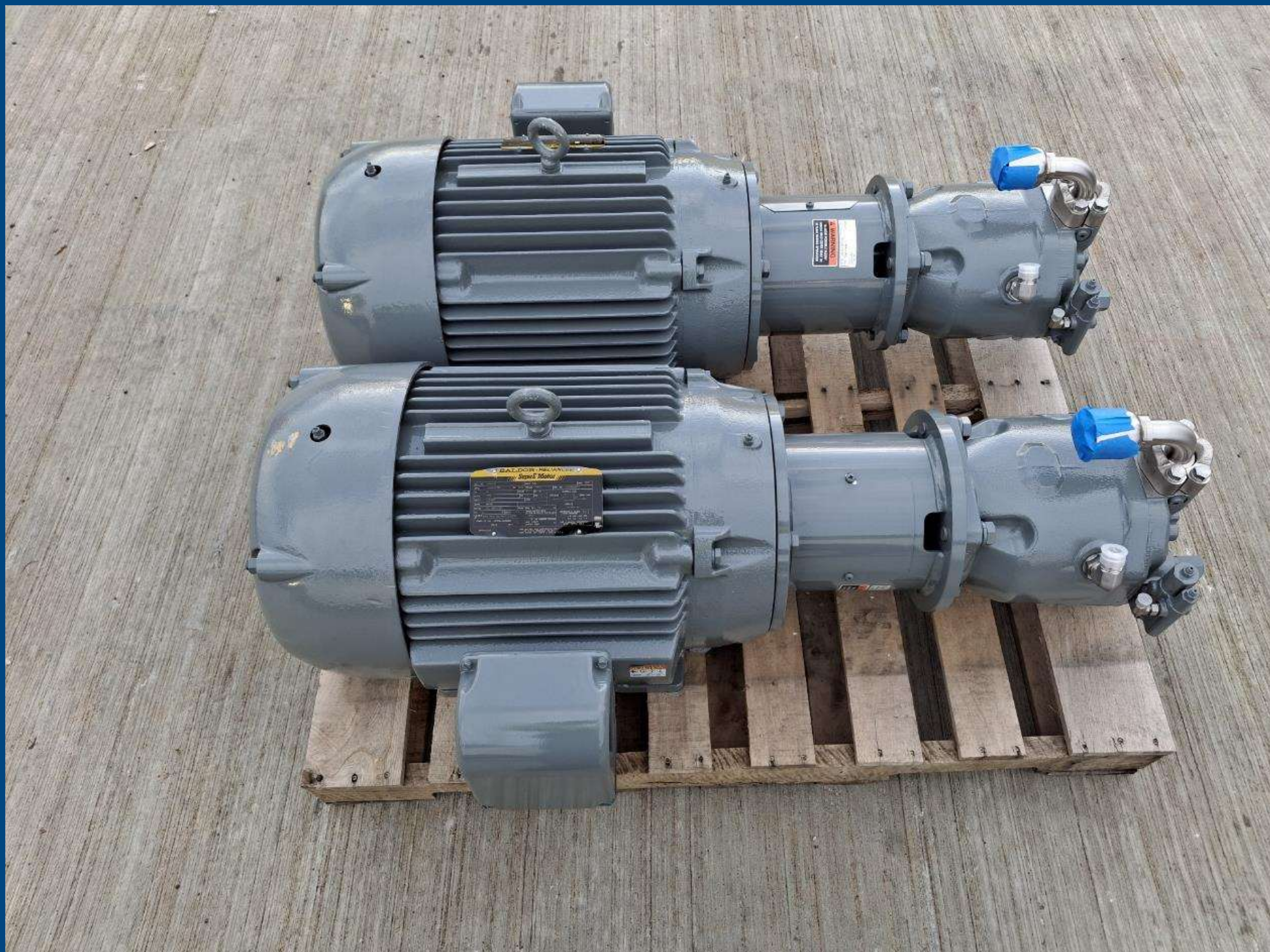
Cylinder Pressure vs Opening Angle



Improvements

Electrical Elements

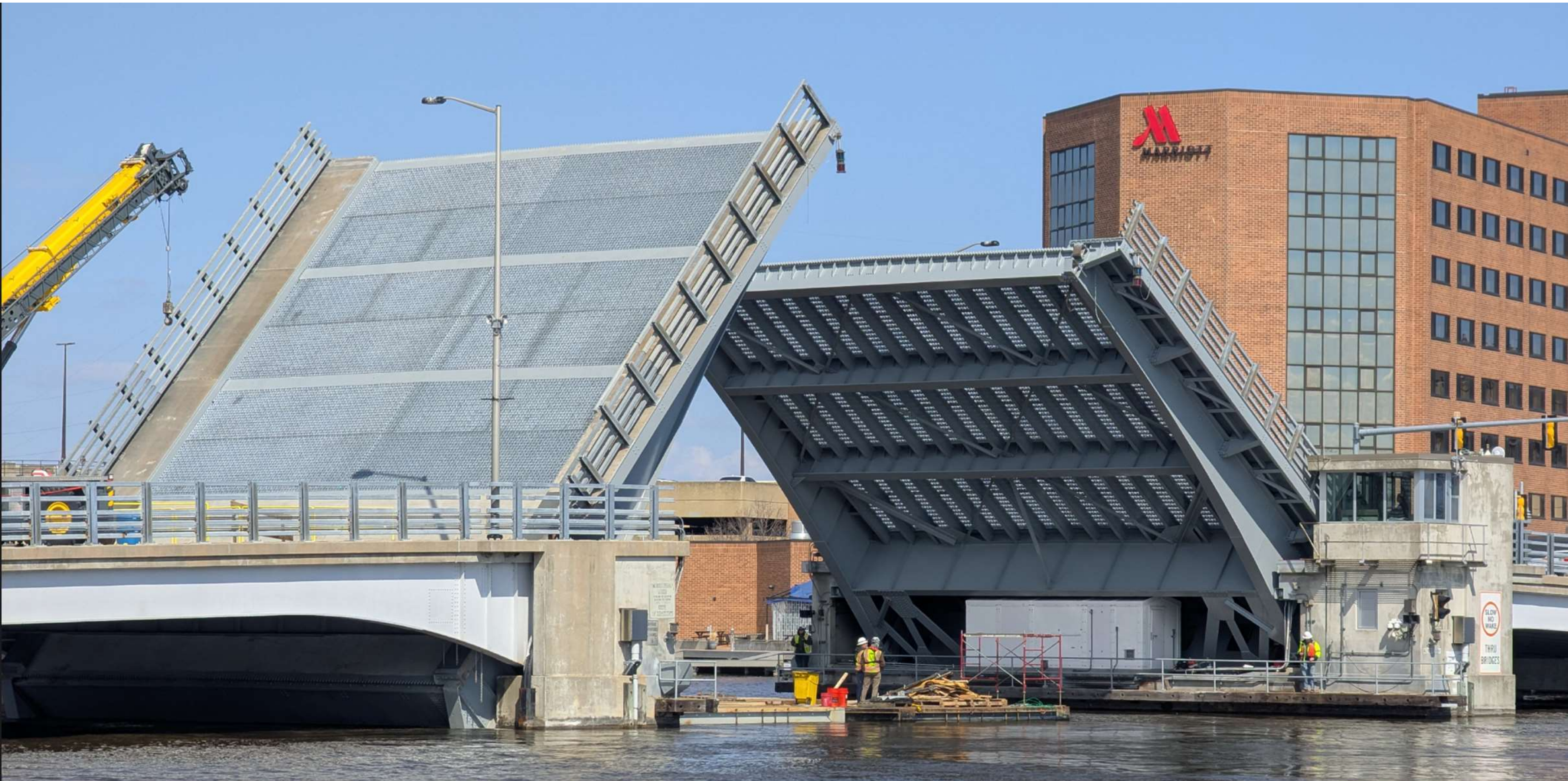
- Replace the electric motors for hydraulic power units
- Integrate new elements into the existing PLC system
- Install new power monitoring equipment
- Replace the control console desktop



New HPU
Pump Motors

Operator Room

Control Console



WISCONSIN DEPARTMENT OF TRANSPORTATION

H&H

Conclusion

- Bridge opened to roadway traffic and navigation on April 17, 2026
- Many different parties involved
- Cooperation between WisDOT, the Engineer of Record, the construction team, and the contractor is critical to a successful movable bridge rehabilitation project

Thank You!

Questions?

Design-Build Update
Structural Engineering Symposium

Laura Shadewald

WisDOT Structures Development Chief

May 26, 2026

WisDOT Design-Build Progress

- 2019 Legislation for Design-Build Pilots
  - $250,000,000
  - Up to 6 projects
  - Required: Best Value, Fixed Price Variable Scope, and Low Bid Contracts
- Permanent Legislation signed October 2, 2025
  - $300M / biennium encumberment limit
- WisDOT Design Build website for developments and project information: www.WisconsinDOT.gov/DesignBuild

Why use Design Build?

- Provides condensed timeframe because design and construction overlap
- Efficiencies in design and construction - designer and contractor are a TEAM
- Opportunity for innovation - get contractor’s input early in the process

Types of Design Build Contracts

- Low Bid
  - Technical Proposal is Pass/Fail
  - Responsive Bidder + Lowest Bid = Award
- Fixed Price Variable Scope
  - Work is prioritized
  - Bidder who can do the most work within Budget= Award
- Best Value
  - Technical Proposal = Part of Score
  - Total project cost = Part of Score
  - Team with highest score = Award

Brief Review of Pilot Projects

- College Avenue (NE Region)
  - Best Value Contract
  - Replaced a box culvert
  - Construction Complete

Benefits – College Avenue

- Very fast construction time (limited closure)
- Reduced impact on local businesses and traffic

Brief Review of Pilot Projects

- Lone Rock (SW Region)
  - Best Value Contract
    - Replaced three truss bridges
    - Two new retaining walls
    - Moved southern intersection
  - Construction Complete

Benefits – Lone Rock ATCs Alternative Technical Concepts (ATC)

- Redesigned bridge piers: lowered the cost, reduced pier material, reduced impacts to sensitive wetlands and added aesthetic benefits
- Reduced the number of bridge spans: lower cost, less maintenance, shorter construction time, improved hydraulics, and reduced impacts to sensitive wetlands
- Changed retaining wall type: reduce road closure time, shorten construction time
- Kept STH 130 open during construction (originally scheduled to be closed during construction)

Benefits – Lone Rock

- New structures opened two years ahead of schedule
- Design-Build allowed for flexibility during construction for field design changes of rock wall
- Reduced forest wetland impacts with modifications to staging plans and access points

Brief Review of Pilot Projects

- Cranberry Interchange (SW Region)
  - Low Bid Contract
    - Replaced two bridges on IH 94
  - Construction Complete
    - Trees planting next year

Benefits - Cranberry Interchange

- Proposals due June 24, 2025
- Construction Completed by Memorial Day Weekend 2026
- ATC for Traffic Staging shortened construction timeline

Brief Review of Pilot Projects

- US 51 – Marathon County "WRAP" (NC Region)
  - Fixed Price Variable Scope Contract
    - Fixed project elements - Pavement Preservation, Guardrail Replacement
    - Variable Scope – Thin Polymer Overlays
  - Currently in Construction

Brief Review of Pilot Projects

- Rock/Crawfish ("SE" Region)
  - Best Value Contract
  - Technical Proposals due May 19, 2026
  - Cost Proposals due June 9, 2026
  - Contract execution end of July
  - Construction starts end of 2026

MNDOT Led Blatnik Bridge Replacement

WISCONSIN DEPARTMENT OF TRANSPORTATION

Blatnik Bridge

- Best Value Contract
- Minnesota led and administered project
  - check MNDOT Sharepoint site
- Tied arch or cabled stay structure option

- Proposals Due & Award Anticipated June 2026
- Major Construction start Spring 2027

What's next?

- Mirror Lake
  - Best Value Contract
  - Request for Qualifications – Fall 2026
  - Request for Proposal - Fall 2026
  - Proposals due Spring 2027
  - Construction ~ Fall 2027 to Fall 2030

What's next?

- Mirror Lake
  - Expand mainline I-90/94 to three lanes
  - Diverging Diamond Interchange @ US 12
  - Replace six mainline bridges
    - US 12
    - Ishnala Rd
    - Mirror Lake
  - Replace Xanadu Rd over I-90/94

Discussion or Questions

- Thank you!
- Laura.Shadewald@dot.wi.gov
- https://wisconsindot.gov/designbuild/

BUREAU OF STRUCTURES

WisDOT Structural Engineers Symposium

Survey QR Codes and Links
May 26, 2026

Interactive Survey

https://forms.office.com/g/a6rjxU1MtN?origin=lprLink

Post-Event Survey

https://forms.office.com/g/Zj4kT95meC?origin=lprLink

Conference Location: Madison College
1701 Wright Street, Room D1630
Madison, WI 53704

For today's presentations, agenda, and proof of attendance, please visit:

http://wisconsindot.gov/Pages/doing-bus/eng-consultants/cnslt-rsrces/strct/research.aspx

Partnerships | People | Process