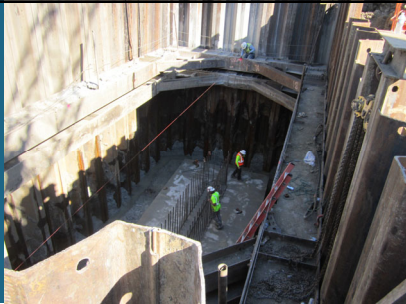


2024  
ACEC-IA + Iowa DOT  
+ FHWA  
Iowa Transportation  
Conference

Iowa DOT Bridges and  
Structures Bureau Update

Michael Nop



IOWA | DOT

September 24, 2024

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**Presentation Outline**

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- BSB Personnel Updates
- 3D/DD/BIM Efforts
- PPCB Update
- Decks
- Drains
- BE Joint
- Paddling Routes
- Foundation Interference
- Narrow Bridges
- Inundation
- Debris Containment Systems
- Bridge Rail Guide
- Settlement and Downdrag
- Drilled Shaft – No Rock Socket
- ABC Lateral Slides
- Deck Cracking
- E5
- UHPC Overlays
- PPC Overlays
- Concrete Removal

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**BSB Personnel**

**Critical vacancies in my area of the BSB**

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graph TD
    MN["Michael Nop  
Bridge Project Development Engineer"]
    MU["Methods Unit"]
    FE["Final Design Unit Leader"]
    FE2["Final Design Unit Leader"]
    AY["Ahmed Yusuf"]
    
    MN --- MU
    MN --- FE
    MN --- FE2
    MN --- AY
    
    MU --- M1["Vacant - Methods Engineer"]
    MU --- M2["Jim Denny - Applications Engineer"]
    MU --- M3["Thomas Hamski - BIM Engineer"]
    MU --- M4["Dennis DeTaku - Engineer"]
    MU --- M5["Kimball Olson - Aesthetics"]
    MU --- M6["Brett Kloss - Technician"]
    MU --- M7["Marie Brombaugh - Technician"]
    
    FE --- FE1["Engineers"]
    FE --- FE2["Technicians"]
    
    FE2 --- FE3["Engineers"]
    FE2 --- FE4["Technicians"]
    
    AY --- AY1["Engineers"]
    AY --- AY2["Technicians"]
  
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**BSB BIM/3D/DD Efforts** IOWA | DOT

**Some Short-Term Goals**

- Spring (early April?) 2025 BSB 3D/DD Forum (DOT/AGC/ACEC) – Thomas Hamski
- Make digital CADD files available at letting “for information only”. Need to establish guidelines.
- Let 3 pilot projects in FY2025
  - BRFN-218-2(155)–39-44, Stanley Consultants, Let 07-16-2024
  - BRF-034-7(148)–38-90, Parsons, Let 10-15-2024
  - BRF-002-1(118)–38-36, In-House, Let 12-17-2024
- Let 3 pilot projects in FY2026
  - BRF-031-3(13)–38-18, In-House, Let 10-21-2025
  - BRF-020-9(261)–38-31, WHKS, Let 11-18-2025
  - BRF-092-3(40)–38-01, Foth, Let 12-16-2025
- Let 2 pilot projects with DD for Rebar in FY2025
  - BRFN-063-1(94)–39-26, HRGreen, Let 01-22-2025
  - BRF-003-7(45)–38-33, Parsons, Let 01-22-2025
- Develop alternate procedure for TSL longitudinal view for highly skewed bridge in FY2025
  - BRF-030-9(198)–38-23, Burns & McDonald, Let 10-15-2024
- Let a MALD project for ADCMS Grant in FY2026
  - BRF-059-3(47)–38-78, HDR, Let 10-21-2025
- Still working on an Augmented Reality Demo

Continue doing in-house and consultant pilots.

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**Digital Delivery of CADD Files** IOWA | DOT

- CADD files are complex. No longer simple 2D drawings.
- BSB is getting more requests for digital CADD files after letting.
- Currently, providing digital CADD files after letting is seen as a courtesy.
- BSB will typically provide digital CADD files when requested, but reserves the right to refuse requests.
- Digital CADD files are provided “as-is”. They are non-contract documents.
- The DOT and its consultants have no liability for any errors or omissions for non-contract documents.
- Currently BSB does not want to provide support after letting.
- BSB will be developing a workflow to provide digital CADD files as part of the standard non-contract deliverables. Use 3D FY2026 pilot projects as part of this effort.

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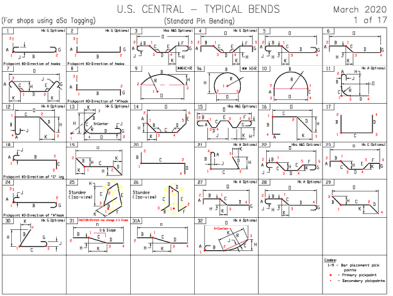
**Digital Delivery for Rebar** IOWA | DOT

Digital delivery effort includes adopting a (industry) standard for reinforcement bending diagrams – shapes and tags.

aSa standards (<https://www.asaha.com/>) are used by many rebar fabricators and is available in Bentley ProStructures.

Two FY2025 pilot projects will deliver rebar schedules in aSa format as a non-contract document in an Excel file.

aSa uses CRSI for minimum bar bend diameters. AASHTO references CRSI.




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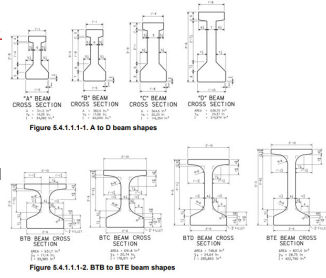
**Bridge Standards**



PPCB standards recently updated.  
PPCB design shall be verified by Designer.

**BDM 5.4.1.1.1**

"At a minimum, designers shall use LBC software to check standard and non-standard PPCB designs used in projects. Standard LBC input files are available on the Iowa DOT website and may be used as a starting point in the checking process."




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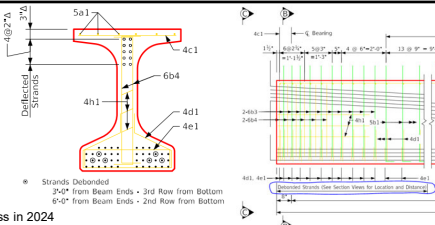
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**Bridge Standards**

**PPCB Strand Debonding**

BDM 5.4.1.4.1.5  
IM 570

Use slit sheathing with high density polyethylene or polypropylene plastic.



ISU measured debonding effectiveness in 2024




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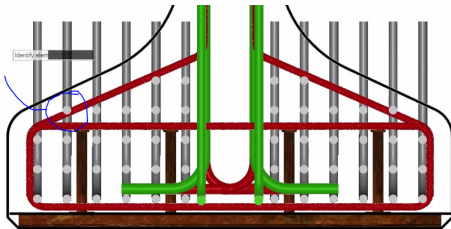
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**Bridge Standards**



PPCB Standards still have a few more updates coming...

Current updated BTD135, BTE150 and BTE155 have strand conflicts that will be resolved in an upcoming standards release.




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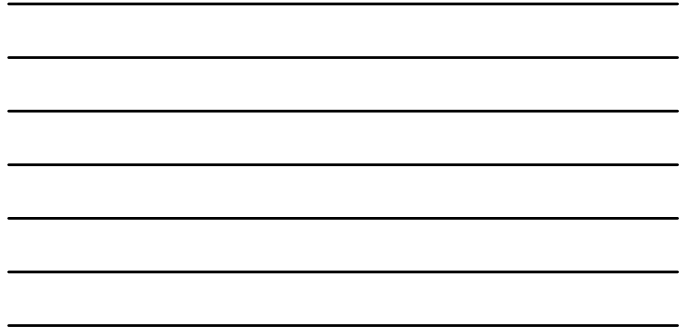


### Drilled Shaft – No Rock Socket

Bridge Replacement-PPCB  
Clinton County  
E Channel Wapsipinicon River  
BRF-030-9(205)-38-23  
Maint No 2399.35030  
Let Date 10-15-2024

**A Bit Out of the Box for Iowa**

- Staged construction
- Primarily non-cohesive soil
- Pile driving vibration/settlement concerns w.r.t. existing piers
- 60" diameter shafts approximately 117' long
- Soil friction resistance only (no end bearing)
- Temporary or permanent casing permitted
- Includes test shaft with Osterberg cell



### ABC easy as 1-2-3?

**Three Upcoming ABC Lateral Slides**

**Cedar Creek, 140'x40' CCS**  
Keokuk County  
FHWA 032601  
Maint. No. 5414.5S021  
IA 21 over Cedar Creek  
BRF-021-1(46)-38-54  
Let Date 12-16-2025

BRF-030-3(53)-38-37, Greene County, PPCB, Let 10-20-2026  
BRF-037-3(10)-38-43, Harrison County, PPCB, Let 10-19-2027

**New Approach to ABC? "Compressed Schedule", "Fast Traditional Construction" or "ABC by Proposal"**

**Prairie Creek, 100'x44' PPCB** East IA-150 @ MM 8.4 (HW 8.20) 07/14/24 09:40:58  
Benton County  
FHWA 014481  
Maint. No. 0608.5S150  
IA 150 over Prairie Creek  
BRFN-150-2(24)-39-06  
Let 01-17-2024  
30 day detour

**Completed ABC Lateral Slides**

**Mossena, 120'x44' PPCB**  
Cass County, FHWA 017841, Maint. No. 1963.45092  
IA 92 over Small Stream  
BRF-092-2(36)-38-15  
Let 04-16-2015

**Camp Creek, 120'x44' PPCB**  
Washington County, FHWA 051661, Maint. No. 5006.15091  
IA 1 over Camp Creek  
BRF-001-6(10)-38-92  
Let 12-18-2018

**Old Woman's Creek, 120'x44' PPCB**  
Johnson County, FHWA 031661, Maint. No. 5278.95001  
IA 1 over Old Woman's Creek  
BRF-001-5(10)-38-92  
Let 12-17-2019

**Old Man's Creek, 200'x44' RSB**  
Johnson County, FHWA 031661, Maint. No. 5278.95001  
IA 1 over Old Man's Creek  
BRF-001-5(10)-38-92  
Let 12-17-2019

**Muchlinoak Creek, 220'x44' CWPG**  
Mankato County, FHWA 031661, Maint. No. 6278.05092  
IA 92 over Muchlinoak Creek  
BRF-092-7(45)-38-02  
Let 12-15-2020

**Woodbine, 72.5'x44' PPCB (30 deg skew)**  
Harrison County, FHWA 027511, Maint. No. 4330.15030  
US 30 over Stream  
BRFN-030-1(164)-38-43  
Let 09-20-2022

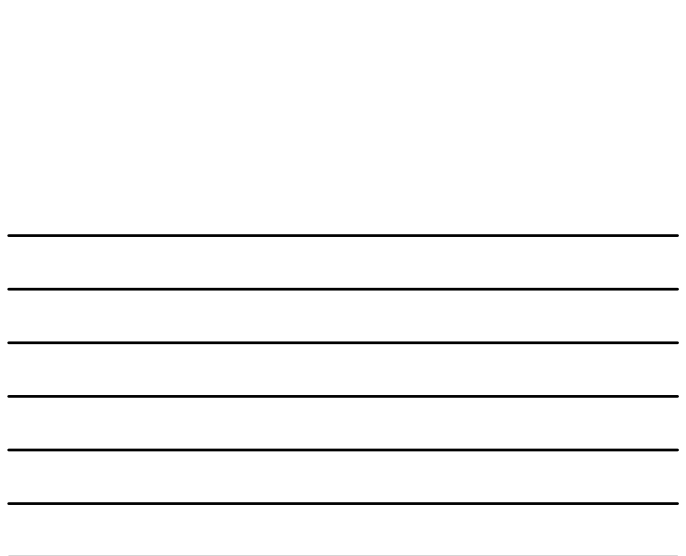
**Cooper Creek, 155'x44' PPCB**  
Appanoose County, FHWA 013301, Maint. No. 0415.25005  
IA 5 over Cooper Creek  
BRF-005-1(74)-38-04  
Let 12-20-2022



### Fiber Reinforced Concrete Decks for Crack Reduction

HPC Deck Polk Design No 120 and 419 710'x62' PPCB widened to 84'78" Maint. No. 7733.1L49380 MX-080-3(209)133-02-77 US 63 over DSM River Let 05-21-2019	Non-HPC Deck Wayne Design No 123 194'x44' PPCB Maint. No. 0307.05065 BRF-065-1(32)-38-93 US 63 over Cedar Creek Let 02-15-2022	Non-HPC Deck Pottawattamie Design No 223 389'x44' PPCB Maint. No. 7863.1S059 BRF-059-3(44)-38-78 US 59 over E Br W Wapahoota R Let 01-18-2023	HPC Deck Story Design No 223 282'x60' PPCB FHWA 049011 IM-035-4(284)103-13-85 IA 210 over I-35 Let 02-20-2024	Non-HPC Deck Davis Design No 123 244'x44' PPCB FHWA 022521 BRF-063-1(91)-38-26 US 63 over Fox River Let 10-15-2024
HPC Deck Polk Design No 125 620'x38' PPCB w/ 10' Sidewalk Maint. No. 7716.1L028 BRF-028-2(45)-38-77 IA 28 over Raccoon River Let 12-21-2021	Non-HPC Deck O'Brien Design No 120 120'x40' PPCB Maint. No. 7143.65010 BRF-010-2(033)-39-71 IA 10 over Mud Creek Let 10-18-2022	HPC Deck Story Design No 123 292'x40' PPCB w/ 10' Trail FHWA 701155 NHS-030-5(277)-39-85 CR 3-14 over US 30 Let 01-18-2023	HPC Deck Wipacis Design No 221(02) 470'x30' Steel (Redeek) FHWA 050550(050560) BRF-034-7(150)-38-90 US 34 EBWB over BNSF Let 05-21-2024	Non-HPC Deck Alamakee Design No 125 229'x44' PPCB FHWA 050550(050560) BRF-078-2(09)-38-03 IA 76 over Waterloo Creek Let 11-19-2024
HPC Deck Johnson Design No 1120 292'x30' PPCB Maint. No. 5250.0C080 MX-071-1(52)1-13-82 Wapsi Ave over I-80 Let 02-15-2022	HPC Deck Cedar Design No 222(322) 264'x72' PPCB Maint. No. 1969.5LR080 IM-ANS-008-7(154)108070-03-16 I-80 WB/EB over Sugar Creek Let 10-18-2022	HPC Deck Benton Design No 224 100'x44' PPCB FHWA 014481 BRFN-150-2(24)-39-06 IA 150 over Prairie Creek Let 01-17-2024	Non-HPC Deck Audison Design No 125 110'x44' CCS FHWA 014691 BRFN-071-4(65)-39-05 US 71 over Sifford Creek Let 10-15-2024	HPC Deck Warren Design No 124 239'x44' PPCB FHWA 050581 BRF-065-3(83)-38-91 US 65 over Otter Creek Let 01-22-2025
Non-HPC Deck Franklin Design No 122 204'x44' PPCB Maint. No. 3577.7S065 BRF-065-7(42)-38-35 US 65 over Bailey Creek Let 02-15-2022	HPC Deck Polk Design No 323 297'x34' PPCB Maint. No. 7798.7D035 IM-035-4(269)99-13-77 NE 142nd Ave over I-35 Let 12-20-2022	HPC Deck Polk Design No 724 287'x30' PPCB FHWA 041891 IM-035-4(305)101-13-77 NE 158th Ave over I-35 Let 02-20-2024	Non-HPC Deck Carroll Design No 125 150'x44' CCS FHWA 017111 BRF-030-2(172)-38-14 US 30 over Storm Creek Let 10-15-2024	HPC Deck Jones Design No 124 120'x40' PPCB FHWA 032251 BRFN-151-4(126)-39-53 US 151 over Kitty Creek Let 02-19-2025

May go all fiber in new decks stating Fall 2025 letting.



### Automated Cracking Scans for New Decks

**Infratek Solutions**  
<https://infrateksolutions.com/mainseite/>

**Section 1**

Crack Width (in)	Color
<math>< 0.002</math>	Blue
0.002 to 0.013	Green
0.013 to 0.020	Yellow
0.020 to 0.030	Orange
> 0.040	Red

Density Label	Range (in ft/ft <sup>2</sup> )	Color
Low	<math>< 0.001</math>	Blue
Moderate	0.001 to 0.0022	Green
Severe	0.0022 to 0.0037	Yellow
Very Severe	> 0.0037	Red



### E5 Products to reduce concrete deck cracking

Polk Design No 1918  
 2650'x48' CWG  
 FHWA No 700885  
 IM-035-3(195)87--13-77  
 I-35 NB over I-80/I-235  
 Let 07-19-2022

**Monitor and Evaluate Proprietary Products E5 Liquid Fly Ash and E5 Internal Cure on New Bridge Deck (#4162)**  
 By Submitted anonymously · © 03/21/2024 · 1:37pm · 169 views

The use of E5 products in bridge deck concrete has grown in recent years in the Midwest. Indiana DOT was one of the first states to adopt use of this product (<https://www.in.gov/indot/about/contact-us/press-releases/24-03-02/>). The primary benefit claimed by manufacturers is a durable concrete with reduced cracking and limited need for wet curing. The product also results in a significant reduction of cement. More information can be found here: <https://www.e5nanosilica.com/e5products>. Iowa has issues with early age bridge deck cracking and is actively looking for solutions.

Significant deck cracking in a number of the units.  
 Used in at least one unit deck pour for the NEMM flyover ramp bridge.

**E5 Internal Cure**

E5 Internal Cure is the first additive proven to provide internal curing of concrete. It controls the evaporation of the free water to ensure increased hydration of concrete. E5 Internal Cure replaces the need for traditional wet cure and curing compounds while maintaining concrete surface strength, plan, and finish.

**E5 Liquid Fly Ash**

E5 Liquid Fly Ash (e5) is a clean, dry, proprietary blend of nano silica particles. It is engineered to deliver predictable results in any new, either recycled base fly ash materials which vary greatly in availability, cost, composition, and quality.

<https://www.e5nanosilica.com/e5products>



### UHPC Overlays

#### Future UHPC Overlay Project

**Non-proprietary UHPC?**  
**296'x40' PPCB (New Replacement Bridge)**  
 Grundy County, FHWA 025842, Maint. No. 3831.3S014  
 IA 14 over Black Hawk Creek  
 BRF-014-6(42)-38-38  
 Let 02-18-2025

- 8.5-inch thick concrete deck
- 1.25" thick UHPC overlay (2<sup>nd</sup> course)

#### Completed Proprietary UHPC Overlay Projects

**Mud Creek Bridge**  
 Buchanan County, Brian Keelerbeier  
 Constructed in 2016

**265.5'x44' PPCB (Bridge built in 1992, 1<sup>st</sup> overlay)**  
 Sioux County, FHWA 048391, Maint. No. 8441.3S018  
 US 18 over Floyd River  
 BRFN-018-1(94)-39-84  
 Let 07-15-2018

**98'x44' PPCB (Bridge built in 1974, 1<sup>st</sup> overlay)**  
 Jasper County, FHWA 030811, Maint. No. 5015.6R163  
 IA 163 EB over Walnut Creek  
 BRFN-163-2(95)-39-50  
 Let 11-19-2019

**151.33'x44' PPCB (1974 bridge, 1<sup>st</sup> overlay)**  
 Humboldt County, FHWA 028941, Maint. No. 4683.1S169  
 US 169 over Truher Creek  
 BRF-169-1(047)-38-46  
 Let 02-21-2022

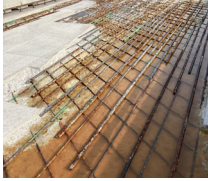
**220.33'x49' PPCB (1974 bridge, 1<sup>st</sup> overlay)**  
 Polk County, FHWA 802920, Maint. No. 7752.5R141  
 IA 141 EBSB over IA 44  
 BRFN-141-1(757)-39-77  
 Let 02-20-2024

**151.33'x44' PPCB (New Replacement Bridge)**  
 Cass County, FHWA 017821, Maint. No. 1548.6S092  
 IA 92 over Sevenmile Creek  
 BRF-092-2(44)-38-15  
 Let 09-20-2022

- 8-inch thick fiber-reinforced concrete deck
- 1.25" thick UHPC proprietary overlay (2<sup>nd</sup> course)







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IOWA | DOT

The End

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