

INDOT's First Precast Bridge Elements Bridge

INDOT BRIDGE DESIGN CONFERENCE
FEBRUARY 22, 2022

ANGELA K. PEARL, PE



1

Agenda

- Implementing ABC
- US 52 over Mud Creek
- Lessons Learned



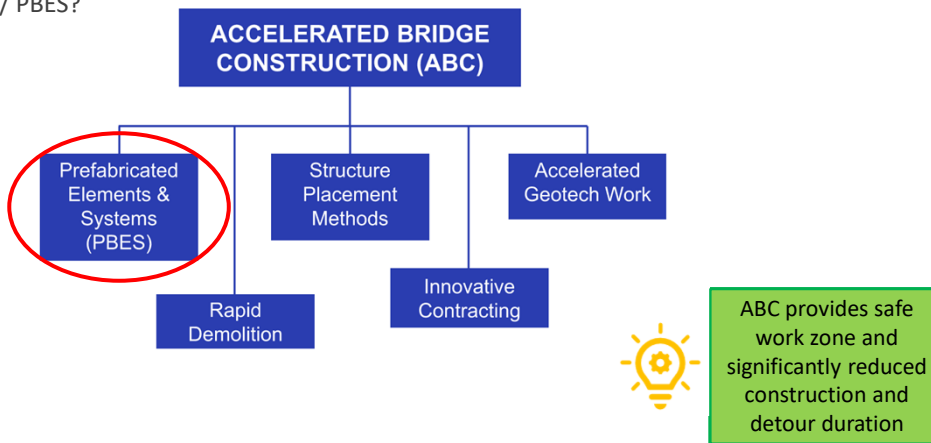
Lessons Learned



2

Implementing ABC

What is ABC / PBES?



3

Implementing ABC

How We Decided to Implement ABC



Identify ABC as construction method during scoping



Consider additional design review coordination and comment resolution

ACCELERATED BRIDGE CONSTRUCTION SCREENING AND FEASIBILITY REPORT

US 52 over Mud Creek

1006266
No. B-35450
202-7070277
No. TSD
July 11, 2018
Prepared For
Leechfield District
John Rogge
Prepared By
HNTB
Austin, PE, SE

Category	Score	Weight Factor	Adjusted Score	Maximum Score	Adjusted Max Score
1) Average Daily Traffic	1	10	10	3	30
2) Truck Traffic %	5	5	25	5	25
3) Detour/ Bypass Length	3	5	15	3	15
4) Daily Operating Vehicle Costs	3	10	30	5	50
5) Impact to local economy	0	10	0	5	50
6) Project Type	1	5	5	5	25
7) Repetitive Spans	3	3	9	3	9
8) Road User and Worker Safety	5	10	50	5	50
9) Bridge Geometry	5	3	15	5	15
10) ROW Impacts/ Site Condition	3	5	15	3	15
11) Underpassing Feature	0	10	0	5	50
Total			174	Max	334
			Normalized Score		52

4

Implementing ABC

Design Considerations

- Typical Bridge Design Calculations... plus additional checks
- Module Dimension/Weight Limitations
- Lifting Check
- UHPC Closure Pours



Detail shear keys



5

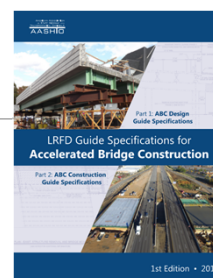
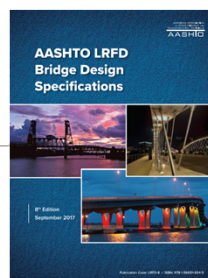
Implementing ABC

Applicable Design Codes:

- AASHTO LRFD 8th Edition
- AASHTO LRFD Guide Specifications for Accelerated Bridge Construction
- FHWA Design and Construction of Field-Cast UHPC Connections (FHWA TechNote)
- 2013 SHRP2 Strategic Highway Research Program: Innovative Bridge Designs for Rapid Renewal, ABC Toolkit
- PCI Design Handbook



Keep up with latest ABC developments



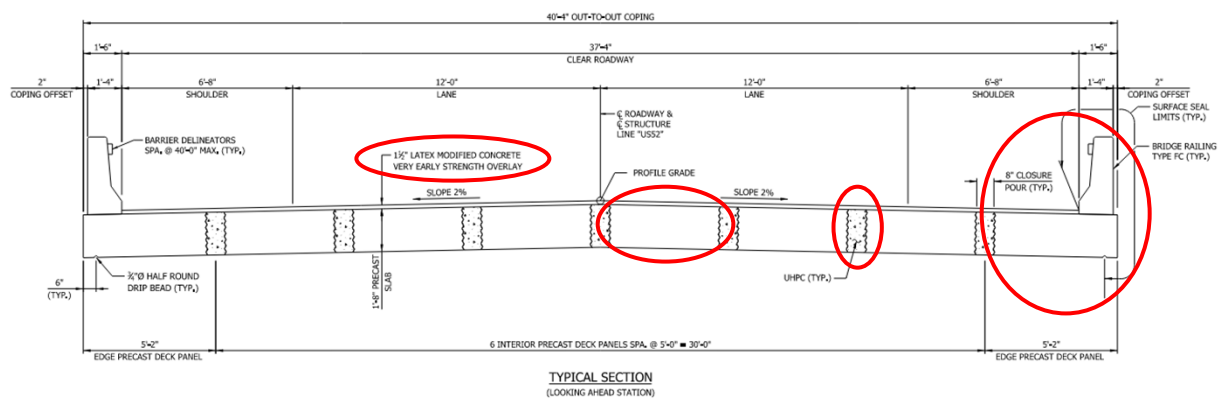
6

US 52 over Mud Creek



7

US 52 over Mud Creek



8

US 52 over Mud Creek

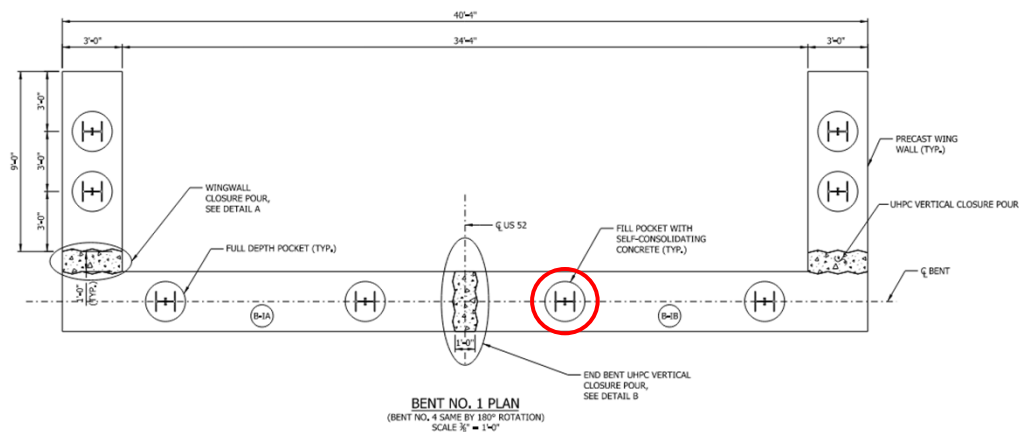


Consider slip forming railings vs precast



9

US 52 over Mud Creek



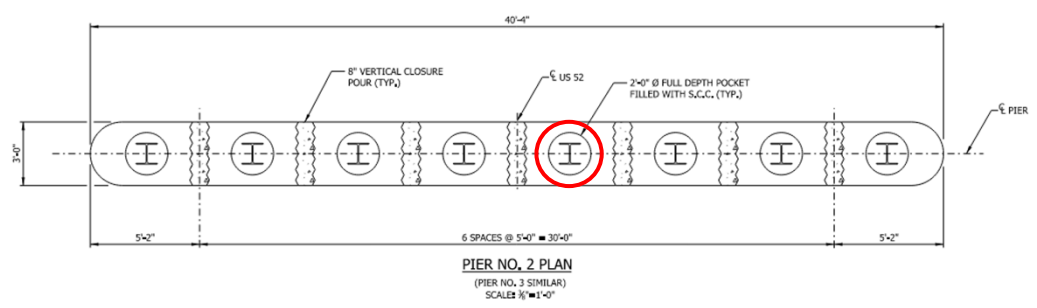
10

US 52 over Mud Creek



11

US 52 over Mud Creek



12

US 52 over Mud Creek



Keep module shapes simple



Additional prequalification and inspection for precast elements

13

AP1

US 52 over Mud Creek

- 6-week advertisement
- Awarded to Force Construction - \$2.98M
- Pre-Bid Meeting
- 35 Day Closure Time

Task	Activity	Duration	Start	End
1	Pre-Bid Meeting	1	01/15/22	01/15/22
1	Advertisement	6	01/15/22	01/21/22
1	Pre-Bid Meeting	1	01/21/22	01/21/22
1	Advertisement	6	01/21/22	01/27/22
1	Pre-Bid Meeting	1	01/27/22	01/27/22
1	Advertisement	6	01/27/22	02/02/22
1	Pre-Bid Meeting	1	02/02/22	02/02/22
1	Advertisement	6	02/02/22	02/08/22
1	Pre-Bid Meeting	1	02/08/22	02/08/22
1	Advertisement	6	02/08/22	02/14/22
1	Pre-Bid Meeting	1	02/14/22	02/14/22
1	Advertisement	6	02/14/22	02/20/22
1	Pre-Bid Meeting	1	02/20/22	02/20/22
1	Advertisement	6	02/20/22	02/26/22
1	Pre-Bid Meeting	1	02/26/22	02/26/22
1	Advertisement	6	02/26/22	03/05/22
1	Pre-Bid Meeting	1	03/05/22	03/05/22
1	Advertisement	6	03/05/22	03/11/22
1	Pre-Bid Meeting	1	03/11/22	03/11/22
1	Advertisement	6	03/11/22	03/17/22
1	Pre-Bid Meeting	1	03/17/22	03/17/22
1	Advertisement	6	03/17/22	03/23/22
1	Pre-Bid Meeting	1	03/23/22	03/23/22
1	Advertisement	6	03/23/22	03/29/22
1	Pre-Bid Meeting	1	03/29/22	03/29/22
1	Advertisement	6	03/29/22	04/04/22
1	Pre-Bid Meeting	1	04/04/22	04/04/22
1	Advertisement	6	04/04/22	04/10/22
1	Pre-Bid Meeting	1	04/10/22	04/10/22
1	Advertisement	6	04/10/22	04/16/22
1	Pre-Bid Meeting	1	04/16/22	04/16/22
1	Advertisement	6	04/16/22	04/22/22
1	Pre-Bid Meeting	1	04/22/22	04/22/22
1	Advertisement	6	04/22/22	04/28/22
1	Pre-Bid Meeting	1	04/28/22	04/28/22
1	Advertisement	6	04/28/22	05/04/22
1	Pre-Bid Meeting	1	05/04/22	05/04/22
1	Advertisement	6	05/04/22	05/10/22
1	Pre-Bid Meeting	1	05/10/22	05/10/22
1	Advertisement	6	05/10/22	05/16/22
1	Pre-Bid Meeting	1	05/16/22	05/16/22
1	Advertisement	6	05/16/22	05/22/22
1	Pre-Bid Meeting	1	05/22/22	05/22/22
1	Advertisement	6	05/22/22	05/28/22
1	Pre-Bid Meeting	1	05/28/22	05/28/22
1	Advertisement	6	05/28/22	06/03/22
1	Pre-Bid Meeting	1	06/03/22	06/03/22
1	Advertisement	6	06/03/22	06/09/22
1	Pre-Bid Meeting	1	06/09/22	06/09/22
1	Advertisement	6	06/09/22	06/15/22
1	Pre-Bid Meeting	1	06/15/22	06/15/22
1	Advertisement	6	06/15/22	06/21/22
1	Pre-Bid Meeting	1	06/21/22	06/21/22
1	Advertisement	6	06/21/22	06/27/22
1	Pre-Bid Meeting	1	06/27/22	06/27/22
1	Advertisement	6	06/27/22	07/03/22
1	Pre-Bid Meeting	1	07/03/22	07/03/22
1	Advertisement	6	07/03/22	07/09/22
1	Pre-Bid Meeting	1	07/09/22	07/09/22
1	Advertisement	6	07/09/22	07/15/22
1	Pre-Bid Meeting	1	07/15/22	07/15/22
1	Advertisement	6	07/15/22	07/21/22
1	Pre-Bid Meeting	1	07/21/22	07/21/22
1	Advertisement	6	07/21/22	07/27/22
1	Pre-Bid Meeting	1	07/27/22	07/27/22
1	Advertisement	6	07/27/22	08/02/22
1	Pre-Bid Meeting	1	08/02/22	08/02/22
1	Advertisement	6	08/02/22	08/08/22
1	Pre-Bid Meeting	1	08/08/22	08/08/22
1	Advertisement	6	08/08/22	08/14/22
1	Pre-Bid Meeting	1	08/14/22	08/14/22
1	Advertisement	6	08/14/22	08/20/22
1	Pre-Bid Meeting	1	08/20/22	08/20/22
1	Advertisement	6	08/20/22	08/26/22
1	Pre-Bid Meeting	1	08/26/22	08/26/22
1	Advertisement	6	08/26/22	09/01/22
1	Pre-Bid Meeting	1	09/01/22	09/01/22
1	Advertisement	6	09/01/22	09/07/22
1	Pre-Bid Meeting	1	09/07/22	09/07/22
1	Advertisement	6	09/07/22	09/13/22
1	Pre-Bid Meeting	1	09/13/22	09/13/22
1	Advertisement	6	09/13/22	09/19/22
1	Pre-Bid Meeting	1	09/19/22	09/19/22
1	Advertisement	6	09/19/22	09/25/22
1	Pre-Bid Meeting	1	09/25/22	09/25/22
1	Advertisement	6	09/25/22	10/01/22
1	Pre-Bid Meeting	1	10/01/22	10/01/22
1	Advertisement	6	10/01/22	10/07/22
1	Pre-Bid Meeting	1	10/07/22	10/07/22
1	Advertisement	6	10/07/22	10/13/22
1	Pre-Bid Meeting	1	10/13/22	10/13/22
1	Advertisement	6	10/13/22	10/19/22
1	Pre-Bid Meeting	1	10/19/22	10/19/22
1	Advertisement	6	10/19/22	10/25/22
1	Pre-Bid Meeting	1	10/25/22	10/25/22
1	Advertisement	6	10/25/22	11/01/22
1	Pre-Bid Meeting	1	11/01/22	11/01/22
1	Advertisement	6	11/01/22	11/07/22
1	Pre-Bid Meeting	1	11/07/22	11/07/22
1	Advertisement	6	11/07/22	11/13/22
1	Pre-Bid Meeting	1	11/13/22	11/13/22
1	Advertisement	6	11/13/22	11/19/22
1	Pre-Bid Meeting	1	11/19/22	11/19/22
1	Advertisement	6	11/19/22	11/25/22
1	Pre-Bid Meeting	1	11/25/22	11/25/22
1	Advertisement	6	11/25/22	12/01/22
1	Pre-Bid Meeting	1	12/01/22	12/01/22
1	Advertisement	6	12/01/22	12/07/22
1	Pre-Bid Meeting	1	12/07/22	12/07/22
1	Advertisement	6	12/07/22	12/13/22
1	Pre-Bid Meeting	1	12/13/22	12/13/22
1	Advertisement	6	12/13/22	12/19/22
1	Pre-Bid Meeting	1	12/19/22	12/19/22
1	Advertisement	6	12/19/22	12/25/22
1	Pre-Bid Meeting	1	12/25/22	12/25/22
1	Advertisement	6	12/25/22	01/01/23



Consider construction site visits during scoping

14

US 52 over Mud Creek



Consider crossing feature when determining closure time



Consider crane access when applying for Permits



15

US 52 over Mud Creek



Include provisions for Pile Driving Template



16

US 52 over Mud Creek



17

US 52 over Mud Creek



Include a CIP leveling pad – set lower than planned elevations



18

US 52 over Mud Creek



19

US 52 over Mud Creek



20

US 52 over Mud Creek



Surface prep of UHPC surfaces is key



21

US 52 over Mud Creek



22

US 52 over Mud Creek



Consider color of UHPC if aesthetics are important to your project



23

US 52 over Mud Creek



24



Lessons Learned

- ✓ ABC provides safe work zone and significantly reduced construction and detour duration
- ✓ Identify ABC as construction method during scoping phase
- ✓ Consider additional design review coordination and comment resolution
- ✓ Detail Shear Keys
- ✓ Keep up with latest ABC developments
- ✓ Consider slip forming railings vs precast
- ✓ Keep module shapes simple
- ✓ Additional prequalification and inspection for precast elements

25



Lessons Learned

- ✓ Consider construction site visits during scoping
- ✓ Consider crane access when applying for Permits
- ✓ Consider crossing feature when determining closure time
- ✓ Include provisions for Pile Driving Template
- ✓ Consider precast module tolerances
- ✓ Include a CIP leveling pad – set lower than planned elevations
- ✓ Surface prep of UHPC surfaces is key
- ✓ Consider color of UHPC if aesthetics are important to your project

26

Thank You!

- Nathan Riggs, INDOT Greenfield District
- Pete White and INDOT Bridge Design
- Robert Poldervaart, INDOT Bridge Design
- Justin Mahlberg, Purdue University
- Force Construction
- Michael Prather and Jim Harvey, INDOT Constr.
- My HNTB Team



Questions?