AASHTO Transportation System Preservation Technical Services Program (TSP-2)

Innovative Technology Demonstrations Working Group (ITD)

Project Title:	Transparent Stay-In-Place Forms for Improved Bridge Deck Construction and Preservation					
Manufacturer:	TrueTech Bridge					
Owner:	Indiana Department of Transportation					
Consultant:	HNTB Indiana, Inc.					
Report Number:	002	**Reporting Period:**	from:	5/1/2020	to:	10/14/2022

Location:	US 20 Over I-80/I-90 Toll Road, LaPorte, Indiana		
Latitude / Longitude	**Structure ID**	**New or Replacement Deck**	**Year Built**
41.678 / 86.668	020-46-021-4	Replacement	1956
Description:	Continuous Composite Steel Beam Bridge Spanning EB and WB Traffic, Staged Construction		
Length / Width / Spans / Bays	**Net Deck Area / Typ. Bay Width**	**Avg. % Transparency**	**Deck Thickness (in.)**
234.65 / 85.33 / 5 / 12	13,606 SF / 5'-7 ½"	72%	8

Purpose for use:	Indiana DOT specified "Permanent Transparent Forms" for this bridge deck replacement to evaluate visibility to the underside of the deck for inspection purposes. INDOT specifications have allowed for stay-in-place metal forms in the past, but going forward, INDOT is looking for ways to promote preservation without sacrificing the speed and safety benefits of stay-in-place forms.		
Objective:	Report on contractor's experience (compared to conventional stay-in-place forms), in terms of installation of forms and deck pour placement, and owner's ability to see the underside of the deck (minimum of 70% visibility through the forms) over at least 2 inspection cycles.		
Work Plan:	HNTB representative to observe transparent form installation and/or deck pour and document with photos and video (with time stamps). Interview the contractor, and the owner representative to gather feedback on the installation, any challenges, and/or performance issues during the deck pour. Confirm the product worked as intended. Report observations below from installation and deck pour, add INDOT inspection reports when completed.		
ITD Installation Completion Date:	Phase I – 05/20/2020 Phase II – 08/07/2020	ITD Evaluation Period:	2 Inspection Cycles

Installation & Deck Pour

Consultant Observations: Phase I: The transparent forms use an 8'-0" support angle while standard metal decking uses 10'-0" lengths. This difference led to some data interpolation that was needed to set screed elevations. In the future, screed calculations can be set up to use 8'-0" increment spacing on projects using transparent deck forms. An additional consideration is that the transparent forms are thicker than traditional metal decking, and therefore are not as forgiving for top of beam elevation differences from anticipated to what was surveyed on site (most relevant for existing beams on a deck replacement project like this one). To address this, the surveyed top of beam elevations should be used to check the screed calculations and adjust haunch depths if needed.

Phase II: The contractor seemed familiar with installation process for this phase. No additional observations.

Contractor Observations: Phase I: The support angles and forms are of different dimensions than traditional metal decking, therefore some additional measurements and calculations were required to ensure that the forms were installed at the correct elevations for final deck surface. This can mostly be attributed to the inexperience with the product. No other concerns or items to note regarding the deck pour.

Phase II: During this phase of installation, the forms were installed more quickly and the Contractor noted that there was little to no difference in installation time as compared to traditional metal deck forms. The clear forms are slightly heavier and take

2 workers to carry each piece, but this is offset by only needing to place a few screws to set in place. Gaps between panels can be sealed with a bead of silicone or tape to prevent concrete from leaking when poured. This project included steel beam cleaning and painting, and there was concern over how to protect the forms from the beam sandblasting. Plywood can be used to create a temporary protective barrier but there is a time and material cost to this effort.

Owner Observations: Phase I: For this project, installation of the transparent forms took longer than installation typically does with traditional metal decking, however it is expected this was just due to inexperience with the product.

Phase II: Installation went much more smoothly, and INDOT was pleased with the speed and quality of installation.

Post Pour Visibility / Inspection

Consultant Observations: Phase I: No specific observations. Phase II: Visibility of the concrete poured in Phase I is very good. There is some glare when trying to document the underside of the deck with pictures but this can be remedied with a polarizing camera lens. These lenses are available for most cameras and even as attachments for phone cameras.

Owner Observations: Phase I: Initial inspections show good visibility and no concerns have been recorded. INDOT will continue to monitor the visibility over the life of the panels.

Phase II: Visibility continues to be clear and no concerns have been recorded.

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Photos: See following pages

Phase I transparent form installation

Phase I transparent form installation – aerial view

Phase I deck pour – view from below

Phase I deck pour – view from below after full concrete placement (polarizing lens)

Phase II transparent form installation

Phase II transparent form installation – placement on beams

Deck pour – view from below after concrete placement (no polarizing lens)

Underside of deck post cure. (polarizing lens)

Underside of deck post cure, with rebar layout marks visible through the form. (polarizing lens)

Underside of deck post cure, stage line between phase I and phase II. Stage line formed and stripped using conventional methods (lumber).

Top surface of completed bridge.