August 2021 ABC-UTC Monthly Webinar: Nebraska's All-Precast Bridge - Belden to Laurel Project		
#	**Webinar Questions**	**Responses**
	Design and Construction	
1	What was the accommodation of the precast bridge deck cross-section for crowning?	Two panels (left slope and right slope) were fabricated to accommodate the slopes and concrete rail. Then a closure pour was utilized in the middle.
2	Was lightweight concrete considered for any precast elements? Would it help to reduce piece weights for hauling and erection?	Yes, lightweight concrete was considered. However, it was not used based on the advice of the fabricators for the project. No difficulties were observed with hauling and erection utilizing normal weight concrete.
3	Did you have any difficulties finding a source for UHPC for the closure pours?	Lafarge was used for the project, and no difficulties were observed when using it. Nebraska DOT has produced a UHPC mix and will use it in future UHPC cast-in-place concrete applications. There are plenty of sources for UHPC currently available.
	Cost	
4	What was the cost of different precast elements? Were they cast on site, near site, or in a plant?	The Contractor was given the option to cast the bridge elements onsite, near site, or in a plant. The Contractor elected to use plant fabrication.
5	Can you discuss Change Orders and Claims for Delay, if any?	There was a delay from large amount of rainfall during construction. The Department elected not to penalize the Contractor. The delay was not due to actual bridge ABC construction.
6	Is there any advice on how to make this system cost-competitive in addition to being fast?	The best way, according to the Contractor, is to built more projects since the Contractor is now more familiar with these ABC construction techniques.
	General	
7	How has the system performed since construction in 2018? What lessons can be worked into the next application?	The system is performing as designed, and no issues are expected with the project. A meeting with all the stakeholders was conducted, and they were generally satisfied with the project as proposed.

8	We fabricate forms. Do you have any comments on what you, the contractor, or the fabricator would like to see in forms?	The Contractor was given the option to fabricate all nonprestressed elements. The Contractor elected to use a precast fabricator for the bridge elements. The forms were built specifically for this project.
	Questions during Webinar	
9	Does the waterproofing membrane below the asphalt wearing surface allow the wearing surface to slip?	The Nebraska DOT uses waterproofing membrane under asphalt wearing surfaces and has not had issues with slip.
10	What was the percent increase in cost to this ABC project compared to using typical construction methods?	We were within the expected 20% increase.
11	Please explain how the actual on-site construction duration compared to the target 30-day road closure. What went well and what caused delay?	Typical bridge construction for a bridge of this size and location will take 150 to 180 days. The Contract was set to allow for a 30-day bridge closure. The Contractor felt that he could finish in less than 30 days if he had to do it again. As with any complicated construction project, the Department collaborated with the Contractor and fabricator.
12	How did the use of epoxy-coated rebar affect your UHPC joints?	Epoxy-coated rebar did not affect the UHPC joints. An 8-inch gap was used to accommodate 6-inch non-contact lap splices.
13	What was the curing method used on the UHPC joints?	Wet burlap was used for curing of the UHPC joints.
14	Was additional surface preparation done on the deck panels, such as rendering the deck joints Saturated Surface Dry (SSD)?	Yes, the aggregate was exposed, and the Saturated Surface Dry (SSD) condition was used.
15	Can you explain more about the piles under the grade beam under the approach slab?	The Nebraska DOT policy is to use piles under the grade beam or sleeper slab to minimize / prevent settlement and bumps, and to minimize the compaction under the approach slab. This also provides resiliency so that the approach slab is not lost due to flooding.

16	How did the contractor support the abutment precast piece at the specified elevation? Did it just rest on-grade?	The precast abutment was supported by the piles and the soil with pile embedment tolerances. Details were given on the plans so the abutment piece could be supported solely on the piles in case there was any soil settlement.
17	How did you connect the backwall to the abutment?	The backwall was connected to the abutment using self-consolidating concrete.
18	Why was there only one row of shear studs? Did you have any concern about stress concentrations and spalling of the haunch?	One row of shear studs was used because the studs extend into the girder web (see Slide # 57). We were not concerned about stress concentrations or spalling of the haunch. The HSS (hollow structural section) provides confinement to the concrete inside the shear pocket, which prevents the splitting or breakout of concrete due to high stress concentrations around the connectors. This confinement also minimizes reinforcement congestion around the shear pockets and allows for increased spacing between pockets. This system was developed at the University of Nebraska-Lincoln and published as https://www.pci.org/PCI_Docs/Publications/PCI%20Journal/2020/May-June/18-0034_Morcous_MJ20.pdf.
19	Why was there such a large (width) space above the girders/below the deck panels, to be filled with self-consolidating concrete (SCC)?	A minimum 8-inch embedment was needed according to the tests. While less embedment was justified, the Department elected to use the test embedment with a 2-inch minimum space between the girder and the bottom of the panel. Any additional space was provided to accommodate camber.
20	Camber was mentioned as being 11 inches. How old were the girders when they were placed?	Nebraska DOT policy is to ship the girders a minimum of 10 days after fabrication, and to install the deck at least 30 days after girder fabrication.
21	How was the excessive camber handled with the deck panels?	It was up to the Contractor to confine the haunch concrete between the top of the girders and bottom of the panels. The presentation showed that the Contractor used shim pad stacks to set grade elevation.

22	Was there any reason why the sheet piles were installed behind the abutment rather than in front so that the piles could have been protected against scour?	Normal cast-in-place concrete abutment details show the sheet piles embedded in the abutment cap, and are considered braced at the top. In this precast abutment case, the sheet piles were placed behind the cap and outside the abutment, and are considered braced.
23	How thick were the deck panels?	The deck panels were 7.5 inches thick.
24	What quality control / test measures did you use on the self-consolidating concrete (SCC) in the field?	The quality control / test measure was the typical spread test as used in the plant.
25	You mentioned that the joint between the panels and rail ends was sand blasted. Does the bottom of the slab get the same treatment?	No. The bottom of the panel was not treated since the horizontal shear was resisted by the shear connectors.
26	In the sideview picture, the bridge deformation was visible. So it seems like even the excessive 11 inches of camber was not enough. Did you check the camber calculation after the project was complete?	The concrete rail was considered a composite load with the bridge deck as in a typical cast-in-place concrete deck. It should have been considered non-composite because of the precast deck panels. This caused a slight visible sag in the bridge rail.
27	What type of barrier did you use, TL3, 4 or 5, and did you face any challenges in this method? Also, how did you solve the girder camber increase from 8.5 to 11 inches?	The barrier was crash tested to TL4 under the NCHRP 350 criteria, and it was qualified to TL3 under MASH criteria. Only TL3 was needed for this site. UHPC was used to create a moment connection between panel sections and the barrier to achieve continuity. Yield line theory was used to check the connections for the collision force. A grade rise was warranted to correct the situation with the camber.
28	Regarding the extra camber (11" versus 8"), what do you think about having two sets of prestressing strands, one set to be stressed at the shop and another set to be stressed at the site to adjust the camber? Can this be useful with UHPC decked NU prestressed girders?	We will have to think about this. Our understanding is that decked prestressed UHPC girders will not have such a high camber.
29	What are the results of post installation inspections? Can you comment on inspection results from the other bridges discussed earlier in the presentation?	All of the bridges are performing as expected and are better than some cast-in-place concrete bridges that are in service.

30	Did the contractor qualify for the incentive payment (or disincentive payment) for completing the project early?	The presentation showed the incentive / disincentive payment. The project was delayed due to large amounts of rainfall. The Department elected not to penalize the Contractor. No disincentive was accessed.
31	Are the abutments integral? If so, what details did you use to connect the girders to the abutment diaphragm?	The abutments are not considered integral. Please refer to the link to the contract plans for the girder / abutment connection details.
32	Design-wise, were the deck and girders considered fully composite?	Yes, the deck and girders were considered fully composite.
33	Was the single 200-ton crane the only crane used on the project?	In addition to the 200-ton crane, a small movable crane was used onsite.