January 2021 ABC-UTC Webinar Featured Presentation: Blackhall Road Bridge Project - Modular Decked Beams Made with Bulb Tee Girders		
#	**Questions**	**Responses**
	Design	
1	What other ABC options were considered for this bridge?	Deck Bulb-tee beams and NEXT Beams were the other options considered.
2	Could you discuss the change in design decision regarding the double tee NEXT beams versus the bulb tee girders?	The 93-feet center span length is just beyond the typical span range for NEXT beams, and the beam weight made transportation and erection challenging and costly. After recognizing these disadvantages, the design team began to look for a solution that could be a conventional bridge construction-ABC hybrid, constructed with equipment and personnel most bridge builders in Georgia have.
3	Where deck bulb tees considered?	They were considered but were dismissed due to lack of availability, complications with profile and cross slope, and cost.
4	Are the approach slabs precast panels? If so, what is the connection detail between the panel and deck and/or end diaphragm? Also, is the bridge joint fabricated with the precast panel?	The approach slabs are not precast. They are 10-inch-thick cast in place concrete with a 3.5-inch-thick asphalt concrete inlay.
5	Is this structure continuous for live load, or three simple spans? How was it analyzed?	The structure is designed as three simple spans. The deck was detailed as jointless, but not continuous, which is a GDOT standard practice.
6	As much as feasible, please discuss all special requirements for deck closure pours.	The longitudinal deck closure pours are nine inches wide and poured with Ultra High Performance concrete. Transverse reinforcement consists of uncoated #5 bars lapped six inches within the nine-inch joint width. The top of the UHPC was poured 1/4-inch high to account for potential consolidation of the UHPC during curing. After curing, the deck was profile ground to grade.
7	How is the negative moment in the precast deck panel closure pour handled over the piers?	The spans are designed as simple spans, and so the closure pours at the piers are not designed for negative moments.

	Construction	
8	Was the site laydown yard for beam casting PCI certified? If so, were there any issues in attaining this certification?	The site laydown yard was not PCI certified. The casting is essentially the same as conventional construction; therefore, precast certification was deemed unnecessary.
9	How is camber controlled to achieve the required profile if there is no cast-in-place concrete deck or asphalt overlay?	The camber is accommodated by a variable depth haunch between the top of the bulb tee beams and the deck. The deck and haunch are cast at the laydown yard.
10	What design checks were there for the closure pours? What was the development length for the bars in the UHPC closure pours, or were hooks used in this location? Were cast-in-place concrete end diaphragms used and, if so, what were the design checks?	The closure joint is designed to fully develop the bars. The design was based on research and work at NYSDOT and FHWA. Today, the design would be according to the AASHTO LRFD Guide Specifications for ABC (which is based on the FHWA work). End diaphragms (referred to as edge beams in Georgia) consist of cast-in-place concrete and are standard Georgia DOT designs.
11	Please describe fabrication-related lessons learned during the on-site casting? How did the DOT feel about the on-site precasting option?	The on-site casting worked very well with no major problems. Use of the "skim" pour over the foam block outs allowing the use of a deck screed was a major innovation by the contractor. Both GDOT and the contractor were pleased with the on-site casting and would consider their use on future projects.
12	What was the biggest constructability issue, and what was the cause of this issue?	There was a minor issue with the length of the transverse bars in the deck pour. The HPC joint requires tight tolerances. The bars were fabricated slightly too long (which is common in reinforcing bar fabrication). The bars needed to be cut on site in order to fit within the prefabricated units.
13	Can you discuss Field Change Orders, Change of Plan, weather, and detrimental interference (Authorizations not honored)?	Fortunately, there were no change orders or weather-related delays for the project.
	Cost	
14	What is the unit price per square foot of deck area?	The unit price was $253 per square foot of deck area.

15	Please compare ABC costs to conventional construction costs.	The bridge had a square foot cost of approximately $253/SF compared to $155/SF for a similar bridge constructed conventionally. This cost was offset by several factors. By building on the same alignment, the roadway work limits were reduced. Also the cost of a temporary bridge was eliminated.
	Questions during Webinar	
16	These bridges would seem to lend themselves well to Construction Manager / General Contractor (CMGC) projects. What is your experience with the CMGC project delivery method?	Georgia DOT is not currently delivering projects with CMGC.
17	Would this superstructure accommodate a sloped abutment, or does it have to be stepped? How is the roadway cross-slope accounted for? Is it a variable thickness deck?	The deck is a constant 8.25-inch thickness the full width of the bridge. The haunches allow for the deck to be sloped. A 2% cross slope is constructed with stepped abutments and piers. The flat steps provide a sound base for the bridge bearings. Variable heights of timber blocking were used at the "false bents" to mimic the stepped piers and abutments of the permanent substructures.
18	Slide 12 - How was the $4182 liquidated damages (LD) determined?	The liquidated damages are based on the road user's cost.
19	Did you face any issues with water penetration through deck panel joints after construction?	Problems with water penetration at the deck joints have not been identified to-date.
20	How was daily rate for the liquidated damages (LD) derived? Was it based on user cost?	The liquidated damages are based on the road user's cost.
21	Was there any incentive for early completion?	There was no incentive for early completion.

22	Was the staging area set up to allow the beam sections to cure more, or why weren't the bents/piers constructed in conjunction with the fabrication of the deck pieces so that they could be set immediately when shipped?	The staging areas were set up for the purposes of casting the deck portion of the beams at the project site. The timing of the deck casting in the staging yard was set to accommodate the overall project schedule. There was an option for precast pier elements; however, the contractor chose to use cast-in-place concrete as it fit within the allowable project schedule.
23	How much did it cost to bury the utility lines? Was this cost absorbed before letting or included in the contractor's bid?	This information is not available.
24	How were the block outs removed after the deck was poured?	The polystyrene foam was broken apart using wrecking bars and pushed out of the bottom of the formed joint once the timber forms were removed from the underside of the deck. Care was taken to avoid damaging the transverse reinforcement. Heavy duty demolition blankets were set up between the bays to capture loose foam debris.
25	Were there any issues with the local residents when driving steel H piles for the temporary bents?	There were no issues with noise during pile driving of either the temporary false bent piles or permanent substructure piles.
26	Were the laydown sites obtained by the contractor or "furnished" by GDOT?	The laydown sites were acquired as temporary easements by Henry County and provided to the contractor for use during construction. Clearing and grading of the laydown yards was performed by the contractor.
27	When the steel cross frames were removed and the bridge disassembled into separate deck/girder pieces, was there any unforeseen differential camber of adjacent pieces when re-assembled?	Fortunately, there was no change in the finished deck between the deck beam units in the move from the laydown yards to the permanent location.

28	How did the contractor take out the temporary styrofoam joints?	The polystyrene foam was broken apart using wrecking bars and pushed out of the bottom of the formed joint once the timber forms were removed from the underside of the deck. Care was taken to avoid damaging the transverse reinforcement. Heavy duty demolition blankets were set up between the bays to capture loose foam debris.
29	What was the surface preparation along the flanges at the longitudinal joint?	The plans required an exposed aggregate surface with an eighth-inch profile amplitude. This was achieved through the use of a concrete retarder applied to the side forms, which allowed for easy removal of the surface of the joint. Once the polystyrene foam was cleaned off, the crews pressure washed the concrete joints. This helped give a clean exposed aggregate surface.
30	Were pick points cast onto the segments for the crane movement?	Yes, a total of four lifting loops were located at the ends of the deck beam units, one loop at five feet and the second at seven feet from the ends of the beams. Each loop was comprised of five 1/2-inch-diameter strands.
31	How much reinforcement protruded from the top flanges into the longitudinal joints?	A top and bottom mat with transverse reinforcement consisting of uncoated #5 bars spaced at 7.125 inches extended into the longitudinal joints.
32	What was the allowable tolerance for cross slope on the bridge?	The bridge has a 2% constant cross slope. All bridges must meet a 1/8 inch in 10 foot straightedge check made longitudinally and transversely.
33	How long did it take to construct the substructure?	The substructure was completed in approximately 2.5 weeks during the 60-day road closure.
34	Are 10th point elevations shot on the beams in the laydown stage before the deck is cast to assure proper final elevations?	The beams are surveyed at the 20th points and the coping buildup calculated on both the left and right sides of the beams, deducting dead load deflections.
35	Why were hammerhead bents chosen?	Each hammerhead bent requires a single pile cap and column. A precast substructure alternate was included in the plans, and the design team felt the single pile cap and column reduced the risk of problems in alignment /mating the precast column to the footing and cap. This would have required four connections for a single column pier compared to eight for a multi-column pier.

36	Considering the weight of concrete beams and a deck, would the use of steel beams and concrete deck (precast deck) be more feasible?	Due to concrete's durability and low maintenance, it is the preference of the Georgia DOT to utilize concrete whenever feasible.
37	Was another crane used to pick the decked beam units (DBUs) from the staging yard to transport them to the primary crane location for setting?	Yes, two cranes were used to pick the decked beam units from the laydown yards.
38	Was a wider deck joint investigated to eliminate the UHPC?	Use of wider deck joints was discussed but UHPC was selected for its high strength and durability.
39	Were steel beam precast beam units (PBUs) considered? They might be a bit lighter in weight. Would this reduce the required crane size?	See response to question #37 above.
40	Were full-depth deck panels considered?	A decision was made by GDOT leadership to explore other ABC methodologies that had not previously been utilized in Georgia. As full-depth deck panels had already been used on multiple Georgia DOT bridge projects, their use was not considered for this project.
41	Did you encounter any issues with the UHPC pours? What was the UHPC strength?	The UHPC had a compressive strength of 21 ksi at 28 days. No problems were encountered during the batching, placement, and curing.
42	What was the thickness of the pier and end diaphragms?	The thickness of the pier diaphragm was 12 inches, and the thickness of the end diaphragm was 18 inches.
43	Was there any issue in removing the foam spacers? Based on the drawings, it seemed that they were hexagonal in shape with rebar passing directly through them.	The polystyrene foam was broken apart using wrecking bars and pushed out of the bottom of the formed joint once the timber forms were removed from the underside of the deck. Care was taken to avoid damaging the transverse reinforcement. Heavy duty demolition blankets were set up between the bays to capture loose foam debris.
44	Was the Bidwell screed setup longitudinally or transverse to the beams, and how did you manage the lifting loops with the Bidwell screed?	The screed was placed transversely to the beams. A vibratory truss screed was used to finish the deck. Areas between the lifting loops were hand-finished. Note that the bridge is not skewed.

45	Were there any Hydrologic and Hydraulic (H&H) analysis and permit requirements?	Yes, a Hydraulic/Hydrological study was performed. The replacement bridge increased the area of the bridge opening by approximately 35% for the 50-year design storm, lowering both the upstream backwater and velocities at the bridge. A FEMA "No Rise" certification and Nationwide Permit 3 were generated for the project.
46	Are the design plans available through the GDOT website?	Plans can be requested from the Georgia DOT by going to the link below and entering project PI #0011691, County Route #661 in Henry County: http://www.dot.ga.gov/BS/HistoricalPlansResearch#tab-1
47	Did you perform any moisture test at the deck joints after construction?	No moisture testing was performed at the deck joints.