February 2021 ABC-UTC Monthly Webinar: Segmental ABC and More: I-59/20 Birmingham Central Business District Bridges Project		
#	**Questions**	**Responses**
	Design	
1	Was rehabilitation of the existing interchange uneconomical compared with replacement?	Yes.
2	Did you consider designing the segmental bridges with 80 ksi or higher reinforcing steel?	No.
3	How was the development length of the dowel bars satisfied between each column segment?	The project used reinforced grouted splice sleeves/couplers with the development length required per the bar size.
4	Was lightweight concrete considered for the structure? Would it have provided any significant benefits if it had been used?	No, lightweight concrete was not considered for the project. It is unclear if lightweight concrete would have provided significant benefits to the project..
	Construction	
5	How was the Maintenance of Traffic handled through this project? Did it involve any weekend shutdowns and detours?	Traffic was diverted to local streets. Weekend shutdowns and detours were common during project construction.
6	What was the allowable headroom for installing the micropiles and drilled shafts under the existing structure?	Low-height equipment was utilized to facilitate installation of most of the micropiles and drilled shafts prior to demolition of the existing structure. Allowable headroom under the existing structure was approximately 16 feet.
7	Do you have any additional comments on the precast column sections, connections, and type of mechanical connectors used on the project?	No, other than it was a great contractor proposed modification.
8	Why was precast segmental span-by-span superstructure placed on falsework chosen for erection? How many days per span was the average erection time?	The contractor elected to erect the segment using the falsework system. This was an economical solution compared to other erection equipment (gantry, truss. etc.) and allowed the contractor to purchase enough equipment to work on as many as eight headings at one time. Average span erection time was one week.

9	Does the team have any ABC experience with decked-beam units and ultra-high-performance concrete (UHPC) closure pours to share? What was the level of savings on construction time using ABC?	The team does not have any ABC experience with decked-beam units and UHPC closure pours. It is unclear what the level of time savings was by using ABC.
10	Did you have any problems with fit-up of the precast segments? If so, what did you do to correct the fit-up?	There were no known issues with the segment fit-up.
11	Do you have any additional comments on design, fabrication, and erection of precast prestressed elements?	No.
12	How far in advance of erection were precast elements available to ship?	Approximately one year.
13	Can you comment on any claims and weather-related impacts?	No.
14	Do you want to comment on any additional lessons learned as applicable to ABC and constructability?	No.
15	Will a structural health monitoring system be included in the project?	A structural health monitoring system is not included in the project.
	Cost	
16	How did the total cost and contract time compare with the bid and engineer's estimate?	The project was completed within project timelines for the full project bonus. The engineer's estimate is internal to ALDOT, and privileged information is not released to the public.
17	How much money and time has the I-59/20 project saved by using precast concrete compared to the original cast-in-place concrete budget and schedule?	There was no cost difference between cast-in-place and precast columns. Precast columns saved a minimum of two days per column installation.
18	What is the cost of the ABC portion of the contract?	The segmental bridges cost $195 million. The ABC portion was not quantified.

19	Can you discuss the development of the incentives /disincentives and the subsequent approval process?	Incentives/disincentives development is internal to ALDOT, and privileged information is not released to the public. The subsequent approval process was a joint effort between ALDOT and the Contractor.
	Questions during Webinar	
20	What is the breakeven point for the minimum deck area needed to justify the expense of casting beds?	The breakeven point varies, depending upon the owner's project specific needs.
21	Did you consider reusing the substructure, as they were not deteriorated much?	No. The original substructure would not have aligned under the segmental boxes.
22	Were there challenges related to the buried utilities?	Yes. The project had to accommodate the buried utilities and keep a minimum of two north/south streets open at all times while not delaying the bridge construction.
23	Why were micropiles selected in preference to steel-H piles?	Micropiles were chosen by the contractor and substituted for drilled shafts.
24	Was there any concern about using segmental construction for long-term duration? The two segmental bridges in the Central Virginia area (built in the 1980s) have creep and other maintenance issues.	No.
25	How long are the coupler bars in the columns? Are they grouted only?	The project used reinforced grouted splice sleeves/couplers with development length required per the bar size (#11).
26	Did you consider steel boxes with the concept of simple-for-dead-load and continuous-for-live-load with pre-deck or precast panels? This would have allowed to go to a 200- to 250-ft-long box per span with lower weight, which could have reduced the number substructure columns and been even faster construction.	No.

27	Why was segmental construction used for the superstructure? With spans typically at 165 feet, could typical precast have been used? Deep prestressed bulb-tees can go simple span to 200 feet and precast, post-tensioned tubs have gone 250 feet using just three segments (cantilevered pier-drop-in-cantilever pier).	The segmental box girders were selected because: (a) they were the only option that could be completed within the 12-month shutdown; (b) they would minimize the duration of interstate closure by precasting many elements offsite; (c) they provided longer span lengths; (d) they reduced noise; and (e) they provided an aesthetic structure.
28	What was the maximum weight of the box segments?	Approximately 75 tons.
29	Are the shear keys different during match-casting, to maintain the elevations and the cross slope?	No. Each segment face features the same shear key layout.
30	How was the shrinkage of the longitudinal pour concrete addressed?	The contractor moist cured the longitudinal closure pour concrete.
31	Was any elastomeric coating required over the closure pours for an additional level of protection for the transverse post-tensioning (PT)? Or was the closure pour concrete all that was needed for protection of the grout caps?	There was an elastomeric coating applied over the transverse PT anchorages.
32	Are the columns post-tensioned?	No.
33	How many bidders were there, and how competitive was the pricing versus the engineer's estimate?	There were three bidders on the project. The engineer's estimate is internal to ALDOT, and privileged information is not released to the public.
34	What was the most difficult part of having separate firms designing the superstructure and the substructure?	There was no difficulty. Each firm would attest to how easily this project was accomplished.
35	How were the shoring towers removed from under the completed superstructure?	The falsework was removed using a front end loader with forks.
36	Questions on substructure foundations: a) What was the size and the maximum length of the micropiles used? b) What was the rate of construction for driving micropiles?	The diameter of the micropiles was 9.63 inches. The maximum length was 132 ft. The rate of construction was approximately 0.5 ft/min.

37	Why not go with a Design Build method?	Design-build was not allowed by Alabama law at that time.
38	Were there any issues with the karst limestone?	Yes, the karst limestone required steel H-pile supported footings.
39	Could you elaborate on the primary advantages of the shoring towers versus the traditional gantry?	The shoring towers were more cost efficient and more could be purchased, for the same price as a gantry.
40	What were the design requirements of the concrete (strength, etc.)?	The concrete strength of the box girders was 6,500 psi.
41	How were the barrier curbs placed, especially at the center?	The barrier curbs were slip formed.
42	From looking at photos of the closure pours, it appears that uncoated reinforcement was used for the deck. What is the anticipated service life for this bridge?	The anticipated service life for this bridge is 75 years.
43	How long did it take to assemble each span on the temporary towers?	Each span was assembled in an average of eight days.
44	What type of concrete did you use for a closure pour?	6,500 psi.
45	Was the mild steel epoxy coated?	No.
46	How thick was the bridge deck?	10 inches.
47	What was the average depth for the micropiles? Were they bonded to rock or soil?	The average depth of the micropiles was 50 ft. The micropiles were socketed into rock approximately 10 ft.
48	Is there any justification that lead to opt for external post-tensioning instead of the internal post-tensioning in this project?	External post-tensioning was used for the ease of placement and inspection.
49	Can you briefly explain how the ramp framed into the mainline? Were there any design challenges due to thermal, differential, box girder behavior, etc.?	The ramp transition was accomplished by adding a third box girder to the two-box-girder configuration. No challenges were encountered with this transition.

50	What was the lowest vertical clearance in driving H piles? Were there any challenges while driving H piles close to existing structures?	The minimum vertical clearance was 16 feet, and low overhead trackhoe mounted equipment was used. Footings were below grade, which helped with driveability.
51	Were any tower settlement issues observed during construction?	No. The contractor prepared the subgrade and incorporated jacks at the towers to compensate for settlement.
52	Were there any construction issues with fit-up for any of the precast substructure elements?	There were no known issues.
53	Did you consider using the balanced cantilever construction method instead of the span-by-span method which will ensure longer spans and less piers and foundations?	No. The balanced cantilever option would have taken longer to erect.
54	Are the precast concrete segments prestressed at the fabrication plant, or was normal reinforcement used?	The transverse post-tensioning was used in addition to mild reinforcement. The transverse post-tensioning was stressed at the casting yard.
55	How were the effects of different locked-in deformations handled at the longitudinal joints? Did any significant cracks form in the joints?	The longitudinal closure joints were designed to withstand differential deflections across the box girders. No significant cracks were observed in the longitudinal closure joints.
56	Was there concern about using black steel in the deck, especially in the closure joints?	No.
57	On slide 28, what size drilled shaft is being drilled, and what is the vertical clearance at that location?	The diameter of the drilled shafts at that location is 3'-6", with a vertical clearance of 20 feet.
58	FYI, the grouted coupler used on this project for the columns and caps is NBM Splice Sleeve, all grouted coupler.	Noted.
59	What is the reason that there is one row of drilled shafts right next to micropiles in the middle section of the project?	Micropiles were chosen by the Contractor and substituted for drilled shafts.
60	Was any work done at night?	Yes.
61	What was the square foot of deck cost for the in-place bridge?	Approximately $185 per square foot.

62	What is the cost of the segmental pier versus a traditional cast-in-place concrete pier? Is this something that was only considered due to possible time savings for the project?	There was no cost difference between cast-in-place and precast columns. Precast columns saved a minimum of two days per column installation.
63	In the demolition of the substructure, were all substructure elements removed from the site?	Yes.
64	Were the American Segmental Bridge Institute (ASBI) standard segment shapes used or considered for the project?	No.
65	What was the thickness of the concrete box flanges? Was an overlay added to the bridge deck?	The thickness of the concrete box flanges was a minimum of 10 inches. No overlay was added to the bridge deck.
66	Was an independent value engineering study conducted for the project?	No.
67	Was there any surface treatment of the deck for waterproofing?	No.