December 2020 ABC-UTC Webinar Featured Presentation: Connecticut's Rapid Rehabilitation of US Route 1 Bridge over I-95		
#	**Questions**	**Responses**
	Design	
1	Are borings recommended for the anticipated staging locations of the superstructure spans?	Yes, borings were taken within both infield areas and within the proposed NE temporary ramp. There were also existing borings taken around the existing bridge.
2	What measures were taken to increase the vertical clearance? Did the approach roadway require modifications to the vertical alignment?	Higher strength steel 50 ksi (proposed) versus 36 ksi (existing) was utilized to allow for a shallower girder depth 4-ft versus 6-ft girder depth. Steel bolsters were utilized to support the shallower girders on the existing bridge seat. No roadway modifications were required.
3	Were any provisions made for future rehabilitation of the bridge?	Regardless of the proposed support location during construction of the superstructures within the infield areas, the girders were cambered as if the structure was conventionally supported at the girder ends to remove complications during future deck replacement. Any other required maintenance or rehabilitation would be as with a typical bridge.
4	Will a form of structural health monitoring be implemented into the project to predict future fatigue issues?	At this time, no structural health monitoring is planned for this location relative to fatigue. We do not anticipate future fatigue issues.
	Construction	
5	Did the superelevation of I-95 affect the transport of the new superstructure from the bridge yard to US 1? If so, how?	Yes, the average maximum traversable slope of SPMTs was determined to be 3% during design. With I-95 having a superelevation of 6% on both northbound and southbound directions and an 18-inch vertical difference at the median, the proposed travel path had to reduce this slope to within limits. The contractor used a state standard fill, which could be compacted to an HS-20 bearing capacity.

6	Can you walk us through the deck replacement? Were precast concrete panels utilized, or were the decks poured traditionally?	The project included a full superstructure replacement. The new deck was cast in place and constructed prior to the SPMT move from the infield staging area to the final location. Concrete for each superstructure span deck was placed as a single monolithic pour.
7	Can you discuss the configuration of the new bearings with the continuous spans, and construction of the new girder seats in such a short time?	The proposed structure consists of two simply-supported spans. The existing girder seats were utilized with minimal clean up and filling of old anchor rod holes during the weekend closure. Steel bolsters were utilized to support the new shallower girders on the existing bridge seats.
8	Can you describe any necessary Change of Plans, Claims, or "lessons learned" during the various activities?	There were no claims associated with the project. As with any project, there can be many lessons learned. For this project, we highlight the following: 1) During design, the project included a standard lidar survey as well as a 3D scan of the bridge. The WSP design and bridge layout was based on the 3D scan. During construction, the Contractor performed a confirmation survey and noted a discrepancy with the pier layout. This resulted in a plan change/update to accommodate a minor geometry adjustment. Lesson Learned was to resolve the 3D laser scan with the existing ground survey in design. 2) During the bidding phase, WSP updated the steel beam cambers to accommodate deck loads as being simply supported. This change mitigates any issue if the Contractor pours the deck differently in construction as well as any change in geometry if the deck were replaced in the future. 3) There was a plan change during construction to accommodate the Contractor pouring the deck from the final end support locations versus the per plan SPMT pick locations. This resulted in WSP evaluating deck stresses and providing additional rebar to properly control crack widths. 4) Lesson learned: Provide strong geometry control and confirmation during construction, including accounting for bridge deflected shape during placement, thus assuring that each superstructure stage is placed to the proper tolerances. 5) Lesson learned for SPMT placement from first weekend to second weekend: First weekend only used compacted processed base in which SPMT tires could "dig holes" during tight placement maneuvers at the final bridge location. The second weekend, steel plates were placed in front of the existing substructures to facilitate a better SPMT maneuvering surface.

	Cost	
9	Can you discuss the major differences and costs that would have occurred if this project did not have such a high skew angle?	A lesser skewed bridge requires a simpler design/analysis of the superstructure elements. Additionally, the skew resulted in increased lateral torsional buckling due to cross frames connected to adjacent girders at different distances along the span resulting in uneven load sharing. A lesser skew would have also reduced the complexity of the superstructure SPMT transport, and overall construction of the superstructure (i.e., cross frame connection details, acute corner deck reinforcing, twist tolerances, etc.).
10	What was the cost for the SPMTs? Also, what was the cost per square foot of the bridge?	Total project cost was $14.8 million, with the SPMT trailers and temporary supports costing approximately $1.8 million.
11	What were the engineer's estimated costs and the contractor's invoiced costs for the major activities?	Engineers estimated the cost for contract items was $17.7 million, with the low bid being $14.9 million and the high bid being $23.6 million.
	Questions during Webinar	
12	Is the Connecticut DOT's ABC Decision Matrix on CTDOT's website?	Please see the link CTDOT's ABC Decision Matrix at https://portal.ct.gov/DOT/Bridges/Bridge-Standard-Practices. The link is also posted separately below the presentation pdf in this archive.
13	Was regular concrete used for the added thicker bridge seat? How were additional dead loads minimized?	The bridge seat was not modified as part of this project. Steel bolsters were utilized to support the shallower proposed superstructure on the existing bridge seats. The new superstructure was lighter than the existing superstructure.
14	Were the temporary bents on the SPMTs custom made for this project, or was the contractor able to adapt some kind of an existing structure to suit?	The SPMT spreader beam used is a prefabricated segmental system that allows modifications as needed when assembled for each project.
15	What kind of pay items were used to capture the ABC methodologies?	The temporary supports and SPMT trailers were individual pay items for the project.
16	How long was the detour, in regards to time and duration?	The local Route 1 detour was one mile long. The detour was in place during each of the 56-hour weekend closures.

17	With the 55 degree skew, how did you handle the web plumbness during construction, i.e., did you use Steel Dead Load Fit or Total Dead Load Fit?	Total Dead Load Fit was utilized.
18	What is the bridge life of the rehabilitation?	The bridge service life is 75 years.
19	What was the allowable soil bearing pressure used for the infield area?	The infield area bearing pressure was left to be per the needs of the contractor. The Contractor maintained a maximum allowable bearing pressure at support location footings of 3,500 psf. Borings were performed to determine existing conditions, and the Contractor installed Connecticut state standard fill within the travel paths which would be compacted to support HS-20 loading.
20	Did this project incoporate any structural health monitoring instrumentation, for post-construction?	There is no structural health monitoring instrumentation planned.
21	How was superstructure movement at the top of the temporary towers allowed during deck placement?	The superstructure sat on temporary bearings, which allowed rotation of the girders typical to the final location.
22	Please clarify if SB I-95 lanes were closed fully on the first weekend. Why was that required since the travel path was only in the NB roadway?	SB I-95 was closed during both weekends to provide the Contractor with as much space as possible to perform the necessary demolition and superstructure installation. Removing traffic from SB I-95 also moved traffic to a safe distance from the construction activities.
23	We did a similar project in Raynham, MA. We saw the lateral slide was much cheaper than the SPMT method. Can you please explain the reason?	Due to the lack of needing the SPMT specialized equipment when a lateral slide is used, it is understandable that the lateral slide would be a cheaper cost option. Lateral slides work well when the road below the bridge being replaced is a lower travel roadway that would have minimal impact from traffic stoppage need to erect the new superstructure over the roadway. For projects like Br 00037, where the roadway beneath the bridge being replaced in a major interstate, a lateral slide is a less viable option.
24	Did you maintain the girder spacing?	Yes, the new girder spacing matched the existing layout.

25	Is there any deck continuity over the pier in the final configuration, or does a joint remain?	The two spans are simply supported, with a preformed silicone seal expansion joint at the pier.
26	How were the bearing reactions controlled in setting the spans?	They were no systems in place to reduce bearing reactions during setting of the spans. The elastomeric bearings were allowed to deflect as required to accommodate the changing deflected shape of the superstructure during placement.
27	What type of bridge deck joint is between the two spans?	A preformed silicone seal was used at the pier joint.
28	What joint types were used, and how were they installed? Were blockout pours required?	Preformed silicone seals were used at the pier and abutments. Blockouts were not required.
29	Was the deck jointless over the pier?	A preformed silicone seal was used at the pier joint.
30	Do you know the difference in cost of using SPMTs if you had selected an alternate material for the girders?	Exact numbers are not known for the cost difference due to the use of alternate girder material, such as prestressed concrete girders. However, prestressed girders are much heavier than steel, and would require additional SPMT units which would increase the cost. The proposed superstructure weight was designed to be less than the existing superstructure weight to result in no increase in existing substructure loads.
31	Were the crossframes on the new bridge larger than the crossframes on the old bridge?	The cross frames on the new structure differ from the existing structure due to the new girders being two feet shallower than the existing girders. Proposed cross frames are designed as heavier primary members.
32	How far away was the steel fabricated? Were the girders transported during the night?	The steel was fabricated by High Steel in Pennsylvania. The Contractor coordinated all required shipping permits and times.
33	Was a detailed finite element analysis used due to such a large skew?	Yes, CSI Bridge was used to do the final design, with preliminary design in MDX and load rating with AASHTOWare Virtis.