SIBC Webinar #8 Q&A

December 15, 2015

Question	Answer
What lightweight aggregate source was used?	Stalite Lightweight Aggregate out of North Carolina
Was the lightweight concrete included with the technical proposal to get WA DOT buy-in during the proposal review?	Yes. We proposed that in our proposal so they knew what we were doing. We had some quality assurance hurdles up front because they didn't have an established procedure for it. They knew what our plan was when they picked us and we worked together on this selection.
How wide was the deck closure pour?	The deck closure pour was 9" in width.
What type of concrete was used for deck closure pours (UHPC)? What strength and was it the same strength as the girders?	Because of the site's location, and the contractor not being familiar with UHPC, we utilized a normal lay weight concrete - it was 7,000 psi pea gravel mix, a very light, small aggregate that fit inside. We had some shear keys on the sides of the flange. That was used because of the proximity of the site. There wasn't a lot of UHPC's needed for a small, single bridge. That was the reason why we employed the header bars for the connection in lieu of the straight bars. That was the material used on-site.
Were there pour and consolidation challenges with lightweight concrete?	No. We didn't run into any particular issues when we poured the diaphragms or during fabrication of the beams.
What was the depth, length and picking weight of the bulb tee beams?	Those were beams were 65" in depth, spanning 160' and weighed 160,000 pounds.
Who furnished the jacking/skidding system?	Omega Morgan was the contractor. Greg Nordholm was the supplier of the jacking and skidding system. The skidding system is now owned by Lydig Construction in Spokane.
Was BIM utilized, or any high-tech graphic modeling, in planning the move?	Yes, quite a lot. We set up shop in Parsons Brinckerhoff visualization lab. We used a lot of 3D modeling to ensure the design was going to work and that everything was going to fit.
What type of bridge bearings were used? Were there any procurement challenges with the bearings?	Conventional elastomeric bearings were used for the bridge structure. To meet the project deadline, those were one of the first things procured after award along with the aggregate - these were finished and approved right away so they could begin the testing and shipping to meet the schedule.
Was there an overlay on top of the concrete girders? If so, what was the material type (concrete or asphalt) and its thickness?	It was a microsilica concrete overlay. 1 1/2". With the deck bulb t-girder and trying to hit the profile of the road, there were a lot of unique challenges with the formula that were employed to reduce the camber on the job (being lightweight and slender girders and spanning 160') to eliminate all of the excessive weight that would be needed on the overlay.
Why was the October date critical since there was a temporary bridge in place?	October 1st was the day we had to be done by. They wanted it done in September - they picked Sept. 4th since it was after the labor day holiday. WSDOT wanted it done as fast as possible. With the ACROW bridges, the side trusses were too narrow in the lanes for trucks with big mirrors on the side. It wasn't a good solution for a permanent situation. In October, they wanted to raise the portal frames of the existing steel truss so they had another contractor coming out to do that work so they didn't want to overlap. They raised those cross members so that another truck wouldn't hit them again. There was also a federal emergency funding timeline that both contracts had to be completed within.
Was differential camber a concern? How much lateral force was needed to move the unit?	The differential camber was a concern. They do a lot of these type of bridges in Washington state but they don't always use the connection we used on this project. We provided some inserts and jacking locations to level out the beams once they were erected so you could do the closure pours between the adjacent units. Here it was more of a concern because of the time restrictions between the first girder cast and last girder cast with such a short window of when they were erected and closed together - there was some differential camber. The maximum recorded on the job was a little over an inch. To lock the beams together, we were going to impart some residual stresses in the system. So not only did we provide a little extra transverse reinforcement within the deck system on the top flange of the beam, we designed the beam in Washington for a zero-tension limit, so that allowed some residual capacity in the system.
Where were the inserts placed to control differential camber?	The inserts wouldn't control it. They were placed along the top flange of the beam at the quarter points and midpoints to allow them to use a spreader beam and they would use blocks, or weights, and the jacking system to lift once they had erected the beams on site. They would send me the results and I would let them know which one I would recommend to use.
What was done to overcome the pile driving challenge regarding the existing the rock conditions?	We had to mobilize a barge with a crane sooner than we would have otherwise, and had to grab those logs and lift them out of the way along with the boulders. We pulled all that stuff out of the way and moved it to the side. Once it was cleared away, then we were able to drive piling relatively normally.

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Were there any seismic design considerations that complicated the design and construction?	No. The magic weight number for this bridge was to stay under the original weight. We did not have to do any type of investigation of the existing foundation which was built in the 1950's and was on timber piles. We were sure if we exceeded the current weight, we were never going to get that to work with code requirements. In Washington state, they utilize stop keys in between each individual beam and because we were trying to leave the ACROW anchor blocks in place, the large pedestals that were actually constructed for the ACROW bridge - we did do some seismic analysis of the superstructure to verify that we could use the anchor blocks for the temporary bridge as our permanent seismic stop shear keys. But that was the limited extent of the seismic investigation on the project.
How close was the final structure to the 915 ton limit?	I don't think anyone recorded it with dial gauge weight. I spent a lot of time at the site doing the overlay, and when they picked the girders, I believe (based on my calculations) the bridge was within about 3 tons of the actual limit - it was very close.
Is Wash DOT pleased with the performance of the lightweight concrete to date? Are they using it on other projects?	As far as I know, they're pleased with the performance. It met the needs of this specific project and they are developing standards to implement this revised connection detail on future projects.
What would you have done differently if you knew all the information you know now?	I'd take a harder look at the risk transfer mechanism the DOT used - it put a disproportionate amount on us given what they were trying to accomplish. A slightly less aggressive schedule could have won the job and worked for everyone. On the design side - it went well even though it was an accelerated schedule. We worked well with the fabricator and keeping them up to date and keeping them moving as we progressed through the design. We did a lot of surveying work and you can never get enough survey to verify that the bridge is square and can fit, and that it will meet the project limits around it. I think the bridge measured about 1/8" on the approach and rode really well in the final conditions. Even more survey would have captured more things that cost us time (plates, diaphragm centered ACROW pedestals) - a lot of things were being built as they were being procured.
Can we have copy of this presentation?	Yes. It'll be posted on the website.