

**January 2018 ABC-UTC Webinar Featured Presentation: Designer Perspective on Tackling ABC Projects –
Spotlight on SHRP2 R04 Gila River Project**

#	Q&A Session: Questions	Responses
	Utilities	
1	Was the utility on the bridge maintained during construction? Is so, how?	The bridge did not support any active utilities that we had to consider in the phasing. The existing steel conduit that is seen in photos hanging from the edge of the bridge deck is an abandoned steel conduit that formerly carried telephone/telecommunications. Well before our project, that utility company had undergrounded their line just west of the bridge. Our extended abutment caps actually cantilevered over the duct bank without affecting it. We also had an adjacent overhead powerline on the east side of the bridge that had to be denergized during construction to allow for girder erection in the pre-slide configuration. There was also an underground waterline along the west side of the bridge that we had to avoid. None of the utilities affected the bridge construction methods.
2	How were utilities moved prior to project?	
	Construction	
3	Was the construction method required by the agency or proposed by the contractor?	The original plan was for conventional Design-Bid-Build construction delivery until we were provided the grant from SHRP2 and changed course to implement an ABC project. The overall decision to implement ABC was predetermined when the GRIC-DOT selected the Construction Manager-General Contractor (CMGC) and this understanding was part of the qualification based selection procedure for the contractor. The ABC technique was not predetermined (PBES, Lateral Slide, SPMT, etc.). The final means/method used by the selected CMGC to construct the bridge was developed collaboratively by our Team (Owner, Builder, Engineer), but it was something that the CMGC, as the bridge builder, ultimately had to be comfortable with.
4	What analysis was done on the existing substructure to ensure that it could support the horizontal load effects of movement?	The existing substructure was not used in the lateral slide. The new bridge elements were supported on completely new substructure. The net horizontal force on our substructure during the sliding operations ended up being zero because of our technique which used one part of the bridge as the "anchor" to pull against to slide the opposite part into place.
5	Please describe the hydraulic jacking system used for this project.	This is covered in the presentation.

6	<p>How long did it take to slide the new structure? Was the project review conducted to find efficiencies to save time, findings?</p>	<p>Each bridge unit took several hours to slide into final position. The operators got faster as they did each one. The stroke on the ram was approximately 8". The time to cycle the ram from full extension to full retraction and to manually reset the nut on the post-tensioning rod was what contributed to the time for each unit to be moved. Overall, the length of time for the bridge slide operation was not the determining factor in the amount of time selected for the full closure. The duration of the roadway approach construction and the other construction activities drove the duration of our closure. We could have completed in a shorter duration, but the cost to accelerate the construction was not warranted in this case. It also was the Team's first time so we were proceeding cautiously, and there was also planning around the Project Showcase event that we scheduled for the middle of "Slide Week".</p>
Cost		
7	<p>What was the cost per square ft of bridge area for design and construction?</p>	<p>This is covered in the presentation.</p>
8	<p>Defend ABC costs versus conventional DESIGN, construction & designer construction engineering.</p>	<p>The benefit of ABC construction cannot be limited to evaluating direct costs on the project for design and construction and construction engineering. The presentation identifies several indirect savings the project creates that affect our ultimate customers, the traveling public. Accelerating bridge construction on even moderately traveled rural roadways has been demonstrated to actually save money when a wholistic view of the project's cost is taken.</p>
ABC Planning		
9	<p>What ABC Decision Making process was used?</p>	<p>For this project, the decision and the ability for the project to implement ABC was incorporated into the grant application.</p>
10	<p>If possible, please discuss details for the feasibility study for the project.</p>	<p>This project was rather unique as described in the presentation. It began as a conventional DBB project where conventional construction was planned. It underwent a traditional scoping and preliminary engineering process which included a Bridge Type Selection Report. It was in that report that a brief mention of ABC was included as part of the Maintenance of Traffic discussion. Ultimately, it was this brief mention of the potential of ABC that led to the opportunity to submit the grant application. This project did not have a lengthy study for the feasibility to implement ABC techniques. However, during the Preconstruction Services phase where we (Owner, Builder and Engineer) were developing our technique, we collectively evaluated several different ABC techniques and even alternative bridge configurations before selecting the chosen method/configuration.</p>

11	Description says 6-month closure for conventional construction. Was staged construction not an option?	Three different construction staging alternatives were evaluated for the conventional construction: staged construction, shoofly detour in river bottom, and full closure. The durations estimated for staged construction were between 6 and 8 months; the shoofly detour and full closure were estimated between 4 and 6 months. The staged construction option also resulted in a slightly wider bridge than needed in order to get 2 lanes of traffic onto the first phase; it also required additional roadway reconstruction length to shift the roadway over, and it required the relocation of the existing telecommunication duct bank on the west side of the road. That process spanned a couple months of weekly meetings.
ABC Design		
12	Please emphasize ENGINEERING DESIGN considerations (details) with respect to ABC projects.	This is covered in the presentation.
13	Was there any requirement for the designer to develop means and methods for the project?	In this case, no. We worked side-by-side with the CMGC to develop the means and methods.
14	How do you develop an engineer's estimate taking into account the accelerated construction?	In this project, we were fortunate to be using the CMGC method which focused on open-book cost models prepared by the contractor that were evaluated/negotiated and ultimately became the basis for the Guaranteed Maximum Price (GMP).
ABC Construction		
15	Could you reference value added innovations and lessons learned mistakes?	There are several "Lessons Learned" that were referenced in the presentation by the light bulb icon. We believe that our low-tech slide system can be considered a value-added innovation that can help the industry. As mentioned in the presentation, I probably would reconfigure the bridge to be jointless and possibly consider eliminating the approach slabs. The approach slab was constructed as cast-in-place slab using typical details. Because it rested on our abutment diaphragms, they became a significant critical path item that affected several steps in the construction process from grading all the way to paving and ultimately opening to traffic as we debated required cure time for the concrete. A more efficient sequencing could have been developed if we didn't include them or constructed them differently.
Questions during Webinar		
16	What lubricant, if any, was used for the slide?	We utilized a thin film of white lithium grease on the slide plates. Something that was not covered in the presentation was that the slide plates were removed at the end of the slide. The bridge was jacked vertically and steel reinforced elastomeric bearings were installed. The remaining white lithium grease came out with the slide plates.

17	Was there an analysis performed to determine the stresses in the structure during the slide-in?	Yes, we did some enveloping to understand what kind of stresses the structure might see, for example, if only one end was moved at a time with the other end rotating in place. What we concluded was that the stresses were inconsequential compared to the overall design stresses. The stiffness and mass of the abutment/pier diaphragms that we were using to slide the bridge elements distributed the forces well and the stiff AASHTO IV's were also an advantage.
18	Can you provide some clarification on the sliding mechanism used? Specifically, the use of the jack to slide the bridge.	The jack was oriented horizontally to "pull" the elements into place using a post-tensioning rod that passed through a sleeve in the abutment and pier diaphragm.
19	How did you manage the flow of river while foundation and substructure work was being done?	That work was the highest risk work because we had to be in the river bottom. Each of the drilled shaft foundations were drilled and cast in a single day. Abutment and pier caps were purposely very simple to minimize reinforcing placement and form construction in the river. In essence, the approach was to get in and get out as quickly as possible to limit our exposure to that risk.
20	Removing from the river all equipment was done every day or only depending on meteo forecasts? Removing every day can be seen as a nuisance for labour workers.	As general practice, the contractor was very clean in their site. There was a designated construction yard up on the banks where the equipment was stored at night along with materials. As a matter of minimizing risk, the practice was to keep the equipment and materials out of the river bottom. I'm sure there was extra time spent doing this, but it pales in comparison to a flood-damaged piece of equipment.
21	What was the concrete strength at the time of slide?	We were beyond our 28-day strength at the time of the slide for the Deck Concrete. Standard DOT concrete in AZ tends to achieve design strengths well ahead of 28 days due to minimum specified cement contents.
22	Was dishsoap (Dawn) considered for the slide versus grease?	We discussed using dishsoap but elected to use white lithium grease instead, particularly because we were removing the slide plates as noted in the question above.
23	Extraordinary presentation!, truly! Bridge Design is more about Bridge Construction! Very good thought!!!	Thank you for the compliment and your attendance.
	N/A	
24	The NDT applications in ABC	What's the question?
25	No specific questions, more details would be better than big picture overview type info though if possible.	Thank you for your comment. Our goal is to provide design and construction details for all featured projects.