	June 2018 ABC-UTC Webinar Featured Presentation: Rhode Island DOT Replaces Bridges Over Extended Weekends Using PBES and SPMTs	
#	**Q&A Session: Questions**	**Responses**
	Design	
1	What steps were taken to add efficiency into the environmental permitting process?	The RIDOT process is pretty efficient, involving pre-application meetings with the Agencies when needed. For this project, the permits were relatively straight-forward, including RI Dept of Environmental Management 1) Fresh Water Wetlands and 2) Pollutant Discharge Elimination System permits.
2	What tolerance/shrinkage/cracking issues were anticipated prior to construction and mitigation measures to marginalize them?	Final location: Bridge placement within 1/2" horizontally and 1/8" vertically of its contract location. SPMT move: Bridge overhang deflection tolerance +/-20% of 1/2", total span twist relative to plane of superstructure <1 3/4". Precast fabrication tolerances: +/-1/4" L, W, D, +/-3/8" sweep. Shrinkage was not a concern for the bridge move. Additional reinforcement was added to the deck in tension areas due to the in-board locations of the lift points.
3	What tolerances did you specify for the PBES and SPMT?	Final location: Bridge placement within 1/2" horizontally and 1/8" vertically of its contract location. SPMT move: Bridge overhang deflection tolerance +/-20% of 1/2", total span twist relative to plane of superstructure <1 3/4". Precast fabrication tolerances: +/-1/4" L, W, D, +/-3/8" sweep.
4	What load case controlled your design?	Strength 1 controlled design.
5	Did you do a load analysis for transporting the prefabricated bridge elements?	SPMT move was evaluated with a 3D model, dead load only, with 15% impact. Additional reinforcement was added to the deck in tension areas due to the in-board locations of the lift points.
6	What is the expected service life of the structures?	In excess of 75 years, and at least as long as conventional construction.
7	Do you prefer steel or prestressed concrete for the SPMT methodology?	Since steel is lighter weight, we would think it would be preferred.
8	Have you had occasion to use PBES on skewed bridges? If so, how great was the skew?	Yes, for these two bridges, including skews of about 60 and 40 degrees.
9	Do you think ABC can be applied to double-span structures?	Yes. As an example, PBU's can be used for multi-span structures with closure pours for live load continuity.

10	Do you see any limitations on the bridge width when using SPMTs?	There are likely no limitations beyond the geometric and load capacity of the equipment, provided that proper measures are taken to control deflections, etc.
11	Do you see any limitations on bridge connections when using SPMTs?	None to our knowledge.
	Construction	
12	Time to build GRS abutment under bridge before closing road to slide bridge?	Spread out over about a month per abutment.
13	Is there a limit to the amount of longitudinal grade an SPMT can traverse when carrying the bridge load?	Per FHWA "Manual on use of Self-Propelled Modular Transporters", the limiting grade is 8%.
14	Can you elaborate on any difficulties with the high skew during construction with PBES and SPMTs?	Please refer to the downloadable presentation pdf.
15	What are the most difficult aspects of the ABC construction coordination?	1. Coordinating all of the many subcontractors during successive and simultaneous operations over the weekend bridge move period. 2. Coordinating the public outreach.
16	If you could have done something different, what would that be?	Please refer to the downloadable presentation pdf.
17	Could you discuss the unanticipated events, changes, and solutions?	Please refer to the downloadable presentation pdf.
18	What-if contingencies?	Contractor's SPMT submittal was to include descriptions of potential delay events, and resulting mitigation actions. Also, spare equipment was to be kept on site.
19	Review of claims under ABC Contracts: basis and disposition?	Fortunately, there were no claims on this project.
20	Is there a time-elapse video, perhaps on Youtube?	Yes, link will be posted on FIU website.
	Cost	
21	What is the cost to use SPMTs?	For this project, the average bid price for "transporting the bridge with SPMT" was about $600k, and included "engineering, designing, detailing, and furnishing all labor, materials, equipment, and all incidentals and services required for preparing and subsequently restoring the Bridge Staging Area (BSA) and the Travel Path (TP), constructing the temporary supports to allow for the construction of the bridge superstructure, and transporting the bridge structure to its final location using Self-Propelled Modular Transporters (SPMTs)."

22	How much does it cost to rent SPMT/day?	Unknown. We suggest you contact SPMT suppliers.
23	What was the total cost and the installed SF cost of the GRS Abutment Installation?	The abutments, excluding the backfill, were bid as part of a lump sum items, so we cannot determine the cost. However, the average bid prices of the GRS and RSF Backfill were about $80/cy and $70/cy respectively.
24	What was the difference in costs compared to conventional construction?	For each of the two bridges, the SPMT move, including all construction design, off-site erection, etc., was about $600k average bid.
25	How do you estimate the construction cost difference between traditional construction and ABC construction methods?	Most accurate/costly way would be to hire a construction estimator to do full comparison estimates. However, a simpler way would be to add an estimated premium for the BSA/staging area items, plus anything involved in the 80-hr weekend move, and estimate the comparative effects of traffic impacts for the two methods with known formulas.
	Questions during webinar	**Responses**
26	How were the conflicts with the telephone poles managed?	The poles and lines were moved in advance of the bridge move.
27	How was the soil compacted under the bridge to reach 90-95% modified proctor densification?	Existing foundation material upon which the GRS Abutments were placed were prepared in accordance with the RIDOT Standard Specifications. The GRS back fill material is 3/8" crushed stone and is considered "self-compacting". It was placed in 8" lifts and tightened in place by a vibratory plate compactor; It was confined by wall blocks, existing ground, and geosynthetic reinforcement.
28	Would GRS-IBS be recommended if geotech report identifies settlement concerns under existing bed rock?	This would depend upon the specific conditions and loads encountered. It would be considered, among other options.
29	Slide 15 - How did the footing leveling work? Did it require grouting after leveling?	Yes, there were leveling devices integral with the footings, and grouting was done after leveling.
30	Slide 15 - Was a special grout used in the shear keys?	Non-shrink grout used under masonry plates and horizontal or vertical shear keys and joints between the precast units was a flowable, self-leveling, high strength, non-shrink grout capable of achieving a minimum compressive strength of 1500 psi in 1 hour after placement, 3,000 psi in 3 hours after placement, and have a minimum 7-day compressive strength of 5,000 psi.

31	What was the detailed-fit condition (e.g. no load, steel dead load or total dead load) of the cross frames? How did the actual twisting compared with the predicted of the 3D FEM?	Detailed for No load fit condition. Data to compare actual rotation vs. 3D model results are not available, but there were no fit-up issues.
32	BSA Means WHAT?	Bridge Staging Area, where the superstructure was assembled.
33	Slide 19 - How much did it cost the project to relocate the electrical utilities?	About $200k. Due to the location of the utilities above and below the existing superstructure, they would have been moved even with traditional construction.
34	Slide 22 - What was the temporary shoring supported by?	The temporary shoring was supported on a concrete slab.
35	How were the precast footings leveled on the GRS?	There were leveling devices integral with the footings, and grouting was done after leveling.
36	Were the existing bridge piles and abutments left in place?	Yes, whatever portions could be buried were left in place.
37	In general, were there separate pay items for the bridge drive-ins or included in other items (e.g., steel, concrete, etc.)?	Yes, separate pay items, including "engineering, designing, detailing, and furnishing all labor, materials, equipment, and all incidentals and services required for preparing and subsequently restoring the Bridge Staging Area (BSA) and the Travel Path (TP), constructing the temporary supports to allow for the construction of the bridge superstructure, and transporting the bridge structure to its final location using Self-Propelled Modular Transporters (SPMTs)."
38	Does the SPMT machine have bearing pads on which steel beams are placed to account for deck cross-slope?	Yes, elastomeric bearing pads were provided.
39	Slide 59 - Do you have a rough cost-per-sq-ft to share for these two bridges?	The replacement costs per square foot for E. Shore Expressway Bridge and McCormick Bridge are $523/SF and $470/SF, respectively. These costs INCLUDE the SPMT costs.
40	Were side, curb and gutter restorations part of the contract road closure?	No.
41	Is there a detail of the bridge joints?	Please refer to the downloadable presentation pdf.
42	In using multiple components that were precast, were there any special sealing or waterproofing procedures utilized to ensure water does not penetrate to the substructure or foundation?	No special procedures beyond what would be done for a non-precast foundation.

43	In steel bridges with skew web the cross frames could be detailed for web to be plumb when you place the steel girder over support, after you place the concrete or final conditions after deck is hardened. So the question is what detailing method was used and how the girder rotation was compared to finite element analysis?	Cross frames were detailed for the no-load condition. Data to compare actual rotation vs. 3D model results is not available, but there were no fit-up issues.
44	Were any issues with fit-up of the structural steel due to the extreme skew?	Nothing out of the ordinary.
45	Did you have any concerning issues with the transportation of the superstructure elements ?	Just that careful elevation controls be carried out from start of the erection to the final placement.
46	How long was the advance public notice duration? Were detours provided?	About six weeks in advance. Detours were provided.
47	Was CMGC considered?	Not for this project. Although this method is being used on another project in RI.
48	What type of joint was used between the integral backwall and the precast approach slab, and how was this joint handled with the PBE erection?	A strip seal joint was used for the longer E. Shore Expressway Bridge, and an Asphaltic Plug joint for the McCormick Bridge. In both cases the joint material/gland was installed after bridge placement.
49	What happens to demolition debris after cleanup?	The contractor is required to legally dispose of it.