April 2019 ABC-UTC Webinar Featured Presentation: Caltrans' 2017 Pfeiffer Canyon Bridge Emergency Replacement		
#	Questions	Responses
	Construction and Management	
1	A summary presentation on claim handling would be interesting and beneficial to those considering ABC.	There were no contract claims. The work was contracted and performed at Time and Materials (Force Account).
2	Were there any impacts to the project schedule due to the environmental permits?	Emergency Permits were procured from the California Coastal Commission. Work was performed in accordance with this permit. Enviromential impacts were mitigated during the work with planting and utility relocation taking place after the work was completed.
3	Was the project essentially design-build? If not, were contractors part of the decision-making process for the method selected?	It was not design-build. Plans were prepared in-house. The contractor was selected early on and contributed in the decision process. The department and contractor worked together to modify the design to accommodate changes required for the launch method.
4	Can you compare and contrast the advantages of planning vs. reacting on an ABC bridge?	If the work was planned I anticipate the project duration for permits, plans and specs could have been 5 years. Staging the construction to maintain a single lane would further increase the duration another 2-3 years. The cost would increase correspondingly.
5	How did you manage the supply chain challenges? What were the key success factors from a supply chain perspective?	Utilizing the Department's public information office and Highway Patrol, we were able to coordinate supply convoys which provided materials to construct the southern abutment.
	Lessons Learned	
6	What are the lessons learned from this project?	As the girders were launched from the roadway grade, it was necessary to lower them to the abutment seat, approximately 18 feet vertically. We would consider using alternative materials for cribbing, besides 12X12 timbers, which may compress more uniformly.

7	Could you discuss any ideas/lessons learned about being able to predict this emergency replacement need?	The emergency was caused by a landslide which developed at a bridge pier column location. Very challenging to predict landslide given the weathering conditions of the Big Sur coast. That being said, the single-span replacement structure eliminated intermediate supports which may also be susceptible to a future event.
8	Were there any lessons learned that could allow for a faster delivery on future incidents that are similar in nature?	Incorporating some of the temporary launch elements into the final structure may yield time saving benefits. For example, the jack-down frames may be cast in the girder end diaphragms which would eliminate activities associated with their removal and planned bar reinforcement installation.
	Cost	
9	What would be the cost comparison between this emergency project and a normal project?	I believe construction costs can be twice as much for an emergency project, if not more.
10	What is the additional cost associated with launching vs. crane-set structural steel?	Conventional steel girder placement using multiple temporary supports and installing a tressle to support 600-ton crane was considered but eliminated as an option due to the slide adjacent to the northern abutment.
11	What is the construction cost of the project?	$21.7 million to remove and replace Pfeiffer Canyon Bridge.
	Design	
12	Was structural lightweight concrete used or considered on the bridge deck to lighten the foundation dead loads?	Lightweight concrete was not used. All concrete was normal weight. We already had deep foundations at the site (piles), due to the slide, and the minimal weight savings did not justify the extra cost and time for lightweight concrete.
13	Please comment on the conception/construction of the new bridge foundation, and the interaction between the old/new foundation.	The new bridge clear spanned the existing pile shafts at the existing columns. The existing abutments were on spread footings. The new abutments were founded on 5-foot diameter cast-in-drilled hole concrete piles. The new abutment was designed to be a "bent type" frame with a single row of 3 piles that would be more resistant to slide activity.
14	Was the bridge fracture critical?	No, it had 3 girder lines.

15	Please dig into the nitty-gritty details of steel-girder design for how this single span was achieved.	The design of the bridge was a failrly basic approach for simple-span girders and was designed per the 2012 AASHTO LRFD Bridge Design Specifications with California Amendments dated 2014. The girders depth/span ratio was 14'/310' = 0.45. The girders were spaced 14'-9" apart. The webs were designed to be unstiffened (thicker plate) to simplify and acceleratate the fabrication. It was on the contractor to verify that girders would not be overstressed during the launching process. The contractor's engineer determined that no strengthening of the girders would be required. This was partly attributed to the design having thicker unstiffened webs and Caltran's long standing policy to design splice plates for the capacity of the thinner plate (not based on loads).
16	Would you please show the sequence of activities?	See presentation.
	Questions during Webinar	
17	Which TL is the California ST-70 (Mod) bridge rail rated to?	TL-4.
18	Can you please explain the initial demolition plan for the bridge, where the wrecking-ball was being dropped onto the deck? How was that (unsuccessful) plan developed? And are there any good lessons learned from that?	The wrecking ball demo plan was to punch through the deck near/at the superstructure fracture. The free fall winch equipped with the crane was faulty and once repaired performed demo with limited success. The demo plan was changed to utilize a track-mounted impact hammer to free the bent cap from the pier column. Lesson learned: ensure equipment is fully functional prior to inviting the press.
19	Did changing the web depth change the fatigue characteristics for this project?	No. Web plate change in depth was small compared to overall depth. The web depth change at a flange was typically going from a 12'-6" deep web plate to a 12'-4 3/4" deep web plate.
20	For the successful demolition plan, the debris was dropped directly into the canyon. Was there any debris containment accounted for? If not, did this complicate debris removal, or was the debris left in the canyon?	The superstructure debris was removed from the canyon utilizing an excavator below transporting debris to crane and bucket above. The concrete, reinf, and wood were sorted up top and hauled to a local recycler.

21	What analysis/design program was used to design the steel girders?	The designer used hand calculations and the NSBA Simon program. The checker used hand calculations, NSBA Simon, and MDX programs.
22	Is the southern abutment outside of the landslide limits? It appears to be in close proximity to the slide area.	There was no slide identified at the southern abutment. The slide was at Pier 3 and in front of the northern abutment (Abutment 4).
23	Was there any consideration with using structural lightweight concrete on the bridge deck?	See question # 12 above.
24	Was a lightweight concrete deck considered for such a long single-span bridge?	See question # 12 above.
25	What was the eventual $/ft² cost?	$21.7 / (315 * 40) = $1,779 / sq ft (includes cost of bridge removal / approach pavement / drainage / guard rail).
26	Was a steel bridge considered because of speed to construction? Cost? Accelerated bridge construction?	The main reason for selecting a steel plate girder superstructure was to reduce the DL/LL ratio for this long-span structure and reduce the weight of the components that would be erected in the field. The site was narrow and remote with very limited access on the south bank. The bridge superstructure had to be constructed from the north bank. The reduced weight of girder segments would allow smaller cranes, lighter erection towers and a lighter trestle across the slide for the crane if conventional erection methods were used. The lighter superstructure would also be easier to launch uphill on the 7% grade. A cast-in-place box girder bridge, similar to the existing bridge, was not considered feasible since it would be too risky to construct falsework on the active slide.
27	Did you calculate a coefficient of friction between the rollers and the girders?	The coefficient of friction between the rollers and girders was calculated to be 5% of the launch DL. 0.05(1863 kips) = 93 kips. Combined with 7% longitudinal slope, total computed pulling force was 223 kips.
28	Was this project federally funded? What was the funding source?	Emergency SHOPP funds intially used. 75% of cost reimbursed through federal funds.
29	What is the vertical clearance under the bridge?	Up to approximantly 100 feet.

30	How was the existing bridge removed from the canyon / valley?	See response to question 20.
31	What was the live load deflection limit for this bridge, and was it verified after construction by a test?	We targeted a HL93 live load deflection limit of span/800 per AASHTO LRFD Article 2.5.2.6.2. For this bridge, the limit was about 4.65 inches. Our calculations showed deflection of about 3.6 inches. Live load deflections were not verified by a field test. The fabricated girder camber at midspan for all dead load components was approximantly 15 1/2 inches.
32	What does the bridge joint look like when using the slide-in-bridge technology? What is the width of the bridge joint? Is there an adjust joint width?	The joint seal was no different than any other bridge. We used a standard Strip Joint Seal Assembly that runs accross the entire width of the bridge. The movement rating of the joint seal assembly was 2.5 inches. After the bridge was lowered into position, the blockout for the assembly was formed into the deck and across the joint into the approach slab before the deck and approach slab concrete was poured. The joint seal assembly was placed into the blockout after the deck and approch slab concrete was cured. Concrete was then placed in the blockout to lock the joint seal assembly into the bridge.
33	What is the ADT through this area of Highway 1?	The peak ADT on Hwy 1 in the Big Sur area is 5900. The average ADT is 4100. 2017 (most recent) statistics.
34	How do you stabilize the slope of the abutment for the future?	The north abutment is outside of the mapped slide area in the Foundation Report. But if the slide does migrate toward the new abutment, it was designed to be a "bent-type " frame supported on a single row of 3 piles that should be able to let slide debris flow between the piles and also take large deflections prior to collapse. It also is possible to add a tie-back wall on the canyon face in front of the abutment.
35	Is the road at Mud Creek still closed?	No, route 1 is open.

36	What was the design of the new substructure? When did the construction start?	The abutments are cast-in-place concrete seat-type abutments with elastometric bearing pads. The abutments are supported on a single row of 3 each - 5-foot diameter cast-in-drilled hole concrete piles that are approximantly 80 feet deep. Demolition / construction commenced 03/13/17.