



**Sonny  
Ferreira/D02/Caltrans/CAGov**

11/16/2011 07:24 PM


To Dorie Mellon/HQ/Caltrans/CAGov@DOT

cc Christian Santos/D02/Caltrans/CAGov@DOT, Steve  
Elkins/D02/Caltrans/CAGov@DOT

bcc

Subject ABC construction research evaluation projects we have  
underway 10/2011 

History:

 This message has been replied to.

**Construction Evaluated Research Project - Accelerated Bridge Deck Construction -  
Improving Mobility - Craig Creek Bridge Replacement , TEH 99 (02-2C1104)  
Blaisdell Construction/ Christian Santos OSC S.R.**

This research project was to evaluate an experimental CIP PCC deck mix to facilitate accelerated construction. Funding for the project was obtained within the original contract allotment using some of the State's portion of the savings from an associated Value Engineering Cost Proposal. That VECP utilized a MABEY temporary bridge with flagger controls to complete the work in one stage rather than two.

The objective is to build a 5" thick, high quality 4000 psi crack free, and quiet, deck using conventional type II Portland cement with a shortened cure period. Currently there is no specification to address accelerated deck construction, other than using more expensive and potentially problematic rapid setting materials, most of which are proprietary. We traded 4 days of water cure for: a secondary curing compound application (100SF/gal) at the expiration of the water cure; Eclipse® 4500 Shrinkage Reducing Admixture (0.75 gal/CY) to counter long term drying shrinkage cracking, STRUX® 90/40 Synthetic macro fiber reinforcement (3 lbs/CY) to resist plastic cracking and improve toughness and post crack control performance [both W.R. Grace Products]; and POLYHEED® 1025 (7 oz/cwt = 49.4 oz/CY) mid range Type A water reducing admixture [Master Builders- BASF product] for workability and enhanced strength gain. Deck concrete was placed October 20th, and opened to traffic on October 24th using temporary k-rail to protect bridge railing construction. The deck was placed with an extra ¼" sacrificial thickness to permit full area diamond drum grinding about 6-8 weeks post placement. This will remove the curing compound and the top burlap drag surface texture to provide a smooth and quiet roadway and an opportunity to visually assess the success of the crack control strategies, and if needed, apply methacrylate deck treatment to any crack affected area. Mapping and coring of representative cracks, if any are found, is in the plan. To date, no shrinkage cracking has been observed! Craig Creek bridge replacement is designated an Accelerated Bridge Construction project by DES.

**Construction Evaluated Research Project - Embedded Fiberglass woven mesh fabric reinforced  
Polyester Overlay - Hat Creek Bridge deck rehabilitation , SHA 44 (02-2E3404)  
ACC West Coast Inc/ Steve Elkins OSC S.R.**

Background:

This project originally required removal of a 6-8"+ AC overlay and deck membrane, to be replaced with a new deck seal and HMA overlay (Plan A). In late August when the AC was removed, many of the inverted U girders were discovered to be severely deteriorated. Superstructure replacement was proposed by OSC, and concurred with by SMI, to be performed under CCO (Plan B). This option was not accepted by the HA21/HM3 Assistant Program Advisor. On September 8th, a 6" thick deck-on-deck WITH overhangs option (increasing the travelled way width, and adding weather protection to exterior girders,) was proposed to provide some structural capacity and protection for the remaining life of the superstructure while a replacement is scoped (it is estimated a replacement program will take 7-10 years to construction). This option also was concurred with by SMI, later to be reversed on Sept 14th, due to the fact the bridge was now being programmed for replacement, and the investment with the new deck and rail upgrade was deemed too expensive (Plan C). On September 23rd, details for a reinforced variable depth PCC overlay were proposed which would restore drainage (crown) and provide some structural capacity and better protection to chloride attack than the planned HMA

overlay (Plan D). On September 28th, the contractor's estimate came in about \$50k more than available contingency funds, due to the traffic control required 24/7 during the deck curing period, and the time required to drill the 1000 dowels to variable depth in the existing girders. Plan E is to go with a protective polyester concrete strategy. SMI was concerned that a standard ¾" thickness poly overlay would not be flexible enough and would soon crack due to the independent deflections of the adjacent inverted U girders.

Research Project:

This research project objective is to compare and evaluate a 2-layer variable thickness polyester overlay, with and without composite fiberglass reinforcement, for constructability and performance in reflection cracking resistance. Funding for this project was obtained within the original contract allotment utilizing savings created from minimizing polyester quantities from the other 10 bridges in this contract. This work took place over 3 days (October 25th through 27th, 2011) and cost \$135,000 including re-mobilization, extended traffic control, labor and materials. This 3 span bridge is 93' long x 32' wide. The overlay thickness varied from ¾" @ E.O.D. (requiring no adjustment to the bridge railing height) to 3-¼" at centerline (providing +/- 1.5% crossfall). The West Bound direction included a base layer and a mid-layer of Fiberglass reinforcing fabric sandwiched between the flat inverted U girder deck and two lifts of polyester concrete. The final layer of the polyester concrete also utilized a black pigmented resin to aid in combating surface freezing due to heat absorbing/retaining characteristics, and blends well with the HMA adjoining pavement. The East Bound direction consists of a two layer, conventional (non-reinforced) polyester overlay, with the exception that both layers contain the black resin pigment. Lifespan and durability of the polyester overlay has been experienced to be increased when lifts are limited to about 2 inches, and this project reflects that best practice. This rehabilitation strategy of this old structure ("reconstructed" in 1958) will provide a preservation benefit, rather than just adding HMA deadload to the structure, and will provide it superior protection over the as-bid strategy, and provides the best quality per dollar spent. This research project will allow future monitoring to determine effectiveness of crack control due to differential girder deflections which might be reflected through the polyester overlays. Side-by-side comparison for performance and effectiveness between fiberglass reinforced polyester concrete and conventional polyester overlay can be monitored over the years. If deemed successful, the fiberglass reinforcement polyester concrete 2-layer system can be adopted statewide and used for the riding surface component, and can be adapted for use in precast superstructures used in Accelerated Bridge Construction projects, eliminating the need for a separate CIP PCC deck.

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Dorie Mellon/HQ/Caltrans/CAGov

**Dorie  
Mellon/HQ/Caltrans/CAGov**  
11/15/2011 01:04 PM

To Sonny Ferreira/D02/Caltrans/CAGov@DOT  
cc

Subject Craig Creek 02-2C1104

Hi Sonny,

Thanks for the info on Craig Creek. Just a reminder to send me the current version of the Construction Evaluation Research Project report you wrote on the subject. See you Thursday!

Dorie Mellon  
Structure Policy and Innovation  
Office of Quality Management, Risk Management, Design Build and ABC

916-227-8334