HYDECK - A DURABLE AND EFFICIENT HYBRID BRIDGE DECK SYSTEM

Many states, like Wisconsin, face challenges of efficiently and rapidly replacing numerous bridge decks and of building new bridges with more durable decks. This is a large-scale problem; the northern states have tens of thousands of concrete highway bridge decks. Bridge decks are the most rapidly deteriorating, time consuming, and expensive components to construct in a bridge. HYDECK will improve the long-term durability and construction efficiency of bridge decks.

HYDECK is a hybrid deck for bridges composed of concrete and fiber reinforced plastic (FRP) forming and reinforcing elements that is easy to construct, economical, and durable. The system was applied in the construction of a new bridge in a major new interchange on USH 151 over State Route 26 north of the city of Waupun, Wisconsin in 2003. The University of Wisconsin, Madison performed the concept and testing; Alfred Benesch & Company performed the design. The bridge deck is 12.75 m (43 ft.) wide with a 32° horizontal skew and is supported by five 1.37 m (54 in.) prestressed concrete girders spaced at 2.65 m (8 ft. 8 in.) on center, and spanning two equal spans of 32.7 m (107 ft.). The deck was reinforced entirely with a reinforcement system consisting of three non-metallic FRP components, except for the cantilevered overhangs and the crash-tested barrier walls, which were reinforced with epoxy-coated steel, since FRP reinforced barrier walls had not been crash-tested at the time.

HYDECK innovative materials:

- Non-metallic, lightweight, pultruded E-glass/vinylester FRP "stay-in-place" (SIP) form.
- Non-metallic pultruded E-Glass/vinylester gird (a grating bar-mat).
- Non-metallic pultruded E-glass/vinylester FRP reinforcing bar.
- Cast-in-place and formed cantilever and bridge guardrail barrier wall.

HYDECK innovative construction technologies:

- Minimal tying and connecting of the three separate FRP elements.
- No removable formwork required between the girders.
- Plywood haunches and bracket assemblies did not need to be removed from the underside of the deck.

HYDECK innovative specifications:

- Performance specification for the three FRP material components.
- Quality Assurance specifications.

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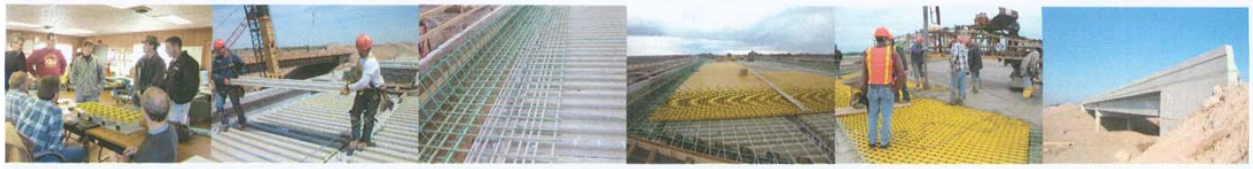

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Partially completed HYDECK reinforcement system prior to concrete placement