

Innovative Bridge Retrofit Richmond - San Rafael Bridge, CA



Aerial view of the Richmond - San Rafael Bridge.

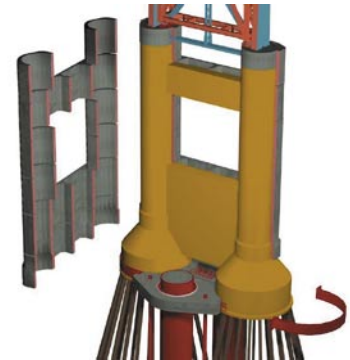
As part of the seismic retrofit design of the Richmond – San Rafael Bridge, Ben C. Gerwick, Inc. developed a concept of using precast concrete jackets to strengthen the existing concrete piers. Unlike steel jackets, concrete jackets can be designed to resist corrosion in the aggressive tidal-splash zone for the remaining 100-year life expectancy of the bridge. A concrete mix with a low water-cement ratio, fly ash, and moderate amounts of an active pozzolan will be specified to allow the jackets to be constructed using a 2.5-inch minimum concrete cover with uncoated reinforcement. The concrete in the splash and tidal zone will receive a polyurea coating. This reduced cover impedes micro cracking and reduces the weight of the jackets.

The concrete jackets will be matchcast horizontally in approximately ten ft tall segments and placed around the exist-

ing shafts, spandrel beam and diaphragm wall in two halves, connected by transverse HS rods. HS rods will also connect the precast segments vertically.

Two thirds of the precast concrete jackets will be submerged under water when placed in their final position. The precast jacket concept allows for a high degree of offsite prefabrication followed by in the wet erection with minimal use of divers.

The existing shafts are cleaned as necessary by high-pressure jets before placing the pre-cast jackets. An erection frame is placed on top of the existing shafts that allows two pre-cast segments to be placed on each side of the concrete substructure above water. HS rods are used to connect the segments on the outside of the shafts.



Rendering of pre-cast concrete jackets.

Prior to joining the segments an epoxy coating is placed on top of the match-cast surfaces. Vertical HS rods are placed in ducts and connected to the first segments through couplers and are then prestressed.

Year of Completion: 2004

Construction Cost: \$500M

Client: CALTRANS

Services Performed:

- Seismic Retrofit Design
- Seismic Vulnerability Assessment
- Design of Alternative Foundations