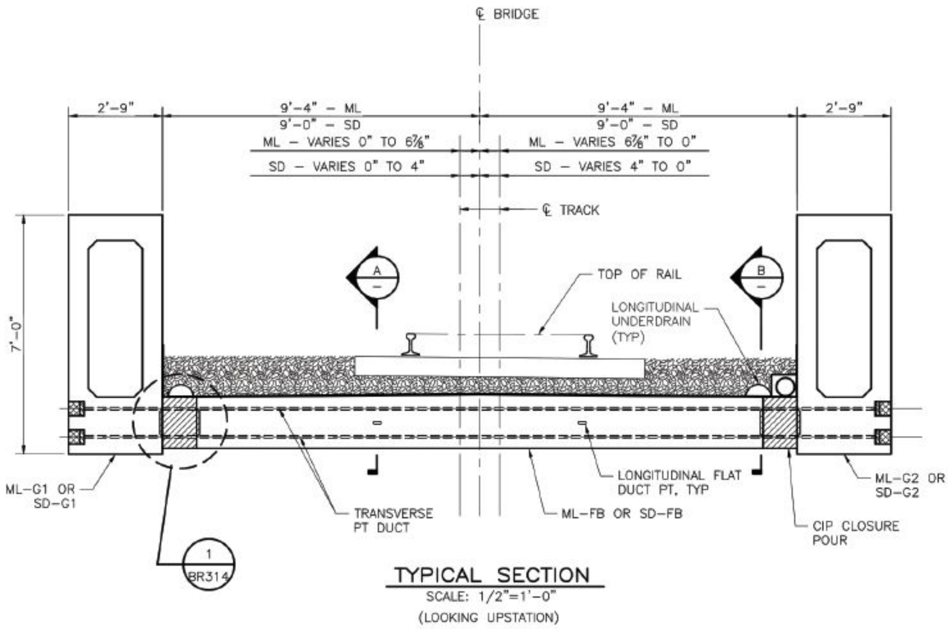

Typical cross section of the trough (U-shaped) bridges.

View from beneath an edge girder. No falsework was permitted in the creek, so the team developed a temporary support system to support the floor beams during construction. The supports were later repurposed to facilitate installation of the bridge's transverse post-tensioning. All Photos: Stacy Witbeck/Herzog.

a solid 3 ft 10 in. length at each end. The concrete compressive strength at transfer was 5 ksi, with a final design compressive strength of 8 ksi. Longitudinal reinforcement in the edge girders consists of straight longitudinal prestressing strands, a portion of which was debonded at the girder ends, and transverse PT to connect the girders with the floor beams. Mainline girders and siding girders used 58 strands and 46 strands, respectively, of 0.6-in.-diameter low-relaxation prestressing steel that was initially tensioned to $0.75f_{pu}$.

Recessed shear keys and overlapping hooked dowels connect each girder to the floor beams within the CIP longitudinal joint. The surface of the edge girders at the joint was form finished, not intentionally roughened. A small-aggregate, 5-ksi concrete was used to ensure flowability; the concrete also includes a corrosion-resistance admixture. The girders are supported at the abutments by 3-in.-thick, steel reinforced elastomeric bearing pads. Dowels were connected by a form-saver cast into the girder, with a U-bar cast into the floor-beam ends that extend into the CIP concrete joint.

The 18-in.-deep, approximately 4-ft-wide precast concrete floor beams were prestressed with eight 0.6-in.-diameter strands each. These beams vary in thickness from 19 in. at the center to 18 in. at the end, and they are topped with a slight cross slope for drainage. Concrete for the floor beams was designed for an initial compressive strength of 4 ksi, and a design compressive strength of 5 ksi. Each beam has recessed shear keys along their longitudinal edges that were grouted with 5-ksi non-shrink grout after placement, and ducts for longitudinal PT connecting the entire floor system. The floor beams were connected by PT before the longitudinal closure joint was placed.

The CIP closure joint between the floor beams and edge girders required dense reinforcement and staggered mild-steel reinforcement couplers to maintain constructability. Detailed analysis ensured that even in a hypothetical tendon-loss scenario, which was used to check for redundancy in case any one strand was compromised, shear and flexural capacity would remain adequate. Transverse PT

AESTHETICS **COMMENTARY**

by Frederick Gottemoeller

Not every bridge is a landmark bridge like the Corpus Christi Harbor Channel Crossing featured in the Winter 2026 issue of *ASPIRE*®. Many bridges, particularly those used for rail or transit like the Sonoma–Marin Area Rail Transit's (SMART's) San Rafael Creek crossing, are background bridges. They do not have a prominent scenic location; they are not meant to attract attention. However, that is not an excuse for designers to be careless about the appearance of such structures. These background bridges can still be part of important urban or rural scenes. They are aesthetic elements that can affect the overall visual quality, enjoyment, or even economic success of their surrounding communities. The SMART bridge located close to the San Rafael Station and Second Street performs that role in San Rafael.

With background bridges, visual simplicity is especially important. The SMART bridge's rectangular box girders are as simple as it gets. No shadow lines, texture, or splashes of color have been added. None are needed. The soffit (which would be important if the bridge were crossing a street) displays only the lines dividing the precast concrete slabs, and a relatively light, reflective color is used to brighten the space below the bridge. Again, this is as simple as it gets.

Although the designers selected the bridge components for structural and constructability reasons, not for visual quality, the San Rafael Creek crossing is yet another example of a "twofer," when a decision made for reasons of efficiency and economy also improves appearance. Neither a park nor a commercial establishment nearby would have any reason to complain about the detrimental effect of the appearance of the SMART bridge.