College Boulevard Golf Cart Bridge
Carlsbad, CA

Team

**Owner:**
City of Carlsbad

**Engineer:**
T.L. Lin International, San Diego, CA

**General Contractor:**
Hazard Construction Company
San Diego, CA

**Reinforcing Bar Fabricator:**
CMC Fontana Steel, Etiwanda, CA

**Concrete Supplier:**
Palomar Transit Mix, Escondido, CA

**Photography:**
T.L. Lin International, San Diego, CA

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**STRUCTURAL FRAMING SYSTEM**

The Crossings at Carlsbad golf course provides citizens with a state-of-the-art, 18-hole championship golf course that gracefully spans College Boulevard while accommodating golf carts and foot traffic. A variety of options were considered before designers planned a cast-in-place reinforced concrete structure with a 123-foot main span.

The bridge, 15’ wide with two 38-foot-long approach spans, features a single-cell box girder that provides a clean span, preventing the need for a pier in the street median. It also eliminated construction in the street that could have disrupted traffic or imperiled workers or users. The girder was fabricated with a 4,500-psi mix of concrete and Standard A706 Grade #60 reinforcing steel (rebar) to meet the stress demands of the clear span.

The cast-in-place box-girder design provided an additional benefit. Designers anticipated that the bridge might need to accommodate at least one significant water line by the time it was constructed, but documents had to be completed prior to that decision. To be conservative, the designers had specified a 5-foot-deep box girder to meet the additional depth needed to accommodate extra future utility lines. This proved to be a prudent decision, as another water line was added to the design during the design/construction process and the space also facilitated the access of the maintenance crew.

To achieve the vertical clearance needed for the arterial street, abutments had to be made 25’ high. Resisting the overturning from so much soil behind conventional back-filled abutments would have resulted in extensive and costly pile-supported foundations for both abutments and wing walls.

To create a more efficient and economical solution, designers took advantage of the bridge’s narrow width and devised transverse, hollow bin-type abutments. This design, popular in the 1940s and 1950s before prestressed concrete could extend span lengths, consists of a reinforced-concrete slab that spans 15’ transversely between the wing walls at the bridge’s edges.

*Cast-in-place reinforced concrete provided a clear span that eliminated the need for a pier in the street median.*