

# San Francisco – Oakland Bay Bridge

The San Francisco – Oakland Bay Bridge (SFOBB) sustained significant damage during the 1989 Loma Prieta earthquake in the San Francisco Bay area. The epicenter of this earthquake was 96km south of the SFOBB. This 15-second event collapsed an upper section of the bridge killing a motorist and causing the bridge to be closed for one month.

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(Photos: John Huseby, California Department of Transportation.)

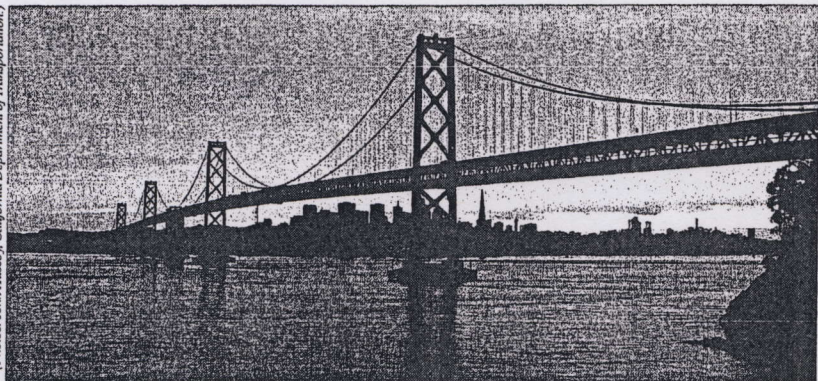


Figure 1: The existing span of the San Francisco – Oakland Bay Bridge at sunset.

The earthquake, coupled with the 1994 Northridge earthquake, highlighted the seismic vulnerability of all state-owned toll bridges. As a result, the state of California enacted the State Toll Bridge Seismic Retrofit Programme (TBSRP) in August 1997. The replacement of the east span of the SFOBB is the largest portion of this retrofit project.

### Construction of the east span

The construction of the new SFOBB east span comprises two distinct elements: the Skyway and the main span. The Skyway element consists of cast-in-place vertical elements and precast box girders/decks. The precast section is being completed in segments using travellers. Each segment is like building an entire structure. The bridge deck is 8.5m wide. The segments coming off a pier table weigh in excess of 800 tonnes each, making them amongst the largest precast segments ever built.

On the contract plan, 'inserts' were specified at the diaphragm beams and walls to allow for the movement of the traveller forms through the interior of the segments, as is typical of most interior structures on a segmental bridge. To meet this specification, it was possible to use inserts with machine-threads or LENTON taper-threaded splices. The LENTON FORM SAVER meets the California Department of Transportation's stringent performance-based require-

ments for mechanical reinforcement connectors. LENTON taper-threaded splices were chosen because the contractor considered that a taper thread was more durable than a machine thread. Cost was also a factor.

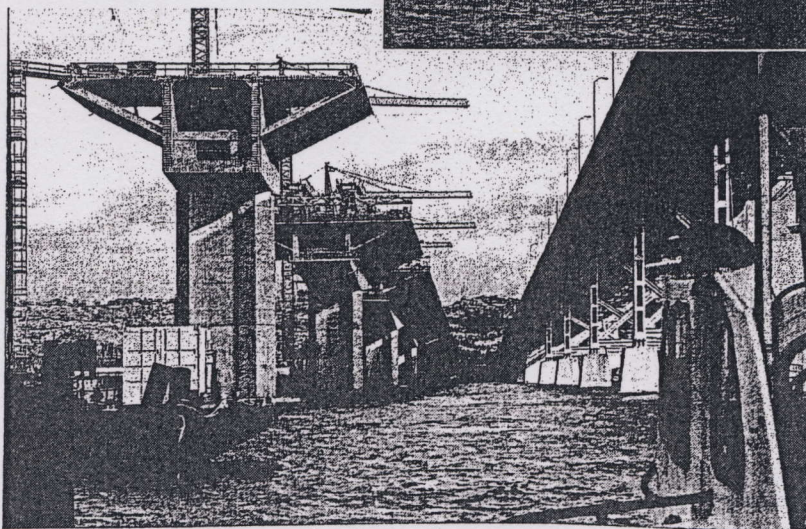
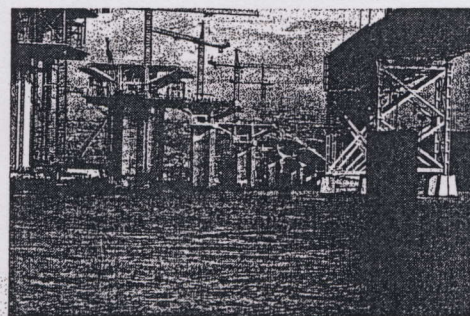
### Coupler taper threaded design

LENTON FORM SAVER is ideal for eliminating protruding dowel bars in segmental pour applications and temporary openings. It is uniquely designed with the LENTON tapered thread, factory-

installed thread protector and a mounting plate for easy attachment to the form. These exclusive dowel bar assemblies from ERICO provide continuity and structural integrity to reinforced concrete construction. The taper threaded design, like the complete family of LENTON couplers, provides load path continuity in tension, compression and stress reversal applications. The splices outperform dowel bars because of their ability to develop strength requirements independent of concrete cover.

### Conclusion

Originally estimated at a cost of US\$1.29 billion, the project estimate has escalated to US\$5.13 billion. No bridge has ever been required to meet such a demanding combination of environmental, seismic and aesthetic requirements. ■



Figures 2 & 3: The bridge deck and box girders.