



Photo courtesy of Martin Chandrawinata, Caltrans

FAST FACTS

- The Bay Bridge is comprised of two separate bridges (West Span and East Span), a tunnel, and a mile-long elevated roadway in San Francisco.
- The entire structure, including the bridge and its approaches, is 8.4 miles long. This length extends from the MacArthur Maze freeway interchange in Oakland to the end of the 5th Street off-ramps in San Francisco.
- The East Span project was divided into four main construction projects: the Yerba Buena Island Transition Structure, the Self-Anchored Suspension Span, the Skyway, and the Oakland Touchdown.
- Together, these four structures form the 2.2-mile East Span, which consists of:
 - ▶ Approximately 250,000 metric tons of steel
 - ▶ Approximately 432,344 cubic meters of concrete
 - ▶ 273 light poles and more than 48,000 individual LEDs in 1,521 light fixtures
 - ▶ A main cable that is nearly 1-mile long but comprised of more than 14,800 miles of steel wire
- Number of countries involved in the project: 8
- 1/3 of the states in the United States and 12 cities in California contributed to the bridge's building
- Weekday average total of vehicles that crossed the span for 2012–2013: 250,000



THE SAN FRANCISCO-OAKLAND BAY BRIDGE SEISMIC SAFETY PROJECTS

CALTRANS

BAY AREA TOLL AUTHORITY

CALIFORNIA TRANSPORTATION COMMISSION



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PROJECT OVERVIEW

The San Francisco-Oakland Bay Bridge is one of the busiest bridges in the United States, with more than 250,000 vehicles crossing the span each day. This traffic makes the Bay Bridge the workhorse bridge of the Bay Area, one that often has been overshadowed by other iconic structures. That has changed with the retrofit of the Bay Bridge, which not only enhanced the bridge seismically and structurally, but also stylistically. The bridge is now one of the most seismically advanced bridges in the world, and the Bay Area has added another unique structure to its world-famous skyline.

A Bridge of Firsts

The new East Span of the Bay Bridge, which connects Yerba Buena Island with Oakland, has achieved many firsts. The Guinness World Records has named the Bay Bridge the world's longest self-anchored suspension span bridge (2,047 feet) and also the widest bridge in the world, with a total deck width of 258.33 feet. This is the first suspension bridge without a connection between

the road-decks and the tower. It is the first to use fusible shear links in its tower to protect the tower shafts during an earthquake, and its tower has the world's largest cable saddle for a suspension bridge. And for the first time in history, pedestrians and cyclists have the chance to travel on the Bay Bridge.

Seismic Innovations

Public safety is of the utmost importance and prime motivation in building the new Bay Bridge. The new bridge is designed to meet the most stringent earthquake standards and to act as a regional lifeline structure, opening to traffic quickly after the strongest ground motions that engineers expect in a 1,500-year period. This is in sharp contrast to the original East Span, which was designed with truck loads and winds, rather than seismic safety, in mind.

The west half of the bridge between San Francisco and Yerba Buena Island underwent extensive seismic retrofitting yet retains its original appearance. On the West Approach, the 1-mile stretch of Interstate 80 in San Francisco, six off- and on-ramps were demolished and rebuilt. The upper and lower decks were given independent columns and foundation support systems. On the West Span, a half million original rivets were replaced with nearly twice as many high-strength bolts. Seventeen million pounds of structural steel was added, and new bracing was installed under both decks. The “laced” diagonal cross beams connecting the upper and lower road-decks were replaced with perforated steel.

The new East Span consists of the self-anchored suspension bridge with a single steel tower and a 1.2-mile-long elevated Skyway viaduct that descends gradually towards the Oakland shoreline. The new span has been made seismically resilient with groundbreaking technology and enhancements, some never before used in bridge building. Seismic innovations, such as fusible shear links in the tower, battered piles in the Skyway’s foundations, and hinge pipe beams in the road-decks, have been designed to absorb the damage from an earthquake and to protect the structural elements of the bridge. These innovations will allow the bridge not only to withstand heavy seismic activity but to last for its expected 150-year lifespan.



Hinge pipe beams

Photo credit: ©2014 Caltrans



Shear link beams

Photo credit: ©2014 Caltrans



Battered piles



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History

On September 2, 2013, the new East Span of the San Francisco-Oakland Bay Bridge opened. It was a long and challenging, yet ultimately rewarding path to that moment.

When a 250-ton section of the original East Span’s upper deck collapsed during the Loma Prieta earthquake, the bridge quickly reopened within a month. Yet a critical question lingered: How could the Bay Bridge be strengthened to withstand the next major earthquake? Any answer had to ensure that the Bay Bridge would survive heavy seismic activity and provide access for emergency services and rebuilding efforts.

After performing an exhaustive study, seismic experts determined that replacing the East Span was the best way to make a bridge of this size seismically safe. And so a new bridge was built—one that will be resilient against powerful earthquakes for generations to come.

World-class Design

The new East Span’s design is unique and iconic while remaining graceful. Unlike the boxy and utilitarian original East Span, the new span is made up of side-by-side bridges that provide sweeping, unencumbered views of the Bay. The bridge’s signature element, the self-anchored suspension span, features an asymmetric design. The span’s single 525-foot-tall tower is closer to the west end, creating a distinctive silhouette, with the single 1-mile-long main cable presenting a sharper angle on the west side but a more sloping appearance on the east. The entire suspension span is painted “Bay Bridge White” to match the container cranes in the Port of Oakland.

Bicycle and Pedestrian Path

For the first time in history, pedestrians and cyclists have the chance to travel across the new East Span of the San Francisco-Oakland Bay Bridge.

Two-thirds of the Bay Bridge Trail opened to the public on September 3, 2013, allowing visitors to traverse just past the span’s 525-foot signature tower. Before the pathway can reach Yerba Buena Island, contractors must dismantle a portion of the original bridge that sits in the way.

Citizen advocacy and public participation were key in turning the possibility of a pathway into a reality. Bicycle-related organizations joined together to advocate that the world class design of the new span include access for bicyclists and pedestrians.

The single, 15.5-foot-wide path that we have today—with one lane in each direction for bicyclists and an outside lane designated for walkers—reflects the work and dedication of these advocacy groups. The bike and pedestrian path is named after the late East Bay Bicycle Coalition founder and Bay Bridge Trail advocate, Alex Zuckermann. A plaque bearing his name is located on the trail.