



## *An American Tour:* *10*



### **San Francisco's Bay Bridge**

Conceived in the Gold Rush Days, a bridge spanning the San Francisco Bay linking The cities of San Francisco and Oakland always seemed like an engineering and financial impossibility. The water separating the cities was too deep and wide. In fact, in 1921 a transbay underwater tube crossing was recommended as the best way of crossing the bay. However this idea was soon deemed inappropriate for automobile traffic.

Practical and economic concerns would make the bridge a reality. Oakland streetcar lines were laid out to feed passengers to a fleet of ferry boats traversing the bay. In 1928, ferries carried over 46 million passengers between the two shorelines. Finally, with the popularity and mass production of the automobile, it was determined that a bridge was necessary and such a structure could support itself with tolls.

In 1926, the California Legislature created the Toll Bridge Authority, with the responsibility for bridging San Francisco and Alameda County. The challenges facing the Toll Bridge Authority were monumental. California State Highway Engineer Charles C. Purcell was put in charge of organizing the design and construction of the Bay Bridge. Fortunately, between the two shorelines was a mountain of shale rock rising above the Bay: Yerba Buena Island. The island divides the Bay into two sections allowing for two crossings, which would meet at the island. Yet spanning the 1.78 miles between the San Francisco and Yerba Buena Island required ingenuity on a grand scale. The water, 100 feet deep at some points, and the underlying soil conditions required new techniques for placing bridge foundations. The solution: build two suspension bridges. Purcell decided to build a center anchorage between the shoreline and Yerba Buena Island supporting one end of each of the two suspension bridges connecting Yerba Buena Island with San Francisco.

Almost as soon as the bridge was opened in 1936, traffic on the Bay Bridge exceeded levels predicted for 1950. The bridge operators lowered tolls in an attempt to lure ferry users. The strategy was successful. In the early years, the bridge carried three lanes of auto traffic in each direction on the upper deck. In 1958, \$49 million was allocated to re-configure the bridge. The railway system was removed and the upper deck was re-aligned to carry five lanes of westbound truck and auto traffic. The lower deck carried five lanes of eastbound traffic. The road deck through Yerba Buena Island had to be lowered to accommodate the large trucks that would now be allowed on the upper lanes. This work was done while traffic continued to use the bridge.

A section of the bridge was damaged in the 1989 Loma Prieta earthquake which measured 7.1 on the Richter scale. The earthquake demonstrated that despite the Bay Bridge's behemoth stature and deep piers, it was vulnerable to damage during strong quakes. Retrofit work to prevent any future failures has begun.

#### **Bay Bridge Facts:**

- Length: 4.5 miles; total project: 8.4 miles.
- Deepest Bridge Pier: 242' below water level - 396 feet high
- Tunnel: Largest bore tunnel in the world: 76' wide, 58' high (546 meters (1700') long)
- Opened: November 12, 1936
- Cost: \$77 million (Including Transbay Transit Terminal)
- Avg. Daily Traffic: 270,000 vehicles

<http://www.dot.ca.gov/hq/esc/tollbridge/SFOBB/>

