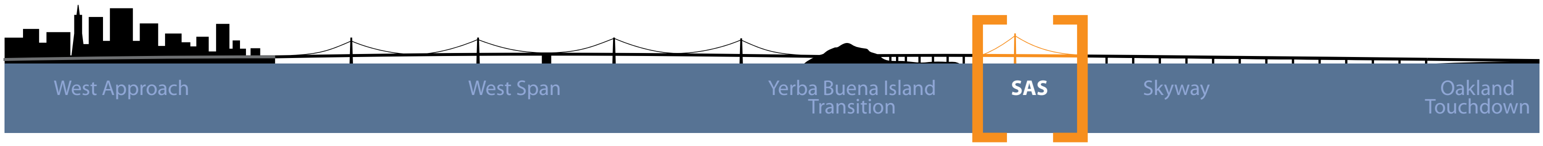
THE SAN FRANCISCO-OAKLAND
BAY BRIDGE SEISMIC SAFETY PROJECTS

CALTRANS BAY AREA TOLL AUTHORITY CALIFORNIA TRANSPORTATION COMMISSION



FACT SHEET

Self-Anchored Suspension Span

The elegant single-tower Self-Anchored Suspension span will be the signature architectural feature of the new East Span of the Bay Bridge.

PROJECT OVERVIEW

When completed, the Self-Anchored Suspension span (SAS) will transform the bridge's appearance with its unique, asymmetric design. With a main span length of 1,263 feet, the SAS will be the longest single-tower, self-anchored suspension bridge in the world. Motorists will be able to enjoy a dramatic view of the Bay Area's landscape while driving under an angled canopy of suspension cables.

The 2.2-mile East Span of the bridge includes two main sections: a Self -Anchored Suspension structure with a single 525-foot-tall steel tower and a 1.2-mile-long elevated Skyway viaduct, which descends gradually towards the Oakland shoreline. The roadways, configured as upper and lower decks on the original East Span, will be built as two parallel roadways with five lanes each. The new span will feature a cantilevered bicycle/pedestrian path on the eastbound (south) side and lighting designed to underscore its beauty. All elements of the SAS, including the tower, piers, color and lighting, will emphasize an elegant, futuristic appearance.

The transition structure connecting the SAS to the Yerba Buena Island (YBI) tunnel will join the parallel decks of the Skyway and SAS with the tunnel's double deck structure. When construction has been completed on the new span, the existing East Span will be demolished.

Key Facts

- *The SAS contract is the largest public works contract in California's history*
- *Construction Start Date: May 2006*
- *Anticipated Completion Date: late 2013*
- *SAS Design: T.Y. Lin/Moffatt Nichol Engineers, Joint Venture*
- *SAS Tower, Cables, and Roadway Construction: American Bridge/ Fluor Enterprises, Joint Venture*
- *Yerba Buena Island Foundations (W2): West Bay Builders, Inc.*
- *Marine Foundations (T1 & E2): Kiewit/FCI/Manson, Joint Venture*
- *The SAS will require 67,000 tons of steel for its superstructure and tower.*
- *At 525 feet, the SAS tower will complement the towers of the Bay Bridge's West Span adjoining San Francisco.*
- *Total Length of SAS Span: 2,047 feet*

The SAS is one of a series of Bay Bridge Seismic Safety Projects to strengthen the bridge. The East Span, between Yerba Buena Island and Oakland, is being entirely rebuilt.

A seismic retrofit of the bridge's West Span was completed in 2004.

For more information about the SAS, visit *www.baybridgeinfo.org*

"Motorists will enjoy a dramatic view of the bay while driving under an angled canopy of suspension cables."

Artist's rendering of the bicycle/pedestrian path to Yerba Buena Island

DESIGN ELEMENTS

The SAS has been designed to be aesthetically unique as well as functional—capable of withstanding a major earthquake.

The single steel tower is made up of four separate legs connected by shear link beams, which are designed to move separately and to distort and absorb most of the shock during an earthquake and to prevent catastrophic damage to the main structure. Damaged beams can later be removed and replaced. The tower legs are tapered and slender to enhance their appearance and to allow light to penetrate the tower's interior.

Traditional suspension bridges have two separate main cables with smaller suspender cables connected to them. These cables support the roadway deck and are anchored to separate structures in the ground. By contrast, although there appear to be two main cables on the SAS, there is actually just one continuous main cable that is anchored within the decks at the eastern end. This cable is carried over the tower and wrapped around the two side-by-side decks at the western end. It is this asymmetric design of the cable, and the fact that the span itself is asymmetric (the section east of the tower is longer than the section to the west), that lend a unique, dynamic appearance to the SAS span.

On the south side of the eastbound deck, a 15-foot wide bicycle/pedestrian path will be cantilevered off the structure slightly above the roadway—so that it almost appears to "float" alongside the bridge. It will be separated from traffic by the roadway shoulder, traffic barrier, and the inside railing of the pathway. The "new" East Span will also feature seven scenic viewing platforms or "belvederes." The belvederes will provide a place for pedestrians to pause, rest, and experience the view.

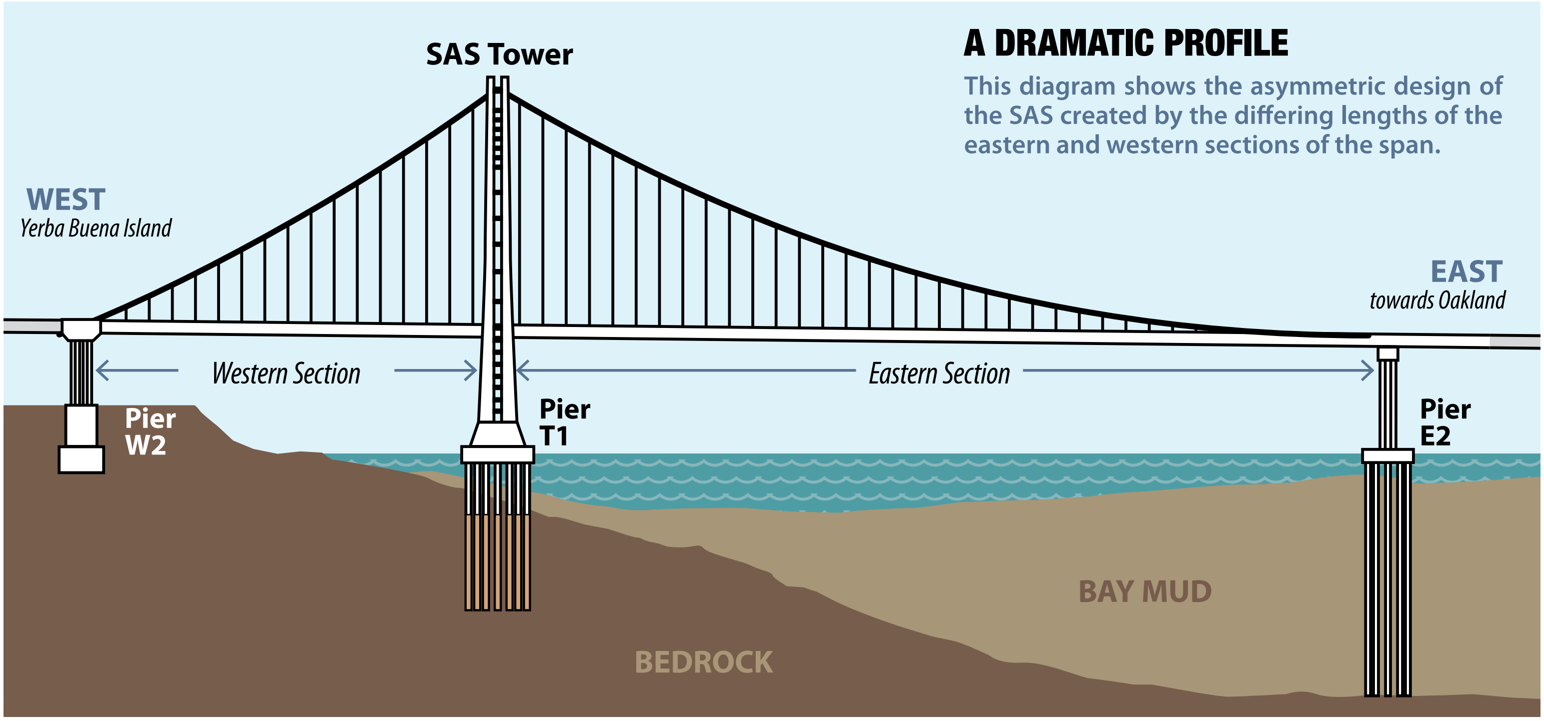
SAS FOUNDATIONS

Two massive marine foundations will provide a solid base of support for the 525-foot-tall tower (T1) of the SAS span and the eastern end of the road decks (E2). Two land-based structures (W2) on Yerba Buena Island will support the western end of the SAS, where the tower's main cable wraps under the roadbed. The W2 foundations were completed in 2004.

A DIFFERENT KIND OF BRIDGE

One continuous main cable, anchored in the eastern section of the SAS, is carried over the single tower, then extends down and loops around the two western decks at the W-2 foundation on Yerba Buena Island.

Anchoring the main cable within the deck itself puts the span into compression and enables it to remain standing. In a traditional suspension span, tension created in the main cables is resisted by anchorages in the soil.



THE BUILDER:
American Bridge/
Fluor Enterprises, Joint Venture

Founded in 1900, the American Bridge Company has a long history of bridge building, specializing in technically and logistically complex projects of all sizes. The company's connection to the Bay Bridge dates back to 1936, when it played a major role in building the bridge's East and West Spans.

The Fluor Corporation is one of the world's largest publicly owned engineering, procurement, construction, and maintenance services companies. In business for approximately 100 years, today the company serves a wide range of industries, including transportation infrastructure.

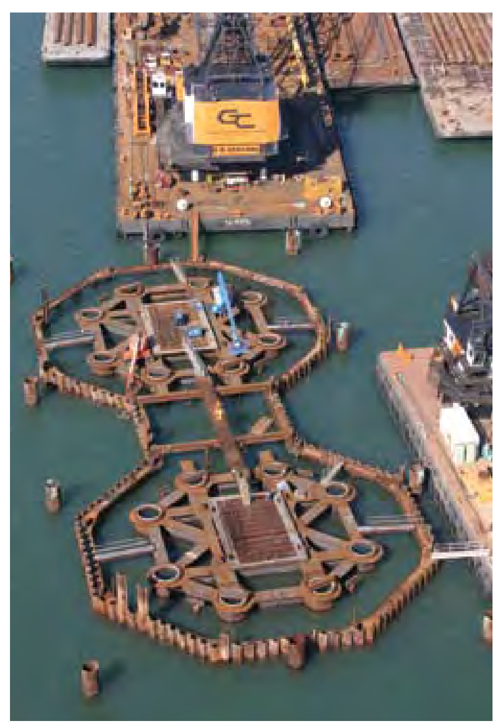
THE T1 FOUNDATION consists of a steel footing box welded to steel shells surrounding each of the 13 Cast In Drilled Hole (CIDH) concrete piles. The footing box was fabricated by Kiewit Offshore Services in Texas and shipped by barge to the job site via the Panama Canal. The piles extend 196 feet below the waterline and are anchored into bedrock. Connecting the foundation into solid bedrock posed a considerable challenge, which was overcome through a process called "rock socketing." The CIDH piles are comprised of two parts. The lower portion of the pile is made up of heavily reinforced concrete and placed within shafts, which are drilled into bedrock. These shafts are referred to as rock sockets; they anchor the piles deep within the bedrock. The upper portion of the pile is a permanent steel shell, about eight feet in diameter, and filled with more heavily reinforced concrete. This shell is welded to the footing box. The entire steel footing box is encased in concrete to make up the tower foundation, which will measure 85 feet long, 73 feet wide, and 21 feet thick.

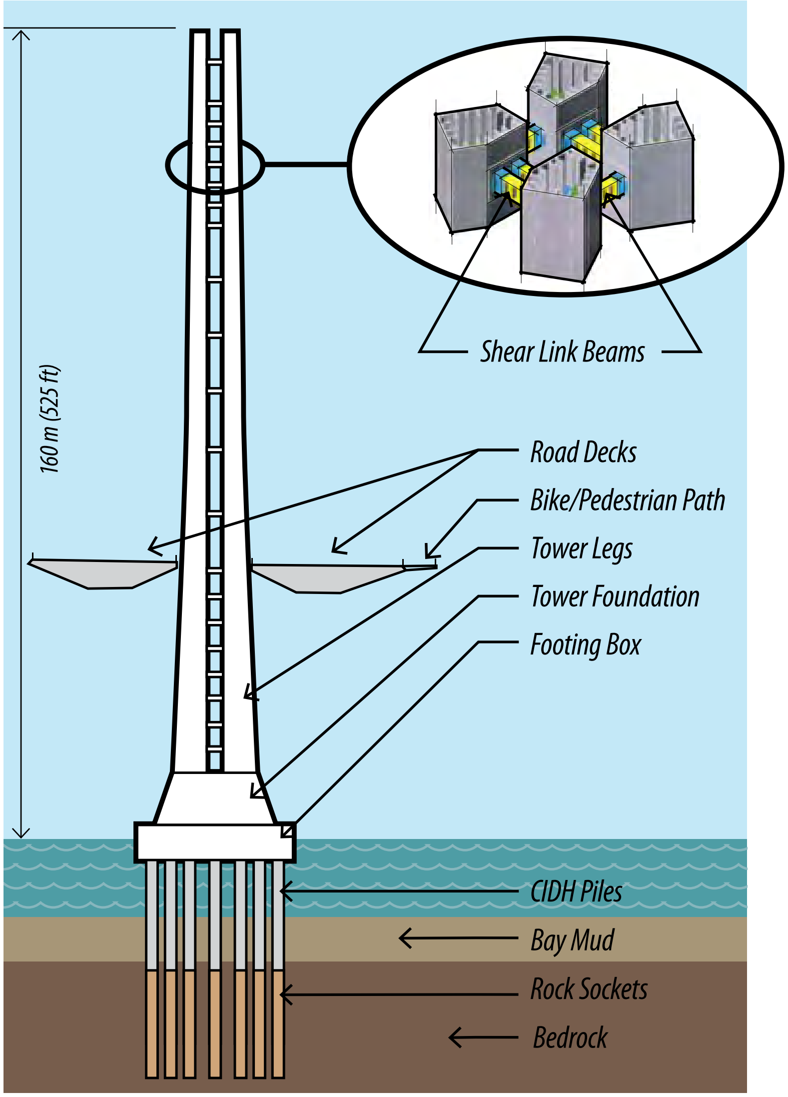
One of the 13 piles of the T1 foundation contains seismic monitoring equipment to collect valuable information, which can be used by the California Division of Mines and Geology to describe the ground motion in an earthquake.

THE E2 FOUNDATION is comprised of twin structures to support the separate east- and westbound bridge decks. The foundations will be linked by a 52-foot-long steel girder. The overall dimensions of the foundation will be 200 feet long by 80 feet wide. Because of the geology east of the tower, the 16 piles supporting the E2 foundation are driven nearly 340 feet to reach bedrock. The steel piles are driven in two sections of more than 150 feet each and welded together. Reinforced concrete is poured into the steel casings to make up the Cast In Steel Shell (CISS) piles. Two concrete pier columns rest on each footing and reach approximately 120 feet above the water, where they are to be linked later by a cap beam beneath the SAS bridge deck.

E2 FOUNDATION

This foundation will support the eastern end of the SAS. Each section rests on 16 CISS piles which extend nearly 340 feet to rest on bedrock.





SHOCK ABSORBERS

Shear link beams are designed to move separately and to distort and absorb most of the energy during an earthquake.

THE TOWER THAT SUPPORTS IT ALL

The tower of the SAS is composed of four separate legs, connected by shear link beams. A 15-foot-wide bicycle/pedestrian path will be cantilevered off the south side of the eastbound deck, and will appear to be "floating" alongside the bridge. The T1 foundation consists of a steel footing box, which is welded to steel shells surrounding 13 Cast in Drilled Hole (CIDH) concrete piles. The lower portion of the pile, which is composed of massive amounts of reinforced concrete, is anchored deep into bedrock through a method called "rock socketing."

W2 PIERS, the two massive piers on Yerba Buena Island (YBI), will provide essential support for the western end of the SAS bridge, where the main cable for the suspension span will extend down from the tower and wrap under the western end of the road deck. These foundations were built through a separate contract.

Each pier measures 66 feet long by 66 feet wide and is 30 feet deep. A set of four support columns rise 100 feet from each concrete foundation to the bottom of the cap beam, which will be constructed as part of the SAS superstructure. The foundations extend down approximately 80 feet through the island's solid rock. These piers include the steel frames used as part of the cap beam tie-down, necessary because the cables do not anchor at the west end of the SAS. The project also involved the construction of retaining walls surrounding the base of the piers.

Building these huge piers required massive amounts of concrete, which was poured for both piers simultaneously and continued for several days. Curing this amount of concrete presented a considerable challenge, because concrete tends to produce heat as it cures and can easily crack. This was addressed by pumping cold water through a system of PVC pipes running through the concrete.

In total, the building of the W2 foundations required 2,000 tons of steel reinforcement and over 12,000 cubic meters (15,700 cubic yards) of concrete.

ANCHORING THE T1 TOWER

This giant rig is used to drill through over 200 feet of rock to create 13 "rock sockets," which will be filled with structural steel and concrete. These structures securely anchor the SAS tower into the bedrock beneath the bay.

This is one in a series of fact sheets available on the
San Francisco-Oakland Bay Bridge Seismic Safety Projects published by the
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