**Golden Gate Bridge**

From Wikipedia, the free encyclopedia

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| **Golden Gate Bridge** | |
|  | |
| **Carries** | 6 lanes of [US 101](http://en.wikipedia.org/wiki/U.S._Route_101_in_California) / [SR 1](http://en.wikipedia.org/wiki/California_State_Route_1) , pedestrians and bicycles |
| **Crosses** | [Golden Gate](http://en.wikipedia.org/wiki/Golden_Gate) |
| **Locale** | [San Francisco](http://en.wikipedia.org/wiki/San_Francisco), [California](http://en.wikipedia.org/wiki/California) and [Marin County, California](http://en.wikipedia.org/wiki/Marin_County,_California) |
| **Maintained by** | [Golden Gate Bridge, Highway and Transportation District](http://en.wikipedia.org/wiki/Golden_Gate_Bridge,_Highway_and_Transportation_District) |
| **Designer** | [Joseph Strauss](http://en.wikipedia.org/wiki/Joseph_Strauss_(engineer)), [Irving Morrow](http://en.wikipedia.org/wiki/Irving_Morrow), and [Charles Ellis](http://en.wikipedia.org/wiki/Charles_Ellis) |
| **Design** | [Suspension](http://en.wikipedia.org/wiki/Suspension_bridge), [truss arch](http://en.wikipedia.org/wiki/Truss_arch_bridge) & [truss causeways](http://en.wikipedia.org/wiki/Truss_bridge) |
| **Total length** | 1.7 mi (2.7 km) or 8,981 ft (2,737.4 m) |
| **Width** | 90 ft (27.4 m) |
| **Height** | 746 ft (227.4 m) |
| **Longest span** | 4,200 ft (1,280.2 m) |
| **Vertical clearance** | 14 ft (4.3 m) at toll gates, higher truck loads possible |
| **Clearance below** | 220 ft (67.1 m) at [mean high water](http://en.wikipedia.org/wiki/Tide) |
| **Opened** | May 27, 1937 |
| **Toll** | [US$](http://en.wikipedia.org/wiki/United_States_dollar)6.00 (southbound) ([US$](http://en.wikipedia.org/wiki/United_States_dollar)5.00 with [FastTrack](http://en.wikipedia.org/wiki/FasTrak)) |
| [**Daily traffic**](http://en.wikipedia.org/wiki/Average_daily_traffic) | 118,000 |
| **Connects:** [**San Francisco Peninsula**](http://en.wikipedia.org/wiki/San_Francisco_Peninsula) **with** [**Marin County**](http://en.wikipedia.org/wiki/Marin_County) |  |
| [**Coordinates**](http://en.wikipedia.org/wiki/Geographic_coordinate_system) | [37°49′11″N 122°28′43″W﻿ / ﻿37.81972°N 122.47861°W﻿ / 37.81972; -122.47861](http://toolserver.org/~geohack/geohack.php?pagename=Golden_Gate_Bridge&params=37_49_11_N_122_28_43_W_region:US-CA_type:landmark)[Coordinates](http://en.wikipedia.org/wiki/Geographic_coordinate_system): [37°49′11″N 122°28′43″W﻿ / ﻿37.81972°N 122.47861°W﻿ / 37.81972; -122.47861](http://toolserver.org/~geohack/geohack.php?pagename=Golden_Gate_Bridge&params=37_49_11_N_122_28_43_W_region:US-CA_type:landmark) |
|  | |

The **Golden Gate Bridge** is a [suspension bridge](http://en.wikipedia.org/wiki/Suspension_bridge) spanning the [Golden Gate](http://en.wikipedia.org/wiki/Golden_Gate), the opening of the [San Francisco Bay](http://en.wikipedia.org/wiki/San_Francisco_Bay) into the [Pacific Ocean](http://en.wikipedia.org/wiki/Pacific_Ocean). As part of both [U.S. Route 101](http://en.wikipedia.org/wiki/U.S._Route_101_in_California) and [California State Route 1](http://en.wikipedia.org/wiki/California_State_Route_1), it connects the city of [San Francisco](http://en.wikipedia.org/wiki/San_Francisco) on the northern tip of the [San Francisco Peninsula](http://en.wikipedia.org/wiki/San_Francisco_Peninsula) to [Marin County](http://en.wikipedia.org/wiki/Marin_County,_California). The Golden Gate Bridge was the [longest suspension bridge span](http://en.wikipedia.org/wiki/List_of_longest_suspension_bridge_spans) in the world when it was completed during the year 1937, and has become one of the most internationally recognized symbols of San Francisco, [California](http://en.wikipedia.org/wiki/California), and of the [United States](http://en.wikipedia.org/wiki/United_States). Since its completion, the span length has been surpassed by eight other bridges. It still has the second longest suspension bridge main span in the United States, after the [Verrazano-Narrows Bridge](http://en.wikipedia.org/wiki/Verrazano-Narrows_Bridge) in [New York City](http://en.wikipedia.org/wiki/New_York_City). In 1999, it was ranked fifth on the [*List of America's Favorite Architecture*](http://en.wikipedia.org/wiki/List_of_America%27s_Favorite_Architecture_according_to_the_AIA) by the [American Institute of Architects](http://en.wikipedia.org/wiki/American_Institute_of_Architects).

**History**

**Ferry service**



Golden Gate with [Fort Point](http://en.wikipedia.org/wiki/Fort_Point,_San_Francisco) in foreground, [circa](http://en.wikipedia.org/wiki/Circa) 1891

Before the bridge was built, the only practical short route between San Francisco and what is now Marin County was by boat across a section of San Francisco Bay. Ferry service began as early as 1820, with regularly scheduled service beginning in the 1840s for purposes of transporting water to San Francisco. The Sausalito Land and Ferry Company service, launched in 1867, eventually became the Golden Gate Ferry Company, a [Southern Pacific Railroad](http://en.wikipedia.org/wiki/Southern_Pacific_Railroad) subsidiary, the largest ferry operation in the world by the late 1920s. Once for railroad passengers and customers only, Southern Pacific's automobile ferries became very profitable and important to the regional economy. The ferry crossing between the [Hyde Street Pier](http://en.wikipedia.org/wiki/Hyde_Street_Pier) in [San Francisco](http://en.wikipedia.org/wiki/San_Francisco) and [Sausalito](http://en.wikipedia.org/wiki/Sausalito) in Marin County took approximately 20 minutes and cost [US$](http://en.wikipedia.org/wiki/United_States_dollar)1.00 per vehicle, a price later reduced to compete with the new bridge. The trip from the [San Francisco Ferry Building](http://en.wikipedia.org/wiki/San_Francisco_Ferry_Building) took 27 minutes.

Many wanted to build a bridge to connect San Francisco to Marin County. San Francisco was the largest American city still served primarily by ferry boats. Because it did not have a permanent link with communities around the bay, the city’s growth rate was below the national average. Many experts said that a bridge couldn’t be built across the 6,700 ft (2,042 m) strait. It had strong, swirling tides and currents, with water 500 ft (150 m) in depth at the center of the channel, and frequent strong winds. Experts said that ferocious winds and blinding fogs would prevent construction and operation.



Seen from edge of Baker Beach

**Conception**

Although the idea of a bridge spanning the Golden Gate was not new, the proposal that eventually took place was made in a 1916 [San Francisco Bulletin](http://en.wikipedia.org/wiki/San_Francisco_Bulletin) article by former engineering student James Wilkins. San Francisco's City Engineer estimated the cost at $100 million, impractical for the time, and fielded the question to bridge engineers of whether it could be built for less. One who responded, [Joseph Strauss](http://en.wikipedia.org/wiki/Joseph_Strauss_(engineer)), was an ambitious but dreamy engineer and poet who had, for his [graduate thesis](http://en.wikipedia.org/wiki/Thesis), designed a 55-mile (89 km) long railroad bridge across the [Bering Strait](http://en.wikipedia.org/wiki/Bering_Strait). At the time, Strauss had completed some 400 [drawbridges](http://en.wikipedia.org/wiki/Drawbridges)—most of which were inland—and nothing on the scale of the new project. Strauss's initial drawings were for a massive [cantilever](http://en.wikipedia.org/wiki/Cantilever) on each side of the strait, connected by a central suspension segment, which Strauss promised could be built for $17 million.

Local authorities agreed to proceed only on the assurance that Strauss alter the design and accept input from several consulting project experts. A suspension-bridge design was considered the most practical, because of recent advances in [metallurgy](http://en.wikipedia.org/wiki/Metallurgy).

Strauss spent more than a decade drumming up support in Northern California. The bridge faced opposition, including litigation, from many sources. The [Department of War](http://en.wikipedia.org/wiki/United_States_Department_of_War) was concerned that the bridge would interfere with ship traffic; the navy feared that a ship collision or sabotage to the bridge could block the entrance to one of its main harbors. Unions demanded guarantees that local workers would be favored for construction jobs. Southern Pacific Railroad, one of the most powerful business interests in California, opposed the bridge as competition to its ferry fleet and filed a lawsuit against the project, leading to a mass boycott of the ferry service. In May 1924, Colonel Herbert Deakyne held the second hearing on the Bridge on behalf of the [Secretary of War](http://en.wikipedia.org/wiki/United_States_Secretary_of_War) in a request to use Federal land for construction. Deakyne, on behalf of the Secretary of War, approved the transfer of land needed for the bridge structure and leading roads to the "Bridging the Golden Gate Association" and both San Francisco County and Marin County, pending further bridge plans by Strauss. Another ally was the fledgling [automobile industry](http://en.wikipedia.org/wiki/Automobile_industry), which supported the development of roads and bridges to increase demand for automobiles.

The bridge's name was first used when the project was initially discussed in 1917 by [M.M. O'Shaughnessy](http://en.wikipedia.org/wiki/Michael_O%27Shaughnessy), city engineer of San Francisco, and Strauss. The name became official with the passage of the [Golden Gate Bridge and Highway District](http://en.wikipedia.org/wiki/Golden_Gate_Bridge,_Highway_and_Transportation_District) Act by the [state legislature](http://en.wikipedia.org/wiki/California_State_Legislature) in 1923.

**Design**



South tower seen from walkway



Viewpoint of North end, showing lanes and traffic.

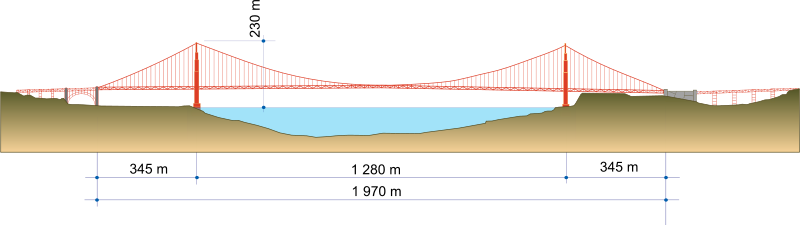
Strauss was chief engineer in charge of overall design and construction of the bridge project. However, because he had little understanding or experience with cable-suspension designs, responsibility for much of the engineering and architecture fell on other experts.

[Irving Morrow](http://en.wikipedia.org/wiki/Irving_Morrow), a relatively unknown residential architect, designed the overall shape of the bridge towers, the lighting scheme, and [Art Deco](http://en.wikipedia.org/wiki/Art_Deco) elements such as the streetlights, railing, and walkways. The famous [International Orange](http://en.wikipedia.org/wiki/International_Orange) color was originally used as a sealant for the bridge. Many locals persuaded Morrow to paint the bridge in the vibrant orange color instead of the standard silver or gray, and the color has been kept ever since.

Senior engineer [Charles Alton Ellis](http://en.wikipedia.org/wiki/Charles_Alton_Ellis), collaborating remotely with famed bridge designer [Leon Moisseiff](http://en.wikipedia.org/wiki/Leon_Moisseiff), was the principal engineer of the project. Moisseiff produced the basic structural design, introducing his "deflection theory" by which a thin, flexible roadway would flex in the wind, greatly reducing stress by transmitting forces via suspension cables to the bridge towers. Although the Golden Gate Bridge design has proved sound, a later Moisseiff design, the [original Tacoma Narrows Bridge](http://en.wikipedia.org/wiki/Tacoma_Narrows_Bridge_(1940)), collapsed in a strong windstorm soon after it was completed, because of an unexpected [aeroelastic flutter](http://en.wikipedia.org/wiki/Aeroelastic_flutter).

Ellis was a Greek scholar and mathematician who at one time was a University of Illinois professor of engineering despite having no engineering degree (he eventually earned a degree in civil engineering from University of Illinois prior to designing the Golden Gate Bridge and spent the last twelve years of his career as a professor at Purdue University). He became an expert in structural design, writing the standard textbook of the time. Ellis did much of the technical and theoretical work that built the bridge, but he received none of the credit in his lifetime. In November 1931, Strauss fired Ellis and replaced him with a former subordinate, Clifford Paine, ostensibly for wasting too much money sending telegrams back and forth to Moisseiff. Ellis, obsessed with the project and unable to find work elsewhere during the Depression, continued working 70 hours per week on an unpaid basis, eventually turning in ten volumes of hand calculations.

With an eye toward self-promotion and posterity, Strauss downplayed the contributions of his collaborators who, despite receiving little recognition or compensation, are largely responsible for the final form of the bridge. He succeeded in having himself credited as the person most responsible for the design and vision of the bridge. Only much later were the contributions of the others on the design team properly appreciated. In May 2007, the Golden Gate Bridge District issued a formal report on 70 years of stewardship of the famous bridge and decided to give Ellis major credit for the design of the bridge.



**Finance**

The [Golden Gate Bridge and Highway District](http://en.wikipedia.org/wiki/Golden_Gate_Bridge,_Highway_and_Transportation_District), authorized by an act of the [California Legislature](http://en.wikipedia.org/wiki/California_Legislature), was incorporated in 1928 as the official entity to design, construct, and finance the Golden Gate Bridge. However, after the [Wall Street Crash of 1929](http://en.wikipedia.org/wiki/Wall_Street_Crash_of_1929), the District was unable to raise the construction funds, so it lobbied for a $38 million [bond measure](http://en.wikipedia.org/wiki/Bond_measure). The bonds were approved in November 1930, by votes in the counties affected by the bridge. The construction budget at the time of approval was $30.1 million. However, the District was unable to sell the bonds until 1932, when [Amadeo Giannini](http://en.wikipedia.org/wiki/Amadeo_Giannini), the founder of San Francisco–based [Bank of America](http://en.wikipedia.org/wiki/Bank_of_America), agreed on behalf of his bank to buy the entire issue in order to help the local economy.



On the south side of the bridge, a 36.5 inches (93 cm) wide cross-section of the cable, containing 27,572 separate wires, is on display.

**Construction**

Construction began on January 5, 1933. The project cost more than $35 million.

Strauss remained head of the project, overseeing day-to-day construction and making some groundbreaking contributions. A graduate of the [University of Cincinnati](http://en.wikipedia.org/wiki/University_of_Cincinnati), he placed a brick from his [alma mater](http://en.wikipedia.org/wiki/Alma_mater)'s demolished McMicken Hall in the south anchorage before the concrete was poured. He innovated the use of movable safety netting beneath the construction site, which saved the lives of many otherwise-unprotected steelworkers. Of eleven men killed from falls during construction, ten were killed (when the bridge was near completion) when the net failed under the stress of a scaffold that had fallen. Nineteen others who were saved by the net over the course of construction became proud members of the (informal) *Halfway to Hell Club*.

The project was finished by April 1937, $1.3 million under budget.

**Opening festivities**



Opening of the Golden Gate Bridge

The bridge-opening celebration began on May 27, 1937 and lasted for one week. The day before vehicle traffic was allowed, 200,000 people crossed by foot and roller skate. On opening day, Mayor [Angelo Rossi](http://en.wikipedia.org/wiki/Angelo_Rossi) and other officials rode the ferry to Marin, then crossed the bridge in a motorcade past three ceremonial "barriers," the last a blockade of [beauty queens](http://en.wikipedia.org/wiki/Beauty_queen) who required Joseph Strauss to present the bridge to the Highway District before allowing him to pass. An official song, "[There's a Silver Moon on the Golden Gate](http://en.wikipedia.org/wiki/There%27s_a_Silver_Moon_on_the_Golden_Gate)," was chosen to commemorate the event. Strauss wrote a poem that is now on the Golden Gate Bridge entitled "The Mighty Task is Done." The next day, President Roosevelt pushed a button in [Washington, DC](http://en.wikipedia.org/wiki/Washington,_DC) signaling the official start of vehicle traffic over the Bridge at noon. When the celebration got out of hand, the [SFPD](http://en.wikipedia.org/wiki/SFPD) had a small riot in the uptown [Polk Gulch](http://en.wikipedia.org/wiki/Polk_Gulch) area. Weeks of civil and cultural activities called "the Fiesta" followed. A statue of Strauss was moved in 1955 to a site near the bridge.

**Description**

**Specifications**



A photograph of the bridge from a boat underneath



[Fog](http://en.wikipedia.org/wiki/Fog) at the Golden Gate Bridge, San Francisco

The center span was the [longest among suspension bridges](http://en.wikipedia.org/wiki/List_of_largest_suspension_bridges) until 1964 when the [Verrazano-Narrows Bridge](http://en.wikipedia.org/wiki/Verrazano-Narrows_Bridge) was erected between the boroughs of [Staten Island](http://en.wikipedia.org/wiki/Staten_Island) and [Brooklyn](http://en.wikipedia.org/wiki/Brooklyn) in [New York City](http://en.wikipedia.org/wiki/New_York_City), surpassing the Golden Gate Bridge by 60 feet (18 m).The Golden Gate Bridge also had the world's tallest suspension towers at the time of construction and retained that record until more recently. In 1957, [Michigan](http://en.wikipedia.org/wiki/Michigan)'s [Mackinac Bridge](http://en.wikipedia.org/wiki/Mackinac_Bridge) surpassed the Golden Gate Bridge's total length to become the world's longest two-tower suspension bridge in total length between anchorages, but the Mackinac Bridge has a shorter suspended span (between towers) compared to the Golden Gate Bridge.

**Structure**

The weight of the roadway is hung from two cables that pass through the two main towers and are fixed in concrete at each end. Each cable is made of 27,572 strands of wire. There are 80,000 miles (129,000 km) of wire in the main cables. The bridge has approximately 1,200,000 total [rivets](http://en.wikipedia.org/wiki/Rivet).

**Traffic**



Traffic crossing the Bridge during a foggy morning

As the only road to exit San Francisco to the north, the bridge is part of both [U.S. Route 101](http://en.wikipedia.org/wiki/U.S._Route_101) and [California Route 1](http://en.wikipedia.org/wiki/California_Route_1). The median markers between the lanes [are moved](http://en.wikipedia.org/wiki/Reversible_lane) to conform to traffic patterns. On weekday mornings, traffic flows mostly southbound into the city, so four of the six lanes run southbound. Conversely, on weekday afternoons, four lanes run northbound. Although there has been discussion concerning the installation of a [movable barrier](http://en.wikipedia.org/wiki/Barrier_transfer_machine) since the 1980s, the Bridge Board of Directors, in March 2005, committed to finding funding to complete the $2 million study required prior to the installation of a movable median barrier. The eastern walkway is for pedestrians and bicycles during the weekdays and during daylight hours only, and the western walkway is open to bicyclists on weekday afternoons, weekends, and holidays. The [speed limit](http://en.wikipedia.org/wiki/Speed_limit) on the Golden Gate Bridge was reduced from 55 mph (89 km/h) to 45 mph (72 km/h) on 1 October 1996.

**Aesthetics**



The Golden Gate Bridge by night, with part of downtown [San Francisco](http://en.wikipedia.org/wiki/San_Francisco) visible in the background at far left

Despite its red appearance, the color of the bridge is officially an orange vermillion called [*international orange*](http://en.wikipedia.org/wiki/International_orange). The color was selected by consulting architect Irving Morrow because it complements the natural surroundings and enhances the bridge's visibility in fog.

The bridge is said to be one of the most beautiful examples of bridge engineering, both as a structural design challenge and for its aesthetic appeal. It was declared one of the modern [Wonders of the World](http://en.wikipedia.org/wiki/Seven_Wonders_of_the_World) by the [American Society of Civil Engineers](http://en.wikipedia.org/wiki/American_Society_of_Civil_Engineers). According to Frommer's travel guide, the Golden Gate Bridge is "possibly the most beautiful, certainly the most photographed, bridge in the world" (although Frommers also bestows the most photographed honor on [Tower Bridge](http://en.wikipedia.org/wiki/Tower_Bridge) in [London](http://en.wikipedia.org/wiki/London), [England](http://en.wikipedia.org/wiki/England)).

Aesthetics was the foremost reason why the first design of Joseph Strauss was rejected. Upon re-submission of his bridge construction plan, he added details, such as lighting, to outline the bridge's cables and towers.

**Paintwork**

The bridge was originally painted with [red lead](http://en.wikipedia.org/wiki/Red_lead) primer and a [lead](http://en.wikipedia.org/wiki/Lead)-based [topcoat](http://en.wikipedia.org/wiki/Topcoat), which was touched up as required. In the mid-1960s, a program was started to improve corrosion protection by stripping the original paint and repainting the bridge with [zinc silicate](http://en.wikipedia.org/wiki/Zinc_silicate) primer and [vinyl](http://en.wikipedia.org/wiki/Vinyl) topcoats. Since 1990 [Acrylic](http://en.wikipedia.org/wiki/Acrylic_paint) topcoats have been used instead for air-quality reasons. The program was completed in 1995 and it is now maintained by 38 painters who touch up the paintwork where it becomes seriously eroded.



Golden Gate Bridge, with its approach arch over [Fort Point](http://en.wikipedia.org/wiki/Fort_Point,_San_Francisco) at the San Francisco terminus (right). Behind the arch is [Angel Island](http://en.wikipedia.org/wiki/Angel_Island_(California)), and to the left of that, [Tiburon, California](http://en.wikipedia.org/wiki/Tiburon,_California), mostly obscuring the [East Bay](http://en.wikipedia.org/wiki/East_Bay_(California)) hills.

**Current issues**

**Economics**

The last of the construction bonds were retired in 1971, with $35 million in principal and nearly $39 million in interest raised entirely from bridge tolls.

In November 2006, the Golden Gate Bridge, Highway and Transportation District recommended a [corporate sponsorship](http://en.wikipedia.org/wiki/Sponsor_(commercial)) program for the bridge to address its operating deficit, projected at $80 million over five years. The District promised that the proposal, which it called a "partnership program," would not include changing the name of the bridge or placing [advertising](http://en.wikipedia.org/wiki/Advertising) on the bridge itself. In October 2007, the Board unanimously voted to discontinue the proposal and seek additional revenue through other means, most likely a toll increase.

On 2 September 2008, the auto cash toll for all southbound [motor vehicles](http://en.wikipedia.org/wiki/Motor_vehicle) was raised from $5 to $6, and the FastTrack toll was increased from $4 to $5. Bicycle, pedestrian, and northbound motor vehicle traffic remain toll free. For vehicles with more than two axles, the toll rate is $2.50 per axle.

**Congestion pricing**

*Further information:* [*San Francisco congestion pricing*](http://en.wikipedia.org/wiki/San_Francisco_congestion_pricing)

In March 2008, the [Golden Gate Bridge District](http://en.wikipedia.org/w/index.php?title=Golden_Gate_Bridge_District&action=edit&redlink=1) board approved a resolution to implement [congestion pricing](http://en.wikipedia.org/wiki/Congestion_pricing) at the Golden Gate Bridge, charging higher tolls during peak hours, but rising and falling depending on traffic levels. This decision allowed the [Bay Area](http://en.wikipedia.org/wiki/San_Francisco_Bay_Area) to meet the federal requirement to receive $158 million in federal transportation funds from [USDOT](http://en.wikipedia.org/wiki/USDOT) Urban Partnership grant. As a condition of the grant, the congestion toll must be in place by September 2009.

The first results of the study, called the Mobility, Access and Pricing Study (MAPS), showed that a congestion pricing program is feasible. The different pricing scenarios considered were presented in public meetings in December 2008 and the final study results are expected for late 2009.



San Francisco with two bridges, [Coit Tower](http://en.wikipedia.org/wiki/Coit_Tower) and [Fort Mason](http://en.wikipedia.org/wiki/Fort_Mason) from the [Marin Headlands](http://en.wikipedia.org/wiki/Marin_Headlands)

**Suicides**



As a [suicide prevention](http://en.wikipedia.org/wiki/Suicide_prevention) initiative, this sign promotes a special telephone available on the bridge that connects to a [crisis hotline](http://en.wikipedia.org/wiki/Crisis_hotline).

The Golden Gate Bridge is not only the most popular place to commit [suicide](http://en.wikipedia.org/wiki/Suicide) in the United States but the [most popular in the entire world](http://en.wikipedia.org/wiki/Suicide#Locations). The deck is approximately 245 feet (75 m) above the water. After a fall of approximately four seconds, [jumpers](http://en.wikipedia.org/wiki/Jumper_(suicide)) hit the water at some 76 miles per hour (122 km/h). At such a speed, water has proven to take on properties similar to concrete. Because of this, most jumpers die on their immediate contact with the water. The few who survive the initial impact generally [drown](http://en.wikipedia.org/wiki/Drown) or die of [hypothermia](http://en.wikipedia.org/wiki/Hypothermia) in the cold water.

An official suicide count was kept, sorted according to which of the bridge's 128 lamp posts the jumper was nearest when he or she jumped. By 2005, this count exceeded 1,200 and new suicides were averaging one every two weeks. For comparison, the reported second-most-popular place to commit suicide in the world, [Aokigahara Forest](http://en.wikipedia.org/wiki/Aokigahara) in [Japan](http://en.wikipedia.org/wiki/Japan), has a record of 78 bodies, found within the forest in 2002, with an average of 30 a year. There were 34 bridge-jump suicides in 2006 whose bodies were recovered, in addition to four jumps that were witnessed but whose bodies were never recovered, and several bodies recovered suspected to be from bridge jumps. The California Highway Patrol removed 70 apparently suicidal people from the bridge that year.

There is no accurate figure on the number of suicides or successful jumps since 1937, because many were not witnessed. People have been known to travel to San Francisco specifically to jump off the bridge, and may take a bus or cab to the site; police sometimes find abandoned rental cars in the parking lot. Currents beneath the bridge are very strong, and some jumpers have undoubtedly been washed out to sea without ever being seen. The water may be as cold as 47 °F (8 °C).

The fatality rate of jumping is roughly 98%. As of 2006, only 26 people are known to have survived the jump. Those who *do* survive strike the water feet-first and at a slight angle, although individuals may still sustain broken bones or internal injuries. One young man survived a jump in 1979, swam to shore, and drove himself to a hospital. The impact cracked several of his [vertebrae](http://en.wikipedia.org/wiki/Vertebrae).

Engineering professor [Natalie Jeremijenko](http://en.wikipedia.org/wiki/Natalie_Jeremijenko), as part of her [Bureau of Inverse Technology](http://en.wikipedia.org/wiki/Bureau_of_Inverse_Technology) art collective, created a "[Despondency Index](http://en.wikipedia.org/wiki/Bureau_of_Inverse_Technology#Despondency_Index)" by correlating the [Dow Jones Industrial Average](http://en.wikipedia.org/wiki/Dow_Jones_Industrial_Average) with the number of jumpers detected by "Suicide Boxes" containing motion-detecting cameras, which she claimed to have set up under the bridge. The boxes purportedly recorded 17 jumps in three months, far greater than the official count. The [Whitney Museum](http://en.wikipedia.org/wiki/Whitney_Museum), although questioning whether Jeremijenko's suicide-detection technology actually existed, nevertheless included her project in its prestigious [Whitney Biennial](http://en.wikipedia.org/wiki/Whitney_Biennial).

Various methods have been proposed and implemented to reduce the number of suicides. The bridge is fitted with [suicide hotline](http://en.wikipedia.org/wiki/Suicide_hotline) telephones, and staff patrol the bridge in carts, looking for people who appear to be planning to jump. Iron workers on the bridge also volunteer their time to prevent suicides by talking or wrestling down suicidal people. The bridge is now closed to pedestrians at night. Cyclists are still permitted across at night, but must be buzzed in and out through the remotely controlled security gates. Attempts to introduce a [suicide barrier](http://en.wikipedia.org/wiki/Suicide_barrier) had been thwarted by engineering difficulties, high costs, and public opposition. One recurring proposal had been to build a barrier to replace or augment the low railing, a component of the bridge's original architectural design. New barriers have eliminated suicides at other landmarks around the world, but were opposed for the Golden Gate Bridge for reasons of cost, aesthetics, and safety (the load from a poorly designed barrier could significantly affect the bridge's structural integrity during a strong windstorm).

Strong appeals for a suicide barrier, fence, or other preventive measures were raised once again by a well-organized vocal minority of psychiatry professionals, suicide barrier consultants, and families of jumpers after the release of the controversial 2006 documentary film [*The Bridge*](http://en.wikipedia.org/wiki/The_Bridge_(2006_film))*,* in which filmmaker Eric Steel and his production crew spent one year (2004) filming the bridge from several vantage points, in order to film actual suicide jumps. The film caught 23 jumps, most notably that of [Gene Sprague](http://en.wikipedia.org/wiki/Gene_Sprague) as well as a handful of thwarted attempts. The film also contained interviews with surviving family members of those who jumped; interviews with witnesses; and, in one segment, an interview with Kevin Hines who, as a 19-year-old in 2000, survived a suicide plunge from the span and is now a vocal advocate for some type of bridge barrier or net to prevent such incidents from occurring.

On October 10, 2008, the Golden Gate Bridge Board of Directors voted 14 to 1 to install a plastic-covered stainless-steel net below the bridge as a suicide deterrent. The net will extend 20 feet (6 m) on either side of the bridge and is expected to cost $40–50 million to complete. However, lack of funding could delay the net's construction. See also [Suicide bridge](http://en.wikipedia.org/wiki/Suicide_bridge).

**Wind**



[Air show](http://en.wikipedia.org/wiki/Red_Bull_Air_Race) over Golden Gate Bridge

Since its completion, the Golden Gate Bridge has been closed due to weather conditions only three times: on 1 December 1951, because of gusts of 69 mph (111 km/h); on 23 December 1982, because of winds of 70 mph (113 km/h); and on 3 December 1983, because of wind gusts of 75 mph (121 km/h).

**Seismic retrofit**



Vertical section of Golden Gate Bridge span

Modern knowledge of the effect of earthquakes on structures led to a program to [retrofit](http://en.wikipedia.org/wiki/Seismic_retrofit) the Golden Gate to better resist seismic events. The proximity of the bridge to the [San Andreas Fault](http://en.wikipedia.org/wiki/San_Andreas_Fault) places it at risk for a significant earthquake. Once thought to have been able to withstand any magnitude of foreseeable earthquake, the bridge was actually vulnerable to complete structural failure (i.e., collapse) triggered by the failure of supports on the 320-foot (98 m) arch over [Fort Point](http://en.wikipedia.org/wiki/Fort_Point,_San_Francisco). A $392 million program was initiated to improve the structure's ability to withstand such an event with only minimal (repairable) damage. The retrofit's planned completion date is 2012.

**Doyle Drive replacement project**

The elevated approach to the Golden Gate Bridge through the San Francisco Presidio is popularly known as Doyle Drive. Doyle Drive, dating back to 1933, was named after Frank P. Doyle, director of the California State Automobile Association. The highway carries approximately 91,000 vehicles each weekday between downtown San Francisco and suburban Marin County. However, the road has been deemed "vulnerable to earthquake damage", has a problematic 4-lane design, and lacks shoulders. For these reasons, a San Francisco County Transportation Authority study recommended that the current outdated structure be replaced with a more modern, efficient, and multimodal transportation structure. Construction on the $1 billion replacement, known as the Presidio Parkway, began in December 2009 and is expected to be completed in 2013.

**In popular culture**

As a prominent American landmark, the Golden Gate Bridge has been used in numerous media. *See* [*Golden Gate Bridge in popular culture*](http://en.wikipedia.org/wiki/Golden_Gate_Bridge_in_popular_culture)*.*  
On June 1992, following an ill-prepared attempt, [Thierry Devaux](http://en.wikipedia.org/wiki/Thierry_Devaux) made six acrobatic figures of [bungee jumping](http://en.wikipedia.org/wiki/Bungee_jumping) 90 meters above the Pacific close to the North tower of the Golden Gate Bridge.

**See also**

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|  | [***San Francisco Bay Area portal***](http://en.wikipedia.org/wiki/Portal:San_Francisco_Bay_Area) |

* [Golden Gate](http://en.wikipedia.org/wiki/Golden_Gate) - the body of water that the bridge crosses
* [List of historic civil engineering landmarks](http://en.wikipedia.org/wiki/List_of_historic_civil_engineering_landmarks)
* [List of longest suspension bridge spans](http://en.wikipedia.org/wiki/List_of_longest_suspension_bridge_spans)
* [Suspension bridge](http://en.wikipedia.org/wiki/Suspension_bridge)

Retrieved from "<http://en.wikipedia.org/wiki/Golden_Gate_Bridge>"

[Categories](http://en.wikipedia.org/wiki/Special:Categories): [Art Deco](http://en.wikipedia.org/wiki/Category:Art_Deco) | [Bridges completed in 1937](http://en.wikipedia.org/wiki/Category:Bridges_completed_in_1937) | [Bridges in the San Francisco Bay Area](http://en.wikipedia.org/wiki/Category:Bridges_in_the_San_Francisco_Bay_Area) | [Buildings and structures in Marin County, California](http://en.wikipedia.org/wiki/Category:Buildings_and_structures_in_Marin_County,_California) | [Buildings and structures in San Francisco, California](http://en.wikipedia.org/wiki/Category:Buildings_and_structures_in_San_Francisco,_California) | [Golden Gate Bridge, Highway and Transportation District](http://en.wikipedia.org/wiki/Category:Golden_Gate_Bridge,_Highway_and_Transportation_District) | [Historic Civil Engineering Landmarks](http://en.wikipedia.org/wiki/Category:Historic_Civil_Engineering_Landmarks) | [Landmarks in San Francisco, California](http://en.wikipedia.org/wiki/Category:Landmarks_in_San_Francisco,_California) | [Road bridges in the United States](http://en.wikipedia.org/wiki/Category:Road_bridges_in_the_United_States) | [Suspension bridges in the United States](http://en.wikipedia.org/wiki/Category:Suspension_bridges_in_the_United_States) | [Symbols of California](http://en.wikipedia.org/wiki/Category:Symbols_of_California) | [Toll bridges in California](http://en.wikipedia.org/wiki/Category:Toll_bridges_in_California) | [Towers in California](http://en.wikipedia.org/wiki/Category:Towers_in_California) | [Transportation in Marin County, California](http://en.wikipedia.org/wiki/Category:Transportation_in_Marin_County,_California) | [Transportation in San Francisco, California](http://en.wikipedia.org/wiki/Category:Transportation_in_San_Francisco,_California) | [U.S. Route 101](http://en.wikipedia.org/wiki/Category:U.S._Route_101) | [Works Progress Administration in California](http://en.wikipedia.org/wiki/Category:Works_Progress_Administration_in_California)