

Golden Gate Bridge – Source http://en.wikipedia.org/wiki/Golden_Gate_Bridge

Ferry service



Golden Gate with [Fort Point](#) in foreground, c. 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.^[9]

The Sausalito Land and Ferry Company service, launched in 1867, eventually became the Golden Gate Ferry Company, a [Southern Pacific Railroad](#) subsidiary, the largest ferry operation in the world by the late 1920s.^{[9][10]} Once for railroad passengers and customers only, Southern Pacific's automobile ferries became very profitable and important to the regional economy.^[11] The ferry crossing between the [Hyde Street Pier](#) in San Francisco and [Sausalito](#) in Marin County took approximately 20 minutes and cost US\$1.00 per vehicle, a price later reduced to compete with the new bridge.^[12] The trip from the [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.^[13] 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 372 ft (113 m) deep^[14] at the center of the channel, and frequent strong winds. Experts said that ferocious winds and blinding fogs would prevent construction and operation.^[13]

Conception

Although the idea of a bridge spanning the Golden Gate was not new, the proposal that eventually took hold was made in a 1916 [San Francisco Bulletin](#) article by former engineering student James Wilkins.^[15] San Francisco's City Engineer estimated the cost at \$100 million, which would be \$2.12 billion today, and impractical for the time. He fielded the question to bridge engineers of whether it could be built for less.^[9] One whded, [Joseph Strauss](#), was an ambitious engineer and poet who had, for his [graduate thesis](#), designed a 55-mile-long (89 km) railroad bridge across the [Bering Strait](#).^[16] At the time, Strauss had completed some 400 [drawbridges](#)—most of which were inland—and nothing on the scale of the

new project.^[3] Strauss's initial drawings^[15] were for a massive [cantilever](#) on each side of the strait, connected by a central suspension segment, which Strauss promised could be built for \$17 million.^[9]

Local authorities agreed to proceed only on the assurance that Strauss would alter the design and accept input from several consulting project experts.^[citation needed] A suspension-bridge design was considered the most practical, because of recent advances in [metallurgy](#).^[9]

Strauss spent more than a decade drumming up support in Northern California.^[17] The bridge faced opposition – including litigation – from many sources. The [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.^[9]

In May 1924, Colonel Herbert Deakyne held the second hearing on the Bridge on behalf of the [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.^[18] Another ally was the fledgling [automobile industry](#), which supported the development of roads and bridges to increase demand for automobiles.^[12]

The bridge's name was first used when the project was initially discussed in 1917 by [M.M. O'Shaughnessy](#), city engineer of San Francisco, and Strauss. The name became official with the passage of the [Golden Gate Bridge and Highway District](#) Act by the [state legislature](#) in 1923.^[19]

Preliminary discussions leading to the eventual building of the Golden Gate Bridge were held on January 13, 1923, at a special convention in Santa Rosa, CA. The Santa Rosa Chamber was charged with considering the necessary steps required to foster the construction of a bridge across the Golden Gate by then Santa Rosa Chamber President Frank Doyle (the street Doyle Drive leading up to the bridge is named after him). On June 12, the Santa Rosa Chamber voted to endorse the actions of the "Bridging the Golden Gate Association" by attending the meeting of the Boards of Supervisors in San Francisco on June 23 and by requesting that the Board of Supervisors of Sonoma County also attend. By 1925, the Santa Rosa Chamber had assumed responsibility for circulating bridge petitions as the next step for the formation of the Golden Gate Bridge.^[citation needed]

Design



South tower seen from walkway, with Art Deco elements

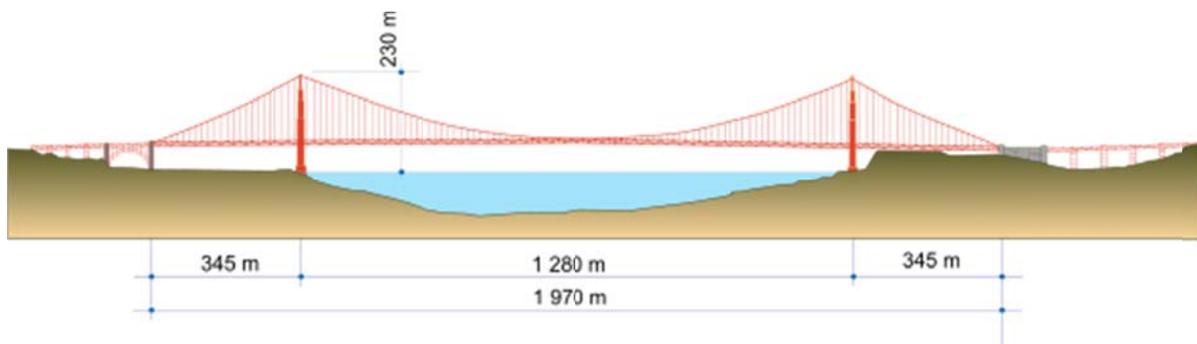
Strauss was chief engineer in charge of overall design and construction of the bridge project.^[13] However, because he had little understanding or experience with cable-suspension designs,^[20] responsibility for much of the engineering and architecture fell on other experts. Strauss' initial design proposal (two double cantilever spans linked by a central suspension segment) was unacceptable from a visual standpoint. The final graceful suspension design was conceived and championed by New York's [Manhattan Bridge](#) designer [Leon Moisseiff](#).^[21]

[Irving Morrow](#), a relatively unknown residential architect, designed the overall shape of the bridge towers, the lighting scheme, and [Art Deco](#) elements such as the tower decorations, streetlights, railing, and walkways. The famous [International Orange](#) color was originally used as a sealant for the bridge.^[22] The US Navy had wanted it to be painted with black and yellow stripes to ensure visibility by passing ships.^[13]

Senior engineer [Charles Alton Ellis](#), collaborating remotely with Moisseiff, was the principal engineer of the project.^[23] 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.^[23] Although the Golden Gate Bridge design has proved sound, a later Moisseiff design, the [original Tacoma Narrows Bridge](#), collapsed in a strong windstorm soon after it was completed, because of an unexpected [aeroelastic flutter](#).^[24] Ellis was also tasked with designing a "bridge within a bridge" in the southern abutment, to avoid the need to demolish [Fort Point](#), a pre-Civil War masonry fortification viewed, even then, as worthy of historic preservation. He penned a graceful steel arch spanning the fort and carrying the roadway to the bridge's southern anchorage.^[25]

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.^[26] 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.^[26] 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.^[26]

With an eye toward self-promotion and posterity, Strauss downplayed the contributions of his collaborators who, despite receiving little recognition or compensation,^[20] 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.^[26] Only much later were the contributions of the others on the design team properly appreciated.^[26] 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, authorized by an act of the [California Legislature](#), was incorporated in 1928 as the official entity to design, construct, and finance the Golden Gate Bridge.^[13] However, after the [Wall Street Crash of 1929](#), the District was unable to raise the construction funds, so it lobbied for a \$30 million [bond measure](#). The bonds were approved in November 1930,^[16] by votes in the counties affected by the bridge.^[27] The construction budget at the time of approval was \$27 million. However, the District was unable to sell the bonds until 1932, when [Amadeo Giannini](#), the founder of San Francisco-based [Bank of America](#), agreed on behalf of his bank to buy the entire issue in order to help the local economy.^[9]

Construction

Construction began on January 5, 1933.^[9] The project cost more than \$35 million,^[28] completing ahead of schedule and under budget.^[29] The Golden Gate Bridge construction project was carried out by the

McClintic-Marshall Construction Co., a subsidiary of [Bethlehem Steel Corporation](#) founded by Howard H. McClintic and Charles D. Marshall, both of [Lehigh University](#).



Some 1.2 million steel rivets hold the bridge together. This is one of those replaced during the seismic retrofit of the bridge after the 1989 Loma Prieta earthquake.

Strauss remained head of the project, overseeing day-to-day construction and making some groundbreaking contributions. A graduate of the [University of Cincinnati](#), he placed a brick from his 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.^[30] Nineteen others who were saved by the net over the course of construction became proud members of the (informal) [Half Way to Hell Club](#).^[31]

The project was finished by April 1937, \$1.3 million under budget.^[9] The [Bridge Round House diner](#) was then included in the southeastern end of the Golden Gate Bridge, adjacent to the tourist plaza which was renovated in 2012.^[32] The Bridge Round House, an [Art Deco](#) design by [Alfred Finnilla](#) completed in 1938, has been popular throughout the years as a starting point for various commercial tours of the bridge and an unofficial gift shop.^[33] The diner was renovated in 2012^[32] and the gift shop was then removed as a new, official gift shop has been included in the adjacent plaza.^[33]

During the bridge work, the Assistant Civil Engineer of California [Alfred Finnilla](#) had overseen the entire iron work of the bridge as well as half of the bridge's road work.^[34] With the death of Jack Balestreri in April 2012, all workers involved in the original construction are now deceased.

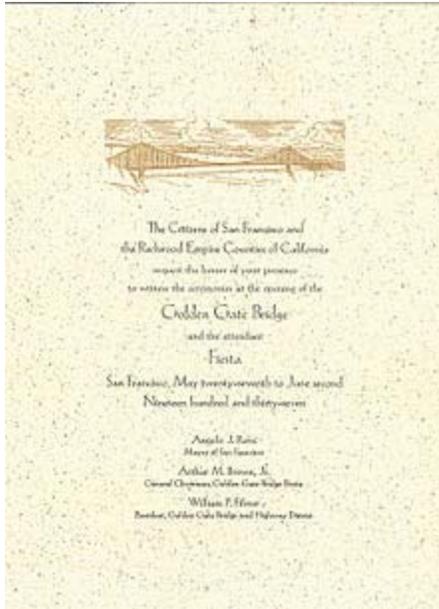
Opening festivities, 50th, and 75th anniversaries



A pedestrian poses at the old railing on opening day, 1937.



Opening of the Golden Gate Bridge



Official invitation to the opening of the bridge. This copy was sent to the City of Seattle.

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 skates.^[9] On opening day, Mayor [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 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](#)", 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, D.C. signaling the official start of vehicle traffic over the Bridge at noon. When the celebration got out of hand, the [SFPD](#) had a small riot in the uptown [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.^[15]

In May 1987, as part of the 50th anniversary celebration, the Golden Gate Bridge district again closed the bridge to automobile traffic and allowed pedestrians to cross the bridge. However, this celebration attracted 750,000 to 1,000,000 people, and ineffective crowd control meant the bridge became congested with roughly 300,000 people, causing the center span of the bridge to flatten out under the weight. Although the bridge is designed to flex in that way under heavy loads, and was estimated not to have exceeded 40% of the yielding stress of the suspension cables,^[35] bridge officials stated that uncontrolled pedestrian access was not being considered as part of the 75th anniversary on Sunday, May 27, 2012,^{[36][37][38]} because of the additional law enforcement costs required "since 9/11".^[39]

Description

Specifications



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



Fog at the Golden Gate Bridge, San Francisco

Until 1964, the Golden Gate Bridge had the [longest suspension bridge main span](#) in the world, at 4,200 feet (1,280.2m). Since 1964 its main span length has been surpassed by ten bridges; it now has the second longest main span in the United States, after the [Verrazano-Narrows Bridge](#) in New York City.

Total length of the Golden Gate Bridge from abutment to abutment is 8,981 feet (2,737 m).

The Golden Gate Bridge's clearance above high water averages 220 feet (67 m) while its towers, at 746 feet (227m) above the water, were the world's tallest on a suspension bridge until 1998 when [bridges in Denmark and Japan](#) were completed.

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.^[40] The bridge has approximately 1,200,000 total [rivets](#).

Traffic

Most maps and signage mark the bridge as part of the [concurrency](#) between [U.S. Route 101](#) and [California State Route 1](#). Although part of the [National Highway System](#), the bridge is not officially part of [California's Highway System](#).^[41] For example, under the [California Streets and Highways Code § 401](#), Route 101 ends at "the approach to the Golden Gate Bridge" and then resumes at "a point in Marin County opposite San Francisco". The [Golden Gate Bridge, Highway and Transportation District](#) has jurisdiction over the segment of highway that crosses the bridge instead of the [California Department of Transportation](#) (Caltrans).

The median markers between the lanes [are moved](#) 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. During off-peak periods and weekends, traffic is split with three lanes in each direction, or three and two lanes with one buffer lane.^[42]

Traffic is separated by small, [plastic pylons](#), and from 1971 through 2007, there were 16 fatalities from head-on collisions.^[43] To improve safety, the [speed limit](#) on the Golden Gate Bridge was reduced from 55 mph (89 km/h) to 45 mph (72 km/h) on October 1, 1983.^[44] Although there has been discussion concerning the installation of a [movable barrier](#) since the 1980s, only in March 2005 did the Bridge Board of Directors commit to finding funding to complete the \$2 million study required prior to the installation of a movable median barrier.^[43] The movable barrier is set to be installed in either late October or early November 2014, during which the bridge will be closed completely for 52 hours, starting on a Friday night. This is the longest closure in the history of the bridge.^[43]

Visiting the bridge

The bridge is popular with pedestrians and bicyclists, and was built with walkways on either side of the six vehicle traffic lanes. Initially, they were separated from the traffic lanes by only a metal curb, but railings between the walkways and the traffic lanes were added in 2003, primarily as a measure to prevent bicyclists from falling into the roadway.^[45]

The main walkway is on the eastern side, and is open for use by both pedestrians and bicycles in the morning to mid-afternoon during weekdays (5 am to 3:30 pm), and to pedestrians only for the remaining daylight hours (until 6 pm, or 9 pm during [DST](#)). The eastern walkway is reserved for pedestrians on weekends (5 am to 6 pm, or 9 pm during DST), and is open exclusively to bicyclists in the evening and overnight, when it is closed to pedestrians. The western walkway is open only for bicyclists and only during the hours when they are not allowed on the eastern walkway.^[46]

Bus service across the bridge is provided by two public transportation agencies: San Francisco Muni and Golden Gate Transit. Muni offers Sunday service on the 76 Marin Headlands bus line, and Golden Gate Transit runs numerous bus lines throughout the week.^{[47][48]} The southern end of the bridge, near the toll plaza and parking lot, is also accessible daily from 5:30 a.m. to midnight by Muni line 28.^[49]

Aesthetics



The Golden Gate Bridge by night, with part of downtown San Francisco visible in the background at far left



A view of the Golden Gate Bridge from the Marin Headlands on a foggy morning at sunrise

The color of the bridge is officially an orange vermillion called *international orange*.^[50] The color was selected by consulting architect Irving Morrow^[51] because it complements the natural surroundings and enhances the bridge's visibility in fog. 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.^[52] In 1999, it was ranked fifth on the *List of America's Favorite Architecture* by the *American Institute of Architects*.

Paintwork

The bridge was originally painted with *red lead* primer and a lead-based 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* primer and *vinyl* topcoats.^{[53][54]} Since 1990 *acrylic* 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 corroded.^[55]

Current issues

Economics and tolls

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.^[56]

In November 2006, the Golden Gate Bridge, Highway and Transportation District recommended a [corporate sponsorship](#) 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 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.^{[57][58]}

On September 2, 2008, the auto cash toll for all southbound [motor vehicles](#) was raised from \$5 to \$6, and the toll for users of the [FasTrak](#) electronic toll collection system was increased from \$4 to \$5. Bicycle, pedestrian, and northbound motor vehicle traffic remain toll free.^[59] For vehicles with more than two axles, the toll rate is \$2.50 per axle.^{[60][61]}

In an effort to save \$19.2 million over the following 10 years, the Golden Gate District voted in January 2011 to eliminate all toll takers by 2012 and use only [open road tolling](#).^[62] Subsequently, this was delayed and toll taker elimination occurred in March 2013. The cost savings have been revised to \$19 million over an eight-year period. In addition to FasTrak, the Golden Gate District will also use license plate tolling and a one time payment system for drivers to pay before or after their trip on the bridge. There will be 28 positions eliminated as part of this plan.^[63]

Congestion pricing

Further information: [San Francisco congestion pricing](#)



Looking south

In March 2008 the Golden Gate Bridge District board approved a resolution to start [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](#) to meet the federal requirement to receive \$158 million in federal transportation funds from [USDOT](#) Urban Partnership grant.^[64] As a condition of the grant, the congestion toll was to be in place by September 2009.^{[65][66]}

The first results of the study, called the Mobility, Access and Pricing Study (MAPS), showed that a congestion pricing program is feasible.^[67] The different pricing scenarios considered were presented in public meetings in December 2008.^[68]

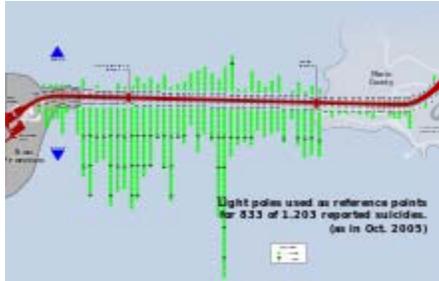
In August 2008 transportation officials ended the congestion pricing program in favor of varying rates for metered parking along the route to the bridge including on Lombard Street and [Van Ness Avenue](#).^[69]

Suicides

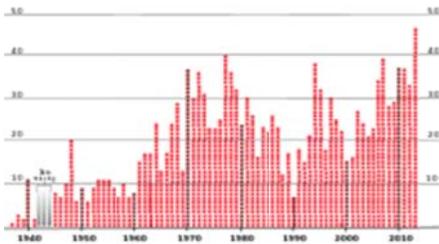




As a [suicide prevention](#) initiative, this sign promotes a special telephone available on the bridge that connects to a [crisis hotline](#).



The jumpers mapped by location. (2005)



Official count of the jumpers ended 1995 on 1,000.



Newspaper clipping from the *San Francisco Examiner* of the youngest jumper, Marilyn DeMont (5)

The Golden Gate Bridge is the second most used suicide site in the world, after the [Nanjing Yangtze River Bridge](#) (see [List of suicide sites](#)).^[70] The deck is about 245 feet (75 m) above the water.^[71] After a

fall of four seconds, [jumpers](#) hit the water at around 75 mph or about 120 km/h. Most of the jumpers die from impact [trauma](#). About 5% of the jumpers survive the initial impact but generally [drown](#) or die of [hypothermia](#) in the cold water.^{[72][73]}

Most suicidal jumps occur on the side facing the bay. The side facing the Pacific is closed to pedestrians.^[74]

An official suicide count was kept until the year 1995,^[75] sorted according to which of the bridge's 128 lamp posts the jumper was nearest when he or she jumped.^[76] The official count ended on June 5, 1995 on the 997th jump,^[77] jumper No. 1000, Eric Atkinson (25), jumped on July 3, 1995.^[75] By 2012 the unofficial count exceeded 1,600 (in which the body was recovered or someone saw the jump)^[78] and new suicides were occurring about once every two weeks, according to a [San Francisco Chronicle](#) analysis.^[79] The most suicides in one month were in August 2013, when 10 jumped, one every three days. Total count of the year 2013 was 46, making it highest so far.^{[73][80]} The youngest jumper has been 5 year old Marilyn DeMont, who was told to jump and was followed by her father in June 1945.^{[78][81]}

For comparison, the reported [third most popular place to commit suicide](#) in the world, [Aokigahara Forest](#) in Japan, has a record of 108 bodies, found within the forest in 2004, with an average of 30 a year.^[82] 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.^[83]

There is no accurate figure on the number of suicides or completed 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 strong and some jumpers have undoubtedly been washed out to sea without being seen.

The fatality rate of jumping is roughly 98%. As of July 2013, only 34 people are known to have survived the jump.^[45] 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 woman, Sarah Rutledge Birnbaum, survived, but returned to jump again and died the second time.^[84] One young man survived a jump in 1979, swam to shore, and drove himself to a hospital. The impact cracked several of his [vertebrae](#).^[85] On March 10, 2011, 17-year-old Luhe "Otter" Vilagomez from Windsor High School in [Windsor, California](#), survived a jump from the bridge, breaking his [coccyx](#) and puncturing one lung, though he said his attempt was for "fun" and not suicide. The teen was helped to shore by Frederic Lecouturier, 55, who was surfing under the bridge when he saw Vilagomez jump.^{[86][87]} The California Highway Patrol ("CHP") recommended that the San Francisco District Attorney's Office charge the student with misdemeanor trespassing (a charge that entails climbing any rail, cable, suspender rope, tower or superstructure not intended for public use), punishable by up to a year in the county jail and/or a fine up to \$10,000. Additionally, the CHP Marin Area recommended the teen undergo a medical/psychiatric evaluation by medical professionals.^{[88][89]}

Engineering professor [Natalie Jeremijenko](#), as part of her "Bureau of Inverse Technology" art collective, created a "Despondency Index" by correlating the [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.^[90] The boxes purportedly recorded 17 jumps in three months, far greater than the official count. The [Whitney Museum](#), although questioning whether Jeremijenko's suicide-detection technology actually existed, nevertheless included her project in its prestigious [Whitney Biennial](#).^[91]

Various methods have been tried to reduce the number of suicides. The bridge is fitted with [suicide-hotline](#) telephones and staff patrol the bridge in carts, looking for people who appear to be planning to jump. Ironworkers on the bridge also volunteer their time to prevent suicides by talking to or wrestling down suicidal people.^[92] The bridge is now closed to pedestrians at night. Cyclists are still permitted across at night, but can buzz themselves in and out through the remotely-controlled security gates.^[93] Attempts to introduce a [suicide barrier](#) have been thwarted by engineering difficulties, high costs, and public opposition.^[94] 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, as 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 again by a well-organized vocal minority of psychiatry professionals, suicide barrier consultants, and families of jumpers beginning in January 2005. These efforts were given momentum by two films dealing with the topic of suicide and the Golden Gate Bridge. On January 14, 2005 the [San Francisco Chronicle](#) published an op-ed^[clarification needed] by writer-director [Jenni Olson](#) calling for a suicide barrier on the Golden Gate Bridge. The letter was, in part, an excerpt from the script of her film [The Joy of Life](#), which world-premiered the following week, on January 20, 2005, at the [Sundance Film Festival](#). The day before, on January 19, 2005, the *Chronicle* broke the news that filmmaker Eric Steel had been shooting suicide leaps from the bridge during 2004 for his film [The Bridge](#), which would be released in 2006. A week later, *The Joy of Life* world-premiered at the [Sundance Film Festival](#) and video copies of the film were circulated to members of the Bridge District board of directors with the help of the Psychiatric Foundation of Northern California.

In the fall of 2005 the *San Francisco Chronicle* published a seven-part series of articles, titled "Lethal Beauty", focusing on the problem of suicide and the Golden Gate Bridge and emphasizing that a solution was possible but even desirable.^[72]

The 2006 release of [The Bridge](#) exerted additional pressure on the Bridge District and created continued public awareness. Filmmaker Eric Steel and his production crew spent 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, 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.

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.^{[95][96][97]} However, lack of funding could delay the net's deployment.^{[98][needs update]} [Kevin Briggs](#), a highway patrolman on the bridge, is credited with saving hundreds of lives of would-be jumpers by talking to them before they can take the plunge.^[99] Despite past suicides, Briggs and others in his department estimate that they save at least 80–90% of people bent on jumping thanks to cameras and their own dialogue.

Water

The water temperature is always cold, it may be from January's 53 °F (12 °C) to September's 60 °F (16 °C) measured at [Fort Point](#), which is near the southern end of the Golden Gate Bridge and at the entrance to [San Francisco Bay](#).^[100] Water temperature can go as low as 41 °F (5 °C), and high as 71 °F (22 °C).^[101]

Wind



[Air race](#) near the Golden Gate Bridge

Since its completion, the Golden Gate Bridge has been closed because of weather conditions only three times: on December 1, 1951, because of gusts of 69 mph (111 km/h); on December 23, 1982, because of winds of 70 mph (113 km/h); and on December 3, 1983, because of wind gusts of 75 mph (121 km/h).^[102] An [anemometer](#), placed midway between the two towers on the west side of the bridge, has been used to measure wind speeds. Another anemometer was placed on one of the towers.

Seismic retrofit

Modern knowledge of the effect of earthquakes on structures led to a program to [retrofit](#) the Golden Gate to better resist seismic events. The proximity of the bridge to the [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](#).^[103] A \$392 million program was initiated to improve the structure's ability to withstand such an event with only minimal (reparable) damage. One challenging undertaking is completing this program without disrupting traffic. A complex electro-hydraulic synchronous lift system was custom built for construction of temporary support

towers and a series of intricate lifts, transferring the loads from the existing bridge onto the temporary supports. This was completed with engineers from [Balfour Beatty](#) and [Enerpac](#), accomplishing this task without disrupting day-to-day San Francisco commuter traffic.^{[104][105]} The retrofit was planned to be completed in 2012.^{[106][107]}

Doyle Drive replacement project



Doyle Drive Replacement Project well underway - October 2013

The former elevated approach to the Golden Gate Bridge through the San Francisco Presidio, known as Doyle Drive, dated to 1933 and was named after Frank P. Doyle, President and son of the founder of the Exchange Bank in Santa Rosa, and the man, who more than any other person, made it possible to build the Golden Gate Bridge.^[108] The highway carried about 91,000 vehicles each weekday between downtown San Francisco and the [North Bay](#) and points north.^[109] The road was deemed "vulnerable to earthquake damage", has a problematic 4-lane design, and lacks shoulders, and a San Francisco County Transportation Authority study recommended that the current structure be replaced. Construction on the \$1 billion^[110] replacement, temporarily known as the Presidio Parkway, began in December 2009.^[111]

The elevated Doyle Drive was demolished on the weekend of April 27–30, 2012. Traffic now uses a part of the partially completed Presidio Parkway, which is expected to be completed in 2016. As of May 2012, an official at Caltrans said there is no plan to permanently rename the portion known as Doyle Drive.^[112]

Golden Gate Bridge in popular culture

Main article: [Golden Gate Bridge in popular culture](#)

As a prominent American landmark, the Golden Gate Bridge has been used in numerous media, including books, films and video games.



San Francisco with two bridges, [Coit Tower](#) and [Fort Mason](#) from [Marin](#)