BATANGAS – MINDORO SUPERBRIDGE PROJECT

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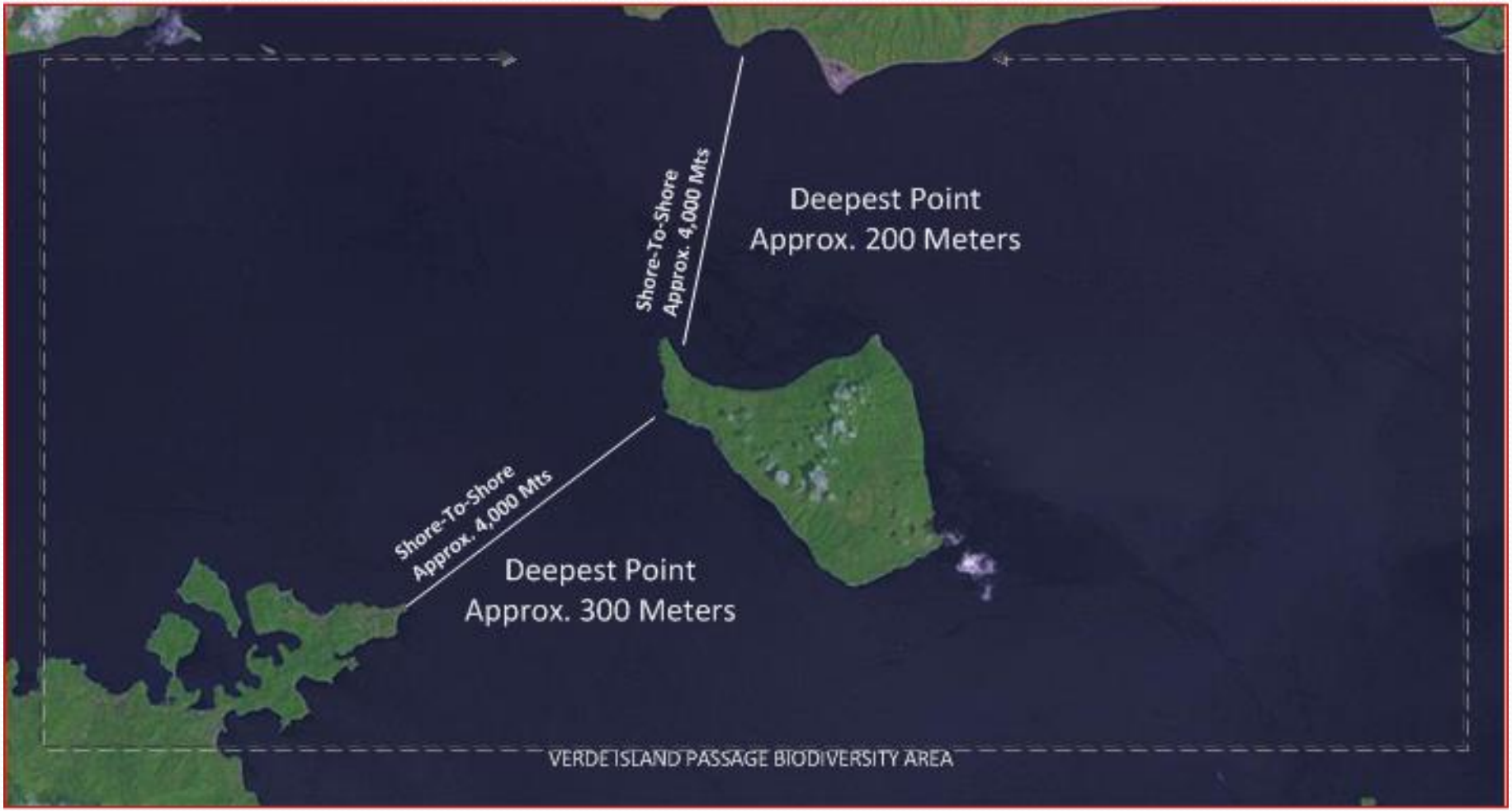
Batangas-Mindoro Superbridge Project

Vision. Mission. Passion. Action.



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The shortest distance between the shores of Batangas and Mindoro is best divided into two (2) legs – the First Leg would be the distance between the farthest tip from Puerto Galera to the Westernmost shore of Isla Verde; the Second Leg would be from the Easternmost shore of Isla Verde to the nearest side of Batangas.

Presently, the estimated distance of the 1st Leg is 3,500 to 4,000 meters. The 2nd Leg is 4,000 to 4,500 meters.

Puerto Galera's farthest tip, in Barangay Sabang, is tight and rugged. It presently has narrow and twisting roads – that a new road length, most likely elevated, may be required to connect to the national road. Isla Verde is mountainous, so will be the Batangas side, where no there is no existing roads.

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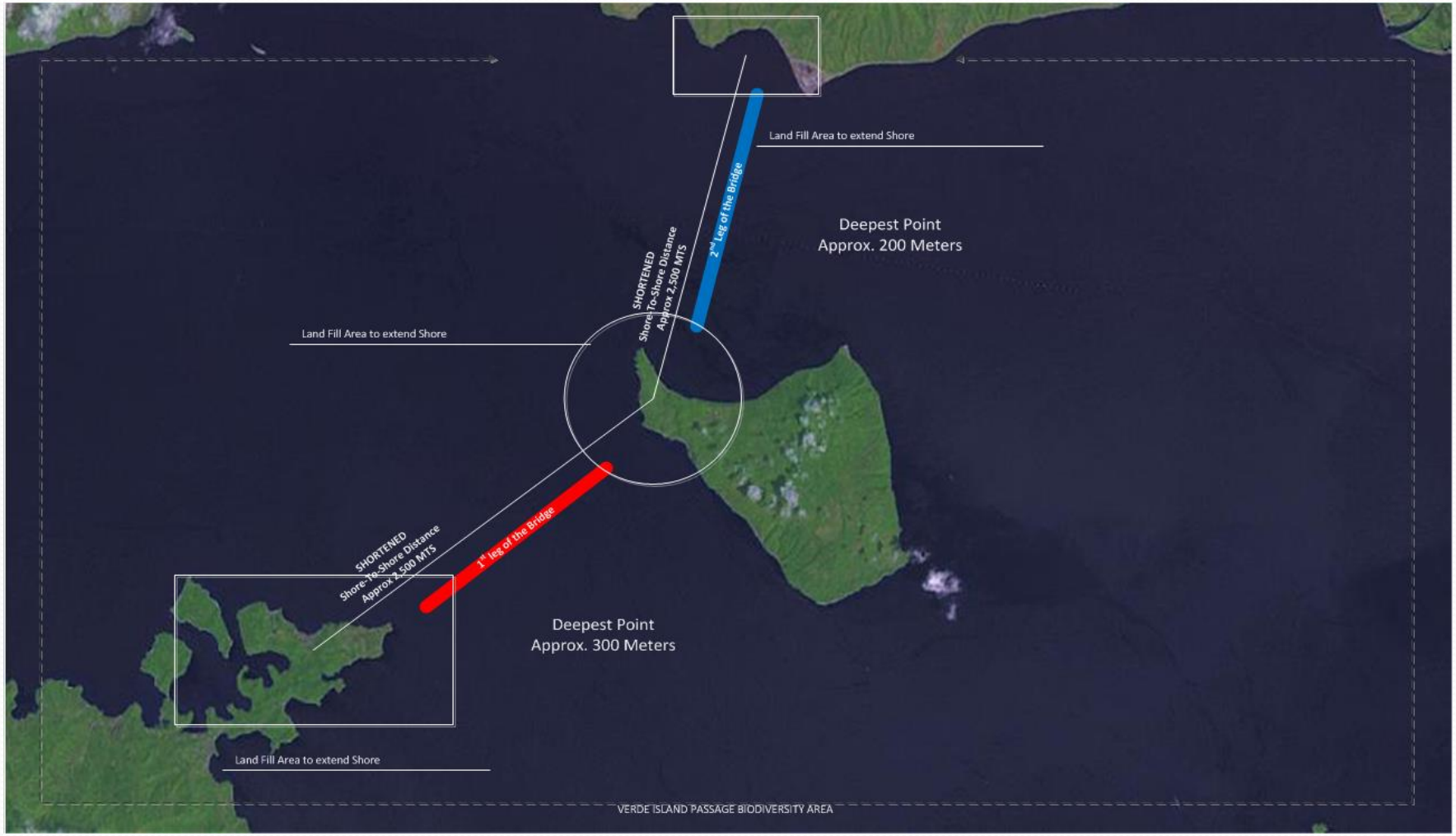

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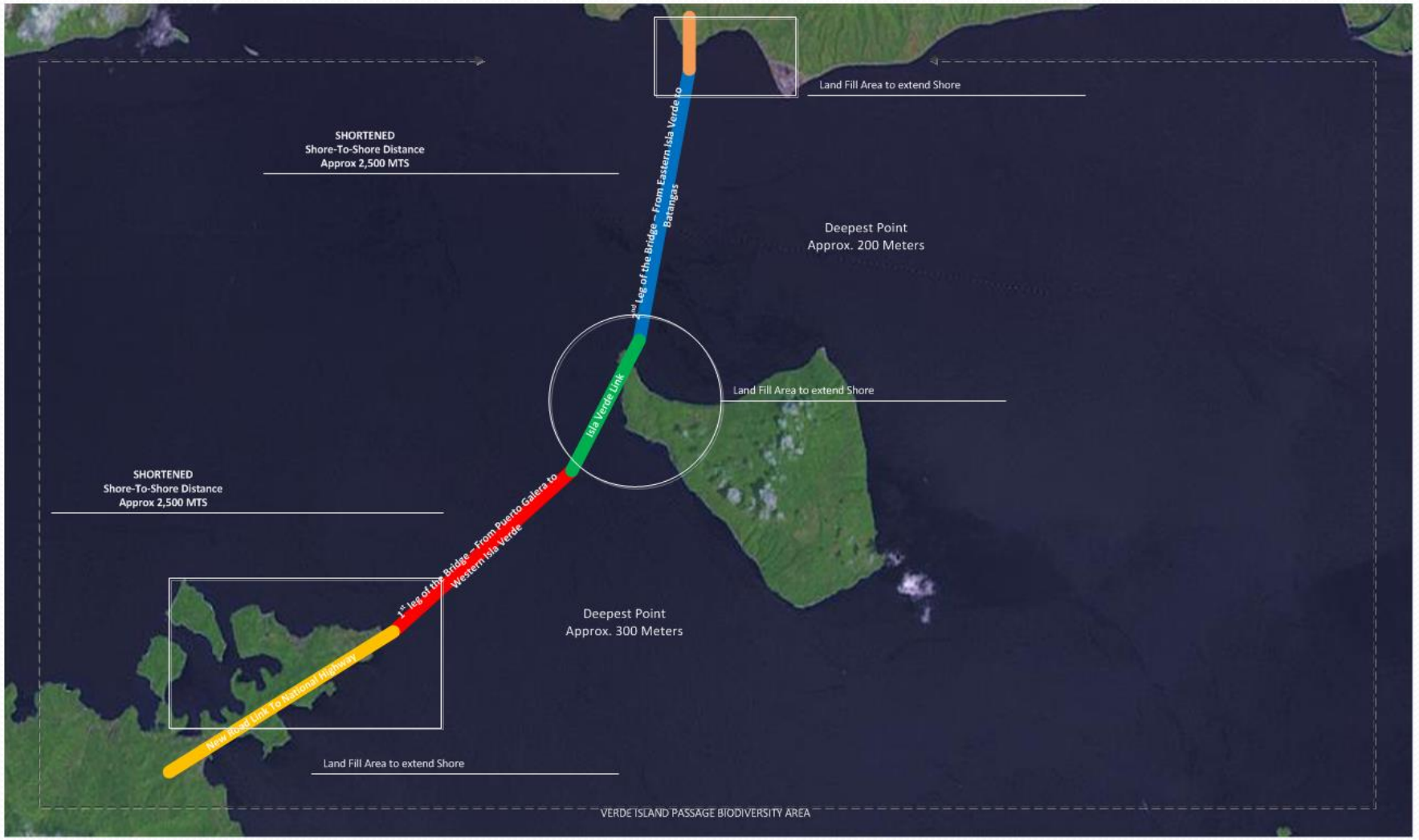


Superbridge Models

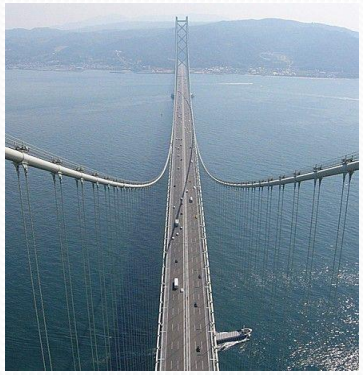
As reference for the superbridge project, we look at existing and planned bridge projects.

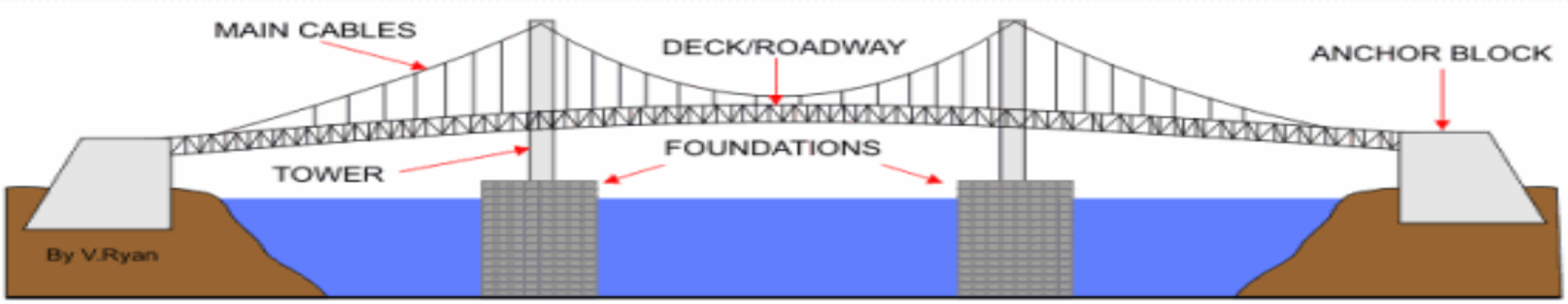
In the Philippines, this project will be unprecedented. Even the country's longest bridge, San Juanico, will be dwarfed by the Batangas-Mindoro Superbridge.

AKASHI KAIKYO BRIDGE (JAPAN)

The Akashi Kaikyo Suspension Bridge is the longest suspension bridge in the world and it is probably Japan's greatest engineering feat. It took two million workers ten years to construct the bridge, from 1988 to 1998. The steel cable used would circle the world seven times. It has six lanes and links the island of Awaji and the mainland city of Kobe. **It is 3,911 meters long with a single span length of 1,991 meters** – the longest in the world.

The Akashi Straits is four miles wide at the bridge site with sea depths of one hundred meters and currents averaging fourteen kmph. The Akashi Straits is one of the busiest sea lanes in the world with over a thousand ships per day travelling through it. Furthermore, the bridge is in a typhoon region in which winds can reach speeds of 290 kph.





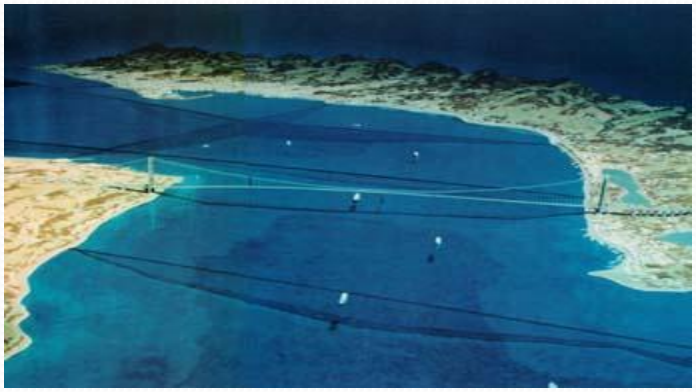
BASIC DIAGRAM - THE AKASHI-KAIKYO SUSPENSION BRIDGE

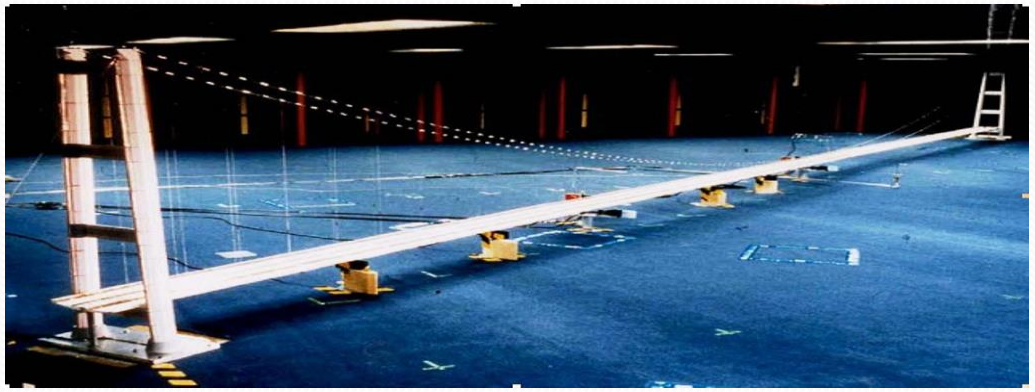
HANGZHOU BAY BRIDGE (China)

It is the longest over sea bridge in the world, spanning a total 35,676 meters – almost the road distance between Calapan City and Victoria.

As a reference for the Batangas-Mindoro Superbridge, its similarities are only that it is a long bridge and it is over sea. Because Hangzhuo Bay is not as deep, pier can be placed on the water to support shorter spans of the bridge. Its longest single span is only 448 meters

MESSINA STRAIT BRIDGE (Italy)





The new Messina Straits suspension bridge to link Sicily with the Italian mainland was likely to be one of the most impressive feats of engineering undertaken this century and one of the biggest construction projects ever undertaken in Europe.

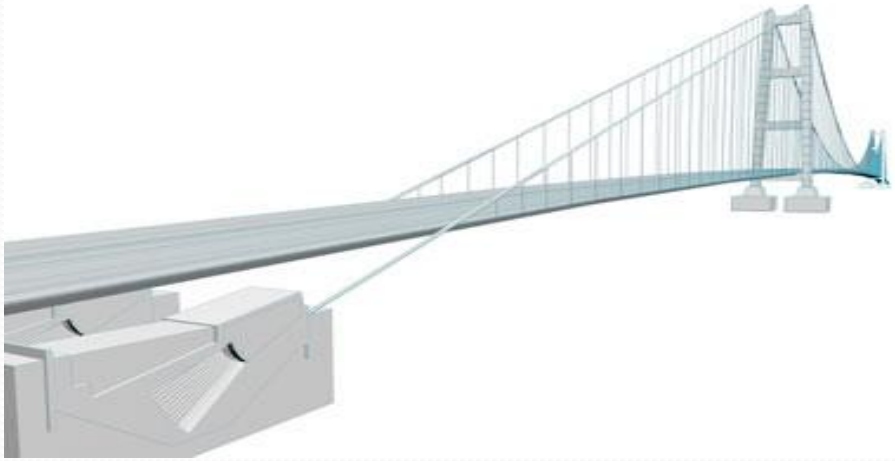
Spanning the Messina Straits, the bridge would have been almost 4km (2.5 miles) long and would have cut the two-hour journey time by ferry and train (transporting over 18,000 vehicles per day). The controversial project had been on the drawing board since the 1960s and has been criticised because it would be a waste of public money in Italy where public spending is already overstretched and also because the area in which the construction was taking place had some seismic activity in the past.

Following the plans for the bridge being scrapped by Italy's new prime minister in October 2006 the project was thought to be totally dead and buried. However, governments change and in April 2008 a general election returned the previous Prime Minister Silvio Berlusconi to power. One of Berlusconi's first acts was to revive the bridge project.

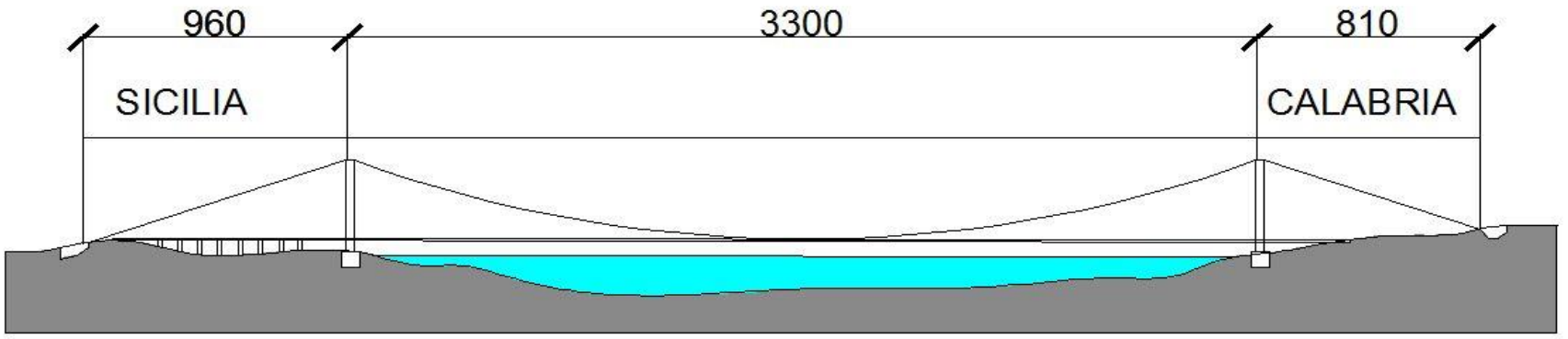
The bridge was being constructed by the Italian Government, which formed a company, the Stretto di Messina SpA, to oversee construction and operate the bridge when potentially completed in 2012.

The bridge would have cost an estimated €4.4bn ($5.3bn; £3bn) to build. The bridge would have been the world's longest suspension bridge and was expected to have a service life of 200 years.

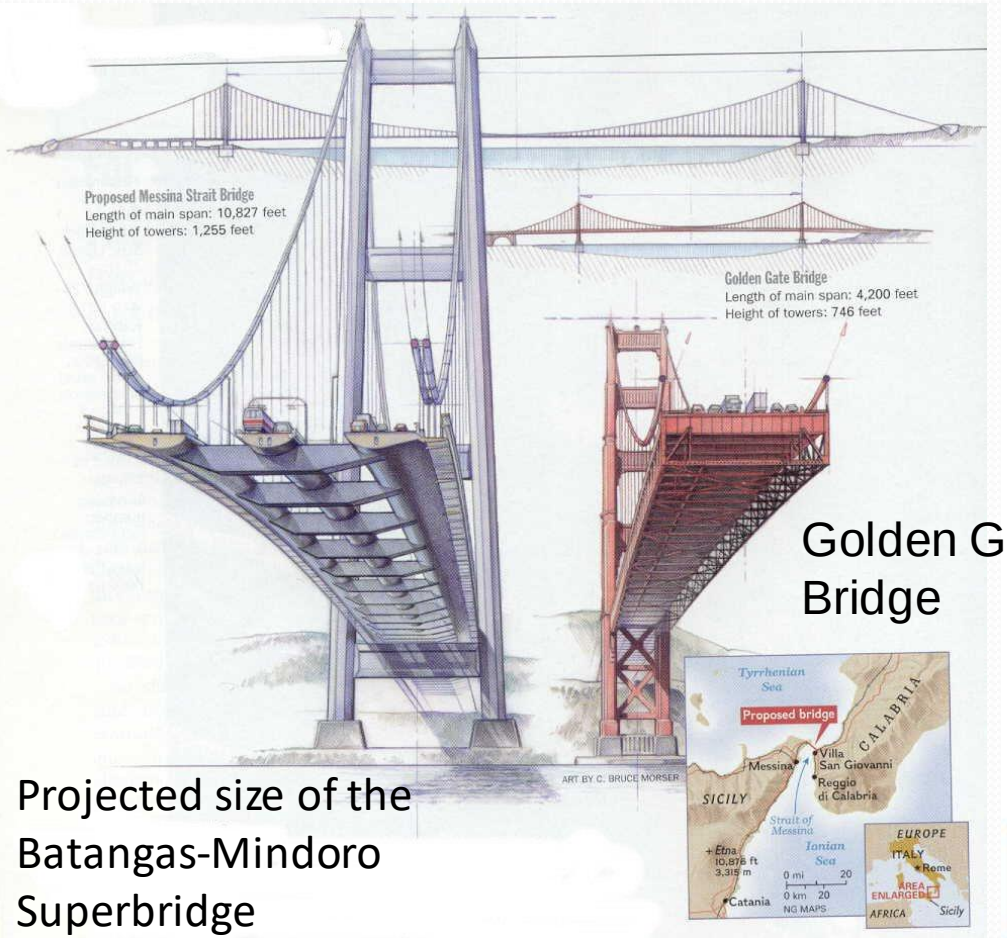
Advances in computer modeling mean structures can be designed lighter and stronger, making possible a single 2-mile-long, 10-lane span suspended from 4-foot-diameter cables hanging from 1,000-foot towers built on the mainland and the island. The span would beat the current world-record holder, Japan's Akashi Kaikyo suspension bridge, by 66 percent. The land-based towers eliminate the problem of building support bases in the turbulent water; a suspension bridge allows the span to flex up to 30 feet during earthquakes.



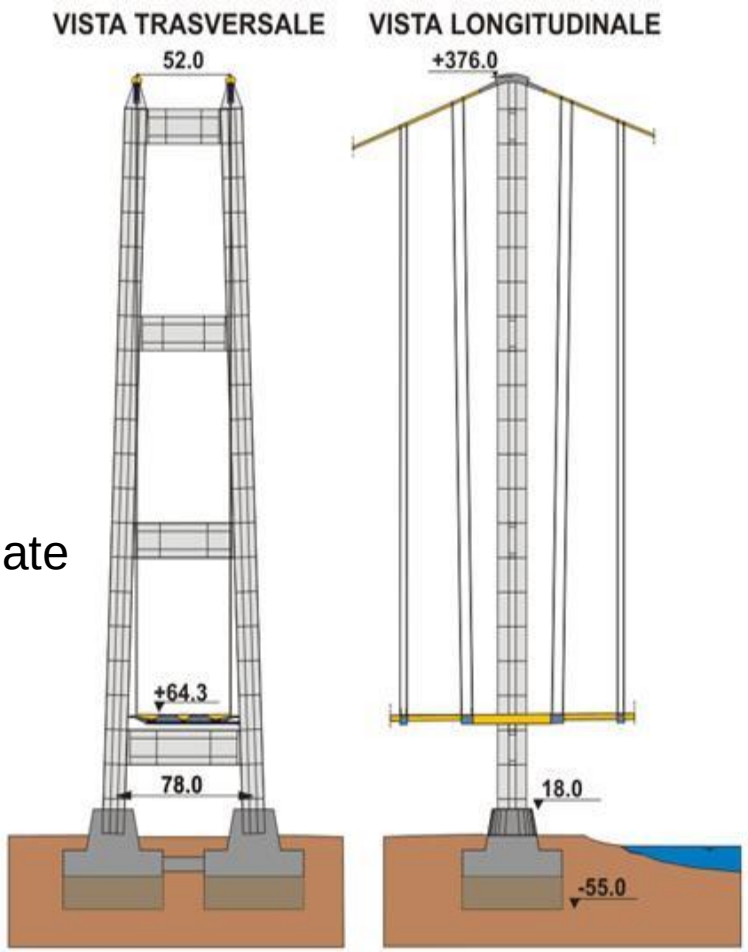
But the wind remains treacherous to the bridge and to large trucks and trains crossing it, says Khaled Mahmoud, director of long-span bridges at Hardesty & Hanover, a New York engineering firm that first began sketching Messina designs in 1969. Using computer and wind-tunnel models, engineers have designed steel box bridge sections that will act like giant aircraft wings to deflect the wind, mitigating the same vortex shedding that bedevils tall buildings. The bridge project remains stalled, however; the Italian government can't manage the enormous expense on its own, and private investors fret there won't be enough traffic to recoup their outlay.



Unless bridge technology will not further modernize in the next 3 to 5 years, the Batangas-Mindoro Superbridge can be a similar design to the Messina Strait bridge, just multiplied by two, to cover the water distance

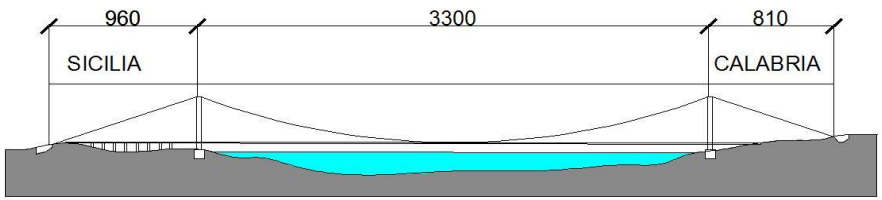


Golden Gate Bridge



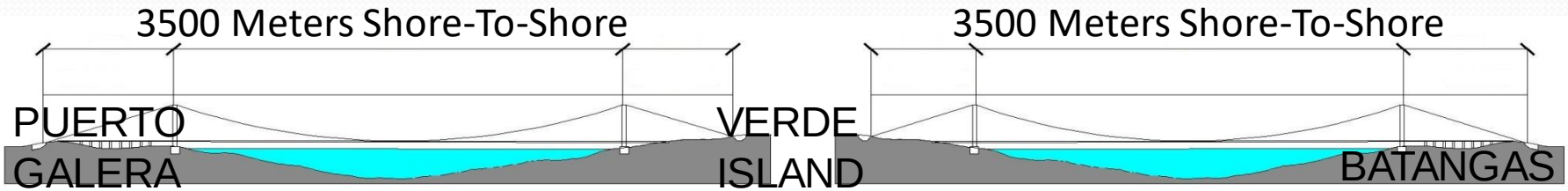
Projected size of the Batangas-Mindoro Superbridge

As scaled from the Messina Strait Bridge



For the design of a crossing structure, the preliminary project definitively opted for a 3,300m-long single-span suspension bridge that will have the world's longest central span. The deck was to be 3,666m long, including the two suspension side spans, and 60m wide.

The structure was to be composed of three box sections – two lateral ones for the roadway deck and a central one for the railway tracks. The deck's roadway section was to have three 3.75m-wide lanes in each direction (two driving lanes and one emergency lane). The railway section was to have two tracks and two lateral pedestrian sidewalks.



At present technology, the Batangas-Mindoro Superbridge would essential a " X2 " of a Messina Strait Bridge project, with the length of the MSB as long as the leg from Puerto Galera to Verde Island and Verde island to Batangas.

Suspension bridges are not typically sensitive to earthquakes as the bridge's structural configuration has a type of natural insulation that comes from the typical frequencies of seismic stresses (periods of fractions of seconds). This helps to insulate the structure against the physical possibilities of vibration periods of several seconds and tens of seconds.

The Batangas-Mindoro Superbridge would have to be designed to withstand an extreme earthquake with a magnitude of around 7.1 on the Richter scale with the focus at around 15km from the bridge. Such an earthquake is extremely rare.