



Tsing Ma Bridge

The 2 160m long Tsing Ma Bridge, a prestigious landmark of Hong Kong, is the most outstanding element in the Lantau Link which provides a direct access to the Hong Kong International Airport at Chek Lap Kok.



The Tsing Ma Bridge has the world's longest bridge span carrying both road and rail traffic. The bridge has been designed to carry dual three lane expressway on the upper deck and two railway tracks on the lower deck. In addition, there are two sheltered, single lane carriageways on the lower deck; these may be used for maintenance access and the diversion of traffic during high winds or in emergencies. Aerodynamic stability of the bridge has been assured by careful design of the shape of the leading edge of the bridge, and by the provision of an air gap at the centre in both the upper and lower decks. Aerodynamic stability has been verified by wind tunnel testing.

The principal foundations of the bridge are the tower piers and the massive gravity anchorages for the main cables.

These are all on land except for one tower foundation, located in relatively shallow water off Ma Wan island, for which concrete caissons were floated into position and sunk onto the seabed rock, and then protected by an artificial island.

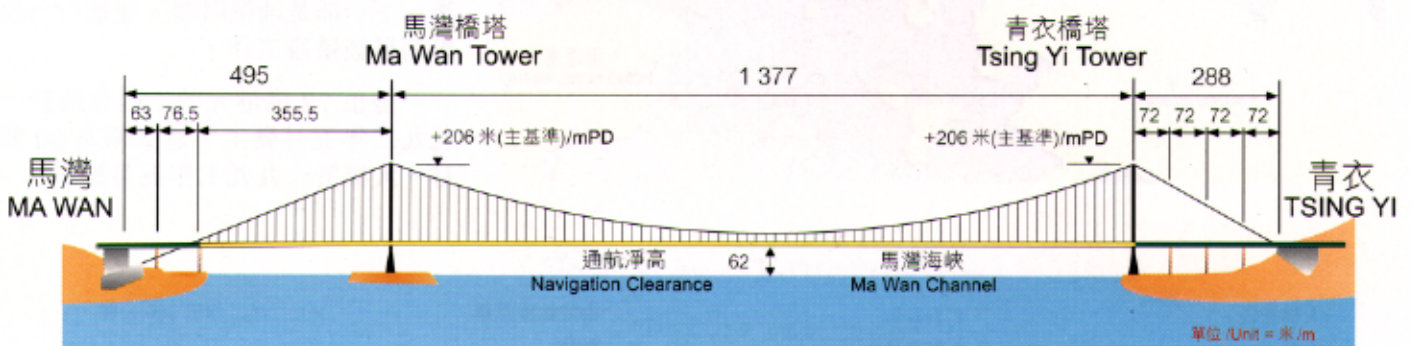
The 206m high concrete towers are taller than many buildings in the Central business district of Hong Kong, including the Hongkong Bank Headquarters Building which is 178m high. The towers were constructed by slipforming in three months, and the heavy steel saddles lifted onto the tower tops by strand jacks.

After completion of the catwalks, which followed the profile of the main cables from Tsing Yi anchorage to Ma Wan anchorage via the tower tops, the 1.1m diameter cables were constructed by aerial spinning. Some 27 000 tonnes of 5.38mm diameter galvanized steel wires were spun and adjusted in just nine months. The total length of wire, 160 000km, is enough to stretch four times round the world.

The steelwork for the deck structure was fabricated overseas, mainly in Britain, Dubai and Japan. The steel deck was assembled into 50 sections generally 36m long in Mainland China at a site beside the Pearl River near Dongguan, 80km north of Hong Kong. These sections, each weighing about 1 000 tonnes, were brought to the site by barge, lifted into position and erected in eight months.

Connection of the erected deck sections then began, along with installation of the railway tracks, and this was followed by laying of the roadway surfacing and a multitude of other finishing works.

The HK\$ 7.2 billion contract commenced in May 1992. The bridge was opened to traffic in May 1997 after 60 months of construction.



Overall Bridge Length	2 160m
Main Span	1 377m
Navigation Clearance	62m
Height of Towers (to saddle)	206m
Anchorage	
Tsing Yi: Weight of concrete	200 000 tonnes
Ma Wan: Weight of concrete	250 000 tonnes
Cables	
No. of 5.38mm wires (main span)	33 400
Total length of wire	160 000km
Total weight of wire	26 700 tonnes
Load in each cable (main span)	53 000 tonnes

Tower Saddle Weight	500 tonnes each
Deck	
Weight of structural steel	49 000 tonnes
Weight of deck/metre	22.7 tonnes
Towers	
Weight of concrete per tower	52 000 tonnes
Maximum Movements	
Vertical : at mid-span	6.0m
Lateral : at mid-span	4.4m
Longitudinal : at Tsing Yi abutment	±0.74m
Traffic Speeds	
Road	100 km/hr
Railway	135 km/hr