Construction of Bridges
Materials suitable for the Construction of Long-span Bridges

1. Stone – in arch masonry
2. Steel – in girder or box-section constructed in steel plates and standard sections
3. Steel – truss constructed of standard sections
4. Reinforced Concrete – in arch or spanned forms
5. Tensioned RC – in various forms
6. Precast – mainly in box-section girder
Common Bridge Forms
Simple Supported – span effective from 10m to 60m

Actual example – Route 3
Interchange at Au Tau, Yuen Long
Continuous Span – from 10m to 100m

Actual example – construction of a span of continual section of elevated highway bridge at Route 3, Kwai Chung
Balanced Cantilever – span from 25m to 200m

Actual example – balanced cantilever bridge series forming the approach to the Ting Kau Bridge
Balanced cantilever bridge for viaduct of West Rail at Au Tau Interchange
Balanced Cantilever Suspended Span – span from 50m to 300m
Steel Truss – 50m to 100m

Actual example – 5-span steel truss bridge in western part of Pearl River, Guangzhou
Steel Arch (framed or trussed) – from 150m to 500m
The Sydney Harbour Bridge and its approach
Cable suspension – from 400m to 1500m

The 1377m span Tsing Ma Bridge
Concrete Arch (ribbed or unribbed) – from 50m to 300m
Steel Arch – from 100m to 500m
Cable stayed (multi-spanned) – from 50 to 500m per span

The 3-span cable-stayed Ting Kau Bridge
Cable stayed span – from 200m to 800m

Actual example – the connecting bridge from Macau Mainland to the Island of Taipa in Macau
Example of box-sectioned steel girder bridge
Structural Elements for Typical Bridges

1. Foundation – for bridge towers, portal frames or piers

2. Bridge Tower – the vertical supporting structure for cable suspension or cable-stayed bridges

3. Portal frame or pier – the vertical supporting structure for usual spanned bridges

4. Bridge deck – the horizontal part of a bridge that support pedestrian or traffic activities

5. Bridge anchor – required only for suspension bridges to counter resist the pull from the suspension cable

6. Suspension cable – for suspension and cable-stayed bridges for the hanging, support or counter-balancing of the bridge deck
The foundation of the bridge tower of Ting Kau Bridge on Tsing Yi side
The foundation for the Bridge Tower of Tsing Ma Bridge on the Tsing Yi side
Forming the foundation for piers of elevated highway bridges
Pier supports for an elevated roadway

A portal frame serving also as a transfer beam in the Route 3/Airport Railway at Kwai Chung
Bridge tower for Tsing Ma Bridge and Kap Shiu Mun Bridge
The forming of the cable anchor of Tsing Ma Bridge on Ma Wan side
The forming of the cable anchor of Tsing Ma Bridge on Tsing Yi side
Forming the deck of the approach section of Tsing Ma Bridge on Ma Wan side using erection and hoisting approach
Forming the deck of the approach section of Tsing Ma Bridge on Tsing Yi side
Completing the deck of Tsing Ma Bridge (abutting section at Tsing Yi side) by erecting of the steel truss at spot
Hoisting and erecting of the modulated bridge deck for the Tsing Ma Bridge
Forming the bridge deck of Ting Kau Bridge using modulated steel girder frames
Laying the precast deck of the steel girder frame
Other methods to form the deck of bridges

1. Balanced cantilever method

2. Construct in-situ

3. Construct using precast beam

4. Construct using precast girder section and erected by a launching machine (viaduct)
Forming the deck of the Ting Kau Bridge approach section using a special balanced-cantilever traveling formwork system.
The Ting Kau Bridge approach section
Construction of a section of elevated railway track in the KCR Ma On Shan Line using in-situ method
The laying of precast beams to form the deck of the Route 3 elevated roadway at Kwai Chung
Hoisting of the precast beams using a special launching gantry
Construction of an elevated highway bridge using precast girder erected by the use of a launching gantry
Detail showing the operation of a Launching Gantry in the Ma On Shan T7 Highway project
Forming the viaduct for railway track of the KCR West Rail
Handling of the precast box girders