Case study

The construction of the West Rail Tsing Kwai Tunnel from Mei Foo to Tsuen Wan
West Rail – Tsing Kwai Tunnel

Kwai Tsing Tunnels – 3.6 km
- Ha Kwai Chung Tunnel (1.7 km)
- Tsing Tsuen Tunnel (1.78 km)
- Tsing Tsuen Cut-and-Cover Section (0.12 km)

Location of major Tunnel Portal

Cross-Section of Ha Kwai Chung Tunnel
- Ha Kwai Chung Tunnel (Drill & Blast)

Cross-Section of Tsing Tsuen Tunnel
- Tsing Tsuen Tunnel (TBM Method)
- Part of Tsing Tsuen Tunnel (Cut and Cover)
West Rail – Tsing Kwai Tunnel

Construction Features

- Total length about 3.6 km
- The 1st section from Mei Foo to Lai King, about 1.7 km long, constructed using drill-and-blast method
- The 2nd section from Lai King to Tsuen is Wan about 1.8 km long, constructed using a 8.4m dia. mix-mould tunnel boring machine (TBM)
- A 50m dia. access shaft is provided at Lai King to facilitate the dismantling of the TBM upon its completion of the drilling from Tsuen Wan direction.
- The TBM has been used twice, forming the east and south bound tube in two separated journeys from Tsuen Wan direction to Lai King
West Rail – Tsing Kwai Tunnel at Mei Foo Portal

Forming a access ramp into the tunnel portal
Forming a access ramp into the tunnel portal
Forming an access ramp into the tunnel portal

Temporary ramp being formed
The purposes of tunnel portal

1. As temporary ramp entering into the tunnel
2. As a working space for the assemble or dismantling of tunnelling equipments
3. As exit to allow excavated spoil be removed from the tunnel interior
4. Setting up and stationing of supporting services such as ventilation or equipment storages
5. As an approach section leading to other tunnel servicing areas, such as equipment depot or spoil/material storage
Inside the portal seeing the preparation and entrance arrangement into the tunnel.
A tunnel working gantry is being assembled at the portal on Mei Foo side.

Setting up arrangement at the tunnel portal.
Works in Drill and Blast Tunnel (for rock tunnel)

1. Layout the tunnel alignment and start drilling holes for placing explosive charges along the side of the tunnel section. Each time about 5m (depth of hole).

2. Place in explosive and do the blasting.

3. Use excavating machine to remove the loosened rock.

4. Removal the excavated using suitable equipment, such as by conveyor or by dumper truck.

5. Temporary stable the exposed tunnel surface by shotcrete, girder beam or rock nail where required.

6. Construct tunnel lining to cover up the tunnel interior permanently.
Boring machine to form holes for placing of explosive

The drilling machine usually can operating 3 to 4 hole drilling operation at one time using computer controlled drilling arm.
Tunnel surface temporary protected by shotcrete

Erection of the waterproofing membrane before the placing of tunnel lining

Formwork for placing tunnel lining
West Rail – Tsing Kwai Tunnel Service Shaft at Lai King
The purposes of tunnel shaft at Lai King

1. As an emergency access at the mid-way of a long tunnel.

2. As an access point for the delivery of materials such as concrete, precast lining segment or rail track into the tunnel tube for the required works

3. To serve as a work station to dismantle and remove the tunnel machine drilling from Tsuen Wan direction.
West Rail –
Tsing Kwai Tunnel
Portal at Tsuen Wan

- Waterside Plaza
- Wing Shun Street Diversion
- Alignment of cut-and-cover tunnel
West Rail – Tsing Kwai Tunnel
Tunnel Boring Machine & Tunnel Lining
The shielding units and some pieces of precast tunnel lining segments storage at the portal
Tsing Kwai Tunnel - Tunnel Boring Machine

Assembling the shield of the tunnel boring machine
West Rail – Tsing Kwai Tunnel Portal at Tsuen Wan

Assembly of the tunnel drilling machine inside the shaft of Tsuen Wan portal

Shield of the TBM
The Tunnel Boring Machine being first assembled for testing and commissioning in the depot
Portal setting up in mid 1999

Portal for the Tsing Kwai Tunnel at Tsuen Wan

Portal arrangement in mid 2000
Acoustic cover to control dust and noise from disturbing the neighbourhood
Spoil removal system for the tunnel construction during boring and excavation process
Tunnel tube with the precast lining segments forming the final tunnel lining
The hydraulic jack system inside the boring machine. The jacks can provide the anchoring, pushing and turning ability for the machine to facilitate the boring process.
Another example of TBM of smaller size used in forming a service tunnel for water supply pipeline
Construction of the Interchanging Section at Ching Cheung Road, Mei Foo

- where a section of tunnel crossing a busy roadway without interrupting the surface traffic
Ching Cheung Road at in Dec 1999
Ching Cheung Road in Dec 2000

Ching Cheung Road in Dec 2001
Construct the tunnel section using cut-and-cover manner in 3 sections, with temporary closure of one section at a time and reinstate afterward, follow by the next section.
Detail showing the arrangement of a cut-and-cover section and the provision of the soil support system
The final reinstatement of the completed section