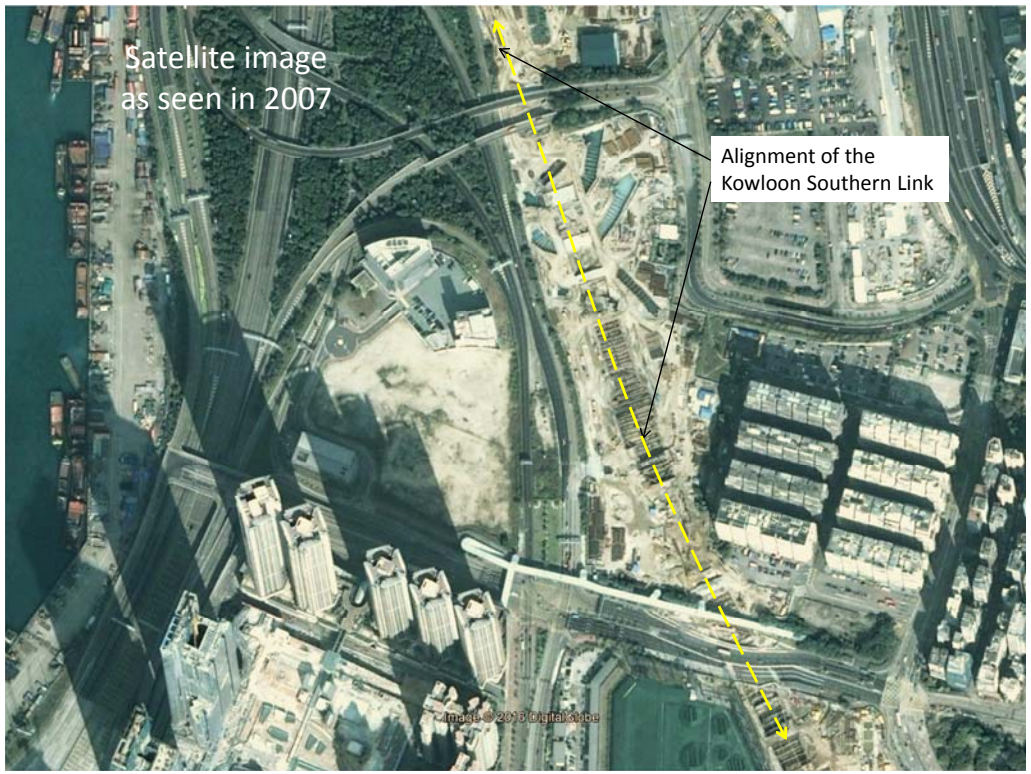
A construction Review of the Express Rail West Kowloon Terminus Part 2

A visual record/summary
prepared by Raymond Wong
as part of his study of the
ERL project since 2010

Project progress highlight,
West Kowloon Terminus Station North

(Mainly for Contract 810B)

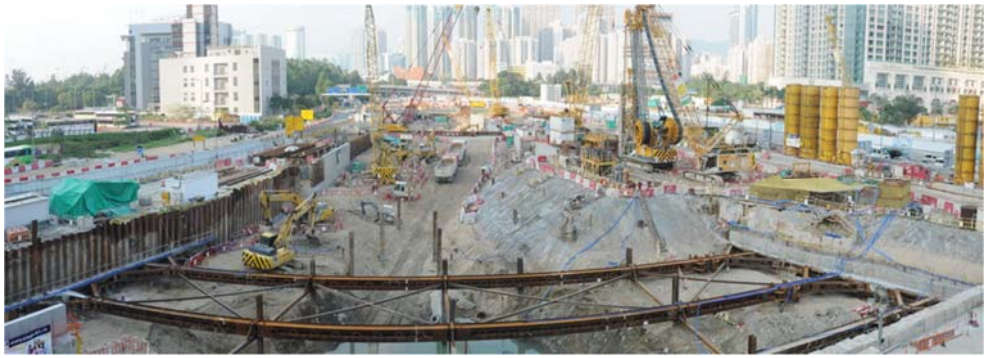


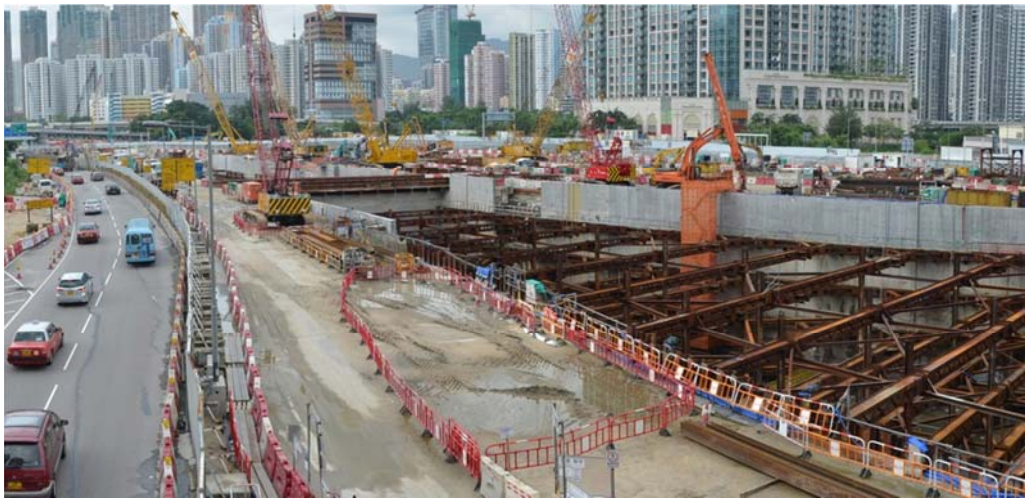
Difficulties encountered
- Crossing storm water culvert
- Crossing a series slip roads of the W Kowloon interchange
- Working close to two servicing railway tunnels

The construction of the cut-and-cover tunnel as seen in early 2015

Site for the approach tunnel as seen in late 2010

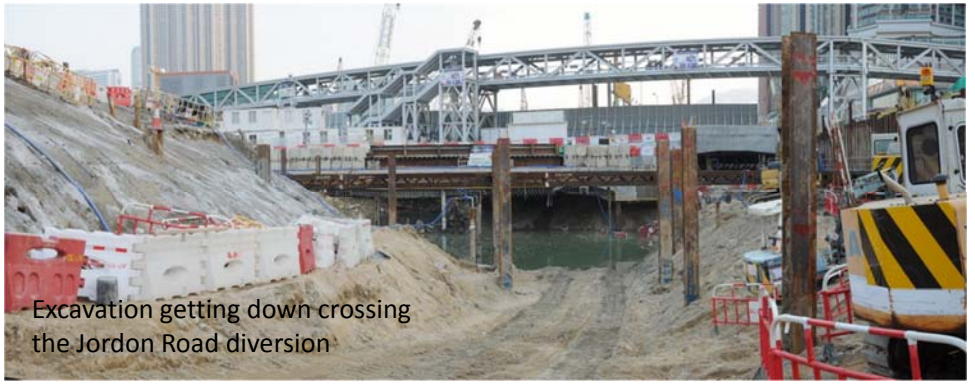
The approaching tunnel heading north as seen in mid 2012





The approaching tunnel heading north as seen in August 2013

The approaching tunnel heading north as seen in early 2014

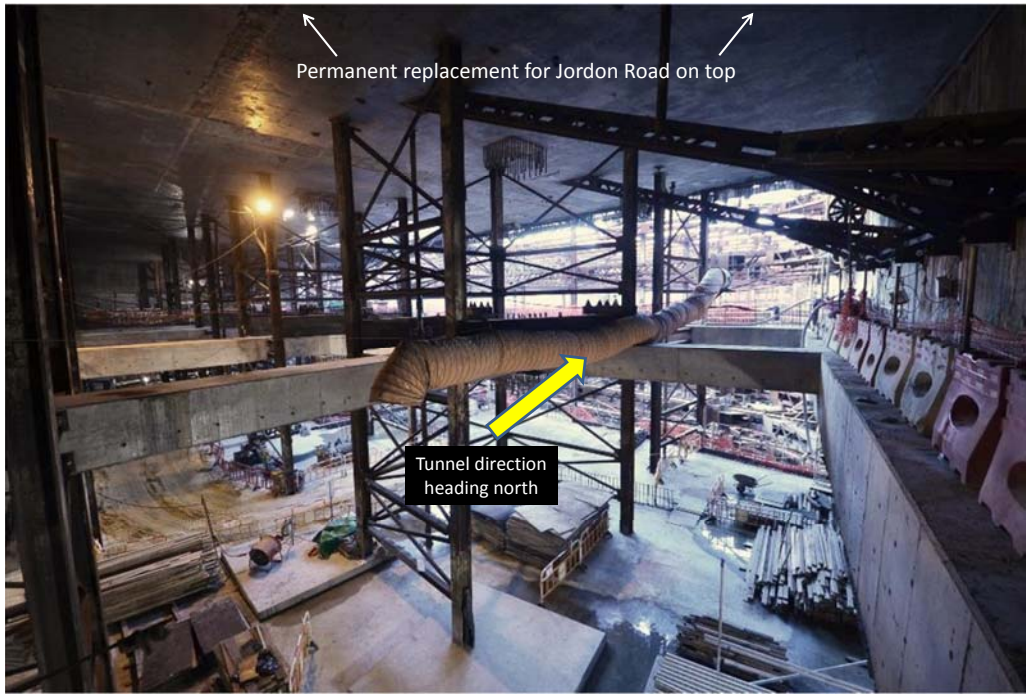


Excavation getting down crossing the Jordon Road diversion

The approaching tunnel constructed using cut-and-cover method as seen in mid 2014

The shoring arrangement inside the tunnel as seen in mid 2014

Views inside the cut-and-cover tunnel
(Mid 2014)

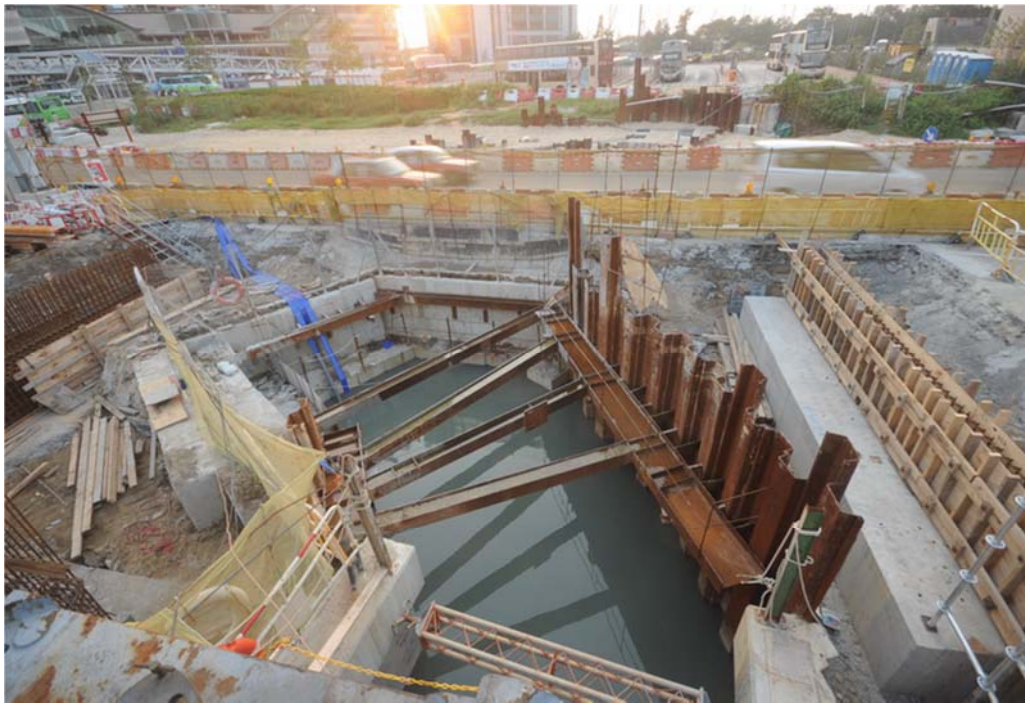


Connecting section between the approach tunnel & the terminus structure (Feb 2014)

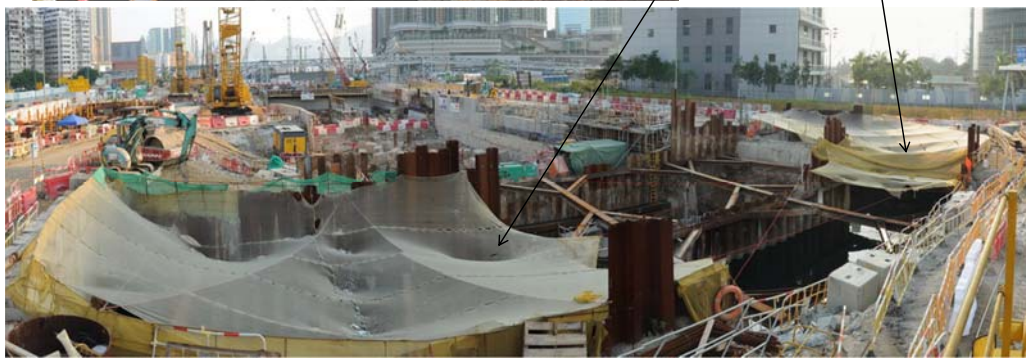
Connecting section between the approach tunnel & the terminus structure (May 2015)

Connecting section between the approach tunnel & the terminus structure (Feb 2014)

Diversion of existing
storm water nullah



Diversion of existing
storm water culvert



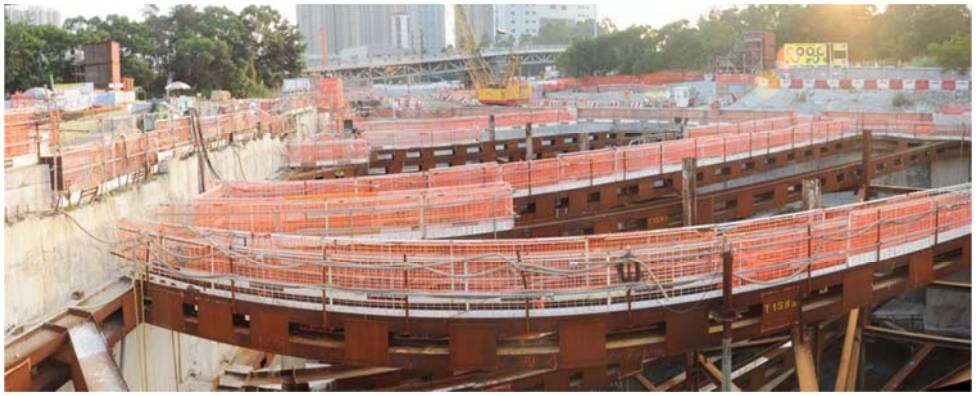
View in late 2015 (majority of the tunnel excavation being back filled)

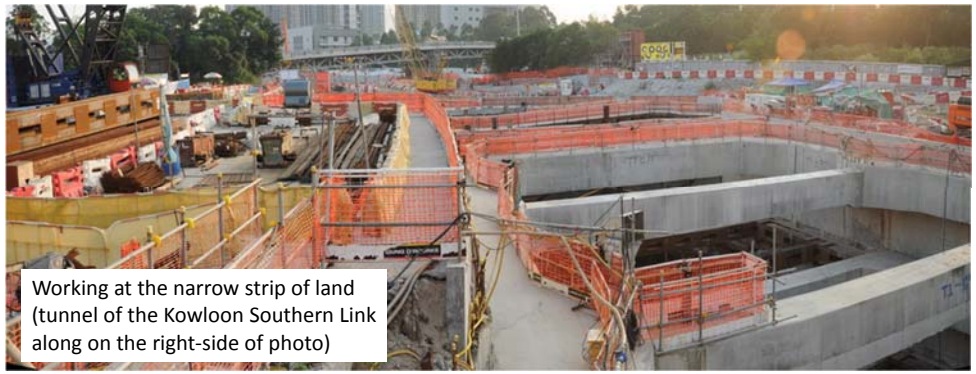
Close up satellite view of the tunnel section at Waterloo Road Interchange

Tunnel section constructed using TBM

Temporary diversion of a slip road
(Waterloo Road Interchange)

Temporary
diverted slipway

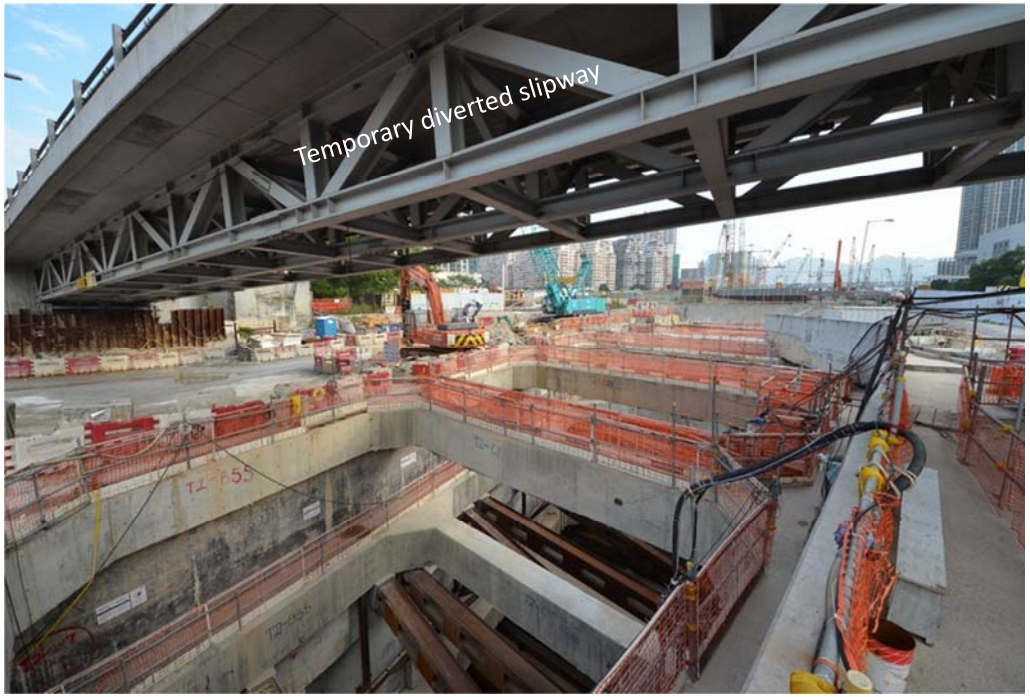


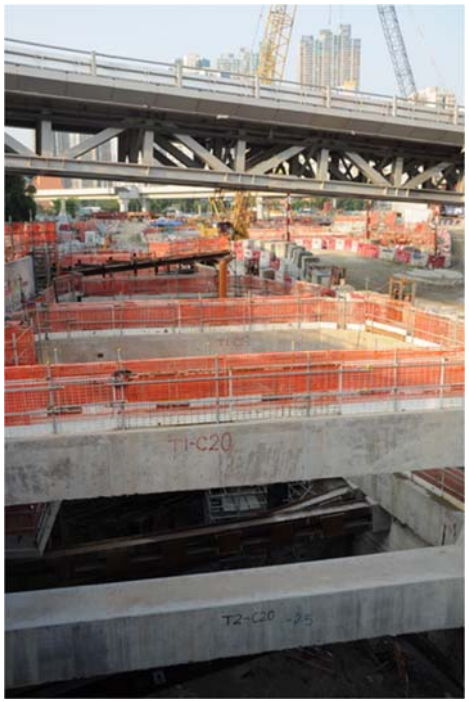


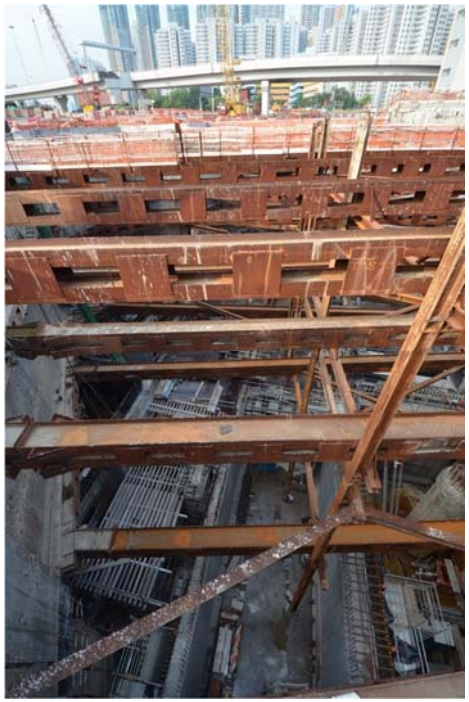
Working at the narrow strip of land (tunnel of the Kowloon Southern Link along on the right-side of photo)

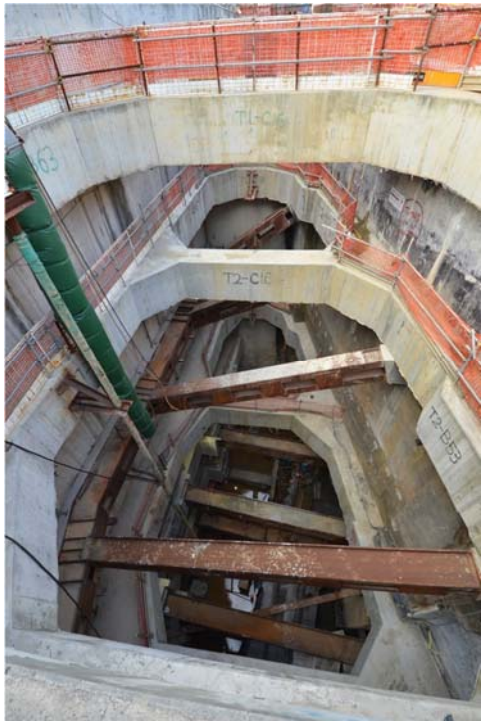
Tunnel section constructed using TBM →
Tunnel section constructed using C&C →

Tunnel end heading to the Tai Kok Tsui TBM section

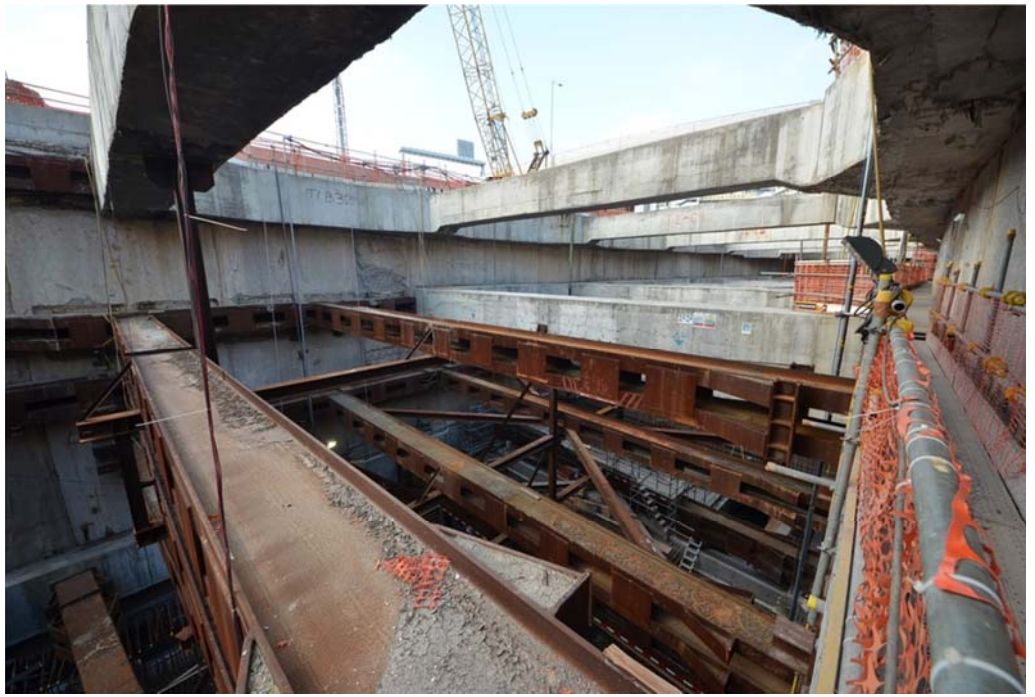


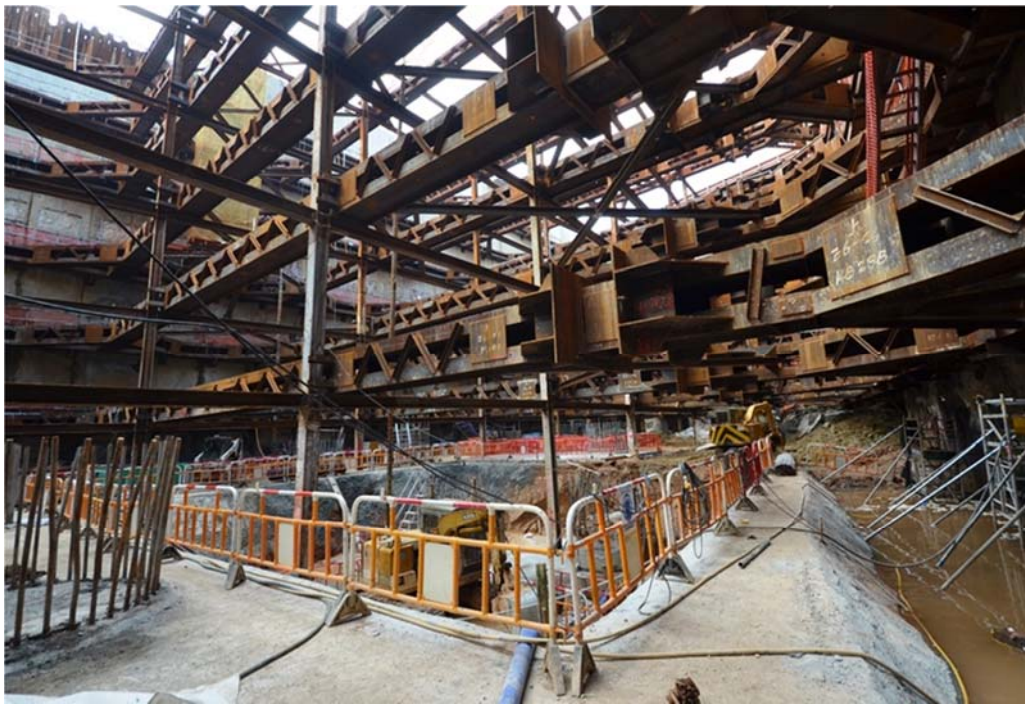

T1-C20
T2-C20




T1-C16
T2-C16
T2-B53


T1-C18

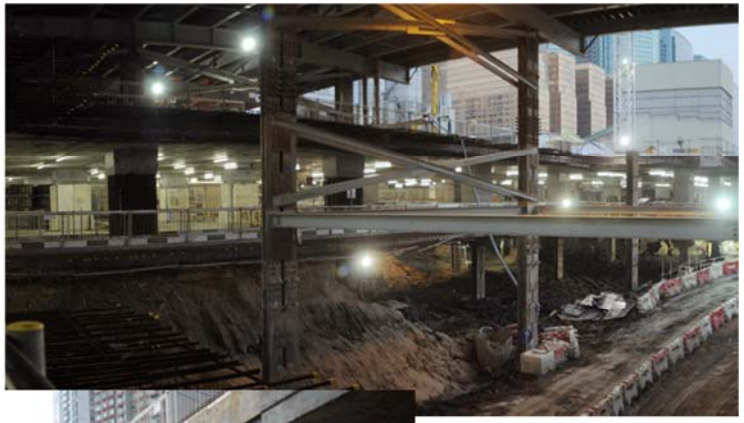




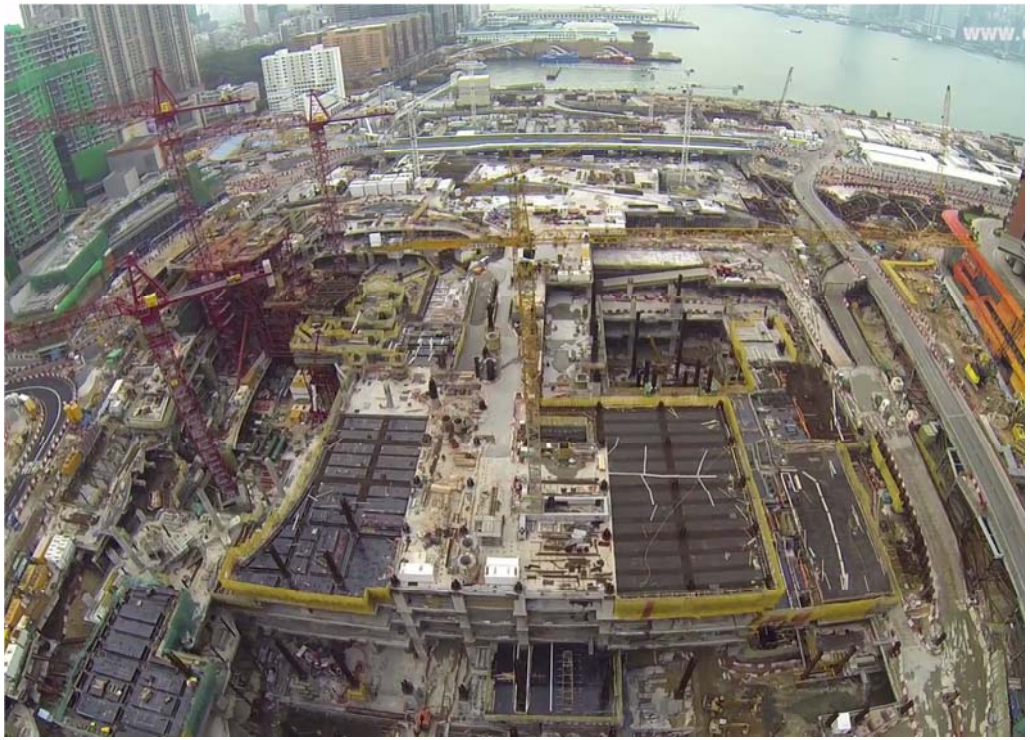
Working inside the cut-and-cover tunnel (on the northern-most tip of Terminus site)

Project progress highlight,
Station portion using top-down construction

Construction using partial top-down approach



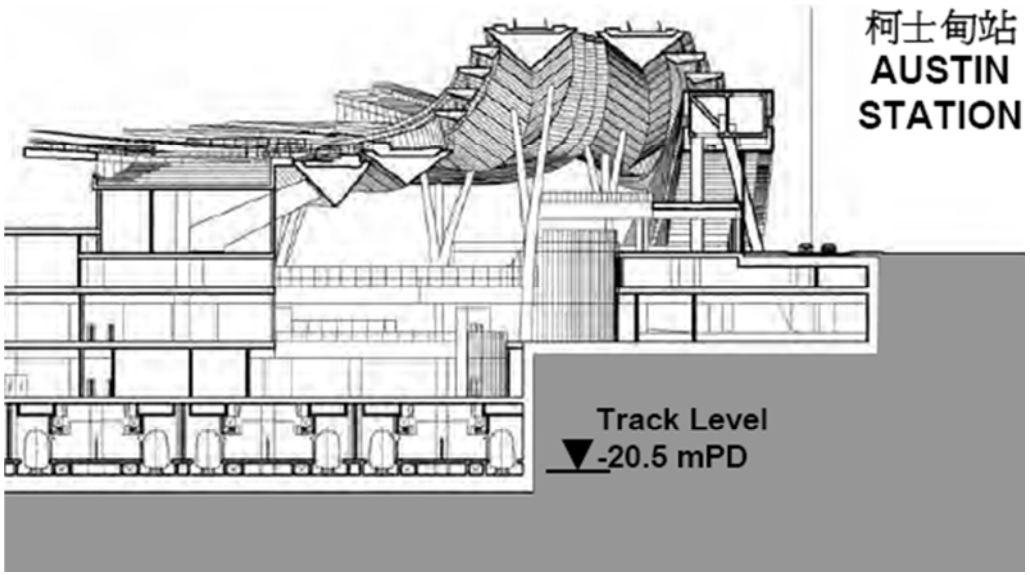

HD820V

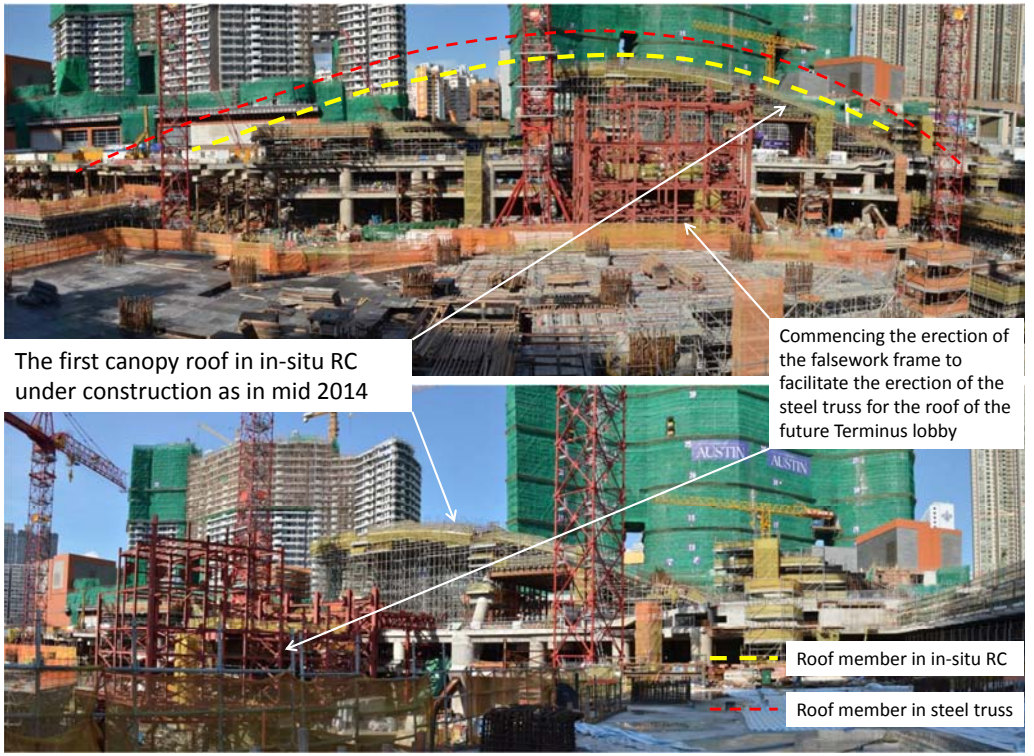


Project progress highlight,
Construction of the canopy truss

The roof of the terminus main lobby iconized the design of the Express Rail Terminus in West Kowloon – however, the roof in the form of a series of wavy trusses makes the construction extremely difficult and costly.

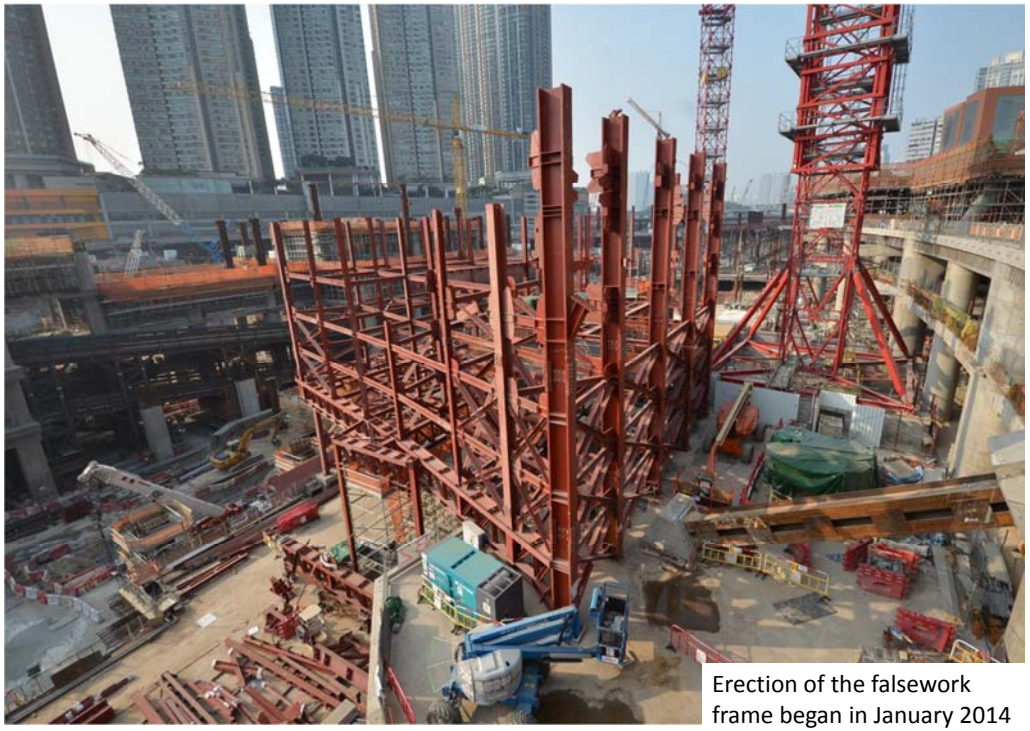
The main entrance to the Express Rail Terminus in front of the wavy canopy


柯士甸站
AUSTIN
STATION
Track Level
-20.5 mPD

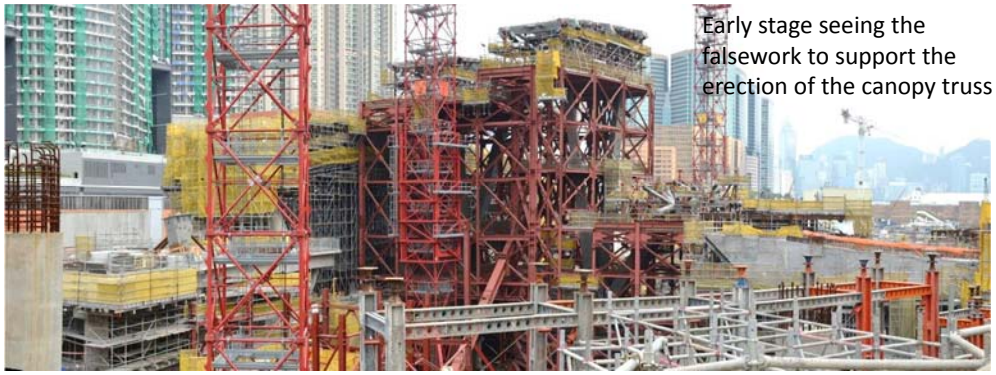

The first canopy roof in in-situ RC under construction as in mid 2014
Commencing the erection of the falsework frame to facilitate the erection of the steel truss for the roof of the future Terminus lobby
Roof member in in-situ RC
Roof member in steel truss


Closer up seeing the construction of the in-situ RC canopy roof


The wavy roof canopy on the front and back sides constructed in in-situ reinforced concrete, partially tensioned.
The intermediate trusses are constructed in fabricated steel modules, each in un-identical shape.



Erection of the falsework frame began in January 2014



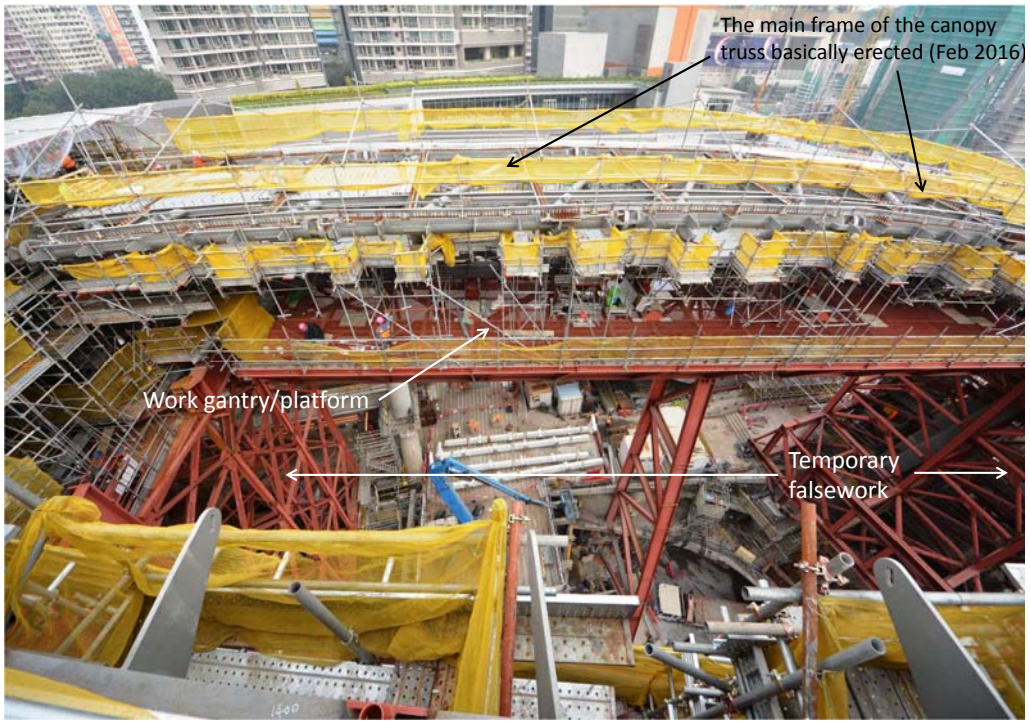
Early stage seeing the falsework to support the erection of the canopy truss

The supporting falsework as seen from the lower platform

Side views of the canopy trusses as seen in February 2016 (Westward side)

Intermediate frame supporting skylight in the form of a glass wall

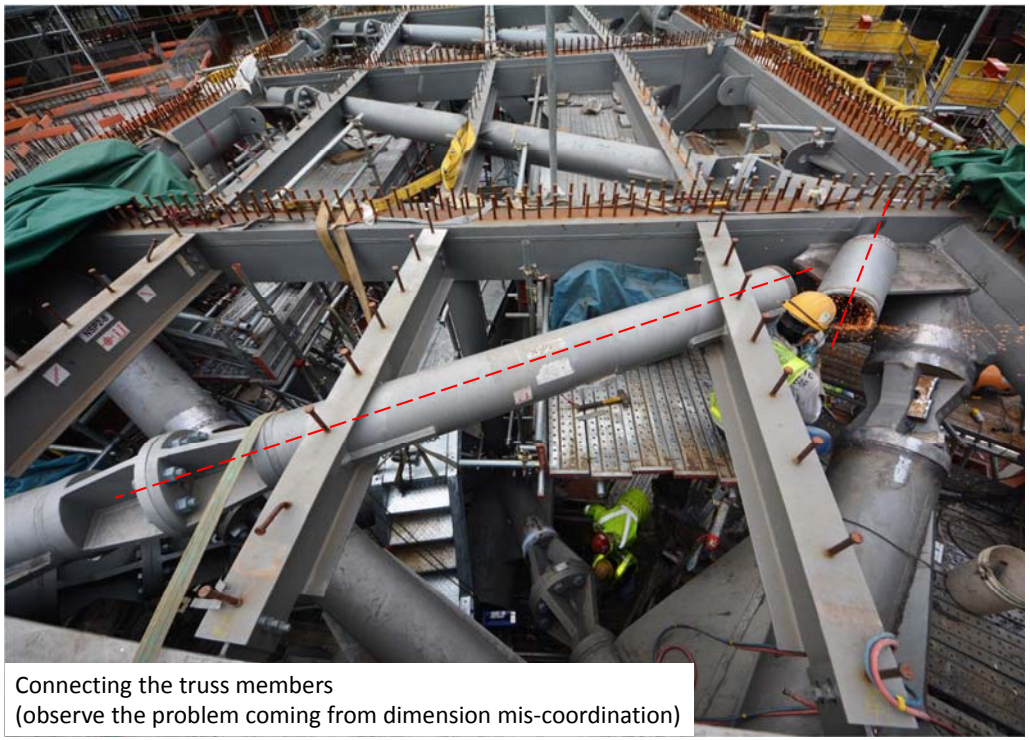
Gigantic gantry supported on the falsework frame facilitates the erection of the intermediate trusses of the curved canopy



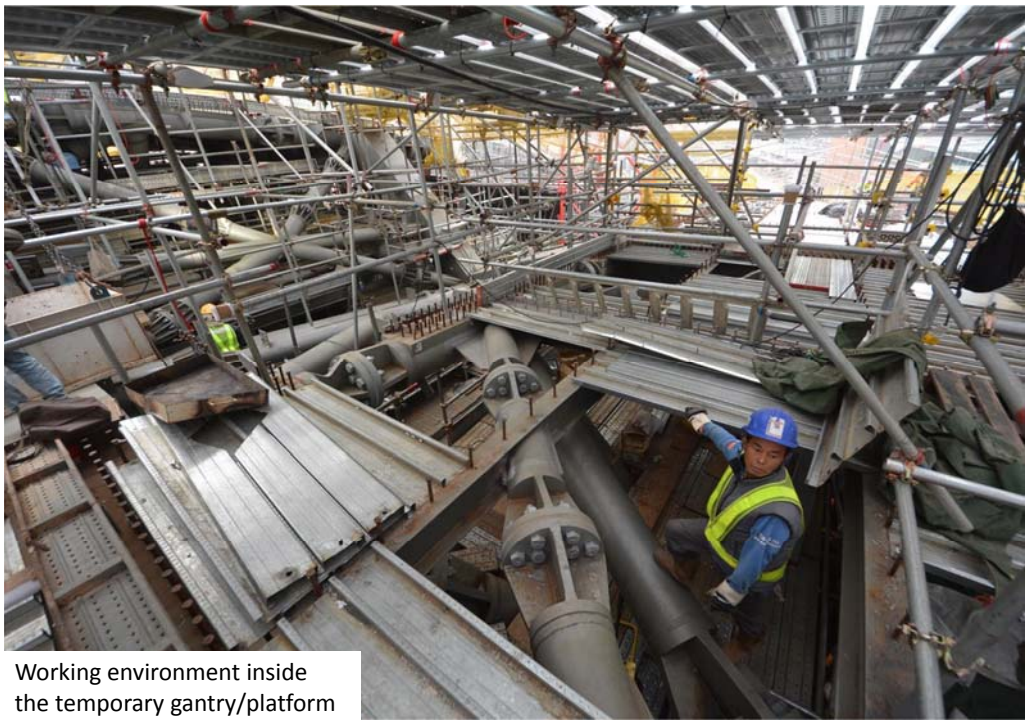
Key modulated components weight more than 10 tons supported on temporary falsework

Key components delivered to site awaiting for installation

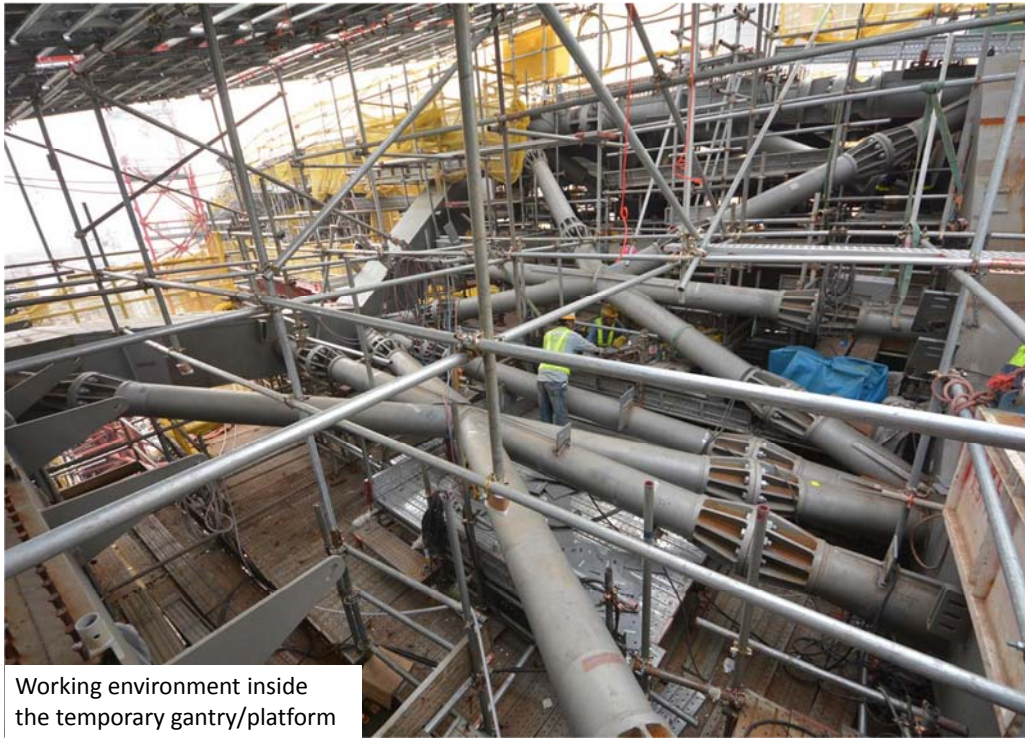
View on the top of the 3rd intermediate truss



Connecting the truss members
(observe the problem coming from dimension mis-coordination)



Working environment inside the temporary gantry/platform

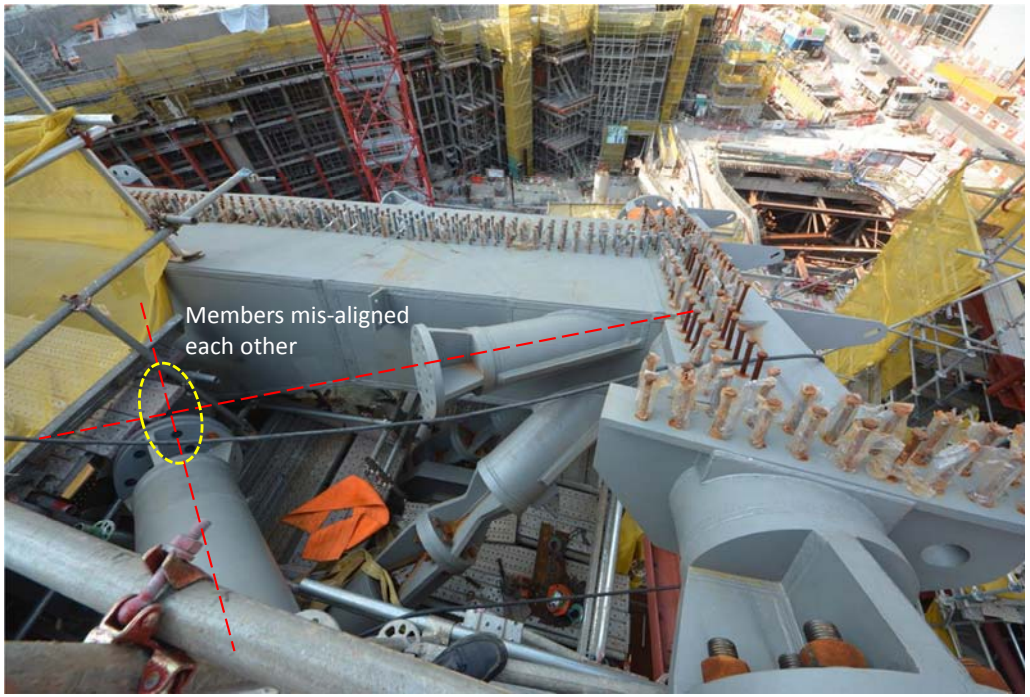


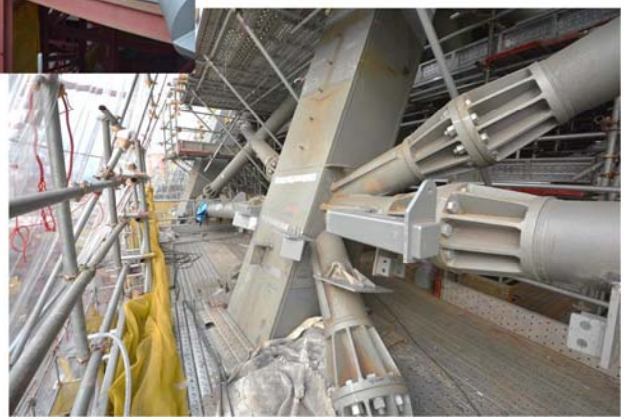
Working environment inside the temporary gantry/platform

Means to control the dimension due to deflection using hydraulic or screw jack

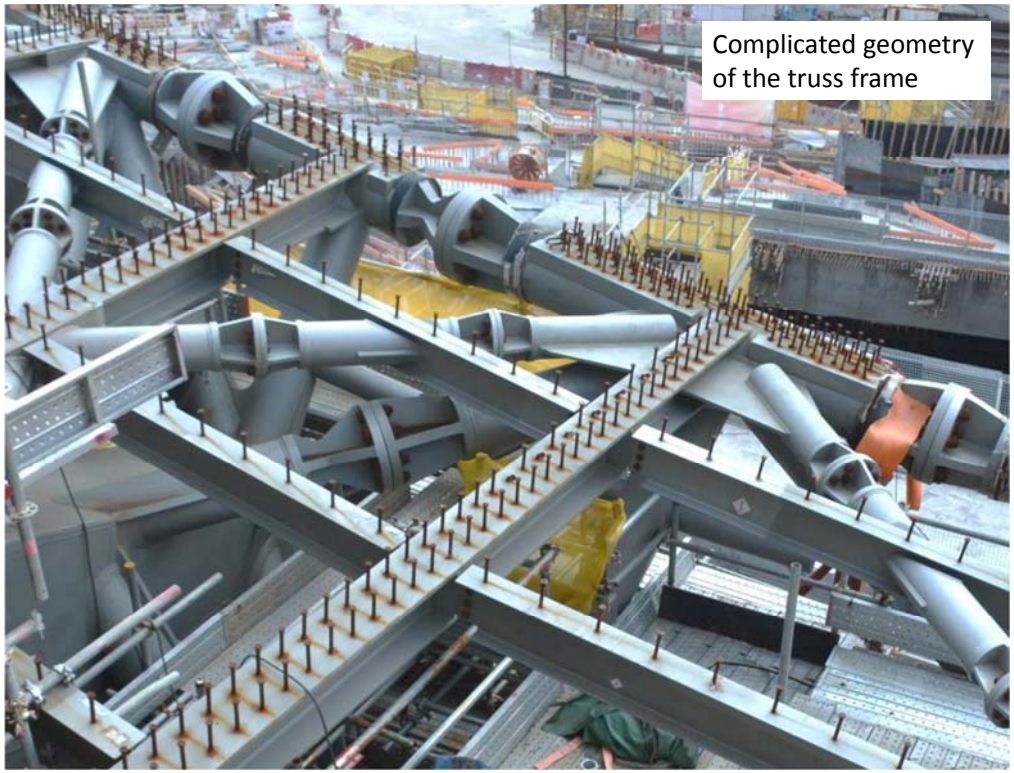
Using hydraulic or screw jacks to control dimensions

Using hydraulic or screw jacks to control dimensions

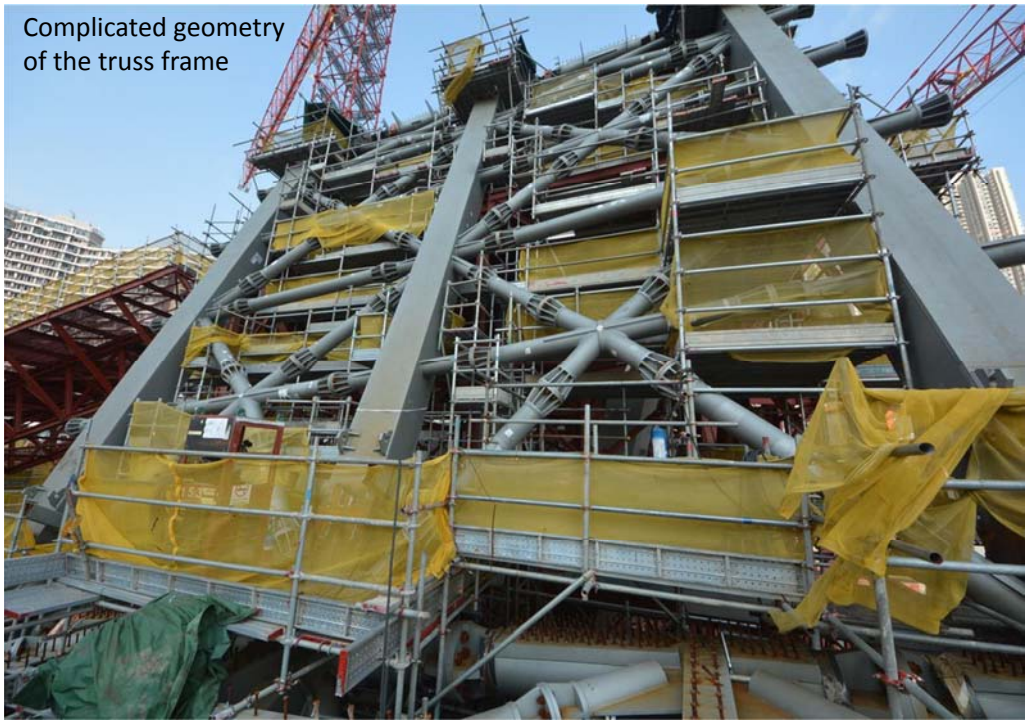




Complicated geometry
of the truss frame

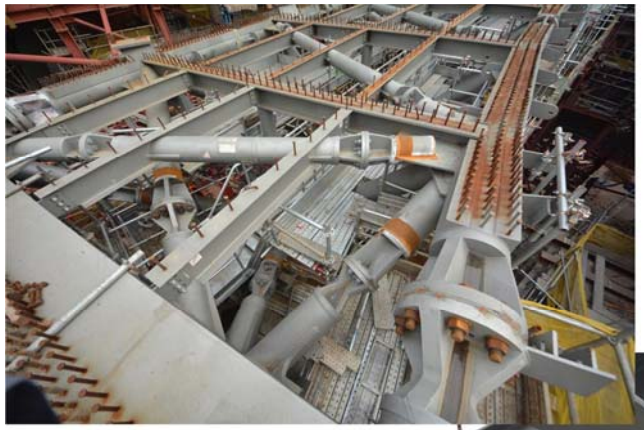


Complicated geometry of the truss frame



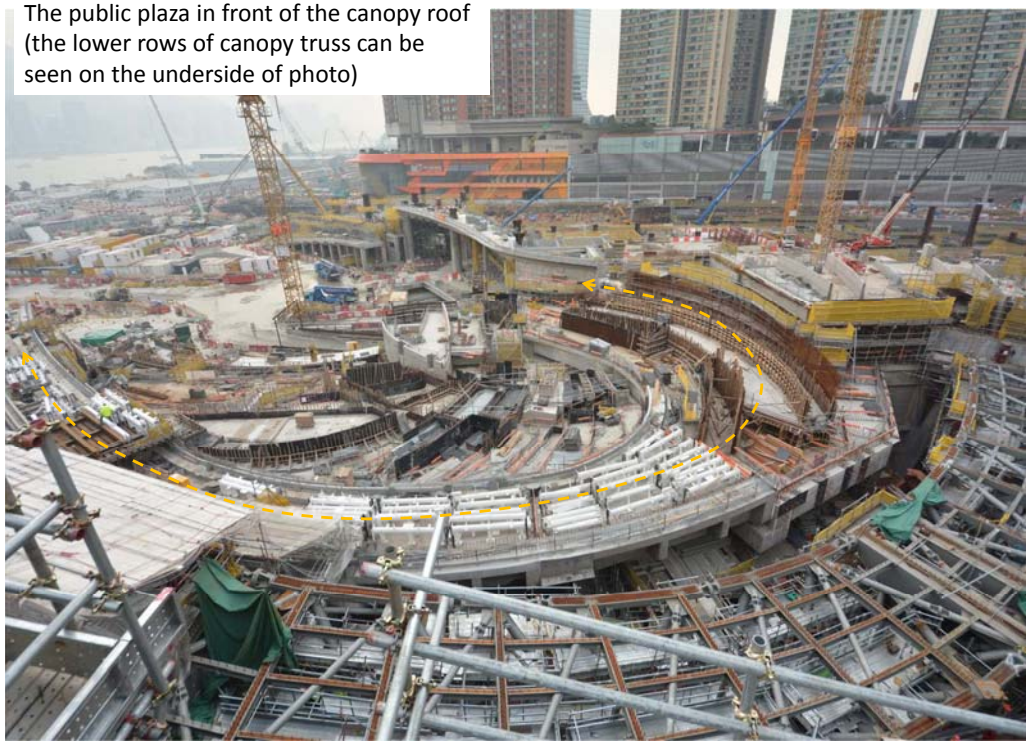
Complicated geometry of the truss frame

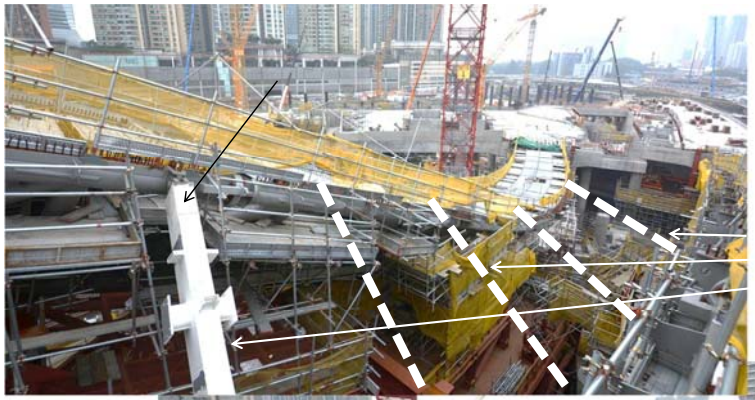
Working at high altitude, gigantic size and heavy weight is also factors causing the work complication



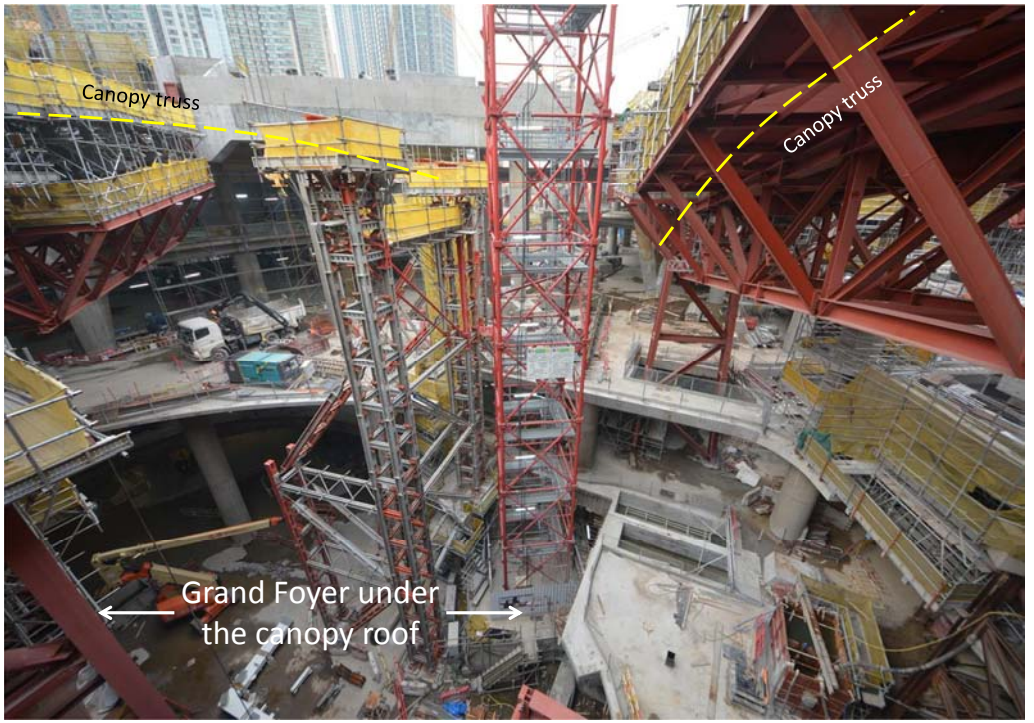
Close up look of some of the jointing knots

The public plaza in front of the canopy roof (the lower rows of canopy truss can be seen on the underside of photo)



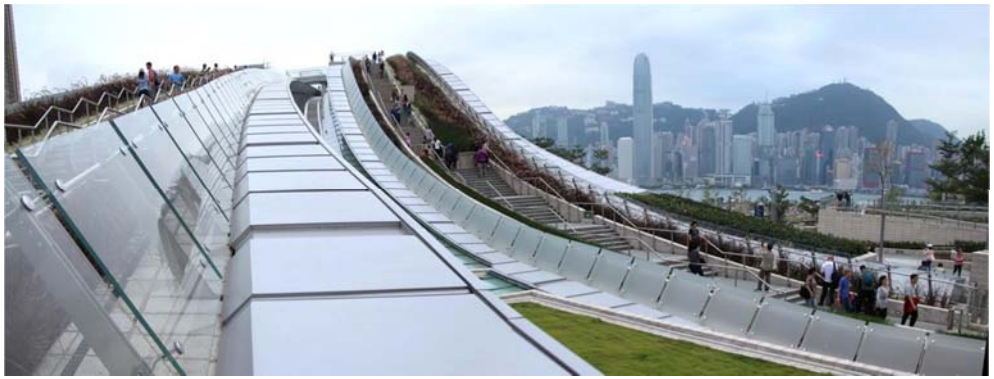


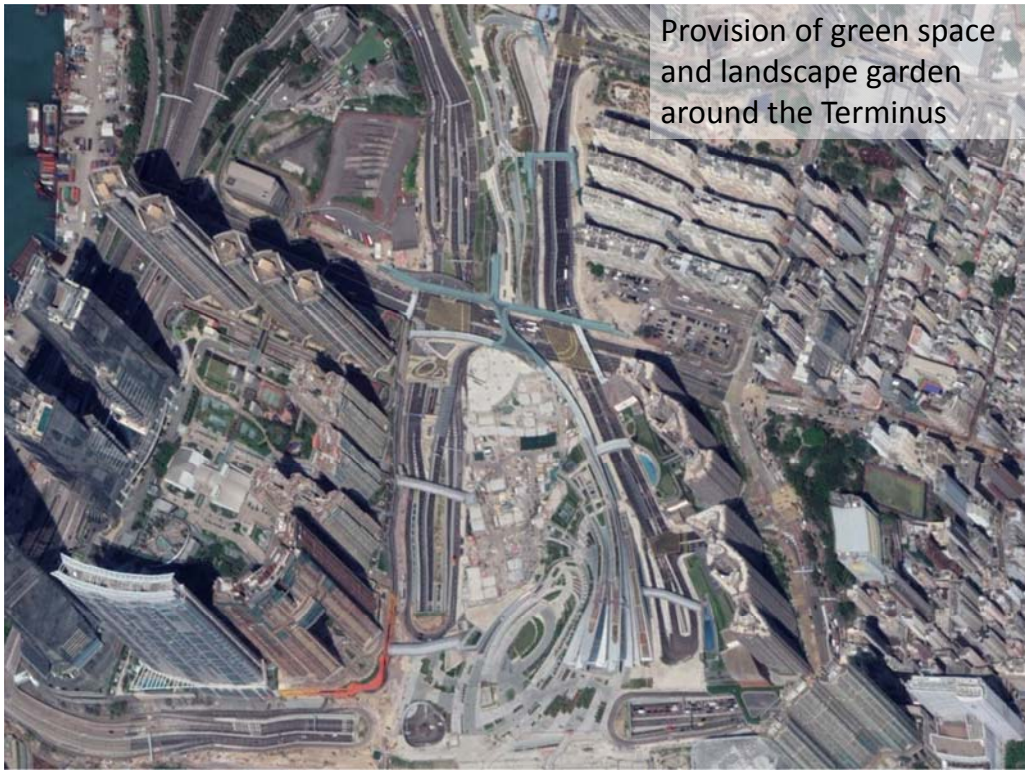
Intermediate frame supporting the future skylight glazed panels



Erection of the main canopy truss as in December 2015

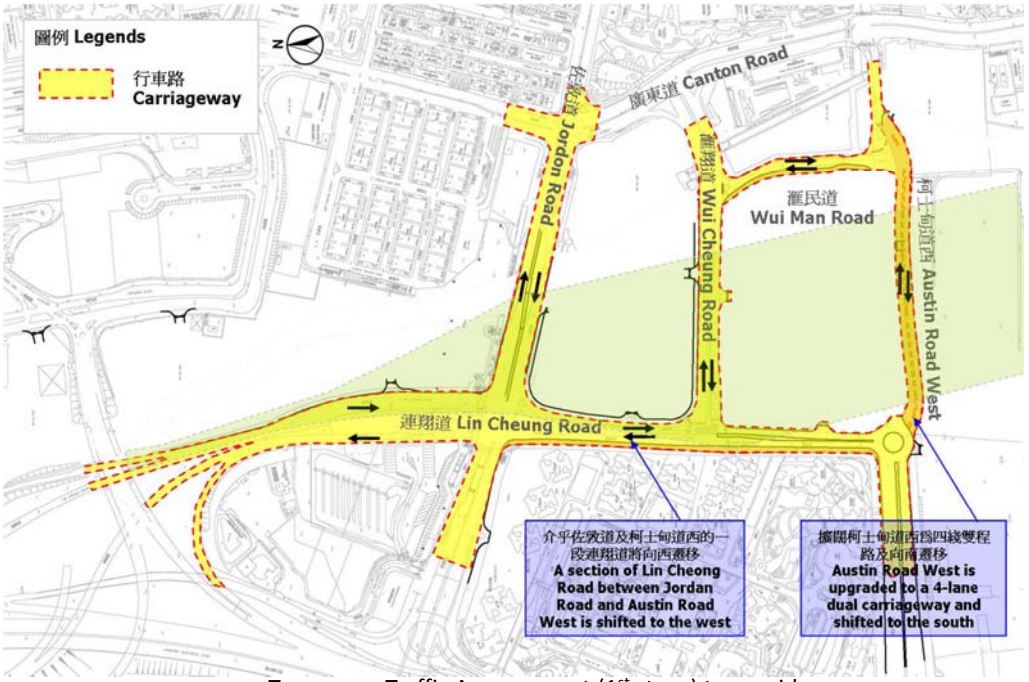
Erection of the main canopy truss as in Feb 2016





Other public facilities need to be
removed and re-instate afterward

(public traffic and pedestrian facilities)

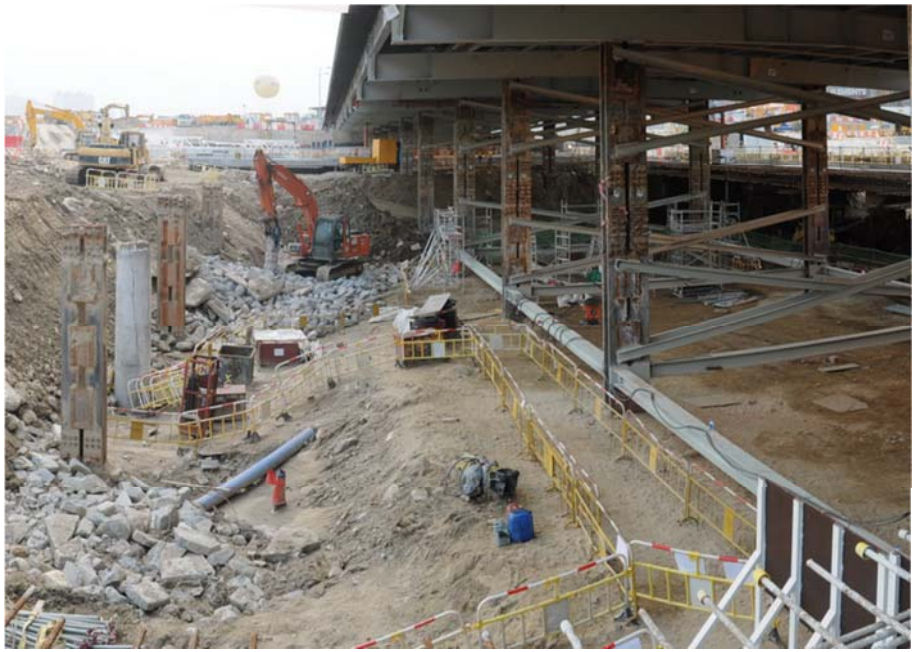


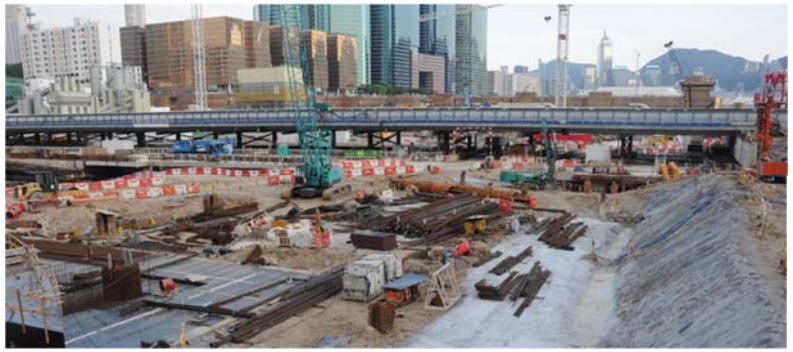
Temporary Traffic Arrangement (1st stage) to provide temporary roadway for the carrying out of the Terminus excavation

October 2011

Excavation under the temporary carriageway started in July 2011

Excavation under the carriageway and construction of the first slab of the Terminus as part of the top-down construction arrangement





Construction using partial top-down approach

A temporary carriage at the northern end of the approach tunnel (substituting Lai Cheung Road) before the tunnel section constructed using TBM

Temporary carriageway substituting part of the slipways of the Yau Ma Tei Waterloo Road Interchange

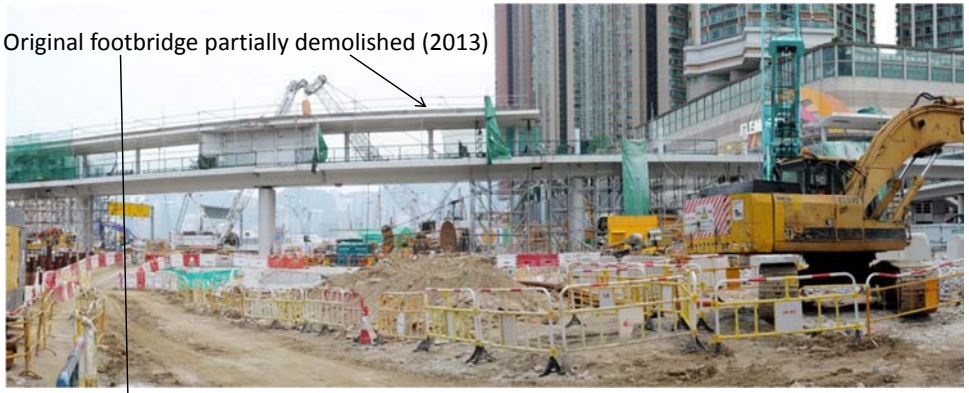
A 500m pedestrian foot-bridge being removed in stages and replaced by a new bridge after completion of the Terminus (photo of the original footbridge as seen in 2010)

The footbridge as seen in 2005

The footbridge as seen in 2014

Site for the approach tunnel as seen in late 2010

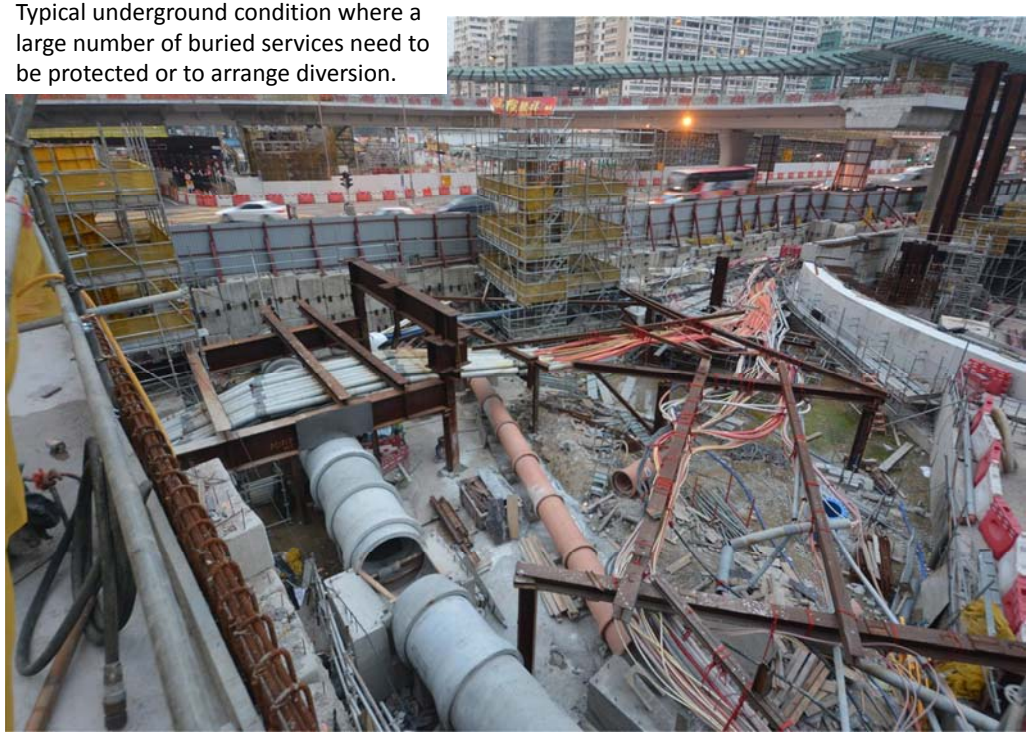

2013
Image © 2015 DigitalGlobe

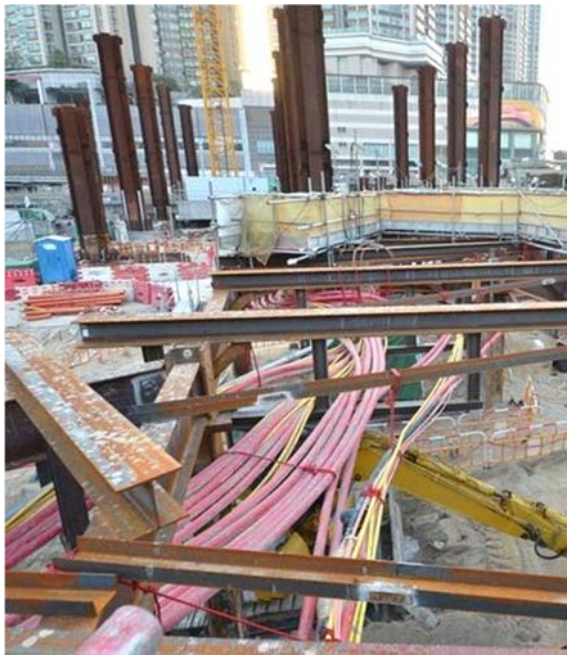

Original footbridge partially demolished (2013)

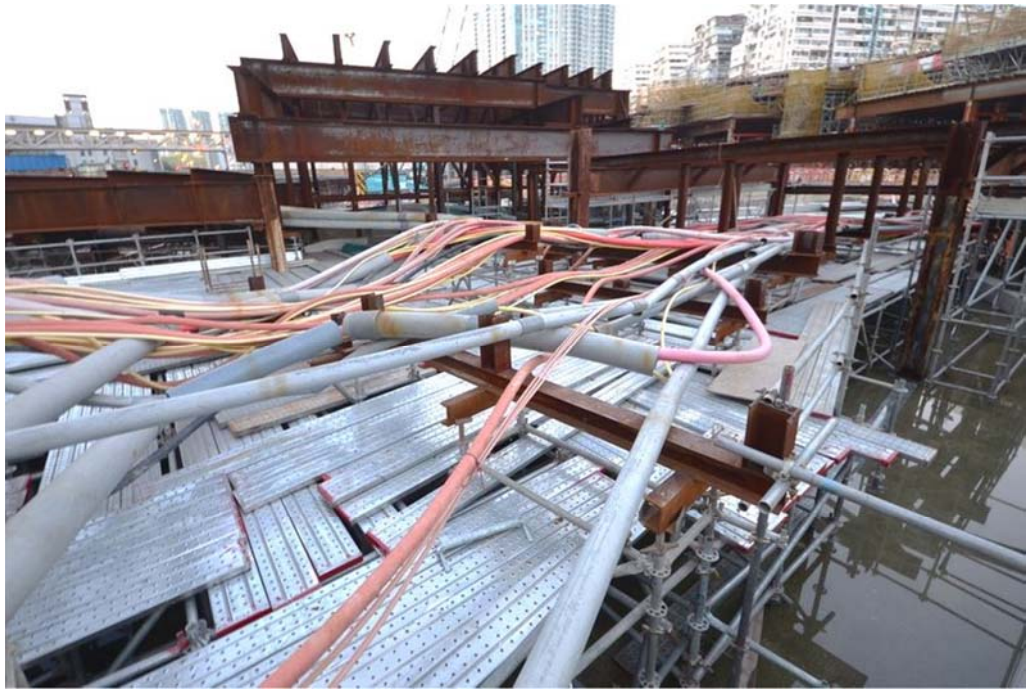

Temporary footbridge as part of the temporary diversions

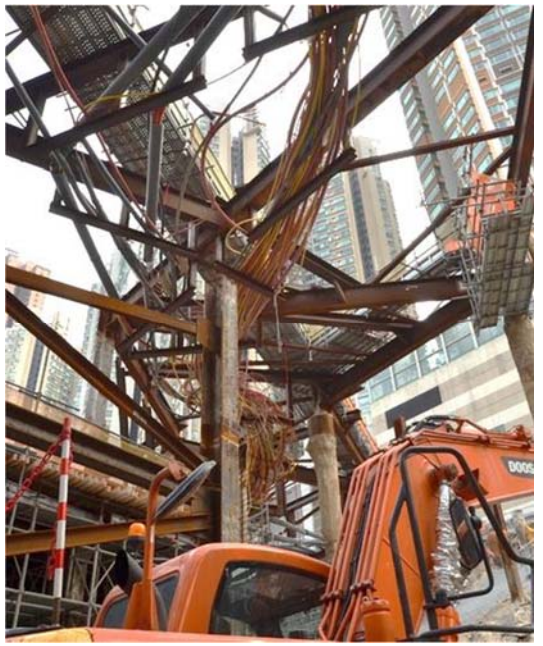
Underground situation obstructed by buried utility services

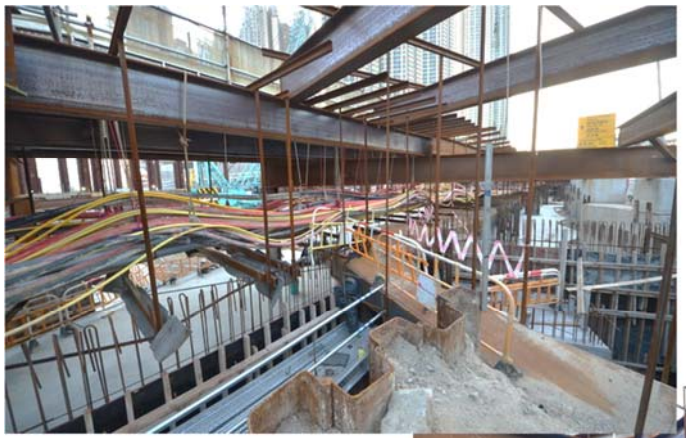
Typical underground condition where a large number of buried services need to be protected or to arrange diversion.

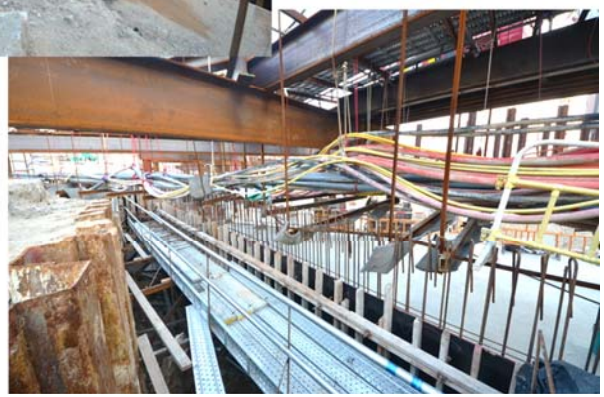




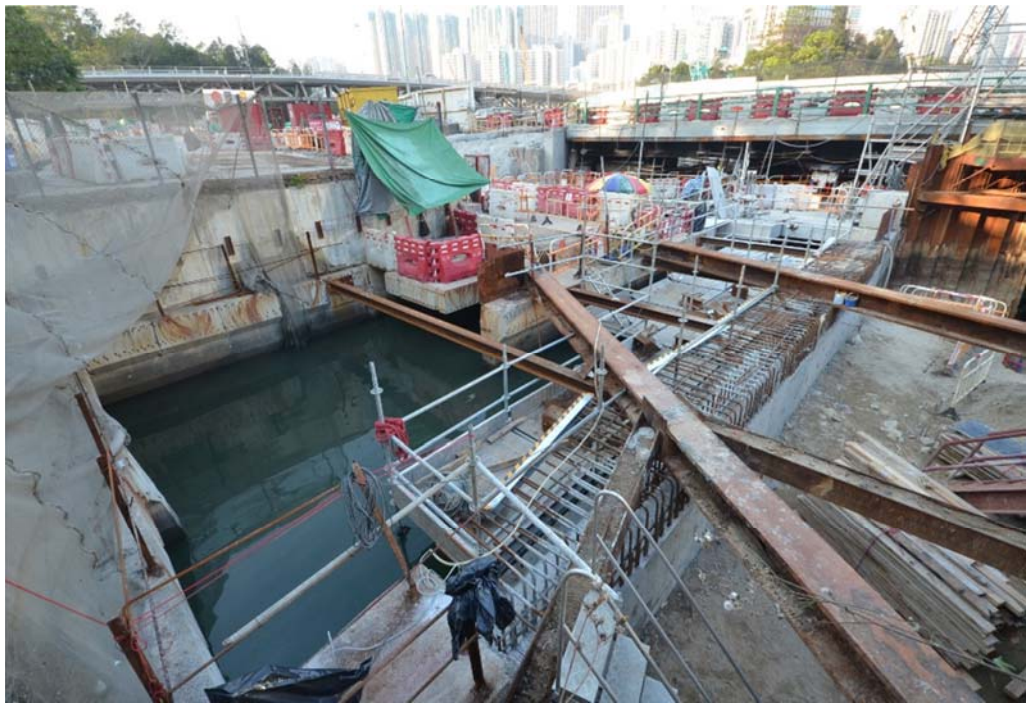








A series of existing storm water box culverts outside Yan Cheung Road need to be diverted



End of presentation

You can also see some other information prepared by Raymond Wong in his homepage under City University server

http://personal.cityu.edu.hk/~bswmwong/contents/studies_con.html