

Overcoming DTL2's Construction Challenges

Opening in early 2016, Downtown Line 2 (DTL2) links Rochor to Bukit Panjang and will benefit thousands of commuters living along the line. As with any MRT construction, building the line was no walk in the park. LTA's engineers shed light on their six-year DTL2 journey.



What were some of the biggest challenges you have encountered?

First, the DTL2 tunnels we were digging crossed so many heavily built-up areas: major roads, busy intersections, many buildings. Second, the type of rock we had to drill through – especially in the Bukit Timah area – it's called Bukit Timah Granite and it's extremely hard.

Any specific stations you can share stories about?

Constructing the stations along the Bukit Timah canal was challenging. It's a very busy road but we couldn't disrupt the flow of traffic. People still had to be able to go home, go to work and visit shops in the area. At the same time, our works could not affect the drainage system and rain water had to be able to flow.

The Bukit Timah area also boasts a variety of rock and soil types, including Bukit Timah granite. This meant that the cutting heads on the two-storey high 350-tonne machines we used to drill through the ground – called Tunnel Boring Machines – were prone to faster degeneration.

1 Steel reinforcing bars are used to increase tensile strength and durability of concrete structures in the station.



How did you overcome these difficulties?

In order to avoid any disruption to the heavily built-up surrounding areas, we employed instruments to carefully monitor the situation so we could respond quickly.

For example, to drill through the Bukit Timah granite, we used a special type of TBM that is more expensive but more effective. We used nine of them on DTL2, more than used in any other LTA project. We took extra precautions to make sure the TBMs didn't disrupt the surrounding roads, structures and facilities, and were well-maintained. In some cases, we stopped the machines every 10m to 15m to change tools.

The Rochor Canal area is also highly built-up. Was that challenging?

Yes. The Rochor station was built under the 20m-wide Rochor canal.

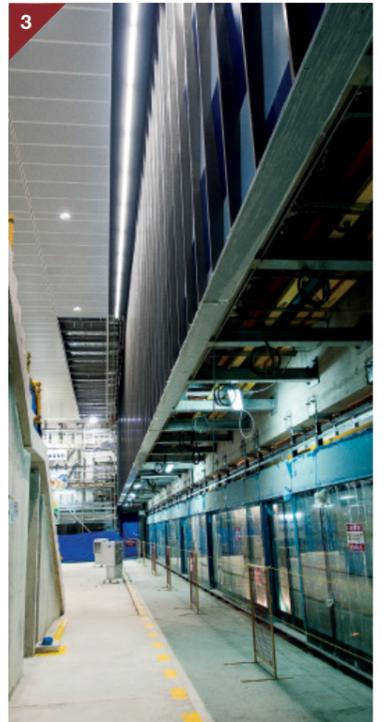
Another geological challenge presented itself at Rochor station, where we encountered a 30m-thick layer of soft marine clay, which was the consistency of peanut butter. We had to be very careful with construction, making sure the adjacent buildings, especially the heritage shop houses, remained stable.

To deal with this, we built a temporary steel deck for cars to drive on – 20m wide and 1km long – to create extra space for construction works. We dug a temporary canal 20m wide and 200m long to 'shift' the actual Rochor canal out of construction's way! All in, over 30 stages of traffic and canal diversions were created – mostly at night and on weekends when there were fewer people – to keep the traffic moving while construction was going on.

As to the weak ground, we built strong temporary earth-retaining structures, and we were very diligent in monitoring any movement.

How did you all feel when these challenges were overcome?

Great relief! Now we can look back on six years of hard work on 12km worth of top-quality underground twin tunnels, in some of the most challenging conditions in the world. Best of all, it was all completed with an impeccable safety record.



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2 Artist impression of the future Downtown Line Rochor station.

3 Platform screen doors installed in Downtown Line Bukit Panjang station.