

Sentosa Gateway Road Tunnels Land Transport Authority Singapore

Location:	Singapore, Singapore
Date:	2009 – 2015
Structure:	Two Road Tunnels
Length:	One-Lane Tunnel 384 feet (117 meters) Two-Lane Tunnel 312 feet (95 meters)
Cross-Section:	One-Lane Tunnel 46 feet (14 meters) x 30 feet (9 meters) High Two-Lane Tunnel 35 feet (10.8 meters) x 27 feet (8.1 meters)
Geology:	Predominantly Granular Soils with Layers of Cohesive Soils, Peat, Peaty and Organic Clay, Organic Sand, Residual Soil and Sedimentary Rocks (Below Tunnel Invert) Groundwater Level is Approximately 8.2 feet (2.5 meters) Below the Surface
Cost:	Approximately \$40 Million
Client:	CPG Consultants
Owner:	Land Transportation Authority (LTA)



Figure 1. Telok Blangah Road at underpass.

Design Services and Consulting for Micro Tunneling Support System:

Gall Zeidler Consultants (GZ) designed two mined sections of the tunnel to pass under the existing major roadways (Telok Blangah Road and Kampong Bahru Road) including the temporary and final support, waterproofing, structural and geotechnical instrumentation, and monitoring programs.

The double-lane tunnel crosses under Telok Blangah Road between existing bridge piers under a maximum overburden of 8 feet (2.5 meters). It is equipped with an emergency shoulder and walkways. The final structure was formed by a single-cell reinforced concrete box that will be erected within a temporary steel pipe box structure. The single-lane tunnel is equipped with an emergency shoulder and walkways. The tunnel crosses under Kampong Bahru Road in an easterly direction, passes under a three-cell concrete culvert with minimal clearance and continues along Keppel Road with a maximum ground cover of 26 feet (8 meters).

The temporary structure comprised of steel pipes arranged in a box-like pattern. These large diameter 2.7 feet (0.82 meters), heavy steel pipes were used to pre-stabilize the ground surrounding the final tunnel. The steel pipes were installed by micro tunneling methods around the final structure to provide initial ground support. The interlocking pipes were filled with concrete.

The design allowed utilities and roadway traffic operational during tunnel construction.

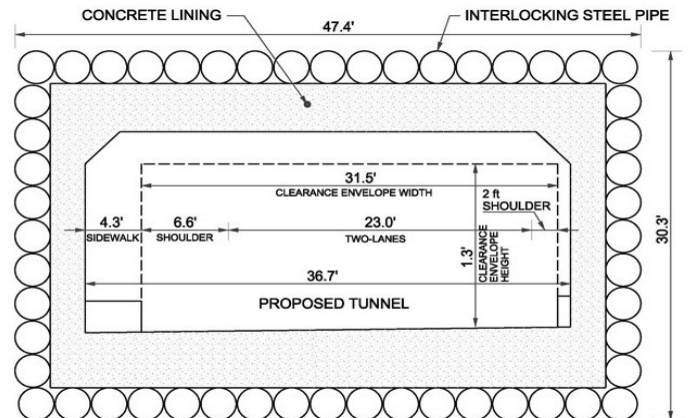


Figure 2. Cross-section of the two lane tunnel.