

# Construction of the Tunnel in Perth

[PR]

**Digging through the sides of mountains too high to climb, building paths through the seabed to link islands — tunnels connect geographically isolated places. In both Japan and Australia, tunnels are an important part of the national infrastructure, one example of which is Perth City centre's Mandurah Line tunnel, which was opened to traffic in 2007.**

Japan is an archipelago and, as at least half of the country is mountainous, there are many tunnels built to ensure the convenience of communication and transportation. Among these, the Seikan tunnel, at 53.85km, stands as the longest railway tunnel in the world. The Seikan tunnel runs beneath the Tsugaru Strait seabed, connecting Aomori Prefecture, at the northern edge of Japan's main island, and Hokkaido. Work began on the Seikan tunnel in 1972, and was completed in 1985. The section of the tunnel that is underwater is slightly less than half of the total length, at 23.3km, and runs 100m below the 140m deep seabed. Kumagai Gumi Joint Venture performed the Seikan tunnel's entire construction, including the seabed portion. Kumagai Gumi is one of Japan's major construction companies, currently working with the use of cutting-edge technology in civil engineering for such things as bridges and tunnels, architecture for office buildings and community facilities, environmental decontamination and afforestation of areas affected by soil pollution, as well as urban redevelopment. The construction of the Seikan tunnel earned Kumagai Gumi the 1983 Outstanding Civil Engineering Achievement Award in Japan for its record length, evacuation of soil from the seabed, and exhaust system. In addition, joint enterprises with overseas companies have to date produced such engineering feats as the Sydney Harbour Tunnel, Hong Kong, Singapore, Delhi, Bangkok's Metro, and Taipei's skyscraper Taipei 101.

As a part of the New MetroRail City Project, Kumagai Gumi and Australia's Leighton Contractors organised a joint venture, called Leighton Kumagai Joint Venture (LKJV), for the construction of the Mandurah Railway Line, which was opened in December 2007. In order to link the Mandurah Line with other pre-existing surface lines operated by Transperth, LKJV took charge of the tunnel running




Traversing the Seikan Tunnel — the train connecting Hokkaido to Aomori Prefecture. It became possible to transport both people and freight without concern for the weather, which had previously caused accidents that cost a number of lives.



A large hole is bored at the position of the present Esplanade Station. From there the components of the Tunnel Boring Machine are brought in.

north-south from the city centre. Having previously constructed many domestic and overseas tunnels by Kumagai Gumi, LKJV judged the method of construction known as the Earth Pressure Balanced Shield to be the most appropriate, based on such things as soil quality, scale of equipment required, and environmental impact. From the east of the Perth Convention Exhibition Centre, to the west point of the Perth station, known as Perth Yard, construction of some 1.1km of tunnel began in February 2004, starting from the present Esplanade Station, judiciously verifying changes in environment such as soil quality, as it progressed. Excavation and construction of what would become tunnel walls progressed at a rate of several metres a day, with two tunnels dug, one for each direction of traffic. The entire tunnel was completed in September 2007.

Kumagai Gumi project manager, Mr. Kiyohiko Akabane, took great pride in the completion of the project, stating, "the tunnel which we constructed is now in use, and especially when I see the train running from the Narrow Bridge towards the Convention Exhibition Centre, I feel a sense of achievement; it really is a delight. Regarding the opening of the Mandurah Line, seeing things like the atmosphere in the city, and the change in people's lifestyles, it makes you aware of how environmental consciousness, seen in things like the Park 'n' Ride, has increased."

For the people of Perth, the Mandurah Line has already become a part of their lives. Behind that construction lies Japanese tunnel construction technology, which is of an internationally competitive standard of excellence. 



The Tunnel Boring Machine at the time of its arrival in Perth Yard.



The enclosure of Perth Underground, used daily by large numbers of people.

Information and Photos:

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