



4 finalists for the Major Project of the Year – ITA Tunnelling Awards 2019

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One of the categories of the ITA Tunnelling Awards 2019 is focused on rewarding the Major Project of the Year (over €500M). Amongst the 8 projects submitted for this category, the panel of judges identified 4 finalists for the Major Project, that seem to pursue one common goal: managing urban expansion.

Since 2015, the international competition "ITA Tunnelling and Underground Space Awards" has sought to reward the most groundbreaking innovations and outstanding projects in underground construction. The 2019 edition will take place on 18-20 November, in Miami, FL during the 8th Annual Cutting Edge conference organized by UCA of SME and the Tunnelling Journal.

Through 8 categories, this competition aims to identify the most important ongoing underground works and technologies that help cities change and enable habits and ways of life to evolve in order to build smart and sustainable urban areas.

The panel of judges identified 4 finalists for the Major Project of the Year that seem to pursue one common goal: managing urban expansion. Global growth impacts large-scale urban regions, in particular their attractiveness. However, land expansion occurs at the edge of existing urban areas, and cities have to adapt and change by investing in transport infrastructure to strengthen inner urban development or "city-to-city" connections despite difficult and complex geological conditions.

Whether they entail high-speed railways or urban tunnels, transport infrastructure projects are at the core of urban expansion management, and the 4 finalists give further evidence of current mega-projects undertaken around the world.

2 MEGA PROJECTS TO STRENGTHEN INNER URBAN DEVELOPMENT, FINALIST FOR THE MAJOR PROJECT

TUEN MUN – CHEK LAP KOK LINK NORTHERN CONNECTION SUB-SEA TUNNEL SECTION – HONG KONG, CHINA

One of the finalists for the Major Project of the Year in the over-€500M category is the Tuen Mun Chek Lap Kok Link, which will provide an alternative access route to the Hong Kong International Airport located on Chek Lap Kok Island, which up to now has only been accessible via the Tsing Ma Bridge.

The works comprise a 4.5-km twin-tube sub-sea tunnel with 57 cross passages as well as a 500m cut and cover section. Construction required two slurry TBMs with an excavation diameter of 14m. The teams had to use innovative solutions to cope with harsh ground conditions and hydrostatic pressure of 5bars at tunnel face (55m below sea level). The first 630m of excavation were also operated by a 17.63m diameter TBM (world's largest TBM), which was then reconfigured as a 14m diameter machine. 41 sub-sea cross passages were also constructed by mini TBM. The first breakthrough was completed on 27 February 2019 and the overall cost of works is estimated at €2.36bn.

Client: Highways Department (the Government of Hong Kong Special Administrative Region)

Contractors: Dragages Hong Kong Ltd & Bouygues Travaux Publics

Engineering firms: AECOM; DBJV; ARUP; ATKINS and Golder

WUHAN SANYANG ROAD YANGTZE RIVER TUNNEL PROJECT – CHINA

The Wuhan Sanyang Road Yangtze River Tunnel is the first tunnel under the Yangtze river. It connects the Hankou and Wuchang districts in the city of Wuhan. This underground construction project consists of an urban road tunnel, two subway stations and a subway section that crosses the Yangtze River.

It will not only serve as a corridor for the urban road tunnel and Line 7 subway tunnel, but it will also be an important part of Wuhan's urban road network and subway network.

In the cross-river section constructed by a shield TBM, the urban road part is built in a superposed scheme, over the subway. This kind of tunnel is a world premiere and the diameter used for tunnelling is the largest in China for shield tunnels.

The construction of the urban-metro tunnel provides a new idea for intensive use of cross-river channel resources and underground urban spaces. The construction of urban tunnel and subway tunnel in a superposed manner challenges the traditional separated scheme and has remarkable environmental and economic benefits. It saves about 120,000 square meters of land, reduces house demolition significantly, and saves a total of about 75€M in investment.

Overall cost for this project is €943.7M.

Client: Wuhan Metro Group Co. Ltd

Contractors: Shanghai Tunnel Engineering; China Railway Erju Group; China Railway 18 Bureau Group

Stakeholders: China Tiesiju Civil Engineering Group; China Railway No.5 Engineering Group

Engineering firms: China Railway Siyuan and Design Group; Wuhan Municipal Engineering Design & Research Institute; Hubei Provincial

Communications Planning and Design Institute; Shanghai Municipal Engineering Management Consulting.

2 MEGA PROJECTS TO CREATE LARGE SCALE URBAN AREAS, FINALISTS FOR THE MAJOR PROJECT

THE SEOUL METROPOLITAN HIGH-SPEED RAILWAY CONSTRUCTION PROJECT -KOREA (YULHYEON TUNNEL):

The Seoul Metropolitan High-Speed Railway connects Suseo to Pyeongtaek. The entry submitted is focused on the Yulhyeon tunnel, which is the longest (52.3km) and the deepest (50m) in South Korea.

This project is considered the most difficult one in South Korea for several reasons: located under the Gyeongbu High Speed Railway (running at a speed of 300km/h) and the large underground station Dongtan, the tunnel also goes through the Singal fault zone. This required a special design that had to be studied closely using such techniques as a 3-dimensional soil resistivity test, ultrasound scan well logging, and physical dynamics tests. Other innovative

techniques, such as automatic measurement, vibration-isolation blasting technique and adoption of U.P.M., were also implemented to ensure complete safety. Civil engineering works were completed in 2017 and the project cost about €2bn.

Client: Korea Rail Network Authority

Contractors: Samsung C&T and 9 other nations

Stakeholders: Korea Railroad T&C and 14 other nations

Engineering firms: Dong Myeong E&C and 9 other nations

THE EPC TBM FOLLO LINE – NORWAY

The Follo Line Project is one of the most ambitious infrastructure initiatives in Scandinavia, as it aims to connect Oslo to Ski via the construction of a 22.5-km High-Speed Railway.

The main part of the project is a 20-km twin-tube tunnel section. Despite hard rock conditions in Norway and geological complexity, the teams have met the challenge of using TBM.

Four tailor-made TBMs were customized and used to crush the hard Norwegian rocks. Works were operated from a large rig-area located halfway between Oslo and Ski. The project established new standards in terms of safety and sustainability: spoil was transported up to the surface for use as a basement for a new residential area, and the re-use of excavated materials using conveyor belts contributed to reducing CO2 emissions and diminishing environmental disturbance. Geological mapping and drilling investigations were performed on a daily basis to detect water from fracture zones as well as continuous measurement of pressure and mitigations.

When completed (2022), the Follo Line will be the longest high-speed railway in Scandinavia, enabling 50% reduction in travel time and improving mobility between Oslo and Ski. The EPC Follo Line project cost 960€M.

Client: Bane NOR Norwegian National Rail Administration

Contractors: Acciona Infrastructure and Ghella S.p.A Joint Venture

Stakeholders: Ministry of transport and communication, Norwegian Railway Directorate, Municipalities of Oslo, Opegard and Ski

Engineering firms: Acciona Ingeneria, COWI