TunnelTalk Direct by Design

ITA underground construction awards

and the outstanding winners for 2022 are...

TunnelTalk reporting

December 2022

Selecting a Winner from such high calibre Finalists was no enviable task for the Judges. The Finalists in each of the eight categories of the ITA Brunel Awards series for 2022 represent the achievements and level of expertise in the underground construction industry of more than 11 countries of the world and across multiple and varied disciplines.

The selected Winners of each category encompass the design and construction of projects of the grandest of scales to the advent of robotics into underground space industry, from managing the most treacherous of explosive ground conditions to innovation for solving design and technical limitations in the most efficient and cost-effective way.

ASSOCIATION INTERNATIONALE DES TUNNELS ET DE L'ESPACE SOUTERRAIN ITA AITES INTERNATIONAL TUNNELLING AND UNDERGROUND SPACE ASSOCIATION

ITA TUNNELLING AWARDS 2022

Each endeavour in the underground construction industry is the hard work and dedication of the engineers and workers who choose this industry as their career. The presentations by engineers of each of the category Finalists and the seven Finalists for Young Tunneller of the Year for 2022 demonstrate that the future of the industry is in good hands with more young talent attracted to the world of underground construction every day.

Congratulations to all the Finalists and the Winners of the ITA Brunel Awards 2022.

Major Project of the Year of more than €500 million:
Los Angeles Metro Purple Line Extension, Section 1, USA

Los Angeles rests on some of the largest oil, natural gas, and ground water aquifers of North America. Planning the alignment and excavation of Section 1 of the new Purple Line Subway past the La Brea Tar Pits required the lifting of a Federal Government funding ban and strict adherence to safety protocols for operating the EPB TBMs engaged for the project.

ITA TUNNELLING AWARDS 2022

Westside Subway Extension – Section 1

MAJOR PROJECT OF THE YEAR +500 M€

1985 - Natural gas explosion in the Fairfax area. US Congress bans Federal funding for metro projects through zones at risk of fire or explosion

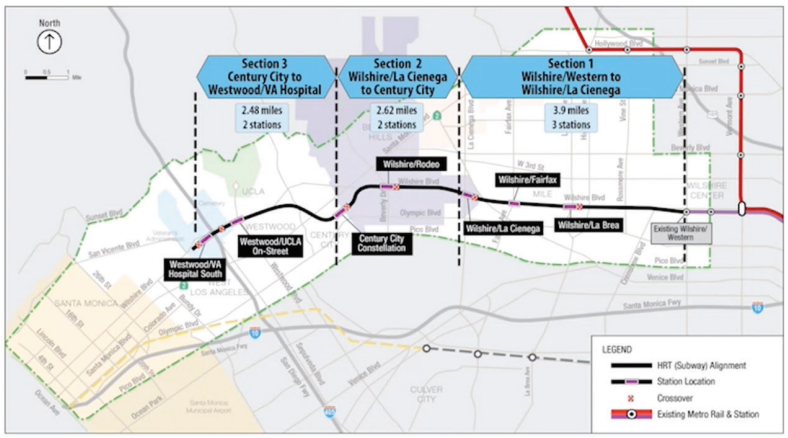
2006 - Successful tunneling in Los Angeles by Traylor Bros. for Gold Line Extension through known oil field with no issues

2008 - The metro client convinces US Congress that new softground TBM technologies will keep people safe and funding ban is lifted

2014 - Section 1 of Purple Line Extension awarded

2016 - Two EPBMs launched to cope with hazardous ground conditions including:

- Presence of gases:
  Methane (CH_4) at 100%, explosive between 1-5% by volume and Hydrogen Sulfide (H_2S) 10,000 ppm, deadly at 500 ppm
- Presence of tar: San Pedro formation and Fernando formation are impacted with tar (oil) from the oil fields below
- Presence of water: Entire alignment baselined below the water table



Project of the Year of between €50 million and €500 million:
The world's first spiral excavation method using horizontal to vertical shield tunnelling method, Japan

Construction of the two 775m long x 5m i.d. under-river sewers in Tokyo Japan faced various vertical and horizontal planning restrictions in one of the most densely populated cities in the world. Needed to reduce flooding in the area and designed to address the narrow width of the river and the existence of other underground structures, the Tachiaigawa River rainwater discharge pipeline project includes the world's first spiral excavation using horizontal to vertical shield tunnelling. The method uses two interconnected TBMs to excavate and construct simultaneously adjacent tunnels in a spiralling manner.

Renovation and Project of the Year up to €50 million:
Four-arch, 10-lane Guanyinyan road tunnel, China

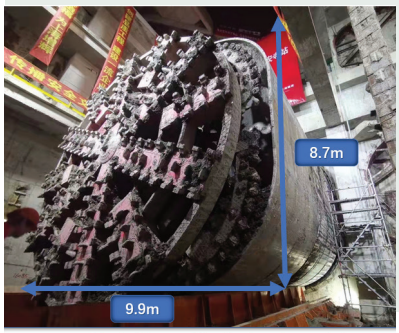
Taking 10 lanes of traffic through a hill required nimble thinking and application for the project to be realised.

Technical Innovation of the Year:
In-tunnel diameter conversion of the largest hard rock TBM in the USA

Changing the diameter of the cutterhead without bringing the Robbins TBM or the cutterhead as a whole to the surface was the solution to meet a change of diameter for hydrology purposes on the alignment of the Mill Creek CSO project in Cleveland, Ohio. Step down of the cutterhead diameter is clearly illustrated and the larger diameter TBM front shield still pinned to the crown for later retrieval.

Beyond Engineering:
Multi-pipe jacking method for construction of the city-core metro station in soft soil, China

Pipe-jacking on a grand scale came to the rescue of the conundrum of how to build a new metro station in a dense city centre in China.



Pipe jacking machine for the subway platform

Pipe jacking machine for the station hall

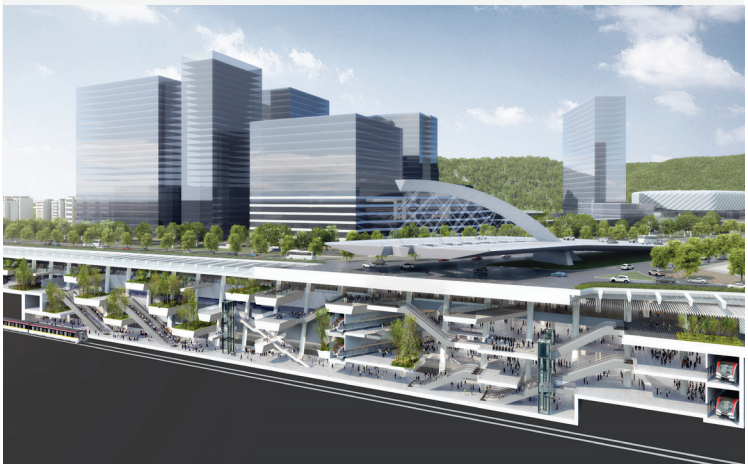

Pipe jacking construction control cloud platform

Winners and finalists in review

Register for free to view the recorded presentations of the Finalists and recording of each category Panel Discussion to know of the most interesting of projects and technical developments in the world of underground construction of today

Innovative Underground Space Use:
Vertical column space of the Shenzhen Huangmugang transportation hub, China

Design of the deep underground transportation hub in Shenzhen creates an underground space of huge capacity while at the same time permitting natural daylight to penetrate to the lowest of the five underground space levels, right to the lowest platform level of the four-line metro interchange station. Truly a magnificent and comfortable underground public environment.



Product/Equipment Innovation of the Year:
Integrating robotics into the construction works at the Chuquicamata Mine, Chile

Conversion of the huge open pit Chuquicamata Mine in Chile into an underground operation provided an opportunity from Acciona to introduce robotics into the construction industry, providing the ability to access areas where conditions were as yet inhospitable or dangerous for humans. The mobile robot brings many advantages over drones including a 14kg carrying payload.

Young Tunneller of the Year:
Erica Frederickson, USA – Project Manager with Traylor Bros.

With 11 years of experience, Erica joined the underground construction industry after earning her Bachelor's Degree in Engineering. Working for Traylor Bros has presented Erica with a rich career exterience to date, working on the Queens tunnels for the East Side Access rail project in New York City, the Blue Plains CSO project in Washington DC, the Purple Line Extension Section 1 of the Los Angeles Metro in California and currently on the Second Narrows water supply tunnel in Vancouver, Canada. Along with a deep-seated interest in civil engineering, Erica is leading a support group to encourage women into the industry and is keen to promote efforts to decrease the carbon footprint and waste involved in tunnelling and underground space projects. The future is different to the ways things have been done in the past and Erica and her young colleagues are ready to take the industry into that future.

2022 Finalists and Winners in each category

Major Project of the Year of more than €500 million

- Tamoios Highway, the largest road tunnel in Brazil
- Tideway Supersewer East Contract, London, UK
- **WINNER: Los Angeles Metro Purple Line Extension, Section 1, USA**

Major Project entry: Location of the Tamoios highway tunnel in Brazil

Product/Equipment Innovation of the Year

- Non-circular boring in hard rock
- **WINNER: Integrating robotics into the construction works at the Chuquicamata Mine in Chile**
- Equipping TBMs with ears - a real-time geological prediction system for TBMs based on rock-boring seismic source, China

Non-circular boring machine for hard rock

Renovation and Project of the Year up to €50 million

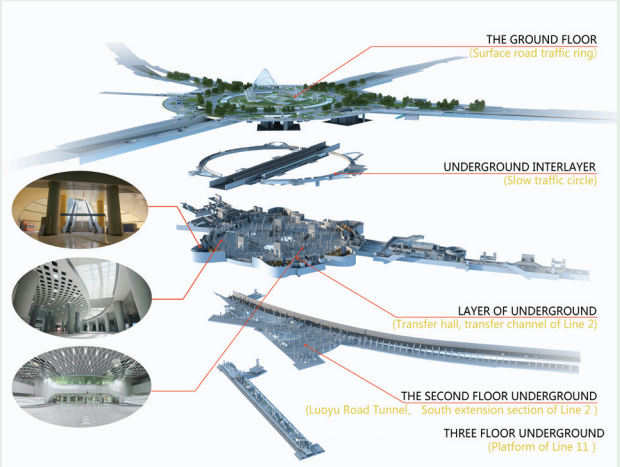
- Metro Circle Line 6 Contract 885 Prince Edward Road Station and Tunnels, Singapore
- Underground project passing through the Taiyuan railway station, China
- **WINNER: Four-arch, bi-directional, 10-lane Guanyinyan road tunnel, China**
- Huanping road project, China

A multi-headed TBM with rectangular pipe-jacking elements completed the Huanping road project, China

Innovative Underground Space Use

- Innovative application of low-carbon and energy-saving technology in the Erlangshan Tunnel on the Sichuan-Tibet Expressway - a power-generating and self-breathing tunnel, China
- Underground transportation complex in the Optics Valley Plaza, China
- **WINNER: Vertical column space of the Shenzhen Huangmugang transportation hub, China**

The underground transportation hub of the Optics Valley Plaza, China, combined two metro stations and an underground slow traffic roadway



Technical Innovation of the Year

- Technology for shallow three-lane, large-section rectangular pipejacking tunnel, China
- **WINNER: Unprecedented in-tunnel diameter conversion of the largest hard rock TBM in the USA**
- Semi-continuous advance for single shield TBMs using centre of thrust technology, UK
- Shield tunnel of super large section embedded in soft-hard stratum at high earthquake- intensity area, China

Semi-continuous advance for single shield TBMs

Beyond Engineering

- **WINNER: Multi-pipe jacking method for construction of the City-core metro station in soft soil, China**
- Urban long span tunnel construction hazard mitigation technology and application, China

An underground cavern of exceptional span in China

Project of the Year of between €50 million and €500 million

- Subsea road tunnels, Faroe Islands
- Xiamen Metro Island-Xiang'an cross-sea metro link, China
- **WINNER: The world's first spiral excavation method using horizontal to vertical shield tunneling method, Japan**
- Tiantaishan highway tunnel on the Baoji-Pingkan Highway, China

Subsea fixed link between Faroe Islands included an undersea traffic roundabout

Know the Winners of previous ITA Awards Editions

Top from left: Cláudio Cabral Dias; Erica Frederickson, Feng Huanhuan
Bottom from left: Han Chen, Lorenzo Peila, Rob Margariti Smith, Sylvia De Vuyst

Young Tunneller of the Year

- Cláudio Cabral Dias, Portugal
- **WINNER: Erica Frederickson, USA**
- Feng Huanhuan, China
- Han Chen, China
- Lorenzo Peila, Italy
- Rob Margariti Smith, UK
- Sylvia De Vuyst, Norway

The ITA International Tunnelling and Underground Space Association is a non-profit and non-governmental international organization that aims to promote the use of underground space as a solution to sustainable development. Founded in 1974 and operating out of Lausanne, Switzerland, the Association currently has 78 Member Nations, 300 affiliated members, 15 prime sponsors and 60 supporters. For more information visit the ITA website. ■