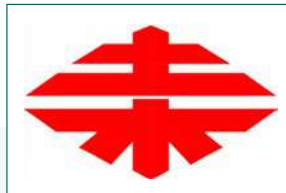


China



Name: China Civil Engineering Society (CCES)

Type of Structure: Non profit, open association

ASSOCIATION ACTIVITIES DURING 2022 AND TO DATE

Academic activities

1. The 20th Academic and Technical Conference on Tunnel and Underground Engineering across Strait was successfully held on November 2nd – 3rd, 2022, in both physical and virtual forms, with the main venue in Taipei, Taiwan. It was organized by the Tunnel Association (China Taiwan) and co-organized by the Tunnel and Underground Engineering Branch of the Civil Engineering Society together with Underground Engineering Branch of the Rock Mechanics and Engineering Society from China mainland. The theme of the conference was “Energy Conservation and Carbon Reduction, Sustainable Tunnel”. More than 170 representatives and scholars from both sides of the Straits attended the Conference physically and virtually.

2. On December 15th, 2022, The “Tunnel and Underground Engineering Science and Technology Innovation Forum (5th Session)” was successfully held online, which was jointly organized by the Tunnel and Underground Engineering Branch of China Civil Engineering Society and China Railway Tunnel Group Co., Ltd., China Railway Tunnel Survey and Design Research Institute Co., LTD., Guangdong Provincial Key Laboratory of Intelligent Monitoring and Maintenance of Tunnel Structure, and Tunnel Construction Journal (Chinese and English). Due to the epidemic, the forum was held on online, attracting a total of 300 experts (due to the platform limitation on the number of participants), with more than 800 online video viewers.

3. On 2nd September 2022, the 48th ITA General Assembly and World Tunneling Congress, with the theme “Underground Solutions for a Changing World”, was successfully held in Copenhagen, Denmark. At the Conference, Liu Jialiang, deputy project manager of the Organizing committee of the 2024 World Tunnel Congress, introduced preparations for the WTC2024. The theme of the WTC2024 is “Tunnels Make Life Better!”. At present, the sponsorship and exhibition of the WTC2024 have been launched, the official congress website has been set up, the registration system has been debugged, the paper

submission system is under testing, and all related works are progressing.

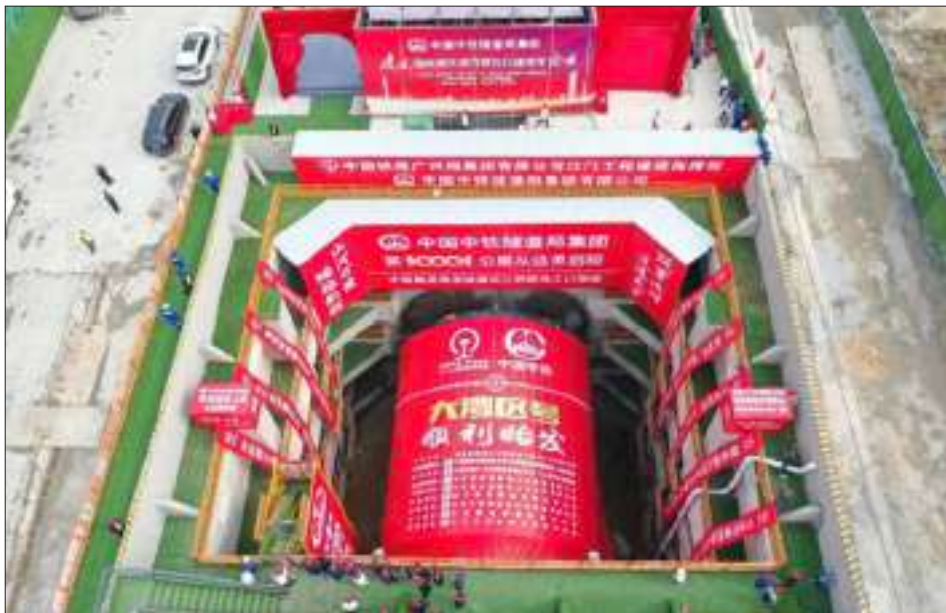
4. On Dec. 5th, 2022, some of our delegates participated in the World Tunnel Day Marathon 2022.

Publications

Modern Tunnel Technology printed and released 3000 copies. The following proceedings are also published, including:

- The 3rd International Conference on Tunnel and Underground Engineering Inspection and Monitoring and the Seventh China Civil Engineering Society Tunnel and Underground Engineering Branch Construction Management and Youth Work Science and Technology Forum Report Summary
- Proceedings of the 20th Academic Exchange of Waterproofing and Drainage Technology Forum of Tunnel and Underground Engineering Branch of China Civil Engineering Society
- Proceedings of the 12th National Operating Safety, Energy Saving and Environmental Protection Tunnel and Underground Space Forum and the Third Traffic Tunnel Engineering Fire Control and Emergency Rescue Technology Forum, Tunnel and Underground Engineering Branch of China Civil Engineering Society

CURRENT TUNNELLING ACTIVITIES



Shenzhen-Zhongshan Immersed Tube Tunnel:

The underwater interchange integrating a bridge, tunnel and island constructed in shallow and deep silt. The total length of the Shenzhen-Zhongshan Channel Project is 24km, including the east artificial island, the west artificial island, an 17,129m bridge, a 6,845m immersed tube tunnel, and an airport hub interchange (the underground on-ramp part), etc. The design speed is 100km/h and the service life is 100 years. The immersed tube tunnel on the project is a two-way eight-lane steel shell concrete structure, comprising a single standard pipe section of 165m length, 46m in width and 10.6m in height. It has a self-weight of about 80,000 tons and a long floating distance of about 50km. The floating installation needs to cross several busy channels. The precision of underwater docking should be within $\pm 5\text{cm}$. The submerged tube adopts the new structure of “steel shell and concrete”, which has large bearing capacity and a better waterproof performance, with significant social, economic and ecological value. The project commenced in April 2018 and plans to open to traffic in June 2024.

Pearl River Estuary Tunnel Project of Shenzhen - Jiangmen Railway

The project has a total length of 13.69km, in a single-tube, double line tunnel, with a design speed of 200km/h. It adopts the combined construction methods of TBM (6.52km, 13.32m diameter TBM), New Austrian Tunneling Method (5.52km) and open excavation (1.65km). The Shenjiang No. 1 shield tunnelling machine advances 3.590km from Humen, Dongguan, and the “Da Wan District shield tunnelling machine” drove 2.93km from Wanqingsha,

Guangzhou. The Project is implemented in complex geological conditions, with a large tunnel depth, high water pressure and long distance TBM tunnelling. The deepest part of the tunnel is 115m underwater. The construction of the Project commenced in July 2020 and will be completed in December 2025.

Pearl Bay Underwater Channel Project (by the immersed tube method)

This cross-river Channel runs from north to south from Huigu Wan City Road, passing Chiaomen Waterway, Lingshan Island Tip (Tuntin Road), Shang Hengli Road, Hengli Island Tip (Sing Can Road), Xia Hengli Road, and then connects to Pearl River East Cluster (Po Shing Wai Road) in the south. The main line of the tunnel is graded as a main trunk road, with a two-way six-lane design speed of 50km/h, and open to traffic of all kinds. The main line of the tunnel is 5.667km in length, the land section is implemented by the open excavation method with a total length of 4.262km, and the underwater section is implemented by the immersed tube method with a total length of 1.405km. Among them, the total length of the tunnel in the first phase of the project is 4.915km, the total length of the open-cut section is 3.935km, and the total length of the immersed section is 0.98km. The construction commenced in November 2022 and will be completed in September 2026.

Guangzhou-Dongguan-Shenzhen Intercity TBM Section Project

The largest diameter tunnel under construction in Shenzhen for rail transit Located in the middle of the Pearl River Delta, the Guangzhou-Dongguan-Shenzhen Intercity Line is the main line of the Pearl River Delta Intercity network.

The Qianhai to Huanggang port section is a further extension of the Suiguanshen Intercity Line. The line runs through the Qianhai Cooperation Zone, Nanshan District and Futian District, with a total length of 21.142km and a design speed of 160km/h. Qianhuang Section 1 (open-cut section) ~ Huanggang Port Station section is a single-tube, double-line tunnel with an outer diameter of 12.8m, constructed by a 13.27m diameter shield machine. The total length of the tunnel is 3.511km, with a minimum curve radius of 1300m, a maximum longitudinal slope of 29.6‰, and a tunnel roof depth of 10.7m ~ 32.9m. The project is located in the core of Shenzhen, and is the largest diameter tunnel under construction by Shenzhen rail transit. It has the characteristics of complex geological conditions, sensitive environments along the route. The construction commenced in 2021 and will be completed in 2026.

Shenzhen Qianhai Comprehensive Transportation Hub

A large-scale underground comprehensive transportation hub Qianhai comprehensive transportation Hub is a rare large-scale all-underground hub TOD project in China. The project includes three subway lines (Line 1, 5 and 11) and two intercity railways (Guangzhou-Dongguan-Shenzhen Intercity Line and Hong Kong-Shenzhen Western Railway). The total land area is 20 hectares, including the underground hub and the upper property, the total construction area is about 2,159,000 square meters. From east to west are: the subway stations on Line 1, 5 and 11; a transfer Hall and property development in the underground space; the Guangzhou-Dongguan-Shenzhen intercity

Line station; the stations of the Hong Kong-Shenzhen Western Railway and port space. It contains multiple functions, such as traffic distribution and underground commerce, and maximizes the intensive use of land resources.

The underground section of the project is a large deep foundation development near the sea, with a total length of 830m, the depth of the standard section of the basement is about 30m, and the deepest foundation in the tower and core tube is about 37m. In order to protect the safety of subway operation, eight foundation pit are excavated in sequence. The adjacent foundation pit of the Guangzhou-Dongguan-Shenzhen Intercity Line, 32m in depth, is constructed synchronously. The Project commenced in 2011 and will be completed in 2027.

FUTURE TUNNELLING ACTIVITIES

By the end of 2022, 5,376 railway tunnels with a total length of 13,221km had been planned.

Beilun to Jintang Submarine high-speed Railway Tunnel

The newly built Beilun to Jintang undersea high-speed rail tunnel (as part of the Ningbo-Zhoushan Railway), has a total length of 16.2km, with an undersea TBM section of 10.87km length, and will be the longest undersea tunnel in China, as well as the longest designed underwater high-speed rail TBM tunnel with the highest pressure (up to 1.0MPa) in China.

Wanghai Road Passage: Constructed by slurry TBM with a diameter of 16.28m

The total length of the Wanghai Road Passage is about 8.25km, including a 5.295km TBM tunnel, constructed by two slurry TBM with a diameter of 16.28m. The minimum curve radius of the TBM section is 520m. The geological conditions are complex and the surrounding environment is sensitive. The main strata is fully weathered, moderately weathered, breezed granite, clay and stone filling, and a uniaxial compressive strength of rock up to 138.9Mpa. The tunnel segment has an outer diameter of 15.7m, an inner diameter of 14.4m and a ring width of 1.8m. It is designed to be a double-layer bidirectional six-lane tunnel with a design speed of 60km/h.

Qiongzhou Strait Cross-Sea Channel

The average water depth of the Qiongzhou Strait is 44m, with a maximum depth of 114m, and a maximum water pressure of



nearly 1.5MPa. The length of the cross-sea tunnel on the Qiongzhou Strait is about 28km. The project is to be constructed by TBM with an excavation diameter of about 16m. The one-way tunnelling length is more than 11km. Construction of the channel will face challenges such as deep water, rapids, complex geology, frequent seismic activities, busy shipping, and many environment sensitive effects, etc.

3rd Symposium for Young Tunnellers in Asia (SYTA), April 21-23, 2023

SYTA is an annual symposium for young professionals working in the tunnelling industry in Asia. The theme of the 3rd SYTA is 'Low-carbon Construction and Sustainable Development of Tunnel Engineering'. The main goal of this symposium is to provide a forum for young professionals and researchers to engage in transnational collaboration, discuss recent advances and future challenges in the design, construction, and safety maintenance of tunnels and underground engineering toward low-carbon technologies and sustainable development. The 3rd SYTA was postponed from 2022 to 2023 due to the pandemic and it will be held in Changsha, Hunan on April 21st – 23rd, 2023. Conference Website: <https://www.syta2022.com/>



STATISTICS

By the end of 2022, there were 17,873 railway tunnels in operation with a total length of 21,978km.

(1) New operation: In 2022, 341 new railway tunnels with a total length of 923km were put into operation, including 25 extra-long tunnels of more than 10km with a total length of 362km.

(2) Under construction: 3,025 railway tunnels with a total length of 7,704km are under construction.

By the end of 2021, there were 23,268 highway tunnels covering 24,698.9km. Compared with 2021, this is an increase of 1,952 tunnels covering 2,699.6km in 2022.

By December 31st, 2022, 55 cities on the Chinese mainland has built urban rail transit lines, reaching 10,291.95km accumulatively. In the 10,291.95km of urban rail transit lines, there are a total of Nine systems, among which subway totals 8012.85km, some 77.85%. In 2022, urban rail transit is operated for the first time in another five cities: Nanping, Jinhua, Nantong, Taizhou and Huangshi.

EDUCATION ON TUNNELLING IN THE COUNTRY

Postgraduate Program		Representative institutions in tunnel and underground engineering disciplines (and major associated disciplines)		
Nature of the Program	Course title	Serial no.	Province	School
Professional degree course (professional core courses)	Testing and testing techniques for underground structures	1	Anhui	Anhui University of Science & Technology
	Advanced rock mechanics	2	Anhui	Hefei University of Technology
	Geotechnical plastic mechanics	3	Beijing	Beijing Jiaotong University
	Theory of calculation of underground structures	4	Beijing	Beijing University of Technology
	Tunnel mechanics and engineering	5	Beijing	University of Science and Technology Beijing
		6	Beijing	Tsinghua University
Specialized non-degree courses	Advanced theory of underground concrete structures	7	Beijing	China University of Mining and Technology
	Intelligent underground structures	8	Beijing	China University of Geosciences (Beijing)
	Case study of geotechnical engineering and underground structure	9	Beijing	China Academy of Railway Sciences Group Co.
	major engineering	10	Beijing	General Institute of Coal Scientific
	Construction technology of underground engineering	11	Chongqing	Chongqing University
	Methods of underground structure optimization	12	Chongqing	Chongqing Jiaotong University
	Seismic resistance of Underground structures	13	Gansu	Lanzhou Jiaotong University
	Deep foundation pit engineering	14	Gansu	Lanzhou University of Technology
	Tunnel and underground engineering IT technology and application	15	Guangdong	Guangzhou University
	Introduction to Underground space utilization	16	Hebei	Shijiazhuang Tiedao University
	Disaster science of underground engineering	17	Henan	Zhengzhou University
	Tunnel and underground space operation safety and disaster prevention	18	Heilongjiang	Harbin Institute of Technology
	Probabilistic analysis of civil engineering	19	Heilongjiang	Institute of Engineering Mechanics, China
	Structural repair and reinforcement of buildings	20	Hubei	University of Chinese Academy of Sciences
		21	Hubei	Wuhan University
		22	Hunan	Central South University
		23	Hunan	Changsha University of Science and
		24	Ji Lin	Jilin University
		25	Jiangsu	Southeast University
		26	Jiangsu	Hohai University
	27	Jiangsu	China University of Mining and Technology	
	28	Jiangsu	Nanjing Tech University	
	29	Jiangsu	Army Engineering University	
	30	Liaoning	Dalian University of Technology	
	31	Liaoning	Shenyang Jianzhu University	
	32	Liaoning	Northeastern University	
	33	Liaoning	Liaoning Technical University	
	34	Shandong	Shandong University	
	35	Shandong	Shandong University of Science and	
	36	Shaanxi	Chang 'an University	
	37	Shaanxi	Xi 'an University of Architecture and	
	38	Shaanxi	Xi 'an University of Science and Technology	
	39	Shaanxi	Xi 'an University of Technology	
	40	Shanxi	Taiyuan University of Technology	
	41	Shanghai	Tongji University	
	42	Sichuan	Southwest Jiaotong University	
	43	Sichuan	Chengdu University of Technology	
	44	Sichuan	Sichuan University	
	45	Tianjin	Tianjin University	
	46	Zhejiang	Zhejiang University	
Submitted graduate courses				
Course number	Course name			
	Professional degree courses			
1020245	Higher underground structure			
2020418	Elastoplastic mechanics			
2020317	Advanced rock mechanics			
2020533	Tunnel Mechanics and Engineering			
2020563	Research Advances and research methods in Civil engineering			
	Non-major degree courses			
1020234	Fracture Mechanics and fatigue			
1020248	Special Discussion on Underground space utilization			
1020249	Risk and Safety in Civil engineering			
		Note: This table is sorted by the pinyin order of the region in which the institution or research institution is located.		