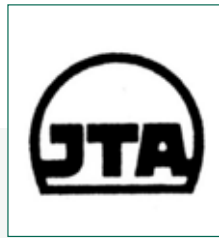


Japan

Name: Japan Tunnelling Association

Type of Structure: Non profit organization

Number of Members: Total number 1476,
number of corporate members 201



ASSOCIATION ACTIVITIES DURING 2021 AND TO DATE

WGs: JTA consists of the following four committees, each committee has WGs and task forces.

Technology/International
Communication/Events/Public Relations
In each committee, the main activities are:

- Investigation, research and information transfer on general techniques and on subjects of specific projects.
- Meetings such as online lectures, online symposiums and online workshops and online training: “Two-days online seminars” and “Online lectures on topics of the year” (Organized by the Events committee)
- Publication of reports and documents: Monthly journal – “Tunnels and Underground” - and Biyearly journal – “Tunnelling Activities in Japan 2022”
- International cooperation
- Publicity activities

CURRENT TUNNELLING ACTIVITIES

The Otonaka Tunnel (4,686m in length) on the Otoineppu Bypass of National Route 40 is set in a section of fragile serpentine rock and subjected to strong ground pressure rarely seen in tunnels, resulting in deformation near the face and large-scale heaving and subsequent destruction of the arch tunnel support (Fig. 1). At the time of the deformation, a closed-ring support

pattern with shotcrete $t=45\text{cm}$ and steel support H-200 was adopted. The section where the deformation occurred was about 450m long, meaning large-scale re-excitation was unavoidable. During re-excitation of the deformed section, various surveys, measurements, and numerical analyses were conducted to determine the support structure and construction method. A round triple support structure (Fig. 2) was adopted to ensure the stability of the tunnel.

Re-excavating the deformed section confirmed that the displacement of the upper half-horizontal inner space remained in the range of -60mm to -80mm and showed a gradual convergence trend after the section was closed. The estimated earth pressures acting on the support structure was slightly lower during the re-excitation than during the initial excavation, but generally increased with the overburden height during both the initial excavation and re-excitation, with the maximum earth pressure estimated to be equivalent to about 140m of overburden.

FUTURE TUNNELLING ACTIVITIES

A 920m long subway station extension/improvement project using the three-dimensional urban planning system at Sengakuji Station, Toei Asakusa Line:

The Sengakuji Station on the Toei Asakusa Line serves as a transport node giving access to Tokyo’s subway

network and Tokyo International Airport. In the vicinity of the station, a new JR station has opened. Sengakuji Station is currently a box-shaped tunnel with two underground levels. The second underground level has two $\times 5\text{m}$ wide island platforms with four tracks. The first underground level has separate concourses on the north and south sides. The station is chronically congested during rush hours and an increase in the number of station users is expected as large-scale developments progress in the surrounding area.

Therefore, there is a need to drastically improve the station, including the widening of platforms and improvement of elevator facilities. The platform width will therefore be widened to about 10m to meet the increase in passenger numbers and to minimize the scope of the renovation.

The station will have additional entrances and exits that will form a new pedestrian network and enhance passenger routes avoiding constraints nearby.

To further improve the station, the elevator facilities will be enhanced, and two barrier-free routes will be developed to allow passengers to move from the platforms to the ground level entrances by elevator.

Improving Sengakuji Station is a highly challenging construction project that will be carried out in a narrow space while the subway is in operation. Furthermore, it is directly under a very busy and congested main road.

This project will apply complex reinforcement methods to cope with any structural changes from the construction and removal of new structures, formulate a track switching plan to minimize the impact on railroad operations, and adopt a trenchless method under a national historic site.

EDUCATION ON TUNNELLING IN THE COUNTRY

Hokkaido University, Muroran Institute of Technology, Kitami Institute of Technology Iwate University, Tohoku University, Akita University, Ibaraki University, Nagaoka University of Technology, Tokyo Institute of Technology, Yokohama National University, Niigata University, Kanazawa University, University of Yamanashi, Gifu University, Nagoya University, Nagoya Institute of Technology, Toyohashi University of Technology, School/Graduate School of Engineering, Osaka University, Tottory University, Ehime University Faculty of Engineering, Kumamoto University, Kagoshima University, University of The Ryukyus, Maebashi Institute of Technology, Osaka City University, Hokkai-Gakuen University, Tohoku Gakuin University, Tokyo University of Science, Nihon University, Hosei University, Tokyo City University, Ritsumeikan University, Setsunan University, Fukuoka University, Ashikaga University, Kindai University, Okayama University, Kyushu Institute of Technology, Nagasaki University,

University of Miyazaki, Kanazawa Institute of Technology, Meijo University, Aichi Institute of Technology, Osaka Institute of Technology, Osaka Sangyo University, Kanazawa University, Kansai University, Gunma University, Saitama University, Kyushu Sangyo University, Shibaura Institute of Technology, Chubu University, Tokyo Denki University, Tohoku Institute of Technology, Nagaoka University of Technology, Hachinohe Institute of Technology, Hiroshima University, University of

Fukui, Yamaguchi University, National Institute of Technology, Kagawa College, National Institute of Technology, Kochi College, National Institute of Technology, Toyota College, National Institute of Technology(Kosen), Kure College, The University of Tokyo, Tokyo Metropolitan University, Waseda University, Kokushikan University, Yokohama National University, Chiba Institute of Technology, Utsunomiya University, Osaka Institute of Technology, Kyoto University, Kobe University, Yamaguchi University

STATISTICS

1. Length of tunnels excavated during 2021

25.8%/58.3%

2. List of tunnels under construction

	Road	Railway	Waterway	Overseas	Others	Total
Number of construction section	187	60	133	23	43	446
Total length(km)	268	214	242	116	114	954
Contract amount (US\$bn)	15	6.7	4.6	6.0	1.9	34