

Name: Australian Tunnelling Society (ATS)

Type of Structure: The ATS is an industry based Technical Society of Engineers Australia (EA) and is affiliated with the Australian Shotcrete Society, the NZ Tunnelling Society and the International Tunnelling and Underground Space Association (ITA).

Number of Members: 640 Members, 54 Gold and Silver Corporate Members and 6 Platinum Sponsors.

ASSOCIATION ACTIVITIES DURING 2019 AND TO DATE

During 2019 the ATS held its Tunnel Design and Construction Short Course in Perth which featured technical presentations by leading experts on topics relevant in Australia and with a knowledge of international practices. The 2019 David Sugden young tunneller's Award was presented to Senthilnath

Thangavelu. The top three 2018 David Sugden paper authors (including the winner) undertook a speaking tour of ATS Chapters in 2019.

The ATS Chapters hold monthly technical sessions and also ran a number of 1 day workshops throughout 2019. The ATS is involved with initiatives undertaken by the Australian Shotcrete Society (AusSS) including an industry

workshop to review and update the Shotcrete Guide – it is expected that the 3rd edition of the Shotcrete Guide will be published by June 2020. The ATS continues to be a contributor to the Austroads Tunnel Task Force which consists of jurisdictional representatives from around Australia and New Zealand.

The ATS is hosting its triennial conference "2020 Australasian Tunnelling Conference" in Melbourne 29 November to 2 December. Additionally, the 2020 ITA Awards are being held in conjunction with the Conference.

Publications: The ATS Journal was published twice in the last calendar year in conjunction with Tunnelling Journal.

Working Groups: During 2019, the ATS developed a Tunnel Design Guidelines which is expected to be published early 2020. The Tunnel Design Guidelines is targeted for use by less experienced practitioners. It is intended to hold

workshops/seminars during 2020 to introduce the guidelines. The ATS Air Quality Working Group (AQWG), published information on health strategies for managing silica dust exposure in tunnels which was launched early 2019. The ATS and the Working Group were recognised internationally for the quality of its work through winning the ITA-AITES Award for Safety Initiative of the Year 2019.

The ATS has 12 members active in ITA Working Groups which includes 1 Animateur and Vice Animateur.

CURRENT TUNNELLING ACTIVITIES

Image 1: LendLease/Bouygues JV is continuing with the design and construction of the \$A2.65B NorthConnex in Sydney, twin 9 km long road tunnels linking the M1 to the M2 and M7 motorways. The project is planned for completion March 2020. The project utilised 17 roadheaders during tunnel excavation.

Image 2: CPB/Samsung/John Holland JV completed the design and construction of the \$A2.7B M4 East project (WestConnex Stage 1B) in Sydney in July 2019. The project includes twin 3-lane road tunnels, each 5.5 km in length and utilised 18 roadheaders to mine the tunnels through Hawkesbury Sandstone and Ashfield Shale.

Image 3: CPB/Samsung/Dragados JV is continuing with the design and construction of the \$A4.3B New M5 project (WestConnex Stage 2) in Sydney. The project includes twin 3-lane road tunnels, each 9 km in length and has utilised 18 roadheaders to mine the tunnels through Hawkesbury Sandstone and Ashfield Shale. The project is due to open to traffic in 2020.

Image 4: In April 2016, the Salini Impregilo-NRW JV was awarded the \$A1.176B Forrestfield-Airport Link design, construct and maintenance contract for the Public Transport Authority in Perth, Western Australia. The project includes 8km of twin 7m diameter bored tunnels, two underground and one at-grade stations. Tunnelling commenced with TBM Grace in July 2017 and TBM Sandy started her journey in September 2017. Grace reached her final destination and broke through, into the dive structure at Bayswater, on 18/02/2020. Sandy is anticipated to follow in May 2020. Trains are expected to be operational in late 2021.

Image 5: Sydney Metro City and South West Tunnels and Station Excavation contract has been awarded to the John Holland/CPB/Ghella JV. The contract involves the design and construction of twin running tunnels, each 15 km long, between Chatswood and Sydenham and six new underground stations. Five TBMS were used to excavate the 30 km of tunnels. TBM excavation will finish in early 2020 with contract completion expected in 2021.

Image 6: In December 2017 the CPB/John Holland JV was awarded the West Gate Tunnel Project which includes the design and construction of twin three lane road tunnels in Melbourne. Two 15.5 m diameter TBMs have been assembled and commissioned for the excavation of the 2.8 km long eastbound tunnel and the 4 km long westbound tunnel. The project is scheduled to be completed by the end of 2022 but may be delayed due to issues with contaminated spoil.

Image 7: In December 2017 the Melbourne Metro Tunnels and Stations PPP contract was awarded to the Cross Yarra Partnership comprising John Holland/Lendlease/ Bouygues and Capella Capital. The contract involves the design and construction of twin running tunnels, each 9 km long, and five new underground stations. Two TBMS commenced the excavation of the running tunnels during 2019 and two TBMs will commence excavation in

2020. The section between the two CBD stations is being mined by roadheaders.

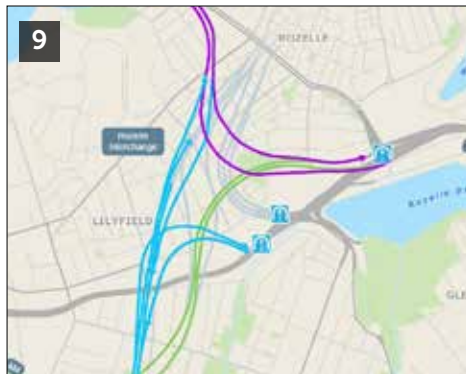
Image 8: In June 2018 the M4-M5 Link Main Tunnel Works Contract (WestConnex Stage 3A) was awarded to the Lendlease-Samsung-Bouygues JV for the design and construction of twin 3 and 4 lane road tunnels each 7.5 km in length. The project is planned to open in 2023.

Image 9: In December 2018 the Rozelle Interchange Contract (WestConnex Stage 3B) was awarded to the John Holland-CPB Contractors JV for the construction of a predominantly underground interchange to link the proposed M4-M5 Link Tunnels with the existing Anzac Bridge, Iron Cove Bridge and the future Western Harbour Tunnel. Twenty one roadheaders will be required to excavate the 22 km of tunnels. The project will be completed by 2023.

Cross River Rail – Brisbane

The State of Queensland reached contractual close during June 2019 with the Pulse consortium, which is comprised of CIMIC Group companies, Pacific Partnerships, CPB Contractors, and UGL with international partners DIF, BAM, and Ghella Investments & Partnerships. The Pulse consortium will deliver 5.9km twin tunnels, four new underground stations, and ongoing maintenance services for Cross River Rail, South East Queensland’s largest infrastructure project.





FUTURE TUNNELLING ACTIVITIES

Kidston Pumped Storage Hydro – Queensland

The 250 MW Power Station will include 1.5 km of tunnels, three 250 m deep shafts and an underground power house. Contract award is expected in mid 2020.

Snowy 2.0 Hydro Project - New South Wales

The preferred tenderer for the civil works which will include 27 km of TBM tunnels is Future Generation, a partnership between Australian construction and engineering company, Clough, and global hydropower and tunnelling specialists, Salini Impregilo. Voith Hydro is the preferred electrical and mechanical tenderer. Australian company Leed Engineering has also been awarded the contract for exploratory works pre-construction activities. Contracts are currently being finalised, with contract execution subject to Shareholder approval of the project.

North East Link – Melbourne

This road link between the existing M80 Ring Road and the Eastern Freeway will include twin tunnels each 5 km long. Tenders are scheduled to close in May 2020.

Inland Rail Project – South East Queensland

The 126 km long Gowrie to Kagaru section of the Inland Rail Project in south east Queensland will include three single track rail tunnels totalling 8.5 km in length. The Inland Rail Project is a 1700 km freight rail link from Melbourne to Brisbane. Tenders for this section of the project are expected to be called in the second half of 2020.

M6 Stage 1 – Sydney

Twin 3-lane road tunnels, each 4 km long, from the New M5 (WestConnex Stage 2) at Arncliffe to Kogarah. Tenders are expected to be called in Q2 2020.

Sydney Metro West – Sydney

This will be a new metro style underground rail line between Parramatta and the Sydney CBD which will include twin running tunnels, each 22 km long. Tenders are expected to be called in Q2 2020.

Western Harbour Tunnel – Sydney

Tenders for the second under harbour road tunnel in Sydney to connect the proposed Rozelle Interchange (WestConnex Stage 3b) with the existing

Warringah Freeway on Sydney’s North Shore are expected in late 2020.

Sydney Metro Greater West – Sydney

This will be a metro style rail line to link the proposed Western Sydney Airport with the existing train service at St Marys. Tenders for the tunnel section are expected to be called in 2021.

Beaches Link – Sydney

This road tunnel will connect the northern beaches area of Sydney with the Warringah Freeway and the proposed Western Harbour Tunnel.

Suburban Rail Loop – Melbourne

The Suburban Rail Loop is a 90 km long circle line to connect the outer suburbs with the existing radial rail network. The project is likely to be delivered in four stages with construction for the first stage planned to commence by 2022. The majority of the loop will be constructed as bored tunnels.

STATISTICS

1. **Length or volume excavated**
 - % mechanized/% conventional during 2019. Length of bored tunnels by TBM completed in 2019 (excluding pipejacking): 34,474m
 - Volume of mined tunnels completed in 2019: 830,000m³
2. **Amount (USD or EUR) of tunnelling/underground space facilities awarded in 2019**
 - USD5,040M or EUR4,632M
3. **List of tunnels completed:**
 - M4 East, July 2019.
4. **List of tunnels under construction (Excludes pipejacking works)**
 - NorthConnex, Sydney, NSW;
 - WestConnex Stage 1B (M4 East), Sydney, NSW;
 - WestConnex Stage 2 (New M5), Sydney NSW;
 - WestConnex stage 3A (M4-M5 Main Tunnel Works);
 - WestConnex Stage 3B (Rozelle Interchange);
 - Forrestfield Airport Link, Perth, WA;
 - Sydney Metro City and Southwest, Sydney, NSW;
 - WestGate Tunnel, Melbourne, Vic;
 - Melbourne Metro Rail Project Tunnel and Stations PPP, Melbourne, Vic;
 - Cross River Rail, Brisbane, Qld.