

# Spain



**Name:** Asociación Española De Túneles Y Obras Subterráneas (Spanish Association Of Tunnels And Underground Works)

**Type of Structure:** Non profit, open association, founded in 1975

**Number of Members:** Total 318 (216 individual members, 66 corporate members, and 36 young members)

## ASSOCIATION ACTIVITIES DURING 2022 AND TO DATE

During 2022, many of the activities that had initially been postponed due to the pandemic took place in both hybrid face-to-face and virtual modes. These include, among others, the following:

- XVIII Máster Universitario in Túneles y Obras Subterráneas AETOS (Endorsed by ITA-AITES).
- Participation in the JRC expert committee on the adaptation of the Eurocodes (2nd gen.) for tunnels and underground structures.
- Activities in Working Groups coordinated by AETOS Tunnel Forum (FAT)
- Meetings of EUFT and GIT and other counterpart Associations.
- Monography issue of tunnels in the ROP (Journal of Public Works) A new special issue of the ROP on Tunnels and Underground Works is presented, as a continuation of the collaboration that the Spanish Association of Tunnels and Underground Works (AETOS) and the Journal of Public Works (ROP), has been developing since 2009, to publish monographs, which disseminate experiences in tunnels and underground works.
- The fulfilment of the objective of AETOS to promote the study and research of underground works, facilitating contact between professionals and collaboration with related organizations is ongoing with, among others, the yearly publication of this monograph.

Other technical conferences and seminars:

- “Andalusian metros: Sustainable solution for city transportation” - Seville, 17th March 2022.
- Northwest corridor tunnels, Madrid-Galicia. Barrié Foundation. A Coruña, 6th and 7th April 2022.
- XI National Symposium on Geotechnical Engineering, organised by SEMSIG in collaboration with the University of Oviedo, SEMR, IGS-Spain, AETOS, SPG, and with the organisational support of

the University of Oviedo Foundation, and in parallel with the Seventh Spanish--Portuguese Geotechnical Engineering Symposium. Mieres - Oviedo. 24th - 27th May 2022.

- Participation as a EUTF member in the SIG Conference: “The role of underground infrastructures in the achievement of the EU sustainable developments goals”. Bologna (Italy). 19th - 21st Oct 2022.
- Spanish presence at the WTC and 48th ITA-GA. Copenhagen 2nd - 8th September
- September 22nd, General Assembly of AETOS, including:
  - Medal of honor award to past AETOS Secretary Pedro Sola Casado, and Alfonso Navarro Lérida as a young member.
  - Conference: “The Brennero-Forzezza Base tunnel” by David Marini, and y Gisuseppe Venditti, managers of engineering and construction.
- 2nd “International conference on road tunnel operations and safety & VIII Spanish Tunnelling Symposium - PIARC. Exhibition centre - Granada, 25th - 28th October 2022.

## FUTURE ASSOCIATION ACTIVITIES

- Technical conference “Tunnel in Gipuzkoa and other unique tunnels”, Donostia, 14th - 15th February.

Forecast events during 2023 (pending on confirming scheduling):

- Innovations and digitalization in tunnelling, EC-2nd Gen - JRC (June)
- AETOS General Assembly including Annual Conference (September)
- Madrid Metro extensions (October)
- Technical meetings and WG activities on going.

## CURRENT TUNNELLING ACTIVITIES

### Railway Tunnels

- Progress on the underground works at the Bergara Junction (Kortazar and Udalaitz tunnels) on the Vitoria-Bilbao-San Sebastián High-Speed Line.
- The Castellbisbal Tunnel in the Mediterranean Corridor.
- Underground works for the commissioning of the LAV to Murcia and works in the underground station at Carmen.
- Rail access to the Outer Port of A Coruña in Punta Langosteira.
- Underground works associated with the future La Sagrera Station (Barcelona).
- New rail access to T1 for the Josep Tarradellas Barcelona-El Prat airport.
- The Rincón tunnel in Pulpí (Almería).
- Commissioning of the LAV tunnel between Puerta de Atocha and Madrid Chamartín-Clara Campoamor (Madrid).
- The Zumelegi tunnel on the Elorrio-Elorrio section of the Vitoria-Bilbao-San Sebastián High-Speed Line.
- Access routes to northwest Spain (Galicia) have been commissioned and put into service, including more than 80 new tunnels. Over 40 new tunnels for high-speed lines are already planned for the coming years and are in the design or construction phase.

### Metro Tunnels

The Madrid Metro expansion project has been launched, which includes the



AETOS representatives, international experts in meters and authorities of the Junta de Andalucía

construction of 40.5km of new tracks and seven more stations, by 2028. Specifically, the Community of Madrid has launched in 2022:

- Line 3 - Villaverde Alto-El Casar, with a length of 2.5km and an investment of over €75M.
- Line 11 - Plaza Elíptica to Conde de Casal, with a 7km length and investment of over €550M
- Line 11 - Conde de Casa to Mar de Cristal, with an 18.6km length and investment of over €556M

The Madrid Metro today includes 302 stations and 294km of tracks, the fifth largest network in the world behind London, New York, Shanghai and Paris. If the schedule is followed in detail, within seven years it will have 309 stations and 334km of tracks.

In total, the three on-going projects will add up to more than 17km of Metro surface area and two brand new stops near the Hospital at Enfermera Isabel Zenda: Ciudad de la Justicia and Valdebebas Norte, which will also be an interchange. The new layout will also pass through the existing Madrid underground station at T4, at the end of Line 8, facilitating a new, more direct connection between the Adolfo Suárez Madrid Barajas Airport and Atocha.

**Road Tunnels**

In compliance with the European Directive on minimum safety requirements, for the adaptation of road tunnels of the RGE to R.D. 635/2006: 65 tunnels have been put out to tender, with a cumulative length of over 32km.

Within this set of activities, the following project for road tunnels are ongoing:

- San Juan Tunnel. (Alicante).
- Aguadulce, Bayyana, La Parra and La Garrofa tunnels (Almería).
- Adaptation of various tunnels in the province of Barcelona.
- Llado, Collaguetes, Fogá and Juan Carlos I tunnels (Lérida).
- Montefurado, Piedrafita San Pedro, Doncos, Cereixal and Neira tunnels (Lugo).
- Villafranca, Trabadelo and La Escrita (León).
- Capistrano, Tablazo, Frigiliana, Lagos, Torrox, Churriana and San Pedro tunnels (Málaga).
- El Carmen, Llovio, Tezangos, El Fabar, Arenal de Morís, Ángel Uriel, El Padrún and Duesos tunnels. (Asturias).
- Gedo, Somaconcha, Lantueno, Las Caldas, Riocorvo and Pedredo, Caviedes, Hoz, Torrelavega, Gibaja, Astillero,

**STATISTICS**

**1. List of tunnels completed:**

High Speed Railway tunnels:

Status	Number of tunnels	Cumulative length (km)
Panning	29	45.8
In the beginning phase of construction	10	28.1
In construction	27	96.4
On service	274	511.6
<b>Total</b>	<b>340</b>	<b>681.9</b>

**EDUCATION ON TUNNELLING IN THE COUNTRY**

Tunnelling Master and Degree courses are available in several universities, the most relevant being: UPM Polytechnic University in Madrid, UPC Cataluña, UPV Valencia, Univ. Cantabria, Univ. La Coruña, Univ. Castilla la Mancha, Univ. Granada, and Univ. Sevilla. All courses include the Discipline of Civil Eng. ECTS (European Credit System, according to the European Higher Education Area).

XVIII Edition “Master in Tunnels and Underground Works”. The Master’s degree is currently a Post-Graduate Master Course from the National University of Distance Education (UNED), with an equivalence of 60 ECTS and is recognized by ITACET (International Tunnelling Association).

The teaching cycle, which includes 1250 teaching hours and a Master’s thesis (plus individual study, design practices, etc.), has allowed us to train numerous specialists in the fields of Design, Construction and Maintenance of Tunnels and Underground Works over 16 years, and many of our students have successfully gained employment in tunnelling works in different areas of the Public and Private sectors.

To offer the highest quality of teaching, since 2014, AETOS has been collaborating with the National University of Distance Education (UNED) (through its Permanent Training program) and with the College of Civil Engineers (CICCP), to offer distance learning possibilities, to access a greater number of students.



Line 3 Villaverde-El Casar. Madrid metro

La Marga, Maliaño, La Albericia, La Morcilla and Limpías tunnels. (Cantabria).

- La Canda, Padornelo, Padornelo N-525 and La Canda N-525 tunnels. (Zamora).

Several road tunnels are currently under construction. Among these is the El Risco-Agaete motorway on the island of Gran Canaria, comprises eight tunnels along 8.5km of dual carriageway with three lanes in each direction and a total budget of €153M.

**Hydraulic Tunnels**

The €52M, 13km long Mularroya tunnel, for the transfer of water between the Jalón and Grío river basins, has completed by September 2022 a total of 8.2km.

The tunnel has an internal diameter of 2.9m and an external diameter of 3.3m, and will cross the municipalities of Calatayud, Paracuellos de la Ribera, El Frasno and Morata de Jalón, with the capacity to transfer 8 cubic meters of water per second.