

Colombia



Name: The Colombian Tunneling Committee

Type of Structure: Non-profit, open association

Number of Members: 10 members that represent more than 2500 engineers in the country

ASSOCIATION ACTIVITIES DURING 2021 AND TO DATE

The Committee continues to participate with the Colombian Society of Engineers as part of the revision team for the Colombian Tunnel Design Manual developed by the National Roads Institute (INVIAS). The Colombian Tunnel Committee (CCT) was working on the following:

Completion of the in-situ stress measurement – ITA working group Bulletin No. 12 - Camilo Marulanda, with historical cases.

As the 2021 congress was rescheduled to 2022, the Colombian tunnel committee has been working on the following two technical publications:

1. Design and Construction Considerations for Two Shallow Highway Tunnels in Soft Ground: C. Marulanda and R. Gutierrez, Ingetec, Bogotá. Colombia.
2. Analysis of the Squeezing Phenomenon and Rehabilitation of La Línea Roadway Tunnel: C. Marulanda (1) and R. Gutiérrez (2) - (1) Technical Manager, (2) Head of Tunneling Department - Geotechnical Division, Ingetec SA, Bogotá, Colombia.

The committee will organize the 2022 Tunneling Symposium, in which all Working Groups will participate. The committee will work on an academic

article on tunnelling based on the local Working Group's research. The committee will organize more short talks by invited experts, which will be open to all interested members of the community.

Participation in the WORLD ROAD TUNNEL SEMINAR: implementation of technologies in tunnel operation, with the two topics:

1. Environment and Sustainability (Design

- and construction of two shallow road tunnels in soft ground)
2. Construction and operation during the useful life of the tunnel (Analysis of the performance and rehabilitation of the La Línea Tunnel).

Participate in the World Tunnel Congress - WTC 2022, Denmark, 2nd - 8th September 2022.

CURRENT TUNNELLING ACTIVITIES

Colombia has an abundance of low strength rocks and due to the tectonic mountain building history of the region there is a huge variability in geological conditions and rock stresses, which give rise to excessive decompressions during underground works, thus generating a significant challenge to the industry.

To mitigate the often-long trips from ports to production centers and vice versa,

EDUCATION ON TUNNELLING IN THE COUNTRY

Postgraduate course applied to tunnel engineering/University: Universidad Javeriana/ Bogotá, Colombia.

Postgraduate course applied to mining engineering/University: Universidad Javeriana/ Bogotá, Colombia.

Postgraduate course in Road Tunnels: Design, Construction and Management/ University: Universidad de Los Andes/Bogotá, Colombia.

Postgraduate course in rock embankments and tunnel design/University: Universidad de Los Andes/Bogotá, Colombia.

Postgraduate course in underground construction /University: Universidad Militar Nueva Granada/Bogotá, Colombia.

Postgraduate course in geotechnical tunnel design/University: Universidad EAFIT/ Medellín, Colombia.

Postgraduate course in road tunnels/University: Universidad Javeriana/Bogotá, Colombia.

Course in bridges/viaducts, tunnels, embankment stability, complex excavations, hydroelectrics, ports, docks and cargo terminals/Escuela Colombiana de Ingeniería Julio Garavito/Bogotá, Colombia.

Andean Seminar about tunnels and underground works/Sociedad Colombiana de Ingenieros/Bogotá, Colombia.

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the design and construction of highway tunnels has increased in recent years.

The Colombian government has committed significant investments through the fourth generation 4G concession plan, which will include the construction of tunnels with varying characteristics.

The construction of tunnels has become a fundamental pillar in the national road network with almost 15km finished in 2021 and more than 36km of tunnels currently being built. The Guillermo Gaviria Echeverry Tunnel (Túnel del Toyo) is 9.73km long as is currently under construction and when complete will be the longest tunnel in Latin America. The entire "Cruce de la Cordillera Central" project is now in operation, after its inauguration in November 2021. It is composed of:

- 31 Bridges (5km)
- 3 Road interchanges
- 25 Tunnels (22km)

The most important tunnel - Túnel de La Línea - was opened in 2020, with a length of 8.65km. This is an important milestone in Colombian history. This project will improve commerce between Buenaventura port and Bogotá, where 42% of merchandise traded enters and leaves the country.

FUTURE TUNNELLING ACTIVITIES

At present, several road tunnel projects are being developed, within which the following stand out:

- 4 Tunnels on the Autopista al Llano Highway (8.25km)
- 1 Tunnel on the Autopista al Mar 1 Highway (4.6km)
- 1 Tunnel on the Autopista al Mar 2 Highway (2.2km)
- 2 Tunnels on the BBY Highway (5.4km)
- 2 Tunnels on the Pacífico 1 Highway (5km)
- 1 Tunnel on the Pacífico 2 Highway (2.5km)
- 1 Tunnel on the Pacífico 3 Highway (3.5km)
- 3 Tunnels on the Pamplona-Cúcuta Highway (2.87km)
- 1 Tunnel on the Vías del Nus Highway (4.1km)

The construction of these tunnels will improve the travel times for vehicles and heavy traffic, reduce the accident rate and will connect the main productive centers of the country with the main Colombian ports.

At present, Line 2 of the Bogota subway is under study, which consists of a 12.6km long main tunnel with a diameter of 10.80m to be built by EPBM through Sabana formation clays. Two entrance and exit shafts 20m wide and 25m deep will be constructed.

STATISTICS

1. Length or volume excavated - % mechanized / % conventional during 2021

100% of the length of the tunnels completed in 2021 were built using the conventional method.

2. List of tunnels completed:

Project	Tunnel	Length (km)
Cruce de la cordillera central	Túnel Los Ocelotes	0.30
Cruce de la cordillera central	Túnel Búho de anteojos	0.14
Cruce de la cordillera central	Túnel Mono aullador	0.23
Cruce de la cordillera central	Túnel Las Mariposas	0.10
Cruce de la cordillera central	Túnel Condor de Los Andes	0.10
Cruce de la cordillera central	Túnel Oso de anteojos	0.34
Cruce de la cordillera central	Túnel Los colibríes	0.90
Cruce de la cordillera central	Túnel Los barranqueros	0.63
Cruce de la cordillera central	Túnel de La Línea	8.60
Cruce de la cordillera central	Túnel Piloto	8.5
Cruce de la cordillera central	Túnel Loro orejiamarillo	0.27
Cruce de la cordillera central	Túnel Tapir Andino	0.16
Cruce de la cordillera central	Túnel Los tucanes	0.06
Cruce de la cordillera central	Túnel Tigrillo lanudo	0.20
Cruce de la cordillera central	Túnel Los trogones	0.40
Cruce de la cordillera central	Túnel Los perezosos	0.11
Cruce de la cordillera central	Túnel León de montaña	0.22
Cruce de la cordillera central	Túnel Los azulejos	0.06
Cruce de la cordillera central	Túnel Carpintero real	0.13
Cruce de la cordillera central	Túnel Las tangaras	0.13
Cruce de la cordillera central	Túnel Los venados	0.19
Cruce de la cordillera central	Túnel Los guatines	0.12
Cruce de la cordillera central	Túnel Las zarigüeyas	0.08
Cruce de la cordillera central	Túnel Los armadillos	0.02
Cruce de la cordillera central	Túnel Las guaguas	0.09
Pacífico 3	Túnel de Tesalia	3.5
Pacífico 2	Túnel de Mulatos	2.5
Pacífico 1	Túnel de Sinifaná	1.4
Vías del Nus	Túnel de La Quiebra	4.1
Conexión Mar 1 y Mar 2	Túnel del Toyo	9.73
Autopista al Mar 1	Túnel de Occidente	4.6
Pacífico 1	Túnel de Amagá	3.6
Pamplona-Cúcuta	Túnel de Pamplona	1.4
Pamplona-Cúcuta	Túnel de Pamplonita	1.07
Pamplona-Cúcuta	Túnel de La Honda	0.4
BBY	Túnel de La Paz	3.2
BBY	Túnel La Sorda	2.2
Autopista al Llano	Túnel Buenavista II	4.6
Autopista al Llano	Túnel 2	0.55
Autopista al Llano	Túnel 3	1.45
Autopista al Llano	Túnel 5	1.65
Autopista al Mar 2	Túnel de Fuemia	2.2