



# SIKA AT WORK

## TUNNEL ARROYO VEGA, BUENOS AIRES, ARGENTINA

USE OF PRODUCTS FOR TBM

BUILDING TRUST



# TUNNEL ARROYO VEGA, BUENOS AIRES, ARGENTINA

## PROJECT DESCRIPTION

The local companies Jose Cartellone Construcciones Civiles S.A. - Benito Roggio e Hijos S.A. - Supercemento SAIC were selected to make the construction of the tunnel "Segundo Emisario del Arroyo Vega". This project is due to improve the dewatering capacity of the central part of the city of Buenos Aires, especially considering the rainy season.

The project will improve the draining capacity of an area of 1,700 hectares where over 315,000 persons are living. From the over 8 km of the final tunnel, 2.4 km are being excavated by a micro-tunneling TBM (2.4 m diameter) and 5.9 km will be excavated by an EPB TBM (5.3 m diameter).

## TBM DESCRIPTION

A leader German supplier of TBMs has provided an Earth Pressure TBM (known for its EPB technology) of around 6.0 m of diameter and almost 70 m long TBM to excavate the 5.9 km of tunnel below the city of Buenos Aires. Excavation started behind the international Airport Jorge Newbery, just in front of the "Rio de la Plata", inside an impressive 30 m depth shaft where the machine had to start excavation facing up to 3 bar water pressure in the mixing chamber.

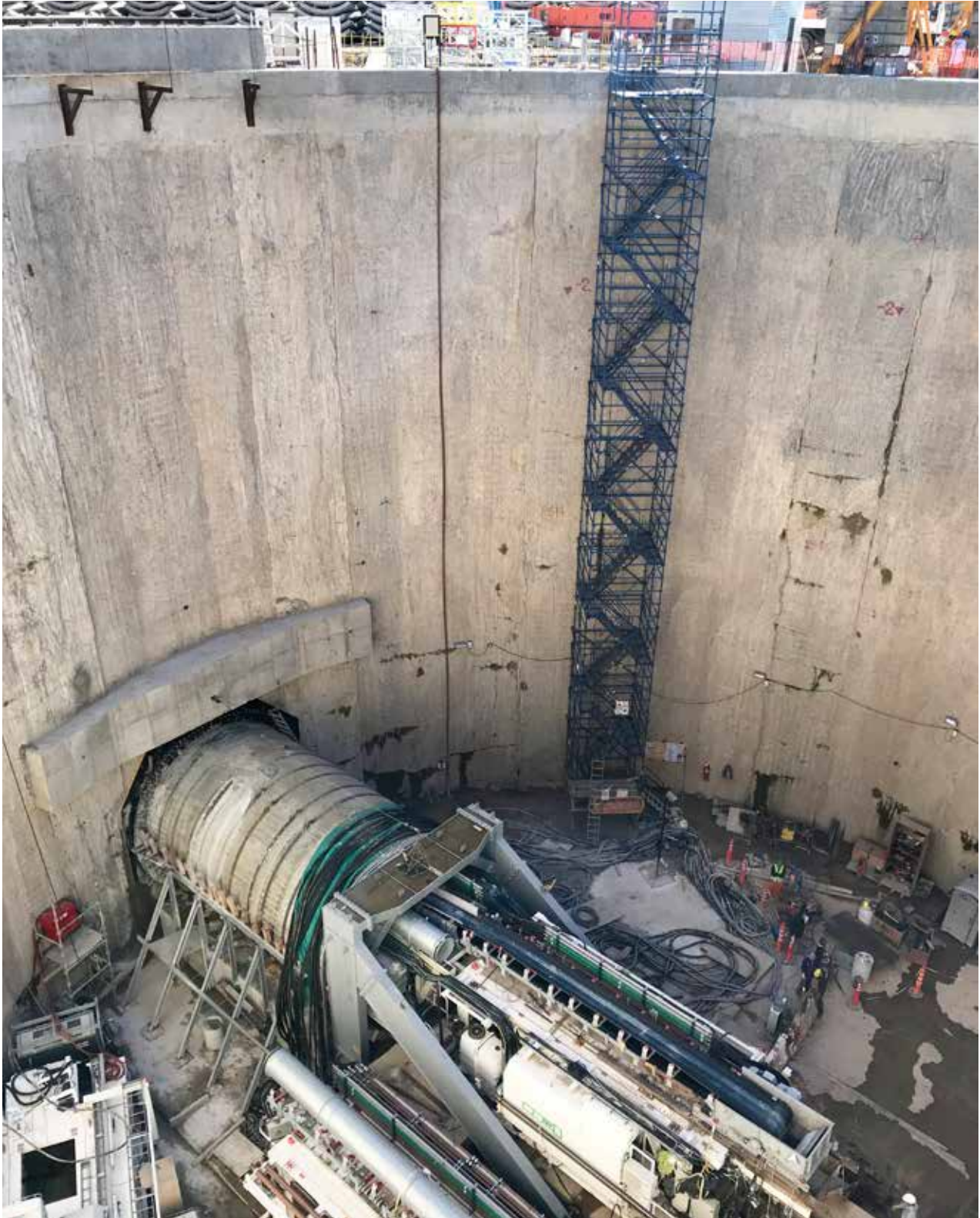
The cutting wheel of the machine counts with several cutting teeth and some discs specially configured to excavate in a mainly sandy ground with high humidity (locally known as "tosca"). During full excavation, the machine can reach 20 - 25 m of tunnel per day.

## ADMIXTURES FOR CONCRETE SEGMENTS

The owner of the project had specific requirements considering the quality of the final concrete segments in this jobsite. A new segment factory was built inside the jobsite, taking advantage of the space available and reducing the logistic requirements for the transport of the segments. During fabrication of the over 30.000 single segments (each with around 1 m<sup>3</sup> of concrete), high early strengths were expected to reduce the curing time, allowing fast demolding. Additionally high requirements considering the performance and durability of each concrete segment were required too. Sika provided the products: Sika® ViscoCrete® WR-2000 and 2700 which are used in the production of high performance concrete, especially in concrete factories where the concrete are characterized by their low ratio water/cement, high cohesion and easy compaction. After few hours the concrete segments had the required strength to be transported to the temporary storage area. The final delivery into the tunnel follows according to the advance of the TBM. Additionally and only in special cases where the surface finishing of few segments had to be improved, the Sika MonoTop®-620 was used with success.











### PRODUCT DESCRIPTION

Considering the huge importance of the soil conditioning during TBM excavation, especially with this specific type of TBM (EPB), and the big influence of the foaming agents that may be injected to the excavation chamber during excavation, the site management decided to carry out different products from different suppliers in the area, before choosing the most appropriate.

Our Sika's local team and the Sika TBM Corporate experts recommended and tested together with the TBM team our basic foaming agent Sika® Foam TBM 101 FB-A, which is a high efficiency foaming agent for ground with high to low permeability and polymer modified. The dosage of the foaming agent was optimized as much as possible, always trying to keep the average advance speed of the TBM and most important, keeping the torque of the cutting wheel as low as possible. During tests, it was proved that the quality of the foam was very strong and fulfilled the expectation of the TBM drivers.

### PROJECT PARTICIPANTS

**Client:** City of Buenos Aires, Argentina

**Construction:** Jose Cartellone Construcciones Civiles S.A. - Benito Roggio e Hijos S.A. - Supercemento SAIC

**Supplier:** Sika Argentina



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**Sika Services AG**  
Tueffenwies 16  
CH-8048 Zurich  
Switzerland

**Contact**  
Phone +41 58 436 40 40  
www.sika.com

