SIKA AT WORK
METRO LINE 7, SANTIAGO DE CHILE, CHILE

CONCRETE:	Sika® ViscoCrete®, Sika® Separol, Sika® Sigunit®, Sika® WT. Sika® Plastocrete®, SikaFiber® Force
TBM:	Sika® Stabilizer
OTHER SOLUTIONS:	Sikaflex®, SikaRep®, Igol® Denso, Igol® Primer, Sika® Antisol®, Sikadur®, SikaTop®, Sika® Intraplast ®, SikaFluid®, SikaSwell®, SikaGrout®, Sikalisto® Repair, SikaCem®, Sika Waterbar®, SikaCure®

BUILDING TRUST

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PROJECT DESCRIPTION
The Metro Line 7 project in Santiago represents a USD 2.528 billion investment and is the most ambitious infrastructure project in the country's history. Spanning 26 km of tunnels with 19 stations, it will benefit 1.6 million residents, reducing travel times by 60% and alleviating congestion on the existing Line 1. The project, undertaken by four construction companies, is divided into six sections and is expected to be fully completed by 2028. A key innovation is the construction of a 7 km section using a TBM for the first time in Santiago, marking a milestone in the city's metro modernization.

CONSTRUCTION METHOD AND CHALLENGES
The construction of Line 7 integrates two primary excavation methods: a 7 km section using the TBM EPB system and the remaining 19 km utilizing the Austrian tunneling method (NATM).

Innovation and Progress with TBM
For the first time, Santiago Metro is employing an EPB TBM, nicknamed "La Matucana," to excavate 7 km of tunnel. This machine features a 9.83 meter diameter cutterhead and a total length of 110 meters. It simultaneously installs concrete rings, each composed of seven segments with a thickness of 320 mm. Since operations began in May 2024, a record of 18 rings per day - equivalent to 36 meters daily - has been achieved, thanks to the collaboration between Sika Chile and the contractor China Railway Construction Corporation (CRCC).

The decision to utilize a TBM ensures controlled and precise excavation, resulting in cost and time reductions. The machine is designed to handle various geological conditions while ensuring tunnel structural integrity and operational safety. Additionally, TBM use enhances workplace safety by mitigating risks associated with open-face excavation.

Soil Conditioning and Crossing Under the Mapocho River
Sika has played a crucial role in construction innovation, particularly in soil conditioning for face support management and tunnel safety, the design and application of the backfill grout injected behind the rings, and the engineering of the concrete segments. Sika Chile technical team has conducted specialized studies to determine precise soil conditioning parameters across different tunnel sections.

A major milestone was the successful crossing beneath the Mapocho River in March 2025, achieved with a minimum coverage of 7 meters below the riverbed. The tunnel face was stabilized using Sika® Stabilizer-1111 TBM CL foaming agent, ensuring safe and efficient excavation.


Soil conditioning TBM trials with Sika TBM experts

2K Grout
Over 8,500 m³ of two-component grout will be injected to fill the annular gap between the concrete segments and the substrate. This grout incorporates our retarder Sika® Stabilizer-5010 TBM CL, our bentonite Sika® Stabilizer-4001 TBM CL and our accelerator Sika® Stabilizer-6030 TBM CL, ensuring proper gap filling, preventing water leakage, and minimizing surface settlement.

Tail Seal Greases
With the use of Sika® Stabilizer-2231 TBM tail seal grease, CRCC has successfully sealed the tail shield, preventing water or soil ingress and protecting the brushes - even under varying TBM penetration rates and highly fluctuating water pressure conditions.

Segment Manufacturing Plant and Sika® ViscoCrete® GL 330 Admixture
The project includes the production of 4,100 concrete rings using Sika® ViscoCrete® GL 330 admixture to enhance workability and mechanical properties. The plant has achieved a record production of nine rings per day, with a demolding time of just 4.5 hours, thanks to the steam curing system and the properties of Sika® Separol PRO release agent.

SIKA SOLUTIONS
Sika has provided advanced chemical solutions essential for the durability and resilience of both permanent and temporary underground structures. These include a comprehensive range of products tailored for this project, ensuring high performance and reliability in challenging tunneling conditions.

Precast Segmental Lining Solutions
- Sika® ViscoCrete® GL 330
  Hyperplasticizing and water-reducing additive
- Sika® Separol PRO
  Ready to use oil-based formwork release agent

TBM Solutions
- Sika® Stabilizer-1111 TBM CL
  Polymer-modified foaming agent for soil conditioning
- Sika® Stabilizer-4001 TBM CL
  Activated sodium bentonite for backfill grouting
- Sika® Stabilizer-5010 TBM CL
  Cement retarding additive for backfill grouting
- Sika® Stabilizer-6030 TBM CL
  Grout accelerator for backfill grouting
- Sika® Stabilizer-2231 TBM
  Fire-resistant tail sealant grease for shielded TBMs
- Sika® Stabilizer-2131 TBM
  First fill, fire-resistant tail sealant grease for shielded TBMs

Shotcrete Solutions
- Sika® Sigunit®-3440 AFL
  Alkali-free setting accelerator for shotcrete
- Sika® WT-240 P
  Crystalline based permeability reducing admixture
- Sika® ViscoCrete®-6000
  Synthetic polymer based water-reducing admixture
- Sika® Plastocrete®-450
  Water-reducing admixture with retarding effect
- Sika® Sigunit®-5460 AFL
  Alkali-free setting accelerator for shotcrete
- SikaFiber® Force-48
  48 mm long synthetic macro fibres for (sprayed) concrete

Tanks of retarder Sika® Stabilizer-6030 TBM for Backfill Grout


Tail Sealant Grease Sika® Stabilizer-2231 TBM under pumping

SIKA, YOUR RELIABLE PARTNER IN METRO PROJECTS

Other Solutions

- Sikaflex®-1A
  Elastomeric joint sealant/adhesive
- SikaRep® AR
  Fiber-reinforced mortar for high-strength concrete repairs
- Igol® Denso
  Asphalt waterproofing and vapor barrier for foundations
- Igol® Primer CL
  Asphalt primer with good penetration and adhesion
- Sika® Antisol®
  Curing compound preventing water loss in fresh concrete
- Sikadur®-31 Hi-Mod Gel
  Thixotropic adhesive based on epoxy resins and inactive fillers
- Sikadur®-32
  Fluid, epoxy resin based structural adhesive
- SikaTop®-107 Flex
  Flexible 2-component waterproofing mortar
- Sika® Intraplast®
  Plasticizing injection additive
- SikaFluid®
  Fluidizing additive for cementitious slurries
- SikaSwell® PS-2010
  Swellable joint sealing strip
- SikaSwell® S-2
  Hydrophilic, swellable joint sealant
- Sikadur®-41 CF
  Thixotropic, 3-component patching and repair mortar
- SikaGrout®-212
  Free flowing, low shrinkage expanding cementitious grout
- Sikalisto® Repair
  Cement-based mortar for waterproofing repairs
- SikaCem® FLC 100
  Admixture for high strength grouts for posttensioned cables and fixing anchors or bolts in concrete or rock
- Sika Waterbar®
  Waterproofing band for expansion and construction joints
- SikaCure®-116
  Polymerized synthetic resin curing compound

Tanks of Accelerator Sika® Stabilizer-6030 TBM for Backfill Grout

CONCLUSIONS

The Metro project's TBM-based approach, supported by Sika solutions, not only optimized construction efficiency but also ensured the long-term sustainability and safety of the transportation system. By implementing these advanced technologies and products, the project sets a high standard for future urban infrastructure developments.

PROJECT PARTICIPANTS

Owner: Metro S.A.
Contractor: China Railway Construction Corporation (CRCC)
Supplier: Sika S.A. Chile

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USGBC MEMBER

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