

# TERRATEC DELIVERS TUNNEL CONVEYORS FOR METRO MANILA SUBWAY PROJECT IN THE PHILIPPINES



*The Metro Manila Subway Project commences with the implementation of TERRATEC's Continuously Advancing Tunnel Conveyors.*

**T**ERRATEC is pleased to announce that the successful delivery of two Continuously Advancing Tunnel Conveyors for Phase I Contract Package CP101 of the Metro Manila Subway Project in Manila, Philippines. These state-of-the-art tunnel conveyors were selected by the Shimizu-Fujita-Takenaka-EEI Joint Venture, the contracting team working on behalf of the Department of Transportation in Manila.

The Metro Manila Subway Project is the first underground

railway system in the Philippines. As a significant infrastructure endeavour, TERRATEC's group company JIM Technology, will supply a total of six Tunnel Boring Machines (TBMs). The project has commenced with TERRATEC's highly efficient and reliable tunnel conveyors.

The two TERRATEC Continuously Advancing Conveyors will play a vital role in the construction of the 33.1-kilometer subway section, connecting Mindanao Avenue in the northern part

of Metro Manila to Western Bicutan in the south. The two tunnel conveyors, delivered for CP101, will excavate the section between the Metro Manila Subway Depot and Quirino Highway.

Designed to meet the specific demands of the project, the two TERRATEC Continuously Advancing Conveyors have an impressive length of 1509m and operate at a rate of 225m<sup>3</sup>/h. With a single pulley head drive power of 150kW, these conveyors are capable of

efficiently handling the various materials extracted by the Tunnel Boring Machine along the entire length of the belt. The conveyed materials include sandy gravel and boulders up to 400mm in size, showcasing the robust capabilities of TERRATEC's conveyors.

In addition to their exceptional performance, these tunnel conveyors offer reliable operation, easy and swift installation, and optimal space utilization. The electric conveyor drives incorporate cutting-edge electronic Variable Voltage Variable Frequency (VVVF) controllers for each motor, ensuring smooth starting, load sharing, and precise control. Hydraulic tensioning is employed for horizontal cassettes, guaranteeing accurate take-up tensions and reliable control. The wider-than-standard carry

and return roller sets allow for enhanced belt wander tolerance and improved control in horizontal curves. Two-roll vee-return idlers are utilized throughout the conveyors to maintain proper return belt tracking.

TERRATEC's unique and patented design of the Advancing Tail Piece levels the Tunnel Conveyor using an active hydraulic system to match the steering/ rolling position of the TBM. This enables the smooth negotiation of any horizontal and vertical curves.

These conveyors are designed to handle both steady state and unsteady conditions, including acceleration, controlled deceleration, and unpowered stopping for loaded and empty conditions. This versatility ensures optimal performance

and safety throughout the construction process.

The excavation is projected to yield approximately 1.2 million cubic meters of soil, equivalent to the volume of 500 Olympic-size swimming pools. Overall, the alignment is anticipated to generate around 7,419,940 cubic meters of soil, equivalent to 2,500 Olympic-size swimming pools.

The Metro Manila Subway Project aims to serve up to 370,000 passengers per day and is expected to be completed in 2028. TERRATEC, a leading provider of innovative tunnelling solutions, remains committed to delivering innovative and reliable solutions, supporting the development of efficient and safe underground transport systems worldwide.

## TERRATEC HARD ROCK DOUBLE SHIELD TBM COMMENCES OPERATIONS FOR VISHNUGAD-PIPALKOTI HYDROPOWER PROJECT

TERRATEC is pleased to announce that the Ø9.86m Hard Rock Double Shield TBM has commenced the excavation for Vishnugad-Pipalkoti Hydropower Project in India.

The Ø9.86m Hard Rock Double Shield TBM is currently working for Hindustan Construction Co. Ltd. of India which is the main contractor responsible for this project. The ongoing project takes place in the state of Uttarakhand, around 500km Northeast of Delhi. The work involves the construction of dams, waterway tunnels vertical shafts and a powerhouse with a generating capacity of 444 MW.

The Double Shield TBM has been designed for the construction of a low-pressure head race tunnel, which is a crucial component of a hydroelectric power system. This TBM is equipped with customized features to efficiently complete the 13km tunnel. The team has been waiting to complete the drill and blast section of the project.

The alignment for the Vishnugad-Pipalkoti Hydropower project comprises primarily of Dolomitic Limestone (33%) and Slates (64%), with the remaining 3% passing through critical geological sections. These sections include Thrust Zones (with shallow

overburden of 150m), Shear Zones (consisting of 5 zones), and Fault Zones (totaling 3 zones). These areas present significant challenges, and as a result, the TBM has been specifically engineered to handle these conditions. Additionally, TERRATEC is providing the Continuously Advancing Tunnel Conveyor for the project.

The CutterHead of the TBM features 19" disc cutters while maintaining twelve large bucket openings. The 4,200kW electric main drive is designed to help the TBM to excavate through the expected hard rock, delivering a

*The Vishnugad-Pipalkoti Hydropower project kicks off with the deployment of TERRATEC's Hard Rock Double Shield TBM.*





## TERRATEC TBMS CONTINUE TO IMPRESS OVER LONG DRIVES IN ARGENTINA

**T**ERRATEC is pleased to share the successful progress of the two dia. 4.66m Earth Pressure Balance Tunnel Boring Machines (EPBMs) currently operational in Buenos Aires, Argentina for the Río Subterráneo a Lomas tunnel.

The first EPB TBM (S74) named "EVA" commence its journey at the end of September 2020. Impressively, "EVA" completed the first drive, covering approximately 8km (7945m), by the end of 2022. During the Covid-19 pandemic, the launch of its first machine was initiated. To accomplish

this, Italian contractor CMC di Ravenna and TERRATEC secured specific permission from different Argentina embassies in different countries, enabling them to send a team of international technicians to Argentina. CMC di Ravenna played a pivotal role in this endeavor by establishing a vast organization and committing substantial resources to comply with governmental restrictions and successfully launched the first TBM.

This remarkable 13.5km tunnel is a pivotal component of the

multi-billion-dollar Agua Sur system that is currently being built by Argentina's national water and sanitation company AySA. Representing the country's most extensive water infrastructure project in four decades, the Agua Sur system is poised to provide fresh water access to 2.5 million inhabitants residing in the southern metropolitan area of Buenos Aires.

The sister machine, the dia. 4.66m TERRATEC EPBM (S73) named "JUANA" has been deployed by CMC di Ravenna for the final 5km of the final

*TERRATEC 3.14m diameter EPB TBM is making excellent progress for Mithi River Water Quality Improvement Project in Mumbai, India.*

torque of over 22,000kNm. As the TBM progresses, universal reinforced concrete lining rings, measuring 1,500mm wide and 350mm thick, are installed. These lining rings consist of five segments plus a key.

The TBM is equipped with features such as a high-speed regripping system, single-shield advancing mode, high-pressure emergency thrust, flood control doors, and numerous others. The key components of the TBM were manufactured in Australia and Japan, while the assembly took place at the TERRATEC facilities in China. TERRATEC's dedicated and skilled Field Service staff are available to offer exceptional after-sales

support ensuring the best possible performance is obtainable. The addition of 444 MW capacity in the Northern region will significantly reduce peaking power shortages in that area. The project has a design energy of 1657.09 MU. Out of the 13% of free power allocated to the home state of Uttarakhand, 1% will be utilized for local area development.

TERRATEC has been chosen for the tunnel package in Vishnugad-Pipalkoti Hydropower Project due to TERRATEC's continuing success on projects such as Phase III & IV of the Delhi Metro, Lucknow Metro, Pune Metro, Kanpur Metro, Ahmadabad Metro and Mumbai Metro. This is a result of tailor-made robust TBM design, prompt

onsite assistance, readily available stock of TBM spares, and highly-skilled specialised TBM support throughout tunnelling operations.





The TERRATEC EPBMs have been designed to handle the diverse soft ground geology along the project alignment, encompassing silts, sandy silts, and some cobbles. Equipped with high-torque soft ground cutterheads featuring a spoke-style design boasting a 49% opening ratio, these TBMs incorporate cutting tools comprising of multiple fixed and back-loading knife bits. This cutting-edge configuration ensures not only rapid advancement but also minimizes the need for interventions.

Both TERRATEC EPBMs were launched and received from shafts. The tunnel excavation takes place at an average

depth of 25m, commencing with an approximately 400m radius curve before continuing along a predominantly straight alignment, with a maximum slope of +/- 2.0%. As the machines progress, a precast concrete lining ring will be installed which are comprising six segments (four parallelograms and two keys) measuring 250mm thick and 1400mm wide each.

The first launch shaft is composed of 4 interconnected circular sectors at the bottom area. Spanning around 45m in length, 12m in width, and 25m in height, this shaft serves as an integral starting point for the tunneling operations. The Agua Sur System, a

comprehensive infrastructure endeavor, encompasses various significant works. These include establishing a raw water intake, expanding the General Belgrano Water Treatment Plant to augment its water production capacity from the existing maximum of 1,950,000m<sup>3</sup> per day to an impressive 2,950,000m<sup>3</sup> per day. Additionally, it involves the construction of a 23km water conveyance tunnel, built in two stages, along with the creation of two pump stations and a vast network of pipe connections spanning 46km. The ambitious project is anticipated to be completed over an estimated timeframe of 10 years.

## WHEREABOUTS

Meet TERRATEC at the following exhibitions!



**Cutting Edge Conference**  
Nov 13-14 |  
Texas, USA



**Tunnelling Asia International Conference & ITA Award**  
Nov 22-24 |  
Mumbai, India



**5th Mexican Congress on Tunnel Engineering & Under-ground Works**  
Nov 29-Dec 1 |  
Ciudad de Mexico, Mexico



**Excon India**  
Dec 12-16 |  
Bengaluru, India

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