



Jakarta MRT Project Case Study

Location:

Jakarta, Indonesia

Client:

PT Sarana Jaya Nusasentosa

Application Summary:

Monitoring ground deformation above twin tunnel boring machines

Tags:

ipx; settlement; deformation; tunnel; top-supported; road;

Description:

With space a precious commodity, Jakarta's Mass Rapid Transit (MRT) expansion project has implemented a design incorporating two stacked stations – a first for Indonesia. The section of twin bored tunnels between Sawah Besar and Mangga Besar will wind their way from side-by-side to stacked one over the other in one of the busiest parts of the city. Jakarta's famously soft ground conditions demanded advanced stabilisation measures from Japanese contractors, Sumitomo Mitsui Construction Company Jakarta-Hutama Karya Joint Operation (SMCC-HKK JO).

Instrumentation arrays comprising of piezometers, earth pressure cells, extensometers, strain gauges, optical prisms and accelerometers were used to monitor the impact of tunnelling on the surrounding ground and stresses on the tunnel itself. The in-place extensometer was selected as a cost-effective means of monitoring deformation above and adjacent to the tunnel alignments, offering simple installation coupled with excellent measurement performance in soft ground.

Key Benefits:

- Excellent performance in soft ground
- Low-profile headworks

Rod extensometers rely on the transfer of displacement from the ground to the anchor, along the rod by compressing the PVC outer sleeve, and moving the spring-loaded displacement transducer. Due to the forces required to transfer displacements in a rod extensometer, it has long been a challenge to achieve good results in soft soil. Since the IPX measures displacement at the point of movement and without contact, it is ideal for monitoring deformation regardless of the ground conditions. Spider magnets provide an excellent connection to the surrounding soil, and since there is no resistance forces on the magnet it moves freely with the ground.





Thanks to the in-ground measurement, only the cable and top support needs to be accommodated at the surface. The top support is equipped with a socket for fixing settlement points or 3D prisms to allow external control to be brought to the string of sensors for instances where the source of movement is coming from below the instrument.

Related Articles:

Indonesia builds two underground stacked stations for MRT in Jakarta

"These stations will be the first underground stacked stations in Indonesia," said Weni Maulina, Director of Construction at PT MRT Jakarta, in Jakarta on Tuesday. "The concepts of stacked platforms and stacked tunnels are used due to the limited space in the areas," she said.

<https://en.antaranews.com/news/306567/indonesia-builds-two-underground-stacked-stations-for-mrt-in-jakarta>

Next MRT Jakarta Line to Have Seven Underground Stations & Multi-Level Tunnel

"A multilevel tunnel will require the construction of four-story underground stations. Sawah Besar and Mangga Besar stations will be located 36 meters below ground"

<https://www.thejakartapost.com/news/2019/11/08/next-mrt-jakarta-line-to-have-seven-underground-stations-multilevel-tunnel.html>

Mangga Besar-Kota MRT construction to commence at the end of 2021

"After the construction of Kota Station is finished, Jalan Pintu Besar Selatan will be changed to be a large pedestrian plaza that can only accommodate public vehicles, such as Transjakarta. All of this is part of the major plan to create a low emission zone," Silvia said.

<https://www.pwc.com/id/en/media-centre/infrastructure-news/september-2021/mangga-besar-kota-mrt-construction-to-commence-at-the-end-of-2021.html>

