

Project dossier



PROJECT DOSSIER

Expolink Route 2020 Dubai Metro Project, UAE

PROJECT OVERVIEW

The Expolink Route 2020 Metro Rail Project is an extension of the existing Dubai Metro Red Line, consisting of a branch line starting at Nakheel Harbour and Tower Station and extending to the 2020 Expo site. The alignment for the project includes around 2 km of bored tunnel excavated by tunnel boring machine (TBM) and 10 km of elevated structures.

A comprehensive instrumentation and monitoring program was undertaken before, during and after the construction of Route 2020 Metro Rail Project (underground).

WHY MONITORING?

The purpose of the instrumentation and monitoring process was to determine ground movements and accurately evaluate the effect of the construction works on the nearby structures, services and utilities in a form that will allow direct comparison with performance criteria and design expectations. The instrumentation data was to help in systematically identifying the significant design risks and allowing prioritisation of actions to minimise and manage them construction risks. This provided information to evaluate the structural stability and possibility of implementing corrective measures if necessary.

Project	Expolink Route 2020 Dubai Metro Rail Project
Location	Dubai, UAE
Client	Roads & Transport Authority
Contractor	Expolink-CWJV
Consultant	Parson-Systra JV
Designer	CH2M
Duration	2017- 2020





MONITORING SOLUTION

Encardio-rite Geosystems, UAE was responsible for monitoring before, during and after the construction activity at the Expolink Route 2020 Metro Rail Project. The purpose of monitoring work, using geotechnical instrumentation, is as follows:

- Safety of building & utilities
- Design Verification
- Construction Control

Instrumented sections included underground stations, annex structure, cut & cover deep excavations, tunnel alignment, NDRC Line, Buildings and utilities within zone of influence of excavations and tunneling works and existing metro piers.



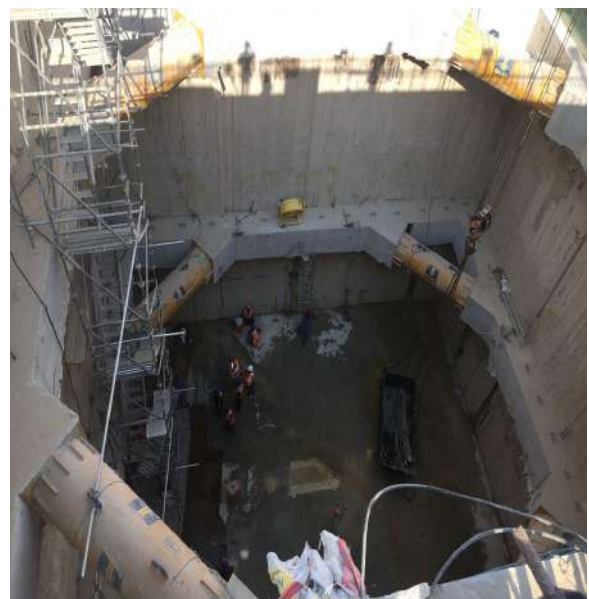
TURNKEY SERVICES

- Conducting pre condition survey of construction sites (photographic record & reporting)
- Responsible for establishment, maintenance, and measurements of survey network
- Responsible for supply, installation and monitoring of geotechnical instruments, associated with the project, to monitor the response of underground structures (station, excavation & retaining walls)
- Setting up an online web-based data management system (WDMS) and maintenance during the contract period
- Weekly & monthly reporting with evaluation & interpretation
- Manual and automatic monitoring

INSTRUMENTS USED

A comprehensive range of instruments were used during the construction activities for the underground sections/stations and tunneling:

Standpipe Piezometer	Installed outside excavation areas to determine the groundwater behaviour before, during and after construction activities.
Inclinometer	Installed outside excavation area and within diaphragm wall to determine lateral deformation of ground and D-wall due to excavation activities.
In-Place Inclinometer	Installed in diaphragm wall, used to measure lateral deformation.
Automatic Groundwater Recorder	Used to measure groundwater level at every one hour interval during excavation period.



Piezometer	Installed outside excavation areas to determine to determine the groundwater pressure at depth before, during and after construction activities.
Extensometers	Two-point rod extensometer will be installed in the adjacent to station box excavations to measure settlement at depths.
Surface Settlement Points	Two types: hard pavement & for soil. Used to determine ground surface deformation.
Prism Target	Used for 3D measurement of deformation during building construction.
Strain Gauges	Used to measure the strain developed on the strut support through ESDL dataloggers. Same strain gauges were also used to measure the strain while cutting the rail tracks for extension of metro route.
Robotic Total Station	Automatic surveying using total stations and our in-house developed control box was done for deformation monitoring
Dataloggers	Our advanced dataloggers were used to collect data automatically from sensors installed at critical locations at required intervals. The data was transmitted wirelessly to central server.

Encardio-rite was responsible for ensuring that all survey investigations were planned and executed in a safe manner complying with all the relevant regulations, so as not to cause danger, inconvenience or interference to the general public or other contractors working on site.

During the project execution, all deliverables were subject to an inter-disciplinary check prior to issuance (such as tunnel design, geological/geotechnical, structures disciplines). All site conditions that may affect the results were recorded with sensor data, like temperature, excavation level, distance of TBM head from the point/excavation level, dewatering, ground improvement, any other works in vicinity of the location of the instrument. This helped in interpretation and evaluation of data, especially in case there was any variation in the sensor data.

The automatic and manual monitoring data was available to the Contractor, Client as well as the Consultant in form of daily, weekly and monthly monitoring reports. The reports included interpretations of variations observed in instrument data with respect to the construction progress in the respective areas. Instant alerts were provided for corrective/preventive measures to be taken in time.



TUNNELS



HYDROELECTRIC



CONSTRUCTION



STRUCTURAL



METRO & RAIL



BRIDGES



MINING