



PROJECT DOSSIER

MSHEIREB STATION



PROJECT OVERVIEW

| | |
|----------------|--|
| Project | Msheireb Station (Package 5), Major Stations, Doha Metro |
| Location | Doha, Qatar |
| Client | Qatar Rail Company |
| Contractor | Samsung C&T - Obrascon Huarte - Qatar Building Co. JV (SOQ JV) - 2013 to 2016 Consolidated Contractors Group S.A.L - 2016- 2019 |
| Consultants | The Louis Berger Egis Rail Joint Venture (LBER JV) |
| Duration | 2013 - 2019 |

Doha Metro is the world's largest infrastructure project. Eighty two km of metro tunnel incorporating 26 stations will run underground in Phase 1. Msheireb Station will serve as the heart of Phase 1 as it is the major interchange station of three metro lines – with Red and Green Lines running parallel and Gold Line situated underneath. It is the largest underground station in Doha situated at the corner of Msheireb Downtown Doha development. The station lies between ~ 15 m to 40 m below ground level.

The Msheireb Station in center of metro already forms the accumulation point of the whole system. All lines meet here, 12 TBM breakthroughs ended at this mammoth station alone. Excavation for Msheireb Station, approximately 40 m below ground level is one of the deepest excavations for metro in the Middle East so far, therefore, Instrumentation & Monitoring (I&M) works play an important role in the project.



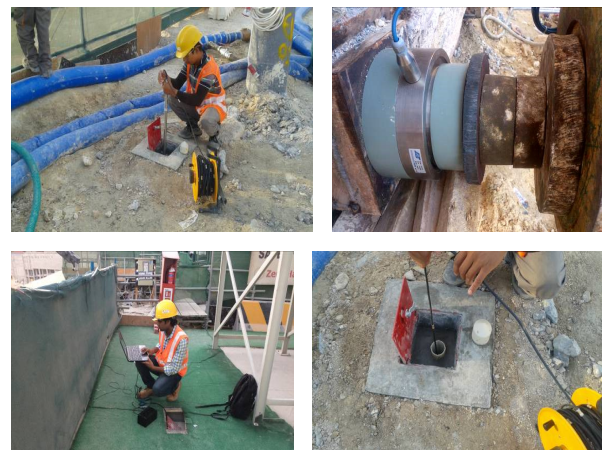
Monitoring solution

Encardio-rite was awarded the I&M sub-contract for complete monitoring and surveying solutions for diaphragm walls, ground anchors, piles, groundwater, adjacent ground and buildings, falling within the zone of influence of Mshereb Station and its west entrance structure.

Turnkey services

- Pre-construction building condition survey.
- Supply of geotechnical instruments, precise survey instruments and targets
- Installation of geotechnical instruments including the drilling works for subsurface instruments and survey targets
- Manual and automatic monitoring
- Optical Surveying-precise levelling & 3D deformation monitoring
- Programming and commissioning of data acquisition systems
- Setting up online web based data management system (WDMS) and maintenance during the contract period
- Spiral test for inclinometer installed in soil
- Daily & weekly reporting with evaluation & interpretation
- Calibration of dataloggers and sensors
- Post-construction building condition survey

Experienced and proficient I&M team of Encardio-rite is providing services for almost 4 years. Monitoring reports included interpretations of variations observed in instrument data, mentioning the factors likely to affect their behavior e.g. construction, dewatering, third party activities etc. were provided to the contractor on a regular basis.



INSTRUMENT USED

- **Inclinometer:** To monitor lateral movements of diaphragm walls, piles and ground around the deep excavation
- **In-place inclinometer (IPI):** Installed in D-wall at critical locations and monitored every two hours automatically to check the lateral movements
- **Vibrating wire piezometer:** Multilevel vibrating wire piezometer were used to monitor ground water pressures around station area at various ground stratum
- **Standpipe piezometer:** Installed in ground around the station's excavation and within excavation to monitor ground water level
- **Surface settlement points:** Installed in soil and pavement to monitor surface settlement around excavation works
- **Building settlement points:** Installed at each building within zone of influence to monitor its settlement
- **Prism targets:** Prism targets and mini-prism targets were installed on critical buildings and D-wall for 3D deformation monitoring
- **Tilt meters:** Tilt plates were installed on critical buildings close to the excavation works. Portable tilt meter was used to record tilt readings
- **Crack meters:** Installed at existing building cracks to monitor variation in crack width during excavation works
- **Load cell:** Installation on ground anchors to monitor load
- **Automatic data acquisitions systems and compact dataloggers:** For automatic monitoring of IPIs, vibrating wire piezometers and load cells.

ENCARDIO-RITE ELECTRONICS PVT. LTD.