



## PROJECT DOSSIER

# DUBAI METRO



## PROJECT OVERVIEW

| Project     | Dubai Metro – Red line and Green Line Contracts |
|-------------|---|
| Location    | Dubai, UAE                                      |
| Client      | Roads & Transport Authority, Dubai              |
| Contractor  | Dubai Rail Link (DURL) consortium               |
| Consultants | Systra- Parsons Corporation JV                  |
| Duration    | 2006 - 2010                                     |

Dubai Metro Project is the longest automated driverless system in the world. It is first urban metro network to run in the Gulf's Arab states. The system has eased the daily commute for thousands of the workers in the emirate. The Red Line and Green Line were the first lines to be operational, completed in 2 phases:

- Phase 1 Red Line (Al-Rashidiya to Jebel Ali): ~53 km long with 26 stations, out of which 5.6 km is underground (tunnels) with 4 underground stations (2006-2009).
- Phase 2 Green Line (Al-Qusais and Al-Jadaf): ~18 km long with 14 stations, out of which 7.9 km is underground (tunnels) with 6 underground stations (2007-2010).

The routes run underground in the city center, from the Sheikh Rashid/Sheikh Khalifa Bin Zayed intersection to Salahuddin/Abu Bakr Al Siddique intersection on Red line and from Garhoud to Oud Metha Road on Green line. The underground works have been carried out without affecting buildings in the zone of influence. A good instrumentation and monitoring plan was designed to meet the purpose.



## Monitoring solution

Encardio-rite was awarded the I&M sub-contract for the complete monitoring and surveying solutions by DURL consortium consisting of Mitsubishi Heavy Industries, Mitsubishi Corporation, Obayashi Corporation, Kajima Corporation and YapiMerkezi. The monitoring solutions were provided for under ground stations, tunneling sections and structures falling within the zone of influence of the Red and Green Lines.

### Turnkey services

- Supply of geotechnical instruments
- Installation of geotechnical instruments including the drilling works for subsurface instruments
- Monitoring and Optical Surveying
- Daily, weekly and monthly reporting with evaluation & interpretation
- Calibration of dataloggers and sensors

Reports included progress charts that gave tunnel excavation details w.r.t. monitoring data. A typical graph given below shows location of TBM head with respect to SS points monitoring arrays and buildings having instrumentation.

## INSTRUMENT USED

- **Inclinometer:** Installed in ground behind diaphragm wall, in diaphragm walls and in monitoring arrays across tunnel alignments to monitor lateral movement due to excavation and tunneling works
- **Standpipe piezometer:** To monitor ground water level around the station area and in monitoring arrays across tunnel alignments
- **Magnetic extensometer:** To monitor subsurface settlement occurring at various depths due to excavation and tunneling
- **Strain gages and load cells:** Installed in struts to determine stress/load while preloading and during course of excavation when load likely to vary due to surrounding soil pressure
- **Surface settlement points:** Installed in soil and pavements to monitor surface settlement around excavation works and across tunnel alignment
- **Building settlement points:** Installed on structures/buildings within ZOI to monitor settlement
- **Tilt meters:** Tilt plates installed on walls, floor slabs, supporting frames to monitor uniaxial or biaxial rotation or angle of tilt of buildings and structures within ZOI
- **Crack gages:** Installed across existing cracks of buildings and structures near construction activities to determine any change in crack width due to settlement in ground induced by construction works

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



## ENCARDIO-RITE ELECTRONICS PVT. LTD.