

Delhi Subway and Mass Rapid Transport System MRTS, Delhi, India

Consultancy and design services for twin bored tunnels, cross passages and underground stations, contracts BC-24, CC-27 and CC-32.

Scope

■ Contract BC-24:

Consultancy service for the design for twin bored tunnels, total route length 4.1km plus associated cross passages.

■ Contract CC-27:

Consultancy and design services for the construction of 5 underground stations (cut & cover) plus twin bored tunnel, total route 5.0km, crosspassages and cut and cover tunnels.

■ Contract CC-32:

Consultancy and design services for the construction of 2 underground stations (cut & cover) plus twin bored tunnel, total route 3.4km, crosspassages and cut and cover tunnels.

Challenges

- Varying stability of ground formation.
- Tunnel above groundwater, coverage 3 25m

Amberg Services

- Preparation of geotechnical interpretative report
- Design for segmental tunnel lining with earthquake loading.
- Design of temporary and permanent lining of mined cross passages including temporary bracings in the running tunnels
- Same for ventilation passages/intervention shaft
- Prediction of ground settlements & influence area
- Proposal ground treatment/soil improvement work
- Site supervision all tunnelling works, assistance to client during entire tunnel construction period.





■ View of drilling head of the EPB-TBM



View of construction site



View of tunnel after completion of structural works

AMBERG FACTS

Contracted value of Amberg

■ Total USD 3.32 Mio.

Project phases & Duration

Contract BC-24
Contract CC-27
Contract CC-32
Aug. 2007 - Oct. 2009
Dec. 2012 - May 2016
Jan. 2013 - Apr. 2016

Project details

Contract BC-24:

- Design of segmental tunnel lining (earthquake load)
- Design of lining of mined cross passages including temporary bracings in the running tunnels.
- Design of lining of ventilation passages into Intervention Shaft (IVS) and design of lining for shaft.
- Site supervision for all tunnelling works which included provision of designer's representative providing consultation for construction period.

Contract CC-27:

- Preparation of geotechnical interpretative report.
- Design of segmental tunnel lining (earthquake load)
- Design of station / tunnel interfaces.
- Design of lining of mined cross passages as above plus sump pits and tunnel drainage
- TBM face pressure calculation.
- Design of TBM cradle, TBM thrust frame, foundation for gantry crane / heavy cranes, etc.
- Prediction of ground settlement including settlement contours within the influence zone of works.
- Building damage Assessment.

Contract CC-32:

- Preparation of geotechnical interpretative report.
- Design of segmental tunnel lining (earthquake load)
- Design of station / tunnel interfaces.
- Design of lining of mined cross passages as above.
- Prediction of ground settlement including settlement contours within the influence zone of works.
- Proposals ground treatment/ soil improvement.

CLIENT FACTS

Overall costs

■ Constructions approx. USC 300 Mio.

Project overview

- Phase 2 and 3 of the Delhi Mass Rapid Transport System
- Tunnels of total 12.5km length, subsurface stations, cross-passages and auxiliary structures
- Earth pressure shield TBM, EPB
- Single shell segmental lining

Geology

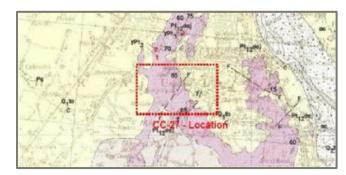
- Older Alluviums (sandy,gravelly,clayey silt)
- Bedrock Quarzite, moderately to highly weathered, occasionally fractured to completely decomposed



CHALLENGES



■ Photo of urban area at site, contract BC24



■ Geological profile at location of CC-27 contract



■ Geological profile at location of CC-32 contract

ENGINEERING APPROACH



■ Earth pressure shield type TBM



■ Cross-passage construction in progress, CC-27



■ Temporary rings at launching shaft, CC-32

TECHNICAL SOLUTIONS



■ Erected segmental tunnel lining, contract BC-24



■ Completed bored tunnel, contract CC-27



■ Bored tunnelling in progress, CC-32

