Implenia

Reference

Extension of Métro Ligne 11, Lot GC01, Rosny-sous-Bois, Paris

SHORT DESCRIPTION

The “Grand Paris Express” project aims to improve links between the French capital and the neighboring residential areas in the Greater Paris region (Île-de-France) by building a transport network of six driverless underground railway lines by 2030. The project will require 210 km of tunnel and nearly 70 new underground stations. It also comprises the extension of the existing line 11 from the station “Mairie des Lilas” in direction to “Rosny Bois-Perrier” in the east of Paris realized in three phases (GC01, GC02 and the viaduct).

THE PROJECT

The lot GC01 includes the construction of a 3 km tunnel, a 200 m long open trench (box section) and the 4 stations Liberté, Place Carnot, Hôpital Nord and La Boissière (two of them excavated traditionally and two in open trench method with diaphragm walls) plus the construction of various annex buildings (three ventilation shafts). The underground stations are excavated in conventional method with two side wall drives, followed by the excavation of the crown and finally by the excavation of the invert and the slab.

Implenia is responsible for the technical lead of the tunneling works on the lot GC01 together with Pizzarotti. The 3 km tunnel is driven by an EPB-TBM with an excavation diameter of 9.15 m which started at the newly built station “Liberté”. The tunnel’s single lining is built with 1.5 m wide and 40 cm thick precast segments. 6+1 segments form a ring with an inner diameter of 7.95 m. A total of 12,000 segments are produced for GC01. Implenia also performs the structural works for the four underground stations Liberté, Place Carnot, Hôpital Nord and La Boissière (main installation plant).

The geological and hydrological conditions required ground improvements and injections, too.

SERVICES IN DETAIL

3 km of tunnel with an earth pressure tunnel boring machine (diameter = 9.15 m, excavated section = 65.8 m^2) with voussoirs (inside diameter = 7.95 m, 1. 5 m wide, 40 cm thick, one ring = 6+1) 200 m of covered trench 4 underground stations (100 m long, 20 m wide, 26 to 30 m deep), 2 stations are dug in traditional way and 2 with shaft and diaphragm walls (1.2 to 1.5 m thick and 30 to 41 m deep) Station sections : Liberté 7,036 m^2 (10,124 m^3); Place Carnot 5,363 m^2 (8,044 m^3); Hôpital Nord 7,286 m^2 (8,743 m^3); Boissière 6,299 m^2 (7,093 m^3) 3 ventilation shafts

CHALLENGES

Changing amounts of clay and gypsum in the marl layers are leading to layers with low permeability and differing pore pressures as well as swelling layers. Cutting through geological interfaces and swelling layers requires permanent regulation of the face-pressure and balancing of the earth pressure of the TBM.

FURTHER INFORMATION

Implenia on site
Implenia France SA - Infrastructure
237 Avenue Marie Curie
Archamps Technopole, Immeuble Alliance Bât C
F-74160 Archamps

Scope of works
Technical leadership tunneling (with Pizzarotti)
Participation on consortium 25 %

Performed services
Tunneling works

Construction methods

- EPB-TBM drive (length = 3 km, 9.15 m diameter, cross section = 65.8 m^2) with segmental lining (internal diameter = 7.95 m, 1.5 m wide, 40 cm thick, ring = 6+1)
- Open trench method, L = 200 m
- 4 underground stations, conventional excavation and with shaft and/or diaphragm walls, L = 100 m, W = 20 m, 25 ⊠ 30 m depth
- Three ventilation shafts

Geology
Clay and gypsum marl, limestone

FACTS

Location	Paris , France
Status	Under construction
Construction volume (value of our services)	267 M EUR
Start of construction	December 2015
Completion	December 2020
Project management	Client: Régie autonome des transports parisiens (RATP); Planner: Groupe ARS; Consortium: Implenia France SA, NGE GC, Demathieu & Bard, Pizzarotti;
Overall length	3200 m
Cross-sectional area	65.8 m^2

SERVICES

Tunnelling

Transport tunnels

https://implenia.com/en/references/detail/ref/extension-of-metro-ligne-11-lot-gc01-rosny-sous-bois-paris/

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