

# EXTENSION OF LINE 3 OF THE MADRID METRO - STATION 3

MADRID - SPAIN



## Construction of an underground metro station



General view of the site

**R**odio was involved in work on Station no. 3, as part of the extension of Line 3 of the Madrid metro, between stations Legazpi and Villaverde Alto.

The work consisted of constructing 1m thick diaphragm walls to a maximum depth of 38m. The ground conditions encountered were:

GENERAL CONTRACTOR:	FCC CONSTRUCCIÓN, S.A.
SPECIALIST CONTRACTOR:	RODIO CIMENTACIONES ESPECIALES, S.A.
CONSTRUCTION PERIOD:	2005

### WORKS QUANTITIES:

10,403 m<sup>2</sup> of diaphragm walls 1m thick, excavated with a hydrofraise rig

- between 0.00 and 2.00 metres : fill,
- between 2.00 and 10.00 metres : sand and/or clean gravel,
- between 10.00 and 20.00 metres : carbonated clay,
- 20.00 metres and more : clay + gypsum (the gypsum content increased with depth).

Apart from a few perched watertables, groundwater elevation was below the maximum depth of excavations.

A hydrofraise was chosen for the diaphragm walls of the project instead of using mechanical grab. This was accepted as there were three factors that seriously compromised the use of more conventional techniques:

- the depth of excavations (38m) which meant the gypsum was hard.
- the lack of space; the site was located on the avenue de Andalucía, a two-way thoroughfare where traffic continued uninterrupted. The space available was therefore that reserved for the station: 100m in length and 25m in width.



General view of the site



Steel reinforcement



Hydrofraise excavating a D.W. panel

- the completion deadline (3 months) would have required the use of several excavation mechanical rigs.

The hydrofraise rig therefore proved to provide the only practical solution:

- Fewer cranes on a narrow site,
  - No trucks needed for the spoil, which was pumped out to the treatment plant located out of the site,
- and the work was completed on time.