

# Madrid Metro (Spain)

## TBM Excavation

### Jet Grouting

<b>Project:</b>	“Metro Norte” Development. 2B package
<b>Scope:</b>	Soil improvement for settlement protection produced by TBM excavation
<b>Property:</b>	CRTM (Consortio Regional de Transportes de Madrid)
<b>Client:</b>	OHL
<b>Year:</b>	

#### Description:

The soil improvement treatment executed by Jet grouting type I, was carried out to avoid possible terrain settling brought about by the TBM ground excavation during the execution of the metro tunnel. For that reason, Jet grouting columns with inverted V shape, were deployed in almost the whole surface to be treated, the only modification applied being the inclination of the columns.

A number of tests were carried out prior to the execution of the works, to ensure that the appropriate parameters influenced by the ground conditions were taken into account.

The soil treatment was executed in one of the main streets of “San Sebastian de los Reyes” in Madrid and therefore the works schedule had to be carefully planned in order to reduce interference with the street's daily activities to a minimum.

#### Summary of site characteristics

- 13.395 lm Jet Grouting drills
- 10.222 lm Jet Grouting injection
- 0° to 15° Drill angle inclination
- 18,5 m Maximum drilling length
- 400 to 550 mm Diameter section



(1) FYM M (Spain) Madrid JG Linea 2B