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ITC NEWS

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Extension of the Parisian Metro line 4 between Porte d'Orléans and the station Mairie de Montrouge, Top heading with Perforex system



Fig. 1 : ITC 312H6 in the clay and ballast of Paris

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M4 to Montrouge: 430 m with Perforex

From Pascal Graindorge – 24.10.08 – BTP magazine

The extension of the metro has a minimum influence on the neighbour hood life. After ditching and covering the jobsite there will soon follow the Perforex system for starting the main tunnel. The RATP will build with the extension of the southern part of the Metro line 4 one station in Mairie de Montrouge and two others till Bagneux. In the first project stage the tunnel will be excavated on a length of 1470m: 817m until the Mairie and 653m until the end station. Task 1 includes the main railway and the connections between Porte d'Orléans and the station Mairie de Montrouge. The project was accorded to three companies of the Fayat group and to Solétanche Bachy. Task 2 concerns the station and the tunnel behind the main station which was accorded to another group of companies, Razel and Biffinger Berger. Bernard Bizon, at the same time technical director for mining from Bec Frères and director of the project Task 1, explains: « The first stage includes the special work with the consolidation of the limestone between the existing tunnel by the station Porte d'Orléans and the Boulevard ringroad. We have hollowed the existing gallery for constructing an access ramp on the soil filled hollows. In the section of the future tunnel the rock was strengthened with mortar – adhesive cement-based – to a hardness of approx. 10 MPa. A big part of the tunnel was treated like this since the beginning on 11th February

2008. To conclude – by exploring the rock we have discovered many chambers and galleries which were not mentioned on the cartography.

Perforex system for the main gallery

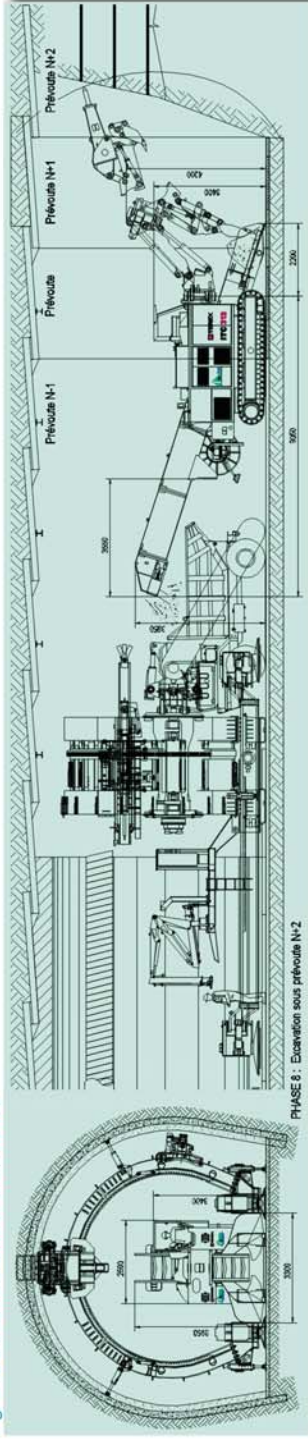
The jobsite is anxious to follow the safety instructions. « The existing chamber, used for special work, will be used for the passenger traffic. In the shaft of the main tunnel of the metro there will be a new chamber only for the material handling», explains Bernard Bizon.

The work in the main gallery will be effected on a length of 430m with the Perforex system and begin 46,82m south of the main entrance to achieve the future station Mairie de Montrouge. This special system, widely searched by Bernard Bizon during his career, was invented by the company Perforex and afterwards bought by Bec frères. RATP was looking for a safe solution – the lines are passing only 4 m under the highway and several buildings of the Montrouge – and determined this solution because with this system the settlement of the ground is much less than with other systems (only a few millimeter monitored).

More precisely is this machine performing two successive jobs. First a kind of chainsaw excavates the material with a thickness of 20 to 30 cm, a width of several meters and a length of 4 to 5 meters out of the subgrade. 20 to 25 minutes later another work equipment throws concrete against



Fig. 2: Common installation in the tunnel



PHASE 6 : Excavation sous prélevate N-2

it to fill up the open cracks.

The individual built pre-arches are cone shaped to assure a constant arch-section. This system allows building curved tunnels. The assembling of the machine and the starting up is planned for February 2009.

The jobsite is working with the Heading- and Loading machine ITC 312H6. In the beginning this machine was delivered with the work equipment H1 but because of the hard clay the machine was converted to a H6. It is the ideal machine for this

Group of companies:

Subgroup engineering:

Bec Frères (contractor), Urbaine de travaux and Solétanche Bachy Tunnels

100 to 120 persons, thereof 20 cadres until autumn 2010

169,119 M€: total costs of the jobsite, there from 35,7 M€ for Task 1.

150 000 m³ excavated soil
Up to 40 000 m³ and 2200 tons of steel are transported underground to actualise the work

Main Data	ITC	312 H6
Basic machine Schaeff , Type	mm	2400
Width of basic machine	mm	770
Inside width of conveyor	kW	90
Electric drive, Power @ 400 Volt, 50 Hz	km/h	0-3,6
Tramming speed	m/s	0,5
Conveyor chain speed	m ³ /h	250
Conveying capacity	kp/cm ²	1,0
Specific ground pressure	kN	280
Pulling force	t	35
Global weight approx.		



Fig. 5: Perforex Machine



Fig. 4: Detail of the geological strata



Fig. 3: Heading machine ITC 312 H6 on heading face



Fig. 6: Rock breaking in the hard clay



Fig. 7: ITC 312 with swivel cabin



Fig. 8: ITC 312 by loading



Fig. 9: ITC 312 by sole cleaning



Fig. 10: ITC 312 by breaking with hammer



Fig. 11: ITC 312 with work equipment H1, working with bucket

Fig. 12: Swivel cabin right respective left



TUNNEL HEADING and LOADING MACHINE SCHAEFF Type ITC 312H6

Fig. 13: Heading in the tunnel

