

Tunnel upgrade

Jet grouting

RER C - 2007 AND 2008 CAMPAIGN

PARIS - FRANCE



Underpinning a railway tunnel with simple jet columns



View of the tunnel after removal of the rails and ballast

Every year, during the summer, the Réseau Ferré de France undertakes renovation work on the RER line C. This programme of maintenance works has been given the name "Castor". The method adopted to underpin the tunnel foundations consists of installing jet grouting columns below the tunnel invert and under the side walls. Solétanche Bachy has been working on the project since 1997.

CLIENT:	RÉSEAU FERRÉ DE FRANCE
DESIGN AND CONSTRUCTION SUPERVISOR:	SNCF
PERIOD OF THE WORKS:	2007 AND 2008

MAIN QUANTITIES:

2007 campaign

- Jet grouting: 950 columns, including :
 - 666 under the slab, 4,20m depth
 - 284 under the side walls, 7m average depth

2008 campaign

- Jet grouting: 384 columns, including :
 - 220 under the slab, 4,20 depth
 - 164 under the side walls, 7m average depth





View of the tunnel with drilling rigs in action



Producing a jet grouting column under the side wall

Jet grouting technic used for RERC

In order to construct columns at least 1,30m thick and 5MPa resistant, the chosen system was simple JetPlus®. The columns are constructed in split sequence: primary, secondary and tertiary.

The process is constantly monitored by recording drilling and jet pressure settings, followed by specific checks on column diameter either by means of core drilling or by Cyljet®, a method developed by EDG, a Solétanche Bachy subsidiary.

Organisation matters

A 5 week period is allocated during which rail traffic is completely suspended. These works require the deployment of a faultless organization including teams that will work 24 hours a day without inconveniencing the neighbourhood.

The slurry plant and pump for jet are located on the embankment of the river Seine. Equipment set up in the openair, such as pumps or compressors, are soundproofed.

River barges are used to supply cement and remove spoils. Solid waste is stored on big-bags inside the tunnel and then removed during the night to skip outside the tunnel or by work trains.

2007 campaign

The two sections to be upgraded (400m of tunnel) were located next to the Saint-Michel Notre Dame station. Approximately 300 persons were mobilised for the successful completion of these works.

2008 campaign

The section to be upgraded (130 m of tunnel) stretched between the Ecole des Beaux-Arts to the Musée d'Orsay. 120 persons worked on this site.



Site on > the Seine quay