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ROCK - SOIL TECHNOLOGY AND EQUIPMENTS

PACCHIOSI DRILL

UNDERPINNING

SABADELL (BARCELONA - SPAIN)

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PROJECT:

Consolidation of the structural wall along the "Ronda de Santa Maria" road.

PERIOD OF EXECUTION:

April – July 2001

CLIENT:

Municipality of Sabadell

Fig. 1. VView of the wall before the works.

Fig. 2. View of the consolidated wall.

Lithology.

Deposits of fluvial origin consisting of silty clays and sandy gravels.

Purpose of the work, difficulties encountered and solutions applied.

The need to improve urban traffic conditions in the city of Sabadell induced

the Authorities to widen a city road called Ronda de Santa Maria.

The works included construction of a structural retaining wall for elevation of the road, with a length of about 105 m, consisting of prefabricated panels fastened to a crossbar in reinforced concrete. A year after completion of the works the paving broke and sank and the wall showed signs of rotation and cracking of some of the panels. This forced the Authorities to close two of the four lanes and undertake geotechnical studies, which gave the following results:

- a the wall foundation soil consisted of silty clay, with geotechnical characteristics of very poor quality;
- a the foundation materials for the new road bed were of extremely poor quality, consisting of clay, masonry waste, plastic material, etc.;
- a the drainage system was insufficient.

It was therefore decided to undertake works to consolidate and restore the structure, proceeding in two operating stages:

- a removal of the foundation soil of the roadbed to the level of the crossbar in the wall, and replacement with appropriately selected sandy materia;
- a consolidation of the wall foundation soil and strengthening of its structure.

Fig. 3.Test field column.

Intervention for consolidation.

The works of consolidation were carried out using **Pacchiosi Jet Grouting System 1 (PS1)**, tested with the performance of a field trial (Fig. 3) to optimize the injection parameters relative to the soils to be treated.

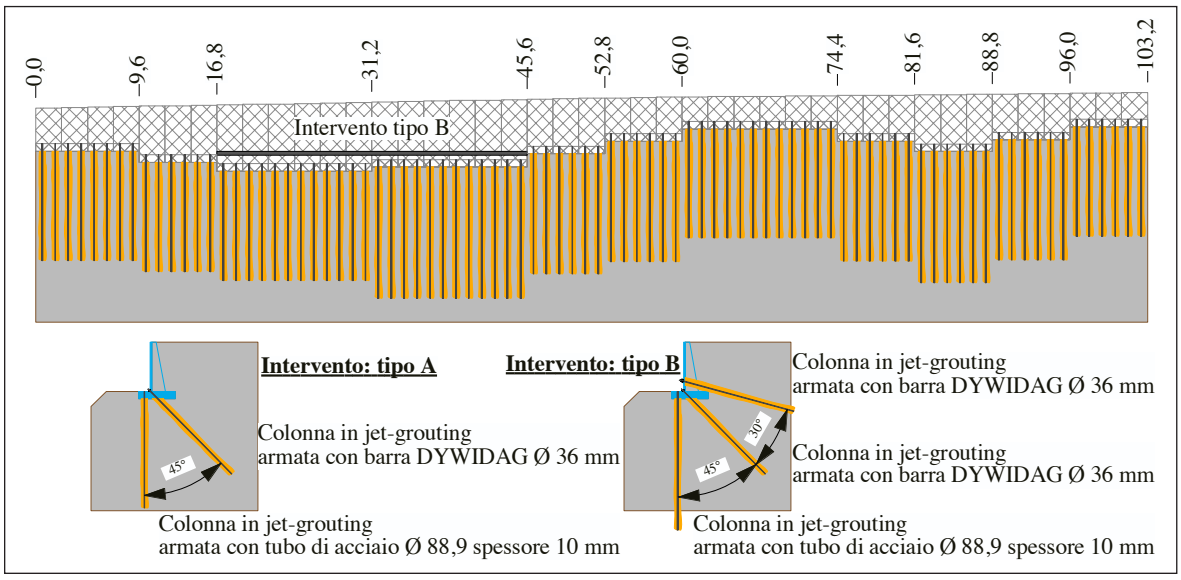

Fig. 4. Cross section of works.

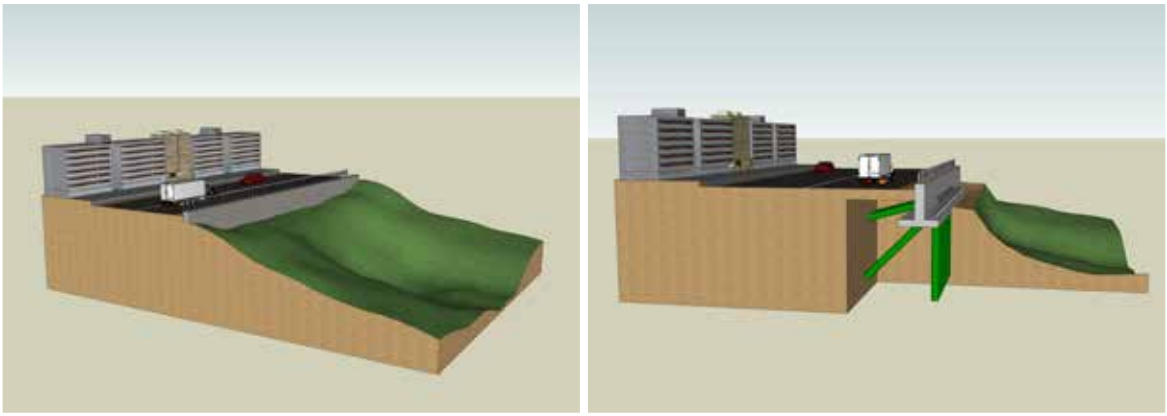

Fig. 5. Ricostruzione 3D dell'intervento.

The works were divided into three separate stages (Fig. 4):

- a anchorage of foundation beam;
- a consolidation of foundation beam soil;
- a consolidation of fissured panels.

1. Anchorage of wall foundation beam.

The treatment was performed with a row of Jet Grouting columns tilted at a 45° angle, variable pitch, reinforced with a Dywidag passive tie rod (diameter 36 mm), 11 m long, diameter 700 mm (Fig. 6 - 7).

Fig. 6. PRP 105 drill rig during the anchoring of foundation beam.

Fig. 7. Detail of intervention.

2. Consolidation of foundation soil for the wall beam.

The treatment was done with a row of vertical Jet Grouting columns, spaced every 1.20 m, reinforced with steel tubing (diameter 88.9 mm, thickness 10 mm), lengths from 10 to 12 m, diameter 700 mm .(Fig. 8).

3. Consolidamento dei pannelli del muro interessati da fessurazioni.

Treatment consisted of a row of Jet Grouting columns tilted at a 15° angle, with a spacing of 1.20 m, reinforced with a Dywidag passive tie rod (diameter 36 mm), length 11 m, diameter 700 mm (Fig. 9).

Fig. 8. PRP 105 durante il consolidamento delle fondazioni.

The works were completed by laying two load-sharing beams (HEB 140), along the section involved in cracking, one above and one below the row of tie rods (Fig. 9 and Fig. 10). The load transmitted by the plates positioned on the anchorages was distributed on the beams.

All perforations were preceded by core sampling of the reinforced concrete of the beams and wall panels. Treatment was completed with the construction of a series of drainages just above the wall beam.

Fig. 10. PRP 105 drill rig during consolidation of the foundations

Fig. 9. Detail of load-sharing beams.

Fig. 11. View of the consolidated wall.

Fig. 12. View of installations.

Fig. 13. Laser 1700 C pump.

Fig. 14. MA 250 turbo-mixer.

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