



Construction of an additional parking basement with jet-grouting

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Summary

This paper shows a case in which superjet grouting has been used to improve soil strength and passive earth pressure at the toe of a diaphragm wall. This treatment had made it possible to excavate deeper than planned, i.e., from -14,00m to -17,35m, in order to enlarge the car park of a building in Seville from four to six floors, when the diaphragm walls were already constructed.

Keywords: Diaphragm wall, excavation, anchor, blue marls, jet-grouting, improving soil strength.

1. Introduction

A building with four basement floors for car park had been designed [4] to be built in a urban site in the city of Seville (Spain), very near the Guadalquivir river.

Diaphragm walls were designed around the perimeter of the building site for earth retaining and waterproofing, so that the excavation could be done.

Excavation was to reach a depth of 14,00 m, and the structural calculation of the diaphragm walls was carried out -and the diaphragm walls built- with the additional depth of un-reinforced concrete needed to provide a seepage cut-off.

Subsequently, the design was modified and the number of underground floors was increased so that the excavation depth should increase to 17,35m.

Diaphragm walls, already designed and constructed, were not able to resist the earth pressure that the new excavation depth for the six basement floors would originate.

In order to solve this problem some ideas were set out. Finally it was considered that the most suitable solution could be to carry out a superjet grouting treatment in the soil located in front of the toe of the diaphragm walls [1].

2. Soil stratigraphy

Boreholes drilled for the study of the soil and penetration tests, along with laboratory tests were used to characterize the soil material, so that soil stratigraphy could be known.

The following approximate stratigraphy could be established for the building site:

- From 0 down to 4,5 m deep, sandy-silt fills.
- From 4,5 down to 15 m deep, quite dense sands.
- From 15 down to 20 m deep, gravel and sand.