

**CONSTRUCTION OF EMBANKMENTS STABILIZED WITH LIME IN THE SITE
DEVELOPMENT WORKS ON THE U.Z.P.2.01 “EL CAÑAVERAL” SITE.
USE OF MARGINAL MATERIAL PRESENT ON SITE.
SUSTAINABLE CONSTRUCTION**

S. GANCEDO & E. WILT
División de Desarrollo Urbano, TYPSA, España
SGANCEDO@TYPSA.ES

ABSTRACT

During the process of urban growth, areas where soils were richer were generally occupied first, not only because of their location but also because of the quality of the materials present in the area, which can be used in the construction of roads in the new town.

In the case of Madrid, sectors in the north, on land with good geotechnical characteristics, were developed fairly hastily, while the areas in the south east, located in areas of gypsum and expansive clay, were not developed as quickly. This was partly due to the high economic repercussions generated by the use of alternative material and the need to take material present that could not be used in the construction to dump sites.

U.Z.P. 2.01 El Cañaveral is a 538 ha sector in the south east of Madrid, with 40 km of roads. At the design stage of the site development, techniques were considered that would enable materials present in the area to be used in the construction of urban road embankments.

The project's main aim was the complete re-use of materials present in the area. The site had a surplus of soils, and materials present were classified as marginal according to Spanish regulations (PG-3).

The location of the best quality marginal material was taken into consideration in the design, and in the recently completed construction. These materials, characterized as “clay minerals”, need to be stabilized “in situ” with lime, in order to change their characteristics and obtain a material suitable for the construction of road embankments, with sufficient capacity to support future traffic demands.

Lower quality materials found were used for ridges on the perimeter, providing acoustic barriers to solve the problems of noise created by the surrounding roads in the residential area.

The goal was finally met, and excavated materials did not have to be removed from the sector, with the consequent economic saving and environmental improvement, large dumps sites not being necessary. In this way the urban development operation was economically and environmentally feasible.

The volume of earthworks totalled more than 13 million m³. The high volumes moved daily, 30,000 m³ in excavations and 15,000 m³ for the stabilized embankment, enabled high levels of quality to be achieved during construction, with innovative procedures to control layers.

In this paper the activities carried out to build the embankments will be described, including the trial embankments to determine the characteristics of the valid material, the percentage of lime and water to be used in the stabilization, the construction procedure, the machinery used, the thickness of the layers, construction supervision and results of laboratory tests.