Protection of a logistical Railway platform in Zaragoza/Spain
Bridging system with high-modulus Fortrac® Geogrids

Situation

As part of the project carried out in the city of Zaragoza in advance of EXPO 2008, it was decided to construct a large logistik center on the outskirts of the city, so as to relieve the central stations of a major part of the railway cargo traffic.

The new railway complex extended into an area measuring 1,000,000 m² that cut through a zone with chalky materials that are very prone to the appearance of sinkholes.

Solution

In the project phase and to solve this problem, it was decided to sanitize the entire area concerned. This decision called for removal of such a large volume of earth that it was dismissed at the execution phase. The engineering firm INTECSA-INARSA engaged the company HUESKER to devise a solution based on the use of high-modulus geogrids to bridge, in a definitive manner, the voids resulting in the event of such cavities occurring. Conductance of these works was entrusted to a temporary consortium of companies comprising the firms Dragados, Tecsa, Río Valle Construcciones y Obras Públicas and APO S.L. All were completely in agreement with modification of the project since it significantly reduced the period of time needed to carry out this work as well as the costs incurred. To implement a proper design, the baseline data from different geotechnical studies conducted in the zone were used.

The maximum diameter of the expected hole was one meter and it was estimated that a filling with a maximum height of 2.6 meters would go on top of these cavities. British standard BS 8006:1995 was used to implement the design. The advantage conferred by this design method resided in its capacity to predict surface settlements based on...
deformations in the geogrid. The resulting design resistance was around 200 kN/m for a uniaxial bridging effect (load transfer in a longitudinal direction) allowing for a deformation of less than 5% for definitive bridging in the event of breaking.

The Fortrac® R 200/20-30MP geogrid is endowed with these properties; it is made of polyvinyl alcohol (PVA) and polyamide and has an elastic modulus in excess of 4000 kN/m.

Installation

It was calculated that the geogrid anchorage length should be three meters, with this being the length needed to assure total load transfer in a longitudinal direction in the event of a hole occurring. The geogrids were anchored transversally and longitudinally using a number of metal staples. The filling material was spread gradually using layers measuring around 50 cm, while always ensuring that there was no movement of vehicles over the geogrid.

Location of the project: Zaragoza/Spain

Construction firm: Complejo ferroviario Plaza U.T.E

Design: Intecsa-Inarsa

Product: Fortrac® R 200/20-30MP