

Case Study

SECUGRID® HS

Secures Road Embankment over old Mining Area





Fig. 1: Installation of Secugrid® HS by means of a spreader bar



Fig. 2: Coverage with fill material

Challenge

The federal highway B 91 between the cities Deuben and Werschen in Germany is a main road with a collector access to the A9 motorway. The sub-soil risks resulting from former lignite mining activities represent an enormous challenge in the region. Subsidence has occurred regularly in the past.

Solution

In the area of a bridge abutment concrete piles have been combined with wick drains and a geogrid reinforced load transfer platform (LTP) to solve the subsidence problem. In the remaining area of the bridge approach ramp, a combination of wick drains together with a geogrid-reinforced preloading was chosen.

Secugrid® HS from NAUE with a tensile strength of 1200kN/m in main strength direction plays a decisive role in the chosen soil improvement solution.

Geologically the area of Werschen is located in the southern area of the Leipzig lowlands, in particular in the Zeitz-Weißenfels brown coal basin. A comprehensive geotechnical report was prepared prior to the construction works. This resulted in a wide variety of possible soil improvement measures.

Since September 2020, a 180m long section of roadway requires a complex

embankment construction as part of "Lot 3" of the construction works.

To mitigate the risk of mining subsidence causing damage to the new road surface, concrete piles were installed in the area of the planned bridge abutments at a center-to-center distance of 1.6m in combination with wick drains. A 0.5m thick granular drainage layer and the decisive load transfer platform (LTP) have been installed on top of the pile caps. The LTP spans the soft subgrade and transfers loads towards the concrete piles into the firm stratum.

The LTP consists of a Secugrid® HS geogrid and a 0.5m thick granular base course. Secugrid® HS is a laid geogrid made of high-tenacity polyester multifilaments (PET) with an extruded polyethylene protective coating and welded junctions.

In order to ensure the integrity of the LTP, it has been wrapped into a Secutex® nonwoven separation and filtration geotextile. This prevents mixing of varying grain fractions in the transition zone between the granular base course and the in-situ subgrade. The LTP is then covered with embankment fill material and a layer of 0.3m qualified soil improvement as foundation for the unbound layers of the road superstructure.

In the area outside the bridge approach ramp, wick drains were installed

to improve the subgrade in combination with the high-strength Secugrid® HS basal reinforcement geogrid. A temporary 1.5m high pre-load was installed prior to the base course and the roadway superstructure, to accelerate consolidation processes and further reduce post-construction settlement potential. Five horizontal inclinometers were installed along different axes of the road embankment to allow continuous monitoring of long-term settlements of the embankment.

Construction works in "Lot 3" have also utilised Secugrid® geogrids.

Project name:

B91, Expansion of the federal highway between Deuben and Werschen, Lot 3 near Weißenfels (Saxony-Anhalt), Germany

Contractor:

Naumburger Bauunion GmbH & Co. Bauunternehmung KG, Görtschen, Germany

Client:

DEGES Deutsche Einheit Fernstraßenplanungs- und -bau GmbH

Products:

Secugrid® HS 200/200 Q6
Secugrid® HS 1000/100 R6
Secugrid® HS 1200/100 R6
Secutex® 251 GRK 4 C



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