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CASE HISTORY

17 m high wall with an inclination of 80° and green facing, Iserlohn, Germany

PRODUCT	TENAX TT 701 SAMP TENAX LBO 220 SAMP
LOCATION	Iserlohn, Germany
OWNER	Lobbe Holding GmbH & Co
PROJECT	Herold & Köhler, Weimar
CONTRACTOR	Lobbe und Hoy

PROBLEM

In 1997 Lobbe Holding GmbH & Co. planned a new head office building in Iserlohn. The construction site is characterised by terrain which slopes strongly towards the North. The construction site is bounded on the West by a railway line and on the North by the A46 motorway. The difference in elevation between the North and South boundaries is 17 m. The aim of the construction was to protect the new building from the noise of the A46 and to allow a parking area to be placed in front of the building. A flexible and steep wall system which could be adapted easily to the form of the area and to the environment (green face) was requested by the owner and the authorities.

Surface of the construction site
in original condition

SOLUTION

Several different solutions were discussed, designs and calculations were carried out and the most economic solution was to use the locally available recycled material with a pH value of 11.5 and integral TENAX geogrids. The recycled material needed a high chemically resistant reinforcement with a low factor of safety against installation damage. The design according DIN V 1054.100 (partial safety concept) required for the 17 m high wall with an inclination of 80° the following layout:

- TENAX TT 701 SAMP a mono-oriented, integral HDPE geogrid with a vertical spacing of 0,45 m in the lower part and 0,90 m in the upper part as the primary reinforcement;
- TENAX LBO 220 SAMP a bi-oriented, integral PP geogrid as secondary reinforcement.

The inclination system was made with formwork beams, which were anchored with steel elements, shaped like a horseshoe, in every third layer of the construction. Behind the steel formwork a vegetation and erosion control mat was placed and additionally supported with 30 cm topsoil and special seeds for a quick vegetation. Both the primary and secondary reinforcement was installed only in the horizontal plane without any back wrapping. To avoid desiccation at the 80° steep wall a superficial water irrigation system was put in place.

Safety railing and inclination guides

West surface during construction, half complete

West side, completed

CONCLUSIONS

- The construction of geosynthetic reinforced earth embankments with an inclination of 80° and green facing is fundamentally possible and economic.
- When the inclination is between 60° and 80°, special steps have to be taken so that the green facing is durable. A sensible solution is a division between primary and secondary green facing. The green facing must be carefully planned.
- In order to take into account the climatic conditions specific to the natural environment in this place with respect to the selection of plants and design of the green facing, the advice of a biological engineer is always recommended
- Analogous to conventional concrete retaining constructions, geosynthetic earth constructions must be carefully designed and planned. Because of a lack of long-term experience with this method at this time, and the resulting difficulty in predicting the deformation of systems of this sort, a program of deformation measurements is to be recommended.
- From an economical point of view, it is necessary to design with the product-specific reduction factors taking into account the intended fill soil.
- The calculation of this building was worked out in accordance with DIN V 1054-100 (partial safety concept). A comparative calculation in accordance with the summation security concept provided the same results.
- Settlements after one year have been lower than the calculated ones. The vertical settlement after one year was between 20 and 30 mm and the horizontal displacement was not measurable.