

Reinforcement of granular road-bases with Fortrac®-Geogrids

Geogrid-Reinforced Gravel Layer Bridges Over Sink-Hole Federal Highway B 180 near Eisleben, Germany

HUESKER

R E P O R T



The situation:

A section of Federal Highway B 180 more than 20 meters (65 ft.) long at Neckendorf near Eisleben, Germany, is now once more in service after being blocked for years. The roadway was destroyed across its entire width in 1987 by a sink-hole.

The sink-hole is located almost on the road axis and is over 30 meters (95 ft.) deep and 8 meters (26 ft.) in diameter. On the surface the sink-hole opening has a diameter of about 20 meters (65 ft.) which includes the entire width of the roadway and the adjoining shoulder. Although the hole was filled with fill material the danger of a new cave-in due to caverns deep underground still existed. To allow the Federal Highway to put the roadway into operation the opening had to be bridged-over sufficiently to allow no more subsidence than 10 cm (4 inches) over 30 meters (100 ft.) of roadway even under heavy truck trafficking.

The solution:

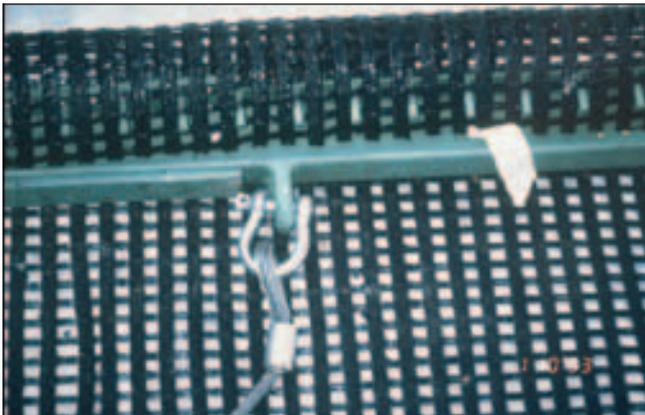
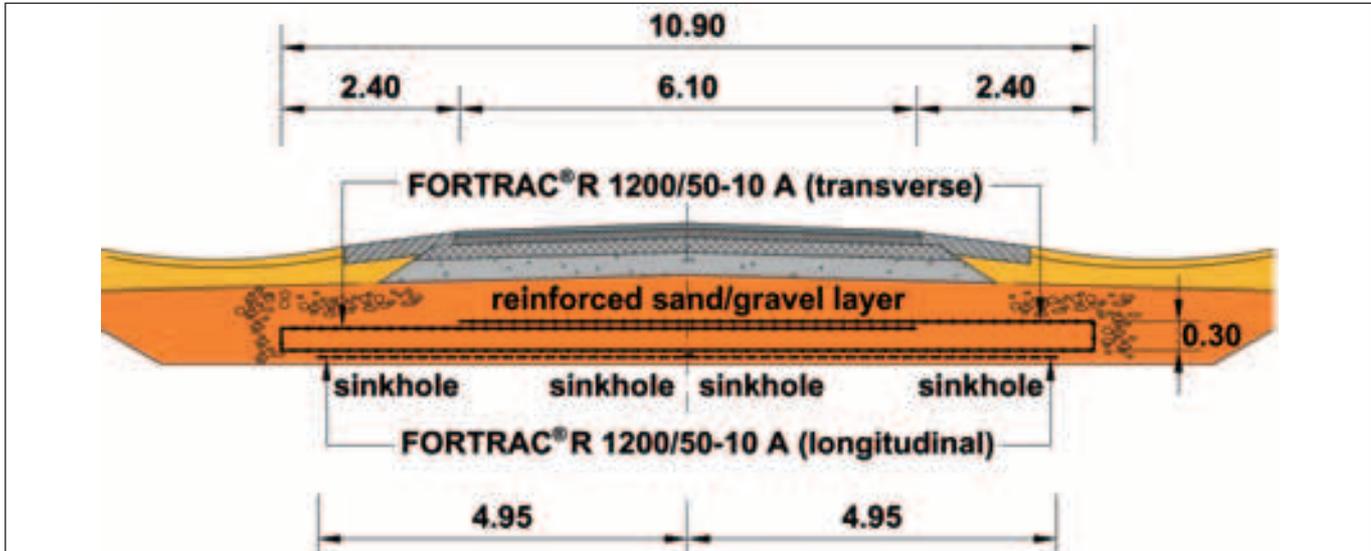
The building sponsor, Straßenbauamt (Department of Road Construction) Sangerhausen, and the planner,



KUHN Engineering GmbH of Leipzig, decided to bridge over the 20-meter (65 ft.) weak section with a geogrid-reinforced gravel/sand layer. The layer was about 60 cm (2 ft.) thick by 60 meters (200 ft.) long, and its approximately 11-meter (36 ft.) width supported the entire road surface. The geogrid reinforcement was installed in three layers. The bottom layer consisted of two 5-meter (16ft.) geogrid strips laid longitudinally side-by-side. The second layer consisted of a transverse geogrid strip, completely encapsulated and overlapped, resulting in a third reinforcing layer. This design provides effective reinforcement against longitudinal and transverse deflection as well as torsion.

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(Note: All dimensions in inches and feet in brackets are approximate, even if not so stated.)



The flexible Fortrac® R 1200/50-10A geogrid is composed of very low-elongation, low creep Aramid fibers with total tensile strength of 1200 kN/m (82,224 lbs/ft) and only 3% elongation. The mesh size is 10 x 10 mm (0.4 in x 0.4 in). The low elongation in combination with the high tensile strength and the good interaction with the sand/gravel mixture guarantees high resistance to subsidence in the event of a new cave-in. The result is an optimal solution from a design engineering and cost point of view. This project is the first instance in which high-tech Aramid geogrids were used in Germany for road construction.

The reinforced layer was prepared within a few days in October 1993 by the firm of Teerbau GmbH.

Project/

Location: Federal Highway B180, Eisleben

Client: Department of Road Construction,
Sangershausen

Constructor: Teerbau GmbH

Year of
construction: 1993

Product: Fortrac®-Geogrids,
Typ R 1200/50-10 A

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