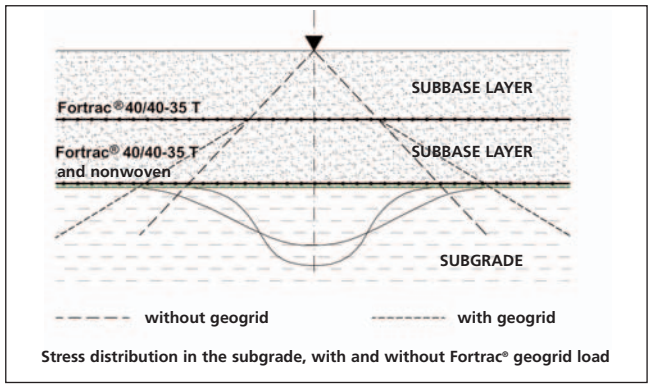
HUESKER
REPORT

Modern Subbase reinforcement with Fortrac® Geogrid successfully replaces old brushwood embankment

Rostock New Market: Rostock Tramway

Track renovation - Rostock Street Tramway AG



Stress distribution in the subgrade, with and without Fortrac® geogrid load

The situation:

In September 1993 the permanent way of the Rostock Tramway, in the Lange Strasse – Steintor section, was renovated by the contractor ARGE Strabag Rostock.

When removing the old and now unusable subbase in the New Market the contractor came across old layers of brushwood, lying about 0.8m below the upper level of the track, which had been placed there as early as the12th-13th century for stabilising the road. Bearing load tests showed that our ancestors had not used this foundation treatment in vain; the bearing strength of the subgrade after removing the brushwood layer was very poor (CBR <2.5%) and in many cases not measurable due to a considerable depth of organic deposits.

The solution:

Almost overnight a solution had to be found to the problem of achieving the necessary bearing capacity at the upper level of the subbase layer without replacing a further depth of the subgrade. After consultation with the local construction authority it was decided to use a geogrid, the modern alternative to the old brushwood layers. A foundation with a double-layer reinforcement was constructed with a geogrid of high-modulus polyester yarn. The **Fortrac®** geogrid selected has a maximum longitudinal and transverse tensile strength of 40 KN/m and a mesh size of 35 mm. It develops excellent tensile strength at low extension and has an extremely low tendency to creep. Interestingly it meets the requirements for tensile strength and extension recently set by the German Railways for permanent way reinforcement.

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Rostock New Market: Rostock Tramway

Project/Location: New market, Rostock

Client: Rostock Tramway AG

Constractor: ARGE Strabag, Rostock

Product: **Fortrac®**-Geogrids, Typ 40/40-35 T

The increase in load bearing capacity results from the development of a supporting structure which forms above the geogrid due to the favourable mesh size compatibility with the foundation material. The resulting stress distribution (see diagram) means that the applied load is borne in a greatly reduced form by the poor subgrade. The foundation stability of the track is thus improved. A precondition is the use of wellgraded subbase material with a high modulus of deformation, which coupled with a flexible geogrid produces a load-carrying platform over the whole area without the formation of surface deformation. Since design information for this use is not yet available the effectiveness of this construction method is usually demonstrated by local evaluation.

In the preceding case, a separation geotextile (nonwoven) had first to be laid on the subgrade to prevent fine material from migrating into the reinforced load-bearing body. The first layer of mesh was laid immediately on top, followed by approx. 250 mm of sand-gravel-crushed stone mixture (0/32). After compaction, the second layer of **Fortrac®** was laid and in turn overlaid with approx. 250 mm subbase with further compaction.

The use of **Fortrac®** geogrid made it possible to compensate for the deficiencies in the bearing strength of the subgrade, and thus ensure the stability of the permanent way. Delay was avoided and construction could be continued without undue extra cost. Apart from its use during construction the geogrid reinforcement has also had a stabilising effect in the operation of the track.

Following the successful results on this site the same method of construction was used in dealing with the similar conditions encountered in the Steintor – Rosa Luxemburg Street section in 1994. Here again, after some two years use by tramway and motor vehicles, there has been no deformation recorded.

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