

Basal Reinforcement with Enkagrid Vác Railway Station

Vác, Hungary

The Vác railway station is one of Budapest's most important suburban railway terminals. To keep up with increasing traffic, its modernization was a priority. Enkagrid MAX and Enka-Tex NW were selected for reinforcement and separation under the railway ballast.



Project owner:
NIF Zrt.

Product:
Enkagrid® MAX 40
Enka®-Tex BS 20 W

Functions:
Reinforcement
Separation
Filtration

Contractor:
Swietelsky Vasúttechnika Kft.

Volume:
15 000 m² Enkagrid® MAX 40
25 000 m² Enka®-Tex BS 20 W

GPS coordinates:
N47 46 57 E19 07 57

Challenge

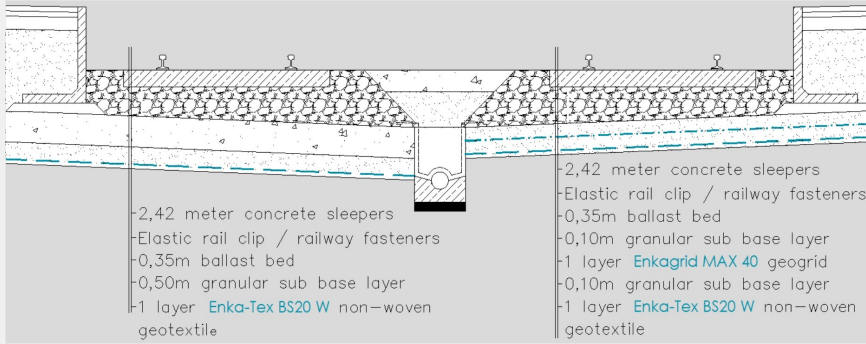
During the design of the Hungarian railway lines in 2014 the designers had to deal with cohesive soils with ineligible geotechnical parameters under the railway superstructures. A similar problem came up at the renewal of one of the busiest railway stations in North Hungary.

The subsoil under the sub base layer did not have enough bearing capacity to carry the heavy dynamic loads from the railway and due to the cohesive subsoils, the designers had to ensure the prevention of the undesirable mixing of granular material with the fine particles.

Solution

- Installing one layer of Enka-Tex BS 20 W nonwoven geotextile under the sub base layer.
- Installing one layer of Enkagrid MAX 40 laser welded biaxial geogrid to reinforce the structure.

The Enka-Tex nonwoven geotextile ensures the separation and filtration functions, while the Enkagrid MAX 40 establishes an effective interlock what will stiffen the soil at the level of the grid creating a composite material reaction what is better than pure tensile force alone.



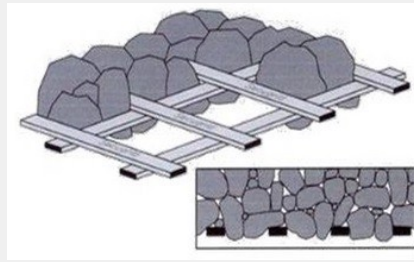
Cross section of the railway superstructure



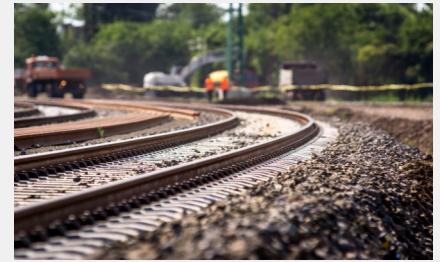
Installation of the Enkagrid MAX 40



Filling the granular sub base material



Interlock will stiffen the soil at the level of the grid creating a composite material



The finished railway structure

Benefits of the solution

Due to the polypropylene raw material of the products they can be used in every natural soil as well as recycled material with excellent durability and installation damage resistance. The Enka-Tex nonwoven minimizes potential track failures which can be caused by the pumping effect (the upward movement of fine particles from the underlying formation) of the railway and ensures long term separation and filtration stability.

The Enkagrid MAX laser welded geogrid exhibits an optimal interaction with most of the granular soils, it can increase the service life of the whole construction, reduces the maintenance costs and the carbon footprint at the same

time. In this current application the Enkagrid MAX 40 provided an immediate increase of the bearing capacity (the tensile strength is 16 kN/m at 2% strain) which enabled the construction of the ballast without increasing the thickness of the sub base layer. Furthermore, the use of these geosynthetics improves the load distribution and provides better settlement equalization in the long term.

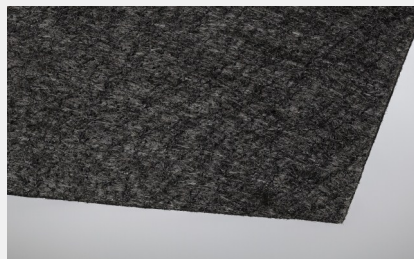
Result

With the aid of the Enkagrid and Enka-Tex products a cost effective and long term reliable structure has been established with faster installation and with lower carbon footprint impact compared to traditional methods.

Products used



Enkagrid® MAX 40
Biaxial laser welded geogrid for soil reinforcement



Enka®-Tex BS 20 W
100% polypropylene needle punched, thermally bonded nonwoven geotextile