



Býčkovice-Týnec

landslide stabilisation by reinforced earth structure

country: Czech Republic

realization: 1999

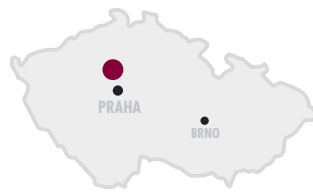
material: Armax® G 35/35

3.500 m²

ARMATEX® G

woven geogrid from high-strength PET with PVC adjustment for soil reinforcement

purpose of usage:
for creation supporting reinforced soil structure with soft facing



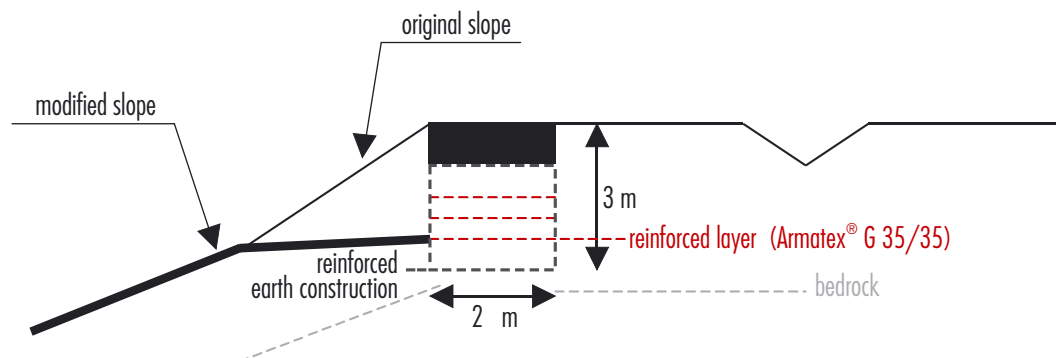
The secondary road between villages of Býčkovice and Týnec near Litoměřice in Central Bohemia suffered an extensive landslide after heavy rainfall in 1998 and 1999. All the area concerned is prone to sliding due to highly plastic clay subsoil overlying mudstone bedrock and erosion of the water stream at the toe of the slope.

The road is constructed at the edge of the escarpment and the drainage conditions (ditches) have gradually deteriorated due to insufficient maintenance. Combination of these factors resulted in above-mentioned landslides that had negative impact on the local transport in the region.

The design office studied four basic alternative solutions:

1. Realignment of the road (shifting the road farther from the escarpment)
2. Stabilisation of the landslide
3. Road reconstruction with the light-weight fill
4. Construction of the retaining wall at the road edge

First three alternatives were rejected because of the high cost. The fourth alternative needed construction of 6m high gravity retaining wall. During the design SG Geotechnika proposed to the Client a cheaper solution-replacement of the concrete retaining wall by reinforced earth structure.



The road near Býčkovice destroyed by landslide (1999)



Reinforced earth structure with green facing (2000)

Kordárna, a.s.

696 74 Velká nad Veličkou 890
Czech Republic

tel.: +420 518 312 400

+420 518 312 407

+420 518 312 433

fax: +420 518 329 240

email: sales@kordarna.cz

internet: www.kordarna.cz



Factory Production Control
Certificate 0799-CPD-19



KORDARNA

A MEMBER OF THE KORD GROUP

The principle of the solution was to integrate the reinforced earth structure into the road embankment body so that it forms part of the road itself. The landslide-deformed section of the road was excavated down to the stable ground (marlstone bedrock) that was not affected by the slope movement. The reinforced earth structure was composed of 2 to 3m wide and 1 to 6m high block of compacted gravel reinforced with polyester geogrid **Armatex® G** at 0,6m vertical layers. The size of the geogrid **Armatex® G** (reinforcement of 35kN tensile strength) opening (30 by 30mm) matched well with the size of the gravel grains 8 to 16mm. Good interaction between the soil and the geogrid is achieved when the grid opening is 2 to 3 times bigger than D₅₀, i.e. grain diameter at 50% on the grain size curve. When this requirement is fulfilled the grains of the soil interlock well in the geogrid and available shear strength of the reinforced earth is at its peak.

The slope face had inclination 1H : 5V. Due to so called "wrapped-around" technique used for formation of the slope a temporary support structure was used in order to keep a good homogeneous appearance of the final slope. The reinforcing grid from bottom of the layer was placed around the compacted soil layer and anchored back into the next layer. This system is called soft facing according to proposal of the European CEN standard. The advantage of this facing is its flexibility, it tolerates high differential settlements and when topsoil with grass seeds are placed near the face the whole structure matches well in the surrounding environment. In our case we used biodegradable geotextiles that incorporated grass seeds. The geotextiles were placed right behind the geogrid **Armatex® G** at the contact with compacted gravel. The slope appearance after the termination of the work is on last picture. In just a few months the grass grew up and the reinforced earth structure is integral part of the natural environment.

The reinforced earth structure was built with small compaction plant and the geogrid **Armatex® G** was placed and stretched manually.

investor:
Ředitelství silnic a dálnic, Liberec

designer:
Vaner, s.r.o. Liberec

judgement:
SG-GEOTECHNIKA a.s., Praha

contractor:
Silnice a mosty, a.s., Česká Lípa

realization:
1999



The road destroyed by landslide



Excavated soil of the landslide with temporary formwork



The landslide-deformed section of the road excavated down to the stable ground



Placing of geogrids. Temporary formwork at the back



Final appearance of the reinforced earth structure

