Highway three-tier surface geogrid reinforced wall - monitoring

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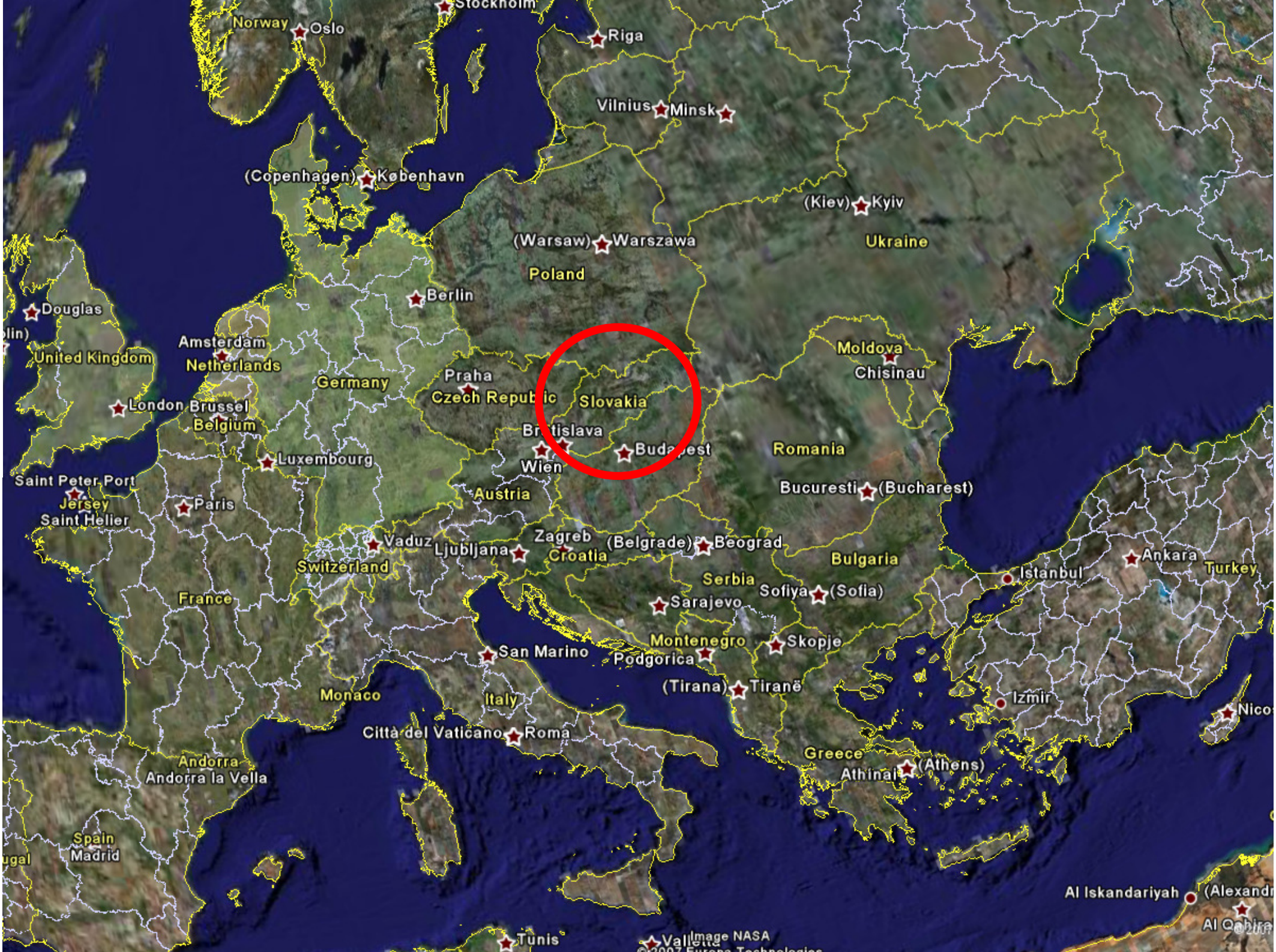
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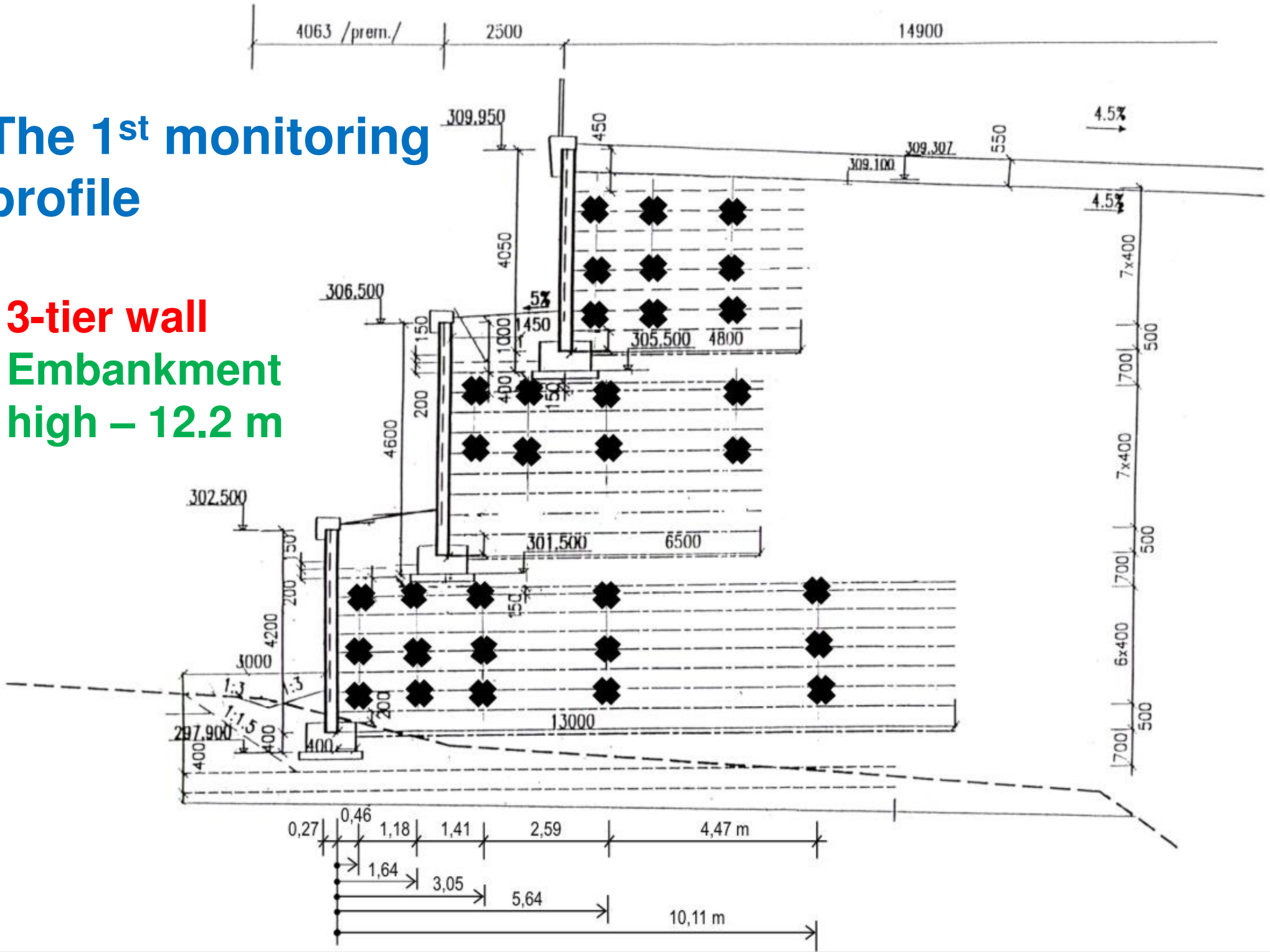
Image NASA

Important parameters:

- Embankment high: 12.0 – 15.5 m;
- The high of tiers: 4.0 – 5.7 m;
- Thickness of compacted soil in embankment: 0.4 – 0.5 m;
- Reinforcing by uniaxial HDPE geogrids type 40 RE to 120 RE;
- Two measuring profiles;
- Monitoring by multi level extensometers installed on all three tiers;
- Distances of cells from concrete face: 0.5 – 1.5 – 6 – 10 m;
- Measuring time: 2001 – 2006;
- Reading of geformation on the airside of the panel in a cover box, using digital T-square gauge with a reading accurancy ± 0.05 mm.

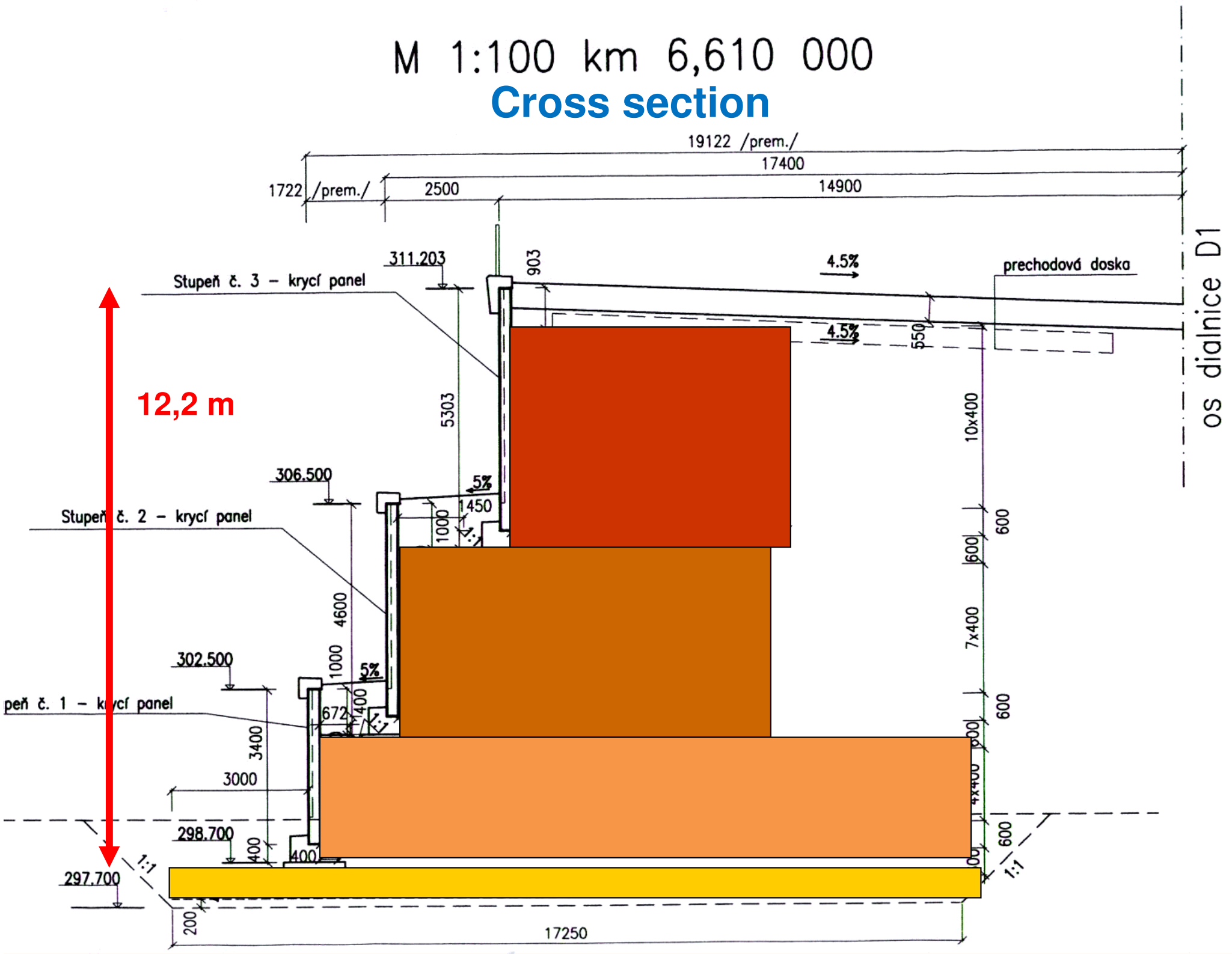
The 1st monitoring profile

3-tier wall
Embankment high – 12.2 m



M 1:100 km 6,610 000

Cross section



max 16,5m

Construction of the first tier

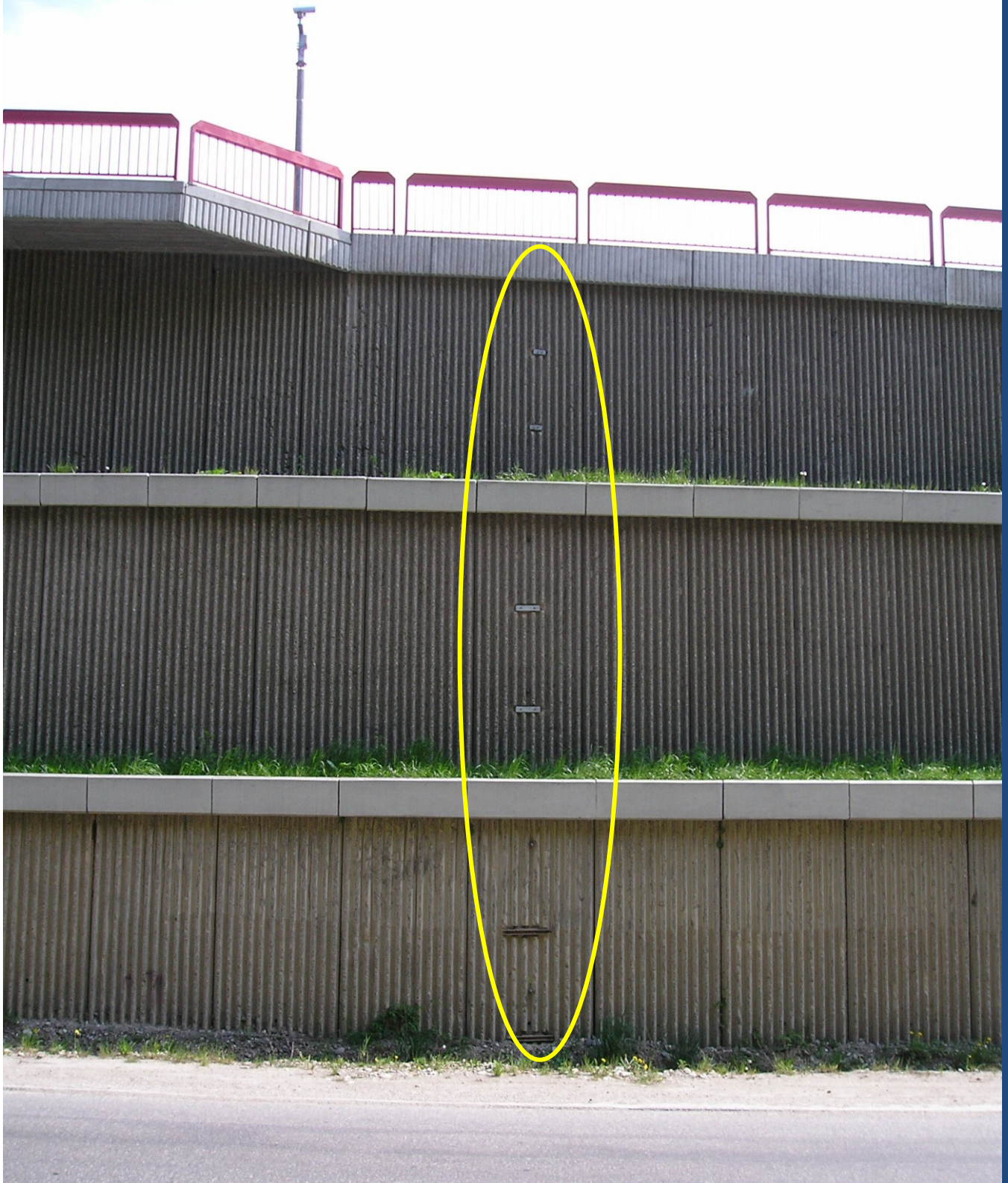
View from the outside

Construction of the first tier

View from the inside

Tensioning of the geogrid to prevent its undulation

Detail of the measuring cell

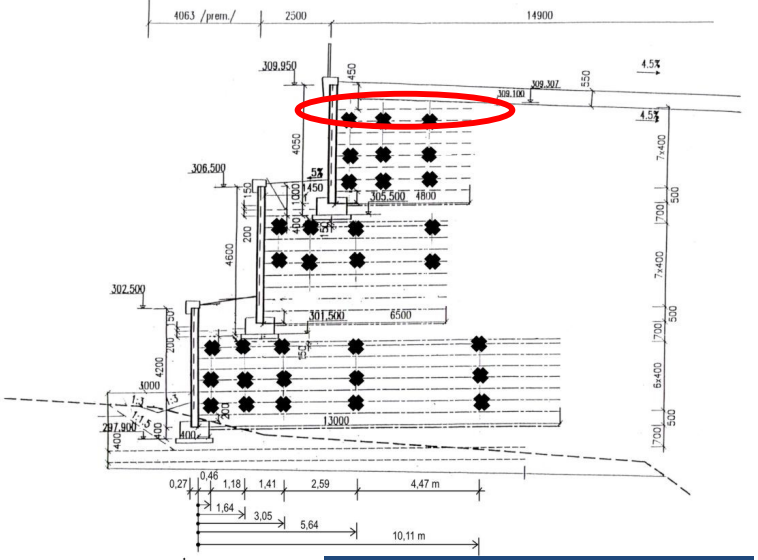


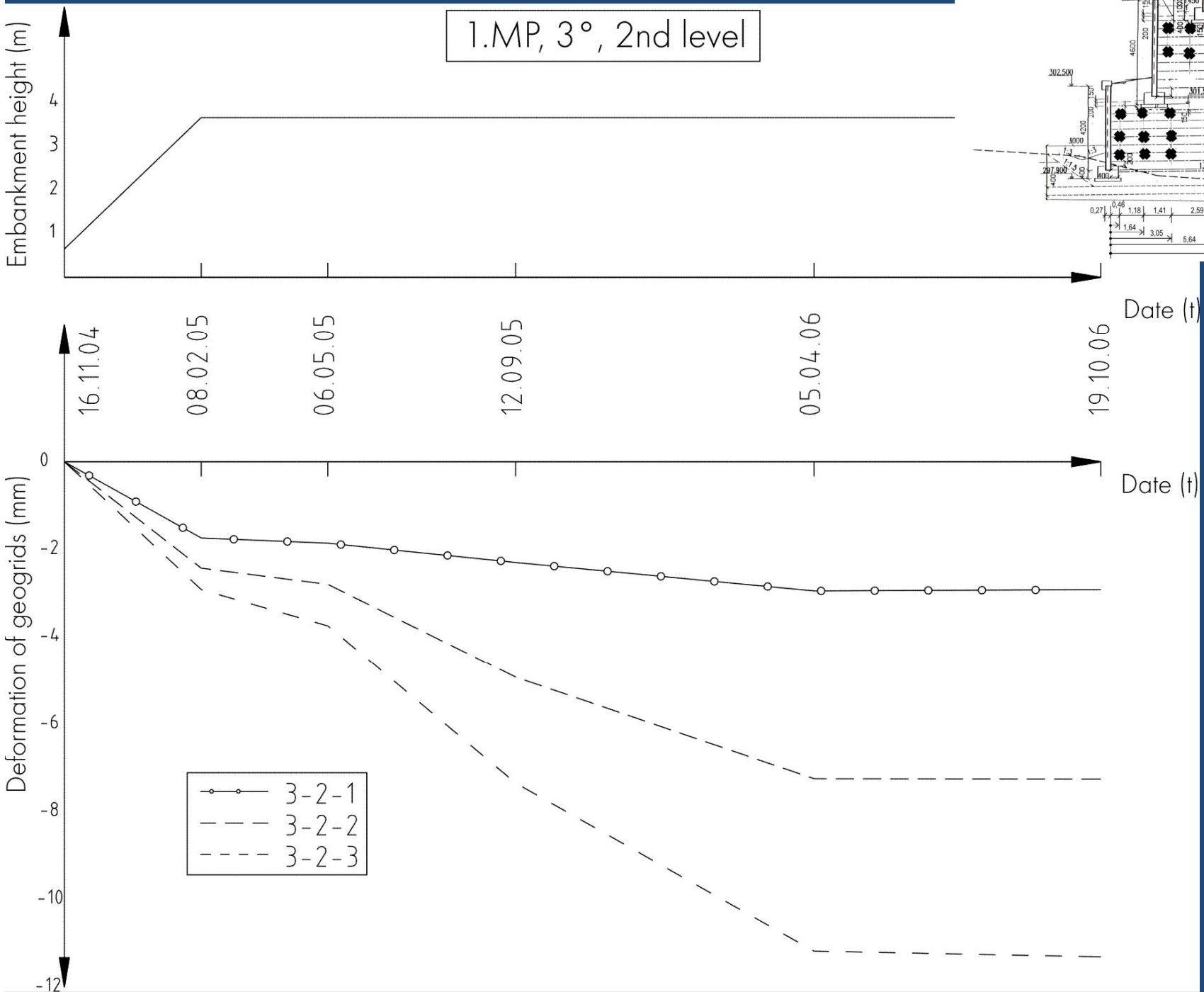
The 2nd monitoring profile

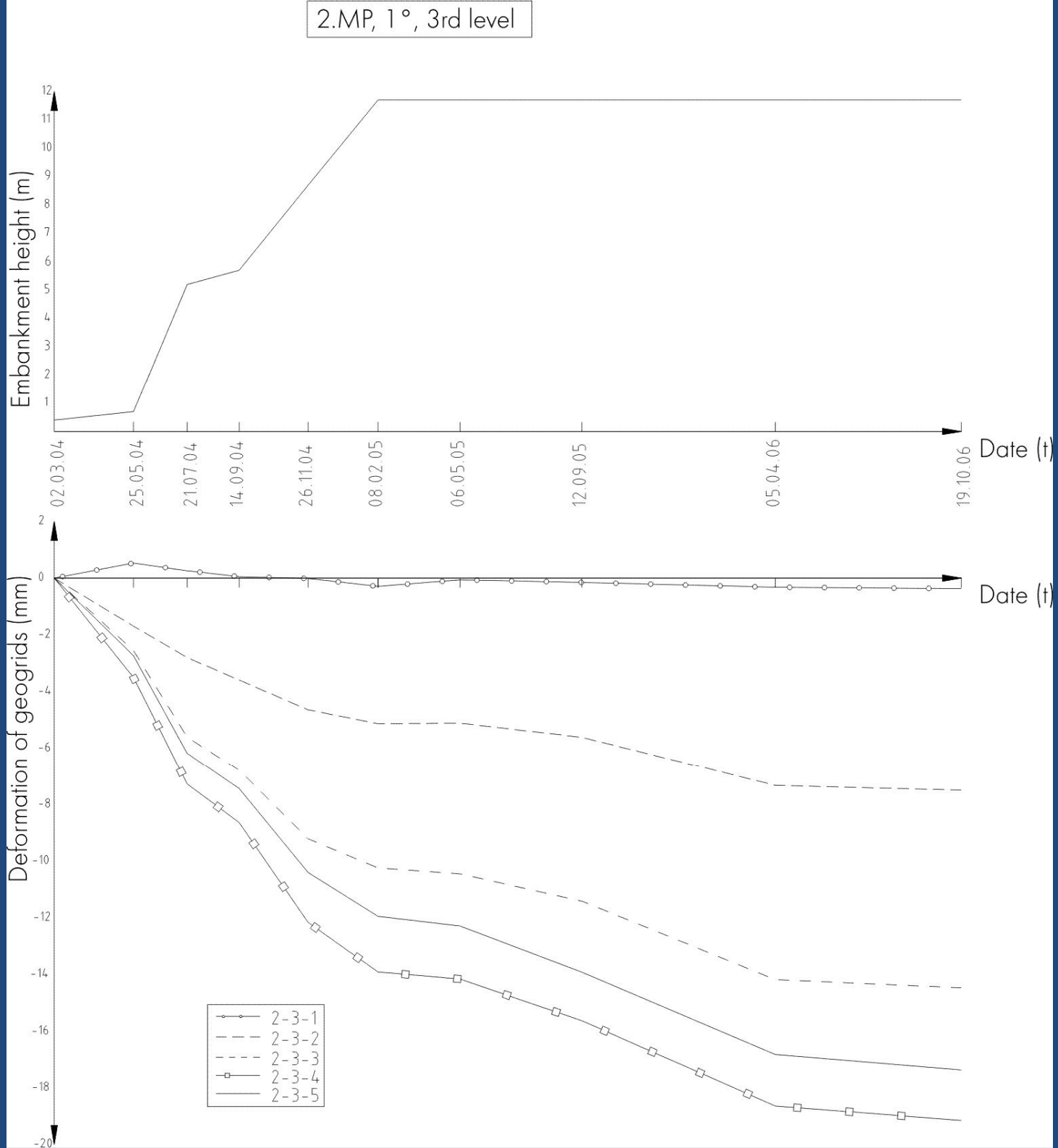
Embankment height 12.2 m

The face: 3-tier concrete panels (thickness 150 mm)

Measurement results: Profil 1, tier 3, level 2







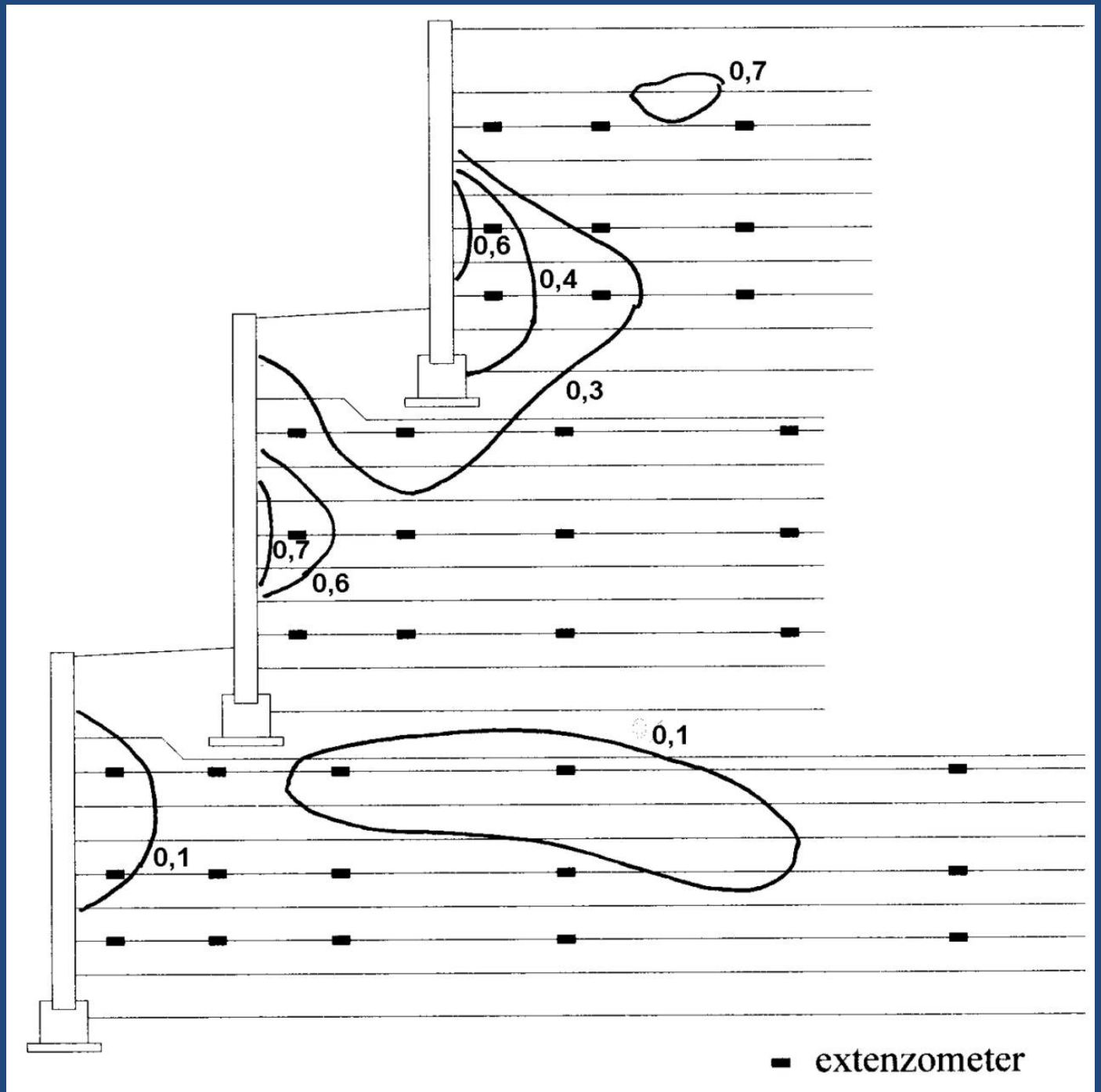
Monitoring profile 2

tier 1

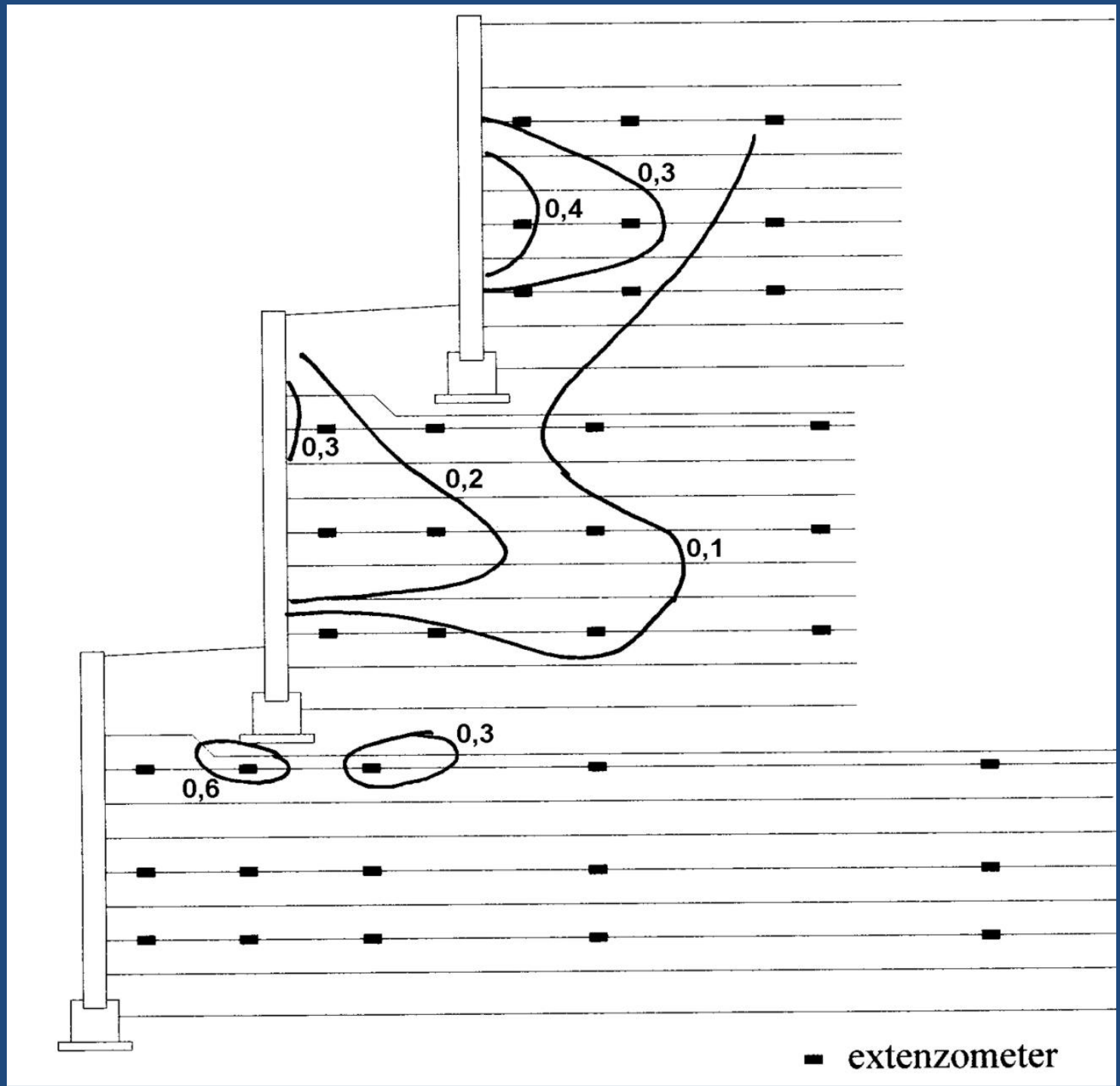
level 3

Relationship between deformation and time

Isolines of relative deformation (%) in measuring profile 1



Isolines of relative deformation (%) in measuring profile 2



Conclusions

- The max. relative geogrid deformations reaches of 0.706 % at a single point only (the highest position of the embankment loaded by the embankment 0.6 high and by the pavement);
- Relative deformations less than 0.1 % were established in 45 % of measurements;
- Relative deformations less than 0.2 % were established in 69 % of measurements;
- Interruption of construction works for more than 1 year + insufficient protection of embankment surface against weather had negative influence on the structure and results of measurements;
- despite of this the structure is in perfect conditions after 3 years of service life

Overall view to the embankment and bridge

Typical wiew to the reinforced 3tier wall