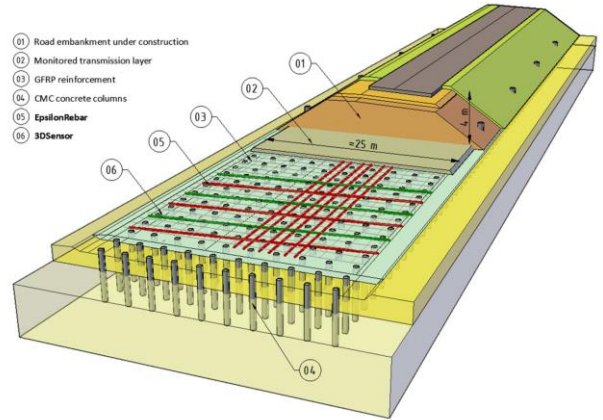


# Strains and displacements at the base of a road embankment



## 3DSensor & ER: Case Study

The road embankment was designed above the substrate strengthened with concrete columns. The transmission layer between the columns and earth body of the structure was equipped with Nerve-Sensors: **EpsilonRebars (ER)** and **3DSensors** for measuring strains and vertical displacements respectively. A total number of 16 sensors were installed both in longitudinal and transverse directions. What is more, the sensors were used for simultaneous measurements of temperatures.



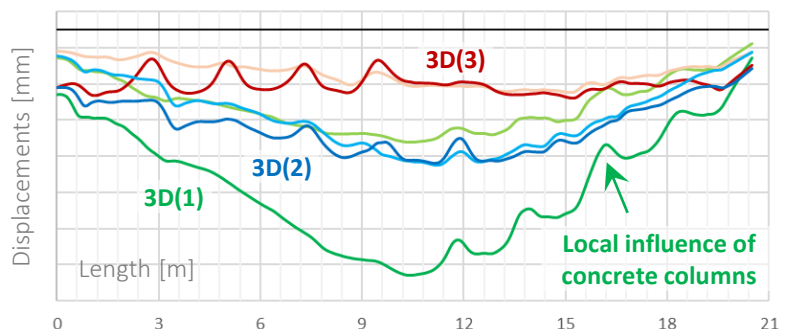
## Benefits of application

- Measurements of **strains, displacements and temperatures** at the same time
- Full deformation control above the concrete columns during construction
- **Thermal self-compensation** for displacements, no need to measure temperature
- **Results** directly as **displacement values (mm)** thanks to a data conversion algorithm

## Example results



The measurement sessions were planned during construction process as well as during embankment operation. The figure below shows example displacement profiles obtained from transverse **3DSensors**. The local effects caused by the presence of concrete columns are clearly detectable. This comprehensive knowledge, unachievable for conventional sensing techniques, could be used for calibration numerical models and reduce uncertainties, which are especially important during geotechnical design.



**37 800** measurement points

**378 m** of sensing path

**4 x 3DSensor, 12 x ER**

during **construction**

project **partner:**

