

Railway embankment on the E65 railway line.

Jurkowice/Malbork, Poland

Thanks to the protection of the active landslide and the strengthening of the ground and the railway embankment, which was completed in the record time of 30 days, new Pendolino trains were put into service on the E65 line in December 2014.



The project

The introduction of Pendolino high-speed rail was one of the priorities of public projects in 2014. Keller offered and executed on behalf of Trakcja an original solution for securing a landslide and strengthening the ground on the section of the damaged railway embankment in the area of Jurkowice near Malbork.

The challenge

The task, carried out in very unfavourable ground conditions, was to develop and modify the design solution in a situation of a progressive landslide, as well as safe execution of works in a situation of unstable ground and railway embankment.

The solution

To ensure the safety of works on both sides of the foot of the embankment, before the basic works were carried out, temporary ground beams were made as working platforms on concrete displacement columns SDC Ø400 (see diagram - photo gallery/films).

Then, on both sides of the embankment, openwork palisades made of reinforced CFA Ø800 piles submerged in bearing soil were made, which ensured the stability of the embankment base. The palisades were connected using reinforced cap beams, which were connected through steel ties made in horizontal, controlled drillings in the embankment base. A retaining structure was created, which permanently cut the deep lines of the slide, stopping the landslide.

The infirm ground within the palisades was reinforced employing the Compaction Grouting injection performed at the foot of one side of the embankment. On the other hand, after removing the soil, the landslide was reinforced using CSC concrete displacement columns. On the heads of the CSC columns, an innovative LTP platform reinforced with prefabricated, unrolled steel mats was made, which allowed to shorten the time of works and save steel on the plants.

Project facts

Owner(s)

PKP PLK

Keller business unit(s)

Keller Polska

Main contractor(s)

Trakcja PRKiL

Solutions

Bearing capacity / settlement control
Slope stabilisation

Markets

Infrastructure

Techniques

CFA piles (auger cast)
Controlled Stiffness Columns CSC®
Compaction grouting