JOB REPORT

Dyke refurbishment in Neuwied for long-term protection

Deep foundations and underpinning with TITAN micropiles

The dyke in the Engers district of Neuwied has protected the inhabitants of the town against flooding for more than 90 years. Another important function of the dyke is to protect the vital drinking water supplies for the entire region against flooding or potentially polluted water from the River Rhine. As the ageing dyke alongside the Rhine would no longer be stable in the case of extreme flooding, it was decided to replace it with a three-zone dyke made up of impermeable layer, earth bank and seepage filter, all in line with the state of the art.

The challenge

Public authority SGD Nord is responsible for designing, awarding contracts and carrying out site supervision for this project, which is expected to cost about €7.2 million. Extensive preparatory works, e.g. land acquisition, tree clearance, ecological compensation measures, recovery of archaeological relics and unexploded ordnance clearance, were needed in advance of the actual construction measures. For example, the railway bridge, once known as the Crown Prince Bridge, was the scene of fierce fighting in the past, and 174 weapons plus about 4500 kg of scrap metal were recovered from an area of 56 000 m^2 in the vicinity of the bridge.

The solution

The new flood defence dyke, about 860 m long, passes beneath this bridge over the river at Rhine km 602.1. Here, as an alternative to a conventional dyke, the width of the embankment was modified to suit the span of the arch of the bridge by erecting a retaining wall on the land side in order to gain space for the dyke access road. At the same time, the seepage path was lengthened along the line of the old dyke to increase stability by installing a sheet pile wall to supplement an existing vibrated beam slurry wall.

The circumstances of the site and the project-specific boundary conditions presented the designers with distinct challenges. The deep foundations for the retaining wall and the anchorages for the sheet pile wall not only need permanent protection against corrosion, but also had to be installed in an area with limited vertical clearance. In addition, the work had to be carried out as quickly as possible to minimise the risk of floods ruining uncompleted

Project:
River Rhine dyke refurbishment, Neuwied-Engers, Germany

Construction period:
14/03 – 04/04/2022

Client:
Federal State of Rhineland Palatinate

Project management:
Struktur- und Genehmigungsdirektion Nord (SGD Nord), Koblenz

Main contractor :
STRABAG, Cologne

Drlling Contractor:
Sidla & Schönberger Spezialtiefbau GmbH, Volxheim

Products used:

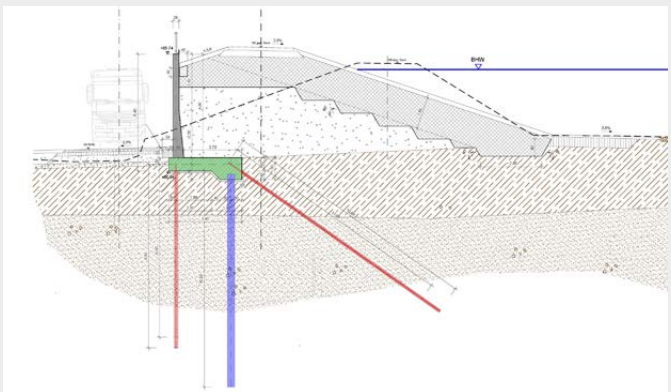
- 95 TITAN micropiles 73/56, approx. 9 m long
- 19 TITAN micropiles 52/26, approx. 8 m long
- 95 TITAN micropiles 40/16, approx. 12 m long
- Cross-cut bits

measures. To guarantee protection against floods despite the ongoing construction, the measures were divided into segments each 75 m long. That meant that the unavoidable temporary gap in the dyke due to construction work could be closed off at short notice with loose fill material kept ready to cope with any impending floods. The TITAN micropiles of FRIEDR. ISCHEBECK GmbH were used for the sheet pile wall anchorages and the foundations to the retaining wall. In total, about 2200 m of tension and compression piles were installed and grouted in less than two weeks. A representative from the contractor, Sidla & Schönberger Spezialtiefbau GmbH, sums up the work as follows: “The progress that can be achieved with the TITAN system is really impressive. Despite the limited clearance beneath the Crown Prince Bridge, it was possible to drill about 180 m every day without any problems.” The TITAN micropiles, up to 12 m long, were installed on site in coupled 3 m lengths so that the confined site conditions did not hinder the work. The “self-drilling” TITAN micropiles ensured fast, economic progress on site. This method eliminates the need for additional steps, such as installing and extracting a casing to stabilise the drilled hole or multi-stage grouting to improve bond in some areas. TITAN micropiles are approved according to National Technical Approval / Construction Technique Permit No. Z-34.14-209 issued by the Deutsches Institut für Bautechnik (DIBt) and may be used for permanent applications exceeding 100 years. So the new dyke will remain fit-for-purpose for many years.

TITAN micropiles were installed to anchor the sheet pile wall and as foundations for the retaining wall.

The retaining wall is made up of precast concrete elements

Good drilling progress was maintained despite the limited clearance beneath the bridge.



TITAN 73/56 micropiles were used as compression piles and TITAN 40/16 micropiles as tension piles (marked in red).

Would you like to find out more about TITAN micropiles?
We would be happy to advise you about your project. Simply get in touch with us. We look forward to hearing from you.

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