

Inspecting aging infrastructure with no information of rebar layout

Overview

- [Concretix](#) were required to scan a concrete tunnel and investigate a large pier in Amsterdam with no knowledge of rebar location and configuration.
- The [Proceq GPRs \(GP8100 & GP8800\)](#) were used to locate and map structural elements and the exact rebar location at all depths.
- The team successfully confirmed rebar location and configuration on both projects giving better understanding of the structure and accurate locations for coring.

[Mr Joost van Gorkum](#) has 20 years' experience of investigating aged and relatively new concrete structures. Four years ago he founded Concretix, a company that provides services in concrete technology, concrete maintenance and materials research. Several of Concretix's projects involve extensive, ageing infrastructure such as bridges and tunnels and the project requirement is often to determine the exact location of rebars. Concretix use a large range of Screening Eagle products including Profometer, Profometer Corrosion and the Proceq GPR range. In this article we will look at two applications of GPR on munipcle in Amsterdam.

Challenge

Concretix were called to analyze a bicycle tunnel (underpass) under the new Purmerweg in Amsterdam after it had suffered severe fire damage. Concrete cores needed to be extracted from the construction for laboratory testing to investigate the concrete compressive strength and porosity/micro-cracks of the concrete. When drilling the cores it was essential to not damage any structural elements. There was a drawing of the tunnel showing the locations of the prestress reinforcement but it was not accurate.

Another time, Concretix were called to investigate the NDSM pier in the IJ (waterfront) in Amsterdam. This was a very large surface for which no information on rebar configuration was available. The pier urgently needed maintenance and calculations are necessary to determine how much longer it can last; the calculations require knowledge on the rebar configuration.



Solution

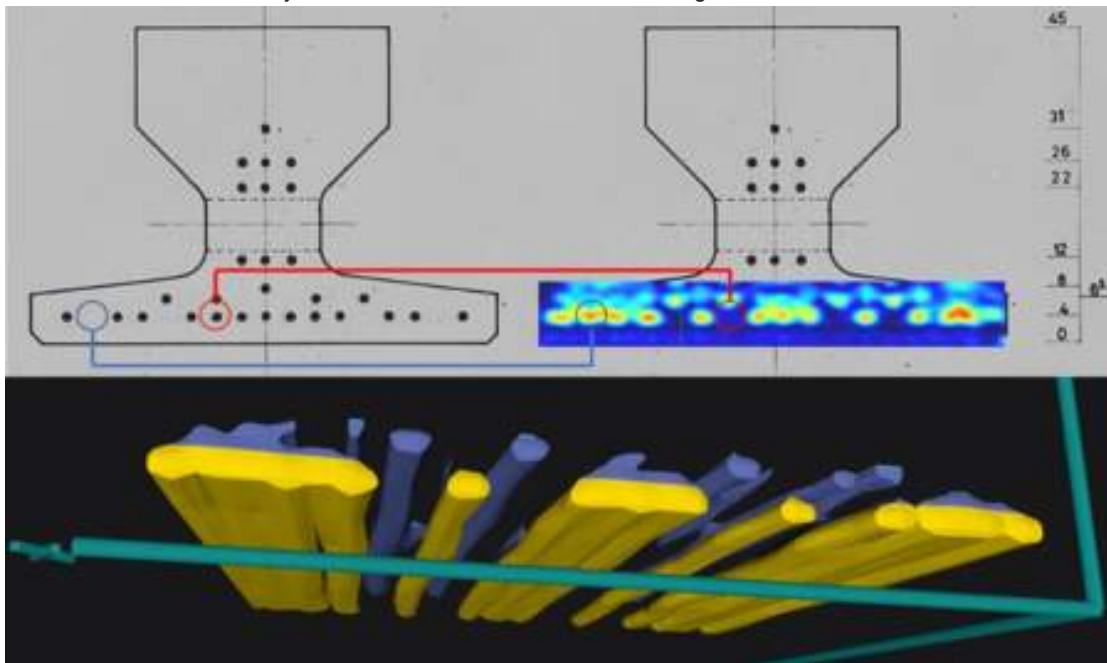
Concretix used the Proceq GP8800 to scan the tunnel surface and identify the exact locations of the structural elements. The GP8800 was chosen because with dimensions of only 8.9 x 8.9 x 7.6 cm it can be used to inspect all locations even tight corners and close to walls. Its small size also makes it very convenient for over-head scanning.

Concretix used the Proceq GP8100 to scan the pier surface. The GP8100 is a six-antenna GPR array with 25 cm effective scan width and 80 cm penetration depth. It was chosen because the large pier could be scanned efficiently and the rebar could be detected at all depths. The GP8800 was also used on the pier for small corners.

Both GPR sensors are used with the [GP app](#) which Concretix find highly intuitive to use. They also strongly value the fast on-site visualisation which is even possible in 3D Augmented Reality.

Results

For both projects, Concretix and their customers were very satisfied with the Proceq GPR results. For the tunnel, the GPR was able to reveal the true rebar layout which differed from that in the drawings.



Two examples of this are shown in the image – the blue circle shows a location where there was thought to be no prestressed reinforcement strands but actually they were present, and the red circle shows a location where the converse was true. Therefore the GPR inspection prevented structural elements from being damaged when cores were removed for laboratory assessment.

For the pier project, the GPR was indispensable because no drawings were available. The full rebar configuration is now known and this can be inputted into the calculation which will determine the maximum possible life extension of the pier.

The asset owner was very concerned about the structural integrity. In addition, the durability inspection could have been done with [Profometer PM8000 Pro](#) checking the concrete cover which can be used in durability calculations for carbonation and chloride contamination.

Concretix will be using [Screening Eagle INSPECT](#) on projects in the near future. Watch this space!

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