



Locating Rebars in Recently Cast Concrete Box Girders

This application note describes how to locate rebar in recently cast box girders.

Box girders are critical support structures used in bridge construction. It is sometimes necessary to perform drilling on these structures to add fixtures such as anchor points. Prior to drilling, it is essential to map out the rebar and other structural elements, to ensure these are not hit during the drilling.

Challenge

In this case study, the box girder was precast and less than 2 months old so the moisture content of the concrete was still quite high. The concrete had two layers of rebar; the first at 5-7 cm depth and the second at 9-11 cm depth. Anchor drilling up to a depth of 12 cm was to be performed; therefore both layers of rebar had to be located.

Ground Penetrating Radar (GPR) is an excellent choice for mapping out rebar at these depths and generating intuitive images. However, it uses radio waves which are strongly attenuated by dampness. In this particular case, the contractor had struggled to detect the second layer of rebar in the box girder with conventional (pulsed) GPR instruments.

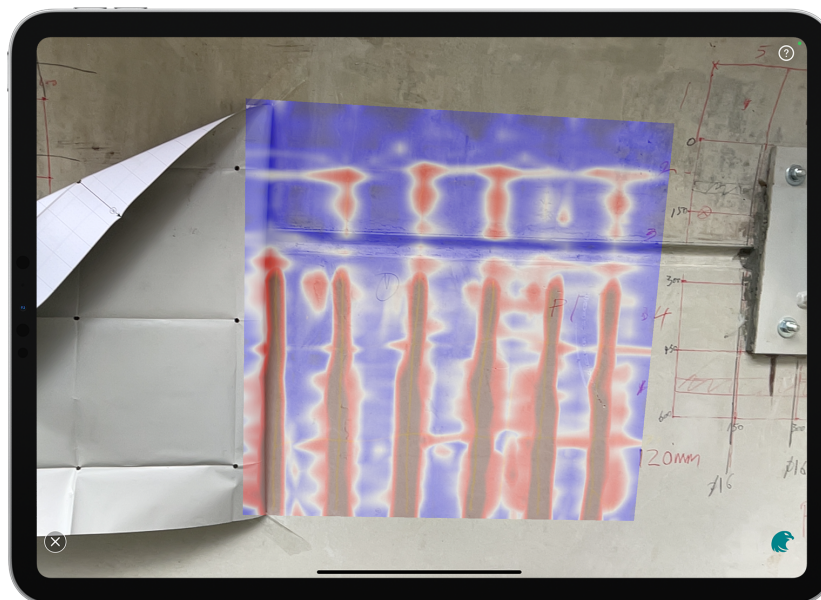


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Solution

Screening Eagle Technologies offers SFCW ([Stepped Frequency Continuous Wave](#)) GPR instruments. This technology provides a super-wide bandwidth of usable frequencies so that both resolution and depth penetration are excellent. Compared to pulsed GPR, SFCW GPR provides higher signal-to-noise ratio (SNR) and better dynamic range. The resulting data is clearer for the inspector.

For this application, due to the complexity of the girder box rebar structure and the young age of the concrete, we recommend to conduct an area scan where GPR data is collected in multiple lines in two orthogonal directions.

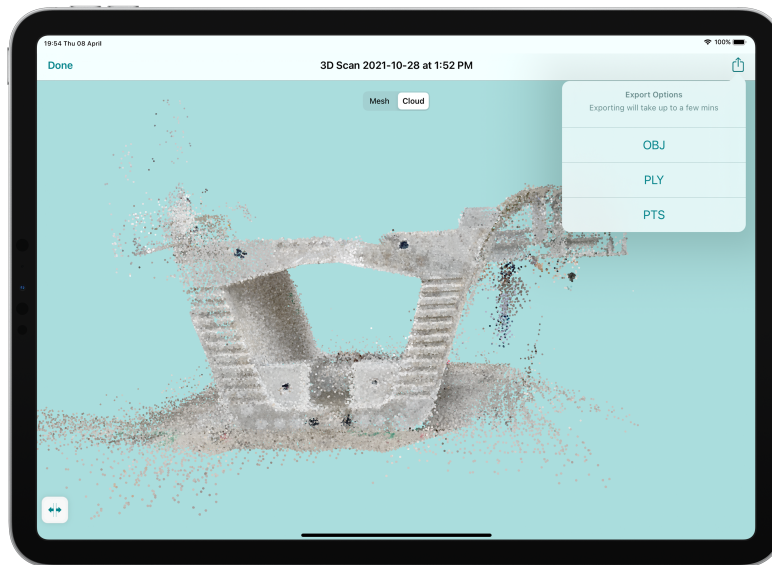


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The contractor used Screening Eagle Technologies' GPR array, [Proceq GP8100](#), and successfully located both layers of rebar, despite the high moisture content. The GP8100 array connects wirelessly to an iPad app and data is automatically synchronised to the cloud for traceability. Furthermore, the intuitive on-site 2D, 3D and AR imaging capabilities ensured the contractor could mark the correct rebar locations on the concrete surface. Drilling could then be successfully performed with no risk of hitting the rebar.



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As a highly productive handheld array GPR, [Proceq GP8100](#) completes 6 parallel scans in one pass, and the depth slice of each pass results are shown in real-time. Each scan covers approximately 25cm in width, hence a total of only 6 cross scans are required to cover an approximate 1 square meter area. There were three scans in the x-direction and another three scans in the y-direction (orthogonal to x-direction).

The scan is completed in a minute, processed in a further minute and results are shared in a couple of clicks, all on-site on the iPad app. No PC, no USB drive, no cables, no data lost. With a market-leading maximum depth of 80 cm, no other array does so much, so fast with such depth penetration.

See more articles, case studies and application notes with SFCW GPR in our [Tech Hub](#).