Real-time subsurface mapping connected to a Robotic Total Station

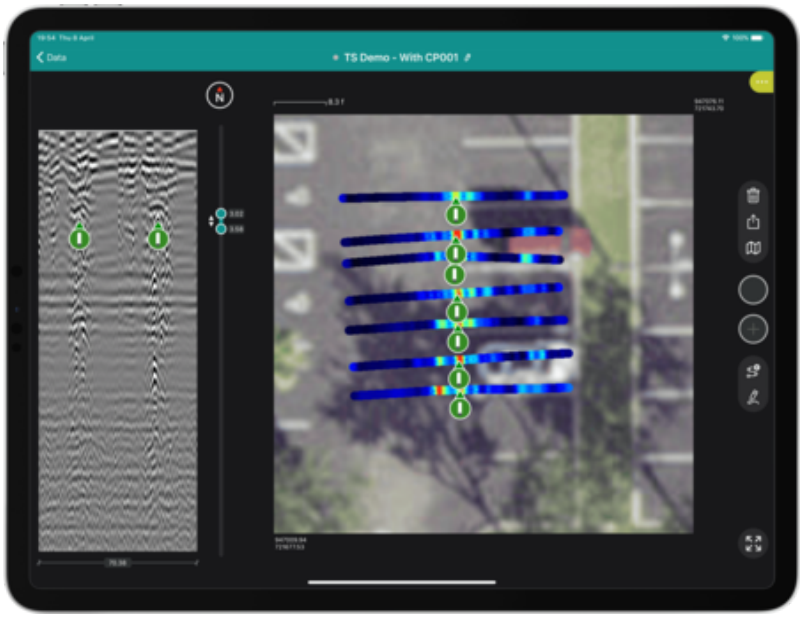
This application note describes how a Robotic Total Station can be connected to the Proceq GS8000 Subsurface Mapping GPR to obtain accurate position data for use with the 'free path' function.

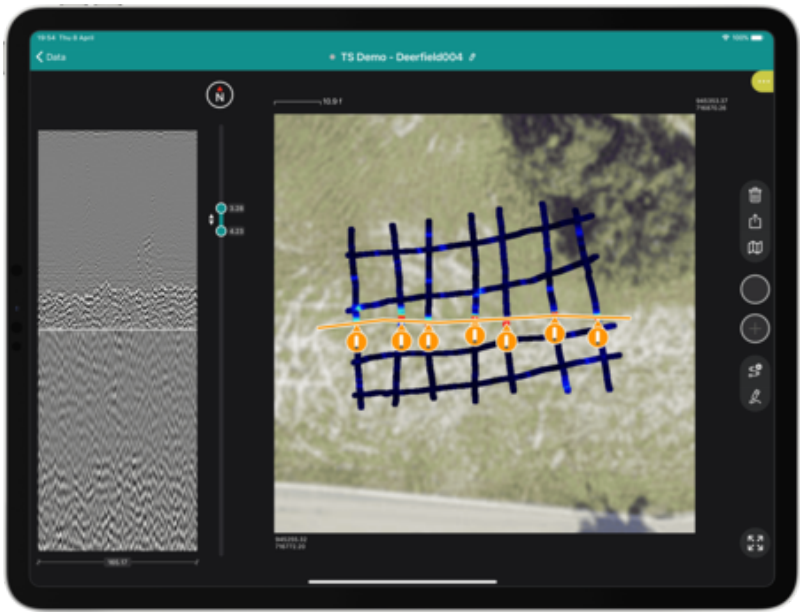
The Proceq GS8000 has an in-built GNSS receiver and its software facilitates corrections over internet (via SSR or NTRIP RTK) to get accurate location data, in a streamlined workflow. However, there are times when this is not feasible and an alternative solution is required.

The use of a GNSS receiver and location data corrections is not always possible. For example, surveying might be taking place indoors or in other locations where there is no satellite coverage and/or there might be no internet available for data corrections.

Furthermore, sometimes the cm-accuracy of corrected GNSS data is insufficient and mm-accuracy is required. A solution to all these situations is to connect a Robotic Total Station to the GS8000.

The Proceq GS8000 boasts a unique 'free path' function which allows the surveyor to walk freely, unconstrained by a grid. The resulting heatmap of the subsurface is plotted on a map in real-time, at the desired depth range.





The purpose of this demonstration was to try out the 'free path' function using a Robotic Total Station. The prism was attached onto the GS8000's fixture rod (instead of the usual GNSS receiver, MA8000). The data controller (for the Robotic Total Station) was also connected to this rod so that the surveyor could easily operate both the GS app on iPad and the data controller, while walking around the site. The Robotic Total Station was stationary on the ground, and care was taken to maintain a direct line-of-sight between it and the prism.

Using this set-up, geo-referenced data was streamed in real-time to the GS app and could be immediately visualized on its exact location on a map. This was as quick as when the in-built GNSS receiver and data corrections are used.

Using a Robotic Total Station with Screening Eagle's 'free path' function is of great benefit to subsurface utility engineers and surveyors. A map of the subsurface is generated immediately without the need for multiple processing steps or further work off-site. The surveying workflow is streamlined and fully achievable by one person.

The set-up is straightforward and requires careful connection of the different hardware components and input of the Robotic Total Station details in the GS app, which the user is guided through in the 'Position' tab. Have questions about this setup? Please do contact us, we're happy to help.

This demonstration was conducted together with our distribution partner, Duncan-Parnell and we thank them for their assistance.

The Robotic Total Station used was a Trimble S7 and the controller was a Trimble TSC7. The table below shows other hardware and software which is known to be compatible with Proceq GS8000. Please note that this is not an exhaustive list.

Field Software	Trimble Access	Leica Viva	Sokkia MAGNET Field
		Leica Captivate	Topcon MAGNET Field
Field Controllers	TSC7	CS10/15	SHC-5000/6000
	TSC3	CS20	FC-5000/6000

Output Parameters	Pseudo NMEA GGA Update Rate >10 Hz	Pseudo NMEA GGA Update Rate >5 Hz	Pseudo GGA Update Rate >1 Hz
Serial Cable (combined with Art. 39350676)	Male-female RS232 cable adapter	GEV162	USB to Female RS232 cable adapter

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