

Portable RTK

Portable reference stations provide a flexible option for RTK positioning.

Real-time kinematic (RTK) positioning and GNSS technology continue to optimize surveying efficiency. But while a significant amount of progress has been made in establishing RTK networks, much work remains to be done. This is especially true in parts of South America such as São Paulo, Brazil.



Jose Henrique Carvalho uses a GSR2700 ISX receiver to establish coordinates of the known geodetic monument SAT-93905.

SAT-93905 Known Coordinates	Sokkia GSR2700 ISX Calculations	Comparative
N = 7 507 510.431 m	N = 7 507 510.441 m	$\Delta N = 1.0$ cm
E = 213 278.482 m	E = 213 278.459 m	$\Delta E = 2.3$ cm

Table 1. Mobile reference station accuracy.

According to Gabriel Santiago de Mello of Teodonivel, a SOKKIA GPS dealer in Brazil, establishing a permanent virtual GNSS RTK network in São Paulo would require a large investment with a risky return. To justify the costs, a high number of surveyors would have to agree to pay the annual subscription fee to access a network that would only cover the metropolitan area. Single reference stations are equally problematic. “The very small coverage area of a single reference station would be a disadvantage for most São Paulo surveying communities,” Santiago de Mello says. “Work in São Paulo normally won’t be positioned in just one location or area, and extending the range [to cover] the entire city area would be far too costly and inefficient.”

When Jose Henrique Carvalho of 3D Engineering, a surveying company based in Piracicaba, São Paulo, began exploring the use of GNSS technology in April 2008, Santiago de Mello suggested that Carvalho try a portable option—a Sokkia mobile reference station (MRS). Carvalho was curious: Could this system provide the accuracy he required?

To evaluate the system, Carvalho and Santiago de Mello configured Sokkia’s GSR2700 ISX receiver to act as an on-the-fly MRS and positioned a second GSR2700 ISX as a rover receiver on a geodetic monument 46 kilometers away. The rover was quickly connected to the mobile reference station and established the coordinates of the point. As seen in Table 1, the MRS produced survey-grade accuracy. Additional testing at a 48-kilometer distance resulted in similar accuracies.

According to Santiago de Mello, a single MRS behaves like a single permanent reference station in that it provides more than 5,000 square kilometers of RTK coverage and can support a high number of GNSS rovers. However, the mobile reference station can be moved around from project to project to focus RTK coverage on specific areas. “The coverage area provides a flexible RTK option that allows users to adjust the RTK infrastructure to meet their job requirements,” Santiago de Mello says.

To function, the MRS units require access to a SOKKIA GSR2700 RSX reference station, which is typically located in a surveyor’s office. However, no electrical hookup or Internet connection is required in the field for units that are configured as a mobile reference station so the RTK coverage can be set up anywhere with GSM-based mobile phone coverage.

Carvalho notes that setting up the mobile reference station was simple, and the wireless setup improved equipment handling without a need for external batteries or other peripherals. “We accomplished everything we needed to accomplish quickly—even in areas where we had previously experienced difficulty using other RTK infrastructure solutions,” he says.

After a thorough analysis, 3D Engineering became the first surveying company in São Paulo to purchase GSR2700 ISX units to operate as mobile reference stations.

“This solution provides us with many advantages over alternative RTK infrastructure solutions,” Carvalho says. “The mobile reference station not only excelled in the tough environment but it also produced precise results.”

For more information about mobile reference stations, visit www.sokkia.com.