No Rest on Labor Day

There was no rest on Labor Day for a four-person crew from Northern California's R.E.Y. Engineers—they spent the entire long U.S. holiday weekend monitoring what may have been 2009's most impressive infrastructure project. Along with Mammoet (the Dutch firm famous for moving heavy things), C.C. Myers, and the California Department of Transportation (CalTrans), the R.E.Y crew slid a 3,300-ton, 86-m-long (283-ft) piece of the double-decker Bay Bridge over a 30.48 m (100 ft) gap—on rails 45.72 m (150 ft) above the ground—into its new permanent position. Tolerances were less than five millimeters throughout, and when the slide was complete, the new section of bridge had been placed within 6.4 mm (1/4 in), at all corners, of the design intent.

The Labor Day slide was part of a massive, ongoing seismic retrofit of the San Francisco-Oakland Bay Bridge. A similar slide had taken place in 2007, but this one was higher and heavier, and segment deformation (not just movement) was being monitored. "We knew that tracking any two points would tell us position," said R.E.Y. Engineers, Inc. Partner Jim Brainard, PLS, "but we needed a lot more information to be sure about deformation." R.E.Y. used Trimble HYDROpro™ Navigation Software to synthesize data streams from eight Trimble total stations—four Trimble S8 Total Stations and four Trimble SPS 930s. In 2007, the new bridge segment had been pushed in one-meter (3.28-ft) increments, then measured; then the hydraulic jacks were adjusted for the next incremental push. This time, jacks pushed continuously, so monitoring data had to be gathered and processed continuously and presented on one screen for Mammoet operators.

"I usually use HYDROpro to guide and track marine construction," says Lou Nash of Measutronics, who adapted HYDROpro for this job. "In those applications the dynamics of moving platforms are usually a challenge. Here, the dynamics—the rate of movement—wasn't such a challenge, but the tolerances were much tighter."

Each total station was fitted with a Trimble TSC2® Controller. The controllers were connected by BlueTooth to a computer running HYDROpro and specialized presentation software to get all the data on one screen.

The system proved itself immediately on the day of the slide when the original Bay Bridge section was cut out and jacked up for removal. At about 2.54 cm (1 in) of lift, R.E.Y. surveyors detected deformation in the southeast corner and identified a stuck area that needed to be cut free. And as the new segment was moved in, the system measured no significant deformation; jack operators were able to keep all four corners on planned trajectory to avoid binding.

Big, innovative projects like the Bay Bridge slide will always require new ideas...but it's nice to know that existing tools can be adapted to get the job done.

See feature article in POB's January issue: www.pobonline.com