

Radio link closes gap between field TCA1103 station and office



In the last thirty years, there have been enormous advances in performing topographic survey. The Surveyor's field work has evolved from being totally manual – setting up baselines, running direct levels and pulling tapes, and plotting locations by hand – to the introduction of compact electronic total stations and computers.

However, these advances have not been without their problems. Traditionally, there has been a communications gap from having field crews perform the field locations and survey technicians perform the office computations. These are mostly associated with the amount and location of the data collected in the field and are not necessarily recognised until the data is processed and the office technician attempts to put the project together. Return trips to the field to correct errors in data or to gather more data can be very costly to the project budget and can affect both the quality of the map and the project schedule.

As experienced engineering and surveying professionals, Concord Engineering & Surveying Inc. (CESI) in North Carolina, have a wide expertise and knowledge-base and always strive to be at the forefront of using new technology, actively looking for ways to improve accuracy and efficiency of their engineering and surveying work.

CESI decided that one significant improvement to surveying work would be to devise a way to allow surveyors to see what they are locating at the same time as they perform the fieldwork. Although laptop computers are now being used in the field, the computer must be connected directly to the instrument, meaning that the Crew Chief

who is keeping the field book and running the rod cannot see the locations as he or she completes them.

CSEI approached Tommy Dudley of Earl Dudley & Associates, regional Leica representatives. Dudley, along with representatives of Carlson Software, worked together to provide a solution. After much planning and trials, the team established a radio link between a Leica TCA 1103 Robotic instrument and a mobile laptop operating Carlson Software.

This innovation allowed CESI's Crew Chief, Cecil Porter, to walk freely around the site and control the instrument via a laptop mounted on the pole or strapped to the waist. He was able to determine the features to locate and immediately see the results displayed on the laptop.

"It won't be long before I can perform various types of surveys without the help of

anyone or anything except this equipment and computer," Porter said.

So far, one of the most successful projects in utilising this system has been a topographic survey for facility improvements to the intersection of NC 73 and International Drive in Concord, North Carolina. This is a congested and heavily travelled corridor, linking two booming communities in Cabarrus and Mecklenburg counties as well as the expanding International Business Park at Concord.

The client, the City of Concord, required CESI to collect accurate and complete data within a short allotted time schedule and avoiding interference with traffic. The project involved many different items for field crews to locate and survey, including the creation of a digital terrain model of the existing pavement and of the areas to be widened, the making of property ties, and the location of gravity and non-gravity utilities.

"We were able to load the limits of the survey on the laptop so the Crew Chief could see when the targeted area was covered," James Craddock, Project Manager of CESI said. "As the pavement was located, it was also drawn and displayed on the laptop in real time. Breaklines, utilities, ground shots and physical features were all located and appeared so that positioning and accuracy of data could be checked."

When the Crew Chief had finished with locations, he was able to use Carlson Survey to process the T-net and check the contours to see if they appeared correct or if he needed to obtain more



locations to define a more detailed area. Using this technique, the fieldwork went smoothly and quickly.

Although the fieldwork took about the same amount of time to complete, the difference was that the crew was able to actually "see" what they were surveying in real time as they located features in the field. The most significant timesavings were realised in the office, as the data came in from field essentially already "processed". This meant greatly-reduced computation time

and the elimination of costly return trips to collect data.

"The only task left to complete the project was to import the drawing and finalise the digital terrain model," Craddock said. "In using this new system to survey a site, the office computations time was cut in half, thus offering both time and money saving to the client." *Bt*

A dynamic team: Chuck Brewster, Marion Saudlin, Alex Raukin, Jim Craddock, Glen Gamble, and Jim Davis.

