Continuous Kinematic Surveying Throughout Iraq

By Second Lieutenant Jonathan Wilson

As the military continues to develop its contingency operating bases (COBs) and create improved facilities and living accommodations for its Soldiers, the demand for military surveyors increases. Surveyors in Iraq have a vital role, ensuring that both military and civilian engineer planners have accurate designs and topographic products necessary for planning construction and improvements. The increased demand for surveys requires new technology, equipment, and methods to obtain rapid and accurate results. One piece of equipment in particular, the Trimble® 5700 Global Positioning System (GPS), proved invaluable to the Survey Platoon of the 320th Engineer Company (Topographic), 130th Engineer Brigade, as it conducted numerous missions across Iraq.

Applications

The Trimble 5700 is a versatile piece of equipment that can be used under most surveying conditions. Within Iraq and the scope of military surveying, the most beneficial use was the continuous kinematic collection of survey points. This function fulfills the purpose of developing comprehensive topographic maps at a rate previously unattainable. Throughout the theater of operations, there are

An Army Soldier uses a Trimble 5700 during a survey mission.

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little or no detailed contour maps. Although the country is predominately desert, rainfall can average up to 100 centimeters in some areas during the rainy season. The sudden addition of water creates massive flooding in regions that were previously dry. Thus, it has become the focus for many design management sections (DMSs) to plan and develop drainage and flood mitigation plans for their forward operating bases (FOBs) and logistics support areas (LSAs).

In order for a DMS to accomplish the lengthy task of flood control planning and construction design, it first needs a final survey product. The survey product includes a thorough topographic contour map of the surveyed area. The development of a contour map involves a lengthy process of surveying a wide area in a specified grid pattern. Typically, a 50-foot interval is used to create a grid of points from which extrapolations can be made for relief. In the past, this process required one surveyor with an optical total station (a tool used to sense position) to take individual shots as a rod man (raises or lowers the target until the surveyor signals that it is at the proper height) moved from point to point along the set grid. But now, with modern technology and the addition of the Trimble 5700 to the Army surveyors' basic equipment list, all of these tasks can easily be accomplished in a fraction of the time.

Continuous Kinematic Surveying

The Trimble 5700 allows you to select the desired time interval that you want to use. Then, the instrument with its built-in satellite receiver measures a point at that time interval. Essentially, the instrument only needs to be kept at a steady height—on a Soldier's back or attached to a vehicle. The Soldier continually walks or drives the area. If tasked with a site survey, to include drainage for a motor pool or other confined areas, only one Soldier is needed to walk the grid pattern. If the area is larger, a contour map is developed and the instrument is placed on top of the vehicle with magnets. The vehicle then drives the pattern. A 15-second interval is optimal when walking, and when driving, a 5-second interval is optimal as long as the vehicle remains at a slow speed.

Once the surveyors collect all of the raw field data, it is processed. Trimble Terramodel™ is one software program that is compatible with the Trimble 5700. The program takes all of the points, inputs them, and connects all of the points of equal elevation and develops a complete contour map for the DMS to use in its planning and designing.

Put to the Test

All of the beneficial aspects of the Trimble 5700 system were put to use recently by the Survey Platoon of the 320th. As the war evolves in Iraq, many of the smaller FOBs are becoming obsolete, and thus it has become a military endeavor to consolidate its forces into more centralized hubs. The 555th Combat Support Brigade (Maneuver Enhancement) DMS has been charged with the mission of developing all the plans necessary for future Soldiers into COB Speicher. In order for the 555th to complete its mission and correctly make all of the designs for the COB, it first needed to know the existing conditions of the area.

The Survey Platoon began the process of surveying COB Speicher, which was flooded throughout the rainy season. For the 555th personnel to combat and mitigate the flooding, they needed to know the total volume of runoff entering the COB and where all of the water was flowing. They created a detailed contour map of the entire COB, as well as the surrounding watershed, for drainage assessment and planning.

Over the course of three weeks, the platoon put the Trimble 5700s to the test, collecting more than a quarter million data points in an elaborate grid spanning the area. They also extended their survey beyond the perimeter to encompass the surrounding farmlands. With an elaborate grid of points collected—each point a precise coordinate and orthometric (height of a point on the earth's surface) elevation—the platoon compiled and processed all of the data. The result was a comprehensive and thorough topographical contour map of the entire installation with decimeter interval precision.

Mission Success

The Survey Platoon has made efficient and valuable use of the Trimble 5700 survey system throughout the country. With it, the platoon has created comprehensive and thorough maps of several FOBs in less than half the time it would have taken using older methods. The Trimble 5700 is a reliable and beneficial piece of equipment that was used in the collection of more than half a million survey points at a rate previously unmatched by other surveyors.

Second Lieutenant Wilson is the survey platoon leader for the 320th Engineer Company, 130th Engineer Brigade. Throughout Iraq, the platoon has performed numerous surveys to include site, topographic, construction, and hydrologic surveys.