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FORENSIC ARTIST

EVIDENCE TECHNICIAN USES ROBOTIC TOTAL STATION TO MAP CRIME SCENE

Imagine the scenario...It's about 2:00 a.m. Tina Perruzzi is at her desk catching up on paperwork when the phone rings. There has been another homicide–a shooting victim in an apartment building courtyard. Time to go to work.

Tina Perruzzi is an evidence technician with the Forensic Services Division of the Prince George's County Police Department, in the Maryland suburbs of Washington, DC.

As she heads for the door, she grabs her tools–briefcase, laptop, digital camera, and a robotic total station–which she will use to create accurate digital maps of the crime scene.

Arriving at the scene, she observes a body is on its right side with multiple gunshot wounds. Blood stains have seeped through the victim's shirt. Five 9-mm shell casings lie on the pavement about 15 feet away. Behind the body two slugs are embedded in the concrete. A technician is already photographing the scene. There are three cigarette butts on the ground near the shell casings, a bag of half-eaten French fries and a soda cup on the ground next to a bank of shrubs. There are several cars in the adjacent parking lot. Perruzzi walks around the crime scene, apparently at random, taking it all in. Then she opens the case and starts setting up the total station...

A few hours later she's back at her desk working to produce 2D and 3D diagrams of the crime scene.

>> By Marc S. Cheves, LS

Crime-scene reenactment

Editor's Note: Bill Murphy, Leica Geosystems' technical sales representative in Maryland, brought this unusual application for robotic total station technology to our attention here at The American Surveyor. To find out more, I conducted an interview with Tina Perruzzi at the Prince George's County Police Headquarters in June. Bill Murphy joined us. Together, they staged a reenactment of a typical crime scene in an outdoor courtyard at the headquarters building. Bill graciously offered to be the "body." (Bill has asked us to tell any of his friends and industry associates who may see these photos not to worry. He is happily alive and kicking.)

TAS: Tina, how did you first get involved in this type of work?

Perruzzi: I first became enamored with law enforcement and forensic science after reading *Helter Skelter* and watching the TV series "Quincy." I hold bachelor degrees in forensic science and chemistry from Eastern Kentucky University. After spending a few years in a crime laboratory doing toxicology and gunshot residue analyses, I decided to go to law school. After I graduated, I spent 14 years practicing labor law. I missed forensic science but did not really want to go back to the laboratory. I thought that crime scene work would be interesting and did some ride-alongs with local

police departments, including Prince Georges County police. I was hooked, and so I applied when an opening became available. I started working for the department in April 2002.

TAS: Can you tell us more about your job? What is a typical work day like for you?

Perruzzi: My day might include anything from taking a few photographs or fingerprinting a car to processing a large homicide scene. As evidence technicians, we are called to the scenes of major felonies, most notably homicides, sexual assaults, and robberies. We also respond to calls relating to unattended deaths such as suicides and industrial accidents. We attend autopsies and testify in court. One of the best things about my job is that I have learned so many new skills. Also, while there are some routine aspects to the job, every day is different and you never know what the next call will bring.

TAS: How did you become interested in using the total station for crime scene mapping?

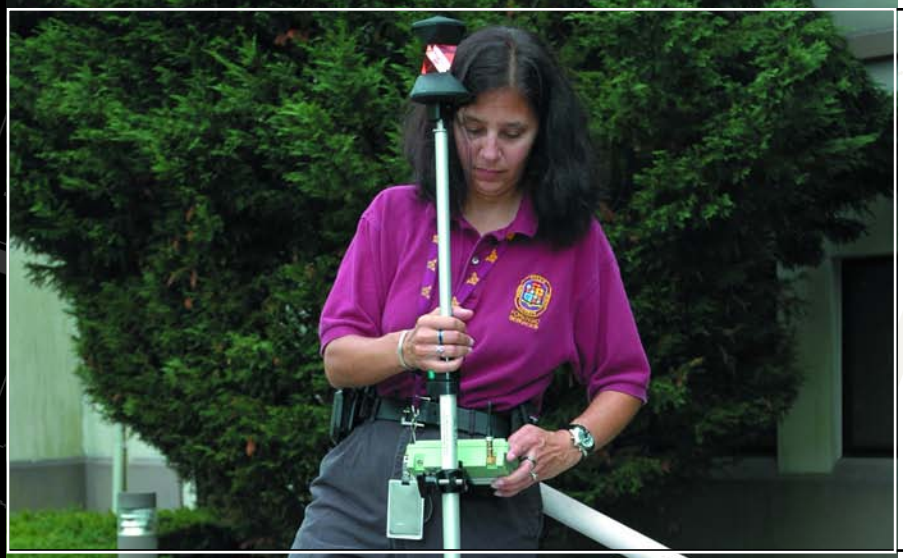
Perruzzi: Actually, the *department had purchased the Leica TCRA1105* robotic total station system before I joined the team here, but it was not being used much. I have always been interested in learning new things, especially when they are technology related. So about a year and a half ago, I pulled it out of the closet and decided to give it a try. I studied the manuals, but they are not written for beginners, and I knew absolutely nothing about the principles of surveying. I eventually figured out how to shoot some points but could not produce a diagram because I did not yet understand the concept of backsighting. After realizing that I was totally over my head, I called Bill Murphy, our Leica representative. He was more than happy to come to headquarters and show me how to get started. I had so many questions I could not ask them fast enough. It's a wonder that Bill could get a word in edgewise. After that first instructive session, I practiced with the total station and acquired enough knowledge to get started.

Murphy: It helped that Tina is a quick learner. Once I introduced her to the basic concepts, she quickly picked up the rest of it.

Perruzzi: Once I mastered the basic concepts of the total station, my next hurdle was trying to learn the software. We had a CAD-based software program that was very difficult for me to learn. I am pretty computer-literate, but CAD software was totally foreign to me. Since I was not working for the department when the initial training on how to use the software was given, I had to learn it on my own. I kept at it, however, and a few months later I was able to produce a basic diagram. At that point, I started taking the total station out on jobs with me. I would map a scene and then download my points into the CAD program before I left the scene so I could make sure that I had all the information I needed for my final diagram. As I continued to struggle with the software, I found that I was spending far too much time completing detailed diagrams. I decided to try to find an easier program that did not have such a steep learning curve. A few months ago, after doing some extensive research, I switched over to Crime Zone, a software package developed by CADZone that is specifically designed for law enforcement forensic applications. This is a powerful, but easy to learn software package. Although I still have much to learn, I am producing diagrams much more quickly, including 3D views of the scene. I now use the total station regularly for outdoor scenes. I have mapped homicides, shootings, death investigations and even a bank robbery.

TAS: Can you describe a typical job?

Perruzzi: Sure. The first thing I do when I get to the scene is walk around the entire area to determine how much of the area surrounding the scene I want to include in my diagram. From there, I try to figure out where to set up the total station so that I can shoot as much of the scene as possible without moving it. I



Crime-scene reenactment

also try to locate a backsight point that will be visible from not only my initial setup, but also from any point to which I move the instrument. I usually shoot curbs and roadways first. We also capture any bits of evidence, such as bullet casings, blood spatter, cigarette butts, food wrappers, items of clothing, shards of glass, cell phones, and anything else that may be useful in recreating the crime scene. I try to shoot reflectorless whenever possible, although it is sometimes difficult in bright sunlight and high heat conditions. I have adopted Bill Murphy's suggestion of using the pole to create an outline of the victim using the robotic feature.

I often find it is quicker and easier to work alone using the robotic mode. It also frees up my co-workers to take care of other crime scene processing tasks such as photographing or collecting evidence. If I need help with the pole and my co-workers are busy, I recruit one of our uniformed officers to help me. On one scene, I had the assistance of an officer whose father was a surveyor so he already had an idea of what I was doing.

Murphy: Tina is a real artist when it comes to creating crime scene maps. She uses the robotic pole almost like a paint brush in outlining the body, roadsides, curbs, cars, trees and other evidence. When shooting a car, she shoots the four axles with the appropriate code descriptors and then snaps the vehicle into place with the CADZone software.

Perruzzi: Bill taught me how to shoot from one location, then move the instrument forward to the next. The other night I had a shooting death in a long parking lot and I had to move the total station several times to get the whole scene.

Murphy: Traversing is something surveyors understand instinctively, but it didn't come naturally to Tina.

Perruzzi: I use the total station mostly for outdoor crime scenes, and sometimes for indoor work if it is a large open space. For houses with smaller rooms, I use the Leica DISTO laser rangefinder instead to measure distances. The DISTO is very easy to use–just point, aim and click. I always take my laptop with me when I go to the scene to

Murphy and Perruzzi on a break from the photo session.

check my work on location. I convert the .gsi file to an ASCII file before I remove the card from the instrument. I import the ASCII file into the Crime Zone software and review the diagram to make sure that everything is recorded properly before I leave. The software automatically connects the dots for data points in the correct order to create straight or curved lines. Once I get back to the office I start finalizing the diagram.

Murphy: We have programmed into the total station a code library specifically for Tina's crime scene forensics application. For instance, EP1 means Evidence Point 1, and V1X1R means vehicle 1, axle 1, right side, and so forth. If necessary, it's easy to add more code descriptors on-the-fly. The instrument automatically produces log files, which are saved in case they are needed for legal evidence. For instance, a defense attorney may ask questions about how the data was gathered, the accuracy of the measurements, when the instrument was calibrated.

TAS: How are your diagrams used? Are they entered as evidence at trial?

Perruzzi: Yes, my total station diagrams have been used for court, grand jury and internal investigations. I have gotten very favorable reviews, especially with regard to the creation of 3D views and "walk-throughs" of the scene. In January, I received a letter of commendation from the director of forensic services for taking the initiative to learn the total station on my own.

TAS: Do you have any advice for other law enforcement departments that may be considering this technology?

Perruzzi: I can't overemphasize the importance of technical support and training. Bill devoted many hours to training me. He was a very patient instructor. Learning the total station was not that hard–it was learning the software that really took time. If I was going to set up a training program for this type of equipment, I think I would teach the total station first and make sure that the individuals using it had a good grasp of how to map a scene using the equipment. From there, I would move on to downloading the information and using the software to create a final diagram. Based on my own experience, it would take at least a few weeks of initial training as well as continuous use in the field in order to become and remain proficient. My ultimate goal is to use the total station to map a scene and then "walk" a jury through the 3D view.

Marc Cheves is Editor of the magazine.