Mapping the Crash Scene
As U.S. highways swell with more traffic each year, one thing is certain for the traffic safety units of law enforcement agencies: more traffic means more crashes, and in turn more scenes to measure. According to statistics from the U.S. Department of Transportation (DOT), 43,443 road deaths occurred in 2006.

Doug Hecox, spokesman for the U.S. DOT, estimates it costs $200 billion for motorists to wait during traffic slowdowns and stoppages due to crashes. In addition to long traffic delays, crashes cause secondary incidents and increased air pollution. “Motorists way in the back of the line may not know there’s an accident, or there may be a hill and they can’t react in enough time,” Hecox says. “We’re trying to change road design to avoid this.”

Pressure to re-open roads closed due to crashes and the probability that an accident with fatalities will face a jury are prompting investigators to eye the latest mapping technology more closely.

Crash scene measuring falls into three distinct categories: manual measurement methods, electronic measurement methods and photogrammetry.

While many police departments face a rise in crashes to investigate, budgets for buying the necessary equipment remains anemic. However, today there is an ample variety of crash measurement tools that can accomplish most mapping requirements and at various pricing levels.

**Laser measuring devices rising in the ranks**

Laser measuring devices, such as those offered through Centennial, Colorado-based Laser Technology Inc. (LTI), are increasingly being used for crash scenes. The LTI laser systems combine reflectorless laser technology and electronic data collection, are easy to use and set up, and require minimal training. Complete LTI mapping systems cost between $5,000 and $9,000, which, for many police agencies, makes them more affordable than total stations or spatial measurement systems.

The Dayton (Ohio) Police Department uses five LTI Impulse 200 range/height lasers with a TDS Recon data collector, from Tripod Data Systems, located in Corvallis, Oregon, and Pocket Zone diagramming software, which Officer Jonathan Seiter, a traffic investigator, says “is a lot cheaper than
buying five total stations.” The department also uses LTI UltraLyte 200 Series mapping systems, which are unique since they can handle speed enforcement and accident reconstruction, making it an easier sell at budget time.

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The Impulse range/height lasers, which can take measurements to non-reflective targets and obtain distances up to 1.4 miles, are lightweight, completely waterproof and can be handheld or mounted on a tripod. “One person can go out and map the scene since our department uses the LTI Impulse lasers,” notes Seiter. Total stations, on the other hand, typically require two operators (except for expensive robotic total stations). LTI’s Impulse 200 lasers also have a built-in inclinometer (tilt-sensor) that allows the user to measure slope-corrected distances, which is needed for 3D mapping.

Finally, LTI allows users to add its MapStar Angle Encoder to an Impulse or UltraLyte laser, which then allows full 3D mapping capability. The angle encoder will calculate a turned, horizontal angle, which is coupled with range and tilt information from the laser. This provides all required data to derive XYZ coordinates for any target.

LTI’s QuickMap 3D (QM3D) accident investigation package has helped the Lake County (Illinois) Major Crash Assistance Team (MCAT) investigate crash scenes quicker and easier. The QM3D consists of an LTI Impulse distance/height laser and a MapStar Angle Encoder. A key capability of the QM3D is its field flexibility, offering three mapping techniques. It adapts to any scene, regardless of size or terrain, and the user can easily transfer all field data points and notations into a CAD drawing program.

Grayslake, Illinois, police officer Joe Manges, who serves with MCAT, recently responded to an accident scene involving a single vehicle crash on a busy, four-lane state road. The road had two curves throughout the 1,000-foot crash scene. Using LTI’s MapStar Angle Encoder, Manges was able to map the scene and reopen the roadway within 2 hours after his arrival.

“We can definitely complete the scene (using an LTI Angle Encoder) a lot faster, and we know for sure it’s to scale,” adds Manges. “We can include 100 times more points this way than we could measuring it by hand, which took several hours. It (the angle encoder) just makes you more thorough in your job, and more accurate.”

Funding enhances availability

If the sticker shock for mapping equipment proves too much for the budget, there is financial help available. According to Al Baxter, administrator for the Accreditation Commission for Traffic Accident Reconstruction (ACTAR), “The first stop they should be making is their governor’s officer of traffic highway safety.” This state government representative should be able to process grant applications to the National Highway Traffic Safety Administration, which offers grant opportunities for technology equipment purchases and other facets of traffic safety.

The grants are helpful if a law enforcement agency wants to purchase just one total station for its officers to...
share, but cannot afford it.

“The next alternative would be a laser mapping device,” says Baxter. “The selling point of getting a total station or a laser, as far as the grant goes, is if you can reduce traffic congestion by opening up a crash scene quicker, or you can get more accurate measurements than some other method.”

Also, suggests Baxter, if a municipality is small, “You can work with your detective bureau and public works people to share equipment like a laser. You have this piece of equipment that’s available for measuring crash and crime scenes, yet it’s good for the public works department if they need to measure road widths or do surveying. It’s a multi-sales point, not just strictly for promoting the measurement of crash scenes.”

With the ever increase in traffic and accompanying crashes, mapping tools are a necessity for all departments. Considering the variety of technology and funding opportunities available, departments should be able to equip themselves for when crashes need to be investigated. It’s time to get smart about crash scene mapping technology.