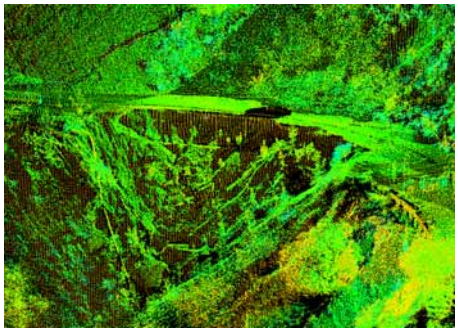
Laser Scanning a Landslide



During the 2004/2005 rainy season, many cities throughout Southern California were affected by landslides, slope failures, and structure damage. Roads were washed away, hillsides slid into homes, and walls collapsed due to fast and furious storm water and saturated soils. One such area was Inverness Drive in the City of La Cañada Flintridge.

Inverness Drive is a residential street that connects hillside residents with the City. The intense rain caused two sections of the road to fall away, one 90-foot-long section and one 40-foot-long section, leaving the road impassable by any vehicles. The road is located on a steep slope surrounded by hills and valleys that made it extremely difficult to access the areas of failure for investigation and surveying.

For this project, Land Surveyors worked with high definition laser scanners. Laser scanning was used as an alternative way to survey the failed slopes and roadway. Laser scanning allowed the surveying to be performed without placing staff in danger.

Land Surveyors worked to perform the laser survey of the slope damage on Inverness Drive. By setting up the laser scanner at five separate locations along the edge of the slope, “shadows” behind trees and solid objects were avoided. A “point cloud” was generated from the laser scans. A point cloud is literally millions of points about 0.05 feet apart defining the slopes and roadway. The laser records unique X, Y, and Z coordinates for every one of these points. The “point cloud” was then used in the office with the laser scanning software to create sections, contours, topographic maps, and point elevations. The results were amazing! (See images).

The software allowed the Land Surveyors to move the view to see the area from any angle. Land Surveyors were able to zoom in on any feature for accurate elevations (i.e., manhole rim, pavement joints, etc.) thus avoiding sending the survey crew out for additional information as the design progressed.

At the beginning of the project, two design solutions were considered: mechanically stabilized earth slope repair and soldier pile retaining wall repair. The laser-scanned data and software allowed Land Surveyors to obtain accurate cross sections at any location as necessary to assist in the selection of the design solution and the design itself. The selected design solution was the mechanically stabilized earth slope repair.

The ability to laser scan the damaged area provided a safe, accurate alternative to traditional survey methods and expedited the design solution.