

Case Study: Surveying an Intersection, Anaheim, California

Date: October 2014

Location: La Palma Ave, Anaheim, California

The Survey

The required task was to survey and draft a 3D CAD plan, with a measurement accuracy of better than 2 centimeters (5-6 hundredths of a foot), of an intersection..



Original Effort Estimate

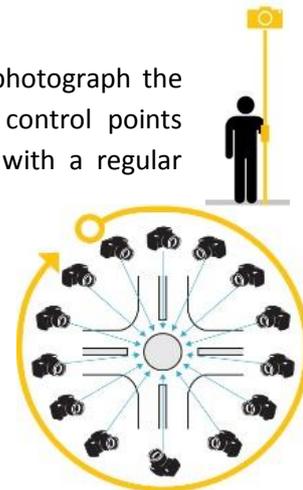
The original effort estimate for the surveying project, using conventional surveying techniques, was two days. This appraisal was based on one day in the field, using a Total Station device from two different stations, and one day in the office to draft the detailed CAD plan of the intersection based on the Total Station measurements and the sketch done in the field.

A key challenge related to the survey was occupational safety hazards due to heavy traffic through the intersection during most of the day. As a result, the survey was planned to be carried out at night, or during a weekend.

Actual Required Time Using DatGram™3D

The actual time to survey and draft a 3D CAD plan of the intersection was less than 6 hours.

The time spent in the field was only 40 minutes: 20 minutes to photograph the intersection, and an additional 20 minutes to measure several control points throughout the intersection. The intersection was photographed with a regular Samsung Smart Camera NX mini camera (20-megapixel resolution) with a 9-mm wide-angle lens. A total of 50 images of the intersection were made from the perimeter of the intersection toward the middle, with an image taken about every 5 meters (25 feet). To minimize foreground obstructions in the images, the camera was elevated above ground level by mounting it on an 8-meter (25-foot) telescopic pole, and was remotely controlled using the Samsung smartphone application via Wi-Fi.



It is important to point out that, by surveying the intersection with a camera and a pole, the field crew was never required to enter the intersection. This permitted carrying out the survey during daytime while conforming to the strictest occupational safety requirements.

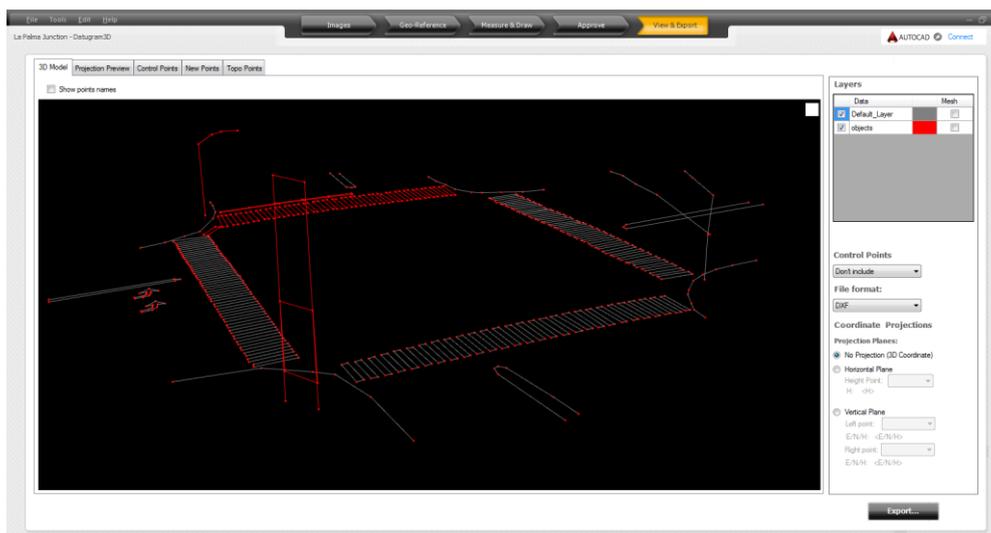
A total of 18 points were measured throughout the intersection using a prism-less Total Station device; 10 of these points were used as control points for the geo-referencing of the images. The selected control points were high-contrast, well-defined objects such as corners of road signs, corners of white marks painted on the road, etc.

The actual time in the office to geo-reference the images and draft the 3D CAD plan of the intersection directly on the images was about 5 hours.



Results

A 3D CAD model of the intersection in DXF format was generated by drafting directly on the oblique images using the DatuGram™3D application. In addition to the DXF file, a list of the measured points in PNT format was generated. This included the point names, codes, descriptions, coordinates, and their measurement accuracies in all axes. Overall, 547 new measurements were made from the images. The measurement accuracy of all points was better than 2 centimeters (5-6 hundredths of a foot) in both position and elevation.



Lessons Learned

The survey in the field using a regular camera mounted on a telescopic pole proved to be rapid, effective and accurate and, furthermore, much safer, compared to surveying using conventional techniques. Overall, the surveyor saved significant field and office time – from one day to less than an hour in the field, and from one day to less than 5 hours in the office.