

Colorado DOT Highway Project

Cyrax® used to survey 22 bridges and more in 40 days with no lane closures

Scope Topographic survey along 18 miles of freeway; deliverables as 2D planimetric drawings and DTM's for contours

Contractor/Designer Kiewit Construction and Parsons Transportation

Date 2001



"I cannot imagine anybody doing 22 bridges and associated topo in 40 days- that's roughly 2 days per bridge — without using Cyrax — and without any inconvenience to the daily traffic. The challenge in the office was to take the massive amount of data from the scanner and strip out the necessary information. We've been able to use the Cyclone software to speed up that process."

Tom Service, PLS, VP, David Evans Associates

Project Facts

Field: 40 calendar days; 2-person crew per scanner; 400 scans

Office: 40 calendar days; <1.5 office person per scanner

Deliverables: MicroStation 2D planimetric files and DTM's for contours

Customer Benefits

- No lane closures
- On time delivery with very tight deadlines (<2 days/bridge)
- Much more complete geometry capture for undersides of bridges enabled better quality clearance checks

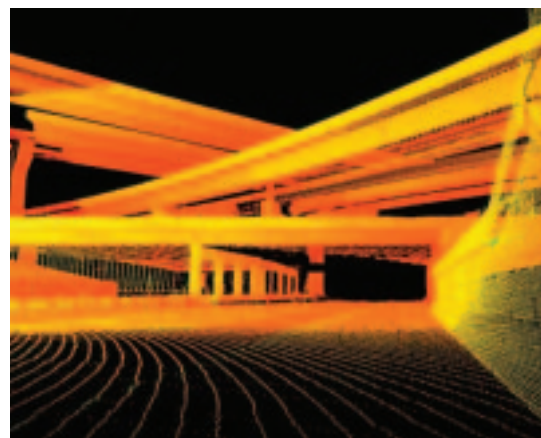
Background: The Colorado DOT's Transportation Expansion (T-Rex) project involves about 18 miles of I-25 freeway corridor through Denver. An important project goal is to accommodate addition of light-rail along sections of the interstate. This involves lowering parts of the freeway, tearing out existing structures, and adding new structures. David Evans and Associates (DEA), an ENR Top 100 firm, was hired by Southeast Corridor Constructors (Kiewit Construction and Parsons Transportation Group) to provide surveying services for the project. A key factor behind their selection was DEA's proposal to perform the challenging survey work quickly, without any lane closures on the already congested freeway, an important public accommodation. A total of 22 bridges needed to be surveyed to 0.15 of a foot accuracy along with roadway topo's, several 6-lane side streets, heavy rail and light rail...all in about 40 calendar days.

Project Workflow: DEA used a combination of surveying methods to accomplish the challenging project. Traditional total station & GPS methods were used for much of the roadway and control; these were supplemented with Cyrax 3D Laser Scanning for the underside and vertical portions of the 22 bridges, plus other complex structures and roadway elements. In addition to using their tripod-mounted Cyrax 2500 scanner, DEA also utilized a second, Cyrax 2500 scanner and a van with an extensible arm for elevating the scanner for selected parts of the project. The vast majority of the scanning work, however, was done with scanners mounted on tripods; tripod mounting achieved a 210 foot range for roadwork and was quicker to set up than using the van which had a range of approximately 250 feet.

Scan teams selectively fine-scanned targets to tie scans to control. While the scanner was automatically scanning, the 2-person crew was able to survey scan targets and perform other survey work. The crew delivered scans daily to the office, where a modeling crew took over. DEA used the following workflow:

1. Process survey data in LISCAD (create control point coordinates).
2. Load survey control data into Cyclone and register scan data (includes quality control check of registration).
3. In Cyclone, create 3D polylines for all key break-lines and bridge. Assign colors to line types and put on appropriate layers for later use in AutoCAD.
4. Launch AutoCAD from Cyclone and save file as an AutoCAD file.
5. Review line work in AutoCAD and correct any layer discrepancies.
6. Translate from AutoCAD to MicroStation (InRoads) for final file/drawing preparation.

Final deliverables were MicroStation files for 2D planimetric drawing files and a DTM (digital terrain model) for contours. The client can use planimetric drawings for their horizontal designs and the DTM for vertical calculations. In the end, deliverables from Cyrax/Cyclone were combined with conventional, aerial and GPS data to create final maps. DEA delivered the survey on time and on budget without any lane closures.



CYRA

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