

Toll Plazas: Economical 2D As-Builts from Point Clouds

"Not only did Cyrax and CloudWorx help us win the as-built portion of the project (40% cost savings to the client and faster delivery), but we also had a very positive project execution experience with CloudWorx. It enabled our CAD technicians to quickly learn how to efficiently process point clouds into 2D drawings directly inside MicroStation."

Greg Lawes, Manager, Laser Scanning Services, Washington Group International

Scope 2D MicroStation as-built deliverables for seven (7) toll plazas; from grade to plaza roof, bullnose to bullnose, and curb to barrier; two plans and two sections per plaza

Owner Delaware River Joint Toll Bridge Commission

Date 2002

Background: The Delaware River Joint Toll Booth Commission awarded a contract to Washington Group International (WGI) for program management of E-ZPass electronic toll collection implementation at seven (7) plazas. The project included providing accurate as-built drawings (to a demanding schedule) of the existing plazas for vendors to design equipment configurations. WGI received competing as-built proposals based on traditional surveying/drafting and based on

accuracy and geo-referencing to 6" hemispherical-style targets (that were also surveyed). Digital photos were also taken to aid office processing.

Office work consisted of two parts. First was clean-up and registration/geo-referencing of scan data in *Cyclone™*; data clean-up included removing points captured when vehicles had passed through the scan beam. Second was creation of 2D drawings, which was done in MicroStation using CloudWorx. This MDL application let the CAD drafter easily view and manipulate large scan data sets (e.g. 400 Mb) directly in MicroStation without having to import scan data into MicroStation. CloudWorx tools were used to cut slices through point clouds representing section and plan views. CAD drafters used MicroStation tools to "digitally trace" over point cloud slices, snapping to points along the slices in MicroStation to create 2D vector lines.

Half-day training enabled each operator to be "production-efficient". The quickness of the training helped deliverables to be ready within three (3) weeks of the first scanning.

Another key benefit of scanning was the ability to provide additional data to vendors and designers as needed, without having to return to the site. Initially, CAD technicians provided additional data upon request; ultimately, CloudWorx for MicroStation was installed for an internal designer, who used the point clouds directly to design overhead sign structures for the project.



Cyrax® laser scanning and CloudWorx™ for MicroStation drafting. The *Cyrax* /CloudWorx proposal offered >40% cost savings, a shorter proposed schedule, a safer means of data collection, a faster way to get additional information without revisiting the site, and the avoidance of lane closures during field data collection. The project was carried out within budget and on schedule.

Project Workflow: A *Cyrax* 2500 was set up on the side of each toll plaza, safely out of traffic. To maximize scan density on the road surface, a lift truck was used. A scan density of 3.6cm point-to-point spacing at 50m (1.8cm spacing at 25m) allowed both the creation of deliverables to the required

Project Facts

Field: 2-person crew; 5 hrs scanning per plaza; one plaza per day

Office: 4 to 5 person-days per plaza

Deliverable: 2D MicroStation drawings

Benefits

- 40% cost savings vs traditional survey/drafting
- Faster project completion
- More complete data; no site revisits needed
- No lane closures
- Overhead sign structure design based directly on point clouds