

# Condition Assessment of Old Suspension Pipeline Bridge

## Cyrax® provides more confidence in bridge condition

**Scope** 250' long x 10' wide bridge plus slopes; output as AutoCAD files  
**Owner** City of Aurora, CO  
**Date** 1999



*"The scanned image allowed us to create an accurate as-built of the pipeline bridge for a minimal cost. The new process greatly enhanced the inspection results while reducing the risks associated with physical surveying of the structure."*

Larry Catalano, Principal, Farnsworth Group

**Background:** In Aurora, Colorado, a 30-yr old suspension bridge for a 66" water pipeline crosses over an emergency spillway from nearby Cherry Creek reservoir. Over time, the steep banks of the spillway have eroded. Movement of the banks caused a security fence next to the pipe bridge to fall down. Furthermore, run-off from the banks had silted over the pipe and anchor cables, neither of which was designed to be buried. This situation raised general concern with City of Aurora authorities about the current stability of the embankments and of the pipe/bridge structure.

As a result of their concerns, the City of Aurora retained the Farnsworth Group, a national, multi-disciplined, architectural and engineering firm, to (1) assess the actual condition of the pipe, bridge, and spillway banks and (2) recommend improvements, as appropriate. In particular, the Farnsworth team was tasked to determine if there had been any significant structural movement over time (e.g., stretched cables or settling of towers) and if the existing embankments were still stable. In order to capture accurate, detailed geometry of the pipe, bridge and steep slopes, Farnsworth turned to 3D Scan, LLC (Grand Junction, CO) and their Cyrax system.

**Project Workflow:** A total of 12 scans were executed – from both banks of the channel - to capture the anchor foundation and cables to the superstructure, the 250-foot span of the bridge, and the opposing embankments. A two-person crew from 3D Scan was able to geo-reference and register scans taken from different set-up points by placing 14 targets on and around the bridge. The targets were surveyed and tied to site control as well as fine-scanned.

Deliverables from 3D Scan LLC to Farnsworth were (1) a 3D AutoCAD model of the structure and (2) contours of the steep embankments. In the office, 3D Scan personnel used Cyra software to register the Cyrax point clouds together and create a single, composite file (accurate to 1/2"). They then processed the registered point cloud of the structures into a 3D

model, also with Cyra software. This model was exported to AutoCAD. With the AutoCAD model in hand, Farnsworth personnel compared about a dozen critical points on the pipe and associated structure against original 2D construction drawings, looking to identify meaningful differences in geometry. They found none.

Contours of the embankments were also generated using Cyra software. Farnsworth provided these contours to a geotechnical subcontractor (J.A. Cesare & Assoc.) for subsequent slope stability analysis. The analysis showed that the embankments were still stable, even considering the erosion that had taken place. Overall, the structure and site were determined to be in sound condition.

### Project Facts

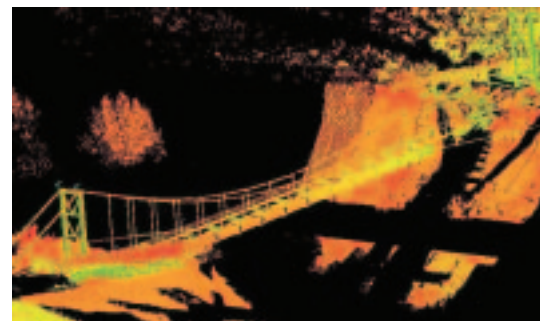
**Field:** 1 day; 2-person crew; 12 scans

**Office:** 6 days

**Deliverable:** 3D AutoCAD model and contours, with overall accuracy of 1/2"

### Customer Benefits

- Complete, accurate geometry of structures and embankments gave client more confidence in the overall condition assessment
- Economical means of capturing and modeling the structures and embankments
- Scan data as high-quality reference for future condition assessments
- Safe means of otherwise hazardous field data collection



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