3D Laser Scanning for Modeling / Monitoring Geohazards

by:
Tom Rayburn, PS
& Richard Mays
Why Scan?

1. When the survey measurements must be non-contact
2. When the survey has complicated content
3. When the site is hazardous to occupy
4. When the site has limited access or restricted availability (i.e. only accessible during limited time windows)
5. When scanning provides added confidence level. A typical scan will contain millions of points and yet only hundreds or perhaps thousands of points are extracted and provided to our clients. For each point extracted there will be scores of points that support the results. Compare this to a discreet point survey where an erroneous or a suspicious point may require a revisit to site, even if it is to prove that you were correct.
Scanners Utilized

**Leica ScanStation 2**
- 50,000 Points Per Second
- 300m Range
- ±4mm Accuracy (Raw Data)
- ±2mm Accuracy (Modeled)

**Riegl RMS-360**
- 12,000 Points Per Second
- 200m Range
- ±6mm Accuracy (Raw Data)
- ±3mm Accuracy (Modeled)
Survey Remote/Hazardous Areas Safely

320 ft. highwall – About 60 million points safely collected
I-64 / I-77 Retaining Wall Deformation Monitoring
I-64 / I-77 Retaining Wall Deformation Monitoring
The Scanner Trailer was designed to provide the necessary height to scan all the walls from the eastbound shoulder while maintaining maximum stability for the scanner.
Wall Sections Modeled from Scan Data

Upper Walls

I-64 / I-77 Westbound

Middle Wall

I-64 / I-77 Eastbound

Lower Wall
Section View of Modeled Wall Section
Other Projects of Interest

- ODOT / University of Akron – Slide Monitoring
- Mine Site – Before & After Construction Scans
ODOT / University of Akron – Slide Monitoring

POINT CLOUD SHOWING 3 SCAN POSITIONS & DATA COVERING ENTIRE JOB SITE

COLORIZED POINT CLOUD SHOWING REALISM OF DATA

PLAN VIEW OF AUTOCAD DELIVERABLE

3D VIEW OF SECTION & PIPING FROM AUTOCAD DELIVERABLE
Mine Site
Aerial Photo of Site Before Construction
Mine Site – DTM of Site Before Construction Created From Point Cloud Data
Mine Site - DTM of Site After Construction
Thank You!

Any Questions?