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Introduction to Static LiDAR Scanning

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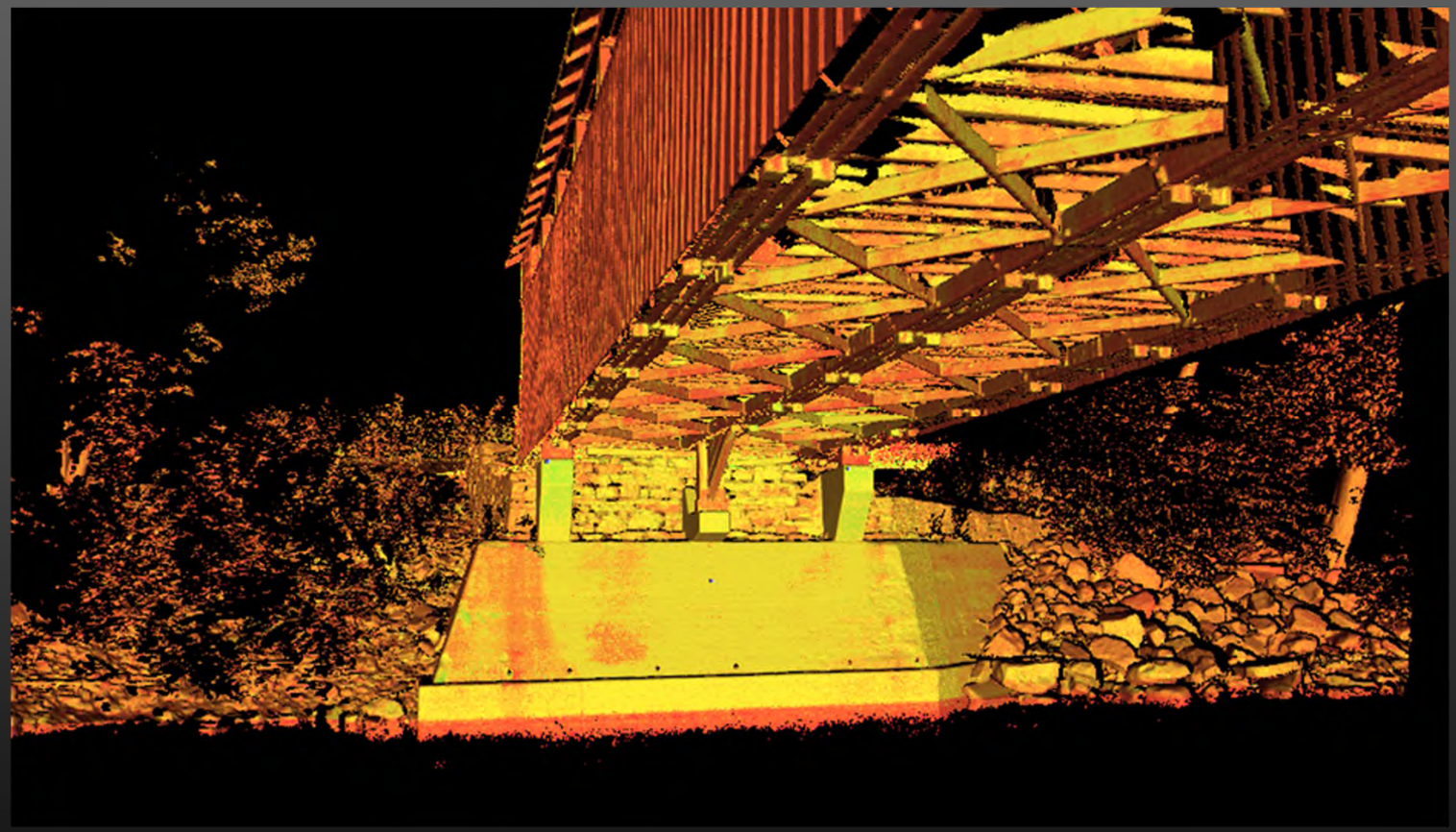
LiDAR Scanning Overview

- Scanning background
- Applications
- Strengths
- Weaknesses
- Scanning Examples



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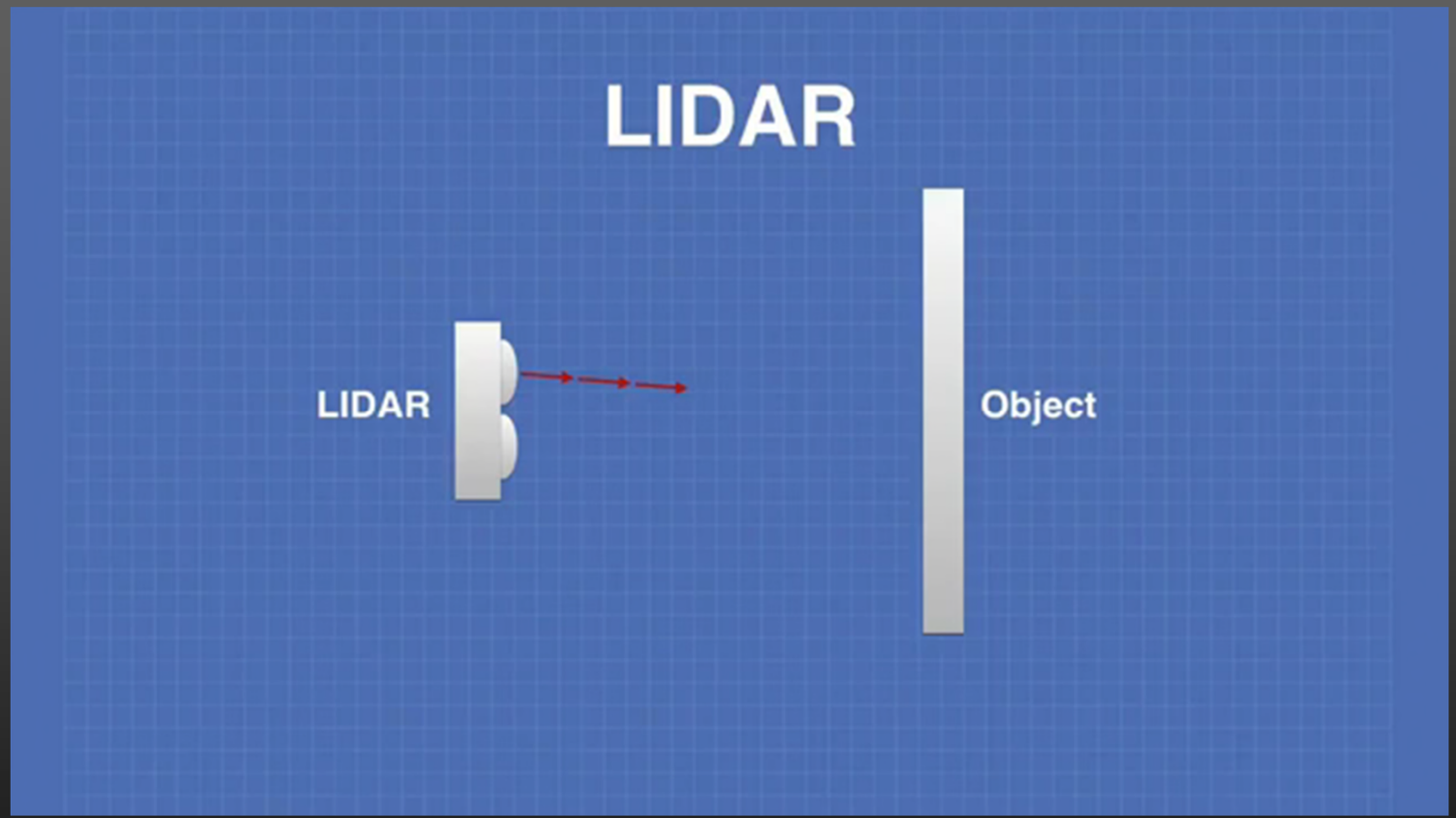

LiDAR = light detecting and ranging

Types of Scanners

- **Airborne**
  - Aerial Platform LiDAR
- **Terrestrial:**
  - Mobile Ground LiDAR
    - Used by autonomous vehicles
    - Cars/boats
  - Static LiDAR
    - Set up on tripod

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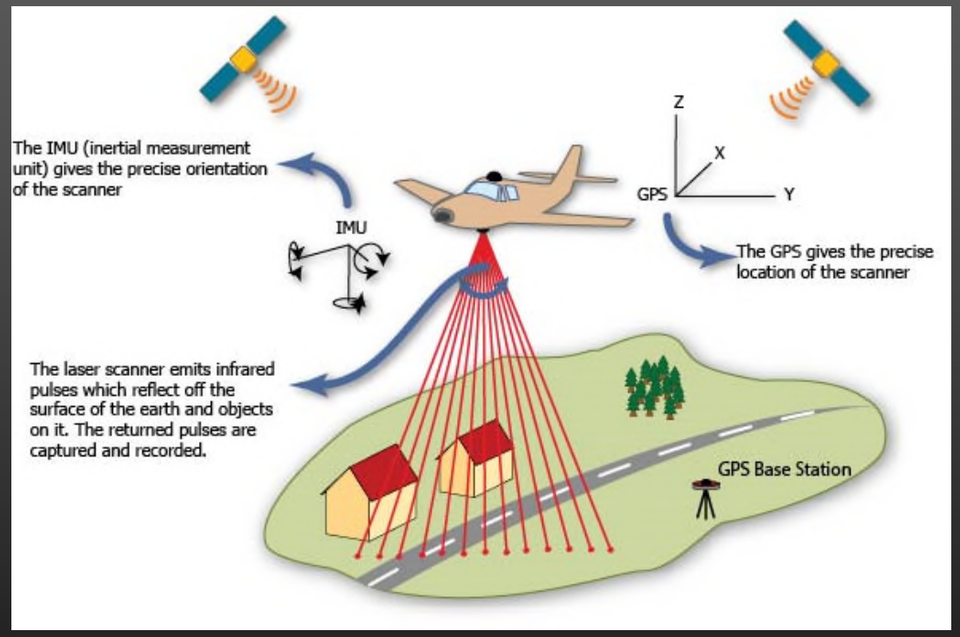
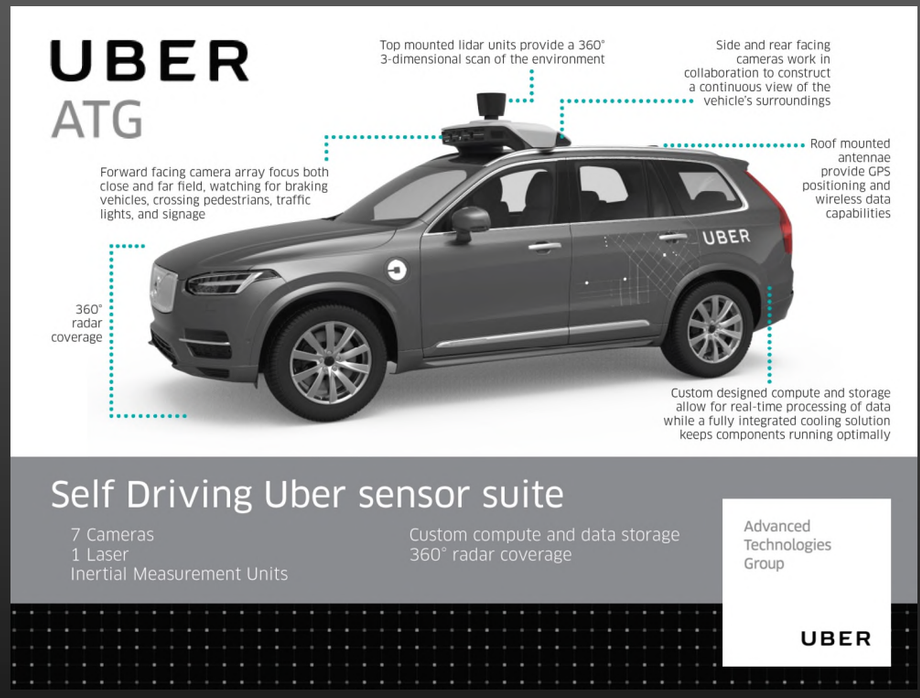
Airborne Scanners



Gmv.cast.uark.edu

Mobile Terrestrial Scanners



Techcrunch.com

Static Terrestrial Scanners

Basic types of terrestrial 3D laser scanners (TLS)-a brief overview. A: Faro Focus 3DX130, B: Leica C10, C: Riegl VZ serie, D: Topcon GLS 1500, E: Surphaser 105HSX, F: Stonex X300.

Researchgate.net

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Applications

- Land Surveying/Civil Engineering
- Geological/Ecological Monitoring
- City Planning
- Architecture
- Archaeology
- Crime Scene Preservation (Forensic)
- Video Gaming

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Land Survey & Engineering

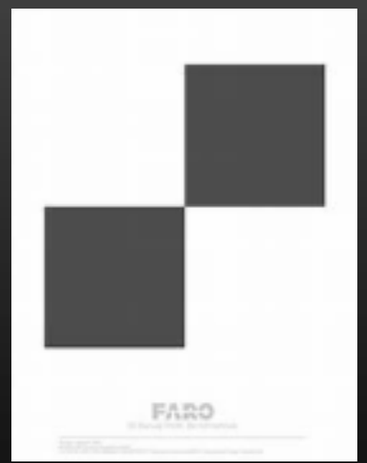
- **Structure or Site monitoring**
  - **Retaining walls**
  - **Pavement**
  - **Bridges**
- **As-Built Surveys**
- **Historical Preservation**
  - **Interior and exterior of structures**

Geological & Ecological Monitoring

- **Mining**
  - **Monitor unlined tunnel**
  - **Monitor for support structure deformation**
- **Analyze hard to reach rock structures**
- **Slope monitoring**
- **Measure leaf density of vegetation**
- **Capture existing stream bank conditions**

Survey Control

- Establish survey control
  - Network of control points – known coordinates
- Can provide different coordinate systems depending on need
- Tied to survey control by spheres and checkered scan targets



Workflow (cont.)

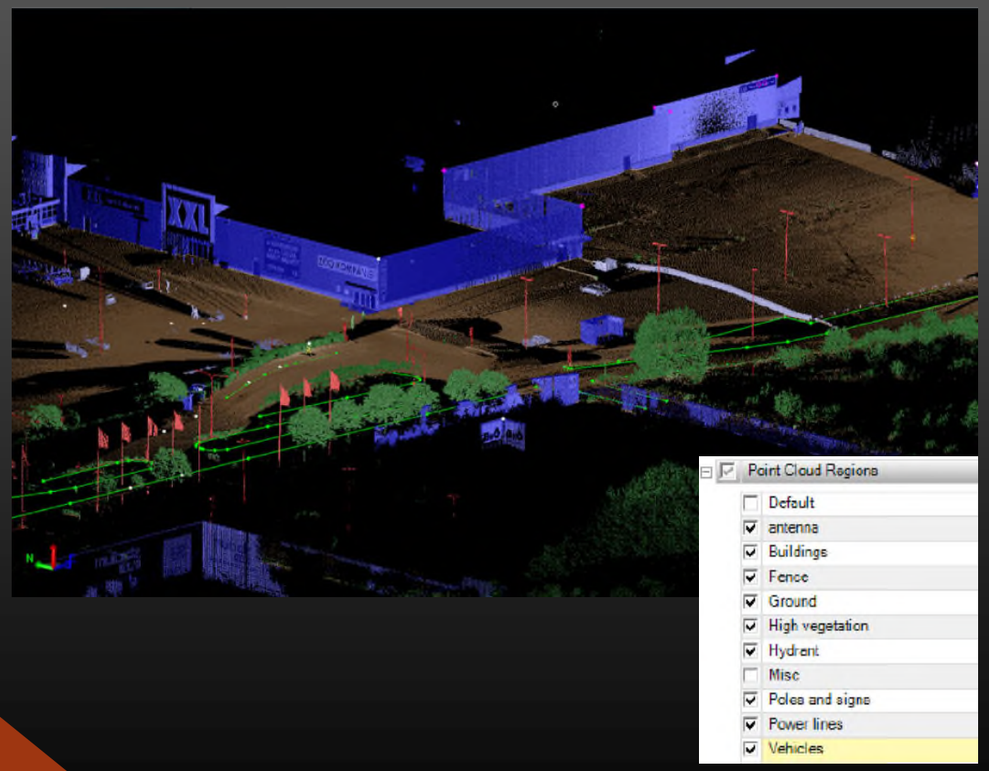
Office

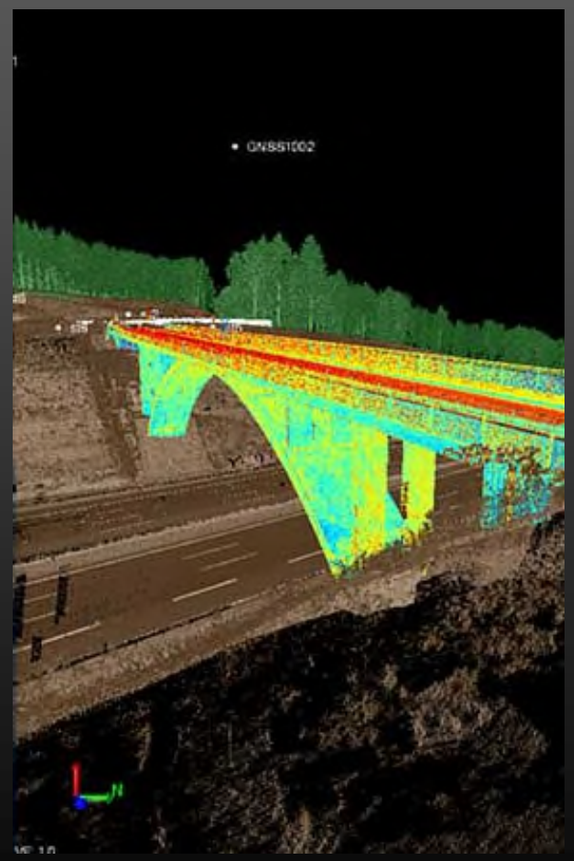
- Process and adjust point cloud
- Classify the point data
  - Most scan processing software automatically classifies or moves like points to specific feature layers

Before Classification with image overlay.

Workflow (cont.)

- Further review of layers is required
- Create classification layers and classify as necessary

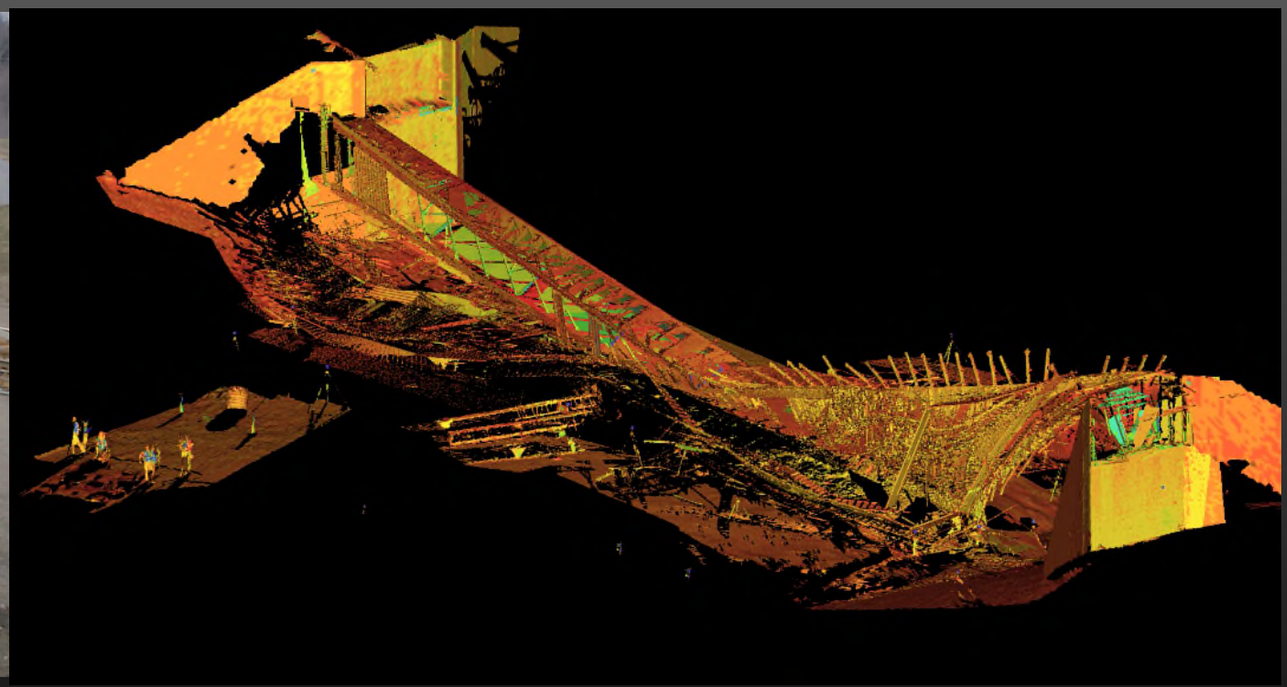




After classification

Fisher Scanning Examples

- Marcy Pedestrian Bridge Forensic Survey

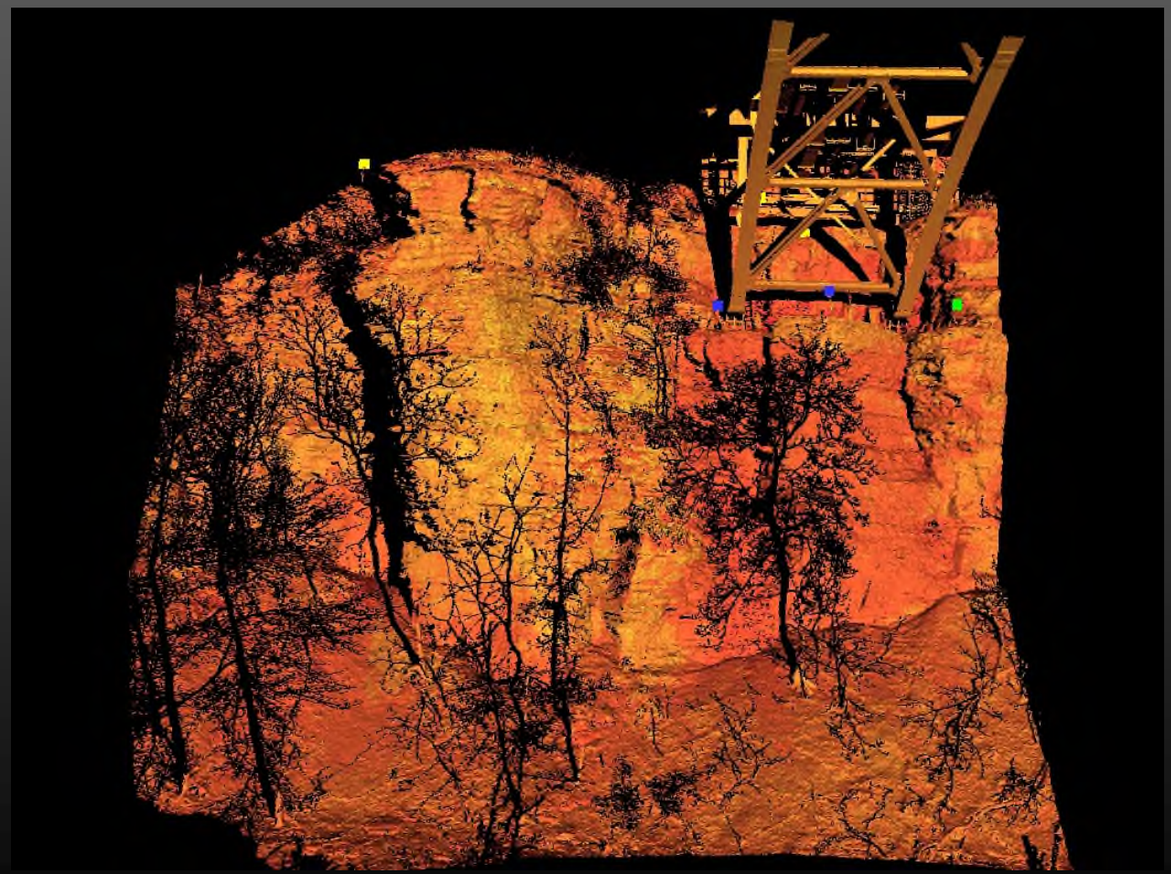


Fisher Scanning Examples (cont.)

- Calspan Helium Tank As-Built Survey

Fisher Scanning Examples (cont.)

- Thurston Avenue Bridge Topographic Survey



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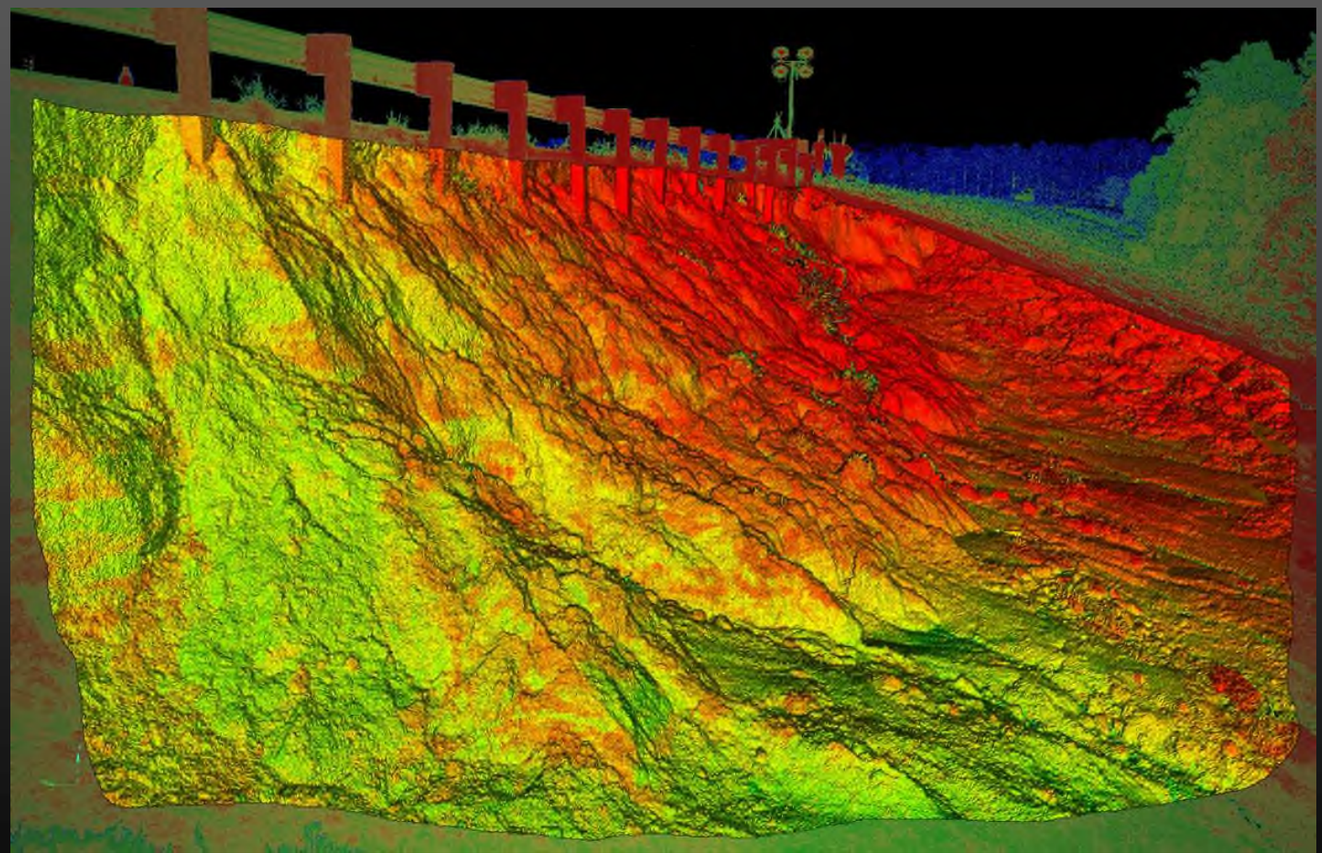
Scanning Examples (cont.)

- Exposed Slide Scan
  (by others)



Strengths

- **Assurance**
  - Scan data is adjusted to survey control after scans are registered
- **Safety**
  - Capture valuable data in areas where field crews may not be able to reach
  - Elevated platforms, confined spaces, busy roadways, etc.
- **Thorough**
  - Generally, no bad shots on break lines or missed features
- **Superior to traditional surveying for volume surveys**
  - Gets all bulges and voids
  - More accurate with dense point clouds.
- **Reduces 2nd trips**
  - Point data extends beyond area of interest (data in the can)
  - Able to pick additional features from point cloud

Weaknesses

- **Reflective Surfaces**
- **Snow**
- **Rain**
- **Vegetation**
- **More labor intensive in the office, although, the time balances out.**

Questions?

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Sources

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