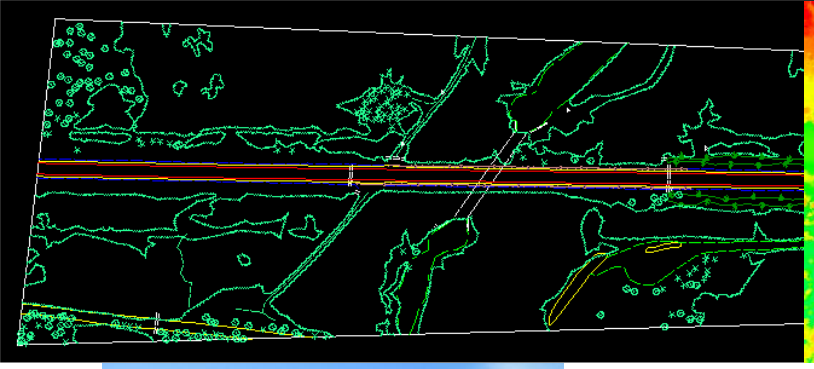
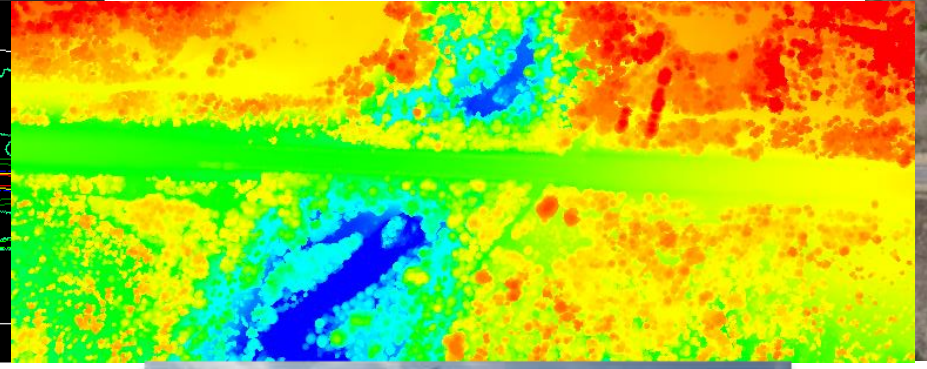




MnDOT Photogrammetry & Remote Sensing

DEPARTMENT OF TRANSPORTATION

Joke

What do you call a map guide to Alcatraz?

Answer

A Con Tour Map

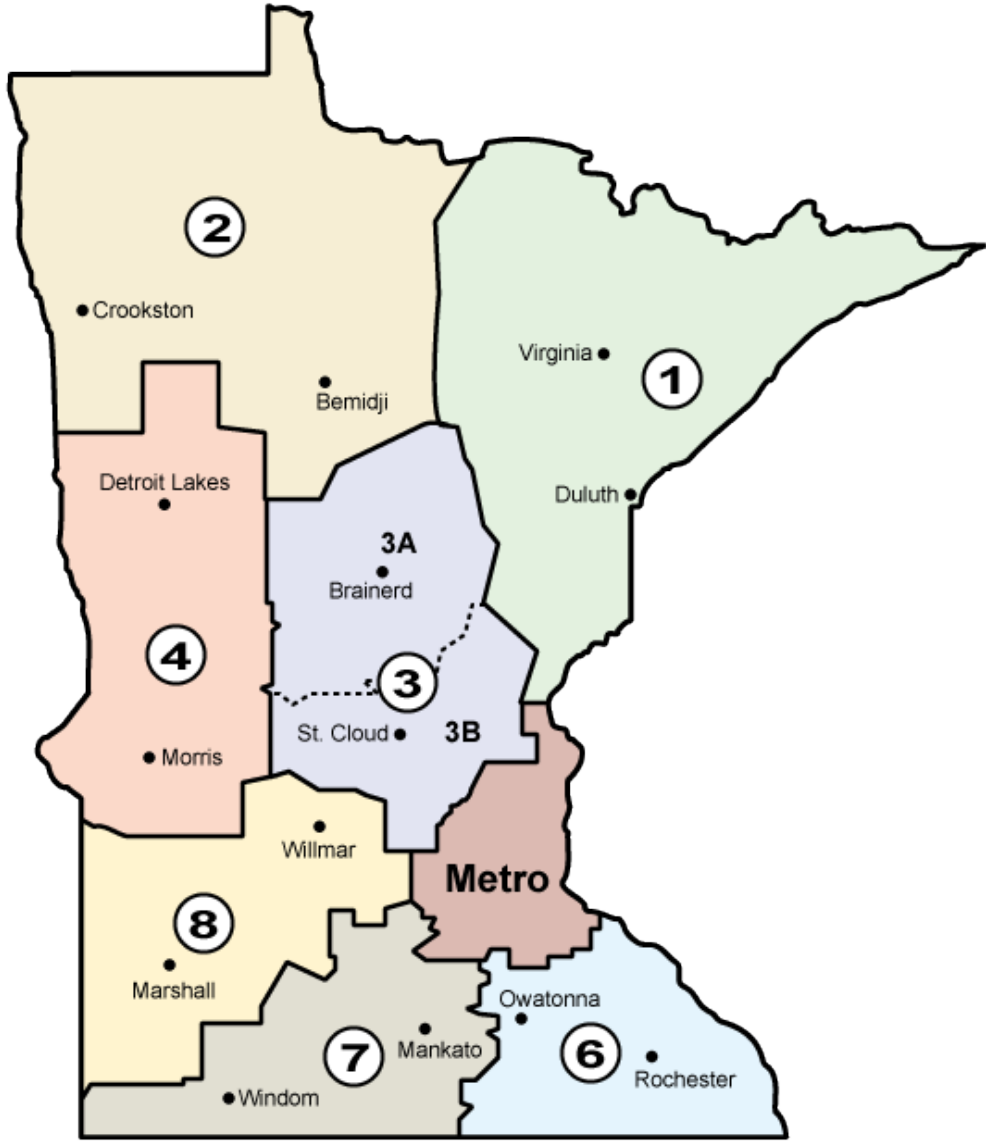
Photogrammetry and Remote Sensing at MnDOT

Who we are

- Part of the Office of Land Management
  - Located in St. Paul – Central Office
- 13 employees
- 5 ASPRS Certified Photogrammetrists
- 1 ASPRS Certified Lidar Technologist
- 3 FAA Certified Remote Pilots
- Two subgroups with field operations
  - UAS
  - Mobile Mapping

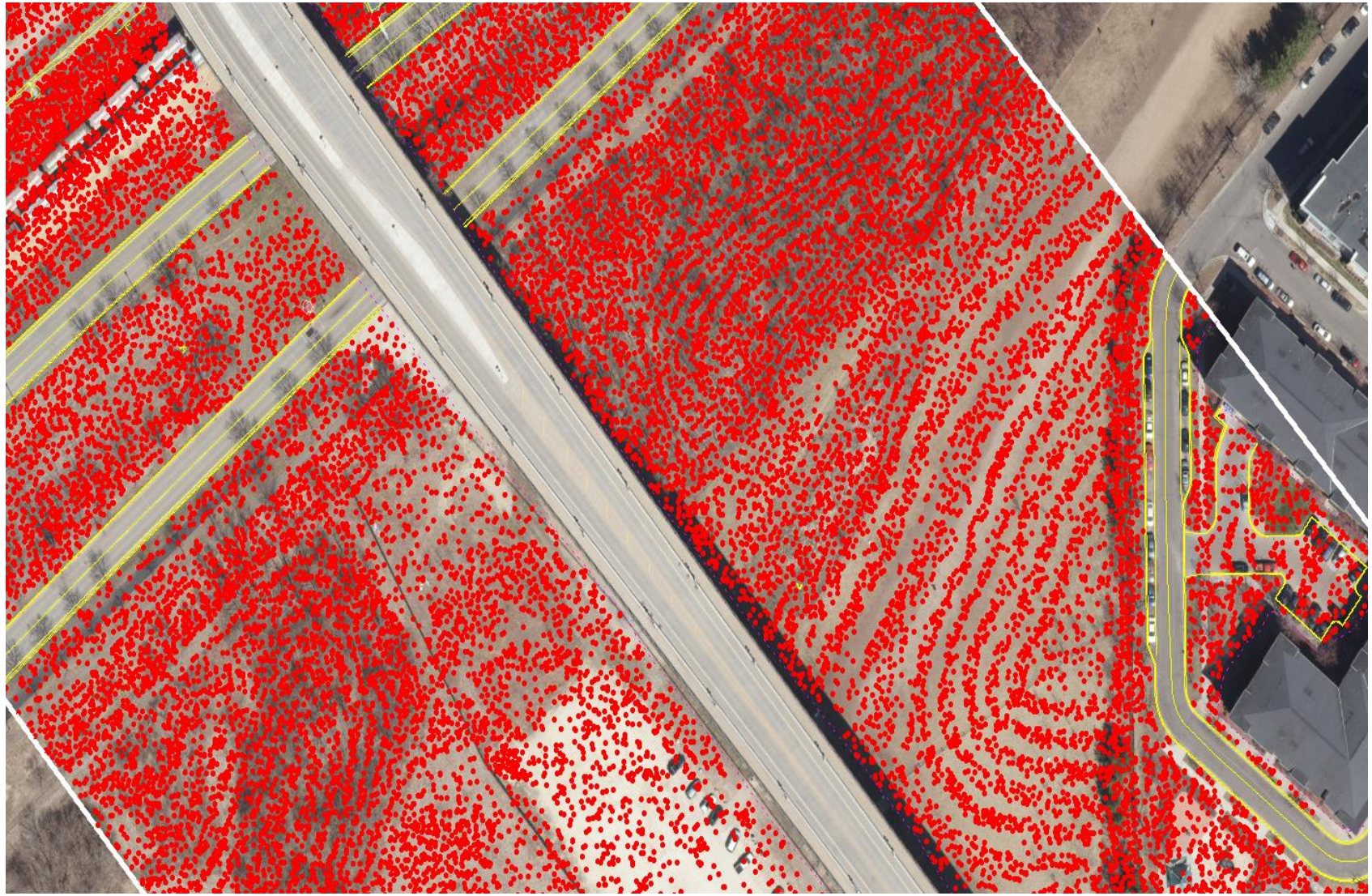
What we do

- The Photogrammetric Unit provides statewide photogrammetric and remote sensing products and services.



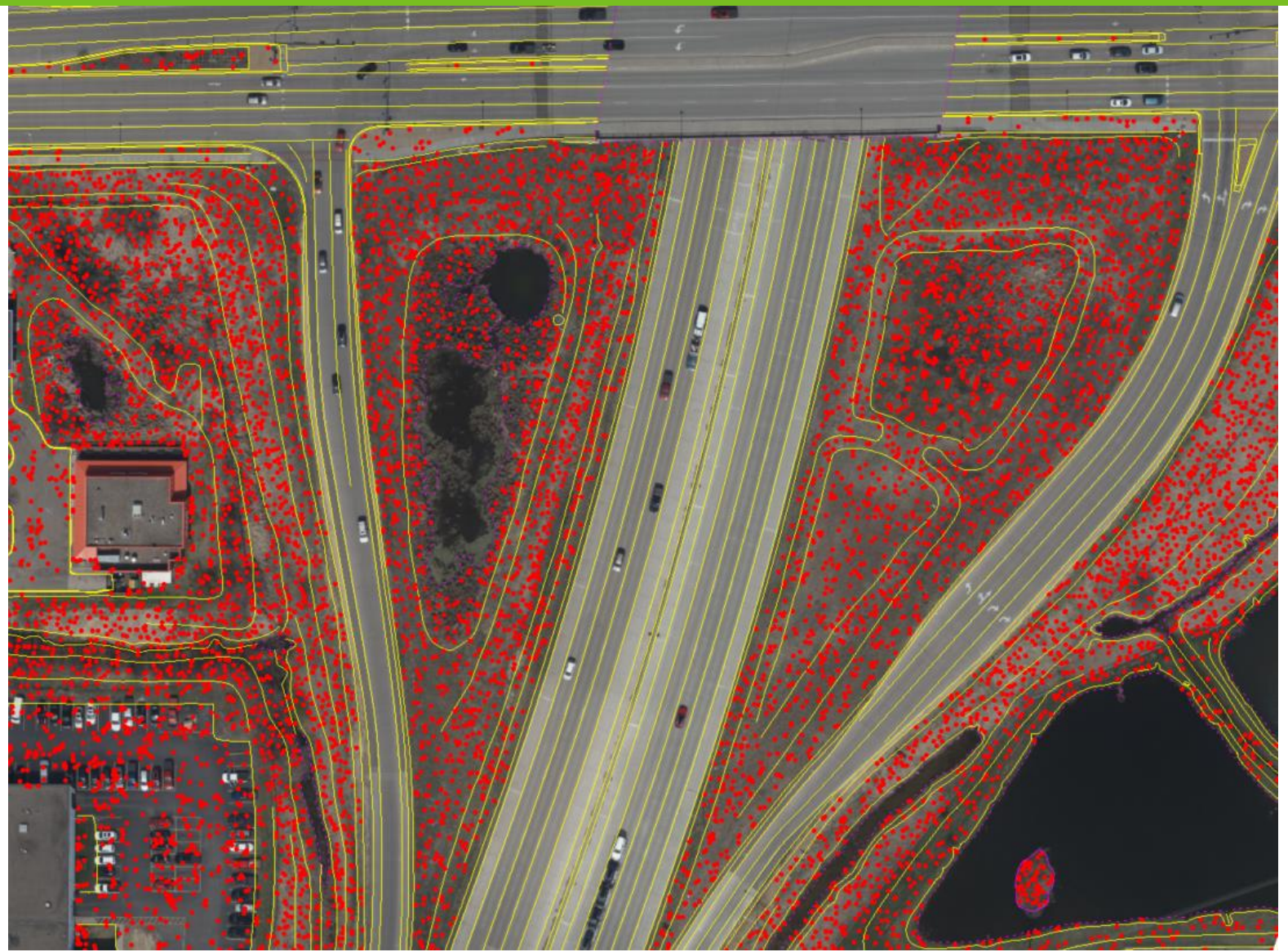
Pre 2020 Airborne Lidar

- Sparse break lines
- Void of water only



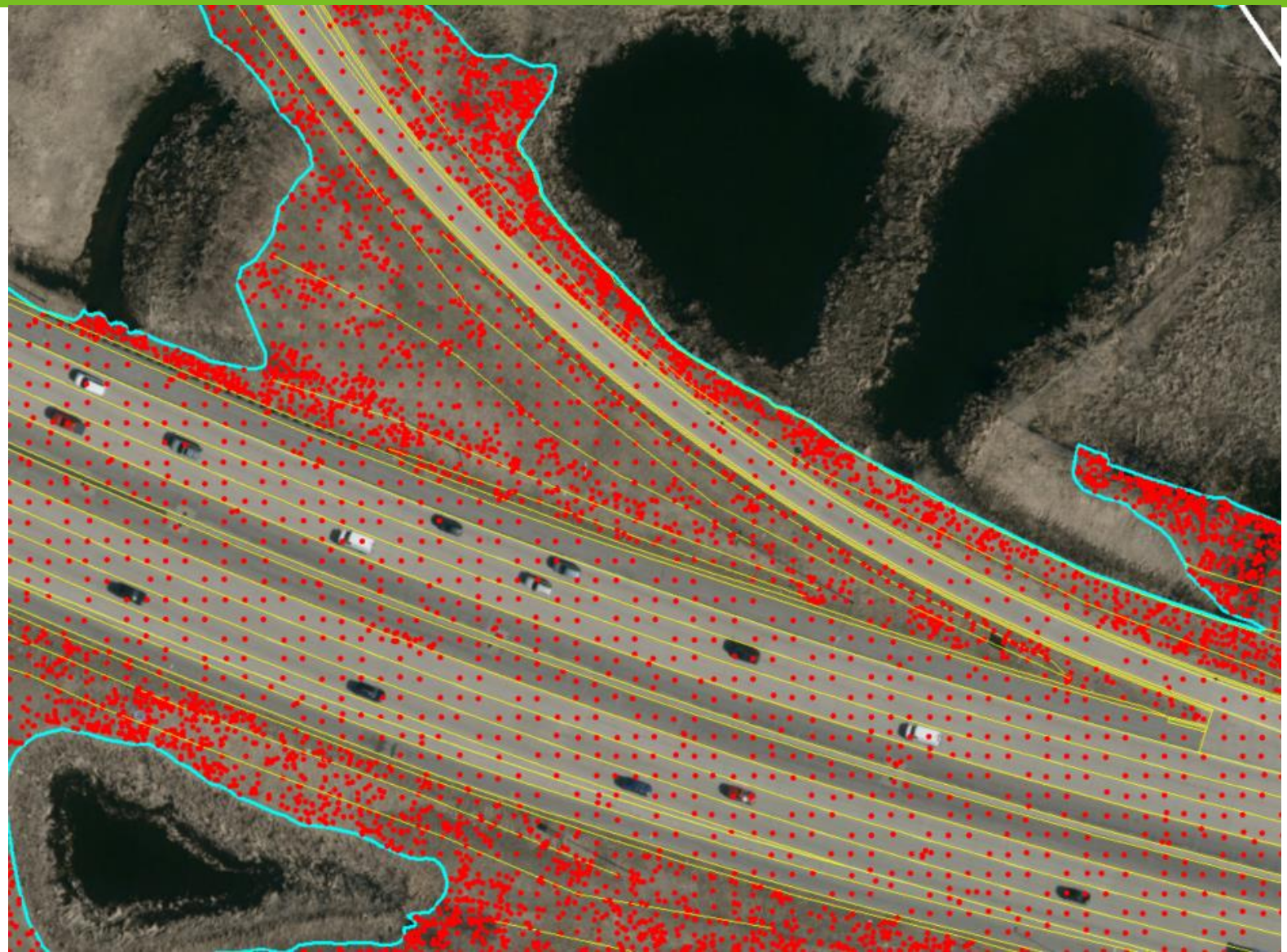
2020-2021 Airborne Lidar

- More break lines
- Void water only



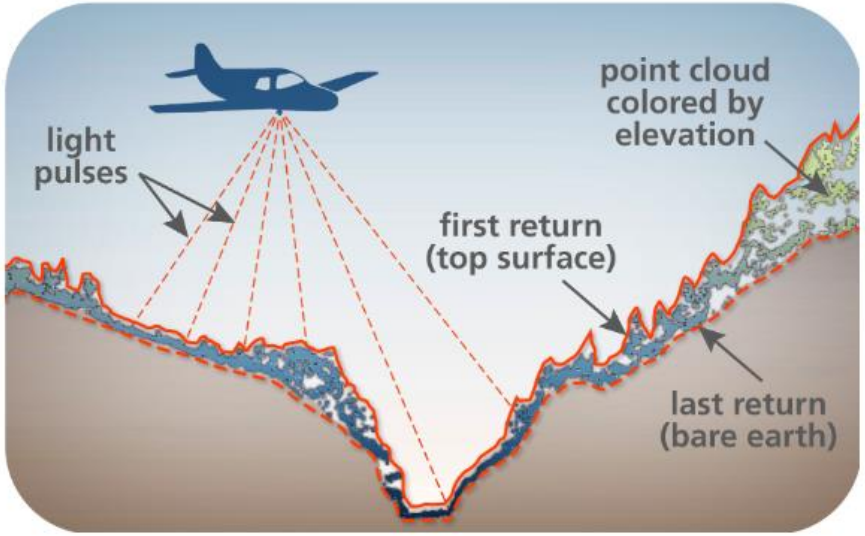
Post 2021 Airborne Lidar

- More break lines
- Low confidence voids
- Stereo adjusted on soft surfaces



Photogrammetry & Lidar Combined

- Lidar on hard surface
- Both lidar and photogrammetric extraction in soft surface
- Void areas placed in low confidence areas
- Every project is reviewed in stereo



Is It Working?

Comparison of random check shots to terrain models

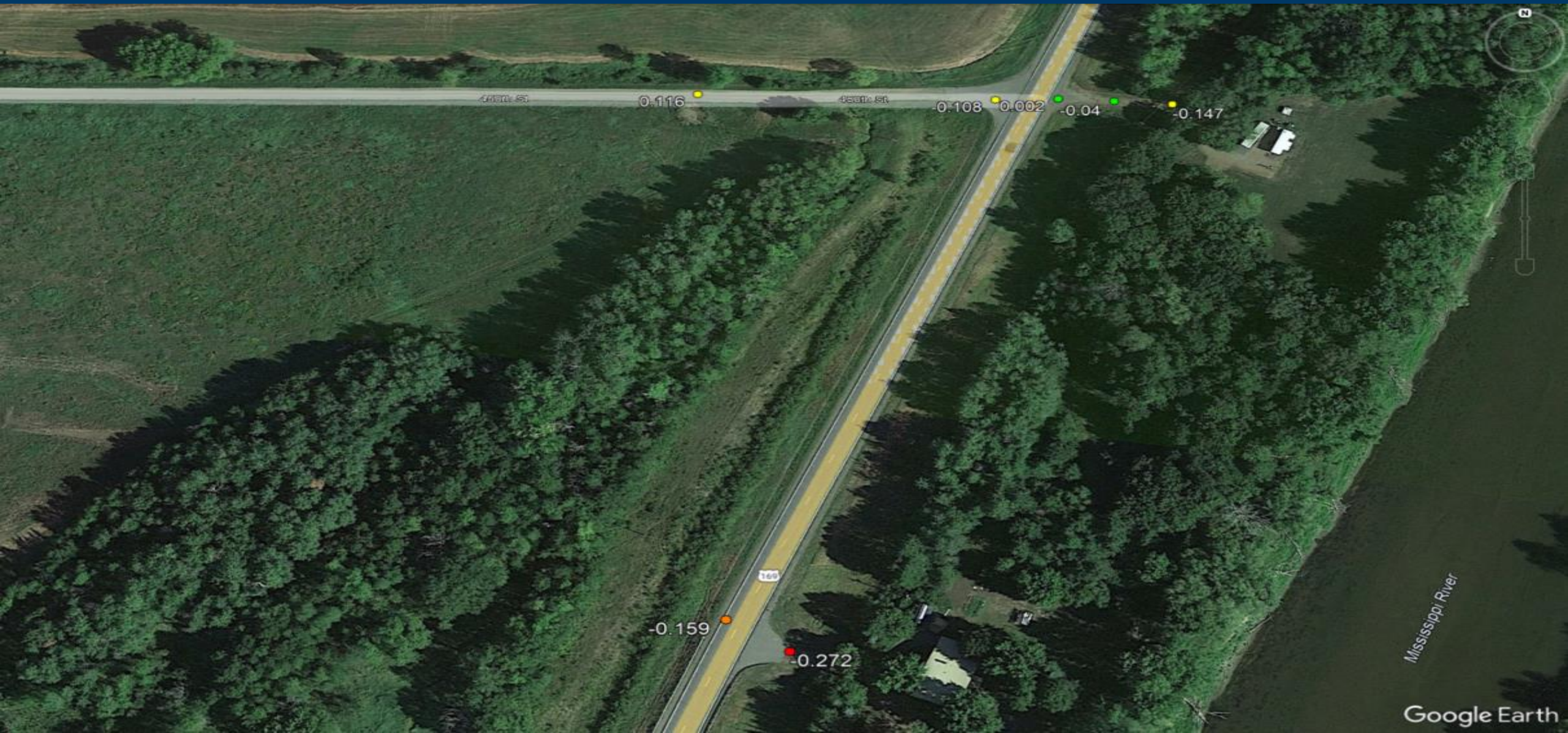
- Quick check
- Looking for trends
- NVA stayed the same
- VVA improved
- Correlation between VVA photogrammetric accuracy and hybrid?

Airborne Lidar					
Year	# Of Projects	Average NVA (RMSEz) FT	# Of Checkshots	Average VVA (RMSEz) FT	# Of Check shots
2020-2021	19	0.08	1662	0.25	1011
2022-2023	17	0.08	1939	0.17	1705

Photogrammetric					
Year	# Of Projects	Average NVA	# Of Checkshots	Average VVA	# Of Checkshots2
2020-2021	14	0.13	1896	0.18	397

Mobile Lidar			
Year	# Of Projects	Average NVA	# Of Checkshots
2022-2023	6	.018	1939

Vertical Accuracy KMZ



UAS

•2014 to 2017 was R&D First Drone in 2017
•Lidar sensor since 2021
•Provide

Program is a Huge Success

•Planned on 15 projects first year to meet ROI and we had over 50 projects. Growth continues.

Groups we Support Statewide

•Surveys\Design
•Cultural Resources
•Geotech\Foundations
•Snow Fencing
•Rail
•GIS
•Water Resources
•We have a strong relationship with Aeronautics

Data we Collect

- Imagery
- Lidar (Design &GIS)
- Multispectral (NIR)

New - MnDOT Mobile Lidar Team

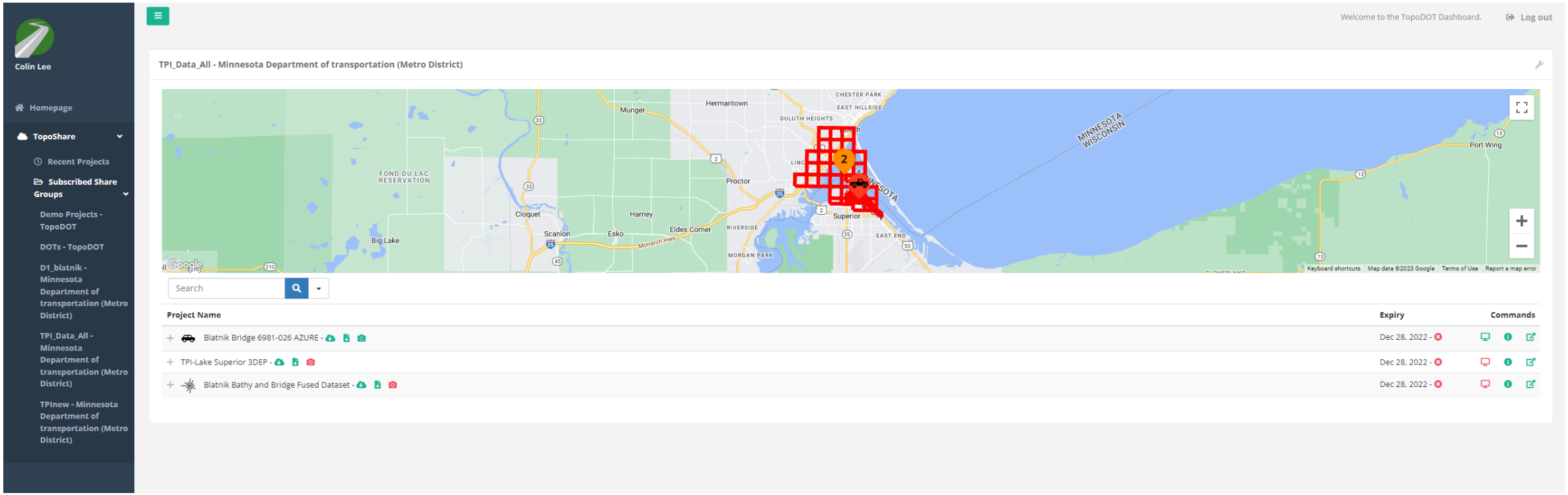
We are creating a mobile lidar subgroup within our unit

- Waiting for delivery
- Creating a new coordinator position
- Survey, Asset Mgmt, GIS (As-builts)
- Ground control by district surveyors

New - Lidar Storage & Management

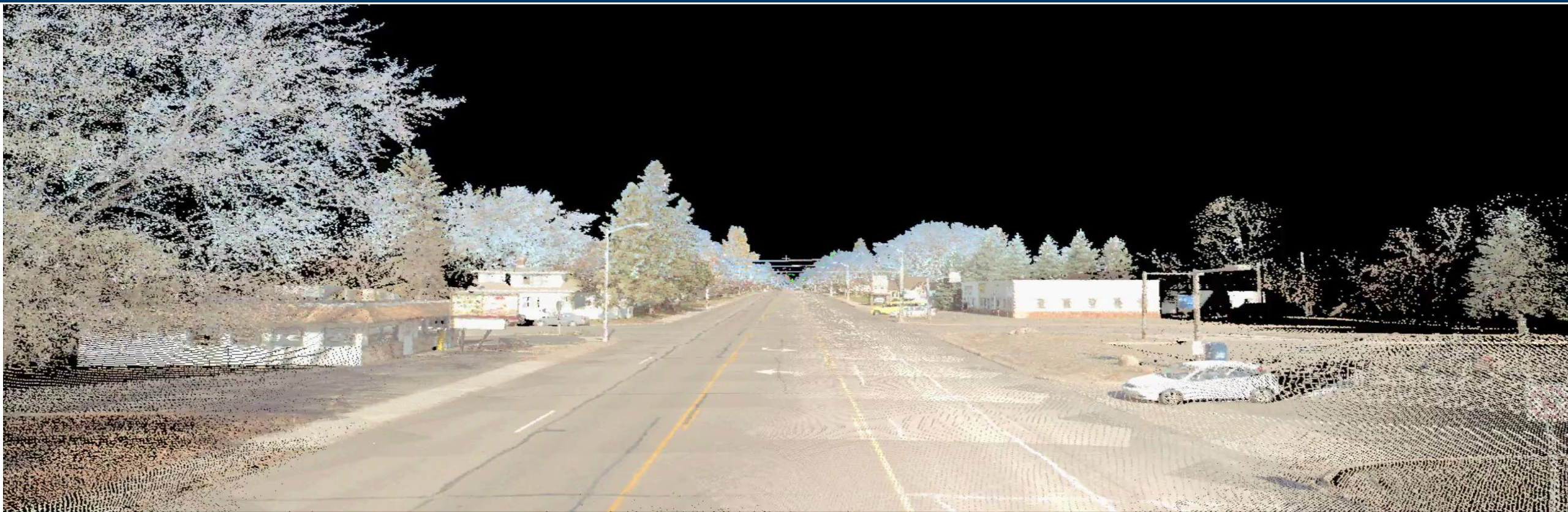
Surveyors statewide requested Photogrammetry & Remote Sensing store and manage all MnDOT lidar data.

- Airborne and terrestrial, including asset grade and district scanning
- Beta



DEPARTMENT OF TRANSPORTATION

Questions



MnDOT BIM/Digital Delivery

I'm not a BIM expert. Just relaying information. Instead, Contact:

Angela Boardman
Digital Program Delivery/BIM Coordinator
angela.boardman@state.mn.us

*Currently working on a Digital Delivery Implementation Plan

2024-25 District Operations Pilot Projects aim to expand use of Digital Delivery and Advanced Construction Technologies

MnDOT is progressing toward a digital project delivery model. Imperative to design more projects in 3D, pass usable models out to contractors and inspectors, collect field data electronically, and employ advanced digital construction technologies like e-ticketing. Use of shared 3D models increases agility in the design process. Digital field inspection lessens the risk of errors and reduces the time required for generating payments. And e-ticketing improves safety by eliminating the need for an on-site ticket taker. These projects provide opportunities to understand how MnDOT can reap the benefits of digital delivery.
District goals for expanding MnDOT's digital delivery capabilities

District(s)	Digital Delivery/Advanced Digital Construction Goal
1, 6, 8	Using Mobile Inspector software with Trimble GPS rovers for field inspection, then synching data back to AASHTOWare
2	Providing electronic files for horizontal alignment and 3D milled surfaces to be let as contractual
3, 4	Using 3D models to help populate inspection and field material testing forms
7	Providing 3D files--for informational purposes only--to contractor and inspector
Metro	Expanding e-ticketing

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- Quantimate
  - Quantimate is an initiative to better automate quantities and cost estimation between products. The high-level solution will use the Bentley infrastructure Cloud (powered by iTwin) and the AASHTOWare Open API as the communication between the Bentley civil products with AASHTOWare Project.

- Asset Management and Pay Item Integration
  - MnDOT Project Data Management Section has continued working with the Asset Management Office to map asset type to pay items. We currently are pulling pay items from AASHTOWare Project by contract into Agile Assets with indication of asset type's by contract. This will allow the asset management team to be proactive on as-built collections.