CURRENT UAV EQUIPMENT

DJI Phantom 4 Pro

- Aircraft weight < 55 pounds
- Certified Pilot
- Daylight or Civil Twilight
- < 400 feet AGL
- Class G airspace
- Within unaided line of sight
- Visibility 3 miles or more
- No flights over non participants

CURRENT APPLICATIONS

- Imagery/Videography
- Inspections:
  - Aircraft Beacon
  - Rockfall Sites
  - Construction Sites
- Mapping- Topo Surveys
- Modeling- 3D terrain models
- Stockpile Measurements

Dearborn River High Bridge. Photo taken 1 week before 25+ Ton vehicle crossed. Bridge is rated at 7 Tons

Beartooth Pass Condition Inspection prior to Snow Removal Operations


Rockfall Site Inspection


MDT Owned Aircraft Beacon Inspection

PUBLIC RELATIONS

MAPPING


Jim Darcy
Elementary School
Rustic Way
W Lincoln Rd
W Lincoln Rd
W Lincoln Rd
229
229
229


Area: 15.87 acres
Distance: 2.26 mi
Max Speed: 14.9 mph
Duration: 10m 5s
Batteries: 1
Images: 181
Points: 434
Storage: 0.90 GB
Altitude: 197 ft
Resolution: 1.0 in/px
34%
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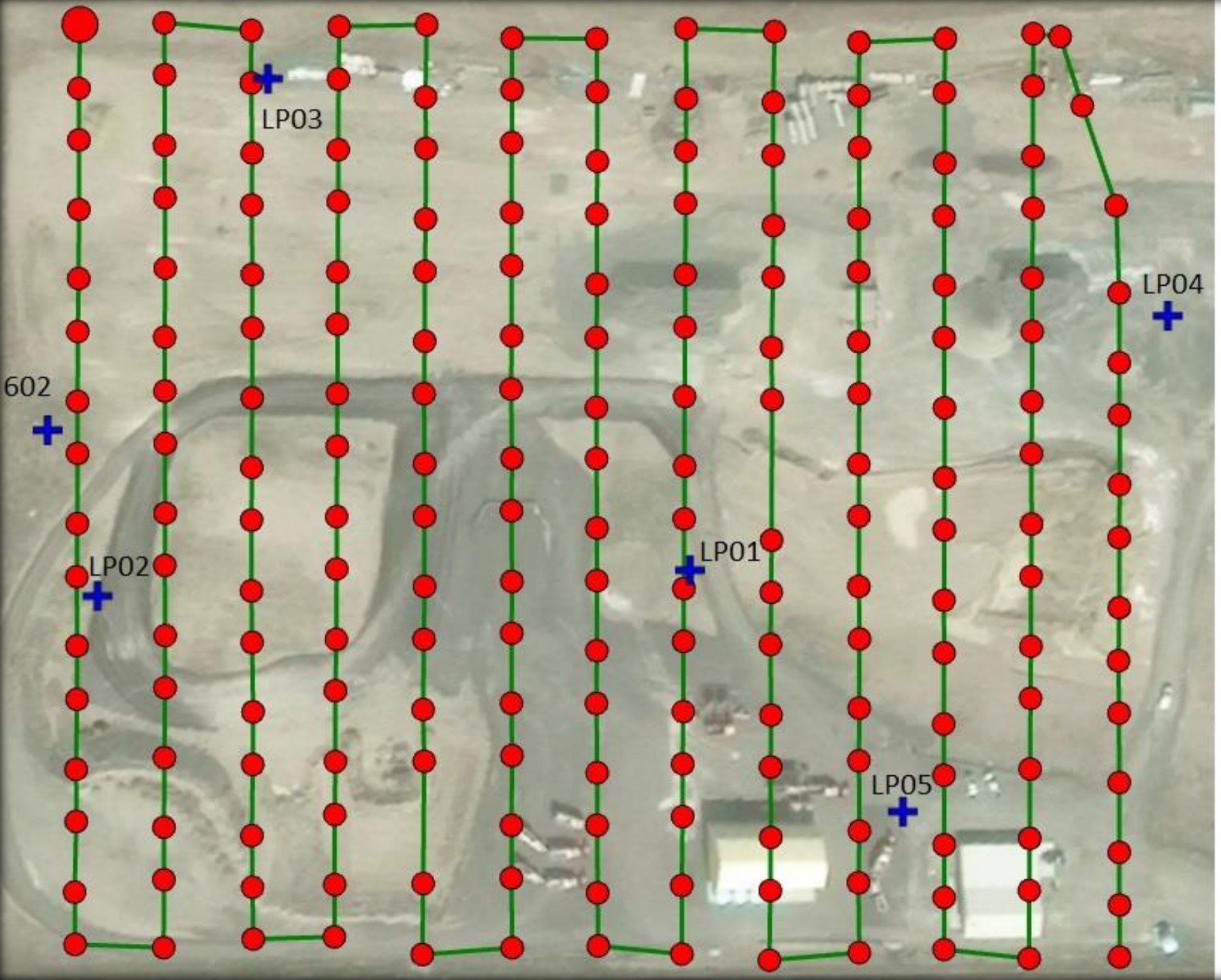
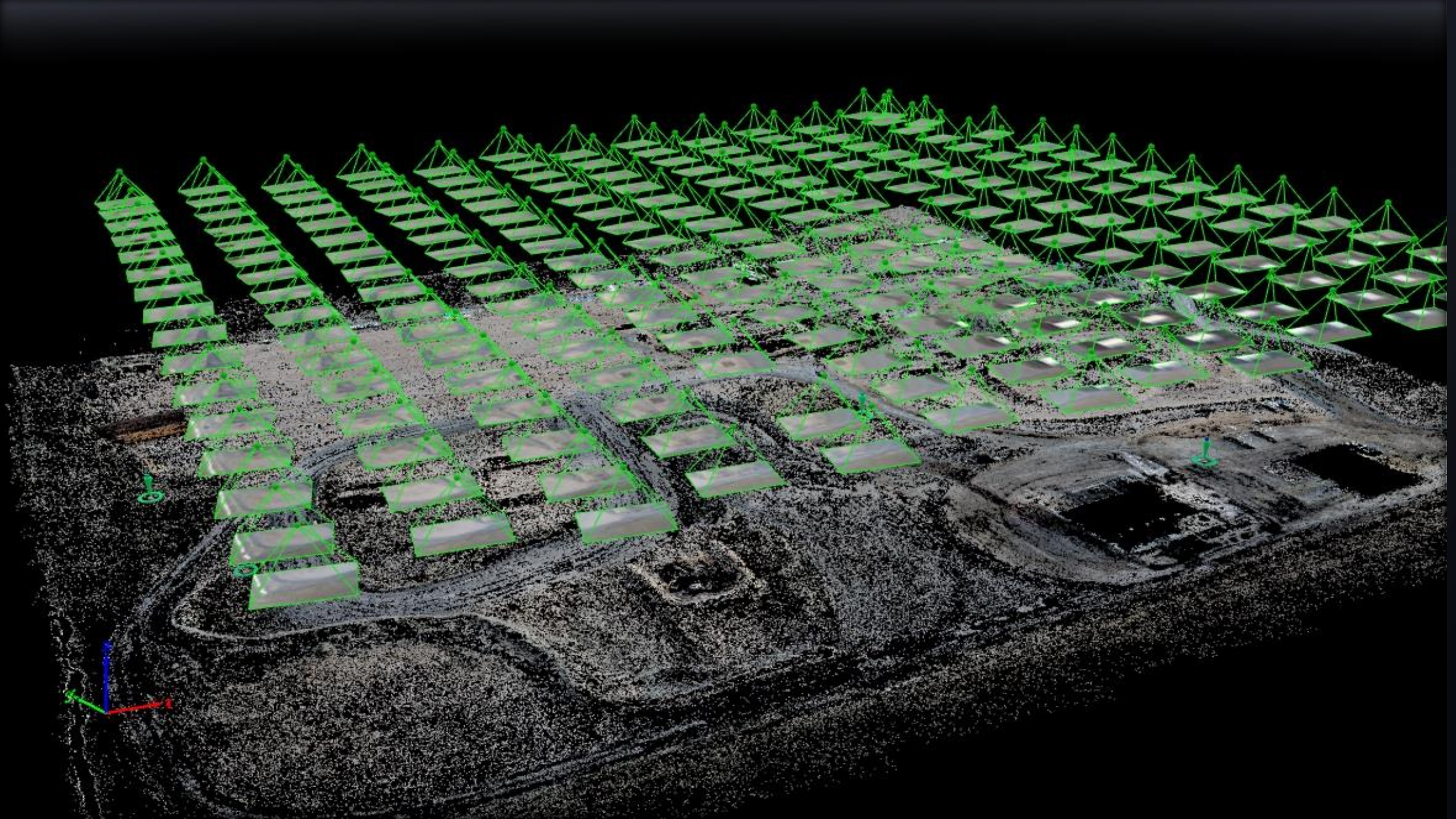
Legal



Ground Control Points

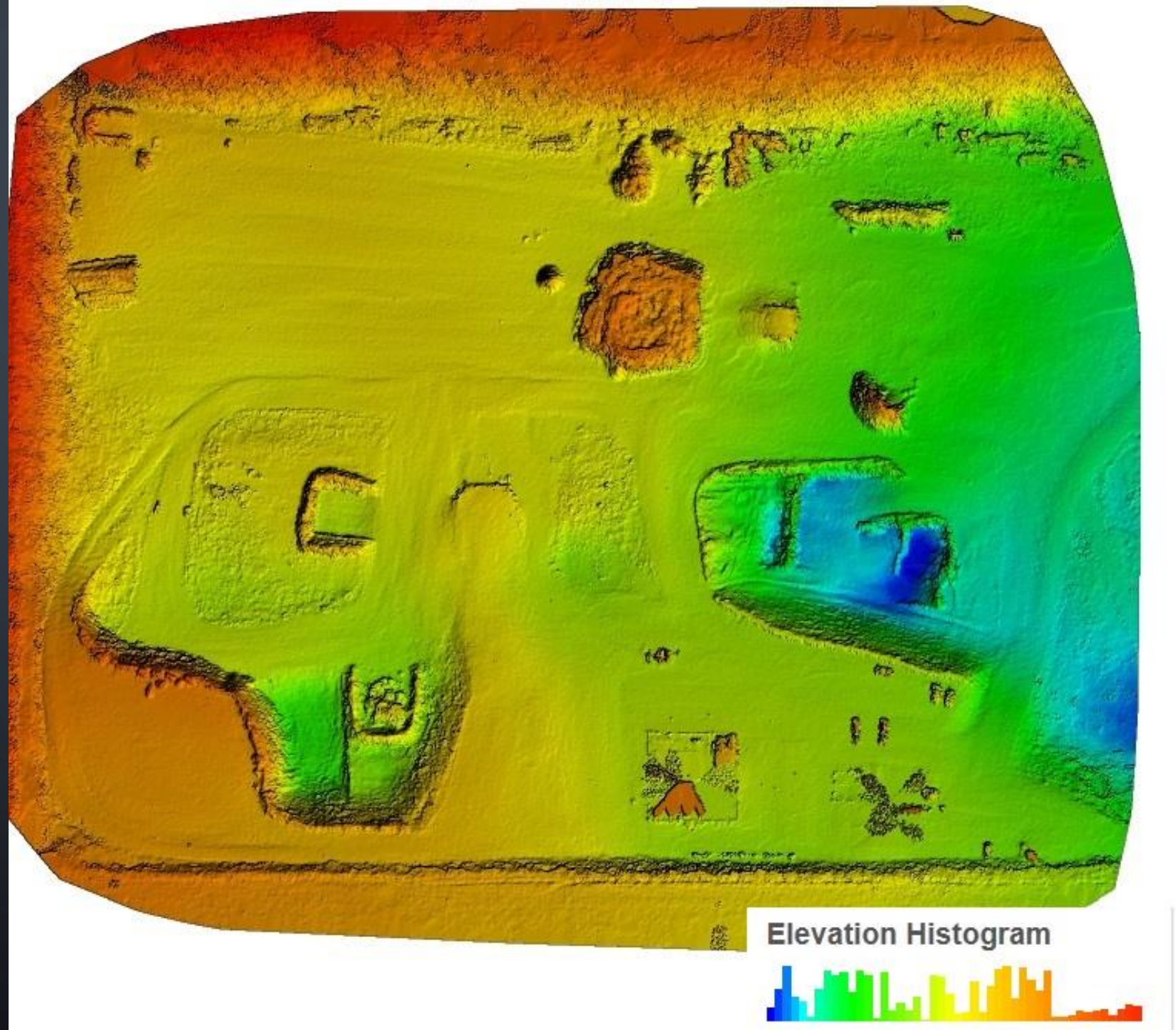
Camera Positions



MAPPING

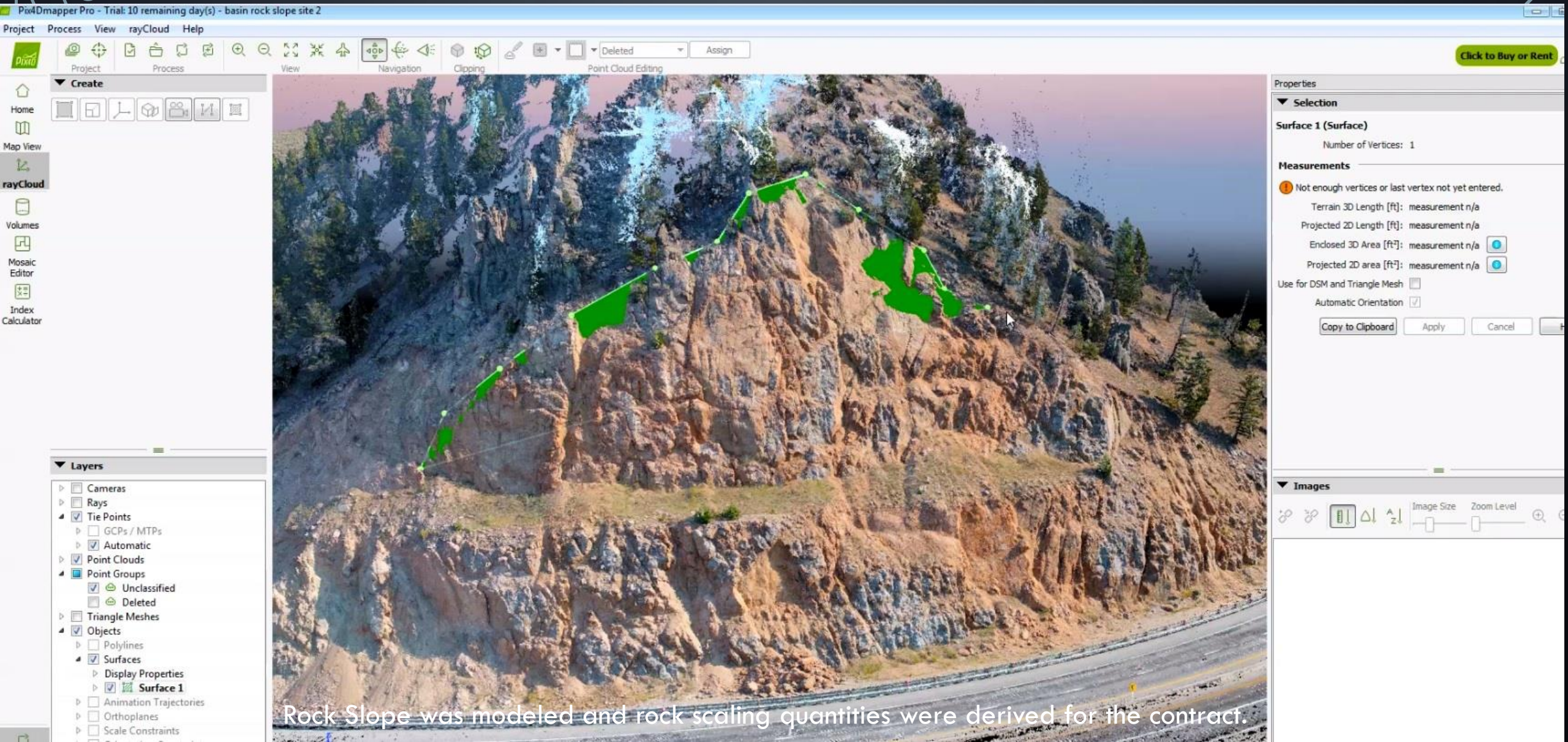
Vertical RMS of 0.078’ and NSSDA accuracy of 0.153’.

(Currently, MDT Photogrammetry targets 0.3’ or better NSSDA)

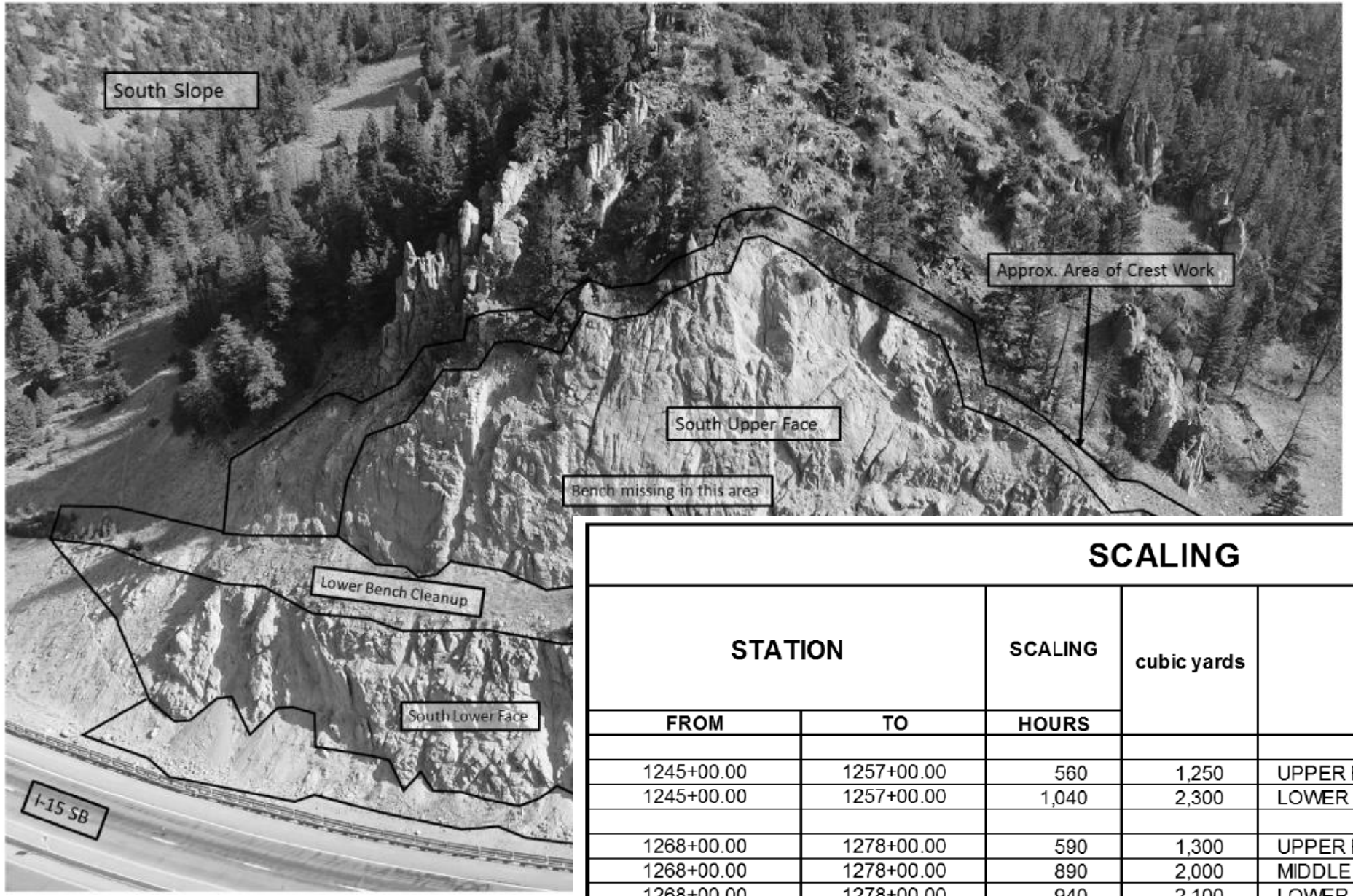



Distance
Length: 23.52 ft

ROCK SCALING PROJECT: BASIN-BOULDER



Rock Slope was modeled and rock scaling quantities were derived for the contract.



SCALING

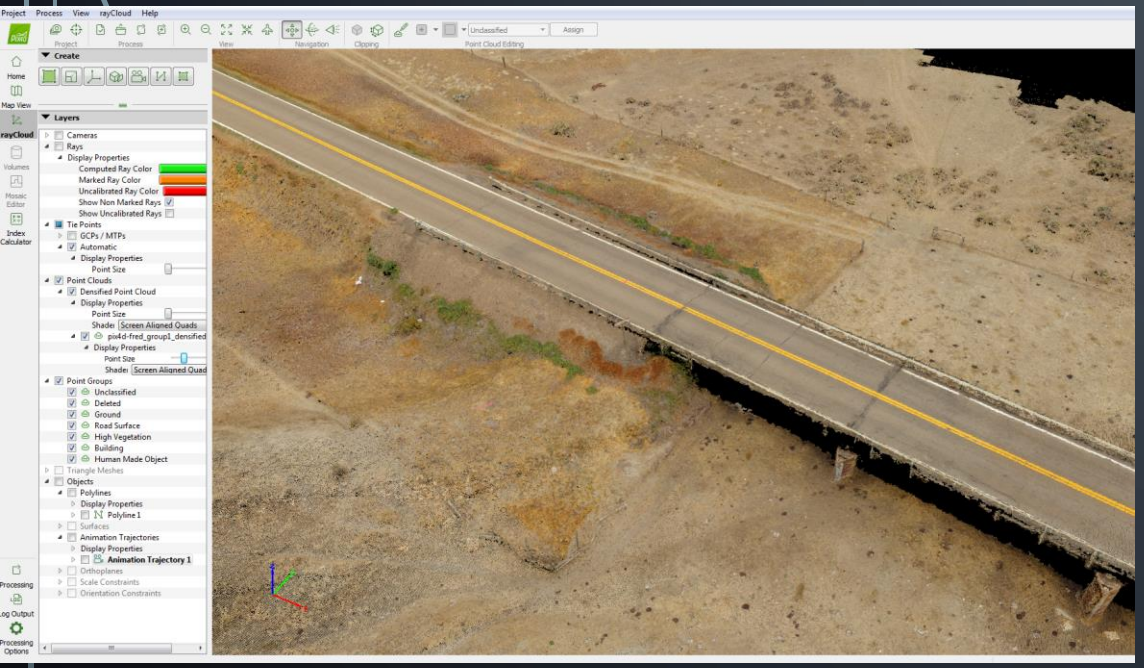
STATION		SCALING	cubic yards	REMARKS
FROM	TO	HOURS		
1245+00.00	1257+00.00	560	1,250	UPPER FACE SITE # 1
1245+00.00	1257+00.00	1,040	2,300	LOWER FACE SITE # 1
1268+00.00	1278+00.00	590	1,300	UPPER FACE SITE # 2
1268+00.00	1278+00.00	890	2,000	MIDDLE FACE SITE # 2
1268+00.00	1278+00.00	940	2,100	LOWER FACE SITE # 2
TOTAL		4,020	# 8,950	

MDT MONTANA DEPARTMENT OF TRANSPORTATION

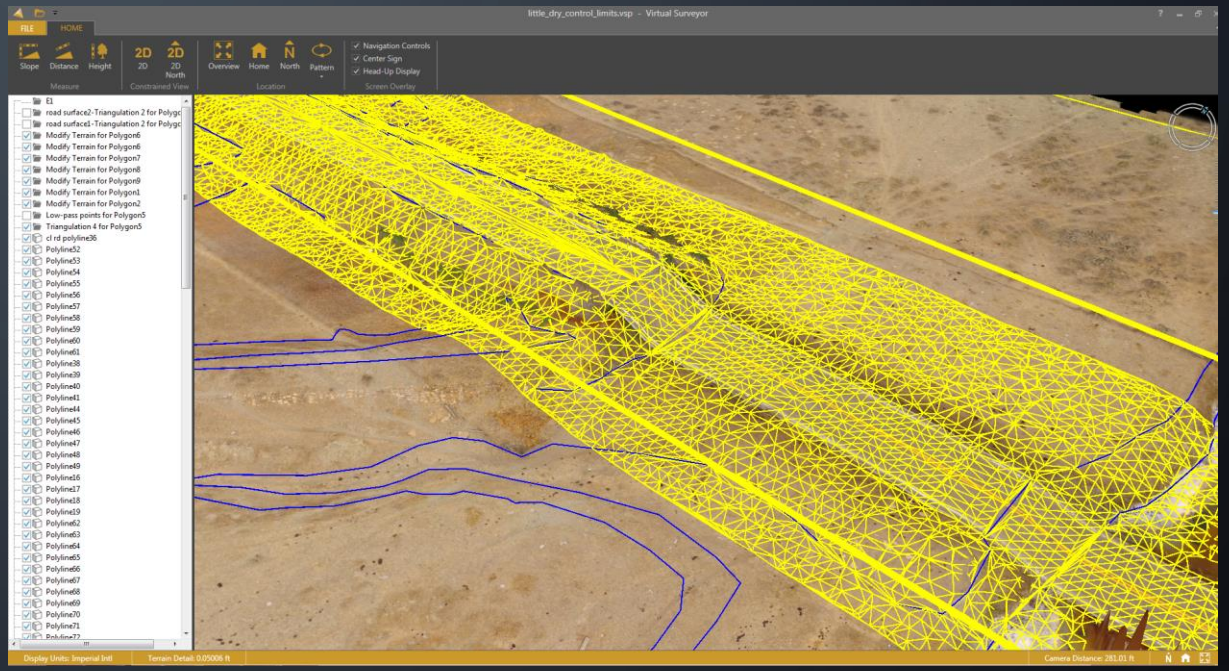
LITTLE DRY CREEK

- Mapped ~3400 feet of project
- 734 images
- 10 control points
- Two 18 minute flights

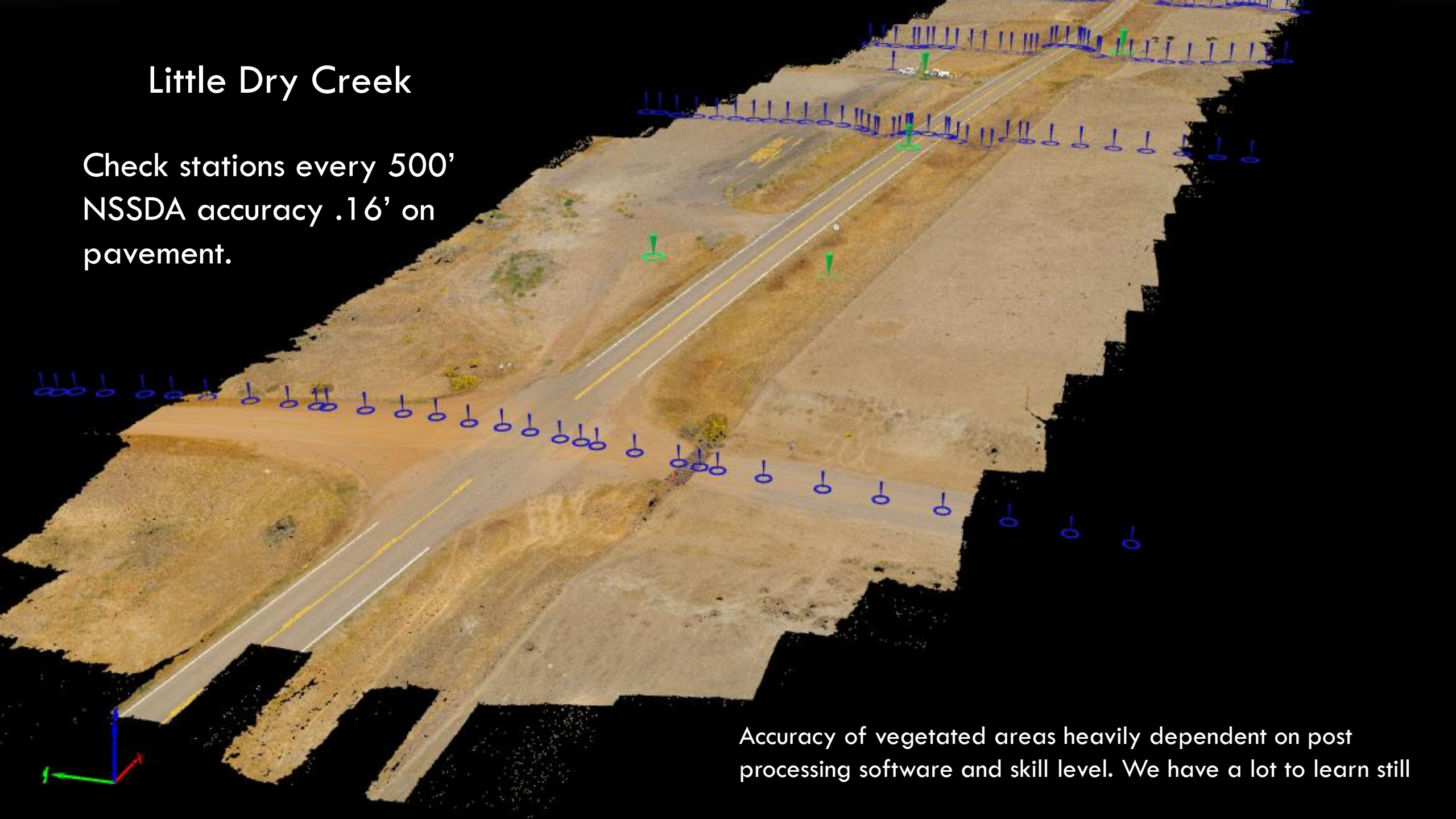
POST PROCESSING SOFTWARE



Pix4D



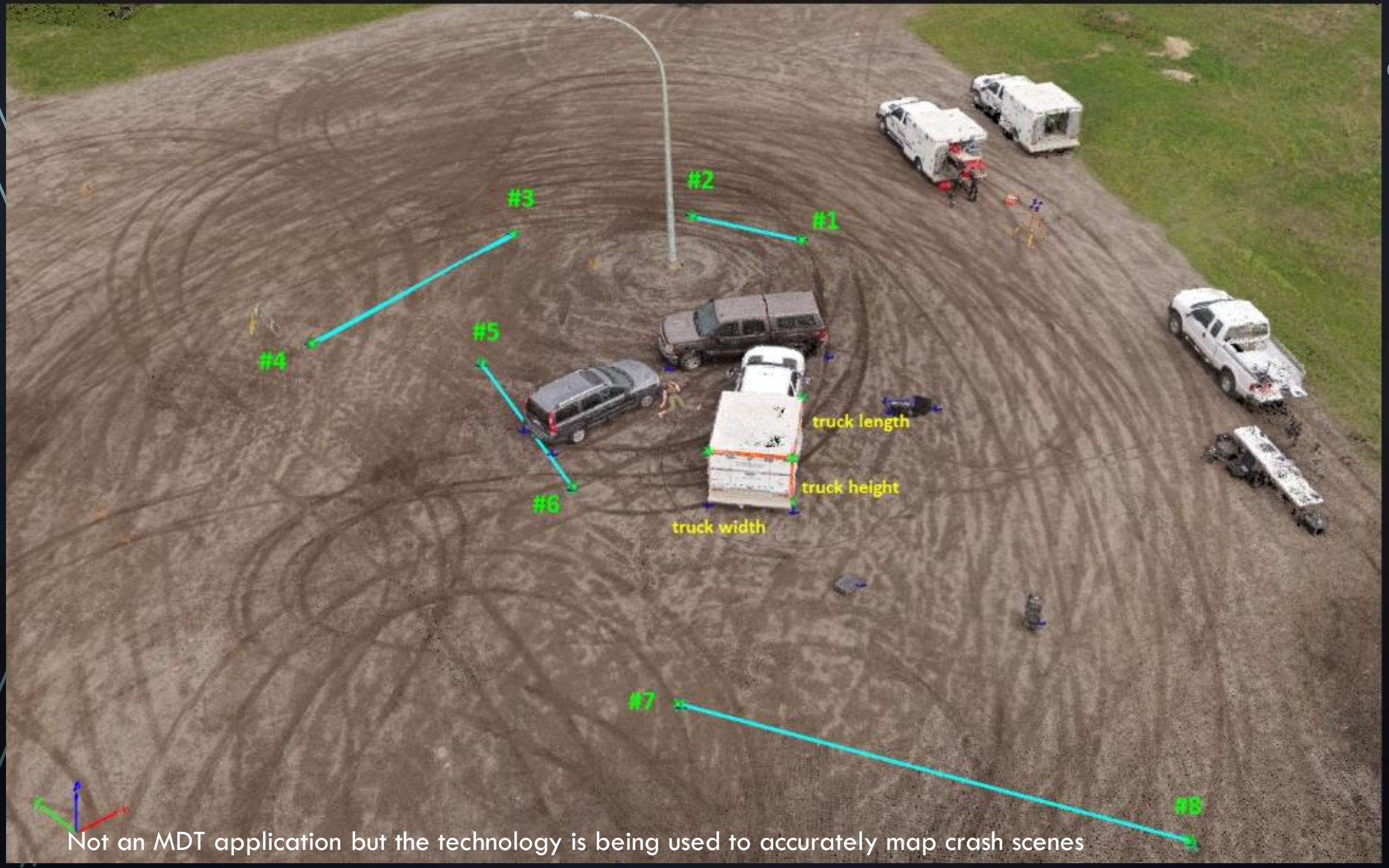
Virtual Surveyor



Little Dry Creek

Check stations every 500’
NSSDA accuracy .16’ on pavement.

Accuracy of vegetated areas heavily dependent on post processing software and skill level. We have a lot to learn still



Not an MDT application but the technology is being used to accurately map crash scenes

NEXT STEPS…

- Survey Grade GPS units
- 2 additional UAVs- DJI Inspire 2

- Develop Workflows for Preconstruction Mapping
- Construction Projects – Earthwork Measurement

FUTURE

- Fixed Wing
- LIDAR
- Machine Learning / Artificial Intelligence to optimize data processing

FUTURE

- Thermal imagery
- In-service Bridge Inspection
- Beyond Line of Sight Operations