



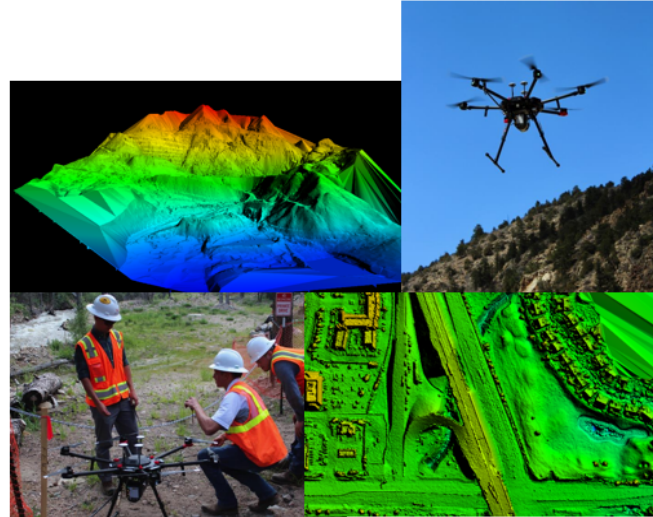
## *UAS Support in the Transportation Sector*

- Thank you for taking time to review our preview of *“UAS Support in the Transportation Sector”*
- If you are interested in seeing the full presentation, please contact Larry Mohr (contact information on last slide) to schedule a time to see the full presentation.

# Introduction to Juniper Unmanned

## Sensing & Analytics Professionals

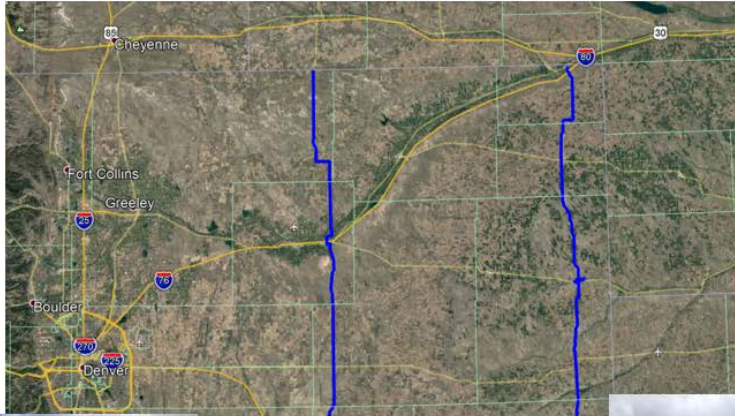
- Enablement Experts
- Data Acquisition
  - Leading LiDAR provider
- Data Analytics and Management
  - Insights, Solutions
  - Predictive and prescriptive analytics
- Certified Service Provider under AUVSI's Trusted Operator Program



- Juniper Unmanned is a 5-year-old Sensing and Analytics organization based in Golden, CO
- In terms of experience, the Juniper Unmanned team has flown over 1000 missions across 6 continents.
- We service our customers by helping them with their data acquisition across various sensors
- We provide deliverables that support a broad analytic capability
- We have been awarded an Emerging Small Business (ESB) certification from the Colorado Department of Transportation.
- Juniper has gone through the rigorous certification process to achieve an "A" ranking by ISNetworld, an online contractor and supplier management platform used by some of the largest organizations in the world
- Juniper Unmanned is also Certified Service Provider under AUVSI's Trusted Operator Program (TOP)

# Colorado Dept of Transportation (CDOT)

## Roadway Study



- CO State Highway 71 and US Highway 385
- 342 Miles
- 600' corridor (300' each side of centerline)
- Limited Control Required
- Deliverables:
  - 0.5' contours
  - Digital Terrain Model (DTM)
  - Orthomosaic
  - TMOSS (Striping, Edge of Oil, Fence Lines)

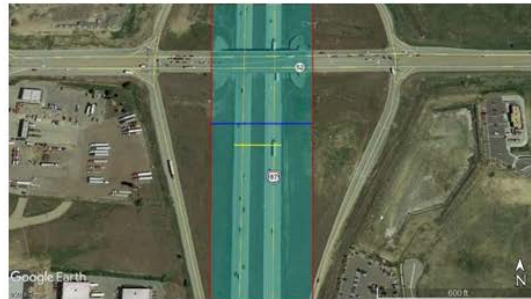


- Juniper Unmanned has undertaken a number of projects in the transportation space.
- We are known across the industry as a leader in UAS LiDAR.
- Under a current Master Services Agreement, CDOT contracted Juniper Unmanned to help them with two roadway studies for potential expansion of shoulders, passing lanes, etc.
- The same data sets can be used for the study, pre-design, and design because the accuracy meets the state standards.



# Colorado Dept of Transportation (CDOT)

## Express Lanes



- CO Interstate 25
- 14 Miles (SH 7 to SH 66)
- ROW to ROW incl frontage
- Deliverables
  - 0.5' contours
  - Digital Terrain Model (DTM)
  - Orthomosaic
  - TMOSS (Edge of Concrete to Edge of Concrete)



- Juniper Unmanned was contracted to perform a survey for 14 miles of Interstate 25, north of Denver, CO.
- The primary focus is on the center median, but the entire ROW was captured and can be processed for future use.

# CDOT - I-70 Corridor Collection



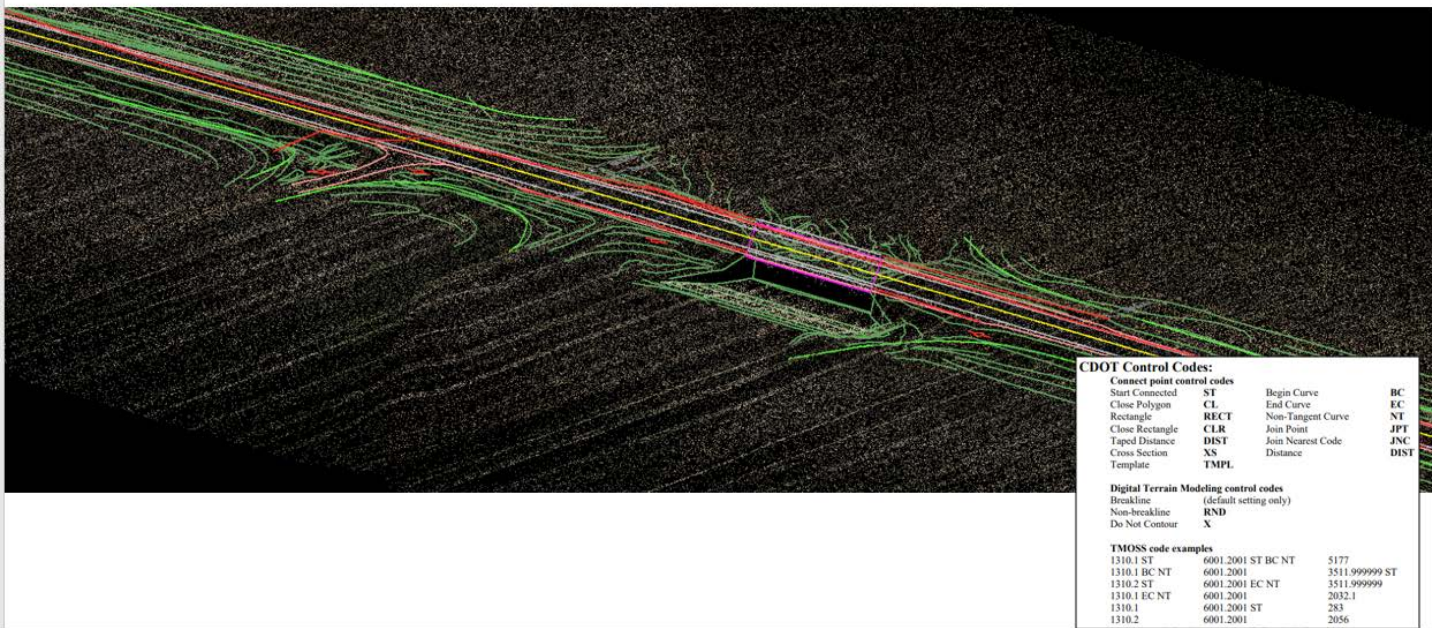
- CO Interstate 70
- ~14 Miles (DeBeque to Rulison)
- Highway ROW to ROW
- Deliverables
  - 0.5' contours
  - Digital Terrain Model (DTM)
  - Orthomosaic
  - TMOSS (limited)



- Juniper Unmanned was awarded a project to fly Interstate 70 in the mountainous areas of Western Colorado
- Deliverable data products will support CDOT with analysis and future design.

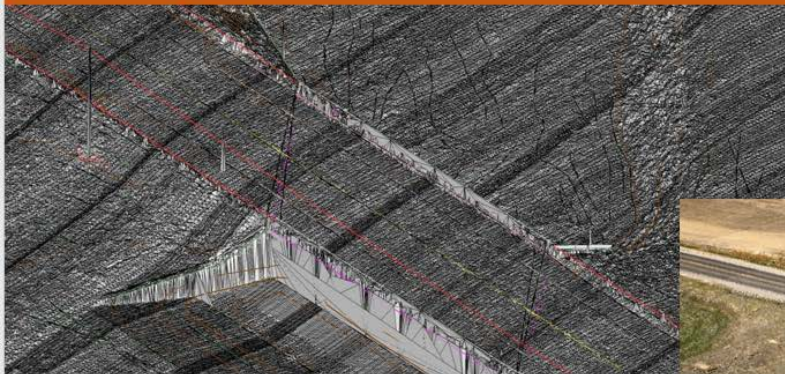


# Terrain Modeling Survey System (TMOSS)



- In addition to other deliverables, extracting the planimetric elements within the Right of Way and coding these all in CDOT's Terrain Modeling Survey System, or TMOSS was also one of the final steps.
- TMOSS is a numeric/alpha coding system designed by CDOT to standardize and automate topographic surveying, mapping and drafting.
  - The code is comprised of a four-digit feature code along with an alpha control code

# LiDAR Deliverables



Point Cloud Generated TIN

Colorized Point Cloud



- This image above shows a TIN file generated from a LiDAR point cloud. While the amount of information is a bit overwhelming, the slide illustrates the detail that can be captured using our methodology. We can process the data to generate a TIN file that is more traditional and useful.
- A colorized point cloud can also be generated by assigning RGB values to the points. This can be a very useful application of the data for certain applications.
- Juniper Unmanned can generate standard survey files with feature identification but we can also generate cut and fill reports, vegetation analysis, machine control files, volumetrics, change detection, 3D visualizations.

If you have any questions, or want  
to schedule a meeting, please contact:

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