WRS EVERYTHING DRONES

Dallas Vanzanten

AGENDA

- WRS Overview
- UAS/Drones (Photogrammetry, Lidar, Spraying)
- Challenges implementing drone technology
- Aerial Data Labs (ADL)
- Emerging Markets & New Technology
- Q & A

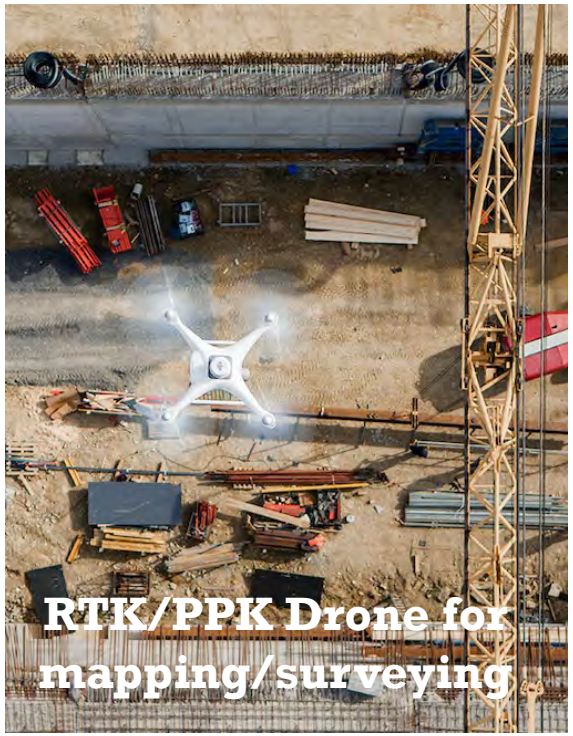
ABOUT ME

- I have been with WRS a total of 16 years.
- Background in heavy Civil construction and GIS.
- Started a drone company in 2014 that focused on surveying and 3D mapping.
- Sold my drone company to a large 3D mapping company in 2018.
- Over 550 flight hours.

ABOUT US

- **From farming to refineries to paving, WRS has a rich history of successful projects dating all the way back to 1982.**

- Asphalt Paving
- Asphalt Sealing and Striping
- Civil Construction
- Concrete Construction
- Technology and Design Services
- Industrial Maintenance
- UAV Mapping and Inspection
- Emergency Response
- Demolition and Processing
- Hydro Excavation Utility Location


RTK/PPK Drone for
mapping/surveying


Inspection drone
Thermal, zoom lens,
Laser distance reader


Confine space
inspections

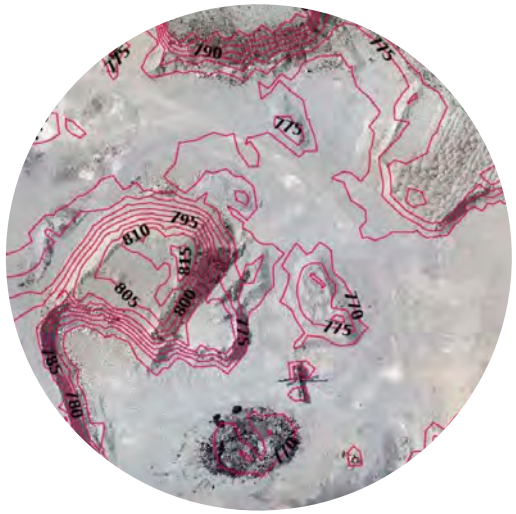

Crop Spraying

UAS SYSTEMS

High Resolution Orthomosaic

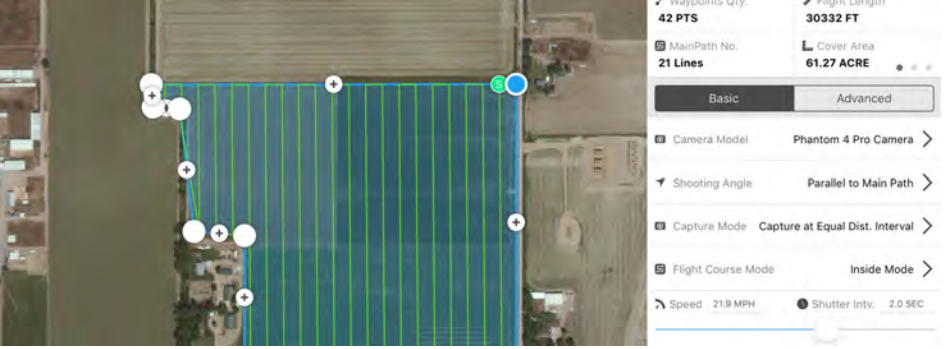
Point Cloud (3D Model)

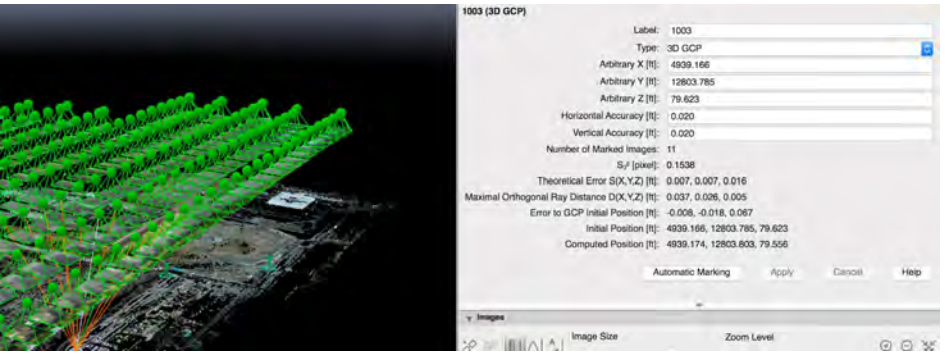
2D & 3D Measurements

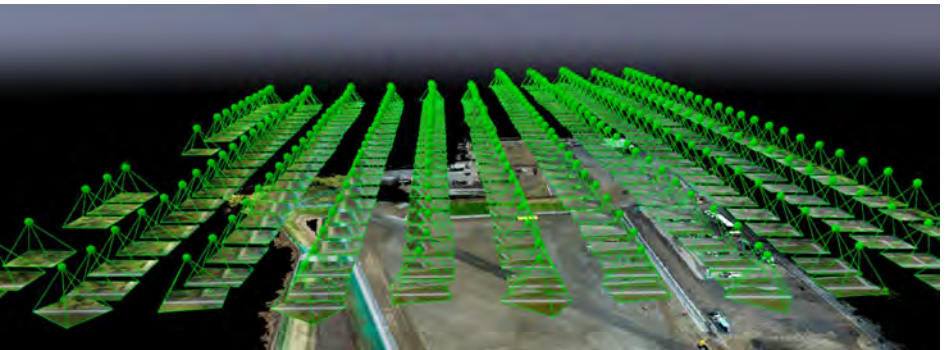


Contour Lines

3D MAPPING

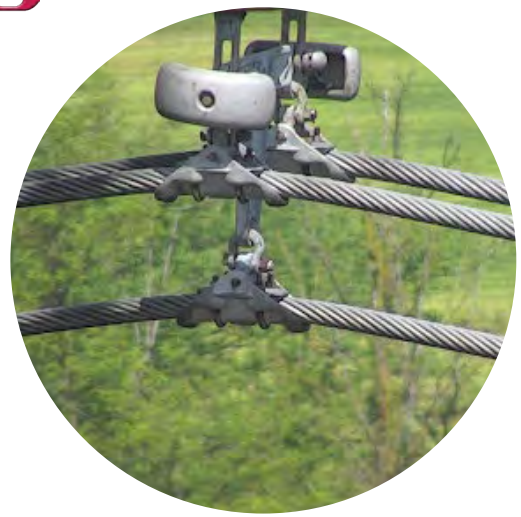






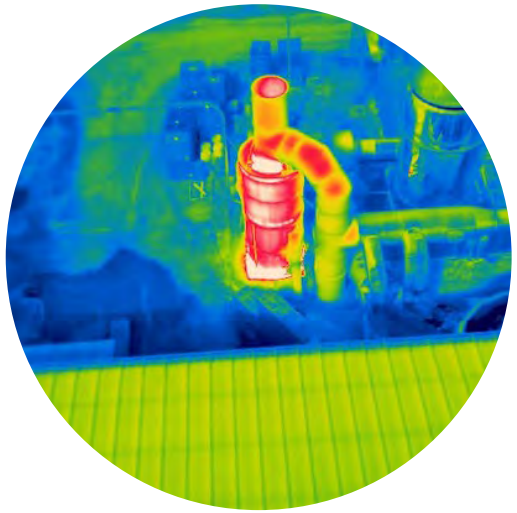
PHOTOGRAMMETRY

- First used for terrestrial topographic mapping in 1849 by Aime Laussedat using cameras attached to kites and balloons.
- capturing large volumes of 2D images over a geographical area and compiling them to create 3D topographical models and orthomosaic maps
- Using photos from different locations, specific lines of sight or "rays" are mathematically intersected to produce 3D coordinates of the intersection points.
- Three dimensional coordinate metrology technique that uses photographs as the medium for measurement.
- Basic flight planning settings (Automated flight)
  - 328 Ft AGL
  - 70% Side lap 80% front lap
  - Taking a picture about every 2 seconds

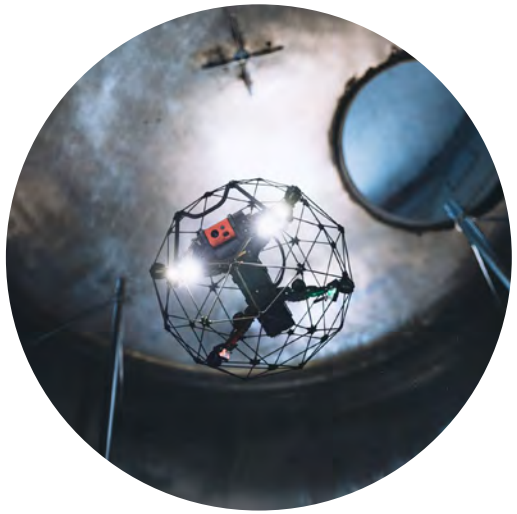


Zoom camera

Visual inspect hard to reach areas

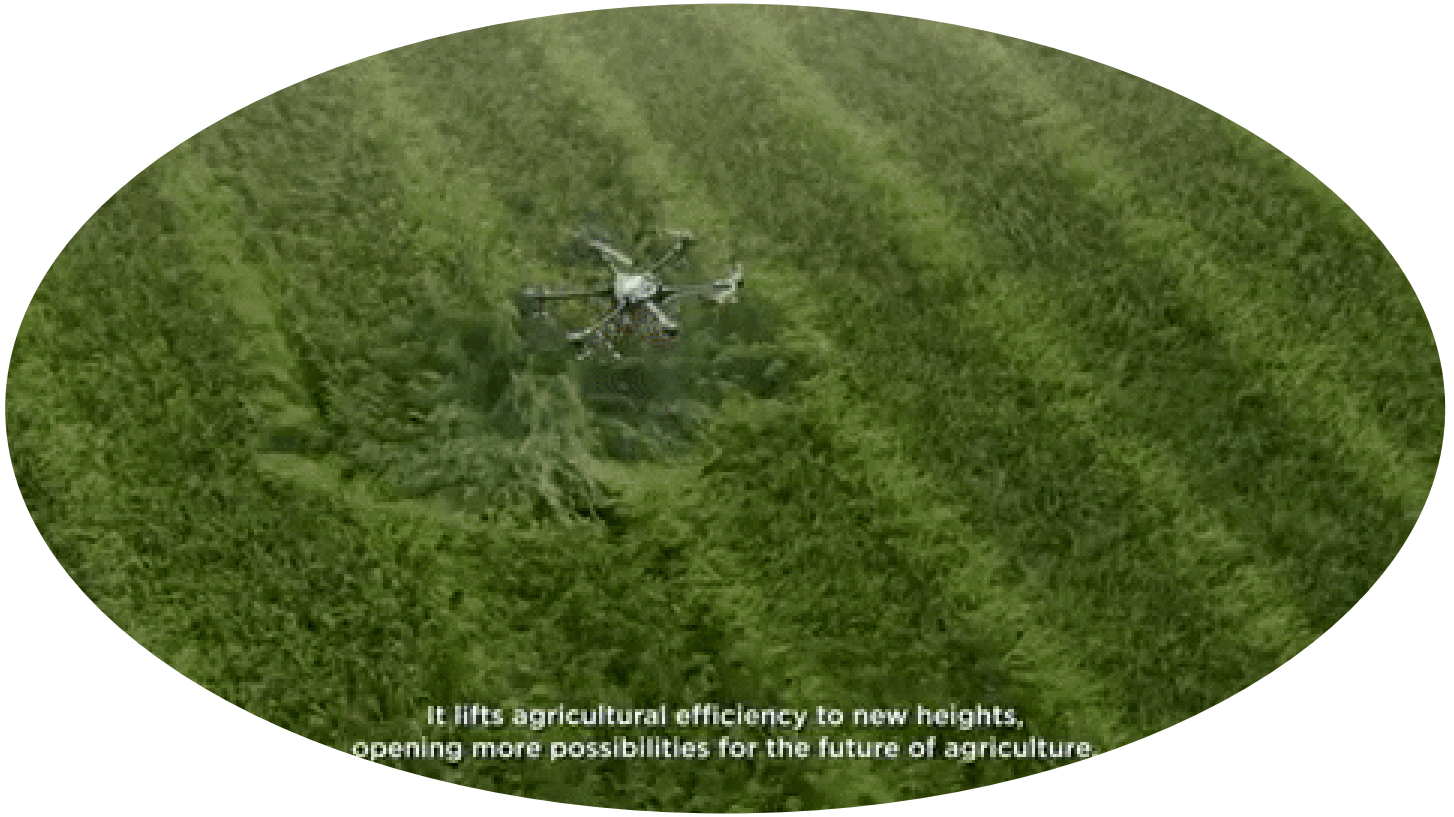


Thermal



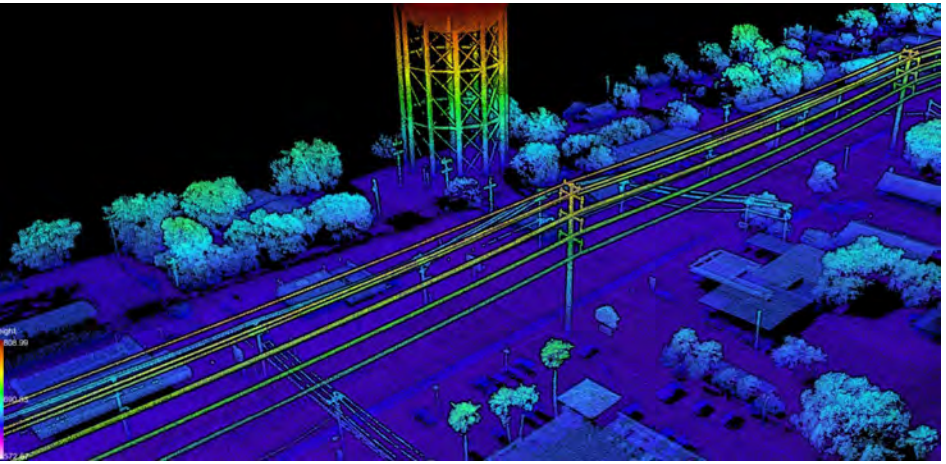
Confine space inspections

INSPECTIONS



CROP SPRAYING


WRS
4-5 Gallons
4.5G Spray Tank
IP67
Core Module IP67 Rating
RTK
RTK Centimeter-Level Positioning
DBF
DBF Imaging Radar
Wide-Angle FPV Camera
AI
AI Engine

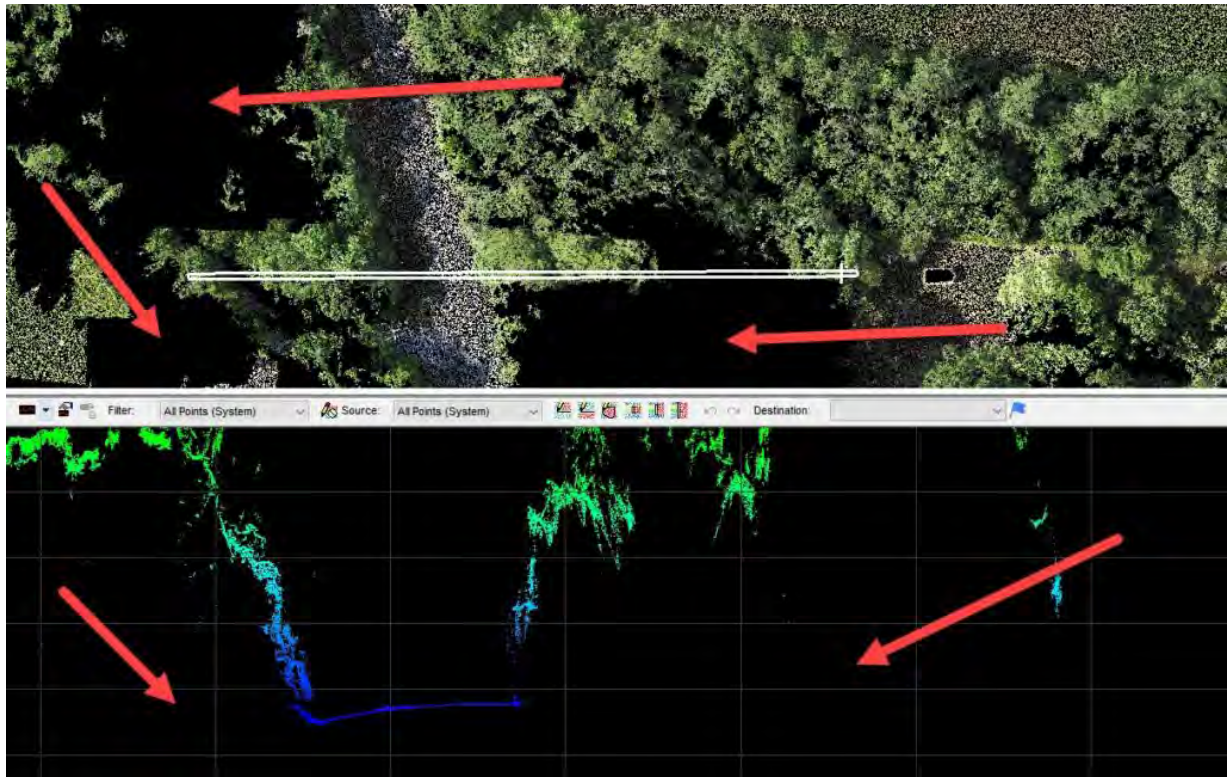


PHOTOGRAMMETRY VS LIDAR

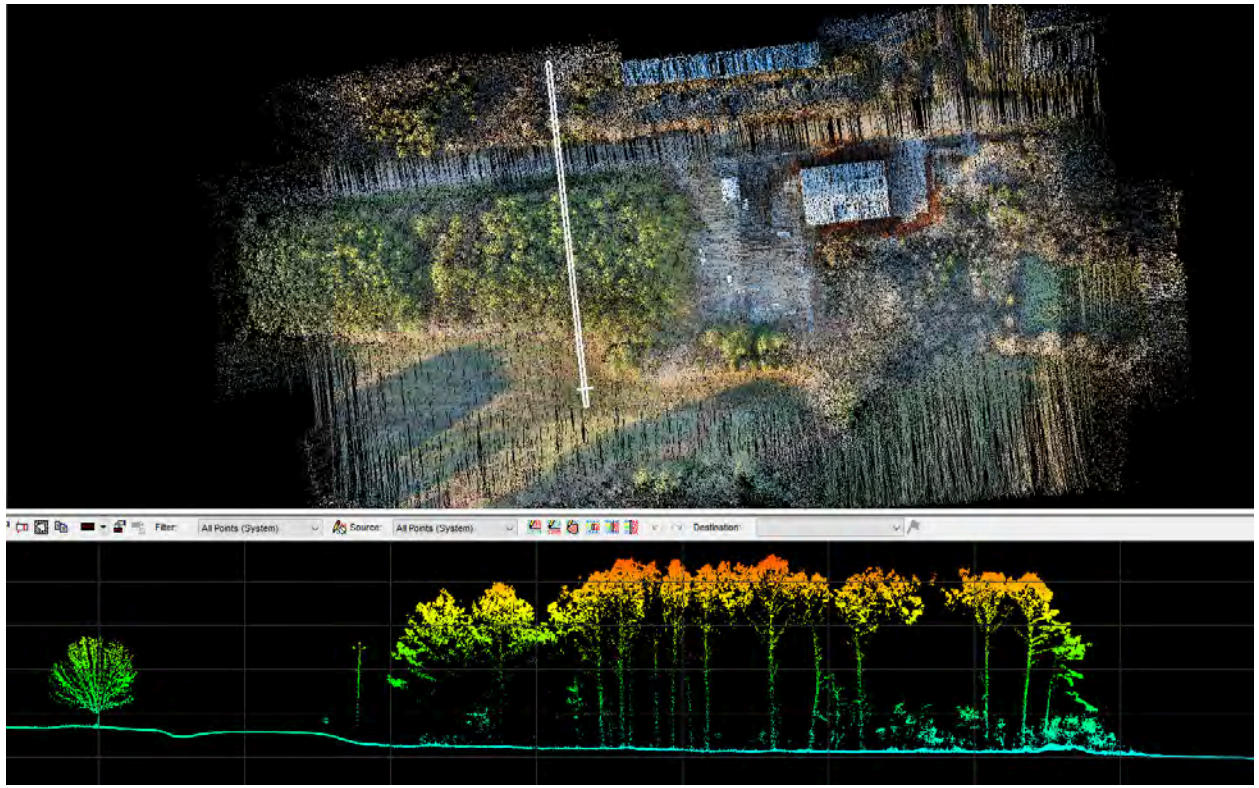
- **How photogrammetry differs from lidar.**
  - Lidar is a direct measurement—you're physically hitting a feature with light and measuring the reflection. Drone photogrammetry uses images captured by a drone-mounted camera to reconstruct the terrain in an accurate 3D model using image overlap and sufficient ground control or RTK/PPK.

  - The choice between photogrammetry and LIDAR depends heavily on the exact application. You also need to consider operational factors, such as cost and complexity. Knowing what outputs you really need will help you make the right decision.

PHOTOGRAMMETRY



LIDAR



LIDAR

PHOTOGRAMMETRY

PHOTOGRAMMETRY VS LIDAR

- **Photogrammetry**
  - For most missions, Photogrammetry can have the same accuracy with greater versatility. For an example a Orthomosaic is generate unlike with LIDAR data. You can improve accuracy with GCP's but can not with LIDAR.
- **LIDAR**
  - There are some applications like featuring power lines or large dense forest canopy where lidar will have better data and calcifications.

CONCLUSION

LIDAR project require an expert who understands the workflow and details of each subsystem and can recognize inconsistencies in the data. You can not use GCP's with LIDAR data therefore its hard to correct the data and catch positional errors. Experience GIS personal is essential to review data.

PHOTOGRAMMETRY is more forgiving and more cost effective with a shorter learning curve therefore leads to greater flexibility. Not ideal in heavy vegetated areas or trying to model vertical structures.

CHALLENGES IMPLEMENTING DRONES INTO YOUR BUSINESS

- Data Collection is the easy part – You can teach anyone to plan an autonomous mapping mission.
  - Mapping settings are important and can impact the quality of the data. ie. Camera settings, overlap, flight altitude.
- Picking the RIGHT hardware for good results.
  - Mechanical shutter
  - At least 20 MP camera
  - Use GCP's even if you are using a RTK drone for QC.
- ITS ALL IN THE DATA – In order to produce accurate results, you need to have experience employees.
- How to share the data to make good business decisions?
  - A lot of companies can collect and process the data but how do you share it with your crews or clients to make smart operational decisions.

ADL
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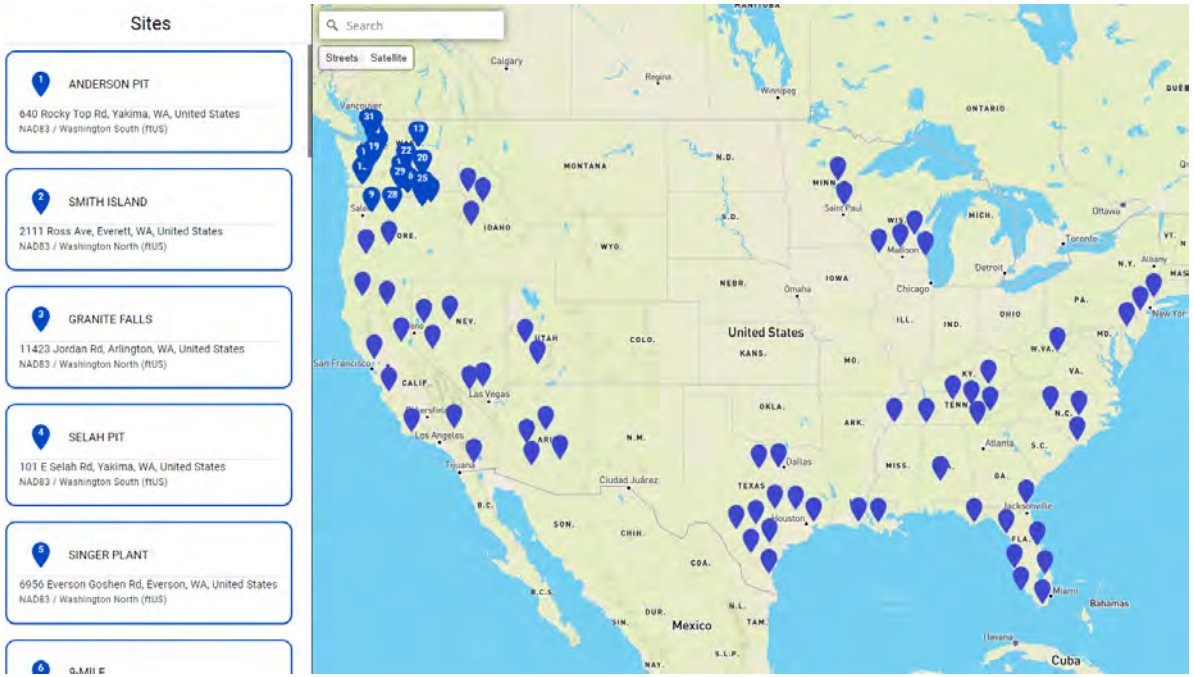
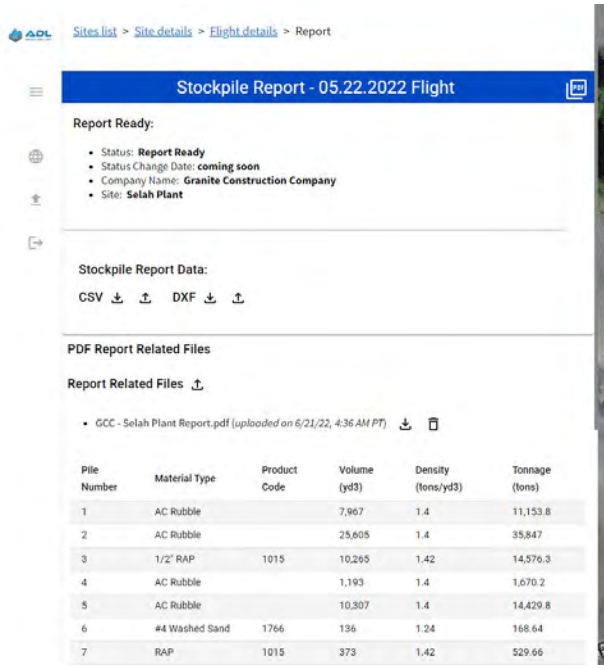
SITE LIST



- Manage multiple sites on one platform.
- Never lose historical data. Go back years to view prior results.
- User Permissions – Give the right people access to the right data.
- Built in Material Database management system. (Material names, Product codes, Densities)
- Branded with your Company logo

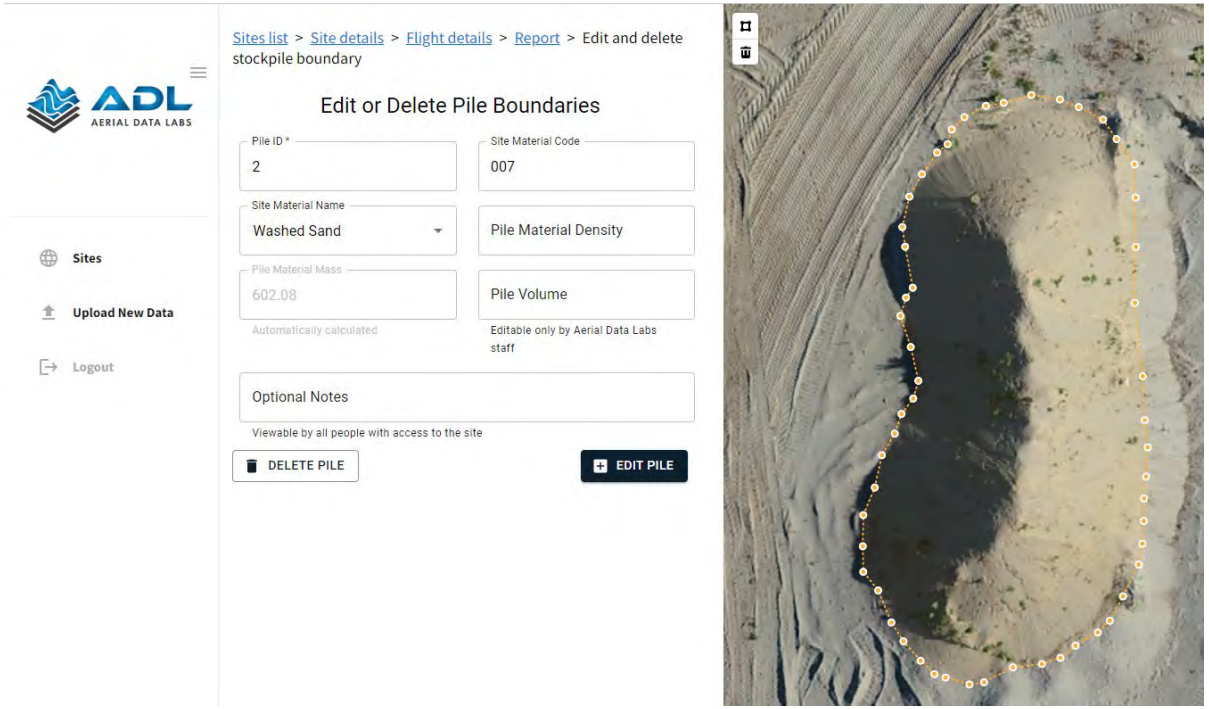
STOCKPILE REPORT

ADL
AERIAL DATA LABS

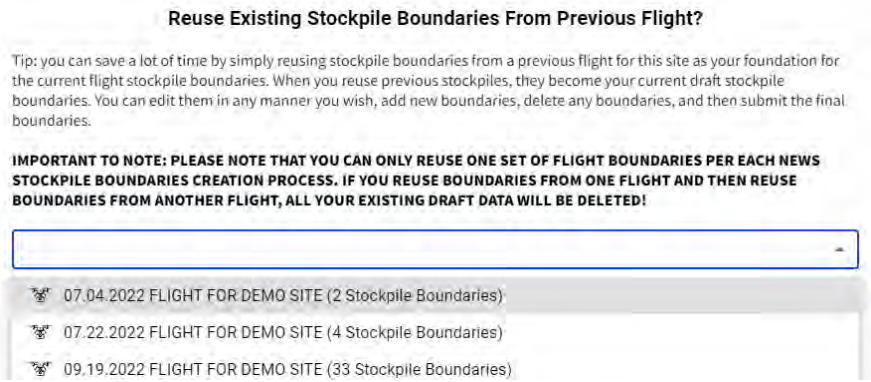


- View and request multiple reports – Stockpile Reports, Cut fill reports, TOPO Maps ect.
- Download Tiff files, DXF files, PDF Reports.
- Download Stockpile Report PDF
- Automated notification when report is ready.

STOCKPILE ID



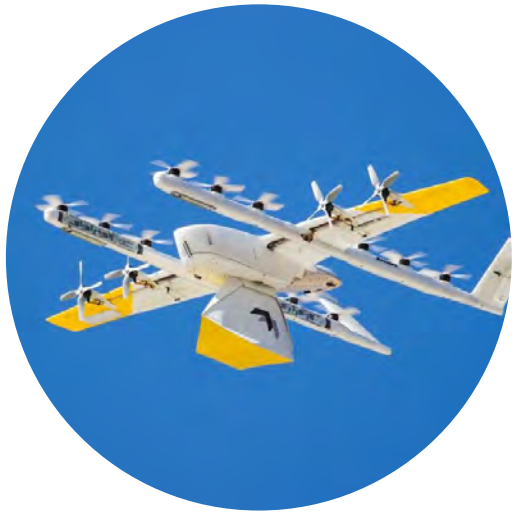
- Material Database with Material names, Product Codes & Densities.
- Automated notifications for transparency when reports are ready.
- Download Stockpile Report PDF
- Identify piles to be calculated for clear communications



Internal drone with lidar

Crop spraying

Drone in a box



Drone Delivery

EMERGING MARKETS & NEW TECHNOLOGY

QUESTIONS & FEEDBACK