Low Altitude Photogrammetry using UAS

Crane Creek Lift Station and Force Main Upgrade

Existing Condition

- 1.3 MGD Lift Station (1996)
- 10” CIP force main (1978)
- Serves East Salisbury, Granite Quarry, Rockwell and Faith

Project Goal

- Increase lift station capacity
- Provide redundant operations

Survey Accuracy for Public Works Design

- Feature Location

  H – 0.05 to 0.2 ft

  V – 0.1 to 0.3 ft

- Contours - 1 ft

Federal Geographic Data Committee

FGDC-STD-007.4-2002

Enter the UAV

Project is a good fit for low altitude photogrammetry

- Size (approx. 9 acres)
- Scope (topography and feature collection)
- Location (away from the city and airport)

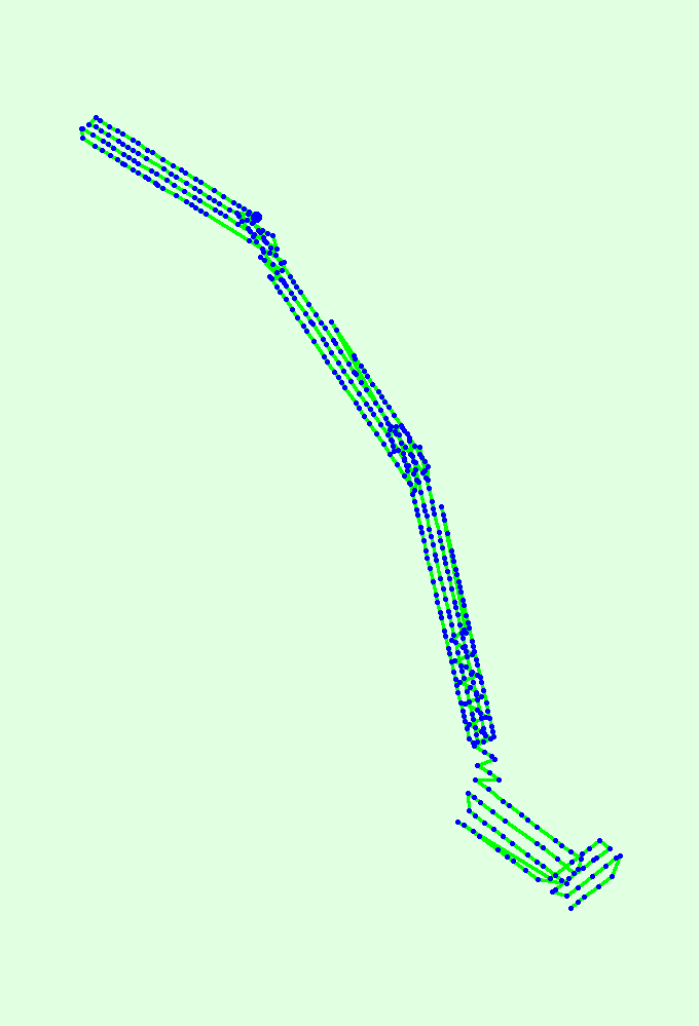
Equipment

- DJI Matrice 100 Airframe
  - 4 rotor
  - Approx 20 min flight time
  - Approx 8 lbs maximum weight
- Zenmuse X5 Camera
  - 16 MP (4608 x 3456)
  - 15 mm lens - 72° field of view

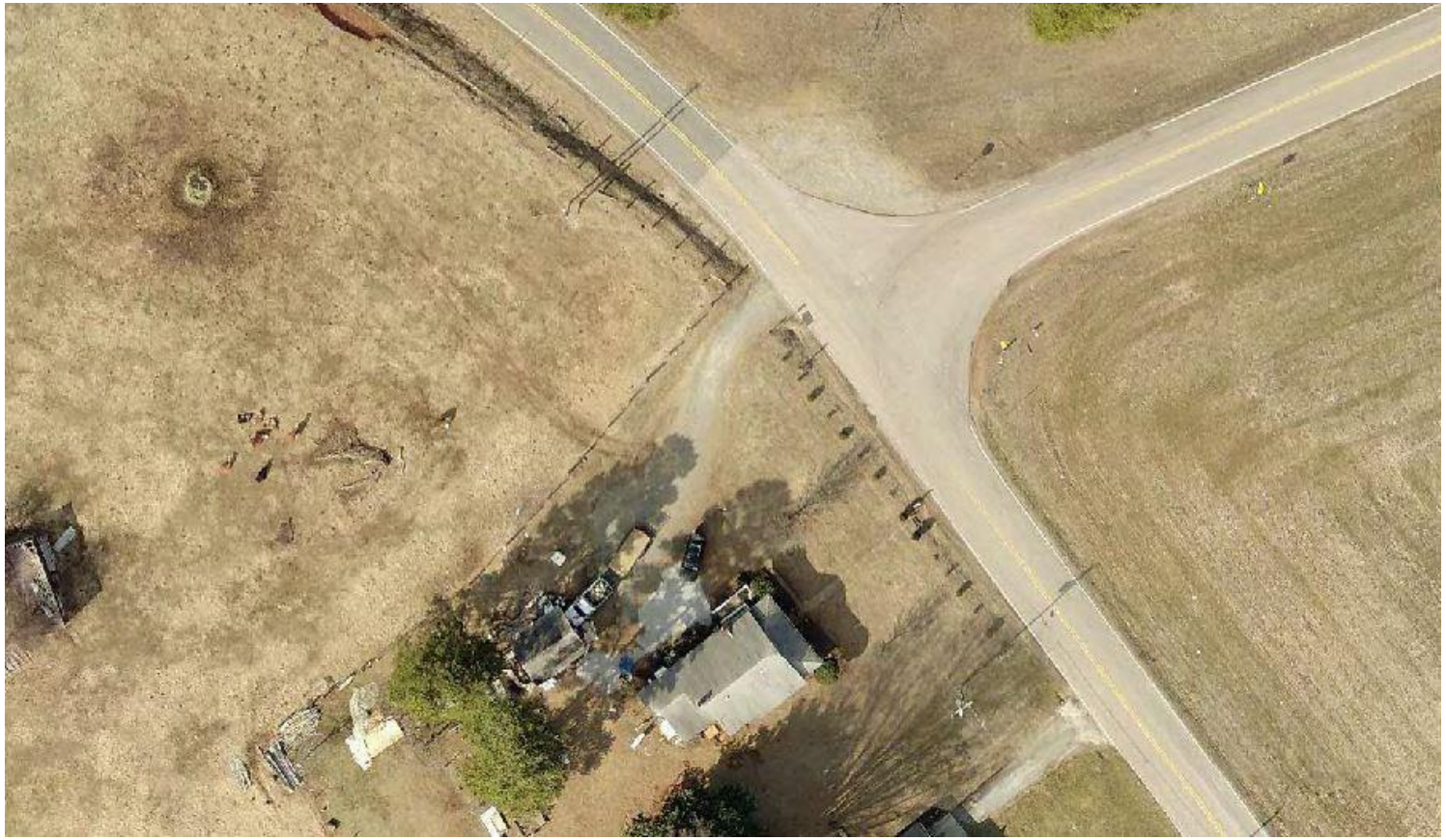
Flight Plan

- Pix4Dcapture
- End Lap/Side Lap = 80%
- Flight Level ≈ 150 ft
- Ground Sample Distance ≈ 1.15 cm (0.04 ft)
- Images = 458
- Flight Time ≈ 1 hr
- Ground Control Points = 9

Flight Path



Statewide High Resolution Orthophoto



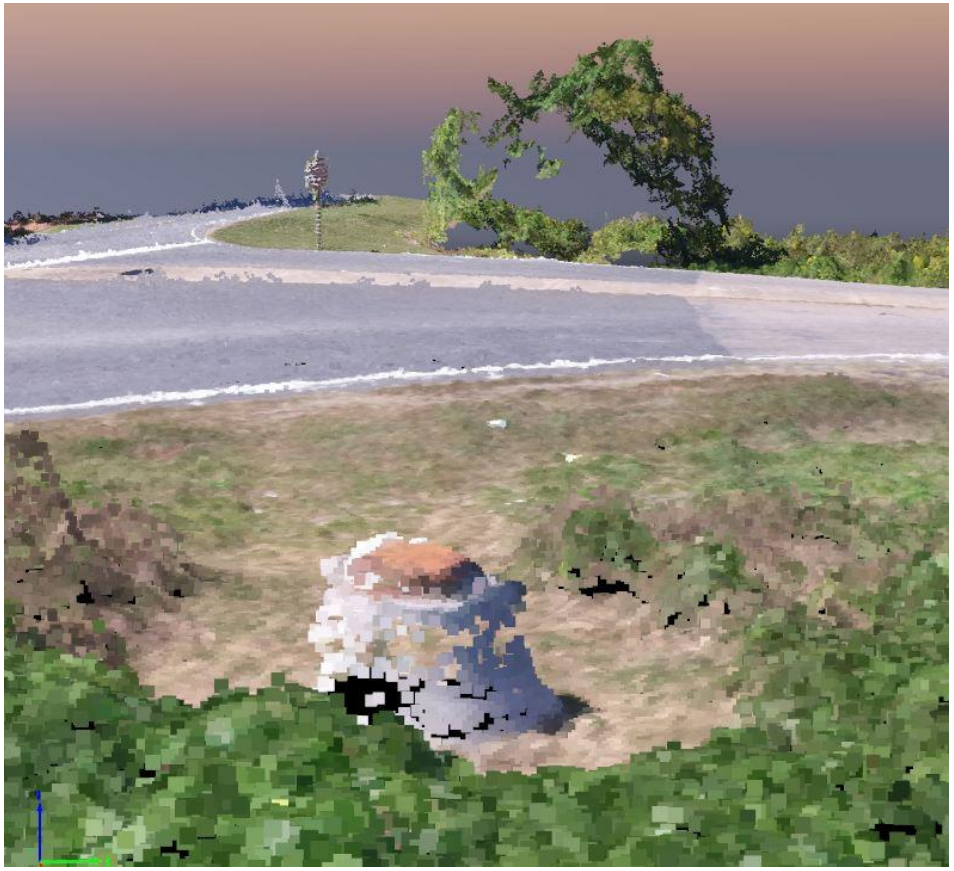
Statewide High Resolution Orthophoto

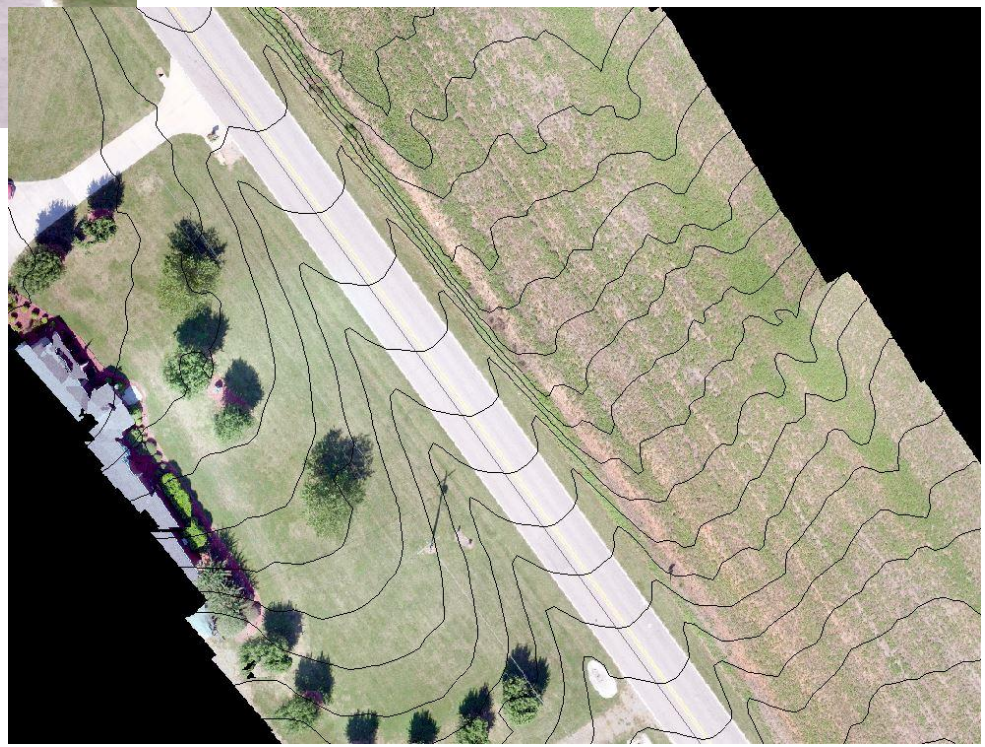
UAV Orthophoto

Point Cloud

UAV Orthophoto

Point Cloud

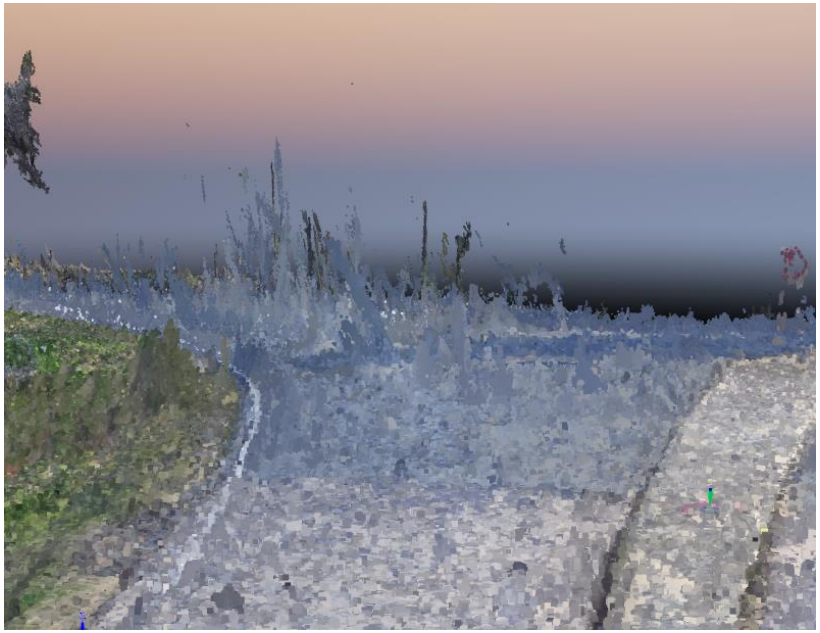


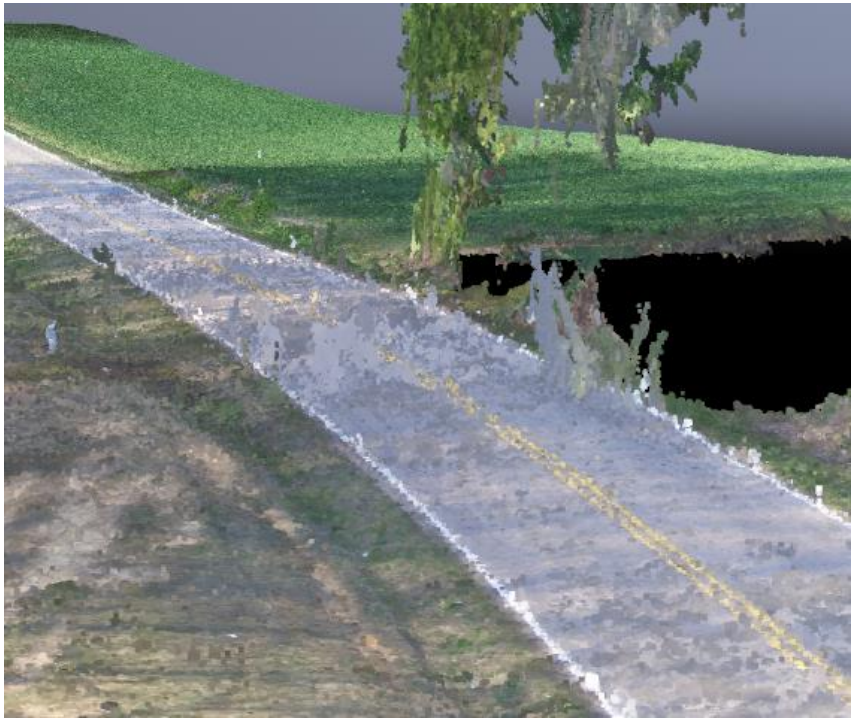


Shortcomings

- Need good photogrammetry conditions
  - Insufficient Tie Point generation
  - Cannot “see” through vegetation
  - Shadows
- Point cloud classification

Shadows…





Cows