

**D.A. COLLINS**  
C O M P A N I E S

# Robert Powers

Engineering Department

Kubricky Construction

(Member of the DA Collins Family)

2015 – Present

## Responsibilities:

- Survey Department
- Overseeing Takeoff efforts
- Manage Crane Work
- Construction Working Documents

# Outline

- KCC and Drones
- Why use Drones?
- Drone Types
- Use Cases
- The Future



# KCC and Drones

- Survey Group captures Quarry Inventories for Materials side of company
- First Drone in 2016
  - Kespry
  - Pix4D
  - Propeller
- Drastic reduction in Survey Labor – From 1 Week per quarry to 1 Day
- Most recent drone system purchase has expanded use cases beyond quarry inventories



# Why use Drones?

- Increases reach and productivity
- Access unsafe areas
- Technology has become more accessible
- Accuracy has improved over time



# Drone Types

- Small Remote Controlled
- Mid-Size Survey Drones
- Large Payload Drones
- Fixed Wing Drones



# Small Remote Controlled

- Pros
  - Easily Portable
  - ~\$1,200
- Cons
  - Not as stable
  - Lower Camera Quality
  - Only functions as a camera



DJI Mavic Pro

# Mid-Size Survey Drones

- Uses/Pros
  - Can handle winds up to 20 mph
  - Better Camera Quality
  - Survey Quality Data
  - ~\$6,500 (includes RTK)
  - ~\$4,000 for RTK Base/AeroPoints
- Cons
  - Larger Case for Transport
  - Battery life limited
  - Limited Survey in wooded areas



DJI Phantom 4 RTK

# Large Payload Drones

- Pros
  - Can handle higher winds
  - Up to ~50 lbs payload
  - ~\$11,000 (attachment separate)
- Cons
  - Cumbersome Case for Transport
  - Attachments can be over \$50,000 for LiDar



DJI Matrice 600

# Fixed Wing Drones

- Pros
  - Can handle higher winds
  - Longer flight times and distances
  - ~\$22,000 (attachment separate)
- Cons
  - Cumbersome Case for Transport
  - No capability of manual control



WingtraOne GEN II

# Use Cases

- Site Photos/Inspections
- Quarry Management
- Site Conditions/As-Built Plans
- Earthwork/Drainage Evaluations



# Site Photos/Inspections

- Reach remote locations without having to mobilize in Access Equipment
- Capture photos of sites on a broader scale
- Utilize images for marketing purposes
- Use images as a teaching tool by evaluating operations



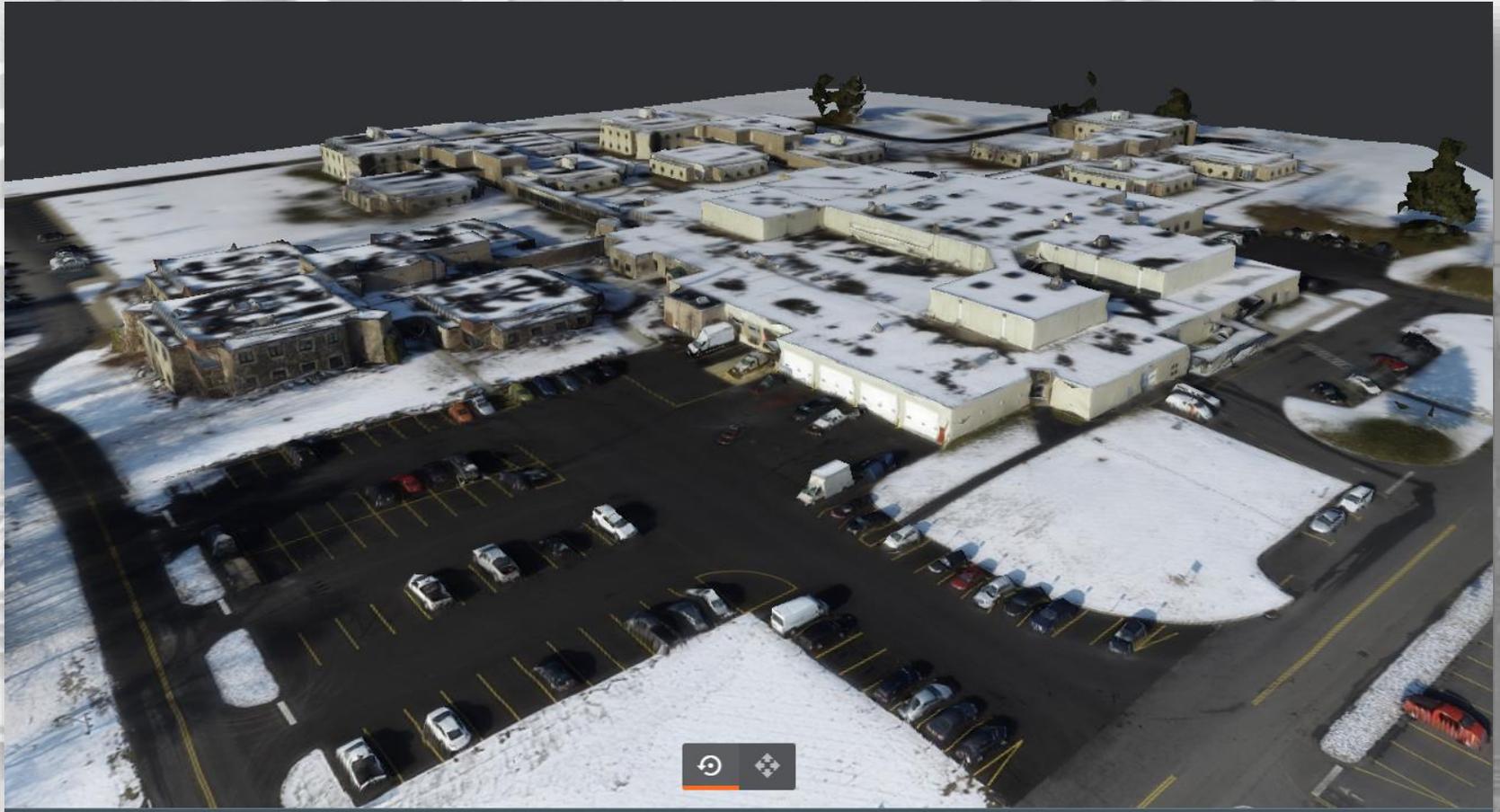
# Site Photos/Inspections

## *Exit 17 Bridge*



# Site Photos/Inspections

## *DACC Wilton Campus*



# Quarry Management

- **Survey Enabled Drones**
  - Propeller Aero
  - Kespry
  - Drone Deploy
  - Pix4D – *Requires Software and Hardware purchase*
- **Inventory Volume Reports**
- **Life of Mine**



# Quarry Management



# Quarry Management

**D.A. COLLINS** | HOME | AEROPOINTS | DATA PROCESSING | Trimble Stratus

SITE: PALLETTE STONE | SURVEY: 03 OCT 2022

**CREATE A MEASUREMENT**

MEASURE

SURVEY

DESIGNS

OUTPUTS

BOOKMARKED TEMPLATES

- Stockpile
- Compare to Previous Survey

Search for measurements

- 2-3
- 3S
- CONCRETE SAND
- COY RD - Mfg Sand
- COY RD 1'S
- COY RD 1A'S
- CP MATL #2 Stone Pile #2
- CP MTL #2 Stone Pile #1
- CP MTL Lightweight
- CP MTL Sand
- CPL MTL #1 Stone
- CRUSHER RUN
- Cold Patch
- Crusher Run - Hole
- DUST1

Move to | Share | Delete

Photo viewer | Timeline

POWERED BY propeller | 200 ft | NAD83(2011) / New York Ea...

# Quarry Management

The screenshot displays the Trimble Stratus software interface for quarry management. The main view shows a 3D aerial perspective of a quarry with a red volume overlay representing a stockpile. The interface includes a sidebar with various tools and data panels.

**Navigation and Site Information:**

- HOME | AERPOINTS | DATA PROCESSING
- Trimble Stratus
- Support | Robert
- SITE: PALLETTE STONE | SURVEY: 03 OCT 2022
- SHARE | SETTINGS

**MEASURE:** Crusher Run - Hole

**TEMPLATE:** Stockpile

**Smart Volume:**

- 3D Cut/Fill | 2D Cut/Fill | Contours
- CUT: 5 873 yd<sup>3</sup>
- NET: -5 864 yd<sup>3</sup>
- FILL: 8.51 yd<sup>3</sup>
- + Add Calculator

**MATERIAL PROPERTIES:**

- CRUSHER RUN
- MASS: 8 575 t
- 1.46 t/yd<sup>3</sup>
- VALUE: \$0
- + ADD / EDIT MATERIALS

**Footer:** Photo viewer | Timeline | POWERED BY propeller | 20 ft | NAD83(2011) / New York East (ftUS) N 1 547 623.428 ft E 688 323.742 ft Z 209.254 ft ±

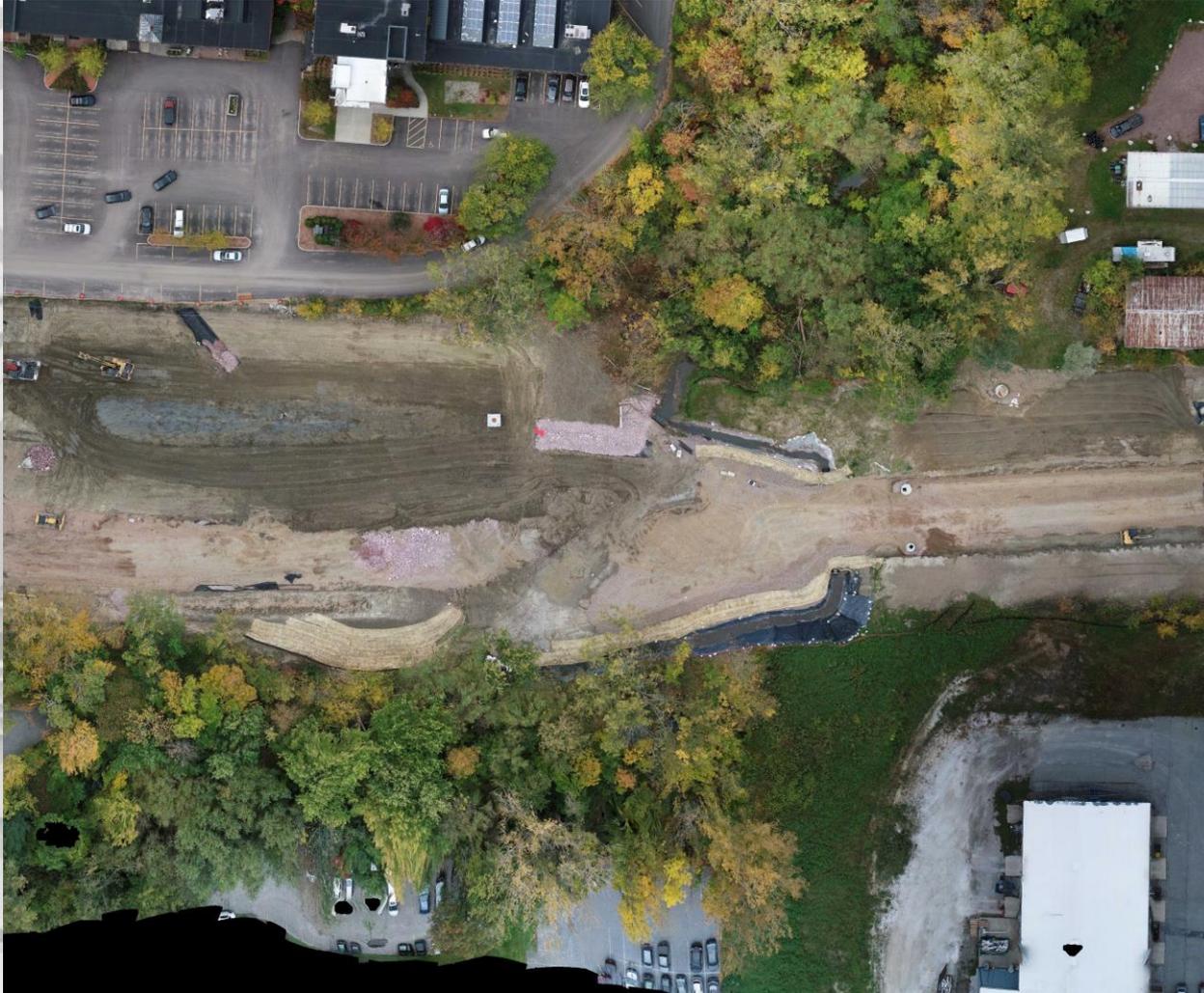
# Site Conditions/As-Builts

- Use Orthomosaic for Operations Planning
- Save time compared to traditional survey
- Provide more clarity than traditional survey data
- Accuracy to within 0.10 Feet in best conditions



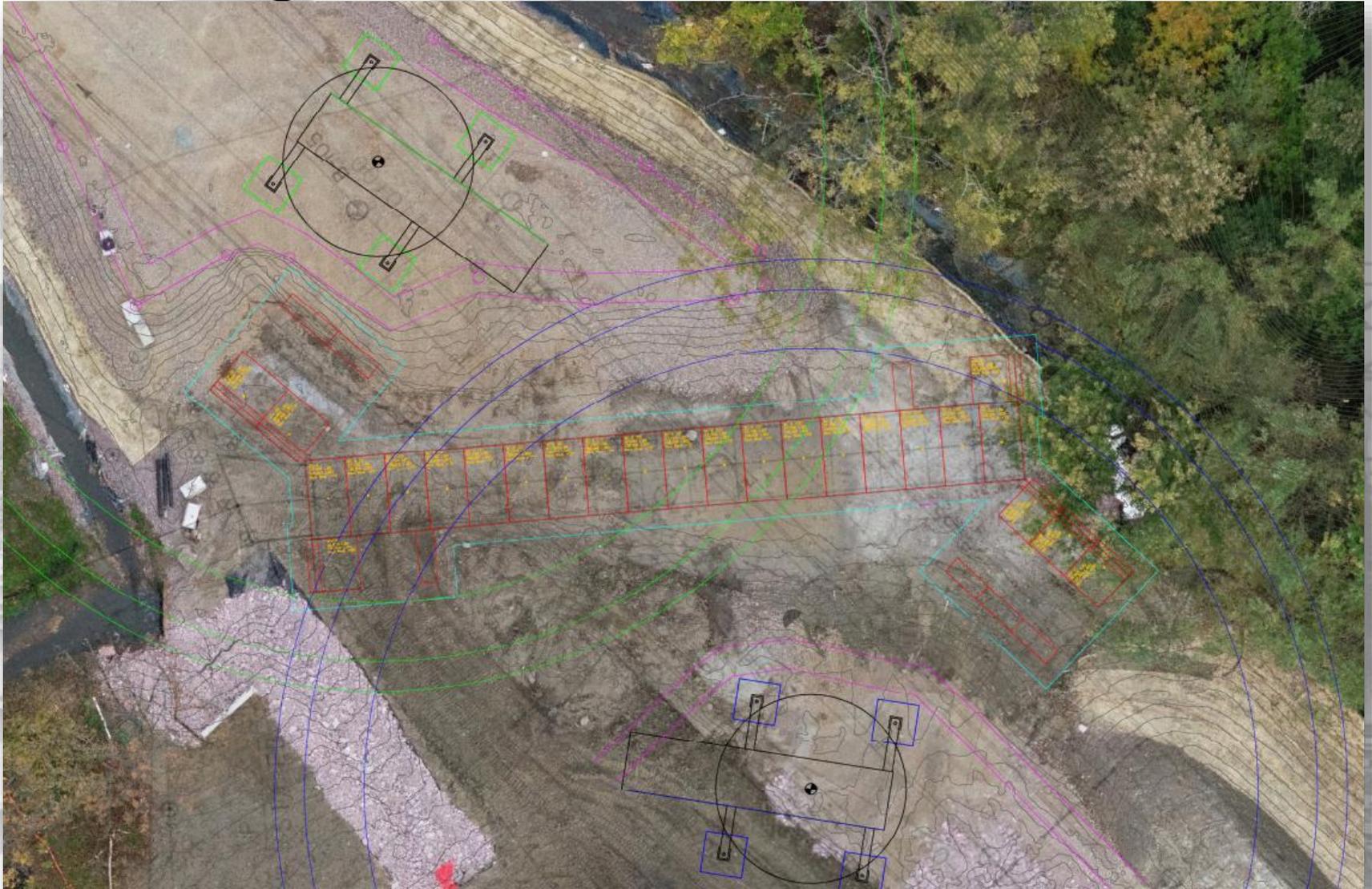
# Site Conditions

## *Burlington Culvert*



# Site Conditions

## *Burlington Culvert – Crane Locations*



# Site Conditions

## *Snell Lock – Access Considerations*



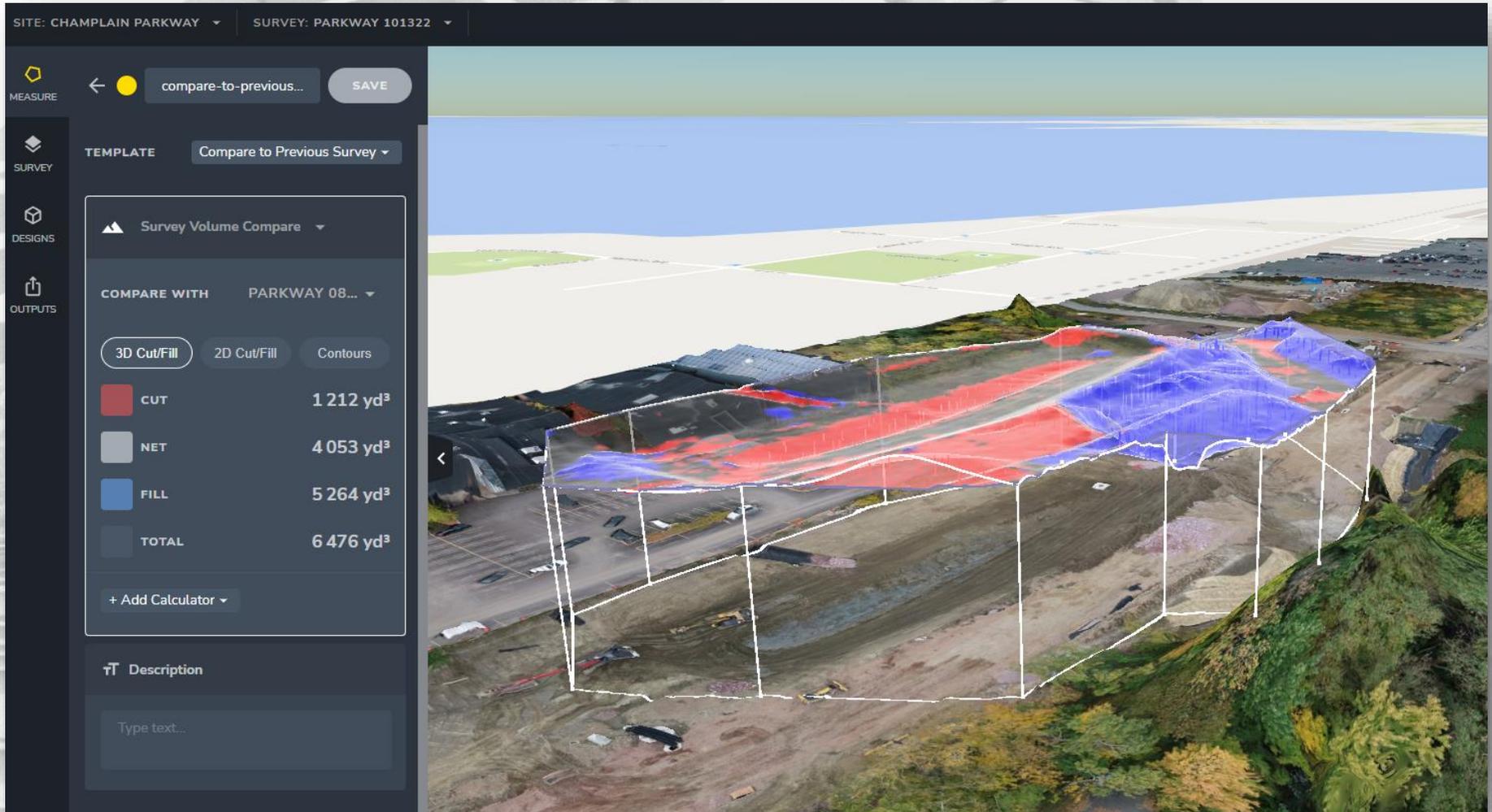
# As-Built Conditions *Clinton County Landfill*



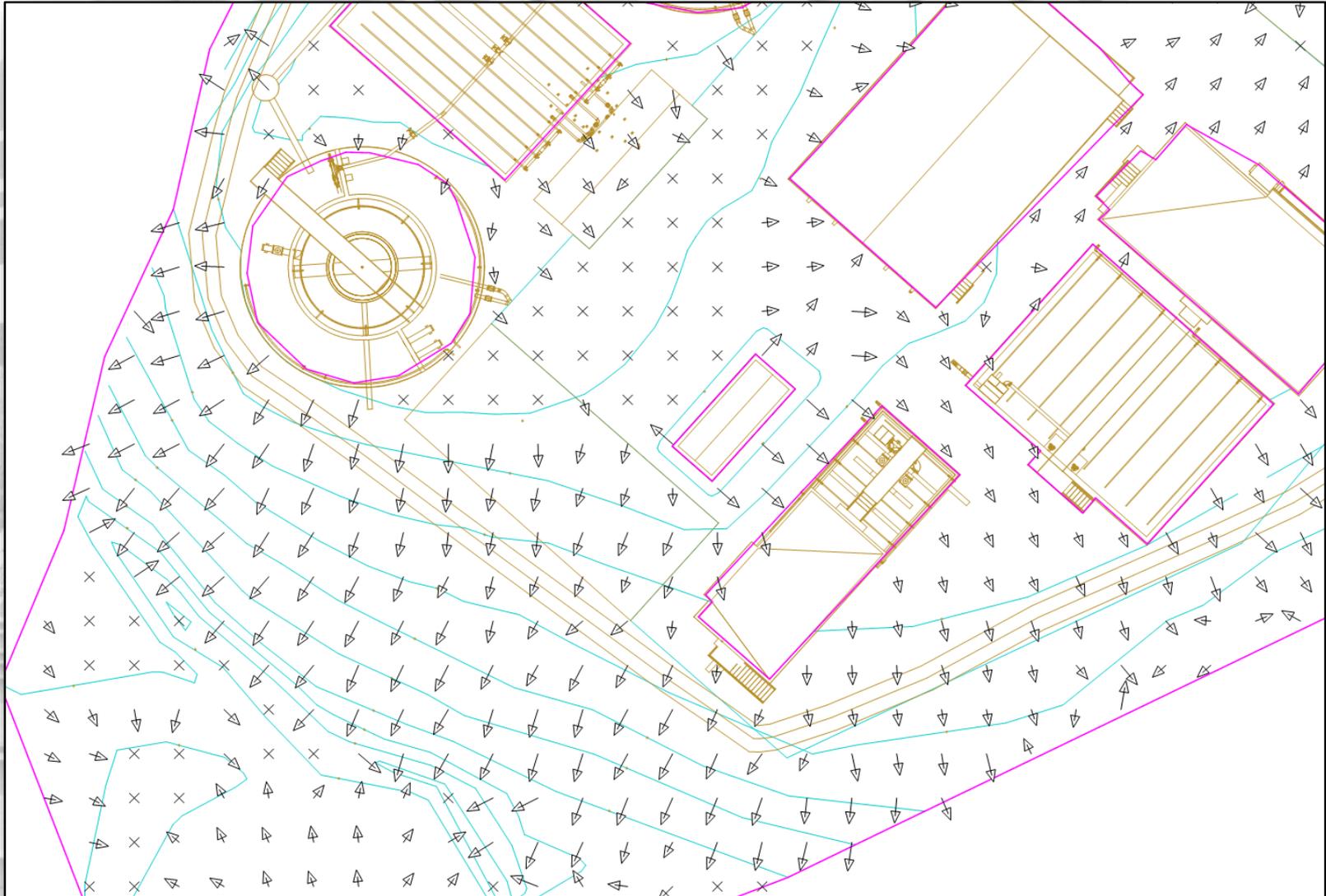
# Earthwork/Drainage Evaluations

- Develop a full surface that can be input into an Earthwork Software (AGTEK, Trimble Business Center, etc.)
  - Drainage flow diagrams
  - Earthwork Quantities
- Some Earthwork quantities right within full service drone software
- Develop work durations based on Surveyed quantity

# Earthwork/Drainage Evaluations



# Earthwork/Drainage Evaluations



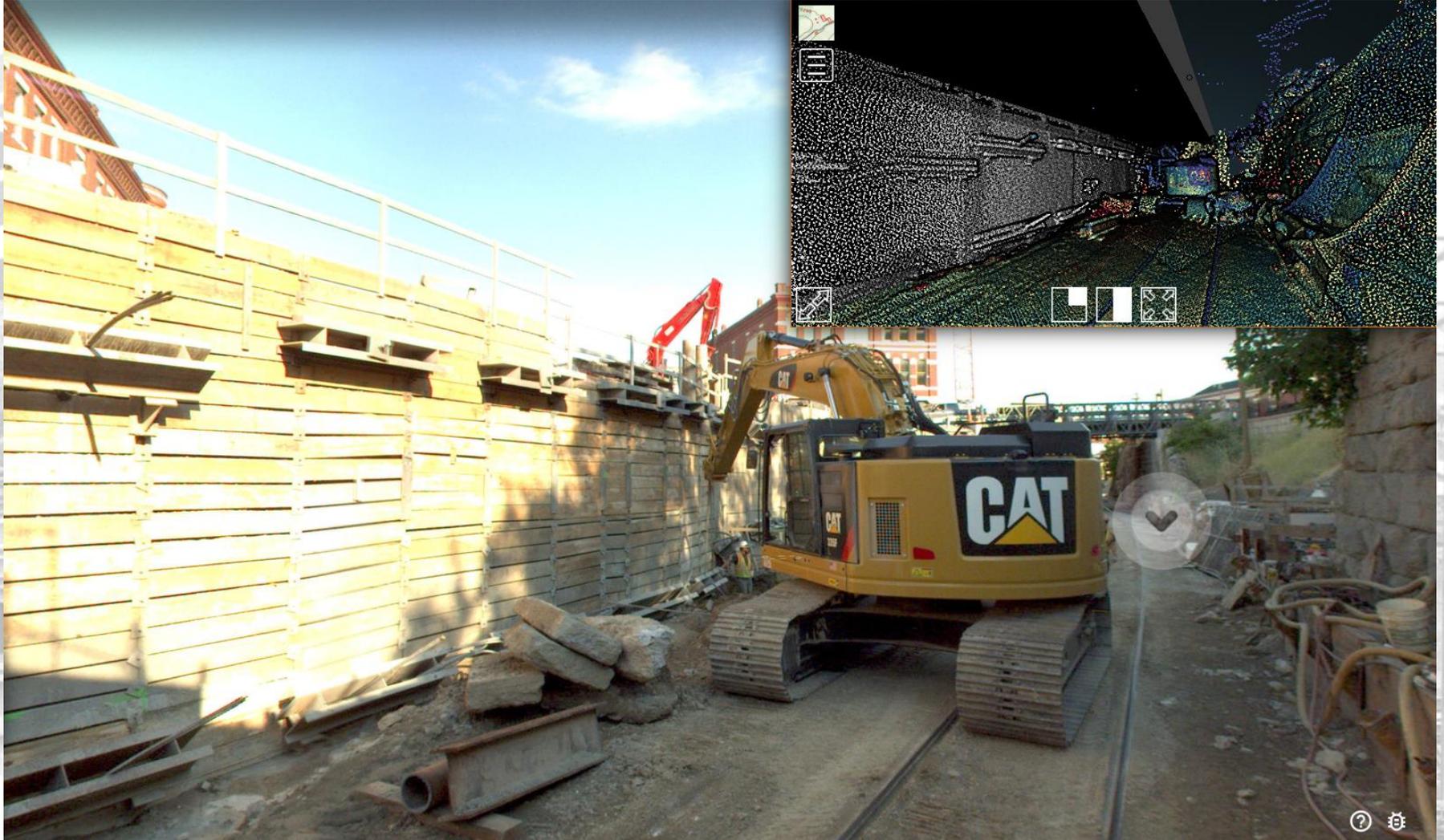
# The Future

- LiDar (\$\$)
  - Accuracies down to 0.25 Inches
  - Generates full point cloud along with Background Images
  - High End Processing required
  - Penetration through foliage
- Interior Survey capabilities
  - Inspections
  - As-Builts
- More Automation

Flyability Elios 3



# The Future - LiDAR



# The Future



# QUESTIONS?

