

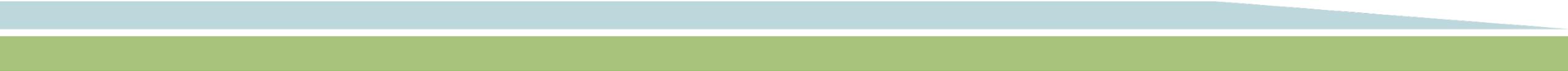


**HOUSTON**  
ENGINEERING INC.

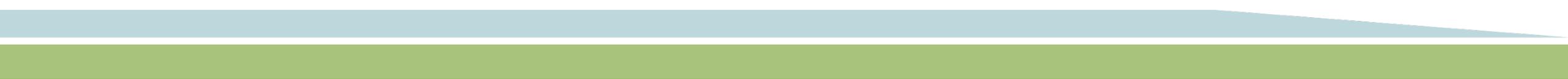
**ENGINEERING | TECHNOLOGY | SOLUTIONS**



*Note regarding this document: This presentation contained many videos that are not available in this PDF. Please contact Houston Engineering for any questions.*

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# **VARIOUS DRONE CAPABILITIES**

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# Drone Technology



## HEI Drone Program

- **14 pilots** who are certified to fly drones across the upper Midwest.
- Trained surveyors and technical professionals
- Streamlined process from data gathering to creating designs and solutions for our clients. **This saves you time and money!**



# Drone Technology



## WHAT DATA CAN A DRONE CAPTURE?



High Quality Photos



4K Resolution Video



Volume of Material

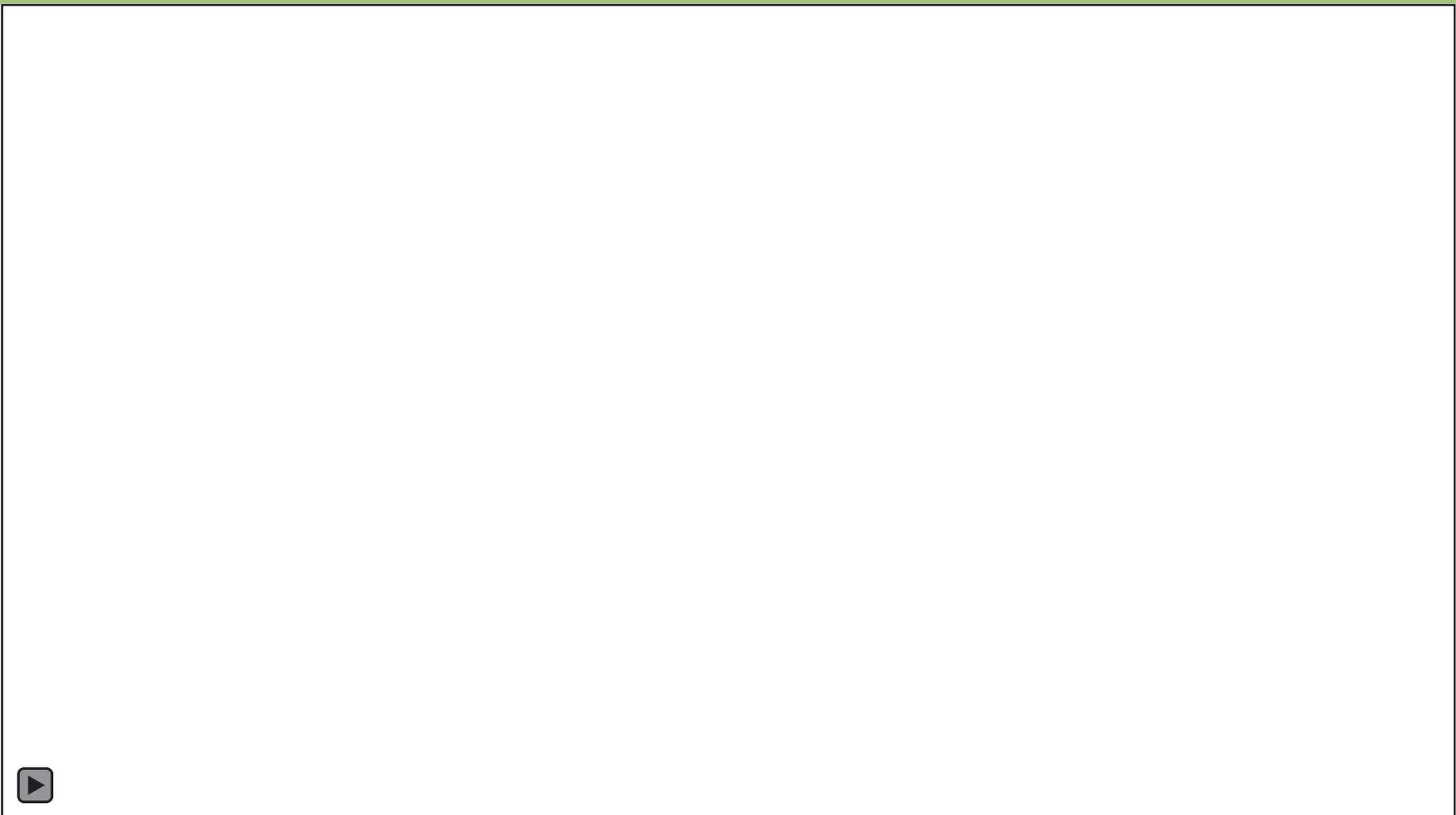


Existing Topography for Digital Elevation Models

(accuracy will depend on project)



# Drone Technology



# Drone Technology: Types of Services



## Video/Photo Based Inspections

Cover miles of pipelines, roads, ditches, etc. in a fraction of the time and cost. Plus, you'll have 4k video and high resolution images to reference again and again.

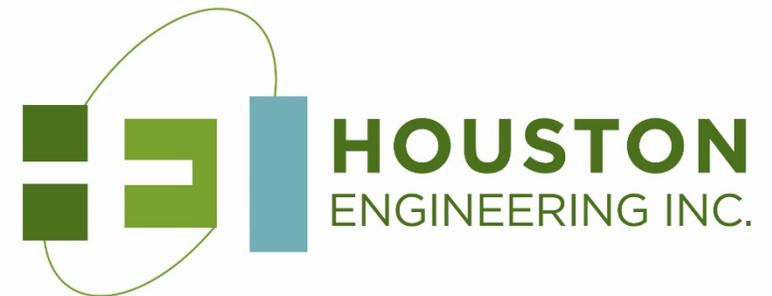


## Client Benefits

- County can now measure fill at any time of the year instead of waiting for winter.
- Surveyors no longer have to climb a potentially dangerous mound.
- Provided a 3D surface and fill report to the County.

# DRONE-BASED LIDAR

SkySkopes



# Drone-Based LiDAR



**Drone-based LiDAR technology is enhancing the way we collect survey and LiDAR data.**



# Drone-Based LiDAR



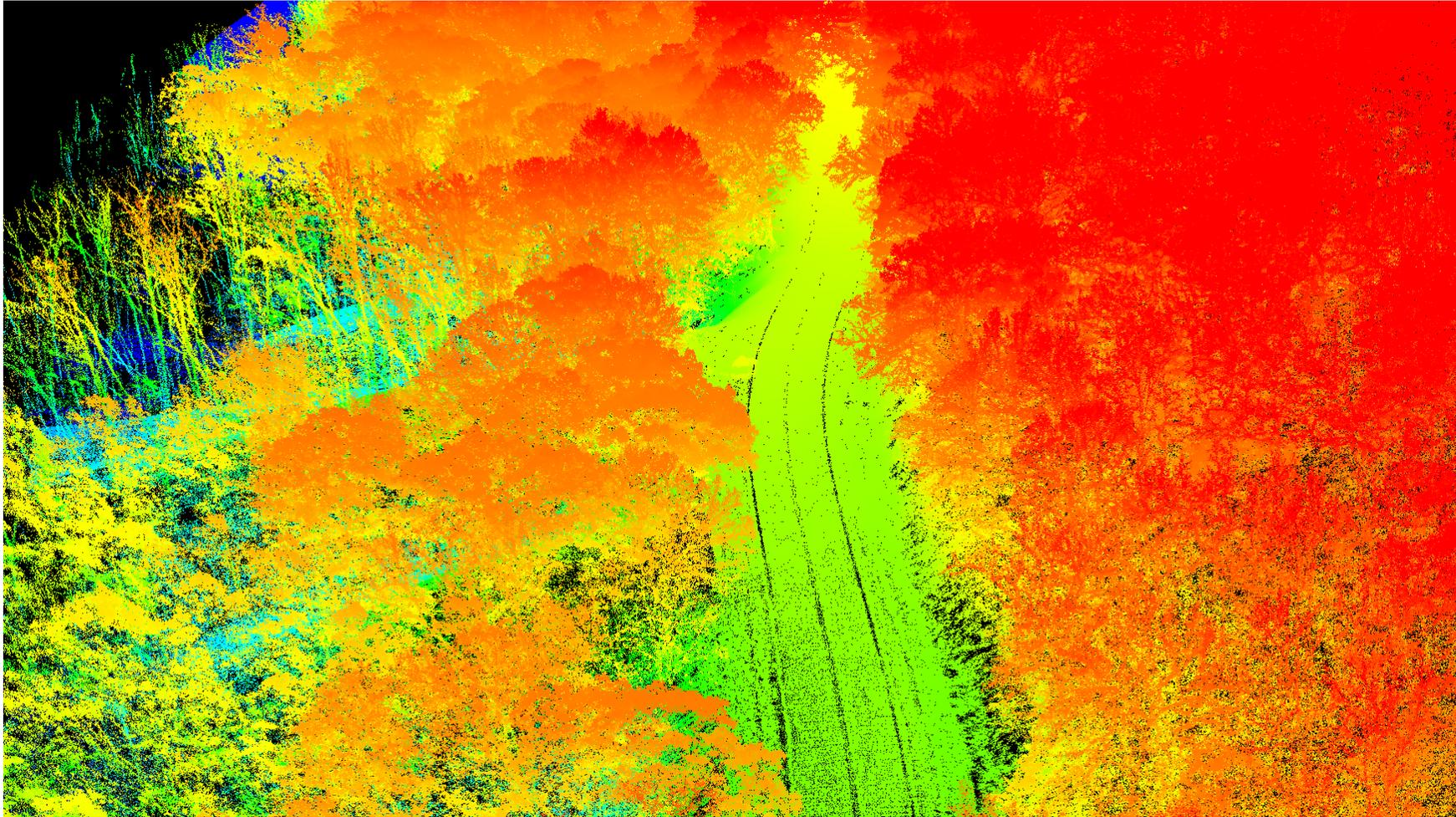
HEI and SkySkopes use a state-of-the-art drone LiDAR system and analysis software to provide cost effective and accurate survey packages to clients.





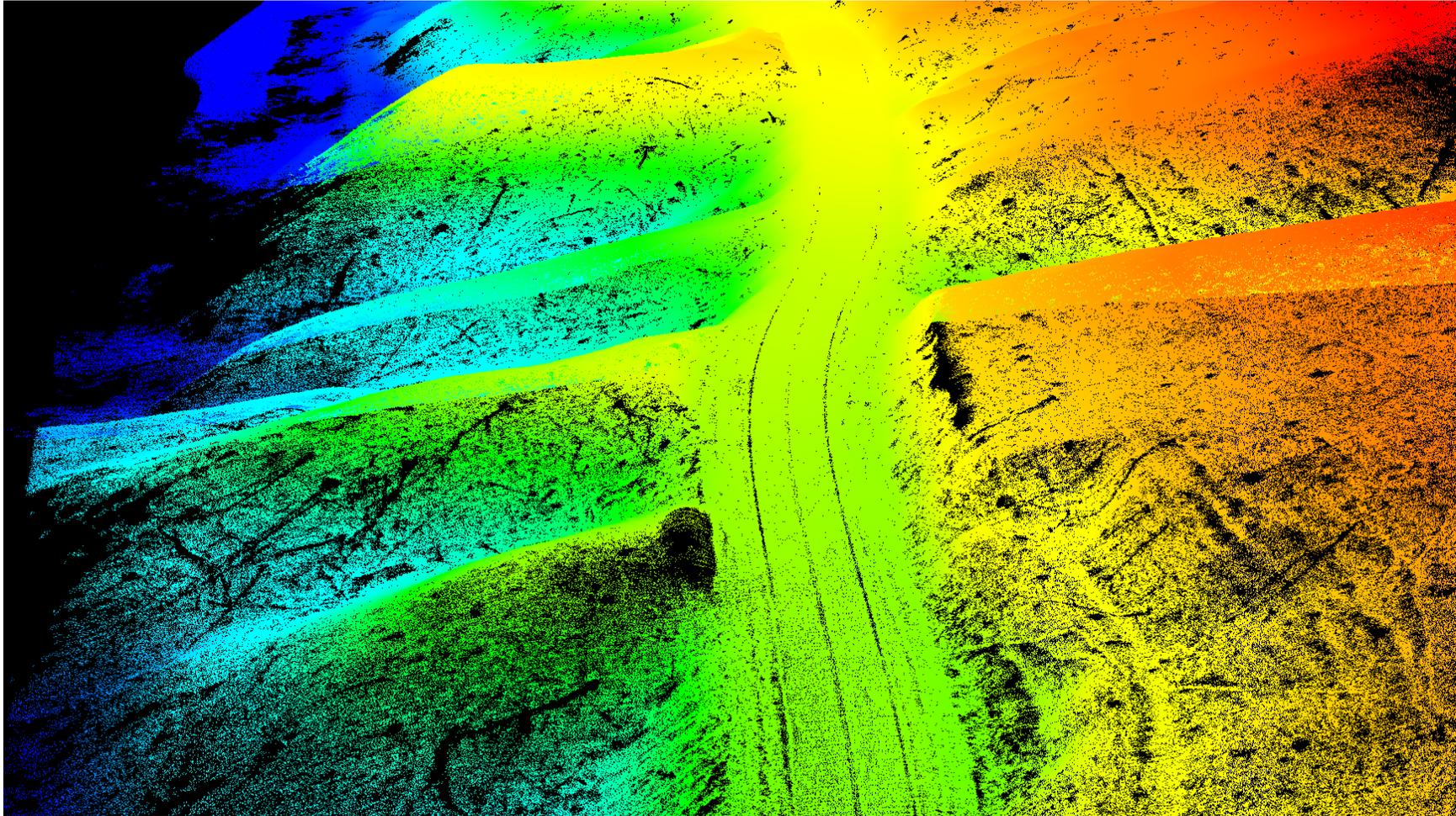


# Too Much Data?



- Full LiDAR collection
- Video of area fly through

# Nope!



- Ground Classification only





## Flexibility and Time Savings

- Drone-based LiDAR flights are **done within hours vs. several days or weeks** compared to traditional survey methods.
- Weather and cloud cover are less of a concern with no obstacles when scheduling flights since drones can fly at various altitudes, levels and at night.
- Drone flights **require less manpower** than a typical ground crew, thus can mobilize and reach job sites more quickly.
- It eliminates the scheduling and cost of a plane for aerial LiDAR.





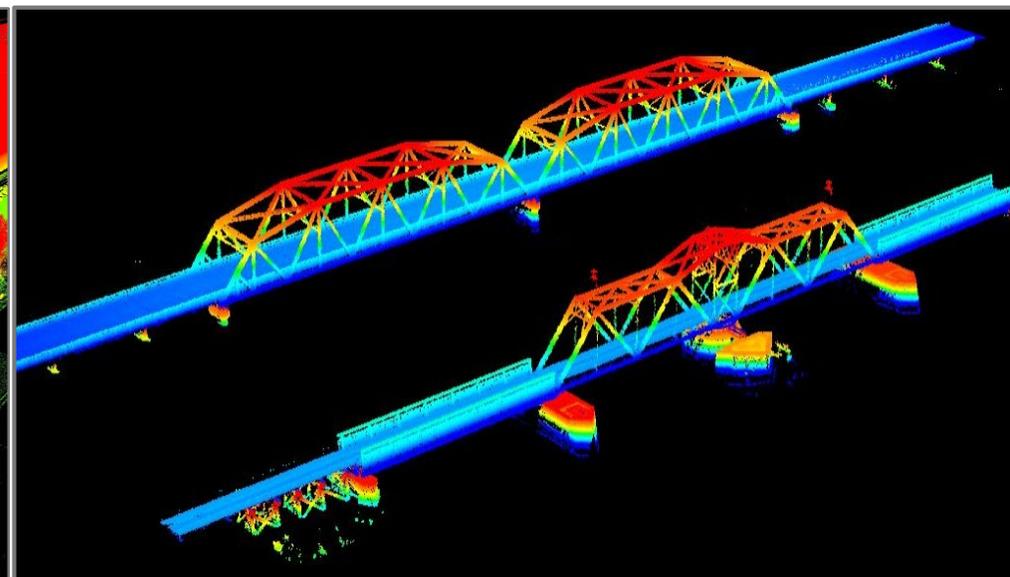
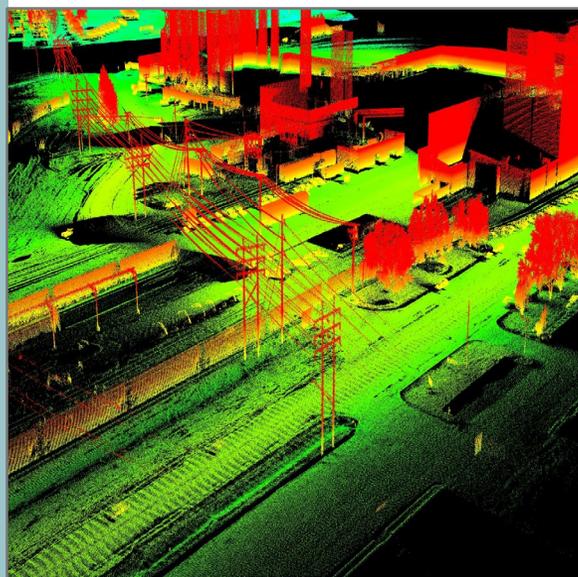
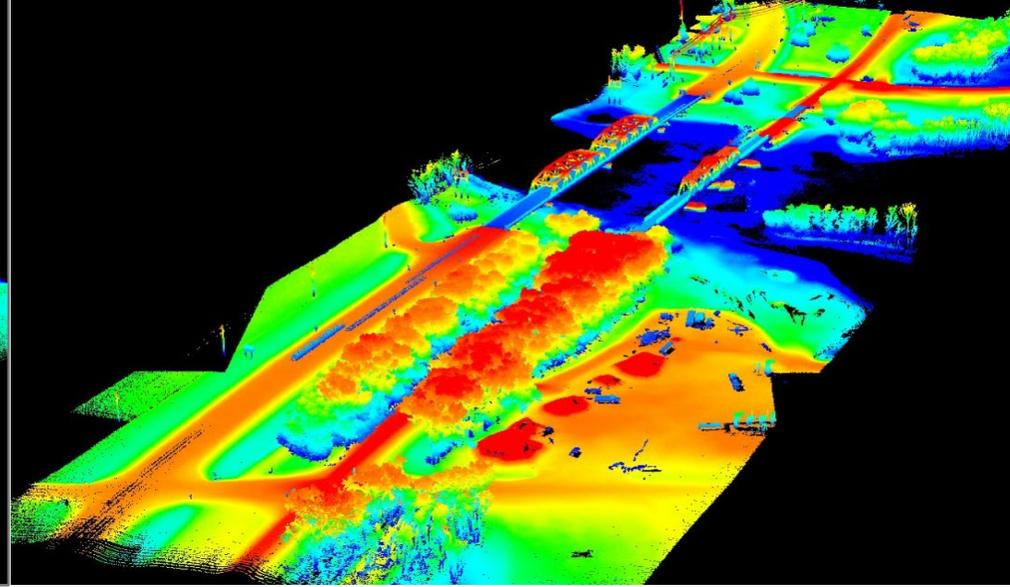
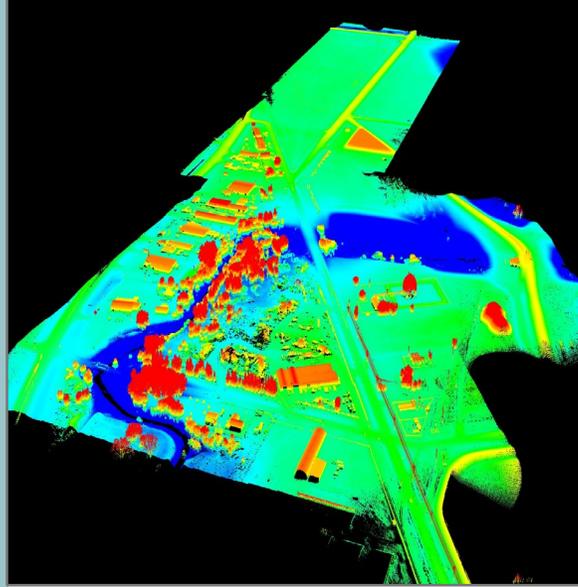
## Flexibility

- Real-time data collection during flight, allowing for immediate adjustments to flight path or sensor settings if needed.
- This method is cost-effective for small-scale projects.
- The data is more representative of the terrain.



## Quality and Accuracy

- Drone-based LiDAR allows us to capture millions of data points with survey-grade vertical accuracy
- More data points = highly accurate surface models for design deliverables.
- Need experts in data processing
- Provide product to end user in various formats, including MicroStation or AutoCAD.





## Quality and Accuracy

- Mobile LiDAR typically can't acquire beyond roadway inslopes (ditch bottom and backslope require other methods)
- Aerial LiDAR more costly to mobilize for small jobs and weather dependent
- Accuracy is key.....



99.7% within 1.5" on roadway  
93.3% within 3" outside roadway  
**3/8" avg. variation on roadway**



## Cost

- Traditional surveys - hours vs. days for actual survey
- Drone-based LiDAR - higher processing costs

### Rough Cost Savings:

- 20% less expensive than Stereo Compilation
- 30% less expensive than traditional survey methods





## Safety

- Drones can be flown over rough, unstable terrain or unreachable areas.
- Team uses trained pilots (not just drone, actual pilots) and survey professionals. We understand the complex FAA relationships to ensure we're flying in compliance and always with safety in mind.
- Drones can fly at **NIGHT** for busy roadways or complex urban projects to lessen impacts to traffic.

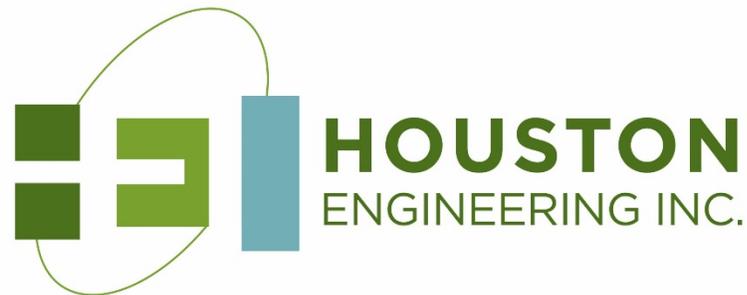


Drones can capture data in places where it can be a safety risk for people.

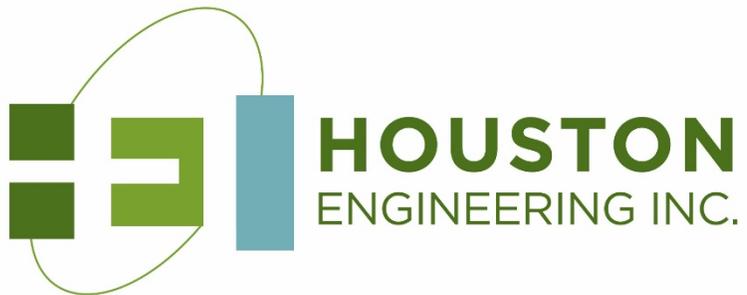




**DEMO IN PARKING LOT AT 12:15**



# QUESTIONS



<https://www.houstoneng.com/what-we-do/Technology/drones/>