Drones and Public Safety

Integrating Drones into the incident means more than just having someone out there flying a Drone.

by

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Today: Drones in the Air

- A drone is flown at an incident.
- All information is exchanged verbally over the radio.
- There might be a “Live Event” video stream on YouTube.

Soon: Actual integration into the Fireground

- Data systems are being introduced into incident management.
- Map based displays for “Situational Awareness” are evolving.
- A central computer Server has lots of real time information about the incident.
- Responders have displays and user interfaces tailored to their role. They see the information they need to see for the job they need to do.

The Example Scenario

- Rural Search and Rescue.
- Area covered: up to 100 Acres.
- Responders are looking for “something”.
- Could be a missing person, fugitive, hiker, responder.

Incident Information Data

- Location given at Page-Out. 
- Drone Operations/Take-Off Location. 
- Responder Locations  
- Map Annotations: Drone Obstructions, Map Icons, “Targets” dropped by the drone pilot. 
- Responder Health Information. 

Responder Roles

- Incident Command - Overview of the entire incident.
- “Boots on the Ground” - The responders actually performing the search.
- Drone Operations - A Drone Operations Officer and a Drone Pilot.

Responder Hardware and Software

Software

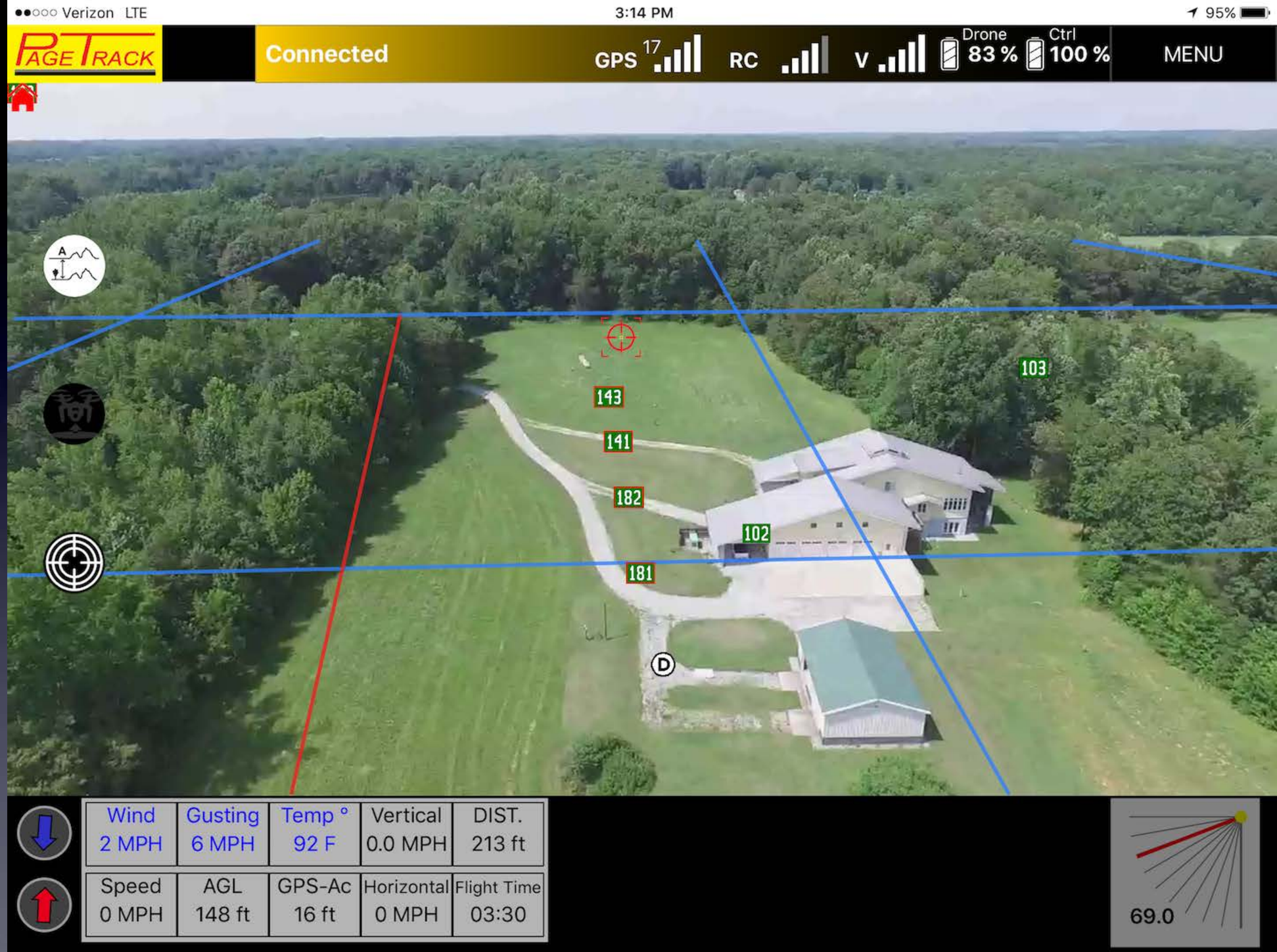
- Connects to the Server every few seconds.
- Retrieves incident information.
- Displays information relevant to the Responders Role.

Hardware

- Smart Phones - Small size, small screens. (Boots on the Ground)
- Tablets - “iPad” - Medium size, medium screens. (Drone Pilot)
- Desktops/laptops - Big size, big or multiple screens. (Incident Command)

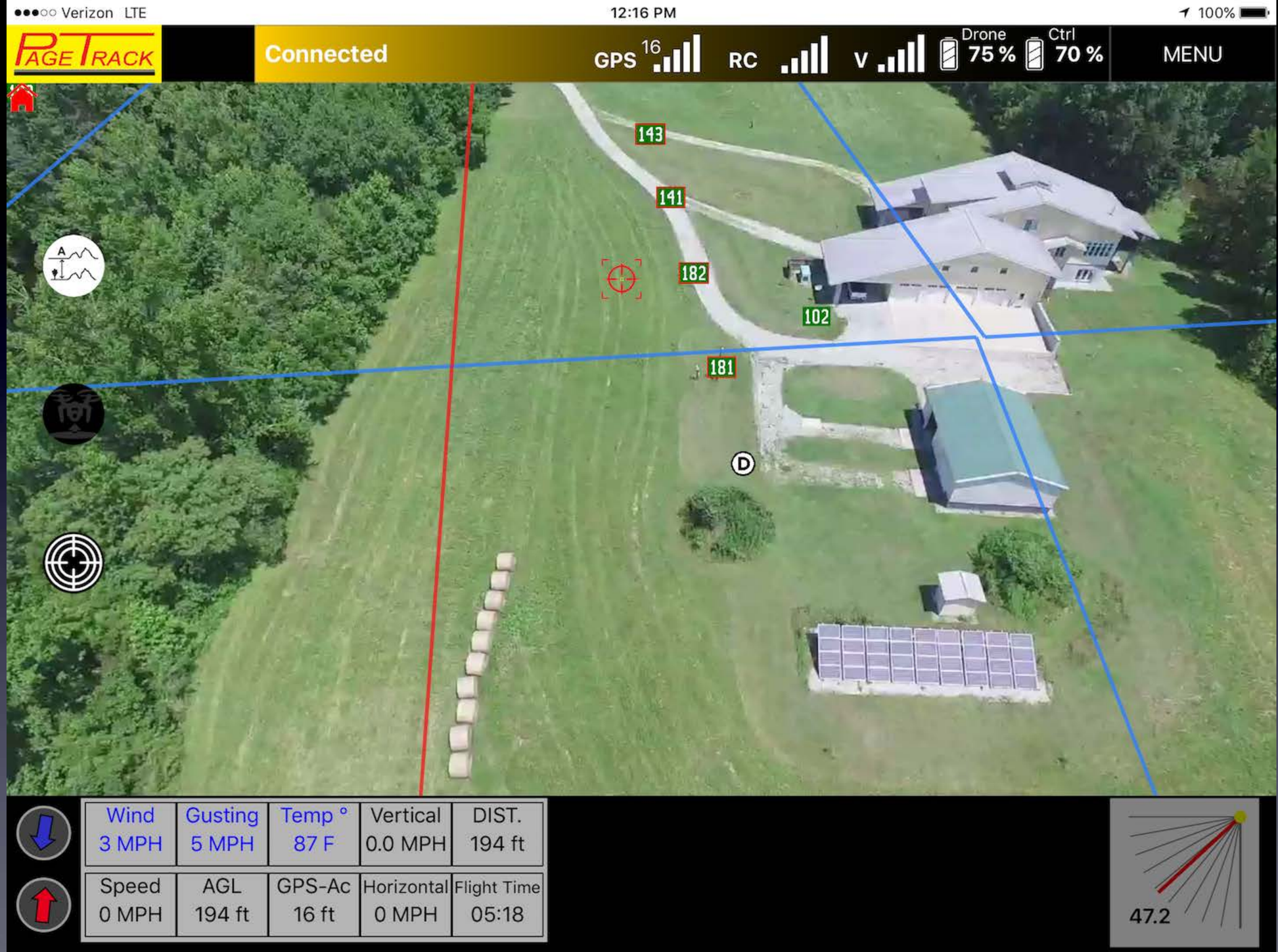
Drone Pilot

The Drone Pilot display shows the video, drone telemetry, weather, search grids, take-off point and responder locations.

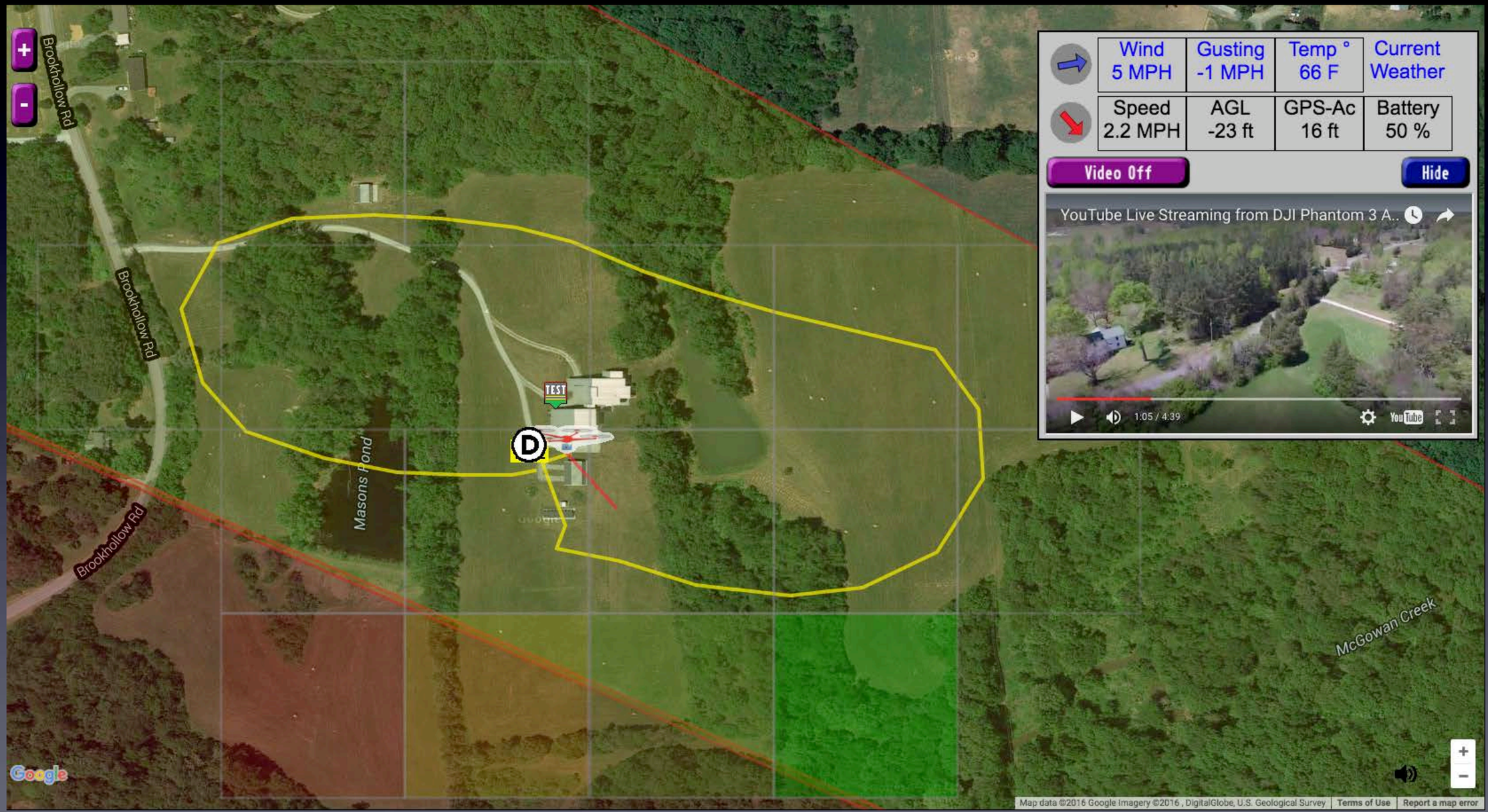


Drone Pilot

Same location in the sky, but at a *higher* AGL altitude but a *lower* camera/gimbal angle.



Incident Command: Sees where the drone is, where the drone has been, live video, weather, telemetry. (responder locations not shown on this view)



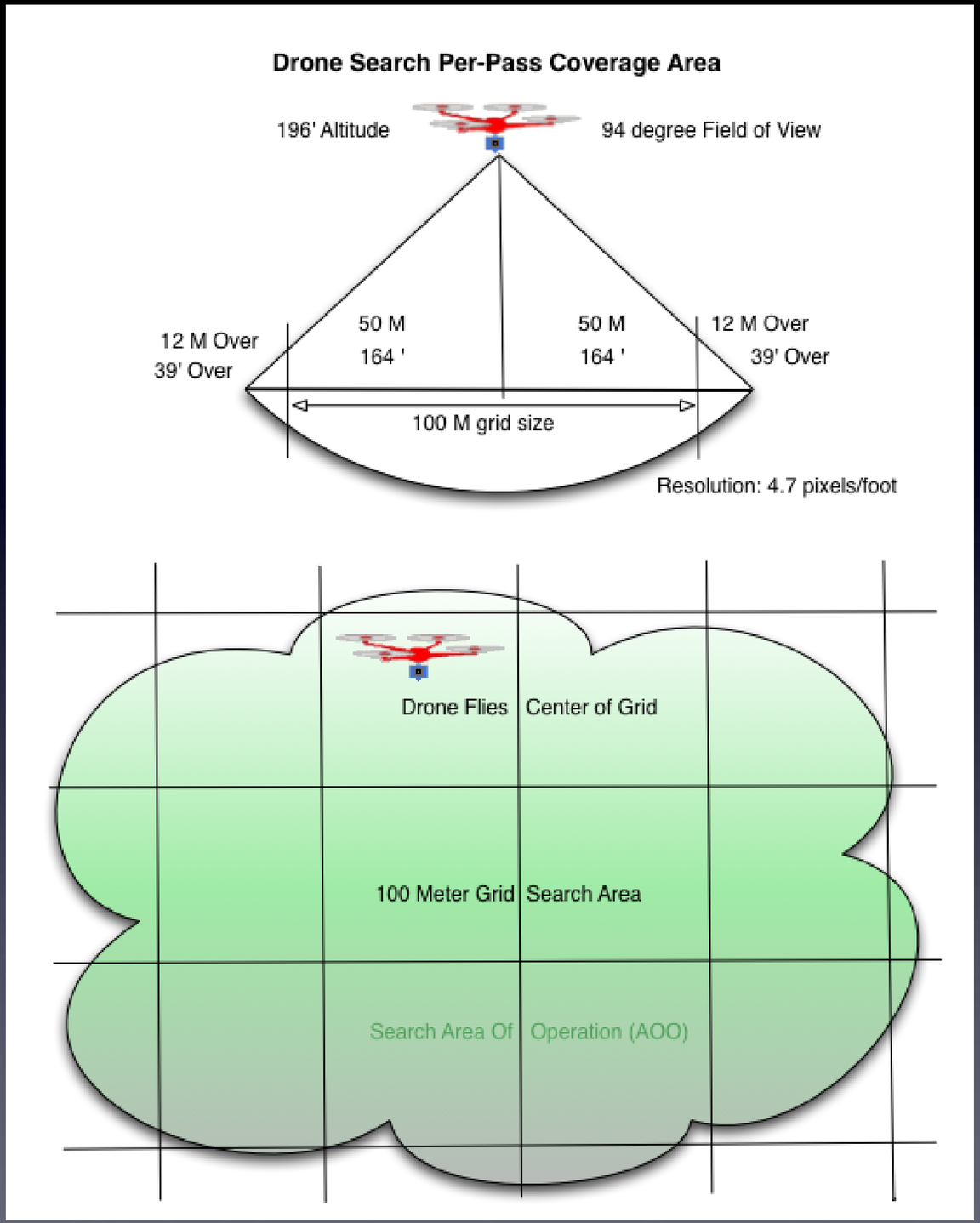
Pilot View

Let’s look at a video of the Pilots iPad during a flight.

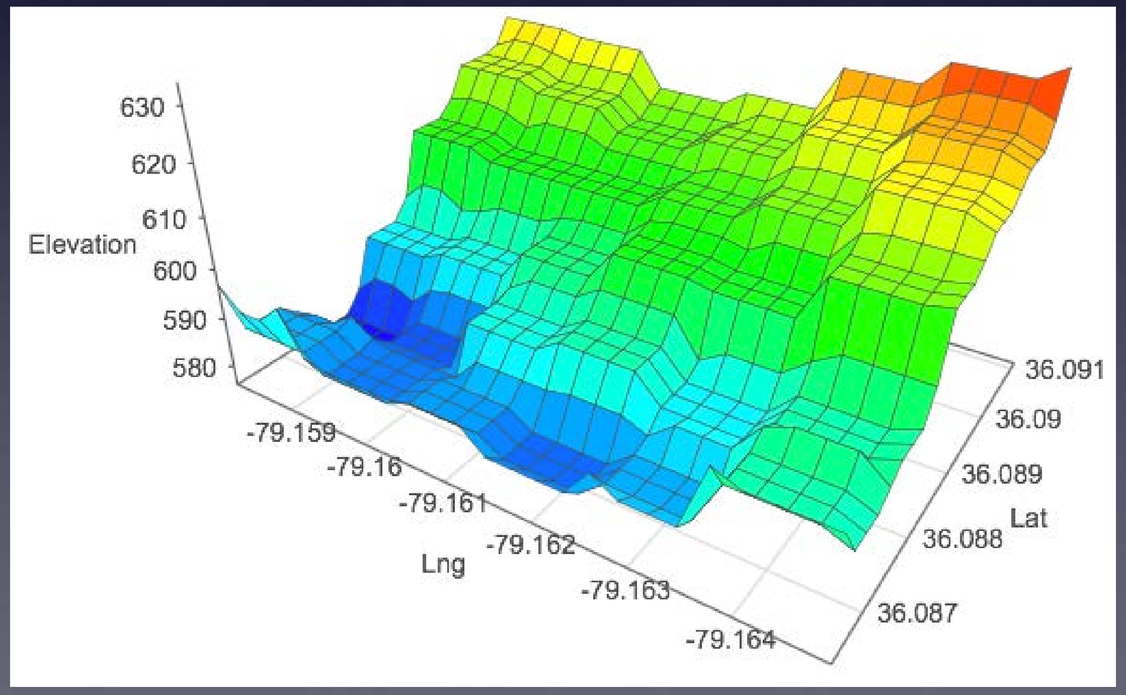
Note that the video quality of the iPad screen capture is poor. The screenshot you saw shows the actual quality the pilot sees.

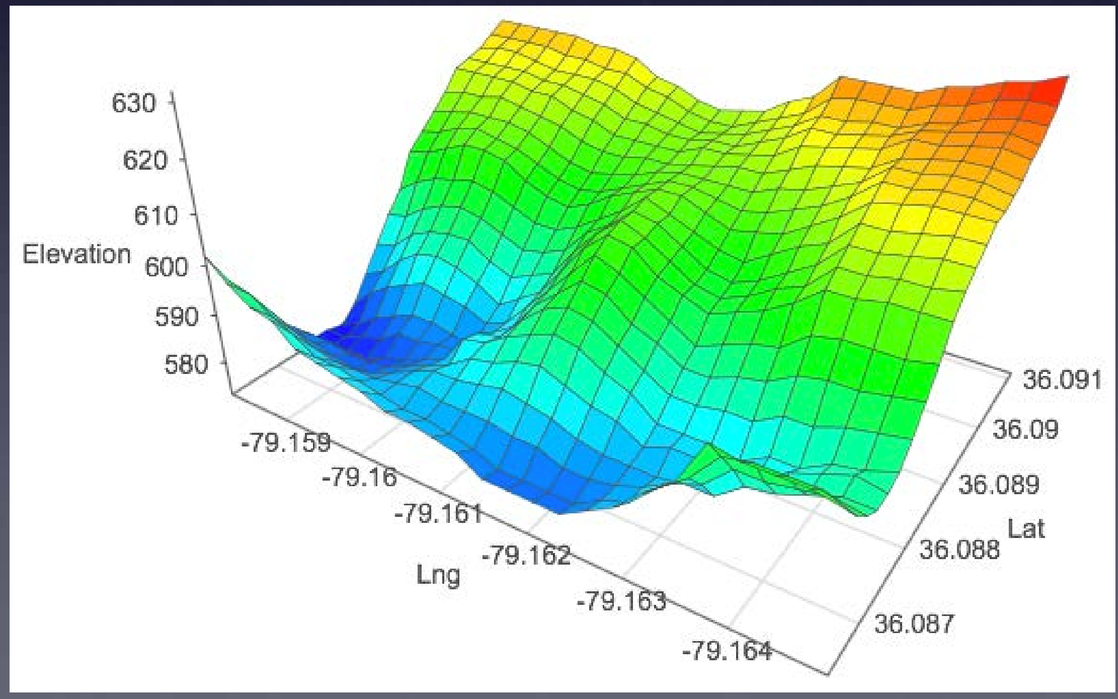
For 100 meter search grids, an altitude of 196’ with a camera gimbal angle of around 45º will show the full grid at about the centerline of the video.

The resolution of the video is about 4.7 pixels per foot.
For a Thermal Imaging Camera (TIC) the resolution is about 1.5 pixels per foot (620H resolution). Lets hope that someday a TIC camera with HD resolution of 1280H becomes available. It won’t be cheap...

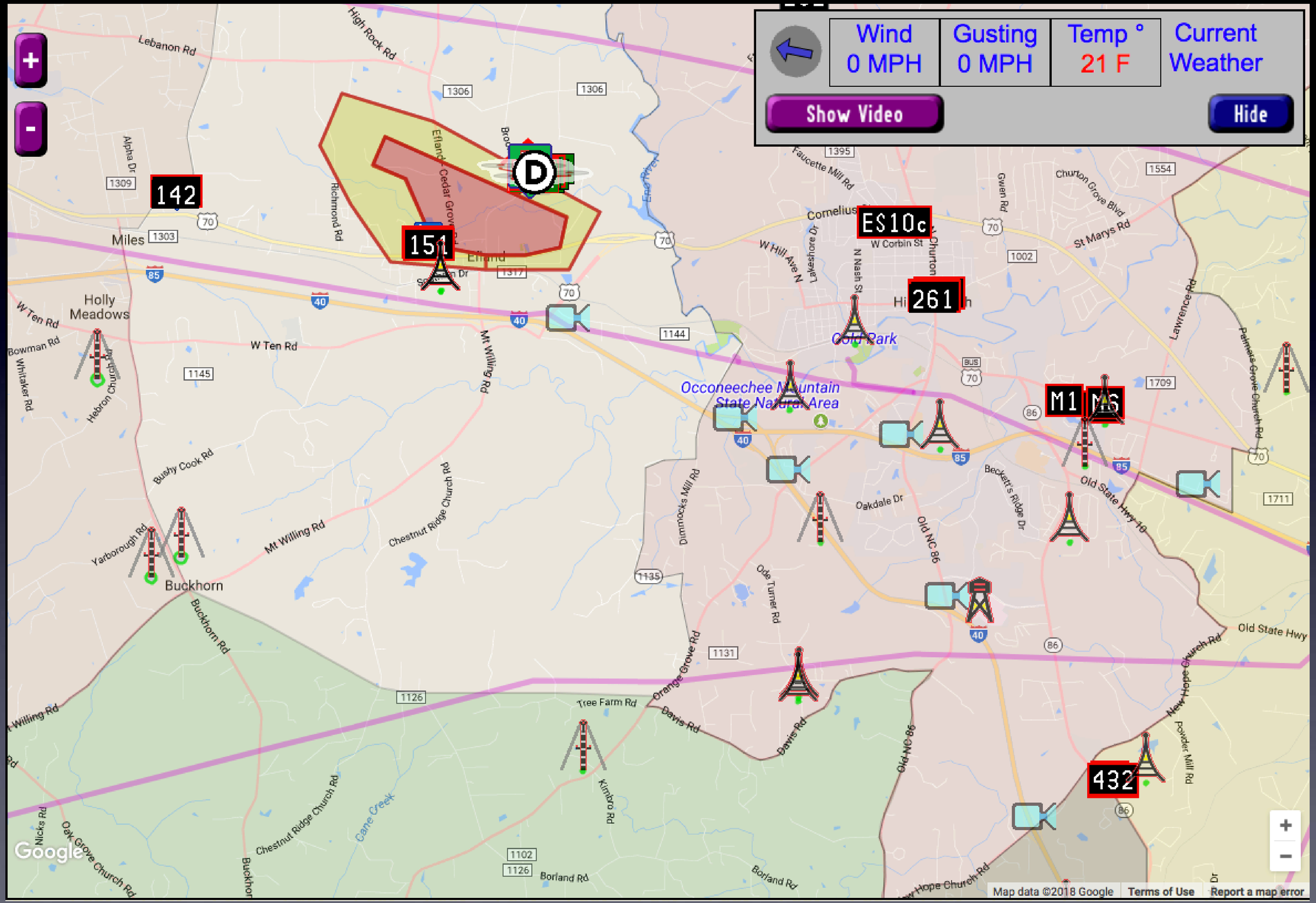


The server creates a 3-D elevation model of the terrain in the vicinity of the drone. It then smooths that terrain model. A button on the iPad can put the drone in a mode where it flies at a constant altitude above ground (AGL).
This lets the pilot focus on flying and looking at the video even when in changing terrain.





You can enter obstructions like towers, water towers, tall buildings, power lines and small airport landing approach patterns.

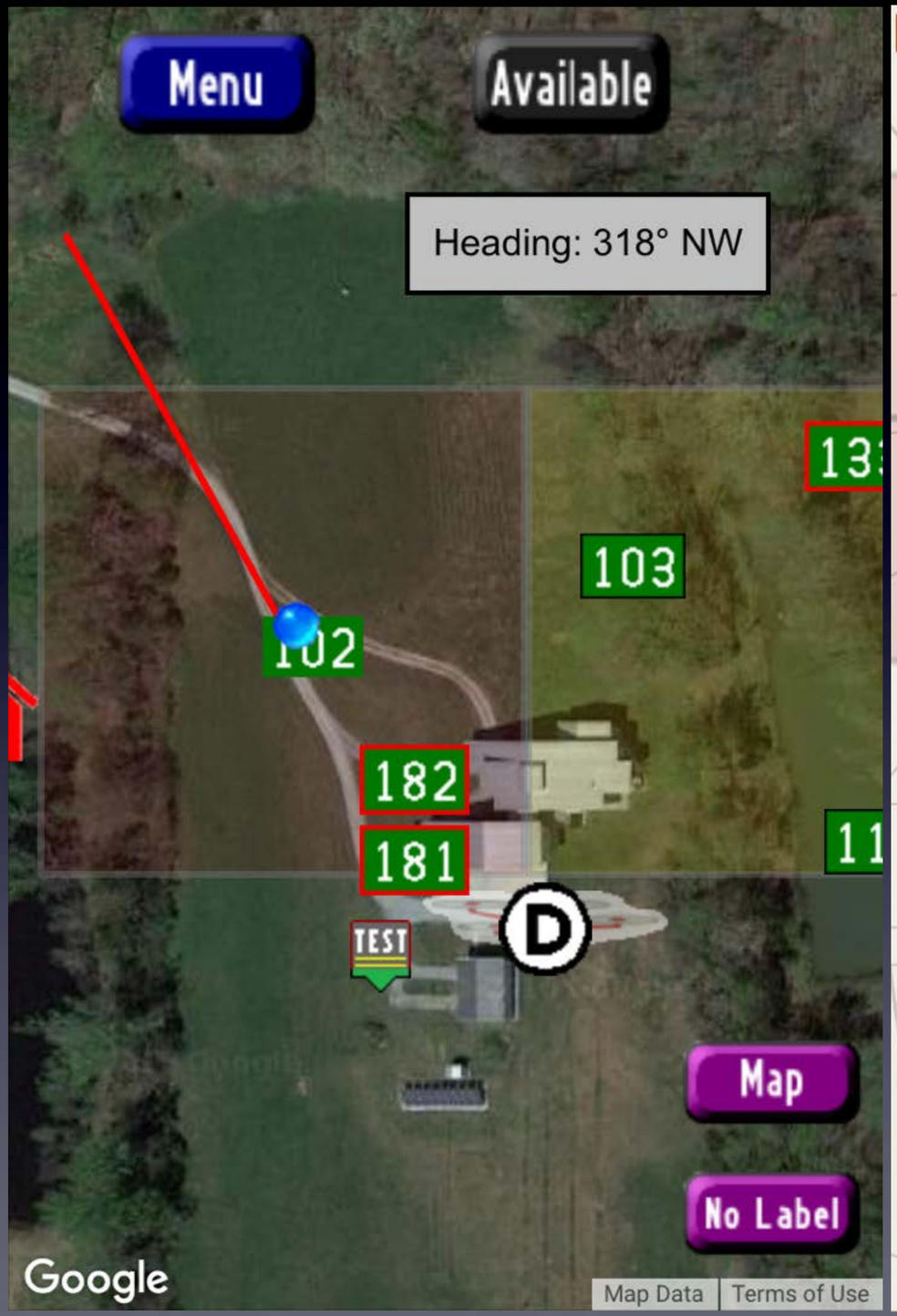


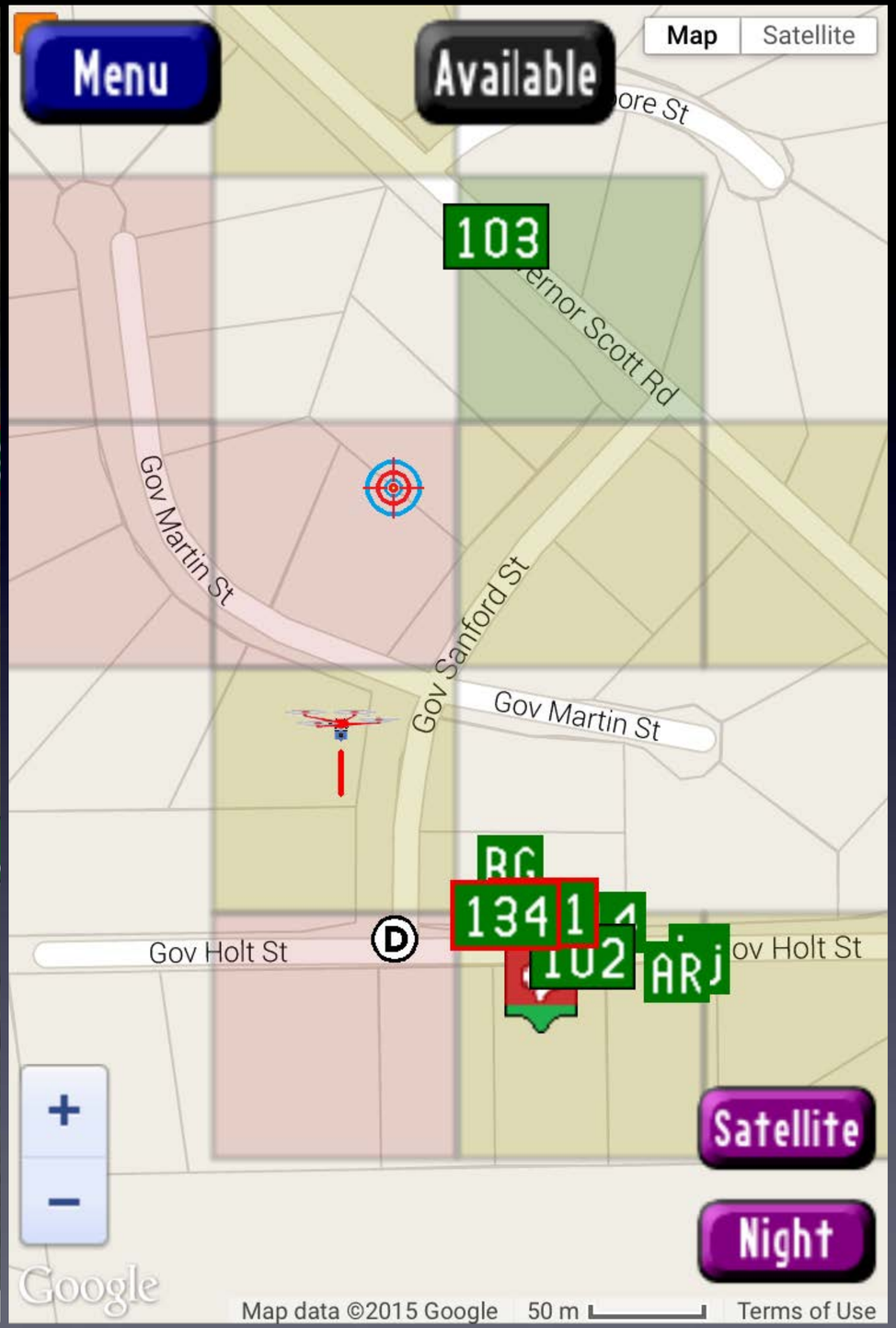
Incident Command View

Video of the PageTrack “ÜberWatcher” screen. Shows “everything”.

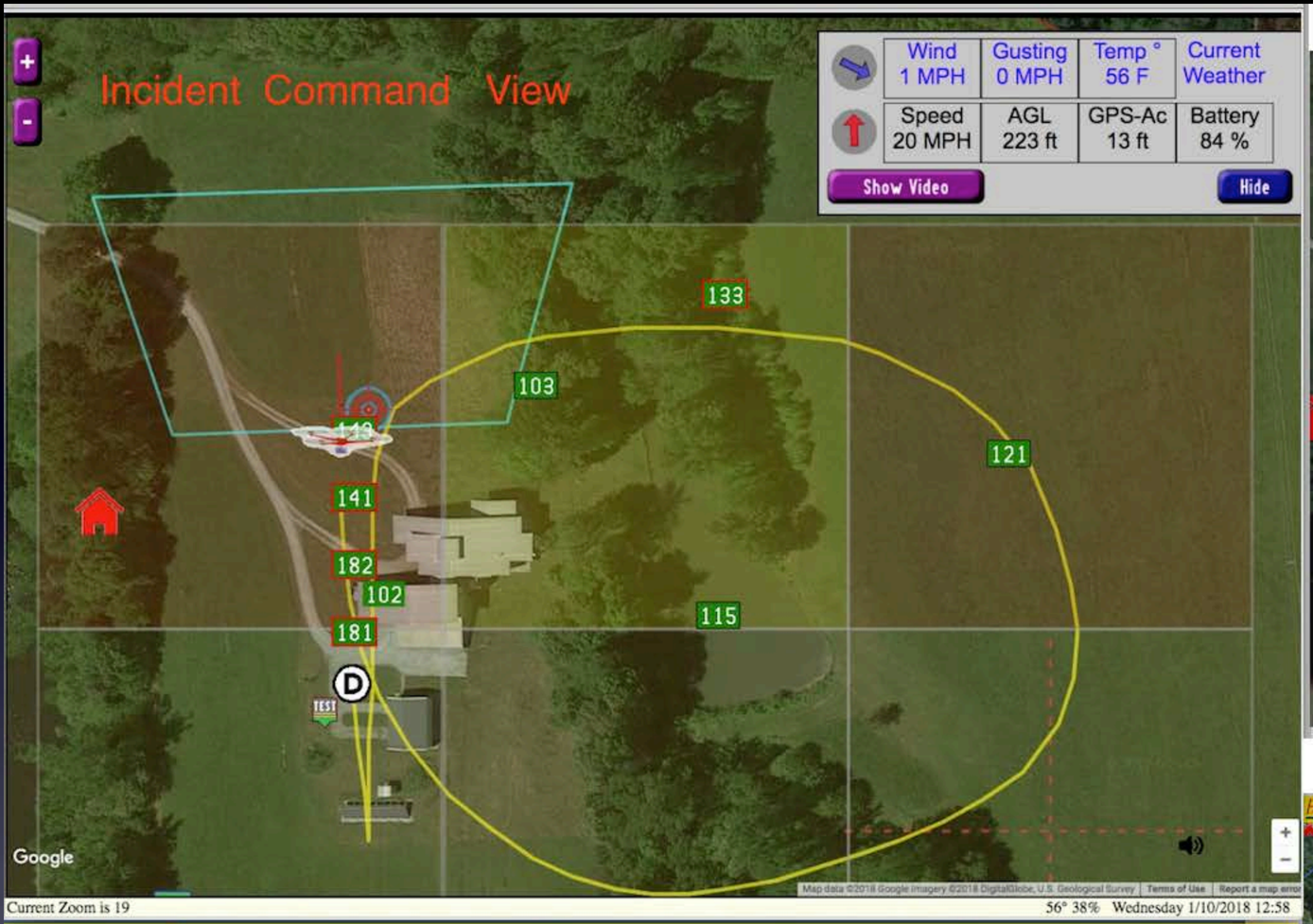
Responders:

On the phone, they see other responders locations, dynamic search grids, drone location/heading, their heading, “Dropped Targets”, DronePort.





Incident Command View



Incident Command can see where responders are, where the drone is, what area the pilot sees in the drone control video display, the path taken by the drone, any dropped targets the pilot placed.

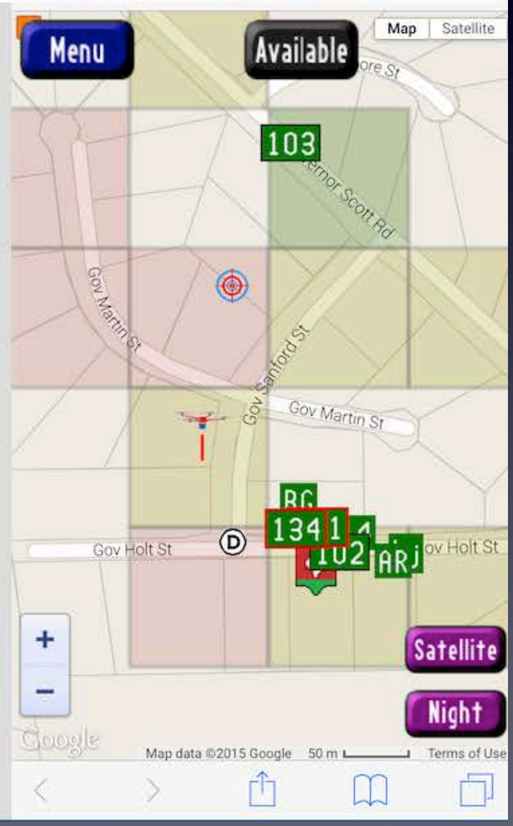
The drone pilot sees the location of responders, search grid boundaries, grid center-lines, hazards and flight telemetry.

Responder View

Drone Pilot View

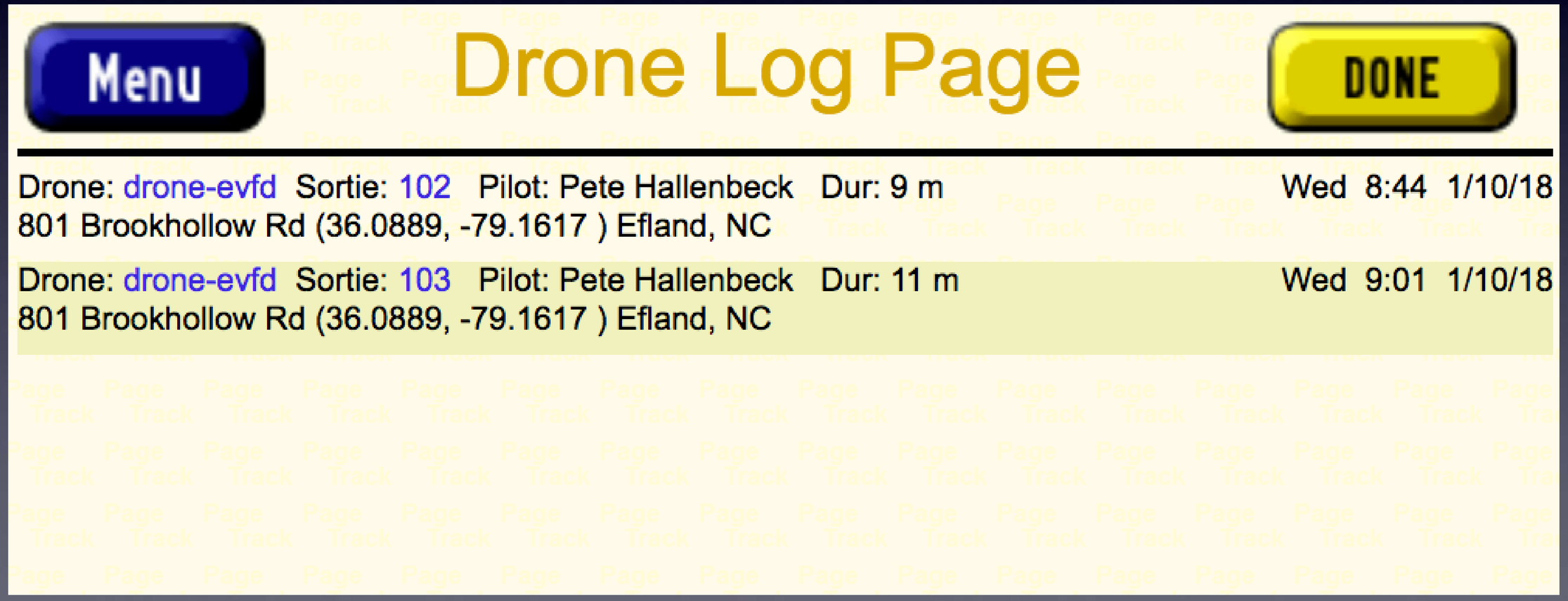
Responders can see the satellite or map view with locations of other responders, the drone, dropped targets and quality of search visible.

Responder View



Automatic Flight Log

No on like paperwork, so the system logs every flight. You can add notes about the equipment used, and the nature of the flight.

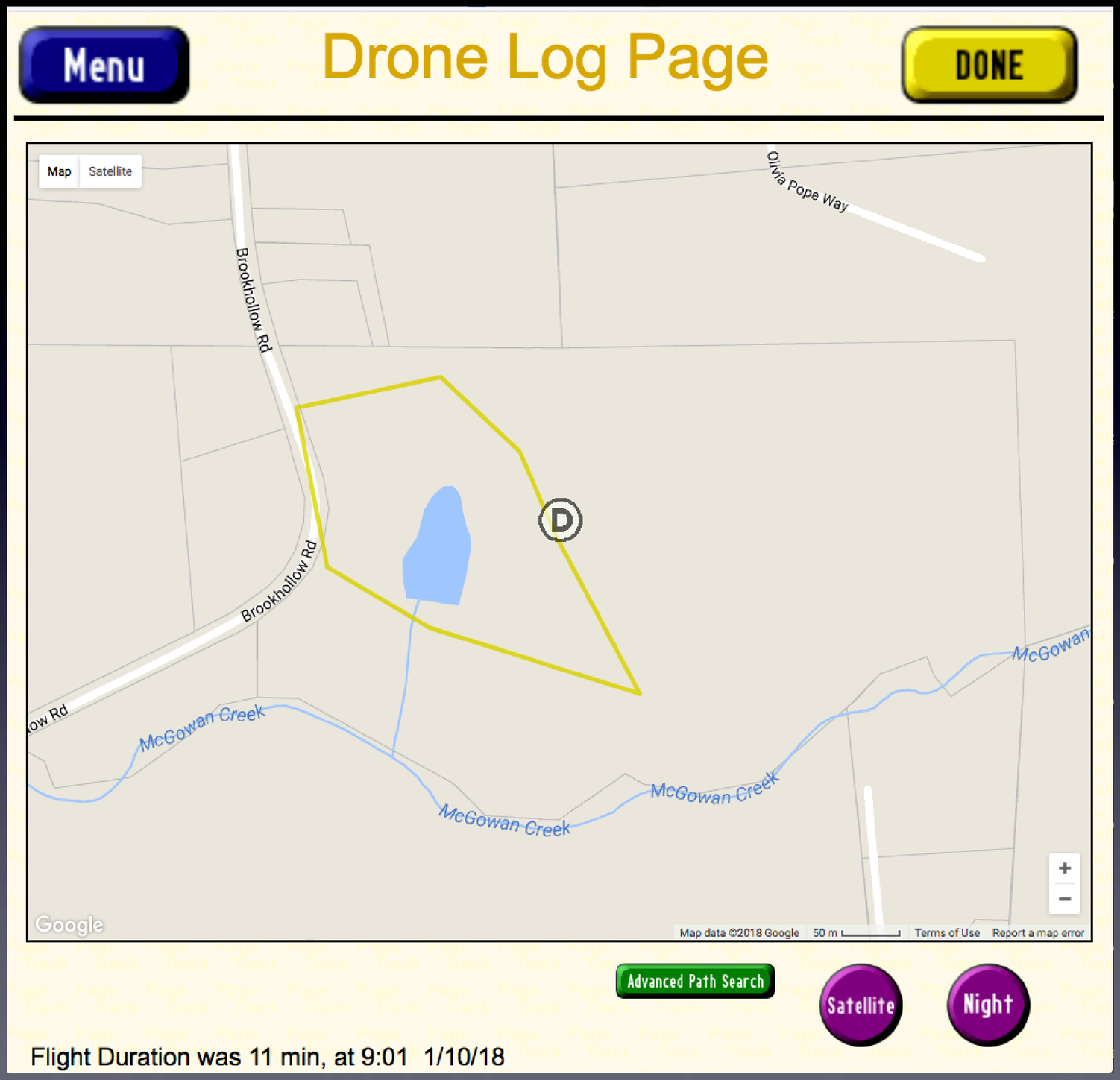


Key information about the flight is logged. The Pilot can add equipment information and general notes about the flight. Note the CFS number that can tie the flight back to the incident. Buttons at the bottom display the flight path.

When you tap

Show Drone Path

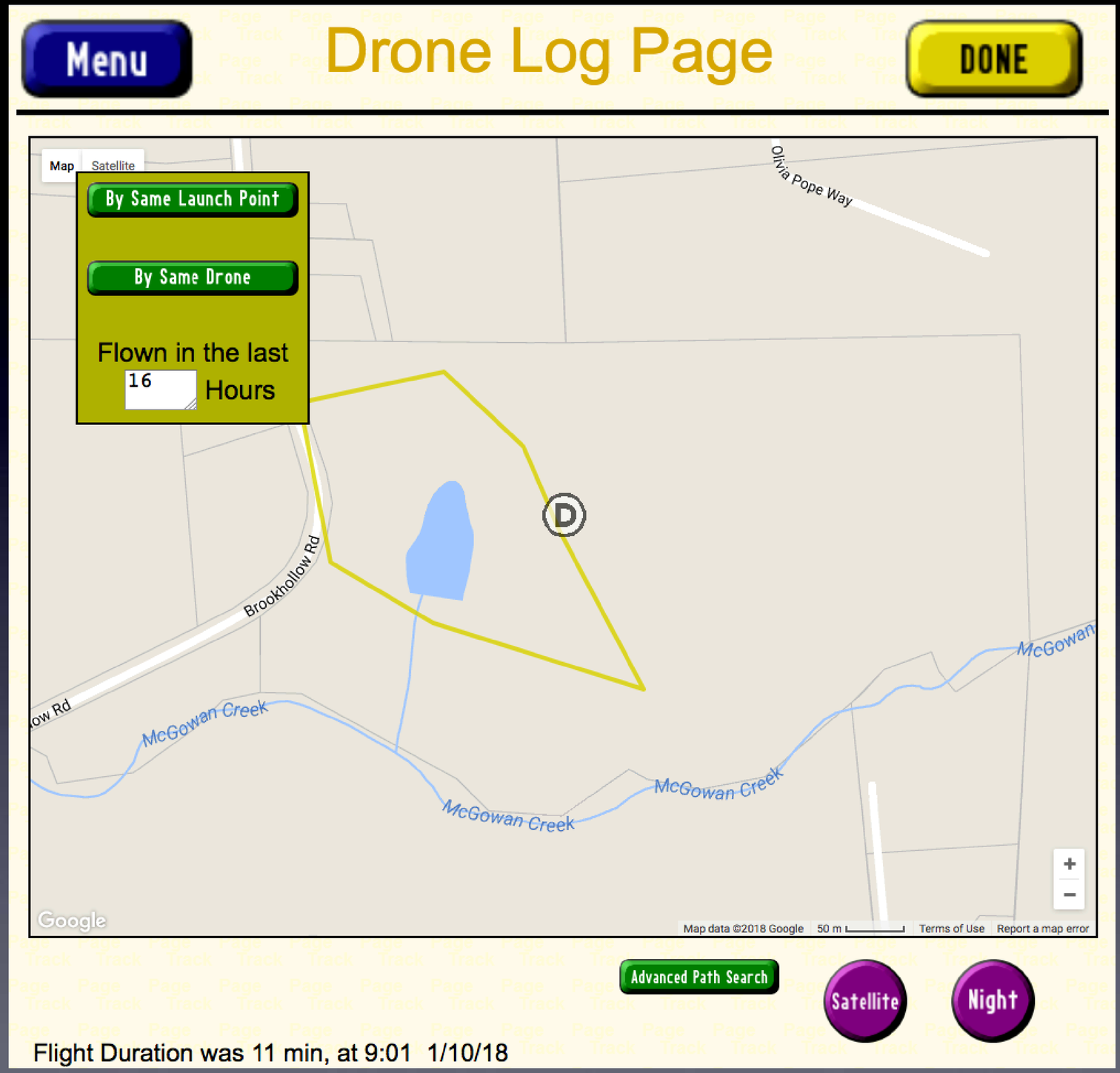
you see the path of the flight the drone took during that sortie.



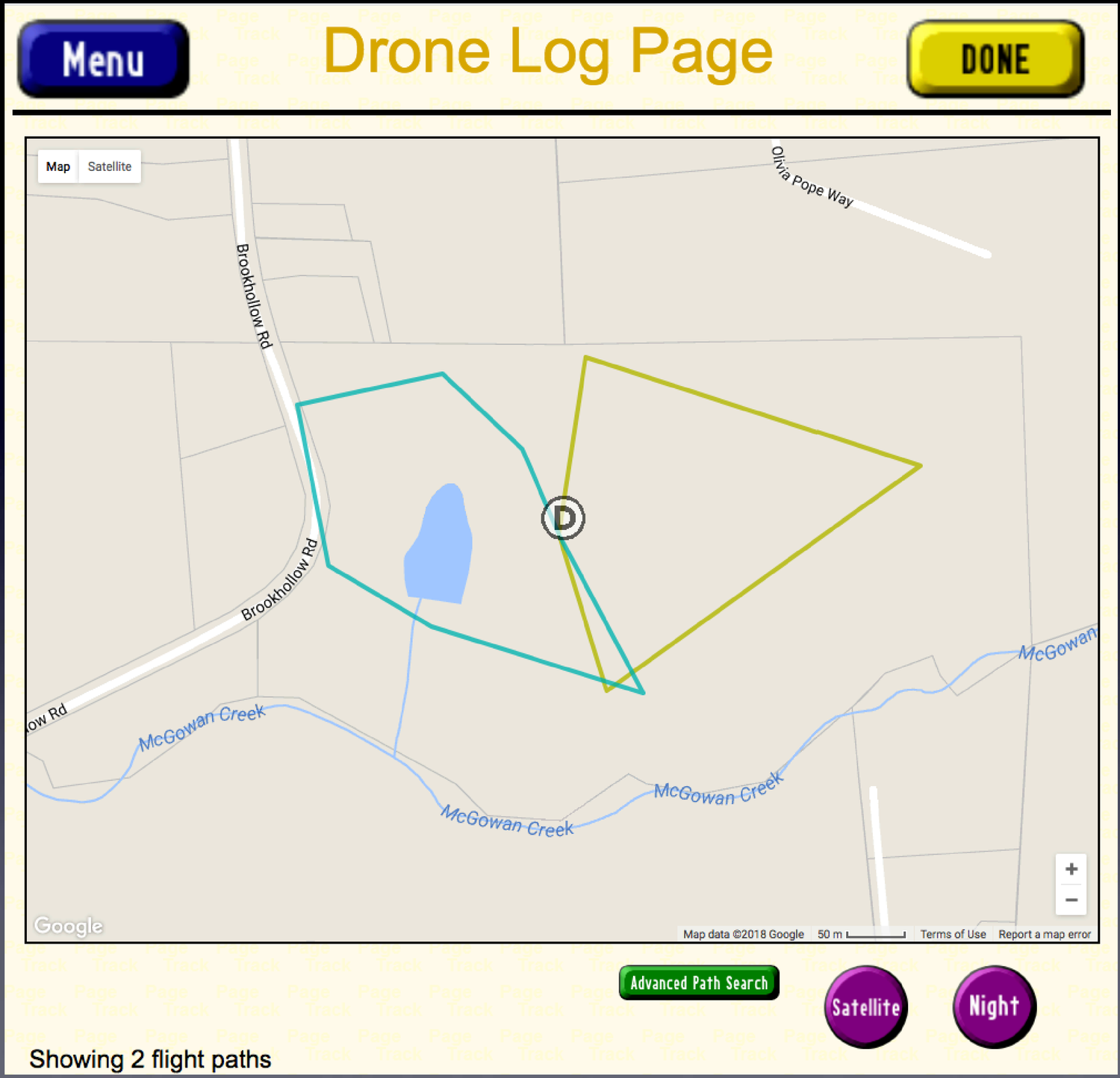
When you tap

Advanced Path Search

you can display multiple sorties at either the same launch point or all the sorties taken by a given drone.

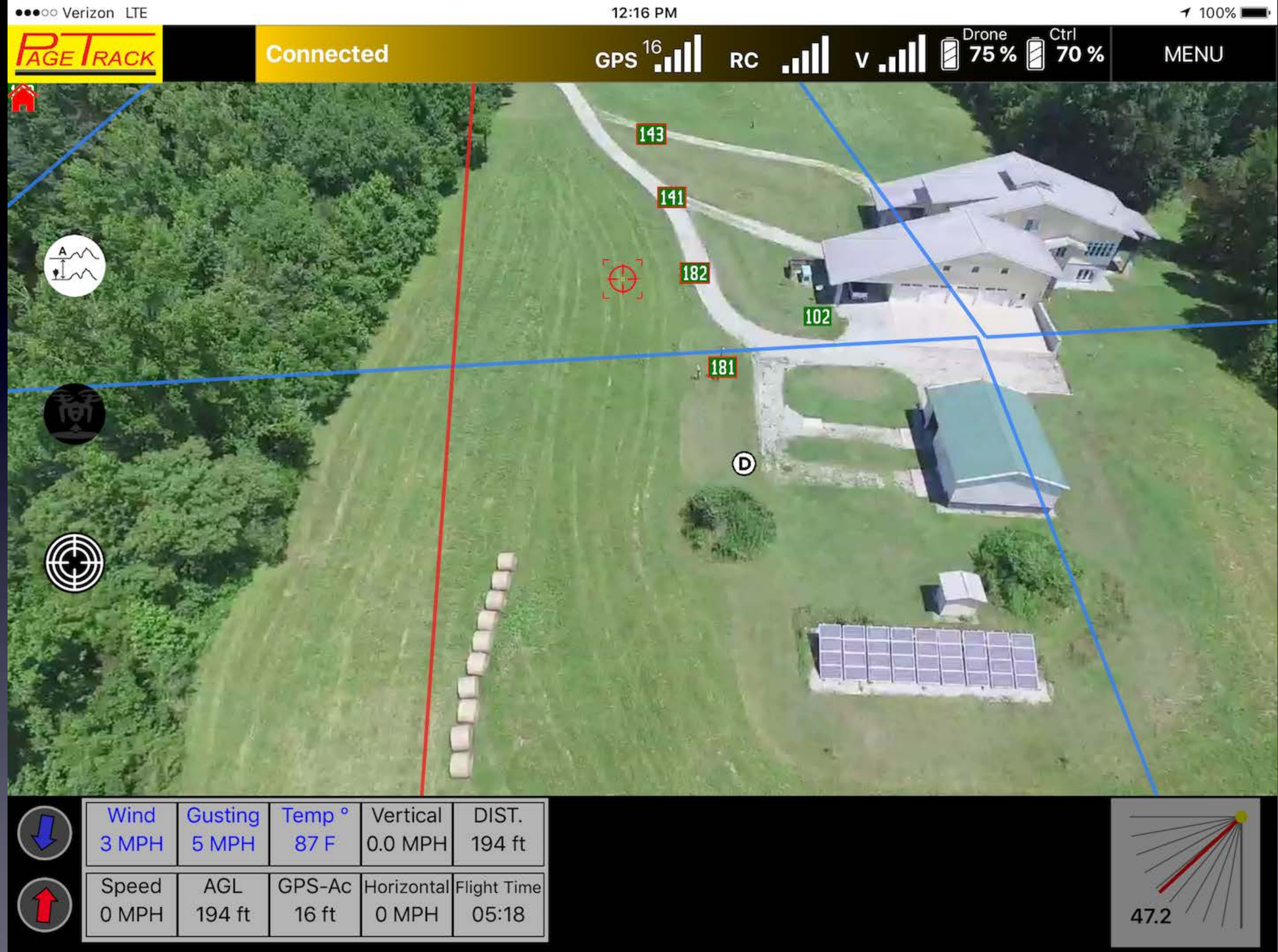


Now you can see all the paths taken by the drone for a given launch point / incident.



Thank You for your attention.

Any Questions?



Presented by Tyler Holloway
GSC Surveying, Inc. & Go Unmanned, Inc.

What is Pix4D?

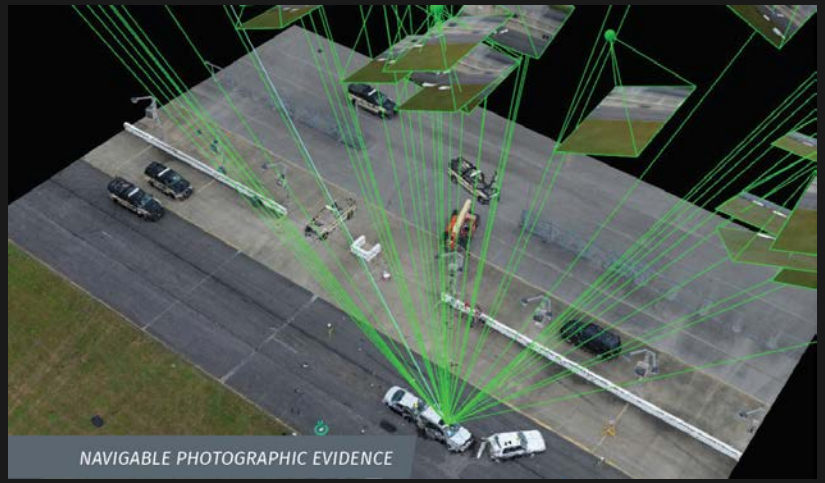
- Photo Processing
- Georeferenced data
- High accuracy point cloud

Pix4D in Forensics

- Fly or take photos around the accident scene
- Process using Pix4D
- Full model to scale of the scene

Crime and Accident Scene Reconstruction

- Reduced time on scene
- ¼ of the time it normally takes with traditional measures
- Fast road re-opening

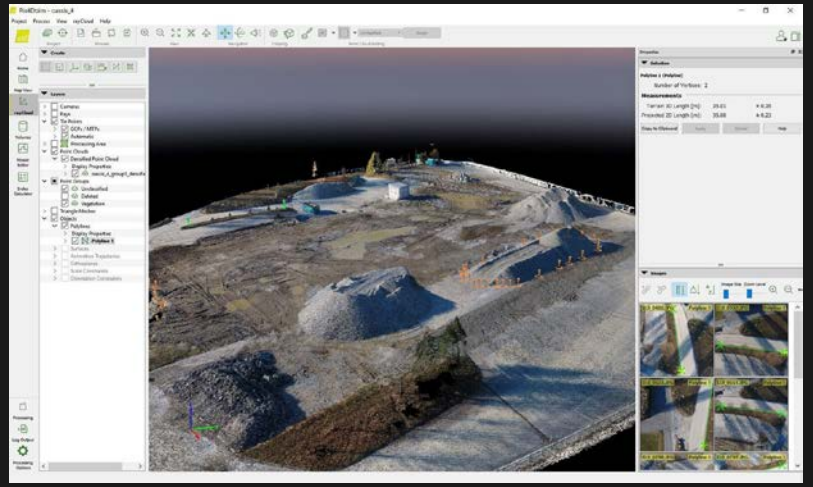


Navigable photographic evidence

- Hundreds of photos rendered into a 3D model
- Investigations continue after the road reopens
- Long term photo and 3D evidence of the scene
- Compatible with investigation software

Pix4D Cloud Processing

- Save projects on Pix4D servers
- Process quickly and save initial costs
- Easily reopen projects



Pix4D User Workshop | Raleigh, NC

This is a technical workshop for professionals using drones in their practice. The workshop will introduce you to creating accurate reconstructions and improving your results using Pix4D mapping software. It is an in-person event taught by Pix4D staff.

GoUnmanned.com/Pix4D-Workshop

Questions?

Contact Go Unmanned to learn more about Pix4D.

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