

By Sergeant B.C. Gruben



UAS Operations

(Unmanned Aircraft Systems, as defined by the FAA)



Oh, I'm sorry. Did you want coffee, too?

D
© 2014
T. K. R. O.
6.2.14
W/ DAN
MCC

STARBUCKS DRONE DELIVERY

What is it? How could it benefit our agency?



- Costs
- FAA Regulations
- Usefulness
- ...and on and on

Know Before You Fly

DO:
FLY YOUR
UNMANNED
AIRCRAFT
BELOW
400 FEET



DO:
FLY WITH
LOCAL
CLUBS



DO:
INSPECT
YOUR
AIRCRAFT
BEFORE
YOU FLY



DO:
TAKE A
LESSON
BEFORE
YOU FLY

DON'T:
FLY YOUR
UNMANNED
AIRCRAFT
BEYOND
LINE OF
SIGHT



DON'T:
FLY NEAR
AIRPORTS
OR ANY
MANNED
AIRCRAFT



DON'T:
FLY NEAR
PEOPLE
or
STADIUMS



DON'T:
BE CARELESS
or
RECKLESS.
YOU COULD
BE FINED
IF YOU
ENDANGER
PEOPLE
OR OTHER
AIRCRAFT



DON'T:
FLY ANYTHING
THAT WEIGHS
MORE THAN
55 LBS.

DON'T:
FLY FOR
PAYMENT
or
COMMERCIAL
PURPOSES
UNLESS
SPECIFICALLY
AUTHORIZED
BY THE FAA

www.faa.gov/uas • www.knowbeforeyoufly.org



SMALL UAV
COALITION
A Partnership for
Safety & Innovation



Federal Aviation
Administration

DRONE REGISTRATION

FAA
Registration
for my
Drone
(UAS)?

Welcome to the Federal Aviation Administration (FAA) drone registration support site. The FAA requires all drone owners to register each drone that is purchased weighing between 0.55lbs to 55lbs. If you meet the criteria to register an unmanned aircraft and do not register, you will be subject to civil and criminal penalties defined in the U.S. Government drone regulation terms.

Fill out the online Drone Registration application in less than five (5) minutes. Our agents will review your application for omissions and errors. Once completed, our experts will start your registration process and a registration certificate will be emailed to you shortly after. At that stage, you will receive a registration number to mark on each drone. Throughout this process, we will communicate any further registration requirements directly with you. We are always here to help with any questions that you may have.

Quickly and easily complete your registration today.

START RECREATIONAL REGISTRATION

START COMMERCIAL REGISTRATION

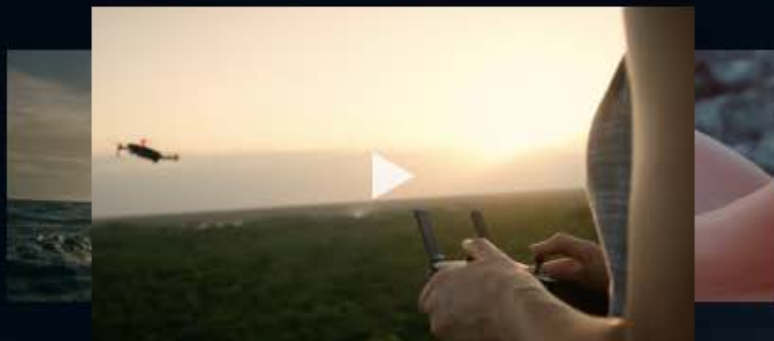
I will solely be flying my drone for recreational purposes, for personal interests or enjoyment.

I will be flying my drone for commercial, government or non-hobby purposes (including non-profits) under FAA Part 107 rules.

By clicking the button, I agree to the [Terms of Service](#) and [Privacy Policy](#).

MAVIC PRO

WHEREVER YOU GO



INTRODUCING THE DJI MAVIC

[WATCH ALL VIDEOS](#) | [JOIN THE NEW PILOT EXPERIENCE NOW](#)



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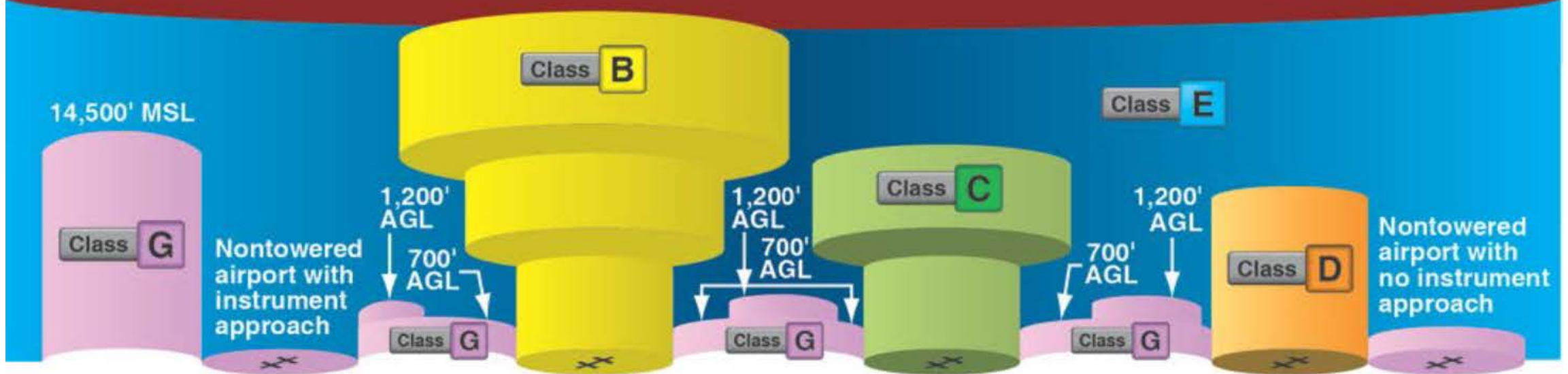
[DOWNLOADS](#)

[FAQ](#)

[BUY NOW](#)

Airspace Classification

Class **A**
18,000' MSL



Unless... “wherever you go” is above the USA.?
The purpose of your flight is also important.
Are you flying for Recreation or Business?



DALLAS-FT WORTH CLASS B AIRSPACE

See back of this chart for procedural information within the Dallas-Ft Worth Class B Airspace

EXAMPLES OF CLASS B ALTITUDES

— Ceiling in hundreds of feet MSL
— Floor in hundreds of feet MSL

110
SFC

EXTENSIVE HELICOPTER ACTIVITY

14

110
25

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20

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30

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30

110
20

EXTENSIVE HELICOPTER ACTIVITY

Fly under the Small UAS Rule

To fly under the FAA's Small UAS Rule (14 CFR part 107), you must:

- ⇓ [Get a Remote Pilot Certificate from the FAA](#)
- ⇓ [Register your UAS as a "non-modeler"](#)
- ⇓ [Follow all part 107 rules](#)

Unmanned Aircraft Systems

Getting Started

[Fly under the Special Rule for Model Aircraft](#)

[Fly under small UAS rule \(Part 107\)](#)

[Becoming a Pilot](#) →

[UAS Registration](#)

[Emergency Operations Approval](#)

Beyond the Basics

Where to Fly

Frequently Asked Questions

Programs, Partnerships and Opportunities

Research & Development

Resources

Contact Us

Report an Accident

[Request a Part 107 Waiver or Operation in Controlled Airspace](#)

[FAA Home](#) ▶ [Unmanned Aircraft Systems](#) ▶ [Getting Started](#) ▶ [Fly under small UAS rule \(Part 107\)](#) ▶ [Becoming a Pilot](#)

Becoming a Pilot



Remote Pilot Knowledge Test Prep

Suggested Study Materials

- [Airmen Certification Standards \(PDF\)](#)
- [Knowledge Test Instructions \(PDF\)](#)
- [Knowledge Test Study Guide \(PDF\)](#)
- [Knowledge Test Sample Questions \(PDF\)](#)
- [Part 107 Advisory Circular \(PDF\)](#)
- [Pilot's Handbook of Aeronautical Knowledge](#)

Quick Links

- [Part 107 Course on FAA Safety Team website](#)
- [FAA Integrated Airman Certificate and/or Rating Application system \(IACRA\)](#)

Requirements and Process for Becoming a Pilot

- ↓ [Instructions for first-time remote pilots](#)
- ↓ [Instructions for part 61 pilot certificate holders](#)

First-Time Pilots

To become a pilot you must:

- Be at least 16 years old
- Be able to read, speak, write, and understand English (exceptions may be made if the person is unable to meet one of these requirements for a medical reason, such as hearing impairment)
- Be in a physical and mental condition to safely operate a small UAS
- Pass the initial aeronautical knowledge exam at an FAA-approved knowledge testing center

Top Tasks

[Getting started with your UAS](#)

[Register your Drone/Request a Waiver](#)

[Become a Drone Pilot](#)

[Learn Where to Fly](#)

[Read Drone Safety Tips](#)



Waiver Outreach Webinar Series

#DroneWaiver



Pilot certificate Requirements

- Must be easily accessible by the remote pilot during all UAS operations
- Valid for 2 years – certificate holders must pass a recurrent knowledge test every two years

Application Process

1. Schedule an appointment with a Knowledge Testing Center (KTC), which administer initial and recurrent FAA knowledge exams
 - a. View the list of [Knowledge Testing Centers \(PDF\)](#) to find one near you.
 - b. Applicants must bring government-issued photo ID to their test
2. Pass the initial [aeronautical knowledge test](#) – initial knowledge test areas include:
 - a. Applicable regulations relating to small unmanned aircraft system rating privileges, limitations, and flight operation
 - b. Airspace classification and operating requirements, and flight restrictions affecting small unmanned aircraft operation
 - c. Aviation weather sources and effects of weather on small unmanned aircraft performance
 - d. Small unmanned aircraft loading and performance
 - e. Emergency procedures
 - f. Crew resource management
 - g. Radio communication procedures
 - h. Determining the performance of small unmanned aircraft
 - i. Physiological effects of drugs and alcohol
 - j. Aeronautical decision-making and judgment
 - k. Airport operations
 - l. Maintenance and preflight inspection procedures
3. Complete FAA Form 8710-13 for a remote pilot certificate (FAA Airman Certificate and/or Rating Application) using the electronic FAA Integrated Airman Certificate and/or Rating Application system (IACRA)*
 - a. Register using the [FAA IACRA system](#)
 - b. Login with username and password
 - c. Click on "Start New Application" and 1) Application Type "Pilot", 2) Certifications "Remote Pilot". 3) Other Path Information, 4) Start Application
 - d. Follow application prompts
 - e. When prompted, enter the 17-digit Knowledge Test Exam ID (NOTE: it may take up to 48 hours from the test date for the knowledge test to appear in IACRA)
 - f. Sign the application electronically and submit to the Registry for processing
4. A confirmation email will be sent when an applicant has completed the TSA security background check. This email will provide instructions for printing a copy of the temporary remote pilot certificate from IACRA.
5. A permanent remote pilot certificate will be sent via mail once all other FAA-internal processing is complete.

* Applicants who do not wish to complete FAA Form 8710-13 online may choose the paper process. Please note that the processing time will be longer a paper application is used since it requires in-person approval and signature by a designated pilot examiner (DPE), an airman certification representative (ACR), or an FAA-certified flight instructor (CFI), and must then be mailed to a Flight Standards District Office (FSDO) for final review and signature. Additionally, a temporary remote pilot certificate will not be provided to the applicant.

Instructions for completing the paper application process may be found in Chapter 6, Section 4 of the Part 107 Advisory Circular

Enroll Today for \$50 Off Drone Pilot Ground School (Now Through June 30th)

Become an FAA-certified drone pilot with Drone Pilot Ground School, an online test prep and training course for commercial drone pilots looking to pass the FAA Aeronautical Knowledge Test for a Remote Pilot Certificate.

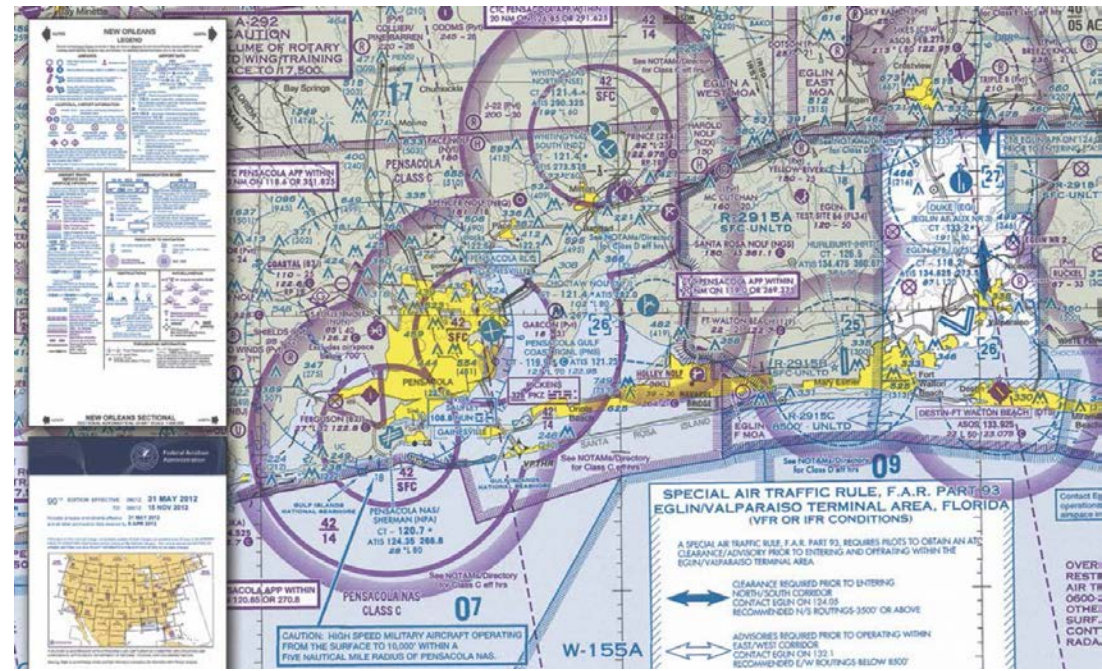
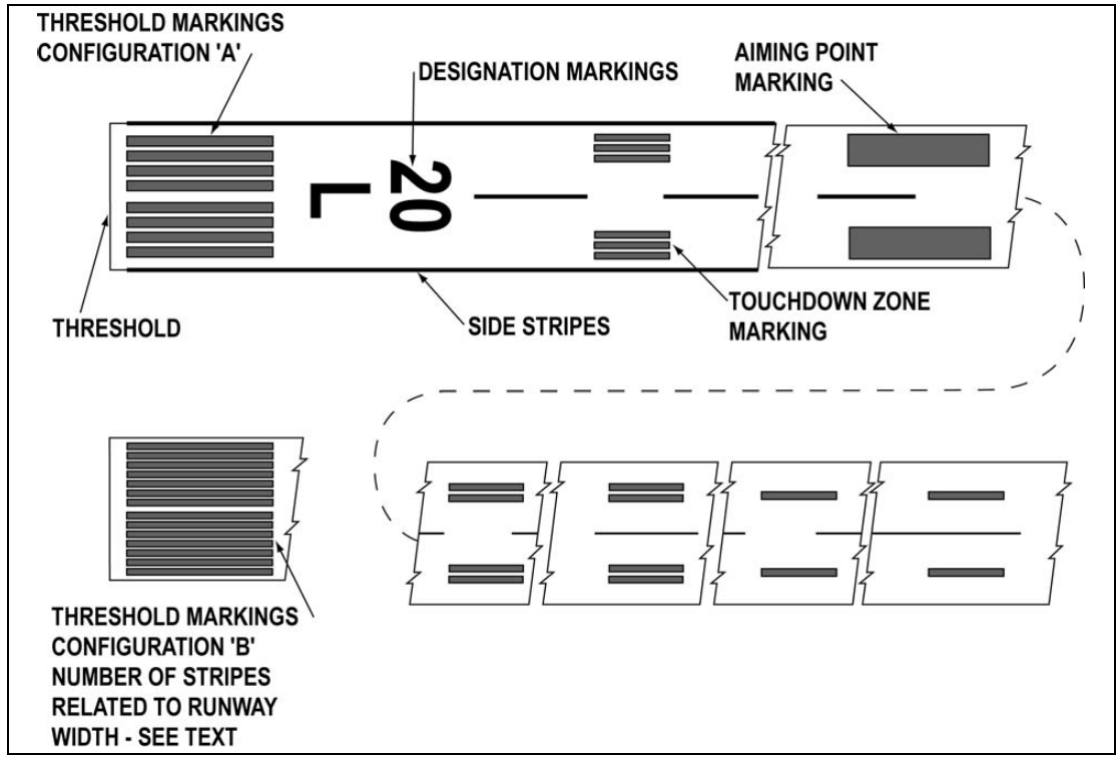
Over 99% of our 10,000+ students have passed the FAA's exam on their first attempt.

[Enroll in Training for \\$299 \\$249](#)

*Use code **ENROLL50** for \$50 off and get instant access to our self-paced test prep course.*

Airspace Charts, METARs, Airport Radio Operations, Runway Operations...

METAR KGGG 161753Z AUTO 14021G26KT 3/4SM +TSRA BR BKN008 OVC012CB 18/17 A2970 RMK PRESFR



The training wasn't easy...

"I'm holding on too tight.
I've lost the edge." - Cougar





IACRA



Integrated Airman Certification and Rating Application (IACRA)

IACRA is the web-based certification/rating application that guides the user through the FAA's airman application process. IACRA helps ensure applicants meet regulatory and policy requirements through the use of extensive data validation. It also uses electronic signatures to protect the information's integrity, eliminates paper forms, and prints temporary certificates.

Several Weeks Later...

Congratulations, you're a Pilot!

(At least technically)





- !STL 05/747 STL TWY E1 CL MARKING NOT STD 1805312049-1806302359
- !STL 05/746 (KSTL A3452/18) STL APRON TERMINAL TWO AIRLINE RAMP WIP CONST EAST OF GATE E2 LGTD AND BARRICADED 1805312043-1806302359
- !STL 05/744 (KSTL A3448/18) STL APRON TERMINAL 1 AIRLINE RAMP WIP OPN EXCAVATION AT GATE C16 LGTD AND BARRICADED 1805312036-1807312359
- !STL 05/743 (KSTL A3447/18) STL APRON CHARLIE PAD BTN SEGMENT 2 AND SEGMENT 5 CLSD 1805312034-1807312359
- !STL 05/740 (KSTL A3440/18) STL APRON TXL C BTN TWY N AND TWY P NORTH EDGE IRREGULAR SFC 1805312014-1807312359
- !STL 05/737 (KSTL A3439/18) STL APRON TERMINAL ONE AIRLINE RAMP WIP OPN EXCAVATION E OF GATE A2 ABEAM ATCT TOWER LGTD AND BARRICADED 1805312013-1806302359
- !STL 05/736 (KSTL A3438/18) STL APRON TERMINAL ONE AIRLINE RAMP WIP EAST OF GATE C35 LEAD IN-LINE. LGTD AND BARRICADED 1805312012-1806302359
- !STL 05/735 (KSTL A3437/18) STL APRON TERMINAL ONE AIRLINE RAMP WIP OPN EXCAVATION AT GATE C27 LGTD AND BARRICADED 1805312012-1806302359
- !STL 05/692 (KSTL A3404/18) STL NAV ILS RWY 12L OUT OF SERVICE 1805302225-1806300100
- !STL 05/639 (KSTL A3351/18) STL TWY E2 BTN RWY 12L/30R AND TWY E WEST EDGE IRREGULAR SFC 1805290952-1806302359
- !STL 05/614 (KSTL A3338/18) STL TWY K HLDG PSN SIGN BTN RWY 12R/30L AND TWY E MISSING 1805272001-1806302359
- !STL 05/591 (KSTL A3307/18) STL RWY 12R/30L SAFETY AREA NOT STD S SIDE BTN TWY M AND TWY L 1805261738-1806302359

Notam = Notice to Airmen

Certificates of Waiver or Authorization (COA)

COA is an authorization issued by the Air Traffic Organization to a public operator for a specific UA activity. After a complete application is submitted, FAA conducts a comprehensive operational and technical review. If necessary, provisions or limitations may be imposed as part of the approval to ensure the UA can operate safely with other airspace users. In most cases, FAA will provide a formal response within 60 days from the time a completed application is submitted.

Unmanned Aircraft Systems

Getting Started

Beyond the Basics

Section 333 →

333 Authorizations Granted

Where to Fly

Frequently Asked Questions

Programs, Partnerships and Opportunities

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Resources

Contact Us

Report an Accident

Request a Part 107 Waiver or Operation in Controlled Airspace

FAA Home ▶ Unmanned Aircraft Systems ▶ Beyond the Basics ▶ Section 333

Section 333



Petitions Granted	Petitions Closed
5,551	1,780
As of 09/28/2016	

By law, any aircraft operation in the national airspace requires a certificated and registered aircraft, a licensed pilot, and operational approval. [Section 333 of the FAA Modernization and Reform Act of 2012 \(FMRA\)](#) (PDF) grants the Secretary of Transportation the authority to determine whether an airworthiness certificate is required for a UAS to operate safely in the National Airspace System (NAS).

This authority is being leveraged to grant case-by-case authorization for certain unmanned aircraft to perform commercial operations prior to the finalization of the Small UAS Rule, which will be the primary method for authorizing small UAS operations once it is complete.

The Section 333 Exemption process provides operators who wish to pursue safe and legal entry into the NAS a competitive advantage in the UAS marketplace, thus discouraging illegal operations and improving safety. It is anticipated that this activity will result in significant economic benefits, and the FAA Administrator has identified this as a high priority project to address demand for civil operation of UAS for commercial purposes.

- See [current exemption requests](#)
- See [authorizations granted via Section 333 exemption](#)
- See [instructions for filing an exemption request](#)

Questions about the Section 333 process should be directed to 333exemptions@faa.gov.

Page last modified: May 02, 2018 10:31:04 AM EDT

Top Tasks

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- Read Drone Safety Tips



Waiver Outreach Webinar Series
#DroneWaiver

Part 107 Knowledge Test Prep

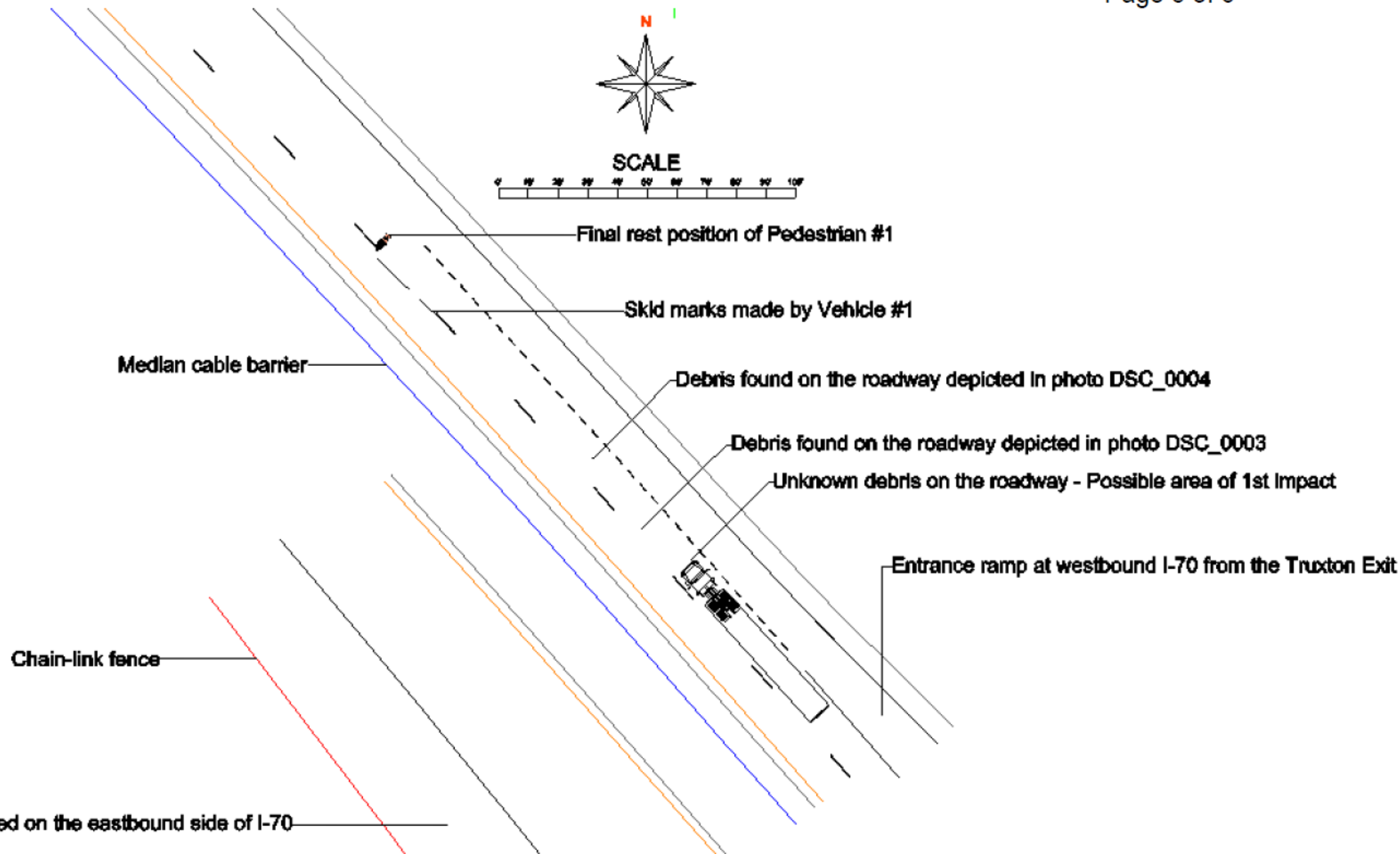


B4UFLY
Mobile App

--- 1 in 4 chance of rejection ---



Look out! We're flying...

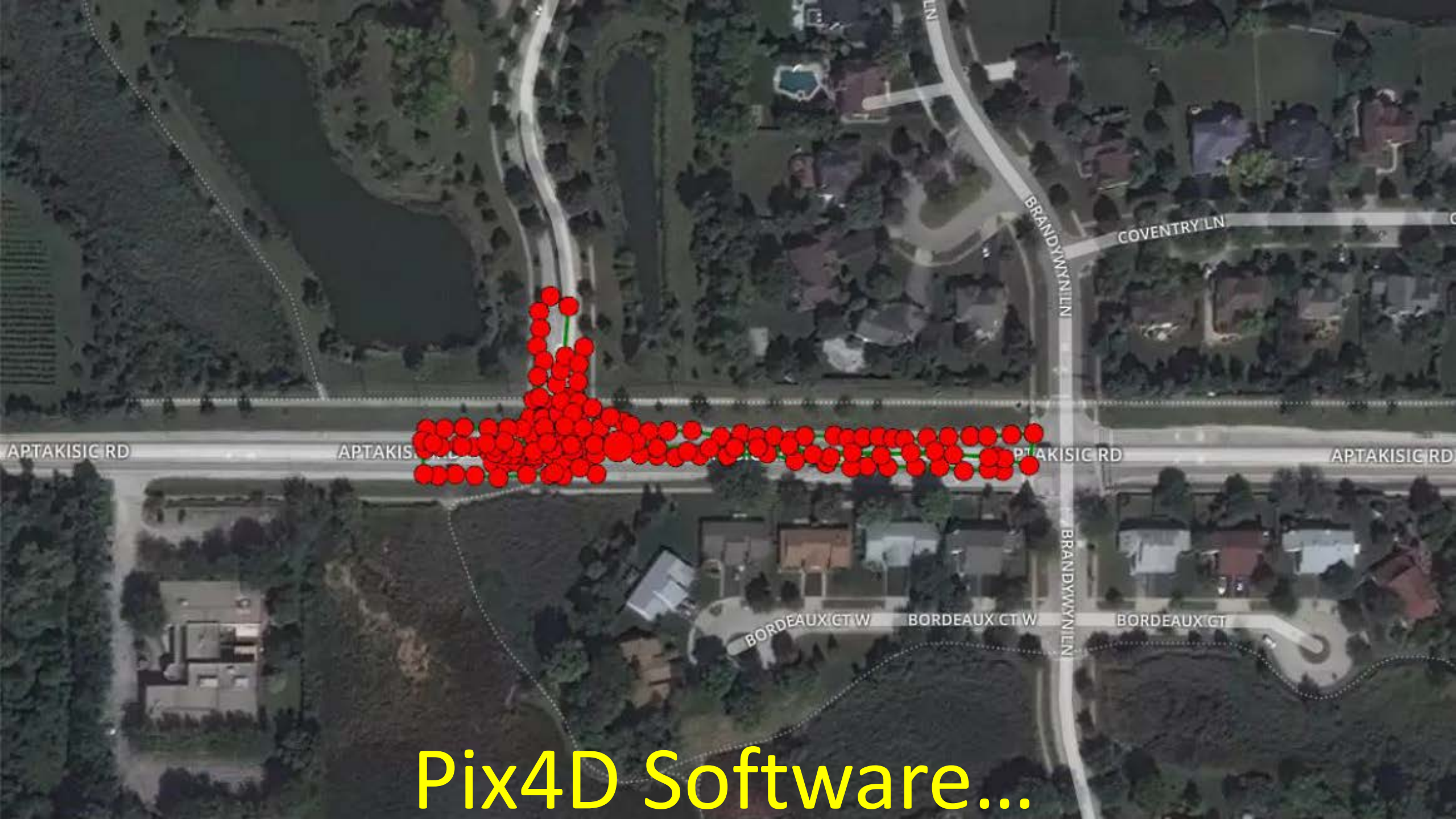




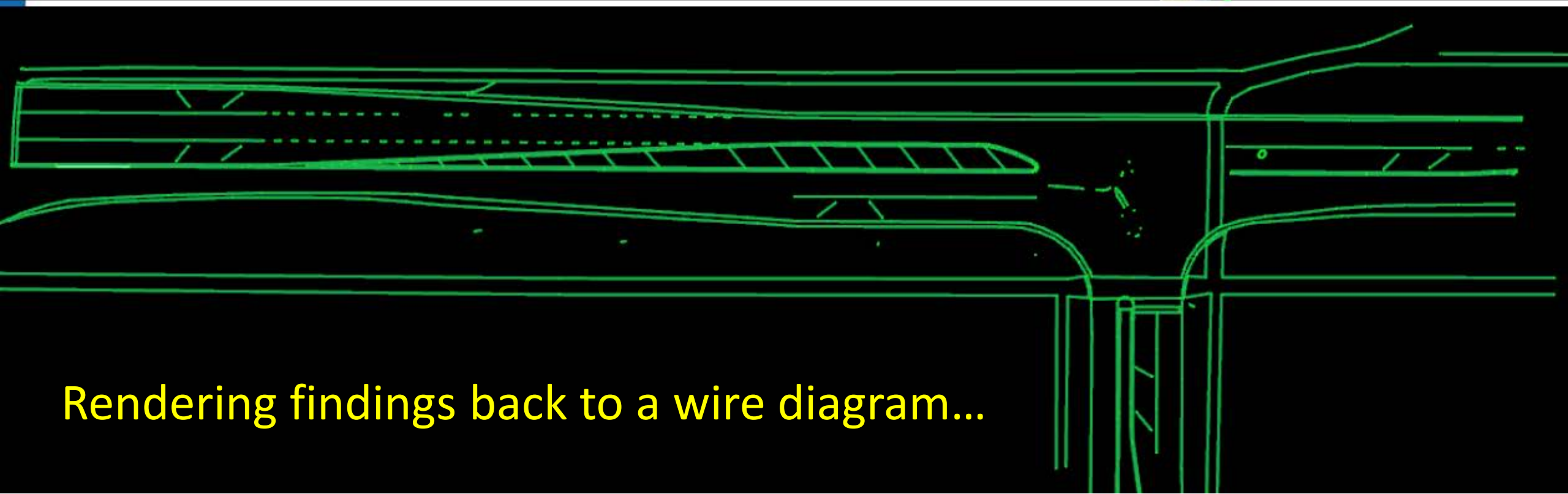
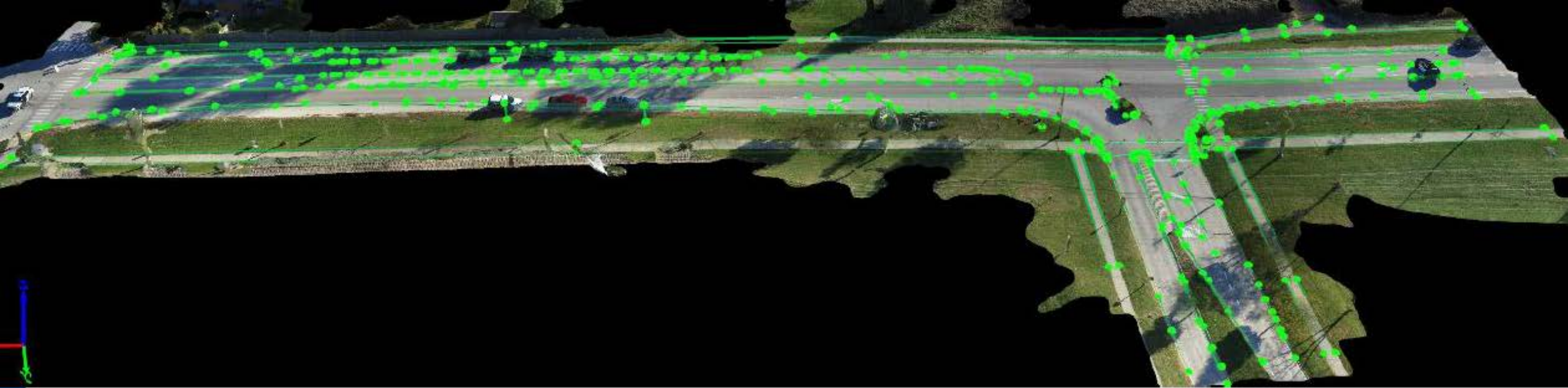
Photogrammetry

“Photogrammetry is the science of making reliable measurements from photographs, especially for recovering the exact positions of surface points.”

The fundamental principle used by **photogrammetry** is triangulation. By taking photographs from at least two different locations, so-called “lines of sight” can be developed from each camera to points on the object.

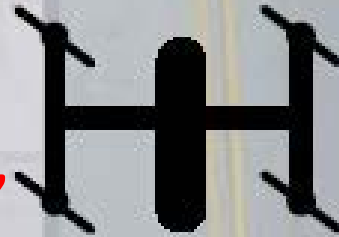


Pix4D Software...



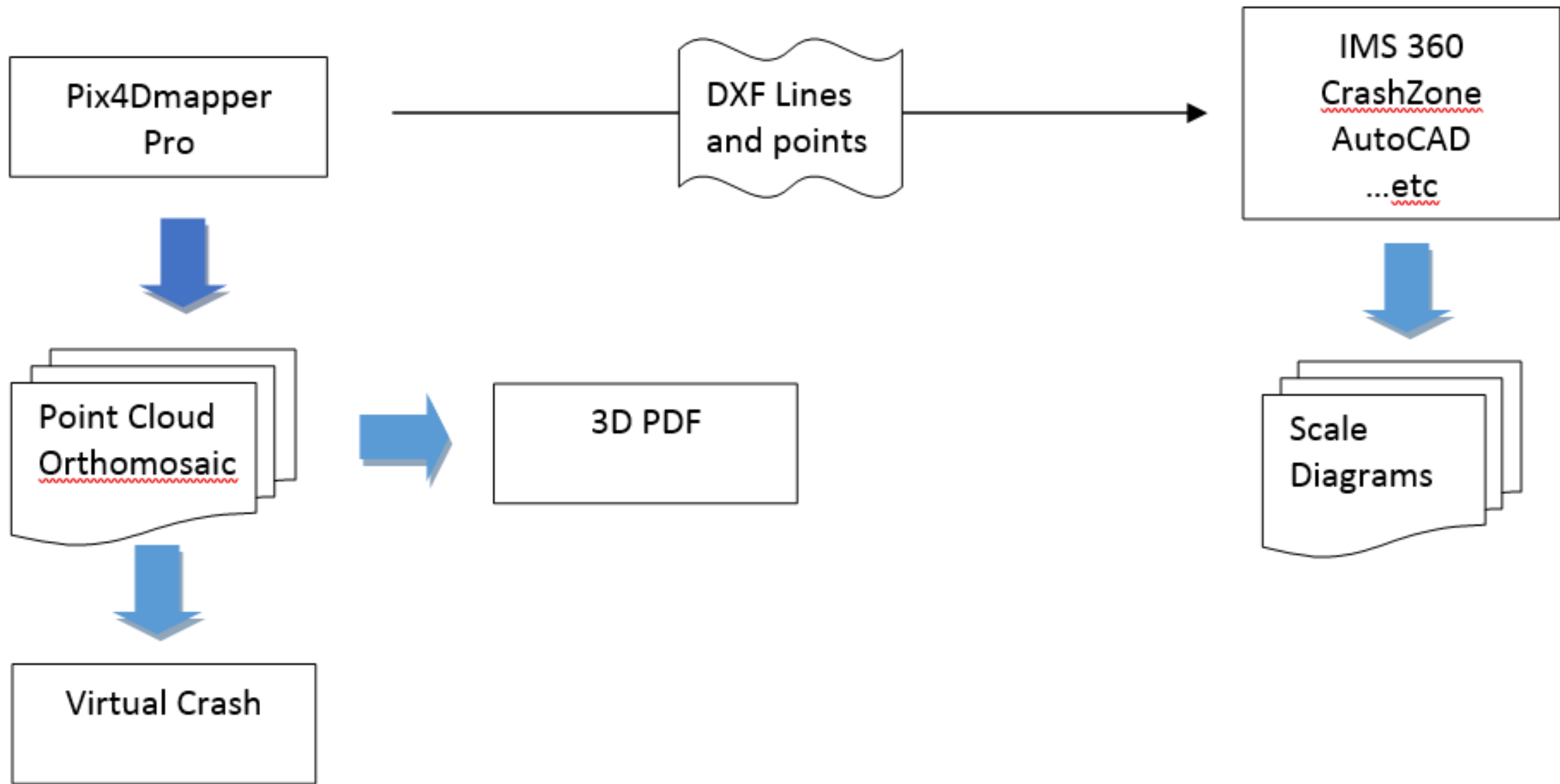
Rendering findings back to a wire diagram...

Overlapping,
Steady,
Detailed,
Still Photos...





Tie Points...



Sparse Point Cloud...

An aerial photograph of a multi-lane road with a dense, grey point cloud overlay. A dark-colored truck is driving on the road. The point cloud is most prominent on the road surface, showing lane markings and texture. The surrounding area includes grassy fields and a paved area with trees.

Dense Point Cloud...

An aerial photograph of a multi-lane asphalt road. A dark-colored car is driving in the right lane. To the right of the road is a roundabout with a concrete curb and a grassy center. The road has double yellow lines and dashed white lines. The text "Triangle Mesh..." is overlaid in yellow in the center of the image.

Triangle Mesh...

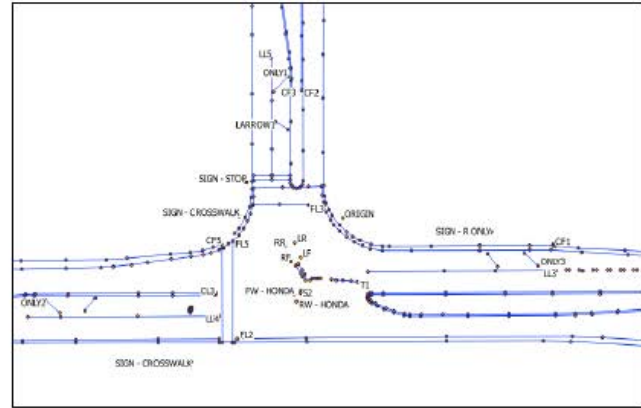
An aerial photograph of a road with a car. The road has two lanes with dashed white lines and a double yellow line. A dark car is driving on the right lane. The road is surrounded by a sidewalk and a grassy area. The text "Orthomosaic..." is overlaid in yellow in the center of the image.

Orthomosaic...

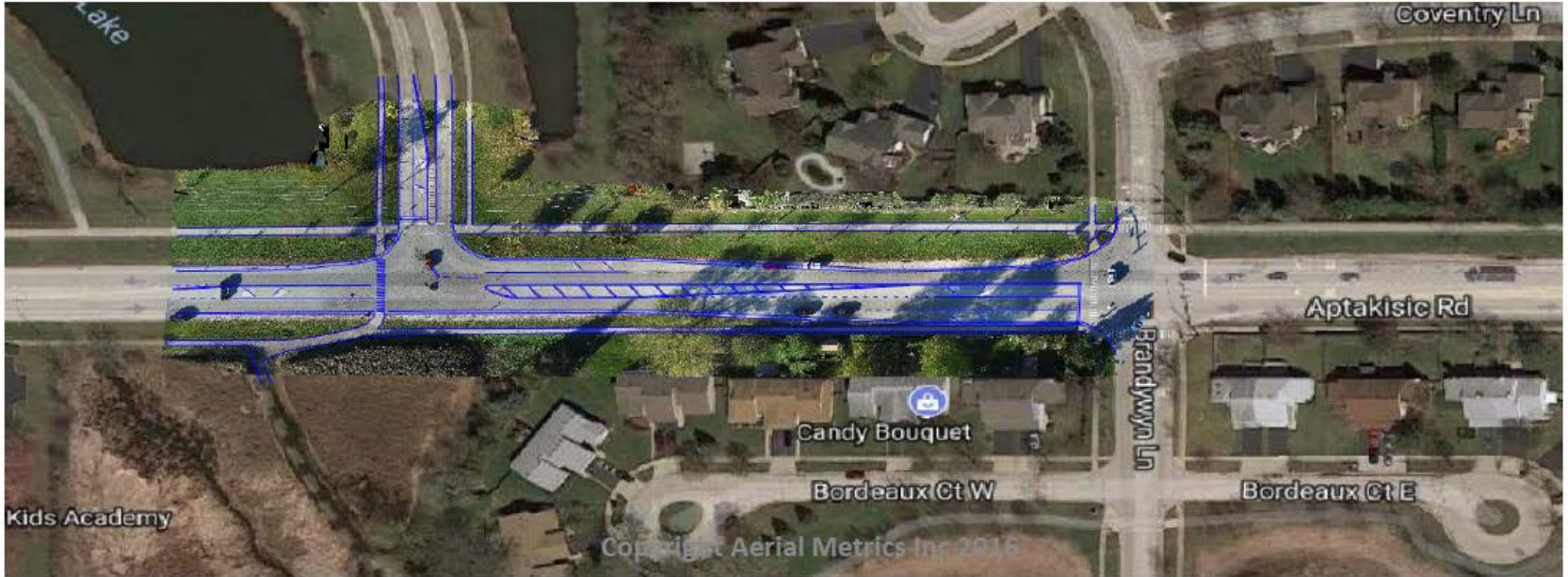
Virtual Survey Overlay



Wire Diagram

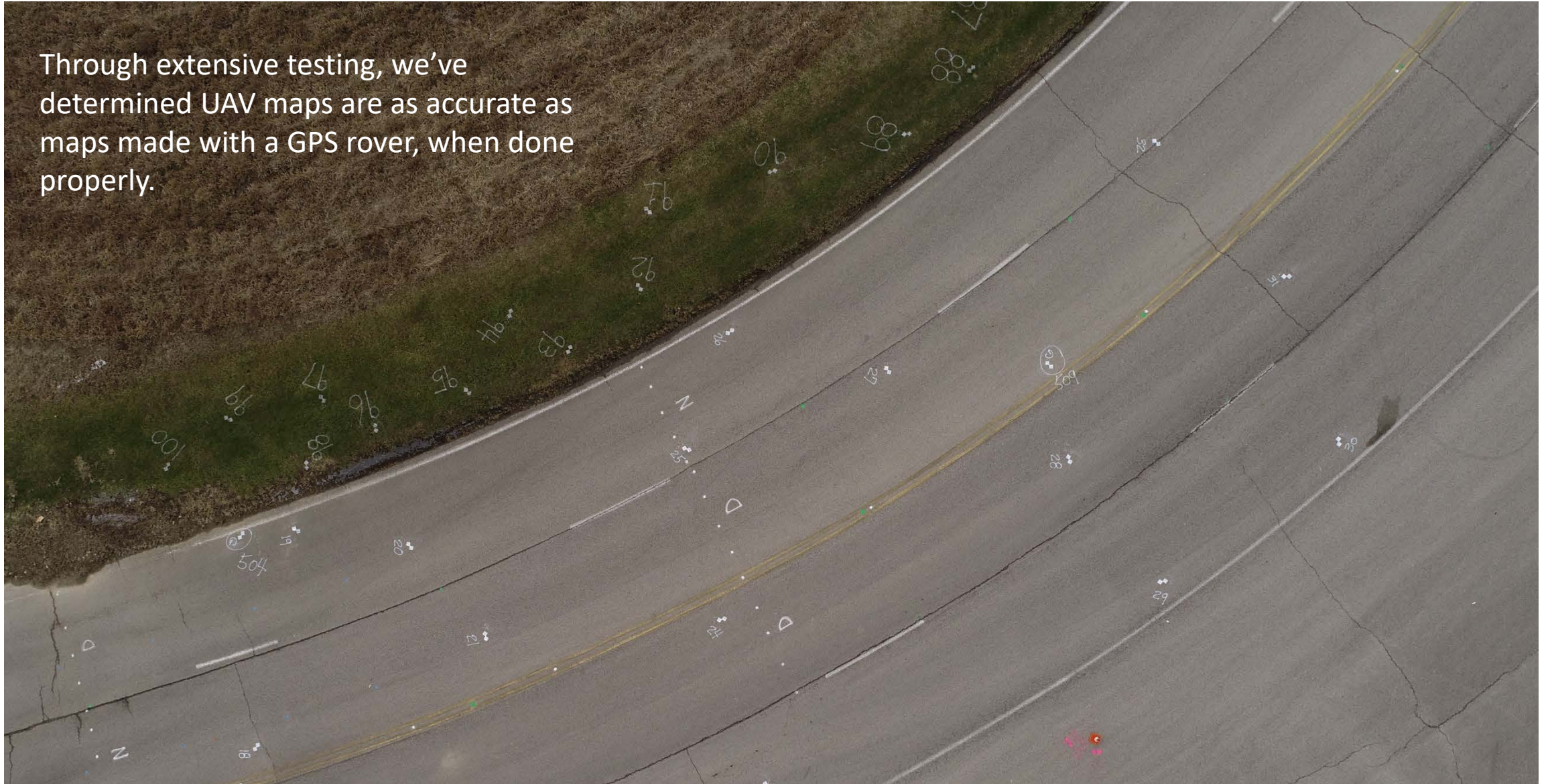


Google Maps Context





Through extensive testing, we've determined UAV maps are as accurate as maps made with a GPS rover, when done properly.



What is the goal?

- **Reduced on-scene time.**
- **Capturing potentially missed evidence previous over-looked. (i.e. extended roadway features)**
- **Generating a picture-like diagram/forensic map easily understood by many.**
- **Increased safety in unstable terrain or conditions.**

Questions?

Please contact the Major Crash Investigation Unit, Team III, and we will assist your agency with the knowledge we have regarding this topic.

Our Office - (417) 753-3369