UTILIZING TCPED IN CIVIL AND PUBLIC UAS AIR OPERATIONS

Presenter: Darren L. Goodbar

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Drone Workshop for Commercial and Government Operators – Nags Head

About

- UAS Program Manager/ Adjunct Instructor- Piedmont Virginia Community College
- Civil and Public UAS program development/ management
- GIS/ Imagery Intelligence Analyst
- 14 CFR Part 61 and 107

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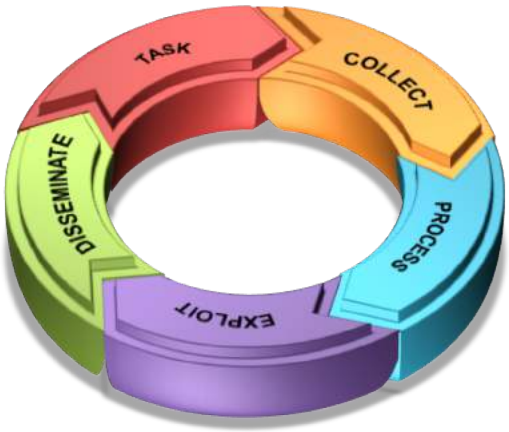
TCPED Simplified

1. **Tasking-** determined by a decision maker (customer) to meet objectives
2. **Collection-** utilize all available resources to gather and provide pertinent information within a required time limit
3. **Processing-** collation of the raw data in preparation for exploitation
4. **Exploitation-** establishes the significance and implications of processed data, integrates, then interprets
5. **Dissemination-** efficient distribution of derivative/ actionable data



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TCPED- Tasking

- Mission assignments or work orders; what and when.
- Tasking is originated by a request for information from a customer
- Stakeholders can include commercial clients, Incident Command, public partners or internal sources.
- Customer makes request based on **KNOWN** capabilities or **EXPECTED** outcomes
- "I need to see…" or "I need a…"

Dissemination

Tasking

Collection

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TCPED- Collection

- Aircraft and sensor selection for outcome (timeliness, accuracy, data)
- Expenses (Labor, Equipment)
- Three elements of UAS collection;

1. Aircraft
2. Payload
3. Personnel

- "Collection Manager" is responsible for determining best case methods to maximize efficiency and accuracy in collection capabilities based on desired outcomes.

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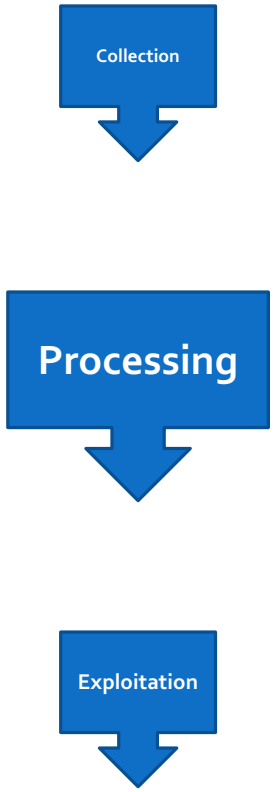
TCPED- Processing

- Simple or complex tasks
- Logical AND Physical location of resources
- Immediate or extended timelines
- Processing tools

1. Human centric
2. Software
3. Hardware



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TCPED- Exploitation

- Data becomes intelligence
- Exploitation timeline and is directly proportional to amount of data points necessary to accomplish the request

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TCPED- Dissemination

- Data becomes actionable, delivered to "Tasking"
- Real time, near real-time, etc.
- Data management
- Usability, applicability
- Distribution

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TCPED- Civil

- Innovation-

1. Collection- Autonomous flight, endurance, payloads
2. Processing- Software/ Hardware, In-flight, Cloud Processing
3. Exploitation- Machine Learning, Artificial Intelligence, etc.
4. Dissemination- Networks, Storage, etc.

- Business Development/ Sales- Tasking

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TCPED- Public

- Tactical TCPED is typically completed by a single individual.
- Tasking originates at federal, state and local stakeholders/ customer.
- Collection techniques based on experience, lessons learned or "best guess"
- Processing and exploitation at the tactical (micro) level; advanced tasking requires rely on additional PE resources/ time.
- Exploitation may require SME and/ or software

TCPED- Issues identified

1. Customers often don't know about UAS capabilities, but have a need (intelligence), rely on operator/ vendor/ manufacturer
2. Operators/ Sales influence or define/ create the task for stakeholders in UAS industry; a solution (CPED) looking for a customer (monetization)
3. Programs' success is determined by a comprehensive TCPED.
4. Programs initiated at C, P, E, or D versus T; capability is defining mission, instead of mission dictating capability
5. Role assignments to complete TCPED in public safety are typically not the primary.
6. Bottlenecks at collection and dissemination phases.

TCPED- Conclusion

1. Majority of UAS applications involve the remote sensed collection of data.
2. Data is processed and exploited to provide intelligence for the required action/ decision; volumetrics, rescue, crop analysis, inspection, etc.
3. All resources [are required to] scale based on tasking requirements, capability of system, time, etc.

Questions?

Contact:

Darren L. Goodbar

Email: darrengoodbar@gmail.com

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A Verizon company

LAANC is Coming

What you need to know

Mike Danielak
Director, Client Strategy

Mike Danielak
Director of Client Strategy
mike@skyward.io

Skyward
A Verizon company

Skyward, a Verizon company, is a leading authority on safe, efficient commercial drone operations.

We help major enterprises fly in more ways and more places with a combination of industry-leading expertise, digital airspace access, regulatory advocacy, and LTE connectivity to power today's flights — and tomorrow's networked fleet deployments.

SUNPOWER® Stantec RAYCOM Media POWER ENGINEERS

Skyward
A Verizon company

Skyward does…

- Provide a **software platform** that companies use to manage all aspects of a drone program (equipment, people, jobs, etc.)
- Professional Services that help companies implement drone programs and ensure low-risk, safe operations.

Skyward does not…

- Make drones
- Sell drones
- Process drone footage or data

Advancing & Shaping Regulations

FAA Part 107 Rules

- Flights Over People
- Beyond Visual Line of Site
- Controlled Airspace
- Restricted Airspace
- Package Delivery
- Night Operations
- Must be below 400’

Drone Advisory Committee (DAC)

Low Altitude Authorization and Notification Capability (LAANC) Working Group

Remote ID Advisory Rulemaking Committee

Global UTM Association

Board President (Jonathan Evans)

Consumer Technology Association™

CTA UAV Working Group

Leading UAV influence at CTIA & GSMA

Skyward
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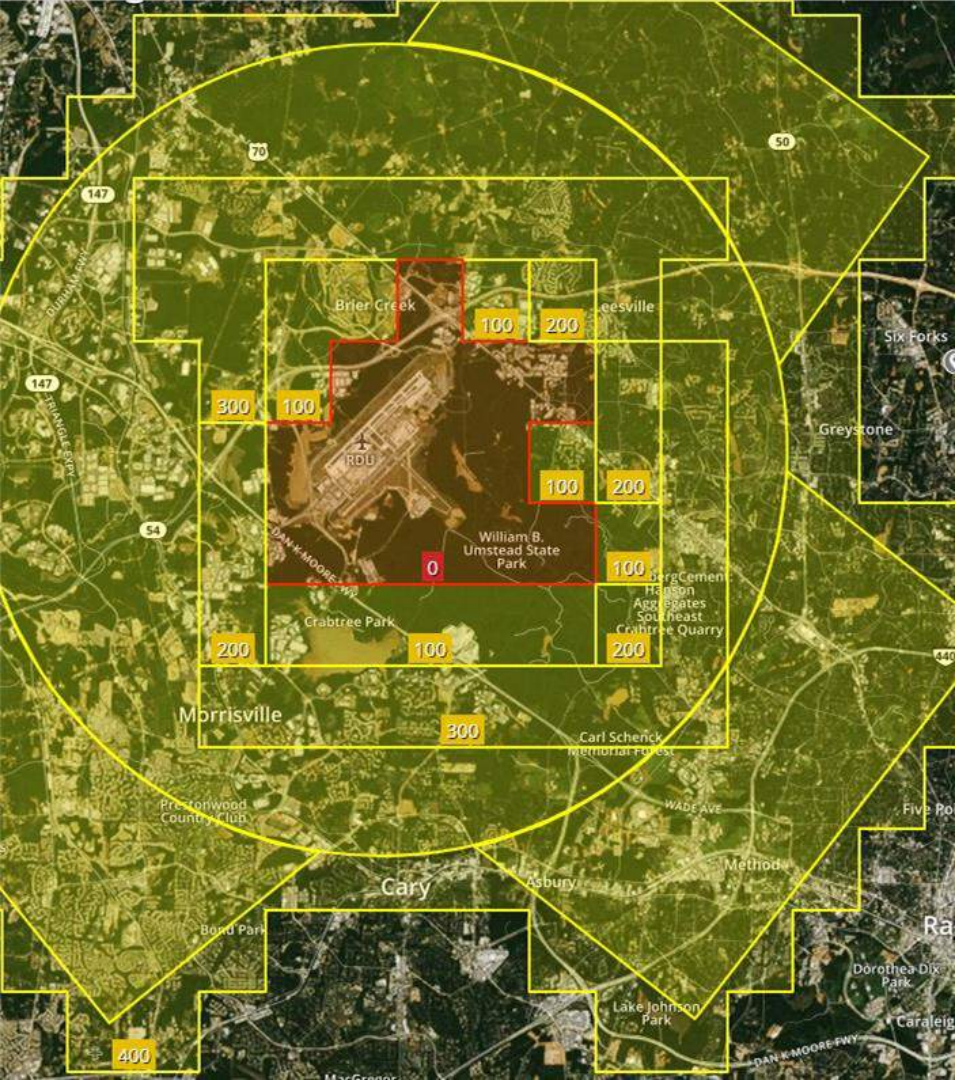
Manage your people, projects, and equipment in one efficient workflow

PLAN | PROVISION | FLY | PROCESS | DELIVER | ANALYZE & IMPROVE

Fast Access to Controlled Airspace with Skyward & LAANC

Skyward
A Verizon company

“Leading through innovation, SunPower is proud to be the first company granted the new LAANC access, enabling us to aerially evaluate a broader range of potential project sites for our customers more quickly and comprehensively," said SunPower CEO and President Tom Werner. "As part of the SunPower Oasis Power Plant platform, drone flights enable us to efficiently generate solar power plant system layouts to optimize site use and reduce project cost.”

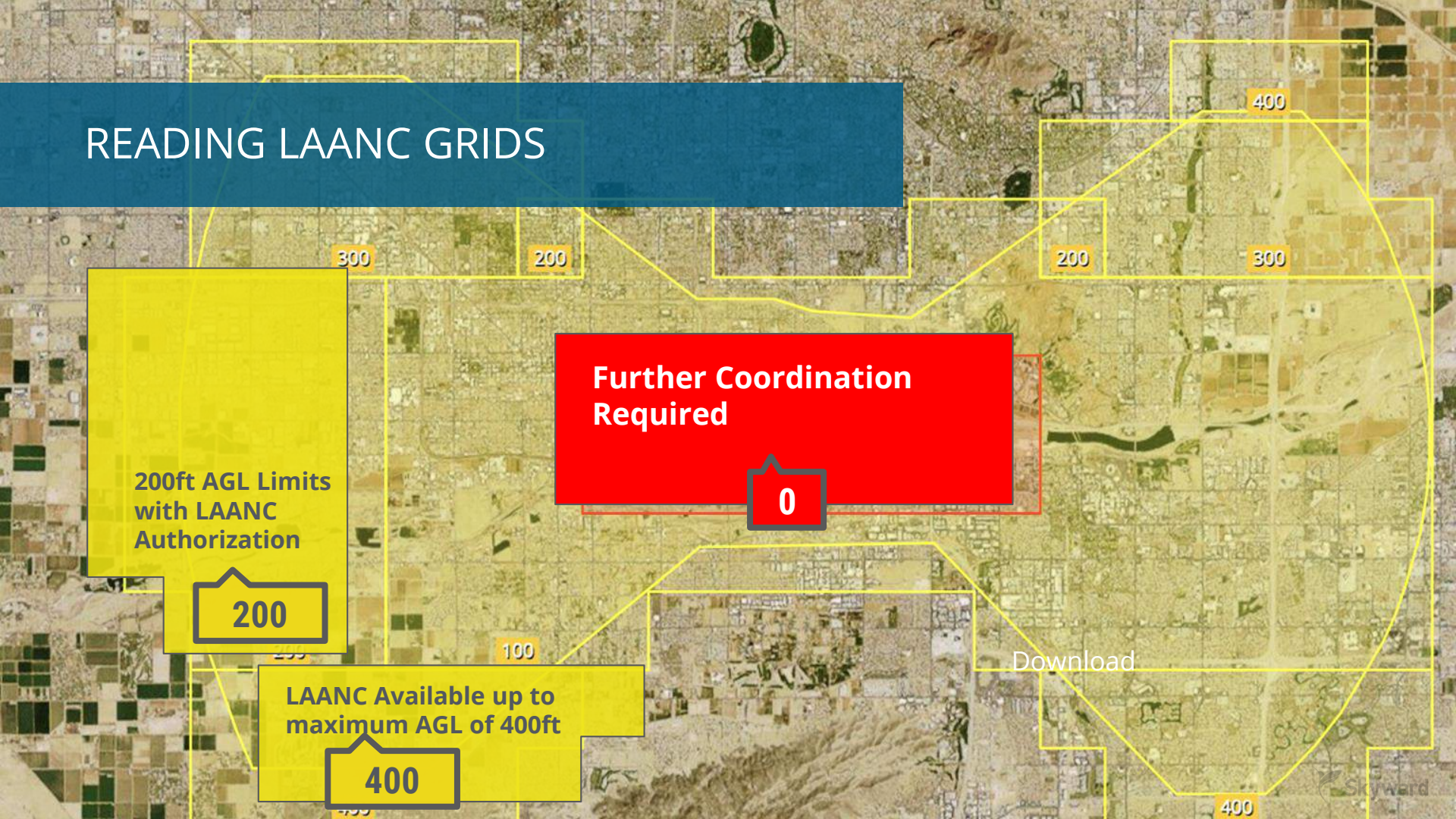


LAANC OVERVIEW

- LAANC: Low Altitude Authorization and Notification Capability system
- Not all airports in each region will participate. A total of 500 facilities will go live in 2018
- The FAA could shift go live dates
- Be sure you're still flying in accordance with state and local laws
- Do not call your airport or ATC to ask about LAANC

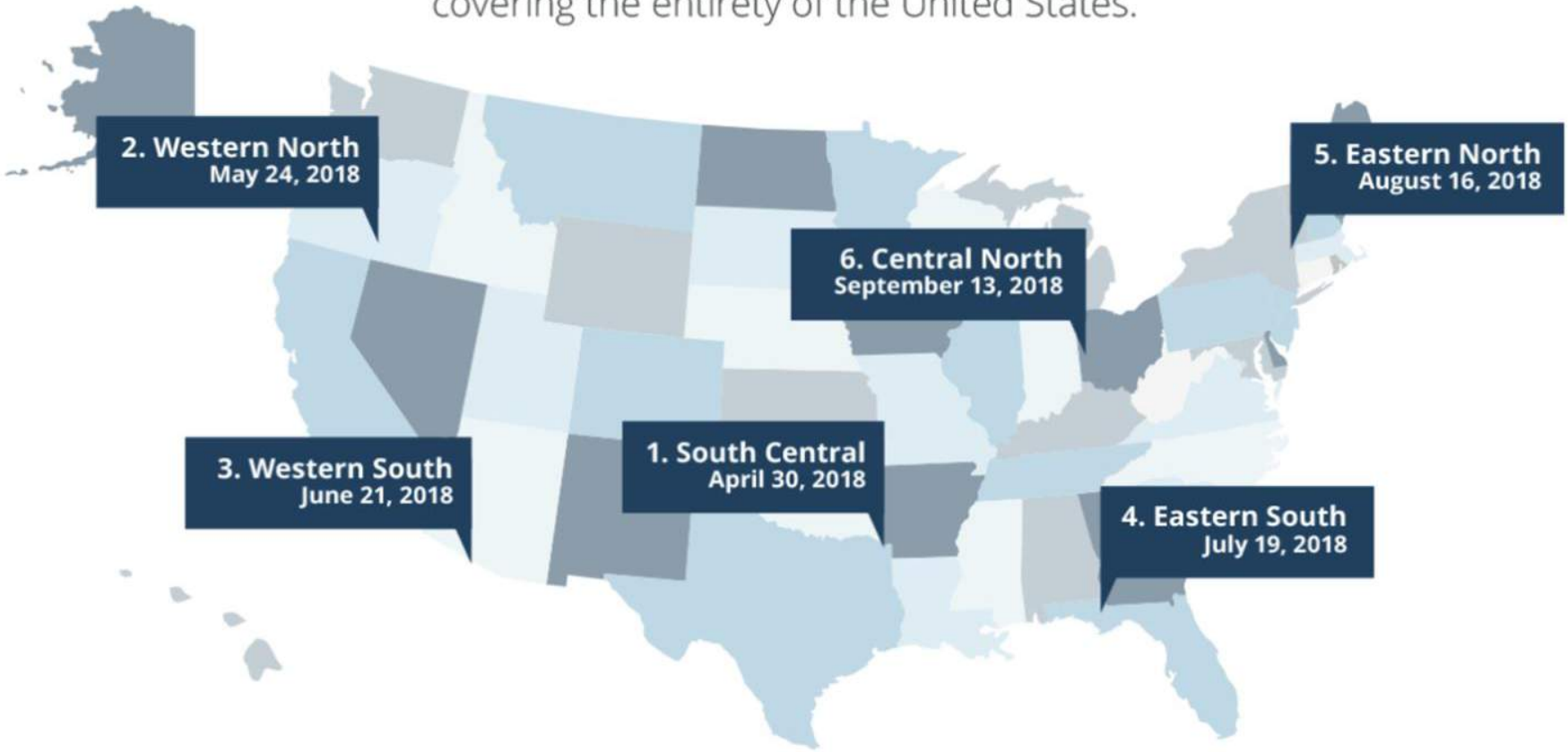
Skyward

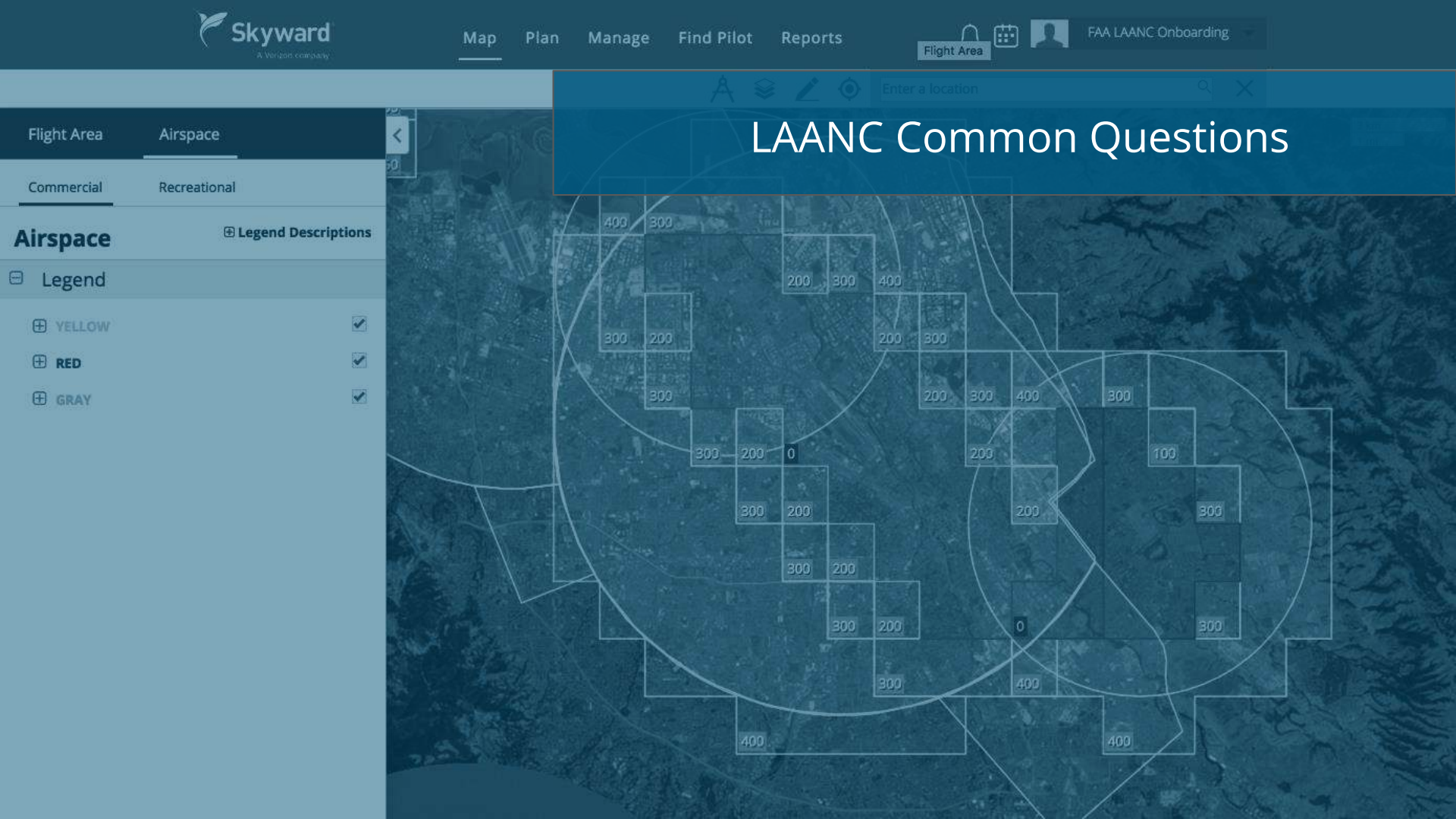
READING LAANC GRIDS



WHEN IS LAANC GOING LIVE IN MY AREA?

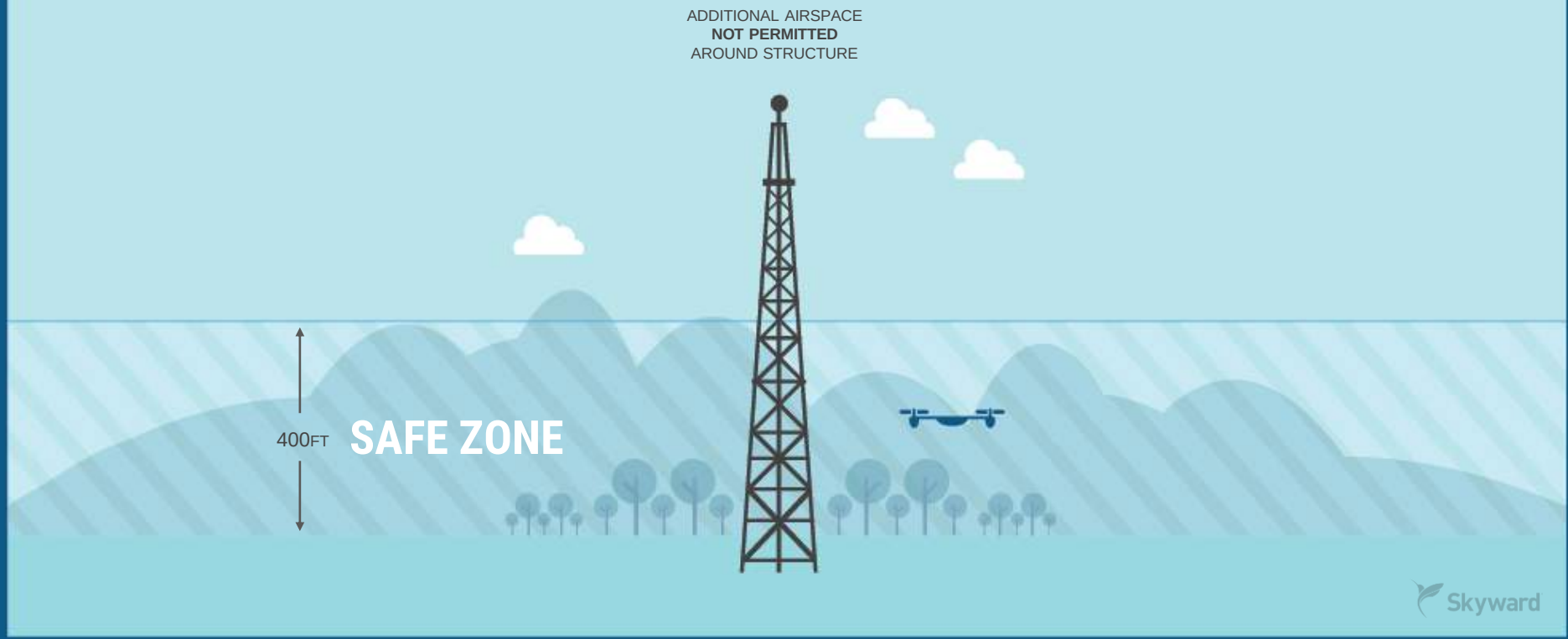
FAA scheduled rollout for hundreds of airports,* covering the entirety of the United States.




Skyward
A Verizon company
Map
Plan
Manage
Find Pilot
Reports
Flight Area
FAA LAANC Onboarding
Enter a location
Flight Area
Airspace
Commercial
Recreational
Airspace
Legend Descriptions
Legend
YELLOW
RED
GRAY
LAANC Common Questions

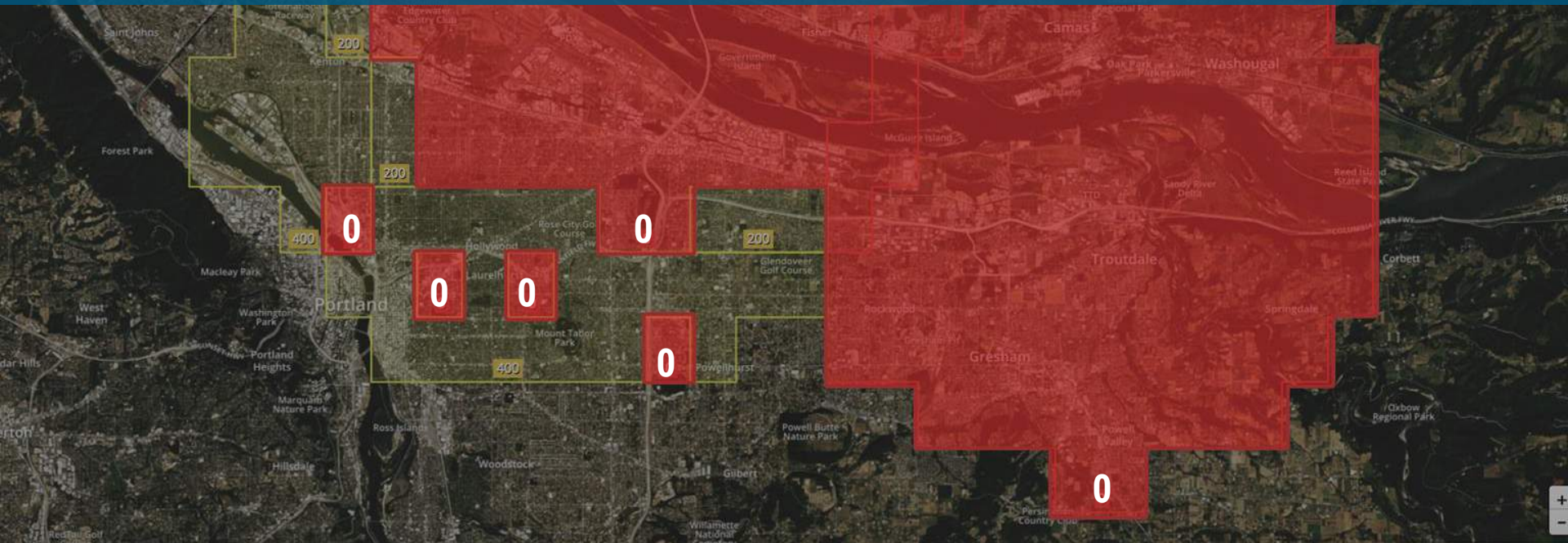
Can you attach an existing waiver (night operations, BVLOS, etc) to a LAANC authorization?

LAANC & VERTICAL STRUCTURES

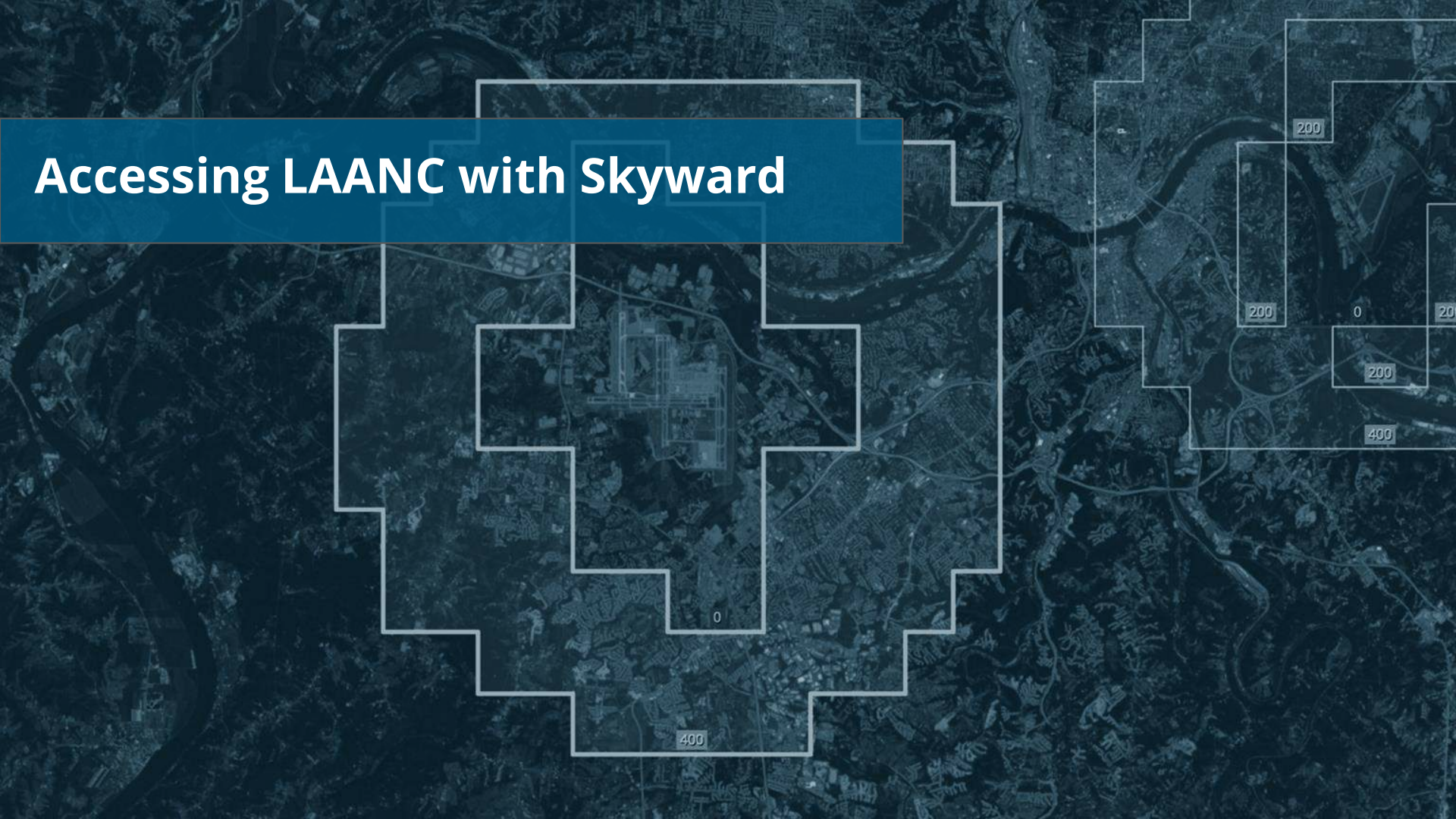


Skyward

How can a pilot get approved to fly in an area that is live with LAANC and has a 0ft AGL grid?

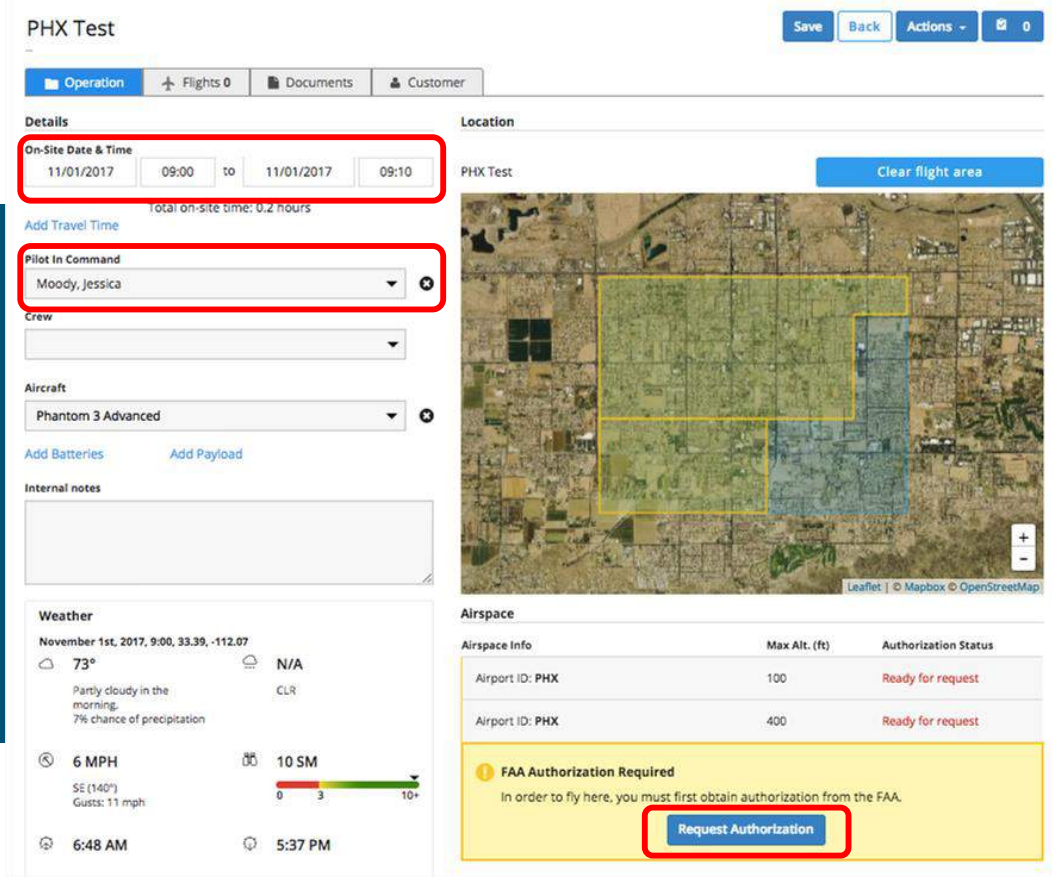


Accessing LAANC with Skyward



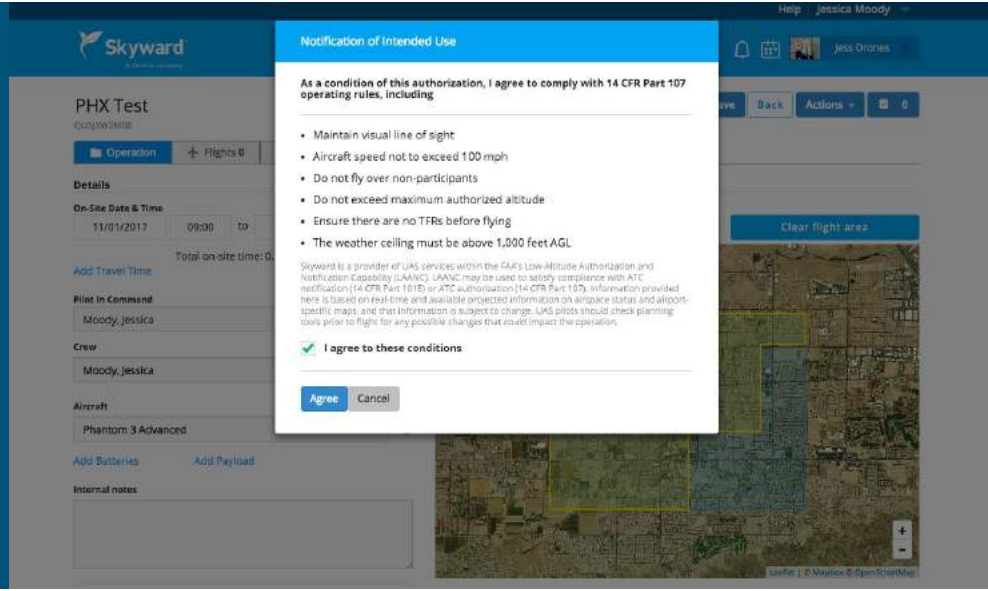
Plan an Operation

- Pilot in command
- Date and time
  - < 90 days out
  - < 12 hr window



Agree to Conditions

- Agree to comply with Part 107 Operating Rules including:
  - Maintain visual line of sight
  - Under 100mph aircraft speed
  - No flight over non-participants
  - Do not exceed maximum authorized altitudes
  - Ensure there are no TFRs before flying



Approved!

Print your Notice of Authorization on paper or as a PDF

Skyward
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An authorized intermediary for the Federal Aviation Administration USS program

Notice of Authorization

Operation Date
Wednesday, November 1st 2017

Pilot In Command
Jessica Moody
jessica@skyward.io
907-602-3313

Beginning Time
09:00 PDT (1600 UTC)

Ending Time
09:10 PDT (1610 UTC)

Conditions Of Authorization
- Maintain visual line of sight
- Aircraft speed not to exceed 100 mph
- Do not fly over non-participants
- Do not exceed maximum altitude
- Ensure there are no TFRs before flying
- The weather ceiling must be above 1,000 feet AGL

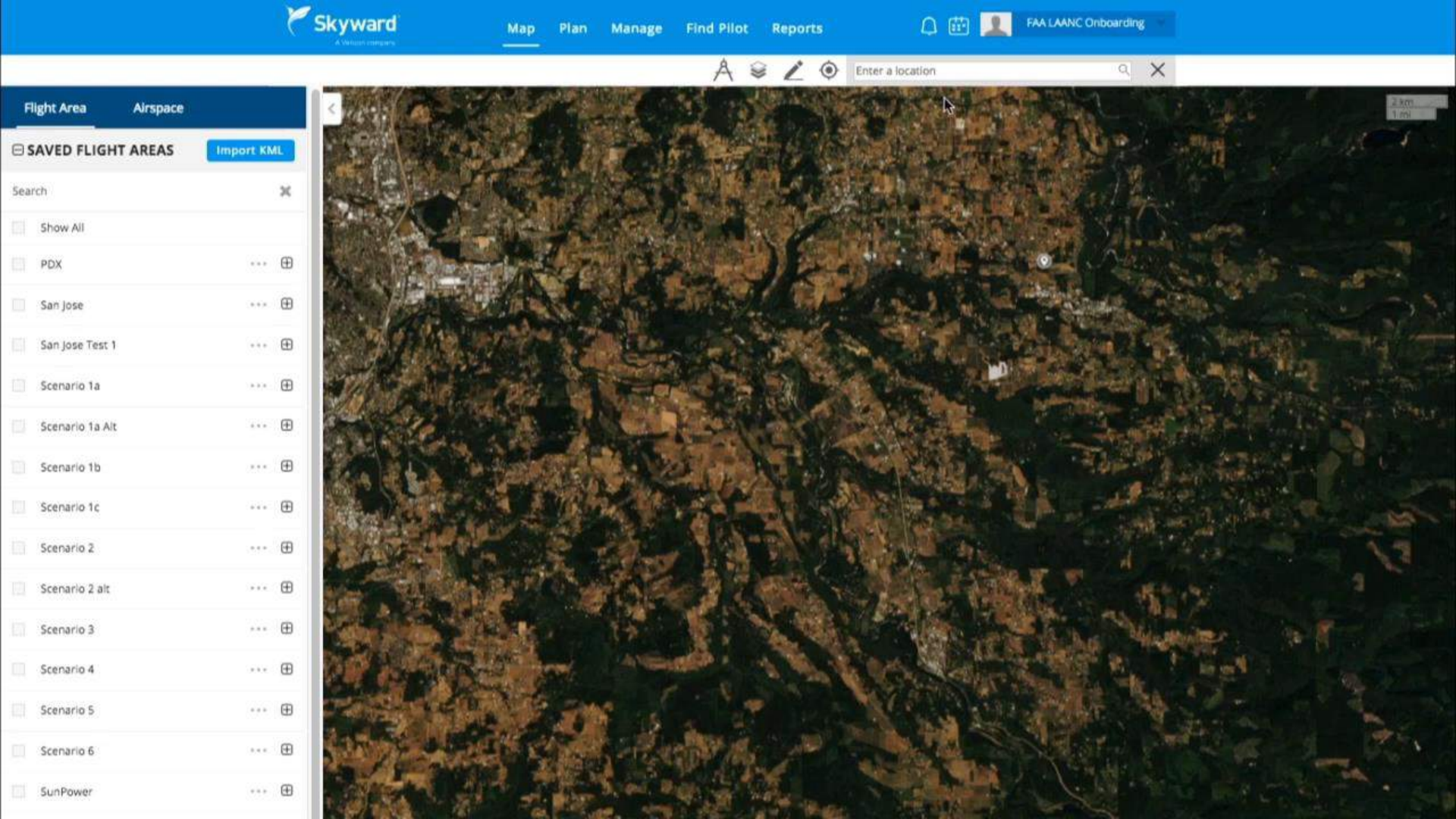
Airspace and maximum altitudes
1. **PHX 400^{ft} - Ref#:** SKD3dbpE4
2. **PHX 100^{ft} - Ref#:** SKD7z833o

In accordance with Title 14 CFR Part 107.41, your operation is authorized within the designated airspace and timeframe constraints. This Authorization is subject to cancellation at any time upon notice by the FAA Administrator or his/her authorized representative. This Authorization does not constitute a waiver of any State law or local ordinance. Jessica Moody is the person designated as responsible for the overall safety of UAS operations under this Authorization. During UAS operations for on-site communication/recall, Jessica Moody shall be continuously available for direct contact at 907-602-3313 by ATC or designated representative. Remote pilots are responsible to check the airspace they are operating in and comply with all restrictions that may be present in accordance with 14 CFR 107.45 and 107.49 (a)(2), such as restricted and Prohibited Airspace, Temporary Flight Restrictions, etc. Operations are not authorized in Class E airspace when there is a weather ceiling less than 1,000 feet AGL. If the UAS loses communications or loses its GPS signal, it must return to a predetermined location within the operating area and land. The pilot in command must abort the flight in the event of unpredicted obstacles or emergencies.

Issue Date:
Tuesday, October 31st 2017 17:59 UTC

Submitted By:
Jessica Moody
through Skyward.io

Print Close


Skyward
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Map
Plan
Manage
Find Pilot
Reports
FAA LAANC Onboarding
Enter a location
Flight Area
Airspace
SAVED FLIGHT AREAS
Import KML
Search
Show All
PDX
San Jose
San Jose Test 1
Scenario 1a
Scenario 1a Alt
Scenario 1b
Scenario 1c
Scenario 2
Scenario 2 alt
Scenario 3
Scenario 4
Scenario 5
Scenario 6
SunPower

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FAA LAANC Resources

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faa.gov/go/laanc

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Mike Danielak

mike@skyward.io

CCI

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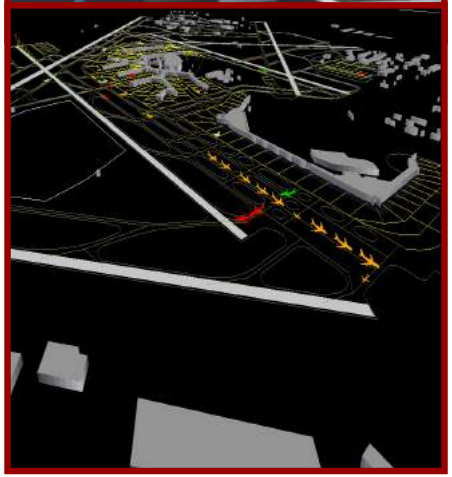
Crown Capabilities to Support UAS Operations

Expertise in the right place, at the right time

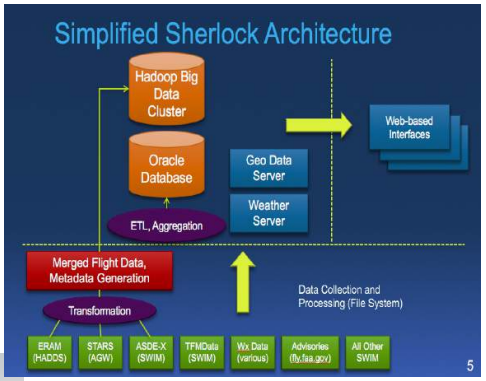
Dr. Thomas A. Edwards
Chief Technology Officer

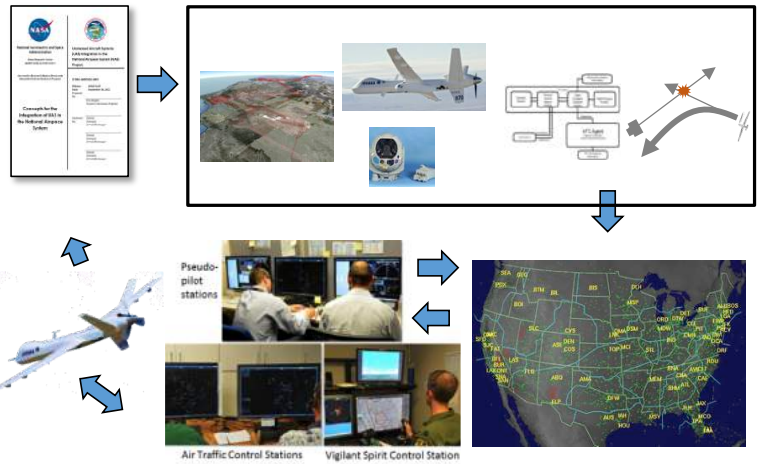
CROWN CORPORATE BACKGROUND

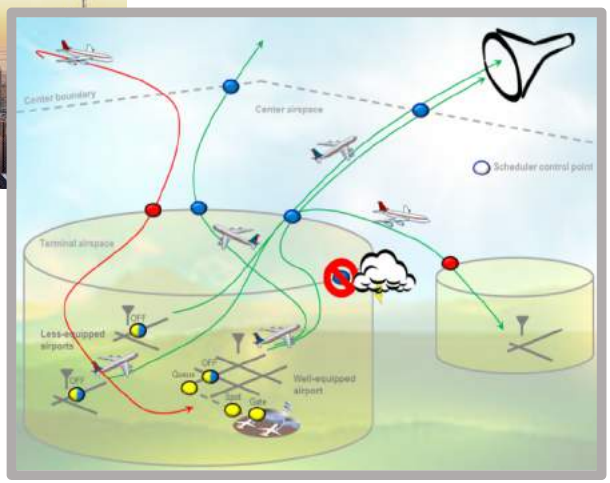


- **Air Traffic Management Planning and Engineering Firm Specializing in Planning & Implementing Aviation and Air Traffic System Modernization and Sustainment Programs**
- **29 Year History of Providing Expert Aviation and Engineering Solutions to help clients (including FAA and NASA) adopt transformational Technologies & Practices**
- **Headquartered in Arlington, Virginia**
  - **Over 200 Aviation Technical Professionals**
  - **Global Service Reach**
- **Senior management presence in North Carolina**

- Strategic planning and roadmaps for Aeronautics
- ATM Test Bed implementation
- ATD-1, -2 and -3
- ATM-X
- UAS in the NAS
- Urban Air Mobility
- Sherlock Data Warehouse

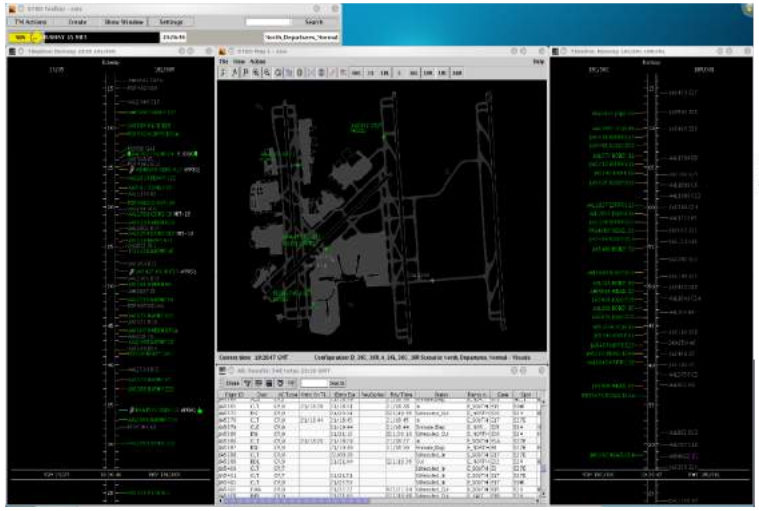


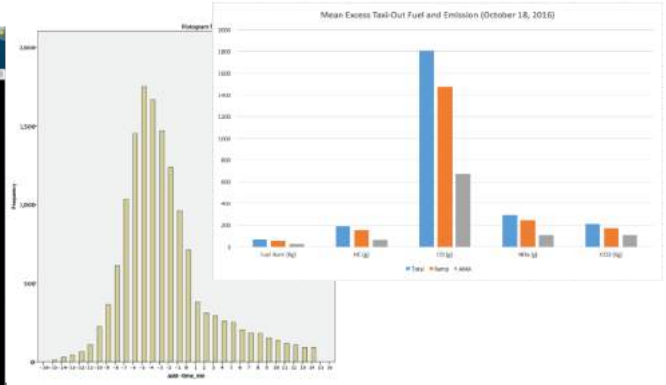




Airspace Technology Demonstration 2

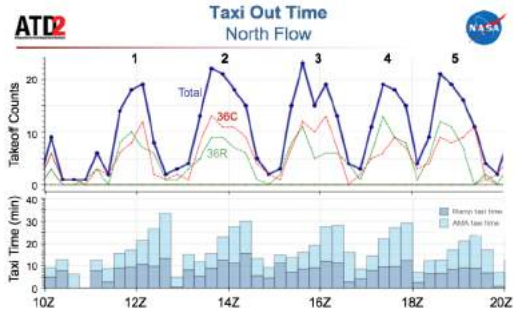
- Research Objective: Support the NASA-FAA ATD-2 effort to demonstrate tactical surface departure metering at the Charlotte-Douglas International Airport (Charlotte, North Carolina) beginning in 2017, followed by increasingly sophisticated strategic surface scheduling demonstrations and the addition of adjacent En Route Center participation through 2020. The project demonstrations culminate in a Metroplex-level technology demonstration with ATD-2 terminal departure scheduling capability and electronic flight data with ATD-2 surface and airspace scheduling.



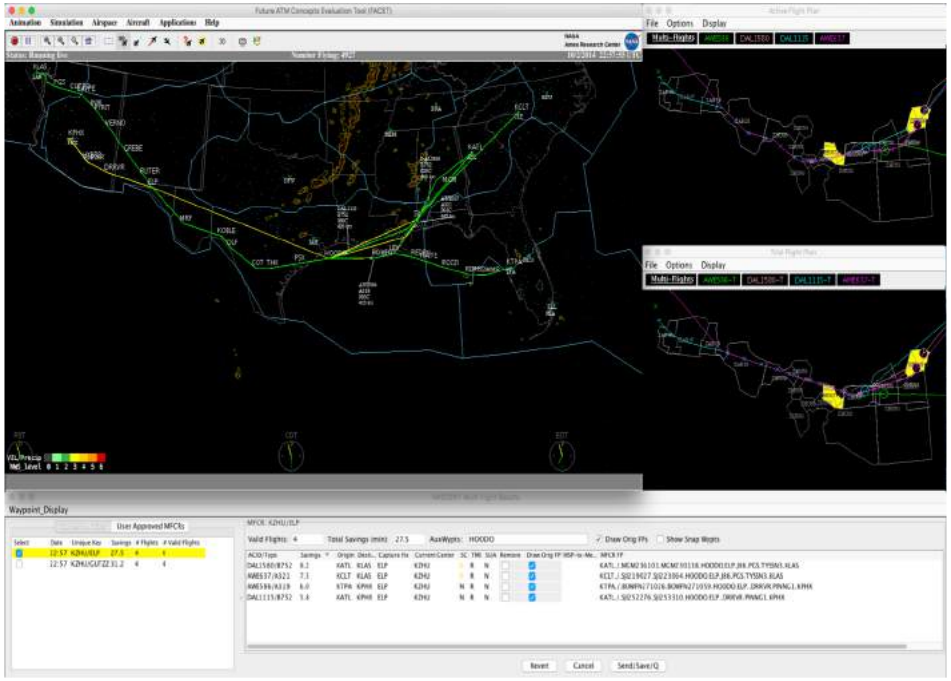


Histogram of AOBT (15 min intervals) CLT Excess Taxi-Out Fuel Burn and Emission (October 2016)

- Only involvement at a staff management level



Multi-Flight Common Routes (MFCR)



FACET:

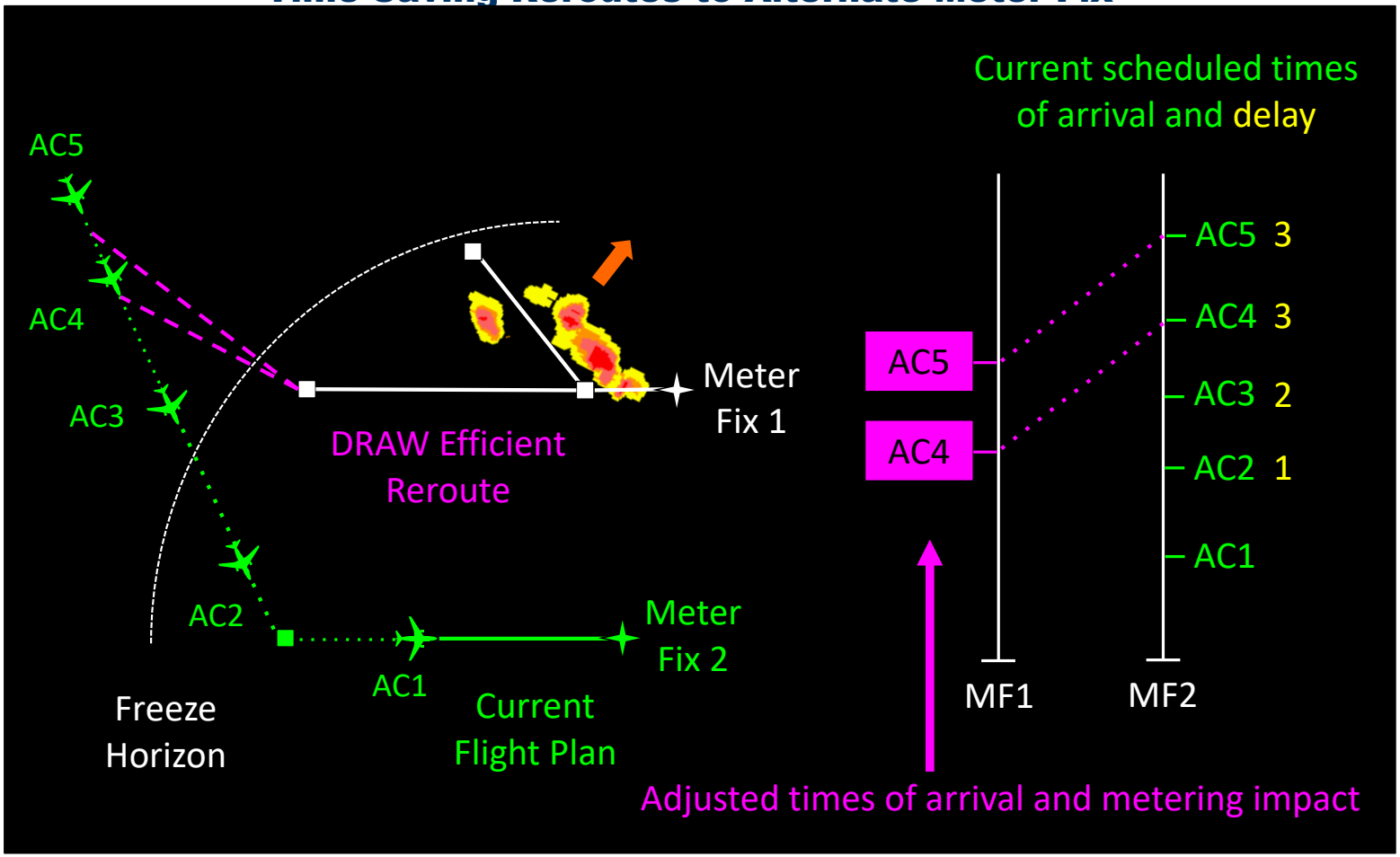
The team is currently adapting FACET to the Release 13 version of the SWIM datafeed from the Release 10 version. This will significantly reduce the level of effort needed to support both releases of the SWIM feed as all of the teams will now only be using the Release 13 version and they will be able to increase reliability of the data feeds. Additionally updates have been made to improve the interfaces in FACET, specifically in the areas of the weather information.

MFCR: (Multi-Flight Common Routes)

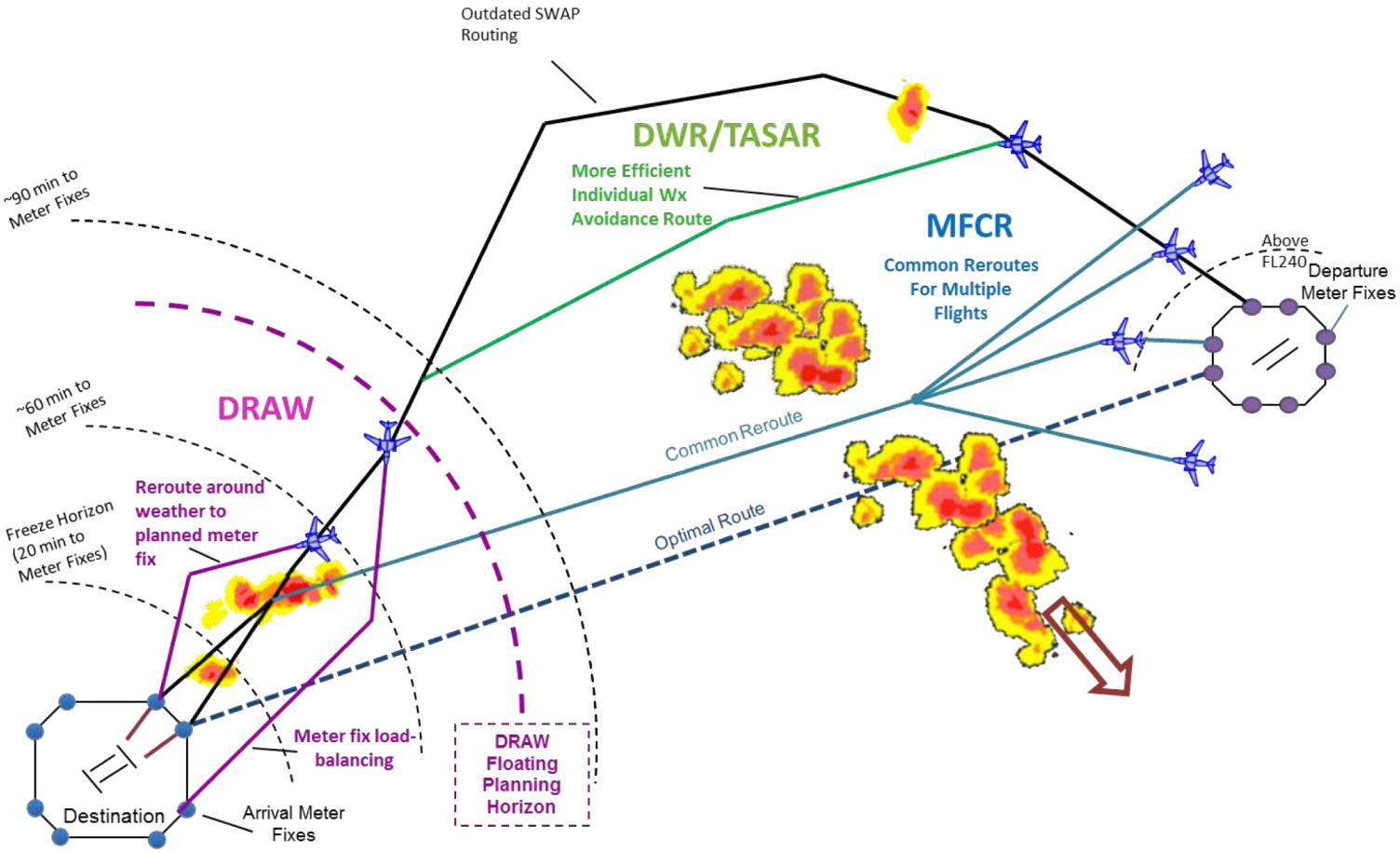
The team has developed new functionality in FACET for advisories for rerouting multiple flights all at once around weather cells within the NAS. This new functionality has already been used for the first Human in the Loop (HiTL) simulation in December. This work was specified, developed and implemented within a very short twelve week timeline. The team is now working on new functionality for the second HiTL using current DFW controllers in March.

Dynamic Reroute Around Weather (DRAW)

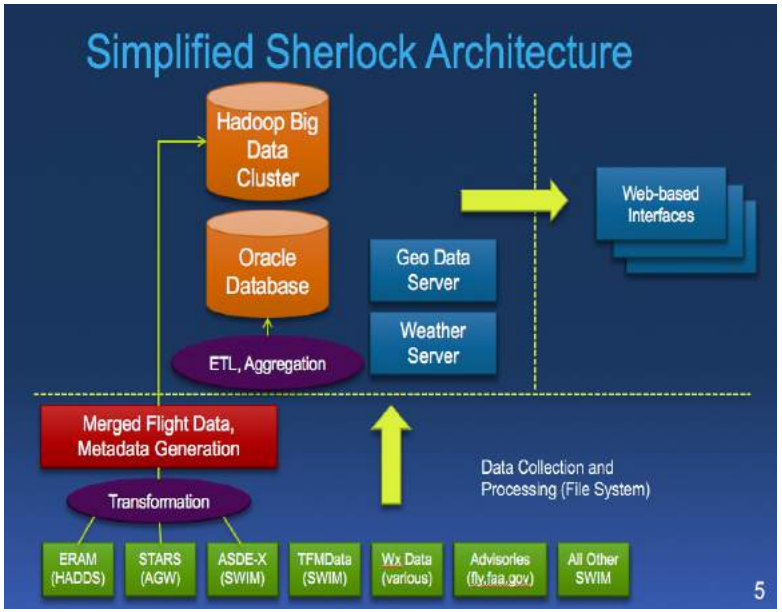
Time Saving Reroutes to Alternate Meter Fix

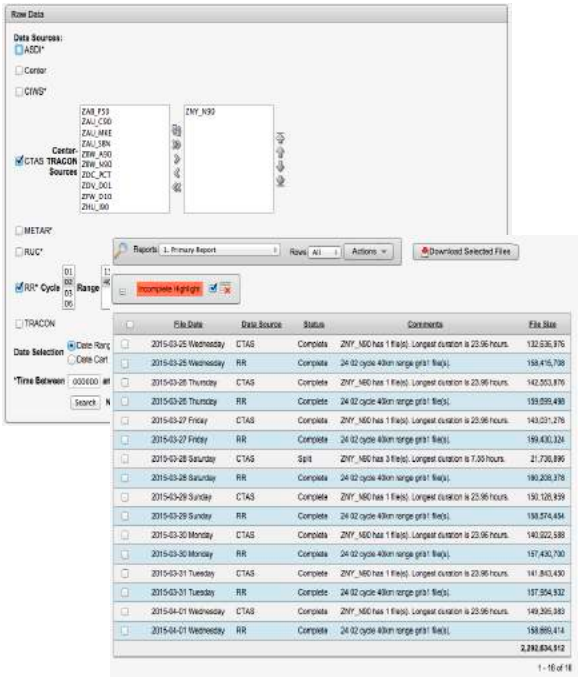


ATD-3 Integrated Concept



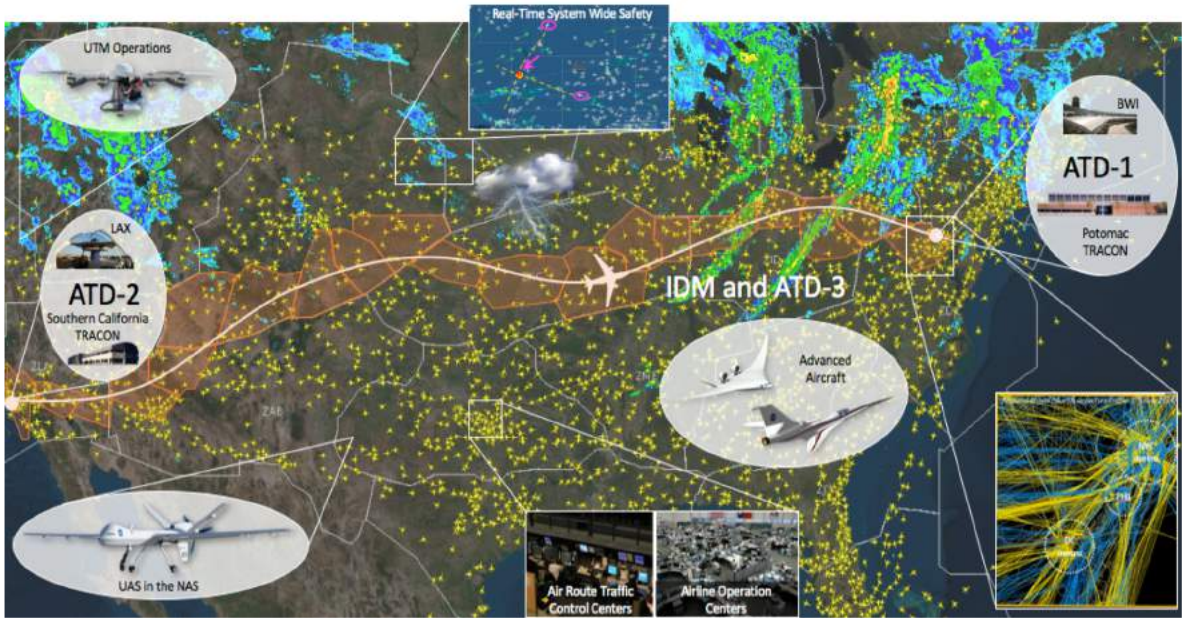
Sherlock Big Data Warehouse





- Sherlock is a platform for ATM data collection, archiving, processing, query, and delivery
- Sherlock is a platform for big data analytics, including data mining and machine learning
- Sherlock also has a semantic data store aimed at enabling more complex data integration

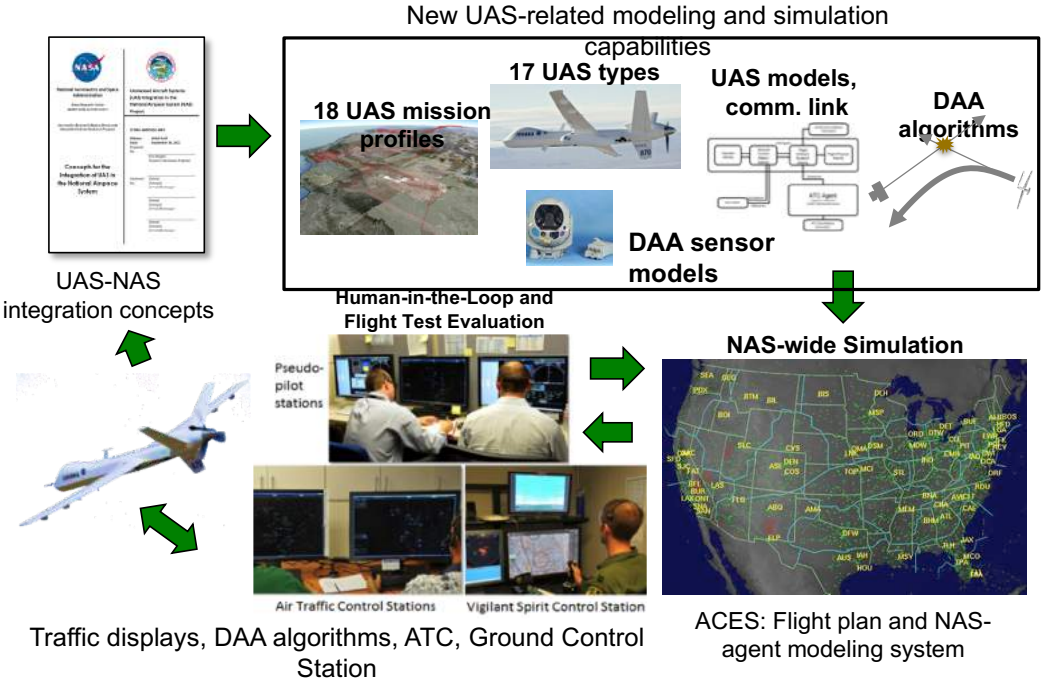
ATM-X (Trajectory Based Operations)



- All vehicle access, flexible airspace
- Federated architecture integrating FAA, user and industry technologies
- Vertical integration, ground to space
- Potential for integration with real-time safety components

- Boeing / SMART NAS
- Urban Air Mobility

UAS in the NAS



Research Objective: Provide support to Unmanned Aircraft System (UAS) Integration into the National Airspace System (NAS) with development & validation of the Detect and Avoid systems for UAS, specifically to define MOPS for Detect and Avoid in support of RTCA SC-228

The 'Java Architecture for DAA Extensibility and Modeling' (JADEM)

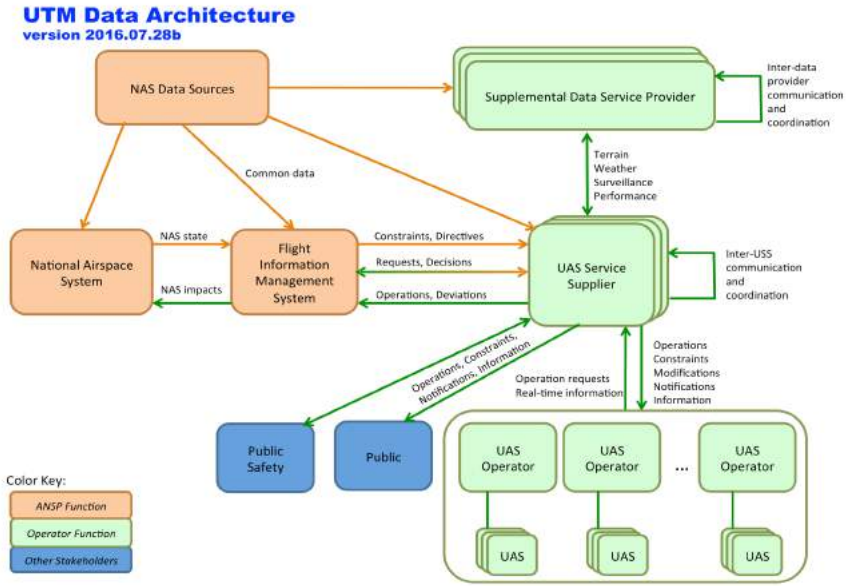
- Models the DAA System Architecture with interchangeable components, realistic flight performance and pilot models
- Is driven by UAS missions and real world VFR and IFR data, encounter models and test scenarios
- Supports flight tests and human in the loop simulations, NAS-wide simulations, parametric studies
- Provides (loosely coupled) components for integration with external platforms

Unmanned Aerial Systems Traffic Management (UTM)

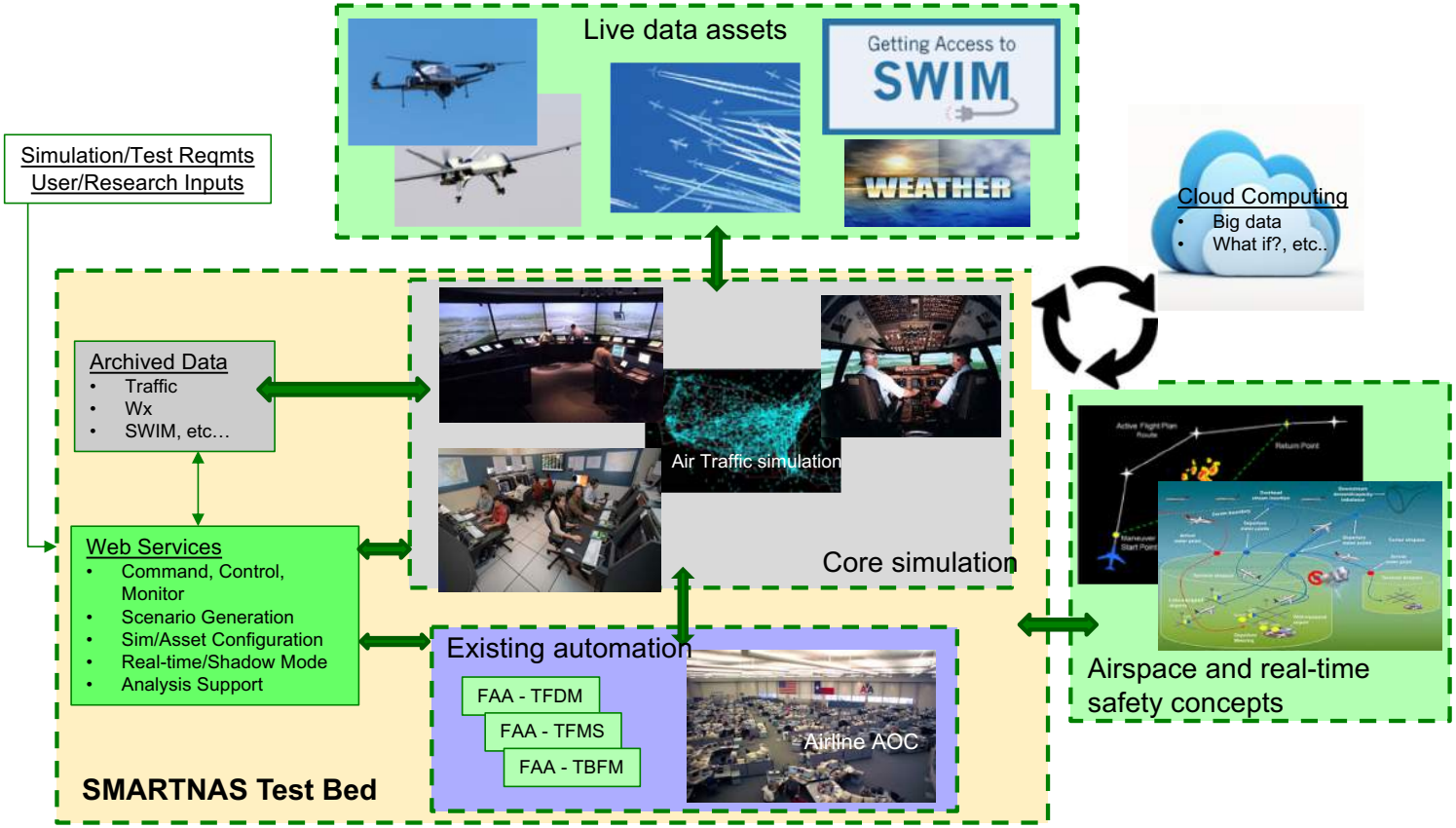
The UTM ConOps is focused on safely enabling large-scale small UAS (sUAS) operations in low altitude airspace. The UTM construct supports large-scale visual line of sight and beyond visual line of sight operations. It is based on two primary mantras:

(1) flexibility where possible and structure where necessary, and

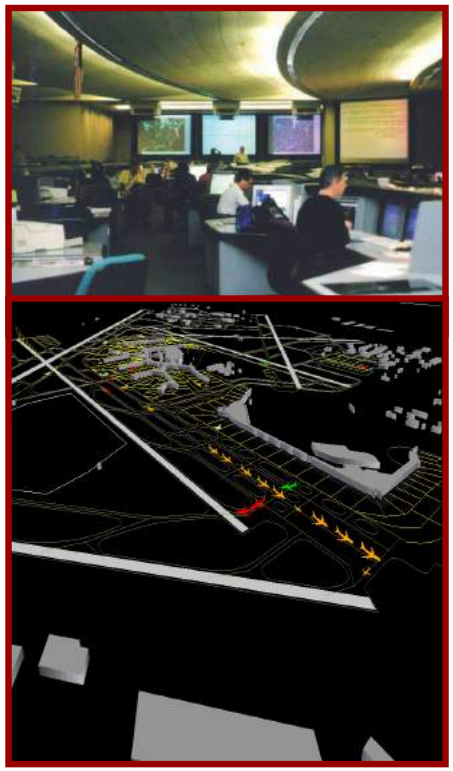
(2) a risk-based approach where geographical needs and use cases determine the airspace performance requirements



SMART NAS Test Bed



CURRENT UAS-RELEVANT ACTIVITIES



- Principal partner supporting NASA's development of UAS Traffic Management (UTM)
- Working with FAA's UAS Integration into the NAS Office processing UAS applications (333 exemptions, COAs, Part 107 authorizations and exemptions)
- Conducting studies for NASA on the introduction of UAS into urban environments
- Supporting NUAIR UAS flight corridor operations
- Partnered with State of Alaska on UAS IPP proposal (selection pending)
- Technical support to NC DOT Division of Aviation on UAS activities
- Professional services to UAS operators in preparation of authorization documentation

Nags Head Police Department

Small Unmanned Aircraft System Use In Public Safety

Det. Sgt. Greg South
(252) 441-6386
Greg.south@nagsheadnc.gov

Nags Head Police Department

How we use the UAS to assist our agency.

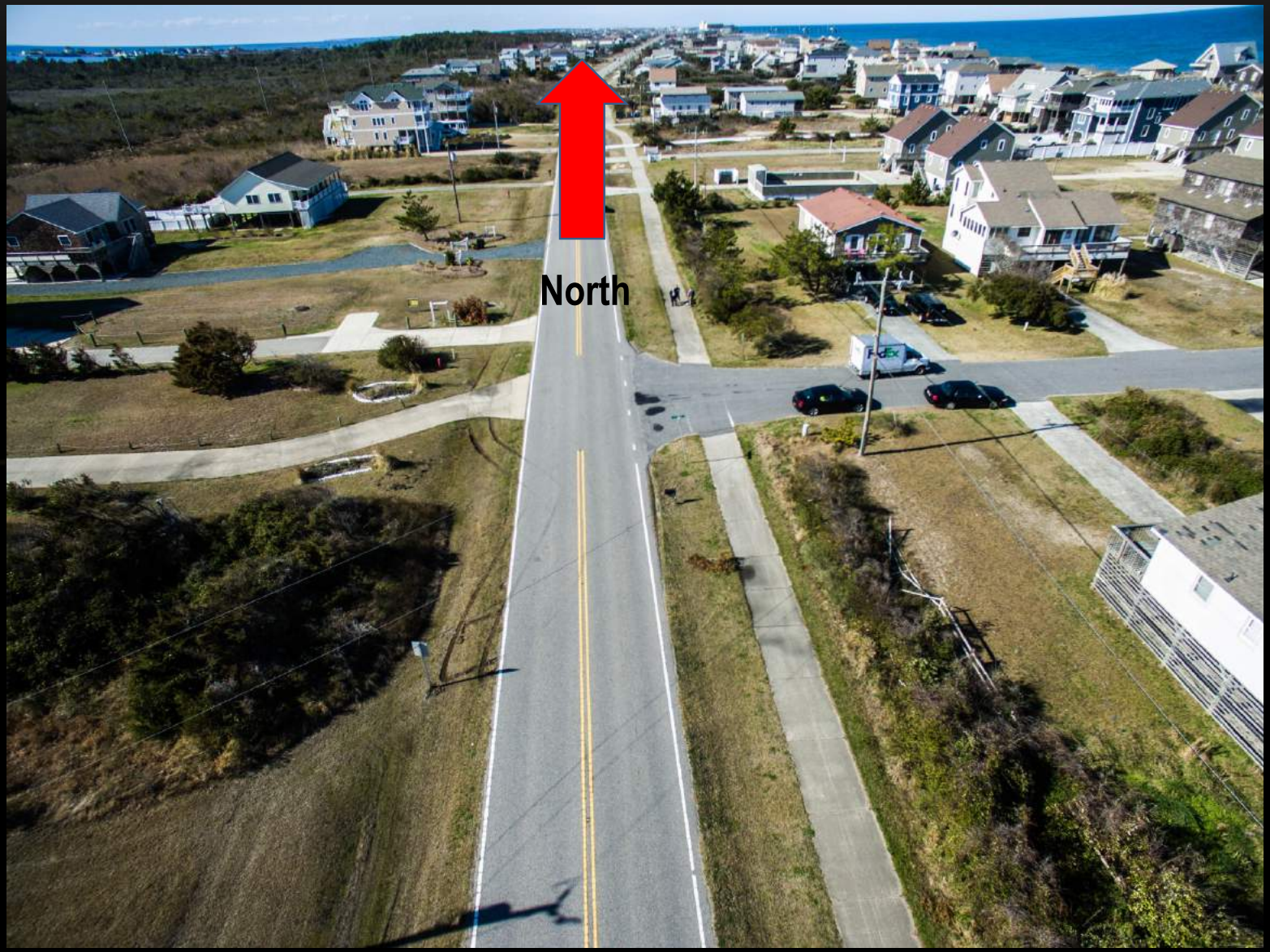
- Search and Rescue
- Crash Investigations
- Hazmat

- Fire Investigations
- Road Conditions/Traffic Monitoring
- And many other uses

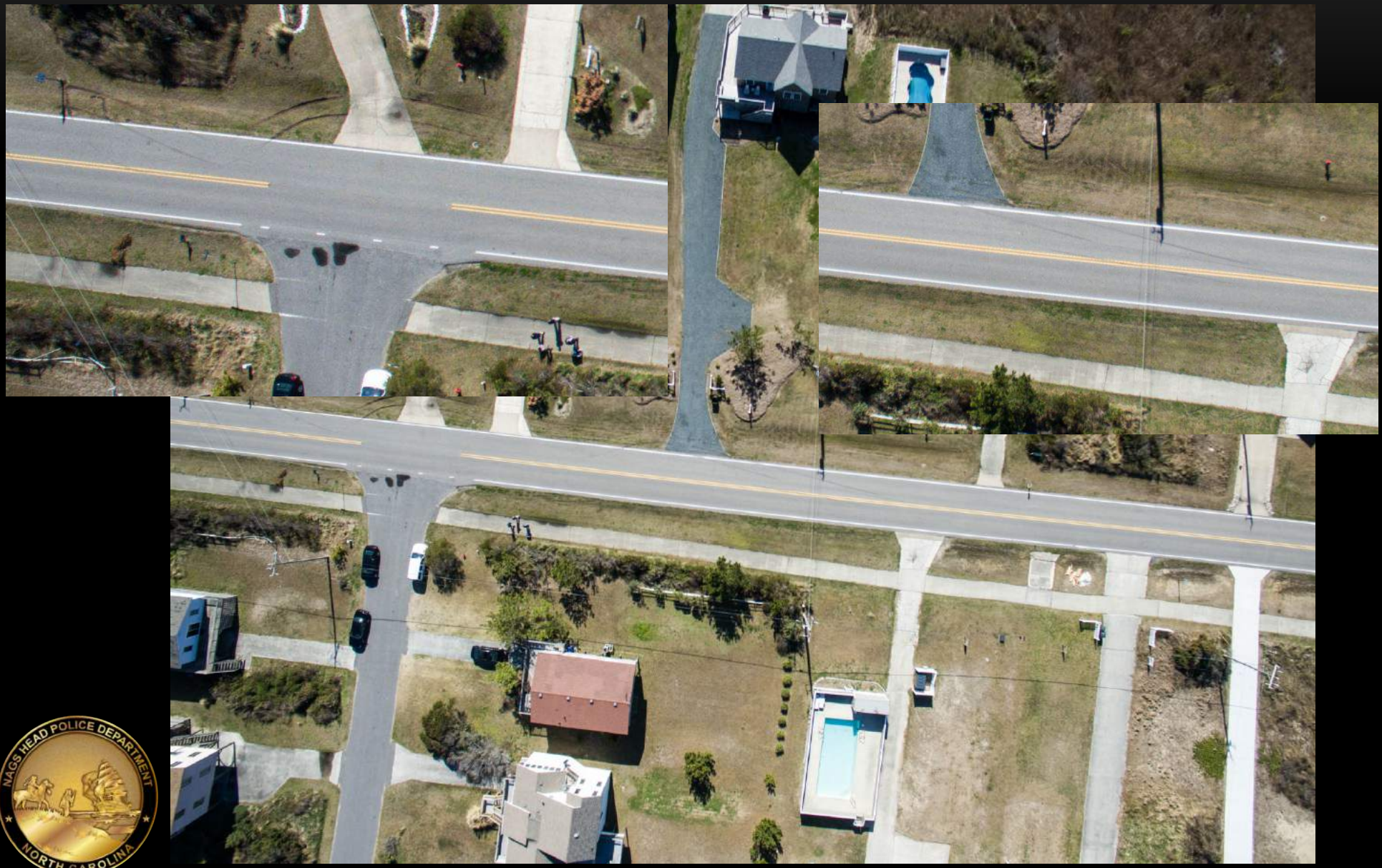
Nags Head Police Department

March 07, 2017
South Nags Head
Road Rage Incident

Nags Head Police Department



Nags Head Police Department



Nags Head Police Department

Tire marks

Scale

Nags Head Police Department

Measurements Are Added

Nags Head Police Department

Final Diagram To Scale

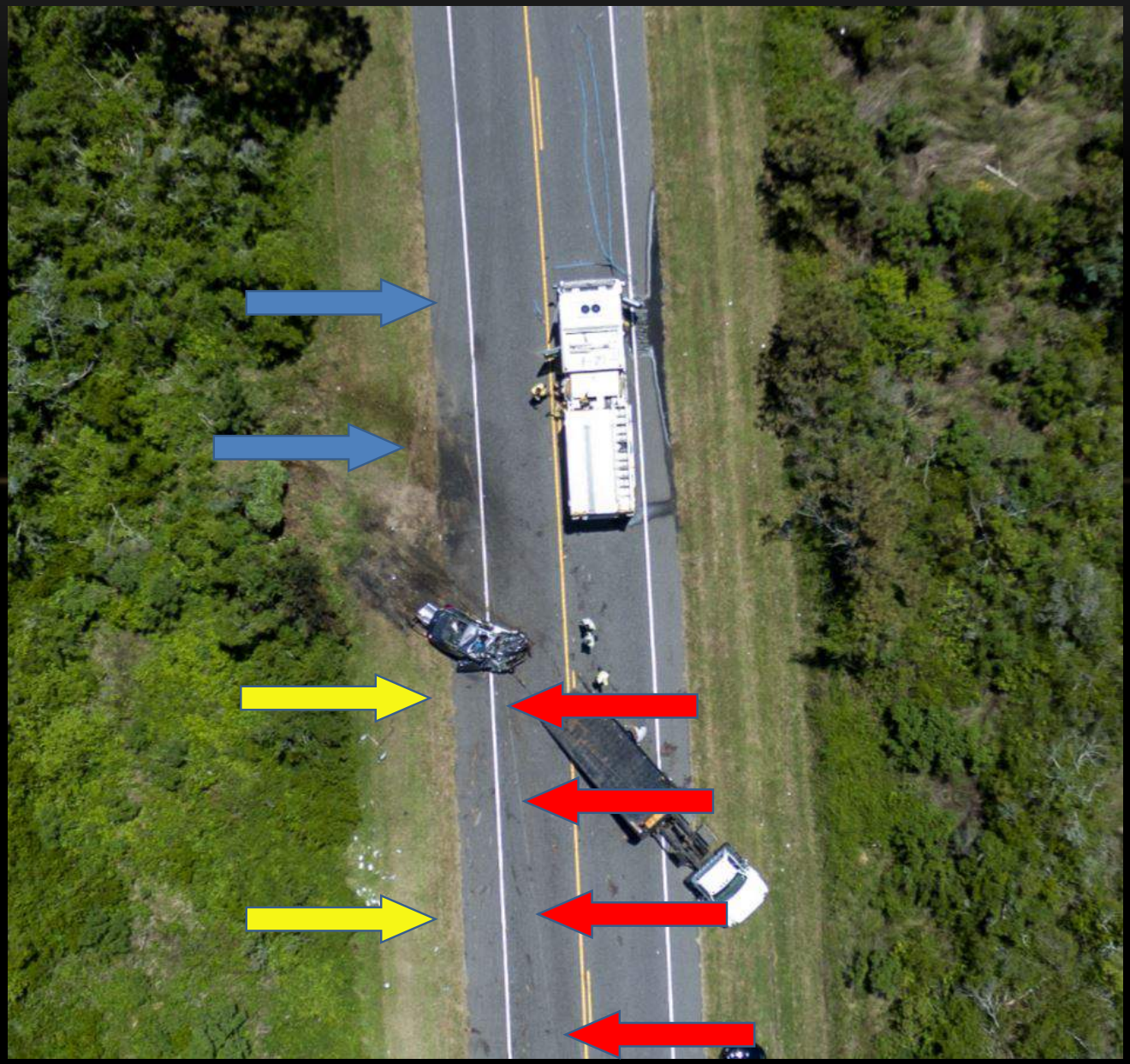
Nags Head Police Department

Fatal Traffic Crash
May 2017
Federal Park Service

Nags Head Police Department

Nags Head Police Department

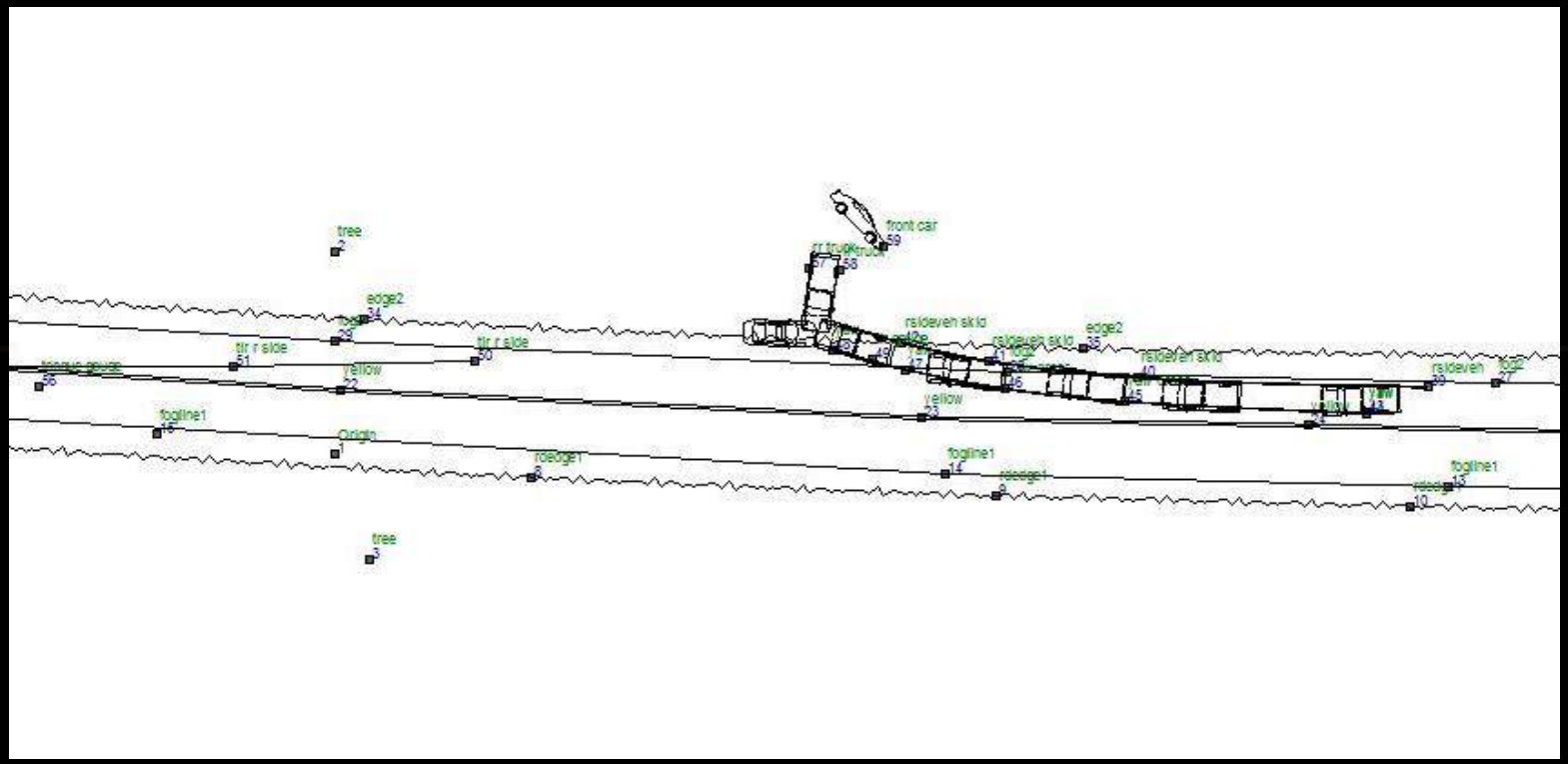
Tire Marks



Trailer

Nags Head Police Department

Measurements Using A Total Station



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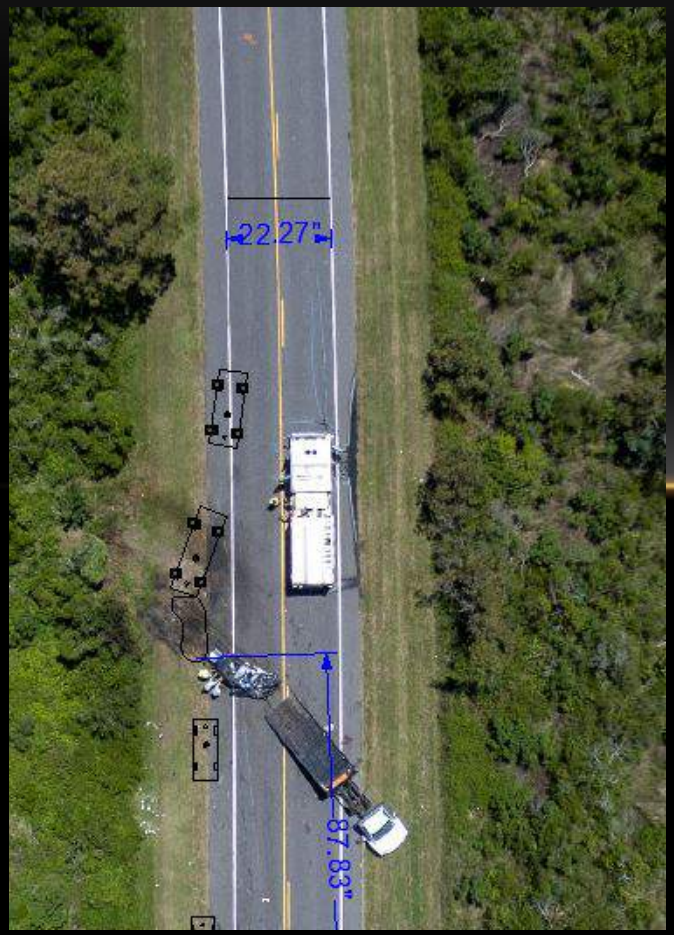
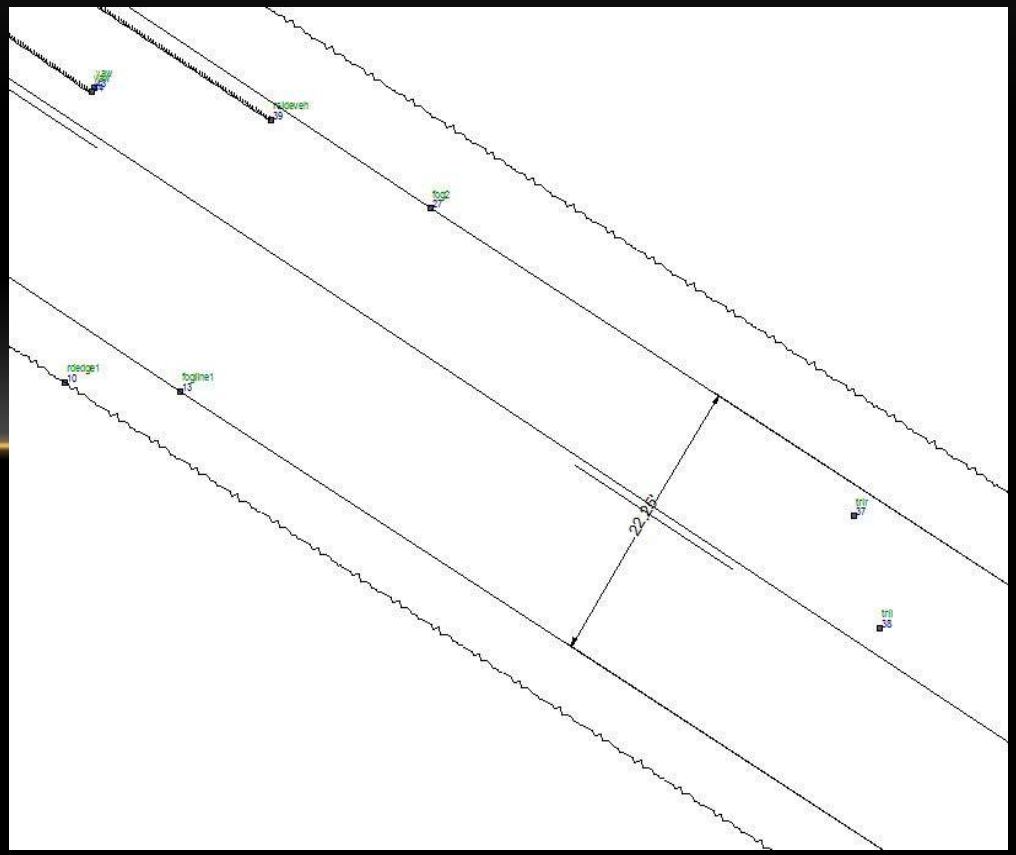


22.27 Feet



22.25 Feet

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Measure and Vectoring with the Photo Scaled
And Total Station Added As A layer

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Final Diagram

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Nags Head Police Department

Policy For Using A UAS

Policies can be used for commercial and public safety use.

What is a Policy?

Policies are the set of basic principles and associated guidelines, formulated and enforced by the governing body of an organization, to direct and limit its actions in pursuit of long-term goals.

Nags Head Police Department

Policy For Using A UAS

The policy should have a primary operations manager, and a secondary manager if needed.

The Operations Manager is the person in control, or the Remote Pilot In Command of the operation.

The Operations Manager is responsible for the following:

- Overseeing all safety of operations
- Ensuring compliance with FAA Rules and Regulations
- Ensuring that all required persons are present during operations
- Ensuring that all persons involved with the operation understand their assigned duties
- Appointing a Ground Supervisor or acting as Ground Supervisor for the operation

Nags Head Police Department

Policy For Using A UAS

A General Flight Safety Plan:
Flying Height of UAS

Permission To Access Private Property

Permission From Airport Authorities

Permission For Land Use From Other Jurisdictions

UAS Pilots Responsibilities

- Pre-Flight, In-Flight and Post-Flight Check Lists

Visual Observer

Nags Head Police Department

Policy For Using A UAS

Pilot Experience

- What training have they had or is required?

Possible Emergency Situations

- Crash of UAS
- Crash Into A Person
- Manned Aircaft
- Loss of Control or Communication with UAS

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Policy For Using A UAS

Flight Records and Maintenance Logs

- Each Pilot must track their own flight records
- Maintenance Record stays with the aircraft

Nags Head Police Department

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NORTH CAROLINA
Department of Transportation

Drone Operations

Division 1

Carlton “CJ” Jackson
NCDOT Division One GIS Technician

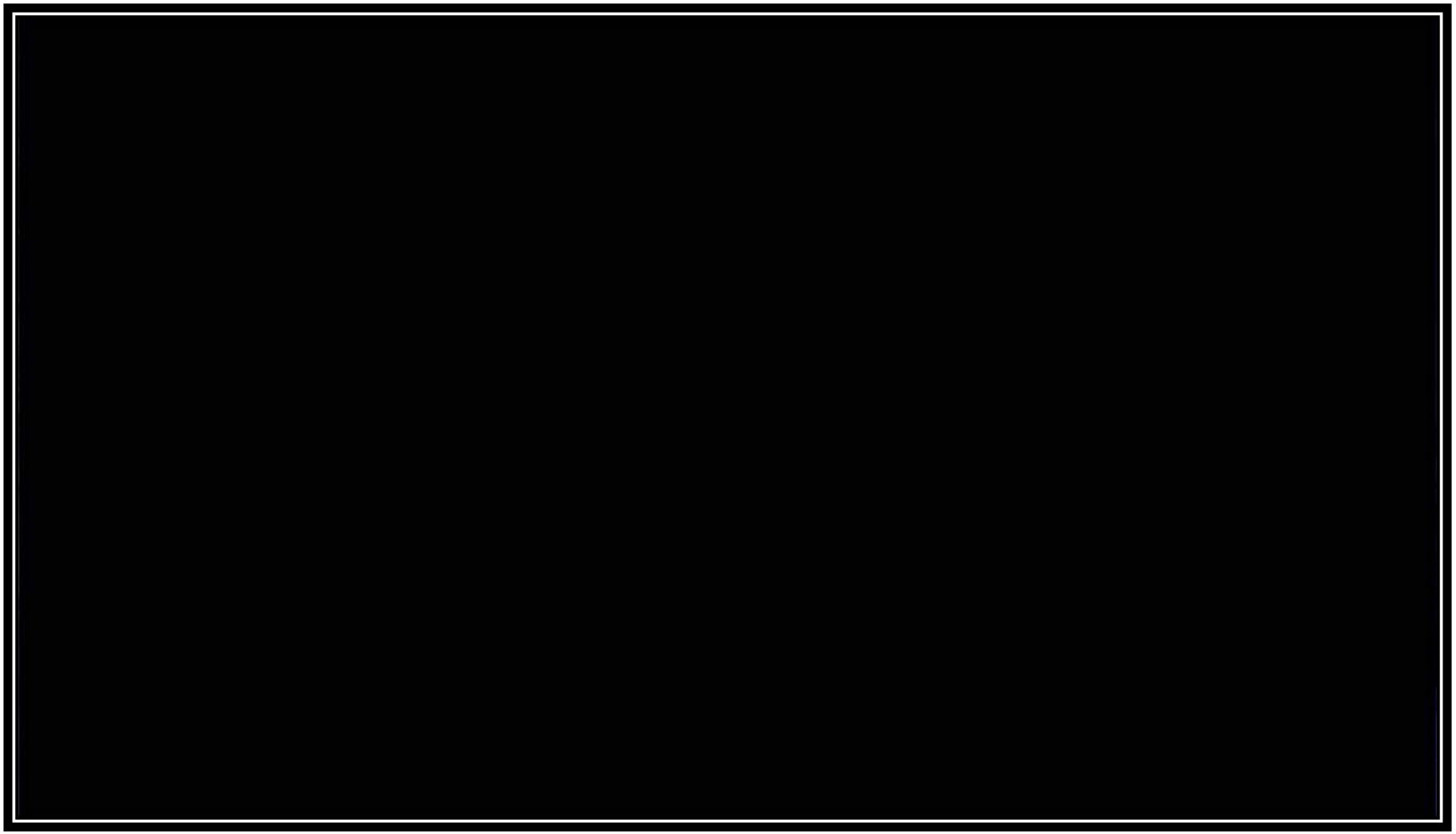
April 19, 2018

Items of Discussion

- Emergency Response
- Project Status/Planning
- Construction Updates
- Maintenance Issues

Division 1 Drone Projects

Emergency Response

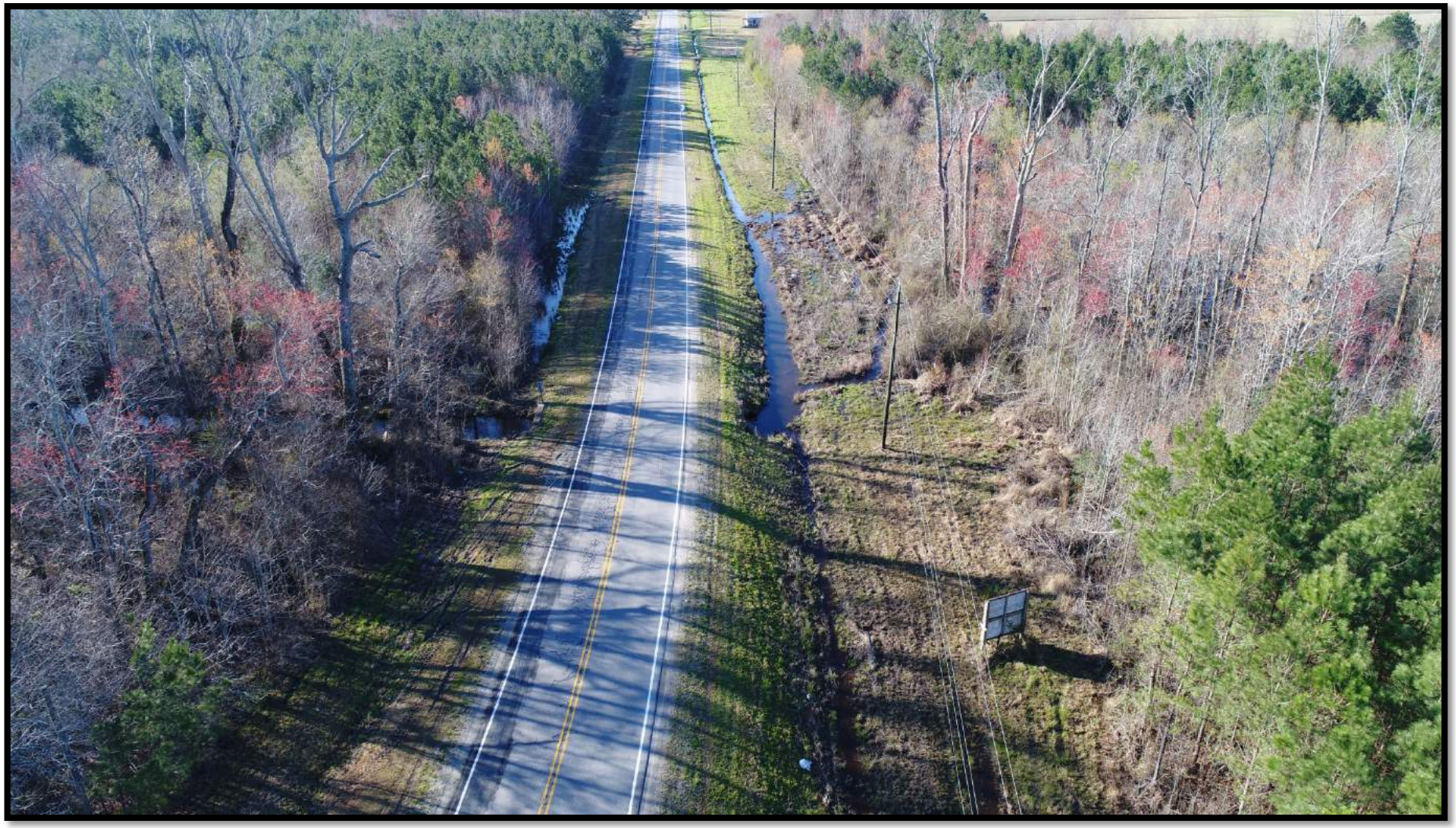


Planning

Planning

Construction Updates

Maintenance Issues



Questions?