State of Research – FAA Statement of Work:

Airport UAS Research

Solicitation Number:

692M15-21-R-00039

<u>Contract Officer POC:</u>

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Task Area 1

UAS Detection and Mitigation Technologies/Systems

Unauthorized UAS Are Disrupting the Safety of the NAS

- **Safety** is FAA's number one priority

- Drones, or Unmanned Aircraft Systems (UAS), are **integrating into the airspace**

- FAA must ensure **airport and aircraft operations are not interrupted**
  - UAS must, therefore, be detected and may need to be mitigated to prevent accidents and incidents

"We expect that by 2024 we can have as many as 800,000 registered commercial drones … this industry must … be safely integrated into the National Airspace."

- Steve Dickson, FAA Administrator

Congress: Understanding the Impacts of UAS on the NAS and Our Nation's Airports

FAA must test and evaluate multiple UAS detection and mitigation technologies and systems at five airports in line with a Congressional mandate

(FAA Reauthorization Act of 2018, Sec. 383)

What is Section 383?

Section 383* created a new § 44810 in Title 49 U.S.C., which among other requirements, directs the FAA to test and evaluate technologies and systems that detect and/or mitigate potential aviation safety risks posed by unmanned aircraft systems (UAS) at 5 airports.

Sec. 383(a)
- Work with Federal agencies who have received grants of authority for Counter-UAS (C-UAS), including Depts. of Defense (DOD), Energy (DOE), Homeland Security (DHS), and Justice (DOJ)
- Ensure activities do not adversely impact or interfere with aviation

Sec. 383(b)
- Develop a plan for the certification, permitting, authorizing, or allowing deployment of C-UAS systems NAS-wide
- Charter an Aviation Rulemaking Committee (ARC)
- Unable to delegate any authority provided in this section

Sec. 383(c)
- Conduct testing and evaluation of detection and mitigation systems at five airports, including one airport that ranks in the top ten of the FAA's most recent Passenger Boarding Data.

Sec. 383(d)
- FAA must test both detection and mitigation technologies under subsection (c)

Sec. 383(e)
- Determine Airport Improvement Program (AIP) funding eligibility requirements for technologies legally permissible for deployment

Sec. 383(f)
- Provide an annual briefing to the appropriate committees of Congress

*Section 383 of the 2018 FAA Reauthorization Act

Sunset date: Sept 30, 2023

Overall Section 383 Program Plan

Program Goal: Evaluate technologies/systems that detect and mitigate potential risks posed by errant or hostile UAS operations in the airport environment to assess impacts on safe airport operations, navigation, air traffic services, and the safe and efficient operation of the National Airspace System.

2021
Install, test, and evaluate technologies/ systems at Atlantic City Airport (ACY)

2020
Established five phase approach, and the Test & Evaluation Team for Phase One

2022
Test and evaluate the most mature technologies/systems at four additional airports in various operational and environmental conditions

Phase One
- Airport UAS Detection and Mitigation Research Program

- **Lead Organization:** Office of Airports (ARP)

Phase Two
- Aviation Rulemaking Committee (ARC)

- **Lead Organization:** Office of Security and Hazardous Materials Safety (ASH)

Phase Three
- Plan for Certification, Permitting, Authorizing of Detection and Mitigation Systems
- **Lead Organization:** Office of Security and Hazardous Materials Safety (ASH)

Phase Four
- Additional Regulatory and Policy Development

- **Lead Organization:** Office of Security and Hazardous Materials Safety (ASH)

Phase Five*
- Implementation of Plan and Airport Improvement Program (AIP) Funding

- **Lead Organization:** Office of Security and Hazardous Materials Safety (ASH)

*Note: Certain Activities and Outcomes May Depend on Additional Legal Authorities Being Enacted By Congress

SIR: Task Area 1 Supports Phase One

Airport Solicitation & Submissions

- **Section 383:** "In order to test and evaluate technologies or systems that detect and mitigate potential aviation safety risks posed by unmanned aircraft, *the Administrator shall deploy such technologies or systems at* **5 airports, including 1 airport that ranks in the top 10 of the FAA's most recent Passenger Boarding Data**."

- Solicitation
  - Vetted by Section 383 Working Group (including key FAA LOBs)
  - Open from September 4, 2020 – October 22, 2020
  - Requested responses to a technical screen/questionnaire and optional summary narrative or supplemental information

- Submissions
  - Received airport submissions.
  - FAA research team conducted down select to identify five suitable airports.

Airport Solicitation & Submissions

Press Release – FAA Selects Five Host Airports to Test and Evaluate Unmanned Aircraft Detection and Mitigation Systems

For Immediate Release

March 2, 2021
Contact: pressoffice@faa.gov

The Federal Aviation Administration (FAA) today selected five host airports to evaluate technologies and systems that could detect and mitigate potential safety risks posed by unmanned aircraft. The effort is part of the agency's Airport Unmanned Aircraft Systems Detection and Mitigation Research Program.

The FAA selected the following airports:

- Atlantic City International Airport in Atlantic City, New Jersey
- Syracuse Hancock International Airport in Syracuse, New York
- Rickenbacker International Airport in Columbus, Ohio
- Huntsville International Airport in Huntsville, Alabama
- Seattle-Tacoma International Airport in Seattle, Washington

These airports meet FAA requirements for diverse testing environments and represent airport operating conditions found across the United States.

The research will lead to the implementation of new technologies that will make airports safer for passengers and manned aircraft. Researchers plan to test and evaluate at least 10 technologies or systems at each airport. Testing will begin later this year and continue through 2023. It will create standards for future unmanned aircraft detection and mitigation technologies at airports around the country.

The FAA Reauthorization Act of 2018 requires the agency to ensure that technologies used to detect or mitigate potential risks posed by unmanned aircraft do not interfere with safe airport operations. The FAA does not support the use of counter-UAS systems by any entities other than federal departments with explicit statutory authority to use this technology, including requirements for extensive coordination with the FAA to ensure safety risks are mitigated.

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Technology Announcement & Submissions

- **Section 383: "In order to test and evaluate technologies or systems that detect and mitigate potential aviation safety risks posed by unmanned aircraft…"**

- Solicitation
  - Utilized an existing FAA Broad Agency Announcement (BAA) to solicit UAS detection and mitigation technology/system vendors:
  - Vetted by Section 383 Working Group (including key FAA Lines of businesses)
  - Open from August 21, 2020 – October 5, 2020
  - Requested responses to a technical screen/questionnaire and optional summary narrative or supplemental information

- Submissions
  - Submissions received.
  - FAA will down-select to at least 10 vendor technologies/systems, in-increments, that are TBD.
  - FAA will enter into a contract with each vendor for participation at ACY plus one airport.
  - Section 383 Working Group sub-team is currently reviewing technical screens/submissions to make selections.
  - First round of selections have been made with others to follow.

UAS Flight Operations

- FAA Contractor (TBD) will be flying UAS as targets.

- Diverse UAS fleet will be used to challenge various sensor types.

- "Test Cards" (@500) have been developed and will be followed.

- Numerous, repetitive UAS flights to provide sufficient data to document detection and/or mitigation capabilities.

- There are ~20 suitable sites identified for UAS launch and recovery around ACY (within 5 miles).

- All approvals received:
  - Certificate of Authorization (COA) in place
  - Completed coordination with local police departments, letters for property owners
  - Privacy notice posted on FAA web page. https://www.faa.gov/uas/critical_infrastructure/section_383/

- Approved practice flights have taken place around ACY in preparation of first technology is installed.

- Process will be repeated at each of the additional four airports.

UAS Trailer Test Complex at FAA Technical Center at Atlantic City (ACY)

- Trailer Complex will serve as base of operations for all testing & data collection
- Dedicated services, electrical, network, video, comms, and data management center
- Complying with FAA 7460 process for all technology sensor sites around ACY
- Installed tent for 'outdoor meeting space'

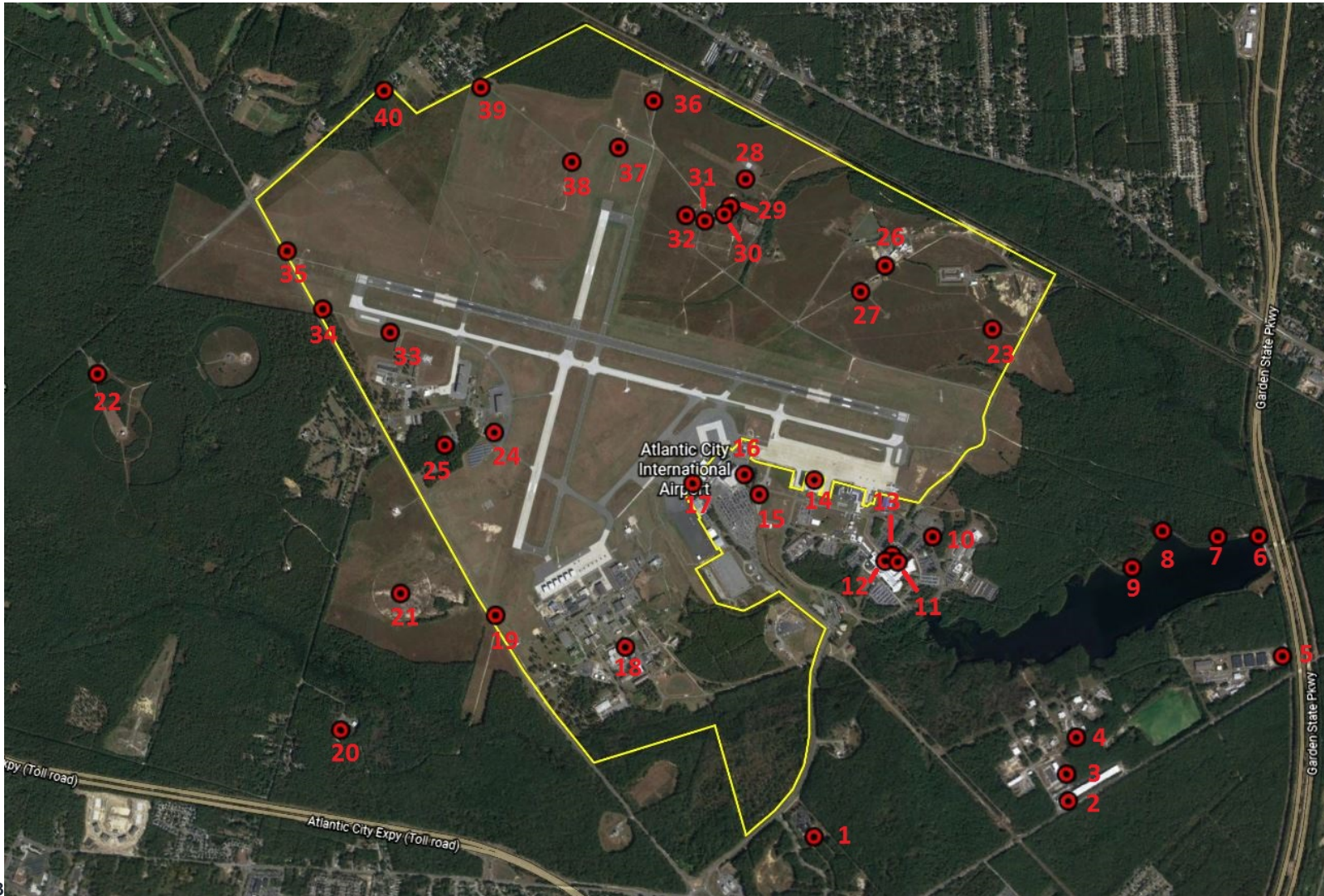# UAS Trailer Test Complex @ FAA Technical Center

Potential Sensor Locations

Contractor will be required to accomplish the setup, operation, maintenance and removal of various sensors/technologies at all or some of these locations, as required to support testing activities.

NOTE:
This map shown sensor locations, and does not represent areas where UAS will be flown. Most sUAS operations will be off airport.
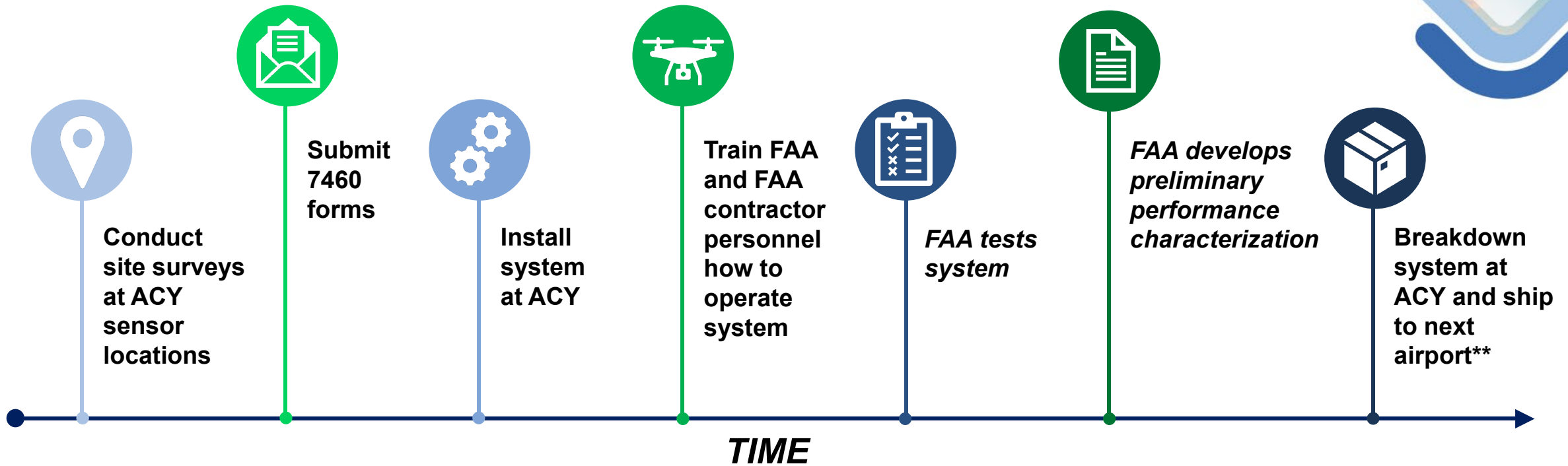
Technology Assessment - Continuation

- Continue coordinating, scheduling, deployment, testing, evaluation, and analysis of vendor UAS detection and mitigation technologies/systems at Atlantic City (ACY) airport.

- Continue coordinating, supporting, performing, and documenting spectrum interference testing so not to interfere with NAS operations.

- Continue and refine data collection process using GIS mapping and analysis tools.

- Continue planning and coordination efforts in preparation for the deployment, testing, and evaluation of UAS detection and mitigation technologies/systems at Rickenbacker (LCK), Huntsville (HSV), and Seattle (SEA) airports.

- Continue to support FAA with resources to support mitigation testing and safety risk management process.

- Continue to document all necessary information to support Task Area.

- Continue to plan, modify, and schedule all activities on a daily basis as needed to support Task Area.

High Level Timeline of Vendor System at ACY*

Conduct site surveys at ACY sensor locations

Submit 7460 forms

Install system at ACY

Train FAA and FAA contractor personnel how to operate system

FAA tests system

FAA develops preliminary performance characterization

Breakdown system at ACY and ship to next airport**

TIME

*This process will repeat if the sensor/technology is tested at an additional airport
**Contingent on system/technology being selected for further evaluation
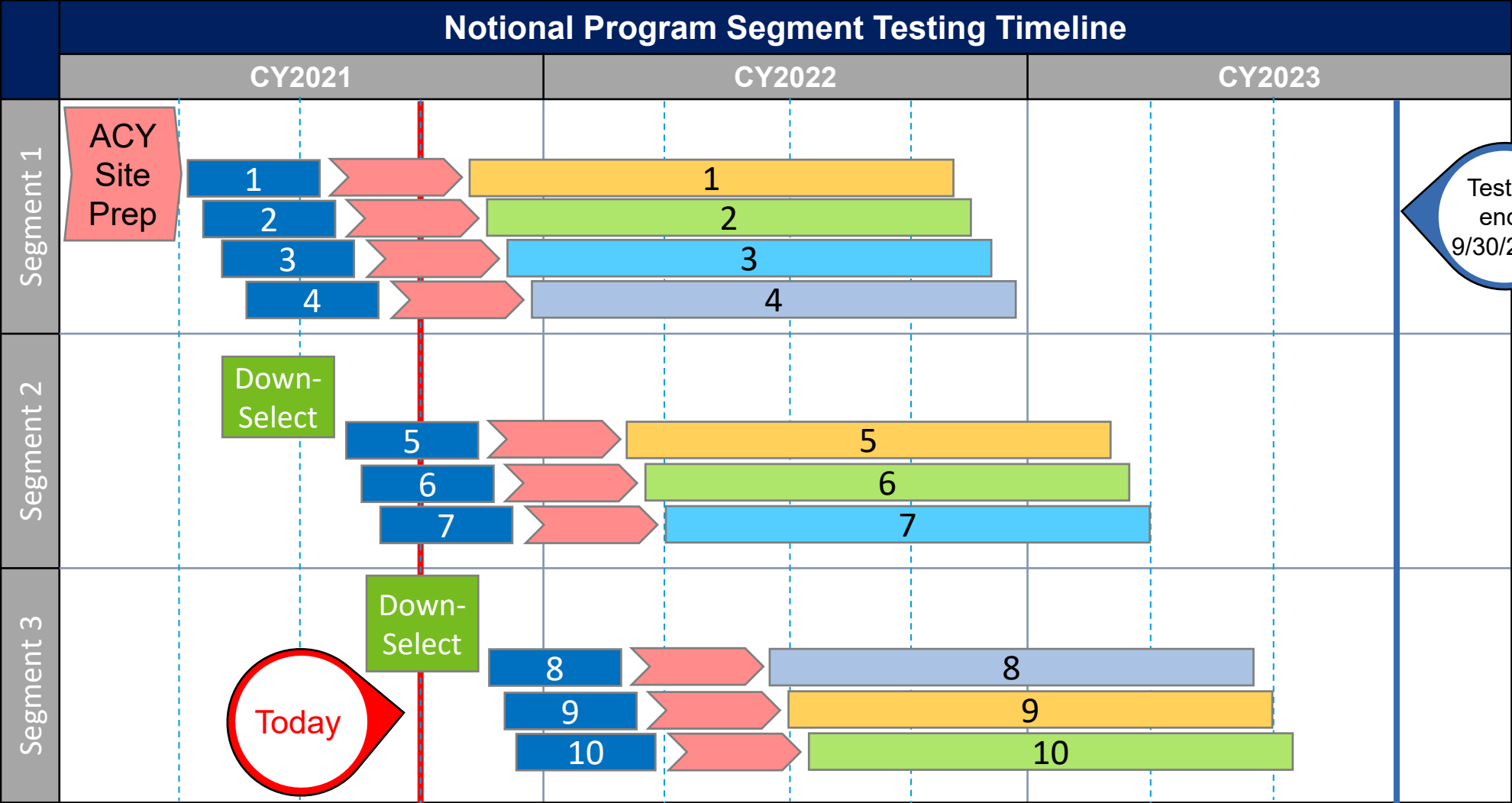
UAS Flight Operations – Continuation

- Continue UAS flight operations with necessary authorizations and waivers to support Task Area.

- Continue to provide UAS as targets imminently upon contract award.

- Continue to identify suitable sites for UAS launch and recovery locations at additional airports.

- Continue to develop additional test cards at all five airport locations and other locations as needed.

- Continue to support FAA with resources to support mitigation testing and safety risk management process.

- Continue to support Task Area with necessary UAS Flight Operations information, knowledge, and experience.

Notional Program Status

Notional Program Segment Testing Timeline

	CY2021	CY2022	CY2023

Segment 1
- ACY Site Prep
- 1 → 1
- 2 → 2
- 3 → 3
- 4 → 4

Testing ends 9/30/2023

Segment 2
- Down-Select
- 5 → 5
- 6 → 6
- 7 → 7

Segment 3
- Down-Select
- Today
- 8 → 8
- 9 → 9
- 10 → 10

KEY
- Testing at ACY
- Airport/Vendor Prep
- Field Validation, Airport 2
- Field Validation, Airport 3
- Field Validation, Airport 4
- Field Validation, Airport 5

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Task Area 2

UAS Airport Applications

UAS Airport Applications

Five Core Applications ('use-cases'):

1. Obstruction Analysis
2. Pavement Inspections
3. Wildlife Hazard Management
4. Perimeter Security Inspections
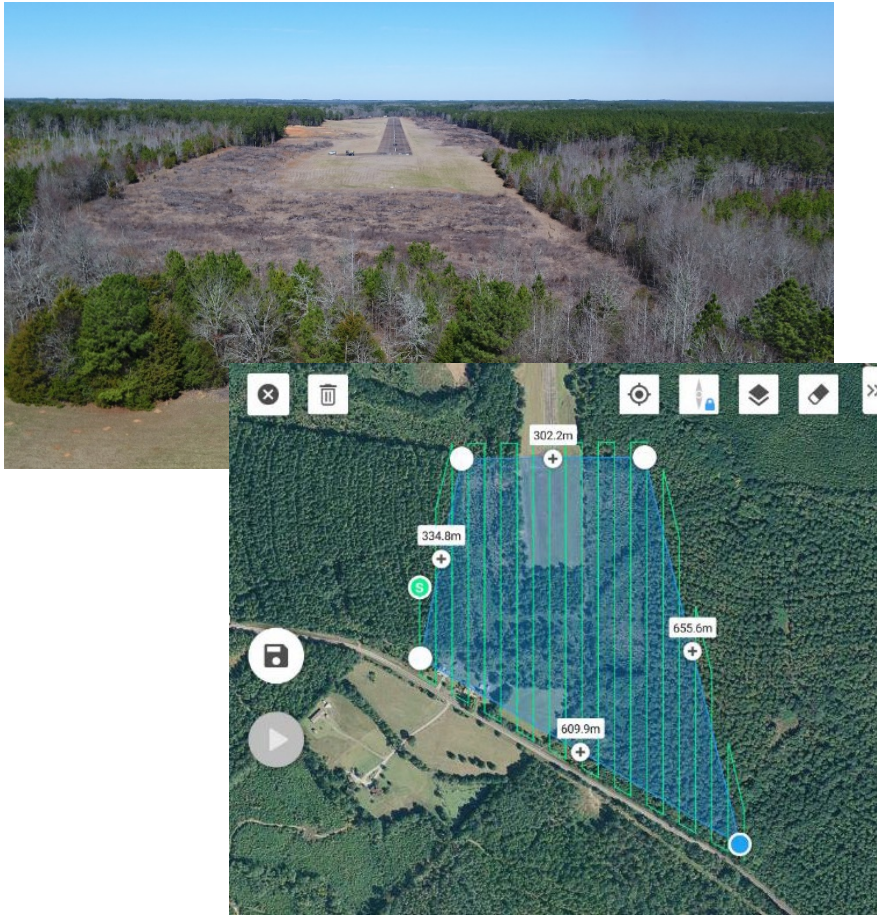5. Aircraft Rescue and Firefighting (ARFF)

The FAA is planning to add additional applications to their Research Portfolio in FY 22 (Task 2) :Examples include, but are not limited to:

- Construction monitoring, tethered UAS, EMAS inspections, and other safety/engineer applications.

Obstruction Analysis

- The FAA and its collaborators recently completed their initial research effort to develop guidance for the use of sUAS for conducting airport obstruction surveys.

- The FAA tested various types of platforms (i.e. fixed wing, vertical take off and landing, and hybrid) and red-green-blue (RGB) cameras.

- Tested was completed in isolated areas at six airports :

  1.   McCormick County Airport (S19), SC

        (Proof of Concept Testing)
  1.   Cape May County Airport (WWD), NJ
  2.   Granbury Regional Airport (GDJ), TX
  3.   Weather Perry-Foley Airport (FPY), FL
  4.   Cincinnati West Airport (I67), OH
  5.   Suffolk Executive Airport (SFQ), VA

- The FAA is collaborating with the National Oceanic and Atmospheric Administration's NOAA's National Geodetic Survey (NGS) on this application.

- The FAA and its collaborators are currently in the process of summarizing the results from this research in a draft final report.

- It is anticipated that the FAA will expand this research to test at altitudes > 400' AGL, test/evaluate different sensors, and develop a processes/procedures to efficiently verify and validating large datasets produced by sUAS.

Pavement Inspections

- Through a Broad Agency Announcement (BAA), the FAA and its collaborators are currently conducting research to develop guidance for using sUAS to supplement airport pavement inspections.

- The FAA and its collaborators tested various types of platforms (i.e. fixed wing, vertical take off and landing (VTOL), and hybrid) and RGB cameras. The research team conducted initial testing with thermal and LiDAR sensors.

- Testing was completed at a total of eight airports, in different geographic regions, and that had different types and severity distresses.

- The research is scheduled to be completed in FY 2022.
  - Although this research is being conducted under a BAA, the contractor may be tasked with assisting the FAA and their collaborators with flying platforms and payloads they do not have in their inventory, processing/analyzing data, reviewing reports, providing subject matter expert input, etc.

- It is anticipated that the FAA will expand this research to further test and evaluate the use of thermal and LiDAR sensors and other emerging technologies.

Cape May County Airport (WWD), NJ

Wildlife Hazard Management

- Through an Interagency Agreement (IAA), the FAA and United States Department of Agriculture – Wildlife Services are currently conducting research to develop guidance for using sUAS for wildlife hazard management. This includes both dispersing and monitoring wildlife.
  - Wildlife dispersal: The FAA and USDA have tested and evaluated various types of sUAS platforms (i.e. fixed wing, VTOL, and ornithopter), as well as different flight patterns, for dispersing various types of bird species that are frequently struck by aircraft. Testing and evaluations were conducted in both controlled and free-ranging environments (not airports). It is anticipated that the FAA and USDA will expand this research to include a wide range of sUAS platforms and wildlife species. In addition, it is anticipated that testing will advance to an airport(s).
  - Wildlife monitoring: The FAA and USDA initiated a study in FY 2022 to conduct research to develop guidance for monitoring different types of wildlife (birds and mammals).
- Although this research is being conducted by the FAA/USDA, the contractor may be tasked with flying sUAS to support the research, providing subject matter expert input, reviewing reports, prepare for testing at an airport, etc.
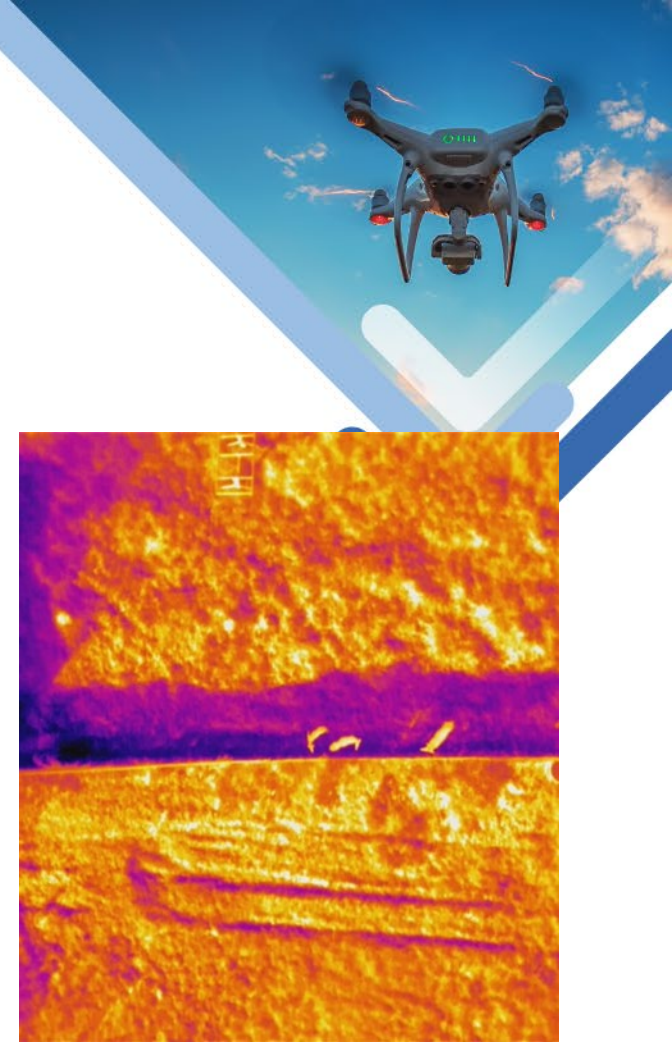
Perimeter Security Inspections

- The FAA and its collaborators recently completed their initial research effort to develop guidance for using sUAS for perimeter security inspections (fence line/surveillance).

- Testing was completed at four airports:
  1. Cape May County Airport (WWD), NJ
  2. McGhee Tyson (TYS), TN
  3. Savannah/Hilton Head (SAV), SC
  4. Cincinnati/Northern Kentucky International Airport (CVG), KY

- The FAA tested various VTOL sUAS platforms and, red-green-blue (RGB) cameras, infrared cameras, and streaming technologies.

- The FAA and its collaborators are currently in the process of summarizing the results from this research in a draft final report.

- It is anticipated that the FAA will expand this research to test emerging technologies.
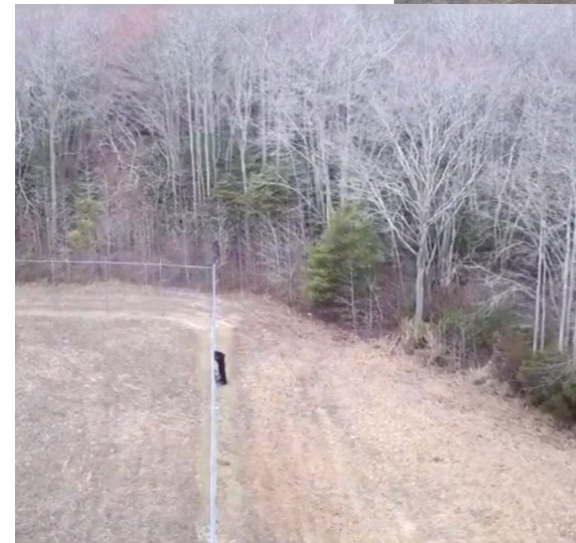
Aircraft Rescue and Firefighting

- The FAA and its collaborators recently completed their initial research effort to develop guidance for using sUAS for ARFF response (live monitoring and accident documentation).
  - Live monitoring of an accident/incident scene
  - Post accident/incident documentation (mapping mission)
- Testing was completed at three airports:
  1. Cape May County Airport (WWD), NJ
  2. Atlantic City International Airport (ACY), NJ
  3. Dallas/Fort Worth International Airport (DFW), TX
- The FAA tested various fixed wing, VTOL, and hybrid sUAS platforms. In addition, the FAA tested various RGB and infrared cameras, as well as streaming technologies.
- The FAA and its collaborators are currently in the process of summarizing the results from this research in a draft final report.
- It is anticipated that the FAA will expand this research to integrate sUAS with a simulated full-scale emergency exercise(s) and also test tethered sUAS systems.

Information & Questions

State of Research –
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