Integrating AAM in the National Airport System: Vertiports

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Federal Aviation Administration

Integrating Advanced Air Mobility in the NAS

Tampa Bay Smart Cities Alliance – AAM Symposium

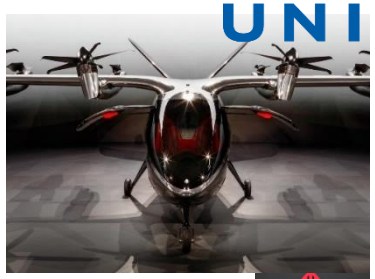
9/12/2023

Advanced Air Mobility (AAM)

DELTA

Joby

UNITED



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American Airlines

VERTICAL

FedEx

ELROY AIR

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- First electric vertical takeoff and landing (eVTOL) *aircraft expected to be FAA certified in 2025*
- Predicted to be a $30B market by 2030
- New venture capital funded "disruptive" manufacturers backed by traditional operators
- Initial business cases
  - *Air taxi (airport to city pair)*
  - *Cargo (small market to hubs)*
  - *Medical transport*
- Initial operations look like traditional helicopter/GA piloted aircraft, but plan ***rapid shift to autonomous***
- Unique, ***yet-to-be-built "ecosystem"*** needs to support vertiports, charging, routes, & automation

Balancing the Pace of Innovation and Safe Operations

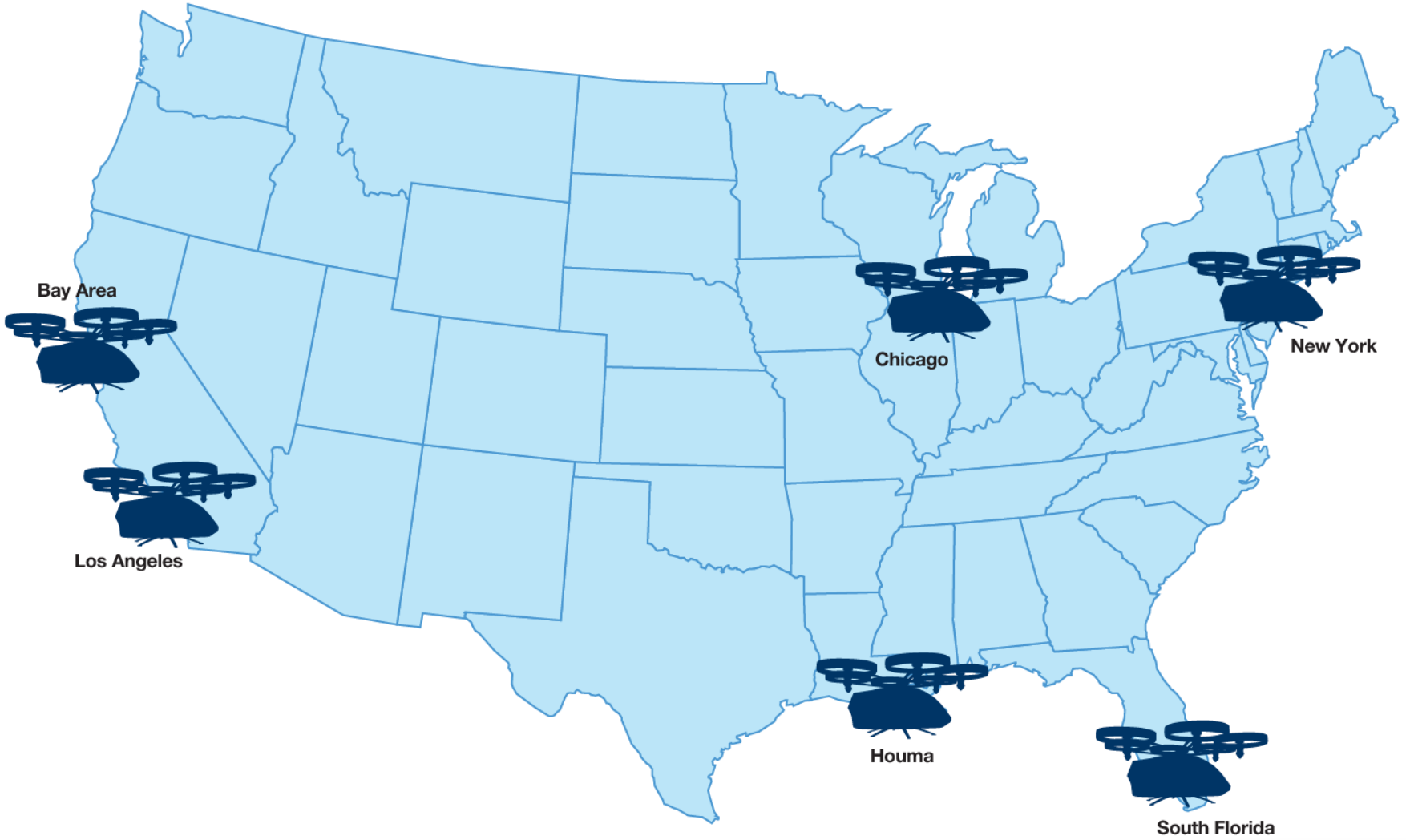
Safety Focused Approach

- ***Whole of government approach*** needed to support integration of new class of aircraft, flying in constrained airspace, needing new support infrastructure, and accelerating to autonomous operations environment
- ***Updating a regulatory framework*** to address the unique aspects of new hybrid, non-traditional aircraft
- The FAA created a ***programmatic portfolio approach called Innovate28*** that integrates all cross-agency-efforts toward user initial entry into service goals
- ***DOT-led AAM interagency working group developing national strategy for AAM***, identifying key national issues for implementation: security, power/energy, infrastructure, community impacts, spectrum, and supply chain

Ecosystem Enablers

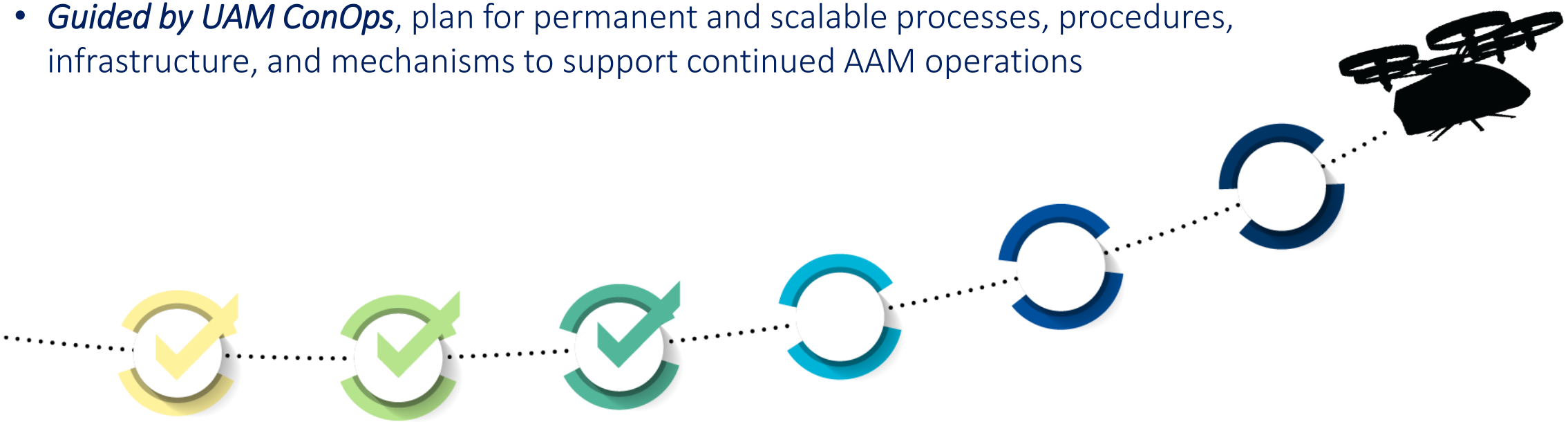
- Aircraft Safety Rulemaking
  - Recognition of pilot in command experience in military/air carrier operations (final rule Sep 2022)
  - Update to air carrier definitions (comment closed Feb 2023)
  - Airman certification standards (comment closed Feb 2023)
  - Notice of proposed rulemaking (NPRM), which proposes special federal aviation regulations (SFAR) for integration of powered-lift operations and associated pilot certification (published June 2023)
  - For type certification, the FAA is accepting established means of compliance as well as developing new means depending on unique design features/characteristics of vehicle
- Planning & Portfolio Management
  - Urban Air Mobility Concept of Operations v2.0 (May 2023)
  - AAM Implementation Plan (July 2023)
  - Planning integrated simulations/testing in partnership with DOD, NASA
- *Airports*
  - *Interim guidance published September 2022* through Engineering Brief #105; refined performance-based guidance planned through *Advisory Circular in 2025*

Potential Initial Operations Locations



Innovate28 Goals for Near-term Operations

- ***Define and complete agency actions needed to enable AAM*** operations in locations determined by industry in the near-term leading up to 2028
- Provide an ***FAA focal point on AAM issues***, and provide programmatic support that coordinates efforts across the agency on behalf of specific key projects
- ***Develop a repeatable process*** to allow ease of implementation in other locations
- ***Guided by UAM ConOps***, plan for permanent and scalable processes, procedures, infrastructure, and mechanisms to support continued AAM operations



FAA Ongoing Engagement

We work with partners across the federal government to implement the AAM Coordination and Leadership Act to coordinate policy for integrating AAM operations.

AAM Interagency Working Group

Office of Science and Technology Policy

Joint test team with Agility Prime and NASA leverages knowledge and resources to collect performance data to develop policy and standards.

Federal Government and Workforce Partners

We encourage state, local, and tribal communities to be informed about AAM technology and how these new operations will affect them. These meetings help us to better understand local sentiment about AAM operations.

Local/State/Tribal Governments and Community Organizations

We engage with industry stakeholders, including aircraft manufacturers, operators, and airport/vertiport companies to understand their vision and implementation plans. Our current priority is U.S.-based eVTOL piloted-passenger manufacturers undergoing FAA certification. Examples include the following stakeholders:

Industry

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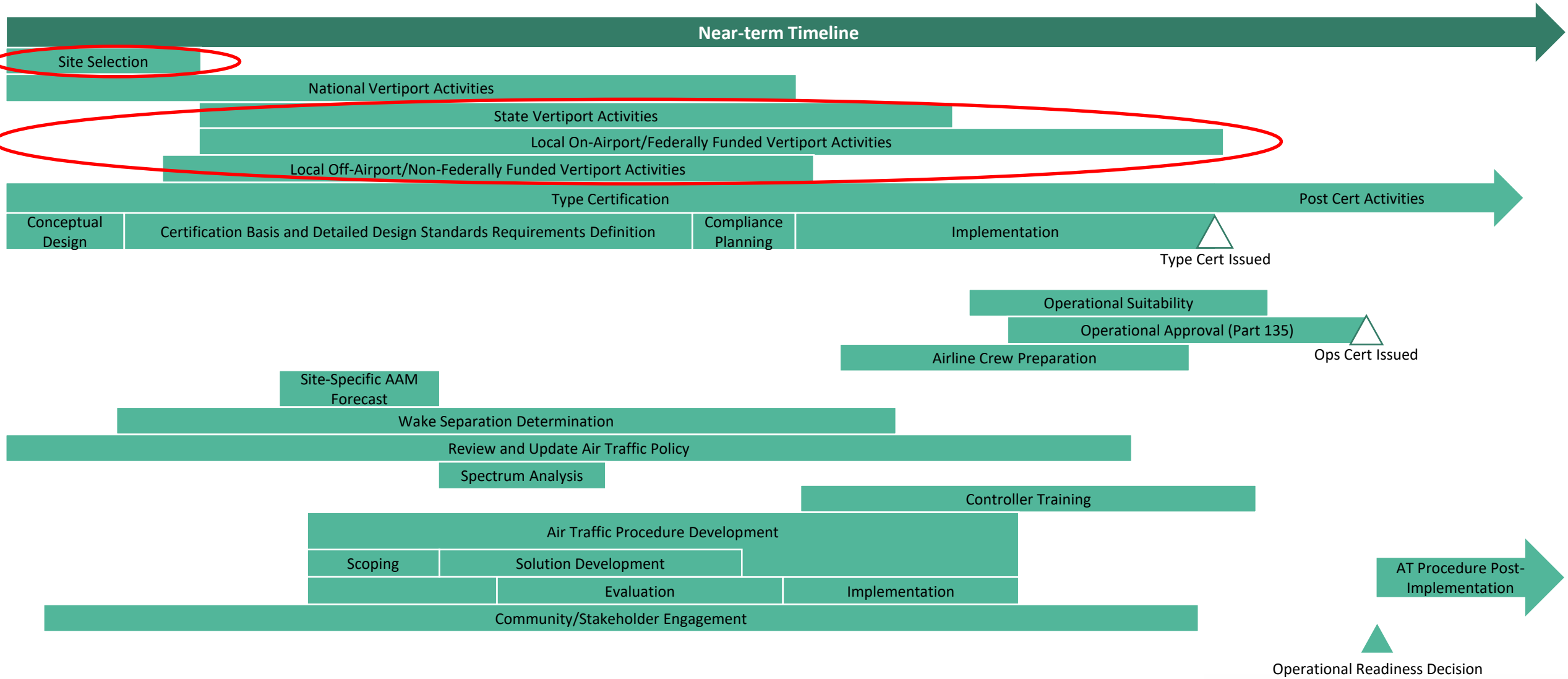
Key Innovate28 Activities

- Aircraft Type Certification
- Air Traffic Policy Review and Updates
- Concept of Use (general and local)
- Hazardous Materials
  - Fire/smoke procedures
  - Cabin safety
  - Emergency training
  - Cargo requirements
- Procedure Development
  - Scoping
  - Solution development
  - Environmental review
  - Safety Risk Management (SRM) process
- Community Engagement
- Cybersecurity
- Part 135 Operational Certification
- Local Vertiport Activities
  - Determine vertiport locations
  - Local zoning
  - Construction
  - Charging infrastructure
- Local ATC Activities
  - Controller training
  - Update Standard Operating Procedures (SOP) and Letters of Agreement (LOA)
- Physical and Operational Security
- Site Selection
- Site-Specific AAM Forecasting
- Wake Separation Requirements
- Crew Preparation
  - Rulemaking for pilot training
  - Train and certify crew
- National Vertiport Activities
  - Flight testing
  - National guidance
  - Rulemaking

➢ The list includes the FAA, other federal government agencies, FSLTT government, industry, and other stakeholder activities.

Portfolio Management for Each AAM Project

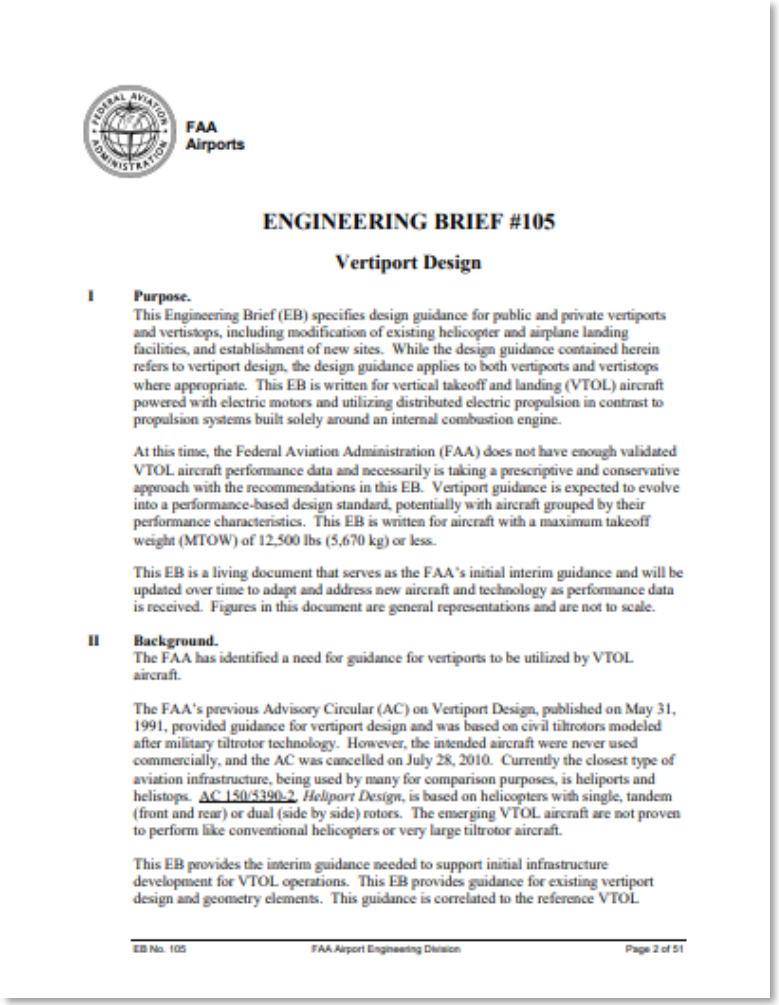


AAM Infrastructure

- The majority of Vertical Takeoff and Landing (VTOL) and Short Takeoff and Landing (STOL) operators intend to begin operations ***using existing infrastructure***. An increasing number of airports, municipalities, and AAM operators are planning for landing and take-off ***sites both on and off airports***.
- As operators explore that interest, questions arise as to what standards to use in the siting, design, and operation of vertiports and supporting infrastructure.
- FAA cancelled Advisory Circular (AC) 150/5390-3, Vertiport Design, in 2010 due to lack of compatible aircraft.
- FAA needs new standards to address facilities required for the boarding and discharging of passengers and cargo by VTOL and STOL aircraft.

AAM Infrastructure

- To support the development of vertiport standards, ARP and the Airport Technology Research and Development Branch (ATR) began a ***multi-year research project*** on vertiport design and operation in 2019.
- In September 2022, FAA released ***Engineering Brief 105, Vertiport Design***.
  - This is an early effort at prescriptive interim design guidance for vertiports, based on limited performance and design data for the types of aircraft that will use these facilities.
- FAA will develop a ***performance-based AC on vertiport design in 2025***.
  - The future AC will address autonomy, different propulsion methods and alternative fuel sources, high tempo facilities, and instrument flight rules (IFR) capability.



FAA
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ENGINEERING BRIEF #105

Vertiport Design

I **Purpose.**
This Engineering Brief (EB) specifies design guidance for public and private vertiports and vertistops, including modification of existing helicopter and airplane landing facilities, and establishment of new sites. While the design guidance contained herein refers to vertiport design, the design guidance applies to both vertiports and vertistops where appropriate. This EB is written for vertical takeoff and landing (VTOL) aircraft powered with electric motors and utilizing distributed electric propulsion in contrast to propulsion systems built solely around an internal combustion engine.

At this time, the Federal Aviation Administration (FAA) does not have enough validated VTOL aircraft performance data and necessarily is taking a prescriptive and conservative approach with the recommendations in this EB. Vertiport guidance is expected to evolve into a performance-based design standard, potentially with aircraft grouped by their performance characteristics. This EB is written for aircraft with a maximum takeoff weight (MTOW) of 12,500 lbs (5,670 kg) or less.

This EB is a living document that serves as the FAA's initial interim guidance and will be updated over time to adapt and address new aircraft and technology as performance data is received. Figures in this document are general representations and are not to scale.

II **Background.**
The FAA has identified a need for guidance for vertiports to be utilized by VTOL aircraft.

The FAA's previous Advisory Circular (AC) on Vertiport Design, published on May 31, 1991, provided guidance for vertiport design and was based on civil tiltrotors modeled after military tiltrotor technology. However, the intended aircraft were never used commercially, and the AC was cancelled on July 28, 2010. Currently the closest type of aviation infrastructure, being used by many for comparison purposes, is heliports and helistops. AC 150/5390-2, *Heliport Design*, is based on helicopters with single, tandem (front and rear) or dual (side by side) rotors. The emerging VTOL aircraft are not proven to perform like conventional helicopters or very large tiltrotor aircraft.

This EB provides the interim guidance needed to support initial infrastructure development for VTOL operations. This EB provides guidance for existing vertiport design and geometry elements. This guidance is correlated to the reference VTOL

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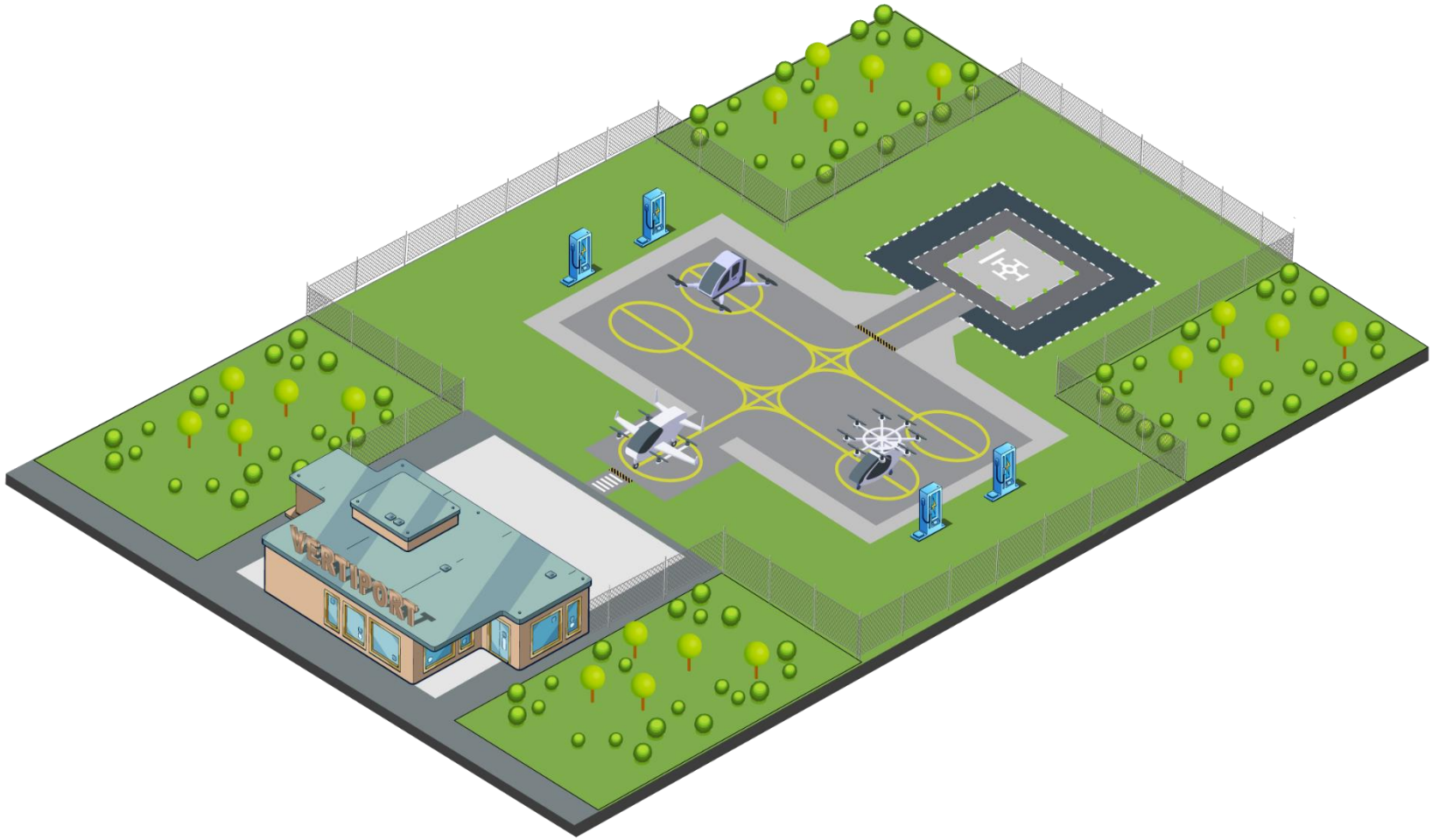
State and Local Considerations to Enable AAM

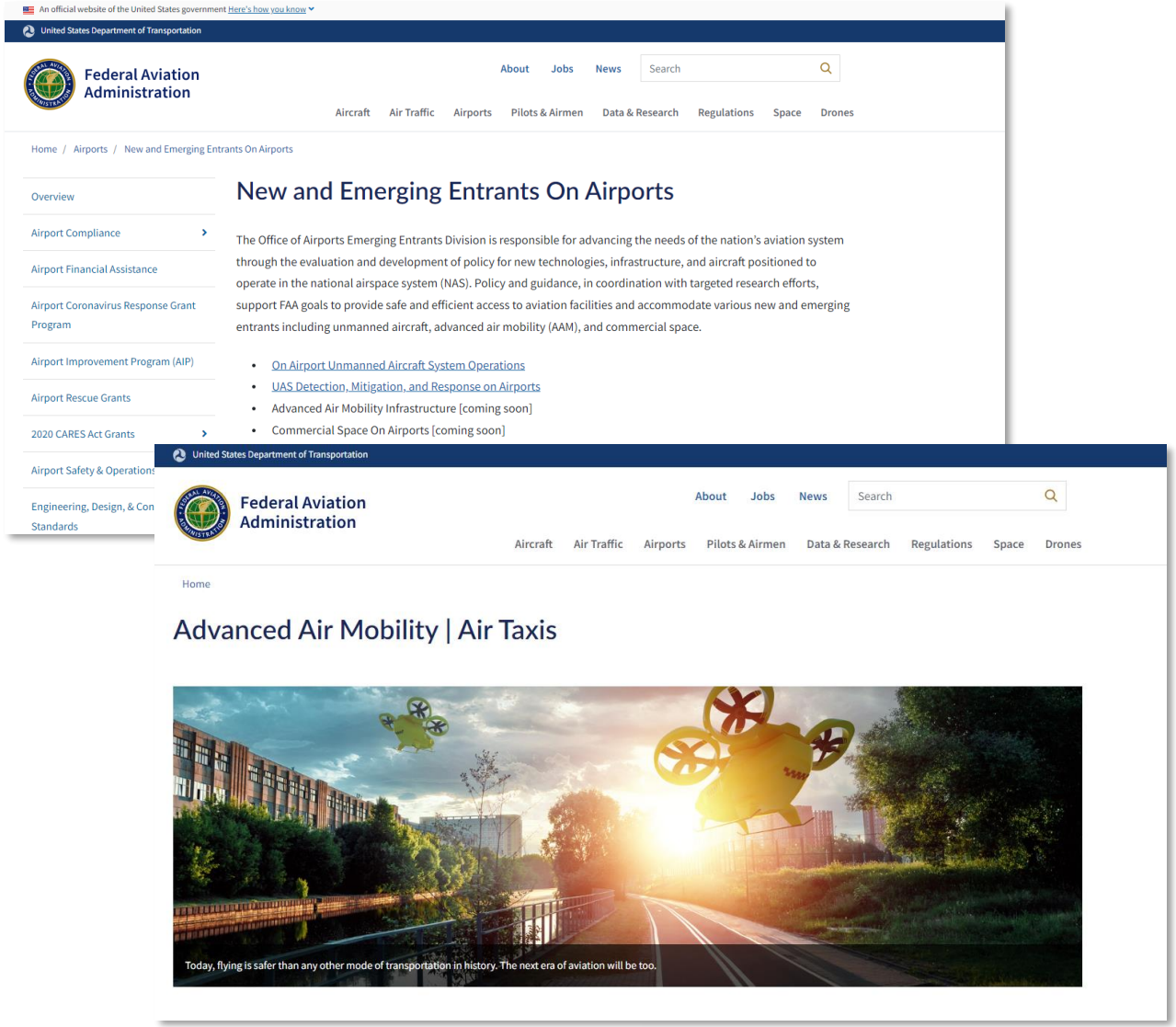


Public Outreach

- To better inform the airport community about emerging entrants, ARP **created the *New and Emerging Entrants on Airports* webpage**, linked to www.faa.gov/airports.
    - This new 'landing page' features links to each of the highlighted emerging entrant portfolios and provide a more centralized location for airport specific information as it relates to each of the portfolios.

    https://www.faa.gov/airports/new_entrants

- To learn more about FAA's broader efforts to enable AAM, please visit www.faa.gov/air-taxis



Summary

- AAM spans an array of concepts, from ***piloted to fully autonomous operations***.
- We are building out an ecosystem to ***safely and efficiently enable*** the full range of a new way of flying so that it is ***beneficial and equitable to the public***.
- The FAA has established a ***focal point for industry to coordinate with the FAA*** as they work though regulatory and operational aspect of their new services.
- ***We strive to be one step ahead of industry***.

Federal Aviation Administration

Questions?

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