What’s Led us to The Topic?

• Emergence of eVTOL aircraft and UAM industry
• Key components to deploy and integrate
  – Vehicles
  – Air Traffic Management
  – Infrastructure
• Void in standards, policy and system oversight
• Aviation Research Division
  • Airport Technology R&D Branch (ATRD)
    • Safety R&D Section
Vertiport Design for eVTOL

**Purpose:**
Study and develop recommendations for vertiport design standards for vertical take-off and landing (VTOL) aircraft. These aircraft include, but are not limited to, standard category aircraft (<7000lbs and <9 passengers), optionally piloted aircraft and unmanned aircraft.

- Intense technology and existing concepts research
- Industry Advisory Board (IAB)
- Develop ~6 concepts and conduct operational simulations
- Eventual operationally test with UAM systems
- Final product are recommendations on AC standards (future)

- Vehicle size
- Landing area design and geometry needed for aircraft
- Approach/departure paths
- Expected aircraft loading on landing area
- Aircraft parking requirements
- Power plant specifications
- Battery type, size and charging specifications (electric only)
- Expected noise production
# Mission and Strategic Goals

## Mission
Support and research for the FAA design standards for vertiports and the emerging urban air mobility industry.

## Strategic Goals

<table>
<thead>
<tr>
<th>Safety</th>
<th>Collaboration</th>
<th>Resiliency</th>
<th>Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus design standards on passenger, operator, and operational safety in and around vertiports.</td>
<td>Develop and coordinate with an Industry Advisory Board to ensure all stakeholders’ perspectives are incorporated.</td>
<td>Ensure design standards can evolve with the industry and incorporate any future design demands.</td>
<td>Generate standards that can easily be integrated with existing infrastructure and tangential Advisory Circulars.</td>
</tr>
</tbody>
</table>
Starting from Scratch... Not exactly

- Advent of VTOLs in 1970’s with tiltrotor and tiltwing aircraft
- Response to hype, FAA published AC 150/5390-3: Vertiport Design
  - Airside, Airspace, Marking, Lighting, Landside Facilities, etc.
- Employed a one-size-fits-all approach
  - Regardless of size, location, operation type, aircraft performance
- AC CANCELLED in 1991 – Limited interest in technology
- VTOL vehicles are:
  - NOT Helicopters,
  - NOT Airplanes...
Research Approach Overview

- Guiding posts to complete the research
  - eVTOL/UAM documentation and data (made available)
  - Stakeholder and industry SME engagement
  - Current airport and heliport criteria and research
- Estimated 36-months
Literature Review/Gap Analysis

- Research team reviewed over 110 documents
  - ~70 determined applicable
- Important sources referenced:
  - Government materials
  - Existing research
  - Technical papers
  - International agencies
- Gap Analysis – post completion of lit review
  - Next step after lit review
  - Living document
  - Incorporating new information
  - Identifying further research needs

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>International</td>
<td>ICAO – EASA</td>
</tr>
<tr>
<td>Manufacturers/Operators</td>
<td>BETA – Uber – Lilliam – EmbraerX – Airservices Australia</td>
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<td>University/Academia</td>
<td>MIT – Embry Riddle – St. Anthony Falls Lab – Georgia Institute of Technology – MITRE</td>
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<tr>
<td>Additional Technical Papers</td>
<td>Various authors – Consultants - Corporations</td>
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<td>Accidents</td>
<td>NTSB – Investigator Interviews</td>
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</table>
Heliport Geospatial Data Standards

- Provide minimum survey specifications to obtain IFPs
- Extension of FAA AC 150/5300-18B: *General Guidance and Specifications for Submission of Aeronautical Surveys to NGS: Field Data Collection and Geographic Information System (GIS) Standards*
  - Airports GIS (AGIS) data standards and specifications
  - FAA’s Airport Data and Information Portal (ADIP)
  - Authoritative source for airport/airspace geospatial data
- Standardized, verifiable, and reliable safety critical airport data
  - Heliport segment in AGIS database
  - New data schema incorporating heliport features
- Delivered as an Engineering Brief (EB)
Heliport Geospatial Data Standards

- Delivery of survey data to FAA will be required
  - Standardized format
  - Meeting accuracy specifications
  - Supplemental reporting
- Establishing authoritative source of safety critical data – multiple applications
- Foundational to eVTOL and UAM safety and operations
  - Future geospatial data requirements
  - Establishing airspace protection for heliports
- Fully integrated airspace of the future

<table>
<thead>
<tr>
<th>Visibility Minimums</th>
<th>Precision approach to IFR heliport</th>
<th>Precision Approach to IFR heliport</th>
<th>非精度 Approach to IFR Heliport</th>
<th>Approach to Point in Space Proceed Visually</th>
<th>Approach to Point in Space proceed VFR</th>
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<tr>
<td>1/4 statute mile</td>
<td>1/2 Statue Mile¹</td>
<td>250' AGL</td>
<td>≥250</td>
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<td>Height above heliport</td>
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<td>200' AGL</td>
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<td>OCS</td>
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<td>Standard Nonprecision ROC</td>
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<td>Heliport Size³</td>
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<td>Heliport Lights³</td>
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<td>Survey Required</td>
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<td>Approach Lights(HALS)</td>
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<td>HPZ helicopter protection</td>
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<td>Final Approach Reference Area</td>
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