ACRP Problem Statement 17-03-09 **Recommended Allocation:** $500,000

Airports and UAS: Integrating UAS into Airport Infrastructure and Planning

ACRP Staff Comments

This is one of four UAS-themed problem statements developed as a result of the ACRP UAS Panel Workshop. (The others are 17-01-21, 17-01-23, and 17-10-09.) Funding the four problem statements in toto would maximize their benefit to the airport industry.

TRB Aviation Committee Comments

AIRFIELD AND AIRSPACE CAPACITY AND DELAY: Support. Consider adding elements of the other four airport-focused UAS projects in this problem statement.

Review Panel Recommendation and Comments

Recommended. Panel recommends this proposed research; however, make sure that it is coordinated with studies that are underway or those that have been recently funded. Scope needs to be refined to be less broad and more focused on issues airports can actually incorporate.

AOC Disposition

This problem statement received an average rating of 4.2 points out of a possible 5 points among voting AOC members. There was significant discussion regarding the UAS-related problem statements, both those developed as part of ACRP's UAS workshop and those submitted from other authors. The AOC allocated $1.0 million for UAS-related research for FY 2017 and directed staff to ensure specific research projects would be both prioritized in terms of timing and importance and also coordinated. UAS-related research will be accomplished as ACRP Project 03-42.

ACRP *Problem Number* **17-03-09**

Airport Cooperative Research Program (ACRP)

Problem Statement

FY 2017

1. Problem Statement Title

Airports and Unmanned Aircraft Systems (UAS): Integrating UAS into Airport Infrastructure and Planning

2. Background

UAS applications are rapidly growing in demand for services and aeronautical use applications. With UAS aircraft of all types of sizes, purpose and use, the potential positive economic impact and how an airport may incorporate UAS operations at their facility has unlimited opportunities. Airport planning and infrastructure development, requires a durational time period and process of review, that can extend long beyond the immediate facility infrastructure improvement needs. With the rapid demand and deployment of UAS operations into the National Airspace System (NAS), public use airports must be ready to accommodate facility demands for UAS operations and the rapidly changing UAS industry, while assessing the impacts on airports and aviation infrastructure to ensure compliance with regulatory guidelines and industry standards.

Under the Federal Aviation Administration (FAA) Modernization and Reform Act of 2012 (FMRA)[i] the FAA is confronted with integrating all types of UAS operations into the NAS. While the Small Unmanned Aircraft Systems (sUAS) proposed rule[ii] (NPRM) has determined that sUAS may be operated safely in the NAS under limited circumstances, including the 333 exemption process[iii], the use of larger UAS that will require airport infrastructure to operate in the commercial sector or as a general aviation activity is just beginning.

Airport Planning for UAS operations is not only an economic opportunity for the airport, it is a federal requirement for public use facilities. Federally obligated airports are required to review and implement near-term, mid-term and long-term facility standard improvements and modifications that can support the future demand needs, to accommodate all aeronautical activities. While UAS operations have many definitions yet to be defined, their potential impact to airports is extensive. A key objective of airport planning is to assure the effective use of airport resources in order to satisfy aviation demand in a financially feasible manner.

3. Objective

The objective of this statement of research intent is to provide airport industry practitioners with guidance for planning, development and integration of all types and sizes of UAS operational needs from an airport infrastructure point of view.

4. Proposed Tasks

This project will produce a guidance document report that airport sponsors and airport operators may reference when considering UAS operations at the airport and what planning factors should be considered. The primary target of this report will be the estimated 3,500 federally obligated airport facilities as identified by National Plan of Integrated Airport System (NPIAS).[iv] The ACRP report should reference airports of all types and categories including Primary and Nonprimary facilities, Large, Medium, Small and Nonhub airports in addition to Local, Regional and Basic facilities as defined by the FAA Asset report[v]. While the planning factors, components and process for review do not vary much between different types of facilities, the funding alternative resources, the design standards and modifications needing to be considered to accommodate UAS operations in the airport infrastructure will require different planning considerations at airports of different sizes and categories.

The guidance report should include tools (such as checklists) and a Planning Project Guide (PPG). The Planning Project Guide will provide a step by step overview of the planning review process needed to plan, design, review and implement facility infrastructure improvements required to meet the near and long term needs for safe UAS operations at airports. The airport sponsor should be able to reference the Planning Project Guide and checklist throughout the duration and at any component of the planning process. The guidance report should address key Airport and Infrastructure Planning issues as they relate specifically to Unmanned Aircraft infrastructure development, with the understanding that many of the issues impacting UAS operations at an airport are still under FAA review. The Planning Project Guide issues to address should include but are not limited to:

- Emerging technological trends and UAS standard practices
  - Technology requirement upgrades for airport infrastructure for UAS operations at airports (e.g., Radio Frequency Spectrum Analysis, ground movement surface detection systems for aircraft/vehicles and potentially UAS such as ASDE-X and "GPS track", ADS-B or GPS track transmitters for UAS, etc.)
  - Ground Control Station design needs
  - Radio Frequency Surface Obstruction Analysis (line of sight)
- Airport Master Planning
  - Forecasting UAS Aeronautical Activity
    - Terminal Area Forecast (TAF)
    - Long Range Forecast
    - Passenger & Cargo Statistics – Enplanement and cargo data
    - Identifying the types of UAS operations proposed for the airport

    - Land use compatibility
        - Noise Abatement
        - Zoning Ordinances and Avigational Easements
        - Arrival and Departure Corridors
    - Airspace analysis
        - Part 77, Terminal Instrument Procedures (TERPS) standards
        - Controlled or non-controlled facility standards
        - Flight Corridors and Altitude Coordination Sectors
- Airside/landside facility design standards
    - Summarize current Experimental/Restricted UAV commercial air worthiness certificates for takeoff / landing requirements and facility needs.
    - Identify (as a checklist) specific airport facility components for planning review to accommodate UAS activity. Identify the potential needs for Modifications of Standards.
        - E.g. Runway Safety Area, Runway Protection Zone, Runway Length, Separation standards, Obstacle Free Zone, Arresting systems, Signage, etc.
        - UAS specific runways, landing pads and taxiways
        - Remote support facilities
        - UAV ground support vehicle access to landing and departure areas (launch vehicles, recovery vehicles, airside movement considerations, etc.)
- Capital Improvement Planning (funding alternatives for UAS facility infrastructure improvements).
    - Airport Improvement Program (AIP)
    - State Block Grants
    - Grant Assurance compliance
- Environmental review process (National Environmental Policy Act, NEPA)
    - Environmental Assessments (EA's), Environmental Impact Study (EIS), Categorical Exclusions (CATEX), Record of Decisions (ROD's)
    - Environmental Due Diligence Audit (EDDA)
    - Scoping and Public Involvement Planning (as defined by NEPA)
        - Educational Outreach and Community awareness of UAS activities in the vicinity of the airport and airspace restrictions
- Airport Layout Plan (ALP) revision requirements and Airports GIS standards
    - How to document UAS on the ALP
    - When is an ALP revision needed for UAS operations
- Potential Construction Impacts of UAS
    - FAA 7460: Notice of Proposed Construction or Alternation

The research should include reference material regarding current rules, regulations and procedures that pertain to UAS operations at airports, in addition to the following planning and regulatory guidance document standards as they apply to UAS operations and airport infrastructure planning needs.

- National System Planning as defined by the National Plan of Integrated Airport System (NPIAS). *FAA Order: 5090.3C, Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)*
- Airport Master Planning: *Advisory Circular 150/5070-6 – Airport Master Plans*
- Airport Design Standards: *Advisory Circular: 150/5300-13*
- Environmental Impacts: Policies and Procedures: *FAA Order 1050.1*
- National Environmental Policy Act (NEPA) *Implementing Instructions for Airport Actions: FAA Order 5050.4*
- ARP SOP 2.0: Standard Procedure for FAA Review and Approval of Airport Layout Plans (ALPs)
- Zoning Ordinances: *A Model Zoning Ordinance to Limit Height of Objects Around Airports: AC 150/5190-4*
- Airport Improvement Program (AIP) Handbook: *FAA Order 5100.38*
- FAA Airport Compliance Manual: *FAA Order 5190.6B*
- Introduction to Safety Management Systems for Airport Operators*: AC 150/5200-37*

5. Estimated Funding

In order to understand and present the full complexity of the planning review process for airports considering UAS integration, a survey of airport sponsors will be required to define the repeated planning features airports should evaluate when considering planning alternatives for UAS operations at the airport. Sample airports should be selected from all FAA regions and sizes to incorporate any potential fluctuations in facility standards as a result of airport location (weather impacts) and to identify any characteristics or assumptions that can be made about a particular planning component dataset, geographic region, or the availability of a beneficial data source. The estimated funding for this research is $500,000.

6. Estimated Research Duration

The time needed to complete the estimated research and produce the guidance report and Planning Project Guide for UAS integration at airports is estimated to be 18 months. A limiting factor will be the time required to gather data from specific airports where UAS operations are currently taking place or are in the planning review process, including airport interviews and potential site visitation requirement needs.

7. Related Research

Previous research efforts include the completion of ACRP, Report 144 (2015) Unmanned Aircraft Systems (UAS) at Airports: A Primer. Using the initial findings from Report 144 and other UAS studies as identified below, further research specific to airport planning requirements is recommended.

1. ACRP LRD 11: Survey of Minimum Standards: Commercial Aeronautical Activities at Airports;
2. ACRP Report 1: A Guidebook for Airport Safety Management Systems;

3. ACRP Synthesis 37: Lessons Learned from Airport Safety Management Systems Pilot Studies;
4. ACRP Synthesis 29: Ramp Safety Practices;
5. ACRP Report 50: Improved Models for Risk Assessment of Runway Safety Areas (RSA)
6. ACRP Report 51: Risk Assessment Method to Support Modification of Airfield Separation Standards
7. ACRP Report 107: Runway Veer-off Location Distribution Risk Assessment Model
8. GAO-13-346T Unmanned Aircraft Systems: Continued Coordination, Operational Data, and Performance Standards Needed to Guide Research and Development
9. FAA Report: Integration of Civil Unmanned Aircraft Systems (UAS) in the National Airspace System (NAS) Roadmap

8. Process Used to Develop the Problem Statement

This problem statement has been developed through cooperative effort and review of previously submitted problem statements including: **16-10-04**: Integration of Unmanned Aerial Systems into Airport Infrastructure and Operations, **15-03-11**: UAS Impacts on Ground Operations – Considerations for Airport Operators and Tenants and coordination with industry representatives during a UAS panel workshop of industry Airport and UAS Subject Matter Experts (SME) conducted on March 16, 2016 at the National Academy of Sciences Keck Center.

It is recommended that this research project be considered as part of a UAS initiative suite of projects that can be conducted simultaneously to ensure they do not overlap in scope or research efforts. This would also ensure that UAS concepts of similar scope, definition and priorities will be developed and reviewed consistently on the applicability of UAS at airports, while providing airport sponsors and public use facilities with clear direction and understanding of airport requirements related to potential different UAS applications and the economic vitality of UAS as a transportation resource in the vicinity of an airport. It is also recommended that this project coordinate with current ACRP UAS projects including: A11-01/08-03: Evolving Law on Airport Implications by Unmanned Aerial Systems Operations.

9. Person Submitting Problem Statement and Date

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DATE Submitted: March 25, 2016

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[i] FAA Modernization and Reform Act of 2012 (FMRA), Public Law: 112-95, § 336(a).

[ii] Operation and Certification of Small Unmanned Aircraft Systems, Proposed Rule, 80 Federal Register 9544 (February 23, 2015) (Docket FAA-2015-0150) (NPRM).

[iii] http://www.faa.gov/uas/legislative_programs/section_333/

[iv] As codified under Title 49 U.S.C. § 47101
[v] FAA (2012). General Aviation Airports: A National Asset.