# Airport Cooperative Research Program

# FY 2019

## Announcement of Airport Research Projects
## August 2018

The Airport Cooperative Research Program (ACRP) was first authorized in December 2003 as part of the Vision 100-Century of Aviation Reauthorization Act. Program oversight and governance are provided by representatives of airport operating agencies and others appointed to the ACRP Oversight Committee (AOC) by the Secretary of Transportation. The AOC met and selected projects for the first program in January 2006.

The ACRP is sponsored by the Federal Aviation Administration (FAA) and managed by the National Academies of Sciences, Engineering, and Medicine, through the Transportation Research Board, in coordination with American Association of Airport Executives, Airport Consultants Council, Airports Council International-North America, National Association of State Aviation Officials, and Airlines for America. The ACRP undertakes research and other technical activities in response to the needs of airport operators on issues involving administration, construction, design, environment, human resources, legal, maintenance, operations, planning, policy, and safety at airports.

The AOC met on July 12, 2018 and selected projects for the Fiscal Year 2019 program. The purpose of this announcement is to inform the airport industry and research community of these new projects.

This announcement contains excerpts from original problem statements, along with elements and descriptions derived from scoping guidance from the AOC. The announcement introduces the selected projects to the airport industry and research community. Detailed project statements (e.g., requests for proposals) formally soliciting research proposals for these projects are expected to be released starting in the fall 2018.

**All ACRP project statements will be available only on the World Wide Web. Each project statement will be announced by e-mail. Instructions to register for e-mail notification of Requests for Proposals is available at http://www.trb.org/acrp. RFPs will be posted at the same Internet address when they are active.**

The ACRP is a contract research program with the objective of developing near-term, practical solutions to problems facing airport-operating agencies. Proposals should evidence strong capabilities gained through extensive, successful experiences. Any research agency interested in submitting a proposal should first make a frank and thorough self-appraisal to determine whether or not it possesses the capability and experience necessary to ensure successful completion of the project. The specifications for preparing proposals are set forth in a brochure, *Information and Instructions for Preparing Proposals*, available at the website referenced above. Proposals will be rejected if they are not prepared in strict conformance with the section entitled, "Instructions for Preparing and Submitting Proposals."

Address inquiries to:

Michael R. Salamone, CM
Manager, Airport Cooperative Research Program
Transportation Research Board
The National Academies of Sciences, Engineering, and Medicine
500 Fifth Street NW
Washington, DC 20001
202/334-1268
msalamone@nas.edu

**Airport Cooperative Research Program**
**Projects in the Fiscal Year 2018 Program**



**Self-nominations will be accepted until September 21, 2018 at MyACRP**

*Page numbers are linked to the project announcement within this document.*
*Project numbers are hyperlinked to that project's webpage on www.TRB.org/ACRP*

## ■ Project 01-39

*Creative Marketing Techniques to Improve Revenue Generation Partnerships*

Research Field: Administration
Allocation: $300,000

Airports have relied on traditional revenue streams such as terminal rent, landing fees, parking, and concessions to operate and maintain their facilities. As operating costs continue to rise and revenue from these traditional sources decreases, airports have been facing greater financial challenges. New digital sources of revenue, such as big data (high-volume, high-velocity, and high-variety information assets) and targeted advertising (which provides contextually relevant information to passengers in real time) are already being used by airlines and may provide new opportunities for airports. In addition, airports may be able to take advantage of their existing relationships with various stakeholders (e.g., airlines, TNCs, concessionaires) to generate new revenue that may ultimately help reduce operating costs for these airport partners. Yet research and guidance as to the applicability of these new revenue-generating opportunities are not available.

The objectives of this research are to provide guidance on using big data and targeted advertising to generate airport revenue including (1) identifying potential partners, (2) quantifying investment requirements (e.g., hardware, software, infrastructure), and (3) understanding and mitigating potential risks (e.g., use and storage of traveler personal information).

## ■ Project 01-40

*Improving the Airport Customer Experience – Update to Research Report 157*

Research Field: Administrative
Allocation: $500,000

Airports strive to improve customer service to meet changing customer service needs as they move away from viewing airlines as their primary customers and start viewing passengers as customers and guests of the airport. Providing quality airport customer service is a constantly-evolving airport goal nationally and internationally as new technologies from other industries and innovations in the airport industry are introduced. Customer experience is a key driver of passenger satisfaction, airport revenue, and the overall ranking of an airport. Customer experience in an airport is influenced at many touch points—remotely visiting an airport's website prior to a trip, traveling to and from the airport, and at the airport itself. Yet, airports often have limited influence on many of these touch points as they connect people and goods at a regional, national, and international level. Recently, ACRP published *ACRP Report 157: Improving the Airport Customer Experience* (2016), which offers comprehensive guidance to help airports address many topics related to improving and maintaining customer experience. Also, *ACRP Research Report 161: Guidelines for Improving Airport Services for International Customers* (2016) identifies key elements of the international customer experience that can influence satisfaction. However, since users' expectations continue to evolve, and new technologies and social issues continue to emerge, an update and a broadened scope is needed.

The objective of this research is to update *ACRP Report 157* to address the needs of airport customers, tenants, and general aviation users.

The following topics would be addressed:

- Customer service needs and expectations by customer type;
- Customer experience management approaches and customer service programs;
- Improving the customer experience via workforce training with advanced interpersonal skills and tenant/contractor coordination;

- New and innovative technologies to improve customer experience; and
- Development of a language access plan.

**■ Project 01-41**
*Blockchain Technology and Airports – A Primer*

Research Field: Administration
Allocation: $330,000

Bitcoin cryptocurrency and its underlying technology—blockchain—have captured the imagination of investors, financial institutions, and technology solution providers. Blockchain's simplicity and elegance lends itself to many business-to-business markets, and aviation is no exception. In essence, blockchain is a secure and robust ledger of business transactions. And yet, its simplicity has become a disruptive innovation because it can both optimize and reduce the cost of many types of transactions by eliminating the middlemen in distribution channels (e.g., banks, credit card companies, freight forwarders and, especially, information aggregators).

Information systems built on blockchain technology can be used by members of an airport ecosystem from their air carriers, ground handlers, concessionaires, and security providers in both large and small airports. Today airport mission critical and business processes often rely on proprietary, sole sourced solutions based on 1990s information exchange technology. Blockchain's ingrained security features coupled with its distributed processing capabilities lead to increased operational performance, reduced costs, improved workflow management, added data privacy and strong auditing capabilities.

Airports have been hearing about blockchain and have questions about its applicability to their operations. Examples of airport information systems that may leverage blockchain technology include flight information and airport resource management, baggage handling and tracking, airport inspections, and reporting of both landing fees and concession point of sale activity. Unfortunately, the blockchain industry does not currently have any airport-specific guidance available.

The object of this research is to develop a primer to introduce airports to blockchain technology, describe potential use cases, and offer guidance to incorporating blockchain into airport operations.

**■ Project 01-42**
*Review of Airport Governance Structures*

Research Field: Administration
Allocation: $300,000

Many airports are in the midst of a growth cycle and require substantial financial resources to accommodate this growth. There are different ways to structure airport governance (e.g., city-run, authority, public-private partnership) each having pros and cons, particularly with regard to finances. Governance also affects other aspects of airport management, including operation and administration. While state laws vary and affect ownership structures.

The objective of this research are to examine and benchmark parameters and financial information among airports and ownership/management structures and to develop guidance to help airports identify how changes in governance may be beneficial, to build stakeholder support, and provide recommendations for implementation.

**■ Project 01-43**
*Conducting Consumer Research of Air Passengers*

Research Field: Administration
Allocation: $450,000

Research of air passengers often focuses on traveler characteristics (e.g., party size, ground trip origin and mode, money spent, number of checked bags), which is needed for facility planning and design. To obtain this data, researchers have relied on traditional,

quantitative-focused techniques. More recently, passengers, along with meeters/greeters, and well-wishers, have been viewed as patrons whose satisfaction warrants assessment. Today, passengers are also viewed as customers who provide an important revenue stream. This means their needs and desires need to be studied and appealed to. The challenge, however, is that consumer-related information is often better captured by qualitative methods that allow for more in-depth study. At the same time, new means of gathering consumer-related data (e.g., using social media) are being employed. There is, however, little information about how best to conduct consumer research for air passengers, including how to evaluate and select the most appropriate data collection methods for particular needs.

The objective of this research is to develop guidance and best practices for conducting consumer research of airport passengers, meeters/greeters, and well-wishers with a focus on identifying optimal airport services and appropriate facility planning. This guidance will help airports evaluate and select from both traditional data collection methods (such as intercept surveys) and newer methods.

**■ Project 02-88**
*Techniques for Modifying NextGen Flight Track Design to Reduce Noise Exposure and Annoyance*

Research Field: Environment
Allocation: $400,000

Implementation of performance-based navigation (PBN) across the entire National Airspace System is a key NextGen goal. PBN is a critical enabler of trajectory-based operations, which are intended to reduce delays through increased operational predictability. With the implementation of PBN flight procedures through FAA's Metroplex and related processes, some communities have expressed concern regarding increased aircraft noise exposure. Multiple lawsuits have been filed, and in some cases, FAA has been directed by the courts to return to the pre-area navigation (RNAV) flight procedures, negating the benefits of reduced fuel consumption and air emissions. It is likely that, to ensure the continued successful rollout of NextGen procedures, consideration will need to be given not only to efficiency improvements but also to minimizing community impacts; yet there is no established technique to balance these two goals.

The objective of this research is to identify viable techniques for considering both capacity/efficiency and community impacts when modifying NextGen flight tracks.

**■ Project 03-49**
*Effective Collaboration to Plan and Respond to Communicable Disease Threats*

Research Field: Policy and Planning
Allocation: $600,000

ACRP Insight Event: The Airports Role in Reducing the Transmission of Communicable Diseases was held in March, 2018, and included members of the airport community in emergency management, EMS, ARFF personnel, and the public health community representing federal, state, and local officials. The objectives of this Insight Event were to (1) foster collaboration among these communities and stakeholders to achieve better outcomes and to identify further research.

The event highlighted collaboration that has taken place between public health and airport staff in planning and responding to threats or actual events concerning communicable diseases. It also highlighted the importance of stakeholder collaboration to prevent, detect, and respond to the threats of communicable diseases. Engaging in planning activities, having correct information, and understanding risks will increase the likelihood of an appropriate and effective response by first and secondary responders. The event concluded with a tabletop activity where the participants engaged in a discussion of different ways they could collaboratively respond. This underscored the need for identifying and disseminating best practices.

The objective of this research is to identify practices that airports and their public health partners have successfully used to prevent and mitigate the transmission of communicable diseases.

**■ Project 03-50**
*An Airport-Centric Study of the Urban Air Mobility Market*

Research Field: Policy and Planning
Allocation: $350,000

Urban air mobility (UAM) is a safe and efficient system for passenger and cargo air transportation within an urban area. It includes small package delivery and other urban unmanned aerial systems (UAS) and supports a mix of onboard/ground-piloted and, increasingly, autonomous operations. UAM has developed rapidly due to advances in technology. A number of firms are developing automated aerial vehicle and piloted aerial vehicle prototypes, and pilot projects are underway in Dubai and planned for Dallas and Los Angeles in the early 2020s. The UAM market is potentially broad (e.g., personal commuting, air ambulance, law enforcement). Due to the recent emergence of this technology, there is little research on the topic, yet airports need to understand and anticipate the effects of a potential UAM market, including anticipated market growth, vehicle types and uses, airspace impacts and management, community and environmental impacts, regulatory changes, financial implications, and other issues.

The objectives of this research are to (1) assess whether a legitimate UAM market exists, and, if so, anticipate the general timing of the market's growth; (2) understand potential political, social, technological, environmental, and legal implications; and (3) identify possible effects on airports and how airports can prepare for this potential market.

**■ Project 03-51**
*Electric Aircraft on the Horizon—an Airport Planning Perspective*

Research Field: Policy and Planning
Allocation: $450,000

Design innovation for electrically powered and hybrid-electric aircraft is accelerating rapidly, with the possibility of electric aircrafts being rolled out in the next 2 to 5 years. Electric motors have far fewer moving parts compared to combustion engines and electric energy costs less than liquid fuels. But not all air service can be replaced by electrically powered aircraft, as batteries are heavy and significantly less energy dense compared to AvGas, and electric aircrafts will fly more slowly than jet aircraft. Yet in certain applications (e.g., short-haul and cargo service), electric power is optimal compared to combustion engines. The advent of electric aircrafts offer both significant opportunities and disruptions for airports and their surrounding communities. Airports may have new roles to play regarding energy generation and transmission; at the same time, electric aircraft may impact revenue from fuel sales. Communities could benefit from potential environmental improvements. Airports need guidance not only to be ready for the introduction of electric aircraft but to help influence their transition into the airport environment.

The objective of this research is to develop guidance to help plan for the operation of electric aircrafts at airports. The research should describe current and emerging technology and address facility requirements, implications for commercial service and general aviation airports, power demand requirements, potential impacts and opportunities for revenue generation, regulatory issues, and environmental impacts.

**■ Project 06-06**
*Cultivating Talent in the Airport Environment*

Research Field: Human Resources
Allocation: $250,000

The airport industry is facing a challenge of cultivating talent, especially in technically demanding professions such as planning, engineering, construction, operations, and facility maintenance. Airports are facing a shortage of individuals who can lead, guide, manage, and carry out airport centric initiatives. Yet there are few resources for managers to attract, cultivate, and retain talented individuals at airports, and most are academic research reports that make implementation of their findings difficult.

The objective of this research is to develop a airport industry talent cultivation "playbook" that would provide inspiring, tested, and readily implementable techniques to enhance talent cultivation and knowledge transfer in their organizations. The playbook should be designed for quick, easy access with key talent planning ideas that can be implemented immediately and utilized by airports of different types and sizes.

**■ Project 06-07**
*Building Academic Programs to Cultivate Future Airport Industry Professionals*

Research Field: Human Resources
Allocation: $300,000

Airports and their support industries have changed significantly over the past several decades; however, many academic programs have remained stagnant in their requirements, and have not evolved with the industry reliant on their training. Current academic curriculums generally still prepare students for initial positions in airport airfield operations, while most current and future trends in the profession are reliant on a comprehensive approach to airport management and consulting careers incorporating engineering, finance, planning, technology, and operations. As a means to prepare students for careers in the airport industry, research is needed to develop a model academic curriculum template to provide a foundation for career success. This effort would likely focus on an evaluation of the current and future succession requirements as outlined by both airport sponsors and consultants, followed by a comparison of existing academic curriculums and graduation requirements. The comparison of industry needs versus the current academic environment would establish a "gap" from which to build a refined track for future students to fulfill positions in current and future airport and consulting professions. Ultimately, this research would seek to bridge the gap that currently exists to ensure both employee, organizational and industry success.

The objective of this research is to develop updated academic curriculums and requirements to cultivate airport industry professionals to meet existing and future needs.

**■ Project 06-08**
*Human Factors in Airport Operations*

Research Field: Human Resources
Allocation: $400,000

Primarily based on the industry-wide prevalence of vehicle pedestrian deviations (V/PDs) attributed to a "loss of situational awareness," it is evident that there is insufficient understanding of the cognitive processes and workload required to operate on an airfield. Further, current mitigation measures disproportionately rely on an individual's sense of sight (markings, signage, and lighting) and hearing (radios), but make little use of other senses, and do not account for what is commonly called "information overload." That is, an individual only has a finite amount of cognitive bandwidth, and may not be making the best use of it. Boeing has stated that "human factors involves gathering information about human abilities, limitations, and other characteristics and applying it to tools, machines, systems, tasks, jobs, and environments to produce safe, comfortable, and effective human use. In aviation, human factors is dedicated to better understanding how humans can most safely and

efficiently be integrated with the technology. That understanding is then translated into design, training, policies, or procedures to help humans perform better." We rely on both basic and advanced technology, as well as other methods to prevent V/PDs—ultimately the human is both the greatest asset and weakest link. Airports would benefit from understanding the demands and limitations of the human element operating in the airfield environment.

The objective of this research is to identify and describe the cognitive abilities used in airfield operations, as well as the limitations and potential complications of current practices. The research should identify methods for mitigating risks inherent to human performance and should identify and/or recommend best practices for developing or improving these abilities.

**■ Project 07-15A**
*Airport Passenger Terminal Design Library—Updates to ACRP WebResource 2*

Research Field: Design
Allocation: $250,000

ACRP WebResource 2, Airport Passenger Terminal Design Library, was created in 2017 under ACRP Project 07-15. WebResource 2 contains a library of related airport terminal design documents, available at the time of publication. Additional terminal-related research and guidance continue to be produced and should be added to the website to make them easily accessible to airport industry practitioners.

The objective of this research is to regularly update the content of ACRP WebResource 2 with additional related material from ACRP and elsewhere, each year, over the next five years.

**■ Project 08-03**
*Construction Safety and Phasing Plans*

Research Field: Construction
Allocation: $250,000

Currently, airports and/or their consultants are responsible for creating a construction safety and phasing plan (CSPP) based on FAA AC 150/5370-2G. Yet there is no guidance of best practices to assist in this process. There also seems to be a lack of collaboration in creating a CSPP between airport operations and airport engineering. A best practices guide would assist the airport in creating quality CSPPs. This guidance would help airport operations and airport engineering find ways to collaborate better on CSPP, especially in the design phase.

The objective of this research is to develop a guide of best practices and a checklist to assist airports in creating CSPPs suitable for airports of various sizes, activity levels, and geographic location.

**■ Project 09-18**
*Rapid Airfield Concrete Pavement Slab Replacement and Patching*

Research Field: Maintenance
Allocation: $400,000

The cost of runway closure is a significant factor in the planning process for the replacement or repair of a runway. Airports want to minimize closures for repairs and rehabilitation projects, and the type of material used can have an impact. There have been instances of material failures that will impact the operational capability of the pavement. FAA currently conducts testing of materials for runways, taxiways, and apron pavements, but research is needed to provide guidance to airports on best practices and lessons learned when pavement repairs are needed so as to minimize runway closures and operational disruptions.

The objective of this research is to produce a guidebook for airports to implement rapid airfield concrete pavement slab replacement and patching. The guidebook would identify the procedures for rapid concrete removal and the preparation required for rapid concrete paving. It would also help airports select materials,

identify proper paving techniques, and determine equipment requirements.

**■ Project 09-19**
*Airfield Pavement Markings—Effective Removal and Temporary Application Techniques*

Research Field: Maintenance
Allocation: $450,000

During airfield construction projects, it is often required to remove or obliterate the existing aviation pavement markings and to apply temporary markings. These operations can leave scarring, visible on the airfield from the cockpits for years. These remaining traces of former markings can be mistaken by air crews as airfield drivers—as active aviation markings. The risk of confusion can be particularly high by night and on wet, lighted pavements. Aviation markings are critical visual aids and vital in the case of runways. Any risk of confusion is a concern for aviation safety and it can lead to serious and catastrophic accidents.

The objective of this research is to identify best practices for the safe, cost-effective, and environmentally acceptable removal of existing markings and application of temporary markings on aviation pavement.

**■ Project 10-27**
*Using Collaborative Decision Making to enhance the Management of Adverse Conditions, IROPS, and Crises*

Research Field: Operations
Allocation: $300,000

Collaborative Decision Making (CDM) is the process of data sharing whereby airports, airlines, mutual aid partners, other stakeholders (such as ground handling service providers), and FAA's Air Traffic Organization share information to make operational decisions together. CDM is also about developing procedures for addressing adverse conditions. CDM has been implemented in the United States for many years; however, until very recently, this program has mainly focused on the cooperation and the data sharing between FAA and the air carriers. Airports are now at the threshold of becoming fully active partners in CDM. ACRP Report 137: Guidebook for Advancing Collaborative Decision Making (CDM) provides guidance to airport operators about the value of CDM and how to integrate it into airport operations and planning. This proposed project would be a continuation of ACRP Report 137 focused on the implementation of airport CDM and its aspects related to the definition and monitoring of metrics/key performance indicators.

The objective of this research is to develop guidance for airports and their stakeholders for an efficient use of airport CDM as a tool for enhancing the management of irregular operations (IROPS), emergencies, and crises. It would provide U.S. airports and their stakeholders (airlines, ATCT, ground handling service providers, etc.) with an overview of the benefits of A-CDM operations management and guidance for developing an A-CDM operations management organization, the related tools, and CDM-friendly procedures. It would also provide an introduction to total airport management (TAM), the future of A-CDM, and case studies and lessons learned from A-CDM airports abroad.

**■ Project 11-02/Task 35**
*Research Roadmap on Administration and Human Resources Issues*

Research Field: Special Projects
Allocation: $100,000

As an industry-driven research program, ACRP relies on a flow of quality research ideas from airport industry practitioners into the program. One important element to this flow is a roadmap of research needs that can guide practitioners as they consider the most important needs for the industry. Such a roadmap can provide a dynamic strategic research plan on a variety of topics. Each research topic has a unique group of subject matter experts (SMEs) and important issues or needs. A research roadmap exercise in each area can identify gaps in knowledge,

practice, and technology; describe key opportunities and challenges; and outline and prioritize specific research ideas needed to address the issues that are important to the practitioners that work in that function throughout the airport industry. Each of these projects will develop a prioritized list of research ideas sorted into topics/themes and described in sufficient depth and detail to convey the idea's concept and help and encourage the industry to develop complete ACRP problem statements.

The objective of this research is to facilitate a research roadmap on airport administration and human resource issues in order to identify future research needs that in turn can inspire industry practitioners to develop problem statements.

**■ Project 11-02/Task 36**
*A Research Roadmap on Safety Issues*

Research Field: Special Projects
Allocation: $100,000

As an industry-driven research program, ACRP relies on a flow of quality research ideas from airport industry practitioners into the program. One important element to this flow is a roadmap of research needs that can guide practitioners as they consider the most important needs for the industry. Such a roadmap can provide a dynamic strategic research plan on a variety of topics. Each research topic has a unique group of subject matter experts (SMEs) and important issues or needs. A research roadmap exercise in each area can identify gaps in knowledge, practice, and technology; describe key opportunities and challenges; and outline and prioritize specific research ideas needed to address the issues that are important to the practitioners that work in that function throughout the airport industry. Each of these projects will develop a prioritized list of research ideas sorted into topics/themes and described in sufficient depth and detail to convey the idea's concept and help and encourage the industry to develop complete ACRP problem statements.

The objective of this research it to facilitate research roadmaps on airport safety related issues in order to identify future research needs that in turn can inspire industry practitioners to develop problem statements.

**■ Project 11-02/Task 37**
*Periodic Report on Transformative Technology for Airports*

Research Field: Special Projects
Allocation: $100,000

When examining current technology trends in aviation, there are many innovative initiatives underway related to improving aviation through technology. In January 2018, Future Travel Experience (FTE) identified ten new and emerging technologies as having the potential to improve customer service and enhance operational efficiency on the ground and in-flight. FTE highlighted technologies that may play an important role in reshaping the air transport industry in the future.

The objective of this research is to prepare a periodic report summarizing transformative technology news, innovation, and opportunities for the airport industry. This report would itemize those new technologies developed and implemented at airports over a period between reports; assess the impact of those technologies at airports; then develop and summarize suggested courses of action that airports can use to prepare for the deployment and/or implementation of the subject technology.

**■ Project 11-08/19-01**
*ACRP Insight Event – Blockchain Technology and Airports*

Research Field: Insight Events
Allocation: $120,000

Airports have been hearing about blockchain and have questions about its applicability to their operations. Examples of airport information systems that may leverage blockchain technology include flight information and airport resource management,

baggage handling and tracking, airport inspections, and reporting of both landing fees and concession point of sale activity.

The objective of this research is to convene a NASEM workshop to present and discuss blockchain technology and describe potential use cases in the airport environment.