

Announcement of Airport Research Projects August 2022

The Airport Cooperative Research Program (ACRP) is a contract research program with the objective of developing near-term, practical solutions to problems facing airport-operating agencies. 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. 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 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 27 & 28, 2022 and selected projects for the Fiscal Year 2023 program. This announcement provides background information and a general research objective for each project.

The ACRP is now seeking nominations for serving on project panels. These panels will develop requests for proposals, select contractors, and review draft deliverables prepared by the contractors. Nominations, including self-nominations, may be submitted through [MyTRB](#), which requires registration.

If you have a MyACRP login, you will use the same credentials. If you previously had a MyACRP account but haven't registered in the last few years, you will need to re-register, since ACRP has transitioned to a new people management platform.

Unless otherwise specified in a particular project summary, the deadline for nominations is September 19, 2022, but it is strongly recommended that you submit your nominations as soon as possible.

Requests for proposals are expected to be released starting in the fall 2022 and will be available only on the World Wide Web. Each proposal will be announced by e-mail. Instructions to register for e-mail notification of requests for proposals are available at <http://www.trb.org/acrp>. Any research agency is eligible to submit a proposal; guidance for proposal preparation is provided in the brochure, [Information and Instructions for Preparing Proposals](#), available at the website referenced above.

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Projects in the Fiscal Year 2023 Program**

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Nominations will be accepted until September 19, 2022 at [MyTRB](#)

Project numbers are hyperlinked to that project's webpage on www.TRB.org/ACRP

Summary of Approved Research Projects

Project 01-53

Review and Update of ACRP Administration and Human Resources Products

Research Field: Administration
Allocation: \$500,000

To meet a key goal of the ACRP Strategic Plan, the ACRP Oversight Committee approved and funded the development of a systematic method to identify research products in need of update. The resulting method takes into account ACRP's operational factors, research roadmaps, metrics for measuring product use and benefits, industry trends, industry input from subject matter experts, and potential efficiencies to be gained by how products can be updated (e.g., grouping or combining products, or updating sections of reports). To date, the method has been applied to ACRP's environmental research (the field with the most products); seven products were recommended for update and three updates are now under way. The research fields of administration and human resources have a combined total of 60 products, and it is likely that many of these products are in need of update.

The objectives of this research are to conduct a systematic review of ACRP administration and human resources products in order to identify those in need of update and to conduct the research needed to update those products.

Note: \$50,000 of the allocated \$500,000 will be used to fund a project to identify administration and human resources products needing update; the remaining funds may be available for one or more projects to conduct the product updates.

Project 02-103

Scan of Technologies to Remove Residual PFAS from Airport Firefighting Equipment

Research Field: Environment
Allocation: \$310,000

As airports begin the transition from perfluoroalkyl and polyfluoroalkyl substance (PFAS)-containing aqueous film-forming foams (AFFFs) in fire suppression and aircraft rescue and firefighting systems, there will likely be a large demand for rapid, effective methods to remove residual PFAS from firefighting equipment to minimize equipment replacement costs and ensure no continued PFAS release with the use of cleaned equipment. Methods for removing these chemicals from existing equipment are being used by the U.S. Department of Defense as well as at European airports. Research is needed to review and assess the performance of various techniques to remove residual PFAS from airport firefighting equipment based on their efficacy and cost.

The objective of this research is to conduct a scan of current and emerging techniques for removing residual PFAS from airport firefighting equipment and to provide information and guidelines to help airports understand the issue and identify techniques that are appropriate for their situation.

Project 03-69

Identifying Congestion and Safety Risks Due to Heterogeneous Airport Curbside Activity and Remedial Solutions

Research Field: Policy & Planning
Allocation: \$350,000

Terminal curbs, particularly at large airports, feature a mix of activity. Private vehicles, taxis, airport shuttles, transit buses, and, most recently, transportation network activity (TNCs) all mix with pedestrians. This heterogeneity can make maintaining safe curbside operations a challenge, especially at high traffic volumes. Implementable measures and management methods, ranging from efficient countermeasures and technologies to policies, are vital to mitigate the congestion and safety risk caused by these heterogeneous conditions. A majority of airports do not have any monitoring or management systems for

curbside activities, while some airports have already started to explore ways and approaches, such as advanced spatial sensing technologies (e.g., radar, LiDAR, camera) to monitor and manage curbside congestion and mitigate potential safety risks. There is a need to review remedial measures and management approaches, and provide insights into airports' curbside congestion and safety problems. Understanding how airports can adapt these approaches to the dynamic environment with minimal infrastructure changes helps maximize the derived cost benefits.

The objective of this research is develop guidelines of remedial solutions, including detection measures, for managing terminal curbside roadways that can be adapted to airports of various layouts and activity levels.

Project 03-70
Incorporating Emerging Technologies into Airport In-Terminal Concession Programs

Research Field: Policy & Planning
Allocation: \$500,000

Consumer buying habits are rapidly evolving. For example, e-commerce is often preferred to in-store purchasing of retail goods and food services, and international airports have started to implement omnichannel e-commerce platforms to deliver an advanced airport retail experience for passengers. The U.S. airport industry has started to implement mobile ordering services for retail and food & beverage, and, while fairly new, this type of service is growing in popularity. However, there is little information available for airport operators to understand the changing habits of consumers, the degree to which new technologies will advance, the pace at which adoption of new technologies will occur, and the overall success/impact of new technologies on airport revenue and customer experience. The future success of airport concession programs will rely on much more than rolling out new technologies. Airports need to understand the challenges, opportunities, and the different components and maturity levels of these technologies and how they will meet customer

needs. This challenge for airports may require traditional in-terminal planning strategies to be adjusted to deliver the optimal in-terminal concessions space plan and concessions mix.

The objective of this research is to develop guidelines that airport operators can use to compare and contrast various technologies supporting in-terminal concessions and then evaluate each for application to individual airport situations and demographics. Recognizing the rapidity of technological change, the guidelines should focus on general technology concepts rather than specific technologies.

Project 03-71
Guidelines for Planning for Future Growth of Electric Vehicles at Airports

Research Field: Policy & Planning
Allocation: \$600,000

Airports are increasingly interested in electrifying the airport-owned/operated fleets as well as encouraging the use of electric vehicles among passengers, employees, and ground transportation companies. Yet airport planners have few resources to help them effectively plan for this growth. For the airport-owned/operated fleet, staff need tools and frameworks to ensure they follow an efficient, cost-effective approach that leverages external funding and partnerships when electrifying their fleet. Airports also need guidelines on how to forecast electric vehicle activity and facility requirements for airport passengers, employees, and ground transportation companies to ensure facilities are correctly sized, located, and priced. Lastly, practitioners need to be able to consider overall airport electrical requirements that also includes the advent of electric aircraft.

The objective of this research is to develop guidelines and tools to help airport industry practitioners plan for the growth in electric vehicle activity. The guidelines and tools should cover requirements for not only ground vehicles (i.e., airport-owned/operated fleets as well as vehicles operated by the public, employees, and

ground transportation operators) but also electric-powered aircraft.

Project 03-72
Economic Impact of E-Commerce on The Airport Industry

Research Field: Policy & Planning
Allocation: \$400,000

Due to the rise of e-commerce, air cargo carriers seek opportunities to build vertical relationships with airports to provide faster delivery options to their customers. The vertical relationships between air cargo carriers and airports lead to the economic growth of airports, and airports enjoy higher output, more revenue, and new cargo facility investments. Air cargo carriers invest heavily at airports to have specialized cargo facilities to provide safe, fast, and accurate movement of goods. Research is needed to examine the economic impact of the rise in e-commerce on the airport industry and to provide insight into the potential opportunities for airports.

The objective of this research is to gain insight into economic impact of increased e-commerce activities at airports, including a better understanding of the vertical relationships between air cargo carriers and airports and potential opportunities for airports to benefit from the e-commerce market.

Project 03-73
Best Practices in Transitioning to Lead-Free AvGas

Research Field: Policy & Planning
Allocation: \$500,000

The U.S. Environmental Protection Agency is publishing a draft Endangerment Finding that connects lead emissions from piston-engine aircraft engines with adverse impacts to health and welfare. FAA and the aviation industry have set a goal and made a commitment to safely eliminate the use of leaded aviation fuel by the end of 2030 without adversely affecting the safe and efficient operation of the existing piston-engine fleet. Achieving this goal will require

airports to play a significant role, namely taking steps to accommodate and offer unleaded fuels while maintaining typical fuel offerings (e.g., 100LL and Jet A). Each airport is unique and will not be able to transition to unleaded fuels in the same manner. Research is therefore needed to better understand how airports can transition to unleaded aviation gasoline (avgas) in a safe and efficient manner that considers their unique situation.

The objectives of this research are to provide an industry overview of the challenges and opportunities for airports as they transition their piston-engine fuel offerings from leaded to unleaded avgas and for developing guidelines and tools to help individual airports effect the transfer in a manner that is safe, efficient, and cost-effective and does not disrupt piston-engine activity.

Note: This an expedited project. The deadline for panel nominations for this project is September 6, 2022.

Project 03-74
ACRP WebResource to Support Research into Air Traveler Choice Models

Research Field: Policy & Planning
Allocation: \$350,000

Air traveler airport choice and ground access mode choice models provide key analytical techniques used in a variety of airport planning studies. Decisions involving billions of dollars of capital investment in infrastructure supporting airport ground transportation, such as rail links or automated people movers, and the implications of these projects for airport revenue, rest on the ability to forecast how air traveler ground access mode and airport choice decisions will change in response to these types of projects, as well as to changes in the user fees charged for different airport ground transportation services. Yet often these analyses use inconsistent assumptions and modeling approaches and methods. Having this data readily available will encourage researchers to explore improved model specifications by reducing the work involved in

assembling the necessary data and will facilitate comparison of models developed in different studies by enabling those studies to base their models on consistent underlying data. Research is needed to develop a repository of ground access-related datasets and to identify best practices in developing and applying mode choice models.

The objective of this research is to develop an ACRP WebResource containing publicly available data sets for use by researchers to develop and explore improved airport ground access/egress mode choice and airport choice models.

Project 04-30
Airport Emergency Management Capabilities Development

Research Field: Safety
Allocation: \$450,000

The scope of airport emergency management continues to expand from solely preparing for aviation-related incidents to an all-hazard approach that includes natural disasters and intentional acts. As a result, airports are developing stand-alone emergency management divisions with varying and often significant degrees of preparedness, response, and recovery program capabilities. Airports can benefit from having established emergency management preparedness capabilities specifically for the airport industry. Benefits include increased opportunity for grant funding as well as consistent opportunities for national emergency management program continuous improvement. Yet at the local level, many emergency managers have limited time to develop a capability assessment from scratch and would benefit from being able to tailor a template of capabilities with metrics to fit their airport's needs.

The objective of this research is to provide resources, tools, and potential guidelines to develop a set of emergency management capabilities that can be used for assessment and to inform a program's strategic roadmap for long-term continuous improvement. The

tools and guidelines should allow for individual airports to tailor their plans to their unique situation.

Project 04-31
Providing Adequate and Balanced Trainer Facilities for Required and Recurrent Training for Airport Firefighters

Research Field: Safety
Allocation: \$350,000

The FAA has funded several regional airport firefighting training centers. These training centers are inherently complex, expensive to construct, and costly to maintain. After a few years, some of these training centers have fallen into disrepair, and FAA funding to repair them has been limited. As a result, several training centers have closed, and the rate of closures has been increasing, particularly due to environmental issues such as perfluoroalkyl and polyfluoroalkyl substance (PFAS). These closures have made it difficult for firefighters to find proper training facilities that are relatively close to their home base, and with recurrent training being required every 12 months, concerns are that airport fire departments across the nation may not be able to meet FAA requirements. Research is needed to assess the current state of airport firefighting training capacity and to consider longer-range requirements relative to possible system capacity shortages, increased demand, limited funding, and environmental concerns.

The objective of this research is to assess the current state of airport firefighting training capacity, estimate future requirements, and describe options for meeting future needs, including methods for planning, approving, building, operating, maintaining, funding, and decommissioning firefighter training centers.

Project 04-32
Guidelines for Using Existing and Emerging Technologies to Identify and Mitigate Human Trafficking in Airports

Research Field: Safety
Allocation: \$400,000

While the transportation industry is associated with moving people to their business and pleasure destinations, it is also the means to conduct human trafficking. U.S. Department of State statistics show that, out of more than 700,000 people who become subjects of human trafficking and cross international borders every year, 50,000 will enter the United States. Significant campaigns and efforts have been made to train aviation industry professionals, including ticketing agents and facility staff, on how to identify potential victims of human trafficking while in transit.

New technologies such as video surveillance and analytics or apps should be explored to see how they could be used in identifying and mitigating human trafficking in airports. By understanding the benefits of these solutions, airports and their staff will have a greater ability to identify and respond to victims of human trafficking and return them to their family, friends, and previous lives.

The objective of this research is to identify emerging technologies, such as digital applications and video analytics, that can aid in connecting victims of human trafficking with those who can actively and appropriately respond in a timely manner..

Project 04-33
Guide for Measuring Financial Benefits of Airport Safety Management Systems

Research Field: Safety
Allocation: \$400,000

The requirement for an airport safety management system (SMS) program is imminent. However, there is limited quantitative data showing its financial benefits to the aviation industry. As a result, acceptance and understanding have lagged. Skepticism (e.g., “How does one prove the benefit of a negative?”) and complacency (e.g., “We’re already safe”) remain prevalent, particularly for small airports. Much of the useful financial data is siloed or viewed as proprietary in nature. The lack of a true understanding means that

airports and regulatory bodies have difficulty justifying investment and rulemaking. Research is needed to develop a method of measuring the financial benefits of implementing an SMS program.

The objective of this research is to develop a means for airports and stakeholders (e.g., airlines and regulatory bodies) to understand and measure the financial aspects of implementation of a SMS program. By being able to understand the scope of an SMS program, airport sponsors will be able to create a fuller level of buy-in culturally, and continually invest more confidently in their SMS program.

Project 04-34
Best Practices for Building and Improving an Aircraft Rescue and Firefighting Program

Research Field: Safety
Allocation: \$500,000

Airports and city firefighting leadership need guidance on building effective airport rescue and firefighting (ARFF) programs that include strong procedures, processes, equipment, staffing, structure, facilities, and training. Airports of all sizes follow regulations set by appropriate agencies, but there is limited guidance on how to design and implement a successful cohesive ARFF program. Instead, ARFF teams follow the knowledge and experience that is passed from leader to leader and firefighter to firefighter. Current regulations and guidance is often limited to operating procedures and training and equipment requirements; they do not provide adequate guidelines on how to build and maintain an ARFF program. Research is needed to develop guidelines for airport and firefighting leaders on how to develop a new ARFF program or enhance an existing one.

The objective of this research is to develop holistic guidelines for creating an ARFF program and managing it for success. The guidelines should consider what an ARFF does and how it benefits the airport, its tenants and stakeholders, and identify best practices and

tools necessary for effective leadership, staffing, training, and meeting regulatory requirements..

Project 06-09
Quantifying and Understanding Women and Minority Airport Employee Populations to Track Progress

Research Field: Human Resources
Allocation: \$800,000

The aviation industry continues to experience dynamic change in terms of technological advancement, customer behavior and expectations, regulatory environment, and workforce. As airports and their stakeholders strive to respond to these changes in a sustainable and resilient manner, they are recognizing the importance of considering equity and environmental justice for underrepresented populations in every aspect of decision making. ACRP’s recent Insight Event on Systemic Inequalities in the Airport Industry highlighted that, while airports are striving to address systemic racism as well as diversity, equity and inclusion, there remain considerable challenges. One key challenge is the lack of robust data. For example, there is no large-scale demographic (e.g., gender, race/ethnicity, career stage) database of airport workers and wages. This data is critical if the industry’s workforce is to be ready for the new trends in aviation (e.g., uncrewed aircraft systems, Internet of Things, commercial space). Airports also need guidelines to help create policies and procedures that promote livable wages. In addition, with airports offering significant business opportunities, it is important to assess current efforts to promote participation in these opportunities by disadvantaged businesses. Lastly, as these research efforts may be viewed as establishing baselines, means of regularly updating the data need to be identified and evaluated to ensure that progress can be measured.

The three objectives of this research are to (1) establish a database of the current airport workforce (including information on demographics and wages) and recommend a

process for regular updates and tracking; (2) develop guidelines to help airports create policies and procedures to promote livable wages for employees working at and for airports; and (3) assess current efforts to promote participation of disadvantaged businesses in airport contracting opportunities.

Project 07-20
Unruly Airport Passengers

Research Field: Design
Allocation: \$400,000

The number of incidents of passengers exhibiting threatening and violent behavior has increased. The FAA has published a “Zero Tolerance for Unruly and Dangerous Behavior Toolkit” that is designed to inform passengers of both expectations concerning good behavior as well as the repercussions of disruptive behavior. Most resources have been focused on behavior in flight. Yet unruly and dangerous behavior also occurs in the airport environment. However, information and guidelines for airports to address this issue are limited. Research is needed to identify steps airports can take to reduce unruly passenger incidents.

The objective of this research is to provide guidelines to help airports prevent, reduce, and manage incidents of unruly passenger behavior. The guidelines should be holistic in nature and should consider behavior calming, crowd management, terminal design and layout, as well as partnering with relevant stakeholders.

Project 07-21
Understanding Opportunities of Deploying Private Wireless Network at Airports

Research Field: Design
Allocation: \$400,000

The Federal Communications Commission has allocated spectrum for private wireless networks, which are stand-alone networks focused on industrial operational assets and users. Airports often have complex systems centered around safety and security,

operations, and monetization, and there are likely many potential opportunities for establishing private wireless networks at airports. Specific examples could include baggage reconciliation, autonomous vehicles, robotic systems, remote cameras, concessions, passenger processing, parking, and asset tracking. While some limited trials are testing the connectivity and benefit to airport systems of a private wireless network, additional research is necessary to clearly identify the best implementation methods, the opportunities and challenges in particular environments, and the benefits of an overall wireless strategy. There may also be benefits from standardization across the aviation industry.

The objectives of this research are to help airports become aware of and understand existing private wireless network technology, to evaluate potential opportunities of deploying private wireless networks at their airport, and to consider the pros and cons of standardization across the aviation industry.

Project 10-35
Automatic Dependent Surveillance-Broadcast (ADS-B) Airport Traffic Count Validation and Recommendations

Research Field: Operations
Allocation: \$400,000

Both towered and non-towered airports need accurate counts of aircraft operations for use in planning, environmental analysis, project justification, and funding and staffing requirements. Tower operation counts offer limited details and towers are often staffed for only portions of each day, which may lead to undercounts. Meanwhile, non-towered airports have traditionally had to estimate activity using either ratios that translate based aircraft to operations or sampling techniques. More recently, as documented in ACRP Report 129: Evaluating Methods for Counting Aircraft Operations at Non-Towered Airports, acoustical counters, sound-level meters, security/trail cameras, and video image detection have also been used. Now, with the FAA requiring

aircraft operating into certain airspace to be equipped with ADS-B, equipment has been developed to use ADS-B data to estimate activity at an airport. Several alternative ADS-B-related technologies are available, and because many state governments and airports are spending tens of thousands of dollars to purchase and install equipment, it is important to review the accuracy of these technologies, including how they might account for aircraft operations that are not using ADS-B.

The objective of this research is to review various technologies and approaches for estimating air traffic activity using ADS-B, including accuracy and detail (e.g., aircraft type, operational mode) and provide guidelines for identifying the equipment specifications most relevant for differing airport sizes and environments.

Project 11-09/Topic 1
Impact of New Corporate Environmental Standards Impact Airports

Research Field: Special Projects
Allocation: \$25,000

Rapid changes in corporate environmental standards will have a profound impact on airport operations and revenues, and airports need to be aware of these potential impacts and prepare accordingly. In recent months, many Fortune 500 companies have updated their policies on employee business travel. These policies include carbon budgets that define maximum travel allowances not only in terms of dollars, but also in terms of CO2 output and carbon penalties, which impose a "business travel fee" on each ton of CO2 emitted over the course of a work trip. At the same time, some of an airport's key customers, such as airlines and logistics firms, have introduced new environmental standards into their investment screening process. For example, a global e-commerce firm recently announced that it will only invest at airports whose power supply is delivered, at least in part, through renewables. Others have made similar commitments regarding sustainable aviation fuels (SAFs). These private-sector policy changes represent

both an opportunity and a threat for airports. Possible threats could include carbon penalties and the inability of some companies to do business with airports that do not meet their environmental standards. Possible opportunities for airports, on the other hand, include significant resources that numerous corporate players have earmarked to support green projects [e.g., using funds collected through carbon penalties to invest in SAFs and electric ground support equipment (GSE)]. As airports seek to achieve their own sustainability targets and address funding gaps, these private partners represent a promising new source of investment. Airports need to be aware of these new investment guidelines and adapt their business development strategy accordingly. Given the time-sensitive nature of the topic, it is essential to disseminate actionable insights to airport managers as soon as possible.

The objective of this research is to prepare an ACRP First Look paper to define the issue, provide regulatory and legal context, and identify how the airport industry should be thinking and preparing for these changes.

Note: This an expedited project. The deadline for panel nominations for this project is September 6, 2022.