

Announcement of Airport Research Projects August 2023

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 20 & 21, 2023 and selected projects for the Fiscal Year 2024 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.

The deadline for nominations is September 18, 2023, but it is **strongly recommended that you submit your nominations as soon as possible**.

Requests for proposals are expected to be released starting in November 2023 and will be available only on the World Wide Web. Each

proposal will also be announced by e-mail. To be notified of RFP's that have been posted and other ACRP news, send an email to LISTSERV@LSW.NAS.EDU and type: SUBSCRIBE ACRP_ANNOUNCE in the body of the email. 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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**Airport Cooperative Research Program
Projects in the Fiscal Year 2024 Program**

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Nominations will be accepted until September 18, 2022 at [MyTRB](#)

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

Summary of Approved Research Projects

Project 01-54

Update to ACRP Report 49: Collaborative Airport Capital Planning Handbook

Research Field: Administration
Allocation: \$450,000

Since *ACRP Report 49: Collaborative Airport Capital Planning Handbook* was published in 2011, the aviation industry has changed significantly, and the matters airports must consider in developing, prioritizing, and financing their capital programs have changed as a result. Issues such as escalating inflation; supply chain challenges; an expanding need for capital; new financing options and delivery methods; changing federal requirements; and greater consideration for environmental, social, and governance goals suggest the need for an updated guide.

The objective of this research is to create a new handbook that outlines and describes an updated collaborative capital planning process and highlights recommended practices for the industry based on the latest research and practices.

Project 01-55

Guidebook for In-Terminal Airport Concession Strategies and Business Models

Research Field: Administration
Allocation: \$500,000

Strategies and models for in-terminal airport concessions continue to evolve. Throughout the COVID-19 pandemic, airports had to demonstrate resiliency and use innovative thinking to adjust existing agreements and provide operational flexibility to concessionaires in a new environment. Additionally, escalating capital, labor, and operating costs have strained the existing business model of in-terminal concessions, while e-commerce, digitalization, and changing demand patterns have challenged traditional ways of understanding airport in-terminal concessions. Airports are looking for

opportunities and approaches to become more agile and ensure their concessions programs provide a best-in-class experience for passengers while optimizing revenue to help meet increasing airport operating costs and ongoing debt and enhance airport financial self-sufficiency. There are opportunities for airports to reevaluate their concession program strategies and models while creatively reinventing their programs to improve the travel experience and maximize non-aeronautical revenue. Building a concessions program requires airports to have the data and business analytical tools necessary to determine the best concessions model and strategy for their airports. The goals of a concessions program include optimizing concessions space, ensuring a balanced mix, partnering with the most aligned businesses and vendors, and identifying appropriate contracting and management practices to balance financial risk. Airports require data and business analytical tools to determine the best concessions model and strategy. They also benefit from a new, up-to-date, evidence-based, data-driven resource for developing and implementing airport concession programs.

The objective of this research is to develop a guide to help airport concession managers and other stakeholders (1) understand the financial and operational challenges affecting the concessions business model and agreement terms and (2) identify and execute more robust concessions programs.

Project 01-56

New Revenue Sources and Financing Alternatives for Small and Mid-Sized Regional Airports

Research Field: Administration
Allocation: \$350,000

The identification and management of airport revenue and financing are essential to the proper management of airports. Small and mid-sized airports in the United States typically generate limited revenue and need to

supplement their income with other sources. The COVID-19 pandemic affected aircraft movements and passenger volumes, making the need for diversified financing and revenue streams, beyond core operations, even more relevant. Airport Operators could benefit from a guide on revenue and financing alternatives (including nonairline revenues such as value capture, airport parking revenues, rental car revenues, and terminal concessions) for small and mid-sized regional airports.

The objective of this research is to create a guide that provides an updated account of finance and revenue alternatives, including innovative capital financing mechanisms, for operators of small and mid-sized regional airports.

Project 03-75
Preparing for Hydrogen-Powered Aircraft and Other Vehicles at Airports

Research Field: Policy & Planning
Allocation: \$650,000

Hydrogen-powered vehicles, including fuel-cell electric ground vehicles and aircraft, are emerging, and manufacturers are developing jet and turboprop propulsion systems using hydrogen as a fuel. It is estimated that hydrogen-powered aircraft could become operational around 2035. The integration of hydrogen-powered aircraft and other vehicles could be very challenging for airports, given that these new vehicles will likely require significant updates to airport infrastructure, operations, and safety protocols. Because the technology is evolving quickly, there is limited understanding of hydrogen power and considerable uncertainty about the timing and degree of market penetration of hydrogen-powered vehicles at airports.

The objectives of this research are to (1) provide airports with an overview of the market for and trends related to hydrogen-powered aircraft and other vehicles; (2) develop a guide to help airports understand the potential for these activities at their facilities; and (3) identify likely facility, operational, safety, and staffing

requirements needed to accommodate the transportation, use, and storage of hydrogen at airports.

Project 03-76
Effectiveness of Technology to Improve Airport Customer Service

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

Airports realize the importance and benefits of gathering and analyzing data, using the latest technology available, to understand and improve customer experiences at airports. The passenger experience is being significantly affected and shaped by technological developments. From the moment of booking to departure and arrival, new technologies are changing the way airports interact with passengers while creating operational efficiencies. Airports would benefit from a guide to help identify, evaluate, select, implement, and maintain technologies related to the customer experience.

The objective of this research is to develop a guide for implementing technology to improve the customer service experience at airports..

Project 03-77
Understanding the Impact of Climate Change on Forecasting Future Airport Activity Levels

Research Field: Policy & Planning
Allocation: \$450,000

Airports rely on aviation activity forecasts for many reasons, including long-range planning and financing. Aviation forecasting is generally based on various assumptions about socioeconomic trends, but it is becoming increasingly clear that climate change may also affect air traffic activity, either directly (e.g., higher temperatures affecting aircraft performance) or indirectly (e.g., through policy). Airports need to ensure their forecasts consider climate change, but there is limited understanding of its possible impacts and how to incorporate climate change into long-range forecasting.

The objective of this research is to provide airports with information, tools, and methods to evaluate the potential impact of climate change and climate change policy on future aviation activity and incorporate the effects into their aviation demand forecasts.

Project 06-10
Guidance for Automation to Optimize Airport Efficiency

Research Field: Human Resources
Allocation: \$450,000

The shortage of available personnel to fully staff all the open roles within an airport environment is one of the primary concerns expressed by airports across the country. The departure and retirement of workers in the industry during the COVID-19 pandemic has significantly reduced the number of skilled and knowledgeable workers. Although much automation exists within the airport environment, manual processes across the entire ecosystem still exist that could be automated or supplemented with technology to increase operational efficiency.

The objective of this research is to identify key areas of automation that can serve to improve airport operational efficiency.

Project 07-22
Accommodating Cognitive and Sensory Diversity of Airport Travelers

Research Field: Design
Allocation: \$800,000

As air travel has become more commonplace, airports are seeing that the traditional “one size fits all” approach to designing terminals may not be sufficient to accommodate the cognitive and sensory diversity seen in their customers. Additionally, there has been an increase in the number of travelers with memory loss challenges or mental health issues, including post-traumatic stress disorder. Given the complexity and inherent stress and challenges of air travel, airports need to design and

operate their facilities to enhance the experience of these travelers.

The objective of this research is to develop guides and tools to help airports implement design elements, practices, and resources to accommodate the diversity of cognitive, sensory, and life experience of their customers.

Project 07-23
Improving the Airport Experience of Travelers Using Wheelchairs

Research Field: Design
Allocation: \$425,000

For users of personal mobility assistive devices, including wheelchairs and scooters, the airport experience can often be challenging and frustrating. A survey conducted by Paralyzed Veterans of America in 2022 found common issues include negotiating check-in, locating an agent for assistance if needed, clearing security, navigating to the gate, and boarding the aircraft. *ACRP Research Report 210: Innovative Solutions to Facilitate Accessibility for Airport Travelers with Disabilities* (2020) and other research have also identified many of these barriers, but it is unclear if current strategies to address these challenges are successful and if additional ones may be needed.

The objectives of this research are to assess current practices for improving the wheelchair user experience at airports and recommend additional evidence-based approaches.

Project 07-24
Virtual Queuing at Airports

Research Field: Design
Allocation: \$350,000

As airports and their tenants strive to improve customer service, the opportunity to address a frequently frustrating situation—spending time in queues—has emerged with the advent of “virtual queuing.” Under this approach, customers can pre-arrange their times to access key processing areas, such as check-in

and inspection services. Virtual queuing could be offered as a complimentary service or rationed using the power of pricing. In either instance, it could significantly increase customer satisfaction.

The objective of this research is to investigate the various alternatives for using virtual queuing at airports, including quantifying their potential benefits and identifying how they could be implemented in an airport setting.

Project 07-25
Value Engineering Applied to Airports

Research Field: Design
Allocation: \$350,000

It is now common practice to conduct a value engineering exercise as an integral part of an airport terminal design. Such reviews consist of assembling an expert panel to conduct a critical review of a developing design to identify elements of the design contributing much to the cost but little to the value received by the traveling public. These elements can then be re-designed to increase their marginal utility or eliminated. The great challenge in conducting such an exercise successfully is to properly identify what constitutes value and to avoid downsizing or eliminating elements that will later be helpful or required. Maintenance operations subsequently may find these reductions suboptimal when seen from a total life cycle perspective.

The objective of this research is to develop tools and guides to help airports evaluate if value engineering is appropriate, and if so, how to implement its use, with a focus on terminal projects.

Project 07-26
Augmented Reality and Virtual Reality in the Airport Environment

Research Field: Design
Allocation: \$400,000

Next-generation wireless technologies support wearable devices with increasing capabilities in

augmented reality (AR) and virtual reality (VR). There is a lack of awareness about the potential of these technologies in airports, but it is believed they can be used to generate value for stakeholders in many applications, including customer service, aircraft maintenance, surveillance, training, and airport planning. It is relevant to explore the benefits and risks of AR and VR technology to ensure preparedness by airports and their stakeholders (including tenants and airlines) in terms of technology infrastructure and established processes.

The objectives of this research are to develop (1) a guide to help airports understand AR and VR technologies and their potential in an airport setting and (2) a plan for accommodating AR and VR technologies at airport facilities.

Project 07-27
Seismic Resiliency for Horizontal Infrastructure at Airports

Research Field: Design
Allocation: \$400,000

The concept of designing vertical structures to withstand seismic activity is now established practice in many parts of the United States; however, incorporating seismic resiliency in horizontal structures (e.g., pavements, utility runs, and drainage) has been limited, particularly in airport settings. As airports seek to make their facilities more resilient, practitioners need to understand what is known about the issues and consider the benefits and challenges of incorporating seismic resiliency into the design of horizontal structures. Guidelines to incorporate seismic resiliency in the design of these structures are also needed.

The objective of this research is to review available evidence-based engineering principles and practices and develop a guide to help airports incorporate seismic resiliency into their horizontal structures and supporting infrastructure.

Project 08-04
Use of Operational Readiness and Testing (ORAT) for Airport Projects

Research Field: Construction
Allocation: \$600,000

Operational Readiness and Testing (ORAT) is a process for seamlessly managing the transfer of a new or substantially upgraded facility from its construction stage to active live operation. ORAT incorporates an airport's safety management systems and construction safety and phasing plan processes into a framework that encompasses stakeholder engagement, quality control and assurance inspection and testing activities, commissioning, training, and regulatory and certification requirements. Airports across the country are investing billions of dollars in facility development and need guidelines to help incorporate ORAT into their construction processes.

The objective of this research is to provide airports with an overview of ORAT processes and lessons learned, as well as a guide and tools to help airports incorporate ORAT into their facility projects.

Project 09-23
Strategy for Spatial Data Maintenance at Airports

Problem Statement(s): 1031

Research Field: Maintenance
Allocation: \$300,000

Airports receive location-based data from contractors and consultants related to a wide variety of airport projects. Many airports are embarking on digital transformation initiatives to improve business processes and support investment in maintenance and operation applications. The goals of these initiatives include increasing efficiencies, complying with FAA reporting requirements, improving safety, and developing preventative maintenance strategies to reduce the overall cost of ownership. For these goals to be realized, airports need an approach to manage spatial

information throughout its lifecycle to ensure the data are current and updated as new structures and infrastructure are commissioned.

The objective of this research is to produce a guide to assist airports in developing a geospatial data maintenance strategy.

Project 10-36
Review and Update of ACRP Products Related to Airport Operations

Research Field: Operations
Allocation: \$500,000

To meet a key goal of the ACRP Strategic Plan, the AOC approved and funded the development of a systematic method to identify research products in need of updating. The resulting method considers 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 research related to the environment as well as policy and planning, along with products focused on airport administration and finance. ACRP also has many products related to airport operations, and some of these probably need updates.

The objectives of this research are to conduct (1) a systematic review of ACRP products related to airport operations to identify those products in need of updating and (2) the research needed to update the highest-priority products.

Project 11-08/Topic 24-01
ACRP Insight Event: Modernization of FIS Facilities at International Airports

Research Field: Special Projects
Allocation: \$135,000

The United States Customs and Border Protection (CBP) service is responsible for

inspecting all passengers, baggage, and cargo arriving at airports from an international origin. In most cases, these inspections are conducted within Federal Inspection Service (FIS) facilities. The combination of strong growth in international travel, evolving technology, heightened customer service expectations, and limited resources suggests a need to consider new approaches to designing FIS facilities and their integration with other terminal elements.

The objective of this project is to conduct an ACRP Insight Event to provide a forum for airports, stakeholders (e.g., airlines, government partners), and subject matter experts to discuss the key factors related to ensuring that FIS facilities meet the needs of CBP while providing a high level of customer service. The event will seek to encourage stakeholder engagement, present information about current practices and trends, and identify future research needs.

Project 11-08/ Topic 24-02
ACRP Insight Event: Improving Extreme Weather Resiliency of Airport Infrastructure

Research Field: Special Projects
Allocation: \$135,000

Airports are experiencing the effects of extreme weather events with growing frequency, including more and increasingly severe hurricanes and floods as well as an increasing frequency of extreme temperatures. Airports must consider the effects of these events as they strive to ensure their facilities and infrastructure are resilient. A key prerequisite to this is understanding the latest research and practice on the topic.

The objective of this project is to conduct an ACRP Insight Event to provide a forum for airports, stakeholders, and subject matter experts to discuss planning for and responding to extreme weather events at airports. The Insight Event will seek to encourage stakeholder engagement, foster discussion about current practices and trends, and identify future research needs.

Project 11-08/Topic 24-03
ACRP Insight Event: Airport Energy Resiliency

Research Field: Special Projects
Allocation: \$135,000

Airports are facing increasing challenges and opportunities as they strive to achieve environmental goals, increase energy resiliency, and meet the quickly evolving energy needs of their customers. For example, gas-fired central utility plants typically create most of an airport's Scope 1 greenhouse gas emissions, and some airports are exploring converting their plants to electric power. Additionally, airports are vulnerable to power disruptions from the larger energy grid, which may adversely affect not only their facilities but large segments of the National Airspace System as well, resulting in millions of dollars in costs. Airports and their customers are increasingly relying on electrification to meet their power requirements, resulting in enhanced charging infrastructure and related ancillary needs.

The objective of this project is to conduct an ACRP Insight Event to provide a forum for airports, stakeholders (e.g., airlines, concessionaires/tenants, service providers, utilities, government partners), and subject matter experts to discuss the key factors related to airport energy resiliency, encourage stakeholder engagement, learn about current practices and trends, and identify future research needs.