

# ACRP

AIRPORT  
COOPERATIVE  
RESEARCH  
PROGRAM

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# 5-YEAR RESEARCH IMPACT REPORT



Publications 2013–2017

*The National Academies of*  
SCIENCES • ENGINEERING • MEDICINE

  
TRANSPORTATION RESEARCH BOARD



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# Summary

This report analyzes the impact of Airport Cooperative Research Program (ACRP) research over a 5-year period from 2013 through 2017. The report begins with an introduction to the publications that ACRP produced over the past 5 years and the topic areas on which these publications focus.



## **The next two sections look at the instances in which people have engaged with ACRP research.**

The first of these sections does so by reviewing the number of pageviews and downloads that each publication area received in addition to the origin of these pageviews and downloads (whether international or domestic). The second section discusses the ACRP webinar program, including topics presented and records of attendance.

The report then turns to a review of why individuals choose to download ACRP publications, how they intend

to use these publications, and the effects of implementing ACRP research. In addition, the report looks at how ACRP research is applied amongst ACRP's target audience: airports, both domestic and international. Finally, the report supplements this data with case studies of people utilizing ACRP research.

The report progresses from an assessment of how often ACRP research is consumed to an analysis of why individuals choose to use ACRP research, and then concludes with a demonstration of the effects of using ACRP research in practice.

# Introduction

## Since its creation in 2005, ACRP has explored ways to improve airports across the nation.

Over time, ACRP's influence has expanded from a national to a global scale, as ACRP research has become a staple for airports worldwide. In the effort to continue producing research that is applicable to the communities that operationalize this knowledge, it is worthwhile to assess the impact that ACRP research

has on the airport community. The purpose of this document is to explore who reads ACRP publications, how ACRP publications are being applied, the beneficial impacts of applying ACRP research, and the overall number of people reading, downloading, engaging with, and applying this research.

ACRP research publications are used by airport practitioners, consultants, and the businesses that

support airports; research results from these publications have been implemented around the world. Publication areas covered in this report include administration, environment, policy and planning, safety, security, human resources, design, maintenance, operations, and legal. A summary of the number of publications for each publication area is depicted in Figure 1.

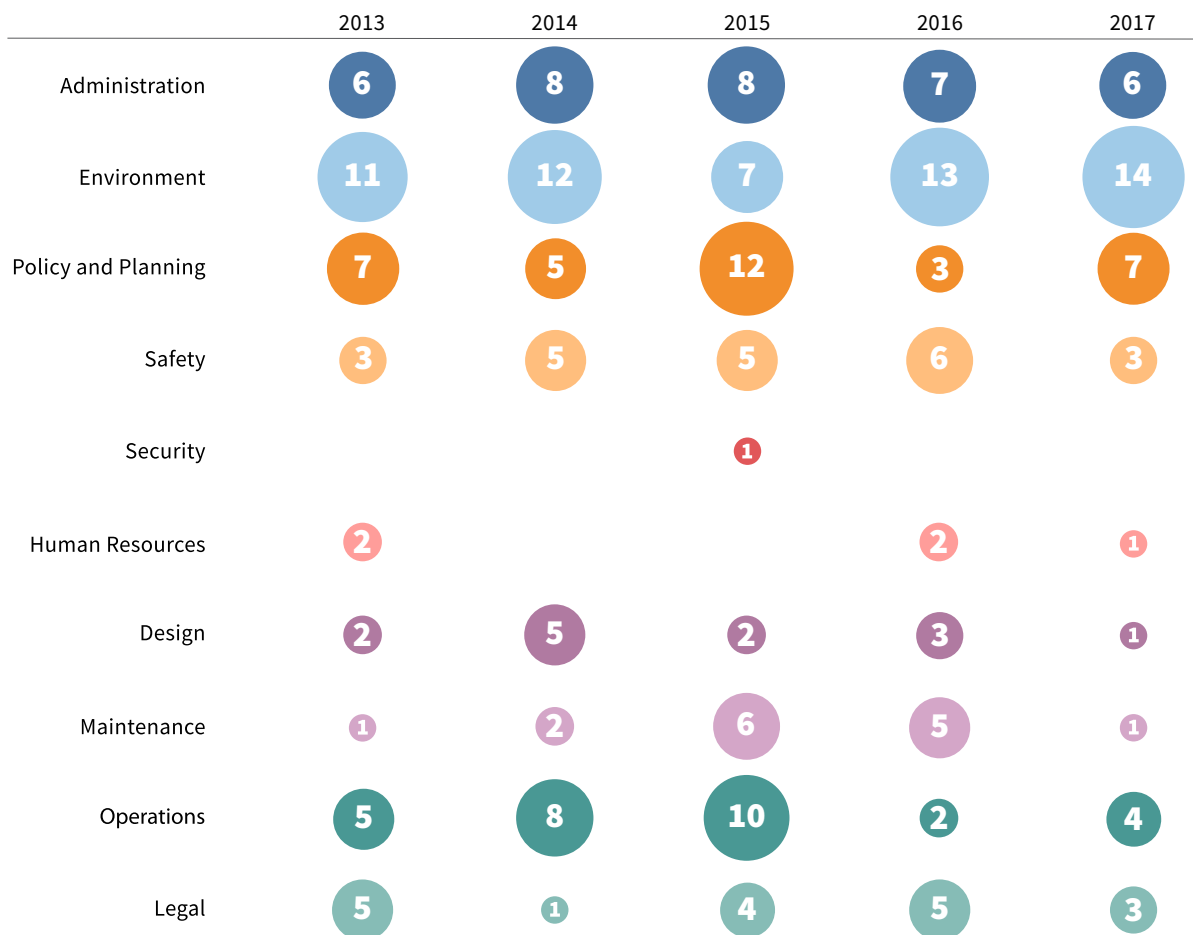


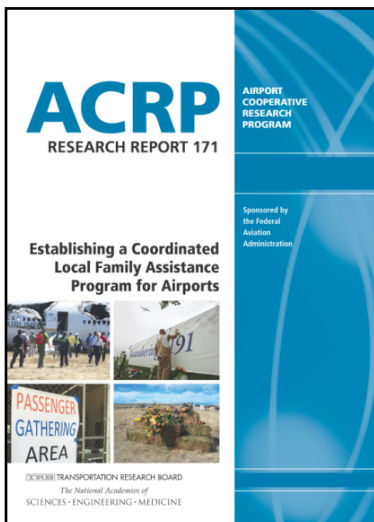
Figure 1: Number of publications by area.

# ► Purpose of Engagement

## ✈ Why Are ACRP Publications Downloaded?

Consumers of ACRP publications include a diverse audience of airport practitioners, consultants, government employees, educational institutions, private organizations, and the general public. Since May 2016, readers have been given the opportunity to comment on the publications they are using. Upon downloading a publication, visitors to the NAP website have been shown a pop-up box that asked, “How will you be using this free PDF?” Of the comments submitted on ACRP products published between 2013 and 2017, the majority

of users planned to use their respective downloaded publication for additional research and/or to put the various topics into practice. Among downloaders intending to use the publication for practice, planning (such as planning for design and emergency preparedness) was the most cited. Other popular uses included using the research to validate current practices or identify best practices, implementing workforce training, improving an existing program, improving regulations compliance, or using the research as a guidance document.



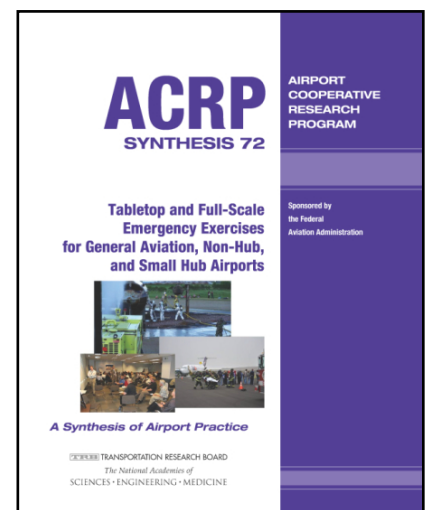
### Top Five Publications with the Most Comments Submitted:

- **ACRP Report 150: NextGen for Airports, Volume 5: Airport Planning and Development.**
- **ACRP Research Report 176: Generating Revenue from Commercial Development On or Adjacent to Airports.**
- **ACRP Synthesis 84: Transportation Network Companies: Challenges and Opportunities for Airport Operators.**
- **ACRP Research Report 174: Green Stormwater Infrastructure, Volume 1: Primer.**
- **ACRP Research Report 177: Enhancing Airport Wayfinding for Aging Travelers and Persons with Disabilities.**

Presently, the most popular publication used in practice is *ACRP Research Report 171: Establishing a Coordinated Local Family Assistance Program for Airports*. Based on the submitted comments, intended uses for this report included new program implementation, emergency planning, and workforce training. Airports using the publication to start a new program included Barnstable Municipal Airport, Cincinnati/Northern Kentucky International Airport, Jackson–Medgar Wiley Evers International Airport,

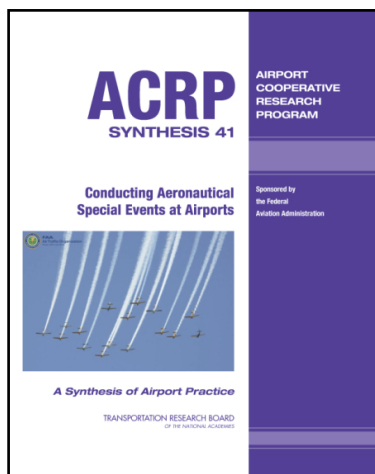
Portland International Airport, Van Nuys Airport, and T. F. Green Airport. The report was also popular among airlines for use in emergency planning, including Alaska Airlines, Allegiant Air, Caribbean Airlines, Emirates, GoJet Airlines, Icelandair, JetBlue, Qatar Airways, Singapore Airlines, WestJet, and United Airlines.

*ACRP Synthesis 72: Tabletop and Full-Scale Emergency Exercises for General Aviation, Non-Hub, and Small Hub Airports* was the most mentioned



publication for implementing workforce training and emergency preparedness planning. Several airports downloaded the publication to plan emergency exercises at their airport, including Barkley Regional Airport, Bemidji Regional Airport, Bonaire International Airport, Brainerd Lakes Regional Airport, Dothan Regional Airport, Flint Bishop Airport, Hartsfield-Jackson Atlanta International Airport, Hudson Valley Regional Airport, Morristown Municipal Airport, Plattsburgh International Airport, Greater Rochester International Airport, and Watertown International Airport.

Several airport authorities mentioned that they were looking into improving their customer service programs. Among these were the Port of Seattle, Los Angeles World Airports, San Diego County Regional Airport Authority, Metropolitan Washington Airports Authority, Port of Portland, and the Metropolitan Airports Commission.



Popular publications downloaded by this group were *ACRP Report 157: Improving the Airport Customer Experience*; *ACRP Research Report 161: Guidelines for Improving Airport Services for International Customers*; and *ACRP Research Report 171:*

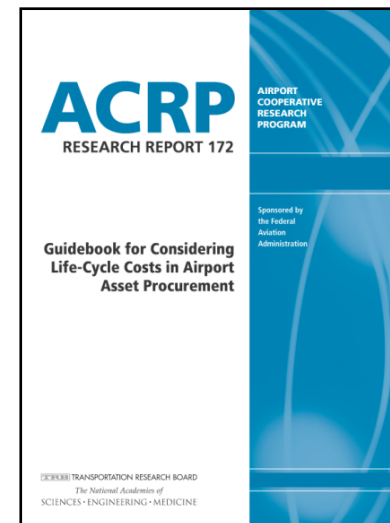
*Establishing a Coordinated Local Family Assistance Program for Airports.*

Downloaders considering the design or layout of their airport have downloaded *ACRP Report 96: Apron Planning and Design Guidebook*; *ACRP Report 130: Guidebook for Airport Terminal Restroom Planning and Design*; and *ACRP Research Report 177: Enhancing Airport Wayfinding for Aging Travelers and Persons with Disabilities*. Baltimore-Washington International Airport, Brussels Airport, Portland International Airport, and the Greater Rochester International Airport mentioned using *ACRP Report 130* to update their restrooms. Bishop Airport, MidAmerica St. Louis Airport, Pittsburgh International Airport, and Phoenix-Mesa Gateway Airport mentioned using *ACRP Report 177* to implement signage improvements. Airports Company South Africa, Alaska Airlines, and John Wayne Airport mentioned using *ACRP Report 96* to research apron markings.

The most popular publication among downloaders using research for planning purposes was *ACRP Synthesis 41: Conducting Aeronautical Special Events at Airports*. Several airports downloaded *ACRP Synthesis 41* to plan airshows, including Lake Tahoe Airport, La Crosse Regional Airport, Burke Lakefront Airport, and Wilkes-Barre/Scranton International Airport. The Metropolitan Airports Commission downloaded the publication for Super Bowl planning.

The top mentioned publication for downloaders looking to use the research as guidance documentation was *ACRP Research Report 172: Guidebook for Considering Life-Cycle Costs in Airport Asset Procurement*.

The airports downloading this report as a guidance document include Cincinnati/Northern Kentucky International Airport, Nashville International Airport, Port of New York and New Jersey, and Port of Seattle. *ACRP Research Report 172* was also used for policy development by Cincinnati/Northern Kentucky International



Airport, Auburn-Lewiston Municipal Airport, and the Port of Seattle.

Downloaders intending to validate current practice/identify best practices have used *ACRP Report 146: Commercial Ground Transportation at Airports*; *ACRP Report 157: Improving the Airport Customer Experience*; and *ACRP Synthesis 77: Airport Sustainability Practices*. Airports that downloaded these publications included Hartsfield-Jackson Atlanta International Airport, Miami International Airport, St. Louis Lambert International Airport, and Tulsa International Airport.

## Implementations and Impacts

Practitioners involved with 2013–2017 publication development (including panel members, research teams, and principle investigators) and NAP publication downloaders responded to an ACRP impact survey that looked at how ACRP publications are used in practice. More than 350 respondents detailed *which* ACRP publications are being used and provided insight into *how* those publications are being used.<sup>1</sup> The most frequently reported uses of ACRP publications included “using the publication as a guidance document,” “recommending or making management decisions,” and “recommending or making changes to standards, specifications, or guidance documents.” An analysis of how practitioners intended to use ACRP publications is depicted in Figure 2.

In addition to describing how they intended to use the publication, respondents also had an opportunity to indicate the positive results that they have seen in applying ACRP research findings. The most frequently reported impacts resulting from implementing ACRP publications

include the improvement of operational efficiency, safety, and compliance with regulations. The positive results that respondents indicated are illustrated in Figure 3.

Improved operational efficiency	36%
Improved safety	32%
Improved compliance with regulations	30%
Reduced environmental impact	29%
Improved community-airport interaction	25%
Reduced operating costs	25%
Improved customer satisfaction	22%
Improved airport communications	21%
Improved tenant relationships	21%
Improved system reliability	20%
Improved planning/preparedness	19%
Improved emergency response	15%
Increased revenue generation	12%
Reduced congestion	11%
Improved workforce skills/training	10%

*Figure 3. Effects of using ACRP research products by percentage of respondents.*

Using the publication as a guidance document	67%
Recommending or making management decisions	46%
Recommending or making changes to standards, specifications, or guidance documents	42%
Validating current practice	32%
Implementing a new program	25%
Recommending or making changes to the design or layout of the airport	24%
Implementing new technology	19%
Getting ideas for new/effective practices used by other airports	17%
Recommending or implementing workforce development/workforce training	13%

*Figure 2. Intended use of the downloaded ACRP publication by percentage of respondents.*

In total, 356 people shared their experiences using 144 ACRP research publications. These publications spanned every topic area and provided a greater sense of the areas that have been most frequently

applied in practice. Figure 4 reflects the topic areas of the publications that have been applied in practice. The most applied publications have been about the environment, and respondents report a reduced

<sup>1</sup> Survey participants were asked about 184 research products (Legal Research Digests, Reports, and Syntheses). Respondents were aware of 144 (78%) publications being used.



environmental impact and improved compliance to regulations as a result. The second, third, and fourth most implemented publication areas are administration, operations, policy and planning, and safety, respectively. Improved safety and improved operational efficiency

were the most frequently reported impacts across these categories. In the administration category, another top impact was improved community–airport interaction, and in the policy and planning category, a top impact was improved planning and preparedness.

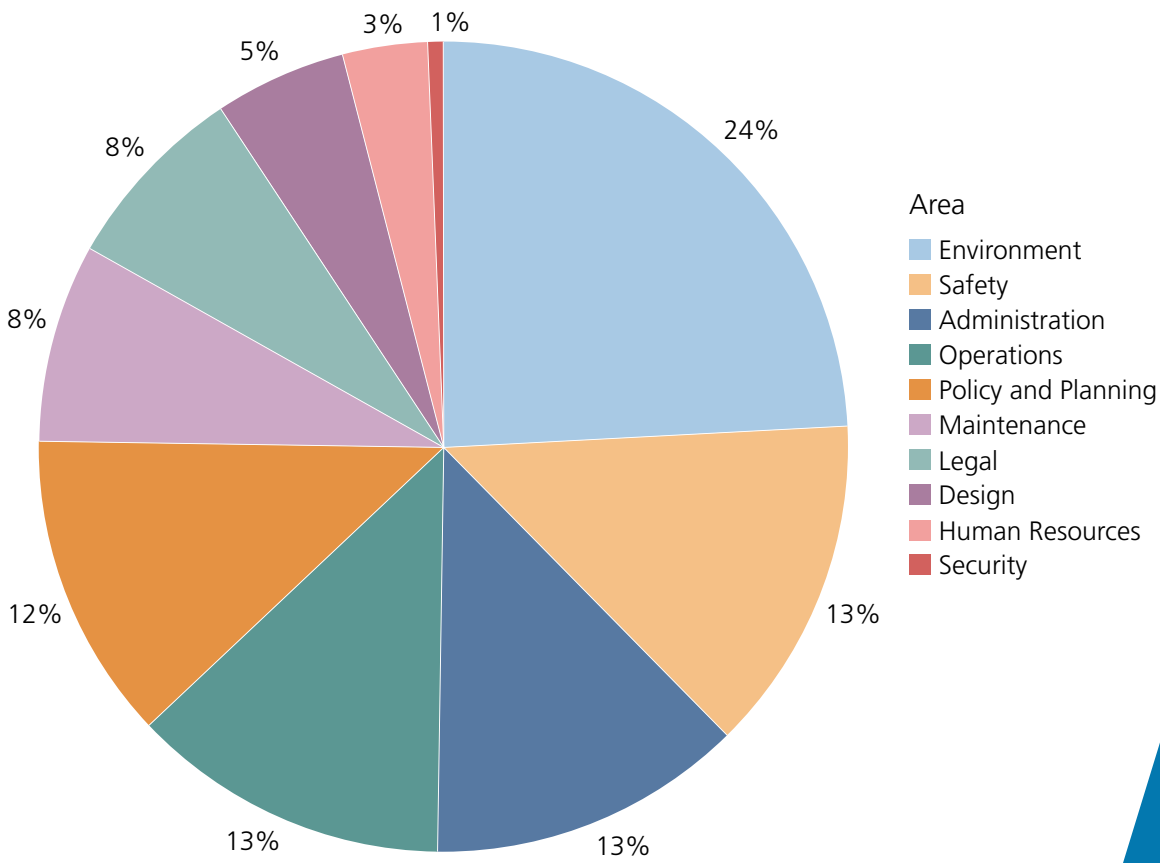


Figure 4. Implemented ACRP publications by the publication area of the document.



## Top five Implementations and Impacts

Impact survey respondents were given a checklist of implementation and impact options to choose from. Listed below are the top five most mentioned implementations and impacts and the top two most mentioned publications for each of these implementations and impacts.<sup>2</sup> The most frequently mentioned reports across the top five implementations and impacts are depicted in Figure 5.

### Improved operational efficiency

- *ACRP Report 130: Guidebook for Airport Terminal Restroom Planning and Design.*
- *ACRP Report 131: A Guidebook for Safety Risk Management for Airports.*
- *ACRP Synthesis 39: Airport Wildlife Population Management.*

### Suggesting or making changes to standards, specifications, or guidance documents

- *ACRP Report 97: Measuring PM Emissions from Aircraft Auxiliary Power Units, Tires, and Brakes*
- *ACRP Report 130: Guidebook for Airport Terminal Restroom Planning and Design*
- *ACRP Report 152: Evaluating Methods for Determining Interior Noise Levels Used in Airport Sound Insulation Programs*
- *ACRP Synthesis 39: Airport Wildlife Population Management*
- *ACRP Synthesis 70: Building Information Modeling for Airports*
- *ACRP Synthesis 71: Airport Safety Risk Management Panel Activities and Outcomes*
- *ACRP Synthesis 72: Tabletop and Full-Scale Emergency Exercises for General Aviation, Non-Hub, and Small Hub Airports*

### Suggesting or making management decisions

- *ACRP Legal Research Digest 30: Contract Risk Management for Airport Agreements*
- *ACRP Report 131: A Guidebook for Safety Risk Management for Airports*
- *ACRP Report 141: Renewable Energy as an Airport Revenue Source*
- *ACRP Report 150: NextGen for Airports, Volume 1: Understanding the Airports Role in Performance-Based Navigation*
- *ACRP Synthesis 39: Airport Wildlife Population Management*

### Suggesting or making policy changes

- *ACRP Report 141: Renewable Energy as an Airport Revenue Source*
- *ACRP Report 151: Developing a Business Case for Renewable Energy at Airports*
- *ACRP Report 152: Evaluating Methods for Determining Interior Noise Levels Used in Airport Sound Insulation Programs*
- *ACRP Report 97: Measuring PM Emissions from Aircraft Auxiliary Power Units, Tires, and Brakes*
- *Legal Research Digest 30: Contract Risk Management for Airport Agreements*

<sup>2</sup> Instances where there are more than two publications listed indicates there was a tie in the data for the top two publications.

- *ACRP Synthesis 39: Airport Wildlife Population Management*
- *ACRP Synthesis 84: Transportation Network Companies: Challenges and Opportunities for Airport Operators*
- *ACRP Report 131: A Guidebook for Safety Risk Management for Airports*

**Using the publication as a guidance document**

- *ACRP Report 130: Guidebook for Airport Terminal Restroom Planning and Design*

- *ACRP Report 96: Apron Planning and Design Guidebook*
- *ACRP Legal Research Digest 20: Airport Responsibility for Wildlife Management*
- *ACRP Synthesis 39: Airport Wildlife Population Management*
- *ACRP Report 131: A Guidebook for Safety Risk Management for Airports*
- *ACRP Synthesis 71: Airport Safety Risk Management Panel Activities and Outcomes*

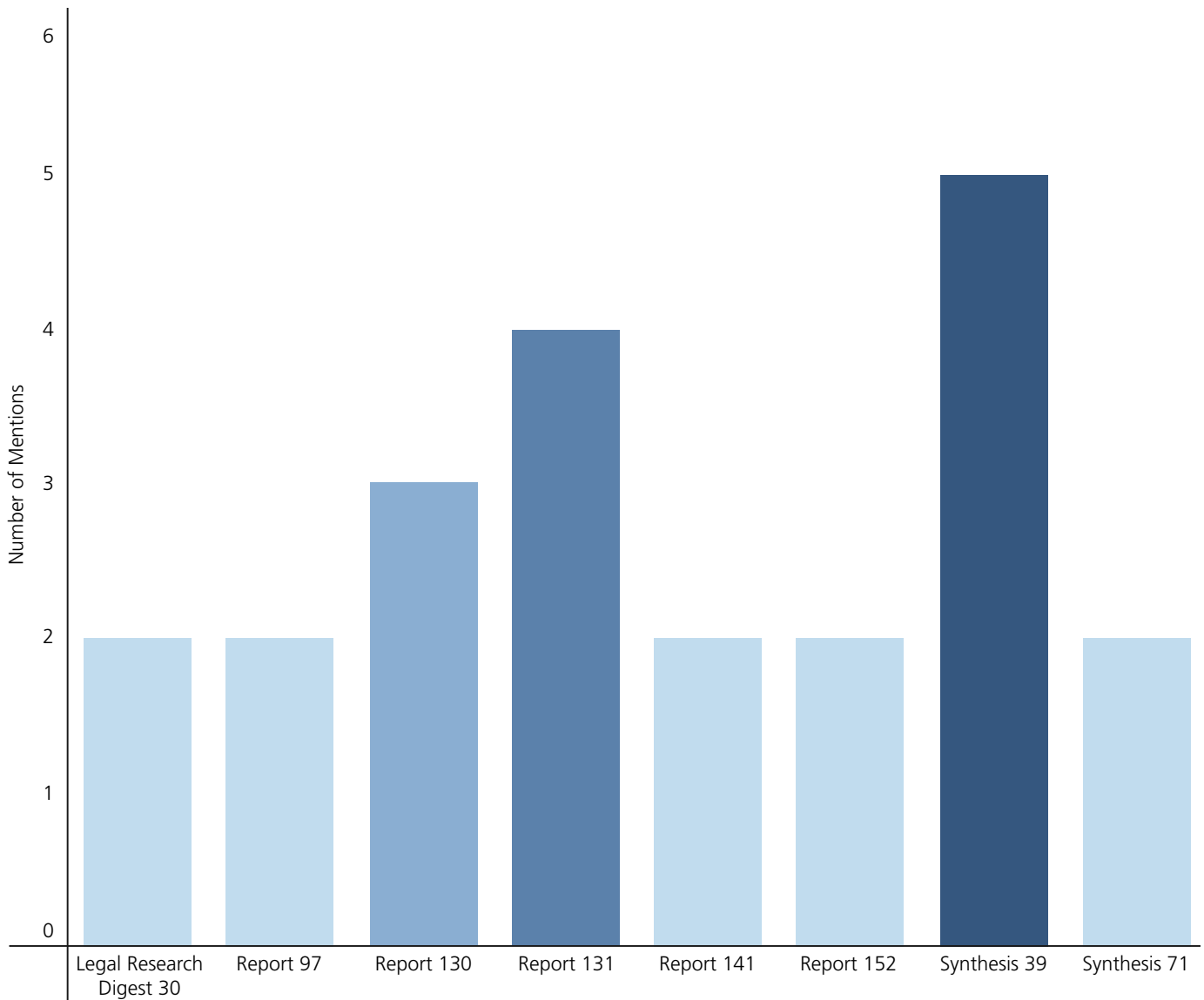


Figure 5. The number of times a publication was mentioned in the top five implementations and impacts.

## ✈️ Target Audience Engagement

Impact survey respondents were asked to describe how airports are using ACRP research publications. In responding to this question, respondents mentioned 83 different airports. Some airports were mentioned multiple times, resulting in 164 airport mentions in total. A representation of how many times an airport was mentioned in the responses is depicted in Figure 6.

The data collected about how ACRP research is applied at airports illustrates the national impact of ACRP

research in practice. This knowledge allows ACRP to continue conducting research on the topics that concern airports across the nation and world at large. The data collected about the airports that have been applying ACRP findings enables ACRP to continue providing airports with needed research products. Further, this data enables ACRP to identify the airports that do not apply ACRP research and becomes a launching point for exploring what these airports might need.

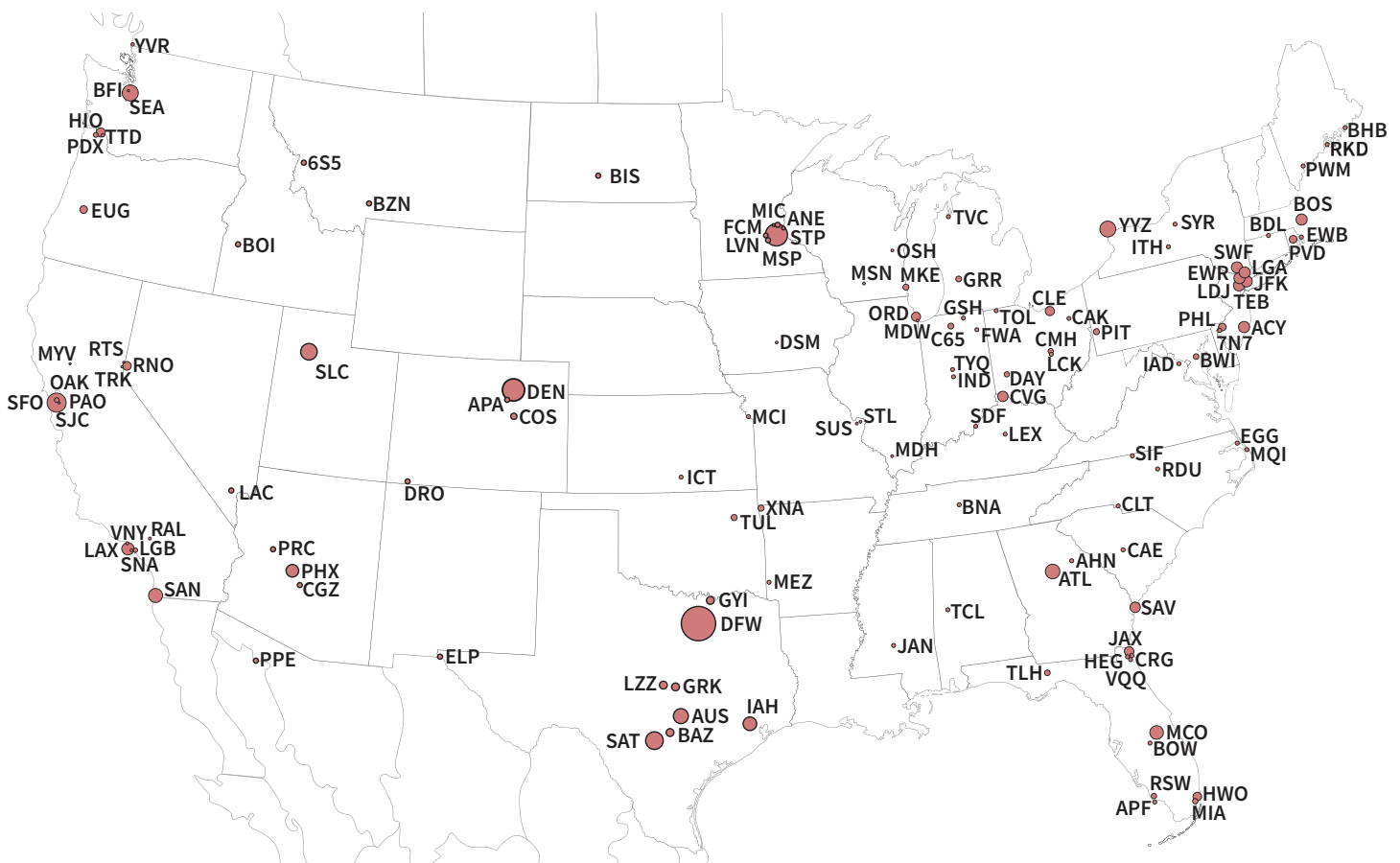


Figure 6. The number of times a survey respondent mentioned an airport as represented by the size of the circle (the more mentions, the bigger the circle).

# ► Case Studies

The following case studies demonstrate some of the ways that individuals have successfully applied ACRP research in practice. These case studies illuminate the diverse community that engages with ACRP research, as well as the many ways that ACRP is implemented successfully.

## ✈️ ACRP Impacts on Safety

### Improving Emergency Response at Airports

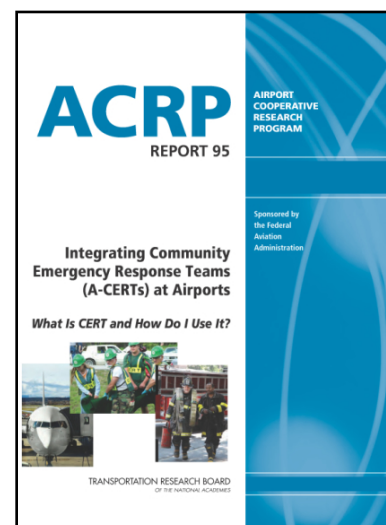
*ACRP Report 95: Integrating Community Emergency Response Teams (A-CERTs) at Airports* describes the process of integrating community emergency response teams (CERTs) to specifically meet the needs of airports. Although these teams are trained to fill a critical need during disaster response, the teams may also be used for a host of other purposes, including traffic control support, staffing informational centers during holidays, and assisting airport law enforcement and security personnel by serving as escorts for construction projects. Volunteers for an A-CERT receive supplemental training specific to the local airport and may also undergo background checks. Robert Sims, on staff at Grand Forks International Airport (GFK) in North Dakota, was tasked in 2014 to integrate CERTs into the airport's emergency management plan. He relied on guidance in *ACRP Report 95* to accomplish this task. When Sims first made contact with local CERTs, he found that many of the teams were no longer active. *ACRP Report 95* suggests regular training as one safeguard against letting a CERT program become inactive.

*Sims found ACRP Report 95, together with general CERT guidance from FEMA, to be an important asset while establishing an A-CERT program. "ACRP Report 95 was one of the main resources we used to see what a successful A-CERT program looked like and how to implement it," said Sims. "It synthesized a lot of information that gave us direction and helped orient us. Once we had the clear vision of how an A-CERT should operate, it became much easier to move forward."*

*ACRP Report 95* provides guidance to A-CERT program coordinators looking to facilitate the development of a healthy, growing program. The report guides facilitators to identify core personnel, including administrative assistance, instructors, and volunteers who take charge of part of the program. These people, as well as future A-CERT volunteers, will take charge of key program responsibilities. The report includes suggestions for securing grant money from FEMA and for identifying other funding sources, such as establishing a non-profit organization or requesting a line-item in the airport's budget. The report also directs the program

coordinator to additional guidance on the FEMA website on CERT training.

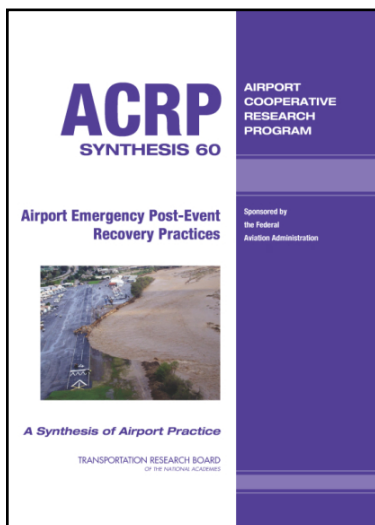
Reaching beyond the airport property into the larger community, *ACRP Report 95* also highlights several examples of CERT members providing community service outside of disaster situations. CERT volunteers have staffed first-aid booths, spoken at PTA meetings, handled donations during disaster situations, and even supplemented fire staff during fire season. *ACRP Report 95* provides basic guidance to enable airports to make use of A-CERT programs as an invaluable community resource.



## ACRP Impacts on Policy and Planning

### **Integrating Airport Research and Decision Making**

Tony Cugno, chief operating officer for the Jacksonville Aviation Authority (JAA), is unequivocal when describing the role ACRP research plays in his organization’s decision-making processes. “The use of ACRP reports is part and parcel of our organizational culture. We employ a business-plan-like assessment for all major decisions and we rely on the findings of ACRP reports to help guide that business planning.”



ACRP is an integral part of the JAA culture. This is evidenced when spending a few minutes talking to JAA employees about ACRP. Meaghan Smalley is the manager of Airport Communications and Emergency Preparedness for JAA. She relies heavily on the “case examples” contained in *ACRP Synthesis 60: Airport Emergency Post-Event Recovery Practices*. “I use the aircraft accident, natural disasters, and criminal acts case examples during our emergency preparedness and training team meetings,” says Smalley. “These

case examples provide an in-depth look into the emergency, common incident objectives, and lessons learned from other airports.”

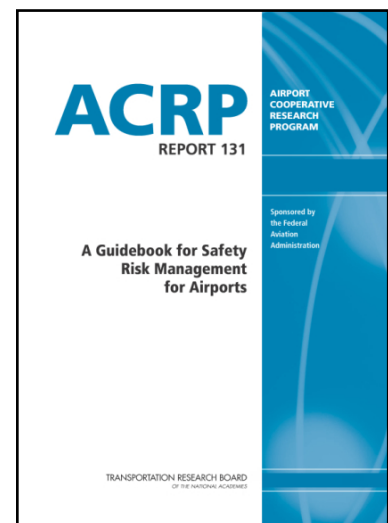
Smalley utilizes Appendices C and D from *ACRP Synthesis 45: Model Mutual Aid Agreements for Airports* to format mutual aid agreements between JAA and the City of Jacksonville. “The templates in those appendices are actually from other airports, so the verbiage is easy to adjust based on the airport being discussed,” she notes. Smalley also references *ACRP Synthesis 50: Effective Cooperation Among Airports and Local and Regional Emergency Management Agencies for Disaster Preparedness and Response*. The report provides a checklist of items to consider when creating and maintaining effective relationships amongst emergency management partners. “At JAA, I have taken this checklist and modified it based on our airport’s needs,” says Smalley. “I have presented my findings at our Emergency Preparedness meetings and at city leadership meetings.”

Active engagement in the ACRP arena affords numerous opportunities for continuous learning as evidenced by Smalley’s recent role as a moderator for an ACRP webinar on *ACRP Report 112: Airport Terminal Incident Response Planning*. “I just learned about the terminal incident response planning (TIRP) tool during the ACRP webinar that I moderated. I have already downloaded the tool off of the ACRP website and have started plugging our airport information into it,” she notes. “This tool, once complete, will serve as an additional resource that I can use for training staff and housing important names

and contact information that I will need during a terminal emergency.”

Roger Studenski is the Risk Management administrator for JAA. He states, “I rely on the findings in ACRP reports for insight as I develop policies and procedures for JAA. I also look to ACRP reports for solid information and ideas regarding how to do’s.” Studenski also teaches safety-related courses at Embry Riddle University. In this role he relies heavily on *ACRP Report 131: A Guidebook for Safety Risk Management for Airports*.

From operations and finance to administration and maintenance, ACRP research has had an enormous impact throughout JAA. “When it comes to the efficacy of ACRP reports, the size of the department and the size of the airport do not matter,” says Cugno. “ACRP findings have significant impact and add tremendous value by helping us make our airports more valuable to our communities. More importantly, ACRP reports help our employees grow—making them more valuable assets to us and to our industry.”



## ACRP Impacts on Human Resources

### ***ACRP and Higher Education: Building the Next Generation of Airport Professionals***

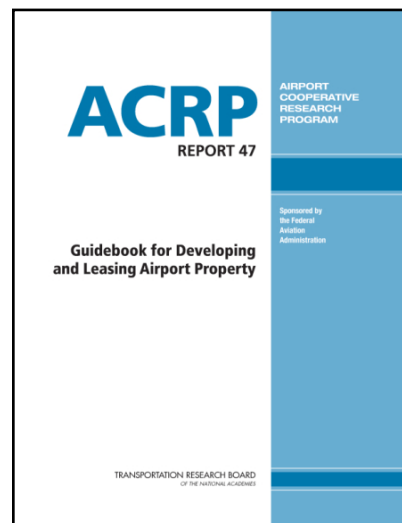
While studying at Kansas State Polytechnic (KSP) University in Salina, Kansas, recent graduate Elizabeth Nelson worked as an intern at the Salina Regional Airport. Now with the Wichita Airport Authority at the Wichita Dwight D. Eisenhower National Airport, Nelson acknowledges the critical role ACRP research products played in her academic and professional growth. “I can’t say enough about how ACRP reports helped me in school and now in the ‘real world.’ ACRP reports made me feel part of the airport industry,” she said. “My familiarity with ACRP research was a huge advantage during the interview process. I’m convinced my ACRP experience was a key reason I was hired here at Wichita.”

*Michael Parker, another KSP graduate, is a self-characterized “analytical guy,” which is one reason he appreciates ACRP research reports. “I’ve reviewed and read over 20 ACRP reports during my academic career at KSP and the data-based findings evident in each of these reports added significant value to my understanding of the key issues confronting today’s airport professionals,” noted Parker.*

Tara Harl, head of the College of Technology and Aviation at KSP emphasizes that “We fully integrate ACRP research products into our program. Our instructors do not rely on traditional textbooks; they rely on ACRP research reports to serve the role of textbooks. I realize

we are not the only institution of higher learning that utilizes ACRP reports in the classroom, but I am confident we are the only institution that integrates ACRP so robustly within the larger degree program.”

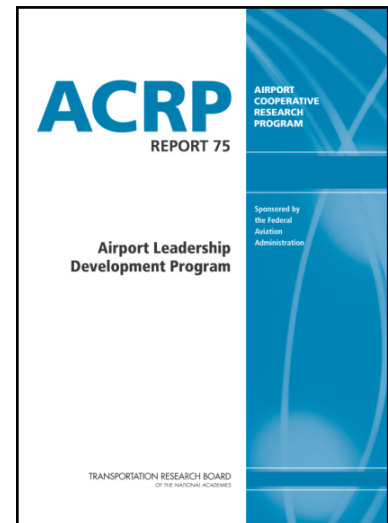
Michelle “Shelli” Swanson is director of finance and administration at the Salina Airport Authority. She noted that the Salina Regional Airport’s 20-year relationship with KSP has recently been formalized through a student internship program. “Each semester we recruit interns from KSP



who work for us for 6 months. We tailor the internship responsibilities to the needs and aspirations of the students. Like Dr. Harl, we utilize ACRP research reports to help better acclimate students to real-world airport issues and solutions.” For example, Swanson utilized *ACRP Report 47: Guidebook for Developing and Leasing Airport Property* as part of the internship curriculum. “I gave the students weekly reading assignments that we reviewed together and made the connection to real-world airport management. We also use the ACRP airport management guide as new intern orientation material,” she said.

### ***Preparing the Next Generation of Airport Leaders***

Florida’s Airport Leadership Development Program is an exciting new education initiative built upon the research and curricula contained in *ACRP Report 75: Airport*



*Leadership Development Program.* The successful program, now in its fourth year, is a collaborative effort between the Florida Department of Transportation (FDOT) Aviation and Spaceports Office, the Florida Airports Council (FAC), the Center for Urban Transportation Research (CUTR) at the University of South Florida, and Direct Effect Solutions. FDOT supports the program financially, while FAC is responsible for its promotion. Michael Audino from CUTR, working with subcontractor Mindy Price from Direct Effect Solutions, facilitates the training course. Audino chaired the ACRP Project 06-02 panel that oversaw the research, and Price co-authored the report’s training curriculum.

In addition to documenting the need for programs to develop future airport leaders, *ACRP Report*

75 finds that the current gap in leadership development is in part because of the unaffordability and unavailability of pertinent courses. The report's findings also indicate that the leadership skills needed at airports are also needed in other industries, but the circumstances in which airport leaders apply the skills are unique. "According to the research, most airport leaders receive some supervisory training to meet mandatory technical requirements. But after that, there may be limited or even no additional leadership-specific courses," says Bill Johnson, former executive director of the FAC. "Further, the report found that existing and

emerging leaders aren't learning the skills needed to lead an organization as complex as an airport."

The 3-1/2-day training and education program provides participants greater knowledge and skills they can apply immediately to circumstances at their airport, and helps participants acquire tools and techniques to focus energy on leadership appropriate to the immediate needs of their current airport environments. The program also helps participants expand their self-awareness and design a developmental roadmap to guide their leadership journey.

Michael Stewart, director of

Governmental Affairs for the JAA and former president of the FAC is committed to making the ACRP-produced curriculum sustainable on a long-term basis. "It can have such an impact on developing future leadership," he explains. "There is a lot of good young talent out there, but they need opportunities presented to them that will help them reach the next step on their career ladder. This course focuses on helping them define a direction instead of just grabbing the next job that may come along."

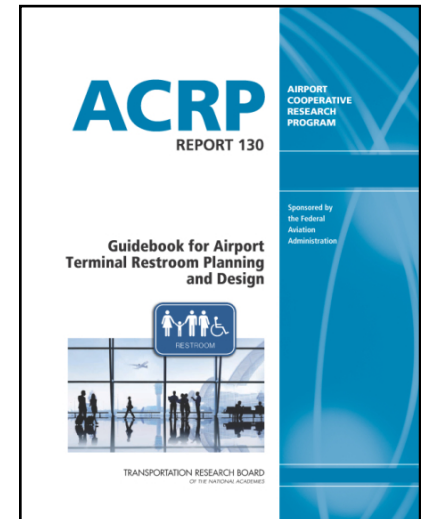
## ACRP Impacts on Design

### **Improving Customer Experience at Airport Restroom Facilities**

In spring 2013, the Austin-Bergstrom International Airport (AUS) began a terminal renovation project that included remodeling its restroom facilities. Since the project's launch, AUS has partnered with consulting firms Sunland Group, Inc.; BLGY Architecture; and Corgan Associates on restroom improvements. The goals of the remodeling were twofold: to improve convenience for customers and maintenance staff and improve the visual aspects of the restrooms. Rohini Kumarage, PMP, aviation project manager for the City of Austin, Texas, lead the renovation project and routinely referenced ACRP research reports in her work. "ACRP has something on every topic we could think of," says Kumarage. In her review of *ACRP Report 130: Guidebook for*

*Airport Terminal Restroom Planning and Design*, published after AUS completed some initial renovations, Kumarage found that many of the restroom remodeling plans aligned with the report's guidance. Going forward, Kumarage continues to reference the report for additional ideas to ensure customer convenience in the terminal restrooms.

As outlined in *ACRP Report 130*, cleanliness and customer safety are two principal aspects in restroom design. To this end, AUS followed the report's recommendation to install touch-free automatic sensors to the toilets and sink faucets. A flip-down step at the sink allows children to wash their hands unassisted. The floor was replaced with a new terrazzo floor and base that is more durable and water resistant than the original ceramic tile and requires less maintenance. Hand dryers were



installed next to the faucets and above the sinks as recommended by the report to further protect against water damage to the floor. Traffic flow is also an important aspect of restroom design. Based on guidance from *ACRP Report 130*, AUS added two new features to its remodeling plan: a grooming area and a full-length mirror. Both features offer



convenience to customers in an area separate from the main stall area and free up space at the sinks. These features are typically placed along the exit path, but away from incoming and outgoing customers not using the grooming area or mirror. Hooks for holding personal belongings are another new addition to the restrooms at AUS. *ACRP Report 130* recommends a strong metal for secure mounting and placement either in the toilet stall or near the urinals and sinks. AUS positioned hooks at the end of the sinks closest to the exits in order to help ensure that customers would not accidentally leave their personal belongings.

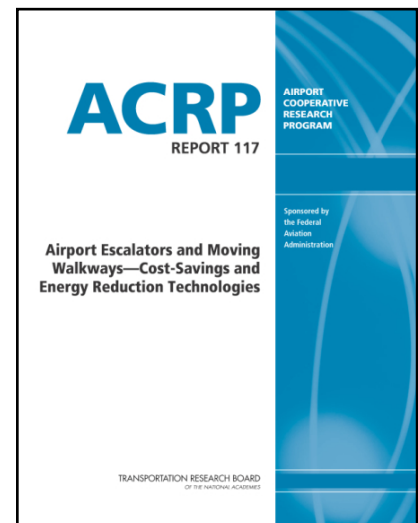
Lessons learned from the original restroom redesign and early renovation work prompted AUS to make some adjustments to its remodeling plans. The updated redesign and remodeling plans are in line with the recommendations from *ACRP Report 130*. “ACRP offers such good reference materials; you can learn a lot from them,” says Kumarage. “It helped us think of practical ideas that will result in new restrooms that will meet customer needs and require less maintenance.”

## ***Moving Customers, Savings, and Energy Consumption in the Right Direction***

Carlton Braley is assistant airport director of operations and facilities at the Manchester-Boston Regional Airport (MHT). According to Braley, *ACRP Report 117: Airport Escalators and Moving Walkways—Cost Savings and Energy Reduction Technologies* helped with the decision to install energy-saving variable demand/variable speed motors on the moving walkways and escalators at MHT. “As a small-hub airport we have just over two million passengers coming in and out of our facility in a year,” noted Braley. “Within our building, we have nine escalators and four moving walkways. We installed new motors on them that operate at lower energy until there is a demand. The moving walkways and escalators run at the same speed but not as much torque is used until somebody steps on them, until it is required. So far we have had no issues with the new motors.”

MHT also used *ACRP Report 117* as a reference when deciding to install LED lighting and motion detection on moving walkways to

reduce energy use. The report also provided MHT with information regarding best practices in the maintenance of escalators and moving walkways, such as cleaning escalator components regularly as well as lubricating components in order to reduce friction-related energy losses. Braley noted that these best practices had been in place at MHT prior to reading *ACRP Report 117*, but the report “drew attention to these practices so now we do it more often.” Braley, who has worked at MHT for over 21 years, has used multiple ACRP reports to gather information on various operational, maintenance, and security topics. “I wish I could remember them all,” he said.



## ACRP Impacts on Operations

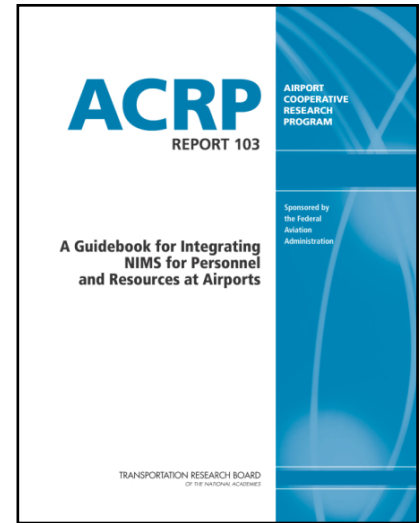
### **Standardizing Airport Incident Management Practices**

NIMS—the National Incident Management System—is a standardized approach for managing incidents involving all threats and hazards, regardless of size, location, or complexity. Developed by the U.S. Department of Homeland Security, NIMS common principles and practices help public- and private-sector entities work together seamlessly when managing incidents in order to reduce loss of life, property, and harm to the environment.

*ACRP Report 103: A Guidebook for Integrating NIMS for Personnel and Resources at Airports* provides guidance for the integration of NIMS into airport response plans for incidents, accidents, and events. The guidebook discusses common NIMS and Incident Command System (ICS) terminology, outlines recommended incident command structures for various situations relative to their complexity, and includes sample plans and training outlines from airports. The report includes an appendix with

examples of organizational charts. Mike Hainsey, executive director of Golden Triangle Regional Airport (GTR), director of search and rescue for the State of Mississippi Civil Air Patrol, and a panel member of ACRP Project 04-13 says, “Many airports are already familiar with NIMS and ICS. However, what many airports need and that the report provides are suggestions on how to more fully integrate NIMS and ICS into the airport environment for a more effective response to incidents and events.”

One of the greatest challenges facing an airport without on-site aircraft rescue firefighting services (ARFF) is integrating mutual aid and law enforcement agency response procedures to effectively manage incidents and events. Kimberly Castro, operations coordinator at general aviation Kissimmee Gateway Airport (KISM) in Florida, noted how *ACRP Report 103* led her and her KISM colleagues to redefine staff-response roles based on internal subject-matter expert resources and to reconfigure her airport’s ICS model to reflect the scope of the response, impact, and associated management structure. The report provides guidance that helps airport professionals to



develop or improve their strategic relationships and emergency plans with surrounding jurisdictions, using the common platform, language, and system residing within NIMS/ICS. The work Castro and her colleagues have done at KISM is evidence of this. KISM staff utilized the report in a recent community-based emergency preparedness workshop that Castro helped moderate. The workshop involved emergency preparedness professionals from a variety of organizations—police, fire, and airport—and other emergency operations providers within the Kissimmee area.

## ACRP Impacts on Maintenance

### ***Creating a Collaborative Environment Between Airport Operations and Maintenance***

Ryan Johnson is an airport operations specialist at the Harrisburg International Airport (MDT), part of the Susquehanna Area Regional Airport Authority in Harrisburg, Pennsylvania. Johnson is also an ACRP Champion and takes his responsibility to promote ACRP products “very seriously.” So, while the operations and maintenance teams at Harrisburg get along “pretty well,” Johnson noted, he wanted to make the situation better and was confident the tools in *ACRP Report 92: Guidebook to Creating a Collaborative Environment Between Airport Operations and Maintenance* would be of assistance.

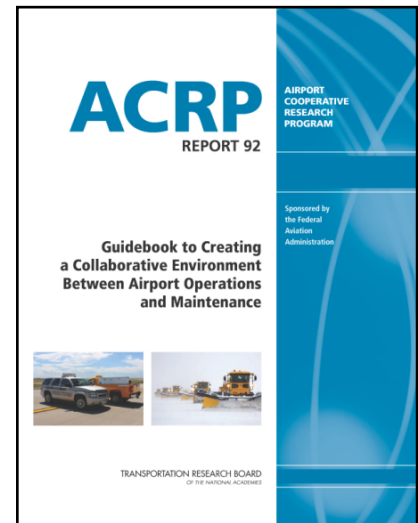
Johnson gathered members of both teams at MDT for a lunch-and-learn event where he presented the primary findings of the guidebook. Johnson developed a survey instrument based on guidance found in the Collaboration Toolbox section of *ACRP Report 92* and administered the survey to his operations and

maintenance employees to assess how well the group collaborated. He compiled and compared the results with national averages contained in the guidebook and reviewed the results during the session.

After reviewing their survey results in light of the warning signs, possible root causes, and action strategies identified in *ACRP Report 92*, Johnson and staff concluded that the warning sign “lack of confidence in others to complete tasks” was relevant to MDT. According to the guidebook, this warning sign can be attributed to “personal aversions, past disappointments, or lack of confidence in others’ skills.” As a result, employees will exhibit distrust in others’ abilities to perform as expected.

“The exercises Ryan led were eye opening to me,” said Crystal Tennis, airfield grounds supervisor at MDT. “As soon as he talked about differences in generations, it made sense to me. Sometimes it’s hard to work with other generations,” she observed. As a result of the process and the new information she obtained, Tennis has worked hard to change her behaviors. She now looks more closely at how

she presents information to others, and no longer expects people to do something just because she said so. “In my role as an ACRP Champion



I attempt to utilize as many ACRP reports and implement as many ACRP research findings as possible here at MDT,” said Johnson. “Without question, the tools contained in *ACRP Report 92* are among the best I’ve seen. I am confident that by better understanding the unique qualities and work styles of employees from different age groups, we will improve the quality of our work.”

# ► Frequency and Nature of Engagement

## ✈ Pageviews and Downloads



ACRP research is disseminated in the form of research reports, syntheses, legal research digests, web-only documents, and WebResources, all of which can be viewed on the ACRP landing page of the Transportation

Research Board website (TRB.org/ACRP). To assess the impact of each report, ACRP monitors the pageviews and downloads of each publication it uploads online. Pageviews are defined as visits to Catalog and OpenBook pages on NAP.edu and publication description (blurb) pages on TRB.org. Downloads are defined as the action of downloading a publication PDF.

Since the program's start, ACRP publications have received 2,070,553 pageviews in total. Additionally, more than 400 unique ACRP publications

have been downloaded in the time since ACRP's creation. In the past 5 years, ACRP has produced 230 publications, most of them in the areas of environment (57 publications), administration (35 publications), and policy and planning (34 publications). In this 5-year period, there have been a total of 746,848 pageviews and downloads. An illustration of the pageviews and downloads by publication area is provided in Figure 7.

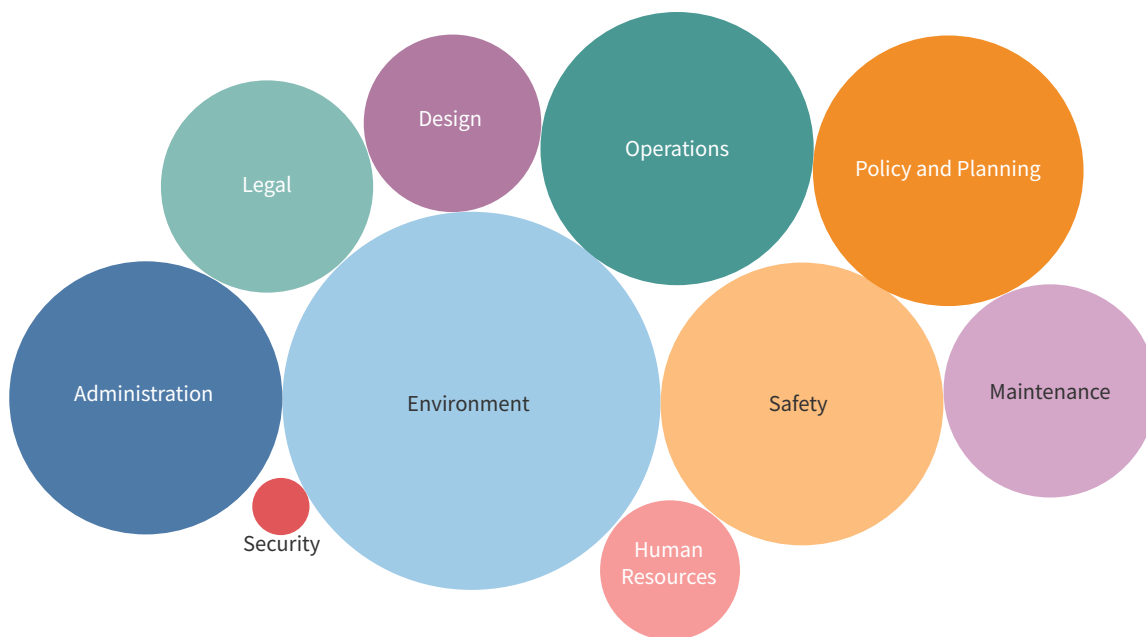


Figure 7. Relative volume of pageviews and downloads by publication area.



ACRP provides an analysis of the pageviews and downloads for its publications in the form of interactive graphics. These graphics can be found at <http://www.trb.org/ACRP/ACRPImpactsonPractice.aspx>.

The United States accounted for 412,117 of the total pageviews and downloads from 2013 to 2017.

**The states with the most pageviews and downloads** included California (43,115), the District of Columbia (32,921), Texas (31,440), Florida (28,866), and Virginia (22,737). A representation of the pageviews and downloads by state is presented in Figure 8. Every state in the nation has viewed or downloaded ACRP research in some form.

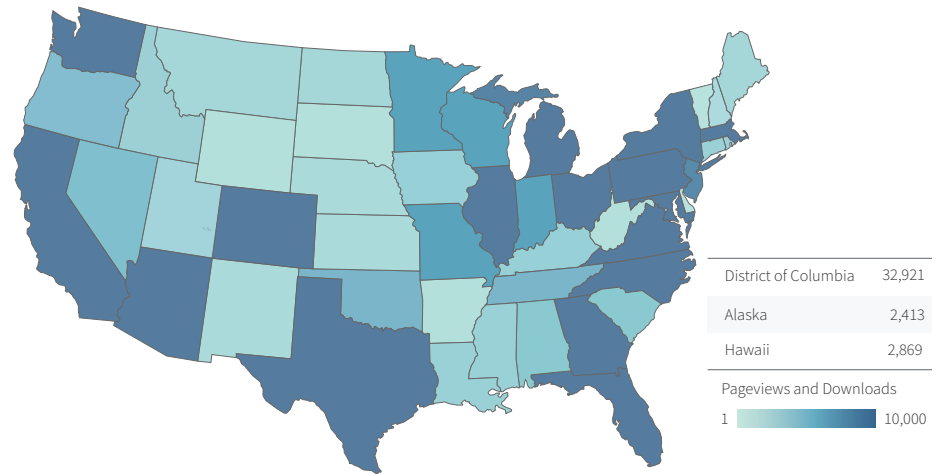


Figure 8: Pageviews and downloads by state.

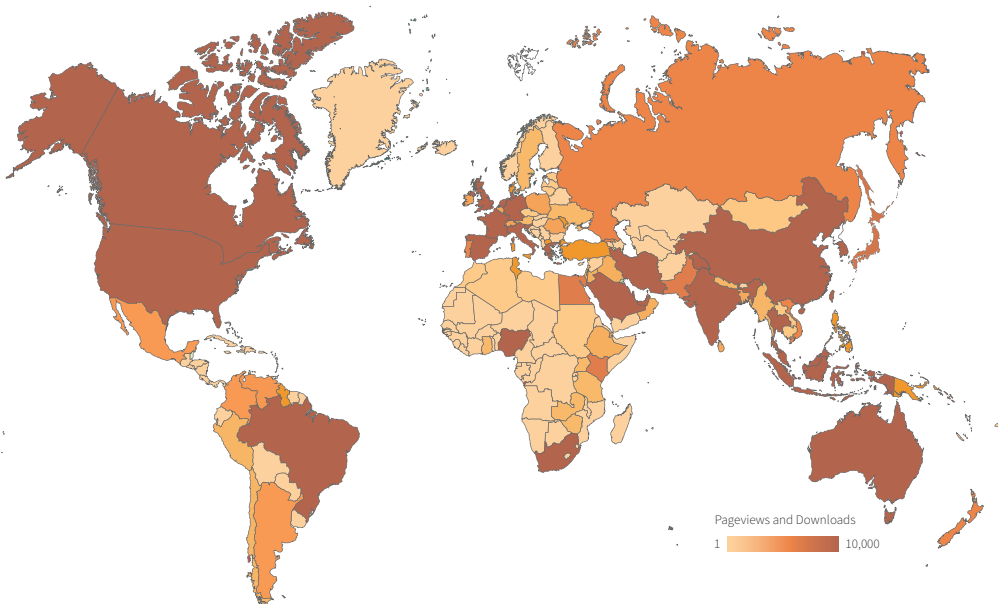


Figure 9: Pageviews and downloads by nation.

**After the United States, the countries with the most pageviews and downloads** included India (33,290), Canada (21,838), the Philippines, (21,829) the United Kingdom (21,775), and Australia (13,487). A representation of the pageviews and downloads by nation is presented in Figure 9. A total of 334,731 pageviews and downloads originated from outside the United States.

To provide contrast, Figure 10 illustrates a breakdown of domestic and international pageviews and downloads. While a slight majority of pageviews and downloads took place in the United States, international readers made up almost half of the total. This breakdown demonstrates the global span of ACRP's research; ACRP publications have been read and applied internationally almost as often as they have been in the United States.

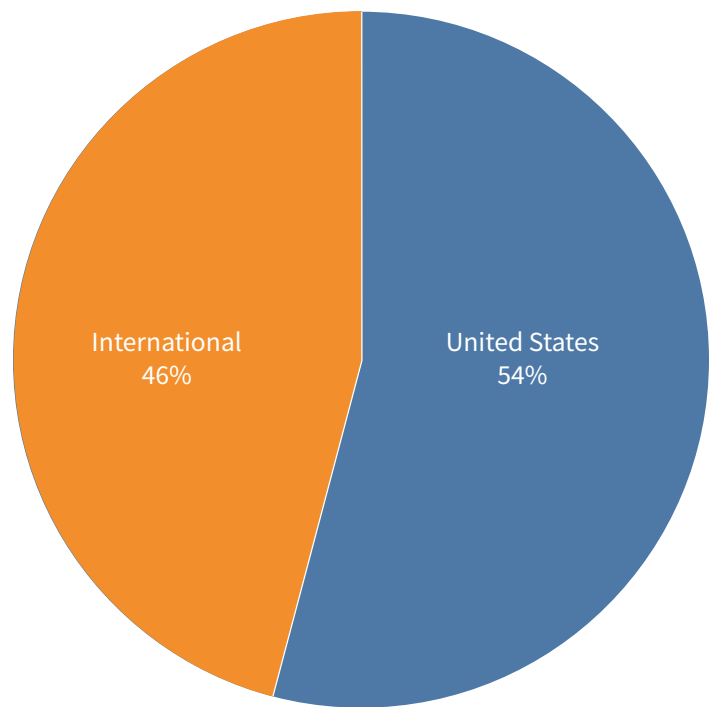


Figure 10. Proportion of international pageviews and downloads to domestic pageviews and downloads.

**These are the top five publications with the most international pageviews and downloads:**

- **ACRP Report 96:** *Apron Planning Design Guidebook* (11,644 pageviews and downloads).
- **ACRP Report 138:** *Preventive Maintenance at General Aviation Airports* (8,199).
- **ACRP Synthesis 71:** *Airport Safety Risk Management Panel Activities and Outcomes* (7,529).
- **ACRP Web-Only Document 24:** *Air Cargo Facility Planning and Development—Final Report* (7,146).
- **ACRP Report 175:** *Improving Intelligibility of Airport Terminal Public Address Systems* (6,096).

**In contrast, the top five publications with the most domestic pageviews and downloads are:**

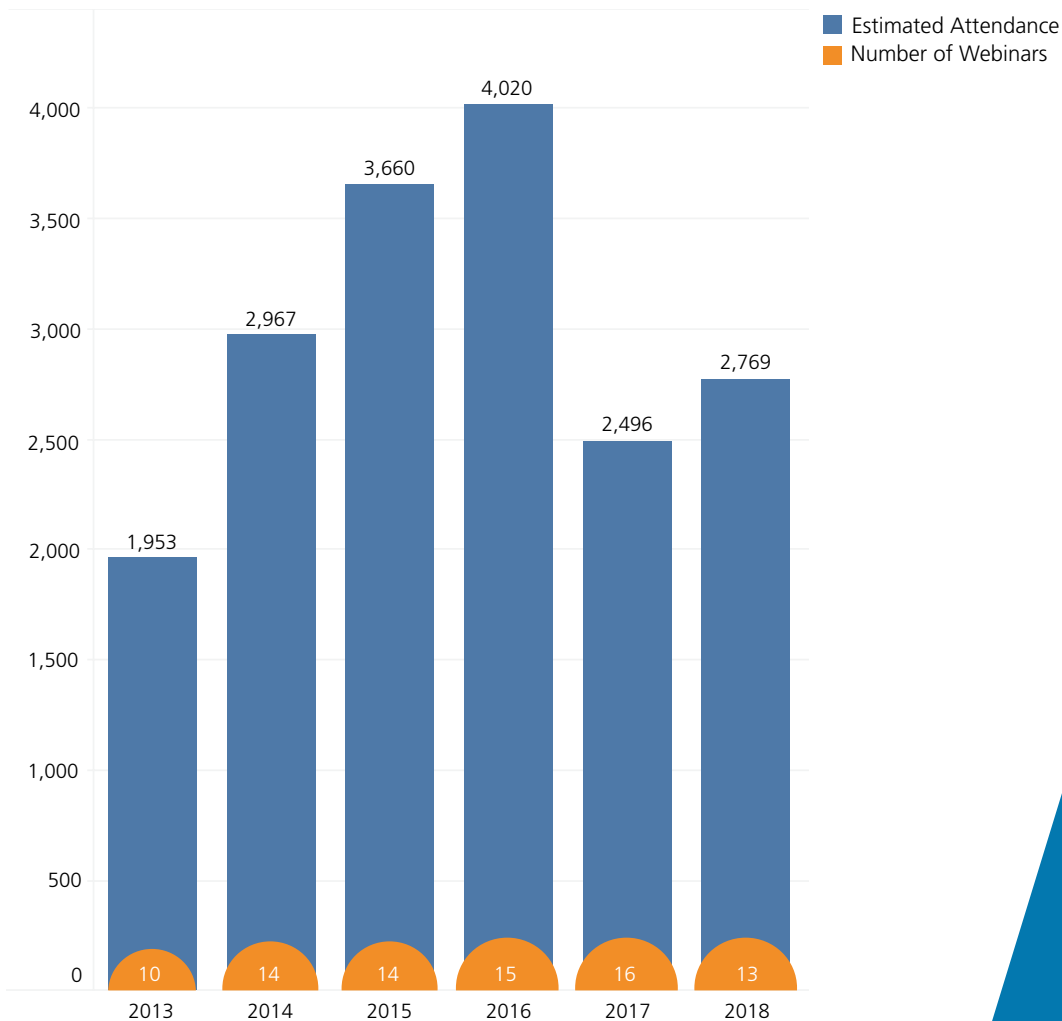
- **ACRP Report 114:** *Unmanned Aircraft Systems (UAS) at Airports: A Primer* (6,543 pageviews and downloads).
- **ACRP Report 103:** *A Guidebook for Integrating NIMS for Personnel and Resources at Airports* (5,832).
- **ACRP Report 96:** *Apron Planning and Design Guidebook* (5,502).
- **ACRP Synthesis 72:** *Tabletop and Full-Scale Emergency Exercises for General Aviation, Non-Hub, and Small Hub Airports* (5,499).
- **ACRP Report 138:** *Preventive Maintenance at General Aviation Airports* (5,127).

## Webinar Attendance

In addition to monitoring how many pageviews and downloads ACRP publications receive, the program also monitors who chooses to engage with ACRP research by attending webinars that elaborate on ACRP's findings. Between 2013 and 2017, the Transportation Research Board (TRB) hosted 69 webinars that focused on ACRP research products. These 69 webinars reached over 15,000 attendees throughout these 5 years and reached over 4,000 people in 2016 alone. Including the 13 webinars hosted

in the beginning of 2018, TRB (and ACRP) hosted 82 webinars attended by close to 18,000 participants (see Figure 11).


Combining the webinar attendees with the pageviews and downloads, it is estimated that there were 803,288 instances of engagement with ACRP research during this 5-year span. The program found that those who view, download, or choose to learn more about ACRP research tend to engage with more than one publication.



*Figure 11. The number of ACRP-focused webinars and estimated webinar attendance by year.*







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