

Announcement of Airport Research Projects August 2010

The Vision 100—Century of Aviation Reauthorization Act established the Airport Cooperative Research Program (ACRP). The ACRP undertakes research and other technical activities in response to the needs of airport operators on various airport issues involving administration, environment, legal, policy, planning, safety, security, human resources, design, construction, maintenance, and operations at airports.

The ACRP is sponsored by the Federal Aviation Administration (FAA) and managed by the National Academies, through the Transportation Research Board (TRB), in coordination with Airports Council International-North America, Airport Consultants Council, American Association of Airport Executives, National Association of State Aviation Officials, and Air Transport Association of America.

The ACRP Oversight Committee (AOC), the governing board for the program, met on July 18 and 19, 2010, and selected projects for the Fiscal Year 2011 program.

The purpose of this announcement is to inform the airport industry and research community of these projects.

This announcement contains excerpts from problem statements that are preliminary descriptions of the selected projects. Detailed project statements (e.g., requests for proposals), formally soliciting research proposals for these projects, are expected to be released starting in November 2010.

ACRP project statements are available only on the World Wide Web. Each project statement will be announced by e-mail. A form to register for e-mail notification of project statements is available at ACRP's website, <http://www.trb.org/acrp>. Research project statements will be posted at the same Internet address when they are active.

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

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**Airport Cooperative Research Program
Projects in the Fiscal Year 2011 Program**

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Summary of Approved Research Projects

■ Project 1-19

Airport Improvements: Developing a Cost Estimating Model and Database

Research Field: Administration
Allocation: \$400,000

Airport capital investment needs are approaching \$20 billion dollars annually, based on a 2009 ACI-NA capital needs survey. Both individual airports and the FAA are dependent upon individual case-by-case engineering cost studies and the bid process to estimate, plan, and budget for their capital needs, engineering cost reviews, value engineering, etc. The engineering, planning, and finance staffs at airports generally do not have extensive project development experience, refined over numerous projects of a similar nature. Thus, they rely upon external consulting expertise. There is insufficient consistency, standardization, and accuracy across the airport industry to compare project cost estimations that result from variations in regional costs or technical expertise. Moreover, principal vs. agent misalignment incentives and other factors make simple extrapolation from other project experience problematic. Although this arrangement may provide some useful benefit, it lends itself to overdependence on consultants. Notwithstanding, the airport and the FAA may not properly direct the consultants or appreciate the options and choices implicit in various designs, their tradeoffs, or have no independent way to benchmark the work of their consultants. Airport sponsors need consultants that are well versed and current with market developments and emerging innovations. Capital budgeting and cost allocation can be more robust, reliable, and equitable when cost estimates are developed enabling both airport managements and their FAA collaborators to plan more efficiently and allocate their limited resources effectively.

The objective of this research is to develop a cost estimating model and integrated database for typical airport capital projects. Examples of the types of projects that could be considered in this research includes runway construction, extension, and rehabilitation for both green field

projects and while airports are in use. The cost estimating model should be regionally specific and tailored to specific categories of airport improvement projects. Specialized information focused on the unique or special characteristics of airport projects should be developed to work in conjunction with readily available commercial construction information databases or services. Operating and maintenance costs could be included in order to permit a full life-cycle costing model.

■ Project 1-20

Procuring and Managing Professional Services for Airports

Research Field: Administration
Allocation: \$350,000

Most U.S. airport owners engage professional service firms to assist them with the planning, design, and management of capital development projects at their facilities. Such firms bring resources, specialized technical capabilities, and subject matter expertise needed for these activities that may not be available within the airport owners' organization. While some resources exist that include best practices for certain elements of procuring professional services, there is no comprehensive resource that provides recommended practices that can guide an airport and their consultant service providers through the initial stages of procuring services to the completion of a project. Such a resource could provide well-documented and practical steps that will improve the consultant-selection process and engagement of the firm through the completion of the project, resulting in successful and high-quality projects that will benefit the traveling public.

The objective of this research is to develop a handbook that describes industry best practices with respect to procuring and managing professional services at airports. The handbook should address all steps that take place in the process, including identifying a need for services, procurement, scoping, and the execution and close-out of professional services contracts. The guide should account for local conditions and regulations that may deviate

from a standard process by suggesting ideas or practices that reduce common risks and pitfalls in the process and increase the probability of success. It is anticipated that the research develop a guide document along the lines of ACRP Report 16: *Guidebook for Managing Small Airports* that describes a simplified selection process for smaller airports, while still meeting the requirements of AC 150/15100-14.

■ Project 2-20a

Evaluating the Risk of Disease at Airports and on Aircraft

Research Field: Environment

Allocation: \$200,000

Air travel is often seen as creating an opportunity for the spread of diseases such as influenza, norovirus, tuberculosis, etc. Despite decades of public health investigations, it remains difficult to quantify the risk posed by an infectious individual at the airport, in the aircraft cabin, or at other stages in travel. Recent advances in modeling the transport of contaminants (e.g., bacteria and viruses) in aircraft cabins have suggested pathways of contagion but have not examined the infectivity of the transported contaminants (i.e., the likelihood that a viral or bacterial particle will actually cause disease in another individual). There is less research on the spread of disease via contact with a surface (i.e., fomite transmission) such as a doorknob, tray table or escalator handrail, although there have been recommendations for disinfecting these and other surfaces in and around airports and aircraft. Linking current modeling techniques to epidemiological methods would allow the aviation community to better assess the risk of exposure for passengers and employees moving through the airport system.

The objective of this research is to use the best available epidemiological data and most current modeling techniques to assess and quantify the exposure risk of air travelers to infectious disease.

■ Project 2-28

Sustainability for Airports: Best Practices, Success Metrics, and Beyond

Research Field: Environment

Allocation: \$800,000

This project will begin in October 2010

Airport sustainability encompasses a wide variety of practices that consider environmental protection, maintenance of high and stable levels of economic growth, and social progress. Many airports have begun to incorporate sustainable practices into their planning, construction, and daily operations in response to regulation and policy and because of the tangible benefits to the airport and surrounding community. Many airports, however, have found barriers to implementing sustainability practices, which include lack of funding, staffing challenges, and lack of understanding and/or awareness. While there have been many efforts to define sustainability as well as to identify airport sustainable practices, none of the efforts to date have developed evaluation metrics and/or rating processes for airport sustainability programs. These metrics are critical to helping airports prioritize projects and practices and to evaluate their performance.

The objective of this research is to identify best practices for airport sustainability and to identify practical metrics to evaluate sustainability efforts and practices. The effort would likely be undertaken in two phases and build off of the findings of ACRP Synthesis 10: *Airport Sustainability Practices*. Phase I would involve holding a series of workshops of airport practitioners to share data, models, and methods, and discuss findings and preliminary conclusions of recent and ongoing sustainability research as it relates to airports. Phase I would also help the industry gain a better understanding of existing and potential drivers, priorities, and impediments to implementing sustainability practices. Phase II would involve the identification of best practices and potential evaluation metrics. This second phase would also explore various models for a sustainability

organizational framework. The work done in Phases I and II would likely lead to a third phase (not currently funded) that could explore methods for encouraging greater airport participation in sustainability projects and practices.

■ **Project 2-29**

Evaluating Treatment of Runoff from Deicing at Airports

Research Field: Environment

Allocation: \$600,000

Airports across the United States face increasing regulatory and technical challenges for addressing runoff containing glycol-based aircraft deicing and anti-icing fluids (ADFs) associated with deicing operations. The handling and discharging of this runoff, which represents millions of gallons of storm water and wastewater associated with industrial activities, present unique challenges for airports as requirements vary state to state. Although the Effluent Limitation Guideline (ELG) being developed by EPA will likely standardize effluent limit and/or collection efficiency requirements, it will not provide airports with the information needed to evaluate treatment options or help them achieve the new effluent limitations with which they must comply. In addition, new treatment technologies, including biological treatment systems, show potential benefit. Several airports have applied biological treatment as a method of treating deicing storm water runoff; however, while there are airports that do have biological treatment systems in place, the effects of cold water temperatures on system performance have not been sufficiently researched or documented. In addition, the potential effect of storm water that contains a mixture of aircraft and pavement deicers on treatment efficiency has not been investigated.

The objective of this research is to evaluate proven and potentially promising emerging technologies for the treatment of ADFs and storm water containing spent ADFs for airports of various sizes, activity levels, and in differing climates and to provide airports with a thorough

review of available options and emerging technologies for the treatment of this fluid. This research should evaluate various existing and emerging treatment options relative to their effectiveness; capital and annual costs; environmental benefits; practicality relative to airport size, activity levels, and climate; and other relevant factors. Alternatives to be considered should include both onsite and offsite options that could be used as pretreatment or as the final treatment solution for the facility-generated material. The research should also address offsite treatment options as well as onsite in-situ active or passive treatment technologies.

■ **Project 2-30**

Enhancing the Airport-Industry Database of Sustainable Practices

Research Field: Environment

Allocation: \$500,000

There is increased attention and interest toward incorporating sustainable practices into airport planning, construction, and everyday operations. Many airport operators have made commitments to be more sustainable through a variety of mechanisms, including policy statements, adoption of goals, measuring and reporting, and development of airport-specific sustainability guidelines. Airports have undertaken myriad sustainable practices focused on improving their environmental, economic, and social viability. Many airports, however, do not have the staff expertise or resources available to learn about the sustainable practices that may be applicable at their airport. To assist airport operators looking to undertake a sustainability program or incorporate sustainable practices into their projects and operations, Airports Council International-North America, the Airport Consultants Council, the American Association of Airport Executives, the Air Transport Association, and the Federal Aviation Administration established the Sustainable Aviation Guidance Alliance (SAGA) in late 2008. SAGA collected information on hundreds of airport sustainability initiatives that have been employed by airports across the U.S.,

Canada, and internationally and used that information to develop a comprehensive searchable database and accompanying guidance document that can assist airport operators in planning, implementing, and maintaining sustainability programs. The SAGA database was launched in October 2009 and is now available online at www.airportsustainability.org. The current database provides a good resource for airports looking to improve their sustainability. However, because SAGA has been a purely volunteer effort of association, airport, and consultant experts in sustainability, the resources were not available to provide additional supporting information that could make the database of practices a more valuable tool. The database provides a list of hundreds of sustainable practices, but little supporting material or resources to consult for additional information. As an example, one practice included is “Develop an Energy Master Plan for the organization's facilities.” The database would prove more useful if it also described what an energy master plan entails; the associated costs/benefits; and links, cites, or contacts for additional information.

The objective of this research is to update and expand the airport-industry database, develop additional supporting information for each of the sustainable practices provided in the database, and improve the user interface of the web-based database. Such additional supporting information may include a brief description of the practice; associated costs and benefits; and link, references, or contacts for additional information.

■ Project 2-31

Assessing Acoustical Materials Used in Airport Residential Sound Insulation Programs

Research Field: Environment
Allocation: \$350,000

Since 1982, more than three billion dollars has been invested in residential sound insulation programs in the United States. These programs have provided significant noise relief to

communities impacted by noise generated by aircraft operations at nearby airports and have helped airports meet the growing demand for air travel and commerce that depends on the aviation industry. At this time, however, there is no programmatic approach to evaluate the long-term effectiveness of sound insulation programs nationwide. The FAA's efforts to provide sound insulation to communities has largely been thought of as a “one-time” effort; that is, once sound insulation has been provided, the noise problem is seen as having been solved and the obligation of aviation-related public agencies has been fulfilled. Complaints from people living in homes that were treated early on have challenged this notion. Airports are increasingly pushed to respond to community demands to maintain the noise reduction levels originally provided. For example, homeowners in communities that were sound insulated in program efforts in the 1980s are beginning to report that effectiveness of the noise reduction originally provided by acoustical products installed in their homes is beginning to be compromised by the deterioration of these products over the past 20 to 30 years. Furthermore, many airports are currently initiating or in the midst of major soundproofing efforts. Lessons learned from earlier programs can be used to better assist current and future programs with more cost-effective methods to better safeguard federal and local investment dollars. Sound insulation programs are on-going and acoustical products are being installed in numerous programs across the country. These programs can benefit immediately from this study, and problems with products that otherwise would be merging 20 to 30 years in the future, might be avoided.

The objective of this research is to survey and test a wide range of acoustical products, including those installed in the 1980s, and compare these products to those emerging as the result of recent and possible future technological improvements. This research would help determine if product performance has deteriorated over time to the point where the noise reduction standards mandated by the FAA are being compromised. A secondary objective

is, through a process of interviews, surveys and testing, to determine what types of products perform more effectively over time. This information can help guide on-going and future sound insulation program efforts to choose products that ensure greater longevity to NR effectiveness.

■ Project 2-32

Understanding and Controlling Nuisance Bacteria in Airport Storm Water Outfalls

Research Field: Environment

Allocation: \$400,000

As the more profound environmental impacts of deicing activities are mitigated by runoff controls, increasing regulatory scrutiny is being directed toward more subtle issues, including the occurrence of bacterial slimes at storm water outfalls. The challenge to the aviation community for complying with these emerging regulations is significant, because bacterial growth associated with deicing discharges is not currently predictable, the controlling factors are poorly understood, and the costs of treatment controls are substantial. For example, “sewer bacteria” (*Sphaerotilus natans*), a filamentous bacteria associated with organic-rich wastewater discharges, appear to be ubiquitous in the environment, and may flourish wherever the right conditions exist. This situation presents a high level of risk associated with the large investments needed for controls that may or may not eliminate the bacterial growths. Airports need reliable information on what is and is not known about the factors controlling the occurrence of nuisance bacteria, and the options for controlling them. Environmental regulators would also benefit from this information as they try to establish realistic and appropriate requirements.

The objective of this research is to provide airport environmental managers, airport consultants, and regulatory agency personnel with a reference document that presents a clear description of what is currently known about the occurrence of bacterial growths associated with deicing discharges, and practical quantitative

guidance on water quality and other environmental parameters that must be controlled for their mitigation.

■ Project 2-33

Understanding Emissions from Airport Construction

Research Field: Environment

Allocation: \$350,000

As airports continue to expand and modify their infrastructure to meet the growing demand for air travel, they need to configure their growth within environmental constraints. Airport projects that rely on federal funding are required to have National Environmental Policy Act (NEPA)-related studies conducted to assess the environmental impacts of these projects. Many airport projects require construction to deal with additions or changes to runways, taxiways, aprons, terminal buildings, parking facilities, etc. Although emissions from construction equipment and associated activities are temporary in nature, they must be accounted for along with other applicable sources to meet NEPA requirements. While the understanding of emissions from various airport sources is improving, construction emissions still remain largely unknown. The Federal Aviation Administration’s (FAA’s) Emissions and Dispersion Modeling System (EDMS)/Aviation Environmental Design Tool (AEDT) currently does not explicitly account for construction emissions, and few resources offer guidance for quantifying explicitly such emissions. As such, there is variability in estimated emission levels and components based on what emission factors are used, how the equipment is characterized, and what activity data are used.

The objective of this research is to develop guidance and a database to more accurately and consistently quantify emissions from airport-related construction activities. Research should also provide consistency in estimating construction emissions for an airport project by answering questions such as: (a) what emission factors should be used and how accurate are they; (b) how should activity data (including

loads) of the equipment be obtained or measured; (c) how should construction emissions be included in EDMS/AEDT, especially if a dispersion analysis is to be conducted; and (d) how should suspended dust from airport construction activities be estimated?

■ **Project 2-34**

Quantifying and Monitoring Lead Emissions from Leaded Aviation Gasoline

Research Field: Environment

Allocation: \$500,000

The current National Ambient Air Quality Standard (NAAQS) for lead is ten times more stringent than the previous standard. Existing regulations are believed to affect only five airports, which have numerous operations from piston engine aircraft that use leaded aviation gas (AVGAS). On December 23, 2009, the U.S. Environmental Protection Agency (EPA) proposed to revise the ambient monitoring requirements for measuring airborne lead. The proposed regulation changes the lead monitoring threshold and will affect up to 73 airports. This revised threshold will be the basis for State Air Quality agencies requiring source-oriented monitors be installed near any applicable source, and it would require airports to be treated as any other source of lead when determining whether source-oriented lead monitoring is needed. The inputs used to determine applicability were based on a number of assumptions and can be improved by obtaining airport specific information. However, the EPA has limited quantitative data to evaluate on-airport or off-airport ambient lead concentrations associated with airports. The primary source of information was from the Santa Monica Airport study. In addition, the National Association of Clean Air Agencies (NACAA) monitoring subcommittee members “claim that lead emissions at airports will have a lesser impact on ambient lead concentrations since the lead emissions from airplanes taking off from or landing at airports are spread out over a larger area, unlike industrial sources where the emissions may be emitted from a few

stacks.” If this proposed regulation is enacted, airports would need to document applicability or work with state agencies to monitor ambient lead concentration of the surrounding air. Airport owners and operators would face significant financial expenditures to quantify emissions accurately and design a representative and effective monitoring program.

The objective of this research is to provide airports with specific guidance regarding the derivation of an effective methodology to quantify lead emissions at airports serving general aviation (GA) aircraft using leaded AVGAS. In addition, this research can develop a protocol for a representative monitoring program that addresses the number and type of monitoring equipment required, and procedures for identifying locations, monitoring time period, estimated cost, and other applicable components.

■ **Project 2-35**

Understanding Public Perceptions of Aircraft Noise and Noise-induced Sleep Disturbance

Research Field: Environment

Allocation: \$600,000

Community annoyance due to aircraft noise exposure has historically led to public opposition against airport and airspace projects. Measuring subjective reactions through social surveys is accepted as the most direct method for determining how residents in a community feel about the impact of noise on their lives. The seminal work by Schultz published in 1978 developed a correlation (exposure-response relationship) between transportation noise exposure levels in terms of the day-night average noise level (DNL) and the percent of the population highly annoyed by that transportation noise from social surveys. Schultz’ work was re-affirmed by the Federal Interagency Committee on Noise (FICON) in 1992. Since then, U.S. research on the effects of aircraft noise has lagged, while aircraft noise has continued to evolve with substantial increases in traffic volume and significant improvements in noise levels of single aircraft.

It is therefore unclear whether an exposure-response relationship based on currently available data is sufficiently representative for U.S. airports today. Another prominent public concern has been sleep disturbance from nocturnal aircraft noise. Developing a relationship between the degree of sleep disturbance and the level of nocturnal noise exposure is a prerequisite for identifying and protecting communities from adverse noise effects. There is currently no widely accepted exposure-response relationship for sleep disturbance. Establishing up-to-date exposure-response relationships for community annoyance and sleep disturbance in the United States requires an extensive data acquisition campaign covering a wide variety of airport types and geographic locations, which in turn requires a well-designed study.

The objective of this research is to provide the starting point for the initiation of a large-scale social survey to acquire data in the United States, which further develops noise exposure-response relationships describing the effects of aircraft noise on annoyance and sleep across the United States today.

■ **Project 2-36**

Airports Exploring Multimodal Opportunities for the Use of Alternative Fuels

Research Field: Environment
Allocation: \$500,000

Increasingly, airports and their tenants are examining the potential to introduce sustainable alternative fuels at their facilities. For example, a potential project for alternative jet fuel purchase and distribution now is in place in the Seattle area, and there are plans for use of alternative fuels for ground service equipment at Los Angeles (LAX). Additional projects are under consideration in other locales from coast to coast. Thus, airports and their tenants serve as concentrated demand centers for potential alternative fuel suppliers. Optimizing the potential of these developments from a broad business view can offer airports a new sustainable business and environmental

opportunity, can renew aviation growth, and can create jobs at airports and in the region. Work to date on soon-to-be-certified Bio SPK (Hydro-treated Renewable Jet) projects suggests that a project sized to optimize jet fuel production near an airport is optimally configured to produce biodiesel and other co-products as well. Consumption from non-airport customers can add as much as 50% to the consumption volume, and other transport modes consuming what remains. Given the concentrated demand for fuel product at an airport, airports can serve as the best possible distribution locus for all transportation and commerce that serve the airport and can benefit from access to green diesel and co-products.

The objective of this research is to define and quantify costs and benefits (environmental, economic, and social [e.g., jobs]) for the use of on- or near-airport alternative fuels facility. This analysis should help frame opportunities for cooperation between an airport and its tenants to serve as a distribution hub of jet fuel, green diesel, and related co-products for which the airport and its tenants would be the prime customer (>50% of production volume). This research seeks to optimize this sustainable business and environmental opportunity by evaluating options from the perspective of all transportation services that serve airports building on the growing discipline of transportation multimodal analysis.

■ **Project 2-37**

Evaluating the Accuracy of the Integrated Noise Model for General Aviation Jet Aircraft

Research Field: Environment
Allocation: \$400,000

Since the 1970s, the FAA has developed and continuously improved its Integrated Noise Model (INM). One component of the INM is the database of aircraft sound levels used to compute sound exposure around airports. This database is used worldwide as the fundamental aircraft noise data for computing airport noise contours. Historically, the emphasis on improving the sound level database has been on

large commercial jets, the most common source of noise at major airports, while the database for general aviation (GA) jets has been less developed. This has often resulted in a disparity between predicted and actual noise levels for GA jets, and is most apparent when modeled results are compared to actual measured data. The disparities can lead to noise contours that do not reflect actual sound levels, which, in turn, may compromise compatible land use planning and result in inappropriate funding of noise mitigation.

The objective of this research is to collect a statistically relevant sample of noise data for representative GA jet aircraft and use this data to both assess the predictive accuracy of existing INM model input and to develop new and improved GA noise INM input.

■ Project 3-24

Air Cargo Facility Planning and Development

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

Air cargo is a significant component of the world's manufacturing and retail supply distribution chain. It is also an important revenue source for the airport industry. Many air cargo gateways are relying on antiquated facilities built in the 1940s and 1950s that are unable to meet demand growth, and changes to TSA mandated cargo handling procedures and security requirements. As airports redevelop and expand their cargo facilities, they are finding incomplete and inconsistent air cargo activity data as well as a lack of generally accepted air cargo planning and design guidelines and standards. The lack of consistent cargo facility planning standards and cargo data collection templates can be problematic for airports engaged in cargo planning and development. Planners need to have current and accurate information to ensure that near-term as well as long-term on-airport cargo needs will be accommodated. Inconsistencies in cargo data collection can compromise revenue generation as well as planning. For example, some carriers include trucked tonnage in monthly reports

while others do not. This can affect how an airport plans for and allocates space for priority on-airport cargo activity that must consider many factors including, facility throughput area, storage/sorting space, aircraft parking, cargo tug lanes, ground handling equipment storage areas, and landside truck docks and circulation.

The objective of this research is to develop air cargo data collection processes and facility planning guidelines that will enable airports to meet the industry's current and future technological, operational, and security challenges in a cost-effective and environmentally sound manner.

■ Project 03-25

Analysis of Cumulative Cost Associated with Regulatory Compliance and its Impact on Small Airport Viability

Research Field: Policy and Planning
Allocation: \$300,000

Since the initial deregulation of the airline industry, federal, state, and local governments have gradually increased the regulatory requirements on U.S. airports. The costs associated with incorporating on-going regulations in a wide array of subject areas have steadily added to airport operating costs over the years. This is especially true for small and non hub airports that have limited staff and financial resources with which to fulfill their regulatory responsibilities. For many small airports, lower passenger enplanements limit their ability to raise revenue or cut costs significantly to make up for the financial burden posed by increased regulation. With limited budgets already stretched by operating costs and capital expenditures, many small airports are struggling to absorb compliance costs associated with the cumulative regulatory requirements. While government agencies provide some funding for new regulatory initiatives, costs attributed to on-going compliance remain unfunded.

The objective of this research is to examine the cumulative regulatory compliance costs at small and non hub airports. Specifically, compare and

contrast the amount of government funding provided for new regulatory initiatives vs. costs associated with on-going regulatory compliance. Additionally, study alternative funding mechanisms to pay for on-going operating costs associated with regulatory compliance.

■ Project 3-26

Understanding Airline and Passenger Choice in Multiple Airport Regions

Research Field: Policy and Planning
Allocation: \$250,000

Improving and expanding commercial air service and attracting more passengers are goals for many airports, especially for small airports. For small airports in a multi-airport region, efforts to attract air service and passengers are complicated by the fact that airlines and passengers have the additional choices made available by the other airports in the system. In multi-airport regions, air carrier service decisions are based on network profitability, competition considerations, and reflect the airlines' understanding of customer behavior. Passengers, in turn, select a particular airport based on flight schedules, air service reliability, airfares, overall travel time, and other factors. Hoping to attract more air service and passengers, small airports often initiate promotional campaigns, air service studies, subsidize air service, and undertake significant facility improvements. The results and performance of these investments are often disappointing because the airport and its community did not have a thorough understanding of how airlines make service decisions and how passengers choose airports in a multi-airport region.

The objective of this research is to provide objective guidance to help airports understand the dynamics of airline and passenger decision-making in multi-airport regions. This guidance will ultimately help communities set realistic expectations for the level of air service and passenger activity at their local airport, which, in turn, will help them focus limited resources on obtaining and maintaining their optimal air

service. The effort would potentially include reviewing relevant literature, conducting case studies, and documenting results.

■ Project 3-27

Tools and Techniques for Counting Aircraft Operations at Airports

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

Aircraft operations counts are used in aviation systems planning, airport master plans, environmental studies, aviation forecasts, and to determine funding and design criteria for the nation's airports. At airports with control towers, aircraft operations are tracked and recorded by air traffic control. However, of the more than 5,300 Public Use airports in the United States, only 546 have towers, and most of the towered airports are not open 24/7. This results in airports having to estimate operations counts and, in the case of non-full-time towers, potential undercounting. Airports, as well as state and metropolitan planning agencies, will often use various methods to estimate aircraft operations counts. Methods typically consist of sampling a limited time period during the year and extrapolating the results. The sample data have traditionally been collected through guest logs, fuel sales, visual observation, automatic counters, and acoustical counters. Recently, newer technologies have been introduced (for example, video motion detectors). In 2007, TRB published ACRP Synthesis 4: *Counting Aircraft Operations at Non-Towered Airports*, which described the different methods of counting and estimating operations and provided an initial recommendation for best practices. The research, however, was completed prior to recent advances in technology and was not based on a rigorous research plan. The research will build off of earlier research.

The objective of this research is to identify, test, and evaluate the various data gathering and sampling plans and technologies to provide guidance for airports in selecting the most cost-

effective and accurate aircraft operations counting tools and techniques. The research will test traditional methods as well as newer technologies and consider how to supplement counts at airports with tower whose operational hours are limited.

■ **Project 4-11**

Integrating Geographic Information Systems into Communications among Airports and Community EMS Partners

Research Field: Safety
Allocation: \$350,000

Geographic Information Systems (GIS) are becoming very useful and appropriate tools at airports. One application for airports is in the area of emergency management and response for their internal response and with their mutual aid community partners. Using GIS could increase situational awareness in airport communications centers and improve the response by local emergency responders. Research is needed to examine specific technologies and benefits that can help airports use GIS as part of their emergency response and mutual aid communications.

The objective of this research is to focus on how GIS can be integrated into an airport's emergency management response, the necessary elements for implementation and coordination with local community partners, barriers to using the technology, the impact on current operating procedures, such as access control and closed circuit television systems, and best management practices.

■ **Project 4-12**

Using Integrated Emergency Data Communications Systems at Airports

Research Field: Safety
Allocation: \$400,000

Various software and Internet-based communications and control systems are being utilized as disaster management tools in municipalities and at airports. Tools such as

“Web-EOC” and “E-team” are used to coordinate between on-scene commanders and emergency operations centers for needed resources. While these technologies have proven useful in disaster management, they also have applicability at airports for other non-routine activities/operations, such as for snow and other weather events, diversions, and security incidents. As airport communications centers and emergency response becomes more sophisticated and the use of technology increases, research is needed to help guide airports to the benefits and costs of adding Internet-based communications and controls systems. Airports need guidance as to the features and functions; how municipalities have integrated these Internet-based communication tools into their disaster management operations; their applicability to airports of all sizes; and guidelines for implementation. Software and Internet-based tools can also be used to help train airport employees in their emergency response.

The objective of this research is to prepare a guidebook to be used by airports and their disaster management response team to evaluate internet based communications and control, to prepare training tools, and to provide best management practices for integration and implementation into emergency response management.

■ **Project 4-13**

Integrating Community Emergency Response Teams at Airports

Research Field: Safety
Allocation: \$400,000

Community Emergency Response Teams (CERT) have been in existence since the 1980s, but since they have been encouraged as part of the Citizen Corps under President George W. Bush, they are becoming much more common. Members of CERTs receive the same basic training, but beyond that, it's up to each CERT team or municipality that operates them to determine training and qualification requirements. Airports can benefit from having

a trained group of dedicated community volunteers able to respond to various emergencies and non-routine events. Team members would be able to handle a number of different tasks and responsibilities in the event of a disaster or emergency situation. An airport CERT program can help create a pool of volunteers who are well-trained in airport operations, security requirements, and in the area most likely to be needed during a disaster, and thus become a useful resource for airports of all sizes.

The objective of this research would be to develop a guidebook for developing an airport CERT program. The guidebook would also include qualifications, training standards, costs, insurance requirements, and ways to integrate them into the emergency response plan.

■ **Project 7-08**

Airport Terminal Design for Revenue Generation and Customer Satisfaction

Research Field: Design
Allocation: \$500,000

Current terminal planning and design approaches typically focus on passenger and baggage processing and functional requirements. While the movement of passengers and bags between the curb and the aircraft is the basic functional role of a terminal, the atmosphere created by the mix of services and facilities in a terminal can greatly impact passenger satisfaction. A calmer, more satisfied passenger can lead to increased revenue generation through additional concession sales, and can also increase overall passenger activity as travelers may be more inclined to select a particular airport in part due to the terminal layout and amenities offered. In addition to the challenges of day-to-day operations, airports also face irregular airline operations that often result in passengers being stranded in their terminals for extended periods of time. Airports are growing increasingly sensitive to these irregular operations with the desire to quickly and efficiently respond passenger needs.

The objective of this research is to generate new terminal concepts that consider and incorporate a planning and design approach centered on improving and maintaining passenger satisfaction levels during both regular and irregular operations and increasing airport terminal revenue.

■ **Project 9-02**

Airport Maintenance Research

Research Field: Maintenance
Allocation: \$500,000

This project will begin in October 2010

The Airport Cooperative Research Program Oversight Committee (AOC) has identified Airport Maintenance and Operations as areas in need of research emphasis, the results of which can provide useful products of research for airports. Inasmuch as few problem statements were submitted in these areas, and to identify issues that could benefit from applied research and be immediately put into practice upon completion, ACRP will be conducting a special meeting for personnel with day-to-day responsibilities for the maintenance and facility management at airports.

The objective of this discussion will be to identify a handful of facility management and maintenance issues that currently affect airports, which could benefit from ACRP research. Participants will outline the objective of the research ideas and prioritize the needs among the issues that are discussed. Upon completion of the developed list, participants will select the highest-priority issues as a project to be included in the FY 2011 program.

■ **Project 10-11**

Airport Operations Research

Research Field: Operations
Allocation: \$500,000

This project will begin in October 2010

The Airport Cooperative Research Program Oversight Committee (AOC) has identified Airport Maintenance and Operations as areas in need of research emphasis, the results of which can provide useful products of research for airports. Inasmuch as few problem statements were submitted in these areas, and to identify issues that could benefit from applied research and be immediately put into practice upon completion, ACRP will be conducting a special meeting for personnel with day-to-day responsibilities for operations management at airports.

The objective of this discussion will be to identify a handful of operational issues that currently affect airports, which could benefit from ACRP research. Participants will outline the objective of the research ideas and prioritize the needs among the issues that are discussed. Upon completion of the developed list, participants will select the highest-priority issues as a project to be included in the FY 2011 program.