Airport Cooperative Research Program

FY 2009

Announcement of Airport Research Projects
August 2008

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 a variety of airport issues involving operations, design, construction, engineering, maintenance, human resources, administration, policy, planning, environment, safety, and security.

The ACRP is sponsored by the Federal Aviation Administration (FAA) and managed by the National Academies, acting through the Transportation Research Board (TRB), in coordination with Airports Council International-North America, 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 20 and 21, 2008 and selected projects for the Fiscal Year 2009 program. The purpose of this announcement is to inform the research community of these projects.

This announcement contains problem statements that are preliminary descriptions of the selected projects. Detailed project statements, formally soliciting proposals for these projects, are expected to be released starting in November 2008.

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 entitled, *Information and Instructions for Preparing Proposals*, that is available on the Internet at the website referenced above. Proposals will be rejected if they are not prepared in strict conformance with the section entitled, "Instructions for Preparing and Submitting Proposals."

Address inquiries to:

Christopher W. Jenks
Director, Cooperative Research Programs
Transportation Research Board
500 Fifth Street NW
Washington, DC 20001
202/334-3089
cjenks@nas.edu

Airport Cooperative Research Program
Projects in the Fiscal Year 2009 Program

■ Project 1-09
Traditional Airport Performance Indicators and Data Collection Methodologies

Research Field: Administration
Allocation: $400,000

This research project is the second phase of what is envisioned to be a multi-phase project based on ACRP Project 1-06. The objectives of ACRP 1-06 were to produce a practical, user-friendly guidebook that would: (a) assist airport management in understanding the practical benefits of a performance-measurement system; (b) identify methods to help airports discern how well they are meeting their customer and stakeholder expectations; (c) guide the development and implementation of the most appropriate performance-measurement system; (d) provide examples of key performance indicators and how to incorporate them into a system; and (e) ultimately enhance the executive decision-making process to improve service and efficiency at airports.

Performance measurement is often lacking at airports and even where currently done may be improved. The Guidebook developed in ACRP Project 1-06 is the first step in moving the industry toward full utilization of best practice performance measurement techniques. ACRP Project 1-06 envisioned several potential subsequent phases (some of which may be consolidated in the future) that would provide significant value to airport management teams including:

- Phase 2 – Development of a comprehensive list of traditional performance indicators and data collection methods (i.e., this research project);
- Phase 3 - Identification of methodologies to establish micro and macro benchmarks (i.e., peer-comparisons) and best practice reporting methodologies;
- Phase 4 – Establishment of methodologies to apply the results to a system of airports or the industry as a whole; and
- Phase 5 – Exploration of non-traditional performance metrics and measurement systems.

The objective of this research project is to support the Guidebook (and interactive CD) prepared under ACRP Project 1-06 with a comprehensive list (and definitions) of traditional airport performance indicators and data collection methodologies that will support the implementation of more comprehensive performance-measurement systems at airports. This research project will also define and address the usefulness of the various performance indicators and how the indicators support the performance-measurement system designed in ACRP Project 1-06.

Potential research tasks may include those described below.

(1) Conduct a thorough review of relevant literature, existing research, regulatory requirements, published practical guidance, and other appropriate material to:

- Identify traditional airport performance measures relevant to airport management and the industry;
- Identify the linkage of such performance measures to the performance-management system described in the ACRP Project 1-06 Guidebook;
- Identify the most efficient and effective data collection methodologies/systems;
- Identify potential restrictions, limitations, influencing airport-uniqueness factors, or other problems associated with defining or applying the measure (e.g., failure to account for climate impacts, contracting out, accounting differences, etc.);
- The research should review previous work done in this area by ACI-NA; DFW International Airport; Tampa International Airport; the University of British Columbia, Vancouver; ATA; IATA; international facility management organizations; and the FAA NexGen program, among others.

(2) Conduct interviews with airport and airline representatives at a cross section of airports to include large hub, medium hub, small hub and other airports. Interviews should:

- Identify traditional airport performance measures relevant to airport management and the industry;
- Identify the measure by type (e.g., efficiency, effectiveness, customer, quality) and by airport function (e.g., financial, asset maintenance, environmental);
- Determine the definition of the performance measure and how the performance measure is calculated (numerator and denominator);
- Determine how airports collect and monitor the data;
- Assess the reliability of the data collection process;
- Note any problems encountered with the measure such as instability due to exogenous factors such as the weather or airline management decisions;
- Assess the usefulness of the measure in influencing management decisions:
- Identify the amount of control that the airport has over this measure;
- Identify the linkage of the identified performance measures to the performance-measurement system described in the ACRP 1-06 Guidebook; and
- Identify the most efficient and effective data collection methodologies and systems.

(3) Develop a resource book, and an easy to use CD, with hyperlinks between sections, that includes:

- A comprehensive list of performance measures categorized to track with ACRP Project 1-06 and cross referenced in any other logical way;
- The definition and calculation (numerator and denominator) of each performance measure;
- The classification of the measure as a leading and lagging indicator;
- An assessment of the most important performance measures for each category, including a rationalization for the performance measures designated as the most important in each category;
- The most reliable data sources from which airports may obtain the data to calculate the performance measure;
- The most reliable collection methodologies used by airports for these systems;
- An assessment of the reliability of the measure given the data source;
- Cautionary notes on any potential pitfalls associated with using the measure;
- Identification of the amount of control that the airport management team has over the measure;
- Associated management decisions;
- A listing of systems or procedures that need to be implemented to effectively monitor the performance measures; and
- Case studies of best practice airports as appropriate.

The inadequacy of airport performance-measurement systems is a critical problem for airports today. With reduced resources and the other challenges facing airports and the industry today, it is critical that airports have access to best practices to develop a performance-measurement system (ACRP Project 1-06) and a supporting comprehensive list of traditional performance measures that are linked to that system. The combination of these sources of guidance will greatly facilitate implementation of performance-measurement systems at airports. In addition, the ACI-NA Finance Committee will be able to use this information to promulgate usage and improve the comparability of information between airports over time.

■ Project 1-10
Capital Projects: Budgeting, Financing, and Management—Best Practices and IT Applications

Research Field: Administration
Allocation: $400,000

Capital projects are a unique segment of an airport's budget that frequently represent the largest expenditure of resources. Additionally, these projects involve complicated combinations of funding, including Federal grants, passenger facility charges, state grants, various forms of financing and cash on hand and in reserves.

Airport staff members from many departments (planning, engineering and finance), consultants, and outside agencies are involved in the project administration. Contractual arrangements may require consultation with or approval of many related parties, each with their own set of priorities. These factors combine to create a very challenging environment in which to plan, budget, finance, manage, and report on a capital program.

The effectiveness of an airport's capital program is crucial to the success of the airport. The dynamic nature of the industry, funding limitations, and the number of airport personnel involved require close attention and coordination of the program. Many airports currently struggle to monitor the programs and devote excessive amounts of time to project administration, often with limited results.

The objective of this research is to produce a handbook (also available on CD with hyperlinks between sections) of current best practices in all phases of capital program management and the development of an IT application based on commercial off-the-shelf programs (i.e., Excel or Access based) available for download to the airport industry. The handbook should identify current best practices in use at various airports for tracking their capital program, including existing technology solutions and their interface capabilities with current ERP software. The IT product would be used to monitor: capital projects from project inception through priority setting, funding determinations, grant applications and reporting, budgeting, project design and construction, performance measures, and all other aspects of managing and monitoring a capital program, including cash forecasting of projects in progress. Additionally, the IT interface with existing financial management/ERP systems should be addressed. The IT application should, to the extent practicable, permit data exchange now, or in the future, with any project monitoring or management system maintained for use by the Federal Aviation Administration (FAA). Both the handbook and the IT application should consider the unique requirements of all sized airports and incorporate guidelines for implementation by need, which may or may not be size based. For example, does the airline lease have an MII clause? If so, what is the best approach to presentation of information to ensure support of the airline?

The research may include, at a minimum, the following tasks:

(1) Conduct interviews and surveys with a representative sample of airport management at various sized airports to determine the current practices for capital project administration. This should include the following areas of concern:

- Budget development techniques including justifications and prioritization/ranking of projects and links to enterprise risk management.
- Identification of best practices for systems and software used for project management and associated interface with accounting systems as well as funds management and reporting tools.
- Identification of best practices for linking capital programs to development of plans of finance.
- Identification of best practice management reporting metrics for monitoring capital project performance.
- Identification of best practices in consultation and collaboration on capital projects with airport boards, tenants (i.e., airlines) and other stakeholders.

(2) Perform a review of existing capital management IT solutions in use by the airports included in the research, or others, as deemed appropriate, in order to:

- Provide a matrix which identifies flexibilities and limitations within existing IT solutions reviewed and prioritize key attributes and/or gaps within those existing solutions; and
- Determine the best approach to the development of new applications within a common software base.

(3) Conduct interviews with FAA personnel or their contractors to determine the requirements to permit data exchange with FAA's own project monitoring or management system.

(4) Prepare draft of handbook.

(5) Develop IT application.

(6) Revise, as needed draft handbook.

Many airports are facing the need for large expenditures of capital resources in the next several years. Airports Council International – North America (ACI-NA) estimates airport's capital development costs for 2007-2011 at $87.4 billion or an annualized amount of $17.5 billion. Managing the complexity of these projects and monitoring the process is a key component of minimizing and controlling these costs. Identification of best practices and the development of IT applications could assist airport management in making the best decisions on capital projects and the subsequent management of the project. Finance managers would also have a tool available to manage the financing of the project and to assist in preparing timelines of activities required to ensure the necessary funding is in place in a timely manner.

■ Project 1-11
Airport Concession Planning—Concepts and Business Terms

Research Field: Administration
Allocation: $350,000

Airport concessions provide an important passenger service amenity but also can provide significant financial benefits to the airport. During the past 10 years, many airports have evolved from generic non-branded food and news locations into shopping mall centers throughout the airport featuring national and regional food concepts and a wide variety of specialty retail brands. With the shift in approach, the planning for concessions and the business terms for concession agreements have changed dramatically.

The objective of this research is to develop a resource manual that summarizes the considerations in concessions program planning, customer service standards, and business terms development. The project will also include a survey of the rental terms and total occupancy costs for major classifications of airport concessions at a comprehensive sample of large, medium, and small airports across the nation. Concession program planning will include issues related to selection of brands, local concepts, and analyzing passenger flows and adjacencies. Rules of thumb with respect to the amount of space dedicated to concessions by categories and general achievable expectations for sales per enplaned passenger and per square foot should also be developed. Best practices in customer service standards should be outlined. The project deliverables will also include a survey tool and an on-line database that can be updated on an ongoing basis to reflect changing occupancy costs to serve as an interactive tool for detailed comparison of approaches by airports.

The research may include the following tasks:

(1) Review existing literature regarding concessions program planning and customer service requirements.

(2) Compile library of concession plan layouts and photographs depicting some of the best practices in concession planning at airports from a representative sample of airports of varying sizes and passenger characteristics.

(3) Conduct interviews with airport concession managers representing a cross section of airports who have implemented new or renovated concession programs during the past 5 years as well as programs that have earned industry awards during the past 5 years. Interviews should capture:

- Critical factors in planning concession programs;
- Description of lessons learned as programs are implemented;
- Key customer service and pricing requirements included in concession agreements;
- Concessionaire's role in assisting passengers stranded during irregular operations;
- Philosophy in establishing rental rates and Total Occupancy Costs including the recovering of utilities, dock services, and other facilities and services provided for concessionaires.

(4) Conduct interviews with major airport concessionaires to develop generic proformas representing typical ranges of the labor, cost of goods, and other elements in the concessionaries operating costs.

(5) Prepare a report that describes best practices for concession program planning, customer service requirements, and business terms for concession agreements.

(6) Conduct an extensive survey of airports and prepare a database with interactive report format that compiles the rental structure and various elements of Total Occupancy Costs charged to the major categories of concessions.

Airports continue to upgrade their terminal concessions programs and need to build programs that meet passengers' needs including extraordinary needs during irregular operations. The financial challenges faced by airlines are rippling down to airport and airport concessionaires whose revenues hinge on shifts in enplanements and their expenses continue to grow as a result of changing security requirements. In this dynamic environment, airports need to understand the financial challenges of their concessionaire partners and establish Total Occupancy Costs that will promote passenger service as well as airport revenues.

■ Project 1-12
A Primer for Enterprise Information Systems at Airports

Research Field: Administration
Allocation: $350,000

Today, many airport managers do not fully understand how to place a value on Information Systems and Technology. At the same time, IT professionals have a difficult time communicating and justifying the business benefits of newer technologies to senior management. As a result, airports tend to lag behind private industry in the strategic use of technology to improve business operations and financial performance. In addition, airports today do not always know how to tailor Information Systems and Technology to best support their operations and thereby increase the value they can offer its staff, tenants, and passengers.

We are seeing a change in the business model at airports, where the airport is becoming a fully involved service provider in the daily operation of all airport activities, including tenant activities. Moreover, there is a large and long-standing set of industry standards and best practices (IATA, ACI, ICAO, and ATA) that support these systems, which airports are not generally aware of or understand. This project intends to assist airport management and IT professionals in becoming familiar with these technologies and technical standards in order to aid them in managing their evolving environment and understanding their associated risks and benefits.

The objective of this research is to develop a non-technical easy to read primer tailored to Airport CEO/Directors and IT professionals, so they understand each other's perspective on how Information Technology benefits the airport as well as how to make business decisions regarding its implementation. The research will also describe the changes in airport business models that presently exist, where they are moving, and the value of systems integration.

The project will research industry best practices (globally) and assess the value of leveraging Information Systems and Technology. The research will include a focus on Information Systems and Technology employed to improve management, productivity, and decision support while being economically justifiable. The research should focus on organizations that have an integrated environment to maximize full benefit of real-time data and information sharing. How did these technologies improve management productivity and decision support at the airport? How did the IT Professional present and justify the technology to management? What was the strategic objective of implementing the technology?

The project will study airports with industry leading technology to identify how these airports have effectively integrated technology

to make their business processes more efficient and profitable. The analysis will include identification of a common thread of technology innovations that have significantly contributed to business success and identification of organizational relationships between top management and technology professionals. Results will include suggestions for (ROI templates) assessing airport-related technology (business cases) and evaluating potential airport technology implementations.

■ Project 2-10
Low-Cost, High-Return Practices to Reduce Airport Carbon Footprints

Research Field: Environment
Allocation: $500,000

As environmental pressures continue to increase nationwide, airports and airlines are increasing their focus on reducing their overall environmental impact. Within the environmental arena, waste management and reduction of greenhouse gas (GHG) emissions are now common issues affecting airports and the aviation industry.

Identifying low-cost, high-return practices to reduce carbon footprints will assist airports, airlines, and other airport tenants in better serving their passengers, customers, and communities. This analysis will foster the exchange of ideas and existing airport, airline, and other tenant experiences to develop a guidance document that identifies and evaluates best practices that could be voluntarily implemented at airports nationwide. This guidance can help foster implementation of successful practices. These practices will, in turn, help address heightened environmental concerns shared by airports, airlines, employees, passengers, and host communities. As airports and airlines strive to satisfy future air travel demands, promoting and implementing "green" operating practices will help improve and sustain positive community rapport.

An example of savings can be seen at Los Angeles International Airport (LAX). In 2004 LAX, including its airlines and other airport tenants, saved enough energy through recycling to power 502 households and reduced greenhouses gas emissions by an amount equal to removing 2,228 passenger cars from the road for a year. LAX recycled 12 tons of aluminum, more than 2,021 tons of cardboard, 89 tons of newspapers and 527 tons of office paper. It also recycled 17 tons of glass products, 9 tons of plastic beverage containers, 913 tons of plastic film and 271 tons of food waste.

The objective of this research will be to review and identify successful practices used by major airports to reduce their carbon footprint. The research will focus on identifying low-cost, high-return practices.

Airports, airlines, and other airport tenants are faced with having to manage a growing number of environmental issues. Coupled with the increasing concern with aviation's contribution to GHG emissions and associated environmental impacts, it is imperative that airports take every opportunity to reduce their carbon footprint. This effort will help more airports, in tandem with airlines and airport tenants, become environmentally sustainable in their local environs.

■ Project 2-11
Understanding Airport Water Quality Issues Impacting Capacity Enhancements

Research Field: Environment
Allocation: $150,000

Many airports face the challenge of balancing business concerns and environmental protection. With the increasing demand for air travel, many airports are faced with the need to enhance capacity. Increased capacity can provide environmental benefits by eliminating congestion in the air and on the ground. Implementing those capacity improvements however, is coupled with the need to address environmental impacts such as minimizing adverse water quality impacts. Adverse water quality impacts can result from construction and increases in impervious areas. Additionally, ongoing aviation activities including maintenance, fueling, deicing, etc., can adversely affect stormwater runoff if appropriate measures are not employed. Mitigating the impacts to water quality,

including wetlands, and obtaining the necessary permits can result in delay in project completion, and thus impact an airport's ability to meet the need for increased capacity.

With the growing demand for air travel and capacity enhancements, there is a need to understand the water quality issues that face airports and how these issues affect the timeliness of project approvals and subsequent implementation of projects or programs. Airports, and the entire aviation system, would benefit from an understanding of those water quality issues and the methodologies used to mitigate those issues and the impediments to completing capacity projects in a timely manner.

The objectives of this research would be to: (1) review and identify water quality issues faced by airports, (2) determine the extent to which these issues impact the ability of an airport to meet the need for increased capacity, and (3) identify methodologies, techniques, and practices airports can employ to ensure projects can be completed in a timely manner. Results of the research will be compiled in a guidebook for use by airport operators.

Airports are faced with having to tackle a growing number of environmental issues while also meeting the growing demand for air travel. Airport projects are often delayed by the need to address water quality impacts. Early planning and understanding of the potential water quality impediments associated with completing capacity enhancement projects efficiently will benefit the entire aviation system.

■ Project 2-12
Environmental Optimization of Aircraft Departures: An Investigation of Fuel Burn, Emissions, and Noise Interdependencies

Research Field: Environment
Allocation: $300,000

Many airports recommend that aircraft operators use Noise Abatement Departure Procedures (NADP) to reduce the impact of noise on their neighboring communities. However, such procedures may result in adverse interdependent environmental effects, such as increased fuel burn and emissions. With the potential of significantly quieter aircraft being introduced in the near-future, optimizing or even eliminating the need for NADPs may enable substantial savings in fuel burn and exhaust emissions reduction while ensuring no noise increase (or even decrease) for communities near airports. In addition, the change to more direct routing can enable increased capacity at the airports due to more efficient use of airspace near the airports.

The recent focus on CO_2 as a climate change driver has brought added attention to aircraft fuel consumption. The efforts to reduce fuel consumption can be broadly put in two categories which are aircraft/engine design improvements and air traffic optimization. Within air traffic optimization, most of the effort has been focused on cruise. This proposal focuses on the take-off procedures that affect airports and airport communities more directly.

For air traffic optimization, the NextGen focus has rightly been on reducing flight time. Reduced flight times generally translate into aircraft engines burning less fuel and emitting fewer pollutants. Since most of the flight time is spent in cruise, optimization of en-route or cruise tracks has been the focus of a majority of these efforts. However, the fuel consumed during cruise is typically less than 50% of the total fuel burn for a short range aircraft. The near-airport operations (arrivals and departures) have received less attention despite the potential for considerable fuel savings especially during take-off and climb to cruise. For arrivals, FAA has worked with airports, airlines and academia to study CDAs (Continuous Descent Arrivals), which simultaneously reduce fuel burn, emissions, and noise. The most attractive feature of CDA's from an environmental perspective is that there is no trade-off involved between emissions and noise—both decrease. For departures, however, the physical principles make this win-win (for emissions and noise) scenario difficult from an operational perspective. However, as quieter aircraft are introduced into service, we may have an opportunity to optimize departures to balance the impacts of noise and emissions. Given the limited efforts to date on environmental optimization of aircraft departures, this project can address the gap and provide a tool to help

regulators and airports make environmentally optimal decisions.

In summary, significantly quieter aircraft designs will enable direct flight tracks while keeping the same or reduced noise exposure to communities around airports. Quantification of the trades and benefits in fuel burn savings and airport capacity increase is a critical first step toward potential implementation of more environmentally friendly departure procedures.

The prime objective of this research is to model and quantify (a) the reductions in source emissions (including fuel burn) and (b) the increase in air traffic capacity that can be achieved by optimizing noise abatement departure procedures for the next generation of quiet aircraft with the constraint that noise exposure remains the same or is reduced for communities around airports. Given the limited efforts to date on environmental optimization of aircraft departures, this project can address the gap and provide a tool to help regulators and airports make environmentally optimal decisions. Another important output of the analysis would be identifying the source noise reduction required to completely eliminate noise abatement departure procedures in order to maximize fuel burn savings.

The analyses may be performed through an incremental study process that examines the operational tradeoffs and interdependencies at two levels: (1) single event operations and (2) total airport operations.

During Phase 1, a comparative study will be carried out of the most direct flight tracks with the current noise abatement departure tracks for a representative in-service aircraft for a few noise-sensitive airports such as LGA, LAX, ORD, or DCA. This will determine the upper bound on emissions and fuel burn savings that can be achieved for a single departure. Since the noise exposure of communities is going to increase with direct flight tracks, incremental reductions in source noise can be made in the model until the noise exposure returns to the one with NADP. The study will also determine how much additional source noise reduction will enable specific reductions in footprint areas, e.g., 1% or 4% reduction in footprint areas. Next, assuming the technology level of aircraft expected to be introduced in 2010-2015 timeframe, an optimization algorithm will be designed that minimizes changes from the direct flight track with the constraint that noise exposure of communities remains the same as with NADP. A quantification of fuel burn and emissions savings for a single event can be made at this point. This optimization algorithm designed for a specific airport can later be generalized for any airport.

In Phase 2, the study will be expanded to all departures at one of the airports studied in Phase 1. The steps would be essentially similar to the single-event analysis. A comparison of the most direct flight tracks with the current noise abatement departure tracks for all aircraft departures at an airport would quantify the total fuel savings possible at current air traffic levels. The same analysis will be carried out with appropriate air traffic growth assumptions. Then a scenario analysis will be carried out using a combination of incremental source noise reductions and assumptions on penetration of these aircraft in fleets of tomorrow while assuming direct flight tracks. This scenario analysis will help determine the optimum combination of source noise reduction and the rate of introduction of new aircraft in the fleet that will enable realization of goals of 1% or 4% reduction in number of people exposed to certain noise levels while also minimizing fuel burn by optimizing departure flight tracks. The flight departure track optimization algorithm developed for a single event can be expanded to undertake studies of a totality of flights departing from an airport.

This research will ultimately help to optimize airport departure flight tracks based on fuel burn savings while ensuring that noise exposure to communities around airports is held the same or even reduced. The more direct flight tracks may also increase air traffic capacity at airports. Ultimately the research would inform airport Environmental Management Systems (EMSs).

The recent focus on CO_2 as a climate change driver has brought increased attention to aircraft fuel consumption. This must be balanced with growing demand for aviation transport and concerns of communities around airports because of aircraft noise. Current noise abatement departure procedures have been

designed for previous or at best current generation of aircraft. The quiet aircraft of the near future offer opportunities for optimizing these departure tracks for fuel burn while ensuring that noise concerns of communities around airports are addressed. The optimization of departure tracks may also enable increase in air traffic again while maintaining the same or reducing noise exposure of airport communities. The departure track, as opposed to cruise or arrival segments, is one area where there has been very limited progress in environmental optimization. This project can address the gap and provide a tool to help regulators and airports make the best environmentally beneficial decisions.

■ Project 2-13
Guidebook of Practices for Improving Environmental Performance at Small Airports

Research Field: Environment
Allocation: $200,000

Improving environmental performance and reducing environmental impacts remains an important issue for the airport industry. Regardless of their size, all airports face concerns from their communities, boards, regulators, and the general public about ensuring airports operate as good environmental stewards. Smaller airports, however, often have significantly less staff, funding, and resources with which to address those environmental concerns compared to larger airports.

The airport community often recognizes that measures that can be taken at larger airports to reduce their environmental impacts can also be undertaken by smaller airports, but on a smaller scale. Additionally, many airports may already have programs in place that provide environmental benefits they are not aware of. Small airports would benefit from a document that provides detailed information on the environmental benefits associated with particular practices and programs demonstrating how the airport can implement various environmental initiatives with limited resources. The objective of this research would be to develop a guidebook targeted for small airports that details how various environmental initiatives can be undertaken. Information to be provided for each initiative includes:

- How to put the initiative in place,
- Associated time and resources,
- Associated cost,
- Expected cost benefits,
- Expected environmental benefits,
- Funding available, and
- Other information resources.

Many existing and ongoing ACRP projects and other documents provide information about environmental programs and practices undertaken by airports to reduce their environmental impacts. Through review of existing documentation and possible survey of several smaller airports, a guidebook will be developed that provides detailed information on environmental initiatives that can be implemented at smaller airports, given limited resources. Information will be provided on initiatives in place at any size airport that can be scaled down for implementation at a small airport. Additionally, the guidebook will highlight the environmental benefits associated with programs that may be put in place for other reasons (e.g., cost, operation efficiency).

The guidebook will be specifically tailored to those airports with limited staff and resources and may prioritize those initiatives that provide the most environmental benefits with limited resource expenditure.

With the growing attention to environmental issues, airports, including small airports, are under continuous pressure to reduce their environmental impacts. This guidebook will provide an invaluable resource for those smaller airports to use as they work to meet environmental challenges using limited resources.

■ Project 3-15
Airport Development and Oil Price Uncertainty

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

Jet fuel prices are up 200% since 2000. These price increases, along with a weak economy, are causing airlines to cut schedules and drop service to some communities. Domestic flight schedules for October 2008 (Official Airline Guide) show many airports are likely to see declines in air

service of 5%-10% with several airports in the 12%-20% range. Higher fuel prices could discourage non-business travel and limit the growth of some business travel. In the short term, airports can help airlines by shifting some revenue collection to non-airline services such as parking and concessions.

The current level of uncertainty about future oil prices poses significant challenges to airport development. Unknown is the effect of sustained, long-term high fuel prices on airlines and airports. Effects on general aviation are unknown as well.

The objective of this research would be to provide airport decision makers with tools to plan for facilities in an era of oil price uncertainty.

This research would provide information on potential future oil prices, and analyze the relationships between oil price, aircraft activity, and airport development. It would also identify strategies for reduced fuel use, including airport operational changes.

The effect of high fuel prices on airports is expected to be uneven. Commercial airports with significant international service and a large origin and destination market are less likely to see significant changes in airline schedules. In contrast, spoke airports in smaller communities and airports that rely on smaller regional jets (less than 70 passengers) service are more vulnerable to schedule changes. General aviation airports that depend heavily on fuel sales and those that primarily accommodate discretionary flying have fewer options to cover costs.

The industry must understand the relationship among sustained high fuel costs, airline and general aviation activity, and airport revenue. Such understanding will reduce the uncertainty over timing and scope of capital investment decisions and allow airports to identify actions they can take to cover operational costs during periods of reduced air operations.

■ **Project 3-16**
Guidebook for Estimating the Economic Impact and Value of Air Freight Activities at Airports

Research Field: Policy and Planning
Allocation: $500,000

The air freight industry is under continuing pressure to undertake ever increasing security measures for cargo moving on passenger aircraft and, to a lesser extent, on freighter aircraft. There is no indication that the industry has seen the last of these measures; in fact, it can be assumed that they will continue to evolve and grow over time.

The public does not appear to understand fully the nature and importance of air freight to airports and the communities they serve. The significance of air freight in the global supply chain is under-valued. There is currently no single definitive resource for demonstrating the economic importance of air freight to airports to the following constituents:

- The airport community,
- The airlines serving those airports,
- Their core customer base, the freight forwarders,
- The air freight trucking community,
- The independent ground handlers serving the airlines, and
- The end user commercial shippers and consignees.

The objective of this research would be to identify, evaluate, and refine tools and techniques suitable for measuring economic impacts and the value of air freight activities at airports. The set of evaluation mechanisms will be compiled into a guidebook for practitioners responsible for evaluating economic impacts of alternative means of providing air freight services in the context of a secure environment. Each airport offers a different context for air freight activity, but the tools and techniques for

measuring the value and impact of that activity can be identified and applied in a variety of scenarios.

Critical issues in measuring economic value of freight activity at a given airport include the following:

- The size of the air freight market,
- Who ships by air and why,
- Direct employment,
- Costs associated with current and planned security regimens, and
- Availability of alternate freight shipment modes.

Identifying a usable set of models and valuation mechanisms can be accomplished through a series of tasks that research and evaluate existing techniques in the context of a detailed literature search along with case study reviews of relevant airport studies.

The research may include the following elements:

- Definitively size the air freight market:
  - Domestic, Export, and Import;
  - Passenger vs. freighter aircraft; and
  - Employment: airports, airlines, forwarders, handlers, and truckers.
- Importance to the supply chain:
  - Popular wisdom holds that "5% of world trade by tonnage, 40% of world trade by value, moves via air freight." Confirm or update as appropriate.
  - Who are the users of air freight and why? Include examples and case studies from industry.
- Security related costs:
  - Current security environment for each segment of the market: airports, forwarders, airlines, ground handlers, and truckers.
  - Anticipated costs of new requirements including technology, training, labor, warehouse space, handling, and economic impact of longer cycle times.
  - Cost to tax payers for TSA oversight, pilot program funding, etc.

The research program will identify mechanisms and models currently in use to measure the value of air freight activities, evaluate alternatives, and select a set of tools for testing on selected case study airports. The output of the study will be a guidebook that outlines effective techniques for measuring economic impacts of air freight with case study examples illustrating application procedures and expected output.

Currently mandated security regimens have the potential to:

- Disrupt commercial supply chains,
- Create mode shift that will have adverse economic impacts on the air freight industry and their customers,
- Eliminate jobs, and
- Increase landed cost of goods and thus wholesale and retail consumer prices.

It is the objective of this project to provide affected decision makers with tools and techniques to measure the "real world" impacts of proposed actions potentially impacting air freight services, and to provide a basis for incorporating security solutions that offer a high degree of safety with minimal adverse economic impacts in the context of long-term accommodation of demand for air freight services.

■ Project 3-17
Airport Airfield Capacity Analyses

Research Field: Policy and Planning
Allocation: $525,000

Airfield capacity estimates are calculated for various airport planning purposes using different methods. Statewide aviation system plans often state the annual service volume (ASV) of each airport. Airport master plans may estimate runway capacity from the FAA's *Airport Capacity and Delay A/C 150/5060-5* (dated 9-23-83) or the FAA's Airport Capacity Model (ACM) for rather simple airfields or from sophisticated computer simulation models such as SIMMOD or TAAM for more complex airfields. Environmental Impact Statements as well as Benefit/Cost Analyses must evaluate

the capacity or delay benefits of proposed airfield improvements.

Given that airport capacity is a critical evaluation piece of most airport planning projects – not to mention how often capacity is a common newspaper headline – it is important that appropriate guidance be available to the aviation community on measuring capacity and delay. While the FAA often employs more sophisticated methods for evaluating capacity, the advisory circular is the formal guidance on this topic and it was last updated in 1983. To use the A/C or the ACM, the planner must choose one or more runway nomographs that, singly or collectively, most closely match the airport's runway layout. With more and more complicated runway layouts, it is nearly impossible to choose nomographs that can accurately estimate capacity for a particular airport.

When computer simulation methods are employed, one is often determining "capacity" from a level of "acceptable delay." The delay output produced by the model may be dependent on modeling techniques, the model itself, and the flight/demand schedule used. While the FAA does not offer a recommendation as to the amount of "acceptable delay," the National Plan of Integrated Airport Systems (NPIAS) does suggest that congestion levels are too high when "the average delay per aircraft operation was six minutes" (measured from the FAA's Aviation System Performance Metric, ASPM, database).

A study of the capacity evaluation methods being used is necessary so that the limitations of each method or model can be evaluated. Initial research may recommend particular modeling techniques and the appropriate capacity and/or delay outputs applicable to specific sets of problems. Further recommendations may include updating the Airport Capacity Model to more fully account for air traffic control changes in the past 25 years and more runway layout combinations.

The objective of the research would be to compile a guidebook of airfield capacity evaluation techniques, methods, and models. The guidebook would also identify limitations of each approach and which approach may be appropriate for specific types of planning studies.

This research would be conducted in phases:

Phase I: Synthesize airfield capacity/delay evaluation methods and models being used in the United States.

Phase II: Recommend Methods of Calculating Capacity.

The expected key tasks are:

(1) Perform a literature search to determine what information and research is available in airport airfield or airside capacity analyses techniques and tools.

(2) Identify various planning studies that require airfield capacity analyses.

(3) For each type of planning study, develop "best modeling techniques" as guidelines for planners. The following will be included: level of detail, traffic demand input, and relevant output analysis.

(4) Prepare draft report.

(5) Review findings with the industry.

(6) Issue a final report providing capacity evaluation guidelines. Report will include recommendations for Phase III.

Phase III: Develop an updated Airport Capacity Model (ACM2).

The expected key tasks are:

(1) Evaluate existing airport capacity models, including the FAA's ACM. Identify strengths and weaknesses of each.

(2) Develop updated model software to replace the FAA's ACM. The intent is not to build a detailed SIMMOD or TAAM-type tool, but instead to build an easy-to-use spreadsheet type model that can take into account more flexibility than the ACM (restricted by nomographs).

(3) Prepare draft report. Deliver draft report and model.

(4) Review findings with the industry.

(5) Update the model to incorporate industry suggestions.

(6) Issue a final report and ACM2 software.

Airfield capacity calculations of existing airports and proposed improvements are critical measures in airport planning. This research will develop capacity evaluation guidelines – and eventually a new airport capacity tool – that will improve planning techniques and make the process more consistent from airport to airport.

■ **Project 04-08**
Improved Models for Risk Assessment of Runway Safety Areas (RSA)

Research Field: Safety
Allocation: $400,000

Current standards for RSAs are fairly rigid as they depend only on the type and size of aircraft using the runway. However, there are numerous factors affecting the operations that may lead to aircraft overruns and undershoots. Hence, in reality, operations are carried out under varying levels of safety.

An innovative approach for risk assessment of RSA has been developed under ACRP Project 4-01 - Aircraft Overrun and Undershoot Analysis for Runway Safety Areas. The study introduces a more comprehensive approach to evaluate the degree of protection offered by a specific RSA. It also provides a risk-based assessment procedure that is rational and accounts for the variability of several risk factors associated with aircraft overruns and undershoots. In addition, the study provides risk models that are based on comprehensive evidence gathered from aircraft accidents and incidents in the United States and other countries.

While the models show great promise, they still do not account for a runway criticality factor, which is a parameter that relates the actual aircraft performance to the existing runway conditions. Depending on the type of operation, the relationship between actual runway distance required and the actual runway distance available for both landing and takeoff can have a significant effect on the risk. Moreover, prototype analysis software developed in the ACRP Project 4-01 project has very limited capabilities to make it useable by airport operators and engineers. The available resources and scope of ACRP Project 4-01 did not permit it to include the runway criticality factor and to develop comprehensive analysis software in the project just completed.

ACRP Project 4-01 contemplated follow-on work to more fully develop the models, to account for runway criticality, and to develop comprehensive analysis software to support the evaluation of RSA at airports, particularly those with relatively short runways and small RSAs. The inclusion of the criticality factor into the frequency models will help differentiate the levels of risk between airports having different runway distances available, and similar weather and traffic conditions.

The objective of this project is to build on the frequency models developed under ACRP Project 4-01, to include a runway criticality factor, as well as to develop analysis software incorporating the full risk assessment approach and revised models.

Incorporation of the criticality factor will certainly improve the predictive performance of the models and enhance the overall accuracy of risk assessment for RSA. Creating comprehensive analysis software will facilitate using the approach for RSA having non-standard configuration and multiple obstacles.

The study developed under ACRP Project 4-01 includes a rational and probabilistic approach that integrates frequency and location models for evaluation of the likelihood of an accident with severe consequences. The approach accounts for the variability and risk exposure relative to various factors and provides a probabilistic assessment of risks.

This research will include gathering of additional data for normal operations and developing revised frequency models that incorporates a criticality factor for runway distances. Normal operations (non-accident/non-incident flight) data (NOD) is essential for risk modeling. In the absence of information on risk exposure, even though the occurrence of a factor (e.g., contaminated runway) can be identified as

a contributor to many accidents, it is impossible to know how critical the factor is since many other flights may have also experienced the factor without incident. With NOD, the number of operations that experience the factor benignly, singly, and in combination can be calculated, risk ratios can be generated, and the importance of risk factors quantified.

A comprehensive software program will enhance the capability of current prototype software to include the integration of multiple hazards and associated risks, facilitate inputting analysis data and generate analysis reports.

The following tasks are potentially envisioned:

(1) Literature review - to evaluate recent advances in risk assessment of runway accidents and the approach utilized in ACRP Project 4-01.
(2) Normal operations data - analysis of alternative sources of normal operations data and collection of actual data.
(3) Analysis approach - development of the approach to incorporate the new information into existing models.
(4) Software structure – the proposed software structure and its capabilities should be developed under this task.
(5) Development of an interim report and discussion of tasks 1 to 4 with the panel in the interim meeting.
(6) Database of accidents and incidents - collection of additional data for accidents and incidents occurring in 2007 and 2008 to complement the existing database developed under ACRP Project 4-01.
(7) Organization of the NOD database – collection and organization of normal operations data.
(8) Revised models – development of revised models for frequency and location of overruns and undershoots.
(9) Development of risk analysis software – a beta version of the analysis software incorporating the revised models should be delivered.
(10) Development of draft final and final reports.

This research will significantly build on the innovative approach developed under the ACRP Project 4-01 project to assess risks associated with runway overrun and undershoot events and will provide a practical analysis tool to evaluate overrun and undershoot risks associated with aircraft operations in runways based on existing runway and environmental conditions, aircraft performance, and runway criticality.

The results of this research will help decision makers on planning RSA improvements and evaluating alternatives and associated safety benefits against costs for improving RSA. The product of this research will help prioritize limited resources to maintain an acceptable level of safety at airports.

■ **Project 04-09**
Assessing the Risk Associated with Maintaining Existing Airfield Separations at Older Urban Airports

Research Field: Safety
Allocation: $250,000

Many airports throughout the country, particularly in older urban areas, have airfield separations (e.g., Taxiway/Runway, Taxiway/Taxiway, Taxiway/Fixed Object) not consistent with existing Federal Aviation

Administration (FAA) design requirements. This is largely because these airports were designed and constructed before certain design standards were established, and such airports are unable to expand their airfields because of development that has occurred up to the airport boundary. When these airports redesign portions of their airfields, FAA typically requires that airfields be modified to meet existing standard regardless of the impact to airport operations or the airport's operating history. In addition, the A380 and 747-8, two new aircraft with wing tip separations greater than the 747-400, will soon be operating at airports nationwide. As a result, many airports will need to assess whether their existing airfield separations are satisfactory to accommodate these aircraft safely.

To date, the FAA has conducted analyses of taxiway deviations by large aircraft at John F. Kennedy International and Anchorage airports. Statistical analyses of these deviation studies have been conducted by the Boeing Company.

Unfortunately, airfield risk assessment guidance is not available for FAA staff to utilize when evaluating airfield separations proposed by airports. As a result, default standards are applied which can sacrifice airport efficiency or prevent certain aircraft from utilization of an airfield.

For example, a recent project for modification of an airfield area used at Newark International Airport for aircraft parking during heavily congested periods and SWAP conditions triggered the application of default separation standards that resulted in reduced operational efficiency (a 10% loss in aircraft parking positions, and the downsizing of an additional 20% of aircraft parking positions). This was required even though 30 years of operational history had demonstrated the existing separation to be adequate for prevention of aircraft collisions. Recent analyses of the 747-8 indicate that existing airfield taxiway to taxiway separation standards would prevent operation of the 747-8 in certain circumstances even through collision risk estimates produced for FAA indicate a collision risk on the order of 1×10^{-9} .

The objective of this research is to identify the level of risk that is considered acceptable for preventing collisions between aircraft at airfields that do not currently meet FAA recommended airfield design standards.
The final product would be a research report that: (1) summarizes the dimensional characteristics of modern aircraft and identifies the separation standards and dimensional requirements currently recommended by the FAA; (2) identifies the logic/analysis used to establish existing airfield design standards; (3) evaluates available taxiway deviation studies and statistical analyses; (4) identifies and analyzes risk levels commonly utilized for evaluating the safety of aircraft operations; and (5) conducts a risk assessment and develops a recommendation of risk levels that are appropriate for separation of aircraft on airfields, or identifies additional research that needs to be conducted to reach this recommendation.

This research will identify the logic behind existing airfield separation requirements, identify the state of the art in regard to taxiway deviation studies and statistical analyses of airfield separations and perform risk analyses that can then be utilized by airport and FAA staff to determine appropriate airfield separations at land constrained airports.

Potential research tasks may include the following:

Task 1. Identify the dimensional characteristics of existing and proposed aircraft and identify the separation standards and dimensional requirements currently recommended by the FAA. Aircraft should be compiled by group and compared against relevant FAA standards with a focus on identifying the few most critical aircraft for each group, the areas of each aircraft at most risk in a collision, and an estimate of worst case collision damage.

Task 2. Research how existing separation standards were developed and the logic for creating these standards. Document research and discussions with representatives from FAA and possibly ICAO will be necessary for completion of this task.

Task 3. Evaluate available taxiway deviation studies and statistical analyses. Studies conducted by the FAA and international airports and agencies will be evaluated, the results of these evaluations summarized, and a conclusion on the completeness of current research provided.

Task 4. Investigate the use of risk assessment in aviation and identify and analyze risk levels commonly utilized for evaluating the safety of aircraft operations. If no risk levels have been established for airfield collision risk, the project team will propose a methodology for calculating such risks and complete the calculation.

Task 5. Conduct a risk assessment and develop a recommendation of the risk levels that are appropriate for separation of aircraft on

airfields, or additional research that needs to be conducted to complete such a risk assessment.

Task 6. Prepare a final report that compiles the analyses conducted in this effort. The report should include an executive summary.

Given the expected entry of the A380 and 747-8 into service at U.S. airports within the next two years, the need to have a risk-based decision-making process for determining appropriate airfield separations is immediate. In addition, given the inability of a lot of older urban airports to expand existing airfields, the issue of "fitting" larger aircraft into an existing airport to increase capacity is a pressure such airports constantly face. At this time the FAA has no risk based guidance available with which to assess Modification of Standards submitted by land constrained airports for accommodation of larger aircraft. As a result, many such applications are denied. At a time of ever-increasing air traffic and mounting delays at our nation's airports, a process to make sound safety decisions based on risk-based guidance is imperative. The potential payoff for land-constrained airports is significant. For example, the Port Authority conducted an analysis to the economic benefit associated with the accommodation of the A380 at JFK airport. It was assumed that eight A380 aircraft would replace eight 747's with a net increase in passenger enplanements of 130 per aircraft. Using FAA guidance on estimating the economic impacts of aviation activity, it was estimated that total economic output associated with these additional passengers would be $59M annually. In addition, allowing larger aircraft to operate at land-constrained airports can also help reduce aircraft delays by handling more passengers with fewer aircraft.

■ Project 08-01
Practices, Technologies, and Procedures for Incorporation During Airport Construction Projects to Reduce the Airport's Environmental Impacts During Construction and Long-Term Operations

Research Field: Construction
Allocation: $150,000

Airports can undertake a number of initiatives and practices to reduce the environmental impacts from onsite construction projects. Examples include recycling construction debris for reuse onsite, using ultra low sulfur diesel fueled equipment and low VOC paints, and purchasing local materials. Several airports have documented these types of initiatives into various sources which may be useful to other airports if they were collected into one comprehensive document.

With the right planning and design, airports can also incorporate a number initiatives and practices into construction projects to reduce the overall environmental impacts of the airport's operations. Existing standards and certification systems for "green buildings" can provide a general framework for incorporating such initiatives and practices into a building. One example is the U.S. Green Building Council's Leadership in Energy and Environmental Design program. Such programs, however, do not account for the unique construct of an airport, particularly on landside and airside operations. A compendium of landside and airside initiatives that can be incorporated into an airport construction project that will provide long-term environmental benefits over the operation of the airport is needed. Examples of such initiatives include providing electric power and preconditioned air at gates, deicing management systems, and alternative fuel infrastructure support systems.

The objective of this research would be to review and gather practices, initiatives, and technologies for consideration and incorporation into airport construction projects to reduce environmental impacts during construction and long-term operation of the airport.

Research in this area would likely include a review of literature, airport-developed design guidelines, and other relevant sources; and collection of practices, initiatives, and technologies airports have used to reduce their environmental impacts during construction projects and for incorporation into building and operational design. A comprehensive report documenting findings would then be prepared.

Airport construction projects are continuously ongoing across the country. The potential exists

for substantial environmental benefits if a comprehensive compendium of practices for reducing both short-term and long-term environmental impacts is available for airports to use during in planning these projects.

■ **Project 10-07**
Current Status and Future Implications of Passenger Self-Tagging

Research Field: Operations
Allocation: $350,000

The evolution of self-service passenger processing over the last 10 years has had a significant impact on airport terminal facility design and operation. Airport terminal departures halls are no longer vast spaces with linear ticket counters staffed by an army of airline agents. Today, passengers are immediately greeted by a field of self-service kiosks that provide more choices and reduce queuing time. The recently opened Terminal 5 at London Heathrow was specifically designed around self-service check-in options, including passenger self-tagging, based on the target of accommodating 80 percent of originating passengers with self-service and the remainder with traditional full-service check-in options.

As self-service check-in continues to evolve, the next logical step is for passengers, who are checking baggage for transport in the aircraft's cargo hold, to apply bag tags and place their checked bags on the conveyor belt for induction into the baggage handling system. While this activity is currently prohibited in the United States by Transportation Security Administration regulations, other North American cities, such as Montreal, as well as several European countries are allowing it. Passenger self-tagging has the potential to not only provide more check-in choices and expedite the process but also to greatly impact airport terminal facility design by increasing the capacity of existing facilities and reducing the space requirements for new facilities.

However, the implications (positive or negative) of passenger self-tagging are not widely understood. With baggage handling and screening systems becoming an increasingly more important factor in airport terminal design and operation and passenger self-empowerment becoming a key method for increasing passenger level of service, further investigation is required to help operators and regulators in the U.S. aviation industry to better understand the future implications for passenger self-tagging.

The objective of this research is to establish the current status of passenger self-tagging in the locations where it is allowed, identify the future implications for passenger self-tagging in the United States, and make recommendations for accommodating passenger self-tagging.

The research would likely include the following efforts:

- Identify cities or countries allowing passenger self-tagging;
- Examine national or local security requirements for airline acceptance of checked baggage (including the United States);
- Establish the U.S. airport stance on passenger self-tagging;
- Establish the U.S. airline stance on accepting baggage tagged by passengers;
- Describe industry initiatives regarding passenger self-tagging;
- Review relevant research regarding passenger self-tagging;
- Identify the methods and technologies by which passengers self-tag their checked baggage and deposit with the airline (i.e., equipment requirements, handling of oversize bags, fee collection for additional/overweight bags, procedures to ensure proper placement of the tags on the bags and bags on the belt, procedure to ensure passengers retain the receipt portion of the tags, etc.);
- Identify common passenger processing rates per agent associated with passenger self-tagging;
- Identify common agent-to-machine ratios associated with passenger self-tagging;
- Establish the magnitude of airline agent injuries associated with checked baggage handling;

- Identify common baggage handling system misread ratios associated with passenger self-tagging;
- Discuss common advantages/dis-advantages associated with passenger self-tagging based on a variety of sources, including: airport management, airline operators, and passenger satisfaction groups;
- Establish the average number of airline agents needed per kiosk if self-tagging is permitted;
- Describe potential impacts to airline baggage handling systems if passengers are allowed to tag their own bags and place on the conveyor belt;
- Identify security concerns with permitting passenger self-tagging in locations remote from the terminal building (e.g., close-in parking, remote parking, urban transit center, etc.);
- Examine the use of current and leading-edge technology to facilitate passenger self-tagging;
- Identify typical baggage handling system modifications needed to accommodate passenger self-tagging;
- Identify process requirements to address TSA concerns; and
- Describe the integration of passenger self-tagging with existing one-step and two-step self-service check-in processes.

This research has the potential for great payoffs. With terminal expansion costs estimated at well over $35 billion between 2007 and 2011, and the airlines looking for every opportunity to improve customer service in a cost-effective manner, the impact of passenger self-tagging could be substantial.

■ Project 10-08
Applying ITS Traveler Information Technology to Airport Ground Access Services

Research Field: Operations
Allocation: $350,000

Throughout the transportation industry, information technology (i.e., Intelligent Transportation Systems, or "ITS") is being applied to better match available supply to potential demand. Across the United States (and in other parts of the world), airports are developing ground access strategies to minimize environmental impacts of airport growth, while maximizing choice for the airport traveler. ITS strategies are now being developed at several North American airports to quickly and inexpensively provide accurate ground access data—specific to the address of the non-airport end of the trip—to the users of public, shared ride and private ground access modes. It would be desirable at this point in time to coordinate the efforts of American major airports who are interested in improving the quality of information about ground access services for their customers.

In October 2007, The Airports Council International—North America jointly co-sponsored an international conference in Baltimore, Maryland entitled "Bringing Together Airport and Ground Transportation Information Systems." During, and following upon, that conference several American airports expressed interest in exploring together the question of a somewhat standardized "graphic user interface" so that the user of many airports could be offered a similar format for data entry and overall content. At present, airport managers in Philadelphia and Baltimore are developing (in cooperation with local transit agencies) mechanisms to offer information about recommended transit trip itineraries to their customers; at the same time, "real time" highway travel times and accurate descriptions of airport parking lot availability are becoming available in many areas for incorporation into route planning.

Many American airports have developed elaborate and often highly sophisticated programs for providing ground access services, but there is no common format for presenting these services to the public on airport websites, and other electronic media. Many American airports have made, or are considering making, major capital investments to improve public mode access, but no consistent format has been put forward for quickly and effectively presenting viable ground access travel options to the user. While many metropolitan areas are developing "511" advanced traveler information

systems, to date none of those systems have incorporated travel modes that are specific to the users of the airports, such as shared ride vans and airport-dedicated express buses.

In several airports highly sophisticated programs of shared taxi, shared van, and specialized "airporter" services have been developed, but there is no agreed upon format for effectively helping the traveler quickly find those services specifically appropriate to him/her. In theory, the user should be able to specify his/her final destination, and be shown only those trip options which are relevant to that destination. In addition, airports often need to present "real time" information about parking availability. In cases of "overflow", the need to travel to alternative satellite lots should be communicated to the user as effectively as possible. To this date, no airport has designed an integrated website that deals with pre-trip planning and real time information on the same set of screens. Once this information had been organized for web-based applications, a series of modifications could be made to transmit the same information via advanced cell phones or PDAs, such as "Blackberry" or "Palm."

The Airports Council International-North America has identified a need for airports to work together to create a common set of procedures for presenting ground access information. Optimally, the user who has become accustomed to the method of attaining ground access information in one American airport would quickly and efficiently gain access to similar information at an airport with which he/she was not familiar.

The objective of this research would be to help the airport community develop a common format for presenting all ground transportation options to the traveling public, particularly to the non-resident market. If many of the large airports (voluntarily) adopted a common format, the process of presenting ground transportation services to new users at an airport could become more efficient, and faster for the user. Possibly, the adoption of a common set of procedures would eliminate the need for many airports to separately undertake the same market research and software development. The product would be both a set of guidelines for presenting ground access services, and a working web-based prototype of such a system for possible adaptation for use at specific American airports.

This research would involve airport managers, and airport ground transportation managers in specific, in a process of determining both their needs, and the kinds of information they can provide on a reasonable and cost effective basis. The research would include some form of market research method, (presumably focus groups combined with some more quantitative method of gathering consumer choice information) that would help the airport managers to understand the "human factors" associated with the way in which the traveler seeks ground transportation information. By way of example, does the traveler prefer an address-based, or a map-based data entry process for a geographic area with which he/she is not familiar?

Based on the results of the both the functional requirements of the airport managers, and market research concerning the needs of the travelers, a series of rough prototype airport ground access information modules would be developed. The research team would then work to determine the attributes most important in the development a common approach to providing ground access services, and, from that, build a single prototype for a web-based application. At the direction of the project panel, the prototype could include the modifications of the program needed to effectively adapt them to cell phone and other portable electronic technologies. It is not the intent of the project to create any form of mandatory "standard" for the individual airports to adopt; rather the research is intended to establish a common logic of information presentation which could be used as each individual airport updates its existing websites.

The traveling public is becoming increasingly reliant on the use of electronic media to purchase airline tickets; indeed, it is now common that purchasing a ticket by any other method is associated with an additional charge. *This means that the user is directly involved with Internet-based information in the planning*

of the full trip. Over the next 5 years, there will be a revolution in the use of portable electronic technology in virtually every phase of the purchasing experience. Consumers who experience nearly ubiquitous access to in-vehicle trip advice in private cars will come to expect similar services concerning other trip making options, such the choice of mode and path to the major airport.

The technology will be developed and implemented quickly, whether or not the airports are prepared to use it. Attitudes and consumer behaviors will be formed and shaped in this 5-year period. It would be highly beneficial for the airports to approach this phase with a common understanding of their functional requirements, and the results of commonly undertaken market research about the needs of the traveler.

In the past, issues have been raised about a possible socio-economic bias associated with providing information through the Internet. However, it can be observed that, around the world, the airlines with the lowest fares are the airlines that sparked the move toward Internet-based ticketing; it is simply a dominant pattern that either the traveler himself, or an advisor to the traveler, uses the Internet in the trip planning/ticketing process. In a similar manner, information on real time travel information sent through the cell phone would have an extremely wide distribution over groups of all income levels.

■ Project 10-09
Elimination of Baggage Recheck for Arriving International Passengers

Research Field: Operations
Allocation: $400,000

Passengers arriving from foreign countries at every large hub airport and connecting to another air carrier flight to continue their trip to another destination within the United States must collect their baggage after they clear immigration (passport control) and before clearance by customs and agriculture in the Federal Inspection Services (FIS). Often, these passengers, after long flights, must await their baggage for awhile before carrying it by hand or by cart through an area where they are inspected, monitored or questioned by Federal officials whose job it is to enforce the U.S. laws regarding illicit drugs, agricultural products, cash or weapons, etc. Baggage is available for search. The passenger may also be questioned and/or searched.

Only a small percentage of passengers are ever intercepted—say 1-5%, while the baggage for the 95-99% of the passengers are handled by airport and airline staff. This handling can be avoided if baggage could be retrieved speedily at the request of the Federal officials, but for only those passengers required. This would allow all other passengers to continue their journey through the terminal unimpeded and without having to wait for and recheck their luggage.

The addition of in-line explosive detection systems and the implementation of Radio Frequency Identification Detection (RFID) systems, for example, may allow for a change in procedures with no loss of law enforcement's ability to carry out their functions. Baggage would be under constant control allowing it to be retrieved quickly and there would be a lower risk of contraband crossing borders.

The objective of this research would be to identify technology and/or processes that could be employed to eliminate the need for baggage rechecking for arriving international passengers. Such technologies and/or processes would enhance customer satisfaction and result in significant cost savings.