

ACRP 10-06
A HANDBOOK TO ASSESS IMPACTS OF
CONSTRAINED AIRPORT PARKING

FINAL REPORT

Prepared for
Airport Cooperative Research Program
Transportation Research Board
of
The National Academies

TRANSPORTATION RESEARCH BOARD
OF THE NATIONAL ACADEMIES
PRIVILEGED DOCUMENT

The report, not released for publication, is furnished only for review to members of or participants in the work of the CRP. This report is to be regarded as fully privileged, and dissemination of the information included herein must be approved by the CRP.

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March 2010

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ABSTRACT

This research supported the development of a Handbook to provide practical assistance to airport operators facing the challenges associated with managing constrained parking facilities. Research was focused on strategies to address public parking constraints, ranging from capacity improvements to influencing parking behavior through strategies such as pricing and technology, while alternative employee commute strategies aimed at the reduction of employee demand for parking were reviewed to address employee parking concerns. The Handbook provides guidance on methods for (1) predicting future constrained parking conditions, (2) predicting the outcomes of strategies being considered to address constrained parking, including development of a predictive model to understand the effects of strategies, (3) evaluating the outcomes of strategies adopted to relieve constrained parking, and (4) selecting strategies to relieve constrained parking. The predictive model was developed to evaluate its effectiveness as a tool for making informed decisions about strategies that would best address parking constraints at an airport. The Handbook also covers issues related to constrained employee parking and alternative commute strategies to reduce demand for employee parking. Operators of airports where parking conditions are currently constrained or are anticipated, whether policy-driven or a result of physical or financial constraints, will benefit from this research.

EXECUTIVE SUMMARY

The research conducted under Airport Cooperative Research Program (ACRP) Project 10-06, *A Handbook to Assess Impacts of Constrained Airport Parking*, as presented in this report, supports the development of a Handbook to provide practical assistance to airport operators and others facing the challenges associated with managing constrained airport parking facilities. The Handbook provides an understanding of the issues airport operators face in dealing with constrained public and employee parking facilities. The Handbook provides guidance on ways to (1) predict constrained parking conditions, (2) predict the outcomes of strategies being considered to address constrained parking, including development and use of a predictive model, (3) evaluate the outcomes of strategies implemented to relieve constrained parking, and (4) select the appropriate strategies to relieve constrained parking. Constrained employee parking is addressed a general review of alternative employee commute strategies aimed at reducing employee demand for on-airport parking.

This research project included the development of a predictive model to aid in understanding the effects of various strategies intended to resolve public parking constraints at airports. The model was developed to evaluate its effectiveness as a tool for making informed decisions regarding the strategies that would best address parking constraints at a specific airport. The operators of airports where parking conditions are currently constrained, or where parking conditions are anticipated to be constrained in the near future, whether policy-driven or as a result of physical or financial constraints, will benefit from this research.

PROJECT OBJECTIVES AND SCOPE

The primary objectives of this research project were to (1) develop a Handbook that airport operators and others can use to assess the effects of constrained public and employee parking at airports and (2) evaluate the benefits of a tool developed specifically for ACRP Project 10-06 to predict the outcome of strategies being considered to address constrained parking. For airports where constrained parking exists or is anticipated, the Handbook provides guidance on methods to quantify the effects of potential changes in airline passenger and employee access to the airport resulting from implementation of strategies, such as changes in parking rates, the provision of new or improved public or private transportation services, and the introduction of remote parking facilities. The Handbook should enable airport operators and others to better understand, anticipate, and evaluate the effects of changes in airport parking and ground access strategies where parking constraints exist or are anticipated.

To achieve these objectives, the scope of the research included a review of current public and employee parking constraints at U.S. airports, including analyses of the strategies implemented at these airports to understand the effects of those strategies on parking customer behavior. The scope of the research project also included the development and evaluation of a probabilistic forecasting model based on stated preference surveys of airline passengers. The model relates ground access mode conditions to passenger access mode and parking choices. The purpose of model evaluation was to determine the usefulness of such a model as a predictive tool. The scope of the research project was focused on promoting the development of practical applications of strategies and predictive tools at those airports where public parking is constrained.

KEY RESEARCH FINDINGS

In addition to developing a Handbook to assist airport operators and others in addressing constrained parking conditions, the research team investigated several key issues regarding the relationship between constrained public parking and airline passenger behavior. These issues included how constrained airport parking affects passenger mode choice and passenger choice of airport within a region with competing airports. The value of the predictive tool developed for this research project in evaluating strategies being considered to address constrained parking was also assessed.

Constrained Airport Parking and Airline Passenger Mode Shares—When airline passenger decisions on airport ground access mode are influenced by constrained parking conditions at the airport, passengers tend to choose private automobile pickup and dropoff modes at a significantly greater rate than high-occupancy vehicle (HOV) modes. This mode shift, from driving to the airport and parking a private automobile for the duration of the trip (i.e., two ground access trips) to being dropped off and picked up at the airport by a friend or relative (i.e., four ground access trips), results not only in increased curbside congestion, but also in increased vehicle trips to the airport, increased roadway congestion, and increased vehicle emissions. This understanding of mode choice shifts in the airport environment is critical when policy makers evaluate the advantages and disadvantages of adopting a policy aimed at reducing vehicle trips by limiting parking supply (i.e., a policy-driven parking constraint)—it is unlikely that such a policy would be successful given the unique travel behavior of airline passengers.

Constrained Airport Parking and Airport Choice—For those airports located within a competing system of airports, constrained airport parking at one airport is not a significant influence on airline passengers' choice of airports. Airline passengers located in metropolitan regions served by multiple commercial service airports do tend to consider other airports when planning their trips; however, trip cost and minimizing travel time (such as the availability of direct and frequent flights to the airline passenger's destination and the total travel time of the ground access trip) were the most important considerations influencing airport choice. The availability of parking was not a significant determinant of airline passengers' choice of airports.

Value of Predictive Tools to Assess Strategies Addressing Constrained Public Parking—The value of using a predictive tool to assess the potential influence of specific strategies adopted by an airport operator on airline passenger parking behavior in a constrained parking environment was demonstrated through this research project. Stated preference surveys of airline passengers are a powerful means of developing predictive relationships between policy changes and the probability of airline passenger ground access mode responses to the policy changes. The results of the stated preference surveys were used to develop a constrained parking forecast model that enables airport operators and others to test these relationships and develop an understanding of the effects of such strategies when addressing constrained parking conditions. A general airport parking forecast model can be downloaded from the Transportation Research Board (TRB) website and used by airport operators to test policy scenarios at a planning level. To use the model, analysts must either know the resident airline passenger mode share distribution for the airport or have a general understanding of this distribution. Alternatively, airport operators and others can build on the methodology and findings of this research project to develop a parking forecast model specific to an individual airport environment.

Strategies Influencing Airline Passenger Ground Access Behavior in a Constrained Parking Environment—A menu of strategies was developed for airport operators to consider implementing to influence passenger ground access behavior in a constrained airport parking environment. These strategies, along with the financial, vehicle traffic, environmental, and customer service considerations related to each strategy, are presented in the Handbook developed as a product of this research project. This menu can serve as a consolidated list and valuable resource of the various strategies airport operators have tested when facing a constrained parking environment.

Constrained Employee Parking— Most airport operators tend to believe that employee parking constraints are easier to solve than public parking constraints. Airport employees typically drive to the airport in single-occupant vehicles, and airport operators tend to find solutions to accommodate the demand for employee parking rather than to influence employee commute behavior for several reasons. Peaks in airport employee parking demand are easier to accommodate because they are more predictable and less pronounced than peaks in public parking demand. Furthermore, airport operators typically have more flexibility in locating areas to accommodate employee parking as opposed to public parking. On the other hand, public transit service schedules may not accommodate employee work shift schedules and thus may not be a viable option for many employees, and airport operators may even be obligated to provide parking for airport tenant employees under use and lease agreements with those tenants. Although many airport operators offer programs or incentives to encourage their own employees to ride-share or use transit to reduce commute trips to and from the airport, it is less common for airport operators to collaborate with other airport employers. Because airport operators typically employ a relatively small share of the total airport employee population, a collective effort among airport operator and tenant employers is needed to significantly reduce the employee trip rate generated by the airport employee population.

RECOMMENDATIONS

Several key recommendations are suggested as a result of the findings of the research conducted under ACRP Project 10-06:

Data Collection Plan—To facilitate application of this research, it is recommended that airport operators develop a data collection plan to capture data both before and after strategies are implemented to alleviate constrained parking conditions. Analysis of these data can provide a quantitative evaluation of the results of implemented strategies. Furthermore, it is recommended that airport management develop goals and objectives for the parking program to guide decision-making on strategies being considered to alleviate constrained parking conditions. The data collection plan should be designed to measure achievement of the airport operator's goals and objectives for the parking program. As airport operators collect and retain before and after data, additional research could include analysis of these data to further assess the capabilities of the predictive model and other practices recommended in the Handbook to predict the outcomes strategies implemented to address constrained parking conditions.

Stated Preference Survey and Predictive Model Refinement—This research included the development of a model for airport operators to use to predict the outcome of strategies being considered. The predictive model is available on the TRB website for immediate use by airport operators; recommendations for further enhancements to the stated preference survey and predictive model are provided in Chapter 4 of this report.

Employee Commute Programs Research—This research included identification of employee commute options to the single-occupant vehicle. Additional research on employee commute programs is recommended to further this research effort. Further research on employee commute programs could provide airport managers with tools and information to reduce single-occupant vehicle commute to airports, for the airport operator and tenant employees. A collaborative effort between airport operators and tenant employers may be necessary to reach the total airport employee population.

PRODUCTS

Several products were developed to document the findings of this research project and facilitate application of the findings:

Handbook—The Handbook is the primary product of this research project. The intent of the Handbook is to serve as a valuable resource for airport operators by providing practical assistance in facing the challenges associated with managing constrained parking facilities at their airports. Where constrained parking conditions exist or are expected to develop, the Handbook helps airport operators to better understand, anticipate, and evaluate changes resulting from implementation of specific airport parking strategies. The Handbook provides a menu of strategies to address airport parking constraints, recommendations on methodologies to predict the outcome of strategies under consideration, and procedures for data collection to measure the outcomes of strategies implemented by an airport operator.

Stated Preference Survey and Predictive Model—Products of this research project also include a predictive model and an explanation of the methodology recommended for airport operators considering the development of their own predictive models. The predictive model, once calibrated to an individual airport, allows the airport operator and others to test various policy scenarios and strategies related to ground access. Alternatively, airport operators can build on the methodology developed in this research project to implement their own stated preference surveys to capture the unique airline passenger characteristics of their airport environments, and develop a predictive model based on the airport-specific survey results.

Executive Summary of Handbook—A high-level Executive Summary presents the research findings and summarizes the usefulness of the Handbook and predictive model. The Executive Summary is intended to help airport operators understand the usefulness of the information presented in the Handbook and the predictive model and to generate interest in the ACRP Project 10-06 research results and products.

CONCLUSIONS

The research conducted under ACRP Project 10-06 provides quantitative information on airline passenger ground access behavior in a constrained parking environment. An understanding of how constrained airport parking affects airline passenger ground transportation mode choices and airport choices in a region with competing airports can inform airport management and other policymaker decisions regarding strategies to resolve such constraints. An understanding that enacted regulations or policies may have unintended consequences on vehicle traffic congestion and vehicle emissions can also be achieved. The report and handbook developed for this research project also provide valuable information for airport managers faced with constrained parking conditions.

The tools developed for this project include a menu of strategies to be considered, tools and methodologies for predicting the outcomes of implementing the strategies being considered, and recommendations for data collection to quantitatively evaluate the results of strategies implemented in the airport environment.

CHAPTER 1 BACKGROUND

This Final Report for ACRP Project 10-06, *A Handbook to Assess the Impacts of Constrained Airport Parking*, is intended to provide background to the research conducted in support of development of the ACPR Project 10-06 Handbook. This report is organized into four chapters and several appendices, as follows:

- Chapter 1 – Background
- Chapter 2 – Research Approach
- Chapter 3 – Findings and Applications
- Chapter 4 – Conclusions and Recommendations
- Appendix A – Annotated Bibliography
- Appendix B – Airport Interview Questionnaire
- Appendix C – Data Collection Plan
- Appendix D – Stated Preference Survey Discussion and Questionnaire
- Appendix E – Stated Preference Survey Results
- Appendix F – Description of ACRP 10-06 Airport Parking Forecast Model

PROBLEM LEADING TO THE STUDY

At most commercial service airports in the United States, the provision of public parking—particularly if the parking supply is constrained or is anticipated to be become constrained—is a high-profile consideration for airport operators. For one reason, revenues generated from public parking are a large revenue source at most airports, and are often the highest nonaeronautical revenue source.

Reasons that constrained parking conditions exist at airports vary, but often include the following: (1) at airports located in developed urban areas, land may not be available to expand parking facilities, (2) a high cost is involved in constructing new parking structures, and (3) at some airports, local government regulations limit the supply of parking spaces to encourage the use of HOV and transit mode options in order to reduce vehicle congestion and automobile emissions. Parking constraints may be further exacerbated by the fact that airport employees require a substantial number of parking spaces that are typically undervalued when compared with the revenue stream generated by public parking. However, employees of the airport operator and its tenants are vital to the operation of an airport, so their need for airport parking must be accommodated.

Anecdotal information indicates that, when public parking at an airport is constrained, many passengers choose to be picked up and dropped off by friends and relatives, thereby potentially doubling the number of vehicle trips to and from the airport. Without an evaluated and documented understanding of this phenomenon, federal, state, and local government agencies—responding to concerns about vehicle emissions or other issues—may unwittingly enact regulations limiting airport parking that may have the opposite effect to that desired. Furthermore, in large metropolitan areas served by more than one commercial service airport, the availability or lack of parking may influence

the airline passenger's choice of airport. Finally, little research has been conducted to verify or quantify how parking constraints affect airport access. Without a thorough understanding of the relationships between constrained parking and strategies adopted to influence airline passenger ground access behavior, the potential exists for policies or strategies to be established that may have adverse effects on airport roadway operations, air quality, customer service, and airport revenues generated from parking.

Research is needed to better understand the changes in airline passenger and employee access behavior caused by constrained airport parking and strategies adopted to influence airline passenger and employee ground access behavior. Such research would be useful to airport operators, especially those working with public agencies that may be considering new policies or regulations to constrain parking, in assessing the implications of implementing strategies to address constrained parking environments and evaluating the outcomes of those strategies.

An understanding of how parking constraints have changed customer behavior and influenced mode share and the related impacts, and an estimation of how potential solutions will influence future behavior, mode choice, and the resulting impacts are needed. An understanding of how airport and regional policy decisions affect the demand for on-airport public parking is also needed. This research project was commissioned to respond to those needs.

CURRENT KNOWLEDGE ABOUT CONSTRAINED PARKING

A review of the literature relevant to constrained parking in the airport environment, as well as discussions with industry and trade organizations on this topic, helped to establish the framework for this research project.

A common understanding of airport parking facility product types and types of parking constraints ensures a common point of reference.

Airport parking facilities generally consist of a mix of the following product types:

- Short-term or hourly parking located in the terminal area
- Long-term or daily parking located in the terminal area
- Economy parking located remote from the terminal(s), requiring shuttle transport to the terminal(s)
- Valet parking typically provided in the terminal area
- Premium parking located in the terminal area
- Privately operated off-airport parking, requiring shuttle transport to the terminal(s)
- Cell phone lot for greeters of arriving airline passengers located remote from the terminal area
- Dedicated employee parking areas located in the terminal area or remote from the terminal area, requiring shuttle transport to the terminal(s)
- Employee parking at worksite
- Employee parking in public parking facilities (dedicated spaces or in any space available to public parking customers)

Typically an airport operator defines parking as constrained when parking occupancy exceeds a defined percentage that is typically less than 100 percent due to the impracticality of managing the parking operation at 100 percent occupancy. This is referred to as the “functional capacity” of a parking facility or parking system. The functional capacity of parking facilities varies by airport, but generally falls between 85 and 95 percent of supply. Regardless of the specific percent defined, once an airport operator considers parking to be constrained, the operator will make decisions related to parking based on this premise. It is the point at which the airport operator acts in response to constraints that is the key to defining whether an airport is operating in a constrained parking environment. Generally, public and employee parking constraints result from an imbalance between parking supply and demand under one of three scenarios as discussed below.

- **Inadequate Total Parking Supply**—Constrained parking will occur when the total demand for public parking generated by airline passengers or employees exceeds functional capacity of the total available parking supply.
- **Lack of Individual Facility Parking Supply**—Constrained parking will occur when individual public or employee parking facilities do not accommodate the demand for parking at those facilities, while others facilities have excess capacity. For example, during peak leisure travel times such as weekends and holiday periods, a short-term or hourly parking facility may have excess capacity while the economy parking is constrained. This condition differs from the previous scenario in that the total airport supply may be adequate to accommodate the total parking demand, but the allocation of supply among facilities does not meet demand.
- **Imbalanced Allocation of Parking Supply**—Parking allocated for specific uses does not accommodate demand during certain times, while parking capacity for other uses is sufficient or underutilized. The distinction between this category and the “lack of individual parking supply” category is that multiple uses may be allocated to one facility or a parking product within a facility. For example, many airports issue parking permits for airport employees to use terminal area public parking. Other airports designate a section of the terminal area parking for short-term parking, with the remainder for long-term parking.

Parking constraints may also be ongoing or occasional constraints. Ongoing parking constraints occur on a weekly basis during busy periods, whereas occasional constrained events result from a nontypical event, such as a few times per year at holiday periods or school vacations or other events that generated nonroutine spikes in airline passenger activity.

Numerous options for ground access to an airport other than parking a private auto are typically available for both airline passengers and airport employees. Ground access options, referred to as modes, vary by airport, but generally include the modes listed in **Table 1**.

Additional current knowledge about airline passengers is presented in the following sections.

Table 1 Typical Airport Ground Access Modes for Airline Passengers and Airport Employees

Airline Passenger Parties Served	Mode	Nature of Service
Single Party	Private Auto Pickup and Dropoff and Use of Curbside Only	On Demand
	Private Auto Pickup and Dropoff and Use of Parking by Greeter or Well-Wisher	On Demand
	Private Auto, Airline Passenger Parks for Duration of Trip	On Demand
	Rental Car	On Demand
	Taxicab	On Demand
	Limousine	On Demand
Multiple Parties	Shared-ride Van	On Demand, Door-to-Door Service
	Bus or Van—Transit or Privately Operated	Scheduled Service
	Subway, Light Rail, or Commuter Rail	Scheduled Service

Sources: Ricondo & Associates, Inc., and DMR Consulting, October 2009.

Airline Passengers: Customer Segments

Airline passengers at an airport are classified as being either origin and destination (O&D) passengers or connecting passengers. O&D passengers board a flight at the local airport to begin their airline travel or arrive at the local airport as the ending point to their airline travel, whereas connecting passengers arrive and depart the airport by airline as they connect between flights. O&D passengers use a form of ground transportation to travel between the airport and the surrounding geographic market area. Connecting passengers do not use ground transportation travel. Therefore, parking and other ground transportation options accommodate O&D passengers only.

Two characteristics of the O&D airline passenger population influence the amount and type of parking that is needed at an airport:

- **Resident status**—Resident airline passengers have the greatest flexibility in selecting a ground access mode. For example, they are more likely to have a private auto available to park and leave at an airport for the duration of their trips. Nonresident airline passengers, on the other hand, are dependent on other modes, such as private auto pickup and dropoff, rental car, taxicab and other for hire modes, and HOV modes. An airport operator has less ability to influence a nonresident airline passenger’s ground access mode selection as it relates to airport parking than a resident airline passenger’s mode selection.
- **Trip purpose**—Business travelers tend to be less price sensitive and more convenience oriented than nonbusiness travelers and, therefore, potentially less easily influenced by strategies airport operators may introduce to change parking behavior.

For purposes of this research project, resident airline passengers were the primary focus. This market segment is likely to have private autos available to park for the duration of their airline trip. They also typically have a better understanding of mode choices available for airport access than does a nonresident airline passenger. A nonresident airline passenger’s influence on airport parking is limited to those being picked up and dropped of at the airport by a friend or relative who parks for the duration of the pickup and dropoff; however, the nonresident airline passenger has less ability to influence the decisions related to ground access.

Airline Passengers: Ground Access Mode Choices

Airline passengers choose private autos and parking or another ground access mode to the airport in the context of their trip purpose (business or nonbusiness), whether the airport is their home airport (local resident with private auto available), knowledge of ground access options to the airport, and previous experience using ground access options to the airport. Within this context, a series of factors influence, to varying degrees, a passenger's decision of whether or not to use airport parking and what type of parking to use. A decision-making process for a passenger (in this case, ultimately selecting parking for the trip duration) is shown on **Figure 1**. **Table 2** provides a list of factors that affect a passenger's decision to use public parking at an airport. This table includes references to the decision nodes shown on Figure 1 to illustrate the points in the decision-making process at which individual factors are relevant.

Strategies to Address Constrained Airport Parking Conditions

Operators of airports across the United States have implemented numerous strategies to address constrained parking conditions. Many of these strategies are operational in nature—trial and error based on the experience of parking operations managers. Other strategies result from recommendations of detailed parking planning or pricing studies. Strategies to address constrained parking range from increasing parking capacity either on a permanent or temporary basis to influencing parkers' decisions through pricing changes and public outreach.

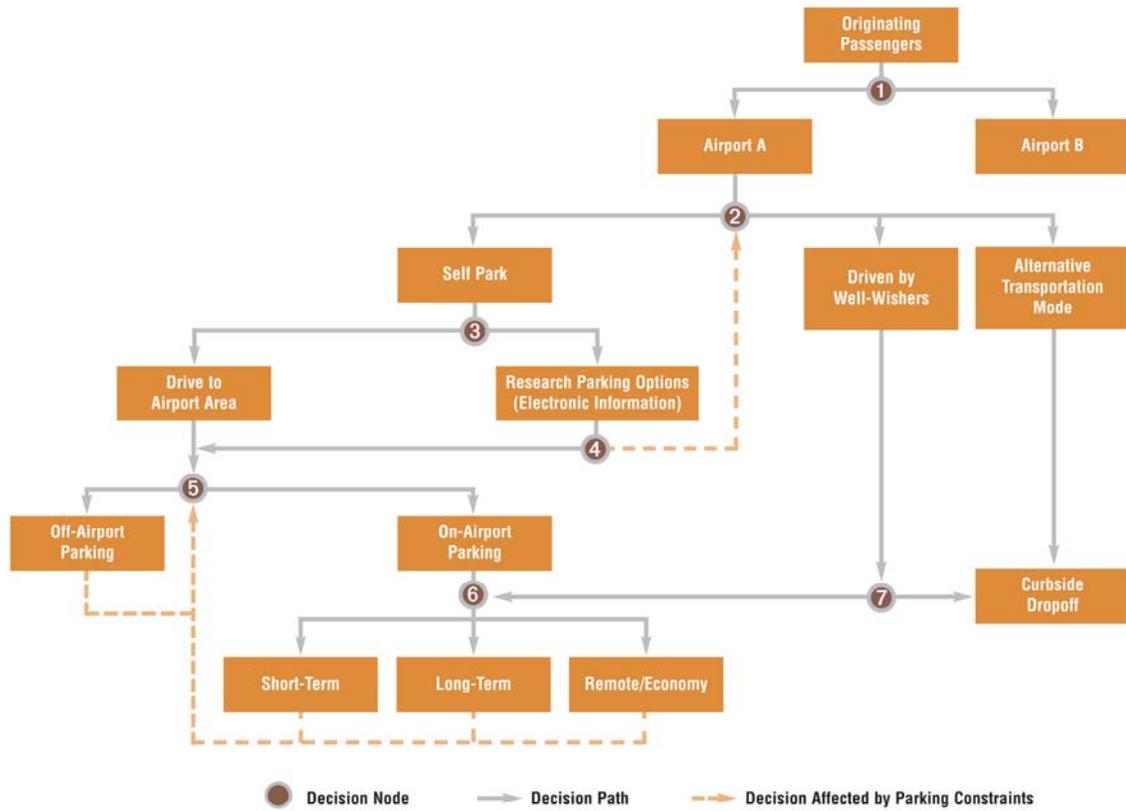
The most straightforward strategy to address a constrained airport parking environment is to increase parking capacity. While this strategy provides a direct solution to the constraint, increasing airport parking capacity may not be the most appropriate or even possible solution for several reasons. These reasons include:

- Physical limitations to constructing a new parking facility
- Costs of constructing a new parking facility
- Public policy or public sentiment affecting the airport parking environment

Although increasing capacity was recognized as a solution to a constrained airport parking environment, it is not the optimum solution for many airport operators.

OBJECTIVES AND SCOPE OF THE RESEARCH PROJECT

The primary objective of this research project was to develop a Handbook that airport operators and others can use to assess the impacts of constrained public and employee parking at airports and to evaluate the benefits of a tool that can be used to predict the outcomes of strategies being considered to address constrained parking. For airports where constrained parking exists or is anticipated, the Handbook should also provide guidance on how to quantify the impacts of potential changes in airport customer and employee access resulting from implementation of such strategies as changes in parking rates, the provision of new or improved public or private transportation services, and the increase of parking supply. The Handbook should allow airport operators and others to better understand, anticipate, and evaluate changes in airport parking strategies at airports where constrained parking exists or is anticipated.



Decision	Factors Affected by Parking Constraints
1. Choice of airports	Airfare; flight schedule distance; access and parking constraint/cost
2. Mode of access	Cost of parking compared with other options; convenience; public service announcements regarding congestion; previous experience with access modes for Airport A
3. Research parking options prior to travel	Availability of on-line information; past knowledge of congestion; comfort with internet
4. Drive to airport or pursue other travel options	Real-time information regarding airport parking congestion and cost
5. Park off- or on-airport	Cost; perceived availability of spaces; travel time; convenience
6. Park in short-term, long-term, or remote lot	Cost; desired level of convenience; duration of stay; travel time from parking to terminal; highway advisory radio announcements
7. Proceed directly to curbside or park	Level of assistance required by passenger; availability of short-term spaces

Figure 1 Airline Passenger Parking Decision Tree.

Source: Ricondo & Associates, Inc., 2008.

Table 2 Factors Affecting Decisions to Use Airport Public Parking

Factors	Affected Decision Node ¹						
	1	2	3	4	5	6	7
Airfare and Flight Schedule	✓						
Distance to Airport	✓						
Total Trip Cost for Private Auto Access and Egress Trips in Comparison to Other Modes		✓					
Availability of Alternative Modes in Accordance with Flight Schedule		✓					
Availability of an Automobile		✓					
Dropoff or Pickup by Meeters and Greeters		✓					
Availability and Convenience of a Cell Phone Lot		✓					✓
Location and Convenience of Private Auto Pickup and Dropoff Areas at Terminal Curb		✓					✓
Amount of Baggage		✓			✓		✓
Availability of an Airport People Mover (APM) Versus Shuttle Bus Service Between Parking Facility and Terminal		✓			✓	✓	
Perceived Safety of Parking Facility (e.g., Lighting, Security, Sightlines)		✓			✓	✓	✓
Proximity to Terminal		✓			✓	✓	✓
Availability of Adequate Number of Handicap Spaces		✓			✓	✓	✓
Mobility of Airline Passenger		✓	✓		✓	✓	✓
Availability of Covered Parking		✓	✓			✓	✓
Availability and Perceived Availability of Spaces (e.g., Experience, Online Information)		✓	✓	✓	✓	✓	✓
Parking Rtes		✓	✓	✓	✓	✓	✓
Availability of Premium Parking Products			✓	✓	✓	✓	✓
Arrival Time at Airport					✓	✓	✓
Walking Distance to Terminal or Shuttle or APM Pickup Location					✓	✓	
Processing Time and Queues to Exit Parking Facility					✓	✓	✓
Availability of Assisted Grade Changes Between Parking and Terminal					✓	✓	
Frequency of APM or Shuttle Bus Service, Travel Times on APM or Parking Shuttle, Availability of Seats, Convenience, and Number of Shuttle Stops to and from Remote Parking Facilities					✓		
Availability of Off-airport Parking, Considering Pricing, Amenities, and Convenience Compared to Those Provided by Airport Operator					✓		
Ease of Use of Parking Facility, Including Maneuverability and Clarity of Layout						✓	
Terminal Curbside Congestion							✓
Airport Policies on Terminal Curbside Pickup and Dropoff, Expected Enforcement of Policies, and Curbside Space Availability							✓

Note:

¹ Numbers correspond to decision nodes identified on Figure 1.

Sources: DMR Consulting and Ricondo & Associates, Inc., August 2008.

To meet these objectives, the scope of the research included a review of constrained parking at U.S. airports, analysis of the strategies implemented at these airports to enable the research team to understand relationships between strategies implemented and parking behavior, and development and evaluation of a probabilistic forecasting model that relates the ground access environment to passenger access mode and parking decisions to understand the usefulness of such models as predictive tools. The scope of the research was focused to ensure the development of practical strategies and predictive tools for those airports where constrained parking exists.

Data Sources

Four primary data sources served as the foundation for this research. Each data source is discussed below.

Literature Review

Literature related to public and employee airport parking constraints was reviewed, as documented in **Appendix A**, Annotated Bibliography. Information from the literature review was supplemented by discussions with industry leaders and the research team's industry knowledge of constrained parking issues. This served as the framework for understanding issues related to constrained airport parking and potential solutions for addressing constrained public and employee parking and served as the basis for identifying airports with constrained parking conditions to participate in this research.

Airport Operator Interviews

Representatives from 15 U.S. airports where parking has been constrained at some point over the past 10 years (i.e., 1998–2008) were interviewed to understand their experiences regarding constrained public and employee parking. The selected airports represent a cross-section of characteristics that were considered relevant to the research topic, including airport size, access to public transportation and other HOV mode choices, single airport or part of a regional airport system, and airports with and without a privately operated off-airport parking supply.

Data from Airport Operators

Additional data were collected from a subset of the representatives of the 15 airports interviewed to quantify how strategies adopted at these airports to address constrained public parking influenced the travel behavior of airline passengers.

Airline Passenger Survey

A stated preference survey of airline passengers was conducted to supplement the analysis of data from airport operators in order to (1) understand the effects of specific strategies adopted to alleviate constrained parking and (2) predict the outcome of strategies being considered. The stated preference survey was designed to provide an understanding of airline passenger choices related to constrained airport parking and to provide insight regarding how to predict airline passenger mode choice behavior in response to strategies being considered to address constrained parking.

Development of the Handbook

The scope of this research project included development of a Handbook to assess the effects of constrained airport parking. The Handbook covers the following topics:

- Understanding the airport parking environment;

- Types, causes, and consequences of constrained airport parking;
- Discussion of goals and objectives for managing constrained airport parking environments;
- Methods for predicting airport parking constraints;
- Strategies to address constrained airport parking;
- Methods for predicting the outcomes of strategies being considered to address constrained airport parking;
- Evaluating the outcomes of strategies adopted to relieve constrained parking;
- Selection of strategies to relieve constrained parking; and
- Considerations for employee alternate commute options.

CHAPTER 2 RESEARCH APPROACH

The initial task of assembling and reviewing existing data sources, contacting industry representatives, and formulating list of factors that affect public and employee parking decisions at airports served as the framework for much of the subsequent research. To develop a thorough understanding of issues related to constrained parking, the researched was focused on developing an understanding of the following issues:

1. Strategies employed to manage constrained public parking;
2. Tools and methods for measuring and evaluating the impacts of strategies implemented to manage constrained public parking;
3. Methods for predicting constrained parking and predicting the effects of strategies considered to address constrained parking; and
4. Impacts of public parking constraints on curbside congestion, use of alternative access modes, and use of competing airports; and
5. Strategies employed to manage constrained employee parking and alternatives to the single-occupant commute.

This chapter presents the approach followed in this research project and used to develop the Handbook:

- Literature Review and Industry Outreach
- Case Studies
- Data Collection Plan
- Analysis of Data from Airport Operators
- Stated Preference Surveys
- Predictive Tool for Estimating Future Behavior
- Development of the Handbook

LITERATURE REVIEW AND INDUSTRY OUTREACH

Relevant published information was reviewed and research on public and employee parking constraints was conducted (as indicated in Appendix A, Annotated Bibliography) to frame the issue and serve as a reference throughout the research project. Key words for each entry in the annotated bibliography identify relevant topics in each article reviewed, such as a specific airport discussed in the article or a strategy implemented at an airport related to parking or parking demand management.

Additionally, a list of small-, medium-, and large-hub airports where parking constraints have been experienced was developed through input from industry representatives and through the collective experience of the research team. For an airport to be considered a candidate airport, it was

either currently experiencing or had experienced constrained parking conditions between 1998 and 2008 and those constraints were not always addressed through capacity expansion.

CASE STUDIES

Relevant case studies were developed through interviews with airport staff to document parking conditions and experiences with constrained parking over the past 10 years (1998–2008). The selected airports represent a cross-section of characteristics that were considered to be relevant to the research topic, including airport size (large, medium, or small hub), access to public transportation and other HOV modes, single airport or part of a regional system of competing airports, and airports both with and without a privately operated off-airport parking supply. **Table 3** presents the characteristics of the 15 airports included as case studies.

The list of interview questions is provided in **Appendix B**. All interviews were completed either in person or by telephone. The research team documented the interviews as comprehensive case studies, which were provided to the interviewed airport representatives for review to verify accuracy. Given the sensitive nature of some of the information documented, full case studies are not included in the published materials for ACRP Project 10-06. However, this information was used to inform the findings of the research.

The following information was documented for each case study airport:

- Descriptive summary of the current parking situation and past periods of constrained parking (airline passenger activity, parking facilities and capacity including the privately operated parking supply, rates, mode share data, and the general parking environment);
- Strategies used to manage constrained parking;
- Impacts of public parking constraints on curbside congestion, use of alternative access modes, and use of competing regional airports;
- Methodologies used to measure impacts of strategies adopted and to predict the outcome of strategies being considered;
- Summary of the current employee parking situation (employment levels, parking facilities and capacity, parking fees, mode share data);
- Future plans for employee and public parking; and
- Studies and data available to the research team for further analysis.

Table 3 Characteristics of Case Study Airports

Airport	Hub Classification ¹	Policy or Public Sentiment Influences Decisions Related to Parking Supply	Within a Competing Airport System	Privately Operated Off-Airport Parking Available	HOV Mode Share	
					Scheduled HOV ²	All HOV Modes ³
Boston-Logan International (BOS)	Large	✓	✓	✓ ⁴	14%	24%
Chicago O'Hare International (ORD)	Large		✓	✓ ⁴	13%	13%
Las Vegas McCarran International (LAS)	Large				–	20%
Miami International (MIA)	Large		✓	✓	1%	8%
San Diego International (SAN)	Large	✓		✓	1%	12%
Seattle-Tacoma International (SEA)	Large	✓		✓	2%	19%
Tampa International (TPA)	Large			✓	–	4%
Washington Dulles International (IAD)	Large		✓		1%	5%
Bob Hope (BUR)	Medium	✓	✓	✓ ⁴	1%	5%
Oakland International (OAK)	Medium		✓	✓	12%	15%
Port Columbus International (CMH)	Medium		✓	✓	– ⁵	7%
Portland International (PDX)	Medium	✓		✓	7%	10%
San Antonio International (SAN)	Medium		✓	✓	–	–
Huntsville International (HSV)	Small		✓	✓	–	–
Tulsa International (TUL)	Small		✓	✓	–	–

Notes:

HOV—High-occupancy vehicle

– indicates data that data are not available or applicable

¹ Hub categorizations are defined by the Federal Aviation Administration for commercial service airports based on the share of total U.S. passenger boardings accommodated at that airport. Large hubs accommodate 1 percent or more of annual passenger boardings, medium hubs accommodate at least 0.25 percent but less than 1 percent of passenger boardings, and small hubs accommodate at least 0.05 percent but less than 0.25 percent of passenger boardings.

² Scheduled HOV modes include public transportation plus privately operated buses and vans operating on a fixed schedule.

³ All HOV modes include shared-ride vans and charter vehicles in addition to the scheduled HOV modes listed above. Courtesy shuttles are not included.

⁴ Staff interviewed at BOS, ORD, and BUR did not consider privately operated off-airport parking to be in competition with the on-airport, public parking supply.

⁵ At CMH, mode share categories include scheduled HOVs with other categories, so the scheduled HOV share is unknown.

Sources: Airports Council International – North America, *Airport Traffic Reports*, 2007 Final Traffic Count, accessed November 2008 (hub classifications–total passengers); Federal Aviation Administration, *Airport Hub Classifications*, November 2008 (hub classifications); DMR Consulting and Ricondo & Associates, Inc., based on interviews with airport representatives conducted between November 2008 and February 2009 (competing airport system, privately operated off-airport parking, and HOV mode shares). (1–15)

DATA COLLECTION PLAN

Based on an evaluation of the information collected in the literature review and airport case studies, a data collection plan was developed to further the research on constrained airport parking. The data collection plan is presented in **Appendix C**. In summary, two data collection approaches were undertaken:

- **Analysis of Existing Data**—Collected and analyzed additional information from a subset of the case study airports to understand the effects of past and current parking constraints and strategies implemented to address the constraints, and to understand the predictive tools used to determine the outcomes of strategies to address constrained parking at one airport and the predictive tool under development at another airport.
- **Stated Preference Surveys**—Designed and conducted a stated preference survey of airline passengers whose home airports are the case study airports to understand customer choices related to constrained airport parking, as input to development of a model to predict the outcome of potential strategies to address constrained parking.

Research for the stated preference data collection plan was conducted to address several important questions instrumental to this research project, including how constrained public parking and strategies adopted to address constraints may affect:

1. Trip generation and mode share;
2. The use of HOV modes;
3. The use of privately operated off-airport parking facilities; and
4. The use of competing airports.

Various responses to the key questions above were collected during the interviews with airport representatives conducted for development of the case studies. In many cases, the responses were based on anecdotal information rather than empirical analysis. Therefore, the data collection effort was intended to develop empirical evidence to support the anecdotal experience.

Of the 10 case study airports that are part of a competing system of airports, none of the airport representatives believed that constrained airport parking has caused their customers to use a competing airport. Therefore, the research team and the ACRP 10-06 Project Panel agreed that minimal effort would be expended trying to answer the fourth question.

The research also focused on the effects of airport employee parking constraints. As only one of the case study airports is currently experiencing employee parking constraints, and all of the airport representatives interviewed were more concerned about public parking constraints, the research team and the Project Panel agreed that the majority of the research project's resources should be devoted to understanding public parking constraints. The research team, therefore, shifted the focus on the collection and summarization of employee commute strategies implemented at airports and other employment centers.

ANALYSIS OF DATA FROM AIRPORT OPERATORS

Additional information was collected and analyzed from a subset of the 15 case study airports to further quantify how strategies adopted at these airports to address constrained parking have influenced the travel behavior of airline passengers.

Of the 15 case study airports, 8 were identified as potential candidates for additional research based on the nature of parking constraints, strategies used to address the constraints, availability of data, and studies and tools available to develop an understanding beyond that learned from the case studies.

The research team conducted teleconferences with airport staff at the eight airports to determine the information available for evaluation and analysis. Of the eight airports, staff members from two declined to participate because of competing demands for their time and their inability to provide the data necessary for further analysis. Data from a third airport were not available. Therefore, further analysis was conducted on data from five of the case study airports.

Types of strategies that lend themselves to evaluation include those employed to influence parking behavior for ongoing constraints rather than responses to occasional constrained events. Examples of these strategies are parking rate changes, reallocation of parking products, and introduction or improvement of new HOV services. To measure changes in the use of airport-operated parking facilities, comparable data from both before and after implementation of the strategy must be captured from the parking revenue control system. This type of data was only available from one of the five case study airports. Additional data are required if the airport operator wishes to know which modes attracted lost parkers or, conversely, if parking transactions increased, the modes from which additional parkers were diverted. Recommendations for additional information that would have been useful in analyzing the effects of the adopted strategies were identified.

Research conducted earlier in this project indicated that employee parking constraints were less of a concern to airport staff than public parking constraints; therefore, a summary of high-level strategies that airport operators could implement to provide employees with alternatives to driving alone and parking was developed for inclusion in the Handbook. Detailed data on employee parking constraints for analysis to further an understanding of this issue were limited.

STATED PREFERENCE SURVEYS

The research team anticipated that the airport case studies and further analysis of airport data would not likely be sufficient to quantify how strategies adopted to address constrained airport parking have influenced the travel behavior of airline passengers. Difficulty interpreting the effects of strategies adopted was expected because airport operators are likely to react to constrained parking conditions by implementing multiple strategies, and external forces (changes in airline passenger activity, general economic conditions, etc.) would also likely influence passenger behavior. These multiple influences would likely obfuscate the cause-and-effect relationship. Therefore, a stated preference survey was conducted to demonstrate one methodology for predicting the outcome of different strategies used to alleviate parking constraints.

The stated preference survey was designed to provide insight as to how to predict the outcome of airline passenger behavior in response to strategies being considered to address

constrained parking for use in developing the predictive model. Stated preference surveys can be thought of as market testing of potential strategies, as opposed to revealed preference surveys, which are used to collect data capturing actual choices made by airline passengers. The stated preference survey captured preferences through an experimental design developed to test airline passenger responses to various strategies that address constrained parking conditions by capturing mode preferences in response to changing conditions.

Several approaches for survey sample collection were developed, documented in the data collection plan (provided in Appendix C), and reviewed with the Project Panel. The research team recommended an online recruiting and survey administration approach, with a goal of obtaining a sample of approximately 600 usable responses (two-thirds) from resident airline travelers who had taken a flight from 14 of the 15 case study airports over the past 6 months (referred to as the general airport sample), and 300 usable responses (one-third) from the 15th case study airport (referred to as the airport-specific sample). Response choices for the airport-specific survey sample would be refined and tailored for the airport's specific environment. This approach was recommended because the research team recognized the value of (1) developing a general model with a national sample to determine its applicability as a predictive screening tool for any airport in the United States, (2) demonstrating the utility of a predictive model for a specific airport used to analyze the conditions at a finer level of detail, including customized survey answer choices to capture airport-specific features, and (3) comparing the two methodologies. The Project Panel approved the recommended approach.

Two of the 15 case study airports were identified as candidates for the airport-specific survey: Boston-Logan International Airport (BOS) and Portland International Airport (PDX). BOS was identified because (1) the Massachusetts Port Authority (Massport), owner and operator of BOS, has dealt with constrained public parking, which has been limited through policy constraints, for many years; (2) BOS had the lowest ratio of total parking spaces per enplaning resident O&D passenger of the 15 case study airports; (3) Massport promotes and sponsors HOV modes; (4) Massport maintains data, including outputs, from a mode choice model, studies, airline passenger surveys, and the parking revenue control system; and (5) a privately operated off-airport parking supply is available at BOS. PDX was identified because (1) the Port of Portland, owner and operator of PDX, has since 2003 dealt with constrained public parking, which is also limited as a result of policy constraints; (2) a light rail line to PDX opened in 2001; and (3) the on-airport public parking supply at PDX is supplemented by a privately operated off-airport parking supply.

Massport declined the invitation to participate in the airport-specific survey due to survey timing, but did agree to participate as part of the general airport sample. The Port of Portland agreed to participate in the airport-specific survey. Representatives from the remaining case study airports were contacted regarding participation in the general airport survey. Staff at Bob Hope Airport (BUR) requested the research team not include its customers in the survey due to timing of the survey.

The general airport sample included survey results from resident airline passengers at the 13 airports, as well as PDX; and the airport-specific sample included survey results from PDX resident airline passengers.

Prior to survey administration, the online survey instrument was tested by the research team, the ACRP Project Panel, and staff at the participating airports. The survey instrument was refined based on the feedback received. The resulting survey instrument, as well as a discussion of the

survey, is provided in **Appendix D**. The research team administered the survey from April 21, 2009, through May 4, 2009. The survey administration was successful, and the targeted response levels were achieved. A summary of the stated preference survey results and several tabulations of the data are provided in **Appendix E**.

PREDICTIVE TOOL FOR ESTIMATING FUTURE BEHAVIOR

The results of the stated preference survey were used to develop a Microsoft Excel-based forecast model to test different outcomes based on traveler behavior when faced with choices such as higher parking prices and transit options with various levels of service and costs. A general airport parking forecast model was developed based on the survey results of respondents from all airports surveyed, and an airport-specific parking forecast model was developed based on the survey results of respondents from PDX.

Using the data from the stated preference survey, multinomial logit models were estimated. The research team used industry standard modeling methods to determine model segments and coefficients that best fit the stated preference data set. Using that data, the Excel-based forecast models were created by calculating the probability of using an access mode for a specific scenario and by applying the probability to the sample to calculate respondent-level preferences for each access mode. Based on this methodology, the general airport parking forecast model can be calibrated to conditions at any small-, medium-, or large-hub airport.

The resulting general airport parking forecast model was specifically developed to be used at any small-, medium-, or large-hub U.S. airport to achieve a planning-level understanding of the effects of parking scenarios and to understand the effects of parking and transit policies on mode share and constrained parking at airports.

The two versions of the model, the general airport model and the airport-specific model, were tested by the research team, the Project Panel, and staff at some of the participating airports. The research team tested a variety of scenarios intended to alleviate constrained parking, and compared the results between the general airport model and the airport-specific model under two policy scenarios to demonstrate the benefits of an airport operator using a model developed using a national sample versus a model developed specifically to its own environment.

Following review of the model and input from various reviewers, the instructions for the model and documentation of some of the model assumptions were clarified for future model users.

Finally, recommendations for the use of a stated preference survey to understand ground access mode preferences and development of a parking forecast model for airport and other transportation policy makers to use in evaluating policy changes at an airport were made to ensure that the approach documented in this research project is adaptable to airports where parking is constrained or anticipated to be constrained.

DEVELOPMENT OF THE HANDBOOK

Development of the Handbook to assess impacts of constrained airport parking was largely based on the research conducted for this project. The purpose of the Handbook is to provide information to airport operators on addressing constrained parking conditions. The Handbook

provides guidance on methods for (1) predicting future constrained parking conditions, (2) predicting the outcomes of strategies being considered to address constrained parking, including development of a predictive model to understand the effects of strategies, (3) evaluating the outcomes of strategies adopted to relieve constrained parking, and (4) selecting strategies to relieve constrained parking. The Handbook is structured similar to a toolbox with a menu of suggested strategies to address airport parking constraints and an discussion of the potential outcomes of various strategies. Financial, vehicle traffic, environmental, and customer service considerations are documented for each potential strategy.

CHAPTER 3 FINDINGS AND APPLICATIONS

This chapter provides a discussion of how the research conducted for this project forwards the knowledge of issues relevant to constrained airport parking and related conclusions. The discussion provides a general understanding of the issues related to constrained airport parking for a cross-section of U.S. airports, and provides further analysis of those issues, where possible, to corroborate the findings. In cases where data were not available to verify or conclusively confirm all findings, methods for additional research and data capture and collection are identified when relevant to further this research.

The findings of this research project are organized in accordance with the primary objectives established for the project:

1. Assess the impacts of constrained parking at airports.
2. Develop a tool to predict the outcome of strategies being considered to address constrained parking at airports and evaluate its benefits.
3. Provide guidance on how to quantify changes in access and related impacts resulting from implementation of strategies.

Findings relevant to research on constrained employee parking are also presented.

ASSESS THE IMPACTS OF CONSTRAINED PARKING

Trip Generation and Mode Share

A central question of this research project was to understand the relationship between constrained parking and mode share shifts, and, furthermore, to understand how these mode share shifts correlate with trip generation and curbside congestion.

The context for exploring this topic stems from an understanding, from the airport operator perspective, that as airport parking becomes constrained, airline passengers tend to shift to single-occupant vehicle modes—pickup and dropoff by private auto, taxicab, or single-party limousine—over other modes, such as public transit. Some airports operate under policy-based parking constraints. For example, if a local policy maker desires to reduce roadway congestion around an airport by limiting the number of trips to and from the airport, the policy maker who is less familiar with the ground access behavior of airline passengers may correlate the concept of limiting the availability of parking at the airport with limiting private auto use to and from the airport environment. However, if this parking limitation results in a shift to pickup and dropoff modes rather than public transit, the number of vehicle trips to and from the airport increases, as explained below.



Relationship between Constrained Parking and Mode Share Shifts at Portland International Airport

The Port of Portland operates under a conditional land use permit from the City of Portland that, among other things, limits the number of public parking spaces that can be added at Portland International Airport (PDX) and specifies where the spaces can be provided. The permit also requires the Port of Portland to charge airport employees a fee to park at PDX. The most recent permit was issued in 2003. Until recently, there has been a general understanding by local regulatory agencies (City of Portland, the Portland Metropolitan Planning Organization, and the State of Oregon) that parking spaces induce automobile trips, and that limiting parking spaces anywhere (including at PDX) will encourage alternate modes of travel. In 2009, development and utilization of a new airline passenger demand component for the regional travel demand model was effective in beginning to change those regulators understanding of how airport parking behavior differs from the behavior of parkers visiting other types of activity centers such as an office building. It is expected that the new understanding will be reflected in a new land use permit to be issued in 2010. (16)

This question was explored both from the airport operator perspective, through interviews with airport staff and review of relevant data from several case study airports, as well as from the passenger perspective through stated preference surveys. Airport staff recognize the relationship between parking constraints and terminal curbside congestion (i.e., a more pronounced relationship between constrained parking and shifts to dropoff ground access modes than between constrained parking and shifts to transit modes). Although data from airports were not available to quantitatively verify this understanding, analysis of the stated preference survey results validates the stronger trade-off relationship between parking and dropoff modes, particularly pickup and dropoff by private auto, rather than parking and increased use of transit modes. This information is valuable for those airports where policy limitations on public parking supply are being considered to ensure that decision-makers understand the relationship between constrained on-airport public parking at an airport and mode share shifts that tend to result in increased vehicle trips rather than increased use of transit or other HOV modes. These findings indicate that constrained parking not only affects airport parking revenue and potentially the airline passenger's customer service experience at the airport, but also results in increased roadway congestion and increased vehicle emissions.

These findings are discussed in greater detail below, from both the airport staff and airline passenger perspectives.

Airport Staff Perspective

Airport staff interviewed recognize the relationship between parking constraints and terminal curbside congestion. If airport parking is not available, airport staff's experience is that more passengers tend to shift to pickup and dropoff modes rather than public transit options. If a passenger shifts from parking to being picked up and dropped off by private automobile for airline trips, that airline passenger is generating twice the number of vehicle trips than when the airline passenger drove to the airport and parked for the duration of their trip. In the latter case, for each one-way airline trip, a one-way vehicle trip is made to or from the airport parking facility, because the vehicle is parked for the duration of the airline trip. When the airline passenger is picked up or dropped off by private auto, two one-way vehicle trips are generated for each one-way airline trip. For the dropoff trip, the driver drops off the passenger at the terminal and departs the airport. Another round trip must be made to pick up the passenger upon the passenger's return. A shift from

airport parking to the pickup and dropoff mode by private auto doubles the number of vehicle trips in the region, on local roads surrounding the airport, and on the airport roadway system. The number of vehicle trips generated by an airline passenger shifting from parking to taxicab or limousine mode also increases because not all taxicabs and limousines are transporting passengers both to and from the airport during the round trip. Increased vehicle trips potentially result in increased roadway congestion and increased vehicle emissions.

None of the airport staff interviewed in this research project had sufficient data available from both before and after the implementation of strategies to alleviate parking constraints to quantify this mode shift. Ideally, O&D passenger surveys would be conducted periodically to track shifts in mode share over time, allowing for a comparison between periods of constrained parking and periods during which various strategies to alleviate constrained parking were adopted.

Airline Passenger Perspective

A stated preference survey was administered to explore the relationship between strategies adopted to address constrained parking and airport ground access mode share, from the passenger perspective. A parking forecast model was developed based on the results of the stated preference survey. (Please refer to Appendix D for a discussion of the survey and questionnaire and Appendix E for a discussion of the survey results.)

The correlation between passenger pickup and dropoff activity and constrained parking is demonstrated by three policy scenarios tested in the parking forecast model. In two of the three scenarios described below, changes in perceived parking constraints (parking rates) were tested to understand their influence on airline passenger ground access mode choice. Scenario #1 presents a scenario at a small-hub airport and Scenario #2 presents a scenario at a large-hub airport. The results of both scenarios demonstrate the relationship between parking and dropoff modes, and that changes in parking conditions do not tend to significantly affect HOV mode shares. Scenario #3 demonstrates that a significant increase in parking supply (remote parking) results in a shift of passengers primarily from higher-priced parking facilities and secondarily from the dropoff and pickup mode by private auto, further illustrating the weak correlation between airport parking supply and the use of HOV modes.

Scenario #1: Doubling Parking Fees

One of the key strategies an airport operator will consider to attempt to influence parking mode share is to change airport parking fees. In this scenario, the results of which are shown in **Table 4**, doubling the parking fees at a small-hub airport was tested. Although airport operators do not frequently double the fees for public parking, it is instructive to see how a dramatic change in parking fees would affect travel behavior. For purposes of this illustration, doubling the parking fees is representative of constraining parking because this dramatic increase in parking fees is likely to influence passenger perspective of the availability of parking. Although this scenario is representative of conditions at small-hub airports, which are less likely to be well served by public transit options compared to large-hub airports, the stated preference survey did include public transit options.

Table 4 Results of Doubling Parking Fees at a Small-Hub Airport

Access Mode	Resident Mode Share			
	Base Case	Scenario #1	Absolute Difference	Percent Difference ¹
Park and Walk to Terminal	15%	6%	-9%	-57%
Park and Ride Shuttle to Terminal	25%	18%	-7%	-27%
Taxicab or Limousine to Terminal	10%	12%	2%	22%
Dropped Off by Private Auto	40%	51%	11%	27%
Public Transportation to Airport	1%	1%	0%	21%
Shared Van to Airport	4%	5%	1%	22%
Scheduled Bus to Airport	5%	6%	1%	27%
Total ²	100%	100%		

Notes:

¹ Percent difference calculations may differ due to rounding.

² Columns may not total to 100 percent due to rounding.

Source: Resource Systems Group, Inc., August 2009.

In this scenario, 16 percent of airline passengers who would have parked for the duration of their trips shifted primarily to the dropoff mode by private auto (11 percent), followed by the taxicab or limousine mode (2 percent). This scenario illustrates the link between parking constraints and shifts to dropoff modes.

Scenario #2: Reducing Parking Fees

A second scenario was tested to measure the influence that a 50 percent reduction in parking fees would have on passenger ground access behavior at a large-hub airport. Again, this scenario, the results of which are shown in **Table 5**, was tested to demonstrate the relationship between changes in perceived parking constraints (in this case, reduced constraints, if pricing is perceived as a constraint) and ground access mode share distribution.

Table 5 Results of Reducing Parking Fees by 50 Percent at a Large-Hub Airport

Access Mode	Resident Mode Share			
	Base Case	Scenario #2	Absolute Difference	Percent Difference ¹
Park and Walk to Terminal	5%	11%	6%	117%
Park and Ride Shuttle to Terminal	10%	15%	5%	48%
Taxicab or Limousine to Terminal	30%	27%	-3%	-10%
Dropped Off by Private Auto	30%	24%	-6%	-19%
Public Transportation to Airport	15%	15%	0%	-3%
Shared Van to Airport	5%	4%	-1%	-11%
Scheduled Bus to Airport	5%	4%	-1%	-19%
Total ²	100%	100%		

Notes:

¹ Percent difference calculations may differ due to rounding.

² Columns may not total to 100 percent due to rounding.

Source: Resource Systems Group, Inc., August 2009.

In this scenario, public transportation accounts for a significant mode share (15 percent) at the airport; this mode share was only minimally affected by the policy intended to influence passenger parking behavior. The shift in mode share as a result of reducing parking fees was from passenger dropoff modes (private autos, taxicabs, and limousines) to the use of airport parking facilities.

Scenario #3: Adding Remote Parking

The presence of off-airport parking has a meaningful effect on an airport’s ground access mode share distribution. Although the stated preference survey did not distinguish between on-airport parking that required a shuttle bus to access the terminal and privately operated off-airport parking, a scenario was tested in the parking forecast model in which 5,000 remote spaces (correlated to the “park and ride shuttle to terminal” mode) were added to the parking supply. This scenario applies to the addition of 5,000 spaces to either the on-airport remote parking supply or the privately operated off-airport parking supply. **Table 6** presents the results of this scenario. The parking forecast model is not configured to include the original airport parking supply as an input, so the additional parking supply is not calculated relative to total parking supply.

Table 6 Results of Adding Remote Parking at a Large-Hub Airport

Access Mode	Resident Mode Share			
	Base Case	Scenario #3	Absolute Difference	Percent Difference ¹
Park and Walk to Terminal	5%	4%	-1%	-25%
Park and Ride Shuttle to Terminal	10%	13%	3%	30%
Taxicab or Limousine to Terminal	30%	30%	0%	-2%
Dropped Off by Private Auto	30%	29%	-1%	-3%
Public Transportation to Airport	15%	15%	0%	0%
Shared Van to Airport	5%	5%	0%	-2%
Scheduled Bus to Airport	5%	5%	0%	-3%
Total ²	100%	100%		

Notes:

¹ Percent difference calculations may differ due to rounding.

² Columns may not total to 100 percent due to rounding.

Source: Resource Systems Group, Inc., August 2009.

The addition of remote parking results in a shift in mode share mainly from the “park and walk to terminal” and “dropped off by private auto” modes to the “park and ride shuttle to terminal” mode. This small shift implies that the addition of parking capacity does not generate significant demand for parking, as there was only a two percentage point increase in the overall share of passengers parking despite a significant increase in parking supply. In this circumstance, with the majority of the shift being from the “park and walk to terminal” mode and the “dropped off by private auto” mode, vehicle trips to the airport and in the terminal area would decrease, since for every one-way airline passenger trip, a passenger who is dropped off generates two vehicle trips and a passenger who parks for the duration of a trip generates one vehicle trip.

Use of Competing Airports

A question instrumental to this research project was how constrained public parking and strategies adopted to address constraints may affect airline passengers’ choice of airports in large

metropolitan areas where more than one airport offers commercial airline service. This question was assessed from both the airport staff and passenger perspectives. Data from the stated preference survey supported the opinions of airport staff that constrained airport parking is not an important consideration in airport choice.

Airport staff did not have data available for review to quantify reasons for airline passenger selection of airports within a competing regional system; however, based on anecdotal information, they do not believe that constrained airport parking has caused their customers to use a competing airport. This perspective was supported through the stated preference survey administered to airline passengers. The majority of airline passengers located within markets served by multiple airports did consider use of another airport when planning their trips. For survey respondents at airports in competing systems, cost of the flight and minimizing flight travel time were the most important considerations influencing their choice of airports. The availability of parking ranked low for respondents in terms of influencing their airport choice.

Airport Staff Perspective

For those airports located within a competing regional airport system, staff were asked whether constrained parking influences airline passengers' choice of airports. The responses were based on anecdotal information rather than empirical analysis. None of the interviewed airport representatives believed that constrained airport parking had caused their customers to use a competing airport. Many believed that characteristics of flights offered were the primary reason for airport selection.

Airline Passenger Perspective

The airline passenger survey included several questions related to the respondents' choice of airports on their most recent trips through their home airports (revealed choice questions). The survey results are documented in Appendix E.

One survey question asked respondents to report which other airports they had considered for their trips. Some airports are in markets with no competing airports, such as PDX. On the other hand, airports such as BOS and Oakland International (OAK) are in competitive markets. The level of consideration regarding airport choice is quite unique to the specific airport and to the regional system of airports including the specific airport. For instance, neither Las Vegas McCarran International Airport (LAS) or Tampa International Airport (TPA) is part of a competing system; however, these airports had very different passenger rates of consideration: 3 percent of LAS respondents considered departing from another airport, while 35 percent of TPA respondents considered using another airport. Similarly, respondents at airports within competing regional systems also indicated varying levels of consideration regarding departure from another airport: 70 percent of BOS respondents, 51 percent of Washington Dulles International Airport (IAD) respondents, and 40 percent of Port Columbus International Airport (CMH) respondents considered departing from another airport. **Table 7** presents the results of this survey question, sorted by airport hub size and then by whether or not the airport is located within a competing regional system of airports. As shown, the majority of airline passengers at all large-hub airports within a competing regional system considered departing from another airport and between 22 and 63 percent of airline passengers at small- and medium-hub airports within a competing regional system considered departing from another airport.

Table 7 Airline Passenger Survey: Considered Use of a Competing Airport

Airports	Airport Located within a Competing Regional System ¹	Airline Passengers Considered Departing from a Competing Airport ²		Total Number of Responses
		Yes	No	
Large Hub				
Boston-Logan International (BOS)	Yes	70%	30%	46
Chicago O'Hare International (ORD)	Yes	55%	45%	44
Miami International (MIA)	Yes	68%	32%	44
Washington Dulles International (IAD)	Yes	51%	49%	43
Las Vegas McCarran International (LAS)	No	3%	97%	38
San Diego International (SAN)	No	15%	85%	39
Seattle-Tacoma International (SEA)	No	12%	88%	59
Tampa International (TPA)	No	35%	65%	46
Medium Hub				
Port Columbus International (CMH)	Yes	40%	60%	45
Oakland International (OAK)	Yes	63%	37%	51
San Antonio International (SAN)	Yes	24%	76%	50
Portland International (PDX)	No	13%	87%	316
Small Hub				
Huntsville International (HSV)	Yes	44%	56%	36
Tulsa International (TUL)	Yes	22%	78%	54

Notes:

¹ Staff interviewed at each airport identified whether or not airport management considered the airport to be part of a competing system of airports.

² Reported responses based on an airline passenger survey conducted in support of this research. Full documentation of the survey and results is contained in Appendices D and E.

Sources: Ricondo & Associates, Inc., and DMR Consulting, based on airport case studies (November 2008 through February 2009) (*I-15*); and Resource Systems Group, Inc., August 2009.

To further the understanding of what influences airline passenger selection of an airport within a competing system, the airline passenger survey also contained a series of questions relevant to airport choice. Respondents were presented with 12 airport attributes and were asked to rate each attribute's influence on their airport choice based on a 5-point scale. The results demonstrate that airline passengers primarily select their airport of choice based on the price of the flight and the flight travel time (total travel time and availability of direct flights to destination). The ground transportation attributes, including reliable transit to and from the airport and parking availability, appear to be less important when selecting an airport than the cost and travel time of the flight itself.

Table 8 shows the percentage of respondents from airports located within a competing system of airports that rated the listed attribute as a high influence (4 or 5 rating on a scale of 1 to 5)

on their choice of airports for their trips. For respondents at airports in competing systems, cost and minimizing travel time were most important—greater than 75 percent of respondents rated those attributes as highly influential in their choice of airports. The availability of parking ranked low in terms of influencing the respondent’s airport choice.

Table 8 Airline Passenger Survey: High Influence Attributes for Airports in a Competing Regional System

Attribute	Percentage of Respondents Ranking Listed Attribute as a High Influence on Airport Choice ^{1,2}
Price of Airline Ticket or Fare	89%
Availability of Direct Flights to Destination	84%
Total Travel Time	79%
Frequent Flights to Destination	73%
Available Flights on Preferred Airline	72%
Wide Selection of Airlines	60%
Familiarity with Airport	57%
Ease of Getting Through Airport Security	55%
Reliable Transit to and from Airport	48%
Ground Transportation to and from Airport	46%
Available Parking at Airport	40%
Variety of Airport Restaurants and Shops	14%
Number of Responses	413

Notes:

¹ Results reported only for airline passengers whose home airport was considered to be part of a competing airport system, as reported by airport staff during case study interviews.

² Respondents ranked each attribute on a scale of 1 to 5, ranging from “no influence at all” to “very high influence” on their decision when choosing an airport. High influence is considered as a rating of 4 to 5. Totals shown are the percent of respondents reporting a 4 or 5 to each attribute, and therefore, the percents do not total to 100 percent.

Source: Resource Systems Group, Inc., August 2009.

Use of Off-Airport Privately Operated Parking Facilities

The availability of privately operated off-airport parking as well as the characteristics of the off-airport parking supply can vary widely from airport to airport. The airport operator has minimal control over privately operated off-airport parking, but the airport operator is affected by its availability, both financially and operationally (e.g., parking demand management and parking shuttle vehicles using the airport roadways and terminal curbs) and when considering future parking capacity increases. Although the off-airport parking supply can serve as overflow capacity by design or by default during constrained periods, airport operators risk permanently losing those passengers who were introduced to the privately operated facility if amenities offered at that facility influence the passenger’s decision for future use.

Airport Staff Perspective

The parking supply at 12 of the 15 airports includes privately operated off-airport parking facilities. The following themes were identified during interviews with airport staff:

- Representatives from 9 of the 12 airports consider the privately operated supply to be in competition with the on-airport public parking supply.
- Some airport representatives interviewed, while desiring to capture as much of the public parking market share as possible, also recognize that during constrained parking situations the privately operated parking supply accommodates overflow demand.
- Conversely, other airport representatives have found that on-airport and privately operated public parking supplies reach capacity concurrently and, therefore, privately operated facilities are unable to accommodate overflow from airport parking facilities during constrained periods.
- Airport representatives noted that off-airport parking operators have frequently developed their own loyal customer base, serving a niche market.
- One airport representative noted that the airport lost customers to off-airport parking facilities during periods when the on-airport parking supply was constrained. Some of these customers lost during constrained on-airport parking periods then became part of the off-airport privately operated parking operator's regular customer base.

Passenger Perspective

The presence of off-airport parking has a meaningful effect on an airport's parking share and ground access mode share distribution. The stated preference survey was conducted to evaluate the effects of remote parking, but did not distinguish between on-airport parking that required a shuttle bus to access the terminal and privately operated off-airport parking. Because the remote parking option combined the airport-operated and privately operated parking supplies, differences between on-airport remote parking facilities and privately operated off-airport parking facilities and pricing were not factored into the analysis.

Further research would be beneficial to specifically analyze the relationship between off-airport parking and constrained parking at an airport, as well as ground access implications, as discussed in Chapter 4.

BENEFITS OF A TOOL TO PREDICT THE OUTCOMES OF POTENTIAL STRATEGIES

Conducting a stated preference survey to understand ground access mode preferences and developing a parking forecast model for airport and other policy makers to evaluate potential changes at an airport, as a result of strategy implementation, is a powerful and adaptable approach. The general airport parking forecast model developed as part of this research can be downloaded from the TRB website for use by airport operators and others, or airport operators can develop a similar tool specific to their airport environments by adopting the methodology recommended in this research project, modified to include some of the recommendations for the stated preference survey and model identified in Chapter 4.

The following sections present findings on the usefulness of the stated preference survey and the parking forecast model developed for this research.

Usefulness of Stated Preference Surveys

As demonstrated through a review of the data available at the 15 airports that experienced constrained parking conditions over the past 10 years (i.e., 1998–2008) that were the subject of research in this project and subsequent analyses of data at a subset of those airports, airport operators do not typically maintain data in sufficient detail to determine the cause-and-effect relationships between strategies adopted to address constrained public parking and airline passenger behavior. Therefore, the research approach used in this project involved conducting stated preference survey experiments via an airline passenger survey to test the effects on airport access mode choice of various strategies to address constrained parking and on airport choice, considering a wide variety of parking and airport access characteristics, such as location of parking, price, availability of remote parking, and availability of transit and other HOV modes to access the airport.

Stated preference surveys can be thought of as market testing of potential strategies. The stated preference experiments developed in this research project and implemented through the airline passenger survey allowed for analysis of cause-and-effect relationships and the ability to develop the parking forecast models used in this research.

Appendix D contains documentation on the stated preference survey instrument used in this research project. Chapter 4 documents recommendations for future refinement of this tool.

Usefulness of a Parking Forecast Model

The general airport model developed through this research project can be used for any small-, medium-, or large-hub airport to provide planning-level insight into potential public parking policies and other transportation policies that may affect constrained airport parking. Planning-level insight is defined as an increased understanding at the planning level into the relative effects that a potential policy would have on the airport and the constrained parking environment at the airport compared to other policies.

It has been demonstrated that the parking forecast model developed as part of this research project can be used to test a variety of changes to the provision of airport access modes, the results of which could be used to address constrained parking conditions. Specifically, the model can be used to estimate the effects of increased or decreased parking fees for terminal area and remote parking, changes in travel times and fares for HOV modes, the addition of previously unavailable scheduled HOV modes, the addition of remote parking, shuttle frequency for remote parking, or the institution of a curbside dropoff fee. (An airport operator can use a curbside drop-off fee to enhance the effectiveness of other strategies aimed at relieving constrained parking, by reducing the potential mode shift from parking to use of curbside pickup and dropoff mode. To implement this strategy, an airport must be configured in a manner that lets them collect fees from curbside users and the regulatory environment must allow the airport operator to collect this fee.)

The estimates from this model represent averages from the airports that were surveyed and, therefore, airport-to-airport differences may exist that are not fully represented when the model is applied to a specific airport. These airport-specific differences could be represented in more detail and at a higher level of predictive accuracy if an airport-specific survey and model were developed. However, the model produced during this research project appears to reasonably represent the general magnitudes of changes in mode share distribution between the scenarios and the base case,

particularly if reliable access mode share information is available for the airport, and should prove useful as a planning-planning resource for any airport operator facing constrained parking issues.

When the model is used with accurate base case mode shares, but without additional airport-specific validation, the results should be interpreted as accurately representing relative changes when comparing across pricing and other policies. For example, the differences in the share of users of various modes that result from a 10 percent increase in terminal area parking rates compared to those that result from a 20 percent price increase should be accurately represented (i.e., within 15 percent or so). However, the actual mode share distribution may differ from the shares estimated in the model because of differences that were not reflected in the base case model calibration.

Similar parking forecast models developed specifically for an airport, and based on airport-specific surveys, have the potential to be even more useful and powerful—airport circumstances vary greatly in terms of size, access mode mix, extent and nature of constrained parking problems, and other influencing factors. The survey tool and model can be further expanded or customized to produce analyses specific to an airport’s needs, such as expanding the model to produce comparative vehicle trips related to policy changes if congestion is an issue or to calculate vehicle miles traveled to understand air quality issues.

To further illustrate the usefulness of both the general airport model and an airport-specific model, two models were developed based on parallel stated preference surveys. As discussed further in **Appendix F**, a general airport model was based on a combined sample of airline passengers from the majority of airports that participated in the case studies for this project. In addition, a larger airline passenger sample was obtained from the PDX catchment area and an airport-specific parking forecast model was developed for PDX. To evaluate the usefulness of the airport-specific model versus the general airport model, the results from each model using identical policy scenarios were applied to the PDX environment and compared.

Both models were calibrated to the specific characteristics of PDX. In the first policy scenario, a 50-percent increase in parking fees was tested—from \$30 to \$45, for the “park and walk to terminal” mode and from \$8 to \$12 for the “park and ride shuttle to terminal” mode. The results are provided in **Table 9**. A second policy scenario, the results of which are provided in **Table 10**, presents the results of testing the imposition of a \$10 fee for dropping off airline passengers.

Table 9 Comparison of General Airport and Airport-Specific Models: 50 Percent Increase in Parking Fees

Access Mode	Portland International Airport Mode Share		
	Base Case	Policy Scenario	
		General Airport Model	Airport-Specific Model
Park and Walk to Terminal	10%	5%	4%
Park and Ride Shuttle to Terminal	15%	13%	12%
Taxicab or Limousine to Terminal	10%	11%	11%
Dropped Off by Private Auto	45%	50%	51%
Public Transportation to Airport	10%	10%	11%
Shared Van to Airport	5%	5%	5%
Scheduled Bus to Airport	5%	6%	6%
Total	100%	100%	100%

Source: Resource Systems Group, Inc., August 2009.

Table 10 Comparison of General Airport and Airport-Specific Models: Implementation of a \$10 Airline Passenger Dropoff Fee

Access Mode	Portland International Airport Mode Share		
	Base Case	Policy Scenario	
		General Airport Model	Airport-Specific Model
Park and Walk to Terminal	10%	12%	13%
Park and Ride Shuttle to Terminal	15%	19%	20%
Taxicab or Limousine to Terminal	10%	12%	12%
Dropped Off by Private Auto	45%	35%	31%
Public Transportation to Airport	10%	11%	12%
Shared Van to Airport	5%	6%	6%
Scheduled Bus to Airport	5%	6%	7%
Total	100%	100%	100%

Note: Columns may not total to 100 percent due to rounding.

Source: Resource Systems Group, Inc., August 2009.

As shown in Table 9, in the first scenario, the general airport model produced results that were similar to the results of the airport-specific model for PDX. As shown in Table 10, in the second scenario, the share of airline passengers dropped off at the terminal, the passengers that would be affected by this policy change, differs by four percentage points, which could indicate that airline passengers in the 14-airport sample are generally less price sensitive than PDX customers or that fewer HOV options are available to them than at PDX.

In 2008, the Port of Portland updated the airline passenger ground access travel component of the regional transportation model. The regional model can be used to project the outcome of certain strategies related to parking, expansion of the regional transit system, and other regional measures under consideration. Port of Portland staff tested the airport-specific model developed under ACRP Project 10-06 for PDX and noted that, although not exactly the same, the outputs for the model developed in this research project generally replicate the results of the Port’s model. (17)

QUANTIFYING THE EFFECTS OF STRATEGIES TO ADDRESS CONSTRAINED AIRPORT PARKING

Airport operators implement various strategies when faced with constrained parking conditions. An objective of this research project was to measure the success of these strategies. In other words, did the adopted strategy lead to measurable changes in passenger parking behavior that resulted in the desired outcome?

The operators of the 15 case study airports have faced a variety of public parking constraints over the past 10 years (i.e., 1998–2008)—from the entire supply being constrained on a regular basis to seasonal constraints in specific facilities or products. All of the airport operators have developed strategies to accommodate parking customers. The research team found, however, that most airport operators do not measure or quantify the results of their strategies, nor do they collect and maintain sufficient data to quantify the success of adopted strategies. Parking management is operational in nature. For many of the strategies, such as the use of temporary overflow parking areas, the results

are obvious to the airport operator. In some cases, the airport operator has a general sense of the results of the strategy; for example, the airport operators that adopted parking rate changes to influence demand had an operational understanding of whether the rate increase changed parking patterns for a short period of time or if the rate change achieved the desired long-term change in behavior.

To quantify whether or not strategies achieved their desired goals, data characterizing the parking conditions must be collected and maintained both before and after the strategy is implemented. The decision to collect data to support an understanding of the effects of implementing various strategies involves an airport operator examining the trade-off between the time and cost of data collection and the usefulness or benefit of the information obtained.

The findings of the data analysis completed during this research are presented below, along with a discussion of the types of data and relevant time periods for data collection to enable airport operators to quantify the effects of strategies adopted to affect passenger parking behavior in the future.

Analysis of Data from Case Study Airports

Two general types of data are needed to quantify the effects of strategies adopted to influence passenger parking behavior at airports. In addition, a clear understanding of other factors that may be influencing parking and ground access mode behavior before and after the period of strategy implementation must be achieved to reflect the influence of external factors. Factors suggested for consideration include local or national economic conditions, changes in pricing or supply of other modes as well as privately operated off-airport parking facilities, and changes in commercial airline service at the airport in question, such as introduction of low-cost carrier service. Data sources include:

- **Parking System Data**—To measure changes in parking use, data must be captured and retained from the parking revenue control system both before and after implementation of the strategy. Manual counts may supplement data from the revenue control system.
- **Mode Share Data**—To understand which modes attracted lost parkers or, conversely, which modes attracted additional parkers, mode share distribution data are needed from periods both before and after implementation of the strategy. These data should be available by resident status and trip purpose to determine how shifts may have influenced mode share distribution by market segment. Such diversions influence levels of vehicle traffic and resulting congestion, parking revenues, and vehicle emissions.

The analysis of data from a subset of the case study airports was focused on strategies adopted to alleviate ongoing parking constraints and, in most cases, influence passenger behavior. For example, the strategy of opening an overflow lot to accommodate parking during holiday travel periods is implemented to accommodate a specific peak demand rather than to influence passenger behavior, and was not assessed in this analysis. **Table 11** summarizes the strategies implemented at five of the case study airports that were evaluated for an understanding of the cause-and-effect relationships.

Table 11 Strategies Evaluated by Airport

Airport	Parking Rate Changes	Parking Capacity Increases	New Transit Line Introduction	HOV Service Improvements
Boston-Logan International (BOS)	✓		✓	✓
Chicago O'Hare International (ORD)	✓			
Tampa International (TPA)	✓	✓		
Portland International (PDX)	✓		✓	
Tulsa International (TUL)	✓	✓		

HOV—High occupancy vehicle

Sources: Ricondo & Associates, Inc. and DMR Consulting, based on airport case studies (November 2008 through February 2009).

Available data were not sufficient from any of the five case study airports to analyze the effects of adopted strategies. Therefore, the research team was unable to fully understand the effects of the strategies adopted by the operators of these airports to address constrained parking. The operator of only one of the five case study airports—Chicago O'Hare International Airport—was able to provide extensive before and after data from its parking revenue control system to evaluate the effects of a parking rate increase. In this situation, multiple simultaneous price changes likely obscured the effects of each rate change. Furthermore, mode share distribution data from before and after the rate change was implemented were not collected, so the ability to understand resulting mode shifts was not possible.

The major findings of this analysis resulted in the identification of data collection recommendations for airport operators interested in quantifying the results of strategies they are planning to adopt.



Analysis of Parking Revenue Control System Data at Chicago O'Hare International Airport

In late 2007, the Chicago Department of Aviation implemented four simultaneous rate changes for individual parking products at Chicago O'Hare International Airport. Three of the four rate changes were aimed at influencing passenger parking decisions and reallocating demand among the parking products offered at the airport.

The Chicago Department of Aviation maintains extensive historical records of parking facility use characteristics, including the following for each parking facility, by month, for several years: (1) parking exits, (2) parking transactions by length of stay increments, (3) parking facility closures by hour, (4) parking facility closures by number of events, and (5) parking revenues (gross, average fee per vehicle, average annualized revenue per space).

The data were distilled to a series of comparative summary charts and included in periodic summary reports. The extensive historical data maintained by the Chicago Department of Aviation allow for analysis of historical data and comparison to recent parking data to identify trends in parking activity and characteristics, which is especially important when an airport operator is implementing strategies to address constrained parking conditions and influence passenger behavior.

Detailed analysis of these data conducted under this ACRP project indicates that the rate changes implemented by the Chicago Department of Aviation to reallocate demand among products were partially successful without affecting gross parking revenues. However, a concurrent decrease in O&D passenger activity during this same period, the inability to isolate parking length of stay data to specific constrained events (summary data are maintained on a monthly basis, whereas constrained parking conditions occur on an hourly basis), and multiple simultaneous price changes that likely obscured other effects, made verification of the ultimate effects on parking facility use resulting from implementation of the strategy difficult.

As mentioned, the Chicago Department of Aviation maintains excellent summary parking data, but to fully understand and evaluate the effect of implemented pricing strategies on influencing parking behavior and potential shifts to other modes, including pickup and dropoff by private automobile, an understanding of the passenger mode share distribution both before and after implementation of the strategy is necessary. (2)

Data Collection Recommendations

Because many airport operators do not collect and retain all the data necessary to measure the success of a strategy they have adopted to influence airline passenger parking behavior, a recommended data collection plan is presented below.

The timing of data collection is critical. Comparative data from both before and after implementation of a strategy are required to assess changes resulting from the strategy. This requires the airport operator to plan for data capture well in advance of implementing a strategy, which is often not considered in an operational environment in which strategies are implemented to mitigate immediate issues. **Table 12** provides a summary of before and after data the airport operator can collect to measure results subsequent to strategy implementation.

Table 12 Recommended Data Collection Items for Analysis of Potential Strategies

Item No.	Data	Data Collection Time Period¹	Importance to Analysis	Representative Data Sources
1	Parking Exits by Parking Facility and Distribution of Parking Exits by Length of Stay by Parking Facility	Before and After	Critical	Parking Revenue Control System
2	Mode Share Distribution by Market Segment ²	Before and After	Critical	Airline Passenger Surveys ³
3	Changes in Market Segment Distribution ²	Before and After	Critical	Airline Passenger Surveys ³
4	Total O&D Passenger Activity	Historical	Critical	Airport Management Records
5	Overnight Counts and Peak Occupancy Counts by Parking Facility	Before and After	Supportive	Parking Revenue Control System or Manual Counts
6	Private Auto Counts in the Terminal Area	Before and After	Supportive	Airport Management Data Collection Effort
7	Counts of Airline Passengers Using Other Access Modes	Before and After	Supportive	Airport Management Data Collection Effort
8	Counts of Airline Passengers per Vehicle	Before and After	Supportive	Airport Management Data Collection Effort
9	Changes in Airline Service	Historical	Critical ⁴	Airport Management
10	Change in Parking Supply	Historical ⁵	Critical ⁴	Parking Management Records
11	Changes in Parking Rates	Historical ⁵	Critical ⁴	Parking Management Records
12	Changes in Local and National Economic Trends	Historical	Critical ⁴	General Understanding
13	Changes in Passenger Origins	Before and After	Supportive ⁴	Airline Passenger Surveys ³
14	Consideration of Other Events with the Potential to Influence Interpretation of Results	Historical	Critical ⁴	Varies

Notes:

¹ Data collection time period (in reference to strategy implementation) distinguishes between those data collection items that may require foresight by airport management to collect (before and after) or data that can likely be obtained, including “before data,” well after the strategy has been implemented (historical). A 12-month period of both before and after data is recommended to capture seasonal travel activity and allow for airline passenger behavior to adapt to the implemented strategy.

² Market segment includes the breakout of origin and destination (O&D) passengers into the following groups: resident-business, resident-nonbusiness, nonresident-business, nonresident-nonbusiness.

³ An airline passenger survey represents a snapshot in time of passenger characteristics, so the timing of survey implementation requires careful consideration. See ACRP Report 26, *Guidebook for Conducting Airport User Surveys*, for considerations when conducting airline passenger surveys.

⁴ Items are critical to the analysis if they are applicable to the time period being evaluated.

⁵ Changes in parking supply and parking rates are noted as being historical data, assuming that the airport operator maintains detailed historical records of these changes.

Sources: DMR Consulting and Ricondo & Associates, Inc., October 2009.

Items 1 through 4 are critical to many analyses of the effects of adopting strategies to alleviate constrained parking. Changes in parking behavior and the use of other modes of airport ground access can be determined through analysis of items 1 and 2. These changes should be assessed in the context of changes in market segment distribution (item 3) and compared to changes

in the numbers of O&D airline passengers (item 4) to determine how much of the change may have resulted from a change in passenger characteristics or activity versus the strategy itself. Strategies adopted to address constrained parking could result in shifts to other modes. Overnight parking facility counts and peak occupancy counts (item 5) can show changes in parking facility use to help understand trends.

Curbside pickup and dropoff activity, use of other modes, and number of passengers per vehicle (items 6, 7, and 8) are not captured in the parking exit data. These data can be collected through analysis of access modes reported in O&D passenger surveys; however, a secondary means to understand overall mode shifts, or to support O&D passenger survey data, is to collect data on changes in private auto activity in the terminal area and counts of customers using private autos and other access modes to understand changes in mode share (e.g., increases in airline passengers being picked up and dropped off). These counts can show changes in mode share and, when considered with changes in private auto activity in the terminal area and parking exits, may allow the analyst to make assumptions about shifts in mode use. However, counts will include both resident and nonresident airline passengers. Some of this information will be expensive to collect, if not readily available. However, if the airport operator collects this type of data anyway, it should be collected at times before and after the rate change that will inform this type of analysis.

Data collection items 9 through 14 are suggestions for consideration of other data that are critical to interpreting the results of the analysis if any of these changes occurred during the time period being evaluated. These items may exert other influences on airline passenger parking and mode decisions. It is noted that these types of activities have the ability to obfuscate the interpretation of results.

CONSTRAINED EMPLOYEE PARKING

During the interviews, staff from the case study airports expressed less concern with employee parking constraints than with public parking constraints. The general sentiment was that employee parking needs will be accommodated. The employee parking supply was unconstrained at all of the case study airports but one. Four airports had a constrained employee parking supply in the past, but the circumstances presented fewer challenges to airport operators than public parking constraints.

Because employee parking constraints were viewed as less of a problem and easier to solve, airport operators do not collect and retain much data on employee parking and employee access mode shares. Most of the airport operators did not know the employee mode share distribution for total airport employees or for their own employees, although most of the airport operators believe that the majority of employees commute alone in private autos.

About half of the operators of the case study airports offer some type of program or incentive to encourage their own employees to ride-share or use transit, such as preferential parking for vanpools, discounted transit passes, or participation in a ride-matching program. In most cases, however, airport operators do not collaborate with other on-airport employers to reduce single-occupant vehicle commuting to the airport. At 14 of the 15 case study airports, the airport operator employed less than 10 percent of the total airport employee population—the exception was a small hub airport at which the airport operator employed almost 20 percent of the total airport employee population. Therefore, to significantly reduce the employee trip rates, a collective effort among

airport operator and tenant employers may be needed to reach the majority of the airport employee population.

Although constrained employee parking is not a significant issue for airports, airport operators are increasingly considering programs to reduce employee trips to and from the airport. This issue is especially important because airport employees tend to commute to work in single-occupant vehicles. The research team documented in the Handbook several key aspects of employee commute programs to provide general guidance for airport operators wishing to explore programs to encourage alternatives to the single-occupant commute by private auto. Additional research on employee commute programs and their applicability to the airport environment is warranted to further this knowledge, as described in Chapter 4.

As noted previously, research project resources focused primarily on public parking constraints, including development of a predictive tool to estimate the outcomes of strategies under consideration to alleviate parking constraints. Two predictive models that apply to employee commute programs were identified, but not evaluated in during this research project—the U.S. Environmental Protection Agency’s EPA COMMUTER Model and the Trip Reduction Impacts for Mobility Management Strategies (TRIMMS) model. Both models can be downloaded from the University of South Florida’s website at <http://www.nctr.usf.edu/clearinghouse/software.htm>.



Employee Commute Program at Boston-Logan International Airport

The Massachusetts Port Authority founded a transportation management association (TMA) at BOS in 1997 to reduce single-occupant employee commute trips to the airport, reduce the demand for employee parking, and improve commuting options for employees using alternative modes of transportation. Employees of participating employers receive discounts on the Logan Express bus and some of the privately operated scheduled HOV services, ride-matching services, and information on alternatives to commuting alone. The TMA introduced a commuter cash program to its members in 2007. Member employees who switch from driving alone to carpooling, bicycling, walking, or public transportation receive \$3 per day. Massport provides a 50 percent subsidy, up to \$100 per month, to its employees who commute using the Logan Express or other public transportation. (1)

CHAPTER 4 CONCLUSIONS AND RECOMMENDATIONS

CONCLUSIONS

The following main conclusions resulted from the research conducted under ACPR 10-06.

Constrained public parking conditions at airports lead to increased pickup and dropoff activity at a higher rate than increased use of HOV modes. This mode shift, from an airline passenger driving to the airport and parking a private auto for the duration of the trip (i.e., two ground access trips) to an airline passenger being dropped off and picked up at the airport by a friend or relative (i.e., four ground access trips), results in not only increased curbside congestion, but also increased vehicle trips to the airport, increased regional roadway congestion, and increased vehicle emissions. This understanding of mode shifts in the airport environment is critical when policy makers evaluate the advantages and disadvantages of policy-driven parking constraints at airports—it is unlikely that a policy aimed at constraining airport parking to reduce vehicle trips will provide the desired outcome given the unique travel behavior of airline passengers.

For those airports located within a competing system of airports, constrained airport parking at one airport is not a significant factor influencing airline passengers' choice of competing airports. Airline passengers in metropolitan areas served by multiple airports that offer commercial airline service do tend to consider another airport when planning their trips; however, the cost of the flight and minimizing travel time of the airline trip were the most important considerations influencing airline passenger choice of airports. The availability of parking was not a significant determinant of airline passenger choice of airports. This understanding confirms airport operators' general sense that constrained parking is not an important factor for airline passengers choice of airport.

Stated preference surveys and development of parking forecast models are valuable tools for airport operators to use in developing an understanding of airline passenger behavior resulting from implementation of a strategy to address constrained parking. This research project included development of a general airport model that can be downloaded from the TRB website and used by U.S. small-, medium-, and large-hub airport operators to test policy considerations at a planning level. To use the model, analysts must either have mode share distribution information for the airport or have a general understanding of this distribution. The value of the stated preference survey and parking forecast model has been demonstrated through this research. These tools were proven to be powerful and useful, and can be developed for a specific airport environment by adopting the methodology recommended in this report, including some of the refinements recommended for the stated preference survey and model discussed in this chapter.

Although airport operators implement a wide range of strategies to manage constrained parking, they typically rely on a general sense of the effectiveness of the strategies rather than formal analysis to measure and quantify the results. Furthermore, airport operators do not typically collect and retain the full scope of data needed to effectively quantify the outcomes of the strategies implemented. To quantify whether or not the implemented strategies achieved airport management's desired objective, data characterizing the parking conditions must be collected and maintained from periods both before and after the strategy is implemented. The decision to undertake a data collection effort to support an understanding of the effects of strategies adopted

involves examining the tradeoff between the time and cost of data collection and the usefulness or benefit of the information obtained. The recommended data to be collected if airport operators wish to measure the outcomes of strategies adopted to influence airline passenger parking behavior are provided in the Handbook and in Chapter 3.

Most airport operators tend to believe that employee parking constraints are easier to solve than public parking constraints. Airport employees typically drive to the airport in single-occupant vehicles, and airport operators tend to find solutions to accommodate the demand for employee parking rather than to influence employee commute behavior for several reasons. Peaks in airport employee parking demand are easier to accommodate because they are more predictable and less pronounced than peaks in public parking demand. Furthermore, airport operators typically have more flexibility in locating areas to accommodate employee parking as opposed to public parking. On the other hand, public transit service schedules may not accommodate employee work shift schedules and thus may not be a viable option for many employees, and airport operators may even be obligated to provide parking for airport tenant employees under use and lease agreements with those tenants. Although many airport operators offer programs or incentives to encourage their own employees to ride-share or use transit to reduce commute trips to and from the airport, it is less common for airport operators to collaborate with other airport employers. Because airport operators typically employ a relatively small share of the total airport employee population, a collective effort among airport operator and tenant employers is needed to significantly reduce the employee trip rate generated by the airport employee population.

Although increasing parking capacity was recognized as one solution for a constrained airport parking environment, it may not be the most appropriate or even a possible solution at many airports. Airport operators may be unable to increase parking capacity to keep pace with demand for many reasons, including physical limitations to constructing a new parking facility, financial limitations to constructing a new parking facility, and public policy or public sentiment limiting the airport operator's ability or desire to increase the public parking capacity.

RECOMMENDATIONS

The following recommendations are suggested to facilitate application of the findings of this research project and to refine and address the limitations of this research based on experience gained through this research project.

Data Collection Plan

It is recommended that airport management develop goals and objectives for the parking program to guide decision-making on any strategies being considered to alleviate constrained parking conditions. To develop quantifiable results of any strategies to be implemented to influence airline passenger parking behavior, a data collection plan, commensurate with evaluations needed to measure the achievement of goals and objectives, should be developed, so that data are collected both before and after a strategy is implemented. Careful consideration should be given to developing an ongoing data collection plan, which may require improvements to the data captured and maintained in an airport parking revenue control system, as well as the ability to capture passenger characteristics, such as mode share distribution and market segments, through a periodically implemented airline passenger survey.

Stated Preference Survey Refinement

Overall, the stated preference survey captured many relevant details of enplaning resident airline passenger ground access trips to their home airports. However, experience from this research project suggests that refinements to the survey instrument could enhance any similar future efforts. Recommendations for refining the stated preference survey instrument are provided below.

- The availability of off-airport parking and the characteristics of that off-airport parking can vary widely from airport to airport. The airport operator has minimal control over privately operated off-airport parking, but the airport operator is affected by it financially and operationally (e.g., parking demand management and parking shuttle vehicles using the airport roadways and terminal curbs) and when considering future parking capacity increases. Therefore, it would be beneficial to specifically analyze the effect of off-airport parking on ground access and constrained parking at an airport. One way to approach this information requirement would be to include off-airport parking as a separate alternative from on-airport parking in the stated preference survey.
- The total parking supply (i.e., airport-operated plus privately operated) should be taken into account in the model, so that the addition or subtraction of airport-operated or privately operated parking would be considered as a percentage of the total airport supply. The model should also have an option for parking capacity to be reduced.
- The levels tested for each attribute (parking fee, shuttle ride time, etc.) included in the stated preference experiments were determined based on the best knowledge available from the initial tasks of this research project. For instance, the levels tested for the “park and walk to terminal” parking fee for large-hub airports were \$15, \$25, \$35, and \$45 per day based on the ranges indicated by the large-hub airport staff interviewed for this research. In the future, it would be beneficial to work with the staff of the airport under consideration to also obtain their input regarding the range of levels to be tested for all attributes in the stated preference experiments. For instance, each study airport would likely have a different range for shuttle wait and ride times from the specific airport’s parking lots to the terminals. Similarly, it would be useful to have input from the study airport regarding the time differential between private autos and HOV options.
- Respondents were asked the time that they began their trip to the airport and the time that they subsequently arrived at the airport. This information provides the respondent’s total travel time to the airport. However, it may be useful to add questions for those respondents whose ground access trips to the airport were multimodal to determine the amount of travel time for each mode of the ground access trip. For instance, it would be useful to know the amount of time a respondent spent walking to a transit stop, waiting for the bus or train, and riding the transit mode to the airport, in addition to the respondent’s total travel time to the airport.
- Understanding why respondents select one ground access mode over other available options is useful for airport policy makers. The increase in passenger dropoff trips as a ground access mode is concerning given the related increase in the number of vehicle trips generated per passenger. The stated preference survey asked all respondents whose ground access mode to the airport was a mode other than a private auto (bus, train, subway, shared ride van, taxicab, limousine) if a private auto had been available to them that they could park at the airport for the duration of the trip and, if so, why the private auto was not used. It would be useful to

also ask if a private auto had been available for dropping them off, and the reasons it was not used if a vehicle were available.

- It would also be useful to ask respondents who were dropped off in a private auto if a private auto were available for them to park for the duration of the trip and, if so, why it was not used.
- Similarly, although respondents who traveled to the airport in a private auto were asked the reasons they selected to travel by that mode, it may also be useful to ask why this group of respondents chose not to use HOV modes to access the airport. Over the long term, there may be a benefit to airport policy makers to better understand how to motivate travelers to access the airport by a means other than a non-HOV mode.
- Respondents should be asked to specifically consider their recently reported trip, as well as any constraints that might have precluded driving to the airport and parking while answering the stated preference experiments. Although it is reasonable to assume that respondents were thinking about their recently reported trip for context while answering the stated preference experiment questions, and that they were thinking about any specific constraints that affected their ground access mode choice for the reported trip while completing the survey, they were not explicitly asked to do so.
- In the future, it may be helpful to provide respondents with a more detailed description of each access mode being considered in the stated preference survey. For instance, it cannot be assumed that respondents are familiar with all of the modes being considered, particularly if that access mode is not offered at their home airport or has only recently become an available ground access option at the respondent's home airport. In addition, some access modes, such as the shared-ride van, can be referred to in several different ways. Therefore, clearly defining each access mode for respondents would minimize ambiguity and result in more comparable responses.
- Fare sensitivity was used as a proxy for sensitivity to a terminal dropoff fee. This assumption is reasonable, but it would be helpful to test this fee as a separate attribute in the stated preference experiments.
- In the stated preference survey, those respondents who considered departing from an airport other than their origination airport were asked from what other airport(s) they considered flying. It would be useful to add a second followup question regarding the reason they ultimately selected the airport they did over the other airport(s) considered. This question would begin to address the decision-making process that led to the respondent choosing one airport in a competing system over another and how the decision relates to ground access mode availability and parking availability or cost.

Refinement of the ACRP 10-06 General Airport Parking Forecast Model

Using a stated preference survey to understand ground access mode preferences and constructing a forecast model for airport and other transportation policy makers to use in evaluating potential ground transportation and parking policy changes at an airport is a powerful and adaptable approach. This section provides suggestions for ways to expand the usefulness of this research approach.

Reaching the Entire Population Making an Airport Ground Access Trip

The ACRP Project 10-06 stated preference survey focused on sampling resident airline passengers at their home airports. This approach is appropriate given that resident airline passengers are the dominant group driving to the airport and using the airport's parking facilities. However, if the model is to fully represent all trips to an airport, other subgroups, such as nonresident airline passengers and airport employees, should be included. Collecting stated preference survey data from these groups in addition to resident airline passengers would capture the entire population of individuals making ground access trips to the airport. A parking forecast model could provide segmentation according to the different types of trips and predict the changes in airport access mode share for policies under consideration.

Secondly, to maximize sampling across many different airports, this research project focused on online sampling, which is an efficient and cost-effective means of sampling resident airline travelers based on their home zip codes. Other means of sampling, including in-person surveying at the departure gates at an airport, could be considered for future research especially for an airport-specific model. Such sampling might be an effective means of obtaining a larger sample size at small- and medium-hub airports where travelers access an airport from farther distances or a larger catchment area.

Airports within Competing Systems

It is quite reasonable to assume that airport choice and airport ground access mode choice are correlated decisions. In addition to flight availability and cost, airline travelers evaluate an airport's available ground access modes during the process of selecting the origination airport for their flights. To fully understand this decision-making process, airline passenger surveys at all airports within a competing system (for instance, Manchester-Boston Regional Airport, Boston-Logan International Airport, and T.F. Green Airport in the Boston market) should be conducted. As part of this expanded survey effort, the stated preference experiments could address the airport choice process, as well as the ground access mode choice to fully quantify airport ground access mode selections.

Expanding the Parking Forecast Model

While the current parking forecast model is a useful tool, a number of other analyses could be added to expand the overall utility of the model.

- **Parking Space Allocation**—An analysis of parking space allocation and availability (especially of constrained conditions) would allow the analyst to understand the effects of, for example, the decommissioning of parking spaces because of construction work or pressure to reduce the parking supply, or a parking supply that does not accommodate growth in airline passenger activity.
- **Parking Revenue Forecast**—Being able to convert mode shares to daily or annual revenues would be useful to include in the parking forecast model, since it is reasonable to expect that revenue implications would likely be considered before any parking policy scenario is adopted. Expanding the model to include a parking revenue forecast would require acquiring data from the selected airport, such as total number of parking spaces by lot and parking lot capacity data and a distribution of parking customers by length of stay.
- **Vehicle Miles Traveled to the Airport and Number of Vehicle Trips**—An estimate of vehicle trips generated and vehicle miles traveled would allow the analyst to determine vehicle traffic effects and to estimate the environmental impacts of different parking policies.

Plan for Implementing the Research Products

Handbook

This research project included development of a Handbook to provide information to airport operators and others such as airport parking consultants and metropolitan planning organizations, on addressing constrained parking conditions at airports. The Handbook provides guidance on methods for (1) predicting future constrained parking conditions, (2) predicting the outcomes of strategies being considered to address constrained parking, including development of a predictive model to understand the effects of strategies, (3) evaluating the outcomes of strategies adopted to relieve constrained parking, and (4) selecting strategies to relieve constrained parking. The Handbook is structured like a toolbox with a menu of suggested strategies for airport operators and others to address parking constraints in different circumstances and to assess the potential outcomes of various strategies.

The Handbook will be posted on the TRB website, available for download by interested parties.

Executive Summary

The Executive Summary provides a high-level summary of the research findings, and a summary of the usefulness of the Handbook and the predictive model. This Executive Summary is written for airport operators and other interested parties such as metropolitan planning organizations and airport parking consultants, to help them understand the usefulness of the Handbook and predictive model and to generate interest in the ACRP Project 10-06 research products.

Stated Preference Survey and ACRP 10-06 Parking Forecast Model

The stated preference survey and ACRP 10-06 parking forecast model are discussed briefly in the Handbook, and are available for use. The stated preference survey materials are included as Appendices D and E of this report. The appendices provide a discussion of the survey instrument and a copy of the survey questions, as well as a discussion of survey refinements recommended to enhance future survey efforts. The forecasting tool, the general airport parking forecast model, is available to download from the TRB website. Instructions for using the model are embedded within the model itself, including detailed model instructions and notations on the model's default values.

Potential Webinar to Introduce Research Products to Industry

The research team and the Project Panel suggest that a webinar be conducted to introduce the research products to the industry.

Conference Presentations to Introduce Research Product to Industry

The research team will pursue opportunities to present the findings of this research project and the resulting research products at industry conferences.

Notification of Availability to Case Study Airports

The research team intends to notify the operators of those airports who contributed to this research project of the availability of the research products.

SUGGESTED FURTHER RESEARCH

Employee Commute Programs

Although employee parking constraints were not identified as a pressing concern to the staff interviewed at the case study airports, one of the challenges airport employers face in recruiting and retaining employees is the availability of viable commute options to the airport that accommodate round-the-clock airport work schedules. As a result, most airport operators dedicate large areas of land to accommodating airport employee parking, and they receive little revenue for land that may have higher revenue-generation potential. Furthermore, the costs associated with employee shuttle operations from remote employee parking areas to various on-airport employment areas results in a financial burden to the airport operator and tenants whose employees use the parking facilities.

In addition to the financial aspects of maintaining a large employee parking supply, employee commute trips to and from the airport add to congestion on airport roadways and the regional highway system. These airport generated, low-occupancy vehicle trips are contribute to regional vehicle emissions and, depending on the airport, can be a substantial cause of mobile-source pollutants.

Advantages of providing guidelines for airport operators in developing employee commute programs include improved employee recruiting and retention, development of land uses with greater revenue-generating potential than employee parking, and improved regional traffic congestion and air quality caused by airport operations. Implementation of an employee commute program could be accomplished with effective public transportation options, carpool and vanpool programs, and related incentives for the airport employee population.

Information collected during this research project indicates that:

- Few airport operators offer commute programs for their employees.
- Fewer airport operators offer commute programs for the total airport employer population.
- Few airport operators collect data that allow an accurate analysis of the employee population and employee commute patterns to develop such commute programs.

While the airport operator is in a unique position to develop employee trip reduction programs, numerous questions need to be answered, such as:

- What level of incentives would result in employees abandoning their low-occupant vehicles in favor of an alternate mode of transportation?
- What type of data would be required to examine the feasibility of such alternatives?
- Are certain types of employees at the airport more amenable to alternative modes of transportation than others?
- What benefits would accrue to the airport operator and airport tenants by implementing an airport employee trip reduction program?
- How would the program be administered and financed?

The research team recommends further investigation into the airport employee commute issues and development of a guidebook to enable airport operators to evaluate the efficiency of their

employee parking programs, feasibility of alternative commuting programs for airport employees, and guidance on developing employee commute programs (including data needs and collection methods, range of alternative commute options, incentives and programs, procedures for program development, and a benefit-cost analysis of such a program). This guidance can draw from studies of successful airport employee trip reduction strategies and programs and programs offered by other employment centers.

Congestion Pricing

Given the relationship demonstrated in this research project between airport parking and pickup and dropoff mode shares (when parking is constrained, airline passengers tend to shift to pickup and dropoff modes rather than HOV options), this research could be enhanced by an analysis of how a dropoff fee (a form of congestion pricing) applied to curbside access may affect airport parking and the use of other ground access modes. For airports with constrained parking facilities and congested curbs, the tradeoffs among the options should be carefully considered. This research should also explore implementation issues. Related to congestion pricing of airport access, more research into dynamic pricing of airport parking system is recommended. Though airport applications of this demand management strategy were identified and discussed as a potential strategy for addressing constrained airport parking as part of this research project, the applicability of this strategy in the U.S. market is unknown.

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- (3) Sherrie Jackson, Clark County Department of Aviation, Telephone interview by Taras Sanow, Ricondo & Associates, Inc., December 9, 2008.
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- (7) Rob Burr, David Gavenda, and Karl Martin, Hillsborough County Aviation Authority, Telephone interview by Taras Sanow, Ricondo & Associates, Inc., December 8, 2008.
- (8) Felicia Payne, Metropolitan Washington Airports Authority, Telephone interview by Taras Sanow, Ricondo & Associates, Inc., December 10, 2008.
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- (10) Steve Grossman, Port of Oakland, Telephone interview by Diane Ricard, DMR Consulting, December 1, 2008. Supplemental information provided by Hugh Johnson, Port of Oakland.
- (11) Randy Bush, Columbus Regional Airport Authority, Telephone interview by Taras Sanow, Ricondo & Associates, Inc., January 6, 2009.
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- (13) Greg Lawrence, City of San Antonio Aviation Department, Telephone interview by Taras Sanow, Ricondo & Associates, Inc., January 5, 2009.
- (14) John Robison, Huntsville/Madison County Airport Authority, Telephone interview by Taras Sanow, Ricondo & Associates, Inc., December 11, 2008.
- (15) Carl Remus and George Shaffer, Tulsa Airport Authority, Telephone interview by Diane Ricard, DMR Consulting, December 29, 2008.

- (16) Scott King, Port of Portland, email to Diane Ricard, DMR Consulting, “RE: Text for final report,” November 9, 2009.
- (17) Scott King, Port of Portland, “Re: Field Testing: ACRP 10-06 Constrained Parking Forecasting Models,” email to Diane Ricard, DMR Consulting, September 8, 2009.

APPENDIX A ANNOTATED BIBLIOGRAPHY

Methodology

The following databases and search engines were used:

- Academic Search Premier
- Airports Council International
- American Association of Airport Executives
- Business Source Complete
- Lexis/Nexis
- ProQuest
- ScienceDirect
- Transportation Research Board TRIS Online

Individuals at the following organizations were contacted for information on recent conference proceedings as well as for input on identifying airports that may be experiencing constrained parking conditions or have experienced constrained parking conditions in the recent past:

- Airport Cooperative Research Program
- Airport Ground Transportation Association
- Airports Council International
- American Association of Airport Executives
- Standard Parking

Annotated Bibliography

- (1) Airports' Rideshare Program Honored by Southern California Association of Governments. *BNET Business Network*. 14 Oct. 1998.

[findarticles.com/p/articles/mi_m0EIN/is_1998_Oct_14/ai_53080976. Accessed Sept. 1, 2008.]

Description: Los Angeles World Airports (LAWA) received an award for its Employee Rideshare Program. At the program's initiation in 1988 only 4% of LAWA employees participated, but in ten years participation increased tenfold to 46%. The program was estimated to have eliminated 6.2 million passenger miles during peak times each year.

Keywords: Employee Parking, LAWA

- (2) Belden, Tom. Off-airport lots can eliminate parking problems. *Parctel Airport and Travel News*. 15 May 2007.

[parctel.com/news/index.php/a?cat=76. Accessed Aug. 30, 2008.]

Description: This article explains the benefits of off-airport parking lots, including, for example, how they operate and how to find these lots online and make a reservation. Typical

services include a valet-like system where the operator drives the user to and from the terminal in the user's car and a shuttle system with vehicle-side pick up. Drawbacks to using off-airport parking products include their distant location from airport terminals (often one to a couple miles) and the need to use websites, such as www.airportparkingreservations.com, to locate a facility and book a parking space (users are charged a booking fee for this service). The article concludes that at airports like Philadelphia International (PHL), where alternative airport ground access modes are too inconvenient, the prices and services of off-airport parking lots can compete with those offered by the airport.

Keywords: Off-Airport Parking Lots, PHL

- (3) Cook, B. Parking's Possibilities. *Airport Magazine*, Vol. 18, No. 7, Dec. 2006, pp. 38-43.

[TRIS. National Transportation Library. McKeldin Library, College Park. 1 Sept. 2008.]

Description: This journal article reviews trends of airport parking management and of new techniques that are being applied throughout the industry to address passenger needs including valet service, credit card payment services, and cell phone lots. This revenue-generating review of parking facilities at airports looks at major airports in competitive regions like Chicago, Boston, the Washington, D.C. metropolitan area, Texas, and other regions. Of note, small hub airport Austin Straubel International Airport (Green Bay, Wisconsin) has relieved capacity constraints during its annual peak parking period in March by temporarily relocating employee parking and allowing public parking in the employee lot.

Keywords: Parking Management Solutions, APA, BOS, BWI, CMH, DCA, DEN, DFW, DSM, EWR, FAT, GRB, IAD, ILM, MCI, MDW, MEM, ORD, PHX, RNO, SBN, SDF, SOW

- (4) Decker, R. At MSP – Innovation, Thy Name is Parking. *Parking Today*, Vol. 12, No. 6, Jun. 2007, pp. 24-26.

[TRIS. National Transportation Library. McKeldin Library, College Park. Accessed Aug. 30, 2008.]

Description: This article highlights parking innovations at Minneapolis St. Paul International Airport (MSP), including a self-pay parking system with over 79% participation by parkers and a demand-management system. The demand-management system tracks parking lot occupancies to allow MSP to redirect parkers to other parking facilities and to allow MSP to vary parking rates throughout the day. A philosophy that allows innovations and execution to flow from the operations level rather than being imposed from above has led to many successes at MSP.

Keywords: Parking Management Solution, MSP

- (5) Drivers get guidance at airport lot. *Civil Engineering*, Vol. 68, 1998.

[Academic Search Premier. McKeldin Library, College Park. Accessed Aug. 30, 2008.]

Description: This article explains a sensor system installed in a parking garage at George Bush International Airport for the extension at Terminal C that not only detects the number of spaces available, but closes off sections of the parking lot to parkers and uses digital displays to direct parkers to other sections of the parking lot where parking is available. The

system is unique in that this is done on each level of the airport's parking garage. The project was designed by HNTB Corporation.

Keywords: Parking Management Solution, IAH

- (6) Frank, T. Airports fast-track rail projects. *USA Today*, 29 May 2008.

[Academic Search Premier. EBSCO Host. McKeldin Library, College Park. Accessed Aug. 30, 2008.]

Description: This article discusses details of several existing and planned rail and metro lines that transport passengers between downtown areas and airports, especially critical in areas where traffic is increasing and adding roads and/or lanes is not practical. Transit officials advise that planned rail connections drop passengers at the terminal rather than at a remote station requiring an additional shuttle bus, since complicated connections result in lower ridership.

Keywords: Rail Transit, BOS, BWI, CLE, DCA, DEN, DFW, LAX, MDW, ORD, PHX, SAC, SEA, SLC, TPA

- (7) Fruehwirth, A. S. Cost Efficient Solutions for Airport Mobility Needs. Paper presented at the Tenth International Conference on Automated People Movers (The Transportation & Development Institute and the American Society of Civil Engineers), Orlando, Florida, USA, May 1–4, 2005.

[Abstract: cedb.asce.org/cgi/WWWdisplay.cgi?0510693. Accessed Sep. 15, 2008.]

Description: This author recognizes how land use constraints on terminal area development can result in distances between a terminal and other terminals, parking garages, hotels, and business parks that may be too far to be handled by walking or moving walkways. The author proposes that many airport people movers (APMs) developed to support this transportation need are overdesigned and overpriced, and that simpler, low-cost rope propelled systems can solve airport mobility needs.

Keywords: Airport People Movers, AMS, BHX, YYZ

- (8) Gosling, Geoffrey D., *Airport Ground Access Mode Choice Models, Airport Cooperative Research Program Synthesis 5*, Transportation Research Board, Washington, D.C., 2008.

Description: This report documents the availability, characteristics, usefulness, and limitations of airport ground access mode choice models through a review of available literature, and a survey of airport authorities, metropolitan planning organizations (MPOs), consulting firms, industry organizations, research organizations and other government organizations. It found no evidence that a mode choice model developed for one airport could easily or accurately be modified to reflect travel behavior at another airport. It states that almost no attention has been given to how reliably existing models predict air passenger access mode use when they are used to predict mode use under very different conditions from those prevailing when they were developed, including changes in the physical infrastructure and ground transportation services. It also found that there has been little effort directed at developing airport employee mode choice models, and that most MPOs model airport employee commute trips using the same methodology as all other journey-to-work trips in the region.

Keywords: Mode Choice Model, ATL, BOS, MDW, MIA, OAK, ORD, PDX, SJC, YYZ

- (9) Goswami, A. K., J. S. Miller, and L. A. Hoel. *Airport Offsite Passenger Service Facilities: An Option for Improving Landside Access: Volume I: Definition, Background, and Opportunities*. Final Report VTRC 08-R15, Virginia Transportation Research Council, May 2008.

[TRIS. EBSCO Host. McKeldin Library, College Park. Accessed Aug. 30, 2008.]

Description: This report is a single volume of a series of reports on off-site operations to complete mode transitions and alleviate landside congestion at airports and other transportation modes. Off-site facilities help improve air quality, but run the risk of not being economical. A report is expected to follow on the demand elasticity of these off-airport facilities.

Keywords: Airport Offsite Passenger Service Facilities, BOS, LAS, LAX, MCO, SFO

- (10) Hibbs, G. Airport Structures Require Creative Designs for Increasing Demand. *Parking Today*, Vol. 10, No. 4, Apr. 2005, pp. 47-49.

[www.parkingtoday.com/ptplus-articledetails.php?id=241. Accessed Aug. 31, 2008]

Description: This article describes the new short-term parking garage at Newark Liberty International Airport's Terminal C under a design-build contract to Clarke Caton Hintz. The 4-level, 3,400-space parking garage was designed constructed to fit inside the circulation roads. "Light-wells" penetrating all four floors are a unique feature of the project that results in the loss of a couple hundred spaces; however, they provide relief in a large structure and assist in wayfinding. This project was constructed in stages to ensure that not more than 1,000 parking spaces were lost at any time due to construction.

Keywords: Construction Phasing Constraints, Parking Structure Amenities, EWR

- (11) *Intermodal Transportation: Potential Strategies Would Redefine Federal Role in Developing Airport Intermodal Capabilities*. GAO-05-727. U.S. Government Accountability Office, 2007.

[TRIS. National Transportation Library. McKeldin Library, College Park. Accessed Sept. 1, 2008.]

Description: This report addresses the possible future role of the federal government in intermodal access to airports. The report states that by 2015, airports in the United States are projected to accommodate over one billion passengers. Airport capacity will continue to be strained, while the economic and social costs of the current reliance on private vehicles for predominant travel to airports continues to grow. The report states that there is a need for federal involvement and suggests that two primary options exist. The first option presented is an increase in federal program flexibility to encourage a system-wide approach to the growth of transportation planning and development. The second option addressed is an intensive high-cost/high-benefit program to develop an integrated rail and air transportation network in the United States. Currently 64 out of 72 airports have intermodal connections to local bus systems, and 27 have connections to local rail services. However, only 19 have connections to nationwide bus or rail services. The report states that using European development as a guide, new developments are critical to eliminating the barriers that exist today, such as

funding, geographical location, inconvenience of alternatives to private vehicles, parking revenues, and limitations of nationwide rail networks.

Keywords: Intermodal Capabilities, Constrained Land, BWI, LAX, MIA, MKE, MSP, EWR, JFK, OAK, PDX, DCA, SFO, SJC, SEA, IAD

- (12) Ison, S. and T. Rye. Role of Public Transport as Transportation Demand Management Measure. Presented at the 87th Annual Meeting of the Transportation Research Board, Washington, D.C., USA, 2008.

Description: This conference paper addresses the feasibility of using public transportation as a transportation demand management (TDM) measure. The paper discusses the actual economic elasticities within the UK, concluding that the potential is not far from that perceived within the industry, but short-term effects of promoting public transportation are less-effective in the short-term. The paper also states that user charging is more effective at curbing behavioral patterns. Effectiveness, impact of latent demand, elasticity values, welfare impacts, and quality of service are analyzed as well.

Keywords: Transportation Demand Management

- (13) Ison, S. et. al. Car Parking Management at Airports: Special Case? Presented at the 85th Annual Meeting of the Transportation Research Board, Washington, D.C., USA, 2006.

Description: This paper addresses the issues of airport employee parking management. The authors state that employees usually equate to one quarter to one half of the level of air passengers. Employee parking costs are usually absorbed by the employer, meaning that employees do not calculate the true cost of driving to work as a transportation mode choice. The paper concludes with lessons for airports interested in implementing a parking charge for employees.

Keywords: Employee Parking Demand Management

- (14) Ison, S., G. Francis, I. Humphreys, and T. Rye. Presented at the 87th Annual Meeting of the Transportation Research Board, Washington, D.C., USA, 2008.

Description: This goal of this paper is to consider parking management issues of both air passengers and employees and the policy implications. The paper focuses on UK airports and addresses the parking management issues through interviews, past work by the author, and a literature review, stating that the private car accounts for sixty-five percent of travel to airports generally, but can reach up to ninety-nine percent at small and medium hubs. The report addresses the transferability of its findings.

Keywords: Public Policy, Air Passenger Parking Demand Management, Employee Parking Demand Management

- (15) Ison, S., I. Humphreys, and T. Rye. UK Airport Employee Car Parking: The Role of a Charge? *Journal of Air Transportation Management*, Vol. 13, 2007, pp. 163-65.

[Science Direct. Accessed Sept. 1, 2008.]

Description: This article addresses the issues with charging employees to park at airports, in an effort to reduce congestion and meet environmental policies. The article focuses on UK airports and the issues facing parking management when trying to conform to the official policies to reduce congestion while meeting employee needs. The article also discusses the role that charging for employee parking may play.

Keywords: Public Policy, Employee Parking Demand Management

- (16) Kouwenhoven, M. The Role of Accessibility in Passengers' Choice of Airports. Discussion Paper No. 2008-14. Prepared for the Round Table of 2-3 October 2008 on Airline Competition, Systems of Airports and Intermodal Connections, Paris, France, Oct. 2-3, 2008.

Description: This paper addresses how the accessibility of a single airport (or group of airports) can have large effects on the passenger choice of airports. Understanding the choice process of air travelers is critical to understanding the effectiveness of policy options regarding airport development. Most airports are located close to large cities or metropolitan areas. Congestion due to ground traffic is becoming a major issue and hence the accessibility of the airport itself. Airport policy considerations to improve airport accessibility include parking pricing alterations, stimulating more effective use of existing airport capacity, expanding the airport's physical capacities, and adding modes such as high-speed rail for accessing the airport. The author concludes that further research on the impact on airport market share that attributes such as fast, easy, and cheap parking have is necessary to better understand airport accessibility and the choices that air travelers make.

Keywords: Mode Choice, Airport Choice, Public Policy

- (17) Logan International Airport Ground Access Pricing Study, Initial Report to the Conservation Law Foundation, Massport, February 1, 1991.

Reports on Massport's Ground Access Program and plan to use pricing to the extent feasible to reduce vehicle trips and related emissions to Boston Logan International Airport. The only ground access modes that Massport is responsible for setting the fares are long-term parking, the shuttle bus service transporting passengers between Logan and the underground subway system, the Logan Express, and the water shuttle. Pricing is not the sole determinant in the passenger's mode choice to Logan, and is often not the primary determinant due to many factors, including time sensitivity, available airport transportation options serving origin/destination points in the BOS market area, and whether the customer is paying for the trip or it is being subsidized by their employer. Mode reliability is the most important determinant in mode choice.

Keywords: Mode Choice, Parking Pricing

- (18) Logan International Airport Ground Access Pricing, Follow-Up Report to the Conservation Law Foundation, Massport, August 12, 1993

An update to the 1991 Pricing Study that talked about the pricing changes that were implemented and discussed the effects of the pricing changes. Commercial parking rates were changed in 1991 from a daily rate of \$10, to a first day rate of \$13, subsequent daily rate of \$11, and a weekly cap of \$50. This was meant to incent pickup/dropoff passengers,

typically with trip durations of approximately one week or longer to use long-term parking, by offering a discount. Parkers with shorter stays are considered to be price-inelastic. The first hour parking rate was increased to increase the cost of pickup/dropoff, but Massport did acknowledge this could cause some autos to use the curb and not parking. Although the percentage of long-term parkers increased slightly and the percentage of short-term parkers decreased slightly, Massport was not sure the price increase had effected the change, but served to facilitate passenger's decisions. In addition, weekend rates were implemented on the Logan Express to try to increase ridership, and ground access fees for commercial users were changed to be on a per trip basis. Prior to this change, high occupancy vehicles were charged a percentage of gross revenue, which served as a penalty for carrying more customers.

Keywords: Mode Choice, Parking Pricing

- (19) Lombardi, T. Park and Stay Packages Provide Revenue for Airport Hotels. *Parking*, 9th ser., 46, 2007, pp. 34-35.

[TRIS. National Transportation Library. McKeldin Library, College Park. Accessed Aug. 31, 2008.]

Description: This article discusses a new parking amenity that has develop post-September 11, 2001, provided by hotels located near airports, often called "Park and Stay." Park and Stay is a program where hotels provide shuttle service between the hotel's parking and the airport terminal for the duration of a passenger's travel in exchange for booking a room at the hotel.

Keywords: Hotel Parking

- (20) Munn, C. Airport Parking: It's Not Just About Parking Cars Anymore. *Parking*, Vol. 6, 2007, pp. 16-20.

[TRIS. National Transportation Library. McKeldin Library, College Park. Accessed Aug. 31, 2008.]

Description: This article addresses the complicated nature of airport parking facility management, specifically in the areas of finance and risk assessment. The article proposes that technology is a new essential to parking management, but that quality staff should not be overlooked. The article identifies tasks for managers overseeing the functioning of employee and public parking and transportation, facility management, and cab starting.

Keywords: Parking Management

- (21) Out of Harm's Way. *Parking Today*, Vol. 9, No. 11, Nov. 2004, pp. 22-24.

[TRIS. National Transportation Library. McKeldin Library, College Park. Accessed Aug. 30, 2008.]

Description: Tulsa International Airport experienced constraints on the lower level of its 2-level parking structure. The 2nd level was uncovered and customers expressed concerns about hail damage and sun exposure. To address these concerns and increase usage of the upper level, the garage was retrofitted with a canopy shade system to provide vehicles protection from the elements.

Keywords: Parking Demand Management, TUL

- (22) Parking rates may rise at Chicago airports. CheapFlights.com. Sept. 13, 2007. news.cheapflights.com/airlines/2007/09/parking-rates-m.html. Accessed Aug. 30, 2008.

Description: The City of Chicago is establishing new parking rates in the hopes of redirecting parkers to long-term lots from the O'Hare's and Midway's main parking garages, which were regularly reaching capacity. Also, at O'Hare, a new parking product was developed called "Economy Valet," with a rate between the rates for the short-term and long-term parking products.

Keywords: Parking Demand Management, Pricing Policy, MDW, ORD

- (23) Reid, R. L. Stuttgart Parking Garage Spans Major Highway. *Civil Engineering*, Vol. 78, 2008, pp. 14-15.

[Academic Search Premier. EBSCO Host. McKeldin Library, College Park. Accessed Aug. 30, 2008.]

Description: This article explains Stuttgart Airport's solution to road congestion and parking constraints resulting from a major traffic artery (the Autobahn) that serves the airport. The Autobahn is located in close proximity to the terminals and constrains the terminal area. The solution included the construction of two joined parking lots spanning the Autobahn that are linked with real-time integrated parking guidance systems that guide the parkers to the parking lot with the most available spaces or the lot without ongoing construction work.

Keywords: Parking Demand Management; STR

- (24) Ricondo & Associates, Inc. Impacts of Inadequate Close-In Parking at San Diego International Airport. Presentation to the San Diego Regional Airport Authority Board, San Diego, California, USA. March 2008.

Description: This presentation summarizes the results of a study to help justify the construction of a new close-in parking garage at San Diego International Airport. The presentation outlines high demand for close-in parking and the impacts of not providing adequate capacity. These impacts include a low level of customer service, increased congestion on terminal area curbsides and roadway, lost revenue, and increased vehicle emissions from vehicles continuing to circle the airport looking for parking. The presentation also outlines other airports that do not provide close-in parking structures and the feasibility of encouraging the use of mass transit as an alternate to providing additional close-in parking.

Keywords: Parking Constraints, Mass Transit, SAN

- (25) Sanchez, R. R., and C. Mitchell. *Case Study and Lessons Learned for the Great Lakes ITS Program, Airport ITS Integration and the Road Infrastructure Management System Projects Final Report, Wayne County, Michigan*. Tech. No. 9844. Science Applications International Corporation, Department of Transportation. MI. 2007.

[TRIS. EBSCO Host. McKeldin Library, College Park. Accessed Aug. 30, 2008.]

Description: This report is a case study of the Great Lakes Intelligent Transportation Systems (GLITS), and focuses on the Airport ITS intended to monitor and facilitate flow into and out of the airport along roadways and to short-term parking facilities. Due to delays on the project studied, the case study focused on an overview of the technology (an interlinked

system of 400 databases with real-time updates available to parkers and operators) and a case study of the implementation of complicated IT transportation projects. Although this study did not result in quantitative system impacts, lessons learned that may be valuable to other interested parties were identified.

Keywords: Intelligent Transportation Systems, Parking Demand Management, DTW

- (26) San Francisco International Airport, 2009 Climate Action Plan.

Description: To address issues related to global warming, the City of San Francisco enacted a mandate to reduce greenhouse gas emissions by each City Department to targeted levels in 2017, 2025, and 2050. This document describes SFO's greenhouse gas emission reduction and mitigation measures, which includes an employee commute program.

- (27) Spassov, V., K. Krastanov, and D. Tonev. The Stacker Cranes – a Good Solution For Parking in Large Urban Areas. *Parking Today*, Vol. 9, Mar. 2004.

[www.parkingtoday.com/ptplus-articledetails.php?id=18. Accessed Aug. 30, 2008.]

Description: This article cites the increasing demand for parking spaces in urban environments where the governing authorities cannot or do not allocate additional surface parking, and how the use of stacker cranes, similar to those used in automated warehouse facilities, can alleviate constraints. The benefits of these systems include the speed of installation due to the module-design of the stacker-system, the elimination of staircases, the elimination of space required for individual access to a vehicle, and the high-speed retrieval process (e.g., between 60 and 90 seconds per vehicle). Several applications of this technology were identified in the article, but the authors state that the technology has yet to be fully adopted by the industry.

Keywords: Technology Solution, Parking Lift/Car Stacker

- (28) Sterzick, M. B. New Technology Ensures Efficient Valet Service at DFW. *Parking Today*, Vol 13, No. 9, Sept. 2008, pp. 50-51.

[www.parkingtoday.com/ptplus-articledetails.php?id=664. Accessed 1 Sept. 2008.]

Description: This article describes the customized valet parking management system at DFW, developed by Advanced Valet Parking Manager (AVPM) that allows the valet parking service provider to monitor all aspects of valet parking service. The system links to the flight arrangements of its passengers by scanning ticket information, and can respond to customer texts, emails, and phone calls to ready vehicles for a customer's arrival and departure. The system is also set to recognize when bursts of customers will arrive and allows the valet service to manage peak hour activity. Twenty-four hour video cameras record damage to vehicles as they enter the parking system. The system recognizes VIN numbers and ensures that payment has been received before a car departs the lot. The goal was to ensure that the system did not add to congestion at DFW, while protecting against fraudulent damage claims, operating mistakes, and interrupted service due to technical difficulties.

Keywords: Valet Parking, DFW

- (29) Stringer, K., and N. Harris. Paved Paradise: The New Airport Parking Lots. *Wall Street Journal*, 2003.

[Academic Search Premier. EBSCO Host. McKeldin Library, College Park. Accessed Aug. 30, 2008.]

Description: This article explores the emergence of strong competition between airports and remote parking lots and hotels that offer not just lower prices, contracted rates, and reservations, but free perks as well such as concessions, carwashes, and oil changes. Hotels near airports have started offering two weeks of free parking for booking one room for one night. The article lists off-airport parking options at many major airports and explains some of the technological solutions that off-airport parking operators have developed, such as parking transponders to automatically deduct the cost of parking from a parker's credit card account. Moreover, these facilities offer free amenities, which can attract parkers to off-airport lots from the more convenient on-airport options. These off-airport lots typically pay fees to the airports: trip fees for access to the airport and/or a percentage of gross revenue (6 to 8% of revenue).

Keywords: Off-Airport Parking, Hotel Parking

- (30) Stroller, G. More airport alerts sent to e-mail, cellphones, PDAs. *USA Today*, June 19, 2008.

[Academic Search Premier. EBSCO Host. McKeldin Library, College Park. Accessed Aug. 30, 2008.]

Description: This article provides a brief overview of the email and text alert systems set up at some airports to disseminate flight and parking information. Chicago O'Hare and Midway airports, for example, provide updates three times a day on the airport parking conditions, as well as updates whenever the airport parking situation changes. Users can sign up on a website for this service.

Keywords: Parking Demand Management, MDW, ORD

- (31) Swanson, F. Interoperability Takes Flight. *Parking Network*. Dec. 18, 2006.

[www.parking-net.com/showcaseitem-18809.aspx. Accessed Aug. 30, 2008.]

Description: This article explains how Radio Frequency Identification (RFID) technology for Automatic Vehicle Identification (AVI) is being implemented into parking systems in connection with local toll road systems. The article cites the changes in parking demand from being cost-based to being convenience-based. The first airport to incorporate the technology was Dallas Fort-Worth International, and now there are over 30 million AVI tags in use at airports. Most high-end electronic payment systems at airports have AVI readers built in, and new multi-protocol AVI readers have the ability to seamlessly integrate a transponder into the payment system.

Keywords: Parking Demand Characteristics, DFW

- (32) Van Horn, J. Bellevue Hospital Turns 68 spaces Into 272, and in Only Five Months. *Parking Today*, Vol.12, No. 4, April 2007, pp. 38-39.

[www.parkingtoday.com/pluscontent/0407-3.pdf. Accessed Sept. 15, 2008.]

Description: This article describes the use of parking lifts to maximize the number of parking spaces provided in a small area through the use of a four-level car stacker. The system is designed similar to a valet parking facility: users provide an estimated pick-up time when dropping off a vehicle, so vehicles can be stacked efficiently. The system described cost approximately \$5,000 per space, and was installed in five months. The system improves the speed at which a car is retrieved in comparison to traditional valet services and improves the safety of the vehicle since each vehicle has its own slot on the stacker rather than valet parkers parking vehicle close together.

Keywords: Technology Solution, Parking Lift/Car Stacker

- (33) Van Horn, J. (ed.). Airports – Work With Off Airport Operators!!! *Parking Today*, Vol. 11, No. 6, June 2006, pp. 30-31.

[www.parkingtoday.com/ptplus-articledetails.php?id=419. Accessed Aug. 30, 2008.]

Description: This editorial highlights the benefits of off-airport parking operations. The editor states that the off-airport parking industry views airport authorities as threatening, and yet airport passengers and airports need off-airport parking operations to provide excess capacity that is often not available on the airport. The author cites the symbiotic relationship between LAX and the 15,000 parking spaces supplied by private industry, and suggests that instead of increasing charges for off-airport operators during periods of financial trouble, the airport should find a more evenly distributed method to apply the needed tax on its passengers, through standard fees, etc., in order to encourage off-airport operated parking.

Keywords: Off-Airport Parking, LAX

- (34) Van Horn, J. Tampa: An Airport Designed to Succeed. *Parking Today*, Vol. 12, No. 4, April, 2007, pp. 16-17.

[TRIS. National Transportation Library. McKeldin Library, College Park. Accessed Aug. 30, 2008.]

Description: This article highlights how smart initial airport parking design and simple management techniques can maintain customer service without extreme installments or programs. Tampa International Airport has been able to manage its internal roadways and take advantage of its infrastructure through simple policies such as free parking for the first hour in the short-term facility (which has elevator access to the terminals) and expanding the cellphone lot.

Keywords: Parking Demand Management, Parking Policies, TPA

- (35) Vovsha, P., S. Gupta, and R. M. Donnelley. Air Passenger Preferences for Choice of Airport and Ground Access Mode in the New York Region. *Journal of the Transportation Research Board*, Issue No. 2042, 2008, pp. 3-11.

Description: This paper addresses mode choice models for airport passengers in New York using nested logit (NL) models and multinomial logit (MNL) models. This research found that airport passenger preferences are highly correlative to average yield, access time, and access cost, with other secondary factors such as demographics and trip distribution being significant as well. The study took into account the many options available to New York air passengers, including premium options, in terms of mode of transport to airports. The

research also concluded that a MNL model was statistically better at predicting mode choice than a NL model that was structured with airport choice at the upper level and ground access mode choice at the second level. The result of the research was a tool for future use in airline passenger modeling and planning for future studies and data generation for New York airports.

Keywords: Mode Choice, New York Airports

- (36) Yu, R. More airports tell drivers just where to go – to get parking. *USA Today*, February 13, 2007.

[Academic Search Premier. EBSCO Host. McKeldin Library, College Park. Accessed Sept. 1, 2008.]

Description: This article describes how BWI, Chicago O'Hare, and Minneapolis St. Paul airports are implementing advance systems for getting passenger to parking spaces efficiently through the use of Intelligent Transportation Systems, websites with capacity information on each parking product, and email alerts.

Keywords: Parking Demand Management Solutions, Intelligent Transportation Systems, BWI, MSP, ORD

APPENDIX B AIRPORT INTERVIEW QUESTIONNAIRE

Interview Questions for Airports Participating in the ACRP 10-06 Research Project

Public Parking

Introductory Questions

- Over the past ten years, have there been periods in which the demand for airport public parking has been near or over capacity? Consider total parking supply, parking facility, and parking products. Please elaborate on time periods, frequency, and nature of constraints.
- What is/was the cause of the constrained parking (for example, demand for parking grew faster than forecasted levels, land constraints, scarce financial resources, policy constraints, etc.)
- Are there any regulations or policies (e.g., airport policies and regulations, local policies, state policies) in place that impact decisions to change or manage the public or employee supply?
- Are there defined goals for your public parking program? (e.g., we never turn away a passenger that desires to park at the airport, we will only accommodate those parkers who are willing to pay more for premium terminal area parking and we'll let the private sector provide economy parking products, etc.)

Air Passenger Demographics

- We have the following O&D data for your airport for 2007, which is based on a sample of tickets from the FAA: total air passengers = XXX, O&D passengers = XXX, O&D percentage = XX%. Please confirm this or provide us with your data.
- Please provide your most recent estimate of the proportion of O&D passengers in 2007 (or most recent year available) by:
 - Resident and non-resident travelers
 - Business and non-business travelers
- Please provide your most recent air passenger mode share distribution (mode share and time period it's based on).
- How much of a flight/seat reduction has your airport experienced in 2008?
How do 2008 air passenger levels to date compare to 2007 levels?

Public Parking Inventory

- Please provide an inventory of public parking by category (short term, long term, valet, monthly, on-airport remote, off-airport, cell phone lot, etc.).
- Do you offer dedicated parking for any of these uses?

- Please describe any changes in the overall public parking inventory or the allocation by category since over the past 10 years. (total inventory, inventory by category, etc.)
- If the current rate schedule for your public parking supply is not available online, please provide the current rate schedule for all parking products. Do you have information on occupancy, average length of stay, and distribution of exits by length of stay during peak and/or average times that you would be willing to share with us?
- Do you have information on the characteristics of passengers using long term and short term parking, and curbside pickup/drop-off? For example, average length of stay, for business and non business travelers.
- Please provide an inventory of privately operated off-airport parking operators and number of spaces (or the total number of privately operated off-airport parking spaces).
- Are the off-airport operators considered competition to on-airport parking? If no, please explain.

Parking Demand Management

- What are the typical peak periods for public parking at your airport?
- Please describe any methods you have for projecting periods when the demand for public parking may exceed supply at your airport.
- In your experience, what metrics serve as a warning for future parking shortages (for example, percent occupancy, or #days at a threshold occupancy level)?
- What strategies have you employed to manage public parking demand when the demand for parking nears or exceeds capacity? For example, permanent or temporary rate changes, reallocation of uses, technology, temporary increases in supply (overflow lots), public information campaigns, other demand management techniques.
- How effective have these strategies been in achieving desired result(s)?
- What data and tools did you use to measure results?
- Please share any lessons learned.
- For any pricing changes, what was the impact on demand and revenue, and did the pricing changes achieve the desired result? Please provide the old and new rates and the date the new rates went into effect.
- For any pricing changes, how was the new pricing scheme developed?
- Have you employed strategies to increase demand or revenue in your public parking facilities?
- How have public parking constraints and strategies you have adopted for alleviating the constraints impacted terminal curbside traffic?
- How have public parking constraints and strategies you have adopted for alleviating parking constraints impacted air passenger utilization of other airport access modes?

- If your airport is located in a region that has a system of commercial airports: how have parking constraints or parking strategies at your airport influenced air passenger use at other commercial airports in your market area?
- Are you planning anything in the future that we haven't covered in previous questions (for example, demand management strategies, new technology, changes in allocation, rate changes, change in supply)?

Airport Employee Parking and Demographics

- What is the total number of airport employees (both the total employees at the airport and the number employed by airport operator)?
- Please provide the number of employee parking spaces.
- What is your standard employee monthly parking permit fee?
- If available, please provide your most recent employee mode share distribution for all airport employees (for both airport operator employees and all other airport employees).
- Is there an employee commute program? Is it for all employees or only employees of the airport operator? Please provide details of the program.
- Have there been periods over the past ten years when your employee parking supply has been constrained? If yes, please describe the constraints. If no, skip to the "Data Available" questions.
- If the employee parking supply has been constrained over the past ten years, please describe the strategies you have employed to alleviate the constraints, how effective they have been, how you measured the impacts, and lessons learned.
- How have parking constraints and strategies you have adopted for alleviating parking constraints impacted employee utilization of other airport access modes?
- Are there defined goals for your employee parking program?
- Are there any regulations or policies (e.g., airport policies and regulations, local policies, state policies) in place that impact decisions to change or manage the employee parking supply?
- Are you planning anything in the future related to employee parking that we haven't covered in previous questions (for example, demand management strategies, changes in allocation, rate changes, change in supply)?

Data Available

- Has an air passenger origin & destination survey been conducted at your airport within the past few years that queries passengers about mode choice, point of origin within the region, resident status, and other questions regarding their use of the airport?
- Have you ever conducted a survey to understand airport employee ground access travel behavior?

- What kind of information do you collect and analyze to understand and predict air passenger and airport employee parking patterns and mode choice to the airport?
- Does the airport or another public entity maintain an airport mode choice model? If so, please describe.
- Do you have simulation models or other predictive tools that assist you with planning and managing public or employee parking?
- Over the past 10 years, have you conducted any studies related to parking demand, parking utilization, or parking pricing that would help us to better understand the parking environment at your airport?
- What kind of data, studies or tools do you have available that would allow us in the next phase of this study to analyze the effects of parking strategies you adopted (before and after data)?

Final Questions

- Are you facing any other challenges with public parking or employee parking that we haven't covered?
- In trying to solve your public parking or employee parking problems, have you brainstormed with other airports or considered strategies being used by other airports? Is there anything else you would like to add?

APPENDIX C DATA COLLECTION PLAN

During the data collection task, the research team will use two different approaches to further research the impacts of constrained airport parking:

- **Analyze Existing Data:** Collect and analyze additional information from six to eight of the 15 airports interviewed for this research project to understand causes and effects from past and current parking constraints and strategies implemented to address constraints.
- **Stated Preference Surveys:** Design and conduct a stated preference survey to understand customer choices related constrained airport parking, to provide insight into how to predict the outcome of potential strategies to address constrained parking.

Research in this task will be conducted with the aim of addressing several important questions instrumental to this study, including how constrained public parking and strategies adopted to address constraints may impact:

1. Trip generation and mode share, for example:
 - When long-term parking is constrained, is there a significant shift by air passengers to modes with higher trip generation rates such as dropoff and pickup by private vehicle or taxicab that have higher trip generation rates, which result in increased congestion on terminal curbs, and airport and regional roadways, as well as increased vehicle emissions.
 - When short-term parking is constrained, do meters and greeters shift to curbside pickups and dropoffs, thereby increasing curbside congestion and potentially vehicle emissions.
2. The use of high occupancy vehicle modes.
3. The use of privately operated off-airport parking facilities
4. The use of competing airports.

Various responses to the first three questions were collected during the airport interviews. In many cases the responses were based on anecdotal information, rather than empirical analysis. During the data collection task, the research team will attempt to answer the questions through data collection and analysis and through stated preference surveys. Of the airports interviewed for this research project that are part of a competing system of airports, none of the airport representatives believed that constrained airport parking has caused their customers to use a competing airport. Therefore, the research team and ACRP 10-06 Panel agree that minimal effort will be spent trying to answer the fourth question.

The research in this study also focused on the impacts of airport employee parking constraints. Since only one airport is currently experiencing employee parking constraints, and all of the airport representatives interviewed were more concerned about public parking constraints, the research team and Panel agreed that the majority of resources in this task should be devoted to understanding public parking constraints. The research team will collect and summarize employee commute strategies implemented by airports selected from among the 15 interviewed and from Los Angeles World Airports (LAX). The remainder of this document describes the proposed data collection plans for the two data collection tasks.

ANALYZE EXISTING DATA

The purpose of this task is to try to identify the impacts of constrained airport parking and strategies adopted to address constrained airport parking at six to eight of the airports interviewed.

The research team expects that in most cases analyses in this task will provide further insight into the constrained parking situation at the selected airports, but it will be difficult to definitively establish causes and effects due to limited data availability and often more than one potential cause for a change (or no change) in usage patterns in the complex airport environment.

Proposed Approach for Data Collection

For each of the airports selected, the research team will review available data, studies, and analysis results, and conduct new analysis to determine the impact of a strategy adopted to address constrained parking, where information is available. If an airport representative provided an opinion on the effectiveness of a strategy, the research team will review the methodology used to assess the effectiveness, or analyze available data to compare the results to anecdotal information provided. Based on results from this and previous tasks, recommendations will be made about before and after data that should be collected by an airport operator to measure the effectiveness of strategies adopted to address constrained parking.

Depending on the situation at each selected airport and available information, examples of data the research team may collect and analyze to assess the effectiveness of strategies adopted to address constrained parking conditions include:

- Mode share by market segment in O&D passenger surveys, including resident status (resident and nonresident), trip purpose (business and non-business), and resident status segmented by trip purpose;
- Mode choice model runs if a mode choice model is available and if airport staff believe the airport component is representative of airport travel patterns;
- Relevant studies that document predictions or findings on the implementation of a strategy to address a parking constraint;
- Parking revenue control data;
- Internal tools for predicting overflow situations;
- Parking inventory changes;
- Market share of each airport in an airport system;
- Relevant curb activity data; and
- Transit or HOV service routes in relation to airport market area.

This effort includes a summary of employee commute strategies used by the airports, plus the LAX program sponsored by Los Angeles World Airports, which is highly regarded in the industry.

Potential Airport Candidates

The airports interviewed for this research project have been grouped into those recommended versus not recommended for further analysis based on the nature of the constraints and availability of further information. The airports are listed in **Table 1**. Six to eight airports will be selected from those contained in Table 1 for further study. The research team anticipates that additional information useful to this study beyond that identified in the interviews may be identified.

Table 1 (Page 1 of 3) Potential Airport Candidates Recommended for Further Study

Airport	Potential Candidate ¹	Hub Classification	HOV Mode Share	In a System of		Discussion
				Completing Airports	Consider Privately Operated Parking to be Competition	
BOS	YES	Large	High scheduled HOV mode share	Yes	No	The Massachusetts Port Authority (Massport) has dealt with constrained public parking for many years. The parking supply is limited through policy constraints. Massport promotes and sponsors HOV modes. Of the airports interviewed, it has the lowest ratio of total parking spaces (airport operated plus privately operated) per enplaning resident O&D passenger. Available data includes outputs from mode choice model, studies, air passenger surveys, and data from the parking revenue control system.
SEA	YES	Large	High HOV mode share	No	Yes	SEA has only one parking facility. The Port of Seattle has struggled with numerous constrained parking events between 2005 and early 2008. Of the airports interviewed, it has the third lowest ratio of total parking spaces (airport operated plus privately operated) per enplaning resident O&D passenger. The amount of off-airport parking in the adjacent City of SeaTac is regulated by the City of SeaTac. Available data includes air passenger surveys, analysis developed for raising parking rates, results from focus groups, and data from the revenue control system. They are currently developing elasticities and a model to predict parking behavior and air passenger mode choice.
TPA	YES	Large	Low scheduled HOV mode share	No	Yes	Prior to an increase in supply, one facility closed a couple of times per week. Curb congestion is also a concern. TPA has used rate changes to try to balance demand. Available data includes air passenger surveys and studies. The suitability of TPA for this task depends on the availability of data from the revenue control system that will allow the research team to analyze parking patterns before and after rate changes.
IAD	No	Large	Low scheduled HOV mode share	Yes	No	IAD experienced constraints during holiday peaks only and limited data are available.
LAS	No	Large	Low scheduled HOV mode share; high HOV mode share	No	No	Clark County Department of Aviation has addressed constrained parking with permanent and temporary capacity and two rate changes. It is too soon to analyze the effects of the most recent rate change and airport representatives do not believe the previous rate change was effective in shifting demand.

Table continued on the next page.

Table 1 (Page 2 of 3) Potential Airport Candidates Recommended for Further Study

Airport	Potential Candidate ¹	Hub Classification	HOV Mode Share	In a System of		Discussion
				Completing Airports	Consider Privately Operated Parking to be Competition	
MIA	No	Large	Low scheduled HOV mode share	Yes	Yes	MIA experienced constrained parking in the terminal area from 2003-2007 during holiday periods. The Miami-Dade Aviation Department has addressed constrained parking by increasing capacity and a rate change. Staff do not believe the rate change was effective. In addition, an increase in capacity occurred in the same general timeframe of the rate change and may have diluted the effects of any changes.
ORD	No	Large	High scheduled HOV mode share	Yes	No	ORD experienced continual parking constraints between 2001 and 2008. Available data is limited to data from revenue control system, and the share of resident travelers is unknown. Parking rate changes in 2007 may have caused a shift in behavior, but Department of Aviation staff believe it cannot be proven because of the economic downturn.
SAN	No	Large	Low scheduled HOV mode share, high HOV mode share	No	Yes	SAN would be an interesting case study for further analysis due to constrained parking from 2005 to the present and policy constraints, but data to support further analysis are not available.
CMH	YES	Medium	Suspected low scheduled HOV mode share	Yes	Yes	Long term parking has been regularly constrained since 2000. Most of the parking rate changes have been enacted to raise revenue, but if data are available from the revenue control system, an analysis can be conducted to determine usage patterns before and after the rate changes. A parking study and O&D survey data are also available.
OAK	YES	Medium	High scheduled HOV mode share	Yes	Yes	OAK experienced periods of constrained parking from the mid-1990s through 2007. Although the constraints have primarily been addressed with temporary and permanent increases in capacity, staff members believe some rate changes have shifted demand, even though revenue enhancement has been the goal of rate changes. However, changes to the amount and location of the parking supply may mask the changes attributable to rate changes. Available data includes air passenger survey data, data from the former revenue control system and a study on potential privatization of part of the parking supply.

Table continued on the next page.

Table 1 (Page 3 of 3) Potential Airport Candidates Recommended for Further Study

Airport	Potential Candidate	Hub Classification	HOV Mode Share	In a System of Completing Airports	Consider		Discussion
					Privately Operated Parking to be Competition	Yes	
PDX	YES	Medium	High HOV mode share	No	Yes		Individual facilities have experienced constraints during different periods since at least 2003. The parking supply has limitations based on policy constraints. The Port of Portland is concerned about constrained parking shifting passengers to using pickup and dropoff modes, which generates more vehicle trips to and from the airport. The light rail line to PDX opened in 2001. Available data includes passenger surveys, data from the revenue control system, roadway and curb counts, and studies. The airport component of the regional travel model was updated in 2008.
SAT	YES	Medium	Limited HOV modes	Yes	Yes		Long-term parking was constrained between 2004 and 2007 and is currently unconstrained due to an increase in supply plus a decrease in passenger activity attributed to the current economic downturn. Curb congestion is also a problem. Parking rates were increased in September 2006 to shift demand from the terminal area to Economy parking, and airport staff believe the rate change was successful. Capacity in the terminal area was increased in December 2007. Available data includes an O&D passenger survey, studies for development of garages and recommended rate changes, and a roadway simulation model. SAT will be a stronger candidate for this task if data from the revenue control system are available to analyze use patterns in the parking facilities before and after the rate change.
BUR	No	Medium	Suspected low scheduled HOV mode share	Yes	No		BUR would be an interesting case study for further analysis due to constrained parking and policy constraints, but data to support further analysis are not available.
HSV	YES	Small	No HOV modes	Yes	No		Some parking constraints have been resolved through rate changes. HSV performs surveys at two competing airports to understand the demand they are not serving. Available data includes surveys at two competing airports, analysis in the master plan, and data from the revenue control system.
TUL	YES	Small	No HOV modes	Yes	Yes		TUL experienced constraints in individual facilities from 2003 to 2004 and in 2006. A candidate if data can be obtained from the revenue control system to determine before and after patterns after a rate change that may have influenced parking and curb behavior. Parking studies are available.

Note:

¹ Six to eight of the airports contained in this study will be selected for inclusion in the Analyze Existing Data task.

Sources: DMR Consulting and Ricondo & Associates, Inc., Based on interviews with airport representatives conducted between November 2008 and February 2009 (see Final Report references 1–15).

STATED PREFERENCE SURVEYS

This section provides details on the stated preference survey portion of the research team's detailed data collection plan.

Proposed Approaches for Data Collection

The Stated Preference Survey data collection will sample air passengers exclusively, with the goal of quantifying passenger parking choice and access mode choice. The research team recommended four sampling plan approaches:

1. National Online Sample – A national online sample of airline travelers drawn randomly from throughout the United States.
2. Limited National Online Sample of 15 Airports – A national online sample of airline travelers from the 15 participating in this research project.
3. Airport-Specific Online Sample – An online sample of airline travelers from two or three of the 15 airports participating in this research project.
4. Combination Online Sample - Two-thirds of study respondents will be a national online sample of airline travelers from 14 of the 15 airports participating in this research project. One-third of study respondents will be an online sample of airline travelers from the remaining airport participating in this study. The research team and the Panel would select the specific airport.

Based on input from the ACRP 10-06 Panel during the February 26, 2009 teleconference, the research team will implement the combination online sample approach (approach #4). Of the 15 airports, the Panel and the research team agreed Boston Logan International Airport was the best candidate for the airport-specific online sample (one-third of survey respondents), and if Massachusetts Port Authority (Massport) staff were not interested in participating as the airport-specific candidate, Portland International Airport was identified as the best alternative.

The following sections highlight the benefits of each of the four proposed survey approaches.

Approach #1—National Online Sample

An option originally detailed in this project's Amplified Work Plan, a national sample of airline travelers drawn randomly from throughout the United States, would serve to provide a representative look at general effects across the full spectrum of U.S. airports and would also provide a general overview of parking or service elements at each airport. Therefore, the first data collection approach considered was to survey a national sample of air passengers.

There are several benefits to conducting a national online sample for the stated preference survey. First, this approach allows for collecting data under many conditions – including, for example, both constrained and unconstrained parking conditions; large, medium, and small hub airports; and airports that are and are not part of a system of competing airports. Collecting data under many airport conditions increases the potential to produce a handbook with recommendations that apply to many airports, rather than a few select airports. Second, collecting data from a national online sample of air travelers provides the opportunity to examine differences between important segments such as travelers at airports with constrained parking versus travelers at airports with unconstrained parking. Last, the national online approach is an approach that is proven to be

effective, as demonstrated through research team member RSG's bi-annual domestic airline traveler survey that addresses airport choice, airport access, and itinerary choice.

In order to conduct the national online sample of airline travelers, the research team would work with a well-known online sample provider.

Approach #2—Limited National Online Sample of 15 Airports

A more focused variation on the national sample would be to limit the national sample to market areas of the 15 airports participating in this research project, rather than surveying travelers from the universe of small, medium, and large hub airports within the United States. Potential survey respondents could be identified and screened by having a home zip-code within a certain range of the 15 airports. Doing so would allow the research team to more specifically incorporate the results from the airport interviews into the questionnaire design. Collecting a national online sample of air travelers from the 15 airports would also allow the overall project to have continuity of focus—researching, interviewing, surveying, and producing recommendations for the handbook based on the same set of 15 airports in the United States. By focusing the data collection on the 15 airports participating in this research project, the research team would be better equipped to tie together the qualitative (airport characteristics) and quantitative components (respondent trip characteristics) of the study airports, compared to the first data collection approach. Lastly, this approach has advantages because it would allow the research team to collect data across a broad spectrum of conditions, but also focus it sufficiently to allow a robust segment size of respondents for each of the 15 airports.

Approach #3—Airport-Specific Online Sample

The third data collection option as originally detailed in this project's Amplified Work Plan, was to sample airline travelers at a selected subset of the airports participating in this research project. By focusing the data collection plan on a few airports, the research team would be able to analyze the conditions at the specified airports at a finer level of detail compared to the first and second approaches. Therefore, the third potential data collection approach would be to select two or three of the 15 airports and collect data from air travelers in the selected market areas. Selecting only two or three airports from which to collect data would require careful consideration on the part of the research team and the Panel as to the determination of which two or three airports to sample. Criteria for airport selection would include examining if the airport were part of a regional system of airports, the nature of the parking constraints at the airport, availability of high occupancy vehicle options at the airport, and the availability of privately operated off-airport parking. The research team would most likely recommend, if the third data collection approach is chosen, that the two to three airports selected for stated preference surveying come from the list of airports being studied more in-depth as part of Analyze Existing Data task (see Table 1 for a list of recommended airports).

By conducting an airport-specific online sample, the research team would be able to gather more in-depth analysis of the conditions at two to three airports, than could be discerned from the information collected at the larger pool of airports studied in the first and second sampling approaches. It would also be possible to collect data for two airports within a system, although findings from the airport interviews indicate that airports do not consider constrained parking conditions to be influence airport choice. Finally, conducting airport-specific data collection would allow the research team to include some airport-specific features in the survey, such as customized answer choices.

Approach #4—Combination Online Sample

The research team recommends a combination of the second and third data collection approaches for the final data collection option for this project. Using a combination approach of a national online sample of the 15 airports and an airport-specific online sample for one airport, would allow the research team to study the cause and effect relationships necessary to estimate the effects of future parking supply changes and other strategies implemented to address parking constraints at airports.

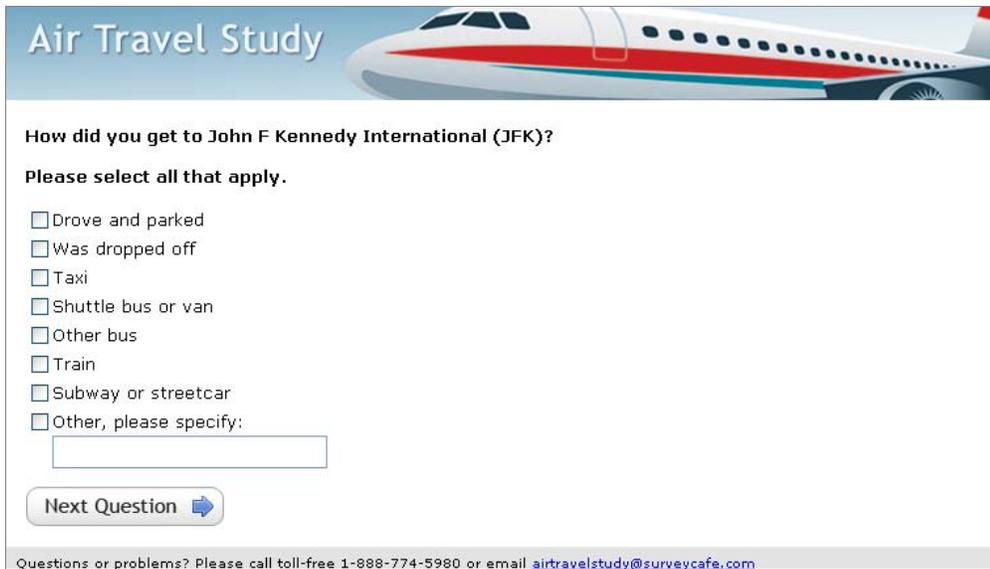
Logistically, in order to conduct a combination approach, the research team would collect approximately two-thirds of study respondents from a national online sample of airline travelers from 14 of the 15 airports participating in this research project. The remaining one-third of study respondents will be an online sample of airline travelers from the fifteenth airport. The selected airport would be chosen by the research team and the Panel. All respondents would be provided by a well-known online sample provider. This approach would allow the research team to collect national sample, and to focus in on a specific airport allowing for a more detailed analysis of the conditions at that airport.

Survey Procedures

While the airport case studies provide useful descriptive information about the parking constraints at the 15 airports participating in this research project, the case studies by themselves do not provide sufficient detail to determine the cause-effect relationships between changes in parking supply and traveler behavior. Therefore, further data collection and the conducting of stated-preference survey experiments are recommended as especially useful tools in estimating cause-effect relationships for airport access in a constrained parking environment. The stated preference survey can be used to test the effects on airport access mode choice and airport choice considering a wide variety of parking and airport access elements such as location, price, availability of privately operated parking, and availability of transit and other high occupancy vehicle modes.

Since 2000, research team member RSG has conducted a bi-annual domestic airline traveler survey that includes stated preference experiments addressing airport choice, airport access, and itinerary choice. For this project, the research team will design a similar survey that is focused on parking-related elements of an air traveler's airport experience and use the survey to estimate the effects of those elements on airline passenger parking behavior, access mode choice, and to a lesser extent, airport choice, given the findings of the airport interviews.

The survey will use an online interactive instrument to collect trip description information and traveler characteristics (see **Figure 1**). **Figure 2** shows an example of the bi-annual domestic airline traveler survey that focuses on airport choice, the itinerary, and in-flight preferences of air travelers.

The image shows a survey screen titled "Air Travel Study" with a header image of an airplane. The main question is "How did you get to John F Kennedy International (JFK)?" and it asks the respondent to "Please select all that apply." There are eight checkbox options: "Drove and parked", "Was dropped off", "Taxi", "Shuttle bus or van", "Other bus", "Train", "Subway or streetcar", and "Other, please specify:". Below the "Other" option is a text input field. A "Next Question" button with a right-pointing arrow is located below the input field. At the bottom of the screen, there is a footer with contact information: "Questions or problems? Please call toll-free 1-888-774-5980 or email airtravelstudy@surveycafe.com".

Air Travel Study

How did you get to John F Kennedy International (JFK)?

Please select all that apply.

- Drove and parked
- Was dropped off
- Taxi
- Shuttle bus or van
- Other bus
- Train
- Subway or streetcar
- Other, please specify:

Next Question ➔

Questions or problems? Please call toll-free 1-888-774-5980 or email airtravelstudy@surveycafe.com

Figure 1 Sample Access Mode Question Survey Screen from RSG's Bi-Annual Domestic Airline Traveler Survey
Source: Resource Systems Group, Inc., February 2009.

Air Travel Study



Which of these 2 alternatives would you select?

Alternative 1		Alternative 2
AirTran Airways Corporation	Airline	Northwest Airlinik
Regional Jet	Aircraft Type	Regional Jet
La Guardia (LGA)	Departure Airport	John F Kennedy International (JFK)
<ul style="list-style-type: none"> \$12/day in airport garage \$7/day in remote lot with 10 min shuttle bus ride 	Parking cost	<ul style="list-style-type: none"> \$20/day in airport garage \$7/day in remote lot with 10 min shuttle bus ride
<ul style="list-style-type: none"> Travel time 10 minutes less than car \$20 round trip, including parking at station Train runs every 15 minutes 	Rail service	<ul style="list-style-type: none"> Travel time 10 minutes less than car \$20 round trip, including parking at station Train runs every 15 minutes
1:05 AM	Arrival Time (Central Time)	2:05 AM
No Connections	Connections	1 connection
1 hr. 50 mins.	Airport to airport travel time	2 hrs. 10 mins.
90% of these flights are on-time	On-time performance	90% of these flights are on-time
\$222 round trip	Round-trip fare	\$555 round trip
I would choose this alternative, and get to the airport by: <ul style="list-style-type: none"> <input type="radio"/> Bus <input type="radio"/> Driving and parking <input type="radio"/> Getting dropped off <input type="radio"/> Taxi <input type="radio"/> Train <input type="radio"/> Other 	Please select one	I would choose this alternative, and get to the airport by: <ul style="list-style-type: none"> <input type="radio"/> Bus <input type="radio"/> Driving and parking <input type="radio"/> Getting dropped off <input type="radio"/> Taxi <input type="radio"/> Train <input type="radio"/> Other

(Question 1 of 10)

Next Question ➔

Questions or problems? Please call toll-free 1-888-774-5980 or email airtravelstudy@surveycafe.com

Note: This study had a different project focus – on airline itinerary and airline choice.

Figure 2 Sample Stated Preference Experiment from RSG's Bi-Annual Domestic Airline Traveler Survey

Source: Resource Systems Group, Inc., February 2009.

The research team will focus on sampling resident business and non-business travelers at each airport. By focusing on the individuals who are most familiar with the airport (their “home” airport) and who are most likely to use a variety of airport access modes, the research team believes it will be able to maximize the usefulness of the stated preference survey results. Travelers are most likely to be able to recall the details of a recent trip to their home airport. Residents are largely responsible for occupying the airport parking supply. The long-term parking supply is occupied exclusively by resident air travelers, because some residents have use of a private auto that can be parked at the airport for the duration of their air trip. Non-residents only have this option at their home airport. Parking spaces used for short-term parking are utilized by autos picking up residents or non-residents. But the choice of being picked up or dropped off by the non-resident traveler depends on the non-resident traveler knowing a resident who will pick them up or drop them off (the meter or greeter), and what the meeters’ or greeters’ perception is of the airport parking situation. Therefore surveying non-residents is not a good use of resources. Surveying meeters and greeters is beyond the scope of this study, and would also produce limited results.

The survey will include limited mode choice questions about each traveler’s visitor trip end (or destination). Recruiting respondents based on residence location provides efficiency in sampling to ensure adequate sample size and timely completion of data collection, as well as diverse sampling of a wide variety of destinations.

The stated-preference survey will focus on the set of air passenger segments shown in **Table 2**. The trip purpose segment helps distinguish between business travelers that typically have their travel costs subsidized by their employers and are more time sensitive and less price sensitive versus non-business travelers that are typically more price sensitive and less time sensitive.

Table 2 Air Passenger Survey Segments

Segment Type	Segment
Trip Purpose	Resident Business Trip
	Resident Non-Business Trip
Access Mode	Park (short-term, long-term, privately operated off-airport lots, etc.)
	Non-Park (transit, car service, shuttle, pickup or dropoff)

Source: Resource Systems Group, Inc., February 2009.

The research team will closely monitor completed survey responses to evaluate the mix of traveler types, trip type, trip purpose, and airport access mode among respondents to ensure a representative sample is collected. The final determination of which data collection plan to use for this study will influence more detailed decisions for this project’s sample goals. For instance, if the research team uses the recommended combined approach of a national sample and an airport-specific sample (the fourth approach), the team will want to determine the specific airport before considering any more specific sample goals. For instance, an airport such as Huntsville International in Alabama has 69 percent business travelers and 31 percent leisure travelers, while an airport such as Portland International has 33 percent business travelers and 67 percent leisure travelers and therefore any specific sample goals need to reflect the data collection approach and the selected airports’ circumstances.

Online Sampling

The survey questionnaire will be programmed as a web-based instrument that will be administered over the Internet to respondents from a sample provider. Respondents’ home zip-codes

will be used as initial screening criteria and survey invitations will be sent by email. The email invitation will include a link to the survey. The survey will be password protected and respondents will only be able to complete the survey once. The research team will closely monitor the live up-to-date results of the survey to ensure that the survey response is as reasonably unbiased and representative as possible. Similarly, the research team will closely evaluate the survey data for any biased or unreasonable survey results. The research team will also monitor sample responses to ensure that adequate responses for each airport market are received and that the responses are representative of the traveling public by collecting demographic data along with trip data.

A web-based approach is the recommended method of surveying these air travelers, because air travelers are recognized as having a somewhat higher income and education level, which usually correlates with increased familiarity and comfort with the Internet. Currently, more than three-quarters of Americans have access to the Internet and it is reasonable to expect that air travelers have significantly higher Internet penetration rates.

Secondly, there are benefits to conducting online sampling for this project. It is possible that online sampling will reach a greater geographic breadth of respondents, as well as small segments of respondents who might not have been reached through in-person sampling such as travelers who have switched airports or switched airport access modes due to constrained parking. In addition, online sampling reaches travelers who then report trips over a longer time frame than in-person sampling. It is possible that in-person sampling at an airport could occur during an anomalous travel period at the airport despite best efforts to avoid such periods.

Lastly, if the project timeline allows, the research team will conduct a pre-test of the survey to a small number of respondents. This will allow the research team to monitor the effectiveness of the survey, examine the initial survey results, and to make revisions to the survey questions or sampling plan prior to providing the survey to all respondents.

Data Collection Approach Recommendation

The research team has carefully considered the four data collection approaches, as well as others not mentioned in this document. The Team recommended approach #4, a mix of national sample and sample from a specific airport selected from the airports participating in this research project, and the ACRP 10-06 Panel concurred with this recommendation during the February 26, 2009 teleconference. Such an approach to online data collection allows the team to collect both a national sample of airline travelers and a sample of travelers from a specific airport being studied on this project. This approach would allow the team to examine the general effects of constrained parking across a broad spectrum of U.S. airports (all 15 airports participating in this research), and also to begin to focus on a more detailed analysis of the specific conditions at one of the airports participating in this research.

Of the 15 airports, the Panel and the research team agreed Boston-Logan International Airport was the best candidate for the airport-specific online sample (one-third of survey respondents), and if Massport staff were not interested in participating as the airport-specific candidate, Portland International Airport was identified as the best alternative.

APPENDIX D STATED PREFERENCE SURVEY DISCUSSION AND QUESTIONNAIRE

SURVEY ADMINISTRATION

This section addresses the structure and format for data collection, the updated plan for data collection, and the approach for how to administer the survey online.

Survey Instrument

The stated preference survey approach employed a computer-assisted self-interview (CASI) technique developed by research team member, Resource Systems Group, Inc. The stated preference survey instrument was customized for every respondent by presenting questions and modifying wording based on respondents' previous answers. These dynamic survey features provided an accurate and efficient means of data collection and allowed presentation of realistic future conditions that corresponded with the respondents' reported experiences traveling to their home airport.

Representatives at each of the 15 airports participating in the ACRP 10-06 research were individually asked to participate in the stated preference survey and were afforded opportunity to review the survey prior to data collection. One airport was selected for in-depth study, Portland International Airport (PDX). Staff at PDX worked more closely with the research team to provide input and suggestions on the survey process.

Appendix C includes the data collection plan for this research project.

Data Collection Plan Update

The research team focused on sampling resident business and non-business travelers at 14 of the 15 airports that participated in this research project. Staff from the fifteenth airport, Bob Hope Airport in Burbank, CA, requested not to be included in the stated preference survey effort due to the timing of the survey. Resident travelers are regular users of their "home" airport and are most likely to use a variety of airport access modes to travel to the airport, due to familiarity with the available options. Travelers are also most likely able to recall the details of a recent trip to their home airport. In addition, residents are largely responsible for occupying an airport's parking supply.

The long-term parking supply is occupied almost exclusively by resident air travelers, because most residents have use of a private auto that can be parked at the airport for the duration of their air trip. Non-residents only have this option at their home airport. Parking spaces that are used for short durations to pickup or drop-off air passengers are utilized by personal vehicles picking up residents or non-residents. But the choice of being picked up or dropped off by the non-resident traveler depends on the non-resident traveler knowing a resident who will pick them up or drop them off (the meter or greeter), and what the meter or greeters perception is of the airport parking situation. Therefore surveying non-residents was determined to be beyond the scope of the study, and would also produce results of more limited use.

The data collection approach was a combination approach of a national online sample of 13 of the 15 airports participating in this research project and an airport-specific online sample for one

of the 15 airports. This approach allowed collection of a national sample and the ability to focus in on a specific airport allowing for a more detailed analysis of the conditions at that airport. Approximately two-thirds of the study respondents were from a national online sample of air travelers. The remaining one-third of study respondents were an online sample of air travelers from PDX, which was recommended by the research team and approved by the ACRP Panel for reasons that are discussed below.

Conducting the online sample of air travelers from 14 of the airports participating in this research project allowed the overall project to have continuity of focus – researching, interviewing, surveying, and producing recommendations for the handbook based on the same set of airports across the country. Focusing the data collection on the 14 airports allows for comparison of qualitative (airport characteristics) and quantitative components (respondent trip characteristics) of the study airports. Lastly, this approach has advantages because it collects data across a broad spectrum of conditions at different airports, while it also focuses sufficiently to allow a reasonable segment size of respondents for each of the 14 airports. **Table 1** summarizes the ground access characteristics of the 14 airports surveyed.

Table 1 Airport Summary Characteristics

Airport	Hub Classification			Competing Airport System	Privately Operated, Off-Airport Parking	Mode Share	
	Large	Medium	Small			Scheduled HOV ²	HOV ³
Boston-Logan International (BOS)	√			√	√ ¹	14%	24%
Chicago O'Hare International (ORD)	√			√	√ ¹	13%	13%
Las Vegas McCarran International (LAS)	√					–	20%
Miami International (MIA)	√			√	√	1%	8%
San Diego International (SAN)	√				√	1%	12%
Seattle-Tacoma International (SEA)	√				√	2%	19%
Tampa International (TPA)	√				√	–	4%
Washington Dulles International (IAD)	√			√		1%	5%
Oakland International (OAK)		√		√	√	12%	15%
Port Columbus International (CMH)		√		√	√	– ⁴	7%
Portland International (PDX)		√			√	7%	10%
San Antonio International (SAT)		√		√	√	–	–
Huntsville International (HSV)			√	√		–	–
Tulsa International (TUL)			√	√	√	–	–

Notes:

– Data not applicable or not available.

¹ Staff interviewed at BOS and ORD did not consider privately operated, off-airport parking to be in competition with the on-airport, public parking supply.

² Public transportation plus privately operated buses and vans operating on a fixed schedule.

³ Shared-ride vans and charter vehicles are added to the scheduled high occupancy vehicle mode category. Courtesy shuttles are not included.

⁴ CMH has mode share categories in which scheduled HOV is aggregated with other categories, so the scheduled HOV share is unknown.

Sources: DMR Consulting and Ricondo & Associates, Inc., Based on interviews with airport representatives conducted between November 2008 and February 2009 (see Final Report references 1–15).

Based on input from the ACRP Panel during the February 26, 2009 teleconference, it was agreed Boston Logan International Airport (BOS) was a good candidate for the airport-specific online sample (one-third of survey respondents), and PDX was identified as an alternative. When selecting potential airport candidates, the research team carefully considered criteria such as the nature of the parking constraints at the airport, the availability of high-occupancy vehicle (HOV) options at the airport (including transit), the availability of privately-operated off-airport parking, and the willingness of the airport to participate as the selected airport. In the end, staff at BOS determined that they were not able to participate for the airport-specific online sample within the given timeframe, so PDX was selected.

By gathering a larger sample from PDX in addition to the national online sample of the other 13 airports, a more in-depth analysis of the conditions at PDX was possible. Lastly, conducting airport-specific data collection at PDX allowed the research team to demonstrate some additional airport-specific features in the survey, such as customized answer choices for the ground access mode questions.

Online Sampling

The research team recommended and the ACRP Panel approved an online sample approach for surveying. Air travelers are recognized as having a somewhat higher income and education level than the general population, which usually correlates with increased familiarity and comfort with the Internet. Currently, more than three-quarters of Americans have access to the Internet, and it is reasonable to expect that air travelers have significantly higher Internet penetration rates. Therefore this method will provide for a representative distribution of respondents with characteristics similar to the overall population of resident air passengers. Respondents were recruited and supplied by the online sample provider Authentic Response.

In addition, there were other benefits to conducting online sampling versus sampling at the airports for the stated preference survey. Online sampling also reaches travelers who reported trips over a longer time frame (within the last six months) than in-person sampling. Therefore, conducting online sampling minimized concerns about conducting in-person sample at an airport during an anomalous travel period.

The survey questionnaire was programmed as a web-based instrument and administered over the Internet to respondents provided by a survey sampling company. Respondents' home zip-codes were used as initial screening criteria and survey invitations were sent by email. The email invitation included a link to the survey. The survey was password protected and respondents were only able to complete the survey once. The research team closely monitored the live up-to-date results of the survey to ensure that the survey responses were as reasonably unbiased and representative of the resident air passenger population as possible. Similarly, the survey data was closely evaluated for any biased or unreasonable survey results. The survey was piloted for respondents that recently used Chicago O'Hare International Airport (ORD) and San Diego International Airport (SAN). Lastly, sample responses were monitored to ensure that adequate responses for each of the 14 airport markets were received and that the responses were representative of the entire traveling public as indicated by the demographic and trip data.

SURVEY QUESTIONNAIRE

A stated preference questionnaire was developed to collect data on resident air passengers' reactions to different aspects of airport parking and access conditions. The questionnaire included five sections:

- Airport choice: Revealed preference questions regarding airport most frequently used and most recent air trip;
- Access mode choice: Revealed preference questions regarding airport access for the trip and access mode decisions;
- Stated preference: Eight stated preference questions, referred to as experiments, in which respondents selected a preferred access mode under various pricing, access time, and mode availability conditions;
- Debrief: Revealed preference questions regarding choices in the stated preference section and general opinions and attitudes; and
- Demographics: Questions regarding individual and household characteristics.

All screen images of the online survey that follow in this section include a header with the survey title and a picture of an airplane, the question and answer choices, a “next question” button, and a status bar indicating progress through the survey. The complete questionnaire text is included in Attachment D1 and all survey screens are included in Attachment D2.

Airport Choice Questions

At the start of the survey respondents were shown a brief introduction to the study and a set of instructions. Respondents then selected the airport that they use most frequently when they leave home to take a flight (**Exhibit 1**). Respondents who selected “none of the above,” indicated that they did not consider any of the designated study airports as their most frequently used airport and were thereby screened out of the survey.

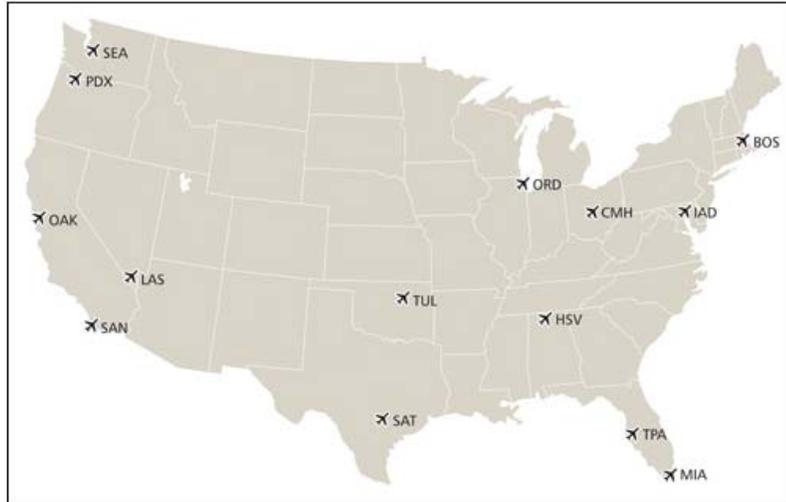
The second screening question asked respondents when they had made their most recent flight out of their selected airport. Respondents who had not made a trip within the last six months were also screened out of the survey. The third and final screening question asked respondents to provide their home zip-code. Respondents whose reported home zip-code was not within a 2.5 hour drive of any of the 14 airports were also screened out of the survey. The 2.5 hour limit was established in part by input from PDX staff about what they considered to be the traveler catchment area around their airport and for the other airports by what was judged to be a reasonable access range for airports in both urban and less urban areas.

ACRP Airport Access Study



Please select the airport that you use most frequently when you leave home to travel.

- Boston Logan (BOS)
- Chicago O'Hare (ORD)
- Columbus (CMH)
- Huntsville (HSV)
- Las Vegas McCarran (LAS)
- Miami (MIA)
- Oakland (OAK)
- Portland (PDX)
- San Antonio (SAT)
- San Diego (SAN)
- Seattle-Tacoma (SEA)
- Tampa (TPA)
- Tulsa (TUL)
- Washington Dulles (IAD)
- None of the above



Next Question 



Figure 1 Survey Screening Question
Source: Resource Systems Group, Inc., April 2009.

Respondents then provided information about their most recent flight departing out of their selected airport, including:

- Flight details: City or country of final destination, final destination airport, date and time of day of flight, date and time of day returned to their selected airport;
- General travel details: Trip purpose, ticket type (economy or business/first class), number of people traveling together, number of bags checked, and number of bags carried on the plane; and
- Whether they had considered departing from another airport besides their selected airport, and what airports they had considered.

Airport Ground Access Mode Choice Questions

Respondents were asked several questions about their ground access trip to the airport. Each respondent indicated the type of place where their trip to the airport began (e.g., home, work, school) and the geographic location of their trip origin. To report the geographic location, respondents were able to enter an address, a street intersection (Figure 2), or they could choose to use a map to locate their trip origin (Figure 3).

Respondents using the mapping feature were shown a series of three dynamic maps, each “zooming in” to show more detail. The map images were “geo-referenced” in real time, immediately recording the origin latitude, longitude, and shortest-path driving distance from the location to the respondent’s selected airport.

Respondents were then asked to provide more detail about their ground access trip to the airport, including:

- Time began trip to airport;
- Time arrived at airport;
- How far in advance of flight respondent arrived at airport;
- Primary type of transportation to airport (Figure 4); and
- Primary reason and other reasons for why they chose to travel to the airport by their selected travel mode (Figure 5).

ACRP Airport Access Study



Please tell us where your trip to the airport began.

Check this box and click "Next Question" if you don't know the address or prefer to use a map

Street Address or Intersection :

(example: Valleydale & Inverness)

City: State:

Zip Code:

[Next Question](#) 

Figure 2 Trip Origin Address Information

Source: Resource Systems Group, Inc., April 2009.

ACRP Airport Access Study



Please click on the map to zoom to the location.

If the location is off the map, click the arrows to move side-to-side or up-and-down.



Figure 3 Map Used to Locate Trip Origin (Boston Logan Airport Trip)

Source: Resource Systems Group, Inc., April 2009.



What was the primary type of transportation you used to get to Oakland Airport for your flight?

- Private vehicle and parked in:
- Private vehicle and was dropped off at the airport
- Rental car
- Taxi
- Limo/town car
- Shared shuttle van/door-to-door van (SuperShuttle)
- Local city bus (AC Transit)
- Regional public bus/van
- Subway

Next Question ➔



Figure 4 Ground Access Trip to Oakland International Airport
Source: Resource Systems Group, Inc., April 2009.



If you had to choose one reason for why you chose to take a taxi to the airport, what would it be?

- Trip cost
- Group (travel party) size
- Short walk to terminal entrance from where I ended my access trip
- Directness of trip (no stops/transfers)
- Comfort
- Good highway/road access to airport
- Convenience of traveling with luggage/belongings
- Reliability
- Travel time to airport
- Purpose of trip (business vs. non-business)
- Frequency of transit service
- Good transit access to airport

Next Question ➔



Figure 5 Primary Reason Traveled to Airport by Selected Ground Access Mode (Taxicab)
Source: Resource Systems Group, Inc., April 2009.

Based on the travel mode to the airport, respondents answered additional mode-specific questions. For instance, respondents who drove and parked were asked where they parked (on-airport parking facility, off-airport parking facility, or hotel parking facility), the kind of facility they parked in (short-term or long-term), how they traveled to their departure terminal, and the amount of time spent traveling to the terminal from the parking facility. Respondents who drove and parked were asked additional questions about their reasoning and motivations for the related choices. These questions for respondents included: the primary reason for choosing where they parked, if they decided prior to arriving at the airport where to park, the cost for parking, parking payment method (cash, credit card, or debit card), and person(s) responsible for paying the parking costs.

Respondents who did not drive and park were asked mode-specific questions, including:

- Those who were dropped off: Did the person dropping them off park their vehicle, and what was the travel mode for how they returned home at the end of their trip; and
- Those who used transit: Travel mode for how they returned home at the end of their trip, availability of a personal vehicle to drive and park at the airport for the duration of the trip, reason why didn't use personal vehicle (if applicable), and how they traveled to the transit stop.

To conclude the airport ground access mode choice questions, all respondents answered some general questions about their travel behavior, including:

- The number of flights made from the selected home airport and overall in the past year;
- Frequency of use of reported ground access mode to airport versus other ground access modes used in the last year; and
- What other ground access modes had been used in the last year, if any.

Stated Preference Questions

Prior to the eight stated preference questions, respondents were presented with an introduction, as well as a reminder about the purpose of the survey (**Figure 6**).

The eight stated preference questions were designed to evaluate respondents' preferences among ground access mode alternatives. Each stated preference question presented the respondent with a set of four ground transportation modes for accessing their selected airport and asked the respondent to choose the alternative that they most preferred. Respondents were asked to choose their preferred alternative based on only the conditions presented on the screen for that question. For each of the eight stated preference screens, the question asked, "Which option would you prefer for traveling to Portland Airport for a business trip?" The airport and the trip purpose (business or non-business) was specific to the respondent's reported trip.

On each screen, specific details of the four ground access alternatives presented were based on characteristics of each respondent's reported trip and were constructed in a way that presented realistic conditions and trade-offs. As such, auto and transit travel time were based on the respondent's reported trip to the airport; parking lot fees were based on a reasonable range according to the selected airport's hub size; and transit costs, shared ride van, public transit, or scheduled bus fares, were based on the distance a respondent traveled to the airport to make their trip.



The Airport Cooperative Research Program (ACRP), as part of the National Academies of Sciences, is conducting research at airports around the United States. Boston Logan Airport is one of 14 airports being studied in order to understand more about how airport customers like you travel to the airport. Your answers in this survey will be useful to airport operators, public agencies, and others as they consider ways to improve access to Boston Logan Airport and other airports.

In the next section, you will see 8 questions asking you how you would prefer to travel to Boston Logan Airport for a business trip.

As you answer the 8 questions, please assume:

- Tip and tolls are included in fares for the taxi and shared ride van
- Travel times for taking a bus, van, or transit to Boston Logan Airport include time to access the travel mode and any transfers you'd need to make

Please click "Next Question" to continue.



Figure 6 Introduction to the Stated Preference Questions (Boston Logan Airport Trip)

Source: Resource Systems Group, Inc., April 2009.

The specific values assigned in each of the eight stated preference questions were determined using an orthogonal experimental design, which ensures that information is collected from respondents in a manner that maximizes the usefulness of the data for model estimation. This technique is commonly used in constructing experimental designs. The experimental design for this survey contained 64 experiments that were divided into eight groups of eight experiments.

For each respondent, one group was randomly chosen and the eight experiments were shown to the respondent in a randomized order. The base values for the attributes (such as travel time and cost) were varied by multiplying, adding, or subtracting one of several factors to give the level required by the experimental design for that particular scenario. By varying the travel times, costs, and other attributes shown in each scenario, respondents demonstrated their travel preferences across a wide range of conditions. The experimental design, which details the calculations used for setting each of the variables' levels, is included in Attachment D1.

Debrief Questions

At the conclusion of the stated preference section, respondents who never chose a transit access alternative (public transit, shared ride van, or scheduled bus) were asked to indicate the primary reason why they never chose to take transit on their trip to the airport (**Figure 7**).

Respondents were also asked how frequently they were flying compared to a year ago. Next, each respondent reported whether they had ever visited their selected airport's website and, if so, what information they had looked for on the airport website. The debrief section then concluded with respondents rating what influenced their decision for an airport to fly from (12 statements) and what amenities were important to have at an airport (9 statements) (see **Figure 8** and **Figure 9**).

Demographic Questions

The questionnaire concluded with several demographic questions, including household size, vehicle ownership, gender, age, employment status, and annual household income. Respondents were also asked how frequently they used public transit. Finally, respondents were given the opportunity to leave comments about their travel to and from the selected airport or about parking options and parking availability at the selected airport.

ACRP Airport Access Study



What is the main reason you never selected the transit option in the previous section?

- Schedule is not convenient
- Less reliable than current method of travel to airport
- Difficult to deal with luggage
- Transit fare is too high
- Transit trip has too many transfers
- Travel time too long
- Time getting to and from transit too long
- Other, please specify:

Next Question 



Figure 7 Reason Why Respondent Did Not Choose Transit

Source: Resource Systems Group, Inc., April 2009.



What influences your decision when choosing which airport to fly from on a trip?

"1" (No influence at all) is the lowest rating you can give. "5" (Very high influence) is the highest rating you can give.

	No influence at all				Very high influence	Does not apply
	1	2	3	4	5	
Frequency of flights to destination	<input type="radio"/>					
Ease of getting through airport security	<input type="radio"/>					
Variety of airport restaurants & shops	<input type="radio"/>					
Wide selection of airlines to choose from	<input type="radio"/>					
Availability of parking at the airport	<input type="radio"/>					
Availability of flights with preferred airline	<input type="radio"/>					
Total travel time	<input type="radio"/>					
Price of airline ticket/fares	<input type="radio"/>					
Reliable transit options to/from airport	<input type="radio"/>					
Availability of direct flights to destination	<input type="radio"/>					
Familiarity with airport	<input type="radio"/>					
Ground transportation options to/from airport	<input type="radio"/>					

Next Question ➔



Figure 8 Influence Statements Regarding Airport Choice
 Source: Resource Systems Group, Inc., April 2009.



How important is it to have each of the following when choosing an airport to fly from on a trip?

	Not at all important	Somewhat unimportant	Neither important nor unimportant	Somewhat important	Very important
Available off-airport privately-owned parking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Affordable parking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Available cell-phone lot to wait for arriving passengers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Available short-term parking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Convenient shuttle bus service between parking lot and terminal area	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Covered parking protected from weather	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Available valet parking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Available long-term parking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Convenient parking close to the terminal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Next Question



Figure 9 Importance Statements Regarding Airport Choice
 Source: Resource Systems Group, Inc., April 2009.

Attachment D1
Survey Questionnaire

Page name	Question Text
intro	<p>Welcome.</p> <p>Thank you for participating in the Airport Cooperative Research Program (ACRP) Airport Access Survey! ACRP is part of the National Academies of Sciences and is conducting research at airports around the United States. Your answers in this survey will be useful to airport operators, public agencies, and others as they consider ways to improve access to airports around the country.</p> <p>This survey will ask you questions about a recent trip you took through a specific airport; however, this is a national survey intended to assist airports around the country and is not sponsored by a specific airport.</p> <p><u>Survey Instructions:</u></p> <p>After answering each question, please click “Next Question” to continue. If you need to back up to change an answer, please use the back button on your browser.</p> <p>This survey will take approximately 10–15 minutes to complete.</p> <p>Please click “Next Question” to begin.</p>
Airport Choice Section	
airport	<p>Please select the airport that you use most frequently when you leave home to travel.</p> <ul style="list-style-type: none"> Boston Logan (BOS) Chicago O’Hare (ORD) Columbus (CMH) Huntsville (HSV) Las Vegas McCarran (LAS) Miami (MIA) Oakland (OAK) Portland (PDX) San Antonio (SAT) San Diego (SAN) Seattle-Tacoma (SEA) Tampa (TPA) Tulsa (TUL) Washington Dulles (IAD) None of the above [Thank and terminate] <div style="display: flex; align-items: center; justify-content: center;">  </div> <p><i>Programmer: Write airport and airport hub size to database</i></p>

trip	<p>Please think about your most recent airline trip where you left home and flew out of <origin airport>.</p> <p>When did you make your trip?</p> <p>April 2009 March 2009 February 2009 January 2009 December 2008 November 2008 October 2008 [Thank and terminate] September 2008 [Thank and terminate] August 2008 [Thank and terminate] Prior to August 2008 [Thank and terminate]</p> <p><i>Note: Must have flown within the last 6 months</i></p>
resident	<p>What is your home zip-code?</p> <p>Open-end box</p>
fltttype	<p>Where was your final destination for the trip you are describing?</p> <p>Inside the United States Outside the United States (or outside of US territory)</p>
dest	<p><i>If flight was inside the United States: What airport did you fly to?</i></p> <p>Please enter your final destination by typing the city, airport name, or airport code.</p> <p>I flew to: _____</p> <p><i>(Use FAA's list of all commercial airports in the U.S. – it has city, full airport name and three-letter code, so the respondent can enter any of 3 and we will list any duplicate matches)</i></p>
destconf	<p><i>If respondent's destination airport returns a duplicate match:</i> Please click "Next Question" if the airport shown below is correct.</p> <p>If your airport is NOT shown in the list below, please use your "back" button to add more detail about where you flew to.</p> <p>I arrived at:</p>
dest2.asp	<p><i>If respondent took an international flight: Please select the country where your flight from <origin airport> ended.</i></p> <p><Drop-box with list of countries></p>

timeaway	<p>When did you depart on your flight and when did you return to <insert airport> at the end of your trip? If you are unsure of the dates or time of day, please provide your best estimate.</p> <p>Please click on the text box to see a calendar and select the correct date. If you do not see a calendar, please enter the date in the format MM/DD/YYYY (i.e. 03/14/2009).</p> <table> <tr> <td>Departure</td> <td>Return</td> </tr> <tr> <td>_____ Day (<i>show calendar</i>)</td> <td>_____ Day (<i>show calendar</i>)</td> </tr> <tr> <td>Midnight–9AM</td> <td>Midnight–9AM</td> </tr> <tr> <td>9AM–Noon</td> <td>9AM–Noon</td> </tr> <tr> <td>Noon–4PM</td> <td>Noon–4PM</td> </tr> <tr> <td>4PM–7PM</td> <td>4PM–7PM</td> </tr> <tr> <td>7PM–Midnight</td> <td>7PM–Midnight</td> </tr> </table> <p><i>Programmer: Calculate total number of hours on trip</i></p>	Departure	Return	_____ Day (<i>show calendar</i>)	_____ Day (<i>show calendar</i>)	Midnight–9AM	Midnight–9AM	9AM–Noon	9AM–Noon	Noon–4PM	Noon–4PM	4PM–7PM	4PM–7PM	7PM–Midnight	7PM–Midnight
Departure	Return														
_____ Day (<i>show calendar</i>)	_____ Day (<i>show calendar</i>)														
Midnight–9AM	Midnight–9AM														
9AM–Noon	9AM–Noon														
Noon–4PM	Noon–4PM														
4PM–7PM	4PM–7PM														
7PM–Midnight	7PM–Midnight														
purp	<p>What was the primary purpose of your trip from <origin airport> to <destination airport>?</p> <p>Business Non-business (vacation/visit family/other personal reasons)</p>														
class	<p>What class of service did you use for your flight from <origin airport>?</p> <p>Economy or coach Business First class</p>														
grdparty	<p>How many people flew with you on your trip?</p> <p>Nobody (I flew alone) 1 person 2 people 3 people 4 people 5 people More than 5 people</p> <p><i>If flew with others: Did you <both/all> travel together to <origin airport>?</i></p> <p>Yes No</p>														
bags	<p><i>If flew with others and traveled to airport together: How many bags did your party check?</i></p> <p><i>Otherwise: How many bags did you check?</i></p> <p>0 (Didn't check any bags) 1 bag 2 bags 3 bags 4 or more bags</p>														

carryon	<p>How many bags did you, personally, carry-on?</p> <p>Please do not include purses, laptops, or other “under your seat” carry-on items.</p> <p>0 (Didn't carry-on any bags) 1 bag 2 bags</p>
altaip	<p>Before your flight was booked, did you consider departing from another airport besides <origin airport> for your trip?</p> <p>No, I only considered flying out of <origin airport> Yes, I considered flying out of other airports</p>

whichalt	<p><i>Branch over question if did not consider departing from other airports.</i></p> <p>What other airports did you consider departing from?</p> <p>Please select all that apply.</p> <p><i>If BOS: Manchester (MHT)</i></p> <p><i>If BOS: Providence TF Green (PVD)</i></p> <p><i>If IAD: Baltimore (BWI)</i></p> <p><i>If IAD: Washington DC Reagan (DCA)</i></p> <p><i>If CMH: Cincinnati/Northern Kentucky (CVG)</i></p> <p><i>If CMH: Cleveland Hopkins (CLE)</i></p> <p><i>If ORD: Chicago Midway (MDW)</i></p> <p><i>If ORD: Milwaukee-Mitchell (MKE)</i></p> <p><i>If HSV: Atlanta Hartsfield-Jackson (ATL)</i></p> <p><i>If HSV: Birmingham (BHM)</i></p> <p><i>If HSV: Memphis (MEM)</i></p> <p><i>If HSV: Nashville (BNA)</i></p> <p><i>If MIA: Fort Lauderdale (FLL)</i></p> <p><i>If MIA or TPA: Fort Myers/Southwest Florida (RSW)</i></p> <p><i>If TPA: Orlando (MCO)</i></p> <p><i>If TUL: Oklahoma City Will Rogers (OKC)</i></p> <p><i>If TUL: Wichita, KS Mid-Continent (ICT)</i></p> <p><i>If SAT: Austin Bergstrom (AUS)</i></p> <p><i>If SAT: Houston Hobby (HOU)</i></p> <p><i>If SAT: Houston George Bush (IAH)</i></p> <p><i>If LAS: Flagstaff, AZ (FLG)</i></p> <p><i>If SAN: Burbank Bob Hope (BUR)</i></p> <p><i>If SAN or BUR: Los Angeles (LAX)</i></p> <p><i>If BUR: San Diego (SAN)</i></p> <p><i>If OAK: Sacramento (SMF)</i></p> <p><i>If OAK: San Francisco (SFO)</i></p> <p><i>If PDX: Eugene, OR (EUG)</i></p> <p><i>If PDX: Seattle-Tacoma (SEA)</i></p> <p><i>If SEA: Portland (PDX)</i></p> <p><i>If SEA: Vancouver (YVR)</i></p> <p><i>All: Other, please specify:</i></p>
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<p>placebeg</p>	<p>For the next few questions, please think about the ground access trip you made to <origin airport>.</p> <p>Where did your trip to <origin airport> begin?</p> <p>My home Someone else's home My regular place of employment Place of business Hotel School Other, please specify:</p>								
<p>origin</p>	<p>Please tell us where your trip to the airport began.</p> <p>Closest Intersection or Business Name: Address: City: State: Zip Code: Don't know the address or prefer to use a map</p> <p><i>If "Don't know" is selected, a map will be shown of the study area. Respondents will click on map which will return x,y coordinates that can be converted to a latitude and longitude and assigned to a TAZ. Level of detail shown in the map to the respondent may vary slightly depending on approach used (national sample or specific airport)</i></p> <p><i>Programmer: Calculate distance from trip origin to airport</i></p>								
<p>otime</p>	<p>What time did leave your <start location> to go to <origin airport> and what time did you arrive at <origin airport>?</p> <table> <tr> <td>Start Time</td> <td>End Time</td> </tr> <tr> <td>Hour:</td> <td>Hour:</td> </tr> <tr> <td>Minutes:</td> <td>Minutes:</td> </tr> <tr> <td>AM/PM:</td> <td>AM/PM:</td> </tr> </table>	Start Time	End Time	Hour:	Hour:	Minutes:	Minutes:	AM/PM:	AM/PM:
Start Time	End Time								
Hour:	Hour:								
Minutes:	Minutes:								
AM/PM:	AM/PM:								
<p>fintime</p>	<p>Approximately how long after you arrived at <origin airport> did your flight depart?</p> <p>Less than 30 minutes 30 - 59 minutes 1 hour-1 hour 29 minutes 1 hour 30 minutes-1 hour 59 minutes 2 hours-2 hours 29 minutes 2 hours 30 minute -3 hours 59 minutes 3 hours or more</p>								

mode	<p>What was the primary type of transportation you used to get to <origin airport> for your flight?</p> <p>Private vehicle and parked in an airport garage or parking lot in an off-airport parking lot in a hotel parking lot</p> <p>Private vehicle and was dropped off at the airport</p> <p>Rental car</p> <p>Taxi</p> <p>Limo/town car</p> <p>Shared shuttle van/door-to-door van (SuperShuttle, etc.)</p> <p>Local city bus (i.e. <insert>)</p> <p>Regional public bus/van</p> <p>Subway</p> <p>Rail (Commuter Rail, Amtrak, etc.)</p> <p><i>If survey is for a specific airport, the answer choices will be specified for the mode options for that airport. If a national sample, then the answer choices will remain generic, but as all encompassing as possible.</i></p> <p><i>Local City bus:</i></p> <p><i>If BOS: MBTA Silver line</i></p> <p><i>If IAD: Metrobus</i></p> <p><i>If CMH: COTA bus</i></p> <p><i>If ORD: Pace bus, CTA bus</i></p> <p><i>If HSV:</i></p> <p><i>If MIA: Metro bus</i></p> <p><i>If TPA: HART bus</i></p> <p><i>If TUL: Tulsa Transit</i></p> <p><i>If SAT: VIA Metropolitan bus</i></p> <p><i>If LAS: RTC bus</i></p> <p><i>If SAN: Metro bus</i></p> <p><i>If BUR: Burbank bus, MTA bus</i></p> <p><i>If OAK: AC Transit</i></p> <p><i>If PDX: Trimet</i></p> <p><i>If SEA: Sound transit, Metro transit</i></p>
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<p>moderns</p>	<p>What were your reasons for choosing how you got to <name of airport>?</p> <p>Please select all that apply.</p> <p><i>Randomize order of answers</i></p> <p>Travel time to airport</p> <p>Group (travel party) size</p> <p>Comfort</p> <p>Reliability</p> <p>Short walk to terminal entrance from where I ended my access trip</p> <p>Directness of trip (no stops / transfers)</p> <p>Purpose of trip (business vs. non-business)</p> <p>Convenience of traveling with luggage / belongings</p> <p>Trip cost</p> <p><i>If mode is transit:</i> Frequency of transit service</p> <p>Good highway / road access to airport</p> <p><i>If mode is transit:</i> Good transit access to airport</p> <p>Other, please specify:</p>
<p>chsone</p>	<p><i>If chose more than one reason:</i> If you had to choose one reason for why you chose to <insert mode> to the airport, what would it be?</p> <p><i>Populate with answers shown in previous question, otherwise, if only one option was selected, write out that answer and continue to next question.</i></p>
<p>parktype</p>	<p><i>If drove and parked at airport:</i> Where did you park?</p> <p>Short-term parking</p> <p>Long-term parking (remote, economy, etc)</p> <p>Other, please specify:</p> <p><i>Travelers who parked off-airport or at a hotel have already indicated their parking location</i></p> <p><i>Programmer: Note that there is an additional question for PDX airport ("prechk.asp")</i></p>
<p>prechk</p>	<p><i>If drove and parked at airport:</i> How did you get from where you parked to the terminal?</p> <p>I walked</p> <p>I took a shuttle</p> <p>Other, please specify:</p> <p>How long did it take you to travel from where you parked to the terminal? (please provide your best estimate)</p> <p>Number of minutes:</p>

<p>whypark</p>	<p><i>If drove and parked:</i> What was the primary reason for choosing where you parked?</p> <p><i>Randomize order of answers</i></p> <ul style="list-style-type: none"> Parking cost Walking distance to terminal Shuttle frequency to terminal Parking availability Length of time vehicle was parked Security of vehicle Weather (parking garage vs. open parking lot) Other, please specify:
<p>aware</p>	<p><i>If drove and parked at airport:</i> Did you know where you intended to park before you arrived at <origin airport>?</p> <ul style="list-style-type: none"> Yes No
<p>yknow</p>	<p><i>If yes:</i> How did you decide in advance which parking lot you would park in? <i>Answer choices will be shown in random order.</i></p> <p>Please select all that apply.</p> <ul style="list-style-type: none"> I checked the airport website I checked other websites I parked where I always park The parking lot was recommended to me I parked in the lot closest to the terminal I parked in an inexpensive lot Other, please specify:
<p>ynoplan</p>	<p><i>If no:</i> How did you decide which parking lot to park in when you arrived at the airport?</p> <p><i>Answer choices will be randomized</i></p> <p>Please select all that apply.</p> <ul style="list-style-type: none"> I drove by the sign and chose a lot that was listed as open I drove around looking for a lot with available parking spaces I chose the lot with the lowest parking cost I chose the first lot I saw I parked in the lot closest to the terminal I parked in a garage or covered lot I saw an ad or billboard for the lot Other, please specify:

cost	<p><i>If drove and parked:</i> How much did you pay for parking? (please indicate the total cost, if you are unsure, please provide your best estimate)</p> <p>\$ ____ total</p> <p>Did you pay your parking costs by cash or credit/debit card?</p> <p>Cash Credit/Debit Card</p> <p><i>Answer will be validated within a reasonable range of parking costs per day.</i></p>
Pay	<p><i>If drove and parked:</i> How did you pay for your parking?</p> <p>I paid a parking attendant I paid at a machine</p>
paypark	<p><i>If drove and parked:</i> Who paid for the cost of parking your vehicle?</p> <p>I paid myself My employer paid Someone else paid I shared parking costs with my employer I shared parking costs with someone else <i>If parked off-airport at a hotel:</i> My parking cost was included with my hotel stay</p>
pickup	<p><i>If drop-off is "Yes":</i> Did the person dropping you off park their vehicle?</p> <p>No, I was dropped off at the curb Yes, the person dropping me off parked at the terminal</p>
return	<p><i>If did not drive and park:</i> How did you return home at the end of your trip?</p> <p>Private vehicle and was picked up Rental car Taxi Limo/town car Shared shuttle van/door-to-door van (SuperShuttle, etc.) Local city bus (i.e. <insert>) Regional public bus/van Subway Rail (Commuter rail, Amtrak) Other, please specify:</p>

caravail	<p><i>If mode is not park or dropped off:</i></p> <p>Did you have a private vehicle available to make your trip to <origin airport> and leave parked for the duration of your trip?</p> <p>Yes No</p>																						
ynodrive	<p><i>If had car available:</i></p> <p>Why didn't you use the private vehicle available to you to make your trip to <origin airport> and leave it parked for the duration of your trip?</p> <p>Please select a main reason and as many other reasons as you'd like.</p> <p><i>Answer choices will be shown in random order.</i></p> <table border="0"> <tr> <td>Main reason</td> <td>Other Reason(s)</td> </tr> <tr> <td>Parking at airport is too far from terminal</td> <td>Parking at airport is too far from terminal</td> </tr> <tr> <td>Parking is not always available at airport</td> <td>Parking is not always available at airport</td> </tr> <tr> <td>Cost of parking at airport is too high</td> <td>Cost of parking at airport is too high</td> </tr> <tr> <td>Takes too long to drive or too much congestion</td> <td>Takes too long to drive or too much congestion</td> </tr> <tr> <td>Car is not available for overnight parking</td> <td>Car is not available for overnight parking</td> </tr> <tr> <td>Car is not secure parked at airport for multiple days</td> <td>Car is not secure parked at airport for multiple days</td> </tr> <tr> <td>Travel time to airport is too unpredictable</td> <td>Travel time to airport is too unpredictable</td> </tr> <tr> <td>Prefer transit for environmental reasons</td> <td>Prefer transit for environmental reasons</td> </tr> <tr> <td>Unfamiliar with route to airport</td> <td>Unfamiliar with route to airport</td> </tr> <tr> <td>Other, please specify:</td> <td>Other, please specify:</td> </tr> </table>	Main reason	Other Reason(s)	Parking at airport is too far from terminal	Parking at airport is too far from terminal	Parking is not always available at airport	Parking is not always available at airport	Cost of parking at airport is too high	Cost of parking at airport is too high	Takes too long to drive or too much congestion	Takes too long to drive or too much congestion	Car is not available for overnight parking	Car is not available for overnight parking	Car is not secure parked at airport for multiple days	Car is not secure parked at airport for multiple days	Travel time to airport is too unpredictable	Travel time to airport is too unpredictable	Prefer transit for environmental reasons	Prefer transit for environmental reasons	Unfamiliar with route to airport	Unfamiliar with route to airport	Other, please specify:	Other, please specify:
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Other, please specify:	Other, please specify:																						
accmode	<p><i>If transit:</i></p> <p>At the start of your trip, which method best describes how you got to your transit stop?</p> <p>Drove car and parked Rode in car and was dropped off Taxi or shuttle Walked or biked</p>																						
freq	<p>How many times have you flown out of <origin airport> in the last year?</p> <p>1 time (this trip only) 2-3 times 4-5 times 6-11 times 12 times or more</p> <p>How many times have you flown in total in the last year from any airport?</p> <p>1 time (this trip only) 2-3 times 4-5 times 6-11 times 12 times or more</p>																						

freqmode	<p><i>If fly more than once a year:</i> Over the past year have you always <insert mode> when departing from <origin airport> for a flight?</p> <p>Yes No</p> <p><i>If no:</i> In the past year, what proportion of your trips to <origin airport> were made by <current mode>?</p> <p>Over 75% 50-75% 25-49% Less than 25% None</p> <p><i>If no:</i> What other travel modes have you used when traveling to <origin airport> for a flight?</p> <p><i>Don't show mode previously mentioned</i></p> <p>Private vehicle and parked in an airport garage or parking lot in an off-airport parking lot in a hotel parking lot Private vehicle and was dropped off at the airport Rental car Taxi Limo/town car Shared shuttle van/door-to-door van (i.e. SuperShuttle) Regional public bus/van Local city bus (i.e. <insert>) Subway Rail (i.e. Commuter Rail, Amtrak) None of the above</p>
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slide1

The Airport Cooperative Research Program (ACRP), as part of the National Academies of Sciences, is conducting research at airports around the United States. <Origin airport> is one of 15 airports being studied in order to understand more about how airport customers like you travel to the airport. Your answers in this survey will be useful to airport operators, public agencies, and others as they consider ways to improve access to <origin airport> and other airports.

In the next section, you will see 8 questions asking you how you would prefer to travel to <origin airport> for a <purpose> trip.

As you answer the 8 questions, please assume:

- Tip and tolls are included in fares for the taxi and shared ride van
- Travel times for taking a bus, van, or transit to Portland Airport include time to access the travel mode and any transfers you'd need to make

Please click "Next Question" to continue.

cbc	Which option would you choose for making a <purpose> trip to <airport>?						
	Text shown in blue will change for each of the 8 questions.						
<table border="1"> <tr> <td> Park in Short-Term Parking Travel Time to Airport: 45 minutes Daily Parking Fee: \$25.00 Within walking distance of the terminal You drive around for 10 minutes looking for a parking spot </td> <td> Park in Long-Term Parking Travel Time to Airport: 45 minutes Daily Parking Fee: \$12.00 Wait 10 minutes for the shuttle to the terminal 8 minute shuttle ride to the terminal You drive around for 5 minutes looking for a parking spot </td> <td> Dropped-off a taxi Travel Time to Airport: 45 minutes Taxi fare: \$15.00 per person Dropped off at terminal </td> <td> Take Public Transit Travel Time to Airport: 43 minutes One-Way Fare: \$2.50 per person Dropped off at terminal </td> </tr> </table>				Park in Short-Term Parking Travel Time to Airport: 45 minutes Daily Parking Fee: \$25.00 Within walking distance of the terminal You drive around for 10 minutes looking for a parking spot	Park in Long-Term Parking Travel Time to Airport: 45 minutes Daily Parking Fee: \$12.00 Wait 10 minutes for the shuttle to the terminal 8 minute shuttle ride to the terminal You drive around for 5 minutes looking for a parking spot	Dropped-off a taxi Travel Time to Airport: 45 minutes Taxi fare: \$15.00 per person Dropped off at terminal	Take Public Transit Travel Time to Airport: 43 minutes One-Way Fare: \$2.50 per person Dropped off at terminal
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Question 1 of 8							
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Question 2 of 8							
<p><i>Note to reviewers: A set of 8 scenarios will be presented to each respondent using the variables in the experimental design. The setting for the variables, which occur at 4 different levels for each variable, will be derived from an orthogonal design that is a commonly used technique for constructing experimental plans. Each of the scenarios is designed in a manner that allows for later estimation of the respondents' relative preferences for each of the tested variables. The table below describes the calculations used for setting each of the variables' levels.</i></p>							

Cbc levels	<p>Levels for Stated Preference attributes:</p> <p>Auto travel time to airport Reported travel time</p> <p>Transit travel time to airport Reported travel time * 100%, 110%, 120%, or 130%</p> <p>Short-term parking fee If Large Hub Airport: \$15, \$25, \$35, or \$45 per day If Medium or Small Hub Airport: \$10, \$20, \$30, \$40 per day</p> <p>Long-term parking fee 50%, 60%, 70%, or 80% of short-term parking fee If Distance from origin to airport is less than 15 miles \$2.50/mile, \$2.75/mile, \$3.00/mile, or \$3.25/mile * distance</p> <p>Taxi fare If Distance from origin to airport is greater than 15 miles \$2.00/mile, \$2.50/mile, \$2.75/mile, or \$3.00/mile * distance</p> <p>Transit fare (not Shared Ride Van) (One-way) If distance is greater than 75 miles – cap at 75 miles If Distance from origin to airport is less than 15 miles \$1.50, \$2.50, \$3.50, or \$4.50 If Distance from origin to airport is 15–30 miles \$6, \$10, \$14, or \$18 If Distance from origin to airport is greater than 30 miles \$15, \$25, \$35, or \$45 If Distance from origin to airport is less than 15 miles \$10, \$17.50, \$25, or \$32.5</p> <p>Transit fare (Shared Ride Van) (One-way) If Distance from origin to airport is 15–30 miles \$20, \$30, \$40, or \$50 If Distance from origin to airport is greater than 30 miles \$25, \$35, \$45, or \$55</p> <p>Shuttle wait time 5, 8, 12, or 15 minutes</p> <p>Shuttle ride time 4, 7, 10, or 13 minutes</p> <p>Drop-off mode Taxi or friend/family</p> <p>Transit mode If Distance from origin to airport is less than 15 miles Public Transit (bus/subway/rail) or Shared ride van (SuperShuttle) If Distance from origin to airport is greater than 15 miles Scheduled bus (like Dartmouth Coach) or Shared ride van (SuperShuttle)</p> <p>Short-term reliability 5 or 10 minutes</p> <p>Long-term reliability 5 or 10 minutes</p> <p><i>Note to reviewers: RSG will continue to refine this design.</i></p>
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ynotran	<p><i>If never chose the transit option:</i></p> <p>What is the main reason you never selected the transit option in the previous section?</p> <p>Transit fare is too high Travel time too long Time getting to and from transit too long Transit trip has too many transfers Schedule is not convenient Difficult to deal with luggage Less reliable than current method of travel to airport Do not like transit (<i>only show if auto mode to airport</i>) Need car for other reasons (<i>only show if auto mode to airport</i>) Other, please specify:</p>
freqfly	<p>Compared to a year ago, how frequently are you flying from <origin airport>?</p> <p>Much less frequently Less frequently About the same More frequently Much more frequently</p>
website	<p>Have you ever visited the <origin airport> airport website?</p> <p>You may need to scroll down to see the entire page.</p> <p>Yes No</p> <p><i>If yes: What information have you looked for on the <origin airport> airport website?</i></p> <p>Please select all that apply. <i>Answer choices will be shown in random order.</i></p> <p>Flight information (arrivals, departures, delays) Information on parking fees and fee payment options Information on available parking (full/closed lots, location of available lots) Information on ground transportation (buses, shuttles, car services) Information on rental car companies Directions to/from the airport Information on weather conditions Information on traveler security requirements Local roadway conditions around airport (road closures, construction) Local area information (hotels, restaurants, attractions) Airport news or general airport information Other, please specify:</p>

<p>influence</p>	<p>What influences your decision when choosing which airport to fly from on a trip? "1" (No influence at all) is the lowest rating you can give. "5" (Very high influence) is the highest rating you can give.</p> <p><i>Statements shown in random order</i></p> <table border="0"> <tr> <td></td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> <td>Does not apply</td> </tr> <tr> <td></td> <td>No influence at all</td> <td></td> <td></td> <td></td> <td>Very high influence</td> <td></td> </tr> </table> <p>Familiarity with airport Ground transportation options to/from airport Reliable transit options to/from airport Availability of parking at the airport Total travel time Frequency of flights to destination Availability of direct flights to destination Price of airline ticket/fares Wide selection of airlines to choose from Availability of flights with preferred airline Ease of getting through airport security Variety of airport restaurants & shops</p>		1	2	3	4	5	Does not apply		No influence at all				Very high influence																																															
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<p>parking</p>	<p>How important is it to have each of the following when choosing an airport to fly from on a trip?</p> <p><i>Statements shown in random order.</i></p> <table border="1"> <thead> <tr> <th></th> <th>Not at all important</th> <th>Somewhat unimportant</th> <th>Neither important nor unimportant</th> <th>Somewhat Important</th> <th>Very Important</th> </tr> </thead> <tbody> <tr> <td>Available short-term parking</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Available long-term parking</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Affordable parking</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Convenient parking close to the terminal</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Covered parking protected from weather</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Convenient shuttle bus service between parking lot and terminal area</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Available cell-phone lot to wait for arriving passengers</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Available off-airport privately-owned parking</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Available valet parking</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </tbody> </table>		Not at all important	Somewhat unimportant	Neither important nor unimportant	Somewhat Important	Very Important	Available short-term parking						Available long-term parking						Affordable parking						Convenient parking close to the terminal						Covered parking protected from weather						Convenient shuttle bus service between parking lot and terminal area						Available cell-phone lot to wait for arriving passengers						Available off-airport privately-owned parking						Available valet parking					
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usepub	<p>How often do you use public transit in general?</p> <p>Never Rarely Occasionally Weekly Daily</p>
hhsiz	<p>For the final section of the survey, you will be asked questions about your household. All of your answers will be kept strictly confidential.</p> <p>How many people live in your household?</p> <p>1 person (I live alone) 2 people 3 people 4 people 5 people 6 or more people</p>
numveh	<p>How many cars, motorcycles, pickup trucks, minivans, etc., are there in your household?</p> <p>0 (no vehicles) 1 vehicle 2 vehicles 3 vehicles 4 vehicles 5 or more vehicles</p>
gender	<p>What is your gender?</p> <p>Female Male</p>
age	<p>Which category represents your age?</p> <p>16-24 25-34 35-44 45-54 55-64 65-74 75 or older</p>

employ	<p>What is your employment status?</p> <p>Employed full-time Employed part-time Self-employed Student Student and employed Retired Homemaker Not currently employed</p>
income	<p>Which category best represents your annual household income before taxes?</p> <p>Note: this information will be kept strictly confidential</p> <p>Under \$20,000 \$20,000-\$39,999 \$40,000-\$59,999 \$60,000-\$79,999 \$80,000-\$99,999 \$100,000-\$124,999 \$125,000-\$149,999 \$150,000-\$174,999 \$175,000-\$199,999 \$200,000 or more</p>
comments	<p>Thank you for participating! All of your responses have now been saved.</p> <p>If you have additional comments on the survey, travel to and from <origin airport>, or parking options and parking availability at <origin airport>, please type them in the box below and click "Next Question."</p> <p>Or, simply click "Next Question" to end the survey.</p>
end	<p>Thank you for your participation!</p> <p>This survey is conducted by Resource Systems Group Inc. (RSG) (http://www.rsginc.com)</p> <p>For the Airport Cooperative Research Program (ACRP) of the National Academies (http://www.trb.org/CRP/ACRP/ACRP.asp)</p>

Attachment D2

Survey Screenshots

TABLE OF CONTENTS

- 1.0 ACRP AIRPORT ACCESS STATED PREFERENCE SURVEY.....1**
- 1.1 Airport Choice Questions 1
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- 1.5 Demographic Questions..... 22

1.0 ACRP AIRPORT ACCESS STATED PREFERENCE SURVEY

1.1 Airport Choice Questions

Welcome



Welcome.

Thank you for participating in the Airport Cooperative Research Program (ACRP) Airport Access Survey! ACRP is part of the National Academies of Sciences and is conducting research at airports around the United States. Your answers in this survey will be useful to airport operators, public agencies, and others as they consider ways to improve access to airports around the country.

This survey will ask you questions about a recent trip you took through a specific airport; however, this is a national survey intended to assist airports around the country and is not sponsored by a specific airport.

Survey Instructions

Please use the "Next Question" button in the lower left corner of the screen to go forward. It is important that you do NOT use the browser's "forward" button because data will be lost.

To back up, use the browser's "back" button, which is the left-pointing arrow in the upper left corner of the screen.

This survey will take approximately 10-15 minutes to complete.

Please click "Next Question" to begin.

Next Question

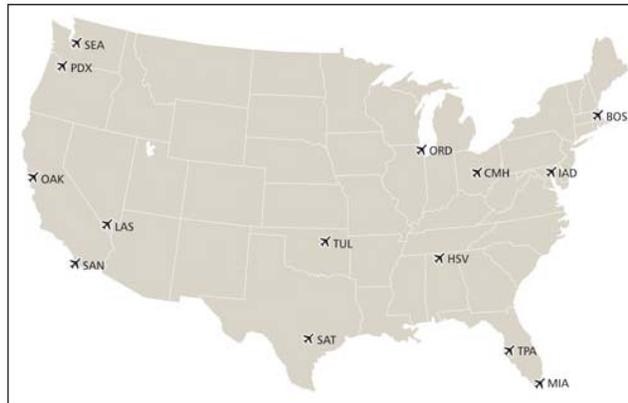


Airport Selection



Please select the airport that you use most frequently when you leave home to travel.

- Boston Logan (BOS)
- Chicago O'Hare (ORD)
- Columbus (CMH)
- Huntsville (HSV)
- Las Vegas McCarran (LAS)
- Miami (MIA)
- Oakland (OAK)
- Portland (PDX)
- San Antonio (SAT)
- San Diego (SAN)
- Seattle-Tacoma (SEA)
- Tampa (TPA)
- Tulsa (TUL)
- Washington Dulles (IAD)
- None of the above



Next Question



Trip Time Period



Please think about your most recent airline trip where you left home and flew out of Portland Airport.

When did you make your trip?

- April 2009
- March 2009
- February 2009
- January 2009
- December 2008
- November 2008
- October 2008
- September 2008
- August 2008
- Prior to August 2008

Next Question 



Home Zip Code



What is your home zip code?

Next Question 



Trip Destination



Where was your final destination for the trip you are describing?

- Inside the United States
- Outside the United States (or outside of US territory)

Next Question 



Trip Destination (In the United States)



What airport did you fly to?

Please enter your final destination by typing the city, airport name, or airport code.

I flew to:

Next Question 



Confirmation Page of Domestic Destination Airport



Please click "Next Question" if the airport shown below is correct.

If your airport is NOT shown in the list below, please use your "back" button to add more detail about where you flew to.

I arrived at:

Mc Ghee Tyson (TYS)
Knoxville, TN

Next Question 



Trip Destination (Internationally)



Please select the country where your flight from Portland Airport ended.

(Please select a country) 

Next Question 



Trip Departure & Return



When did you depart on your flight and when did you return to Portland Airport at the end of your trip? If you are unsure of the dates or time of day, please provide your best estimate.

Please click on the text box to see a calendar and select the correct date. If you do not see a calendar, please enter the date in the format MM/DD/YYYY (i.e., 03/14/2009).

Depart Portland Airport

Date: (select time of day) 

Return to Portland Airport

Date: (select time of day) 

Next Question 



Trip Purpose



What was the primary purpose of your flight from Portland Airport to Mc Ghee Tyson?

- Business
- Non-business (vacation/visit family/other personal reasons)

Next Question 



Ticket Class



What class of service did you use for your flight from Portland Airport?

- Economy or coach
- Business
- First class

Next Question 



Travel Party Size



How many people flew with you on your trip?

- Nobody (I flew alone)
- 1 person
- 2 people
- 3 people
- 4 people
- 5 people
- More than 5 other people

Next Question 



Travel Party Size with Travel To Airport



How many people flew with you on your trip?

- Nobody (I flew alone)
- 1 person
- 2 people
- 3 people
- 4 people
- 5 people
- More than 5 other people

Did you travel together to Portland Airport?

- Yes
- No

Next Question ➔



Travel Party Number of Bags



How many bags did your party check?

- 0 (Didn't check any bags)
- 1 bag
- 2 bags
- 3 bags
- 4 or more bags

Next Question ➔



Bags Carried On Flight



How many bags did you, personally, carry-on?

Please do not include purses, laptops, or other "under your seat" carry-on items.

- 0 (Didn't carry-on any bags)
- 1 bag
- 2 bags

Next Question ➔



Alternate Airports Considered



Before your flight was booked, did you consider departing from another airport besides Portland Airport for your trip?

- No, I only considered flying out of Portland Airport
- Yes, I considered flying out of other airports

Next Question ➔



What Alternate Airports Considered



What other airports did you consider departing from?

Please select all that apply.

- Eugene, OR Airport (EUG)
- Seattle-Tacoma Airport (SEA)
- Other, please specify:

Next Question ➔



Place Began Trip to Airport



For the next few questions, please think about the ground access trip you made to Portland Airport.

Where did your trip to Portland Airport begin?

- My home
- Someone else's home
- My regular place of employment
- Place of business
- Hotel
- School
- Other, please specify:

Next Question ➔



Address of Location Began Trip to Airport



Please tell us where your trip to the airport began.

Check this box and click "Next Question" if you don't know the address or prefer to use a map

Street Address or Intersection :
(example: Valleydale & Inverness)

City: State:

Zip Code:

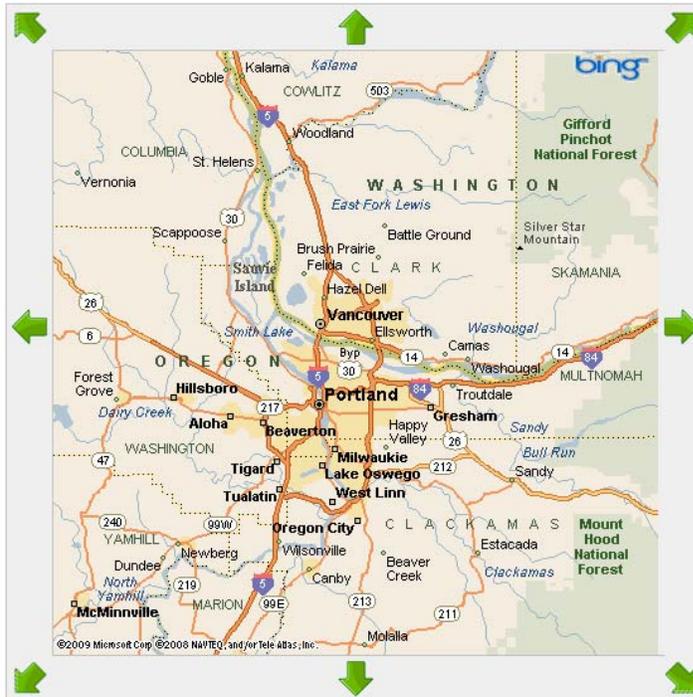
[Next Question](#)

Map to Select Location Began Trip to Airport



Please click on the map to zoom to the location.

If the location is off the map, click the arrows to move side-to-side or up-and-down.



Time Departed for Airport & Time Arrived at Airport



What time did you leave your home to go to Portland Airport and what time did you arrive at Portland Airport?

Began Trip to Airport

Hour : Min AM
 PM

Arrival Time at Airport

Hour : Min AM
 PM

Next Question

Time Arrived in Advance of Flight



Approximately how long after you arrived at Portland Airport did your flight depart?

- Less than 30 min
- 30-59 min
- 1 hr-1 hr 29 min
- 1 hr 30 min-1 hr 59 min
- 2 hr-2 hr 29 min
- 2 hr 30 min-2 hr 59 min
- 3 hr or more

Next Question



1.2 Access Mode Choice Questions

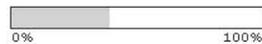
Access Mode



What was the primary type of transportation you used to get to Portland Airport for your flight?

- Private vehicle and parked in:
- Private vehicle and was dropped off at the airport
- Rental car
- Taxi
- Limo/town car
- Shared shuttle van/door-to-door van (Blue Star, Shuttle & Fly)
- Regional public bus/van (HUT, CAC/Breeze)
- Rail (MAX red line)

Next Question



Reasons for Airport Selection



What were your reasons for choosing how you got to Portland Airport?

Please select all that apply.

- Purpose of trip (business vs. non-business)
- Trip cost
- Reliability
- Comfort
- Travel time to airport
- Group (travel party) size
- Directness of trip (no stops/transfers)
- Good transit access to airport
- Short walk to terminal entrance from where I ended my access trip
- Good highway/road access to airport
- Convenience of traveling with luggage/belongings
- Frequency of transit service
- Other, please specify:

Next Question ➔



Primary Reason for Airport Selection



If you had to choose one reason for why you chose to take a taxi to the airport, what would it be?

- Trip cost
- Group (travel party) size
- Short walk to terminal entrance from where I ended my access trip
- Directness of trip (no stops/transfers)
- Comfort
- Good highway/road access to airport
- Convenience of traveling with luggage/belongings
- Reliability
- Travel time to airport
- Purpose of trip (business vs. non-business)
- Frequency of transit service
- Good transit access to airport

Next Question ➔



On Airport Parking Location



Where did you park?

- Short-term parking
- Long-term parking (remote, economy, etc.)
- Other, please specify:

Next Question ➔



On Airport Travel from Parking Location to Terminal



How did you get from where you parked to the terminal?

- I walked
- I took a shuttle
- Other, please specify:

How long did it take you to travel from where you parked to the terminal? (Please provide your best estimate.)

 number of minutes

Next Question ➔



Reason why Parked



What was the primary reason for choosing where you parked?

- Shuttle frequency to terminal
- Walking distance to terminal
- Length of time vehicle was parked
- Weather (parking garage vs. open parking lot)
- Parking availability
- Security of vehicle
- Parking cost
- Other, please specify:

Next Question ➔



Parking Location Intention



Did you know where you intended to park before you arrived at Portland Airport?

- Yes
- No

Next Question 

How Decide in Advance Where to Park



How did you decide in advance which parking lot you would park in?

Please select all that apply.

- I checked the airport website
- I parked in the lot closest to the terminal
- The parking lot was recommended to me
- I checked other websites
- I parked where I always park
- I parked in an inexpensive lot
- Other, please specify:

Next Question 



How Decide at Airport Where to Park

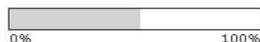


How did you decide which parking lot to park in when you arrived at the airport?

Please select all that apply.

- I chose the first lot I saw
- I drove by the sign and chose a lot that was listed as open
- I chose the lot with the lowest parking cost
- I drove around looking for a lot with available parking spaces
- I saw an ad or billboard for the lot
- I parked in a garage or covered lot
- I parked in the lot closest to the terminal
- Other, please specify:

Next Question 



Parking Cost



How much did you pay for parking? (Please indicate the total cost, if you are unsure, please provide your best estimate.)

\$ total

Did you pay your parking costs by cash or credit/debit card?

- Cash
- Credit/Debit Card

Next Question 

Parking Payment



How did you pay for your parking?

- I paid a parking attendant
- I paid at a machine

Next Question 



Parking Responsibility



Who paid for the cost of parking your vehicle?

- I paid myself
- My employer paid
- Someone else paid
- I shared parking costs with my employer
- I shared parking costs with someone else

Next Question 



Drop-Off Trip



Did the person dropping you off park their vehicle?

- No, I was dropped off at the curb
- Yes, the person dropping me off parked at the terminal

Next Question 



Non-Park Trips Return at Trip End



How did you return home at the end of your trip?

- Private vehicle and was picked up
- Rental car
- Taxi
- Limo/town car
- Shared shuttle van/door-to-door van (Blue Star, Shuttle & Fly)
- Regional public bus/van (HUT, CAC/Breeze)
- Rail (MAX red line)
- Other, please specify:

Next Question 



Private Vehicle Availability



Did you have a private vehicle available to make your trip to Portland Airport and leave parked for the duration of your trip?

- Yes
- No

Next Question 



Why Didn't Use Private Vehicle



Why didn't you use the private vehicle available to you to make your trip to Portland Airport and leave it parked for the duration of your trip?

Please select a main reason and as many other reasons as you'd like.

	Main Reason (one)	Other Reason(s) (all that apply)
Unfamiliar with route to airport	<input type="radio"/>	<input type="checkbox"/>
Car is not available for overnight parking	<input type="radio"/>	<input type="checkbox"/>
Prefer transit for environmental reasons	<input type="radio"/>	<input type="checkbox"/>
Cost of parking at airport is too high	<input type="radio"/>	<input type="checkbox"/>
Takes too long to drive or too much congestion	<input type="radio"/>	<input type="checkbox"/>
Parking at airport is too far from terminal	<input type="radio"/>	<input type="checkbox"/>
Car is not secure parked at airport for multiple days	<input type="radio"/>	<input type="checkbox"/>
Parking is not always available at airport	<input type="radio"/>	<input type="checkbox"/>
Travel time to airport is too unpredictable	<input type="radio"/>	<input type="checkbox"/>
Other, please specify: <input type="text"/>	<input type="radio"/>	<input type="checkbox"/>

Next Question



Transit Access Mode



At the start of your trip, which method best describes how you got to your transit stop?

- Drove car and parked
- Rode in car and was dropped off
- Taxi or shuttle
- Walked or biked

Next Question



Travel Frequency



How many times have you flown out of Portland Airport in the last year?

- 1 time (this trip only)
- 2-3 times
- 4-5 times
- 6-11 times
- 12 times or more

How many times have you flown in total in the last year from any airport?

- 1 time (this trip only)
- 2-3 times
- 4-5 times
- 6-11 times
- 12 times or more

Next Question 



Frequency of Access Mode



Over the past year have you always drove and parked when departing from Portland Airport for a flight?

- Yes
- No

Next Question 



Frequency of Access Mode - Elaborated



Over the past year have you always drove and parked when departing from Portland Airport for a flight?

- Yes
 No

In the past year, what proportion of your trips to Portland Airport were made by driving and parking?

- Over 75%
 50-75%
 25-49%
 Less than 25%

What other travel modes have you used when traveling to Portland Airport for a flight?

- Private vehicle and was dropped off at the airport
 Rental car
 Taxi
 Limo/town car
 Shared shuttle van/door-to-door van (Blue Star, Shuttle & Fly)
 Regional public bus/van (HUT, CAC/Breeze)
 Rail (MAX red line)

Next Question 



1.3 Stated Preference Section

Introduction to Stated Preference Questions



The Airport Cooperative Research Program (ACRP), as part of the National Academies of Sciences, is conducting research at airports around the United States. Portland Airport is one of 14 airports being studied in order to understand more about how airport customers like you travel to the airport. Your answers in this survey will be useful to airport operators, public agencies, and others as they consider ways to improve access to Portland Airport and other airports.

In the next section, you will see 8 questions asking you how you would prefer to travel to Portland Airport for a business trip.

As you answer the 8 questions, please assume:

- Tip and tolls are included in fares for the taxi and shared ride van
- Travel times for taking a bus, van, or transit to Portland Airport include time to access the travel mode and any transfers you'd need to make

Please click "Next Question" to continue.

Next Question 



Example Stated Preference Question



Which option would you choose for traveling to Portland Airport for a business trip?

Drive and Take Shuttle from Parking	Drive and Walk from Parking	Take Shared Ride Van	Dropped Off by Taxi
Travel time to airport: 40 mins. Daily parking fee: \$28.00	Travel time to airport: 40 mins. Daily parking fee: \$40.00	Travel time to airport: 44 mins. One-way fare to airport: \$17.50 per person	Travel time to airport: 40 mins. One-way taxi fare to airport: \$21.00
Wait for airport shuttle to terminal: 15 minutes Ride airport shuttle to terminal: 8 minutes	Walking distance to terminal		
Drive around looking for parking spot: 10 minutes	Drive around looking for parking spot: 5 minutes	Dropped off at terminal	Dropped off at terminal
<input type="radio"/> I'll drive and take a shuttle from parking	<input type="radio"/> I'll drive and walk from parking	<input type="radio"/> I'll take a shared ride van	<input type="radio"/> I'll get dropped off by taxi

Question 1 of 8

Next Question ➔

Example Stated Preference Question



Information in **blue** has changed.

Which option would you choose for traveling to Portland Airport for a business trip?

Drive and Take Shuttle from Parking	Drive and Walk from Parking	Take Shared Ride Van	Dropped Off by Taxi
Travel time to airport: 40 mins. Daily parking fee: \$16.00 Wait for airport shuttle to terminal: 12 minutes Ride airport shuttle to terminal: 15 minutes Drive around looking for parking spot: 5 minutes	Travel time to airport: 40 mins. Daily parking fee: \$20.00 Walking distance to terminal Drive around looking for parking spot: 10 minutes	Travel time to airport: 48 mins. One-way fare to airport: \$25.00 per person Dropped off at terminal	Travel time to airport: 40 mins. One-way taxi fare to airport: \$19.00 Dropped off at terminal
<input type="radio"/> I'll drive and take a shuttle from parking	<input type="radio"/> I'll drive and walk from parking	<input type="radio"/> I'll take a shared ride van	<input type="radio"/> I'll get dropped off by taxi

Question 2 of 8

Next Question ➔

1.4 Debrief Questions

Why Never Selected Transit Option in Stated Preference Section



What is the main reason you never selected the transit option in the previous section?

- Schedule is not convenient
- Less reliable than current method of travel to airport
- Difficult to deal with luggage
- Transit fare is too high
- Transit trip has too many transfers
- Travel time too long
- Time getting to and from transit too long
- Other, please specify:

Next Question ➔



Frequency of Flying



Compared to a year ago, how frequently are you flying from Portland Airport?

- Much less frequently
- Less frequently
- About the same
- More frequently
- Much more frequently

Next Question



Airport Website



Have you ever visited the Portland Airport website (shown below)?

You may need to scroll down to see the entire page.

- Yes
- No



Next Question



Airport Website What Information Looked For



Have you ever visited the Portland Airport website (shown below)?

You may need to scroll down to see the entire page.

- Yes
- No



What information have you looked for on the Portland Airport airport website?

Please select all that apply.

- Flight information (arrivals, departures, delays)
- Information on parking fees and fee payment options
- Information on available parking (full/closed lots, location of available lots)
- Information on ground transportation (buses, shuttles, car services)
- Information on rental car companies
- Directions to/from the airport
- Information on weather conditions
- Information on traveler security requirements
- Local roadway conditions around airport (road closures, construction)
- Local area information (hotels, restaurants, attractions)
- Airport news or general airport information
- Other, please specify:

Next Question ➔



Influences Decision to Use an Airport



What influences your decision when choosing which airport to fly from on a trip?

"1" (No influence at all) is the lowest rating you can give. "5" (Very high influence) is the highest rating you can give.

	No influence at all 1	2	3	4	Very high influence 5	Does not apply
Frequency of flights to destination	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ease of getting through airport security	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Variety of airport restaurants & shops	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Wide selection of airlines to choose from	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Availability of parking at the airport	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Availability of flights with preferred airline	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Total travel time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Price of airline ticket/fares	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Reliable transit options to/from airport	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Availability of direct flights to destination	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Familiarity with airport	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Ground transportation options to/from airport	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Next Question



Importance



How important is it to have each of the following when choosing an airport to fly from on a trip?

	Not at all important	Somewhat unimportant	Neither important nor unimportant	Somewhat important	Very important
Available off-airport privately-owned parking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Affordable parking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Available cell-phone lot to wait for arriving passengers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Available short-term parking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Convenient shuttle bus service between parking lot and terminal area	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Covered parking protected from weather	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Available valet parking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Available long-term parking	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Convenient parking close to the terminal	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Next Question



1.5 Demographic Questions

Use of Public Transit



How often do you use public transit in general?

- Never
- Rarely
- Occasionally
- Weekly
- Daily

Next Question 



Household Size



For the final section of the survey, you will be asked questions about your household. All of your answers will be kept strictly confidential.

How many people live in your household?

- 1 person (I live alone)
- 2 people
- 3 people
- 4 people
- 5 people
- 6 or more people

Next Question 



Household Vehicles



How many cars, motorcycles, pickup trucks, minivans, etc., are there in your household?

- 0 (no vehicles)
- 1 vehicle
- 2 vehicles
- 3 vehicles
- 4 vehicles
- 5 or more vehicles

Next Question 



Gender



What is your gender?

- Female
- Male

Next Question 



Age



Which category represents your age?

- 16-24
- 25-34
- 35-44
- 45-54
- 55-64
- 65-74
- 75 or older

Next Question 



Employment



What is your employment status?

- Employed full-time
- Employed part-time
- Self-employed
- Student
- Student and employed
- Retired
- Homemaker
- Not currently employed

Next Question 



Income



Which category best represents your annual household income before taxes?

Note: This information will be kept strictly confidential.

- Under \$20,000
- \$20,000-\$39,999
- \$40,000-\$59,999
- \$60,000-\$79,999
- \$80,000-\$99,999
- \$100,000-\$124,999
- \$125,000-\$149,999
- \$150,000-\$174,999
- \$175,000-\$199,999
- \$200,000 or more

Next Question 



Comments



Thank you for participating! All of your responses have now been saved.

If you have additional comments on the survey, travel to and from Boston Logan Airport, or parking options and parking availability at Boston Logan Airport, please type them in the box below and click "Next Question."

Or, simply click "Next Question" to end the survey.

Next Question 



APPENDIX E STATED PREFERENCE SURVEY RESULTS

SURVEY RESULTS

Complete tabulations and cross-tabulations for all respondents are included in **Attachment E1 to Attachment E3**. Maps of respondent trip origin for each airport are included in **Attachment E4**.

Data Cleaning

The study data set was vetted to ensure all records contained consistent and credible responses. The data cleaning process reviewed:

- Differences between respondents' reported airport access travel times and the estimated travel times based upon the trip distance from the respondent's origin to the airport;
- Time spent completing the survey, as well as time evaluating the stated preference exercises;
- Consistency of responses, for example, to ensure a reported flight duration was realistic based on the respondent's origin and destination airports;
- Lack of variation in responses, for example, selecting the same level of importance across all statements asking to rank airport attributes;
- Open-ended responses suggesting carelessness or inattentiveness; and
- Individual experiment and average respondent choice probabilities from the stated preference exercise.

Of the 1,099 total respondents who completed the survey, 911 were used for analysis and modeling. Of the 911 vetted respondents, 316 (35 percent) reported PDX as their home airport, while 595 (65 percent) reported one of the other 13 airports as their home airport (**Table 1**). The modeling results are described in Section 5.

Sample Size

The study collected data from a sample of resident air passengers from among the 14 study airports participating in this research project. It is important that the sample be a representative portion of the entire population of airports because the sample is used to draw conclusions about the entire population of resident air passengers. The following sections of this document reflect the careful review of data and the efforts to ensure that the sample data reflect the population as much as possible.

Additionally, it is a fact that larger sample sizes result in smaller sampling error. As a whole, the 911 respondents in the sample should well reflect the population of resident air passengers around the United States. Using a binary proportion test, the margin of error calculated for the entire sample is plus or minus 2 percent at a 95 percent confidence interval. However, as segments of the sample become smaller, their error increases and those below 300 respondents have errors of approximately 10 percent at a 95 percent confidence interval. For this reason of small sample size, the small and medium hub airports are included as one segment in the following analysis.

Table 1 Respondent Sample

Airport	Hub Classification ¹	Within a Competing Airport System	Transit Access	Privately Operated Off-Airport Parking Available	Vetted Responses	Percent of Total Responses	
						National Survey	National Survey and Portland International Airport
Boston-Logan International (BOS)	Large	✓	✓	✓	46	7.7%	5.0%
Chicago O'Hare International (ORD)	Large	✓	✓	✓	44	7.4%	4.8%
Las Vegas McCarran International (LAS)	Large				38	6.4%	4.2%
Miami International (MIA)	Large	✓		✓	44	7.4%	4.8%
San Diego International (SAN)	Large			✓	39	6.6%	4.3%
Seattle-Tacoma International (SEA)	Large			✓	59	9.9%	6.5%
Tampa International (TPA)	Large			✓	46	7.7%	5.0%
Washington Dulles International (IAD)	Large	✓			43	7.2%	4.7%
Port Columbus International (CMH)	Medium	✓		✓	45	7.6%	4.9%
Oakland International (OAK)	Medium	✓	✓	✓	51	8.6%	5.6%
San Antonio International (SAT)	Medium	✓		✓	50	8.4%	5.5%
Huntsville International (HSV)	Small	✓		✓	36	6.1%	4.0%
Tulsa International (TUL)	Small	✓		✓	54	9.1%	5.9%
Subtotal					595	100.0%	65.3%
Portland International (PDX)	Medium		✓	✓	316	–	34.7%
Total					911	–	100.0%

Notes:

Totals may not add to 100 percent due to rounding.

– Data not applicable.

¹ Hub classification is defined by the Federal Aviation Administration for commercial service airports based on the community's share of total U.S. passenger boardings accommodated. Large hub airports accommodate 1 percent or more of annual passenger boardings, medium hub airports accommodate at least 0.25 percent, but less than 1 percent of passenger boardings; and small hub airports accommodate at least 0.05 percent, but less than 0.25 percent of passenger boardings in the United States and its territorial possessions.

Sources: Airports Council International – North America, *Airport Traffic Reports*, “2007 Final Traffic Count,” accessed November 2008 (hub classifications); Federal Aviation Administration, *Airport Hub Classifications*, November 2008 (hub classifications); DMR Consulting and Ricondo & Associates, Inc., based on interviews with airport representatives conducted between November 2008 and February 2009 (See Final Report references 1–15) (airport characteristics other than hub classifications); and Resource Systems Group, Inc., August 2009 (survey responses).

Segmentation

For analysis and modeling, responses were grouped into segments based on the purpose of the air trip (business or non-business) (**Table 2**). In addition to the trip purpose segmentation, airport

size (large hub, medium hub, or small hub) (Table 3), and respondents' primary access mode served as key attributes throughout analysis (Table 4).

Table 2 Respondents by Trip Purpose

Trip Purpose	13 Airports		Portland International Airport	
	Count	Percent	Count	Percent
Business	102	17.1%	75	23.7%
Non-Business	493	82.9%	241	76.3%
Total	595	100.0%	316	100.0%

Source: Resource Systems Group, Inc., August 2009.

Table 3 Respondents by Airport Hub Classification

Airport Size	13 Airports		Portland International Airport	
	Count	Percent	Count	Percent
Small Hub	90	15.1%		
Medium Hub	146	24.5%	316	100%
Large Hub	359	60.3%		
Total	595	100.0%	316	100%

Note: Totals may not add to 100 percent due to rounding.

Source: Resource Systems Group, Inc., August 2009.

Table 4 Respondents by Airport Ground Access Mode

Airport Access Mode	13 Airports		Portland International Airport	
	Count	Percent	Count	Percent
Drove & Dropped Off	281	47.2%	128	40.5%
Drove & Parked	208	35.0%	125	39.6%
Taxi	31	5.2%	15	4.7%
Limo/Town Car	25	4.2%	5	1.6%
Shared Shuttle Van	23	3.9%	10	3.2%
Transit (Bus, Rail, or Subway)	19	3.2%	31	9.8%
Rental Car	8	1.3%	2	0.6%
Total	595	100.0%	316	100.0%

Source: Resource Systems Group, Inc., August 2009.

Overall, 82% of respondents across the 13 airports and 80% of respondents at Portland either drove to the airport and parked or drove and were dropped off at the airport. Respondents who parked are defined as respondents who drove to the airport and parked their vehicle on or off-airport. Respondents who were dropped off were either travelers who were dropped off at the curb or who dropped off by someone who parked in short-term parking to wish them good-bye in the terminal. Travelers departing on business trips were more likely to drive and park at the airport, while travelers on personal trips were more likely to be driven to the airport and dropped off (Figure 1).

There is a relationship between airport size and how resident air passengers travel to an airport (**Table 5**). In many cases, the availability of HOV options develops because of an airport's size, which in turn influences mode choice.

Table 5 Ground Access Mode to Airport by Airport Hub Classification

Airport	Large Hub	Small or Medium Hub	Portland International Airport
Drove & Dropped Off	45%	50%	40%
Drove & Parked	31%	42%	40%
Taxi, Limo, and Rental Car	15%	4%	7%
Transit & Shared Shuttle Van	9%	4%	13%
Total	100%	100%	100%
Count (n)	359	236	316

Source: Resource Systems Group, Inc., August 2009.

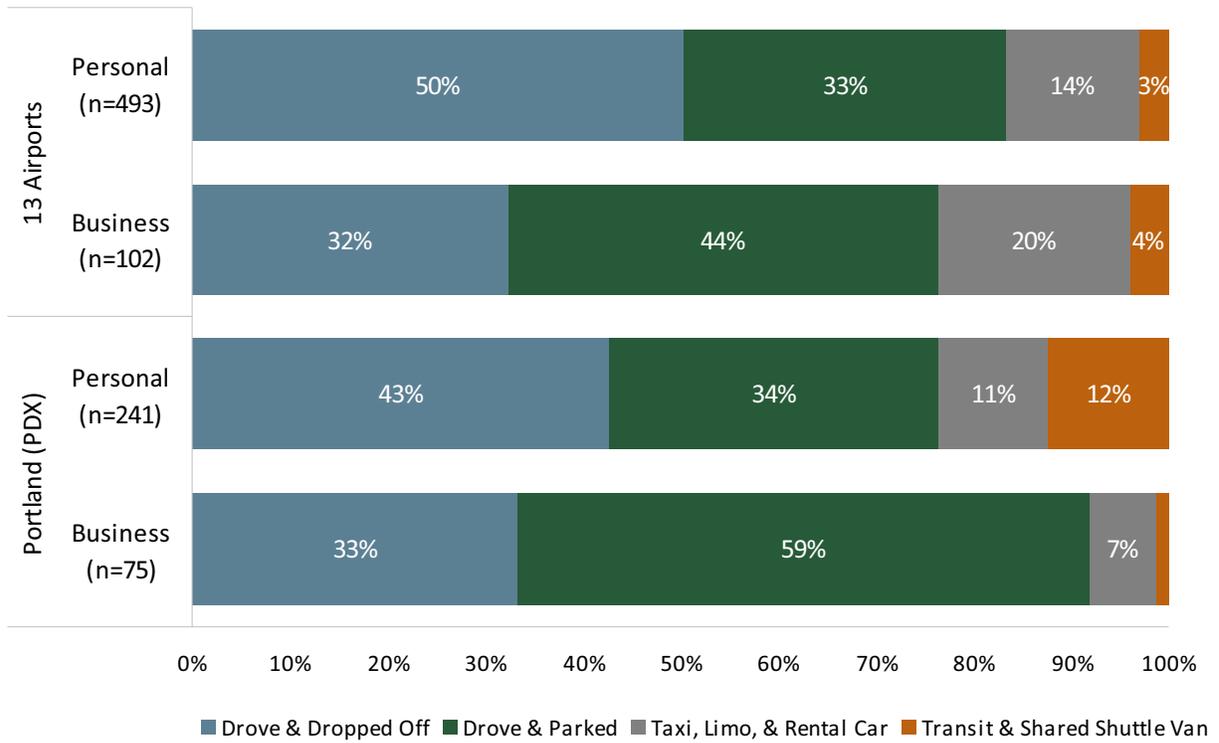


Figure 1 Ground Access Mode to Airport by Trip Purpose

Source: Resource Systems Group, Inc., August 2009.

Airport Choice Analysis

After selecting their home airport, respondents reported the destination of their trip. Overall, 87 percent of respondents reported domestic trips, with just 13 percent of respondents reporting an international trip. There was little difference between business and personal trips, with 90 percent of business travelers and 86 percent of personal travelers reporting domestic trips.

However, as expected, business travelers do have different travel preferences. Overall, 91 percent of respondents making personal trips across the 13 airports indicated that they flew coach or economy class. However, only 72 percent of business travelers across the 13 airports indicated that they flew coach or economy, with the remaining 28 percent flying business or first class. Of the PDX respondents, 93 percent of travelers making personal trips and 87 percent of business travelers reported that they flew coach or economy. Business travelers also were much more likely to fly alone as shown in **Table 6**.

Table 6 Travel Party Size by Trip Purpose

Travel Party Size	13 Airports		Portland International Airport	
	Business	Personal	Business	Personal
Flew alone	66.7%	37.1%	72.0%	30.3%
Flew with 1 person	16.7%	29.0%	18.7%	36.9%
Flew with 2 or more people	16.6%	33.9%	9.3%	32.8%
Total	100.0%	100.0%	100.0%	100.0%
Count (n)	102	493	75	241

Source: Resource Systems Group, Inc., August 2009.

Travel party size is reflected in the selected ground access travel mode to the airport. Respondents traveling alone were more likely to travel by transit, shared shuttle van, or to be dropped off at the airport (**Figure 2** and **Figure 3**). Of those who used the single travel party on-demand modes, i.e., drove and parked, were dropped off in a private vehicle, took a taxicab, took a limousine, or drove a rental car to the airport, the majority traveled with at least one other person.

The final component of the airport choice questions was for respondents to report which other airports they considered for their trip. Overall, 38 percent of travelers from the 13 airports and 13 percent of PDX travelers considered departing from another airport for their trip. It is worth reiterating that PDX is in a non-competitive market with no competing airports within 150 miles. On the other hand, airports such as BOS and Oakland (OAK), included within the 13 airport sample, are in very competitive markets. Non-business travelers in the 13 airport sample were more likely than business travelers to consider another airport: 40 percent of non-business travelers and 32 percent of business travelers considered departing from another airport for their trip. PDX business and non-business travelers were more similar, with 13 percent of both types of travelers considering departing from another airport for their trip.

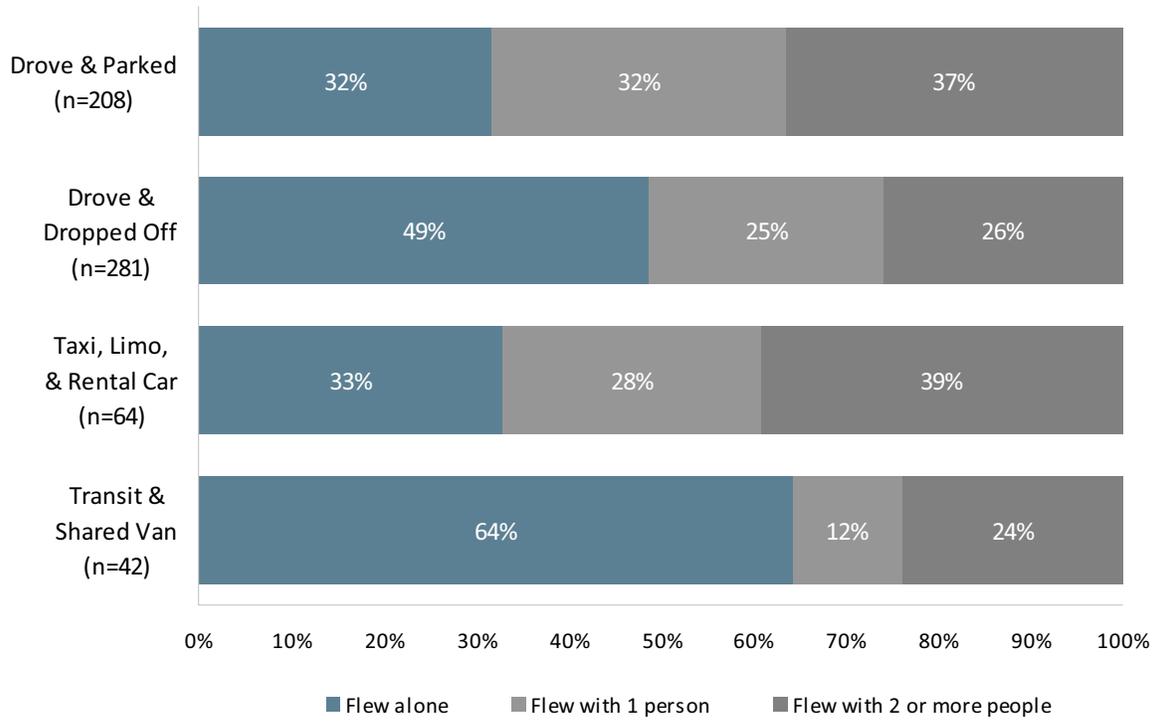


Figure 2 Thirteen Airport Respondents' Travel Party Size by Ground Access Mode to Airport
 Source: Resource Systems Group, Inc., August 2009.

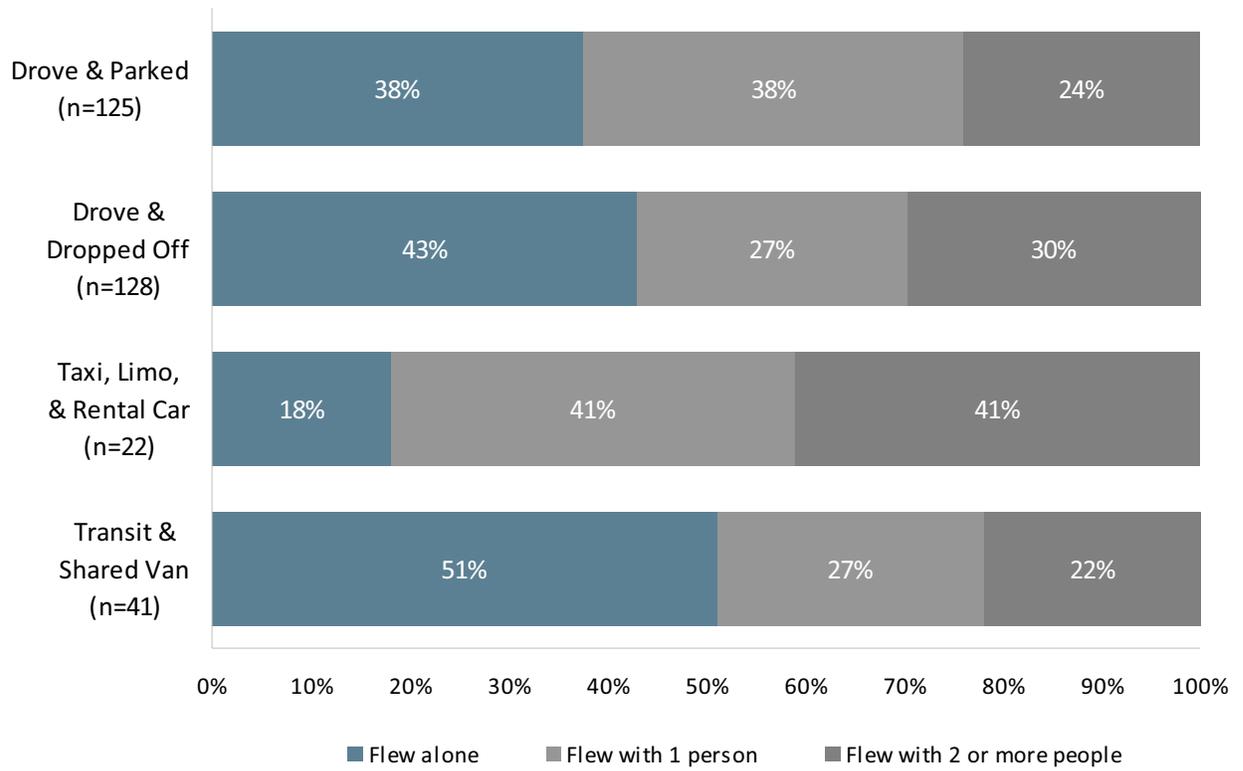


Figure 3 Portland Respondents' Travel Party Size by Ground Access Mode to Airport

Source: Resource Systems Group, Inc., August 2009.

Table 7 demonstrates how the level of consideration for departing from another airport is quite unique to the specific airport and to the system of which an airport is a part. For instance, both Las Vegas McCarran (LAS) and Tampa (TPA) are airports that are not part of a competing system; however, they have very different rates of consideration of other airports: 3 percent of LAS respondents considered departing from another airport, while 35 percent of TPA respondents considered using another airport. Similarly, respondents from airports within competing systems also had varying levels of consideration for departing from another airport: 70 percent of BOS respondents, 51 percent of Washington Dulles (IAD) respondents, and 40 percent of Columbus (CMH) respondents considered departing from another airport.

Table 7 Respondents Who Considered Departing from a Different Airport

Airport	Hub Classification ¹	Within a Competing Airport System	Survey Responses		
			No	Yes	Count
Boston-Logan International (BOS)	Large	✓	30%	70%	46
Chicago O’Hare International (ORD)	Large	✓	45%	55%	44
Las Vegas McCarran International (LAS)	Large		97%	3%	38
Miami International (MIA)	Large	✓	32%	68%	44
San Diego International (SAN)	Large		85%	15%	39
Seattle-Tacoma International (SEA)	Large		88%	12%	59
Tampa International (TPA)	Large		65%	35%	46
Washington Dulles International (IAD)	Large	✓	49%	51%	43
Port Columbus International (CMH)	Medium	✓	60%	40%	45
Oakland International (OAK)	Medium	✓	37%	63%	51
San Antonio International (SAT)	Medium	✓	76%	24%	50
Huntsville International (HSV)	Small	✓	56%	44%	36
Tulsa International (TUL)	Small	✓	78%	22%	54
Subtotal			62%	38%	595
Portland International (PDX)	Medium		87%	13%	316

Note:

¹ Hub classification is defined by the Federal Aviation Administration for commercial service airports based on the community’s share of total U.S. passenger boardings accommodated. Large hub airports accommodate 1 percent or more of annual passenger boardings, medium hub airports accommodate at least 0.25 percent, but less than 1 percent of passenger boardings; and small hub airports accommodate at least 0.05 percent, but less than 0.25 percent of passenger boardings in the United States and its territorial possessions.

Sources: Airports Council International – North America, *Airport Traffic Reports*, “2007 Final Traffic Count,” accessed November 2008 (hub classifications); Federal Aviation Administration, *Airport Hub Classifications*, November 2008 (hub classifications); DMR Consulting and Ricondo & Associates, Inc., based on interviews with airport representatives conducted between November 2008 and February 2009 (See Final Report references 1–15) (within a competing system); and Resource Systems Group, Inc., August 2009 (survey responses).

Airport Ground Access Mode Choice Analysis

In the section of questions asking respondents to provide details of their ground access trip to the airport, each respondent indicated the type of place where their trip to the airport began (e.g., home, work, school) and the geographic location of their trip origin. **Table 8** confirms that the majority of travelers began their trip to the airport from home or a personal residence. Attachment E4 details the origin location for each respondent across all airports.

Table 8 Trip Origin Location by Trip Purpose

Trip Origin Location	13 Airports		Portland International Airport	
	Business	Personal	Business	Personal
My home or someone else's home	87%	98%	92%	95%
My place of employment or a place of business	10%	1%	7%	2%
Other (school, hotel, etc)	3%	1%	1%	3%
Total	100%	100%	100%	100%
Count (n)	102	493	75	241

Source: Resource Systems Group, Inc., August 2009.

Across all trip purposes and airports, more than half of respondents spent an hour or less traveling to the airport for their flight (**Figure 4**). Travelers making non-business trips were more likely to travel longer periods of time to get to the airport with 17 percent of respondents across the 13 airports and 14 percent of PDX respondents traveling more than one and a half hours to get to their departure airport.

In general, the larger the airport, the more time respondents allowed at the airport before their flight departed (see **Figure 5**). Two-thirds of respondents from the small and medium hub airports (CMH, Huntsville [HSV], OAK, San Antonio [SAT], and Tulsa [TUL]) departed on a flight that left less than an hour and a half after they arrived at the airport. Alternatively, more than half of respondents (53 percent) from the large hub airports were at the airport for more than an hour and a half before departing on their flight.

Ground access mode share also varies by airport size. Inherently, the small and medium hub airports have fewer ground access options and therefore respondents are more likely to have driven and parked or driven and been dropped off at their departure airport (**Table 9**).

Of those respondents who parked (for the duration of their trip) at an airport, 72 percent of respondents from the 13 airports and 78 percent of PDX respondents chose to park in long-term parking (remote, economy, etc.) at the airport. The characteristics of the parking supply at each airport affected the percentage of respondents walking or taking a shuttle to the terminal from their parking location. For instance, at HSV, 86 percent of respondents walked to the terminal from their on-airport parking location, whereas at CMH, 70 percent of respondents rode a shuttle to the terminal from their on-airport parking location.

As the final questions before the stated preference experiments, respondents were asked how often they had flown in the last year at their selected airport and overall. Three-quarters (75 percent) of respondents from both the small and medium hub airports and from the large hub airports had flown out of their selected airport three or fewer times in the last year (**Figure 6**). In PDX,

respondents traveled more frequently over the previous year, with 72 percent of respondents having flown at least four times in the last year.

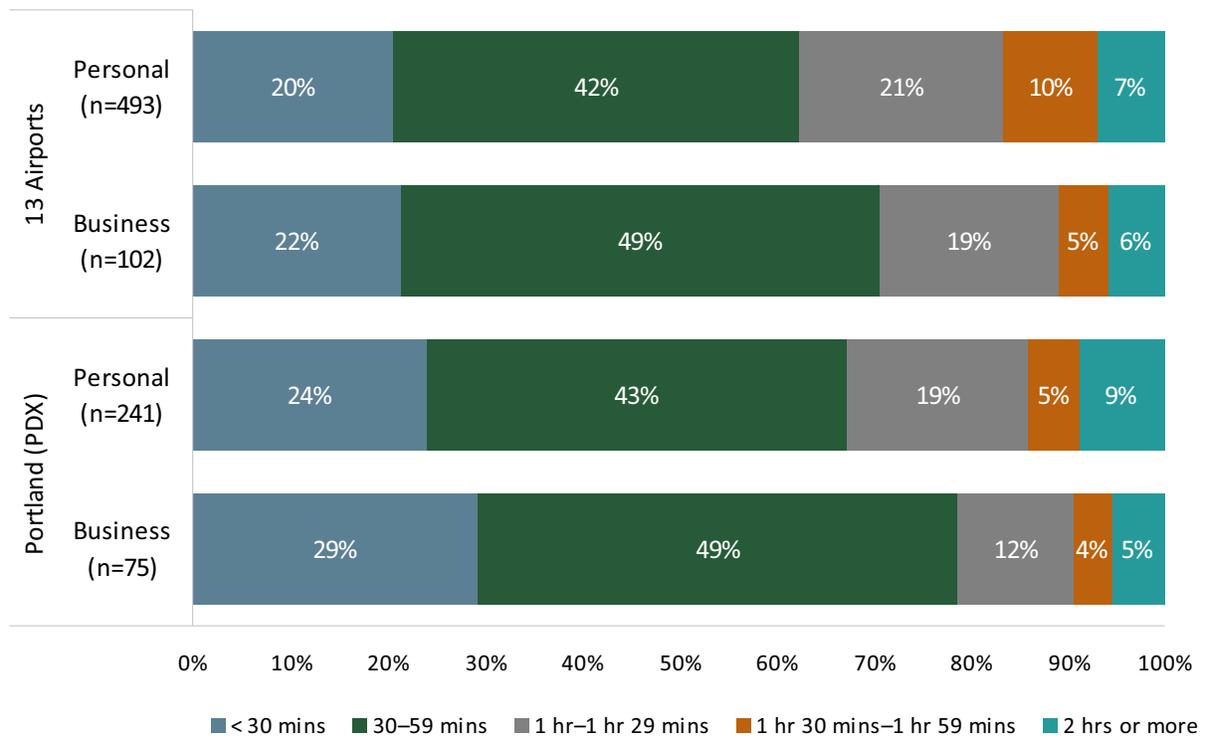


Figure 4 Travel Time to Airport by Trip Purpose
 Source: Resource Systems Group, Inc., August 2009.

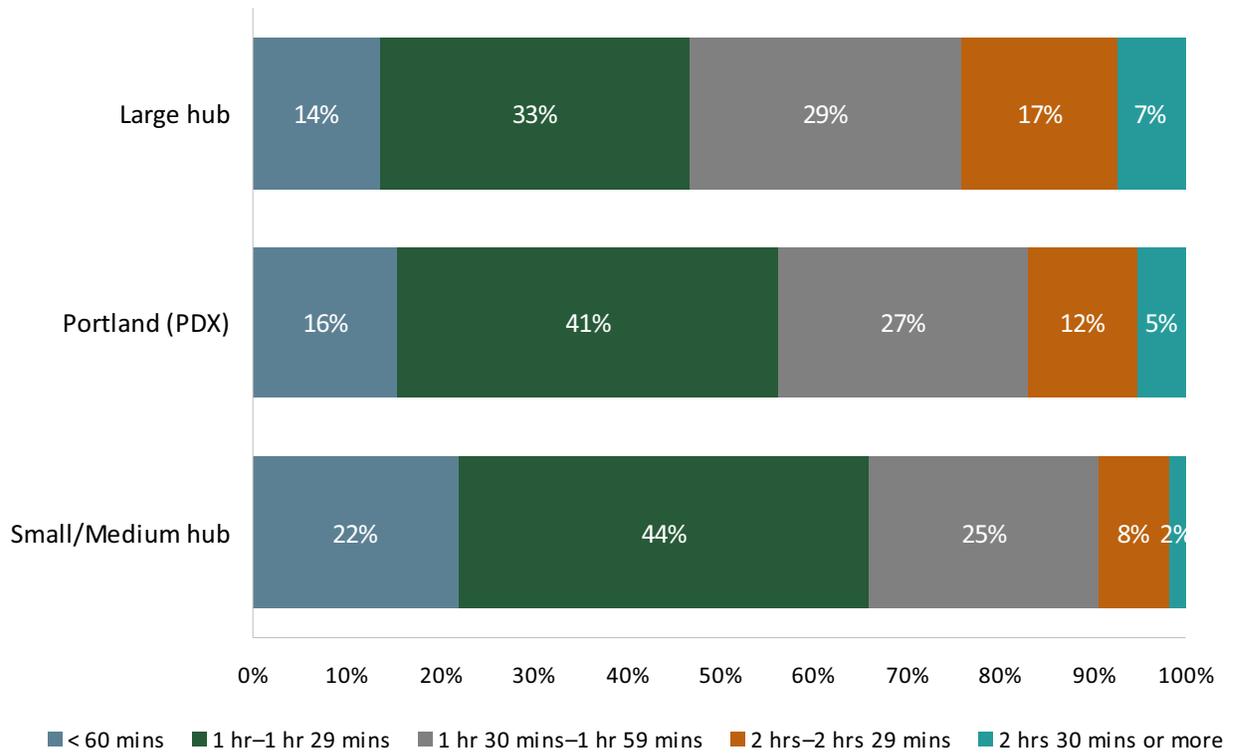


Figure 5 Amount of Time at Airport before Flight Departure by Airport Size
 Source: Resource Systems Group, Inc., August 2009.

Table 9 Ground Access Travel Mode to Airport by Airport Sample

Ground Access Mode	13 Airport Sample				Portland International Airport	
	Large Hubs		Small or Medium Hubs		Medium Hub	
	Count	Percent	Count	Percent	Count	Percent
Drove & Dropped Off	163	45%	118	50%	128	41%
Drove & Parked On-Airport	69	19%	72	31%	98	31%
Drove & Parked Off-Airport	37	10%	26	11%	21	7%
Taxi	25	7%	6	3%	15	5%
Limo/Town Car	23	6%	2	1%	5	2%
Shared Shuttle Van	16	4%	7	3%	10	3%
Rental Car	6	2%	2	1%	2	1%
Local City Bus	6	2%	0	0%	0	0%
Regional Bus/Van	5	1%	1	0%	6	2%
Subway	4	1%	2	1%	0	0%
Drove & Parked at a Hotel	4	1%	0	0%	6	2%
Rail	1	0%	0	0%	25	8%
Total	359	100%	236	100%	316	100%

Note: Totals may not add to 100 percent due to rounding.

Source: Resource Systems Group, Inc., August 2009.

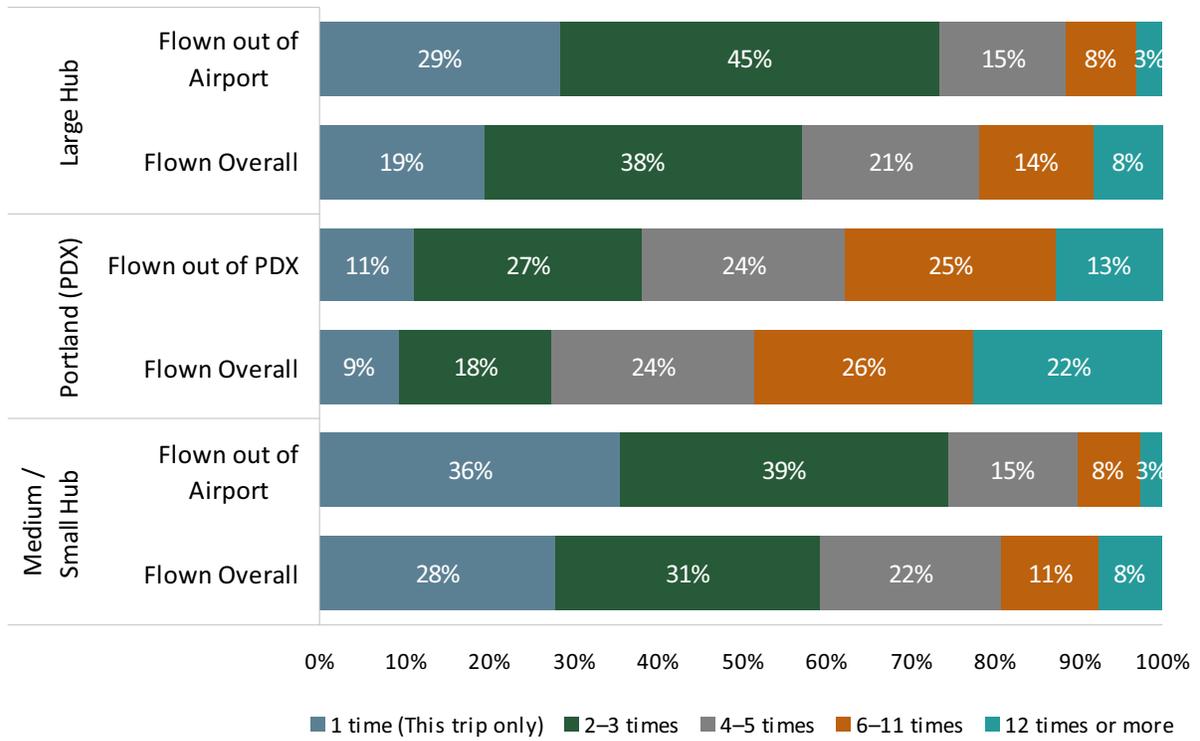


Figure 6 *Flight Frequency by Airport Hub Classification*
 Source: Resource Systems Group, Inc., August 2009.

Debrief Analysis

Transit Debrief Question

Staff interviewed at each airport in participating in this research study provided information on their airport's HOV mode share (see Table IV-1). All airports have HOV mode shares exceeding 5 percent, with the exception of TPA) SAT, HSV, and TUL.

At the conclusion of the stated preference section, the 175 people (29 percent) across the 13 airports and the 104 people (33 percent) from PDX who never chose an alternative for accessing the airport by an HOV option (e.g., public transit, shared ride van, or scheduled bus) were asked to indicate the primary reason why they didn't select an HOV option for accessing the airport. **Table 10** below indicates respondents' answers to this question by airports with and without scheduled HOV mode share. There are some differences among airports with and without scheduled HOV mode share. In particular, 17 percent of respondents from airports without scheduled HOV mode share citing the hassle of dealing with luggage as their reason for not selecting an HOV option to access the airport in the stated preference section, while only 9 percent of respondents from airports with scheduled HOV mode share cited the same reason.

Table 10 Primary Reason Why Didn't Select Transit in Stated Preference Section

Airport	13 Airports Overall	Airports With Scheduled HOV Mode (>2%)	Airports Without Scheduled HOV Mode Share (<=2%)	Portland International Airport
Do not like transit	21.1%	26.1%	19.4%	13%
Transit fare is too high	20.0%	23.9%	18.6%	9%
Difficult to deal with luggage	14.9%	8.7%	17.1%	12%
Less reliable method of travel	9.1%	10.9%	8.5%	15%
Other	8.6%	10.9%	7.8%	9%
Schedule not convenient	6.3%	4.3%	7.0%	13%
Travel time too long	6.3%	2.2%	7.8%	12%
Time getting to/from transit too long	6.3%	4.3%	7.0%	10%
Need car for other reasons	4.0%	0%	5.4%	7%
Transit trip has too many transfers	3.4%	8.7%	1.6%	3%
Total	100.0%	100.0%	100.0%	100%
Count (n)	175	46	129	104

Note: Totals may not add to 100 percent due to rounding.

Source: Resource Systems Group, Inc., August 2009.

For PDX respondents more familiar with transit and living in a medium-sized city, a broader range of answer choices was provided by respondents, with 15 percent stating that taking transit was less reliable than their current method of travel to the airport, 13 percent stating that the transit schedule was not convenient, and another 13 percent stating they don't like transit. Fifteen percent of respondents from the 13 airport sample and 12 percent of PDX respondents stated it was too difficult to deal with luggage.

Frequency of Flying and Airport Website Use

Respondents were also asked how frequently they were flying compared to a year ago (see **Figure 7**). Across all respondents, regardless of hub classification or trip purpose, the majority of respondents reported flying about the same amount when compared to the previous year. Overall, 59 percent of respondents at the 13 airports reported flying about the same, while 27 percent reported flying less frequently, and 14 percent reported flying more frequently. Similarly, 60 percent of PDX respondents reported flying about the same amount, while 24 percent reported flying less frequently and 16 percent reported flying more frequently.

Next, each respondent reported whether they had ever visited their selected airport's website and, if applicable, what information they had looked for on the airport website. Airport size was not a factor in determining whether respondents had viewed their selected airport website, as 61 percent of respondents from large hub airports and 66 percent of respondents from small and medium hub airports had never visited their airport's website. Similarly, 58 percent of business travelers and 64 percent of travelers making personal trips had never visited their airport's website. PDX travelers reported greater use of airports' online resources with more than half (53 percent) reporting that they had visited the PDX website. In particular, 68 percent of PDX business travelers reported having visited the airport's website.

The most frequently cited reasons for visiting an airport website by respondents from the 13 airports were to find flight information (74 percent) and to find information on parking fees and parking fee payment options (51 percent). These were also the top two reasons for PDX travelers with 74 percent searching for flight information and 41 percent searching for information on parking fees and parking fee payment options on the PDX website.

Ratings Statements

The debrief section then concluded with two sets of statements. First, respondents were presented with 12 airport attributes and were asked to rate each attribute's influence on their airport choice based on a five point scale (1 indicating "no influence at all" and 5 indicating "very high influence") (**Figure 8** and **Figure 9**).

The choice of which airport to use was driven by the price of the flight and the flight travel time (total travel time and availability of direct flights to destination). The ground transportation options, including transit and parking availability, appear to be less important when selecting an airport than the cost and travel time of the flight itself.

Table 11 shows the percentage of respondents who rated the shown statement as a high influence (4 or 5 rating) on their decision when choosing an airport to fly from. For respondents at airports in competing systems and for respondents not in a competing system, cost and minimizing travel time are most important. However, respondents from competing systems rated cost, available direct flights, and total travel time to be five to ten percentage points more important than respondents not in a competing system. Lastly, regardless of whether an airport was part of a competing system or not, the availability of parking ranked low for respondents in terms of influencing their airport choice. Again, flight cost, available direct flights and travel time were most the most important factors in airport selection.

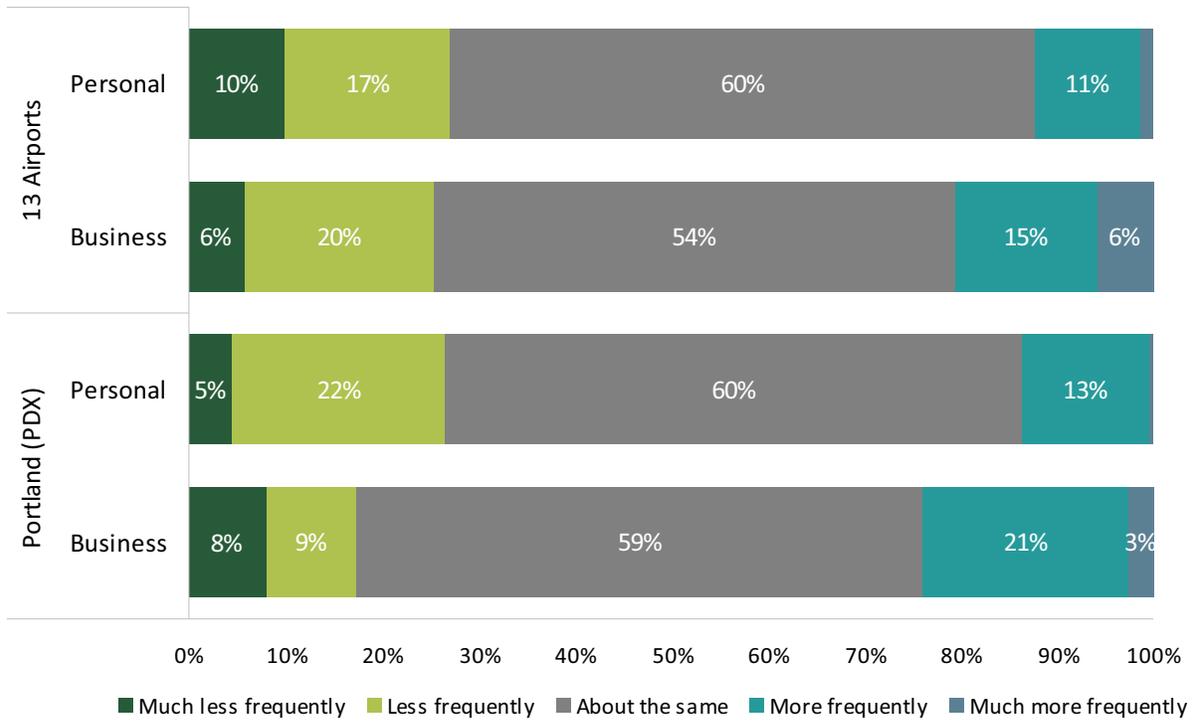


Figure 7 *Frequency of Flying Compared to 1 Year Ago by Trip Purpose*
 Source: Resource Systems Group, Inc., August 2009.

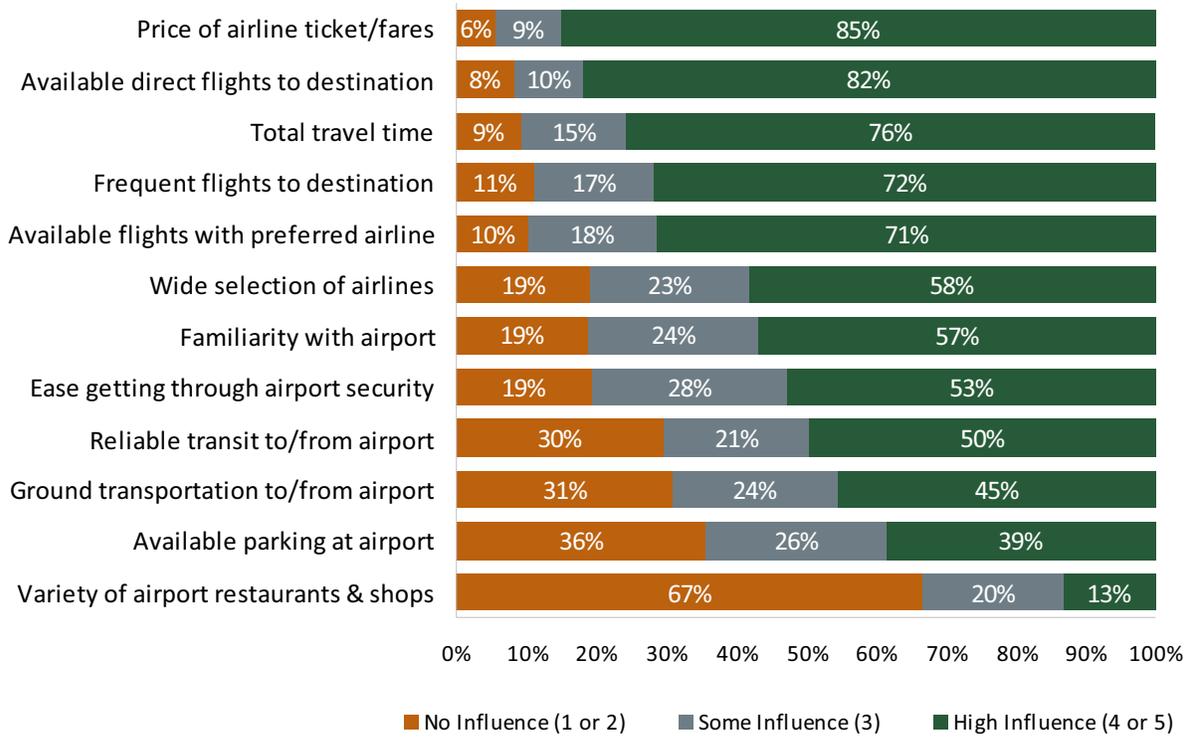


Figure 8 Factors Influencing Airport Choice for the 13 Airport Respondents (n=595)
 Source: Resource Systems Group, Inc., August 2009.

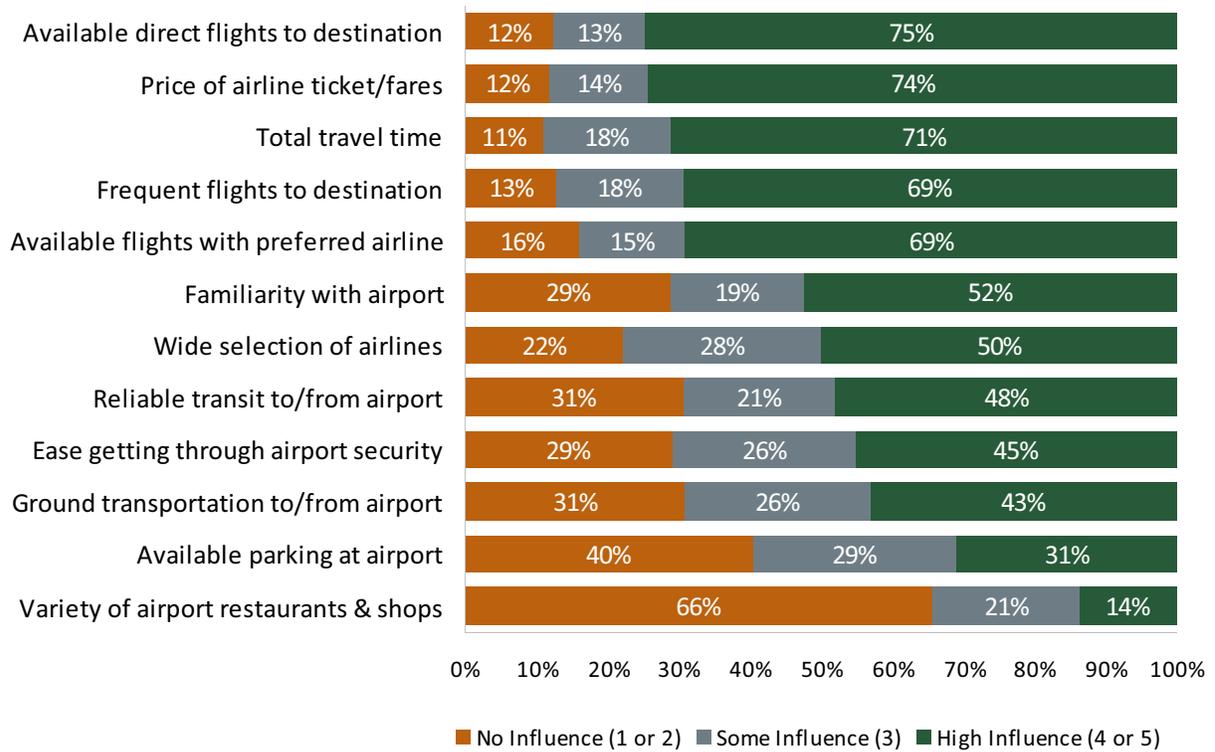


Figure 9 Factors Influencing Airport Choice for the Portland Respondents (n=316)

Source: Resource Systems Group, Inc., August 2009.

Table 11 High Influence (4 or 5 Rating) Factors by Competing System for 13 Airport Respondents

Statement	Member of Competing System	Not a Member of Competing System
Price of airline ticket/fares	89%	76%
Available direct flights to destination	84%	76%
Total travel time	79%	69%
Frequent flights to destination	73%	69%
Available flights with preferred airline	72%	70%
Wide selection of airlines	60%	53%
Familiarity with airport	57%	56%
Ease getting through airport security	55%	46%
Reliable transit to/from airport	48%	54%
Ground transportation to/from airport	46%	45%
Available parking at airport	40%	36%
Variety of airport restaurants & shops	14%	12%
Count (n)	413	182

Source: Resource Systems Group, Inc., August 2009.

The second set of statements included nine attributes about airport amenities and asked respondents to rate the amenities on a five-point scale (1 indicating “not at all important” and 5 indicating “very important”). These statements asked respondents how important the amenity was when they selected the airport to travel from (see **Figure 10** and **Figure 11**). Affordable parking was the most important attribute for respondents, followed by convenient parking close to the terminal, convenient shuttle bus service, and available long-term parking. In general, convenience and cost are most important to respondents with regard to the amenities at an airport. The amenities that did not apply to all respondents or all airports were rated least important by respondents (valet parking, cell-phone lot, and off-airport parking).

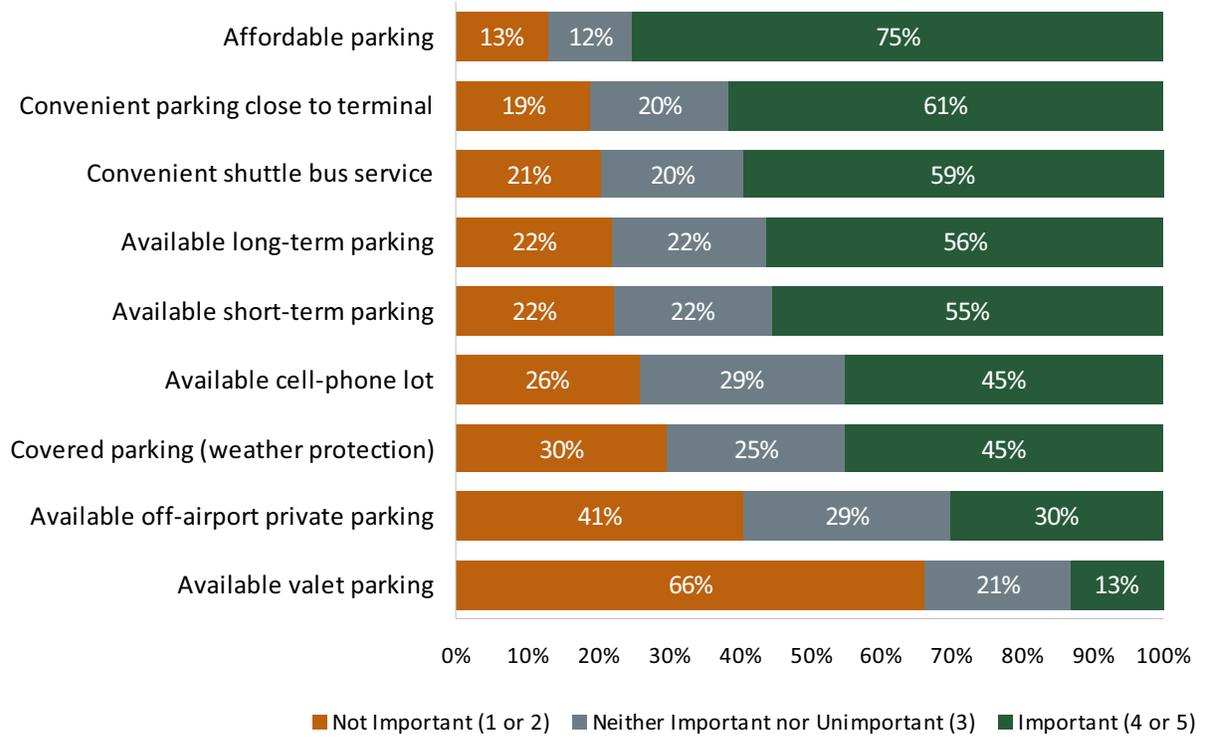


Figure 10 Thirteen Airport Respondents' Level of Importance when Selecting an Airport (n=595)

Source: Resource Systems Group, Inc., August 2009.

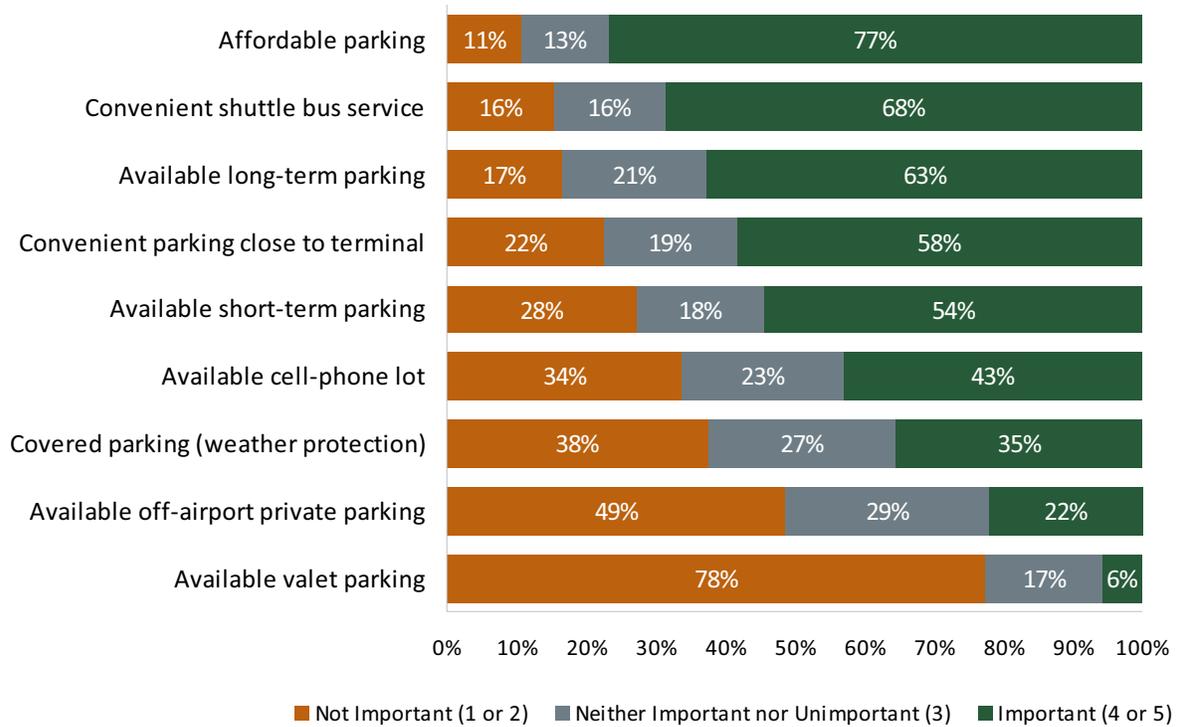


Figure 11 Portland Respondents' Level of Importance when Selecting an Airport (n=316)

Source: Resource Systems Group, Inc., August 2009.

Demographic Analysis

The final section of the survey asked respondents for demographic information. Overall, 9 percent of respondents from the 13 airports across the country use transit at least once per week. This number was somewhat higher for PDX respondents, with 13 percent reporting that they use transit at least once per week.

Of the 595 respondents across the 13 airports, only 14 reported not owning a vehicle, while 26 percent reported owning more than 3 vehicles (**Table 12**).

Table 12 13 Airport Respondents' Household Size by Vehicle Ownership

Household Size	0 (no vehicles)	1 vehicle	2 vehicles	3 or more vehicles
I person (I live alone)	50%	41%	3%	1%
2 people	21%	37%	44%	24%
3 people	7%	10%	21%	26%
4 or more people	21%	11%	32%	49%
Total	100%	100%	100%	100%
Count (n)	14	163	262	156

Note: Totals may not add to 100 percent due to rounding.

Source: Resource Systems Group, Inc., August 2009.

Respondents across the 13 airports covered a range of ages; 8 percent were under age 25, 17 percent were age 25–34, 22 percent were age 35–44, 28 percent were age 45–54, 21 percent were age 55–64, and 4 percent were 65 years old or older. In sum, two-thirds (67 percent) of respondents were employed full-time, part-time, or self-employed. Students, homemakers, and retired individuals comprised the remaining 33 percent of respondents across the 13 airports.

By comparison, PDX respondents had smaller household sizes and similar vehicle ownership rates. Vehicle ownership rates are shown in **Table 13**.

Table 13 Portland Airport Respondents' Household Size by Vehicle Ownership

Household Size	0 (no vehicles)	1 vehicle	2 vehicles	3 or more vehicles
I person (I live alone)	71%	49%	5%	2%
2 people	14%	35%	60%	40%
3 people	0%	11%	16%	27%
4 or more people	14%	6%	18%	31%
Total	100%	100%	100%	100%
Count (n)	7	72	141	96

Note: Totals may not add to 100 percent due to rounding.

Source: Resource Systems Group, Inc., August 2009.

Respondents from the 13 airports and PDX respondents had similar gender split responses (60 percent females and 40 percent males). PDX respondents also covered a range of ages; 4 percent were under age 25, 23 percent were age 25–34, 21 percent were age 35–44, 22 percent were age 45–54, 23 percent were age 55–64, and 7 percent were 65 years old or older. In total, 70 percent of respondents were employed full-time, part-time, or self-employed. Students, homemakers, and retired individuals comprised the remaining 30 percent of respondents across the 13 airports.

Incomes distributions for the sample are shown in **Figure 12**. In general, the PDX respondents had somewhat higher income levels. It is important to note that each of the 14 airport markets has a different cost of living and different mean and median annual household income. Given that income levels, as well as the available ground access modes, vary by airport market, care should be taken in drawing conclusions about the influence of income on travel behavior.

As shown in **Figure 13**, business respondents reported higher incomes than non-business respondents. More than half of non-business respondents reported an annual household income of less than \$80,000, while 38 percent of business respondents from the 13 airports and 36 percent of business respondents from PDX indicated an annual household income of less than \$80,000.

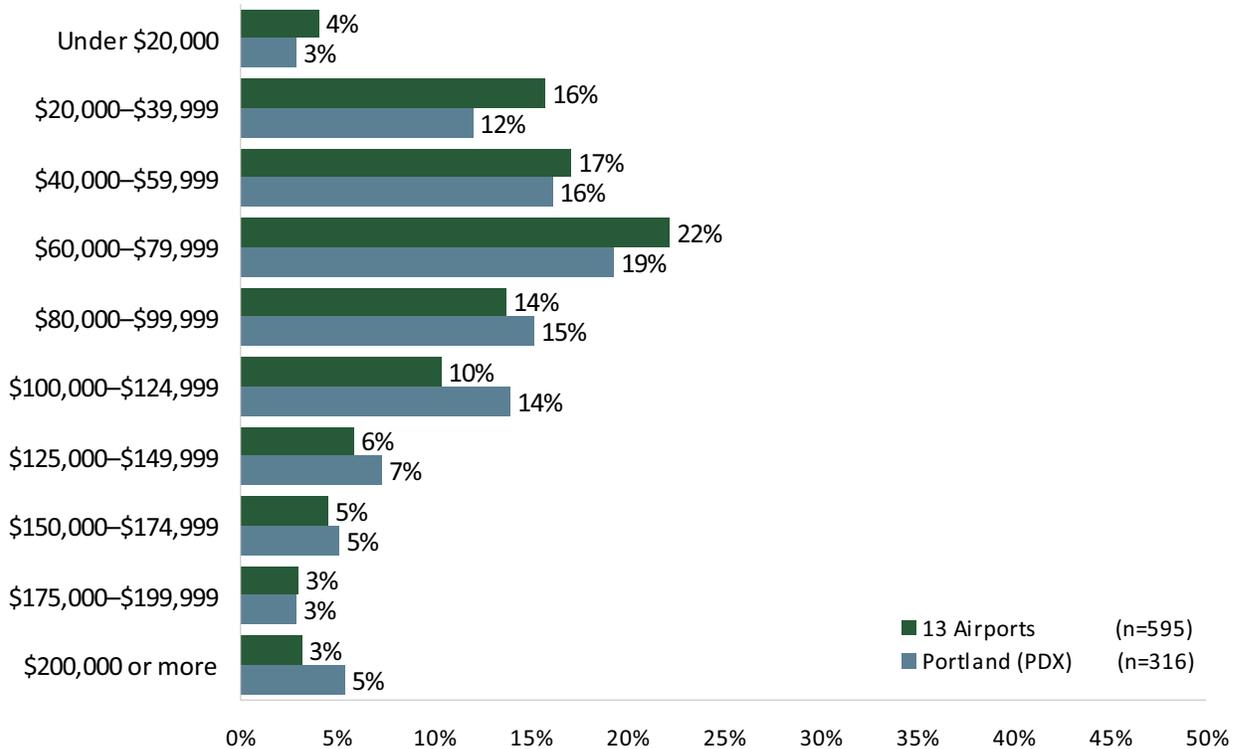


Figure 12 Annual Household Income Overall
 Source: Resource Systems Group, Inc., August 2009.



Figure 13 Annual Household Income by Trip Purpose
 Source: Resource Systems Group, Inc., August 2009.

Attachment E1

Portland Sample Cross-Tabulations: Purpose

When did you make your trip?

	Business		Non-business	
	Count	Percent	Count	Percent
April 2009	37	49.3%	66	27.4%
March 2009	15	20.0%	54	22.4%
February 2009	14	18.7%	31	12.9%
January 2009	7	9.3%	26	10.8%
December 2008	1	1.3%	40	16.6%
November 2008	1	1.3%	24	10.0%
Total	75	100.0%	241	100.0%

End location of flight

	Business		Non-business	
	Count	Percent	Count	Percent
Inside the United States	70	93.3%	218	90.5%
Outside the United States (or outside of US territory)	5	6.7%	23	9.5%
Total	75	100.0%	241	100.0%

What date did you depart from your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
01/01/2009	0	.0%	1	.4%
01/02/2009	0	.0%	2	.8%
01/03/2009	0	.0%	1	.4%
01/06/2009	1	1.3%	1	.4%
01/07/2009	0	.0%	1	.4%
01/09/2009	1	1.3%	3	1.2%
01/11/2009	0	.0%	1	.4%
01/12/2009	1	1.3%	0	.0%
01/14/2009	0	.0%	4	1.7%
01/15/2009	1	1.3%	2	.8%
01/16/2009	2	2.7%	1	.4%
01/18/2009	0	.0%	2	.8%
01/19/2009	0	.0%	2	.8%
01/20/2009	1	1.3%	0	.0%
01/21/2009	0	.0%	1	.4%
01/25/2009	0	.0%	1	.4%
01/28/2009	0	.0%	1	.4%
01/30/2009	0	.0%	1	.4%
01/31/2009	0	.0%	3	1.2%
02/01/2009	0	.0%	1	.4%
02/02/2009	1	1.3%	1	.4%

What date did you depart from your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
02/03/2009	1	1.3%	2	.8%
02/04/2009	1	1.3%	1	.4%
02/05/2009	0	.0%	2	.8%
02/06/2009	0	.0%	1	.4%
02/09/2009	2	2.7%	0	.0%
02/10/2009	0	.0%	1	.4%
02/11/2009	1	1.3%	0	.0%
02/12/2009	0	.0%	1	.4%
02/13/2009	0	.0%	3	1.2%
02/15/2009	0	.0%	1	.4%
02/16/2009	1	1.3%	0	.0%
02/17/2009	0	.0%	1	.4%
02/18/2009	0	.0%	1	.4%
02/19/2009	1	1.3%	0	.0%
02/20/2009	2	2.7%	6	2.5%
02/21/2009	0	.0%	4	1.7%
02/23/2009	2	2.7%	1	.4%
02/25/2009	1	1.3%	2	.8%
02/26/2009	1	1.3%	1	.4%
02/28/2009	0	.0%	1	.4%
03/02/2009	1	1.3%	2	.8%

What date did you depart from your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
03/03/2009	1	1.3%	4	1.7%
03/04/2009	0	.0%	1	.4%
03/05/2009	0	.0%	2	.8%
03/07/2009	2	2.7%	0	.0%
03/08/2009	1	1.3%	1	.4%
03/09/2009	0	.0%	3	1.2%
03/10/2009	1	1.3%	2	.8%
03/11/2009	0	.0%	3	1.2%
03/12/2009	0	.0%	3	1.2%
03/14/2009	0	.0%	1	.4%
03/15/2009	1	1.3%	1	.4%
03/16/2009	0	.0%	1	.4%
03/17/2009	1	1.3%	2	.8%
03/18/2009	1	1.3%	4	1.7%
03/19/2009	3	4.0%	3	1.2%
03/20/2009	0	.0%	5	2.1%
03/21/2009	1	1.3%	0	.0%
03/22/2009	0	.0%	2	.8%
03/23/2009	0	.0%	1	.4%
03/24/2009	0	.0%	2	.8%
03/26/2009	0	.0%	1	.4%

What date did you depart from your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
03/27/2009	0	.0%	4	1.7%
03/28/2009	0	.0%	2	.8%
03/29/2009	0	.0%	1	.4%
03/30/2009	1	1.3%	1	.4%
03/31/2009	0	.0%	1	.4%
04/01/2009	2	2.7%	3	1.2%
04/02/2009	1	1.3%	2	.8%
04/03/2009	1	1.3%	2	.8%
04/04/2009	0	.0%	3	1.2%
04/05/2009	2	2.7%	1	.4%
04/06/2009	1	1.3%	3	1.2%
04/07/2009	0	.0%	1	.4%
04/08/2009	1	1.3%	2	.8%
04/09/2009	0	.0%	5	2.1%
04/10/2009	1	1.3%	2	.8%
04/11/2009	0	.0%	4	1.7%
04/12/2009	0	.0%	1	.4%
04/13/2009	3	4.0%	1	.4%
04/14/2009	0	.0%	2	.8%
04/15/2009	2	2.7%	3	1.2%
04/16/2009	1	1.3%	4	1.7%

What date did you depart from your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
04/17/2009	1	1.3%	4	1.7%
04/19/2009	3	4.0%	2	.8%
04/20/2009	4	5.3%	2	.8%
04/21/2009	3	4.0%	4	1.7%
04/22/2009	2	2.7%	2	.8%
04/23/2009	2	2.7%	5	2.1%
04/24/2009	2	2.7%	4	1.7%
04/25/2009	1	1.3%	1	.4%
04/26/2009	1	1.3%	1	.4%
04/27/2009	4	5.3%	0	.0%
11/03/2008	0	.0%	3	1.2%
11/04/2008	0	.0%	1	.4%
11/06/2008	0	.0%	2	.8%
11/08/2008	0	.0%	1	.4%
11/10/2008	1	1.3%	1	.4%
11/12/2008	0	.0%	1	.4%
11/13/2008	0	.0%	1	.4%
11/14/2008	0	.0%	1	.4%
11/15/2008	0	.0%	2	.8%
11/16/2008	0	.0%	1	.4%
11/18/2008	0	.0%	1	.4%

What date did you depart from your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
11/19/2008	0	.0%	1	.4%
11/20/2008	0	.0%	3	1.2%
11/22/2008	0	.0%	1	.4%
11/25/2008	0	.0%	3	1.2%
12/01/2008	1	1.3%	1	.4%
12/02/2008	0	.0%	1	.4%
12/05/2008	0	.0%	2	.8%
12/07/2008	0	.0%	1	.4%
12/08/2008	0	.0%	2	.8%
12/09/2008	0	.0%	1	.4%
12/10/2008	0	.0%	2	.8%
12/12/2008	0	.0%	2	.8%
12/13/2008	0	.0%	1	.4%
12/16/2008	0	.0%	2	.8%
12/17/2008	0	.0%	4	1.7%
12/18/2008	0	.0%	4	1.7%
12/19/2008	0	.0%	1	.4%
12/20/2008	0	.0%	5	2.1%
12/21/2008	0	.0%	4	1.7%
12/23/2008	0	.0%	3	1.2%
12/24/2008	0	.0%	2	.8%

What date did you depart from your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
12/26/2008	0	.0%	1	.4%
12/28/2008	0	.0%	1	.4%
12/29/2008	0	.0%	1	.4%
12/30/2008	0	.0%	1	.4%
Total	75	100.0%	241	100.0%

What time of day did you depart from your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
Midnight - 9AM	38	50.7%	86	35.7%
9AM - Noon	23	30.7%	70	29.0%
Noon - 4PM	11	14.7%	47	19.5%
4PM - 7PM	2	2.7%	26	10.8%
7PM - Midnight	1	1.3%	12	5.0%
Total	75	100.0%	241	100.0%

What date did you return to your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
01/01/2009	0	.0%	1	.4%
01/02/2009	0	.0%	2	.8%
01/03/2009	0	.0%	3	1.2%
01/04/2009	0	.0%	4	1.7%
01/05/2009	0	.0%	1	.4%
01/06/2009	1	1.3%	0	.0%
01/07/2009	0	.0%	1	.4%
01/08/2009	0	.0%	2	.8%
01/10/2009	0	.0%	2	.8%
01/11/2009	1	1.3%	1	.4%
01/12/2009	0	.0%	1	.4%
01/13/2009	0	.0%	2	.8%
01/14/2009	0	.0%	1	.4%
01/15/2009	1	1.3%	0	.0%
01/16/2009	0	.0%	1	.4%
01/18/2009	1	1.3%	2	.8%
01/19/2009	1	1.3%	0	.0%
01/20/2009	0	.0%	1	.4%
01/21/2009	0	.0%	2	.8%
01/22/2009	2	2.7%	0	.0%
01/23/2009	0	.0%	1	.4%

What date did you return to your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
01/24/2009	0	.0%	1	.4%
01/25/2009	0	.0%	4	1.7%
01/27/2009	0	.0%	1	.4%
01/28/2009	0	.0%	1	.4%
01/31/2009	0	.0%	1	.4%
02/02/2009	0	.0%	1	.4%
02/03/2009	0	.0%	1	.4%
02/04/2009	0	.0%	2	.8%
02/06/2009	2	2.7%	1	.4%
02/07/2009	0	.0%	1	.4%
02/08/2009	0	.0%	2	.8%
02/09/2009	0	.0%	1	.4%
02/10/2009	1	1.3%	2	.8%
02/12/2009	1	1.3%	0	.0%
02/13/2009	1	1.3%	0	.0%
02/16/2009	1	1.3%	3	1.2%
02/17/2009	0	.0%	1	.4%
02/18/2009	1	1.3%	0	.0%
02/19/2009	0	.0%	1	.4%
02/21/2009	1	1.3%	0	.0%
02/22/2009	1	1.3%	2	.8%

What date did you return to your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
02/23/2009	1	1.3%	2	.8%
02/24/2009	0	.0%	2	.8%
02/25/2009	0	.0%	3	1.2%
02/26/2009	2	2.7%	0	.0%
02/28/2009	1	1.3%	0	.0%
03/01/2009	0	.0%	4	1.7%
03/02/2009	1	1.3%	1	.4%
03/03/2009	0	.0%	2	.8%
03/06/2009	0	.0%	3	1.2%
03/07/2009	2	2.7%	2	.8%
03/08/2009	0	.0%	2	.8%
03/09/2009	0	.0%	2	.8%
03/10/2009	0	.0%	1	.4%
03/11/2009	4	5.3%	0	.0%
03/12/2009	0	.0%	2	.8%
03/13/2009	0	.0%	1	.4%
03/15/2009	0	.0%	2	.8%
03/16/2009	0	.0%	4	1.7%
03/18/2009	1	1.3%	1	.4%
03/19/2009	1	1.3%	1	.4%
03/20/2009	1	1.3%	0	.0%

What date did you return to your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
03/21/2009	1	1.3%	2	.8%
03/22/2009	0	.0%	5	2.1%
03/23/2009	1	1.3%	3	1.2%
03/25/2009	0	.0%	4	1.7%
03/26/2009	0	.0%	3	1.2%
03/27/2009	0	.0%	2	.8%
03/28/2009	0	.0%	3	1.2%
03/29/2009	0	.0%	2	.8%
03/30/2009	0	.0%	2	.8%
04/01/2009	1	1.3%	5	2.1%
04/02/2009	1	1.3%	1	.4%
04/03/2009	2	2.7%	2	.8%
04/04/2009	0	.0%	1	.4%
04/05/2009	0	.0%	2	.8%
04/06/2009	0	.0%	5	2.1%
04/07/2009	0	.0%	1	.4%
04/08/2009	1	1.3%	1	.4%
04/09/2009	1	1.3%	0	.0%
04/10/2009	3	4.0%	1	.4%
04/11/2009	0	.0%	2	.8%
04/12/2009	0	.0%	4	1.7%

What date did you return to your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
04/13/2009	0	.0%	3	1.2%
04/15/2009	0	.0%	4	1.7%
04/16/2009	1	1.3%	3	1.2%
04/17/2009	3	4.0%	0	.0%
04/18/2009	0	.0%	3	1.2%
04/19/2009	0	.0%	7	2.9%
04/20/2009	1	1.3%	2	.8%
04/21/2009	1	1.3%	3	1.2%
04/22/2009	3	4.0%	3	1.2%
04/23/2009	3	4.0%	3	1.2%
04/24/2009	6	8.0%	1	.4%
04/25/2009	1	1.3%	3	1.2%
04/26/2009	1	1.3%	4	1.7%
04/27/2009	3	4.0%	6	2.5%
04/28/2009	6	8.0%	5	2.1%
04/29/2009	2	2.7%	1	.4%
04/30/2009	1	1.3%	1	.4%
11/07/2008	0	.0%	2	.8%
11/08/2008	0	.0%	2	.8%
11/11/2008	1	1.3%	1	.4%
11/12/2008	0	.0%	1	.4%

What date did you return to your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
11/14/2008	0	.0%	1	.4%
11/16/2008	0	.0%	1	.4%
11/18/2008	0	.0%	1	.4%
11/21/2008	0	.0%	1	.4%
11/22/2008	0	.0%	2	.8%
11/23/2008	0	.0%	1	.4%
11/24/2008	0	.0%	1	.4%
11/27/2008	0	.0%	2	.8%
11/28/2008	0	.0%	1	.4%
11/29/2008	0	.0%	3	1.2%
11/30/2008	0	.0%	1	.4%
12/01/2008	0	.0%	1	.4%
12/07/2008	0	.0%	1	.4%
12/08/2008	1	1.3%	0	.0%
12/09/2008	0	.0%	1	.4%
12/10/2008	0	.0%	1	.4%
12/13/2008	0	.0%	1	.4%
12/14/2008	0	.0%	1	.4%
12/15/2008	0	.0%	2	.8%
12/17/2008	0	.0%	2	.8%
12/22/2008	0	.0%	3	1.2%

What date did you return to your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
12/24/2008	0	.0%	1	.4%
12/26/2008	0	.0%	3	1.2%
12/27/2008	0	.0%	3	1.2%
12/28/2008	0	.0%	5	2.1%
12/3/2008	0	.0%	1	.4%
12/30/2008	0	.0%	2	.8%
Total	75	100.0%	241	100.0%

What time of day did you return to your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
Midnight - 9AM	3	4.0%	22	9.1%
9AM - Noon	4	5.3%	32	13.3%
Noon - 4PM	18	24.0%	62	25.7%
4PM - 7PM	21	28.0%	55	22.8%
7PM - Midnight	29	38.7%	70	29.0%
Total	75	100.0%	241	100.0%

What class of service did you use on your flight?

	Business		Non-business	
	Count	Percent	Count	Percent
Economy or coach	65	86.7%	225	93.4%
Business	4	5.3%	3	1.2%
First class	6	8.0%	13	5.4%
Total	75	100.0%	241	100.0%

How many people flew with you on your trip?

	Business		Non-business	
	Count	Percent	Count	Percent
Nobody (I flew alone)	54	72.0%	73	30.3%
1 person	14	18.7%	89	36.9%
2 people	5	6.7%	39	16.2%
3 people	1	1.3%	17	7.1%
4 people	1	1.3%	11	4.6%
5 people	0	.0%	5	2.1%
More than 5 other people	0	.0%	7	2.9%
Total	75	100.0%	241	100.0%

How many bags did you/your party check?

	Business		Non-business	
	Count	Percent	Count	Percent
0 (Didn't check any bags)	29	38.7%	54	22.4%
1 bag	39	52.0%	69	28.6%
2 bags	4	5.3%	73	30.3%
3 bags	1	1.3%	15	6.2%
4 or more bags	2	2.7%	30	12.4%
Total	75	100.0%	241	100.0%

How many bags did you, personally, carry-on?

	Business		Non-business	
	Count	Percent	Count	Percent
0 (Didn't carry-on any bags)	17	22.7%	45	18.7%
1 bag	51	68.0%	155	64.3%
2 bags	7	9.3%	41	17.0%
Total	75	100.0%	241	100.0%

Before your flight was booked, did you consider departing from another airport for your trip?

	Business		Non-business	
	Count	Percent	Count	Percent
No, I only considered flying out of	65	86.7%	210	87.1%
Yes, I considered flying out of other airports	10	13.3%	31	12.9%
Total	75	100.0%	241	100.0%

Alternative airport considered

	Business		Non-business	
	Count	Percent	Count	Percent
Eugene, OR Airport (EUG)	9	90.0%	14	45.2%
Seattle-Tacoma Airport (SEA)	2	20.0%	16	51.6%
Other	0	.0%	5	16.1%
Total	11	110.0%	35	112.9%

Where did your trip to the airport begin?

	Business		Non-business	
	Count	Percent	Count	Percent
My home	67	89.3%	220	91.3%
Someone else's home	2	2.7%	8	3.3%
My regular place of employment	1	1.3%	2	.8%
Place of business	4	5.3%	4	1.7%
Hotel	0	.0%	5	2.1%
School	1	1.3%	2	.8%
Total	75	100.0%	241	100.0%

Time began trip to the airport

	Business		Non-business	
	Count	Percent	Count	Percent
Midnight - 1:59 AM	0	.0%	1	.4%
2:00 AM - 3:59 AM	2	2.7%	7	2.9%
4:00 AM - 5:59 AM	24	32.0%	49	20.3%
6:00 AM - 7:59 AM	23	30.7%	60	24.9%
8:00 AM - 9:59 AM	9	12.0%	32	13.3%
10:00 AM - 11:59 AM	9	12.0%	25	10.4%
Noon - 1:59 PM	3	4.0%	20	8.3%
2:00 PM - 3:59 PM	3	4.0%	24	10.0%
4:00 PM - 5:59 PM	0	.0%	11	4.6%
6:00 PM - 7:59 PM	1	1.3%	5	2.1%
8:00 PM - 9:59 PM	1	1.3%	4	1.7%
10:00 PM - 11:59 PM	0	.0%	3	1.2%
Total	75	100.0%	241	100.0%

Time arrived at airport

	Business		Non-business	
	Count	Percent	Count	Percent
2:00 AM - 3:59 AM	0	.0%	3	1.2%
4:00 AM - 5:59 AM	18	24.0%	41	17.0%
6:00 AM - 7:59 AM	27	36.0%	54	22.4%
8:00 AM - 9:59 AM	12	16.0%	40	16.6%
10:00 AM - 11:59 AM	8	10.7%	29	12.0%
Noon - 1:59 PM	4	5.3%	18	7.5%
2:00 PM - 3:59 PM	4	5.3%	25	10.4%
4:00 PM - 5:59 PM	0	.0%	13	5.4%
6:00 PM - 7:59 PM	1	1.3%	10	4.1%
8:00 PM - 9:59 PM	1	1.3%	2	.8%
10:00 PM - 11:59 PM	0	.0%	6	2.5%
Total	75	100.0%	241	100.0%

Travel time to the airport

	Business		Non-business	
	Count	Percent	Count	Percent
Less than 30 minutes	22	29.3%	58	24.1%
30 - 59 minutes	37	49.3%	104	43.2%
1 hour - 1 hour 29 minutes	9	12.0%	45	18.7%
1 hour 30 minutes - 1 hour 59 minutes	3	4.0%	13	5.4%
2 hours or more	4	5.3%	21	8.7%
Total	75	100.0%	241	100.0%

Approximately how long after you arrived at the airport did your flight depart?

	Business		Non-business	
	Count	Percent	Count	Percent
Less than 30 minutes	2	2.7%	3	1.2%
30 - 59 minutes	22	29.3%	22	9.1%
1 hour - 1 hour 29 minutes	32	42.7%	97	40.2%
1 hour 30 minutes - 1 hour 59 minutes	15	20.0%	70	29.0%
2 hour - 2 hour 29 minutes	3	4.0%	34	14.1%
2 hour 30 minutes - 2 hour 59 minutes	1	1.3%	9	3.7%
3 hours or more	0	.0%	6	2.5%
Total	75	100.0%	241	100.0%

What was the primary type of transportation you used to get to the airport?

	Business		Non-business	
	Count	Percent	Count	Percent
Private vehicle and parked	44	58.7%	81	33.6%
Private vehicle and was dropped off at the airport	25	33.3%	103	42.7%
Rental car	0	.0%	2	.8%
Taxi	3	4.0%	12	5.0%
Limo/town car	0	.0%	5	2.1%
Shared shuttle van/door-to-door van	2	2.7%	8	3.3%
Regional public bus/van	0	.0%	6	2.5%
Rail	1	1.3%	24	10.0%
Total	75	100.0%	241	100.0%

Where did you park?

	Business		Non-business	
	Count	Percent	Count	Percent
An airport garage or parking lot	37	84.1%	61	75.3%
An off-airport parking lot	7	15.9%	14	17.3%
A hotel parking lot	0	.0%	6	7.4%
Total	44	100.0%	81	100.0%

Reason for selecting mode

	Business		Non-business	
	Count	Percent	Count	Percent
Travel time to airport	36	48.0%	92	38.2%
Group (travel party) size	0	.0%	20	8.3%
Comfort	27	36.0%	78	32.4%
Reliability	24	32.0%	92	38.2%
Short walk to terminal entrance from where I ended my access trip	18	24.0%	47	19.5%
Directness of trip (no stops/transfers)	21	28.0%	67	27.8%
Purpose of trip (business vs. non-business)	16	21.3%	10	4.1%
Convenience of traveling with luggage/belongings	27	36.0%	121	50.2%
Trip cost	20	26.7%	69	28.6%
Frequency of transit service	2	2.7%	17	7.1%
Good highway/road access to airport	21	28.0%	59	24.5%
Good transit access to airport	7	9.3%	35	14.5%
Other	6	8.0%	26	10.8%
Total	225	300.0%	733	304.1%

Main reason for selecting mode to get to airport

	Business		Non-business	
	Count	Percent	Count	Percent
Travel time to airport	15	20.0%	32	13.3%
Group (travel party) size	0	.0%	7	2.9%
Comfort	5	6.7%	19	7.9%
Reliability	6	8.0%	20	8.3%
Short walk to terminal entrance from where I ended my access trip	4	5.3%	8	3.3%
Directness of trip (no stops/transfers)	7	9.3%	15	6.2%
Purpose of trip (business vs. non-business)	6	8.0%	2	.8%
Convenience of traveling with luggage/belongings	13	17.3%	57	23.7%
Trip cost	8	10.7%	33	13.7%
Frequency of transit service	0	.0%	4	1.7%
Good highway/road access to airport	3	4.0%	11	4.6%
Good transit access to airport	3	4.0%	13	5.4%
Other	5	6.7%	20	8.3%
Total	75	100.0%	241	100.0%

Where did you park?

	Business		Non-business	
	Count	Percent	Count	Percent
Short-term parking	9	24.3%	11	18.0%
Long-term parking (remote, economy, etc.)	27	73.0%	49	80.3%
Other	1	2.7%	1	1.6%
Total	37	100.0%	61	100.0%

How did you get from where you parked to the terminal?

	Business		Non-business	
	Count	Percent	Count	Percent
I walked	12	32.4%	12	19.7%
I took a shuttle	25	67.6%	49	80.3%
Other, please specify:	0	.0%	0	.0%
Total	37	100.0%	61	100.0%

Time spent traveling from parking lot to terminal

	Business		Non-business	
	Count	Percent	Count	Percent
Less than 5 minutes	8	21.6%	3	4.9%
5 - 9 minutes	7	18.9%	20	32.8%
10 - 14 minutes	13	35.1%	12	19.7%
15 - 19 minutes	7	18.9%	23	37.7%
20 minutes or more	2	5.4%	3	4.9%
Total	37	100.0%	61	100.0%

What was the primary reason for choosing where you parked?

	Business		Non-business	
	Count	Percent	Count	Percent
Parking cost	22	50.0%	44	54.3%
Walking distance to terminal	6	13.6%	2	2.5%
Shuttle frequency to terminal	3	6.8%	4	4.9%
Parking availability	3	6.8%	3	3.7%
Length of time vehicle was parked	8	18.2%	14	17.3%
Security of vehicle	1	2.3%	6	7.4%
Weather (parking garage vs. open parking lot)	0	.0%	1	1.2%
Other	1	2.3%	7	8.6%
Total	44	100.0%	81	100.0%

Did you know where you intended to park before you arrived at the airport?

	Business		Non-business	
	Count	Percent	Count	Percent
Yes	37	100.0%	60	98.4%
No	0	.0%	1	1.6%
Total	37	100.0%	61	100.0%

How did you decide which parking lot to use?

	Business		Non-business	
	Count	Percent	Count	Percent
I checked the airport website	2	5.4%	4	6.7%
I checked other websites	0	.0%	1	1.7%
I parked where I always park	28	75.7%	38	63.3%
The parking lot was recommended to me	0	.0%	2	3.3%
I parked in the lot closest to the terminal	5	13.5%	7	11.7%
I parked in an inexpensive lot	6	16.2%	22	36.7%
Other	2	5.4%	1	1.7%
Total	43	116.2%	75	125.0%

How did you decide which parking lot to park in when arriving?

	Business		Non-business	
	Count	Percent	Count	Percent
I drove by the sign and chose a lot that was listed as open	0	.0%	1	100.0%
Total	0	.0%	1	100.0%

Parking cost

	Business		Non-business	
	Count	Percent	Count	Percent
Less than \$25	17	38.6%	17	21.0%
\$25 - \$49	16	36.4%	33	40.7%
\$50 - \$74	10	22.7%	17	21.0%
\$75 - \$99	1	2.3%	8	9.9%
\$100 - \$124	0	.0%	4	4.9%
\$125 - \$149	0	.0%	0	.0%
\$150 - \$174	0	.0%	0	.0%
\$175 - \$199	0	.0%	2	2.5%
\$200 or more	0	.0%	0	.0%
Total	44	100.0%	81	100.0%

How did you pay for your parking?

	Business		Non-business	
	Count	Percent	Count	Percent
I paid a parking attendant	10	22.7%	34	42.0%
I paid at a machine	34	77.3%	47	58.0%
Total	44	100.0%	81	100.0%

Who paid for the cost of parking your vehicle?

	Business		Non-business	
	Count	Percent	Count	Percent
I paid myself	4	9.1%	69	85.2%
My employer paid	36	81.8%	0	.0%
Someone else paid	3	6.8%	8	9.9%
I shared parking costs with my employer	1	2.3%	0	.0%
I shared parking costs with someone else	0	.0%	3	3.7%
My parking cost was included with my hotel stay	0	.0%	1	1.2%
Total	44	100.0%	81	100.0%

Did you pay your parking costs by cash or credit/debit card?

	Business		Non-business	
	Count	Percent	Count	Percent
Cash	2	4.5%	13	16.0%
Credit/Debit Card	42	95.5%	68	84.0%
Total	44	100.0%	81	100.0%

Did the person dropping you off park their vehicle?

	Business		Non-business	
	Count	Percent	Count	Percent
No, I was dropped off at the curb	24	96.0%	92	89.3%
Yes, the person dropping me off parked at the terminal	1	4.0%	11	10.7%
Total	25	100.0%	103	100.0%

How did you return home at the end of your trip?

	Business		Non-business	
	Count	Percent	Count	Percent
Private vehicle and was picked up	23	74.2%	113	70.6%
Rental car	0	.0%	2	1.3%
Taxi	3	9.7%	11	6.9%
Limo/town car	0	.0%	4	2.5%
Shared shuttle van/door-to-door van	3	9.7%	5	3.1%
Local city bus	0	.0%	0	.0%
Regional public bus/van	0	.0%	4	2.5%
Subway	0	.0%	0	.0%
Rail	2	6.5%	15	9.4%
Other	0	.0%	6	3.8%
Total	31	100.0%	160	100.0%

Did you have a private vehicle available to make your trip to the airport and leave parked for the duration of your trip?

	Business		Non-business	
	Count	Percent	Count	Percent
Yes	16	51.6%	76	47.5%
No	15	48.4%	84	52.5%
Total	31	100.0%	160	100.0%

Why didn't you use the private vehicle available to you to make your trip to the airport and leave it parked for the duration of your trip?

	Business		Non-business	
	Count	Percent	Count	Percent
Parking at airport is too far from terminal	1	6.3%	2	2.6%
Parking is not always available at airport	0	.0%	0	.0%
Cost of parking at airport is too high	11	68.8%	49	64.5%
Takes too long to drive or too much congestion	0	.0%	1	1.3%
Car is not available for overnight parking	1	6.3%	0	.0%
Car is not secure parked at airport for multiple days	0	.0%	9	11.8%
Prefer transit for environmental reasons	1	6.3%	6	7.9%
Other	2	12.5%	9	11.8%
Total	16	100.0%	76	100.0%

Why didn't you drive to the airport?

	Business		Non-business	
	Count	Percent	Count	Percent
Parking at airport is too far from terminal	3	42.9%	17	40.5%
Parking is not always available at airport	0	.0%	8	19.0%
Cost of parking at airport is too high	1	14.3%	11	26.2%
Takes too long to drive or too much congestion	0	.0%	6	14.3%
Car is not available for overnight parking	0	.0%	2	4.8%
Car is not secure parked at airport for multiple days	4	57.1%	24	57.1%
Travel time to airport is too unpredictable	1	14.3%	8	19.0%
Prefer transit for environmental reasons	2	28.6%	7	16.7%
Unfamiliar with route to airport	0	.0%	2	4.8%
Other	0	.0%	3	7.1%
Total	11	157.1%	88	209.5%

At the start of your trip, which method best describes how you got to your transit stop?

	Business		Non-business	
	Count	Percent	Count	Percent
Drove car and parked	0	.0%	5	16.7%
Rode in car and was dropped off	0	.0%	4	13.3%
Walked or biked	1	100.0%	21	70.0%
Total	1	100.0%	30	100.0%

How many times have you flown out of your airport in the last year?

	Business		Non-business	
	Count	Percent	Count	Percent
1 time (this trip only)	1	1.3%	34	14.1%
2-3 times	4	5.3%	82	34.0%
4-5 times	17	22.7%	59	24.5%
6-11 times	23	30.7%	56	23.2%
12 times or more How many times have you flown in total in the last year from any airport?	30	40.0%	10	4.1%
Total	75	100.0%	241	100.0%

How many times have you flown in total in the last year?

	Business		Non-business	
	Count	Percent	Count	Percent
1 time (this trip only)	1	1.3%	29	12.0%
2-3 times	1	1.3%	56	23.2%
4-5 times	14	18.7%	62	25.7%
6-11 times	18	24.0%	64	26.6%
12 times or more	41	54.7%	30	12.4%
Total	75	100.0%	241	100.0%

Over the past year have you always used the same mode when departing from the airport for a flight?

	Business		Non-business	
	Count	Percent	Count	Percent
Yes	38	51.4%	96	46.4%
No	36	48.6%	111	53.6%
Total	74	100.0%	207	100.0%

What proportion of your trips to the airport in the past year were made by taking the mode you used?

	Business		Non-business	
	Count	Percent	Count	Percent
Over 75%	12	33.3%	21	18.9%
50-75%	14	38.9%	42	37.8%
25-49%	4	11.1%	23	20.7%
Less than 25%	6	16.7%	25	22.5%
Total	36	100.0%	111	100.0%

What other modes have you used in the past year?

	Business		Non-business	
	Count	Percent	Count	Percent
Private vehicle	12	33.3%	52	46.8%
Private vehicle and was dropped off at the airport	18	50.0%	50	45.0%
Rental car	2	5.6%	0	.0%
Taxi	6	16.7%	8	7.2%
Limo/town car	5	13.9%	5	4.5%
Shared shuttle van/door-to-door van	2	5.6%	7	6.3%
Regional public bus/van	0	.0%	1	.9%
Rail	8	22.2%	27	24.3%
Total	53	147.2%	150	135.1%

Where did you park?

	Business		Non-business	
	Count	Percent	Count	Percent
An airport garage or parking lot	10	83.3%	37	71.2%
An off-airport parking lot	1	8.3%	14	26.9%
A hotel parking lot	1	8.3%	1	1.9%
Total	12	100.0%	52	100.0%

What is the main reason you never selected the transit option in the previous section?

	Business		Non-business	
	Count	Percent	Count	Percent
Transit fare is too high	0	.0%	9	12.3%
Travel time too long	4	12.9%	8	11.0%
Time getting to and from transit too long	4	12.9%	6	8.2%
Transit trip has too many transfers	2	6.5%	1	1.4%
Schedule is not convenient	5	16.1%	8	11.0%
Difficult to deal with luggage	3	9.7%	9	12.3%
Less reliable than current method of travel to airport	4	12.9%	12	16.4%
Do not like transit	3	9.7%	10	13.7%
Need car for other reasons	3	9.7%	4	5.5%
Other, please specify:	3	9.7%	6	8.2%
Total	31	100.0%	73	100.0%

Compared to a year ago, how frequently are you flying from your airport?

	Business		Non-business	
	Count	Percent	Count	Percent
Much less frequently	6	8.0%	11	4.6%
Less frequently	7	9.3%	53	22.0%
About the same	44	58.7%	144	59.8%
More frequently	16	21.3%	32	13.3%
Much more frequently	2	2.7%	1	.4%
Total	75	100.0%	241	100.0%

Have you ever visited the airport website?

	Business		Non-business	
	Count	Percent	Count	Percent
Yes	51	68.0%	116	48.1%
No	24	32.0%	125	51.9%
Total	75	100.0%	241	100.0%

What did you use the airport website for?

	Business		Non-business	
	Count	Percent	Count	Percent
Flight information (arrivals, departures, delays)	33	64.7%	90	77.6%
Information on parking fees and fee payment options	21	41.2%	48	41.4%
Information on available parking (full/closed lots, location of available lots)	6	11.8%	31	26.7%
Information on ground transportation (buses, shuttles, car services)	4	7.8%	22	19.0%
Information on rental car companies	4	7.8%	9	7.8%
Directions to/from the airport	2	3.9%	7	6.0%
Information on weather conditions	14	27.5%	42	36.2%
Information on traveler security requirements	16	31.4%	35	30.2%
Local roadway conditions around airport (road closures, construction)	10	19.6%	16	13.8%
Local area information (hotels, restaurants, attractions)	1	2.0%	7	6.0%
Airport news or general airport information	15	29.4%	31	26.7%
Other	4	7.8%	9	7.8%
Total	130	254.9%	347	299.1%

Have you ever visited the airport website?

	Business		Non-business	
	Count	Percent	Count	Percent
Yes	51	68.0%	116	48.1%
No	24	32.0%	125	51.9%
Total	75	100.0%	241	100.0%

Influence on choosing which airport to fly from: Familiarity with airport

	Business		Non-business	
	Count	Percent	Count	Percent
No influence at all	14	20.6%	42	18.8%
2	6	8.8%	22	9.8%
3	12	17.6%	43	19.2%
4	24	35.3%	47	21.0%
Very high influence	12	17.6%	70	31.3%
Total	68	100.0%	224	100.0%

Influence on choosing which airport to fly from: Ground transportation options to/from airport

	Business		Non-business	
	Count	Percent	Count	Percent
No influence at all	21	30.4%	40	18.6%
2	10	14.5%	17	7.9%
3	16	23.2%	58	27.0%
4	14	20.3%	55	25.6%
Very high influence	8	11.6%	45	20.9%
Total	69	100.0%	215	100.0%

Influence on choosing which airport to fly from: Reliable transit options to/from airport

	Business		Non-business	
	Count	Percent	Count	Percent
No influence at all	21	32.3%	38	17.9%
2	2	3.1%	24	11.3%
3	14	21.5%	45	21.2%
4	18	27.7%	58	27.4%
Very high influence	10	15.4%	47	22.2%
Total	65	100.0%	212	100.0%

Influence on choosing which airport to fly from: Availability of parking at the airport

	Business		Non-business	
	Count	Percent	Count	Percent
No influence at all	18	27.7%	56	26.4%
2	6	9.2%	32	15.1%
3	17	26.2%	62	29.2%
4	15	23.1%	34	16.0%
Very high influence	9	13.8%	28	13.2%
Total	65	100.0%	212	100.0%

Influence on choosing which airport to fly from: Total travel time

	Business		Non-business	
	Count	Percent	Count	Percent
No influence at all	3	4.1%	17	7.6%
2	4	5.5%	9	4.0%
3	14	19.2%	39	17.3%
4	20	27.4%	52	23.1%
Very high influence	32	43.8%	108	48.0%
Total	73	100.0%	225	100.0%

Influence on choosing which airport to fly from: Frequency of flights to destination

	Business		Non-business	
	Count	Percent	Count	Percent
No influence at all	4	5.6%	20	8.8%
2	4	5.6%	10	4.4%
3	9	12.7%	44	19.5%
4	30	42.3%	71	31.4%
Very high influence	24	33.8%	81	35.8%
Total	71	100.0%	226	100.0%

Influence on choosing which airport to fly from: Availability of direct flights to destination

	Business		Non-business	
	Count	Percent	Count	Percent
No influence at all	5	7.0%	16	7.0%
2	2	2.8%	14	6.2%
3	9	12.7%	29	12.8%
4	18	25.4%	60	26.4%
Very high influence	37	52.1%	108	47.6%
Total	71	100.0%	227	100.0%

Influence on choosing which airport to fly from: Price of airline ticket/fares

	Business		Non-business	
	Count	Percent	Count	Percent
No influence at all	7	9.9%	14	6.3%
2	3	4.2%	11	4.9%
3	9	12.7%	32	14.3%
4	15	21.1%	43	19.2%
Very high influence	37	52.1%	124	55.4%
Total	71	100.0%	224	100.0%

Influence on choosing which airport to fly from: Wide selection of airlines to choose from

	Business		Non-business	
	Count	Percent	Count	Percent
No influence at all	10	14.1%	28	12.7%
2	6	8.5%	21	9.5%
3	20	28.2%	61	27.6%
4	17	23.9%	58	26.2%
Very high influence	18	25.4%	53	24.0%
Total	71	100.0%	221	100.0%

Influence on choosing which airport to fly from: Availability of flights with preferred airline

	Business		Non-business	
	Count	Percent	Count	Percent
No influence at all	6	8.5%	25	11.2%
2	1	1.4%	15	6.7%
3	10	14.1%	34	15.2%
4	22	31.0%	63	28.3%
Very high influence	32	45.1%	86	38.6%
Total	71	100.0%	223	100.0%

Influence on choosing which airport to fly from: Ease of getting through airport security

	Business		Non-business	
	Count	Percent	Count	Percent
No influence at all	13	18.3%	36	16.3%
2	3	4.2%	33	14.9%
3	22	31.0%	53	24.0%
4	19	26.8%	43	19.5%
Very high influence	14	19.7%	56	25.3%
Total	71	100.0%	221	100.0%

Influence on choosing which airport to fly from: Variety of airport restaurants & shops

	Business		Non-business	
	Count	Percent	Count	Percent
No influence at all	29	43.3%	90	42.9%
2	10	14.9%	53	25.2%
3	20	29.9%	37	17.6%
4	7	10.4%	19	9.0%
Very high influence	1	1.5%	11	5.2%
Total	67	100.0%	210	100.0%

Importance in selecting an airport: Available short-term parking

	Business		Non-business	
	Count	Percent	Count	Percent
Not at all important	16	21.3%	37	15.4%
Somewhat unimportant	7	9.3%	27	11.2%
Neither important nor unimportant	14	18.7%	43	17.8%
Somewhat important	25	33.3%	80	33.2%
Very important	13	17.3%	54	22.4%
Total	75	100.0%	241	100.0%

Importance in selecting an airport: Available long-term parking

	Business		Non-business	
	Count	Percent	Count	Percent
Not at all important	6	8.0%	23	9.5%
Somewhat unimportant	6	8.0%	18	7.5%
Neither important nor unimportant	12	16.0%	53	22.0%
Somewhat important	28	37.3%	80	33.2%
Very important	23	30.7%	67	27.8%
Total	75	100.0%	241	100.0%

Importance in selecting an airport: Affordable parking

	Business		Non-business	
	Count	Percent	Count	Percent
Not at all important	5	6.7%	14	5.8%
Somewhat unimportant	2	2.7%	13	5.4%
Neither important nor unimportant	9	12.0%	31	12.9%
Somewhat important	29	38.7%	77	32.0%
Very important	30	40.0%	106	44.0%
Total	75	100.0%	241	100.0%

Importance in selecting an airport: Convenient parking close to the terminal

	Business		Non-business	
	Count	Percent	Count	Percent
Not at all important	11	14.7%	35	14.5%
Somewhat unimportant	5	6.7%	20	8.3%
Neither important nor unimportant	15	20.0%	46	19.1%
Somewhat important	23	30.7%	85	35.3%
Very important	21	28.0%	55	22.8%
Total	75	100.0%	241	100.0%

Importance in selecting an airport: Covered parking protected from weather

	Business		Non-business	
	Count	Percent	Count	Percent
Not at all important	20	26.7%	54	22.4%
Somewhat unimportant	11	14.7%	34	14.1%
Neither important nor unimportant	17	22.7%	68	28.2%
Somewhat important	22	29.3%	49	20.3%
Very important	5	6.7%	36	14.9%
Total	75	100.0%	241	100.0%

Importance in selecting an airport: Convenient shuttle bus service between parking lot and terminal area

	Business		Non-business	
	Count	Percent	Count	Percent
Not at all important	8	10.7%	19	7.9%
Somewhat unimportant	3	4.0%	19	7.9%
Neither important nor unimportant	12	16.0%	39	16.2%
Somewhat important	23	30.7%	83	34.4%
Very important	29	38.7%	81	33.6%
Total	75	100.0%	241	100.0%

Importance in selecting an airport: Available cell-phone lot to wait for arriving passengers

	Business		Non-business	
	Count	Percent	Count	Percent
Not at all important	21	28.0%	51	21.2%
Somewhat unimportant	11	14.7%	24	10.0%
Neither important nor unimportant	21	28.0%	53	22.0%
Somewhat important	16	21.3%	72	29.9%
Very important	6	8.0%	41	17.0%
Total	75	100.0%	241	100.0%

Importance in selecting an airport: Available off-airport privately-owned parking

	Business		Non-business	
	Count	Percent	Count	Percent
Not at all important	32	42.7%	79	32.8%
Somewhat unimportant	12	16.0%	31	12.9%
Neither important nor unimportant	18	24.0%	74	30.7%
Somewhat important	9	12.0%	36	14.9%
Very important	4	5.3%	21	8.7%
Total	75	100.0%	241	100.0%

Importance in selecting an airport: Available valet parking

	Business		Non-business	
	Count	Percent	Count	Percent
Not at all important	54	72.0%	164	68.0%
Somewhat unimportant	5	6.7%	22	9.1%
Neither important nor unimportant	12	16.0%	41	17.0%
Somewhat important	3	4.0%	7	2.9%
Very important	1	1.3%	7	2.9%
Total	75	100.0%	241	100.0%

How often do you use public transit in general?

	Business		Non-business	
	Count	Percent	Count	Percent
Never	9	12.0%	36	14.9%
Rarely	39	52.0%	99	41.1%
Occasionally	18	24.0%	74	30.7%
Weekly	4	5.3%	18	7.5%
Daily	5	6.7%	14	5.8%
Total	75	100.0%	241	100.0%

How many people live in your household?

	Business		Non-business	
	Count	Percent	Count	Percent
1 person (I live alone)	13	17.3%	36	14.9%
2 people	31	41.3%	118	49.0%
3 people	16	21.3%	41	17.0%
4 people	13	17.3%	29	12.0%
5 people	2	2.7%	10	4.1%
6 or more people	0	.0%	7	2.9%
Total	75	100.0%	241	100.0%

How many cars, motorcycles, pickup trucks, minivans, etc., are there in your household?

	Business		Non-business	
	Count	Percent	Count	Percent
0 (no vehicles)	1	1.3%	6	2.5%
1 vehicle	14	18.7%	58	24.1%
2 vehicles	29	38.7%	112	46.5%
3 vehicles	23	30.7%	40	16.6%
4 vehicles	7	9.3%	17	7.1%
5 or more vehicles	1	1.3%	8	3.3%
Total	75	100.0%	241	100.0%

What is your gender?

	Business		Non-business	
	Count	Percent	Count	Percent
Female	31	41.3%	159	66.0%
Male	44	58.7%	82	34.0%
Total	75	100.0%	241	100.0%

Which category represents your age?

	Business		Non-business	
	Count	Percent	Count	Percent
16-24	2	2.7%	11	4.6%
25-34	14	18.7%	60	24.9%
35-44	23	30.7%	44	18.3%
45-54	21	28.0%	48	19.9%
55-64	12	16.0%	60	24.9%
65-74	2	2.7%	16	6.6%
75 or older	1	1.3%	2	.8%
Total	75	100.0%	241	100.0%

What is your employment status?

	Business		Non-business	
	Count	Percent	Count	Percent
Employed full-time	53	70.7%	120	49.8%
Employed part-time	4	5.3%	17	7.1%
Self-employed	12	16.0%	16	6.6%
Student	0	.0%	5	2.1%
Student and employed	1	1.3%	8	3.3%
Retired	4	5.3%	39	16.2%
Homemaker	0	.0%	20	8.3%
Not currently employed	1	1.3%	16	6.6%
Total	75	100.0%	241	100.0%

Which category best represents your annual household income before taxes?

	Business		Non-business	
	Count	Percent	Count	Percent
Under \$20,000	0	.0%	9	3.7%
\$20,000–\$39,999	5	6.7%	33	13.7%
\$40,000–\$59,999	9	12.0%	42	17.4%
\$60,000–\$79,999	13	17.3%	48	19.9%
\$80,000–\$99,999	13	17.3%	35	14.5%
\$100,000–\$124,999	14	18.7%	30	12.4%
\$125,000–\$149,999	7	9.3%	16	6.6%
\$150,000–\$174,999	9	12.0%	7	2.9%
\$175,000–\$199,999	3	4.0%	6	2.5%
\$200,000 or more	2	2.7%	15	6.2%
Total	75	100.0%	241	100.0%

Attachment E2

Airport Sample Cross-Tabulations: Purpose

Please select the airport that you use most frequently when you leave home to travel.

	Business		Non-business	
	Count	Percent	Count	Percent
Boston Logan (BOS)	5	4.9%	41	8.3%
Chicago O'Hare (ORD)	9	8.8%	35	7.1%
Columbus (CMH)	3	2.9%	42	8.5%
Huntsville (HSV)	11	10.8%	25	5.1%
Las Vegas McCarran (LAS)	5	4.9%	33	6.7%
Miami (MIA)	8	7.8%	36	7.3%
Oakland (OAK)	12	11.8%	39	7.9%
San Antonio (SAT)	10	9.8%	40	8.1%
San Diego (SAN)	7	6.9%	32	6.5%
Seattle-Tacoma (SEA)	8	7.8%	51	10.3%
Tampa (TPA)	7	6.9%	39	7.9%
Tulsa (TUL)	9	8.8%	45	9.1%
Washington Dulles (IAD)	8	7.8%	35	7.1%
Total	102	100.0%	493	100.0%

When did you make your trip?

	Business		Non-business	
	Count	Percent	Count	Percent
April 2009	22	21.6%	77	15.6%
March 2009	27	26.5%	102	20.7%
February 2009	20	19.6%	69	14.0%
January 2009	13	12.7%	61	12.4%
December 2008	10	9.8%	116	23.5%
November 2008	10	9.8%	68	13.8%
Total	102	100.0%	493	100.0%

End location of flight

	Business		Non-business	
	Count	Percent	Count	Percent
Inside the United States	92	90.2%	425	86.2%
Outside the United States (or outside of US territory)	10	9.8%	68	13.8%
Total	102	100.0%	493	100.0%

What date did you depart from your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
01/01/2009	0	.0%	3	.6%
01/02/2009	1	1.0%	2	.4%
01/03/2009	0	.0%	2	.4%
01/04/2009	1	1.0%	3	.6%
01/05/2009	1	1.0%	4	.8%
01/06/2009	0	.0%	4	.8%
01/07/2009	0	.0%	2	.4%
01/08/2009	2	2.0%	6	1.2%
01/09/2009	0	.0%	5	1.0%
01/10/2009	1	1.0%	1	.2%
01/12/2009	2	2.0%	0	.0%
01/13/2009	2	2.0%	0	.0%
01/14/2009	0	.0%	3	.6%
01/15/2009	0	.0%	4	.8%
01/16/2009	0	.0%	2	.4%
01/17/2009	0	.0%	2	.4%
01/20/2009	1	1.0%	0	.0%
01/21/2009	0	.0%	3	.6%
01/22/2009	0	.0%	1	.2%
01/23/2009	0	.0%	1	.2%
01/24/2009	1	1.0%	3	.6%

What date did you depart from your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
01/25/2009	0	.0%	1	.2%
01/26/2009	0	.0%	1	.2%
01/29/2009	1	1.0%	1	.2%
01/30/2009	0	.0%	1	.2%
01/31/2009	0	.0%	1	.2%
02/01/2009	1	1.0%	3	.6%
02/02/2009	1	1.0%	0	.0%
02/03/2009	2	2.0%	3	.6%
02/04/2009	1	1.0%	1	.2%
02/05/2009	2	2.0%	1	.2%
02/06/2009	1	1.0%	4	.8%
02/07/2009	0	.0%	3	.6%
02/09/2009	2	2.0%	2	.4%
02/10/2009	2	2.0%	1	.2%
02/11/2009	1	1.0%	4	.8%
02/12/2009	0	.0%	8	1.6%
02/13/2009	0	.0%	9	1.8%
02/14/2009	0	.0%	5	1.0%
02/16/2009	1	1.0%	0	.0%
02/18/2009	0	.0%	2	.4%
02/19/2009	1	1.0%	4	.8%

What date did you depart from your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
02/20/2009	2	2.0%	7	1.4%
02/21/2009	0	.0%	1	.2%
02/23/2009	0	.0%	1	.2%
02/24/2009	2	2.0%	0	.0%
02/25/2009	1	1.0%	4	.8%
02/26/2009	0	.0%	2	.4%
02/27/2009	0	.0%	4	.8%
02/28/2009	0	.0%	2	.4%
03/01/2009	0	.0%	1	.2%
03/02/2009	0	.0%	2	.4%
03/03/2009	1	1.0%	1	.2%
03/04/2009	0	.0%	4	.8%
03/05/2009	0	.0%	2	.4%
03/06/2009	3	2.9%	4	.8%
03/07/2009	0	.0%	4	.8%
03/08/2009	1	1.0%	1	.2%
03/09/2009	1	1.0%	5	1.0%
03/10/2009	1	1.0%	7	1.4%
03/11/2009	0	.0%	4	.8%
03/12/2009	2	2.0%	5	1.0%
03/13/2009	1	1.0%	3	.6%

What date did you depart from your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
03/14/2009	0	.0%	3	.6%
03/15/2009	0	.0%	2	.4%
03/16/2009	3	2.9%	2	.4%
03/17/2009	3	2.9%	4	.8%
03/18/2009	2	2.0%	4	.8%
03/19/2009	2	2.0%	4	.8%
03/20/2009	0	.0%	6	1.2%
03/21/2009	0	.0%	4	.8%
03/22/2009	3	2.9%	1	.2%
03/23/2009	1	1.0%	5	1.0%
03/24/2009	0	.0%	2	.4%
03/25/2009	1	1.0%	5	1.0%
03/26/2009	0	.0%	6	1.2%
03/27/2009	0	.0%	5	1.0%
03/28/2009	0	.0%	3	.6%
03/29/2009	1	1.0%	0	.0%
03/30/2009	0	.0%	3	.6%
03/31/2009	1	1.0%	1	.2%
04/01/2009	0	.0%	4	.8%
04/02/2009	1	1.0%	3	.6%
04/03/2009	0	.0%	5	1.0%

What date did you depart from your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
04/04/2009	0	.0%	3	.6%
04/05/2009	0	.0%	5	1.0%
04/06/2009	1	1.0%	4	.8%
04/07/2009	1	1.0%	5	1.0%
04/08/2009	4	3.9%	5	1.0%
04/09/2009	0	.0%	5	1.0%
04/10/2009	1	1.0%	4	.8%
04/11/2009	0	.0%	3	.6%
04/12/2009	1	1.0%	0	.0%
04/13/2009	2	2.0%	0	.0%
04/14/2009	0	.0%	3	.6%
04/15/2009	2	2.0%	2	.4%
04/16/2009	0	.0%	5	1.0%
04/17/2009	0	.0%	4	.8%
04/18/2009	0	.0%	4	.8%
04/19/2009	2	2.0%	1	.2%
04/20/2009	1	1.0%	0	.0%
04/21/2009	0	.0%	1	.2%
04/22/2009	1	1.0%	2	.4%
04/23/2009	3	2.9%	4	.8%
04/24/2009	0	.0%	1	.2%

What date did you depart from your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
04/27/2009	2	2.0%	0	.0%
11/01/2008	0	.0%	2	.4%
11/02/2008	0	.0%	2	.4%
11/03/2008	1	1.0%	0	.0%
11/04/2008	0	.0%	2	.4%
11/05/2008	1	1.0%	2	.4%
11/06/2008	1	1.0%	5	1.0%
11/07/2008	0	.0%	3	.6%
11/08/2008	0	.0%	3	.6%
11/09/2008	3	2.9%	2	.4%
11/10/2008	1	1.0%	2	.4%
11/11/2008	1	1.0%	7	1.4%
11/12/2008	0	.0%	2	.4%
11/13/2008	0	.0%	3	.6%
11/14/2008	1	1.0%	1	.2%
11/15/2008	0	.0%	1	.2%
11/16/2008	0	.0%	1	.2%
11/17/2008	0	.0%	1	.2%
11/18/2008	0	.0%	2	.4%
11/19/2008	1	1.0%	5	1.0%
11/20/2008	0	.0%	5	1.0%

What date did you depart from your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
11/21/2008	0	.0%	1	.2%
11/22/2008	0	.0%	2	.4%
11/23/2008	0	.0%	6	1.2%
11/24/2008	0	.0%	4	.8%
11/25/2008	0	.0%	2	.4%
11/27/2008	0	.0%	2	.4%
11/28/2008	1	1.0%	0	.0%
11/29/2008	0	.0%	1	.2%
11/30/2008	1	1.0%	0	.0%
12/02/2008	1	1.0%	1	.2%
12/04/2008	1	1.0%	2	.4%
12/05/2008	0	.0%	9	1.8%
12/06/2008	1	1.0%	2	.4%
12/07/2008	1	1.0%	1	.2%
12/08/2008	0	.0%	2	.4%
12/09/2008	1	1.0%	1	.2%
12/10/2008	0	.0%	3	.6%
12/11/2008	1	1.0%	7	1.4%
12/12/2008	0	.0%	2	.4%
12/14/2008	0	.0%	2	.4%
12/15/2008	0	.0%	3	.6%

What date did you depart from your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
12/16/2008	0	.0%	3	.6%
12/17/2008	0	.0%	4	.8%
12/18/2008	0	.0%	12	2.4%
12/19/2008	1	1.0%	14	2.8%
12/20/2008	0	.0%	7	1.4%
12/21/2008	0	.0%	3	.6%
12/22/2008	1	1.0%	12	2.4%
12/23/2008	0	.0%	7	1.4%
12/24/2008	0	.0%	5	1.0%
12/25/2008	0	.0%	3	.6%
12/26/2008	0	.0%	3	.6%
12/27/2008	0	.0%	1	.2%
12/28/2008	0	.0%	3	.6%
12/29/2008	0	.0%	2	.4%
12/30/2008	0	.0%	3	.6%
12/31/2008	0	.0%	4	.8%
Total	102	100.0%	493	100.0%

What time of day did you depart from your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
Midnight - 9AM	33	32.4%	148	30.0%
9AM - Noon	34	33.3%	174	35.3%
Noon - 4PM	18	17.6%	89	18.1%
4PM - 7PM	15	14.7%	58	11.8%
7PM - Midnight	2	2.0%	24	4.9%
Total	102	100.0%	493	100.0%

What date did you return to your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
01/01/2009	0	.0%	2	.4%
01/02/2009	0	.0%	3	.6%
01/03/2009	0	.0%	9	1.8%
01/04/2009	1	1.0%	3	.6%
01/05/2009	0	.0%	8	1.6%
01/06/2009	0	.0%	1	.2%
01/08/2009	0	.0%	4	.8%
01/09/2009	1	1.0%	4	.8%
01/10/2009	0	.0%	3	.6%
01/11/2009	0	.0%	5	1.0%

What date did you return to your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
01/12/2009	1	1.0%	7	1.4%
01/13/2009	1	1.0%	4	.8%
01/14/2009	0	.0%	3	.6%
01/15/2009	3	2.9%	2	.4%
01/16/2009	2	2.0%	2	.4%
01/17/2009	1	1.0%	1	.2%
01/18/2009	0	.0%	1	.2%
01/19/2009	0	.0%	2	.4%
01/20/2009	1	1.0%	3	.6%
01/21/2009	0	.0%	2	.4%
01/22/2009	0	.0%	2	.4%
01/23/2009	0	.0%	2	.4%
01/24/2009	0	.0%	1	.2%
01/25/2009	0	.0%	2	.4%
01/26/2009	0	.0%	3	.6%
01/29/2009	0	.0%	1	.2%
01/30/2009	0	.0%	3	.6%
01/31/2009	0	.0%	3	.6%
02/01/2009	0	.0%	3	.6%
02/02/2009	1	1.0%	1	.2%
02/03/2009	1	1.0%	0	.0%

What date did you return to your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
02/04/2009	0	.0%	1	.2%
02/05/2009	1	1.0%	1	.2%
02/06/2009	2	2.0%	1	.2%
02/07/2009	0	.0%	1	.2%
02/08/2009	2	2.0%	2	.4%
02/10/2009	0	.0%	2	.4%
02/12/2009	1	1.0%	2	.4%
02/13/2009	2	2.0%	2	.4%
02/14/2009	1	1.0%	5	1.0%
02/15/2009	0	.0%	7	1.4%
02/16/2009	0	.0%	9	1.8%
02/17/2009	0	.0%	2	.4%
02/18/2009	1	1.0%	0	.0%
02/19/2009	2	2.0%	1	.2%
02/20/2009	1	1.0%	3	.6%
02/21/2009	2	2.0%	6	1.2%
02/22/2009	1	1.0%	5	1.0%
02/23/2009	0	.0%	2	.4%
02/24/2009	1	1.0%	0	.0%
02/25/2009	0	.0%	2	.4%
02/26/2009	2	2.0%	3	.6%

What date did you return to your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
02/28/2009	0	.0%	4	.8%
03/01/2009	1	1.0%	1	.2%
03/02/2009	0	.0%	2	.4%
03/03/2009	0	.0%	2	.4%
03/04/2009	0	.0%	1	.2%
03/05/2009	0	.0%	1	.2%
03/06/2009	0	.0%	1	.2%
03/07/2009	1	1.0%	2	.4%
03/08/2009	1	1.0%	2	.4%
03/09/2009	1	1.0%	3	.6%
03/10/2009	0	.0%	3	.6%
03/11/2009	1	1.0%	1	.2%
03/13/2009	0	.0%	6	1.2%
03/14/2009	0	.0%	5	1.0%
03/15/2009	2	2.0%	8	1.6%
03/16/2009	2	2.0%	2	.4%
03/17/2009	0	.0%	2	.4%
03/18/2009	1	1.0%	2	.4%
03/19/2009	0	.0%	2	.4%
03/20/2009	5	4.9%	3	.6%
03/21/2009	3	2.9%	3	.6%

What date did you return to your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
03/22/2009	1	1.0%	6	1.2%
03/23/2009	0	.0%	6	1.2%
03/24/2009	1	1.0%	3	.6%
03/25/2009	2	2.0%	6	1.2%
03/26/2009	1	1.0%	1	.2%
03/27/2009	2	2.0%	1	.2%
03/28/2009	0	.0%	1	.2%
03/29/2009	0	.0%	11	2.2%
03/30/2009	0	.0%	4	.8%
03/31/2009	1	1.0%	5	1.0%
04/01/2009	0	.0%	3	.6%
04/02/2009	0	.0%	5	1.0%
04/03/2009	1	1.0%	0	.0%
04/04/2009	1	1.0%	0	.0%
04/05/2009	0	.0%	5	1.0%
04/06/2009	0	.0%	3	.6%
04/07/2009	0	.0%	4	.8%
04/08/2009	1	1.0%	6	1.2%
04/09/2009	1	1.0%	4	.8%
04/10/2009	1	1.0%	3	.6%
04/11/2009	1	1.0%	6	1.2%

What date did you return to your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
04/12/2009	2	2.0%	5	1.0%
04/13/2009	1	1.0%	3	.6%
04/14/2009	0	.0%	1	.2%
04/15/2009	2	2.0%	3	.6%
04/16/2009	2	2.0%	3	.6%
04/17/2009	2	2.0%	1	.2%
04/18/2009	1	1.0%	4	.8%
04/19/2009	0	.0%	6	1.2%
04/20/2009	1	1.0%	3	.6%
04/21/2009	2	2.0%	7	1.4%
04/22/2009	0	.0%	1	.2%
04/24/2009	1	1.0%	3	.6%
04/25/2009	1	1.0%	1	.2%
04/26/2009	0	.0%	2	.4%
04/27/2009	0	.0%	5	1.0%
04/28/2009	4	3.9%	3	.6%
04/29/2009	1	1.0%	1	.2%
04/30/2009	0	.0%	1	.2%
11/06/2008	1	1.0%	1	.2%
11/08/2008	0	.0%	1	.2%
11/09/2008	0	.0%	2	.4%

What date did you return to your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
11/10/2008	1	1.0%	3	.6%
11/11/2008	0	.0%	1	.2%
11/12/2008	2	2.0%	2	.4%
11/13/2008	3	2.9%	3	.6%
11/14/2008	1	1.0%	0	.0%
11/15/2008	0	.0%	1	.2%
11/16/2008	0	.0%	4	.8%
11/17/2008	0	.0%	2	.4%
11/18/2008	0	.0%	2	.4%
11/19/2008	0	.0%	2	.4%
11/20/2008	0	.0%	2	.4%
11/21/2008	0	.0%	3	.6%
11/22/2008	0	.0%	4	.8%
11/23/2008	0	.0%	2	.4%
11/24/2008	0	.0%	2	.4%
11/26/2008	0	.0%	1	.2%
11/27/2008	0	.0%	6	1.2%
11/28/2008	1	1.0%	0	.0%
11/29/2008	0	.0%	6	1.2%
11/30/2008	0	.0%	9	1.8%
12/02/2008	0	.0%	2	.4%

What date did you return to your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
12/03/2008	0	.0%	2	.4%
12/04/2008	2	2.0%	0	.0%
12/05/2008	1	1.0%	0	.0%
12/06/2008	1	1.0%	2	.4%
12/07/2008	1	1.0%	3	.6%
12/08/2008	0	.0%	1	.2%
12/09/2008	0	.0%	2	.4%
12/10/2008	0	.0%	2	.4%
12/12/2008	2	2.0%	3	.6%
12/13/2008	0	.0%	2	.4%
12/14/2008	0	.0%	5	1.0%
12/15/2008	0	.0%	4	.8%
12/17/2008	0	.0%	1	.2%
12/18/2008	0	.0%	2	.4%
12/19/2008	0	.0%	2	.4%
12/20/2008	1	1.0%	3	.6%
12/21/2008	0	.0%	4	.8%
12/22/2008	1	1.0%	5	1.0%
12/23/2008	0	.0%	3	.6%
12/24/2008	0	.0%	1	.2%
12/26/2008	0	.0%	3	.6%

What date did you return to your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
12/27/2008	0	.0%	8	1.6%
12/28/2008	0	.0%	9	1.8%
12/29/2008	0	.0%	6	1.2%
12/30/2008	0	.0%	12	2.4%
12/31/2008	0	.0%	8	1.6%
Total	102	100.0%	493	100.0%

What time of day did you return to your home airport?

	Business		Non-business	
	Count	Percent	Count	Percent
Midnight - 9AM	10	9.8%	34	6.9%
9AM - Noon	18	17.6%	66	13.4%
Noon - 4PM	22	21.6%	140	28.4%
4PM - 7PM	31	30.4%	143	29.0%
7PM - Midnight	21	20.6%	110	22.3%
Total	102	100.0%	493	100.0%

What class of service did you use on your flight?

	Business		Non-business	
	Count	Percent	Count	Percent
Economy or coach	73	71.6%	451	91.5%
Business	19	18.6%	17	3.4%
First class	10	9.8%	25	5.1%
Total	102	100.0%	493	100.0%

How many people flew with you on your trip?

	Business		Non-business	
	Count	Percent	Count	Percent
Nobody (I flew alone)	68	66.7%	183	37.1%
1 person	17	16.7%	143	29.0%
2 people	6	5.9%	96	19.5%
3 people	4	3.9%	29	5.9%
4 people	0	.0%	17	3.4%
5 people	1	1.0%	6	1.2%
More than 5 other people	6	5.9%	19	3.9%
Total	102	100.0%	493	100.0%

Did you travel together to the airport

	Business		Non-business	
	Count	Percent	Count	Percent
Yes	27	79.4%	295	95.2%
No	7	20.6%	15	4.8%
Total	34	100.0%	310	100.0%

How many bags did you/your party check?

	Business		Non-business	
	Count	Percent	Count	Percent
0 (Didn't check any bags)	25	24.5%	100	20.3%
1 bag	49	48.0%	169	34.3%
2 bags	19	18.6%	145	29.4%
3 bags	6	5.9%	34	6.9%
4 or more bags	3	2.9%	45	9.1%
Total	102	100.0%	493	100.0%

How many bags did you, personally, carry-on?

	Business		Non-business	
	Count	Percent	Count	Percent
0 (Didn't carry-on any bags)	11	10.8%	85	17.2%
1 bag	82	80.4%	319	64.7%
2 bags	9	8.8%	89	18.1%
Total	102	100.0%	493	100.0%

Before your flight was booked, did you consider departing from another airport for your trip?

	Business		Non-business	
	Count	Percent	Count	Percent
No, I only considered flying out of	69	67.6%	298	60.4%
Yes, I considered flying out of other airports	33	32.4%	195	39.6%
Total	102	100.0%	493	100.0%

Alternative airport considered

	Business		Non-business	
	Count	Percent	Count	Percent
Manchester Airport (MHT)	0	.0%	13	6.7%
Providence TF Green Airport (PVD)	3	9.1%	16	8.2%
Baltimore Airport (BWI)	3	9.1%	9	4.6%
Washington DC Reagan Airport (DCA)	4	12.1%	13	6.7%

Alternative airport considered

	Business		Non-business	
	Count	Percent	Count	Percent
Cincinnati/Northern Kentucky Airport (CVG)	0	.0%	10	5.1%
Cleveland Hopkins Airport (CLE)	0	.0%	2	1.0%
Chicago Midway Airport (MDW)	4	12.1%	14	7.2%
Milwaukee-Mitchell Airport (MKE)	1	3.0%	8	4.1%
Atlanta Hartsfield-Jackson Airport (ATL)	1	3.0%	3	1.5%
Birmingham Airport (BHM)	4	12.1%	8	4.1%
Nashville Airport (BNA)	3	9.1%	7	3.6%
Fort Lauderdale Airport (FLL)	3	9.1%	27	13.8%
Fort Myers/Southwest Florida Airport (RSW)	0	.0%	1	.5%
Orlando Airport (MCO)	1	3.0%	9	4.6%
Oklahoma City Will Rogers Airport (OKC)	1	3.0%	5	2.6%
Austin Bergstrom Airport (AUS)	2	6.1%	9	4.6%
Houston Hobby Airport (HOU)	1	3.0%	0	.0%
Houston George Bush Airport (IAH)	1	3.0%	2	1.0%
John Wayne Airport (SNA)	0	.0%	4	2.1%
Los Angeles Airport (LAX)	0	.0%	5	2.6%
Sacramento Airport (SMF)	0	.0%	4	2.1%
San Francisco Airport (SFO)	7	21.2%	23	11.8%
Portland Airport (PDX)	0	.0%	1	.5%
Vancouver Airport (YVR)	0	.0%	3	1.5%
San Jose Airport (SJC)	3	9.1%	8	4.1%

Alternative airport considered

	Business		Non-business	
	Count	Percent	Count	Percent
Dayton International Airport (DAY)	0	.0%	11	5.6%
Other	3	9.1%	34	17.4%
Total	45	136.4%	249	127.7%

Where did your trip to the airport begin?

	Business		Non-business	
	Count	Percent	Count	Percent
My home	87	85.3%	454	92.1%
Someone else's home	2	2.0%	29	5.9%
My regular place of employment	6	5.9%	2	.4%
Place of business	4	3.9%	1	.2%
Hotel	3	2.9%	5	1.0%
School	0	.0%	1	.2%
Other, please specify:	0	.0%	1	.2%
Total	102	100.0%	493	100.0%

Time began trip to the airport

	Business		Non-business	
	Count	Percent	Count	Percent
Midnight - 1:59 AM	0	.0%	5	1.0%
2:00 AM - 3:59 AM	2	2.0%	8	1.6%
4:00 AM - 5:59 AM	19	18.6%	102	20.7%
6:00 AM - 7:59 AM	33	32.4%	135	27.4%
8:00 AM - 9:59 AM	12	11.8%	66	13.4%
10:00 AM - 11:59 AM	13	12.7%	52	10.5%
Noon - 1:59 PM	5	4.9%	32	6.5%
2:00 PM - 3:59 PM	12	11.8%	38	7.7%
4:00 PM - 5:59 PM	3	2.9%	33	6.7%
6:00 PM - 7:59 PM	2	2.0%	11	2.2%
8:00 PM - 9:59 PM	1	1.0%	9	1.8%
10:00 PM - 11:59 PM	0	.0%	2	.4%
Total	102	100.0%	493	100.0%

Time arrived at airport

	Business		Non-business	
	Count	Percent	Count	Percent
Midnight - 1:59 AM	0	.0%	1	.2%
2:00 AM - 3:59 AM	1	1.0%	5	1.0%
4:00 AM - 5:59 AM	12	11.8%	65	13.2%
6:00 AM - 7:59 AM	30	29.4%	141	28.6%
8:00 AM - 9:59 AM	21	20.6%	81	16.4%
10:00 AM - 11:59 AM	12	11.8%	62	12.6%
Noon - 1:59 PM	6	5.9%	32	6.5%
2:00 PM - 3:59 PM	12	11.8%	45	9.1%
4:00 PM - 5:59 PM	5	4.9%	28	5.7%
6:00 PM - 7:59 PM	2	2.0%	21	4.3%
8:00 PM - 9:59 PM	0	.0%	9	1.8%
10:00 PM - 11:59 PM	1	1.0%	3	.6%
Total	102	100.0%	493	100.0%

Travel time to the airport

	Business		Non-business	
	Count	Percent	Count	Percent
Less than 30 minutes	22	21.6%	101	20.5%
30 - 59 minutes	50	49.0%	207	42.0%
1 hour - 1 hour 29 minutes	19	18.6%	103	20.9%
1 hour 30 minutes - 1 hour 59 minutes	5	4.9%	48	9.7%
2 hours or more	6	5.9%	34	6.9%
Total	102	100.0%	493	100.0%

Approximately how long after you arrived at the airport did your flight depart?

	Business		Non-business	
	Count	Percent	Count	Percent
Less than 30 minutes	6	5.9%	12	2.4%
30 - 59 minutes	15	14.7%	68	13.8%
1 hour - 1 hour 29 minutes	39	38.2%	184	37.3%
1 hour 30 minutes - 1 hour 59 minutes	25	24.5%	138	28.0%
2 hour - 2 hour 29 minutes	13	12.7%	65	13.2%
2 hour 30 minutes - 2 hour 59 minutes	3	2.9%	13	2.6%
3 hours or more	1	1.0%	13	2.6%
Total	102	100.0%	493	100.0%

What was the primary type of transportation you used to get to the airport?

	Business		Non-business	
	Count	Percent	Count	Percent
Private vehicle and parked	45	44.1%	163	33.1%
Private vehicle and was dropped off at the airport	33	32.4%	248	50.3%
Rental car	1	1.0%	7	1.4%
Taxi	7	6.9%	24	4.9%
Limo/town car	3	2.9%	22	4.5%
Shared shuttle van/door-to-door van	9	8.8%	14	2.8%
Local city bus	1	1.0%	5	1.0%
Regional public bus/van	1	1.0%	5	1.0%
Subway	2	2.0%	4	.8%
Rail	0	.0%	1	.2%
Total	102	100.0%	493	100.0%

Where did you park?

	Business		Non-business	
	Count	Percent	Count	Percent
An airport garage or parking lot	35	77.8%	106	65.0%
An off-airport parking lot	9	20.0%	54	33.1%
A hotel parking lot	1	2.2%	3	1.8%
Total	45	100.0%	163	100.0%

Reason for selecting mode

	Business		Non-business	
	Count	Percent	Count	Percent
Travel time to airport	45	44.1%	173	35.1%
Group (travel party) size	5	4.9%	32	6.5%
Comfort	28	27.5%	151	30.6%
Reliability	40	39.2%	175	35.5%
Short walk to terminal entrance from where I ended my access trip	17	16.7%	77	15.6%
Directness of trip (no stops/transfers)	30	29.4%	124	25.2%
Purpose of trip (business vs. non-business)	30	29.4%	19	3.9%
Convenience of traveling with luggage/belongings	37	36.3%	205	41.6%
Trip cost	33	32.4%	163	33.1%
Frequency of transit service	6	5.9%	18	3.7%
Good highway/road access to airport	27	26.5%	109	22.1%
Good transit access to airport	18	17.6%	50	10.1%
Other	5	4.9%	36	7.3%
Total	321	314.7%	1332	270.2%

Main reason for selecting mode to get to airport

	Business		Non-business	
	Count	Percent	Count	Percent
Travel time to airport	13	12.7%	57	11.6%
Group (travel party) size	2	2.0%	9	1.8%
Comfort	7	6.9%	38	7.7%
Reliability	11	10.8%	61	12.4%
Short walk to terminal entrance from where I ended my access trip	9	8.8%	20	4.1%
Directness of trip (no stops/transfers)	8	7.8%	30	6.1%
Purpose of trip (business vs. non-business)	10	9.8%	4	.8%
Convenience of traveling with luggage/belongings	17	16.7%	107	21.7%
Trip cost	13	12.7%	89	18.1%
Frequency of transit service	1	1.0%	3	.6%
Good highway/road access to airport	3	2.9%	26	5.3%
Good transit access to airport	3	2.9%	15	3.0%
Other	5	4.9%	34	6.9%
Total	102	100.0%	493	100.0%

Where did you park?

	Business		Non-business	
	Count	Percent	Count	Percent
Short-term parking	10	28.6%	25	23.6%
Long-term parking (remote, economy, etc.)	25	71.4%	76	71.7%
Other	0	.0%	5	4.7%
Total	35	100.0%	106	100.0%

How did you get from where you parked to the terminal?

	Business		Non-business	
	Count	Percent	Count	Percent
I walked	22	62.9%	62	58.5%
I took a shuttle	12	34.3%	43	40.6%
Other, please specify:	1	2.9%	1	.9%
Total	35	100.0%	106	100.0%

Time spent traveling from parking lot to terminal

	Business		Non-business	
	Count	Percent	Count	Percent
Less than 5 minutes	4	11.4%	12	11.3%
5 - 9 minutes	13	37.1%	35	33.0%
10 - 14 minutes	7	20.0%	39	36.8%
15 - 19 minutes	5	14.3%	13	12.3%
20 minutes or more	6	17.1%	7	6.6%
Total	35	100.0%	106	100.0%

What was the primary reason for choosing where you parked?

	Business		Non-business	
	Count	Percent	Count	Percent
Parking cost	14	31.1%	51	31.3%
Walking distance to terminal	7	15.6%	24	14.7%
Shuttle frequency to terminal	3	6.7%	10	6.1%
Parking availability	5	11.1%	17	10.4%
Length of time vehicle was parked	7	15.6%	31	19.0%
Security of vehicle	7	15.6%	22	13.5%
Weather (parking garage vs. open parking lot)	0	.0%	5	3.1%
Other	2	4.4%	3	1.8%
Total	45	100.0%	163	100.0%

Did you know where you intended to park before you arrived at the airport?

	Business		Non-business	
	Count	Percent	Count	Percent
Yes	33	94.3%	86	81.1%
No	2	5.7%	20	18.9%
Total	35	100.0%	106	100.0%

How did you decide which parking lot to use?

	Business		Non-business	
	Count	Percent	Count	Percent
I checked the airport website	2	6.1%	13	15.1%
I checked other websites	0	.0%	4	4.7%
I parked where I always park	21	63.6%	44	51.2%
The parking lot was recommended to me	4	12.1%	3	3.5%
I parked in the lot closest to the terminal	8	24.2%	18	20.9%
I parked in an inexpensive lot	7	21.2%	17	19.8%
Other	1	3.0%	3	3.5%
Total	43	130.3%	102	118.6%

How did you decide which parking lot to park in when arriving?

	Business		Non-business	
	Count	Percent	Count	Percent
I drove by the sign and chose a lot that was listed as open	0	.0%	4	20.0%
I drove around looking for a lot with available parking spaces	0	.0%	3	15.0%
I chose the lot with the lowest parking cost	0	.0%	5	25.0%
I chose the first lot I saw	1	50.0%	3	15.0%
I parked in the lot closest to the terminal	1	50.0%	5	25.0%
I parked in a garage or covered lot	0	.0%	1	5.0%
I saw an ad or billboard for the lot	0	.0%	1	5.0%
Other	0	.0%	1	5.0%
Total	2	100.0%	23	115.0%

Parking cost

	Business		Non-business	
	Count	Percent	Count	Percent
Less than \$25	11	24.4%	52	31.9%
\$25 - \$49	16	35.6%	51	31.3%
\$50 - \$74	9	20.0%	26	16.0%
\$75 - \$99	3	6.7%	17	10.4%
\$100 - \$124	3	6.7%	9	5.5%
\$125 - \$149	2	4.4%	3	1.8%
\$150 - \$174	0	.0%	2	1.2%
\$175 - \$199	1	2.2%	3	1.8%
\$200 or more	0	.0%	0	.0%
Total	45	100.0%	163	100.0%

How did you pay for your parking?

	Business		Non-business	
	Count	Percent	Count	Percent
I paid a parking attendant	35	77.8%	124	76.1%
I paid at a machine	10	22.2%	39	23.9%
Total	45	100.0%	163	100.0%

Who paid for the cost of parking your vehicle?

	Business		Non-business	
	Count	Percent	Count	Percent
I paid myself	16	35.6%	139	85.3%
My employer paid	28	62.2%	1	.6%
Someone else paid	0	.0%	16	9.8%
I shared parking costs with my employer	0	.0%	0	.0%
I shared parking costs with someone else	1	2.2%	5	3.1%
My parking cost was included with my hotel stay	0	.0%	2	1.2%
Total	45	100.0%	163	100.0%

Did you pay your parking costs by cash or credit/debit card?

	Business		Non-business	
	Count	Percent	Count	Percent
Cash	16	35.6%	65	39.9%
Credit/Debit Card	29	64.4%	98	60.1%
Total	45	100.0%	163	100.0%

Did the person dropping you off park their vehicle?

	Business		Non-business	
	Count	Percent	Count	Percent
No, I was dropped off at the curb	30	90.9%	222	89.5%
Yes, the person dropping me off parked at the terminal	3	9.1%	26	10.5%
Total	33	100.0%	248	100.0%

How did you return home at the end of your trip?

	Business		Non-business	
	Count	Percent	Count	Percent
Private vehicle and was picked up	36	63.2%	235	71.2%
Rental car	0	.0%	4	1.2%
Taxi	7	12.3%	30	9.1%
Limo/town car	1	1.8%	20	6.1%
Shared shuttle van/door-to-door van	6	10.5%	16	4.8%
Local city bus	0	.0%	6	1.8%
Regional public bus/van	1	1.8%	3	.9%
Subway	4	7.0%	9	2.7%
Rail	0	.0%	2	.6%
Other	2	3.5%	5	1.5%
Total	57	100.0%	330	100.0%

Did you have a private vehicle available to make your trip to the airport and leave parked for the duration of your trip?

	Business		Non-business	
	Count	Percent	Count	Percent
Yes	20	35.1%	123	37.3%
No	37	64.9%	207	62.7%
Total	57	100.0%	330	100.0%

Why didn't you use the private vehicle available to you to make your trip to the airport and leave it parked for the duration of your trip?

	Business		Non-business	
	Count	Percent	Count	Percent
Parking at airport is too far from terminal	0	.0%	2	1.6%
Parking is not always available at airport	0	.0%	2	1.6%
Cost of parking at airport is too high	13	65.0%	92	74.8%
Takes too long to drive or too much congestion	0	.0%	4	3.3%
Car is not available for overnight parking	0	.0%	1	.8%
Car is not secure parked at airport for multiple days	2	10.0%	12	9.8%
Travel time to airport is too unpredictable	0	.0%	1	.8%
Prefer transit for environmental reasons	2	10.0%	0	.0%
Unfamiliar with route to airport	1	5.0%	1	.8%
Other	2	10.0%	8	6.5%
Total	20	100.0%	123	100.0%

Why didn't you drive to the airport?

	Business		Non-business	
	Count	Percent	Count	Percent
Parking at airport is too far from terminal	5	45.5%	23	30.3%
Parking is not always available at airport	3	27.3%	9	11.8%
Cost of parking at airport is too high	3	27.3%	15	19.7%
Takes too long to drive or too much congestion	4	36.4%	8	10.5%
Car is not available for overnight parking	0	.0%	3	3.9%
Car is not secure parked at airport for multiple days	7	63.6%	38	50.0%
Travel time to airport is too unpredictable	1	9.1%	13	17.1%
Prefer transit for environmental reasons	1	9.1%	7	9.2%
Unfamiliar with route to airport	0	.0%	8	10.5%
Other	1	9.1%	4	5.3%
Total	25	227.3%	128	168.4%

At the start of your trip, which method best describes how you got to your transit stop?

	Business		Non-business	
	Count	Percent	Count	Percent
Drove car and parked	1	25.0%	2	13.3%
Rode in car and was dropped off	1	25.0%	3	20.0%
Walked or biked	2	50.0%	10	66.7%
Total	4	100.0%	15	100.0%

How many times have you flown out of your airport in the last year?

	Business		Non-business	
	Count	Percent	Count	Percent
1 time (this trip only)	12	11.8%	175	35.5%
2-3 times	35	34.3%	218	44.2%
4-5 times	24	23.5%	66	13.4%
6-11 times	20	19.6%	28	5.7%
12 times or more How many times have you flown in total in the last year from any airport?	11	10.8%	6	1.2%
Total	102	100.0%	493	100.0%

How many times have you flown in total in the last year?

	Business		Non-business	
	Count	Percent	Count	Percent
1 time (this trip only)	8	7.8%	128	26.0%
2-3 times	19	18.6%	190	38.5%
4-5 times	31	30.4%	96	19.5%
6-11 times	18	17.6%	58	11.8%
12 times or more	26	25.5%	21	4.3%
Total	102	100.0%	493	100.0%

Over the past year have you always used the same mode when departing from the airport for a flight?

	Business		Non-business	
	Count	Percent	Count	Percent
Yes	65	72.2%	222	69.8%
No	25	27.8%	96	30.2%
Total	90	100.0%	318	100.0%

What proportion of your trips to the airport in the past year were made by taking the mode you used?

	Business		Non-business	
	Count	Percent	Count	Percent
Over 75%	5	20.0%	22	22.9%
50-75%	9	36.0%	36	37.5%
25-49%	9	36.0%	22	22.9%
Less than 25%	2	8.0%	16	16.7%
Total	25	100.0%	96	100.0%

What other modes have you used in the past year?

	Business		Non-business	
	Count	Percent	Count	Percent
Private vehicle	10	40.0%	42	43.8%
Private vehicle and was dropped off at the airport	15	60.0%	33	34.4%
Rental car	1	4.0%	2	2.1%
Taxi	8	32.0%	15	15.6%
Limo/town car	2	8.0%	7	7.3%
Shared shuttle van/door-to-door van	2	8.0%	21	21.9%
Local city bus	1	4.0%	4	4.2%
Regional public bus/van	0	.0%	1	1.0%
Subway	2	8.0%	7	7.3%
Total	41	164.0%	132	137.5%

Where did you park?

	Business		Non-business	
	Count	Percent	Count	Percent
An airport garage or parking lot	8	80.0%	29	69.0%
An off-airport parking lot	2	20.0%	13	31.0%
Total	10	100.0%	42	100.0%

What is the main reason you never selected the transit option in the previous section?

	Business		Non-business	
	Count	Percent	Count	Percent
Transit fare is too high	5	14.7%	30	21.3%
Travel time too long	2	5.9%	9	6.4%
Time getting to and from transit too long	4	11.8%	7	5.0%
Transit trip has too many transfers	1	2.9%	5	3.5%
Schedule is not convenient	4	11.8%	7	5.0%
Difficult to deal with luggage	5	14.7%	21	14.9%
Less reliable than current method of travel to airport	1	2.9%	15	10.6%
Do not like transit	7	20.6%	30	21.3%
Need car for other reasons	1	2.9%	6	4.3%
Other, please specify:	4	11.8%	11	7.8%
Total	34	100.0%	141	100.0%

Compared to a year ago, how frequently are you flying from your airport?

	Business		Non-business	
	Count	Percent	Count	Percent
Much less frequently	6	5.9%	49	9.9%
Less frequently	20	19.6%	85	17.2%
About the same	55	53.9%	298	60.4%
More frequently	15	14.7%	55	11.2%
Much more frequently	6	5.9%	6	1.2%
Total	102	100.0%	493	100.0%

Have you ever visited the airport website?

	Business		Non-business	
	Count	Percent	Count	Percent
Yes	43	42.2%	177	35.9%
No	59	57.8%	316	64.1%
Total	102	100.0%	493	100.0%

What did you use the airport website for?

	Business		Non-business	
	Count	Percent	Count	Percent
Flight information (arrivals, departures, delays)	30	69.8%	133	75.1%
Information on parking fees and fee payment options	28	65.1%	85	48.0%
Information on available parking (full/closed lots, location of available lots)	17	39.5%	43	24.3%
Information on ground transportation (buses, shuttles, car services)	11	25.6%	51	28.8%
Information on rental car companies	9	20.9%	18	10.2%
Directions to/from the airport	14	32.6%	35	19.8%
Information on weather conditions	11	25.6%	33	18.6%
Information on traveler security requirements	18	41.9%	55	31.1%
Local roadway conditions around airport (road closures, construction)	7	16.3%	21	11.9%
Local area information (hotels, restaurants, attractions)	3	7.0%	9	5.1%
Airport news or general airport information	13	30.2%	48	27.1%
Other	1	2.3%	9	5.1%
Total	162	376.7%	540	305.1%

Have you ever visited the airport website?

	Business		Non-business	
	Count	Percent	Count	Percent
Yes	43	42.2%	177	35.9%
No	59	57.8%	316	64.1%
Total	102	100.0%	493	100.0%

Influence on choosing which airport to fly from: Familiarity with airport

	Business		Non-business	
	Count	Percent	Count	Percent
No influence at all	8	7.9%	48	10.3%
2	7	6.9%	44	9.4%
3	21	20.8%	117	25.1%
4	37	36.6%	133	28.5%
Very high influence	28	27.7%	125	26.8%
Total	101	100.0%	467	100.0%

Influence on choosing which airport to fly from: Ground transportation options to/from airport

	Business		Non-business	
	Count	Percent	Count	Percent
No influence at all	16	16.7%	82	18.1%
2	11	11.5%	61	13.5%
3	21	21.9%	109	24.1%
4	30	31.3%	114	25.2%
Very high influence	18	18.8%	87	19.2%
Total	96	100.0%	453	100.0%

Influence on choosing which airport to fly from: Reliable transit options to/from airport

	Business		Non-business	
	Count	Percent	Count	Percent
No influence at all	15	15.3%	81	18.1%
2	10	10.2%	56	12.5%
3	23	23.5%	90	20.1%
4	24	24.5%	124	27.7%
Very high influence	26	26.5%	97	21.7%
Total	98	100.0%	448	100.0%

Influence on choosing which airport to fly from: Availability of parking at the airport

	Business		Non-business	
	Count	Percent	Count	Percent
No influence at all	18	18.4%	92	20.8%
2	16	16.3%	67	15.2%
3	24	24.5%	115	26.0%
4	29	29.6%	97	21.9%
Very high influence	11	11.2%	71	16.1%
Total	98	100.0%	442	100.0%

Influence on choosing which airport to fly from: Total travel time

	Business		Non-business	
	Count	Percent	Count	Percent
No influence at all	5	5.0%	21	4.4%
2	4	4.0%	24	5.1%
3	16	16.0%	69	14.5%
4	25	25.0%	151	31.8%
Very high influence	50	50.0%	210	44.2%
Total	100	100.0%	475	100.0%

Influence on choosing which airport to fly from: Frequency of flights to destination

	Business		Non-business	
	Count	Percent	Count	Percent
No influence at all	3	3.1%	27	5.7%
2	3	3.1%	30	6.4%
3	18	18.4%	80	16.9%
4	37	37.8%	145	30.7%
Very high influence	37	37.8%	190	40.3%
Total	98	100.0%	472	100.0%

Influence on choosing which airport to fly from: Availability of direct flights to destination

	Business		Non-business	
	Count	Percent	Count	Percent
No influence at all	3	3.0%	16	3.4%
2	6	6.0%	23	4.8%
3	6	6.0%	50	10.5%
4	28	28.0%	122	25.6%
Very high influence	57	57.0%	265	55.7%
Total	100	100.0%	476	100.0%

Influence on choosing which airport to fly from: Price of airline ticket/fares

	Business		Non-business	
	Count	Percent	Count	Percent
No influence at all	5	5.1%	18	3.8%
2	1	1.0%	8	1.7%
3	15	15.2%	39	8.2%
4	30	30.3%	86	18.1%
Very high influence	48	48.5%	324	68.2%
Total	99	100.0%	475	100.0%

Influence on choosing which airport to fly from: Wide selection of airlines to choose from

	Business		Non-business	
	Count	Percent	Count	Percent
No influence at all	4	4.1%	49	10.6%
2	13	13.3%	41	8.9%
3	23	23.5%	105	22.7%
4	31	31.6%	139	30.0%
Very high influence	27	27.6%	129	27.9%
Total	98	100.0%	463	100.0%

Influence on choosing which airport to fly from: Availability of flights with preferred airline

	Business		Non-business	
	Count	Percent	Count	Percent
No influence at all	6	6.1%	24	5.1%
2	3	3.0%	27	5.7%
3	16	16.2%	89	18.7%
4	29	29.3%	142	29.9%
Very high influence	45	45.5%	193	40.6%
Total	99	100.0%	475	100.0%

Influence on choosing which airport to fly from: Ease of getting through airport security

	Business		Non-business	
	Count	Percent	Count	Percent
No influence at all	8	8.0%	50	10.7%
2	8	8.0%	44	9.4%
3	31	31.0%	128	27.4%
4	29	29.0%	130	27.8%
Very high influence	24	24.0%	116	24.8%
Total	100	100.0%	468	100.0%

Influence on choosing which airport to fly from: Variety of airport restaurants & shops

	Business		Non-business	
	Count	Percent	Count	Percent
No influence at all	35	36.1%	188	42.2%
2	29	29.9%	109	24.5%
3	18	18.6%	92	20.7%
4	12	12.4%	42	9.4%
Very high influence	3	3.1%	14	3.1%
Total	97	100.0%	445	100.0%

Importance in selecting an airport: Available short-term parking

	Business		Non-business	
	Count	Percent	Count	Percent
Not at all important	9	8.8%	66	13.4%
Somewhat unimportant	9	8.8%	49	9.9%
Neither important nor unimportant	15	14.7%	118	23.9%
Somewhat important	47	46.1%	161	32.7%
Very important	22	21.6%	99	20.1%
Total	102	100.0%	493	100.0%

Importance in selecting an airport: Available long-term parking

	Business		Non-business	
	Count	Percent	Count	Percent
Not at all important	10	9.8%	73	14.8%
Somewhat unimportant	10	9.8%	39	7.9%
Neither important nor unimportant	12	11.8%	118	23.9%
Somewhat important	37	36.3%	134	27.2%
Very important	33	32.4%	129	26.2%
Total	102	100.0%	493	100.0%

Importance in selecting an airport: Affordable parking

	Business		Non-business	
	Count	Percent	Count	Percent
Not at all important	7	6.9%	41	8.3%
Somewhat unimportant	4	3.9%	26	5.3%
Neither important nor unimportant	8	7.8%	63	12.8%
Somewhat important	40	39.2%	126	25.6%
Very important	43	42.2%	237	48.1%
Total	102	100.0%	493	100.0%

Importance in selecting an airport: Convenient parking close to the terminal

	Business		Non-business	
	Count	Percent	Count	Percent
Not at all important	8	7.8%	58	11.8%
Somewhat unimportant	8	7.8%	39	7.9%
Neither important nor unimportant	14	13.7%	103	20.9%
Somewhat important	45	44.1%	176	35.7%
Very important	27	26.5%	117	23.7%
Total	102	100.0%	493	100.0%

Importance in selecting an airport: Covered parking protected from weather

	Business		Non-business	
	Count	Percent	Count	Percent
Not at all important	15	14.7%	92	18.7%
Somewhat unimportant	9	8.8%	62	12.6%
Neither important nor unimportant	22	21.6%	127	25.8%
Somewhat important	36	35.3%	139	28.2%
Very important	20	19.6%	73	14.8%
Total	102	100.0%	493	100.0%

Importance in selecting an airport: Convenient shuttle bus service between parking lot and terminal area

	Business		Non-business	
	Count	Percent	Count	Percent
Not at all important	10	9.8%	65	13.2%
Somewhat unimportant	7	6.9%	40	8.1%
Neither important nor unimportant	17	16.7%	103	20.9%
Somewhat important	39	38.2%	153	31.0%
Very important	29	28.4%	132	26.8%
Total	102	100.0%	493	100.0%

Importance in selecting an airport: Available cell-phone lot to wait for arriving passengers

	Business		Non-business	
	Count	Percent	Count	Percent
Not at all important	15	14.7%	75	15.2%
Somewhat unimportant	14	13.7%	50	10.1%
Neither important nor unimportant	27	26.5%	147	29.8%
Somewhat important	25	24.5%	138	28.0%
Very important	21	20.6%	83	16.8%
Total	102	100.0%	493	100.0%

Importance in selecting an airport: Available off-airport privately-owned parking

	Business		Non-business	
	Count	Percent	Count	Percent
Not at all important	25	24.5%	134	27.2%
Somewhat unimportant	15	14.7%	67	13.6%
Neither important nor unimportant	26	25.5%	149	30.2%
Somewhat important	30	29.4%	103	20.9%
Very important	6	5.9%	40	8.1%
Total	102	100.0%	493	100.0%

Importance in selecting an airport: Available valet parking

	Business		Non-business	
	Count	Percent	Count	Percent
Not at all important	39	38.2%	246	49.9%
Somewhat unimportant	21	20.6%	89	18.1%
Neither important nor unimportant	23	22.5%	99	20.1%
Somewhat important	9	8.8%	42	8.5%
Very important	10	9.8%	17	3.4%
Total	102	100.0%	493	100.0%

How often do you use public transit in general?

	Business		Non-business	
	Count	Percent	Count	Percent
Never	17	16.7%	119	24.1%
Rarely	42	41.2%	230	46.7%
Occasionally	29	28.4%	103	20.9%
Weekly	6	5.9%	17	3.4%
Daily	8	7.8%	24	4.9%
Total	102	100.0%	493	100.0%

How many people live in your household?

	Business		Non-business	
	Count	Percent	Count	Percent
1 person (I live alone)	10	9.8%	73	14.8%
2 people	24	23.5%	193	39.1%
3 people	22	21.6%	90	18.3%
4 people	24	23.5%	68	13.8%
5 people	15	14.7%	44	8.9%
6 or more people	7	6.9%	25	5.1%
Total	102	100.0%	493	100.0%

How many cars, motorcycles, pickup trucks, minivans, etc., are there in your household?

	Business		Non-business	
	Count	Percent	Count	Percent
0 (no vehicles)	1	1.0%	13	2.6%
1 vehicle	24	23.5%	139	28.2%
2 vehicles	38	37.3%	224	45.4%
3 vehicles	23	22.5%	78	15.8%
4 vehicles	11	10.8%	21	4.3%
5 or more vehicles	5	4.9%	18	3.7%
Total	102	100.0%	493	100.0%

What is your gender?

	Business		Non-business	
	Count	Percent	Count	Percent
Female	30	29.4%	332	67.3%
Male	72	70.6%	161	32.7%
Total	102	100.0%	493	100.0%

Which category represents your age?

	Business		Non-business	
	Count	Percent	Count	Percent
16-24	7	6.9%	41	8.3%
25-34	16	15.7%	84	17.0%
35-44	33	32.4%	96	19.5%
45-54	29	28.4%	135	27.4%
55-64	15	14.7%	108	21.9%
65-74	1	1.0%	25	5.1%
75 or older	1	1.0%	4	.8%
Total	102	100.0%	493	100.0%

What is your employment status?

	Business		Non-business	
	Count	Percent	Count	Percent
Employed full-time	67	65.7%	206	41.8%
Employed part-time	7	6.9%	58	11.8%
Self-employed	14	13.7%	48	9.7%
Student	3	2.9%	18	3.7%
Student and employed	2	2.0%	8	1.6%
Retired	3	2.9%	60	12.2%
Homemaker	1	1.0%	57	11.6%
Not currently employed	5	4.9%	38	7.7%
Total	102	100.0%	493	100.0%

Which category best represents your annual household income before taxes?

	Business		Non-business	
	Count	Percent	Count	Percent
Under \$20,000	0	.0%	24	4.9%
\$20,000–\$39,999	12	11.8%	82	16.6%
\$40,000–\$59,999	8	7.8%	94	19.1%
\$60,000–\$79,999	19	18.6%	113	22.9%
\$80,000–\$99,999	16	15.7%	66	13.4%
\$100,000–\$124,999	15	14.7%	47	9.5%
\$125,000–\$149,999	13	12.7%	22	4.5%
\$150,000–\$174,999	8	7.8%	19	3.9%
\$175,000–\$199,999	6	5.9%	12	2.4%
\$200,000 or more	5	4.9%	14	2.8%
Total	102	100.0%	493	100.0%

Attachment E3

Airport Sample Cross-Tabulations: Hub Classification

Please select the airport that you use most frequently when you leave home to travel.

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Boston Logan (BOS)	46	12.8%	0	.0%
Chicago O'Hare (ORD)	44	12.3%	0	.0%
Columbus (CMH)	0	.0%	45	19.1%
Huntsville (HSV)	0	.0%	36	15.3%
Las Vegas McCarran (LAS)	38	10.6%	0	.0%
Miami (MIA)	44	12.3%	0	.0%
Oakland (OAK)	0	.0%	51	21.6%
San Antonio (SAT)	0	.0%	50	21.2%
San Diego (SAN)	39	10.9%	0	.0%
Seattle-Tacoma (SEA)	59	16.4%	0	.0%
Tampa (TPA)	46	12.8%	0	.0%
Tulsa (TUL)	0	.0%	54	22.9%
Washington Dulles (IAD)	43	12.0%	0	.0%
Total	359	100.0%	236	100.0%

When did you make your trip?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
April 2009	59	16.4%	40	16.9%
March 2009	74	20.6%	55	23.3%
February 2009	51	14.2%	38	16.1%
January 2009	47	13.1%	27	11.4%
December 2008	80	22.3%	46	19.5%
November 2008	48	13.4%	30	12.7%
Total	359	100.0%	236	100.0%

End location of flight

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Inside the United States	305	85.0%	212	89.8%
Outside the United States (or outside of US territory)	54	15.0%	24	10.2%
Total	359	100.0%	236	100.0%

What date did you depart from your home airport?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
01/01/2009	3	.8%	0	.0%
01/02/2009	1	.3%	2	.8%
01/03/2009	1	.3%	1	.4%
01/04/2009	2	.6%	2	.8%
01/05/2009	4	1.1%	1	.4%
01/06/2009	4	1.1%	0	.0%
01/07/2009	2	.6%	0	.0%
01/08/2009	4	1.1%	4	1.7%
01/09/2009	4	1.1%	1	.4%
01/10/2009	2	.6%	0	.0%
01/12/2009	1	.3%	1	.4%
01/13/2009	1	.3%	1	.4%
01/14/2009	1	.3%	2	.8%
01/15/2009	3	.8%	1	.4%
01/16/2009	1	.3%	1	.4%
01/17/2009	1	.3%	1	.4%
01/20/2009	1	.3%	0	.0%
01/21/2009	3	.8%	0	.0%
01/22/2009	0	.0%	1	.4%
01/23/2009	1	.3%	0	.0%
01/24/2009	3	.8%	1	.4%

What date did you depart from your home airport?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
01/25/2009	1	.3%	0	.0%
01/26/2009	0	.0%	1	.4%
01/29/2009	1	.3%	1	.4%
01/30/2009	0	.0%	1	.4%
01/31/2009	0	.0%	1	.4%
02/01/2009	3	.8%	1	.4%
02/02/2009	0	.0%	1	.4%
02/03/2009	2	.6%	3	1.3%
02/04/2009	2	.6%	0	.0%
02/05/2009	2	.6%	1	.4%
02/06/2009	2	.6%	3	1.3%
02/07/2009	1	.3%	2	.8%
02/09/2009	3	.8%	1	.4%
02/10/2009	2	.6%	1	.4%
02/11/2009	4	1.1%	1	.4%
02/12/2009	5	1.4%	3	1.3%
02/13/2009	4	1.1%	5	2.1%
02/14/2009	2	.6%	3	1.3%
02/16/2009	1	.3%	0	.0%
02/18/2009	0	.0%	2	.8%
02/19/2009	5	1.4%	0	.0%

What date did you depart from your home airport?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
02/20/2009	4	1.1%	5	2.1%
02/21/2009	1	.3%	0	.0%
02/23/2009	1	.3%	0	.0%
02/24/2009	0	.0%	2	.8%
02/25/2009	2	.6%	3	1.3%
02/26/2009	2	.6%	0	.0%
02/27/2009	3	.8%	1	.4%
02/28/2009	2	.6%	0	.0%
03/01/2009	1	.3%	0	.0%
03/02/2009	0	.0%	2	.8%
03/03/2009	1	.3%	1	.4%
03/04/2009	3	.8%	1	.4%
03/05/2009	0	.0%	2	.8%
03/06/2009	1	.3%	6	2.5%
03/07/2009	0	.0%	4	1.7%
03/08/2009	1	.3%	1	.4%
03/09/2009	1	.3%	5	2.1%
03/10/2009	4	1.1%	4	1.7%
03/11/2009	3	.8%	1	.4%
03/12/2009	6	1.7%	1	.4%
03/13/2009	2	.6%	2	.8%

What date did you depart from your home airport?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
03/14/2009	2	.6%	1	.4%
03/15/2009	1	.3%	1	.4%
03/16/2009	2	.6%	3	1.3%
03/17/2009	5	1.4%	2	.8%
03/18/2009	3	.8%	3	1.3%
03/19/2009	4	1.1%	2	.8%
03/20/2009	5	1.4%	1	.4%
03/21/2009	2	.6%	2	.8%
03/22/2009	4	1.1%	0	.0%
03/23/2009	5	1.4%	1	.4%
03/24/2009	1	.3%	1	.4%
03/25/2009	4	1.1%	2	.8%
03/26/2009	4	1.1%	2	.8%
03/27/2009	4	1.1%	1	.4%
03/28/2009	1	.3%	2	.8%
03/29/2009	1	.3%	0	.0%
03/30/2009	2	.6%	1	.4%
03/31/2009	1	.3%	1	.4%
04/01/2009	3	.8%	1	.4%
04/02/2009	1	.3%	3	1.3%
04/03/2009	3	.8%	2	.8%

What date did you depart from your home airport?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
04/04/2009	2	.6%	1	.4%
04/05/2009	3	.8%	2	.8%
04/06/2009	4	1.1%	1	.4%
04/07/2009	5	1.4%	1	.4%
04/08/2009	5	1.4%	4	1.7%
04/09/2009	4	1.1%	1	.4%
04/10/2009	4	1.1%	1	.4%
04/11/2009	2	.6%	1	.4%
04/12/2009	0	.0%	1	.4%
04/13/2009	1	.3%	1	.4%
04/14/2009	3	.8%	0	.0%
04/15/2009	3	.8%	1	.4%
04/16/2009	3	.8%	2	.8%
04/17/2009	1	.3%	3	1.3%
04/18/2009	1	.3%	3	1.3%
04/19/2009	2	.6%	1	.4%
04/20/2009	1	.3%	0	.0%
04/21/2009	0	.0%	1	.4%
04/22/2009	1	.3%	2	.8%
04/23/2009	3	.8%	4	1.7%
04/24/2009	0	.0%	1	.4%

What date did you depart from your home airport?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
04/27/2009	1	.3%	1	.4%
11/01/2008	2	.6%	0	.0%
11/02/2008	1	.3%	1	.4%
11/03/2008	1	.3%	0	.0%
11/04/2008	2	.6%	0	.0%
11/05/2008	2	.6%	1	.4%
11/06/2008	3	.8%	3	1.3%
11/07/2008	3	.8%	0	.0%
11/08/2008	2	.6%	1	.4%
11/09/2008	2	.6%	3	1.3%
11/10/2008	3	.8%	0	.0%
11/11/2008	5	1.4%	3	1.3%
11/12/2008	1	.3%	1	.4%
11/13/2008	0	.0%	3	1.3%
11/14/2008	1	.3%	1	.4%
11/15/2008	0	.0%	1	.4%
11/16/2008	1	.3%	0	.0%
11/17/2008	1	.3%	0	.0%
11/18/2008	0	.0%	2	.8%
11/19/2008	5	1.4%	1	.4%
11/20/2008	3	.8%	2	.8%

What date did you depart from your home airport?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
11/21/2008	1	.3%	0	.0%
11/22/2008	1	.3%	1	.4%
11/23/2008	3	.8%	3	1.3%
11/24/2008	3	.8%	1	.4%
11/25/2008	1	.3%	1	.4%
11/27/2008	1	.3%	1	.4%
11/28/2008	1	.3%	0	.0%
11/29/2008	1	.3%	0	.0%
11/30/2008	0	.0%	1	.4%
12/02/2008	0	.0%	2	.8%
12/04/2008	2	.6%	1	.4%
12/05/2008	7	1.9%	2	.8%
12/06/2008	2	.6%	1	.4%
12/07/2008	0	.0%	2	.8%
12/08/2008	1	.3%	1	.4%
12/09/2008	2	.6%	0	.0%
12/10/2008	2	.6%	1	.4%
12/11/2008	7	1.9%	1	.4%
12/12/2008	1	.3%	1	.4%
12/14/2008	1	.3%	1	.4%
12/15/2008	1	.3%	2	.8%

What date did you depart from your home airport?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
12/16/2008	2	.6%	1	.4%
12/17/2008	1	.3%	3	1.3%
12/18/2008	8	2.2%	4	1.7%
12/19/2008	10	2.8%	5	2.1%
12/20/2008	5	1.4%	2	.8%
12/21/2008	2	.6%	1	.4%
12/22/2008	3	.8%	10	4.2%
12/23/2008	7	1.9%	0	.0%
12/24/2008	4	1.1%	1	.4%
12/25/2008	2	.6%	1	.4%
12/26/2008	3	.8%	0	.0%
12/27/2008	0	.0%	1	.4%
12/28/2008	2	.6%	1	.4%
12/29/2008	1	.3%	1	.4%
12/30/2008	2	.6%	1	.4%
12/31/2008	3	.8%	1	.4%
Total	359	100.0%	236	100.0%

What time of day did you depart from your home airport?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Midnight - 9AM	102	28.4%	79	33.5%
9AM - Noon	125	34.8%	83	35.2%
Noon - 4PM	64	17.8%	43	18.2%
4PM - 7PM	53	14.8%	20	8.5%
7PM - Midnight	15	4.2%	11	4.7%
Total	359	100.0%	236	100.0%

What date did you return to your home airport?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
01/01/2009	1	.3%	1	.4%
01/02/2009	3	.8%	0	.0%
01/03/2009	6	1.7%	3	1.3%
01/04/2009	2	.6%	2	.8%
01/05/2009	6	1.7%	2	.8%
01/06/2009	0	.0%	1	.4%
01/08/2009	3	.8%	1	.4%
01/09/2009	2	.6%	3	1.3%
01/10/2009	3	.8%	0	.0%
01/11/2009	3	.8%	2	.8%

What date did you return to your home airport?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
01/12/2009	4	1.1%	4	1.7%
01/13/2009	5	1.4%	0	.0%
01/14/2009	3	.8%	0	.0%
01/15/2009	3	.8%	2	.8%
01/16/2009	2	.6%	2	.8%
01/17/2009	2	.6%	0	.0%
01/18/2009	1	.3%	0	.0%
01/19/2009	1	.3%	1	.4%
01/20/2009	4	1.1%	0	.0%
01/21/2009	1	.3%	1	.4%
01/22/2009	2	.6%	0	.0%
01/23/2009	1	.3%	1	.4%
01/24/2009	0	.0%	1	.4%
01/25/2009	1	.3%	1	.4%
01/26/2009	2	.6%	1	.4%
01/29/2009	1	.3%	0	.0%
01/30/2009	2	.6%	1	.4%
01/31/2009	1	.3%	2	.8%
02/01/2009	1	.3%	2	.8%
02/02/2009	1	.3%	1	.4%
02/03/2009	0	.0%	1	.4%

What date did you return to your home airport?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
02/04/2009	1	.3%	0	.0%
02/05/2009	2	.6%	0	.0%
02/06/2009	3	.8%	0	.0%
02/07/2009	0	.0%	1	.4%
02/08/2009	1	.3%	3	1.3%
02/10/2009	1	.3%	1	.4%
02/12/2009	3	.8%	0	.0%
02/13/2009	2	.6%	2	.8%
02/14/2009	5	1.4%	1	.4%
02/15/2009	4	1.1%	3	1.3%
02/16/2009	5	1.4%	4	1.7%
02/17/2009	2	.6%	0	.0%
02/18/2009	0	.0%	1	.4%
02/19/2009	2	.6%	1	.4%
02/20/2009	1	.3%	3	1.3%
02/21/2009	4	1.1%	4	1.7%
02/22/2009	3	.8%	3	1.3%
02/23/2009	1	.3%	1	.4%
02/24/2009	0	.0%	1	.4%
02/25/2009	1	.3%	1	.4%
02/26/2009	2	.6%	3	1.3%

What date did you return to your home airport?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
02/28/2009	3	.8%	1	.4%
03/01/2009	1	.3%	1	.4%
03/02/2009	1	.3%	1	.4%
03/03/2009	2	.6%	0	.0%
03/04/2009	1	.3%	0	.0%
03/05/2009	1	.3%	0	.0%
03/06/2009	0	.0%	1	.4%
03/07/2009	2	.6%	1	.4%
03/08/2009	1	.3%	2	.8%
03/09/2009	2	.6%	2	.8%
03/10/2009	1	.3%	2	.8%
03/11/2009	0	.0%	2	.8%
03/13/2009	3	.8%	3	1.3%
03/14/2009	1	.3%	4	1.7%
03/15/2009	5	1.4%	5	2.1%
03/16/2009	3	.8%	1	.4%
03/17/2009	0	.0%	2	.8%
03/18/2009	2	.6%	1	.4%
03/19/2009	2	.6%	0	.0%
03/20/2009	3	.8%	5	2.1%
03/21/2009	2	.6%	4	1.7%

What date did you return to your home airport?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
03/22/2009	5	1.4%	2	.8%
03/23/2009	3	.8%	3	1.3%
03/24/2009	3	.8%	1	.4%
03/25/2009	4	1.1%	4	1.7%
03/26/2009	1	.3%	1	.4%
03/27/2009	3	.8%	0	.0%
03/28/2009	1	.3%	0	.0%
03/29/2009	5	1.4%	6	2.5%
03/30/2009	3	.8%	1	.4%
03/31/2009	5	1.4%	1	.4%
04/01/2009	2	.6%	1	.4%
04/02/2009	2	.6%	3	1.3%
04/03/2009	1	.3%	0	.0%
04/04/2009	1	.3%	0	.0%
04/05/2009	5	1.4%	0	.0%
04/06/2009	2	.6%	1	.4%
04/07/2009	3	.8%	1	.4%
04/08/2009	5	1.4%	2	.8%
04/09/2009	3	.8%	2	.8%
04/10/2009	4	1.1%	0	.0%
04/11/2009	6	1.7%	1	.4%

What date did you return to your home airport?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
04/12/2009	4	1.1%	3	1.3%
04/13/2009	4	1.1%	0	.0%
04/14/2009	1	.3%	0	.0%
04/15/2009	1	.3%	4	1.7%
04/16/2009	4	1.1%	1	.4%
04/17/2009	2	.6%	1	.4%
04/18/2009	3	.8%	2	.8%
04/19/2009	2	.6%	4	1.7%
04/20/2009	3	.8%	1	.4%
04/21/2009	7	1.9%	2	.8%
04/22/2009	1	.3%	0	.0%
04/24/2009	2	.6%	2	.8%
04/25/2009	1	.3%	1	.4%
04/26/2009	2	.6%	0	.0%
04/27/2009	1	.3%	4	1.7%
04/28/2009	1	.3%	6	2.5%
04/29/2009	2	.6%	0	.0%
04/30/2009	0	.0%	1	.4%
11/06/2008	2	.6%	0	.0%
11/08/2008	1	.3%	0	.0%
11/09/2008	1	.3%	1	.4%

What date did you return to your home airport?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
11/10/2008	4	1.1%	0	.0%
11/11/2008	1	.3%	0	.0%
11/12/2008	3	.8%	1	.4%
11/13/2008	2	.6%	4	1.7%
11/14/2008	1	.3%	0	.0%
11/15/2008	0	.0%	1	.4%
11/16/2008	3	.8%	1	.4%
11/17/2008	0	.0%	2	.8%
11/18/2008	2	.6%	0	.0%
11/19/2008	1	.3%	1	.4%
11/20/2008	0	.0%	2	.8%
11/21/2008	2	.6%	1	.4%
11/22/2008	2	.6%	2	.8%
11/23/2008	2	.6%	0	.0%
11/24/2008	1	.3%	1	.4%
11/26/2008	0	.0%	1	.4%
11/27/2008	3	.8%	3	1.3%
11/28/2008	0	.0%	1	.4%
11/29/2008	3	.8%	3	1.3%
11/30/2008	6	1.7%	3	1.3%
12/02/2008	1	.3%	1	.4%

What date did you return to your home airport?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
12/03/2008	1	.3%	1	.4%
12/04/2008	0	.0%	2	.8%
12/05/2008	1	.3%	0	.0%
12/06/2008	3	.8%	0	.0%
12/07/2008	2	.6%	2	.8%
12/08/2008	0	.0%	1	.4%
12/09/2008	0	.0%	2	.8%
12/10/2008	2	.6%	0	.0%
12/12/2008	4	1.1%	1	.4%
12/13/2008	2	.6%	0	.0%
12/14/2008	3	.8%	2	.8%
12/15/2008	3	.8%	1	.4%
12/17/2008	1	.3%	0	.0%
12/18/2008	0	.0%	2	.8%
12/19/2008	0	.0%	2	.8%
12/20/2008	4	1.1%	0	.0%
12/21/2008	3	.8%	1	.4%
12/22/2008	3	.8%	3	1.3%
12/23/2008	3	.8%	0	.0%
12/24/2008	1	.3%	0	.0%
12/26/2008	2	.6%	1	.4%

What date did you return to your home airport?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
12/27/2008	4	1.1%	4	1.7%
12/28/2008	6	1.7%	3	1.3%
12/29/2008	4	1.1%	2	.8%
12/30/2008	7	1.9%	5	2.1%
12/31/2008	5	1.4%	3	1.3%
Total	359	100.0%	236	100.0%

What time of day did you return to your home airport?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Midnight - 9AM	30	8.4%	14	5.9%
9AM - Noon	46	12.8%	38	16.1%
Noon - 4PM	100	27.9%	62	26.3%
4PM - 7PM	99	27.6%	75	31.8%
7PM - Midnight	84	23.4%	47	19.9%
Total	359	100.0%	236	100.0%

What was the primary purpose of your flight?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Business	57	15.9%	45	19.1%
Non-business	302	84.1%	191	80.9%
Total	359	100.0%	236	100.0%

What class of service did you use on your flight?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Economy or coach	316	88.0%	208	88.1%
Business	21	5.8%	15	6.4%
First class	22	6.1%	13	5.5%
Total	359	100.0%	236	100.0%

How many people flew with you on your trip?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Nobody (I flew alone)	155	43.2%	96	40.7%
1 person	95	26.5%	65	27.5%
2 people	59	16.4%	43	18.2%
3 people	24	6.7%	9	3.8%
4 people	8	2.2%	9	3.8%
5 people	5	1.4%	2	.8%
More than 5 other people	13	3.6%	12	5.1%
Total	359	100.0%	236	100.0%

Did you travel together to the airport

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Yes	195	95.6%	127	90.7%
No	9	4.4%	13	9.3%
Total	204	100.0%	140	100.0%

How many bags did you/your party check?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
0 (Didn't check any bags)	72	20.1%	53	22.5%
1 bag	128	35.7%	90	38.1%
2 bags	101	28.1%	63	26.7%
3 bags	27	7.5%	13	5.5%
4 or more bags	31	8.6%	17	7.2%
Total	359	100.0%	236	100.0%

How many bags did you, personally, carry-on?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
0 (Didn't carry-on any bags)	59	16.4%	37	15.7%
1 bag	239	66.6%	162	68.6%
2 bags	61	17.0%	37	15.7%
Total	359	100.0%	236	100.0%

Before your flight was booked, did you consider departing from another airport for your trip?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
No, I only considered flying out of	221	61.6%	146	61.9%
Yes, I considered flying out of other airports	138	38.4%	90	38.1%
Total	359	100.0%	236	100.0%

Alternative airport considered

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Manchester Airport (MHT)	13	9.4%	0	.0%
Providence TF Green Airport (PVD)	19	13.8%	0	.0%
Baltimore Airport (BWI)	12	8.7%	0	.0%
Washington DC Reagan Airport (DCA)	17	12.3%	0	.0%
Cincinnati/Northern Kentucky Airport (CVG)	0	.0%	10	11.1%
Cleveland Hopkins Airport (CLE)	0	.0%	2	2.2%
Chicago Midway Airport (MDW)	18	13.0%	0	.0%
Milwaukee-Mitchell Airport (MIKE)	9	6.5%	0	.0%
Atlanta Hartsfield-Jackson Airport (ATL)	0	.0%	4	4.4%
Birmingham Airport (BHM)	0	.0%	12	13.3%
Nashville Airport (BNA)	0	.0%	10	11.1%
Fort Lauderdale Airport (FLL)	30	21.7%	0	.0%
Fort Myers/Southwest Florida Airport (RSW)	1	.7%	0	.0%

Alternative airport considered

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Orlando Airport (MCO)	10	7.2%	0	.0%
Oklahoma City Will Rogers Airport (OKC)	0	.0%	6	6.7%
Austin Bergstrom Airport (AUS)	0	.0%	11	12.2%
Houston Hobby Airport (HOU)	0	.0%	1	1.1%
Houston George Bush Airport (IAH)	0	.0%	3	3.3%
John Wayne Airport (SNA)	4	2.9%	0	.0%
Los Angeles Airport (LAX)	5	3.6%	0	.0%
Sacramento Airport (SMF)	0	.0%	4	4.4%
San Francisco Airport (SFO)	0	.0%	30	33.3%
Portland Airport (PDX)	1	.7%	0	.0%
Vancouver Airport (YVR)	3	2.2%	0	.0%
San Jose Airport (SJC)	0	.0%	11	12.2%
Dayton International Airport (DAY)	0	.0%	11	12.2%
Other	25	18.1%	12	13.3%
Total	167	121.0%	127	141.1%

Where did your trip to the airport begin?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
My home	328	91.4%	213	90.3%
Someone else's home	19	5.3%	12	5.1%
My regular place of employment	2	.6%	6	2.5%
Place of business	4	1.1%	1	.4%
Hotel	4	1.1%	4	1.7%
School	1	.3%	0	.0%
Other, please specify:	1	.3%	0	.0%
Total	359	100.0%	236	100.0%

Time began trip to the airport BY Hub size of airport

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Midnight - 1:59 AM	2	.6%	3	1.3%
2:00 AM - 3:59 AM	6	1.7%	4	1.7%
4:00 AM - 5:59 AM	64	17.8%	57	24.2%
6:00 AM - 7:59 AM	110	30.6%	58	24.6%
8:00 AM - 9:59 AM	46	12.8%	32	13.6%
10:00 AM - 11:59 AM	37	10.3%	28	11.9%
Noon - 1:59 PM	23	6.4%	14	5.9%
2:00 PM - 3:59 PM	29	8.1%	21	8.9%
4:00 PM - 5:59 PM	23	6.4%	13	5.5%
6:00 PM - 7:59 PM	10	2.8%	3	1.3%
8:00 PM - 9:59 PM	7	1.9%	3	1.3%
10:00 PM - 11:59 PM	2	.6%	0	.0%
Total	359	100.0%	236	100.0%

Time arrived at airport

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Midnight - 1:59 AM	0	.0%	1	.4%
2:00 AM - 3:59 AM	3	.8%	3	1.3%
4:00 AM - 5:59 AM	46	12.8%	31	13.1%
6:00 AM - 7:59 AM	99	27.6%	72	30.5%
8:00 AM - 9:59 AM	65	18.1%	37	15.7%
10:00 AM - 11:59 AM	43	12.0%	31	13.1%
Noon - 1:59 PM	22	6.1%	16	6.8%
2:00 PM - 3:59 PM	33	9.2%	24	10.2%
4:00 PM - 5:59 PM	22	6.1%	11	4.7%
6:00 PM - 7:59 PM	16	4.5%	7	3.0%
8:00 PM - 9:59 PM	6	1.7%	3	1.3%
10:00 PM - 11:59 PM	4	1.1%	0	.0%
Total	359	100.0%	236	100.0%

Travel time to the airport

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Less than 30 minutes	62	17.3%	61	25.8%
30 - 59 minutes	169	47.1%	88	37.3%
1 hour - 1 hour 29 minutes	72	20.1%	50	21.2%
1 hour 30 minutes - 1 hour 59 minutes	33	9.2%	20	8.5%
2 hours or more	23	6.4%	17	7.2%
Total	359	100.0%	236	100.0%

Approximately how long after you arrived at the airport did your flight depart?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Less than 30 minutes	5	1.4%	13	5.5%
30 - 59 minutes	44	12.3%	39	16.5%
1 hour - 1 hour 29 minutes	119	33.1%	104	44.1%
1 hour 30 minutes - 1 hour 59 minutes	105	29.2%	58	24.6%
2 hour - 2 hour 29 minutes	60	16.7%	18	7.6%
2 hour 30 minutes - 2 hour 59 minutes	15	4.2%	1	.4%
3 hours or more	11	3.1%	3	1.3%
Total	359	100.0%	236	100.0%

What was the primary type of transportation you used to get to the airport?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Private vehicle and parked	110	30.6%	98	41.5%
Private vehicle and was dropped off at the airport	163	45.4%	118	50.0%
Rental car	6	1.7%	2	.8%
Taxi	25	7.0%	6	2.5%
Limo/town car	23	6.4%	2	.8%
Shared shuttle van/door-to-door van	16	4.5%	7	3.0%
Local city bus	6	1.7%	0	.0%
Regional public bus/van	5	1.4%	1	.4%
Subway	4	1.1%	2	.8%
Rail	1	.3%	0	.0%
Total	359	100.0%	236	100.0%

Where did you park?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
An airport garage or parking lot	69	62.7%	72	73.5%
An off-airport parking lot	37	33.6%	26	26.5%
A hotel parking lot	4	3.6%	0	.0%
Total	110	100.0%	98	100.0%

Reason for selecting mode

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Travel time to airport	129	35.9%	89	37.7%
Group (travel party) size	23	6.4%	14	5.9%
Comfort	113	31.5%	66	28.0%
Reliability	138	38.4%	77	32.6%
Short walk to terminal entrance from where I ended my access trip	59	16.4%	35	14.8%
Directness of trip (no stops/transfers)	101	28.1%	53	22.5%
Purpose of trip (business vs. non-business)	30	8.4%	19	8.1%
Convenience of traveling with luggage/belongings	148	41.2%	94	39.8%
Trip cost	123	34.3%	73	30.9%
Frequency of transit service	20	5.6%	4	1.7%
Good highway/road access to airport	77	21.4%	59	25.0%
Good transit access to airport	51	14.2%	17	7.2%
Other	26	7.2%	15	6.4%
Total	1038	289.1%	615	260.6%

Main reason for selecting mode to get to airport

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Travel time to airport	39	10.9%	31	13.1%
Group (travel party) size	5	1.4%	6	2.5%
Comfort	26	7.2%	19	8.1%
Reliability	43	12.0%	29	12.3%
Short walk to terminal entrance from where I ended my access trip	13	3.6%	16	6.8%
Directness of trip (no stops/transfers)	28	7.8%	10	4.2%
Purpose of trip (business vs. non-business)	7	1.9%	7	3.0%
Convenience of traveling with luggage/belongings	73	20.3%	51	21.6%
Trip cost	64	17.8%	38	16.1%
Frequency of transit service	3	.8%	1	.4%
Good highway/road access to airport	17	4.7%	12	5.1%
Good transit access to airport	16	4.5%	2	.8%
Other	25	7.0%	14	5.9%
Total	359	100.0%	236	100.0%

Where did you park?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Short-term parking	21	30.4%	14	19.4%
Long-term parking (remote, economy, etc.)	46	66.7%	55	76.4%
Other	2	2.9%	3	4.2%
Total	69	100.0%	72	100.0%

How did you get from where you parked to the terminal?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
I walked	44	63.8%	40	55.6%
I took a shuttle	23	33.3%	32	44.4%
Other, please specify:	2	2.9%	0	.0%
Total	69	100.0%	72	100.0%

Time spent traveling from parking lot to terminal

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Less than 5 minutes	5	7.2%	11	15.3%
5 - 9 minutes	23	33.3%	25	34.7%
10 - 14 minutes	23	33.3%	23	31.9%
15 - 19 minutes	8	11.6%	10	13.9%
20 minutes or more	10	14.5%	3	4.2%
Total	69	100.0%	72	100.0%

What was the primary reason for choosing where you parked? BY Hub size of airport

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Parking cost	40	36.4%	25	25.5%
Walking distance to terminal	17	15.5%	14	14.3%
Shuttle frequency to terminal	8	7.3%	5	5.1%
Parking availability	9	8.2%	13	13.3%
Length of time vehicle was parked	19	17.3%	19	19.4%
Security of vehicle	12	10.9%	17	17.3%
Weather (parking garage vs. open parking lot)	3	2.7%	2	2.0%
Other	2	1.8%	3	3.1%
Total	110	100.0%	98	100.0%

Did you know where you intended to park before you arrived at the airport?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Yes	58	84.1%	61	84.7%
No	11	15.9%	11	15.3%
Total	69	100.0%	72	100.0%

How did you decide which parking lot to use?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
I checked the airport website	8	13.8%	7	11.5%
I checked other websites	2	3.4%	2	3.3%
I parked where I always park	36	62.1%	29	47.5%
The parking lot was recommended to me	0	.0%	7	11.5%
I parked in the lot closest to the terminal	13	22.4%	13	21.3%
I parked in an inexpensive lot	12	20.7%	12	19.7%
Other	1	1.7%	3	4.9%
Total	72	124.1%	73	119.7%

How did you decide which parking lot to park in when arriving?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
I drove by the sign and chose a lot that was listed as open	3	27.3%	1	9.1%
I drove around looking for a lot with available parking spaces	0	.0%	3	27.3%
I chose the lot with the lowest parking cost	3	27.3%	2	18.2%
I chose the first lot I saw	1	9.1%	3	27.3%
I parked in the lot closest to the terminal	3	27.3%	3	27.3%
I parked in a garage or covered lot	1	9.1%	0	.0%
I saw an ad or billboard for the lot	0	.0%	1	9.1%
Other	1	9.1%	0	.0%
Total	12	109.1%	13	118.2%

Parking cost

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Less than \$25	27	24.5%	36	36.7%
\$25 - \$49	38	34.5%	29	29.6%
\$50 - \$74	19	17.3%	16	16.3%
\$75 - \$99	10	9.1%	10	10.2%
\$100 - \$124	9	8.2%	3	3.1%
\$125 - \$149	2	1.8%	3	3.1%
\$150 - \$174	1	.9%	1	1.0%
\$175 - \$199	4	3.6%	0	.0%
\$200 or more	0	.0%	0	.0%
Total	110	100.0%	98	100.0%

How did you pay for your parking?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
I paid a parking attendant	78	70.9%	81	82.7%
I paid at a machine	32	29.1%	17	17.3%
Total	110	100.0%	98	100.0%

Who paid for the cost of parking your vehicle?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
I paid myself	75	68.2%	80	81.6%
My employer paid	18	16.4%	11	11.2%
Someone else paid	11	10.0%	5	5.1%
I shared parking costs with my employer	0	.0%	0	.0%
I shared parking costs with someone else	4	3.6%	2	2.0%
My parking cost was included with my hotel stay	2	1.8%	0	.0%
Total	110	100.0%	98	100.0%

Did you pay your parking costs by cash or credit/debit card?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Cash	33	30.0%	48	49.0%
Credit/Debit Card	77	70.0%	50	51.0%
Total	110	100.0%	98	100.0%

Did the person dropping you off park their vehicle?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
No, I was dropped off at the curb	146	89.6%	106	89.8%
Yes, the person dropping me off parked at the terminal	17	10.4%	12	10.2%
Total	163	100.0%	118	100.0%

How did you return home at the end of your trip?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Private vehicle and was picked up	154	61.8%	117	84.8%
Rental car	3	1.2%	1	.7%
Taxi	32	12.9%	5	3.6%
Limo/town car	20	8.0%	1	.7%
Shared shuttle van/door-to-door van	18	7.2%	4	2.9%
Local city bus	5	2.0%	1	.7%
Regional public bus/van	2	.8%	2	1.4%
Subway	9	3.6%	4	2.9%
Rail	2	.8%	0	.0%
Other	4	1.6%	3	2.2%
Total	249	100.0%	138	100.0%

Did you have a private vehicle available to make your trip to the airport and leave parked for the duration of your trip?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Yes	90	36.1%	53	38.4%
No	159	63.9%	85	61.6%
Total	249	100.0%	138	100.0%

Why didn't you use the private vehicle available to you to make your trip to the airport and leave it parked for the duration of your trip?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Parking at airport is too far from terminal	2	2.2%	0	.0%
Parking is not always available at airport	1	1.1%	1	1.9%
Cost of parking at airport is too high	67	74.4%	38	71.7%
Takes too long to drive or too much congestion	4	4.4%	0	.0%
Car is not available for overnight parking	0	.0%	1	1.9%
Car is not secure parked at airport for multiple days	5	5.6%	9	17.0%
Travel time to airport is too unpredictable	1	1.1%	0	.0%
Prefer transit for environmental reasons	2	2.2%	0	.0%
Unfamiliar with route to airport	2	2.2%	0	.0%
Other	6	6.7%	4	7.5%
Total	90	100.0%	53	100.0%

Why didn't you drive to the airport?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Parking at airport is too far from terminal	13	24.1%	15	45.5%
Parking is not always available at airport	7	13.0%	5	15.2%
Cost of parking at airport is too high	12	22.2%	6	18.2%
Takes too long to drive or too much congestion	6	11.1%	6	18.2%
Car is not available for overnight parking	1	1.9%	2	6.1%
Car is not secure parked at airport for multiple days	27	50.0%	18	54.5%
Travel time to airport is too unpredictable	12	22.2%	2	6.1%
Prefer transit for environmental reasons	7	13.0%	1	3.0%
Unfamiliar with route to airport	4	7.4%	4	12.1%
Other	3	5.6%	2	6.1%
Total	92	170.4%	61	184.8%

At the start of your trip, which method best describes how you got to your transit stop?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Drove car and parked	2	12.5%	1	33.3%
Rode in car and was dropped off	3	18.8%	1	33.3%
Taxi or shuttle	0	.0%	0	.0%
Walked or biked	11	68.8%	1	33.3%
Total	16	100.0%	3	100.0%

How many times have you flown out of your airport in the last year?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
1 time (this trip only)	103	28.7%	84	35.6%
2-3 times	161	44.8%	92	39.0%
4-5 times	54	15.0%	36	15.3%
6-11 times	30	8.4%	18	7.6%
12 times or more	11	3.1%	6	2.5%
Total	359	100.0%	236	100.0%

How many times have you flown in total in the last year?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
1 time (this trip only)	70	19.5%	66	28.0%
2-3 times	135	37.6%	74	31.4%
4-5 times	76	21.2%	51	21.6%
6-11 times	49	13.6%	27	11.4%
12 times or more	29	8.1%	18	7.6%
Total	359	100.0%	236	100.0%

Over the past year have you always used the same mode when departing from the airport for a flight?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Yes	175	68.4%	112	73.7%
No	81	31.6%	40	26.3%
Total	256	100.0%	152	100.0%

What proportion of your trips to the airport in the past year were made by taking the mode you used?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Over 75%	15	18.5%	12	30.0%
50-75%	34	42.0%	11	27.5%
25-49%	21	25.9%	10	25.0%
Less than 25%	11	13.6%	7	17.5%
Total	81	100.0%	40	100.0%

What other modes have you used in the past year?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Private vehicle	31	38.3%	21	52.5%
Private vehicle and was dropped off at the airport	33	40.7%	15	37.5%
Rental car	1	1.2%	2	5.0%
Taxi	11	13.6%	12	30.0%
Limo/town car	9	11.1%	0	.0%
Shared shuttle van/door-to-door van	18	22.2%	5	12.5%
Local city bus	5	6.2%	0	.0%
Regional public bus/van	1	1.2%	0	.0%
Subway	4	4.9%	5	12.5%
Total	113	139.5%	60	150.0%

Where did you park?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
An airport garage or parking lot	21	67.7%	16	76.2%
An off-airport parking lot	10	32.3%	5	23.8%
Total	31	100.0%	21	100.0%

What is the main reason you never selected the transit option in the previous section?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Transit fare is too high	16	16.8%	19	23.8%
Travel time too long	9	9.5%	2	2.5%
Time getting to and from transit too long	8	8.4%	3	3.8%
Transit trip has too many transfers	4	4.2%	2	2.5%
Schedule is not convenient	7	7.4%	4	5.0%
Difficult to deal with luggage	14	14.7%	12	15.0%
Less reliable than current method of travel to airport	9	9.5%	7	8.8%
Do not like transit	17	17.9%	20	25.0%
Need car for other reasons	3	3.2%	4	5.0%
Other, please specify:	8	8.4%	7	8.8%
Total	95	100.0%	80	100.0%

Compared to a year ago, how frequently are you flying from your airport?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Much less frequently	34	9.5%	21	8.9%
Less frequently	63	17.5%	42	17.8%
About the same	214	59.6%	139	58.9%
More frequently	39	10.9%	31	13.1%
Much more frequently	9	2.5%	3	1.3%
Total	359	100.0%	236	100.0%

Have you ever visited the airport website?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Yes	139	38.7%	81	34.3%
No	220	61.3%	155	65.7%
Total	359	100.0%	236	100.0%

What did you use the airport website for?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Flight information (arrivals, departures, delays)	99	71.2%	64	79.0%
Information on parking fees and fee payment options	72	51.8%	41	50.6%
Information on available parking (full/closed lots, location of available lots)	42	30.2%	18	22.2%
Information on ground transportation (buses, shuttles, car services)	45	32.4%	17	21.0%
Information on rental car companies	18	12.9%	9	11.1%
Directions to/from the airport	28	20.1%	21	25.9%
Information on weather conditions	29	20.9%	15	18.5%
Information on traveler security requirements	42	30.2%	31	38.3%
Local roadway conditions around airport (road closures, construction)	19	13.7%	9	11.1%
Local area information (hotels, restaurants, attractions)	9	6.5%	3	3.7%
Airport news or general airport information	44	31.7%	17	21.0%
Other	7	5.0%	3	3.7%
Total	454	326.6%	248	306.2%

Have you ever visited the airport website?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Yes	139	38.7%	81	34.3%
No	220	61.3%	155	65.7%
Total	359	100.0%	236	100.0%

Influence on choosing which airport to fly from: Familiarity with airport

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
No influence at all	39	11.4%	17	7.5%
2	32	9.4%	19	8.4%
3	82	24.0%	56	24.8%
4	95	27.8%	75	33.2%
Very high influence	94	27.5%	59	26.1%
Total	342	100.0%	226	100.0%

Influence on choosing which airport to fly from: Ground transportation options to/from airport

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
No influence at all	53	15.8%	45	21.0%
2	45	13.4%	27	12.6%
3	71	21.2%	59	27.6%
4	90	26.9%	54	25.2%
Very high influence	76	22.7%	29	13.6%
Total	335	100.0%	214	100.0%

Influence on choosing which airport to fly from: Reliable transit options to/from airport

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
No influence at all	50	14.8%	46	22.0%
2	37	11.0%	29	13.9%
3	77	22.8%	36	17.2%
4	88	26.1%	60	28.7%
Very high influence	85	25.2%	38	18.2%
Total	337	100.0%	209	100.0%

Influence on choosing which airport to fly from: Availability of parking at the airport

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
No influence at all	72	22.2%	38	17.6%
2	49	15.1%	34	15.7%
3	84	25.9%	55	25.5%
4	70	21.6%	56	25.9%
Very high influence	49	15.1%	33	15.3%
Total	324	100.0%	216	100.0%

Influence on choosing which airport to fly from: Total travel time

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
No influence at all	23	6.6%	3	1.3%
2	17	4.9%	11	4.8%
3	59	17.0%	26	11.4%
4	96	27.7%	80	35.1%
Very high influence	152	43.8%	108	47.4%
Total	347	100.0%	228	100.0%

Influence on choosing which airport to fly from: Frequency of flights to destination

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
No influence at all	21	6.1%	9	4.0%
2	14	4.0%	19	8.5%
3	56	16.2%	42	18.8%
4	113	32.7%	69	30.8%
Very high influence	142	41.0%	85	37.9%
Total	346	100.0%	224	100.0%

Influence on choosing which airport to fly from: Availability of direct flights to destination

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
No influence at all	12	3.4%	7	3.1%
2	17	4.9%	12	5.3%
3	35	10.0%	21	9.3%
4	84	24.1%	66	29.1%
Very high influence	201	57.6%	121	53.3%
Total	349	100.0%	227	100.0%

Influence on choosing which airport to fly from: Price of airline ticket/fares

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
No influence at all	16	4.7%	7	3.0%
2	5	1.5%	4	1.7%
3	34	9.9%	20	8.7%
4	69	20.1%	47	20.4%
Very high influence	220	64.0%	152	66.1%
Total	344	100.0%	230	100.0%

Influence on choosing which airport to fly from: Wide selection of airlines to choose from

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
No influence at all	33	9.6%	20	9.2%
2	28	8.1%	26	12.0%
3	73	21.2%	55	25.3%
4	105	30.5%	65	30.0%
Very high influence	105	30.5%	51	23.5%
Total	344	100.0%	217	100.0%

Influence on choosing which airport to fly from: Availability of flights with preferred airline

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
No influence at all	21	6.0%	9	4.0%
2	16	4.6%	14	6.2%
3	56	16.0%	49	21.8%
4	102	29.2%	69	30.7%
Very high influence	154	44.1%	84	37.3%
Total	349	100.0%	225	100.0%

Influence on choosing which airport to fly from: Ease of getting through airport security

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
No influence at all	42	12.2%	16	7.1%
2	33	9.6%	19	8.4%
3	92	26.8%	67	29.8%
4	95	27.7%	64	28.4%
Very high influence	81	23.6%	59	26.2%
Total	343	100.0%	225	100.0%

Influence on choosing which airport to fly from: Variety of airport restaurants & shops

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
No influence at all	128	38.8%	95	44.8%
2	83	25.2%	55	25.9%
3	70	21.2%	40	18.9%
4	38	11.5%	16	7.5%
Very high influence	11	3.3%	6	2.8%
Total	330	100.0%	212	100.0%

Importance in selecting an airport: Available short-term parking

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Not at all important	51	14.2%	24	10.2%
Somewhat unimportant	38	10.6%	20	8.5%
Neither important nor unimportant	76	21.2%	57	24.2%
Somewhat important	120	33.4%	88	37.3%
Very important	74	20.6%	47	19.9%
Total	359	100.0%	236	100.0%

Importance in selecting an airport: Available long-term parking

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Not at all important	53	14.8%	30	12.7%
Somewhat unimportant	30	8.4%	19	8.1%
Neither important nor unimportant	85	23.7%	45	19.1%
Somewhat important	98	27.3%	73	30.9%
Very important	93	25.9%	69	29.2%
Total	359	100.0%	236	100.0%

Importance in selecting an airport: Affordable parking

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Not at all important	32	8.9%	16	6.8%
Somewhat unimportant	20	5.6%	10	4.2%
Neither important nor unimportant	43	12.0%	28	11.9%
Somewhat important	106	29.5%	60	25.4%
Very important	158	44.0%	122	51.7%
Total	359	100.0%	236	100.0%

Importance in selecting an airport: Convenient parking close to the terminal

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Not at all important	46	12.8%	20	8.5%
Somewhat unimportant	32	8.9%	15	6.4%
Neither important nor unimportant	72	20.1%	45	19.1%
Somewhat important	122	34.0%	99	41.9%
Very important	87	24.2%	57	24.2%
Total	359	100.0%	236	100.0%

Importance in selecting an airport: Covered parking protected from weather

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Not at all important	73	20.3%	34	14.4%
Somewhat unimportant	48	13.4%	23	9.7%
Neither important nor unimportant	87	24.2%	62	26.3%
Somewhat important	100	27.9%	75	31.8%
Very important	51	14.2%	42	17.8%
Total	359	100.0%	236	100.0%

Importance in selecting an airport: Convenient shuttle bus service between parking lot and terminal area

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Not at all important	49	13.6%	26	11.0%
Somewhat unimportant	32	8.9%	15	6.4%
Neither important nor unimportant	72	20.1%	48	20.3%
Somewhat important	101	28.1%	91	38.6%
Very important	105	29.2%	56	23.7%
Total	359	100.0%	236	100.0%

Importance in selecting an airport: Available cell-phone lot to wait for arriving passengers

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Not at all important	57	15.9%	33	14.0%
Somewhat unimportant	38	10.6%	26	11.0%
Neither important nor unimportant	97	27.0%	77	32.6%
Somewhat important	107	29.8%	56	23.7%
Very important	60	16.7%	44	18.6%
Total	359	100.0%	236	100.0%

Importance in selecting an airport: Available off-airport privately-owned parking

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Not at all important	104	29.0%	55	23.3%
Somewhat unimportant	50	13.9%	32	13.6%
Neither important nor unimportant	97	27.0%	78	33.1%
Somewhat important	82	22.8%	51	21.6%
Very important	26	7.2%	20	8.5%
Total	359	100.0%	236	100.0%

Importance in selecting an airport: Available valet parking

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Not at all important	177	49.3%	108	45.8%
Somewhat unimportant	64	17.8%	46	19.5%
Neither important nor unimportant	68	18.9%	54	22.9%
Somewhat important	31	8.6%	20	8.5%
Very important	19	5.3%	8	3.4%
Total	359	100.0%	236	100.0%

How often do you use public transit in general?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Never	76	21.2%	60	25.4%
Rarely	173	48.2%	99	41.9%
Occasionally	72	20.1%	60	25.4%
Weekly	18	5.0%	5	2.1%
Daily	20	5.6%	12	5.1%
Total	359	100.0%	236	100.0%

How many people live in your household?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
1 person (I live alone)	53	14.8%	30	12.7%
2 people	131	36.5%	86	36.4%
3 people	72	20.1%	40	16.9%
4 people	48	13.4%	44	18.6%
5 people	38	10.6%	21	8.9%
6 or more people	17	4.7%	15	6.4%
Total	359	100.0%	236	100.0%

How many cars, motorcycles, pickup trucks, minivans, etc., are there in your household?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
0 (no vehicles)	12	3.3%	2	.8%
1 vehicle	102	28.4%	61	25.8%
2 vehicles	156	43.5%	106	44.9%
3 vehicles	52	14.5%	49	20.8%
4 vehicles	23	6.4%	9	3.8%
5 or more vehicles	14	3.9%	9	3.8%
Total	359	100.0%	236	100.0%

What is your gender?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Female	207	57.7%	155	65.7%
Male	152	42.3%	81	34.3%
Total	359	100.0%	236	100.0%

Which category represents your age?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
16-24	30	8.4%	18	7.6%
25-34	55	15.3%	45	19.1%
35-44	66	18.4%	63	26.7%
45-54	112	31.2%	52	22.0%
55-64	76	21.2%	47	19.9%
65-74	17	4.7%	9	3.8%
75 or older	3	.8%	2	.8%
Total	359	100.0%	236	100.0%

What is your employment status?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Employed full-time	157	43.7%	116	49.2%
Employed part-time	38	10.6%	27	11.4%
Self-employed	36	10.0%	26	11.0%
Student	16	4.5%	5	2.1%
Student and employed	7	1.9%	3	1.3%
Retired	35	9.7%	28	11.9%
Homemaker	39	10.9%	19	8.1%
Not currently employed	31	8.6%	12	5.1%
Total	359	100.0%	236	100.0%

Which category best represents your annual household income before taxes?

	Large hub		Small/Medium hub	
	Count	Percent	Count	Percent
Under \$20,000	17	4.7%	7	3.0%
\$20,000–\$39,999	45	12.5%	49	20.8%
\$40,000–\$59,999	59	16.4%	43	18.2%
\$60,000–\$79,999	79	22.0%	53	22.5%
\$80,000–\$99,999	49	13.6%	33	14.0%
\$100,000–\$124,999	44	12.3%	18	7.6%
\$125,000–\$149,999	26	7.2%	9	3.8%
\$150,000–\$174,999	16	4.5%	11	4.7%
\$175,000–\$199,999	13	3.6%	5	2.1%
\$200,000 or more	11	3.1%	8	3.4%
Total	359	100.0%	236	100.0%

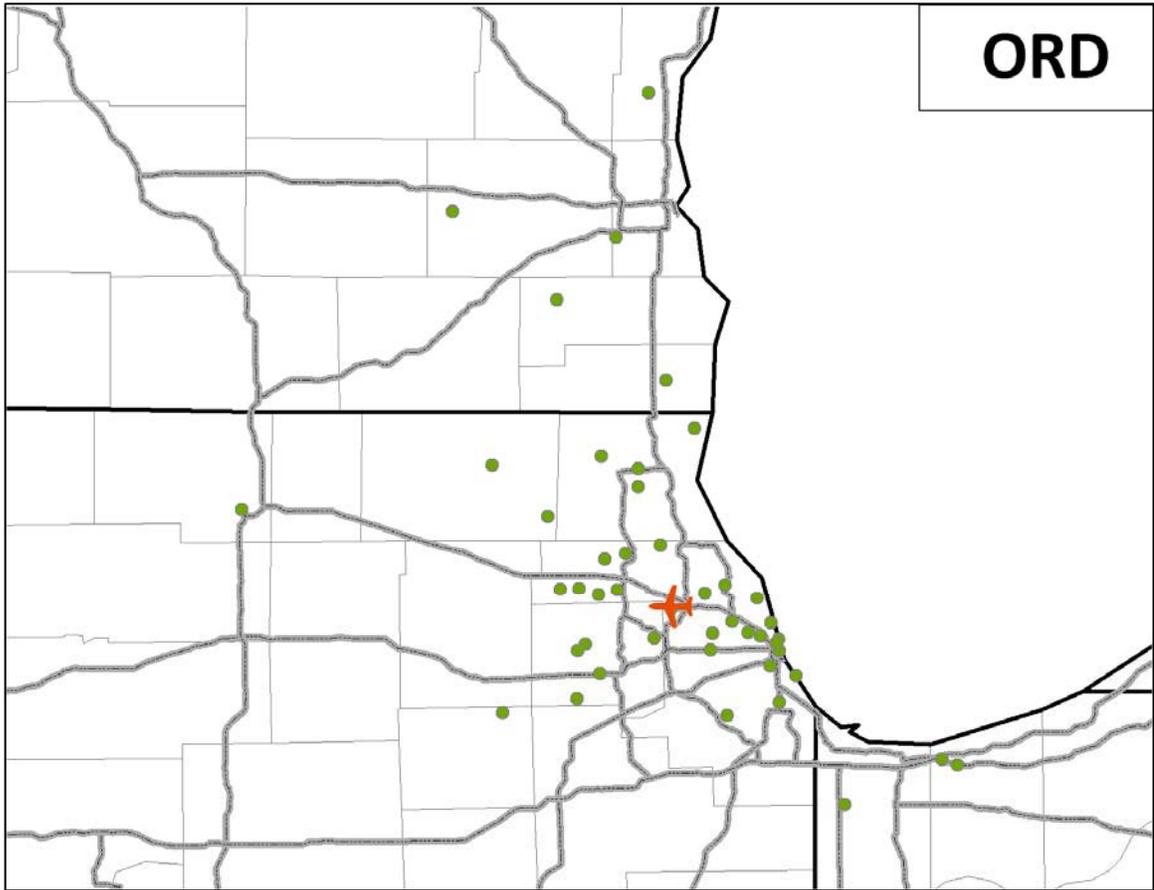
Attachment E4

Respondent Origin by Airport

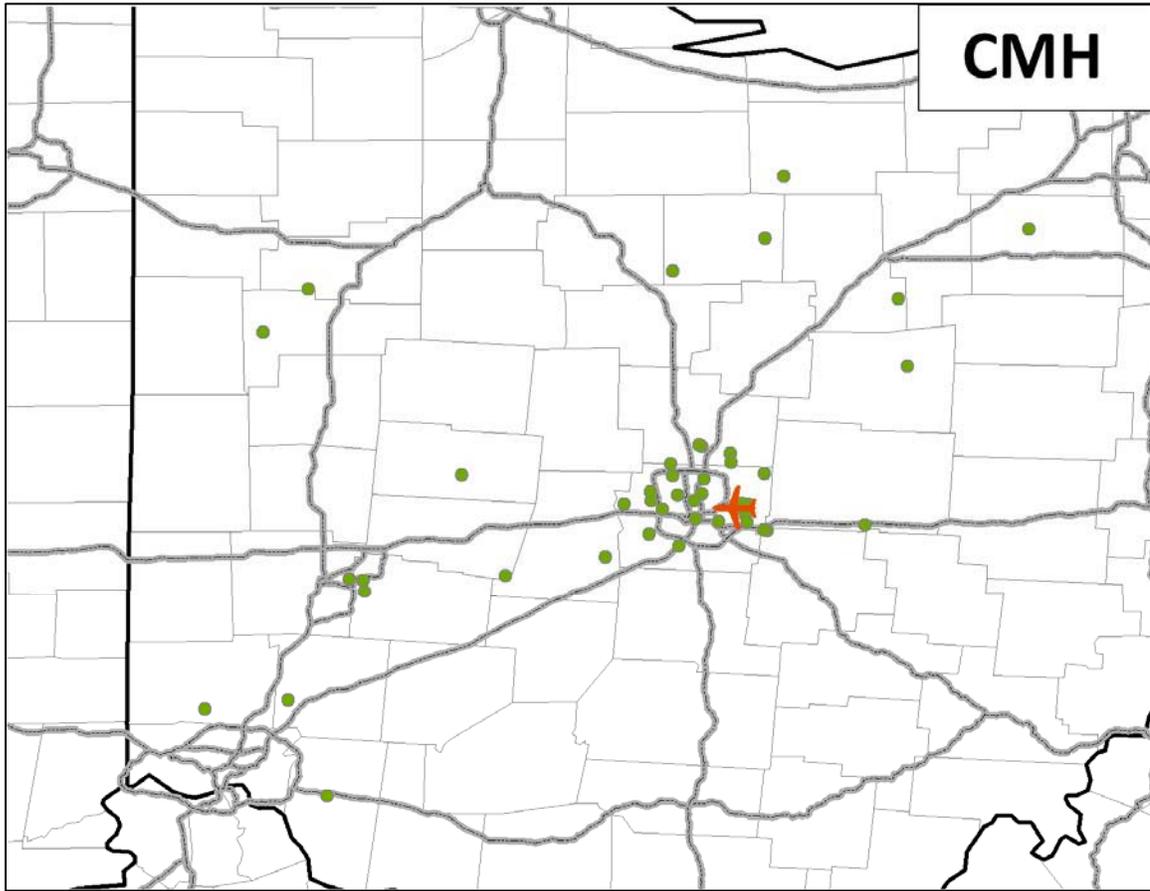
Boston Logan (BOS) Respondent Trip Origin Locations



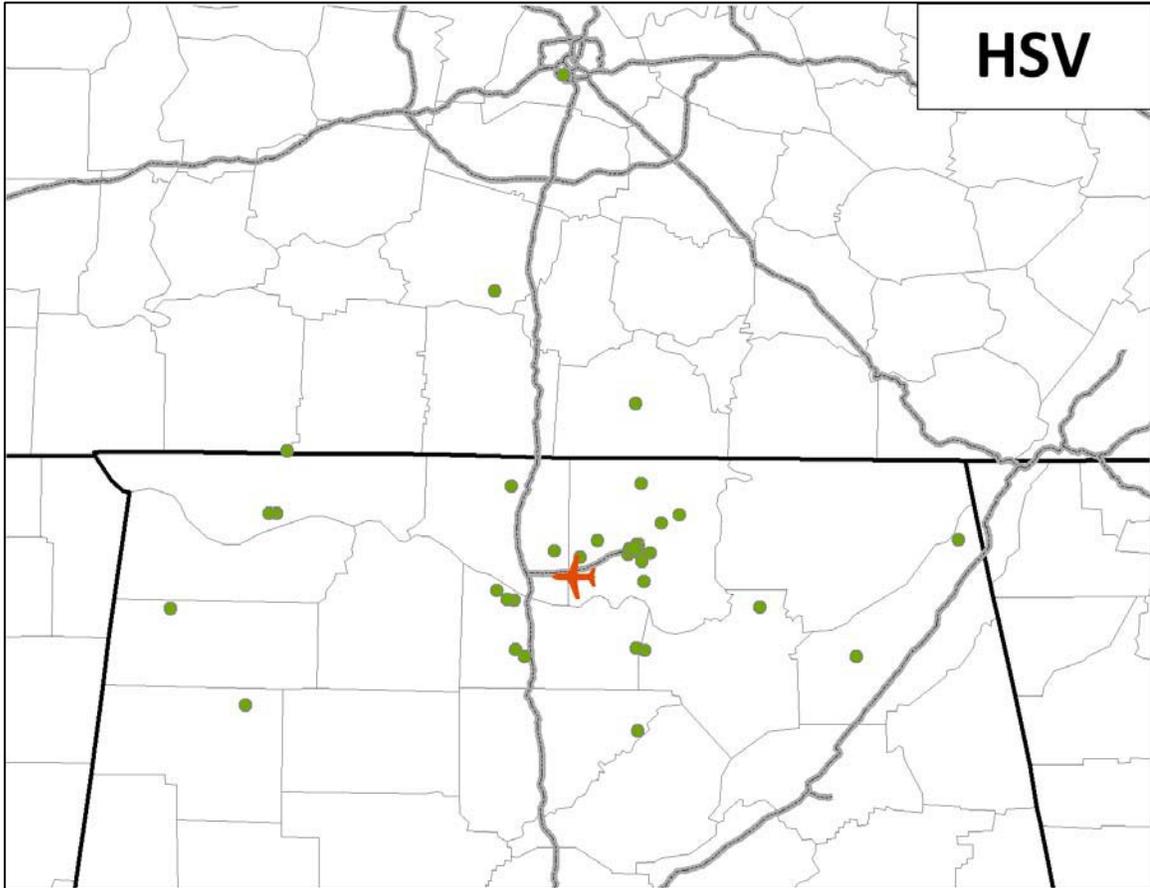
Chicago O'Hare (ORD) Respondent Trip Origin Locations



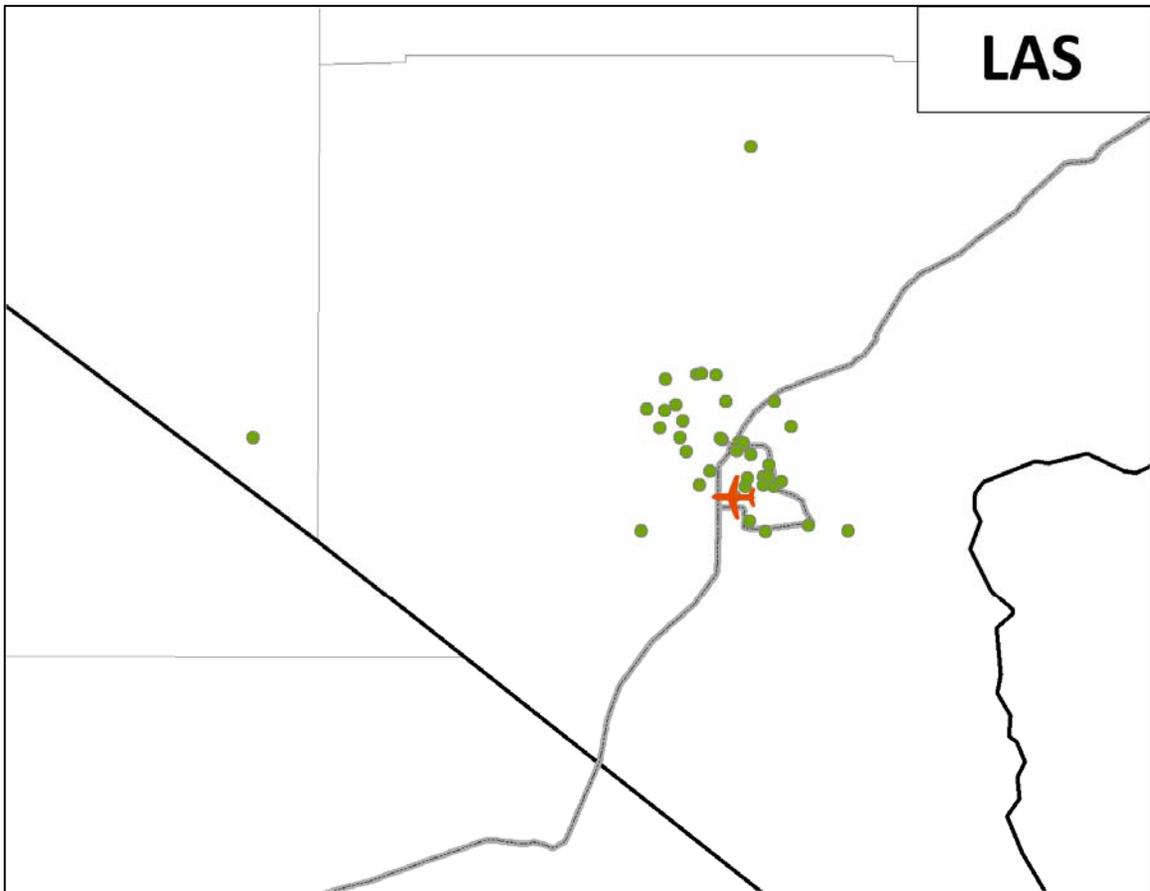
Columbus (CMH) Respondent Trip Origin Locations



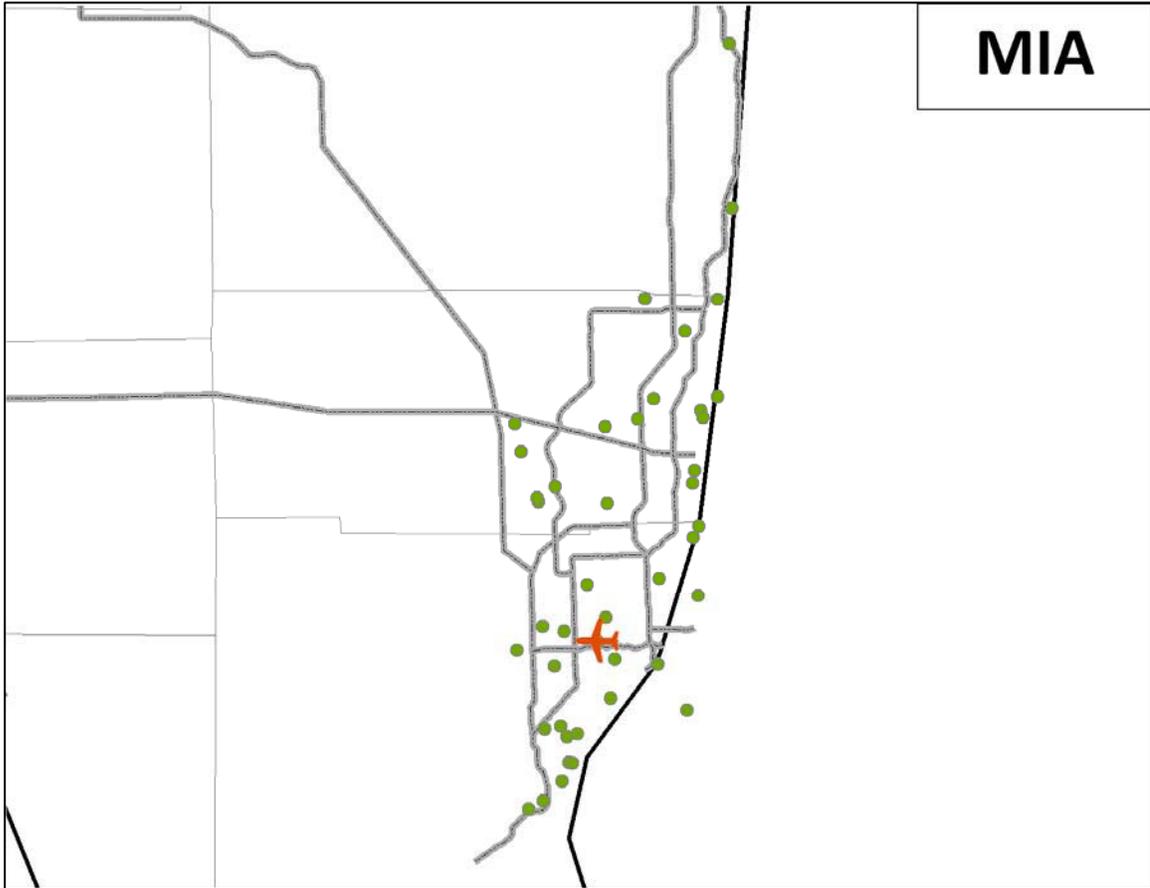
Huntsville (HSV) Respondent Trip Origin Locations



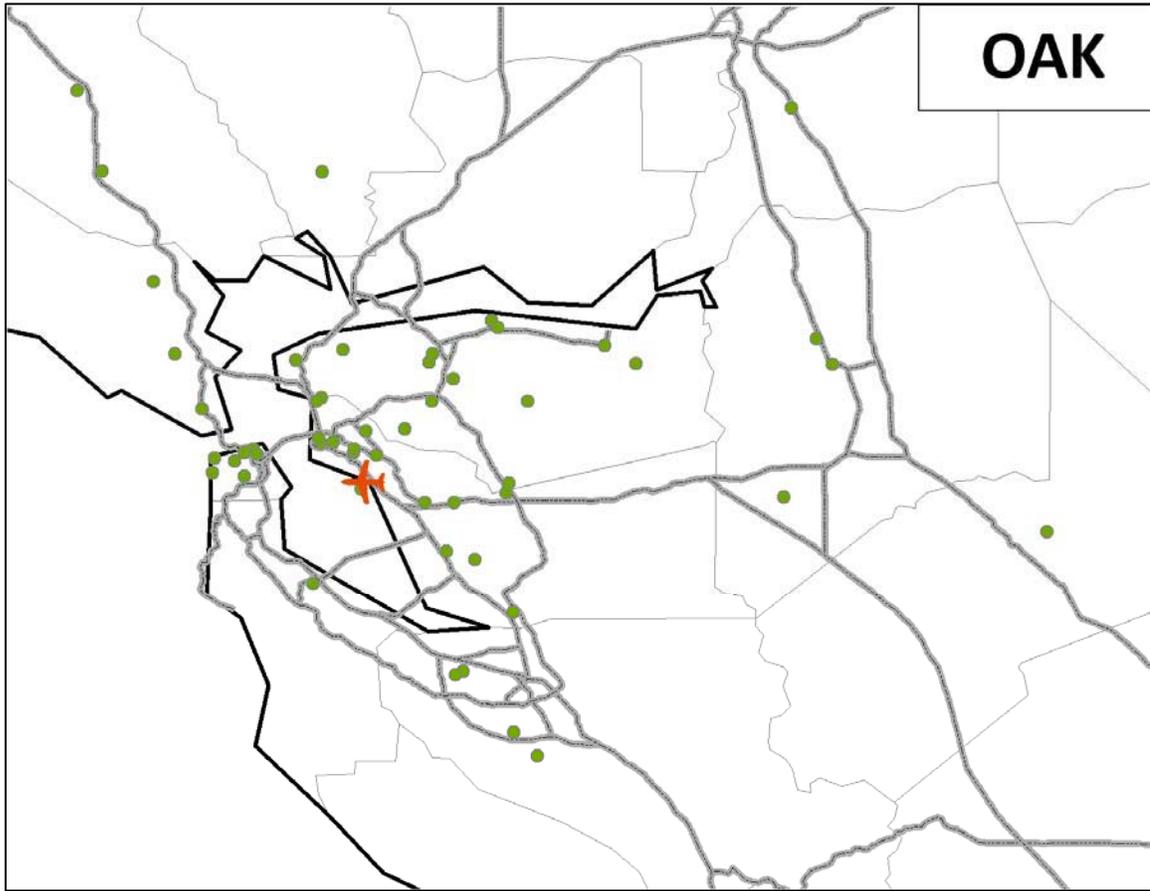
Las Vegas McCarran (LAS) Respondent Trip Origin Locations



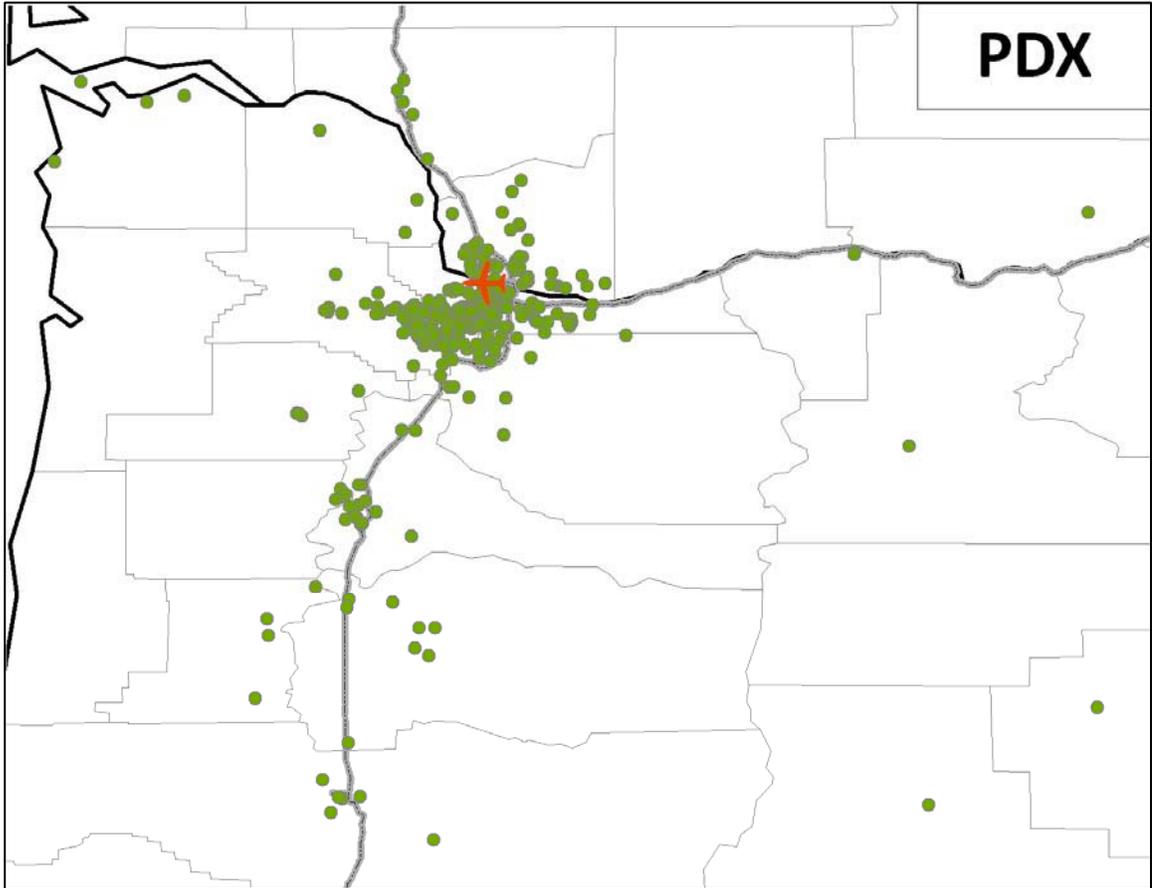
Miami (MIA) Respondent Trip Origin Locations



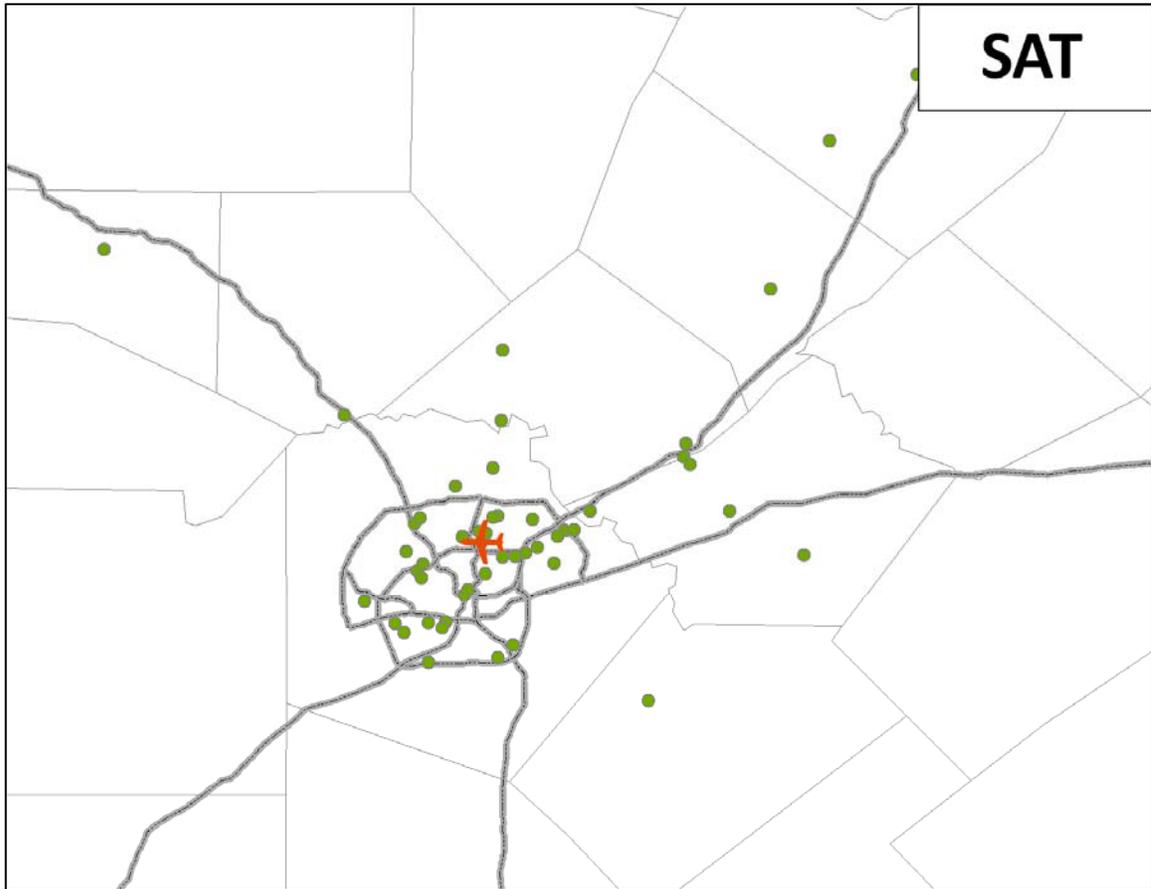
Oakland (OAK) Respondent Trip Origin Locations



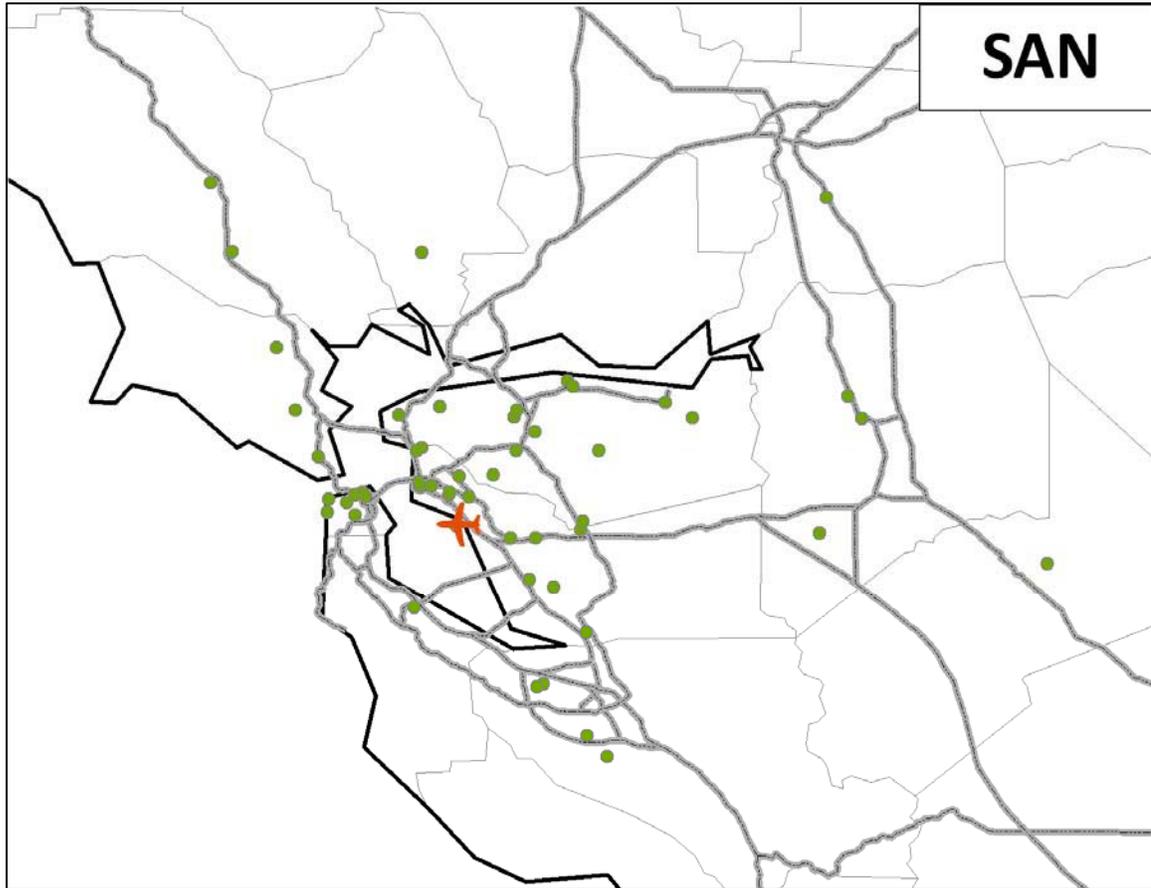
Portland (PDX) Respondent Trip Origin Locations



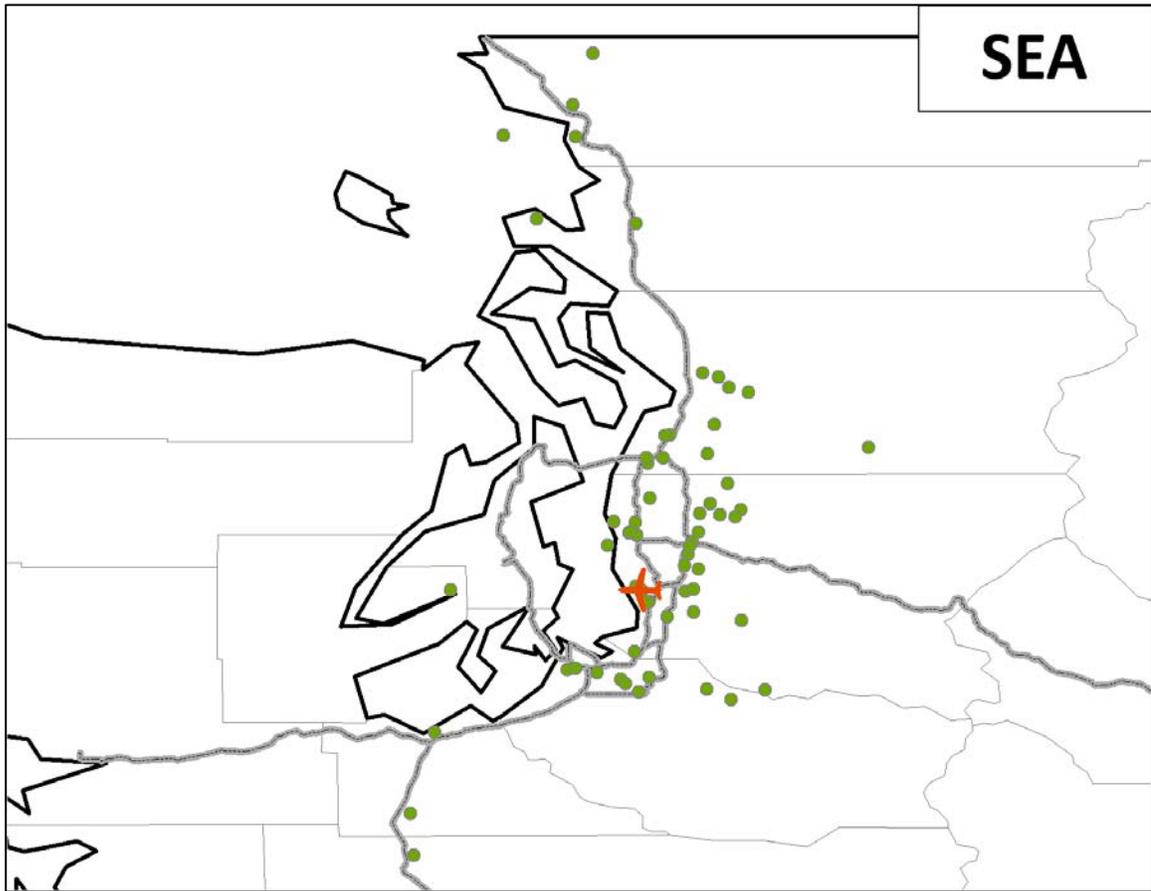
San Antonio (SAT) Respondent Trip Origin Locations



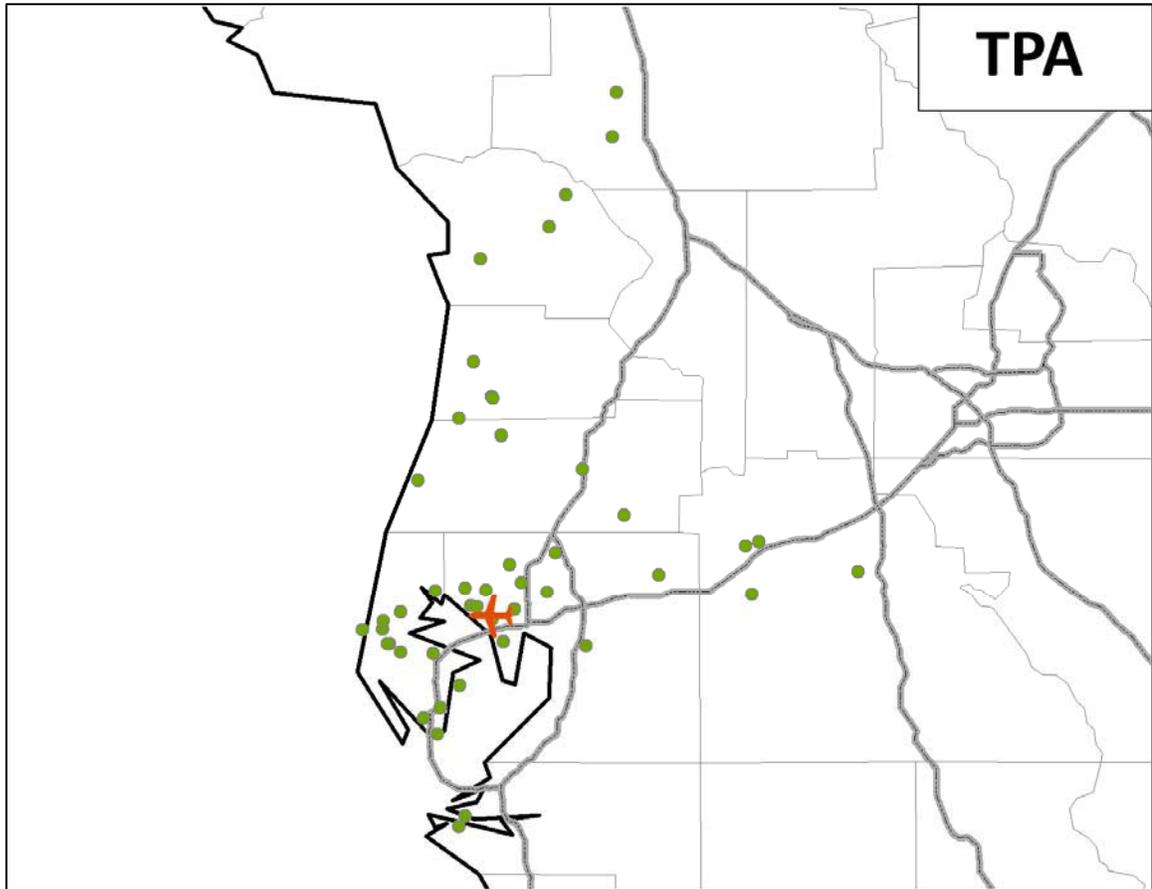
San Diego (SAN) Respondent Trip Origin Locations



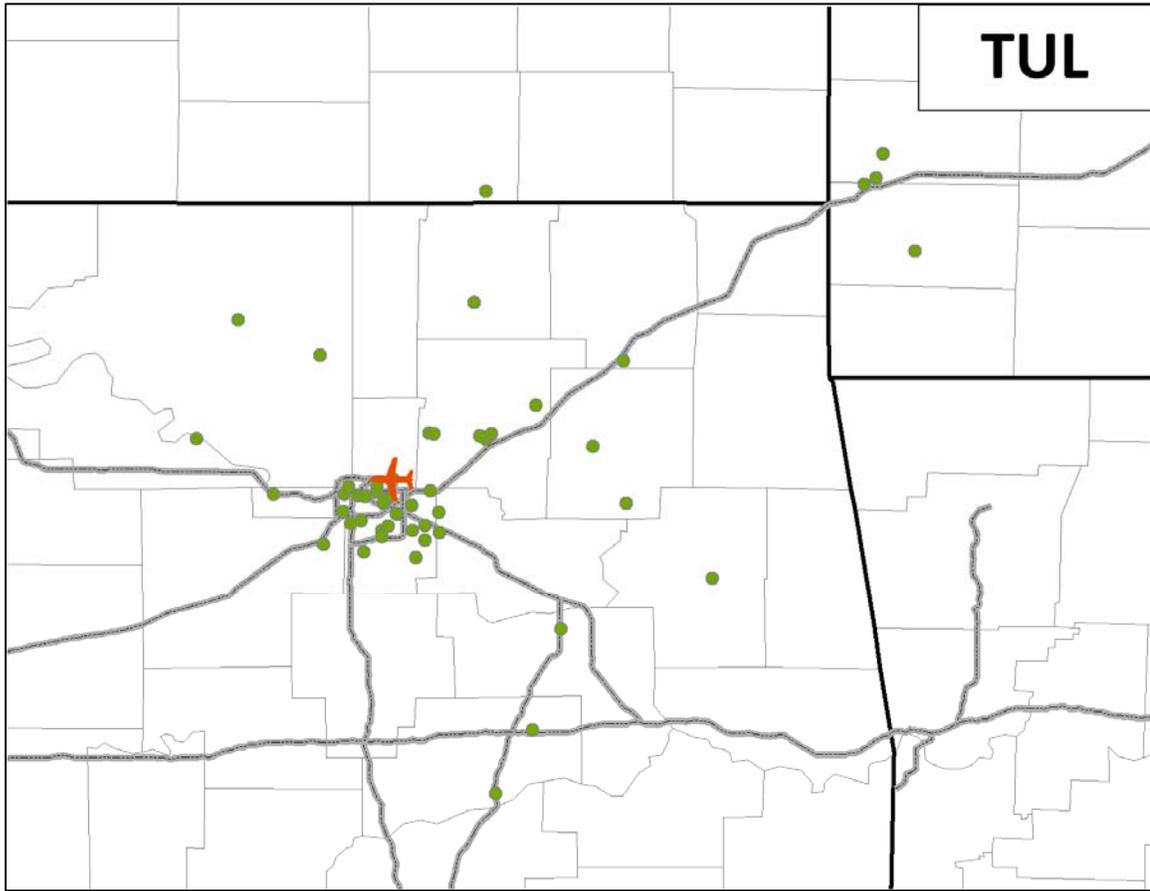
Seattle-Tacoma (SEA) Respondent Trip Origin Locations



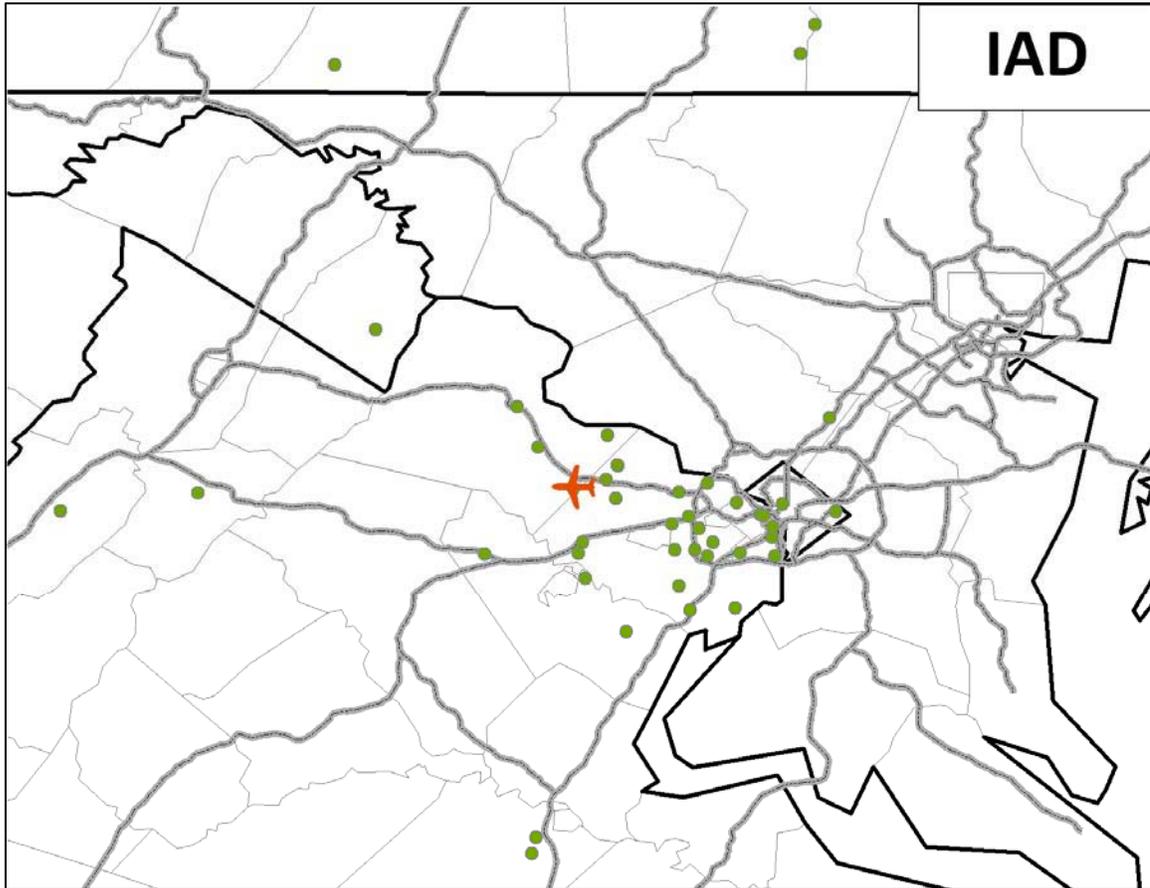
Tampa (TPA) Respondent Trip Origin Locations



Tulsa (TUL) Respondent Trip Origin Locations



Washington Dulles (IAD) Respondent Trip Origin Locations



APPENDIX F DESCRIPTION OF ACRP 10-06 AIRPORT PARKING FORECAST MODEL

ACRP 10-06 AIRPORT PARKING FORECAST MODEL DEVELOPMENT

A general airport parking forecast model for resident airline passengers was developed using the stated preference data collected from 911 survey respondents from the 14 participating airports. The general airport parking forecast model was specifically developed to be used by any airport to get a planning-level understanding of the effects of parking scenarios and to understand the impact that parking and transit policies have on mode share and constrained parking at airports. As discussed below data from the 13 airports were included in the model as well as weighted data from Portland International Airport (PDX) to create a combined, general airport parking forecast model. For more detailed analysis of a specific airport, an airport-specific model was also developed for PDX using only the 316 PDX respondents.

The statistical estimation of model coefficients and testing of alternative model structures were completed using industry standard discrete choice modeling methods. The model coefficients provide information about the relative importance of the attributes shown in the stated preference experiments and can be used to construct overall preferences for each of the airport ground access mode alternatives. Using these overall preferences, a probability of using an airport ground access mode under specific conditions can be calculated, which allows for forecasting airport ground access mode share under different parking policy scenarios.

Experimental Design

In each stated preference experiment (the experimental design is discussed in Appendix D), respondents were presented with four alternatives for a making a future trip to the airport:

- Park and Walk to the Terminal
- Park and Take a Shuttle to the Terminal
- Drop Off
- High Occupancy Vehicle

In the stated preference experiments, the drop off alternative switched between a respondent getting dropped off by family or friends and being dropped off by a taxicab. Respondents whose access distance to their selected airport was less than 15 miles saw the high occupancy vehicle alternative switch between a transit (e.g., rail or bus) alternative and a shared-ride van alternative. Respondents whose access distance was greater than 15 miles saw the high occupancy vehicle alternative switch between a scheduled bus alternative and a shared-ride van alternative.

For each of the four alternatives, a set of attributes was shown describing the details of the trip for that ground access mode. These trip details included attributes such as travel time, parking costs, and HOV fare. The values shown for each attribute were derived from an orthogonal experimental design, which is a type commonly used for constructing stated preference experiments. Each respondent was asked to complete eight stated preference experiments. **Figure 1** contains an example of a stated preference experiment.

ACRP Airport Access Study



Which option would you choose for traveling to Boston Logan Airport for a business trip?

Take Shared Ride Van	Dropped Off by Taxi	Drive and Walk from Parking	Drive and Take Shuttle from Parking
Travel time to airport: 58 mins. One-way fare to airport: \$17.50 per person Dropped off at terminal	Travel time to airport: 45 mins. One-way taxi fare to airport: \$14.00 Dropped off at terminal	Travel time to airport: 45 mins. Daily parking fee: \$25.00 Walking distance to terminal Drive around looking for parking spot: 10 minutes	Travel time to airport: 45 mins. Daily parking fee: \$12.50 Wait for airport shuttle to terminal: 5 minutes Ride airport shuttle to terminal: 8 minutes Drive around looking for parking spot: 10 minutes
<input type="radio"/> I'll take a shared ride van	<input type="radio"/> I'll get dropped off by taxi	<input type="radio"/> I'll drive and walk from parking	<input type="radio"/> I'll drive and take a shuttle from parking

Question 1 of 8

Next Question

Figure 1 An Example of a Stated Preference Experiment
 Source: Resource Systems Group, Inc., April 2009.

Specification Testing

Responses from the stated preference experiments were expanded into a dataset containing eight observations for each of the 911 respondents, yielding a total of 7,288 observations. These data were used to support estimation of the coefficients of a multinomial logit (MNL) choice model for three segments:

- Business trips to the 14 airports
- Non-business trips to the 14 airports
- All trips (business and non-business) to PDX

During model estimation, it was observed that there were behavioral differences between business and non-business trips that could be captured by using separate choice models. For a more detailed analysis of a specific airport, a separate airport-specific model was developed based on the PDX survey results. This also allows for a comparison to be made between an airport-specific parking forecast model and the nationally representative general airport parking forecast model.

For all three segments, several utility equation structures were tested using the variables included in the stated preference experiments, as well as trip characteristics and demographic variables. The general structure of these equations, or specifications were similar to the final specifications used; however, other variables were introduced, one at a time, to test potential interactions with parking costs and travel time. These model specifications were developed to determine whether other characteristics of the respondents' trip or demographic information significantly influenced their choice of airport ground access mode. **Table 1** contains a subset of the variables tested during the stated preference model estimation.

In addition, non-linear transformations of the cost attributes (parking fees, taxicab fare, transit fare, shared van fare, and scheduled bus fare) were tested to determine whether a respondent's household income affected choice of airport access mode. The cost attributes were divided by the natural log of a respondent's household income. The effect of this transformation is such that as household income increases, sensitivity to the cost attributes decreases but at a rate that is less than linear with income. These transformations significantly improved model fit and so were included in the final specifications reported below.

Finally, belonging to a competitive airport system was tested. It was observed that there were some statistically significant behavioral differences between travelers in a competitive system versus travelers in a non-competitive system. However, these differences resulted in very little difference in share for each of the ground access modes. For instance, it was observed that users of a competitive system were in aggregate less price sensitive than users of the non-competitive system but were on average paying more for parking. This resulted in equivalent mode shares. The following models do not include variables segmented by competing and non-competing systems.

Table 1 Variables Tested During the Stated Preference Model Estimation

Variable	Description	Statistically Significant? ¹		
		General Airport Model		Airport-Specific Model
		Business	Non-Business	
Parking Fee – Not Reimbursed or Reimbursed	The difference in cost sensitivities that travelers exhibit when costs are reimbursed by a third party	Yes	No	Yes
Total Trip Duration	The additional sensitivity to the parking modes for longer duration trips.	Yes	Yes	Yes
Distance from Airport	The preference of some or all of the transit modes for longer distance access trips.	Yes	Yes	Yes
Household Size	The preference of the drop-off mode for those travelers who do not live alone.	Yes	Yes	Yes
Small and Medium Hub	The additional sensitivity to some of the modes for those travelers using a small or medium hub airport.	Yes	Yes	–
Current Mode (Inertia)	The preference of travelers to choose the mode that they are currently using.	Yes	No	Yes
Off Airport Parking	The effect that the presence of off airport parking has on the two parking modes.	Yes	Yes	–
Frequency of Transit Use	The effect of a traveler’s familiarity with transit on the transit modes.	Yes	Yes	Yes
Car Availability	The preference of the parking modes for those travelers who have a car available to them for making the trip.	No	Yes	No
Parking Space Availability	The additional time spent driving around the parking area looking for a parking spot.	No	No	No
Ground Party Size	The sensitivity to some of the transit modes as the ground party size increases.	No	Yes	Yes
Airport Mode Frequency	The preference towards a traveler’s current mode as the percentage of time they have used it in the past year increases.	No	Yes	Yes
Number of Checked Bags	The sensitivity to some of the transit modes as the amount of luggage increases.	No	Yes	No

Notes:

– Not applicable.

¹ A variable is considered statistically significant if it can be shown to have an influence on airport ground access mode choice behavior. In this context, a variable is statistically significant if it is shown to be different from 0 using the t-test at the 95 percent confidence level.

Source: Resource Systems Group, Inc., April 2009.

Sample Weighting

For the two models that were based on data from all 14 airports, the sample was weighted prior to estimation so that all had equal weights in the statistical estimation process. As part of the sampling plan, a larger number of respondents were collected from the PDX catchment area. This larger sample from a single airport allowed for the estimation of a model specific to circumstances at PDX. To avoid having the choices made by respondents using PDX dominate the results of the general airport parking forecast models, the sample was weighted so the choices made by respondents at each airport had equal weight in the model estimation. **Table 2** contains the sample size and the weight calculation for each of the 14 airports.

Table 2 Sample Size and Weight Calculations for Each of the Participating Airports

Airport	Survey Count	Survey Target	Estimated Weight
Boston-Logan International (BOS)	46	50	50/46 = 1.086957
Chicago O'Hare International (ORD)	44	50	50/44 = 1.136264
Port Columbus International (CMH)	45	50	50/45 = 1.111111
Huntsville International (HSV)	36	50	50/36 = 1.388889
Las Vegas McCarran International (LAS)	38	50	50/38 = 1.315789
Miami International (MIA)	44	50	50/44 = 1.136364
Oakland International (OAK)	51	50	50/51 = 0.980392
Portland International (PDX)	316	50	50/316 = 0.158228
San Antonio International (SAT)	50	50	50/50 = 1.000000
San Diego International (SAN)	39	50	50/39 = 1.282051
Seattle-Tacoma International (SEA)	59	50	50/59 = 0.847458
Tampa International (TPA)	46	50	50/46 = 1.086957
Tulsa International (TUL)	54	50	50/54 = 0.925926
Washington Dulles International (IAD)	43	50	50/43 = 1.162791
Total	911	700	

Source: Resource Systems Group, Inc., August 2009.

Statistical Estimation of the Model Coefficients

Tables 3 through **8** contain the logit model utility function specification and model coefficients for the General Airport Business, General Airport Non-Business, and the PDX choice models. A complete explanation of the model structures can be found in **Attachment F1**.

Table 3 Utility Specification for General Airport Business Model

Coefficient	Alternatives						
	Park and Walk	Park and Shuttle	Drop Off by Taxicab	Drop Off by Family or Friends	Transit	Shared Van	Scheduled Bus
Parking Fee – Not Reimbursed	✓	✓					
Parking Fee – Reimbursed	✓	✓					
Fare for Taxicab, Transit, Shared Van & Scheduled Bus			✓		✓	✓	✓
Additional Travel Time over Park and Walk		✓			✓	✓	✓
Total Trip Duration	✓	✓					
Distance from Airport – Shared Van						✓	
Distance from Airport – Scheduled Bus							✓
Household Size – Lives Alone				✓			
Household Size – Lives With Others				✓			
Small and Medium Hub – Taxicab			✓				
Small and Medium Hub – Shared Van						✓	
Current Mode (Inertia)	✓	✓	✓	✓	✓	✓	✓
Off Airport Parking – Park and Shuttle		✓					
Off Airport Parking – Park and Walk	✓						
Never Use Transit					✓	✓	✓
Rare to Occasional Use of Transit					✓	✓	✓
Daily Use of Transit					✓	✓	✓
Alternative Specific Constant – Park and Shuttle		✓					
Alternative Specific Constant – Taxicab			✓				
Alternative Specific Constant – Drop Off				✓			
Alternative Specific Constant – Transit					✓		
Alternative Specific Constant – Shared Van						✓	
Alternative Specific Constant – Bus							✓

Source: Resource Systems Group, Inc., August 2009.

Table 4 Model Coefficients for the General Airport Business Model

Coefficient	Units	Value	Std Error	T-Statistic
Parking Fee – Not Reimbursed	Dollars/log(income ¹)	-1.04	0.102	-10.19
Parking Fee – Reimbursed	Dollars/log(income ¹)	-0.65	0.126	-5.15
Fare for Taxicab, Transit, Shared Van & Scheduled Bus	Dollars/log(income ¹)	-0.424	0.0449	-9.44
Additional Travel Time over Park and Walk	Minutes	-0.0236	0.00843	-2.8
Total Trip Duration	Log of Days	-0.311	0.0866	-3.59
Distance from Airport – Shared Van	Log of Miles	1.04	0.178	5.85
Distance from Airport – Scheduled Bus	Log of Miles	1.28	0.22	5.8
Household Size – Lives Alone	(0,1)	0.0	0.0	0.0
Household Size – Lives With Others	(0,1)	0.572	0.258	2.22
Small and Medium Hub – Taxicab	(0,1)	-0.592	0.301	-1.97
Small and Medium Hub – Shared Van	(0,1)	-1.1	0.246	-4.46
Current Mode (Inertia)	(0,1)	1.02	0.0874	11.71
Off Airport Parking – Park and Shuttle	1,000s of parking spots	0.0821	0.0272	3.02
Off Airport Parking – Park and Walk	1,000s of parking spots	-0.0324	0.0323	-1.0
Never Use Transit	(0,1)	0.0	0.0	0.0
Rare to Occasional Use of Transit	(0,1)	1.58	0.287	5.5
Daily Use of Transit	(0,1)	3.31	0.367	9.01
Alternative Specific Constant – Park and Shuttle	(0,1)	-0.108	0.209	-0.51
Alternative Specific Constant – Taxicab	(0,1)	0.117	0.392	0.3
Alternative Specific Constant – Drop Off	(0,1)	-1.11	0.322	-3.45
Alternative Specific Constant – Transit	(0,1)	-2.0	0.38	-5.27
Alternative Specific Constant – Shared Van	(0,1)	-4.29	0.668	-6.43
Alternative Specific Constant – Scheduled Bus	(0,1)	-5.72	0.804	-7.12

Number of individuals:	177
Number of observations:	1416
Number of estimated parameters:	21
Log likelihood at zero values:	-1381.56
Final log-likelihood:	-974.231
Rho-square:	0.295
Adjusted rho-square:	0.28

Note:

¹ Income in hundreds of dollars

Source: Resource Systems Group, Inc., August 2009.

Table 5 Utility Specification for General Airport Non-Business Model

Coefficient	Alternatives						
	Park and Walk	Park and Shuttle	Taxicab	Drop Off by Family or Friends	Transit	Shared Van	Scheduled Bus
Parking Fee	✓	✓					
Fare for Taxicab, Transit, Shared Van & Scheduled Bus			✓		✓	✓	✓
Additional Travel Time over Park and Walk		✓			✓	✓	✓
Total Trip Duration	✓	✓					
Distance from Airport						✓	✓
Car Availability	✓	✓					
Household Size – Lives Alone				✓			
Household Size – Lives With Others				✓			
Small and Medium Hub – Taxicab			✓				
Small and Medium Hub – Shared Van						✓	
Small and Medium Hub – Scheduled Bus							✓
Airport Mode Frequency Less than 25%	✓	✓	✓	✓	✓	✓	✓
Airport Mode Frequency 25% to 50%	✓	✓	✓	✓	✓	✓	✓
Airport Mode Frequency 50% to 75%	✓	✓	✓	✓	✓	✓	✓
Airport Mode Frequency Over 75%	✓	✓	✓	✓	✓	✓	✓
Number of Checked Bags					✓	✓	
Off Airport Parking – Park and Shuttle		✓					
Off Airport Parking – Park and Walk	✓						
Ground Party Size						✓	✓
Never Use Transit					✓	✓	✓
Rarely Use Transit					✓	✓	✓
Occasional to Daily Use of Transit					✓	✓	✓
Alternative Specific Constant – Park and Shuttle		✓					
Alternative Specific Constant – Taxicab			✓				
Alternative Specific Constant – Drop Off by Family or Friends				✓			
Alternative Specific Constant – Transit					✓		
Alternative Specific Constant – Shared Van						✓	
Alternative Specific Constant – Scheduled Bus							✓

Source: Resource Systems Group, Inc., August 2009.

Table 6 Model Coefficients for the General Airport Non-Business Model

Coefficient	Units	Value	Std Error	T-Statistic
Parking Fee	Dollars/log(income ¹)	-1.12	0.0664	-16.91
Fare for Taxicab, Transit, Shared Van and Scheduled Bus	Dollars/log(income ¹)	-0.359	0.0202	-17.72
Additional Travel Time over Park and Walk	Minutes	-0.00534	0.00379	-1.41
Trip Duration	Log of Days	-0.319	0.0496	-6.45
Distance from Airport	Log of Miles	0.362	0.0726	4.98
Car Availability	(0,1)	0.525	0.094	5.59
Household Size – Lives Alone	(0,1)	0.0	0.0	0.0
Household Size – Lives With Others	(0,1)	0.567	0.117	4.84
Small Hub – Taxicab	(0,1)	-0.595	0.123	-4.85
Small Hub – Van	(0,1)	-0.597	0.11	-5.43
Small Hub – Bus	(0,1)	-0.546	0.114	-4.78
Airport Mode Frequency Less than 25%	(0,1)	0.0	0.0	0.0
Airport Mode Frequency 25% to 50%	(0,1)	0.591	0.13	4.55
Airport Mode Frequency 50% to 75%	(0,1)	0.731	0.182	4.03
Airport Mode Frequency Over 75%	(0,1)	1.29	0.0561	23.0
Number of Checked Bags	Number of Bags	-0.193	0.0359	-5.38
Off Airport Parking – Park and Shuttle	1,000s of parking spots	0.0335	0.0124	2.69
Off Airport Parking – Park and Walk	1,000s of parking spots	-0.0801	0.0209	-3.83
Ground Party Size	Number of People	-0.0848	0.0338	-2.51
Never Use Transit	(0,1)	0.0	0.0	0.0
Rarely Use Transit	(0,1)	0.41	0.101	4.07
Occasional to Daily Use of Transit	(0,1)	0.924	0.103	8.95
Alternative Specific Constant – Park and Shuttle	(0,1)	0.0654	0.113	0.58
Alternative Specific Constant – Taxicab	(0,1)	0.502	0.212	2.37
Alternative Specific Constant – Drop Off by Family or Friends	(0,1)	0.0762	0.193	0.39
Alternative Specific Constant – Transit	(0,1)	-0.323	0.202	-1.6
Alternative Specific Constant – Shared Van	(0,1)	-0.911	0.303	-3.01
Alternative Specific Constant – Scheduled Bus	(0,1)	0.404	0.216	1.87

Number of individuals:	734
Number of observations:	5872
Number of estimated parameters:	25
Log likelihood at zero values:	-6381.69
Final log-likelihood:	-4158.19
Rho-square:	0.348
Adjusted rho-square:	0.345

Note:

¹ Income in hundreds of dollars

Source: Resource Systems Group, Inc., August 2009.

Table 7 Utility Specification for the Portland International Airport Model

Coefficient	Alternatives						
	Park and Walk	Park and Shuttle	Taxicab	Drop Off by Family or Friends	Transit	Shared Van	Scheduled Bus
Parking Fee – Not Reimbursed	✓	✓					
Parking Fee – Reimbursed	✓	✓					
Fare for Taxicab, Transit, Shared Van and Scheduled Bus			✓		✓	✓	✓
Additional Travel Time over Park and Walk		✓			✓	✓	✓
Trip Duration	✓	✓					
Distance from Airport						✓	✓
Household Size – Lives Alone				✓			
Household Size – Lives With Others				✓			
Current Mode (Inertia)	✓	✓	✓	✓	✓	✓	✓
Airport Mode Frequency Less Than 75%	✓	✓	✓	✓	✓	✓	✓
Airport Mode Frequency Over 75%	✓	✓	✓	✓	✓	✓	✓
Ground Party Size						✓	✓
Never Use Transit					✓	✓	✓
Rarely Use Transit					✓	✓	✓
Occasional to Daily Use of Transit					✓	✓	✓
Alternative Specific Constant – Park and Shuttle		✓					
Alternative Specific Constant – Taxicab			✓				
Alternative Specific Constant – Drop Off by Family or Friends				✓			
Alternative Specific Constant – Transit					✓		
Alternative Specific Constant – Shared Van						✓	
Alternative Specific Constant – Scheduled Bus							✓

Source: Resource Systems Group, Inc., August 2009.

Table 8 Model Coefficients for the Portland International Airport Model

Coefficient	Units	Value	Std Error	T-Test
Parking Fee – Not Reimbursed	Dollars/log(income ¹)	-0.927	0.0576	-16.08
Parking Fee – Reimbursed	Dollars/log(income ¹)	-0.55	0.08	-6.87
Fare for Taxicab, Transit, Shared Van and Scheduled Bus	Dollars/log(income ¹)	-0.281	0.0217	-12.95
Additional Travel Time over Park and Walk	Minutes	-0.0132	0.00639	-2.06
Trip Duration	Log of Days	-0.297	0.0731	-4.07
Distance from Airport	Log of Miles	0.746	0.111	6.74
Household Size – Lives Alone	(0,1)	0.0	0.0	0.0
Household Size – Lives With Others	(0,1)	0.457	0.18	2.54
Current Mode (Inertia)	(0,1)	0.644	0.0956	6.74
Airport Mode Frequency Less Than 75%	(0,1)	0.0	0.0	0.0
Airport Mode Frequency Over 75%	(0,1)	0.974	0.132	7.39
Ground Party Size	Number of People	-0.272	0.0583	-4.66
Never Use Transit	(0,1)	0.0	0.0	0.0
Rarely Use Transit	(0,1)	0.565	0.202	2.81
Occasional to Daily Use of Transit	(0,1)	1.29	0.199	6.46
Alternative Specific Constant – Park and Shuttle	(0,1)	0.606	0.156	3.88
Alternative Specific Constant – Taxicab	(0,1)	0.104	0.257	0.4
Alternative Specific Constant – Drop Off by Family or Friends	(0,1)	-0.32	0.239	-1.34
Alternative Specific Constant – Transit	(0,1)	-1.18	0.276	-4.29
Alternative Specific Constant – Shared Van	(0,1)	-2.75	0.415	-6.61
Alternative Specific Constant – Scheduled Bus	(0,1)	-2.9	0.446	-6.5

Number of individuals:	316
Number of observations:	2528
Number of estimated parameters:	18
Log likelihood at zero values:	-3504.55
Final log-likelihood:	-2126.12
Rho-square:	0.393
Adjusted rho-square:	0.388

Note:

¹ Income in hundreds of dollars

Source: Resource Systems Group, Inc., August 2009.

Value of Time by Region

The marginal rate of substitution between access travel time and fare (calculated using the ratio of those coefficients) provides the implied dollar value that travelers place on their travel time. The values of time for business and non-business travelers as estimated from these models are provided in **Table 9** and broken out by U.S. Census region.

Table 9 Values of Time by U.S. Census Region Using the General Airport Model

	Household Income		Business Travelers		Non-Business Travelers	
	Median	Mean	Mean VOT (\$ per hour)	Median VOT (\$ per hour)	Mean VOT (\$ per hour)	Median VOT (\$ per hour)
Midwest Region	\$48,917	\$63,634	\$20.68	\$21.56	\$7.58	\$7.82
Northeast Region	\$54,976	\$76,046	\$21.07	\$22.15	\$7.69	\$7.98
South Region	\$45,775	\$62,942	\$20.46	\$21.52	\$7.52	\$7.81
West Region	\$54,150	\$73,395	\$21.02	\$22.04	\$7.67	\$7.94

Source: Resource Systems Group, Inc., August 2009.

Development of Spreadsheet Parking Forecast Models

Using the logit-form discrete choice models, the probability of using an airport ground access mode under specific conditions can be calculated. Applying these models provides forecasts of airport ground access mode share under different scenarios aimed at alleviating constrained parking. To test the different scenarios in an automated way, two Excel-based parking forecast models were developed – one for the general airport models and one for the PDX model.

These parking forecast models apply the discrete choice models described above to the respective sample, calculating respondent-level preferences (or utilities) for each airport ground access mode. These utilities can then be converted to respondent-level probabilities (or shares) using the multinomial logit model structure, as shown in **Equation 1**. As in the model estimation, the sample used for the general airport forecasting model was weighted so that all airports have equal weight. The calculations are contained in multiple Excel worksheets and accept the forecasting model inputs described below. This model calculates an overall share for each ground access mode under different policy scenarios.

Equation 1 Multinomial Logit Model Structure

The multinomial logit model has the general form $p(i) = \frac{e^{U_i}}{\sum_{AllModes} e^{U_j}}$ where $p(i)$ is the probability that mode i will be chosen and U_i is the “utility” of mode i , a function of service and other variables.

Note: See, for example, M. E. Ben-Akiva and S. R. Lerman, *Discrete Choice Analysis*, MIT Press, 1985, for details on the model structure and statistical estimations procedures.

Source: Resource Systems Group, Inc., August 2009.

Figure 2 shows the ACRP 10-06 parking forecast model inputs. The inputs shaded in light gray are specific to an airport’s current situation (or base case). The inputs for the policy scenario to be tested are shaded in dark gray. In **Figure 3**, the model output—the resulting ground access mode shares—is displayed. The pricing and travel time model inputs are shown in **Table 10**.

Model Inputs

Airport Specific Base Case & Policy Scenario Levels	Base Case	Policy Scenario	Units
Park & Walk to Terminal Parking Fee	\$25.00	\$35.00	per day
Park & Ride Parking Shuttle to Terminal Parking Fee	\$18.00	\$20.00	per day
Parking Shuttle Riding Time to Terminal	10	10	minutes
Wait Time for Shuttle	10	5	minutes
Airport Drop Off Charge	N/A	\$0.00	\$/trip
Taxi/Limo/Towncar Fare by Distance	\$2.00	\$2.50	\$/mile
Transit Fare	\$3.00	\$3.50	\$/trip
Shared Van Fare by Distance	\$1.75	\$2.00	\$/mile
Scheduled Bus Fare by Distance	\$0.20	\$0.20	\$/mile
Additional Transit Time (over auto travel time)	0.30	0.30	mins/mile
Additional Shared Van Time (over auto travel time)	0.30	0.30	mins/mile
Additional Bus Time (over auto travel time)	0.30	0.30	mins/mile
Amount of Remote Parking	1.00	1.20	(1,000s of spaces)

Alternative Availability	Base Case	Policy Scenario
Park & Walk to Terminal	TRUE	TRUE
Park & Ride Shuttle to Terminal	TRUE	TRUE
Taxi/Limo/Towncar to Terminal	TRUE	TRUE
Dropped Off at Terminal	TRUE	TRUE
Transit to Airport	TRUE	TRUE
Shared Van to Airport	TRUE	TRUE
Scheduled Bus to Airport	TRUE	TRUE

Resident Air Passengers Trip Purpose	Base Case
Business Trips	29%
Non-Business Trips	71%

Airport Size	Small/Medium Hub

Base Case Ground Access Mode Shares	Business Trips
Park & Walk to Terminal	32%
Park & Ride Shuttle to Terminal	17%
Taxi/Limo/Towncar to Terminal	17%
Dropped Off at Terminal	14%
Transit to Airport	10%
Shared Van to Airport	9%
Scheduled Bus to Airport	1%
Total	100%

Base Case Ground Access Mode Shares	Nonbusiness Trips
Park & Walk to Terminal	13%
Park & Ride Shuttle to Terminal	18%
Taxi/Limo/Towncar to Terminal	9%
Dropped Off at Terminal	32%
Transit to Airport	18%
Shared Van to Airport	7%
Scheduled Bus to Airport	3%
Total	100%

Figure 2 ACRP 10-06 Parking Forecast Model Inputs

Source: Resource Systems Group, Inc., August 2009.

Model Output

	Business Trips			
Resident Access Mode Share	Base Case	Policy Scenario	Absolute Difference	% Difference
Park & Walk to Terminal	32%	23%	-9%	-30%
Park & Ride Shuttle to Terminal	17%	23%	6%	35%
Taxi/Limo/Towncar to Terminal	17%	14%	-3%	-17%
Dropped Off at Terminal	14%	19%	5%	35%
Transit to Airport	10%	11%	1%	14%
Shared Van to Airport	9%	9%	0%	-1%
Scheduled Bus to Airport	1%	1%	0%	38%
Total	100%	100%		

	Nonbusiness Trips			
Resident Access Mode Share	Base Case	Policy Scenario	Absolute Difference	% Difference
Park & Walk to Terminal	13%	9%	-4%	-35%
Park & Ride Shuttle to Terminal	18%	19%	1%	5%
Taxi/Limo/Towncar to Terminal	9%	7%	-2%	-21%
Dropped Off at Terminal	32%	37%	5%	15%
Transit to Airport	18%	19%	1%	4%
Shared Van to Airport	7%	7%	0%	-7%
Scheduled Bus to Airport	3%	4%	1%	17%
Total	100%	100%		

	All Trips			
Resident Access Mode Share	Base Case	Policy Scenario	Absolute Difference	% Difference
Park & Walk to Terminal	19%	13%	-6%	-32%
Park & Ride Shuttle to Terminal	18%	20%	2%	13%
Taxi/Limo/Towncar to Terminal	11%	9%	-2%	-20%
Dropped Off at Terminal	27%	32%	5%	18%
Transit to Airport	16%	17%	1%	6%
Shared Van to Airport	8%	7%	0%	-5%
Scheduled Bus to Airport	2%	3%	0%	19%
Total	100%	100%		

Figure 3 ACRP 10-06 Parking Forecast Model Output

Source: Resource Systems Group, Inc., August 2009.

Table 10 Pricing and Travel Time Model Inputs (Base Case)

Model Input	Units
Park & Walk to Terminal Parking Fee	per day
Park & Ride Shuttle to Terminal Parking Fee	per day
Shuttle Riding Time to Terminal	minutes
Wait Time for Shuttle	minutes
Airport Drop Off Charge ¹	\$/trip
Taxicab Fare by Distance	\$/mile
Transit Fare	\$/trip
Van Fare by Distance	\$/mile
Scheduled Bus Fare by Distance	\$/mile
Additional Transit Time (over auto travel time)	minutes/mile
Additional Van Time (over auto travel time)	minutes/mile
Additional Bus Time (over auto travel time)	minutes/mile
Amount of Off-Airport Parking	1,000s of spaces

Note:

¹ The drop-off fee is a one-time fee charged to all passengers who get dropped off at the terminal.

Source: Resource Systems Group, Inc., August 2009.

In addition to testing different pricing scenarios for parking and other ground access modes, the parking forecast models allow for the inclusion of access modes that might not currently exist at a given airport. For example, the models can be used to test the effect of adding a new HOV access mode at an airport that does not currently have such service.

Finally, the remaining inputs allow the users to enter specific information for their airport. This allows the analyst to calibrate the parking forecast model to the airport's specific situation and allows the parking forecast model to provide a reasonable sketch planning level analysis for any size airport. It should be noted that there are significant differences between airports and, therefore, a more detailed analysis would require gathering more data from a specific airport.

To calibrate the parking forecast model, a macro has been written to adjust the alternative-specific constants in an iterative manner. Instructions for how to set macro permissions in Excel for optimum use of the spreadsheet ACRP 10-06 parking forecast models are included in **Attachment F2**.

TESTING PARKING POLICY SCENARIOS

Using the ACRP 10-06 general airport parking forecast model, a variety of scenarios aimed at alleviating constrained parking can be tested. The following section documents a variety of scenarios and demonstrates the value of this approach in evaluating potential policy changes.

Scenario #1: Adding HOV as an Access Mode to a Small Hub Airport

Before calculating the effect of adding a rail or bus transit mode, the general airport parking forecast model was calibrated to the specific conditions of one of the small hub airports in the study. In this scenario, a rail or bus transit mode is added with an assumed fare of \$1.50. The travel time by rail and bus transit was assumed to be 30 percent greater than traveling by auto. The resulting mode share can be found in **Table 11**.

Table 11 The Effect of Adding a Rail or Bus Transit Mode to a Small Hub Airport

Access Mode Share	All Trips			
	Base Case	Policy Scenario	Absolute Difference	Percent Difference ¹
Park & Walk to Terminal	15%	14%	-1%	-5%
Park & Ride Shuttle to Terminal	25%	24%	-1%	-6%
Taxicab to Terminal	10%	9%	-1%	-14%
Dropped Off at Terminal	40%	38%	-2%	-6%
Transit to Airport	0%	7%	7%	-
Shared Van to Airport	5%	4%	-1%	-14%
Scheduled Bus to Airport	5%	5%	0%	0%
Total ²	100%	100%		

Notes:

¹ Percent difference calculations may differ due to rounding.

² Totals may not add to 100 percent due to rounding.

Source: Resource Systems Group, Inc., August 2009.

Seven percent of resident airline passengers are projected to use transit, with approximately two-thirds shifting from private auto modes. Two percent of the share would shift from driving and parking and two percent would shift from being dropped off in a private auto. The remaining customers are projected to shift from taxicabs and shared ride vans. In this scenario, the introduction of transit could potentially alleviate parking constraints and terminal curb congestion.

Scenario #2: Implementing a Drop-Off Fee at a Large Hub Airport

First, the general airport parking forecast model was calibrated to the specific conditions of one of the large hub airports in the study. In this test, a \$5 drop-off fee is charged to those airline passengers being dropped off at the terminal by family and friends. The intent of a drop-off fee would be to decrease private vehicle activity at the airport terminal curb area, which is a topic currently under consideration at some airports, referred to as congestion pricing. Another purpose could be to increase HOV mode share to the airport, or the share of passengers using public parking. Since drop-off fees were not shown in the stated preference experiments, the sensitivity to the HOV fares as estimated in the choice models is used to calculate the disutility associated with the drop-off fee. **Table 12** contains the results of implementing a drop-off fee.

Table 12 The Results of Implementing a \$5 Drop-Off Fee at a Large Hub Airport

Access Mode Share	All Trips			
	Base Case	Policy Scenario	Absolute Difference	Percent Difference ¹
Park & Walk to Terminal	5%	5%	0%	10%
Park & Ride Shuttle to Terminal	10%	11%	1%	11%
Taxi to Terminal	30%	32%	2%	5%
Dropped Off at Terminal	30%	26%	-4%	-14%
Transit to Airport	15%	15%	0%	1%
Shared Van to Airport	5%	5%	0%	6%
Scheduled Bus to Airport	5%	6%	1%	11%
Total ²	100%	100%		

Notes:

¹ Percent difference calculations may differ due to rounding.

² Totals may not add to 100 percent due to rounding.

Source: Resource Systems Group, Inc., August 2009.

The \$5 drop off fee increases the taxicab mode share, the HOV mode share, and the share of passengers using public parking. The 14 percent decrease in passengers being dropped off at the terminal curb may significantly reduce traffic congestion in the terminal area. However, the net reduction in traffic will be lower due to the two percent projected shift in share to taxicab. By increasing the fee to \$15, more dramatic changes in share occur in all modes. **Table 13** contains the results of using the larger drop-off fee of \$15.

Table 13 The Results of Implementing a \$15 Drop-Off Fee at a Large Hub Airport

Access Mode Share	All Trips			
	Base Case	Policy Scenario	Absolute Difference	Percent Difference ¹
Park & Walk to Terminal	5%	6%	1%	28%
Park & Ride Shuttle to Terminal	10%	13%	3%	31%
Taxi to Terminal	30%	34%	4%	14%
Dropped Off at Terminal	30%	18%	-12%	-39%
Transit to Airport	15%	16%	1%	3%
Shared Van to Airport	5%	6%	1%	15%
Scheduled Bus to Airport	5%	7%	2%	31%
Total ²	100%	100%		

Notes:

¹ Percent difference calculations may differ due to rounding.

² Totals may not add to 100 percent due to rounding.

Source: Resource Systems Group, Inc., August 2009.

Scenario #3: Doubling of the Parking Fees

One of the key strategies an airport will consider to try to influence parking mode share is to change the parking fee structure. In this scenario shown in **Table 14**, a doubling of the parking fees is tested. Although it would be a rare circumstance under which an airport operator would double the fees for public parking, it is instructive to see how a dramatic change in parking fees would impact travel behavior. A large increase in the parking fee structure without other accompanying policy changes results in a 27 percent increase in passengers using the drop-off mode and a 22 percent increase in passengers using taxicabs to access the airport. Although this will likely alleviate constrained public parking, it will result in additional congestion on airport roadways and in the terminal area.

Table 14 Doubling of the Parking Fees at a Small Hub Airport

Access Mode Share	All Trips			
	Base Case	Policy Scenario	Absolute Difference	Percent Difference ¹
Park & Walk to Terminal	15%	6%	-9%	-57%
Park & Ride Shuttle to Terminal	25%	18%	-7%	-27%
Taxi to Terminal	10%	12%	2%	22%
Dropped Off at Terminal	40%	51%	11%	27%
Transit to Airport	1%	1%	0%	21%
Shared Van to Airport	4%	5%	1%	22%
Scheduled Bus to Airport	5%	6%	1%	27%
Total ²	100%	100%		

Notes:

¹ Percent difference calculations may differ due to rounding.

² Totals may not add to 100 percent due to rounding.

Source: Resource Systems Group, Inc., August 2009.

Scenario #4: Addition of Remote Public Parking or Off-Airport Parking at a Large Hub Airport

The presence of off-airport parking has a meaningful effect on an airport's ground access mode share distribution. In this scenario, the addition of 5,000 remote public parking or off airport parking spots to a large hub airport is tested. It should be noted that the stated preference survey instrument did not distinguish between on-airport parking that required a shuttle bus to get to the terminal and privately-operated off-airport parking, so this scenario applies to the addition of 5,000 spaces to either the public parking supply or the off-airport supply. **Table 15** contains the results of this test. The addition of remote parking takes share mainly from the Park & Walk to Terminal mode.

This implies that the addition of parking capacity does generate demand for parking, since there is only an increase in the overall share of passengers parking of two percentage points despite a significant increase in supply. In this circumstance, with the majority of the shift coming from the Park & Walk to Terminal mode and the Dropped Off at Terminal mode, vehicle trips to the airport and in the terminal area will decrease, since for every one-way air passenger trip, a passenger who is dropped off generates two vehicle trips and a passenger who parks for the duration of their trip

generates one vehicle trip. However, revenue implications to the airport operator would also need to be considered.

Table 15 The Addition of Off-Airport Parking

Access Mode Share	All Trips			
	Base Case	Policy Scenario	Absolute Difference	Percent Difference ¹
Park & Walk to Terminal	5%	4%	-1%	-25%
Park & Ride Shuttle to Terminal	10%	13%	3%	30%
Taxi to Terminal	30%	30%	0%	-2%
Dropped Off at Terminal	30%	29%	-1%	-3%
Transit to Airport	15%	15%	0%	0%
Shared Van to Airport	5%	5%	0%	-2%
Scheduled Bus to Airport	5%	5%	0%	-3%
Total ²	100%	100%		

Notes:

¹ Percent difference calculations may differ due to rounding.

² Totals may not add to 100 percent due to rounding.

Source: Resource Systems Group, Inc., August 2009.

Scenario #5: Lowering of Parking Fees

In this scenario, parking fees are reduced by 50 percent. The results can be found in **Table 16** and show a doubling of people using the Park & Walk to Terminal mode and a slightly smaller increase in the Park & Ride Shuttle to Terminal mode. The shifting share comes primarily from those passengers being dropped off at the terminal, and secondarily from taxicab users. In this case, the pricing policy would result in improved traffic conditions in the terminal area and on airport roadways. Assuming the parking supply was sufficient to consider adopting this strategy, the airport operator would consider both the changes in net revenue and the changes in traffic and environment impacts as part of the decision making process.

Table 16 Reducing Parking Fees by 50 Percent

Access Mode Share	All Trips			
	Base Case	Policy Scenario	Absolute Difference	Percent Difference ¹
Park & Walk to Terminal	5%	11%	6%	117%
Park & Ride Shuttle to Terminal	10%	15%	5%	48%
Taxi to Terminal	30%	27%	-3%	-10%
Dropped Off at Terminal	30%	24%	-6%	-19%
Transit to Airport	15%	15%	0%	-3%
Shared Van to Airport	5%	4%	-1%	-11%
Scheduled Bus to Airport	5%	4%	-1%	-19%
Total ²	100%	100%		

Notes:

¹ Percent difference calculations may differ due to rounding.

² Totals may not add to 100 percent due to rounding.

Source: Resource Systems Group, Inc., August 2009.

COMPARISON OF THE GENERAL AIRPORT AND THE AIRPORT SPECIFIC MODELS

Using the larger sample from the PDX catchment area, an airport-specific parking forecast model was developed. It is natural then to make a comparison of the airport-specific parking forecast model with the general airport model to test policies for the PDX environment. In this section, the results of the general airport and the airport-specific models are compared under two different policy scenarios to demonstrate the benefits of an airport using a model developed with a national sample versus developing a model specific to its own environment.

Portland International Airport Scenarios Tested

Both models were calibrated to PDX. In the first policy scenario, an increase in parking fees of 50 percent was tested from \$30 to \$45 for the “park and walk to terminal” mode and from \$8 to \$12 for the “park and ride shuttle to terminal” mode. The results are presented in **Table 17**.

Table 17 Comparison of the General Airport Model and the Airport-Specific Model Performance with an Increased Parking Fee

Access Mode Share	Existing Portland Mode Share	General Airport Model	Airport Specific Model
Park & Walk to Terminal	10%	5%	4%
Park & Ride Shuttle to Terminal	15%	13%	12%
Taxi to Terminal	10%	11%	11%
Dropped Off at Terminal	45%	50%	51%
Transit to Airport	10%	10%	11%
Shared Van to Airport	5%	5%	5%
Scheduled Bus to Airport	5%	6%	6%
Total	100%	100%	100%

Source: Resource Systems Group, Inc., August 2009.

In the second policy scenario, a drop-off fee of \$10 was tested. The results are presented in **Table 18**.

Table 18 Comparison of the General Airport Model and the Airport-Specific Model Performance with the Implementation of a Drop-Off Fee

Access Mode Share	Existing Portland Mode Share	General Airport Model	Airport Specific Model
Park & Walk to Terminal	10%	12%	13%
Park & Ride Shuttle to Terminal	15%	19%	20%
Taxi to Terminal	10%	12%	12%
Dropped Off at Terminal	45%	35%	31%
Transit to Airport	10%	11%	12%
Shared Van to Airport	5%	6%	6%
Scheduled Bus to Airport	5%	6%	7%
Total	100%	100%	100%

Note: Totals may not add due to rounding.

Source: Resource Systems Group, Inc., August 2009.

In the first scenario, the general airport model produces results that are similar to the airport-specific model. In the second scenario, the share of customers dropped off at the terminal, which are the customers who will be impacted by this policy change, differs by four percentage points between the two models. More policies would have to be tested to compare differences in order to make a determination about whether an airport should consider developing its own airport-specific model or using the general airport model to test policy scenarios.

SUMMARY

The stated preference survey has been shown to be a reasonable and useful tool for understanding the airport access mode choices made by resident air travelers in response to parking policies and other ground transportation strategies. The development of discrete choice models using the data from these surveys provides a reliable means of estimating the effects of airport access policies on airport access mode choice decisions and how those decisions impact a constrained parking environment.

More importantly, the general airport parking forecast model is a product of this research project that can be used by any small, medium or large hub airport to provide planning-level insight into potential airport and other transportation policies to address constrained parking. It has been demonstrated that the general airport parking forecast model can be used to test a variety of changes to airport access mode characteristics that could be used to address constrained parking conditions. Specifically, the model can estimate the effects of an increased or decreased terminal and shuttle parking fees, the addition of previously unavailable scheduled HOV modes, the addition of off-airport parking, or the institution of a terminal drop-off fee. The estimates from this model represent averages from the airports that were surveyed and there may therefore be airport-to-airport differences that are not fully represented when the model is applied to a specific airport. These airport-specific differences could be represented in more detail if an airport-specific survey and model were developed. However, the tool produced in this project appears to represent the general magnitudes of changes reasonably and should prove useful as a planning resource for any airport facing constrained parking issues.

Attachment F1

Discrete Choice Models

1.0 INTRODUCTION

This attachment contains the utility specifications for the three discrete choice models described in the report.

1.1 Utility Specification for the 14 Airport Business Model

Coefficients

β_{pf} = Sensitivity to daily parking fee when not reimbursed by a third party
 β_{pfr} = Sensitivity to daily parking fee when reimbursed by a third party
 β_{fare} = Sensitivity to fare (taxi, transit, van and bus)
 β_{time} = Sensitivity to additional travel time over park and walk
 $\beta_{duration}$ = Sensitivity to the parking modes for longer duration trips
 β_{dis1} = Preference for Shared Van based on distance from airport
 β_{dis2} = Preference for Scheduled Bus based on distance from airport
 β_{hhsize} = Preference for Drop Off mode for travelers who do not live alone
 β_{hub1} = Sensitivity to the Taxi mode for travelers using small and medium hub airports
 β_{hub2} = Sensitivity to the Shared Van mode for travelers using small and medium hub airports
 $\beta_{inertia}$ = Preference for a traveler to choose their reported mode
 β_{oap1} = Sensitivity to the Park and Walk mode when off-airport parking is available
 β_{oap2} = Preference for the Park and Shuttle mode when off-airport parking is available
 β_{tran1} = Preference for the general transit modes for occasional transit users
 β_{tran2} = Preference for the general transit modes for daily transit users
 δ_1 = Alternative Specific Constant – Park and Shuttle
 δ_2 = Alternative Specific Constant – Taxi
 δ_3 = Alternative Specific Constant – Drop Off
 δ_4 = Alternative Specific Constant – Transit
 δ_5 = Alternative Specific Constant – Shared Van
 δ_6 = Alternative Specific Constant – Scheduled Bus

Trip Attributes

F_{pw} = Daily parking fee for Park and Walk mode
 F_{ps} = Daily parking fee for Park and Shuttle mode
 F_{taxi} = Taxi fare
 $F_{transit}$ = Transit fare
 F_{van} = Shared Van fare
 F_{bus} = Scheduled Bus fare
 T_{ps} = Shuttle and wait time
 $T_{transit}$ = Additional time for using Transit
 T_{van} = Additional time for using Shared Van
 T_{bus} = Additional time for using Scheduled Bus
 $X_{duration}$ = Natural Log of trip duration
 X_{dis} = Natural log of distance from airport
 X_{hub} = Airport hub size
 X_{oap} = Amount of off-airport parking

Demographic Attributes

I_{inc} = Household income
 I_r = Parking fee is reimbursed
 I_{nr} = Parking fee is not reimbursed
 I_{hhsize} = Does not live alone
 $I_{repmode1}$ = Reported trip is by Park and Walk
 $I_{repmode2}$ = Reported trip is by Park and Shuttle
 $I_{repmode3}$ = Reported trip is by Taxi
 $I_{repmode4}$ = Reported trip is by Drop Off
 $I_{repmode5}$ = Reported trip is by Transit
 $I_{repmode6}$ = Reported trip is by Shared Van
 $I_{repmode7}$ = Reported trip is by Scheduled Bus
 I_{tran1} = Occasional transit user
 I_{tran2} = Daily transit user

Utility Specifications

$$V_{Park \& Walk} = \beta_{pf} \cdot I_{nr} \cdot \frac{F_{pw}}{\log_e \left(\frac{I_{inc}}{100} \right)} + \beta_{pfr} \cdot I_r \cdot \frac{F_{pw}}{\log_e \left(\frac{I_{inc}}{100} \right)} + \beta_{duration} \cdot X_{duration} + \beta_{inertia} \cdot I_{repmode 1} + \beta_{oap 1} \cdot X_{oap}$$

$$V_{Park \& Shuttle} = \beta_{pf} \cdot I_{nr} \cdot \frac{F_{ps}}{\log_e \left(\frac{I_{inc}}{100} \right)} + \beta_{pfr} \cdot I_r \cdot \frac{F_{ps}}{\log_e \left(\frac{I_{inc}}{100} \right)} + \beta_{duration} \cdot X_{duration} + \beta_{time} \cdot T_{ps} + \beta_{inertia} \cdot I_{repmode 2} + \beta_{oap 2} \cdot X_{oap} + \delta_1$$

$$V_{Taxi} = \beta_{fare} \cdot \frac{F_{taxi}}{\log_e \left(\frac{I_{inc}}{100} \right)} + \beta_{hub 1} \cdot X_{hub} + \beta_{inertia} \cdot I_{repmode 3} + \delta_2$$

$$V_{Drop Off} = \beta_{hhsize} \cdot I_{hhsize} + \beta_{inertia} \cdot I_{repmode 4} + \delta_3$$

$$V_{Transit} = \beta_{fare} \cdot \frac{F_{transit}}{\log_e \left(\frac{I_{inc}}{100} \right)} + \beta_{time} \cdot T_{transit} + \beta_{inertia} \cdot I_{repmode 5} + \beta_{tran 1} \cdot I_{tran 1} + \beta_{tran 2} \cdot I_{tran 2} + \delta_4$$

$$V_{Shared Van} = \beta_{fare} \cdot \frac{F_{van}}{\log_e \left(\frac{I_{inc}}{100} \right)} + \beta_{time} \cdot T_{van} + \beta_{inertia} \cdot I_{repmode 6} + \beta_{tran 1} \cdot I_{tran 1} + \beta_{tran 2} \cdot I_{tran 2} + \beta_{hub 2} \cdot X_{hub} + \beta_{dis 1} \cdot X_{dis} + \delta_5$$

$$V_{Scheduled Bus} = \beta_{fare} \cdot \frac{F_{bus}}{\log_e \left(\frac{I_{inc}}{100} \right)} + \beta_{time} \cdot T_{bus} + \beta_{inertia} \cdot I_{repmode 7} + \beta_{tran 1} \cdot I_{tran 1} + \beta_{tran 2} \cdot I_{tran 2} + \beta_{dis 2} \cdot X_{dis} + \delta_6$$

1.2 Utility Specification for the 14 Airport Non-Business Model

Coefficients

β_{pf} = Sensitivity to daily parking fee

β_{fare} = Sensitivity to fare (taxi, transit, van and bus)

β_{time} = Sensitivity to additional travel time over park and walk

$\beta_{duration}$ = Sensitivity to the parking modes for longer duration trips

β_{dis1} = Preference for Shared Van based on distance from airport

β_{dis2} = Preference for Scheduled Bus based on distance from airport

β_{hhsize} = Preference for Drop Off mode for travelers who do not live alone

β_{hub1} = Sensitivity to the Taxi mode for travelers using small and medium hub airports

β_{hub2} = Sensitivity to the Shared Van mode for travelers using small and medium hub airports

β_{hub3} = Sensitivity to the Scheduled Bus mode for travelers using small and medium hub airports

β_{freq1} = Preference for reported mode for those who use that mode between 25% and 50% of the time

β_{freq2} = Preference for reported mode for those who use that mode between 50% and 75% of the time

β_{freq3} = Preference for reported mode for those who use that mode more than 75% of the time

β_{bags} = Sensitivity to Transit and Shared Van as the amount of luggage increases

β_{size} = Sensitivity to Shared Van and Scheduled Bus as the ground party size increases

β_{oap1} = Sensitivity to the Park and Walk mode when off-airport parking is available

β_{oap2} = Preference for the Park and Shuttle mode when off-airport parking is available

β_{tran1} = Preference for the general transit modes for occasional transit users

β_{tran2} = Preference for the general transit modes for daily transit users

β_{car} = Preference for a traveler to choose a parking alternative if they have a car available

δ_1 = Alternative Specific Constant – Park and Shuttle

δ_2 = Alternative Specific Constant – Taxi

δ_3 = Alternative Specific Constant – Drop Off

δ_4 = Alternative Specific Constant – Transit

δ_5 = Alternative Specific Constant – Shared Van

δ_6 = Alternative Specific Constant – Scheduled Bus

Trip Attributes

F_{pw} = Daily parking fee for Park and Walk mode

F_{ps} = Daily parking fee for Park and Shuttle mode

F_{taxi} = Taxi fare

$F_{transit}$ = Transit fare

F_{van} = Shared Van fare

F_{bus} = Scheduled Bus fare

T_{ps} = Shuttle and wait time

$T_{transit}$ = Additional time for using Transit

T_{van} = Additional time for using Shared Van

T_{bus} = Additional time for using Scheduled Bus

$X_{duration}$ = Natural log of trip duration

X_{dis} = Natural log of distance from airport

X_{hub} = Airport hub size

X_{oap} = Amount of off-airport parking

Demographic Attributes

I_{inc} = Household income

I_{hhsize} = Does not live alone

$I_{repmode1}$ = Reported trip is by Park and Walk

$I_{repmode2}$ = Reported trip is by Park and Shuttle

$I_{repmode3}$ = Reported trip is by Taxi

$I_{repmode4}$ = Reported trip is by Drop Off

$I_{repmode5}$ = Reported trip is by Transit

$I_{repmode6}$ = Reported trip is by Shared Van

$I_{repmode7}$ = Reported trip is by Scheduled Bus

$I_{modfreq1}$ = Uses reported mode between 25% and 50% of the time

$I_{modfreq2}$ = Uses reported mode between 50% and 75% of the time

$I_{modfreq3}$ = Uses reported mode more than 75% of the time

I_{tran1} = Occasional transit user

I_{tran2} = Daily transit user

I_{bags} = Number of checked bags

I_{size} = Ground party size

I_{car} = A car is available

Utility Specifications

$$\begin{aligned}
 V_{Park \& Walk} &= \beta_{pf} \cdot \frac{F_{pw}}{\log_e\left(\frac{I_{inc}}{10}\right)} + \\
 &\beta_{duration} \cdot X_{duration} + \beta_{freq1} \cdot I_{modefreq1} \cdot I_{repmode1} + \beta_{freq2} \cdot I_{modefreq2} \cdot I_{repmode1} + \beta_{freq3} \cdot I_{modefreq3} \cdot I_{repmode1} \\
 &\quad + \beta_{oap1} \cdot X_{oap} + \beta_{car} \cdot I_{car} \\
 V_{Park \& Shuttle} &= \beta_{pf} \cdot \frac{F_{ps}}{\log_e\left(\frac{I_{inc}}{10}\right)} + \beta_{duration} \cdot X_{duration} + \beta_{time} \cdot T_{ps} + \beta_{freq1} \cdot I_{modefreq1} \cdot I_{repmode2} \\
 &\quad + \beta_{freq2} \cdot I_{modefreq2} \cdot I_{repmode2} + \beta_{freq3} \cdot I_{modefreq3} \cdot I_{repmode2} + \beta_{oap2} \cdot X_{oap} + \beta_{car} \cdot I_{car} \\
 &\quad + \delta_1 \\
 V_{Taxi} &= \beta_{fare} \cdot \frac{F_{taxi}}{\log_e\left(\frac{I_{inc}}{10}\right)} + \beta_{hub1} \cdot X_{hub} + \beta_{freq1} \cdot I_{modefreq1} \cdot I_{repmode3} + \beta_{freq2} \cdot I_{modefreq2} \cdot I_{repmode3} \\
 &\quad + \beta_{freq3} \cdot I_{modefreq3} \cdot I_{repmode3} + \delta_2 \\
 V_{Drop Off} &= \beta_{hsize} \cdot I_{hsize} + \beta_{freq1} \cdot I_{modefreq1} \cdot I_{repmode4} + \beta_{freq2} \cdot I_{modefreq2} \cdot I_{repmode4} \\
 &\quad + \beta_{freq3} \cdot I_{modefreq3} \cdot I_{repmode4} + \delta_3 \\
 V_{Transit} &= \beta_{fare} \cdot \frac{F_{transit}}{\log_e\left(\frac{I_{inc}}{10}\right)} + \beta_{time} \cdot T_{transit} + \beta_{freq1} \cdot I_{modefreq1} \cdot I_{repmode5} + \beta_{freq2} \cdot I_{modefreq2} \cdot I_{repmode5} \\
 &\quad + \beta_{freq3} \cdot I_{modefreq3} \cdot I_{repmode5} + \beta_{tran1} \cdot I_{tran1} + \beta_{tran2} \cdot I_{tran2} + \delta_4 \\
 V_{Shared Van} &= \beta_{fare} \cdot \frac{F_{van}}{\log_e\left(\frac{I_{inc}}{10}\right)} + \beta_{time} \cdot T_{van} + \beta_{freq1} \cdot I_{modefreq1} \cdot I_{repmode6} + \beta_{freq2} \cdot I_{modefreq2} \cdot I_{repmode6} \\
 &\quad + \beta_{freq3} \cdot I_{modefreq3} \cdot I_{repmode6} + \beta_{tran1} \cdot I_{tran1} + \beta_{tran2} \cdot I_{tran2} + \beta_{hub2} \cdot X_{hub} + \beta_{dis1} \cdot X_{dis} \\
 &\quad + \delta_5 \\
 V_{Scheduled Bus} &= \beta_{fare} \cdot \frac{F_{bus}}{\log_e\left(\frac{I_{inc}}{10}\right)} + \beta_{time} \cdot T_{bus} + \beta_{freq1} \cdot I_{modefreq1} \cdot I_{repmode7} + \beta_{freq2} \cdot I_{modefreq2} \cdot I_{repmode7} \\
 &\quad + \beta_{freq3} \cdot I_{modefreq3} \cdot I_{repmode7} + \beta_{tran1} \cdot I_{tran1} + \beta_{tran2} \cdot I_{tran2} + \beta_{hub3} \cdot X_{hub} + \beta_{dis2} \cdot X_{dis} \\
 &\quad + \delta_6
 \end{aligned}$$

1.3 Utility Specification for the Portland International Model

Coefficients

- β_{pf} = Sensitivity to daily parking fee when not reimbursed by a third party
 β_{pfr} = Sensitivity to daily parking fee when reimbursed by a third party
 β_{fare} = Sensitivity to fare (taxi, transit, van and bus)
 β_{time} = Sensitivity to additional travel time over park and walk
 $\beta_{duration}$ = Sensitivity to the parking modes for longer duration trips
 β_{dis1} = Preference for Shared Van based on distance from airport
 β_{dis2} = Preference for Scheduled Bus based on distance from airport
 β_{hhsize} = Preference for Drop Off mode for travelers who do not live alone
 $\beta_{inertia}$ = Preference for a traveler to choose their reported mode
 β_{freq1} = Preference for reported mode for those who use that mode more than 75% of the time
 β_{tran1} = Preference for the general transit modes for occasional transit users
 β_{tran2} = Preference for the general transit modes for daily transit users
 β_{size} = Sensitivity to Shared Van and Scheduled Bus as the ground party size increases
 δ_1 = Alternative Specific Constant - Park and Shuttle
 δ_2 = Alternative Specific Constant - Taxi
 δ_3 = Alternative Specific Constant - Drop Off
 δ_4 = Alternative Specific Constant - Transit
 δ_5 = Alternative Specific Constant - Shared Van
 δ_6 = Alternative Specific Constant - Scheduled Bus

Trip Attributes

- F_{pw} = Daily parking fee for Park and Walk mode
 F_{ps} = Daily parking fee for Park and Shuttle mode
 F_{taxi} = Taxi fare
 $F_{transit}$ = Transit fare
 F_{van} = Shared Van fare
 F_{bus} = Scheduled Bus fare
 T_{ps} = Shuttle and wait time
 $T_{transit}$ = Additional time for using Transit
 T_{van} = Additional time for using Shared Van
 T_{bus} = Additional time for using Scheduled Bus
 $X_{duration}$ = Natural Log of trip duration
 X_{dis} = Natural log of distance from airport

Demographic Attributes

- I_{inc} = Household income
 I_r = Parking fee is reimbursed
 I_{nr} = Parking fee is not reimbursed
 I_{hhsize} = Does not live alone
 $I_{repmode1}$ = Reported trip is by Park and Walk
 $I_{repmode2}$ = Reported trip is by Park and Shuttle
 $I_{repmode3}$ = Reported trip is by Taxi
 $I_{repmode4}$ = Reported trip is by Drop Off
 $I_{repmode5}$ = Reported trip is by Transit
 $I_{repmode6}$ = Reported trip is by Shared Van
 $I_{repmode7}$ = Reported trip is by Scheduled Bus
 $I_{modefreq1}$ = Uses reported mode more than 75% of the time
 I_{tran1} = Occasional transit user
 I_{tran2} = Daily transit user
-

Utility Specifications

$$V_{Park \& Walk} = \beta_{pf} \cdot I_{nr} \cdot \frac{F_{pw}}{\log_e\left(\frac{I_{inc}}{1000}\right)} + \beta_{pfr} \cdot I_r \cdot \frac{F_{pw}}{\log_e\left(\frac{I_{inc}}{1000}\right)} + \beta_{duration} \cdot X_{duration} + \beta_{inertia} \cdot I_{inertia 1} + \beta_{freq 1} \cdot I_{modefreq 1} \cdot I_{repmode 1}$$

$$V_{Park \& Shuttle} = \beta_{pf} \cdot I_{nr} \cdot \frac{F_{ps}}{\log_e\left(\frac{I_{inc}}{1000}\right)} + \beta_{pfr} \cdot I_r \cdot \frac{F_{ps}}{\log_e\left(\frac{I_{inc}}{1000}\right)} + \beta_{duration} \cdot X_{duration} + \beta_{time} \cdot T_{ps} + \beta_{inertia} \cdot I_{inertia 2} + \beta_{freq 1} \cdot I_{modefreq 1} \cdot I_{repmode 2} + \delta_1$$

$$V_{Taxi} = \beta_{fare} \cdot \frac{F_{taxi}}{\log_e\left(\frac{I_{inc}}{1000}\right)} + \beta_{inertia} \cdot I_{inertia 3} + \beta_{freq 1} \cdot I_{modefreq 1} \cdot I_{repmode 3} + \delta_2$$

$$V_{Drop Off} = \beta_{hsize} \cdot I_{hsize} + \beta_{inertia} \cdot I_{inertia 4} + \beta_{freq 1} \cdot I_{modefreq 1} \cdot I_{repmode 4} + \delta_3$$

$$V_{Transit} = \beta_{fare} \cdot \frac{F_{transit}}{\log_e\left(\frac{I_{inc}}{1000}\right)} + \beta_{time} \cdot T_{transit} + \beta_{inertia} \cdot I_{inertia 5} + \beta_{freq 1} \cdot I_{modefreq 1} \cdot I_{repmode 5} + \beta_{tran 1} \cdot I_{tran 1} + \beta_{tran 2} \cdot I_{tran 2} + \delta_4$$

$$V_{Shared Van} = \beta_{fare} \cdot \frac{F_{van}}{\log_e\left(\frac{I_{inc}}{1000}\right)} + \beta_{time} \cdot T_{van} + \beta_{inertia} \cdot I_{inertia 6} + \beta_{freq 1} \cdot I_{modefreq 1} \cdot I_{repmode 6} + \beta_{tran 1} \cdot I_{tran 1} + \beta_{tran 2} \cdot I_{tran 2} + \beta_{dis 1} \cdot X_{dis} + \delta_5$$

$$V_{Scheduled Bus} = \beta_{fare} \cdot \frac{F_{bus}}{\log_e\left(\frac{I_{inc}}{1000}\right)} + \beta_{time} \cdot T_{bus} + \beta_{inertia} \cdot I_{inertia 7} + \beta_{freq 1} \cdot I_{modefreq 1} \cdot I_{repmode 7} + \beta_{tran 1} \cdot I_{tran 1} + \beta_{tran 2} \cdot I_{tran 2} + \beta_{dis 2} \cdot X_{dis} + \delta_6$$

Attachment F2

**Macro Instructions for Running
The General Airport Parking Forecast Model**

MACRO INSTRUCTIONS FOR RUNNING THE ACRP 10-06 GENERAL AIRPORT PARKING FORECAST MODEL

The ACRP 10-06 general airport parking forecast model was developed in Microsoft Excel 2007. The model includes macros, which are shortcuts for tasks that the user of the file needs to do repeatedly.

If a user of the model is having difficulty viewing the file, it may be either that the user's permission settings for enabling macros are set at too high of a security level or that the user has an older version of Microsoft Excel (1997–2003) that isn't compatible with the Excel 2007 file. Instructions for Microsoft Excel 2007 and 2003 users are provided below.

MICROSOFT EXCEL 2007 USERS

Permission settings for enabling macros:

- Click the **Microsoft Office button** , and then click **Excel Options**.
- Click **Trust Center**, and then click **Trust Center Settings**, and then click **Macro Settings**.
- Click the either of the following options to see the ACRP 10-06 general airport parking forecast model:
 - **Disable all macros with notification** This is the default setting. Click this option if you want macros to be disabled, but you want to get security alerts if there are macros present. This way, you can choose when to enable those macros on a case by case basis.
 - **Disable all macros except digitally signed macros** This setting is the same as the **Disable all macros with notification** option, except that if the macro is digitally signed by a trusted publisher, the macro can run if you have already trusted the publisher. If you have not trusted the publisher, you are notified. That way, you can choose to enable those signed macros or trust the publisher. All unsigned macros are disabled without notification.

When opening the file:

- Click “Enable” macros.

MICROSOFT EXCEL 2003 USERS

Permission settings for enabling macros:

- On the **Tools** menu, click **Options**.
- Click the **Security** tab.
- Under Macro Security, click **Macro Security**.
- Click the **Security Level** tab, and then select the “medium” setting.

Viewing a Microsoft Excel 2007 file:

- To download the Microsoft Office Compatibility Pack for 2007 Word, Excel, and Powerpoint file formats go to the following website. This allows the user to open, edit, and save an Excel 2007 workbook
 - <http://www.microsoft.com/downloads/details.aspx?FamilyId=941B3470-3AE9-4AEE-8F43-C6BB74CD1466&displaylang=en>

When opening the file:

- Click “Enable” macros.