ACRP
Airport Cooperative Research Program

Evaluating Airport Parking Strategies and Managing Parking Constraints

Tuesday, October 26, 2010
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Today’s Moderator

Marci Greenberger, AAE

Transportation Research Board

Airport Cooperative Research Program (ACRP)

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Airport Cooperative Research Program

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Evaluating Airport Parking Strategies and Managing Parking Constraints

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MANAGING PARKING
CONSTRAINTS

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Overview of
Airport Cooperative Research Program Report 24

GUIDEBOOK FOR EVALUATING AIRPORT PARKING STRATEGIES AND SUPPORTING TECHNOLOGIES
ACRP PROJECT 10-03 PANEL

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  Dallas/Fort Worth International Airport, Chair

- Evelyn Addante  
  Massachusetts Port Authority

- Dan Brame  
  Portland International Airport

- Harold Schulke  
  Kimley-Horn & Associates

- Danilo Simich  
  Parsons

- Tim Stiles  
  Des Moines International Airport

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  FAA Liaison

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  - Thomas A. Butcher

  Mannix Group
  - Mike Mannix

  DMR Consulting
  - Diane Ricard
Presentation Outline

1. Study Purpose
2. Evaluating and Selecting Strategies and Technologies
3. Parking Strategies and Supporting Technologies
4. Outline of Guide
1. Overview of ACRP Project 10-03

- Research Objective:
  Prepare a guidebook to help airport operators evaluate and select parking strategies and technologies to improve customer service, enhance revenues, reduce operating costs, and achieve other objectives

- Research Approach
  - Conducted extensive literature search/prepared bibliography
  - Interviewed airport operators, private operators, manufacturers, and others to document parking strategies now used in the U.S., overseas, and in other industries, as well as existing/forthcoming technologies
  - Identified over 70 relevant strategies and technologies
  - Prepared guidebook ACRP Report 24
Distinguishing Characteristics of Airport Parking Customers

- Airport customers are concerned about flights
- Airport customers use facilities infrequently
- Airport customers park for long durations
- Airport customers pay higher fees
Distinguishing Characteristics of Airport Parking Operators

- Emphasis on customer service
- Need to be financially self sustainable
- Large parking facilities required
- Large amount of revenue handled
2. Evaluating and Selecting Parking Strategies
Determining the Relevant Goals of Management
Key Considerations When Determining Management’s Goals and Objectives

- Estimated future parking requirements by type of product
- Available parking spaces by type of product
- Projected net revenue requirements
- Airport development plans/capital program
- Airport management’s tolerance of risk
Benchmarking – Selection of Peer Airports

- Passenger volume (at peer airports)
- Proximity
- Airlines
- Extent of privately operated off-airport parking
- Passenger demographics
- Use of public transportation
- Definition of the parking product
- Airline agreements
Metrics for Evaluating the Performance of Parking Strategies

- Revenues and net revenues
- Facility use
- Customer service
- Payment methods
- Operations and operating costs
- Planning and marketing
# Ability of Strategy to Support Goals (example)

<table>
<thead>
<tr>
<th>Category/Strategies</th>
<th>Enhances parking revenues</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Very positive</td>
<td>Somewhat positive</td>
</tr>
<tr>
<td>B. Value-added Parking Products</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B.1 Valet Parking—Curbside Drop-off/Pickup</td>
<td>●</td>
<td></td>
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<tr>
<td>B.2 Valet Parking—Curbside Drop-off/Pickup with Airline Check-in</td>
<td>●</td>
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<tr>
<td>B.3 Valet Parking—Non-curbside Drop-off/Pickup</td>
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<tr>
<td>B.4 Valet Parking—Customer Transferred to/from Airport in Shuttle Van</td>
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<tr>
<td>B.5 Business Parking</td>
<td>●</td>
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<td>B.6 Monthly Billing—Pay per Use</td>
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<tr>
<td>B.7 Reserved Parking Zone—Pay per Use</td>
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<tr>
<td>B.8 Guaranteed Space—Unlimited Use</td>
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<tr>
<td>B.9 Validated Parking—Retail</td>
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<tr>
<td>B.10 Validated Parking—Park-Sleep-Fly</td>
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<tr>
<td>B.11 XXL (Extra Large) Parking</td>
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<td>B.12 Ladies' Parking</td>
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<tr>
<td>B.13 Secure Parking</td>
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</tbody>
</table>
3. Parking Strategies

- For each strategy, the Guidebook documents:
  - Purpose
  - Use by customers
  - Benefits
  - Implementation actions
  - Key considerations
  - Implementation costs
  - Ongoing O&M costs
  - Implementation schedule
  - Supporting and complementary strategies and technologies
  - Examples of airports (or other facilities using strategy)
Categories of Strategies and Supporting Technologies

- Over 65 individual parking strategies and technologies grouped into 8 categories:
  A. Parking Products—Duration-based
  B. Value-added Parking Products
  C. Complementary Customer Services
  D. Parking Space Availability and Guidance Systems
  E. Cashierless Transactions
  F. Revenue Enhancement Strategies
  G. Safety and Security Strategies
  H. Operational Enhancements
A. Parking Products—Duration Based

1. Hourly/Short-duration Parking
2. Daily Parking
3. Economy/Long-term Parking
4. Very Short-duration Parking/Curbside Areas
5. Free 30-minute Parking
6. Cell Phone Lots
7. No Overnight Parking Zones
A. Parking Products—Duration Based (continued)

8. Vacation Parking
9. Holiday Overflow Parking
10. Parking Condominiums
B. Value-Added Parking Products

1. Valet Parking – Curbside drop-off/pick-up
2. Valet Parking-Curbside – Drop-off/pick-up with airline check-in
3. Valet Parking – Non-curbside drop-off/pick-up
4. Valet Parking – Customer transported to/from airport in shuttle bus/van
5. Business Parking
6. Monthly Billing – Pay Per Use
7. Reserved Parking Zone – Pay Per Use
B. Value-Added Parking Products (continued)

8. Guaranteed Space – Unlimited Use

9. Validated Parking – Retail

10. Validated Parking – Park-Sleep-Fly

11. XXL (Extra Large) Parking

12. Ladies’ Parking

13. Secure Parking

14. Secure Parking w/Valet Service
C. Complimentary Customer Services

1. Vehicle Washing and Servicing
2. Concierge Services
3. On-site Sale of Food, Beverages, and Other Products
4. Pre-reserved In-flight Meals to Go
5. Loyalty Programs (Frequent Parkers)
6. Passenger Check-in Kiosks
C. Complementary Customer Services (continued)

7. Baggage Check-in
8. Pet Kennels
9. Shaded Spaces/Shade Ramadas
10. Shaded Spaces/with Solar Power
11. Electric Charging Stations
D. Parking Space Availability and Guidance Systems

1. Space Availability Prior to Arrival via the Internet
2. Space Availability Prior to Arrival via Phone/Radio
3. Space Availability by Facility
4. Space Availability by Parking Level
D. Parking Space Availability and Guidance Systems (continued)

5. Space Availability by Aisle/Sector
6. Space Availability by Individual Space
7. Managed Fills
8. Parking Boxes
9. Space Reminders
10. Automated Space Locators
11. In-vehicle Parking Guidance Systems (Future)
Frankfurt International Airport “Parking Box”
E. Cashier-less Payment/Cash-free Transactions

1. Pay-on-foot
2. Credit card in/out
3. AVI/RFID
4. IntelliDrive (Future)
5. Proximity cards
6. License Plate Recognition (LPR)
7. Cellular telephone/Pay-by-Cell (PbC)
8. In-car meters
9. In-lane customer processing
F. Revenue Enhancement Strategies

1. Parking Rate Adjustments
2. Strategic Pricing
3. Web-based Reservations
4. Yield Management
5. Coupons
6. Advertising—Interior, Tickets, and Equipment
7. Branding
8. Marketing
G. Safety and Security Strategies

H. Operational Enhancements

G. Safety and Security Strategies

1. Visual surveillance — camera
2. Audio surveillance — microphones
3. Active security/ParkSafe

H. Operational Enhancements

1. Concession, management, and self-operation
2. Privatized development
3. Mobile LPR-automated overnight license plate inventory
4. Outline of Guidebook ACRP Report 24

1. Overview
2. Documenting the Goals of Airport Management
3. Assessing the Needs and Preferences of Your Customers
4. Parking Strategies and Supporting Technologies (A thru H)
5. Selecting Potential Strategies and Technologies
6. Evaluating Strategies and Technologies
7. Key Implementation Steps
Appendices: Costs, Glossary, Sources for Further Info
Thank you!

Questions?

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REPORT 34: Handbook to Assess the Impacts of Constrained Airport Parking

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Agenda

• Introduction and Research Purpose
• Research Methods and Findings
• Handbook
• Predictive Model
Intent of ACRP Report 34

To Assist...

airport operators and others, such as external policymakers, metropolitan planning organizations, and those working on issues related to constrained airport parking

with assessing the impacts of constrained public and employee parking at airports
Research Objectives

Develop a handbook that helps airport operators better understand, anticipate, and evaluate changes in airport parking strategies to address parking constraints. The handbook should:

- **Identify strategies** airport operators can employ to address constrained parking
- Identify tools and methodologies to **predict the outcome of strategies** being considered by an airport operator, including the development of a predictive model
- Provide an approach for **selecting strategies**
- Identify ways to **measure the results of the strategies implemented**
ACRP Report 34
Handbook to Assess the Impacts of Constrained Airport Parking

RESEARCH METHODS AND FINDINGS
Research Questions

AIRPORT PERSPECTIVE:
• How do other airport operators predict and respond to constrained parking conditions?
• How do other airport operators predict the effects of potential strategies they are considering?
• How do other airport operators quantify the outcomes of strategies they implement?

PASSENGER PERSPECTIVE:
• How is passenger ground access behavior affected (e.g., mode shifts) in response to changing parking conditions?
Research Approach

1. **LITERATURE REVIEW** and **INDUSTRY OUTREACH**:
   Identified representative airports

2. **CASE STUDIES**: Conducted in-depth, comprehensive telephone interviews with staff at representative U.S. airports

3. **CASE STUDY DATA ANALYSIS**: Collected and analyzed parking and operations data from a subset of the “case study” airports to identify cause-effect relationships

4. **PASSENGER SURVEYS**: Conducted a stated preference survey of “case study” airport passengers

Airport Staff and Passenger Perspectives
### “Case Study” Airports

<table>
<thead>
<tr>
<th>Airport</th>
<th>Hub Classification</th>
<th>Policy or Public Sentiment Influences Decisions Related to Parking Supply</th>
<th>Within a Competing Airport System</th>
<th>Privately Operated Off-Airport Parking Available</th>
<th>HOV Mode Share</th>
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<tbody>
<tr>
<td>Boston Logan International (BOS)</td>
<td>Large</td>
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<td>✓</td>
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<td>McCarran International (LAS)</td>
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<tr>
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<tr>
<td>Tampa International (TPA)</td>
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<td></td>
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<tr>
<td>Washington Dulles International (IAD)</td>
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<td>5%</td>
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<tr>
<td>Bob Hope (BUR)</td>
<td>Medium</td>
<td></td>
<td></td>
<td>✓</td>
<td>5%</td>
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<tr>
<td>Oakland International (OAK)</td>
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<td>San Antonio International (SAT)</td>
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<td>Huntsville International (HSV)</td>
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<td>✓</td>
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<tr>
<td>Tulsa International (TUL)</td>
<td>Small</td>
<td></td>
<td></td>
<td>✓</td>
<td>n/a</td>
</tr>
</tbody>
</table>
Strategies

Strategies to address ongoing parking constraints:
• Supply: increase or reallocate
• New products
• Adjust parking rates: traditional, differential, or variable
• Technology
• HOV modes: increase, improve, or promote

Strategies to address short-term parking constraints (events):
• Hands-on management
• Adjust parking rates
• Temporary overflow
• Information dissemination
• Off-Airport parking as relief valve
Key Research Findings

- Research supported development of a *Handbook* and *Predictive Model* for use by airport operators to manage constrained parking at airports.

- Research provided quantitative support of several assumptions about passenger ground access behavior.
Key Finding #1

Trip Generation and Mode Share:

*When parking is constrained at an airport, passengers tend to shift to pickup and drop-off modes at a higher rate than they shift to HOV modes.*

“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.”

Airport ground access trips (per passenger party) for two modes: parking for trip duration and drop-off.
Key Finding #2

Use of Competing Airports:

Constrained parking conditions at one airport in a competing system of airports is not a significant factor influencing airline passengers’ choice of competing airports.

Top 3 factors influencing a passenger’s decision of which airport to use within a system of competing airports:

1. Price of airline ticket
2. Availability of direct flights to destination
3. Frequency of flights to destination
Key Finding #3

Benefits of a Tool to Predict the Outcomes of Potential Strategies:

A forecast model developed based on data from a stated preference survey can be a valuable prediction tool for airport operators to gain insight into changes in airline passenger ground access behavior that may result from implementing a strategy to address constrained parking.

How may ground access behavior (mode share) change if:
- The parking fee is doubled?
- A new public transit mode is introduced at the airport?

<table>
<thead>
<tr>
<th>Resident Access Mode Share</th>
<th>Base Case</th>
<th>Policy Scenario</th>
<th>Absolute Difference</th>
<th>% Difference</th>
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</thead>
<tbody>
<tr>
<td>Park &amp; Walk to Terminal</td>
<td>32%</td>
<td>23%</td>
<td>-9%</td>
<td>-27%</td>
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<tr>
<td>Park &amp; Ride Shuttle to Terminal</td>
<td>17%</td>
<td>22%</td>
<td>5%</td>
<td>30%</td>
</tr>
<tr>
<td>Taxi/Limo/Towncar to Terminal</td>
<td>17%</td>
<td>19%</td>
<td>2%</td>
<td>10%</td>
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<tr>
<td>Dropped Off at Terminal</td>
<td>14%</td>
<td>16%</td>
<td>2%</td>
<td>17%</td>
</tr>
</tbody>
</table>
Purpose of Handbook

Planning resource for current or anticipated constrained parking:

- Types of constraints/related impacts
- Parking strategies/related outcomes
- Strategy selection
- Predict outcomes of strategies
- Measure results
How to Use Handbook

- **Chapters 1-3, Background:** *recommended*
- **Chapters 4-8, Public Parking:** *modular or comprehensive, based on*
  - Familiarity with topics
  - Level of guidance needed
- **Chapter 9, Employee Parking**
Road Map to Handbook

CHAPTER 1
Background on Airport Parking Operations
• What do I need to understand about airport parking products and users of airport parking products to effectively use this Handbook?
• Is parking at my airport constrained?

CHAPTER 2
Constrained Airport Parking
• What causes constrained parking conditions?
• What are the consequences of continuing to operate in a constrained parking environment?

CHAPTER 3
Goals and Objectives for Managing Constrained Airport Parking Environments
• Why are goals and objectives important to my ability to resolve a constrained parking condition?
• How should I frame the issue of parking (and constrained parking) to identify the strategies that are consistent with my airport’s goals and objectives?
• What types of internal and external policy considerations are relevant?
Road Map to Handbook

CHAPTER 4
Predicting Public Parking Constraints
• How can I best prepare my airport for future constrained parking events?
• What data should I track to understand trends and predict future constrained parking events?

CHAPTER 5
Strategies to Address Constrained Public Parking
• What strategies should I consider to resolve or manage constrained parking conditions at my airport?
• What are the potential effects of implementing those strategies (financial, vehicle traffic, environmental, and customer service)?

CHAPTER 6
Predicting Outcomes of Selected Strategies
• How can I predict whether the strategies being considered to resolve or manage my airport’s constrained parking condition may be effective?

CHAPTER 7
Guidelines for Strategy Selection
• How do I select a strategy or group of strategies to resolve or manage my airport’s constrained parking condition?

CHAPTER 8
Evaluating the Effectiveness of Strategies
• After implementation, how do I know if the strategy or strategies implemented at my airport are effective?
• What data should I collect (and when) to measure the effectiveness of the strategies that were implemented?
• What strategies should I consider to resolve or manage constrained employee parking conditions at my airport?
• What types of strategies would allow me to reduce employee vehicle trips and reduce the demand for employee parking spaces?
• How can I evaluate the effectiveness of the strategies implemented to reduce employee commute trips?
Goals & Objectives

For clarity in addressing/resolving constrained parking and results measurement

- Airport’s overall goals & objectives or guiding principals
- Goals & objectives of parking program
Goals & Objectives—Categories

• Financial
• Customer Service
• Vehicle Traffic/Mode Share
• Environmental
• Land Use
Predicting Constraints

- Historical data
- Airline passenger bookings/activity
- Operational experience/knowledge of parking patterns
Strategies–Ongoing Constraints

Entail planning, capital investment, or executive/regulatory approval

- Supply: increase or reallocate
- New products
- Adjust parking rates: traditional, differential, or variable
- Technology
- HOV modes: increase, improve, or promote
Strategies–Short-term Constraints

Operational solutions to handle a finite period

- Hands-on management
- Adjust parking rates
- Temporary overflow
- Information dissemination
- Off-Airport parking as relief valve
Strategies—Considerations

Potential Impacts:

• Financial
• Vehicle Traffic
• Environmental
• Customer Service
Strategies—Example

STRATEGY: Adjust Parking Rates

CONSIDERATIONS:

<table>
<thead>
<tr>
<th>IMPACT CATEGORIES</th>
<th>POTENTIAL IMPACTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>FINANCIAL</td>
<td>Net revenue, potential changes in technology, information dissemination</td>
</tr>
<tr>
<td>VEHICLE TRAFFIC</td>
<td>Shifts between parking facilities or shifts between parking and curb pickup and drop-off</td>
</tr>
<tr>
<td>ENVIRONMENTAL</td>
<td>Impacts resulting from vehicle traffic shifts</td>
</tr>
<tr>
<td>CUSTOMER SERVICE</td>
<td>Level of satisfaction and behavioral changes</td>
</tr>
</tbody>
</table>
Predicting Outcome of Strategies

**FORMAL TOOLS** may reveal unanticipated results. Considerations include reliability of underlying data, relevance of outputs to decision making

- Mode Choice Models – regional or airport
- Parking Models
- ACRP 10-06 Airport Parking Forecast Models – described a little later

**INFORMAL TOOLS** may be less rigorous; unanticipated results will not be captured
Strategy Selection

Strategy Selection Approach

- **INITIAL FILTERING**: qualitative evaluation and elimination
- **ALTERNATIVES ANALYSIS**: analyze strategies, project results, eliminate underachievers/undesirable results
- **COMPARATIVE ANALYSIS**: rank final candidates/select strategy
Strategy Selection

**INITIAL FILTERING PHASE**

**STEP 1:** Define targeted results and threshold results for managing or resolving parking constraints.

**STEP 2:** Evaluate strategies for consistency with goals and objectives of parking program and ability to implement. Strategy is not consistent with goals and objectives → ELIMINATE from further consideration.

**STEP 3:** Evaluate strategies for potential to achieve targeted results defined in Step 1. Strategy has potential to achieve threshold results → Strategy is consistent with goals and objectives → ELIMINATE from further consideration.

**STEP 4:** Calculate related effects of strategy or package of strategies.

**STEPS 5-7:** Evaluate parking related outcomes for ability to achieve targeted and threshold results.

**STEPS 8-9:** Determine if strategy or package of strategies is likely to achieve threshold results.

**STEPS 10-11:** Develop a subordinate parking plan based on how well each alternative meets the secondary objectives of the parking program.

**ALTERNATIVES ANALYSIS PHASE**

**COMPARATIVE ANALYSIS PHASE**

**STEP 1:** Rank each alternative based on how well it meets the primary objectives of the parking program.

**STEP 2:** Preferred Strategy or Package of Strategies

**STEP 3:** Compare strategies and packages of strategies to identify preferred option.

**STEP 4:** A single strategy or package of strategies identified as viable during the Alternatives Analysis Phase.

**STEP 5:** During the Alternatives Analysis Phase, more than one strategy or one package of strategies were identified as viable.
Strategy Selection—Example

Theoretical Airport

• Background
• Potential Strategies
• Strategy Selection
Measuring Results

- Importance of before and after data
  - Selecting correct time period
- Relevance of other factors/events
- Relevance of goals & objectives – understanding what was intended with the strategy
- If several strategies, may be difficult to understand effects of individual strategies
Airport Employees

- Employee Commute Modes
- Strategies
  - Capacity: increase, consolidate facilities, reassign employees among facilities
  - Adjust parking rates
  - Alternatives to drive alone commute
- Measuring Results – Similar to Chapter 8
Airport Employees

Alternatives to drive alone commute are generally not offered airport-wide

- Transportation Management Association
- Carpool/vanpool
- Transit subsidies
- Enhanced transit
- Discounts on private HOV services
- Emergency ride home
ACRP Report 34
Handbook to Assess the Impacts of Constrained Airport Parking

GENERAL-AIRPORT MODEL
Survey Sample

Resident air passengers surveyed at 14 airports
- 911 respondents from respected online panel provider
- Respondents vetted for credible and consistent responses

Stated preference survey
- Revealed preference: Airport mode access behavior and travel behavior
- Stated preference: 8 questions in which respondents select a preferred access mode under varying pricing, time, and mode availability conditions
ACRP Airport Access Study

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

<table>
<thead>
<tr>
<th>Take Shared Ride Van</th>
<th>Dropped Off by Taxi</th>
<th>Drive and Walk from Parking</th>
<th>Drive and Take Shuttle from Parking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Travel time to airport: <strong>58 mins.</strong></td>
<td>Travel time to airport: 45 mins.</td>
<td>Travel time to airport: 45 mins.</td>
<td>Travel time to airport: 45 mins.</td>
</tr>
<tr>
<td>One-way fare to airport: <strong>$17.50</strong> per person</td>
<td>One-way taxi fare to airport: <strong>$14.00</strong></td>
<td>Daily parking fee: <strong>$25.00</strong></td>
<td>Daily parking fee: <strong>$12.50</strong></td>
</tr>
<tr>
<td>Dropped off at terminal</td>
<td>Dropped off at terminal</td>
<td>Walking distance to terminal</td>
<td>Wait for airport shuttle to terminal: <strong>5 minutes</strong></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ride airport shuttle to terminal: <strong>8 minutes</strong></td>
</tr>
<tr>
<td><strong>I'll take a shared ride van</strong></td>
<td><strong>I'll get dropped off by taxi</strong></td>
<td><strong>I'll drive and walk from parking</strong></td>
<td><strong>I'll drive and take a shuttle from parking</strong></td>
</tr>
<tr>
<td><strong>I'll drive and take a shuttle from parking</strong></td>
<td><strong>I'll drive and walk from parking</strong></td>
<td><strong>I'll drive and walk from parking</strong></td>
<td><strong>I'll drive and take a shuttle from parking</strong></td>
</tr>
</tbody>
</table>

Question 1 of 8
Model Development

• Estimated multinomial logit models using stated preference data
  • Portland specific model (316 PDX respondents)
  • Generic airport model (respondents from 13 airports & weighted PDX data)
• Used industry standard modeling methods to determine model segments and coefficients that best fit stated preference data
• Created 2 Excel-based forecast model tools by:
  • Calculating probability of using an airport ground access mode for a specific scenario
  • Applied to sample to calculate respondent-level preferences for each ground access mode
• Can be calibrated to conditions at any small, medium, or large hub airport
• Tested series of policy scenarios, such as:
  • Changing parking fee
  • Adding HOV access
## Model Inputs

<table>
<thead>
<tr>
<th>Airport Specific Base Case &amp; Policy Scenario Levels</th>
<th>Base Case</th>
<th>Policy Scenario</th>
<th>Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Park &amp; Walk to Terminal Parking Fee</td>
<td>$27.50</td>
<td>$35.00</td>
<td>per day</td>
</tr>
<tr>
<td>Park &amp; Ride Parking Shuttle to Terminal Parking Fee</td>
<td>$18.00</td>
<td>$18.50</td>
<td>per day</td>
</tr>
<tr>
<td>Parking Shuttle Riding Time to Terminal</td>
<td>10</td>
<td>10</td>
<td>minutes</td>
</tr>
<tr>
<td>Wait Time for Shuttle</td>
<td>10</td>
<td>5</td>
<td>minutes</td>
</tr>
<tr>
<td>Airport Drop Off Charge</td>
<td>N/A</td>
<td>$4.00</td>
<td>$/trip</td>
</tr>
<tr>
<td>Taxi/Limo/Towncar Fare by Distance</td>
<td>$2.55</td>
<td>$2.50</td>
<td>$/mile</td>
</tr>
<tr>
<td>Transit Fare</td>
<td>$3.50</td>
<td>$3.50</td>
<td>$/trip</td>
</tr>
<tr>
<td>Shared Van Fare by Distance</td>
<td>$1.75</td>
<td>$2.00</td>
<td>$/mile</td>
</tr>
<tr>
<td>Scheduled Bus Fare by Distance</td>
<td>$0.20</td>
<td>$0.20</td>
<td>$/mile</td>
</tr>
<tr>
<td>Additional Transit Time (over auto travel time)</td>
<td>0.30</td>
<td>0.30</td>
<td>mins/mile</td>
</tr>
<tr>
<td>Additional Shared Van Time (over auto travel time)</td>
<td>0.30</td>
<td>0.30</td>
<td>mins/mile</td>
</tr>
<tr>
<td>Additional Bus Time (over auto travel time)</td>
<td>0.30</td>
<td>0.30</td>
<td>mins/mile</td>
</tr>
<tr>
<td>Amount of Remote Parking</td>
<td>1.00</td>
<td>2.00</td>
<td>(1000s of spaces)</td>
</tr>
</tbody>
</table>

### Alternative Availability

<table>
<thead>
<tr>
<th>Alternative Availability</th>
<th>Base Case</th>
<th>Policy Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>Park &amp; Walk to Terminal</td>
<td>TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>Park &amp; Ride Shuttle to Terminal</td>
<td>TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>Taxi/Limo/Towncar to Terminal</td>
<td>TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>Dropped Off at Terminal</td>
<td>TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>Transit to Airport</td>
<td>TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>Shared Van to Airport</td>
<td>TRUE</td>
<td>TRUE</td>
</tr>
<tr>
<td>Scheduled Bus to Airport</td>
<td>TRUE</td>
<td>TRUE</td>
</tr>
</tbody>
</table>

### Resident Air Passengers Trip Purpose

<table>
<thead>
<tr>
<th>Trip Purpose</th>
<th>Base Case</th>
<th>Policy Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>Business Trips</td>
<td>29%</td>
<td></td>
</tr>
<tr>
<td>Nonbusiness Trips</td>
<td>71%</td>
<td></td>
</tr>
</tbody>
</table>

### Airport Size

<table>
<thead>
<tr>
<th>Airport Size</th>
<th>Small/Medium Hub</th>
</tr>
</thead>
</table>

### Base Case Ground Access Mode Shares

#### Business Trips

<table>
<thead>
<tr>
<th>Access Mode</th>
<th>Base Case</th>
<th>Policy Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>Park &amp; Walk to Terminal</td>
<td>32%</td>
<td></td>
</tr>
<tr>
<td>Park &amp; Ride Shuttle to Terminal</td>
<td>17%</td>
<td></td>
</tr>
<tr>
<td>Taxi/Limo/Towncar to Terminal</td>
<td>17%</td>
<td></td>
</tr>
<tr>
<td>Dropped Off at Terminal</td>
<td>14%</td>
<td></td>
</tr>
<tr>
<td>Transit to Airport</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Shared Van to Airport</td>
<td>9%</td>
<td></td>
</tr>
<tr>
<td>Scheduled Bus to Airport</td>
<td>1%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>

#### Nonbusiness Trips

<table>
<thead>
<tr>
<th>Access Mode</th>
<th>Base Case</th>
<th>Policy Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>Park &amp; Walk to Terminal</td>
<td>13%</td>
<td></td>
</tr>
<tr>
<td>Park &amp; Ride Shuttle to Terminal</td>
<td>18%</td>
<td></td>
</tr>
<tr>
<td>Taxi/Limo/Towncar to Terminal</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Dropped Off at Terminal</td>
<td>12%</td>
<td></td>
</tr>
<tr>
<td>Transit to Airport</td>
<td>18%</td>
<td></td>
</tr>
<tr>
<td>Shared Van to Airport</td>
<td>7%</td>
<td></td>
</tr>
<tr>
<td>Scheduled Bus to Airport</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td></td>
</tr>
</tbody>
</table>
**Example Model Outputs**

**Planning-Level Insight**

- Increase understanding at the planning level into the relative impact that a potential policy would have on the airport and constrained parking at the airport

<table>
<thead>
<tr>
<th>Model Output</th>
<th>Business Trips</th>
<th>Nonbusiness Trips</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resident Access Mode Share</td>
<td>Base Case</td>
<td>Policy Scenario</td>
</tr>
<tr>
<td>Park &amp; Walk to Terminal</td>
<td>32%</td>
<td>23%</td>
</tr>
<tr>
<td>Park &amp; Ride Shuttle to Terminal</td>
<td>17%</td>
<td>22%</td>
</tr>
<tr>
<td>Taxi/Limo/Towncar to Terminal</td>
<td>17%</td>
<td>13%</td>
</tr>
<tr>
<td>Dropped Off at Terminal</td>
<td>14%</td>
<td>16%</td>
</tr>
<tr>
<td>Transit to Airport</td>
<td>10%</td>
<td>11%</td>
</tr>
<tr>
<td>Shared Van to Airport</td>
<td>9%</td>
<td>8%</td>
</tr>
<tr>
<td>Scheduled Bus to Airport</td>
<td>1%</td>
<td>1%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
<td>100%</td>
</tr>
</tbody>
</table>
Add HOV at Small Hub
- Assumed fare of $1.50
- Introduction of transit could help alleviate constrained parking and reduce curb congestion

Double parking fees
- How would dramatic fee increase impact behavior?
- Likely alleviate parking congestion, but increase curb congestion

<table>
<thead>
<tr>
<th>Access Mode Share</th>
<th>All Trips</th>
<th>Base Case</th>
<th>Policy Scenario</th>
<th>Absolute Difference</th>
<th>Percent Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Park &amp; Walk</td>
<td></td>
<td>15%</td>
<td>14%</td>
<td>-1%</td>
<td>-5%</td>
</tr>
<tr>
<td>Park &amp; Ride Shuttle</td>
<td></td>
<td>25%</td>
<td>24%</td>
<td>-1%</td>
<td>-6%</td>
</tr>
<tr>
<td>Taxi</td>
<td></td>
<td>10%</td>
<td>9%</td>
<td>-1%</td>
<td>-14%</td>
</tr>
<tr>
<td>Dropped Off</td>
<td></td>
<td>40%</td>
<td>38%</td>
<td>-2%</td>
<td>-6%</td>
</tr>
<tr>
<td>Transit</td>
<td></td>
<td>0%</td>
<td>7%</td>
<td>7%</td>
<td>--</td>
</tr>
<tr>
<td>Shared Van</td>
<td></td>
<td>5%</td>
<td>4%</td>
<td>-1%</td>
<td>-14%</td>
</tr>
<tr>
<td>Scheduled Bus</td>
<td></td>
<td>5%</td>
<td>5%</td>
<td>0%</td>
<td>0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Access Mode Share</th>
<th>All Trips</th>
<th>Base Case</th>
<th>Policy Scenario</th>
<th>Absolute Difference</th>
<th>Percent Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Park &amp; Walk</td>
<td></td>
<td>15%</td>
<td>6%</td>
<td>-9%</td>
<td>-57%</td>
</tr>
<tr>
<td>Park &amp; Ride Shuttle</td>
<td></td>
<td>25%</td>
<td>18%</td>
<td>-7%</td>
<td>-27%</td>
</tr>
<tr>
<td>Taxi</td>
<td></td>
<td>10%</td>
<td>12%</td>
<td>2%</td>
<td>22%</td>
</tr>
<tr>
<td>Dropped Off</td>
<td></td>
<td>40%</td>
<td>51%</td>
<td>11%</td>
<td>27%</td>
</tr>
<tr>
<td>Transit</td>
<td></td>
<td>1%</td>
<td>1%</td>
<td>0%</td>
<td>21%</td>
</tr>
<tr>
<td>Shared Van</td>
<td></td>
<td>4%</td>
<td>5%</td>
<td>1%</td>
<td>22%</td>
</tr>
<tr>
<td>Scheduled Bus</td>
<td></td>
<td>5%</td>
<td>6%</td>
<td>1%</td>
<td>27%</td>
</tr>
</tbody>
</table>