Multimodal Optimization of Urban Freeway Corridors

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Introduction

Project Objectives

- Investigate forms of multimodal use on urban freeway corridors
- Survey other DOTs to determine what modes they rely on and why
- Demonstrate the factors and data that should be considered in the decision-making process
Introduction

Goals

• Research not intended to provide comprehensive answer to multimodal choice on urban freeways
• Is intended to show that choosing multimodal applications should be a conscientious decision considering technical factors
Points of Interest

• Two primary means of implementing multimodal travel on urban freeways:
  – “Managed Lanes”
    e.g., HOV, HOT, BRT, Exclusive-use
  – Rail
    e.g., Light Rail (LRT), Commuter Rail

• HOV Lanes are by far the most prevalent
DOT Surveys

Points of Interest

- Surveys sent out to 29 DOTs (only 9 returned responses) based on established points of contact from researching 44 DOTs
- Most utilize or plan to implement HOV lanes (of the concurrent flow type)
- HOT lanes, BRT exclusive-use lanes, dual facilities, and LRT were the modes least used/thought of by the DOT respondents
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Approach Basis

- Intent of exercise was to demonstrate the factors and data that could/should be considered when deciding what multimodal application to implement.
Multimodal Optimization of Urban Freeway Corridors

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Approach Basis (continued)

- Multimodal applications considered:
  - General Purpose (GP) lanes only
  - GP lanes + HOV lane (with BRT use)
  - GP lanes + LRT
  - GP lanes + HOT lane (HOV at no toll)
  - GP lanes + dedicated BRT lane
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Approach Basis (continued)

• Calculations relied on actual data, modeled data (from a separate unrelated ADOT study), and cost estimates (construction, implementation, maintenance, revenue).

• Comparison of multimodal forms based on common travel characteristic of “person-miles” conveyed
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Findings

- Costs to accommodate an additional person-mile* (as compared to base case of only 3 GP lanes in each direction):

  - HOT Lane $0.012 to $0.027
  - Additional GP Lane in each direction $0.019 to $0.042
  - HOV (w/BRT) Lane (existing) $0.026 to $0.057
  - Exclusive BRT Lane $0.066 to $0.147
  - LRT $0.161 to $0.358

*Range of values due to different calculation methods for the projected traffic volume by mode
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**Findings (continued)**

*Estimated Costs Per Person-Mile*

<table>
<thead>
<tr>
<th>HOT Lane</th>
<th>Additional GP Lane</th>
<th>HOV w/BRT Lane</th>
<th>Exclusive BRT Lane</th>
<th>LRT</th>
</tr>
</thead>
<tbody>
<tr>
<td>$0.05</td>
<td>$0.25</td>
<td>$0.15</td>
<td>$0.10</td>
<td>$0.40</td>
</tr>
</tbody>
</table>

*cost to carry one person, one mile*
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Findings (continued)

- Ease of Implementation (simplest to most complex):
  - Adding fourth GP lane in each direction
  - Adding HOV (w/BRT) Lane/Exclusive BRT Lane
  - Adding HOT Lane (and tolling equipment/stations)
  - Incorporating LRT into shoulder/median
- Comparison suggests GP lane and HOT lane may be comparable, except:
  - HOT lane generates revenue
  - Offers an exclusive lane for use by BRT
Overall

Conclusions

Examples of Multimodal Applications in Other States

• Managed Lanes and Rail Options Increasing in Use

• Very limited instances where specific/technical measures of effectiveness compared between multimodal options
Overall

Conclusions (continued)

DOT Surveys
• HOV Lanes clearly favored as multimodal component
• No formal compilation of the decision-making steps to evaluate multimodal options
Overall

Conclusions (continued)

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- Multimodal options that often get more public presentation and comment are not necessarily the most cost-effective
- HOT Lanes may be a viable choice for multimodal travel on Arizona’s urban freeway corridors
**Overall Recommendation**

- ADOT should consider investigating the use of HOT Lanes as the preferred choice for multimodal travel within urban freeway environments
  - Offers the benefits of HOV Lane travel to more users (without penalizing current HOV users)
  - Allows BRT use of the lane as is the case with current HOV system
  - Generates revenue to cover implementation/maintenance costs and eventually upgrades like additional direct-access ramps and overall facility expansion
Questions / Further Information

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Report available through the Arizona Transportation Research Center at:

http://www.azdot.gov/TPD/ATRC/publications/project_reports/PDF/AZ582.pdf