Multimodal Optimization of Urban Freeway Corridors

Presented by

Brennan Kidd, P.E.

Lee Engineering, LLC

Phoenix, Arizona

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

Literature Review

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

SR 51 Case Study

Approach Basis

- Intent of exercise was to demonstrate the factors and data that could/should be considered when deciding what multimodal application to implement

A Milwaukee-Congress "A" train of 6000-series PCC cars travels eastbound in the median of the brand-new Congress Superhighway. A CTA bus can been seen on the overpass in the background in this 1958 photo.

SR 51 Case Study

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

SR 51 Case Study

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

Bus Rapid Transit Service on a Barrier-Separated Busway

Source: Charlotte Area Transit System.

SR 51 Case Study

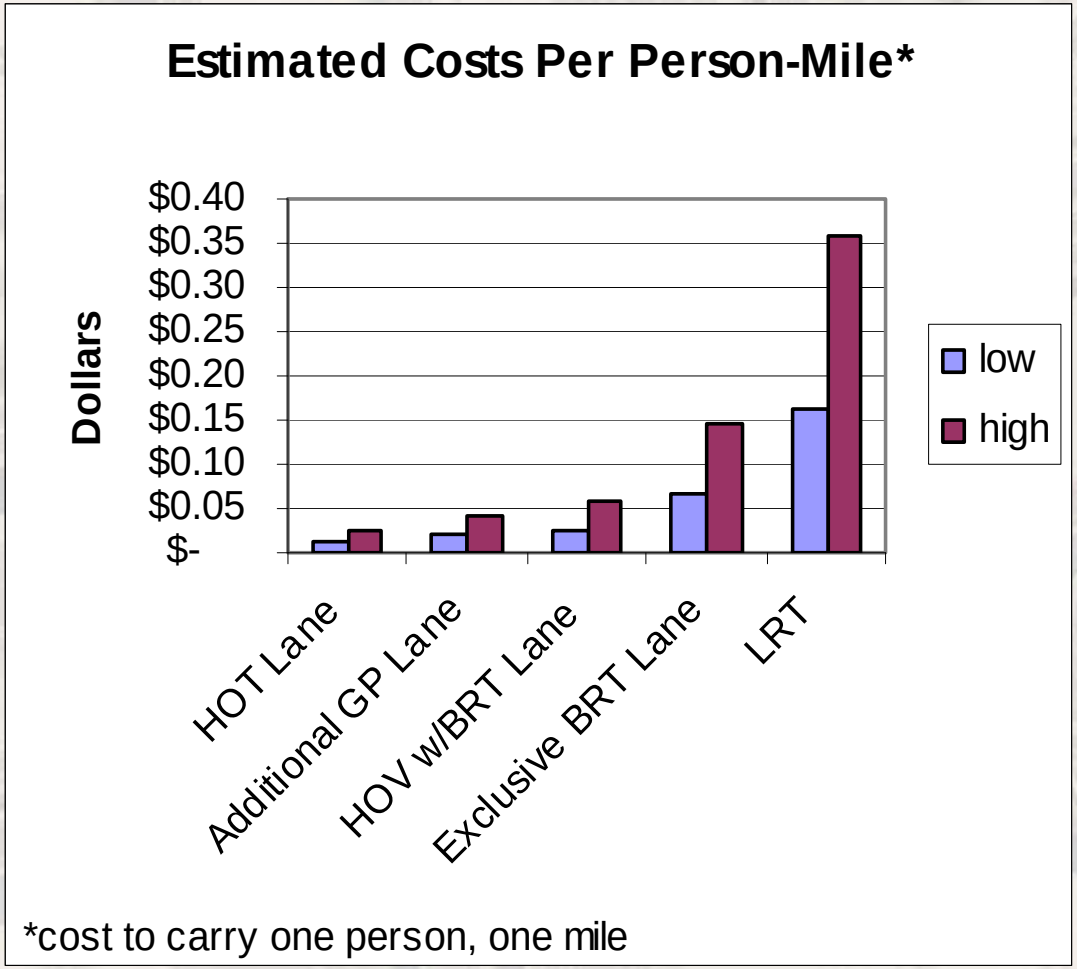
Findings

- 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

SR 51 Case Study

Findings (continued)



SR 51 Case Study

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)

SR 51 Case Study

- 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

My contact info:
bkidd@lee-eng.com
(602) 955-7206

Report available through the
Arizona Transportation Research Center at:

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