Express Lane Networks: Effectiveness and Acceptance

Rethinking Transportation Finance Roundtable
Minneapolis, MN
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Overview

- Low-cost highway capacity expansion
- Express lane pricing concepts
- Results of analysis of costs, benefits and revenues
## Cost of Highway Capacity Expansion

<table>
<thead>
<tr>
<th>Major Urbanized Areas</th>
<th>Normal Cost</th>
<th>High Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highway construction cost/ lane mile*</td>
<td>$13.4 M.</td>
<td>$55.9 M.</td>
</tr>
<tr>
<td>Daily traffic volume in peak periods (5-6 hours/day)</td>
<td>10,000 vehicles</td>
<td>10,000 vehicles</td>
</tr>
<tr>
<td>Const. cost per vehicle per mile</td>
<td>$1,340</td>
<td>$5,590</td>
</tr>
<tr>
<td>Const. cost for 20-mile round trip</td>
<td>$26,800</td>
<td>$111,800</td>
</tr>
<tr>
<td>Annualized const. cost for 20-mile trip**</td>
<td>$1,742</td>
<td>$7,267</td>
</tr>
<tr>
<td>Cost for 20-mile trip per working day</td>
<td>$7.00</td>
<td>$29.00</td>
</tr>
<tr>
<td>Gas tax paid for 20-mile trip (2 cents/mile)</td>
<td>$0.40</td>
<td>$0.40</td>
</tr>
</tbody>
</table>

*Source: FHWA, in 2006 dollars  
**Annualization factor 0.065 assuming a 5.25% discount rate and 30-years
Active Traffic Management (ATM) with Shoulder Travel Lane
But New Issues Arise

- **Safety concerns:**
  - Driver understanding
  - Emergency response

- **Pilot tests:**
  - Minneapolis I-35W
  - Seattle SR 520
Overview

- Low-cost highway capacity expansion
- Express lane pricing concepts
- Costs, benefits and revenues
Single Priced Lane

Flexible and Efficient Express (FEE) Lane

- Left shoulder (6 ft.)
  - GP-1 (12 ft.)
  - GP-2 (12 ft.)
  - GP-3 (12 ft.)

- Right shoulder (10 ft)

- Left shoulder
  - FEE (11 ft.)
  - GP-1 (11 ft.)
  - GP-2 (11 ft.)

  - GP – shoulder (13 ft.)
Two Priced Lanes

FEE Lanes plus fee credits

Left shoulder (6 ft.)

→ GP-1 (12 ft.)
→ GP-2 (12 ft.)
→ GP-3 (12 ft.)

Right shoulder (10 ft)

→ FEE
→ FEE

→ GP
→ GP - shoulder
All Lanes Priced

FEE Highways with credits

Left shoulder (6 ft.)
- GP-1 (12 ft.)
- GP-2 (12 ft.)
- GP-3 (12 ft.)

Right shoulder (10 ft.)

Left shoulder
- FEE (11 ft)
- FEE (11 ft.)
- FEE (11 ft.)
- FEE (13 ft.) sh. lane

Office of Innovative Program Delivery
Overview

- Low-cost highway capacity expansion
- Express lane pricing concepts
- Costs, benefits and revenues
Costs

- **Capital costs:**
  - Overhead lane controls
  - Shoulder improvements
  - Tolling infrastructure

- **Operating costs:**
  - Active traffic management
  - Tolling and crediting operations
Benefits

- **Traveler benefits:**
  - Delay reduction
  - Travel time reliability
  - Fuel savings

- **Social benefits – reductions in:**
  - Air pollution and GHG emissions
  - Noise and water pollution, and other externalities
Sketch Planning Analysis

- Account for induced travel demand due to increase in capacity
- Toll rates set to maintain 55 mph speed
Regionwide Impacts

Prototypical large city:
- About 3 million population
- 300-mile controlled access highway network
- 1,800 lane-miles
### Effectiveness of Pricing Concepts

<table>
<thead>
<tr>
<th></th>
<th>1 FEE lane</th>
<th>2 FEE lanes</th>
<th>4 FEE lanes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Toll for 10-mile trip</td>
<td>$5.27</td>
<td>$3.71</td>
<td>$1.97</td>
</tr>
<tr>
<td>Annual revenues</td>
<td>$0.5B</td>
<td>$0.9B</td>
<td>$1.0B</td>
</tr>
<tr>
<td>Annual user benefits</td>
<td>$0.5B</td>
<td>$0.9B</td>
<td>$2.0B</td>
</tr>
<tr>
<td>Peak period CO2 emissions</td>
<td>-5%</td>
<td>-15%</td>
<td>-39%</td>
</tr>
</tbody>
</table>
Effectiveness vs. Acceptance

- All lanes priced
- Single priced lane

Effectiveness vs. Public Acceptance
Conclusions

- Effectiveness dramatically increases with number of priced lanes
- Surplus for credits or transportation investment with more priced lanes
- Segregating traffic into priced and unpriced lanes increases operational issues
- Further discussion is needed, particularly with regard to safety issues
Analytical Details

ITE Journal, September 2009:
Creating a Network of Express Lanes in Metropolitan Areas

By
Patrick DeCorla-Souza &
John Halkias
(pp 40-46)
For More Information on Pricing

FHWA Office of Innovative Program Delivery:
www.fhwa.dot.gov/ipd

FHWA Office of Operations:
http://ops.fhwa.dot.gov/tolling_pricing/index.htm
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