Advancing Traveler Information Technologies for Managed Lane Networks

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PROBLEM

ML networks are complex, interconnected facilities that require traveler information

• Pricing Rules, Vehicle Occupancy, Hours of Operation, Access

Past projects developed for single corridors now turning into expansive regional networks

Roadway signage to convey info will become ineffective as complexity increases
RESEARCH PLAN

Consisted of these parts:

• National State-of-the-Practice Review
• Human Factors Assessment (Travel Surveys)
• Technology Assessment
REVIEW: DISTANCE PRICING STRUCTURE

Current practice is evolving, syntax is not standardized

Single entry price
  • Travelers pay only one price for any location, any dist.

Uniform per-mile
  • Same $ per mile along corridor

Destination-based
  • Travelers pay different $ per mile, depending on entry/exit
REVIEW: DISTANCE PRICING STRUCTURE

Zone-based

- Variation of destination-based pricing
- Grouping of specific origin-destination pairs

I-880 Express Lanes in Alameda County, CA
REVIEW: NUMBER OF DESTINATION POINTS

Varies nationally from 1-3 prices on overhead signs

- Private concessionaires tend to want fewer prices
- More prices can lead to driver confusion (sole vs additive price)
Availability of real-time toll rate information varies nationally

- Some fear complaints about changing rates
- Other operators allow third-parties to access data feeds (GitHub, existing 511)
<table>
<thead>
<tr>
<th>Network</th>
<th>Existing Configuration</th>
<th>Pricing Structure for Most Facilities</th>
<th>View Real-time Toll Online?</th>
<th>Number of Pricing Destinations on Signs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dallas/Fort Worth</td>
<td>6 corridors / 79 miles</td>
<td>Destination-based</td>
<td>No</td>
<td>2 (LBJ Express) 1 (NTE)</td>
</tr>
<tr>
<td>Houston</td>
<td>6 corridors / 97 miles</td>
<td>Single entry price</td>
<td>Yes</td>
<td>1 (METRO HOT) 3 (Katy MLs)</td>
</tr>
<tr>
<td>Minneapolis-St. Paul, Minnesota</td>
<td>3 corridors / 31 miles</td>
<td>Destination-based</td>
<td>No</td>
<td>2</td>
</tr>
<tr>
<td>South Florida</td>
<td>2 corridors / 17 miles</td>
<td>Destination-based</td>
<td>No</td>
<td>3 (planned)</td>
</tr>
<tr>
<td>Seattle, Washington</td>
<td>2 corridors / 26 miles</td>
<td>Destination-based</td>
<td>Yes</td>
<td>3</td>
</tr>
<tr>
<td>San Francisco Bay Area</td>
<td>3 corridors / 34 miles</td>
<td>Zone-based</td>
<td>Yes</td>
<td>2</td>
</tr>
<tr>
<td>Washington, DC/Northern VA</td>
<td>2 corridors / 43 miles</td>
<td>Uniform per-mile</td>
<td>Yes</td>
<td>3</td>
</tr>
</tbody>
</table>
HUMAN FACTORS ASSESSMENT: SURVEYS

Online web-based survey instrument

Open from February – March 2017

Collected over 800 responses

Focused on ML travelers in D/FW, Houston, Austin
What pre-trip tools do you use often or very often?

Respondents can select more than one option.
What trip elements are critical?

Deemed *Critical* by 80% or more of respondents

- Expected Delays
- Re-routing Advice
- Alternate Routes

Deemed *Critical* by less than 80%

- Trip Distance (63%)
- Toll Cost (43%)
- Toll Payment Options (41%)
- Bus or Train Options (23%)
What is the single most important factor in your decision to use managed lanes?

Respondents can only select one option.

- Traffic conditions that I observe in the regular lanes: 35%
- Traffic reports on a smartphone map or in-vehicle GPS: 23%
- Whether I have enough passengers to qualify for HOV status: 15%
- Whether the lane has an exit convenient to my destination: 9%
- Whether I think it is safer than the regular lanes: 7%
- Price shown on sign: 5%
- Traffic conditions that I observe in the managed lanes: 3%
- Traffic conditions in the managed lanes: 2%
Which information should be on a sign or provided on an in-vehicle device?

- Alerts about crashes, construction, or other incidents
- Traffic condition status
- Travel time estimates to certain destinations
- List of intersecting roads the managed lane connects to
- List of points where you can exit the managed lane
- Current toll price
- Toll tag requirements
- Speed limit
- Restrictions about vehicle type (like “no towed trailers”)
- Number of occupants required
- Entrance location to the managed lane
TECH CONSIDERATIONS

Some private parties would love to have data, but encounter challenges

• Don’t know where managed lanes exist – can find barrier-separated facilities, but not those with a changeable, pylon, or striped buffer

• Need to know which elements are relatively static vs. dynamic

• Lack of consistency across facilities

• MLs are not a core need for some map providers

Agencies need to provide timely, accurate, and structured information
MOVING FORWARD: ONE PATHWAY

Provide information through an open-source data format for use by third-party entities

A sample data set might include:

- Corridors (lat/long, left/right of the GPLs)
- Access (ingress, egress points)
- Tolls (O-D table, based on destination points)
- Payment (transponder, pay-by-mail)
- Vehicle Type (tolled, discounted, not permitted)
- Hours of Operations (closed, reversible)
Realize the importance of incremental progress

Don’t wait for perfection

Understand the need for continuous improvement
MORE INFORMATION

Research report expected to be complete next month
Forthcoming paper for the 2018 TRB Annual Meeting

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