From Policy to Implementation

Freeway Tolling and Express Lanes

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TODAY’S DISCUSSION

➔ Freeway Tolling to Manage Congestion
➔ Where / How Has the Concept Been Used
➔ Policy, Design, and Operations Options
➔ Lessons and Trends
WHAT’S THE POINT OF FREEWAY TOLLING?
#1 RAISE REVENUE

- Drive More, Use Less Gas
- Net Decline in Gas Tax Revenue Corresponds with Fuel Efficiency Increase Since 2005
#2 SOLVE THE ECONOMICS OF CONGESTION

Congestion is an imbalance between:

- Supply (highway lanes)
- Demand (highway travel)

Equilibrium where Supply and Demand are in balance
ECONOMICS OF CONGESTION

Congestion is an imbalance between:
- Supply (highway lanes)
- Demand (highway travel)

Unlimited demand yields overconsumption of supply
- Demand limited by fuel consumption, not location and time of use

Outcome is economic scarcity
DEALING WITH SCARCITY

Limited Capacity

Unlimited Demand

3 Options for Dealing with Scarcity

- Increase Capacity
- Reduce Demand
- Control Access
DEALING WITH SCARCITY

Build More Lanes
- Congestion relief is temporary
- Does not fix the fundamental imbalance
- Widening costs are expensive

Reduce Demand
- Yields rationing and trip avoidance
- Requires viable alternatives
- Impedes economic productivity

Control Access
- Does nothing for growth
- Shifts more trips to arterials
AVOIDING CONGESTION

→ Requires a fundamental commitment to manage roadway capacity to avoid traffic flow breakdowns.
CONGESTION IS THE RESULT OF FLOW BREAKDOWN

→ Predictable conditions
  - **Bottlenecks** at known locations
    - Ramp merges, grades, weaving points, lane constrictions, bridges, etc.
  - **Speed differentials** between vehicles

→ Unpredictable conditions
  - **Driver behavior** that slows traffic, such as rubber necking or sudden braking
  - **Spikes in traffic** that yield short periods of high density flow
Flow breaks down at 1800 – 2000 vehicles per hour per lane
EXAMPLE OF FLOW BREAKDOWN
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WHY SHOULD WE USE TOLLING?

→ Generates Revenue
  - Afford more than we could otherwise build and maintain

→ Meters Traffic
  - Higher travel speeds accrue in medium and (especially) long term
  - Pricing more efficient than signalization or rationing

You Don’t Need a Toll to Meter
I-70 (Colorado) meters traffic through mainline traffic signals.
FREeway TOLLING COMBINES ALL THREE

→ Application
  ▪ Expands capacity
  ▪ Shifts demand
  ▪ Uses Pricing

→ Outcome
  ▪ Congestion-free lanes
  ▪ Safety & Reliability
  ▪ Long term Return on Investment
Use of pricing meters traffic in order to prevent breakdown into congested conditions.
TOLLED EXPRESS LANES: 2003

SR 91 Express
I-15 FasTrak
US 290 QuickRide
I-10 QuickRide
TOLLED EXPRESS LANES: 2013

SR 167 HOT Lanes
I-85 Express
I-15 Express
SR 237 / I-880 Express
I-10 Metro Express
I-110 Metro Express
SR 91 Express
I-15 San Diego
I-680 Express
I-495 Express
I-85 Express
US 59 North
US 59 South
US 290 Northwest
I-10 Katy Freeway
I-45 South
I-45 North
I-10 Metro Express
I-95 Express
I-25 Express
I-35W MnPASS
I-394 MnPASS
I-45 North
TOLLED EXPRESS LANES: 2016

- I-10 Metro Express
- SR 91 Express
- US 290 Northwest
- US 59 South
- I-35W MnPASS
- I-35E MnPASS
- I-354 MnPASS
- US 36 Express
- I-25 Express
- I-25 Reversible
- I-495 Express
- I-95 Express
- I-85 Express
- Loop 375
- DFW Connector
- North Tarrant Express
- I-635 LBJ Managed
- US 59 North
- I-10 Katy Freeway
- I-45 South
- US 59 North
- I-595 Express
- I-95 Express
RAPID GROWTH IN TOLLED EXPRESS LANES

Almost doubling the total lane miles in the next five years
ALREADY IN SECOND GENERATION

I-15 San Diego, 2003

I-15 San Diego, 2013

I-10 Houston, 1999

I-10 Houston, 2013
NOT ALL FACILITIES ARE THE SAME

Convert HOV Lanes

- Overused HOV
  - I-85 Atlanta
  - I-405 Seattle

- Underused HOV
  - I-25 Denver
  - I-15 Salt Lake City
  - SR-167 Seattle
  - I-394 Minneapolis

Build New Lanes

- Convert + Build
  - I-15 San Diego
  - I-95 Miami
  - I-495 Virginia
  - I-35W Minneapolis
  - I-10 Houston
  - I-635 Dallas

- Build Only
  - SR-91 Orange County
  - I-595 Ft. Lauderdale
  - North Tarrant Express Dallas
  - DFW Connector Dallas

Anticipate More Benefits

Anticipate Less Benefits
INITIAL LAINES WERE PHYSICALLY SEPARATED
CONTEMPORARY LANES ALSO SIDE-BY-SIDE WITH GENERAL PURPOSE LANES
PRICING OF HOV’S

**HOV-2+ free at all times**
- I-15 (CA)
- I-25
- SR 167
- I-35W
- I-394
- I-680
- SR-237 / I-880
- I-15 (UT)

**HOV-2+ free peak only**
- I-10 (TX)
- I-45

**HOV-3+ free with limits**
- I-95 (FL)
- I-85
- I-495
- SR-91*

**HOV-3+ discount**
- SR-91*
- I-635
- I-35E (TX)

**No HOV benefits**
- Loop 375
- Loop 1
- I-595
- I-95 (MD)

I-635, Dallas
PRICING MECHANISMS

→ Variable time of day
  - SR-91, I-25, I-10,
  - Loop 375, Houston Metro

→ Variable dynamic
  - I-15, SR 167, I-680,
  - I-394, I-35W, I-95, I-85
Dynamic Speed Control
- Reduce speeds in advance of sudden blockages and disruptions
- Manage queues to prevent secondary crashes
- Affirm events in real time

Variable Lane Control
- Makes additional capacity available during peak traffic conditions
- Uses overhead signage and pavement markings to indicate lane status
- Can close lanes in advance of incidents
LESSONS AND TRENDS
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➔ Freeway Tolling is an increasingly mainstream mobility option
  ▪ Adopted express lanes policies in multiple states
    – Mandate preference for express lanes as new capacity
    – Shift to express lane *networks*
  ▪ Limited general purpose lane widening in urban areas
  ▪ Preservation of options

➔ Still recognize that express lanes are a fundamental change in how we use highway capacity
  ▪ Evolution from “build and forget” to “every day operation”
LESSONS AND TRENDS

→ Big Projects Require Big Revenue
  ▪ $1B+ reconstruction projects increasingly funded with revenue from express lanes
  ▪ Leverages multiple funding sources
  ▪ Alternative delivery / concession agreements
  ▪ Provides O&M and limited capital coverage

→ Tolling for revenue involves different fundamental decisions than tolling for traffic management
  ▪ Mechanisms still the same
LESSONS AND TRENDS

→ Success driven by planning and policy
  - Invest early in education and outreach
→ Technical, institutional, public acceptance issues can be overcome
  - Don’t oversell the project
  - Create “win” scenarios
  - Listen to constituents
  - Adapt policies to public desires
→ Establish performance measures and key policies early
  - Agreement on what will constitute success or failure
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