

THE IMPACT OF U.S. HOV AND HOT LANES ON CONGESTION

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Overview



- Part 1: The evolution of HOV and HOT lanes in the United States
- Part 2: HOT lane performance
- Part 3: HOT lanes' implications for freeway pricing

Part I: Evolution

From busways to HOV lanes

- Busway rationale was reducing oil imports.
- Excess capacity on bus lanes led to allowing vanpools and 4-person carpools.
- Excess capacity then led to HOV-3, and ultimately HOV-2.
- Rationale became reduced emissions.
- New federal policy: only lane additions allowed were HOV, not GP.

Second thoughts on HOV lanes

- Most HOV lanes either too full or too empty.
- HOV lane “revolts” urged conversion to GP lanes.
- Fam-pooling recognized as a problem.
- No workable way to verify occupancy or enforce it.
- Long-term decline in carpooling as more lanes added (from 19.7% of commuters in 1980 to 9% in 2018).

Origin of HOT lanes

1991 federal law changes:

- Allowing addition of toll lanes to federal-aid highways.
- Creation of FHWA Congestion Pricing Pilot Program.

Independent of these, California law allowed:

- SR 91 (Orange County) to add privately financed variable toll lanes.
- I-15 (San Diego) to convert HOV-2 lanes to HOT-2.

Growth of HOT lanes

- Federal program renamed *Value Pricing Pilot Program*.
- Early projects converted HOV-2 to HOT-2
- Next privately financed lane additions: HOT-3 on Beltway outside Washington, DC
- Both kinds proliferated since mid-2000s.
- TRB created Managed Lanes Committee and projects database.
- 53 ML projects in operation by mid-2020

Changing HOT lanes trends

- HOT networks added to metro-area long-range transportation plans.
 - Newer projects increased requirement for HOT-3 or gave no exemptions to carpools.
 - Increasing fraction developed as lane additions, financed by toll revenue bonds:
 - Some carried out under long-term P3 agreements
 - Others carried out by state or local transportation agencies
- Most of these have investment-grade bond ratings.

Part 2: HOT lanes performance



Findings on customers

- Increased understanding of values of time and values of reliability (Small, et al.)
- Newest concept: value of urgency (Bento, et al.)
- Demographic and vehicle data counter the idea of “Lexus Lanes”
- Most motorists use HOT lanes only occasionally, for specific trips of high value (informal 90/10 rule)

Impact on transit use

- Less-congested corridor as preferred guideway for express bus service.
- Transit agencies increasingly taking advantage of HOT lanes.
- Some data show significant increases in bus ridership, compared with bus in HOV lane.
- Nearly all planned HOT lanes plan to host express bus service.

Impact on carpooling

- I-15 had carpool increase after HOV to HOT conversion.
- HOT-2 often led to carpool increase.
- HOT-3 usually leads to carpool decrease, at least in the lanes themselves.
- Atlanta (I-85) and Miami (I-95) permit registered carpools only, to exclude fam-pools.

Equity findings, (I)

Detailed I-405 study (Hallenbeck, et al.)

- Regular users (8% of total) account for 76.5% of daily use.
- Lowest-income users are 20% of AM peak, 12% of PM peak.
- Net benefit findings (VOT saving minus toll cost)
 - \$2.50/trip for lowest-income group
 - \$1.70/trip for middle-income group
 - \$1.45/trip for high-income group.

Equity findings (2)

Social welfare modeling, DFW area, (Do, et al)

Four alternative freeway projects:

- Add GP lane
- Add HOV lane
- Add HOT lane (“priced ML”)
- Price all lanes.

“Priced ML” showed the greatest increase in social welfare.

HOV/HOT enforcement

- Original method (still used) is highway patrol officers' eyeballs.
- Various roadside camera systems (none is accurate or reliable enough)
- Switchable transponder (honor system)
- Smartphone is newest approach.
- Registered carpool with regular certification

Part 3:

HOT lanes and freeway pricing



- The congestion reduction and equity benefits of HOT lanes offer some degree of hope for eventual freeway pricing.
- However, the political difficulties must be thought through and overcome, for this to happen

Political difficulties

World Bank analyst's three groups (Hau):

- The tolled—winners
- The tolled-off—losers
- The un-tolled—losers

Dealing with the losers:

- Compensate them using toll revenue (Small, King)--
or
- Create a value-based approach

Change the rhetoric from negative to positive

Support for HOT lanes increased when focus shifted:

Congestion Pricing Pilot Program suggested forcing people to pay for driving during peaks (punitive).

Value Pricing Pilot Program offered valued time savings for those who choose to pay (opportunity).

How can we apply this lesson to freeways?

A proposed evolution toward freeway pricing



- Emerging HOT networks will increase familiarity with motorist and transit benefits of variable pricing.
- As fuel tax revenue continues to decline, stress the need to replace it with per-mile charges, starting with limited-access highways/freeways
- Urge modest peak/off-peak charge for regular (GP) lanes with continued variable (market) pricing in premium (HOT) lanes.
- The rationale here is to extend the value pricing *benefits* to regular lanes, to ensure they are properly funded and work better long-term.
- This approach would avoid rhetoric about shifting motorists out of freeways (punitive) and seek to attract them to pricing's proven benefits.