

Super HOT Highways: Costs, Benefits and Revenues

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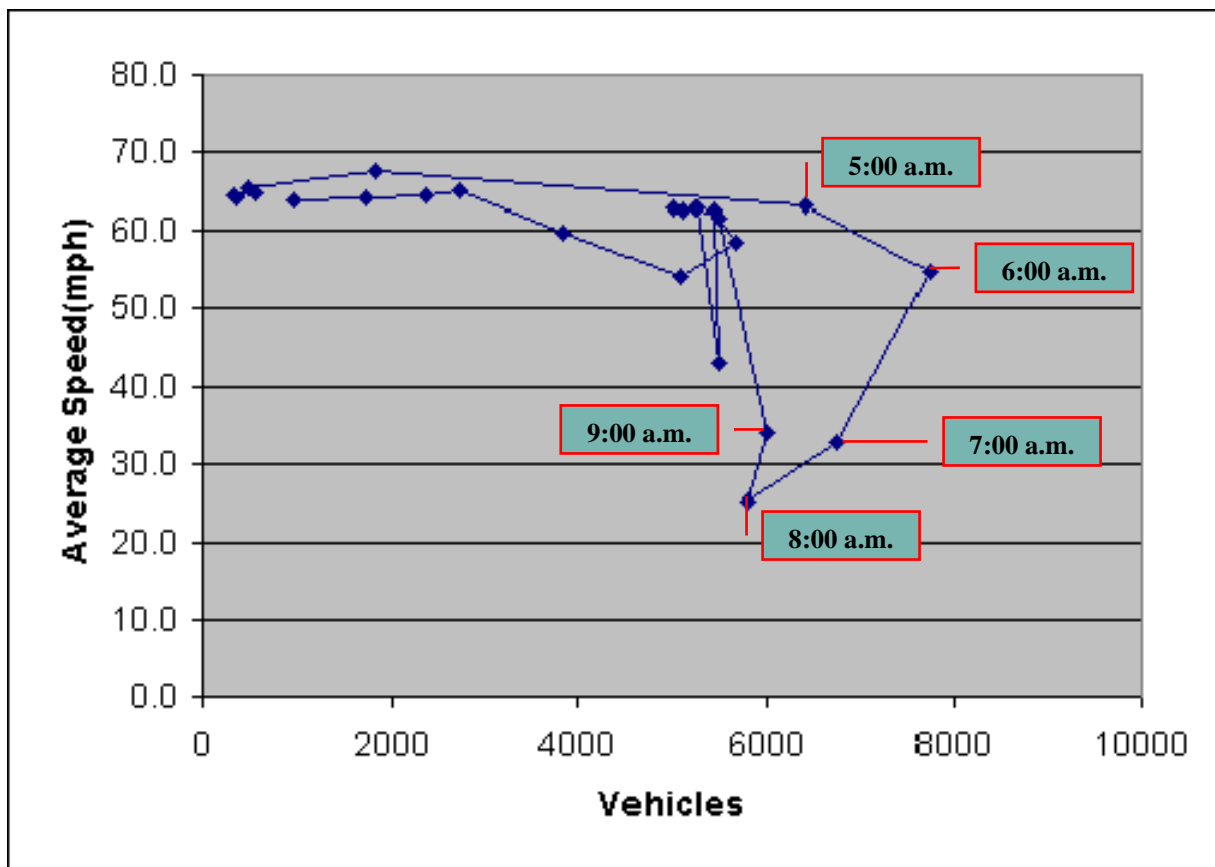
TRB Freeway & Tolling Operations Conference

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Overview

- **The freeway congestion paradox**
- **Addressing traffic flow breakdown with congestion pricing**
- **Costs, revenues and benefits**

Morning Rush Hour Traffic: Eastbound I-66, VA - March 5, 2007



Travel Time on I-66, Northern VA

| | Traffic volume | Speed (mph) | Travel time per mile (min.) |
|------------------------|---------------------|-------------|-----------------------------|
| • 7:00-8:00 am | 7,000 | 30.0 | 14,000 |
| • 8:00-9:00 am | 6,000 | 25.0 | 14,400 |
| • 9:00-10:00 am | <u>6,000</u> | 30.0 | <u>12,000</u> |
| | 19,000 | | 40,400 |

Travel Time with No Flow Breakdown

| | Traffic volume | Speed (mph) | Travel time per mile (min.) |
|------------------------|----------------------|-------------|-----------------------------|
| • 7:00-8:00 am | 8,000 | 55.0 | 8,720 |
| • 8:00-9:00 am | 8,000 | 55.0 | 8,720 |
| • 9:00-10:00 am | <u>3,000*</u> | 55.0 | <u>3,270</u> |
| | 19,000 | | 20,710 |

*Previous freeway traffic only. Available capacity will attract additional drivers, some from alternate routes.

The Problem is Solvable

- **Only a small drop in traffic (about 10%) can prevent flow breakdown**
- **Evidence:**
 - **Washington DC in August**
 - **State holiday in California**
 - **Jewish holiday in Boston**

Can We Reduce Traffic by 10%?

- **Possibilities:**
 - **Transit**
 - **Vanpooling, carpooling or slugging**
 - **Flextime or telecommuting**
- **Key is to get 10% off during the first “breakdown” hour**
- **“Pull” strategies MUST be supplemented by “push” strategies**

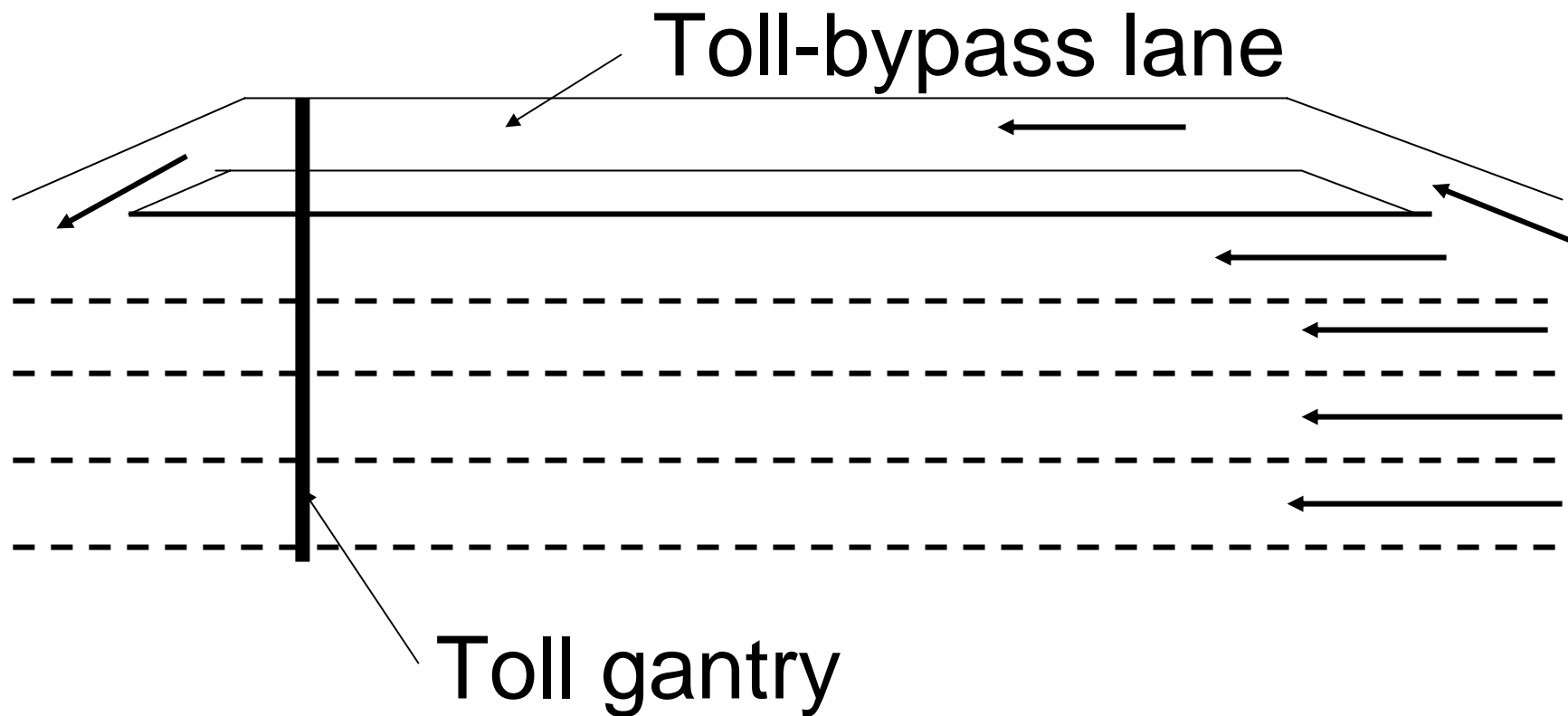
Congestion Pricing

- **Toll “price” to manage demand for use of freeway:**
 - **Toll cost is not a “wasted” resource – revenue can be used to reduce taxes or generate additional benefits**
- **Main issue:**
 - **Motorist perceives that “free” service will be taken away**

Providing Choices with Super HOT Concept

- **Transfer to inexpensive express bus**
- **Form an employer-certified vanpool or carpool**
- **Pay market-based toll and get guaranteed high speed**
- **Wait in toll-free queue and “pay” with time**

Toll-Bypass Lane



Advantages

- Reduces congestion now on whole freeway network
- Creates an HOV network and a “fixed guideway” transit network practically overnight
- Advantages relative to priced lane networks:
 - Costs *lower* – less right-of-way & construction
 - Capacity per lane *higher*
 - Safety – *less* weaving
 - User cost - *lower* toll for premium service
 - *Entire facility* congestion-free

Sketch Planning Using TRUCE Model

- **Toll rates**
- **Costs to implement**
- **Revenues**
- **Social benefits**

Example Application of TRUCE

- **Los Angeles**
- **8 hours of congestion daily**
- **Price all lanes**
- **New express bus services with discounted transit fares**
- **Park-and-ride at transfer sites**
- **Toll-bypass lanes at 5-mile intervals**

Peak Period Toll Rates for 10-mile Freeway Segment in Los Angeles

| | |
|-----------------------------------|-----------------|
| • Avg. existing speed | 34.3 mph |
| • Time saved over 10 miles | 7.5 min. |
| • Average toll | \$1.72 |

Annual Highway Costs for Los Angeles Network (million \$)

| | |
|----------------------------------------------------|----------------------|
| Capital (toll infrastructure, bypass lanes) | \$1,100 |
| Annualized capital | \$ 100 |
| O & M (per year) | <u>\$ 235</u> |
| Total annualized cost | \$ 325 |

Annual Transit Costs for Los Angeles Network (million \$)

| | |
|---------------------------------------|--------------------|
| Transit subsidy | \$575 |
| Park-and-ride (transit riders) | <u>\$95</u> |
| Total | \$670 |

Annual Costs for Los Angeles Multimodal Network (million \$)

| | |
|-----------------------------------|---------------------|
| Highway | \$325 |
| Transit and park-and -ride | <u>\$670</u> |
| TOTAL | \$995 |

Annual Benefits for Los Angeles Multimodal Network (million \$)

| | |
|-------------------------------------------|---------------------|
| Delay and fuel savings* | \$3,800 |
| Other (reliability & transit)* | <u>\$950</u> |
| TOTAL | \$4,750 |

*Freeway only – does not include reductions due to reduced arterial congestion

Los Angeles Costs vs. Revenues and Benefits (million \$)

| | |
|------------------|-----------------------|
| Costs | \$995 |
| Revenues | <u>\$2,035</u> |
| Surplus | \$1,040 |
| Benefits | \$4,750 |
| B/C ratio | 4.8 |

Conclusions

- **“Super HOT” highway network can be financially self-sufficient**
- **Benefits will exceed costs, depending on existing congestion levels**
- **Potential to get public acceptance - no one is made worse off**