



Achieving High Performance Transportation Networks

Toolbox for Corridor Management and Planning In Metro Washington

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ENVIRONMENTAL DEFENSE

finding the ways that work

13 April 2006

High Performance Transportation: A Systems Framework Linking -



- Comprehensive transportation asset management
- Smart pricing incentives
- Integrated planning and life cycle cost analysis: fix-it-first
- Performance based contracting
- Focus on boosting travel choice & reliability, cutting congestion, improving environmental quality, enhancing stakeholder support

Transportation Plans Must Meet Planning Process Objectives in SAFETEA-LU



New duty for states and metro areas to adopt transportation plans that accomplish the planning objectives in 2005 SAFETEA-LU law:

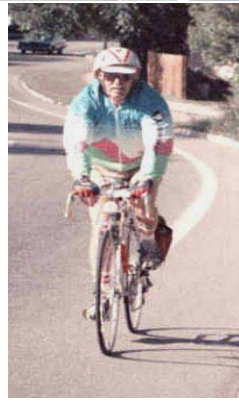
- improve mobility
- promote economic development
- minimize fuel use, and
- minimize air emissions

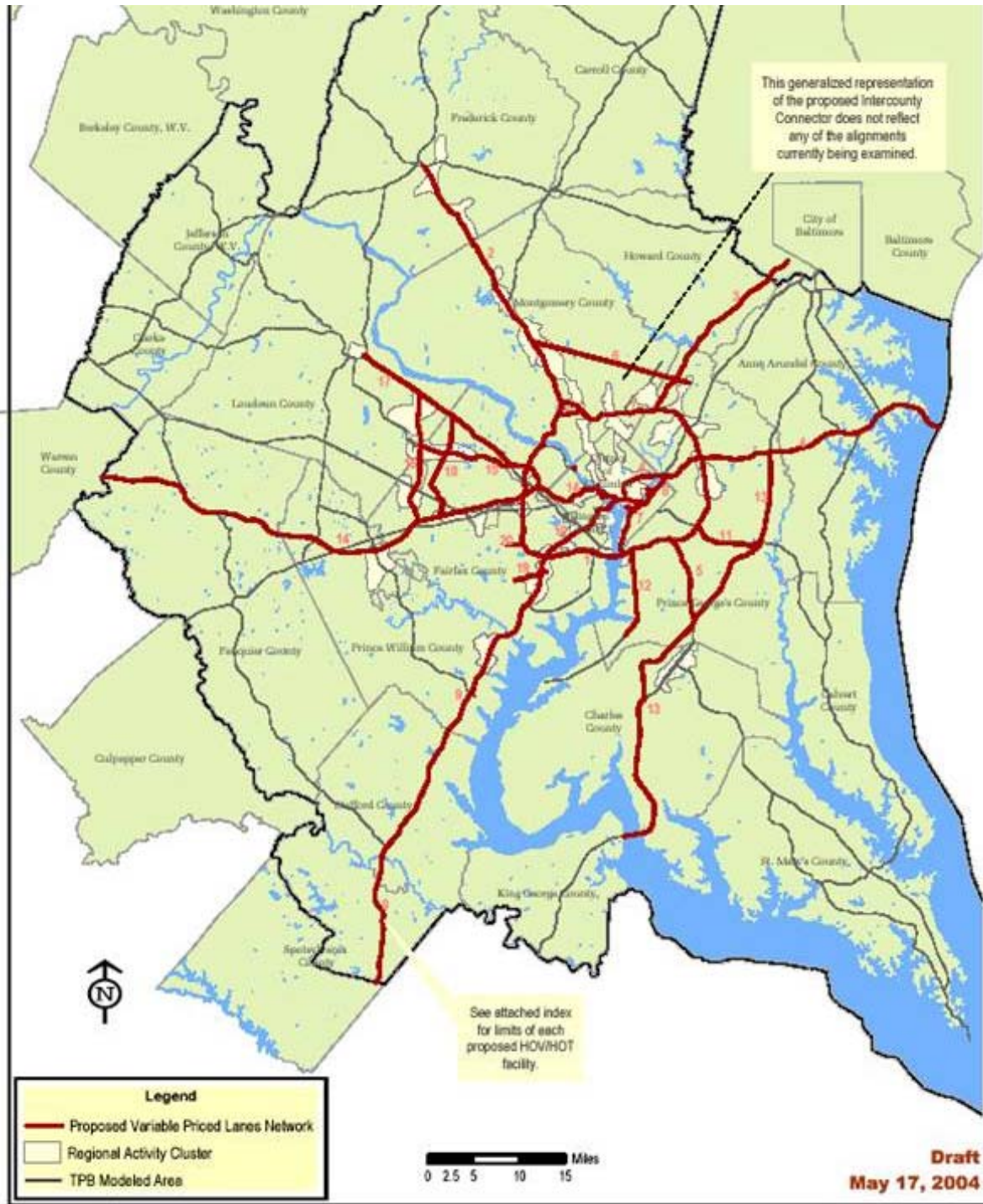


Planning Strategies Likely Capable of Achieving All Objectives Include



- Peak period tolls on new and existing lanes to manage congestion
- Real time traffic ops management, monitoring
- Ramp metering
- Bus Rapid Transit (BRT)
- Intermodal freight projects
- Safe routes to schools & transit, complete streets
- Contracting for performance





Proposed Variable Priced Toll Lane Network for Metro Washington, DC

Adopted by Metropolitan Washington Transportation Planning Board for Testing in 2005



Adopted Principles for Variable Priced Lanes in Metro Washington Include...

- *...bus service should be integral part of system of variably-priced lanes, beginning with project planning and design, to move maximum number of people, not just vehicles.*
- *Transit buses should have reasonably free-flowing and direct access to variably-priced lanes from major activity centers, key rail stations, and park-and-ride lots, so buses don't have to cross congested general purpose lanes.*
- *Transit buses using variably-priced lanes should have clearly designated and accessible stops at activity centers or park-and-ride lots, and signal priority or dedicated bus lanes to ensure efficient access to and from activity centers.*
- *Toll revenues from priced lanes may finance construction, service debt, and pay for operation and maintenance of the priced lanes. Should toll lanes operate at a revenue surplus, consideration should be given to enhancing transit services.*

But Will There Be Surplus Revenue?

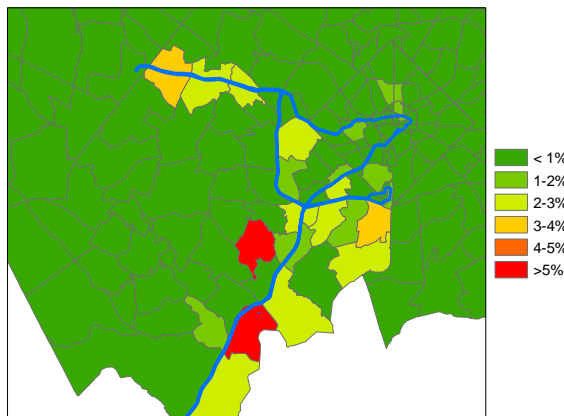
- Surplus toll revenue for transit easy if converting HOV to HOT lanes at low cost
- Surplus revenue scarce if only costly new lanes will be tolled
- To cut costs and boost revenues: convert existing shoulders to rush hour lanes while managing general purpose lanes with peak period tolls, incentives



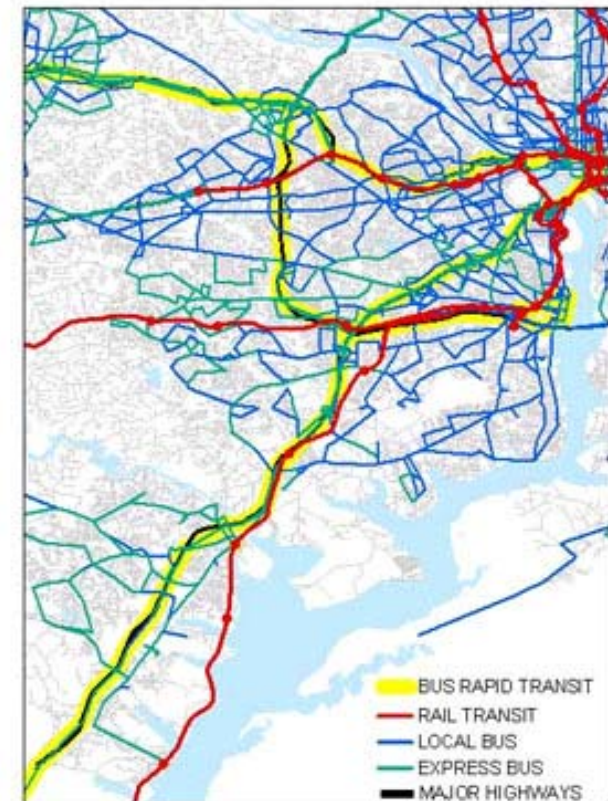
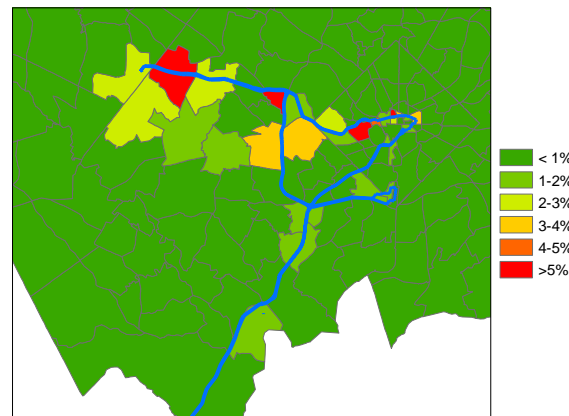
Putting Express Buses on HOT Lanes Can Cut Congestion, Boost Choices

Northern Virginia study shows potential for 7,700 net new 2010 transit riders: 79% from Single Occupant Vehicles; 21% from HOV *

Net new transit trip origins



Net new transit trip destinations



* Environmental Defense/Breakthrough Technology Institute, www.gobrt.org

HOT Lanes on Capital Beltway



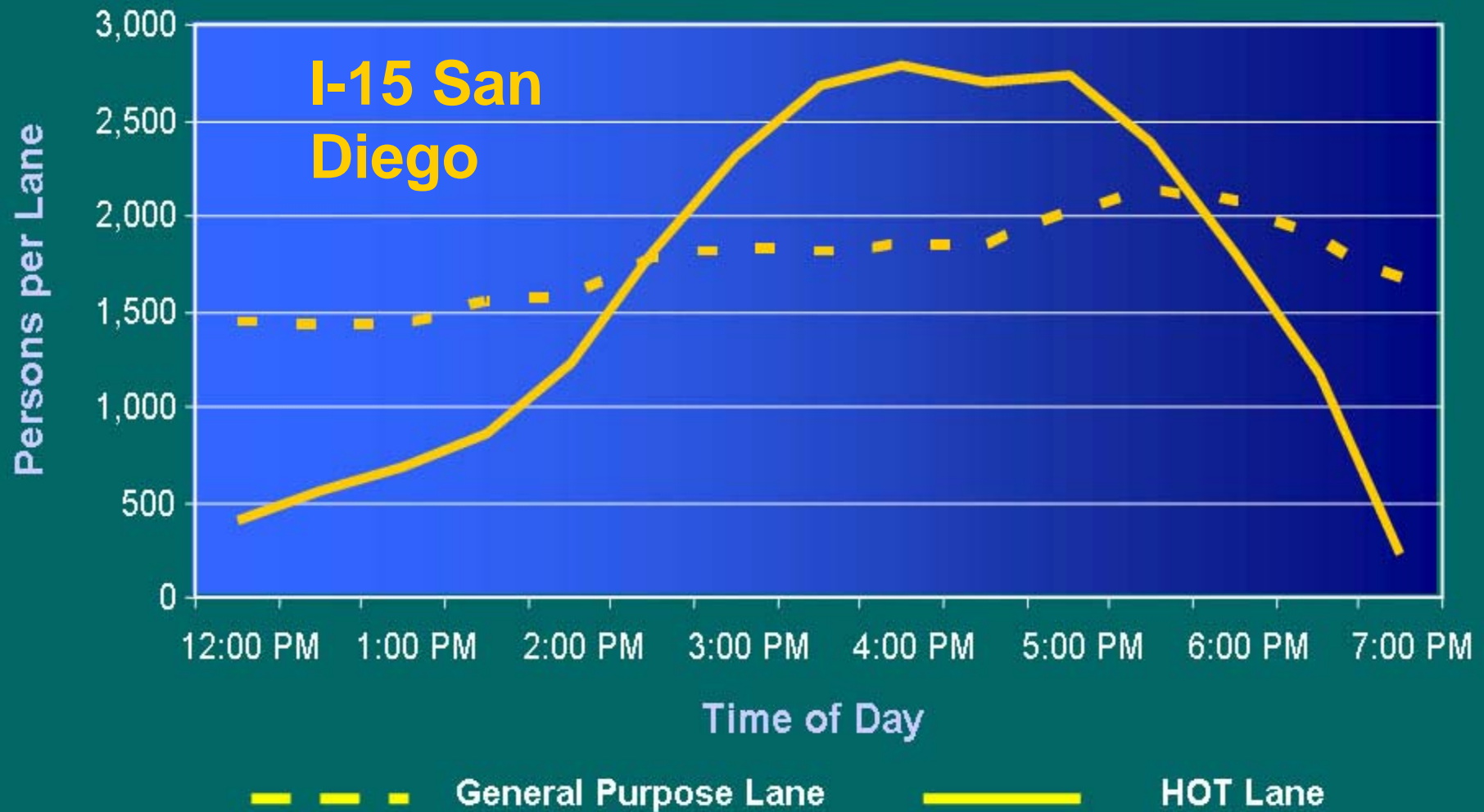
10-lane Beltway (add-one HOT lane and convert one HOT lane in each direction)

vs.

12-lane Beltway (add two HOT lanes/direction):

- 2% induced traffic growth vs. 12%
- 3 times higher toll revenue
- More space in right-of-way for transit access infrastructure
- Lower capital costs for roadways offset higher transit costs

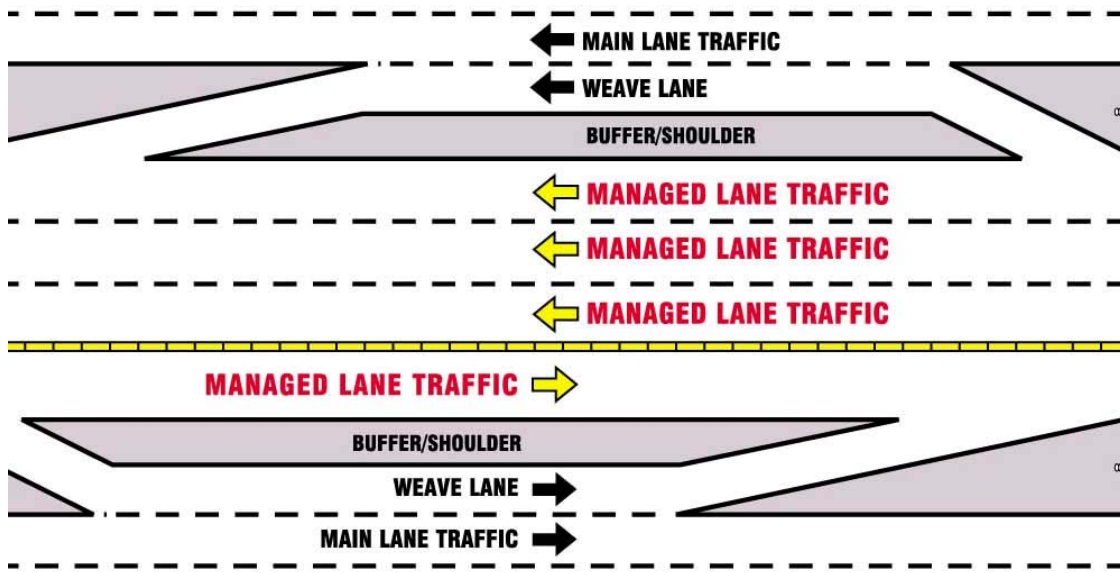
HOT Lanes: Showing New Ways to Create Higher Performance Corridors



Northbound at Mira Mesa Blvd—9/02 weekday average

Courtesy Dave Schumacher,
SANDAG

Expanding I-15 Travel Options

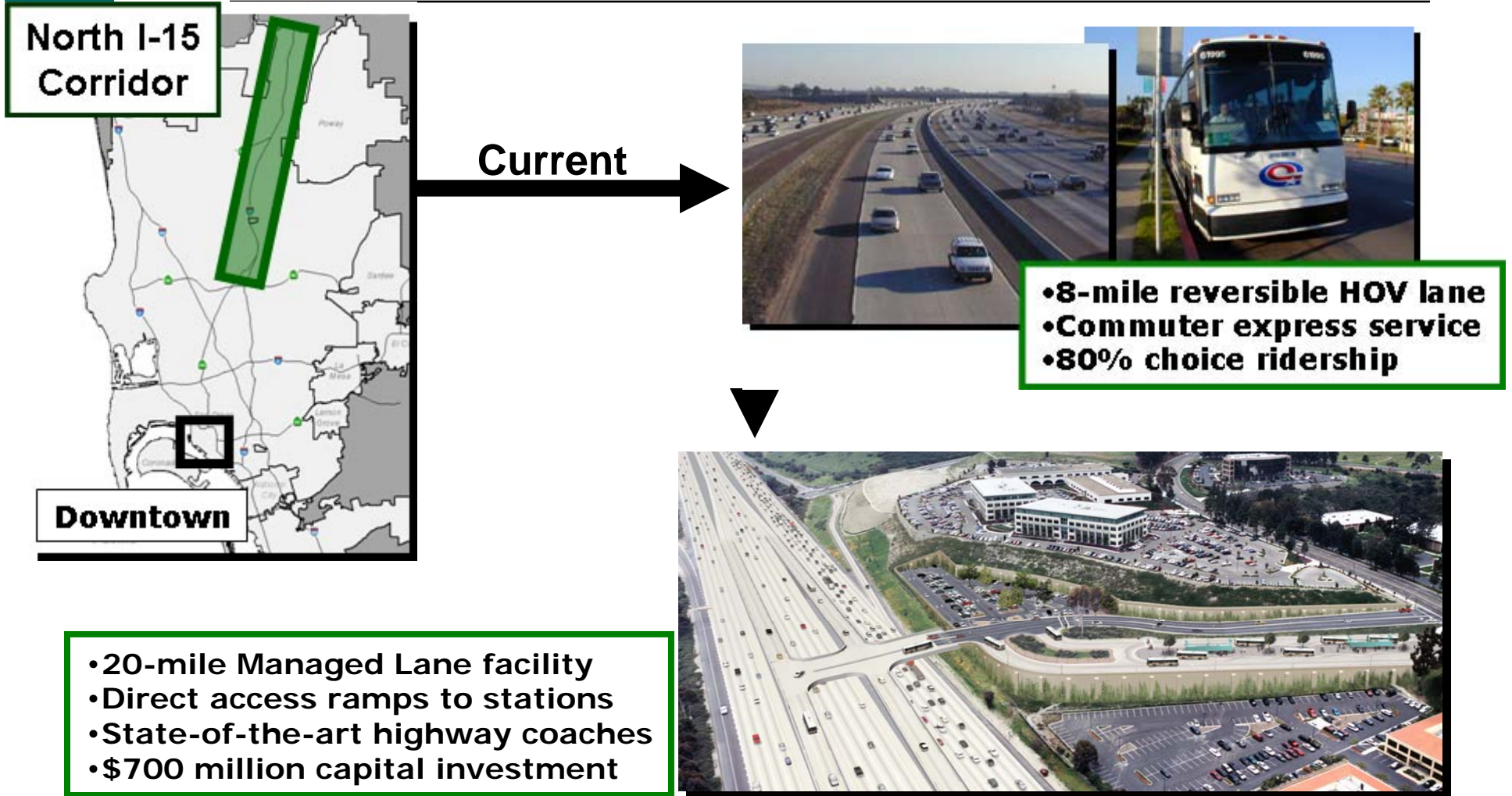


- Add managed lanes, movable barrier
- Direct access ramps and bus stations



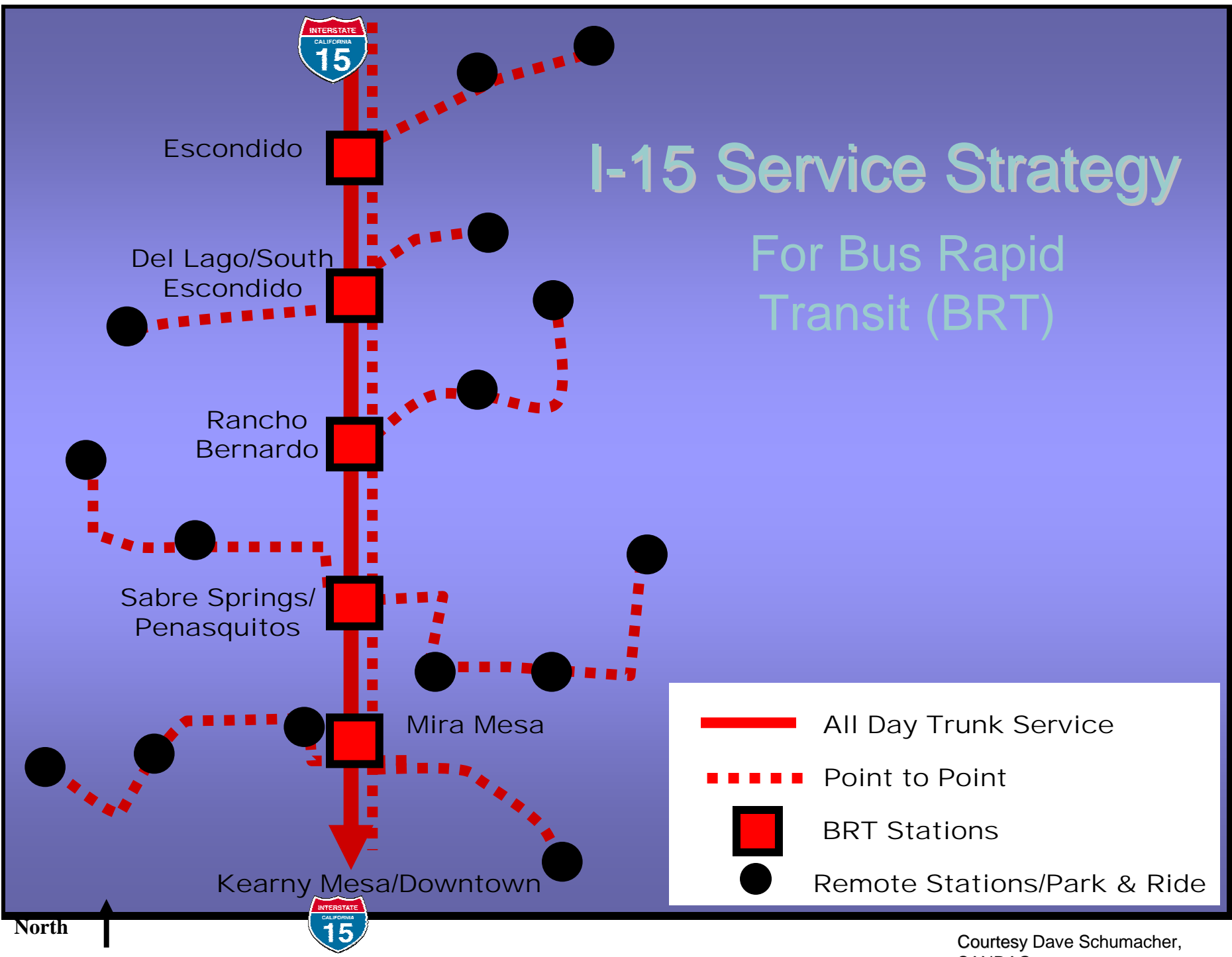
Courtesy Dave Schumacher,

San Diego's I-15 Toll Managed Lanes



I-15 Service Strategy

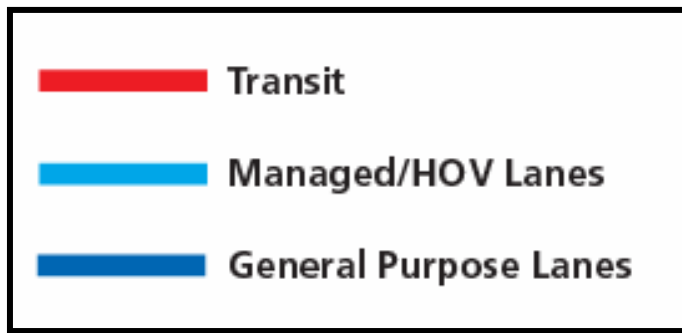
For Bus Rapid Transit (BRT)



- All Day Trunk Service
- Point to Point
- BRT Stations
- Remote Stations/Park & Ride

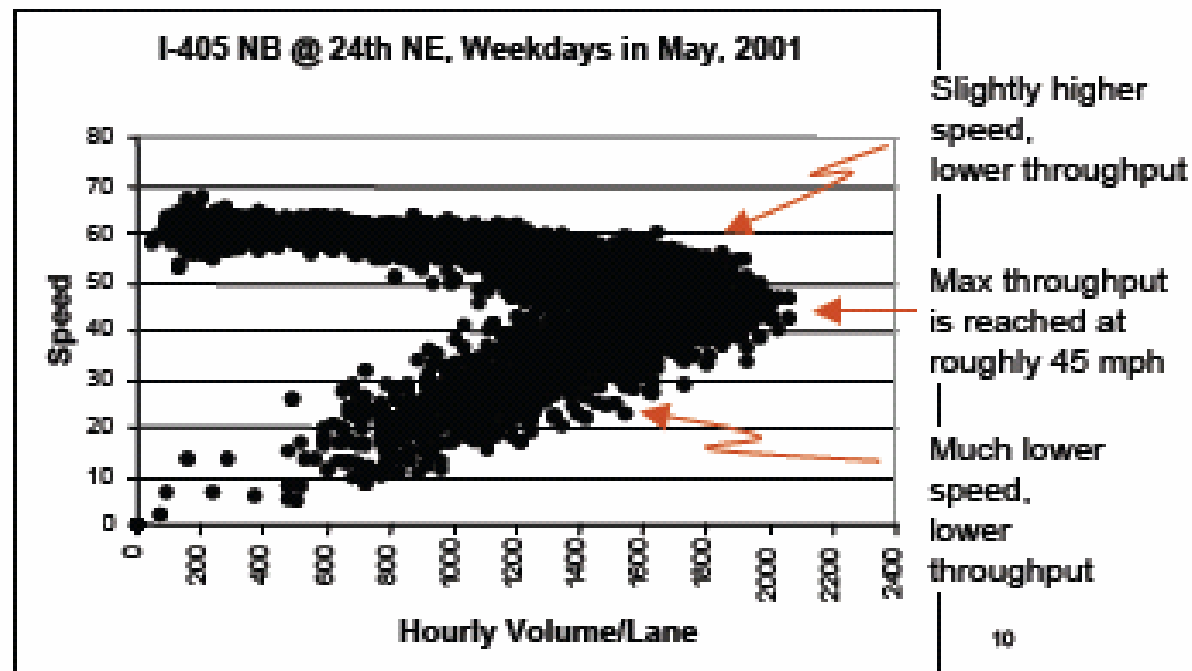
More HOT/BRT Lanes on the Way in San Diego

Additional toll managed – BRT corridors recently added to 2030 San Diego Regional Transportation Plan



Congestion Management: Key to High Performance Corridors

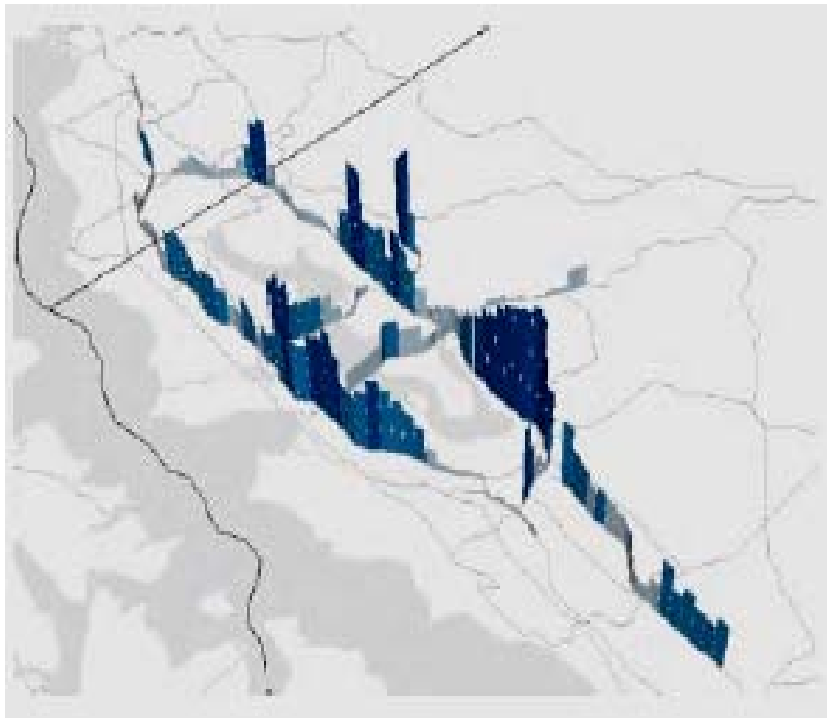
If congestion reaches critical point, speeds drop, vehicles bunch up, and per lane throughput plummets



Source: Doug MacDonald, Highway Congestion: What Is To Be Done?
WS DOT, <http://www.wsdot.wa.gov/secretary/>

Congestion Management: Potential to Reclaim Lost Peak Period Road Capacity

Lost Peak Period Highway Productivity in Central Puget Sound Region



Underused congestion management tools:

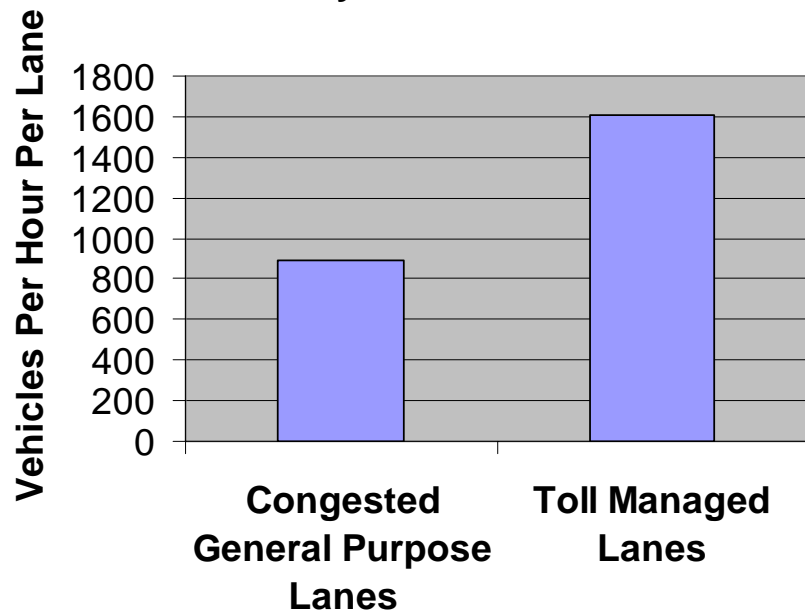
- Incident clearance
- Ramp metering
- Signal retiming
- Congestion charges
- Bus rapid transit
- Rideshare options
- Bike-transit linkage
- Commute incentives
- Access management

Source: Doug MacDonald, Highway Congestion: What Is To Be Done?
WS DOT, <http://www.wsdot.wa.gov/secretary/>

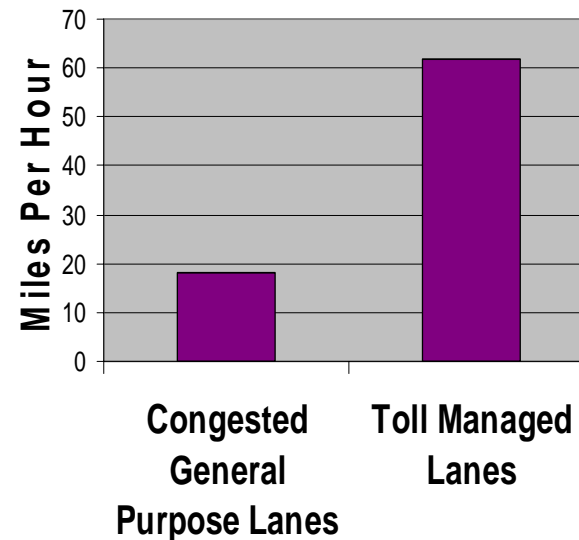
Converting Free Lanes to Toll Managed Lanes Could Recover Lost Capacity

2 toll managed lanes carry as much peak hour traffic – at 3 times the speed - as moved in 4 free, but congested lanes

Traffic in Peak Hours on Eastbound
SR91 Friday Afternoons 2004



Average Traffic Speed Peak Hours Eastbound
SR 91 Friday Afternoons 2004



Rapid Incident Management Can Cut Congestion

Potential impact of incidents on vehicle throughput capacity of 3-lane divided freeway:

- Car out of gas on shoulder: **-20%**
- Disabled car blocking 1 lane: **-50%**
- Accident blocking 2 lanes: **-85%**

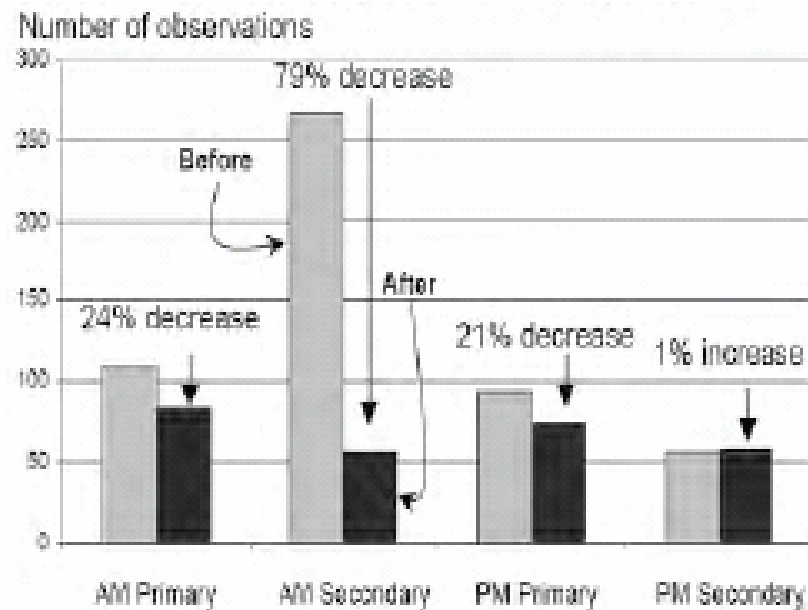


Source: Doug MacDonald, Highway Congestion: What Is To Be Done? WS DOT, <http://www.wsdot.wa.gov/secretary/>

Ramp Metering Can Cut Congestion



Ramp Meters Improve Traffic Flow



Conflict results at S 212th St. to NB SR 167

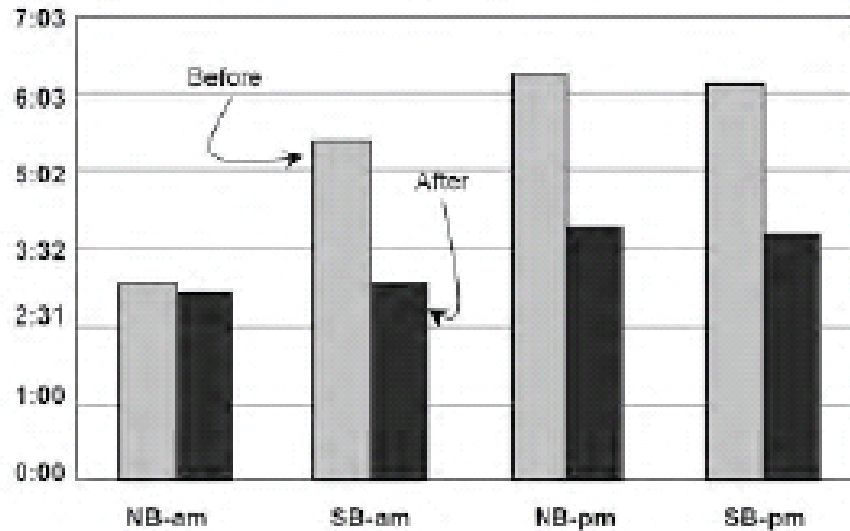
Primary conflicts: when either the merging Behind or the adjacent mainline vehicle brake to avoid each other.

Secondary conflicts: mainline drivers behind a primary conflict that also must brake.

Source: Doug MacDonald, Highway Congestion: What Is To Be Done?
WS DOT, <http://www.wsdot.wa.gov/secretary/>

Signal Retiming Can Cut Congestion

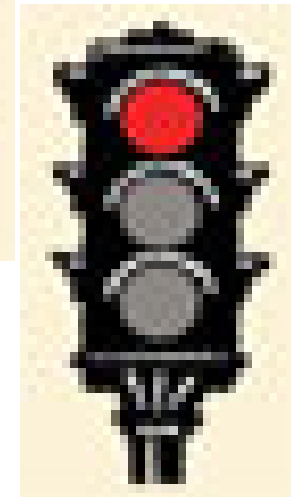
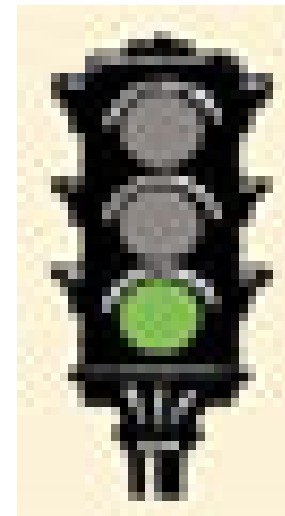
Effect of Signal Retiming on Peak Road Travel Time



Before and after peak hour travel times

Study conducted by the City of Bothell on retiming traffic signals on SR 527 between 228th Street SE and SR 524.

Source: Doug MacDonald, Highway Congestion: What Is To Be Done? WS DOT, <http://www.wsdot.wa.gov/secretary/>



Bus Rapid Transit Can Cut Congestion



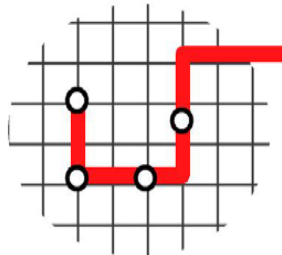
Vehicles



Running Ways



Stations & Terminals



Systems



Service Plan

BRT: A New Element in Highway Corridor Asset Management?



- BRT is a flexible, permanently integrated high performance transit with a quality image & strong identity
- This typically entails:
 - High-capacity, comfortable vehicles, easy multi-door boarding
 - Frequent, reliable, high-speed service with priority/dedicated lane
 - Weather protected stations
 - Platform offering easy entry
 - Efficient operations, passenger information, fare payment systems

But Buses on Motorways Face Challenges



- Most successful BRT is on arterial roads serving transit oriented land uses – not motorways
- Examples include Bogota, Curitiba, Ottawa, Vancouver, Los Angeles, Denver, Pittsburgh, Seattle



Arterial vs. HOT Lane BRT

Arterial BRT

- Short inter-stop spacing
- Shorter distance travel
- Easy to serve with cheap walk/bike access
- Harder to site park-and-ride space
- More opportunity for transit oriented development

HOT Lane BRT

- Long inter-stop spacing
- Longer distance travel
- More dependent on costly park-and-ride access
- More likely to spur sprawl, inequitable access to jobs
- May worsen unhealthy pollution hot spot exposure

Los Angeles I-110 Freeway Median Bus Stops

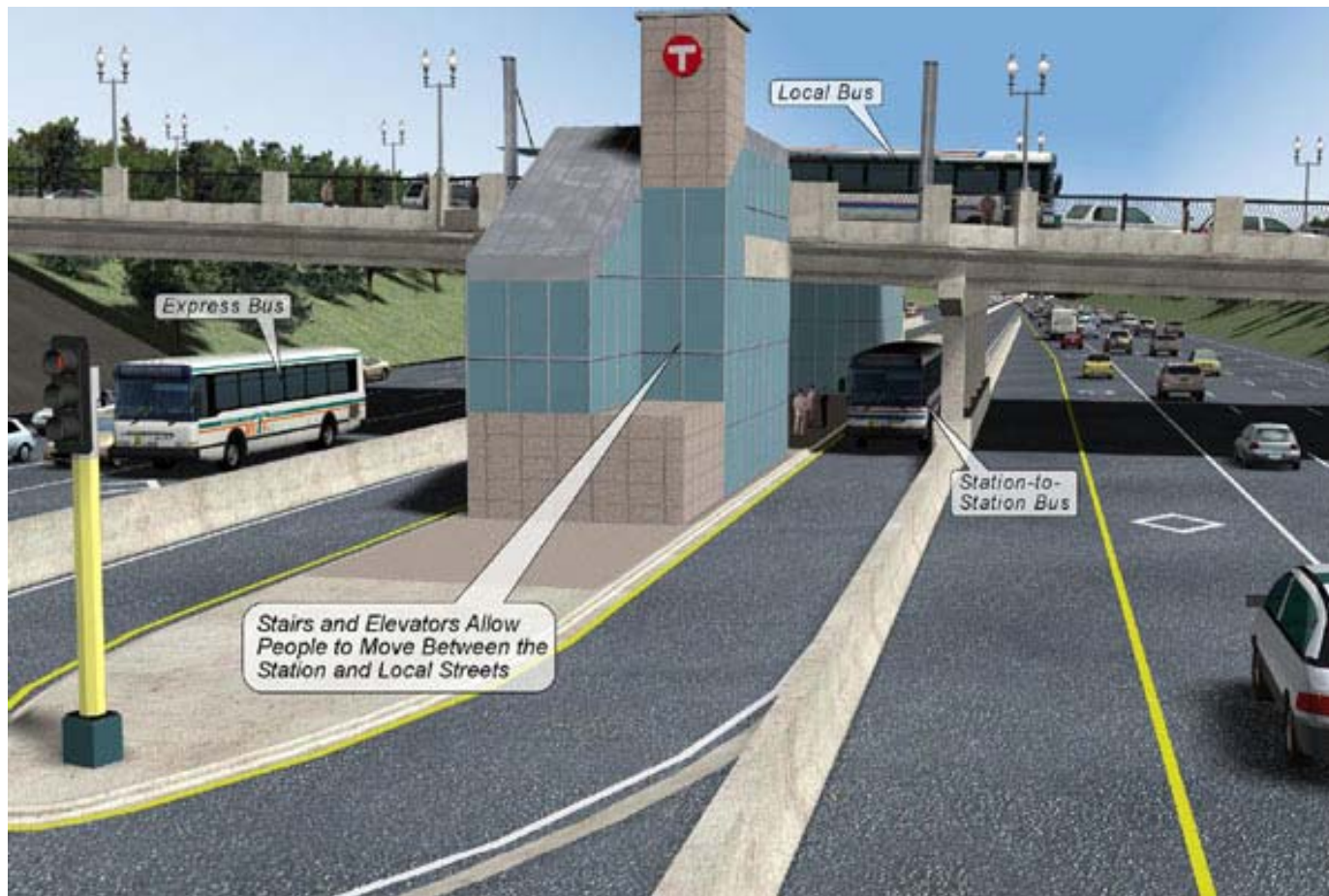


Poor pedestrian and bicycle access to freeway bus stops and pedestrian-unfriendly neighborhood design constrains ridership



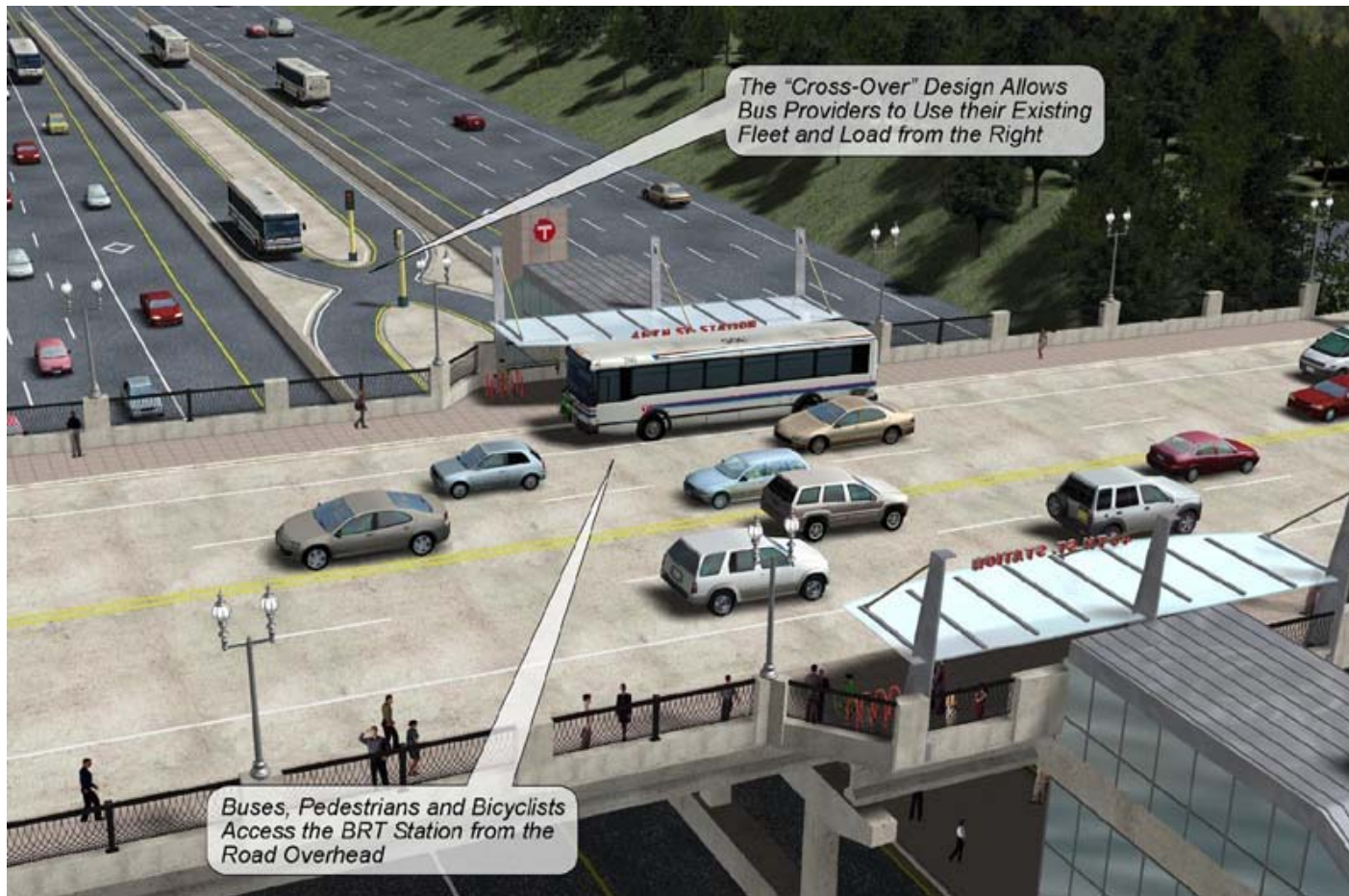
Source: Tridib Banerjee, et.al, Highway Oriented Transit System: A Comprehensive Land Use/Transportation Strategy to Improve Transit Service Delivery A Case Study of (I-110) Harbor Transitway Stations, University of Southern California, April 2001.

Can BRT Fit In Central Median Motorway Environment?



Source: Minnesota DOT

Motorway Median BRT Stations: Worth the Effort?



Source: Minnesota DOT

Design for Noise, Pollution

- Trade off of in-line station speed vs. noise and pollution exposure in motorway medians
- Doorway screening, grade separation, barrier treatments, other options, dependent on ROW



The Way to the Station Matters

Transit utility maximized by:

- Network of safe walk/bike routes connecting homes, transit stops, activity centers: traffic calming, medians at crossings
- Information infrastructure



Bicycle Access to Transit Can Make a Difference Cut Congestion

www.bikestation.org



- Expands transit catchment area 35-fold over walking at both trip ends
- Bikestations: cheaper, less polluting than park-and-ride lots
- Successful in California, Holland, Germany, around the world



Opportunities to Expand Use of Federal, State Commuter Tax Incentives

- Pre-tax transit and vanpool benefits paid for by employees or employer save both money
- Cash-in-lieu-of-parking: 6 to 25% of employees take the money and leave their car at home
- But awareness and use still well short of potential



Dynamic Ridematching: New Markets Where Transit Does Not Reach

Pay-me-not-to-drive systems (www.nuride.com)



Plan Trips Online

Log into www.nuride.com, enter your desired trip and find just the right person who is going your way.

NURIDE
Ride the Network



Ride Together

Meet your fellow NuRider and enjoy the ride.



Get Paid

Confirm your trip and earn over \$500 a year in cash, good at participating retailers.

Tolling Existing Lanes: Acceptable When It Boosts Performance, Choices

New tolls on formerly free roads:

- London
- Singapore
- Oslo
- Trondheim
- Bergen
- Stockholm



Source: Kristian Wærst, Norwegian Public Roads Administration

Oslo Toll Ring Experience

- Reduced regional traffic 3-5%
- Growth in public transport: 6-9%
- Situation back to “normal” after few months
- Tolls pay for roads, public transport, parks

City Hall Street, Oslo, before



and after toll ring

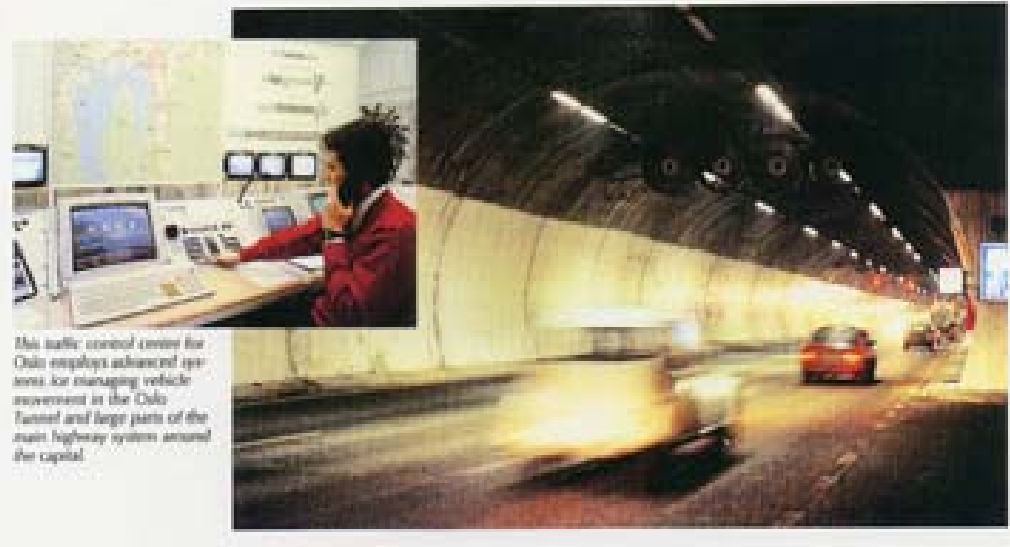


Source: Kristian Wærst, Norwegian Public Roads Administration

Oslo Uses Road Pricing to Improve Traffic, Public Transport, Walking

- Daily traffic in central square cut from 90,000 to zero
- New tram line opened
- A new plaza for walking, festivals and exhibitions

Traffic cut & moved 45 m underground



This traffic control center for Oslo employs advanced systems for managing vehicle movement in the Oslo Tunnel and large parts of the main highway system around the capital.

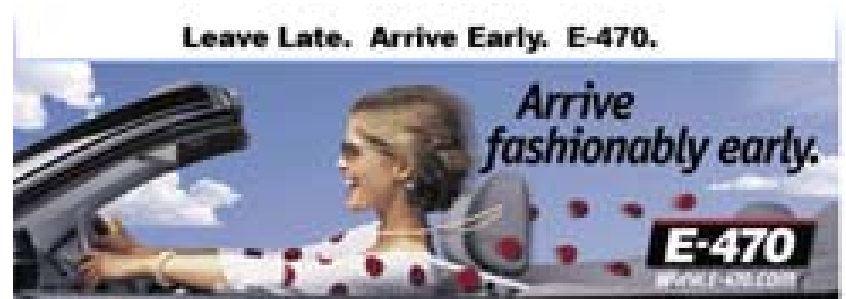
A Strategy for Upgrading Existing Free Lanes to Toll Managed Lanes



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The Operate-Design-Build-Operate (OBDO) concession model *

1. Add new bus/van services, rush hour shoulder lanes, and contract for toll-based road traffic management services in congested corridor

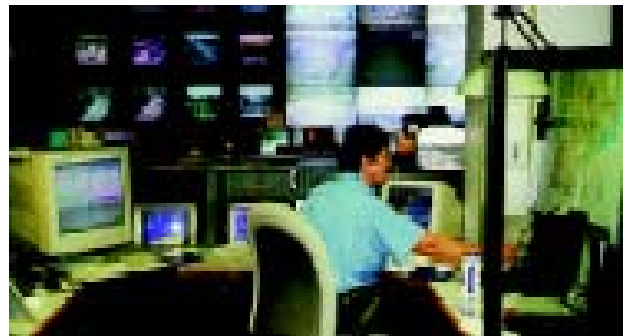


* See: Pat DeCorla Souza, *A New Financing Approach for Transportation Infrastructure Expansion*, Transportation Research Board 2006

OBDO: Upgrading Existing Lanes With Toll Traffic Management

Operate-Design-Build-Operate concession model

1. Add new bus/van services, rush hour shoulder lanes, contract for toll-based road traffic management services in congested corridor
2. Tolls only on congested road sections, only in peak, set by private operator to manage demand and keep congestion from degrading peak road capacity



OBDO: Enhancing Corridor Capacity and Choices



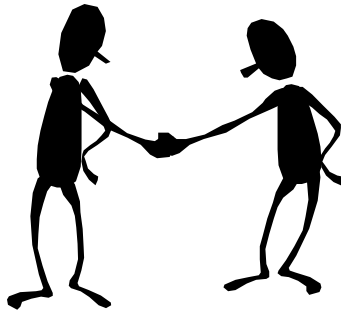
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3. **Tolls revenues dedicated to corridor improvement: road, transit, walk/bike access, impact mitigation**

OBDO: Performance Incentives Set to Meet Planning Objectives

1. Add new bus/van services, rush hour shoulder lanes, contract for toll-based road traffic management services in congested corridor
2. Tolls only on congested road sections, only in peak, set by private operator to manage demand and keep congestion from degrading peak road capacity
3. Tolls revenues dedicated to corridor improvement: road, transit, walk/bike access, impact mitigation
4. **Concurrent Real and Shadow Tolling: private operator fee based on persons moved without congestion, independent of congestion toll revenues**



Environmental and Community Performance Agreements



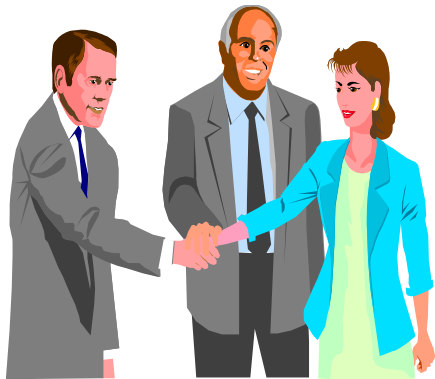
COMMUNITY BENEFITS AGREEMENT

LAX MASTER PLAN PROGRAM



- o Key way to cut political and regulatory risk
- o Ensure roads comply with state & federal requirements
- o Streamline compliance through community and environmental agreements with dedicated funding for monitoring and mitigation?

Ensuring Public Support for High Performance Transportation



- Deliver performance and new choices
- Tolls as management tool, not just source of revenue: consider alternatives
- Asset management and contracting incentives set so transport plans achieve high performance objectives, fix-it-first
- Enforceable environmental performance agreements and community benefit agreements
- Transparency in funding, contracting and financial management



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