



Congestion and Road Finance

Presentation to Subcommittees of the Joint Committee on
Transportation Preservation and Modernization

Oregon Legislature

February 22, 2017

CAUSES OF ROAD CONGESTION



- Demand:
 - Growing too fast? ‘Bad’ travel habits?
- Supply:
 - Insufficient funds to build capacity fast enough? Building the wrong kinds of capacity?
- Utilization:
 - Are we wasting existing capacity?

Remedies we have tried:

- Demand: Growth controls, parking restrictions, advertising campaigns
- Supply: Have tried both building and not building roads; building public transit systems
- Utilization: Subsidizing transit rides, authorizing car-pool-only lanes

The problem persists

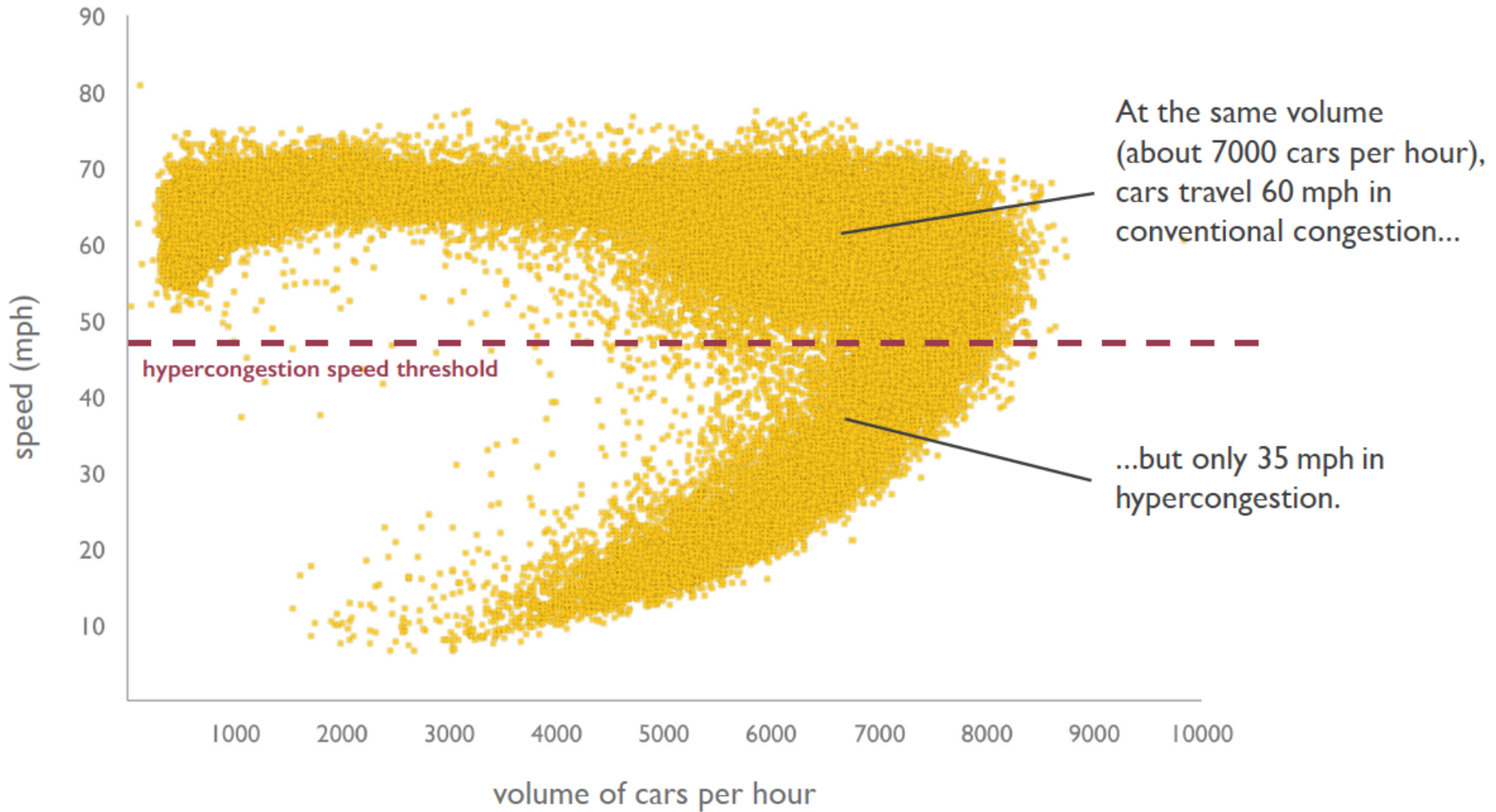
- Some would say it is growing, everywhere

- Early Finance
 - Most roads built by “private” companies and funded with tolls
 - Public investments funded through general taxes
 - In 1901 New York City imposes a vehicle registration fee
 - By 1914 all states collect vehicle registration fees
- Federal Aid Road Act of 1916
 - Federal grants to States to improve public roads system
 - Led to the formalization of State Road Authorities
 - Prohibited tolls on Federal Aid facilities
- A Tax on Fuels
 - Oregon is the first; 1919
 - By 1929 all 48 states impose a tax on fuels
 - Federal fuel taxes imposed in 1932

Current road finance methods are relatively easy and efficient to administer, but...

- Road Finance System is financially weak: poor fiscal elasticity of gas tax while costs are rising
- System performance is declining: congestion; deteriorating roads; land use and transit not obviating the problems
- Gas tax (and other tax-based) finance perceived as unfair: benefits are local while the taxes are broadly applied
- Conventional road finance is a vicious circle: low charge per mile fails to address peak loads which prompts road building without fiscal resources

SLOWER SPEEDS AND LESS “WORK”



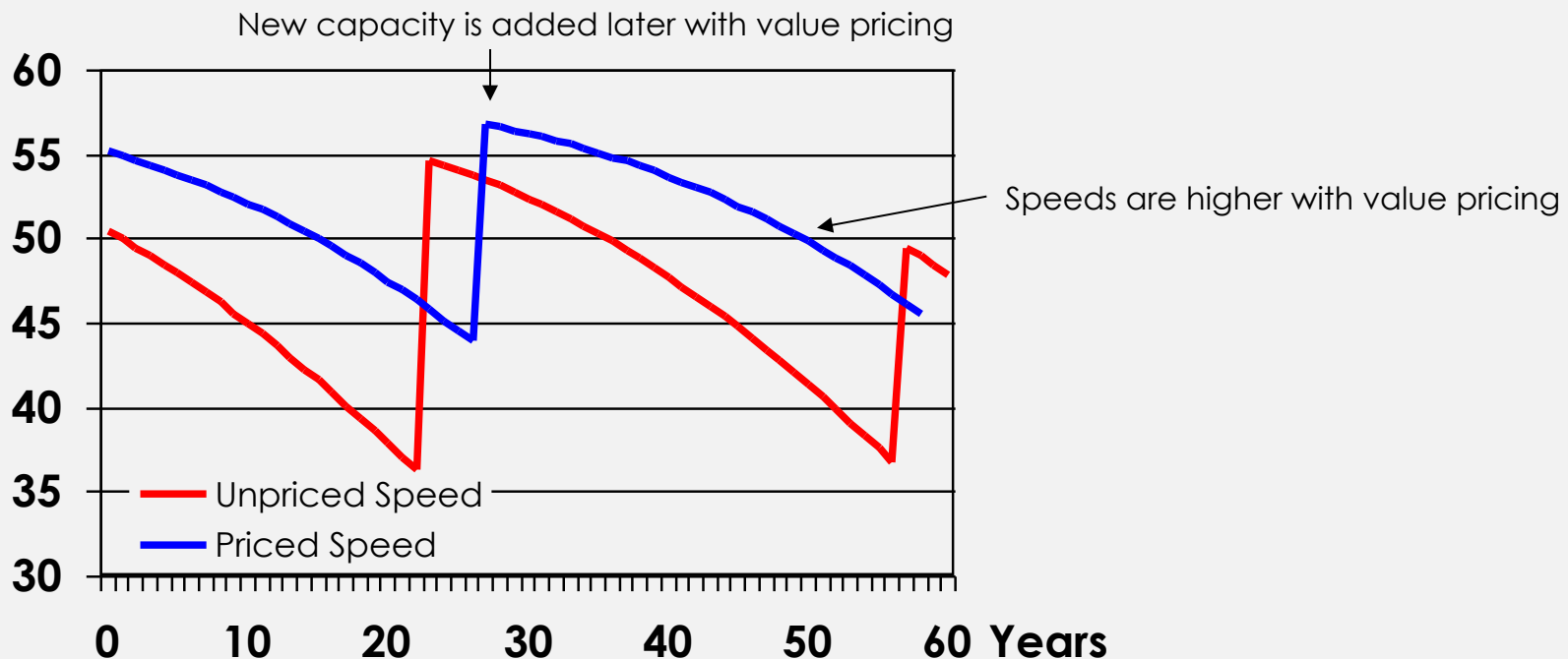
CONGESTION IS HARMFUL TO THE ECONOMY



- Congestion represents real resources that are lost
- Labor compensation must be higher to offset employee time lost to congestion
- Freight is delivered on congested roads
- High-occupancy vehicles share the same road space
- Highway performance is a defining factor for urban form
- Congestion costs are evident in land markets
- There are attendant environmental costs

ROAD PRICING HELPS, IN THEORY...

- Charges are levied selectively on certain vehicle-miles
- Controls excessive congestion during peak periods
- Road pricing generates the revenue to build capacity when it is really needed
- Revenue is collected from those who burden capacity



RECENT TRENDS IN ROAD PRICING



- Toll Managed Lanes
- Variable (time of day) Facility Tolls
- Private Sector Involvement
- Area or Zone Charges (mostly in Europe)
- Mileage Fees

- Conversion of HOV lanes to toll management
- Facility performance must already be compromised
- Single lanes with lots of “free” alternatives
- Extremely sensitive to overall corridor demand and economic conditions
- Movement toward systems of managed lanes
- Variable pricing; often constrained by legacy operating rules
- Managed lanes revenues can often cover implementation and operating costs, and sometimes partially support capital investments

SAMPLE MANAGED LANES REVENUE ANALYSIS

HOV 2+ Free: Annual Toll Revenue by Toll Policy, Corridor, and Time of Day

Objective	Facility	Year	Corridor	Distance	AM Peak (6-9am)	Midday (9am-3pm)	PM Peak (3-7pm)	Evening (7-9pm)	Night (9pm-6am)	Corridor Annual Rev.	Annual Rev.
Cost Min.	XX	2035	NB	89.56	426,833	352,477	4,886	153,432	3,514	941,141	1,659,553
Cost Min.	XX	2035	SB	90.02	172,992	365,763	32,172	121,619	25,867	718,412	
Rev. Max.	XX	2035	NB	89.56	658,851	681,376	69,601	345,040	106,455	1,861,322	3,199,738
Rev. Max.	XX	2035	SB	90.02	208,174	636,470	45,655	292,610	155,507	1,338,416	

HOV 3+ Free: Annual Toll Revenue by Toll Policy, Corridor, and Time of Day

Alternative	Facility	Year	Corridor	Distance	AM Peak (6-9am)	Midday (9am-3pm)	PM Peak (3-7pm)	Evening (7-9pm)	Night (9pm-6am)	Corridor Annual Rev.	Annual Rev.
Cost Min.	XX	2035	NB	89.56	8,554,558	6,535,702	27,743,182	855,352	4,322	43,693,116	95,222,423
Cost Min.	XX	2035	SB	90.02	16,480,079	7,462,558	26,814,151	740,010	32,509	51,529,307	
Rev. Max.	XX	2035	NB	89.56	12,062,417	10,474,901	31,860,580	1,570,635	160,847	56,129,380	120,524,580
Rev. Max.	XX	2035	SB	90.02	20,453,084	11,785,012	30,348,551	1,562,451	246,102	64,395,200	

* Annual revenue forecasts assume 260 weekdays per year and that weekend revenue is 20% of weekday revenue.

ECONorthwest from Dynamic Toll Optimization Model
This is not an investment-grade forecast.

WHOLE FACILITY TOLLS

- Tolls can be designed to minimize congestion or to raise revenue
- Tolls are often combined with other investments
- These are often high risk projects
- The best projects involve few diversion opportunities

- **New projects:** financial requirements may lead to high toll rates that undermine demand.
- **Existing projects:** traffic diversion harms mobility unnecessarily and toll rates rarely respond to changing demand

TOLLING IN WASHINGTON STATE

Existing Tolling

- Tacoma narrows Bridge – flat rate tolls
- SR167 Hot Lanes – variable tolls
- SR520 Floating Bridge – whole facility, variable tolls
- I-405 Managed Lanes

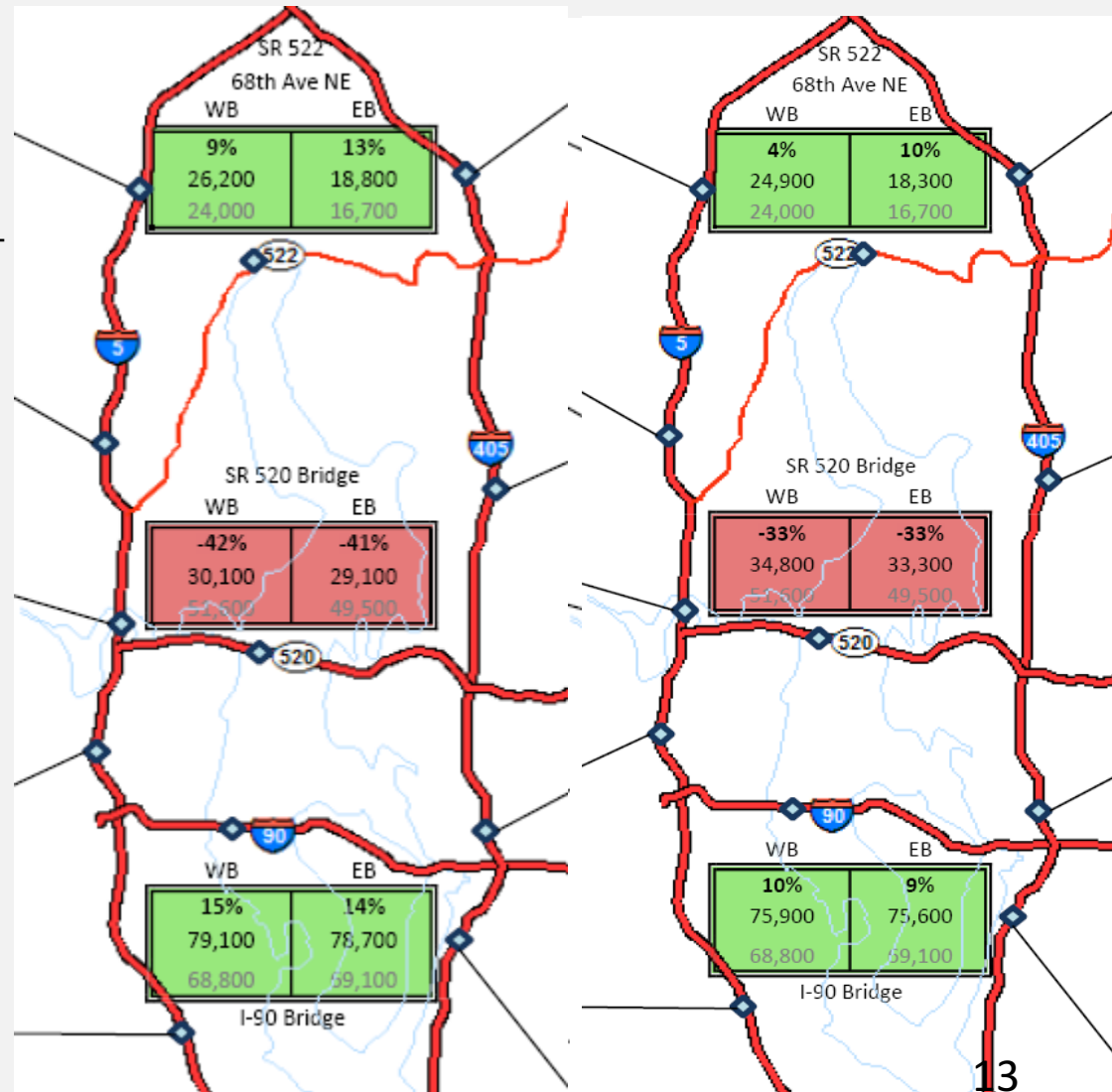
Future Consideration

- SR99 Alaskan Way Viaduct Replacement
- SR509 Extension Project
- SR167 Extension Project
- I-5 Express Lanes
- Others to come...?

SR520 BRIDGE REPLACEMENT

Thursday, January 5, 2012

March 26-30, 2012



- Traffic and Revenue Study

- An initial drop of 45% from pre-toll volumes on SR520
- Within 5 years SR520 volumes will be only 30% lower than pre-toll volumes

- A Dynamic Environment

- Ramp up/adjustment period
- Economic growth
- Real income growth/value of time
- Changing locational decisions

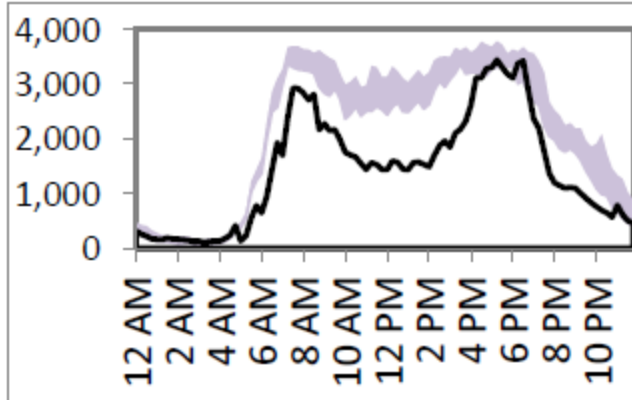
Central Question:
How do we best manage for public benefit over time?

SR520 TIME OF DAY TOLLING

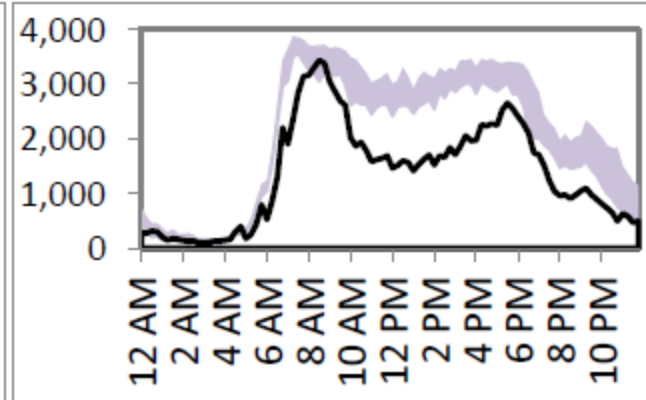
Two-Axle Vehicle Toll Rates

Monday through Friday	Good To Go! Pass
Midnight to 4:59 a.m.	\$0.00
5 a.m. to 5:59 a.m.	\$1.90
6 a.m. to 6:59 a.m.	\$3.25
7 a.m. to 8:59 a.m.	\$4.10
9 a.m. to 9:59 a.m.	\$3.25
10 a.m. to 1:59 p.m.	\$2.55
2 p.m. to 2:59 p.m.	\$3.25
3 p.m. to 5:59 p.m.	\$4.10
6 p.m. to 6:59 p.m.	\$3.25
7 p.m. to 8:59 p.m.	\$2.55
9 p.m. to 10:59 p.m.	\$1.90
11 p.m. to 11:59 p.m.	\$0.00

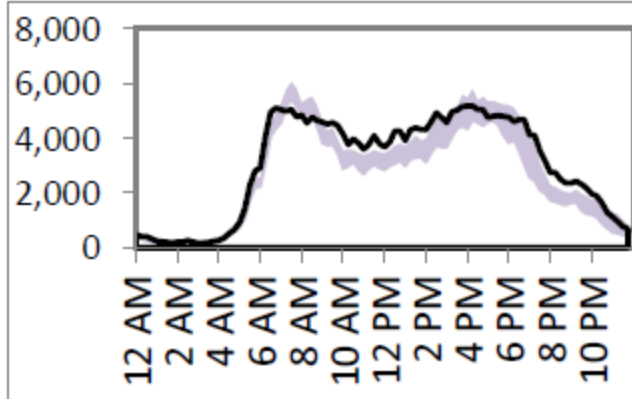
SR 520 WB Bridge



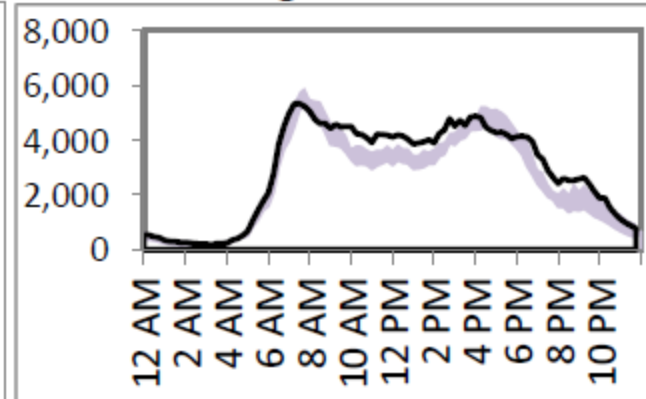
SR 520 EB Bridge



I-90 WB Bridge



I-90 EB Bridge



AN ALTERNATIVE FINANCIAL FUTURE

- Retain what is good about Public oversight
 - Safeguard the public against monopolists
 - Ability to price externalities: pollution, congestion
 - Dampen shocks from sudden shifts in capital allocation
 - Consider distributional issues: fairness
- While reintroducing (or replicating) some market forces
 - Competition (prices, innovation, choices)
 - Recapitalize the transport system
 - Focus on the “value proposition”
- What could this look like?
 - It depends...
 - ...but certainly it would involve pricing-based road finance
 - There would be lots of questions to resolve

ELEMENTS OF A NEW AGENDA

- Tolls rates would be based on the costs the users impose.
- Opportunities would be sought to increase the extent of the road network that has tolls so that diversion is minimized and the revenue yield is improved.
- The toll revenues would be used as a guide that cues investment decisions
- Toll rate policy would allow for the adjustment of rates that respond to new capacity and demand conditions.
- Toll rates, toll policies, and investment policies would be clear to the customers so they understand the long-term direction and can make sensible choices.

WHAT ABOUT ROAD PRICING IN OREGON?

- Toll Managed Lanes
 - I-5 HOV lanes often operate below 45mph
 - Short extent is a limiting factor
 - Adding lanes to existing corridors (partial funding from tolls)
- Tolling Existing Facilities
 - Bridge crossings (I-5 and I-205 are strong substitutes)
 - Highway corridors (I-5, I-405, I-84, SR217, others)
 - Tolling partial network requires special (Ramsey) pricing to minimize traffic diversion
- Non-traditional Approaches
 - Area charge in Portland (could be an economic deterrent)
 - Congestion charges on a larger network (the gold standard)

THE VALUE PROPOSITION

- The value proposition involves a tight link between costs to the users (taxes, tolls) and the benefits (mobility, use of revenues).
 - Tolls are directly linked to the demand for road infrastructure
 - If toll revenue is used to benefit the toll payers then the circle is complete



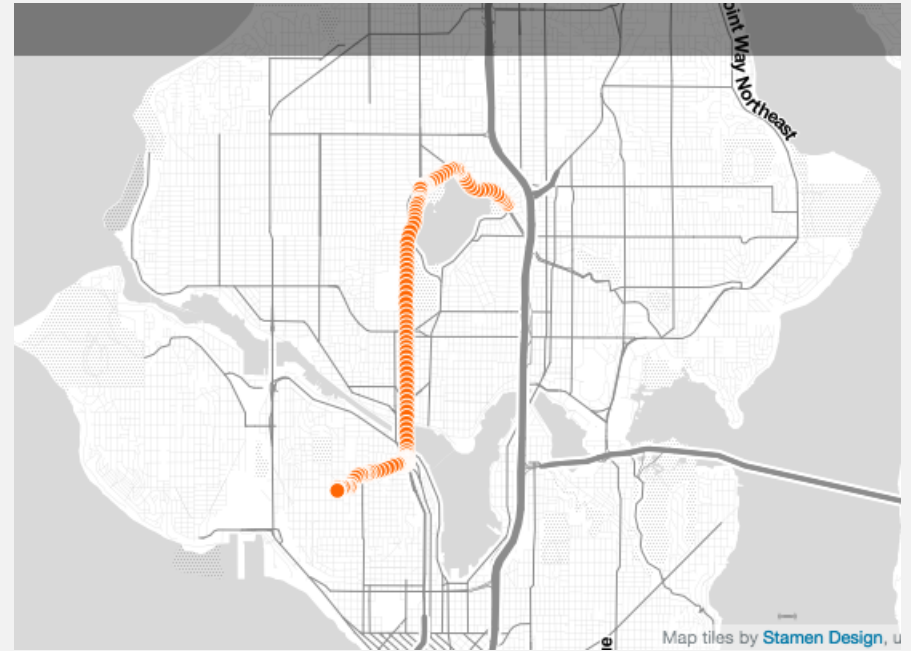
- The Benefits are Tied Up in the Revenues
 - Even when tolls manage traffic the revenues are usually larger than the user benefits
 - How revenues are spent determines the overall usefulness of tolling
- Revenues Guide Investments
 - Revenues are a signal for investment
 - Knowing which roads generate revenues can help set investment priorities
- Tolls Minimize Effects on Other Markets
 - Raising general taxes for transportation distorts behavior elsewhere in the economy

STATES AND REGIONS MUST LEAD

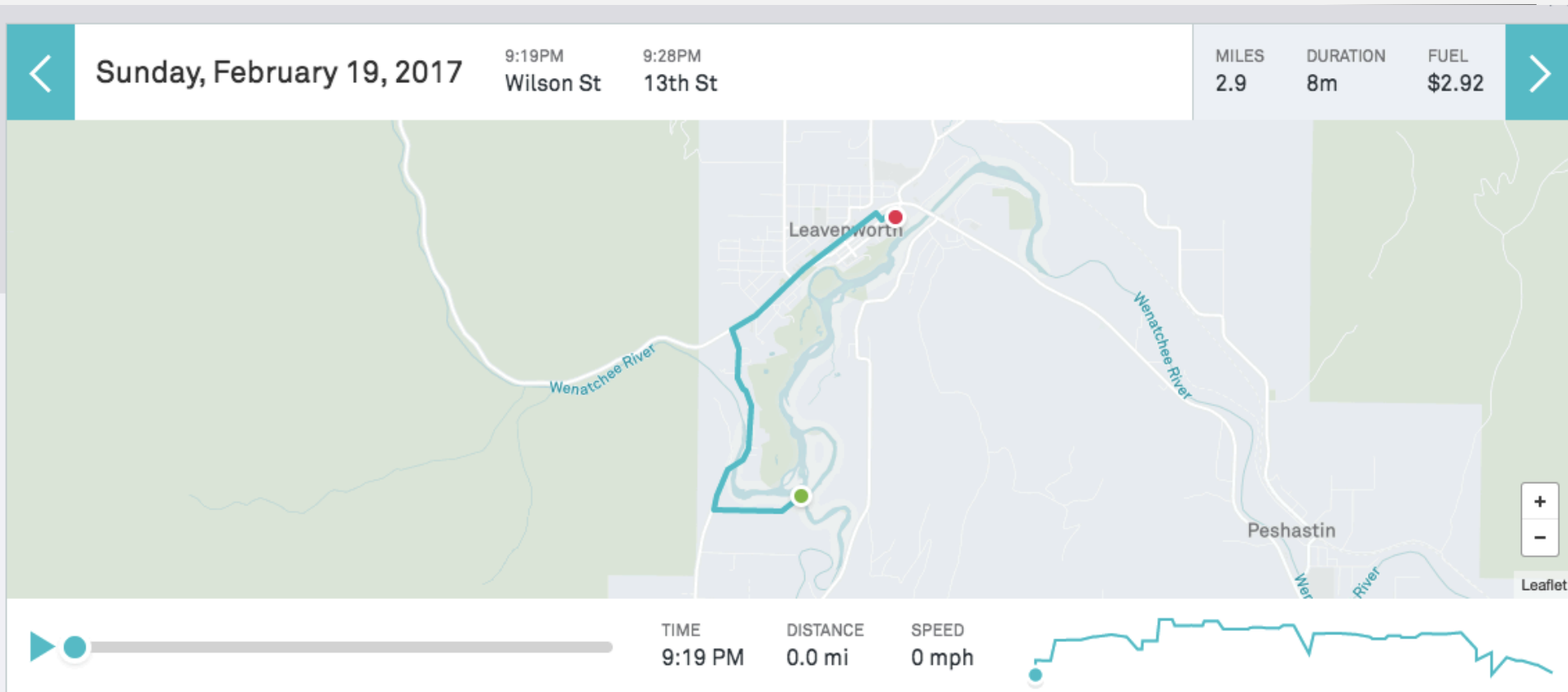
- Metro places are the scale of the new economy
 - Economies of place are metro specific
 - Labor markets
 - Many metro and state economies are export oriented
- The federal government won't
 - Lack of strategic focus in federal aid programs
 - Political consensus for national initiatives is difficult
- A fiscal and economic imperative
 - Congestion is a “tax” in the range of 1%-2% of gross product
 - Toll revenue opportunity is in the range of 3%-5% of gross product
 - The combined effect of eliminating the congestion “tax” and the fiscal stimulus from “spending” is large

FEASIBLE AND EFFICIENT ROAD PRICING

- There are no real technological barriers to pricing all roads properly.
- GPS-based devices are accurate, cheap, tamper proof, and can be used in a manner that protects privacy.
- Such devices are already supporting insurance products.



ENTERPRISE USE OF INEXPENSIVE GPS DEVICES



- Customer has secure access to driving history and how the billing was calculated.
- The device detects if it has been tampered with or removed.
- No roadway infrastructure is needed (gantries, road-side equipment, policing, etc.)
- Your vehicle provides the primary information on your speed and distance of travel, as well as the type of vehicle

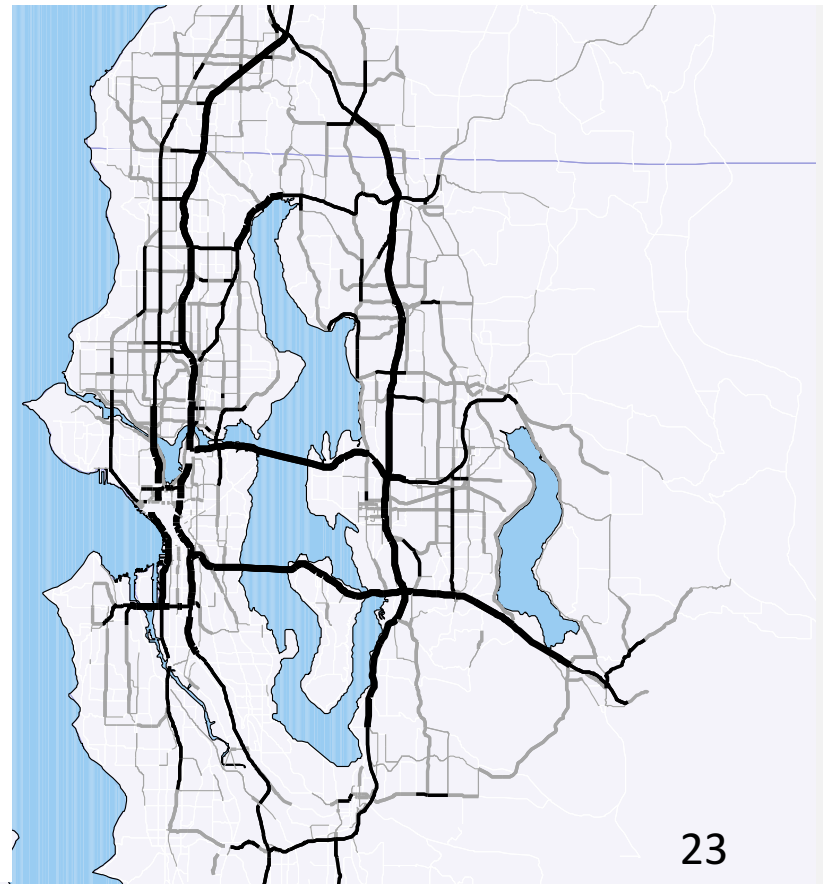
TOLL REVENUES ON THE ROAD NETWORK

Results from a regional road pricing experiment in the central Puget Sound region

- 5% of centerline miles produced 50% of toll revenues
- Next 50% of revenues spread broadly across the core urban network
- 25% of the centerline miles produced less than 1% of total revenues



Traffic Choices Study



KEY FACTORS IN ACCEPTABILITY

- Relationship between fee and cost responsibility
(who pays)
- Relationship between fee and investment policy
(who benefits)
- Administrative burden
(efficiency)
- Intrusiveness
(privacy)
- Ability to Deliver
(enterprise)

A central question in public acceptability will be whether there is an opportunity to significantly “improve” enough factors, while keeping others from getting significantly “worse”.



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