Tolling and Congestion Pricing in Washington State

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Presentation outline

- Tolling and Congestion Pricing Concepts and Definitions
- Overview of Tolling in Washington
- SR 520 Urban Partnership
- HOT and Express Toll Lanes
- PSRC Transportation 2040
- Future of tolling
Why congestion pricing?

- **Congestion occurs due to a market failure**
  - To some extent, it’s analogous to bread lines in the old Soviet Union
  - For other scarce goods we use price to balance supply and demand
  - Unpriced goods with any value are likely to be over-consumed
  - The scarce good is roadway capacity, not travel itself

- **Variable pricing increases revenues**
  - In theory, highest price when travel is least elastic

- **Variable pricing decreases congestion and diversion**
  - Peak congestion lowered by shifting travel to off-peak periods
  - Lower midday prices reduce impacts to other corridors
Why not just add enough lanes?

- Revenues declining rapidly...
  - Federal transportation spending is down
  - State gas tax does not increase with inflation
  - Recent gas tax increases were dedicated to specific projects
  - Taxes increasingly taken to a vote
  - Stronger support for transit, less support for road investments

- … while costs increasing
  - More stringent environmental requirements for stormwater, etc.
  - Right-of-way around freeways is built out and expensive
  - Improvements must be made under traffic
  - Rampant construction inflation until recently
  - Heavy use of bonding doubles total cost of bonded projects
  - Opposition to freeway development and desire for expensive mitigation
Concepts and definitions

- **Traditional Bridge and Tunnel Tolls**
  - Levied to repay bonds for capital construction
  - Tolls removed when bonds are repaid
  - Usually collected at a single point with toll booths

- **Turnpikes**
  - On the east coast mostly, set up to cover construction, operation and maintenance on an ongoing basis
Concepts and definitions, cont.

- **Congestion Pricing**
  - Price varies to match demand to capacity

- **HOT lanes and Express Toll Lanes**
  - Usually mean the same thing – but… in HOT lanes carpools go free, while in express toll lanes they may not be
  - HOV lanes are opened to other drivers for a toll
  - Usually done when HOV lanes have unused capacity
  - Can be done when HOV lanes are congested, easing the transition to a 3+ carpool definition
- **Cordon toll**  
  - Anyone entering an area pays a toll

- **Variable price**  
  - Price changes by time of day on a set schedule  
  - Predictable price from day to day

- **Dynamic price**  
  - Price changes in real time based on current traffic conditions

- **Public-private partnership (P3)**  
  - Private sector entity improves, operates and maintains a transportation facility over a set term in exchange for tolls
History of tolling in Washington State

- 14 bridges financed with bonds and paid for with tolls
- The first tolled bridges were the Tacoma Narrows Bridge and the I-90 bridge across Lake Washington, both of which opened in July 1940
- First HOT lane system opened in May 2008 on SR 167 between Renton and Auburn.
Brief interest in P3’s

- PPP legislation allowed for six franchises to be proposed by private parties
- Passed in Legislature unanimously in 2005
- Due to strong opposition only the Tacoma Narrows Bridge survived – and the state bought out the private developer
- No clear rationale why some would need to pay for improvements that others receive for free
- Legislature is studying P3’s again now
Megaprojects and regional initiatives

- **Major initiative to develop a tax-funded, combined roads-and-transit ballot measure**
  - Included “megaprojects” throughout the region and extensive rail extension
  - Measure failed; a second successful attempt was for transit only

- **Fuel tax increased twice, by 14.5 cents**
  - Bond-financing now powers major construction program, including progress on megaprojects
  - Bond financed income coming to an end; 14.5 cent gas tax devoted to debt service for many years
  - Some large projects remain unfinished and unfunded
Legislative tolling framework

- Tolling should be used when it can:
  - Contribute a significant portion of the cost of a project that cannot be funded solely with existing sources
  - Optimize the performance of the transportation system

- Toll rates must be set to meet anticipated funding obligation to the extent possible. The toll rates should be set to optimize system performance, recognizing necessary trade-offs to generate revenue.

- Tolling should be fairly and equitably applied and not have significant adverse diversion impacts that cannot be mitigated.

- Tolling authority is shared:
  - Legislature has authority to implement tolls
  - Transportation Commission sets toll rates
  - WSDOT implements the tolling program
Current tolling projects in Washington

Tacoma Narrows Bridge
State’s first electronic tolling facility opened July 15, 2007

SR 167 HOT Lanes Pilot Project
State’s first high-occupancy toll lanes launched May 3, 2008

SR 520 Evergreen Point Floating Bridge
- Partially funded with major gaps
- Urban Partnership Agreement
- Significant outreach effort
- Legislature authorized tolling

Coming Soon:
Legislatively Directed Toll Studies

- **I-405/SR 167 Corridor Study on Express Toll Lanes**
  - Report sent to Legislature and Governor January 2010

- **Columbia River Crossing**
  - Report sent to Legislature and Governor January 2010

- **Alaskan Way Viaduct Replacement**
  - Report sent to Legislature and Governor January 2010

- **I-5 Express Lanes**
  - Report due to Legislature June 2011

- **SR 167 Extension**
  - Report sent to Legislature and Governor September 2010

- **SR 509 Extension**
  - Report sent to Legislature and Governor September 2010
How tolls are collected

Payment Methods

- **Toll booths**
  - Pay with cash  
    (only available on Tacoma Narrows Bridge)

- **Electronic tolling**
  - *Good To Go!* transponders
  - Photo Tolling
    - Pay By Mail
    - Customer Initiated Payments
    - Pay By Plate

Electronic tolling visualization
Technology - New Transponder Passes

• Sticker Pass

• Moveable Passes

• Specialty Passes
Rate structures support different objectives

- **Tacoma Narrows Bridge**
  - *Fixed* toll rates generate revenue to pay for bridge construction

- **SR 167 HOT Lanes**
  - *Dynamic* toll rates adjust every minute to best manage traffic throughput based on current traffic conditions

- **SR 520**
  - *Variable* toll rates change on a set time of day schedule provides expected toll to pay for bridge construction and manage traffic
SR 520 all electronic tolling begins soon

- All electronic tolls – No toll booths
- Transponder or license plate can be used for tolling
- Prepaid *Good To Go!* accounts or pay by mail
- One tolling location on existing bridge, tolls charged in both directions
- Variable tolls – rate will vary by time of day
- Tolls begin in advance of bridge reconstruction
Lake Washington Urban Partnership

$154.5 million federal grant to apply these innovative approaches to reduce congestion in the 520 corridor

- **Tolling** – encourages travel at off-peak hours and reduces trips
- **Technology** – variable speed limits and real time driver info
- **Transit** – adding over 130 new bus trips
- **Telecommuting** – educational efforts with employers, van/carpools

**Partners:** USDOT, WSDOT, King County, PSRC
Increased transit service

- **$41 million** for transit capital investments
- Additional **130 daily trips** and expanded bus service along SR 520
- Increases current service by nearly 20%
Smarter highways

- Traffic accidents are responsible for at least 25% of all congestion
- Anticipate a 30% reduction in injury collisions
- Give drivers information to make better travel decisions
- Variable speed limits
- Lane control
- Real time traffic information
New SR 520 Bridge opens in 2014

Typical section of new floating bridge with two general-purpose and one transit/HOV lane in each direction.
### Program Costs & Toll Funding Needs

<table>
<thead>
<tr>
<th>Description</th>
<th>Amount ($ millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Floating Bridge, Landings &amp; Eastside</td>
<td>2,621</td>
</tr>
<tr>
<td>Nickel &amp; TPA</td>
<td>(554)</td>
</tr>
<tr>
<td>Federal funding*</td>
<td>(848)</td>
</tr>
<tr>
<td>Toll Funding Need</td>
<td>1,219</td>
</tr>
<tr>
<td>Deferred sales tax paid from tolls</td>
<td>(144)</td>
</tr>
<tr>
<td>Toll Construction Funding Required</td>
<td>1,075</td>
</tr>
</tbody>
</table>

* Amount available for project expenditures after financing; comprised of both bond proceeds and funding used directly for construction. Pre-financing federal funding pledged totals $1,186 M (Risk Pool = $1,082 M, Other Bridge Funding = $114 M).

- This table shows bridge replacement and eastside cost only
- Westside project remains unfunded – gap is $2.2 Billion
Traffic and revenue studies

- **Toll modeling uses traditional forecast tools**
  - Model uses “impedance” between forecast zones to determine demand – usually based on travel time
  - Tolls are an additional impedance, based on value of time for each income group.
  - Value of time is usually measured through stated choice surveys. PSRC uses a different “revealed choice” method

- **“Investment grade” traffic and revenue analyses are performed to advise bonding agencies on investment risk**
  - Performed by small number of consulting firms using proprietary tools
  - Purpose of these analyses is to project the worst case for investors
  - Likely to produce lower forecast than traditional transportation models
Weekday toll rates on opening in 2011

No tolls assumed to be charged between 11 PM and 5 AM during the pre-completion period.

Pay-by-Mail (Post-pay) Toll Rates

Good to Go! (Pre-paid Account) Toll Rates

Weekday AM Peak Maximum

Weekday PM Peak Maximum

2 AXLES $3.50 $5.00

ADDED TOLL PER AXLE
Weekday variable tolls mirror traffic

FY 2017 Scenario D Weekday Tolls and Projected Traffic Distribution

- Scenario D Weekday Toll Rates (FY 2017)
- Scenario D Projected Traffic Distribution
Weekday variable tolls optimize revenue

- Weekday traffic patterns are predictable.
- The majority of peak period trips are by regular users.
- A multi-step variable toll schedule yields more revenue with less diversion.
  - The midday and peak shoulder periods collectively contribute 40% of the revenue when priced optimally.
  - People tend to remember the 2-3 toll rates at the times they travel most.
Rates vary by payment type

Example of customer costs by payment method when the toll rate is $3.50
**Traffic diversion and monitoring**

- **Modeled several scenarios**
  - Drivers will use a variety of new routes as a result of tolling SR 520
  - Traffic on alternate routes will increase but not significantly; over time we expect this to lessen
  - Expect a period of adjustment where people modify their travel schedules to take advantage of transit, telecommuting and off-peak travel

- **Monitoring traffic pattern changes in the short and long term**

- **Coordinating monitoring efforts with local jurisdictions**
Equity - Depends on context

- For feds: unfair to tax residents of another state for benefits they won’t share
- At project selection: unfair to tax me for something someone else gets for free, or that I have no choice to avoid
- At rate-setting: unfair for the poor to pay a disproportionate share of tolls
- For some, tolls are just unfair, period.
- For a project, equity is assessed as “environmental justice”
  - Purpose of environmental justice was to ensure that transportation projects won’t be located in places that adversely impact poor or minority communities
  - All pricing adversely affects the poor, but congestion also has disproportionate effects, as do other transportation finance methods
SR 167 High Occupancy Toll (HOT) Lanes

What are HOT lanes?

• Give solo drivers an option to use HOV lanes by paying an electronic toll
• Toll rates automatically adjust to ensure toll lane traffic is free-flowing
• HOV drivers still have priority to use the lanes

Why HOT lanes on SR 167?

• Reduces GP lane congestion because HOT lane drivers leave the GP lane
• Provides solo drivers an option to pay for a more reliable trip
• Improves corridor’s efficiency by putting more vehicles in an underused lane
Maximizing throughput

If the price is too high, the lanes will be empty.

Priced to obtain free flow conditions.

If the price is too low, the lanes will be congested and slow moving.
Since activating HOT lanes:

General Purpose drivers save time:
- GP lane speeds increased by 11 percent
- Volume has increased two to three percent

HOT lane drivers save time:
- HOT lane drivers save up to eight minutes during rush hour
- Volumes increased 12 percent

Usage and Revenue is growing:
- HOT lane usage doubled during the second year of the pilot
- HOT lanes are average $50,000 per month in revenue
- SR 167 HOT lanes revenue began to cover operating costs in 2011
Addressing the “Lexus Lanes” perception

Five most frequently tolled vehicles in SR 167 HOT lanes:

1. Ford
2. Chevrolet/GMC
3. Toyota
4. Honda
5. Dodge

Based on Good To Go! account data for HOT Lanes users who paid a toll
In 2009, Legislature directed WSDOT to undertake the following activities as part of the report:

- Develop a plan to operate up to two express toll lanes in each direction of I-405
- Confer with the mayors and city councils for jurisdictions impacted by express toll lanes
- Engage the public to solicit their viewpoints and identify concerns
Express toll lanes strategy

- WSDOT’s Moving Washington includes strategy to evolve the Puget Sound HOV lanes into tolled express lanes
  - Many current HOV lanes do not meet speed and reliability standard
  - 3+ HOV would leave lanes underused, while adding to congestion in other lanes
  - Express toll lanes allow paid users, using dynamic pricing to manage traffic volumes
  - Provides better performance for transit and carpools, while giving everyone a way to avoid congestion when it’s most important
  - In some places a two-lane express facility could be provided

- PSRC Transportation 2040 also includes express toll lane strategy
I-405 10-year implementation strategy

1. First phase: dual-lane express toll facility north of Bellevue
2. Widen south end to implement dual-lane express toll facility south to Renton
3. Connect to SR 167 HOT lane to establish a continuous corridor
I-405 express toll concept

- Access at designated locations only
- Lanes separated by a double-striped line and buffer area
- Six toll “zones,” three north of Bellevue and three south
- Prices shown to each ‘destination’ – no interpolating
- Price changes based on traffic in express lanes and all lanes
- Pay using transponder or license plate
- Carpools go free, but need special transponder
I-405 north end traffic performance

**Non-tolled vs. Tolled for 2020 and 2035**

<table>
<thead>
<tr>
<th>Year</th>
<th>SR522 to SR 520 Southbound AM Average of AM Peak Three Hours</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>2020</td>
</tr>
<tr>
<td></td>
<td>2035</td>
</tr>
<tr>
<td></td>
<td>Option 4 Non-Tolled 60 MPH</td>
</tr>
<tr>
<td></td>
<td>Option 4 40 MPH</td>
</tr>
<tr>
<td></td>
<td>Option 4 Non-Tolled 60 MPH</td>
</tr>
<tr>
<td></td>
<td>Option 4 38 MPH</td>
</tr>
<tr>
<td></td>
<td>Option 4 Non-Tolled 60 MPH</td>
</tr>
<tr>
<td></td>
<td>Option 4 45 MPH</td>
</tr>
</tbody>
</table>

**Legend**

- HOV (non-tolled) / express toll lanes
- General purpose (GP) lanes
Express Lanes Pre-Design Study

- Funded by $1.28M Federal Value Pricing grant

Questions this project will address:
- What are system objectives?
- What users and user requirements should be accommodated?
- What operating policies and design options should be used?
- How could this concept be implemented on I-5?
- How could implementation be funded and staged over time?

Intent:
- Develop approach that provides consistent customer experience
- Clarify the concept before engaging in extensive public outreach
User requirements

- **What transit service will be accommodated?**
  - LRT expansion will reduce bus service in some corridors
  - Is BRT service anticipated, with direct access and intermediate stops?

- **What trucks should be allowed?**
  - Should a higher weight threshold be considered?
  - Are there segments where heavy trucks should be accommodated?

- **What incentives to carpooling should be offered?**
  - Allowing 2+ unlimited free access would not meet performance goals
  - What incentives could be offered to 2-person carpools, if any?
  - Should carpool registration be required?

- **What is the market for paying customers?**
  - Short trips or long? Commuter trips or through trips?
Design options

- How will lanes be priced, and how will the price be communicated?
- What toll technology will be used?
  - Will photo tolling be available, or Pay By Mail?
  - Will carpool users need a special transponder?
- Can access be continuous, like HOV lanes, or are dedicated entrances and exits needed?
- Can a lane be used as an express lanes at some times and a general purpose lane at others?
  - Are overhead signs adequate?
  - Can part-time shoulder use be used to provide the added lane?
Examples from other cities

I-15 FasTrak (San Diego)  I-394 MnPASS Express Lanes (Minneapolis)  I-15 (Salt Lake City)

I-95 (Miami)  I-25 (Denver)
Each City/Region has its Own Style

- 11 examples nationally
  - 10 are HOV conversions, most allow 3+ free use
  - Some are 2+ free, implemented as response to underutilization

- Single lane, double lane, reversible

- Continuous access, dedicated access

- Barrier-separated, buffers, pylons, paint stripe

- Fixed price schedule or dynamic

- Most use electronic tolling
  - One uses monthly price with sticker for unlimited use
  - No examples yet of photo tolls or declarable transponders

- Some require carpool registration
  - 1 requires carpoolers to live and work near each other
  - 1 lets users change their carpool status over phone or internet
Carpool policies

- Several questions that need to be answered together:
  - Carpool status determined by occupancy or transponder?
  - Do carpools need to be registered in advance?
  - Should 2- and 3-person carpools be treated the same?
  - Can occupancy requirements change by time of day?
  - Can different carpool policies be used in different corridors?

- 3+ exemption is the default option
  - Consistent with carpool policies and long range policies
  - Some elected officials reticent

- Fixed discount for 2+ carpools could have merit
  - Retains benefits for existing HOV users
  - Self-adjusting with congestion – all users affected by toll
  - Avoids empty lane – carpools free during uncongested periods
Most HOT lanes use dedicated access and egress points
- All multi-lane facilities
- Concern about toll evasion, especially if funding bonded improvements

Recent research and experience
- Minnesota has implemented continuous access
- California finds no safety benefits with dedicated access

Observations
- Dedicated access reduces lane volumes, has revenue impact
- No data to evaluate loss from evasion vs. reduced accessibility
- Advantages of dedicated access limited to tolling concerns

If continuous access is found feasible, some potential benefits:
- Striping on SR 167 is biggest source of customer complaints
- Transit access challenges reduced
I-5 express toll lane options

- Examining I-5 from south of Dupont to north of Everett
- Reversible lanes in Seattle and HOV lanes are considered together as a system
- In addition to converting HOV and express lanes, also asking:
  - Is a southbound contra-flow lane possible in the reversible lanes?
  - Can a second express lane be operated part time north of Northgate (in same direction as reversible lanes)
  - Could an extension of SR 509 and SR 167 be connected with a two-lane express lane segment?
  - Where are additional direct access ramps needed, and freeway-to-freeway connections?
The PSRC prepares the metropolitan transportation plan

The most recent update, Transportation 2040, incorporated toll policies into the transportation analysis
- Explicit interest in understanding the effect of pricing on transportation system performance as well as revenues
- Focus on tolling meant less attention was paid to alternative transportation investments

Significant enhancement made to modeling capability
- Activity-based trip generation
- Land use feedback
- Updated values of time
- Toll optimization model
- Benefit-cost evaluation software
Alternatives:

1. Emphasize efficiency of existing system
   - Single lane HOT
2. Emphasize roadway and transit expansion
   - Dual lane HOT
3. Toll revenues expand capacity and improve efficiency
   - New tolled corridors/extensions
4. Combine Traditional Revenues and Tolls to Maximize Efficiency
   - Full freeway tolling
5. Reduce Emissions with Limited Highway Investment and a Focus on Regional Tolling
   - All roads tolled
Preferred alternative passed the General Assembly with only two no votes

Note says:
The Preferred Alternative in the Full Plan (includes unprogrammed element) is defined as representing a range of user fees “such as extended VMT, system tolling, and other user fees.” For analysis purposes highway and arterial tolling, plus a VMT charge, were used to represent the extent of that range of user fees.
Future of tolling?

 Depends on:

- Next week’s initiative
- WSDOT credibility and customer service
- Evolving federal policies
- Perceived fairness
- State of the economy
- Whether uses of revenue are compelling
- Political courage
- Whether a bus or tanker truck tips over and burns up due to pavement falling apart (I’m not suggesting that will happen!)
- Other?...
Questions?

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