
Date: December 12, 2008
To: 520 Tolling Implementation Committee
From: David Hopkins, WSDOT
Subject: 520 Tolling Implementation Committee Traffic Diversion Mitigation Framework

Background

HB 3096, which created the 520 Tolling Implementation Committee, contains the following requirement for the Committee's work:

“Evaluate the potential diversion of traffic from state route number 520 to other parts of the transportation system, including state route number 522 and local roadways, when tolls are implemented on state route number 520 or other corridors, and recommend mitigation measures to address the diversion;”
(Section (6)(a))

This memo outlines a framework to guide the Committee's recommendations on traffic diversion mitigation measures.

Discussion

Summary of what the data says about diversion effects

All of the tolling scenarios analyzed had similar effects on traffic diversion, with the specific amounts and locations of that diversion varying depending on the toll rates and structure. This general pattern can be described as follows:

Changes in 520 volumes

The 2010 no-toll vehicle volume estimated for 520 is 118,000. The 2010 520-only scenarios reduce this vehicle volume by between 17% and 23% (20,000 to almost 28,000 vehicles). In 2016, the no-toll volume (with an expanded 520) is estimated to be 134,000. The 2016 520-only scenarios reduce this vehicle volume by between 16% and 33% (22,000 to almost 45,000 vehicles).

On the two-bridge (520 & 90) scenarios, less traffic is diverted off of 520, ranging between 9% to 14% (12,000 to 19,000 vehicles) in 2016.

People make four choices in response to tolls

The analysis has determined that this diverted traffic is a result of people making four different types of choices in changing their travel in response to tolls:

1. People choose to stay on 520, but **switch from driving to transit**. The analysis indicates that between 2,000 and 2,500 people switch to transit, which reflects about a 15% to 35% increase in 520 corridor transit ridership during the peak period in 2010.
2. People stay on 520, but **switch to other travel times**. The analysis indicates that between 2% and 11% of 520 travelers choose to travel at different times on 520.
3. People still make the trip, but **switch to a different destination** which doesn't require crossing Lake Washington. People who choose not to cross the lake range from 0% to 5% (up to 2,500 people) during the peak periods in 2010, and between 6% and 11% (5,500 to 10,000 people) during the off peak periods in 2010. In 2016, the range is between 0% and 14% (up to 9,900 people) during the peaks, and between 6% and 15% (5,800 to almost 16,000 people) during the off-peaks.
4. People **switch routes**:
 - a. *To I-90*: When 520 alone is tolled, most of the traffic diverted to other routes goes to I-90. This varies between 2% and 9% of the peak period travelers on I-90 (1800 to 8300 additional trips).
 - b. *To 522*: When 520 alone is tolled, traffic volumes on 522 are estimated to increase from 2% to over 6% during the peak period (from 740 to over 2,000 additional peak period trips). When both bridges are tolled, peak trips increase about 4% on 522 (1,200 to 1,300 trips).
 - c. *To I-405*: When 520 alone is tolled, peak traffic volumes on 405 in Renton increase 2% to 3% (1400 to 2700 trips). In two-bridge scenarios, 405 peak period volumes increase from 3% to 9% (3,000 to 8,000 trips).

What happens on local roads?

- *520-Only Scenarios*

In the 520-only scenarios, (when compared to the 520 no-toll six-lane baseline) traffic drops on direct access routes to 520 (such as on local arterials around Montlake in Seattle, and Bellevue Way/Lake Washington Boulevard on the Eastside). This drop reflects the overall lower volumes on 520 when 520 alone is tolled. Similarly, direct access routes to I-90 (such as Rainier Avenue in Seattle and Bellevue Way in Bellevue) show increases.
- *Two-Bridge (520 & 90) Scenarios*

In the two-bridge scenarios, traffic on direct access arterials to both bridges drops somewhat, reflecting the overall decline in cross-lake traffic. Local arterials which provide access to 522 (such as Juanita Way) have increases in volumes in all toll scenarios.

A Proposed Two-Part Approach to Diversion Mitigation

Staff is recommending a two part approach for the Committee's recommendations on traffic diversion mitigation. The first part consists of steps recommended to keep traffic on the tolled 520. The second part consists of potential actions to mitigate the effects of diversion off of 520. These two parts are described more fully below:

Part 1: Keeping Traffic on the Tolled 520

All of the scenarios that toll 520 reduce traffic on 520, and cause some degree of traffic to be diverted to other routes. However, there are several approaches that can be taken to mitigate the effect of traffic diversion by keeping 520 traffic on the bridge, thereby minimizing the traffic effect on other routes and corridors. The key is to find a traffic level at which good bridge performance is maintained while also considering revenue needs. These approaches include:

- **Toll Levels:** The data indicate that the toll levels themselves affect the amount of traffic diverted off of the 520 bridge, with higher toll levels diverting more traffic off of the bridge.
- **Variable Toll Rate Structure:** The data indicate that a variable toll rate structure helps improve 520 performance during the peak periods, and encourages traffic to stay on the bridge during the mid-day, at night, and on weekends because the toll is lower during those time periods.
- **Segment Tolls:** While the evaluation itself was not fine-grained enough to show how traffic would divert onto many local arterials in Seattle and in Bellevue/Points Communities, a certain amount of local traffic would by-pass 520, using local arterials, to avoid a segment toll. The Committee heard concerns to this effect from Seattle, the Points Communities and Bellevue. Eliminating segment tolls from further consideration would eliminate this concern. However, this is a direct trade-off with performance in the corridor from I-5 to I-405: the data indicate that segment tolls do lower traffic on both bridge approach segments and thereby improve traffic flow approaching the bridge.
- **Transit promotion and demand management programs as proposed under the Urban Partnership Program:** The Urban Partnership Program has secured funding to buy 45 new buses to provide service in the 520 corridor, (with operating revenue yet to be determined), and has committed to a telework and transportation demand management program with major employers in the corridor to both encourage use of the new bus service and increase commuter's awareness and use of alternatives. These are funded programs which can help keep commuters on the 520 bridge in alternative modes.
- **The 520 expansion project itself:** Ultimately, the replacement of the 520 bridge with an expanded bridge and improvements on the corridor from I-5 to I-405 will increase traffic flow and will bring traffic back to the 520 corridor.

Part 2: Mitigating the effects of diversion off of 520

The following principles are proposed for the Committee's consideration regarding recommendations for mitigation for traffic diversion to other routes:

- The primary focus of the Tolling Implementation Committee's mitigation recommendations should be on effects from tolling 520 in 2010.
- The level of mitigation should be related to the level and type of estimated diversion effects.
- Mitigation recommendations should recognize that no action and background growth affect alternate routes - mitigation recommendations should focus on the increment of tolling effects.
- Given the potential short time before tolling begins, and the uncertainty of actual behavior changes with tolling, operational measures which can be implemented at a relatively low cost, and can be modified quickly to respond to observed traffic problems (such as dynamic information signs and traffic signal coordination/optimization) should be considered first before more expensive and inflexible capital solutions. Some of these measures may be incorporated into other ongoing WSDOT improvement projects.
- Roadway capital projects should be considered if significant toll-related diversion is projected to persist once the 520 project is completed.

Areas for Potential Mitigation:

Through analyzing the traffic model data for the scenarios and through input received by the Committee during the first round of public input and consultation with local jurisdictions, five areas of concern have been identified relating to traffic diversion off of a tolled 520. (Note: Since tolling on 520 may occur in the relative short term (between 2010 and 2016, potential mitigation actions focus on operational actions which are easier to accomplish in the short term. Construction projects which might relieve congestion on alternate routes probably could not be implemented in time to mitigate the effects of 520 traffic diversion.)

Five specific areas of concern are outlined below, with information on what the data analysis indicates, and what the Tolling Implementation Committee heard as concerns from local jurisdictions and the public:

1. 522 Traffic

What the data tell us:

Based on the Travel Demand Model results, SR 522 traffic volumes are forecast to increase when tolls are implemented on SR 520. At higher toll rates, there is an increase in the amount of diversion to SR 522. The tolling of I-90 has little impact on the amount of diversion to SR 522.

In the pre-completion scenarios, the changes on SR 522 range from approximately 400 total vehicles in the 6-hour peak periods up to approximately 1,000 vehicles at

the highest set of toll rates on SR 520. These equate to percentage changes of the order of 2% up to 6%. The highest diversion effects are seen in the off peak periods. These off peak changes are on the order of 1,500 to 2,000 vehicles per day in the off peak periods, which expressed in percentage terms are on the order of 3% to 6%.

What we heard:

The Northshore communities along 522 are concerned about additional traffic being diverted to a highway that already is highly congested during the morning and afternoon commute times. Concern was expressed over the ability of 522 to handle more peak traffic; unreliability of traffic signals along the route, especially during bad weather; inability of local arterials accessing 522 (such as Juanita Way) to handle more peak traffic; negative effects of cut-through traffic on neighborhoods with drivers seeking a way out of 522 congestion; and lack of information for travelers about conditions on 522 before they decide to exit I-5 or I-405 (once on 522, there are few alternatives off). Northshore communities also want to see increased transit service on 522 when tolls are placed on 520.

2. Bellevue/Points Communities Arterial Traffic

What the data tell us:

For the Points communities, the volumes generally decrease for the approaches to SR 520 as tolls are applied. The higher the toll rates on SR 520, the lower the approach volumes. When I-90 is tolled, more traffic is shifted back to SR 520 and the traffic reductions in the Points communities are lessened.

Total peak period traffic changes for arterial access to SR 520 range from a reduction of about 100 vehicles in some two bridge scenarios to over 1,500 in the highest toll scenarios on SR 520. The off peak reductions are generally greater in magnitude than the peak reductions, mainly due to less SR 520 diversion in the peak periods.

There are no scenarios in which the volume of traffic approaching the SR 520 corridor increases with tolls on SR 520.

Traffic approaching the I-90 corridor from Bellevue, mainly Bellevue Way, does experience increased volumes when SR 520 is tolled. These increases are on the order of 1% to 3% in the pre-completion toll scenarios when SR 520 is tolled. These percent changes are on the order of 200 to 500 total vehicles in the peak periods. When I-90 is also tolled, traffic approaching the I-90 corridor from Bellevue is also decreased.

What we heard:

The biggest concern expressed was the potential for traffic cutting-through local streets to avoid segment tolls (an example being traffic that might cut-through Bellevue and Medina to access Clyde Hill and Yarrow Point instead of taking 520 to

92nd). Another diversion concern was related to increased traffic on local arterials (such as Bellevue Way south of Downtown Bellevue) accessing I-90 when 520 is tolled.

3. I-90 Traffic

What the data tell us:

In general, the tolling of SR 520 results in increased volumes on I-90. The percentage increases range from less than 5% to almost 10% depending on the level of the toll rate. These increased volumes result in slightly lower speeds on I-90, but all speed changes are less than 6mph.

Off-peak diversion accounts for almost two-thirds of the total daily diversion to I-90. Since I-90 is less congested in the off peak periods, this leads to smaller reductions in average travel speeds due to the increased volumes.

When I-90 is also tolled, the total amount of traffic crossing I-90 reduces by almost 20%. This results in speed improvements on I-90 of approximately 10 mph.

Approximately 20% of the total traffic on I-90 is destined to or from Mercer Island. This percentage is fairly equal on both sides of the Island; however, the volumes going eastbound are slightly higher.

What we heard:

Mercer Island residents expressed concern that the increased traffic volumes on I-90 when 520 is tolled might make it more difficult for them to leave the island, or for people coming to work on the island to get there. Mercer Island residents wanted to be sure that the center roadway would continue to be available for their use, and that any changes made would recognize the terms of the I-90 Memorandum of Agreement. (The Committee also heard that Mercer Islanders were concerned in general about people having to pay a toll to access or leave the island. It was suggested that Mercer Island traffic should be exempted from the toll, or at a minimum, there should be at least one free way off of the island. These concerns have more to do with the toll structure than diversion effects.)

In addition, the City of Issaquah expressed concern about potential traffic impacts to I-90 when 520 is tolled. Their concern included traffic flow on I-90 itself, as well as access routes to I-90 including potential worsened traffic conditions on I-405.

4. I-405 South Traffic

What the data tell us:

As the toll rates increase on SR 520, more trips are diverted to I-90. This in turn causes more traffic to divert to the south end of I-405. This is even greater when I-90 is also tolled. The changes on I-405 at the south end range from about 5% increases in the single bridge scenarios to over 10% increases when I-90 is also

tolled. As was the case with I-90, most of this diversion occurs in the off peak periods. This is due in part to the congestion levels already present on I-405 in the AM and PM peak periods.

It should be noted that the post-completion tolling scenarios assumed that the south end improvements on I-405 would be completed. This allowed more diversion opportunities for traffic. In the pre-completion cases, all in which I-405 is as it exists today, traffic volume changes were less than 5%. This was even true even under Scenario #9, a two-bridge toll scenario. This points out that some of the south end diversion was due to the ability of traffic to actually divert around the south end. Should these improvements not be in place, less diversion would occur.

What we heard:

The City of Renton expressed the need for the I-405 Phase 2 project to proceed as scheduled so that further improvements to I-405 would be made as planned.

The City of Newcastle has stated that improvements to Coal Creek Parkway, currently getting underway, are important because Coal Creek Parkway is an important alternative to I-405, especially under a two-bridge tolling scenario.

5. Seattle/University of Washington Arterial Traffic

What the data tell us:

As with all other facilities that connect directly with SR 520, when tolls are implemented on SR 520, the approach volumes decrease. The decreases on the Seattle end of the corridor range from about 2% to 6% depending on the scenario. The largest reduction can be seen on screenlines south of SR 520 where the total daily volume reductions ranges from 2,000 vehicles a day to over 4,000 a day in the higher toll scenarios as compared against a 520 no-toll, six-lane baseline. Traffic approaching to and from the north side of SR 520 is reduced at about half the rate as that from south of SR 520.

What we heard:

The University of Washington expressed concern about transit access for their students and staff, traffic levels on arterials accessing the University; and overall ability of UW employees, who might not all have access to transit, to access the campus.

Recommended Traffic Mitigation Actions

1. System-wide instrumentation and traffic monitoring

As part of the project development work for tolling 520, WSDOT should put in place a traffic monitoring program which would allow continued monitoring and feedback as actual traffic effects of tolling 520 are experienced and felt on alternate routes. Adequate traffic monitoring systems are largely in place on 520, I-5, I-405 and I-90 as part of WSDOT's system of freeway traffic loops known as the "FLOW" system. A portion of SR 522 is also covered, but additional monitoring capability would be needed to cover the whole length of SR 522 from I-5 to I-405. Systems may also be needed on local access roads including Montlake/24th, Arboretum, and Rainier Avenue in Seattle; Lake Washington Blvd/Bellevue Way in Kirkland and Bellevue, and Bellevue Way and 148th approaching I-90; and Juanita Way approaching SR 522. This monitoring system should be able to report traffic volumes and congested conditions on a real-time basis.

2. SR 522 Traffic Reporting

Once the monitoring system is complete, WSDOT should consider installing variable message signs on I-5 and I-405 sections approaching 522, and along 522 itself, to report current traffic conditions on 522 and alternate routes. The purpose would be to inform travelers of adverse traffic conditions on SR 522, and comparisons with travel times on a tolled 520 and other alternate routes, at key decision-points that would allow travelers to make informed travel choices before choosing to take SR 522. These actions would bring 522 traffic reporting up to capabilities that exist on other major state highways in the region.

3. SR 522 Traffic Signal Reliability and Coordination

In preparation for tolling, WSDOT should work with the Northshore communities to ensure that all traffic signals along 522 have a reliable power supply to guard against bad weather interruptions, and should improve signal timing coordination along the entire route to improve flow.

4. 520 Tolling Mitigation Account

Traffic analysis to date has been based on modeling outputs, which provide good indicators for where likely traffic impacts might occur from tolling, but may not adequately represent real-world conditions once tolling begins. To provide the ability to respond to actual emerging effects of tolling, the Legislature should create an account that is available to address emergent traffic impacts on alternate routes based on monitored data. A mechanism should be created which would allow traffic improvements, such as changes to signal timing plans, interchange improvements, and other relatively small-scale projects to be funded

based on established performance thresholds. The account could be administered by WSDOT, with input by local affected jurisdictions. WSDOT should recommend an appropriate amount of funding for this account, after consultation with affected local jurisdictions.

5. Advanced Traffic Technology on 520, I-90, I-405 and I-5

WSDOT should proceed as planned with implementation of advanced traffic technology, aimed at improving traffic flow. This work on 520 and I-90 is planned and funded as part of the Urban Partnership Agreement, which is tied to a Legislative decision to toll 520 before completion. In addition, advanced technology applications are being proposed on I-5 as part of the Alaskan Way Viaduct early actions, and are being discussed on I-405 as part of improvement work in that corridor. These advanced technology approaches, including variable speed limits, individual lane controls, and enhanced traveler information, have been shown to improve traffic flow under congested conditions. These technologies, applied in a coordinated system approach, can help all of these corridors better accommodate normally expected traffic, and traffic expected to be diverted by tolling.

6. Transit Service Improvements

Additional transit service can help accommodate trips for people who choose to avoid tolls. The Urban Partnership Agreement will provide an additional 45 buses to Metro and Sound Transit to augment transit service on 520, should the Legislature choose to toll 520 in 2010. At this time, funding for operating costs for these additional buses has not been identified. In addition, the Sound Transit 2 package, passed by voters in November, includes an additional increment of transit service beginning in 2009, with some of this service likely being in corridors affected by 520 tolling. The Tolling Implementation Committee recommends that WSDOT, King County, and Sound Transit develop a coordinated transit implementation plan utilizing Urban Partnership, Sound Transit 2, and other existing resources to lay out what transit service improvements can be expected for 520, I-90, and 522 under current programs, and what additional resources might be needed to address 520 tolling mitigation needs.

7. Special considerations for two-bridge tolling scenarios

A two-bridge tolling scenario might create additional traffic diversion to the I-405 corridor and to SR 522, and would heighten the need for alternative transit service in the I-90 corridor. Under a two bridge tolling scenario, the Tolling Implementation Committee recommends that additional attention be paid to these affected corridors, including additional park and ride capacity in the I-90 corridor; continued expansion work on the I-405 corridor (including completion of alternative routes such as Coal Creek Parkway); and additional 522 actions as indicated by monitored data.