

# SR 520 BRIDGE

Investment Grade Traffic and Revenue Study Update



## SR 520 Bridge and the Eastside plus West Approach Bridge Project

January 29, 2015

*Photographs Courtesy Of WSDOT*



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**Disclaimer**

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**Note on terminology:**

*The terms “traffic” and “transactions” are used throughout this document. Each usage is usually accompanied by an indicator of what quantity it is referring to. For instance, Average Annual Daily Traffic is noted to include all traffic crossing the bridge, including non-revenue and nighttime traffic while “Traffic and Revenue” study refers both to traffic and actual toll revenue transactions. The term transaction always refers to tolled traffic and/or actual transactions in the toll payment stream. Table and figure titles and footnotes provide additional context.*

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# Executive Summary

The Washington State Department of Transportation (WSDOT) has utilized toll financing as part of a broader package to finance the implementation of the SR 520 Floating Bridge and HOV Program. WSDOT began tolling the bridge in December 2011, prior to the construction of the replacement floating bridge. WSDOT continues to collect tolls during construction and toll collection is expected to continue after construction is completed.

The U.S. Department of Transportation's Transportation Infrastructure Finance and Innovation Act (TIFIA) program is providing financial support to the SR 520 Program via a direct loan. In order to satisfy TIFIA requirements and meet current and future bond requirements, the SR 520 Bridge Investment Grade Traffic and Revenue Study was updated based on actual SR 520 bridge tolling experience, changes in toll rates, updated construction schedules, and revisions to the underlying economic forecasting.

The focus of this update was to reexamine a number of key assumptions including: bridge project and regional roadway configuration; bridge closures during construction; socio-economic forecast; traffic and toll transaction growth, and tolling schedule. Revised transaction and gross revenue forecasts are provided for FY 2015 through FY 2056.

## Project Description

The SR 520 corridor stretches nearly 13 miles between I-5 in Seattle to the west and SR 202 to the east, crossing I-405 at about the halfway point, and serving various Eastside communities, including Bellevue, Kirkland and Redmond. The main SR 520 bridge span across Lake Washington is currently 1.42 miles long, making it the longest floating bridge span in the world. Until the replacement bridge opens, tolls are being collected at the east high-rise section of the SR 520 bridge.

Figure ES-1 shows the assumed lane configurations for this study. The configuration assumed in the forecast through FY 2016 (June 30, 2016) consists of:

- I-5 to east side of Lake Washington (including the main bridge span): two general-purpose lanes in each direction
- Lake Washington to I-405: two general-purpose lanes in each direction and one westbound outside transit/high occupancy vehicle lane with a 3+ occupancy requirement (HOV3+)
- I-405 to SR 202 in Redmond: two general-purpose lanes in each direction and one outside transit/HOV lane in each direction with a 2+ occupancy requirement

Replacement of the existing bridge is required due to its structural deficiency and functional obsolescence. For purposes of this study, the configuration assumed from FY 2017 forward includes:

- I-5 to Montlake Boulevard: two general-purpose lanes in each direction
- Montlake Boulevard to west end of western high rise: a new three lane westbound West Approach Bridge North (WABN) is assumed to be completed shortly after the main span. This connector and reconfiguration of the existing four lane west approach bridge will result in three lanes in each direction from the Montlake Boulevard interchange to the western high rise (two

general-purpose and one inside transit/HOV 3+ lane in each direction). The WABN connection bridge and reconfiguration of the existing west approach bridge are new elements since the original September 2011 study.

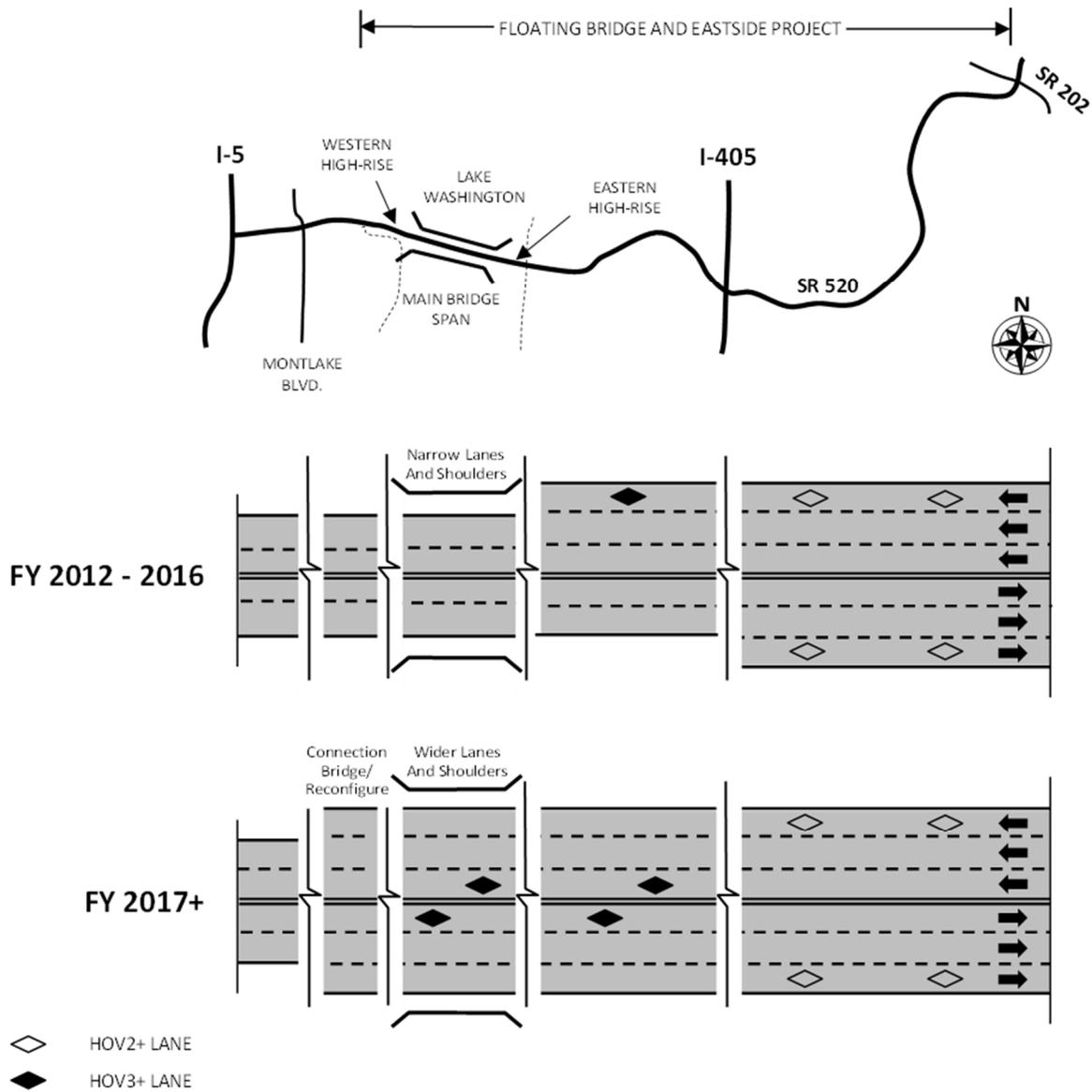
- Main Span: Replacement of the main span by a six-lane main span (two general-purpose and one inside transit/HOV 3+ lane in each direction) from west end of the western high rise, across Lake Washington to the eastern shore. Once the replacement main span opens, tolls are assumed to be collected at a location on the eastern shore of Lake Washington.
- Lake Washington to I-405: Addition of one eastbound lane from eastern shore of Lake Washington to I-405 resulting in three lanes in each direction (two general-purpose and one transit/HOV 3+ lane in each direction) with HOV lanes moved to the inside lanes.
- I-405 to SR 202 in Redmond: Current configuration of two general-purpose lanes in each direction and one outside transit/HOV lane in each direction with a 2+ occupancy requirement.
- The replacement SR 520 bridge main span is assumed to open in FY 2017 and carry three lanes (two general purpose and one HOV) across the lake to the west end of the western high rise.

The SR 520 Bridge Replacement and HOV Program includes the portion of the corridor between I-5 and I-405 and is comprised of five major components:

- Pontoon Construction
- Eastside Transit and HOV Project
- Floating Bridge and Landings (FB&L) Project
- West Approach Bridge North
- I-5 to Lake Washington, including the West Approach Bridge South

The total program cost is currently estimated at \$4.47 billion, part of which is funded. The \$2.90 billion funded portion of the program authorized by the Washington State Legislature includes the Pontoon Construction, Eastside, Floating Bridge and Landings, and West Approach Bridge North. Essentially, the funded program replaces the existing four lane floating bridge and upgrades the corridor to six lanes (two general purpose lanes and one high occupancy vehicle lane in each direction) between the Montlake Boulevard interchange in Seattle and the I-405 interchange on the Eastside.

**Figure ES-1: Assumed SR 520 Lane Configuration**



## Traffic and Revenue Forecasting History

CDM Smith conducted the initial investment grade study for SR 520, completed in late summer 2011. That study developed annual gross revenue estimates from the assumed start of tolling (January 1, 2012) through 2056. The study was conducted at a level of detail sufficient for use in support of project financing and resulted in the September 2011 investment grade traffic and revenue forecast.<sup>1</sup>

<sup>1</sup> The report containing the September 2011 traffic and revenue forecast was dated August 29, 2011. It was prepared in conjunction with other financing reports that are collectively referred to as the September 2011 forecast.

Tolling started on the bridge on December 29, 2011. In September 2012, CDM Smith provided an updated forecast based on the tolling experience over the first six months of 2012, a revised socio-economic basis, and revised project construction schedule. The resulting updated revenue forecast differed only modestly from the September 2011 forecast. From 2013 through 2021 the updated revenue forecast was generally slightly higher than the original forecast. From 2022 and beyond the revenue forecast was slightly lower mostly as a result of lower longer term population and employment growth forecasts.

In late 2012 and early 2013, CDM Smith provided analysis of a series of alternative toll rate scenarios requested by the Washington State Transportation Commission (WSTC). A traffic and revenue forecast was produced for a nickel rounding alternative ultimately adopted by WSTC in May 2013 for the FY 2014 toll rate change. In this alternative, toll rates for account-based (*Good To Go!*) and Pay By Mail transactions in FY 2014 were rounded to the nearest \$0.05. The forecast also assumed similar rounding for FY 2015 and FY 2016 toll rates would be ultimately adopted by the WSTC. (Toll rates from FY 2017 onward were rounded to the nearest \$0.05 consistent with all prior studies.)

In October 2013, CDM Smith provided a revised forecast based on detailed information for tolling experience from January 1, 2012 to December 31, 2012, preliminary tolling experience from January 1, 2013 to June 30, 2013, revised closure schedule, assumed toll rate schedule, and revised economic forecasts prepared in July 2013. The updated traffic and gross toll revenue forecast was documented in the April 4, 2014 investment grade study update.<sup>2</sup>

## Review of Tolling Performance

For purposes of generating this November 2014 SR 520 forecast, CDM Smith analyzed traffic and tolling performance data provided by WSDOT covering January 2013 through June 2014. These results of actual tolling experience provided valuable information to help evaluate and adjust the traffic and revenue estimates.

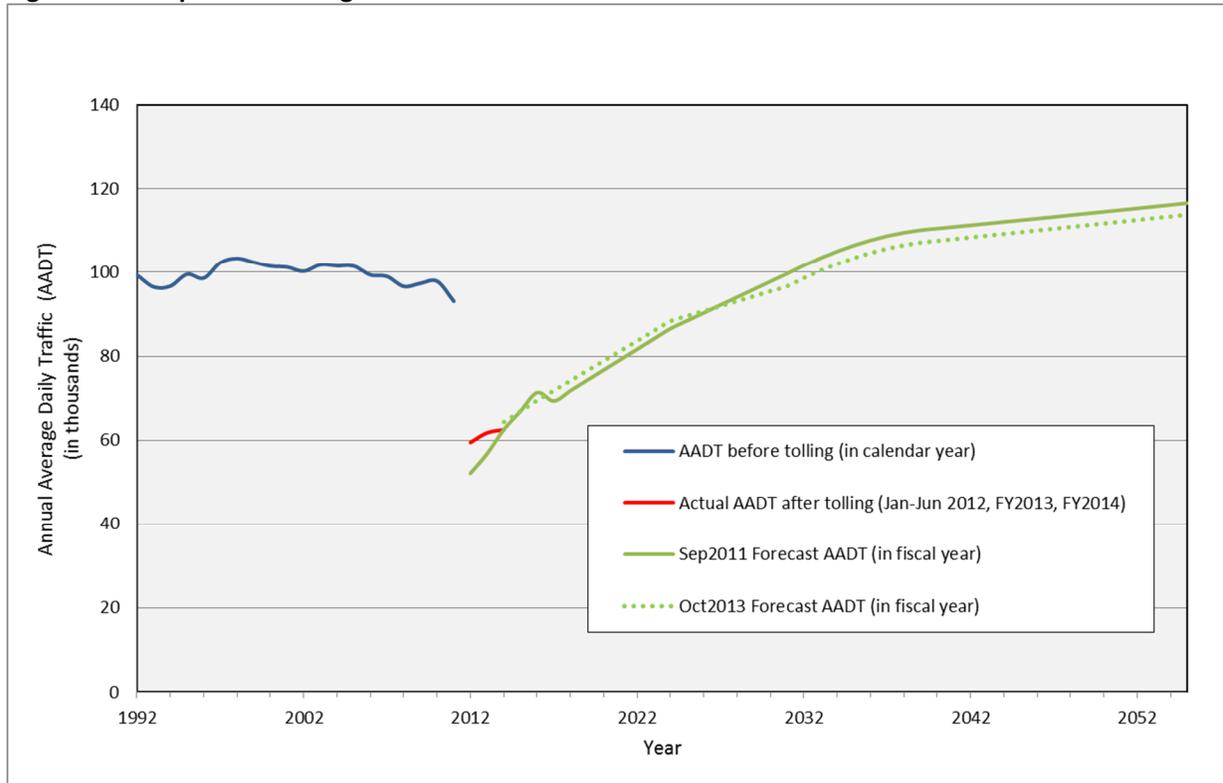
The traffic performance review examined the traffic impacts as a result of tolling; the focus was on comparing how traffic conditions, including travel times, have evolved from January 2013 through June 2014. Figure ES-2 shows the actual traffic volumes and the forecast traffic based on the 2011 Investment Grade study (referred to as the September 2011 forecast) and the October 2013 forecast. Note that on this figure, the annual average daily traffic includes all traffic (non-revenue vehicles, overnight traffic, and weekend traffic) and is adjusted to exclude weekend closures due to construction.

As illustrated by Figure ES-2, the overall average daily traffic on SR 520 dropped by about 36 percent when tolling began from 93,100 in 2011 to 59,500 in the first six months of 2012. The September 2011 forecast had anticipated a drop of about 44 percent. In FY 2013, the average daily traffic increased to 61,800 and in FY 2014 to 62,500 vehicles. The October 2013 forecast had anticipated a traffic volume of 64,400 vehicles for FY 2014.

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<sup>2</sup> The forecast presented in the April 2014 report was generated and reviewed in the summer and fall of 2013. It was prepared in conjunction with other financing reports that are collectively referred to as the October 2013 forecast.

**Figure ES-2: Impacts of Tolling on Traffic**



The tolling performance review also covered the following elements: transactions; gross toll revenue potential; method of payment; average weekday and weekend day transactions; and vehicle classification. When applicable, the performance data (actuals) for FY 2014 are compared to the prior IG forecasts prepared by CDM Smith (September 2011 and October 2013 forecasts) in the information that follows.

Table ES-1 presents the difference between total annual forecast transactions and actual results. Overall, the actual transactions in FY 2014 matched the September 2011 forecast and exceeded the October 2013 forecast by 1.1 percent.

**Table ES-1: FY 2014 Transactions vs. Forecasts**

Transactions	Sep2011 Forecast <sup>1</sup>	Oct2013 Forecast <sup>2</sup>	Actuals <sup>3,4</sup>	Variance vs 2011 Forecast	Variance vs 2013 Forecast
Jul 2013-Dec 2013	10,419,000	10,376,000	10,512,520	0.9%	1.3%
Jan 2014-Jun 2014	10,549,000	10,351,000	10,447,054	-1.0%	0.9%
<b>FY 2014</b>	<b>20,968,000</b>	<b>20,727,000</b>	<b>20,959,574</b>	<b>0.0%</b>	<b>1.1%</b>

1. Based on CDM Smith September 2011 forecast

2. Based on CDM Smith October 2013 forecast

3. For CY 2013, actuals are based on WSDOT toll transaction data provided to CDM Smith on 8/25/14

4. For CY 2014, actuals are based on WSDOT monthly lane equipment data adjusted by CDM Smith

Table ES-2 presents the difference between total annual forecast gross toll revenue potential and actual results available for FY 2014. The revenue potential reflects the toll rate increase implemented on July 1, 2013. Overall, the actual revenue potential was about 7 percent lower than the September

2011 forecast and matched (within 0.1 percent) the October 2013 forecast. The primary reason for the actual FY 2014 revenue results being lower than the Sep2011 forecast when the transactions were just about correct is primarily due to higher *Good To Go!* proportion of transactions, lower proportion of trucks, and higher total weekend transactions than assumed in the Sep2011 forecast. All these factors lower average revenue per transaction. During the Oct 2013 forecast process, actual tolling results indicated the assumptions for these parameters should be revised and the 2013 forecast reflected those changes. As a result, the 2013 differences in transactions and revenue between forecast and actuals are much closer. The 2013 forecast variance was caused by slightly higher *Good To Go!* proportion of transactions and slightly lower proportion of trucks than forecast.

**Table ES-2: FY 2014 Gross Toll Revenue Potential vs. Forecasts**

Gross Toll Revenue Potential	Sep2011 Forecast <sup>1</sup>	Oct2013 Forecast <sup>2</sup>	Actuals <sup>3,4</sup>	Variance vs 2011 Forecast	Variance vs 2013 Forecast
Jul 2013-Dec 2013	\$34,478,000	\$32,320,000	\$32,277,734	-6.4%	-0.1%
Jan 2014-Jun 2014	\$34,912,000	\$32,336,000	\$32,311,413	-7.4%	-0.1%
<b>FY 2014</b>	<b>\$69,390,000</b>	<b>\$64,656,000</b>	<b>\$64,589,147</b>	<b>-6.9%</b>	<b>-0.1%</b>

1. Based on CDM Smith September 2011 forecast

2. Based on CDM Smith October 2013 forecast

3. For CY 2013, actuals are based on WSDOT toll transaction data provided to CDM Smith on 8/25/14

4. For CY 2014, actuals are based on preliminary financial reporting system results and adjustments

## Economic Growth Analysis

In October 2014, the CDM Smith team developed independent revised economic forecasts of population and employment based on estimates of current socioeconomic variables and forecasts of future socioeconomic activity. These forecasts reflect newly available economic performance estimates, current regional economic forecasts, projected development in Seattle and Eastside King County communities, and current market conditions such as office occupancy rates and housing unit absorption trends.

The team produced base year traffic analysis zone (TAZ) estimates for 2013 drawing from current data published by State and regional government agencies and data providers. Then, using the revised base year and extrapolated recent regional growth forecasts, the team generated employment and population forecasts for key years including 2015, 2016, 2017, 2020, 2030 and 2040.

Overall, when compared to the prior economic forecast (October 2013), the population forecasts were adjusted upwards for King County and downwards for the region as a whole. However, the overall population growth rates remain essentially the same for the region and increase slightly for King County. Within King County, the total population forecast among the four major cities along the SR 520 corridor (Seattle, Kirkland, Bellevue, and Redmond) has been adjusted upwards, primarily driven by more growth expected in Seattle and to a lesser extent in Bellevue.

For total employment, King County performs about the same as expected in the prior forecast (slightly better in the short term and slightly worse in the long term), and regional total jobs were adjusted upwards particularly in the short term. Regional growth rates are lower through 2020, while King County growth rates are only slightly lower in the immediate future, but reflect the regional growth rates 2016 to 2020. From 2020-2040, regional and King County employment growth rates are very

similar to the October 2013 forecast. On a subarea basis, Seattle and Kirkland are now expected to have more total employment in the short term, Bellevue a little worse, and Redmond about the same. Growth rates are expected to be stronger in the four cities near term, with Seattle and Redmond leading the group. Longer term growth rates are slightly better for the four cities and slightly worse for the other parts of King County. The additional growth in Seattle results from more forecast jobs assigned to the Seattle CBD due to increased project development pipeline, especially in Denny Triangle and South Lake Union.

The revised economic forecasts were incorporated into the tolling analysis model by changing overall trip demand between those geographic areas which heavily influence travel demand on SR 520 and in the cross Lake Washington corridor.

## Tolling Operations

Tolling commenced on the existing SR 520 bridge on December 29, 2011. Overall, the toll rates assumed in the 2011 study at the start of tolling were implemented. The Washington State Transportation Commission (WSTC) has since raised the tolls approximately 2.5 percent on July 1, 2012, July 1, 2013 and July 1, 2014, consistent with the original 2011 study assumptions.

In May 2013, when adopting the FY 2014 toll rates, the WSTC decided toll rates should be rounded to the nearest nickel for simplicity. As a result, for FY 2014 through FY 2016, slight changes in the study toll rate assumptions have occurred:

- The maximum *Good To Go!* toll rate for 2-axle vehicles is \$3.80 on weekdays and \$2.35 on weekends and holidays in FY 2015. The toll rates have been rounded to the nearest \$0.05.
- In FY 2015, Pay By Mail customers pay approximately \$1.62 above the *Good To Go!* toll rates on average. The Pay By Mail rates are rounded to the nearest \$0.05.
- At the beginning of FY 2016, both weekday and weekend *Good To Go!* account-based tolls will increase by approximately 2.5 percent on average. It is assumed the tolls schedule reviewed by the WSTC in spring 2014, which included nearest \$0.05 rounding for the FY 2016 increase, will be adopted by the WSTC and implemented. The weekday maximum *Good To Go!* toll rate is assumed to be \$3.90 and the weekend rate is assumed to be \$2.40.
- At the beginning of FY 2016, it is assumed the differential for Pay By Mail customers will escalate by 2.5 percent and that the Pay By Mail rates will be rounded to the nearest \$0.05. The differential is approximately \$1.66
- Tolls for multi-axle vehicles (those with more than two axles on the ground) will be determined by multiplying the number of axles by the per axle toll rate for two-axle vehicles using the same payment method and rounded to the nearest \$0.05. The maximum rate is the six-axle rate, regardless of additional axles.

For FY 2017 and beyond, the toll rates assumed in the 2011 study, which were rounded to the nearest \$0.05 originally, remain unchanged. Weekday *Good To Go!* account-based tolls are assumed to increase approximately 15 percent on average from FY 2016 to FY 2017 (i.e. on July 1, 2016). Weekend account-based tolls are assumed to increase approximately 2 percent on average. The maximum weekday *Good To Go!* toll rate is assumed to be \$4.35 on weekdays and \$2.50 on weekends. There are no more assumed toll rate increases after FY 2017.

## Tolling Analysis Model Update

As part of the 2011 study, CDM Smith developed a tolling analysis model specific to the SR 520 corridor. For this 2014 forecast update, the tolling analysis model was revised by incorporating data gathered and analysis conducted in the tolling performance assessment, economic growth review, and revisions of toll rate assumptions. Specific toll model and forecasting revisions for the current forecast include:

- **Model trip table calibration** – The SR 520 toll model trip tables were calibrated to actual toll transactions and to actual traffic volumes on SR 520, I-90, SR 522, I-5, and I-405.
- **Growth performance review** – Short-term transaction and revenue forecasts revisions were partly informed by growth in actual transactions for FY 2013 and FY 2014 and partly by modeled FY 2016 results. Average weekday and average weekend transactions for FY 2015 and FY 2016 were adjusted accordingly.
- **Socioeconomic growth** – The revised socioeconomic growth review was incorporated into the new forecast.
- **Gas price forecast change** – Compared to the gas price forecast used in the October 2013 forecast, the new forecast assumes a lower gas price during pre-completion period and higher gas price in FY 2024 and later.
- **Proportion of payment** – The shares of *Good To Go!* account-based transactions (weekday, weekend, and overall) have been revised based on the performance review.
- **Weekend closures due to construction** – As the SR 520 reconstruction project has progressed, the number of planned weekend closures has been revised by WSDOT.
- **HOV3+ toll exemption** - It was assumed that all HOV3+ will meet the requirements imposed by WSDOT and therefore will be traveling toll-free from FY 2017 onward.
- **Trucks** – The proportions of trucks (weekday, weekend, and overall) have been revised based on the performance review
- **Annualization method** - A revised annualization approach was implemented to explicitly reflect the effect of holidays and leap year on annual transaction and revenue for each year.

## Summary of Assumptions

A summary of the assumptions used for the updated forecast is shown in Table ES-3.<sup>3</sup>

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<sup>3</sup> The forecast presented in this report was prepared in conjunction with other financing reports that are collectively referred to as the November 2014 forecast.

**Table ES-3: November 2014 Traffic and Gross Revenue Forecast Assumptions**

General Assumptions
Improvements in the Puget Sound Regional Council's current regional transportation plan, <i>Transportation 2040</i> , will be implemented as planned. No new competitive toll-free facilities or additional capacity will be constructed during the projection period other than those assumed in the plan.
The percentage of payment types will be consistent with the ranges assumed for this study. The percentage of potential bridge users in the <i>Good To Go!</i> account-based program is assumed to increase from 85% in FY 2015 to 88% in FY2031.
Economic growth in the project study area will occur as forecasted herein based in part on the 2013 PSRC Land Use Baseline Forecast from the Puget Sound Regional Council, Conway Pedersen June 2014 forecasts, and the independent socioeconomic consultant.
The facility will continue to be well maintained, efficiently operated, effectively signed, and promoted to encourage maximum usage.
Inflation will average 2.5% annually over the forecast horizon. This figure is based on historic CPI up to 2014. While current inflation forecasts are somewhat lower for the state overall (1.9% long term), the greater Seattle region and the SR 520 primary market corridor are growing at a significant pace implying the assumption of 2.5% inflation throughout the SR 520 forecasts should be kept.
Motor fuel will remain in adequate supply and no national or regional emergency will arise that would abnormally restrict the use of motor vehicles. The per gallon price for passenger car gasoline is assumed to be \$3.61 in FY 2014, rising to \$3.88 in FY 2017, \$5.10 in FY 2024, and \$6.15 in FY 2031, resulting in a long term annual growth assumption of 3.2% similar to TRFC's September 2014 long term forecast of gas price.
The value of time for work trips ranges from \$9.60 per hour for the lowest income group to \$22.80 per hour for the highest income group. The value of time for non-work passenger car trips is \$13.80 per hour. Truck trip value of time reaches \$36.00 per hour for heavy trucks. All values are in 2010 dollars.

*(table continued)*

**Table ES-3: November 2014 Traffic and Gross Revenue Forecast Assumptions (Continued)**

<b>SR 520 Configuration</b>
Bridge Configuration: FY 2015- FY 2016: Two narrow general-purpose lanes and shoulders in each direction.
Bridge Configuration FY 2017 and onward: Two wider general-purpose lanes in each direction, one HOV/transit lane in each direction, and wider shoulders in each direction on replacement span. A new west approach bridge north connection from the western high rise to Montlake Blvd. interchange such that three standard lanes and full shoulders are provided between the floating span and Montlake Blvd utilizing the current bridge connection and new west approach bridge north connection. West of Montlake Blvd., SR 520 will remain in its current two-lane per direction configuration.
SR 520 Configuration East of Bridge to I-405 FY 2015 - FY 2016: Two general-purpose lanes in each direction and one outside HOV lane (with three person occupancy requirement HOV3+) westbound.
SR 520 Configuration East of Bridge to I-405 FY 2017 and onward: Two general-purpose lanes in each direction and one inside HOV/transit lane in each direction (with three person occupancy requirement HOV3+).
<b>Construction Closures</b>
Weekend closures of SR 520 from the Montlake Interchange to I-405 including the tolled section will occur an equivalent of 15.5 days in FY 2015, ten days in FY 2016, one day in FY 2017, and 3.5 days in FY 2018. Typical weekend closures are from 11 PM on Friday to 5 AM on Monday. Since night time (5 AM to 11 PM) tolling is assumed from FY 2017 forward, night time closures from FY 2017 forward are included.
<b>Ramp-Up</b>
No ramp-up is included in the current forecast horizon (FY 2015 through FY 2056)
<b>Toll Collection</b>
Tolls will be collected at a single point on the eastern high-rise of the main span while traffic remains on the existing bridge and at a single point on the eastern shore when traffic moves to the replacement bridge.
Toll rates will be the same for either direction on the bridge.
The toll collection is all electronic; there will be no manual toll collection.
FY 2015 - FY 2016: no night time tolling (11pm - 5am). FY 2017 and beyond: tolls will be charged during all 24 hours.

*(table continued)*

**Table ES-3: November 2014 Traffic and Gross Revenue Forecast Assumptions (Continued)**

Toll Rates	
<b>Toll Rates FY 2015 - FY 2016</b>	
	The maximum <i>Good To Go!</i> toll rate for 2-axle vehicles is \$3.80 on weekdays and \$2.35 on weekends in FY 2015 as adopted by the Washington State Transportation Commission. The toll rates have been rounded to the nearest \$0.05.
	In FY 2015, Pay By Mail customers pay approximately \$1.62 above the <i>Good To Go!</i> toll rates on average. The Pay By Mail rates are rounded to the nearest \$0.05.
	At the beginning of FY 2016, both weekday and weekend <i>Good To Go!</i> account-based tolls will increase by approximately 2.5% on average. It is assumed the tolls schedule reviewed by the WSTC in spring 2014, which included nearest \$0.05 rounding for the FY 2016 increase, will be adopted by the WSTC and implemented.
	At the beginning of FY 2016, it is assumed the differential for Pay By Mail customers will escalate by 2.5 percent and that the Pay By Mail rates will be rounded to the nearest \$0.05.
	Through the end of FY 2016, High occupancy vehicles (HOVs) will pay the same toll as single-occupant vehicles (SOVs).
	Toll exemptions as outlined by the Washington State Transportation Commission (the largest of which is the transit buses, private regular route buses such as the Microsoft Connector, and WSDOT sanctioned vanpools) are assumed.
	Tolls for multi-axle vehicles (those with more than two axles on the ground) will be determined by multiplying the number of axles by the per axle toll rate for two-axle vehicles using the same payment method and rounded to the nearest \$0.05. The maximum rate is the six-axle rate, regardless of additional axles.
<b>Toll Rates FY 2017 and beyond</b>	
	Weekday <i>Good To Go!</i> account-based tolls will increase approx. 15% on average from FY 2016 to FY 2017 (i.e. on July 1, 2016).
	Weekend account-based tolls will increase approx. 2.5% on average from FY 2016 to FY 2017 (i.e. on July 1, 2016).
	The maximum <i>Good To Go!</i> toll rate for 2-axle vehicles is \$4.35 on weekdays and \$2.50 on weekends in FY 2017 and beyond.
	The Pay By Mail toll differential will increase 2.5% from FY 2016 to FY 2017 (i.e. on July 1, 2016).
	In FY 2017 and beyond, Pay By Mail customers pay approximately \$1.70 above the <i>Good To Go!</i> toll rates on average.
	All toll rates will be rounded to the nearest \$0.05
	Toll exemptions as noted above are continued.
	HOVs with three or more occupants will be exempt from paying tolls if paying by transponder; HOVs with two occupants will pay the same toll as single occupant vehicles (SOVs).
	Tolls for multi-axle vehicles will continue to be factored by the number of axles as noted above.
	No toll rate escalation is assumed after FY 2017.

## Updated Transactions and Gross Toll Revenue Potential

Taking into account the tolling experience to date, revised independent economic forecast, and revised bridge configuration assumptions including closures, updated baseline estimates of toll transactions and gross toll revenue potential were developed for FY 2015 through FY 2056, shown in Table ES-4.

Initially, annual growth in transactions and revenue is expected to generally follow recent trends. Revenue grows somewhat faster than transactions due to the toll increases in FY 2015 and FY 2016. In FY 2017, the large increase in toll rates results in lower transaction growth, but a significant increase in annual revenue due to the toll rate increase. After FY 2017, toll rates are assumed not to change with regular inflation, which makes the real value of the toll decline. From FY 2018 through 2032,

average transactions are expected to grow at a variable but declining rate from approximately 3 to 4 percent annually to about 2 percent by FY 2032. Throughout the remainder of the forecast horizon, the growth rates of both transactions and revenue declines to well below 1 percent annually.

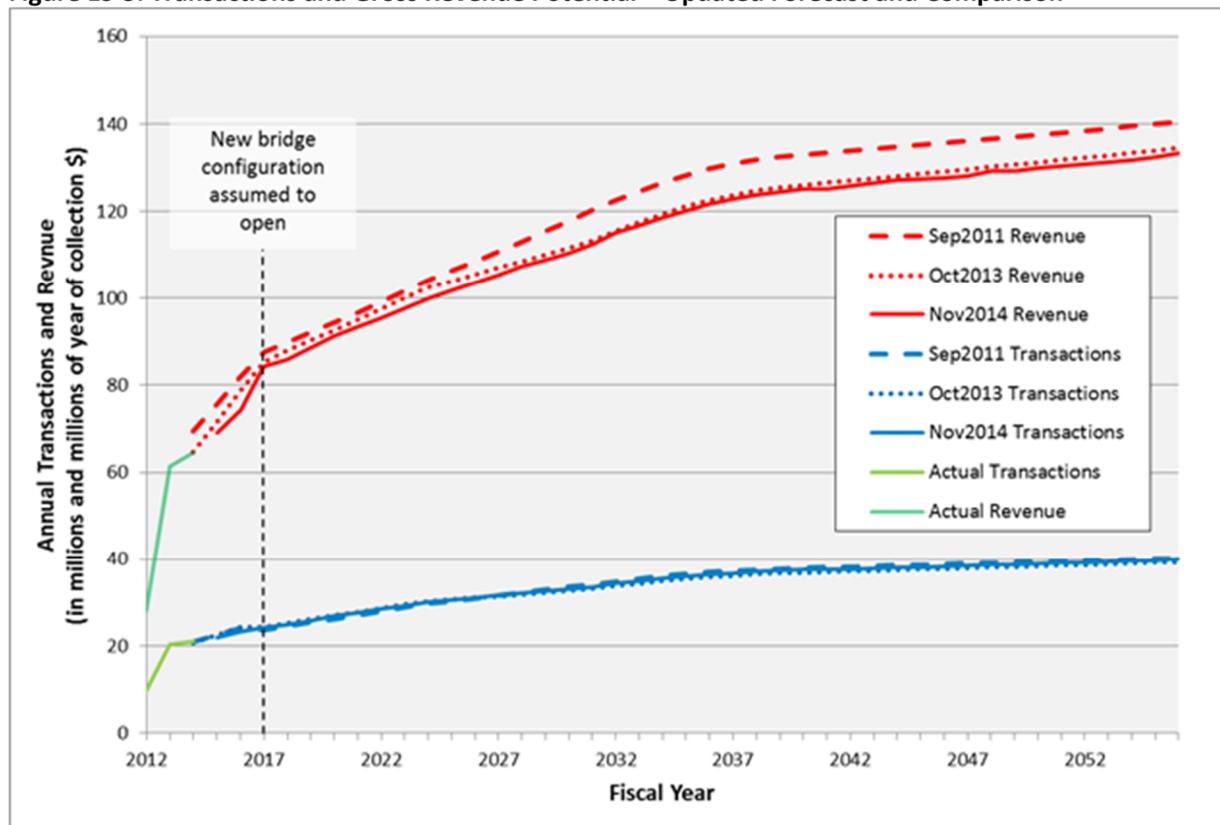
**Table ES-4: SR 520 Annual Transactions and Gross Toll Revenue Potential - Updated Forecast**

Fiscal Year	Transactions (millions)	Annual Growth	Gross Toll Revenue Potential (millions of year of collection \$)	Annual Growth
2015	21.882	--	\$68.995	--
2016	23.181	5.9%	74.383	7.8%
2017	24.175	4.3%	84.207	13.2%
2018	24.850	2.8%	85.960	2.1%
2019	25.863	4.1%	88.640	3.1%
2020	26.802	3.6%	91.339	3.0%
2021	27.552	2.8%	93.273	2.1%
2022	28.383	3.0%	95.507	2.4%
2023	29.215	2.9%	97.741	2.3%
2024	30.081	3.0%	99.951	2.3%
2025	30.548	1.6%	101.755	1.8%
2026	31.050	1.6%	103.536	1.8%
2027	31.553	1.6%	105.316	1.7%
2028	32.151	1.9%	107.447	2.0%
2029	32.524	1.2%	108.679	1.1%
2030	33.025	1.5%	110.455	1.6%
2031	33.560	1.6%	112.435	1.8%
2032	34.344	2.3%	115.070	2.3%
2033	34.862	1.5%	116.752	1.5%
2034	35.421	1.6%	118.603	1.6%
2035	35.881	1.3%	120.021	1.2%
2036	36.420	1.5%	121.828	1.5%
2037	36.705	0.8%	122.828	0.8%
2038	36.996	0.8%	123.776	0.8%
2039	37.215	0.6%	124.486	0.6%
2040	37.441	0.6%	125.145	0.5%
2041	37.478	0.1%	125.210	0.1%
2042	37.663	0.5%	125.908	0.6%
2043	37.813	0.4%	126.386	0.4%
2044	38.078	0.7%	127.279	0.7%
2045	38.115	0.1%	127.346	0.1%
2046	38.232	0.3%	127.608	0.2%
2047	38.386	0.4%	128.092	0.4%
2048	38.690	0.8%	129.224	0.9%
2049	38.728	0.1%	129.293	0.1%
2050	38.883	0.4%	129.785	0.4%
2051	39.038	0.4%	130.278	0.4%
2052	39.244	0.5%	130.752	0.4%
2053	39.352	0.3%	131.272	0.4%
2054	39.509	0.4%	131.772	0.4%
2055	39.667	0.4%	132.274	0.4%
2056	39.945	0.7%	133.210	0.7%

Figure ES-3 shows the comparison of the September 2011, October 2013, and November 2014 forecasts over the entire study period. Overall, the transactions vary little between the three forecasts. The average difference is about plus or minus 1 percent. In the short term (FY 2015 through FY 2018), transactions in the November 2014 forecast versus those in the October 2013 forecast have a pronounced difference due to the changes in expected closures and lower expected near term growth. During this period, transactions ranging from 0.3 to 4.1 percent lower. For FY 2019 and beyond, corresponding November 2014 forecast variations range from 0.8 percent lower to 1.9 percent more than the 2013 forecast.

For revenue, the changes between forecasts are more pronounced than transactions. As noted earlier, review of actual performance during the October 2013 forecast process and again during the November 2014 forecast process showed an overall much lower truck share and higher *Good To Go!* share than the September 2011 forecast. On weekdays, these two effects are marginally lower with actual trucks being 0.8 percent vs. October 2013 forecasted 1.1 percent; and *Good To Go!* share being 86 percent instead of October 2013 forecasted 85 percent for FY 2014. On weekends, much more detailed information over a longer span of days was available for this study than prior studies. Consequently, weekend day truck shares were lowered from 1.1 percent in the October 2013 forecast to 0.3 percent, and *Good To Go!* share was raised from 70 percent in the October 2013 forecast to 79 percent. These factors were also adjusted in later forecast years and both factors lower revenue per transaction.

**Figure ES-3: Transactions and Gross Revenue Potential – Updated Forecast and Comparison**



In comparing the November 2014 revenue forecast to the October 2013 revenue forecast, impacts are biggest in FY 2015 and FY 2016, due to closures and lower expected near term growth. In FY 2017 and beyond, the November 2014 revenue forecast is slightly lower than the October 2013 forecast due to a marginal increase in *Good To Go!* share and slightly lower truck proportions throughout the forecast horizon.

## Sensitivity Tests

In order to evaluate the impact of possible changes in input parameters and their effect on transactions and revenue, several sensitivity tests were performed, involving variations in the following parameters and assumptions:

- Toll rate sensitivity
- Regional growth
- Account-based participation rate.

### Toll Rate Sensitivity

A range of toll rates from \$2.00 to \$9.00 peak hours and from \$1.50 to \$5.00 midday was modeled using the tolling analysis model for FY 2017. For each toll rate, the corresponding revenue was computed to develop toll sensitivity curves for AM peak, midday, and PM peak periods.

The FY 2017 selected peak period toll rate of \$4.35 is estimated to generate 87 and 86 percent of the maximum revenue during the AM and PM peak periods, respectively. During the off-peak (midday) period in FY 2017, the selected toll rate of \$2.90 is estimated to generate 93 percent of the maximum revenue.

### Regional Growth

Using a downside economic forecast generated by the CDM Smith team, the tolling analysis model was run to estimate transactions and gross toll revenue potential under lower economic growth conditions. For FY 2017, under an approximately 2 and 4 percent economic downside scenario for population and employment respectively, transactions and revenue are expected to be about 3 and 4 percent lower respectively. For FY 2024, under an approximately 6 and 7 percent economic downside scenario for population and employment respectively, transactions and revenue are expected to be about 8 percent lower. For FY 2031, under an approximately 9 and 10 percent economic downside scenario for population and employment respectively, transactions and revenue are expected to be about 12 percent lower.

### Account-based Participation Rate

This test examined the difference in transactions and revenue for account-based participation rates differing from those assumed in the baseline scenario. The overall transaction *Good To Go!* share for the baseline scenario is 85 percent in FY 2017, 87 percent in FY 2024, and 88 percent in FY 2031. In the sensitivity test, these rates were raised to 87 percent in FY 2017, 91 percent in FY 2024, and 93 percent in FY 2031.

The higher account-based participation rate resulted in higher transactions by 0.7 percent in FYs 2017, 2024, and 2031. Under this scenario, gross toll revenue potential would be expected to be lower by 0.3 percent in FY 2017, by 1.1 percent in FY 2024, and by 2.0 percent in FY 2031.

# Chapter 1

## Introduction

The Washington State Department of Transportation (WSDOT) has utilized toll financing as part of a broader package to finance the implementation of the SR 520 Floating Bridge and HOV Program. The U.S. Department of Transportation's Transportation Infrastructure Finance and Innovation Act (TIFIA) program provided financial support to the SR 520 Program via a direct loan in October 2012. WSDOT began tolling the bridge in December 2011, prior to the construction of the replacement floating bridge. WSDOT continues to collect tolls during construction and toll collection is expected to continue after construction is completed.

In order to satisfy TIFIA requirements and meet current and future bond requirements, the SR 520 Bridge Investment Grade Traffic and Revenue Study was updated with additional actual tolling experience of the SR 520 bridge and changes in toll rates, updated construction schedules, and revisions to the underlying economic forecasting.

The focus of this update is to reexamine a number of key assumptions including: bridge project and regional roadway configuration; bridge closures during construction; socio-economic forecast; traffic growth, and tolling schedule. Revised transactions and gross revenue forecasts are provided for FY 2015 through FY 2056.

## Project Description

The SR 520 corridor stretches nearly 13 miles between I-5 in Seattle to the west and SR 202 to the east, crossing I-405 at about the halfway point, and serving various Eastside communities, including Bellevue, Kirkland and Redmond. Figure 1-1 shows the corridor location. The main SR 520 bridge span across Lake Washington is currently 1.42 miles long, making it the longest floating bridge span in the world. Until the replacement bridge opens, tolls are being collected at the east high-rise section of the SR 520 bridge.

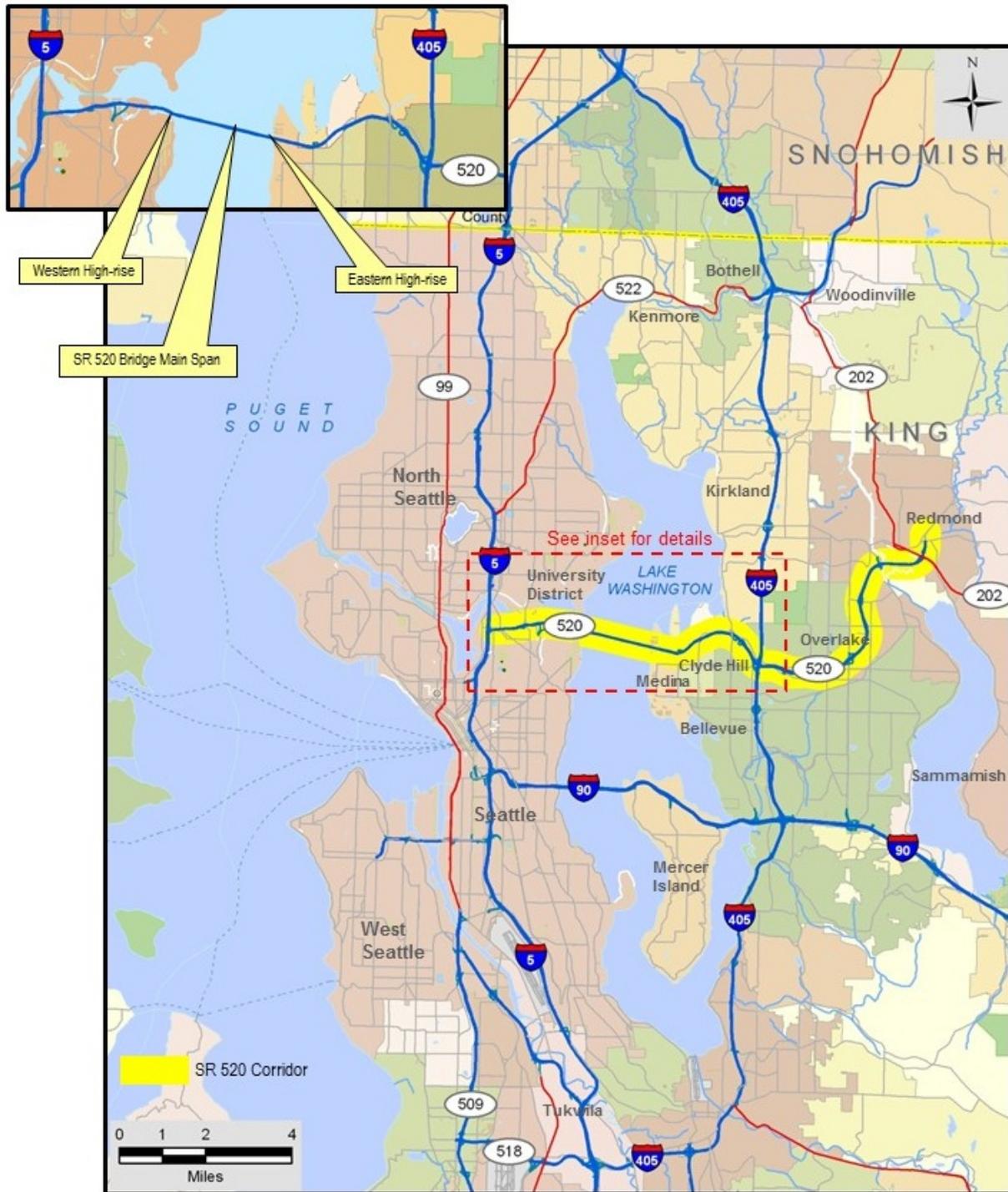
Figure 1-2 shows the assumed lane configurations for this study. The configuration assumed in the forecast through FY 2016 (June 30, 2016) consists of:

- I-5 to east side of Lake Washington (including the main bridge span): two general-purpose lanes in each direction.
- Lake Washington to I-405: two general-purpose lanes in each direction and one westbound outside transit/high occupancy vehicle lane with a 3+ occupancy requirement (HOV3+).
- I-405 to SR 202 in Redmond: two general-purpose lanes in each direction and one outside transit/HOV lane in each direction with a 2+ occupancy requirement.

Replacement of the existing bridge is required due to its structural deficiency and functional obsolescence. For purposes of this study, the configuration assumed from FY 2017 forward includes:

- Replacement of the main span by a six-lane main span (two general-purpose and one inside transit/HOV 3+ lane in each direction) from west end of main span, across Lake Washington to the eastern shore.

Figure 1-1: SR 520 Corridor Location



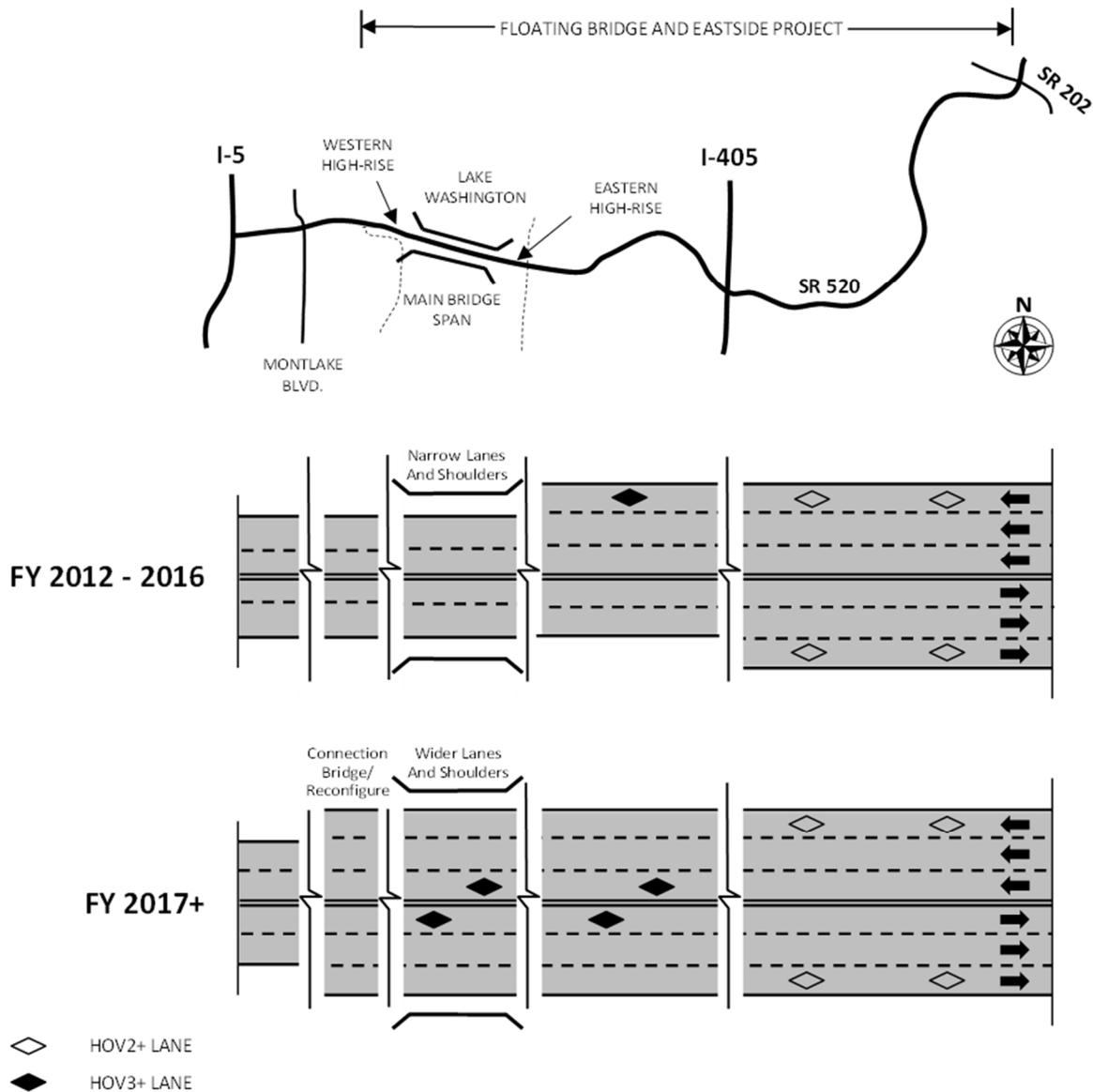
- Lake Washington to I-405: Addition of one eastbound lane from eastern shore of Lake Washington to I-405 resulting in three lanes in each direction (two general-purpose and one transit/HOV 3+ lane in each direction) with HOV lanes moved to the inside lanes
- I-405 to SR 202 in Redmond: Current configuration of two general-purpose lanes in each direction and one outside transit/HOV lane in each direction with a 2+ occupancy requirement.
- The replacement SR 520 bridge main span is assumed to open in FY 2017 and carry three lanes (two general purpose and one HOV) across the lake to the west end of the western high rise. Tolls will be collected at a location on the eastern shore of Lake Washington. A three lane westbound West Approach Bridge North (WABN) connector is assumed to be completed shortly after the main span. This connector and reconfiguration of the existing four lane west approach bridge connector will result in three lanes in each direction to the Montlake Boulevard interchange (two general-purpose and one inside transit/HOV 3+ lane in each direction). The connection bridge and reconfiguration are new elements since the September 2011 study.

The SR 520 Bridge Replacement and HOV Program includes the portion of the corridor between I-5 and I-405 and is comprised of five major components:

- Pontoon Construction
- Eastside Transit and HOV Project
- Floating Bridge and Landings (FB&L) Project
- West Approach Bridge North
- I-5 to Lake Washington, including the West Approach Bridge South

The total program cost is currently estimated at \$4.47 billion, part of which is funded. The \$2.90 billion funded portion of the program authorized by the Washington State Legislature includes the Pontoon Construction, Eastside, Floating Bridge and Landings, and West Approach Bridge North. Essentially, the funded program replaces the existing four lane floating bridge and upgrades the corridor to six lanes (two general purpose lanes and one high occupancy vehicle lane in each direction) between the Montlake Boulevard interchange in Seattle and the I-405 interchange on the Eastside.

**Figure 1-2: Assumed SR 520 Lane Configuration**



## Bond Financing Context

Several different debt instruments are being used to finance the SR 520 Corridor program. A combination of triple pledge bonds (backed by toll revenue, fuel tax, and the full faith and credit of the state), toll revenue bonds, Federal Highway Grant Anticipation Revenue (GARVEE) bonds, and a loan from the Transportation Infrastructure Finance and Innovation Act (TIFIA) are being considered to finance the program.

To date, four bonds have been issued under the two master bond resolutions that govern the municipal financing provided to the project, including: (1) triple pledge bonds in October 2011; (2) GARVEE bonds in June 2012; (3) TIFIA bond in the form of a draw down loan in October 2012; and (4) GARVEE bonds in September 2013. Additional bonds may be issued in the form of triple pledge, and/or toll revenue backed bonds.

## Traffic and Revenue Forecasting History

CDM Smith conducted the initial investment grade study for SR 520, completed in late summer 2011. This study developed annual gross revenue estimates from the assumed start of tolling (January 1, 2012) through 2056. The study was conducted at a level of detail sufficient for use in support of project financing and resulted in the September 2011 investment grade traffic and revenue forecast.<sup>4</sup> The estimates were prepared based on a study work program which included:

- **Traffic count data collection** – including review of WSDOT annual traffic reports, as well as independent traffic count data collection.
- **Travel pattern surveys** – Mail-back surveys were sent to SR 520 users in the fall of 2009. The survey requested information on origin and destination travel, trip frequency, travel time of day, trip purpose, vehicle occupancy, vehicle class, and SR 520 entrance and exit points.
- **Travel time surveys** – Travel time surveys were performed along SR 520 and on important routes that could be potential alternatives.
- **Stated preference surveys** – Stated preference surveys were conducted in the fall of 2009 to measure the responses of current bridge users to tolling of SR 520. The results were used to develop a travel choice model which was used to forecast future travel behavior under tolled conditions including values of time, trip suppression, and mode shift.
- **Independent corridor growth analysis** – an independent review was conducted to update the PSRC data. This review utilized independent regional forecasts which account for the major recession and overall economic downturn, data on economic and real estate activity, and a review of area development plans as the basis for revised population and employment forecasts for the region.
- **Tolling analysis model development** – The model development process included compiling and converting the Puget Sound Regional Council (PSRC) regional model data sets to the toll forecast model. The model was calibrated to match existing observed conditions based on traffic counts and speeds. Once calibrated, the traffic assignment model was developed, incorporating tolling algorithms with the assignment process. CDM Smith also incorporated the results of the travel patterns surveys, the stated preference survey, independent corridor growth review, and travel time surveys.
- **Traffic and revenue analysis** – CDM Smith utilized the toll analysis model to analyze several preliminary toll structures, as requested by WSDOT. The final investment grade traffic and revenue scenario was based on the FY 2012 adopted tolling structure and the future year tolling structure in the financing plan reviewed by the Washington State Transportation Commission (WSTC).
- **Sensitivity tests** – Several sensitivity tests were performed to determine the revenue impacts associated with variations in the following parameters and assumptions: regional growth,

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<sup>4</sup> The report containing the September 2011 traffic and revenue forecast was dated August 29, 2011. It was prepared in conjunction with other financing reports that are collectively referred to as the September 2011 forecast.

values of time, account-based participation rate, motor fuel cost, trip suppression and mode shift, and possible tolling of the I-90 bridge.

Tolling started on the bridge on December 29, 2011. In September 2012, CDM Smith provided an updated forecast based on the tolling experience over the first six months of 2012, a revised socio-economic basis, and revised project construction schedule. The resulting updated revenue forecast differed only modestly from the September 2011 forecast. From 2013 through 2021 the updated revenue forecast was generally slightly higher than the original forecast. From 2022 and beyond the revenue forecast was slightly lower mostly as a result of lower longer term population and employment growth forecasts.

In late 2012 and early 2013, CDM Smith provided analysis of a series of alternative toll rate scenarios requested by the Washington State Transportation Commission (WSTC). A traffic and revenue forecast was produced for the nickel rounding alternative ultimately adopted by WSTC in May 2013. In this alternative, toll rates for account-based (*Good To Go!*) and Pay By Mail transactions in FY 2014 through FY 2016 were rounded to the nearest \$0.05. (Toll rates from FY 2017 onward were rounded to the nearest \$0.05 in the original 2011 study and continued to be so in the later studies.)

In October 2013, CDM Smith provided a revised forecast based on detailed information for tolling experience from January 1, 2012 to December 31, 2012, preliminary tolling experience from January 1, 2013 to June 30, 2013, revised closure schedule, assumed toll rate schedule, and revised economic forecasts prepared in July 2013. The updated traffic and gross toll revenue forecast was documented in the April 4, 2014 investment grade study update.<sup>5</sup>

## Traffic and Revenue Study Approach

The primary tasks leading to the development of this report and the revised forecast are summarized in this section. The approach essentially followed the same process as the October 2013 forecast. These tasks are described in detail in subsequent chapters of the report.

### Review of Tolling Performance

CDM Smith analyzed data provided by WSDOT to examine the traffic, transactions, and tolling performance of the SR 520 bridge between January 2013 and June 2014 (18-month period). The results of actual tolling experience provide valuable information to help evaluate and adjust the transactions and revenue forecast.

The traffic performance review examines the traffic impacts as a result of tolling; the focus is on comparing how traffic conditions, including travel times, have evolved from January 2013 through June 2014.

The tolling performance review covers the following elements: transactions; gross toll revenue potential; method of payment; average weekday and weekend day transactions; and vehicle classification. When applicable, the performance data (actuals) for FY 2014 are compared to the prior IG forecast prepared by CDM Smith (October 2013 forecast).

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<sup>5</sup> The forecast presented in the April 2014 report was generated and reviewed in the summer and fall of 2013. It was prepared in conjunction with other financing reports that are collectively referred to as the October 2013 forecast.

## Economic Growth Analysis

The CDM Smith team developed independent economic forecasts of population and employment based on estimates of current socioeconomic variables and forecasts of future socioeconomic activity. These forecasts were updated in October 2014 by CDM Smith team member Community Attributes Inc. to reflect newly available economic performance estimates, current regional economic forecasts, projected development in Seattle and Eastside King County communities, and current market conditions such as office occupancy rates and housing unit absorption trends.

The team produced base year traffic analysis zone (TAZ) estimates for 2013 drawing from current data published by State and regional government agencies and data providers. Forecasts include employment and population forecasts for 2014, 2015, 2016, 2017, 2018, 2020, 2030 and 2040, driven by data and published forecasts. The revised economic forecasts were incorporated into the tolling analysis model by changing overall trip demand in those geographic areas which heavily influence travel demand on SR 520 and in the cross Lake Washington corridor.

For comparative purposes, the updated economic forecasts are compared to forecasts used in the previous October 2013 SR 520 traffic and revenue forecast.

## Tolling Operations

Tolling commenced on the existing SR 520 bridge on December 29, 2011. Overall, the toll rates assumed in the 2011 study at the start of tolling were implemented. The Washington State Transportation Commission (WSTC) has since raised the tolls approximately 2.5 percent on July 1, 2012, July 1, 2013 and July 1, 2014, consistent with the original 2011 study assumptions.

For FY 2014 through FY 2016, slight changes in the 2011 study toll rate assumptions have occurred due to a nickel rounding strategy adopted by WSTC in May 2013. The resultant rates are:

- The maximum *Good To Go!* toll rate for 2-axle vehicles is \$3.80 on weekdays and \$2.35 on weekends in FY 2015. The toll rates have been rounded to the nearest \$0.05.
- In FY 2015, Pay By Mail customers pay approximately \$1.62 above the *Good To Go!* toll rates on average. The Pay By Mail rates are rounded to the nearest \$0.05.
- At the beginning of FY 2016, both weekday and weekend *Good To Go!* account-based tolls will increase by approximately 2.5 percent on average. It is assumed the tolls schedule reviewed by the WSTC in spring 2014, which included nearest \$0.05 rounding for the FY 2016 increase, will be adopted by the WSTC and implemented.
- At the beginning of FY 2016, it is assumed the differential for Pay By Mail customers will escalate by 2.5 percent and that the Pay By Mail rates will be rounded to the nearest \$0.05.
- Tolls for multi-axle vehicles (those with more than two axles on the ground) will be determined by multiplying the number of axles by the per axle toll rate for two-axle vehicles using the same payment method and rounded to the nearest \$0.05. The maximum rate is the six-axle rate, regardless of additional axles.

For FY 2017 and beyond, the toll rates assumed in the 2011 study, which were rounded to the nearest \$0.05, remain unchanged. Weekday *Good To Go!* account-based tolls are assumed to increase

approximately 15 percent on average from FY 2016 to FY 2017 (i.e. on July 1, 2016). Weekend account-based tolls are assumed to increase approximately 2.5 percent on average.

## Toll Model Update

As part of the 2011 study, CDM Smith developed a tolling analysis model specific to the SR 520 corridor. A detailed description of the model structure and primary input is provided in the 2011 IG report. Specific toll model and forecasting revisions incorporated in the revised forecast include:

- **Model trip table calibration** – The SR 520 toll model trip tables were calibrated to toll transactions derived from the toll performance analysis and to traffic volumes on SR 520, I-90, SR 522, I-5, and I-405.
- **Growth performance review** – Short-term traffic and revenue revised forecasts (FY 2015 and FY 2016) were partly informed by actual results for FY 2013 and FY 2014, as well as recent growth patterns revealed by the tolling performance review. Average weekday and average weekend transactions for FY 2015 and FY 2016 were adjusted accordingly.
- **Socioeconomic growth** – The revised socioeconomic growth review was incorporated into the new forecast.
- **Gas price forecast change** – Compared to the gas price forecast used in the October 2013 forecast, the new forecast assumes a lower gas price during pre-completion period and higher gas price in FY 2024 and later.
- **Proportion of payment** – The shares of *Good To Go!* account-based transactions (weekday, weekend, and overall) have been revised based on the performance review.
- **Weekend closures due to construction** – As the SR 520 reconstruction project has progressed, the number of planned weekend closures has been revised by WSDOT.
- **HOV3+ toll exemption** - It was assumed that all HOV3+ will meet the requirements imposed by WSDOT and therefore will be traveling toll-free from FY 2017 onward.
- **Trucks** – The proportions of trucks (weekday, weekend, and overall) have been revised based on the performance review
- **Annualization method** - A revised annualization approach was implemented to explicitly reflect the effect of holidays and leap year on annual transaction and revenue for each year.

## Transactions and Revenue Analysis

The revised tolling analysis model was used to generate new transaction and gross revenue forecasts. The first step was to run the model to evaluate transactions and revenue impacts on an average weekday for key analysis years: FY 2016, FY 2017, FY 2024, and FY 2031. Both FY 2016 and FY 2017 were directly modeled because the bridge lane configuration is assumed to change during that time.

The weekday results for years between model years were determined by interpolation. The model results were then annualized taking into account weekend traffic and toll rates. The process generated a baseline transaction and gross revenue forecast from FY 2015 to FY 2056.

## Sensitivity Tests

In order to evaluate the impact of possible changes in input parameters and their effect on transactions and revenue, several sensitivity tests were performed, involving variations in the following parameters and assumptions:

- Toll rate sensitivity
- Regional growth
- Account-based participation rate

## Report Structure

The remainder of this report is organized as follows:

- Chapter 2 presents a review of traffic and tolling performance including comparisons to the October 2013 forecast.
- Chapter 3 covers the economic growth analysis and revised economic forecast. It includes comparisons to the 2013 study economic forecast.
- Chapter 4 discusses the assumptions related to toll structure and toll rates including vehicle classes and toll exemptions, methods of payment, and estimated market shares by payment type.
- Chapter 5 presents the traffic and revenue forecasting approach. It includes an overview of the tolling analysis model, a description of the revisions made to the model and forecasting process, and a summary of major forecasting assumptions.
- Chapter 6 includes the results of traffic and gross revenue analysis in the form of an estimated annual transactions and gross toll revenue potential stream for the period from FY 2015 through FY 2056.<sup>6</sup>
- Chapter 7 contains the results of sensitivity testing of key model parameters and assumptions.

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<sup>6</sup> The forecast presented in this report was prepared in conjunction with other financing reports that are collectively referred to as the November 2014 forecast.

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## Chapter 2

# Review of Tolling Performance

CDM Smith analyzed data provided by WSDOT to examine the traffic and tolling performance of SR 520 between January 2013 and June 2014, an additional 18 months of actual experience. The results of actual tolling experience provide valuable information to refine the traffic and revenue estimates.

This chapter provides a general overview of the traffic and toll performance reviews performed by CDM Smith as part of this November 2014 investment grade (IG) study update. The traffic performance review examines the traffic impacts as a result of tolling; the focus is on comparing how traffic conditions, including travel times, have evolved from January 2013 through June 2014. The tolling performance review covers the following elements: transactions; gross toll revenue potential; method of payment; average weekday and weekend day transactions; and vehicle classification. When applicable, the performance data (actuals) for FY 2014 are compared to the prior IG forecast prepared by CDM Smith (October 2013 forecast).

The results presented here are based on transaction resolution as of August 2014, the latest dataset available at the time the report was prepared. Consequently, the results presented may show some variation versus official values reported previously. Also, not all of the transactions had reached final resolution<sup>7</sup> by the time of this analysis; therefore, additional adjustments to transactions and revenue are likely over time, as more transactions reach final resolution. In particular, the analysis of tolling experience in the first six months of 2014 has been adjusted based on experience with resolved transactions in 2013. **The analysis in this assessment was prepared to help inform the update of the SR 520 forecast and does not represent a change in officially reported values.**

## Traffic Impacts as a Result of Tolling

Traffic data provided by WSDOT were used to review traffic variations on SR 520 prior to and after tolling started.

### Traffic Volumes

Figure 2-1 shows the observed traffic volumes and the October 2013 forecast traffic. Note that on this figure, the annual average daily traffic includes all traffic (non-revenue vehicles, overnight traffic, and weekend traffic) and is adjusted to exclude weekend bridge closures due to construction on SR 520.

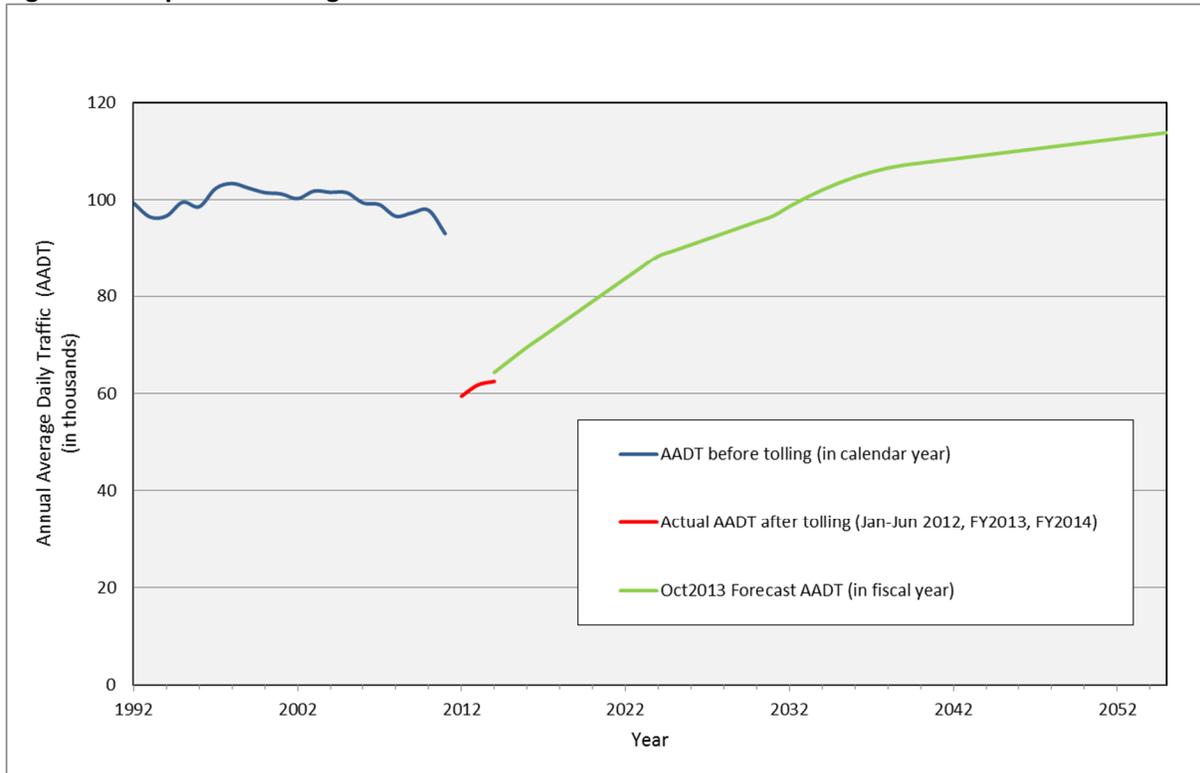
As illustrated by Figure 2-1, the overall average daily traffic on SR 520 dropped by about 36 percent when tolling began from 93,100 in 2011 to 59,500 in the first six months of 2012. The September 2011 forecast had anticipated a drop of about 44 percent. In FY 2013, the average daily traffic increased to 61,800 and in FY 2014 to 62,500 vehicles. The October 2013 forecast had anticipated a traffic volume of 64,400 vehicles for FY 2014.

Table 2-1 shows the average weekday traffic volumes on SR 520 and I-90 by fiscal year since tolling started.

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<sup>7</sup> A transaction is considered resolved when it has reached final disposition.

**Figure 2-1: Impacts of Tolling on Traffic**



**Table 2-1: Average Weekday Traffic – Comparison of SR 520 and I-90 Cross-lake Travel**

	FY 2012 <sup>1</sup>			FY 2013			FY 2014		
	SR 520	I-90	Total	SR 520	I-90	Total	SR 520	I-90	Total
July				67,354	154,823	222,177	69,652	147,914	217,567
August				70,345	158,094	228,439	70,415	146,661	217,077
September				69,182	151,469	220,651	69,702	145,412	215,114
October				68,681	153,143	221,824	69,413	144,330	213,743
November				66,696	149,314	216,010	68,558	139,700	208,257
December				64,426	146,471	210,898	65,495	135,520	201,015
January	58,835	146,655	205,490	66,450	148,890	215,341	68,415	139,462	207,878
February	65,461	154,936	220,397	70,239	151,755	221,993	67,379	139,364	206,743
March	67,672	155,698	223,370	73,735	155,179	228,914	69,651	143,504	213,155
April	66,321	156,352	222,673	67,166	144,425	211,591	70,927	144,281	215,209
May	69,875	156,965	226,840	71,557	147,212	218,768	73,718	148,106	221,824
June	71,118	159,038	230,157	71,384	149,061	220,445	72,818	153,133	225,951
<b>Jan-Jun Average</b>	<b>66,832</b>	<b>155,230</b>	<b>222,062</b>	<b>70,037</b>	<b>149,344</b>	<b>219,381</b>			
<b>Annual Average</b>				<b>68,938</b>	<b>150,864</b>	<b>219,802</b>	<b>69,693</b>	<b>143,991</b>	<b>213,683</b>
<b>Jan-Jun % Change</b>				<b>4.8%</b>	<b>-3.8%</b>	<b>-1.2%</b>			
<b>Annual % Change</b>							<b>1.1%</b>	<b>-4.6%</b>	<b>-2.8%</b>

1. January 2012 snow storms were removed

2. All major holidays falling on weekdays were removed

3. Data includes all traffic crossing the bridges. For SR 520, it includes non-revenue and overnight vehicles

Sources: WSDOT data and CDM Smith analysis

Weekday data shows the average weekday traffic volume on SR 520 increased by 4.8 percent in January-June 2013 compared to the same period in 2012. In FY 2014, the average weekday traffic on SR 520 increased by 1.1 percent compared to FY 2013. The average weekday traffic volume on the SR 520 bridge was 69,700 vehicles in FY 2014 compared to 68,900 vehicles in FY 2013.

I-90 is the main alternative route across Lake Washington. I-90 average weekday traffic fell by 3.8 percent in January-June 2013 compared to the same period in 2012, and by 4.6 percent in FY 2014 compared to FY 2013. The average weekday traffic volume on the I-90 bridge was 144,000 vehicles in FY 2014 compared to 150,900 vehicles in FY 2013.

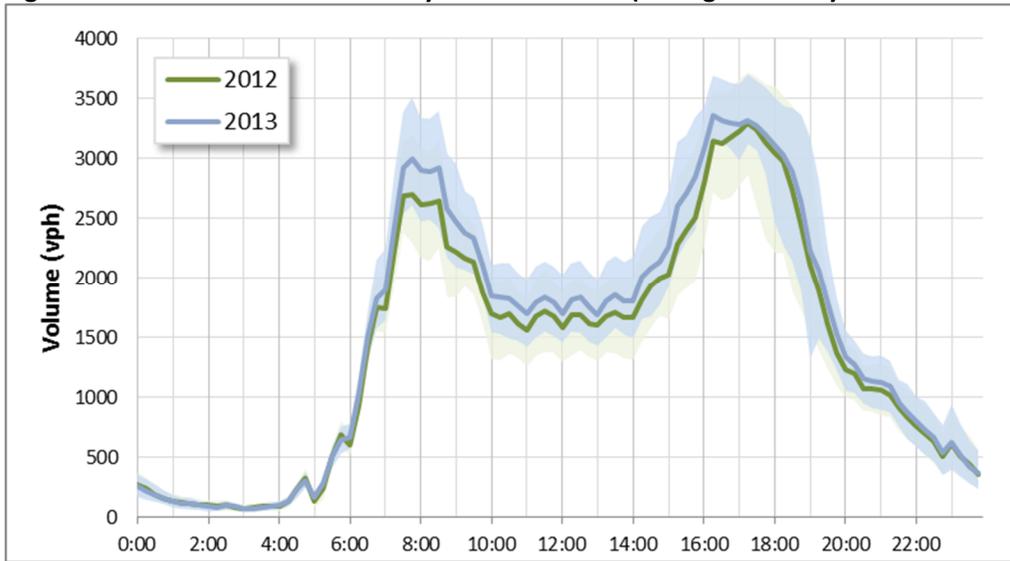
The average weekday cross lake traffic (combining SR 520 and I-90 traffic volumes) decreased by 1.2 percent in January-June 2013 compared to the same period in 2012, and by 2.8 percent in FY 2014 compared to FY 2013.

### Hourly Traffic Variations on Weekdays

For SR 520, Figures 2-2 and 2-3 show hourly variations of average weekday traffic volumes in calendar years 2013 and 2012, respectively for the westbound and eastbound direction. The figures show 2013 and 2012 annual averages, as well as typical range (10th to 90th percentiles) in both 2012 and 2013. It can be observed that in the eastbound direction of SR 520, the 2013 average hourly profile is almost identical to the 2012 profile. In the westbound direction of SR 520, 2013 average hourly volumes are slightly higher than 2012 values between 7:00 am and 6:00 pm.

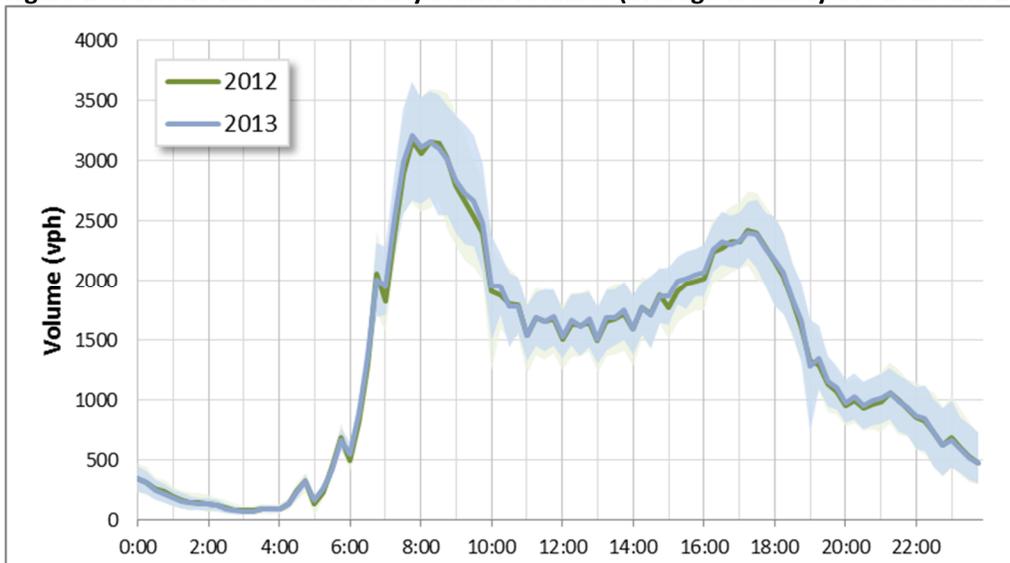
For I-90, Figures 2-4 and 2-5 show hourly variations of average weekday traffic volumes in calendar years 2013 and 2012, respectively for the westbound and eastbound direction. Again, the figures show 2013 and 2012 annual averages, as well as typical range (10th to 90th percentiles). On eastbound I-90, 2013 hourly traffic volumes were very similar to those observed in 2012, with a slight increase between 7:00 am and 9:00 am and again between 4:00 pm and 6:00 pm. Similarly, in the westbound direction, 2013 hourly traffic volumes were very close to the 2012 level, with a slight increase between 3:00 pm and 7:00 pm.

**Figure 2-2: SR 520 Westbound Hourly Traffic Volumes (average weekday CYs 2013 and 2012)**



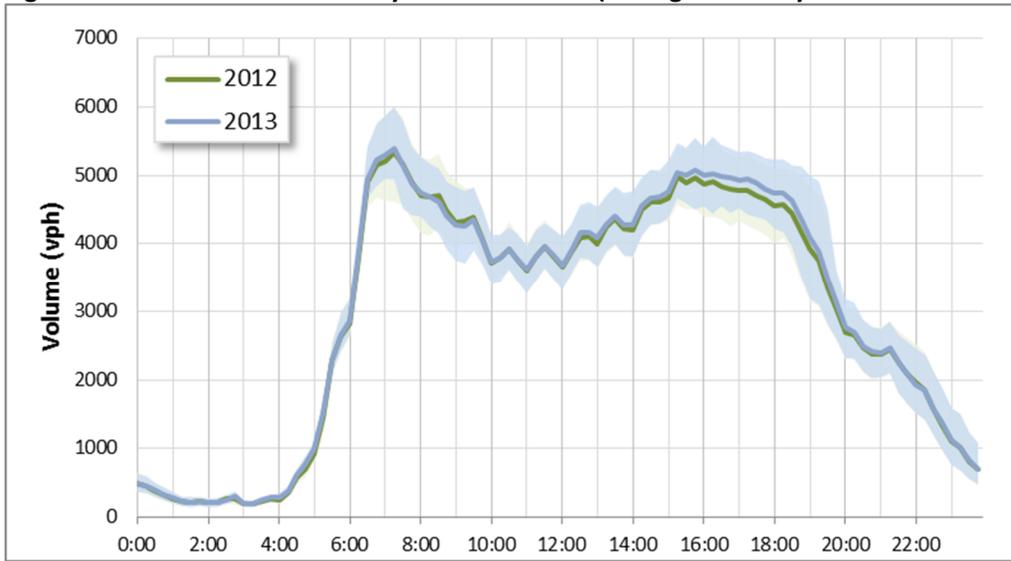
Source: WSDOT

**Figure 2-3: SR 520 Eastbound Hourly Traffic Volumes (average weekday CYs 2013 and 2012)**



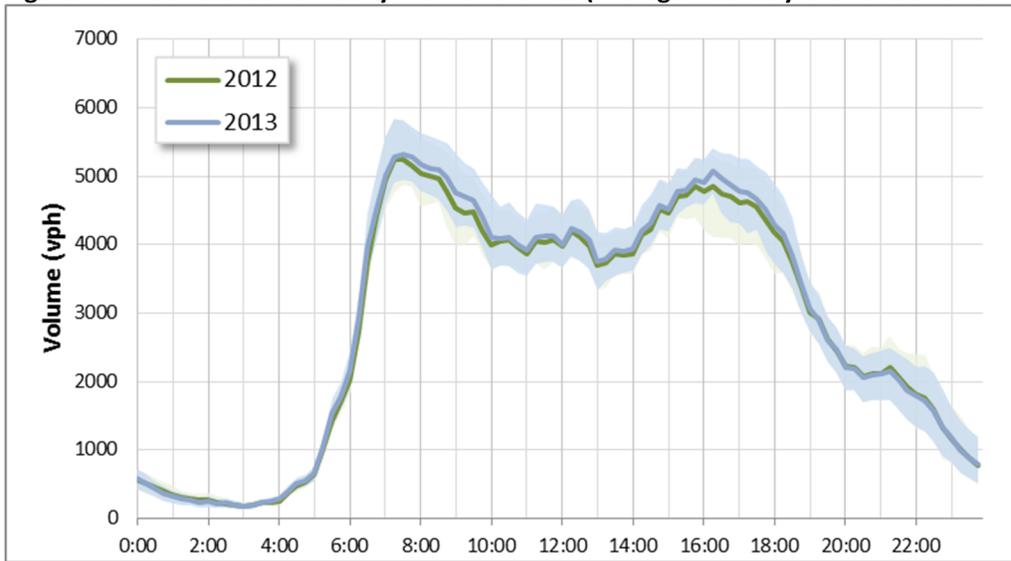
Source: WSDOT

**Figure 2-4: I-90 Westbound Hourly Traffic Volumes (average weekday CYs 2013 and 2012)**



Source: WSDOT

**Figure 2-5: I-90 Eastbound Hourly Traffic Volumes (average weekday CYs 2013 and 2012)**



Source: WSDOT

## Travel Times

Travel time information available for review came from WSDOT. The information is based on data from loop detectors (for SR 520 and I-90) and from license matching using video detection (for SR 522).

Table 2-2 summarizes the average travel time difference between 2013 and 2012 (full calendar years) as well as between 2014 and 2013 (first six months of calendar years), for the three routes across Lake Washington, and for the AM and PM peak periods.

On SR 520, the average travel times during peak periods have increased in CY 2013 and early CY 2014. Travel time differences vary significantly by direction and month. The more substantial travel time increases have been observed in CY 2013 during the PM peak, at about three minutes longer on average. During the AM peak, year-to-year average travel time increases were under one minute.

On I-90, average travel times during peak periods have been nearly stable (with changes of one minute or less), except for the westbound AM peak for which average travel times increased by two minutes in CY 2013.

On SR 522, average travel times were slower in CY 2013 compared with CY 2012, especially in the westbound direction (from Woodinville to Seattle). There is substantial variation in month-to-month travel time changes. In CY 2014, average travel times were close to the CY 2013 levels with a noticeable decrease in AM eastbound travel times.

**Table 2-2: Changes in Average Weekday Peak Period Travel Times**

Calendar Years		Redmond/Seattle via SR 520		Issaquah/Seattle via I-90		Woodinville/Seattle via SR 522	
		WB	EB	WB	EB	WB	EB
<b>AM Peak 7am-9am</b>							
2013 vs. 2012	minutes	0.8	0.4	1.8	-0.4	2.4	-1.0
	% change	(+4%)	(+3%)	(+7%)	(-2%)	(+7%)	(-4%)
2014 vs. 2013*	minutes	0.9	0.6	0.7	-0.1	0.6	-1.6
	% change	(+5%)	(+3%)	(+3%)	(-0%)	(+2%)	(-6%)
<b>PM Peak 3pm-6pm</b>							
2013 vs. 2012	minutes	3.2	2.9	-0.2	-1.0	1.2	1.6
	% change	(+12%)	(16%)	(-1%)	(-4%)	(+2%)	(+4%)
2014 vs. 2013*	minutes	2.2	0.2	1.0	-0.4	-0.4	-0.0
	% change	(+8%)	(+1%)	(+4%)	(-2%)	(-1%)	(-0%)

\*Based on January through June data

Source: WSDOT data and CDM Smith analysis

## Toll Transactions and Gross Toll Revenue Potential

The primary tolling data available for review from WSDOT are reports from transactions processed by the Customer Service Center (CSC). The dataset provided to CDM Smith on August 25, 2014 contains toll transaction information broken down by date, hour, class and type of toll transaction. The breakout of *Good To Go!* (GTG) account-based vs. Pay By Mail (PBM) proportions reflects the tracing of transactions from lane equipment through processing within the CSC. The dataset reflects any adjustments that occur such as a license plate read transaction later changed to Pay By Plate. The data is generally thought to be at a level appropriate to derive the actual gross toll revenue potential comparable to CDM Smith's forecasts.

For January 2014 through June 2014, the CSC dataset was not available.<sup>8</sup> Instead, the actual transactions were estimated based on WSDOT's data from the toll lane equipment system as reported in the Monthly Trips Reports (MTR). The MTR provides an aggregated summary of toll transactions. Transactions are subsequently processed and reconciled with toll accounts by the CSC. In order to provide a more reliable comparison with the forecast transactions and revenue, the number of transactions from the lane equipment system was adjusted based on the experience gained from analyzing the CY 2013 CSC dataset. Available information on the number of duplicate transactions was used to adjust the MTR results downward. The second adjustment focused on estimating and removing the likely amount of non-revenue transactions. Then, the number of post-CSC process transactions was estimated by applying a factor derived from the comparison of 2013 pre- and post-CSC processing. The resulting "estimated actual" number of monthly transactions is what is considered the best estimate at the date this report was produced; the values will be revised as more information becomes available and as the transactions are resolved.

### Transactions

Table 2-3 shows the actual number of transactions by month for the period from January 2012 through June 2014. Overall, transactions increased by 3.7 percent in FY 2014 compared to FY 2013. Note that the decrease in June's transactions is due to the very high number of bridge closures in June 2014 (only two weekend days were open that month).

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<sup>8</sup> To get an accurate estimate of transaction resolution, prior analysis has indicated the CSC data pull for a given period cannot start until 90 days after the end of the analysis period to give most of the transactions time to reach final status. Also, the analysis of the CSC data set takes many weeks after this 90 day period. In order to meet the timeframe for delivery of this forecast, it was necessary to estimate the CY 2014 results as described in the text above.

**Table 2-3: Monthly Actual Transactions**

Actual Transactions	FY 2012 <sup>1</sup>	FY 2013 <sup>1</sup>	% Change	FY 2014 <sup>1,2</sup>	% Change
July		1,634,862		1,714,340	4.9%
August		1,748,279		1,843,593	5.5%
September		1,605,673		1,672,627	4.2%
October		1,780,703		1,891,073	6.2%
November		1,595,208		1,698,416	6.5%
December	101,620	1,627,330		1,692,471	4.0%
January	1,275,306	1,697,451	33.1%	1,782,226	5.0%
February	1,505,263	1,537,817	2.2%	1,555,759	1.2%
March	1,667,299	1,794,438	7.6%	1,871,405	4.3%
April	1,579,205	1,651,778	4.6%	1,848,497	11.9%
May	1,800,544	1,843,724	2.4%	1,816,370	-1.5%
June	1,679,936	1,703,339	1.4%	1,572,796	-7.7%
<b>Annual Total</b>	<b>9,609,173</b>	<b>20,220,601</b>		<b>20,959,574</b>	<b>3.7%</b>

1. For data through December 2013, actuals are based on WSDOT processed transaction data provided to CDM Smith

2. For January-June 2014, actuals are based on WSDOT monthly lane equipment data adjusted by CDM Smith

Table 2-4 presents the difference between total annual forecast transactions and actual results available. Overall, the actual transactions exceeded the forecast by 1.1 percent in FY 2014.

**Table 2-4: FY 2014 Transactions vs. Forecast**

Transactions	Forecast <sup>1</sup>	Actuals <sup>2,3</sup>	Variance
Jul 2013-Dec 2013	10,376,000	10,512,520	1.3%
Jan 2014-Jun 2014	10,351,000	10,447,054	0.9%
<b>FY 2014</b>	<b>20,727,000</b>	<b>20,959,574</b>	<b>1.1%</b>

1. Based on CDM Smith October 2013 forecast

2. For CY 2013, actuals are based on WSDOT processed transaction data provided to CDM Smith

3. For CY 2014, actuals are based on WSDOT monthly lane equipment data adjusted by CDM Smith

## Gross Toll Revenue Potential

For purposes of this analysis, the gross toll revenue potential is defined as the revenue that would be collected if every vehicle crossing the bridge paid exactly the published toll rate based on time of crossing, vehicle class, payment method, and applicable exemptions. The gross toll revenue potential does not include any fee revenue (including pay by plate fees), short term account discounts, Notice of Civil Penalty fines, nor any amounts attributed to non-revenue vehicles.

Table 2-5 shows the actual gross toll revenue potential by month for the period from January 2012 through June 2014. Overall, the gross toll revenue potential increased by 5.4 percent in FY 2014 compared to FY 2013.

**Table 2-5: Monthly Actual Gross Toll Revenue Potential**

Actual Gross Toll Revenue Potential	FY 2012 <sup>1</sup>	FY 2013 <sup>1</sup>	% Change	FY 2014 <sup>1,2</sup>	% Change
July		\$4,976,772		\$5,359,491	7.7%
August		5,398,814		5,693,623	5.5%
September		4,836,775		5,149,693	6.5%
October		5,459,692		5,827,248	6.7%
November		4,853,751		5,138,744	5.9%
December	\$325,281	4,797,087		5,108,936	6.5%
January	3,753,917	5,138,969	36.9%	5,458,848	6.2%
February	4,462,654	4,686,538	5.0%	4,821,340	2.9%
March	4,887,942	5,364,149	9.7%	5,726,176	6.7%
April	4,596,628	5,075,045	10.4%	5,683,192	12.0%
May	5,172,209	5,574,437	7.8%	5,598,529	0.4%
June	4,857,006	5,139,682	5.8%	5,023,328	-2.3%
<b>Annual Total</b>	<b>\$28,055,637</b>	<b>\$61,301,711</b>		<b>\$64,589,147</b>	<b>5.4%</b>

1. For data through December 2013, actuals are based on WSDOT toll revenue data

2. For January-June 2014, actuals are based on preliminary financial reporting system results and adjustments

Table 2-6 presents the difference between total annual forecast revenue potential and actual results available. The revenue potential reflects the toll rate increase implemented on July 1, 2013. Overall, the actual gross toll revenue potential for FY 2014 was very close to the forecast, within 0.1 percent.

**Table 2-6: FY 2014 Gross Toll Revenue Potential vs. Forecast**

Gross Toll Revenue Potential	Forecast <sup>1</sup>	Actuals <sup>2,3</sup>	Variance
Jul 2013-Dec 2013	\$32,320,000	\$32,277,734	-0.1%
Jan 2014-Jun 2014	\$32,336,000	\$32,311,413	-0.1%
<b>FY 2014</b>	<b>\$64,656,000</b>	<b>\$64,589,147</b>	<b>-0.1%</b>

1. Based on CDM Smith October 2013 forecast

2. For CY 2013, actuals are based on WSDOT toll revenue data.

3. For CY 2014, actuals are based on preliminary financial reporting system results and adjustments

## Payment Share

Table 2-7 presents the breakout of CY 2013 transactions and gross toll revenue potential by payment type, based on the CSC-processed transactions. In this table, the Pay By Mail category includes transactions in-process, billed, and paid. The un-billable category includes unreadable transponder/license plate, inability to identify owner, and dismissals for business rules.

The proportion of *Good To Go!* (i.e., account-based) transactions was 84 percent for calendar year 2013, with 69 percent of the transactions using a transponder and 15 percent using the Pay By Plate payment option.

The proportion of actual account-based transactions vs. Pay By Mail in CY 2013 (84 percent) was higher than projected (80 percent for FY 2013 and 82 percent for FY 2014). The higher proportion of account-based transactions than forecasted (which have a lower revenue per transaction than Pay By Mail transactions) partially explains why actual transactions are slightly higher than forecast while gross toll revenue potential is very close to forecast.

**Table 2-7: CY 2013 Actual Method of Payment**

Payment Type	Transactions		Gross Toll Revenue Potential	
	Total	Proportion	Total	Proportion
<i>Good To Go!</i> – Transponder	14,276,131	69%	\$40,309,838	64%
<i>Good To Go!</i> – Pay By Plate	3,198,366	15%	\$8,761,937	14%
Pay By Mail <sup>1</sup>	2,236,045	11%	\$9,381,830	15%
NOCP Tolls	556,601	3%	\$2,384,728	4%
Un-billable <sup>2</sup>	476,702	2%	\$2,103,970	3%
<b>Total CY 2013</b>	<b>20,743,845</b>	<b>100%</b>	<b>\$62,942,304</b>	<b>100%</b>

1. Includes transactions in process, billed, and paid

2. Unbillable includes unreadable transponder/license plate, inability to identify owner, and business rule dismissals

Source: WSDOT toll transaction data provided to CDM Smith on 8/25/14

Table 2-8 shows how the share of payment type has evolved over time. Ever since tolling started, there has been a continuous increase in the share of account-based *Good To Go!* transactions. Among account-based transactions, Pay By Plate transactions have substantially increased, going from 14 percent of all transactions in FY 2013 to 16.5 percent in FY 2014. On the other hand, the share of *Good To Go!* transponder transactions has generally decreased over time. In terms of number of transactions, the transponder transactions have generally increased modestly, the Pay By Plate transactions have increased more rapidly, and the Pay By Mail transactions have slightly decreased.

**Table 2-8: Trends in Actual Method of Payment**

Share of Transactions <sup>1,2</sup>	<i>Good To Go!</i>		PBM
	Transponder	PBP	
Jan-Jun 2012	71.2%	11.6%	17.2%
<b>FY 2012</b>	<b>71.2%</b>	<b>11.6%</b>	<b>17.2%</b>
Jul-Dec 2013	69.7%	13.1%	17.2%
Jan-Jun 2013	69.7%	14.8%	15.4%
<b>FY 2013</b>	<b>69.7%</b>	<b>14.0%</b>	<b>16.3%</b>
Jul-Dec 2013	67.9%	16.0%	16.1%
Jan-Jun 2014	67.8%	17.1%	15.1%
<b>FY 2014</b>	<b>67.9%</b>	<b>16.5%</b>	<b>15.6%</b>

1. For CYs 2012 and 2013, values are based on WSDOT toll transaction data provided to CDM Smith on May 20, 2013; July 9, 2013; and August 25, 2014. These values may slightly differ from reported values and do not represent a change in officially reported values. They are used for informing future forecasts only.

2. For CY 2014, values are based on preliminary financial reporting system results and adjustments

## Average Weekday and Weekend Day Transactions

Table 2-9 shows a comparison of observed average weekday and average weekend day transactions to the forecast. Adjustments were made to account for bridge closure weekends and major holidays (when WSDOT charged weekend toll rates) to provide comparable data. For FY 2014, weekday transactions were running 1.2 percent above forecasts, while weekend transactions were running 3.6 percent below forecasts.

**Table 2-9: FY 2014 Average Weekday and Average Weekend Transactions vs. Forecast**

Average Daily Transactions	Forecast <sup>1</sup>	Actuals <sup>2,3</sup>	Variance
<b>Weekdays<sup>4</sup></b>			
Jul 2013-Dec 2013	65,904	66,294	0.6%
Jan 2014-Jun 2014	67,245	68,512	1.9%
<b>FY 2014</b>	<b>66,572</b>	<b>67,398</b>	<b>1.2%</b>
<b>Weekend Days<sup>5,6</sup></b>			
Jul 2013-Dec 2013	40,422	38,485	-4.8%
Jan 2014-Jun 2014	41,158	40,269	-2.2%
<b>FY 2014</b>	<b>40,774</b>	<b>39,296</b>	<b>-3.6%</b>

1. Based on CDM Smith October 2013 forecast

2. For CY 2013, actuals are based on WSDOT toll transaction data

3. For CY 2014, actuals are based on WSDOT monthly lane equipment data adjusted by CDM Smith

4. Does not include holidays on weekdays

5. Toll periods when the facility was closed are not included in forecast and actuals

6. Includes holidays on weekdays (weekend rates)

Table 2-10 shows how the average weekday and weekend transactions have evolved over time. Average weekday transactions have increased by 2.9 percent in FY 2013, and by 3.4 percent in FY 2014. Average weekend transactions have followed a similar pattern, increasing by 3.3 percent in FY 2013 and 3.0 percent in FY 2014.

**Table 2-10: Trends in Actual Average Weekday and Average Weekend Transactions**

Average Daily Transactions	Weekday	Weekend
Jan-Jun 2012	63,303	36,920
<b>FY 2012</b>	<b>63,303</b>	<b>36,920</b>
Jul-Dec 2012	64,616	37,469
Jan Jun 2013	65,715	38,802
<b>FY 2013</b>	<b>65,165</b>	<b>38,142</b>
Jul-Dec 2013	66,294	38,485
Jan-Jun 2014 <sup>1</sup>	68,512	40,269
<b>FY 2014<sup>1</sup></b>	<b>67,398</b>	<b>39,296</b>

1. Based on preliminary data

## Transactions by Time Period

Observed transactions by time period for average weekdays in CY 2013 were examined and compared to forecasts. The time periods used in this analysis correspond to the time periods of the toll rates (which are different on weekdays and weekends). Table 2-11 shows the number of actual transactions per weekday toll period, the payment method proportion, and the share of transactions by time period (observed versus assumed in the October 2013 forecast).

The share of *Good To Go!* transactions tend to be higher during the morning commute peak period, with a ratio of 90 percent or more between 5:00 am and 9:00 am. The share of weekday transactions by toll period in CY 2013 has followed the IG forecast amounts very closely.

**Table 2-11: CY 2013 Average Weekday Toll Period Transactions and Payment Shares**

Toll Period	Actual Transactions	<i>Good To Go!</i> <sup>1</sup> (% of Txns)	Pay By Mail <sup>2</sup> (% of Txns)	2013 Observed % of Day <sup>3</sup>	2013 IG Forecast % of Day <sup>4</sup>
05:00-05:59	745	90%	10%	1%	1%
06:00-06:59	2,378	91%	9%	4%	4%
07:00-08:59	11,158	90%	10%	17%	16%
09:00-09:59	5,039	88%	12%	8%	7%
10:00-13:59	13,924	82%	18%	21%	22%
14:00-14:59	3,709	82%	18%	6%	6%
15:00-17:59	15,566	85%	15%	24%	24%
18:00-18:59	4,817	86%	14%	7%	7%
19:00-20:59	5,253	84%	16%	8%	8%
21:00-22:59	3,415	82%	18%	5%	5%
<b>Total</b>	<b>66,006</b>	<b>86%</b>	<b>14%</b>	<b>100%</b>	<b>100%</b>

1. Includes Pay By Plate and transponders

2. Includes NOCP Toll and leakage

3. Observed proportion of CY 2013 transactions by time period

4. Proportion of transactions by time period in the October 2013 forecast

Source: WSDOT toll transaction data provided to CDM Smith on 8/25/14, CDM Smith October 2013 forecast

## Vehicle Classification

Table 2-12 indicates how the FY 2014 observed proportion of trucks compared to the forecast, in terms of share of transactions and share of gross toll revenue potential.

The table shows that the observed truck percentage in the toll transactions is lower than what was assumed in the forecast. This difference in the share of transactions (between actuals and forecast) produces an even higher difference in the share of gross toll revenue potential, due to the fact that trucks pay higher toll rates.

**Table 2-12: FY 2014 Truck Percentages – Actuals vs. Forecast**

Trucks	Forecast <sup>1</sup>	Actuals <sup>2,3</sup>	Difference
<b>Truck Share of Transactions<sup>4</sup></b>			
Jul 2013-Dec 2013	1.1%	0.7%	-0.4%
Jan 2014-Jun 2014	1.1%	0.8%	-0.3%
<b>FY 2014</b>	<b>1.1%</b>	<b>0.7%</b>	<b>-0.4%</b>
<b>Truck Share of Potential Revenue<sup>4</sup></b>			
Jul 2013-Dec 2013	2.3%	1.3%	-1.0%
Jan 2014-Jun 2014	2.3%	1.5%	-0.8%
<b>FY 2014</b>	<b>2.3%</b>	<b>1.4%</b>	<b>-0.9%</b>

1. Based on CDM Smith October 2013 forecast

2. For Jul-Dec 2013, actuals are based on WSDOT toll transaction data

3. For Jan-Jun 2014, actuals are based on WSDOT monthly lane equipment data adjusted by CDM Smith

4. Trucks defined as three or more axles

Table 2-13 shows how the truck share of transactions and the truck share of gross toll revenue potential have evolved over time. The proportion of trucks among toll transactions started at a very low level (around 1.0 percent) and decreased by the beginning of CY 2013, but has been stable since. The contribution of trucks to overall gross revenue follows the same pattern.

**Table 2-13: Trends in Actual Truck Shares**

Trucks	Truck Share of Transactions	Truck Share of Revenue
Jan-Jun 2012	1.0%	2.2%
<b>FY 2012</b>	<b>1.0%</b>	<b>2.2%</b>
Jul-Dec 2012	1.0%	1.9%
Jan-Jun 2013	0.7%	1.5%
<b>FY 2013</b>	<b>0.8%</b>	<b>1.7%</b>
Jul-Dec 2013	0.7%	1.3%
Jan-Jun 2014 <sup>1</sup>	0.8%	1.5%
<b>FY 2014<sup>1</sup></b>	<b>0.7%</b>	<b>1.4%</b>

1. Based on preliminary data

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## Chapter 3

# Economic Growth Analysis

Economic growth is an important factor in evaluating the expected revenue from a toll facility. CDM Smith retained Community Attributes Inc. (CAI) to provide an updated independent economic forecast. CAI provided the economic forecasts used in the September 2011 and October 2013 traffic and revenue investment grade forecasts.

Future levels of population and employment in the bridge market area are important because they are an indication of cross-lake travel demand as well as a determinant of highway congestion levels influencing the attractiveness of alternatives to the SR 520 bridge. The CDM Smith team developed independent economic forecasts of population and employment based on estimates of current socioeconomic variables and forecasts of future socioeconomic activity. The forecasts were developed for the Seattle metropolitan planning region which includes King, Snohomish, Pierce, and Kitsap counties. These forecasts were updated in October 2014 to reflect current economic conditions, updated regional forecasts, projected development in Seattle and Eastside King County communities, and current market conditions, such as office occupancy rates and housing unit absorption trends.

The updated economic forecasts are compared to economic forecasts used in the October 2013 traffic and revenue forecast.

## Methodology

CAI provided updated socioeconomic forecasts for use in the revised toll revenue forecast. The update benefited from newly released population and employment data from Washington State Office of Financial Management (OFM), the Puget Sound Regional Council (PSRC), and the U.S. Bureau of Labor Statistics.

The analysis followed methods similar to those used for the October 2013 forecast. The approach included reviewing current estimates and forecasts of socioeconomic measures for the overall region and employment sectors, and sub-regional differences in estimated population and employment growth. From this, a Baseline Scenario for regional growth was developed covering the Central Puget Sound Region. Then, utilizing this baseline information along with other adjustments, such as estimates of new building growth absorption, detailed estimates and forecasts at a finer geographic scale were developed. This finer geographic scale was compatible with the main regional travel demand model from PSRC and the tolling analysis model developed for this study.

The methodology leveraged existing regional and national resources, along with primary data gathered expressly for this analysis, such as real estate development pipeline and market data.

Population baseline data were collected from the Washington State Office of Financial Management, which provides Census-based estimates of population and households at the Traffic Analysis Zone (TAZ) level for the year 2013. In addition to these 2013 base estimates, PSRC's 2012 population estimates provide the most recent data available for income-based population distributions. PSRC data also provides estimates of the percent of population residing in multi-family dwellings. CAI's analysis used these PSRC estimates.

Employment baseline data were drawn from PSRC employment estimates at the TAZ level and total sector-based employment at the forecast analysis zone (FAZ) level. The PSRC's estimates include total employment for year 2012, thus capturing both covered employment—the vast majority of workers—and the self-employed.

The population forecasts relied heavily on Conway-Pedersen regional forecasts through 2024 published in June 2014, which cover the entire four-county region. Conway Pedersen reports are widely recognized to be one of the best regional forecasts in the greater Seattle area and have been relied on for many years. For the years 2020 to 2040, CAI employed trend line analysis based on historic estimates and Conway Pedersen forecasts to arrive at estimates for 2030 and 2040.

Employment forecasts by macro-sector were made based on a combination of PSRC and Conway Pedersen region and county-based forecasts. Once allocated to TAZs, additional development pipeline information was used to further refine the forecast. The resulting population and employment data by forecast years are used as direct input to the traffic forecasting process.

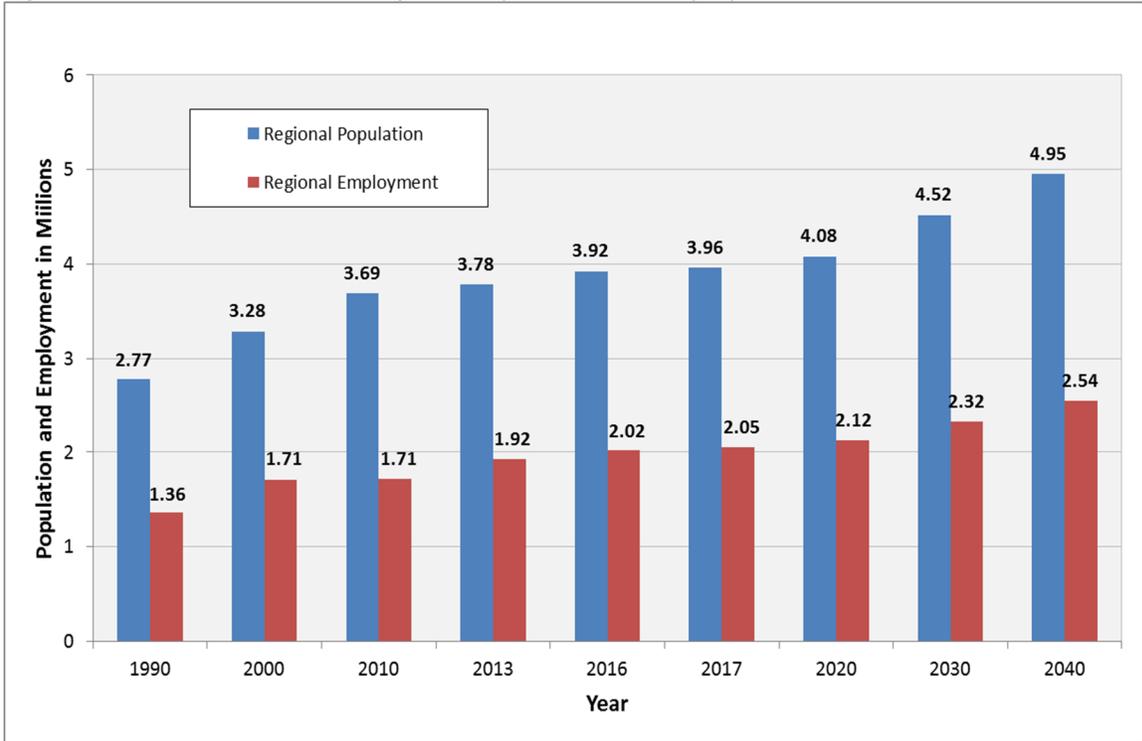
## Regional Population and Employment Baseline Forecasts

The baseline scenario relies on countywide forecasts of population and employment and region-wide employment estimates by sector from Conway Pedersen Economics. Conway Pedersen's published forecasts run through 2024. Trend line analysis of implicit growth rates from these estimates was used to arrive at county and sector forecast totals for 2030 and 2040.

Baseline population in the Central Puget Sound Region is expected to grow steadily from 3.7 million people in 2010 to almost 5 million by 2040, a compounded annual growth rate of 1.0 percent. Annual regional population growth is anticipated to be 1.2 percent from 2013 through 2016, then to slightly decrease to 1.0 percent through 2030. Figure 3-1 shows the population forecast, and Figure 3-2 shows the corresponding average annual changes.

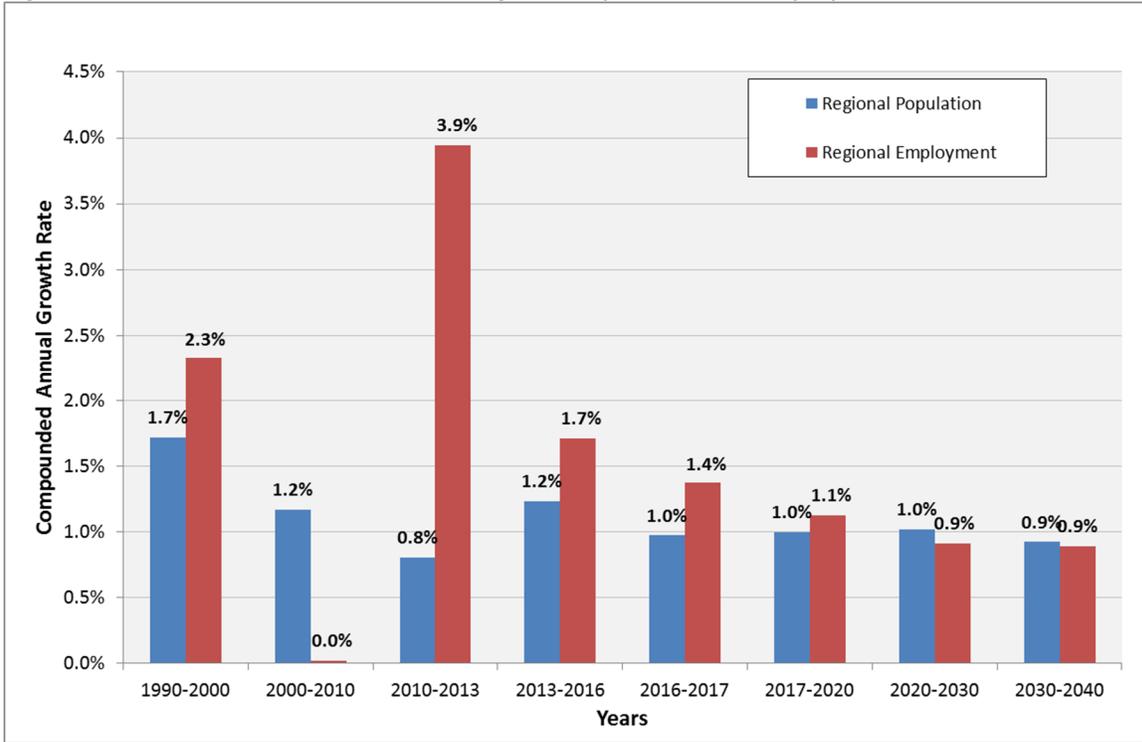
Regional employment is expected to grow from 1.7 million jobs in 2010 to 2.5 million in 2040, a compounded annual growth rate of 1.3 percent. Annual regional employment growth is anticipated to be 1.7 percent from 2013 through 2016, then decline to 1.4 percent from 2016 to 2017, and then decline to 1.1 percent from 2017 to 2020. Beyond 2020, the annual employment growth rate is anticipated to be steady at 0.9 percent. Figure 3-1 shows the employment forecast, and Figure 3-2 shows the corresponding average annual changes (compounded annual growth rate).

**Figure 3-1: 1990-2040 Baseline Regional Population and Employment**



Source: Conway Pedersen Economics, Community Attributes Inc., 2014

**Figure 3-2: 1990-2040 CAGR of Baseline Regional Population and Employment**



Source: Conway Pedersen Economics, Community Attributes Inc., 2014

## Traffic Analysis Zone (TAZ) Level

The unit of analysis and projection in this study are Traffic Analysis Zones (TAZ). TAZ sizes range from a fraction of a square mile to several square miles based on the development density. Forecasts by TAZ are developed by allocation of the countywide forecasts. The allocations utilize core information from PSRC and data analyzed regarding real estate conditions (occupancy rates), development pipeline projections provided by private vendors and municipalities along the corridor, and economic events reported in local media such as Amazon.com-related construction in South Lake Union and development plans for the Bel-Red Road area in Bellevue.

An important difference compared with earlier studies is PSRC's adoption in 2013 of a new method for allocating its macroeconomic forecast by TAZ. The PSRC 2014 forecast (as well as the 2013 PSRC forecast) utilizes a capacity-constraint model for estimating TAZ-level distributions. The UrbanSim model uses parcel data to determine where projected growth may occur, bringing a higher degree of precision over previous PSRC TAZ-level estimates.

The near term projections were mainly driven by the Conway Pederson forecast through 2024. Average annual growth rates were calculated from this forecast and applied on a county-wide basis to baseline data. To arrive at TAZ-level estimates, PSRC TAZ-level distributions were applied to the Conway Pedersen county control totals. Growth forecasts by economic sector were integrated with real-estate development pipeline and absorption calculations and pertinent local economic news. Beyond 2020, trend line analysis was employed based on historic and Conway Pedersen forecast estimates to derive 2030 and 2040 estimates.

## Near-Term Forecasts in Areas of Interest

Growth within the Central Puget Sound Region is not expected to be uniform, and the baseline forecast shows variations among the cities and neighborhoods that make up the area. Table 3-1 shows the near-term population and employment forecast by subareas, focusing on King County and the cities of Seattle, Bellevue, Kirkland and Redmond.

King County population is expected to grow at a slower pace than the region during the 2013 to 2020 period, and to account for 41 percent of the regional population growth. The annual population growth in Seattle is forecasted to be 1.3 percent, similar to annual growth rates expected on the Eastside (varying between 1.2 and 1.5 percent). Overall, the cities of Seattle, Bellevue, Kirkland and Redmond are expected to account for 67 percent of the population growth in King County population over the 2013-2020 period.

King County is expected to outpace regional employment growth over the 2013 to 2020 period, and to account for 73 percent of the regional employment growth. The annual employment growth in Seattle is forecasted to be 2.6 percent; on the Eastside, Bellevue and Redmond are expected to grow at a higher rate of respectively 2.7 and 3.1 percent, while the expected growth rate in Kirkland is lower at 0.9 percent. Overall, the cities of Seattle, Bellevue, Kirkland and Redmond are expected to generate more jobs than the County as a whole over the period 2013 to 2020, meaning that the rest of the county is expected to experience a net decline in employment.

**Table 3-1: Near-term Population and Employment Forecasts in Areas of Interest**

	2013	2016	2017	2020	2013-2020 CAGR <sup>1</sup>
<b>Population</b>					
<b>Four Major Cities</b>	<b>871,800</b>	<b>919,200</b>	<b>928,900</b>	<b>955,200</b>	<b>1.3%</b>
Seattle	626,500	663,600	671,000	686,900	1.3%
Bellevue	128,200	132,600	133,700	140,000	1.3%
Kirkland	51,800	54,400	55,100	57,400	1.5%
Redmond	65,300	68,600	69,100	70,900	1.2%
<b>King County</b>	<b>1,981,800</b>	<b>2,037,700</b>	<b>2,054,200</b>	<b>2,106,200</b>	<b>0.9%</b>
<b>Region</b>	<b>3,780,900</b>	<b>3,922,500</b>	<b>3,960,700</b>	<b>4,080,700</b>	<b>1.1%</b>
<b>Employment</b>					
<b>Four Major Cities</b>	<b>764,100</b>	<b>833,000</b>	<b>853,100</b>	<b>916,500</b>	<b>2.6%</b>
Seattle	520,800	563,400	577,900	625,000	2.6%
Bellevue	121,200	134,900	138,200	146,200	2.7%
Kirkland	35,300	36,900	36,900	37,600	0.9%
Redmond	86,800	97,800	100,100	107,700	3.1%
<b>King County</b>	<b>1,237,500</b>	<b>1,316,900</b>	<b>1,335,800</b>	<b>1,382,300</b>	<b>1.6%</b>
<b>Region</b>	<b>1,922,100</b>	<b>2,022,400</b>	<b>2,050,200</b>	<b>2,120,200</b>	<b>1.4%</b>

1. Compounded annual growth rate

Source: Community Attributes Inc., 2014

## Comparison with October 2013 Socioeconomic Forecasts

Comparison of the region and King County compound annual growth rates with the 2013 forecast are presented in Tables 3-2 and 3-4, respectively for population and employment. Comparison of the subarea forecasts with the 2013 forecasts are presented in Tables 3-3 and 3-5, respectively for population and employment. In both population and employment forecasts, differences with the prior forecast can be explained primarily by three important changes:

1. The new forecasts include an adjustment in the 2013 base year estimate compared with previous forecasts
2. Updates to the PSRC's UrbanSim model for TAZ-based allocations, which are reflected in the PSRC 2014 forecasts by TAZ
3. New developments, either underway or planned have shifted more growth to Seattle over the forecast period, especially in the Central Business District. These new projects in Seattle's CBD, which includes South Lake Union, in large part reflect real estate demand and growth from Amazon, among other factors.

Tables 3-2 and 3-3 show the October 2013 and revised population forecast for the SR 520 corridor. Overall, when compared to the prior economic forecast, the population forecasts were adjusted upwards for King County and downwards for the region as a whole. However, the overall population growth rates remain essentially the same for the region and increase slightly for King County. Within King County, the total population forecast among the four major cities along the SR 520 corridor

(Seattle, Kirkland, Bellevue, and Redmond) has been adjusted upwards along with forecasted higher growth rates, primarily driven by more growth expected in Seattle and to a lesser extent in Bellevue.

**Table 3-2: Comparison of Compound Annual Growth Rates for Population**

Population CAGR	2013-2016	2016-2020	2020-2030	2030-2040
<b>Region</b>				
2014 Updated Forecast	1.2%	1.0%	1.0%	0.9%
2013 Forecast	1.2%	1.0%	1.0%	0.9%
<b>King County</b>				
2014 Updated Forecast	0.9%	0.8%	0.9%	0.8%
2013 Forecast	0.8%	0.7%	0.9%	0.8%

Source: Community Attributes Inc., 2014

Table 3-3: Population Forecast – Comparison with October 2013 Forecast

	2013	2016	2017	2020	2030	2040
<b>2014 Updated Forecast</b>						
<b>Four Major Cities</b>	<b>871,800</b>	<b>919,200</b>	<b>928,900</b>	<b>955,200</b>	<b>1,032,800</b>	<b>1,096,900</b>
<i>Seattle</i>	626,500	663,600	671,000	686,900	731,400	770,100
<i>Bellevue</i>	128,200	132,600	133,700	140,000	161,200	171,100
<i>Kirkland</i>	51,800	54,400	55,100	57,400	60,500	65,200
<i>Redmond</i>	65,300	68,600	69,100	70,900	79,700	90,500
<b>King County</b>	<b>1,981,800</b>	<b>2,037,700</b>	<b>2,054,200</b>	<b>2,106,200</b>	<b>2,311,000</b>	<b>2,512,400</b>
<b>Region</b>	<b>3,780,900</b>	<b>3,922,500</b>	<b>3,960,700</b>	<b>4,080,700</b>	<b>4,517,100</b>	<b>4,951,900</b>
<b>2013 Forecast</b>						
<b>Four Major Cities</b>	<b>874,300</b>	<b>894,100</b>	<b>899,300</b>	<b>914,400</b>	<b>980,500</b>	<b>1,036,500</b>
<i>Seattle</i>	618,900	630,500	633,300	640,700	676,700	704,800
<i>Bellevue</i>	127,800	131,300	132,100	136,000	153,400	166,500
<i>Kirkland</i>	52,700	54,300	55,600	56,700	60,000	66,200
<i>Redmond</i>	74,900	78,000	78,300	81,000	90,400	99,000
<b>King County</b>	<b>1,979,600</b>	<b>2,029,400</b>	<b>2,044,600</b>	<b>2,090,300</b>	<b>2,291,800</b>	<b>2,485,800</b>
<b>Region</b>	<b>3,828,100</b>	<b>3,971,000</b>	<b>4,012,500</b>	<b>4,137,300</b>	<b>4,586,400</b>	<b>5,033,100</b>
<b>Absolute Difference</b>						
<b>Four Major Cities</b>	<b>(2,500)</b>	<b>25,100</b>	<b>29,600</b>	<b>40,800</b>	<b>52,300</b>	<b>60,400</b>
<i>Seattle</i>	7,600	33,100	37,700	46,200	54,700	65,300
<i>Bellevue</i>	400	1,300	1,600	4,000	7,800	4,600
<i>Kirkland</i>	(900)	100	(500)	700	500	(1,000)
<i>Redmond</i>	(9,600)	(9,400)	(9,200)	(10,100)	(10,700)	(8,500)
<b>King County</b>	<b>2,200</b>	<b>8,300</b>	<b>9,600</b>	<b>15,900</b>	<b>19,200</b>	<b>26,600</b>
<b>Region</b>	<b>(47,200)</b>	<b>(48,500)</b>	<b>(51,800)</b>	<b>(56,600)</b>	<b>(69,300)</b>	<b>(81,200)</b>
<b>Percentage Difference</b>						
<b>Four Major Cities</b>	<b>-0.3%</b>	<b>2.8%</b>	<b>3.3%</b>	<b>4.5%</b>	<b>5.3%</b>	<b>5.8%</b>
<i>Seattle</i>	1.2%	5.2%	6.0%	7.2%	8.1%	9.3%
<i>Bellevue</i>	0.3%	1.0%	1.2%	2.9%	5.1%	2.8%
<i>Kirkland</i>	-1.7%	0.2%	-0.9%	1.2%	0.8%	-1.5%
<i>Redmond</i>	-12.8%	-12.1%	-11.7%	-12.5%	-11.8%	-8.6%
<b>King County</b>	<b>0.1%</b>	<b>0.4%</b>	<b>0.5%</b>	<b>0.8%</b>	<b>0.8%</b>	<b>1.1%</b>
<b>Region</b>	<b>-1.2%</b>	<b>-1.2%</b>	<b>-1.3%</b>	<b>-1.4%</b>	<b>-1.5%</b>	<b>-1.6%</b>

Source: Community Attributes Inc., 2014

Tables 3-4 and 3-5 show the October 2013 and revised employment forecast for the SR 520 corridor. For employment, King County performs about the same as expected in the prior forecast (slightly better in the short term and slightly worse in the long term), and the region's jobs were adjusted upwards particularly in the short term. Regional growth rates are lower through 2020, while King County growth rates are only slightly lower in the immediate future, but reflect the regional growth rates 2016 to 2020. From 2020-2040, regional and King County employment growth rates are very similar to the October 2013 forecast. On a subarea basis, Seattle and Kirkland are now expected to have more total employment in the short term, Bellevue a little worse, and Redmond about the same. Growth rates are expected to be stronger in the four cities near term, with Seattle and Redmond leading the group. Longer term growth rates are slightly better for the four cities and slightly worse for the other parts of King County. The additional growth in Seattle results from more forecast jobs assigned to the Seattle CBD due to increased project development pipeline, especially in Denny Triangle and South Lake Union, e.g., Amazon. For the overall SR 520 corridor (four cities), employment is now expected to be higher by about 2.1 percent in 2016, 4.6 percent in 2020, and 3.1 percent in 2040 compared to the previous forecast.

**Table 3-4: Comparison of Compound Annual Growth Rates for Employment**

Population CAGR	2013-2016	2016-2020	2020-2030	2030-2040
<b>Region</b>				
2014 Updated Forecast	1.7%	1.2%	0.9%	0.9%
2013 Forecast	2.2%	1.6%	1.0%	1.0%
<b>King County</b>				
2014 Updated Forecast	2.1%	1.2%	0.9%	0.9%
2013 Forecast	2.2%	1.6%	0.9%	1.0%

Source: Community Attributes Inc., 2014

Table 3-5: Employment Forecast – Comparison with October 2013 Forecast

	2013	2016	2017	2020	2030	2040
<b>2014 Updated Forecast</b>						
<b>Four Major Cities</b>	<b>764,100</b>	<b>833,000</b>	<b>853,100</b>	<b>916,500</b>	<b>994,800</b>	<b>1,074,600</b>
Seattle	520,800	563,400	577,900	625,000	674,900	702,200
Bellevue	121,200	134,900	138,200	146,200	167,800	188,100
Kirkland	35,300	36,900	36,900	37,600	40,300	50,400
Redmond	86,800	97,800	100,100	107,700	111,800	133,900
<b>King County</b>	<b>1,237,500</b>	<b>1,316,900</b>	<b>1,335,800</b>	<b>1,382,300</b>	<b>1,504,700</b>	<b>1,643,700</b>
<b>Region</b>	<b>1,922,100</b>	<b>2,022,400</b>	<b>2,050,200</b>	<b>2,120,200</b>	<b>2,321,200</b>	<b>2,537,000</b>
<b>2013 Forecast</b>						
<b>Four Major Cities</b>	<b>759,800</b>	<b>816,200</b>	<b>826,500</b>	<b>875,900</b>	<b>964,300</b>	<b>1,042,000</b>
Seattle	511,800	547,100	549,600	591,200	643,300	688,100
Bellevue	126,000	137,700	142,700	143,400	165,300	182,100
Kirkland	32,500	34,900	36,600	39,200	40,400	48,000
Redmond	89,500	96,500	97,600	102,100	115,300	123,800
<b>King County</b>	<b>1,221,900</b>	<b>1,305,300</b>	<b>1,329,100</b>	<b>1,389,900</b>	<b>1,523,700</b>	<b>1,676,800</b>
<b>Region</b>	<b>1,828,900</b>	<b>1,950,200</b>	<b>1,985,100</b>	<b>2,075,300</b>	<b>2,293,500</b>	<b>2,533,700</b>
<b>Absolute Difference</b>						
<b>Four Major Cities</b>	<b>4,300</b>	<b>16,800</b>	<b>26,600</b>	<b>40,600</b>	<b>30,500</b>	<b>32,600</b>
Seattle	9,000	16,300	28,300	33,800	31,600	14,100
Bellevue	(4,800)	(2,800)	(4,500)	2,800	2,500	6,000
Kirkland	2,800	2,000	300	(1,600)	(100)	2,400
Redmond	(2,700)	1,300	2,500	5,600	(3,500)	10,100
<b>King County</b>	<b>15,600</b>	<b>11,600</b>	<b>6,700</b>	<b>(7,600)</b>	<b>(19,000)</b>	<b>(33,100)</b>
<b>Region</b>	<b>93,200</b>	<b>72,200</b>	<b>65,100</b>	<b>44,900</b>	<b>27,700</b>	<b>3,300</b>
<b>Percentage Difference</b>						
<b>Four Major Cities</b>	<b>0.6%</b>	<b>2.1%</b>	<b>3.2%</b>	<b>4.6%</b>	<b>3.2%</b>	<b>3.1%</b>
Seattle	1.8%	3.0%	5.1%	5.7%	4.9%	2.0%
Bellevue	-3.8%	-2.0%	-3.2%	2.0%	1.5%	3.3%
Kirkland	8.6%	5.7%	0.8%	-4.1%	-0.2%	5.0%
Redmond	-3.0%	1.3%	2.6%	5.5%	-3.0%	8.2%
<b>King County</b>	<b>1.3%</b>	<b>0.9%</b>	<b>0.5%</b>	<b>-0.5%</b>	<b>-1.2%</b>	<b>-2.0%</b>
<b>Region</b>	<b>5.1%</b>	<b>3.7%</b>	<b>3.3%</b>	<b>2.2%</b>	<b>1.2%</b>	<b>0.1%</b>

Source: Community Attributes Inc., 2014

## Downside Alternative Scenario

In order to provide input for sensitivity analysis of the transactions and revenue estimates, a downside alternative scenario forecast was also developed. It should be noted that the downside alternative scenario depicts a situation that is not likely to occur. The sources for population and employment forecasts in the baseline and downside alternative scenarios are as follows:

- **Baseline Scenario:** Conway Pedersen Economics control totals for population and employment
- **Downside Alternative Scenario:** Employment and population growth rates cut in half from the baseline scenario, except during periods when growth was negative (in which case negative growth remained unchanged).

The results of the baseline scenario and the downside alternative are summarized for the entire region in Tables 3-6 (regional population) and 3-7 (regional employment), and shown graphically in Figures 3-3 (regional population) and 3-4 (regional employment). These tables and figures also include the latest (as of October 2014) PSRC-based forecast as an additional comparison.

The downside regional forecast would result in regional population of 4,333,200 in 2040 versus a baseline forecast of 4,951,900 (12.5 percent lower than the baseline). Regional employment would be 2,185,300 in the downside scenario versus a baseline forecast of 2,537,000 jobs in 2040 (13.9 percent lower than baseline).

Note that this downside scenario is not considered likely but was considered for the purposes of sensitivity testing. Since both population and employment affect travel demand, the effect of lower population and/or employment growth is considered a downside risk for toll revenues. Lower growth rates and resulting lower travel demand was one of the risk factors evaluated in the sensitivity analysis presented in Chapter 7 of this report.

**Table 3-6: Comparison of Regional Population Forecasts**

	2013	2016	2017	2020	2030	2040
<b>Regional Population (millions)</b>						
PSRC 2014	3.78	3.93	3.98	4.12	4.50	4.97
Baseline Scenario (CAI 2013)	3.83	3.97	4.01	4.14	4.59	5.03
Downside Alternative (CAI 2014)	3.78	3.85	3.87	3.93	4.13	4.33
<b>Baseline Scenario (CAI 2014)</b>	<b>3.78</b>	<b>3.92</b>	<b>3.96</b>	<b>4.08</b>	<b>4.52</b>	<b>4.95</b>
<b>Percentage Difference from CAI 2014 Baseline</b>						
PSRC 2014	0.0%	0.1%	0.4%	1.0%	-0.4%	0.4%
Baseline Scenario (CAI 2013)	1.2%	1.2%	1.3%	1.4%	1.5%	1.6%
Downside Alternative (CAI 2014)	0.0%	-1.8%	-2.3%	-3.7%	-8.5%	-12.5%
<b>Baseline Scenario (CAI 2014)</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>

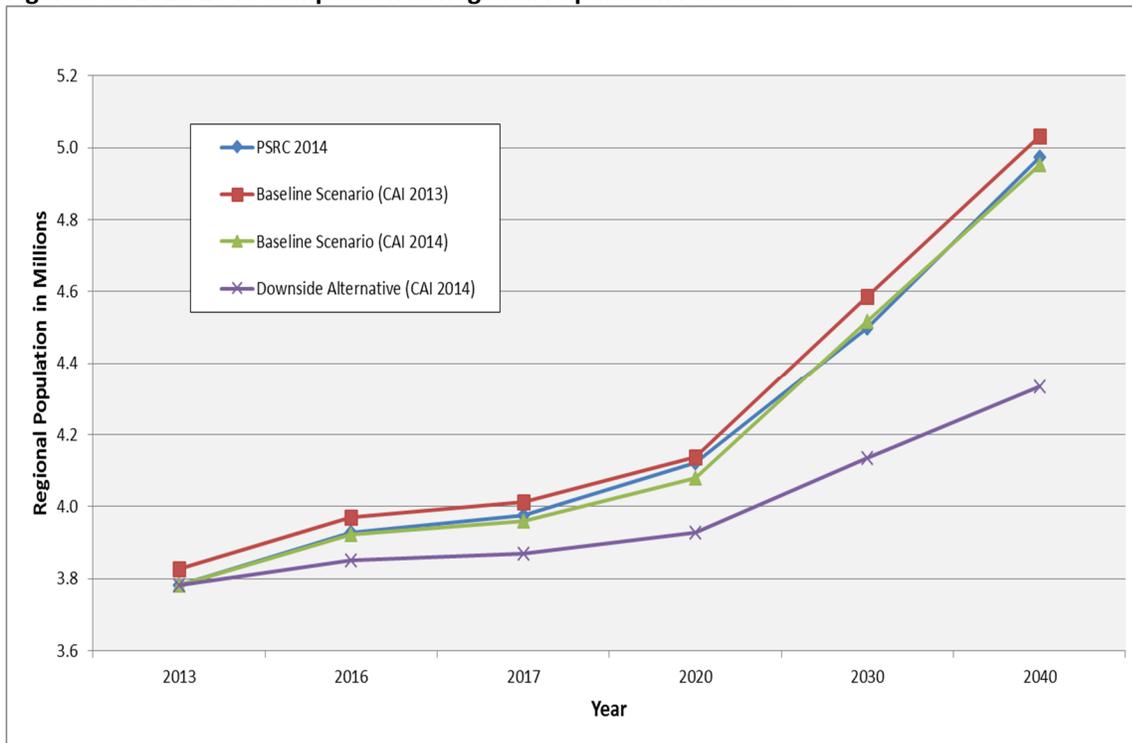
Source: Community Attributes Inc., 2014

**Table 3-7: Comparison of Regional Employment Forecasts**

	2013	2016	2017	2020	2030	2040
<b>Regional Employment (millions)</b>						
PSRC 2014	1.92	2.02	2.06	2.17	2.41	2.81
Baseline Scenario (CAI 2013)	1.83	1.95	1.99	2.08	2.29	2.53
Downside Alternative (CAI 2014)	1.92	1.96	1.98	2.01	2.09	2.19
<b>Baseline Scenario (CAI 2014)</b>	<b>1.92</b>	<b>2.02</b>	<b>2.05</b>	<b>2.12</b>	<b>2.32</b>	<b>2.54</b>
<b>Percentage Difference from CAI 2014 Baseline</b>						
PSRC 2014	0.0%	0.1%	0.5%	2.3%	4.0%	10.8%
Baseline Scenario (CAI 2013)	-4.8%	-3.6%	-3.2%	-2.1%	-1.2%	-0.1%
Downside Alternative (CAI 2014)	0.0%	-2.9%	-3.6%	-5.4%	-9.8%	-13.9%
<b>Baseline Scenario (CAI 2014)</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>	<b>0.0%</b>

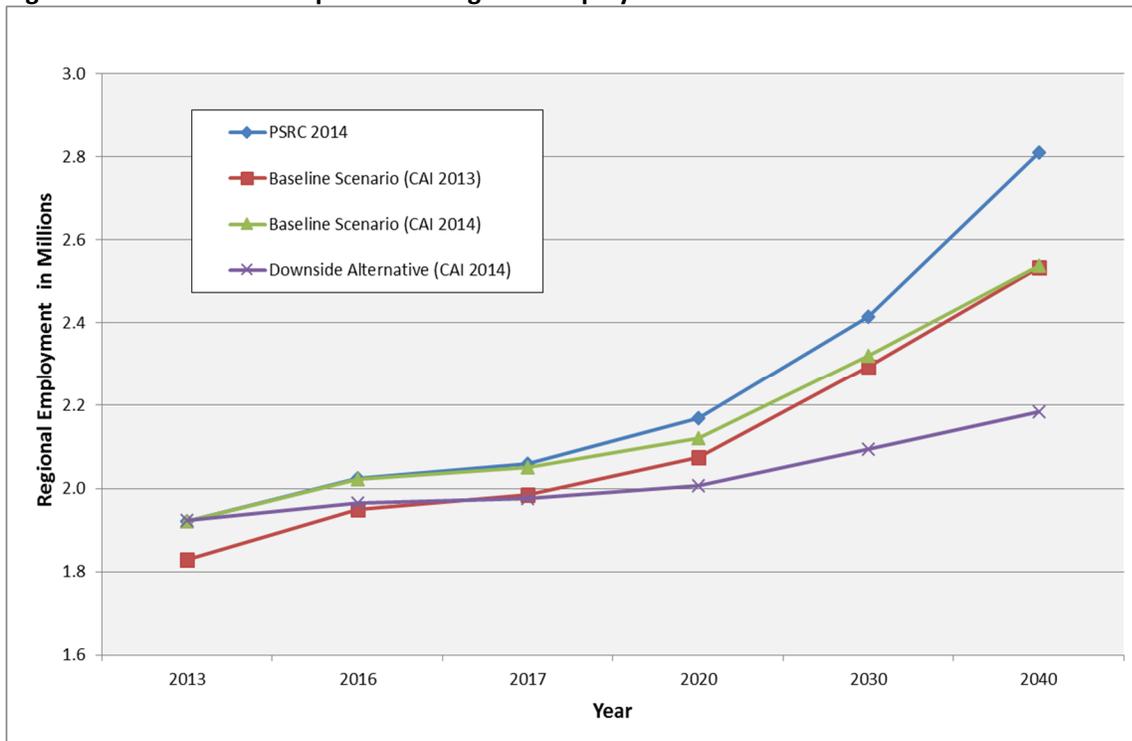
Source: Community Attributes Inc., 2014

**Figure 3-3: 2010-2040 Comparison of Regional Population Forecasts**



Source: Community Attributes Inc., 2014

**Figure 3-4: 2010-2040 Comparison of Regional Employment Forecasts**



Source: Community Attributes Inc., 2014

## Chapter 4

# Tolling Operations

Tolling on the SR 520 bridge commenced on December 29, 2011 in advance of the construction of the replacement bridge. Tolls continue to be collected during construction. Tolls will also be collected on the replacement bridge span which is anticipated to open to traffic in 2016. This report assumes tolling continues through FY 2056.

WSDOT has chosen to implement a variably-priced, cashless tolling system on the SR 520 bridge. The all-electronic approach allows vehicles to travel through the corridor at highway speeds without stopping to pay the toll, while minimizing right-of-way requirements, and allowing faster construction and installation compared to conventional toll plazas. Until the replacement bridge opens, tolls are being collected at the east high-rise section of the SR 520 bridge. Once the replacement bridge opens, tolls will be collected at a location on the eastern shore of Lake Washington. Tolls are collected in both directions via electronic toll collection and video collection systems and are assumed to be collected both directions via electronic and video systems once the new bridge opens to traffic.

Toll rates vary by time of day and day of week (weekday versus weekend day) with higher tolls during peak demand periods. The variable pricing allows for better management of traffic operations on the facility during peak periods.

Two payment types are available: account-based (pre-paid) and Pay By Mail (post-paid). Account-based toll payment, branded as “*Good To Go!*” provides two options – via transponder or registered license plate. The first option requires motorists to establish a prepaid account and obtain a *Good To Go!* transponder. The second option requires motorists to establish a prepaid account and register their vehicle license plate, known as Pay By Plate. Pay By Mail toll payments also provide two options – through customer-initiated payments and following receipt of an invoice in the mail. Different costs of toll collection are associated with each payment type including processing costs and revenue losses.

In the October 2013 forecast, estimated payment proportions for the market of potential bridge users were 82 percent *Good To Go!* account-based for FY 2014. Actual results for CY 2013 show 84 percent *Good To Go!* account-based. (See Table 2-6, CY 2013 Actual Method of Payment, for details.)

On the existing SR 520 floating bridge, a weekday toll schedule applies to all weekdays, and a separate weekend toll schedule applies to both weekend days. Major holidays<sup>9</sup> that fall on weekdays use the weekend toll schedule. Similarly, from FY 2017 onwards, toll collection on the replacement bridge is assumed to be based on weekday and weekend day toll schedules.

During the ongoing construction period, tolls are not collected during the overnight period (defined as 11:00 pm to 5:00 am) on the existing bridge. Once construction of the replacement bridge is complete, from FY 2017 onwards, it is assumed tolls will be collected over the entire day.

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<sup>9</sup> New Year’s Day, Memorial Day, Independence Day, Labor Day, Thanksgiving Day and Christmas Day per WAC rule 468-270-071.

Vehicles are tolled according to vehicle classes by number of axles. The toll rates for multiple-axle vehicles are based on the axle multiple of the appropriate two-axle vehicle per axle base toll rate for primary payment types: account-based *Good To Go!* and Pay By Mail.

A variety of toll exemptions have been implemented on the SR 520 bridge. Some are being initiated by State policy while others are by agreement between the State and Federal Highway Administration.

These exemptions include:

- Agency-owned and branded transit vehicles
- Privately-owned transit vehicles which operate on a fixed route and regular schedule
- Agency-sanctioned vanpools
- State Police vehicles
- Bridge maintenance vehicles
- Emergency vehicles
- Tow trucks while responding to SR 520 calls
- Vehicles owned or operated by a foreign government.

Because the existing bridge lacks dedicated lanes needed for HOV enforcement, all passenger car vehicles including HOVs are tolled on the current bridge. After the replacement bridge opens, it is assumed high occupancy passenger vehicles with three or more occupants (HOV3+) will be exempt from paying tolls when traveling in the high occupancy vehicle (HOV) lane.

The original toll schedule plan assumed in the 2011 study has been implemented. In accordance with this plan, the Washington State Transportation Commission (WSTC) has raised the tolls approximately 2.5 percent on July 1, 2012 (FY 2013), July 1, 2013 (FY 2014) and July 1, 2014 (FY 2015), consistent with the September 2011 traffic and revenue forecast assumptions. These toll rate increases support the finance plan for SR 520, which include four annual 2.5 percent rate increases planned through FY 2016 and an increase of approximately 15 percent in FY 2017.

The existing (FY 2015) and assumed (FY 2016) toll rates for two-axle vehicles are shown in Tables 4-1 and 4-2, respectively for weekdays and weekends, and summarized below:

- The maximum Good To Go! toll rate for 2-axle vehicles is \$3.80 on weekdays and \$2.35 on weekends in FY 2015. The toll rates have been rounded to the nearest \$0.05.
- In FY 2015, Pay By Mail customers pay approximately \$1.62 above the Good To Go! toll rates on average. The Pay By Mail rates are rounded to the nearest \$0.05.
- At the beginning of FY 2016, both weekday and weekend Good To Go! account-based tolls will increase by approximately 2.5 percent on average. It is assumed the tolls schedule reviewed by the WSTC in spring 2014, which included nearest \$0.05 rounding for the FY 2016 increase, will be adopted by the WSTC and implemented.

- At the beginning of FY 2016, it is assumed the differential for Pay By Mail customers will escalate by 2.5 percent and that the Pay By Mail rates will be rounded to the nearest \$0.05.
- Tolls for multi-axle vehicles (those with more than two axles on the ground) will be determined by multiplying the number of axles by the per axle toll rate for two-axle vehicles using the same payment method and rounded to the nearest \$0.05. The maximum rate is the six-axle rate, regardless of additional axles.

For FY 2017 and beyond, the toll rates assumed in the 2011 study and subsequent updates, which were rounded to the nearest \$0.05 originally, remain unchanged. Weekday *Good To Go!* account-based tolls are assumed to increase approximately 15 percent on average from FY 2016 to FY 2017 (i.e. on July 1, 2016). Weekend account-based tolls are assumed to increase approximately 2.5 percent on average. The assumed toll rates for FY 2017 and beyond for two-axle vehicles are shown in Tables 4-1 and 4-2, respectively for weekdays and weekends. No toll rate escalation is assumed after FY 2017.

**Table 4-1: Weekday Two-Axle Vehicle Toll Rates**

Fiscal Year	12-5 AM	5-6 AM	6-7 AM	7-9 AM	9-10 AM	10 AM-2 PM	2-3 PM	3-6 PM	6-7 PM	7-9 PM	9-11 PM	11 PM-12 AM
<b>Good To Go! Weekday 2-Axle Toll Rates</b>												
2015		\$1.75	\$3.00	\$3.80	\$3.00	\$2.40	\$3.00	\$3.80	\$3.00	\$2.40	\$1.75	
2016		\$1.80	\$3.10	\$3.90	\$3.10	\$2.45	\$3.10	\$3.90	\$3.10	\$2.45	\$1.80	
2017+	\$1.25	\$2.05	\$3.55	\$4.35	\$3.55	\$2.90	\$3.55	\$4.35	\$3.55	\$2.90	\$2.05	\$1.25
<b>Pay By Mail Weekday 2-Axle Toll Rates</b>												
2015		\$3.35	\$4.60	\$5.40	\$4.60	\$4.05	\$4.60	\$5.40	\$4.60	\$4.05	\$3.35	
2016		\$3.45	\$4.70	\$5.55	\$4.70	\$4.15	\$4.70	\$5.55	\$4.70	\$4.15	\$3.45	
2017+	\$2.95	\$3.75	\$5.25	\$6.05	\$5.25	\$4.60	\$5.25	\$6.05	\$5.25	\$4.60	\$3.75	\$2.95

Note: Toll rates in year of expenditure dollars

**Table 4-2: Weekend Two-Axle Vehicle Toll Rates**

Fiscal Year	12-5 AM	5-8 AM	8-11 AM	11AM-6PM	6-9 PM	9-11 PM	11 PM-12 AM
<b>Good To Go! Weekend 2-Axle Toll Rates</b>							
2015		\$1.20	\$1.80	\$2.35	\$1.80	\$1.20	
2016		\$1.25	\$1.85	\$2.40	\$1.85	\$1.25	
2017+	\$1.25	\$1.25	\$1.85	\$2.50	\$1.85	\$1.25	\$1.25
<b>Pay By Mail Weekend 2-Axle Toll Rates</b>							
2015		\$2.80	\$3.40	\$4.00	\$3.40	\$2.80	
2016		\$2.85	\$3.50	\$4.10	\$3.50	\$2.85	
2017+	\$2.95	\$2.95	\$3.55	\$4.20	\$3.55	\$2.95	\$2.95

Note: Toll rates in year of expenditure dollars

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## Chapter 5

# Traffic and Revenue Approach

This chapter presents an overview of the modeling and forecasting approach. The revised forecast utilized the travel demand toll model and model processing tools developed for the September 2011 forecast, but incorporated new information to account for key changes. This chapter starts with an overview of the tolling analysis model used in the September 2011 forecast, then describes the changes made to the model and associated post processing tools.

## Overview of September 2011 Tolling Analysis Model

The September 2011 SR 520 tolling analysis model was built from the Puget Sound Regional Council (PSRC) travel demand model. The PSRC files contain highway and transit networks, data on land-use and socioeconomic forecasts, and trip tables representing vehicle trips. These files formed the basis of the tolling analysis model. CDM Smith used a number of studies and surveys specific to the SR 520 corridor to build and update the modeling tools.

Traffic data was obtained from WSDOT's traffic count stations for the years 2008 through 2010. In addition, CDM Smith conducted vehicle occupancy and truck classification studies using video cameras in November 2009. This data was used in the calibration stage of the tolling analysis model. Travel time and speed data was collected using Global Positioning System (GPS) equipped vehicles in November 2009 and was also used for model calibration.

A travel pattern survey, conducted by CDM Smith in September 2009 and including 6,400 participants, was a major effort to understand the travel patterns of the SR 520 bridge users. Information obtained from this survey was used to refine the original trip tables. The results showed the strong use of the SR 520 bridge for commuting in both directions across Lake Washington. The survey results indicated:

- AM peak (6:00 to 9:00 am) travel and PM peak (3:00 to 6:00 pm) travel each account for approximately 18 percent of total trips; midday trips account for approximately 36 percent of total trips
- Trip purpose results show 85 percent of AM peak and 62 percent of PM peak trips are for work commuting; midday trips are dominated by company business, personal business/medical trips, and people going to jobs with later start times
- About half of all peak trips are made five times a week
- West end origins and destinations are almost all in Seattle, while east end origins and destinations are dominated by Bellevue, Redmond, and Kirkland.

The CDM Smith team conducted a stated preference survey in November 2009 to help assess current bridge users' willingness to pay tolls. This is measured in value of time, which is the monetary value an individual places on saving a certain increment of travel time. The survey also provided data to estimate changes in travel behavior in response to tolls. Changes in travel behavior include combining or forgoing trips, choosing a different destination, shifting to alternative modes including transit, and/or changes in the time of travel. Value of time results from the 2009 stated preference survey

were demonstrably lower than value of time results from a similar stated preference survey of SR 520 users in 2003. The survey results also revealed respondents have a relatively high median household income of about \$125,000. While the range of values from the 2009 survey fell within the average range for the region estimated from other sources, the higher income of travelers in this corridor suggested that the value of time estimates should be higher than the regional average. Accordingly, analytical methods were used to re-benchmark value of time estimates to bring them into alignment with average hourly wages.

An independent review of economic growth forecasts was conducted by local economic forecasting consultant Community Attributes Inc. who included impacts of the recent recession on short and long-term growth forecasts for the region as a whole. The most recent population, employment, and economic activity data was used for this purpose, primarily from 2009 and the first half of 2010. Regional independent population and employment forecasts were applied to updated PSRC regional distributions to model zone areas and the results were further augmented by up to date development pipeline information. The resulting model zone socioeconomic forecasts were used to adjust the tolling analysis model trip tables.

The PSRC highway networks were updated to include the fields necessary to perform toll diversion calculations and also to better represent traffic movements on SR 520 and I-90 bridges. Model modifications were made to allow accounting for possible suppression of trips or shifting to non-automobile modes due to tolling.

After the updates of trip tables and highway networks using the data and surveys were completed, CDM Smith developed a toll analysis model for tolling analysis of the SR 520 bridge. Prior to tolling analysis, the model was calibrated using 2010 hourly traffic counts and travel time data under toll-free operation. The model was then used to develop projected SR 520 transactions and gross toll revenue potential from FY 2012 through FY 2056.

## Regional Transportation Projects

The September 2011 model assumed that a number of regional highway and transit projects would be completed. The November 2014 forecast is based on similar modeling assumptions. Table 5-1 provides a list of relevant major regional transportation projects, with an indication of completion date as currently anticipated. No significant changes in planned major network projects have occurred. Minor revisions include: the East Link Light Rail Extension to Bellevue has been pushed back to 2023 (original expected completion date was 2020-21), the previously mentioned widening of SR 520 to Montlake Boulevard via the new west approach bridge north has been added, and the SR 520 eastside expansion/HOV project was completed in November 2014.

**Table 5-1: Summary of Major Regional Transportation Projects**

Route	Expected Completion <sup>1</sup>	Project Description
I-90	mid 2017	Addition of an HOV2+ lane in each direction on the outer roadway across Lake Washington. Closure of the reversible center roadway once the outer roadway is reconfigured. (Center roadway will be used for East Link Light Rail.)
I-405	late August 2015	Bellevue to Lynnwood Widening and Express Toll Lanes (ETL) Project: <ul style="list-style-type: none"> <li>- Conversion of existing HOV lane to ETL from SR 522 to I-5 in Lynnwood.</li> <li>- Addition of new travel lane and conversion of existing HOV lane to ETL (resulting in two ETL lanes in each direction) from SR 522 to downtown Bellevue (NE 6th Street) . The lanes will be narrow (11' min) lanes between 6th and SR 522 in both directions during the entire construction duration</li> </ul>
I-405	Unfunded	I-405 Express Toll Lanes between Bellevue and SR 167: <ul style="list-style-type: none"> <li>- NE 6th to I-90 conversion from 4 general purpose (GP) lanes and 1 HOV lane to 3 GP lanes and 2 ETL lanes</li> <li>- I-90 to SR 167 conversion from 2 GP lanes and 1 HOV lane to 2 GP lanes and 2 ETL lanes.</li> </ul>
SR 522	2015-2016	Business Access and Transit Lanes between 61st Ave NE and 65th Ave NE (Kenmore Improvement Project, Segment West A)
East Link	Targeted 2023	Sound Transit East Link Light Rail Extension - Extension of Link Light Rail from downtown Seattle at International District Station, on I-90 corridor east to Bellevue Way, then north to Downtown Bellevue, and then east to Overlake Transit Center (152nd Ave NE) with possible extension to Downtown Redmond.

1. Expected completion date as of August 2014

## Adjustments Made to Toll Modeling and Traffic and Gross Revenue Forecasting

The revised forecast utilized the travel demand toll model and model processing tools developed for the September 2011 forecast but incorporated new information to account for key changes. This section focuses on the changes made to the September 2011 tolling analysis model and associated post processing tools. The revised model is referred to as the November 2014 model.

The travel demand toll model, which covers average weekday travel, was updated and re-run for the following model years: FY 2014, FY 2016, FY 2017, FY 2024, and FY 2031. The results for years between model years are determined by interpolation.

The observed data did not indicate a need to update the values and distribution of value of time and trip diversion methodology. Consequently, these parameters and methodology as applied in the September 2011 study were not modified for the current study. The September 2011 study used trip suppression and mode shift parameters and methodologies to estimate the impact of adding tolling to the bridge. The current study, as noted below, includes a post-tolling model trip table calibration. This

calibration replaces the suppression and mode shift due to tolling as these effects took place when tolling was implemented on the bridge.

For the current study, the travel demand toll model and post-processing elements were modified to reflect:

- Revised roadway configuration
- Revised socioeconomic forecasts
- Model trip table calibration
- Growth performance review
- Gas price forecast change
- Shift in payment type proportions
- Revised toll vehicle classification
- Change in planned weekend closures due to construction
- HOV3+ toll exemption
- New annualization method

Each of these modifications and adjustments are discussed in this section.

### Roadway Configuration Assumptions

The model network assumptions were generally kept the same as the September 2011 and October 2013 studies, with the exception of the West Approach Bridge North (WABN) reconfiguration. As explained in Chapter 1 (Project Description), the replacement SR 520 bridge main span is assumed to open in FY 2017 and carry three lanes (two general purpose and one HOV) across the lake to the west end of the western high rise. A three lane westbound West Approach Bridge North (WABN) connector is assumed to be completed shortly after the main span. This connector and reconfiguration of the existing four lane west approach bridge south connector will result in three lanes in each direction to the Montlake Boulevard interchange (two general-purpose and one inside transit/HOV 3+ lane in each direction).

In the October 2013 forecast, it was assumed that the addition of the WABN and reconfiguring SR 520 to three lanes in each direction from Montlake Boulevard to the replacement bridge main span would have a marginal positive effect on toll revenue based on sensitivity tests conducted during the 2011 study and was not included in that forecast. Consequently, this resulted in a slightly conservative forecast in October 2013. As of fall 2014, the WABN project is fully funded and under construction, and therefore the connection bridge and reconfiguration have been coded in the revised November 2014 model.

### Revised Socioeconomic Forecasts

A revised socioeconomic forecast was prepared in October 2014, as discussed in Chapter 3: Economic Growth Analysis. Overall, when compared to the prior economic forecast, the population forecasts were adjusted upwards for King County and downwards for the region as a whole. However, the

overall population growth rates remain essentially the same for the region and increase slightly for King County. Within King County, the total population forecast among the four major cities along the SR 520 corridor (Seattle, Kirkland, Bellevue, and Redmond) has been adjusted upwards along with forecasted higher growth rates, primarily driven by more growth expected in Seattle and to a lesser extent in Bellevue.

For employment, King County performs about the same as expected in the October 2013 forecast (slightly better in the short term and slightly worse in the long term), and the regional jobs were adjusted upwards particularly in the short term. Regional growth rates are lower, while King County growth rates are only slightly lower. On a subarea basis, Seattle and Kirkland are now expected to have more total employment in the short term, Bellevue a little worse, and Redmond about the same. Growth rates are expected to be stronger in the four cities near term, with Seattle and Redmond leading the group. Longer term growth rates are slightly better for the four cities and slightly worse for the other parts of King County.

The October 2013 forecast study utilized the changes in the socioeconomic forecast base between the 2011 basis and 2013 forecast to factor the original 2011 trip tables such that they reflected the change in socioeconomics. Similarly, the November 2014 forecast study factored the original 2011 trip tables such that they reflect the new socioeconomic forecast. The process started with the original trip tables used in the September 2011 study, and applied a growth ratio derived by comparing the original 2011 study and revised 2014 study socioeconomic forecasts at the FAZ (Forecast Analysis Zone) level. (Due to changes in the regional socioeconomic baseline resulting from PSRC's recent use of the UrbanSim model and revised baseline data, it was necessary to review the changes in the socioeconomic forecast at the FAZ level so that 2011 and 2014 forecasts would be comparable.) The growth ratio was based on the sum of population and employment at the FAZ level. The individual growth rate for each FAZ was applied uniformly to the TAZ's within that FAZ. Trip tables for the new toll forecast were developed for fiscal years 2014, 2017, 2021, 2031. They were then used to interpolate fiscal years 2016 and 2024.

### Model Trip Table Calibration

The trip tables reflecting revised socioeconomic data were used as the starting point for trip table calibration. The other inputs to the calibration were the latest traffic counts including: FY 2014 toll transactions derived from the toll performance review described in Chapter 2; and 2013 traffic data provided by WSDOT for vehicles crossing Lake Washington on SR 520 and I-90, and other nearby facilities (SR 522, I-5 and I-405).

As part of the calibration process, the trip tables for the base year (FY 2014) were adjusted to better match existing traffic volumes at five count stations located on SR 520, I-90, SR 522, I-5 and I-405. The adjustments to the trip tables were done at the hourly level (for all tolling hours from 5 AM to 11 PM) to reflect the peaking patterns on the Lake Washington corridor and surrounding highways.

The calibration results were tested by comparing model assigned volumes to traffic counts at two levels: at a disaggregated level, the volumes were compared on a link by link basis using the GEH statistic, at each of the five count stations by direction and for each hour (the GEH statistic is a standard measurement of traffic model calibration results); and at an aggregated level, the differences between assigned volume and count at individual links were compared to evaluate the overall match of all count stations using Percent Root Mean Square Error (%RMSE) statistic. Both methods indicated a good fit between modeled traffic and actual counts.

Once the FY 2014 trip tables were calibrated, they served as the new base year trip tables. The difference between the original and calibrated base year trip tables for each origin-destination movement was used to adjust future year model trip tables (fiscal years 2016, 2017, 2014 and 2031) to account for the FY 2014 calibration.

## Growth Performance Review

After incorporating the impact of both the revised socioeconomic forecasts and trip table calibration into future model years, actual toll transaction results and trends were reviewed and compared to initial model results and appropriate adjustments made. Details are provided in the next two sections.

### Average Weekday Transactions

The toll performance review showed that FY 2014 weekday toll transactions were about 1.2 percent higher than previously forecasted. Consequently, the average weekday transactions for the base year model (FY 2014) was adjusted up by 1.2 percent through the trip table calibration process. Since the weekday transactions were used to calibrate the FY 2014 trip tables, the increase was reflected in the modeled average weekday transactions for the base year and was also applied to later year model trip tables.

Average weekday transactions grew by 2.9 percent and 3.4 percent in FY 2013 and FY 2014. These growth rates are lower than what was expected based on the previous forecast. As a result the short-term growth rates for average weekday transactions were adjusted slightly downward in the revised forecast.

These adjustments when combined led to slightly higher average weekday transactions for FY 2015 (0.6 percent higher than in the previous forecast) and slightly lower for FY 2016 (0.9 percent lower).

### Average Weekend Day Transactions

The weekend model used in prior studies was modified to reflect more extensive data on tolling performance to-date. The new weekend model method starts with the base year average weekend toll transactions and applies annual growth rates to derive future year toll transactions.

The toll performance review showed that FY 2014 weekend toll transactions were about 3.6 percent lower than forecasted number. The review also showed that weekend toll transactions grew at around 3 percent annually since tolling started. The revised weekend growth rates were developed based on a combination of historical growth of weekend transactions and growth patterns revealed by the weekday model during the off-peak period. Future year weekend growth rates were adjusted accordingly and the effect of these adjustments led to lower weekend toll transactions overall. The effect is most pronounced in FY 2015, FY 2016, and FY 2024 with approximately 4 to 5 percent less weekend day transactions.

## Gas Price Forecast Change

Compared to the gas price forecast used in the October 2013 forecast, the new forecast has a lower gas price during pre-completion period and higher gas price in FY 2024 and later. Per gallon price for passenger car gasoline is assumed to be \$3.61 in FY 2014 rising to \$3.88 in FY 2017, \$5.10 in FY 2024 and \$6.15 in FY 2031 resulting in a long term annual growth assumption of 3.2 percent similar to the state gasoline price forecast of September 2014.

## Shift in Payment Type Proportions

As described in Chapter 2, posted transactions and revenue results including split between account-based and Pay By Mail transactions are now available for FY 2013 and FY 2014. Some of these key actual values are shown in Table 5-2.

**Table 5-2: SR 520 FY 2013 and FY 2014 Actuals**

FY	Transactions			Gross Toll Revenue Potential		
	GTG!	PBM	Total	GTG!	PBM	Total
2013	16,922,151	3,298,449	<b>20,220,601</b>	\$47,283,626	\$14,018,085	<b>\$61,301,711</b>
2014	17,687,660	3,271,914	<b>20,959,574</b>	\$50,625,660	\$13,963,487	<b>\$64,589,147</b>

Sources:

- Actual transactions for July-December periods are based on CDM Smith analysis of toll transaction data from CSC provided by WSDOT. Actual transactions for January-June periods are based on monthly toll collection system equipment reports adjusted for non-revenue and duplicate transactions.
- Actual gross toll revenue for July-December 2013 are based on CDM Smith analysis of toll transaction data from CSC provided by WSDOT. Actual gross toll revenue for other periods are based on preliminary financial reporting system results adjusted for estimated CSC processing effects.

Posted actuals shown in Table 5-2 were used to benchmark the base year model (FY 2014). The tolling analysis model was modified to reflect changes in payment types based on actual tolling performance data covering January 2012 through June 2014. Table 5-3 shows the *Good To Go!* (account-based) payment share assumed in the October 2013 forecast, the actual values for fiscal years 2012 through 2014, and the revised payment type proportions in the new forecast.

**Table 5-3: Good To Go! Transaction Account-based Share**

Fiscal Year	Oct2013 Forecast	Nov2014 Forecast	Actual
2012	--	--	82.7%
2013	--	--	83.7%
2014	82.2%	--	84.4%*
2015	82.7%	84.6%	--
2016	83.1%	84.8%	--
2017	84.3%	85.1%	--
2024	85.8%	87.3%	--
2031	85.9%	87.8%	--

\* July-December 2013 actual, January-June 2014 preliminary data

As discussed in Chapter 2, the actual share of *Good To Go!* transactions in FY 2014 were higher than assumed in the October 2013 forecast. Based on this observation, the proportion of *Good To Go!* transactions assumed in the revised forecast was adjusted up for the forecast horizon.

Another finding of the tolling performance review was that weekday and weekend *Good To Go!* shares are different, with account-based transactions representing approximately 86 percent of the weekday totals, but only about 78 percent of weekend transactions (in calendar year 2013). The September 2011 forecast assumed the same share for weekdays and weekends. This was revised in the October 2013 forecast with weekday share increased and weekend share reduced, which results in a slightly lower overall share in outer years since weekend transactions as a share of all transactions are forecast to be greater over time. The tolling performance review showed the weekday *Good To Go!*

transaction share is slightly higher in the FY 2014 base year at 85.7 percent as opposed to the 84.0 percent assumed in the October 2013 forecast. Also, the weekend *Good To Go!* transaction share is much higher in the base year at 78.6 percent versus the October 2013 forecast of 70.0 percent. This affects the *Good To Go!* share assumptions for all future years. The new forecast has overall higher weekend *Good To Go!* shares, with differences ranging from 6.8 percent higher in FY 2016 to 2.0 percent higher in FY 2031.

Consequently, the share of *Good To Go!* account-based transactions has been revised slightly upward as shown in Table 5-3.

### Revised Toll Vehicle Classification

The tolling performance review indicated a slightly lower share of trucks (defined as vehicles with 3 or more axles) than what was assumed in the October 2013 forecast. The actual results indicate approximately a 0.7 percent truck share in CY 2013, among which weekday truck share is 0.8 percent and weekend is 0.3 percent. In previous forecasts, the weekend truck share was assumed to be the same as weekday.

With more extensive performance data now available and a pattern showing much less truck share on weekends, the new forecast revises the assumption on weekend truck share for all future years correspondingly. Weekday truck share is assumed to be 0.8 percent in FY 2016 and gradually increases to 2.1 percent in FY 2031. Weekend truck share is assumed to be 0.3 percent in FY 2016 and slowly increases to 0.9 percent in FY 2031. The new annual average forecast for share of trucks is shown in Table 5-4 below.

**Table 5-4: Proportion of Trucks**

Fiscal Year	Oct2013 Forecast	Nov2014 Forecast	Actual
2013	--	--	0.8%
2014	1.1%	--	0.7%*
2015	1.1%	0.7%	--
2016	1.1%	0.7%	--
2017	1.3%	0.8%	--
2024	1.8%	1.3%	--
2031	2.4%	1.8%	--

\* July-December 2013 actual, January-June 2014 preliminary data

### Change in Planned Weekend Closures due to Construction

The prior forecast assumed a particular set of full weekend closures of the SR 520 bridge due to construction. As the SR 520 project has progressed with awarding the West Approach Bridge North contract, the number of planned weekend closures has been revised by WSDOT. A revised construction schedule was obtained and incorporated into the revised forecast developed in this study, as shown in Table 5-5. For most fiscal years between 2015 and 2018, the number of weekend closures has increased when compared to the prior forecast.

**Table 5-5: Weekend Closure Days**

Fiscal Year	Oct2013 Forecast	Nov2014 Forecast	Actual
2014	18.0	--	13.8
2015	10.0	15.5	--
2016	0.0	10.0	--
2017	4.0	1.0	--
2018	0.0	3.5	--

Closures outside of tolling hours are not considered in the forecast since they do not affect toll transactions and revenue. In the original September 2011 forecast, all closures were assumed to be for both directions from 11 PM on Friday to 5 AM on Monday, and no closures were anticipated after the replacement bridge was assumed to open, at the beginning of FY 2017. This has been revised in subsequent forecasts. The November 2014 forecast reflects assumptions on full or partial closures depending on whether or not both directions are closed, and the closure time frame. Also, some closures are now expected in FY 2017 and FY 2018. With night-time tolling assumed to start in FY 2017, the transactions and revenue forecasts were adjusted to account for closures that would affect overnight tolling where appropriate.

Similar to prior forecasts, bridge closures for span opening for vessel navigational needs are not considered in the revised forecast. It has been determined that they have little impact on toll revenue due to their limited duration and restriction to off-peak hours. No other construction closures in the regional highway system are considered as part of this analysis.

### HOV3+ Toll Exemption

Similar to prior forecasts, HOVs with three or more occupants are assumed to be exempt from paying tolls when the replacement bridge opens (assumed to start in FY 2017). As a conservative assumption for this traffic and revenue forecast, it was assumed that all HOV3+ will meet any requirements to be exempt and therefore will be traveling toll-free.

### Annualization Method

In the new forecast, a revised approach for annualization was implemented in order to explicitly reflect the effect of holidays and leap year on annual transaction and revenue. The technique used in prior forecasts assumed a long term average for the number of weekdays, weekend days, and weekday holidays in a year. The new system explicitly uses the number of days for each year. The revised approach results in greater year-to-year variation but has little overall effect.

## Summary of Assumptions

A summary of the assumptions used for the forecast is shown in Table 5-6.

**Table 5-6: November 2014 Traffic and Gross Revenue Forecast Assumptions**

General Assumptions
Improvements in the Puget Sound Regional Council's current regional transportation plan, <i>Transportation 2040</i> , will be implemented as planned. No new competitive toll-free facilities or additional capacity will be constructed during the projection period other than those assumed in the plan.
The percentage of payment types will be consistent with the ranges assumed for this study. The percentage of potential bridge users in the <i>Good To Go!</i> account-based program is assumed to increase from 85% in FY 2015 to 88% in FY2031.
Economic growth in the project study area will occur as forecasted herein based in part on the 2013 PSRC Land Use Baseline Forecast from the Puget Sound Regional Council, Conway Pedersen June 2014 forecasts, and the independent socioeconomic consultant.
The facility will continue to be well maintained, efficiently operated, effectively signed, and promoted to encourage maximum usage.
Inflation will average 2.5% annually over the forecast horizon. This figure is based on historic CPI up to 2014. While current inflation forecasts are somewhat lower for the state overall (1.9% long term), the greater Seattle region and the SR 520 primary market corridor are growing at a significant pace implying the assumption of 2.5% inflation throughout the SR 520 forecasts should be kept.
Motor fuel will remain in adequate supply and no national or regional emergency will arise that would abnormally restrict the use of motor vehicles. The per gallon price for passenger car gasoline is assumed to be \$3.61 in FY 2014, rising to \$3.88 in FY 2017, \$5.10 in FY 2024, and \$6.15 in FY 2031, resulting in a long term annual growth assumption of 3.2% similar to TRFC's September 2014 long term forecast of gas price.
The value of time for work trips ranges from \$9.60 per hour for the lowest income group to \$22.80 per hour for the highest income group. The value of time for non-work passenger car trips is \$13.80 per hour. Truck trip value of time reaches \$36.00 per hour for heavy trucks. All values are in 2010 dollars.

*(table continued)*

**Table 5-6: November 2014 Traffic and Gross Revenue Forecast Assumptions (Continued)**

<b>SR 520 Configuration</b>
Bridge Configuration: FY 2015- FY 2016: Two narrow general-purpose lanes and shoulders in each direction.
Bridge Configuration FY 2017 and onward: Two wider general-purpose lanes in each direction, one HOV/transit lane in each direction, and wider shoulders in each direction on replacement span. A new west approach bridge north connection from the western high rise to Montlake Blvd. interchange such that three standard lanes and full shoulders are provided between the floating span and Montlake Blvd utilizing the current bridge connection and new west approach bridge north connection. West of Montlake Blvd., SR 520 will remain in its current two-lane per direction configuration.
SR 520 Configuration East of Bridge to I-405 FY 2015 - FY 2016: Two general-purpose lanes in each direction and one outside HOV lane (with three person occupancy requirement HOV3+) westbound.
SR 520 Configuration East of Bridge to I-405 FY 2017 and onward: Two general-purpose lanes in each direction and one inside HOV/transit lane in each direction (with three person occupancy requirement HOV3+).
<b>Construction Closures</b>
Weekend closures of SR 520 from the Montlake Interchange to I-405 including the tolled section will occur an equivalent of 15.5 days in FY 2015, ten days in FY 2016, one day in FY 2017, and 3.5 days in FY 2018. Typical weekend closures are from 11 PM on Friday to 5 AM on Monday. Since night time (5 AM to 11 PM) tolling is assumed from FY 2017 forward, night time closures from FY 2017 forward are included.
<b>Ramp-Up</b>
No ramp-up is included in the current forecast horizon (FY 2015 through FY 2056)
<b>Toll Collection</b>
Tolls will be collected at a single point on the eastern high-rise of the main span while traffic remains on the existing bridge and at a single point on the eastern shore when traffic moves to the replacement bridge.
Toll rates will be the same for either direction on the bridge.
The toll collection is all electronic; there will be no manual toll collection.
FY 2015 - FY 2016: no night time tolling (11pm - 5am). FY 2017 and beyond: tolls will be charged during all 24 hours.

*(table continued)*

**Table 5-6: November 2014 Traffic and Gross Revenue Forecast Assumptions (Continued)**

Toll Rates	
<b>Toll Rates FY 2015 - FY 2016</b>	
	The maximum <i>Good To Go!</i> toll rate for 2-axle vehicles is \$3.80 on weekdays and \$2.35 on weekends in FY 2015 as adopted by the Washington State Transportation Commission. The toll rates have been rounded to the nearest \$0.05.
	In FY 2015, Pay By Mail customers pay approximately \$1.62 above the <i>Good To Go!</i> toll rates on average. The Pay By Mail rates are rounded to the nearest \$0.05.
	At the beginning of FY 2016, both weekday and weekend <i>Good To Go!</i> account-based tolls will increase by approximately 2.5% on average. It is assumed the tolls schedule reviewed by the WSTC in spring 2014, which included nearest \$0.05 rounding for the FY 2016 increase, will be adopted by the WSTC and implemented.
	At the beginning of FY 2016, it is assumed the differential for Pay By Mail customers will escalate by 2.5 percent and that the Pay By Mail rates will be rounded to the nearest \$0.05.
	Through the end of FY 2016, High occupancy vehicles (HOVs) will pay the same toll as single-occupant vehicles (SOVs).
	Toll exemptions as outlined by the Washington State Transportation Commission (the largest of which is the transit buses, private regular route buses such as the Microsoft Connector, and WSDOT sanctioned vanpools) are assumed.
	Tolls for multi-axle vehicles (those with more than two axles on the ground) will be determined by multiplying the number of axles by the per axle toll rate for two-axle vehicles using the same payment method and rounded to the nearest \$0.05. The maximum rate is the six-axle rate, regardless of additional axles.
<b>Toll Rates FY 2017 and beyond</b>	
	The maximum <i>Good To Go!</i> toll rate for 2-axle vehicles is \$4.35 on weekdays and \$2.50 on weekends in FY 2017 and beyond.
	In FY 2017 and beyond, Pay By Mail customers pay approximately \$1.70 above the <i>Good To Go!</i> toll rates on average.
	Weekday <i>Good To Go!</i> account-based tolls will increase approx. 15% on average from FY 2016 to FY 2017 (i.e. on July 1, 2016).
	Weekend account-based tolls will increase approx. 2.5% on average from FY 2016 to FY 2017 (i.e. on July 1, 2016).
	The Pay By Mail toll differential will increase 2.5% from FY 2016 to FY 2017 (i.e. on July 1, 2016).
	All toll rates will be rounded to the nearest \$0.05
	Toll exemptions as noted above are continued.
	HOVs with three or more occupants will be exempt from paying tolls if paying by transponder; HOVs with two occupants will pay the same toll as single occupant vehicles (SOVs).
	Tolls for multi-axle vehicles will continue to be factored by the number of axles as noted above.
	No toll rate escalation is assumed after FY 2017.

## Chapter 6

# Updated Transactions and Gross Toll Revenue Potential

This chapter provides the results of the updated baseline estimates of transactions and gross toll revenue potential for this project. Taking into account the tolling experience to date, revised independent economic forecast, and revised bridge configuration assumptions including closures, the methodology outlined in Chapter 5 was used to generate FY 2015 through FY 2056 transaction and gross toll revenue potential forecasts. This forecast is referred to as the November 2014 forecast.

Table 6-1 shows the SR 520 annual transactions and gross toll revenue potential updated forecast. Initially, annual growth in transactions and revenue is expected to generally follow recent trends. Revenue grows somewhat faster than transactions due to the toll increases in FY 2015 and FY 2016. In FY 2017, the large increase in toll rates results in lower transaction growth, but a significant increase in annual revenue due to the toll rate increase. After FY 2017, toll rates are assumed not to change, which makes the real value of the toll decline due to inflation. From FY 2018 through 2032, average transactions are expected to grow at a variable but declining rate from approximately 3 to 4 percent annually to about 2 percent by FY 2032. Throughout the remainder of the forecast horizon, the growth rates of both transactions and revenue declines to well below 1 percent annually.

Table 6-2 shows the revised forecast compared to the October 2013 forecast for example years. Figure 6-1 shows the comparison of the forecasts over the entire study period. For the pre-completion tolling period, the revised forecast shows transactions 2.2 percent lower in FY 2015 and 4.1 percent lower in FY 2016 than the October 2013 forecast. Gross toll revenue potential is lower by 3.3 percent in FY 2015, and 5.5 percent in FY 2016.

Between FY 2017 and FY 2025, the new forecast shows lower transactions than the October 2013 forecast, varying between 0.2 percent and 1.6 percent. During this period, gross toll revenue potential is lower than the prior forecast, varying between 1.3 percent and 2.5 percent.

Starting in FY 2026, the new forecast shows higher transactions than the October 2013 forecast, varying between 0.1 percent and 1.9 percent. The forecast gross toll revenue potential from FY 2026 and beyond is lower than the October 2013 forecast, with changes varying between 0.3 percent and 1.9 percent. Higher *Good To Go!* account-based transactions and lower truck share are the primary causes of the higher transactions versus lower revenue.

**Table 6-1: SR 520 Annual Transactions and Gross Toll Revenue Potential Updated Forecast**

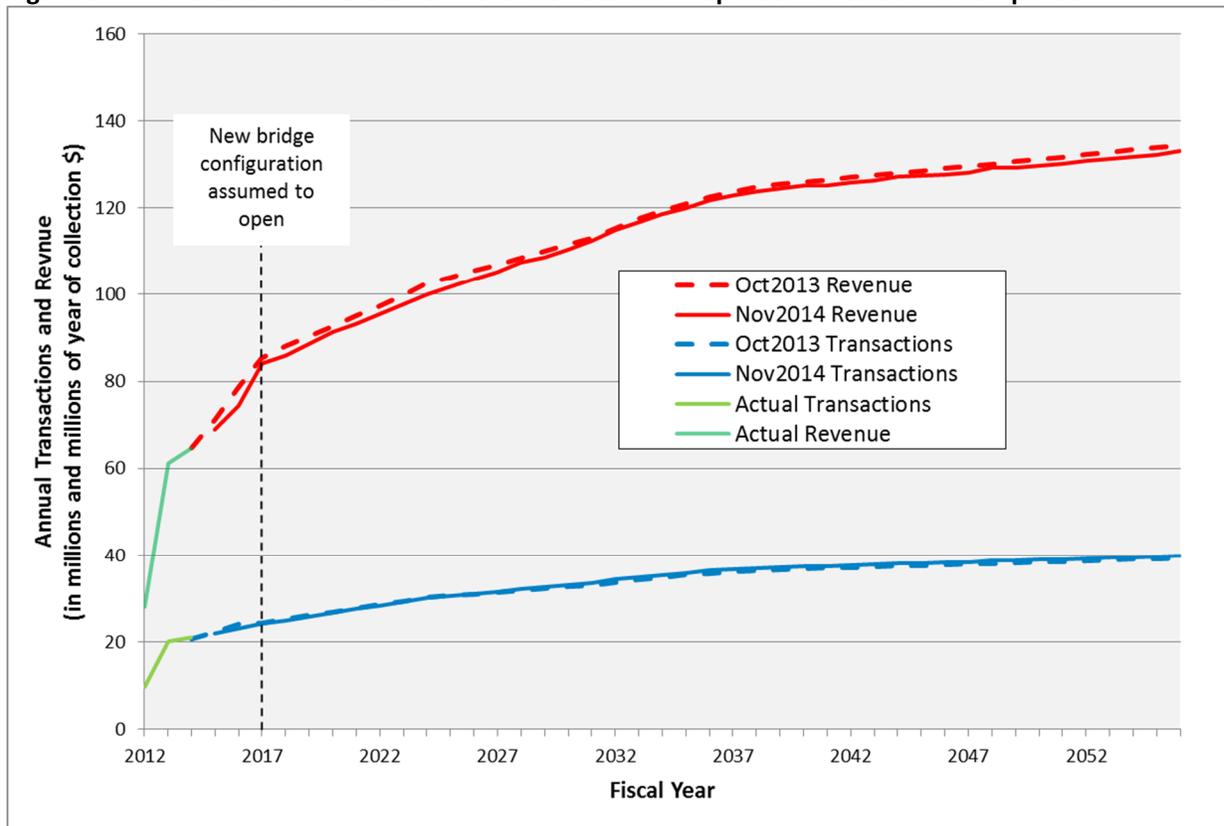
Fiscal Year	Transactions (millions)	Annual Growth	Gross Toll Revenue Potential (millions of year of collection \$)	Annual Growth
2015	21.882	--	\$68.995	--
2016	23.181	5.9%	74.383	7.8%
2017	24.175	4.3%	84.207	13.2%
2018	24.850	2.8%	85.960	2.1%
2019	25.863	4.1%	88.640	3.1%
2020	26.802	3.6%	91.339	3.0%
2021	27.552	2.8%	93.273	2.1%
2022	28.383	3.0%	95.507	2.4%
2023	29.215	2.9%	97.741	2.3%
2024	30.081	3.0%	99.951	2.3%
2025	30.548	1.6%	101.755	1.8%
2026	31.050	1.6%	103.536	1.8%
2027	31.553	1.6%	105.316	1.7%
2028	32.151	1.9%	107.447	2.0%
2029	32.524	1.2%	108.679	1.1%
2030	33.025	1.5%	110.455	1.6%
2031	33.560	1.6%	112.435	1.8%
2032	34.344	2.3%	115.070	2.3%
2033	34.862	1.5%	116.752	1.5%
2034	35.421	1.6%	118.603	1.6%
2035	35.881	1.3%	120.021	1.2%
2036	36.420	1.5%	121.828	1.5%
2037	36.705	0.8%	122.828	0.8%
2038	36.996	0.8%	123.776	0.8%
2039	37.215	0.6%	124.486	0.6%
2040	37.441	0.6%	125.145	0.5%
2041	37.478	0.1%	125.210	0.1%
2042	37.663	0.5%	125.908	0.6%
2043	37.813	0.4%	126.386	0.4%
2044	38.078	0.7%	127.279	0.7%
2045	38.115	0.1%	127.346	0.1%
2046	38.232	0.3%	127.608	0.2%
2047	38.386	0.4%	128.092	0.4%
2048	38.690	0.8%	129.224	0.9%
2049	38.728	0.1%	129.293	0.1%
2050	38.883	0.4%	129.785	0.4%
2051	39.038	0.4%	130.278	0.4%
2052	39.244	0.5%	130.752	0.4%
2053	39.352	0.3%	131.272	0.4%
2054	39.509	0.4%	131.772	0.4%
2055	39.667	0.4%	132.274	0.4%
2056	39.945	0.7%	133.210	0.7%

**Table 6-2: SR 520 Transactions and Gross Toll Revenue Potential – Forecast Comparison**

Fiscal Year	Transactions (millions)			Gross Toll Revenue Potential (millions of year of collection \$)		
	October 2013 (1)	November 2014	Change	October 2013 (1)	November 2014	Change
2015	22.384	21.882	-2.2%	\$71.373	\$68.995	-3.3%
2016	24.168	23.181	-4.1%	78.712	74.383	-5.5%
2017	24.245	24.175	-0.3%	85.338	84.207	-1.3%
2024	30.216	30.081	-0.4%	102.520	99.951	-2.5%
2031	33.029	33.560	1.6%	113.114	112.435	-0.6%
2056	39.307	39.945	1.6%	134.442	133.210	-0.9%

1. October 2013 Traffic and Revenue Forecast by CDM Smith

**Figure 6-1: Transactions and Gross Toll Revenue Potential – Updated Forecast and Comparison**



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# Chapter 7

## Sensitivity Tests

This chapter includes the results of a series of tests conducted to measure the sensitivity of gross toll revenue potential forecasts to changes in key study assumptions. The assumptions chosen for the tests are those that present risks because they are subject to variability and have a potential impact on the magnitude of the revenue estimate.

The following sensitivity tests were performed in conjunction with the forecast update:

- Toll rate sensitivity (FY 2017 – after bridge completion)
- Regional growth (FY 2017, FY 2024, and FY 2031)
- Account-based participation rate (FY 2017, FY 2024, and FY 2031).

Each parameter was tested individually. The results are not necessarily additive and do not provide an estimate of the overall impact of changes if they were to occur simultaneously.

Note that other sensitivity tests had been performed for the September 2011 study, including value of time, motor fuel costs, trip suppression/mode shift, and possible tolling of the I-90 bridge. The value of time and trip suppression/mode shift tests were deemed unnecessary now that the tolling analysis model has been calibrated with actual toll experience. The motor fuel cost test is considered of limited value; with the downside socioeconomic test, a bleaker future scenario is already captured. The tolling of the I-90 across the lake, which has only upside potential for SR 520 revenue and is not therefore a risk, has shifted to a separate EIS process from the SR 520 forecast, and is therefore not included here.

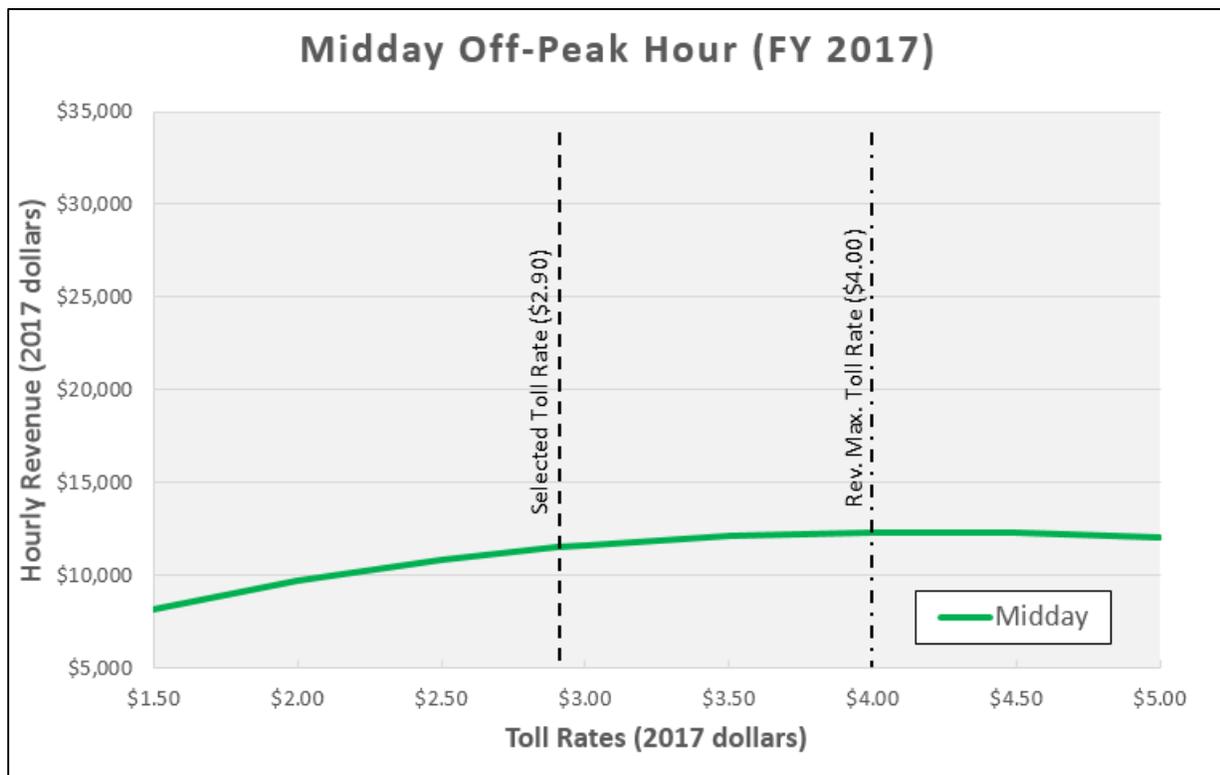
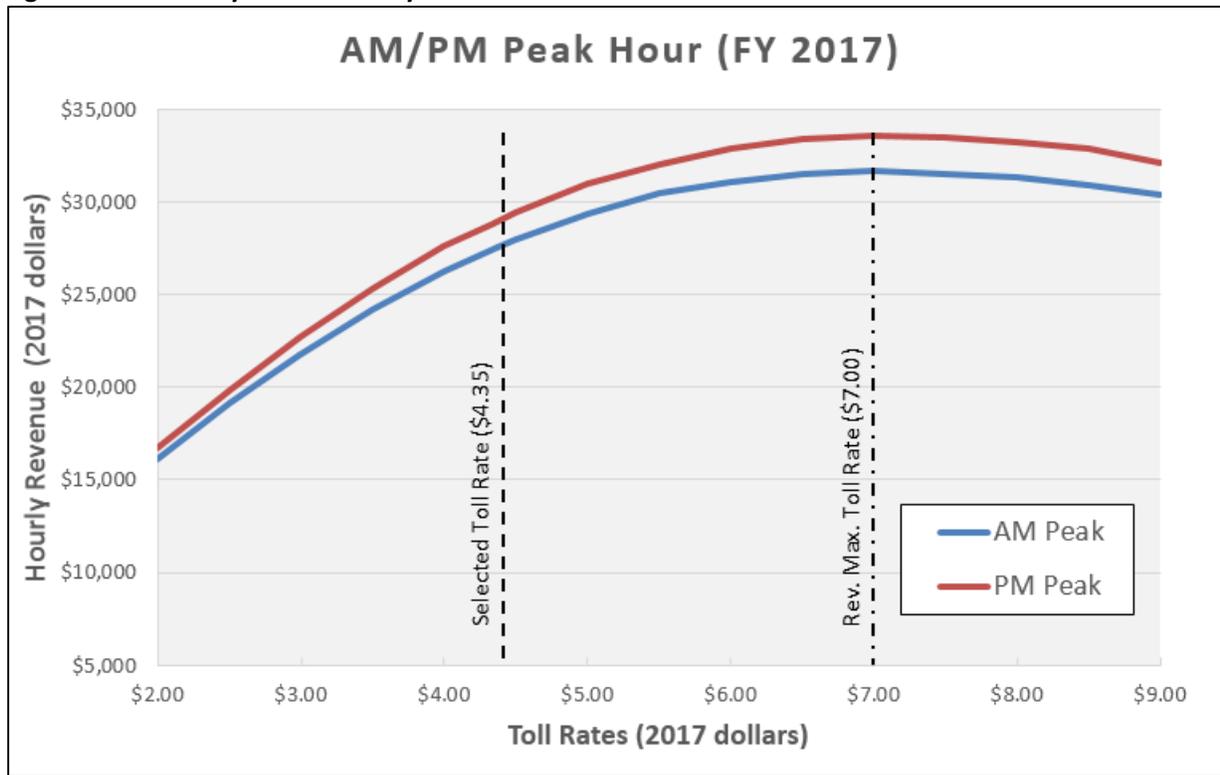
### Toll Rate Sensitivity

A range of toll rates from \$2.00 to \$9.00 during peak hours and from \$1.50 to \$5.00 during the midday was modeled using the tolling analysis model for FY 2017. These toll rates are expressed in year of collection dollars (FY 2017). For each toll rate, the corresponding revenue was computed to develop toll sensitivity curves for AM peak, midday, and PM peak periods.

Figure 7-1 shows toll sensitivity curves for FY 2017. The graphs show where the selected toll rates fall on the sensitivity curves (\$4.35 for peak hours and \$2.90 for midday). Revenue maximization is obtained at toll rates corresponding to the crest of the revenue curve. As indicated on the figure, the selected toll rates are lower than the revenue maximization toll rates.

The FY 2017 selected peak period toll rate of \$4.35 is estimated to generate 87 and 86 percent of the maximum revenue during the AM and PM peak periods, respectively. During the off-peak (midday) period in FY 2017, the selected toll rate of \$2.90 is estimated to generate 93 percent of the maximum revenue.

Figure 7-1: Weekday Toll Sensitivity Curves FY 2017



## Regional Growth

Using the downside economic forecast described in Chapter 3, the tolling analysis model was run to determine transactions and gross toll revenue potential under lower economic growth conditions. The results are in Table 7-1.

For FY 2017, under an approximately 2 and 4 percent economic downside scenario for population and employment respectively, transactions and revenue are expected to be about 3 and 4 percent lower respectively.

For FY 2024, under an approximately 6 and 7 percent economic downside scenario for population and employment respectively, transactions and revenue are expected to be about 8 percent lower.

For FY 2031, under an approximately 9 and 10 percent economic downside scenario for population and employment respectively, transactions and revenue are expected to be about 12 percent lower.

**Table 7-1: Regional Growth Sensitivity Test**

Growth Scenario	Transactions <sup>1</sup>	Gross Toll Revenue Potential <sup>2</sup>
<b>FY 2017<sup>3</sup></b>		
Baseline	24.175	\$84.21
Downside Socioeconomic	23.336	\$81.17
<i>Percent Difference</i>	-3.5%	-3.6%
<b>FY 2024</b>		
Baseline	30.081	\$99.95
Downside Socioeconomic	27.732	\$91.92
<i>Percent Difference</i>	-7.8%	-8.0%
<b>FY 2031</b>		
Baseline	33.560	\$112.44
Downside Socioeconomic	29.691	\$99.30
<i>Percent Difference</i>	-11.5%	-11.7%

1. In millions

2. In millions of year of collection dollars

3. FY 2017 results incorporate impact of closures

## Account-based Participation Rate

This test examined the difference in transactions and revenue for account-based participation rates differing from those assumed in the baseline scenario.

In the baseline scenario, the *Good To Go!* market output shares are assumed to be 87 percent on weekdays and 79 percent on weekends in FY 2017; 90 percent on weekdays and 79 percent on weekends in FY 2024; and 90 percent on weekdays and 80 percent on weekends in FY 2031. The resulting overall output transaction *Good To Go!* share for the baseline scenario is 85 percent in FY 2017, 87 percent in FY 2024, and 88 percent in FY 2031.

The high sensitivity test evaluated an increase to 89 percent weekday and 80 percent weekend *Good To Go!* output market share in FY 2017; 93 percent weekday and 83 percent weekend output market share in FY 2024; and an increase to 95 percent weekday and 85 percent weekend output market share in FY 2031. The resulting overall output transaction *Good To Go!* share for the higher *Good To Go!* share scenario is 87 percent in FY 2017, 91 percent in FY 2024, and 93 percent in FY 2031.

The results of the tests are shown in Table 7-2. The higher account-based participation rate results in transactions increasing by 0.7 percent in FYs 2017, 2024 and 2031. Under this scenario, gross toll revenue potential would be expected to decline by 0.3 percent in FY 2017, by 1.1 percent in FY 2024, and by 2.0 percent in FY 2031.

**Table 7-2: Account-based Participation Rate Sensitivity Test**

<i>GTG!</i> Rate Scenario	Overall <i>GTG!</i> Rate	Transactions <sup>1</sup>	Gross Toll Revenue Potential <sup>2</sup>
<b>FY 2017<sup>3</sup></b>			
Baseline	85.1%	24.175	\$84.21
Higher <i>GTG!</i> Rate	87.1%	24.347	\$83.92
<i>Percent Difference</i>		0.7%	-0.3%
<b>FY 2024</b>			
Baseline	87.3%	30.081	\$99.95
Higher <i>GTG!</i> Rate	90.7%	30.291	\$98.87
<i>Percent Difference</i>		0.7%	-1.1%
<b>FY 2031</b>			
Baseline	87.8%	33.560	\$112.44
Higher <i>GTG!</i> Rate	92.8%	33.800	\$110.24
<i>Percent Difference</i>		0.7%	-2.0%

1. In millions

2. In millions of year of collection dollars

3. FY 2017 results incorporate impact of closures

# Disclaimer

CDM Smith used currently-accepted professional practices and procedures in the development of these traffic and revenue estimates. However, as with any forecast, it should be understood that differences between forecasted and actual results may occur, as caused by events and circumstances beyond the control of the forecasters. In formulating the estimates, CDM Smith reasonably relied upon the accuracy and completeness of information provided (both written and oral) by the Washington State Department of Transportation. CDM Smith also relied upon the reasonable assurances of independent parties and is not aware of any material facts that would make such information misleading.

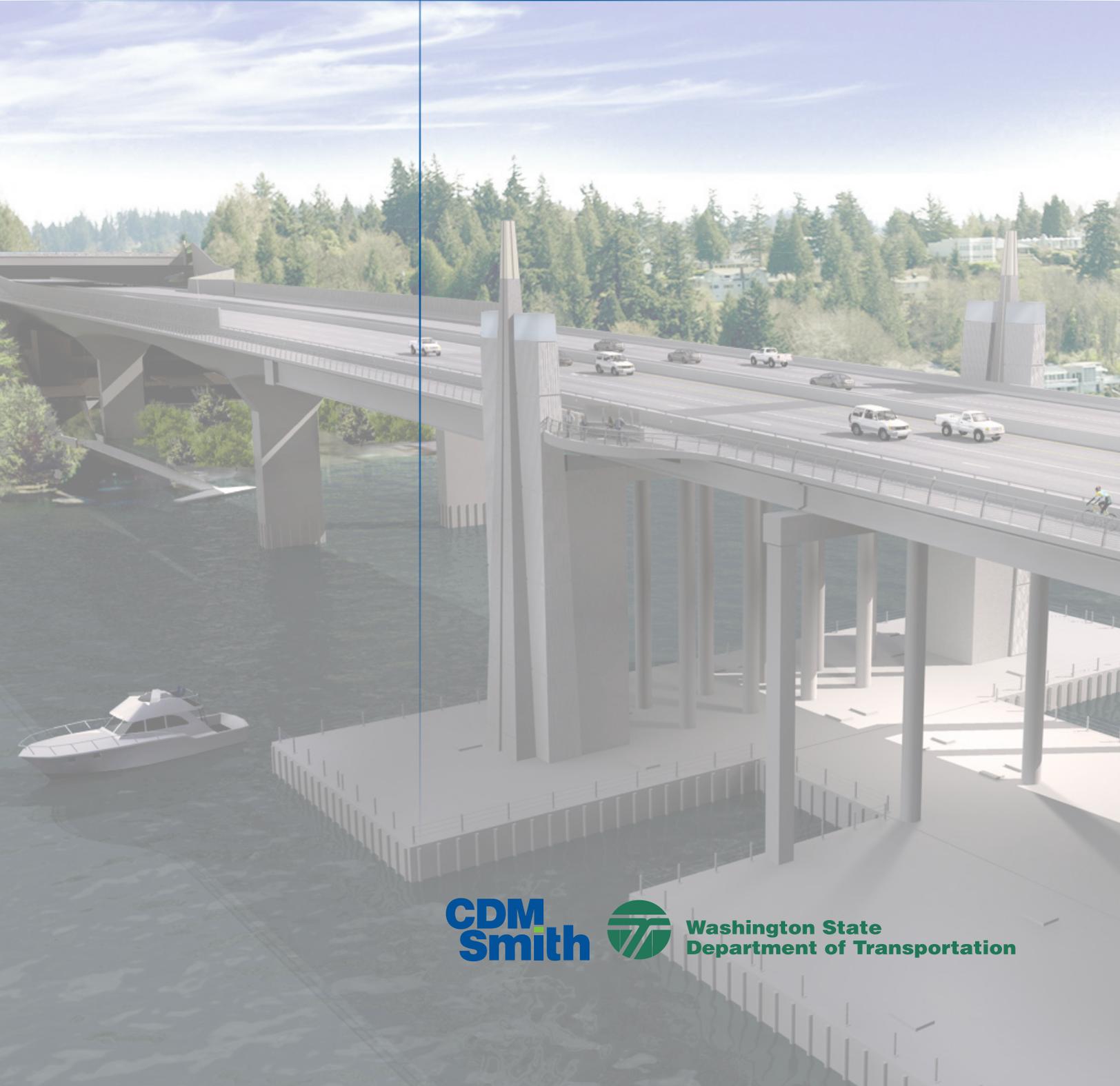
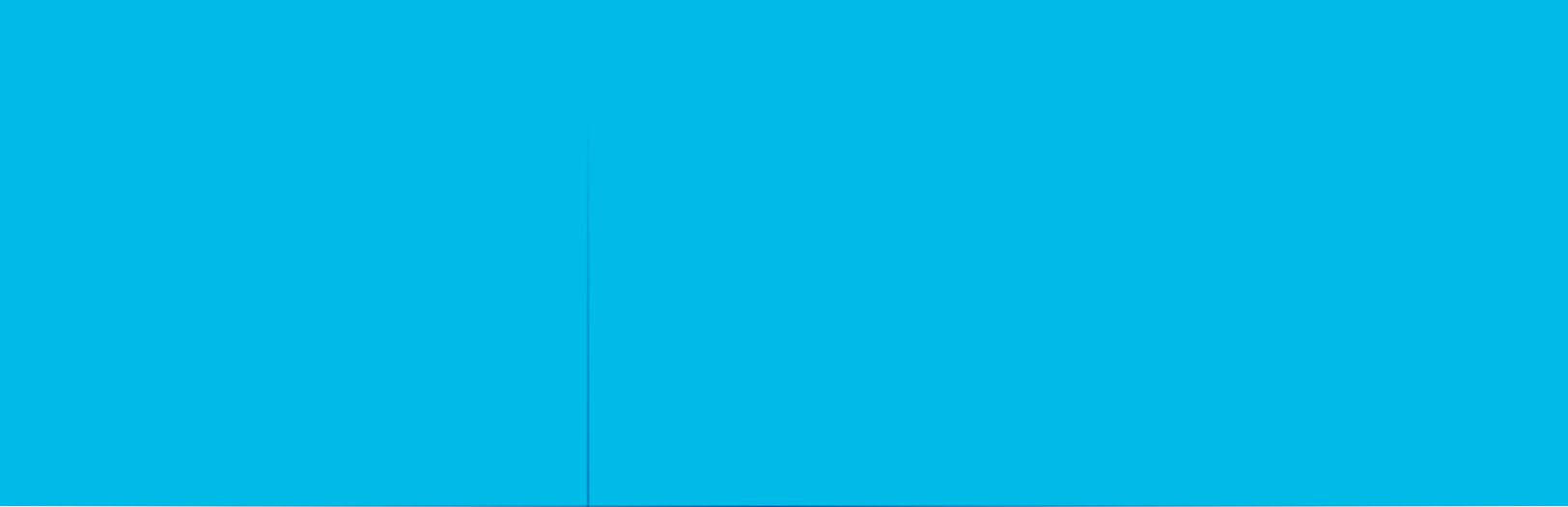
CDM Smith made qualitative judgments related to several key variables in the development and analysis of the traffic and revenue estimates that must be considered as a whole; therefore, selecting portions of any individual result without consideration of the intent of the whole may create a misleading or incomplete view of the results and the underlying methodologies used to obtain the results. CDM Smith gives no opinion as to the value or merit of partial information extracted from this report.

All estimates and projections reported herein are based on CDM Smith's experience and judgment and on a review of information obtained from multiple agencies, including the Washington State Department of Transportation. These estimates and projections may not be indicative of actual or future values, and are therefore subject to substantial uncertainty. Future developments cannot be predicted with certainty, and may affect the estimates or projections expressed in this report, such that CDM Smith does not specifically guarantee or warrant any estimate or projection contained within this report.

While CDM Smith believes that the projections or other forward-looking statements contained within this report are based on reasonable assumptions as of the date of the report, such forward-looking statements involve risks and uncertainties that may cause actual results to differ materially from the results predicted. Therefore, following the date of this report, CDM Smith will take no responsibility or assume any obligation to advise of changes that may affect its assumptions contained within the report, as they pertain to socioeconomic and demographic forecasts, proposed residential or commercial land use development projects and/or potential improvements to the regional transportation network.

CDM Smith is not, and has not been, a municipal advisor as defined in Federal law (the Dodd Frank Bill) to the Washington State Department of Transportation and does not owe a fiduciary duty pursuant to Section 15B of the Exchange Act to the Washington State Department of Transportation with respect to the information and material contained in this report. CDM Smith is not recommending and has not recommended any action to the Washington State Department of Transportation. The Washington State Department of Transportation should discuss the information and material contained in this report with any and all internal and external advisors that it deems appropriate before acting on this information.

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