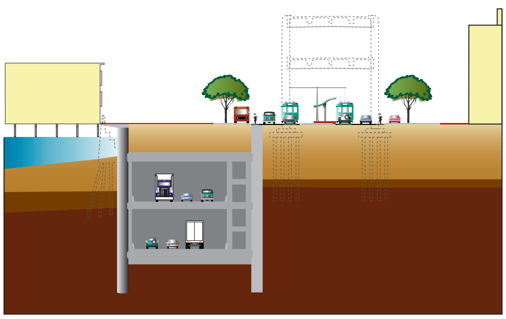
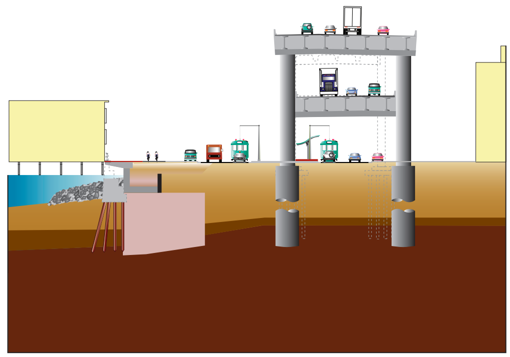
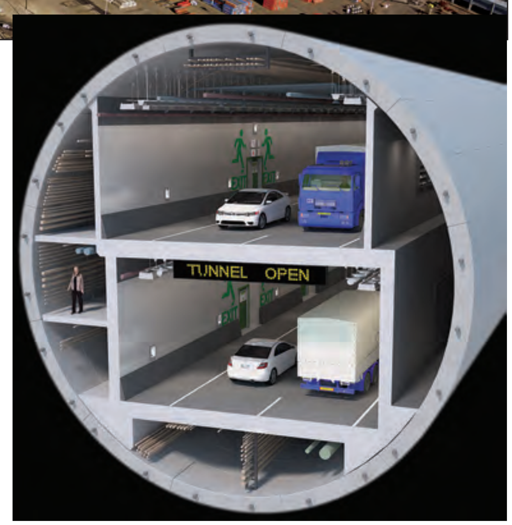
ALASKAN WAY VIADUCT REPLACEMENT PROJECT
Final Environmental Impact Statement

APPENDIX X **Tolling Re-evaluation Memo**



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Alaskan Way Viaduct Replacement Project: Tolling Re-Evaluation Memorandum

1 What is the purpose of this memorandum?

The purpose of this memorandum is to assess the significance of the new information being developed for the Final EIS regarding the effects of tolling the build alternatives. If this analysis shows new significant adverse effects that were not evaluated in the 2010 Supplemental Draft EIS, then another supplemental EIS would be required before a Final EIS is prepared. See 23 CFR § 771.130. Based on an analysis of the new information being developed for the Final EIS, we have concluded that there are no new significant impacts and, as such, we have concluded that no supplemental EIS is required. Additional detailed analysis of the issues presented in this re-evaluation will appear in the FEIS.

2 What are the main differences between the traffic forecasts in the 2010 SDEIS and the forecasts that are being developed for the Final EIS?

The traffic forecasts being developed for the Final EIS are based on the same underlying data, methodology, analytical processes and tools that were used to develop the traffic forecasts for the 2010 Supplemental Draft EIS. However, there are three main differences between the traffic forecasts in the 2010 Supplemental Draft EIS and the traffic forecasts that are being prepared for the Final EIS:

- *Design Year.* In the 2010 SDEIS, the traffic forecasts were prepared primarily for the year 2015, which was assumed to be the opening year of the project. Traffic impacts in 2030 were discussed briefly in the 2010 SDEIS. The traffic forecasts that are being developed for the Final EIS focus on the year 2030.

- *Tolled Traffic Forecasts.* In the 2010 Supplemental Draft EIS, tolled traffic forecasts were provided only for the Bored Tunnel Alternative; tolling impacts were described qualitatively for the Cut-and-Cover Tunnel and the Elevated Structure Alternative. The traffic analysis that is being developed for the Final EIS will include tolled traffic forecasts for all three build alternatives.
- *Toll Rate Scenario.* In the 2010 Supplemental Draft EIS, the tolled traffic forecasts were presented for three different toll rate scenarios, known as Scenarios A, C, and E. Scenarios A and C involved higher toll rates and therefore greater traffic diversion; Scenario E involved a lower toll rate and therefore lower traffic diversion. For the Final EIS, the tolled traffic forecasts are being developed based on Scenario C. Scenario C is being evaluated for all three build alternatives since it has the highest toll rates and therefore provides a conservative analysis of the upper end of potential effects.

Because of these changes, the traffic forecasts presented in the Final EIS will be noticeably different from the forecasts in the 2010 Supplemental Draft EIS. To a large extent, the differences will reflect the use of 2030 rather than 2015 as the horizon year in the traffic forecasts. In general, traffic volumes increase over time, so the use of 2030 rather than 2015 tends to result in higher traffic volumes for all alternatives, including the No Build alternative. The use of 2030 rather than 2015 as the design year does not reflect any change in the alternatives themselves, nor does it reflect any change in the affected environment.

The traffic forecasts in the Final EIS also will be different because they will include more detailed information on the effects of tolling. As noted above, the Final EIS will include quantitative traffic data for all three Build alternatives, not just the Bored Tunnel Alternative. This more detailed information allows for a more in-depth comparison of the tolled versions of the three Build alternatives. Again, this new information does not reflect any change in the alternatives nor does it reflect any change in the affected environment. It provides more a detailed picture of impacts that were described qualitatively in the Supplemental Draft EIS.

The use of toll rate Scenario C does not itself result in new information, because Scenario C was one of the toll rate scenarios used in the Supplemental Draft EIS. A single toll rate scenario is being used to simplify the presentation of the tolled traffic forecasts, because in the Final EIS the tolled forecasts will compare three different build alternatives. The tolling scenario that will be evaluated in the Final EIS was chosen because it is the most conservative of the three scenarios presented in the 2010 Supplemental Draft EIS, meaning that it results in the most diversion from SR 99 to city streets and I-5, which causes the most impacts to the area.

Lastly, some technical changes have been made in the traffic forecasts that are being developed for the Final EIS. These changes include correcting some errors in the traffic models and changing one traffic count location. These changes are described below and did not substantially change the modeling approach or results.

3 How was tolling addressed in the 2010 Supplemental Draft EIS?

The 2010 Supplemental Draft EIS addressed tolling-related issues in Chapter 9, Tolling. Chapter 9 informed readers that tolls could be implemented on the SR 99 replacement facility in the future, and included an analysis of the potential effects of tolling. This chapter included a quantitative analysis of tolling on the Bored Tunnel Alternative. It included a brief qualitative assessment of the impacts of tolling on the Elevated Structure and Cut-and-Cover Tunnel Alternatives. Other chapters in the

2010 Supplemental Draft EIS alerted the reader to the tolling analyses in Chapter 9, including: Chapter 2, Summary; Chapter 3, Alternatives Development; and Chapter 8, Comparison of Alternatives.

The tolling analysis for the Bored Tunnel Alternative in the 2010 Supplemental Draft EIS was based on three toll rate scenarios, known as Scenarios A, C, and E. Scenarios A and C involved higher toll rates and therefore greater traffic diversion; Scenario E involved a lower toll rate and therefore lower traffic diversion. For each of those toll scenarios, the traffic forecasts were prepared for the year 2015. The year 2015 was used for the tolled forecasts in the 2010 Supplemental Draft EIS because it also was used for the non-tolled traffic forecasts in that document.[1]

The 2010 Supplemental Draft EIS evaluated the effects of tolling by analyzing the following data for the Bored Tunnel Alternative under both tolled and non-tolled conditions in 2015:

- Vehicle miles traveled in the center city and the region
- Vehicle hours traveled in the center city and the region
- Vehicle hours of delay in the center city and the region
- Average travel speeds on SR 99 and other facilities
- Average travel times between various points
- Average daily traffic volumes on SR 99 and other facilities

The tolled traffic forecasts in the 2010 Supplemental Draft EIS assumed that only through-traffic on SR 99 (not traffic bound

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[1] The 2010 SDEIS used the year 2015 as the primary basis for comparing the traffic forecasts for the Build and No-Build alternatives. The year 2015 was used in order to illustrate the effects of the Build alternatives on their own, without the effect of other transportation improvements that would be implemented between 2015 and 2030. For the FEIS, the lead agencies decided to use 2030 (the design year) as the primary basis for comparing alternatives, for consistency with FHWA's usual practice in NEPA documents for highway projects.

for or originating from downtown Seattle) would be tolled. The same assumption has been made in the tolled traffic forecasts that are being developed for the Final EIS.

4 What did the 2010 Supplemental Draft EIS conclude with regard to the impacts of tolling?

The tolling analysis in the 2010 Supplemental Draft EIS reached the following key conclusions with regard to tolling under Scenario C, which is the scenario is being used as the basis for tolling evaluations in preparation of the current analysis:

- "Anticipated effects of tolling the Bored Tunnel Alternative in 2030 are similar to the effects discussed for 2015 and are briefly discussed in Question 12". (p. 208)
- "With untolled conditions, surface streets are projected to carry less traffic under the Cut-and-Cover Tunnel and Elevated Structure Alternatives than the Bored Tunnel Alternative. Therefore, if a toll were applied to SR 99, it is assumed that more traffic would divert to the city streets under these alternatives, compared to the Bored Tunnel Alternative, as the surface streets would have more capacity to accommodate diverted traffic. However, even though a higher volume of traffic may divert to surface streets due to more available surface street capacity under the tolled Cut-and-Cover Tunnel and Elevated Structure Alternatives, the resulting surface street volumes would likely be similar across all three alternatives (except along Elliott and Western Avenues north of Battery Street, which would likely be lower under the Bored Tunnel Alternative because it does not have ramps to/from SR 99 at this location). Therefore, tolling the Cut-and-Cover Tunnel and Elevated Structure Alternatives would likely result in similar effects on the transportation network as those discussed above for the tolled Bored Tunnel Alternative." (pgs. 218-219)

- "Generally, VHT is projected to increase as tolls are applied to SR 99 and are more apparent in the Seattle Center City area than in the region, where the change is less than 1 percent of all regional VHT." (p. 208)
- For 2015 Bored Tunnel Toll Scenarios A and C, VHT in the Seattle Center City area is projected to increase between 5 and 9 percent when compared to the untolled 2015 Bored Tunnel, whereas projected VHT increases for 2015 Bored Tunnel Toll Scenario E are approximately 2 percent. VHT increases at a greater rate than VMT because the traffic diverting from the tolled facility is generally using slower facilities, such as surface streets, and is entering the transportation network where some intersections are already at capacity and where minor changes in traffic volumes can increase delay. (p. 208).
- "In general, VHD increases as the toll rate increases because more drivers are expected to divert from SR 99 to slower routes, such as surface streets, to avoid the toll. As more traffic diverts from SR 99, congestion and delay on these alternate routes increases, as discussed below in Question 10. For the scenarios considered, VHD is lowest for Bored Tunnel Toll Scenario E, followed by Bored Tunnel Toll Scenarios A and C. The projected increase in VHD, for all toll scenarios considered in the four-county region is not meaningfully different from VHD projected for the untolled 2015 Bored Tunnel. For the Seattle Center City area, VHD in 2015 is projected to increase between 3 percent and 20 percent when compared to untolled 2015 Bored Tunnel. In general, all-day tolling results in the highest modeled increase in VHD, while peak period tolling results in relatively minor increases in VHD. During peak periods, I-5 and surface streets become more congested, so an uncongested trip through the bored tunnel becomes more attractive to drivers, even if they must pay a toll. Thus, less traffic is projected to

divert from the bored tunnel during peak periods. Conversely, during non-peak periods, I-5 and surface streets become less congested and, therefore, more attractive to drivers, so more vehicles are projected to divert to these routes during non-peak periods. All-day tolling is projected to result in more diversion from SR 99 to slower facilities, such as city streets, and, therefore is expected to cause more delay." (pp. 208-209)

- "Faster speeds are expected in the bored tunnel with the Toll Scenarios because SR 99 volumes are reduced due to drivers diverting from the bored tunnel to avoid the toll." (p. 209)
- "Modeling results indicate that traffic speeds on SR 99 north and south of the bored tunnel portals are most affected by tolling in the peak direction during the peak period, with average speeds reduced between 7 and 13 miles per hour depending on the toll scenario."(p. 209)
- "The following list presents general observations regarding the relative differences in travel times between the 2015 Bored Tunnel and Bored Tunnel Toll Scenarios A, C, and E:
    - For most trip pairs analyzed, modeling results show travel times are 1 to 2 minutes longer for Bored Tunnel Toll Scenarios A and C as compared to the 2015 Bored Tunnel.
    - For two trip pairs analyzed (West Seattle to downtown and Woodland Park to downtown), modeling results show travel times are 3 to 4 minutes longer for Bored Tunnel Toll Scenarios A and C as compared to the 2015 Bored Tunnel.
    - For trips using Alaskan Way (Ballard to S. Spokane Street), modeling results show travel times are 1 to 3 minutes longer for Bored

Tunnel Toll Scenarios A and C as compared to the 2015 Bored Tunnel.

- Routes to and from the Central Business District on SR 99 (as opposed to routes using the bored tunnel) generally are projected to have higher travel time increases than through routes traveling through the bored tunnel.” (p. 209)

- “Drivers using the bored tunnel for 2015 Bored Tunnel Toll Scenarios A and C are projected to have slightly longer travel times than they would for the 2015 Bored Tunnel due to expected backups on the SR 99 mainline. These back-ups would be due heavier off-ramp volumes just before the bored tunnel, which would increase delay at intersections at the ramp termini.” (p. 209)
- “Modeling results indicate tolling SR 99 would cause traffic to shift to I-5 and city streets. As noted in Question 9, model projections show 40,000 to 45,000 daily trips shifting to other facilities with the 2015 Bored Tunnel Toll Scenarios A and C as follows:
    - 14,000 to 15,000 more vehicles are projected to use I-5.
    - 16,000 to 18,000 more vehicles are projected to travel on north-south downtown city streets west of I-5.
    - 10,000 to 12,000 additional daily vehicles are projected on north-south arterials east of I-5.
    - North of Seneca Street, the number of vehicles traveling on Alaskan Way each day is projected to increase by 6,000 to 7,000 vehicles.
- “Modeling results indicate this diverted traffic would have little effect on I-5 trips (increases of 2 minutes or less), but would have a larger effect on trips using north-south arterials through downtown on streets such

as Second and Fourth Avenues, as discussed below in this question. Slower travel times are modeled because vehicle volumes are expected to increase on these streets, resulting in increased congestion and delay at specific intersections…" (pgs 209-214)

- "The modeled diversion for the peak periods is expected to be proportionately less than for daily traffic, with 24 to 42 percent of the SR 99 volumes expected to shift to other facilities during peak periods for Bored Tunnel Toll Scenarios E, C, and A. As mentioned previously, during peak periods, I-5 and surface streets become more congested, so an uncongested trip through the bored tunnel becomes more attractive, even though it would be tolled. Thus, less traffic is projected to divert during peak periods. Conversely, during non-peak periods, I-5 and surface streets become less congested and therefore, more attractive, so more traffic is projected to divert during non-peak periods." (p. 214).
- "…modeling results show the impact of tolling on transit ridership appears to be negligible. Modeling results indicate that transit priority treatments on Second and Fourth Avenues and peak period restrictions on Third Avenue for traffic in general-purpose lanes would minimize the transit travel time increases expected from increased diverted traffic. However, modeling results indicate the increased transit travel times would result in slightly lower ridership." (p. 215).
- "…other scenarios would be evaluated and reasonable optimization measures would be applied and analyzed before tolling would be implemented." (p. 215)
- "Modeling results show systemwide measures (VMT, VHT, and VHD) exhibit diversion patterns similar to those discussed for 2015 with respect to the relative differences between tolled and untolled operations. The

primary difference exhibited by 2030 estimates is an overall increase in travel as the region and the city grow over time." (p. 215).

- "In general, it would be somewhat more complicated to toll the Cut-and-Cover Tunnel and Elevated Structure Alternatives as compared to the Bored Tunnel Alternative due to the larger number of access points along the tolling route. Both the Cut-and-Cover Tunnel and Elevated Structure Alternatives would provide access to SR 99 via a southbound Elliott Avenue on-ramp and northbound Western Avenue off-ramp. Additionally, the Elevated Structure Alternative would provide access to SR 99 via a southbound on-ramp at Columbia Street and a northbound off-ramp at Seneca Street. Because traffic using the Columbia and Seneca ramps will only use a portion of the corridor, and because their diversion route is relatively short (i.e., taking First Avenue or Alaskan Way to the new Stadium ramps), it is assumed that the toll rate for traffic using these ramps would be less than the rate for traffic passing through downtown on the structure." (pgs. 216-217)
- "North of Virginia Street, near the Battery Street Tunnel, SR 99 daily volumes with the Bored Tunnel Alternative are expected to be higher than the other alternatives. With the Bored Tunnel Alternative, traffic volumes would increase near the Battery Street Tunnel because the Battery Street Tunnel would be closed and replaced with a new bored tunnel that would have wider lanes and shoulders and less abrupt curves." (p. 217)
- "With untolled conditions, surface streets are projected to carry less traffic under the Cut-and-Cover Tunnel and Elevated Structure Alternatives than the Bored Tunnel Alternative. Therefore, if a toll were applied to SR 99, it is assumed that more traffic would divert to the city streets under these alternatives, compared to the Bored Tunnel Alternative, as the surface streets would have

more capacity to accommodate diverted traffic. However, even though a higher volume of traffic may divert to surface streets due to more available surface street capacity under the tolled Cut-and-Cover Tunnel and Elevated Structure Alternatives, the resulting surface street volumes would likely be similar across all three alternatives (except along Elliott and Western Avenues north of Battery Street, which would likely be lower under the Bored Tunnel Alternative because it does not have ramps to/from SR 99 at this location). Therefore, tolling the Cut-and-Cover Tunnel and Elevated Structure Alternatives would likely result in similar effects on the transportation network as those discussed above for the tolled Bored Tunnel Alternative." (pgs. 217-219).

- "…based on the analysis of Scenarios A, C, and E, it appears that tolling SR 99 could have the potential of a disproportionately high and adverse effect on some low-income populations, especially those without access to transit or who are dependent on their cars, unless proper optimization measures are implemented." (p. 222).

- "The primary operational effect of a tolled Bored Tunnel Alternative versus an untolled Bored Tunnel Alternative on historic resources would be potential congestion from increased car and truck traffic in the historic districts and in the vicinity of other historic resources due to diversion from the tolled facility." (p. 222).

- "Slightly increased VMT, VHT, and VHD would have a negligible effect on the amounts of ozone precursors emitted into the atmosphere from vehicular traffic. These changes in traffic conditions are unlikely to cause or exacerbate a violation of the ozone National Ambient Air Quality Standards (NAAQS) in the region, based on current and projected ozone levels and the anticipated change in regional emission rates under the toll scenarios." "Under all tolling conditions, vehicle trips would increase by up to a third at intersections in the project area. The increased vehicular trips through already congested intersections would increase CO and PM levels at sensitive land uses located near intersections. However, these changes in localized traffic conditions are unlikely to cause a violation of the CO or PM NAAQS in the region, based on current and projected CO and PM levels and anticipated increases in congestion under each tolling condition." (p. 222)

- "As discussed above, the toll scenarios are expected to slightly increase VMT, VHT, and VHD within the four-county region, relative to the untolled Bored Tunnel Alternative. This increase would result in very small overall reductions in average network speed of approximately 0.2 percent under Bored Tunnel Toll Scenario A, 0.2 percent under Bored Tunnel Toll Scenario C, and less than 0.1 percent under Bored Tunnel Toll Scenario E, as compared to the untolled Bored Tunnel Alternative. The slight increase in VMT under all of the toll scenarios and slight decrease in overall network speed within the estimated speed range are expected have negligible effects on regional energy usage and greenhouse gas emissions." "The increase in VMT under all of the toll scenarios and the decrease in overall network speed within the estimated speed range is expected to result in increased energy usage and greenhouse gas emissions of approximately 8 percent under Bored Tunnel Toll Scenario A, 9 percent under Bored Tunnel Toll Scenario C, and 1 percent under Bored Tunnel Toll Scenario E, as compared to the untolled Bored Tunnel Alternative." (p. 222)

- "Traffic volumes on SR 99 are expected to decrease by approximately one-quarter under Bored Tunnel Toll Scenarios A and C, relative to the untolled Bored Tunnel Alternative, which would result in slightly lower traffic noise levels at noise-sensitive sites located immediately adjacent to the bored tunnel portals." "Diverted traffic under Bored Tunnel Toll Scenarios A and C would increase traffic volumes on downtown city streets by approximately one-tenth, relative to the untolled Bored Tunnel Alternative. These increases in downtown traffic would be present throughout much of the downtown street network but would result in no noticeable change in traffic noise levels at noise-sensitive sites located near downtown city streets." (p. 223).

- "Potential environmental effects under the tolled Cut-and-Cover Tunnel and Elevated Structure Alternatives would be similar to the tolled Bored Tunnel Alternative. As discussed above, traffic would divert from SR 99 to avoid paying tolls, which would result in increased congestion on local streets. This diverted traffic and increased congestion would have the potential to result in effects on the disciplines of environmental justice, historic and cultural resources, air quality, energy and greenhouse gases, and noise, similar to the effects discussed above for the Bored Tunnel Alternative." (p. 223).

5 How have the build alternatives changed since the 2010 Supplemental Draft EIS?

The build alternatives (Bored Tunnel, Elevated Structure, and Cut-and-Cover Tunnel) have changed very little since the 2010 Supplemental Draft EIS was prepared. Some minor design changes were made at the south end of the project area for the Cut-and-Cover Tunnel and Elevated Structure Alternatives to reduce congestion on ramps to and from SR 99. In general, these design changes have not affected the traffic operations of the alternatives. The new information presented here results from the development of more detailed analysis, using a different design year, rather than any major changes in the design of the alternatives.

6 How does this memorandum assess the significance of changes in the tolling analysis?

This memorandum describes the analysis that is now being prepared for the Final EIS and compares the results of the new analysis to the results that were presented in the 2010 Supplemental Draft EIS.

Specifically, this report evaluates regional travel measures (VMT, VHT, and VHD), travel speeds, travel times, and traffic volumes. For each of these measures, the summary tables below compare the 2010 Supplemental Draft EIS to the current transportation modeling results, which are being developed for the Final EIS. All of the larger differences between values are explained in the table footnotes. In most cases, the differences reflect transportation network changes expected as a result of projected increases in population and roadway use between 2015 and 2030. In a few cases, the differences were the result of minor network coding errors caught between the preparation of the 2010 Supplemental Draft EIS and the current analysis or the way in which the data was summarized.

As described further below, the transportation conditions shown by the current analysis are not significantly different than those described in the 2010 Supplemental Draft EIS. Consistent with this conclusion, evaluations now being completed for the Final EIS have shown the effects on historic and cultural resources, air quality, energy and greenhouse gases, and noise are not significantly different from the effects described in the 2010 Supplemental Draft EIS. Also, additional analysis done since the 2010 Supplemental Draft EIS shows that the environmental justice populations are affected less than previously disclosed.

7 What travel demand model was used?

The travel demand model for this project incorporates future projections of population and employment, roadway improvements that would be in place and various transit service improvements. The specific model used to forecast traffic and revenue was a refined version of the City of

Seattle's regional travel demand model, which is a variation on the Puget Sound Regional Council's model but with a more refined structure of transportation zones. For the traffic analysis in the Supplemental Draft EIS, modelers refined and validated the City of Seattle's travel demand model to incorporate tolling analysis procedures from the PSRC model version 1.0A.2. The same approach has been used in the traffic analysis for the Final EIS.

The travel demand model is based on a variety of assumptions for the development of future year traffic forecasts. Assumptions include land use (population and employment) forecasts, transportation network elements, and values of time for transportation users. Detailed documentation of the toll modeling methodology, sensitivity tests and results can be found in the document entitled: "*Technical Analysis to Support the SR 99 Alaskan Way Viaduct Replacement Finance Plan*, February 2010". The current methodology to evaluate transportation is described in the updated Transportation Discipline Report and has not changed from the 2010 SDEIS.

8 What tolling rate scenarios were used?

In the 2010 Supplemental Draft EIS, five toll scenarios were considered – Scenarios A through E. Toll Scenario C evaluated the highest toll rates, while Toll Scenario E evaluated the lowest toll rate. Toll rates evaluated for Toll Scenarios A and B and D fell between the rates for Toll Scenarios E and C. The range of toll rates considered is shown in Exhibit 1. Toll rates would be higher for more congested times of day; weekend tolls would be lower than tolls at the same time of day on a weekday. Exhibit 1 shows the range of toll rates under each of the toll scenarios considered in the Supplemental Draft EIS. These ranges provide a basis of comparison between the scenarios; they do not set a floor or ceiling on the toll rates that could be charged on the facility.

For the Final EIS, a single toll scenario – Toll Scenario C – is being used as the basis for the tolled traffic forecasts for all three build alternatives. Scenario C is being used because it is the scenario with the highest toll rates and therefore provides a conservative analysis of the upper end of potential effects. For all alternatives tolls would apply only to through traffic on SR 99 and not to trips to or from downtown. The portion of SR 99 that would have tolls is different for each alternative because ramp locations vary. For the Bored Tunnel tolls would apply to all traffic using the tunnel and not traffic leaving SR 99 at either portal. Similary for the Cut-and-Cover Tunnel tolls would apply to all traffic in the tunnel, including southbound traffic entering south of the Battery Street Tunnel. For the Elevated Structure tolls would be charged for trips through the city, but not to trips entering or exiting SR 99 at the Columbia and Seneca Street ramps.

Exhibit 1
Range of Toll Rates Evaluated per Scenario (in 2008 dollars)

Scenario	Low	Average	High
A	$0.84	$2.16	$3.37
B	$0.84	$1.88	$3.37
C	$0.84	$2.44	$4.21
D	$0.84	$2.17	$3.37
E	$0 (no tolls off-peak)	$1.87	$2.35

See 2010 SDEIS pp. 207-208 for an explanation of the tolling scenarios.

9 What years were analyzed?

The 2010 Supplemental Draft EIS primarily evaluated tolls for the Bored Tunnel Alternative in its opening year of 2015 to show the public the immediate effects. For the Final EIS, the tolled traffic forecasts will evaluate both tolled and non-tolled versions of the build alternatives in the project's design year of 2030. The year 2030 is being used in the Final EIS as the basis for comparing alternatives because the alternatives have different opening years and because 2030 forecasts show the project's long-term effects.

10 How would tolls affect local and regional travel?

Three common metrics are often used to report system-wide transportation performance: vehicle miles traveled (VMT), vehicle hours traveled (VHT), and vehicle hours of delay (VHD). Exhibits 2, 3, and 4 compare 2015 and 2030 data on these measures. The 2015 data is taken from the 2010 Supplemental Draft EIS; the 2030 data is taken from the forecasts that are being developed for the Final EIS. For the 2015 and 2030 forecasts, the measures are presented for the Seattle City Center area and for the four-county region (Snohomish, King, Kitsap, and Pierce counties).

As shown in Exhibits 2, 3, and 4, the traffic analyses prepared for the Final EIS yield two main findings, both of which are consistent with the findings presented in the Supplemental Draft EIS:

(1) Traffic volumes will grow substantially between 2015 and 2030. The increases shown between the 2015 and 2030 data are the result of forecasted population growth. These changes are not related to tolling on the Alaskan Way Viaduct. While the 2030 data itself is new, the 2010 Supplemental Draft EIS informed the reader that traffic volumes were expected to increase between 2015 and 2030. For example:

- Page 98: “In most cases, traffic volumes are expected to increase between 2015 and 2030. These traffic volume increases are related to expected population growth in the study area and region”.
- Page 215: “Modeling results show systemwide measures (VMT, VHT, and VHD) exhibit diversion patterns similar to those discussed for 2015 with respect to the relative differences between tolled and non-tolled operations. The primary difference exhibited by 2030 estimates is an overall increase in travel as the region and the city grow over time.”
- Local and regional population and employment projections by the Puget Sound Regional Council show the Seattle City Center employment and households increasing between 2015 and 2030 by 45,100 and 23,100, respectively. During the same period the four county region employment and population increases by

418,000 and 346,100. Population and employment data is provided in the 2010 SDEIS Transportation Discipline Report on pages 261 and 262.

(2) The three build alternatives, if tolled, are similar to one another in terms of their traffic impacts, except that there would be more diversion of traffic to local streets under the Elevated Structure Alternative. The traffic forecasts in Exhibits 2, 3, and 4 show that VMT, VHT, and VHD are similar for all three build alternatives. While the data does not specifically measure diversion to local streets, the forecasts do indicate increased diversion with the Elevated Structure because VMT, VHT, and VHD are generally higher in the Seattle City Center areas with this alternative. This conclusion is further supported by the data on travel speeds, which is summarized in the next section; it shows that average travel speeds in Seattle City Center would be slightly lower with the Elevated Structure alternative.

Exhibit 2

Vehicle Miles Traveled

	SDEIS 2015 Tolled Bored Tunnel	2030 Viaduct Closed (No Build)	Current 2030 Tolled Bored Tunnel [% change from SDEIS]	Current 2030 Tolled Cut-and-Cover Tunnel [% change from SDEIS]	Current 2030 Tolled Elevated Structure [% change from SDEIS]
Seattle Center City[2]					
AM	427,600	413,000	445,700 / [4.2]	446,800 [4.5]	448,900 [5.0]
PM	529,900	521,400	559,400 [5.5]	561,900 [6.0]	563,600 [6.4]
Daily	2,397,000	2,371,400	2,534,400 [5.7]	2,540,000 [6.0]	2,551,200 [6.4]
Four-County Region					
AM	18,035,200	20,452,500	20,250,200 [12.3]	20,243,500 [12.2]	20,292,100 [12.5]
PM	21,245,700	24,263,200	23,962,400 [12.8]	23,952.400 [12.7]	24,014,200 [13.0]
Daily	97,259,500	110,820,300	109,541,400 [12.6]	109,506,800 [12.6]	109,696,600 [12.8]

Exhibit 3

Vehicle Hours Traveled

	SDEIS 2015 Tolled Bored Tunnel	2030 Viaduct Closed (No Build)	Current 2030 Tolled Bored Tunnel [% change from SDEIS]	Current 2030 Tolled Cut-and-Cover Tunnel [% change from SDEIS]	Current 2030 Tolled Elevated Structure [% change from SDEIS]
		Seattle Center City[2]			
AM	18,400	20,300	19,900 [8.2]	19,900 [8.2]	20,300 / [10.3]
PM	26,700	33,600	32,600 [22.1]	32,100[20.2]	32,700 / [22.5]
Daily	94,900	107,400	107,900 [13.7]	107,500 [13.3]	109,100 [15.0]
		Four-County Region			
AM	749,800	1,107,200	1,097,400 [46.4]	1,095,600 [46.1]	1,108,100 [47.8]
PM	863,000	1,236,400	1,226,400 [42.1]	1,223,100 [41.7]	1,236,600 [43.3]
Daily	3,324,000	4,436,100	4,415,500 [32.8]	4,409,500 [32.7]	4,440,500 [33.6]

[2] The Seattle City Center is roughly bounded by S. Royal Brougham Way in the south, just north of Mercer Street to the north, Broadway to the east, and Elliott Bay to the west.

Exhibit 4
Vehicle Hours of Delay

	SDEIS 2015 Tolled Bored Tunnel	Viaduct Closed (No Build)	Current 2030 Tolled Bored Tunnel [% change from SDEIS]	Current 2030 Tolled Cut-and-Cover Tunnel [% change from SDEIS]	Current 2030 Tolled Elevated Structure [% change from SDEIS]
Seattle Center City					
AM	6,600	8,600	7,600 [15.2]	7,400 [12.1]	7,800 [18.2]
PM	11,800	18,500	16,800 [42.4]	16,000 [35.6]	16,600 [40.7]
Daily	29,600	41,300	38,700 [30.7]	37,600 [27.0]	38,900 [31.4]
Four-County Region					
AM	255,400	537,900	526,600 [106.2]	524,900 [105.5]	536,000 [109.7]
PM	275,600	553,800	544,200 [97.5]	541,100 [96.3]	552,800 [100.6]
Daily	687,700	1,385,800	1,364,400 [98.4]	1,358,700 [97.6]	1,384,900 [101.4]

11 How would tolls affect SR 99 traffic conditions?

SR 99 travel speeds, travel times, and vehicle volumes were analyzed to compare the effects of (1) using 2030 rather than 2015 data and (2) analyzing traffic data for all three build alternatives rather than only the Bored Tunnel alternative. This data is shown in Exhibits 5, 6, and 7.

Exhibit 5

Travel Speeds(mph) – AM Peak

	SDEIS 2015 Tolled Bored Tunnel	Current 2030 Tolled Bored Tunnel	Current 2030 Tolled Cut-and-Cover Tunnel	Current 2030 Tolled Elevated Structure
South of King Street to Spokane Street				
NB	31	26	17	9
SB	49	48	48	48
King Street to Harrison Street				
NB	47	46	*Described by segments below*	
SB	48	48	*Described by segments below*	
King Street to Columbia/Seneca				
NB	*Described by King Street to Harrison Street*		48	44
SB	*Described by King Street to Harrison Street*		48	48
Columbia/Seneca Ramps to Elliott/Western				
NB	*Described by King Street to Harrison Street*		48	46
SB	*Described by King Street to Harrison Street*		48	48
Battery Street Tunnel				
NB	*Described by King Street to Harrison Street*		34	35
SB	*Described by King Street to Harrison Street*		34	34
North of Bored Tunnel/Battery Street Tunnel to Aurora Bridge				
NB	32	32	35	35
SB	29	18	10	10

Note: Viaduct Closed (No Build) alternative is not shown because traffic would be extremely congested and traffic models are not designed for these conditions.

Exhibit 6

Travel Speeds(mph) – PM Peak

	SDEIS 2015 Tolled Bored Tunnel	Current 2030 Tolled Bored Tunnel	Current 2030 Tolled Cut-and-Cover Tunnel	Current 2030 Tolled Elevated Structure
South of King Street to Spokane Street				
NB	48	45	46	10
SB	46	35	44	43
King Street to Harrison Street				
NB	47	45	*Described by segments below*	
SB	47	47	*Described by segments below*	
King Street to Columbia/Seneca Streets				
NB	*Described by King Street to Harrison Street*		48	47
SB	*Described by King Street to Harrison Street*		47	48
Columbia/Seneca Ramps to Elliott/Western Avenues				
NB	*Described by King Street to Harrison Street*		48	48
SB	*Described by King Street to Harrison Street*		47	48
Battery Street Tunnel				
NB	*Described by King Street to Harrison Street*		34	35
SB	*Described by King Street to Harrison Street*		34	34
North of Bored Tunnel/Battery Street Tunnel to Aurora Bridge				
NB	30	29	35	35
SB	37	36	21	20

Note: Viaduct Closed (No Build) alternative is not shown because traffic would be extremely congested and traffic models are not designed for these conditions.

This travel-speed data shows that:

(1) Travel speeds in 2030 are generally similar to the speeds projected for 2015; where they are different, the differences are attributable primarily to population growth[3]. In general, this analysis indicates that travel speeds for any build alternative in 2030 would be similar to the travel speeds projected for the Bored Tunnel in the 2010 Supplemental Draft EIS. However, the analysis identified four specific location/times where 2030

[3] PSRC. 2006. Population, Households, and Employment Forecast. Available at:http://www.psrc.org/assets/1327/2006_Forecasts_Population_Households Employment.xls. Accessed March 18, 2010.

travel speeds would be noticeably lower than 2015 travel speeds:

- Northbound AM South of King Street
- Northbound PM South of King Street
- Southbound PM South of King Street
- Southbound AM North of the Bored Tunnel

Review of the detailed forecasts and microsimulation models shows that these locations are sensitive to increases in traffic volumes projected in 2030 because a large volume of vehicles are expected to divert at these locations with a tolled SR 99 facility. Thus, the differences shown in the exhibits are to be expected given the projected increases in traffic volumes due to population growth between 2015 and 2030. Furthermore, this trend is consistent with statements in the Supplemental Draft EIS noted above on expected increases in local and regional traffic.

(2) The three build alternatives, if tolled, are similar to one another in terms of their effects on travel speeds. Travel times for the build alternatives in 2030 are shown in Exhibit 7. To the extent that there are differences, the forecasts indicate that the Elevated Structure alternative would result in a greater reduction in average travel speeds, because it would cause greater congestion on local streets.

12 What technical changes have been made since the Supplemental Draft EIS? How did they affect the analysis?

There have been several technical changes made to the traffic analysis since the 2010 Supplemental Draft EIS, but these changes have not materially affected the results of the traffic analysis.

Some travel times for the tolled Bored Tunnel in 2015 have been revised upwards from those reported in the 2010

Supplemental Draft EIS [4]. The primary cause of this difference is the use of a different and more accurate methodology. The process for summarizing travel time data from VISSIM[5] was updated between the 2010 Supplemental Draft EIS and the current analysis to more accurately capture the effect of diversion on both through-trips and trips exiting at the ramps. This change in method is particularly evident in three travel time routes (West Seattle to CBD inbound AM, Woodland Park to CBD inbound AM, Ballard to Spokane Street (via Alaskan Way) AM northbound) since segments of those routes were impacted the most by toll-related diversion. For the 2010 Supplemental Draft EIS, the segments used to calculate travel times ended immediately upstream of off-ramps. The travel time segment was then added to travel times for other roadway segments based on the entire travel time route being summarized. This method did not accurately capture the effects of diversion and overestimated the travel times for through-vehicles and underestimated the travel time for exiting vehicles at the major diversion points.

In the current analysis, two separate travel time segments were created to isolate through-trips from exiting trips. One segment ends on the mainline just downstream of the diverge point (to capture through-trips), and one ends on the off-ramp (to capture exiting trips). The use of this new methodology resulted in higher travel times for routes that exited SR 99 at the major diversion points.

---

[4] Travels times revisions are: no change – 8 trips, one minute – 2 trips, two minutes – 2 trips 3, 4, and 5 minutes – 1 trip each, eight minutes – 1 trip.

[5] VISSIM is a microscopic multi-modal traffic flow simulation software that allows each entity (car, train, person) to be simulated individually, i.e. it is represented by a corresponding entity in the simulation, thereby considering all relevant properties.

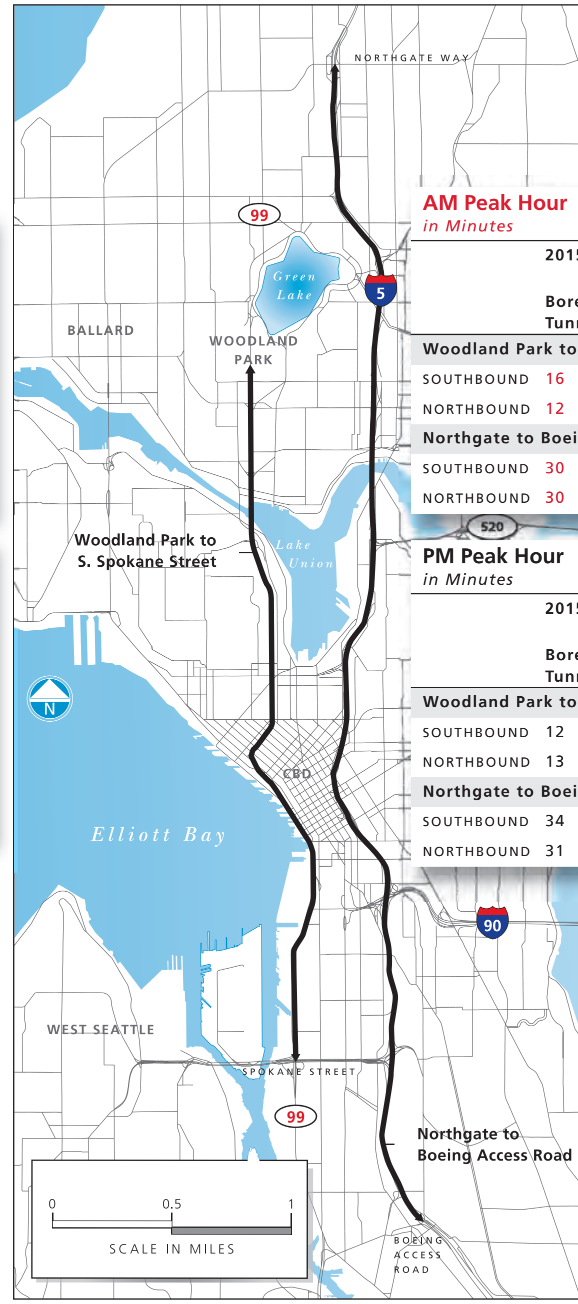
Tolled Travel Times

AM Peak Hour
in Minutes

	2015 Bored Tunnel	2030 Bored Tunnel	2030 Cut-&-Cover Tunnel	2030 Elevated Structure
West Seattle to Downtown Central Business District				
NORTHBOUND	29	32	32	33
Woodland Park to Downtown Central Business District				
SOUTHBOUND	27	27	35	32

PM Peak Hour
in Minutes

	2015 Bored Tunnel	2030 Bored Tunnel	2030 Cut-&-Cover Tunnel	2030 Elevated Structure
West Seattle to Downtown Central Business District				
NORTHBOUND	21	23	20	20
Woodland Park to Downtown Central Business District				
SOUTHBOUND	25	31	29	25

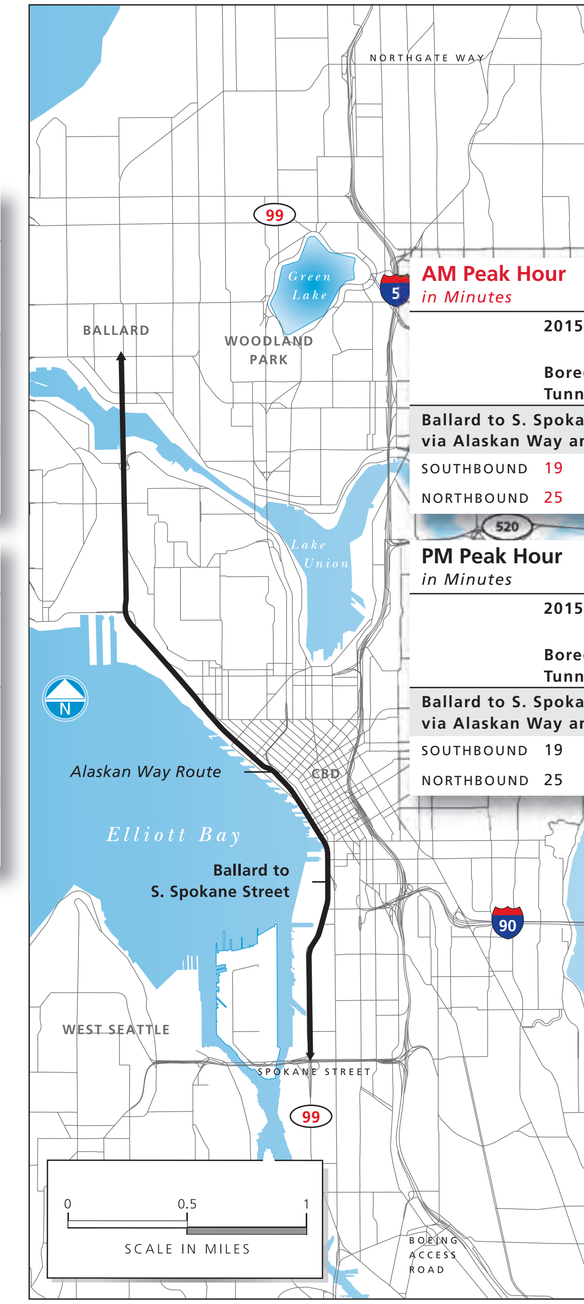


AM Peak Hour
in Minutes

	2015 Bored Tunnel	2030 Bored Tunnel	2030 Cut-&-Cover Tunnel	2030 Elevated Structure
Woodland Park to S. Spokane Street				
SOUTHBOUND	16	16	22	21
NORTHBOUND	12	12	14	22
Northgate to Boeing Access Road				
SOUTHBOUND	30	32	32	32
NORTHBOUND	30	33	33	33

PM Peak Hour
in Minutes

	2015 Bored Tunnel	2030 Bored Tunnel	2030 Cut-&-Cover Tunnel	2030 Elevated Structure
Woodland Park to S. Spokane Street				
SOUTHBOUND	12	14	16	16
NORTHBOUND	13	15	15	19
Northgate to Boeing Access Road				
SOUTHBOUND	34	40	39	40
NORTHBOUND	31	36	36	36



AM Peak Hour
in Minutes

	2015 Bored Tunnel	2030 Bored Tunnel	2030 Cut-&-Cover Tunnel	2030 Elevated Structure
Ballard to S. Spokane Street – via Alaskan Way and Alaskan Way Viaduct				
SOUTHBOUND	19	20	16	15
NORTHBOUND	25	27	17	26

PM Peak Hour
in Minutes

	2015 Bored Tunnel	2030 Bored Tunnel	2030 Cut-&-Cover Tunnel	2030 Elevated Structure
Ballard to S. Spokane Street – via Alaskan Way and Alaskan Way Viaduct				
SOUTHBOUND	19	23	16	17
NORTHBOUND	25	27	23	25

Note: *Viaduct Closed (No Build) alternative is not shown because traffic would be extremely congested and traffic models are not designed for these conditions.*

Exhibit 7

Overall, the changes in travel times between the 2010 Supplemental Draft EIS and the forecasts being developed for the Final EIS are small and are consistent with the results described in the 2010 Supplemental Draft EIS. The greatest change is for the trip pairs between West Seattle and Woodland Park to downtown Seattle; instead of stating “travel times are 3 to 4 minutes longer” the analysis would state “travel times are 6 to 9 minutes longer” (2010 SDEIS page 209). The changes to other trip pairs discussed in the 2010 SDEIS are smaller and none lead to different conclusions (see Exhibit 7). In the highly urban context of the project area, these changes not noticeable given normal variations in daily traffic conditions. We therefore conclude the updated results from the current analysis do not show any significant difference in travel times from the results presented in the 2010 Supplemental Draft EIS.

13 How would tolls affect adjacent roadways such as I-5 and city streets?

Modeling results for the 2010 Supplemental Draft EIS indicated tolling SR 99 would cause traffic to shift to I-5 and city streets. The traffic analysis that is being developed for the Final EIS, as summarized in exhibits 8, 9, and 10, also shows that tolling SR 99 would cause traffic to shift to I-5 and city streets. These effects of these changes in volumes are also illustrated in the effects to travel times discussed above (note the “Northgate to Boeing Access Road” route shows travel times on I-5). Vehicle volumes at screenlines were prepared for 2030 in the 2010 Supplemental Draft EIS. As a result, the volumes are directly comparable between the current analysis and Supplemental Draft EIS in exhibits 8, 9, and 10. The 2010 Supplemental Draft EIS model lane configurations for two downtown arterials were modeled incorrectly in several locations. These did not cause significant effects, but have been corrected for the current analysis and account for the difference between the forecasted 2010 Supplemental Draft EIS and current vehicle volumes. Where figures have been corrected from those presented in the 2010 Supplemental Draft EIS, the corrections made are indicated in footnotes as applicable in exhibits 8, 9, and 10.

Additional changes were made to how vehicle volumes are modeled in the current analysis:

- The 2010 Supplemental Draft EIS included surface Aurora Avenue, which is excluded from the current analysis vehicle volumes (109,400).
- The 2010 Supplemental Draft EIS model lane configurations for two downtown arterials were modeled incorrectly in several locations.
- The Supplemental Draft EIS mistakenly double-counted volumes on 6th Avenue for the S. Spokane Street screenline.
- In the southbound direction I-5 volumes south of I-90 were mistakenly calculated before the Forest Street exit.

Exhibit 8

Vehicle Volumes at Screenlines

	SDEIS 2030 Tolled Bored Tunnel	Current 2030 Viaduct Closed (No Build)	Current 2030 Tolled Bored Tunnel	Current 2030 Tolled Cut-and-Cover Tunnel	Current 2030 Tolled Elevated Structure
Harrison Street (Ellliott Bay to Aurora)	109,400[6]	113,700	107,300	106,600	107,800
Harrison Street (Aurora to I-5)	94,800	79,500	93,500	93,500	95,200
Seneca Street (Alaskan Way to I-5)	136,400	143,000	129,100	130,300	138,400
Seneca Street (I-5 to Lake Washington)	166,000	167,400	167,100	167,400	170,400
S. King Street (SR 99 to I-5)	126,500	124,100	124,100	119,900	116,800
S. Spokane Street (SR 99 to I-5)	129,300[7]	139,300	128,100	129,300	122,600

[6] •The 2010 Supplemental Draft EIS included surface Aurora Avenue at this screenline, which is excluded from the current analysis vehicle volumes to more accurately describe conditions off of mainline SR 99. The forecasted 2010 Supplemental Draft EIS volume, including Aurora Avenue, was 141,100.

[7] •The Supplemental Draft EIS mistakenly double-counted volumes on 6th Avenue for the S. Spokane Street screenline. The 2010 Supplemental Draft EIS forecast was 150,000.

Exhibit 9

Vehicle Volumes at Screenlines on Alaskan Way (surface street)

	SDEIS 2030 Tolled Bored Tunnel	Current 2030 Viaduct Closed (No Build)	Current 2030 Tolled Bored Tunnel	Current 2030 Tolled Cut-and-Cover Tunnel	Current 2030 Tolled Elevated Structure
North of Pine	24,100	24,800	24,900	27,600	28,200
North of Seneca	24,700	25,300	25,700	30,100	30,500
South of S. King	38,500	47,300	38,200	47,000	34,300

Regarding volumes on the Alaskan Way surface street, the Cut-and-Cover Tunnel and Elevated Structure Alternatives have additional capacity on Alaskan Way south of King Street when compared to the Bored Tunnel alternatives, thus drawing additional vehicles to this section of Alaskan Way.

For the Elevated Structure Alternative diversion levels for this screenline are higher due to the tolling location north of the Seneca Street ramps. Of the vehicles diverting to surface streets to avoid tolls, many make use of the Seneca Street ramp and increase volumes on Alaskan Way north of the Seneca Street screenline. The 2010 Supplemental Draft EIS discussed this traffic pattern on pages 216-217.

Exhibit 10
Vehicle Volumes at Screenlines on I-5

	SDEIS 2030 Tolled Bored Tunnel	Current 2030 Viaduct Closed (No Build)	Current 2030 Tolled Bored Tunnel	Current 2030 Tolled Cut-and-Cover Tunnel	Current 2030 Tolled Elevated Structure
South of SR 520	326,300	324,900	326,100	325,200	326,300
North of Seneca	284,500	283,200	281,000	280,700	281,200
South of I-90	277,500[8]	281,900	276,700	277,100	273,000

When the clarifications noted above are taken into account, the differences between vehicle volumes in the Supplemental Draft EIS and the current analysis are negligible. Context for the variability associated with travel demand modeling can be taken from the Travel Demand Model Refinement and Validation report prepared in 2009. The model was validated against actual data for a variety of metrics including trip length, mode share, transit boardings and vehicle volume counts along screenlines. Generally, the model performed within +/- 4 % of observed transit boarding s and +/- 10% on vehicle screenlines.

As shown in Exhibit 11, volumes on SR 99 in the current analysis are similar to those modeled for the Bored Tunnel alternative in the 2010 Supplemental Draft EIS, with the exception of the Elevated Structure. All alternatives are based on tolling only through-traffic on SR 99 and not trips to and from downtown Seattle. Unlike either the Bored Tunnel or the Cut-and-Cover Tunnel, the Elevated Structure has ramps connecting into downtown Seattle at Columbia (SB on) and Seneca (NB off). For this alternative, tolls are applied only to the through-portion of SR 99 between the Columbia/Seneca and Elliott/Western on and off ramps. This makes access to the downtown area via SR 99 attractive for trips to and from the south and results in higher modeled volumes. The 2010

[8] •In the southbound direction I-5 volumes south of I-90 were mistakenly calculated before the Forest Street exit. The 2010 Supplemental Draft EIS volume south of I-90 was forecasted to be 283,600.

Supplemental Draft EIS anticipated this difference on pages 216-217, noting

- "…it is assumed that the toll rate for traffic using these ramps would be less than the rate for traffic passing through downtown on the structure." (Note: The current analysis evaluates not just lower tolls for traffic using these ramps but no tolls at all.)

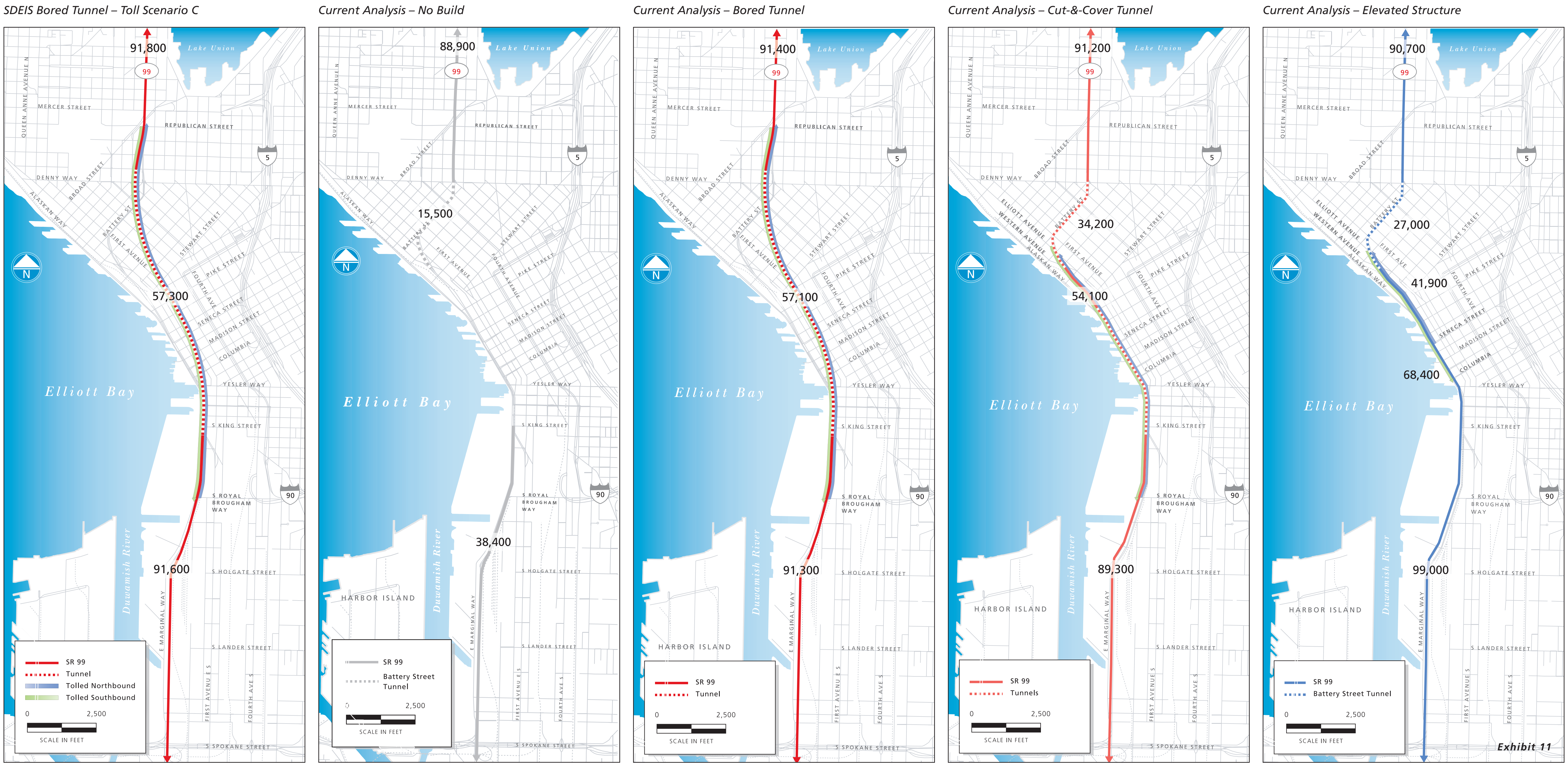
The 2010 SDEIS further states that:

- "Daily traffic volumes on SR 99 through the south and central sections are projected to be highest for the Elevated Structure Alternative…"
- "Projected volumes in these areas are highest because with the Elevated Structure Alternative because it is the only alternative that provides the Columbia and Seneca ramps and the Elliott and Western ramps, which increases travel demand."

The results from the current analysis include additional volumes due to population growth from 2015 to 2030 and most of the changes in VMT, VHT, and VHD between the Supplement Draft EIS using 2015 and the updated analysis done for the Final EIS using 2030 are due to this forecast population growth.

Volumes north of downtown with the No Build alternative are notably higher than in the central area. This is because in the north there are a number of street options to use when accessing downtown from SR 99 (e.g. arterials intersecting SR 99 such as Roy, Valley, Harrison, John etc., off-ramps at Denny and the southern end of the Battery Street Tunnel). As a result a large percentage of vehicles continue to use SR 99 to access downtown. In the south, there would be only one set of ramps to/from SR 99 in the Stadium area. Travelers tend to disperse to surface streets and I-5 thus resulting in a lower volume on SR 99 south of downtown.

2030 Daily SR 99 Volumes



14 What types of other environmental effects would Tolls have?

The 2010 Supplemental Draft EIS discussed potential environmental effects that could result from the toll scenarios, based on the transportation analysis. Potential effects were considered for the following environmental disciplines considered most sensitive to increased congestion on local streets:

- Environmental justice
- Historic and cultural resources
- Air quality
- Energy and greenhouse gases
- Noise

The 2010 Supplemental Draft EIS and current analysis of each subject is discussed below. Additional detailed analysis of the issues presented in this re-evaluation will appear in the FEIS.

Social Resources and Environmental Justice

2010 Supplemental Draft EIS

The 2010 Supplemental Draft EIS stated that:

> "…based on the analysis of Scenarios A, C, and E, it appears that tolling SR 99 could have the potential of a disproportionately high and adverse effect on some low-income populations, especially those without access to transit or who are dependent on their cars, unless proper optimization measures are implemented." (p. 222)

The 2010 Supplemental Draft EIS did not discuss effects of tolling on social resources in general. The current analysis considers how tolling would change access to social services and neighborhoods.

Current Analysis

The location, intensity, and duration of potential environmental impacts due to tolling have been reviewed following publication of the 2010 Supplemental Draft EIS. The project team reviewed the effects of tolling on traffic, air quality, and noise, seeking to identify whether any of these impacts may also have consequences for environmental justice populations.

Indications are that disproportionately high and adverse effects on environmental justice populations under the build alternatives could be avoided or reduced by careful planning and design, continued outreach to minority and low-income populations.

Further analysis of the impacts from tolling on the environmental justice population have shown that due to multiple non-tolled alternatives available, transit availability, and programs to make transponders available without a bank account, we have determined that operational effects will not result in a disproportionately high and adverse effect on the environmental justice populations. Other operational effects on low-income and minority populations due to changes in access, acquisitions and displacements, noise, and transit do not result in high, adverse, and disproportionate effects to low-income and minority populations.

Project construction would require many years to complete and would have effects in many parts of the study area. The most widespread effects would include increased traffic congestion, noise, dust, and light and glare in and around the construction zone. These effects would be adverse, but would not disproportionately affect low-income and minority populations.

Therefore, the current analysis finds build alternatives would not result in high, adverse, and disproportionate impacts on low-income and minority populations. The 2011 Social Resources Discipline Report, Appendix H, section 7.1. This report also addresses environmental justice. The report concludes tolling of any of the build alternatives would not have an additional significant impact on social resources because there would be numerous alternative routes that would not be tolled.

Conclusion

Additional analysis of potential effects to environmental justice populations since the 2010 Supplemental Draft EIS has found the options to avoid tolls and measures to make transponders available result in no disproportionately high and adverse effects. This reduction in effects (relative to the potential effects discussed in the 2010 Supplemental Draft EIS) does not merit further supplemental NEPA documentation.

Historic and Cultural Resources

2010 Supplemental Draft EIS

The 2010 Supplemental Draft EIS stated that:

> “The primary operational effect of a tolled Bored Tunnel Alternative versus an untolled Bored Tunnel Alternative on historic resources would be potential congestion from increased car and truck traffic in the historic districts and in the vicinity of other historic resources due to diversion from the tolled facility.
>
> “Diverted traffic would filter along the north-south streets throughout the downtown area, with particular impacts on Alaskan Way and on First Avenue/First Avenue S. This street runs along the western portion of Pioneer Square, on the eastern edge of the Pike Place Market and through Belltown. Pioneer Square, the Pike Place Market and the central waterfront piers are dependent on visitor traffic, and the character of these areas is defined by high levels of pedestrian activity, which could be affected by the additional diverted vehicular traffic.” (p. 222)

Current Analysis

Current findings on effects on historic and cultural resources in the current analysis show fewer effects on historic resources than were predicted in the 2010 Supplemental Draft EIS.

A major potential effect of tolling at any rate level or location is the diversion of traffic to other routes. Much of the diverted traffic would use the alternate routes closest to SR 99: Alaskan Way or First Avenue/First Avenue S. The increased traffic on these routes could potentially affect two historic districts (Pioneer Square and Pike Place Market) and two neighborhoods with numerous historic buildings (Belltown and the central waterfront). However, the effect would not be adverse. Under Section 106, there is a high standard for adverse effects related to economic conditions. Increased traffic could have an adverse effect on an historic district if it diminished its historic integrity and the qualities that made it eligible to be listed in the NRHP. For example, traffic congestion could have an adverse effect on historic buildings if traffic becomes severe enough or prolonged enough that it leads to a loss of businesses in the historic district. Property owners would then be unable to maintain the buildings properly and historic material or features could be lost. In other words, it would have an adverse effect if there was so much congestion that people stopped patronizing businesses or renting apartments or leasing offices. The increased traffic may pose an inconvenience to some businesses, employees, residents, and customers. However, tolling is not expected to increase traffic impacts enough to threaten the viability of the historic districts or the historic buildings. See 2011 Appendix I, Historic, Cultural and Archaeological Resources Discipline Report, section 7.1.

The traffic analysis indicates that the diverted traffic would spread over several parallel routes (Alaskan Way; First, Second and Fourth Avenues; and I-5). In some cases, vibration from traffic can potentially damage vulnerable historic buildings. However, each intersection has a traffic signal and the vehicles would be moving relatively slowly. The amount of vibration is not anticipated to affect the buildings. See 2011 Appendix I, Historic, Cultural, and Archaeological Resources Discipline Report, section 7.1.

Conclusion

The current analysis shows fewer effects on historic resources than were expected in the 2010 Supplemental Draft EIS analysis. This reduction in effect does not merit additional supplemental NEPA analysis.

Air Quality

2010 Supplemental Draft EIS

The 2010 Supplemental Draft EIS stated that:

> "Slightly increased VMT, VHT, and VHD would have a negligible effect on the amounts of ozone precursors emitted into the atmosphere from vehicular traffic. These changes in traffic conditions are unlikely to cause or exacerbate a violation of the ozone National Ambient Air Quality Standards (NAAQS) in the region, based on current and projected ozone levels and the anticipated change in regional emission rates under the toll scenarios.
>
> "Under all tolling conditions, vehicle trips would increase by up to a third at intersections in the project area. The increased vehicular trips through already congested intersections would increase CO and PM levels at sensitive land uses located near intersections. However, these changes in localized traffic conditions are unlikely to cause a violation of the CO or PM NAAQS in the region, based on current and projected CO and PM levels and anticipated increases in congestion under each tolling condition. Traffic volumes on SR 99 are expected to decrease under all tolled alternatives. Therefore the concentrations of CO and PM emitted from the tunnel portals and tunnel operations buildings would be lower than Bored Tunnel Alternative and would be below the NAAQS." (p. 222)

Current Analysis

The results of the screening-level mobile source analysis (WASIST) represent the reasonable worst-case conditions that would occur in the project area. The values are the highest 1-hour and 8-hour CO concentrations predicted at any of the receptor sites near the selected intersections for conditions in the design year (2030). As predicted in the 2010 Supplemental Draft EIS estimated carbon monoxide (CO) concentrations at intersections for all of the build alternatives are all projected to be below the 1-hour and 8-hour National Ambient Air Quality Standards (NAAQS) of 35 and 9 parts per million, respectively. Even at areas of higher pollutant concentration, such as the tunnel portals and tunnel operations buildings analysis showed that all estimated concentrations of CO and particulate matter with a diameter of 2.5 micrometers or less ($PM_{2.5}$) would be below the NAAQS for the tolled and non-tolled build alternatives. See 2011 Appendix M, Air Discipline Report for more information.

Conclusion

The current analysis shows effects consistent with those described in the 2010 Supplemental Draft EIS. Therefore additional supplemental NEPA documentation is not required.

Energy and Greenhouse Gases

2010 Supplemental Draft EIS

The 2010 Supplemental Draft EIS stated that:

> "[T]he toll scenarios are expected to slightly increase VMT, VHT, and VHD within the four-county region, relative to the untolled Bored Tunnel Alternative. This increase would result in very small overall reductions in average network speed of approximately 0.2 percent under Bored Tunnel Toll Scenario A, 0.2 percent under Bored Tunnel Toll Scenario C, and less than 0.1 percent under Bored Tunnel Toll Scenario E, as compared to the untolled Bored Tunnel Alternative. The slight increase in VMT under all of the toll scenarios and slight

decrease in overall network speed within the estimated speed range are expected have negligible effects on regional energy usage and greenhouse gas emissions. [T]he toll scenarios would increase VMT, VHT, and VHD within the Seattle Center City, relative to the 2015 Existing Viaduct and the untolled Bored Tunnel Alternative. This increase would result in an overall reduction in average network speed of approximately 5 percent under Bored Tunnel Toll Scenario A, 6 percent under Bored Tunnel Toll Scenario C, and less than 1 percent under Bored Tunnel Toll Scenario E, as compared to the untolled Bored Tunnel Alternative. The increase in VMT under all of the toll scenarios and the decrease in overall network speed within the estimated speed range is expected to result in increased energy usage and greenhouse gas emissions of approximately 8 percent under Bored Tunnel Toll Scenario A, 9 percent under Bored Tunnel Toll Scenario C, and 1 percent under Bored Tunnel Toll Scenario E, as compared to the untolled Bored Tunnel Alternative. Energy use would increase compared to the 2015 Existing Viaduct. Energy usage rates are based on rate factors estimated using EPA's MOVES model. MOVES is EPA's new emission modeling system that allows the user to estimate criteria pollutant and greenhouse gas emission factors and energy usage rates." (p. 222)

Current Analysis

While the evaluation for the 2010 Supplemental Draft EIS used expected changes in network speeds as surrogates to predict changes in greenhouse gas emissions, the current analysis has estimated potential direct emissions of greenhouse gases under the build alternatives in 2030 using the EPA MOVES2010a model. This analysis shows much lower increases than were predicted in the 2010 Supplemental Draft EIS. For the Bored Tunnel, greenhouse gas emissions would decrease by 0.06 percent, instead of the 9 percent increase previously predicted. The increases for the Cut and Cover Tunnel (0.06 percent) and

Elevated Structure (0.04 percent) are similarly well below what was discussed in the 2010 Supplemental Draft EIS Appendix R, Energy Discipline Report, Section 5.2 Operational Effects (Exhibit5-2). (See 2011 Appendix R, Energy Discipline Report)

Conclusions

The greenhouse gas emissions resulting from tolling are predicted to be much lower than predicted in the 2010 Supplemental Draft EIS analysis; therefore, additional supplemental NEPA documentation is not required.

Noise

2010 Supplemental Draft EIS

The 2010 Supplemental Draft EIS stated that:

> "Noise effects were qualitatively assessed based on changes in traffic volumes. Traffic volumes on SR 99 are expected to decrease by approximately one-quarter under Bored Tunnel Toll Scenarios A and C, relative to the untolled Bored Tunnel Alternative, which would result in slightly lower traffic noise levels at noise-sensitive sites located immediately adjacent to the bored tunnel portals. Noise levels would continue to be lower than the 2015 Existing Viaduct."
>
> "Under Bored Tunnel Toll Scenarios A and C, traffic volumes on Alaskan Way would increase by approximately one-half, relative to the untolled Bored Tunnel Alternative, which would result in slightly higher traffic noise levels at noise-sensitive sites located along the waterfront, near Alaskan Way. Because SR 99 traffic would be underground, noise levels would be substantially lower than the 2015 Existing Viaduct.
>
> Diverted traffic under Bored Tunnel Toll Scenarios A and C would increase traffic volumes on downtown city streets by approximately one-tenth, relative to the

> untolled Bored Tunnel Alternative. These increases in downtown traffic would be present throughout much of the downtown street network but would result in no noticeable change in traffic noise levels at noise-sensitive sites located near downtown city streets. Noise levels would continue to be similar to the 2015 Existing Viaduct." (pp. 222-223)

Current Analysis

To compare how noise levels would change, traffic noise levels were modeled at 70 sites for both existing conditions and the year 2030 for each of the build alternatives, with and without tolls. For the Bored Tunnel and Elevated Structure Alternatives, the difference between the tolled and non-tolled modeling results is within 2 dBA. This is consistent with the findings in the 2010 Supplemental Draft EIS that there would be no noticeable change. For the Cut-and-Cover Tunnel Alternative, there is one location where the non-tolled noise level would be 3 dBA higher, but all other locations are within 2 dBA. A change of 2 dBA or less is not noticeable to most listeners, so noise levels between the tolled and non-tolled conditions for each alternative would be very similar, consistent with the findings of the 2011 Appendix F, Noise Discipline Report.

Conclusion

The current analysis shows noise levels for tolled and non-tolled operation of the build alternatives is very similar. This is consistent with the effects described in the 2010 Supplemental Draft EIS so additional supplemental documentation is not required.

15 Conclusion

Results from updated transportation modeling for all alternatives in 2030 are consistent with results presented or anticipated in the Supplemental Draft EIS and do not show any new significant adverse impacts. Similarly, the current analysis has not shown new significant effects beyond those indicated in the 2010 Supplemental Draft EIS. Therefore, based on the information currently available, a supplemental NEPA document is not required.