RTID Travel Demand Modeling: Assumptions and Method of Analysis

Overall Model and Scenario Assumptions

The Puget Sound Regional Council's (PSRC) regional travel demand model was used to forecast travel demand and system performance for the highway portion of the Roads + Transit package. The key focus of the analysis was the travel time benefits of implementing the package.

In order to determine the performance benefits of the package, the modeling analysis considered three scenarios for comparison.

- **2028 Baseline** – Includes in the baseline all State, Sound Transit, City, and County roadway projects, either under construction or expected to be completed by 2028. This scenario was used as the baseline of comparison for the travel time benefits of the RTID package.

- **Scenario 1 – RTID Benefits** - To create this modeling scenario, RTID projects were added to the baseline package of funded improvements. Figure 3 illustrates the RTID improvements contained in the proposed Roads + Transit package. Local improvements are also included in the 2028 Baseline and modeling; however, these local projects are not shown on the map in this report due to space limitations. Subtracting the performance of the baseline from the Scenario 1 performance provides the improved performance of the RTID package.

- **Scenario 2 – State Funded Improvements Plus RTID** – This scenario developed the cumulative performance benefits of the currently funded projects on state highways from the 2003 and 2005 transportation packages plus the RTID investment package. The benefits of the state funded projects in conjunction with the RTID package could be determined by subtracting Scenario 2 performance from the revised baseline performance.

The starting point for the transit network in the RTID benefit analysis was the latest 2006 PSRC Transit network. No new bus routes were added to the future transit network. To take advantage of the improved network, bus routes that use the freeway system were moved into new HOV lanes that are proposed as a part of the package.

To summarize, the 2028 baseline and two modeling scenarios were used in the analysis for the RTID package. These scenarios were:

1. **2028 Baseline** : All State, Sound Transit, City, and County roadway and rail projects, either under construction or expected to be completed by 2028
2. **Scenario 1 - 2028 RTID**: RTID projects in addition to all State, Sound Transit, City, and County roadway and rail projects, either under construction or expected to be completed by 2028
3. **Scenario 2 - 2028 State Funded Improvements plus RTID**: RTID proposal combined with state funded improvements compared to a revised 2028 baseline that includes all Sound Transit, City, and County roadway and rail projects, either under construction or expected to be completed by 2028

With these scenarios developed, two methods were then utilized to measure performance; one at the system level and one at the individual project level. In both cases, the focus was on the Snohomish, Pierce, and King County portion of the regional model. Kitsap County was not considered in the analysis.

System Level Analysis

The system level analysis was used to help assess the overall travel demand and benefits of the full RTID package for the three county area. Each scenario was run through the entire 4-stage modeling process. This allowed the model to change the distribution of trips as well as the mode used for travel as a result of different levels of transportation supply and network congestion.

Each scenario's travel demand, which includes cars, trucks and transit users, was then assigned to the transportation network to determine an estimated travel speed for every link in the model. These speeds and volumes were then used to measure the average vehicle hours traveled (VHT) as well as the overall amount of delay in the entire 3-County area. The system wide analysis compared the change in delay, speed, and average trip travel time between the 2028 Baseline and RTID scenario. Delay in each scenario was measured as the difference in VHT on the network at the speed limit versus the VHT on the network as predicted in the model.

The 4-Stage model run produces daily travel by five distinct time periods. These periods are:

- A.M. peak (6:00 a.m. to 8:59 a.m.)
- Midday (9:00 a.m. to 2:59 p.m.)
- P.M. peak (3:00 p.m. to 5:59 p.m.)
- Evening (6:00 p.m. to 9:59 p.m.)
- Night (10:00 p.m. to 5:59 a.m.)

For the purposes of this analysis, all performance measures were reported for the PM Peak Period. The reason for this decision is that the PM Peak Period experiences the greatest amount of demand, and in turn congestion, of all five time periods. By measuring the system wide performance benefits for the PM Peak Period, we were able to capture the greatest impact of the proposed RTID Package.

The results of the system level analysis were then compared between the three scenarios detailed above. The key performance measures calculated at the System Level were vehicle hours of delay, average trip travel time, and average speed. The performance of the RTID investments compared against a 2028 Baseline that included all current state investments is shown in Figure 1.

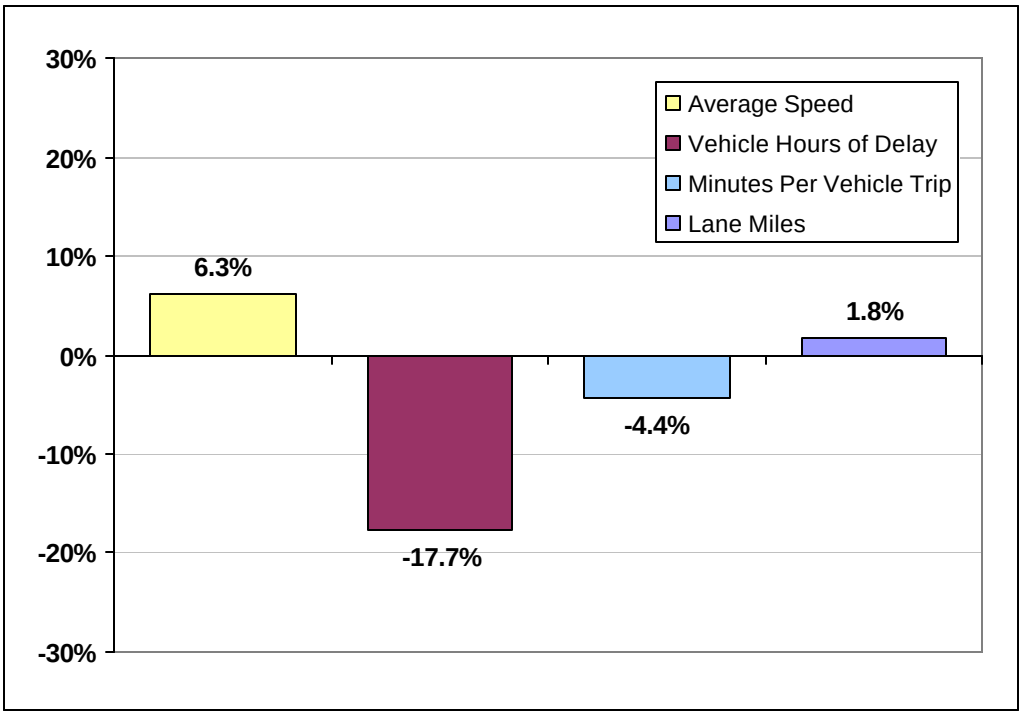

Figure 1. 2028 Improved Highway Performance with the RTID Package
Numbers are rounded

The RTID investment package reduces the PM Peak Period delay by approximately 18%. The average system wide speed would increase by over 6%. These are system-wide improvements that include both local and state facilities.

When you combine the benefits of all State Investments (Nickel, TPA) along with RTID and compare it against a 2028 Baseline with local projects only, the benefits are significantly greater as shown in Figure 2.

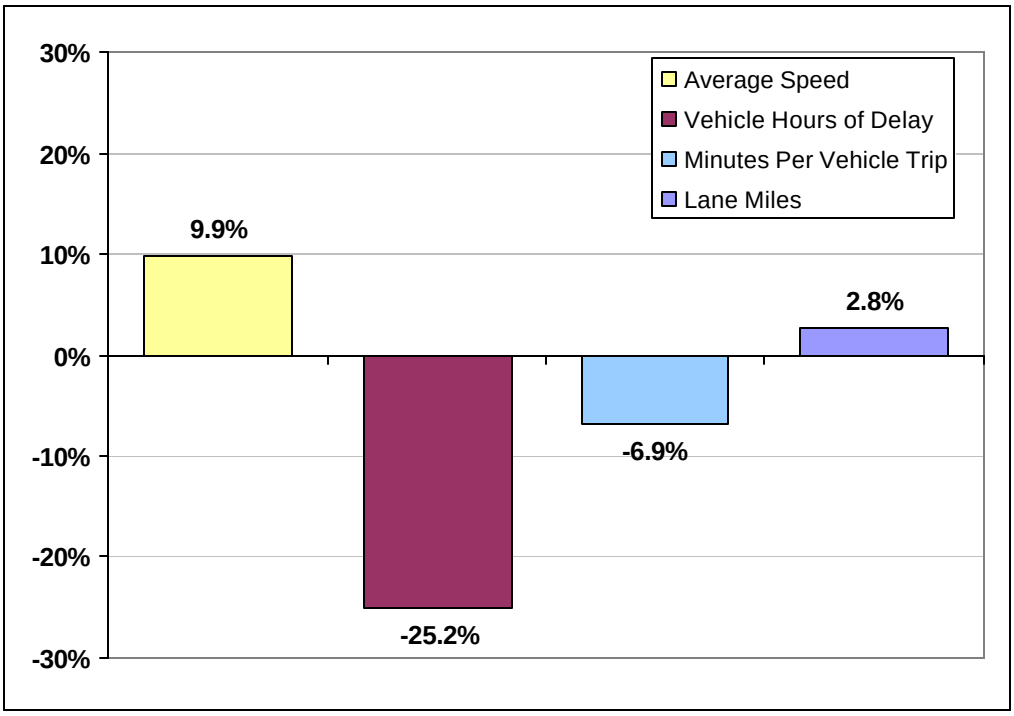

Figure 2. Highway Performance of the RTID, Nickel and TPA Packages
Numbers are rounded

As illustrated in Figure 2, the addition of all the investments results in a 25% reduction in PM Peak period delay and approximately 10% increase in PM Peak Period speeds.

Project Level Performance Analysis

Two modeling methodologies were use to calculate individual RTID project level performance. One methodology used the Puget Sound Regional Councils' regional travel demand model. The second methodology used was through a proprietary model developed by Westby Consulting LLC.

Using the regional travel demand model, the individual RTID project analysis was calculated by removing each individual project from the model and then re-running the highway assignment to determine how the VMT, VHT and delay changed as a result of the removal of that specific project. This process was repeated using the same travel demand for each RTID project to determine the relative system benefits of each project. The performance for each project was determined by comparing the system performance with and without the project being evaluated. To capture the benefits of smaller projects that may have been washed out in the system level numbers, we measured model performance within a five mile radius from the center of the project.

The contract with Westby Consulting LLC stipulated the benefits be determined for the following corridors for which RTID projects are proposed: SR 509, SR 167 (King County), I-405, SR 520, the I-405/SR 167 Interchange, SR 524, SR 9, SR 522 and SR 531. Due to limitations of the tool and budget constraints, these were the only corridors analyzed with this model.

Forecasting the likely performance of transportation improvement projects many years in the future is a challenging task. Assumptions about the amount and location of future population and job growth must be made in order to do the forecasting. In accord with the enabling legislation that has lead to the Regional Transportation Investment District's (RTID) ballot proposal, WSDOT staff endeavored to perform this analysis.

In order to be as conservative as possible when reporting RTID project level performance, the decision was made to use the most conservative benefit output regardless of the model used. For example, if the regional model showed better project performance than the Westby model, the results from the Westby model have been reported. Conversely, if the Westby model indicated better project level performance than the regional model, the regional model output was used. The findings from this analysis are found in Table 1.

While the majority of the RTID projects were analyzed using the methodologies described above, several of the projects were difficult to assess using either model. In these cases, further analysis outside the two models was required. Examples of projects where further analysis was necessary are spot improvements (such as interchange reconstruction). In order to analyze these improvements, the project benefit evaluation was accomplished by performing a planning level highway capacity analysis.

Additionally, projects that propose a completely new roadway on new alignment did not have similar links in the 2028 Baseline scenario from which to compare performance. For such projects, a representative existing alternative path was compared to the new route.

Table 2 provides the benefit results from the regional travel demand model and Table 3 provides the results of all the corridors analyzed with the Westby model. This information is provided in order to provide full disclosure of the benefit calculations from each methodology.

Table 1. 2028 RTID Individual Project Performance with Conservative Delay Estimates

State Route	Project Description	Daily (24hr) Vehicle Hours of Delay Savings	Daily (24hr) Person Hours of Delay Savings	Daily (24hr) Truck Hours of Delay Savings	Average PM Peak Corridor Travel Time (Peak Direction)			Average PM Peak Period Corridor Speed (Peak Direction)			Additional PM Peak Period Person Trips that could be Accommodated	Tool used for Performance Calculation
					Without Project	With Project	Improvement	Without Project	With Project	Improvement		
		Veh-Hrs	Person-Hour	Truck-Hour	minutes	minutes	%	MPH	MPH	%	People	
167	SR 167: SR 509 (Port of Tacoma) to N Meridian (Puyallup) - Extension of SR 167	740	1,000	40	14.9	9.2	38%	22	36	62%	2,430	Regional Model
704 / 512	SR 704: I-5 to SR 7 - New 4 lane limited access highway	730	990	20	28.1	10.3	63%	26	37	45%	5,940	Regional Model
162	SR 162: SR 410 to 96th St. SE - Widen to 4 lanes and interchange improvements at SR 410	2,530	3,420	80	4.1	1.2	71%	7	25	240%	1,490	Regional Model
5	I-5: S 38th St. Interchange - Access ramp to Tacoma Mall	110	150	0	0.6	0.6	7%	28	30	7%	2,970	Regional Model
5	I-5: SR 18 Interchange Vicinity - New interchange and arterial improvements	5,070	6,840	260	-	-	-	-	-	-	-	Other
509 / I-5	SR 509: S 188th St. to I-5 - New 4 lane highway including a new I-5 interchange and associated improvements	10,630	14,350	510	81.7	52.8	35%	13	16	26%	6,420	Regional Model
-	S Spokane St: 1st Ave. S to I-5 - Widen for extended transit lane and improve interchanges	1,050	1,420	40	0.9	0.9	4%	32	33	4%	2,160	Regional Model
-	S Lander St: 1st Ave. S to 4th Ave. S - Grade separation over railroad	2,540	3,430	100	0.5	0.5	4%	31	32	4%	-	Other
-	South Park Bridge: Duwamish Waterway Replace bridge	4,010	5,410	160	14.6	7.7	47%	12	22	91%	3,240	Regional Model
99	SR 99: N 165th St. to N 205th St. (Shoreline) - Widen for Business Access and Transit lanes	50	70	0	5.3	5.1	3%	23	24	3%	-	Regional Model

Table 1 2028 RTID Individual Project Performance with Conservative Delay Estimates Continued

State Route	Project Description	Daily (24hr) Vehicle Hours of Delay Savings	Daily (24hr) Person Hours of Delay Savings	Daily (24hr) Truck Hours of Delay Savings	Average PM Peak Corridor Travel Time (Peak Direction)			Average PM Peak Period Corridor Speed (Peak Direction)			Additional PM Peak Period Person Trips that could be Accommodated	Tool used for Performance Calculation
					Without Project	With Project	Improvement	Without Project	With Project	Improvement		
		Veh-Hrs	Person-Hour	Truck-Hour	minutes	minutes	%	MPH	MPH	%	People	
167	SR 167: 8th St to 15th St. NW - NB High Occupancy Toll lane (from AM network)	2,190	2,960	100	13.0	8.9	32%	24	35	46%	2,160	Regional Model
167	SR 167: 180th to 84th - SB GP Lane	1,860	2,510	80	10.5	8.8	16%	17	21	19%	1,220	Regional Model
167	SR 167: 84th Ave to SR 516 - SB GP lane	310	420	10	4.9	3.6	27%	21	29	36%	1,220	Regional Model
167	SR 167: S. 277th to SR 516 - SB GP lane	3,050	4,120	130	6.7	4.0	41%	15	26	68%	1,220	Westby Model
90	I-90: Two-way transit and HOV lanes	4,710	6,360	180	15.5	12.2	22%	29	37	28%	2,160	Regional Model
405	I-405: SR 167 Interchange - Direct NB and SB HOV/HOT flyover ramp connections	1,310	1,770	50	35.7	25.0	30%	33	47	43%	600	Regional Model
405	I-405: SR 169 to SR 520 - I-405 congestion relief projects	9,340	12,610	340	28.7	19.6	32%	23	33	47%	5,670	Regional Model
520	SR 520: I-5 to 108th Ave. NE - Widen for HOV lane and replace the Evergreen Point Floating Bridge	4,650	6,280	160	16.4	13.1	20%	23	29	25%	2,430	Westby Model
524	SR 524: 24th Ave. W to Royal Anne Rd - Widen to 5 lanes	900	1,220	30	8.0	5.1	36%	22	34	55%	1,220	Westby Model
9	SR 9: 176th St. SE - Widen to 4 lanes	2,890	3,900	80	29.4	22.4	24%	23	30	31%	1,620	Regional Model
5	I-5: US-2 Interchange Vicinity - Everett arterial access improvements	3,830	5,170	120	-	-	-	-	-	-	-	Other
5	I-5: 128th St. SE Interchange - Interchange improvements	1,140	1,540	40	-	-	-	-	-	-	-	Other

Table 1 2028 RTID Individual Project Performance with Conservative Delay Estimates Continued

State Route	Project Description	Daily (24hr) Vehicle Hours of Delay Savings	Daily (24hr) Person Hours of Delay Savings	Daily (24hr) Truck Hours of Delay Savings	Average PM Peak Corridor Travel Time (Peak Direction)			Average PM Peak Period Corridor Speed (Peak Direction)			Additional PM Peak Period Person Trips that could be Accommodated	Tool used for Performance Calculation
					Without Project	With Project	Improvement	Without Project	With Project	Improvement		
		Veh-Hrs	Person-Hour	Truck-Hour	minutes	minutes	%	MPH	MPH	%	People	
522	SR 522: Paradise Lake Rd. to Snohomish River - Widen to 4 lanes and new interchange at Paradise Lake Rd.	1,840	2,480	40	13.6	6.7	51%	18	36	104%	3,240	Westby Model
2	US-2: SR 204 Interchange Vicinity - Interchange improvements	2,040	2,750	120	-	-	-	12	26	117%	-	Other
531	SR 531: 43rd Ave. NE to SR 9 - Widen to 5 lanes	90	120	0	6.3	4.9	21%	26	34	27%	1,080	Regional Model
524	SR 524: 48th Ave. W to 37th Ave. W - Widen to 7 lanes	380	510	10	2.0	1.7	18%	22	27	22%	1,080	Regional Model
99	SR 99: 244th St SW thru the SR 104 Interchange - Widen for Business Access and Transit lanes	240	320	10	1.5	0.8	49%	9	18	95%	1,490	Regional Model
5	I-5: Everett Interchange Vicinity - 100th St. SE HOV access to I-5	110	150	0	1.1	0.9	17%	27	32	21%	2,030	Regional Model
5	I-5: Everett Interchange Vicinity - On-ramp to SB I-5	2,580	3,480	80	-	-	-	-	-	-	-	Other
5	I-5: 88th St. NE Interchange - Interchange improvements	380	510	10	-	-	-	-	-	-	-	Other
5	I-5: 116th St. NE Interchange - New Single Point Urban Interchange	260	350	10	-	-	-	-	-	-	-	Other
5	I-5: 41st St. SE Vicinity - Arterial improvements on Broadway	230	310	10	1.6	0.6	60%	8	21	153%	1,490	Other

Table 1 2028 RTID Individual Project Performance with Conservative Delay Estimates Continued

State Route	Project Description	Daily (24hr) Vehicle Hours of Delay Savings	Daily (24hr) Person Hours of Delay Savings	Daily (24hr) Truck Hours of Delay Savings	Average PM Peak Corridor Travel Time (Peak Direction)			Average PM Peak Period Corridor Speed (Peak Direction)			Additional PM Peak Period Person Trips that could be Accommodated	Tool used for Performance Calculation
					Without Project	With Project	Improvement	Without Project	With Project	Improvement		
		Veh-Hrs	Person-Hour	Truck-Hour	minutes	minutes	%	MPH	MPH	%	People	
-	39th Ave SE: 240th St. SE to 228th St. SE - Missing arterial link	250	340	10	2.4	2.1	11%	26	30	12%	1,220	Regional Model
-	39th/35th Ave. SE: 228th St. SE to Seattle Hill Rd - Widen to 3 lanes	50	70	0	8.7	8.0	8%	32	35	9%	140	Westby Model
-	88th St. NW: State Ave. NE to 67th Ave. NE - Widen to 5 lanes	200	270	10	3.8	2.9	22%	27	34	29%	2,700	Regional Model
2	US-2: City of Monroe - Monroe bypass phase	260	350	10	6.0	2.5	58%	25	55	117%	4,860	Other
-	Mercer St: Dexter Ave. N to Fairview Ave. N - Reconfigure Mercer St. for two way traffic and other improvements	220	300	10	16.0	15.0	6%	-	-	-	-	Regional Model
104	SR 104: City of Edmonds - New Multimodal Terminal and new SR 104 connection	-	-	-	-	-	-	-	-	-	-	Other
-	244th at Sammamish: Extend the roadway	20	30	0	4.5	4.4	1%	36	36	-	1,350	Regional Model

Table 2 2028 RTID Individual Project Performance estimated with Regional Model

State Route	Project Description	Daily (24hr) Vehicle Hours of Delay Savings	Daily (24hr) Person Hours of Delay Savings	Daily (24hr) Truck Hours of Delay Savings	Average PM Peak Corridor Travel Time (Peak Direction)			Average PM Peak Period Corridor Speed (Peak Direction)			Additional PM Peak Period Person Trips that could be Accommodated	Tool used for Performance Calculation
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		Veh-Hrs	Person-Hour	Truck-Hour	minutes	minutes	%	MPH	MPH	%	People	
167	SR 167: SR 509 (Port of Tacoma) to N Meridian (Puyallup) - Extension of SR 167	740	1,000	40	14.9	9.2	38%	22	36	62%	2,430	Regional Model
704 / 512	SR 704: I-5 to SR 7 - New 4 lane limited access highway	730	990	20	28.1	10.3	63%	26	37	45%	5,940	Regional Model
162	SR 162: SR 410 to 96th St. SE - Widen to 4 lanes and interchange improvements at SR 410	2,530	3,420	80	4.1	1.2	71%	7	25	240%	1,490	Regional Model
5	I-5: S 38th St. Interchange - Access ramp to Tacoma Mall	110	150	0	0.6	0.6	7%	28	30	7%	2,970	Regional Model
509 / I-5	SR 509: S 188th St. to I-5 - New 4 lane highway including a new I-5 interchange and associated improvements	10,630	14,350	510	81.7	52.8	35%	13	16	26%	6,420	Regional Model
-	S Spokane St: 1st Ave. S to I-5 - Widen for extended transit lane and improve interchanges	1,050	1,420	40	0.9	0.9	4%	32	33	4%	2,160	Regional Model
-	South Park Bridge: Duwamish Waterway Replace bridge	4,010	5,410	160	14.6	7.7	47%	12	22	91%	3,240	Regional Model
99	SR 99: N 165th St. to N 205th St. (Shoreline) - Widen for Business Access and Transit lanes	50	70	0	5.3	5.1	3%	23	24	3%	-	Regional Model
167	SR 167: 8th St to 15th St. NW - NB High Occupancy Toll lane (from AM network)	2,190	2,960	100	13.0	8.9	32%	24	35	46%	2,160	Regional Model

Table 2 2028 RTID Individual Project Performance estimated with Regional Model continued

State Route	Project Description	Daily (24hr) Vehicle Hours of Delay Savings	Daily (24hr) Person Hours of Delay Savings	Daily (24hr) Truck Hours of Delay Savings	Average PM Peak Corridor Travel Time (Peak Direction)			Average PM Peak Period Corridor Speed (Peak Direction)			Additional PM Peak Period Person Trips that could be Accommodated	Tool used for Performance Calculation
					Without Project	With Project	Improvement	Without Project	With Project	Improvement		
		Veh-Hrs	Person-Hour	Truck-Hour	minutes	minutes	%	MPH	MPH	%	People	
167	SR 167: 180th to 84th - SB GP Lane	1,860	2,510	80	10.5	8.8	16%	17	21	19%	1,220	Regional Model
167	SR 167: 84th Ave to SR 516 - SB GP lane	310	420	10	4.9	3.6	27%	21	29	36%	1,220	Regional Model
167	SR 167: S. 277th to SR 516 - SB GP lane	3,100	4,190	130	11.1	9.0	19%	9	11	24%	1,220	Regional Model
90	I-90: Two-way transit and HOV lanes	4,710	6,360	180	15.5	12.2	22%	29	37	28%	2,160	Regional Model
405	I-405: SR 167 Interchange - Direct NB and SB HOV/HOT flyover ramp connections	1,310	1,770	50	35.7	25.0	30%	33	47	43%	600	Regional Model
405	I-405: SR 169 to SR 520 - I-405 congestion relief projects	9,340	12,610	340	28.7	19.6	32%	23	33	47%	5,670	Regional Model
520	SR 520: I-5 to 108th Ave. NE - Widen for HOV lane and replace the Evergreen Point Floating Bridge	6,130	8,280	210	18.9	12.1	36%	20	31	56%	2,430	Regional Model
524	SR 524: 24th Ave. W to Royal Anne Rd - Widen to 5 lanes	1,490	2,010	40	9.7	6.5	33%	18	27	50%	1,220	Regional Model
9	SR 9: 176th St. SE - Widen to 4 lanes	2,890	3,900	80	29.4	22.4	24%	23	30	31%	1,620	Regional Model
522	SR 522: Paradise Lake Rd. to Snohomish River - Widen to 4 lanes and new interchange at Paradise Lake Rd.	6,500	8,780	150	31.1	7.0	78%	8	35	346%	3,240	Regional Model

Table 2 2028 RTID Individual Project Performance estimated with Regional Model continued

State Route	Project Description	Daily (24hr) Vehicle Hours of Delay Savings	Daily (24hr) Person Hours of Delay Savings	Daily (24hr) Truck Hours of Delay Savings	Average PM Peak Corridor Travel Time (Peak Direction)			Average PM Peak Period Corridor Speed (Peak Direction)			Additional PM Peak Period Person Trips that could be Accommodated	Tool used for Performance Calculation
					Without Project	With Project	Improvement	Without Project	With Project	Improvement		
		Veh-Hrs	Person-Hour	Truck-Hour	minutes	minutes	%	MPH	MPH	%	People	
531	SR 531: 43rd Ave. NE to SR 9 - Widen to 5 lanes	90	120	0	6.3	4.9	21%	26	34	27%	1,080	Regional Model
524	SR 524: 48th Ave. W to 37th Ave. W - Widen to 7 lanes	380	510	10	2.0	1.7	18%	22	27	22%	1,080	Regional Model
99	SR 99: 244th St SW thru the SR 104 Interchange - Widen for Business Access and Transit lanes	240	320	10	1.5	0.8	49%	9	18	95%	1,490	Regional Model
5	I-5: Everett Interchange Vicinity - 100th St. SE HOV access to I-5	110	150	0	1.1	0.9	17%	27	32	21%	2,030	Regional Model
-	39th Ave SE: 240th St. SE to 228th St. SE - Missing arterial link	250	340	10	2.4	2.1	11%	26	30	12%	1,220	Regional Model
-	39th/35th Ave. SE: 228th St. SE to Seattle Hill Rd - Widen to 3 lanes	320	430	10	8.7	8.0	8%	18	19	3%	140	Regional Model
-	88th St. NW: State Ave. NE to 67th Ave. NE - Widen to 5 lanes	200	270	10	3.8	2.9	22%	27	34	29%	2,700	Regional Model
-	Mercer St: Dexter Ave. N to Fairview Ave. N - Reconfigure Mercer St. for two way traffic and other improvements	220	300	10	16.0	15.0	6%	-	-	-	-	Regional Model
-	244th at Sammamish: Extend the roadway	20	30	0	4.5	4.4	1%	36	36	-	1,350	Regional Model

Table 3 2028 RTID Individual Project Performance estimated with Westby Model

State Route	Project Description	Daily (24hr) Vehicle Hours of Delay Savings	Daily (24hr) Person Hours of Delay Savings	Daily (24hr) Truck Hours of Delay Savings	Average PM Peak Corridor Travel Time (Peak Direction)			Average PM Peak Period Corridor Speed (Peak Direction)			Additional PM Peak Period Person Trips that could be Accommodated	Tool used for Performance Calculation
					Without Project	With Project	Improvement	Without Project	With Project	Improvement		
		Veh-Hrs	Person-Hour	Truck-Hour	minutes	minutes	%	MPH	MPH	%	People	
509 / I-5	SR 509: S 188th St. to I-5 - New 4 lane highway including a new I-5 interchange and associated improvements	10,970	14,810	530	14.9	6.2	59%	17	40	141%	6,420	Westby Model
167	SR 167: 180th to 84th - SB GP Lane	3,370	4,550	140	12.1	4.9	59%	15	37	145%	1,220	Westby Model
167	SR 167: S. 277th to SR 516 - SB GP lane	3,050	4,120	130	6.7	4.0	41%	15	26	68%	1,220	Westby Model
405	I-405: SR 167 Interchange - Direct NB and SB HOV/HOT flyover ramp connections	1,550	2,090	60	35.7	25.0	30%	22	38	72%	600	Westby Model
405	I-405: SR 169 to SR 520 - I-405 congestion relief projects	16,320	22,030	590	19.3	14.7	24%	34	44	31%	5,670	Westby Model
520	SR 520: I-5 to 108th Ave. NE - Widen for HOV lane and replace the Evergreen Point Floating Bridge	4,650	6,280	160	16.4	13.1	20%	23	29	25%	2,430	Westby Model
524	SR 524: 24th Ave. W to Royal Anne Rd - Widen to 5 lanes	900	1,220	30	8.0	5.1	36%	22	34	55%	1,220	Westby Model
9	SR 9: 176th St. SE - Widen to 4 lanes	4,990	6,740	130	33.0	18.4	44%	21	37	79%	1,620	Westby Model
522	SR 522: Paradise Lake Rd. to Snohomish River - Widen to 4 lanes and new interchange at Paradise Lake Rd.	1,840	2,480	40	13.6	6.7	51%	18	36	104%	3,240	Westby Model
531	SR 531: 43rd Ave. NE to SR 9 - Widen to 5 lanes	170	230	0	6.3	4.9	21%	26	34	27%	1,080	Westby Model
524	SR 524: 48th Ave. W to 37th Ave. W - Widen to 7 lanes	830	1,120	20	2.0	1.7	18%	22	27	22%	1,080	Westby Model
-	39th/35th Ave. SE: 228th St. SE to Seattle Hill Rd - Widen to 3 lanes	50	70	0	8.7	8.0	8%	32	35	9%	140	Westby Model

Collision Reduction Performance Measurement

Collision savings are based on expected collision reductions resulting from specific types of roadway improvements. The RTID projects can be described as primarily "lane additions" and "interchange" improvements. To asses the possible benefits of collision reductions, each collision within the project limit is categorized as being one of the following: Fatality, disabling injury, evident injury, possible injury or property damage only (PDO). The reduction factors used for "lane addition" improvements are 31% for Fatalities and 11% for the other categories of collisions. The reduction factor used for "interchange improvements" is 25% for all categories of collisions. Each collision category has been assigned the following industry standard societal cost:

Fatality:	$1,100,000
Disabling Injury:	$1,100,000
Evident Injury:	$70,000
Possible Injury:	$35,000
Property Damage Only:	$6,500

Using a minimum of 3 years of accident data along with appropriate AASHTO reduction factors, an estimated annual savings for collision reductions can be estimated. It should be noted that these savings are only for the state highways in the package for which accident data is available and confined to societal costs as they do not include the impacts of fewer collisions on congestion levels.

The analysis estimates societal cost savings of approximately $12 million dollars per year. This number accounts for collision reduction savings only. However, collisions also result in delay for motorists trapped in the backup. Fewer collisions will also result in less delay for motorists.

Improved Freight Mobility Performance Measurement

WSDOT calculated the mobility improvement freight haulers would realize as a result of the RTID investments. However, this analysis was also confined to the state highways in the package for which available freight data exists. When freight is hauled by truck it uses the same lanes that general-purpose traffic uses. Mobility improvements for general-purpose traffic should translate to mobility improvements for freight. Using the regional model, the 2028 travel-time savings for the movement of freight on the state highways in the package was calculated. WSDOT calculated the 24-hour cost of delay using an industry standard cost of $57/hour for the movement of freight.

The RTID investments are estimated to provide approximately 10,900 hours of delay savings per day for freight. At $57/hr and assuming 260 weekdays per year, this equates to approximately $160 million dollars saved annually.

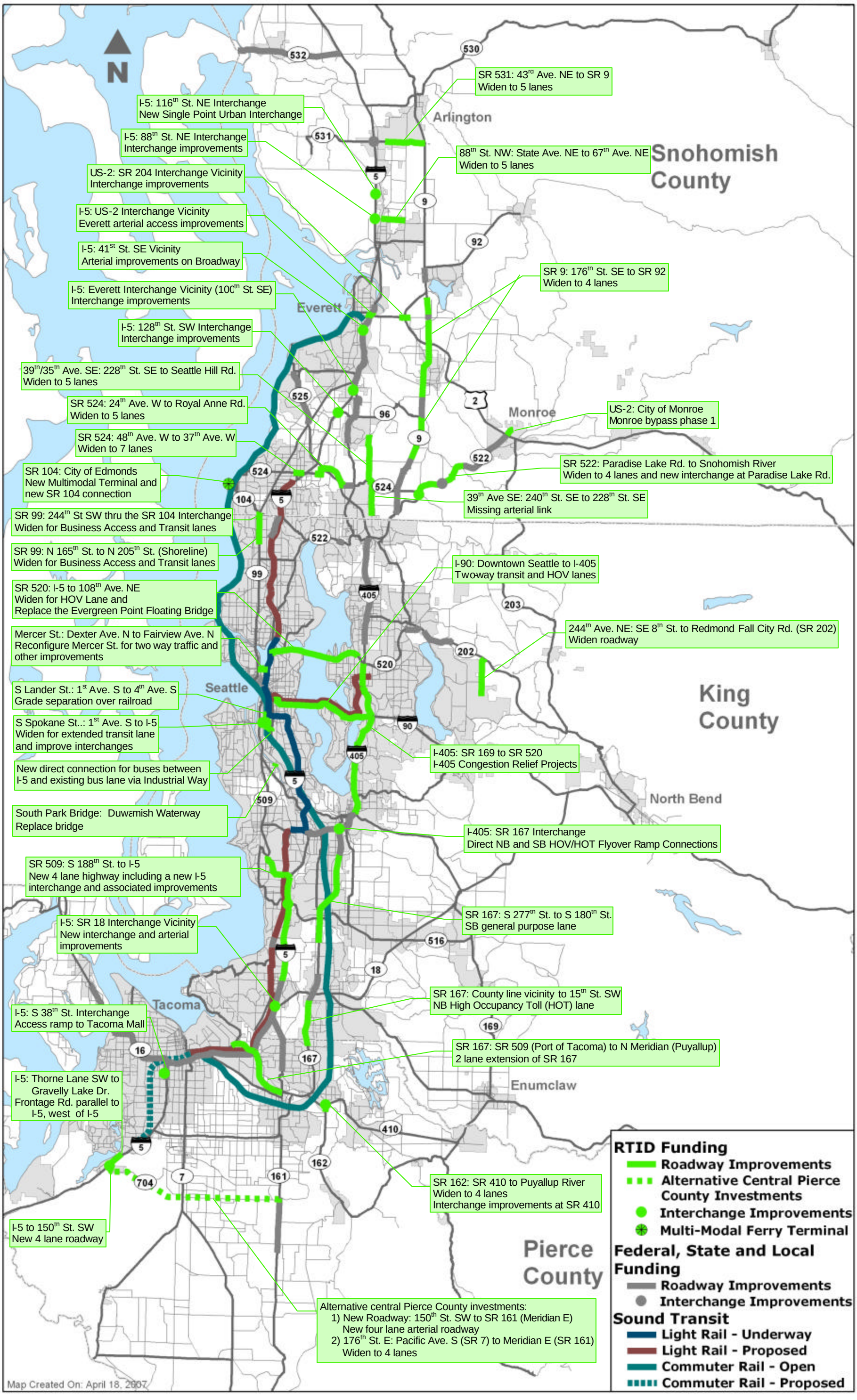

Figure 3. Roads + Transit Project Map