TABLE OF CONTENTS

2030 PM Peak Hour
Railroad Crossing Analysis
2030 AM Peak Hour
2030 PM Peak Hour

NEEDS

WSDOT Criteria
Intersection Needs
LOS with Mitigations

Mitigation Cost

Segment Needs

RECOMMENDATIONS

APPENDICES

APPENDIX A: Traffic Volume and Intersection LOS
APPENDIX B: Origin and Destination of Trips

LIST OF EXHIBITS

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Executive Summary

This chapter provides the description of technical analysis, results and draft recommendations for SR 516 corridor improvements. The project team used the Puget Sound Regional Council's (PSRC) regional travel demand model (EMME software) and the VISUM models from the cities of Kent and Maple Valley for forecasting travel demand. The team used SYNCHRO software and Highway Capacity Software (HCS) tools based on Highway Capacity Manual for detailed traffic analyses. All analyses focused on the AM and PM peak hours of existing condition (2009) and three future year conditions (2016, 2022 and 2030). Based upon this analysis, of 26 signalized intersections studied, 13 would operate below LOS E in 2030. Conceptual solutions identified for these intersections were estimated to cost between $39 and $51 million (2011 dollars). The recommendation and assumed application of specific Transportation Demand Management (TDM) techniques resulted in a reduction of 5% of the 2030 peak demand and reduced the number of intersections listed as being deficient in the 20 year timeframe to eight. The project team proposes widening of the roadway segment between Jenkins Creek and 216th Avenue SE by adding a lane in each direction at an estimated cost of $31 million to $42 million (2011 dollars). Intersection improvements are also recommended at the eight intersections operating below LOS E within the 20 year planning horizon.

Introduction

WSDOT worked with local agencies and communities in south-east King County on a transportation corridor study along a segment of SR 516 between the cities of Kent and Maple Valley. This effort has resulted in a plan that includes a list of short and long-term recommendations addressing mobility and safety needs along this corridor. This report documents the analysis, the geographic limits of the study area, forecasting and modeling methodologies, traffic analysis methods, and the performance measures used in the analysis.

Project Description

The SR 516 corridor study area is 11.7 miles in length between SR 181 (SR MP 4.52/ ARM 4.79) and SR 169 (SR MP 16.22/ARM 16.49). This portion of the corridor runs through the cities of Kent, Covington, King County and Maple Valley in south King County. The corridor serves urban and suburban areas with a multitude of land uses including: Central Business Districts, strip developments, gated communities, single family and multi-family homes, grocery stores, retail businesses, and fast food restaurants. WSDOT Urban Planning Office Staff (i.e., the project team) conducted this study under the guidance and direction of the corridor working group (CWG) representing the local agencies along the corridor.

Goals and Objectives

The WSDOT project team conducted this technical analysis in order:

- to identify mobility needs along the corridor;
- to develop conceptual solutions to the identified near term mobility needs (if any);
- to identify where safety needs (if any) exist; and
- to perform an evaluation of railroad crossing impacts on the performance of the SR 516 corridor.

Study Area

The portion of SR 516 corridor from SR 181 on the west end (Kent) to SR 169 in Maple Valley on the east end as shown in **Exhibit 1** is included in the study. This corridor segment goes through the cities of Kent, Covington and Maple Valley. The focus of the analysis on the travelled way in general, the at-grade railroad crossing in the vicinity of SR 167/SR181/SR516, and a total of 26 signalized intersections within the study area.

In this study the SR 516 corridor between SR 181 and SR 169 has been divided into six segments as shown in **Exhibit 2**. The segments are:

- West of SR 181 to Jason Avenue N,
- Jason Avenue N to 101st Avenue SE,
- 101st Avenue SE to Kent/Covington City Limit,
- Kent/Covington City Limit to Jenkins Creek,
- Jenkins Creek to 216th Avenue SE, and
- 216th Avenue SE to SR 169.

Exhibit 1: SR 516 Study Area

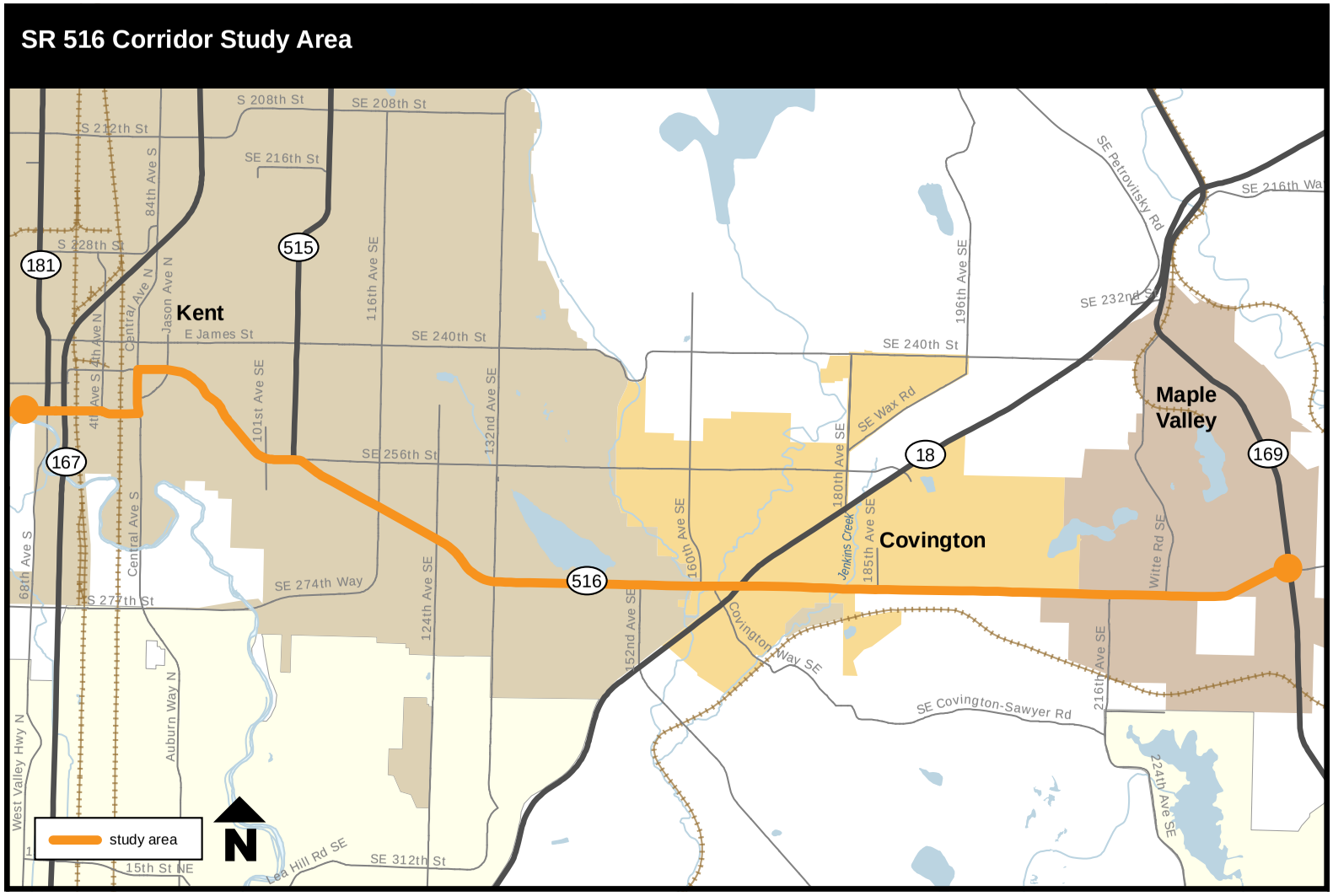
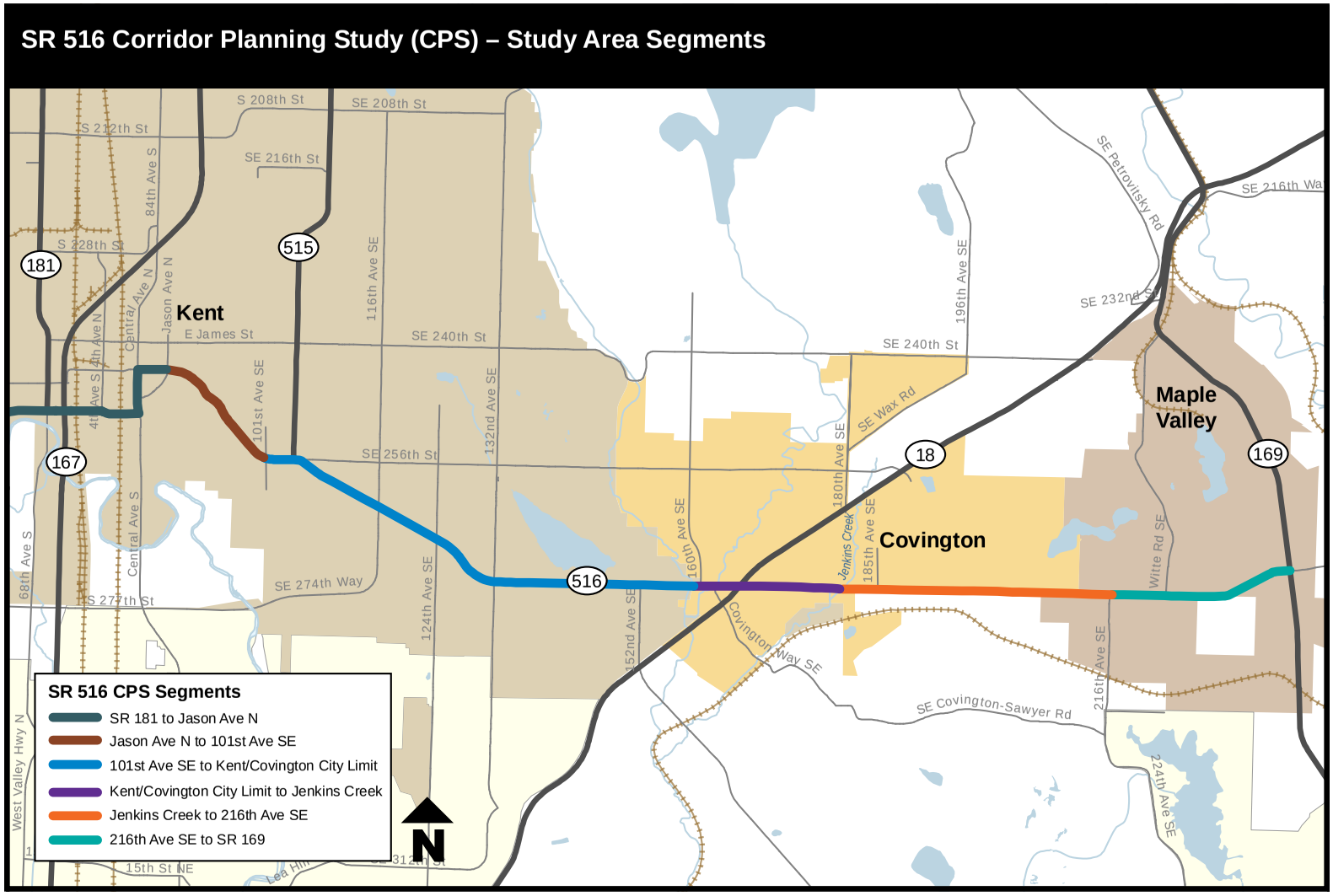


Exhibit 2: SR 516 Corridor Segments



MODEL DEVELOPMENT / METHODOLOGY

Analysis Years and Time Periods

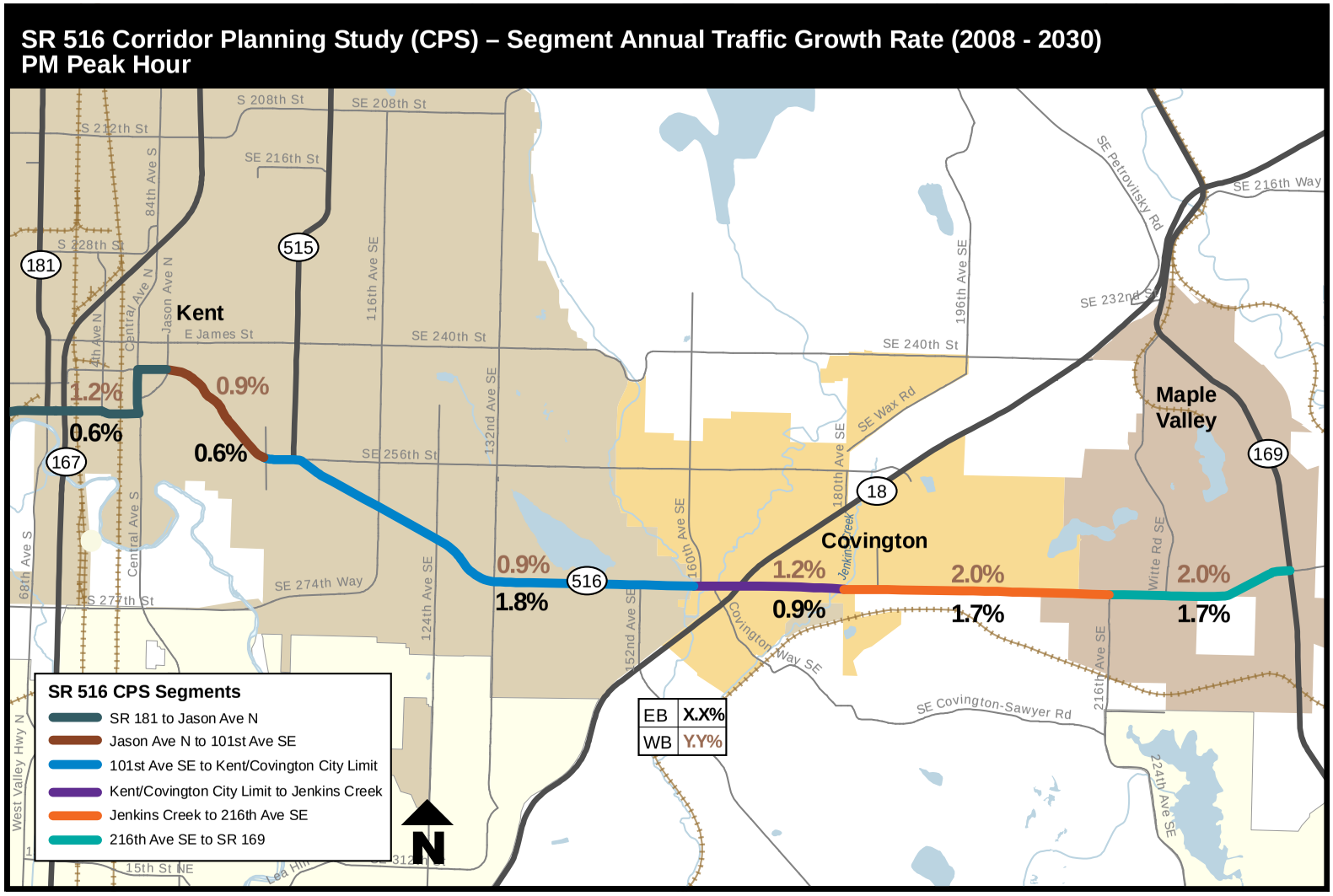
The study team performed traffic analyses for existing condition (2009) and three future year conditions (2016, 2022 and 2030). All analyses are focused on the AM and PM peak demand hours.

Model Used/Growth Assumption

The project team used the PSRC's regional travel demand model (in EMME software) along with the Kent and Maple Valley models (in VISUM software) from the cities of Kent and Maple Valley for forecasting travel demand. The team used these models primarily to forecast traffic growth for the intersections and roadway segments along this corridor. The future year road networks were constrained to only include funded projects. The growth rate by direction for six segments is shown in **Exhibit 3**.

Between the period of 2008 and 2030, PM peak hour demand grows as high as 1.8% annually in the eastbound direction of SR 516 in Kent. Covington and Maple Valley segments in the eastbound direction show relatively high growth (1.7% annually). In the westbound direction, the highest growth (2% annually) is forecasted for the segment in Covington and Maple Valley.

Exhibit 3: Traffic Growth Rate along the Corridor (2008-2030 PM Peak Hour)



In this study the team analyzed both the AM and PM peak hours to identify needs (if any) in both morning and evening periods of high demand. The team used the PSRC model to arrive at AM growth factors. The project team used SYNCHRO and SIMTRAFFIC simulation modeling software packages to analyze the intersections, and the Highway Capacity Manual (HCM) methodologies to analyze the roadway segments.

Origin and Destination of Trips

This corridor plays an important role in the lives of the communities and people living along the corridor. The major north-south routes intersecting SR 516 are State Routes 181, 167, 18 and 169, with no other east-west arterials connecting them in the study area. The corridor is predominantly used for local accesses with very few trips traveling all the way through.

The team conducted an origin-destination study of vehicular trips for a number of locations on SR 516. The team performed select-link analysis using the PSRC's regional travel demand model. This study included only 2030 PM peak demand hour. For a location on SR 516 just east of SR 167, about 72% of trips come from I-5 and SR 509, and 28% comes from north and south on SR 167. For the same location, about 70% of trips end in Kent and the rest end in south Kent and Auburn.

At the intersection of SR 516 and SR 515, 60% trips come from within Kent and 40% comes from north via SR 167, SR 181, I-5 and SR 99. 70% of trips that passes through this location end in Kent, whereas remaining 30% go to Black Diamond and south-east King County. APPENDIX D-1 of this traffic analysis report shows origin and destination of trips traveling on SR 516 for a number of locations.

TRAFFIC ANALYSIS

The project team conducted traffic analysis for existing and 2030 future conditions. The following sections provide an overview of this analysis.

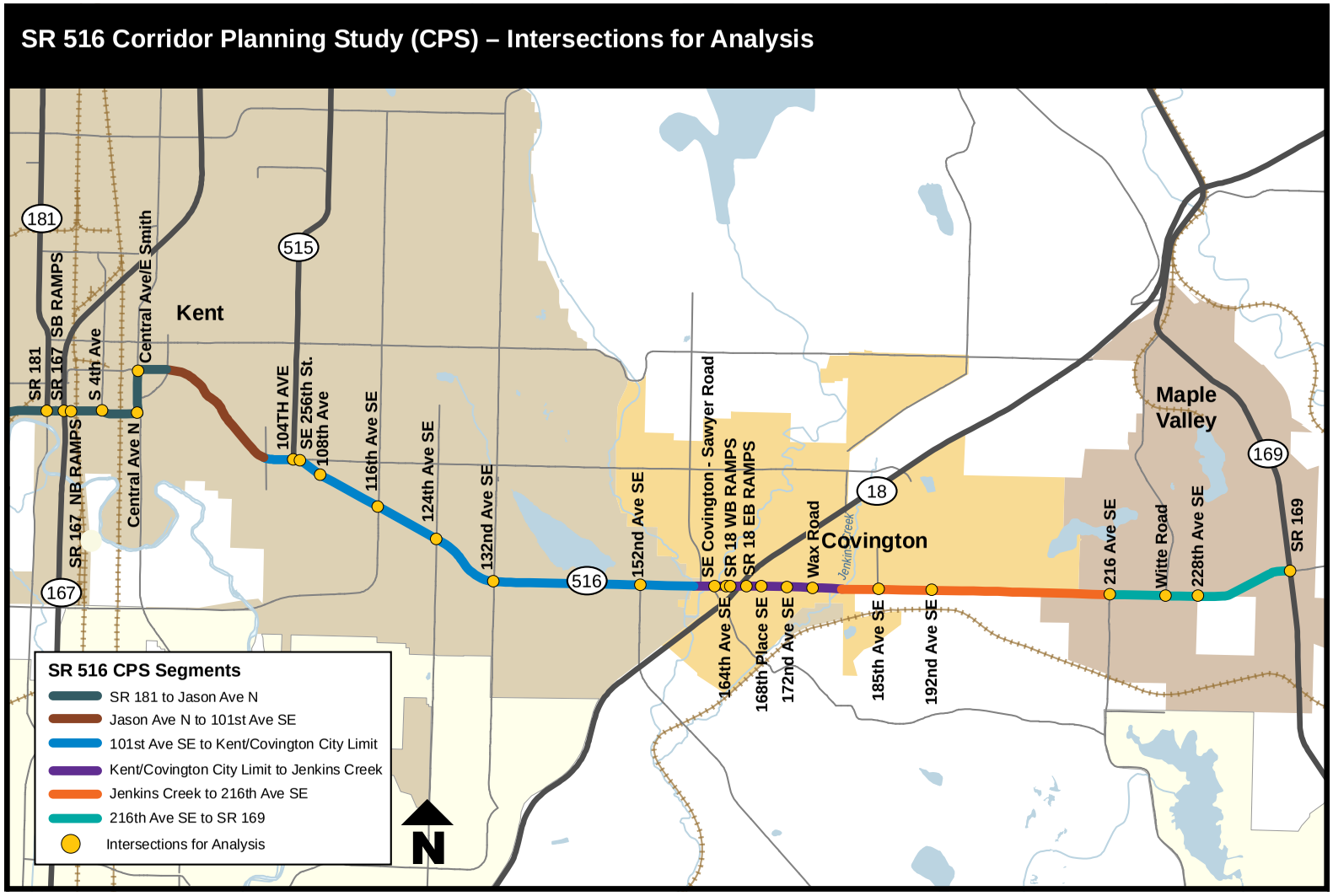
Existing Condition

The project team carried out an existing conditions analysis for the SR 516 corridor for AM and PM peak hour conditions to identify current safety and mobility needs along the corridor within study limits. This includes field observation and data collection at railroad crossing, calculation of intersection level of service (LOS), and calculation of corridor level LOS and travel time for all segments on the corridor. In addition, the team conducted a collision analysis to identify if and where safety problems may exist.

Intersection LOS

The project team analyzed 26 intersections along the corridor. These intersections are shown in **Exhibit 4**. All of these are signalized intersections.

Exhibit 4 : Major Intersections along the Corridor



AM Peak Hour

All intersections studied operate at LOS D or better during AM peak hour of operation (see APPENDIX B of this traffic analysis report for details). Other than the Union Pacific Rail Road (UPRR) crossing impacts on the intersections near the SR 167 interchange, all the intersections on SR 516 between SR 181 and Central Avenue N operate at LOS D or better in existing conditions. This is consistent with the results obtained from the SYNCHRO model developed by the City of Kent.

PM Peak Hour

Most intersections operate at or above LOS D during PM peak hour in existing condition with only three intersections operating at LOS E and one operating at LOS F. The intersections operating at LOS E or LOS F include:

- SR 516 and 104th Avenue SE (LOS E)
- SR 516 and 172nd Avenue SE (LOS E)
- SR 516 and SR 169 (LOS E)
- SR 516 and SE Wax Rd (LOS F)

Except the intersections in the vicinity of the railroad crossing, all of the intersections on SR 516 between SR 181 and Central Avenue N operate at LOS D or better during the PM peak hour in existing condition. These results are consistent with the results of SYNCHRO model from the City of Kent.

Segment Travel Speed

WSDOT uses a threshold target of 70% for the ratio of operating speed to the posted speed in order to identify roadway segments that may need more analysis and/or improvements. For the purpose of performing a 70% speed study, WSDOT used ARTPLAN of HCS 2000 (version 5.3) that implements the procedures defined in the 2000 Highway Capacity Manual (HCM 2000). The inputs for this analysis include roadway classification; geometric information of segments including number of lanes, segment length and left turn channelization; free flow speed; annual average daily traffic (AADT); directional distribution; saturation flow rate; peak hour factor; and other information.

The segment analysis reflects speed on the roadway segments only and does not account for delay incurred due to intersection operations. To calculate speed ratio, average travel speed for a segment is divided by the free flow/posted speed for the same segment. The calculated speed ratio is then compared against the 70% speed threshold to identify needs of a segment.

AM Peak Hour

The project team calculated the speed ratio for both directions of the roadway. The speed ratio of existing operating condition is presented in Exhibit 5. The posted speed limits on these segments vary from 30 to 50 mph.

During the AM peak hour operation in existing condition, three segments fall below the 70% speed threshold. These segments are:

- SR 181 to Jason Avenue N,
- 101st Avenue SE to Kent/Covington City Limit, and
- Kent/Covington City Limit to Jenkins Creek.

PM Peak Hour

The speed ratio of existing PM peak hour operating condition is presented in Exhibit 6. Like AM peak hour analysis, the project team calculated speed ratios by direction.

During PM peak hour operation in existing condition, the same three segments as in AM peak hour operation fall below the 70% speed threshold.

- SR 181 to Jason Avenue N,
- 101st Avenue SE to Kent/Covington City Limit, and
- Kent/Covington City Limit to Jenkins Creek.

Exhibit 5: Ratio of Operating Speed to Posted Speed (AM Peak Hour)

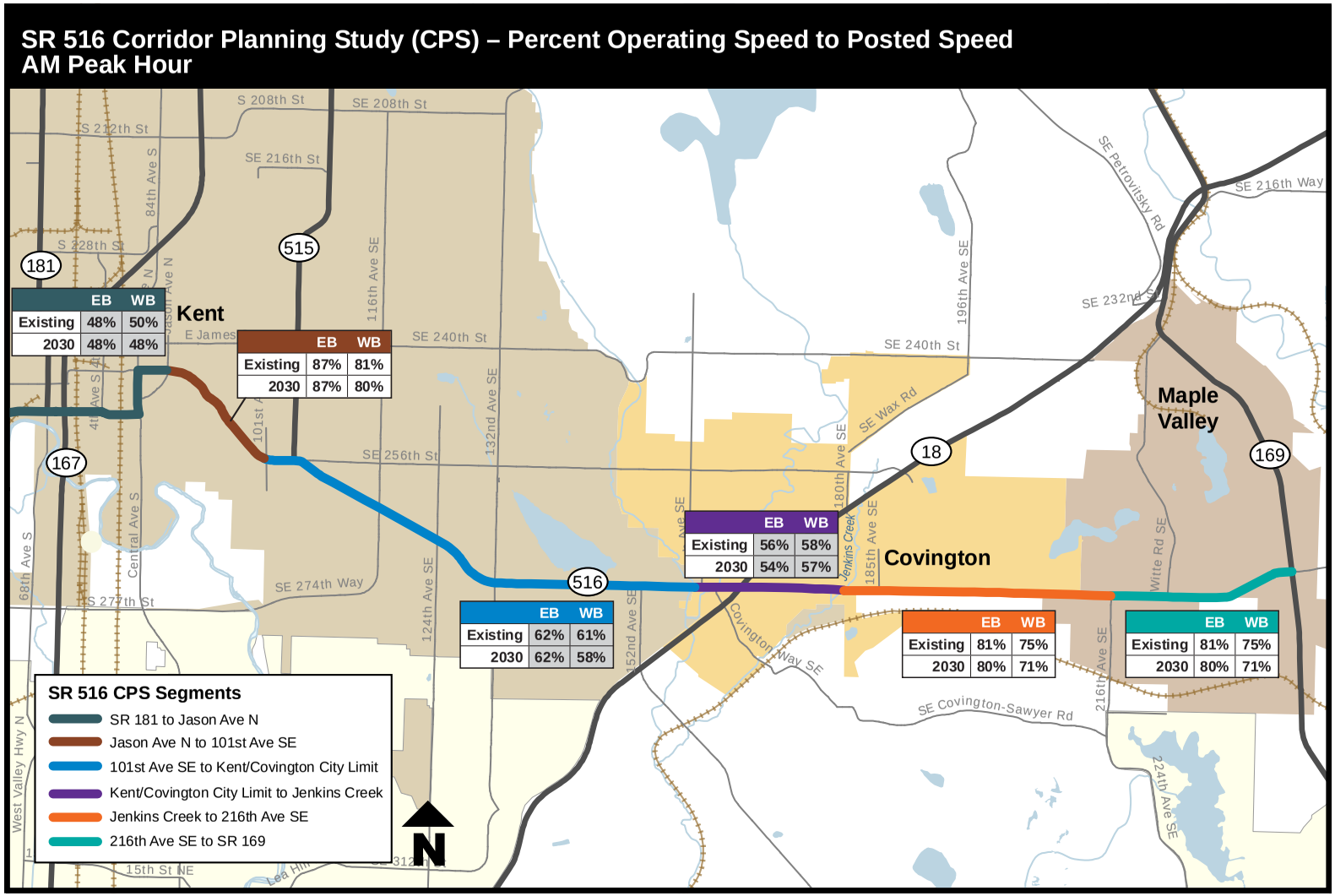
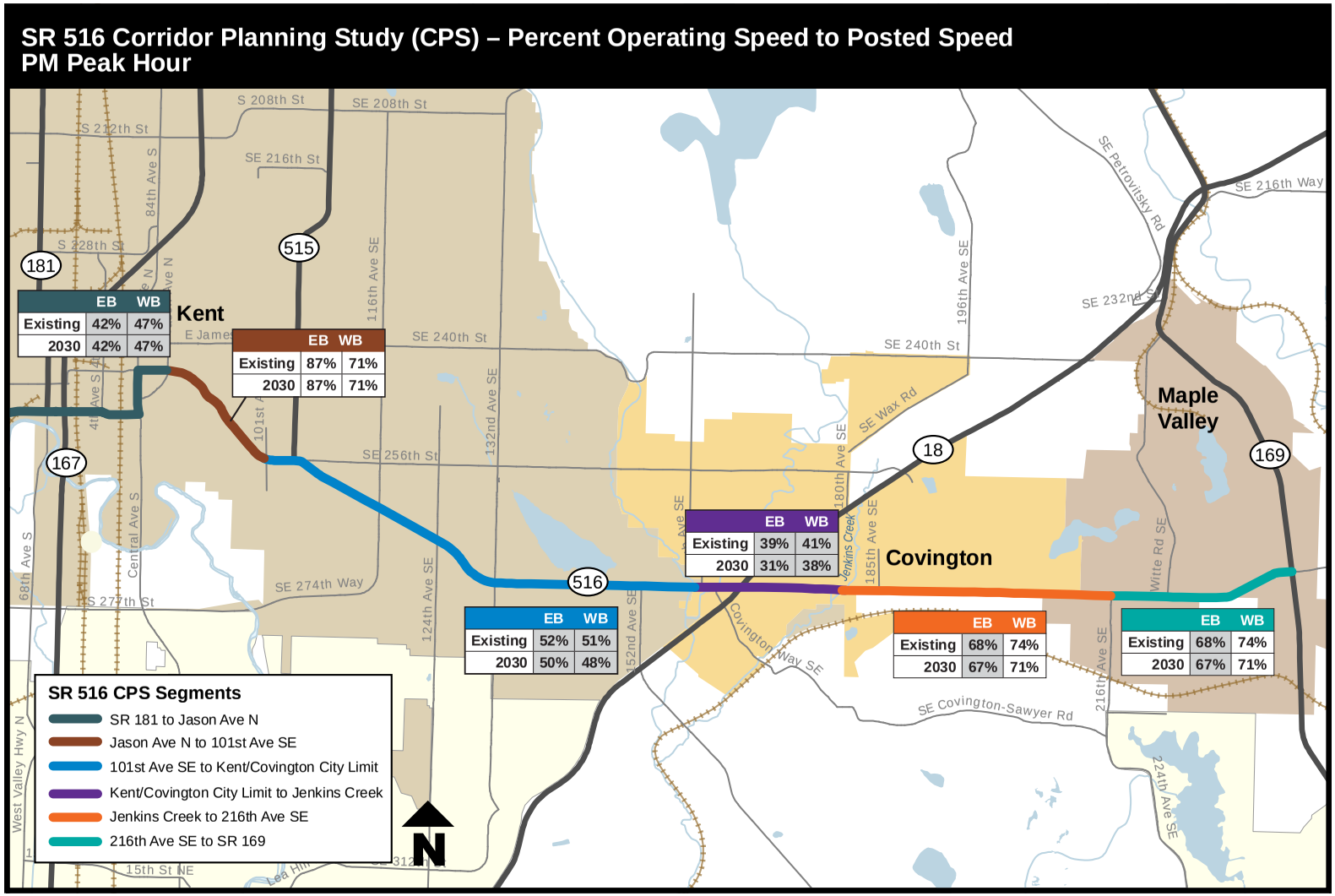


Exhibit 6: Ratio of Operating Speed to Posted Speed (PM Peak Hour)



Railroad Crossing Analysis

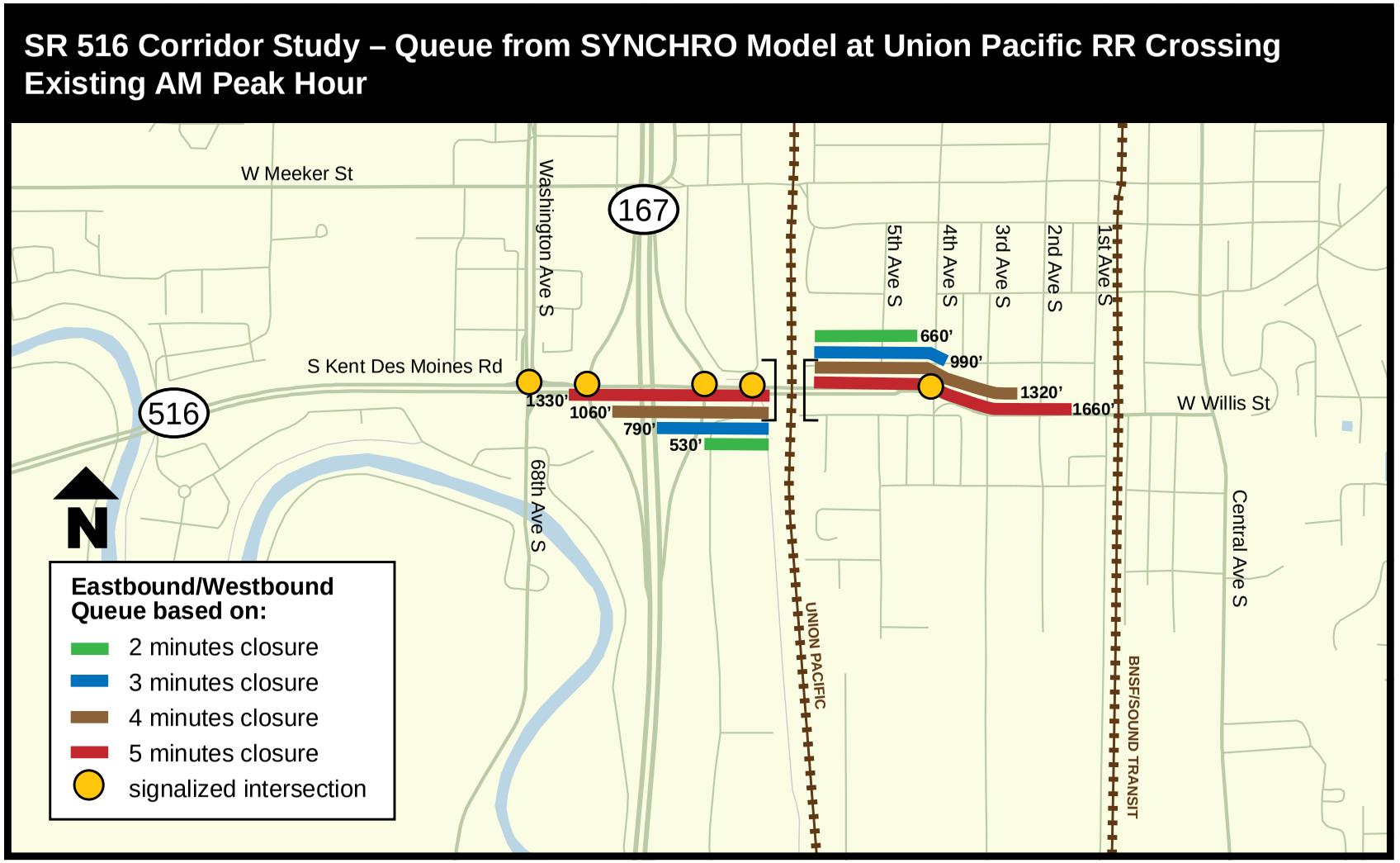
Field observation is one of the best methods of assessing railroad crossing roadway impacts. Another way to analyze railroad crossing is using a traffic micro-simulation modeling tool such as VISSIM. Since VISSIM modeling is a data-intensive, time consuming, and expensive approach, the project team resorted to a more inexpensive and faster alternative, in order to stay within a relatively small budget for the project. The project team used the traffic analysis tool SYNCHRO to analyze railroad crossing impacts on roadway traffic. The needed inputs for the analysis include segment length, number of lanes, left turn channelization, turning movement counts, speed, number of train crossings during the peak hour, and a peak hour factor.

In developing the traffic model using SYNCHRO, the WSDOT project team assumes the railroad crossing operates as a pre-timed signalized intersection with signal turning red during train crossing. However, due to the software limitations the team had to make several simplifying assumptions including a 15 minutes cycle length and different green time for different length of trains.

AM Peak Hour

The number of trains crossing SR 516 was based on a sample data received from the city of Kent for May, 2010. The data reveals that, on an average, one train crosses SR 516 during AM peak hour. Trains are of various lengths and run at different speeds. To capture impacts of trains with various lengths and speeds, the project team assumed a railroad gate closure for 2, 3, 4, and 5 minutes. For each of these closure durations, the project team developed a model to estimate traffic queue length and travel time. Exhibit 7 shows traffic queue lengths obtained from this modeling effort.

Exhibit 7: Traffic Queue at Union Pacific Railroad Crossing (AM Peak Hour)



Modeling data indicates that the traffic queue in existing AM peak hour of operation extends on eastbound direction from about 500 feet (west of NB SR 167 ramp intersection) to over 1,300 feet (west of NB SR 167 ramp intersection).

During existing AM peak hour, the average eastbound travel time from SR 181 to Central Avenue S increases up to 1.3 minutes per vehicle for the worst case scenario with five minutes closure time (**Exhibit 8**). Westbound traffic experiences little more than one minute of delay per vehicle for the five minutes closure.

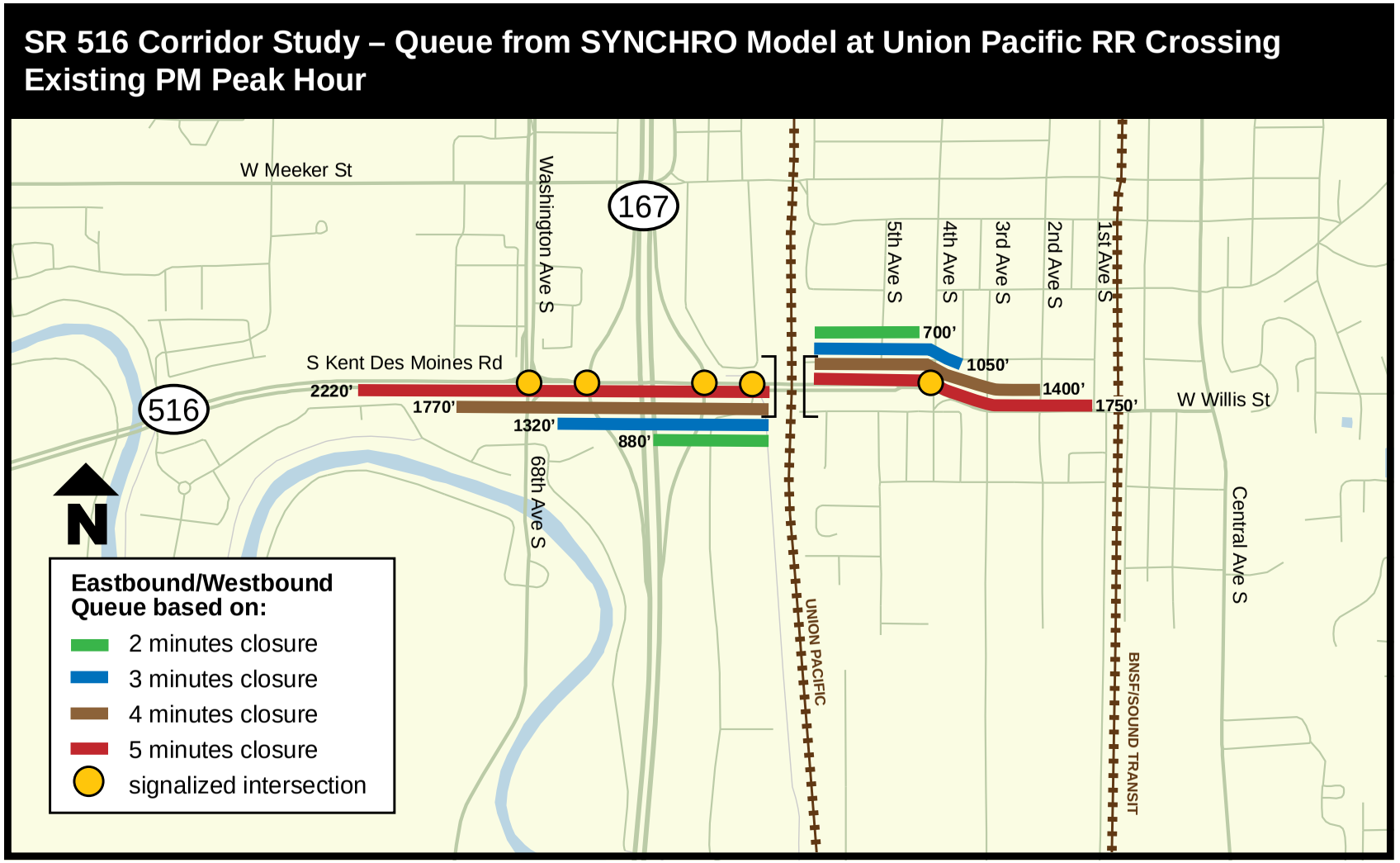
Exhibit 8: Travel Delay on SR 516 at Union Pacific RR Crossing (AM Peak).

Travel direction	Eastbound	Westbound
Average delay (min/vehicle)	1.30	1.06
Number of peak hour vehicles	830	980
Approach delay (hours)	18	17
Estimated peak period delay (hours)	105	

PM Peak Hour

Like AM peak hour, Kent provided the PM peak hour train crossing data for May, 2010. The data reveals crossing of one train during two-hour PM peak period on an average. The project team assumed a gate closure of 2, 3, 4, and 5 minutes to allow for crossing of trains with different lengths and speeds. **Exhibit 9** shows traffic queue length resulting from train passing.

Exhibit 9: Traffic Queue at Union Pacific Railroad Crossing (PM Peak Hour)



Modeling data indicates that existing traffic queues on eastbound direction during PM peak hour extends from about 880 feet to 2220 feet (West of SR 181). During existing PM peak hour, the average eastbound travel time from SR 181 to Central Avenue S increases up to 0.7 minutes per vehicle during the worst case scenario with five minutes closure duration (Exhibit 10). For the same closure duration, westbound traffic experiences moderate delay of about 0.2 minutes per vehicle.

Exhibit 10: Travel Delay on SR 516 at Union Pacific Railroad Crossing (PM Peak).

Travel direction	Eastbound	Westbound
Average delay (min/vehicle)	0.71	0.21
Number of peak hour vehicles	1,190	1,020
Approach delay (hours)	14	4
Estimated peak period delay (hours)	54	

Future Condition

The project team conducted future year analysis for three different years - 2016, 2022 and 2030.

The analysis focused only on AM and PM peak demand periods. The project team developed future year growth rates for each of the 26 intersections (Exhibit 4) by approach and by movement. The team conducted a growth rate reasonableness check before using the rates. The team applied growth rates to the traffic counts to develop future traffic demand for analyzing both segments and intersections. For the update of the future year road network, the team included only funded projects that affect the SR 516 study area corridor. Like existing condition analyses, future condition analyses focused on evaluation of intersection LOS, segment travel speed and railroad crossing.

Intersection LOS

The project team performed intersection LOS calculations using SYNCHRO as a modeling tool. An overview of the analysis results are provided below.

2016 AM Peak Hour

Traffic analysis indicates that all the intersections studied operate at LOS D or above in 2016 AM peak hour (Exhibit 11). The number of intersections operating at LOS A, LOS B and LOS C are five, ten and nine, respectively. Only two intersections operate at LOS D.

Exhibit 11: Intersection Level of Service in 2016.

LOCATION	2016*–LOS	
	AM	PM
SR 516 & SR 181	C	C
SR 516 & SR 167 SB RAMPS	A	B
SR 516 & SR 167 NB RAMPS	C	B
SR 516 & S 4th Ave	B	B
SR 516 & Central Ave N	B	B
SR 516 (E Smith) & Central Ave	C	D
SR 516 & 104TH AVE	C	E
SR 516 & SE 256th St.	B	B
SR 516 & 108th Ave	A	B
SR 516 & 116th Ave SE	B	C
SR 516 & 124th Ave SE	C	C
SR 516 & 132nd Ave SE	C	D
SR 516 & 152nd Ave SE	D	C
SR 516 & SE Covington - Sawyer Road	B	C
SR 516 & 164th Ave SE	C	C
SR 516 & SR 18 WB RAMPS	B	C
SR 516 & SR 18 EB RAMPS	B	B
SR 516 & 168th Place	B	C
SR 516 & 172nd Ave SE	A	D
SR 516 & Wax Road	D	D
SR 516 & 185th Place	A	A
SR 516 & 192nd Ave SE	A	A
SR 516 & 216 Ave SE	B	B
SR 516 & Witte Road	C	C
SR 516 & 228th Ave SE	B	B
SR 516 7 SR 169	C	C

* *Traffic is assumed to grow only 5% between 2010 and 2016 given the current recession; and The signal timings for 2016 conditions are assumed to be optimized.*

2016 PM Peak Hour

Most intersections show lower level of service during PM peak hour operation in 2016 compared to AM peak hour (**Exhibit 11**). One intersection operates at LOS E.

2022 AM Peak Hour

All 26 intersections studied operate at LOS D or above in 2022 AM peak hour. The number of intersections operating at LOS A, LOS B and LOS C are three, eleven and eight respectively. Four intersections would operate at LOS D. (**Exhibit 12**)

Exhibit 12: Intersection Level of Service in 2022.

LOCATION	2022*–LOS	
	AM	PM
SR 516 & SR 181	C	C
SR 516 & SR 167 SB RAMPS	B	B
SR 516 & SR 167 NB RAMPS	C	B
SR 516 & S 4th Ave	B	C
SR 516 & Central Ave N	B	C
SR 516 (E Smith) & Central Ave	D	E
SR 516 & 104TH AVE	C	F
SR 516 & SE 256th St.	B	C
SR 516 & 108th Ave	A	D
SR 516 & 116th Ave SE	B	C
SR 516 & 124th Ave SE	C	D
SR 516 & 132nd Ave SE	D	E
SR 516 & 152nd Ave SE	D	E
SR 516 & SE Covington - Sawyer Road	B	C
SR 516 & 164th Ave SE	C	C
SR 516 & SR 18 WB RAMPS	C	C
SR 516 & SR 18 EB RAMPS	B	C
SR 516 & 168th Place	B	C
SR 516 & 172nd Ave SE	B	D
SR 516 & Wax Road	D	E
SR 516 & 185th Place	A	A
SR 516 & 192nd Ave SE	A	B
SR 516 & 216 Ave SE	B	B
SR 516 & Witte Road	C	C
SR 516 & 228th Ave SE	B	C

* *The signal timings for 2022 conditions are assumed to be optimized.*

2022 PM Peak Hour

Of the 26 intersections analyzed, four intersections operate at LOS E and one intersection operates at LOS F during PM peak hour operation in 2022 (Exhibit 12).

2030 AM Peak Hour

All intersections studied operate at an acceptable level of service during the 2030 AM peak hour of operation (see APPENDIX D-1 of this report for details). Other than the Union Pacific Railroad crossing impacts on the intersections near the SR 167 interchange, all the intersections on SR 516 between SR 181 and Central Avenue N operate at LOS D or better during the AM peak hour in 2030 conditions. This is consistent with the SYNCHRO model results from the City of Kent.

2030 PM Peak Hour

During the 2030 PM peak hour, operations at twelve of the intersections fall below LOS D (four intersections at LOS E and eight intersections at LOS F).

Intersections with LOS E are:

SR 516 and 124th Avenue SE
SR 516 and SE Covington-Sawyer Road
SR 516 and 168th PL SE
SR 516 and SR 169

Intersections with LOS F are:

SR 516 and Central Avenue N/E Smith St
SR 516 and 104th Avenue SE
SR 516 and SE 256th St
SR 516 and 108th Avenue SE
SR 516 and 132nd Avenue SE
SR 516 and 152nd Avenue SE
SR 516 and 172nd Avenue SE
SR 516 and SE Wax Road

With the exception of the intersections in the vicinity of the railroad crossings, all the intersections on SR 516 between SR 181 and Central Avenue N operate at LOS D or better during the PM peak hour of 2030 operational conditions. The SYNCHRO model from the City of Kent shows comparable results.

Segment Travel Speed

For the segment travel speed and speed ratio calculation, the project team applied the same methodologies and tools as explained in the "Segment Travel Speed" section of the existing condition analysis. A brief overview of the analysis results follows.

2016 and 2022 Peak Hour

Only two segments, #'s 5 & 6, were analyzed for the 2016 and 2022 mid-term conditions. The results are in Exhibit 13. Both the segments operate above the WSDOT's speed threshold during 2016. The segment between Jenkins Creek and 216th Ave SE operate below the speed threshold during 2022.

Exhibit 13: Ratio of Operating Speed to Posted Speed (PM Peak Hour).

SR 516 Arterial Planning Analysis Summary							
Segments		Seg #5 (Jenkins Creek to 216th Ave)			Seg #6 (216th to SR 169)		
Year	Dir	Average Speed (mph)	Posted Speed (mph)	Operating/ Posted Speed	Average Speed (mph)	Posted Speed (mph)	Operating/ Posted Speed
Existing	EB	31	40	78%	32	40	80%
	WB	31	40	78%	32	40	80%
2016*	EB	31	40	78%	32	40	80%
	WB	31	40	78%	32	40	80%
2022	EB	18	40	45%	30	40	75%
	WB	24	40	60%	32	40	80%
2030	EB	10	40	25%	30	40	75%
	WB	13	40	33%	29	40	73%

* *Traffic is assumed to grow only 5% between 2010 and 2016 given the current recession*

2030 AM Peak Hour

The team calculated travel speed and speed ratio for both directions of SR 516 in 2030 conditions. The results are presented in Exhibit 5. During the AM peak hour operation in 2030 conditions, three segments fall below the 70% speed threshold target. These segments are:

- SR 181 to Jason Avenue N,
- 101st Avenue SE to Kent/Covington City Limit, and
- Kent/Covington City Limit to 185th Avenue SE.

2030 PM Peak Hour

The directional speed ratios in 2030 PM peak hour conditions are presented in Exhibit 6. During PM peak hour operations in 2030 conditions, the same three segments as in AM peak hour operation, as well as the eastbound segment between 185th Avenue SE and SR 169 fall below the 70% speed threshold. The westbound segment between 185th Avenue SE and SR 169 is slightly above the threshold.

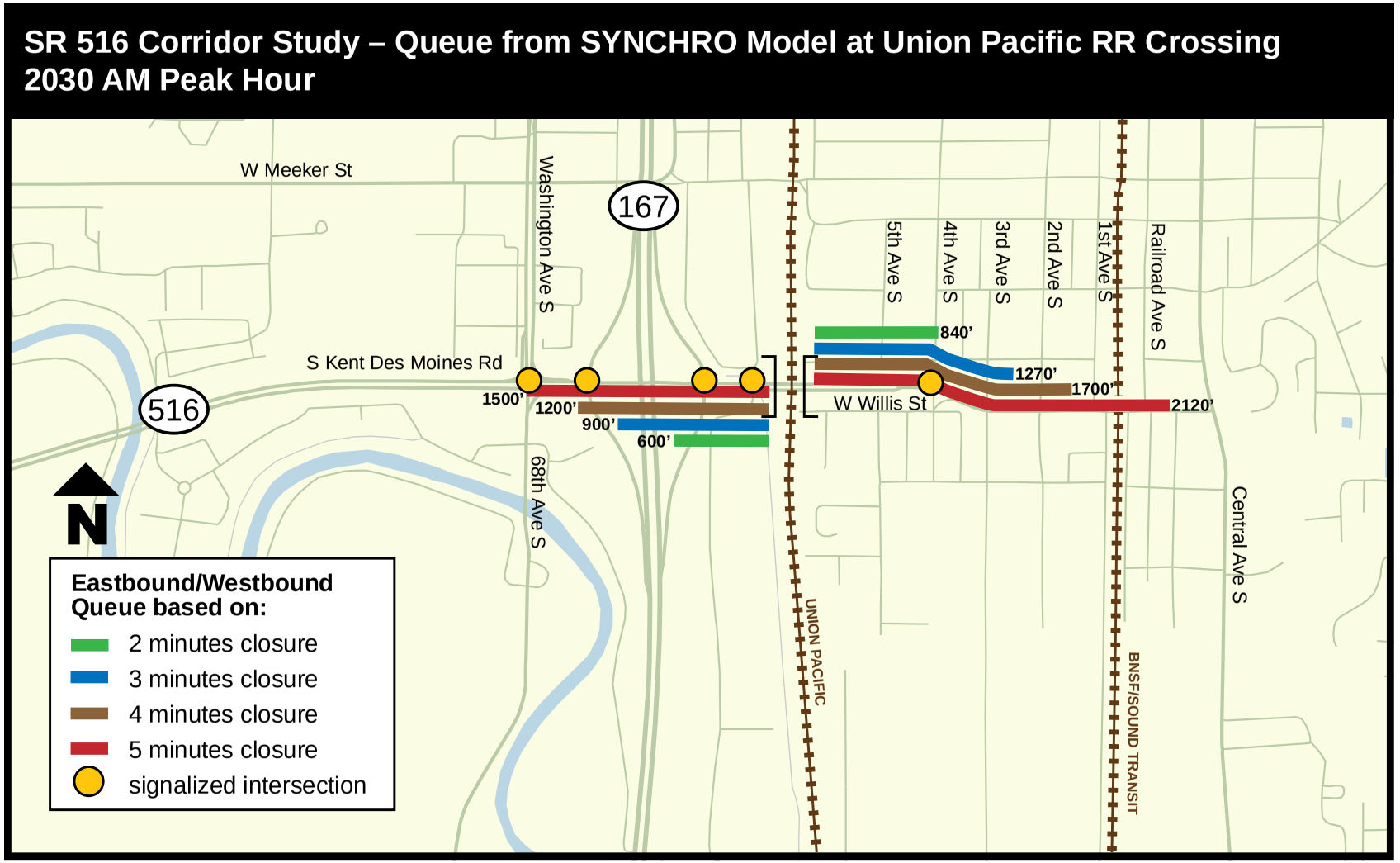
Railroad Crossing Analysis

The project team conducted railroad crossing analysis for future year conditions using the same methodology as explained in the existing condition analysis. The following sections provide a brief overview of analysis results.

2030 AM Peak Hour

Eastbound queue length during 2030 AM peak hour is expected to range between 600 feet and 1500 feet depending on the length of railroad gate closure time. The westbound traffic queue might grow about 840 feet for two minutes closure and 2120 feet for five minutes closure for train crossing. Exhibit 14 shows the estimated queue lengths for different length of railroad gate closures.

Exhibit 14: Traffic Queue at Union Pacific Railroad Crossing (2030 PM Peak Hour).



In the worst case scenario of five minutes closure time, the average travel time from SR 181 to Central Avenue S could increase up to 2.25 minutes in the eastbound direction and 2.45 minutes in the westbound direction, respectively (**Exhibit 15**). The eastbound traffic incurs over 100 hours of delay during the AM peak period, while the westbound traffic experiences about 40% more delay during the same period.

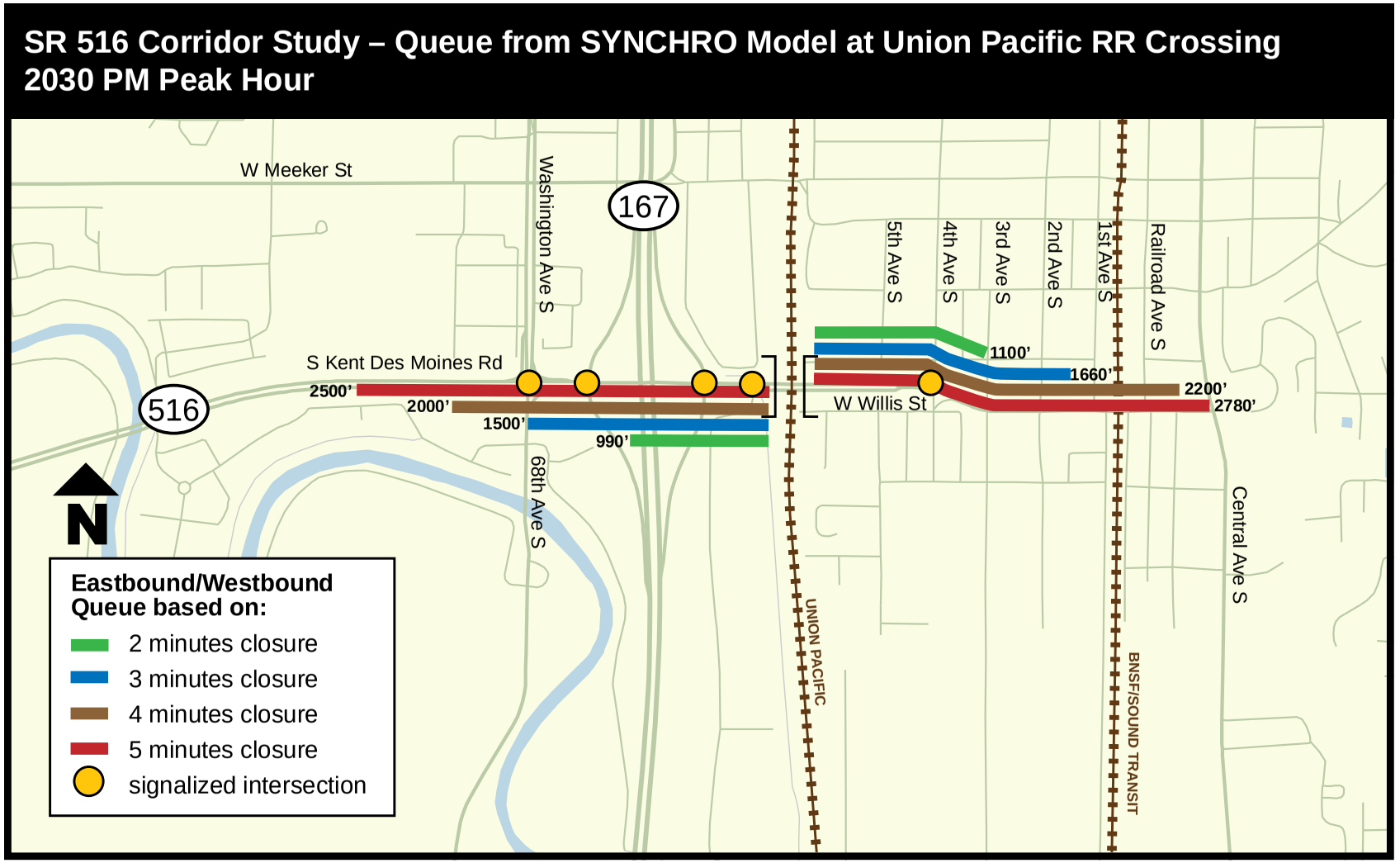
Exhibit 15: Travel Delay on SR 516 at Union Pacific Railroad Crossing (2030 AM Peak).

Travel direction	Eastbound	Westbound
Average delay (min/vehicle)	2.25	2.45
Number of peak hour vehicles	915	1,155
Approach delay (hours)	34	47
Estimated peak period delay (hours)	102	141

2030 PM Peak Hour

During the 2030 PM peak hour operation, the eastbound traffic queue extends from 990 feet to 2500 feet (well beyond SR 181) depending on the railroad gate closure times (**Exhibit 16**). The eastbound queue would be long enough to negatively impact four signalized intersections including SR 167 ramp junctions. The westbound traffic queue is estimated to range between 1100 feet and 2780 feet.

Exhibit 14: Traffic Queue at Union Pacific Railroad Crossing (2030 PM Peak Hour).



During the five minutes of closure time at the railroad crossing in the 2030 PM peak hour condition, the average travel time from SR 181 to Central Avenue S could increase up to about 1.90 minutes in eastbound direction and more than three minutes in westbound direction (**Exhibit 17**). Total peak period delay is about 120 hours for both eastbound and westbound directions.

Exhibit 17: Travel Delay on SR 516 at Union Pacific Railroad Crossing (2030 PM Peak).

Travel direction	Eastbound	Westbound
Average delay (min/vehicle)	1.91	3.19
Number of peak hour vehicles	1,280	1,365
Approach delay (hours)	41	73
Estimated peak period delay (hours)	123	219

Findings

The project team conducted traffic analyses to identify needs along the SR 516 corridor, compared the analysis results with the study criteria and developed conceptual solutions for the identified needs. The solutions fall into two categories: intersection and roadway segment recommendations.

Study Criteria

WSDOT maintains separate operational standards for roadway segments and intersections. According to WSDOT practice, any highway segment that operates below 70% of the assigned posted speed is assumed to have some operational issues that demands further investigation to identify potential needs. WSDOT's analysis of intersections is more conservative than that of local agencies. The threshold determination used for intersection analysis is LOS E. For any intersection that operates below LOS E, the project team developed recommendations to improve these operations to LOS D or better. The project team provided additional recommendations for the signalized intersections. In providing these recommendations the project team reviewed the existing signal cycle length, phasing and in order to confirm that they are operating optimally-

- We assumed the signals would be optimized and coordinated (where possible) to allow for maximum throughput for the future traffic demand conditions
- We considered mitigation only when the facility operated below the study criteria after exhausting efficiency measures for the future conditions.

Recommended Transportation Demand Management measures are assumed to reduce future peak hour volumes by five percent.

LOS for all analyzed intersections

The project team conducted traffic analysis to evaluate the intersection operations without improvements. **Exhibit 18** shows intersection LOS.

Exhibit 18: LOS of Intersections

Int.#	LOCATION	Existing–LOS	2016–LOS	2022–LOS	2030–LOS
		PM	PM	PM	PM
1	SR 516 & SR 181	D	C	C	D
2	SR 516 & SR 167 SB RAMPS	D	B	B	B
3	SR 516 & SR 167 NB RAMPS	C	B	B	C
4	SR 516 & S 4th Ave	C	B	C	D
5	SR 516 & Central Ave N	C	B	C	D
6	SR 516 (E Smith) & Central Ave	D	D	E	F
7	SR 516 & 104TH AVE	E	E	F	F
8	SR 516 & SE 256th St.	C	B	C	F
9	SR 516 & 108th Ave	D	B	D	F
10	SR 516 & 116th Ave SE	C	C	C	D
11	SR 516 & 124th Ave SE	C	C	D	E
12	SR 516 & 132nd Ave SE	D	D	E	F
13	SR 516 & 152nd Ave SE	D	C	E	F
14	SR 516 & SE Covington - Sawyer Road	C	C	C	E
15	SR 516 & 164th Ave SE	C	C	C	C
16	SR 516 & SR 18 WB RAMPS	C	C	C	D
17	SR 516 & SR 18 EB RAMPS	B	B	C	C
18	SR 516 & 168th Place	D	C	C	E
19	SR 516 & 172nd Ave SE	E	D	D	F
20	SR 516 & Wax Road	F	D	E	F
21	SR 516 & 185th Place	B	A	A	C
22	SR 516 & 192nd Ave SE	A	A	B	B
23	SR 516 & 216 Ave SE	B	B	B	C
24	SR 516 & Witte Road	C	C	C	D
25	SR 516 & 228th Ave SE	C	B	C	C
26	SR 516 & SR 169	D	C	D	E

Intersection Recommendations

By 2016, the project team found all intersections operate at or above LOS E.

By 2022, the intersection of SR 516/SR 515/104th Ave SE operates below LOS E. To bring this intersection back to LOS D, the project team recommends improvements for this intersection. Improvements can range from capacity improvements between 101st and 104th, coupled with additional channelization, or a roundabout, or local improvements to 108th with a closure of 256th at the intersection, or a combination of various elements of all the options mentioned. For this reason, nothing specifically is recommended for implementation and the estimated cost range varies widely.

By 2030, eight of the 26 intersections analyzed operate below LOS E. The project team identified needs and recommended improvements be considered for each of these intersections in order to address these needs and improve operations. The eight intersections operating below LOS E by 2030 are:

SR 516 (E Smith) & Central Ave
SR 516 & SR 515 & 104TH Ave.
SR 516 & SE 256th St.
SR 516 & 108th Ave.
SR 516 & 132nd Ave. SE
SR 516 & 152nd Ave. SE
SR 516 & 172nd Ave. SE
SR 516 & Wax Road

Intersection Improvement Cost Estimate

The project team developed a planning level cost estimate of the proposed intersection improvement(s) at SR 516/SR 515/104th Ave SE. The estimate is based on conceptual solutions with no design work done. It utilizes unit price approach that accounts for cost differences by land use types, development density, size of the improvement, etc. The intersection improvement cost estimate is given as a range, with potential low and high values for different improvement scenarios. The low end estimate range would provide for a roundabout configuration, the high end estimate would represent widening between 101st and 104th, with channelization improvements on all four legs, and an additional westbound through lane between 256th and 104th . The cost estimate range for improving the intersection at 104th Ave SE and SR 516 is between $3.5 million to $11.1 million in 2011 dollars.

Longer term needs for the other seven intersections were identified but no conceptual solutions are offered at this time to allow for greater flexibility in the future. As a result, no cost estimates are given.

Segment Mitigation

The projected traffic volume on the roadway segment between Jenkins Creek and 216th Avenue SE is much higher than available capacity. The 70% operating speed threshold is not met on the eastbound segment and is 71% on the westbound segment. Because of this, and coupled with safety concerns near the existing Jenkins Creek culvert (with the existing two lane roadway configuration), the project team proposed widening of the 2.4 mile long segment by adding a single lane each direction.

All the analyses are carried out using forecasted growth are for the year 2030. These forecasts are based on the growth rate assumed for different segments by direction. Given the fixed demand, it is assumed that adding a capacity improvement at a location will not have the latent demand that may contribute to congestion downstream. Given the nature of the land use in the downstream locations, coupled with the study area being located in a more rural environment, this is a valid assumption. The growth rate in the City of Maple Valley area of SR 516 assumes city's comprehensive plan's land use. Other growth from Black Diamond is also assumed in the growth rate.

The widening is recommended to be carried out in stages, with the segment between Jenkins Ck and 185th Ave SE being identified as a near term need (2016), the segment between 185th Ave SE and 192nd Ave SE is identified as a mid term need (2022), and the segment between 192nd Ave SE and 216th Ave SE being identified as a long term need (2030).

The planning level cost estimates for the near term and mid term of this conceptual solution, including the Jenkins Creek culvert replacement is as follows:

Jenkins Ck and 185th Ave SE	$ 10.6M to $15.2M (2011 dollars).
185th Ave SE and 192nd Ave SE	$ 10.2M to $ 13.5M (2011 dollars).

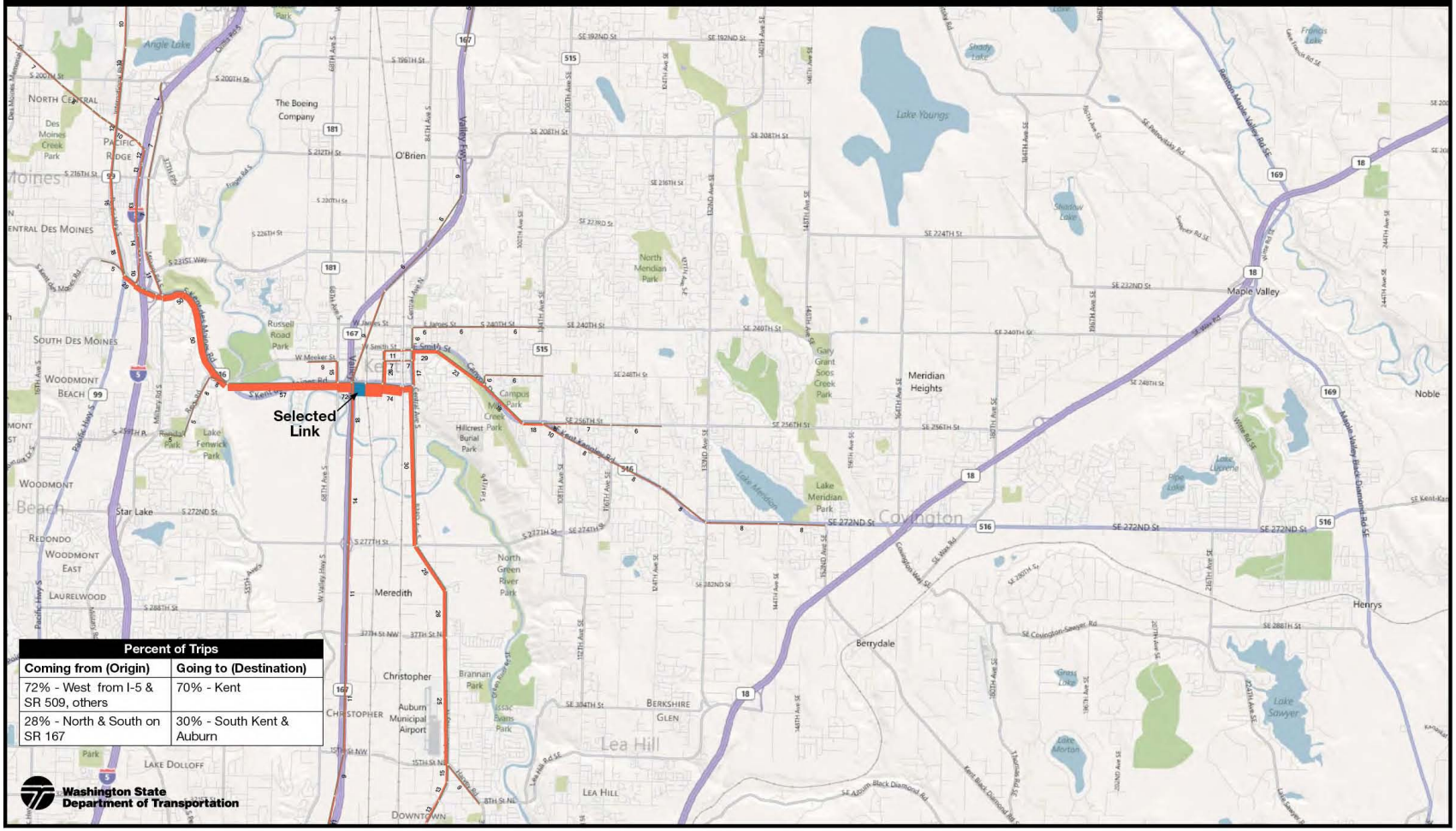
Findings from analysis

The primary focus of the technical analysis is to identify potential mobility or safety needs and develop conceptual near and mid term solutions. Based on detailed analyses of the AM and PM peak hour of traffic in existing and future year conditions, the project team recommends the following:

- Provide improvements to one intersection mid-term (cost estimates in the range of $3.5 to $11.1 million: (2011 dollars); and
- Widen the roadway segment between Jenkins Creek and 216th Avenue SE by adding a lane in each direction (cost estimates in the range of $31 to $42 million: 2011 dollars).

APPENDIX D-1: Origin and Destination of Trips.

SR 516 CPS: Select Link Analysis Showing Percent Of Origin And Destination Of Trips
2030 PM Peak Hour



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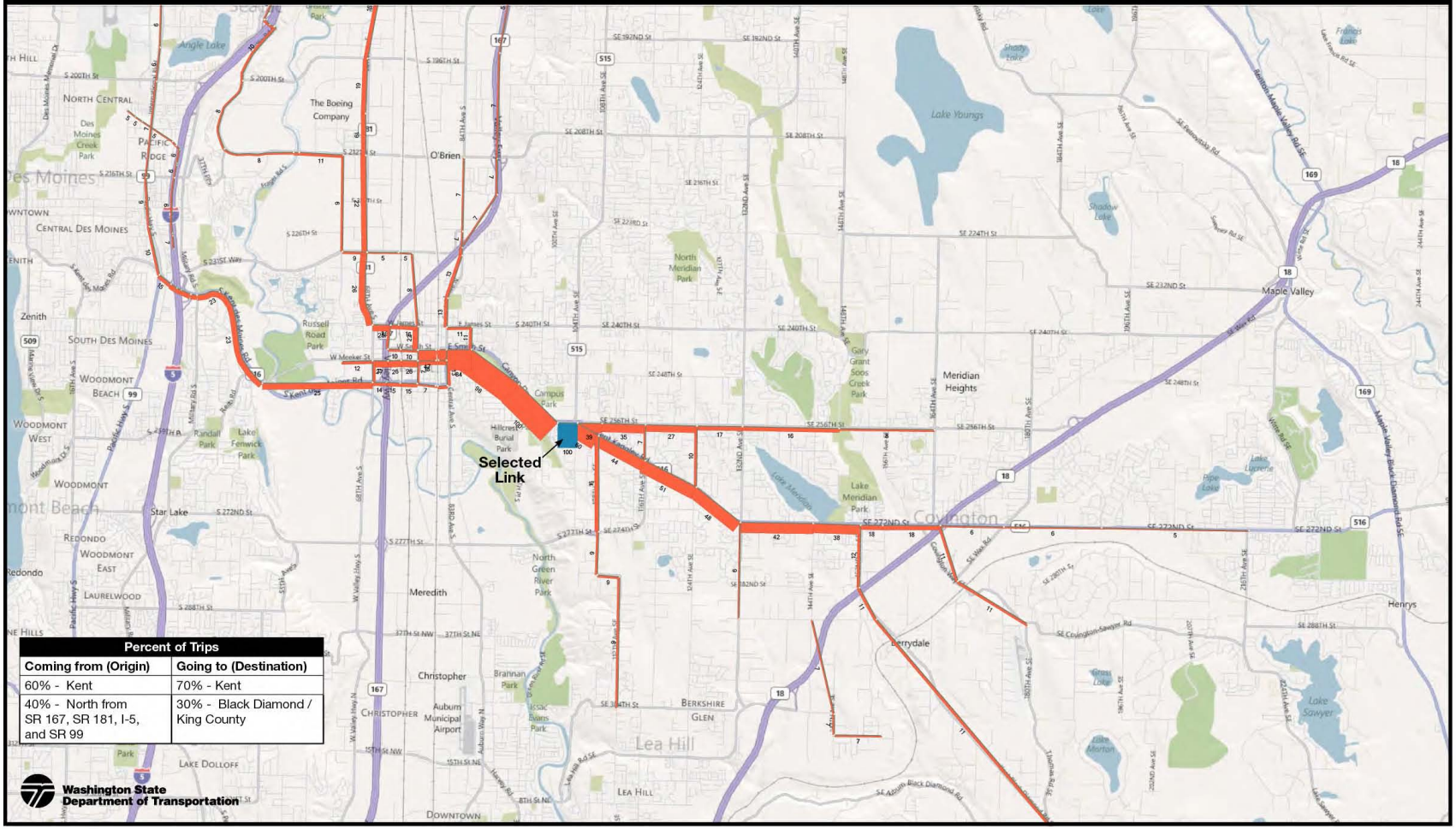

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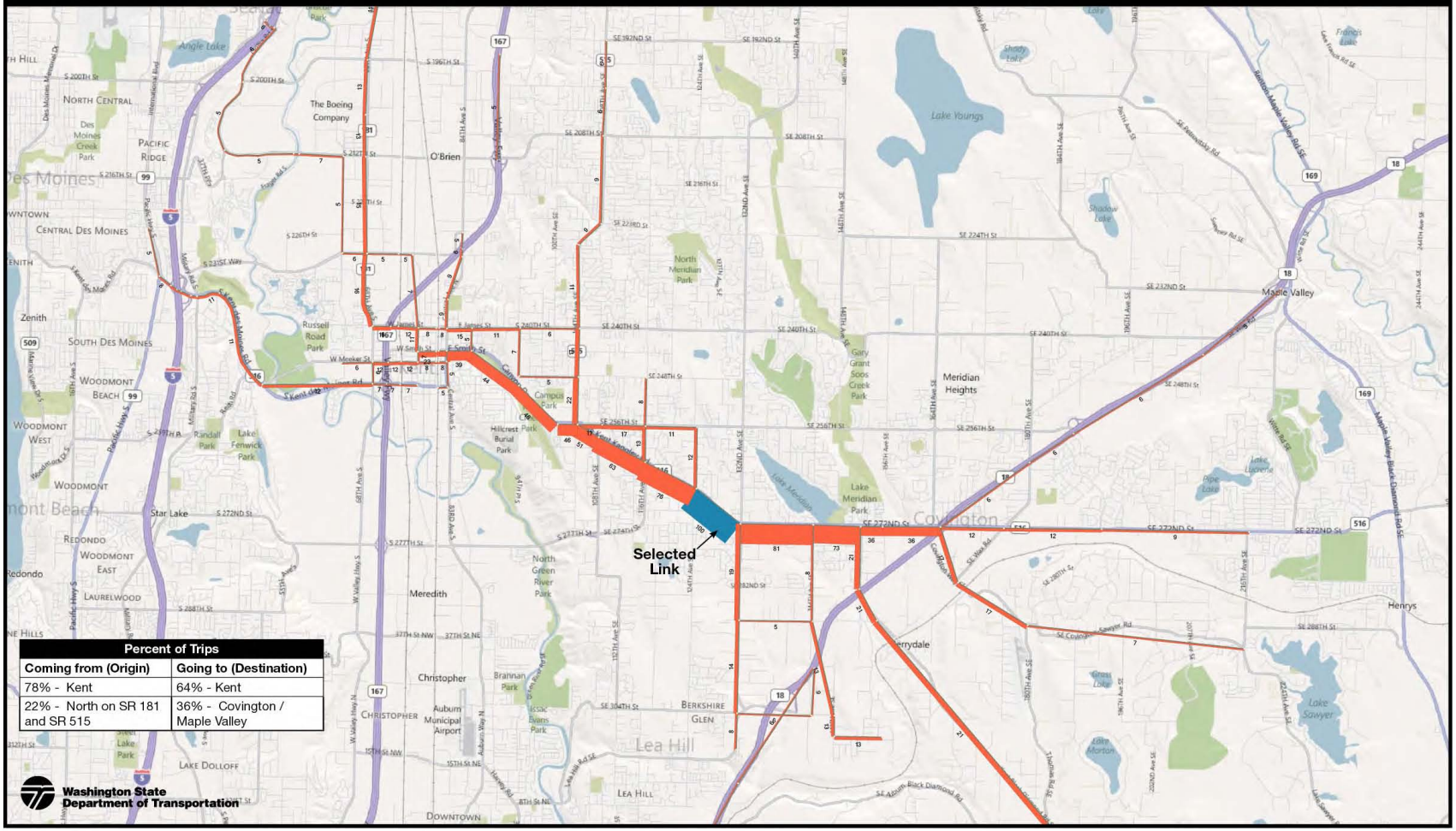

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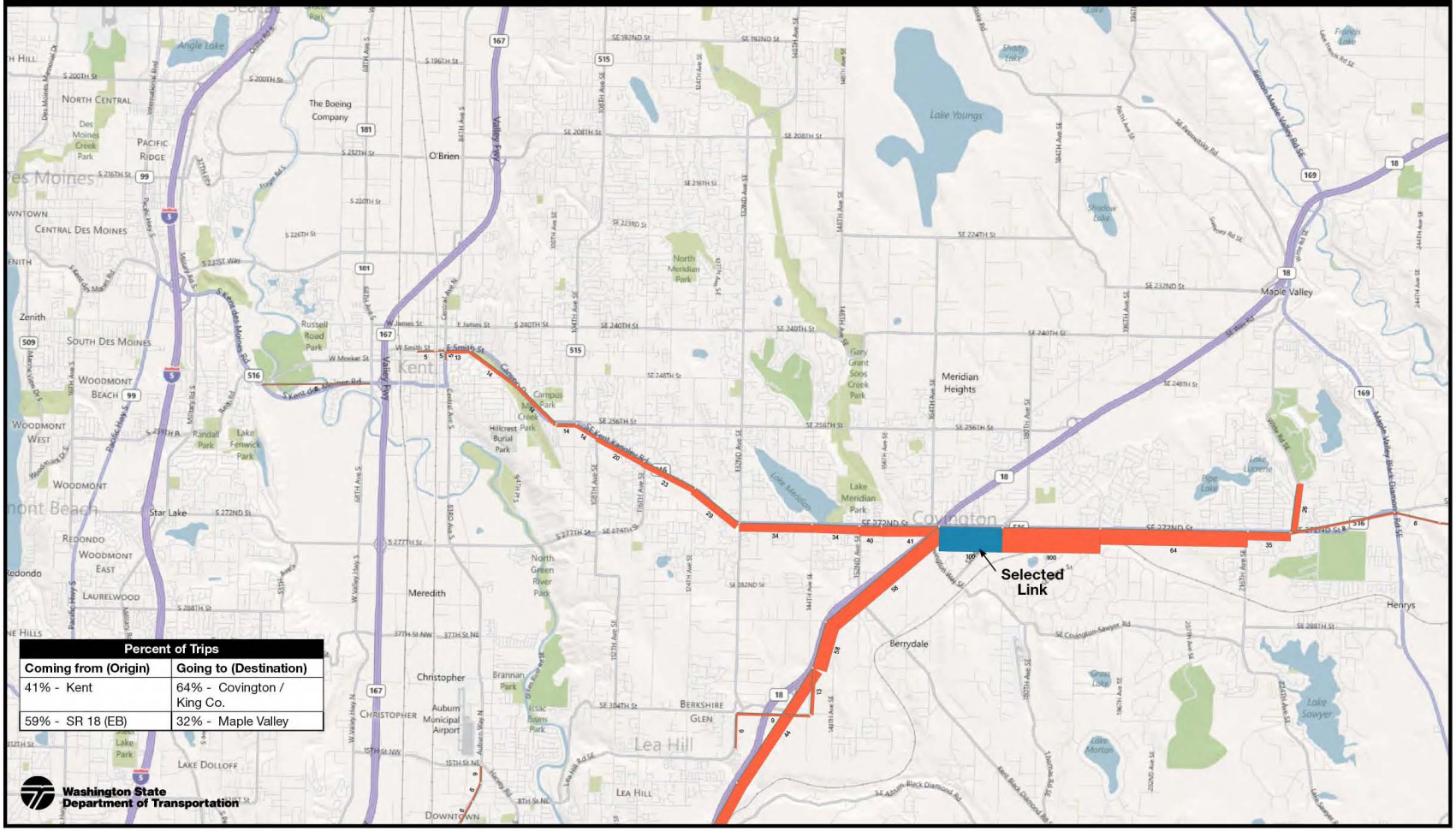

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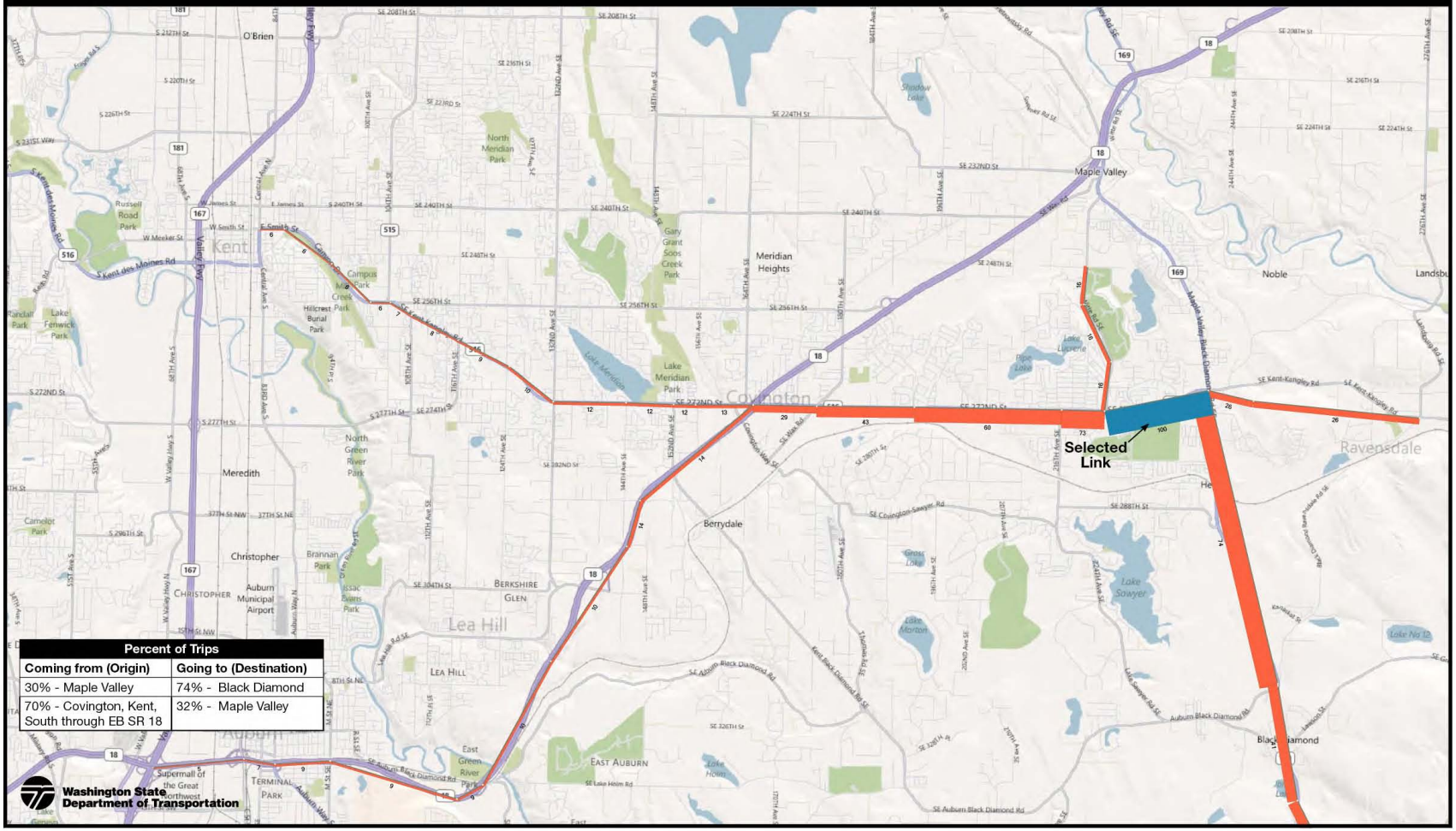
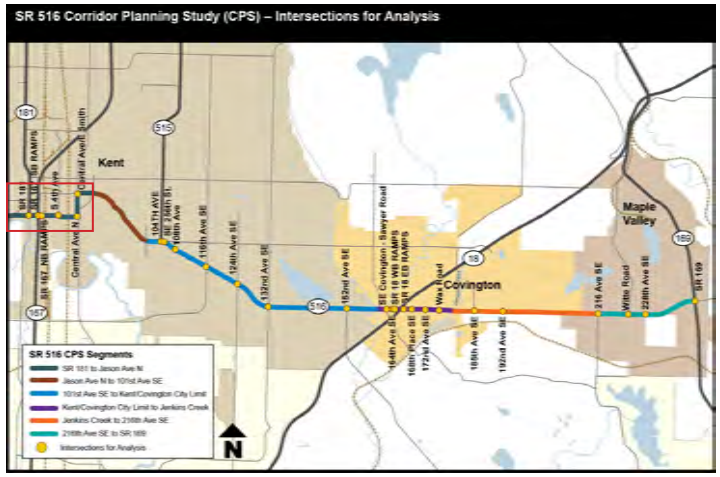
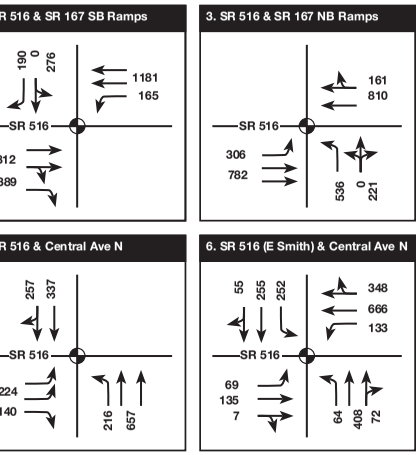


APPENDIX D-2: Traffic Volume and Intersection LOS.

SR 516 CPS – Traffic Volumes, Lane Configurations and LOS
2009 AM Peak Hour





LEGEND

- Turn Lane
- 1 Study Intersection
- Traffic Signal
- City of Kent
- City of Covington
- City of Maple Valley
- Location Area

Level of Service

- A - D
- E
- F

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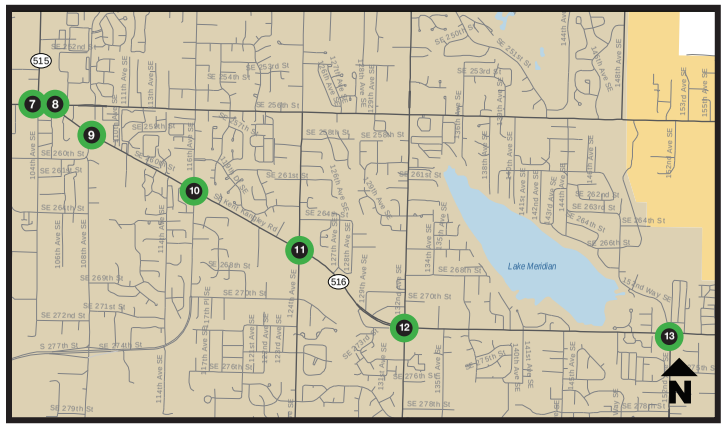
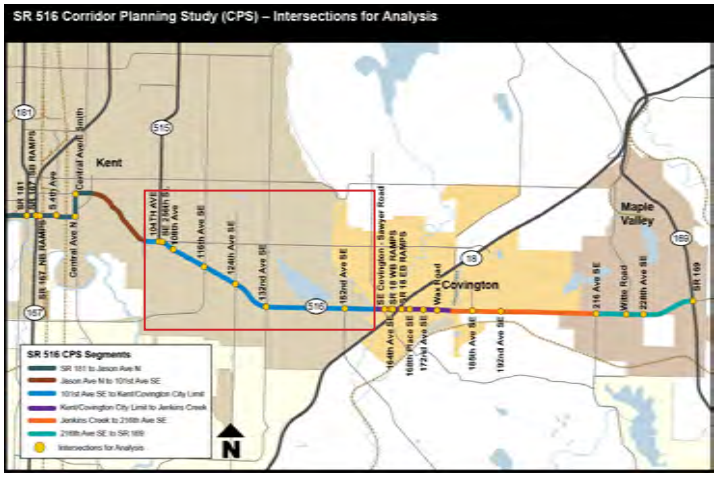
1/23/12

APPENDIX D-2: Traffic Volume and Intersection LOS.

SR 516 CPS – Traffic Volumes, Lane Configurations and LOS
2009 AM Peak Hour





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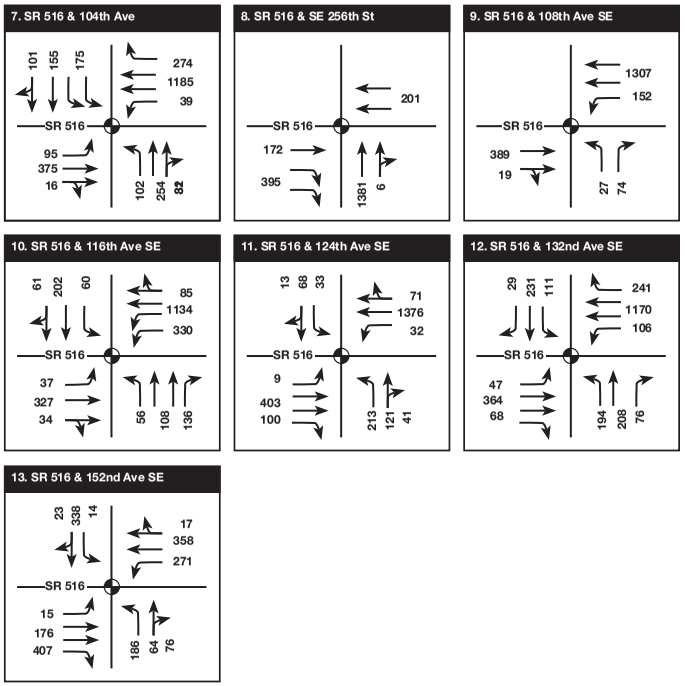

LEGEND

- Turn Lane
- 1 Study Intersection
- Traffic Signal
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- City of Covington
- City of Maple Valley
- Location Area

Level of Service

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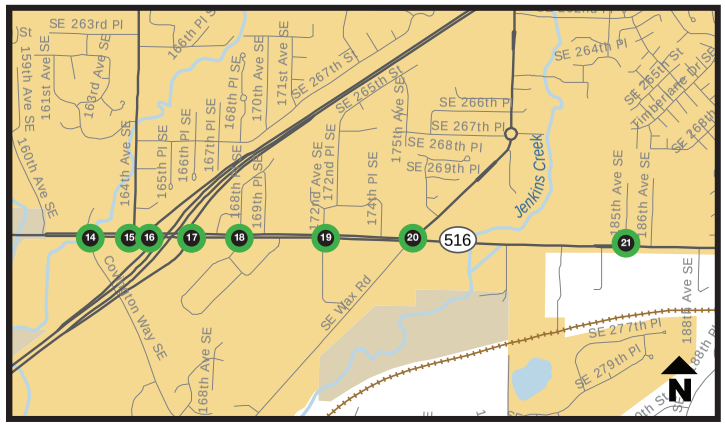
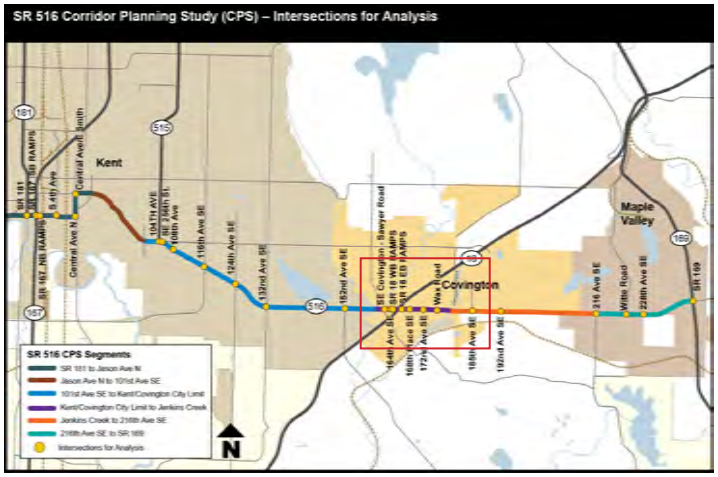
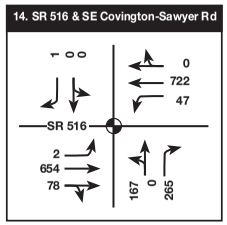
1/23/12

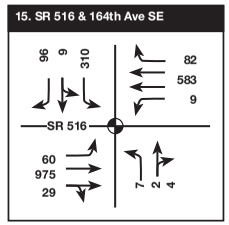
APPENDIX D-2: Traffic Volume and Intersection LOS.

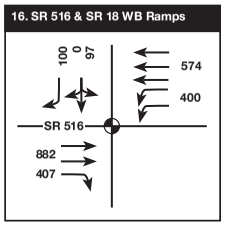
SR 516 CPS – Traffic Volumes, Lane Configurations and LOS 2009 AM Peak Hour

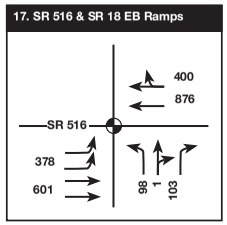


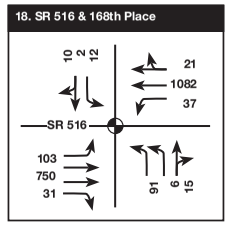


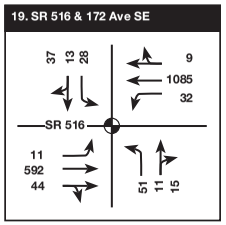


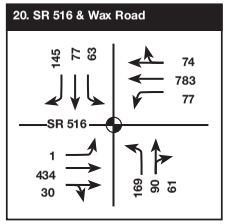


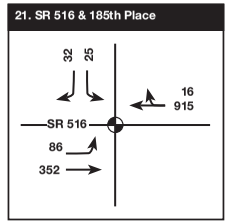












LEGEND

Turn Lane | 1 Study Intersection | Traffic Signal

City of Kent | City of Covington | City of Maple Valley

Location Area

Level of Service

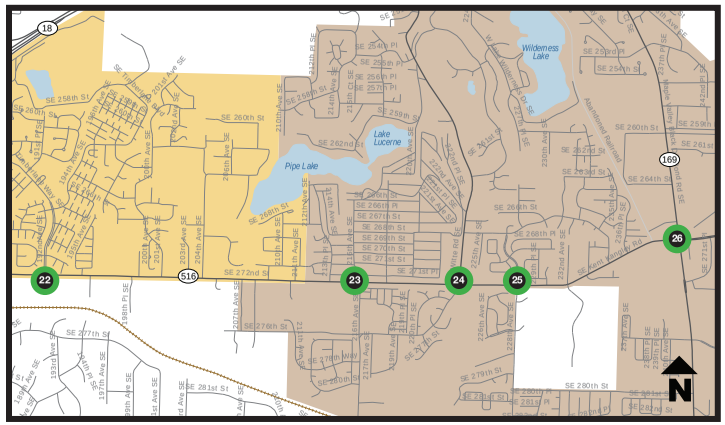
A - D | E | F

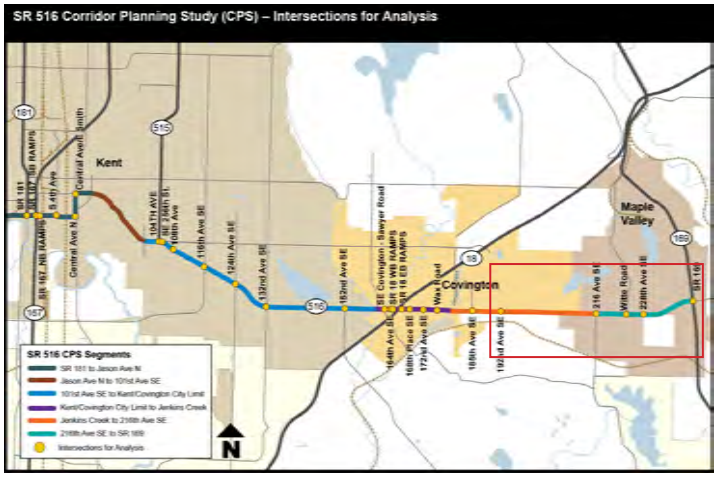
Washington State Department of Transportation

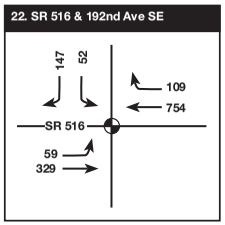
1/23/12

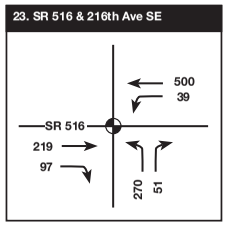
APPENDIX D-2: Traffic Volume and Intersection LOS.

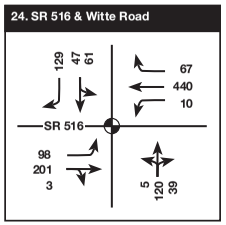
SR 516 CPS – Traffic Volumes, Lane Configurations and LOS
2009 AM Peak Hour

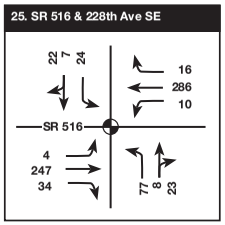


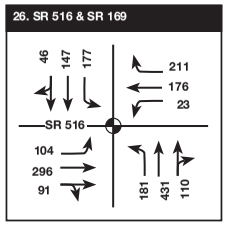












LEGEND

- Turn Lane
- Study Intersection
- Traffic Signal
- City of Kent
- City of Covington
- City of Maple Valley
- Location Area

Level of Service

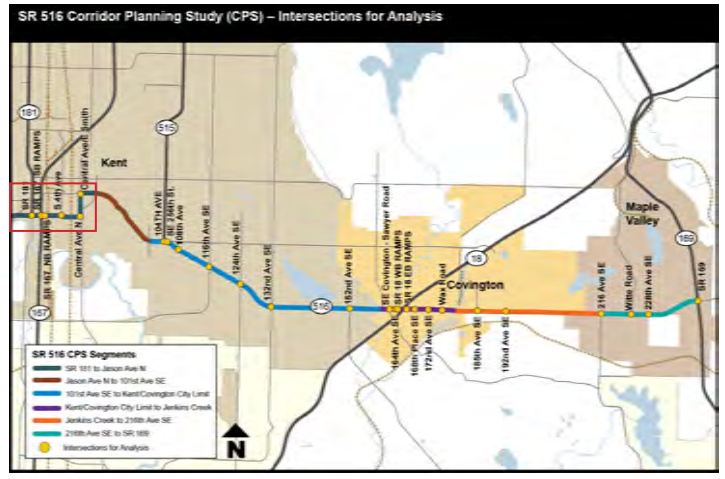
- A - D
- E
- F

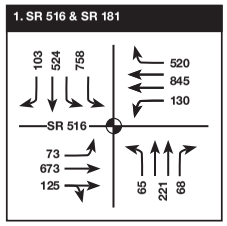
Washington State Department of Transportation

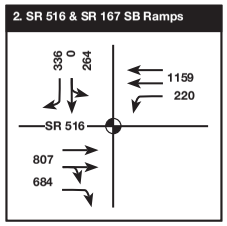
1/23/12

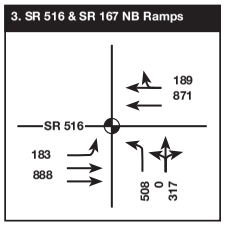
APPENDIX D-2: Traffic Volume and Intersection LOS.

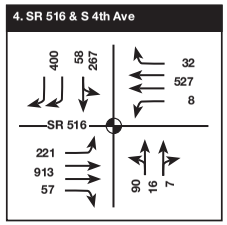
SR 516 CPS – Traffic Volumes, Lane Configurations and LOS
2009 PM Peak Hour

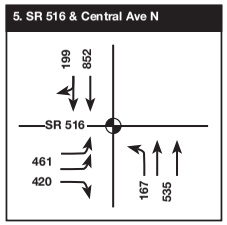


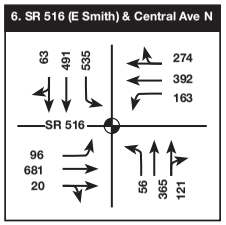












LEGEND

- Turn Lane
- 1 Study Intersection
- Traffic Signal
- City of Kent
- City of Covington
- City of Maple Valley
- Location Area

Level of Service

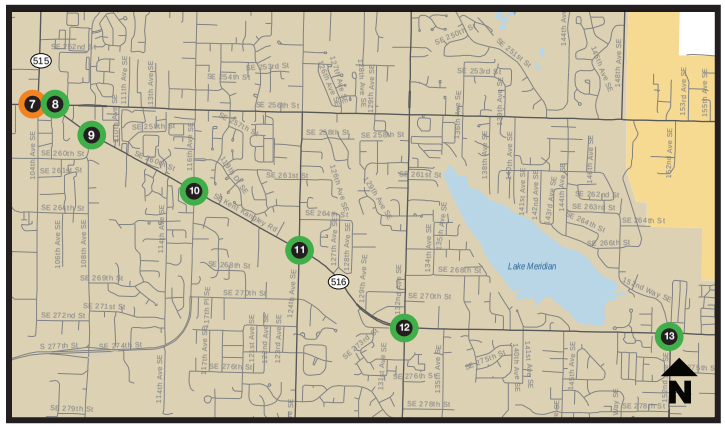
A - D E F

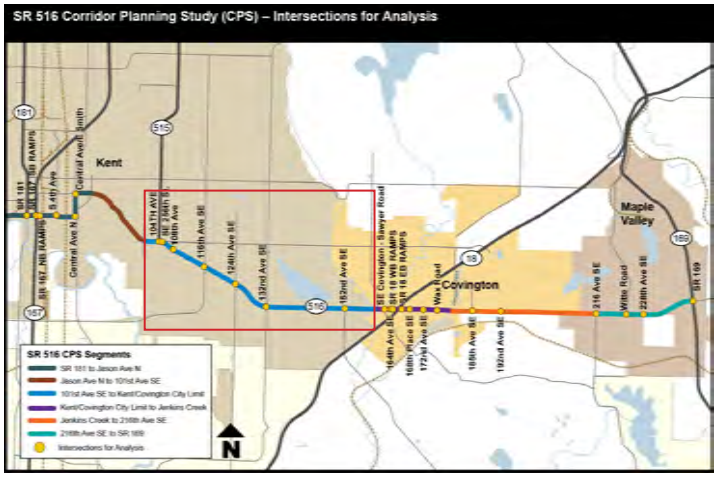
Washington State Department of Transportation

1/23/12

APPENDIX D-2: Traffic Volume and Intersection LOS.

SR 516 CPS – Traffic Volumes, Lane Configurations and LOS 2009 PM Peak Hour





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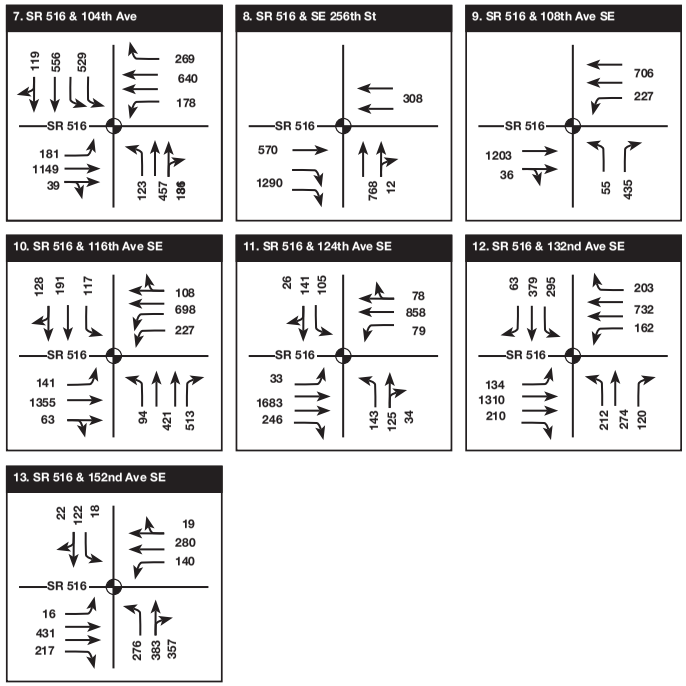

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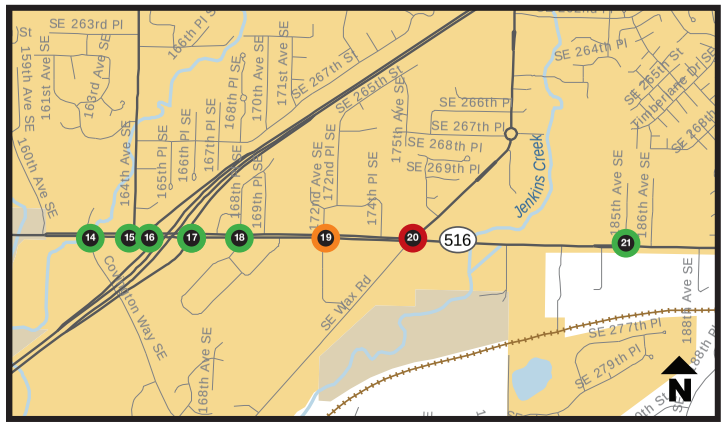

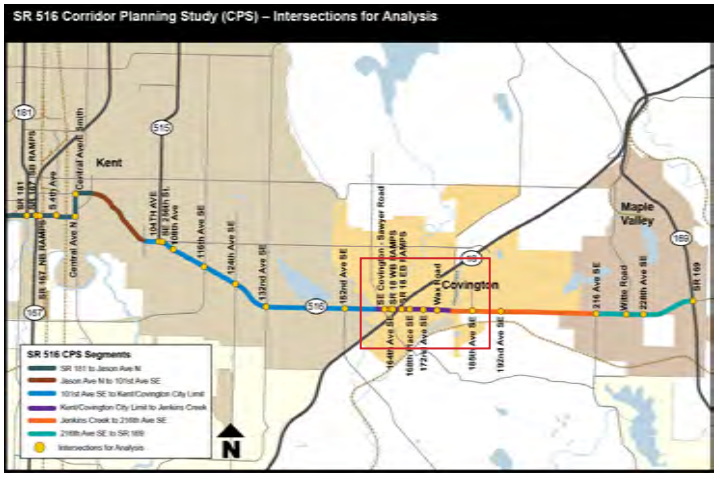

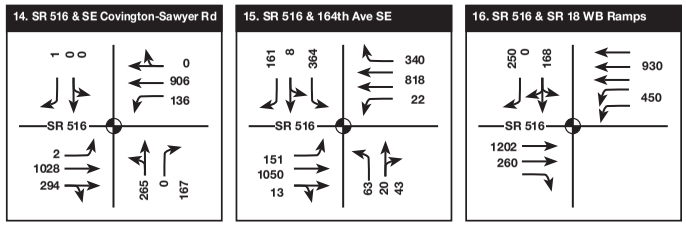

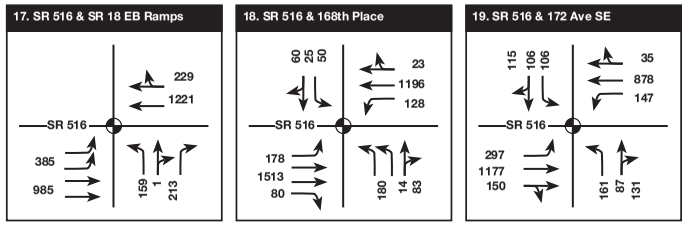

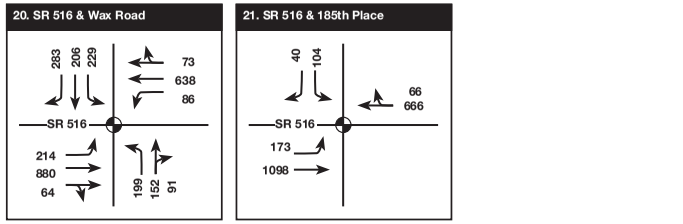

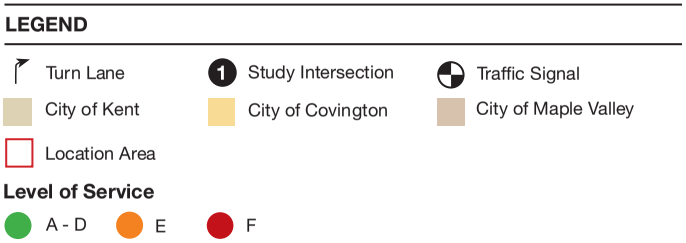

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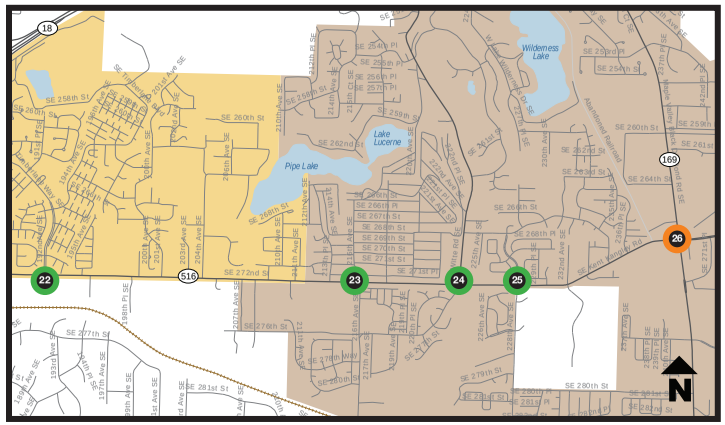
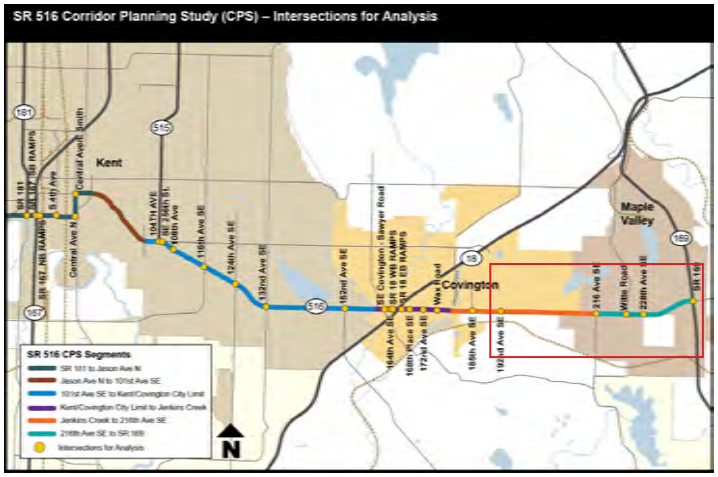
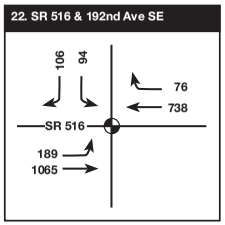
1/23/12

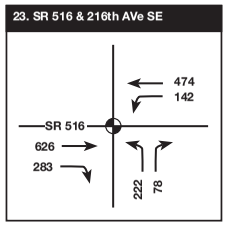
APPENDIX D-2: Traffic Volume and Intersection LOS.

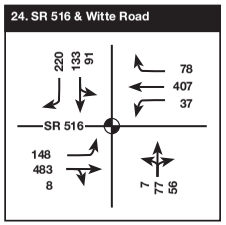
SR 516 CPS – Traffic Volumes, Lane Configurations and LOS 2009 PM Peak Hour

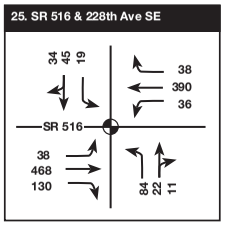


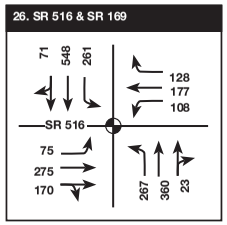












LEGEND

- Turn Lane
- Study Intersection
- Traffic Signal
- City of Kent
- City of Covington
- City of Maple Valley
- Location Area

Level of Service

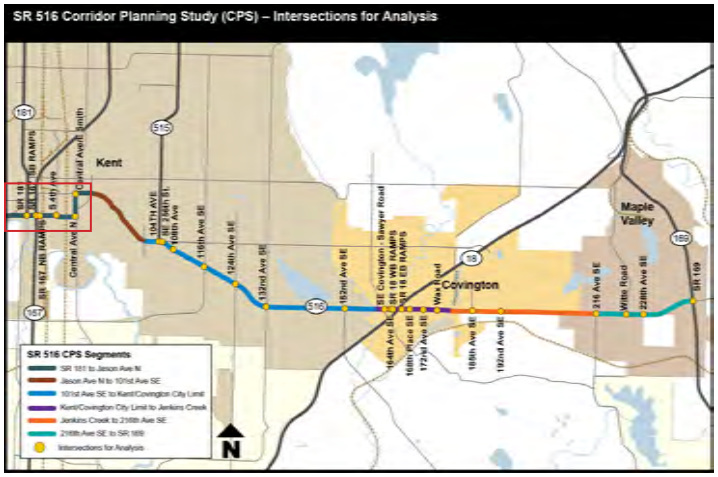
- A - D
- E
- F

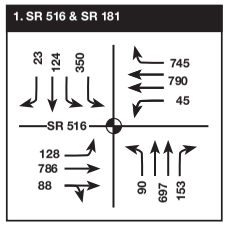
Washington State Department of Transportation

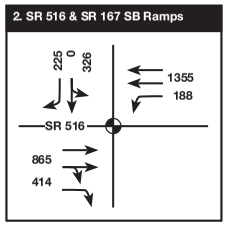
1/23/12

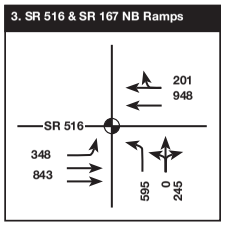
APPENDIX D-2: Traffic Volume and Intersection LOS.

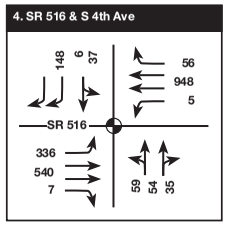
SR 516 CPS – Traffic Volumes, Lane Configurations and LOS
2030 AM Peak Hour

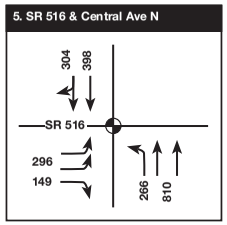


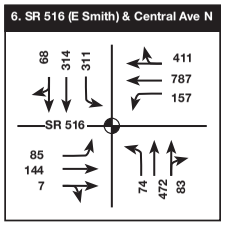












LEGEND

- Turn Lane
- 1 Study Intersection
- Traffic Signal
- City of Kent
- City of Covington
- City of Maple Valley
- Location Area

Level of Service

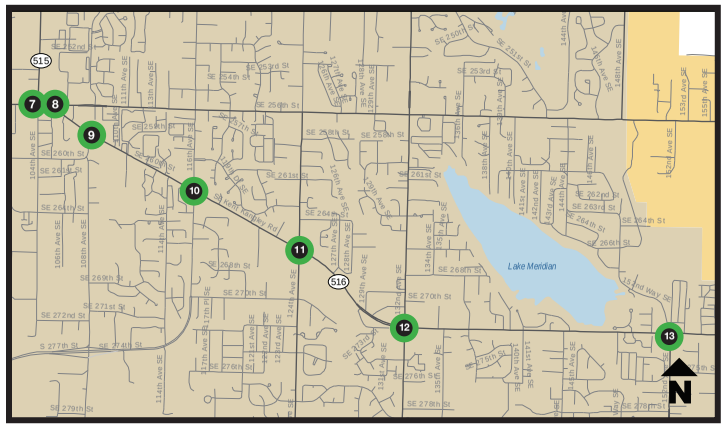
- A - D
- E
- F

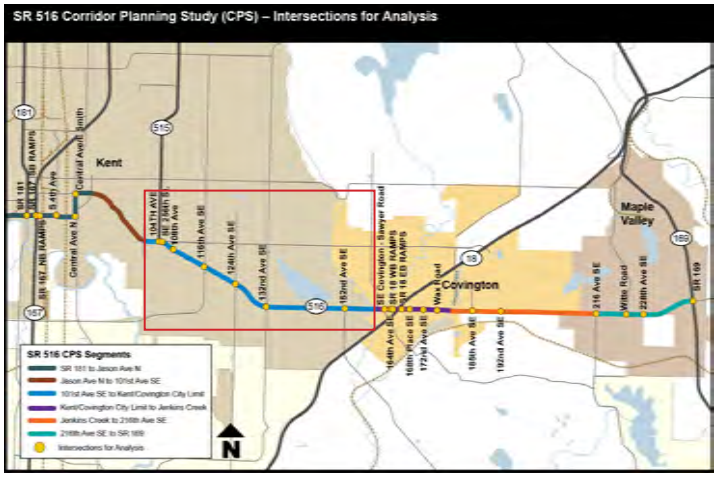
Washington State Department of Transportation

1/23/12

APPENDIX D-2: Traffic Volume and Intersection LOS.

SR 516 CPS – Traffic Volumes, Lane Configurations and LOS
2030 AM Peak Hour





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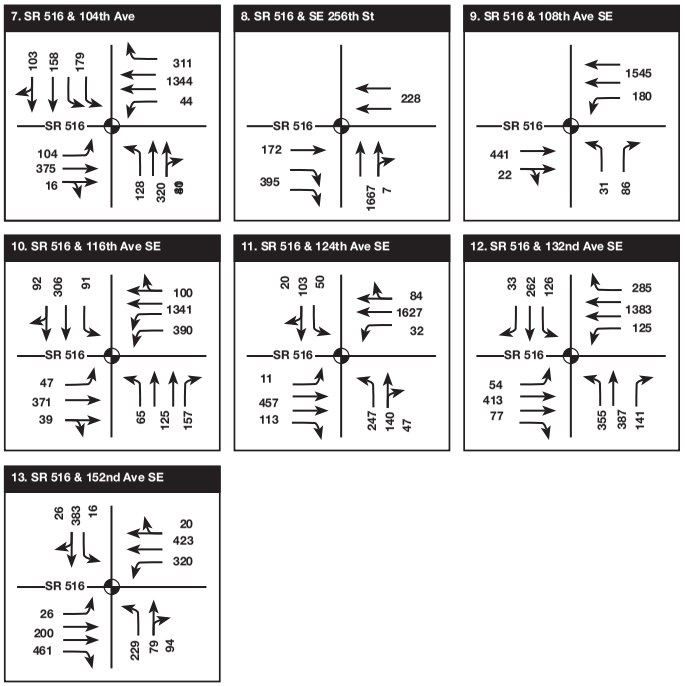

LEGEND

- Turn Lane
- 1 Study Intersection
- Traffic Signal
- City of Kent
- City of Covington
- City of Maple Valley
- Location Area

Level of Service

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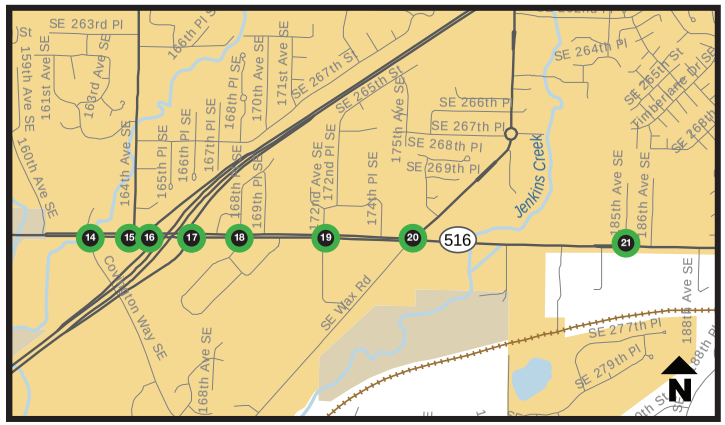
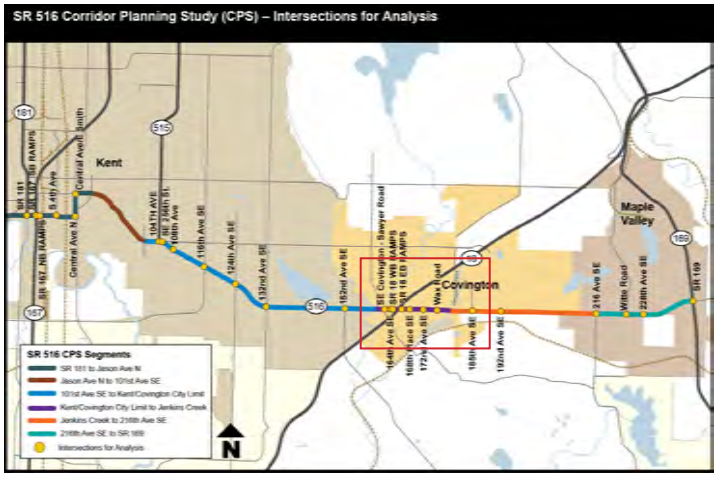
- F

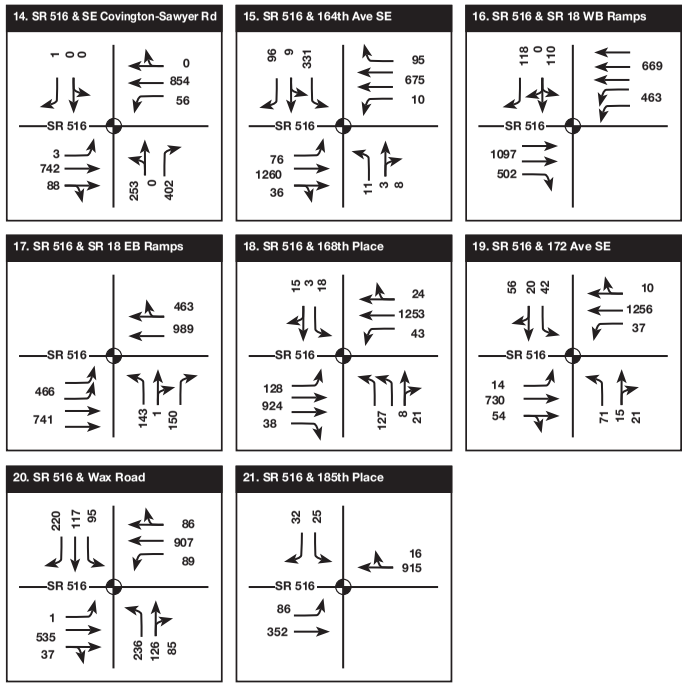
1/23/12

APPENDIX D-2: Traffic Volume and Intersection LOS.

SR 516 CPS – Traffic Volumes, Lane Configurations and LOS
2030 AM Peak Hour







LEGEND

- Turn Lane
- 1 Study Intersection
- Traffic Signal
- City of Kent
- City of Covington
- City of Maple Valley
- Location Area

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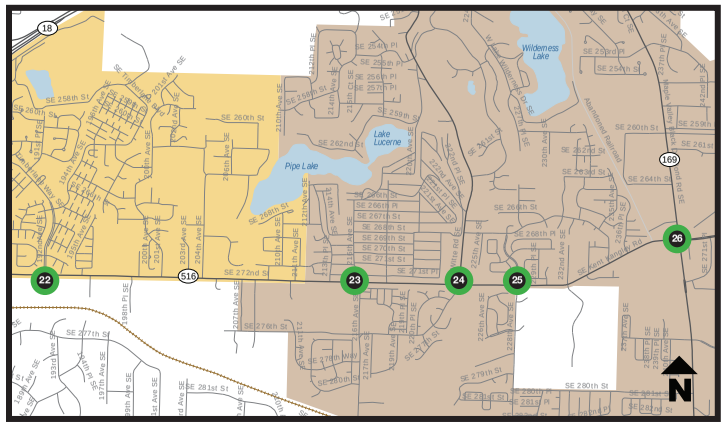
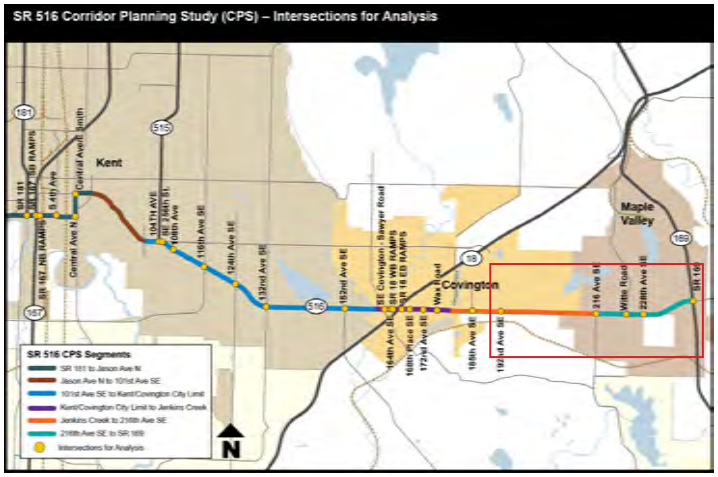
Washington State Department of Transportation

1/23/12

APPENDIX D-2: Traffic Volume and Intersection LOS.

SR 516 CPS – Traffic Volumes, Lane Configurations and LOS
2030 AM Peak Hour





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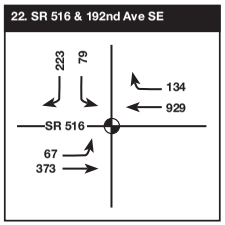
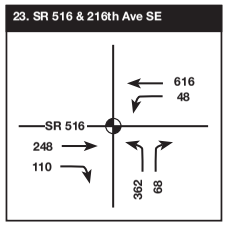
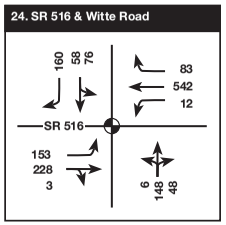
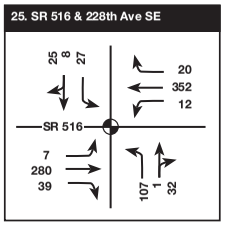
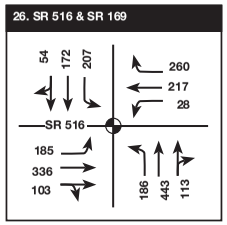










LEGEND

- Turn Lane
- Study Intersection
- Traffic Signal
- City of Kent
- City of Covington
- City of Maple Valley
- Location Area

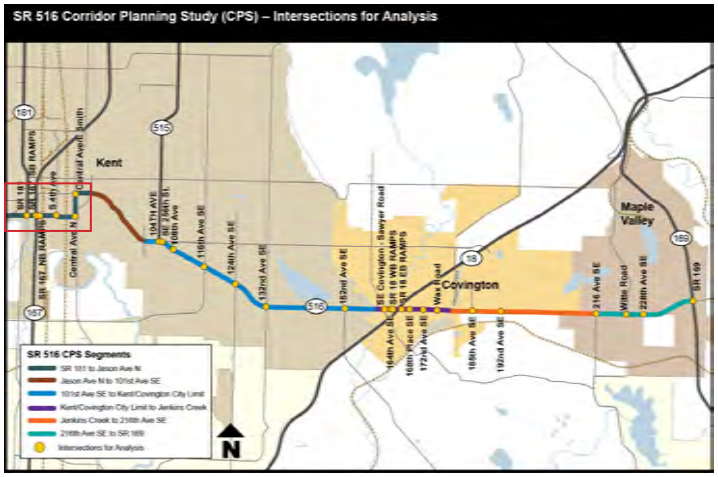
Level of Service

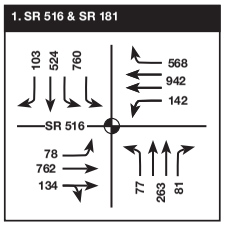
- A - D
- E
- F

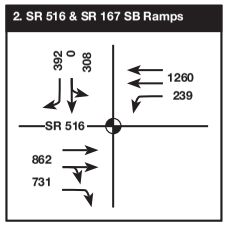
1/23/12

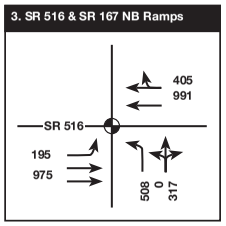
APPENDIX D-2: Traffic Volume and Intersection LOS.

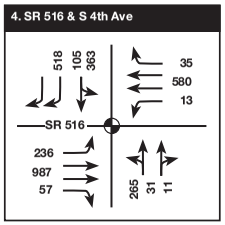
SR 516 CPS – Traffic Volumes, Lane Configurations and LOS
2030 PM Peak Hour

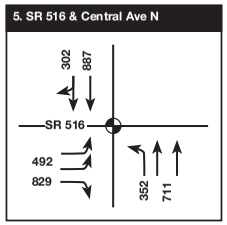


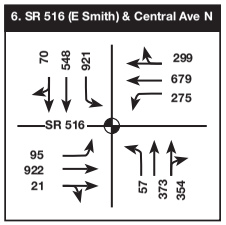












LEGEND

- Turn Lane
- 1 Study Intersection
- Traffic Signal
- City of Kent
- City of Covington
- City of Maple Valley
- Location Area

Level of Service

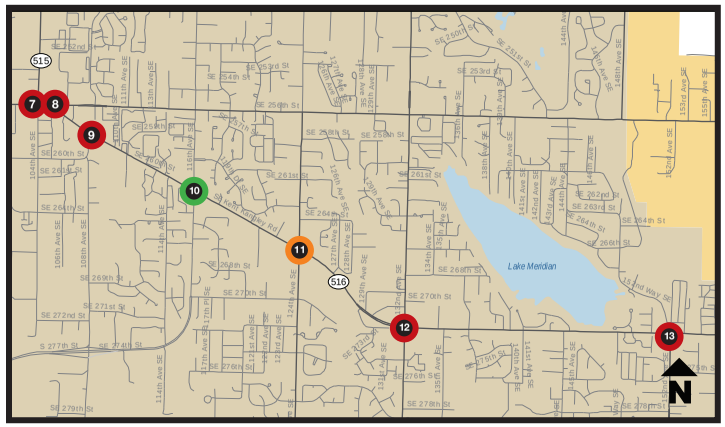
- A - D
- E
- F

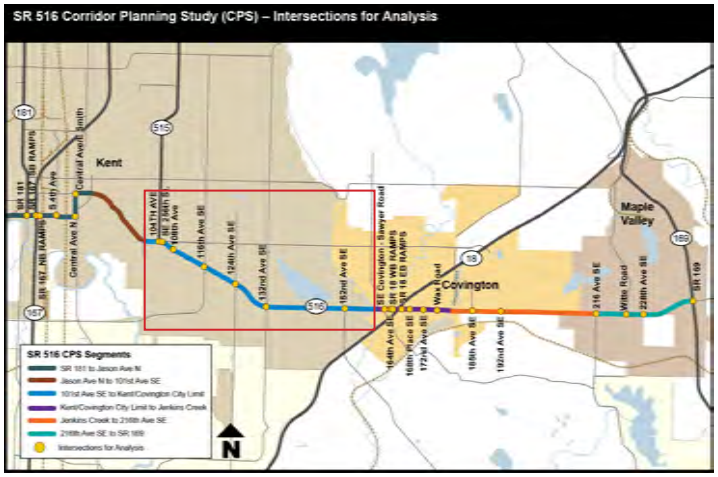
Washington State Department of Transportation

1/23/12

APPENDIX D-2: Traffic Volume and Intersection LOS.

SR 516 CPS – Traffic Volumes, Lane Configurations and LOS
2030 PM Peak Hour





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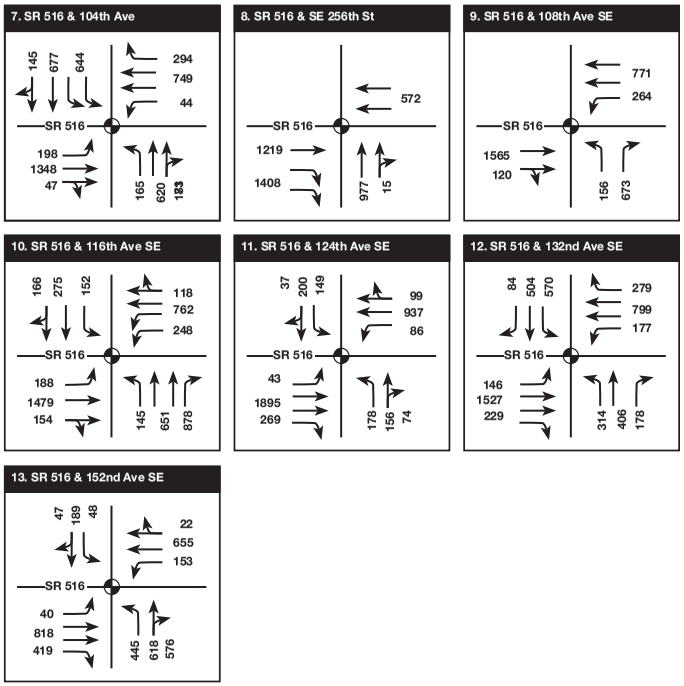


LEGEND

- Turn Lane
- Study Intersection
- Traffic Signal
- City of Kent
- City of Covington
- City of Maple Valley
- Location Area

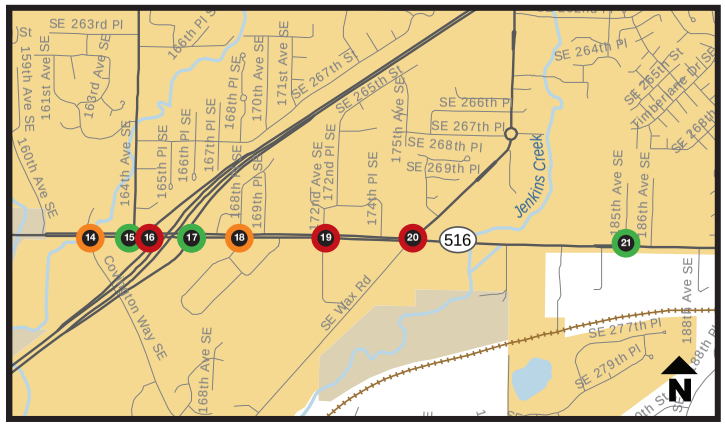
Level of Service

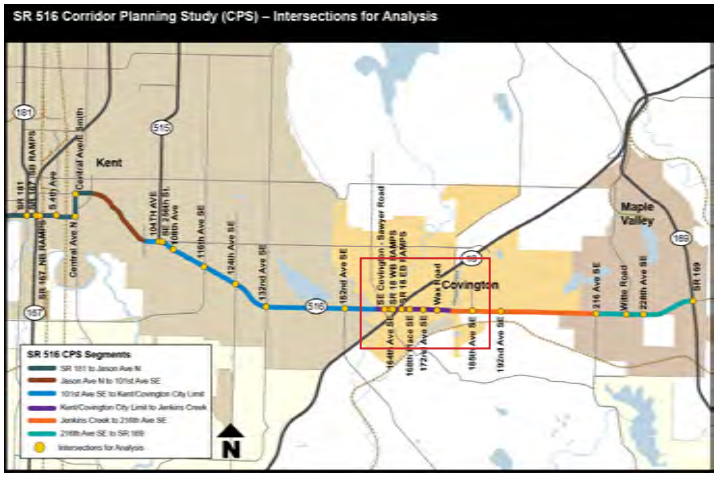
A - D E F

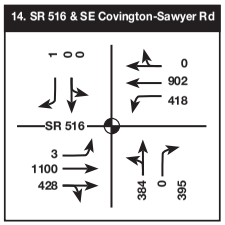
1/23/12

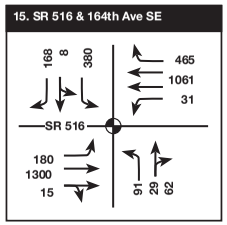
APPENDIX D-2: Traffic Volume and Intersection LOS.

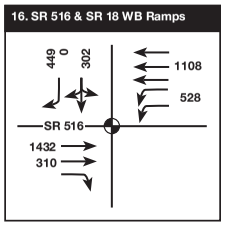
SR 516 CPS – Traffic Volumes, Lane Configurations and LOS
2030 PM Peak Hour

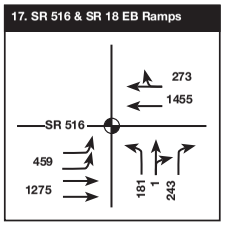


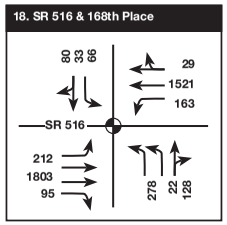


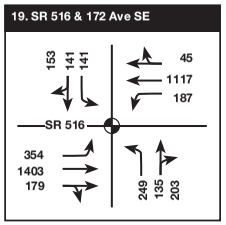


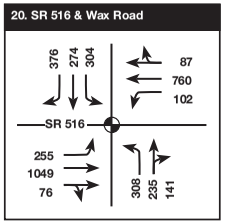


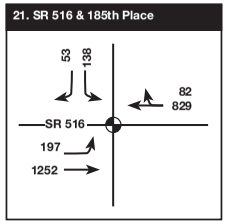












LEGEND

Turn Lane | 1 Study Intersection | Traffic Signal

City of Kent | City of Covington | City of Maple Valley

Location Area

Level of Service

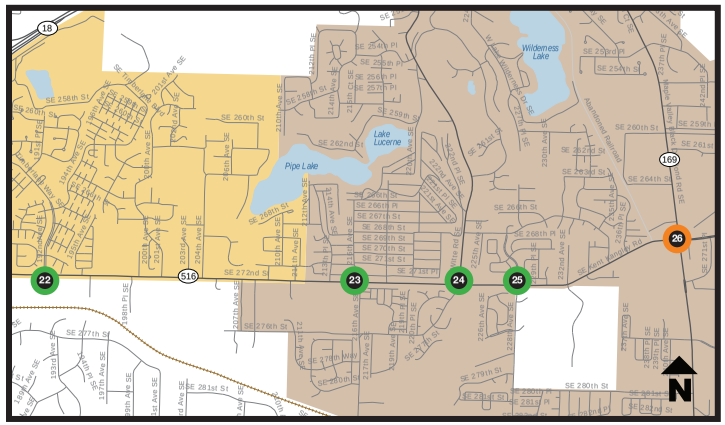
A - D | E | F

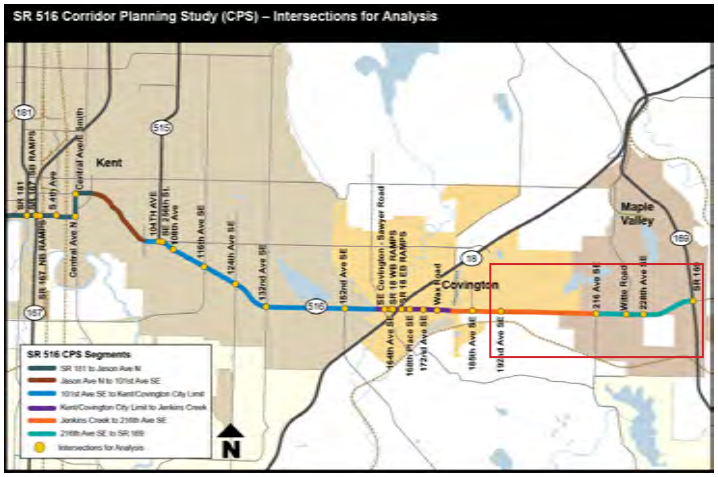
Washington State Department of Transportation

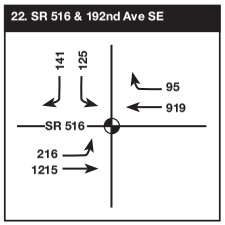
1/23/12

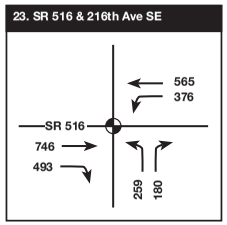
APPENDIX D-2: Traffic Volume and Intersection LOS.

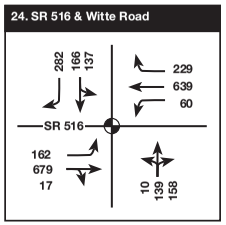
SR 516 CPS – Traffic Volumes, Lane Configurations and LOS
2030 PM Peak Hour

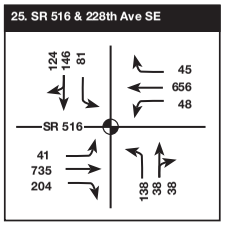


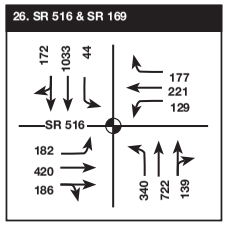












LEGEND

- Turn Lane
- Study Intersection
- Traffic Signal
- City of Kent
- City of Covington
- City of Maple Valley
- Location Area

Level of Service

- A - D
- E
- F

Washington State Department of Transportation

1/23/12

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Appendix E – Evaluation of Recommendations and Benefit Cost Analysis

SR 516: Evaluation of Potential Improvements for Impediments and Determination of Benefit Cost Ratio

Based on traffic analysis and inputs from local jurisdictions, the study team identified short-term (2016), mid-term (2022) and long-term (2030 and beyond) capacity improvement needs of this corridor. While most of the identified capacity improvement needs arise in 2030 and beyond, a few improvement needs arises in the short- and mid-term. These locations with short- and mid-term needs are:

- Jenkins Creek to 185th Ave SE (2016 needs)
- 185th Ave SE to 192nd Ave SE (2022 needs)
- Intersection at SR 516/104th Ave SE (2022 needs)

The study team looked into the potential solutions to address these needs. With collaboration from stakeholders, the team developed the following potential solutions that seem to be adequate to address the identified needs:

- Widening from Jenkins Creek to 185th Ave SE
- Widening from 185th Ave SE to 192nd Ave SE
- Intersection improvements at SR 516/104th Ave SE

The study team conducted field visits, analyzed aerial maps and prepared GIS maps to identify potential obstructions to implementing the solutions. Obstructions include commercial buildings, gas stations, residential units, wetlands, etc. Below are the potential constraints and impacts of possible solutions:

SR 516 and 104th Ave Intersection Improvement would impact:

- A portion of the parking lot of Key Bank at the northwest quadrant
- ARCO gas station at the northeast quadrant (space on the south side of the gas station would be reduced leading to possible relocation of gas station as shown in the image below)
- Starbucks building

- The parking lot of Jiffy Lube (this location has a potential for encountering hazardous materials)
- The drive through of Key Bank

SR 516 widening through Covington (Jenkins creek to 192nd Ave SE) would impact:

- Wetlands
- Residential properties
- Access and egress points to and from SR 516

To figure out the additional right of way needs and the extent of impacts on adjacent properties, GIS maps were prepared showing state highway, and adjacent property lines and parcel numbers with aerial maps as background (examples are shown in **Exhibits 2 and 3**). For each parcel, property values (including land and structures) were obtained from the King County Department of Assessments website (http://info.kingcounty.gov/Assessor/eRealProperty/default.aspx). Right of acquisition cost was calculated by adding administrative cost to the property value obtained from the above website for each parcel.

The study team used WSDOT's planning level cost estimation tool, PLCE, for estimating costs of potential improvements. The tool comes with default quantities per lane-mile and unit costs from historical data of WSDOT's past projects. The default unit prices accounts for differences in area prices, terrain, ground conditions, and design assumptions. The underlying assumption of the methodology is that little or no geotechnical data is known during this early stage of the project development. The methodology and assumptions are documented in the Manual and posted in WSDOT's website (http://www.wsdot.wa.gov/mapsdata/travel/pdf/PLCE_Manual_1_6_2009.pdf).

The study team performed benefit-cost analysis using WSDOT's Mobility Project Prioritization Process Benefit-Cost (MP3BC) software. The tool helps to estimate benefits based on collision reduction and annual 24-hour user travel time savings for 20 years after implementing the project. Costs include right-of-way, engineering, construction, and operation and maintenance over the same 20 years of analysis horizon. A description of the background, benefit-cost calculations, assumptions, methodologies, and procedures is provided in WSDOT's website (http://www.wsdot.wa.gov/mapsdata/travel/pdf/Mobility_Users_Guide_2001.PDF).

A summary of the benefit-cost analysis is provided in Exhibit 4 below. The potential intersection improvements at 104th Ave SE generates over six times of benefits for the dollar amounts needed to implement the potential improvements. The potential widening projects between Jenkins Creek and 192nd Ave SE would produce less benefits (travel time savings and collision reductions) compared to its costs.

Exhibit 1: 104th Ave SE (looking east).

Exhibit 2: SR 516 and 104th Ave SE Vicinity.

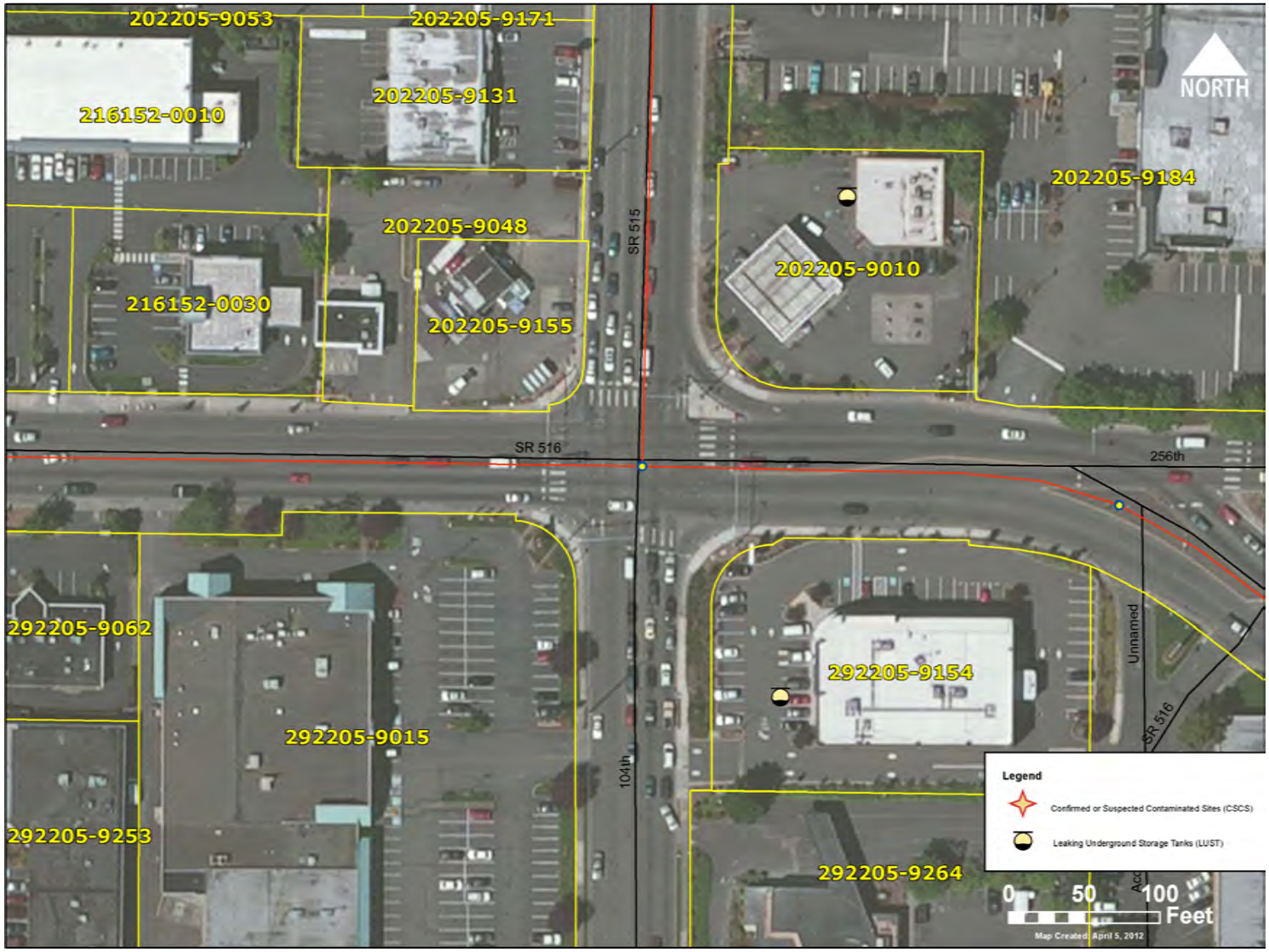

Exhibit 3: A Portion of SR 516 between Jenkins Creek and 185th Ave SE.

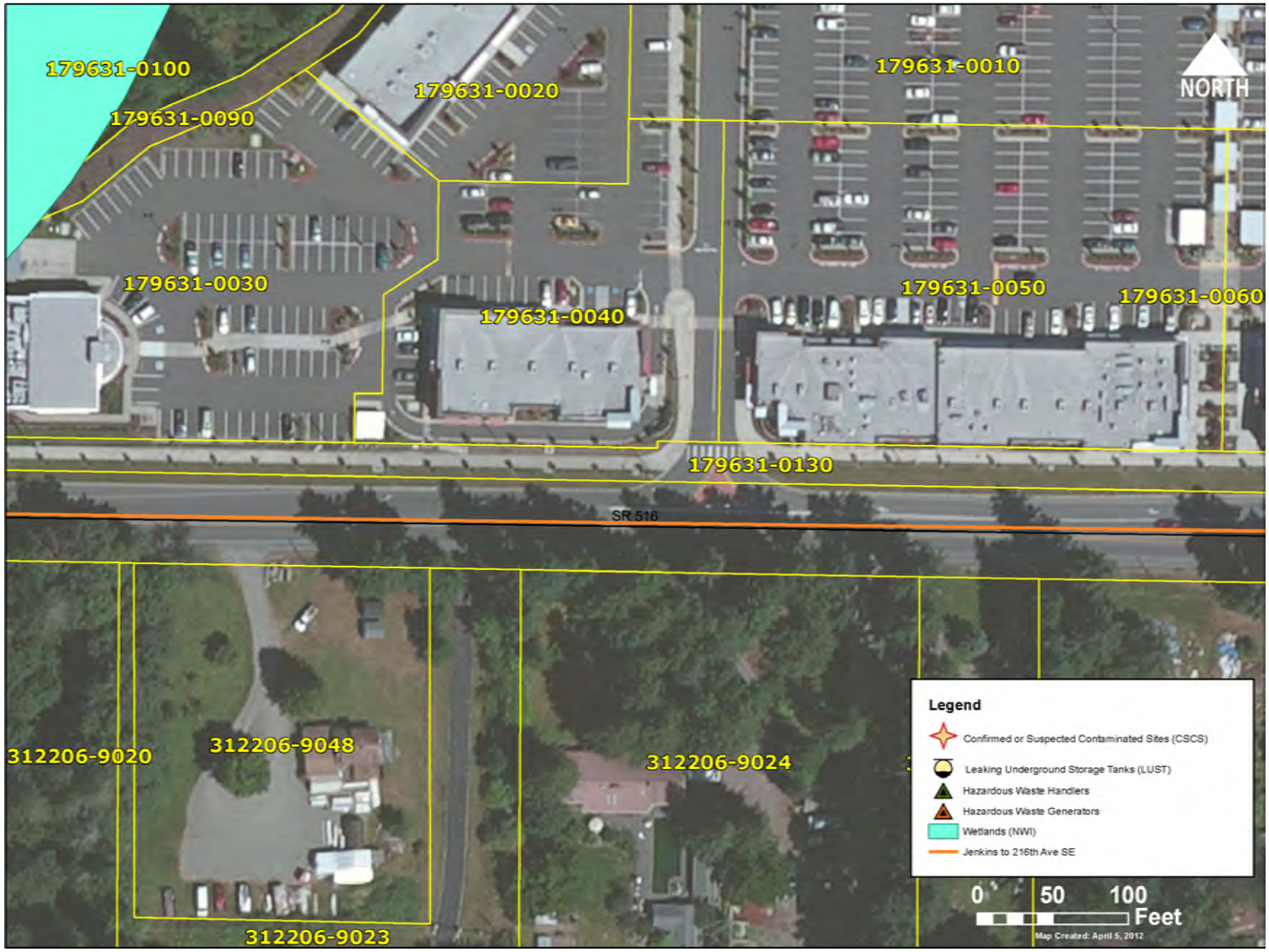

Exhibit 4: Benefit-Cost Analysis Summary

SR	BEGIN ARM	END ARM	LOCATION	PROJECT DESCRIPTION	COST RANGE	PROJECT COST (YOE$)							BENEFITS			B/C RATIO
						PE	ROW	STRUCTURES	DRAINAGE/ GRADING	OTHERS	TOTAL PROJECT COST	COST DURING ANLYSIS PERIOD	SAFETY BENEFIT	TRAVEL TIME BENEFIT	BENEFIT (PRESENT VALUE)	
516	7.34	-	Intersection at 104th Ave SE	Widen between 101st and 104th to six lanes; add separate northbound, southbound and eastbound right turn lanes; and add a third westbound thru lane between 256th and 104th.	LOW	$574,000	$5,813,000	$0	$980,000	$7,275,000	$14,642,000	$11,634,150	$2,423,000	$85,332,000	$87,755,000	7.54
					HIGH	$765,000	$7,751,000	$0	$1,307,000	$9,700,000	$19,523,000	$15,512,250	$2,423,000	$85,332,000	$87,755,000	5.66
516	12.43	12.93	Jenkins Creek to 185th Ave SE	Add a lane each direction	LOW	$423,000	$2,232,000	$0	$1,231,000	$6,743,000	$10,629,000	$9,132,200	$2,934,000	$5,092,000	$8,026,000	0.88
					HIGH	$563,000	$2,977,000	$0	$1,641,000	$9,991,000	$15,172,000	$13,175,950	$2,934,000	$5,092,000	$8,026,000	0.61
516	12.93	13.38	185th Ave SE to 192nd Ave SE	Add a lane each direction	LOW	$580,000	$676,000	$0	$1,378,000	$7,527,000	$10,161,000	$9,305,600	$2,124,000	$4,801,000	$6,925,000	0.74
					HIGH	$773,000	$901,000	$0	$1,838,000	$10,037,000	$13,549,000	$12,408,350	$2,124,000	$4,801,000	$6,925,000	0.56

Appendix F – Stakeholder Meetings

Corridor Working Group Meetings. The agenda and meeting summaries for each Corridor Working Group are presented on the following pages.

SR 516 Corridor Planning Study Meeting Notes
September 27, 2010, 9:30 AM
Covington City Hall

Corridor Working Group (CWG) Attendees:
Chad Bieren (Kent)
Don Vondran (Covington)
Matt Torpey (Maple Valley)
Doug Johnson (METRO)
Sean Ardussi (PSRC)
Rick Roberts (WSDOT NW Region Traffic)
Thomas Noyes - Richard Warren - Tom Washington (WSDOT Urban Planning Office)

Tom Washington was introduced as the Corridor Planning Study Project Manager for WSDOT. After introductions, there was a brief overview on the study background. The initial funding request by the city of Kent was for $500,000 and was intended to study the SR 167/SR 516 interchange. The funding request went through several iterations in the legislature, and resulted in a $150,000 funding appropriation for the study of the SR 516 corridor from SR 167 (MP 4.92) to SR 169 (MP 16.49). The specific language of the legislation is as follows:

"$150,000 of the motor vehicle account--state appropriation is provided solely for a corridor study of state route number 516 from the eastern border of Maple Valley to state route number 167 to determine whether improvements are needed and the costs of any needed improvements."

WSDOT will conduct the SR 516 Route Development Plan (RDP) "in-house" owing to the limited funding provided by the legislature. Although no end date for the study was specified in the legislation, WSDOT anticipates draft recommendations will be completed by late spring 2011. The local partners in this study include the cities of Covington, Kent and Maple Valley along with involvement from King County (Metro) and the Puget Sound Regional Council. Sound Transit and other appropriate agencies will be consulted during the study process.

There is some traffic data available from the partner jurisdictions. The city of Kent has data from a traffic study conducted about three years ago. The city of Maple Valley has recent traffic data which is being refined and reviewed before it will be released. The final product will be made available for this study. The city of Covington has data from a traffic model update that is about two years old. Covington will also supply the study with traffic data scheduled to be collected in the next couple of months. All of the local cities' traffic forecast model data sets utilize PSRC's regional model as the baseline for their models and have a horizon year of 2030. The Maple Valley model projections have included growth projections from both Maple Valley's "donut hole" development and a large proposed development within Black Diamond's urban growth area. The forecasts for Covington and Kent might not include this potential growth, but this will be looked into by the respective jurisdictions. The existing traffic data, as well as new data that will be collected in the near future, will be used in this RDP.

There was a question raised about what benefit/cost (B/C) ratio methodology will be used and whether the threshold value is still equal or greater than one in order to be considered. A B/C analysis is required for new projects, but the threshold values within B/C analysis is not entirely clear. This will be confirmed and clarified in advance of the next CWG meeting.

Another question was raised about the effect of PSRC removing the exempt status of SR 516 sections and including all SRs in the recently adopted PSRC's regional plan "Transportation 2040". Will any improvements proposed have to be in the regional plan (T-2040)? Sean Ardussi mentioned that the "Transportation 2040" regional plan updates will be ongoing. Any potential and/or proposed corridor improvements could be considered for inclusion in to the regional plan during the plan amendment process.

Doug Johnson indicated that Metro route #168 has recently increased service on the SR 516 corridor. However, the current Metro budget constraints make any additional future service improvements unlikely. The Metro #168 route service improvements are only funded for three years (through 2013) through a state regional transit mobility grant.

Chad gave an update on the SR 167/SR 516/SR181 interchange area. A Single Point Urban Interchange (SPUI) has been considered by the city of Kent for the SR 167/SR 516 interchange. SR 516, which is also known as "Willis Street" through Kent is also proposed to be grade separated over the Union Pacific Railroad tracks adjacent to the SR 167/ SR 516 interchange. The city Kent would like to see the study focus on the needs at and adjacent to the SR 167 / SR 516 interchange. The city has done traffic modeling of a SR 516 grade separation, but has not analyzed the interchange modifications. Kent does not plan to update their traffic model for several years.

Don expressed Covington's desire to have the SR 516 RDP focus on future transportation project needs to help in funding requests. Maple Valley agreed that the plan should serve to identify needs

and focus attention on those potential solutions. Current WSDOT "Moving Washington" policy regarding the use of a three tiered focus for proposing solutions will need to be considered.

Tier 1: Low-cost solutions that deliver a high return on capital investment and have a short delivery schedule. Tier 1 projects include variable message signs, closed circuit traffic cameras, highway advisory radio, incident management, and 5-1-1 travel information.

Tier 2: Moderate-to-higher cost improvements providing lower returns on capital investment are generally considered after applicable Tier 1 solutions have been implemented. These solutions include adding auxiliary lanes, collector-distributor lanes, and HOV direct access ramps.

Tier 3: High-cost projects that deliver corridor-wide benefits. Generally considered after Tier 1 and 2 solutions have been implemented, Tier 3 includes projects adding HOV lanes, High Occupancy Toll (HOT) lanes, and new interchanges.

In an effort to identify current issues, discussion focused on current areas of concern within the corridor. Some of the locations included Jenkins Creek in Covington (lane reduction), Meridian HS area (pedestrian crossings mid block), the SR 18/SR 516 ramp termini, and the SR 167/SR 516 IC with the proximal, at-grade RR Xing's. It was noted the corridor was not currently listed as a Collision Analysis Corridor (CAC) or Collision Analysis Location (CAL), and the current standard for collision analysis was more focused on severity as opposed to frequency. Another traffic issue could involve a possible future logging haul route using the SR 516 in the Four Corners/Ravensdale area in and near Maple Valley. This logging operation is expected to generate approximately 30 to 100 truck trips per-day on the SR 516 corridor.

Next Steps

- Collect existing traffic data on the SR 516 corridor from WSDOT and local partners (Covington, Kent, Maple Valley).
- Determine which model to use for traffic forecasting and existing conditions analysis.
- Determine what additional traffic data is needed to complete the analysis.
- Collect additional needed traffic data and inputs for the corridor traffic forecasting.

Tom Washington committed to sending out a draft Vision and Goals Statement as well as a draft Group Charter to all the participants for review and comment. After revisions are submitted, final documents will be produced and re-distributed for final approval and signature by the partners. A future meeting is tentatively scheduled for November/December.

SR 516 Corridor Planning Study Meeting Notes
June 16, 2011 1:00PM
Covington City Hall

Corridor Working Group (CWG) Attendees:
Seth Boettcher (Black Diamond)
Steve Clark (Maple Valley)
Glen Akramoff (Covington)
Don Vondran (Covington)
Doug Levy (Outcomes by Levy)
Doug Johnson (METRO)
Sean Ardussi (PSRC)
Matt Torpey (Maple Valley)
Rick Roberts (WSDOT NW Region Traffic)
Richard Warren, Tom Washington, Jana Janarthanan (WSDOT Urban Planning Office)
Faris Al-Memar, Matt Neely, Bill Bennet (WSDOT Programming)

After introductions, the first item covered was a recap of the revised Charter and Vision & Goals documents. Tom will send out copies of the final versions to the CWG next week. The group was also reminded that the study website was up and running (www.wsdot.wa.gov/planning/Studies/SR516Corridor/) and a one pager information sheet was available for distribution to the public via city offices. Some copies were distributed to the group and Tom will send electronic version to the CWG to reproduce and distribute as needed.

Tom reminded the group that, at the last meeting, we discussed areas of special concern along the corridor. Some of the issues/locations included development occurring at the eastern end of the corridor, Jenkins Creek in Covington (lane reduction), Meridian HS area (pedestrian crossings mid block), the SR 18/SR 516 ramp termini, and the SR 167/SR 516 IC with the proximal, at-grade RR Xing's were mentioned. When asked if there were any other areas of particular concern, no new locations or issues were identified.

There will be an outreach effort to elected officials and groups along the corridor to let them know that this study is underway. The group was asked if there should be any additions to the contact list that was distributed via e-mail. There was a question about the state legislature and Tom explained the state officials were also included in the contact list and would include Districts 5, 33, and 47. Tom also asked the CWG if there were other non-elected individuals or groups within their jurisdictions that might be interested in the plan that should be notified. Two groups that were mentioned were Cascade bicycle club and Middle Green River Coalition. They will be included in our outreach effort.

The draft Scope of Work and schedule were discussed and it was decided to allow an additional week for review and comments. Any comments on these drafts should be submitted before June 24th.

Steve asked if a budget will be developed and available to ensure the study is completed, despite the small allocation for the work. A line item budget sheet was not developed due to the assumption that all work will be performed in-house, and the realization that the study allocation will require the use of general planning monies to complete the study. The limited funding will restrict the scope of the work to be completed.

Jana presented the methods and assumptions that will be guide transportation analysis for this study. A methods and assumptions draft memo was distributed to the CWG a week prior to this meeting. Some questions asked were:

- Were the Black Diamond MPD's taken into account? – Yes, through local land use plans' inclusion of the developments.
- How were intersections identified? – All intersections with arterials were included for analysis. Covington asked that additional five intersections be added for analysis:. SR 516/164th Ave SE, SR 516/168th Place SE, SR 516/172nd Ave SE, SR 516/185th Ave SE, and SR 516/192nd Ave SE.
- How did the housing and employment numbers get developed? – From the local comprehensive plans and PSRC projections.
- How will sustainability, multimodality LOS standards, freight performance, GHG, and "whole streets" issues be addressed? – Standards do not exist currently that would allow a quantitative measurement of multi-modal LOS. Benchmarks do exist. An 18% reduction of green house gasses is included as a goal in PSRC's regional plan, but definitive ways to determine what strategies might get us there are not available. Some discussion of at least presenting a VMT comparison of past, present, and future may at least indicate an idea of what the proposed solutions might represent in these areas. This qualitative approach would be in keeping with the limited budget and still try to address these issues. Perhaps the model could identify potential "hot spots" along the corridor.
- Can the method of "melding" the different models (local/regional/state) be better explained? – This will be carried out in the Transportation analysis report.
- How will safety issues be looked at? – WSDOT has a new safety analysis software package named "Traffic Safety Analyst" and will be used in the analysis of this corridor.
- Pavement condition graphic does not reflect recent work in Covington. – The graphic will be updated to reflect the recent work.

After discussion and questions, the methods and assumptions presented were accepted by the group for use in analyzing the corridor. The five additional intersections proposed by Covington will be incorporated into the study.

Doug was concerned that the draft schedule indicated that recommendations would not be available in time for the 2012 legislative session and potential funding. We will look into trying to compress the work schedule but the realities of coordination, review, oversight, and final approval may present challenges for a faster turnaround. Faris also reminded the CWG that the planning process was intended to feed the Highway System Plan, and with that in mind, the SR 516 projects identified by the study will be assessed on a statewide basis of need and prioritized as appropriate.

Next Steps

- Tom will send out the final charter, vision and goals to the CWG
- The CWG will have written comments on the draft scope of work and Methods and Assumptions memo to Tom by June 24th.
- The one-pager information sheet will be sent to the CWG for printing and distribution as needed.
- Outreach and notification of the study will be sent electronically to the appropriate elected officials by the end of the month. Tribal outreach to the Muckleshoot and Yakama Tribes will be completed before the end of the month.
- Cascade and Middle Green River Coalition contacts will be made before the end of the month.
- The next CWG meeting is tentatively scheduled for September but may be moved to an earlier date if feasible.
- The scope of work will be modified to address GHG and complete streets issues.

Meeting adjourned at 3:00 PM

SR 516 Corridor Planning Study Meeting Notes
November 16, 2011 1:00PM to 2:30PM
Covington Council Chambers

Participants
WSDOT – Stacy Trussler, Richard Warren, Jana Janarthanan, Tom Washington, Faris Al Memar, Rick Roberts, Janice Helmann
Kent – Chad Bieren
Covington – Don Vondran, Glenn Akramoff, Salina Lyons
Maple Valley – Steve Clark, Matt Torpey
Black Diamond – Seth Boettcher
KCMetro – Doug Johnson

Went through the history of the study, the method and assumptions, and timeframe. Earlier meeting with Kent (11/4) reviewed. JJ delivered the study analysis and results.

TW covered the last CWG meeting on June 16th. Went over growth assumptions, analysis methodology, and WSDOT prioritization criteria. Areas of concern included SR 516/SR 167 IC area (RR Xings), Kent Meridian high school area ped crossing issues, SR 516/SR 18 ramp termini, Jenkins Ck structure replacement, and the timing of draft results being developed and released.

Meeting with Kent November 4th covered the findings of the RR crossing analysis. No project proposed, but we will make a recommendation for further study of the SR 516/SR 167 interchange area.

Our study results did not show a need for grade separations at the two RR crossings to the east of SR 167. One recommendation will be for an additional study of the SR 167/SR 516/ SR 181/ RR Xings area with a much more detailed analysis, i.e.-micro-simulation, should improvements to SR 167 be implemented. Our modeling efforts were more macro/corridor focused.

Reviewed collision data for the years 2005 thru 2009. Corridor is not on the CAC or CAL lists. Using SafetyAnalyst, most of the severe and fatal collisions seemed to be associated with DUIs and random in location, season, and time of day. No geometric solutions were indicated. No specific safety improvements were identified in the study corridor. Current safety project in Kent between 104th and 124th is aimed at pedestrian safety. The focus of the project is to the east of the high school by 0.2 miles. Alcohol related collisions may be targeted by enforcement and education. Additional lighting at bus stops would be a possible safety improvement as well as helping promote transit use.

Projections for 26 intersections and proposed improvements at 12 of those intersections were reviewed.

No widening projects were identified. Areas were identified as substandard in speed (under 70%) but they were either highly developed (and signalized) or marginally deficient. DV- Surprised that the study did not show the need for widening between Jenkins Creek and 216th. Previous work done by the city indicates otherwise. More refined analysis may be needed to clarify if a project would be recommended. The city has a concern with the possible perception that WSDOT is not supporting local improvement efforts within the corridor. WSDOT will investigate further, perhaps with a refinement in the segment section to isolate a smaller portion for analysis.

TW Re-clarified the Moving Washington priorities and the fact that the recommendations will be subject to ranking against other projects throughout the state.

TDM thoughts
Telecommuting options, School ride sharing, DMU transit options should be included, transit must be efficient/reliable/etc to compete with SOV, increased transit service between four corners and Auburn, 100 stall P&R at four corners planned. TDM measures could reduce future traffic volumes by five percent over the next 20 years. A five percent reduction would eliminate the need for at least two intersection improvements.

General Comments

SB- Urban centers focus- what can be done to make suburbia more attractive to industry? Can WSDOT advocate or purchase future ROW? (TW- Usually no- unless we have an actual project in the works, at least partially funded by the legislature. RDP's in the past were used by local jurisdictions to condition future development to dedicate ROW or require setbacks.) ST- rare occurrences have created budgets for advance ROW purchase, but only in exceptional cases - i.e.- SR 167 extension/SR 509 extension)

SC-The plan should have a vision of the corridor for the future. Layout, capacity improvements, geometrics, profiles, should be coordinated. Whole streets programs, sidewalks, separations, rebuild existing infrastructure to reflect "outside the box" thinking.

Draft report tentatively scheduled for release by February 2012. Chapters to be reviewed electronically as they become available. There were no objections raised to future communications being carried out electronically.

Adjourned