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Memorandum

To: **Shane Tapani**
CT6, LLC

From: **Daniel Stumpf, PE**

Date: **January 14, 2025**

Subject: **SR-411 at Westside Highway – Mitigation Analysis**
Due Diligence Analysis Memorandum

Introduction

This memorandum reports the findings of a due diligence analysis conducted for the Landing on the Cowlitz (LOTC) Master Plan area and subsequent development that will occur on-site. Specifically, this analysis reviews operation and potential mitigation at the intersection of SR-411 at Westside Highway. Prior study of the intersection was found it to exceed WSDOT mobility standards during the PM peak hour by year 2043 without impacts from the LOTC project.

Analysis items reviewed in this study include the following:

- Determine what year the intersection will operate in excess of WSDOT standards when considering both general traffic growth in the area in conjunction with added site trips.
- Review potential mitigation at the intersection that will allow for acceptable operation with full site buildout under year 2043 conditions.

The analysis conducted in this study focuses specifically on the PM peak hour since the intersection was found to operate acceptably during the AM peak hour under year 2043 conditions with full buildout of the project site. All potential mitigative measures reviewed in this study are not expected to worsen intersection operation during the AM peak hour to levels below WSDOT mobility standards.

Detailed information on traffic volume projections and level of service calculations are included as attachments to this memorandum.

Intersection Failure Year

The intersection of SR-411 at Westside Highway operates under the jurisdiction of WSDOT, where WSDOT mobility standards require the intersection operate at Level of Service (LOS) C or better. According to the *Landing on the Cowlitz Master Plan Development Agreement Transportation Impact Study* (TIS), dated November 13, 2023, the intersection of SR-411 at Westside Highway is projected to operate in excess of this LOS C standard during the PM peak hour by year 2043, without added impacts from the LOTC Master Plan area. To determine what year the intersection may exceed standards when considering both general traffic volume growth in the area and added impacts from future development withing LOTC Master Plan area, the following methodology was used:

- Traffic volumes, trip generation/distribution methodologies, and growth assumptions used in the 2023 TIS were referenced and utilized in developing volumes at the intersection of SR-411 at Westside Highway. These assumptions/data include the following:
    - PM peak hour counts were collected on Tuesday, October 17, 2023, from 4:00 PM to 6:00 PM.
    - A compounding annual growth rate of 2% per year over a 20-year period was applied to the collected 2023 traffic counts to estimate future year 2043 conditions.
    - With full buildout of the LOTC Master Plan area, the intersection is projected to be impacted by up to 174 PM peak hour trips.
    - Trips traveling between the intersection and project site will do so via SR-411 to the east. From the intersection approximately 5% of trips will travel to/from the north intersection leg, 5% of trips to/from the south leg, and 5% of trips to/from the west leg.
- Intersection volumes were estimated for each year between 2023 and 2043 by:
    - Applying a 2% compounding growth factor to the collected counts for each year after 2023.
    - Assuming 5% of the of the LOTC Master Plan area will be developed each year after 2023 until full buildout in 2043. The peak hour trips impacting the intersection were adjusted accordingly based on the percentage of site buildout.
- Intersection volumes for each year between 2023 and 2043 were inputted into a Trafficware Synchro/SimTraffic capacity analysis model to determine when the intersection will operate in excess of LOS C standards.

Based on the analysis findings, the SR-411 at Westside Highway intersection is projected to operate in excess of LOS C by year 2037 with approximately 70% of the LOTC Master Plan area developed.

The LOS, delay, and v/c results of the 2036 and 2037 capacity analyses are shown in Table 1 for the PM peak hour. The traffic volume projections and capacity reports are included as an attachment to this memorandum.

Table 1: 2036 and 2037 Intersection Capacity Analysis Summary

Analysis Scenario		PM Peak Hour		
Year	Percent of Site Buildout	LOS	Delay (s)	v/c
1. SR-411 at Westside Highway				
2036 Conditions	65%	C	23	0.81
2037 Conditions	70%	**D**	27	0.86

Table Notes: ***BOLDED*** *text indicates intersection operates in excess of agency standards.*

Mitigation Analysis

Under the existing lane and traffic control configuration, the intersection of SR-411 at Westside Highway was found to operate at LOS F during the PM peak hour under year 2043 conditions with full buildout of the site. In order to meet WSDOT's LOS C standard, three potential mitigative measures were considered and evaluated for the intersection. These measures include the following:

1. Add additional travel lanes at critical intersection approaches and turning movements.
2. Install a traffic signal with no revisions to intersection approach lanes.
3. Install a single-lane roundabout.

A fourth mitigative measure was initially considered which involved converting the all-way stop-controlled intersection to two-way stop-controlled by either removing the northbound/southbound stop signs or eastbound/westbound stop signs. Such mitigation was found infeasible given the highest volume intersection approaches during the PM peak hour were the northbound and westbound approaches, and no practical number of lane additions will allow the intersection to operate at LOS C or better.

Mitigation 1: Add Lanes

Focusing on the PM peak hour, the most critical and highest demand intersection approaches from greatest to least were 1) the westbound approach, 2) the northbound approach, 3) the southbound approach, and 4) the eastbound approach. Dedicated turn lanes were added to highest volume left or right turn movements of each approach until an LOS C result was obtained. The following intersection configuration was found to be necessary:

- Northbound and Westbound Approaches: Install a dedicated right-turn lane and revise the existing travel lane to serve both left-turn and through traffic.
- Southbound and Eastbound Approaches: No changes.

The aforementioned lane configuration is the most efficient design found to improve intersection operation to acceptable standards. However, alternative lane configuration designs that will still satisfy WSDOT standards are available. If obtaining adequate right-of-way or designing the intersection as described above in not practical, these alternative lane configuration designs can be further explored at your request.

Mitigation 2: Install a Traffic Signal

Based on a preliminary review of traffic signal Warrant 1 in the *Manual on Uniform Traffic Control Devices*, a traffic signal is projected to be warranted at the intersection by year 2037 with 70% of the LOTC Master Plan area development. Note the intersection is projected to trigger signal warrants by year 2043 without any added trips from the project site. Therefore, the installation of a signal at this intersection is reasonable.

Without revising the existing intersection lane configuration, the installation of a traffic signal will allow the intersection to operate at LOS B during the PM peak hour.

Mitigation 3: Install a Single-Lane Roundabout

The third reviewed mitigation would include reconstructing the intersection as a single-lane roundabout. The existing paved area of the intersection could potentially accommodate a roundabout with an outer radius of approximately 45 to 50 feet (90 to 100-foot inscribed diameter). This outer radius is sufficient to design either a mini-roundabout or a smaller roundabout with an inner radius of approximately 25 to 30 feet (50 to 60-foot diameter) with a circulating lane width of 20 feet.

Assuming the intersection is reconstructed as a single-lane roundabout, the intersection is projected to operate at LOS A during the PM peak hour.

Analysis Summary

The LOS, delay, and v/c results of each mitigation analysis scenario is shown in Table 2 for the PM peak hour. A figure depicting the 2043 buildout year volumes in the LOTC TIS is included in the attachments to this memorandum for reference purposes. The capacity reports for each mitigative analysis scenario and the preliminary signal warrant calculations are included in the attachments.

Table 2: Mitigation Capacity Analysis Summary

Analysis Scenario		PM Peak Hour		
Year	Mitigation	LOS	Delay (s)	v/c
1. SR-411 at Westside Highway				
2043 Site Buildout Conditions	None	**F**	60	1.11
2043 Site Buildout Conditions	Added NB & WB RT Lanes	C	21	0.68
2043 Site Buildout Conditions	Traffic Signal	B	12	-
2043 Site Buildout Conditions	Roundabout	A	9	0.59

Table Notes: ***BOLDED*** *text indicates intersection operates in excess of agency standards.*

Conclusions

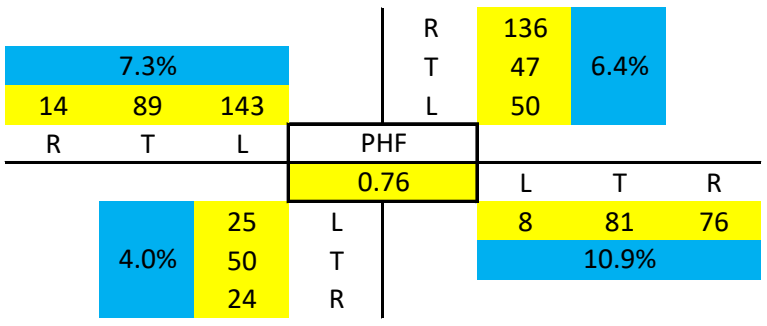
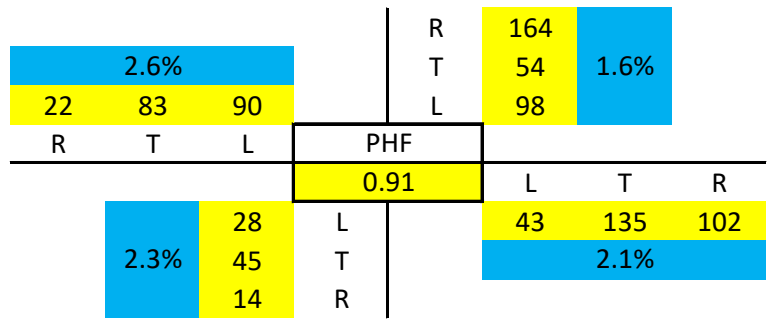
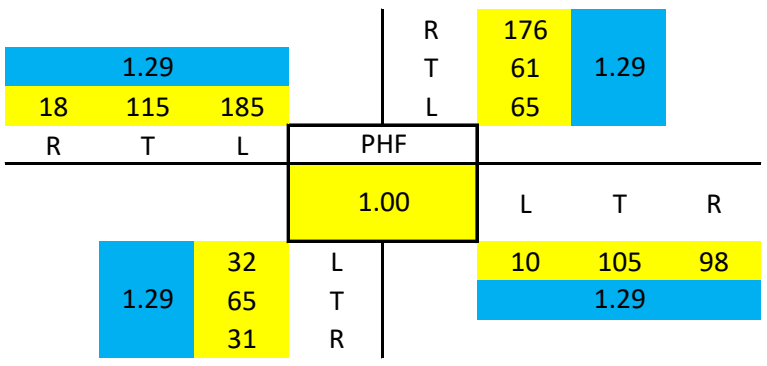
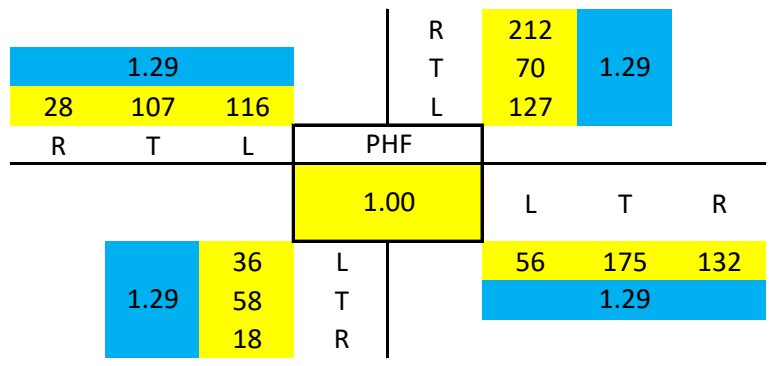
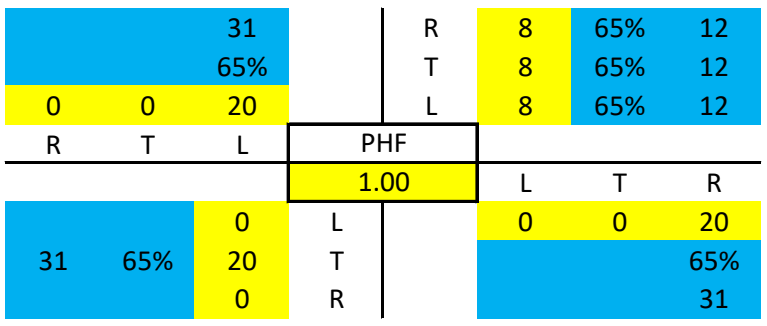
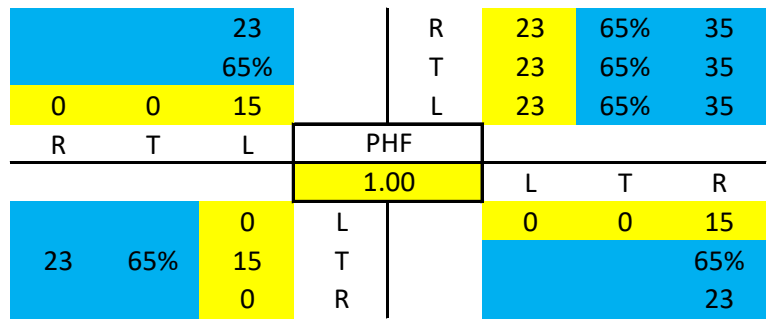
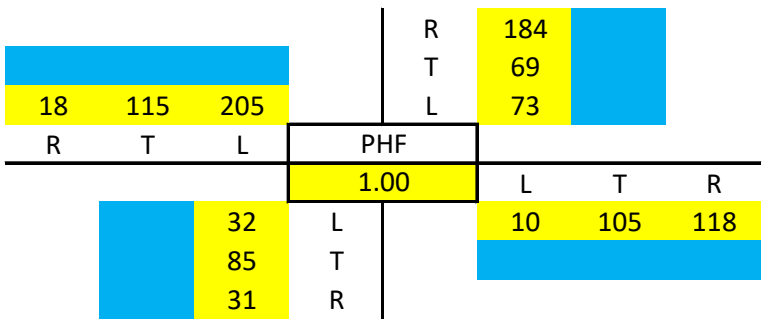
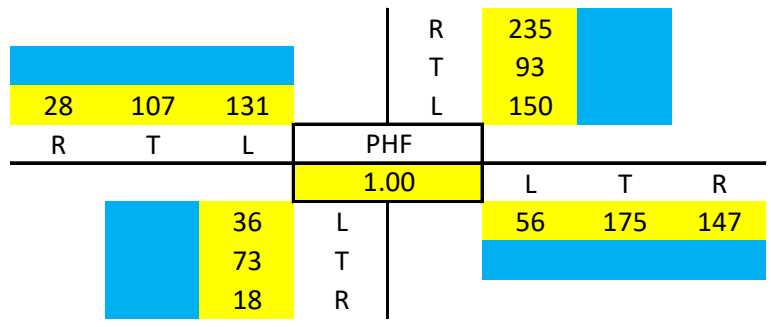
The intersection of SR-411 at Westside Highway is projected to operate in excess of WSDOT's LOS C standard by year 2037 with approximately 70% of the LOTC Master Plan area developed.

Potential mitigation that will allow the intersection to operate acceptably with full buildout of the LOTC Master Plan area may include the following:

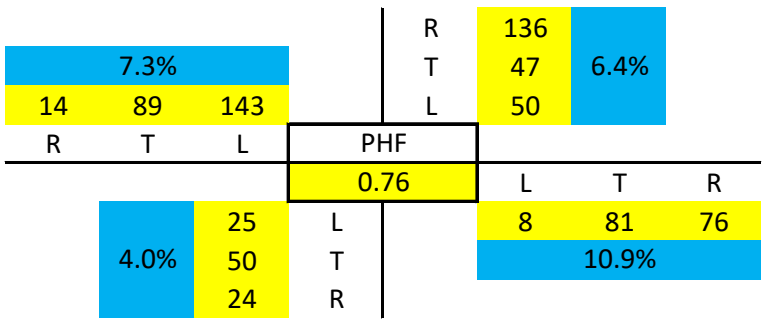
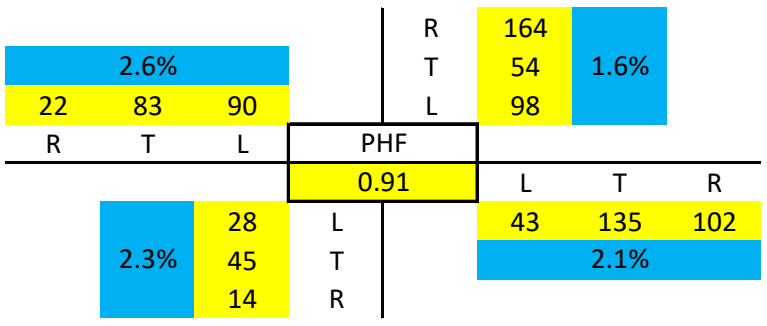
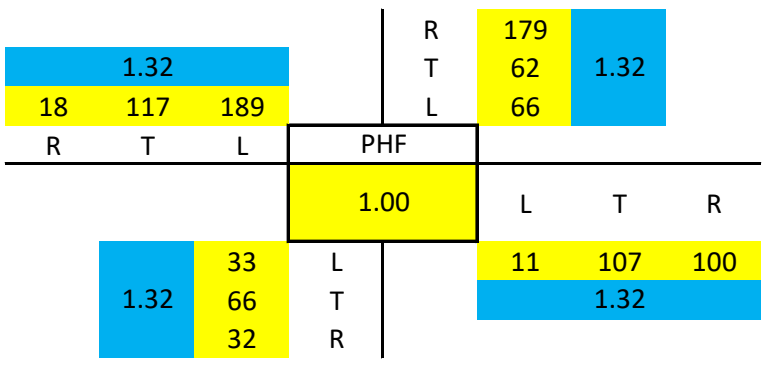
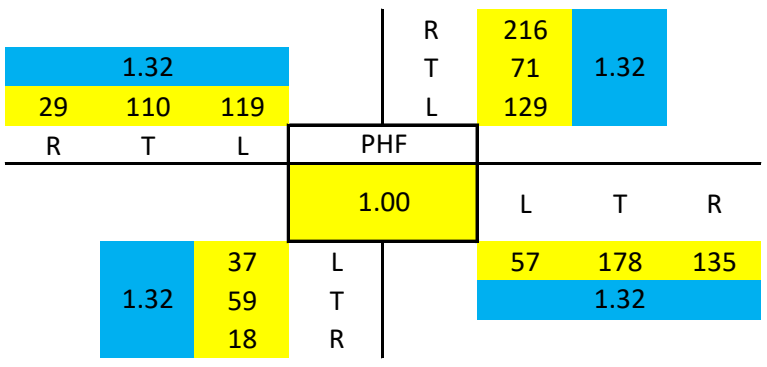
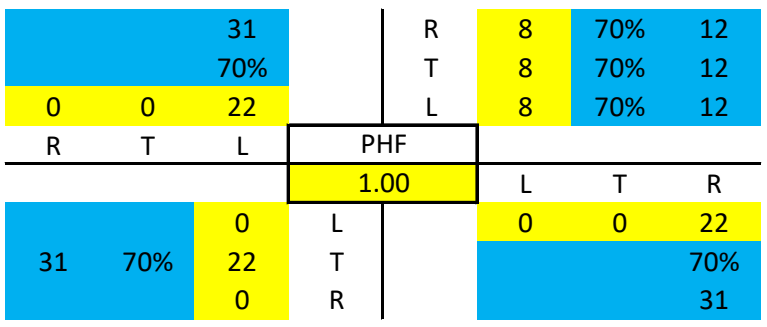
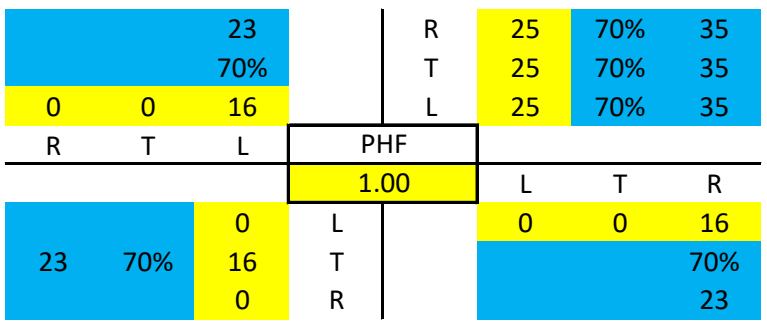
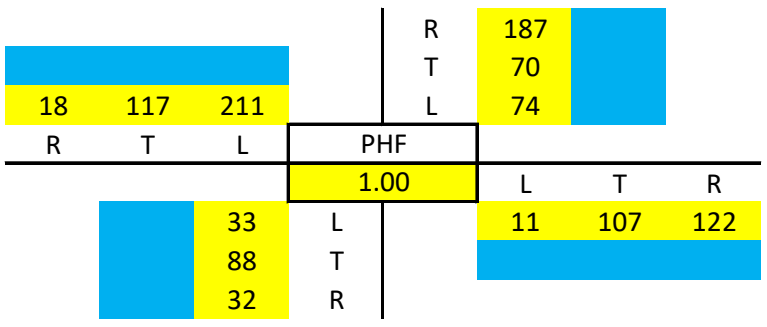
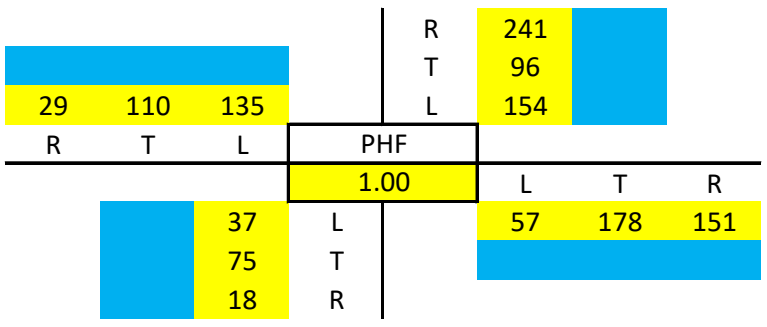
- Install dedicated right-turn lanes on the northbound and westbound intersection approaches. Note, alternative intersection lane configuration designs can be explored if this suggested design is not practical.
- Install a traffic signal at the intersection. No changes to intersection approach lanes or geometry are necessary.
- Reconstruct the intersection as either mini-roundabout or a smaller roundabout.

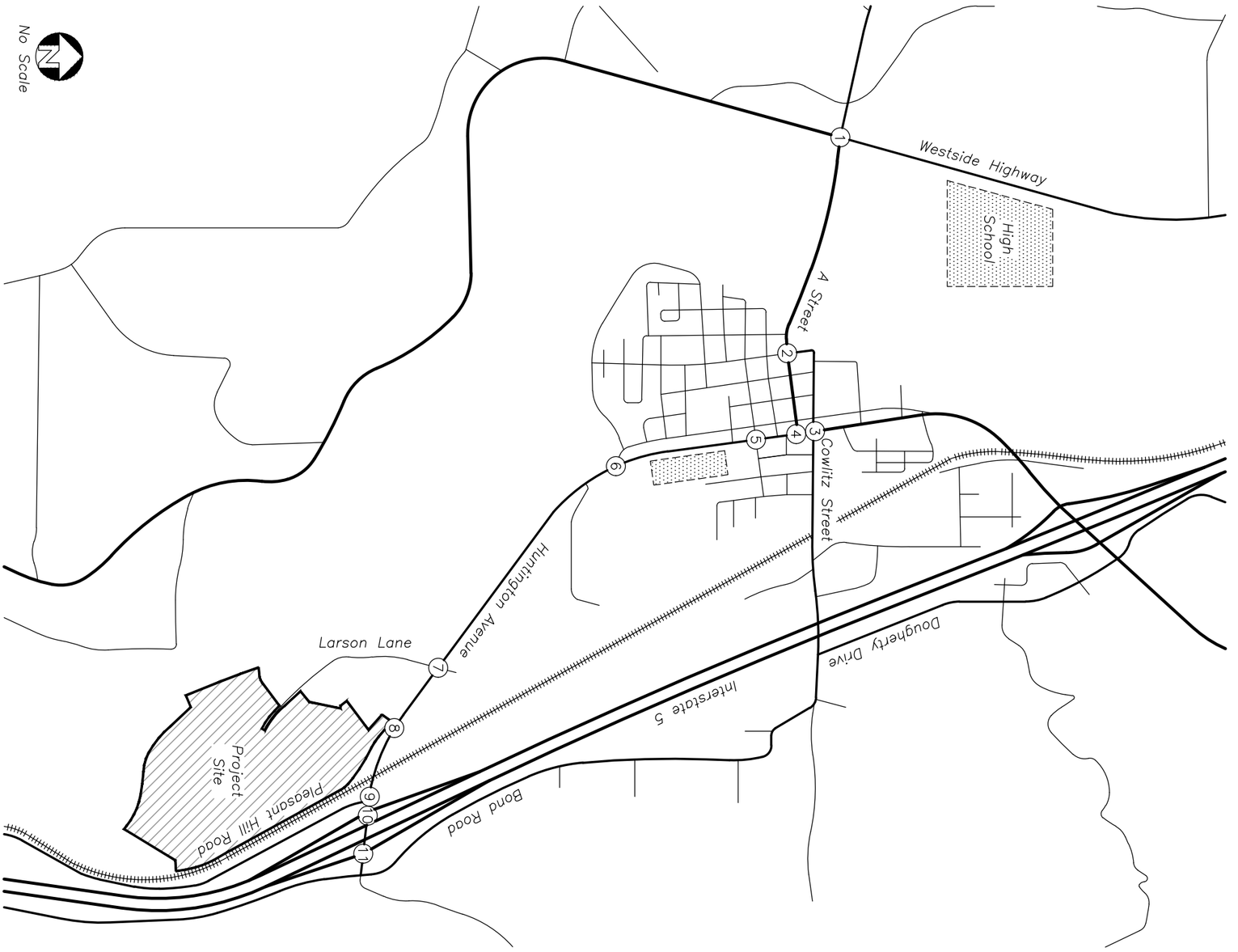
If you have any questions or concerns regarding this analysis, please don't hesitate to contact me.

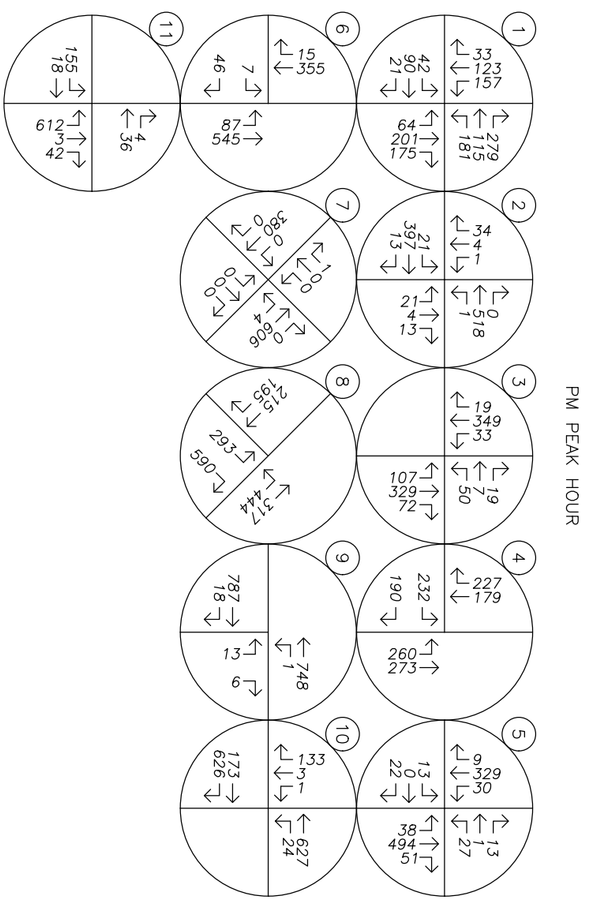
Year 2036 Traffic Volumes (13 Years of Growth and 65% Site Buildout)

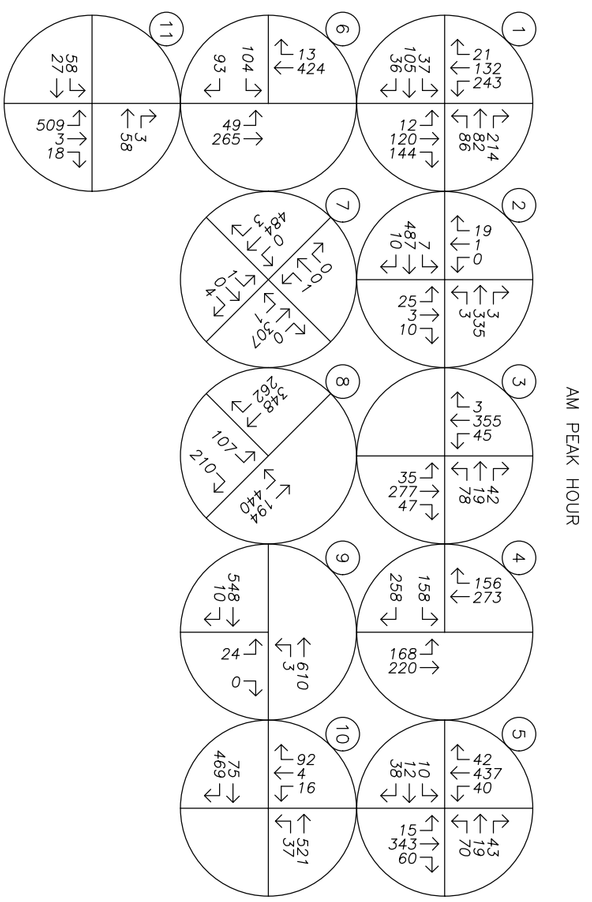
	1. SR-411 & Westside Highway AM Peak Hour	1. SR-411 & Westside Highway PM Peak Hour
Existing Conditions (Blue: Heavy Vehicle Percentages)		
Background Conditions (Blue: Growth Factor) Year? (1-20) 13 1.29360663		
External Site Trips (Blue: Full Buildout Trips and Assumed Percentage of Site Buildout) Year? (1-20) 13 % Built 65%		
Buildout Conditions		

Year 2037 Traffic Volumes (14 Years of Growth and 70% Site Buildout)

	1. SR-411 & Westside Highway AM Peak Hour	1. SR-411 & Westside Highway PM Peak Hour
Existing Conditions (Blue: Heavy Vehicle Percentages)		
Background Conditions (Blue: Growth Factor) Year? (1-20) 14 1.319478763		
External Site Trips (Blue: Full Buildout Trips and Assumed Percentage of Site Buildout) Year? (1-20) 14 % Built 70%		
Buildout Conditions		







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TRAFFIC VOLUMES

Year 2043 Buildout Conditions

AM & PM Peak Hours

Figure 6

Landing on the Cowlitz Master Plan

11/13/2023

Traffic Signal Warrant Analysis

Project: SR-411 at Westside Highway Mitigation Analysis
Date: 1/13/2025
Scenario: 2037 Traffic Volumes (70% Site Buildout)

Major Street:	North/South Approaches	Minor Street:	East/West Approaches
Number of Lanes:	1	Number of Lanes:	1
PM Peak Hour Volumes:	660	PM Peak Hour Volumes:	431

Warrant Used:

_____	100 percent of standard warrants used
X	70 percent of standard warrants used due to 85th percentile speed in excess of 40 mph or isolated community with population less than 10,000.

Number of Lanes for Moving Traffic on Each Approach:		ADT on Major St. (total of both approaches)		ADT on Minor St. (higher-volume approach)	
WARRANT 1, CONDITION A		100%	70%	100%	70%
Major St.	Minor St.	Warrants	Warrants	Warrants	Warrants
1	1	8,850	6,200	2,650	1,850
2 or more	1	10,600	7,400	2,650	1,850
2 or more	2 or more	10,600	7,400	3,550	2,500
1	2 or more	8,850	6,200	3,550	2,500
WARRANT 1, CONDITION B					
1	1	13,300	9,300	1,350	950
2 or more	1	15,900	11,100	1,350	950
2 or more	2 or more	15,900	11,100	1,750	1,250
1	2 or more	13,300	9,300	1,750	1,250

Note: ADT volumes assume 8th highest hour is 5.6% of the daily volume

	Approach Volumes	Minimum Volumes	Is Signal Warrant Met?
Warrant 1			
Condition A: Minimum Vehicular Volume			
Major Street	6,600	6,200	
Minor Street*	4,310	1,850	**Yes**
Condition B: Interruption of Continuous Traffic			
Major Street	6,600	9,300	
Minor Street*	4,310	950	**No**
Combination Warrant			
Major Street	6,600	7,440	
Minor Street*	4,310	1,480	**No**

* Minor street right-turning traffic volumes reduced by 25%

Traffic Signal Warrant Analysis

Project: SR-411 at Westside Highway Mitigation Analysis
Date: 1/13/2025
Scenario: 2043 Traffic Volumes (0% Site Buildout)

Major Street:	North/South Approaches	Minor Street:	East/West Approaches
Number of Lanes:	1	Number of Lanes:	1
PM Peak Hour Volumes:	707	PM Peak Hour Volumes:	409

Warrant Used:

_____	100 percent of standard warrants used
X	70 percent of standard warrants used due to 85th percentile speed in excess of 40 mph or isolated community with population less than 10,000.

Number of Lanes for Moving Traffic on Each Approach:		ADT on Major St. (total of both approaches)		ADT on Minor St. (higher-volume approach)	
WARRANT 1, CONDITION A		100%	70%	100%	70%
Major St.	Minor St.	Warrants	Warrants	Warrants	Warrants
1	1	8,850	6,200	2,650	1,850
2 or more	1	10,600	7,400	2,650	1,850
2 or more	2 or more	10,600	7,400	3,550	2,500
1	2 or more	8,850	6,200	3,550	2,500
WARRANT 1, CONDITION B					
1	1	13,300	9,300	1,350	950
2 or more	1	15,900	11,100	1,350	950
2 or more	2 or more	15,900	11,100	1,750	1,250
1	2 or more	13,300	9,300	1,750	1,250

Note: ADT volumes assume 8th highest hour is 5.6% of the daily volume

	Approach Volumes	Minimum Volumes	Is Signal Warrant Met?
Warrant 1			
Condition A: Minimum Vehicular Volume			
Major Street	7,070	6,200	
Minor Street*	4,090	1,850	**Yes**
Condition B: Interruption of Continuous Traffic			
Major Street	7,070	9,300	
Minor Street*	4,090	950	**No**
Combination Warrant			
Major Street	7,070	7,440	
Minor Street*	4,090	1,480	**No**

* Minor street right-turning traffic volumes reduced by 25%

Intersection	
Intersection Delay, s/veh	23.1
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	36	73	18	150	93	235	56	175	147	131	107	28
Future Vol, veh/h	36	73	18	150	93	235	56	175	147	131	107	28
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	3	3	3
Mvmt Flow	36	73	18	150	93	235	56	175	147	131	107	28
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay, s/veh	12.9	30.6	21.4	16.8
HCM LOS	B	D	C	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	15%	28%	31%	49%
Vol Thru, %	46%	57%	19%	40%
Vol Right, %	39%	14%	49%	11%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	378	127	478	266
LT Vol	56	36	150	131
Through Vol	175	73	93	107
RT Vol	147	18	235	28
Lane Flow Rate	378	127	478	266
Geometry Grp	1	1	1	1
Degree of Util (X)	0.667	0.258	0.812	0.506
Departure Headway (Hd)	6.353	7.326	6.117	6.847
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	563	493	588	521
Service Time	4.438	5.326	4.194	4.942
HCM Lane V/C Ratio	0.671	0.258	0.813	0.511
HCM Control Delay, s/veh	21.4	12.9	30.6	16.8
HCM Lane LOS	C	B	D	C
HCM 95th-tile Q	5	1	8.1	2.8

Intersection	
Intersection Delay, s/veh	26.7
Intersection LOS	D

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	37	75	18	154	96	241	57	178	151	135	110	29
Future Vol, veh/h	37	75	18	154	96	241	57	178	151	135	110	29
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	3	3	3
Mvmt Flow	37	75	18	154	96	241	57	178	151	135	110	29
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay, s/veh	13.4	37	24	18.2
HCM LOS	B	E	C	C

Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	15%	28%	31%	49%
Vol Thru, %	46%	58%	20%	40%
Vol Right, %	39%	14%	49%	11%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	386	130	491	274
LT Vol	57	37	154	135
Through Vol	178	75	96	110
RT Vol	151	18	241	29
Lane Flow Rate	386	130	491	274
Geometry Grp	1	1	1	1
Degree of Util (X)	0.707	0.272	0.863	0.539
Departure Headway (Hd)	6.594	7.52	6.328	7.088
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	548	476	574	507
Service Time	4.624	5.59	4.35	5.149
HCM Lane V/C Ratio	0.704	0.273	0.855	0.54
HCM Control Delay, s/veh	24	13.4	37	18.2
HCM Lane LOS	C	B	E	C
HCM 95th-tile Q	5.6	1.1	9.5	3.2

Intersection	
Intersection Delay, s/veh	59.8
Intersection LOS	F

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	42	90	21	181	115	279	64	201	175	157	123	33
Future Vol, veh/h	42	90	21	181	115	279	64	201	175	157	123	33
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	3	3	3
Mvmt Flow	42	90	21	181	115	279	64	201	175	157	123	33
Number of Lanes	0	1	0	0	1	0	0	1	0	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	1	1	1	1
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	1	1	1
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	1	1	1	1
HCM Control Delay, s/veh	16.7	101.5	43.8	26.6
HCM LOS	C	F	E	D

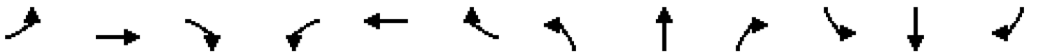
Lane	NBLn1	EBLn1	WBLn1	SBLn1
Vol Left, %	15%	27%	31%	50%
Vol Thru, %	46%	59%	20%	39%
Vol Right, %	40%	14%	49%	11%
Sign Control	Stop	Stop	Stop	Stop
Traffic Vol by Lane	440	153	575	313
LT Vol	64	42	181	157
Through Vol	201	90	115	123
RT Vol	175	21	279	33
Lane Flow Rate	440	153	575	313
Geometry Grp	1	1	1	1
Degree of Util (X)	0.874	0.357	1.117	0.674
Departure Headway (Hd)	7.584	8.849	6.995	8.229
Convergence, Y/N	Yes	Yes	Yes	Yes
Cap	480	409	518	441
Service Time	5.584	6.849	5.067	6.229
HCM Lane V/C Ratio	0.917	0.374	1.11	0.71
HCM Control Delay, s/veh	43.8	16.7	101.5	26.6
HCM Lane LOS	E	C	F	D
HCM 95th-tile Q	9.3	1.6	18.8	4.9

Intersection	
Intersection Delay, s/veh	20.5
Intersection LOS	C

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	42	90	21	181	115	279	64	201	175	157	123	33
Future Vol, veh/h	42	90	21	181	115	279	64	201	175	157	123	33
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	3	3	3
Mvmt Flow	42	90	21	181	115	279	64	201	175	157	123	33
Number of Lanes	0	1	0	0	1	1	0	1	1	0	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	2	1	1	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	1	2	1	2
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	1	2	1
HCM Control Delay, s/veh	16.3	20.6	17.8	26.3
HCM LOS	C	C	C	D

Lane	NBLn1	NBLn2	EBLn1	WBLn1	WBLn2	SBLn1
Vol Left, %	24%	0%	27%	61%	0%	50%
Vol Thru, %	76%	0%	59%	39%	0%	39%
Vol Right, %	0%	100%	14%	0%	100%	11%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	265	175	153	296	279	313
LT Vol	64	0	42	181	0	157
Through Vol	201	0	90	115	0	123
RT Vol	0	175	21	0	279	33
Lane Flow Rate	265	175	153	296	279	313
Geometry Grp	5	5	4b	5	5	4b
Degree of Util (X)	0.576	0.339	0.359	0.645	0.528	0.683
Departure Headway (Hd)	7.822	6.977	8.457	7.844	6.811	7.857
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes
Cap	461	515	424	459	527	460
Service Time	5.59	4.745	6.55	5.612	4.579	5.926
HCM Lane V/C Ratio	0.575	0.34	0.361	0.645	0.529	0.68
HCM Control Delay, s/veh	20.8	13.3	16.3	23.9	17	26.3
HCM Lane LOS	C	B	C	C	C	D
HCM 95th-tile Q	3.6	1.5	1.6	4.5	3.1	5



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	42	90	21	181	115	279	64	201	175	157	123	33
Future Volume (veh/h)	42	90	21	181	115	279	64	201	175	157	123	33
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Lane Width Adj.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	0.99		0.99	0.99		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1856	1856	1856
Adj Flow Rate, veh/h	42	90	21	181	115	279	64	201	175	157	123	33
Peak Hour Factor	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	3	3	3
Cap, veh/h	244	477	97	295	174	335	153	292	228	315	222	48
Arrive On Green	0.45	0.45	0.45	0.45	0.45	0.45	0.34	0.34	0.34	0.34	0.34	0.34
Sat Flow, veh/h	300	1066	217	406	388	748	161	868	679	552	661	143
Grp Volume(v), veh/h	153	0	0	575	0	0	440	0	0	313	0	0
Grp Sat Flow(s),veh/h/ln	1583	0	0	1542	0	0	1708	0	0	1356	0	0
Q Serve(g_s), s	0.0	0.0	0.0	10.8	0.0	0.0	1.4	0.0	0.0	0.0	0.0	0.0
Cycle Q Clear(g_c), s	2.1	0.0	0.0	13.5	0.0	0.0	9.3	0.0	0.0	7.8	0.0	0.0
Prop In Lane	0.27		0.14	0.31		0.49	0.15		0.40	0.50		0.11
Lane Grp Cap(c), veh/h	819	0	0	804	0	0	673	0	0	586	0	0
V/C Ratio(X)	0.19	0.00	0.00	0.71	0.00	0.00	0.65	0.00	0.00	0.53	0.00	0.00
Avail Cap(c_a), veh/h	1132	0	0	1125	0	0	1042	0	0	876	0	0
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	6.9	0.0	0.0	10.0	0.0	0.0	12.3	0.0	0.0	11.5	0.0	0.0
Incr Delay (d2), s/veh	0.1	0.0	0.0	1.3	0.0	0.0	1.1	0.0	0.0	0.8	0.0	0.0
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	0.0	0.0	3.2	0.0	0.0	2.9	0.0	0.0	1.9	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	7.0	0.0	0.0	11.3	0.0	0.0	13.3	0.0	0.0	12.3	0.0	0.0
LnGrp LOS	A			B			B			B		
Approach Vol, veh/h		153			575			440			313	
Approach Delay, s/veh		7.0			11.3			13.3			12.3	
Approach LOS		A			B			B			B	

Timer - Assigned Phs		2		4		6		8				
Phs Duration (G+Y+Rc), s		18.5		23.2		18.5		23.2				
Change Period (Y+Rc), s		4.5		4.5		4.5		4.5				
Max Green Setting (Gmax), s		23.5		27.5		23.5		27.5				
Max Q Clear Time (g_c+I1), s		11.3		4.1		9.8		15.5				
Green Ext Time (p_c), s		2.2		0.8		1.7		3.1				

Intersection Summary												
HCM 7th Control Delay, s/veh			11.7									
HCM 7th LOS			B									

Intersection	
Intersection Delay, s/veh	9.3
Intersection LOS	A

Approach	EB	WB	NB	SB
Entry Lanes	1	1	1	1
Conflicting Circle Lanes	1	1	1	1
Adj Approach Flow, veh/h	153	575	440	313
Demand Flow Rate, veh/h	156	587	449	323
Vehicles Circulating, veh/h	474	313	297	367
Vehicles Exiting, veh/h	216	433	333	533
Ped Vol Crossing Leg, #/h	10	0	0	5
Ped Cap Adj	0.999	1.000	1.000	0.999
Approach Delay, s/veh	6.2	11.6	8.6	7.6
Approach LOS	A	B	A	A

Lane	Left	Left	Left	Left
Designated Moves	LTR	LTR	LTR	LTR
Assumed Moves	LTR	LTR	LTR	LTR
RT Channelized				
Lane Util	1.000	1.000	1.000	1.000
Follow-Up Headway, s	2.609	2.609	2.609	2.609
Critical Headway, s	4.976	4.976	4.976	4.976
A (Intercept)	1380	1380	1380	1380
B (Slope)	1.02e-3	1.02e-3	1.02e-3	1.02e-3
Entry Flow, veh/h	156	587	449	323
Cap Entry Lane, veh/h	851	1003	1019	949
Entry HV Adj Factor	0.982	0.979	0.980	0.970
Flow Entry, veh/h	153	575	440	313
Cap Entry, veh/h	834	982	999	920
V/C Ratio	0.184	0.585	0.441	0.341
Control Delay, s/veh	6.2	11.6	8.6	7.6
LOS	A	B	A	A
95th %tile Queue, veh	1	4	2	2