

Memorandum

Date: September 16, 2025

To: City of Tumwater

From: Siddharth Sivakumar & Daniel Dye, Fehr & Peers

Subject: City of Tumwater Vehicle Operations Analysis Reports

TC24-0105

The City of Tumwater is in the process of updating the Transportation Plan of its Comprehensive Plan with a planning horizon of 2045. This appendix provides outputs from the software platforms used for existing and future vehicle operations analysis.

Traffic Operations Methodology

To understand traffic operations in the City of Tumwater, the project team utilized Synchro traffic operations analysis software for signalized or stop controlled intersections, and SIDRA software for roundabouts. The existing conditions analysis was based on 2024 conditions, while future analysis was completed for forecast conditions in 2045. The analysis was carried out for the weekday PM peak hour (the highest volume hour between 4 PM and 6 PM). Two future scenarios were considered, a baseline scenario with planned intersection improvements and a mitigation scenario with additional improvements assumed for intersections that failed in the future baseline scenario.

The following pages have PM Peak Hour operations reports for the following scenarios:

1. Existing (2024)
2. Future (2045) Baseline
3. Future (2045) with Mitigation (only for the five intersections that failed in the above scenario)

Existing (2024)

HCM Signalized Intersection Capacity Analysis

1: Crosby Blvd SW & Mottman Rd SW

Existing

PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	79	285	17	0	18	30	32	316	128	47	477	257
Future Volume (vph)	79	285	17	0	18	30	32	316	128	47	477	257
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	16
Total Lost time (s)	5.0	5.0			5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99			0.92		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1752	1827			1690		1752	1845	1568	1752	3505	1777
Flt Permitted	0.95	1.00			1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1752	1827			1690		1752	1845	1568	1752	3505	1777
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	101	365	22	0	23	38	41	405	164	60	612	329
RTOR Reduction (vph)	0	2	0	0	35	0	0	0	104	0	0	124
Lane Group Flow (vph)	101	385	0	0	26	0	41	405	60	60	612	205
Confl. Peds. (#/hr)			5	5								
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	Split	NA			NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	3	3		4	4		1	6		5	2	
Permitted Phases									6			2
Actuated Green, G (s)	23.7	23.7			6.9		4.2	24.3	24.3	6.1	26.2	26.2
Effective Green, g (s)	23.7	23.7			6.9		4.2	24.3	24.3	6.1	26.2	26.2
Actuated g/C Ratio	0.29	0.29			0.09		0.05	0.30	0.30	0.08	0.32	0.32
Clearance Time (s)	5.0	5.0			5.0		5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.5	3.5			2.5		2.5	2.5	2.5	2.5	2.5	2.5
Lane Grp Cap (vph)	512	534			143		90	553	470	131	1133	574
v/s Ratio Prot	0.06	c0.21			c0.02		0.02	c0.22		c0.03	0.17	
v/s Ratio Perm									0.04			0.12
v/c Ratio	0.20	0.72			0.18		0.46	0.73	0.13	0.46	0.54	0.36
Uniform Delay, d1	21.5	25.7			34.4		37.3	25.4	20.6	35.9	22.5	21.0
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.2	4.9			0.5		2.6	4.7	0.1	1.8	0.4	0.3
Delay (s)	21.7	30.6			34.9		39.9	30.1	20.7	37.7	22.9	21.2
Level of Service	C	C			C		D	C	C	D	C	C
Approach Delay (s/veh)		28.8			34.9			28.3			23.2	
Approach LOS		C			C			C			C	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			26.2									
HCM 2000 Volume to Capacity ratio			0.64									
Actuated Cycle Length (s)			81.0									
Intersection Capacity Utilization			49.1%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2: Crosby Blvd SW & Irving St SW

Existing
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	46	2	54	3	18	98	1	296	32	134	354	3
Future Volume (vph)	46	2	54	3	18	98	1	296	32	134	354	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	14
Total Lost time (s)		5.0	5.0		5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes		1.00	0.97		1.00	0.99	1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected		0.95	1.00		0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1753	1516		1832	1556	1745	1812		1750	1845	1625
Flt Permitted		0.72	1.00		0.96	1.00	0.52	1.00		0.38	1.00	1.00
Satd. Flow (perm)		1316	1516		1765	1556	961	1812		703	1845	1625
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	53	2	62	3	21	113	1	340	37	154	407	3
RTOR Reduction (vph)	0	0	54	0	0	78	0	2	0	0	0	1
Lane Group Flow (vph)	0	55	8	0	24	35	1	375	0	154	407	2
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)	2		2	2		2	2		2	2		2
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	pm+pt	NA	Perm	Perm	NA	pm+ov	Perm	NA		pm+pt	NA	Perm
Protected Phases	3	8			4	5		6		5	2	
Permitted Phases	8		8	4		4	6			2		2
Actuated Green, G (s)		7.6	7.6		7.6	17.5	24.7	24.7		39.6	39.6	39.6
Effective Green, g (s)		7.6	7.6		7.6	17.5	24.7	24.7		39.6	39.6	39.6
Actuated g/C Ratio		0.13	0.13		0.13	0.31	0.43	0.43		0.69	0.69	0.69
Clearance Time (s)		5.0	5.0		5.0	5.0	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)		174	201		234	612	414	782		667	1277	1125
v/s Ratio Prot						0.01		c0.21		0.04	c0.22	
v/s Ratio Perm		c0.04	0.01		0.01	0.01	0.00			0.12		0.00
v/c Ratio		0.32	0.04		0.10	0.06	0.00	0.48		0.23	0.32	0.00
Uniform Delay, d1		22.4	21.6		21.8	14.0	9.2	11.6		3.7	3.5	2.7
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		0.8	0.1		0.1	0.0	0.0	0.3		0.1	0.1	0.0
Delay (s)		23.2	21.7		21.9	14.0	9.2	12.0		3.9	3.6	2.7
Level of Service		C	C		C	B	A	B		A	A	A
Approach Delay (s/veh)		22.4			15.4			12.0			3.7	
Approach LOS		C			B			B			A	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			9.5									
HCM 2000 Volume to Capacity ratio			0.49									
Actuated Cycle Length (s)			57.2									
Intersection Capacity Utilization			47.7%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: Sunset Way SE & Capitol Blvd SE & Carlyon Ave SE

Existing
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	253	42	0	0	48	21	8	3	0	15	1	573
Future Volume (vph)	253	42	0	0	48	21	8	3	0	15	1	573
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	10	12	12	11	12	12	16	12	9	9	12
Total Lost time (s)	6.0	6.0			6.0			6.0			6.0	6.0
Lane Util. Factor	0.95	0.95			1.00			1.00			1.00	0.88
Frpb, ped/bikes	1.00	1.00			0.99			1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00			1.00			0.99	1.00
Frt	1.00	1.00			0.96			1.00			1.00	0.85
Flt Protected	0.95	0.97			1.00			0.97			0.95	1.00
Satd. Flow (prot)	1681	1595			1712			2038			1590	2787
Flt Permitted	0.95	0.97			1.00			0.97			1.00	1.00
Satd. Flow (perm)	1681	1595			1712			2038			1666	2787
Peak-hour factor, PHF	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Adj. Flow (vph)	320	53	0	0	61	27	10	4	0	19	1	725
RTOR Reduction (vph)	0	0	0	0	10	0	0	0	0	0	0	0
Lane Group Flow (vph)	186	187	0	0	78	0	0	14	0	0	20	725
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)	2		2	2		2	2		2	2		2
Turn Type	Split	NA			NA		Split	NA		Perm	NA	custom
Protected Phases	4	4		1	1		2	2			3	8
Permitted Phases										3		
Actuated Green, G (s)	32.1	32.1			9.4			3.0			1.3	39.4
Effective Green, g (s)	32.1	32.1			9.4			3.0			1.3	39.4
Actuated g/C Ratio	0.46	0.46			0.13			0.04			0.02	0.56
Clearance Time (s)	6.0	6.0			6.0			6.0			6.0	6.0
Vehicle Extension (s)	5.0	5.0			5.0			5.0			5.0	5.0
Lane Grp Cap (vph)	773	733			230			87			31	1573
v/s Ratio Prot	0.11	0.12			c0.05			c0.01				c0.26
v/s Ratio Perm											0.01	
v/c Ratio	0.24	0.26			0.34			0.16			0.65	0.46
Uniform Delay, d1	11.4	11.5			27.4			32.2			34.0	8.9
Progression Factor	1.00	1.00			1.00			1.00			1.00	1.00
Incremental Delay, d2	0.3	0.4			1.8			1.8			49.1	0.4
Delay (s)	11.8	11.9			29.2			34.0			83.1	9.4
Level of Service	B	B			C			C			F	A
Approach Delay (s/veh)		11.9			29.2			34.0			11.4	
Approach LOS		B			C			C			B	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			13.1									B
HCM 2000 Volume to Capacity ratio			0.48									
Actuated Cycle Length (s)			69.8							24.0		
Intersection Capacity Utilization			47.0%									A
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

4: North 2nd Ave SW & Custer Way SW

Existing
PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	156	143	10	84	971	231
Future Volume (vph)	156	143	10	84	971	231
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	11	12	11	12
Total Lost time (s)	6.0	6.0	6.2		6.0	6.0
Lane Util. Factor	1.00	1.00	1.00		0.95	0.95
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.88		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	0.97
Satd. Flow (prot)	1787	1599	1566		1641	1733
Flt Permitted	0.95	1.00	1.00		0.95	0.97
Satd. Flow (perm)	1787	1599	1566		1641	1733
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	179	164	11	97	1116	266
RTOR Reduction (vph)	0	132	87	0	0	0
Lane Group Flow (vph)	179	32	21	0	681	701
Confl. Peds. (#/hr)	6			5	5	
Confl. Bikes (#/hr)	2			2	2	
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	Prot	Prot	NA		Split	NA
Protected Phases	3	3	2		1	1
Permitted Phases						
Actuated Green, G (s)	15.9	15.9	8.6		31.9	31.9
Effective Green, g (s)	15.9	15.9	8.6		31.9	31.9
Actuated g/C Ratio	0.20	0.20	0.11		0.39	0.39
Clearance Time (s)	6.0	6.0	6.2		6.0	6.0
Vehicle Extension (s)	6.0	6.0	6.0		3.0	3.0
Lane Grp Cap (vph)	350	313	166		646	682
v/s Ratio Prot	c0.10	0.02	c0.01		c0.41	0.40
v/s Ratio Perm						
v/c Ratio	0.51	0.10	0.13		1.05	1.03
Uniform Delay, d1	29.1	26.7	32.8		24.6	24.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	3.3	0.4	1.0		50.5	41.8
Delay (s)	32.4	27.1	33.8		75.1	66.3
Level of Service	C	C	C		E	E
Approach Delay (s/veh)	29.9		33.8			70.6
Approach LOS	C		C			E
Intersection Summary						
HCM 2000 Control Delay (s/veh)			60.8		HCM 2000 Level of Service	E
HCM 2000 Volume to Capacity ratio			0.72			
Actuated Cycle Length (s)			81.0		Sum of lost time (s)	21.4
Intersection Capacity Utilization			58.3%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

HCM 6th TWSC
5: Boston St SW/Parking lot & Custer Way SW

Existing
PM Peak Hour

Intersection												
Int Delay, s/veh	12											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔↔		↗	↗			↗			↔↔	
Traffic Vol, veh/h	0	854	134	479	259	0	0	0	112	0	0	0
Future Vol, veh/h	0	854	134	479	259	0	0	0	112	0	0	0
Conflicting Peds, #/hr	0	0	6	6	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	250	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	87	87	87	87	87	87	87	87	87	87	87	87
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	0	982	154	551	298	0	0	0	129	0	0	0

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	298	0	0	1142	0	0	-	2465	574	1891	2542	298
Stage 1	-	-	-	-	-	-	-	1065	-	1400	1400	-
Stage 2	-	-	-	-	-	-	-	1400	-	491	1142	-
Critical Hdwy	4.115	-	-	4.115	-	-	-	6.515	6.915	7.315	6.515	6.215
Critical Hdwy Stg 1	-	-	-	-	-	-	-	5.515	-	6.115	5.515	-
Critical Hdwy Stg 2	-	-	-	-	-	-	-	5.515	-	6.515	5.515	-
Follow-up Hdwy	2.2095	-	-	2.2095	-	-	-	4.0095	3.3095	3.5095	4.0095	3.3095
Pot Cap-1 Maneuver	1268	-	-	614	-	-	0	30	465	48	27	743
Stage 1	-	-	-	-	-	-	0	300	-	174	208	-
Stage 2	-	-	-	-	-	-	0	208	-	531	276	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	1268	-	-	611	-	-	-	3	463	8	3	743
Mov Cap-2 Maneuver	-	-	-	-	-	-	-	3	-	8	3	-
Stage 1	-	-	-	-	-	-	-	299	-	174	20	-
Stage 2	-	-	-	-	-	-	-	20	-	383	275	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	0	27.5	15.7	0
HCM LOS			C	A

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	463	1268	-	-	611	-	-	-
HCM Lane V/C Ratio	0.278	-	-	-	0.901	-	-	-
HCM Control Delay (s/veh)	15.7	0	-	-	42.3	-	-	0
HCM Lane LOS	C	A	-	-	E	-	-	A
HCM 95th %tile Q (veh)	1.1	0	-	-	11.1	-	-	-

HCM 6th Signalized Intersection Summary

6: Capitol Blvd SE & Custer Way SW/Custer Way

Existing
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	80	752	99	266	543	2	16	165	418	11	208	146
Future Volume (veh/h)	80	752	99	266	543	2	16	165	418	11	208	146
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.98	0.99		0.98	1.00		0.96
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	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	90	845	0	299	610	2	18	185	288	12	234	64
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	170	1146		361	801	3	243	309	576	203	423	112
Arrive On Green	0.09	0.32	0.00	0.20	0.43	0.43	0.03	0.16	0.16	0.02	0.15	0.15
Sat Flow, veh/h	1795	3582	1598	1795	1878	6	1795	1885	1560	1795	2770	736
Grp Volume(v), veh/h	90	845	0	299	0	612	18	185	288	12	149	149
Grp Sat Flow(s),veh/h/ln	1795	1791	1598	1795	0	1884	1795	1885	1560	1795	1791	1716
Q Serve(g_s), s	3.3	14.7	0.0	11.2	0.0	19.3	0.0	6.4	6.2	0.0	5.4	5.6
Cycle Q Clear(g_c), s	3.3	14.7	0.0	11.2	0.0	19.3	0.0	6.4	6.2	0.0	5.4	5.6
Prop In Lane	1.00		1.00	1.00		0.00	1.00		1.00	1.00		0.43
Lane Grp Cap(c), veh/h	170	1146		361	0	803	243	309	576	203	273	262
V/C Ratio(X)	0.53	0.74		0.83	0.00	0.76	0.07	0.60	0.50	0.06	0.54	0.57
Avail Cap(c_a), veh/h	385	1689		1078	0	1610	540	1099	1230	519	1044	1000
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	1.00	0.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	30.2	21.2	0.0	26.8	0.0	17.0	28.4	27.1	7.1	29.7	27.4	27.5
Incr Delay (d2), s/veh	2.6	0.9	0.0	4.9	0.0	1.5	0.1	1.9	0.7	0.1	1.7	1.9
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	1.5	6.0	0.0	5.1	0.0	8.0	0.3	2.9	2.7	0.2	2.3	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	32.8	22.1	0.0	31.7	0.0	18.6	28.5	29.0	7.7	29.8	29.1	29.5
LnGrp LOS	C	C		C		B	C	C	A	C	C	C
Approach Vol, veh/h	935		911				491		310			
Approach Delay, s/veh	23.1		22.9				16.5		29.3			
Approach LOS	C		C				B		C			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	6.7	16.7	19.1	27.6	7.4	15.9	11.6	35.0				
Change Period (Y+Rc), s	5.0	5.2	5.0	* 5.2	5.0	5.2	5.0	5.2				
Max Green Setting (Gmax), s	14.0	40.8	42.0	* 33	14.0	40.8	15.0	59.8				
Max Q Clear Time (g_c+I1), s	2.0	8.4	13.2	16.7	2.0	7.6	5.3	21.3				
Green Ext Time (p_c), s	0.0	2.1	0.9	5.7	0.0	1.8	0.1	5.1				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh	22.5											
HCM 6th LOS	C											
Notes												
* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.												
Unsignalized Delay for [EBR] is excluded from calculations of the approach delay and intersection delay.												

HCM Signalized Intersection Capacity Analysis

7: Cleveland Ave SE & Custer Way/North St SE

Existing
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	54	345	789	3	157	60	602	87	9	130	225	78
Future Volume (vph)	54	345	789	3	157	60	602	87	9	130	225	78
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	10	9	12	12	12	12	12	12	12
Total Lost time (s)	6.2	6.2	6.2	6.2	6.2		6.2	6.2		6.2	6.2	6.2
Lane Util. Factor	1.00	1.00	1.00	1.00	1.00		0.97	1.00		1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.98	1.00	0.99		1.00	1.00		1.00	1.00	0.98
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	0.96		1.00	0.99		1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)	1778	1881	1573	1661	1609		3467	1848		1787	1881	1570
Flt Permitted	0.55	1.00	1.00	0.33	1.00		0.95	1.00		0.95	1.00	1.00
Satd. Flow (perm)	1037	1881	1573	571	1609		3467	1848		1787	1881	1570
Peak-hour factor, PHF	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Adj. Flow (vph)	58	371	848	3	169	65	647	94	10	140	242	84
RTOR Reduction (vph)	0	0	173	0	15	0	0	4	0	0	0	66
Lane Group Flow (vph)	58	371	675	3	219	0	647	100	0	140	242	18
Confl. Peds. (#/hr)	5		6	6		5	5		5	5		5
Confl. Bikes (#/hr)	2		2	2		2	2		2	2		2
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%	1%
Turn Type	Perm	NA	pm+ov	Perm	NA		Split	NA		Split	NA	Perm
Protected Phases		8	1		4		1	1		2	2	
Permitted Phases	8		8	4								2
Actuated Green, G (s)	20.0	20.0	39.9	20.0	20.0		19.9	19.9		15.9	15.9	15.9
Effective Green, g (s)	20.0	20.0	39.9	20.0	20.0		19.9	19.9		15.9	15.9	15.9
Actuated g/C Ratio	0.27	0.27	0.54	0.27	0.27		0.27	0.27		0.21	0.21	0.21
Clearance Time (s)	6.2	6.2	6.2	6.2	6.2		6.2	6.2		6.2	6.2	6.2
Vehicle Extension (s)	3.0	3.0	2.5	3.0	3.0		2.5	2.5		3.0	3.0	3.0
Lane Grp Cap (vph)	278	505	974	153	432		927	494		381	401	335
v/s Ratio Prot		0.20	c0.19		0.14		0.19	0.05		0.08	c0.13	
v/s Ratio Perm	0.06		0.24	0.01								0.01
v/c Ratio	0.21	0.73	0.69	0.02	0.51		0.70	0.20		0.37	0.60	0.05
Uniform Delay, d1	21.1	24.8	12.7	20.0	23.0		24.5	21.1		25.0	26.4	23.3
Progression Factor	1.00	1.00	1.00	1.00	1.00		1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2	0.4	5.5	2.0	0.1	0.9		2.1	0.1		0.6	2.6	0.1
Delay (s)	21.4	30.3	14.7	20.0	24.0		26.7	21.3		25.6	29.0	23.3
Level of Service	C	C	B	C	C		C	C		C	C	C
Approach Delay (s/veh)		19.5			23.9			25.9			26.9	
Approach LOS		B			C			C			C	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			22.9			HCM 2000 Level of Service				C		
HCM 2000 Volume to Capacity ratio			0.74									
Actuated Cycle Length (s)			74.4			Sum of lost time (s)				18.6		
Intersection Capacity Utilization			82.6%			ICU Level of Service				E		
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th AWSC
8: Deschutes Way SW & Boston St SW

Existing
PM Peak Hour

Intersection

Intersection Delay, s/veh 85.7

Intersection LOS F

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	69	593	398	16	108	90
Future Vol, veh/h	69	593	398	16	108	90
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	81	698	468	19	127	106
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left NB			WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right SB		WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay, s/veh 85.9		38.5	16.6
HCM LOS	F	E	C

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	10%	55%
Vol Thru, %	96%	0%	45%
Vol Right, %	4%	90%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	414	662	198
LT Vol	0	69	108
Through Vol	398	0	90
RT Vol	16	593	0
Lane Flow Rate	487	779	233
Geometry Grp	1	1	1
Degree of Util (X)	0.856	1.228	0.448
Departure Headway (Hd)	6.923	5.675	7.614
Convergence, Y/N	Yes	Yes	Yes
Cap	526	646	475
Service Time	4.923	3.675	5.614
HCM Lane V/C Ratio	0.926	1.206	0.491
HCM Control Delay, s/veh	38.5	135.9	16.6
HCM Lane LOS	E	F	C
HCM 95th-tile Q	9.1	28.4	2.3

HCM 6th TWSC
9: Black Lake Blvd SW & Black Lake Belmore Rd SW

Existing
PM Peak Hour

Intersection						
Int Delay, s/veh	8.8					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	109	150	163	66	155	309
Future Vol, veh/h	109	150	163	66	155	309
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	121	167	181	73	172	343

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	905	218	0	0	254
Stage 1	218	-	-	-	-
Stage 2	687	-	-	-	-
Critical Hdwy	6.41	6.21	-	-	4.11
Critical Hdwy Stg 1	5.41	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-
Follow-up Hdwy	3.509	3.309	-	-	2.209
Pot Cap-1 Maneuver	308	824	-	-	1317
Stage 1	821	-	-	-	-
Stage 2	501	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	268	824	-	-	1317
Mov Cap-2 Maneuver	268	-	-	-	-
Stage 1	821	-	-	-	-
Stage 2	435	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	27.4	0	2.7
HCM LOS	D		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	440	1317
HCM Lane V/C Ratio	-	-	0.654	0.131
HCM Control Delay (s/veh)	-	-	27.4	8.1
HCM Lane LOS	-	-	D	A
HCM 95th %tile Q (veh)	-	-	4.6	0.5

HCM 6th Signalized Intersection Summary

10: Capitol Blvd SE & E St/Tumwater Valley Dr SE

Existing
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	75	0	102	0	0	0	124	376	0	0	379	20
Future Volume (veh/h)	75	0	102	0	0	0	124	376	0	0	379	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		1.00	1.00		1.00	1.00		1.00	1.00		0.96
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	1885	1885	1885	1885	1885	1961	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	82	0	0	0	0	0	136	413	0	0	416	18
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	359	0		0	224		183	1989	0	5	1023	44
Arrive On Green	0.12	0.00	0.00	0.00	0.00	0.00	0.10	0.56	0.00	0.00	0.29	0.29
Sat Flow, veh/h	1403	0	1598	0	1885	1662	1795	3676	0	1795	3490	151
Grp Volume(v), veh/h	82	0	0	0	0	0	136	413	0	0	213	221
Grp Sat Flow(s),veh/h/ln	1403	0	1598	0	1885	1662	1795	1791	0	1795	1791	1850
Q Serve(g_s), s	2.0	0.0	0.0	0.0	0.0	0.0	2.8	2.2	0.0	0.0	3.6	3.6
Cycle Q Clear(g_c), s	2.0	0.0	0.0	0.0	0.0	0.0	2.8	2.2	0.0	0.0	3.6	3.6
Prop In Lane	1.00		1.00	0.00		1.00	1.00		0.00	1.00		0.08
Lane Grp Cap(c), veh/h	359	0		0	224		183	1989	0	5	525	542
V/C Ratio(X)	0.23	0.00		0.00	0.00		0.74	0.21	0.00	0.00	0.41	0.41
Avail Cap(c_a), veh/h	1126	0		0	1254		960	2862	0	960	1431	1478
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	0.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	15.4	0.0	0.0	0.0	0.0	0.0	16.3	4.2	0.0	0.0	10.6	10.6
Incr Delay (d2), s/veh	0.3	0.0	0.0	0.0	0.0	0.0	5.9	0.1	0.0	0.0	0.5	0.5
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	0.6	0.0	0.0	0.0	0.0	0.0	1.2	0.4	0.0	0.0	1.1	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	15.8	0.0	0.0	0.0	0.0	0.0	22.2	4.2	0.0	0.0	11.1	11.1
LnGrp LOS	B						C	A			B	B
Approach Vol, veh/h		82			0			549			434	
Approach Delay, s/veh		15.8			0.0			8.7			11.1	
Approach LOS		B						A			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	0.0	26.9		10.5	9.8	17.1		10.5				
Change Period (Y+Rc), s	6.0	6.1		6.1	6.0	6.1		6.1				
Max Green Setting (Gmax), s	20.0	29.9		24.9	20.0	29.9		24.9				
Max Q Clear Time (g_c+I1), s	0.0	4.2		4.0	4.8	5.6		0.0				
Green Ext Time (p_c), s	0.0	2.7		0.4	0.3	2.5		0.0				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh			10.2									
HCM 6th LOS			B									
Notes												
Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.												

HCM 6th TWSC
11: Parking lot/S 7th Ave & Linwood Ave SW

Existing
PM Peak Hour

Intersection												
Int Delay, s/veh	11.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	17	138	0	0	286	265	0	0	0	253	0	10
Future Vol, veh/h	17	138	0	0	286	265	0	0	0	253	0	10
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	19	153	0	0	318	294	0	0	0	281	0	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	617	0	0	158	0	0	672	813	163	666	666	475
Stage 1	-	-	-	-	-	-	196	196	-	470	470	-
Stage 2	-	-	-	-	-	-	476	617	-	196	196	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	963	-	-	1422	-	-	370	313	882	373	380	590
Stage 1	-	-	-	-	-	-	806	739	-	574	560	-
Stage 2	-	-	-	-	-	-	570	481	-	806	739	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	959	-	-	1415	-	-	354	303	875	364	368	586
Mov Cap-2 Maneuver	-	-	-	-	-	-	354	303	-	364	368	-
Stage 1	-	-	-	-	-	-	784	719	-	559	558	-
Stage 2	-	-	-	-	-	-	557	479	-	785	719	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	1	0	0	43.2
HCM LOS			A	E

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	959	-	-	1415	-	-	369
HCM Lane V/C Ratio	-	0.02	-	-	-	-	-	0.792
HCM Control Delay (s/veh)	0	8.8	0	-	0	-	-	43.2
HCM Lane LOS	A	A	A	-	A	-	-	E
HCM 95th %tile Q (veh)	-	0.1	-	-	0	-	-	6.7

HCM 6th AWSC
12: S 2nd Ave & Linwood Ave SW

Existing
PM Peak Hour

Intersection												
Intersection Delay, s/veh	32.4											
Intersection LOS	D											

Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	20	235	149	121	191	0	213	127	128	71	170	111
Future Vol, veh/h	20	235	149	121	191	0	213	127	128	71	170	111
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Heavy Vehicles, %	1	1	1	1	1	1	1	1	1	1	1	1
Mvmt Flow	22	258	164	133	210	0	234	140	141	78	187	122
Number of Lanes	1	1	1	1	1	1	1	1	0	1	1	0

Approach	EB	WB	NB	SB
Opposing Approach	WB	EB	SB	NB
Opposing Lanes	3	3	2	2
Conflicting Approach Left	SB	NB	EB	WB
Conflicting Lanes Left	2	2	3	3
Conflicting Approach Right	NB	SB	WB	EB
Conflicting Lanes Right	2	2	3	3
HCM Control Delay, s/veh	28.5	25.3	33.5	41.9
HCM LOS	D	D	D	E

Lane	NBLn1	NBLn2	EBLn1	EBLn2	EBLn3	WBLn1	WBLn2	WBLn3	SBLn1	SBLn2
Vol Left, %	100%	0%	100%	0%	0%	100%	0%	0%	100%	0%
Vol Thru, %	0%	50%	0%	100%	0%	0%	100%	100%	0%	60%
Vol Right, %	0%	50%	0%	0%	100%	0%	0%	0%	0%	40%
Sign Control	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop	Stop
Traffic Vol by Lane	213	255	20	235	149	121	191	0	71	281
LT Vol	213	0	20	0	0	121	0	0	71	0
Through Vol	0	127	0	235	0	0	191	0	0	170
RT Vol	0	128	0	0	149	0	0	0	0	111
Lane Flow Rate	234	280	22	258	164	133	210	0	78	309
Geometry Grp	6	6	6	6	6	6	6	6	6	6
Degree of Util (X)	0.673	0.737	0.065	0.726	0.427	0.404	0.607	0	0.231	0.845
Departure Headway (Hd)	10.347	9.462	10.646	10.124	9.393	10.939	10.413	10.413	10.656	9.849
Convergence, Y/N	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cap	349	381	337	356	383	330	346	0	337	367
Service Time	8.104	7.219	8.405	7.883	7.151	8.7	8.174	8.174	8.414	7.606
HCM Lane V/C Ratio	0.67	0.735	0.065	0.725	0.428	0.403	0.607	0	0.231	0.842
HCM Control Delay, s/veh	32.1	34.6	14.1	35.7	19	21	28.1	13.2	16.6	48.3
HCM Lane LOS	D	D	B	E	C	C	D	N	C	E
HCM 95th-tile Q	4.6	5.7	0.2	5.5	2.1	1.9	3.8	0	0.9	7.8

HCM 6th Signalized Intersection Summary 13: Capitol Blvd SE & Linwood Ave SW/Parking Lot

Existing
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	245	0	140	0	0	0	123	355	0	0	428	214
Future Volume (veh/h)	245	0	140	0	0	0	123	355	0	0	428	214
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.97	1.00		1.00	1.00		1.00	1.00		0.97
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	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	250	0	41	0	0	0	126	362	0	0	437	153
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	534	0	320	166	390	0	436	1816	0	457	720	249
Arrive On Green	0.21	0.00	0.21	0.00	0.00	0.00	0.09	0.51	0.00	0.00	0.28	0.28
Sat Flow, veh/h	1782	0	1547	1377	1885	0	1795	3676	0	1795	2586	895
Grp Volume(v), veh/h	250	0	41	0	0	0	126	362	0	0	301	289
Grp Sat Flow(s),veh/h/ln	1782	0	1547	1377	1885	0	1795	1791	0	1795	1791	1690
Q Serve(g_s), s	5.6	0.0	0.9	0.0	0.0	0.0	1.9	2.4	0.0	0.0	6.3	6.4
Cycle Q Clear(g_c), s	5.6	0.0	0.9	0.0	0.0	0.0	1.9	2.4	0.0	0.0	6.3	6.4
Prop In Lane	1.00		1.00	1.00		0.00	1.00		0.00	1.00		0.53
Lane Grp Cap(c), veh/h	534	0	320	166	390	0	436	1816	0	457	499	471
V/C Ratio(X)	0.47	0.00	0.13	0.00	0.00	0.00	0.29	0.20	0.00	0.00	0.60	0.61
Avail Cap(c_a), veh/h	1187	0	886	670	1079	0	1310	2878	0	1074	1439	1358
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	1.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	15.9	0.0	14.0	0.0	0.0	0.0	8.9	5.9	0.0	0.0	13.6	13.6
Incr Delay (d2), s/veh	0.5	0.0	0.1	0.0	0.0	0.0	0.3	0.0	0.0	0.0	0.9	1.0
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	2.1	0.0	0.3	0.0	0.0	0.0	0.6	0.6	0.0	0.0	2.1	2.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	16.3	0.0	14.1	0.0	0.0	0.0	9.2	5.9	0.0	0.0	14.4	14.6
LnGrp LOS	B		B				A		A		B	
Approach Vol, veh/h	291		0				488		590			
Approach Delay, s/veh	16.0		0.0				6.8		14.5			
Approach LOS	B						A		B			
Timer - Assigned Phs	1	2	4		5	6	8					
Phs Duration (G+Y+Rc), s	0.0	28.2	15.1		9.9	18.3	15.1					
Change Period (Y+Rc), s	6.0	6.2	6.2		6.0	6.2	6.2					
Max Green Setting (Gmax), s	15.0	34.8	24.8		25.0	34.8	24.8					
Max Q Clear Time (g_c+I10), s	10.0	4.4	7.6		3.9	8.4	0.0					
Green Ext Time (p_c), s	0.0	2.0	0.7		0.2	3.0	0.0					
Intersection Summary												
HCM 6th Ctrl Delay, s/veh			12.1									
HCM 6th LOS			B									

HCM 6th Signalized Intersection Summary

14: Henderson Blvd SE & Yelm Hwy SE

Existing
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	26	919	116	437	589	85	59	124	516	104	167	14
Future Volume (veh/h)	26	919	116	437	589	85	59	124	516	104	167	14
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.97	0.99		1.00	0.99		0.97
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	1885	1885	1885	1885	1885	1885	1885	1885	1961	1885	1885	1885
Adj Flow Rate, veh/h	28	988	119	470	633	85	63	133	0	112	180	4
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	299	1040	125	523	2103	282	191	208		237	431	355
Arrive On Green	0.32	0.32	0.32	0.29	0.67	0.67	0.11	0.11	0.00	0.07	0.23	0.23
Sat Flow, veh/h	737	3203	386	1795	3161	424	1197	1885	1662	1795	1885	1551
Grp Volume(v), veh/h	28	552	555	470	358	360	63	133	0	112	180	4
Grp Sat Flow(s),veh/h/ln	737	1791	1797	1795	1791	1794	1197	1885	1662	1795	1885	1551
Q Serve(g_s), s	3.2	36.5	36.5	30.4	10.1	10.2	6.0	8.2	0.0	6.5	9.9	0.2
Cycle Q Clear(g_c), s	3.2	36.5	36.5	30.4	10.1	10.2	6.0	8.2	0.0	6.5	9.9	0.2
Prop In Lane	1.00		0.21	1.00		0.24	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	299	581	583	523	1192	1194	191	208		237	431	355
V/C Ratio(X)	0.09	0.95	0.95	0.90	0.30	0.30	0.33	0.64		0.47	0.42	0.01
Avail Cap(c_a), veh/h	301	586	588	667	1192	1194	352	461		410	461	379
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.7	39.9	39.9	41.2	8.5	8.5	50.6	51.6	0.0	42.2	39.8	36.1
Incr Delay (d2), s/veh	0.2	25.3	25.4	15.5	0.1	0.1	0.4	1.2	0.0	0.5	0.8	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	0.6	19.7	19.9	15.5	3.7	3.7	1.8	3.9	0.0	2.9	4.6	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	28.9	65.3	65.4	56.7	8.6	8.6	51.0	52.8	0.0	42.8	40.6	36.1
LnGrp LOS	C	E	E	E	A	A	D	D		D	D	D
Approach Vol, veh/h	1135					1188		196		296		
Approach Delay, s/veh	64.4					27.7		52.2		41.3		
Approach LOS	E					C		D		D		
Timer - Assigned Phs	2		3		4		5		6		8	
Phs Duration (G+Y+Rc), s	87.0		14.4		19.7		41.3		45.7		34.1	
Change Period (Y+Rc), s	6.4		6.0		6.4		6.0		6.4		6.4	
Max Green Setting (Gmax), s	39.6		20.0		29.6		45.0		39.6		29.6	
Max Q Clear Time (g_c+I1), s	12.2		8.5		10.2		32.4		38.5		11.9	
Green Ext Time (p_c), s	4.7		0.1		0.5		2.8		0.8		1.0	
Intersection Summary												
HCM 6th Ctrl Delay, s/veh			45.6									
HCM 6th LOS			D									

Notes

Unsignalized Delay for [NBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th TWSC
15: Trosper Rd SW & Rural Rd SW

Existing
PM Peak Hour

Intersection						
Int Delay, s/veh	3.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	31	132	236	133	118	54
Future Vol, veh/h	31	132	236	133	118	54
Conflicting Peds, #/hr	0	0	0	0	0	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	120
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	33	140	251	141	126	57
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	392	0	-	0	528	327
Stage 1	-	-	-	-	322	-
Stage 2	-	-	-	-	206	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1172	-	-	-	513	717
Stage 1	-	-	-	-	737	-
Stage 2	-	-	-	-	831	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1172	-	-	-	497	714
Mov Cap-2 Maneuver	-	-	-	-	497	-
Stage 1	-	-	-	-	714	-
Stage 2	-	-	-	-	831	-
Approach	EB	WB		SB		
HCM Control Delay, s/v	1.6	0		13.4		
HCM LOS				B		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1172	-	-	-	497	714
HCM Lane V/C Ratio	0.028	-	-	-	0.253	0.08
HCM Control Delay (s/veh)	8.2	0	-	-	14.7	10.5
HCM Lane LOS	A	A	-	-	B	B
HCM 95th %tile Q (veh)	0.1	-	-	-	1	0.3

HCM 6th Signalized Intersection Summary
16: Parking Lot/Lake Park Dr SW & Trosper Rd SW

Existing
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	225	0	0	334	18	0	0	0	16	0	5
Future Volume (veh/h)	0	225	0	0	334	18	0	0	0	16	0	5
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00	0.96		1.00
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	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	0	237	0	0	352	13	0	0	0	17	0	0
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	735	2133	0	873	1122	927	214	78	0	286	78	0
Arrive On Green	0.00	0.60	0.00	0.00	0.60	0.60	0.00	0.00	0.00	0.04	0.00	0.00
Sat Flow, veh/h	1795	3676	0	1795	1885	1557	1429	1885	0	1730	1885	0
Grp Volume(v), veh/h	0	237	0	0	352	13	0	0	0	17	0	0
Grp Sat Flow(s), veh/h/ln	1795	1791	0	1795	1885	1557	1429	1885	0	1730	1885	0
Q Serve(g_s), s	0.0	1.0	0.0	0.0	3.1	0.1	0.0	0.0	0.0	0.3	0.0	0.0
Cycle Q Clear(g_c), s	0.0	1.0	0.0	0.0	3.1	0.1	0.0	0.0	0.0	0.3	0.0	0.0
Prop In Lane	1.00		0.00	1.00		1.00	1.00		0.00	1.00		0.00
Lane Grp Cap(c), veh/h	735	2133	0	873	1122	927	214	78	0	286	78	0
V/C Ratio(X)	0.00	0.11	0.00	0.00	0.31	0.01	0.00	0.00	0.00	0.06	0.00	0.00
Avail Cap(c_a), veh/h	1264	3188	0	1402	1678	1386	789	836	0	982	836	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)	0.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	0.0	2.9	0.0	0.0	3.4	2.8	0.0	0.0	0.0	15.6	0.0	0.0
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	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	0.0	0.1	0.0	0.0	0.5	0.0	0.0	0.0	0.0	0.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.0	3.0	0.0	0.0	3.4	2.8	0.0	0.0	0.0	15.6	0.0	0.0
LnGrp LOS	A			A			B					
Approach Vol, veh/h	237			365			0			17		
Approach Delay, s/veh	3.0			3.4			0.0			15.6		
Approach LOS	A			A						B		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	0.0	26.1		7.5	0.0	26.1		7.5				
Change Period (Y+Rc), s	6.0	6.1		6.1	6.0	6.1		6.1				
Max Green Setting (Gmax), s	10.0	29.9		14.9	10.0	29.9		14.9				
Max Q Clear Time (g_c+l1), s	0.0	5.1		0.0	0.0	3.0		2.3				
Green Ext Time (p_c), s	0.0	1.5		0.0	0.0	1.1		0.0				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh				3.6								
HCM 6th LOS				A								

HCM Signalized Intersection Capacity Analysis

17: Littlerock Rd SW/South 2nd Ave & Trosper Rd SW

Existing
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	29	182	106	277	232	57	168	261	381	118	263	43
Future Volume (vph)	29	182	106	277	232	57	168	261	381	118	263	43
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	10	12	11	11	10	12	11	10	12	11	11
Total Lost time (s)	6.0	6.0		6.0	6.0		5.6	6.0	6.0	5.6	6.0	
Lane Util. Factor	1.00	0.95		0.91	0.91		1.00	1.00	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	0.99		1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.94		1.00	0.98		1.00	1.00	0.85	1.00	0.98	
Flt Protected	0.95	1.00		0.95	0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1752	3066		1542	3119		1752	1783	1454	1752	3308	
Flt Permitted	0.95	1.00		0.95	0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1752	3066		1542	3119		1752	1783	1454	1752	3308	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	29	184	107	280	234	58	170	264	385	119	266	43
RTOR Reduction (vph)	0	71	0	0	8	0	0	0	143	0	11	0
Lane Group Flow (vph)	29	220	0	190	374	0	170	264	242	119	298	0
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)	2		2	2		2			2	2		
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	Split	NA		Split	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	1	1		2	2		7	4		3	8	
Permitted Phases									4			
Actuated Green, G (s)	16.6	16.6		53.7	53.7		21.1	27.1	80.8	14.0	20.0	
Effective Green, g (s)	16.6	16.6		53.7	53.7		21.1	27.1	80.8	14.0	20.0	
Actuated g/C Ratio	0.12	0.12		0.40	0.40		0.16	0.20	0.60	0.10	0.15	
Clearance Time (s)	6.0	6.0		6.0	6.0		5.6	6.0	6.0	5.6	6.0	
Vehicle Extension (s)	2.5	2.5		3.0	3.0		3.0	2.5	3.0	3.0	2.5	
Lane Grp Cap (vph)	215	377		613	1240		273	357	934	181	490	
v/s Ratio Prot	0.02	c0.07		c0.12	0.12		c0.10	c0.15	0.10	0.07	0.09	
v/s Ratio Perm									0.06			
v/c Ratio	0.13	0.58		0.31	0.30		0.62	0.74	0.26	0.66	0.61	
Uniform Delay, d1	52.8	55.9		27.9	27.8		53.2	50.6	12.9	58.2	53.8	
Progression Factor	1.00	1.00		0.74	0.74		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	1.9		1.3	0.6		4.4	7.4	0.1	8.3	1.8	
Delay (s)	53.0	57.8		22.0	21.1		57.6	58.0	13.0	66.5	55.6	
Level of Service	D	E		C	C		E	E	B	E	E	
Approach Delay (s/veh)		57.4			21.4			36.8			58.7	
Approach LOS		E			C			D			E	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			40.1			HCM 2000 Level of Service			D			
HCM 2000 Volume to Capacity ratio			0.51									
Actuated Cycle Length (s)			135.0			Sum of lost time (s)			23.6			
Intersection Capacity Utilization			76.3%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

18: Tyee Dr SW/I-5 SB Ramp & Trosper Rd SW

Existing
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	179	540	6	180	219	181	33	139	258	351	342	363
Future Volume (vph)	179	540	6	180	219	181	33	139	258	351	342	363
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	11	12	16	11	11	11	13	13	16
Total Lost time (s)	4.6	4.6	4.6	4.6	4.6	4.0	4.6	4.6	4.6	4.6	4.6	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1694	3505	1515	1694	3505	1740	1694	1783	1516	1811	1906	1753
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1694	3505	1515	1694	3505	1740	1694	1783	1516	1811	1906	1753
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	183	551	6	184	223	185	34	142	263	358	349	370
RTOR Reduction (vph)	0	0	4	0	0	0	0	0	93	0	0	0
Lane Group Flow (vph)	183	551	2	184	223	185	34	142	170	358	349	370
Confl. Peds. (#/hr)			5	5			5					5
Confl. Bikes (#/hr)	2		2	2		2						
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	Prot	NA	Perm	Prot	NA	Free	Split	NA	pt+ov	Split	NA	Free
Protected Phases	1	6		5	2		4	4	4 5	3	3	
Permitted Phases			6			Free						Free
Actuated Green, G (s)	20.9	47.8	47.8	19.3	46.2	135.0	17.1	17.1	41.0	32.4	32.4	135.0
Effective Green, g (s)	20.9	47.8	47.8	19.3	46.2	135.0	17.1	17.1	41.0	32.4	32.4	135.0
Actuated g/C Ratio	0.15	0.35	0.35	0.14	0.34	1.00	0.13	0.13	0.30	0.24	0.24	1.00
Clearance Time (s)	4.6	4.6	4.6	4.6	4.6		4.6	4.6		4.6	4.6	
Vehicle Extension (s)	3.0	2.7	2.7	3.2	3.0		3.2	3.2		3.5	3.5	
Lane Grp Cap (vph)	262	1241	536	242	1199	1740	214	225	460	434	457	1753
v/s Ratio Prot	0.11	c0.16		c0.11	0.06		0.02	c0.08	0.11	c0.20	0.18	
v/s Ratio Perm			0.00			0.11						c0.21
v/c Ratio	0.70	0.44	0.00	0.76	0.19	0.11	0.16	0.63	0.37	0.82	0.76	0.21
Uniform Delay, d1	54.1	33.4	28.2	55.6	31.2	0.0	52.5	56.0	36.9	48.6	47.7	0.0
Progression Factor	0.92	1.29	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	7.5	1.1	0.0	13.3	0.3	0.1	0.4	5.8	0.5	12.4	7.6	0.3
Delay (s)	57.4	44.3	28.2	68.9	31.5	0.1	52.9	61.7	37.4	61.0	55.4	0.3
Level of Service	E	D	C	E	C	A	D	E	D	E	E	A
Approach Delay (s/veh)		47.4			33.3			46.5			38.3	
Approach LOS		D			C			D			D	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			40.9			HCM 2000 Level of Service			D			
HCM 2000 Volume to Capacity ratio			0.63									
Actuated Cycle Length (s)			135.0			Sum of lost time (s)			18.4			
Intersection Capacity Utilization			76.2%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary 19: Littlerock Rd SW & Parking Lot

Existing
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔	↔	↔	↔		↔	↔	
Traffic Volume (veh/h)	102	18	59	105	16	214	60	405	90	225	410	93
Future Volume (veh/h)	102	18	59	105	16	214	60	405	90	225	410	93
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	0.99		0.97	1.00		0.97	1.00		0.97
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	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	111	20	13	114	17	47	65	440	68	245	446	81
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	115	12	400	116	10	400	100	822	126	294	1126	203
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26	0.06	0.27	0.27	0.16	0.37	0.37
Sat Flow, veh/h	0	46	1557	0	38	1557	1795	3097	475	1795	3016	544
Grp Volume(v), veh/h	131	0	13	131	0	47	65	253	255	245	263	264
Grp Sat Flow(s), veh/h/ln	46	0	1557	38	0	1557	1795	1791	1781	1795	1791	1769
Q Serve(g_s), s	0.0	0.0	0.4	0.0	0.0	1.3	2.1	7.0	7.1	7.7	6.3	6.4
Cycle Q Clear(g_c), s	14.9	0.0	0.4	14.9	0.0	1.3	2.1	7.0	7.1	7.7	6.3	6.4
Prop In Lane	0.85		1.00	0.87		1.00	1.00		0.27	1.00		0.31
Lane Grp Cap(c), veh/h	126	0	400	126	0	400	100	475	473	294	668	660
V/C Ratio(X)	1.04	0.00	0.03	1.04	0.00	0.12	0.65	0.53	0.54	0.83	0.39	0.40
Avail Cap(c_a), veh/h	126	0	400	126	0	400	774	1078	1072	310	1078	1064
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.6	0.0	16.1	27.9	0.0	16.5	26.8	18.2	18.3	23.5	13.4	13.4
Incr Delay (d2), s/veh	90.1	0.0	0.0	91.7	0.0	0.1	6.8	0.9	1.0	16.8	0.4	0.4
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	4.9	0.0	0.1	4.9	0.0	0.5	1.0	2.8	2.8	4.4	2.3	2.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	117.7	0.0	16.2	119.6	0.0	16.6	33.6	19.2	19.2	40.2	13.7	13.8
LnGrp LOS	F		B	F		B	C	B	B	D	B	B
Approach Vol, veh/h	144			178			573			772		
Approach Delay, s/veh	108.6			92.4			20.8			22.2		
Approach LOS	F			F			C			C		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	27.7			21.0	15.5	21.5		21.0				
Change Period (Y+Rc), s	6.0	6.1		6.1	6.0	6.1		6.1				
Max Green Setting (Gmax), s	25.0	34.9		14.9	10.0	34.9		14.9				
Max Q Clear Time (g_c+I+1), s	14.5	8.4		16.9	9.7	9.1		16.9				
Green Ext Time (p_c), s	0.1	3.4		0.0	0.0	3.2		0.0				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh	36.7											
HCM 6th LOS	D											

HCM 6th Signalized Intersection Summary 20: Capitol Blvd SE & Lee St SW/Lee St SE

Existing
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔	↔	↔	↔		↔	↔	
Traffic Volume (veh/h)	107	0	33	1	3	26	18	457	0	13	597	72
Future Volume (veh/h)	107	0	33	1	3	26	18	457	0	13	597	72
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		1.00	1.00		0.97
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	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683
Adj Flow Rate, veh/h	118	0	5	1	3	4	20	502	0	14	656	74
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	53	0	358	33	74	358	38	1875	0	29	1678	189
Arrive On Green	0.26	0.00	0.26	0.26	0.26	0.26	0.01	0.19	0.00	0.01	0.19	0.19
Sat Flow, veh/h	0	0	1397	0	290	1397	1603	3282	0	1603	2888	325
Grp Volume(v), veh/h	118	0	5	4	0	4	20	502	0	14	363	367
Grp Sat Flow(s), veh/h/ln	0	0	1397	290	0	1397	1603	1599	0	1603	1599	1615
Q Serve(g_s), s	0.0	0.0	0.4	0.0	0.0	0.3	1.7	18.0	0.0	1.2	26.8	26.8
Cycle Q Clear(g_c), s	34.6	0.0	0.4	34.6	0.0	0.3	1.7	18.0	0.0	1.2	26.8	26.8
Prop In Lane	1.00		1.00	0.25		1.00	1.00		0.00	1.00		0.20
Lane Grp Cap(c), veh/h	53	0	358	108	0	358	38	1875	0	29	929	938
V/C Ratio(X)	2.21	0.00	0.01	0.04	0.00	0.01	0.53	0.27	0.00	0.48	0.39	0.39
Avail Cap(c_a), veh/h	53	0	358	108	0	358	71	1875	0	119	929	938
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	0.33	0.33	0.33	0.33	0.33	0.33
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	67.5	0.0	37.5	40.5	0.0	37.4	66.2	29.8	0.0	66.5	33.7	33.7
Incr Delay (d2), s/veh	601.4	0.0	0.0	0.1	0.0	0.0	4.3	0.4	0.0	4.5	1.2	1.2
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	0.0	0.0	0.1	0.1	0.0	0.1	0.7	7.8	0.0	0.5	11.8	12.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	668.9	0.0	37.5	40.5	0.0	37.4	70.5	30.1	0.0	71.0	34.9	34.9
LnGrp LOS	F		D	D		D	E	C		E	C	C
Approach Vol, veh/h	123			8			522			744		
Approach Delay, s/veh	643.3			39.0			31.7			35.6		
Approach LOS	F			D			C			D		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	85.5			41.0	9.2	84.8		41.0				
Change Period (Y+Rc), s	6.0	6.4		6.4	6.0	6.4		6.4				
Max Green Setting (Gmax), s	10.0	71.6		34.6	6.0	75.6		34.6				
Max Q Clear Time (g_c+I1), s	13.2	20.0		36.6	3.7	28.8		36.6				
Green Ext Time (p_c), s	0.0	3.7		0.0	0.0	5.1		0.0				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh	87.7											
HCM 6th LOS	F											

MOVEMENT SUMMARY

 **Site: 21 [21: Littlerock Rd & Kingswood Dr (Site Folder: Tumwater)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Littlerock Rd & Kingswood Dr
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh. veh	Dist]				
			veh/h		veh/h	%	v/c	sec			ft				mph
South: Littlerock Rd															
8	T1	All MCs	339	2.0	339	2.0	0.379	2.3	LOS A	2.0	50.1	0.28	0.30	0.28	14.8
18	R2	All MCs	115	2.0	115	2.0	0.379	2.7	LOS A	2.0	50.1	0.28	0.30	0.28	26.2
Approach			454	2.0	454	2.0	0.379	2.4	LOS A	2.0	50.1	0.28	0.30	0.28	17.6
East: Kingswood Dr															
1	L2	All MCs	74	2.0	74	2.0	0.072	6.8	LOS A	0.3	8.5	0.44	0.58	0.44	24.6
16	R2	All MCs	115	2.0	115	2.0	0.091	2.6	LOS A	0.5	11.4	0.42	0.39	0.42	23.5
Approach			189	2.0	189	2.0	0.091	4.2	LOS A	0.5	11.4	0.43	0.47	0.43	24.1
North: Littlerock Rd															
7	L2	All MCs	109	2.0	109	2.0	0.114	7.0	LOS A	0.5	13.0	0.23	0.57	0.23	22.3
4	T1	All MCs	502	2.0	502	2.0	0.353	2.2	LOS A	2.2	54.7	0.25	0.29	0.25	27.7
Approach			611	2.0	611	2.0	0.353	3.0	LOS A	2.2	54.7	0.25	0.34	0.25	26.5
All Vehicles			1254	2.0	1254	2.0	0.379	3.0	LOS A	2.2	54.7	0.29	0.35	0.29	21.9

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

HCM 6th Signalized Intersection Summary 22: Capitol Blvd SE & Dennis St SW/Dennis St SE

Existing
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔	↔	↔	↔		↔	↔	
Traffic Volume (veh/h)	15	19	17	22	14	26	5	395	19	71	517	34
Future Volume (veh/h)	15	19	17	22	14	26	5	395	19	71	517	34
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.93		0.91	0.93		0.91	0.99		0.94	0.99		0.95
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	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856	1856
Adj Flow Rate, veh/h	16	20	2	23	15	2	5	420	17	76	550	32
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	3	3	3	3	3	3	3	3	3	3	3	3
Cap, veh/h	244	266	364	315	179	364	313	841	34	430	1107	64
Arrive On Green	0.25	0.25	0.25	0.25	0.25	0.25	0.01	0.24	0.24	0.09	0.33	0.33
Sat Flow, veh/h	559	1049	1436	795	705	1436	1767	3445	139	1767	3376	196
Grp Volume(v), veh/h	36	0	2	38	0	2	5	214	223	76	287	295
Grp Sat Flow(s), veh/h/ln	1609	0	1436	1500	0	1436	1767	1763	1821	1767	1763	1809
Q Serve(g_s), s	0.0	0.0	0.1	0.0	0.0	0.1	0.1	5.3	5.4	1.5	6.7	6.7
Cycle Q Clear(g_c), s	0.8	0.0	0.1	0.8	0.0	0.1	0.1	5.3	5.4	1.5	6.7	6.7
Prop In Lane	0.44		1.00	0.61		1.00	1.00		0.08	1.00		0.11
Lane Grp Cap(c), veh/h	510	0	364	494	0	364	313	431	445	430	578	593
V/C Ratio(X)	0.07	0.00	0.01	0.08	0.00	0.01	0.02	0.50	0.50	0.18	0.50	0.50
Avail Cap(c_a), veh/h	679	0	521	653	0	521	994	2539	2623	963	2539	2606
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	14.5	0.0	14.2	14.5	0.0	14.2	14.4	16.6	16.6	11.9	13.8	13.8
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.9	0.9	0.2	0.7	0.6
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	0.3	0.0	0.0	0.3	0.0	0.0	0.0	2.0	2.0	0.5	2.3	2.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	14.5	0.0	14.2	14.6	0.0	14.2	14.4	17.5	17.5	12.1	14.4	14.4
LnGrp LOS	B		B	B		B	B	B	B	B	B	B
Approach Vol, veh/h	38			40			442			658		
Approach Delay, s/veh	14.5			14.6			17.4			14.2		
Approach LOS	B			B			B			B		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.6	20.0		20.4	6.3	24.2		20.4				
Change Period (Y+Rc), s	6.0	7.5		7.5	6.0	7.5		7.5				
Max Green Setting (Gmax), s	20.0	73.5		18.5	20.0	73.5		18.5				
Max Q Clear Time (g_c+I), s	13.5	7.4		2.8	2.1	8.7		2.8				
Green Ext Time (p_c), s	0.1	2.7		0.1	0.0	3.8		0.1				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh	15.4											
HCM 6th LOS	B											

HCM 6th Signalized Intersection Summary 23: Henderson Blvd SE & Wildflower Ln SE/65th Ave SE

Existing
 PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	0	0	48	1	100	3	629	71	77	587	1
Future Volume (veh/h)	0	0	0	48	1	100	3	629	71	77	587	1
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	0.98		0.95	1.00		0.97	1.00		0.97
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	1885	1961	1885	1885	1961	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	0	0	0	51	1	15	3	669	69	82	624	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	0	222	0	274	19	39	486	979	101	405	1100	2
Arrive On Green	0.00	0.00	0.00	0.11	0.11	0.11	0.58	0.58	0.58	0.58	0.58	0.58
Sat Flow, veh/h	0	1961	0	1013	171	341	805	1676	173	725	1882	3
Grp Volume(v), veh/h	0	0	0	67	0	0	3	0	738	82	0	625
Grp Sat Flow(s),veh/h/ln	0	1961	0	1525	0	0	805	0	1849	725	0	1885
Q Serve(g_s), s	0.0	0.0	0.0	1.1	0.0	0.0	0.1	0.0	11.0	3.5	0.0	8.2
Cycle Q Clear(g_c), s	0.0	0.0	0.0	1.5	0.0	0.0	8.3	0.0	11.0	14.5	0.0	8.2
Prop In Lane	0.00		0.00	0.76		0.22	1.00		0.09	1.00		0.00
Lane Grp Cap(c), veh/h	0	222	0	332	0	0	486	0	1080	405	0	1101
V/C Ratio(X)	0.00	0.00	0.00	0.20	0.00	0.00	0.01	0.00	0.68	0.20	0.00	0.57
Avail Cap(c_a), veh/h	0	494	0	538	0	0	1131	0	2561	986	0	2611
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)	0.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	16.3	0.0	0.0	7.7	0.0	5.7	10.7	0.0	5.1
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.9	0.3	0.0	0.6
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	0.0	0.0	0.0	0.5	0.0	0.0	0.0	0.0	2.1	0.4	0.0	1.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.0	0.0	0.0	16.6	0.0	0.0	7.7	0.0	6.6	11.0	0.0	5.7
LnGrp LOS				B			A			A		
Approach Vol, veh/h	0			67			741			707		
Approach Delay, s/veh	0.0			16.6			6.6			6.3		
Approach LOS				B			A			A		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	29.2			10.5			29.2			10.5		
Change Period (Y+Rc), s	6.0			6.0			6.0			6.0		
Max Green Setting (Gmax), s	55.0			10.0			55.0			10.0		
Max Q Clear Time (g_c+I1), s	16.5			3.5			13.0			0.0		
Green Ext Time (p_c), s	6.7			0.1			7.7			0.0		
Intersection Summary												
HCM 6th Ctrl Delay, s/veh			6.9									
HCM 6th LOS			A									

MOVEMENT SUMMARY

 **Site: 24 [24: Littlerock Rd & Israel Rd & 70th Ave (Site Folder: Tumwater)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Littlerock Rd & Israel Rd & 70th Ave
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]		[Total HV]					[Veh.	Dist]				
			veh/h	%	veh/h	%				veh	ft				
South: Littlerock Rd															
3	L2	All MCs	196	2.0	196	2.0	0.509	9.1	LOS A	3.5	87.8	0.58	0.56	0.58	28.7
8	T1	All MCs	252	2.0	252	2.0	0.509	3.7	LOS A	3.5	87.8	0.58	0.56	0.58	19.0
18	R2	All MCs	62	2.0	62	2.0	0.509	4.3	LOS A	3.5	87.8	0.58	0.56	0.58	29.0
Approach			510	2.0	510	2.0	0.509	5.8	LOS A	3.5	87.8	0.58	0.56	0.58	24.3
East: Israel Rd															
1	L2	All MCs	119	2.0	119	2.0	0.299	10.7	LOS B	1.8	46.3	0.63	0.64	0.63	28.4
6	T1	All MCs	182	2.0	182	2.0	0.299	5.6	LOS A	1.8	46.3	0.63	0.64	0.63	30.6
16	R2	All MCs	138	2.0	138	2.0	0.178	6.3	LOS A	0.9	23.4	0.60	0.63	0.60	28.8
Approach			439	2.0	439	2.0	0.299	7.2	LOS A	1.8	46.3	0.62	0.64	0.62	29.5
North: Littlerock Rd															
7	L2	All MCs	119	2.0	119	2.0	0.532	10.8	LOS B	4.5	113.9	0.78	0.71	0.86	27.1
4	T1	All MCs	389	2.0	389	2.0	0.532	6.6	LOS A	4.5	113.9	0.78	0.71	0.86	25.2
14	R2	All MCs	152	2.0	152	2.0	0.242	6.9	LOS A	1.3	34.2	0.67	0.66	0.67	27.7
Approach			660	2.0	660	2.0	0.532	7.4	LOS A	4.5	113.9	0.76	0.70	0.82	26.1
West: 70th Ave															
5	L2	All MCs	60	2.0	60	2.0	0.176	10.9	LOS B	0.9	21.9	0.59	0.68	0.59	19.4
2	T1	All MCs	81	2.0	81	2.0	0.176	6.0	LOS A	0.9	21.9	0.59	0.68	0.59	30.5
12	R2	All MCs	145	2.0	145	2.0	0.176	6.7	LOS A	0.9	22.2	0.59	0.66	0.59	28.9
Approach			286	2.0	286	2.0	0.176	7.4	LOS A	0.9	22.2	0.59	0.67	0.59	27.5
All Vehicles			1895	2.0	1895	2.0	0.532	6.9	LOS A	4.5	113.9	0.65	0.64	0.67	26.6

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\TC-Projects\2024\TC24-0105_Tumwater Transportation Master Plan and Impact Fees\Analysis\Operation Analysis
\Existing\Sidra\Tumwater Sidra.sip9

HCM 6th Signalized Intersection Summary 25: Linderson Way SW & Israel Rd SW

Existing
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	63	400	101	150	394	38	179	43	67	16	124	69
Future Volume (veh/h)	63	400	101	150	394	38	179	43	67	16	124	69
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	0.99		0.96	0.97		0.95
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	1885	1885	1885	1885	1885	1885	1885	1961	1885	1885	1885	1885
Adj Flow Rate, veh/h	71	449	106	169	443	41	201	48	29	18	139	59
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	360	515	122	323	656	61	384	292	176	358	203	86
Arrive On Green	0.05	0.35	0.35	0.09	0.39	0.39	0.12	0.26	0.26	0.02	0.16	0.16
Sat Flow, veh/h	1795	1464	346	1795	1694	157	1795	1124	679	1795	1233	523
Grp Volume(v), veh/h	71	0	555	169	0	484	201	0	77	18	0	198
Grp Sat Flow(s),veh/h/ln	1795	0	1809	1795	0	1851	1795	0	1803	1795	0	1756
Q Serve(g_s), s	1.7	0.0	19.4	3.9	0.0	14.7	5.9	0.0	2.2	0.6	0.0	7.2
Cycle Q Clear(g_c), s	1.7	0.0	19.4	3.9	0.0	14.7	5.9	0.0	2.2	0.6	0.0	7.2
Prop In Lane	1.00		0.19	1.00		0.08	1.00		0.38	1.00		0.30
Lane Grp Cap(c), veh/h	360	0	637	323	0	716	384	0	468	358	0	289
V/C Ratio(X)	0.20	0.00	0.87	0.52	0.00	0.68	0.52	0.00	0.16	0.05	0.00	0.68
Avail Cap(c_a), veh/h	793	0	791	693	0	809	573	0	522	718	0	768
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	13.6	0.0	20.5	15.1	0.0	17.2	18.9	0.0	19.4	22.7	0.0	26.6
Incr Delay (d2), s/veh	0.1	0.0	8.8	1.3	0.0	1.9	0.4	0.0	0.1	0.0	0.0	2.9
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	0.6	0.0	9.2	1.6	0.0	6.2	2.3	0.0	0.9	0.2	0.0	3.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	13.7	0.0	29.3	16.4	0.0	19.1	19.3	0.0	19.4	22.7	0.0	29.5
LnGrp LOS	B		C	B		B	B		B	C		C
Approach Vol, veh/h	626		653			278			216			
Approach Delay, s/veh	27.5		18.4			19.3			28.9			
Approach LOS	C		B			B			C			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.2	31.1	5.9	22.5	10.5	28.7	12.4	16.1				
Change Period (Y+Rc), s	4.5	4.9	4.5	4.9	4.5	4.9	4.5	4.9				
Max Green Setting (Gmax), s	20.0	29.6	15.0	19.6	20.0	29.6	15.0	29.6				
Max Q Clear Time (g_c+I), s	13.7	16.7	2.6	4.2	5.9	21.4	7.9	9.2				
Green Ext Time (p_c), s	0.1	2.7	0.0	0.2	0.4	2.4	0.2	1.1				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh			23.1									
HCM 6th LOS			C									

HCM 6th Signalized Intersection Summary 26: Capitol Blvd SE & Israel Rd SW/Israel Rd SE

Existing
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	79	123	243	57	155	39	180	358	11	16	642	147
Future Volume (veh/h)	79	123	243	57	155	39	180	358	11	16	642	147
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		0.97	1.00		0.97
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	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683
Adj Flow Rate, veh/h	93	145	241	67	182	40	212	421	12	19	755	160
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	328	151	252	179	351	77	308	1419	40	430	957	203
Arrive On Green	0.06	0.27	0.27	0.05	0.26	0.26	0.11	0.45	0.45	0.03	0.37	0.37
Sat Flow, veh/h	1603	560	931	1603	1330	292	1603	3173	90	1603	2610	553
Grp Volume(v), veh/h	93	0	386	67	0	222	212	212	221	19	463	452
Grp Sat Flow(s),veh/h/ln	1603	0	1491	1603	0	1623	1603	1599	1664	1603	1599	1564
Q Serve(g_s), s	3.8	0.0	23.3	2.7	0.0	10.7	7.0	7.7	7.7	0.7	23.5	23.6
Cycle Q Clear(g_c), s	3.8	0.0	23.3	2.7	0.0	10.7	7.0	7.7	7.7	0.7	23.5	23.6
Prop In Lane	1.00		0.62	1.00		0.18	1.00		0.05	1.00		0.35
Lane Grp Cap(c), veh/h	328	0	403	179	0	428	308	715	744	430	587	574
V/C Ratio(X)	0.28	0.00	0.96	0.38	0.00	0.52	0.69	0.30	0.30	0.04	0.79	0.79
Avail Cap(c_a), veh/h	670	0	403	531	0	439	577	957	996	828	957	936
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	22.8	0.0	32.8	25.2	0.0	28.7	19.0	16.1	16.1	17.1	25.8	25.8
Incr Delay (d2), s/veh	0.6	0.0	34.1	1.6	0.0	1.2	3.3	0.3	0.3	0.1	2.9	3.0
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	1.5	0.0	12.1	1.1	0.0	4.3	2.6	2.7	2.8	0.2	8.9	8.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	23.4	0.0	66.9	26.8	0.0	29.9	22.2	16.4	16.4	17.1	28.7	28.7
LnGrp LOS	C		E	C		C	C	B	B	B	C	C
Approach Vol, veh/h	479					289		645		934		
Approach Delay, s/veh	58.4					29.2		18.3		28.5		
Approach LOS	E					C		B		C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	6.8	45.7	9.4	29.5	14.2	38.3	10.0	28.9				
Change Period (Y+Rc), s	4.5	4.8	4.5	4.8	4.5	4.8	4.5	4.8				
Max Green Setting (Gmax), s	25.0	54.7	25.0	24.7	25.0	54.7	25.0	24.7				
Max Q Clear Time (g_c+I2), s	12.7	9.7	4.7	25.3	9.0	25.6	5.8	12.7				
Green Ext Time (p_c), s	0.0	3.3	0.2	0.0	0.7	8.0	0.3	1.2				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh			31.9									
HCM 6th LOS			C									

HCM 6th Signalized Intersection Summary

27: Henderson Blvd SE & Tumwater Blvd SE

Existing
PM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	556	32	31	160	185	511
Future Volume (veh/h)	556	32	31	160	185	511
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	0.97	1.00			0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1961
Adj Flow Rate, veh/h	598	32	33	172	199	345
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	1	1	1	1	1	1
Cap, veh/h	691	37	44	229	468	399
Arrive On Green	0.41	0.41	0.15	0.15	0.25	0.25
Sat Flow, veh/h	1688	90	301	1569	1885	1607
Grp Volume(v), veh/h	631	0	205	0	199	345
Grp Sat Flow(s), veh/h/ln	1781	0	1870	0	1885	1607
Q Serve(g_s), s	29.7	0.0	9.6	0.0	8.1	18.8
Cycle Q Clear(g_c), s	29.7	0.0	9.6	0.0	8.1	18.8
Prop In Lane	0.95	0.05	0.16			1.00
Lane Grp Cap(c), veh/h	729	0	273	0	468	399
V/C Ratio(X)	0.87	0.00	0.75	0.00	0.43	0.87
Avail Cap(c_a), veh/h	1166	0	612	0	617	526
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	24.7	0.0	37.5	0.0	29.0	33.0
Incr Delay (d2), s/veh	7.2	0.0	8.5	0.0	0.6	11.3
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	8.1	0.0	4.9	0.0	3.7	8.3
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	31.9	0.0	46.0	0.0	29.6	44.3
LnGrp LOS	C		D		C	D
Approach Vol, veh/h	631			205	544	
Approach Delay, s/veh	31.9			46.0	38.9	
Approach LOS	C			D	D	
Timer - Assigned Phs	2			4		8
Phs Duration (G+Y+Rc), s	43.5			28.7		19.4
Change Period (Y+Rc), s	6.0			6.0		6.0
Max Green Setting (Gmax), s	60.0			30.0		30.0
Max Q Clear Time (g_c+I1), s	31.7			20.8		11.6
Green Ext Time (p_c), s	5.8			1.7		1.8
Intersection Summary						
HCM 6th Ctrl Delay, s/veh			36.8			
HCM 6th LOS			D			

Notes

User approved volume balancing among the lanes for turning movement.

MOVEMENT SUMMARY

 **Site: 28 [28: Littlerock Rd & Tumwater Blvd (Site Folder: Tumwater)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Littlerock Rd & Tumwater Blvd
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]		[Total HV]					[Veh. veh	Dist]				
			veh/h	%	veh/h	%	v/c	sec			ft				mph
South: Littlerock Rd															
8	T1	All MCs	214	2.0	214	2.0	0.162	3.4	LOS A	0.8	20.3	0.46	0.42	0.46	28.1
18	R2	All MCs	114	2.0	114	2.0	0.162	3.9	LOS A	0.8	20.3	0.46	0.46	0.46	29.7
Approach			328	2.0	328	2.0	0.162	3.6	LOS A	0.8	20.3	0.46	0.44	0.46	28.6
East: Tumwater Blvd															
1	L2	All MCs	187	2.0	187	2.0	0.187	9.6	LOS A	0.9	21.8	0.38	0.63	0.38	28.0
16	R2	All MCs	290	2.0	290	2.0	0.260	4.3	LOS A	1.3	32.7	0.39	0.49	0.39	29.8
Approach			477	2.0	477	2.0	0.260	6.4	LOS A	1.3	32.7	0.38	0.54	0.38	29.0
North: Littlerock Rd															
7	L2	All MCs	330	2.0	330	2.0	0.277	8.2	LOS A	1.7	43.7	0.43	0.58	0.43	27.9
4	T1	All MCs	339	2.0	339	2.0	0.256	2.8	LOS A	1.6	40.4	0.41	0.34	0.41	28.2
Approach			670	2.0	670	2.0	0.277	5.5	LOS A	1.7	43.7	0.42	0.45	0.42	28.1
All Vehicles			1475	2.0	1475	2.0	0.277	5.4	LOS A	1.7	43.7	0.42	0.48	0.42	28.5

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

HCM 6th Signalized Intersection Summary

29: I-5 SB Onramp/I-5 SB Offramp & Tumwater Blvd SW

Existing
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑↑		↑	↑					↑	↑↓	
Traffic Volume (veh/h)	0	211	228	398	203	0	0	0	0	492	0	243
Future Volume (veh/h)	0	211	228	398	203	0	0	0	0	492	0	243
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		1.00
Parking Bus, Adj	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	
Adj Sat Flow, veh/h/ln	0	1870	1870	1870	1870	0				1870	1870	1870
Adj Flow Rate, veh/h	0	237	101	447	228	0				384	236	216
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89				0.89	0.89	0.89
Percent Heavy Veh, %	0	2	2	2	2	0				2	2	2
Cap, veh/h	0	385	159	520	971	0				607	306	280
Arrive On Green	0.00	0.16	0.16	0.29	0.52	0.00				0.34	0.34	0.34
Sat Flow, veh/h	0	2545	1013	1781	1870	0				1781	899	823
Grp Volume(v), veh/h	0	170	168	447	228	0				384	0	452
Grp Sat Flow(s), veh/h/ln	0	1777	1688	1781	1870	0				1781	0	1722
Q Serve(g_s), s	0.0	5.8	6.1	15.6	4.4	0.0				11.9	0.0	15.4
Cycle Q Clear(g_c), s	0.0	5.8	6.1	15.6	4.4	0.0				11.9	0.0	15.4
Prop In Lane	0.00		0.60	1.00		0.00				1.00		0.48
Lane Grp Cap(c), veh/h	0	279	265	520	971	0				607	0	586
V/C Ratio(X)	0.00	0.61	0.63	0.86	0.23	0.00				0.63	0.00	0.77
Avail Cap(c_a), veh/h	0	1355	1287	815	1426	0				1630	0	1576
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	25.7	25.9	22.0	8.6	0.0				18.2	0.0	19.3
Incr Delay (d2), s/veh	0.0	2.2	2.6	6.6	0.1	0.0				1.2	0.0	2.5
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.5	2.5	6.8	1.5	0.0				4.3	0.0	5.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.0	28.0	28.5	28.5	8.8	0.0				19.4	0.0	21.8
LnGrp LOS		C	C	C	A					B		C
Approach Vol, veh/h		338			675						836	
Approach Delay, s/veh		28.2			21.8						20.7	
Approach LOS		C			C						C	
Timer - Assigned Phs		2			5	6		8				
Phs Duration (G+Y+Rc), s		38.6			23.7	14.9		26.9				
Change Period (Y+Rc), s		4.6			4.6	4.6		4.6				
Max Green Setting (Gmax), s		50.0			30.0	50.0		60.0				
Max Q Clear Time (g_c+I1), s		6.4			17.6	8.1		17.4				
Green Ext Time (p_c), s		1.4			1.6	2.2		4.9				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh			22.5									
HCM 6th LOS			C									

Notes

User approved volume balancing among the lanes for turning movement.

HCM 6th TWSC
30: I-5 NB Offramp/I-5 NB Onramp & Tumwater Blvd SW

Existing
PM Peak Hour

Intersection												
Int Delay, s/veh	12.5											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Vol, veh/h	122	518	0	0	486	825	85	1	177	0	0	0
Future Vol, veh/h	122	518	0	0	486	825	85	1	177	0	0	0
Conflicting Peds, #/hr	0	0	0	0	0	0	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Yield	Yield	Yield
RT Channelized	-	-	None	-	-	Free	-	-	None	-	-	None
Storage Length	300	-	-	-	-	0	-	-	140	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	83	83	83	83	83	83	83	83	83	83	83	83
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	147	624	0	0	586	994	102	1	213	0	0	0

Major/Minor	Major1			Major2			Minor1		
Conflicting Flow All	586	0	-	-	-	0	1504	1504	312
Stage 1	-	-	-	-	-	-	918	918	-
Stage 2	-	-	-	-	-	-	586	586	-
Critical Hdwy	4.13	-	-	-	-	-	6.63	6.53	6.93
Critical Hdwy Stg 1	-	-	-	-	-	-	5.83	5.53	-
Critical Hdwy Stg 2	-	-	-	-	-	-	5.43	5.53	-
Follow-up Hdwy	2.219	-	-	-	-	-	3.519	4.019	3.319
Pot Cap-1 Maneuver	987	-	0	0	-	0	122	121	685
Stage 1	-	-	0	0	-	0	350	350	-
Stage 2	-	-	0	0	-	0	555	496	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	987	-	-	-	-	-	104	0	685
Mov Cap-2 Maneuver	-	-	-	-	-	-	104	0	-
Stage 1	-	-	-	-	-	-	298	0	-
Stage 2	-	-	-	-	-	-	555	0	-

Approach	EB	WB	NB
HCM Control Delay, s/v	1.8	0	61.9
HCM LOS			F

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	WBT
Capacity (veh/h)	104	685	987	-	-
HCM Lane V/C Ratio	0.996	0.311	0.149	-	-
HCM Control Delay (s/veh)	163.4	12.6	9.3	-	-
HCM Lane LOS	F	B	A	-	-
HCM 95th %tile Q (veh)	6.2	1.3	0.5	-	-

HCM 6th Signalized Intersection Summary

31: Center St SW/Linderson Way SW & Tumwater Blvd SW

Existing
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	87	473	98	47	839	67	128	83	52	105	86	331
Future Volume (veh/h)	87	473	98	47	839	67	128	83	52	105	86	331
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		0.97	1.00		1.00
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	1870	1870	1870
Adj Flow Rate, veh/h	106	577	114	57	1023	38	156	101	7	128	105	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	230	791	156	349	1424	631	200	211	174	207	225	
Arrive On Green	0.07	0.27	0.27	0.20	0.40	0.40	0.11	0.11	0.11	0.12	0.12	0.00
Sat Flow, veh/h	3456	2954	582	1781	3554	1575	1781	1870	1539	1781	1870	1585
Grp Volume(v), veh/h	106	346	345	57	1023	38	156	101	7	128	105	0
Grp Sat Flow(s),veh/h/ln	1728	1777	1759	1781	1777	1575	1781	1870	1539	1781	1870	1585
Q Serve(g_s), s	2.4	14.5	14.6	2.2	19.9	0.7	7.0	4.2	0.3	5.6	4.3	0.0
Cycle Q Clear(g_c), s	2.4	14.5	14.6	2.2	19.9	0.7	7.0	4.2	0.3	5.6	4.3	0.0
Prop In Lane	1.00		0.33	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	230	476	471	349	1424	631	200	211	174	207	225	
V/C Ratio(X)	0.46	0.73	0.73	0.16	0.72	0.06	0.78	0.48	0.04	0.62	0.47	
Avail Cap(c_a), veh/h	2949	752	744	349	2587	1147	652	677	557	869	905	
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	36.9	27.3	27.3	27.4	20.7	4.6	35.4	34.1	32.4	34.5	33.6	0.0
Incr Delay (d2), s/veh	1.7	2.6	2.7	0.3	0.8	0.0	7.6	2.0	0.1	3.6	1.8	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	1.0	6.2	6.2	0.9	7.7	0.4	3.4	2.0	0.1	2.6	2.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	38.6	29.9	30.0	27.7	21.5	4.6	43.0	36.1	32.5	38.1	35.4	0.0
LnGrp LOS	D	C	C	C	C	A	D	D	C	D	D	
Approach Vol, veh/h	797				1118				264		233	
Approach Delay, s/veh	31.1				21.3				40.1		36.9	
Approach LOS	C				C				D		D	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	11.5	39.2	15.8	15.6	22.4	28.3	15.2	16.2				
Change Period (Y+Rc), s	6.0	6.3	6.3	* 6.3	6.3	* 6.3	6.0	6.3				
Max Green Setting (Gmax), s	70.0	59.7	40.0	* 30	10.0	* 35	30.0	39.7				
Max Q Clear Time (g_c+I1), s	4.4	21.9	7.6	6.2	4.2	16.6	9.0	6.3				
Green Ext Time (p_c), s	0.5	11.0	0.5	0.6	0.1	4.7	0.5	0.6				

Intersection Summary

HCM 6th Ctrl Delay, s/veh	28.1
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

MOVEMENT SUMMARY

 **Site: 32 [32: Tumwater Blvd & New Market St (Site Folder: Tumwater)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Tumwater Blvd & New Market St
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]				mph
South: New Market St															
3	L2	All MCs	26	2.0	26	2.0	0.031	6.4	LOS A	0.1	2.9	0.48	0.56	0.48	26.2
8	T1	All MCs	5	2.0	5	2.0	0.031	1.6	LOS A	0.1	2.9	0.48	0.56	0.48	23.4
18	R2	All MCs	21	2.0	21	2.0	0.025	2.6	LOS A	0.1	2.2	0.50	0.44	0.50	27.7
Approach			51	2.0	51	2.0	0.031	4.4	LOS A	0.1	2.9	0.49	0.51	0.49	26.4
East: Tumwater Blvd															
1	L2	All MCs	92	2.0	92	2.0	0.385	9.1	LOS A	2.6	65.8	0.23	0.33	0.23	27.7
6	T1	All MCs	1053	2.0	1053	2.0	0.385	2.3	LOS A	2.6	66.4	0.22	0.28	0.22	32.8
16	R2	All MCs	17	2.0	17	2.0	0.385	2.9	LOS A	2.6	66.4	0.21	0.25	0.21	28.1
Approach			1162	2.0	1162	2.0	0.385	2.9	LOS A	2.6	66.4	0.22	0.29	0.22	32.3
North: New Market St															
7	L2	All MCs	24	2.0	24	2.0	0.039	8.1	LOS A	0.1	3.4	0.57	0.72	0.57	25.8
4	T1	All MCs	1	2.0	1	2.0	0.039	3.4	LOS A	0.1	3.4	0.57	0.72	0.57	23.1
14	R2	All MCs	55	2.0	55	2.0	0.062	2.9	LOS A	0.2	5.8	0.56	0.52	0.56	27.6
Approach			81	2.0	81	2.0	0.062	4.5	LOS A	0.2	5.8	0.56	0.58	0.56	26.9
West: Tumwater Blvd															
5	L2	All MCs	22	2.0	22	2.0	0.297	9.5	LOS A	1.8	46.2	0.33	0.32	0.33	27.7
2	T1	All MCs	727	2.0	727	2.0	0.297	2.7	LOS A	1.8	46.9	0.32	0.31	0.32	32.6
12	R2	All MCs	99	2.0	99	2.0	0.297	3.2	LOS A	1.8	46.9	0.31	0.30	0.31	27.9
Approach			847	2.0	847	2.0	0.297	2.9	LOS A	1.8	46.9	0.32	0.31	0.32	31.9
All Vehicles			2141	2.0	2141	2.0	0.385	3.0	LOS A	2.6	66.4	0.28	0.31	0.28	31.7

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\TC-Projects\2024\TC24-0105_Tumwater Transportation Master Plan and Impact Fees\Analysis\Operation Analysis
\Existing\Sidra\Tumwater Sidra.sip9

HCM 6th Signalized Intersection Summary

33: Capitol Blvd SE & Tumwater Blvd SW/Tumwater Blvd SE

Existing

PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	42	213	334	19	298	36	282	421	24	76	600	267
Future Volume (veh/h)	42	213	334	19	298	36	282	421	24	76	600	267
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		0.98	1.00		0.98
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	1870	1870	1870
Adj Flow Rate, veh/h	47	237	187	21	331	34	313	468	25	84	667	114
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	91	370	511	51	570	58	446	1239	66	121	1068	467
Arrive On Green	0.05	0.20	0.20	0.03	0.18	0.18	0.13	0.36	0.36	0.07	0.30	0.30
Sat Flow, veh/h	1781	1870	1551	1781	3248	331	3456	3428	183	1781	3554	1554
Grp Volume(v), veh/h	47	237	187	21	180	185	313	242	251	84	667	114
Grp Sat Flow(s),veh/h/ln	1781	1870	1551	1781	1777	1802	1728	1777	1834	1781	1777	1554
Q Serve(g_s), s	1.8	8.3	6.6	0.8	6.6	6.7	6.2	7.2	7.2	3.3	11.6	4.0
Cycle Q Clear(g_c), s	1.8	8.3	6.6	0.8	6.6	6.7	6.2	7.2	7.2	3.3	11.6	4.0
Prop In Lane	1.00		1.00	1.00		0.18	1.00		0.10	1.00		1.00
Lane Grp Cap(c), veh/h	91	370	511	51	312	316	446	642	663	121	1068	467
V/C Ratio(X)	0.52	0.64	0.37	0.41	0.58	0.59	0.70	0.38	0.38	0.69	0.62	0.24
Avail Cap(c_a), veh/h	747	777	849	623	738	748	1450	862	890	498	3464	1515
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	33.1	26.3	18.4	34.1	27.0	27.1	29.8	16.9	16.9	32.6	21.5	18.9
Incr Delay (d2), s/veh	1.7	1.9	0.4	2.0	1.7	1.7	2.0	0.4	0.4	6.9	0.7	0.3
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	0.8	3.7	2.2	0.4	2.8	2.9	2.6	2.8	2.9	1.6	4.5	1.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	34.8	28.2	18.9	36.1	28.7	28.8	31.9	17.3	17.3	39.5	22.3	19.2
LnGrp LOS	C	C	B	D	C	C	C	B	B	D	C	B
Approach Vol, veh/h	471					386		806		865		
Approach Delay, s/veh	25.1					29.2		23.0		23.5		
Approach LOS	C					C		C		C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.9	32.1	8.0	20.4	15.2	27.8	9.6	18.9				
Change Period (Y+Rc), s	6.0	6.3	6.0	6.3	6.0	6.3	6.0	6.3				
Max Green Setting (Gmax), s	20.0	34.7	25.0	29.7	30.0	69.7	30.0	29.7				
Max Q Clear Time (g_c+I), s	15.3	9.2	2.8	10.3	8.2	13.6	3.8	8.7				
Green Ext Time (p_c), s	0.1	3.5	0.0	1.9	1.0	7.0	0.0	2.0				

Intersection Summary

HCM 6th Ctrl Delay, s/veh	24.5
HCM 6th LOS	C

HCM 6th Signalized Intersection Summary

34: Littlerock Rd SW & 77th Way SW/Black Hills School Drwy/77th Way SW

Existing
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	65	1	12	1	2	23	33	214	2	27	404	161
Future Volume (veh/h)	65	1	12	1	2	23	33	214	2	27	404	161
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.99	0.98		0.99	1.00		0.97	1.00		0.97
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	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	71	1	2	1	2	3	36	233	2	29	439	164
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	338	68	135	340	82	123	326	784	7	609	538	201
Arrive On Green	0.12	0.12	0.12	0.12	0.12	0.12	0.03	0.42	0.42	0.03	0.41	0.41
Sat Flow, veh/h	1394	555	1110	1396	674	1011	1795	1866	16	1795	1297	485
Grp Volume(v), veh/h	71	0	3	1	0	5	36	0	235	29	0	603
Grp Sat Flow(s), veh/h/ln	1394	0	1665	1396	0	1685	1795	0	1882	1795	0	1782
Q Serve(g_s), s	2.0	0.0	0.1	0.0	0.0	0.1	0.5	0.0	3.5	0.4	0.0	12.5
Cycle Q Clear(g_c), s	2.1	0.0	0.1	0.1	0.0	0.1	0.5	0.0	3.5	0.4	0.0	12.5
Prop In Lane	1.00		0.67	1.00		0.60	1.00		0.01	1.00		0.27
Lane Grp Cap(c), veh/h	338	0	203	340	0	205	326	0	790	609	0	739
V/C Ratio(X)	0.21	0.00	0.01	0.00	0.00	0.02	0.11	0.00	0.30	0.05	0.00	0.82
Avail Cap(c_a), veh/h	1236	0	1276	1240	0	1291	697	0	1442	1420	0	1365
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	17.1	0.0	16.1	16.2	0.0	16.2	8.5	0.0	8.0	6.7	0.0	10.8
Incr Delay (d2), s/veh	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	0.9
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	0.6	0.0	0.0	0.0	0.0	0.0	0.1	0.0	1.0	0.1	0.0	3.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	17.2	0.0	16.2	16.2	0.0	16.2	8.5	0.0	8.1	6.8	0.0	11.7
LnGrp LOS	B		B	B		B	A		A	A		B
Approach Vol, veh/h	74			6			271			632		
Approach Delay, s/veh	17.2			16.2			8.2			11.4		
Approach LOS	B			B			A			B		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.4	23.3		11.1	7.1	23.5		11.1				
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0				
Max Green Setting (Gmax), s	10.0	32.0		32.0	20.0	32.0		32.0				
Max Q Clear Time (g_c+I), s	12.5	14.5		2.1	2.4	5.5		4.1				
Green Ext Time (p_c), s	0.0	2.5		0.0	0.0	0.8		0.1				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh	11.0											
HCM 6th LOS	B											

HCM 6th Signalized Intersection Summary 35: Old Hwy 99 SE/Capitol Blvd SE & Driveway/Henderson Blvd SE

Existing
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (veh/h)	0	0	0	114	0	60	0	609	79	80	896	0	
Future Volume (veh/h)	0	0	0	114	0	60	0	609	79	80	896	0	
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0	
Ped-Bike Adj(A_pbT)	1.00		1.00	0.98		0.95	1.00		0.97	1.00		1.00	
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	1945	1870	1870	1870	1870	1870	1870	1870	1870	1870	1945	
Adj Flow Rate, veh/h	0	0	0	121	0	10	0	648	81	85	953	0	
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2	
Cap, veh/h	0	216	0	340	0	167	147	719	90	325	1189	1048	
Arrive On Green	0.00	0.00	0.00	0.11	0.00	0.11	0.00	0.44	0.44	0.07	0.64	0.00	
Sat Flow, veh/h	0	1945	0	1741	0	1508	589	1624	203	1781	1870	1648	
Grp Volume(v), veh/h	0	0	0	121	0	10	0	0	729	85	953	0	
Grp Sat Flow(s),veh/h/ln	0	1945	0	1741	0	1508	589	0	1827	1781	1870	1648	
Q Serve(g_s), s	0.0	0.0	0.0	3.2	0.0	0.3	0.0	0.0	18.1	1.1	18.5	0.0	
Cycle Q Clear(g_c), s	0.0	0.0	0.0	3.2	0.0	0.3	0.0	0.0	18.1	1.1	18.5	0.0	
Prop In Lane	0.00		0.00	1.00		1.00	1.00		0.11	1.00		1.00	
Lane Grp Cap(c), veh/h	0	216	0	340	0	167	147	0	809	325	1189	1048	
V/C Ratio(X)	0.00	0.00	0.00	0.36	0.00	0.06	0.00	0.00	0.90	0.26	0.80	0.00	
Avail Cap(c_a), veh/h	0	589	0	852	0	610	486	0	1860	1111	2478	2184	
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)	0.00	0.00	0.00	1.00	0.00	1.00	0.00	0.00	1.00	1.00	1.00	0.00	
Uniform Delay (d), s/veh	0.0	0.0	0.0	20.8	0.0	19.5	0.0	0.0	12.6	9.8	6.6	0.0	
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.2	0.0	0.1	0.0	0.0	1.6	0.2	0.5	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	0.0	0.0	0.0	1.2	0.0	0.1	0.0	0.0	5.5	0.3	3.3	0.0	
Unsig. Movement Delay, s/veh													
LnGrp Delay(d), s/veh	0.0	0.0	0.0	21.0	0.0	19.5	0.0	0.0	14.2	9.9	7.1	0.0	
LnGrp LOS				C	B			B			A	A	
Approach Vol, veh/h	0		131			729			1038				
Approach Delay, s/veh	0.0		20.9			14.2			7.3				
Approach LOS				C			B			A			
Timer - Assigned Phs	1	2	4		6		8						
Phs Duration (G+Y+Rc), s	9.4	27.9	11.6		37.3		11.6						
Change Period (Y+Rc), s	6.0	6.2	6.2		6.2		6.2						
Max Green Setting (Gmax), s	25.0	49.8	14.8		64.8		19.8						
Max Q Clear Time (g_c+I1), s	13.1	20.1	0.0		20.5		5.2						
Green Ext Time (p_c), s	0.0	1.6	0.0		2.3		0.0						
Intersection Summary													
HCM 6th Ctrl Delay, s/veh			10.9										
HCM 6th LOS			B										

HCM 6th Signalized Intersection Summary 36: Old Hwy 99 SE & 88th Ave SE/Driveway

Existing
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	205	0	37	0	0	0	6	0	395	0	729	143
Future Volume (veh/h)	205	0	37	0	0	0	6	0	395	0	729	143
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.96	1.00		1.00	1.00		1.00	1.00		1.00
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	1885	1961	1885	1885	1961	1885	1885	1885	1885	1885	1885	1961
Adj Flow Rate, veh/h	238	0	10	0	0	0	7	0	259	0	848	111
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	463	0	296	0	363	0	236	0	865	136	1025	899
Arrive On Green	0.19	0.00	0.19	0.00	0.00	0.00	0.54	0.00	0.54	0.00	0.54	0.54
Sat Flow, veh/h	1771	0	1600	0	1961	0	590	0	1590	1129	1885	1654
Grp Volume(v), veh/h	238	0	10	0	0	0	7	0	259	0	848	111
Grp Sat Flow(s),veh/h/ln	1771	0	1600	0	1961	0	590	0	1590	1129	1885	1654
Q Serve(g_s), s	6.7	0.0	0.3	0.0	0.0	0.0	0.5	0.0	4.7	0.0	19.8	1.7
Cycle Q Clear(g_c), s	6.7	0.0	0.3	0.0	0.0	0.0	20.3	0.0	4.7	0.0	19.8	1.7
Prop In Lane	1.00		1.00	0.00		0.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	463	0	296	0	363	0	236	0	865	136	1025	899
V/C Ratio(X)	0.51	0.00	0.03	0.00	0.00	0.00	0.03	0.00	0.30	0.00	0.83	0.12
Avail Cap(c_a), veh/h	963	0	747	0	554	0	302	0	1042	1007	2479	2175
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	1.00	0.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	20.4	0.0	17.7	0.0	0.0	0.0	18.5	0.0	6.6	0.0	10.0	5.9
Incr Delay (d2), s/veh	0.9	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.2	0.0	1.8	0.1
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	2.4	0.0	0.1	0.0	0.0	0.0	0.1	0.0	1.0	0.0	5.1	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	21.2	0.0	17.8	0.0	0.0	0.0	18.5	0.0	6.8	0.0	11.8	6.0
LnGrp LOS	C		B				B		A		B A	
Approach Vol, veh/h	248		0				266			959		
Approach Delay, s/veh	21.1		0.0				7.1			11.1		
Approach LOS	C						A			B		
Timer - Assigned Phs	2		4		6		8					
Phs Duration (G+Y+Rc), s	36.1		17.0		36.1		17.0					
Change Period (Y+Rc), s	7.2		7.2		7.2		7.2					
Max Green Setting (Gmax), s	34.8		24.8		69.8		15.0					
Max Q Clear Time (g_c+I1), s	22.3		8.7		21.8		0.0					
Green Ext Time (p_c), s	1.2		0.6		7.1		0.0					
Intersection Summary												
HCM 6th Ctrl Delay, s/veh			12.1									
HCM 6th LOS			B									

HCM 6th Signalized Intersection Summary 37: I-5 SB onramp/I-5 SB offramp & 93rd Ave SW

Existing
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↗	↖	↑						↖	↗
Traffic Volume (veh/h)	0	194	51	163	124	0	0	0	0	379	0	460
Future Volume (veh/h)	0	194	51	163	124	0	0	0	0	379	0	460
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		0.98
Parking Bus, Adj	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	
Adj Sat Flow, veh/h/ln	0	1826	1826	1826	1826	0				1826	1899	1826
Adj Flow Rate, veh/h	0	220	15	185	141	0				431	0	186
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88				0.88	0.88	0.88
Percent Heavy Veh, %	0	5	5	5	5	0				5	5	5
Cap, veh/h	0	544	461	560	912	0				574	0	481
Arrive On Green	0.00	0.30	0.30	0.11	0.50	0.00				0.32	0.00	0.32
Sat Flow, veh/h	0	1826	1547	1739	1826	0				1809	0	1513
Grp Volume(v), veh/h	0	220	15	185	141	0				431	0	186
Grp Sat Flow(s),veh/h/ln	0	1826	1547	1739	1826	0				1809	0	1513
Q Serve(g_s), s	0.0	4.8	0.3	3.3	2.1	0.0				10.7	0.0	4.8
Cycle Q Clear(g_c), s	0.0	4.8	0.3	3.3	2.1	0.0				10.7	0.0	4.8
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	544	461	560	912	0				574	0	481
V/C Ratio(X)	0.00	0.40	0.03	0.33	0.15	0.00				0.75	0.00	0.39
Avail Cap(c_a), veh/h	0	1451	1230	1060	1451	0				1437	0	1202
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	14.1	12.5	9.1	6.8	0.0				15.4	0.0	13.4
Incr Delay (d2), s/veh	0.0	0.5	0.0	0.3	0.1	0.0				2.0	0.0	0.5
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	1.7	0.1	1.0	0.6	0.0				3.7	0.0	1.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.0	14.6	12.6	9.5	6.9	0.0				17.4	0.0	13.9
LnGrp LOS		B	B	A	A					B		B
Approach Vol, veh/h		235			326						617	
Approach Delay, s/veh		14.5			8.4						16.3	
Approach LOS		B			A						B	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	10.1	19.6		20.6		29.7						
Change Period (Y+Rc), s	4.6	4.6		4.6		4.6						
Max Green Setting (Gmax), s	20.0	40.0		40.0		40.0						
Max Q Clear Time (g_c+I), s	15.3	6.8		12.7		4.1						
Green Ext Time (p_c), s	0.4	1.3		3.2		0.7						
Intersection Summary												
HCM 6th Ctrl Delay, s/veh			13.8									
HCM 6th LOS			B									

HCM 6th Signalized Intersection Summary 38: I-5 NB offramp/I-5 NB onramp & 93rd Ave SW

Existing
 PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	137	448	0	0	244	354	19	0	92	0	0	0
Future Volume (veh/h)	137	448	0	0	244	354	19	0	92	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.98			
Parking Bus, Adj	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					
Adj Sat Flow, veh/h/ln	1826	1826	0	0	1826	1826	1826	1899	1826			
Adj Flow Rate, veh/h	154	503	0	0	274	0	21	0	11			
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89			
Percent Heavy Veh, %	5	5	0	0	5	5	5	5	5			
Cap, veh/h	738	1170	0	0	619		85	0	71			
Arrive On Green	0.15	0.64	0.00	0.00	0.34	0.00	0.05	0.00	0.05			
Sat Flow, veh/h	1739	1826	0	0	1826	1547	1809	0	1511			
Grp Volume(v), veh/h	154	503	0	0	274	0	21	0	11			
Grp Sat Flow(s),veh/h/ln	1739	1826	0	0	1826	1547	1809	0	1511			
Q Serve(g_s), s	1.3	4.0	0.0	0.0	3.4	0.0	0.3	0.0	0.2			
Cycle Q Clear(g_c), s	1.3	4.0	0.0	0.0	3.4	0.0	0.3	0.0	0.2			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	738	1170	0	0	619		85	0	71			
V/C Ratio(X)	0.21	0.43	0.00	0.00	0.44		0.25	0.00	0.16			
Avail Cap(c_a), veh/h	1664	2477	0	0	2477		2454	0	2050			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	3.8	2.6	0.0	0.0	7.6	0.0	13.5	0.0	13.5			
Incr Delay (d2), s/veh	0.1	0.1	0.0	0.0	0.2	0.0	0.6	0.0	0.4			
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.1	0.0	0.0	0.0	0.7	0.0	0.1	0.0	0.1			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	4.0	2.7	0.0	0.0	7.8	0.0	14.1	0.0	13.9			
LnGrp LOS	A	A			A		B		B			
Approach Vol, veh/h	657			274			32					
Approach Delay, s/veh	3.0			7.8			14.0					
Approach LOS	A			A			B					
Timer - Assigned Phs	2			5			6			8		
Phs Duration (G+Y+Rc), s	23.5			8.9			14.6			6.0		
Change Period (Y+Rc), s	4.6			4.6			4.6			4.6		
Max Green Setting (Gmax), s	40.0			20.0			40.0			40.0		
Max Q Clear Time (g_c+I1), s	6.0			3.3			5.4			2.3		
Green Ext Time (p_c), s	0.9			0.3			0.5			0.0		

Intersection Summary

HCM 6th Ctrl Delay, s/veh	4.7
HCM 6th LOS	A

Notes

User approved changes to right turn type.

Unsignalized Delay for [WBR] is excluded from calculations of the approach delay and intersection delay.

HCM 6th TWSC
39: Tilley Rd S & 93rd Ave SE

Existing
PM Peak Hour

Intersection						
Int Delay, s/veh	15					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	308	157	104	310	166	76
Future Vol, veh/h	308	157	104	310	166	76
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	92	92	92	92	92	92
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	335	171	113	337	180	83
Major/Minor	Major1	Major2		Minor1		
Conflicting Flow All	0	0	506	0	984	421
Stage 1	-	-	-	-	421	-
Stage 2	-	-	-	-	563	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	1059	-	275	632
Stage 1	-	-	-	-	662	-
Stage 2	-	-	-	-	570	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	1059	-	239	632
Mov Cap-2 Maneuver	-	-	-	-	239	-
Stage 1	-	-	-	-	662	-
Stage 2	-	-	-	-	495	-
Approach	EB	WB		NB		
HCM Control Delay, s/v	0	2.2		65.5		
HCM LOS	F					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	297	-	-	1059	-	
HCM Lane V/C Ratio	0.886	-	-	0.107	-	
HCM Control Delay (s/veh)	65.5	-	-	8.8	0	
HCM Lane LOS	F	-	-	A	A	
HCM 95th %tile Q (veh)	8	-	-	0.4	-	

HCM 6th TWSC
40: 93rd Ave SE & Old Hwy 99 SE

Existing
PM Peak Hour

Intersection						
Int Delay, s/veh	6.6					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↘	↑	↘	↗
Traffic Vol, veh/h	604	47	99	277	58	200
Future Vol, veh/h	604	47	99	277	58	200
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	435	400	-	220	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	728	57	119	334	70	241
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	785	0	1300	728
Stage 1	-	-	-	-	728	-
Stage 2	-	-	-	-	572	-
Critical Hdwy	-	-	4.11	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	-	-	2.209	-	3.509	3.309
Pot Cap-1 Maneuver	-	-	838	-	179	425
Stage 1	-	-	-	-	480	-
Stage 2	-	-	-	-	567	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	838	-	154	425
Mov Cap-2 Maneuver	-	-	-	-	154	-
Stage 1	-	-	-	-	480	-
Stage 2	-	-	-	-	486	-
Approach	EB		WB		NB	
HCM Control Delay, s/v	0		2.6		29.1	
HCM LOS	D					
Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	154	425	-	-	838	-
HCM Lane V/C Ratio	0.454	0.567	-	-	0.142	-
HCM Control Delay (s/veh)	46.5	24	-	-	10	-
HCM Lane LOS	E	C	-	-	B	-
HCM 95th %tile Q (veh)	2.1	3.4	-	-	0.5	-

Future (2045) Baseline

HCM Signalized Intersection Capacity Analysis

1: Crosby Blvd SW & Mottman Rd SW

2045 Baseline

PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	96	285	19	0	20	40	32	418	130	50	530	280
Future Volume (vph)	96	285	19	0	20	40	32	418	130	50	530	280
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	16
Total Lost time (s)	5.0	5.0			5.0		5.0	5.0	5.0	5.0	5.0	5.0
Lane Util. Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00	0.95	1.00
Frpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	0.99			0.91		1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00			1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1752	1826			1680		1752	1845	1568	1752	3505	1777
Flt Permitted	0.95	1.00			1.00		0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1752	1826			1680		1752	1845	1568	1752	3505	1777
Peak-hour factor, PHF	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78	0.78
Adj. Flow (vph)	123	365	24	0	26	51	41	536	167	64	679	359
RTOR Reduction (vph)	0	2	0	0	48	0	0	0	90	0	0	139
Lane Group Flow (vph)	123	387	0	0	29	0	41	536	77	64	679	220
Confl. Peds. (#/hr)			5	5								
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	Split	NA			NA		Prot	NA	Perm	Prot	NA	Perm
Protected Phases	3	3		4	4		1	6		5	2	
Permitted Phases									6			2
Actuated Green, G (s)	24.0	24.0			6.0		3.1	32.6	32.6	5.1	34.6	34.6
Effective Green, g (s)	24.0	24.0			6.0		3.1	32.6	32.6	5.1	34.6	34.6
Actuated g/C Ratio	0.27	0.27			0.07		0.04	0.37	0.37	0.06	0.39	0.39
Clearance Time (s)	5.0	5.0			5.0		5.0	5.0	5.0	5.0	5.0	5.0
Vehicle Extension (s)	3.5	3.5			2.5		2.5	2.5	2.5	2.5	2.5	2.5
Lane Grp Cap (vph)	479	499			114		61	685	582	101	1382	701
v/s Ratio Prot	0.07	c0.21			c0.02		0.02	c0.29		c0.04	0.19	
v/s Ratio Perm									0.05			0.12
v/c Ratio	0.26	0.78			0.26		0.67	0.78	0.13	0.63	0.49	0.31
Uniform Delay, d1	24.9	29.4			38.7		41.8	24.4	18.2	40.4	19.9	18.3
Progression Factor	1.00	1.00			1.00		1.00	1.00	1.00	1.00	1.00	1.00
Incremental Delay, d2	0.3	7.6			0.9		23.3	5.6	0.1	10.8	0.2	0.2
Delay (s)	25.2	37.0			39.6		65.1	30.0	18.3	51.2	20.1	18.5
Level of Service	C	D			D		E	C	B	D	C	B
Approach Delay (s/veh)		34.2			39.6			29.3			21.4	
Approach LOS		C			D			C			C	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			27.1									
HCM 2000 Volume to Capacity ratio			0.72									
Actuated Cycle Length (s)			87.7									
Intersection Capacity Utilization			54.6%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

2: Crosby Blvd SW & Irving St SW

2045 Baseline

PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	69	2	69	3	20	127	1	347	32	158	379	3
Future Volume (vph)	69	2	69	3	20	127	1	347	32	158	379	3
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	12	12	12	12	12	12	12	12	12	12	14
Total Lost time (s)		5.0	5.0		5.0	5.0	5.0	5.0		5.0	5.0	5.0
Lane Util. Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frpb, ped/bikes		1.00	0.97		1.00	0.99	1.00	1.00		1.00	1.00	0.97
Flpb, ped/bikes		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Frt		1.00	0.85		1.00	0.85	1.00	0.99		1.00	1.00	0.85
Flt Protected		0.95	1.00		0.99	1.00	0.95	1.00		0.95	1.00	1.00
Satd. Flow (prot)		1752	1518		1833	1557	1746	1817		1751	1845	1626
Flt Permitted		0.71	1.00		0.96	1.00	0.51	1.00		0.28	1.00	1.00
Satd. Flow (perm)		1309	1518		1770	1557	936	1817		509	1845	1626
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	79	2	79	3	23	146	1	399	37	182	436	3
RTOR Reduction (vph)	0	0	67	0	0	93	0	3	0	0	0	1
Lane Group Flow (vph)	0	81	12	0	26	53	1	433	0	182	436	2
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)	2		2	2		2	2		2	2		2
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	pm+pt	NA	Perm	Perm	NA	pm+ov	Perm	NA		pm+pt	NA	Perm
Protected Phases	3	8			4	5		6		5	2	
Permitted Phases	8		8	4		4	6			2		2
Actuated Green, G (s)		8.2	8.2		8.2	19.7	19.2	19.2		35.7	35.7	35.7
Effective Green, g (s)		8.2	8.2		8.2	19.7	19.2	19.2		35.7	35.7	35.7
Actuated g/C Ratio		0.15	0.15		0.15	0.37	0.36	0.36		0.66	0.66	0.66
Clearance Time (s)		5.0	5.0		5.0	5.0	5.0	5.0		5.0	5.0	5.0
Vehicle Extension (s)		2.5	2.5		2.5	2.5	2.5	2.5		2.5	2.5	2.5
Lane Grp Cap (vph)		199	230		269	713	333	647		602	1222	1076
v/s Ratio Prot						0.02		c0.24		0.06	c0.24	
v/s Ratio Perm		c0.06	0.01		0.01	0.02	0.00			0.14		0.00
v/c Ratio		0.41	0.05		0.10	0.07	0.00	0.67		0.30	0.36	0.00
Uniform Delay, d1		20.7	19.5		19.7	11.2	11.2	14.7		4.8	4.0	3.1
Progression Factor		1.00	1.00		1.00	1.00	1.00	1.00		1.00	1.00	1.00
Incremental Delay, d2		1.0	0.1		0.1	0.0	0.0	2.4		0.2	0.1	0.0
Delay (s)		21.6	19.6		19.8	11.2	11.2	17.0		5.1	4.2	3.1
Level of Service		C	B		B	B	B	B		A	A	A
Approach Delay (s/veh)		20.6			12.5			17.0			4.4	
Approach LOS		C			B			B			A	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			11.2									
HCM 2000 Volume to Capacity ratio			0.62									
Actuated Cycle Length (s)			53.9									
Intersection Capacity Utilization			52.8%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

3: Sunset Way SE & Capitol Blvd SE & Carlyon Ave SE

2045 Baseline
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	300	60	0	0	59	21	17	3	0	20	10	670
Future Volume (vph)	300	60	0	0	59	21	17	3	0	20	10	670
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	10	12	12	11	12	12	16	12	9	9	12
Total Lost time (s)	6.0	6.0			6.0			6.0			6.0	6.0
Lane Util. Factor	0.95	0.95			1.00			1.00			1.00	0.88
Frpb, ped/bikes	1.00	1.00			0.99			1.00			1.00	1.00
Flpb, ped/bikes	1.00	1.00			1.00			1.00			1.00	1.00
Frt	1.00	1.00			0.96			1.00			1.00	0.85
Flt Protected	0.95	0.97			1.00			0.96			0.97	1.00
Satd. Flow (prot)	1681	1598			1721			2025			1616	2787
Flt Permitted	0.95	0.97			1.00			0.96			1.00	1.00
Satd. Flow (perm)	1681	1598			1721			2025			1670	2787
Peak-hour factor, PHF	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79	0.79
Adj. Flow (vph)	380	76	0	0	75	27	22	4	0	25	13	848
RTOR Reduction (vph)	0	0	0	0	15	0	0	0	0	0	0	0
Lane Group Flow (vph)	228	228	0	0	87	0	0	26	0	0	38	848
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)	2		2	2		2	2		2	2		2
Turn Type	Split	NA			NA		Split	NA		Perm	NA	custom
Protected Phases	4	4		1	1		2	2			3	8
Permitted Phases										3		
Actuated Green, G (s)	31.2	31.2			5.8			4.9			1.8	39.0
Effective Green, g (s)	31.2	31.2			5.8			4.9			1.8	39.0
Actuated g/C Ratio	0.46	0.46			0.09			0.07			0.03	0.58
Clearance Time (s)	6.0	6.0			6.0			6.0			6.0	6.0
Vehicle Extension (s)	5.0	5.0			5.0			5.0			5.0	5.0
Lane Grp Cap (vph)	774	736			147			146			44	1605
v/s Ratio Prot	0.14	0.14			c0.05			c0.01				c0.30
v/s Ratio Perm											0.02	
v/c Ratio	0.29	0.31			0.59			0.18			0.86	0.53
Uniform Delay, d1	11.4	11.5			29.8			29.5			32.8	8.7
Progression Factor	1.00	1.00			1.00			1.00			1.00	1.00
Incremental Delay, d2	0.4	0.5			9.4			1.2			89.7	0.6
Delay (s)	11.8	12.0			39.2			30.7			122.5	9.3
Level of Service	B	B			D			C			F	A
Approach Delay (s/veh)		11.9			39.2			30.7			14.2	
Approach LOS		B			D			C			B	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			15.5									
HCM 2000 Volume to Capacity ratio			0.57									
Actuated Cycle Length (s)			67.7									
Intersection Capacity Utilization			50.4%									
Analysis Period (min)			15									
c Critical Lane Group												

HCM Signalized Intersection Capacity Analysis

4: North 2nd Ave SW & Custer Way SW

2045 Baseline
PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (vph)	160	190	10	100	1010	240
Future Volume (vph)	160	190	10	100	1010	240
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900
Lane Width	12	12	11	12	11	12
Total Lost time (s)	6.0	6.0	6.2		6.0	6.0
Lane Util. Factor	1.00	1.00	1.00		0.95	0.95
Frpb, ped/bikes	1.00	1.00	0.98		1.00	1.00
Flpb, ped/bikes	1.00	1.00	1.00		1.00	1.00
Frt	1.00	0.85	0.88		1.00	1.00
Flt Protected	0.95	1.00	1.00		0.95	0.97
Satd. Flow (prot)	1787	1599	1560		1641	1733
Flt Permitted	0.95	1.00	1.00		0.95	0.97
Satd. Flow (perm)	1787	1599	1560		1641	1733
Peak-hour factor, PHF	0.87	0.87	0.87	0.87	0.87	0.87
Adj. Flow (vph)	184	218	11	115	1161	276
RTOR Reduction (vph)	0	190	103	0	0	0
Lane Group Flow (vph)	184	28	23	0	708	729
Confl. Peds. (#/hr)	6			5	5	
Confl. Bikes (#/hr)	2			2	2	
Heavy Vehicles (%)	1%	1%	1%	1%	1%	1%
Turn Type	Prot	Prot	NA		Split	NA
Protected Phases	3	3	2		1	1
Permitted Phases						
Actuated Green, G (s)	13.2	13.2	11.1		53.0	53.0
Effective Green, g (s)	13.2	13.2	11.1		53.0	53.0
Actuated g/C Ratio	0.13	0.13	0.11		0.52	0.52
Clearance Time (s)	6.0	6.0	6.2		6.0	6.0
Vehicle Extension (s)	6.0	6.0	6.0		3.0	3.0
Lane Grp Cap (vph)	230	206	169		849	896
v/s Ratio Prot	c0.10	0.02	c0.02		c0.43	0.42
v/s Ratio Perm						
v/c Ratio	0.80	0.14	0.14		0.83	0.81
Uniform Delay, d1	43.3	39.5	41.3		21.0	20.6
Progression Factor	1.00	1.00	1.00		1.00	1.00
Incremental Delay, d2	20.8	0.9	1.1		7.1	5.7
Delay (s)	64.2	40.4	42.4		28.0	26.3
Level of Service	E	D	D		C	C
Approach Delay (s/veh)	51.3		42.4			27.2
Approach LOS	D		D			C
Intersection Summary						
HCM 2000 Control Delay (s/veh)			33.1		HCM 2000 Level of Service	C
HCM 2000 Volume to Capacity ratio			0.69			
Actuated Cycle Length (s)			102.4		Sum of lost time (s)	21.4
Intersection Capacity Utilization			59.8%		ICU Level of Service	B
Analysis Period (min)			15			
c Critical Lane Group						

MOVEMENT SUMMARY

 **Site: 24 [5: Custer Way SW & Boston St SW (Site Folder: Tumwater)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Custer Way SW & Boston St SW
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]		[Total HV]					[Veh. veh	Dist]				
			veh/h	%	veh/h	%	v/c	sec			ft				mph
South: Boston St SW															
18	R2	All MCs	172	1.0	172	1.0	0.301	5.3	LOS A	1.3	32.1	0.68	0.74	0.68	23.5
Approach			172	1.0	172	1.0	0.301	5.3	LOS A	1.3	32.1	0.68	0.74	0.68	23.5
East: Custer Way															
1	L2	All MCs	551	1.0	551	1.0	0.703	5.5	LOS A	0.0	0.0	0.00	0.43	0.00	23.8
6	T1	All MCs	334	1.0	334	1.0	0.703	0.9	LOS A	0.0	0.0	0.00	0.43	0.00	24.0
16	R2	All MCs	1	1.0	1	1.0	0.703	2.4	LOS A	0.0	0.0	0.00	0.43	0.00	22.1
Approach			886	1.0	886	1.0	0.703	3.7	LOS A	0.0	0.0	0.00	0.43	0.00	23.9
North: Boston St SW															
7	L2	All MCs	1	1.0	1	1.0	0.005	5.8	LOS A	0.0	0.7	0.66	0.44	0.66	20.5
4	T1	All MCs	1	1.0	1	1.0	0.005	5.3	LOS A	0.0	0.7	0.66	0.44	0.66	20.5
14	R2	All MCs	1	1.0	1	1.0	0.005	5.3	LOS A	0.0	0.7	0.66	0.44	0.66	20.5
Approach			3	1.0	3	1.0	0.005	5.5	LOS A	0.0	0.7	0.66	0.44	0.66	20.5
West: Custer Way															
2	T1	All MCs	1000	1.0	1000	1.0	0.604	6.8	LOS A	5.6	141.6	0.77	0.75	0.96	23.2
12	R2	All MCs	195	1.0	195	1.0	0.604	6.8	LOS A	5.6	141.6	0.77	0.73	0.93	23.3
Approach			1195	1.0	1195	1.0	0.604	6.8	LOS A	5.6	141.6	0.77	0.74	0.95	23.2
All Vehicles			2257	1.0	2257	1.0	0.703	5.5	LOS A	5.6	141.6	0.46	0.62	0.56	23.5

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 Site: 24 [6: Custer Way SW & Capitol Blvd (Site Folder: Tumwater)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Custer Way SW & Capitol Blvd
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh. veh	Dist]				
			veh/h		veh/h			v/c	sec		ft				mph
South: Capitol Blvd															
3	L2	All MCs	22	1.0	22	1.0	0.459	13.9	LOS B	2.4	60.5	0.76	0.85	0.89	26.3
8	T1	All MCs	225	1.0	225	1.0	0.459	8.1	LOS A	2.4	60.5	0.76	0.85	0.89	28.1
18	R2	All MCs	539	1.0	539	1.0	0.740	10.3	LOS B	6.0	152.4	0.88	1.01	1.24	25.7
Approach			787	1.0	787	1.0	0.740	9.8	LOS A	6.0	152.4	0.84	0.96	1.13	26.1
East: Custer Way															
1	L2	All MCs	381	1.0	381	1.0	0.388	7.5	LOS A	2.5	63.8	0.61	0.62	0.61	25.6
6	T1	All MCs	639	1.0	639	1.0	0.529	2.1	LOS A	4.2	105.3	0.67	0.32	0.67	23.8
16	R2	All MCs	2	1.0	2	1.0	0.529	2.6	LOS A	4.2	105.3	0.67	0.32	0.67	23.3
Approach			1022	1.0	1022	1.0	0.529	4.1	LOS A	4.2	105.3	0.65	0.43	0.65	24.5
North: Capitol Blvd															
7	L2	All MCs	12	1.0	12	1.0	0.360	11.2	LOS B	1.8	44.6	0.72	0.78	0.77	22.8
4	T1	All MCs	302	1.0	302	1.0	0.360	6.2	LOS A	1.8	46.5	0.72	0.77	0.77	29.3
14	R2	All MCs	180	1.0	180	1.0	0.360	5.7	LOS A	1.8	46.5	0.72	0.76	0.76	23.1
Approach			494	1.0	494	1.0	0.360	6.1	LOS A	1.8	46.5	0.72	0.77	0.76	26.5
West: Custer Way															
5	L2	All MCs	101	1.0	101	1.0	0.665	11.1	LOS B	5.5	138.5	0.79	0.85	1.04	12.8
2	T1	All MCs	899	1.0	899	1.0	0.665	6.6	LOS A	5.5	138.5	0.79	0.85	1.04	23.2
12	R2	All MCs	124	1.0	124	1.0	0.665	7.4	LOS A	5.4	135.3	0.79	0.85	1.05	26.2
Approach			1124	1.0	1124	1.0	0.665	7.1	LOS A	5.5	138.5	0.79	0.85	1.04	22.5
All Vehicles			3427	1.0	3427	1.0	0.740	6.7	LOS A	6.0	152.4	0.75	0.74	0.91	24.2

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\TC-Projects\2024\TC24-0105_Tumwater Transportation Master Plan and Impact Fees\Analysis\Operation Analysis\2050\Sidra\2050.sip9

MOVEMENT SUMMARY

 Site: 24 [7: Custer Way/North St & Cleveland Ave (Site Folder: Tumwater)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Custer Way/North St & Cleveland Ave
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh. veh	Dist]				
			veh/h		veh/h			v/c	sec		ft				mph
South: Cleveland Ave															
3	L2	All MCs	731	1.0	731	1.0	0.870	22.1	LOS D	13.9	350.8	1.00	1.16	1.70	22.9
8	T1	All MCs	108	1.0	108	1.0	0.242	8.4	LOS A	1.1	28.2	0.66	0.69	0.66	15.1
18	R2	All MCs	11	1.0	11	1.0	0.242	8.7	LOS A	1.1	28.2	0.66	0.69	0.66	26.4
Approach			849	1.0	849	1.0	0.870	20.2	LOS C	13.9	350.8	0.95	1.10	1.55	22.1
East: North St															
1	L2	All MCs	3	1.0	3	1.0	0.257	8.4	LOS A	1.4	34.9	0.73	0.51	0.73	26.6
6	T1	All MCs	180	1.0	180	1.0	0.257	3.3	LOS A	1.4	34.9	0.73	0.51	0.73	23.7
16	R2	All MCs	65	1.0	65	1.0	0.134	5.7	LOS A	0.6	15.0	0.69	0.70	0.69	22.5
Approach			247	1.0	247	1.0	0.257	4.0	LOS A	1.4	34.9	0.72	0.56	0.72	23.5
North: Cleveland Ave															
7	L2	All MCs	140	1.0	140	1.0	0.433	15.8	LOS B	3.4	86.0	0.96	0.85	1.05	20.4
4	T1	All MCs	258	1.0	258	1.0	0.433	9.4	LOS A	3.8	94.8	0.98	0.82	1.04	26.9
14	R2	All MCs	86	1.0	86	1.0	0.433	8.9	LOS A	3.8	94.8	0.99	0.80	1.04	22.0
Approach			484	1.0	484	1.0	0.433	11.2	LOS B	3.8	94.8	0.98	0.82	1.05	23.7
West: Custer Way															
5	L2	All MCs	65	1.0	65	1.0	0.575	8.6	LOS A	3.9	98.2	0.68	0.63	0.77	13.0
2	T1	All MCs	398	1.0	398	1.0	0.575	3.9	LOS A	3.9	98.2	0.68	0.63	0.77	23.6
12	R2	All MCs	946	1.0	946	1.0	0.940	12.2	LOS D	17.6	443.6	1.00	1.27	1.63	24.7
Approach			1409	1.0	1409	1.0	0.940	9.7	LOS A	17.6	443.6	0.90	1.06	1.35	23.8
All Vehicles			2989	1.0	2989	1.0	0.940	12.4	LOS B	17.6	443.6	0.91	0.99	1.30	23.2

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\TC-Projects\2024\TC24-0105_Tumwater Transportation Master Plan and Impact Fees\Analysis\Operation Analysis\2050\Sidra\2050.sip9

Intersection

Intersection Delay, s/veh 119.7

Intersection LOS F

Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	87	593	460	30	130	140
Future Vol, veh/h	87	593	460	30	130	140
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	102	698	541	35	153	165
Number of Lanes	1	0	1	0	0	1

Approach	WB	NB	SB
Opposing Approach		SB	NB
Opposing Lanes	0	1	1
Conflicting Approach Left NB			WB
Conflicting Lanes Left	1	0	1
Conflicting Approach Right SB		WB	
Conflicting Lanes Right	1	1	0
HCM Control Delay, s/veh 86.2		80.2	23.9
HCM LOS	F	F	C

Lane	NBLn1	WBLn1	SBLn1
Vol Left, %	0%	13%	48%
Vol Thru, %	94%	0%	52%
Vol Right, %	6%	87%	0%
Sign Control	Stop	Stop	Stop
Traffic Vol by Lane	490	680	270
LT Vol	0	87	130
Through Vol	460	0	140
RT Vol	30	593	0
Lane Flow Rate	576	800	318
Geometry Grp	1	1	1
Degree of Util (X)	1.044	1.346	0.627
Departure Headway (Hd)	7.417	6.223	8.142
Convergence, Y/N	Yes	Yes	Yes
Cap	496	592	448
Service Time	5.417	4.223	6.142
HCM Lane V/C Ratio	1.161	1.351	0.71
HCM Control Delay, s/veh	80.2	186.2	23.9
HCM Lane LOS	F	F	C
HCM 95th-tile Q	15.2	33.7	4.2

HCM 6th TWSC
9: Black Lake Blvd SW & Black Lake Belmore Rd SW

2045 Baseline
PM Peak Hour

Intersection						
Int Delay, s/veh	17.7					
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Vol, veh/h	110	200	170	70	220	330
Future Vol, veh/h	110	200	170	70	220	330
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Stop	Stop	Free	Free	Free	Free
RT Channelized	-	None	-	None	-	None
Storage Length	0	-	-	-	200	-
Veh in Median Storage, #	0	-	0	-	-	0
Grade, %	0	-	0	-	-	0
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	122	222	189	78	244	367

Major/Minor	Minor1	Major1	Major2		
Conflicting Flow All	1083	228	0	0	267
Stage 1	228	-	-	-	-
Stage 2	855	-	-	-	-
Critical Hdwy	6.41	6.21	-	-	4.11
Critical Hdwy Stg 1	5.41	-	-	-	-
Critical Hdwy Stg 2	5.41	-	-	-	-
Follow-up Hdwy	3.509	3.309	-	-	2.209
Pot Cap-1 Maneuver	241	814	-	-	1303
Stage 1	812	-	-	-	-
Stage 2	418	-	-	-	-
Platoon blocked, %			-	-	-
Mov Cap-1 Maneuver	196	814	-	-	1303
Mov Cap-2 Maneuver	196	-	-	-	-
Stage 1	812	-	-	-	-
Stage 2	340	-	-	-	-

Approach	WB	NB	SB
HCM Control Delay, s/v	56.9	0	3.4
HCM LOS	F		

Minor Lane/Major Mvmt	NBT	NBRWBLn1	SBL	SBT
Capacity (veh/h)	-	-	384	1303
HCM Lane V/C Ratio	-	-	0.897	0.188
HCM Control Delay (s/veh)	-	-	56.9	8.4
HCM Lane LOS	-	-	F	A
HCM 95th %tile Q (veh)	-	-	9.2	0.7

HCM 6th Signalized Intersection Summary

10: Capitol Blvd SE & E St/Tumwater Valley Dr SE

2045 Baseline
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	110	0	180	0	0	0	150	430	0	0	520	20
Future Volume (veh/h)	110	0	180	0	0	0	150	430	0	0	520	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		1.00	1.00		1.00	1.00		1.00	1.00		0.96
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	1885	1885	1885	1885	1885	1961	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	121	0	0	0	0	0	165	473	0	0	571	18
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	384	0		0	276		210	1974	0	4	1010	32
Arrive On Green	0.15	0.00	0.00	0.00	0.00	0.00	0.12	0.55	0.00	0.00	0.29	0.29
Sat Flow, veh/h	1408	0	1598	0	1885	1662	1795	3676	0	1795	3539	111
Grp Volume(v), veh/h	121	0	0	0	0	0	165	473	0	0	289	300
Grp Sat Flow(s),veh/h/ln	1408	0	1598	0	1885	1662	1795	1791	0	1795	1791	1859
Q Serve(g_s), s	3.2	0.0	0.0	0.0	0.0	0.0	3.6	2.8	0.0	0.0	5.5	5.6
Cycle Q Clear(g_c), s	3.2	0.0	0.0	0.0	0.0	0.0	3.6	2.8	0.0	0.0	5.5	5.6
Prop In Lane	1.00		1.00	0.00		1.00	1.00		0.00	1.00		0.06
Lane Grp Cap(c), veh/h	384	0		0	276		210	1974	0	4	511	530
V/C Ratio(X)	0.31	0.00		0.00	0.00		0.79	0.24	0.00	0.00	0.57	0.57
Avail Cap(c_a), veh/h	1048	0		0	1164		223	1974	0	223	973	1010
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	0.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	16.1	0.0	0.0	0.0	0.0	0.0	17.3	4.7	0.0	0.0	12.3	12.3
Incr Delay (d2), s/veh	0.5	0.0	0.0	0.0	0.0	0.0	15.9	0.1	0.0	0.0	1.0	1.0
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	1.0	0.0	0.0	0.0	0.0	0.0	2.2	0.5	0.0	0.0	1.8	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	16.5	0.0	0.0	0.0	0.0	0.0	33.3	4.7	0.0	0.0	13.3	13.2
LnGrp LOS	B						C	A			B	B
Approach Vol, veh/h		121			0			638			589	
Approach Delay, s/veh		16.5			0.0			12.1			13.2	
Approach LOS		B						B			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	0.0	28.3		12.0	10.7	17.6		12.0				
Change Period (Y+Rc), s	6.0	6.1		6.1	6.0	6.1		6.1				
Max Green Setting (Gmax), s	5.0	21.9		24.9	5.0	21.9		24.9				
Max Q Clear Time (g_c+I1), s	0.0	4.8		5.2	5.6	7.6		0.0				
Green Ext Time (p_c), s	0.0	2.8		0.6	0.0	3.0		0.0				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh			13.0									
HCM 6th LOS			B									
Notes												
Unsignalized Delay for [EBR, WBR] is excluded from calculations of the approach delay and intersection delay.												

HCM 6th TWSC
11: Parking lot/S 7th Ave & Linwood Ave SW

2045 Baseline
PM Peak Hour

Intersection												
Int Delay, s/veh	17.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↕			↕			↕			↕	
Traffic Vol, veh/h	20	150	0	0	300	290	0	0	0	270	0	10
Future Vol, veh/h	20	150	0	0	300	290	0	0	0	270	0	10
Conflicting Peds, #/hr	5	0	5	5	0	5	5	0	5	5	0	5
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	-	-	-	-	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	90	90	90	90	90	90	90	90	90	90	90	90
Heavy Vehicles, %	2	2	2	2	2	2	2	2	2	2	2	2
Mvmt Flow	22	167	0	0	333	322	0	0	0	300	0	11

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	660	0	0	172	0	0	721	876	177	715	715	504
Stage 1	-	-	-	-	-	-	216	216	-	499	499	-
Stage 2	-	-	-	-	-	-	505	660	-	216	216	-
Critical Hdwy	4.12	-	-	4.12	-	-	7.12	6.52	6.22	7.12	6.52	6.22
Critical Hdwy Stg 1	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.12	5.52	-	6.12	5.52	-
Follow-up Hdwy	2.218	-	-	2.218	-	-	3.518	4.018	3.318	3.518	4.018	3.318
Pot Cap-1 Maneuver	928	-	-	1405	-	-	343	287	866	346	356	568
Stage 1	-	-	-	-	-	-	786	724	-	554	544	-
Stage 2	-	-	-	-	-	-	549	460	-	786	724	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	924	-	-	1398	-	-	327	277	859	337	344	564
Mov Cap-2 Maneuver	-	-	-	-	-	-	327	277	-	337	344	-
Stage 1	-	-	-	-	-	-	762	702	-	537	542	-
Stage 2	-	-	-	-	-	-	536	458	-	763	702	-

Approach	EB	WB	NB	SB
HCM Control Delay, s/v	1.1	0	0	63.9
HCM LOS			A	F

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	-	924	-	-	1398	-	-	342
HCM Lane V/C Ratio	-	0.024	-	-	-	-	-	0.91
HCM Control Delay (s/veh)	0	9	0	-	0	-	-	63.9
HCM Lane LOS	A	A	A	-	A	-	-	F
HCM 95th %tile Q (veh)	-	0.1	-	-	0	-	-	9

MOVEMENT SUMMARY

 **Site: 24 [12: 2nd Ave & Linwood Ave (Site Folder: Tumwater)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

2nd Ave & Linwood Ave
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]		[Total HV]					[Veh. veh	Dist]				
			veh/h	%	veh/h	%	v/c	sec		veh	ft				mph
South: 2nd Ave															
3	L2	All MCs	253	1.0	253	1.0	0.638	11.5	LOS B	6.0	152.3	0.78	0.74	0.90	24.6
8	T1	All MCs	165	1.0	165	1.0	0.638	6.2	LOS A	6.0	152.3	0.78	0.74	0.90	14.1
18	R2	All MCs	176	1.0	176	1.0	0.638	6.7	LOS A	6.0	152.3	0.78	0.74	0.90	24.7
Approach			593	1.0	593	1.0	0.638	8.6	LOS A	6.0	152.3	0.78	0.74	0.90	21.7
East: Linwood Ave															
1	L2	All MCs	176	1.0	176	1.0	0.493	8.7	LOS A	3.6	91.7	0.73	0.64	0.77	24.9
6	T1	All MCs	253	1.0	253	1.0	0.493	3.7	LOS A	3.6	91.7	0.73	0.64	0.77	23.4
16	R2	All MCs	1	1.0	1	1.0	0.493	4.6	LOS A	3.6	91.7	0.73	0.64	0.77	15.2
Approach			430	1.0	430	1.0	0.493	5.8	LOS A	3.6	91.7	0.73	0.64	0.77	23.9
North: 2nd Ave															
7	L2	All MCs	88	1.0	88	1.0	0.560	14.2	LOS B	4.7	119.2	0.85	0.84	1.04	24.2
4	T1	All MCs	197	1.0	197	1.0	0.560	8.9	LOS A	4.7	119.2	0.85	0.84	1.04	26.4
14	R2	All MCs	122	1.0	122	1.0	0.560	9.4	LOS A	4.7	119.2	0.85	0.84	1.04	24.3
Approach			407	1.0	407	1.0	0.560	10.2	LOS B	4.7	119.2	0.85	0.84	1.04	25.2
West: Linwood Ave															
5	L2	All MCs	22	1.0	22	1.0	0.538	9.5	LOS A	4.2	106.3	0.74	0.65	0.82	12.8
2	T1	All MCs	275	1.0	275	1.0	0.538	4.5	LOS A	4.2	106.3	0.74	0.65	0.82	23.6
12	R2	All MCs	176	1.0	176	1.0	0.538	5.3	LOS A	4.2	106.3	0.74	0.65	0.82	25.4
Approach			473	1.0	473	1.0	0.538	5.0	LOS A	4.2	106.3	0.74	0.65	0.82	23.7
All Vehicles			1902	1.0	1902	1.0	0.638	7.4	LOS A	6.0	152.3	0.77	0.72	0.88	23.4

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\TC-Projects\2024\TC24-0105_Tumwater Transportation Master Plan and Impact Fees\Analysis\Operation Analysis\2050\Sidra\2050.sip9

HCM 6th Signalized Intersection Summary
13: Capitol Blvd SE & Linwood Ave SW/Parking Lot

2045 Baseline
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	280	0	160	0	0	0	140	390	0	0	580	270
Future Volume (veh/h)	280	0	160	0	0	0	140	390	0	0	580	270
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.99		0.97	1.00		1.00	1.00		1.00	1.00		0.97
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	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	286	0	61	0	0	0	143	398	0	0	592	211
Peak Hour Factor	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	537	0	344	141	419	0	384	1917	0	475	855	304
Arrive On Green	0.22	0.00	0.22	0.00	0.00	0.00	0.08	0.54	0.00	0.00	0.33	0.33
Sat Flow, veh/h	1783	0	1549	1352	1885	0	1795	3676	0	1795	2566	913
Grp Volume(v), veh/h	286	0	61	0	0	0	143	398	0	0	413	390
Grp Sat Flow(s),veh/h/ln	1783	0	1549	1352	1885	0	1795	1791	0	1795	1791	1688
Q Serve(g_s), s	7.6	0.0	1.6	0.0	0.0	0.0	2.4	3.0	0.0	0.0	10.2	10.3
Cycle Q Clear(g_c), s	7.6	0.0	1.6	0.0	0.0	0.0	2.4	3.0	0.0	0.0	10.2	10.3
Prop In Lane	1.00		1.00	1.00		0.00	1.00		0.00	1.00		0.54
Lane Grp Cap(c), veh/h	537	0	344	141	419	0	384	1917	0	475	596	562
V/C Ratio(X)	0.53	0.00	0.18	0.00	0.00	0.00	0.37	0.21	0.00	0.00	0.69	0.69
Avail Cap(c_a), veh/h	1355	0	1054	761	1283	0	582	3139	0	648	1394	1314
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	1.00	0.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00
Uniform Delay (d), s/veh	18.4	0.0	16.1	0.0	0.0	0.0	10.0	6.2	0.0	0.0	14.8	14.8
Incr Delay (d2), s/veh	0.6	0.0	0.2	0.0	0.0	0.0	0.4	0.0	0.0	0.0	1.1	1.2
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	2.9	0.0	0.5	0.0	0.0	0.0	0.8	0.8	0.0	0.0	3.6	3.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	19.0	0.0	16.3	0.0	0.0	0.0	10.5	6.2	0.0	0.0	15.9	15.9
LnGrp LOS	B		B				B	A			B	B
Approach Vol, veh/h	347			0			541			803		
Approach Delay, s/veh	18.5			0.0			7.4			15.9		
Approach LOS	B						A			B		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	0.0	33.6		17.6	10.3	23.2		17.6				
Change Period (Y+Rc), s	6.0	6.2		6.2	6.0	6.2		6.2				
Max Green Setting (Gmax), s	5.0	44.8		34.8	10.0	39.8		34.8				
Max Q Clear Time (g_c+I1), s	0.0	5.0		9.6	4.4	12.3		0.0				
Green Ext Time (p_c), s	0.0	2.2		0.9	0.1	4.4		0.0				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh				13.7								
HCM 6th LOS				B								

HCM 6th Signalized Intersection Summary

14: Henderson Blvd SE & Yelm Hwy SE

2045 Baseline
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	30	990	140	460	660	90	70	140	540	110	200	20
Future Volume (veh/h)	30	990	140	460	660	90	70	140	540	110	200	20
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.96	1.00		0.97	0.99		1.00	0.99		0.97
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	1885	1885	1885	1885	1885	1885	1885	1885	1961	1885	1885	1885
Adj Flow Rate, veh/h	32	1065	145	495	710	91	75	151	0	118	215	11
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	305	1160	158	523	2238	287	168	227		174	380	312
Arrive On Green	0.37	0.37	0.37	0.29	0.70	0.70	0.12	0.12	0.00	0.04	0.20	0.20
Sat Flow, veh/h	683	3151	428	1795	3181	407	1154	1885	1662	1795	1885	1548
Grp Volume(v), veh/h	32	604	606	495	399	402	75	151	0	118	215	11
Grp Sat Flow(s),veh/h/ln	683	1791	1789	1795	1791	1798	1154	1885	1662	1795	1885	1548
Q Serve(g_s), s	4.2	43.5	43.7	36.5	11.5	11.5	8.5	10.4	0.0	5.0	13.9	0.8
Cycle Q Clear(g_c), s	4.2	43.5	43.7	36.5	11.5	11.5	11.4	10.4	0.0	5.0	13.9	0.8
Prop In Lane	1.00		0.24	1.00		0.23	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	305	659	658	523	1260	1265	168	227		174	380	312
V/C Ratio(X)	0.11	0.92	0.92	0.95	0.32	0.32	0.45	0.67		0.68	0.57	0.04
Avail Cap(c_a), veh/h	314	683	683	544	1306	1311	264	385		174	538	442
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.3	40.8	40.8	46.9	7.6	7.6	58.7	56.9	0.0	54.6	48.6	43.4
Incr Delay (d2), s/veh	0.2	17.1	17.6	26.4	0.1	0.1	0.7	1.3	0.0	8.4	1.6	0.1
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	0.7	22.0	22.1	19.9	4.2	4.2	2.5	5.0	0.0	1.9	6.7	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	28.5	57.9	58.4	73.3	7.8	7.8	59.4	58.1	0.0	63.0	50.2	43.4
LnGrp LOS	C	E	E	E	A	A	E	E		E	D	D
Approach Vol, veh/h	1242			1296			226			344		
Approach Delay, s/veh	57.4			32.8			58.5			54.4		
Approach LOS	E			C			E			D		
Timer - Assigned Phs	2		3	4	5	6	8					
Phs Duration (G+Y+Rc), s	101.5		11.0	22.7	45.4	56.2	33.7					
Change Period (Y+Rc), s	6.4		6.0	6.4	6.0	6.4	6.4					
Max Green Setting (Gmax), s	98.6		5.0	27.6	41.0	51.6	38.6					
Max Q Clear Time (g_c+I1), s	13.5		7.0	13.4	38.5	45.7	15.9					
Green Ext Time (p_c), s	5.8		0.0	0.5	0.9	4.0	1.4					
Intersection Summary												
HCM 6th Ctrl Delay, s/veh	46.9											
HCM 6th LOS	D											

HCM 6th TWSC
15: Trosper Rd SW & Rural Rd SW

2045 Baseline
PM Peak Hour

Intersection						
Int Delay, s/veh	4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	40	150	300	140	120	80
Future Vol, veh/h	40	150	300	140	120	80
Conflicting Peds, #/hr	0	0	0	0	0	5
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	120
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	43	160	319	149	128	85
Major/Minor	Major1	Major2		Minor2		
Conflicting Flow All	468	0	-	0	640	399
Stage 1	-	-	-	-	394	-
Stage 2	-	-	-	-	246	-
Critical Hdwy	4.11	-	-	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	2.209	-	-	-	3.509	3.309
Pot Cap-1 Maneuver	1099	-	-	-	441	653
Stage 1	-	-	-	-	683	-
Stage 2	-	-	-	-	797	-
Platoon blocked, %		-	-	-		
Mov Cap-1 Maneuver	1099	-	-	-	422	650
Mov Cap-2 Maneuver	-	-	-	-	422	-
Stage 1	-	-	-	-	654	-
Stage 2	-	-	-	-	797	-
Approach	EB	WB		SB		
HCM Control Delay, s/v	1.8	0		14.9		
HCM LOS				B		
Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	1099	-	-	-	422	650
HCM Lane V/C Ratio	0.039	-	-	-	0.303	0.131
HCM Control Delay (s/veh)	8.4	0	-	-	17.2	11.4
HCM Lane LOS	A	A	-	-	C	B
HCM 95th %tile Q (veh)	0.1	-	-	-	1.3	0.4

HCM 6th Signalized Intersection Summary
16: Parking Lot/Lake Park Dr SW & Trosper Rd SW

2045 Baseline
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	0	250	0	0	400	60	0	0	0	20	0	10
Future Volume (veh/h)	0	250	0	0	400	60	0	0	0	20	0	10
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		0.97	1.00		1.00	0.97		0.96
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	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	0	263	0	0	421	57	0	0	0	21	0	6
Peak Hour Factor	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	652	2109	0	843	1110	917	212	98	0	303	0	80
Arrive On Green	0.00	0.59	0.00	0.00	0.59	0.59	0.00	0.00	0.00	0.05	0.00	0.05
Sat Flow, veh/h	1795	3676	0	1795	1885	1557	1421	1885	0	1744	0	1531
Grp Volume(v), veh/h	0	263	0	0	421	57	0	0	0	21	0	6
Grp Sat Flow(s),veh/h/ln	1795	1791	0	1795	1885	1557	1421	1885	0	1744	0	1531
Q Serve(g_s), s	0.0	1.1	0.0	0.0	4.0	0.5	0.0	0.0	0.0	0.4	0.0	0.1
Cycle Q Clear(g_c), s	0.0	1.1	0.0	0.0	4.0	0.5	0.0	0.0	0.0	0.4	0.0	0.1
Prop In Lane	1.00		0.00	1.00		1.00	1.00		0.00	1.00		1.00
Lane Grp Cap(c), veh/h	652	2109	0	843	1110	917	212	98	0	303	0	80
V/C Ratio(X)	0.00	0.12	0.00	0.00	0.38	0.06	0.00	0.00	0.00	0.07	0.00	0.08
Avail Cap(c_a), veh/h	911	3680	0	1102	1937	1600	761	827	0	977	0	672
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)	0.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	3.1	0.0	0.0	3.7	3.0	0.0	0.0	0.0	15.4	0.0	15.3
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1
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	0.0	0.2	0.0	0.0	0.7	0.1	0.0	0.0	0.0	0.1	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.0	3.1	0.0	0.0	3.8	3.0	0.0	0.0	0.0	15.5	0.0	15.5
LnGrp LOS	A			A			B			B		
Approach Vol, veh/h	263			478			0			27		
Approach Delay, s/veh	3.1			3.7			0.0			15.5		
Approach LOS	A			A			B			B		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	0.0	26.1		7.9	0.0	26.1		7.9				
Change Period (Y+Rc), s	6.0	6.1		6.1	6.0	6.1		6.1				
Max Green Setting (Gmax), s	5.0	34.9		14.9	5.0	34.9		14.9				
Max Q Clear Time (g_c+I1), s	0.0	6.0		0.0	0.0	3.1		2.4				
Green Ext Time (p_c), s	0.0	2.0		0.0	0.0	1.2		0.0				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh				3.9								
HCM 6th LOS				A								

HCM Signalized Intersection Capacity Analysis

17: Littlerock Rd SW/South 2nd Ave & Trosper Rd SW

2045 Baseline
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	40	200	110	277	254	59	204	295	381	130	290	60
Future Volume (vph)	40	200	110	277	254	59	204	295	381	130	290	60
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	12	10	12	11	11	10	12	11	10	12	11	11
Total Lost time (s)	6.0	6.0		6.0	6.0		5.6	6.0	6.0	5.6	6.0	
Lane Util. Factor	1.00	0.95		0.91	0.91		1.00	1.00	1.00	1.00	0.95	
Frpb, ped/bikes	1.00	0.99		1.00	1.00		1.00	1.00	0.99	1.00	1.00	
Flpb, ped/bikes	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Frt	1.00	0.95		1.00	0.98		1.00	1.00	0.85	1.00	0.97	
Flt Protected	0.95	1.00		0.95	0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (prot)	1752	3074		1542	3124		1752	1783	1452	1752	3290	
Flt Permitted	0.95	1.00		0.95	0.99		0.95	1.00	1.00	0.95	1.00	
Satd. Flow (perm)	1752	3074		1542	3124		1752	1783	1452	1752	3290	
Peak-hour factor, PHF	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Adj. Flow (vph)	40	202	111	280	257	60	206	298	385	131	293	61
RTOR Reduction (vph)	0	72	0	0	10	0	0	0	142	0	16	0
Lane Group Flow (vph)	40	241	0	196	391	0	206	298	243	131	338	0
Confl. Peds. (#/hr)	5		5	5		5	5		5	5		5
Confl. Bikes (#/hr)	2		2	2		2			2	2		
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	Split	NA		Split	NA		Prot	NA	pm+ov	Prot	NA	
Protected Phases	1	1		2	2		7	4		3	8	
Permitted Phases									4			
Actuated Green, G (s)	16.4	16.4		38.0	38.0		23.6	27.3	65.3	14.7	18.4	
Effective Green, g (s)	16.4	16.4		38.0	38.0		23.6	27.3	65.3	14.7	18.4	
Actuated g/C Ratio	0.14	0.14		0.32	0.32		0.20	0.23	0.54	0.12	0.15	
Clearance Time (s)	6.0	6.0		6.0	6.0		5.6	6.0	6.0	5.6	6.0	
Vehicle Extension (s)	2.5	2.5		3.0	3.0		3.0	2.5	3.0	3.0	2.5	
Lane Grp Cap (vph)	239	420		488	989		344	405	862	214	504	
v/s Ratio Prot	0.02	c0.08		c0.13	0.13		c0.12	c0.17	0.09	0.07	0.10	
v/s Ratio Perm									0.08			
v/c Ratio	0.17	0.57		0.40	0.40		0.60	0.74	0.28	0.61	0.67	
Uniform Delay, d1	45.8	48.5		32.1	32.0		43.9	43.0	14.7	49.9	47.9	
Progression Factor	1.00	1.00		1.00	1.00		1.00	1.00	1.00	1.00	1.00	
Incremental Delay, d2	0.2	1.6		2.5	1.2		2.8	6.4	0.1	5.1	3.2	
Delay (s)	46.0	50.1		34.6	33.2		46.7	49.4	14.9	55.1	51.1	
Level of Service	D	D		C	C		D	D	B	E	D	
Approach Delay (s/veh)		49.6			33.6			33.8			52.2	
Approach LOS		D			C			C			D	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			40.0			HCM 2000 Level of Service			D			
HCM 2000 Volume to Capacity ratio			0.57									
Actuated Cycle Length (s)			120.0			Sum of lost time (s)			23.6			
Intersection Capacity Utilization			79.0%			ICU Level of Service			D			
Analysis Period (min)			15									

c Critical Lane Group

HCM Signalized Intersection Capacity Analysis

18: Tyee Dr SW/I-5 SB Ramp & Trosper Rd SW

2045 Baseline
PM Peak Hour

												
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (vph)	190	560	10	190	219	181	40	140	260	351	362	367
Future Volume (vph)	190	560	10	190	219	181	40	140	260	351	362	367
Ideal Flow (vphpl)	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900	1900
Lane Width	11	12	12	11	12	16	11	11	11	13	13	16
Total Lost time (s)	4.6	4.6	4.6	4.6	4.6	4.0	4.6	4.6	4.6	4.6	4.6	4.0
Lane Util. Factor	1.00	0.95	1.00	1.00	0.95	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frpb, ped/bikes	1.00	1.00	0.97	1.00	1.00	0.98	1.00	1.00	1.00	1.00	1.00	0.99
Flpb, ped/bikes	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Frt	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85	1.00	1.00	0.85
Flt Protected	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (prot)	1694	3505	1515	1694	3505	1740	1694	1783	1516	1811	1906	1753
Flt Permitted	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00	0.95	1.00	1.00
Satd. Flow (perm)	1694	3505	1515	1694	3505	1740	1694	1783	1516	1811	1906	1753
Peak-hour factor, PHF	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98	0.98
Adj. Flow (vph)	194	571	10	194	223	185	41	143	265	358	369	374
RTOR Reduction (vph)	0	0	6	0	0	0	0	0	96	0	0	0
Lane Group Flow (vph)	194	571	4	194	223	185	41	143	169	358	369	374
Confl. Peds. (#/hr)			5	5			5					5
Confl. Bikes (#/hr)	2		2	2		2						
Heavy Vehicles (%)	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%	3%
Turn Type	Prot	NA	Perm	Prot	NA	Free	Split	NA	pt+ov	Split	NA	Free
Protected Phases	1	6		5	2		4	4	4 5	3	3	
Permitted Phases			6			Free						Free
Actuated Green, G (s)	20.8	50.3	50.3	20.9	50.4	140.0	16.6	16.6	42.1	33.8	33.8	140.0
Effective Green, g (s)	20.8	50.3	50.3	20.9	50.4	140.0	16.6	16.6	42.1	33.8	33.8	140.0
Actuated g/C Ratio	0.15	0.36	0.36	0.15	0.36	1.00	0.12	0.12	0.30	0.24	0.24	1.00
Clearance Time (s)	4.6	4.6	4.6	4.6	4.6		4.6	4.6		4.6	4.6	
Vehicle Extension (s)	3.0	2.7	2.7	3.2	3.0		3.2	3.2		3.5	3.5	
Lane Grp Cap (vph)	251	1259	544	252	1261	1740	200	211	455	437	460	1753
v/s Ratio Prot	c0.11	c0.16		0.11	0.06		0.02	c0.08	0.11	c0.20	0.19	
v/s Ratio Perm			0.00			0.11						c0.21
v/c Ratio	0.77	0.45	0.01	0.77	0.18	0.11	0.21	0.68	0.37	0.82	0.80	0.21
Uniform Delay, d1	57.3	34.3	28.8	57.2	30.6	0.0	55.7	59.1	38.5	50.2	50.0	0.0
Progression 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
Incremental Delay, d2	13.7	1.2	0.0	13.4	0.3	0.1	0.5	8.5	0.6	11.7	10.0	0.3
Delay (s)	71.1	35.5	28.8	70.6	30.9	0.1	56.3	67.6	39.1	61.9	59.9	0.3
Level of Service	E	D	C	E	C	A	E	E	D	E	E	A
Approach Delay (s/veh)		44.3			34.2			49.7			40.3	
Approach LOS		D			C			D			D	
Intersection Summary												
HCM 2000 Control Delay (s/veh)			41.6			HCM 2000 Level of Service			D			
HCM 2000 Volume to Capacity ratio			0.64									
Actuated Cycle Length (s)			140.0			Sum of lost time (s)			18.4			
Intersection Capacity Utilization			76.8%			ICU Level of Service			D			
Analysis Period (min)			15									
c Critical Lane Group												

HCM 6th Signalized Intersection Summary 19: Littlerock Rd SW & Parking Lot

2045 Baseline
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔	↔	↔	↔		↔	↔	
Traffic Volume (veh/h)	102	20	68	130	20	220	70	460	110	225	442	93
Future Volume (veh/h)	102	20	68	130	20	220	70	460	110	225	442	93
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	1.00		0.97	1.00		0.97
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	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	111	22	23	141	22	53	76	500	90	245	480	81
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	114	13	399	116	10	399	109	800	143	296	1127	189
Arrive On Green	0.26	0.26	0.26	0.26	0.26	0.26	0.06	0.27	0.27	0.16	0.37	0.37
Sat Flow, veh/h	0	50	1557	0	39	1557	1795	3018	540	1795	3054	512
Grp Volume(v), veh/h	133	0	23	163	0	53	76	296	294	245	280	281
Grp Sat Flow(s), veh/h/ln	50	0	1557	39	0	1557	1795	1791	1767	1795	1791	1775
Q Serve(g_s), s	0.0	0.0	0.6	0.0	0.0	1.5	2.4	8.4	8.5	7.7	6.8	6.9
Cycle Q Clear(g_c), s	14.9	0.0	0.6	14.9	0.0	1.5	2.4	8.4	8.5	7.7	6.8	6.9
Prop In Lane	0.83		1.00	0.87		1.00	1.00		0.31	1.00		0.29
Lane Grp Cap(c), veh/h	127	0	399	126	0	399	109	475	468	296	661	655
V/C Ratio(X)	1.05	0.00	0.06	1.30	0.00	0.13	0.70	0.62	0.63	0.83	0.42	0.43
Avail Cap(c_a), veh/h	127	0	399	126	0	399	216	645	636	340	768	761
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	27.5	0.0	16.3	27.8	0.0	16.6	26.7	18.8	18.8	23.4	13.7	13.7
Incr Delay (d2), s/veh	94.1	0.0	0.1	179.7	0.0	0.1	7.7	1.3	1.4	13.9	0.4	0.4
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	0.0	0.0	0.2	8.0	0.0	0.5	1.2	3.3	3.3	4.1	2.5	2.5
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	121.6	0.0	16.3	207.5	0.0	16.8	34.4	20.1	20.2	37.3	14.1	14.2
LnGrp LOS	F		B	F		B	C	C	C	D	B	B
Approach Vol, veh/h	156			216			666			806		
Approach Delay, s/veh	106.1			160.7			21.8			21.2		
Approach LOS	F			F			C			C		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	27.5			21.0	15.6	21.5		21.0				
Change Period (Y+Rc), s	6.0	6.1		6.1	6.0	6.1		6.1				
Max Green Setting (Gmax), s	24.9			14.9	11.0	20.9		14.9				
Max Q Clear Time (g_c+I), s	8.9			16.9	9.7	10.5		16.9				
Green Ext Time (p_c), s	0.0	3.1		0.0	0.1	2.7		0.0				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh	44.9											
HCM 6th LOS	D											

HCM 6th Signalized Intersection Summary

20: Capitol Blvd SE & Lee St SW/Lee St SE

2045 Baseline
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔	↔		↔	↔	↔	↔		↔	↔	
Traffic Volume (veh/h)	110	0	50	1	3	26	30	540	0	20	690	80
Future Volume (veh/h)	110	0	50	1	3	26	30	540	0	20	690	80
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		1.00	1.00		0.97
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	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683
Adj Flow Rate, veh/h	121	0	24	1	3	4	33	593	0	22	758	83
Peak Hour Factor	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	80	0	398	50	109	398	60	1530	0	45	1360	149
Arrive On Green	0.28	0.00	0.28	0.28	0.28	0.28	0.07	0.96	0.00	0.06	0.94	0.94
Sat Flow, veh/h	0	0	1398	0	385	1398	1603	3282	0	1603	2898	317
Grp Volume(v), veh/h	121	0	24	4	0	4	33	593	0	22	418	423
Grp Sat Flow(s), veh/h/ln	0	0	1398	385	0	1398	1603	1599	0	1603	1599	1616
Q Serve(g_s), s	0.0	0.0	1.1	0.0	0.0	0.2	1.8	1.1	0.0	1.2	3.0	3.0
Cycle Q Clear(g_c), s	25.6	0.0	1.1	25.6	0.0	0.2	1.8	1.1	0.0	1.2	3.0	3.0
Prop In Lane	1.00		1.00	0.25		1.00	1.00		0.00	1.00		0.20
Lane Grp Cap(c), veh/h	80	0	398	159	0	398	60	1530	0	45	750	758
V/C Ratio(X)	1.51	0.00	0.06	0.03	0.00	0.01	0.55	0.39	0.00	0.49	0.56	0.56
Avail Cap(c_a), veh/h	80	0	398	159	0	398	107	1530	0	107	750	758
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	2.00	2.00	2.00	2.00	2.00	2.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	0.00	1.00	1.00	1.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	45.0	0.0	23.4	25.3	0.0	23.1	40.9	1.0	0.0	41.8	1.6	1.6
Incr Delay (d2), s/veh	284.5	0.0	0.0	0.0	0.0	0.0	2.9	0.7	0.0	3.0	3.0	2.9
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	8.1	0.0	0.4	0.1	0.0	0.1	0.7	0.4	0.0	0.5	1.1	1.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	329.5	0.0	23.5	25.3	0.0	23.1	43.8	1.8	0.0	44.8	4.5	4.5
LnGrp LOS	F		C	C		C	D	A		D	A	A
Approach Vol, veh/h	145			8			626			863		
Approach Delay, s/veh	278.8			24.2			4.0			5.6		
Approach LOS	F			C			A			A		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	49.5			32.0	9.4	48.6		32.0				
Change Period (Y+Rc), s	6.0	6.4		6.4	6.0	6.4		6.4				
Max Green Setting (Gmax), s	39.6			25.6	6.0	39.6		25.6				
Max Q Clear Time (g_c+I1), s	13.2	3.1		27.6	3.8	5.0		27.6				
Green Ext Time (p_c), s	0.0	4.3		0.0	0.0	5.9		0.0				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh	29.2											
HCM 6th LOS	C											

MOVEMENT SUMMARY

 **Site: 21 [21: Littlerock Rd & Kingswood Dr (Site Folder: Tumwater)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Littlerock Rd & Kingswood Dr
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh. veh	Dist]				
			veh/h		veh/h		v/c	sec			ft				mph
South: Littlerock Rd															
8	T1	All MCs	353	1.0	353	1.0	0.355	2.3	LOS A	1.8	45.7	0.30	0.30	0.30	16.9
18	R2	All MCs	115	1.0	115	1.0	0.355	2.7	LOS A	1.8	45.7	0.30	0.30	0.30	28.4
Approach			468	1.0	468	1.0	0.355	2.4	LOS A	1.8	45.7	0.30	0.30	0.30	19.9
East: Kingswood Dr															
1	L2	All MCs	85	1.0	85	1.0	0.076	8.4	LOS A	0.4	9.3	0.44	0.62	0.44	26.4
16	R2	All MCs	170	1.0	170	1.0	0.118	3.5	LOS A	0.6	15.8	0.43	0.46	0.43	26.7
Approach			255	1.0	255	1.0	0.118	5.2	LOS A	0.6	15.8	0.43	0.51	0.43	26.6
North: Littlerock Rd															
7	L2	All MCs	138	1.0	138	1.0	0.125	6.9	LOS A	0.6	14.6	0.23	0.57	0.23	25.1
4	T1	All MCs	553	1.0	553	1.0	0.348	2.1	LOS A	2.2	54.2	0.25	0.29	0.25	27.7
Approach			691	1.0	691	1.0	0.348	3.1	LOS A	2.2	54.2	0.25	0.35	0.25	27.1
All Vehicles			1415	1.0	1415	1.0	0.355	3.2	LOS A	2.2	54.2	0.30	0.36	0.30	23.9

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 **Site: 24 [22: Capitol Blvd & Dennis St (Site Folder: Tumwater)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Capitol Blvd & Dennis St
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh.]	[Dist]				
			veh/h		veh/h		v/c	sec		veh	ft				mph
South: Capitol Blvd															
3	L2	All MCs	11	3.0	11	3.0	0.450	9.6	LOS A	2.9	73.9	0.42	0.43	0.42	27.1
8	T1	All MCs	468	3.0	468	3.0	0.450	4.0	LOS A	2.9	73.9	0.42	0.43	0.42	15.5
18	R2	All MCs	21	3.0	21	3.0	0.450	4.3	LOS A	2.9	73.9	0.42	0.43	0.42	27.3
Approach			500	3.0	500	3.0	0.450	4.1	LOS A	2.9	73.9	0.42	0.43	0.42	16.2
East: Dennis St															
1	L2	All MCs	23	3.0	23	3.0	0.090	8.0	LOS A	0.4	11.5	0.56	0.55	0.56	26.6
6	T1	All MCs	20	3.0	20	3.0	0.090	3.0	LOS A	0.4	11.5	0.56	0.55	0.56	23.7
16	R2	All MCs	31	3.0	31	3.0	0.090	3.9	LOS A	0.4	11.5	0.56	0.55	0.56	17.4
Approach			74	3.0	74	3.0	0.090	4.9	LOS A	0.4	11.5	0.56	0.55	0.56	22.3
North: Capitol Blvd															
7	L2	All MCs	96	3.0	96	3.0	0.641	7.7	LOS A	6.5	165.2	0.38	0.39	0.38	23.7
4	T1	All MCs	617	3.0	617	3.0	0.641	2.7	LOS A	6.5	165.2	0.38	0.39	0.38	30.8
14	R2	All MCs	64	3.0	64	3.0	0.641	2.7	LOS A	6.5	165.2	0.38	0.39	0.38	23.9
Approach			777	3.0	777	3.0	0.641	3.3	LOS A	6.5	165.2	0.38	0.39	0.38	29.1
West: Dennis St															
5	L2	All MCs	21	3.0	21	3.0	0.111	10.0	LOS A	0.6	15.4	0.69	0.64	0.69	12.7
2	T1	All MCs	32	3.0	32	3.0	0.111	4.9	LOS A	0.6	15.4	0.69	0.64	0.69	23.3
12	R2	All MCs	21	3.0	21	3.0	0.111	5.8	LOS A	0.6	15.4	0.69	0.64	0.69	26.3
Approach			74	3.0	74	3.0	0.111	6.6	LOS A	0.6	15.4	0.69	0.64	0.69	20.9
All Vehicles			1426	3.0	1426	3.0	0.641	3.9	LOS A	6.5	165.2	0.42	0.42	0.42	21.9

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\TC-Projects\2024\TC24-0105_Tumwater Transportation Master Plan and Impact Fees\Analysis\Operation Analysis\2050\Sidra\2050.sip9

HCM 6th Signalized Intersection Summary
23: Henderson Blvd SE & Wildflower Ln SE/65th Ave SE

2045 Baseline
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↔			↔		↖	↗		↖	↗	
Traffic Volume (veh/h)	0	0	0	50	1	109	10	660	80	90	629	1
Future Volume (veh/h)	0	0	0	50	1	109	10	660	80	90	629	1
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	0.98		0.96	1.00		0.97	1.00		0.97
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	1885	1961	1885	1885	1961	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	0	0	0	53	1	25	11	702	78	96	669	1
Peak Hour Factor	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	0	240	0	252	23	60	452	977	109	374	1107	2
Arrive On Green	0.00	0.00	0.00	0.12	0.12	0.12	0.59	0.59	0.59	0.59	0.59	0.59
Sat Flow, veh/h	0	1961	0	869	190	490	773	1661	185	698	1882	3
Grp Volume(v), veh/h	0	0	0	79	0	0	11	0	780	96	0	670
Grp Sat Flow(s),veh/h/ln	0	1961	0	1549	0	0	773	0	1845	698	0	1885
Q Serve(g_s), s	0.0	0.0	0.0	1.2	0.0	0.0	0.4	0.0	12.5	4.7	0.0	9.4
Cycle Q Clear(g_c), s	0.0	0.0	0.0	1.9	0.0	0.0	9.8	0.0	12.5	17.2	0.0	9.4
Prop In Lane	0.00		0.00	0.67		0.32	1.00		0.10	1.00		0.00
Lane Grp Cap(c), veh/h	0	240	0	335	0	0	452	0	1085	374	0	1108
V/C Ratio(X)	0.00	0.00	0.00	0.24	0.00	0.00	0.02	0.00	0.72	0.26	0.00	0.60
Avail Cap(c_a), veh/h	0	473	0	513	0	0	613	0	1469	519	0	1500
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)	0.00	0.00	0.00	1.00	0.00	0.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	0.0	0.0	16.7	0.0	0.0	8.6	0.0	6.1	12.2	0.0	5.5
Incr Delay (d2), s/veh	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	1.3	0.4	0.0	0.6
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	0.0	0.0	0.0	0.7	0.0	0.0	0.1	0.0	2.6	0.6	0.0	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.0	0.0	0.0	17.2	0.0	0.0	8.6	0.0	7.4	12.7	0.0	6.1
LnGrp LOS				B			A			A		
Approach Vol, veh/h	0			79			791			766		
Approach Delay, s/veh	0.0			17.2			7.4			6.9		
Approach LOS				B			A			A		
Timer - Assigned Phs	2			4			6			8		
Phs Duration (G+Y+Rc), s	30.4			11.1			30.4			11.1		
Change Period (Y+Rc), s	6.0			6.0			6.0			6.0		
Max Green Setting (Gmax), s	33.0			10.0			33.0			10.0		
Max Q Clear Time (g_c+I1), s	19.2			3.9			14.5			0.0		
Green Ext Time (p_c), s	5.2			0.2			6.5			0.0		
Intersection Summary												
HCM 6th Ctrl Delay, s/veh			7.6									
HCM 6th LOS			A									

MOVEMENT SUMMARY

 **Site: 24 [24: Littlerock Rd & Israel Rd & 70th Ave (Site Folder: Tumwater)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Littlerock Rd & Israel Rd & 70th Ave
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]				mph
South: Littlerock Rd															
3	L2	All MCs	196	1.0	196	1.0	0.477	10.2	LOS B	3.2	80.4	0.57	0.59	0.57	30.5
8	T1	All MCs	269	1.0	269	1.0	0.477	4.7	LOS A	3.2	80.4	0.57	0.59	0.57	20.3
18	R2	All MCs	62	1.0	62	1.0	0.477	5.0	LOS A	3.2	80.4	0.57	0.59	0.57	30.8
Approach			527	1.0	527	1.0	0.477	6.8	LOS A	3.2	80.4	0.57	0.59	0.57	25.7
East: Israel Rd															
1	L2	All MCs	119	1.0	119	1.0	0.283	10.4	LOS B	1.8	45.8	0.64	0.62	0.64	30.2
6	T1	All MCs	204	1.0	204	1.0	0.283	5.4	LOS A	1.8	45.8	0.64	0.62	0.64	30.7
16	R2	All MCs	171	1.0	171	1.0	0.193	6.0	LOS A	1.1	26.8	0.61	0.62	0.61	29.0
Approach			495	1.0	495	1.0	0.283	6.8	LOS A	1.8	45.8	0.63	0.62	0.63	30.2
North: Littlerock Rd															
7	L2	All MCs	140	1.0	140	1.0	0.539	10.7	LOS B	4.8	119.9	0.79	0.70	0.85	27.7
4	T1	All MCs	452	1.0	452	1.0	0.539	6.6	LOS A	4.8	119.9	0.79	0.70	0.85	28.3
14	R2	All MCs	194	1.0	194	1.0	0.253	6.2	LOS A	1.5	37.8	0.67	0.66	0.67	28.6
Approach			785	1.0	785	1.0	0.539	7.2	LOS A	4.8	119.9	0.76	0.69	0.81	28.3
West: 70th Ave															
5	L2	All MCs	75	1.0	75	1.0	0.184	10.9	LOS B	1.0	26.1	0.66	0.69	0.66	19.3
2	T1	All MCs	86	1.0	86	1.0	0.184	6.1	LOS A	1.0	26.1	0.66	0.69	0.66	30.3
12	R2	All MCs	151	1.0	151	1.0	0.192	7.1	LOS A	1.0	25.8	0.65	0.69	0.65	30.6
Approach			312	1.0	312	1.0	0.192	7.7	LOS A	1.0	26.1	0.66	0.69	0.66	28.0
All Vehicles			2118	1.0	2118	1.0	0.539	7.1	LOS A	4.8	119.9	0.67	0.65	0.68	27.9

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\TC-Projects\2024\TC24-0105_Tumwater Transportation Master Plan and Impact Fees\Analysis\Operation Analysis\2050\Sidra\2050.sip9

HCM 6th Signalized Intersection Summary

25: Linderson Way SW & Israel Rd SW

2045 Baseline
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	70	450	110	150	420	40	200	50	70	20	140	80
Future Volume (veh/h)	70	450	110	150	420	40	200	50	70	20	140	80
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.97	1.00		0.97	0.99		0.96	0.97		0.95
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	1885	1885	1885	1885	1885	1885	1885	1961	1885	1885	1885	1885
Adj Flow Rate, veh/h	79	506	117	169	472	43	225	56	33	22	157	71
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	359	574	133	292	707	64	360	300	177	348	199	90
Arrive On Green	0.05	0.39	0.39	0.08	0.42	0.42	0.12	0.26	0.26	0.02	0.17	0.17
Sat Flow, veh/h	1795	1471	340	1795	1697	155	1795	1136	670	1795	1205	545
Grp Volume(v), veh/h	79	0	623	169	0	515	225	0	89	22	0	228
Grp Sat Flow(s),veh/h/ln	1795	0	1811	1795	0	1852	1795	0	1806	1795	0	1750
Q Serve(g_s), s	2.0	0.0	24.8	4.3	0.0	17.5	7.6	0.0	3.0	0.8	0.0	9.7
Cycle Q Clear(g_c), s	2.0	0.0	24.8	4.3	0.0	17.5	7.6	0.0	3.0	0.8	0.0	9.7
Prop In Lane	1.00		0.19	1.00		0.08	1.00		0.37	1.00		0.31
Lane Grp Cap(c), veh/h	359	0	707	292	0	772	360	0	477	348	0	289
V/C Ratio(X)	0.22	0.00	0.88	0.58	0.00	0.67	0.62	0.00	0.19	0.06	0.00	0.79
Avail Cap(c_a), veh/h	382	0	895	302	0	951	382	0	491	422	0	354
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	14.3	0.0	22.0	17.1	0.0	18.3	22.0	0.0	22.1	25.8	0.0	31.1
Incr Delay (d2), s/veh	0.1	0.0	8.5	2.6	0.0	1.3	2.0	0.0	0.1	0.0	0.0	9.4
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	0.8	0.0	11.6	1.8	0.0	7.4	3.3	0.0	1.2	0.3	0.0	4.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	14.4	0.0	30.5	19.7	0.0	19.6	24.0	0.0	22.2	25.9	0.0	40.5
LnGrp LOS	B		C	B		B	C		C	C		D
Approach Vol, veh/h	702		684			314			250			
Approach Delay, s/veh	28.7		19.6			23.5			39.2			
Approach LOS	C		B			C			D			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.6	37.3	6.4	25.4	10.6	35.2	14.1	17.7				
Change Period (Y+Rc), s	4.5	4.9	4.5	4.9	4.5	4.9	4.5	4.9				
Max Green Setting (Gmax), s	5.1	39.9	5.1	21.1	6.6	38.4	10.5	15.7				
Max Q Clear Time (g_c+I), s	14.0	19.5	2.8	5.0	6.3	26.8	9.6	11.7				
Green Ext Time (p_c), s	0.0	3.5	0.0	0.2	0.0	3.5	0.0	0.4				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh			26.0									
HCM 6th LOS			C									

HCM 6th Signalized Intersection Summary

26: Capitol Blvd SE & Israel Rd SW/Israel Rd SE

2045 Baseline
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	90	130	280	60	170	40	190	389	11	20	700	160
Future Volume (veh/h)	90	130	280	60	170	40	190	389	11	20	700	160
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		0.97	1.00		0.97
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	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683	1683
Adj Flow Rate, veh/h	106	153	284	71	200	41	224	458	12	24	824	175
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	349	167	310	168	414	85	267	1417	37	398	965	205
Arrive On Green	0.06	0.32	0.32	0.05	0.31	0.31	0.10	0.45	0.45	0.03	0.37	0.37
Sat Flow, veh/h	1603	520	965	1603	1350	277	1603	3181	83	1603	2609	554
Grp Volume(v), veh/h	106	0	437	71	0	241	224	230	240	24	505	494
Grp Sat Flow(s),veh/h/ln	1603	0	1485	1603	0	1626	1603	1599	1666	1603	1599	1564
Q Serve(g_s), s	5.2	0.0	33.0	3.5	0.0	14.0	9.6	10.8	10.9	1.1	33.9	33.9
Cycle Q Clear(g_c), s	5.2	0.0	33.0	3.5	0.0	14.0	9.6	10.8	10.9	1.1	33.9	33.9
Prop In Lane	1.00		0.65	1.00		0.17	1.00		0.05	1.00		0.35
Lane Grp Cap(c), veh/h	349	0	476	168	0	499	267	712	742	398	592	578
V/C Ratio(X)	0.30	0.00	0.92	0.42	0.00	0.48	0.84	0.32	0.32	0.06	0.85	0.85
Avail Cap(c_a), veh/h	369	0	564	181	0	587	343	890	927	437	734	717
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	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	25.9	0.0	38.1	30.1	0.0	32.8	25.5	20.9	20.9	21.5	33.8	33.8
Incr Delay (d2), s/veh	0.6	0.0	18.6	2.0	0.0	0.9	14.2	0.3	0.3	0.1	8.5	8.7
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	2.1	0.0	14.4	1.4	0.0	5.7	4.5	4.0	4.2	0.4	14.1	13.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	26.5	0.0	56.7	32.1	0.0	33.7	39.6	21.2	21.2	21.5	42.3	42.4
LnGrp LOS	C		E	C		C	D	C	C	C	D	D
Approach Vol, veh/h	543		312			694			1023			
Approach Delay, s/veh	50.8		33.3			27.2			41.9			
Approach LOS	D		C			C			D			
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	7.7	56.6	9.9	42.1	16.5	47.9	11.5	40.5				
Change Period (Y+Rc), s	4.5	4.8	4.5	4.8	4.5	4.8	4.5	4.8				
Max Green Setting (Gmax), s	64.8	6.3	44.2	17.5	53.4	8.5	42.0					
Max Q Clear Time (g_c+I13), s	12.9	5.5	35.0	11.6	35.9	7.2	16.0					
Green Ext Time (p_c), s	0.0	3.7	0.0	2.4	0.4	7.2	0.0	1.8				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh			38.8									
HCM 6th LOS			D									

HCM 6th Signalized Intersection Summary

27: Henderson Blvd SE & Tumwater Blvd SE

2045 Baseline
PM Peak Hour



Movement	EBL	EBR	NBL	NBT	SBT	SBR
Lane Configurations						
Traffic Volume (veh/h)	590	40	40	160	210	530
Future Volume (veh/h)	590	40	40	160	210	530
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	0.97	1.00			0.97
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No			No	No	
Adj Sat Flow, veh/h/ln	1885	1885	1885	1885	1885	1961
Adj Flow Rate, veh/h	634	41	43	172	226	366
Peak Hour Factor	0.93	0.93	0.93	0.93	0.93	0.93
Percent Heavy Veh, %	1	1	1	1	1	1
Cap, veh/h	688	44	195	205	494	421
Arrive On Green	0.41	0.41	0.11	0.11	0.26	0.26
Sat Flow, veh/h	1668	108	1795	1885	1885	1608
Grp Volume(v), veh/h	676	0	43	172	226	366
Grp Sat Flow(s), veh/h/ln	1779	0	1795	1885	1885	1608
Q Serve(g_s), s	29.9	0.0	1.8	7.4	8.3	18.0
Cycle Q Clear(g_c), s	29.9	0.0	1.8	7.4	8.3	18.0
Prop In Lane	0.94	0.06	1.00			1.00
Lane Grp Cap(c), veh/h	734	0	195	205	494	421
V/C Ratio(X)	0.92	0.00	0.22	0.84	0.46	0.87
Avail Cap(c_a), veh/h	794	0	195	205	591	504
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	23.1	0.0	33.8	36.3	25.7	29.2
Incr Delay (d2), s/veh	16.5	0.0	1.2	27.7	0.7	13.2
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	4.7	0.0	0.8	4.9	3.7	8.1
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	39.6	0.0	35.0	64.0	26.3	42.4
LnGrp LOS	D		C	E	C	D
Approach Vol, veh/h	676			215	592	
Approach Delay, s/veh	39.6			58.2	36.3	
Approach LOS	D			E	D	
Timer - Assigned Phs	2			4		8
Phs Duration (G+Y+Rc), s	40.2			27.7		15.0
Change Period (Y+Rc), s	6.0			6.0		6.0
Max Green Setting (Gmax), s	37.0			26.0		9.0
Max Q Clear Time (g_c+I1), s	31.9			20.0		9.4
Green Ext Time (p_c), s	2.3			1.4		0.0
Intersection Summary						
HCM 6th Ctrl Delay, s/veh			41.0			
HCM 6th LOS			D			

MOVEMENT SUMMARY

 **Site: 28 [28: Littlerock Rd & Tumwater Blvd (Site Folder: Tumwater)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Littlerock Rd & Tumwater Blvd
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]		[Total HV]					[Veh. veh	Dist]				
			veh/h	%	veh/h	%	v/c	sec			ft				mph
South: Littlerock Rd															
8	T1	All MCs	228	1.0	228	1.0	0.158	3.3	LOS A	0.8	20.7	0.47	0.42	0.47	28.1
18	R2	All MCs	120	1.0	120	1.0	0.158	3.7	LOS A	0.8	20.7	0.46	0.45	0.46	28.0
Approach			348	1.0	348	1.0	0.158	3.5	LOS A	0.8	20.7	0.47	0.43	0.47	28.1
East: Tumwater Blvd															
1	L2	All MCs	250	1.0	250	1.0	0.221	8.0	LOS A	1.1	26.6	0.38	0.60	0.38	26.5
16	R2	All MCs	315	1.0	315	1.0	0.250	3.2	LOS A	1.3	31.6	0.38	0.44	0.38	28.2
Approach			565	1.0	565	1.0	0.250	5.3	LOS A	1.3	31.6	0.38	0.51	0.38	27.4
North: Littlerock Rd															
7	L2	All MCs	348	1.0	348	1.0	0.290	8.4	LOS A	1.8	46.3	0.49	0.59	0.49	26.4
4	T1	All MCs	391	1.0	391	1.0	0.272	2.9	LOS A	1.8	44.4	0.45	0.35	0.45	28.1
Approach			739	1.0	739	1.0	0.290	5.5	LOS A	1.8	46.3	0.47	0.46	0.47	27.3
All Vehicles			1652	1.0	1652	1.0	0.290	5.0	LOS A	1.8	46.3	0.44	0.47	0.44	27.5

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 **Site: 24 [29: Tumwater Boulevard & I-5 SB Ramp (Site Folder: Tumwater)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Tumwater Boulevard & I-5 SB Ramp
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]		[Total HV]					[Veh. veh	Dist]				
			veh/h	%	veh/h	%	v/c	sec			ft				mph
East: Tumwater Blvd															
1	L2	All MCs	447	2.0	447	2.0	0.297	8.5	LOS A	0.0	0.0	0.00	0.64	0.00	33.3
6	T1	All MCs	328	2.0	328	2.0	0.241	3.1	LOS A	0.0	0.0	0.00	0.33	0.00	33.1
Approach			775	2.0	775	2.0	0.297	6.2	LOS A	0.0	0.0	0.00	0.51	0.00	33.2
North: I-5 SB Off-Ramp															
7	L2	All MCs	596	2.0	596	2.0	0.622	12.6	LOS B	4.0	101.0	0.67	0.90	0.88	26.2
14	R2	All MCs	427	2.0	427	2.0	0.521	7.0	LOS A	2.7	69.3	0.63	0.80	0.78	29.0
Approach			1022	2.0	1022	2.0	0.622	10.3	LOS B	4.0	101.0	0.65	0.86	0.84	27.2
West: Tumwater Blvd															
2	T1	All MCs	371	2.0	371	2.0	0.347	12.3	LOS B	2.6	66.2	0.93	0.79	0.93	29.1
12	R2	All MCs	360	2.0	360	2.0	0.321	5.7	LOS A	1.9	47.2	0.57	0.58	0.57	35.0
Approach			730	2.0	730	2.0	0.347	9.1	LOS A	2.6	66.2	0.75	0.69	0.75	31.7
All Vehicles			2528	2.0	2528	2.0	0.622	8.7	LOS A	4.0	101.0	0.48	0.70	0.56	30.8

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 **Site: 24 [30: Tumwater Boulevard & I-5 NB Ramp (Site Folder: Tumwater)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Tumwater Boulevard & I-5 NB Ramp
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh. veh	Dist]				
			veh/h		veh/h		v/c	sec			ft				mph
South: I-5 NB Off-Ramp															
3	L2	All MCs	135	2.0	135	2.0	0.186	13.9	LOS B	0.6	16.0	0.54	0.82	0.54	31.2
18	R2	All MCs	214	2.0	214	2.0	0.241	7.9	LOS A	0.9	22.0	0.54	0.73	0.54	33.9
Approach			349	2.0	349	2.0	0.241	10.2	LOS B	0.9	22.0	0.54	0.76	0.54	32.8
East: Tumwater Blvd															
6	T1	All MCs	639	2.0	639	2.0	0.567	6.2	LOS A	4.7	120.3	0.70	0.63	0.77	31.3
16	R2	All MCs	1169	2.0	1169	2.0	0.712	3.4	LOS A	0.0	0.0	0.00	0.39	0.00	31.2
Approach			1807	2.0	1807	2.0	0.712	4.4	LOS A	4.7	120.3	0.25	0.48	0.27	31.2
West: Tumwater Blvd															
5	L2	All MCs	289	2.0	289	2.0	0.331	8.4	LOS A	0.0	0.0	0.00	0.56	0.00	20.1
2	T1	All MCs	675	2.0	675	2.0	0.331	3.2	LOS A	0.0	0.0	0.00	0.40	0.00	32.6
Approach			964	2.0	964	2.0	0.331	4.8	LOS A	0.0	0.0	0.00	0.45	0.00	29.0
All Vehicles			3120	2.0	3120	2.0	0.712	5.1	LOS A	4.7	120.3	0.20	0.50	0.22	30.6

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akcelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

HCM 6th Signalized Intersection Summary

31: Center St SW/Linderson Way SW & Tumwater Blvd SW

2045 Baseline
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Traffic Volume (veh/h)	87	478	115	70	910	70	140	90	60	110	109	331
Future Volume (veh/h)	87	478	115	70	910	70	140	90	60	110	109	331
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.99	1.00		0.99	1.00		0.97	1.00		1.00
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	No	No	No	No	No	No	No	No
Adj Sat Flow, veh/h/ln	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870	1870
Adj Flow Rate, veh/h	106	583	134	85	1110	41	171	110	17	134	133	0
Peak Hour Factor	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82	0.82
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	248	791	181	277	1292	572	168	228	188	190	259	
Arrive On Green	0.07	0.28	0.28	0.16	0.36	0.36	0.09	0.12	0.12	0.11	0.14	0.00
Sat Flow, veh/h	3456	2865	657	1781	3554	1574	1781	1870	1541	1781	1870	1585
Grp Volume(v), veh/h	106	361	356	85	1110	41	171	110	17	134	133	0
Grp Sat Flow(s), veh/h/ln	1728	1777	1745	1781	1777	1574	1781	1870	1541	1781	1870	1585
Q Serve(g_s), s	2.2	13.7	13.8	3.1	21.4	0.7	7.0	4.1	0.7	5.4	4.9	0.0
Cycle Q Clear(g_c), s	2.2	13.7	13.8	3.1	21.4	0.7	7.0	4.1	0.7	5.4	4.9	0.0
Prop In Lane	1.00		0.38	1.00		1.00	1.00		1.00	1.00		1.00
Lane Grp Cap(c), veh/h	248	490	482	277	1292	572	168	228	188	190	259	
V/C Ratio(X)	0.43	0.74	0.74	0.31	0.86	0.07	1.02	0.48	0.09	0.70	0.51	
Avail Cap(c_a), veh/h	280	664	652	277	1375	609	168	749	617	264	850	
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	33.0	24.4	24.4	27.8	21.8	4.9	33.6	30.4	28.9	32.0	29.6	0.0
Incr Delay (d2), s/veh	1.4	3.2	3.4	0.8	5.6	0.1	74.0	1.9	0.2	5.9	1.9	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	0.9	5.8	5.7	1.3	9.1	0.4	6.4	1.9	0.3	2.5	2.2	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	34.4	27.6	27.8	28.5	27.4	5.0	107.6	32.3	29.1	37.9	31.5	0.0
LnGrp LOS	C	C	C	C	C	A	F	C	C	D	C	
Approach Vol, veh/h		823			1236			298			267	
Approach Delay, s/veh		28.6			26.8			75.3			34.7	
Approach LOS		C			C			E			C	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	1.3	33.3	14.2	15.4	17.8	26.8	13.0	16.6				
Change Period (Y+Rc), s	6.0	6.3	6.3	* 6.3	6.3	* 6.3	6.0	6.3				
Max Green Setting (Gmax), s	6.0	28.7	11.0	* 30	7.0	* 28	7.0	33.7				
Max Q Clear Time (g_c+I), s	14.2	23.4	7.4	6.1	5.1	15.8	9.0	6.9				
Green Ext Time (p_c), s	0.1	3.5	0.1	0.7	0.0	4.0	0.0	0.8				

Intersection Summary

HCM 6th Ctrl Delay, s/veh	33.7
HCM 6th LOS	C

Notes

* HCM 6th computational engine requires equal clearance times for the phases crossing the barrier.

Unsignalized Delay for [SBR] is excluded from calculations of the approach delay and intersection delay.

MOVEMENT SUMMARY

 **Site: 32 [32: Tumwater Blvd & New Market St (Site Folder: Tumwater)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Tumwater Blvd & New Market St
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%				[Veh. veh	Dist]				
			veh/h		veh/h		v/c	sec		veh	ft				mph
South: New Market St															
3	L2	All MCs	21	2.0	21	2.0	0.027	6.0	LOS A	0.1	2.5	0.44	0.47	0.44	26.5
8	T1	All MCs	11	2.0	11	2.0	0.027	1.2	LOS A	0.1	2.5	0.44	0.47	0.44	23.6
18	R2	All MCs	21	2.0	21	2.0	0.023	2.1	LOS A	0.1	2.0	0.46	0.39	0.46	27.8
Approach			53	2.0	53	2.0	0.027	3.5	LOS A	0.1	2.5	0.45	0.43	0.45	26.3
East: Tumwater Blvd															
1	L2	All MCs	85	2.0	85	2.0	0.337	9.1	LOS A	2.1	53.6	0.23	0.33	0.23	27.7
6	T1	All MCs	947	2.0	947	2.0	0.337	2.2	LOS A	2.1	54.3	0.21	0.28	0.21	32.9
16	R2	All MCs	32	2.0	32	2.0	0.337	2.9	LOS A	2.1	54.3	0.21	0.25	0.21	28.2
Approach			1064	2.0	1064	2.0	0.337	2.7	LOS A	2.1	54.3	0.22	0.28	0.22	32.3
North: New Market St															
7	L2	All MCs	43	2.0	43	2.0	0.054	7.4	LOS A	0.2	4.9	0.54	0.70	0.54	25.9
4	T1	All MCs	1	2.0	1	2.0	0.054	2.5	LOS A	0.2	4.9	0.54	0.70	0.54	23.2
14	R2	All MCs	85	2.0	85	2.0	0.078	2.3	LOS A	0.3	7.6	0.53	0.42	0.53	27.6
Approach			129	2.0	129	2.0	0.078	4.0	LOS A	0.3	7.6	0.53	0.51	0.53	27.0
West: Tumwater Blvd															
5	L2	All MCs	28	2.0	28	2.0	0.242	9.4	LOS A	1.4	35.9	0.32	0.32	0.32	27.7
2	T1	All MCs	614	2.0	614	2.0	0.242	2.5	LOS A	1.4	36.7	0.31	0.31	0.31	32.7
12	R2	All MCs	82	2.0	82	2.0	0.242	3.2	LOS A	1.4	36.7	0.30	0.29	0.30	27.9
Approach			723	2.0	723	2.0	0.242	2.8	LOS A	1.4	36.7	0.31	0.31	0.31	31.9
All Vehicles			1969	2.0	1969	2.0	0.337	2.9	LOS A	2.1	54.3	0.28	0.31	0.28	31.6

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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HCM 6th Signalized Intersection Summary

33: Capitol Blvd SE & Tumwater Blvd SW/Tumwater Blvd SE

2045 Baseline

PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	50	246	334	20	340	50	282	458	30	100	640	310
Future Volume (veh/h)	50	246	334	20	340	50	282	458	30	100	640	310
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00		0.98	1.00		0.98	1.00		0.98	1.00		0.98
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	1870	1870	1870
Adj Flow Rate, veh/h	56	273	187	22	378	50	313	509	31	111	711	161
Peak Hour Factor	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Percent Heavy Veh, %	2	2	2	2	2	2	2	2	2	2	2	2
Cap, veh/h	102	421	489	53	623	82	302	1042	63	142	1061	464
Arrive On Green	0.06	0.23	0.23	0.03	0.20	0.20	0.09	0.31	0.31	0.08	0.30	0.30
Sat Flow, veh/h	1781	1870	1553	1781	3149	413	3456	3399	207	1781	3554	1554
Grp Volume(v), veh/h	56	273	187	22	212	216	313	266	274	111	711	161
Grp Sat Flow(s),veh/h/ln	1781	1870	1553	1781	1777	1785	1728	1777	1828	1781	1777	1554
Q Serve(g_s), s	2.1	9.1	6.5	0.8	7.4	7.6	6.0	8.4	8.4	4.2	12.0	5.6
Cycle Q Clear(g_c), s	2.1	9.1	6.5	0.8	7.4	7.6	6.0	8.4	8.4	4.2	12.0	5.6
Prop In Lane	1.00		1.00	1.00		0.23	1.00		0.11	1.00		1.00
Lane Grp Cap(c), veh/h	102	421	489	53	352	353	302	545	560	142	1061	464
V/C Ratio(X)	0.55	0.65	0.38	0.41	0.60	0.61	1.04	0.49	0.49	0.78	0.67	0.35
Avail Cap(c_a), veh/h	156	810	811	156	770	773	302	744	765	156	1488	651
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	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	31.4	24.1	18.4	32.7	25.0	25.1	31.3	19.4	19.4	31.0	21.1	18.8
Incr Delay (d2), s/veh	1.7	1.7	0.5	1.9	1.7	1.7	61.1	0.8	0.8	20.9	0.9	0.5
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	0.9	3.9	2.2	0.4	3.1	3.2	4.9	3.3	3.4	2.5	4.7	1.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	33.1	25.8	18.9	34.5	26.7	26.8	92.4	20.2	20.2	51.9	22.0	19.4
LnGrp LOS	C	C	B	C	C	C	F	C	C	D	C	B
Approach Vol, veh/h	516			450			853			983		
Approach Delay, s/veh	24.1			27.1			46.7			24.9		
Approach LOS	C			C			D			C		
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	1.4	27.3	8.1	21.7	12.0	26.8	9.9	19.9				
Change Period (Y+Rc), s	6.0	6.3	6.0	6.3	6.0	6.3	6.0	6.3				
Max Green Setting (Gmax), s	6.0	28.7	6.0	29.7	6.0	28.7	6.0	29.7				
Max Q Clear Time (g_c+I10), s	10.4	10.4	2.8	11.1	8.0	14.0	4.1	9.6				
Green Ext Time (p_c), s	0.0	3.5	0.0	2.1	0.0	5.4	0.0	2.4				

Intersection Summary

HCM 6th Ctrl Delay, s/veh	31.8
HCM 6th LOS	C

HCM 6th Signalized Intersection Summary

34: Littlerock Rd SW & 77th Way SW/Black Hills School Drwy/77th Way SW

2045 Baseline

PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	99	1	20	1	2	27	34	214	2	30	420	230
Future Volume (veh/h)	99	1	20	1	2	27	34	214	2	30	420	230
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	0.98		0.96	0.98		0.96	1.00		0.99	1.00		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	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	108	1	11	1	2	7	37	233	2	33	457	239
Peak Hour Factor	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1
Cap, veh/h	338	18	198	335	49	173	281	846	7	636	524	274
Arrive On Green	0.14	0.14	0.14	0.14	0.14	0.14	0.03	0.45	0.45	0.03	0.45	0.45
Sat Flow, veh/h	1392	130	1426	1389	355	1243	1795	1866	16	1795	1163	608
Grp Volume(v), veh/h	108	0	12	1	0	9	37	0	235	33	0	696
Grp Sat Flow(s), veh/h/ln	1392	0	1555	1389	0	1598	1795	0	1882	1795	0	1772
Q Serve(g_s), s	3.5	0.0	0.3	0.0	0.0	0.2	0.5	0.0	3.7	0.5	0.0	16.9
Cycle Q Clear(g_c), s	3.7	0.0	0.3	0.3	0.0	0.2	0.5	0.0	3.7	0.5	0.0	16.9
Prop In Lane	1.00		0.92	1.00		0.78	1.00		0.01	1.00		0.34
Lane Grp Cap(c), veh/h	338	0	216	335	0	222	281	0	853	636	0	798
V/C Ratio(X)	0.32	0.00	0.06	0.00	0.00	0.04	0.13	0.00	0.28	0.05	0.00	0.87
Avail Cap(c_a), veh/h	701	0	621	697	0	638	374	0	1147	734	0	1080
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	1.00	1.00	0.00	1.00	1.00	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	19.3	0.0	17.8	17.9	0.0	17.7	9.7	0.0	8.1	6.7	0.0	11.8
Incr Delay (d2), s/veh	0.2	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.0	4.9
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	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.0	1.1	0.1	0.0	5.9
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	19.5	0.0	17.8	17.9	0.0	17.8	9.7	0.0	8.2	6.7	0.0	16.8
LnGrp LOS	B		B	B		B	A		A	A		B
Approach Vol, veh/h	120			10			272			729		
Approach Delay, s/veh	19.4			17.8			8.4			16.3		
Approach LOS	B			B			A			B		
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	7.5	27.4		12.6	7.4	27.6		12.6				
Change Period (Y+Rc), s	6.0	6.0		6.0	6.0	6.0		6.0				
Max Green Setting (Gmax), s	4.0	29.0		19.0	4.0	29.0		19.0				
Max Q Clear Time (g_c+I), s	12.5	18.9		2.3	2.5	5.7		5.7				
Green Ext Time (p_c), s	0.0	2.4		0.0	0.0	0.8		0.1				
Intersection Summary												
HCM 6th Ctrl Delay, s/veh	14.7											
HCM 6th LOS	B											

MOVEMENT SUMMARY

 Site: 24 [35: Old Hwy 99 & Henderson Blvd (Site Folder: Tumwater)]

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Old Hwy 99 & Henderson Blvd
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]	%	[Total HV]	%	v/c	sec		[Veh. veh	Dist]				mph
South: Old Hwy 99 SE															
3	L2	All MCs	1	2.0	1	2.0	0.656	10.5	LOS B	7.3	184.9	0.54	0.44	0.54	28.0
8	T1	All MCs	681	2.0	681	2.0	0.656	4.9	LOS A	7.3	184.9	0.54	0.44	0.54	34.9
18	R2	All MCs	85	2.0	85	2.0	0.656	4.9	LOS A	7.3	184.9	0.54	0.44	0.54	32.9
Approach			767	2.0	767	2.0	0.656	4.9	LOS A	7.3	184.9	0.54	0.44	0.54	34.6
East: Henderson Blvd SE															
1	L2	All MCs	128	2.0	128	2.0	0.280	12.8	LOS B	1.7	42.7	0.75	0.74	0.75	30.4
6	T1	All MCs	1	2.0	1	2.0	0.280	7.3	LOS A	1.7	42.7	0.75	0.74	0.75	25.7
16	R2	All MCs	64	2.0	64	2.0	0.280	7.6	LOS A	1.7	42.7	0.75	0.74	0.75	30.8
Approach			193	2.0	193	2.0	0.280	11.1	LOS B	1.7	42.7	0.75	0.74	0.75	30.5
North: Capitol Blvd SE															
7	L2	All MCs	85	2.0	85	2.0	0.943	17.2	LOS D	26.5	671.9	1.00	0.84	1.16	30.4
4	T1	All MCs	979	2.0	979	2.0	0.943	11.6	LOS D	26.5	671.9	1.00	0.84	1.16	32.4
14	R2	All MCs	1	2.0	1	2.0	0.943	11.6	LOS D	26.5	671.9	1.00	0.84	1.16	26.6
Approach			1065	2.0	1065	2.0	0.943	12.0	LOS B	26.5	671.9	1.00	0.84	1.16	32.2
West: Driveway															
5	L2	All MCs	1	2.0	1	2.0	0.012	17.7	LOS B	0.1	2.0	0.97	0.72	0.97	24.7
2	T1	All MCs	1	2.0	1	2.0	0.012	12.7	LOS B	0.1	2.0	0.97	0.72	0.97	24.2
12	R2	All MCs	1	2.0	1	2.0	0.012	13.5	LOS B	0.1	2.0	0.97	0.72	0.97	25.0
Approach			3	2.0	3	2.0	0.012	14.6	LOS B	0.1	2.0	0.97	0.72	0.97	24.6
All Vehicles			2028	2.0	2028	2.0	0.943	9.2	LOS A	26.5	671.9	0.80	0.68	0.89	32.9

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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HCM 6th Signalized Intersection Summary
36: Old Hwy 99 SE & 88th Ave SE/Driveway

2045 Baseline
PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR	
Lane Configurations													
Traffic Volume (veh/h)	213	0	37	20	0	0	6	416	18	0	770	150	
Future Volume (veh/h)	213	0	37	20	0	0	6	416	18	0	770	150	
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0	0	0	0	
Ped-Bike Adj(A_pbT)	0.99		0.97	0.99		1.00	1.00		1.00	1.00		1.00	
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	1885	1961	1885	1885	1961	1885	1885	1885	1885	1885	1885	1961	
Adj Flow Rate, veh/h	248	0	10	23	0	0	7	484	-179	0	895	119	
Peak Hour Factor	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	0.86	
Percent Heavy Veh, %	1	1	1	1	1	1	1	1	1	1	1	1	
Cap, veh/h	430	0	341	425	0	0	194	1021	0	123	1021	896	
Arrive On Green	0.21	0.00	0.21	0.21	0.00	0.00	0.54	0.54	0.00	0.00	0.54	0.54	
Sat Flow, veh/h	1413	0	1603	1422	0	0	560	1885	0	1083	1885	1654	
Grp Volume(v), veh/h	248	0	10	23	0	0	7	305	0	0	895	119	
Grp Sat Flow(s),veh/h/ln	1413	0	1603	1422	0	0	560	1885	0	1083	1885	1654	
Q Serve(g_s), s	8.5	0.0	0.3	0.7	0.0	0.0	0.6	5.2	0.0	0.0	24.3	2.1	
Cycle Q Clear(g_c), s	9.5	0.0	0.3	1.0	0.0	0.0	24.9	5.2	0.0	0.0	24.3	2.1	
Prop In Lane	1.00		1.00	1.00		0.00	1.00		0.00	1.00		1.00	
Lane Grp Cap(c), veh/h	430	0	341	425	0	0	194	1021	0	123	1021	896	
V/C Ratio(X)	0.58	0.00	0.03	0.05	0.00	0.00	0.04	0.30	0.00	0.00	0.88	0.13	
Avail Cap(c_a), veh/h	611	0	547	612	0	0	279	1305	0	286	1305	1145	
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	1.00	1.00	0.00	0.00	1.00	1.00	0.00	0.00	1.00	1.00	
Uniform Delay (d), s/veh	21.8	0.0	18.3	18.7	0.0	0.0	22.6	7.3	0.0	0.0	11.7	6.6	
Incr Delay (d2), s/veh	1.2	0.0	0.0	0.1	0.0	0.0	0.1	0.2	0.0	0.0	5.7	0.1	
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	2.8	0.0	0.1	0.2	0.0	0.0	0.1	1.4	0.0	0.0	7.9	0.5	
Unsig. Movement Delay, s/veh													
LnGrp Delay(d), s/veh	23.0	0.0	18.3	18.7	0.0	0.0	22.7	7.5	0.0	0.0	17.5	6.7	
LnGrp LOS	C		B		B		C		A		B		A
Approach Vol, veh/h	258				23		312				1014		
Approach Delay, s/veh	22.8				18.7		7.8				16.2		
Approach LOS	C				B		A				B		
Timer - Assigned Phs	2		4		6		8						
Phs Duration (G+Y+Rc), s	39.0		19.7		39.0		19.7						
Change Period (Y+Rc), s	7.2		7.2		7.2		7.2						
Max Green Setting (Gmax), s	40.6		20.0		40.6		20.0						
Max Q Clear Time (g_c+I1), s	26.9		11.5		26.3		3.0						
Green Ext Time (p_c), s	1.3		0.5		5.5		0.0						
Intersection Summary													
HCM 6th Ctrl Delay, s/veh			15.7										
HCM 6th LOS			B										

HCM 6th Signalized Intersection Summary 37: I-5 SB onramp/I-5 SB offramp & 93rd Ave SW

2045 Baseline
 PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations		↑	↑	↑	↑						↑	↑
Traffic Volume (veh/h)	0	260	60	163	147	0	0	0	0	420	0	500
Future Volume (veh/h)	0	260	60	163	147	0	0	0	0	420	0	500
Initial Q (Qb), veh	0	0	0	0	0	0				0	0	0
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00				1.00		0.98
Parking Bus, Adj	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	
Adj Sat Flow, veh/h/ln	0	1826	1826	1826	1826	0				1826	1899	1826
Adj Flow Rate, veh/h	0	295	25	185	167	0				477	0	231
Peak Hour Factor	0.88	0.88	0.88	0.88	0.88	0.88				0.88	0.88	0.88
Percent Heavy Veh, %	0	5	5	5	5	0				5	5	5
Cap, veh/h	0	533	452	490	895	0				598	0	500
Arrive On Green	0.00	0.29	0.29	0.11	0.49	0.00				0.33	0.00	0.33
Sat Flow, veh/h	0	1826	1547	1739	1826	0				1809	0	1513
Grp Volume(v), veh/h	0	295	25	185	167	0				477	0	231
Grp Sat Flow(s), veh/h/ln	0	1826	1547	1739	1826	0				1809	0	1513
Q Serve(g_s), s	0.0	7.0	0.6	3.4	2.6	0.0				12.3	0.0	6.2
Cycle Q Clear(g_c), s	0.0	7.0	0.6	3.4	2.6	0.0				12.3	0.0	6.2
Prop In Lane	0.00		1.00	1.00		0.00				1.00		1.00
Lane Grp Cap(c), veh/h	0	533	452	490	895	0				598	0	500
V/C Ratio(X)	0.00	0.55	0.06	0.38	0.19	0.00				0.80	0.00	0.46
Avail Cap(c_a), veh/h	0	726	615	518	1117	0				860	0	719
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00				1.00	1.00	1.00
Upstream Filter(I)	0.00	1.00	1.00	1.00	1.00	0.00				1.00	0.00	1.00
Uniform Delay (d), s/veh	0.0	15.3	13.1	10.0	7.3	0.0				15.6	0.0	13.6
Incr Delay (d2), s/veh	0.0	0.9	0.1	0.5	0.1	0.0				3.5	0.0	0.7
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0				0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.0	2.5	0.2	1.0	0.7	0.0				4.4	0.0	1.7
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	0.0	16.2	13.1	10.5	7.4	0.0				19.1	0.0	14.2
LnGrp LOS		B	B	B	A					B		B
Approach Vol, veh/h		320			352						708	
Approach Delay, s/veh		16.0			9.0						17.5	
Approach LOS		B			A						B	
Timer - Assigned Phs	1	2		4		6						
Phs Duration (G+Y+Rc), s	0.2	19.6		21.6		29.8						
Change Period (Y+Rc), s	4.6	4.6		4.6		4.6						
Max Green Setting (Gmax), s	0.4	20.4		24.4		31.4						
Max Q Clear Time (g_c+I), s	15.4	9.0		14.3		4.6						
Green Ext Time (p_c), s	0.0	1.2		2.7		0.8						
Intersection Summary												
HCM 6th Ctrl Delay, s/veh			15.0									
HCM 6th LOS			B									

HCM 6th Signalized Intersection Summary
 38: I-5 NB offramp/I-5 NB onramp & 93rd Ave SW

2045 Baseline
 PM Peak Hour



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	200	490	0	0	260	370	30	0	100	0	0	0
Future Volume (veh/h)	200	490	0	0	260	370	30	0	100	0	0	0
Initial Q (Qb), veh	0	0	0	0	0	0	0	0	0			
Ped-Bike Adj(A_pbT)	1.00		1.00	1.00		1.00	1.00		0.98			
Parking Bus, Adj	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			
Adj Sat Flow, veh/h/ln	1826	1826	0	0	1826	1826	1826	1899	1826			
Adj Flow Rate, veh/h	225	551	0	0	292	0	34	0	20			
Peak Hour Factor	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89	0.89			
Percent Heavy Veh, %	5	5	0	0	5	5	5	5	5			
Cap, veh/h	721	1156	0	0	585		130	0	109			
Arrive On Green	0.16	0.63	0.00	0.00	0.32	0.00	0.07	0.00	0.07			
Sat Flow, veh/h	1739	1826	0	0	1826	1547	1809	0	1510			
Grp Volume(v), veh/h	225	551	0	0	292	0	34	0	20			
Grp Sat Flow(s),veh/h/ln	1739	1826	0	0	1826	1547	1809	0	1510			
Q Serve(g_s), s	2.1	4.9	0.0	0.0	4.0	0.0	0.6	0.0	0.4			
Cycle Q Clear(g_c), s	2.1	4.9	0.0	0.0	4.0	0.0	0.6	0.0	0.4			
Prop In Lane	1.00		0.00	0.00		1.00	1.00		1.00			
Lane Grp Cap(c), veh/h	721	1156	0	0	585		130	0	109			
V/C Ratio(X)	0.31	0.48	0.00	0.00	0.50		0.26	0.00	0.18			
Avail Cap(c_a), veh/h	1683	4812	0	0	3232		1299	0	1085			
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00			
Upstream Filter(I)	1.00	1.00	0.00	0.00	1.00	0.00	1.00	0.00	1.00			
Uniform Delay (d), s/veh	4.4	3.0	0.0	0.0	8.6	0.0	13.7	0.0	13.6			
Incr Delay (d2), s/veh	0.2	0.1	0.0	0.0	0.2	0.0	0.4	0.0	0.3			
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
%ile BackOfQ(50%),veh/ln	0.2	0.0	0.0	0.0	0.9	0.0	0.2	0.0	0.1			
Unsig. Movement Delay, s/veh												
LnGrp Delay(d), s/veh	4.6	3.1	0.0	0.0	8.8	0.0	14.1	0.0	13.9			
LnGrp LOS	A	A			A		B		B			
Approach Vol, veh/h	776				292				54			
Approach Delay, s/veh	3.6				8.8				14.0			
Approach LOS	A				A				B			
Timer - Assigned Phs	2				5		6		8			
Phs Duration (G+Y+Rc), s	24.3				9.7		14.6		6.8			
Change Period (Y+Rc), s	4.6				4.6		4.6		4.6			
Max Green Setting (Gmax), s	82.2				22.4		55.2		22.4			
Max Q Clear Time (g_c+I1), s	6.9				4.1		6.0		2.6			
Green Ext Time (p_c), s	1.1				0.6		0.5		0.0			
Intersection Summary												
HCM 6th Ctrl Delay, s/veh			5.4									
HCM 6th LOS			A									

Intersection						
Int Delay, s/veh	66.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations						
Traffic Vol, veh/h	350	170	104	336	170	80
Future Vol, veh/h	350	170	104	336	170	80
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	-	-	0	-
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	79	79	79	79	79	79
Heavy Vehicles, %	2	2	2	2	2	2
Mvmt Flow	443	215	132	425	215	101
Major/Minor	Major1		Major2		Minor1	
Conflicting Flow All	0	0	658	0	1240	551
Stage 1	-	-	-	-	551	-
Stage 2	-	-	-	-	689	-
Critical Hdwy	-	-	4.12	-	6.42	6.22
Critical Hdwy Stg 1	-	-	-	-	5.42	-
Critical Hdwy Stg 2	-	-	-	-	5.42	-
Follow-up Hdwy	-	-	2.218	-	3.518	3.318
Pot Cap-1 Maneuver	-	-	930	-	~ 193	534
Stage 1	-	-	-	-	577	-
Stage 2	-	-	-	-	498	-
Platoon blocked, %	-	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	930	-	~ 157	534
Mov Cap-2 Maneuver	-	-	-	-	~ 157	-
Stage 1	-	-	-	-	577	-
Stage 2	-	-	-	-	405	-
Approach	EB		WB		NB	
HCM Control Delay, s/v	0		2.2		\$ 316.6	
HCM LOS	F					
Minor Lane/Major Mvmt	NBLn1	EBT	EBR	WBL	WBT	
Capacity (veh/h)	203	-	-	930	-	
HCM Lane V/C Ratio	1.559	-	-	0.142	-	
HCM Control Delay (s/veh)	\$ 316.6	-	-	9.5	0	
HCM Lane LOS	F	-	-	A	A	
HCM 95th %tile Q (veh)	20.1	-	-	0.5	-	
Notes						
~: Volume exceeds capacity		\$: Delay exceeds 300s		+: Computation Not Defined		*: All major volume in platoon

Intersection						
Int Delay, s/veh	9.1					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑	↗	↘	↑	↘	↗
Traffic Vol, veh/h	640	50	120	310	60	230
Future Vol, veh/h	640	50	120	310	60	230
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	435	400	-	220	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	83	83	83	83	83	83
Heavy Vehicles, %	1	1	1	1	1	1
Mvmt Flow	771	60	145	373	72	277
Major/Minor	Major1	Major2		Minor1		
Conflicting Flow All	0	0	831	0	1434	771
Stage 1	-	-	-	-	771	-
Stage 2	-	-	-	-	663	-
Critical Hdwy	-	-	4.11	-	6.41	6.21
Critical Hdwy Stg 1	-	-	-	-	5.41	-
Critical Hdwy Stg 2	-	-	-	-	5.41	-
Follow-up Hdwy	-	-	2.209	-	3.509	3.309
Pot Cap-1 Maneuver	-	-	806	-	148	402
Stage 1	-	-	-	-	458	-
Stage 2	-	-	-	-	514	-
Platoon blocked, %	-	-		-		
Mov Cap-1 Maneuver	-	-	806	-	121	402
Mov Cap-2 Maneuver	-	-	-	-	121	-
Stage 1	-	-	-	-	458	-
Stage 2	-	-	-	-	421	-
Approach	EB	WB		NB		
HCM Control Delay, s/v	0	2.9		39.9		
HCM LOS	E					
Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	121	402	-	-	806	-
HCM Lane V/C Ratio	0.597	0.689	-	-	0.179	-
HCM Control Delay (s/veh)	71.5	31.6	-	-	10.4	-
HCM Lane LOS	F	D	-	-	B	-
HCM 95th %tile Q (veh)	3	5	-	-	0.7	-

Future (2045) with Mitigation

HCM 6th Signalized Intersection Summary 8: Deschutes Way SW & Boston St SW

2045 with Mitigation
PM Peak Hour

						
Movement	WBL	WBR	NBT	NBR	SBL	SBT
Lane Configurations						
Traffic Volume (veh/h)	87	593	460	30	130	140
Future Volume (veh/h)	87	593	460	30	130	140
Initial Q (Qb), veh	0	0	0	0	0	0
Ped-Bike Adj(A_pbT)	1.00	0.97		0.99	1.00	
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach	No		No			No
Adj Sat Flow, veh/h/ln	1810	1885	1885	1885	1885	1885
Adj Flow Rate, veh/h	102	698	541	35	153	165
Peak Hour Factor	0.85	0.85	0.85	0.85	0.85	0.85
Percent Heavy Veh, %	1	1	1	1	1	1
Cap, veh/h	93	636	716	46	188	771
Arrive On Green	0.48	0.48	0.41	0.41	0.41	0.41
Sat Flow, veh/h	193	1320	1751	113	844	1885
Grp Volume(v), veh/h	801	0	0	576	153	165
Grp Sat Flow(s),veh/h/ln	1515	0	0	1864	844	1885
Q Serve(g_s), s	53.0	0.0	0.0	29.1	15.9	6.2
Cycle Q Clear(g_c), s	53.0	0.0	0.0	29.1	45.0	6.2
Prop In Lane	0.13	0.87		0.06	1.00	
Lane Grp Cap(c), veh/h	730	0	0	763	188	771
V/C Ratio(X)	1.10	0.00	0.00	0.76	0.82	0.21
Avail Cap(c_a), veh/h	730	0	0	763	188	771
HCM Platoon Ratio	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	0.00	0.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	28.5	0.0	0.0	27.8	48.6	21.0
Incr Delay (d2), s/veh	63.1	0.0	0.0	4.3	23.5	0.1
Initial Q Delay(d3), s/veh	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	31.3	0.0	0.0	13.7	5.5	2.8
Unsig. Movement Delay, s/veh						
LnGrp Delay(d), s/veh	91.6	0.0	0.0	32.1	72.1	21.2
LnGrp LOS	F			C	E	C
Approach Vol, veh/h	801		576			318
Approach Delay, s/veh	91.6		32.1			45.7
Approach LOS	F		C			D
Timer - Assigned Phs	2		6		8	
Phs Duration (G+Y+Rc), s	51.0		51.0		59.0	
Change Period (Y+Rc), s	6.0		6.0		6.0	
Max Green Setting (Gmax), s	45.0		45.0		53.0	
Max Q Clear Time (g_c+I1), s	31.1		47.0		55.0	
Green Ext Time (p_c), s	3.4		0.0		0.0	
Intersection Summary						
HCM 6th Ctrl Delay, s/veh			62.8			
HCM 6th LOS			E			

MOVEMENT SUMMARY

 **Site: 24 [9: Black Lake Blvd & Black Lake Belmore Rd (Site Folder: Tumwater)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Black Lake Blvd & Black Lake Belmore Rd
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]		[Total HV]					[Veh. veh	Dist]				
			veh/h	%	veh/h	%	v/c	sec			ft				mph
South: Black Lake Blvd															
8	T1	All MCs	189	1.0	189	1.0	0.251	4.2	LOS A	1.4	34.5	0.44	0.47	0.44	15.4
18	R2	All MCs	78	1.0	78	1.0	0.251	4.5	LOS A	1.4	34.5	0.44	0.47	0.44	27.3
Approach			267	1.0	267	1.0	0.251	4.3	LOS A	1.4	34.5	0.44	0.47	0.44	18.9
East: Black Lake Belmore Rd															
1	L2	All MCs	122	1.0	122	1.0	0.311	6.5	LOS A	1.8	45.3	0.42	0.45	0.42	26.8
16	R2	All MCs	222	1.0	222	1.0	0.311	2.3	LOS A	1.8	45.3	0.42	0.45	0.42	17.6
Approach			344	1.0	344	1.0	0.311	3.8	LOS A	1.8	45.3	0.42	0.45	0.42	21.2
North: Black Lake Blvd															
7	L2	All MCs	244	1.0	244	1.0	0.523	11.5	LOS B	4.0	99.7	0.43	0.55	0.43	28.5
4	T1	All MCs	367	1.0	367	1.0	0.523	5.8	LOS A	4.0	99.7	0.43	0.55	0.43	33.8
Approach			611	1.0	611	1.0	0.523	8.1	LOS A	4.0	99.7	0.43	0.55	0.43	31.5
All Vehicles			1222	1.0	1222	1.0	0.523	6.1	LOS A	4.0	99.7	0.43	0.50	0.43	25.6

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 **Site: 24 [11: 7th Ave & Linwood Ave (Site Folder: Tumwater)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

7th Ave & Linwood Ave
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]		[Total HV]					[Veh.	Dist]				
			veh/h	%	veh/h	%	v/c	sec		veh	ft				mph
South: 7th Ave															
3	L2	All MCs	1	2.0	1	2.0	0.004	2.2	LOS A	0.0	0.5	0.52	0.29	0.52	18.1
8	T1	All MCs	1	2.0	1	2.0	0.004	2.2	LOS A	0.0	0.5	0.52	0.29	0.52	18.1
18	R2	All MCs	1	2.0	1	2.0	0.004	2.2	LOS A	0.0	0.5	0.52	0.29	0.52	18.1
Approach			3	2.0	3	2.0	0.004	2.2	LOS A	0.0	0.5	0.52	0.29	0.52	18.1
East: Linwood Ave															
1	L2	All MCs	1	2.0	1	2.0	0.522	5.6	LOS A	4.3	109.7	0.20	0.17	0.20	18.6
6	T1	All MCs	333	2.0	333	2.0	0.522	0.6	LOS A	4.3	109.7	0.20	0.17	0.20	24.5
16	R2	All MCs	322	2.0	322	2.0	0.522	1.5	LOS A	4.3	109.7	0.20	0.17	0.20	24.4
Approach			657	2.0	657	2.0	0.522	1.0	LOS A	4.3	109.7	0.20	0.17	0.20	24.5
North: 7th Ave															
7	L2	All MCs	300	2.0	300	2.0	0.317	7.4	LOS A	1.7	43.8	0.52	0.61	0.52	22.9
4	T1	All MCs	1	2.0	1	2.0	0.317	5.8	LOS A	1.7	43.8	0.52	0.61	0.52	17.9
14	R2	All MCs	11	2.0	11	2.0	0.317	3.2	LOS A	1.7	43.8	0.52	0.61	0.52	23.0
Approach			312	2.0	312	2.0	0.317	7.3	LOS A	1.7	43.8	0.52	0.61	0.52	22.9
West: Linwood Ave															
5	L2	All MCs	22	2.0	22	2.0	0.192	7.0	LOS A	1.0	25.7	0.48	0.35	0.48	23.8
2	T1	All MCs	167	2.0	167	2.0	0.192	1.9	LOS A	1.0	25.7	0.48	0.35	0.48	24.0
12	R2	All MCs	1	2.0	1	2.0	0.192	4.1	LOS A	1.0	25.7	0.48	0.35	0.48	18.4
Approach			190	2.0	190	2.0	0.192	2.5	LOS A	1.0	25.7	0.48	0.35	0.48	23.9
All Vehicles			1162	2.0	1162	2.0	0.522	3.0	LOS A	4.3	109.7	0.33	0.31	0.33	23.9

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 **Site: 24 [39: 93rd Ave & Tilley Rd SW (Site Folder: Tumwater)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

93rd Ave & Tilley Rd SW
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]		[Total HV]					[Veh.]	[Dist]				
			veh/h	%	veh/h	%	v/c	sec		veh	ft				mph
South: Tilley Rd SW															
3	L2	All MCs	215	2.0	215	2.0	0.359	14.1	LOS B	2.2	55.3	0.64	0.71	0.64	34.6
18	R2	All MCs	101	2.0	101	2.0	0.359	8.2	LOS A	2.2	55.3	0.64	0.71	0.64	35.1
Approach			316	2.0	316	2.0	0.359	12.2	LOS B	2.2	55.3	0.64	0.71	0.64	34.8
East: 93rd Ave															
1	L2	All MCs	132	2.0	132	2.0	0.527	11.2	LOS B	4.0	100.8	0.58	0.56	0.58	35.5
6	T1	All MCs	425	2.0	425	2.0	0.527	5.6	LOS A	4.0	100.8	0.58	0.56	0.58	34.2
Approach			557	2.0	557	2.0	0.527	6.9	LOS A	4.0	100.8	0.58	0.56	0.58	34.5
West: 93rd Ave															
2	T1	All MCs	443	2.0	443	2.0	0.578	5.1	LOS A	4.9	123.9	0.51	0.48	0.51	35.0
12	R2	All MCs	215	2.0	215	2.0	0.578	5.1	LOS A	4.9	123.9	0.51	0.48	0.51	36.9
Approach			658	2.0	658	2.0	0.578	5.1	LOS A	4.9	123.9	0.51	0.48	0.51	35.6
All Vehicles			1532	2.0	1532	2.0	0.578	7.2	LOS A	4.9	123.9	0.56	0.56	0.56	35.0

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

MOVEMENT SUMMARY

 **Site: 24 [40: Old Hwy 99 & 93rd Ave (Site Folder: Tumwater)]**

Output produced by SIDRA INTERSECTION Version: 9.1.6.228

Old Hwy 99 & 93rd Ave
Site Category: (None)
Roundabout

Vehicle Movement Performance															
Mov ID	Turn	Mov Class	Demand Flows		Arrival Flows		Deg. Satn	Aver. Delay	Level of Service	95% Back Of Queue		Prop. Que	Eff. Stop Rate	Aver. No. of Cycles	Aver. Speed
			[Total HV]		[Total HV]					[Veh. veh	Dist]				
			veh/h	%	veh/h	%	v/c	sec			ft				mph
South: 93rd Ave															
3	L2	All MCs	72	1.0	72	1.0	0.559	18.0	LOS B	4.8	121.5	0.91	0.88	1.13	32.9
18	R2	All MCs	277	1.0	277	1.0	0.559	12.4	LOS B	4.8	121.5	0.91	0.88	1.13	33.3
Approach			349	1.0	349	1.0	0.559	13.6	LOS B	4.8	121.5	0.91	0.88	1.13	33.2
East: Old Hwy 99															
1	L2	All MCs	145	1.0	145	1.0	0.431	11.8	LOS B	3.3	84.4	0.34	0.52	0.34	36.4
6	T1	All MCs	373	1.0	373	1.0	0.431	6.2	LOS A	3.3	84.4	0.34	0.52	0.34	39.9
Approach			518	1.0	518	1.0	0.431	7.8	LOS A	3.3	84.4	0.34	0.52	0.34	38.9
West: Old Hwy 99															
2	T1	All MCs	771	1.0	771	1.0	0.725	7.4	LOS A	7.5	188.0	0.64	0.54	0.64	39.6
12	R2	All MCs	60	1.0	60	1.0	0.725	7.1	LOS A	7.5	188.0	0.64	0.54	0.64	36.5
Approach			831	1.0	831	1.0	0.725	7.3	LOS A	7.5	188.0	0.64	0.54	0.64	39.3
All Vehicles			1699	1.0	1699	1.0	0.725	8.7	LOS A	7.5	188.0	0.60	0.61	0.65	37.8

Site Level of Service (LOS) Method: Delay & Degree of Saturation (SIDRA). Site LOS Method is specified in the Parameter Settings dialog (Options tab).

Roundabout LOS Method: Same as Signalised Intersections.

Vehicle movement LOS values are based on average delay and v/c ratio (degree of saturation) per movement.

Intersection and Approach LOS values are based on average delay for all movements (v/c not used).

Roundabout Capacity Model: SIDRA HCM.

Delay Model: SIDRA Standard (Control Delay: Geometric Delay is included).

Queue Model: SIDRA queue estimation methods are used for Back of Queue and Queue at Start of Gap.

Gap-Acceptance Capacity Formula: SIDRA Standard (Akçelik M3D).

HV (%) values are calculated for All Movement Classes of All Heavy Vehicle Model Designation.

Arrival Flows used in performance calculations are adjusted to include any Initial Queued Demand and Upstream Capacity Constraint effects.

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Project: C:\fpbox\Box\Projects\TC-Projects\2024\TC24-0105_Tumwater Transportation Master Plan and Impact Fees\Analysis\Operation Analysis\2050 Mitigation\Sidra\2050.sip9