

OUR MAIN STREET SPRINGFIELD



MAIN STREET SAFETY PROJECT | 20th Street to 72nd Street

TECHNICAL MEMORANDUM #5: EXISTING INTERSECTION OPERATIONS

DATE: February 17, 2019

TO: Molly Markarian | City of Springfield
Bill Johnston | ODOT Region 2

FROM: Kayla Fleskes, Garth Appanaitis, | DKS Associates

SUBJECT: Task 4.3: Existing Intersection Operations Memo
Tech Memo #5: Final

DKS Project 14180-023

This memorandum summarizes existing intersection operations for the Main Street (OR 126) corridor in the City of Springfield, Oregon. The analyzed corridor includes 15 intersections and is an approximately five-mile segment on Main Street (also known as OR 126 or the McKenzie Highway). *Technical Memorandum #4: Transportation Analysis Methods and Assumptions (TM#4)* includes information about analysis methods, traffic counts, and traffic volume factoring for peak seasonal demands, while *Technical Memorandum #6: Existing Transportation Conditions (TM #6)* provides a summary of the traffic volumes at identified intersections during the peak hours (and other aspects of the existing transportation system).

MOBILITY STANDARDS

Agency mobility standards often require intersections to meet level of service (LOS) or volume-to-capacity (V/C) intersection operation thresholds.

- The intersection LOS is similar to a “report card” rating based upon average vehicle delay. Level of service A, B, and C indicate conditions where traffic moves without significant delays over periods of peak hour travel demand. Level of service D and E are progressively more congested operating conditions with more motor vehicle delay. Level of service F represents conditions where average motor vehicle delay has become excessive and demand has exceeded capacity. This condition is typically evident in long queues and delays.





- The volume-to-capacity (V/C) ratio represents the level of saturation of the intersection or individual movement. It is determined by dividing the peak hour traffic volume by the maximum hourly capacity of an intersection or turn movement. When the V/C ratio approaches 0.95, operations become unstable and small disruptions can cause the traffic flow to break down, as seen by the formation of excessive queues.

The entire Main Street (OR 126) corridor is located within the City of Springfield, serves as a regional route for the larger Eugene-Springfield Metropolitan Area, and is an Oregon Department of Transportation (ODOT) facility classified as a Statewide Highway. According to the *1999 Oregon Highway Plan (OHP)*, ODOT mobility standards are given as V/C ratios and are based on the highway category. The mobility standards¹ for Main Street (OR 126) are listed in Table 1. The City of Springfield’s standards (which are based on LOS rather than ODOT’s V/C metric) are also listed in Table 1.

Table 1. Main Street Intersection Mobility Standards

Major Roadway	Jurisdiction	Mobility Standard
Main Street (OR 126)	ODOT (Statewide Highway)	0.90 v/c ¹ (0.95 for unsignalized side street approaches)
Main Street (OR 126)	City of Springfield	LOS D or better

¹ The intersection of Bob Straub Parkway and OR 126B is classified a Statewide Expressway, with a mobility standard of 0.85 v/c.

EXISTING INTERSECTION OPERATIONS

The existing performance of the intersections was evaluated using Synchro™ software, which employs methodology from the *Highway Capacity Manual 6th Edition*.² Traffic counts were conducted on Tuesday, May 22, 2018 during the a.m. (7:00 a.m. to 9:00 a.m.) and p.m. (4:00 p.m. to 6:00 p.m.) peak periods. The traffic volumes were balanced and seasonally adjusted to represent the 30th highest hour traffic conditions, as described in the *Transportation Analysis Methods and Assumptions Memorandum (TM #4)*. The traffic volumes and transportation system configurations described in TM #6 were evaluated to determine intersection levels of service (LOS) and volume-to-capacity (V/C) ratios. Intersection signal timing parameters were obtained from the City of Springfield and used in the analysis.

The results of the intersection operations analysis are listed in Table 2. All of the intersections meet ODOT mobility standards (0.90 for signalized and 0.95 for unsignalized approaches) for existing conditions with a V/C of 0.82 or better at all locations. During the p.m. peak hour, three unsignalized intersections fail to meet City of Springfield mobility standards while only one unsignalized intersection fails to meet City of Springfield mobility

¹ City of Springfield and ODOT are in the process of evaluating and potentially approving alternative v/c mobility targets for the Main Street/42nd Street intersection and the Main Street/Bob Straub Parkway intersection that would allow for more motor vehicle delay than the 0.90 v/c mobility standard that is currently approved for those locations.

² *Highway Capacity Manual 6th Edition*, Transportation Research Board, Washington, D.C., 2016.



standards during the a.m. peak hour. The unsignalized side street approaches at 30th Street, 35th Street, 48th Street experience long delays, operating at LOS E or F. All three intersections have low side street traffic volumes (90 or less vehicles on each approach lane) during each peak hour. Side street traffic from 30th Street or 48th Street do not have a nearby signalized intersection to access Main Street. However, northbound traffic along 35th Street could instead use the signalized intersection at 32nd Street to avoid delay at the unsignalized intersection of 35th Street. HCM 6 reports are provided in Appendix A (Note: For signalized intersections, an intersection v/c ratio is not directly reported in Synchro but was calculated using HCM 6 Equations 19-30 and 19-31).

Table 2. Main Street Existing Peak Hour Intersection Operations

Intersection	Control Type	A.M. Peak Hour			P.M. Peak Hour		
		Average Delay (s)	LOS	V/C	Average Delay (s)	LOS	V/C
<i>Signalized Intersections¹</i>							
21st Street	Signalized	8.0	A	0.41	8.9	A	0.46
28th Street	Signalized	24.6	C	0.72	37.3	D	0.82
S. 32nd Street	Signalized	15.4	B	0.48	19.8	B	0.70
42nd Street	Signalized	33.9	C	0.78	36.8	D	0.80
54th Street	Signalized	10.1	B	0.34	14.3	B	0.39
Bob Straub Pkwy	Signalized	54.7	D	0.58	49.0	D	0.79
58th Street	Signalized	51.7	D	0.82	46.4	D	0.76
69th Street	Signalized	10.5	B	0.45	8.8	A	0.38
<i>Unsignalized Intersections²</i>							
30th Street	Unsignalized	36.0	E	0.14	40.1	E	0.32
35th Street	Unsignalized	18.2	C	0.14	36.4	E	0.20
36th Street	Unsignalized	13.5	B	0.07	13.4	B	0.09
41st Street	Unsignalized	14.6	B	0.08	23.7	C	0.13
48th Street	Unsignalized	23.6	C	0.21	88.8	F	0.48
S 51st Street	Unsignalized	14.8	B	0.24	12.5	B	0.12
62nd Place	Unsignalized	14.8	B	0.16	11.5	B	0.07

¹ For signalized intersections, results reported for the intersection as a whole.

² For unsignalized intersections, results reported for the worst side street approach. The major approach (Main Street) does not experience significant delay at the unsignalized intersections.

Bold/Shaded indicates not meeting City of Springfield mobility standards. These unsignalized intersections have low side street volumes (90 vehicles or less on each approach lane) and delay does not significantly impact the major approach (Main Street).



APPENDIX A – HCM 6 INTERSECTION REPORTS

HCM 6th Signalized Intersection Summary

101: 21st St & OR 126

01/23/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕			↕			↕	↖
Traffic Volume (veh/h)	22	453	9	7	830	35	6	0	9	26	2	55
Future Volume (veh/h)	22	453	9	7	830	35	6	0	9	26	2	55
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		1.00	0.99		0.99	0.99		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1750	1068	1068	781	1695	1695	1750	1750	1750	1750	1750	1668
Adj Flow Rate, veh/h	25	521	10	8	954	40	7	0	10	30	2	63
Peak Hour Factor	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87	0.87
Percent Heavy Veh, %	0	50	50	71	4	4	0	0	0	0	0	6
Cap, veh/h	57	981	19	16	1479	62	213	19	110	381	20	180
Arrive On Green	0.03	0.48	0.45	0.02	0.47	0.44	0.10	0.00	0.10	0.10	0.13	0.13
Sat Flow, veh/h	1667	2035	39	744	3150	132	448	151	856	1300	159	1404
Grp Volume(v), veh/h	25	259	272	8	488	506	17	0	0	32	0	63
Grp Sat Flow(s),veh/h/ln	1667	1014	1060	744	1611	1671	1455	0	0	1458	0	1404
Q Serve(g_s), s	0.5	5.8	5.8	0.3	7.5	7.5	0.0	0.0	0.0	0.3	0.0	1.3
Cycle Q Clear(g_c), s	0.5	5.8	5.8	0.3	7.5	7.5	0.3	0.0	0.0	0.6	0.0	1.3
Prop In Lane	1.00		0.04	1.00		0.08	0.41		0.59	0.94		1.00
Lane Grp Cap(c), veh/h	57	489	511	16	756	785	298	0	0	357	0	180
V/C Ratio(X)	0.44	0.53	0.53	0.49	0.65	0.65	0.06	0.00	0.00	0.09	0.00	0.35
Avail Cap(c_a), veh/h	562	1586	1658	251	2519	2614	1290	0	0	1358	0	1162
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	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	15.4	5.9	5.9	15.8	6.6	6.6	13.0	0.0	0.0	13.1	0.0	13.0
Incr Delay (d2), s/veh	4.0	0.9	0.9	16.3	0.9	0.9	0.1	0.0	0.0	0.1	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	0.2	0.8	0.8	0.1	1.4	1.4	0.1	0.0	0.0	0.2	0.0	0.4
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	19.4	6.8	6.8	32.0	7.5	7.5	13.0	0.0	0.0	13.1	0.0	13.8
LnGrp LOS	B	A	A	C	A	A	B	A	A	B	A	B
Approach Vol, veh/h		556			1002			17				95
Approach Delay, s/veh		7.3			7.7			13.0				13.6
Approach LOS		A			A			B				B
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.7	19.7		8.2	5.1	19.3		8.2				
Change Period (Y+Rc), s	4.5	5.0		5.0	4.5	5.0		5.0				
Max Green Setting (Gmax), s	10.5	50.0		26.0	10.5	50.0		26.0				
Max Q Clear Time (g_c+I1), s	2.3	7.8		2.3	2.5	9.5		3.3				
Green Ext Time (p_c), s	0.0	2.5		0.0	0.0	4.7		0.3				
Intersection Summary												
HCM 6th Ctrl Delay				8.0								
HCM 6th LOS				A								

HCM 6th Signalized Intersection Summary

102: 28th St & OR 126

01/23/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗			↕		↖	↗	
Traffic Volume (veh/h)	39	434	26	19	860	330	16	30	30	166	93	73
Future Volume (veh/h)	39	434	26	19	860	330	16	30	30	166	93	73
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		0.99	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	1750	1409	1409	1108	1709	1709	1095	1095	1095	1695	1259	1259
Adj Flow Rate, veh/h	39	438	0	19	869	333	16	30	30	168	94	74
Peak Hour Factor	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99	0.99
Percent Heavy Veh, %	0	25	25	47	3	3	48	48	48	4	36	36
Cap, veh/h	68	1261		29	1050	401	21	38	38	314	127	100
Arrive On Green	0.04	0.47	0.00	0.03	0.46	0.44	0.08	0.10	0.08	0.19	0.19	0.19
Sat Flow, veh/h	1667	2747	0	1056	2293	875	213	400	400	1615	652	514
Grp Volume(v), veh/h	39	438	0	19	614	588	76	0	0	168	0	168
Grp Sat Flow(s),veh/h/ln	1667	1338	0	1056	1624	1544	1012	0	0	1615	0	1166
Q Serve(g_s), s	1.7	7.9	0.0	1.4	25.1	25.4	5.6	0.0	0.0	7.1	0.0	10.3
Cycle Q Clear(g_c), s	1.7	7.9	0.0	1.4	25.1	25.4	5.6	0.0	0.0	7.1	0.0	10.3
Prop In Lane	1.00		0.00	1.00		0.57	0.21		0.39	1.00		0.44
Lane Grp Cap(c), veh/h	68	1261		29	743	707	97	0	0	314	0	227
V/C Ratio(X)	0.57	0.35		0.65	0.83	0.83	0.78	0.00	0.00	0.54	0.00	0.74
Avail Cap(c_a), veh/h	241	1445		153	876	834	280	0	0	659	0	476
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	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	35.8	12.7	0.0	36.6	18.0	18.3	33.8	0.0	0.0	27.5	0.0	28.8
Incr Delay (d2), s/veh	7.3	0.2	0.0	21.5	5.7	6.2	17.2	0.0	0.0	1.5	0.0	5.1
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	0.8	2.1	0.0	0.5	9.4	9.2	1.8	0.0	0.0	2.7	0.0	3.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	43.1	12.9	0.0	58.0	23.7	24.5	51.0	0.0	0.0	29.1	0.0	33.9
LnGrp LOS	D	B		E	C	C	D	A	A	C	A	C
Approach Vol, veh/h		477	A		1221			76			336	
Approach Delay, s/veh		15.3			24.6			51.0			31.5	
Approach LOS		B			C			D			C	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	6.1	39.8		18.8	7.1	38.8		11.3				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	10.0	40.0		30.0	10.0	40.0		20.0				
Max Q Clear Time (g_c+I1), s	3.4	9.9		12.3	3.7	27.4		7.6				
Green Ext Time (p_c), s	0.0	3.1		1.5	0.0	6.4		0.3				

Intersection Summary

HCM 6th Ctrl Delay	24.6
HCM 6th LOS	C

Notes

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

Intersection						
Int Delay, s/veh	1.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↖	↗	↗		↖	↖
Traffic Vol, veh/h	74	565	1145	48	18	63
Future Vol, veh/h	74	565	1145	48	18	63
Conflicting Peds, #/hr	9	0	0	9	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	80	-	-	-	150	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	11	8	4	3	16	2
Mvmt Flow	79	601	1218	51	19	67

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	1278	0	-	0	1713 644
Stage 1	-	-	-	-	1253 -
Stage 2	-	-	-	-	460 -
Critical Hdwy	4.32	-	-	-	7.12 6.94
Critical Hdwy Stg 1	-	-	-	-	6.12 -
Critical Hdwy Stg 2	-	-	-	-	6.12 -
Follow-up Hdwy	2.31	-	-	-	3.66 3.32
Pot Cap-1 Maneuver	493	-	-	-	70 416
Stage 1	-	-	-	-	207 -
Stage 2	-	-	-	-	563 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	489	-	-	-	58 413
Mov Cap-2 Maneuver	-	-	-	-	135 -
Stage 1	-	-	-	-	172 -
Stage 2	-	-	-	-	559 -

Approach	EB	WB	SB
HCM Control Delay, s	1.6	0	20
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	489	-	-	-	135	413
HCM Lane V/C Ratio	0.161	-	-	-	0.142	0.162
HCM Control Delay (s)	13.8	-	-	-	36	15.4
HCM Lane LOS	B	-	-	-	E	C
HCM 95th %tile Q(veh)	0.6	-	-	-	0.5	0.6

HCM 6th Signalized Intersection Summary

104: S 32nd St/32nd St & OR 126

01/23/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↑↑	↘	↗	↑↑		↗	↘		↗	↘	
Traffic Volume (veh/h)	20	354	214	93	728	21	258	203	54	6	1	5
Future Volume (veh/h)	20	354	214	93	728	21	258	203	54	6	1	5
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		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	1750	1709	1750	1682	1682	1682	1709	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	21	369	223	97	758	22	269	211	56	6	1	5
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	0	3	0	5	5	5	3	0	0	0	0	0
Cap, veh/h	43	987	438	136	1150	33	392	321	85	44	7	34
Arrive On Green	0.03	0.30	0.30	0.09	0.36	0.35	0.24	0.24	0.23	0.03	0.03	0.02
Sat Flow, veh/h	1667	3247	1439	1602	3168	92	1628	1332	354	1667	253	1264
Grp Volume(v), veh/h	21	369	223	97	382	398	269	0	267	6	0	6
Grp Sat Flow(s),veh/h/ln	1667	1624	1439	1602	1598	1662	1628	0	1686	1667	0	1517
Q Serve(g_s), s	0.6	4.2	5.9	2.7	9.3	9.3	7.0	0.0	6.7	0.2	0.0	0.2
Cycle Q Clear(g_c), s	0.6	4.2	5.9	2.7	9.3	9.3	7.0	0.0	6.7	0.2	0.0	0.2
Prop In Lane	1.00		1.00	1.00		0.06	1.00		0.21	1.00		0.83
Lane Grp Cap(c), veh/h	43	987	438	136	580	603	392	0	406	44	0	40
V/C Ratio(X)	0.48	0.37	0.51	0.71	0.66	0.66	0.69	0.00	0.66	0.13	0.00	0.15
Avail Cap(c_a), veh/h	393	3553	1575	378	1748	1819	1100	0	1139	1091	0	993
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	22.4	12.7	13.4	20.8	12.4	12.5	16.1	0.0	16.0	22.2	0.0	22.4
Incr Delay (d2), s/veh	6.1	0.2	0.9	5.1	1.3	1.2	1.6	0.0	1.4	1.0	0.0	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	0.3	1.3	1.7	1.1	2.8	2.9	2.3	0.0	2.3	0.1	0.0	0.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	28.5	13.0	14.3	25.8	13.7	13.7	17.7	0.0	17.4	23.2	0.0	23.6
LnGrp LOS	C	B	B	C	B	B	B	A	B	C	A	C
Approach Vol, veh/h		613			877			536				12
Approach Delay, s/veh		14.0			15.0			17.5				23.4
Approach LOS		B			B			B				C
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.0	18.2		15.2	5.2	20.9		5.2				
Change Period (Y+Rc), s	4.5	4.8		4.5	4.5	4.8		4.5				
Max Green Setting (Gmax), s	10.5	50.2		31.0	10.5	50.2		30.0				
Max Q Clear Time (g_c+I1), s	4.7	7.9		9.0	2.6	11.3		2.2				
Green Ext Time (p_c), s	0.1	2.9		1.6	0.0	3.4		0.0				
Intersection Summary												
HCM 6th Ctrl Delay				15.4								
HCM 6th LOS				B								

Intersection												
Int Delay, s/veh	0.9											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕			↕			↕	↕
Traffic Vol, veh/h	5	404	13	3	782	5	10	0	14	15	0	29
Future Vol, veh/h	5	404	13	3	782	5	10	0	14	15	0	29
Conflicting Peds, #/hr	11	0	2	2	0	11	1	0	0	0	0	1
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	100	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	10	0	0	5	25	0	0	13	8	0	0
Mvmt Flow	5	416	13	3	806	5	10	0	14	15	0	30

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	822	0	0	431	0	0	845	1263	217	1044	1267	418
Stage 1	-	-	-	-	-	-	435	435	-	826	826	-
Stage 2	-	-	-	-	-	-	410	828	-	218	441	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.5	6.5	7.16	7.66	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.66	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.66	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.5	4	3.43	3.58	4	3.3
Pot Cap-1 Maneuver	816	-	-	1139	-	-	259	171	755	175	170	589
Stage 1	-	-	-	-	-	-	575	584	-	320	389	-
Stage 2	-	-	-	-	-	-	595	389	-	747	580	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	809	-	-	1137	-	-	243	168	754	169	167	583
Mov Cap-2 Maneuver	-	-	-	-	-	-	243	168	-	169	167	-
Stage 1	-	-	-	-	-	-	570	579	-	315	384	-
Stage 2	-	-	-	-	-	-	563	384	-	728	575	-

Approach	EB	WB	NB	SB
HCM Control Delay, s	0.1	0	14.5	18.2
HCM LOS			B	C

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	402	809	-	-	1137	-	-	318
HCM Lane V/C Ratio	0.062	0.006	-	-	0.003	-	-	0.143
HCM Control Delay (s)	14.5	9.5	-	-	8.2	-	-	18.2
HCM Lane LOS	B	A	-	-	A	-	-	C
HCM 95th %tile Q(veh)	0.2	0	-	-	0	-	-	0.5

Intersection						
Int Delay, s/veh	0.4					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↑↑	↑↑		↘	
Traffic Vol, veh/h	10	426	760	5	8	21
Future Vol, veh/h	10	426	760	5	8	21
Conflicting Peds, #/hr	11	0	0	11	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	0	10	6	0	13	14
Mvmt Flow	10	439	784	5	8	22

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	800	0	-	0	1038 406
Stage 1	-	-	-	-	798 -
Stage 2	-	-	-	-	240 -
Critical Hdwy	4.1	-	-	-	7.06 7.18
Critical Hdwy Stg 1	-	-	-	-	6.06 -
Critical Hdwy Stg 2	-	-	-	-	6.06 -
Follow-up Hdwy	2.2	-	-	-	3.63 3.44
Pot Cap-1 Maneuver	832	-	-	-	209 562
Stage 1	-	-	-	-	377 -
Stage 2	-	-	-	-	745 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	824	-	-	-	203 557
Mov Cap-2 Maneuver	-	-	-	-	300 -
Stage 1	-	-	-	-	369 -
Stage 2	-	-	-	-	738 -

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	13.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	824	-	-	-	451
HCM Lane V/C Ratio	0.013	-	-	-	0.066
HCM Control Delay (s)	9.4	-	-	-	13.5
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection						
Int Delay, s/veh	0.3					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↑↑	↑↑		↘	
Traffic Vol, veh/h	7	429	721	15	12	11
Future Vol, veh/h	7	429	721	15	12	11
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	10	10	5	5	9	9
Mvmt Flow	7	452	759	16	13	12

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	775	0	-	0	1007 388
Stage 1	-	-	-	-	767 -
Stage 2	-	-	-	-	240 -
Critical Hdwy	4.3	-	-	-	6.98 7.08
Critical Hdwy Stg 1	-	-	-	-	5.98 -
Critical Hdwy Stg 2	-	-	-	-	5.98 -
Follow-up Hdwy	2.3	-	-	-	3.59 3.39
Pot Cap-1 Maneuver	786	-	-	-	226 591
Stage 1	-	-	-	-	401 -
Stage 2	-	-	-	-	757 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	786	-	-	-	224 591
Mov Cap-2 Maneuver	-	-	-	-	323 -
Stage 1	-	-	-	-	397 -
Stage 2	-	-	-	-	757 -

Approach	EB	WB	SB
HCM Control Delay, s	0.2	0	14.3
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	786	-	-	-	412
HCM Lane V/C Ratio	0.009	-	-	-	0.059
HCM Control Delay (s)	9.6	-	-	-	14.3
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0	-	-	-	0.2

Intersection						
Int Delay, s/veh	0.9					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑	↖	↖
Traffic Vol, veh/h	419	22	18	705	31	49
Future Vol, veh/h	419	22	18	705	31	49
Conflicting Peds, #/hr	0	1	1	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	75	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	95	95	95	95	95	95
Heavy Vehicles, %	9	19	5	5	3	4
Mvmt Flow	441	23	19	742	33	52

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	465	0	863 233
Stage 1	-	-	-	-	454 -
Stage 2	-	-	-	-	409 -
Critical Hdwy	-	-	4.2	-	6.86 6.98
Critical Hdwy Stg 1	-	-	-	-	5.86 -
Critical Hdwy Stg 2	-	-	-	-	5.86 -
Follow-up Hdwy	-	-	2.25	-	3.53 3.34
Pot Cap-1 Maneuver	-	-	1072	-	292 763
Stage 1	-	-	-	-	603 -
Stage 2	-	-	-	-	636 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	1071	-	286 762
Mov Cap-2 Maneuver	-	-	-	-	406 -
Stage 1	-	-	-	-	592 -
Stage 2	-	-	-	-	636 -

Approach	EB	WB	NB
HCM Control Delay, s	0	0.2	11.8
HCM LOS			B

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	406	762	-	-	1071	-
HCM Lane V/C Ratio	0.08	0.068	-	-	0.018	-
HCM Control Delay (s)	14.6	10.1	-	-	8.4	-
HCM Lane LOS	B	B	-	-	A	-
HCM 95th %tile Q(veh)	0.3	0.2	-	-	0.1	-

HCM 6th Signalized Intersection Summary

109: 42nd St & OR 126

01/23/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	137	285	48	76	501	196	163	375	46	186	151	94
Future Volume (veh/h)	137	285	48	76	501	196	163	375	46	186	151	94
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		0.99	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	1750	1723	1723	1641	1668	1668	1723	1695	1695	1682	1723	1600
Adj Flow Rate, veh/h	140	291	49	78	511	200	166	383	47	190	154	96
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, %	0	2	2	8	6	6	2	4	4	5	2	11
Cap, veh/h	154	906	151	78	624	243	184	432	53	208	534	519
Arrive On Green	0.09	0.32	0.31	0.05	0.28	0.27	0.11	0.29	0.29	0.13	0.31	0.29
Sat Flow, veh/h	1667	2805	466	1563	2223	866	1641	1480	182	1602	1723	1349
Grp Volume(v), veh/h	140	168	172	78	363	348	166	0	430	190	154	96
Grp Sat Flow(s),veh/h/ln	1667	1637	1635	1563	1585	1505	1641	0	1662	1602	1723	1349
Q Serve(g_s), s	6.9	6.4	6.6	4.1	17.7	17.9	8.3	0.0	20.5	9.7	5.6	3.9
Cycle Q Clear(g_c), s	6.9	6.4	6.6	4.1	17.7	17.9	8.3	0.0	20.5	9.7	5.6	3.9
Prop In Lane	1.00		0.29	1.00		0.58	1.00		0.11	1.00		1.00
Lane Grp Cap(c), veh/h	154	528	528	78	445	422	184	0	485	208	534	519
V/C Ratio(X)	0.91	0.32	0.33	0.99	0.82	0.82	0.90	0.00	0.89	0.91	0.29	0.19
Avail Cap(c_a), veh/h	271	770	769	217	707	672	366	0	742	319	728	670
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	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	37.3	21.2	21.3	39.3	27.8	28.2	36.4	0.0	28.1	35.6	21.7	16.9
Incr Delay (d2), s/veh	10.2	0.3	0.3	27.3	3.2	3.6	6.4	0.0	5.9	16.6	0.1	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	3.2	2.4	2.5	2.1	6.7	6.6	3.6	0.0	8.6	4.7	2.2	1.2
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	47.5	21.4	21.6	66.7	31.0	31.8	42.8	0.0	33.9	52.2	21.8	17.0
LnGrp LOS	D	C	C	E	C	C	D	A	C	D	C	B
Approach Vol, veh/h		480			789			596				440
Approach Delay, s/veh		29.1			34.9			36.4				33.9
Approach LOS		C			C			D				C
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	8.7	30.8	15.3	28.2	12.2	27.3	13.8	29.7				
Change Period (Y+Rc), s	3.5	5.0	3.5	4.5	3.5	5.0	3.5	4.5				
Max Green Setting (Gmax), s	12.5	38.0	17.5	36.5	14.5	36.0	19.5	34.5				
Max Q Clear Time (g_c+I1), s	6.1	8.6	11.7	22.5	8.9	19.9	10.3	7.6				
Green Ext Time (p_c), s	0.1	1.0	0.2	0.9	0.1	2.1	0.2	0.6				

Intersection Summary

HCM 6th Ctrl Delay	33.9
HCM 6th LOS	C

Notes

User approved changes to right turn type.

Intersection												
Int Delay, s/veh	2.1											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↕		↖	↕		↖	↕			↕	
Traffic Vol, veh/h	19	395	15	6	631	2	49	12	12	5	2	40
Future Vol, veh/h	19	395	15	6	631	2	49	12	12	5	2	40
Conflicting Peds, #/hr	0	0	1	1	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	150	-	-	150	-	-	150	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	94	94	94	94	94	94	94	94	94	94	94	94
Heavy Vehicles, %	0	7	8	17	5	25	0	0	10	0	0	10
Mvmt Flow	20	420	16	6	671	2	52	13	13	5	2	43

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	673	0	0	437	0	0	818	1154	219	941	1161	337
Stage 1	-	-	-	-	-	-	469	469	-	684	684	-
Stage 2	-	-	-	-	-	-	349	685	-	257	477	-
Critical Hdwy	4.1	-	-	4.44	-	-	7.5	6.5	7.1	7.5	6.5	7.1
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.37	-	-	3.5	4	3.4	3.5	4	3.4
Pot Cap-1 Maneuver	927	-	-	1020	-	-	271	199	761	221	197	636
Stage 1	-	-	-	-	-	-	549	564	-	410	452	-
Stage 2	-	-	-	-	-	-	646	451	-	731	559	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	927	-	-	1019	-	-	245	193	760	202	191	636
Mov Cap-2 Maneuver	-	-	-	-	-	-	245	193	-	202	191	-
Stage 1	-	-	-	-	-	-	537	551	-	401	449	-
Stage 2	-	-	-	-	-	-	596	448	-	687	546	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.4			0.1			21.7			13.4		
HCM LOS							C			B		

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	245	308	927	-	-	1019	-	-	479
HCM Lane V/C Ratio	0.213	0.083	0.022	-	-	0.006	-	-	0.104
HCM Control Delay (s)	23.6	17.7	9	-	-	8.6	-	-	13.4
HCM Lane LOS	C	C	A	-	-	A	-	-	B
HCM 95th %tile Q(veh)	0.8	0.3	0.1	-	-	0	-	-	0.3

Intersection						
Int Delay, s/veh	2					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	65	316	549	61	35	70
Future Vol, veh/h	65	316	549	61	35	70
Conflicting Peds, #/hr	5	0	0	5	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	25	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	90	90	90	90	90	90
Heavy Vehicles, %	5	8	5	3	8	6
Mvmt Flow	72	351	610	68	39	78

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	683	0	-	0	969 344
Stage 1	-	-	-	-	649 -
Stage 2	-	-	-	-	320 -
Critical Hdwy	4.2	-	-	-	6.96 7.02
Critical Hdwy Stg 1	-	-	-	-	5.96 -
Critical Hdwy Stg 2	-	-	-	-	5.96 -
Follow-up Hdwy	2.25	-	-	-	3.58 3.36
Pot Cap-1 Maneuver	886	-	-	-	241 640
Stage 1	-	-	-	-	466 -
Stage 2	-	-	-	-	691 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	882	-	-	-	220 637
Mov Cap-2 Maneuver	-	-	-	-	325 -
Stage 1	-	-	-	-	426 -
Stage 2	-	-	-	-	688 -

Approach	EB	WB	SB
HCM Control Delay, s	1.6	0	14.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	882	-	-	-	483
HCM Lane V/C Ratio	0.082	-	-	-	0.242
HCM Control Delay (s)	9.4	-	-	-	14.8
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.3	-	-	-	0.9

Intersection						
Int Delay, s/veh	0.7					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	22	516	1100	4	1	63
Future Vol, veh/h	22	516	1100	4	1	63
Conflicting Peds, #/hr	6	0	0	6	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	11	10	4	0	0	3
Mvmt Flow	23	549	1170	4	1	67

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	1180	0	-	0	1499 593
Stage 1	-	-	-	-	1178 -
Stage 2	-	-	-	-	321 -
Critical Hdwy	4.32	-	-	-	6.8 6.96
Critical Hdwy Stg 1	-	-	-	-	5.8 -
Critical Hdwy Stg 2	-	-	-	-	5.8 -
Follow-up Hdwy	2.31	-	-	-	3.5 3.33
Pot Cap-1 Maneuver	539	-	-	-	115 446
Stage 1	-	-	-	-	259 -
Stage 2	-	-	-	-	714 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	536	-	-	-	109 444
Mov Cap-2 Maneuver	-	-	-	-	201 -
Stage 1	-	-	-	-	247 -
Stage 2	-	-	-	-	710 -

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	14.8
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	536	-	-	-	436
HCM Lane V/C Ratio	0.044	-	-	-	0.156
HCM Control Delay (s)	12	-	-	-	14.8
HCM Lane LOS	B	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.5

HCM 6th Signalized Intersection Summary

101: 21st St & OR 126

01/23/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	49	1032	5	3	709	53	15	8	14	57	2	49
Future Volume (veh/h)	49	1032	5	3	709	53	15	8	14	57	2	49
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	0.98		0.98	0.98		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	1750	1573	1573	1300	1695	1695	1750	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	51	1064	5	3	731	55	15	8	14	59	2	51
Peak Hour Factor	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97	0.97
Percent Heavy Veh, %	0	13	13	33	4	4	0	0	0	0	0	0
Cap, veh/h	80	1518	7	20	1412	106	196	97	96	416	11	243
Arrive On Green	0.05	0.50	0.47	0.02	0.47	0.44	0.14	0.17	0.14	0.14	0.17	0.17
Sat Flow, veh/h	1667	3049	14	1238	3034	228	366	582	577	1364	69	1459
Grp Volume(v), veh/h	51	521	548	3	388	398	37	0	0	61	0	51
Grp Sat Flow(s),veh/h/ln	1667	1494	1570	1238	1611	1651	1525	0	0	1433	0	1459
Q Serve(g_s), s	1.1	10.1	10.1	0.1	6.4	6.4	0.0	0.0	0.0	0.6	0.0	1.1
Cycle Q Clear(g_c), s	1.1	10.1	10.1	0.1	6.4	6.4	0.7	0.0	0.0	1.3	0.0	1.1
Prop In Lane	1.00		0.01	1.00		0.14	0.41		0.38	0.97		1.00
Lane Grp Cap(c), veh/h	80	744	781	20	750	768	348	0	0	389	0	243
V/C Ratio(X)	0.64	0.70	0.70	0.15	0.52	0.52	0.11	0.00	0.00	0.16	0.00	0.21
Avail Cap(c_a), veh/h	489	2033	2136	363	2191	2247	1158	0	0	1163	0	1051
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	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	17.5	7.3	7.3	18.2	7.1	7.1	13.7	0.0	0.0	14.0	0.0	13.5
Incr Delay (d2), s/veh	6.0	1.2	1.2	2.7	0.6	0.5	0.1	0.0	0.0	0.1	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	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	0.5	2.1	2.2	0.0	1.4	1.4	0.3	0.0	0.0	0.4	0.0	0.3
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	23.6	8.5	8.4	20.9	7.6	7.7	13.8	0.0	0.0	14.1	0.0	13.8
LnGrp LOS	C	A	A	C	A	A	B	A	A	B	A	B
Approach Vol, veh/h		1120			789			37			112	
Approach Delay, s/veh		9.1			7.7			13.8			14.0	
Approach LOS		A			A			B			B	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	4.6	22.7		10.2	5.8	21.4		10.2				
Change Period (Y+Rc), s	4.5	5.0		5.0	4.5	5.0		5.0				
Max Green Setting (Gmax), s	10.5	50.0		26.0	10.5	50.0		26.0				
Max Q Clear Time (g_c+I1), s	2.1	12.1		2.7	3.1	8.4		3.3				
Green Ext Time (p_c), s	0.0	5.5		0.1	0.0	3.5		0.3				

Intersection Summary

HCM 6th Ctrl Delay	8.9
HCM 6th LOS	A

HCM 6th Signalized Intersection Summary
 102: 28th St & OR 126

01/23/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗			↕		↖	↗	
Traffic Volume (veh/h)	103	1001	11	10	638	323	34	36	37	307	225	82
Future Volume (veh/h)	103	1001	11	10	638	323	34	36	37	307	225	82
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		0.99	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	1750	1709	1709	1477	1723	1723	1518	1518	1518	1750	1450	1450
Adj Flow Rate, veh/h	110	1065	0	11	679	344	36	38	39	327	239	87
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, %	0	3	3	20	2	2	17	17	17	0	22	22
Cap, veh/h	151	1441		25	776	393	49	51	53	451	275	100
Arrive On Green	0.09	0.44	0.00	0.02	0.37	0.37	0.10	0.11	0.10	0.27	0.27	0.27
Sat Flow, veh/h	1667	3333	0	1407	2091	1059	449	474	486	1667	1014	369
Grp Volume(v), veh/h	110	1065	0	11	531	492	113	0	0	327	0	326
Grp Sat Flow(s),veh/h/ln	1667	1624	0	1407	1637	1513	1408	0	0	1667	0	1383
Q Serve(g_s), s	6.4	27.2	0.0	0.8	30.4	30.4	7.8	0.0	0.0	17.9	0.0	22.6
Cycle Q Clear(g_c), s	6.4	27.2	0.0	0.8	30.4	30.4	7.8	0.0	0.0	17.9	0.0	22.6
Prop In Lane	1.00		0.00	1.00		0.70	0.32		0.35	1.00		0.27
Lane Grp Cap(c), veh/h	151	1441		25	607	561	152	0	0	451	0	375
V/C Ratio(X)	0.73	0.74		0.44	0.88	0.88	0.74	0.00	0.00	0.72	0.00	0.87
Avail Cap(c_a), veh/h	183	1441		154	669	618	295	0	0	515	0	427
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(l)	1.00	1.00	0.00	1.00	1.00	1.00	1.00	0.00	0.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	44.4	23.1	0.0	48.8	29.4	29.4	43.7	0.0	0.0	33.2	0.0	34.9
Incr Delay (d2), s/veh	11.1	2.1	0.0	11.5	11.7	12.5	9.7	0.0	0.0	4.5	0.0	16.1
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	3.1	10.2	0.0	0.3	13.3	12.5	3.1	0.0	0.0	7.6	0.0	9.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	55.5	25.2	0.0	60.3	41.1	41.9	53.4	0.0	0.0	37.6	0.0	51.0
LnGrp LOS	E	C		E	D	D	D	A	A	D	A	D
Approach Vol, veh/h		1175	A		1034			113				653
Approach Delay, s/veh		28.0			41.7			53.4				44.3
Approach LOS		C			D			D				D
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	5.8	48.5		31.2	13.1	41.2		14.8				
Change Period (Y+Rc), s	5.0	5.0		5.0	5.0	5.0		5.0				
Max Green Setting (Gmax), s	10.0	40.0		30.0	10.0	40.0		20.0				
Max Q Clear Time (g_c+I1), s	2.8	29.2		24.6	8.4	32.4		9.8				
Green Ext Time (p_c), s	0.0	5.3		1.6	0.0	3.9		0.5				

Intersection Summary

HCM 6th Ctrl Delay	37.3
HCM 6th LOS	D

Notes

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

Intersection						
Int Delay, s/veh	1.5					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↑↑	↑↑		↘	↘
Traffic Vol, veh/h	84	1479	881	49	47	87
Future Vol, veh/h	84	1479	881	49	47	87
Conflicting Peds, #/hr	12	0	0	12	2	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	80	-	-	-	150	0
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	2	2	2	0	0	0
Mvmt Flow	87	1525	908	51	48	90

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	971	0	-	0	1885 492
Stage 1	-	-	-	-	946 -
Stage 2	-	-	-	-	939 -
Critical Hdwy	4.14	-	-	-	6.8 6.9
Critical Hdwy Stg 1	-	-	-	-	5.8 -
Critical Hdwy Stg 2	-	-	-	-	5.8 -
Follow-up Hdwy	2.22	-	-	-	3.5 3.3
Pot Cap-1 Maneuver	706	-	-	-	64 528
Stage 1	-	-	-	-	343 -
Stage 2	-	-	-	-	346 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	699	-	-	-	55 523
Mov Cap-2 Maneuver	-	-	-	-	150 -
Stage 1	-	-	-	-	297 -
Stage 2	-	-	-	-	343 -

Approach	EB	WB	SB
HCM Control Delay, s	0.6	0	22.7
HCM LOS			C

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1	SBLn2
Capacity (veh/h)	699	-	-	-	150	523
HCM Lane V/C Ratio	0.124	-	-	-	0.323	0.171
HCM Control Delay (s)	10.9	-	-	-	40.1	13.3
HCM Lane LOS	B	-	-	-	E	B
HCM 95th %tile Q(veh)	0.4	-	-	-	1.3	0.6

HCM 6th Signalized Intersection Summary
 104: S 32nd St/32nd St & OR 126

01/23/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations												
Traffic Volume (veh/h)	14	947	577	90	607	12	167	115	52	15	7	42
Future Volume (veh/h)	14	947	577	90	607	12	167	115	52	15	7	42
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		0.99	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	1750	1736	1750	1654	1695	1695	1736	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	15	997	607	95	639	13	176	121	55	16	7	44
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, %	0	1	0	7	4	4	1	0	0	0	0	0
Cap, veh/h	28	1635	726	127	1806	37	260	179	81	114	14	87
Arrive On Green	0.02	0.50	0.50	0.08	0.56	0.55	0.16	0.16	0.15	0.07	0.07	0.06
Sat Flow, veh/h	1667	3299	1465	1576	3228	66	1654	1135	516	1667	203	1279
Grp Volume(v), veh/h	15	997	607	95	319	333	176	0	176	16	0	51
Grp Sat Flow(s),veh/h/ln	1667	1650	1465	1576	1611	1683	1654	0	1651	1667	0	1482
Q Serve(g_s), s	0.7	17.7	28.8	4.8	8.8	8.8	8.1	0.0	8.1	0.7	0.0	2.7
Cycle Q Clear(g_c), s	0.7	17.7	28.8	4.8	8.8	8.8	8.1	0.0	8.1	0.7	0.0	2.7
Prop In Lane	1.00		1.00	1.00		0.04	1.00		0.31	1.00		0.86
Lane Grp Cap(c), veh/h	28	1635	726	127	901	942	260	0	260	114	0	101
V/C Ratio(X)	0.54	0.61	0.84	0.75	0.35	0.35	0.68	0.00	0.68	0.14	0.00	0.50
Avail Cap(c_a), veh/h	227	2082	924	214	1016	1062	644	0	643	629	0	559
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	0.00	1.00	1.00	0.00	1.00
Uniform Delay (d), s/veh	39.4	14.7	17.6	36.3	9.8	9.8	32.1	0.0	32.2	35.4	0.0	36.5
Incr Delay (d2), s/veh	11.3	0.4	5.4	6.4	0.2	0.2	2.3	0.0	2.3	0.4	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	0.4	6.0	9.6	2.0	2.8	2.9	3.3	0.0	3.3	0.3	0.0	1.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	50.7	15.1	23.0	42.7	10.0	10.0	34.4	0.0	34.5	35.8	0.0	39.4
LnGrp LOS	D	B	C	D	B	B	C	A	C	D	A	D
Approach Vol, veh/h		1619			747			352				67
Approach Delay, s/veh		18.4			14.2			34.4				38.6
Approach LOS		B			B			C				D
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	10.5	44.1		16.7	5.4	49.2		9.5				
Change Period (Y+Rc), s	4.5	4.8		4.5	4.5	4.8		4.5				
Max Green Setting (Gmax), s	10.5	50.2		31.0	10.5	50.2		30.0				
Max Q Clear Time (g_c+I1), s	6.8	30.8		10.1	2.7	10.8		4.7				
Green Ext Time (p_c), s	0.1	8.4		1.0	0.0	2.7		0.2				
Intersection Summary												
HCM 6th Ctrl Delay				19.8								
HCM 6th LOS				B								

Intersection												
Int Delay, s/veh	1.4											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↵	↕		↵	↕			↕			↕	
Traffic Vol, veh/h	24	974	17	19	672	27	13	1	13	20	1	14
Future Vol, veh/h	24	974	17	19	672	27	13	1	13	20	1	14
Conflicting Peds, #/hr	6	0	5	5	0	6	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	100	-	-	100	-	-	-	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	97	97	97	97	97	97	97	97	97	97	97	97
Heavy Vehicles, %	0	2	0	5	4	0	0	0	0	0	0	0
Mvmt Flow	25	1004	18	20	693	28	13	1	13	21	1	14

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	727	0	0	1027	0	0	1455	1835	516	1306	1830	367
Stage 1	-	-	-	-	-	-	1068	1068	-	753	753	-
Stage 2	-	-	-	-	-	-	387	767	-	553	1077	-
Critical Hdwy	4.1	-	-	4.2	-	-	7.5	6.5	6.9	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.5	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.25	-	-	3.5	4	3.3	3.5	4	3.3
Pot Cap-1 Maneuver	886	-	-	654	-	-	93	77	509	120	77	636
Stage 1	-	-	-	-	-	-	240	301	-	372	420	-
Stage 2	-	-	-	-	-	-	614	414	-	490	298	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	882	-	-	651	-	-	86	72	507	110	72	633
Mov Cap-2 Maneuver	-	-	-	-	-	-	86	72	-	110	72	-
Stage 1	-	-	-	-	-	-	232	291	-	360	405	-
Stage 2	-	-	-	-	-	-	580	399	-	462	288	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			0.3			36.4			33.7		
HCM LOS							E			D		

Minor Lane/Major Mvmt	NBLn1	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	142	882	-	-	651	-	-	161
HCM Lane V/C Ratio	0.196	0.028	-	-	0.03	-	-	0.224
HCM Control Delay (s)	36.4	9.2	-	-	10.7	-	-	33.7
HCM Lane LOS	E	A	-	-	B	-	-	D
HCM 95th %tile Q(veh)	0.7	0.1	-	-	0.1	-	-	0.8

Intersection

Int Delay, s/veh 0.4

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations	↘	↑↑	↑↑		↘	
Traffic Vol, veh/h	14	1008	680	5	12	30
Future Vol, veh/h	14	1008	680	5	12	30
Conflicting Peds, #/hr	10	0	0	10	1	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	97	97	97	97	97	97
Heavy Vehicles, %	7	1	3	0	0	3
Mvmt Flow	14	1039	701	5	12	31

Major/Minor

	Major1	Major2	Minor2		
Conflicting Flow All	716	0	-	0	1263 363
Stage 1	-	-	-	-	714 -
Stage 2	-	-	-	-	549 -
Critical Hdwy	4.24	-	-	-	6.8 6.96
Critical Hdwy Stg 1	-	-	-	-	5.8 -
Critical Hdwy Stg 2	-	-	-	-	5.8 -
Follow-up Hdwy	2.27	-	-	-	3.5 3.33
Pot Cap-1 Maneuver	848	-	-	-	164 631
Stage 1	-	-	-	-	452 -
Stage 2	-	-	-	-	548 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	841	-	-	-	159 626
Mov Cap-2 Maneuver	-	-	-	-	291 -
Stage 1	-	-	-	-	441 -
Stage 2	-	-	-	-	544 -

Approach

	EB	WB	SB
HCM Control Delay, s	0.1	0	13.4
HCM LOS			B

Minor Lane/Major Mvmt

	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	841	-	-	-	471
HCM Lane V/C Ratio	0.017	-	-	-	0.092
HCM Control Delay (s)	9.4	-	-	-	13.4
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.3

Intersection

Int Delay, s/veh 0.3

Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	15	938	696	19	7	26
Future Vol, veh/h	15	938	696	19	7	26
Conflicting Peds, #/hr	0	0	0	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	2	2	2	2	14	2
Mvmt Flow	16	998	740	20	7	28

Major/Minor

	Major1	Major2	Minor2		
Conflicting Flow All	760	0	-	0	1281 380
Stage 1	-	-	-	-	750 -
Stage 2	-	-	-	-	531 -
Critical Hdwy	4.14	-	-	-	7.08 6.94
Critical Hdwy Stg 1	-	-	-	-	6.08 -
Critical Hdwy Stg 2	-	-	-	-	6.08 -
Follow-up Hdwy	2.22	-	-	-	3.64 3.32
Pot Cap-1 Maneuver	848	-	-	-	142 618
Stage 1	-	-	-	-	398 -
Stage 2	-	-	-	-	521 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	848	-	-	-	139 618
Mov Cap-2 Maneuver	-	-	-	-	263 -
Stage 1	-	-	-	-	390 -
Stage 2	-	-	-	-	521 -

Approach

	EB	WB	SB
HCM Control Delay, s	0.1	0	13.1
HCM LOS			B

Minor Lane/Major Mvmt

	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	848	-	-	-	480
HCM Lane V/C Ratio	0.019	-	-	-	0.073
HCM Control Delay (s)	9.3	-	-	-	13.1
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.2

Intersection						
Int Delay, s/veh	1.2					
Movement	EBT	EBR	WBL	WBT	NBL	NBR
Lane Configurations	↑↑		↖	↑↑	↖	↖
Traffic Vol, veh/h	921	44	64	667	27	62
Future Vol, veh/h	921	44	64	667	27	62
Conflicting Peds, #/hr	0	11	11	0	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	-	-	100	-	75	0
Veh in Median Storage, #	0	-	-	0	0	-
Grade, %	0	-	-	0	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	2	0	1	3	0	0
Mvmt Flow	940	45	65	681	28	63

Major/Minor	Major1	Major2	Minor1		
Conflicting Flow All	0	0	996	0	1445 504
Stage 1	-	-	-	-	974 -
Stage 2	-	-	-	-	471 -
Critical Hdwy	-	-	4.12	-	6.8 6.9
Critical Hdwy Stg 1	-	-	-	-	5.8 -
Critical Hdwy Stg 2	-	-	-	-	5.8 -
Follow-up Hdwy	-	-	2.21	-	3.5 3.3
Pot Cap-1 Maneuver	-	-	696	-	125 518
Stage 1	-	-	-	-	331 -
Stage 2	-	-	-	-	600 -
Platoon blocked, %	-	-	-	-	-
Mov Cap-1 Maneuver	-	-	690	-	112 513
Mov Cap-2 Maneuver	-	-	-	-	220 -
Stage 1	-	-	-	-	297 -
Stage 2	-	-	-	-	600 -

Approach	EB	WB	NB
HCM Control Delay, s	0	0.9	16.2
HCM LOS			C

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBT	EBR	WBL	WBT
Capacity (veh/h)	220	513	-	-	690	-
HCM Lane V/C Ratio	0.125	0.123	-	-	0.095	-
HCM Control Delay (s)	23.7	13	-	-	10.8	-
HCM Lane LOS	C	B	-	-	B	-
HCM 95th %tile Q(veh)	0.4	0.4	-	-	0.3	-

HCM 6th Signalized Intersection Summary

109: 42nd St & OR 126

01/23/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↗	↗↘		↗	↗↘		↗	↘		↗	↘	↗
Traffic Volume (veh/h)	131	613	154	93	440	206	128	265	87	312	439	201
Future Volume (veh/h)	131	613	154	93	440	206	128	265	87	312	439	201
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		0.98	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	1750	1723	1723	1736	1709	1709	1723	1723	1723	1723	1736	1695
Adj Flow Rate, veh/h	134	626	157	95	449	210	131	270	89	318	448	205
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, %	0	2	2	1	3	3	2	2	2	2	1	4
Cap, veh/h	155	744	186	110	559	259	152	317	105	348	653	652
Arrive On Green	0.09	0.29	0.28	0.07	0.26	0.25	0.09	0.26	0.25	0.21	0.38	0.36
Sat Flow, veh/h	1667	2586	647	1654	2144	994	1641	1234	407	1641	1736	1420
Grp Volume(v), veh/h	134	396	387	95	339	320	131	0	359	318	448	205
Grp Sat Flow(s),veh/h/ln	1667	1637	1596	1654	1624	1514	1641	0	1641	1641	1736	1420
Q Serve(g_s), s	7.2	20.5	20.6	5.1	17.6	17.9	7.1	0.0	18.8	17.1	19.6	8.3
Cycle Q Clear(g_c), s	7.2	20.5	20.6	5.1	17.6	17.9	7.1	0.0	18.8	17.1	19.6	8.3
Prop In Lane	1.00		0.41	1.00		0.66	1.00		0.25	1.00		1.00
Lane Grp Cap(c), veh/h	155	471	459	110	424	395	152	0	422	348	653	652
V/C Ratio(X)	0.86	0.84	0.84	0.86	0.80	0.81	0.86	0.00	0.85	0.91	0.69	0.31
Avail Cap(c_a), veh/h	221	652	636	165	593	553	254	0	581	509	884	841
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	0.00	1.00	1.00	1.00	1.00
Uniform Delay (d), s/veh	40.4	30.2	30.5	41.8	31.2	31.6	40.4	0.0	32.0	34.8	23.7	15.5
Incr Delay (d2), s/veh	15.9	6.3	6.6	17.8	4.5	5.3	7.1	0.0	6.6	12.9	0.6	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	3.5	8.5	8.4	2.6	7.1	6.9	3.1	0.0	8.0	7.9	7.8	2.6
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	56.3	36.5	37.1	59.5	35.7	36.9	47.5	0.0	38.6	47.7	24.3	15.6
LnGrp LOS	E	D	D	E	D	D	D	A	D	D	C	B
Approach Vol, veh/h		917			754			490				971
Approach Delay, s/veh		39.7			39.2			41.0				30.1
Approach LOS		D			D			D				C
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	10.0	30.0	23.1	27.2	12.4	27.6	12.4	38.0				
Change Period (Y+Rc), s	3.5	5.0	3.5	4.5	3.5	5.0	3.5	4.5				
Max Green Setting (Gmax), s	9.5	35.0	28.5	31.5	12.5	32.0	14.5	45.5				
Max Q Clear Time (g_c+I1), s	7.1	22.6	19.1	20.8	9.2	19.9	9.1	21.6				
Green Ext Time (p_c), s	0.0	2.2	0.5	0.7	0.1	1.8	0.1	1.6				

Intersection Summary

HCM 6th Ctrl Delay	36.8
HCM 6th LOS	D

Notes

User approved changes to right turn type.

Intersection												
Int Delay, s/veh	3											
Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↖↗		↖	↖↗		↖	↗			↔	
Traffic Vol, veh/h	26	928	62	14	591	3	35	3	18	4	11	46
Future Vol, veh/h	26	928	62	14	591	3	35	3	18	4	11	46
Conflicting Peds, #/hr	5	0	4	4	0	5	0	0	1	1	0	0
Sign Control	Free	Free	Free	Free	Free	Free	Stop	Stop	Stop	Stop	Stop	Stop
RT Channelized	-	-	None	-	-	None	-	-	None	-	-	None
Storage Length	150	-	-	150	-	-	150	-	-	-	-	-
Veh in Median Storage, #	-	0	-	-	0	-	-	0	-	-	0	-
Grade, %	-	0	-	-	0	-	-	0	-	-	0	-
Peak Hour Factor	95	95	95	95	95	95	95	95	95	95	95	95
Heavy Vehicles, %	0	2	2	0	2	0	3	0	6	0	0	0
Mvmt Flow	27	977	65	15	622	3	37	3	19	4	12	48

Major/Minor	Major1			Major2			Minor1			Minor2		
Conflicting Flow All	630	0	0	1046	0	0	1415	1728	526	1204	1759	318
Stage 1	-	-	-	-	-	-	1068	1068	-	659	659	-
Stage 2	-	-	-	-	-	-	347	660	-	545	1100	-
Critical Hdwy	4.1	-	-	4.1	-	-	7.56	6.5	7.02	7.5	6.5	6.9
Critical Hdwy Stg 1	-	-	-	-	-	-	6.56	5.5	-	6.5	5.5	-
Critical Hdwy Stg 2	-	-	-	-	-	-	6.56	5.5	-	6.5	5.5	-
Follow-up Hdwy	2.2	-	-	2.2	-	-	3.53	4	3.36	3.5	4	3.3
Pot Cap-1 Maneuver	962	-	-	673	-	-	97	89	486	142	86	684
Stage 1	-	-	-	-	-	-	235	301	-	424	464	-
Stage 2	-	-	-	-	-	-	639	463	-	495	290	-
Platoon blocked, %	-	-	-	-	-	-	-	-	-	-	-	-
Mov Cap-1 Maneuver	958	-	-	671	-	-	77	84	484	127	81	681
Mov Cap-2 Maneuver	-	-	-	-	-	-	77	84	-	127	81	-
Stage 1	-	-	-	-	-	-	228	292	-	410	452	-
Stage 2	-	-	-	-	-	-	565	451	-	457	281	-

Approach	EB			WB			NB			SB		
HCM Control Delay, s	0.2			0.2			62.4			23.3		
HCM LOS							F			C		

Minor Lane/Major Mvmt	NBLn1	NBLn2	EBL	EBT	EBR	WBL	WBT	WBR	SBLn1
Capacity (veh/h)	77	288	958	-	-	671	-	-	260
HCM Lane V/C Ratio	0.478	0.077	0.029	-	-	0.022	-	-	0.247
HCM Control Delay (s)	88.8	18.5	8.9	-	-	10.5	-	-	23.3
HCM Lane LOS	F	C	A	-	-	B	-	-	C
HCM 95th %tile Q(veh)	2	0.2	0.1	-	-	0.1	-	-	0.9

Intersection						
Int Delay, s/veh	0.8					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	43	827	501	26	16	48
Future Vol, veh/h	43	827	501	26	16	48
Conflicting Peds, #/hr	9	0	0	9	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	25	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	94	94	94	94	94	94
Heavy Vehicles, %	0	1	2	3	0	0
Mvmt Flow	46	880	533	28	17	51

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	570	0	-	0	1088 290
Stage 1	-	-	-	-	556 -
Stage 2	-	-	-	-	532 -
Critical Hdwy	4.1	-	-	-	6.8 6.9
Critical Hdwy Stg 1	-	-	-	-	5.8 -
Critical Hdwy Stg 2	-	-	-	-	5.8 -
Follow-up Hdwy	2.2	-	-	-	3.5 3.3
Pot Cap-1 Maneuver	1013	-	-	-	213 713
Stage 1	-	-	-	-	544 -
Stage 2	-	-	-	-	559 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	1005	-	-	-	200 708
Mov Cap-2 Maneuver	-	-	-	-	325 -
Stage 1	-	-	-	-	515 -
Stage 2	-	-	-	-	555 -

Approach	EB	WB	SB
HCM Control Delay, s	0.4	0	12.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	1005	-	-	-	547
HCM Lane V/C Ratio	0.046	-	-	-	0.124
HCM Control Delay (s)	8.8	-	-	-	12.5
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.1	-	-	-	0.4

HCM 6th Signalized Intersection Summary

112: 54th St & OR 126

01/23/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗			↕			↕	
Traffic Volume (veh/h)	30	787	19	11	482	65	28	5	15	54	7	29
Future Volume (veh/h)	30	787	19	11	482	65	28	5	15	54	7	29
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	0.99		0.99	0.99		0.99
Parking Bus, Adj	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Work Zone On Approach		No			No			No			No	
Adj Sat Flow, veh/h/ln	1750	1750	1750	1750	1709	1709	1750	1750	1750	1750	1750	1750
Adj Flow Rate, veh/h	34	884	21	12	542	73	31	6	17	61	8	33
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, %	0	0	0	0	3	3	0	0	0	0	0	0
Cap, veh/h	49	1964	47	338	2211	297	122	29	47	131	21	50
Arrive On Green	0.03	0.59	0.58	0.41	1.00	1.00	0.10	0.10	0.10	0.10	0.10	0.10
Sat Flow, veh/h	1667	3319	79	1667	2874	386	733	284	467	821	208	492
Grp Volume(v), veh/h	34	443	462	12	305	310	54	0	0	102	0	0
Grp Sat Flow(s),veh/h/ln	1667	1663	1735	1667	1624	1637	1484	0	0	1521	0	0
Q Serve(g_s), s	2.4	17.8	17.8	0.5	0.0	0.0	0.0	0.0	0.0	3.6	0.0	0.0
Cycle Q Clear(g_c), s	2.4	17.8	17.8	0.5	0.0	0.0	3.9	0.0	0.0	7.6	0.0	0.0
Prop In Lane	1.00		0.05	1.00		0.24	0.57		0.31	0.60		0.32
Lane Grp Cap(c), veh/h	49	984	1027	338	1249	1259	192	0	0	196	0	0
V/C Ratio(X)	0.70	0.45	0.45	0.04	0.24	0.25	0.28	0.00	0.00	0.52	0.00	0.00
Avail Cap(c_a), veh/h	292	984	1027	338	1249	1259	357	0	0	362	0	0
HCM Platoon Ratio	1.00	1.00	1.00	2.00	2.00	2.00	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	1.00	1.00	1.00	0.93	0.93	0.93	1.00	0.00	0.00	1.00	0.00	0.00
Uniform Delay (d), s/veh	57.7	13.6	13.7	28.6	0.0	0.0	50.4	0.0	0.0	51.9	0.0	0.0
Incr Delay (d2), s/veh	6.4	1.5	1.4	0.0	0.4	0.4	0.3	0.0	0.0	0.8	0.0	0.0
Initial Q Delay(d3),s/veh	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
%ile BackOfQ(50%),veh/ln	1.1	6.7	7.0	0.2	0.2	0.2	1.5	0.0	0.0	3.0	0.0	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	64.1	15.1	15.1	28.6	0.4	0.4	50.7	0.0	0.0	52.7	0.0	0.0
LnGrp LOS	E	B	B	C	A	A	D	A	A	D	A	A
Approach Vol, veh/h		939			627			54			102	
Approach Delay, s/veh		16.9			1.0			50.7			52.7	
Approach LOS		B			A			D			D	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	28.8	75.0		16.2	7.5	96.3		16.2				
Change Period (Y+Rc), s	5.0	* 5		4.5	4.5	5.0		4.5				
Max Green Setting (Gmax), s	10.5	* 70		25.5	20.5	60.0		25.5				
Max Q Clear Time (g_c+I1), s	2.5	19.8		9.6	4.4	2.0		5.9				
Green Ext Time (p_c), s	0.0	4.1		0.2	0.0	2.6		0.1				

Intersection Summary

HCM 6th Ctrl Delay	14.3
HCM 6th LOS	B

Notes

User approved pedestrian interval to be less than phase max green.

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

HCM 6th Signalized Intersection Summary

113: Bob Straub & OR 126

01/23/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗	↘	↖	↗	↘	↖	↗	↘	↖	↗	↘
Traffic Volume (veh/h)	94	657	137	53	373	502	126	226	34	1006	374	128
Future Volume (veh/h)	94	657	137	53	373	502	126	226	34	1006	374	128
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		1.00	1.00		0.96	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	1750	1668	1736	1573	1736	1695	1668	1736	1736	1736	1736	1736
Adj Flow Rate, veh/h	101	706	147	57	401	0	135	243	37	1082	402	0
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, %	0	6	1	13	1	4	6	1	1	1	1	1
Cap, veh/h	139	1004	641	50	852		191	343	51	1096	593	
Arrive On Green	0.17	0.63	0.63	0.01	0.09	0.00	0.12	0.12	0.11	0.34	0.34	0.00
Sat Flow, veh/h	1667	3169	1466	1498	3299	1437	1589	2859	428	3208	1736	1471
Grp Volume(v), veh/h	101	706	147	57	401	0	135	138	142	1082	402	0
Grp Sat Flow(s),veh/h/ln	1667	1585	1466	1498	1650	1437	1589	1650	1637	1604	1736	1471
Q Serve(g_s), s	6.9	17.7	4.6	4.0	13.9	0.0	9.8	9.7	10.0	40.2	23.8	0.0
Cycle Q Clear(g_c), s	6.9	17.7	4.6	4.0	13.9	0.0	9.8	9.7	10.0	40.2	23.8	0.0
Prop In Lane	1.00		1.00	1.00		1.00	1.00		0.26	1.00		1.00
Lane Grp Cap(c), veh/h	139	1004	641	50	852		191	198	196	1096	593	
V/C Ratio(X)	0.73	0.70	0.23	1.14	0.47		0.71	0.70	0.72	0.99	0.68	
Avail Cap(c_a), veh/h	153	1004	641	50	852		278	289	287	1096	593	
HCM Platoon Ratio	2.00	2.00	2.00	0.33	0.33	0.33	1.00	1.00	1.00	1.00	1.00	1.00
Upstream Filter(I)	0.94	0.94	0.94	1.00	1.00	0.00	1.00	1.00	1.00	1.00	1.00	0.00
Uniform Delay (d), s/veh	48.7	18.3	10.9	59.3	47.1	0.0	50.8	50.7	51.1	39.2	33.8	0.0
Incr Delay (d2), s/veh	12.7	3.9	0.8	171.7	1.9	0.0	3.6	3.3	3.7	24.0	3.1	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	3.2	4.8	1.8	3.9	6.4	0.0	4.0	4.1	4.2	18.3	9.9	0.0
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	61.4	22.2	11.7	231.0	48.9	0.0	54.4	54.0	54.7	63.2	36.9	0.0
LnGrp LOS	E	C	B	F	D		D	D	D	E	D	
Approach Vol, veh/h		954			458	A		415			1484	A
Approach Delay, s/veh		24.7			71.6			54.4			56.1	
Approach LOS		C			E			D			E	
Timer - Assigned Phs	1	2		4	5	6		8				
Phs Duration (G+Y+Rc), s	8.0	42.0		45.0	15.0	35.0		18.4				
Change Period (Y+Rc), s	4.5	5.5		6.0	5.5	* 5.5		5.5				
Max Green Setting (Gmax), s	3.5	36.5		39.0	10.5	* 30		19.5				
Max Q Clear Time (g_c+I1), s	6.0	19.7		42.2	8.9	15.9		12.0				
Green Ext Time (p_c), s	0.0	4.0		0.0	0.0	1.7		0.9				

Intersection Summary

HCM 6th Ctrl Delay	49.0
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

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

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

HCM 6th Signalized Intersection Summary

114: 58th St & OR 126

01/23/2019



Movement	EBL	EBT	EBR	WBL	WBT	WBR	NBL	NBT	NBR	SBL	SBT	SBR
Lane Configurations	↖	↗		↖	↗		↖	↗	↗	↖	↗	↖
Traffic Volume (veh/h)	168	1071	52	99	647	28	136	157	193	108	137	96
Future Volume (veh/h)	168	1071	52	99	647	28	136	157	193	108	137	96
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		0.99	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	1750	1709	1709	1750	1695	1695	1709	1736	1709	1723	1736	1736
Adj Flow Rate, veh/h	175	1116	54	103	674	29	142	164	201	112	143	100
Peak Hour Factor	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96	0.96
Percent Heavy Veh, %	0	3	3	0	4	4	3	1	3	2	1	1
Cap, veh/h	209	1376	67	134	1206	52	149	324	383	143	172	120
Arrive On Green	0.13	0.44	0.42	0.08	0.38	0.37	0.09	0.19	0.19	0.09	0.18	0.18
Sat Flow, veh/h	1667	3151	152	1667	3145	135	1628	1736	1430	1641	945	661
Grp Volume(v), veh/h	175	575	595	103	345	358	142	164	201	112	0	243
Grp Sat Flow(s),veh/h/ln	1667	1624	1680	1667	1611	1670	1628	1736	1430	1641	0	1607
Q Serve(g_s), s	12.3	37.1	37.1	7.3	20.2	20.2	10.4	10.2	14.4	8.0	0.0	17.5
Cycle Q Clear(g_c), s	12.3	37.1	37.1	7.3	20.2	20.2	10.4	10.2	14.4	8.0	0.0	17.5
Prop In Lane	1.00		0.09	1.00		0.08	1.00		1.00	1.00		0.41
Lane Grp Cap(c), veh/h	209	709	733	134	617	640	149	324	383	143	0	292
V/C Ratio(X)	0.84	0.81	0.81	0.77	0.56	0.56	0.95	0.51	0.52	0.79	0.00	0.83
Avail Cap(c_a), veh/h	292	709	733	292	617	640	149	324	383	219	0	348
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	0.00	1.00
Uniform Delay (d), s/veh	51.3	29.5	29.6	54.1	29.0	29.1	54.2	43.9	37.5	53.7	0.0	47.4
Incr Delay (d2), s/veh	13.8	9.8	9.5	8.8	3.6	3.5	59.1	1.3	1.3	9.9	0.0	13.7
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	5.9	15.9	16.4	3.4	8.3	8.6	6.7	4.5	5.2	3.7	0.0	8.1
Unsig. Movement Delay, s/veh												
LnGrp Delay(d),s/veh	65.1	39.3	39.1	62.8	32.7	32.6	113.3	45.1	38.8	63.5	0.0	61.1
LnGrp LOS	E	D	D	E	C	C	F	D	D	E	A	E
Approach Vol, veh/h		1345			806			507			355	
Approach Delay, s/veh		42.5			36.5			61.7			61.9	
Approach LOS		D			D			E			E	
Timer - Assigned Phs	1	2	3	4	5	6	7	8				
Phs Duration (G+Y+Rc), s	13.7	56.4	14.4	26.4	20.1	50.0	15.0	25.8				
Change Period (Y+Rc), s	4.5	5.5	4.5	4.5	5.5	* 5.5	4.5	4.5				
Max Green Setting (Gmax), s	20.5	44.5	15.5	20.5	20.5	* 45	10.5	25.5				
Max Q Clear Time (g_c+I1), s	9.3	39.1	10.0	16.4	14.3	22.2	12.4	19.5				
Green Ext Time (p_c), s	0.2	2.6	0.1	0.6	0.3	2.8	0.0	0.5				

Intersection Summary

HCM 6th Ctrl Delay	46.4
HCM 6th LOS	D

Notes

User approved pedestrian interval to be less than phase max green.

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

Intersection						
Int Delay, s/veh	0.6					
Movement	EBL	EBT	WBT	WBR	SBL	SBR
Lane Configurations						
Traffic Vol, veh/h	73	1227	724	4	1	42
Future Vol, veh/h	73	1227	724	4	1	42
Conflicting Peds, #/hr	6	0	0	6	0	0
Sign Control	Free	Free	Free	Free	Stop	Stop
RT Channelized	-	None	-	None	-	None
Storage Length	100	-	-	-	0	-
Veh in Median Storage, #	-	0	0	-	0	-
Grade, %	-	0	0	-	0	-
Peak Hour Factor	98	98	98	98	98	98
Heavy Vehicles, %	0	1	3	0	0	0
Mvmt Flow	74	1252	739	4	1	43

Major/Minor	Major1	Major2	Minor2		
Conflicting Flow All	749	0	-	0	1521 378
Stage 1	-	-	-	-	747 -
Stage 2	-	-	-	-	774 -
Critical Hdwy	4.1	-	-	-	6.8 6.9
Critical Hdwy Stg 1	-	-	-	-	5.8 -
Critical Hdwy Stg 2	-	-	-	-	5.8 -
Follow-up Hdwy	2.2	-	-	-	3.5 3.3
Pot Cap-1 Maneuver	869	-	-	-	111 625
Stage 1	-	-	-	-	434 -
Stage 2	-	-	-	-	421 -
Platoon blocked, %		-	-	-	
Mov Cap-1 Maneuver	865	-	-	-	100 622
Mov Cap-2 Maneuver	-	-	-	-	213 -
Stage 1	-	-	-	-	395 -
Stage 2	-	-	-	-	419 -

Approach	EB	WB	SB
HCM Control Delay, s	0.5	0	11.5
HCM LOS			B

Minor Lane/Major Mvmt	EBL	EBT	WBT	WBR	SBLn1
Capacity (veh/h)	865	-	-	-	595
HCM Lane V/C Ratio	0.086	-	-	-	0.074
HCM Control Delay (s)	9.6	-	-	-	11.5
HCM Lane LOS	A	-	-	-	B
HCM 95th %tile Q(veh)	0.3	-	-	-	0.2